DRAINAGE PLAN
AND
SUPPORTING CALCULATIONS

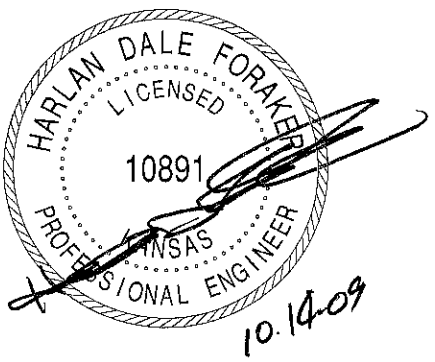
FOR
DAN SCHMIDT ADDITION
AN ADDITION TO
WICHITA, KANSAS

PREPARED FOR:
SAVOY COMPANY, P.A.
433 SOUTH HYDRAULIC
WICHITA, KS 67211

OCTOBER 14, 2009

PREPARED BY:

CERTIFIED ENGINEERING DESIGN, P.A.
810 WEST DOUGLAS, SUITE C
WICHITA, KANSAS 67203-6105
(316)262-8808 PHONE
(316)262-1669 FAX



Adopted: February 23, 2007

CITY OF WICHITA

Public Works, Engineering Division
Final Drainage Plan Submittal Checklist

Reviewer: _____ Date: Oct. 20, 2009

Subdivision Name: Dan Schmidt Addition Location: 5439 S Hydraulic

Total Land Area Of Ownership: 3.56 Acres

Type: X Residential _____ Commercial _____ Industrial _____ Recreation _____ Municipal _____ Other

Applicant: Savoy Company Contact: Mark Savoy, LS Phone #: 265-0005

Engineer: Certified Engineering Design Contact: Harlan Forker, PE Phone # 262-8808

Please check the appropriate box: I = Included; NA = Non-Applicable; R= Required prior to development

(If "NA" is checked, an explanation must be entered)

	Applicant			Engr	
Tab 1. Project Narrative	**I**	**NA**	**Explanation / Location in Plan**	**I**	**NA**
A. Site Location Map, using USGS Map					
B. Discussion of development, existing conditions, and proposed impacts on stormwater, wetland, riparian, and flood plain	X				
C. Discussion of offsite conditions	X				
D. Summary of runoff calculations (pre/post development) No increase in peak discharge for all storm series	X				
E. Narrative description of the type and function of the permanent best management practices that are incorporated into the site design		X			
F. Copy of the plat	X				
G. Preliminary grading plan (The final grading plan shall be sealed, signed and dated prior to Engineering receiving the final sanitary sewer plans. One plan sheet and PDF shall be submitted to the Subdivision Engineer.)		X			
H. Professional Engineer seal, signature and date on cover of report	X				
I. CD of drainage plan in PDF format (one file) and one paper copy bound with this checklist included behind the cover					

	Applicant			Engr	
Tab 2. Existing Conditions Runoff Calculations	**I**	**NA**	**Explanation / Location in Plan**	**I**	**NA**
A. Copy of applicable orthophoto showing proposed project boundaries (preferable in color)	X				
B. Runoff Method (Rational, Hydrograph Method, or other approved methods by Engineering)	X				
C. Existing topography (no greater than 2-foot contours, 1-foot recommend)	X				
D. Total Site Area and Total Impervious Area (acres)	X				
E. Benchmarks used for site control	X				
F. Streams, creeks, and waterway labeled		X			
G. Predominant soils from USDA soil surveys, and/or on site soil borings	X				
H. Location and boundaries of natural features such as wetlands, lakes, and ponds with the normal water elevation noted		X			
I. Location of existing roads, buildings, parking lots and other impervious areas.	X				

Consulting Engineer Initials _____

J. Location of existing utilities (e.g., water, sewer, gas, electric) and easements	X				
K. Location of existing conveyance systems such as storm drains, inlets, catch basins, channels, swales, and areas of overland flow	X				
L. Flow paths	X				
M. Location and dimensions of existing channels, bridges or culvert crossings	X				
N. Existing conditions hydrologic analysis for runoff rates, volumes and velocities showing methodologies used and supporting calculations (2, 5, 10, 25 & 100 year, 24-hour storm events) or Critical Duration	X				
O. Assumed pre-developed runoff curve numbers	X				
P. Existing time of concentrations used in calculations	X				
Q. Evaluate immediate downstream drainage capacity, not to exceed more than 0.25 miles downstream of site		X			
R. Existing structural elevations (e.g., invert of pipes, manholes, etc.)		X			
S. Cross-section data for open channels		X			
T. Ground water elevations, if applicable		X			

	Applicant			Engr	
Tab 3. Post-Development Hydrologic Analysis	**I**	**NA**	**Explanation / Location in Plan**	**I**	**NA**
A. Proposed (post-development) conditions hydrologic and hydraulic analysis for runoff rates, volumes, HGL, and velocities showing the methodologies used and supporting calculations for all applicable design storms (2, 5, 10, 25 & 100 year, 24-hour storm events)	X				
B. Proposed time of concentrations used in calculations	X				
C. Assumed post-developed runoff curve numbers	X				
D. Proposed contours for detention facilities (to equal area used in outlet rating curves)		X			
E. Preliminary sizing calculations for stormwater controls including contributing drainage area, storage, and outlet configuration		X			
F. Stage-storage-discharge or outlet rating curves and inflow and outflow hydrographs for storage facilities		X			
G. Final analysis of potential upstream/downstream impact/effects of project, where necessary		X			
H. Existing and proposed structural elevations (e.g., invert of pipes, manholes, etc.)		X			
I. Design water surface elevations and normal pool elevation for ponds.		X			
J. Typical detail for outlet structures, embankments, spillways, grade control structures, conveyance channels, etc. To include height, width, elevation, and/or diameter.		X			
K. Proposed limits of clearing and grading		X			
L. Location of existing and proposed roads, buildings, parking lots and other impervious areas.	X				
M. Location of existing and proposed utilities (e.g., water, sewer) and easements	X				
N. Location of existing and proposed conveyance systems such as storm drains, inlets, catch basins, channels, swales, and areas of overland flow	X				
O. Preliminary location and dimensions of proposed channel modifications, such as bridge or culvert crossings		X			

Consulting Engineer Initials _____

P. Preliminary selection and location of stormwater controls		X			
Q. Emergency overflow structure's flow path		X			
R. Detention facility provides one-foot of freeboard above the HWL and emergency outfall shown (top of berm elevation shown)		X			
S. The 100-year 24-hour HWL delineated on the plan for detention pond		X			
T. Lowest opening elevations table on the plat for structures located adjacent to channels or ponds		X			
U. Stormwater Management Facilities located within a Reserve		X			
V. Maintenance responsibility of stormwater management facility shall be specified in the platters text. (e.g. HOA, Lot Owners Association, or lot)		X			
W. Off-site drainage easements or agreements required, where necessary		X			

	Applicant			Engr	
Tab 4. Floodplain Submittal	**I**	**NA**	**Explanation / Location in Plan**	**I**	**NA**
A. Provide source of flood profile		X			
B. Nearest base flood elevations		X			
C. Delineation of pre-developed regulatory floodplain/floodway limits		X			
D. Delineation of post-developed regulatory floodplain and floodway limits		X			
E. Floodplain boundary determination per elevation (project limits shown)		X			
F. Provide source of floodway data table and discharges		X			
G. Provide all hydrologic and hydraulic study information for site-specific floodplain studies, unnumbered Zone A area elevation determinations and flood plain map revisions or required permits		X			
H. Provide regulatory floodway and four natural profile models (10,50,100, and 500-yr) for existing and future watershed conditions		X			
I. Location of floodplain/floodway limits and relationship of site to upstream/downstream properties (floodplain limits to be per elevation and scaled location)		X			
J. Flood plains and floodways located within a Reserve, where necessary		X			

	Applicant			Engr	
Tab 5. Federal, State and Local Permits (to be provided prior to construction unless otherwise specified)	**I/R**	**NA**	**Explanation / Location in Plan**	**I/R**	**NA**
A. US Army Corps of Engineers - Regulatory program permits (404 water quality certification)		X			
B. Kansas Department of Agriculture - Division of Water Resources Permits (Stream Obstruction, Channel Change, Flood Plain Fill, Levee, Water Appropriations, Dam safety permit, etc.)		X			
C. Federal Emergency Management Agency (FEMA) Letter of Map Changes (LOMA, LOMR, LOMR-f, CLOMR, etc.) Shall be included and approved when project modifies the limits of the floodway.		X			
D. Kansas Department of Transportation		X			
E. Sedgwick County Right-of-way Permit		X			

Consulting Engineer Initials _____

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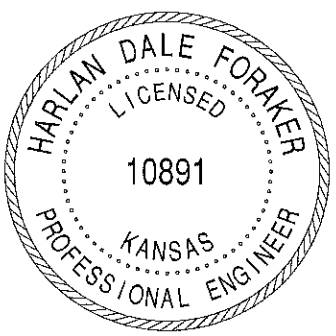


Dan Schmidt Addition Drainage Plan(Con't)
Mr. Scott Lindebak
October 14, 2009

CERTIFIED ENGINEERING DESIGN, P.A
810 West Douglas,Suite C
Wichita, KS 67203-6105
(316)262-8808 Office
(316)262-1669 Fax

LETTER OF TRANSMITTAL

DATE: October 14, 2009

TO: Mr. Scott Lindebak, P.E.
Division of Public Works
1155 South Seneca
Wichita, KS 67202

RE: Drainage Plan
Dan Schmidt Addition
Wichita , KS

FROM: Harlan D. Foraker, P.E.

