

Preliminary Drainage Report Rock Road Farm Addition Wichita, Sedgwick County, Kansas

Location

The subject property is in Sedgwick County, Kansas and is being annexed by the city of Wichita. The proposed development is located east of Rock Road, between 31st and 39th Street South, in Section 8, Township 28 South, Range 2 East. The plat is approximately 99.9 acres and is shown on the Sedgwick County, Kansas Quadrangle, located in Appendix A.

Soils

The soil types found on the property, according to the NRCS (SCS) Sedgwick County Soil Survey (Appendix B), are listed in Table 1.

Table 1. Soil Survey

Symbol	Name	Hydrologic Soil Group (HSG)
la	Irwin silty clay loam, 1 to 3 percent slopes	"D"
Rd	Rosehill silty clay, 1 to 3 percent slopes	"D"
Ta	Tabler silty clay loam	"D"

The Hydrologic Soil Group used to select runoff coefficients for the site is "D".

Pre-Project Conditions

Pre-Project Development

The site is currently undeveloped pastureland.

Pre-Project Landform and Slope

Slopes across the site range from 0.5-5.0%.

Pre-Project Drainage Conditions

The site is entirely in Zone C, areas of minimal flooding. The nearest Zone A, area within the 100-year floodplain, is located approximately 1/3 mile east of the site (FIRM Panel 225, Sedgwick County, Kansas, June 3, 1986) (Appendix C).

Pre-Project Runoff Characteristics

The property is divided into four drainage basins as shown on the Pre-Project Drainage Boundary Map shown in Appendix D. Runoff from the Northwest basin enters an existing drainage swale, along the northern property line of the site, and is routed west into the Rock Road ditch. Runoff from the Southwest drainage basin is directed into an existing creek that drains offsite to the south. The Southeast basin also drains offsite to the south.

through a less defined channel. The Northeast basin contains the northeast corner of the site and is approximately 1.2 acres. The Northeast basin drains offsite to the east.

The pre-project conditions for the four drainage basins were modeled in Hydraflow Hydrographs by Intelisolve, Appendix E. The times of concentration were calculated using the FAA Method in a spreadsheet, Appendix F. The runoff flow rates leaving the site under pre-project conditions are shown in Table 2.

Table 2. Pre-Project Runoff

Basin	2-Year (cfs)	5-Year (cfs)	10-Year (cfs)	100-Year (cfs)
Northeast	2.1	3.3	4.1	7.2
Southeast	55.3	86.2	107.1	187.0
Northwest	16.0	25.0	31.1	54.2
Southwest	76.0	118.6	147.8	258.1

Post-Project Conditions

Post-Project Development

The site will develop as approximately 180, ¼ acre single family lots. Approximately 17 acres will be reserved for ponds and a park.

Post-Project Landform and Slope

The final grading plan has not been completed; however the Post-Project Development is expected to closely follow the existing slopes. A preliminary Four-Corner Lot Grading plan is Appendix G.

Post-Project Runoff Characteristics

Under Post-Project conditions, the open area between Rock Road and the property, within the Northwest and Southwest drainage basins, was considered as developed commercial land. The remaining areas draining onto the property were left as undeveloped pastureland in the Post-Project Calculations. The Northwest and the Northeast drainage basins will be reduced in size to eliminate the need for detention under Post-Project conditions. Ponds will be constructed to provide detention for the Southeast and Southwest Basins. The Post-Project Drainage Boundary Map is Appendix H. The post-project times of concentration were calculated using the FAA Method, Appendix F. The post-project runoff was calculated using Hydraflow Hydrographs by Intelisolve, Appendix E. Table 3 shows the post-project runoff exiting each watershed.

Table 3. Post-Project Runoff

Basin	2-Year (cfs)	5-Year (cfs)	10-Year (cfs)	100-Year (cfs)
Northeast	2.2	3.1	3.8	6.0
Southeast	47.5	72.3	89.0	153.1
Northwest	17.1	23.0	26.8	40.5
Southwest	75.4	112.9	138.8	235.2

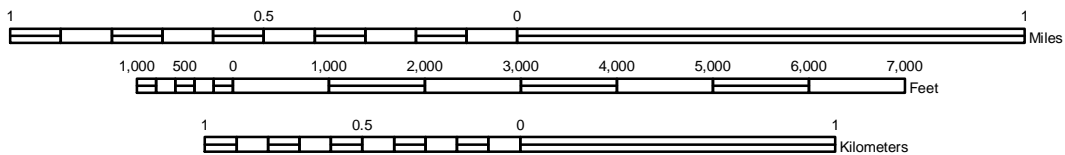
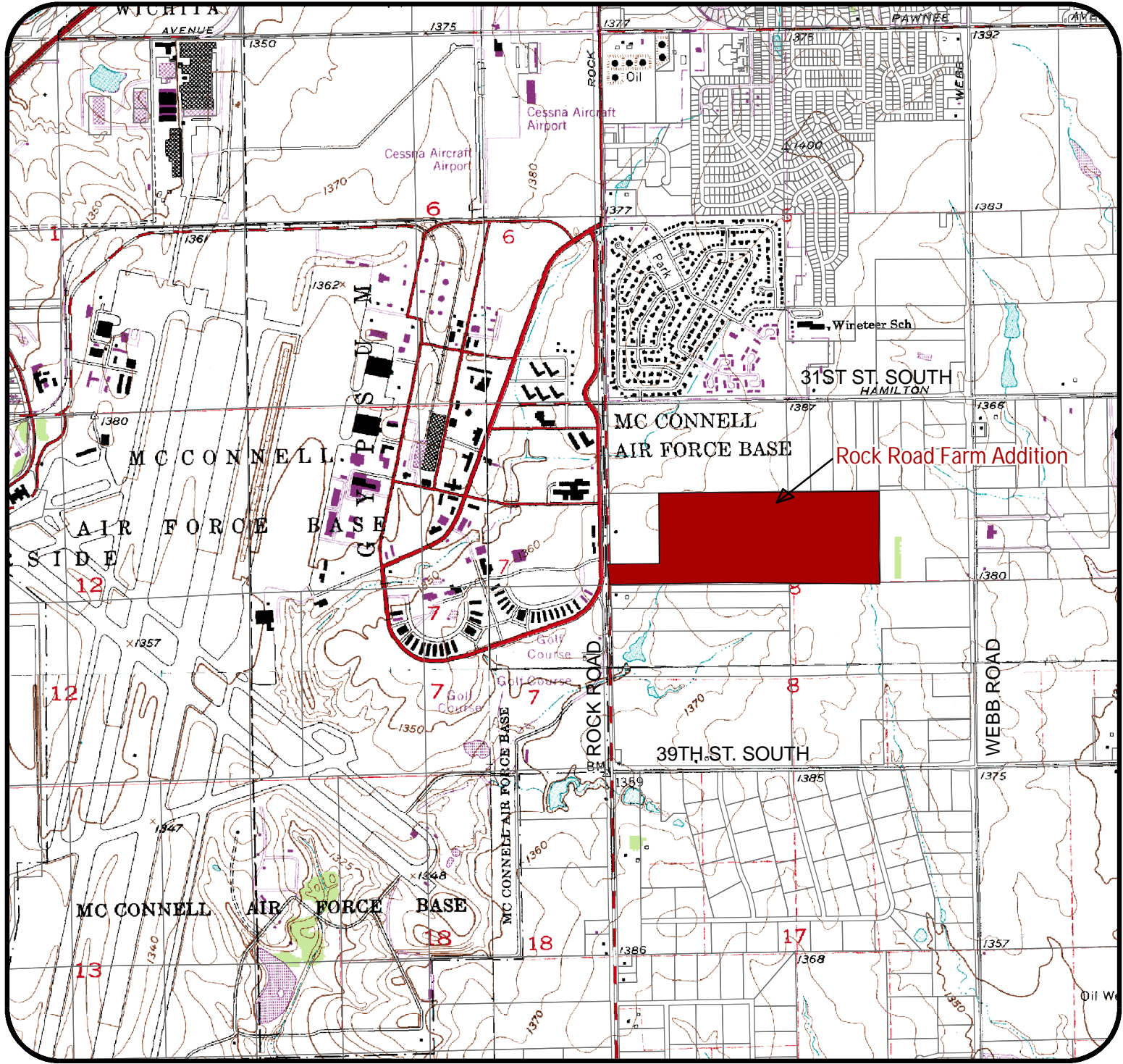
The 100-year runoff was reduce in the Northeast, Southeast, Northwest, and Southwest basins by 16.7%, 18.1%, 25.3%, and 8.9% respectively. A preliminary layout of the SWS, sanitary sewer, and waterline is shown on the Preliminary Drainage and Utility Plan in Appendix I.

