

**DRAINAGE PLAN
AND
SUPPORTING CALCULATIONS**

FEB 16 2010

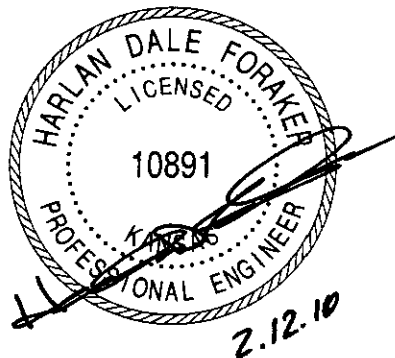
**FOR
GREIFFENSTEIN SQUARE
A SUBDIVISION TO
SEDGWICK COUNTY, KANSAS**

**PREPARED FOR:
MARK SAVOY
433 S. HYDRAULIC STREET
WICHITA, KS 67211**

FEBRUARY 10, 2010

PREPARED BY:

**CERTIFIED ENGINEERING DESIGN, P.A.
1935 WEST MAPLE
WICHITA, KANSAS 67213
(316)262-8808 PHONE
(316)262-1669 FAX**





**Public Works, Engineering Division
Final Drainage Plan Submittal Checklist**

Reviewer: _____ Date: 2-10-10
 Subdivision Name: GRIPPENSTEIN SQUARE Location: 21st St. N. 1/2 mi. W. of 19th St. West
 Total Land Area Of Ownership: 1.0 Acres
 Type: Residential _____ Commercial Industrial _____ Recreation _____ Municipal _____ Other _____
 Applicant: Ian T. Doops Contact: Ian T. Doops Phone #: _____
 Engineer: CERTIFIED ENG. DESIGN Contact: HARUN FORAKER 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)

Tab 1. Project Narrative	Applicant			Engr	
	I	NA	Explanation / Location in Plan	I	NA
A. Site Location Map, using USGS Map				<input checked="" type="checkbox"/>	
B. Discussion of development, existing conditions, and proposed impacts on stormwater, wetland, riparian, and flood plain	<input checked="" type="checkbox"/>			<input checked="" type="checkbox"/>	
C. Discussion of offsite conditions					<input checked="" type="checkbox"/>
D. Summary of runoff calculations (pre/post development) No increase in peak discharge for all storm series				<input checked="" type="checkbox"/>	
E. Narrative description of the type and function of the permanent best management practices that are incorporated into the site design				<input checked="" type="checkbox"/>	
F. Copy of the plat				<input checked="" type="checkbox"/>	
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.)				<input checked="" type="checkbox"/>	
H. Professional Engineer seal, signature and date on cover of report				<input checked="" type="checkbox"/>	
I. CD of drainage plan in PDF format (one file) and one paper copy bound with this checklist included behind the cover				<input checked="" type="checkbox"/>	

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)				<input checked="" type="checkbox"/>	
B. Runoff Method (Rational, Hydrograph Method, or other approved methods by Engineering)				<input checked="" type="checkbox"/>	
C. Existing topography (no greater than 2-foot contours, 1-foot recommend)				<input checked="" type="checkbox"/>	
D. Total Site Area and Total Impervious Area (acres)				<input checked="" type="checkbox"/>	
E. Benchmarks used for site control				<input checked="" type="checkbox"/>	
F. Streams, creeks, and waterway labeled				<input checked="" type="checkbox"/>	
G. Predominant soils from USDA soil surveys, and/or on site soil borings				<input checked="" type="checkbox"/>	
H. Location and boundaries of natural features such as wetlands, lakes, and ponds with the normal water elevation noted				<input checked="" type="checkbox"/>	
I. Location of existing roads, buildings, parking lots and other impervious areas.				<input checked="" type="checkbox"/>	



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			<i>RATIONAL C FACTORS USED</i>	✓	
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					✓

