

Drainage Study of
**University Congregational
Church**

Wichita, Kansas

CTS No. 093017-00

October 26, 2009

Prepared by:



Crafton Tull Sparks
architecture | engineering

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C.A. E-341 Expires 12/31/2010



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DRAINAGE LETTER

PROJECT OWNER AND DEVELOPER

University Congregational Church
9209 E 29th Street N
Wichita, KS 67226

PROJECT DESCRIPTION

The following is a drainage report for the parking lot modifications at the existing University Congregational Church in the city of Wichita, Kansas. The overall size of the subject property is approximately 3.65 acres. The property is located at 9209 E. 29th Street N, also known as Lot 1 of University Congregational Church Addition, in Section 5, T-27-S, R-2-E of the 6th Principal Meridian in Wichita, Sedgwick County, Kansas. More precisely, the site is located at 37°44'13"N, 97°13'49"W.

SITE CONDITIONS

The property is currently developed as an existing church and associated development. Land to the west, south, and east is residentially developed, with commercial uses to the north. Runoff from the site generally flows from the northeast to southwest of the property, to an existing detention pond in the southwest corner of the site. The existing pond discharges through two existing PVC pipes: one to the south and one to the west. A drainage plan was developed for the site when it was initially developed. Comparing the details in the drainage plan to the onsite conditions, there are discrepancies between the proposed and existing drainage facilities.

Soil Properties

The National Resources Conservation Service soil survey of Sedgwick County indicates two soil types on the referenced property: Goessel silty clay, 1 to 3 percent slopes (Hydrologic rating 'D') and Rosehill silty clay, 1 to 3 percent slopes (Hydrologic rating 'D').

FEMA Flood Plains

The Federal Emergency Management Agency (FEMA) provides flood maps that depict 100-yr and 500-yr flood plains. Review of the FEMA maps for this area shows the subject site to be outside of the 100-yr flood plain. The FEMA Flood Insurance Rate Map for reference is map Number 20173C0376E, 2/02/2007.

METHODOLOGY

The intent of the drainage design for the site is that the increase in runoff due to new development be attenuated by increasing the storage volume in the existing pond.

For the development of drainage and detention design for the subject property, storm water runoff values were determined using the NRCS method, with rainfall intensity values provided for Sedgwick County. Flow in the basin will be one basic area, as illustrated in the attached Drainage Maps.

Rainfall Data Source

Rainfall data for the site was obtained using values provided for Sedgwick County, Kansas. The NRCS storm distribution is Type II. Modeling was conducted using the 2, 5, 10, 25, 50, and 100 year frequency storm events.

Time of Concentration

For purposes of flow estimation, a Time of Concentration value was taken for the site as the City's minimum value of 15 minutes in both the pre- and post-developed condition.

Runoff Coefficient

A site runoff curve number (CN) was determined for each drainage area for use with the NRCS method by considering the soil type and usage. For example, pavement, which has very little pervious area, would be represented with a CN of 98, while an open field would be represented with a CN of 79.

In the pre-developed condition, a composite CN of 91 was used. This number was obtained by measuring the existing hardscape and building area as 2.18 acres (CN of 98), with the remaining 1.47 acres of the site modeled as open space in good condition (CN of 80).

In the post-developed condition, a composite CN of 92 was used. This number was obtained by measuring the existing hardscape and building area as 2.35 acres (CN of 98), with the remaining 1.30 acres of the site modeled as open space in good condition (CN of 80).

Stormwater Detention

PondPack version 10.0 was used to analyze the existing pond and outfall structures. After examination of the existing pond system, the pond was enlarged to offset the impact of construction on the site.

For the 100-year frequency storm event, the water surface elevation is estimated to reach an elevation of 1409.51'. This lowers the 100-year elevation by 0.09'. It can be seen in the table that discharge from the overall basin was decreased as a result of improvements made to the existing detention facility.

Stormwater Discharge Comparison

Storm event (year)	Pre developed flow (cfs)	Post developed flow (cfs)	Change in flow (cfs)
2	3.19	3.09	-0.10
5	3.45	3.40	-0.05
10	3.59	3.57	-0.02
25	3.75	3.73	-0.02
50	3.91	3.86	-0.05
100	4.03	3.96	-0.07

CONCLUSION

Based on the provided data, the proposed drainage system will pass the runoff from the 2, 5, 10, 25, 50, and 100-year storm events at a peak runoff rate that is less than that experienced in the current condition.

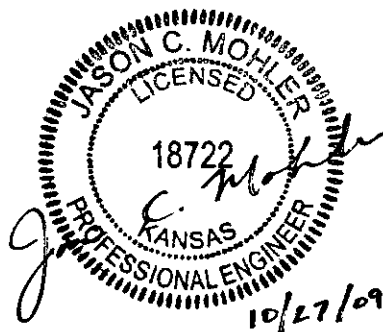
The design, analysis, and their applicability as presented herein is based on and limited by the weather data. This development, with recommended improvements and if constructed per the site development plans, is deemed not to increase existing endangerment to life or property in the surrounding area.

Sincerely,
Craffon, Tull, Sparks & Associates, Inc



Prepared by: Andrew Wilson, E.I.

Reviewed by: Jason Mohler, P.E.



EXISTING DRAINAGE MAP

POST DEVELOPED DRAINAGE MAP



DRAINAGE CALCULATIONS



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MASTER DESIGN STORM SUMMARY

Network Storm Collection: New Element

Return Event	Total Depth in	Rainfall Type	RNF ID
2	3.5000	Synthetic Curve	TypeII 24hr
5	4.5000	Synthetic Curve	TypeII 24hr
10	5.2500	Synthetic Curve	TypeII 24hr
25	6.1250	Synthetic Curve	TypeII 24hr
50	7.0000	Synthetic Curve	TypeII 24hr
100	7.7500	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	Return Type	Event	HYG Vol ac-ft	Trun	Qpeak hrs	Qpeak cfs	Max WSEL ft	Max Pond Storage ac-ft
EXISTING PONDIN	POND	2	.773		12.0500	10.90		
EXISTING PONDIN	POND	5	1.064		12.0500	14.75		
EXISTING PONDIN	POND	10	1.285		12.0500	17.63		
EXISTING PONDIN	POND	25	1.545		12.0500	20.96		
EXISTING PONDIN	POND	50	1.806		12.0500	24.28		
EXISTING PONDIN	POND	100	2.031		12.0500	27.11		
EXISTING PONDOUT	POND	2	.773		12.3000	3.19	1408.54	.225
EXISTING PONDOUT	POND	5	1.064		12.3500	3.45	1408.83	.343
EXISTING PONDOUT	POND	10	1.285		12.3500	3.59	1409.02	.437
EXISTING PONDOUT	POND	25	1.545		12.4000	3.75	1409.22	.550
EXISTING PONDOUT	POND	50	1.806		12.4500	3.91	1409.43	.667
EXISTING PONDOUT	POND	100	2.031		12.4500	4.03	1409.60	.769

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
EXISTING SITE	AREA	2	.773		12.0500	10.90		
EXISTING SITE	AREA	5	1.064		12.0500	14.75		
EXISTING SITE	AREA	10	1.285		12.0500	17.63		
EXISTING SITE	AREA	25	1.545		12.0500	20.96		
EXISTING SITE	AREA	50	1.806		12.0500	24.28		
EXISTING SITE	AREA	100	2.031		12.0500	27.11		
IMPROVED SITE	AREA	2	.802		12.0500	11.21		
IMPROVED SITE	AREA	5	1.096		12.0500	15.05		
IMPROVED SITE	AREA	10	1.318		12.0500	17.91		
IMPROVED SITE	AREA	25	1.579		12.0500	21.23		
IMPROVED SITE	AREA	50	1.842		12.0500	24.53		
IMPROVED SITE	AREA	100	2.067		12.0500	27.35		
*OUT NOW	JCT	2	.773		12.3000	3.19		
*OUT NOW	JCT	5	1.064		12.3500	3.45		
*OUT NOW	JCT	10	1.285		12.3500	3.59		
*OUT NOW	JCT	25	1.545		12.4000	3.75		
*OUT NOW	JCT	50	1.806		12.4500	3.91		
*OUT NOW	JCT	100	2.031		12.4500	4.03		
*OUT PROP	JCT	2	.802		12.3000	3.09		
*OUT PROP	JCT	5	1.096		12.3500	3.40		
*OUT PROP	JCT	10	1.318		12.4000	3.57		
*OUT PROP	JCT	25	1.579		12.4000	3.73		
*OUT PROP	JCT	50	1.842		12.4500	3.86		
*OUT PROP	JCT	100	2.067		12.4500	3.96		
PROPOSED PONDIN	POND	2	.802		12.0500	11.21		
PROPOSED PONDIN	POND	5	1.096		12.0500	15.05		
PROPOSED PONDIN	POND	10	1.318		12.0500	17.91		
PROPOSED PONDIN	POND	25	1.579		12.0500	21.23		
PROPOSED PONDIN	POND	50	1.842		12.0500	24.53		
PROPOSED PONDIN	POND	100	2.067		12.0500	27.35		

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
PROPOSED	PONDOUT	POND	2		12.3000	3.09	1408.43	.254
PROPOSED	PONDOUT	POND	5		12.3500	3.40	1408.78	.373
PROPOSED	PONDOUT	POND	10		12.4000	3.57	1408.99	.469
PROPOSED	PONDOUT	POND	25		12.4000	3.73	1409.19	.585
PROPOSED	PONDOUT	POND	50		12.4500	3.86	1409.37	.704
PROPOSED	PONDOUT	POND	100		12.4500	3.96	1409.51	.809

NETWORK SUMMARY -- NODES

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

DEFAULT Design Storm File, ID = New Element

Storm Tag Name = 2

Data Type, File, ID = Synthetic Storm TypeII 24hr

Storm Frequency = 2 yr

Total Rainfall Depth= 3.5000 in

Duration Multiplier = 1

Resulting Duration = 24.0000 hrs

Resulting Start Time= .0000 hrs Step= .1000 hrs End= 24.0000 hrs

Node ID	Type	HYG Vol ac-ft	Qpeak Trun. hrs	Qpeak cfs	Max WSEL ft
EXISTING PONDIN	POND	.773	12.0500	10.90	
EXISTING PONDOUT	POND	.773	12.3000	3.19	1408.54
EXISTING SITE	AREA	.773	12.0500	10.90	
IMPROVED SITE	AREA	.802	12.0500	11.21	
Outfall OUT NOW	JCT	.773	12.3000	3.19	
Outfall OUT PROP	JCT	.802	12.3000	3.09	
PROPOSED PONDIN	POND	.802	12.0500	11.21	
PROPOSED PONDOUT	POND	.802	12.3000	3.09	1408.43

NETWORK SUMMARY -- NODES

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

DEFAULT Design Storm File, ID = New Element

Storm Tag Name = 5

Data Type, File, ID = Synthetic Storm TypeII 24hr
Storm Frequency = 5 yr
Total Rainfall Depth= 4.5000 in
Duration Multiplier = 1
Resulting Duration = 24.0000 hrs
Resulting Start Time= .0000 hrs Step= .1000 hrs End= 24.0000 hrs

Table with 7 columns: Node ID, Type, HYG Vol ac-ft, Qpeak hrs, Qpeak cfs, Max WSEL ft. Rows include EXISTING PONDIN, EXISTING PONDOUT, EXISTING SITE, IMPROVED SITE, Outfall OUT NOW, Outfall OUT PROP, PROPOSED PONDIN, and PROPOSED PONDOUT.

NETWORK SUMMARY -- NODES

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

DEFAULT Design Storm File, ID = New Element

Storm Tag Name = 10

Data Type, File, ID = Synthetic Storm TypeII 24hr

Storm Frequency = 10 yr

Total Rainfall Depth= 5.2500 in

Duration Multiplier = 1

Resulting Duration = 24.0000 hrs

Resulting Start Time= .0000 hrs Step= .1000 hrs End= 24.0000 hrs

Node ID	Type	HYG Vol ac-ft	Qpeak Trun. hrs	Qpeak cfs	Max WSEL ft
EXISTING PONDIN	POND	1.285	12.0500	17.63	
EXISTING PONDOUT	POND	1.285	12.3500	3.59	1409.02
EXISTING SITE	AREA	1.285	12.0500	17.63	
IMPROVED SITE	AREA	1.318	12.0500	17.91	
Outfall OUT NOW	JCT	1.285	12.3500	3.59	
Outfall OUT PROP	JCT	1.318	12.4000	3.57	
PROPOSED PONDIN	POND	1.318	12.0500	17.91	
PROPOSED PONDOUT	POND	1.318	12.4000	3.57	1408.99

NETWORK SUMMARY -- NODES

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

DEFAULT Design Storm File, ID = New Element

Storm Tag Name = 25

Data Type, File, ID = Synthetic Storm TypeII 24hr
Storm Frequency = 25 yr
Total Rainfall Depth= 6.1250 in
Duration Multiplier = 1
Resulting Duration = 24.0000 hrs
Resulting Start Time= .0000 hrs Step= .1000 hrs End= 24.0000 hrs

Table with 7 columns: Node ID, Type, HYG Vol ac-ft, Qpeak Trun. hrs, Qpeak cfs, Max WSEL ft. Rows include EXISTING PONDIN, EXISTING PONDOUT, EXISTING SITE, IMPROVED SITE, Outfall OUT NOW, Outfall OUT PROP, PROPOSED PONDIN, and PROPOSED PONDOUT.

NETWORK SUMMARY -- NODES

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

DEFAULT Design Storm File, ID = New Element

Storm Tag Name = 50

Data Type, File, ID = Synthetic Storm TypeII 24hr

Storm Frequency = 50 yr

Total Rainfall Depth= 7.0000 in

Duration Multiplier = 1

Resulting Duration = 24.0000 hrs

Resulting Start Time= .0000 hrs Step= .1000 hrs End= 24.0000 hrs

Node ID	Type	HYG Vol ac-ft	Qpeak Trun. hrs	Qpeak cfs	Max WSEL ft
EXISTING PONDIN	POND	1.806	12.0500	24.28	
EXISTING PONDOUT	POND	1.806	12.4500	3.91	1409.43
EXISTING SITE	AREA	1.806	12.0500	24.28	
IMPROVED SITE	AREA	1.842	12.0500	24.53	
Outfall OUT NOW	JCT	1.806	12.4500	3.91	
Outfall OUT PROP	JCT	1.842	12.4500	3.86	
PROPOSED PONDIN	POND	1.842	12.0500	24.53	
PROPOSED PONDOUT	POND	1.842	12.4500	3.86	1409.37

NETWORK SUMMARY -- NODES

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

DEFAULT Design Storm File, ID = New Element

Storm Tag Name = 100

Data Type, File, ID = Synthetic Storm TypeII 24hr

Storm Frequency = 100 yr

Total Rainfall Depth= 7.7500 in

Duration Multiplier = 1

Resulting Duration = 24.0000 hrs

Resulting Start Time= .0000 hrs Step= .1000 hrs End= 24.0000 hrs

Node ID	Type	HYG Vol ac-ft	Qpeak Trun. hrs	Qpeak cfs	Max WSEL ft
EXISTING PONDIN	POND	2.031	12.0500	27.11	
EXISTING PONDOUT	POND	2.031	12.4500	4.03	1409.60
EXISTING SITE	AREA	2.031	12.0500	27.11	
IMPROVED SITE	AREA	2.067	12.0500	27.35	
Outfall OUT NOW	JCT	2.031	12.4500	4.03	
Outfall OUT PROP	JCT	2.067	12.4500	3.96	
PROPOSED PONDIN	POND	2.067	12.0500	27.35	
PROPOSED PONDOUT	POND	2.067	12.4500	3.96	1409.51

Type.... Network Calcs Sequence

Page 2.07

Name.... Watershed

Event: 100 yr

File.... C:\Documents and Settings\aw2758\Desktop\University church\pondpack\Existing pond

Storm... TypeII 24hr Tag: 100

NETWORK RUNOFF NODE SEQUENCE

Runoff Data		Apply to Node		Receiving Link	
SCS UH	EXISTING SITE	Subarea	EXISTING SITE	Add Hyd	EXISTING SITE
SCS UH	IMPROVED SITE	Subarea	IMPROVED SITE	Add Hyd	IMPROVED SITE

S/N:

Bentley PondPack (10.00.027.00)

11:15 AM

Bentley Systems, Inc.

