

SAK CONSTRUCTION  
864 HOFF ROAD  
O'FALLON, MO

DRAINAGE STUDY

CITY OF O'FALLON  
COMMUNITY DEVELOPMENT DEPARTMENT  
ACCEPTED FOR CONSTRUCTION  
BY:  DATE: 9/28/10  
PROFESSIONAL ENGINEER'S SEAL  
INDICATES RESPONSIBILITY FOR DESIGN

By:  
David Mason and Associates  
800 South Vandeventer  
St. Louis, MO 63110  
314-534-1030

Date: September 16, 2010

DMA # 2010003-00



SEPT 16, 2010

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**DETENTION BASIN**

The City of O’Fallon detention basin design requirements are that the post development 2, 15, 25, and 100 year storm discharge from the basin be less than the pre development discharge rate for the same return period storms.

Computer programs TR-55 and Hydraflow Hydrographs by Intelesolve were utilized to determine maximum runoff rates and water surface elevations in the detention basin. The NCRS hydrologic characteristic grouping for all soils within the project area is type “C”. With a letter designation system from “A” to “D” with “A” being the most pervious and “D” being the least pervious a soil classification of “C” describes a surface that does not readily absorb runoff. This is evident by the minimal increase in flow from the pre to the post development condition.

The following table provides a summary of flow rates and water surface elevations for the detention basin.

Storm Return Period, i	Pre Development Flow, (CFS)	Post Development Flow In, (CFS)	Post Development Flow Out, (CFS)	Elevation
2 Year, 2.39	5.60	16.55	5.18	564.80
15 Year, 5.20	22.47	38.98	21.18	566.12
25 Year, 5.40	23.74	40.56	22.90	566.18
100 Year, 7.00	34.25	53.13	32.34	566.66

The detention basin was analyzed with the low flow blocked resulting in a maximum water surface elevation of 567.70. The elevation is 1.00 feet lower than the top of the detention basin berm (568.70) thus providing more than 1 foot of free board.

**STORM SEWER DESIGN**

The site storm sewers were also designed based on the City of O’Fallon requirement of a 15 year storm recurrence interval. The minimum pipe diameter for the collection system is 12 inch. The storm sewer improvements are limited to adding a grated inlet at the bottom of a ramp for a loading dock and intercepting an existing downspout collector system along the north end of the building, all other areas are either served by an existing storm sewer or surface drains to the detention basin. The runoff value per acre used for the building roof and ramp will be 3.5 c.f.s. per acre (15 year, 100% impervious).

**DOWN STREAM STORM SYSTEM ADAQUACY**

After the Stormwater leaves the existing detention basin it travels in a ditch parallel and east of Hoff Road in a northerly direction. Approximately 80 feet north of the site is a cross road corrugated metal pipe culvert that carries runoff under Hoff Road from the east to the west side. Only the top

few inches of the culvert can be seen, the lower portion is filled with debris. Because of the condition of the culvert it is not possible to determine the adequacy of the storm sewer system downstream of the site. It is however possible to compare the discharge from the site based on the current detention basin with the proposed detention basin and see if the site runoff flow rate has decreased. Reducing the runoff to a level that is less than the rate currently discharged would alleviate any problems that currently exist. The existing basin was modeled and the results can be found in the table below.

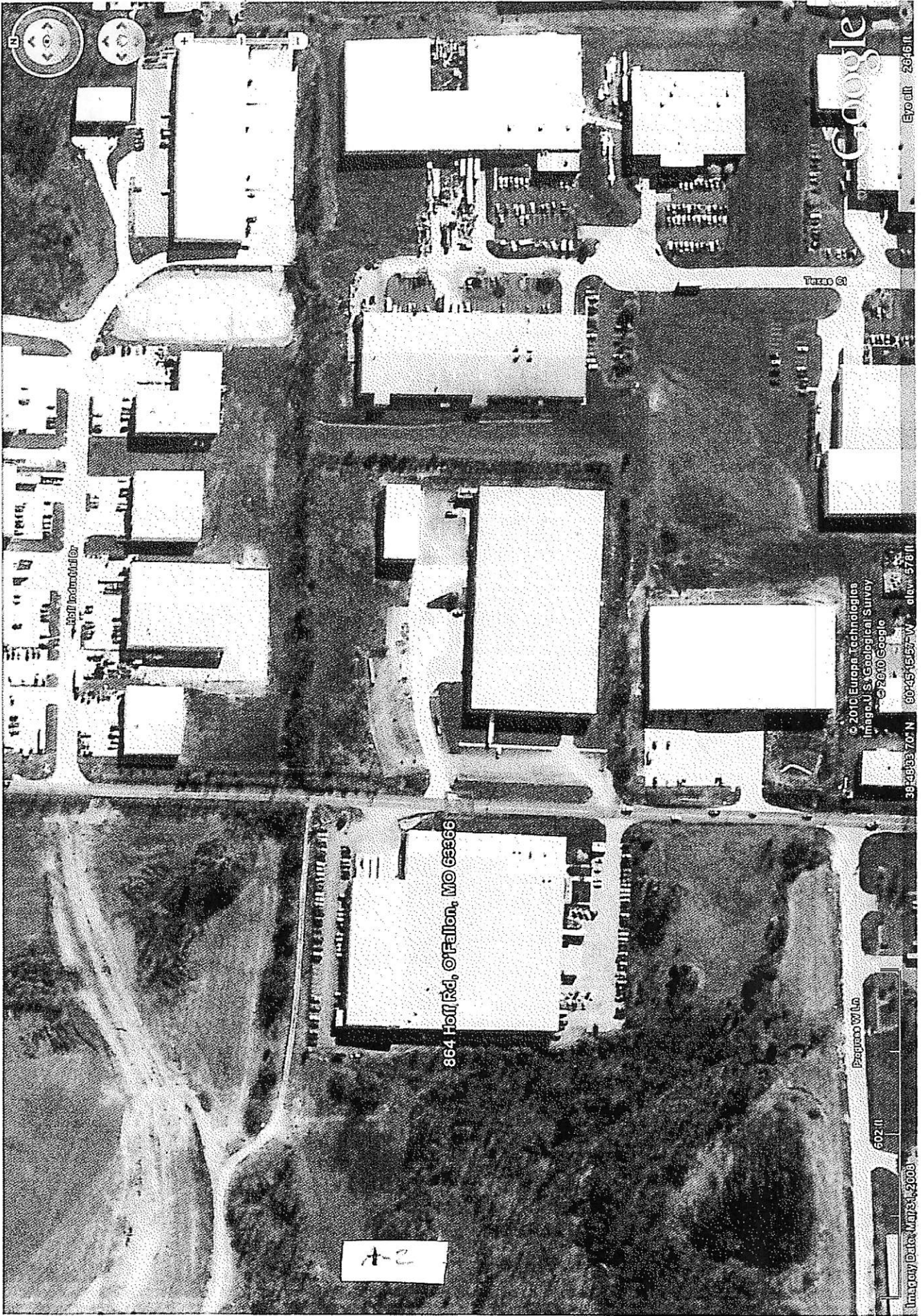
Storm Return Period	Pre Development Flow In, (CFS)	Pre Development Flow Out, (CFS)	Elevation	Maximum Storage CF
100 Year	40.90	40.18	566.21	6324

Based on a 100 year storm, the maximum flow rate exiting the basin (site) as it exists today is 40.18 c.f.s., the maximum storage volume is 6324 cubic feet, this compares with 30.48 c.f.s. and a maximum storage volume of 31,336 cubic feet in the post development state. By increasing the detention basin by 5 times we have significantly reduced the discharge from the site.

The site improvements will include cleaning the ditch and cross road culvert to improve flow along and under Hoff Road.

**APPENDIX A**

**WEB SOIL SURVEY**  
**TR-55 EXISTING CONDITIONS**  
**TR-55 PROPOSED CONDITIONS**



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864 Hoff Rd, O'Fallon, MO 63366

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Image.J.S. Geodigital Survey  
© 2010 Google

39°48'33.70"N 007°45'55.77"W elev: 578 ft

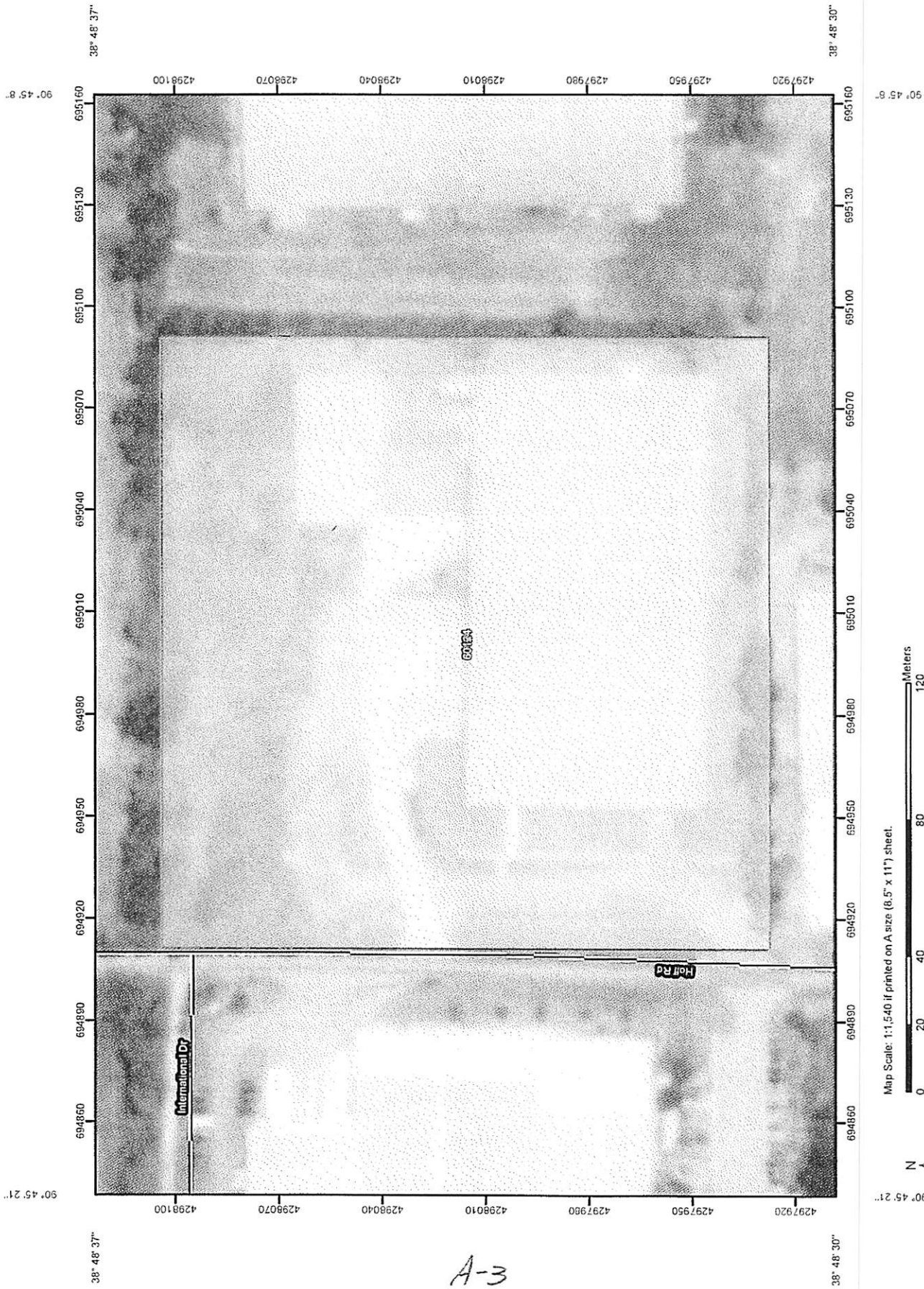
Google

Evo III 28.611

30.809 N 33° 48' 32.25" W 45' 14.52" 90.754

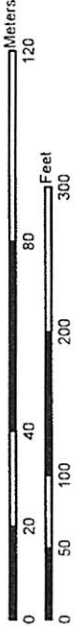


Hydrologic Soil Group—St. Charles County, Missouri




A-3

Map Scale: 1:1,540 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: 1:1,540 if printed on A size (8.5" × 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 15N NAD83

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

Soil Survey Area: St. Charles County, Missouri  
Survey Area Data: Version 9, Jun 3, 2009

Date(s) aerial images were photographed: 8/10/2007

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.

A-4



## Hydrologic Soil Group

Hydrologic Soil Group— Summary by Map Unit — St. Charles County, Missouri				
Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
60124	Harvester-Urban land complex, 2 to 9 percent slopes	C	7.8	100.0%
Totals for Area of Interest			7.8	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

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**COMPUTATION SHEETS**

PROJECT #: 2010003-00  
 PROJECT TITLE: SAK CONSTRUCTION  
 CLIENT: SAK

COMPUTED BY: M. DAVIS  
 CHECKED BY: \_\_\_\_\_  
 DATE: 4-20-2010

TOTAL SITE AREA = 336,398.4 S.F. = 7.73 ACRES  
 PRE DEV GRASS AREA BYPASSING DETENTION BASIN = 80912 S.F. = 1.86 AC  
 POST DEV GRASS AREA BYPASSING DETENTION BASIN = 66059 S.F. = 1.52 AC  
 TOTAL<sup>EX</sup> SITE AREA DRAINING TO DETENTION BASIN = 7.73 - 1.86 = 5.87 AC

EXISTING AREA OF GRASS DRAINING TO DETENTION BASIN

A = 55400 + 1186 + 6879 + 7677 + 2732.  
 A = 73,874 S.F. = 1.70 ACRES

EXISTING AREA OF BUILDING DRAINING TO DETENTION BASIN:

A = 89086 + 8042 = 97128 S.F.  
 A = 2.23 ACRES.

EXISTING AREA OF PAVEMENT DRAINING TO DETENTION BASIN

A = 84307 S.F.  
 A = 1.94 ACRES

FEATURE	AREA	C	C x A
GRASS	1.70	.2	0.34
BLDG	2.23	1.0	2.23
PVMT	1.94	1.0	1.94
	<u>5.87</u>		

5.87  $\left[ \begin{array}{l} 4.51 \\ \hline \end{array} \right] = 0.77 = C$

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COMPUTATION SHEETS

PROJECT #: 2010003-00  
PROJECT TITLE: B64 HOFF ROAD  
CLIENT: SAK CONSTRUCTION

COMPUTED BY: M. DAVIS  
CHECKED BY: \_\_\_\_\_  
DATE: 4-21-2010

ASSUME IN THE PRE DEVELOPMENT CONDITION THAT SITE WAS  
ROLLING MEADOW / PASTURE.