Summary

The Rock Road Farm Addition is located east of Rock Road between 31st Street South and 39th Street South. The Property will develop as approximately 180, single family, 1/4 acre lots. The property currently drains into four separate basins. The area of the Northeast and Northwest basins will be reduced to eliminate the need for detention in those basins. Ponds will be constructed to provide detention in the Southeast and Southwest basins. The 100-year flow rate leaving the site will be reduced from pre-project to post-project conditions in all watersheds.

Appendix A

Quadrangle



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ROCK ROAD FARM ADDITION

Project Name:
 USGS - Sedgwick County, KS
 Sheet Title:



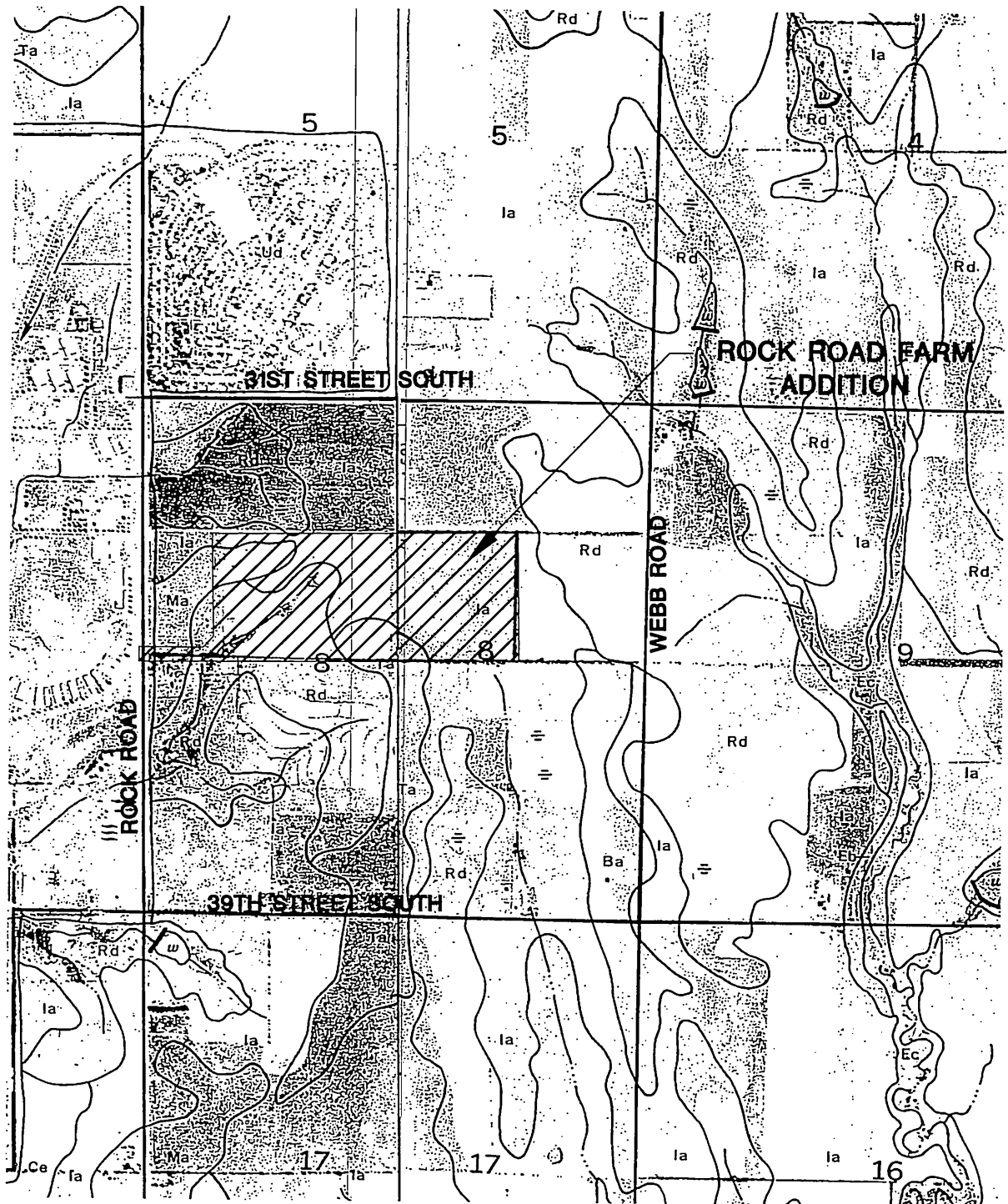
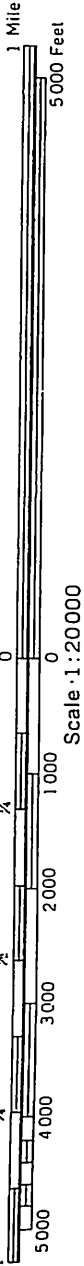
KWS	Jan., 2006
Drawn By:	Date:
AJK / KLA	03277
Design / Review:	Job No.:

Appendix B

Soil Survey

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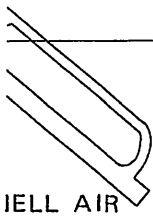
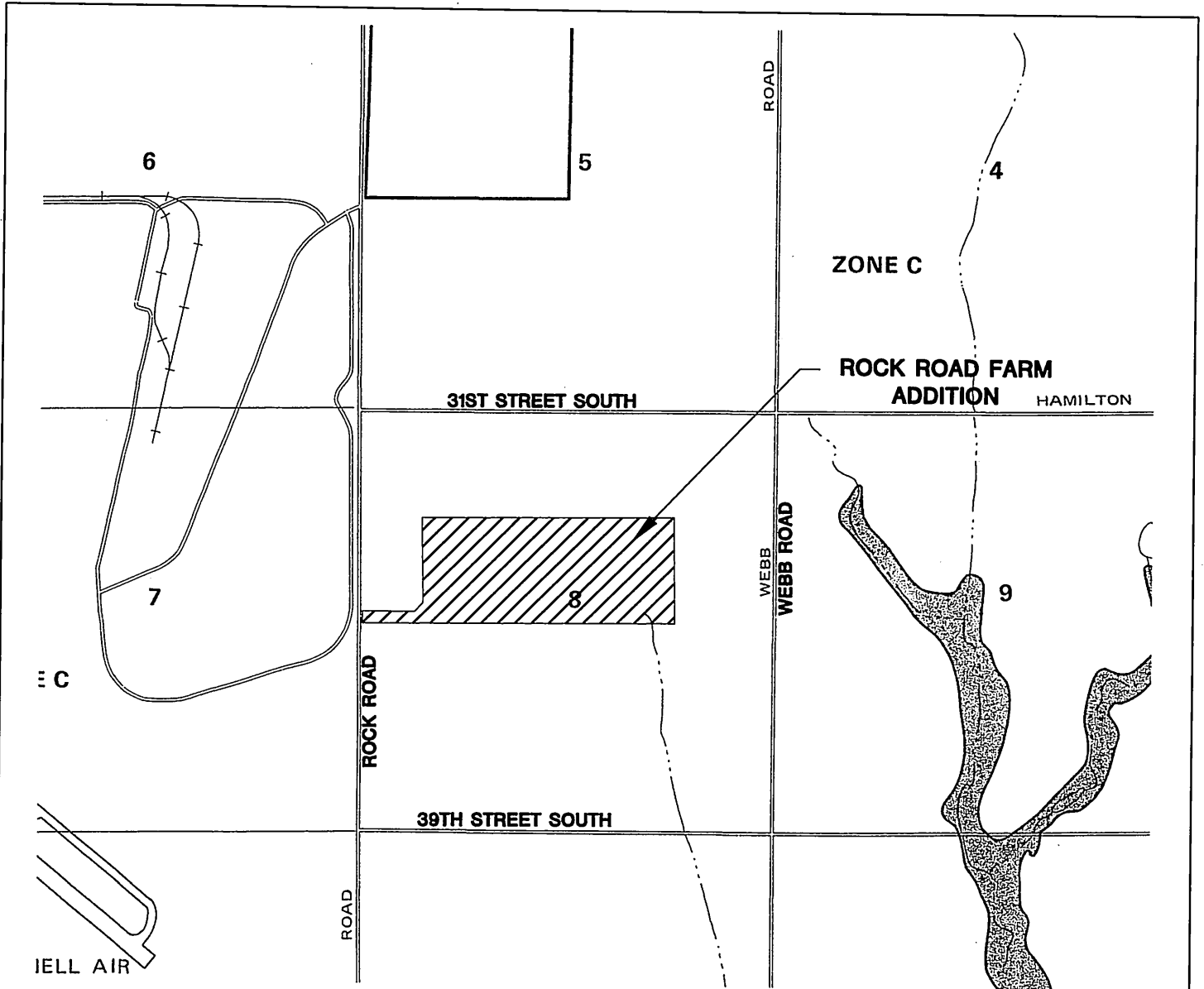