10/26/2009

NETWORK ROUTING SEQUENCE

```

=====
Link Operation          UPstream Node          DNstream Node
=====
Add Hyd ADDLINK 20     Subarea IMPROVED SITE  Pond    PROPOSED PONDIN

POND ROUTE TOTAL OUTFLOW...
Total Pond Outflow     Pond    PROPOSED PONDIN  Outflow PROPOSED PONDOUT

SET POND ROUTING LINK TO TOTAL POND OUTFLOW...
Outlet ROUTE 20        Outflow PROPOSED PONDOUT  Jct    OUT PROP

Add Hyd ADDLINK 10     Subarea EXISTING SITE  Pond    EXISTING PONDIN

POND ROUTE TOTAL OUTFLOW...
Total Pond Outflow     Pond    EXISTING PONDIN  Outflow EXISTING PONDOUT

SET POND ROUTING LINK TO TOTAL POND OUTFLOW...
Outlet ROUTE 10        Outflow EXISTING PONDOUT  Jct    OUT NOW

```

Name.... New Element

File.... C:\Documents and Settings\aw2758\Desktop\University church\pondpack\Existing pond

Title... Project Date: 10/7/2009
Project Engineer: aw2758
Project Title: Watershed
Project Comments:

DESIGN STORMS SUMMARY

Design Storm File, ID = New Element

Storm Tag Name = 2

Data Type, File, ID = Synthetic Storm TypeII 24hr
Storm Frequency = 2 yr
Total Rainfall Depth= 3.5000 in
Duration Multiplier = 1
Resulting Duration = 24.0000 hrs
Resulting Start Time= .0000 hrs Step= .1000 hrs End= 24.0000 hrs

Storm Tag Name = 5

Data Type, File, ID = Synthetic Storm TypeII 24hr
Storm Frequency = 5 yr
Total Rainfall Depth= 4.5000 in
Duration Multiplier = 1
Resulting Duration = 24.0000 hrs
Resulting Start Time= .0000 hrs Step= .1000 hrs End= 24.0000 hrs

Storm Tag Name = 10

Data Type, File, ID = Synthetic Storm TypeII 24hr
Storm Frequency = 10 yr
Total Rainfall Depth= 5.2500 in
Duration Multiplier = 1
Resulting Duration = 24.0000 hrs
Resulting Start Time= .0000 hrs Step= .1000 hrs End= 24.0000 hrs

Storm Tag Name = 25

Data Type, File, ID = Synthetic Storm TypeII 24hr
Storm Frequency = 25 yr
Total Rainfall Depth= 6.1250 in
Duration Multiplier = 1
Resulting Duration = 24.0000 hrs
Resulting Start Time= .0000 hrs Step= .1000 hrs End= 24.0000 hrs

Storm Tag Name = 50

Data Type, File, ID = Synthetic Storm TypeII 24hr
Storm Frequency = 50 yr
Total Rainfall Depth= 7.0000 in
Duration Multiplier = 1
Resulting Duration = 24.0000 hrs
Resulting Start Time= .0000 hrs Step= .1000 hrs End= 24.0000 hrs

Type.... Design Storms

Page 3.02

Name.... New Element

File.... C:\Documents and Settings\aw2758\Desktop\University church\pondpack\Existing pond

Title... Project Date: 10/7/2009
Project Engineer: aw2758
Project Title: Watershed
Project Comments:

DESIGN STORMS SUMMARY

Design Storm File, ID = New Element

Storm Tag Name = 100

Data Type, File, ID = Synthetic Storm TypeII 24hr

Storm Frequency = 100 yr

Total Rainfall Depth= 7.7500 in

Duration Multiplier = 1

Resulting Duration = 24.0000 hrs

Resulting Start Time= .0000 hrs Step= .1000 hrs End= 24.0000 hrs

S/N:

Bentley PondPack (10.00.027.00)

11:15 AM

Bentley Systems, Inc.

10/26/2009

CUMULATIVE RAINFALL FRACTIONS

Output Time increment = .1000 hrs

Time on left represents time for first value in each row.

Time hrs	.000	.001	.002	.003	.004
.0000	.000	.001	.002	.003	.004
.5000	.005	.006	.007	.008	.009
1.0000	.011	.012	.013	.014	.015
1.5000	.016	.017	.018	.020	.021
2.0000	.022	.023	.024	.026	.027
2.5000	.028	.029	.031	.032	.033
3.0000	.035	.036	.037	.038	.040
3.5000	.041	.042	.044	.045	.047
4.0000	.048	.049	.051	.052	.054
4.5000	.055	.057	.058	.060	.061
5.0000	.063	.065	.066	.068	.070
5.5000	.071	.073	.075	.076	.078
6.0000	.080	.082	.084	.085	.087
6.5000	.089	.091	.093	.095	.097
7.0000	.099	.101	.103	.105	.107
7.5000	.109	.111	.113	.116	.118
8.0000	.120	.122	.125	.127	.130
8.5000	.132	.135	.138	.141	.144
9.0000	.147	.150	.153	.157	.160
9.5000	.163	.166	.170	.173	.177
10.0000	.181	.185	.189	.194	.199
10.5000	.204	.209	.215	.221	.228
11.0000	.235	.243	.251	.261	.271
11.5000	.283	.307	.354	.431	.568
12.0000	.663	.682	.699	.713	.725
12.5000	.735	.743	.751	.759	.766
13.0000	.772	.778	.784	.789	.794
13.5000	.799	.804	.808	.812	.816
14.0000	.820	.824	.827	.831	.834
14.5000	.838	.841	.844	.847	.850
15.0000	.854	.856	.859	.862	.865
15.5000	.868	.870	.873	.875	.878
16.0000	.880	.882	.885	.887	.889
16.5000	.891	.893	.895	.898	.900
17.0000	.902	.904	.906	.908	.910
17.5000	.912	.914	.915	.917	.919
18.0000	.921	.923	.925	.926	.928
18.5000	.930	.931	.933	.935	.936
19.0000	.938	.939	.941	.942	.944
19.5000	.945	.947	.948	.949	.951
20.0000	.952	.953	.955	.956	.957
20.5000	.958	.960	.961	.962	.964
21.0000	.965	.966	.967	.968	.970
21.5000	.971	.972	.973	.975	.976

CUMULATIVE RAINFALL FRACTIONS

Output Time increment = .1000 hrs

Time on left represents time for first value in each row.

22.0000	.977	.978	.979	.981	.982
22.5000	.983	.984	.985	.986	.988
23.0000	.989	.990	.991	.992	.993
23.5000	.994	.996	.997	.998	.999
24.0000	1.000				

CUMULATIVE RAINFALL FRACTIONS

Output Time increment = .1000 hrs

Time on left represents time for first value in each row.

Time hrs	.000	.001	.002	.003	.004
.0000	.000	.001	.002	.003	.004
.5000	.005	.006	.007	.008	.009
1.0000	.011	.012	.013	.014	.015
1.5000	.016	.017	.018	.020	.021
2.0000	.022	.023	.024	.026	.027
2.5000	.028	.029	.031	.032	.033
3.0000	.035	.036	.037	.038	.040
3.5000	.041	.042	.044	.045	.047
4.0000	.048	.049	.051	.052	.054
4.5000	.055	.057	.058	.060	.061
5.0000	.063	.065	.066	.068	.070
5.5000	.071	.073	.075	.076	.078
6.0000	.080	.082	.084	.085	.087
6.5000	.089	.091	.093	.095	.097
7.0000	.099	.101	.103	.105	.107
7.5000	.109	.111	.113	.116	.118
8.0000	.120	.122	.125	.127	.130
8.5000	.132	.135	.138	.141	.144
9.0000	.147	.150	.153	.157	.160
9.5000	.163	.166	.170	.173	.177
10.0000	.181	.185	.189	.194	.199
10.5000	.204	.209	.215	.221	.228
11.0000	.235	.243	.251	.261	.271
11.5000	.283	.307	.354	.431	.568
12.0000	.663	.682	.699	.713	.725
12.5000	.735	.743	.751	.759	.766
13.0000	.772	.778	.784	.789	.794
13.5000	.799	.804	.808	.812	.816
14.0000	.820	.824	.827	.831	.834
14.5000	.838	.841	.844	.847	.850
15.0000	.854	.856	.859	.862	.865
15.5000	.868	.870	.873	.875	.878
16.0000	.880	.882	.885	.887	.889
16.5000	.891	.893	.895	.898	.900
17.0000	.902	.904	.906	.908	.910
17.5000	.912	.914	.915	.917	.919
18.0000	.921	.923	.925	.926	.928
18.5000	.930	.931	.933	.935	.936
19.0000	.938	.939	.941	.942	.944
19.5000	.945	.947	.948	.949	.951
20.0000	.952	.953	.955	.956	.957
20.5000	.958	.960	.961	.962	.964
21.0000	.965	.966	.967	.968	.970
21.5000	.971	.972	.973	.975	.976

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CUMULATIVE RAINFALL FRACTIONS

Output Time increment = .1000 hrs

Time on left represents time for first value in each row.

Time hrs	.000	.001	.002	.003	.004
.0000	.000	.001	.002	.003	.004
.5000	.005	.006	.007	.008	.009
1.0000	.011	.012	.013	.014	.015
1.5000	.016	.017	.018	.020	.021
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5.5000	.071	.073	.075	.076	.078
6.0000	.080	.082	.084	.085	.087
6.5000	.089	.091	.093	.095	.097
7.0000	.099	.101	.103	.105	.107
7.5000	.109	.111	.113	.116	.118
8.0000	.120	.122	.125	.127	.130
8.5000	.132	.135	.138	.141	.144
9.0000	.147	.150	.153	.157	.160
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13.0000	.772	.778	.784	.789	.794
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14.0000	.820	.824	.827	.831	.834
14.5000	.838	.841	.844	.847	.850
15.0000	.854	.856	.859	.862	.865
15.5000	.868	.870	.873	.875	.878
16.0000	.880	.882	.885	.887	.889
16.5000	.891	.893	.895	.898	.900
17.0000	.902	.904	.906	.908	.910
17.5000	.912	.914	.915	.917	.919
18.0000	.921	.923	.925	.926	.928
18.5000	.930	.931	.933	.935	.936
19.0000	.938	.939	.941	.942	.944
19.5000	.945	.947	.948	.949	.951
20.0000	.952	.953	.955	.956	.957
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22.5000	.983	.984	.985	.986	.988
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23.5000	.994	.996	.997	.998	.999
24.0000	1.000				

CUMULATIVE RAINFALL FRACTIONS

Output Time increment = .1000 hrs

Time on left represents time for first value in each row.

Time hrs	.000	.001	.002	.003	.004
.0000	.000	.001	.002	.003	.004
.5000	.005	.006	.007	.008	.009
1.0000	.011	.012	.013	.014	.015
1.5000	.016	.017	.018	.020	.021
2.0000	.022	.023	.024	.026	.027
2.5000	.028	.029	.031	.032	.033
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6.0000	.080	.082	.084	.085	.087
6.5000	.089	.091	.093	.095	.097
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7.5000	.109	.111	.113	.116	.118
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14.5000	.838	.841	.844	.847	.850
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15.5000	.868	.870	.873	.875	.878
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.5000	.005	.006	.007	.008	.009
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13.0000	.772	.778	.784	.789	.794
13.5000	.799	.804	.808	.812	.816
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14.5000	.838	.841	.844	.847	.850
15.0000	.854	.856	.859	.862	.865
15.5000	.868	.870	.873	.875	.878
16.0000	.880	.882	.885	.887	.889
16.5000	.891	.893	.895	.898	.900
17.0000	.902	.904	.906	.908	.910
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18.5000	.930	.931	.933	.935	.936
19.0000	.938	.939	.941	.942	.944
19.5000	.945	.947	.948	.949	.951
20.0000	.952	.953	.955	.956	.957
20.5000	.958	.960	.961	.962	.964
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23.0000	.989	.990	.991	.992	.993
23.5000	.994	.996	.997	.998	.999
24.0000	1.000				

Type.... Tc Calcs
Name.... EXISTING SITE

File.... C:\Documents and Settings\aw2758\Desktop\University church\pondpack\Existing pond

.....
TIME OF CONCENTRATION CALCULATOR
.....

Segment #1: Tc: User Defined

Segment #1 Time: .2500 hrs

=====
Total Tc: .2500 hrs
=====

Type.... Tc Calcs
Name.... EXISTING SITE

File.... C:\Documents and Settings\aw2758\Desktop\University church\pondpack\Existing pond

Tc Equations used...

==== User Defined =====

Tc = Value entered by user

Where: Tc = Time of concentration

Type.... Tc Calcs
Name.... IMPROVED SITE

File.... C:\Documents and Settings\aw2758\Desktop\University church\pondpack\Existing pond

.....
TIME OF CONCENTRATION CALCULATOR
.....

Segment #1: Tc: User Defined

Segment #1 Time: .2500 hrs

=====
Total Tc: .2500 hrs
=====

Type.... Tc Calcs
Name.... IMPROVED SITE

File.... C:\Documents and Settings\aw2758\Desktop\University church\pondpack\Existing pond

Tc Equations used...

==== User Defined =====

Tc = Value entered by user

Where: Tc = Time of concentration

Type.... Runoff CN-Area
Name.... EXISTING SITE

File.... C:\Documents and Settings\aw2758\Desktop\University church\pondpack\Existing pond

RUNOFF CURVE NUMBER DATA

.....

Soil/Surface Description	CN	Area acres	Impervious Adjustment		Adjusted CN
			%C	%UC	
Open space (Lawns, parks etc.) - Goo	80	1.470			80.00
Impervious Areas - Paved parking lo	98	2.180			98.00

COMPOSITE AREA & WEIGHTED CN ---> 3.650 90.75 (91)

.....

Type.... Runoff CN-Area
Name.... IMPROVED SITE

File.... C:\Documents and Settings\aw2758\Desktop\University church\pondpack\Existing pond

RUNOFF CURVE NUMBER DATA

.....

Soil/Surface Description	CN	Area acres	Impervious Adjustment		Adjusted CN
			%C	%UC	
Open space (Lawns,parks etc.) - Goo	80	1.300			80.00
Impervious Areas - Paved parking lo	98	2.350			98.00

COMPOSITE AREA & WEIGHTED CN ---> 3.650 91.59 (92)

.....

Name....

File.... C:\Documents and Settings\aw2758\Desktop\University church\pondpack\Existing pond

SCS UNIT HYDROGRAPH METHOD
(Computational Notes)

DEFINITION OF TERMS: -----

At = Total area (acres): $At = Ai + Ap$
 Ai = Impervious area (acres)
 Ap = Pervious area (acres)
 CNi = Runoff curve number for impervious area
 CNp = Runoff curve number for pervious area
 fLoss = f loss constant infiltration (depth/time)
 gKs = Saturated Hydraulic Conductivity (depth/time)
 Md = Volumetric Moisture Deficit
 Psi = Capillary Suction (length)
 hK = Horton Infiltration Decay Rate ($time^{-1}$)
 fo = Initial Infiltration Rate (depth/time)
 fc = Ultimate(capacity) Infiltration Rate (depth/time)
 Ia = Initial Abstraction (length)
 dt = Computational increment (duration of unit excess rainfall)
 Default dt is smallest value of $0.1333Tc$, r_{tm} , and t_h
 (Smallest dt is then adjusted to match up with T_p)
 UDDt = User specified override computational main time increment
 (only used if UDDt is => $.1333Tc$)
 D(t) = Point on distribution curve (fraction of P) for time step t

 K = $2 / (1 + (T_r/T_p))$: default K = 0.75: (for $T_r/T_p = 1.67$)
 Ks = Hydrograph shape factor
 = Unit Conversions * K:
 = $((1hr/3600sec) * (1ft/12in) * ((5280ft)**2/sq.mi)) * K$
 Default Ks = $645.333 * 0.75 = 484$

 Lag = Lag time from center of excess runoff (dt) to T_p : Lag = $0.6T_c$
 P = Total precipitation depth, inches
 Pa(t) = Accumulated rainfall at time step t
 Pi(t) = Incremental rainfall at time step t
 qp = Peak discharge (cfs) for lin. runoff, for 1hr, for 1 sq.mi.
 = $(K_s * A * Q) / T_p$ (where Q = lin. runoff, A=sq.mi.)
 Qu(t) = Unit hydrograph ordinate (cfs) at time step t
 Q(t) = Final hydrograph ordinate (cfs) at time step t
 Rai(t) = Accumulated runoff (inches) at time step t for impervious area
 Rap(t) = Accumulated runoff (inches) at time step t for pervious area
 Rii(t) = Incremental runoff (inches) at time step t for impervious area
 Rip(t) = Incremental runoff (inches) at time step t for pervious area
 R(t) = Incremental weighted total runoff (inches)
 Rtm = Time increment for rainfall table
 Si = S for impervious area: $Si = (1000/CNi) - 10$
 Sp = S for pervious area: $Sp = (1000/CNp) - 10$
 t = Time step (row) number
 Tc = Time of concentration
 Tb = Time (hrs) of entire unit hydrograph: $T_b = T_p + T_r$
 Tp = Time (hrs) to peak of a unit hydrograph: $T_p = (dt/2) + Lag$
 Tr = Time (hrs) of receding limb of unit hydrograph: Tr = ratio of T_p

Name....

File.... C:\Documents and Settings\aw2758\Desktop\University church\pondpack\Existing pond

SCS UNIT HYDROGRAPH METHOD
(Computational Notes)

PRECIPITATION: -----

Column (1): Time for time step t
Column (2): D(t) = Point on distribution curve for time step t
Column (3): Pi(t) = Pa(t) - Pa(t-1): Col.(4) - Preceding Col.(4)
Column (4): Pa(t) = D(t) x P: Col.(2) x P

PERVIOUS AREA RUNOFF (using SCS Runoff CN Method) -----

Column (5): Rap(t) = Accumulated pervious runoff for time step t
If (Pa(t) is <= 0.2Sp) then use: Rap(t) = 0.0
If (Pa(t) is > 0.2Sp) then use:

Rap(t) = (Col.(4)-0.2Sp)**2 / (Col.(4)+0.8Sp)

Column (6): Rip(t) = Incremental pervious runoff for time step t
Rip(t) = Rap(t) - Rap(t-1)
Rip(t) = Col.(5) for current row - Col.(5) for preceding row.

