

DRAINAGE REPORT

FOR

KRUG SOUTH COMMERCIAL
Wichita, Kansas

DECEMBER 2008



Public Works, Engineering Division Final Drainage Plan Submittal Checklist

Reviewer: _____	Date: _____
Subdivision Name: _____	Location: _____
Total Land Area Of Ownership: _____ Acres	
Type: _____ Residential _____ Commercial _____ Industrial _____ Recreation _____ Municipal _____ Other	
Applicant: _____	Contact: _____ Phone #: _____
Engineer: _____	Contact: _____ Phone #: _____

Please check the appropriate box:

I = Included; NA = Non-Applicable; R= Required prior to development
(If "NA" is checked, an explanation must be entered)

Tab 1. Project Narrative	Applicant			Engr	
	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					
C. Discussion of offsite conditions					
D. Summary of runoff calculations (pre/post development) No increase in peak discharge for all storm series					
E. Narrative description of the type and function of the permanent best management practices that are incorporated into the site design					
F. Copy of the plat					
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.)					
H. Professional Engineer seal, signature and date on cover of report					
I. CD of drainage plan in PDF format (one file) and one paper copy bound with this checklist included behind the cover					

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



J. Location of existing utilities (e.g., water, sewer, gas, electric) and easements					
K. Location of existing conveyance systems such as storm drains, inlets, catch basins, channels, swales, and areas of overland flow					
L. Flow paths					
M. Location and dimensions of existing channels, bridges or culvert crossings					
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					
O. Assumed pre-developed runoff curve numbers					
P. Existing time of concentrations used in calculations					
Q. Evaluate immediate downstream drainage capacity, not to exceed more than 0.25 miles downstream of site					
R. Existing structural elevations (e.g., invert of pipes, manholes, etc.)					
S. Cross-section data for open channels					
T. Ground water elevations, if applicable					

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



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

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

Tab 5. Federal, State and Local Permits (to be provided prior to construction unless otherwise specified)	Applicant			Engr	
	I/R	NA	Explanation / Location in Plan	I/R	NA
A. US Army Corps of Engineers - Regulatory program permits (404 water quality certification)					
B. Kansas Department of Agriculture - Division of Water Resources Permits (Stream Obstruction, Channel Change, Flood Plain Fill, Levee, Water Appropriations, Dam safety permit, etc.)					
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.					
D. Kansas Department of Transportation					
E. Sedgwick County Right-of-way Permit					

Tab 1. Project Narrative

A. Location

The site is located in Wichita, Sedgwick County, Kansas, on the southwest corner of 143rd Street East and 21st Street North. It lies in the northeast quarter of Section 11, Township 27 South, Range 2 East of the Sixth Principal Meridian, Sedgwick County, Kansas. The total site area is approximately 19 acres. The site is bounded by Krug South residential addition to the west and south, 21st Street to the north, and 143rd Street to the east. The site is shown on the USGS Map, Figure 1.1.

B. Discussion of Development

Krug South commercial will be developed as ten commercial lots. The plat area is 19 acres.

C. Discussion of Offsite

Krug South residential is to the west and south of the site. The site is bounded by 21st Street and 143rd Street to the north and east, respectively.

D. Summary of Runoff

Drainage considerations for this plat were addressed when Krug South residential addition was platted. *Preliminary Drainage Report for Krug South Addition, Wichita, Kansas Revised January 2007* should be referenced for runoff calculations. This development is part of a larger common plan of development for this area. Detention for the 19 commercial acres was accounted for in the Krug South residential development. The pre- and post-development flow rates are shown below.

Comparison of Pre and Post-Development Flow Rates

Description	Design Storm Flows (cfs)			
	2-Yr	5-Yr	10-Yr	100-Yr
Pre-project Basin 1	477	893	1164	2081
Post-project Basin 1	420	791	1030	2053

E. Best Management Practices

The site will be seeded or sodded after construction of grading and utilities are complete. During construction best management practices will be followed to comply with state and federal stormwater regulations.

F. Plat

The plat is included, Figure 1.2.

G. Preliminary Grading Plan

The preliminary lot grading plan is included, Figure 1.3.

H. Professional Engineer Seal

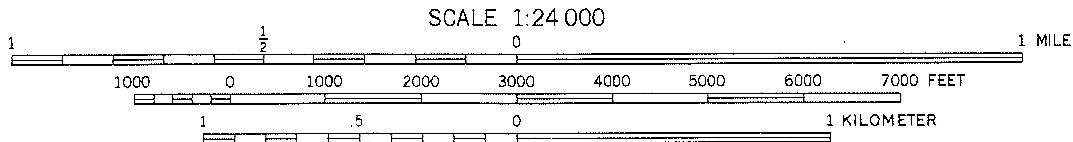
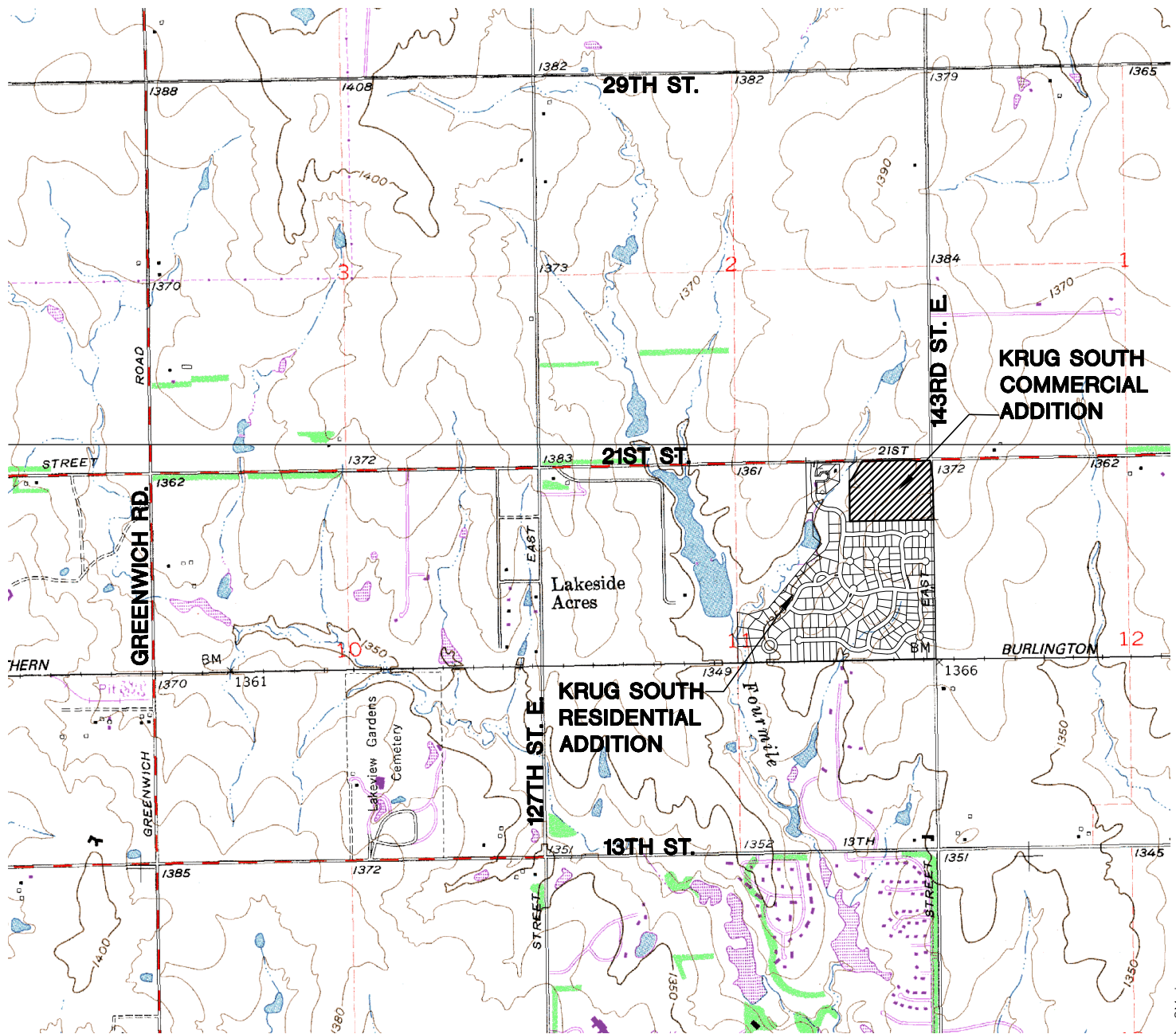
The cover of the report will be signed and dated.