MKEC
ENGINEERING
CONSULTANTS
411 N. WEBB ROAD
WICHITA, KS. 67206
316 - 684 - 9600

ROCK ROAD FARM ADDITION
PROJECT NAME
SOIL SURVEY
SEDGWICK COUNTY, KANSAS
SHEET TITLE

<i>KLA</i>	<i>KWS</i>	<i>GJA</i>
DESIGN BY.	DRAWN BY.	CHECKED BY.
JANUARY 2006	03277	1 / 1
DATE	JOB NO.	SHEET/OF

Appendix C
FIRM & FBFM



NATIONAL FLOOD INSURANCE PROGRAM


FIRM
FLOOD INSURANCE RATE MAP

SEDGWICK COUNTY,
KANSAS
(UNINCORPORATED AREAS)

PANEL 225 OF 300

COMMUNITY-PANEL NUMBER
200321 0225 A

EFFECTIVE DATE:
JUNE 3, 1986



Federal Emergency Management Agency

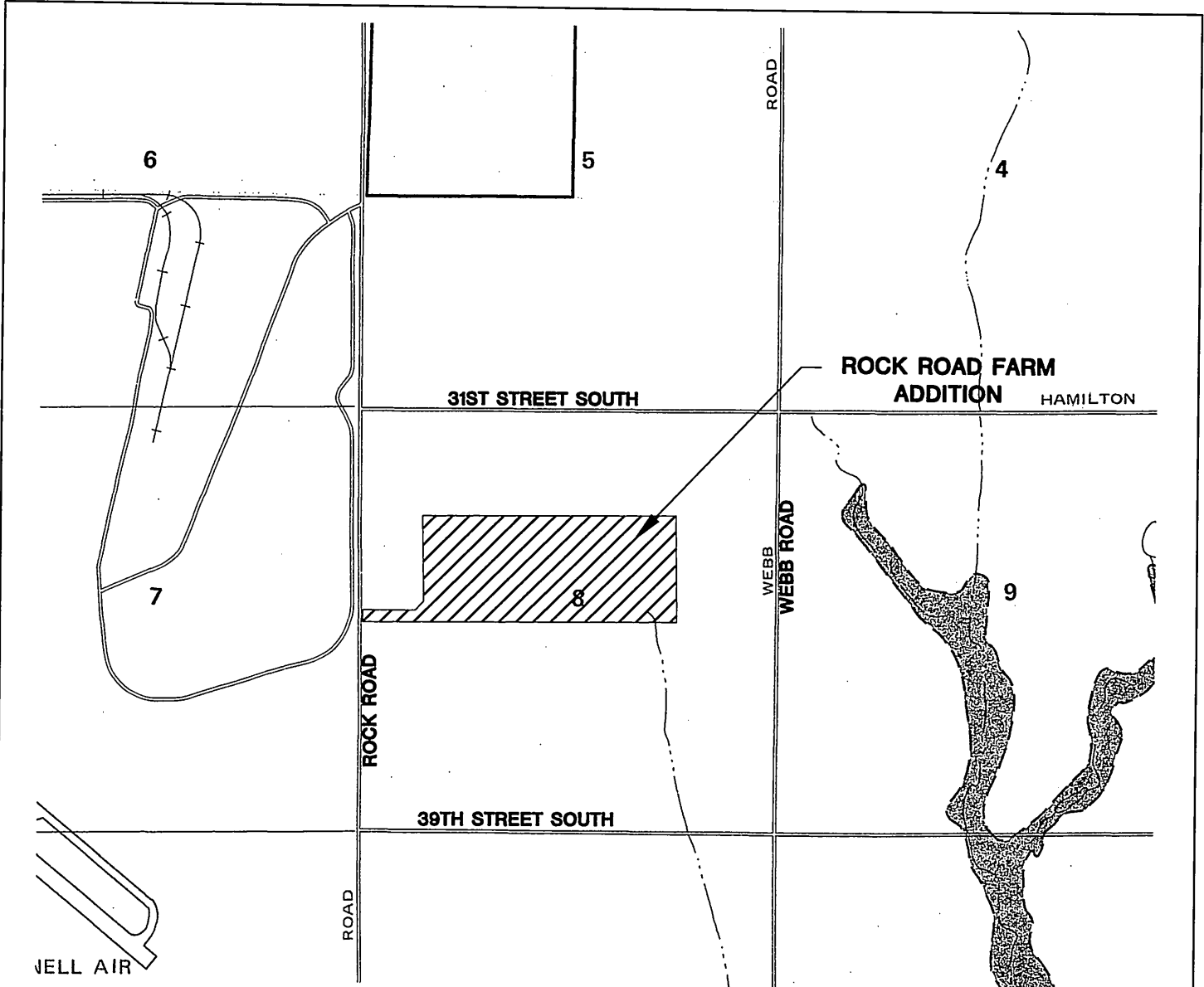
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MKEC
ENGINEERING
CONSULTANTS
411 N. WEBB ROAD
WICHITA, KS. 67206
316 - 684 - 9600

ROCK ROAD FARM ADDITION
PROJECT NAME
FIRM PANEL 225 OF 300
SEDGWICK COUNTY, KANSAS
SHEET TITLE

KLA DESIGN BY:	KWS DRAWN BY:	GJA CHECKED BY:
JANUARY 2006 DATE	03277 JOB NO.	1 / 1 SHEET/OF



NATIONAL FLOOD INSURANCE PROGRAM


FLOODWAY
FLOOD BOUNDARY AND FLOODWAY MAP

SEDGWICK COUNTY, KANSAS
(UNINCORPORATED AREAS)

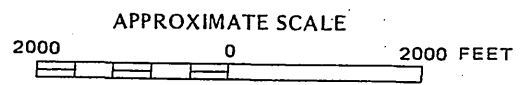
PANEL 225 OF 300
(SEE MAP INDEX FOR PANELS NOT PRINTED)