IMPERVIOUS AREA RUNOFF -----

Column (7 & 8)... Did not specify to use impervious areas.

INCREMENTAL WEIGHTED RUNOFF: -----

Column (9): R(t) = (Ap/At) x Rip(t) + (Ai/At) x Rii(t)
R(t) = (Ap/At) x Col.(6) + (Ai/At) x Col.(8)

SCS UNIT HYDROGRAPH METHOD: -----

Column (10): Q(t) is computed with the SCS unit hydrograph method
using R() and Qu().

Name.... EXISTING SITE Tag: 2

Event: 2 yr

File.... C:\Documents and Settings\aw2758\Desktop\University church\pondpack\Existing pond

Storm... TypeII 24hr Tag: 2

SCS UNIT HYDROGRAPH METHOD

STORM EVENT: 2 year storm

Duration = 24.0000 hrs Rain Depth = 3.5000 in

Rain Dir = C:\Documents and Settings\aw2758\Desktop\University church\p

Rain File -ID = - TypeII 24hr

Unit Hyd Type = Default Curvilinear

HYG Dir = C:\Documents and Settings\aw2758\Desktop\University church\p

HYG File - ID = work_pad.hyg - EXISTING SITE 2

Tc = .2500 hrs

Drainage Area = 3.650 acres Runoff CN= 91

Computational Time Increment = .03333 hrs
Computed Peak Time = 12.0333 hrs
Computed Peak Flow = 11.04 cfs

Time Increment for HYG File = .0500 hrs
Peak Time, Interpolated Output = 12.0500 hrs
Peak Flow, Interpolated Output = 10.90 cfs

DRAINAGE AREA

ID:EXISTING SITE

CN = 91

Area = 3.650 acres

S = .9890 in

0.2S = .1978 in

Cumulative Runoff

2.5411 in
.773 ac-ft

HYG Volume... .773 ac-ft (area under HYG curve)

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

Time Concentration, Tc = .25000 hrs (ID: EXISTING SITE)
Computational Incr, Tm = .03333 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 = 16.54 cfs
Unit peak time Tp = .16667 hrs
Unit receding limb, Tr = .66667 hrs
Total unit time, Tb = .83333 hrs

Name.... EXISTING SITE Tag: 5

Event: 5 yr

File.... C:\Documents and Settings\aw2758\Desktop\University church\pondpack\Existing pond

Storm... TypeII 24hr Tag: 5

SCS UNIT HYDROGRAPH METHOD

STORM EVENT: 5 year storm
Duration = 24.0000 hrs Rain Depth = 4.5000 in
Rain Dir = C:\Documents and Settings\aw2758\Desktop\University church\p
Rain File -ID = - TypeII 24hr
Unit Hyd Type = Default Curvilinear
HYG Dir = C:\Documents and Settings\aw2758\Desktop\University church\p
HYG File - ID = work_pad.hyg - EXISTING SITE 5
Tc = .2500 hrs
Drainage Area = 3.650 acres Runoff CN= 91

=====
Computational Time Increment = .03333 hrs
Computed Peak Time = 12.0333 hrs
Computed Peak Flow = 14.96 cfs

Time Increment for HYG File = .0500 hrs
Peak Time, Interpolated Output = 12.0500 hrs
Peak Flow, Interpolated Output = 14.75 cfs
=====

DRAINAGE AREA

ID:EXISTING SITE
CN = 91
Area = 3.650 acres
S = .9890 in
0.2S = .1978 in

Cumulative Runoff

3.4980 in
1.064 ac-ft

HYG Volume... 1.064 ac-ft (area under HYG curve)

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

Time Concentration, Tc = .25000 hrs (ID: EXISTING SITE)
Computational Incr, Tm = .03333 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 = 16.54 cfs
Unit peak time Tp = .16667 hrs
Unit receding limb, Tr = .66667 hrs
Total unit time, Tb = .83333 hrs

Name.... EXISTING SITE Tag: 10

Event: 10 yr

File.... C:\Documents and Settings\aw2758\Desktop\University church\pondpack\Existing pond

Storm... TypeII 24hr Tag: 10

SCS UNIT HYDROGRAPH METHOD

STORM EVENT: 10 year storm
Duration = 24.0000 hrs Rain Depth = 5.2500 in
Rain Dir = C:\Documents and Settings\aw2758\Desktop\University church\p
Rain File -ID = - TypeII 24hr
Unit Hyd Type = Default Curvilinear
HYG Dir = C:\Documents and Settings\aw2758\Desktop\University church\p
HYG File - ID = work_pad.hyg - EXISTING SITE 10
Tc = .2500 hrs
Drainage Area = 3.650 acres Runoff CN= 91

Computational Time Increment = .03333 hrs
Computed Peak Time = 12.0333 hrs
Computed Peak Flow = 17.88 cfs
Time Increment for HYG File = .0500 hrs
Peak Time, Interpolated Output = 12.0500 hrs
Peak Flow, Interpolated Output = 17.63 cfs

DRAINAGE AREA

ID:EXISTING SITE
CN = 91
Area = 3.650 acres
S = .9890 in
0.2S = .1978 in

Cumulative Runoff

4.2251 in
1.285 ac-ft

HYG Volume... 1.285 ac-ft (area under HYG curve)

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

Time Concentration, Tc = .25000 hrs (ID: EXISTING SITE)
Computational Incr, Tm = .03333 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 = 16.54 cfs
Unit peak time Tp = .16667 hrs
Unit receding limb, Tr = .66667 hrs
Total unit time, Tb = .83333 hrs

Name.... EXISTING SITE Tag: 25

Event: 25 yr

File.... C:\Documents and Settings\aw2758\Desktop\University church\pondpack\Existing pond

Storm... TypeII 24hr Tag: 25

SCS UNIT HYDROGRAPH METHOD

STORM EVENT: 25 year storm
 Duration = 24.0000 hrs Rain Depth = 6.1250 in
 Rain Dir = C:\Documents and Settings\aw2758\Desktop\University church\p
 Rain File -ID = - TypeII 24hr
 Unit Hyd Type = Default Curvilinear
 HYG Dir = C:\Documents and Settings\aw2758\Desktop\University church\p
 HYG File - ID = work_pad.hyg - EXISTING SITE 25
 Tc = .2500 hrs
 Drainage Area = 3.650 acres Runoff CN= 91

=====
 Computational Time Increment = .03333 hrs
 Computed Peak Time = 12.0333 hrs
 Computed Peak Flow = 21.28 cfs

Time Increment for HYG File = .0500 hrs
 Peak Time, Interpolated Output = 12.0500 hrs
 Peak Flow, Interpolated Output = 20.96 cfs
 WARNING: The difference between calculated peak flow
 and interpolated peak flow is greater than 1.50%
 =====

DRAINAGE AREA

 ID:EXISTING SITE
 CN = 91
 Area = 3.650 acres
 S = .9890 in
 0.2S = .1978 in

Cumulative Runoff

 5.0796 in
 1.545 ac-ft

HYG Volume... 1.545 ac-ft (area under HYG curve)

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

Time Concentration, Tc = .25000 hrs (ID: EXISTING SITE)
 Computational Incr, Tm = .03333 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 = 16.54 cfs
 Unit peak time Tp = .16667 hrs
 Unit receding limb, Tr = .66667 hrs
 Total unit time, Tb = .83333 hrs

Name.... EXISTING SITE Tag: 50

Event: 50 yr

File.... C:\Documents and Settings\aw2758\Desktop\University church\pondpack\Existing pond

Storm... TypeII 24hr Tag: 50

SCS UNIT HYDROGRAPH METHOD

STORM EVENT: 50 year storm
Duration = 24.0000 hrs Rain Depth = 7.0000 in
Rain Dir = C:\Documents and Settings\aw2758\Desktop\University church\p
Rain File -ID = - TypeII 24hr
Unit Hyd Type = Default Curvilinear
HYG Dir = C:\Documents and Settings\aw2758\Desktop\University church\p
HYG File - ID = work_pad.hyg - EXISTING SITE 50
Tc = .2500 hrs
Drainage Area = 3.650 acres Runoff CN= 91

Computational Time Increment = .03333 hrs
Computed Peak Time = 12.0333 hrs
Computed Peak Flow = 24.66 cfs

Time Increment for HYG File = .0500 hrs
Peak Time, Interpolated Output = 12.0500 hrs
Peak Flow, Interpolated Output = 24.28 cfs
WARNING: The difference between calculated peak flow
and interpolated peak flow is greater than 1.50%

DRAINAGE AREA

ID:EXISTING SITE
CN = 91
Area = 3.650 acres
S = .9890 in
0.2S = .1978 in

Cumulative Runoff

5.9387 in
1.806 ac-ft

HYG Volume... 1.806 ac-ft (area under HYG curve)

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

Time Concentration, Tc = .25000 hrs (ID: EXISTING SITE)
Computational Incr, Tm = .03333 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 = 16.54 cfs
Unit peak time Tp = .16667 hrs
Unit receding limb, Tr = .66667 hrs
Total unit time, Tb = .83333 hrs

Name.... EXISTING SITE Tag: 100

Event: 100 yr

File.... C:\Documents and Settings\aw2758\Desktop\University church\pondpack\Existing pond

Storm... TypeII 24hr Tag: 100

SCS UNIT HYDROGRAPH METHOD

STORM EVENT: 100 year storm

Duration = 24.0000 hrs Rain Depth = 7.7500 in

Rain Dir = C:\Documents and Settings\aw2758\Desktop\University church\p

Rain File -ID = - TypeII 24hr

Unit Hyd Type = Default Curvilinear

HYG Dir = C:\Documents and Settings\aw2758\Desktop\University church\p

HYG File - ID = work_pad.hyg - EXISTING SITE 100

Tc = .2500 hrs

Drainage Area = 3.650 acres Runoff CN= 91

=====
Computational Time Increment = .03333 hrs
Computed Peak Time = 12.0333 hrs
Computed Peak Flow = 27.54 cfs

Time Increment for HYG File = .0500 hrs
Peak Time, Interpolated Output = 12.0500 hrs
Peak Flow, Interpolated Output = 27.11 cfs

WARNING: The difference between calculated peak flow
and interpolated peak flow is greater than 1.50%

DRAINAGE AREA

ID:EXISTING SITE

CN = 91

Area = 3.650 acres

S = .9890 in

0.2S = .1978 in

Cumulative Runoff

6.6777 in

2.031 ac-ft

HYG Volume... 2.031 ac-ft (area under HYG curve)

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

Time Concentration, Tc = .25000 hrs (ID: EXISTING SITE)

Computational Incr, Tm = .03333 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 = 16.54 cfs

Unit peak time, Tp = .16667 hrs

Unit receding limb, Tr = .66667 hrs

Total unit time, Tb = .83333 hrs

Name.... IMPROVED SITE Tag: 2

Event: 2 yr

File.... C:\Documents and Settings\aw2758\Desktop\University church\pondpack\Existing pond

Storm... TypeII 24hr Tag: 2

SCS UNIT HYDROGRAPH METHOD

STORM EVENT: 2 year storm

Duration = 24.0000 hrs Rain Depth = 3.5000 in
Rain Dir = C:\Documents and Settings\aw2758\Desktop\University church\p
Rain File -ID = - TypeII 24hr
Unit Hyd Type = Default Curvilinear
HYG Dir = C:\Documents and Settings\aw2758\Desktop\University church\p
HYG File - ID = work_pad.hyg - IMPROVED SITE 2
Tc = .2500 hrs
Drainage Area = 3.650 acres Runoff CN= 92

Computational Time Increment = .03333 hrs
Computed Peak Time = 12.0333 hrs
Computed Peak Flow = 11.36 cfs
Time Increment for HYG File = .0500 hrs
Peak Time, Interpolated Output = 12.0500 hrs
Peak Flow, Interpolated Output = 11.21 cfs

DRAINAGE AREA

ID:IMPROVED SITE
CN = 92
Area = 3.650 acres
S = .8696 in
0.2S = .1739 in

Cumulative Runoff

2.6367 in
.802 ac-ft

HYG Volume... .802 ac-ft (area under HYG curve)

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

Time Concentration, Tc = .25000 hrs (ID: IMPROVED SITE)
Computational Incr, Tm = .03333 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 = 16.54 cfs
Unit peak time Tp = .16667 hrs
Unit receding limb, Tr = .66667 hrs
Total unit time, Tb = .83333 hrs

SCS UNIT HYDROGRAPH METHOD

STORM EVENT: 5 year storm

Duration = 24.0000 hrs Rain Depth = 4.5000 in
Rain Dir = C:\Documents and Settings\aw2758\Desktop\University church\p
Rain File -ID = - TypeII 24hr
Unit Hyd Type = Default Curvilinear
HYG Dir = C:\Documents and Settings\aw2758\Desktop\University church\p
HYG File - ID = work_pad.hyg - IMPROVED SITE 5
Tc = .2500 hrs
Drainage Area = 3.650 acres Runoff CN= 92

Computational Time Increment = .03333 hrs
Computed Peak Time = 12.0333 hrs
Computed Peak Flow = 15.27 cfs
Time Increment for HYG File = .0500 hrs
Peak Time, Interpolated Output = 12.0500 hrs
Peak Flow, Interpolated Output = 15.05 cfs

DRAINAGE AREA

ID:IMPROVED SITE
CN = 92
Area = 3.650 acres
S = .8696 in
0.2S = .1739 in

Cumulative Runoff

3.6021 in
1.096 ac-ft

HYG Volume... 1.096 ac-ft (area under HYG curve)

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

Time Concentration, Tc = .25000 hrs (ID: IMPROVED SITE)
Computational Incr, Tm = .03333 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 = 16.54 cfs
Unit peak time Tp = .16667 hrs
Unit receding limb, Tr = .66667 hrs
Total unit time, Tb = .83333 hrs

SCS UNIT HYDROGRAPH METHOD

STORM EVENT: 10 year storm
 Duration = 24.0000 hrs Rain Depth = 5.2500 in
 Rain Dir = C:\Documents and Settings\aw2758\Desktop\University church\p
 Rain File -ID = - TypeII 24hr
 Unit Hyd Type = Default Curvilinear
 HYG Dir = C:\Documents and Settings\aw2758\Desktop\University church\p
 HYG File - ID = work_pad.hyg - IMPROVED SITE 10
 Tc = .2500 hrs
 Drainage Area = 3.650 acres Runoff CN= 92

=====
 Computational Time Increment = .03333 hrs
 Computed Peak Time = 12.0333 hrs
 Computed Peak Flow = 18.19 cfs
 Time Increment for HYG File = .0500 hrs
 Peak Time, Interpolated Output = 12.0500 hrs
 Peak Flow, Interpolated Output = 17.91 cfs
 =====

DRAINAGE AREA

 ID:IMPROVED SITE
 CN = 92
 Area = 3.650 acres
 S = .8696 in
 0.2S = .1739 in

Cumulative Runoff

 4.3337 in
 1.318 ac-ft

HYG Volume... 1.318 ac-ft (area under HYG curve)

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

Time Concentration, Tc = .25000 hrs (ID: IMPROVED SITE)
 Computational Incr, Tm = .03333 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 = 16.54 cfs
 Unit peak time Tp = .16667 hrs
 Unit receding limb, Tr = .66667 hrs
 Total unit time, Tb = .83333 hrs

Name.... IMPROVED SITE Tag: 25

Event: 25 yr

File.... C:\Documents and Settings\aw2758\Desktop\University church\pondpack\Existing pond

Storm... TypeII 24hr Tag: 25

SCS UNIT HYDROGRAPH METHOD

STORM EVENT: 25 year storm
Duration = 24.0000 hrs Rain Depth = 6.1250 in
Rain Dir = C:\Documents and Settings\aw2758\Desktop\University church\p
Rain File -ID = - TypeII 24hr
Unit Hyd Type = Default Curvilinear
HYG Dir = C:\Documents and Settings\aw2758\Desktop\University church\p
HYG File - ID = work_pad.hyg - IMPROVED SITE 25
Tc = .2500 hrs
Drainage Area = 3.650 acres Runoff CN= 92

Computational Time Increment = .03333 hrs
Computed Peak Time = 12.0333 hrs
Computed Peak Flow = 21.57 cfs

Time Increment for HYG File = .0500 hrs
Peak Time, Interpolated Output = 12.0500 hrs
Peak Flow, Interpolated Output = 21.23 cfs
WARNING: The difference between calculated peak flow
and interpolated peak flow is greater than 1.50%

DRAINAGE AREA

ID:IMPROVED SITE
CN = 92
Area = 3.650 acres
S = .8696 in
0.2S = .1739 in

Cumulative Runoff

5.1924 in
1.579 ac-ft

HYG Volume... 1.579 ac-ft (area under HYG curve)

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

Time Concentration, Tc = .25000 hrs (ID: IMPROVED SITE)
Computational Incr, Tm = .03333 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 = 16.54 cfs
Unit peak time Tp = .16667 hrs
Unit receding limb, Tr = .66667 hrs
Total unit time, Tb = .83333 hrs

Name.... IMPROVED SITE Tag: 50

Event: 50 yr

File.... C:\Documents and Settings\aw2758\Desktop\University church\pondpack\Existing pond

