ENGINEERING
PLANNING
SURVEYING

STATE OF MISSOURI
TODD C. FLAUAUS
NUMBER PE-2005000982
PROFESSIONAL ENGINEER
5/5/08

STORMWATER DETENTION ANALYSIS
PREPARED BY: BAX ENGINEERING

COOL SPRINGS BUSINESS PARK
CITY OF O'FALLON, MISSOURI
BAX PROJECT NO. 99-10639C
April 29, 2008

*Detention not provided for Lot 3.

INTRODUCTION

This tract of land presently consists of four buildings with gravel driveways. The proposed land use for this tract is to demolish all existing improvements and construct a business park consisting of two office/warehouse buildings and parking lot. The overall area of this tract is approximately 3.76 acres.

The purpose of this report is to analyze the existing and proposed site runoff conditions and detail the design of the proposed detention facility. The proposed detention facility will be constructed to proportion the post-developed runoff from the site to rates that are less than or equal to the existing discharge rates from the site.

The detention requirements for the City of O'Fallon require that all proposed developments provide detention for the 2 yr, 15 yr and 25 yr 20 minute design storms. Sites that are within either the Peruque or Belleau Creek watersheds must also provide detention for the 100 yr, 20 minute design storm.

GENERAL SITE AND RUNOFF CALCULATIONS

The pre-developed and post-developed P.I. factors used in the analysis are:

LAND USAGE	2 YEAR	15 YEAR	25 YEAR	100 YEAR
OPEN SPACE 5% IMPERVIOUS	1.15 CFS/AC	1.87 CFS/AC	2.31 CFS/AC	2.95 CFS/AC
PAVEMENT/BUILDINGS 100% IMPERVIOUS	2.39 CFS/AC	3.85 CFS/AC	4.75 CFS/AC	6.08 CFS/AC

BAX ENGINEERING CO.
221 Point West Blvd.
St. Charles, MO 63301
636-928-5552 FAX 928-1718

Required Attenuation

The required attenuation is the amount of runoff that must be detained in the detention basin to ensure that no increase in runoff will occur under post-developed conditions. The required attenuation is the difference between the proposed runoff produced by the site, and the runoff produced under existing conditions. The required attenuation for the site is calculated as follows.

15 yr, 20 minute storm:

11.61 cfs – 7.89 cfs = 3.72 cfs

2 yr, 20 minute:	2.33 cfs
15 yr, 20 minute:	3.72 cfs
25 yr, 20 minute:	4.58 cfs
100 yr, 20 minute:	5.87 cfs

Basin Inflows

Inflows to the detention basin have been estimated from the post-developed drainage area map included with this report. Approximately 2.39 acres are tributary to the detention basin. Total basin inflows are calculated as follows.

15 yr, 20 minute storm:

0.39 ac(1.87 cfs/ac) + 2.00 ac(3.85 cfs/ac) = 8.43 cfs

2 yr, 20 minute:	5.23 cfs
15 yr, 20 minute:	8.43 cfs
25 yr, 20 minute:	10.40 cfs
100 yr, 20 minute:	13.31 cfs

Routing Results

A computer program, "Pond Pack V.10," has been used to route the required design storms through the proposed detention basin. Since the bottom of the detention basin is below the 15 yr, 20 minute hydraulic grade line of the outfall pipe a starting water surface elevation equal to the H.G.L. of the outfall pipe has been defined. The H.G.L. of the outfall pipe is approximately 472.56 as shown on the hydraulic calculations included with the construction plans. A tailwater equal to the H.G.L. has also been defined so that there is no existing outfall from the basin prior to inflow from the design storms. Please see the attached Pond Pack data summary for a detailed calculation, a summary of these results is presented here.

DESIGN STORM	BASIN PEAK INFLOW	ALLOWABLE RELEASE RATE	CALCULATED RELEASE	ELEVATION
2 YR, 20 MIN	5.23 CFS	2.90 CFS	2.66 CFS	474.83 FT
15 YR, 20 MIN	8.43 CFS	4.71 CFS	4.50 CFS	475.94 FT
25 YR, 20 MIN	10.40 CFS	5.82 CFS	5.18 CFS	476.56 FT
100 YR, 20 MIN	13.31 CFS	7.44 CFS	6.00 CFS	477.47 FT

Sediment Storage Calculations

The City of O'Fallon design standards require that all detention basins are designed to accommodate two years of sediment storage. This is accomplished by routing the design storms through the outfall structure and determining the 100 yr, 20 minute high-water elevation. Using the annual sediment storage nomograph included in the appendix of this report we calculate the volume of sediment delivered to the detention basin over a two year period. By adding the volume of sediment to the storage volume required for the 100 yr, 20 minute storm we calculate the crest elevation of the standpipe; which must be above the volume required for the 100 yr, 20 minute storm plus the volume required for sediment storage. Pond Pack has been used to calculate this elevation, please see the pond volume data included with the data output. A summary is presented below:

Description of Outfall Structure and Detention Basin

The detention basin will be an above ground dry basin with a 60" R.C.P. standpipe for an outfall structure. The standpipe will have a series of weirs and orifices cut or pre-cast into it's body to proportion the discharge to rates that are less than or equal to the existing runoff from the site. The low flow slot will be a 9"w x 6"h slot with a flow line elevation of 470.75 ft. The upper flow slot will be 7"w x 6"h with a flow line elevation of 474.85. As detailed earlier, the crest of the 60" standpipe will be at an elevation of 477.75 ft. The top of the standpipe will be equipped with a trash rack to prevent large debris from entering the outfall structure.

The outfall pipe will consist of approximately 52 feet of 30" RCP with an upper flow line of 470.55 and a lower flow line of 470.00. The outfall pipe has been sized to handle the runoff produced by the 100 yr, 20 minute design storm.

SUMMARY

2 yr, 20 min H.W.	474.83 ft.
15 yr, 20 min H.W.	475.94 ft.
25 yr, 20 min H.W.	476.56 ft.
100 yr, 20 min H.W.	477.47 ft.
100 yr, 20 min low flow blocked H.W.	478.18 ft.
LOW-FLOW OUTLET	9"W x 6"H
LOW-FLOW SILL ELEVATION	470.75 ft.
UPPER-FLOW OUTLET	7"W x 6"H
UPPER-FLOW SILL ELEVATION	474.85 ft.
EMERGENCY SPILLWAY	60" Stand Pipe
EMERGENCY SPILLWAY ELEVATION	477.75 ft.
TOP OF BERM	481.26 ft.
FREEBOARD (100 yr, 20 min LFB H.W.)	3.08 ft.

Note: Additional freeboard is provided to ensure sufficient storage volume can be provided for the future buildout of lot 3.

FIGURES

Bax Engineering
Engineering – Planning - Surveying
221 Point West Blvd.
St. Charles, Missouri 63301
(636) 928-5552 FAX (636) 928-1718

Project: Cool Springs Bus. Park
Date: 4-25-08 Project No: 99-10639C
Designer: JEL Checked: TCF

TIME OF CONCENTRATION FOR SMALL DRAINAGE BASINS

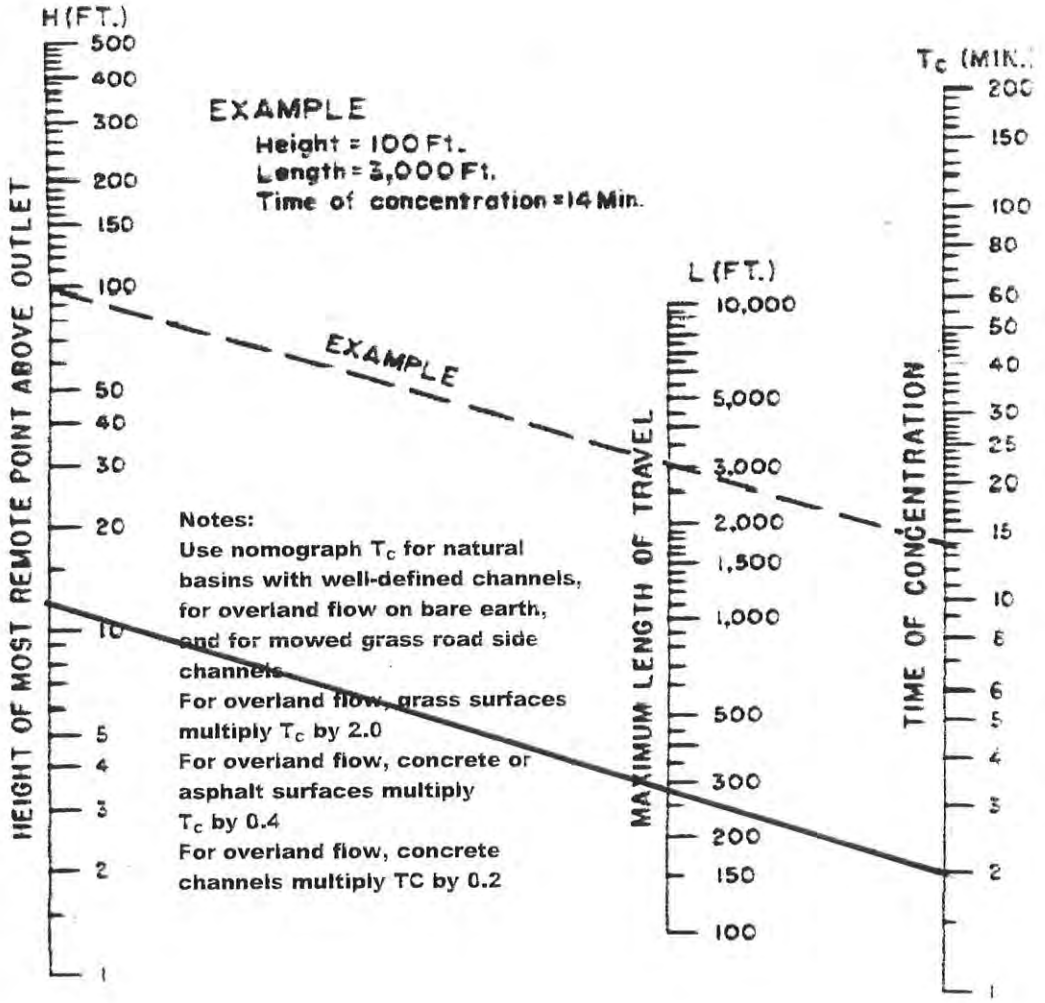
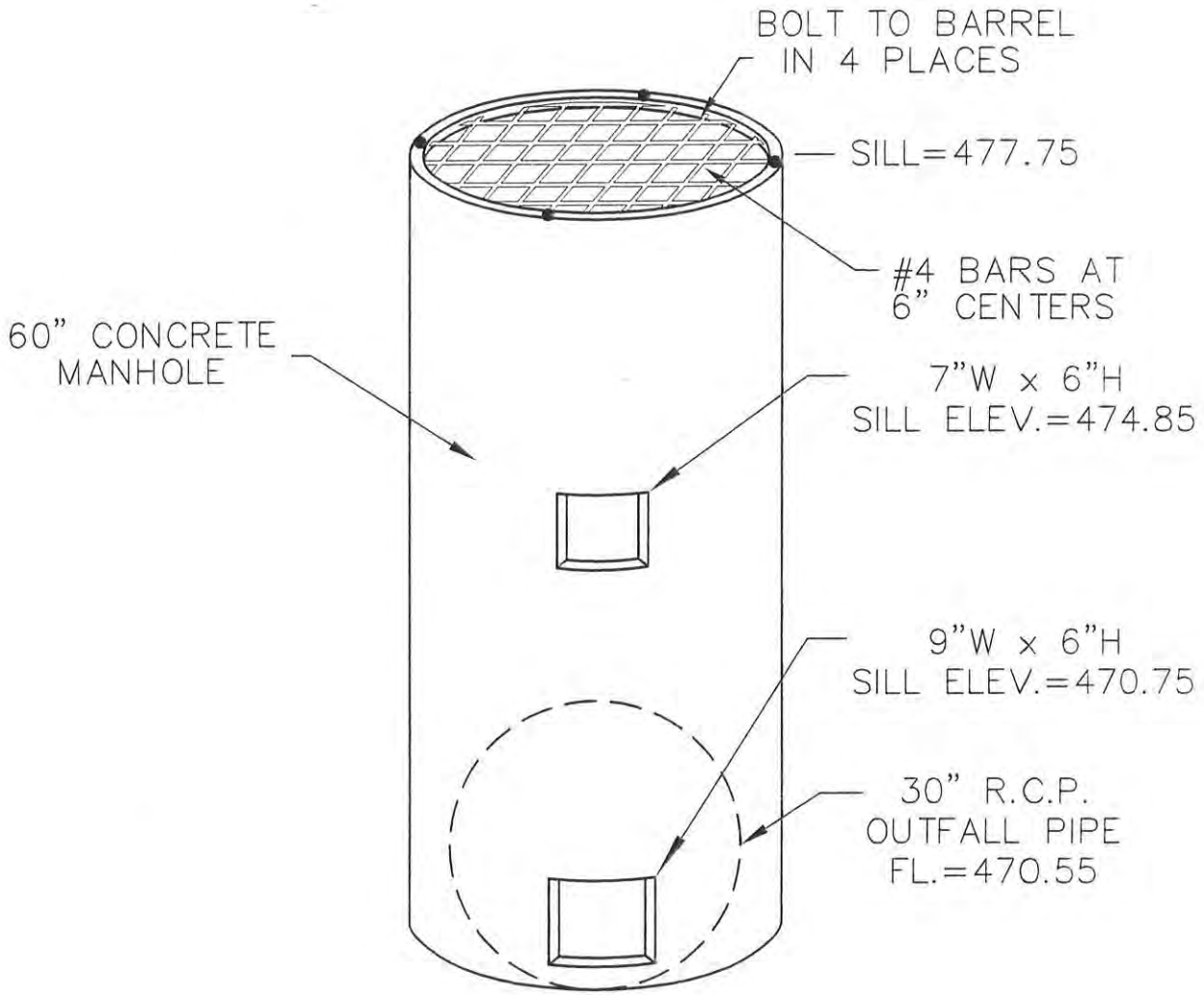