COMMUNITY-PANEL NUMBER
200321 0225

EFFECTIVE DATE:
JUNE 3, 1986



Federal Emergency Management Agency



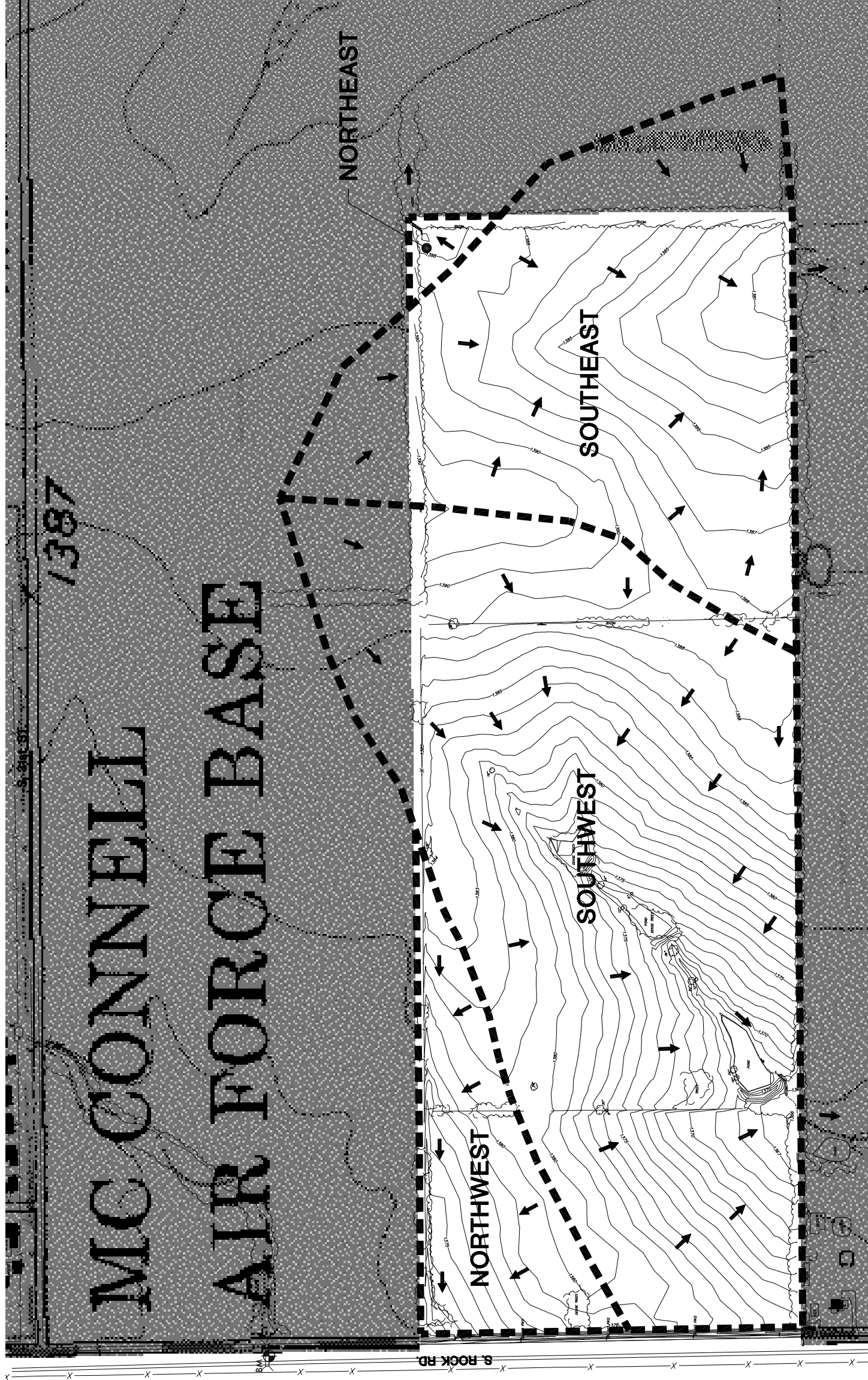
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ENGINEERING CONSULTANTS
411 N. WEBB ROAD
WICHITA, KS. 67206
316 - 684 - 9600

ROCK ROAD FARM ADDITION		
PROJECT NAME		
FBFM PANEL 225 OF 300		
SEDGWICK COUNTY, KANSAS		
SHEET TITLE		
KLA	KWS	GJA
DESIGN BY:	DRAWN BY:	CHECKED BY:
JANUARY 2006	03277	1 / 1
DATE	JOB NO.	SHEET/OF

Appendix D
Pre-Project Drainage Boundary Map

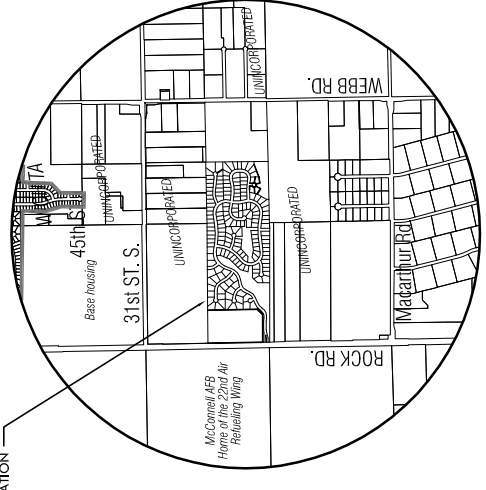


NOTES

1. ZONING: Existing - SF-20
Proposed - SF-20 and SF-5 (SF-5 by annexation)
2. ANNEXATION: An application for annexation has shall be submitted to the City of Wichita.
3. PUBLIC UTILITIES: Shall be extended to the site by petitions
Sanitary shall be extended by way of a force main and lift station
4. LEGAL DESCRIPTION: See hereon
5. EXISTING USE: Vacant Land and agricultural
6. GROSS PLAT AREA: 99.93 Ac. NET PLAT AREA: 57.56 Ac.
7. SURVEY DATE: December, 2003 (by MKEC)
8. MINIMUM PADS: As shown on the Final Drainage Plan
9. LOT TOTAL - 178 (Lots 1-28, Blk. 1, and 1-3, Blk. 2 are in SF-20 Zoning District)
10. RESERVES: "A", "B", and "C" are platted for monuments, landscaping, irrigation, open space, utilities in designated easements, and water features. Additionally, Reserve "C" is platted for drainageways, pool and associated pool house, clubhouse, private playgrounds and walkways. Reserve "D" is platted for utilities in designated easements, a grassy mall, outdoor recreation, open space, irrigation, landscaping, and walkways. Reserve "E" is platted for drainage, utilities in designated easements, open space, landscaping, and irrigation.

LEGAL DESCRIPTION

The South Half of the Northwest Quarter of Section 8, Township 28 South, Range 2 East of the Sixth Principal Meridian, EXCEPT, BEGINNING at the Northwest corner of said South Half; thence along the North line of said South Half on a Kansas Coordinate System 1983 South Zone grid bearing of N89°33'35"E, 770.05 feet; thence parallel with and 770.00 feet East of the West line of said South Half, S01°05'29"E, 1065.47 feet; thence S42°48'04"W, 158.46 feet; thence S89°53'16"W, 660.24 feet to said West line; thence along said West line, N01°05'29"W, 1177.13 feet to the POINT OF BEGINNING.
TOGETHER WITH:
The Southwest Quarter of the Northeast Quarter of Section 8, Township 28 South, Range 2 East of the Sixth Principal Meridian.



VICINITY MAP

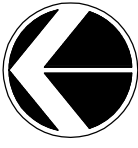
LEGEND

- | | |
|-----------------------------|----------------------------|
| △ - Sec. Corner | ○ - Fnd. Prop. Corner |
| SN - SIGN | ○ - GAS METER |
| — - GATE | ○ - SANITARY SEWER MANHOLE |
| — - TREES | ○ - POWER POLE/GUY ANCHOR |
| — - EDGE OF TREES | — - ELECTRIC BOX |
| — - POLE, POLE | — - FIRE HYDRANT |
| — - FENCE | — - WATER VALVE |
| — - STORM SEWER PIPE | — - WATER METER |
| — - WATER LINE | — - TELEPHONE RISER |
| — - SANITARY SEWER LINE | — - TELEPHONE RISER |
| — - GAS LINE | — - TELEPHONE RISER |
| — - TELEPHONE LINE | — - TELEPHONE RISER |
| — - OVERHEAD ELECTRIC | — - TELEPHONE RISER |
| — - CITY LIMITS | — - TELEPHONE RISER |
| — - DRAINAGE BOUNDARIES | — - TELEPHONE RISER |
| — - DRAINAGE BOUNDARY LABEL | — - TELEPHONE RISER |

SOUTHEAST

BENCH MARK

BM City of Wichita benchmark disc in South end of West hubguard of RCB under Rock Road, 600' ± South of 31st Street South. Elev. = 1367.44 NGVD 29.



MKEC
ENGINEERING
CONSULTANTS, INC.