I. CD

A CD of the drainage report in PDF format is attached to the inside front cover of the bound report.

Figure 1.1

USGS Quadrangle Map



CONTOUR INTERVAL 5 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929



MKEC ENGINEERING CONSULTANTS, INC. 411 N. WEBB ROAD WICHITA, K.S. 67206 316 - 684 - 9600	KRUG SOUTH COMMERCIAL PROJECT NAME		
	USGS GEOLOGICAL SURVEY WICHITA, KANSAS QUADRANGLE SHEET TITLE		
TMH DESIGN BY:	SLC DRAWN BY:	GJA CHECKED BY:	
NOVEMBER 2008 DATE	08372 JOB NO.	1 / 1 SHEET/OF	

J:\Civil\08372 Krug Comm\dwg\drng\KRUG_QM.dwg

Figure 1.2

Plat

FINAL PLAT

KRUG SOUTH COMMERCIAL ADDITION

AN ADDITION TO WICHITA, SEDGWICK COUNTY, KANSAS

CERTIFICATE OF SURVEY

I, Gregory J. Allison, a registered land surveyor in Kansas, do hereby certify that I have been in responsible charge of surveying and plating of "KRUG SOUTH COMMERCIAL ADDITION", an addition to Wichita, Sedgwick County, Kansas, into Lots and a Block, the same being accurately set forth in the accompanying plat and described herein:

A tract of land lying in the Northeast Quarter of Section 11, Township 27 South, Range 2 East of the Sixth Principal Meridian, Wichita, Sedgwick County, Kansas; said tract being more particularly described as follows:

BEGINNING at the northeast corner of said Northeast Quarter; thence along the east line of said Northeast Quarter on a Kansas coordinate system of 1983 south zone grid bearing of S00°53'20"W, 850.00 feet; thence S88°37'33"W, 60.00 feet to the northeast corner of Lot 13, Block 1, King South Addition, an addition to Wichita, Sedgwick County, Kansas; thence along a northerly line of said Block 1, S88°37'33"W, 1093.19 feet to the southeast corner of Reserve "E", said addition; thence along the east line of said Reserve "E", N00°53'20"W, 528.84 feet; thence N47°35'57"E, 33.05 feet; thence N37°49'11"E, 37.54 feet; thence N29°15'37"E, 115.12 feet; thence N31°05'32"E, 49.58 feet; thence N29°33'01"E, 81.00 feet to a point lying 73.34 feet east of the northeast corner of said Reserve "E", thence N01°22'27"W, 40.00 feet to the north line of said Northeast Quarter; thence along said north line, N88°37'33"E, 980.36 feet to the POINT OF BEGINNING.

All reserves, streets, utility easements, building setbacks, access control, together with, a Right-Of-Way Agreement, recorded in Book Misc. 308, Page 329; together with, an Easement for roadway, recorded in Film 1970, Page 228; together with, an Easement for Right-Of-Way, recorded in Book 1621, Page 1165; together with, a Drainage easement, recorded in DOCF/PUM-PG-528962/2793, together with, a Dedication for street purposes, recorded in DOCF/PUM-PG-2883-4671, together with, Utility and Drainage easement, recorded in DOCF/PUM-PG-28971911, within the above described property are hereby vacated and replated by virtue of K.S.A. 12-31-2(b).

I hereby certify that the details of this plat are correct to the best of my knowledge and belief this ____ day of _____, 2009.

Gregory J. Allison, PE, LS #1 257
 411 North Webb Road
 Wichita, Kansas 67206

OWNER'S CERTIFICATE

Know all men by these presents that we, the undersigned property owner of the land above set forth in the Registered Land Surveyor's Certificate, have caused the same to be surveyed and platted into Lots and a Block, the same to be known as "KRUG SOUTH COMMERCIAL ADDITION", an addition to Wichita, Sedgwick County, Kansas.

Easements for the construction and maintenance of public utilities and drainage, as indicated on the accompanying plat are hereby granted to the public. The 5' Wall Easement along west and south lines of the addition, as shown, is hereby platted for the construction and maintenance of a private wall. Utilities may cross the wall easement.

The streets are hereby dedicated to and for the use of the public.

All abutters' right to access to or from E. 143rd Street over and across the east line of "KRUG SOUTH COMMERCIAL ADDITION" are hereby granted to the appropriate governing body, as indicated hereon. All abutters' right to access to or from 21st Street N. over and across the north line of "KRUG SOUTH COMMERCIAL ADDITION" are hereby granted to the appropriate governing body, as indicated hereon.

A drainage plan has been developed for this plat. All drainage easements, rights-of-way, and reserves shall remain at established grades or as modified with the approval of the applicable City or County Engineer, and unobstructed to allow for the conveyance of storm water.

Lots 2 and 3, Block 1, are required to adhere to the minimum pad elevation as shown on the "Minimum Pad Elevations".

This plat shall adhere and conform to the recitals of C.U.P. DP-302 as approved and recorded at the Wichita-Sedgwick County Metropolitan Area Planning Department.

BRISTOL SQUARE, LLC, a Kansas Limited Liability Company

Gary L. Olson, Managing Member
 Managing Member

STATE OF KANSAS, SEDGWICK COUNTY) ss:

This instrument was acknowledged before me on ____ day of _____, 2009, by Gary L. Olson, Managing Member, Bristol Square, LLC, a Kansas Limited Liability Company.

IN WITNESS WHEREOF, I have hereunto set my hand and affixed my official seal, the day and year last above written.

Notary Public: _____, Notary Public
 My Term Expires: _____

MORTGAGE CERTIFICATE

We, Legacy Bank, holders of a mortgage on the above described property, do hereby consent to the plat of "KRUG SOUTH COMMERCIAL ADDITION."

Legacy Bank

Briice Malloy, Vice President
 Vice President

This instrument was acknowledged before me on this ____ day of _____, 2009, by Briice Malloy, Vice President, Legacy Bank.