FIGURE 1

Δ Height = 12'
Length = 277 ft.
T_c = 2.0(0.40) = 0.80 min

STRUCTURE DETAILS



OVERFLOW STRUCTURE DETAIL

NOT TO SCALE

POND PACK V.10
ROUTING RESULTS
2 YR, 15 YR, 25 YR & 100 YR, 20 MINUTE STORM

Table of Contents

Table of Contents (continued)

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

Node ID	Type	HYG Vol cu.ft	Trun.	Qpeak min	Qpeak cfs	Max WSEL ft
BASIN IN	POND	10117		2.00	8.43	
BASIN OUT	POND	10122	L	21.00	4.50	475.94
HYD QUEUE 20	HYG	10117		2.00	8.43	
Outfall OUT 10	JCT	10122	L	21.00	4.50	

NETWORK SUMMARY -- NODES

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

Node ID	Type	HYG Vol cu.ft	Trun.	Qpeak min	Qpeak cfs	Max WSEL ft
BASIN IN	POND	15973		2.00	13.31	
BASIN OUT	POND	15978	L	21.00	6.00	477.47
HYD QUEUE 20	HYG	15973		2.00	13.31	
Outfall OUT 10	JCT	15978	L	21.00	6.00	

HYG file =
HYG ID = 15 yr, 20 min
HYG Tag =

Peak Discharge =	8.43 cfs
Time to Peak =	2.00 min
HYG Volume =	10117 cu.ft

HYDROGRAPH ORDINATES (cfs)
Output Time increment = 1.00 min
Time on left represents time for first value in each row.

Time min					
.00	.00	4.22	8.43	8.43	8.43
5.00	8.43	8.43	8.43	8.43	8.43
10.00	8.43	8.43	8.43	8.43	8.43
15.00	8.43	8.43	8.43	8.43	8.43
20.00	8.43	4.22	.00		

HYG file =
HYG ID = 100 yr, 20 min
HYG Tag =

Peak Discharge =	13.31 cfs
Time to Peak =	2.00 min
HYG Volume =	15973 cu.ft

HYDROGRAPH ORDINATES (cfs)
Output Time increment = 1.00 min
Time on left represents time for first value in each row.

Time min					
.00	.00	6.66	13.31	13.31	13.31
5.00	13.31	13.31	13.31	13.31	13.31
10.00	13.31	13.31	13.31	13.31	13.31
15.00	13.31	13.31	13.31	13.31	13.31
20.00	13.31	6.66	.00		

TIME vs. ELEVATION (ft)

Output Time increment = 1.00 min
Time on left represents time for first value in each row.

Time min					
.00	472.56	472.72	473.10	473.44	473.70
5.00	473.91	474.09	474.26	474.42	474.58
10.00	474.73	474.88	475.02	475.15	475.28
15.00	475.39	475.50	475.61	475.71	475.80
20.00	475.89	475.94	475.88	475.78	475.69
25.00	475.59	475.50	475.41	475.32	475.24
30.00	475.16	475.08	475.01	474.94	474.87
35.00	474.80	474.74	474.67	474.60	474.54
40.00	474.47	474.41	474.34	474.28	474.22
45.00	474.15	474.09	474.03	473.97	473.91
50.00	473.85	473.78	473.72	473.66	473.59
55.00	473.52	473.45	473.38	473.30	473.23
60.00	473.16	473.08	473.00	472.93	472.86
65.00	472.79	472.72	472.67	472.62	472.59
70.00	472.57	472.56	472.56	472.55	472.55
75.00	472.55	472.55	472.55		

TIME vs. ELEVATION (ft)

Output Time increment = 1.00 min

Time min	Time on left represents time for first value in each row.				
.00	472.56	472.82	473.34	473.78	474.11
5.00	474.41	474.70	474.97	475.22	475.45
10.00	475.67	475.88	476.07	476.26	476.44
15.00	476.61	476.78	476.94	477.10	477.25
20.00	477.39	477.47	477.42	477.30	477.19
25.00	477.08	476.96	476.85	476.74	476.63
30.00	476.52	476.41	476.30	476.20	476.10
35.00	475.99	475.89	475.79	475.70	475.60
40.00	475.51	475.42	475.33	475.25	475.17
45.00	475.09	475.02	474.95	474.88	474.81
50.00	474.74	474.67	474.61	474.54	474.48
55.00	474.41	474.35	474.28	474.22	474.16
60.00	474.10	474.04	473.98	473.92	473.85
65.00	473.79	473.73	473.66	473.59	473.52
70.00	473.46	473.38	473.31	473.24	473.16
75.00	473.09	473.01	472.94	472.86	472.79
80.00	472.73	472.67	472.62	472.59	472.57
85.00	472.56	472.56	472.55	472.55	472.55
90.00	472.55	472.55			

TIME vs. VOLUME (cu.ft)

Output Time increment = 1.00 min
Time on left represents time for first value in each row.

Time min					
.00	306	409	728	1146	1544
5.00	1932	2312	2683	3047	3404
10.00	3756	4102	4440	4765	5073
15.00	5365	5642	5910	6168	6418
20.00	6661	6772	6631	6369	6115
25.00	5869	5632	5403	5184	4978
30.00	4783	4598	4421	4251	4087
35.00	3926	3768	3612	3459	3308
40.00	3160	3014	2871	2730	2592
45.00	2456	2323	2193	2065	1939
50.00	1819	1699	1583	1472	1362
55.00	1257	1156	1057	963	874
60.00	790	711	637	570	509
65.00	454	408	370	341	323
70.00	313	308	305	303	302
75.00	301	301	301		

TIME vs. VOLUME (cu.ft)

Output Time increment = 1.00 min
Time on left represents time for first value in each row.

Time min					
.00	306	477	1003	1695	2370
5.00	3030	3678	4315	4930	5516
10.00	6075	6617	7143	7657	8158
15.00	8648	9128	9599	10061	10516
20.00	10962	11203	11044	10690	10341
25.00	9999	9663	9333	9008	8690
30.00	8379	8074	7777	7486	7201
35.00	6924	6654	6392	6137	5890
40.00	5652	5422	5202	4995	4800
45.00	4614	4436	4266	4101	3940
50.00	3782	3625	3472	3321	3172
55.00	3026	2883	2742	2604	2468
60.00	2334	2204	2075	1950	1829
65.00	1709	1594	1482	1372	1266
70.00	1165	1065	971	882	797
75.00	717	643	575	514	459
80.00	412	373	343	324	314
85.00	308	305	303	302	301
90.00	301	301			

REQUESTED POND WS ELEVATIONS:

Min. Elev.= 470.75 ft
Increment = .10 ft
Max. Elev.= 481.26 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
Weir-Rectangular	W0	--->	C0	470.750	471.250
Orifice-Area	O1	--->	C0	475.350	481.260
Weir-Rectangular	W1	--->	C0	474.850	475.350
Stand Pipe	R0	--->	C0	477.750	481.260
Orifice-Area	O0	--->	C0	471.250	481.260
Culvert-Circular	C0	--->	TW	470.520	481.260

TW SETUP, DS Channel

OUTLET STRUCTURE INPUT DATA

Structure ID	= R0	
Structure Type	= Stand Pipe	
# of Openings	= 1	
Invert Elev.	= 477.75	ft
Diameter	= 5.0000	ft
Orifice Area	= 19.6350	sq.ft
Orifice Coeff.	= .600	
Weir Length	= 15.71	ft
Weir Coeff.	= 3.000	
K, Reverse	= 1.000	
Mannings n	= .0000	
Kev,Charged Riser	= .000	
Weir Submergence	= No	

Structure ID	= O0	
Structure Type	= Orifice-Area	
# of Openings	= 1	
Invert Elev.	= 470.75	ft
Area	= .3750	sq.ft
Top of Orifice	= 471.25	ft
Datum Elev.	= 471.00	ft
Orifice Coeff.	= .600	

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

CUMULATIVE HGL CONVERGENCE ERROR .004 (+/- ft)
FLOW PATH: Elev= 473.25; Branch: O0-C0-TW

* Max. convergence errors shown may also occur for flow paths other than the ones listed above.

WS Elev, Total Q		Converge		Notes
Elev. ft	Q cfs	TW Elev ft	Error +/-ft	Contributing Structures
470.75	.00	472.56	.000	(no Q: W0,O1,W1,R0,O0,C0)
470.85	.00	472.56	.000	(no Q: W0,O1,W1,R0,O0,C0)
470.95	.00	472.56	.000	(no Q: W0,O1,W1,R0,O0,C0)
471.05	.00	472.56	.000	(no Q: W0,O1,W1,R0,O0,C0)
471.15	.00	472.56	.000	(no Q: W0,O1,W1,R0,O0,C0)
471.25	.00	472.56	.000	(no Q: W0,O1,W1,R0,O0,C0)
471.35	.00	472.56	.000	(no Q: W0,O1,W1,R0,O0,C0)
471.45	.00	472.56	.000	(no Q: W0,O1,W1,R0,O0,C0)
471.55	.00	472.56	.000	(no Q: W0,O1,W1,R0,O0,C0)
471.65	.00	472.56	.000	(no Q: W0,O1,W1,R0,O0,C0)
471.75	.00	472.56	.000	(no Q: W0,O1,W1,R0,O0,C0)
471.85	.00	472.56	.000	(no Q: W0,O1,W1,R0,O0,C0)
471.95	.00	472.56	.000	(no Q: W0,O1,W1,R0,O0,C0)
472.05	.00	472.56	.000	(no Q: W0,O1,W1,R0,O0,C0)
472.15	.00	472.56	.000	(no Q: W0,O1,W1,R0,O0,C0)
472.25	.00	472.56	.000	(no Q: W0,O1,W1,R0,O0,C0)
472.35	.00	472.56	.000	(no Q: W0,O1,W1,R0,O0,C0)
472.45	.00	472.56	.000	(no Q: W0,O1,W1,R0,O0,C0)
472.55	.00	472.56	.000	(no Q: W0,O1,W1,R0,O0,C0)
472.65	.54	472.56	.000	O0,C0 (no Q: W0,O1,W1,R0)
472.75	.77	472.56	.000	O0,C0 (no Q: W0,O1,W1,R0)
472.85	.95	472.56	.001	O0,C0 (no Q: W0,O1,W1,R0)
472.95	1.10	472.56	.001	O0,C0 (no Q: W0,O1,W1,R0)
473.05	1.24	472.56	.000	O0,C0 (no Q: W0,O1,W1,R0)
473.15	1.35	472.56	.001	O0,C0 (no Q: W0,O1,W1,R0)
473.25	1.47	472.56	.004	O0,C0 (no Q: W0,O1,W1,R0)
473.35	1.58	472.56	.000	O0,C0 (no Q: W0,O1,W1,R0)
473.45	1.67	472.56	.001	O0,C0 (no Q: W0,O1,W1,R0)
473.55	1.76	472.56	.002	O0,C0 (no Q: W0,O1,W1,R0)
473.65	1.84	472.56	.002	O0,C0 (no Q: W0,O1,W1,R0)
473.75	1.92	472.56	.002	O0,C0 (no Q: W0,O1,W1,R0)
473.85	2.00	472.56	.002	O0,C0 (no Q: W0,O1,W1,R0)

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

CUMULATIVE HGL CONVERGENCE ERROR .004 (+/- ft)
FLOW PATH: Elev= 473.25; Branch: O0-C0-TW

* Max. convergence errors shown may also occur for flow paths other than the ones listed above.