SOIL IS HYDROLOGIC SOIL GROUP "C"

HIGH POINT IS @ SOUTH EAST CORNER OF SITE ELEV = 584  
LOW POINT IS @ NORTH WEST CORNER OF SITE ELEV = 564

ASSUME IN THE PRE DEVELOPMENT CONDITION THE SLOPE WAS  
CONSTANT

$$S = (584 - 564) \div BOB = 2.72 \%$$

WinTR-55 Current Data Description

--- Identification Data ---

User: MED Date: 9/15/2010  
Project: 864 Hoff Road Units: English  
SubTitle: Pre development state Areal Units: Acres  
State: Missouri  
County: St. Charles  
Filename: L:\2010003-00\_SAK\_864\_Hoff\Calculations & Data\Civil\WIN TR55\pre development.w55

--- Sub-Area Data ---

Name	Description	Reach	Area(ac)	RCN	Tc
upstream		site	5.87	79	.224

Total area: 5.87 (ac)

--- Storm Data --

Rainfall Depth by Rainfall Return Period

2-Yr (in)	5-Yr (in)	15-Yr (in)	25-Yr (in)	50-Yr (in)	100-Yr (in)	1-Yr (in)
2.39	.0	5.2	5.4	.0	7.0	.0

Storm Data Source: User-provided custom storm data  
Rainfall Distribution Type: Type II  
Dimensionless Unit Hydrograph: <standard>

A-B

MED

864 Hoff Road  
Pre development state  
St. Charles County, Missouri

Watershed Peak Table

Sub-Area or Reach Identifier	Peak Flow by Rainfall Return Period			
	2-Yr (cfs)	15-Yr (cfs)	25-Yr (cfs)	100-Yr (cfs)
-----				
SUBAREAS upstream	5.60	22.47	23.74	34.25
REACHES site	5.60	22.47	23.74	34.25
Down	5.60	22.47	23.74	34.25
OUTLET	5.60	22.47	23.74	34.25

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MED

864 Hoff Road  
Pre development state  
St. Charles County, Missouri

Hydrograph Peak/Peak Time Table

Sub-Area or Reach Identifier	Peak Flow and Peak Time (hr) by Rainfall Return Period			
	2-Yr (cfs) (hr)	15-Yr (cfs) (hr)	25-Yr (cfs) (hr)	100-Yr (cfs) (hr)

-----  
SUBAREAS

upstream	5.60	22.47	23.74	34.25
	12.05	12.03	12.02	12.03

REACHES

site	5.60	22.47	23.74	34.25
	12.05	12.03	12.02	12.03
Down	5.60	22.47	23.74	34.25
	12.05	12.01	12.02	12.01

OUTLET	5.60	22.47	23.74	34.25
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MED

864 Hoff Road  
Pre development state  
St. Charles County, Missouri

Sub-Area Land Use and Curve Number Details

Sub-Area Identifier	Land Use	Hydrologic Soil Group	Sub-Area Area (ac)	Curve Number
upstream	Pasture, grassland or range	(fair) C	5.87	79
Total Area / Weighted Curve Number			5.87	79
			====	==

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**COMPUTATION SHEETS**

PROJECT #: 2010003-00  
 PROJECT TITLE: B64 HOFF ROAD  
 CLIENT: SAT CONSTRUCTION

COMPUTED BY: M. DAVIS  
 CHECKED BY: \_\_\_\_\_  
 DATE: 7-29-2010

**PROPOSED DRAINAGE AREA SURFACES**

AREA DRAINING TO BASIN = 6.20 ACRES (1.52 AC GR BYPASS)

BUILDING AREA DRAINING TO BASIN =  $89,836 + 8042 = 97,878$  S.F. = 2.23 AC

GRAVEL STORAGE AREA DRAINING TO BASIN = 40,571 S.F. = 0.93 ACRES

GRASS AREA DRAINING TO BASIN =  $92927 + 1186 + 6879 + 7677 - 66059$   
 = 42610 S.F.  
 = 0.98 ACRES

PVMT AREA DRAINING TO BASIN IS :

TOTAL      BLDG      GRAVEL      GRASS

$$PVMT = 6.20 - 2.23 - 0.93 - 0.98 = 2.06 \text{ ACRES}$$

**DETERMINE COMPOSITE "C" VALUE**

	SURFACE	AREA	C	C x A
TOTAL 100% IMP 14 5.22 ACRES	GRASS	0.98	x 0.2	0.196
	BLDG	2.23	x 1.0	2.23
	PVMT	2.06	x 1.0	2.06
	GRAVEL	0.93	x 1.0	0.93
				6.2
				5.416

POST DEVELOPMENT C = 0.87

WinTR-55 Current Data Description

--- Identification Data ---

User: MED Date: 9/15/2010  
Project: 864 Hoff Road Units: English  
SubTitle: Post development state Areal Units: Acres  
State: Missouri  
County: St. Charles  
Filename: L:\2010003-00\_SAK\_864\_Hoff\Calculations & Data\Civil\WIN TR55\post development.w55

--- Sub-Area Data ---

Name	Description	Reach	Area (ac)	RCN	Tc
upstream		site	6.2	95	0.1

Total area: 6.20 (ac)

--- Storm Data ---

Rainfall Depth by Rainfall Return Period

2-Yr (in)	5-Yr (in)	15-Yr (in)	25-Yr (in)	50-Yr (in)	100-Yr (in)	1-Yr (in)
2.39	.0	5.2	5.4	.0	7.0	.0

Storm Data Source: User-provided custom storm data  
Rainfall Distribution Type: Type II  
Dimensionless Unit Hydrograph: <standard>

MED

864 Hoff Road  
Post development state  
St. Charles County, Missouri

Watershed Peak Table

Sub-Area or Reach Identifier	Peak Flow by Rainfall Return Period			
	2-Yr (cfs)	15-Yr (cfs)	25-Yr (cfs)	100-Yr (cfs)
-----				
SUBAREAS upstream	17.01	40.16	41.79	54.74
REACHES site	17.01	40.16	41.79	54.74
Down	17.01	40.16	41.79	54.74
OUTLET	17.01	40.16	41.79	54.74

MED

864 Hoff Road  
Post development state  
St. Charles County, Missouri

Hydrograph Peak/Peak Time Table

Sub-Area or Reach Identifier	Peak Flow and Peak Time (hr) by Rainfall Return Period			
	2-Yr (cfs) (hr)	15-Yr (cfs) (hr)	25-Yr (cfs) (hr)	100-Yr (cfs) (hr)

-----  
SUBAREAS

upstream	17.01	40.16	41.79	54.74
	11.93	11.93	11.93	11.93

REACHES

site	17.01	40.16	41.79	54.74
	11.93	11.93	11.93	11.93
Down	17.01	40.16	41.79	54.74
	11.93	11.93	11.93	11.93

OUTLET	17.01	40.16	41.79	54.74
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MED

864 Hoff Road  
Post development state  
St. Charles County, Missouri

Sub-Area Land Use and Curve Number Details

Sub-Area Identifier	Land Use	Hydrologic Soil Group	Sub-Area Area (ac)	Curve Number
upstream	Open space; grass cover 50% to 75% (fair)	C	.98	79
	Paved parking lots, roofs, driveways	C	5.22	98
	Total Area / Weighted Curve Number		6.2 ==	95 ==

A-18

**APPENDIX B**  
**STORM SEWER DESIGN**

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**COMPUTATION SHEETS**

PROJECT #: 2010003-00  
PROJECT TITLE: SAR CONSTRUCTION  
CLIENT: SAR CONSTRUCTION

COMPUTED BY: M. DAVIS  
CHECKED BY: \_\_\_\_\_  
DATE: 6-3-2010

SIZE STORM SEWER FROM FE'S 6 TO INLET 8

FLOW IN THIS STORM SEWER ENTERS THE SYSTEM @ INLET 7

D.A. = AREA OF BUILDING + AREA OF RAMP

$$D.A. = [(210' \times 220') + 1434] \div 43560 = 1.0935 \text{ ACRES}$$

$$Q = 1.0935 \text{ ACRES} \times 3.50 \text{ C.F.S. / ACRE}$$

$$Q = 3.83 \text{ C.F.S.}$$

PIPE IS 15" RCP ( $n = 0.013$ ) @ 2.12%

$$\frac{A R^{2/3}}{d^8} = \frac{N Q}{1.49 S^{1/2} d^{5/3}} = \frac{0.013 \times 3.83}{1.49 \times 0.0198^{1/2} \times 1.25^{2/3}} = 0.1310$$

FROM HOW OPEN CHANNEL FLOW APPROX "A"

$$\textcircled{C} \frac{A R^{2/3}}{d^8} = 0.1310$$

$$\frac{Y}{d} = .46$$

$$Y = 0.575$$

$$\frac{A}{d^2} = .3527, A = 0.3527 \times 1.25^2 = 0.5511 \text{ S.F.}$$

$$V = Q / A = 3.83 \text{ C.F.S.} / 0.5511 \text{ S.F.} = 6.95 \text{ F.P.S.}$$

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**COMPUTATION SHEETS**

PROJECT #: 2010503-03  
 PROJECT TITLE: 664 Huff Road  
 CLIENT: CAF CONSTRUCTION

COMPUTED BY: M. DAVIS  
 CHECKED BY: \_\_\_\_\_  
 DATE: AUGUST 19, 2010

SIZE DETERMINATION MAIN DISCHARGE PIPE

$Q_{100}$  OUTFLOW = 53.13 C.K.S.

$$\frac{A Q^{2/3}}{d_0^{8/3}} = \frac{N \times Q}{1.49 \times 5^{1/2} \times d_0^{8/3}}$$

$$= \frac{.013 \times 53.13}{1.49 \times (0.0059)^{1/2} \times (3.0)^{8/3}} = 0.3211$$

$$\frac{y}{d_0} = 0.90 \quad y = 2.7'$$

$$\frac{A}{d_0^2} = 0.7445 \quad A = 6.70$$

$$V = Q \div A = 53.13 \div 6.70 = 7.9 \text{ F.P.S. } \approx 8 \text{ C.S.D.}$$

APPENDIX A. GEOMETRIC ELEMENTS FOR CIRCULAR CHANNEL SECTIONS

$d_0$  = diameter  $R$  = hydraulic radius

$y$  = depth of flow  $T$  = top width

$A$  = water area  $D$  = hydraulic depth

$P$  = wetter perimeter  $Z = A \sqrt{D}$  = section factor for critical-flow computation

$\frac{y}{d_0}$	$\frac{A}{d_0^2}$	$\frac{P}{d_0}$	$\frac{R}{d_0}$	$\frac{T}{d_0}$	$\frac{D}{d_0}$	$\frac{Z}{d_0^{2.5}}$	$\frac{AR^{3/2}}{d_0^{3/2}}$
0.01	0.0013	0.2003	0.0066	0.1990	0.0066	0.0001	0.0000
0.02	0.0037	0.2838	0.0132	0.2800	0.0134	0.0004	0.0002
0.03	0.0069	0.3482	0.0197	0.3412	0.0202	0.0010	0.0005
0.04	0.0105	0.4027	0.0262	0.3919	0.0268	0.0017	0.0009
0.05	0.0147	0.4510	0.0326	0.4359	0.0336	0.0027	0.0015
0.06	0.0192	0.4949	0.0389	0.4750	0.0408	0.0039	0.0022
0.07	0.0242	0.5355	0.0451	0.5103	0.0474	0.0053	0.0031
0.08	0.0294	0.5735	0.0513	0.5428	0.0542	0.0069	0.0040
0.09	0.0350	0.6094	0.0574	0.5724	0.0612	0.0087	0.0052
0.10	0.0409	0.6435	0.0635	0.6000	0.0682	0.0107	0.0065
0.11	0.0470	0.6761	0.0695	0.6258	0.0752	0.0129	0.0079
0.12	0.0534	0.7075	0.0754	0.6499	0.0822	0.0153	0.0095
0.13	0.0600	0.7377	0.0813	0.6728	0.0892	0.0179	0.0113
0.14	0.0668	0.7670	0.0871	0.6940	0.0964	0.0217	0.0131
0.15	0.0739	0.7954	0.0929	0.7141	0.1034	0.0238	0.0152
0.16	0.0811	0.8230	0.0986	0.7332	0.1106	0.0270	0.0173
0.17	0.0885	0.8500	0.1042	0.7513	0.1178	0.0304	0.0196
0.18	0.0961	0.8763	0.1097	0.7684	0.1252	0.0339	0.0220
0.19	0.1039	0.9020	0.1152	0.7846	0.1324	0.0378	0.0247
0.20	0.1118	0.9273	0.1206	0.8000	0.1398	0.0418	0.0273
0.21	0.1199	0.9521	0.1259	0.8146	0.1472	0.0460	0.0301
0.22	0.1281	0.9764	0.1312	0.8285	0.1546	0.0503	0.0333
0.23	0.1365	1.0003	0.1364	0.8417	0.1622	0.0549	0.0359
0.24	0.1449	1.0239	0.1416	0.8542	0.1698	0.0597	0.0394
0.25	0.1535	1.0472	0.1466	0.8660	0.1774	0.0646	0.0427
0.26	0.1623	1.0701	0.1516	0.8773	0.1850	0.0697	0.0464
0.27	0.1711	1.0928	0.1566	0.8879	0.1926	0.0751	0.0497
0.28	0.1800	1.1152	0.1614	0.8980	0.2004	0.0805	0.0536
0.29	0.1890	1.1373	0.1662	0.9075	0.2084	0.0862	0.0571
0.30	0.1982	1.1593	0.1709	0.9165	0.2162	0.0921	0.0610

B-4



APPENDIX A. GEOMETRIC ELEMENTS FOR CIRCULAR  
CHANNEL SECTIONS (continued)

$\frac{y}{d_0}$	$\frac{A}{d_0^2}$	$\frac{P}{d_0}$	$\frac{R}{d_0}$	$\frac{T}{d_0}$	$\frac{D}{d_0}$	$\frac{Z}{d_0^{1.5}}$	$\frac{AR^{3/2}}{d_0^{3/2}}$
0.31	0.2074	1.1810	0.1755	0.9250	0.2242	0.0981	0.0650
0.32	0.2167	1.2025	0.1801	0.9330	0.2322	0.1044	0.0690
0.33	0.2260	1.2239	0.1848	0.9404	0.2404	0.1107	0.0736
0.34	0.2355	1.2451	0.1891	0.9474	0.2486	0.1172	0.0776
0.35	0.2450	1.2661	0.1935	0.9539	0.2568	0.1241	0.0820
0.36	0.2546	1.2870	0.1978	0.9600	0.2652	0.1310	0.0864
0.37	0.2642	1.3078	0.2020	0.9656	0.2736	0.1381	0.0909
0.38	0.2739	1.3284	0.2061	0.9708	0.2822	0.1453	0.0955
0.39	0.2836	1.3490	0.2102	0.9755	0.2908	0.1528	0.1020
0.40	0.2934	1.3694	0.2142	0.9798	0.2994	0.1603	0.1050
0.41	0.3032	1.3898	0.2181	0.9837	0.3082	0.1682	0.1100
0.42	0.3132	1.4101	0.2220	0.9871	0.3172	0.1761	0.1147
0.43	0.3229	1.4303	0.2257	0.9902	0.3262	0.1844	0.1196
0.44	0.3328	1.4505	0.2294	0.9928	0.3352	0.1927	0.1245
0.45	0.3428	1.4706	0.2331	0.9950	0.3446	0.2011	0.1298
0.46	0.3527	1.4907	0.2366	0.9988	0.3538	0.2098	0.1348
0.47	0.3627	1.5108	0.2400	0.9982	0.3634	0.2186	0.1401
0.48	0.3727	1.5308	0.2434	0.9992	0.3730	0.2275	0.1452
0.49	0.3827	1.5508	0.2467	0.9998	0.3828	0.2366	0.1505
0.50	0.3927	1.5708	0.2500	1.0000	0.3928	0.2459	0.1558
0.51	0.4027	1.5908	0.2531	0.9998	0.4028	0.2553	0.1610
0.52	0.4127	1.6108	0.2561	0.9992	0.4130	0.2650	0.1664
0.53	0.4227	1.6308	0.2591	0.9982	0.4234	0.2748	0.1715
0.54	0.4327	1.6509	0.2620	0.9968	0.4340	0.2848	0.1772
0.55	0.4426	1.6710	0.2649	0.9950	0.4448	0.2949	0.1825
0.56	0.4526	1.6911	0.2676	0.9928	0.4558	0.3051	0.1878
0.57	0.4625	1.7113	0.2703	0.9902	0.4670	0.3158	0.1933
0.58	0.4723	1.7315	0.2728	0.9871	0.4786	0.3263	0.1987
0.59	0.4822	1.7518	0.2753	0.9837	0.4902	0.3373	0.2041
0.60	0.4920	1.7722	0.2776	0.9798	0.5022	0.3484	0.2092
0.61	0.5018	1.7926	0.2797	0.9755	0.5144	0.3560	0.2146
0.62	0.5115	1.8132	0.2818	0.9708	0.5270	0.3710	0.2199
0.63	0.5212	1.8338	0.2839	0.9656	0.5398	0.3830	0.2252
0.64	0.5308	1.8546	0.2860	0.9600	0.5530	0.3945	0.2302
0.65	0.5404	1.8755	0.2881	0.9539	0.5666	0.4066	0.2358

B-5

APPENDIX A. GEOMETRIC ELEMENTS FOR CIRCULAR  
CHANNEL SECTIONS (continued)