IN WITNESS WHEREOF, I have hereunto set my hand and affixed my official seal, the day and year last above written.

Notary Public: _____, Notary Public
 My Term Expires: _____

PLANNING COMMISSION CERTIFICATE

This plat of "KRUG SOUTH COMMERCIAL ADDITION" has been submitted to and approved by the Wichita-Sedgwick County Metropolitan Area Planning Commission, Wichita, Kansas.

Dated this ____ day of _____, 2009

WICHITA-SEDGWICK COUNTY METROPOLITAN AREA PLANNING COMMISSION

Darrell A. Downing, Chair

Affert: John L. Schlegel, Secretary
 Secretary

GOVERNING BODY CERTIFICATE

The dedications shown on this plat are hereby accepted and this plat is hereby approved by the governing body of the City of Wichita, Kansas.

Dated this ____ day of _____, 2009

At the direction of the City Council.

Carl Brewer, Mayor

Affert: Karen Sublett, City Clerk
 City Clerk

TRANSFER RECORD

STATE OF KANSAS, SEDGWICK COUNTY) ss:

Entered on transfer record this ____ day of _____, 2009

Don Brace, County Clerk
 County Clerk

REGISTER OF DEEDS CERTIFICATE

This is to certify that this instrument was filed for record in the Register of Deeds office this ____ day of _____, 2009, at ____ o'clock ____ M., and is duly recorded.

Bill Meeks, Register of Deeds
 Register of Deeds

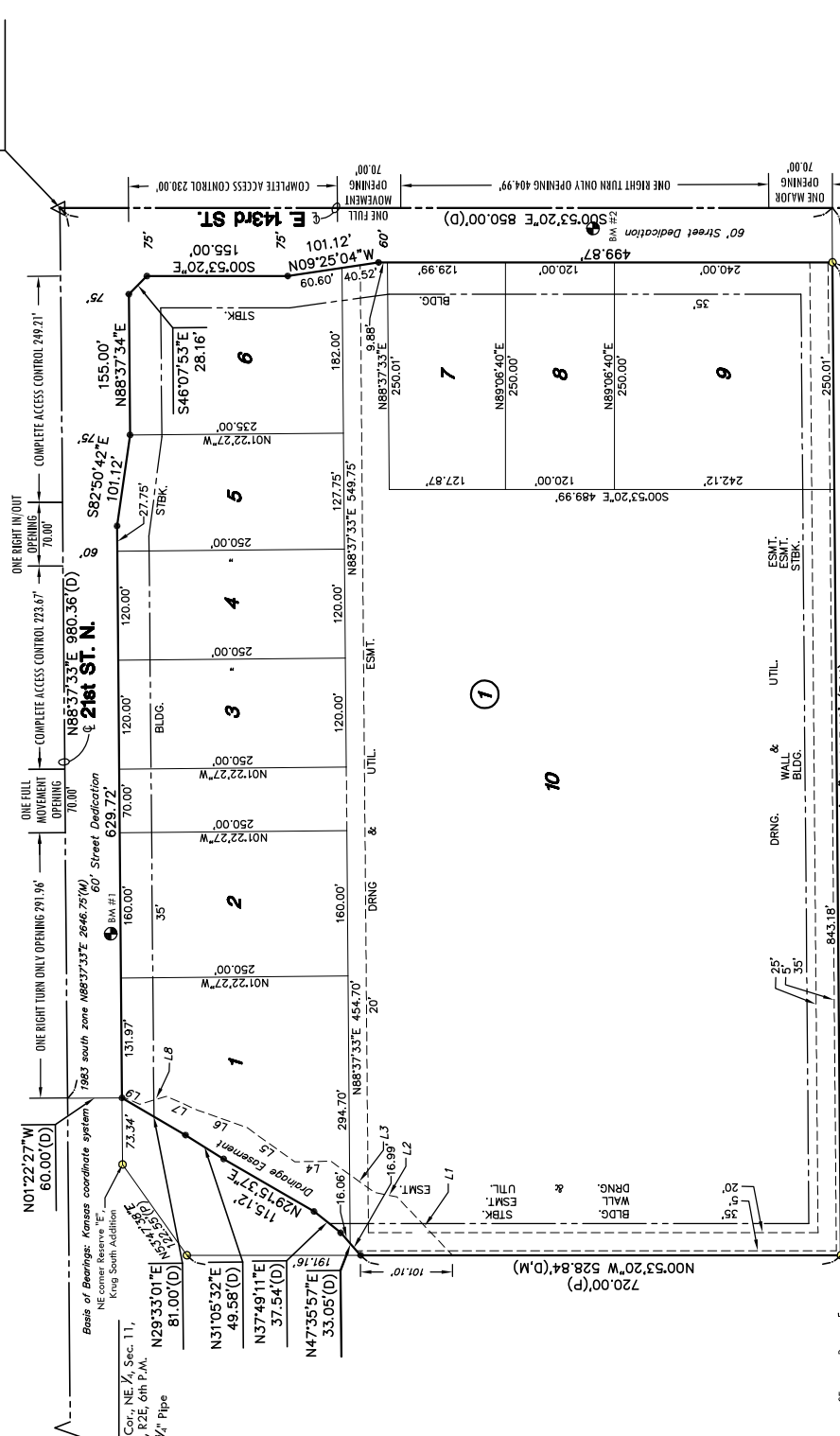
Affert: Tonya E. Buckingham, Deputy
 Deputy

COUNTY SURVEYOR

Reviewed in accordance with K.S.A. 58-2005 on this ____ day of _____, 2009.

Tricia L. Robello, LS #1246
 Deputy County Surveyor
 Sedgwick County, Kansas
 Deputy County Surveyor

NE Cor., NE 1/4, Sec. 11,
 T27S, R2E, 6th P.M.
 Fnd. 1/2" w/ cap



SE corner Reserve E,
 King South Addition

NE corner Lot 13,
 Block 1, King South
 Addition

NE Cor., NE 1/4, Sec. 11,
 T27S, R2E, 6th P.M.
 Fnd. 1/2" w/ PEC cap

MINIMUM PAD ELEVATIONS LOWEST OPENINGS		
LOTS (inclusive)	BLOCK	ELEVATION NGVD
1 and 10	1	1362.0

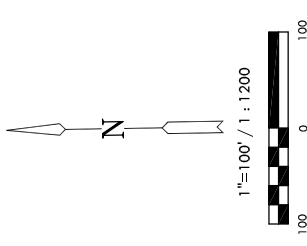
- LEGEND**
- △ = Section Corner Monument Found
 - = Found 3/4" Rebar w/ MKEC
 - = CLS 39 Id. cap
 - = Set 3/4" Rebar w/ MKEC
 - = CLS 39 Id. cap
 - (M) = Measured
 - (P) = Platted
 - (D) = Deeded or Described

DRAINAGE EASEMENT LINE TABLE		
LINE	LENGTH	BEARING
L1	88.47	N45°36'09"E
L2	24.83	N10°18'34"E
L3	59.85	N34°31'22"E
L4	39.57	N02°02'47"W
L5	64.45	N34°45'00"E
L6	57.39	N18°40'01"E
L7	38.29	N22°47'40"E
L8	30.37	N17°36'06"W
L9	21.26	N22°28'02"E

BENCH MARKS

- Datum BM
 Williams gate over bridge in
 Howthorne Addition.
 Elev. = 1362.17(NGVD 29)
- BM#1
 RR spike in S. face of PP, 3rd PP W. of
 143rd St.(799' from CL) S. side of 21st
 St. (49' from CL)
 Elev. = 1362.17(NGVD 29)
- BM#2
 FH NE bolt w/ tag on top of drive,
 W. side of 143rd St. NW of flange. (23'
 from CL)
 Elev. = 1382.81(NGVD29)

VICINITY MAP



Basis of Bearings: Kansas coordinate system 1983 south zone bearing of N88°37'33"E along the north line of Northeast Quarter, Section 11, T27S, R2E, 6th P.M.