PROJECT NAME: **ROCK ROAD FARM ADDITION**

SHEET TITLE: **PRE-PROJECT DRAINAGE BOUNDARIES**

411 N. WEBB ROAD
WICHITA, KS 67206
WWW.MKEC.COM

DESIGN BY: **AJK**
DRAWN BY: **JJL**
CHECKED BY: **GJA**

DATE: **JANUARY 2006**
JOB NO.: **03277**
SHEET OF: **1 / 1**

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Appendix E
Hydraflow Hydrographs
By Intelisolve
Output



Hydrograph Return Period Recap

Hyd. No.	Hydrograph type (origin)	Inflow Hyd(s)	Peak Outflow (cfs)								Hydrograph description
			1-Yr	2-Yr	3-Yr	5-Yr	10-Yr	25-Yr	50-Yr	100-Yr	
1	SCS Runoff	-----	-----	2.12	-----	3.32	4.14	-----	-----	7.18	Pre-Proj NE
2	SCS Runoff	-----	-----	2.16	-----	3.12	3.75	-----	-----	6.05	Post-Proj NE
3	SCS Runoff	-----	-----	55.31	-----	86.20	107.13	-----	-----	187.00	Pre-Proj SE
4	SCS Runoff	-----	-----	81.58	-----	120.43	146.20	-----	-----	240.44	Post-Proj SE
5	Reservoir	4	-----	47.49	-----	72.26	89.01	-----	-----	153.10	Southeast Pond
6	SCS Runoff	-----	-----	16.04	-----	25.00	31.07	-----	-----	54.24	Pre-Proj NW
7	SCS Runoff	-----	-----	17.14	-----	22.99	26.80	-----	-----	40.54	Post-Proj NW
8	SCS Runoff	-----	-----	76.04	-----	118.62	147.76	-----	-----	258.07	Pre-Proj SW
9	SCS Runoff	-----	-----	138.94	-----	199.90	240.00	-----	-----	385.62	Post-Proj SW
10	Reservoir	9	-----	75.41	-----	112.90	138.81	-----	-----	235.17	Southwest Pond

Hydrograph Summary Report

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Volume (acft)	Inflow hyd(s)	Maximum elevation (ft)	Maximum storage (acft)	Hydrograph description
1	SCS Runoff	2.12	6	720	0.152	----	-----	-----	Pre-Proj NE
2	SCS Runoff	2.16	6	720	0.152	----	-----	-----	Post-Proj NE
3	SCS Runoff	55.31	6	738	6.434	----	-----	-----	Pre-Proj SE
4	SCS Runoff	81.58	6	726	7.604	----	-----	-----	Post-Proj SE
5	Reservoir	47.49	6	744	7.604	4	1381.83	2.113	Southeast Pond
6	SCS Runoff	16.04	6	738	1.866	----	-----	-----	Pre-Proj NW
7	SCS Runoff	17.14	6	726	1.654	----	-----	-----	Post-Proj NW
8	SCS Runoff	76.04	6	744	9.914	----	-----	-----	Pre-Proj SW
9	SCS Runoff	138.94	6	732	16.005	----	-----	-----	Post-Proj SW
10	Reservoir	75.41	6	762	16.005	9	1368.21	5.014	Southwest Pond

Proj. file: Preliminary Calcs.gpw	Return Period: 2 yr	Run date: 01-27-2006
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Hydrograph Summary Report

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Volume (acft)	Inflow hyd(s)	Maximum elevation (ft)	Maximum storage (acft)	Hydrograph description
1	SCS Runoff	3.32	6	720	0.235	----	-----	-----	Pre-Proj NE
2	SCS Runoff	3.12	6	720	0.221	----	-----	-----	Post-Proj NE
3	SCS Runoff	86.20	6	738	9.942	----	-----	-----	Pre-Proj SE
4	SCS Runoff	120.43	6	726	11.211	----	-----	-----	Post-Proj SE
5	Reservoir	72.26	6	744	11.211	4	1382.17	3.013	Southeast Pond
6	SCS Runoff	25.00	6	738	2.884	----	-----	-----	Pre-Proj NW
7	SCS Runoff	22.99	6	726	2.252	----	-----	-----	Post-Proj NW
8	SCS Runoff	118.62	6	744	15.321	----	-----	-----	Pre-Proj SW
9	SCS Runoff	199.90	6	732	23.104	----	-----	-----	Post-Proj SW
10	Reservoir	112.90	6	756	23.104	9	1368.67	6.990	Southwest Pond

Proj. file: Preliminary Calcs.gpw

Return Period: 5 yr

Run date: 01-27-2006

Hydrograph Summary Report

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Volume (acft)	Inflow hyd(s)	Maximum elevation (ft)	Maximum storage (acft)	Hydrograph description
1	SCS Runoff	4.14	6	720	0.292	----	-----	-----	Pre-Proj NE
2	SCS Runoff	3.75	6	720	0.267	----	-----	-----	Post-Proj NE
3	SCS Runoff	107.13	6	738	12.356	----	-----	-----	Pre-Proj SE
4	SCS Runoff	146.20	6	726	13.643	----	-----	-----	Post-Proj SE
5	Reservoir	89.01	6	744	13.643	4	1382.39	3.593	Southeast Pond
6	SCS Runoff	31.07	6	738	3.584	----	-----	-----	Pre-Proj NW
7	SCS Runoff	26.80	6	726	2.645	----	-----	-----	Post-Proj NW
8	SCS Runoff	147.76	6	738	19.040	----	-----	-----	Pre-Proj SW
9	SCS Runoff	240.00	6	732	27.852	----	-----	-----	Post-Proj SW
10	Reservoir	138.81	6	756	27.852	9	1368.96	8.241	Southwest Pond

Proj. file: Preliminary Calcs.gpw

Return Period: 10 yr

Run date: 01-27-2006

Hydrograph Summary Report

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Volume (acft)	Inflow hyd(s)	Maximum elevation (ft)	Maximum storage (acft)	Hydrograph description
1	SCS Runoff	7.18	6	720	0.510	----	-----	-----	Pre-Proj NE
2	SCS Runoff	6.05	6	720	0.440	----	-----	-----	Post-Proj NE
3	SCS Runoff	187.00	6	732	21.590	----	-----	-----	Pre-Proj SE
4	SCS Runoff	240.44	6	726	22.759	----	-----	-----	Post-Proj SE
5	Reservoir	153.10	6	744	22.759	4	1383.11	5.588	Southeast Pond
6	SCS Runoff	54.24	6	732	6.262	----	-----	-----	Pre-Proj NW
7	SCS Runoff	40.54	6	726	4.081	----	-----	-----	Post-Proj NW
8	SCS Runoff	258.07	6	738	33.269	----	-----	-----	Pre-Proj SW
9	SCS Runoff	385.62	6	732	45.506	----	-----	-----	Post-Proj SW
10	Reservoir	235.17	6	756	45.506	9	1369.92	12.572	Southwest Pond

Proj. file: Preliminary Calcs.gpw

Return Period: 100 yr

Run date: 01-27-2006

Hydrograph Report

Hyd. No. 1

Pre-Proj NE

Hydrograph type	=	SCS Runoff	Peak discharge	=	7.18 cfs
Storm frequency	=	100 yrs	Time interval	=	6 min
Drainage area	=	1.20 ac	Curve number	=	80
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	USER	Time of conc. (Tc)	=	15 min
Total precip.	=	7.80 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

Hydrograph Volume = 0.510 acft

Hydrograph Discharge Table

Time -- Outflow
(hrs cfs)

12.00	7.18 <<
12.10	6.54

...End

Hydrograph Report

Hyd. No. 2

Post-Proj NE

Hydrograph type	= SCS Runoff	Peak discharge	= 6.05 cfs
Storm frequency	= 100 yrs	Time interval	= 6 min
Drainage area	= 0.90 ac	Curve number	= 87
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 15 min
Total precip.	= 7.80 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Volume = 0.440 acft

Hydrograph Discharge Table

Time -- Outflow
(hrs cfs)

12.00	6.05 <<
12.10	5.41

...End

Hydrograph Report

Hyd. No. 3

Pre-Proj SE

Hydrograph type	= SCS Runoff	Peak discharge	= 187.00 cfs
Storm frequency	= 100 yrs	Time interval	= 6 min
Drainage area	= 46.20 ac	Curve number	= 80
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 37.4 min
Total precip.	= 7.80 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Volume = 21.590 acft

Hydrograph Discharge Table

Time -- Outflow (hrs cfs)

12.10	161.38
12.20	187.00 <<
12.30	185.25
12.40	163.89

...End

Hydrograph Report

Hyd. No. 4

Post-Proj SE

Hydrograph type	=	SCS Runoff	Peak discharge	=	240.44 cfs
Storm frequency	=	100 yrs	Time interval	=	6 min
Drainage area	=	45.10 ac	Curve number	=	85.3
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	USER	Time of conc. (Tc)	=	29.5 min
Total precip.	=	7.80 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

Hydrograph Volume = 22.759 acft

Hydrograph Discharge Table

Time -- Outflow (hrs cfs)

12.00	197.84
12.10	240.44 <<
12.20	231.21

...End

Hydrograph Report

Hyd. No. 5

Southeast Pond

Hydrograph type = Reservoir
Storm frequency = 100 yrs
Inflow hyd. No. = 4
Max. Elevation = 1383.11 ft

Peak discharge = 153.10 cfs
Time interval = 6 min
Reservoir name = Big SE Pond
Max. Storage = 5.588 acft

Storage Indication method used.