$\frac{y}{d_0}$	$\frac{A}{d_0^2}$	$\frac{P}{d_0}$	$\frac{R}{d_0}$	$\frac{T}{d_0}$	$\frac{D}{d_0}$	$\frac{Z}{d_0^{1.5}}$	$\frac{AR^{3/2}}{d_0^{3/2}}$
0.66	0.5499	1.8965	0.2899	0.9474	0.5804	0.4188	0.2407
0.67	0.5594	1.9177	0.2917	0.9404	0.5948	0.4309	0.2460
0.68	0.5687	1.9391	0.2935	0.9330	0.6096	0.4437	0.2510
0.69	0.5780	1.9606	0.2950	0.9250	0.6250	0.4566	0.2560
0.70	0.5872	1.9823	0.2962	0.9165	0.6408	0.4694	0.2608
0.71	0.5964	2.0042	0.2973	0.9075	0.6572	0.4831	0.2653
0.72	0.6054	2.0264	0.2984	0.8980	0.6742	0.4964	0.2702
0.73	0.6143	2.0488	0.2995	0.8879	0.6918	0.5100	0.2751
0.74	0.6231	2.0714	0.3006	0.8773	0.7104	0.5248	0.2794
0.75	0.6318	2.0944	0.3017	0.8660	0.7296	0.5392	0.2840
0.76	0.6404	2.1176	0.3025	0.8542	0.7498	0.5540	0.2888
0.77	0.6489	2.1412	0.3032	0.8417	0.7710	0.5695	0.2930
0.78	0.6573	2.1652	0.3037	0.8285	0.7934	0.5850	0.2969
0.79	0.6655	2.1895	0.3040	0.8146	0.8170	0.6011	0.3008
0.80	0.6736	2.2143	0.3042	0.8000	0.8420	0.6177	0.3045
0.81	0.6815	2.2395	0.3044	0.7846	0.8686	0.6347	0.3082
0.82	0.6893	2.2653	0.3043	0.7684	0.8970	0.6524	0.3118
0.83	0.6969	2.2916	0.3041	0.7513	0.9276	0.6707	0.3151
0.84	0.7043	2.3186	0.3038	0.7332	0.9606	0.6897	0.3182
0.85	0.7115	2.3462	0.3033	0.7141	0.9964	0.7098	0.3212
0.86	0.7186	2.3746	0.3026	0.6940	1.0354	0.7307	0.3240
0.87	0.7254	2.4038	0.3017	0.6726	1.0784	0.7528	0.3264
0.88	0.7320	2.4341	0.3008	0.6499	1.1264	0.7754	0.3286
0.89	0.7380	2.4655	0.2996	0.6258	1.1800	0.8016	0.3307
0.90	0.7445	2.4981	0.2980	0.6000	1.2408	0.8285	0.3324
0.91	0.7504	2.5322	0.2963	0.5724	1.3110	0.8586	0.3336
0.92	0.7560	2.5681	0.2944	0.5426	1.3932	0.8917	0.3345
0.93	0.7612	2.6061	0.2922	0.5103	1.4918	0.9292	0.3350
0.94	0.7662	2.6467	0.2896	0.4750	1.6130	0.9725	0.3353
0.95	0.7707	2.6906	0.2864	0.4359	1.7682	1.0242	0.3349
0.96	0.7749	2.7389	0.2830	0.3919	1.9770	1.0888	0.3340
0.97	0.7785	2.7934	0.2787	0.3412	2.2820	1.1752	0.3322
0.98	0.7816	2.8578	0.2735	0.2800	2.7916	1.3050	0.3291
0.99	0.7841	2.9412	0.2665	0.1990	3.9400	1.5554	0.3248
1.00	0.7854	3.1416	0.2500	0.0000	$\infty$	$\infty$	0.3117

**DAVID MASON & ASSOCIATES**  
**CHICAGO, IL • ST. LOUIS, MO • DALLAS, TX**

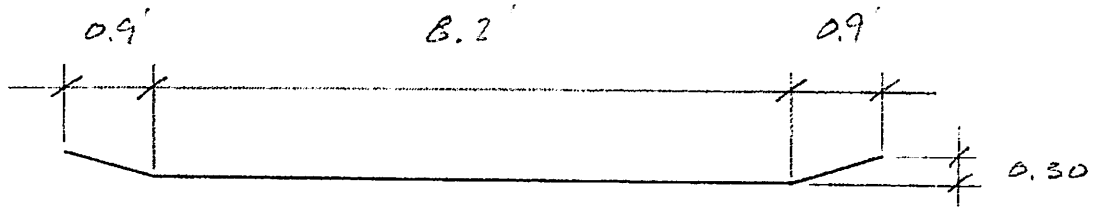
**COMPUTATION SHEETS**

PROJECT #: 2010003-00  
 PROJECT TITLE: 864 HOFF ROAD  
 CLIENT: SAA CONSTRUCTION

COMPUTED BY: M. DAVIS  
 CHECKED BY: \_\_\_\_\_  
 DATE: 6-17-2010

VEGETATED SWALE

$Q = 3.83$  C.F.S. (15" PIPE FROM BUILDING)  
 $S = 1.0\%$ ,  $N = 0.024$



DESCRIPTION	VALUE
Channel Bottom Slope (ft/ft)	0.01
Manning's Roughness Coefficient (n-value)	0.024
Channel Left Side Slope (horizontal/vertical)	3.0
Channel Right Side Slope (horizontal/vertical)	3.0
Channel Bottom Width (ft)	8.2
Minimum Flow Depth (ft)	0.1
Maximum Flow Depth (ft)	0.3
Incremental Head (ft)	0.01

COMPUTATION RESULTS							
Flow Depth (ft)	Flow Rate (cfs)	Flow Velocity (fps)	Froude Number	Velocity Head (ft)	Energy Head (ft)	Flow Area (sq ft)	Top Width (ft)
0.1	1.11	1.3	0.738	0.026	0.126	0.85	8.8
0.11	1.3	1.38	0.749	0.03	0.14	0.94	8.86
0.12	1.5	1.46	0.759	0.033	0.153	1.03	8.92
0.13	1.72	1.54	0.769	0.037	0.167	1.12	8.98
0.14	1.95	1.61	0.778	0.04	0.18	1.21	9.04
0.15	2.18	1.68	0.786	0.044	0.194	1.3	9.1
0.16	2.44	1.75	0.794	0.048	0.208	1.39	9.16
0.17	2.7	1.82	0.802	0.052	0.222	1.48	9.22
0.18	2.97	1.89	0.809	0.055	0.235	1.57	9.28
0.19	3.26	1.95	0.815	0.059	0.249	1.67	9.34
0.2	3.55	2.02	0.822	0.063	0.263	1.76	9.4
0.21	3.86	2.08	0.828	0.067	0.277	1.85	9.46
0.22	4.17	2.14	0.834	0.071	0.291	1.95	9.52
0.23	4.5	2.2	0.839	0.075	0.305	2.04	9.58
0.24	4.83	2.26	0.845	0.079	0.319	2.14	9.64
0.25	5.18	2.32	0.85	0.083	0.333	2.24	9.7
0.26	5.54	2.37	0.855	0.087	0.347	2.33	9.76
0.27	5.91	2.43	0.86	0.092	0.362	2.43	9.82
0.28	6.28	2.48	0.865	0.096	0.376	2.53	9.88
0.29	6.67	2.54	0.869	0.1	0.39	2.63	9.94
0.3	7.07	2.59	0.873	0.104	0.404	2.73	10.0

**APPENDIX C**  
**WATER QUALITY VOLUME AND DESIGN**

**DAVID MASON & ASSOCIATES**  
 CHICAGO, IL • ST. LOUIS, MO • DALLAS, TX

**COMPUTATION SHEETS**

PROJECT #: 2010002-00  
 PROJECT TITLE: 804 HOFF ROAD  
 CLIENT: JKR CONSTRUCTION

COMPUTED BY: J. DAVIS  
 CHECKED BY: \_\_\_\_\_  
 DATE: 7-28-2010

Determine Soil Moisture Storage Volume

$$\begin{aligned} \text{Volume} &= 2.2 \text{ IN} \times \text{SITE AREA} \\ &= 2.2 \text{ IN} \times \frac{1}{12} \times 7.72 \text{ AC} \times 43560 \\ &= 5610 \text{ CUBIC FEET} \end{aligned}$$

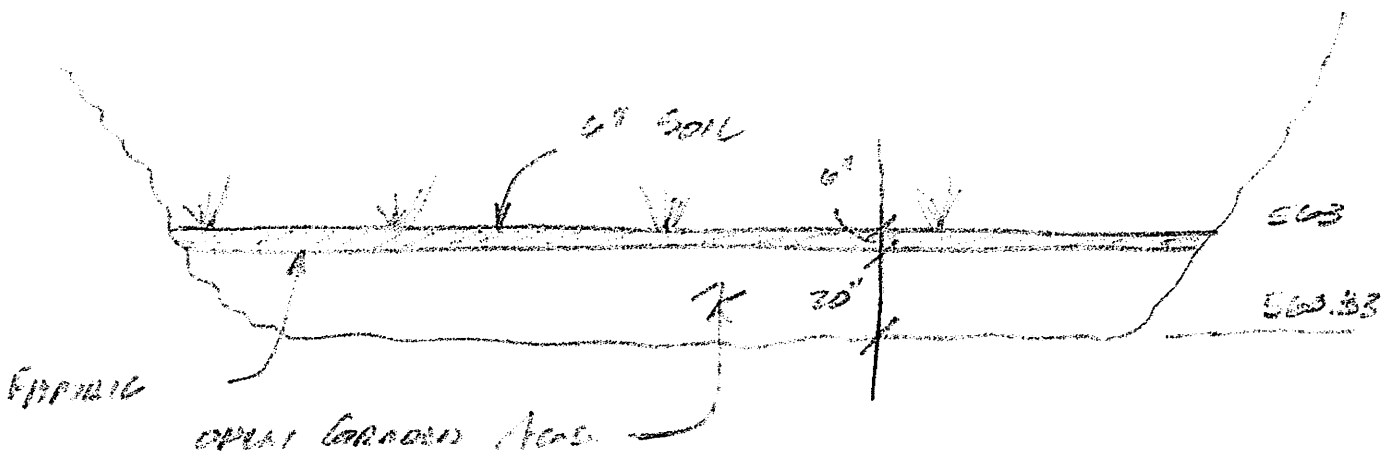
- USE FRACTION OF TERMINATION BASIN TO STORE THIS VOLUME.
- ASSUME 40% VOID SPACE DETERMINE DEPTH OF STORAGE ROLT

$$\frac{5610 \text{ C.F.}}{.40} = \text{AREA OF BASIN} \times \text{DEPTH OF ROLT.}$$

AREA 563 (CONTIGUA)

$$14,025 \text{ C.F.} = 8641 \times \text{DEPTH OF ROLT}$$

$$\text{DEPTH OF ROLT} = 1.62' = 1' 7.5" = 1' 8" = 20"$$



**APPENDIX D**

**DETENTION BASIN RESERVOIR REPORT**

# Reservoir Report

Reservoir No. 1 - FL 562.89

English

## Pond Data

Pond storage is based on known contour areas

## Stage / Storage Table

Stage ft	Elevation ft	Contour area sqft	Incr. Storage cuft	Total storage cuft
0.00	562.89	00	0	0
0.11	563.00	530	29	29
1.11	564.00	9,767	5,149	5,178
2.11	565.00	10,947	10,357	15,535
3.11	566.00	12,190	11,569	27,103
4.11	567.00	13,485	12,838	39,941
5.11	568.00	14,832	14,159	54,099

## Culvert / Orifice Structures

	[A]	[B]	[C]	[D]
Rise in	= 13.0	14.0	0.0	0.0
Span in	= 13.0	23.0	0.0	0.0
No. Barrels	= 1	2	0	0
Invert El. ft	= 562.89	564.80	0.00	0.00
Length ft	= 10.0	10.0	0.0	0.0
Slope %	= 1.00	1.00	0.00	0.00
N-Value	= .013	.013	.000	.000
Orif. Coeff.	= 0.60	0.60	0.00	0.00
Multi-Stage	= ----	No	No	No

## Weir Structures

	[A]	[B]	[C]	[D]
Crest Len ft	= 15.00	0.00	0.00	0.00
Crest El. ft	= 566.67	0.00	0.00	0.00
Weir Coeff.	= 3.00	0.00	0.00	0.00
Eqn. Exp.	= 1.50	0.00	0.00	0.00
Multi-Stage	= No	No	No	No

Tailwater Elevation = 0.00 ft

Note: All outflows have been analyzed under inlet and outlet control

## Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Civ A cfs	Civ B cfs	Civ C cfs	Civ D cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Discharge cfs
0.00	0	562.89	0.00	0.00	---	---	0.00	---	---	---	0.00
0.11	29	563.00	0.06	0.00	---	---	0.00	---	---	---	0.06
1.11	5,178	564.00	1.97	0.00	---	---	0.00	---	---	---	1.97
2.11	15,535	565.00	5.56	1.17	---	---	0.00	---	---	---	6.72
3.11	27,103	566.00	7.11	10.08	---	---	0.00	---	---	---	17.20
4.11	39,941	567.00	8.38	27.38	---	---	8.53	---	---	---	44.29
5.11	54,099	568.00	9.48	34.83	---	---	69.02	---	---	---	113.34



# Reservoir Report

LOW FLOW BLOCKED

Reservoir No. 1 - FL 562.89

English

## Pond Data

Pond storage is based on known contour areas

## Stage / Storage Table

Stage ft	Elevation ft	Contour area sqft	Incr. Storage cuft	Total storage cuft
0.00	562.89	00	0	0
0.11	563.00	530	29	29
1.11	564.00	9,767	5,149	5,178
2.11	565.00	10,947	10,357	15,535
3.11	566.00	12,190	11,569	27,103
4.11	567.00	13,485	12,838	39,941
5.11	568.00	14,832	14,159	54,099

## Culvert / Orifice Structures

	[A]	[B]	[C]	[D]
Rise in	= 0.0	0.0	0.0	0.0
Span in	= 0.0	0.0	0.0	0.0
No. Barrels	= 1	2	0	0
Invert El. ft	= 562.89	564.80	0.00	0.00
Length ft	= 10.0	10.0	0.0	0.0
Slope %	= 1.00	1.00	0.00	0.00
N-Value	= .013	.013	.000	.000
Orif. Coeff.	= 0.60	0.60	0.00	0.00
Multi-Stage	= ----	No	No	No

## Weir Structures

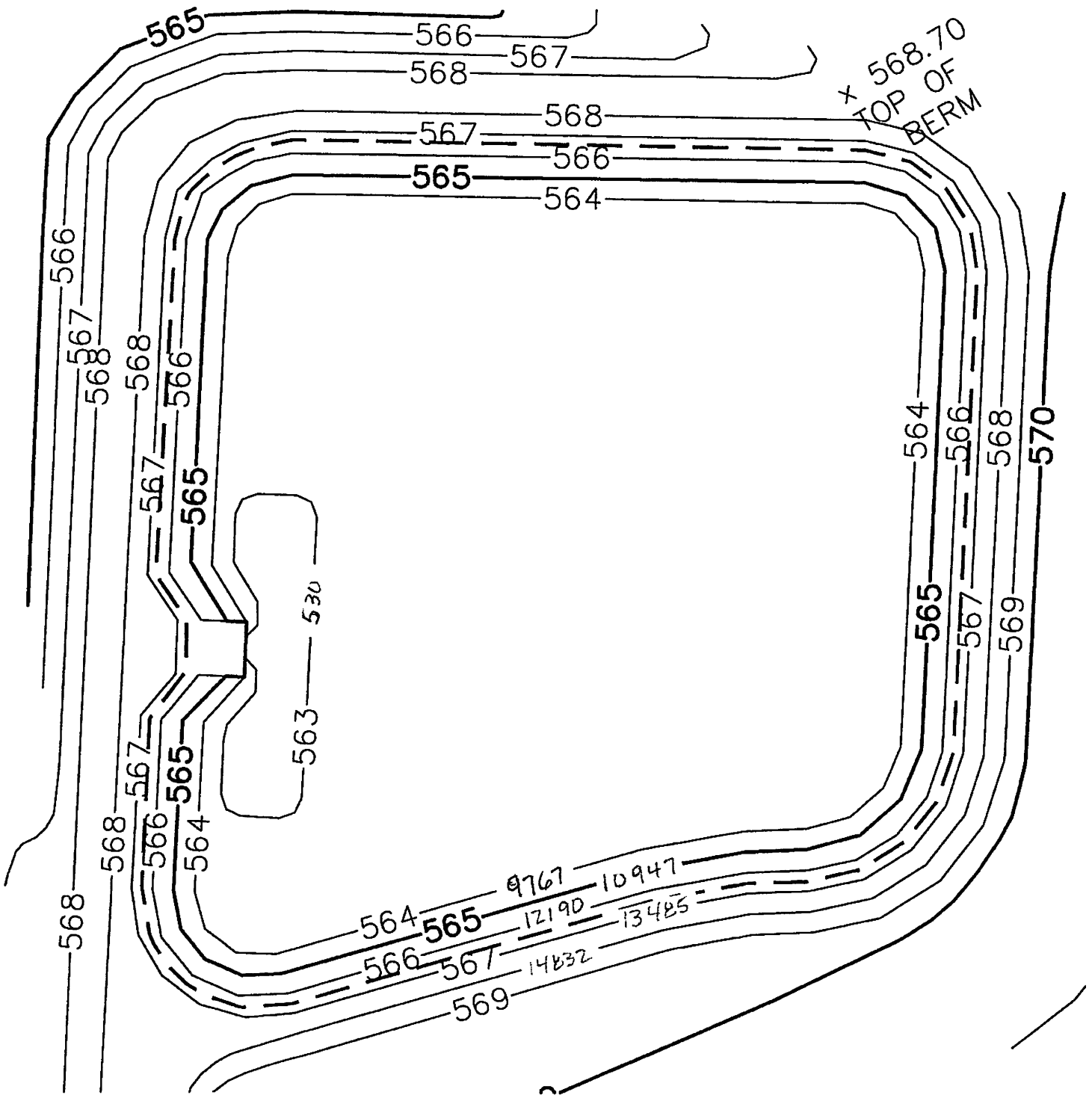
	[A]	[B]	[C]	[D]
Crest Len ft	= 15.00	0.00	0.00	0.00
Crest El. ft	= 566.67	0.00	0.00	0.00
Weir Coeff.	= 3.00	0.00	0.00	0.00
Eqn. Exp.	= 1.50	0.00	0.00	0.00
Multi-Stage	= No	No	No	No
Tailwater Elevation = 0.00 ft				