I. PROJECT NARRATIVE

The site is located on the west side of Hydraulic Avenue approximately a quarter mile north of 55th Street South. The address of the existing residence is 5439 S. Hydraulic. The site currently has a single family dwelling on the proposed Lot 2. The front lot, Lot 1, has an existing circular drive and green houses. The lot is a proposed church site. The proposed Lot 3 is undeveloped. The SCS soil present is Canadian-Waldeck fine sandy loam which is a SCS Class B Soil.

II. EXISTING CONDITIONS RUNOFF CALCULATIONS

The rational method will be used to determine the peak discharges from the study area. Rational 'C' Factors were assigned to the existing site and proposed improvements from "Interim Drainage and Storm Sewer Policy for Design Criteria and Documentation" for the City of Wichita, Kansas. Rainfall Intensity tables from the same policy were utilized to determine the rainfall intensity for the 2, 5, 10, 25, and 100 year design storms.

The Soil Conservation Service TR-55 manual was used to compute the Time of Concentration for the drainage subareas. A design assumption was made as follows: that the minimum subarea time of concentration is 15 minutes.

Soil types were determined from the Natural Resources Conservation Service's Soil Survey web site. The SCS soil present is Canadian-Waldeck fine sandy loam (0 to 1 percent) which is a SCS Class B Soil.

The developed drainage subareas have been delineated on the 1" = 50' site and topographic mapping survey performed for this site.

Design Storm Events Evaluated: 2, 5, 10, 25, and 100 yr. storm events

The runoff calculations for the property have been completed utilizing the 5 storm events.

The existing site was a nursery with green houses. The proposed Lot 1, consists of 2.36 acres which contains several green houses and out buildings. The proposed Lot 2 consists of 0.48 acres and has an existing single family residence on it. The proposed Lot 3 consists of 0.47 acres and is undeveloped. The parcel has an undefined ridgeline approximately 500 feet east of the west property line. This divides the property into 2 drainage subbasins. The west subbasin drains to the west where the flow is intercepted by Victoria Court. The flow to the east is intercepted by Hydraulic and flows south to a curb inlet.

The following table summarizes the peak discharge for the west drainage subbasin which includes the west half of Lot 2 and a small area of Lot 3; as this area is already developed, the existing condition is the proposed condition also. The drainage sub-basin includes 0.27 acres within the proposed Dan Schmidt Addition.

EXISTING AND PROPOSED PEAK RUNOFF
FOR THE WEST DRAINAGE SUBBASIN

Description	C	Tc	I	Area	Q(cfs)
Existing Drainage Area(2 yr.)	.36	25	2.93	0.27	0.3
Existing Drainage Area(5 yr.)	.38	25	3.64	0.27	0.4
Existing Drainage Area(10 yr.)	.44	25	4.15	0.27	0.5
Existing Drainage Area(25 yr.)	.49	25	4.88	0.27	0.7
Existing Drainage Area(100 yr.)	.54	25	6.01	0.27	0.9

This sub-basin continues to sheet flow to the west where it is intercepted by the Victoria Court. There are no proposed changes within this subbasin.

The east sub-basin consists of all of Lot 1, the east half of Lot 2, and the majority of Lot 3. Lot 1 currently has green houses and some pavement on it; while Lot 1 is developed with a single family residence. The drainage sub-basin includes 3.29 acres within the proposed Dan Schmidt Addition.

EXISTING PEAK RUNOFF FOR THE EAST DRAINAGE SUBBASIN

Description	C	Tc	I	Area	Q(cfs)
Existing Drainage Area(2 yr.)	.19	67	1.57	3.29	1.0
Existing Drainage Area(5 yr.)	.21	67	2.06	3.29	1.5
Existing Drainage Area(10 yr.)	.27	67	2.31	3.29	2.1
Existing Drainage Area(25 yr.)	.34	67	2.76	3.29	3.1
Existing Drainage Area(100 yr.)	.40	67	3.46	3.29	4.5

The east drainage subbasin drains to the east to Hydraulic Avenue. The discharge flows south to a curb inlet approximately 215' south of the proposed addition.

OFF SITE DRAINAGE

There is no offsite drainage to consider for this site.

III. POST DEVELOPMENT HYDROLOGIC ANALYSIS

Design Storm Events Evaluated: 2, 5, 10, 25, and 100 yr. storm events

The runoff calculations for the property have been completed utilizing the 5 storm events.

The developed runoff condition for the west sub-basin is the same as the existing runoff conditions.

The following table summarizes the peak discharge for developed conditions for the east drainage subbasin of 3.29 acres of Dan Schmidt Addition. The area consists of all of Lot 1, the east half of Lot 2, and the majority of Lot 3.

PROPOSED PEAK RUNOFF FOR THE EAST DRAINAGE SUBBASIN

Description	C	Tc	I	Area	Q(cfs)
Developed Drainage Area(2 yr.)	.37	66	1.59	3.29	1.9
Developed Drainage Area(5 yr.)	.40	66	2.08	3.29	2.7
Developed Drainage Area(10 yr.)	.46	66	2.33	3.29	3.5
Developed Drainage Area(25 yr.)	.51	66	2.78	3.29	4.7
Developed Drainage Area(100 yr.)	.55	66	3.48	3.29	6.3

Lot 1 is a proposed church site. It has been assumed that the church will create approximately 0.98 acres of impervious area. The current green houses which will presumably be removed have approximately 0.15 acres of impervious area. As the previous table shows, the peak runoff from the 2 year storm increases by 0.9 cfs, the 10 year storm increases by 1.4 cfs, and the peak runoff from the 100 year storm increases by 1.8 cfs, or 40 percent, from 4.5 cfs to 6.3 cfs. The discharge flows south in the west road ditch of Hydraulic Avenue.

IV. FLOODPLAIN SUBMITTAL – No FEMA floodplain is located on this plat.

V. FEDERAL, STATE AND LOCAL PERMITS

A. US Army Corp of Engineers-Not Applicable
B. Kansas Dept. of Agriculture-Not Applicable
C. FEMA- Not Applicable
D. Kansas Department of Transportation-Not Applicable
E. Sedgwick County Right-of-Way Permit-Not Applicable

VI. APPENDIX I:

All charts, graphs, tables including a 1"=50' scale drainage plan map are included for review.

Dan Schmidt Addition

Legend

Historic Site Buffers

- 1000' National Historic Site Buffers
- 500' Local Historic Site Buffers
- Historic Districts
- Nationally Registered Historic Sites
- Locally Registered Historic Sites
- Special Use Cases