WS Elev, Total Q		Converge		Notes
Elev. ft	Q cfs	TW Elev ft	Error +/-ft	Contributing Structures
477.15	5.72	472.56	.000	O1,O0,C0 (no Q: W0,W1,R0)
477.25	5.81	472.56	.000	O1,O0,C0 (no Q: W0,W1,R0)
477.35	5.90	472.56	.000	O1,O0,C0 (no Q: W0,W1,R0)
477.45	5.98	472.56	.002	O1,O0,C0 (no Q: W0,W1,R0)
477.55	6.07	472.56	.000	O1,O0,C0 (no Q: W0,W1,R0)
477.65	6.15	472.56	.000	O1,O0,C0 (no Q: W0,W1,R0)
477.75	6.23	472.56	.000	O1,O0,C0 (no Q: W0,W1,R0)
477.85	7.72	472.56	.000	O1,R0,O0,C0 (no Q: W0,W1)
477.95	10.30	472.56	.000	O1,R0,O0,C0 (no Q: W0,W1)
478.05	13.54	472.56	.000	O1,R0,O0,C0 (no Q: W0,W1)
478.15	16.99	472.56	.000	O1,R0,O0,C0 (no Q: W0,W1)
478.25	20.30	472.56	.000	O1,R0,O0,C0 (no Q: W0,W1)
478.35	23.02	472.56	.000	O1,R0,O0,C0 (no Q: W0,W1)
478.45	23.47	472.56	.000	R0,C0 (no Q: W0,O1,W1,O0)
478.55	23.67	472.56	.000	R0,C0 (no Q: W0,O1,W1,O0)
478.65	23.87	472.56	.000	O1,R0,O0,C0 (no Q: W0,W1)
478.75	24.06	472.56	.000	R0,C0 (no Q: W0,O1,W1,O0)
478.85	24.26	472.56	.000	R0,C0 (no Q: W0,O1,W1,O0)
478.95	24.45	472.56	.000	R0,C0 (no Q: W0,O1,W1,O0)
479.05	24.64	472.56	.000	R0,C0 (no Q: W0,O1,W1,O0)
479.15	24.83	472.56	.000	R0,C0 (no Q: W0,O1,W1,O0)
479.25	25.01	472.56	.000	R0,C0 (no Q: W0,O1,W1,O0)
479.35	25.20	472.56	.000	R0,C0 (no Q: W0,O1,W1,O0)
479.45	25.38	472.56	.000	R0,C0 (no Q: W0,O1,W1,O0)
479.55	25.57	472.56	.000	R0,C0 (no Q: W0,O1,W1,O0)
479.65	25.75	472.56	.000	R0,C0 (no Q: W0,O1,W1,O0)
479.75	25.93	472.56	.000	R0,C0 (no Q: W0,O1,W1,O0)
479.85	26.11	472.56	.000	R0,C0 (no Q: W0,O1,W1,O0)
479.95	26.29	472.56	.000	R0,C0 (no Q: W0,O1,W1,O0)
480.05	26.47	472.56	.000	R0,C0 (no Q: W0,O1,W1,O0)
480.15	26.64	472.56	.000	R0,C0 (no Q: W0,O1,W1,O0)
480.25	26.82	472.56	.000	R0,C0 (no Q: W0,O1,W1,O0)

LEVEL POOL ROUTING DATA

HYG Dir = H:\PONDPACK\A10500PLUS\10639C\Detention\
Inflow HYG file = NONE STORED - BASIN IN 2
Outflow HYG file = NONE STORED - BASIN OUT 2

Pond Node Data = BASIN
Pond Volume Data = BASIN
Pond Outlet Data = OS 101

No Infiltration

INITIAL CONDITIONS

Starting WS Elev	=	472.56 ft
Starting Volume	=	306 cu.ft
Starting Outflow	=	.05 cfs
Starting Infiltr.	=	.00 cfs
Starting Total Qout	=	.05 cfs
Time Increment	=	1.00 min

Elevation ft	Outflow cfs	Storage cu.ft	Area sq.ft	Infilt. cfs	Q Total cfs	2S/t + O cfs
470.75	.00	0	0	.00	.00	.00
470.85	.00	0	1	.00	.00	.00
470.95	.00	0	6	.00	.00	.01
471.05	.00	1	13	.00	.00	.04
471.15	.00	3	23	.00	.00	.10
471.25	.00	6	36	.00	.00	.20
471.35	.00	10	52	.00	.00	.34
471.45	.00	16	70	.00	.00	.55
471.55	.00	24	92	.00	.00	.82
471.65	.00	35	116	.00	.00	1.16
471.75	.00	48	143	.00	.00	1.59
471.85	.00	64	173	.00	.00	2.12
471.95	.00	83	206	.00	.00	2.75
472.05	.00	105	248	.00	.00	3.50
472.15	.00	132	300	.00	.00	4.42
472.25	.00	165	356	.00	.00	5.51
472.35	.00	204	417	.00	.00	6.79
472.45	.00	249	484	.00	.00	8.29
472.55	.00	301	555	.00	.00	10.02
472.65	.54	360	631	.00	.54	12.54

Type.... Pond E-V-Q Table
Name.... BASIN
File.... H:\PONDPACK\A10500PLUS\10639C\Detention\10639 Detention 4-21-08 JEL.ppw

LEVEL POOL ROUTING DATA

HYG Dir = H:\PONDPACK\A10500PLUS\10639C\Detention\
Inflow HYG file = NONE STORED - BASIN IN 2
Outflow HYG file = NONE STORED - BASIN OUT 2

Pond Node Data = BASIN
Pond Volume Data = BASIN
Pond Outlet Data = OS 101

No Infiltration

INITIAL CONDITIONS

Starting WS Elev	=	472.56 ft
Starting Volume	=	306 cu.ft
Starting Outflow	=	.05 cfs
Starting Infiltr.	=	.00 cfs
Starting Total Qout	=	.05 cfs
Time Increment	=	1.00 min

Elevation ft	Outflow cfs	Storage cu.ft	Area sq.ft	Infilt. cfs	Q Total cfs	2S/t + O cfs
474.75	2.62	3801	2336	.00	2.62	129.32
474.85	2.68	4036	2364	.00	2.68	137.20
474.95	2.80	4274	2392	.00	2.80	145.25
475.05	2.94	4514	2420	.00	2.94	153.41
475.15	3.13	4758	2448	.00	3.13	161.72
475.25	3.34	5004	2477	.00	3.34	170.13
475.35	3.64	5253	2505	.00	3.64	178.74
475.45	3.81	5505	2534	.00	3.81	187.31
475.55	3.97	5760	2563	.00	3.97	195.95
475.65	4.11	6017	2592	.00	4.11	204.69
475.75	4.26	6278	2621	.00	4.26	213.52
475.85	4.38	6542	2651	.00	4.38	222.44
475.95	4.51	6808	2680	.00	4.51	231.45
476.05	4.62	7078	2708	.00	4.62	240.54
476.15	4.74	7350	2736	.00	4.74	249.73
476.25	4.85	7625	2763	.00	4.85	259.01
476.35	4.96	7902	2790	.00	4.96	268.37
476.45	5.06	8183	2817	.00	5.06	277.82
476.55	5.16	8466	2845	.00	5.16	287.36
476.65	5.26	8752	2873	.00	5.26	296.98

Type.... Pond E-V-Q Table
Name.... BASIN
File.... H:\PONDPACK\A10500PLUS\10639C\Detention\10639 Detention 4-21-08 JEL.ppw

LEVEL POOL ROUTING DATA

HYG Dir = H:\PONDPACK\A10500PLUS\10639C\Detention\
Inflow HYG file = NONE STORED - BASIN IN 2
Outflow HYG file = NONE STORED - BASIN OUT 2

Pond Node Data = BASIN
Pond Volume Data = BASIN
Pond Outlet Data = OS 101

No Infiltration

INITIAL CONDITIONS

Starting WS Elev	=	472.56 ft
Starting Volume	=	306 cu.ft
Starting Outflow	=	.05 cfs
Starting Infiltr.	=	.00 cfs
Starting Total Qout	=	.05 cfs
Time Increment	=	1.00 min

Elevation ft	Outflow cfs	Storage cu.ft	Area sq.ft	Infilt. cfs	Q Total cfs	2S/t + O cfs
478.75	24.06	15398	3433	.00	24.06	537.33
478.85	24.26	15742	3456	.00	24.26	549.00
478.95	24.45	16089	3479	.00	24.45	560.75
479.05	24.64	16438	3503	.00	24.64	572.58
479.15	24.83	16790	3526	.00	24.83	584.48
479.25	25.01	17144	3550	.00	25.01	596.47
479.35	25.20	17500	3574	.00	25.20	608.53
479.45	25.38	17858	3598	.00	25.38	620.66
479.55	25.57	18219	3621	.00	25.57	632.87
479.65	25.75	18583	3645	.00	25.75	645.17
479.75	25.93	18948	3670	.00	25.93	657.54
479.85	26.11	19317	3694	.00	26.11	670.00
479.95	26.29	19687	3718	.00	26.29	682.53
480.05	26.47	20060	3753	.00	26.47	695.14
480.15	26.64	20438	3799	.00	26.64	707.91
480.25	26.82	20820	3845	.00	26.82	720.82
480.35	26.99	21207	3892	.00	26.99	733.90
480.45	27.16	21599	3939	.00	27.16	747.12
480.55	27.34	21995	3986	.00	27.34	760.50
480.65	27.51	22396	4034	.00	27.51	774.04

LEVEL POOL ROUTING SUMMARY

HYG Dir = H:\PONDPACK\A10500PLUS\10639C\Detention\
Inflow HYG file = NONE STORED - BASIN IN 2
Outflow HYG file = NONE STORED - BASIN OUT 2

Pond Node Data = BASIN
Pond Volume Data = BASIN
Pond Outlet Data = OS 101

No Infiltration

INITIAL CONDITIONS

Starting WS Elev	=	472.56 ft
Starting Volume	=	306 cu.ft
Starting Outflow	=	.05 cfs
Starting Infiltr.	=	.00 cfs
Starting Total Qout	=	.05 cfs
Time Increment	=	1.00 min

INFLOW/OUTFLOW HYDROGRAPH SUMMARY

Peak Inflow	=	5.23 cfs	at	2.00 min
Peak Outflow	=	2.66 cfs	at	21.00 min
Peak Elevation	=	474.83 ft		
Peak Storage	=	3977 cu.ft		

MASS BALANCE (cu.ft)

+ Initial Vol	=	306
+ HYG Vol IN	=	6277
- Infiltration	=	0
- HYG Vol OUT	=	6282
- Retained Vol	=	301
Unrouted Vol	= -	cu.ft (.000% of Outflow Volume)

LEVEL POOL ROUTING SUMMARY

HYG Dir = H:\PONDPACK\A10500PLUS\10639C\Detention\
Inflow HYG file = NONE STORED - BASIN IN 15
Outflow HYG file = NONE STORED - BASIN OUT 15

Pond Node Data = BASIN
Pond Volume Data = BASIN
Pond Outlet Data = OS 101

No Infiltration

INITIAL CONDITIONS

Starting WS Elev	=	472.56 ft
Starting Volume	=	306 cu.ft
Starting Outflow	=	.05 cfs
Starting Infiltr.	=	.00 cfs
Starting Total Qout	=	.05 cfs
Time Increment	=	1.00 min

INFLOW/OUTFLOW HYDROGRAPH SUMMARY

Peak Inflow	=	8.43 cfs	at	2.00 min
Peak Outflow	=	4.50 cfs	at	21.00 min
Peak Elevation	=	475.94 ft		
Peak Storage	=	6772 cu.ft		

MASS BALANCE (cu.ft)

+ Initial Vol	=	306
+ HYG Vol IN	=	10117
- Infiltration	=	0
- HYG Vol OUT	=	10122
- Retained Vol	=	301
Unrouted Vol	= -	cu.ft (.000% of Outflow Volume)

LEVEL POOL ROUTING SUMMARY

HYG Dir = H:\PONDPACK\A10500PLUS\10639C\Detention\
Inflow HYG file = NONE STORED - BASIN IN 25
Outflow HYG file = NONE STORED - BASIN OUT 25

Pond Node Data = BASIN
Pond Volume Data = BASIN
Pond Outlet Data = OS 101

No Infiltration

INITIAL CONDITIONS

Starting WS Elev	=	472.56 ft
Starting Volume	=	306 cu.ft
Starting Outflow	=	.05 cfs
Starting Infiltr.	=	.00 cfs
Starting Total Qout	=	.05 cfs
Time Increment	=	1.00 min

INFLOW/OUTFLOW HYDROGRAPH SUMMARY

Peak Inflow	=	10.40 cfs	at	2.00 min
Peak Outflow	=	5.18 cfs	at	21.00 min
Peak Elevation	=	476.56 ft		
Peak Storage	=	8507 cu.ft		

MASS BALANCE (cu.ft)

+ Initial Vol	=	306
+ HYG Vol IN	=	12480
- Infiltration	=	0
- HYG Vol OUT	=	12485
- Retained Vol	=	301
Unrouted Vol	= -	cu.ft (.000% of Outflow Volume)

LEVEL POOL ROUTING SUMMARY

HYG Dir = H:\PONDPACK\A10500PLUS\10639C\Detention\
Inflow HYG file = NONE STORED - BASIN IN 100
Outflow HYG file = NONE STORED - BASIN OUT 100

Pond Node Data = BASIN
Pond Volume Data = BASIN
Pond Outlet Data = OS 101

No Infiltration

INITIAL CONDITIONS

Starting WS Elev	= 472.56	ft
Starting Volume	= 306	cu.ft
Starting Outflow	= .05	cfs
Starting Infiltr.	= .00	cfs
Starting Total Qout	= .05	cfs
Time Increment	= 1.00	min