Storm... TypeII 24hr Tag: 50

SCS UNIT HYDROGRAPH METHOD

STORM EVENT: 50 year storm
 Duration = 24.0000 hrs Rain Depth = 7.0000 in
 Rain Dir = C:\Documents and Settings\aw2758\Desktop\University church\p
 Rain File -ID = - TypeII 24hr
 Unit Hyd Type = Default Curvilinear
 HYG Dir = C:\Documents and Settings\aw2758\Desktop\University church\p
 HYG File - ID = work_pad.hyg - IMPROVED SITE 50
 Tc = .2500 hrs
 Drainage Area = 3.650 acres Runoff CN= 92

=====
 Computational Time Increment = .03333 hrs
 Computed Peak Time = 12.0333 hrs
 Computed Peak Flow = 24.93 cfs

Time Increment for HYG File = .0500 hrs
 Peak Time, Interpolated Output = 12.0500 hrs
 Peak Flow, Interpolated Output = 24.53 cfs
 WARNING: The difference between calculated peak flow
 and interpolated peak flow is greater than 1.50%
 =====

DRAINAGE AREA

 ID: IMPROVED SITE
 CN = 92
 Area = 3.650 acres
 S = .8696 in
 0.2S = .1739 in

Cumulative Runoff

 6.0548 in
 1.842 ac-ft

HYG Volume... 1.842 ac-ft (area under HYG curve)

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

Time Concentration, Tc = .25000 hrs (ID: IMPROVED SITE)
 Computational Incr, Tm = .03333 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 = 16.54 cfs
 Unit peak time Tp = .16667 hrs
 Unit receding limb, Tr = .66667 hrs
 Total unit time, Tb = .83333 hrs

Name.... IMPROVED SITE Tag: 100

Event: 100 yr

File.... C:\Documents and Settings\aw2758\Desktop\University church\pondpack\Existing pond

Storm... TypeII 24hr Tag: 100

SCS UNIT HYDROGRAPH METHOD

STORM EVENT: 100 year storm
 Duration = 24.0000 hrs Rain Depth = 7.7500 in
 Rain Dir = C:\Documents and Settings\aw2758\Desktop\University church\p
 Rain File -ID = - TypeII 24hr
 Unit Hyd Type = Default Curvilinear
 HYG Dir = C:\Documents and Settings\aw2758\Desktop\University church\p
 HYG File - ID = work_pad.hyg - IMPROVED SITE 100
 Tc = .2500 hrs
 Drainage Area = 3.650 acres Runoff CN= 92

=====
 Computational Time Increment = .03333 hrs
 Computed Peak Time = 12.0333 hrs
 Computed Peak Flow = 27.80 cfs

Time Increment for HYG File = .0500 hrs
 Peak Time, Interpolated Output = 12.0500 hrs
 Peak Flow, Interpolated Output = 27.35 cfs
 WARNING: The difference between calculated peak flow
 and interpolated peak flow is greater than 1.50%
 =====

DRAINAGE AREA

 ID:IMPROVED SITE
 CN = 92
 Area = 3.650 acres
 S = .8696 in
 0.2S = .1739 in

Cumulative Runoff

 6.7961 in
 2.067 ac-ft

HYG Volume... 2.067 ac-ft (area under HYG curve)

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

Time Concentration, Tc = .25000 hrs (ID: IMPROVED SITE)
 Computational Incr, Tm = .03333 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 = 16.54 cfs
 Unit peak time Tp = .16667 hrs
 Unit receding limb, Tr = .66667 hrs
 Total unit time, Tb = .83333 hrs

Name.... EXISTING POND

File.... C:\Documents and Settings\aw2758\Desktop\University church\pondpack\Existing pond

Elevation (ft)	Planimeter (sq.in)	Area (acres)	A1+A2+sqr(A1*A2) (acres)	Volume (ac-ft)	Volume Sum (ac-ft)
1406.11	-----	.0008	.0000	.000	.000
1406.40	-----	.0140	.0181	.002	.002
1407.00	-----	.0467	.0863	.017	.019
1408.00	-----	.1350	.2611	.087	.106
1409.00	-----	.5547	.9634	.321	.427
1409.50	-----	.5548	1.6643	.277	.705
1410.00	-----	1.2300	2.6109	.435	1.140

POND VOLUME EQUATIONS

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

$$\text{Volume} = (1/3) * (\text{EL2}-\text{EL1}) * (\text{Area1} + \text{Area2} + \text{sq.rt.}(\text{Area1}*\text{Area2}))$$

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:\Documents and Settings\aw2758\Desktop\University church\pondpack\Existing pond

Elevation (ft)	Planimeter (sq.in)	Area (acres)	A1+A2+sqr(A1*A2) (acres)	Volume (ac-ft)	Volume Sum (ac-ft)
1406.11	-----	.0008	.0000	.000	.000
1406.40	-----	.0140	.0181	.002	.002
1407.00	-----	.1160	.1703	.034	.036
1408.00	-----	.1450	.3907	.130	.166
1409.00	-----	.5100	.9269	.309	.475
1409.50	-----	.8200	1.9767	.329	.804
1410.00	-----	1.2300	3.0543	.509	1.314

POND VOLUME EQUATIONS

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

$$\text{Volume} = (1/3) * (\text{EL2}-\text{EL1}) * (\text{Area1} + \text{Area2} + \text{sq.rt.}(\text{Area1}*\text{Area2}))$$

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

Type.... Outlet Input Data
Name.... Outlet 1

File.... C:\Documents and Settings\aw2758\Desktop\University church\pondpack\Existing pond

REQUESTED POND WS ELEVATIONS:

Min. Elev.= 1406.11 ft
Increment = .05 ft
Max. Elev.= 1410.00 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
Culvert-Circular	C1	--->	TW	1406.110	1410.000
Culvert-Circular	C0	--->	TW	1406.460	1410.000
TW SETUP, DS Channel					

Type.... Outlet Input Data
Name.... Outlet 1

File.... C:\Documents and Settings\aw2758\Desktop\University church\pondpack\Existing pond

OUTLET STRUCTURE INPUT DATA

Structure ID = C1
Structure Type = Culvert-Circular

No. Barrels = 1
Barrel Diameter = .5000 ft
Upstream Invert = 1406.11 ft
Dnstream Invert = 1405.74 ft
Horiz. Length = 35.00 ft
Barrel Length = 35.00 ft
Barrel Slope = .01057 ft/ft

OUTLET CONTROL DATA...

Mannings n = .0130
Ke = .0000 (forward entrance loss)
Kb = .078805 (per ft of full flow)
Kr = 1.0000 (reverse entrance loss)
HW Convergence = .001 +/- ft

INLET CONTROL DATA...

Equation form = 2
Inlet Control K = .5190
Inlet Control M = .6400
Inlet Control c = .02100
Inlet Control Y = .9000
T1 ratio (HW/D) = 1.157
T2 ratio (HW/D) = 1.231
Slope Factor = -.500

Use unsubmerged inlet control Form 2 equ. below T1 elev.
Use submerged inlet control Form 2 equ. above T2 elev.

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

At T1 Elev = 1406.69 ft ---> Flow = .49 cfs
At T2 Elev = 1406.73 ft ---> Flow = .56 cfs

Type.... Outlet Input Data
Name.... Outlet 1

File.... C:\Documents and Settings\aw2758\Desktop\University church\pondpack\Existing pond

OUTLET STRUCTURE INPUT DATA

Structure ID = C0
Structure Type = Culvert-Circular

No. Barrels = 1
Barrel Diameter = .6660 ft
Upstream Invert = 1406.46 ft
Dnstream Invert = 1406.34 ft
Horiz. Length = 40.00 ft
Barrel Length = 40.00 ft
Barrel Slope = .00300 ft/ft

OUTLET CONTROL DATA...

Mannings n = .0130
Ke = .0000 (forward entrance loss)
Kb = .053771 (per ft of full flow)
Kr = .5000 (reverse entrance loss)
HW Convergence = .001 +/- ft

INLET CONTROL DATA...

Equation form = 2
Inlet Control K = .5190
Inlet Control M = .6400
Inlet Control c = .02100
Inlet Control Y = .9000
T1 ratio (HW/D) = 1.157
T2 ratio (HW/D) = 1.235
Slope Factor = -.500

Use unsubmerged inlet control Form 2 equ. below T1 elev.
Use submerged inlet control Form 2 equ. above T2 elev.

In transition zone between unsubmerged and submerged inlet control,
interpolate between flows at T1 & T2...
At T1 Elev = 1407.23 ft ---> Flow = 1.00 cfs
At T2 Elev = 1407.28 ft ---> Flow = 1.14 cfs

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.... Outlet 1

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RATING TABLE FOR ONE OUTLET TYPE

Structure ID = C1 (Culvert-Circular)

Mannings open channel maximum capacity: .62 cfs

Upstream ID = (Pond Water Surface)

DNstream ID = TW (Pond Outfall)

WS Elev, Device	Q	Tail Water	Notes
WS Elev. ft	Q cfs	TW Elev ft	Converge +/-ft Computation Messages
1406.11	.00	Free Outfall	Upstream HW & DNstream TW < Inv.El
1406.16	.01	Free Outfall	CRIT.DEPTH CONTROL Vh= .013ft Dcr= .039ft CRIT.DEPTH Hev= .00ft
1406.21	.02	Free Outfall	CRIT.DEPTH CONTROL Vh= .026ft Dcr= .074ft CRIT.DEPTH Hev= .00ft
1406.26	.05	Free Outfall	CRIT.DEPTH CONTROL Vh= .039ft Dcr= .111ft CRIT.DEPTH Hev= .00ft
1406.31	.09	Free Outfall	CRIT.DEPTH CONTROL Vh= .053ft Dcr= .146ft CRIT.DEPTH Hev= .00ft
1406.36	.13	Free Outfall	INLET CONTROL... Equ.2: HW =.25
1406.41	.17	Free Outfall	INLET CONTROL... Equ.2: HW =.30
1406.46	.22	Free Outfall	INLET CONTROL... Equ.2: HW =.35
1406.51	.27	Free Outfall	INLET CONTROL... Equ.2: HW =.40
1406.56	.33	Free Outfall	INLET CONTROL... Equ.2: HW =.45
1406.61	.39	Free Outfall	INLET CONTROL... Equ.2: HW =.50
1406.66	.45	Free Outfall	INLET CONTROL... Equ.2: HW =.55
1406.71	.53	Free Outfall	INLET CONTROL... Transition: HW =.60
1406.76	.61	Free Outfall	INLET CONTROL... Submerged: HW =.65
1406.81	.65	Free Outfall	FULL FLOW...Lfull=9.93ft Vh=.172ft HL=.306ft Hev= .00ft
1406.86	.67	Free Outfall	FULL FLOW...Lfull=20.03ft Vh=.181ft HL=.466ft Hev= .00ft
1406.91	.69	Free Outfall	FULL FLOW...Lfull=24.42ft Vh=.191ft HL=.557ft Hev= .00ft

RATING TABLE FOR ONE OUTLET TYPE

Structure ID = C1 (Culvert-Circular)

Mannings open channel maximum capacity: .62 cfs
 Upstream ID = (Pond Water Surface)
 DNstream ID = TW (Pond Outfall)

WS Elev, Device	Q	Tail Water	Notes
WS Elev. ft	Q cfs	TW Elev ft	Converge +/-ft Computation Messages
1406.96	.71	Free Outfall	
		FULL FLOW...Lfull=26.54ft	Vh=.204ft HL=.630ft Hev= .00ft
1407.01	.73	Free Outfall	
		FULL FLOW...Lfull=28.78ft	Vh=.215ft HL=.704ft Hev= .00ft
1407.06	.75	Free Outfall	
		FULL FLOW...Lfull=30.17ft	Vh=.228ft HL=.769ft Hev= .00ft
1407.11	.77	Free Outfall	
		FULL FLOW...Lfull=31.20ft	Vh=.240ft HL=.829ft Hev= .00ft
1407.16	.79	Free Outfall	
		FULL FLOW...Lfull=31.96ft	Vh=.252ft HL=.888ft Hev= .00ft
1407.21	.81	Free Outfall	
		FULL FLOW...Lfull=32.58ft	Vh=.265ft HL=.945ft Hev= .00ft
1407.26	.83	Free Outfall	
		FULL FLOW...Lfull=32.97ft	Vh=.277ft HL=.998ft Hev= .00ft
1407.31	.85	Free Outfall	
		FULL FLOW...Lfull=33.71ft	Vh=.289ft HL=1.055ft Hev= .00ft
1407.36	.87	Free Outfall	
		FULL FLOW...Lfull=33.81ft	Vh=.302ft HL=1.107ft Hev= .00ft
1407.41	.88	Free Outfall	
		FULL FLOW...Lfull=33.90ft	Vh=.316ft HL=1.159ft Hev= .00ft
1407.46	.90	Free Outfall	
		FULL FLOW...Lfull=33.98ft	Vh=.329ft HL=1.210ft Hev= .00ft
1407.51	.92	Free Outfall	
		FULL FLOW...Lfull=34.06ft	Vh=.342ft HL=1.259ft Hev= .00ft
1407.56	.94	Free Outfall	
		FULL FLOW...Lfull=34.18ft	Vh=.355ft HL=1.311ft Hev= .00ft
1407.61	.96	Free Outfall	
		FULL FLOW...Lfull=34.28ft	Vh=.368ft HL=1.363ft Hev= .00ft
1407.66	.97	Free Outfall	
		FULL FLOW...Lfull=34.36ft	Vh=.381ft HL=1.412ft Hev= .00ft
1407.71	.99	Free Outfall	
		FULL FLOW...Lfull=34.49ft	Vh=.394ft HL=1.464ft Hev= .00ft
1407.76	1.01	Free Outfall	
		FULL FLOW...Lfull=34.52ft	Vh=.407ft HL=1.515ft Hev= .00ft

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RATING TABLE FOR ONE OUTLET TYPE

Structure ID = C1 (Culvert-Circular)

Mannings open channel maximum capacity: .62 cfs

Upstream ID = (Pond Water Surface)

DNstream ID = TW (Pond Outfall)

WS Elev, Device	Q	Tail Water	Notes		
WS Elev. ft	Q cfs	TW Elev ft	Converge +/-ft	Computation Messages	
1407.81	1.02	Free Outfall			
		FULL FLOW...Lfull=34.56ft	Vh=.421ft	HL=1.566ft	Hev= .00ft
1407.86	1.04	Free Outfall			
		FULL FLOW...Lfull=34.59ft	Vh=.433ft	HL=1.615ft	Hev= .00ft
1407.91	1.05	Free Outfall			
		FULL FLOW...Lfull=34.74ft	Vh=.446ft	HL=1.667ft	Hev= .00ft
1407.96	1.07	Free Outfall			
		FULL FLOW...Lfull=34.75ft	Vh=.459ft	HL=1.716ft	Hev= .00ft
1408.01	1.08	Free Outfall			
		FULL FLOW...Lfull=34.75ft	Vh=.473ft	HL=1.767ft	Hev= .00ft
1408.06	1.10	Free Outfall			
		FULL FLOW...Lfull=34.77ft	Vh=.486ft	HL=1.818ft	Hev= .00ft
1408.11	1.11	Free Outfall			
		FULL FLOW...Lfull=34.78ft	Vh=.499ft	HL=1.868ft	Hev= .00ft
1408.16	1.13	Free Outfall			
		FULL FLOW...Lfull=34.79ft	Vh=.513ft	HL=1.918ft	Hev= .00ft
1408.21	1.14	Free Outfall			
		FULL FLOW...Lfull=34.80ft	Vh=.526ft	HL=1.968ft	Hev= .00ft
1408.26	1.16	Free Outfall			
		FULL FLOW...Lfull=34.82ft	Vh=.539ft	HL=2.018ft	Hev= .00ft
1408.31	1.17	Free Outfall			
		FULL FLOW...Lfull=34.82ft	Vh=.552ft	HL=2.067ft	Hev= .00ft
1408.36	1.18	Free Outfall			
		FULL FLOW...Lfull=34.84ft	Vh=.565ft	HL=2.117ft	Hev= .00ft
1408.41	1.20	Free Outfall			
		FULL FLOW...Lfull=34.85ft	Vh=.579ft	HL=2.167ft	Hev= .00ft
1408.46	1.21	Free Outfall			
		FULL FLOW...Lfull=34.86ft	Vh=.592ft	HL=2.218ft	Hev= .00ft
1408.51	1.23	Free Outfall			
		FULL FLOW...Lfull=34.87ft	Vh=.605ft	HL=2.268ft	Hev= .00ft
1408.56	1.24	Free Outfall			
		FULL FLOW...Lfull=34.88ft	Vh=.619ft	HL=2.319ft	Hev= .00ft
1408.61	1.25	Free Outfall			
		FULL FLOW...Lfull=34.89ft	Vh=.632ft	HL=2.369ft	Hev= .00ft

RATING TABLE FOR ONE OUTLET TYPE

Structure ID = C1 (Culvert-Circular)

Mannings open channel maximum capacity: .62 cfs

Upstream ID = (Pond Water Surface)

DNstream ID = TW (Pond Outfall)