Outflow hydrograph volume = 22.759 acft

Hydrograph Discharge Table

Time (hrs)	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	Exfil cfs	Outflow cfs
12.20	231.21	1382.88	131.45	-----	-----	-----	131.44	-----	-----	-----	-----	131.44
12.30	186.03	1383.08	150.11	-----	-----	-----	150.10	-----	-----	-----	-----	150.11
12.40	139.28	1383.11 <<	153.12	-----	-----	-----	153.11	-----	-----	-----	-----	153.10 <<
12.50	94.72	1383.02	144.53	-----	-----	-----	144.53	-----	-----	-----	-----	144.52
12.60	57.62	1382.84	127.90	-----	-----	-----	127.89	-----	-----	-----	-----	127.89

...End

Reservoir Report

Reservoir No. 4 - Big SE Pond

Hydraflow Hydrographs by Intelisolve

Pond Data

Pond storage is based on known contour areas. Average end area method used.

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (acft)	Total storage (acft)
0.00	1381.00	107,354	0.000	0.000
1.00	1382.00	114,566	2.547	2.547
2.00	1383.00	121,880	2.714	5.261
3.00	1384.00	129,294	2.883	8.144

Culvert / Orifice Structures

	[A]	[B]	[C]	[D]
Rise in	= 36.0	0.0	0.0	0.0
Span in	= 84.0	0.0	0.0	0.0
No. Barrels	= 2	0	0	0
Invert El. ft	= 1380.50	0.00	0.00	0.00
Length ft	= 0.0	0.0	0.0	0.0
Slope %	= 0.00	0.00	0.00	0.00
N-Value	= .013	.000	.000	.000
Orif. Coeff.	= 0.60	0.00	0.00	0.00
Multi-Stage	= n/a	No	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len ft	= 24.00	0.00	0.00	0.00
Crest El. ft	= 1381.00	0.00	0.00	0.00
Weir Coeff.	= 3.33	0.00	0.00	0.00
Weir Type	= Rect	---	---	---
Multi-Stage	= Yes	No	No	No

Exfiltration Rate = 0.00 in/hr/sqft Tailwater Elev. = 0.00 ft

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

Stage / Storage / Discharge Table

Stage ft	Storage acft	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	Exfil cfs	Total cfs
0.00	0.000	1381.00	0.00	---	---	---	0.00	---	---	---	---	0.00
0.10	0.255	1381.10	16.85	---	---	---	2.53	---	---	---	---	2.53
0.20	0.509	1381.20	16.85	---	---	---	7.15	---	---	---	---	7.15
0.30	0.764	1381.30	16.85	---	---	---	13.13	---	---	---	---	13.13
0.40	1.019	1381.40	19.80	---	---	---	19.79	---	---	---	---	19.79
0.50	1.274	1381.50	26.00	---	---	---	25.99	---	---	---	---	25.99
0.60	1.528	1381.60	32.29	---	---	---	32.29	---	---	---	---	32.29
0.70	1.783	1381.70	38.77	---	---	---	38.76	---	---	---	---	38.76
0.80	2.038	1381.80	45.45	---	---	---	45.45	---	---	---	---	45.45
0.90	2.293	1381.90	52.36	---	---	---	52.35	---	---	---	---	52.35
1.00	2.547	1382.00	59.50	---	---	---	59.50	---	---	---	---	59.50
1.10	2.819	1382.10	66.85	---	---	---	66.84	---	---	---	---	66.84
1.20	3.090	1382.20	74.41	---	---	---	74.41	---	---	---	---	74.41
1.30	3.361	1382.30	82.20	---	---	---	82.19	---	---	---	---	82.19
1.40	3.633	1382.40	90.20	---	---	---	90.18	---	---	---	---	90.18
1.50	3.904	1382.50	98.39	---	---	---	98.39	---	---	---	---	98.39
1.60	4.176	1382.60	106.81	---	---	---	106.80	---	---	---	---	106.80
1.70	4.447	1382.70	115.42	---	---	---	115.41	---	---	---	---	115.41
1.80	4.719	1382.80	124.23	---	---	---	124.22	---	---	---	---	124.22
1.90	4.990	1382.90	133.23	---	---	---	133.22	---	---	---	---	133.22
2.00	5.261	1383.00	142.45	---	---	---	142.44	---	---	---	---	142.44
2.10	5.550	1383.10	151.83	---	---	---	151.82	---	---	---	---	151.82
2.20	5.838	1383.20	161.40	---	---	---	161.39	---	---	---	---	161.39
2.30	6.126	1383.30	171.15	---	---	---	171.13	---	---	---	---	171.13
2.40	6.415	1383.40	181.07	---	---	---	181.07	---	---	---	---	181.07
2.50	6.703	1383.50	191.18	---	---	---	191.16	---	---	---	---	191.16
2.60	6.991	1383.60	201.46	---	---	---	201.43	---	---	---	---	201.43
2.70	7.279	1383.70	211.90	---	---	---	211.88	---	---	---	---	211.88
2.80	7.568	1383.80	222.50	---	---	---	222.50	---	---	---	---	222.50
2.90	7.856	1383.90	233.28	---	---	---	233.28	---	---	---	---	233.28
3.00	8.144	1384.00	244.25	---	---	---	244.24	---	---	---	---	244.24

Hydrograph Report

Hyd. No. 6

Pre-Proj NW

Hydrograph type	= SCS Runoff	Peak discharge	= 54.24 cfs
Storm frequency	= 100 yrs	Time interval	= 6 min
Drainage area	= 13.40 ac	Curve number	= 80
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 33.4 min
Total precip.	= 7.80 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Volume = 6.262 acft

Hydrograph Discharge Table

Time -- Outflow
(hrs cfs)

12.10	46.81
12.20	54.24 <<
12.30	53.73
12.40	47.54

...End

Hydrograph Report

Hyd. No. 7

Post-Proj NW

Hydrograph type	= SCS Runoff	Peak discharge	= 40.54 cfs
Storm frequency	= 100 yrs	Time interval	= 6 min
Drainage area	= 6.80 ac	Curve number	= 95
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 23.3 min
Total precip.	= 7.80 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Volume = 4.081 acft

Hydrograph Discharge Table

Time -- Outflow
(hrs cfs)

12.00	33.91
12.10	40.54 <<
12.20	38.54

...End

Hydrograph Report

Hyd. No. 8

Pre-Proj SW

Hydrograph type	=	SCS Runoff	Peak discharge	=	258.07 cfs
Storm frequency	=	100 yrs	Time interval	=	6 min
Drainage area	=	75.30 ac	Curve number	=	80
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	USER	Time of conc. (Tc)	=	41.3 min
Total precip.	=	7.80 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

Hydrograph Volume = 33.269 acft

Hydrograph Discharge Table

Time -- Outflow
(hrs cfs)

12.20	230.77
12.30	258.07 <<
12.40	255.32
12.50	230.95

...End

Hydrograph Report

Hyd. No. 9

Post-Proj SW

Hydrograph type	= SCS Runoff	Peak discharge	= 385.62 cfs
Storm frequency	= 100 yrs	Time interval	= 6 min
Drainage area	= 83.40 ac	Curve number	= 87.8
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 32.7 min
Total precip.	= 7.80 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Volume = 45.506 acft

Hydrograph Discharge Table

Time -- Outflow
(hrs cfs)

12.10	337.09
12.20	385.62 <<
12.30	378.50
12.40	332.85

...End

Hydrograph Report

Hyd. No. 10

Southwest Pond

Hydrograph type = Reservoir
Storm frequency = 100 yrs
Inflow hyd. No. = 9
Max. Elevation = 1369.92 ft

Peak discharge = 235.17 cfs
Time interval = 6 min
Reservoir name = SW Pond
Max. Storage = 12.572 acft

Storage Indication method used.