Note: All outflows have been analyzed under inlet and outlet control

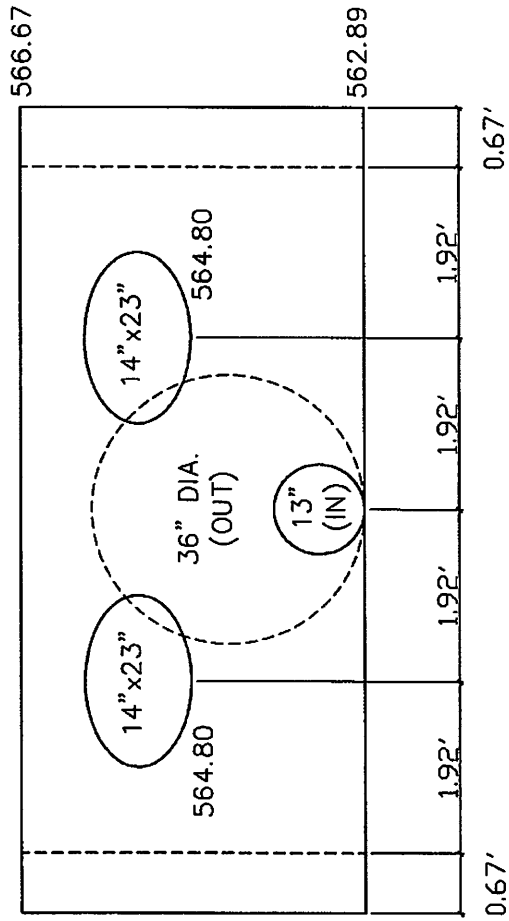
## Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Civ A cfs	Civ B cfs	Civ C cfs	Civ D cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Discharge cfs
0.00	0	562.89	0.00	0.00	---	---	0.00	---	---	---	0.00
0.11	29	563.00	0.00	0.00	---	---	0.00	---	---	---	0.00
1.11	5,178	564.00	0.00	0.00	---	---	0.00	---	---	---	0.00
2.11	15,535	565.00	0.00	0.00	---	---	0.00	---	---	---	0.00
3.11	27,103	566.00	0.00	0.00	---	---	0.00	---	---	---	0.00
4.11	39,941	567.00	0.00	0.00	---	---	8.53	---	---	---	8.53
5.11	54,099	568.00	0.00	0.00	---	---	69.02	---	---	---	69.02

D-3



D-4



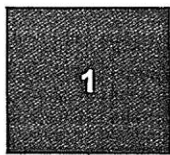
STANDARD MSD DOUBLE AREA GRATE INLET

CONTROL STRUCTURE  
N.T.S.

D-5

**APPENDIX E**

**DETENTION BASIN 2 YR, 24 HOUR STORM**



# Hydrograph Summary Report

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Volume (cuft)	Return period (yrs)	Inflow hyd(s)	Maximum elevation (ft)	Maximum storage (cuft)	Hydrograph description
1	SCS Runoff	16.55	3	717	39,181	2	----	-----	-----	864 Hoff Road
2	Reservoir	5.18	3	726	39,181	2	1	564.80	13,427	Thru Basin
Proj. file: SAK PR 2y 24h.GPW			IDF file: Sample.idf				Run date: 09-16-2010			

# Hydrograph Report

## Hyd. No. 1

864 Hoff Road

Hydrograph type = SCS Runoff  
Storm frequency = 2 yrs  
Drainage area = 6.20 ac  
Basin Slope = 2.7 %  
Tc method = USER  
Total precip. = 2.39 in  
Storm duration = 24 hrs

Peak discharge = 16.55 cfs  
Time interval = 3 min  
Curve number = 95  
Hydraulic length = 808 ft  
Time of conc. (Tc) = 6 min  
Distribution = Type II  
Shape factor = 484

Total Volume = 39,181 cuft

## Hydrograph Discharge Table

Time -- Outflow (min cfs)	Time -- Outflow (min cfs)
675 0.89	771 0.97
678 0.95	774 0.94
681 1.00	777 0.90
684 1.06	780 0.87
687 1.12	783 0.84
690 1.18	
693 1.41	
696 2.01	...End
699 2.99	
702 4.25	
705 5.66	
708 7.42	
711 10.04	
714 13.65	
717 16.55 <<	
720 15.50	
723 10.66	
726 5.78	
729 3.09	
732 2.31	
735 2.16	
738 2.01	
741 1.87	
744 1.72	
747 1.57	
750 1.42	
753 1.28	
756 1.18	
759 1.12	
762 1.07	
765 1.04	
768 1.01	

# Hydrograph Report

## Hyd. No. 2

Thru Basin

Hydrograph type = Reservoir  
 Storm frequency = 2 yrs  
 Inflow hyd. No. = 1  
 Max. Elevation = 564.80 ft

Peak discharge = 5.18 cfs  
 Time interval = 3 min  
 Reservoir name = FL 562.89  
 Max. Storage = 13,427 cuft

Storage Indication method used.

Total Volume = 39,181 cuft

### Hydrograph Discharge Table

Time (min)	Inflow cfs	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	Clv D cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Outflow cfs
612	0.38	563.13	0.27	----	----	----	----	----	----	----	0.27
615	0.39	563.13	0.27	----	----	----	----	----	----	----	0.27
618	0.40	563.14	0.28	----	----	----	----	----	----	----	0.28
621	0.42	563.14	0.29	----	----	----	----	----	----	----	0.29
624	0.43	563.14	0.30	----	----	----	----	----	----	----	0.30
627	0.44	563.15	0.31	----	----	----	----	----	----	----	0.31
630	0.46	563.15	0.32	----	----	----	----	----	----	----	0.32
633	0.47	563.16	0.32	----	----	----	----	----	----	----	0.32
636	0.49	563.16	0.33	----	----	----	----	----	----	----	0.33
639	0.51	563.17	0.35	----	----	----	----	----	----	----	0.35
642	0.53	563.18	0.36	----	----	----	----	----	----	----	0.36
645	0.56	563.18	0.37	----	----	----	----	----	----	----	0.37
648	0.58	563.19	0.38	----	----	----	----	----	----	----	0.38
651	0.60	563.20	0.39	----	----	----	----	----	----	----	0.39
654	0.63	563.20	0.41	----	----	----	----	----	----	----	0.41
657	0.65	563.21	0.42	----	----	----	----	----	----	----	0.42
660	0.67	563.22	0.44	----	----	----	----	----	----	----	0.44
663	0.66	563.23	0.46	----	----	----	----	----	----	----	0.46
666	0.66	563.23	0.47	----	----	----	----	----	----	----	0.47
669	0.73	563.24	0.49	----	----	----	----	----	----	----	0.49
672	0.81	563.25	0.51	----	----	----	----	----	----	----	0.51
675	0.89	563.26	0.53	----	----	----	----	----	----	----	0.53
678	0.95	563.28	0.56	----	----	----	----	----	----	----	0.56
681	1.00	563.29	0.58	----	----	----	----	----	----	----	0.58
684	1.06	563.30	0.62	----	----	----	----	----	----	----	0.62
687	1.12	563.32	0.65	----	----	----	----	----	----	----	0.65
690	1.18	563.34	0.69	----	----	----	----	----	----	----	0.69
693	1.41	563.36	0.74	----	----	----	----	----	----	----	0.74
696	2.01	563.39	0.81	----	----	----	----	----	----	----	0.81
699	2.99	563.45	0.94	----	----	----	----	----	----	----	0.94
702	4.25	563.54	1.14	----	----	----	----	----	----	----	1.14
705	5.66	563.67	1.40	----	----	----	----	----	----	----	1.40
708	7.42	563.84	1.67	----	----	----	----	----	----	----	1.67
711	10.04	564.04	2.24	----	----	----	----	----	----	----	2.24
714	13.65	564.20	3.16	----	----	----	----	----	----	----	3.16
717	16.55 <<	564.40	4.02	----	----	----	----	----	----	----	4.02

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**APPENDIX F**

**DETENTION BASIN 15 YR, 24 HOUR STORM**

# Hydrograph Summary Report

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Volume (cuft)	Return period (yrs)	Inflow hyd(s)	Maximum elevation (ft)	Maximum storage (cuft)	Hydrograph description
1	SCS Runoff	38.98	3	717	97,431	15	---	---	---	864 Hoff Road Thru Basin
2	Reservoir	21.18	3	723	97,431	15	1	566.12	28,663	
Proj. file: SAK PR 15y 24h.GPW			IDF file: Sample.idf				Run date: 09-16-2010			

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# Hydrograph Report

## Hyd. No. 1

864 Hoff Road

Hydrograph type = SCS Runoff  
Storm frequency = 15 yrs  
Drainage area = 6.20 ac  
Basin Slope = 2.7 %  
Tc method = USER  
Total precip. = 5.20 in  
Storm duration = 24 hrs

Peak discharge = 38.98 cfs  
Time interval = 3 min  
Curve number = 95  
Hydraulic length = 808 ft  
Time of conc. (Tc) = 6 min  
Distribution = Type II  
Shape factor = 484

Total Volume = 97,431 cuft

## Hydrograph Discharge Table

Time -- Outflow (min) cfs)	Time -- Outflow (min) cfs)
408 0.39	888 0.96
423 0.41	903 0.91
438 0.43	918 0.86
453 0.46	933 0.81
468 0.48	948 0.75
483 0.50	963 0.70
498 0.56	978 0.68
513 0.63	993 0.66
528 0.70	1008 0.64
543 0.77	1023 0.62
558 0.79	1038 0.60
573 0.81	1053 0.58
588 0.90	1068 0.56
603 1.02	1083 0.55
618 1.18	1098 0.53
633 1.36	1113 0.51
648 1.62	1128 0.49
663 1.82	1143 0.47
678 2.54	1158 0.45
693 3.69	1173 0.43
708 18.33	1188 0.41
723 24.68	1203 0.40
738 4.60	
753 2.92	
768 2.29	...End
783 1.90	
798 1.66	
813 1.45	
828 1.29	
843 1.14	
858 1.07	
873 1.02	

# Hydrograph Report

## Hyd. No. 2

Thru Basin

Hydrograph type = Reservoir  
 Storm frequency = 15 yrs  
 Inflow hyd. No. = 1  
 Max. Elevation = 566.12 ft

Peak discharge = 21.18 cfs  
 Time interval = 3 min  
 Reservoir name = FL 562.89  
 Max. Storage = 28,663 cuft

Storage Indication method used

Total Volume = 97,431 cuft

## Hydrograph Discharge Table

Time (min)	Inflow cfs	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	Clv D cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Outflow cfs
345	0.30	563.11	0.23	----	----	----	----	----	----	----	0.23
360	0.32	563.12	0.25	----	----	----	----	----	----	----	0.25
375	0.35	563.13	0.28	----	----	----	----	----	----	----	0.28
390	0.37	563.15	0.30	----	----	----	----	----	----	----	0.30
405	0.39	563.16	0.32	----	----	----	----	----	----	----	0.32
420	0.41	563.17	0.34	----	----	----	----	----	----	----	0.34
435	0.43	563.18	0.36	----	----	----	----	----	----	----	0.36
450	0.45	563.19	0.39	----	----	----	----	----	----	----	0.39
465	0.47	563.20	0.41	----	----	----	----	----	----	----	0.41
480	0.49	563.21	0.43	----	----	----	----	----	----	----	0.43
495	0.54	563.23	0.46	----	----	----	----	----	----	----	0.46
510	0.61	563.24	0.49	----	----	----	----	----	----	----	0.49
525	0.68	563.27	0.54	----	----	----	----	----	----	----	0.54
540	0.76	563.29	0.59	----	----	----	----	----	----	----	0.59
555	0.79	563.32	0.65	----	----	----	----	----	----	----	0.65
570	0.80	563.34	0.70	----	----	----	----	----	----	----	0.70
585	0.88	563.36	0.74	----	----	----	----	----	----	----	0.74
600	0.99	563.39	0.81	----	----	----	----	----	----	----	0.81
615	1.15	563.43	0.89	----	----	----	----	----	----	----	0.89
630	1.32	563.48	1.01	----	----	----	----	----	----	----	1.01
645	1.57	563.54	1.15	----	----	----	----	----	----	----	1.15
660	1.86	563.62	1.32	----	----	----	----	----	----	----	1.32
675	2.40	563.73	1.50	----	----	----	----	----	----	----	1.50
690	3.11	563.92	1.78	----	----	----	----	----	----	----	1.78
705	14.21	564.37	3.89	----	----	----	----	----	----	----	3.89
720	36.14	565.95	7.05	9.31	----	----	----	----	----	----	16.35
735	4.94	565.69	6.67	6.75	----	----	----	----	----	----	13.41
750	3.24	565.17	5.84	2.67	----	----	----	----	----	----	8.51
765	2.36	564.83	5.26	0.14	----	----	----	----	----	----	5.40
780	1.98	564.59	4.69	----	----	----	----	----	----	----	4.69
795	1.70	564.37	3.91	----	----	----	----	----	----	----	3.91
810	1.49	564.20	3.18	----	----	----	----	----	----	----	3.18
825	1.32	564.08	2.50	----	----	----	----	----	----	----	2.50
840	1.17	563.99	1.95	----	----	----	----	----	----	----	1.95
855	1.08	563.87	1.70	----	----	----	----	----	----	----	1.70
870	1.03	563.77	1.57	----	----	----	----	----	----	----	1.57

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**APPENDIX G**  
**DETENTION BASIN 25 YR, 24 HOUR STORM**

# Hydrograph Summary Report

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Volume (cuft)	Return period (yrs)	Inflow hyd(s)	Maximum elevation (ft)	Maximum storage (cuft)	Hydrograph description
1	SCS Runoff	40.56	3	717	101,615	25	---	-----	-----	864 Hoff Road Thru Basin
2	Reservoir	22.90	3	723	101,615	25	1	566.18	29,471	

Proj. file: SAK PR 25y 24h.GPW	IDF file: Sample.idf	Run date: 09-16-2010
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# Hydrograph Report

## Hyd. No. 1

864 Hoff Road

Hydrograph type = SCS Runoff  
Storm frequency = 25 yrs  
Drainage area = 6.20 ac  
Basin Slope = 2.7 %  
Tc method = USER  
Total precip. = 5.40 in  
Storm duration = 24 hrs

Peak discharge = 40.56 cfs  
Time interval = 3 min  
Curve number = 95  
Hydraulic length = 808 ft  
Time of conc. (Tc) = 6 min  
Distribution = Type II  
Shape factor = 484

Total Volume = 101,615 cuft

## Hydrograph Discharge Table

Time -- Outflow (min) cfs)	Time -- Outflow (min) cfs)
402 0.41	882 1.02
417 0.43	897 0.97
432 0.45	912 0.92
447 0.47	927 0.86
462 0.49	942 0.81
477 0.52	957 0.75
492 0.56	972 0.71
507 0.63	987 0.69
522 0.70	1002 0.67
537 0.78	1017 0.65
552 0.83	1032 0.63
567 0.84	1047 0.61
582 0.90	1062 0.59
597 1.02	1077 0.58
612 1.16	1092 0.56
627 1.34	1107 0.54
642 1.58	1122 0.52
657 1.88	1137 0.50
672 2.29	1152 0.48
687 3.10	1167 0.46
702 11.27	1182 0.44
717 40.56 <<	1197 0.42
732 5.49	1212 0.41
747 3.72	
762 2.54	
777 2.13	...End
792 1.81	
807 1.59	
822 1.40	
837 1.25	
852 1.13	
867 1.08	



# Hydrograph Report

## Hyd. No. 2

Thru Basin

Hydrograph type = Reservoir  
 Storm frequency = 25 yrs  
 Inflow hyd. No. = 1  
 Max. Elevation = 566.18 ft

Peak discharge = 22.90 cfs  
 Time interval = 3 min  
 Reservoir name = FL 562.89  
 Max. Storage = 29,471 cuft

Storage Indication method used.