WS Elev, Device	Q	Tail Water	Notes		
WS Elev. ft	Q cfs	TW Elev ft	Converge +/-ft	Computation Messages	
1408.66	1.26	Free Outfall			
		FULL FLOW...Lfull=34.90ft	Vh=.645ft	HL=2.418ft	Hev= .00ft
1408.71	1.28	Free Outfall			
		FULL FLOW...Lfull=34.91ft	Vh=.658ft	HL=2.469ft	Hev= .00ft
1408.76	1.29	Free Outfall			
		FULL FLOW...Lfull=34.91ft	Vh=.672ft	HL=2.519ft	Hev= .00ft
1408.81	1.30	Free Outfall			
		FULL FLOW...Lfull=34.92ft	Vh=.685ft	HL=2.570ft	Hev= .00ft
1408.86	1.32	Free Outfall			
		FULL FLOW...Lfull=34.92ft	Vh=.698ft	HL=2.618ft	Hev= .00ft
1408.91	1.33	Free Outfall			
		FULL FLOW...Lfull=34.92ft	Vh=.712ft	HL=2.670ft	Hev= .00ft
1408.96	1.34	Free Outfall			
		FULL FLOW...Lfull=34.95ft	Vh=.724ft	HL=2.719ft	Hev= .00ft
1409.01	1.35	Free Outfall			
		FULL FLOW...Lfull=34.95ft	Vh=.737ft	HL=2.769ft	Hev= .00ft
1409.06	1.36	Free Outfall			
		FULL FLOW...Lfull=34.95ft	Vh=.751ft	HL=2.819ft	Hev= .00ft
1409.11	1.38	Free Outfall			
		FULL FLOW...Lfull=34.95ft	Vh=.764ft	HL=2.870ft	Hev= .00ft
1409.16	1.39	Free Outfall			
		FULL FLOW...Lfull=34.95ft	Vh=.778ft	HL=2.920ft	Hev= .00ft
1409.21	1.40	Free Outfall			
		FULL FLOW...Lfull=34.95ft	Vh=.791ft	HL=2.970ft	Hev= .00ft
1409.26	1.41	Free Outfall			
		FULL FLOW...Lfull=34.95ft	Vh=.804ft	HL=3.019ft	Hev= .00ft
1409.31	1.42	Free Outfall			
		FULL FLOW...Lfull=34.96ft	Vh=.818ft	HL=3.069ft	Hev= .00ft
1409.36	1.44	Free Outfall			
		FULL FLOW...Lfull=34.96ft	Vh=.831ft	HL=3.120ft	Hev= .00ft
1409.41	1.45	Free Outfall			
		FULL FLOW...Lfull=34.96ft	Vh=.844ft	HL=3.170ft	Hev= .00ft
1409.46	1.46	Free Outfall			
		FULL FLOW...Lfull=34.96ft	Vh=.857ft	HL=3.219ft	Hev= .00ft

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RATING TABLE FOR ONE OUTLET TYPE

Structure ID = C1 (Culvert-Circular)

Mannings open channel maximum capacity: .62 cfs

Upstream ID = (Pond Water Surface)

DNstream ID = TW (Pond Outfall)

WS Elev, Device	Q	Tail Water	Notes
WS Elev. ft	Q cfs	TW Elev ft	Converge +/-ft Computation Messages
1409.51	1.47	Free Outfall	
		FULL FLOW...Lfull=34.96ft	Vh=.871ft HL=3.269ft Hev= .00ft
1409.56	1.48	Free Outfall	
		FULL FLOW...Lfull=34.98ft	Vh=.884ft HL=3.319ft Hev= .00ft
1409.61	1.49	Free Outfall	
		FULL FLOW...Lfull=34.98ft	Vh=.897ft HL=3.369ft Hev= .00ft
1409.66	1.50	Free Outfall	
		FULL FLOW...Lfull=34.98ft	Vh=.910ft HL=3.419ft Hev= .00ft
1409.71	1.51	Free Outfall	
		FULL FLOW...Lfull=34.98ft	Vh=.923ft HL=3.469ft Hev= .00ft
1409.76	1.52	Free Outfall	
		FULL FLOW...Lfull=34.98ft	Vh=.937ft HL=3.520ft Hev= .00ft
1409.81	1.54	Free Outfall	
		FULL FLOW...Lfull=34.98ft	Vh=.950ft HL=3.570ft Hev= .00ft
1409.86	1.55	Free Outfall	
		FULL FLOW...Lfull=34.98ft	Vh=.964ft HL=3.620ft Hev= .00ft
1409.91	1.56	Free Outfall	
		FULL FLOW...Lfull=34.98ft	Vh=.977ft HL=3.670ft Hev= .00ft
1409.96	1.57	Free Outfall	
		FULL FLOW...Lfull=34.98ft	Vh=.990ft HL=3.719ft Hev= .00ft
1410.00	1.58	Free Outfall	
		FULL FLOW...Lfull=34.98ft	Vh=1.001ft HL=3.760ft Hev= .00ft

RATING TABLE FOR ONE OUTLET TYPE

Structure ID = C0 (Culvert-Circular)

Mannings open channel maximum capacity: .71 cfs
 Upstream ID = (Pond Water Surface)
 DNstream ID = TW (Pond Outfall)

WS Elev, Device	Q	Tail Water	Notes
WS Elev. ft	Q cfs	TW Elev ft	Converge +/-ft Computation Messages
1406.11	.00	Free Outfall	Upstream HW & DNstream TW < Inv.El
1406.16	.00	Free Outfall	Upstream HW & DNstream TW < Inv.El
1406.21	.00	Free Outfall	Upstream HW & DNstream TW < Inv.El
1406.26	.00	Free Outfall	Upstream HW & DNstream TW < Inv.El
1406.31	.00	Free Outfall	Upstream HW & DNstream TW < Inv.El
1406.36	.00	Free Outfall	Upstream HW & DNstream TW < Inv.El
1406.41	.00	Free Outfall	Upstream HW & DNstream TW < Inv.El
1406.46	.00	Free Outfall	Upstream HW & DNstream TW < Inv.El
1406.51	.01	Free Outfall	BACKWATER CONTROL.. Vh= .005ft hwDi= .046ft Lbw= 40.0ft Hev= .00ft
1406.56	.02	Free Outfall	BACKWATER CONTROL.. Vh= .012ft hwDi= .088ft Lbw= 40.0ft Hev= .00ft
1406.61	.05	Free Outfall	BACKWATER CONTROL.. Vh= .020ft hwDi= .130ft Lbw= 40.0ft Hev= .00ft
1406.66	.10	Free Outfall	BACKWATER CONTROL.. Vh= .029ft hwDi= .171ft Lbw= 40.0ft Hev= .00ft
1406.71	.15	Free Outfall	BACKWATER CONTROL.. Vh= .037ft hwDi= .213ft Lbw= 40.0ft Hev= .00ft
1406.76	.21	Free Outfall	BACKWATER CONTROL.. Vh= .044ft hwDi= .256ft Lbw= 40.0ft Hev= .00ft
1406.81	.28	Free Outfall	BACKWATER CONTROL.. Vh= .052ft hwDi= .299ft Lbw= 40.0ft Hev= .00ft
1406.86	.35	Free Outfall	BACKWATER CONTROL.. Vh= .059ft hwDi= .341ft Lbw= 40.0ft Hev= .00ft
1406.91	.43	Free Outfall	BACKWATER CONTROL.. Vh= .066ft hwDi= .384ft Lbw= 40.0ft Hev= .00ft

RATING TABLE FOR ONE OUTLET TYPE

Structure ID = C0 (Culvert-Circular)

Mannings open channel maximum capacity: .71 cfs

Upstream ID = (Pond Water Surface)

DNstream ID = TW (Pond Outfall)

WS Elev, Device Q	Tail Water	Notes
WS Elev. ft	Q cfs	TW Elev Converge ft +/-ft Computation Messages
1406.96	.51	Free Outfall
		INLET CONTROL... Equ.2: HW = .50
1407.01	.59	Free Outfall
		INLET CONTROL... Equ.2: HW = .55
1407.06	.67	Free Outfall
		INLET CONTROL... Equ.2: HW = .60
1407.11	.76	Free Outfall
		BACKWATER CONTROL.. Vh= .092ft hwDi= .559ft Lbw= 40.0ft Hev= .00ft
1407.16	.84	Free Outfall
		BACKWATER CONTROL.. Vh= .099ft hwDi= .601ft Lbw= 40.0ft Hev= .00ft
1407.21	.91	Free Outfall
		BACKWATER CONTROL.. Vh= .107ft hwDi= .643ft Lbw= 40.0ft Hev= .00ft
1407.26	.96	Free Outfall
		FULL FLOW...Lfull=4.91ft Vh=.118ft HL=.149ft Hev= .00ft
1407.31	1.01	Free Outfall
		FULL FLOW...Lfull=13.38ft Vh=.130ft HL=.224ft Hev= .00ft
1407.36	1.06	Free Outfall
		FULL FLOW...Lfull=19.28ft Vh=.143ft HL=.292ft Hev= .00ft
1407.41	1.10	Free Outfall
		FULL FLOW...Lfull=23.68ft Vh=.156ft HL=.355ft Hev= .00ft
1407.46	1.15	Free Outfall
		FULL FLOW...Lfull=26.94ft Vh=.169ft HL=.414ft Hev= .00ft
1407.51	1.19	Free Outfall
		FULL FLOW...Lfull=29.53ft Vh=.183ft HL=.473ft Hev= .00ft
1407.56	1.24	Free Outfall
		FULL FLOW...Lfull=31.71ft Vh=.196ft HL=.530ft Hev= .00ft
1407.61	1.29	Free Outfall
		FULL FLOW...Lfull=32.14ft Vh=.213ft HL=.580ft Hev= .00ft
1407.66	1.33	Free Outfall
		FULL FLOW...Lfull=33.44ft Vh=.227ft HL=.634ft Hev= .00ft
1407.71	1.37	Free Outfall
		FULL FLOW...Lfull=34.49ft Vh=.241ft HL=.688ft Hev= .00ft
1407.76	1.41	Free Outfall
		FULL FLOW...Lfull=35.33ft Vh=.255ft HL=.740ft Hev= .00ft

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RATING TABLE FOR ONE OUTLET TYPE

Structure ID = C0 (Culvert-Circular)

Mannings open channel maximum capacity: .71 cfs

Upstream ID = (Pond Water Surface)

DNstream ID = TW (Pond Outfall)

WS Elev, Device Q	Tail Water	Notes
WS Elev. ft	Q cfs	TW Elev Converge ft +/-ft Computation Messages
1407.81	1.45	Free Outfall FULL FLOW...Lfull=35.94ft Vh=.270ft HL=.792ft Hev= .00ft
1407.86	1.49	Free Outfall FULL FLOW...Lfull=36.57ft Vh=.284ft HL=.843ft Hev= .00ft
1407.91	1.53	Free Outfall FULL FLOW...Lfull=36.95ft Vh=.299ft HL=.894ft Hev= .00ft
1407.96	1.57	Free Outfall FULL FLOW...Lfull=37.46ft Vh=.314ft HL=.947ft Hev= .00ft
1408.01	1.60	Free Outfall FULL FLOW...Lfull=37.74ft Vh=.329ft HL=.997ft Hev= .00ft
1408.06	1.64	Free Outfall FULL FLOW...Lfull=37.97ft Vh=.345ft HL=1.048ft Hev= .00ft
1408.11	1.67	Free Outfall FULL FLOW...Lfull=38.69ft Vh=.357ft HL=1.101ft Hev= .00ft
1408.16	1.71	Free Outfall FULL FLOW...Lfull=38.78ft Vh=.373ft HL=1.150ft Hev= .00ft
1408.21	1.74	Free Outfall FULL FLOW...Lfull=38.82ft Vh=.389ft HL=1.201ft Hev= .00ft
1408.26	1.78	Free Outfall FULL FLOW...Lfull=38.90ft Vh=.405ft HL=1.251ft Hev= .00ft
1408.31	1.81	Free Outfall FULL FLOW...Lfull=38.96ft Vh=.421ft HL=1.302ft Hev= .00ft
1408.36	1.85	Free Outfall FULL FLOW...Lfull=39.01ft Vh=.436ft HL=1.352ft Hev= .00ft
1408.41	1.88	Free Outfall FULL FLOW...Lfull=39.11ft Vh=.452ft HL=1.402ft Hev= .00ft
1408.46	1.91	Free Outfall FULL FLOW...Lfull=39.17ft Vh=.468ft HL=1.452ft Hev= .00ft
1408.51	1.94	Free Outfall FULL FLOW...Lfull=39.26ft Vh=.483ft HL=1.502ft Hev= .00ft
1408.56	1.97	Free Outfall FULL FLOW...Lfull=39.33ft Vh=.498ft HL=1.551ft Hev= .00ft
1408.61	2.00	Free Outfall FULL FLOW...Lfull=39.38ft Vh=.514ft HL=1.602ft Hev= .00ft

RATING TABLE FOR ONE OUTLET TYPE

Structure ID = C0 (Culvert-Circular)

Mannings open channel maximum capacity: .71 cfs

Upstream ID = (Pond Water Surface)

DNstream ID = TW (Pond Outfall)

WS Elev, Device	Q	Tail Water	Notes		
WS Elev. ft	Q cfs	TW Elev ft	Converge +/-ft	Computation Messages	
1408.66	2.03	Free Outfall			
		FULL FLOW...Lfull=39.49ft	Vh=.529ft	HL=1.652ft	Hev= .00ft
1408.71	2.06	Free Outfall			
		FULL FLOW...Lfull=39.51ft	Vh=.545ft	HL=1.703ft	Hev= .00ft
1408.76	2.09	Free Outfall			
		FULL FLOW...Lfull=39.55ft	Vh=.561ft	HL=1.753ft	Hev= .00ft
1408.81	2.12	Free Outfall			
		FULL FLOW...Lfull=39.56ft	Vh=.577ft	HL=1.803ft	Hev= .00ft
1408.86	2.15	Free Outfall			
		FULL FLOW...Lfull=39.60ft	Vh=.592ft	HL=1.853ft	Hev= .00ft
1408.91	2.18	Free Outfall			
		FULL FLOW...Lfull=39.74ft	Vh=.607ft	HL=1.903ft	Hev= .00ft
1408.96	2.20	Free Outfall			
		FULL FLOW...Lfull=39.74ft	Vh=.623ft	HL=1.953ft	Hev= .00ft
1409.01	2.23	Free Outfall			
		FULL FLOW...Lfull=39.75ft	Vh=.639ft	HL=2.004ft	Hev= .00ft
1409.06	2.26	Free Outfall			
		FULL FLOW...Lfull=39.77ft	Vh=.654ft	HL=2.054ft	Hev= .00ft
1409.11	2.29	Free Outfall			
		FULL FLOW...Lfull=39.77ft	Vh=.670ft	HL=2.103ft	Hev= .00ft
1409.16	2.31	Free Outfall			
		FULL FLOW...Lfull=39.78ft	Vh=.686ft	HL=2.153ft	Hev= .00ft
1409.21	2.34	Free Outfall			
		FULL FLOW...Lfull=39.78ft	Vh=.702ft	HL=2.203ft	Hev= .00ft
1409.26	2.37	Free Outfall			
		FULL FLOW...Lfull=39.79ft	Vh=.718ft	HL=2.253ft	Hev= .00ft
1409.31	2.39	Free Outfall			
		FULL FLOW...Lfull=39.80ft	Vh=.734ft	HL=2.304ft	Hev= .00ft
1409.36	2.42	Free Outfall			
		FULL FLOW...Lfull=39.81ft	Vh=.749ft	HL=2.353ft	Hev= .00ft
1409.41	2.44	Free Outfall			
		FULL FLOW...Lfull=39.82ft	Vh=.765ft	HL=2.404ft	Hev= .00ft
1409.46	2.47	Free Outfall			
		FULL FLOW...Lfull=39.83ft	Vh=.781ft	HL=2.453ft	Hev= .00ft

RATING TABLE FOR ONE OUTLET TYPE

Structure ID = C0 (Culvert-Circular)

Mannings open channel maximum capacity: .71 cfs

Upstream ID = (Pond Water Surface)

DNstream ID = TW (Pond Outfall)

WS Elev, Device Q	Tail Water	Notes
WS Elev. ft	Q cfs	TW Elev Converge ft +/-ft Computation Messages
1409.51	2.49	Free Outfall
		FULL FLOW...Lfull=39.83ft Vh=.797ft HL=2.504ft Hev= .00ft
1409.56	2.52	Free Outfall
		FULL FLOW...Lfull=39.85ft Vh=.812ft HL=2.553ft Hev= .00ft
1409.61	2.54	Free Outfall
		FULL FLOW...Lfull=39.86ft Vh=.828ft HL=2.604ft Hev= .00ft
1409.66	2.57	Free Outfall
		FULL FLOW...Lfull=39.86ft Vh=.844ft HL=2.653ft Hev= .00ft
1409.71	2.59	Free Outfall
		FULL FLOW...Lfull=39.87ft Vh=.860ft HL=2.705ft Hev= .00ft
1409.76	2.62	Free Outfall
		FULL FLOW...Lfull=39.88ft Vh=.876ft HL=2.754ft Hev= .00ft
1409.81	2.64	Free Outfall
		FULL FLOW...Lfull=39.89ft Vh=.891ft HL=2.803ft Hev= .00ft
1409.86	2.66	Free Outfall
		FULL FLOW...Lfull=39.91ft Vh=.907ft HL=2.854ft Hev= .00ft
1409.91	2.68	Free Outfall
		FULL FLOW...Lfull=39.91ft Vh=.923ft HL=2.903ft Hev= .00ft
1409.96	2.71	Free Outfall
		FULL FLOW...Lfull=39.91ft Vh=.939ft HL=2.955ft Hev= .00ft
1410.00	2.73	Free Outfall
		FULL FLOW...Lfull=39.91ft Vh=.952ft HL=2.994ft Hev= .00ft