INFLOW/OUTFLOW HYDROGRAPH SUMMARY

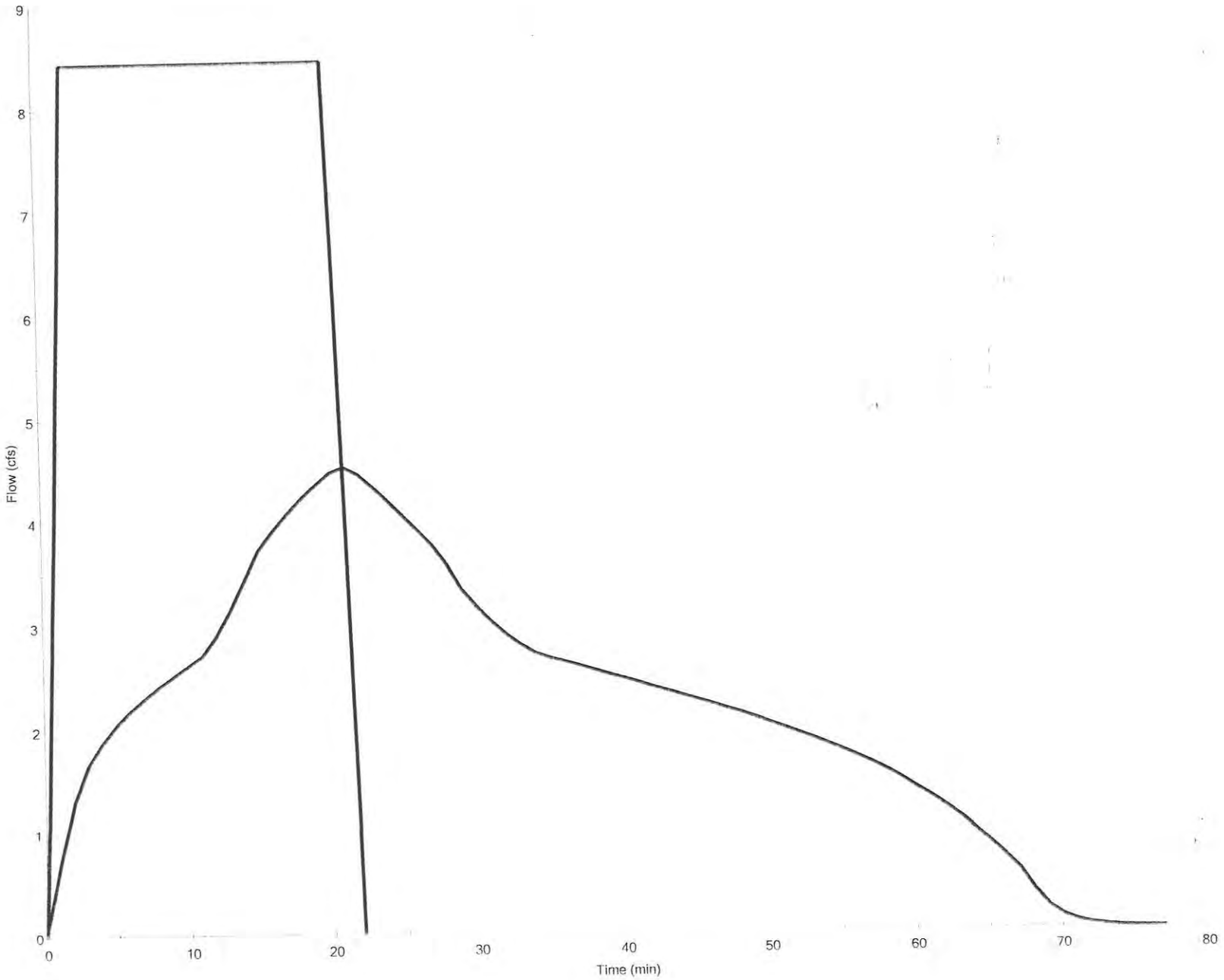
Peak Inflow	= 13.31	cfs	at	2.00 min
Peak Outflow	= 6.00	cfs	at	21.00 min
Peak Elevation	= 477.47	ft		
Peak Storage	= 11203	cu.ft		

MASS BALANCE (cu.ft)

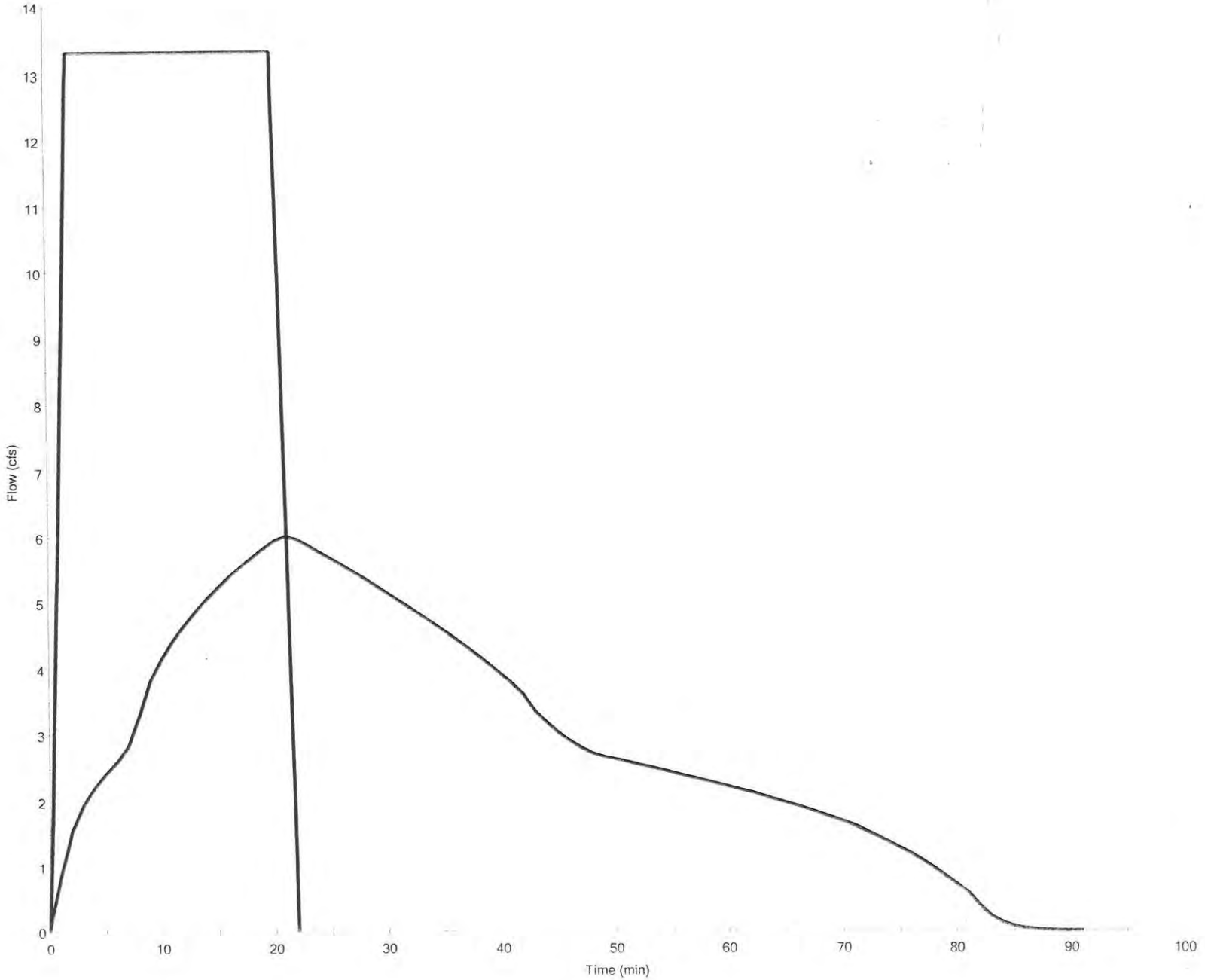
+ Initial Vol	=	306
+ HYG Vol IN	=	15973
- Infiltration	=	0
- HYG Vol OUT	=	15978
- Retained Vol	=	301
Unrouted Vol	= -	cu.ft (.000% of Outflow Volume)

Index of Starting Page Numbers for ID Names

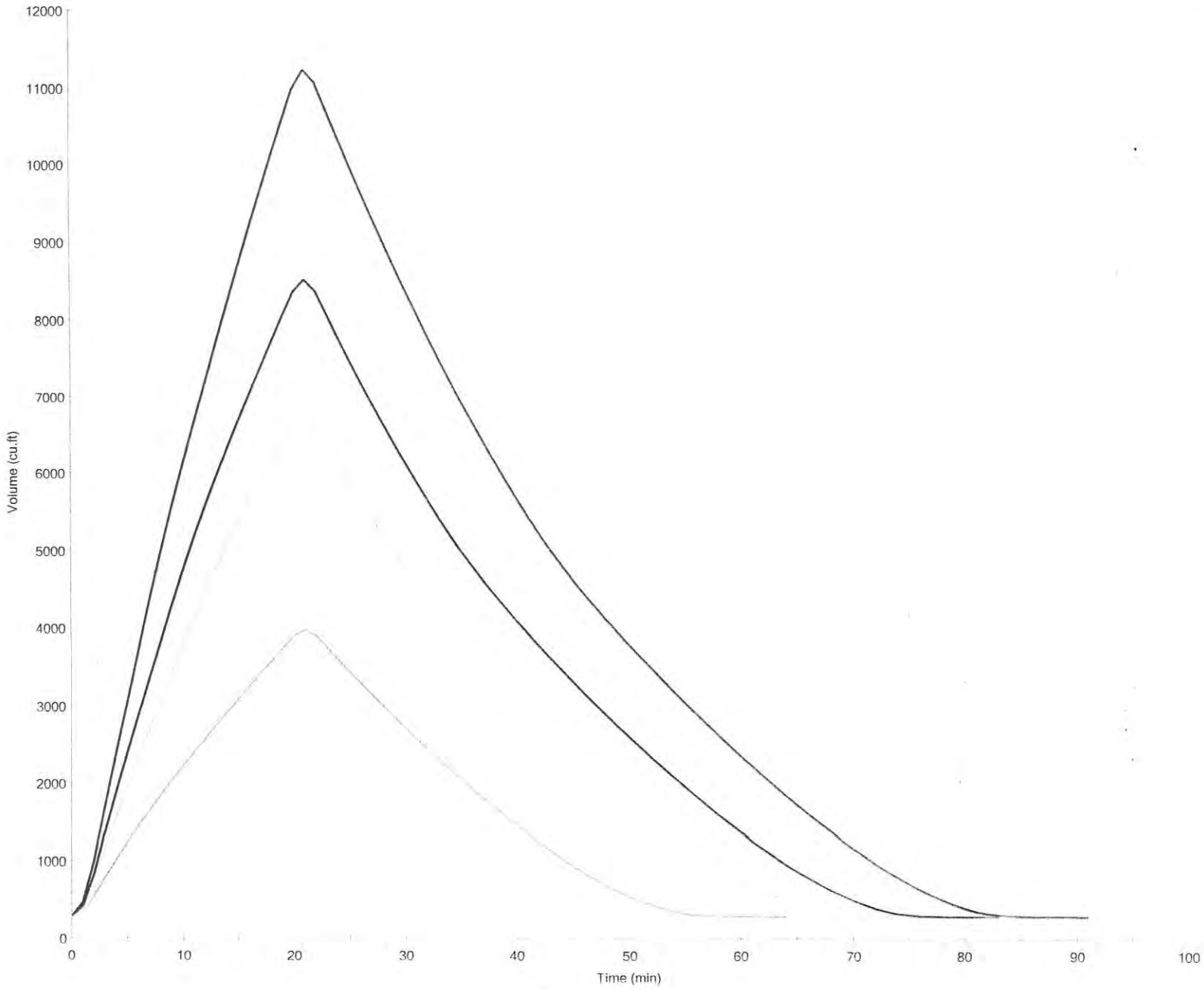
Hydrograph
BASIN OUT 15

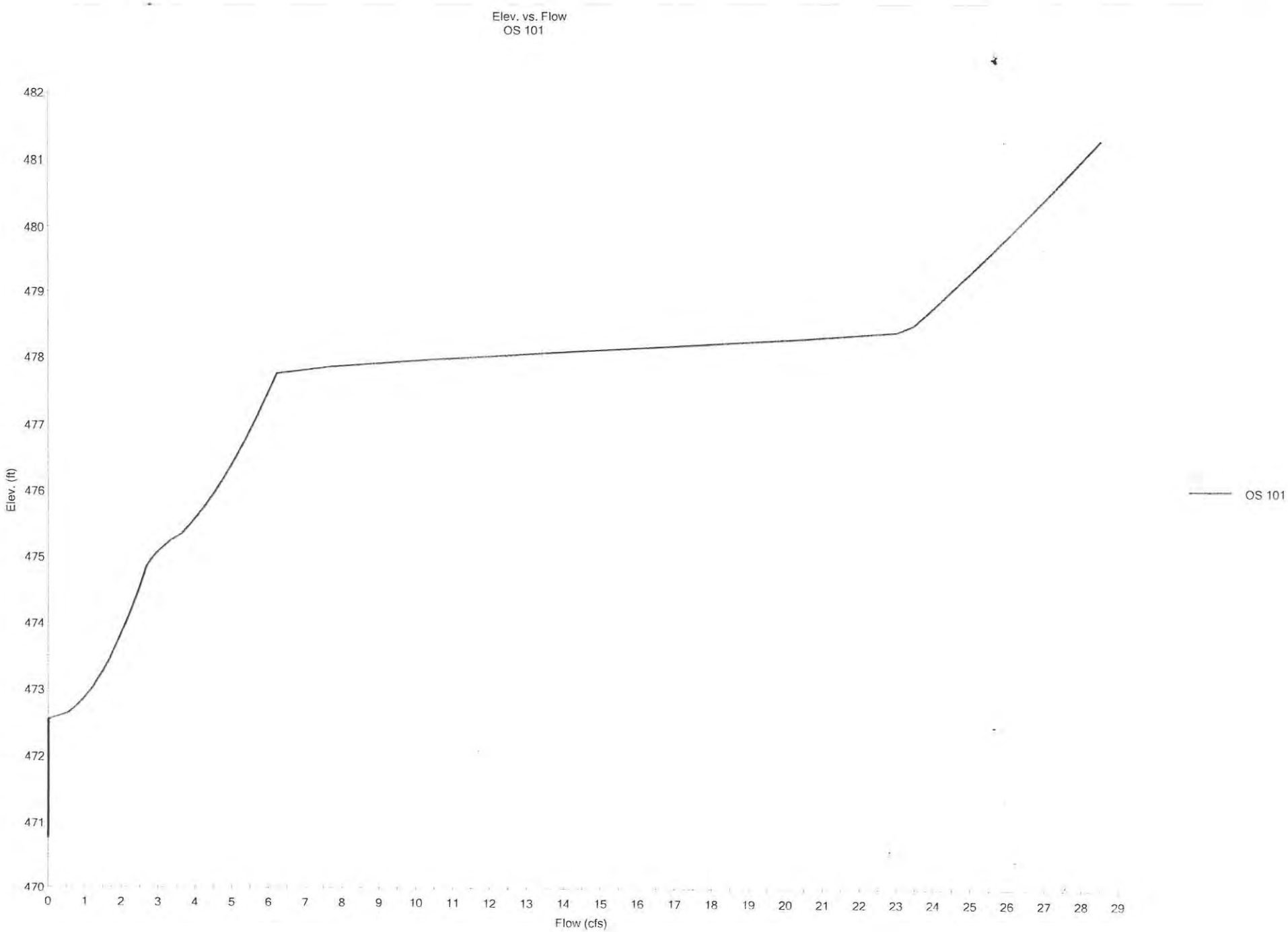


Hydrograph
BASIN OUT 100



Volume vs. Time
BASIN OUT 25




Elev. vs. Flow
OS 101
Elev. (ft)
Flow (cfs)
OS 101
482
481
480
479
478
477
476
475
474
473
472
471
470
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29