Total Volume = 101,615 cuft

### Hydrograph Discharge Table

Time (min)	Inflow cfs	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	Clv D cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Outflow cfs
345	0.32	563.12	0.25	----	----	----	----	----	----	----	0.25
360	0.34	563.13	0.27	----	----	----	----	----	----	----	0.27
375	0.37	563.14	0.30	----	----	----	----	----	----	----	0.30
390	0.39	563.16	0.32	----	----	----	----	----	----	----	0.32
405	0.41	563.17	0.34	----	----	----	----	----	----	----	0.34
420	0.43	563.18	0.36	----	----	----	----	----	----	----	0.36
435	0.45	563.19	0.39	----	----	----	----	----	----	----	0.39
450	0.48	563.20	0.41	----	----	----	----	----	----	----	0.41
465	0.50	563.22	0.43	----	----	----	----	----	----	----	0.43
480	0.52	563.23	0.46	----	----	----	----	----	----	----	0.46
495	0.57	563.24	0.48	----	----	----	----	----	----	----	0.48
510	0.64	563.26	0.52	----	----	----	----	----	----	----	0.52
525	0.72	563.28	0.57	----	----	----	----	----	----	----	0.57
540	0.79	563.31	0.63	----	----	----	----	----	----	----	0.63
555	0.83	563.34	0.69	----	----	----	----	----	----	----	0.69
570	0.84	563.36	0.74	----	----	----	----	----	----	----	0.74
585	0.92	563.38	0.78	----	----	----	----	----	----	----	0.78
600	1.04	563.41	0.85	----	----	----	----	----	----	----	0.85
615	1.20	563.45	0.94	----	----	----	----	----	----	----	0.94
630	1.38	563.50	1.06	----	----	----	----	----	----	----	1.06
645	1.64	563.56	1.20	----	----	----	----	----	----	----	1.20
660	1.94	563.65	1.37	----	----	----	----	----	----	----	1.37
675	2.51	563.76	1.56	----	----	----	----	----	----	----	1.56
690	3.25	563.97	1.89	----	----	----	----	----	----	----	1.89
705	14.81	564.40	4.04	----	----	----	----	----	----	----	4.04
720	37.59	566.03	7.15	11.03	----	----	----	----	----	----	18.18
735	5.13	565.72	6.72	7.02	----	----	----	----	----	----	13.74
750	3.36	565.19	5.89	2.87	----	----	----	----	----	----	8.76
765	2.46	564.85	5.29	0.22	----	----	----	----	----	----	5.52
780	2.05	564.61	4.75	----	----	----	----	----	----	----	4.75
795	1.77	564.39	4.00	----	----	----	----	----	----	----	4.00
810	1.55	564.22	3.27	----	----	----	----	----	----	----	3.27
825	1.37	564.09	2.60	----	----	----	----	----	----	----	2.60
840	1.21	564.01	2.02	----	----	----	----	----	----	----	2.02
855	1.12	563.89	1.72	----	----	----	----	----	----	----	1.72
870	1.07	563.79	1.61	----	----	----	----	----	----	----	1.61

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**APPENDIX H**  
**DETENTION BASIN 100 YR, 24 HOUR STORM**

# Hydrograph Summary Report

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Volume (cuft)	Return period (yrs)	Inflow hyd(s)	Maximum elevation (ft)	Maximum storage (cuft)	Hydrograph description	
1	SCS Runoff	53.13	3	717	135,157	100	---	-----	-----	864 Hoff Road	
2	Reservoir	32.34	3	723	135,157	100	1	566.66	35,530	Thru Basin	
Proj. file: SAK PR 100 y 24h.GPW						IDF file: Sample.idf			Run date: 09-16-2010		

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# Hydrograph Report

## Hyd. No. 1

864 Hoff Road

Hydrograph type	= SCS Runoff	Peak discharge	= 53.13 cfs
Storm frequency	= 100 yrs	Time interval	= 3 min
Drainage area	= 6.20 ac	Curve number	= 95
Basin Slope	= 2.7 %	Hydraulic length	= 808 ft
Tc method	= USER	Time of conc. (Tc)	= 6 min
Total precip.	= 7.00 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

Total Volume = 135,157 cuft

## Hydrograph Discharge Table

Time -- Outflow (min) cfs)	Time -- Outflow (min) cfs)
369 0.53	849 1.49
384 0.56	864 1.42
399 0.59	879 1.35
414 0.62	894 1.28
429 0.64	909 1.21
444 0.67	924 1.13
459 0.70	939 1.06
474 0.72	954 0.99
489 0.77	969 0.93
504 0.86	984 0.91
519 0.96	999 0.88
534 1.06	1014 0.86
549 1.14	1029 0.83
564 1.16	1044 0.80
579 1.20	1059 0.78
594 1.36	1074 0.75
609 1.54	1089 0.73
624 1.78	1104 0.70
639 2.05	1119 0.68
654 2.45	1134 0.65
669 2.78	1149 0.63
684 3.94	1164 0.60
699 10.64	1179 0.58
714 44.55	1194 0.55
729 9.62	
744 5.31	
759 3.44	...End
774 2.89	
789 2.42	
804 2.13	
819 1.87	
834 1.66	

# Hydrograph Report

## Hyd. No. 2

Thru Basin

Hydrograph type = Reservoir  
 Storm frequency = 100 yrs  
 Inflow hyd. No. = 1  
 Max. Elevation = 566.66 ft

Peak discharge = 32.34 cfs  
 Time interval = 3 min  
 Reservoir name = FL 562.89  
 Max. Storage = 35,530 cuft

Storage Indication method used.

Total Volume = 135,157 cuft

### Hydrograph Discharge Table

Time (min)	Inflow cfs	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	Clv D cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Outflow cfs
315	0.43	563.17	0.34	----	----	----	----	----	----	----	0.34
330	0.46	563.18	0.37	----	----	----	----	----	----	----	0.37
345	0.49	563.20	0.40	----	----	----	----	----	----	----	0.40
360	0.52	563.21	0.43	----	----	----	----	----	----	----	0.43
375	0.54	563.23	0.46	----	----	----	----	----	----	----	0.46
390	0.57	563.24	0.49	----	----	----	----	----	----	----	0.49
405	0.60	563.26	0.52	----	----	----	----	----	----	----	0.52
420	0.63	563.27	0.55	----	----	----	----	----	----	----	0.55
435	0.65	563.29	0.58	----	----	----	----	----	----	----	0.58
450	0.68	563.30	0.60	----	----	----	----	----	----	----	0.60
465	0.71	563.31	0.63	----	----	----	----	----	----	----	0.63
480	0.74	563.33	0.66	----	----	----	----	----	----	----	0.66
495	0.81	563.34	0.70	----	----	----	----	----	----	----	0.70
510	0.90	563.36	0.75	----	----	----	----	----	----	----	0.75
525	1.00	563.39	0.82	----	----	----	----	----	----	----	0.82
540	1.10	563.43	0.89	----	----	----	----	----	----	----	0.89
555	1.15	563.46	0.97	----	----	----	----	----	----	----	0.97
570	1.16	563.49	1.03	----	----	----	----	----	----	----	1.03
585	1.26	563.51	1.09	----	----	----	----	----	----	----	1.09
600	1.42	563.55	1.17	----	----	----	----	----	----	----	1.17
615	1.63	563.60	1.28	----	----	----	----	----	----	----	1.28
630	1.87	563.67	1.41	----	----	----	----	----	----	----	1.41
645	2.21	563.77	1.57	----	----	----	----	----	----	----	1.57
660	2.61	563.90	1.73	----	----	----	----	----	----	----	1.73
675	3.36	564.03	2.15	----	----	----	----	----	----	----	2.15
690	4.33	564.14	2.86	----	----	----	----	----	----	----	2.86
705	19.58	564.69	4.98	----	----	----	----	----	----	----	4.98
720	49.17	566.51	7.79	22.20	----	----	----	----	----	----	29.99
735	6.70	566.00	7.11	9.93	----	----	----	----	----	----	17.03
750	4.39	565.42	6.25	4.64	----	----	----	----	----	----	10.89
765	3.20	564.95	5.46	0.82	----	----	----	----	----	----	6.28
780	2.68	564.71	5.02	----	----	----	----	----	----	----	5.02
795	2.30	564.51	4.44	----	----	----	----	----	----	----	4.44
810	2.02	564.34	3.80	----	----	----	----	----	----	----	3.80
825	1.78	564.21	3.19	----	----	----	----	----	----	----	3.19
840	1.58	564.10	2.63	----	----	----	----	----	----	----	2.63

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**APPENDIX I**  
**DETENTION BASIN 100 YR, 24 HOUR STORM**  
**LOW FLOW BLOCKED**

I-1

# Hydrograph Summary Report

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Volume (cuft)	Return period (yrs)	Inflow hyd(s)	Maximum elevation (ft)	Maximum storage (cuft)	Hydrograph description
1	SCS Runoff	53.13	3	717	135,157	100	---	-----	-----	864 Hoff Road
2	Reservoir	46.79	3	720	100,352	100	1	567.70	49,800	Thru Basin
Proj. file: SAK PR 100 y 24h low flow							DT file: SRM.idf		Run date: 09-16-2010	

# Hydrograph Report

## Hyd. No. 1

864 Hoff Road

Hydrograph type = SCS Runoff  
Storm frequency = 100 yrs  
Drainage area = 6.20 ac  
Basin Slope = 2.7 %  
Tc method = USER  
Total precip. = 7.00 in  
Storm duration = 24 hrs

Peak discharge = 53.13 cfs  
Time interval = 3 min  
Curve number = 95  
Hydraulic length = 808 ft  
Time of conc. (Tc) = 6 min  
Distribution = Type II  
Shape factor = 484

Total Volume = 135,157 cuft

## Hydrograph Discharge Table

Time -- Outflow (min cfs)	Time -- Outflow (min cfs)
369 0.53	849 1.49
384 0.56	864 1.42
399 0.59	879 1.35
414 0.62	894 1.28
429 0.64	909 1.21
444 0.67	924 1.13
459 0.70	939 1.06
474 0.72	954 0.99
489 0.77	969 0.93
504 0.86	984 0.91
519 0.96	999 0.88
534 1.06	1014 0.86
549 1.14	1029 0.83
564 1.16	1044 0.80
579 1.20	1059 0.78
594 1.36	1074 0.75
609 1.54	1089 0.73
624 1.78	1104 0.70
639 2.05	1119 0.68
654 2.45	1134 0.65
669 2.78	1149 0.63
684 3.94	1164 0.60
699 10.64	1179 0.58
714 44.55	1194 0.55
729 9.62	
744 5.31	
759 3.44	...End
774 2.89	
789 2.42	
804 2.13	
819 1.87	
834 1.66	



# Hydrograph Report

## Hyd. No. 2

Thru Basin

Hydrograph type = Reservoir  
 Storm frequency = 100 yrs  
 Inflow hyd. No. = 1  
 Max. Elevation = 567.70 ft

Peak discharge = 46.79 cfs  
 Time interval = 3 min  
 Reservoir name = FL 562.89  
 Max. Storage = 49,800 cuft

Storage Indication method used.

Total Volume = 100,352 cuft

### Hydrograph Discharge Table

Time (min)	Inflow cfs	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	Clv D cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Outflow cfs
705	19.58	566.85	0.00	0.00	----	----	3.42	----	----	----	3.42
720	49.17	567.70 <<	0.00	0.00	----	----	46.79	----	----	----	46.79 <<
735	6.70	567.08	0.00	0.00	----	----	11.84	----	----	----	11.84
750	4.39	566.92	0.00	0.00	----	----	5.61	----	----	----	5.61
765	3.20	566.86	0.00	0.00	----	----	3.73	----	----	----	3.73
780	2.68	566.83	0.00	0.00	----	----	2.97	----	----	----	2.97
795	2.30	566.81	0.00	0.00	----	----	2.49	----	----	----	2.49
810	2.02	566.80	0.00	0.00	----	----	2.17	----	----	----	2.17
825	1.78	566.79	0.00	0.00	----	----	1.94	----	----	----	1.94
840	1.58	566.78	0.00	0.00	----	----	1.74	----	----	----	1.74
855	1.46	566.77	0.00	0.00	----	----	1.56	----	----	----	1.56
870	1.39	566.77	0.00	0.00	----	----	1.46	----	----	----	1.46
885	1.32	566.76	0.00	0.00	----	----	1.38	----	----	----	1.38
900	1.25	566.76	0.00	0.00	----	----	1.30	----	----	----	1.30
915	1.18	566.75	0.00	0.00	----	----	1.23	----	----	----	1.23
930	1.11	566.75	0.00	0.00	----	----	1.16	----	----	----	1.16
945	1.03	566.75	0.00	0.00	----	----	1.09	----	----	----	1.09
960	0.96	566.74	0.00	0.00	----	----	1.02	----	----	----	1.02
975	0.92	566.74	0.00	0.00	----	----	0.96	----	----	----	0.96
990	0.90	566.74	0.00	0.00	----	----	0.92	----	----	----	0.92
1005	0.87	566.73	0.00	0.00	----	----	0.89	----	----	----	0.89
1020	0.85	566.73	0.00	0.00	----	----	0.86	----	----	----	0.86
1035	0.82	566.73	0.00	0.00	----	----	0.84	----	----	----	0.84
1050	0.79	566.73	0.00	0.00	----	----	0.81	----	----	----	0.81
1065	0.77	566.73	0.00	0.00	----	----	0.79	----	----	----	0.79
1080	0.74	566.73	0.00	0.00	----	----	0.76	----	----	----	0.76
1095	0.72	566.73	0.00	0.00	----	----	0.74	----	----	----	0.74
1110	0.69	566.73	0.00	0.00	----	----	0.71	----	----	----	0.71
1125	0.67	566.72	0.00	0.00	----	----	0.69	----	----	----	0.69
1140	0.64	566.72	0.00	0.00	----	----	0.66	----	----	----	0.66
1155	0.62	566.72	0.00	0.00	----	----	0.64	----	----	----	0.64
1170	0.59	566.72	0.00	0.00	----	----	0.61	----	----	----	0.61
1185	0.57	566.72	0.00	0.00	----	----	0.58	----	----	----	0.58
1200	0.54	566.72	0.00	0.00	----	----	0.56	----	----	----	0.56
1215	0.53	566.72	0.00	0.00	----	----	0.54	----	----	----	0.54
1230	0.52	566.72	0.00	0.00	----	----	0.53	----	----	----	0.53

Continues on next page...