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

WS Elev, Total Q		Converge		Notes
Elev. ft	Q cfs	TW Elev ft	Error +/-ft	Contributing Structures
1406.11	.00	Free Outfall		None contributing
1406.16	.01	Free Outfall		C1
1406.21	.02	Free Outfall		C1
1406.26	.05	Free Outfall		C1
1406.31	.09	Free Outfall		C1
1406.36	.13	Free Outfall		C1
1406.41	.17	Free Outfall		C1
1406.46	.22	Free Outfall		C1
1406.51	.28	Free Outfall		C1 +C0
1406.56	.35	Free Outfall		C1 +C0
1406.61	.44	Free Outfall		C1 +C0
1406.66	.55	Free Outfall		C1 +C0
1406.71	.67	Free Outfall		C1 +C0
1406.76	.82	Free Outfall		C1 +C0
1406.81	.93	Free Outfall		C1 +C0
1406.86	1.02	Free Outfall		C1 +C0
1406.91	1.12	Free Outfall		C1 +C0
1406.96	1.22	Free Outfall		C1 +C0
1407.01	1.32	Free Outfall		C1 +C0
1407.06	1.43	Free Outfall		C1 +C0
1407.11	1.53	Free Outfall		C1 +C0
1407.16	1.63	Free Outfall		C1 +C0
1407.21	1.72	Free Outfall		C1 +C0
1407.26	1.79	Free Outfall		C1 +C0
1407.31	1.86	Free Outfall		C1 +C0
1407.36	1.92	Free Outfall		C1 +C0
1407.41	1.99	Free Outfall		C1 +C0
1407.46	2.05	Free Outfall		C1 +C0
1407.51	2.11	Free Outfall		C1 +C0
1407.56	2.17	Free Outfall		C1 +C0
1407.61	2.24	Free Outfall		C1 +C0
1407.66	2.30	Free Outfall		C1 +C0
1407.71	2.36	Free Outfall		C1 +C0
1407.76	2.42	Free Outfall		C1 +C0
1407.81	2.47	Free Outfall		C1 +C0
1407.86	2.53	Free Outfall		C1 +C0
1407.91	2.58	Free Outfall		C1 +C0
1407.96	2.63	Free Outfall		C1 +C0

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

WS Elev, Total Q		Converge		Notes
Elev. ft	Q cfs	TW Elev ft	Error +/-ft	Contributing Structures
1408.01	2.69	Free	Outfall	C1 +C0
1408.06	2.74	Free	Outfall	C1 +C0
1408.11	2.78	Free	Outfall	C1 +C0
1408.16	2.83	Free	Outfall	C1 +C0
1408.21	2.89	Free	Outfall	C1 +C0
1408.26	2.93	Free	Outfall	C1 +C0
1408.31	2.98	Free	Outfall	C1 +C0
1408.36	3.03	Free	Outfall	C1 +C0
1408.41	3.08	Free	Outfall	C1 +C0
1408.46	3.12	Free	Outfall	C1 +C0
1408.51	3.17	Free	Outfall	C1 +C0
1408.56	3.21	Free	Outfall	C1 +C0
1408.61	3.26	Free	Outfall	C1 +C0
1408.66	3.30	Free	Outfall	C1 +C0
1408.71	3.34	Free	Outfall	C1 +C0
1408.76	3.38	Free	Outfall	C1 +C0
1408.81	3.43	Free	Outfall	C1 +C0
1408.86	3.47	Free	Outfall	C1 +C0
1408.91	3.51	Free	Outfall	C1 +C0
1408.96	3.55	Free	Outfall	C1 +C0
1409.01	3.59	Free	Outfall	C1 +C0
1409.06	3.63	Free	Outfall	C1 +C0
1409.11	3.66	Free	Outfall	C1 +C0
1409.16	3.70	Free	Outfall	C1 +C0
1409.21	3.74	Free	Outfall	C1 +C0
1409.26	3.78	Free	Outfall	C1 +C0
1409.31	3.82	Free	Outfall	C1 +C0
1409.36	3.85	Free	Outfall	C1 +C0
1409.41	3.89	Free	Outfall	C1 +C0
1409.46	3.93	Free	Outfall	C1 +C0
1409.51	3.96	Free	Outfall	C1 +C0
1409.56	4.00	Free	Outfall	C1 +C0
1409.61	4.03	Free	Outfall	C1 +C0
1409.66	4.07	Free	Outfall	C1 +C0
1409.71	4.11	Free	Outfall	C1 +C0
1409.76	4.14	Free	Outfall	C1 +C0
1409.81	4.17	Free	Outfall	C1 +C0
1409.86	4.21	Free	Outfall	C1 +C0

Type.... Composite Rating Curve
Name.... Outlet 1

File.... C:\Documents and Settings\aw2758\Desktop\University church\pondpack\Existing pond

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

WS Elev, Total Q		Converge		Notes
Elev. ft	Q cfs	TW Elev ft	Error +/-ft	Contributing Structures
1409.91	4.24	Free Outfall		C1 +C0
1409.96	4.28	Free Outfall		C1 +C0
1410.00	4.30	Free Outfall		C1 +C0

Name.... post out 1

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REQUESTED POND WS ELEVATIONS:

Min. Elev.= 1406.11 ft
Increment = .05 ft
Max. Elev.= 1410.00 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
Culvert-Circular	C1	----> TW	1406.110	1410.000
Culvert-Circular	C0	----> TW	1406.460	1410.000

TW SETUP, DS Channel

Type.... Outlet Input Data
Name.... post out 1

File.... C:\Documents and Settings\aw2758\Desktop\University church\pondpack\Existing pond

OUTLET STRUCTURE INPUT DATA

Structure ID = C1
Structure Type = Culvert-Circular

No. Barrels = 1
Barrel Diameter = .5000 ft
Upstream Invert = 1406.11 ft
Dnstream Invert = 1405.74 ft
Horiz. Length = 35.00 ft
Barrel Length = 35.00 ft
Barrel Slope = .01057 ft/ft

OUTLET CONTROL DATA...

Mannings n = .0130
Ke = .0000 (forward entrance loss)
Kb = .078805 (per ft of full flow)
Kr = 1.0000 (reverse entrance loss)
HW Convergence = .001 +/- ft

INLET CONTROL DATA...

Equation form = 2
Inlet Control K = .5190
Inlet Control M = .6400
Inlet Control c = .02100
Inlet Control Y = .9000
T1 ratio (HW/D) = 1.157
T2 ratio (HW/D) = 1.231
Slope Factor = -.500

Use unsubmerged inlet control Form 2 equ. below T1 elev.
Use submerged inlet control Form 2 equ. above T2 elev.

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

At T1 Elev = 1406.69 ft ---> Flow = .49 cfs
At T2 Elev = 1406.73 ft ---> Flow = .56 cfs

Type.... Outlet Input Data
Name.... post out 1

File.... C:\Documents and Settings\aw2758\Desktop\University church\pondpack\Existing pond

OUTLET STRUCTURE INPUT DATA

Structure ID = C0
Structure Type = Culvert-Circular

No. Barrels = 1
Barrel Diameter = .6660 ft
Upstream Invert = 1406.46 ft
Dnstream Invert = 1406.34 ft
Horiz. Length = 40.00 ft
Barrel Length = 40.00 ft
Barrel Slope = .00300 ft/ft

OUTLET CONTROL DATA...

Mannings n = .0130
Ke = .0000 (forward entrance loss)
Kb = .053771 (per ft of full flow)
Kr = .5000 (reverse entrance loss)
HW Convergence = .001 +/- ft

INLET CONTROL DATA...

Equation form = 2
Inlet Control K = .5190
Inlet Control M = .6400
Inlet Control c = .02100
Inlet Control Y = .9000
T1 ratio (HW/D) = 1.157
T2 ratio (HW/D) = 1.235
Slope Factor = -.500

Use unsubmerged inlet control Form 2 equ. below T1 elev.
Use submerged inlet control Form 2 equ. above T2 elev.

In transition zone between unsubmerged and submerged inlet control,
interpolate between flows at T1 & T2...
At T1 Elev = 1407.23 ft ---> Flow = 1.00 cfs
At T2 Elev = 1407.28 ft ---> Flow = 1.14 cfs

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

RATING TABLE FOR ONE OUTLET TYPE

Structure ID = C1 (Culvert-Circular)

Mannings open channel maximum capacity: .62 cfs

Upstream ID = (Pond Water Surface)

DNstream ID = TW (Pond Outfall)

WS Elev, Device Q	Tail Water	Notes
WS Elev. ft	Q cfs	TW Elev Converge ft +/-ft
Computation Messages		
1406.11	.00	Free Outfall Upstream HW & DNstream TW < Inv.El
1406.16	.01	Free Outfall CRIT.DEPTH CONTROL Vh= .013ft Dcr= .039ft CRIT.DEPTH Hev= .00ft
1406.21	.02	Free Outfall CRIT.DEPTH CONTROL Vh= .026ft Dcr= .074ft CRIT.DEPTH Hev= .00ft
1406.26	.05	Free Outfall CRIT.DEPTH CONTROL Vh= .039ft Dcr= .111ft CRIT.DEPTH Hev= .00ft
1406.31	.09	Free Outfall CRIT.DEPTH CONTROL Vh= .053ft Dcr= .146ft CRIT.DEPTH Hev= .00ft
1406.36	.13	Free Outfall INLET CONTROL... Equ.2: HW =.25
1406.41	.17	Free Outfall INLET CONTROL... Equ.2: HW =.30
1406.46	.22	Free Outfall INLET CONTROL... Equ.2: HW =.35
1406.51	.27	Free Outfall INLET CONTROL... Equ.2: HW =.40
1406.56	.33	Free Outfall INLET CONTROL... Equ.2: HW =.45
1406.61	.39	Free Outfall INLET CONTROL... Equ.2: HW =.50
1406.66	.45	Free Outfall INLET CONTROL... Equ.2: HW =.55
1406.71	.53	Free Outfall INLET CONTROL... Transition: HW =.60
1406.76	.61	Free Outfall INLET CONTROL... Submerged: HW =.65
1406.81	.65	Free Outfall FULL FLOW...Lfull=9.93ft Vh=.172ft HL=.306ft Hev= .00ft
1406.86	.67	Free Outfall FULL FLOW...Lfull=20.03ft Vh=.181ft HL=.466ft Hev= .00ft
1406.91	.69	Free Outfall FULL FLOW...Lfull=24.42ft Vh=.191ft HL=.557ft Hev= .00ft

Name.... post out 1

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RATING TABLE FOR ONE OUTLET TYPE

Structure ID = C1 (Culvert-Circular)

Mannings open channel maximum capacity: .62 cfs

Upstream ID = (Pond Water Surface)

DNstream ID = TW (Pond Outfall)

WS Elev, Device Q	Tail Water	Notes
WS Elev. ft	Q cfs	TW Elev Converge ft +/-ft Computation Messages
1406.96	.71	Free Outfall
		FULL FLOW...Lfull=26.54ft Vh=.204ft HL=.630ft Hev= .00ft
1407.01	.73	Free Outfall
		FULL FLOW...Lfull=28.78ft Vh=.215ft HL=.704ft Hev= .00ft
1407.06	.75	Free Outfall
		FULL FLOW...Lfull=30.17ft Vh=.228ft HL=.769ft Hev= .00ft
1407.11	.77	Free Outfall
		FULL FLOW...Lfull=31.20ft Vh=.240ft HL=.829ft Hev= .00ft
1407.16	.79	Free Outfall
		FULL FLOW...Lfull=31.96ft Vh=.252ft HL=.888ft Hev= .00ft
1407.21	.81	Free Outfall
		FULL FLOW...Lfull=32.58ft Vh=.265ft HL=.945ft Hev= .00ft
1407.26	.83	Free Outfall
		FULL FLOW...Lfull=32.97ft Vh=.277ft HL=.998ft Hev= .00ft
1407.31	.85	Free Outfall
		FULL FLOW...Lfull=33.71ft Vh=.289ft HL=1.055ft Hev= .00ft
1407.36	.87	Free Outfall
		FULL FLOW...Lfull=33.81ft Vh=.302ft HL=1.107ft Hev= .00ft
1407.41	.88	Free Outfall
		FULL FLOW...Lfull=33.90ft Vh=.316ft HL=1.159ft Hev= .00ft
1407.46	.90	Free Outfall
		FULL FLOW...Lfull=33.98ft Vh=.329ft HL=1.210ft Hev= .00ft
1407.51	.92	Free Outfall
		FULL FLOW...Lfull=34.06ft Vh=.342ft HL=1.259ft Hev= .00ft
1407.56	.94	Free Outfall
		FULL FLOW...Lfull=34.18ft Vh=.355ft HL=1.311ft Hev= .00ft
1407.61	.96	Free Outfall
		FULL FLOW...Lfull=34.28ft Vh=.368ft HL=1.363ft Hev= .00ft
1407.66	.97	Free Outfall
		FULL FLOW...Lfull=34.36ft Vh=.381ft HL=1.412ft Hev= .00ft
1407.71	.99	Free Outfall
		FULL FLOW...Lfull=34.49ft Vh=.394ft HL=1.464ft Hev= .00ft
1407.76	1.01	Free Outfall
		FULL FLOW...Lfull=34.52ft Vh=.407ft HL=1.515ft Hev= .00ft

Name.... post out 1

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RATING TABLE FOR ONE OUTLET TYPE

Structure ID = C1 (Culvert-Circular)

Mannings open channel maximum capacity: .62 cfs

Upstream ID = (Pond Water Surface)

DNstream ID = TW (Pond Outfall)

WS Elev, Device	Q	Tail Water	Notes		
WS Elev. ft	Q cfs	TW Elev ft	Converge +/-ft	Computation Messages	
1407.81	1.02	Free Outfall			
		FULL FLOW...Lfull=34.56ft	Vh=.421ft	HL=1.566ft	Hev= .00ft
1407.86	1.04	Free Outfall			
		FULL FLOW...Lfull=34.59ft	Vh=.433ft	HL=1.615ft	Hev= .00ft
1407.91	1.05	Free Outfall			
		FULL FLOW...Lfull=34.74ft	Vh=.446ft	HL=1.667ft	Hev= .00ft
1407.96	1.07	Free Outfall			
		FULL FLOW...Lfull=34.75ft	Vh=.459ft	HL=1.716ft	Hev= .00ft
1408.01	1.08	Free Outfall			
		FULL FLOW...Lfull=34.75ft	Vh=.473ft	HL=1.767ft	Hev= .00ft
1408.06	1.10	Free Outfall			
		FULL FLOW...Lfull=34.77ft	Vh=.486ft	HL=1.818ft	Hev= .00ft
1408.11	1.11	Free Outfall			
		FULL FLOW...Lfull=34.78ft	Vh=.499ft	HL=1.868ft	Hev= .00ft
1408.16	1.13	Free Outfall			
		FULL FLOW...Lfull=34.79ft	Vh=.513ft	HL=1.918ft	Hev= .00ft
1408.21	1.14	Free Outfall			
		FULL FLOW...Lfull=34.80ft	Vh=.526ft	HL=1.968ft	Hev= .00ft
1408.26	1.16	Free Outfall			
		FULL FLOW...Lfull=34.82ft	Vh=.539ft	HL=2.018ft	Hev= .00ft
1408.31	1.17	Free Outfall			
		FULL FLOW...Lfull=34.82ft	Vh=.552ft	HL=2.067ft	Hev= .00ft
1408.36	1.18	Free Outfall			
		FULL FLOW...Lfull=34.84ft	Vh=.565ft	HL=2.117ft	Hev= .00ft
1408.41	1.20	Free Outfall			
		FULL FLOW...Lfull=34.85ft	Vh=.579ft	HL=2.167ft	Hev= .00ft
1408.46	1.21	Free Outfall			
		FULL FLOW...Lfull=34.86ft	Vh=.592ft	HL=2.218ft	Hev= .00ft
1408.51	1.23	Free Outfall			
		FULL FLOW...Lfull=34.87ft	Vh=.605ft	HL=2.268ft	Hev= .00ft
1408.56	1.24	Free Outfall			
		FULL FLOW...Lfull=34.88ft	Vh=.619ft	HL=2.319ft	Hev= .00ft
1408.61	1.25	Free Outfall			
		FULL FLOW...Lfull=34.89ft	Vh=.632ft	HL=2.369ft	Hev= .00ft

Name.... post out 1

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RATING TABLE FOR ONE OUTLET TYPE

Structure ID = C1 (Culvert-Circular)

Mannings open channel maximum capacity: .62 cfs

Upstream ID = (Pond Water Surface)

DNstream ID = TW (Pond Outfall)