POND PACK V.10
ROUTING RESULTS
100 YR, 20 MINUTE LOW FLOW BLOCKED

Table of Contents

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

Node ID	Type	HYG Vol cu.ft	Trun.	Qpeak min	Qpeak cfs	Max WSEL ft
BASIN IN	POND	15973		2.00	13.31	
BASIN OUT	POND	15972		14.00	13.31	478.18
HYD QUEUE 20	HYG	15973		2.00	13.31	
Outfall OUT 10	JCT	15972		14.00	13.31	

TIME vs. ELEVATION (ft)

Output Time increment = 1.00 min

Time min	Time on left represents time for first value in each row.				
.00	477.75	477.80	477.95	478.07	478.13
5.00	478.16	478.17	478.18	478.18	478.18
10.00	478.18	478.18	478.18	478.18	478.18
15.00	478.18	478.18	478.18	478.18	478.18
20.00	478.18	478.14	478.03	477.93	477.88
25.00	477.84	477.82	477.80	477.79	477.78
30.00	477.77	477.77	477.76	477.76	477.76
35.00	477.76	477.75	477.75	477.75	477.75
40.00	477.75	477.75	477.75	477.75	477.75
45.00	477.75	477.75	477.75		

POND VOLUME CALCULATIONS

Planimeter scale: 1.00 ft/in

Elevation (ft)	Planimeter (sq.in)	Area (sq.ft)	A1+A2+sqr(A1*A2) (sq.ft)	Volume (cu.ft)	Volume Sum (cu.ft)
470.75	.000	0	0	0	0
472.00	224.000	224	224	93	93
474.00	2133.000	2133	3048	2032	2125
476.00	2695.000	2695	7226	4817	6943
478.00	3260.000	3260	8919	5946	12889
480.00	3730.000	3730	10477	6985	19873
481.26	4330.000	4330	12079	5073	24946

POND VOLUME EQUATIONS

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

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

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

OUTLET STRUCTURE INPUT DATA

Structure ID	= R0	
Structure Type	= Stand Pipe	
# of Openings	= 1	
Invert Elev.	= 477.75	ft
Diameter	= 5.0000	ft
Orifice Area	= 19.6350	sq.ft
Orifice Coeff.	= .600	
Weir Length	= 15.71	ft
Weir Coeff.	= 3.000	
K, Reverse	= 1.000	
Mannings n	= .0000	
Kev,Charged Riser	= .000	
Weir Submergence	= No	

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

WS Elev, Total Q		Converge		Notes
Elev. ft	Q cfs	TW Elev ft	Error +/-ft	Contributing Structures
470.75	.00	Free Outfall		(no Q: R0,C0)
470.85	.00	Free Outfall		(no Q: R0,C0)
470.95	.00	Free Outfall		(no Q: R0,C0)
471.05	.00	Free Outfall		(no Q: R0,C0)
471.15	.00	Free Outfall		(no Q: R0,C0)
471.25	.00	Free Outfall		(no Q: R0,C0)
471.35	.00	Free Outfall		(no Q: R0,C0)
471.45	.00	Free Outfall		(no Q: R0,C0)
471.55	.00	Free Outfall		(no Q: R0,C0)
471.65	.00	Free Outfall		(no Q: R0,C0)
471.75	.00	Free Outfall		(no Q: R0,C0)
471.85	.00	Free Outfall		(no Q: R0,C0)
471.95	.00	Free Outfall		(no Q: R0,C0)
472.05	.00	Free Outfall		(no Q: R0,C0)
472.15	.00	Free Outfall		(no Q: R0,C0)
472.25	.00	Free Outfall		(no Q: R0,C0)
472.35	.00	Free Outfall		(no Q: R0,C0)
472.45	.00	Free Outfall		(no Q: R0,C0)
472.55	.00	Free Outfall		(no Q: R0,C0)
472.65	.00	Free Outfall		(no Q: R0,C0)
472.75	.00	Free Outfall		(no Q: R0,C0)
472.85	.00	Free Outfall		(no Q: R0,C0)
472.95	.00	Free Outfall		(no Q: R0,C0)
473.05	.00	Free Outfall		(no Q: R0,C0)
473.15	.00	Free Outfall		(no Q: R0,C0)
473.25	.00	Free Outfall		(no Q: R0,C0)
473.35	.00	Free Outfall		(no Q: R0,C0)
473.45	.00	Free Outfall		(no Q: R0,C0)
473.55	.00	Free Outfall		(no Q: R0,C0)
473.65	.00	Free Outfall		(no Q: R0,C0)
473.75	.00	Free Outfall		(no Q: R0,C0)
473.85	.00	Free Outfall		(no Q: R0,C0)
473.95	.00	Free Outfall		(no Q: R0,C0)
474.05	.00	Free Outfall		(no Q: R0,C0)
474.15	.00	Free Outfall		(no Q: R0,C0)
474.25	.00	Free Outfall		(no Q: R0,C0)
474.35	.00	Free Outfall		(no Q: R0,C0)
474.45	.00	Free Outfall		(no Q: R0,C0)

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

WS Elev, Total Q		Converge		Notes
Elev. ft	Q cfs	TW Elev ft	Error +/-ft	Contributing Structures
478.35	21.90	Free Outfall		R0,C0
478.45	25.50	Free Outfall		R0,C0
478.55	25.68	Free Outfall		R0,C0
478.65	25.87	Free Outfall		R0,C0
478.75	26.05	Free Outfall		R0,C0
478.85	26.22	Free Outfall		R0,C0
478.95	26.40	Free Outfall		R0,C0
479.05	26.58	Free Outfall		R0,C0
479.15	26.75	Free Outfall		R0,C0
479.25	26.93	Free Outfall		R0,C0
479.35	27.10	Free Outfall		R0,C0
479.45	27.27	Free Outfall		R0,C0
479.55	27.44	Free Outfall		R0,C0
479.65	27.61	Free Outfall		R0,C0
479.75	27.78	Free Outfall		R0,C0
479.85	27.95	Free Outfall		R0,C0
479.95	28.12	Free Outfall		R0,C0
480.05	28.28	Free Outfall		R0,C0
480.15	28.45	Free Outfall		R0,C0
480.25	28.61	Free Outfall		R0,C0
480.35	28.78	Free Outfall		R0,C0
480.45	28.93	Free Outfall		R0,C0
480.55	29.10	Free Outfall		R0,C0
480.65	29.26	Free Outfall		R0,C0
480.75	29.41	Free Outfall		R0,C0
480.85	29.57	Free Outfall		R0,C0
480.95	29.73	Free Outfall		R0,C0
481.05	29.89	Free Outfall		R0,C0
481.15	30.04	Free Outfall		R0,C0
481.25	30.20	Free Outfall		R0,C0
481.26	30.21	Free Outfall		R0,C0

LEVEL POOL ROUTING DATA

HYG Dir = H:\PONDPACK\A10500PLUS\10639C\Detention\
Inflow HYG file = NONE STORED - BASIN IN 2
Outflow HYG file = NONE STORED - BASIN OUT 2

Pond Node Data = BASIN
Pond Volume Data = BASIN
Pond Outlet Data = LFB

No Infiltration

INITIAL CONDITIONS

Starting WS Elev	=	477.75 ft
Starting Volume	=	12083 cu.ft
Starting Outflow	=	.00 cfs
Starting Infiltr.	=	.00 cfs
Starting Total Qout	=	.00 cfs
Time Increment	=	1.00 min

Elevation ft	Outflow cfs	Storage cu.ft	Area sq.ft	Infilt. cfs	Q Total cfs	2S/t + O cfs
472.75	.00	427	711	.00	.00	14.23
472.85	.00	502	797	.00	.00	16.75
472.95	.00	587	888	.00	.00	19.55
473.05	.00	680	983	.00	.00	22.67
473.15	.00	783	1084	.00	.00	26.11
473.25	.00	897	1189	.00	.00	29.90
473.35	.00	1021	1299	.00	.00	34.04
473.45	.00	1157	1414	.00	.00	38.56
473.55	.00	1304	1534	.00	.00	43.47
473.65	.00	1464	1658	.00	.00	48.79
473.75	.00	1636	1788	.00	.00	54.53
473.85	.00	1821	1922	.00	.00	60.72
473.95	.00	2021	2062	.00	.00	67.35
474.05	.00	2232	2146	.00	.00	74.41
474.15	.00	2448	2173	.00	.00	81.61
474.25	.00	2667	2200	.00	.00	88.90
474.35	.00	2888	2227	.00	.00	96.28
474.45	.00	3112	2254	.00	.00	103.75
474.55	.00	3339	2281	.00	.00	111.30
474.65	.00	3569	2308	.00	.00	118.95

LEVEL POOL ROUTING DATA

HYG Dir = H:\PONDPACK\A10500PLUS\10639C\Detention\
Inflow HYG file = NONE STORED - BASIN IN 2
Outflow HYG file = NONE STORED - BASIN OUT 2

Pond Node Data = BASIN
Pond Volume Data = BASIN
Pond Outlet Data = LFB

No Infiltration

INITIAL CONDITIONS

Starting WS Elev	=	477.75 ft
Starting Volume	=	12083 cu.ft
Starting Outflow	=	.00 cfs
Starting Infiltr.	=	.00 cfs
Starting Total Qout	=	.00 cfs
Time Increment	=	1.00 min

Elevation ft	Outflow cfs	Storage cu.ft	Area sq.ft	Infilt. cfs	Q Total cfs	2S/t + O cfs
476.75	.00	9040	2901	.00	.00	301.35
476.85	.00	9332	2929	.00	.00	311.06
476.95	.00	9626	2957	.00	.00	320.87
477.05	.00	9923	2985	.00	.00	330.77
477.15	.00	10223	3013	.00	.00	340.77
477.25	.00	10526	3042	.00	.00	350.86
477.35	.00	10832	3070	.00	.00	361.05
477.45	.00	11140	3099	.00	.00	371.33
477.55	.00	11451	3128	.00	.00	381.71
477.65	.00	11766	3157	.00	.00	392.19
477.75	.00	12083	3186	.00	.00	402.76
477.85	1.49	12403	3216	.00	1.49	414.92
477.95	4.21	12726	3245	.00	4.21	428.41
478.05	7.74	13052	3271	.00	7.74	442.80
478.15	11.92	13380	3294	.00	11.92	457.92
478.25	16.66	13711	3317	.00	16.66	473.68
478.35	21.90	14044	3340	.00	21.90	490.02
478.45	25.50	14379	3363	.00	25.50	504.79
478.55	25.68	14716	3386	.00	25.68	516.22
478.65	25.87	15056	3409	.00	25.87	527.73

LEVEL POOL ROUTING DATA

HYG Dir = H:\PONDPACK\A10500PLUS\10639C\Detention\
Inflow HYG file = NONE STORED - BASIN IN 2
Outflow HYG file = NONE STORED - BASIN OUT 2

Pond Node Data = BASIN
Pond Volume Data = BASIN
Pond Outlet Data = LFB

No Infiltration

INITIAL CONDITIONS

Starting WS Elev	= 477.75	ft
Starting Volume	= 12083	cu.ft
Starting Outflow	= .00	cfs
Starting Infiltr.	= .00	cfs
Starting Total Qout	= .00	cfs
Time Increment	= 1.00	min

Elevation ft	Outflow cfs	Storage cu.ft	Area sq.ft	Infilt. cfs	Q Total cfs	2S/t + O cfs
480.75	29.41	22802	4082	.00	29.41	789.47
480.85	29.57	23212	4130	.00	29.57	803.32
480.95	29.73	23628	4178	.00	29.73	817.32
481.05	29.89	24048	4227	.00	29.89	831.48
481.15	30.04	24473	4276	.00	30.04	845.81
481.25	30.20	24903	4325	.00	30.20	860.30
481.26	30.21	24946	4330	.00	30.21	861.76