1-4

**APPENDIX J**

**EXISTING DETENTION BASIN 100 YR, 24 HOUR STORM**

J-1

# Hydrograph Summary Report

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Volume (cuft)	Return period (yrs)	Inflow hyd(s)	Maximum elevation (ft)	Maximum storage (cuft)	Hydrograph description
1	SCS Runoff	40.90	3	723	137,834	100	----	---	-----	864 Hoff Road Thru Basin
2	Reservoir	40.18	3	726	137,834	100	1	566.21	6,324	

Proj. file: SAK PR 100 y 24h existing Dam file: GPM Sample.idf Run date: 07-29-2010

# Hydrograph Report

## Hyd. No. 1

864 Hoff Road

Hydrograph type = SCS Runoff  
Storm frequency = 100 yrs  
Drainage area = 6.20 ac  
Basin Slope = 2.7 %  
Tc method = USER  
Total precip. = 7.00 in  
Storm duration = 24 hrs

Peak discharge = 40.90 cfs  
Time interval = 3 min  
Curve number = 91  
Hydraulic length = 808 ft  
Time of conc. (Tc) = 16.5 min  
Distribution = Type II  
Shape factor = 484

Total Volume = 137,834 cuft

## Hydrograph Discharge Table

Time -- Outflow  
(min cfs)

693	4.14
696	4.79
699	5.97
702	7.89
705	10.56
708	14.14
711	18.95
714	25.30
717	32.45
720	38.25
723	40.90 <<
726	39.41
729	34.46
732	28.47
735	22.74
738	17.41
741	12.74
744	9.13
747	6.97
750	6.06
753	5.57
756	5.11
759	4.69
762	4.33

...End

# Hydrograph Report

## Hyd. No. 2

Thru Basin

Hydrograph type = Reservoir  
 Storm frequency = 100 yrs  
 Inflow hyd. No. = 1  
 Max. Elevation = 566.21 ft

Peak discharge = 40.18 cfs  
 Time interval = 3 min  
 Reservoir name = Existing Pond  
 Max. Storage = 6,324 cuft

Storage Indication method used

Total Volume = 137,834 cuft

## Hydrograph Discharge Table

Time (min)	Inflow cfs	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	Clv D cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Outflow cfs
696	4.79	565.59	2.47	----	----	----	1.75	----	----	----	4.22
699	5.97	565.62	2.57	----	----	----	2.59	----	----	----	5.16
702	7.89	565.66	2.72	----	----	----	3.99	----	----	----	6.70
705	10.56	565.72	2.92	----	----	----	6.08	----	----	----	8.99
708	14.14	565.78	3.16	----	----	----	9.15	----	----	----	12.31
711	18.95	565.87	3.43	----	----	----	13.33	----	----	----	16.76
714	25.30	565.96	3.72	----	----	----	18.95	----	----	----	22.67
717	32.45	566.06	4.02	----	----	----	25.00	----	----	----	29.02
720	38.25	566.14	4.28	----	----	----	31.01	----	----	----	35.29
723	40.90 <<	566.20	4.43	----	----	----	35.18	----	----	----	39.61
726	39.41	566.21 <<	4.44	----	----	----	35.74	----	----	----	40.18 <<
729	34.46	566.16	4.33	----	----	----	32.56	----	----	----	36.89
732	28.47	566.09	4.14	----	----	----	27.31	----	----	----	31.45
735	22.74	566.01	3.87	----	----	----	21.90	----	----	----	25.77
738	17.41	565.91	3.58	----	----	----	15.91	----	----	----	19.49
741	12.74	565.83	3.31	----	----	----	11.44	----	----	----	14.75
744	9.13	565.75	3.05	----	----	----	7.81	----	----	----	10.86
747	6.97	565.70	2.85	----	----	----	5.25	----	----	----	8.10
750	6.06	565.66	2.72	----	----	----	4.00	----	----	----	6.72
753	5.57	565.64	2.65	----	----	----	3.28	----	----	----	5.93
756	5.11	565.63	2.60	----	----	----	2.82	----	----	----	5.41
759	4.69	565.61	2.55	----	----	----	2.41	----	----	----	4.96
762	4.33	565.60	2.52	----	----	----	2.05	----	----	----	4.57
765	4.04	565.59	2.48	----	----	----	1.80	----	----	----	4.28
768	3.80	565.58	2.44	----	----	----	1.61	----	----	----	4.05

...End

J-4

# Reservoir Report

## Reservoir No. 1 - Existing Pond

English

### Pond Data

Pond storage is based on known contour areas

### Stage / Storage Table

Stage ft	Elevation ft	Contour area sqft	Incr. Storage cuft	Total storage cuft
0.00	564.70	00	0	0
0.30	565.00	3,187	478	478
1.30	566.00	5,738	4,462	4,941
2.30	567.00	7,583	6,661	11,601
3.30	568.00	7,583	7,583	19,184

### Culvert / Orifice Structures

	[A]	[B]	[C]	[D]
Rise in	= 21.0	0.0	0.0	0.0
Span in	= 21.0	0.0	0.0	0.0
No. Barrels	= 1	0	0	0
Invert El. ft	= 564.70	0.00	0.00	0.00
Length ft	= 10.0	0.0	0.0	0.0
Slope %	= 1.00	0.00	0.00	0.00
N-Value	= .013	.000	.000	.000
Orif. Coeff.	= 0.60	0.00	0.00	0.00
Multi-Stage	= ----	No	No	No

### Weir Structures

	[A]	[B]	[C]	[D]
Crest Len ft	= 20.00	0.00	0.00	0.00
Crest El. ft	= 565.50	0.00	0.00	0.00
Weir Coeff.	= 3.00	0.00	0.00	0.00
Eqn. Exp.	= 1.50	0.00	0.00	0.00
Multi-Stage	= No	No	No	No

Tailwater Elevation = 0.00 ft

Note: All outflows have been analyzed under inlet and outlet control.

### Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	Clv D cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Discharge cfs
0.00	0	564.70	0.00	---	---	---	0.00	---	---	---	0.00
0.30	478	565.00	0.51	---	---	---	0.00	---	---	---	0.51
1.30	4,941	566.00	3.83	---	---	---	21.21	---	---	---	25.05
2.30	11,601	567.00	12.12	---	---	---	110.23	---	---	---	122.35
3.30	19,184	568.00	18.03	---	---	---	237.17	---	---	---	255.20

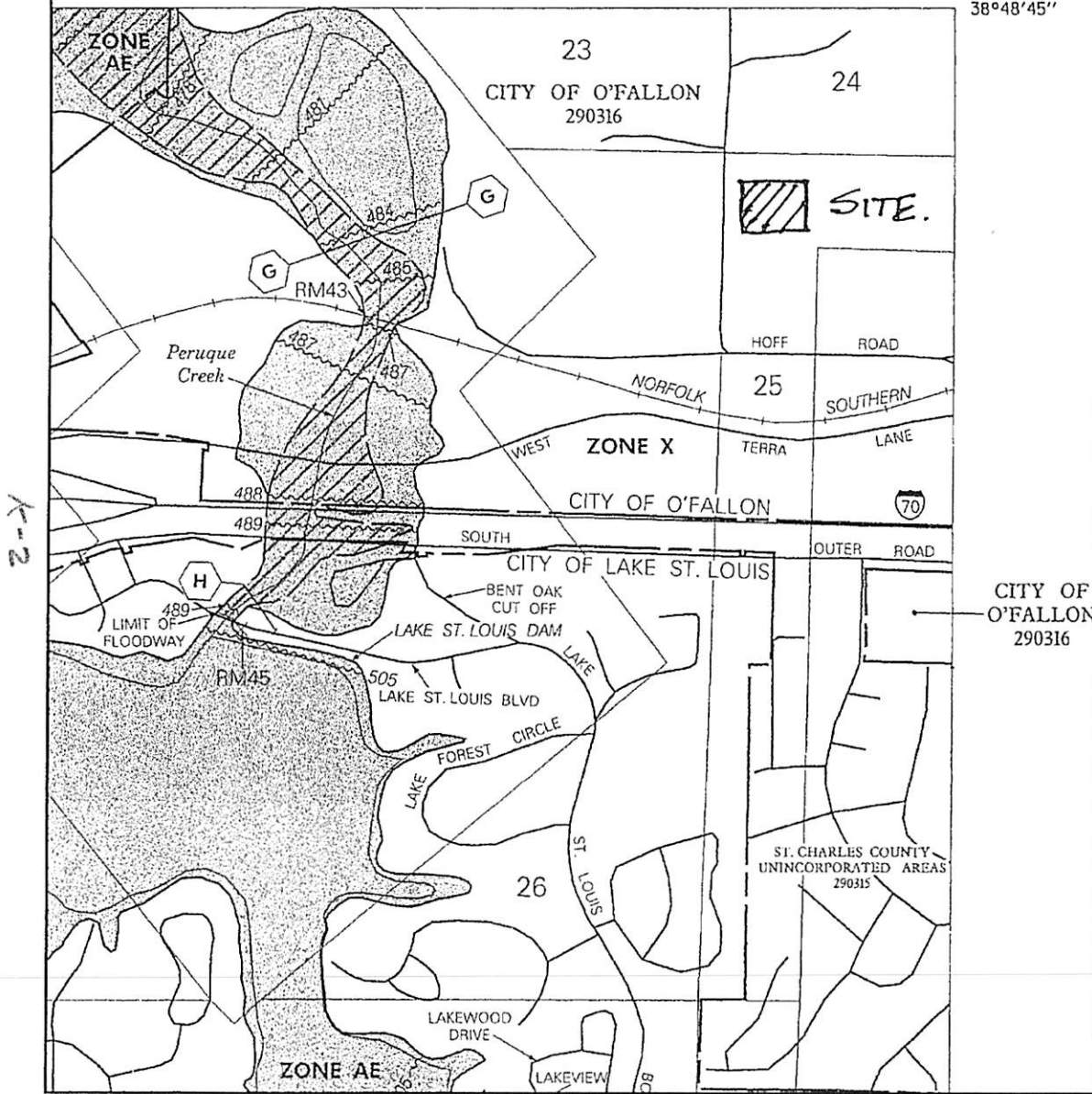
**APPENDIX K**

**FIRM MAP**



APPROXIMATE SCALE IN FEET  
 1000 0 1000

-90°45'00"  
 38°48'45"



NATIONAL FLOOD INSURANCE PROGRAM

**FIRM**  
 FLOOD INSURANCE RATE MAP  
 ST. CHARLES COUNTY,  
 MISSOURI AND  
 INCORPORATED AREAS

PANEL 220 OF 525  
 (SEE MAP INDEX FOR PANELS NOT PRINTED)

CONTAINS COMMUNITY	NUMBER	PANEL	SUFFIX
DIXONVILLE PRINCE TOWN OF	250659	0220	F
LAKE ST. LOUIS, CITY OF	290316	0220	F
O'FALLON, CITY OF	290316	0220	F
ST. CHARLES COUNTY, UNINCORPORATED AREAS	290315	0220	F
WENTZVILLE, CITY OF	200320	0220	F

MAP NUMBER  
 29183C0220 F

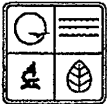
MAP REVISED:  
 MARCH 17, 2003



Federal Emergency Management Agency

This is an official copy of a portion of the above referenced flood map. It was extracted using F-MIT On-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](http://www.msc.fema.gov)





MISSOURI DEPARTMENT OF NATURAL RESOURCES  
 WATER PROTECTION PROGRAM  
 FORM E - APPLICATION FOR GENERAL PERMIT  
 UNDER MISSOURI CLEAN WATER LAW

FOR AGENCY USE ONLY	
CHECK NUMBER	
DATE RECEIVED	FEE SUBMITTED

1.00 CATEGORY OF GENERAL PERMIT APPLIED FOR <b>LAND DISTURBANCE</b>			
1.10 <input type="checkbox"/> a. This facility is now in operation under Missouri Operating Permit Number, or NPDES, MO - _____ and there is <u>not</u> a proposed increase in design flow. <input type="checkbox"/> b. This facility is now in operation under Missouri Operating Permit Number MO - _____ and there <u>is</u> a proposed increase in design flow. <input checked="" type="checkbox"/> c. This is a new permit. If you checked either item b or c above then you may need to submit an antidegradation review. See instructions.			
2.00 NAME OF FACILITY <b>SAX CONSTRUCTION</b>			
2.10 ADDRESS (PHYSICAL) <b>664 HOFF ROAD</b>		CITY <b>O'FALLON</b>	STATE <b>MO</b>
		ZIP CODE <b>63366</b>	
3.00 OWNER			
NAME <b>JERRY SHAW</b>		E-MAIL ADDRESS <b>JSHAW@SAXCONST.COM</b>	TELEPHONE NUMBER WITH AREA CODE <b>636-379-2350</b>
		FAX NUMBER WITH AREA CODE <b>636-379-2461</b>	
STREET <b>103 N COOL SPRING RD</b>		CITY <b>O'FALLON</b>	STATE <b>MO</b>
		ZIP CODE <b>63366</b>	
4.00 CONTINUING AUTHORITY			
NAME <b>SAME AS OWNER</b>		E-MAIL ADDRESS	
		TELEPHONE NUMBER WITH AREA CODE	
		FAX NUMBER WITH AREA CODE	
STREET		CITY	STATE
		ZIP CODE	
5.00 OPERATOR			
NAME <b>SAME AS OWNER</b>		TELEPHONE NUMBER WITH AREA CODE	
6.00 FACILITY CONTACT			
NAME <b>SAME AS OWNER</b>		TELEPHONE NUMBER WITH AREA CODE	
		FAX NUMBER WITH AREA CODE	
TITLE			
7.00 FOR EACH OUTFALL GIVE THE LEGAL DESCRIPTION (ATTACH ADDITIONAL SHEETS AS NECESSARY)			
Outfall Number <u>1</u> _____ % <u>No</u> % Sec. <u>25</u> T <u>47N</u> R <u>2E</u> <u>STL</u> County			
Outfall Number _____ % _____ % Sec. _____ T _____ R _____ County			
Outfall Number _____ % _____ % Sec. _____ T _____ R _____ County			
7.10 FOR EACH OUTFALL LIST THE NAME OF THE RECEIVING WATER			
Outfall Number <u>1</u> Receiving Water <u>UNNAMED TRIBUTARY TO PERQUE CREEK</u>			
Outfall Number _____ Receiving Water _____			
Outfall Number _____ Receiving Water _____			
7.20 BRIEFLY DESCRIBE THE NATURE OF YOUR BUSINESS <b>MANUFACTURING AND TUNNEL EQUIPMENT MAINTENANCE</b>			
7.30 Does the discharge(s) for which you are seeking a permit discharge to a combined sewer system? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No			
7.40 Primary SIC Code <u>1622</u>			
7.50 If this application is for a storm water permit, list any materials that are stored outside and exposed to storm water. <u>NONE</u>			
7.60 Attach a USGS 1" = 2,000' scale map showing the location of the facility in relation to the local road system. Indicate on the map the facility, the receiving stream, the points of discharge and the map section, township and range.			
7.70 If this is an existing discharge, submit a summary of pollutants analyzed in the past two years.			
7.80 What is the method of domestic wastewater disposal? <u>PUBLIC SEWER</u>			
7.90 I certify that I am familiar with the information contained in the application and to the best of my knowledge and belief such information is true, complete and accurate, and if granted this permit, I agree to abide by the Missouri Clean Water Law and all rules, regulations, orders and decisions, subject to any legitimate appeal available to applicant under the Missouri Clean Water Law of Missouri Clean Water Commission.			
A. NAME AND OFFICIAL TITLE (TYPE OR PRINT)		B. TELEPHONE NUMBER WITH AREA CODE	
C. SIGNATURE		D. DATE SIGNED	

## INSTRUCTIONS

This form must be submitted with the application fee (listed below). Persons with more than one operating location shall obtain a general permit for each location unless other permitting arrangements are allowed by the terms of the general permit. Where multiple discharge points exist at a single operating location, one application may cover all the applicable discharges. If there are any questions concerning this form, please contact the appropriate regional office (see map available at [www.dnr.mp.gov/regions/regions.htm](http://www.dnr.mp.gov/regions/regions.htm)).

**Fees:** Land Disturbance (Form G must be included) - \$300 (due at application time only)  
Ag Chem Fertilizer/Pesticide - \$50 due with application for new permits; \$50/year while permit is in effect; no fee required with renewal application  
Concentrated Animal Feeding Operation, or CAFO - \$150 (due at application time only)  
General Permit - Other (e.g., Motor Vehicle Salvage, Limestone Quarry, Petroleum Storage.) - \$150 due with application for new permits and each year until expiration; \$60/year thereafter; no fee required with renewal application.

1.00 Give the name of the specific general permit you are applying for: (e.g., Land Disturbance, Motor Vehicle Salvage.) If you are unsure about the specific name for the general permit, contact the Water Protection Program, Water Pollution Branch at 573-751-8825.

1.10 Fill out either item (a.), item (b.), or item (c. as applicable).

Each General permit may have specific antidegradation review requirements contained within it. Go to the following Web sites to verify your specific requirements. For MO-G permits visit [www.dnr.mo.gov/env/wpp/permits/wpcpermits-general.htm](http://www.dnr.mo.gov/env/wpp/permits/wpcpermits-general.htm). For MO-R permits visit [www.dnr.mo.gov/env/wpp/permits/wpcpermits-stormwater.htm](http://www.dnr.mo.gov/env/wpp/permits/wpcpermits-stormwater.htm).