WS Elev, Device	Q	Tail Water	Notes
WS Elev. ft	Q cfs	TW Elev Converge ft +/-ft	Computation Messages
1408.66	1.26	Free Outfall	
		FULL FLOW...Lfull=34.90ft	Vh=.645ft HL=2.418ft Hev= .00ft
1408.71	1.28	Free Outfall	
		FULL FLOW...Lfull=34.91ft	Vh=.658ft HL=2.469ft Hev= .00ft
1408.76	1.29	Free Outfall	
		FULL FLOW...Lfull=34.91ft	Vh=.672ft HL=2.519ft Hev= .00ft
1408.81	1.30	Free Outfall	
		FULL FLOW...Lfull=34.92ft	Vh=.685ft HL=2.570ft Hev= .00ft
1408.86	1.32	Free Outfall	
		FULL FLOW...Lfull=34.92ft	Vh=.698ft HL=2.618ft Hev= .00ft
1408.91	1.33	Free Outfall	
		FULL FLOW...Lfull=34.92ft	Vh=.712ft HL=2.670ft Hev= .00ft
1408.96	1.34	Free Outfall	
		FULL FLOW...Lfull=34.95ft	Vh=.724ft HL=2.719ft Hev= .00ft
1409.01	1.35	Free Outfall	
		FULL FLOW...Lfull=34.95ft	Vh=.737ft HL=2.769ft Hev= .00ft
1409.06	1.36	Free Outfall	
		FULL FLOW...Lfull=34.95ft	Vh=.751ft HL=2.819ft Hev= .00ft
1409.11	1.38	Free Outfall	
		FULL FLOW...Lfull=34.95ft	Vh=.764ft HL=2.870ft Hev= .00ft
1409.16	1.39	Free Outfall	
		FULL FLOW...Lfull=34.95ft	Vh=.778ft HL=2.920ft Hev= .00ft
1409.21	1.40	Free Outfall	
		FULL FLOW...Lfull=34.95ft	Vh=.791ft HL=2.970ft Hev= .00ft
1409.26	1.41	Free Outfall	
		FULL FLOW...Lfull=34.95ft	Vh=.804ft HL=3.019ft Hev= .00ft
1409.31	1.42	Free Outfall	
		FULL FLOW...Lfull=34.96ft	Vh=.818ft HL=3.069ft Hev= .00ft
1409.36	1.44	Free Outfall	
		FULL FLOW...Lfull=34.96ft	Vh=.831ft HL=3.120ft Hev= .00ft
1409.41	1.45	Free Outfall	
		FULL FLOW...Lfull=34.96ft	Vh=.844ft HL=3.170ft Hev= .00ft
1409.46	1.46	Free Outfall	
		FULL FLOW...Lfull=34.96ft	Vh=.857ft HL=3.219ft Hev= .00ft

RATING TABLE FOR ONE OUTLET TYPE

Structure ID = C1 (Culvert-Circular)

Mannings open channel maximum capacity: .62 cfs

Upstream ID = (Pond Water Surface)

DNstream ID = TW (Pond Outfall)

WS Elev, Device Q	Tail Water	Notes
WS Elev. ft	Q cfs	TW Elev Converge ft +/-ft Computation Messages
1409.51	1.47	Free Outfall FULL FLOW...Lfull=34.96ft Vh=.871ft HL=3.269ft Hev= .00ft
1409.56	1.48	Free Outfall FULL FLOW...Lfull=34.98ft Vh=.884ft HL=3.319ft Hev= .00ft
1409.61	1.49	Free Outfall FULL FLOW...Lfull=34.98ft Vh=.897ft HL=3.369ft Hev= .00ft
1409.66	1.50	Free Outfall FULL FLOW...Lfull=34.98ft Vh=.910ft HL=3.419ft Hev= .00ft
1409.71	1.51	Free Outfall FULL FLOW...Lfull=34.98ft Vh=.923ft HL=3.469ft Hev= .00ft
1409.76	1.52	Free Outfall FULL FLOW...Lfull=34.98ft Vh=.937ft HL=3.520ft Hev= .00ft
1409.81	1.54	Free Outfall FULL FLOW...Lfull=34.98ft Vh=.950ft HL=3.570ft Hev= .00ft
1409.86	1.55	Free Outfall FULL FLOW...Lfull=34.98ft Vh=.964ft HL=3.620ft Hev= .00ft
1409.91	1.56	Free Outfall FULL FLOW...Lfull=34.98ft Vh=.977ft HL=3.670ft Hev= .00ft
1409.96	1.57	Free Outfall FULL FLOW...Lfull=34.98ft Vh=.990ft HL=3.719ft Hev= .00ft
1410.00	1.58	Free Outfall FULL FLOW...Lfull=34.98ft Vh=1.001ft HL=3.760ft Hev= .00ft

RATING TABLE FOR ONE OUTLET TYPE

Structure ID = C0 (Culvert-Circular)

Mannings open channel maximum capacity: .71 cfs

Upstream ID = (Pond Water Surface)

DNstream ID = TW (Pond Outfall)

WS Elev, Device	Q	Tail Water	Notes
WS Elev. ft	Q cfs	TW Elev ft	Converge +/-ft Computation Messages
1406.11	.00	Free Outfall	
		Upstream HW & DNstream TW <	Inv.El
1406.16	.00	Free Outfall	
		Upstream HW & DNstream TW <	Inv.El
1406.21	.00	Free Outfall	
		Upstream HW & DNstream TW <	Inv.El
1406.26	.00	Free Outfall	
		Upstream HW & DNstream TW <	Inv.El
1406.31	.00	Free Outfall	
		Upstream HW & DNstream TW <	Inv.El
1406.36	.00	Free Outfall	
		Upstream HW & DNstream TW <	Inv.El
1406.41	.00	Free Outfall	
		Upstream HW & DNstream TW <	Inv.El
1406.46	.00	Free Outfall	
		Upstream HW & DNstream TW <	Inv.El
1406.51	.01	Free Outfall	
		BACKWATER CONTROL.. Vh=	.005ft hwDi= .046ft Lbw= 40.0ft Hev= .00ft
1406.56	.02	Free Outfall	
		BACKWATER CONTROL.. Vh=	.012ft hwDi= .088ft Lbw= 40.0ft Hev= .00ft
1406.61	.05	Free Outfall	
		BACKWATER CONTROL.. Vh=	.020ft hwDi= .130ft Lbw= 40.0ft Hev= .00ft
1406.66	.10	Free Outfall	
		BACKWATER CONTROL.. Vh=	.029ft hwDi= .171ft Lbw= 40.0ft Hev= .00ft
1406.71	.15	Free Outfall	
		BACKWATER CONTROL.. Vh=	.037ft hwDi= .213ft Lbw= 40.0ft Hev= .00ft
1406.76	.21	Free Outfall	
		BACKWATER CONTROL.. Vh=	.044ft hwDi= .256ft Lbw= 40.0ft Hev= .00ft
1406.81	.28	Free Outfall	
		BACKWATER CONTROL.. Vh=	.052ft hwDi= .299ft Lbw= 40.0ft Hev= .00ft
1406.86	.35	Free Outfall	
		BACKWATER CONTROL.. Vh=	.059ft hwDi= .341ft Lbw= 40.0ft Hev= .00ft
1406.91	.43	Free Outfall	
		BACKWATER CONTROL.. Vh=	.066ft hwDi= .384ft Lbw= 40.0ft Hev= .00ft

RATING TABLE FOR ONE OUTLET TYPE

Structure ID = C0 (Culvert-Circular)

Mannings open channel maximum capacity: .71 cfs

Upstream ID = (Pond Water Surface)

DNstream ID = TW (Pond Outfall)

WS Elev, Device Q	Tail Water	Notes
WS Elev. ft	Q cfs	TW Elev Converge ft +/-ft
Computation Messages		
1406.96	.51	Free Outfall
		INLET CONTROL... Equ.2: HW = .50
1407.01	.59	Free Outfall
		INLET CONTROL... Equ.2: HW = .55
1407.06	.67	Free Outfall
		INLET CONTROL... Equ.2: HW = .60
1407.11	.76	Free Outfall
		BACKWATER CONTROL.. Vh= .092ft hwDi= .559ft Lbw= 40.0ft Hev= .00ft
1407.16	.84	Free Outfall
		BACKWATER CONTROL.. Vh= .099ft hwDi= .601ft Lbw= 40.0ft Hev= .00ft
1407.21	.91	Free Outfall
		BACKWATER CONTROL.. Vh= .107ft hwDi= .643ft Lbw= 40.0ft Hev= .00ft
1407.26	.96	Free Outfall
		FULL FLOW...Lfull=4.91ft Vh=.118ft HL=.149ft Hev= .00ft
1407.31	1.01	Free Outfall
		FULL FLOW...Lfull=13.38ft Vh=.130ft HL=.224ft Hev= .00ft
1407.36	1.06	Free Outfall
		FULL FLOW...Lfull=19.28ft Vh=.143ft HL=.292ft Hev= .00ft
1407.41	1.10	Free Outfall
		FULL FLOW...Lfull=23.68ft Vh=.156ft HL=.355ft Hev= .00ft
1407.46	1.15	Free Outfall
		FULL FLOW...Lfull=26.94ft Vh=.169ft HL=.414ft Hev= .00ft
1407.51	1.19	Free Outfall
		FULL FLOW...Lfull=29.53ft Vh=.183ft HL=.473ft Hev= .00ft
1407.56	1.24	Free Outfall
		FULL FLOW...Lfull=31.71ft Vh=.196ft HL=.530ft Hev= .00ft
1407.61	1.29	Free Outfall
		FULL FLOW...Lfull=32.14ft Vh=.213ft HL=.580ft Hev= .00ft
1407.66	1.33	Free Outfall
		FULL FLOW...Lfull=33.44ft Vh=.227ft HL=.634ft Hev= .00ft
1407.71	1.37	Free Outfall
		FULL FLOW...Lfull=34.49ft Vh=.241ft HL=.688ft Hev= .00ft
1407.76	1.41	Free Outfall
		FULL FLOW...Lfull=35.33ft Vh=.255ft HL=.740ft Hev= .00ft

RATING TABLE FOR ONE OUTLET TYPE

Structure ID = C0 (Culvert-Circular)

Mannings open channel maximum capacity: .71 cfs

Upstream ID = (Pond Water Surface)

DNstream ID = TW (Pond Outfall)

WS Elev, Device	Q	Tail Water	Notes		
WS Elev. ft	Q cfs	TW Elev ft	Converge +/-ft	Computation Messages	
1407.81	1.45	Free Outfall			
		FULL FLOW...Lfull=35.94ft	Vh=.270ft	HL=.792ft	Hev= .00ft
1407.86	1.49	Free Outfall			
		FULL FLOW...Lfull=36.57ft	Vh=.284ft	HL=.843ft	Hev= .00ft
1407.91	1.53	Free Outfall			
		FULL FLOW...Lfull=36.95ft	Vh=.299ft	HL=.894ft	Hev= .00ft
1407.96	1.57	Free Outfall			
		FULL FLOW...Lfull=37.46ft	Vh=.314ft	HL=.947ft	Hev= .00ft
1408.01	1.60	Free Outfall			
		FULL FLOW...Lfull=37.74ft	Vh=.329ft	HL=.997ft	Hev= .00ft
1408.06	1.64	Free Outfall			
		FULL FLOW...Lfull=37.97ft	Vh=.345ft	HL=1.048ft	Hev= .00ft
1408.11	1.67	Free Outfall			
		FULL FLOW...Lfull=38.69ft	Vh=.357ft	HL=1.101ft	Hev= .00ft
1408.16	1.71	Free Outfall			
		FULL FLOW...Lfull=38.78ft	Vh=.373ft	HL=1.150ft	Hev= .00ft
1408.21	1.74	Free Outfall			
		FULL FLOW...Lfull=38.82ft	Vh=.389ft	HL=1.201ft	Hev= .00ft
1408.26	1.78	Free Outfall			
		FULL FLOW...Lfull=38.90ft	Vh=.405ft	HL=1.251ft	Hev= .00ft
1408.31	1.81	Free Outfall			
		FULL FLOW...Lfull=38.96ft	Vh=.421ft	HL=1.302ft	Hev= .00ft
1408.36	1.85	Free Outfall			
		FULL FLOW...Lfull=39.01ft	Vh=.436ft	HL=1.352ft	Hev= .00ft
1408.41	1.88	Free Outfall			
		FULL FLOW...Lfull=39.11ft	Vh=.452ft	HL=1.402ft	Hev= .00ft
1408.46	1.91	Free Outfall			
		FULL FLOW...Lfull=39.17ft	Vh=.468ft	HL=1.452ft	Hev= .00ft
1408.51	1.94	Free Outfall			
		FULL FLOW...Lfull=39.26ft	Vh=.483ft	HL=1.502ft	Hev= .00ft
1408.56	1.97	Free Outfall			
		FULL FLOW...Lfull=39.33ft	Vh=.498ft	HL=1.551ft	Hev= .00ft
1408.61	2.00	Free Outfall			
		FULL FLOW...Lfull=39.38ft	Vh=.514ft	HL=1.602ft	Hev= .00ft

Name.... post out 1

File.... C:\Documents and Settings\aw2758\Desktop\University church\pondpack\Existing pond

RATING TABLE FOR ONE OUTLET TYPE

Structure ID = C0 (Culvert-Circular)

Mannings open channel maximum capacity: .71 cfs

Upstream ID = (Pond Water Surface)

DNstream ID = TW (Pond Outfall)

WS Elev, Device	Q	Tail Water	Notes		
WS Elev. ft	Q cfs	TW Elev ft	Converge +/-ft	Computation Messages	
1408.66	2.03	Free Outfall			
		FULL FLOW...Lfull=39.49ft	Vh=.529ft	HL=1.652ft	Hev= .00ft
1408.71	2.06	Free Outfall			
		FULL FLOW...Lfull=39.51ft	Vh=.545ft	HL=1.703ft	Hev= .00ft
1408.76	2.09	Free Outfall			
		FULL FLOW...Lfull=39.55ft	Vh=.561ft	HL=1.753ft	Hev= .00ft
1408.81	2.12	Free Outfall			
		FULL FLOW...Lfull=39.56ft	Vh=.577ft	HL=1.803ft	Hev= .00ft
1408.86	2.15	Free Outfall			
		FULL FLOW...Lfull=39.60ft	Vh=.592ft	HL=1.853ft	Hev= .00ft
1408.91	2.18	Free Outfall			
		FULL FLOW...Lfull=39.74ft	Vh=.607ft	HL=1.903ft	Hev= .00ft
1408.96	2.20	Free Outfall			
		FULL FLOW...Lfull=39.74ft	Vh=.623ft	HL=1.953ft	Hev= .00ft
1409.01	2.23	Free Outfall			
		FULL FLOW...Lfull=39.75ft	Vh=.639ft	HL=2.004ft	Hev= .00ft
1409.06	2.26	Free Outfall			
		FULL FLOW...Lfull=39.77ft	Vh=.654ft	HL=2.054ft	Hev= .00ft
1409.11	2.29	Free Outfall			
		FULL FLOW...Lfull=39.77ft	Vh=.670ft	HL=2.103ft	Hev= .00ft
1409.16	2.31	Free Outfall			
		FULL FLOW...Lfull=39.78ft	Vh=.686ft	HL=2.153ft	Hev= .00ft
1409.21	2.34	Free Outfall			
		FULL FLOW...Lfull=39.78ft	Vh=.702ft	HL=2.203ft	Hev= .00ft
1409.26	2.37	Free Outfall			
		FULL FLOW...Lfull=39.79ft	Vh=.718ft	HL=2.253ft	Hev= .00ft
1409.31	2.39	Free Outfall			
		FULL FLOW...Lfull=39.80ft	Vh=.734ft	HL=2.304ft	Hev= .00ft
1409.36	2.42	Free Outfall			
		FULL FLOW...Lfull=39.81ft	Vh=.749ft	HL=2.353ft	Hev= .00ft
1409.41	2.44	Free Outfall			
		FULL FLOW...Lfull=39.82ft	Vh=.765ft	HL=2.404ft	Hev= .00ft
1409.46	2.47	Free Outfall			
		FULL FLOW...Lfull=39.83ft	Vh=.781ft	HL=2.453ft	Hev= .00ft

Name.... post out 1

File.... C:\Documents and Settings\aw2758\Desktop\University church\pondpack\Existing pond

RATING TABLE FOR ONE OUTLET TYPE

Structure ID = C0 (Culvert-Circular)

Mannings open channel maximum capacity: .71 cfs

Upstream ID = (Pond Water Surface)

DNstream ID = TW (Pond Outfall)

WS Elev, Device	Q	Tail Water	Notes		
WS Elev. ft	Q cfs	TW Elev ft	Converge +/-ft	Computation Messages	
1409.51	2.49	Free Outfall			
		FULL FLOW...Lfull=39.83ft	Vh=.797ft	HL=2.504ft	Hev= .00ft
1409.56	2.52	Free Outfall			
		FULL FLOW...Lfull=39.85ft	Vh=.812ft	HL=2.553ft	Hev= .00ft
1409.61	2.54	Free Outfall			
		FULL FLOW...Lfull=39.86ft	Vh=.828ft	HL=2.604ft	Hev= .00ft
1409.66	2.57	Free Outfall			
		FULL FLOW...Lfull=39.86ft	Vh=.844ft	HL=2.653ft	Hev= .00ft
1409.71	2.59	Free Outfall			
		FULL FLOW...Lfull=39.87ft	Vh=.860ft	HL=2.705ft	Hev= .00ft
1409.76	2.62	Free Outfall			
		FULL FLOW...Lfull=39.88ft	Vh=.876ft	HL=2.754ft	Hev= .00ft
1409.81	2.64	Free Outfall			
		FULL FLOW...Lfull=39.89ft	Vh=.891ft	HL=2.803ft	Hev= .00ft
1409.86	2.66	Free Outfall			
		FULL FLOW...Lfull=39.91ft	Vh=.907ft	HL=2.854ft	Hev= .00ft
1409.91	2.68	Free Outfall			
		FULL FLOW...Lfull=39.91ft	Vh=.923ft	HL=2.903ft	Hev= .00ft
1409.96	2.71	Free Outfall			
		FULL FLOW...Lfull=39.91ft	Vh=.939ft	HL=2.955ft	Hev= .00ft
1410.00	2.73	Free Outfall			
		FULL FLOW...Lfull=39.91ft	Vh=.952ft	HL=2.994ft	Hev= .00ft