NOTE

Zoning:
 This plat shall adhere and conform to the recitals of CUP DP-302 as approved and recorded at the Wichita-Sedgwick County Metropolitan Planning Area Department.

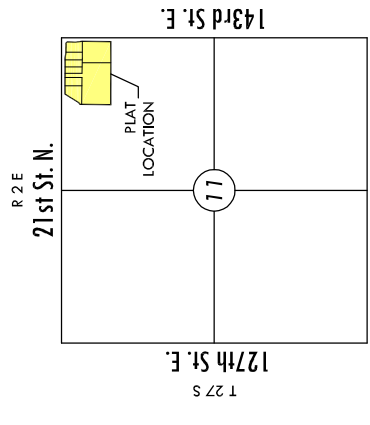
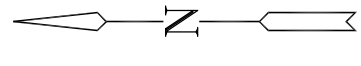
MKEC
 ENGINEERING
 CONSULTANTS, INC.
 411 N. WEBB ROAD
 WICHITA, KS. 67206
 316-684-9600

Figure 1.3

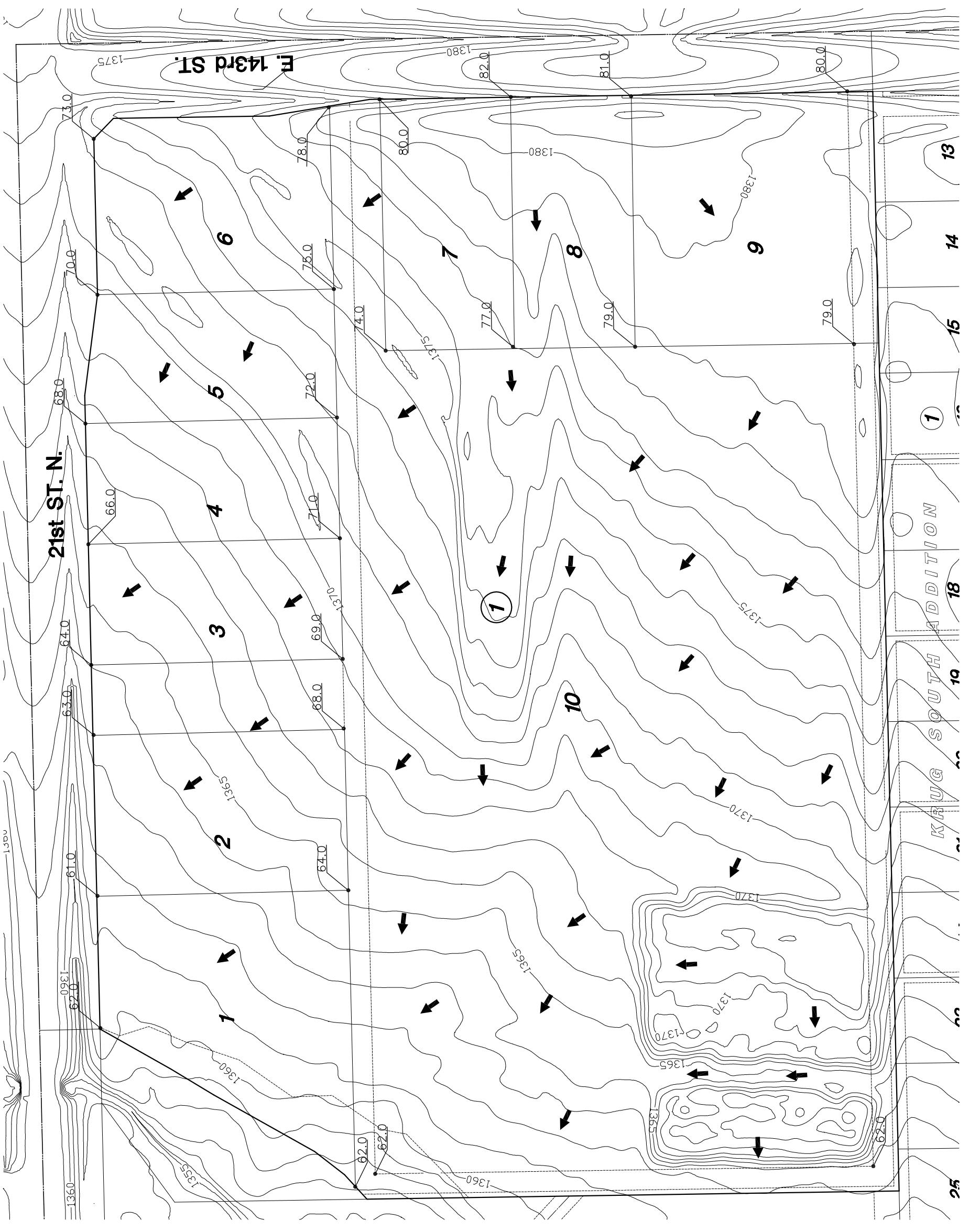
Preliminary Grading Plan

J:\C:\1\08372 Krug Comm\dwg\08372.LGP.dwg

- LEGEND**
- CONIFEROUS TREE
 - DECIDUOUS TREE
 - SN - SIGN
 - POWER POLE
 - ELECTRIC BOX
 - LIGHT POLE
 - FIRE HYDRANT
 - WATER VALVE
 - WATER METER
 - SECTION CORNER
 - BENCHMARK
 - EASEMENT
 - BUILDING SETBACK
 - FENCE
 - STORM SEWER PIPE
 - WATER LINE
 - SANITARY SEWER LINE
 - GAS LINE
 - GAS PIPELINE
 - TELEPHONE LINE
 - UNDERGROUND ELEC.
 - OVERHEAD ELECTRIC
 - FIBER OPTIC CABLE
 - SPOT ELEVATION
 - FLOW ARROW



VICINITY MAP
13th St. N.



Tab 2. Existing Conditions Runoff Calculations

A. Orthophotograph

The aerial photograph is included, Figure 2.1.

B. Runoff Method

The site was modeled using TR-20 software; see *Preliminary Drainage Report for Krug South Addition, Wichita, Kansas Revised January 2007*.

C. Existing Topography

The site drains from east to west. Slopes on site are about 2%. Elevations on the site range from 1380 feet in the east to 1357 feet in the west. The existing topography is shown in the *Preliminary Drainage Report for Krug South Addition, Wichita, Kansas Revised January 2007*.

D. Site Areas

Krug South commercial addition is 19 acres. The site is currently undeveloped rangeland.