Effective Sept. 1, 2008, facilities are required to use *Missouri's Antidegradation Rule and Implementation Procedure*. This document is available on the Web at [www.dnr.mo.gov/env/wpp/docs/aip-cwc-appr-050708.pdf](http://www.dnr.mo.gov/env/wpp/docs/aip-cwc-appr-050708.pdf). For more information please contact the Department at 800-361-4827 or 573-751-1300.

2.00 Name of facility - by what name is this facility known locally? (e.g., Southwest Sewage Treatment Plant or Oak Hill Mobile Home Park.)

2.10 Give the street address of the facility. If the facility lacks a mailing address, give an accurate geographic description. (e.g., Intersection of Route A and M.)

3.00 Owner - legal name and address of owner.

4.00 Continuing Authority - permanent organization which will serve as the continuing authority for the operation, maintenance and modernization of the facility.

5.00 Operator - name, certificate number of person operating the facility.

6.00 Give name of person at the facility who can be contacted by the Department if necessary.

7.00 An outfall is the point(s) at which wastewater is discharged. For storm water this may be the point(s) where water leaves the property. Outfalls should be given in terms of the legal description of the facility. Sufficient information should be submitted so the outfall may be located by Department staff.

7.10 Receiving stream(s) - the name of the stream(s) to which the discharge is directed and any subsequent tributary until a lake or continuous flowing stream is reached.

7.20 Describe the primary business conducted at this site.

7.30 A combined sewer system is one in which the sanitary and storm sewers are one pipe. In Missouri, parts of Macon, Moberly, Cape Girardeau, St. Joseph, Kansas City, Sedalia and all of the city of St. Louis are on combined sewer systems. To find out information, consult with your municipal public works department or, if in St. Louis, the St. Louis Metropolitan Sewer District (MSD). If this discharge is to a combined sewer system, it is exempt from storm water permitting requirements. You do not need to file this application if it is for storm water discharges only.

7.40 List only your primary Standard Industrial Classification, or SIC, code. The SIC system was devised by the U.S. Office of Management and Budget to cover all economic activities. The primary SIC code is that of the operation that generates the most revenue, or, secondly, employs the most personnel. To find the correct SIC code, contact the Missouri Department of Natural Resources at 573-526-6627 or refer to the following Web sites: [www.census.gov/epcd/www/naicstab.htm](http://www.census.gov/epcd/www/naicstab.htm) or [www.osha.gov/pls/fmis/sicsearch.html](http://www.osha.gov/pls/fmis/sicsearch.html).

7.50 Please list anything stored outside, including wood pallets, empty storage barrels, waste disposal containers (except for a secured Dempsey dumpster), or anything that is a raw material, by-product, or product of your manufacturing activities.

If your facility is listed under any of the following SIC codes or major group codes, and you can certify that no materials are stored outside, then you are exempt from storm water permitting requirements. You do not need to file this application if it is for storm water discharges only. This information refers to the first two, first three, or all four numbers of your SIC code listed in 7.40 above. The SIC codes that are exempt from regulations if no materials are stored outside are: 20xx-23xx, 25xx, 285x, 287x, 27xx, 283x, 285x, 30xx, 31xx, 323x, 34xx-39xx, and 4221-4225.

7.60 A map showing the facility in relation to the local roads and receiving streams is required. Attach a 1" = 2000' scale U.S. Geological Survey topographic map, which is available from the Department's Division of Geology and Land Survey in Rolla, MO at 573-368-2125.

7.70 If this is an existing discharge, submit a list of pollutants that have been analyzed in the past two years and any laboratory findings.

7.80 Give the method of domestic wastewater disposal, identify the future method if the site is currently undeveloped. If public sewers, give name of sewer agency. If private system with a State Operating Permit, give name of facility and permit number. If other, please describe.

8.00 Signature - all applications must be signed as follows and the signature must be original.

a. For a corporation, by an officer having responsibility for the overall operation of the regulated facility or activity or for environmental matters.

b. For a partnership or sole proprietorship, by a general partner or the proprietor.

c. For a municipal, state, federal, or other public facility, by either a principal executive officer or by an individual having overall responsibility for environmental matters at the facility.



MISSOURI DEPARTMENT OF NATURAL RESOURCES  
 WATER PROTECTION PROGRAM  
 FORM G - APPLICATION FOR STORM WATER PERMIT (FORM E MUST BE INCLUDED)  
 UNDER THE GENERAL PERMIT: LAND DISTURBANCE

A map of the appropriate regional office is available on the department's Web site at [dnr.mo.gov/regions/regions.htm](http://dnr.mo.gov/regions/regions.htm).

Name of development  
*SAR CONSTRUCTION*

Phase (Indicate Phase I, II, etc., if applicable.)  
*PHASE I*

Nature of construction activity  
*LAND DISTURBANCE*

Physical location of development (Address, if assigned.)  
*664 HOFF ROAD, O'FALLON MO 63366*

Date construction is to begin  
*JULY 2010*

Total area of site: 7.72 acres

Total area of land to be disturbed: 2.3 acres

Is a department of Natural Resources approved erosion control plan operative in the city or the unincorporated area of the county in which the land disturbance is occurring?  
 Yes  No

If yes, a letter of approval or a copy of a permit from the local authority is required and must be enclosed for the permit to be issued.  
 Please check this box if enclosed.

Has a Storm Water Pollution Prevention Plan, or SWPPP, been developed for this site?  
 (This plan must be developed in accordance with requirements and guidelines specified within the general permit for storm water discharges from land disturbance activities. The application will be considered incomplete if the Storm Water Pollution Prevention Plan has not been developed. Please do not enclose a copy of the plan. A copy of the Storm Water Pollution Prevention Plan may be requested by the department at any time.)  
 Yes  No

The department requests that a completed Storm Water Pollution Prevention Plan be submitted along with the application if:  
 The receiving water is Lake of the Ozarks, or  
 The first classified waterbody is Lake of the Ozarks.

Summarize the measures (Best Management Practices) from the Storm Water Pollution Prevention Plan that will be used to control pollutants in storm water discharges during constructions.  
*PERIMETER FILTER FABRIC BARRIER, STRAW BALE DITCH CHECK, INLET PROTECTION, TEMPORARY SEEDING + MULCHING, SILTATION BASIN*

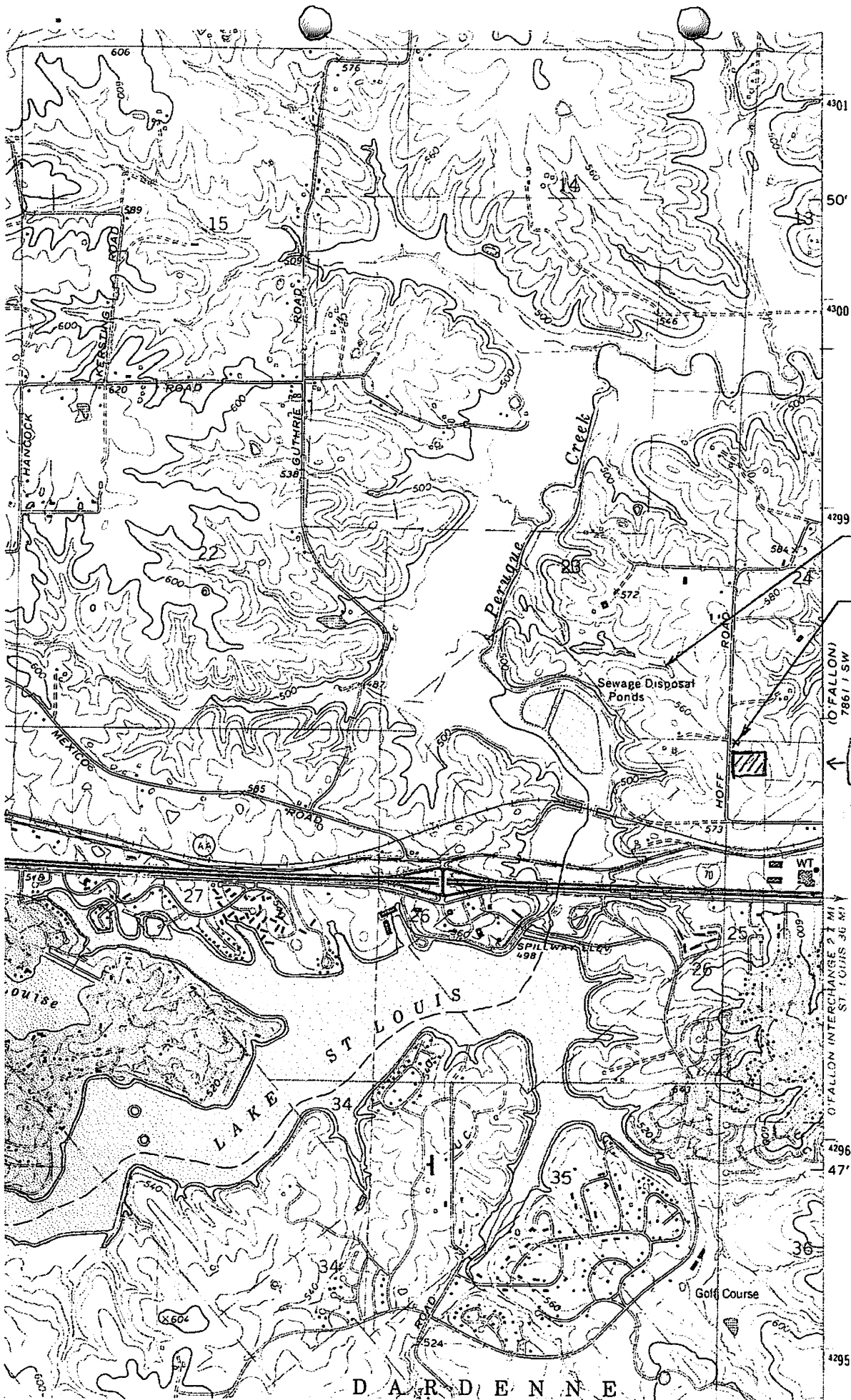
Summarize Best Management Practices from the Storm Water Pollution Prevention Plan that will remain in place after construction operations have been completed.  
*PERMANENT SEEDING, VEGETATED SWALES, DETENTION BASIN  
 WATER QUALITY UNIT*

Describe the nature of the fill material.  
*FILL MATERIAL WILL BE EXCAVATED FROM ON SITE LOCATION'S  
 SOILS REPORT INDICATES MEDIUM STIFF TO STIFF, LOW ACID HIGH  
 PLASTICITY CLAY*

MO 780-1408 (03-10)

<b>ATTACH ANY EXISTING DATA CONCERNING SOIL OR QUALITY OF THE DISCHARGE.</b>	
Estimate of runoff coefficient of site. <u>0.68</u>	
Estimate of increase in impervious area. <u>% DECREASE</u>	
Estimate of runoff coefficient upon completion. <u>0.67</u>	
Is the land disturbance within 1,000 feet of:	
<input type="checkbox"/> Water classified in 10 CSR 20-7.031 water quality standards as a public drinking water supply lake (L <sub>1</sub> ), outstanding national or state resource waters, or streams designated for cold-water sport fishery.	
<input type="checkbox"/> Streams, lakes or reservoirs identified as critical habitat for endangered species as determined by Missouri Department of Conservation and U.S. Fish and Wildlife Service.	
Is the land disturbance within 100 feet of waters classified as major reservoirs (L <sub>2</sub> ) or permanent flow streams (P), except the Missouri and Mississippi rivers, or within two stream miles upstream of biocriteria reference locations as defined in 10 CSR 20, Chapter 7?	
<input type="checkbox"/> Yes <input type="checkbox"/> No	
Is any part of the area that is being disturbed discharging to a jurisdictional water of the United States?	
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	
If yes, have you received a CWA, Section 404 Permit for this site from the United States Army Corps of Engineers? (The permit cannot be issued until the site is under a 404 or Nationwide General Permit, if one is required.)	
<input type="checkbox"/> Yes <input type="checkbox"/> No	
Does the storm water runoff discharge to a sinkhole, losing stream, or any other topographical feature that would be a direct conduit to groundwater?	
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	
I certify I am familiar with the information contained in the application, that to the best of my knowledge and belief such information is true, complete and accurate, and if granted this permit, I agree to abide by the Missouri Clean Water Law and all rules, regulations, orders and decisions, subject to any legitimate appeal available to an applicant under the Missouri Clean Water Law of the Missouri Clean Water Commission.	
Name and Official Title	Telephone number with area code
Signature	Date signed
<b>Note:</b> This form must be submitted with the permit fee (\$300), map and <i>Form E – Application for a General Permit (780-0795)</i> . The form is available on the department's Web site at <a href="http://dnr.mo.gov/forms/780-0795.doc">dnr.mo.gov/forms/780-0795.doc</a> or <a href="http://dnr.mo.gov/forms/780-0795.pdf">dnr.mo.gov/forms/780-0795.pdf</a> .	

MO 780-1408 (03-10)



RECEIVING  
STREAM

OUT FALL

(D'FALCON)  
7867 SW

PROJECT  
SITE

WENTSVILL MO  
QUAD

SECTION 25

TOWNSHIP 47N

RANGE 2E

SCALE 1"=2000'

K-7

6-17-2010

D A R R D E N N E

**SUBSURFACE EXPLORATION**  
**SAK OFFICE ADDITIONS**  
**O'FALLON, MISSOURI**

**SECTION I - EXECUTIVE SUMMARY**

The executive summary is provided solely for the purposes of overview, and a number of details are omitted, any one of which could be crucial to the proper application of this report. Any party who relies on this report must read the full report.

- The project includes construction of an office/warehouse addition and the relocation of a three-sided shed.
- Below the topsoil at the boring locations, the stratigraphy generally consists of inter-bedded, medium stiff to stiff, low and high plasticity clay underlain by weathered limestone. Fill is present in one boring to a depth of approximately 4 feet. Sampler refusal occurred in one of the four borings at a depth of approximately 19 feet. Groundwater was not encountered.
- Highly plastic soil occurs in all of the borings. Highly plastic soil occurring within 2 feet of lightly loaded footings and within 3 feet of floor slab subgrade must be remediated as discussed herein.
- Fill, where present, should be considered uncontrolled and compressible. Complete fill remediation is recommended due to the apparent shallow fill depth. However, proof-rolling and remediating localized soft zones is an option in slab-on-grade areas provided a higher level of risk for settlement is acceptable.
- Strip and spread footings may be proportioned for net allowable bearing pressures of 2,000 and 2,500 pounds per square foot (psf), respectively, provided the footings bear on natural soil and/or controlled fill.
- The site soil profile may be classified as Site Class C in accordance with International Building Code (IBC) criteria.