Outflow hydrograph volume = 45.506 acft

Hydrograph Discharge Table

Time (hrs)	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	Exfil cfs	Outflow cfs
12.40	332.85	1369.72	213.90	----	----	----	213.89	----	----	----	----	213.88
12.50	282.89	1369.88	230.57	----	----	----	230.57	----	----	----	----	230.57
12.60	229.38	1369.92 <<	235.17	----	----	----	235.16	----	----	----	----	235.17 <<
12.70	175.19	1369.86	229.27	----	----	----	229.26	----	----	----	----	229.26
12.80	124.75	1369.73	215.20	----	----	----	215.18	----	----	----	----	215.19
12.90	83.71	1369.55	195.96	----	----	----	195.94	----	----	----	----	195.95

...End

Reservoir Report

Reservoir No. 5 - SW Pond

Hydraflow Hydrographs by Intelisolve

Pond Data

Pond storage is based on known contour areas. Average end area method used.

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (acft)	Total storage (acft)
0.00	1367.00	173,624	0.000	0.000
1.00	1368.00	183,150	4.095	4.095
2.00	1369.00	192,780	4.315	8.410
3.00	1370.00	202,511	4.537	12.948

Culvert / Orifice Structures

	[A]	[B]	[C]	[D]
Rise in	= 36.0	0.0	0.0	0.0
Span in	= 84.0	0.0	0.0	0.0
No. Barrels	= 2	0	0	0
Invert El. ft	= 1366.50	0.00	0.00	0.00
Length ft	= 0.0	0.0	0.0	0.0
Slope %	= 0.00	0.00	0.00	0.00
N-Value	= .013	.000	.000	.000
Orif. Coeff.	= 0.60	0.00	0.00	0.00
Multi-Stage	= n/a	No	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len ft	= 24.00	0.00	0.00	0.00
Crest El. ft	= 1367.00	0.00	0.00	0.00
Weir Coeff.	= 3.33	0.00	0.00	0.00
Weir Type	= Rect	---	---	---
Multi-Stage	= Yes	No	No	No

Exfiltration Rate = 0.00 in/hr/sqft Tailwater Elev. = 0.00 ft

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

Stage / Storage / Discharge Table

Stage ft	Storage acft	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	Exfil cfs	Total cfs
0.00	0.000	1367.00	0.00	---	---	---	0.00	---	---	---	---	0.00
0.10	0.410	1367.10	16.85	---	---	---	2.53	---	---	---	---	2.53
0.20	0.819	1367.20	16.85	---	---	---	7.15	---	---	---	---	7.15
0.30	1.229	1367.30	16.85	---	---	---	13.13	---	---	---	---	13.13
0.40	1.638	1367.40	19.80	---	---	---	19.79	---	---	---	---	19.79
0.50	2.048	1367.50	26.00	---	---	---	25.99	---	---	---	---	25.99
0.60	2.457	1367.60	32.29	---	---	---	32.29	---	---	---	---	32.29
0.70	2.867	1367.70	38.77	---	---	---	38.76	---	---	---	---	38.76
0.80	3.276	1367.80	45.45	---	---	---	45.45	---	---	---	---	45.45
0.90	3.686	1367.90	52.36	---	---	---	52.35	---	---	---	---	52.35
1.00	4.095	1368.00	59.50	---	---	---	59.50	---	---	---	---	59.50
1.10	4.527	1368.10	66.85	---	---	---	66.84	---	---	---	---	66.84
1.20	4.958	1368.20	74.41	---	---	---	74.41	---	---	---	---	74.41
1.30	5.390	1368.30	82.20	---	---	---	82.19	---	---	---	---	82.19
1.40	5.821	1368.40	90.20	---	---	---	90.18	---	---	---	---	90.18
1.50	6.253	1368.50	98.39	---	---	---	98.39	---	---	---	---	98.39
1.60	6.684	1368.60	106.81	---	---	---	106.80	---	---	---	---	106.80
1.70	7.116	1368.70	115.42	---	---	---	115.41	---	---	---	---	115.41
1.80	7.547	1368.80	124.23	---	---	---	124.22	---	---	---	---	124.22
1.90	7.979	1368.90	133.23	---	---	---	133.22	---	---	---	---	133.22
2.00	8.410	1369.00	142.45	---	---	---	142.44	---	---	---	---	142.44
2.10	8.864	1369.10	151.83	---	---	---	151.82	---	---	---	---	151.82
2.20	9.318	1369.20	161.40	---	---	---	161.39	---	---	---	---	161.39
2.30	9.771	1369.30	171.15	---	---	---	171.13	---	---	---	---	171.13
2.40	10.225	1369.40	181.07	---	---	---	181.07	---	---	---	---	181.07
2.50	10.679	1369.50	191.18	---	---	---	191.16	---	---	---	---	191.16
2.60	11.133	1369.60	201.46	---	---	---	201.43	---	---	---	---	201.43
2.70	11.586	1369.70	211.90	---	---	---	211.88	---	---	---	---	211.88
2.80	12.040	1369.80	222.50	---	---	---	222.50	---	---	---	---	222.50
2.90	12.494	1369.90	233.28	---	---	---	233.28	---	---	---	---	233.28
3.00	12.948	1370.00	244.25	---	---	---	244.24	---	---	---	---	244.24