E. Benchmarks

Benchmarks used for site control are included on the plat, Figure 1.2.

F. Streams, Creeks, and Waterways

A majority of the platted area is located in Zone X, areas outside the 1% annual chance storm, as shown on the revised FIRM panel 0385E, effective November 14, 2008, Figure 2.2. A portion of the northwest corner is within the 1% annual chance floodplain; however, this area is confined to a drainage easement. The FIRM is revised based on LOMR Case Number 09-07-0232P. Unnamed Tributary 2 to Fourmile Creek is west of the site.

G. Soils

According to the NRCS (SCS) Sedgwick County Soil Survey, Figure 2.3, soils on the site are:

- Irwin Series (Ia: Irwin silty clay loam, with 1 to 3 percent slopes).
- Rose Hill Series (Rd: silty clay, 1 to 3 percent slopes).

The Hydrological Soil Group (HSG) for the site is "D".

H. Natural Features

The property is currently undeveloped rangeland.

I. Location of Existing Impervious Areas

Currently the site is undeveloped agricultural land with no impervious area.

J. Location of Existing Utilities

No existing utilities are onsite. However, utilities have been constructed for Krug South residential development which borders the site to the west and south.

K. Location of Existing Conveyance Systems

There are no existing conveyance systems onsite.

L. Flow Paths

Existing flow paths are shown in the *Preliminary Drainage Report for Krug South Addition, Wichita, Kansas Revised January 2007*.

M. Location and Sizes of Existing Structures

There are no existing structures in the area identified on the plat as Krug South commercial.

N. Existing Conditions Hydrologic Analysis

The site is part of Basin 1 as shown in the *Preliminary Drainage Report for Krug South Addition, Wichita, Kansas Revised January 2007*.

The resulting pre-project flows are reported in the table below. Runoff calculations are in *Preliminary Drainage Report for Krug South Addition, Wichita, Kansas Revised January 2007*.

Pre-Development Flow Rates

Description	Design Storm Flows (cfs)			
	2-Yr	5-Yr	10-Yr	100-Yr
Pre-project Basin 1	477	893	1164	2081

O. Pre-Developed Runoff Curve Numbers

A weighted curve number of 85.4 was used for Basin 1.

P. Existing Time of Concentration

The time of concentration for pre-development conditions is shown in the following table. Time of concentration calculations are in *Preliminary Drainage Report for Krug South Addition, Wichita, Kansas Revised January 2007*.

Existing Times of Concentration

Area	T _c	Curve Number
	minutes	
Basin 1	91	85.4

Q. Downstream Drainage Capacity

Post-project runoff rates from Krug commercial and residential development remain unchanged from pre-project conditions. After development, downstream drainage effects will remain similar to what is currently experienced.

R. Existing Structural Elevations

There are no existing structures on site.

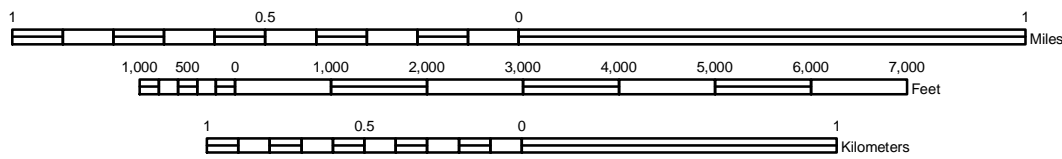
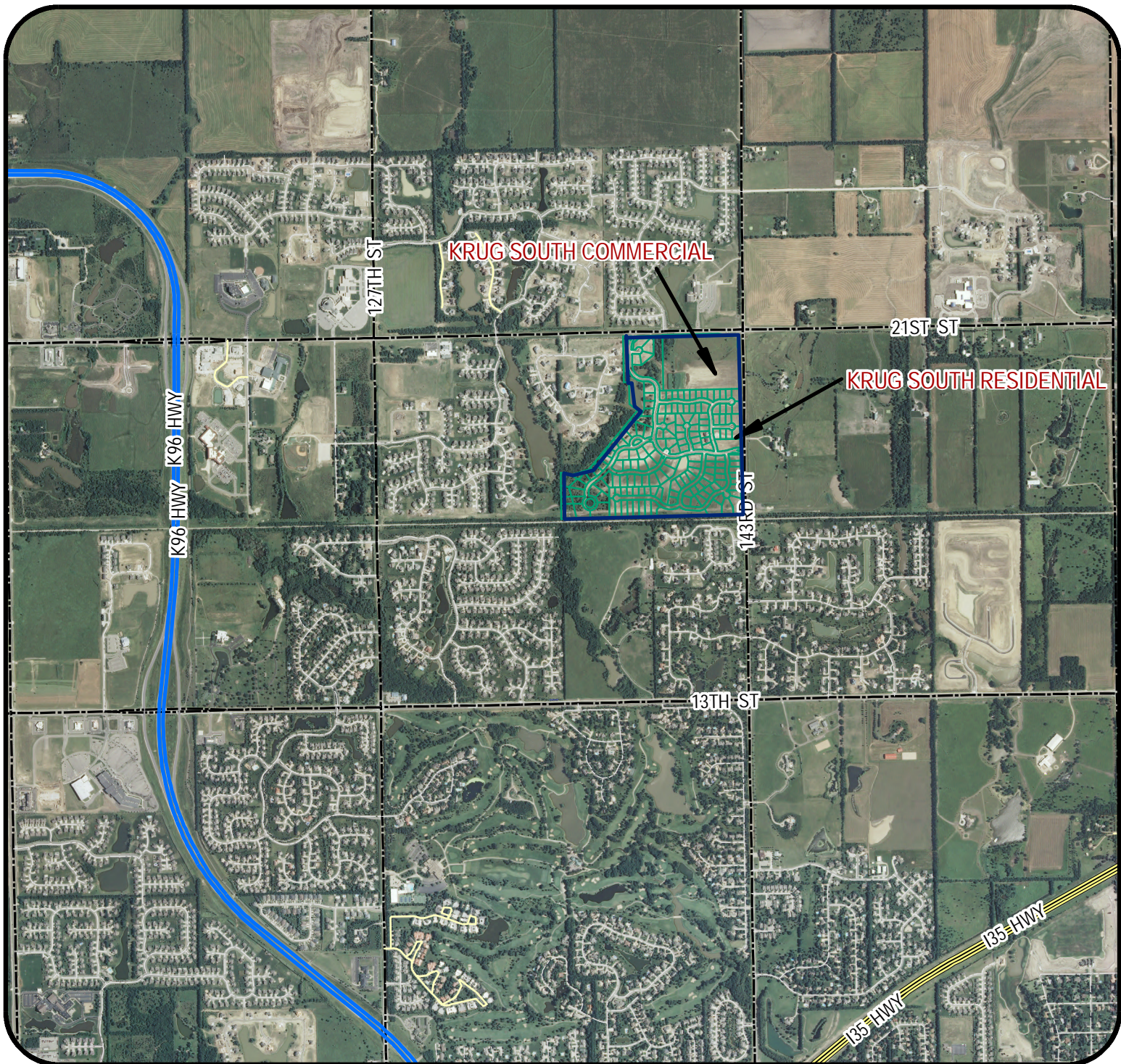
S. Open Channels

Unnamed Tributary 2 is approximately 100 feet west of the site. There are no open channels on the Krug Commercial site.