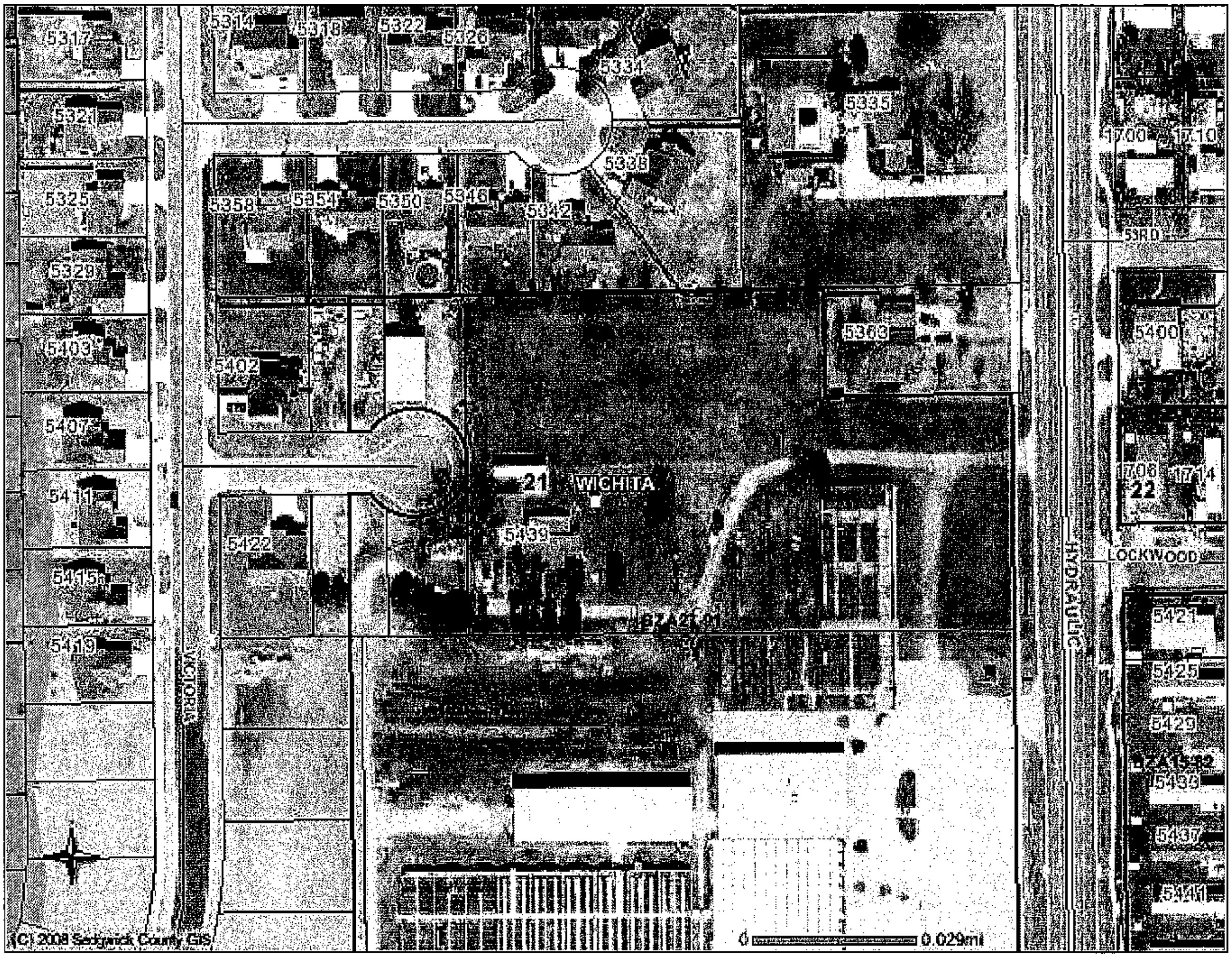
Zoning Districts

- Rural Residential
- Single Family 20,000
- Single Family 10,000
- Single Family 5,000
- Two-Family
- Multi-Family 18 d.u./ac
- Multi-Family 29 d.u./ac
- Multi-Family 75 d.u./ac
- Manufactured Housing
- Neighborhood Office
- General Office
- Neighborhood Retail
- Limited Commercial
- Office Warehouse
- General Commercial
- Industrial Park
- Industrial Park - Airport
- Central Business District
- Limited Industrial
- General Industrial
- University
- Planned Unit Development
- Air Force Base
- Unknown
- Not Zoned

Sedgwick County GIS

Geographic Information Services
Division of Information & Operations
www.sedgwickcounty.org/gis
525 N. Main, Suite 212, Wichita, KS 67203
Tel: 316.660.9290 Fax: 316.262.1174

Dan Schmidt Addition



Legend

Historic Site Buffers

- 1000' National Historic Site Buffers
- 500' Local Historic Site Buffers
- Historic Districts
- Nationally Registered Historic Sites
- Locally Registered Historic Sites
- Special Use Cases

Zoning Districts

- Rural Residential
- Single Family 20,000
- Single Family 10,000
- Single Family 5,000
- Two-Family
- Multi-Family 18 d.u./ac
- Multi-Family 29 d.u./ac
- Multi-Family 75 d.u./ac
- Manufactured Housing
- Neighborhood Office
- General Office
- Neighborhood Retail
- Limited Commercial
- Office Warehouse
- General Commercial
- Industrial Park
- Industrial Park - Airport
- Central Business District
- Limited Industrial
- General Industrial
- University
- Planned Unit Development
- Air Force Base
- Unknown
- Not Zoned

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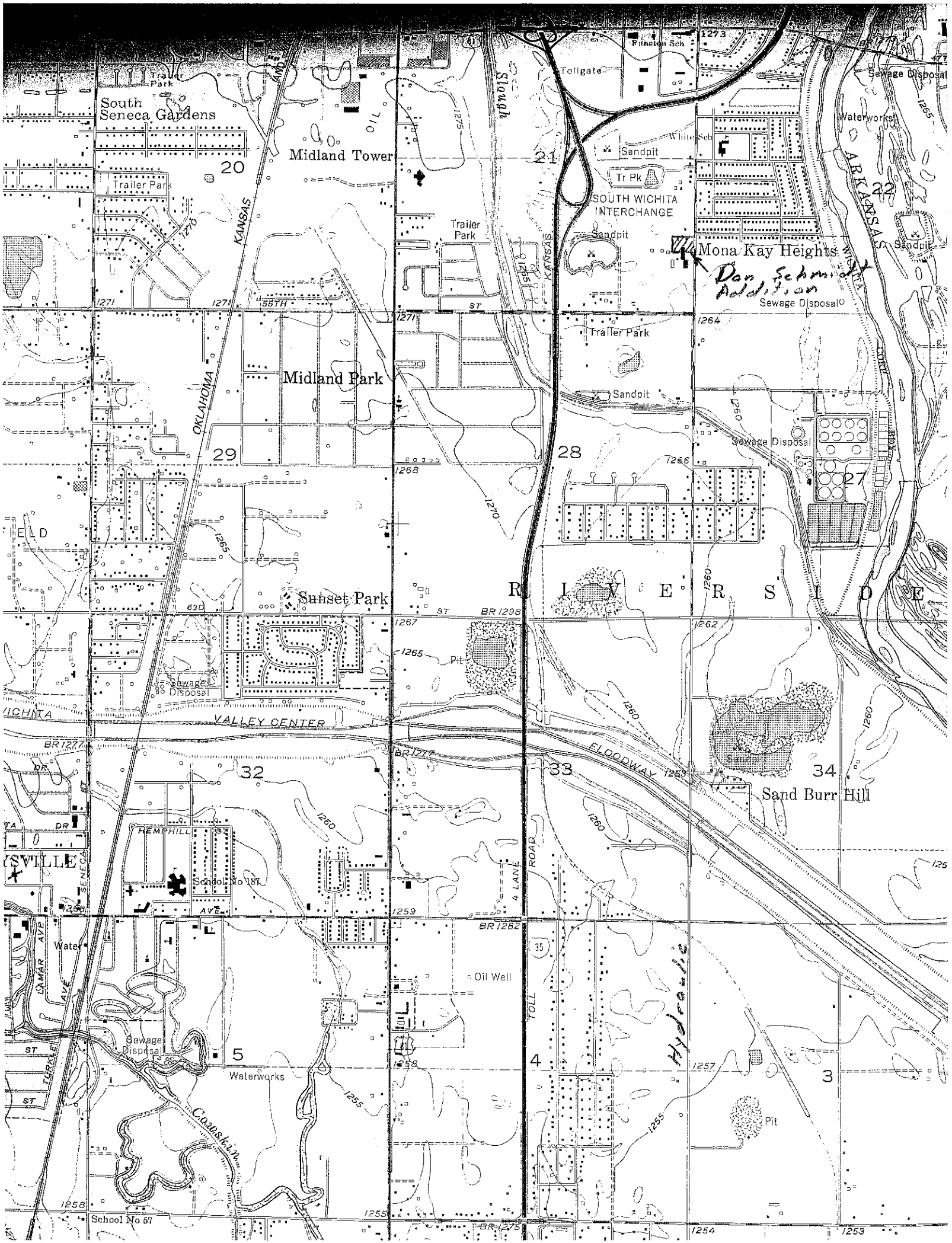
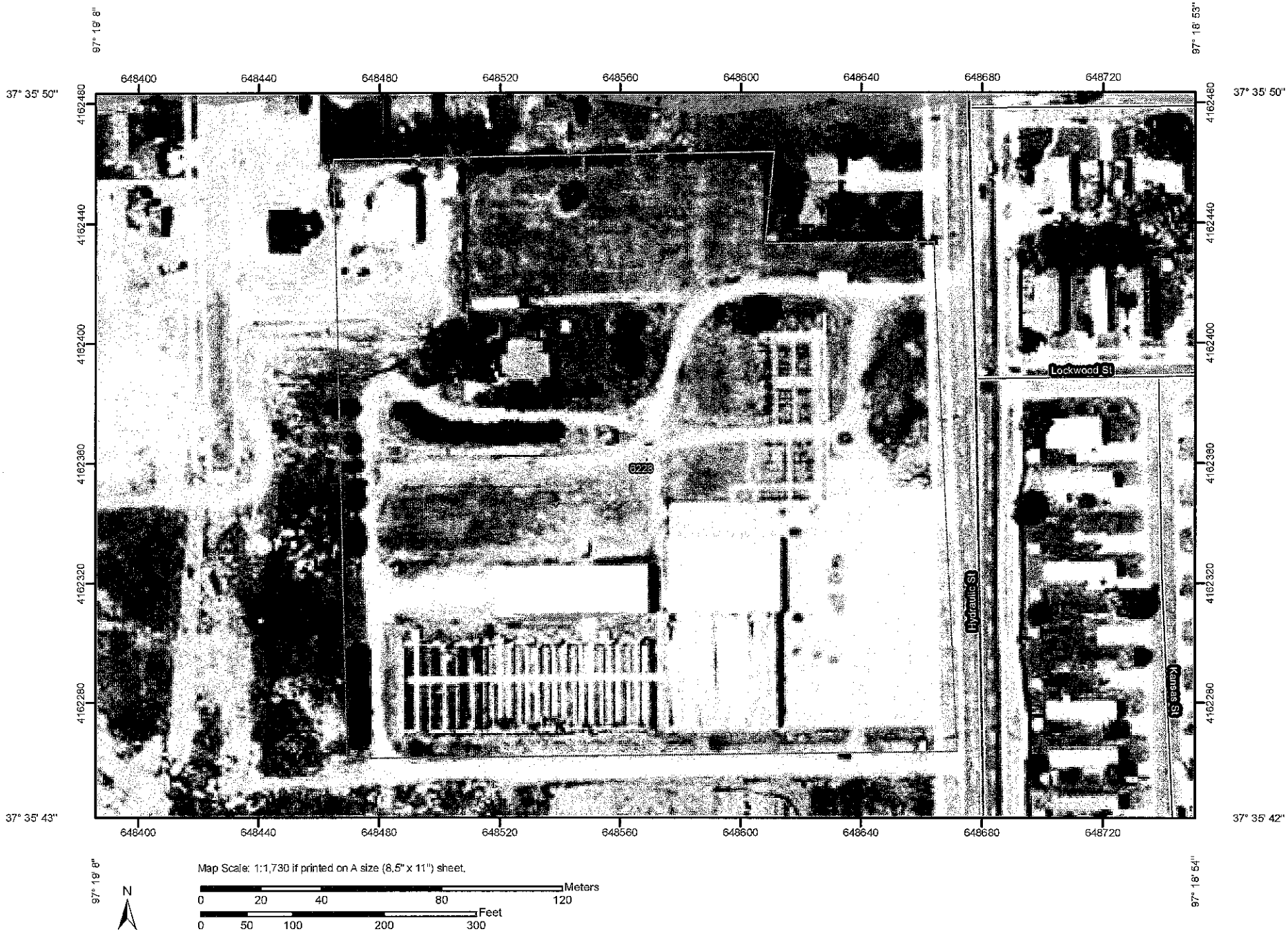