K-B

**APPENDIX L**  
**2 YEAR SEDIMENT CALCULATION**

**DAVID MASON & ASSOCIATES**  
 CHICAGO, IL • ST. LOUIS, MO • DALLAS, TX

**COMPUTATION SHEETS**

PROJECT #: 2010403-00  
 PROJECT TITLE: 864 HOPE ROAD  
 CLIENT: SITE CONSTRUCTION

COMPUTED BY: M. DAVIS  
 CHECKED BY: \_\_\_\_\_  
 DATE: 6-22-2010

2 YEAR SEDIMENT CALCULATION

$$A = R K L S C P$$

- A = COMPUTED SOIL LOSS PER UNIT ACRE (TONS PER AC)
- R = RAINFALL FACTOR 220 FOR ST LOUIS REGION
- K = SOIL ERODIBILITY FACTOR = 0.32
- L, S = SLOPE LENGTH + SLOPE GRADIENT FACTOR = 1.5
- C = CROPPING MANAGEMENT FACTOR = 0.20
- P = SEDIMENT CONTROL MANAGEMENT FACTOR = 0.50

$$A = 220 \times 0.32 \times 0.50 \times 0.20 \times 0.50$$

$$A = 3.52 \text{ TONS PER ACRE}$$

DEVELOPED SITE IS 2.49 ACRES LAND SLOPED

$$\begin{aligned} 2 \text{ YEAR SEDIMENT} &= 3.52 \text{ TONS/ACRE} \times 2.49 \text{ ACRES} \times 2 \text{ YRS.} \\ &= 17.5 \text{ TONS.} \\ &= 35000 \text{ LBS} \end{aligned}$$

VOLUME OF EARTH @ 100 LBS / CUBIC FT

$$V = 35,000 \text{ LBS} \div 100 \text{ LBS / CUBIC FT}$$

$$V = 350 \text{ CUBIC FT}$$

$$\begin{aligned} \text{SEDIMENT BASIN STORAGE} &= 864' \times (20'' + 6'') \div 12 \\ &= 18722 \text{ CUBIC FEET} \end{aligned}$$

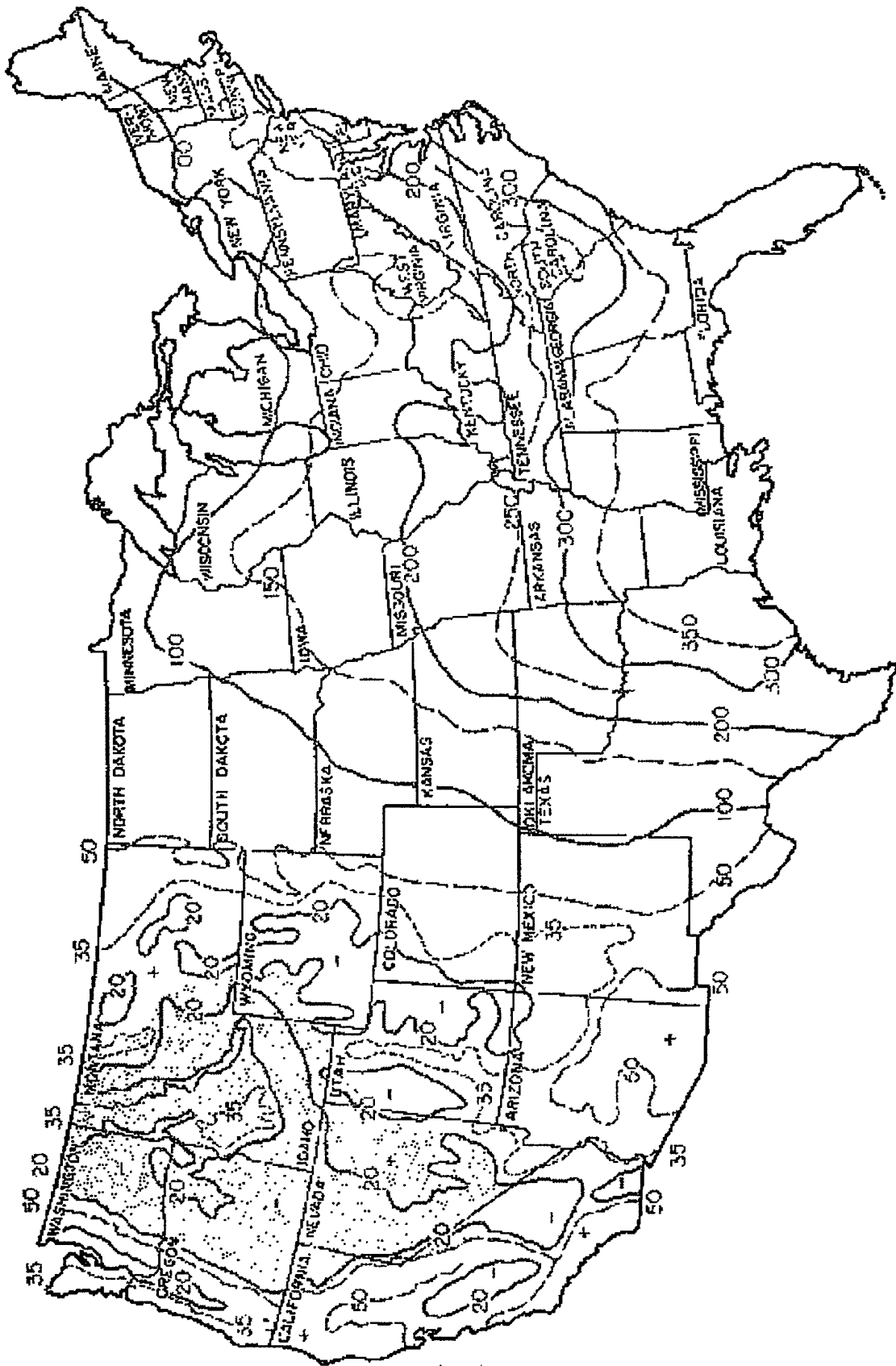
OR AVAILABLE STORAGE > REQUIRED GOOD

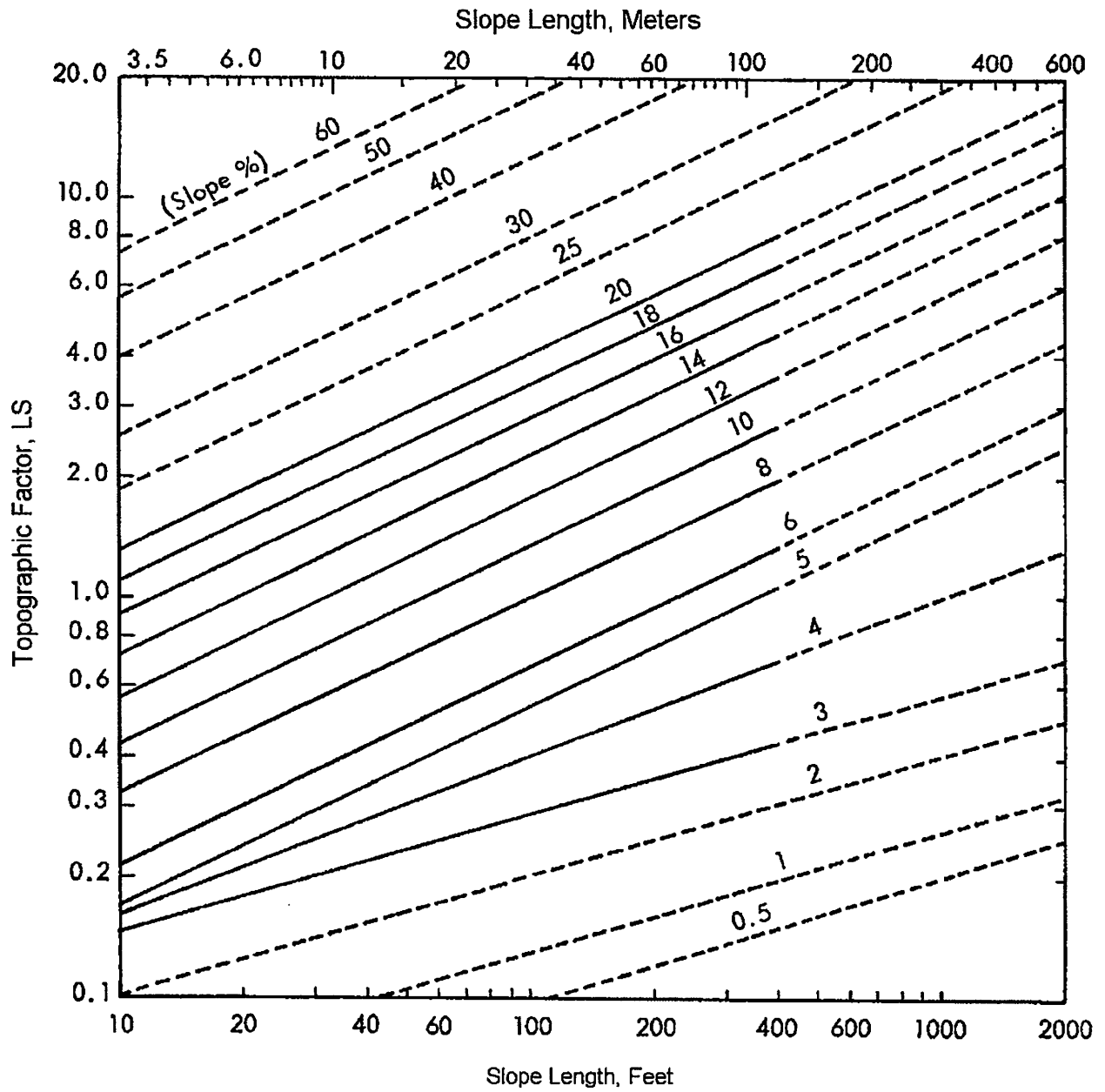


**Universal Soil Loss Equation:**  
(Wischmeier and Smith)

<b>A = RKLSCP</b>
-------------------

- A = Computed soil loss per unit area (tons per acre)**
- R = Rainfall factor**  
# of erosion index units in a normal year's rain. Erosion index is a measure of the erosive force of a specific rainfall
- K = Soil erodability factor**  
erosion rate/unit of erosion index for a specific soil in cultivated continuous fallow on a 9% slope 72.6 feet long
- L = Slope length factor**  
ratio of soil loss from the field slope length to that from a 72.6-foot length on the same soil type and gradient
- S = Slope gradient factor**  
ratio of soil loss from the field gradient to that from a 9% slope
- C = Cropping management factor**  
ratio of soil loss from a field with specified cropping and management to that from the fallow condition on which the factor K is evaluated
- P = Erosion control management factor**  
ratio of soil loss with contouring, strip cropping or terracing to that with straight-row farming, up and down slope





Dashed lines represent estimates for slope dimensions beyond the range of lengths and steepnesses for which data are available

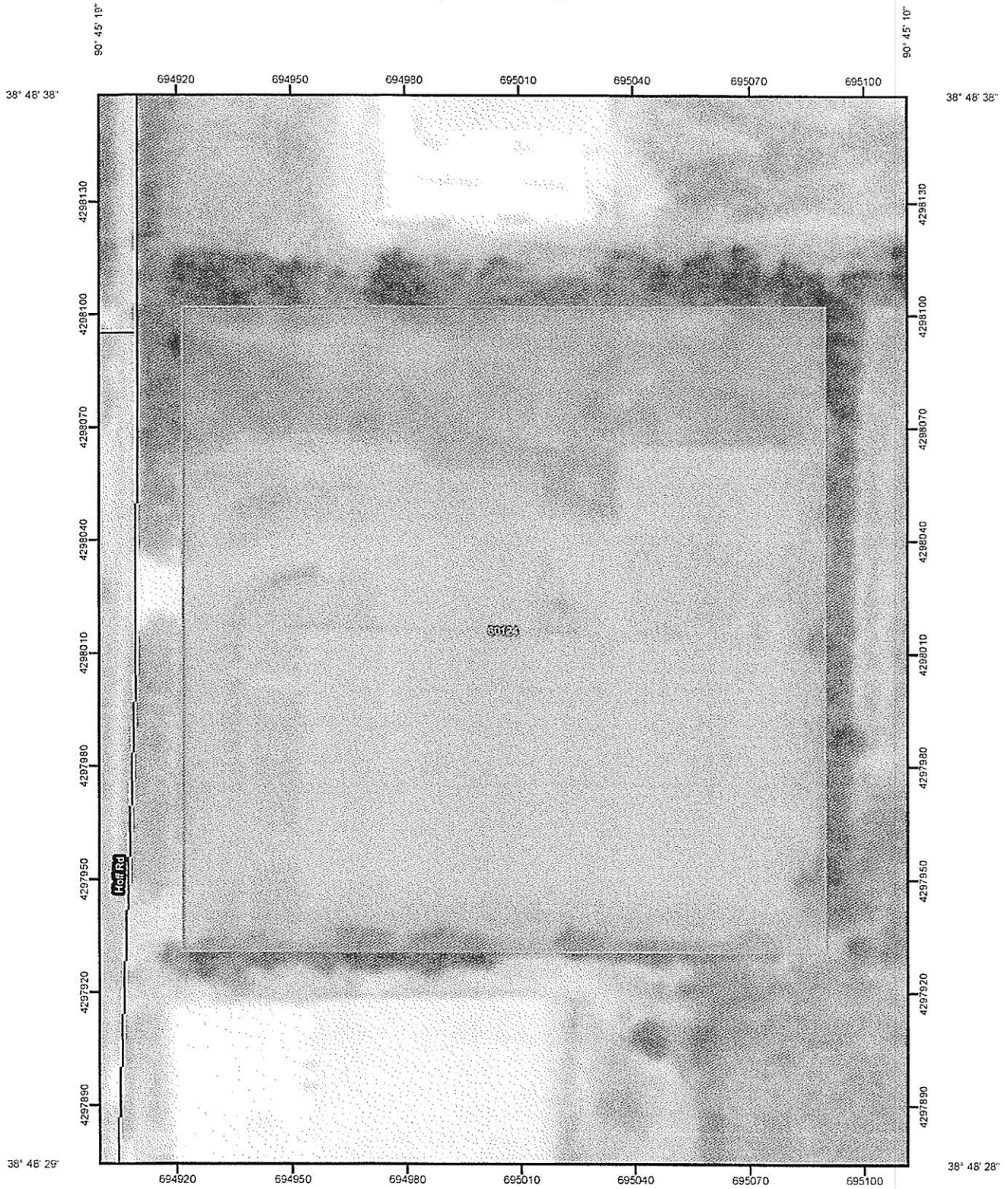
RELATIVE PROTECTION OF GROUND COVER AGAINST EROSION  
(in order of increasing C factor)

Land-use groups	Examples	Range of "C" values
Permanent vegetation	Protected woodland Prairie Permanent pasture Sodded orchard Permanent meadow	0.0001 -- 0.45
Established meadows	Alfalfa Clover Fescue	0.004 -- 0.3
Small grains	Rye Wheat Barley Oats	0.07 -- 0.5
Large-seeded legumes	Soybeans Cowpeas Peanuts Field peas	0.1 -- 0.65
Row crops	Cotton Potatoes Tobacco Vegetables Corn Sorghum	0.1 -- 0.7
Fallow	Summer fallow Period between plowing and growth of crop	1.0

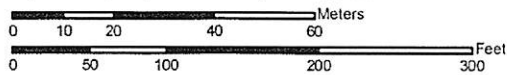
Practice factor values for contouring

Land slope, %	P value
1.1 to 2	0.60
2.1 to 7	0.50
7.1 to 12	0.60
12.1 to 18	0.80
18.1 to 24	0.90

K Factor, Whole Soil—St. Charles County, Missouri  
(SAK Construction)




























Map Scale: 1:1,360 if printed on A size (8.5" x 11") sheet



K Factor, Whole Soil—St. Charles County, Missouri  
(SAK Construction)

**MAP LEGEND**

<b>Area of Interest (AOI)</b>			Rails
	Area of Interest (AOI)		Interstate Highways
<b>Soils</b>			US Routes
	Soil Map Units		Major Roads
<b>Soil Ratings</b>			Local Roads
	.02		
	.05		
	.10		
	.15		
	.17		
	.20		
	.24		
	.28		
	.32		
	.37		
	.43		
	.49		
	.55		
	.64		
	Not rated or not available		
<b>Political Features</b>			
	Cities		
<b>Water Features</b>			
	Oceans		
	Streams and Canals		
<b>Transportation</b>			

**MAP INFORMATION**

Map Scale: 1:1,360 if printed on A size (8.5" × 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 15N NAD83

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

Soil Survey Area: St. Charles County, Missouri  
Survey Area Data: Version 9, Jun 3, 2009

Date(s) aerial images were photographed: 8/10/2007

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.

8-7

## K Factor, Whole Soil

K Factor, Whole Soil— Summary by Map Unit — St. Charles County, Missouri				
Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
60124	Harvester-Urban land complex, 2 to 9 percent slopes	.32	7.1	100.0%
Totals for Area of Interest			7.1	100.0%

### Description

Erosion factor K indicates the susceptibility of a soil to sheet and rill erosion by water. Factor K is one of six factors used in the Universal Soil Loss Equation (USLE) and the Revised Universal Soil Loss Equation (RUSLE) to predict the average annual rate of soil loss by sheet and rill erosion in tons per acre per year. The estimates are based primarily on percentage of silt, sand, and organic matter and on soil structure and saturated hydraulic conductivity (Ksat). Values of K range from 0.02 to 0.69. Other factors being equal, the higher the value, the more susceptible the soil is to sheet and rill erosion by water.

"Erosion factor Kw (whole soil)" indicates the erodibility of the whole soil. The estimates are modified by the presence of rock fragments.

### Rating Options

*Aggregation Method:* Dominant Condition

*Component Percent Cutoff:* None Specified

*Tie-break Rule:* Higher

*Layer Options:* Surface Layer