T. Groundwater Elevations

Groundwater is not a significant factor for this development.

Figure 2.1
Orthophotograph



J:\Civil\108372\dwg\DRNG\Soil Survey.mxd

Krug South Addition

Project Name:

Aerial - Sedgwick County, KS

Sheet Title:



KWS

Drawn By:

TMH / KLA

Design / Review:

NOV. 2008

Date:

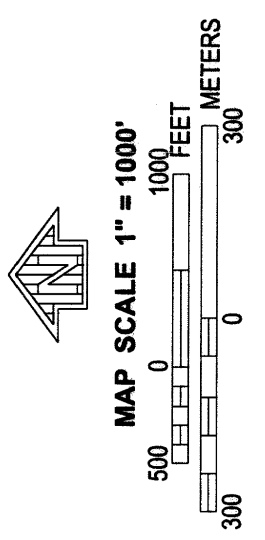
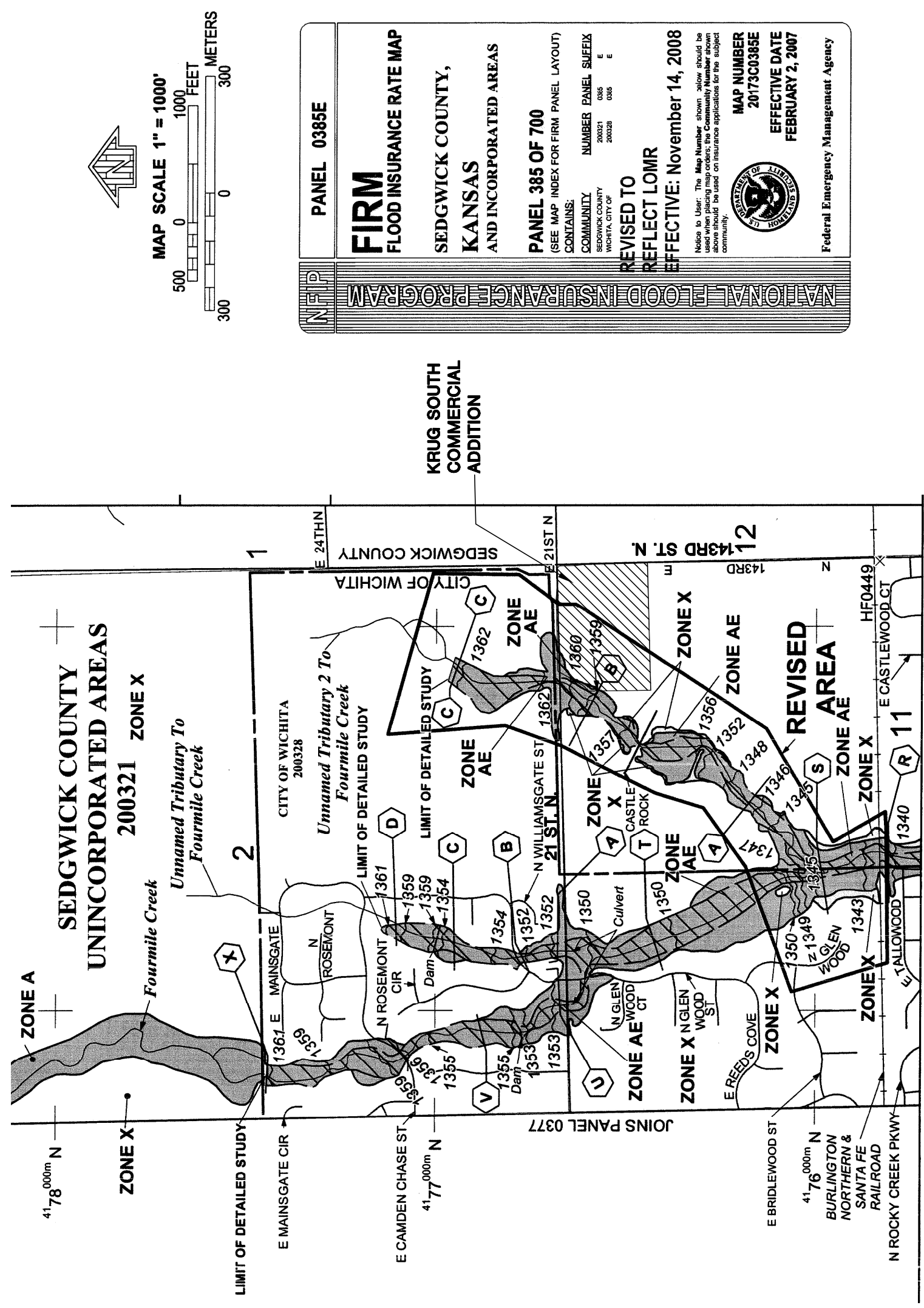
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Job No.:

Figure 2.2

FIRM

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NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0385E

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

PANEL 385 OF 700
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:
COMMUNITY NUMBER 200321
SEDGWICK COUNTY 0385
WICHITA, CITY OF 200328 0385 E E