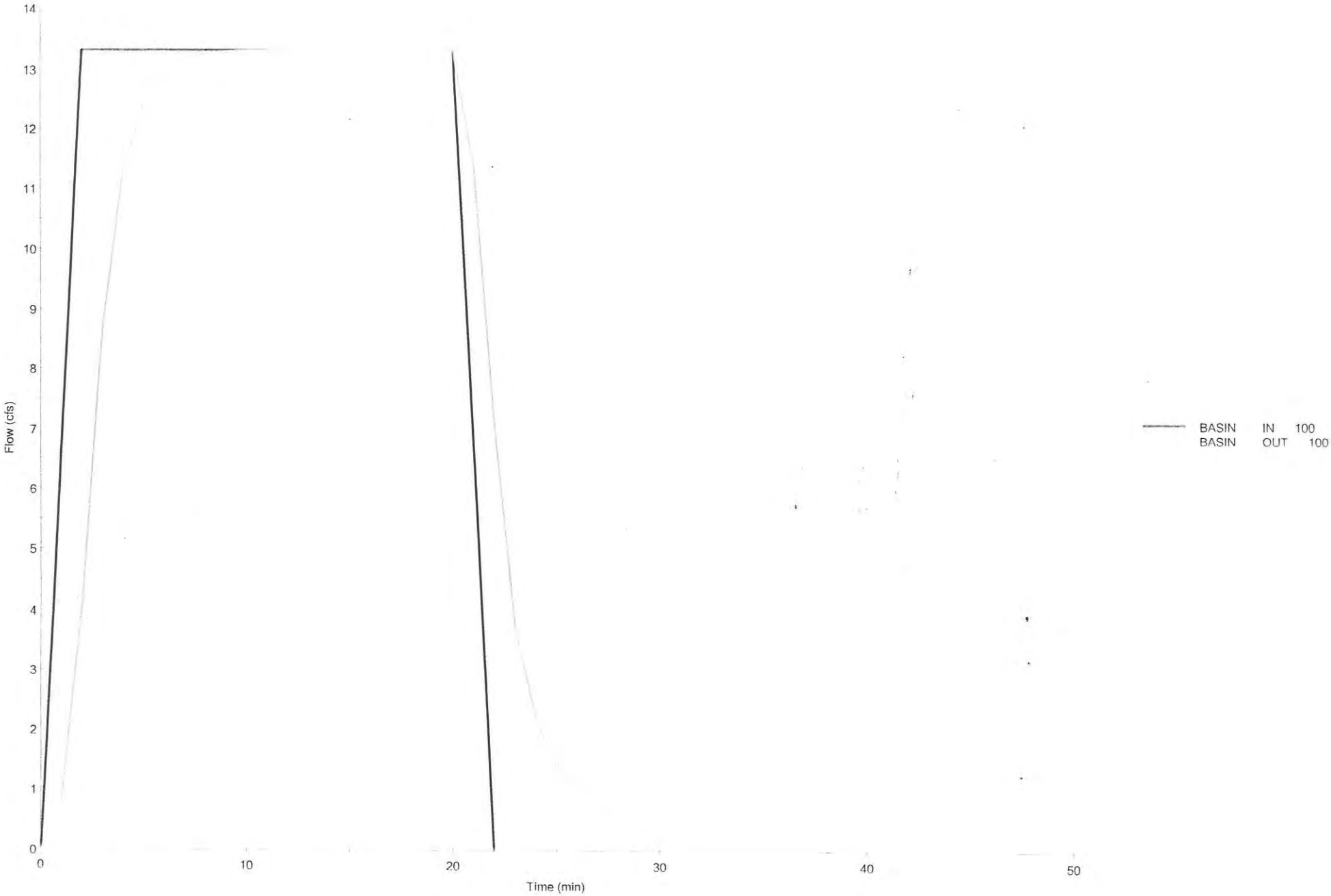
POND ROUTED TOTAL OUTFLOW HYG...
HYG file =
HYG ID = BASIN OUT
HYG Tag = 100

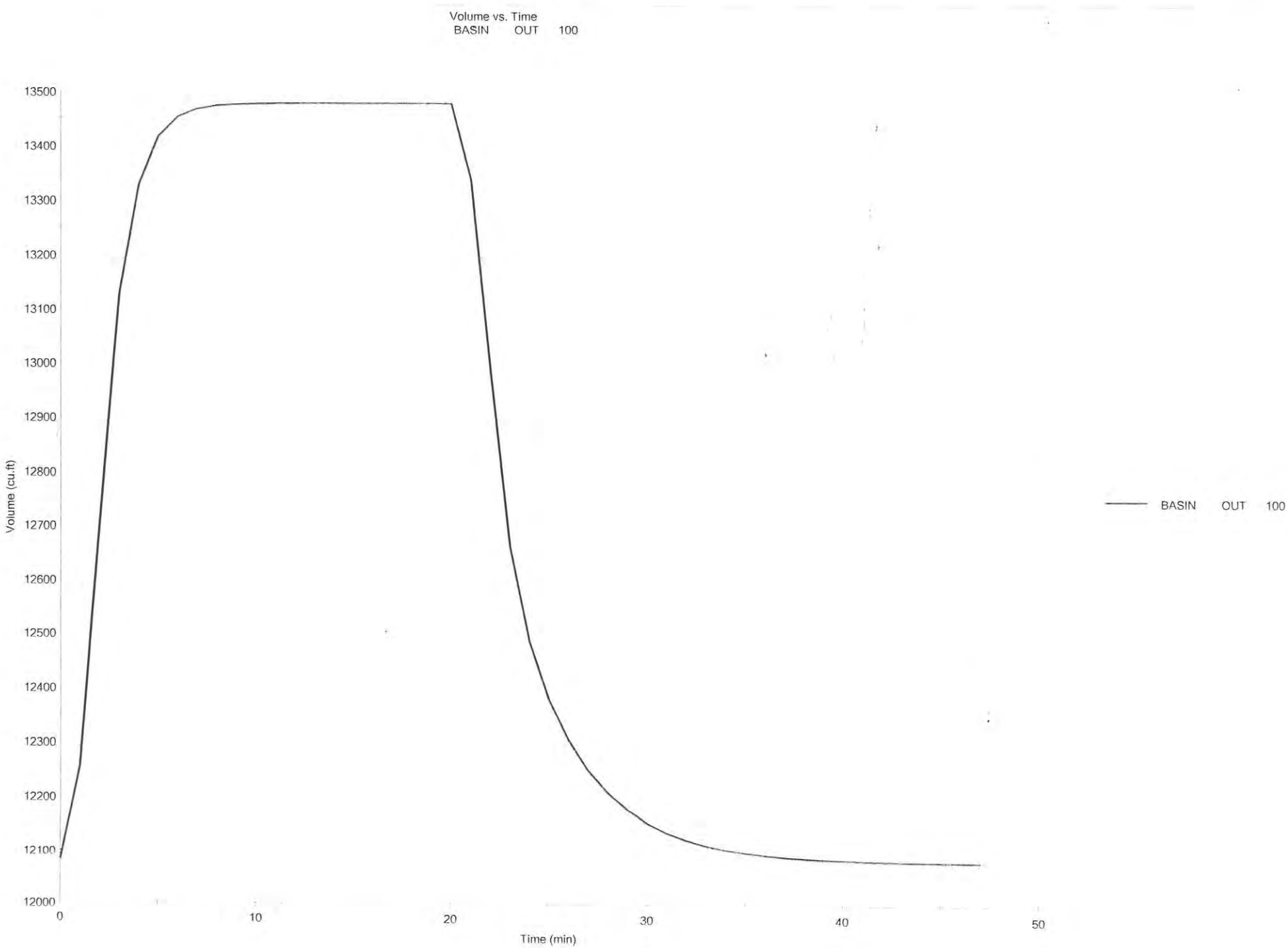
Peak Discharge =	13.31 cfs
Time to Peak =	14.00 min
HYG Volume =	15972 cu.ft

HYDROGRAPH ORDINATES (cfs)
Output Time increment = 1.00 min
Time on left represents time for first value in each row.

Time min					
.00	.00	.82	4.08	8.68	11.24
5.00	12.43	12.96	13.17	13.25	13.29
10.00	13.30	13.31	13.31	13.31	13.31
15.00	13.31	13.31	13.31	13.31	13.31
20.00	13.31	11.36	7.01	3.69	2.20
25.00	1.38	1.04	.79	.59	.45
30.00	.34	.26	.19	.15	.11
35.00	.08	.06	.05	.04	.03
40.00	.02	.02	.01	.01	.01
45.00	.01	.00	.00		

Hydrograph
BASIN OUT 100




Volume vs. Time
BASIN OUT 100
13500
13400
13300
13200
13100
13000
12900
12800
12700
12600
12500
12400
12300
12200
12100
12000
Volume (cu.ft)
0
10
20
30
40
50
Time (min)
BASIN OUT 100

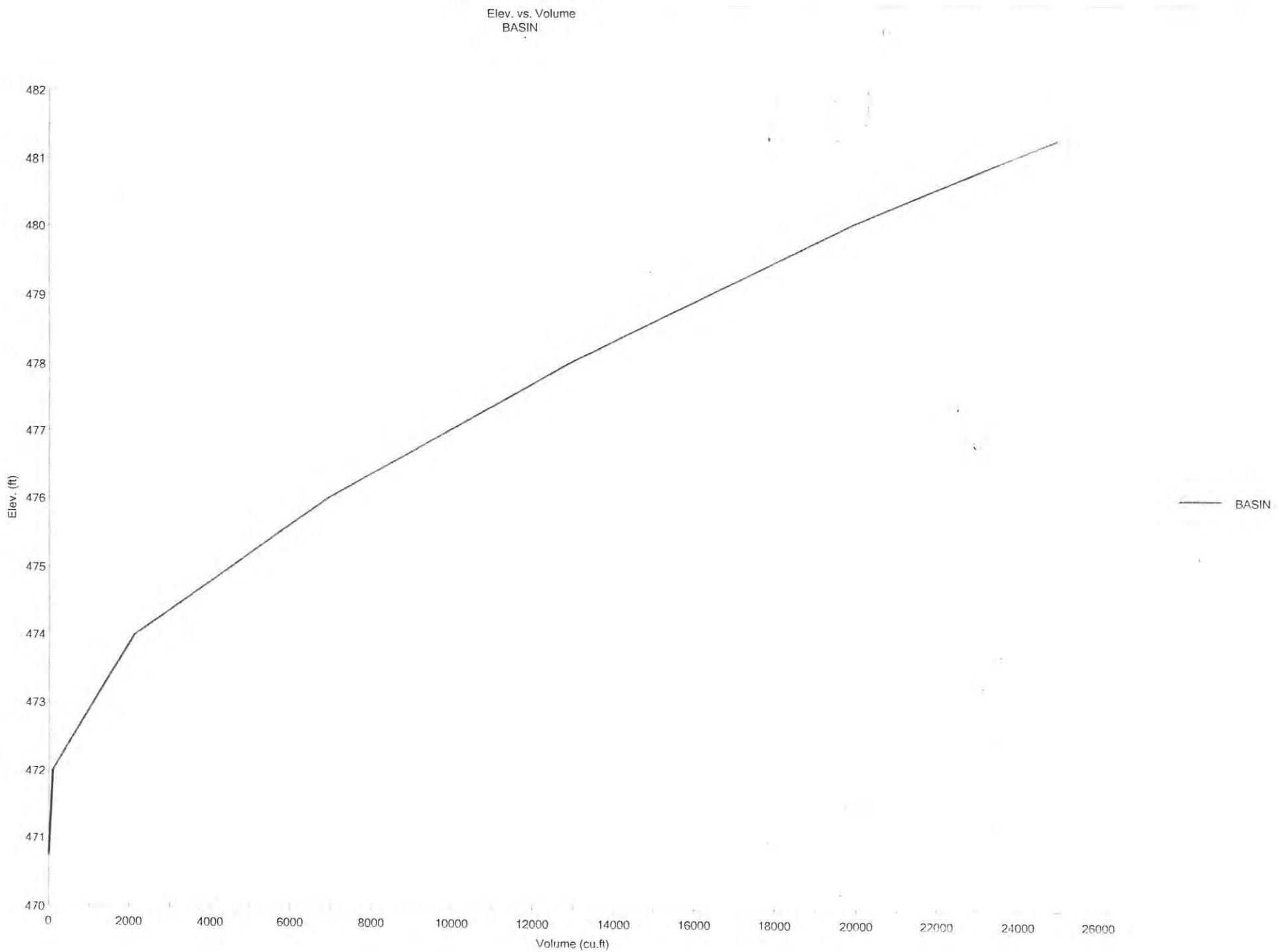
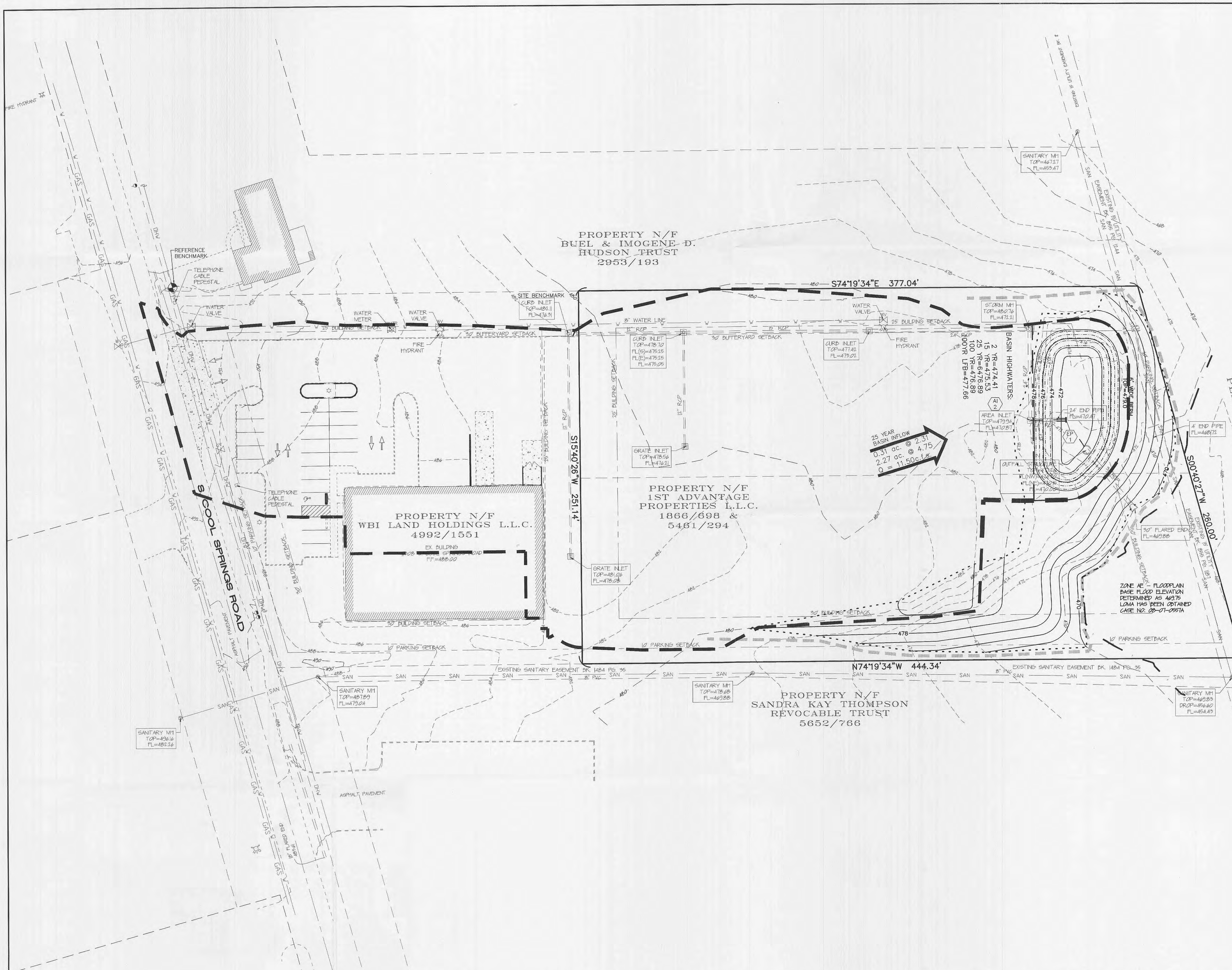