South Seneca Gardens
Trailer Park
Midland Tower
Trailer Park
Trailer Park
Midland Park
Sunset Park
Sewage Disposal
Pit
VALLEY CENTER
HEMPHILL
School No 187
Water
Sewage Disposal
Waterworks
School No 67
Caney River
Oil Well
Pit
Pit
Sand Burr Hill
Tollgate
Princeton Sch
Sewage Disposal
Waterworks
Sandpit
Tr Pk
SOUTH WICHITA INTERCHANGE
Sandpit
Trailer Park
Mona Kay Heights
Don Schmidt Addition
Sewage Disposal
Trailer Park
Sandpit
Sewage Disposal
FLOODWAY
TOLL ROAD
4 LANE
Slough
KANSAS
OKLAHOMA
ARKANSAS
RIVERSIDE
58TH ST
63D ST
BR 1298
BR 1277
BR 1282
BR 1275
20
21
22
29
28
27
32
33
34
5
4
3
35

Soil Map—Sedgwick County, Kansas
(Dan Schmidt Addition)



MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Units

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other

Special Line Features
- Gully
- Short Steep Slope
- Other

Political Features
- Cities

Water Features
- Oceans
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

MAP INFORMATION

Map Scale: 1:1,730 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 14N NAD83

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

Soil Survey Area: Sedgwick County, Kansas
Survey Area Data: Version 5, Dec 3, 2008

Date(s) aerial images were photographed: 6/20/2006

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

Map Unit Legend

Sedgwick County, Kansas (KS173)			
Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
6228	Canadian-Waldeck fine sandy loams, rarely flooded	9.5	100.0%
Totals for Area of Interest		**9.5**	**100.0%**

WORKSHEET 3: TIME OF CONCENTRATION

Project: Dan Schmidt By Date

Section: _____ SE 1/4, Sec 21, T28S, R1E, Wichita Checked Date

Parcel Description: _____ Home with out buildings

Existing Developed

Sheet Flow

1	Surface Description (Table 3-1): _____	Grass	
2	Manning's Roughness Coeffiecient, n (Table 3-1)	0.24	
3	Flow Length, L<=300 ft	93	ft.
4	Two-yr 24-hr rainfall, P2	3.5	in
5	Land Slope, s	0.004	ft./ft.
6	$T = \frac{0.007 (nL)^{0.8}}{(P2^{0.5})(s^{0.4})}$	0.4085	hr

Shallow Concentrated Flow

7	Surface Desription (Paved or Unpaved)	unpaved	
8	Flow Length, L	0	ft.
9	Watercourse Slope, s	0.004	ft./ft.
10	Average Velocity, V (Figure 3-1)	0.9	ft./s
11	T = L / 3600 V	0	hr

Channel Flow

12	Cross sectional Flow Area, a	0	ft^2
13	Wetted Perimeter, P	0	ft.
14	Hydraulic Radius r = a / P	0	ft.
15	Channel Slope , S	0	ft./ft.
16	Mannin's Roughness Coeff., n	0	
17	V = 1.49 (r^2/3)(s^1/2) / n	0	ft./s
18	Flow Length, L	0	ft.
19	T = L / 3600 V	0	hr
20	T= T + T + T	0.41	hr

25 minutes

Dan Schmidt Additior
SE 1/4, Sec 21, T 28

Site
Existing West Home Site

Drainage Area =	0.27 Acres

Time of Concentratio	25.00 Minutes

Soil	Canadian-Waldeck Sandy Loam Type B 1/2 Acre SF Dwelling 100%
Soil	
Soil	
Soil	

C	Weighted				
	B, .5 SF				Total
	100.00%				Average
2	0.36				0.36
5	0.38				0.38
10	0.44				0.44
25	0.49				0.49
100	0.54				0.54

I	
2	2.93
5	3.64
10	4.15
25	4.88
100	6.01

Peak Flow						
Year		C	I	A	=	Q
						cfs
2		0.36	2.93	0.27		0.28
5		0.38	3.64	0.27		0.37
10		0.44	4.15	0.27		0.49
25		0.49	4.88	0.27		0.65
100		0.54	6.01	0.27		0.88

WORKSHEET 3: TIME OF CONCENTRATION

Project: Dan Schmidt By Date

Section: _____ SE 1/4, Sec 21, T28S, R1E, Wichita Checked Date

Parcel Description: _____ Home with out buildings

Existing Developed

Sheet Flow

1	Surface Description (Table 3-1): _____	Grass
2	Manning's Roughness Coeffiecient, n (Table 3-1)	0.24
3	Flow Length, L<=300 ft	300 ft.
4	Two-yr 24-hr rainfall, P2	3.5 in
5	Land Slope, s	0.004 ft./ft.
6	$T = \frac{0.007 (nL)^{0.8}}{(P2^{0.5})(s^{0.4})}$	1.04257 hr

Shallow Concentrated Flow

7	Surface Desription (Paved or Unpaved)	unpaved
8	Flow Length, L	230 ft.
9	Watercourse Slope, s	0.004 ft./ft.
10	Average Velocity, V (Figure 3-1)	0.9 ft./s
11	T = L / 3600 V	0.07099 hr

Channel Flow

12	Cross sectional Flow Area, a	0 ft^2
13	Wetted Perimeter, P	0 ft.
14	Hydraulic Radius r = a / P	0 ft.
15	Channel Slope , S	0 ft./ft.
16	Mannin's Roughness Coeff., n	0
17	V = 1.49 (r^2/3)(s^1/2) / n	0 ft./s
18	Flow Length, L	0 ft.
19	T = L / 3600 V	0 hr
20	T= T + T + T	1.11 hr