Appendix F
Time of Concentration Calculations

**Time of Concentration Calculations
Rock Road Farm Addition**

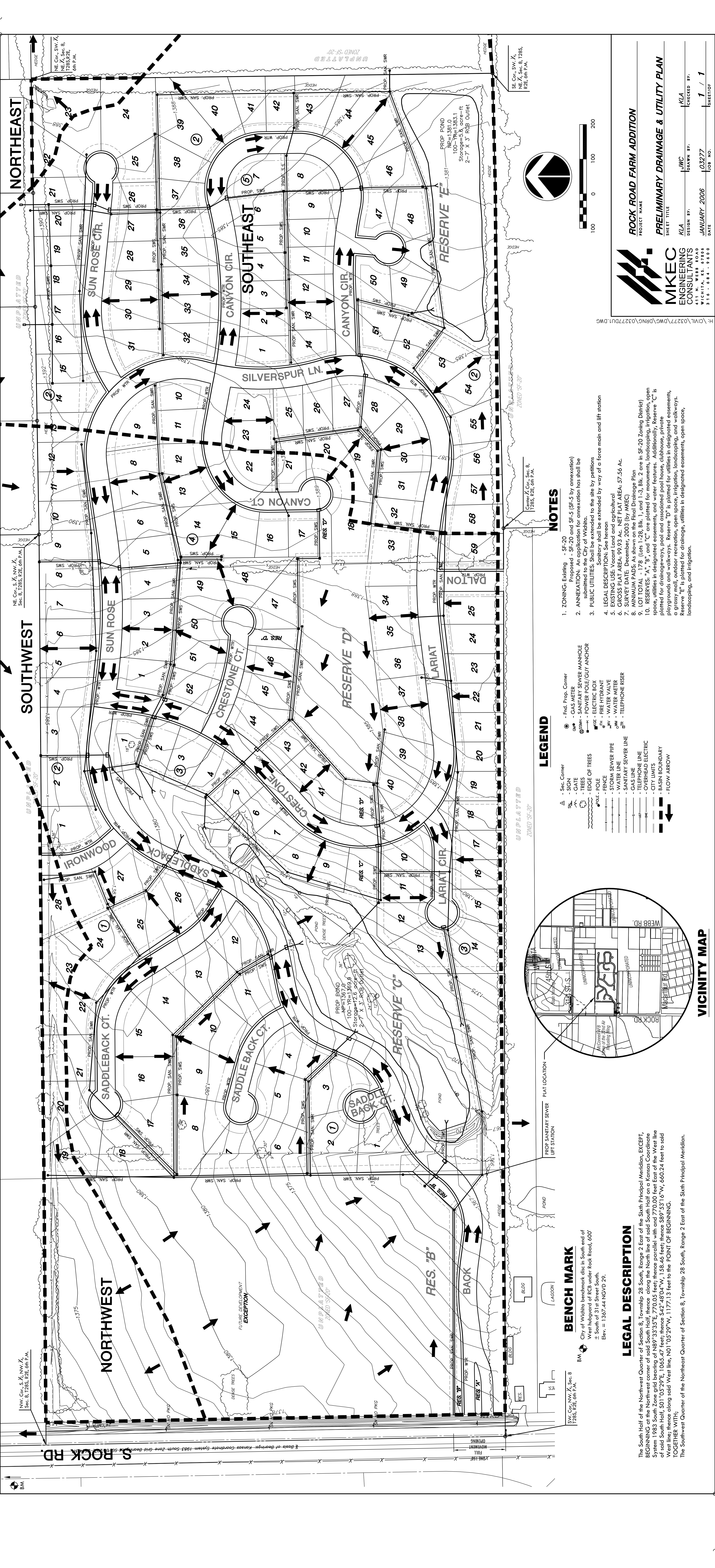
Soil Group D

Area Name	C 2-yr	C 5-yr	C 10-yr	C 100-yr	Land Use	Maximum Elevation	Minimum Elevation	Flow Length (L)	T _c 2-yr	T _c 5-yr	T _c 10-yr	T _c 100-yr
Pre-Developed												
Northeast	0.32	0.37	0.47	0.67	Agricultural - Pasture - Slopes 1-4%	1389.0	1387.0	200	19.9	18.6	16.0	15.0
Southeast	0.32	0.37	0.47	0.67	Agricultural - Pasture - Slopes 1-4%	1395.0	1381.0	1900	67.8	63.4	54.7	37.4
Northwest	0.32	0.37	0.47	0.67	Agricultural - Pasture - Slopes 1-4%	1384.0	1371.0	1610	60.5	56.6	48.9	33.4
Southwest	0.32	0.37	0.47	0.67	Agricultural - Pasture - Slopes 1-4%	1395.0	1367.0	2830	75.0	70.2	60.5	41.3
Post-Project												
Northeast	0.50	0.54	0.62	0.76	Residential - 1/4 Acre	1389.0	1387.0	200	15.3	15.0	15.0	15.0
Southeast	0.50	0.54	0.62	0.76	Residential - 1/4 Acre	1395.0	1381.0	1900	52.1	48.6	41.7	29.5
Northwest	0.68	0.69	0.73	0.80	Business - Neighborhood	1384.0	1371.0	1610	32.6	31.8	28.7	23.3
Southwest	0.50	0.54	0.62	0.76	Residential - 1/4 Acre	1395.0	1367.0	2830	57.7	53.8	46.1	32.7

Appendix G
Preliminary Four Corner Lot Grading Plan

Appendix H
Post-Project Drainage Boundary Map

Appendix I
Preliminary Drainage & Utility Plan



ROCK ROAD FARM ADDITION
 PROJECT NAME
PRELIMINARY DRAINAGE & UTILITY PLAN
 SHEET TITLE
MIKEC ENGINEERING CONSULTANTS
 DESIGN BY: KLA
 CHECKED BY: J/MC
 DRAWN BY: J/MC
 DATE: JANUARY 2006
 JOB NO.: 03277
 SHEET OF: 1 / 1

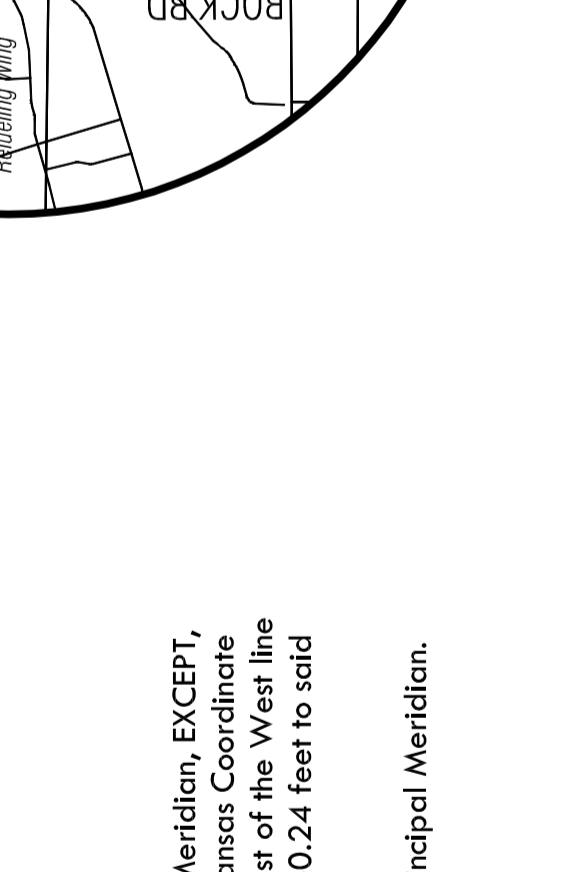
Center A Cor, Sec. 8, T28S, R2E, 6th P.M.
 NE 1/4, Sec. 8, T28S, R2E, 6th P.M.
 SE 1/4, Sec. 8, T28S, R2E, 6th P.M.

- NOTES**
1. ZONING: Existing - SF-20
 Proposed - SF-20 and SF-5 (SF-5 by annexation)
 2. ANNEXATION: An application for annexation has been submitted to the City of Wichita.
 3. PUBLIC UTILITIES: Shall be extended to the site by partitions. Sanitary shall be extended by way of a force main and lift station.
 4. LEGAL DESCRIPTION: See hereon
 5. EXISTING USE: Vacant Land and agricultural
 6. GROSS PLAT AREA: 99.93 Ac. NET PLAT AREA: 57.56 Ac.
 7. SURVEY DATE: December, 2003 (by MKEC)
 8. MINIMUM PADS: As shown on the Final Drainage Plan
 9. LOT TOTAL - 178 (Lots 1-28, Blk. 1, and 1-3, Blk. 2 are in SF-20 Zoning District)
 10. RESERVES: "A", "B", and "C" are platted for monuments, landscaping, irrigation, open space, utilities in designated easements, and water features. Additionally, Reserve "C" is platted for driveways, pool and associated pool house, clubhouse, private playgrounds and walkways. Reserve "D" is platted for utilities in designated easements, a grassy mall, outdoor recreation, open space, irrigation, landscaping, and walkways. Reserve "E" is platted for drainage, utilities in designated easements, open space, landscaping, and irrigation.

- LEGEND**
- ▲ - Sec. Corner
 - - Find. Prop. Corner
 - - GAS METER
 - - SANITARY SEWER MANHOLE
 - - POWER POLE/GUY ANCHOR
 - - FIRE HYDRANT
 - - WATER VALVE
 - - TELEPHONE RISER
 - - FENCE
 - - STORM SEWER PIPE
 - - WATER LINE
 - - SANITARY SEWER LINE
 - - GAS LINE
 - - PHONE LINE
 - - OVERHEAD ELECTRIC
 - - CITY LIMITS
 - - BASIN BOUNDARY
 - - FLOW ARROW

- LEGAL DESCRIPTION**
- The South Half of the Northwest Quarter of Section 8, Township 28 South, Range 2 East of the Sixth Principal Meridian, EXCEPT, BEGINNING at the Northwest corner of said South Half, thence along the North line of said South Half on a Kansas Coordinate System 1983 South Zone grid bearing of N89°33'35"E, 770.05 feet; thence parallel with and 770.00 feet East of the West line of said South Half, S01°05'29"E, 1065.47 feet; thence S42°48'04"W, 158.46 feet; thence S89°53'16"W, 660.24 feet to said West line; thence along said West line, N01°05'29"W, 1177.13 feet to the POINT OF BEGINNING.
- TOGETHER WITH:
 The Southwest Quarter of the Northeast Quarter of Section 8, Township 28 South, Range 2 East of the Sixth Principal Meridian.

- BENCH MARK**
- BM City of Wichita benchmark disc in South end of West Subgrade of RCB under Rock Road, 600' ± South of 31st Street South.
 Elev. = 1367.44 NGVD 29.



- LEGEND**
- ▲ - Sec. Corner
 - - Find. Prop. Corner
 - - GAS METER
 - - SANITARY SEWER MANHOLE
 - - POWER POLE/GUY ANCHOR
 - - FIRE HYDRANT
 - - WATER VALVE
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- NOTES**
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 6. GROSS PLAT AREA: 99.93 Ac. NET PLAT AREA: 57.56 Ac.
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 9. LOT TOTAL - 178 (Lots 1-28, Blk. 1, and 1-3, Blk. 2 are in SF-20 Zoning District)
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Center A Cor, Sec. 8, T28S, R2E, 6th P.M.
 NE 1/4, Sec. 8, T28S, R2E, 6th P.M.
 SE 1/4, Sec. 8, T28S, R2E, 6th P.M.