Elev. vs. Volume
BASIN
482
481
480
479
478
477
476
475
474
473
472
471
470
Elev. (ft)
0
2000
4000
6000
8000
10000
12000
14000
16000
18000
20000
22000
24000
26000
Volume (cu.ft)
BASIN

EXHIBIT A
BASIN INFLOW MAP
COOL SPRINGS BUSINESS PARK
99-10639D



PROPERTY N/F
BUEL & IMOGENE D.
HUDSON TRUST
2953/193
PROPERTY N/F
1ST ADVANTAGE
PROPERTIES L.L.C.
1866/698 &
5461/294
PROPERTY N/F
WBI LAND HOLDINGS L.L.C.
4992/1551
PROPERTY N/F
SANDRA KAY THOMPSON
REVOCABLE TRUST
5652/766
PROPERTY N/F
PEBBLE ACRES NO. 1 L.L.C.
2844/152
S. COOL SPRINGS ROAD
S74°19'34"E 377.04'
N74°19'34"W 444.34'
S15°40'26"W 251.14'
S00°40'27"W 260.00'
REFERENCE BENCHMARK
SITE BENCHMARK
TELEPHONE CABLE PEDESTAL
WATER VALVE
WATER METER
FIRE HYDRANT
8" WATER LINE
25' BUILDING SETBACK
30' BUFFERYARD SETBACK
30' BUILDING SETBACK
10' PARKING SETBACK
EX BUILDING
BASIN HIGHWATERS:
2 YR=474.41
15 YR=475.53
25 YR=475.89
100 YR=476.89
100YR LFB=477.66
25 YEAR BASIN INFLOW
0.31 ac. @ 2.31
2.27 ac. @ 4.75
Q = 11.50c.f.s.
AREA INLET
STORM MH
CURB INLET
GRATE INLET
SANITARY MH
4' END PIPE
30" FLARED END
ZONE AE - FLOODPLAIN
BASE FLOOD ELEVATION
DETERMINED AS 469.75
LOMA HAS BEEN OBTAINED
CASE NO. 08-07-0557A
EXISTING SANITARY EASEMENT BK. 1484 PG. 35
ASPHALT PAVEMENT
GAS
SAN

GRAPHIC SCALE

30 0 15 30

(IN FEET)
1 inch = 30 ft.

BAX
ENGINEERING
PLANNING
SURVEYING

221 Point West Blvd.
St. Charles, MO 63301
636-928-5552
FAX 928-1718

UNDERGROUND UTILITIES HAVE BEEN PLOTTED FROM AVAILABLE INFORMATION AND THEREFORE THEIR LOCATIONS SHALL BE CONSIDERED APPROXIMATE ONLY. THE VERIFICATION OF THE LOCATION OF ALL UNDERGROUND UTILITIES, EITHER SHOWN OR NOT SHOWN ON THESE PLANS SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR, AND SHALL BE LOCATED PRIOR TO ANY GRADING OR CONSTRUCTION OF THE IMPROVEMENTS.

STATE OF MISSOURI
TODD C. FLAUAUS
NUMBER
PE-2005000982
PROFESSIONAL ENGINEER

Todd C. Flauaus
Civil Engineer
2005000982

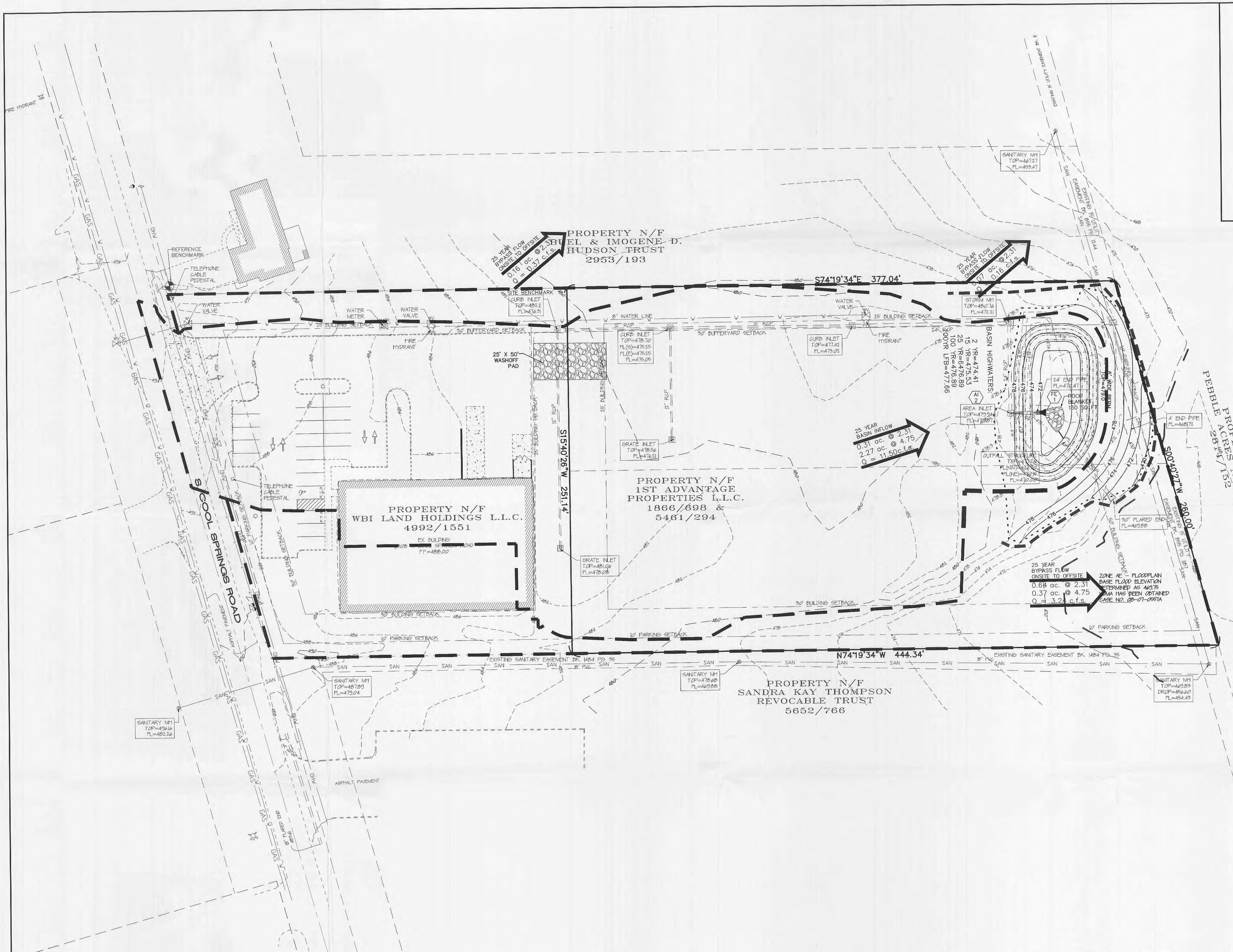
EXHIBIT A
BASIN INFLOW MAP
COOL SPRINGS BUSINESS PARK
99-10639D

GRAPHIC SCALE

(IN FEET)
1 inch = 30 ft.

ENGINEERING
PLANNING
SURVEYING

221 Point West Blvd.
St. Charles, MO 63301
636-928-5552
FAX 928-1718



UNDERGROUND UTILITIES HAVE BEEN PLOTTED FROM AVAILABLE INFORMATION AND THEREFORE THEIR LOCATIONS SHALL BE CONSIDERED APPROXIMATE ONLY. THE VERIFICATION OF THE LOCATION OF ALL UNDERGROUND UTILITIES, EITHER SHOWN OR NOT SHOWN ON THESE PLANS SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR, AND SHALL BE LOCATED PRIOR TO ANY GRADING OR CONSTRUCTION OF THE IMPROVEMENTS.

STATE OF MISSOURI
TODD C. FLAUAUS
NUMBER PE-2005000982
PROFESSIONAL ENGINEER

3-18-15

Todd C. Flauaus
Civil Engineer
2005000982

EXHIBIT B
PREDEVELOPED DRAINAGE MAP
COOL SPRINGS BUSINESS PARK
99-10639D

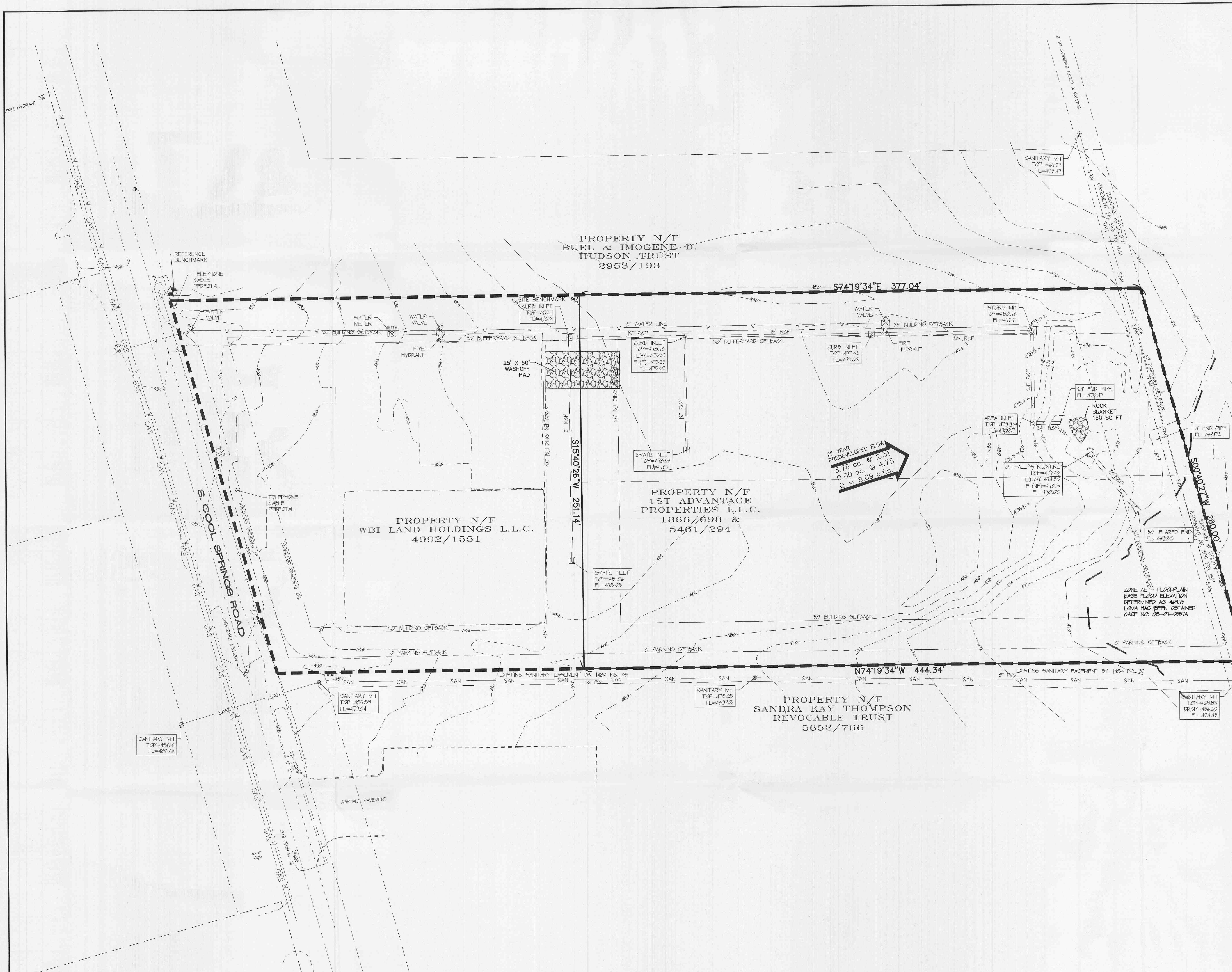
GRAPHIC SCALE

30 0 15 30

(IN FEET)
1 inch = 30 ft.