67 minutes

Dan Schmidt Additior
SE 1/4, Sec 21, T 28

Site
Existing Site

Drainage Area =	3.29 Acres

Time of Concentratio	67.00 Minutes

Soil	Canadian-Waldeck Sandy Loam Type B 100%
Soil	
Soil	Green house roofs 5%
Soil	

C	Weighted				
	B, 0-1%		roofs		Total
	95.00%		5.00%		Average
2	0.16		0.80		0.19
5	0.18		0.85		0.21
10	0.24		0.90		0.27
25	0.31		0.92		0.34
100	0.37		0.93		0.40

I	
2	1.57
5	2.06
10	2.31
25	2.76
100	3.46

Peak Flow						
Year		C	I	A	=	Q
						cfs
2		0.19	1.57	3.29		0.99
5		0.21	2.06	3.29		1.45
10		0.27	2.31	3.29		2.07
25		0.34	2.76	3.29		3.09
100		0.40	3.46	3.29		4.53

WORKSHEET 3: TIME OF CONCENTRATION

Project: Dan Schmidt By Date

Section: _____ SE 1/4, Sec 21, T28S, R1E, Wichita Checked Date

Parcel Description: _____ Proposed Church Site ~~Home with out buildings~~

Existing Developed

Sheet Flow

1	Surface Description (Table 3-1): _____ Grass	
2	Manning's Roughness Coeffiecient, n (Table 3-1)	0.24
3	Flow Length, L<=300 ft	300 ft.
4	Two-yr 24-hr rainfall, P2	3.5 in
5	Land Slope, s	0.004 ft./ft.
6	T= $\frac{0.007 (nL)^{0.8}}{(P2^{0.5})(s^{0.4})}$	1.04257 hr

Shallow Concentrated Flow

7	Surface Desription (Paved or Unpaved)	paved
8	Flow Length, L	230 ft.
9	Watercourse Slope, s	0.004 ft./ft.
10	Average Velocity, V (Figure 3-1)	1.3 ft./s
11	T = L / 3600 V	0.04915 hr

Channel Flow

12	Cross sectional Flow Area, a	0 ft^2
13	Wetted Perimeter, P	0 ft.
14	Hydraulic Radius r = a / P	0 ft.
15	Channel Slope , S	0 ft./ft.
16	Mannin's Roughness Coeff., n	0
17	V = 1.49 (r^2/3)(s^1/2) / n	0 ft./s
18	Flow Length, L	0 ft.
19	T = L / 3600 V	0 hr
20	T= T + T + T	1.09 hr

66 minutes

Dan Schmidt Addition
SE 1/4, Sec 21, T 28

Site
Proposed Church Site

Drainage Area =	3.29 Acres
Time of Concentratio	66.00 Minutes

Soil	Canadian-Waldeck Sandy Loam Type B 100%
Soil	
Soil	Developed Condition is Church use 33% Roofs
Soil	

C	Weighted				
	B, 0-1%		roofs		Total
	67.00%		33.00%		Average
2	0.16		0.80		0.37
5	0.18		0.85		0.40
10	0.24		0.90		0.46
25	0.31		0.92		0.51
100	0.37		0.93		0.55

I	
2	1.59
5	2.08
10	2.33
25	2.78
100	3.48

Peak Flow						
Year		C	I	A	=	Q
						cfs
2		0.37	1.59	3.29		1.94
5		0.40	2.08	3.29		2.74
10		0.46	2.33	3.29		3.51
25		0.51	2.78	3.29		4.68
100		0.55	3.48	3.29		6.35

RAINFALL INTENSITY TABLE
SEDGWICK COUNTY
KANSAS

THIS TABLE CONTAINS AVERAGE RAINFALL INTENSITIES
IN INCHES PER HOUR.

Time of conc.

DURATION, HR:MIN	RETURN PERIOD 1 YR	2 YR	5 YR	10 YR	25 YR	50 YR	100 YR
0:05	4.91	5.64	6.64	7.38	8.48	9.34	10.20
0:06	4.62	5.34	6.33	7.07	8.15	9.00	9.84
0:07	4.38	5.09	6.08	6.80	7.86	8.69	9.52
0:08	4.17	4.87	5.85	6.56	7.60	8.41	9.22
0:09	4.00	4.68	5.63	6.33	7.34	8.14	8.93
0:10	3.84	4.50	5.43	6.11	7.10	7.87	8.64
0:11	3.70	4.34	5.25	5.90	6.86	7.61	8.36
0:12	3.56	4.19	5.07	5.71	6.64	7.36	8.09
0:13	3.44	4.05	4.91	5.53	6.43	7.14	7.84
0:14	3.33	3.92	4.76	5.36	6.24	6.92	7.61
0:15	3.22	3.80	4.62	5.21	6.06	6.73	7.40
0:16	3.12	3.69	4.49	5.07	5.91	6.56	7.21
0:17	3.03	3.58	4.37	4.94	5.76	6.40	7.04
0:18	2.94	3.48	4.26	4.82	5.63	6.26	6.88
0:19	2.85	3.39	4.16	4.71	5.50	6.12	6.74
0:20	2.77	3.30	4.06	4.60	5.38	5.99	6.60
0:21	2.70	3.22	3.97	4.50	5.27	5.87	6.47
0:22	2.63	3.14	3.88	4.41	5.17	5.76	6.35
0:23	2.56	3.07	3.80	4.32	5.07	5.65	6.23
0:24	2.50	3.00	3.72	4.23	4.97	5.54	6.12
0:25	2.44	2.93	3.64	4.15	4.88	5.44	6.01
0:26	2.38	2.87	3.57	4.07	4.79	5.35	5.90
0:27	2.33	2.81	3.50	4.00	4.70	5.26	5.80
0:28	2.27	2.75	3.44	3.92	4.62	5.17	5.71
0:29	2.23	2.69	3.37	3.86	4.54	5.08	5.61
0:30	2.18	2.64	3.31	3.79	4.47	4.99	5.52
0:31	2.14	2.59	3.26	3.72	4.39	4.91	5.43
0:32	2.09	2.54	3.20	3.66	4.32	4.83	5.34
0:33	2.05	2.50	3.14	3.60	4.25	4.76	5.26
0:34	2.02	2.45	3.09	3.54	4.18	4.68	5.18
0:35	1.98	2.41	3.04	3.48	4.12	4.61	5.10
0:36	1.94	2.37	2.99	3.43	4.05	4.54	5.02
0:37	1.91	2.33	2.94	3.38	3.99	4.47	4.95
0:38	1.88	2.29	2.90	3.32	3.93	4.40	4.87
0:39	1.85	2.25	2.85	3.27	3.87	4.34	4.80
0:40	1.82	2.22	2.81	3.23	3.82	4.28	4.73
0:41	1.79	2.18	2.77	3.18	3.76	4.22	4.67
0:42	1.76	2.15	2.73	3.13	3.71	4.16	4.60
0:43	1.73	2.12	2.69	3.09	3.66	4.10	4.54
0:44	1.71	2.09	2.65	3.05	3.61	4.04	4.48
0:45	1.68	2.06	2.62	3.01	3.56	3.99	4.42

RAINFALL INTENSITY TABLE
SEDGWICK COUNTY
KANSAS

THIS TABLE CONTAINS AVERAGE RAINFALL INTENSITIES
IN INCHES PER HOUR.