REVISED TO REFLECT LOMR
EFFECTIVE: November 14, 2008

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

MAP NUMBER
20173C0385E
EFFECTIVE DATE
FEBRUARY 2, 2007

Federal Emergency Management Agency



SEDGWICK COUNTY UNINCORPORATED AREAS
200321 ZONE X

KRUG SOUTH COMMERCIAL ADDITION

REVISED AREA

41,780,000m N

41,770,000m N

41,760,000m N

JOINS PANEL 0377

LIMIT OF DETAILED STUDY

E MAINS GATE CIR

E CAMDEN CHASE ST

N ROSEMONT CIR

N WILLIAMSGATE ST

N GLEN WOOD CT

N GLEN WOOD ST

E REEDS COVE

E BRIDLEWOOD ST

BURLINGTON NORTHERN & SANTA FE RAILROAD

N ROCKY CREEK PKWY

E CASTLEWOOD CT

HF0449

E 24TH N

E 21ST N

E 143RD ST N

SEDGWICK COUNTY

CITY OF WICHITA

200328

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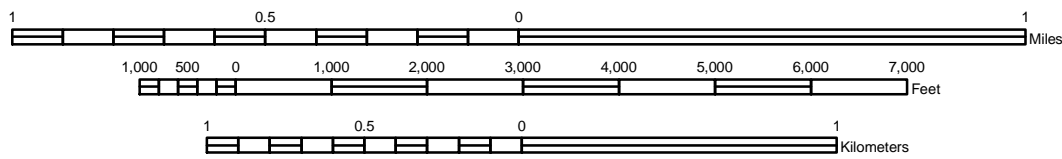
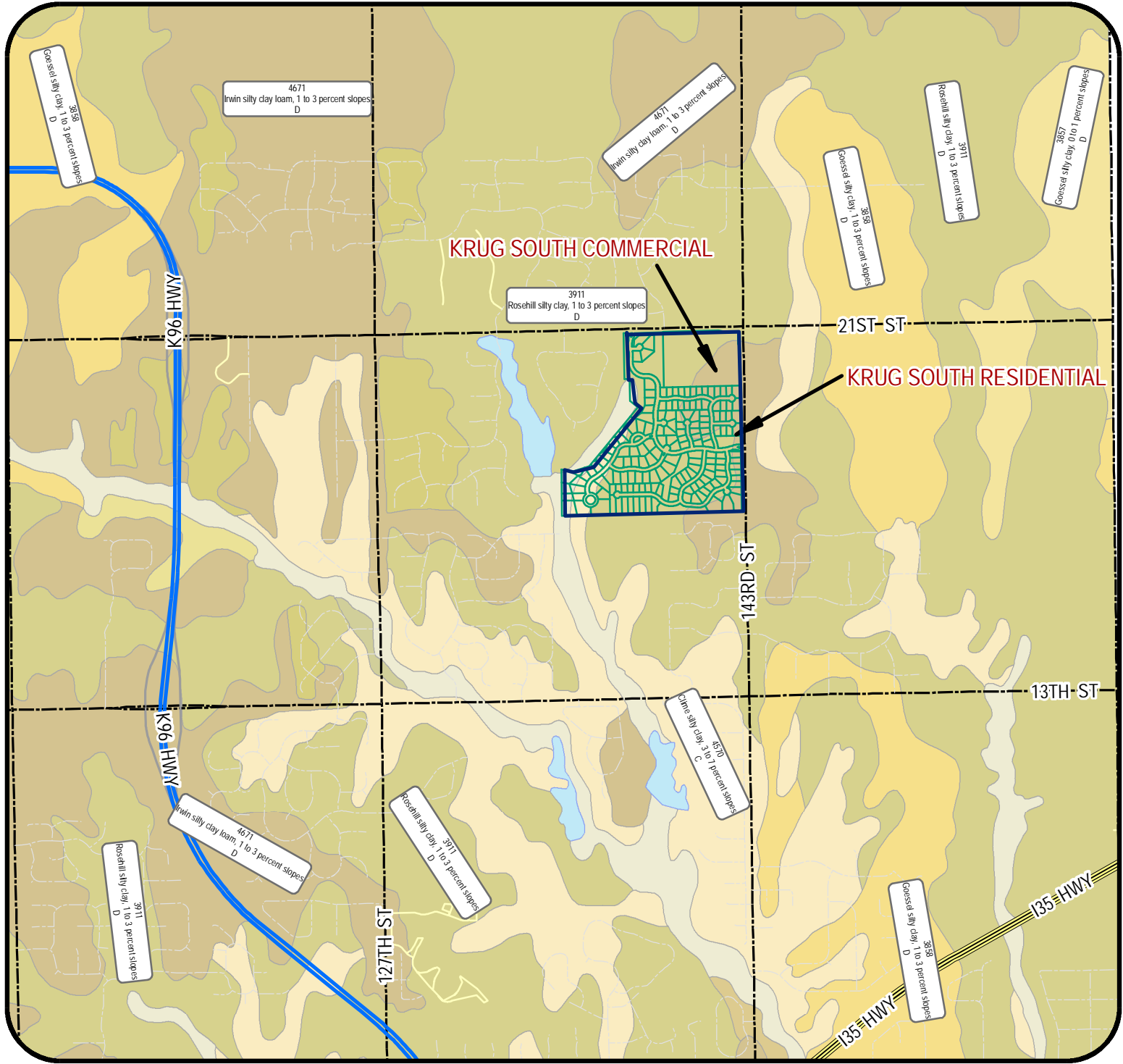
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Figure 2.3

Soil Survey



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Krug South Addition

Project Name: _____

Soil Survey - Sedgwick County, KS

Sheet Title: _____

	KWS	NOV. 2008
	Drawn By:	Date:
	TMH / KLA	08372
	Design / Review:	Job No.:

Tab 3. Post-Development Hydrologic Analysis

A. Proposed Conditions Hydrologic and Hydraulic Analysis

The post-project drainage boundaries are shown in the *Preliminary Drainage Report for Krug South Addition, Wichita, Kansas Revised January 2007*. TR-20 software was used to complete the hydrologic analysis for Krug South Commercial. The runoff calculations are in *Preliminary Drainage Report for Krug South Addition, Wichita, Kansas Revised January 2007* and the resulting flows are in the table below.

Post-Development Flowrates

Description	Design Storm Flows (cfs)			
	2-Yr	5-Yr	10-Yr	100-Yr
Post-project Basin 1	420	791	1030	2053

B. Proposed Time of Concentration

The time of concentration was calculated using the FAA method. The following table shows the post-development time of concentration. Time of concentration calculations are in *Drainage Preliminary Drainage Report for Krug South Addition, Wichita, Kansas Revised January 2007*.

Proposed Time of Concentrations

Area	T _c	Curve Number
	minutes	
*Basin 1 - Onsite	18.7	88

*Includes residential and commercial portions of Krug South

C. Assumed Post-Developed Curve Numbers

A weighted curve number of 88 was used for the onsite portion of Basin 1. Curve number calculations are in *Preliminary Drainage Report for Krug South Addition, Wichita, Kansas Revised January 2007*.

D. Proposed Contours for Detention

The existing detention ponds west of the site (part of Krug South residential development) adequately serve this development.

E. Preliminary SWS Sizing Calculations

Stormsewer within the Krug South commercial site will be designed for the 5-year storm. Pipe sizing calculations are in Figure 3.1.

F. Stage-Storage-Discharge

There are no detention areas proposed on the commercial site. Detention is provided west of the site as a part of the entire Krug South residential and commercial development.

G. Analysis of upstream/downstream impact

Runoff flows for all design storms remain the same or decrease from pre to post-development; therefore, upstream/downstream impacts are unchanged from current conditions.

H. Existing and Proposed Structural Elevations

There are no existing structures on site. Minimum pad elevations will be set 3 feet above the 100-year water surface elevation of Unnamed Tributary 2. This requirement results in a minimum pad elevation of 1362.0 for Lots 1 and 10, Block 1. When feasible, current grade will dictate structural elevations.

I. Pond Design Elevations

There are no ponds proposed for Krug South commercial.

J. Structure Details

Storm sewer is proposed for the site.

K. Limits of Clearing and Grading

The entire site will be cleared and graded.

L. Location of Impervious Areas

The commercial buildings, parking areas and drives will be impervious.

M. Location of Utilities

Proposed utilities are shown on the drainage and utility plan, Figure 3.2.

N. Location of Conveyance Systems

Storm sewer will carry flow from the paving west into the existing detention ponds and Unnamed Tributary 2. Proposed storm sewer lines are shown on the drainage and utility plan, Figure 3.2.

O. Location of Channel Modifications

Unnamed Tributary 2, west of the site, was modified as a part of the Krug South residential development. A LOMR has been approved for the channel modifications; the appropriate Department of Water Resources (DWR) and United States Army Corps of Engineers (USACE) permits were obtained before construction. No further modifications are proposed

P. Selection and Location of Stormwater Controls

Stormwater controls consist of curb inlets, storm sewer sized to handle 5-year flows. The detention area west of the site adequately controls flows from this development.

Q. Emergency Overflow

Runoff from Krug South commercial will flow into Unnamed Tributary 2 in the event of an emergency.

R. Freeboard

Detention ponds are not proposed for the commercial site.