Name.... post out 1

File.... C:\Documents and Settings\aw2758\Desktop\University church\pondpack\Existing pond

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

WS Elev, Total Q		Converge		Notes
Elev. ft	Q cfs	TW Elev ft	Error +/-ft	Contributing Structures
1406.11	.00	Free Outfall		None contributing
1406.16	.01	Free Outfall		C1
1406.21	.02	Free Outfall		C1
1406.26	.05	Free Outfall		C1
1406.31	.09	Free Outfall		C1
1406.36	.13	Free Outfall		C1
1406.41	.17	Free Outfall		C1
1406.46	.22	Free Outfall		C1
1406.51	.28	Free Outfall		C1 +C0
1406.56	.35	Free Outfall		C1 +C0
1406.61	.44	Free Outfall		C1 +C0
1406.66	.55	Free Outfall		C1 +C0
1406.71	.67	Free Outfall		C1 +C0
1406.76	.82	Free Outfall		C1 +C0
1406.81	.93	Free Outfall		C1 +C0
1406.86	1.02	Free Outfall		C1 +C0
1406.91	1.12	Free Outfall		C1 +C0
1406.96	1.22	Free Outfall		C1 +C0
1407.01	1.32	Free Outfall		C1 +C0
1407.06	1.43	Free Outfall		C1 +C0
1407.11	1.53	Free Outfall		C1 +C0
1407.16	1.63	Free Outfall		C1 +C0
1407.21	1.72	Free Outfall		C1 +C0
1407.26	1.79	Free Outfall		C1 +C0
1407.31	1.86	Free Outfall		C1 +C0
1407.36	1.92	Free Outfall		C1 +C0
1407.41	1.99	Free Outfall		C1 +C0
1407.46	2.05	Free Outfall		C1 +C0
1407.51	2.11	Free Outfall		C1 +C0
1407.56	2.17	Free Outfall		C1 +C0
1407.61	2.24	Free Outfall		C1 +C0
1407.66	2.30	Free Outfall		C1 +C0
1407.71	2.36	Free Outfall		C1 +C0
1407.76	2.42	Free Outfall		C1 +C0
1407.81	2.47	Free Outfall		C1 +C0
1407.86	2.53	Free Outfall		C1 +C0
1407.91	2.58	Free Outfall		C1 +C0
1407.96	2.63	Free Outfall		C1 +C0

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

WS Elev, Total Q		Converge		Notes
Elev. ft	Q cfs	TW Elev ft	Error +/-ft	Contributing Structures
1408.01	2.69	Free	Outfall	C1 +C0
1408.06	2.74	Free	Outfall	C1 +C0
1408.11	2.78	Free	Outfall	C1 +C0
1408.16	2.83	Free	Outfall	C1 +C0
1408.21	2.89	Free	Outfall	C1 +C0
1408.26	2.93	Free	Outfall	C1 +C0
1408.31	2.98	Free	Outfall	C1 +C0
1408.36	3.03	Free	Outfall	C1 +C0
1408.41	3.08	Free	Outfall	C1 +C0
1408.46	3.12	Free	Outfall	C1 +C0
1408.51	3.17	Free	Outfall	C1 +C0
1408.56	3.21	Free	Outfall	C1 +C0
1408.61	3.26	Free	Outfall	C1 +C0
1408.66	3.30	Free	Outfall	C1 +C0
1408.71	3.34	Free	Outfall	C1 +C0
1408.76	3.38	Free	Outfall	C1 +C0
1408.81	3.43	Free	Outfall	C1 +C0
1408.86	3.47	Free	Outfall	C1 +C0
1408.91	3.51	Free	Outfall	C1 +C0
1408.96	3.55	Free	Outfall	C1 +C0
1409.01	3.59	Free	Outfall	C1 +C0
1409.06	3.63	Free	Outfall	C1 +C0
1409.11	3.66	Free	Outfall	C1 +C0
1409.16	3.70	Free	Outfall	C1 +C0
1409.21	3.74	Free	Outfall	C1 +C0
1409.26	3.78	Free	Outfall	C1 +C0
1409.31	3.82	Free	Outfall	C1 +C0
1409.36	3.85	Free	Outfall	C1 +C0
1409.41	3.89	Free	Outfall	C1 +C0
1409.46	3.93	Free	Outfall	C1 +C0
1409.51	3.96	Free	Outfall	C1 +C0
1409.56	4.00	Free	Outfall	C1 +C0
1409.61	4.03	Free	Outfall	C1 +C0
1409.66	4.07	Free	Outfall	C1 +C0
1409.71	4.11	Free	Outfall	C1 +C0
1409.76	4.14	Free	Outfall	C1 +C0
1409.81	4.17	Free	Outfall	C1 +C0
1409.86	4.21	Free	Outfall	C1 +C0

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

WS Elev, Total Q		Converge		Notes
Elev. ft	Q cfs	TW Elev ft	Error +/-ft	Contributing Structures
1409.91	4.24	Free Outfall		C1 +C0
1409.96	4.28	Free Outfall		C1 +C0
1410.00	4.30	Free Outfall		C1 +C0

Index of Starting Page Numbers for ID Names

----- E -----

EXISTING POND... 8.01
EXISTING SITE... 5.01, 6.01, 7.03,
7.04, 7.05, 7.06, 7.07, 7.08

----- I -----

IMPROVED SITE... 5.03, 6.02, 7.09,
7.10, 7.11, 7.12, 7.13, 7.14

----- N -----

New Element... 3.01

----- O -----

Outlet 1... 9.01, 9.04, 9.14

----- P -----

post out 1... 9.17, 9.20, 9.30
PROPOSED POND... 8.02

----- T -----

TypeII 24hr 2... 4.01, 4.03, 4.05,
4.07, 4.09, 4.11

----- W -----

Watershed... 1.01, 2.01, 2.02, 2.03,
2.04, 2.05, 2.06, 2.07

APPENDICES



Image U.S. Geological Survey
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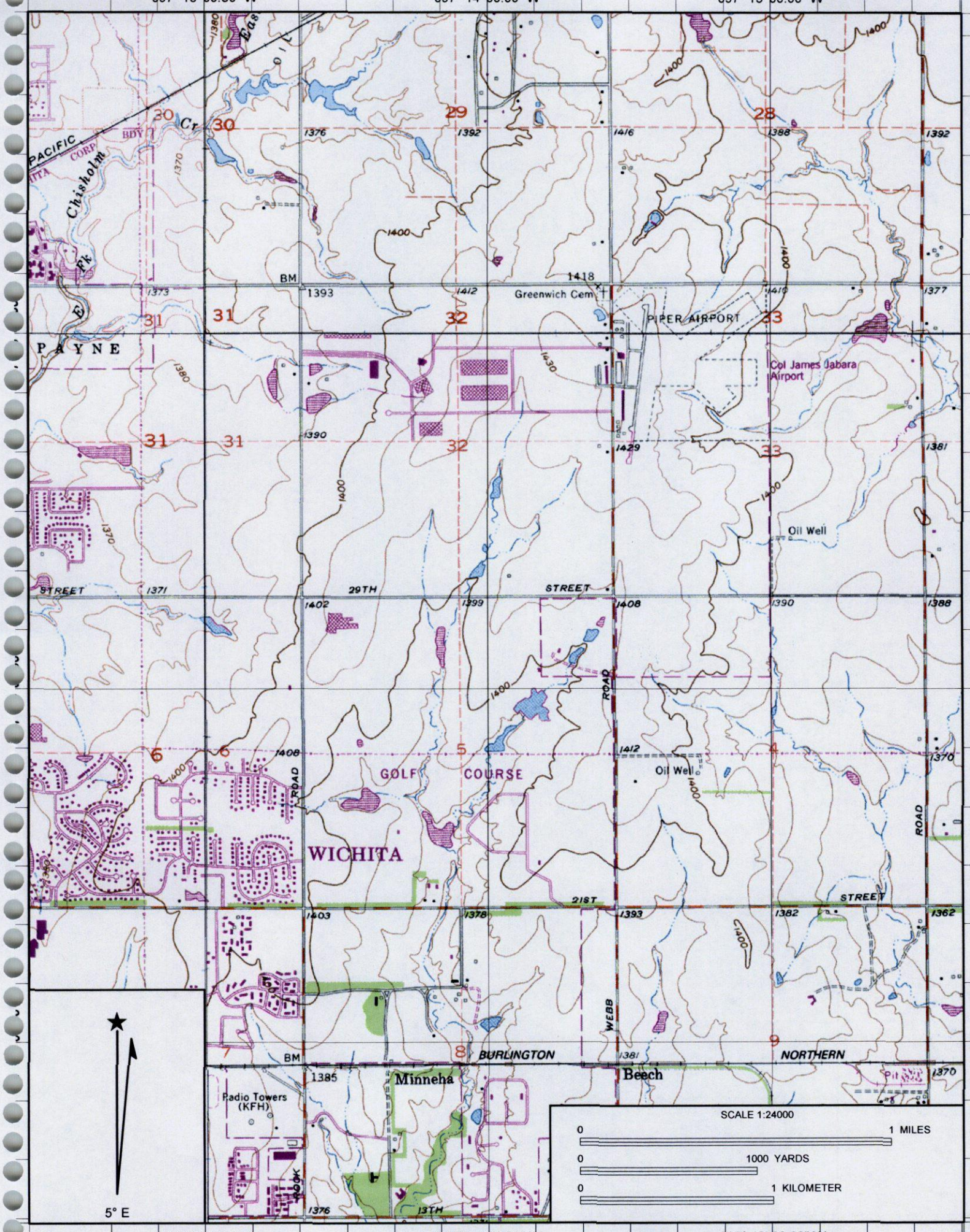
Google

37°44'10" 20" N 97°13'41" 90" W

elev 1404 ft

Mar 2008

Eye alt. 3491 ft



37 45 00.00 N
37 40 00.00 N
37 35 00.00 N
37 30 00.00 N



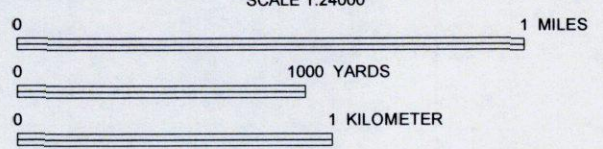
5° E

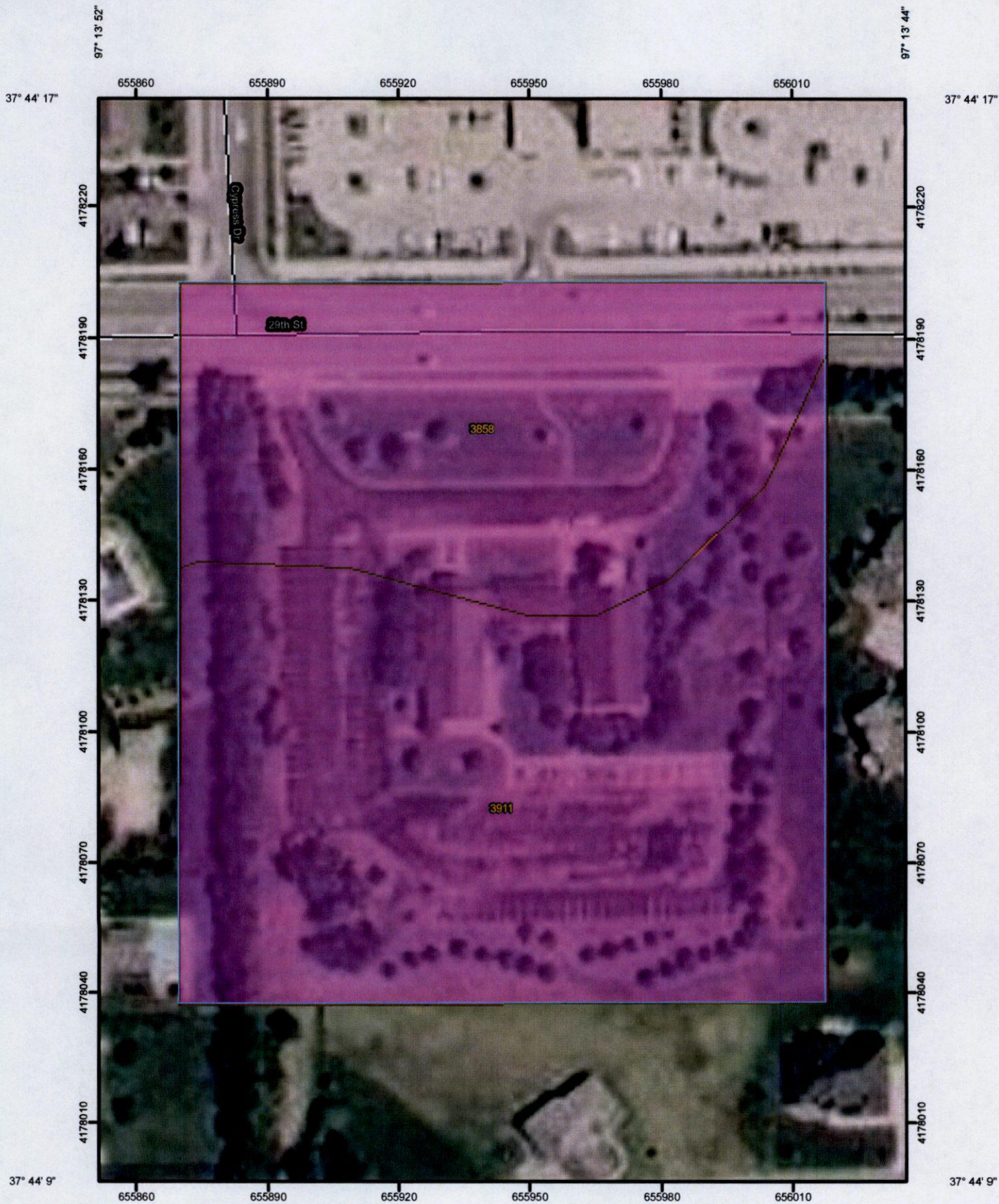
097° 15' 00.00" W

097° 14' 00.00" W

097° 13' 00.00" W

SCALE 1:24000

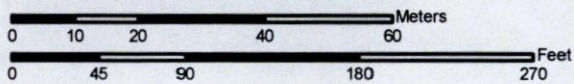






















97° 13' 52"



Map Scale: 1:1,180 if printed on A size (8.5" x 11") sheet.



MAP LEGEND

- Area of Interest (AOI)
 -  Area of Interest (AOI)
- Soils
 -  Soil Map Units
- Soil Ratings
 -  A
 -  A/D
 -  B
 -  B/D
 -  C
 -  C/D
 -  D
 -  Not rated or not available
- Political Features
 -  Cities
- Water Features
 -  Oceans
 -  Streams and Canals
- Transportation
 -  Rails
 -  Interstate Highways
 -  US Routes
 -  Major Roads
 -  Local Roads

MAP INFORMATION

Map Scale: 1:1,180 if printed on A size (8.5" x 11") sheet.

The soil surveys that comprise your AOI were mapped at 1:24,000. Please rely on the bar scale on each map sheet for accurate map measurements.

Source of Map: Natural Resources Conservation Service
 Web Soil Survey URL: <http://websoilsurvey.nrcs.usda.gov>
 Coordinate System: UTM Zone 14N NAD83

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Sedgwick County, Kansas
 Survey Area Data: Version 5, Dec 3, 2008
 Date(s) aerial images were photographed: 6/20/2006

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Hydrologic Soil Group

Hydrologic Soil Group— Summary by Map Unit — Sedgwick County, Kansas				
Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
3858	Goessel silty clay, 1 to 3 percent slopes	D	2.3	38.7%
3911	Rosehill silty clay, 1 to 3 percent slopes	D	3.7	61.3%
Totals for Area of Interest			6.0	100.0%

Description

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

Rating Options

Aggregation Method: Dominant Condition

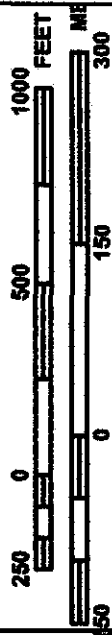


Component Percent Cutoff: None Specified

Tie-break Rule: Lower



MAP SCALE 1" = 500'



PANEL 0376E

FIRM
FLOOD INSURANCE RATE MAP
SEDGWICK COUNTY,
KANSAS
AND INCORPORATED AREAS

PANEL 376 OF 700

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
WICHITA, CITY OF	200328	0376	E

Notice to User: The Map Number shown below should be used when placing map orders; the Community Number shown above should be used on insurance applications for the subject community.



MAP NUMBER
20173C0376E

EFFECTIVE DATE
FEBRUARY 2, 2007
Federal Emergency Management Agency

This is an official copy of a portion of the above referenced flood map. It was extracted using F-MIT One-Line. This map does not reflect changes or amendments which may have been made subsequent to the date on the title block. For the latest product information about National Flood Insurance Program flood maps check the FEMA Flood Map Store at www.msc.fema.gov