DURATION, HR:MIN	RETURN PERIOD 1 YR	2 YR	5 YR	10 YR	25 YR	50 YR	100 YR
0:46	1.66	2.03	2.58	2.96	3.51	3.94	4.36
0:47	1.63	2.00	2.55	2.93	3.47	3.89	4.30
0:48	1.61	1.97	2.51	2.89	3.42	3.84	4.25
0:49	1.59	1.95	2.48	2.85	3.38	3.79	4.20
0:50	1.57	1.92	2.45	2.81	3.34	3.74	4.15
0:51	1.55	1.90	2.42	2.78	3.30	3.70	4.10
0:52	1.53	1.87	2.39	2.75	3.26	3.65	4.05
0:53	1.51	1.85	2.36	2.71	3.22	3.61	4.00
0:54	1.49	1.83	2.33	2.68	3.18	3.57	3.95
0:55	1.47	1.80	2.30	2.65	3.14	3.53	3.91
0:56	1.45	1.78	2.28	2.62	3.11	3.49	3.86
0:57	1.43	1.76	2.25	2.59	3.07	3.45	3.82
0:58	1.41	1.74	2.22	2.56	3.04	3.41	3.78
0:59	1.40	1.72	2.20	2.53	3.01	3.37	3.74
1:00	1.38	1.70	2.17	2.50	2.97	3.34	3.70
1:05	1.30	1.61	2.06	2.38	2.82	3.17	3.52
1:10	1.23	1.53	1.96	2.26	2.69	3.02	3.35
1:15	1.17	1.45	1.87	2.16	2.57	2.89	3.20
1:20	1.11	1.38	1.79	2.06	2.46	2.77	3.07
1:25	1.06	1.32	1.71	1.98	2.36	2.65	2.95
1:30	1.01	1.27	1.64	1.90	2.27	2.55	2.83
1:35	0.97	1.21	1.58	1.83	2.18	2.46	2.73
1:40	0.93	1.16	1.52	1.76	2.10	2.37	2.63
1:45	0.89	1.12	1.46	1.70	2.03	2.29	2.54
1:50	0.86	1.08	1.41	1.64	1.96	2.21	2.46
1:55	0.82	1.04	1.36	1.58	1.89	2.13	2.38
2:00	0.79	1.00	1.31	1.53	1.83	2.07	2.30
2:05	0.76	0.97	1.27	1.48	1.77	2.00	2.23
2:10	0.74	0.93	1.23	1.43	1.72	1.94	2.16
2:15	0.71	0.90	1.19	1.39	1.67	1.88	2.10
2:20	0.69	0.87	1.15	1.35	1.62	1.83	2.04
2:25	0.66	0.85	1.12	1.31	1.57	1.78	1.98
2:30	0.64	0.82	1.09	1.27	1.53	1.73	1.93
2:35	0.62	0.80	1.06	1.24	1.49	1.68	1.88
2:40	0.61	0.78	1.03	1.21	1.45	1.64	1.83
2:45	0.59	0.75	1.01	1.18	1.42	1.60	1.79
2:50	0.57	0.74	0.98	1.15	1.38	1.56	1.74
2:55	0.56	0.72	0.96	1.12	1.35	1.53	1.70
3:00	0.55	0.70	0.94	1.10	1.32	1.49	1.67

(3 pages)

ATTACHMENT D

DRAINAGE CRITERIA

CITY OF WICHITA, KANSAS

RECOMMENDED RUNOFF COEFFICIENTS FOR RATIONAL METHOD
AND PERCENT IMPERVIOUS FOR UNIT HYDROGRAPH METHOD

Land Use or Surface Characteristics	Percent Impervious	Frequency 2	5	10	100
1. Business:					
Downtown Areas	95	0.84	0.85	0.87	0.91
Neighborhood Areas	70	0.68	0.69	0.73	0.80
2. Residential:					
Single Family (Soil Group D)					
1/8 Acre	50	0.57	0.61	0.66	0.79
1/4 Acre	38	0.50	0.54	0.62	0.76
1/3 Acre	30	0.46	0.50	0.59	0.73
1/2 Acre	25	0.42	0.48	0.56	0.72
3/4 Acre	22	0.42	0.46	0.55	0.71
1 Acre	20	0.41	0.45	0.54	0.71
Multi-Family (Soil Group D)					
Multi-Unit (detached)	60	0.62	0.66	0.72	0.82
Multi-Unit (attached)	65	0.64	0.68	0.73	0.83
Apartments	75	0.70	0.73	0.79	0.86
Single Family (Soil Group C)					
1/8 Acre	50	0.55	0.58	0.64	0.73
1/4 Acre	38	0.48	0.51	0.57	0.68
1/3 Acre	30	0.43	0.46	0.53	0.65
1/2 Acre	25	0.40	0.43	0.50	0.63
3/4 Acre	22	0.39	0.42	0.49	0.62
1 Acre	20	0.37	0.40	0.48	0.61
Multi-Family (Soil Group C)					
Multi-Unit (detached)	60	0.60	0.63	0.69	0.77
Multi-Unit (attached)	65	0.63	0.66	0.71	0.79
Apartments	75	0.68	0.72	0.77	0.83
Single-Family (Soil Group B)					
1/8 Acre	50	0.52	0.54	0.59	0.67
1/4 Acre	38	0.44	0.46	0.52	0.61
1/3 Acre	30	0.39	0.41	0.47	0.57
1/2 Acre	25	0.36	0.38	0.44	0.54
3/4 Acre	22	0.34	0.36	0.42	0.52
1 Acre	20	0.33	0.35	0.40	0.51
Multi-Family (Soil Group B)					
Multi-Unit (detached)	60	0.58	0.60	0.65	0.72
Multi-Unit (attached)	65	0.61	0.64	0.68	0.75
Apartments	75	0.67	0.70	0.74	0.80

Land Use or face Characteristics	Percent Impervious	Frequency 2	5	10	100
Single Family (Soil Group A)					
1/8 Acre	50	0.47	0.50	0.54	0.60
1/4 Acre	38	0.39	0.41	0.45	0.52
1/3 Acre	30	0.33	0.35	0.39	0.47
1/2 Acre	25	0.30	0.31	0.35	0.44
3/4 Acre	22	0.28	0.29	0.33	0.42
1 Acre	20	0.26	0.28	0.32	0.40
Multi-Family (Soil Group A)					
Multi-Unit (detached)	60	0.55	0.57	0.61	0.67
Multi-Unit (attached)	65	0.58	0.60	0.64	0.70
Apartments	75	0.65	0.68	0.72	0.77
3. Industrial:					
Light Areas	70	0.68	0.69	0.73	0.80
Heavy Areas	80	0.74	0.76	0.79	0.84
4. Playgrounds:	15	0.33	0.35	0.42	0.55
5. Schools:	40	0.49	0.51	0.56	0.66
6. Railroad Yard Areas:	30	0.43	0.45	0.50	0.62
Undeveloped Urban Areas: Offsite Flow Analysis (when land use not defined)	45	0.52	0.54	0.59	0.68
8. Streets:					
Paved	99	0.87	0.88	0.90	0.93
Gravel	00	0.24	0.26	0.33	0.48
9. Drive, Parking Lots and Walks:	96	0.87	0.87	0.88	0.89
10. Roofs:	90	0.80	0.85	0.90	0.93
11. Urban Lawn Areas (See Note No. 1 below):					
Soil Group A					
Slope less than 1%	00	0.08	0.09	0.13	0.23
Slope 1% to 4%	00	0.12	0.13	0.17	0.27
Slope more than 4%	00	0.16	0.17	0.21	0.31
Soil Group B					
Slope less than 1%	00	0.16	0.18	0.24	0.37
Slope 1% to 4%	00	0.20	0.22	0.28	0.41
Slope more than 4%	00	0.24	0.26	0.32	0.45
Soil Group C					
Slope less than 1%	00	0.24	0.27	0.35	0.51
Slope 1% to 4%	00	0.26	0.29	0.37	0.53
Slope more than 4%	00	0.28	0.31	0.39	0.55

Land Use or Face Characteristics	Percent Impervious	Frequency 2	5	10	100
Soil Group D					
Slope less than 1%	00	0.28	0.33	0.43	0.63
Slope 1% to 4%	00	0.30	0.35	0.45	0.65
Slope more than 4%	00	0.32	0.37	0.47	0.67

Note No. 1: Coefficients shown in the above table are for pervious open space areas with thick turf which includes pervious areas in parks and cemeteries. Coefficients shown above must be increased 0.02 for use with agricultural pasture areas. Coefficients shown above must be reduced by 0.04 for use with agricultural cultivated areas. Group A soils are well-drained, coarse textured sands with high infiltration rates. Group B soils are moderately well-drained, moderately coarse textured soils with moderate infiltration rates. Group C soils are moderately poor-drained, moderately fine textured soils with slow infiltration rates. Group D soils are poor-drained, fine textured soils with very slow infiltration rates.