S. 100-Year High Water Line

The 100-year water surface elevation of the portion of Unnamed Tributary 2 that is adjacent to Krug South commercial is 1359.0.

T. Lowest Openings

The lowest opening for lots adjacent to the Tributary will be 1362.0. All other lots will be graded to maintain at least 0.5% slope in the parking areas and drives.

U. Stormwater Management Facilities

Stormsewer lines will be placed in a drainage easement.

V. Maintenance Responsibility

The maintenance of any easements will be the responsibility of the owner.

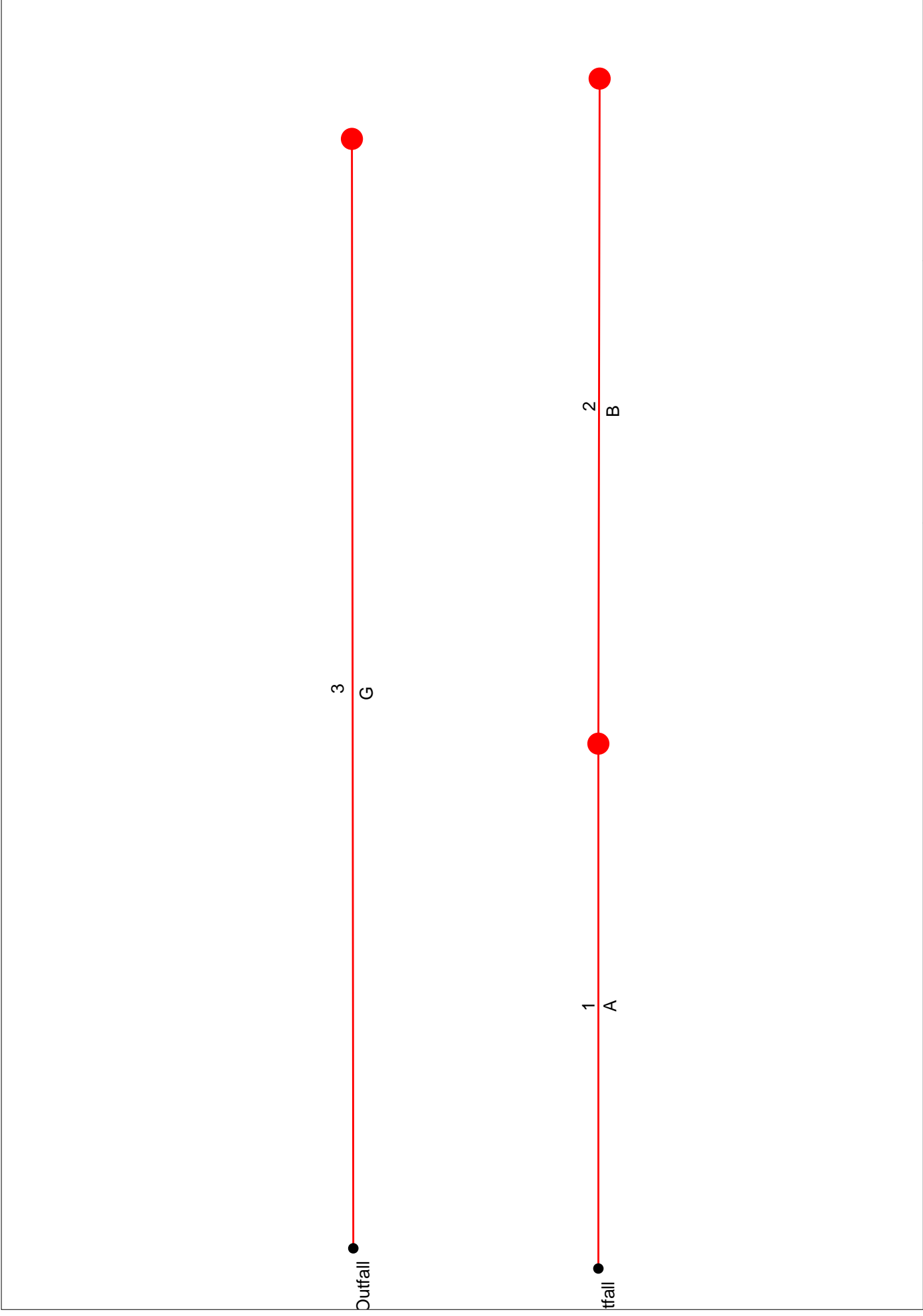
W. Offsite-Drainage Easements

Not applicable to Krug South commercial addition.

Figure 3.1

Pipe Sizing Calculations

Hydraflow Storm Sewers Plan



Storm Sewer Tabulation

Station Line	To Line	Len (ft)	Drng Area		Rnoff coeff (C)	Area x C		Tc		Rain (l) (in/hr)	Total flow (cfs)	Cap full (cfs)	Vel (ft/s)	Pipe		Invert Elev		HGL Elev		Grnd / Rim Elev		Line ID
			Incr (ac)	Total (ac)		Incr	Total	Inlet (min)	Syst (min)					Size (in)	Slope (%)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	
1	End	104	5.30	12.90	0.87	4.61	11.22	15.0	15.7	4.5	50.01	20.71	7.08	36	0.10	1353.50	1353.60	1356.50	1357.08	1359.00	1359.00	A
2	1	131	7.60	7.60	0.87	6.61	6.61	15.0	15.0	4.5	30.08	13.39	6.13	30	0.11	1354.10	1354.24	1357.13	1357.83	1359.00	1371.00	B
3	End	219	5.50	5.50	0.87	4.79	4.79	15.0	15.0	4.5	21.77	9.42	7.38	24	0.17	1354.00	1354.38	1355.65	1357.88	1354.00	1370.00	G
Project File: 08372SWS.stm														Number of lines: 3				Run Date: 12-03-2008				

NOTES: Intensity = 52.62 / (Inlet time + 11.20) ^ 0.75; Return period = 5 Yrs. ; c = cir e = ellip b = box

Figure 3.2

Drainage and Utility Plan

Tab 4. Floodplain Submittal

Not applicable to Krug South commercial addition; however, LOMR Case Number 09-07-0232P (November 14, 2008) was approved as a part of the Krug South residential development, south and west of the site.

Tab 5. Permits

A. US Army Corps of Engineers

Not applicable to Krug South commercial addition; however, the Krug South residential development was permitted under Nationwide Permit 29 (NWK-2007-1070, June 1, 2007).

B. Kansas Department of Agriculture

Not applicable to Krug South commercial addition; however, the following DWR permits were approved for Krug South residential addition:

- CSG-0266 (Approved 08-13-07)
- SSG-0564-L (Approved 08-13-07)
- LSG-0335-S (Approved 08-13-07)
- LSG-0330 (Approved 08-13-07)
- SSG-0563-L (Approved 08-13-07)
- LSG-0331-S (Approved 08-13-07)

Stream obstruction permits may be required depending on the final stormsewer design.

C. Federal Emergency Agency (FEMA)

Not applicable to Krug South commercial addition; however, LOMR Case Number 09-07-0232P was approved as a part of the Krug South residential development, south and west of the site.

D. Kansas Department of Transportation

Not applicable to Krug South commercial addition.

E. Sedgwick County Right-of-way Permit

Not applicable to Krug South commercial addition.