ENGINEERING
PLANNING
SURVEYING

221 Point West Blvd.
St. Charles, MO 63301
636-928-5552
FAX 928-1718



Todd C. Flauaus
Civil Engineer
2005000982

UNDERGROUND UTILITIES HAVE BEEN PLOTTED FROM AVAILABLE INFORMATION AND THEREFORE THEIR LOCATIONS SHALL BE CONSIDERED APPROXIMATE ONLY. THE VERIFICATION OF THE LOCATION OF ALL UNDERGROUND UTILITIES, EITHER SHOWN OR NOT SHOWN ON THESE PLANS SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR, AND SHALL BE LOCATED PRIOR TO ANY GRADING OR CONSTRUCTION OF THE IMPROVEMENTS.

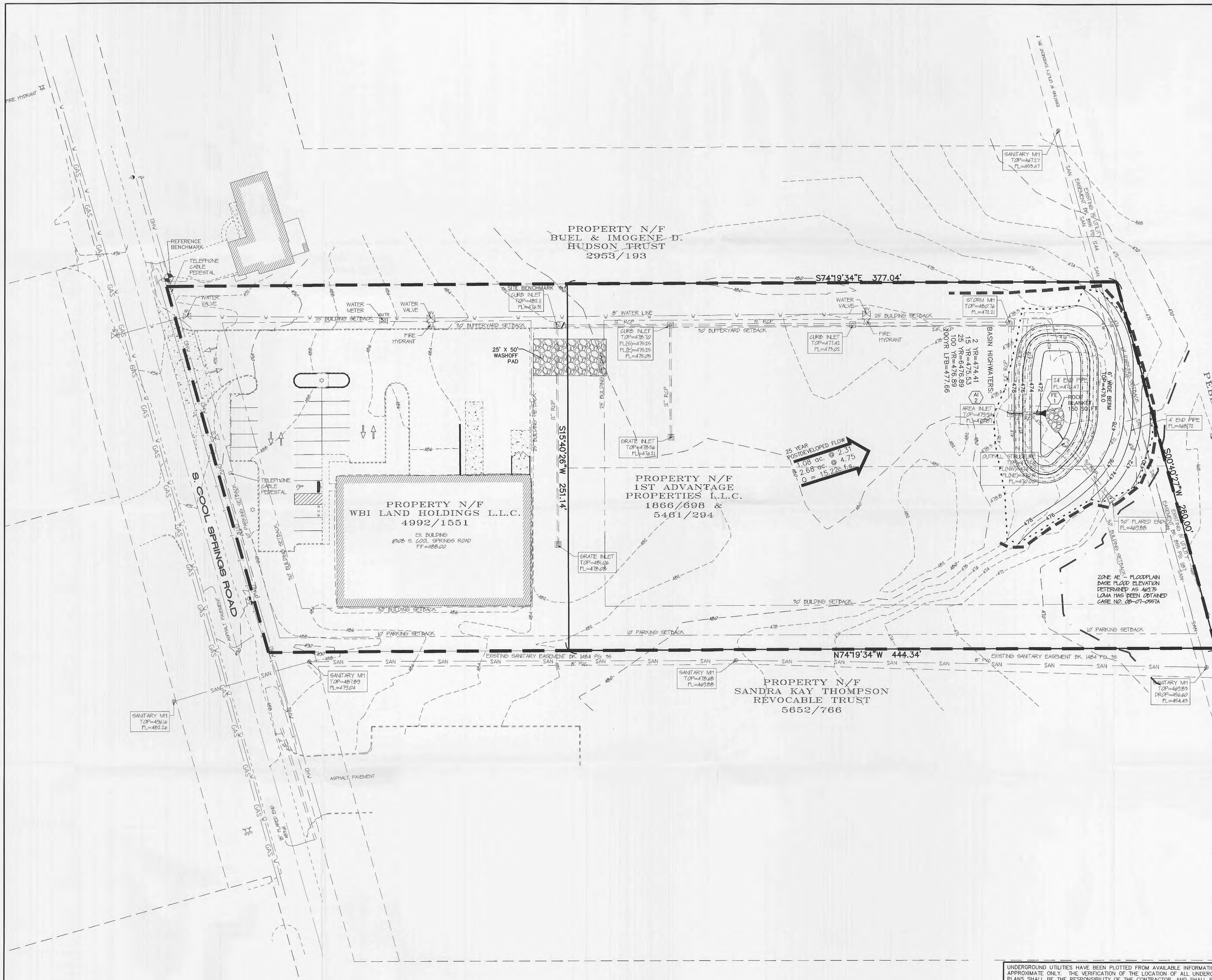

PROPERTY N/F
BUEL & IMOGENE D.
HUDSON TRUST
2953/193
S74°19'34"E 377.04'
PROPERTY N/F
WBI LAND HOLDINGS L.L.C.
4992/1551
PROPERTY N/F
1ST ADVANTAGE
PROPERTIES L.L.C.
1866/698 &
5461/294
S15°40'26"W 251.14'
25 YEAR
POSTDEVELOPED FLOW
1.08 ac. @ 2.31
2.68 ac. @ 4.75
Q = 15.22c.f.s.
BASIN HIGHWATERS:
2 YR=474.41
15 YR=475.53
25 YR=476.89
100 YR=476.89
ROOF LFB=477.66
6' WIDE BERM
TOP=479.0
PROPERTY N/F
PEBBLE ACRES NO. 1 L.L.C.
2814/152
S00°40'27"W 260.00'
N74°19'34"W 444.34'
PROPERTY N/F
SANDRA KAY THOMPSON
REVOCABLE TRUST
5652/766
S. COOL SPRINGS ROAD
25' X 50' WASHOFF PAD
ZONE AE - FLOODPLAIN
BASE FLOOD ELEVATION
DETERMINED AS 467.75
LOMA HAS BEEN OBTAINED
CASE NO. 08-07-0551A
REFERENCE BENCHMARK
SITE BENCHMARK
25' BUILDING SETBACK
30' BUFFERYARD SETBACK
30' BUILDING SETBACK
10' PARKING SETBACK
EXISTING SANITARY EASEMENT BK. 1484 PG. 36
ASPHALT PAVEMENT

EXHIBIT C
POSTDEVELOPED DRAINAGE MAP
COOL SPRINGS BUSINESS PARK
99-10639D

GRAPHIC SCALE
(IN FEET)
1 inch = 30 ft.

ENGINEERING
PLANNING
SURVEYING

221 Point West Blvd.
St. Charles, MO 63301
636-928-5552
FAX 928-1718

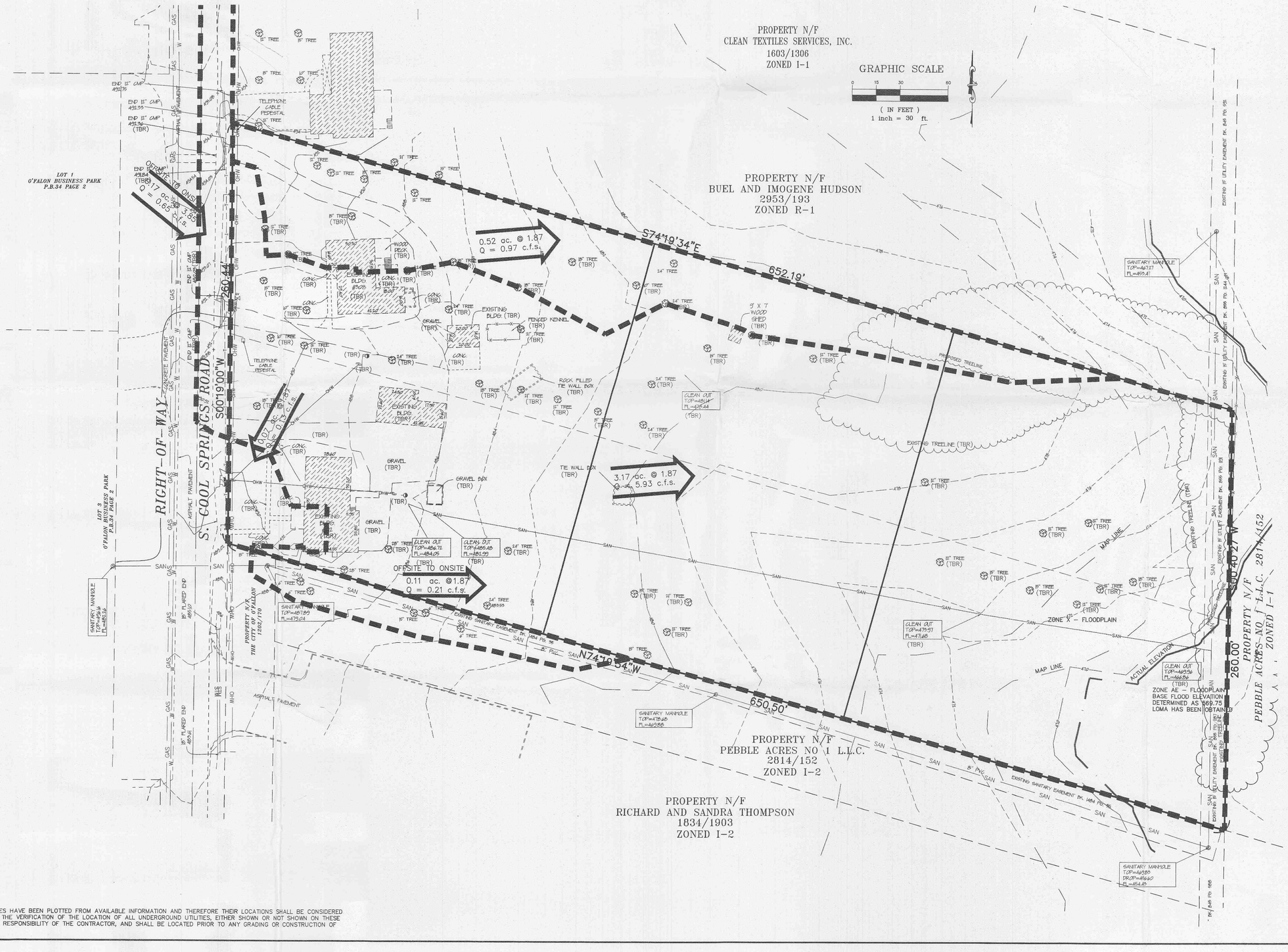
STATE OF MISSOURI
TODD C. FLAUAUS
NUMBER PE-2005000982
PROFESSIONAL ENGINEER
3-18-15

Todd C. Flauaus
Civil Engineer
2005000982

UNDERGROUND UTILITIES HAVE BEEN PLOTTED FROM AVAILABLE INFORMATION AND THEREFORE THEIR LOCATIONS SHALL BE CONSIDERED APPROXIMATE ONLY. THE VERIFICATION OF THE LOCATION OF ALL UNDERGROUND UTILITIES, EITHER SHOWN OR NOT SHOWN ON THESE PLANS SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR, AND SHALL BE LOCATED PRIOR TO ANY GRADING OR CONSTRUCTION OF THE IMPROVEMENTS.

THIS SHEET FOR DRAINAGE AREA PURPOSES ONLY, NOT FOR CONSTRUCTION!!!!

A PRE DRAINAGE AREA MAP FOR
COOL SPRINGS
BUSINESS PARK
99-10639C 5-2-08



UNDERGROUND UTILITIES HAVE BEEN PLOTTED FROM AVAILABLE INFORMATION AND THEREFORE THEIR LOCATIONS SHALL BE CONSIDERED APPROXIMATE ONLY. THE VERIFICATION OF THE LOCATION OF ALL UNDERGROUND UTILITIES, EITHER SHOWN OR NOT SHOWN ON THESE PLANS SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR, AND SHALL BE LOCATED PRIOR TO ANY GRADING OR CONSTRUCTION OF THE IMPROVEMENTS.

CITY #2207 & 2207.01 P&Z APPROVED 11-1-07

A POST DRAINAGE AREA MAP FOR
COOL SPRINGS
BUSINESS PARK
99-10639C 5-2-08

THIS SHEET FOR DRAINAGE AREA PURPOSES ONLY, NOT FOR CONSTRUCTION!!!!

UNDERGROUND UTILITIES HAVE BEEN PLOTTED FROM AVAILABLE INFORMATION AND THEREFORE THEIR LOCATIONS SHALL BE CONSIDERED APPROXIMATE ONLY. THE VERIFICATION OF THE LOCATION OF ALL UNDERGROUND UTILITIES, EITHER SHOWN OR NOT SHOWN ON THESE PLANS SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR, AND SHALL BE LOCATED PRIOR TO ANY GRADING OR CONSTRUCTION OF THE IMPROVEMENTS.

CITY #2207 & 2207.01 P&Z APPROVED 11-1-07