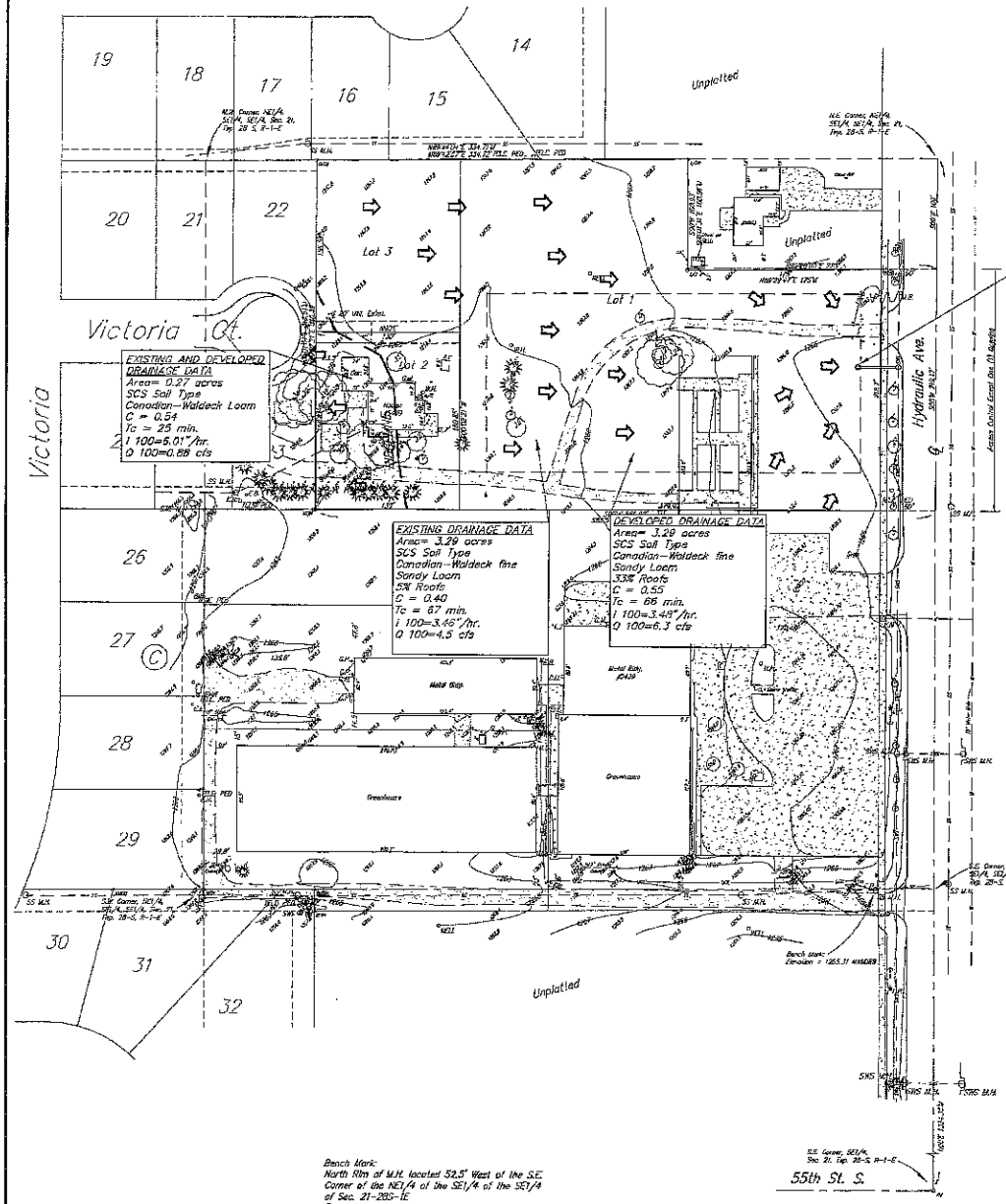
GENERAL NOTE: These Rational Formula Coefficients may not be valid for basins 320 acres or larger.

EXHIBIT NO. 1

SOIL LEGEND

SYMBOL	HYDROLOGIC GROUP	NAME
Aa	B	Albion-Shellabarger sandy loams, 1 to 4 percent slopes
Ab	B	Albion and Shellabarger sandy loans, 7 to 15 percent slopes
Ba	C	Blanket silt loam, 0 to 1 percent slopes
Bb	C	Blanket silt loan, 1 to 3 percent slopes
Ca	B	Canadian fine sandy loan
Cb	B	Canadian-Waldeck fine sandy loams
Cc	D	Carwile fine sandy loam
Cd	B	Clark-Ost clay loams, 1 to 4 percent slopes
Ce	C	Clime silty clay, 3 to 6 percent slopes
Ea	B	Elandco silt loam
Eb	B	Elandco silt loam, occasionally flooded
Ec	B	Elandco silt loam, frequently flooded
Fa	B	Farnum loam, 0 to 1 percent slopes
Fb	B	Farnum loam, 1 to 3 percent slopes
Fc	B	Farnum loam, sandy substratum, 0 to 1 percent slopes
Ga	D	Goessel silty clay, 0 to 1 percent slopes
Gb	D	Goessel silty clay, 1 to 2 percent slopes
Ia	D	Irwin silty clay loam, 1 to 3 percent slopes
Ib	D	Irwin silty clay loam, 3 to 6 percent slopes
Ic	D	Irwin silty clay loam, 2 to 6 percent slopes, eroded
La	C	Lesho loam
Lb	A	Lincoln soils
Ma	B	Milan loam, 1 to 3 percent slopes
Mb	B	Milan form, 3 to 6 percent slopes
Mc	B	Milan clay loam, 2 to 6 percent slopes, eroded
Na	B	Naron fine sandy loam
Oc	D	Owens clay loam, 1 to 3 percent slopes
Od	D	Owens-Rock outcrop complex, 3 to 10 percent slopes
Pa		Pits
Pb	D	Plevna fine sandy loam
Pc	A	Pratt loamy fine sand, undulating
Pd	A	Pratt-Tivoli complex, rolling
Ra	D	Renfrow silty clay loam, 1 to 3 percent slopes
Rb	D	Renfrow silty clay loam, 3 to 6 percent slopes
Rc	D	Renfrow-Owens clay loams, 1 to 4 percent slopes
Rd	D	Rosehill silty clay, 1 to 3 percent slopes
Sa	B	Shellabarger sandy loam, 1 to 3 percent slopes
Sb	B	Shellabarger sandy loam, 3 to 6 percent slopes
Sc	B	Shellabarger sandy loam, 3 to 6 percent slopes, eroded
Ta	D	Tabler silty clay loam
Tb	D	Tabler-Drummond complex
Ua	B	Urban land-Canadian complex
Ub	B	Urban land-Elandco complex
Uc	B	Urban land-Farnum complex, 0 to 3 percent slopes
Ud	D	Urban land-Irwin complex, 1 to 3 percent slopes
Ue	D	Urban land-Tabler complex
Va	B	Vanoss silt loam, 0 to 1 percent slopes
Vb	B	Vanoss silt loam, 1 to 3 percent slopes
Vc	B	Vanoss silt loam, 3 to 6 percent slopes
Vd	B	Vanoss silt loam, 3 to 6 percent slopes, eroded
Ve	D	Vernon sandy loam, 1 to 3 percent slopes
Vf	D	Vernon sandy loam, 3 to 6 percent lopes
Wa	C	Waldeck sandy loam
Wb	D	Waurika silt loam

DRAINAGE PLAN
DAN SCHMIDT ADDITION
WICHITA, SEDGWICK COUNTY, KANSAS



GRAPHIC SCALE
(IN FEET)
1 inch = 60 ft.

DRAINAGE KEY
= Proposed Surface Drainage Direction
= Existing Contours
= Proposed Contours

IMPERVIOUS AREA CALCULATION
Gross Area =155,288 sq.ft. (3.56 acres)
Existing Home, Out Buildings, and Drives Impervious Area=15,200 sq.ft. (0.35 acres)
Proposed Church and Paved Drive Impervious Area (Estimated)=47,300 sq.ft. (1.09 acres)
Pervious Area to remain in Gross=102,788 sq.ft. (2.36 acres)

Bench Mark:
North Rim of M.H. located 52.5' West of the S.E. Corner of the NE1/4 of the SE1/4 of the SE1/4 of Sec. 21-28S-1E
Elevation = 1265.31 NAVD88

Legal Description:

That part of the SE1/4 of the SE1/4 of Sec. 21, Twp. 28-S, R-1-E of the 6th P.M., Sedgwick County, Kansas described as: Commencing at the N.E. Corner of the SE1/4 of the SE1/4 of said Sec. 21; thence south, along the east line of said SE1/4, 100.00 feet for a point of beginning; thence right at an angle of 89°28', 525.00 feet; thence right at an angle of 90°32', 100.98 feet more or less to a point on the north line of the SE1/4 of the SE1/4 of said Sec. 21; thence west along said north line 334.78 feet more or less to a point 100.00 feet east of the N.W. Corner of the NE1/4 of the SE1/4 of the SE1/4 of said Sec. 21; thence south parallel with and 100.00 feet east of the west line of the NE1/4 of the SE1/4 of the SE1/4 of said Sec. 21, 316.39 feet; thence east deflecting left 90°02'21", 358.92 feet more or less to a point on the east line of the SE1/4 of said Sec. 21; thence north 316.17 feet to the point of beginning, subject to road right-of-way over the east 50.00 feet thereof.

OWNER:
Dan B. & Kathy R. Schmidt
5439 S. Hydraulic Ave.
Wichita, Kansas
Ph. 264-5222

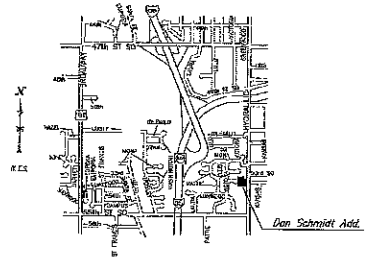
GROSS AREA:
155288.61 Sq. Ft.±
3.56 Acres±

NET AREA:
144341.79 Sq. Ft.±
3.31 Acres±

MINIMUM LOT SIZE:
20910.27 Sq. Ft.±
0.48 Acres±

EXISTING ZONING: SF-5

CONTROL NO. 118716



VICINITY MAP

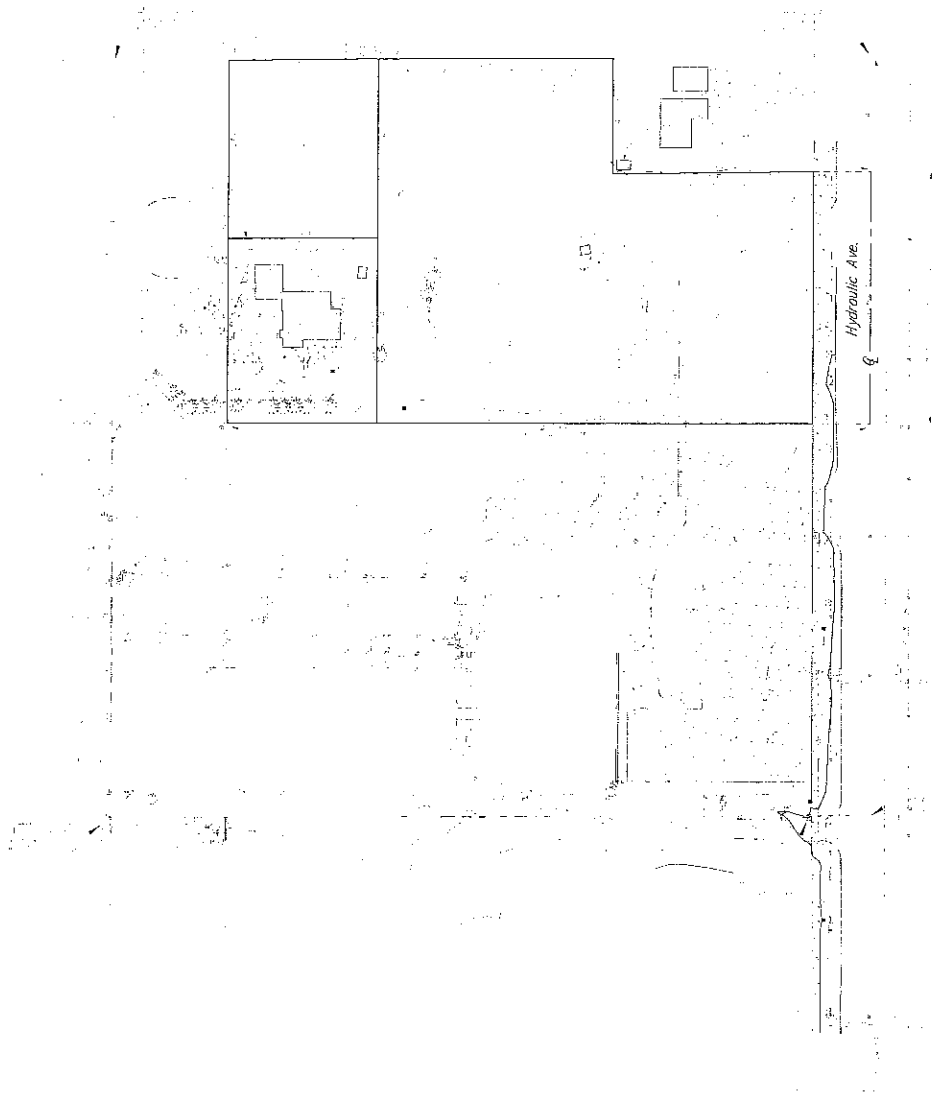
SURVEY DISCLAIMER:
TOPOGRAPHIC SURVEY AND CONTOUR MAP USED IN PREPARING PLANS WAS PROVIDED BY SAVOY COMPANY, P.A., 535 S. EMPORIA, SUITE 104, WICHITA, KS. ENGINEER DOES NOT GUARANTEE SURVEY ELEVATIONS FOR ACCURACY. CONTRACTOR SHALL VERIFY ELEVATIONS AND NOTIFY ENGINEER OF ANY DISCREPANCIES.

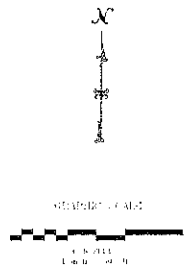
HARLAN DALE FORAN
LICENSED
10891
KANSAS
PROFESSIONAL ENGINEER
10.21.09

CED PROJ. NO.: 200911836
CERTIFIED ENGINEERING DESIGN, P.A.
810 WEST DOUGLAS, SUITE C
WICHITA, KANSAS 67203
PH: (316) 262-8808
FAX: (316) 262-1589
SHEET: 1
TOTAL: 1

Savoy Company, P.A.
Land Surveyors

PRELIMINARY PLAT
DAN SCHMIDT ADDITION
WICHITA, SEDGWICK COUNTY, KANSAS





Bench Mark
North Bolt of M.H. located 52.5' West of the S.E. Corner of the NE1/4 of the SE1/4 of the SE1/4 of Sec. 21-28S-1E
Elevation = 1245.31 NAVD88

LEGEND

G = GAS MAIN
W = WATER MAIN
SS = SANITARY SEWER
SWS = STORM WATER SEWER
UEC = UNDER GROUND ELECTRIC
UGT = UNDER GROUND TELEPHONE

BM	BENCH MARK
TELE PED	TELEPHONE PEDESTAL
C.O.	CLEAN OUT
E.B.	ELECTRIC BOX
	GUY ANCHOR
G.M.	GAS METER
G.P.	GUARD POST
L.P.	LIGHT POLE
M.B.	MAIL BOX
	POWER POLE W/LIGHT
	POST
	POWER POLE
	ROOF VENT
	SIGN
WELL	WATER WELL
W.H.	WATER HYDRANT
W.M.	WATER METER
W.M.V.	WATER METER VAULT
W.V.	WATER VALVE
XFMR	ELECTRIC TRANSFORMER
SS M.H.	SANITARY SEWER MANHOLE
SWS M.H.	STORM WATER SEWER MANHOLE

Legal Description:

That part of the SE1/4 of the SE1/4 of Sec. 21, Twp. 28-S, R-1-E of the 6th P.M., Sedgwick County, Kansas described as: Commencing at the N.E. Corner of the SE1/4 of the SE1/4 of said Sec. 21; thence south, along the east line of said SE1/4, 100.00 feet for a point of beginning, thence right at an angle of 89°28', 225.00 feet; thence right at an angle of 90°32', 100.98 feet more or less to a point on the north line of the SE1/4 of the SE1/4 of said Sec. 21; thence west along said north line 334.78 feet more or less to a point 100.00 feet east of the N.W. Corner of the NE1/4 of the SE1/4 of the SE1/4 of said Sec. 21; thence south parallel with and 100.00 feet east of the west line of the NE1/4 of the SE1/4 of the SE1/4 of said Sec. 21, 316.33 feet; thence east deflecting left 90°02'21", 559.92 feet more or less to a point on the east line of the SE1/4 of said Sec. 21; thence north 219.17 feet to the point of beginning, subject to road right-of-way over the east 50.00 feet thereof.

OWNER:
Dan W. & Kathy K. Schmidt
5439 S. Hydraulic Ave.
Wichita, Kansas
Ph. 204-5722

GROSS AREA:
155,288.61 Sq. Ft ±
3.56 Acres ±

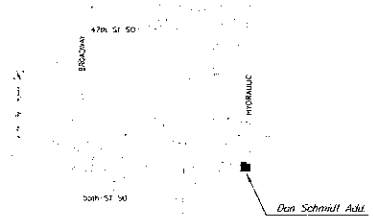
NET AREA:
144,341.79 Sq. Ft ±
3.31 Acres ±

MINIMUM LOT SIZE:
20,910.27 Sq. Ft.
0.48 Acres ±

EXISTING ZONING: SF-5 -

CONTROL NO. 118716

BZA27-91



VICINITY MAP

Savoy Company, P.A.
Land Surveyors
433 S. Hydraulic, Wichita, KS 67211-1911
PH (316) 265-4821
FAX (316) 265-4979
www.savoyco.com