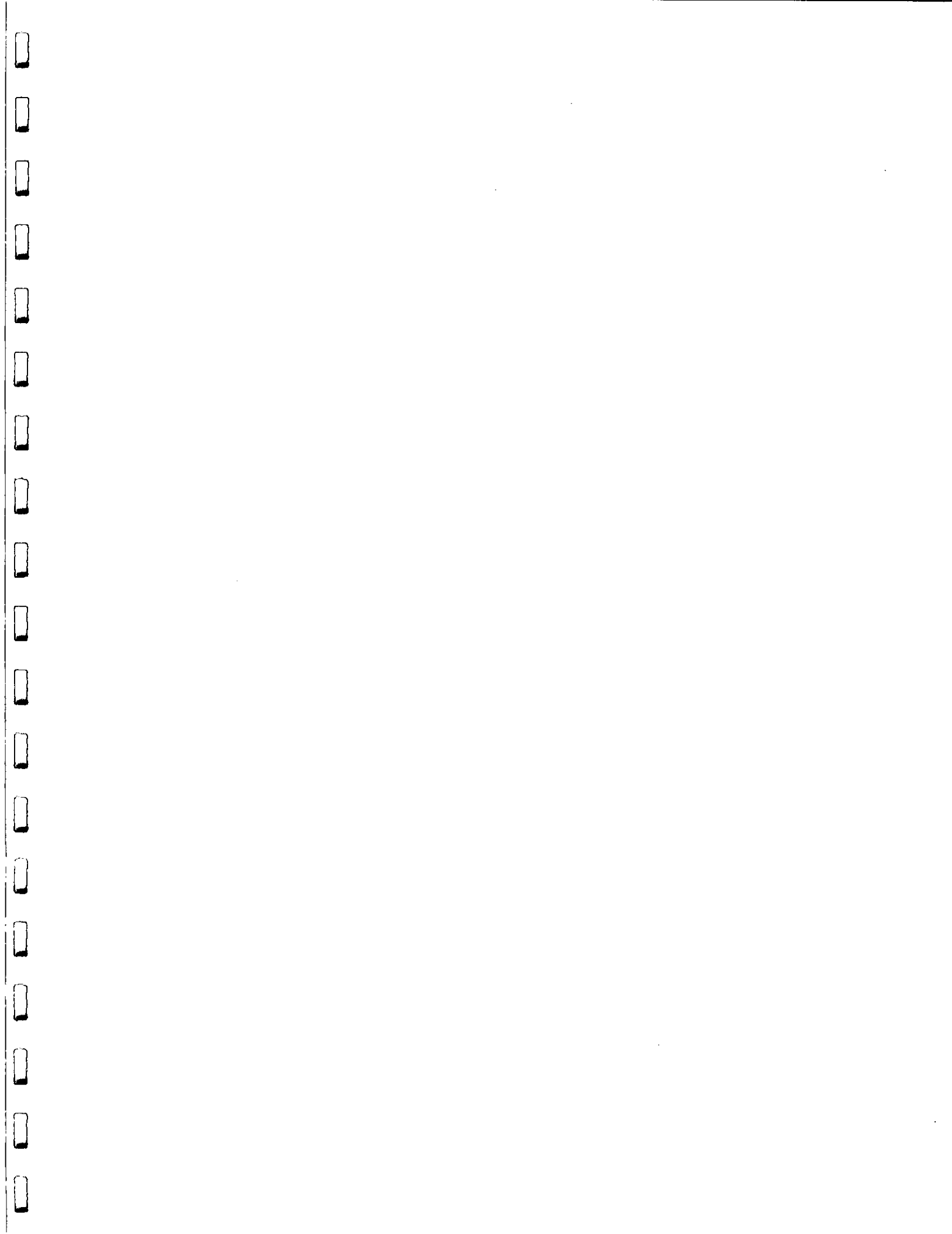
Tab 3. Post-Development Hydrologic Analysis	Applicant			Engr	
	I	NA	Explanation / Location in Plan	I	NA
A. Proposed (post-development) conditions hydrologic and hydraulic analysis for runoff rates, volumes, HGL, and velocities showing the methodologies used and supporting calculations for all applicable 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			<i>RATIONAL C FACTORS USED</i>	✓	
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 plat text. (e.g. HOA, Lot Owners Association, or lot)					✓
W. Off-site drainage easements or agreements required, where necessary					IN PROCESS OF OBTAINING

Tab 4. Floodplain Submittal	Applicant		Engr	
	I	NA	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	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				✓





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)					✓
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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				✓

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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				✓

DRAINAGE PLAN AND SUPPORTING CALCULATIONS

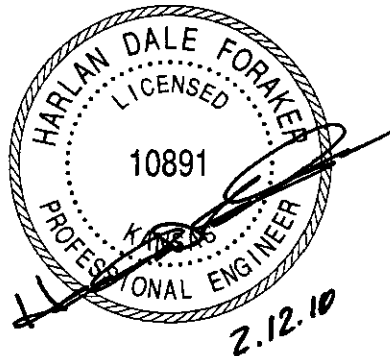
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Greiffenstein Square Drainage Plan (Con't)
February 10, 2010

CERTIFIED ENGINEERING DESIGN, P.A
1935 West Maple
Wichita, KS 67213
(316)262-8808 Office
(316)262-1669 Fax

LETTER OF TRANSMITTAL

DATE: February 10, 2010

TO: Mr. Scott Lindebak, P.E.
Engineering Division
City of Wichita
7th Floor, City Hall
455 North Main
Wichita, KS 67202

RE: Drainage Plan
Greiffenstein Square
Wichita, Sedgwick County, KS

FROM: Harlan D. Foraker, P.E. *HDF*

I. PROJECT NARRATIVE

This site is located on the south side of 21st Street North, between 119th Street West and 135th Street West, directly west of Teal Brook Estates. This site is zoned "SF-20" single family 20,000 and currently undeveloped. Project area is 1 acre and consists of dense grasses and light to dense underbrush. Property to the north, south and west is mainly dense underbrush and zoned SF-20. The property to the east is single family dwellings and zoned SF-5. The SCS soil type present is Elandco Silt Loam and has a Class B rating. This property has been removed from the flood plain. See attached documents.

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.

Greiffenstein Square Drainage Plan (Con't)
February 10, 2010

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 sub area time of concentration is 15 minutes.

Soil types were determined from the Natural Resources Conservation Service's Soil Survey web site. The SCS soil types at this location are Elandco Silt Loam (rarely flooded) is a SCS class B soil.

The developed drainage sub areas have been delineated on the 1" = 30' 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 all 5 storm events.

For existing conditions this site has 3 sub-basins.

Sub-basin A is 0.47 acres in area. Drainage flows north across sub-basin A to the outside of the lot where it connects with the south drainage ditch of 21st Street West. Drainage continues west following the drainage ditch offsite.

The following table summarizes the peak discharge for drainage area sub-basin A which comprises 0.47 acres within the proposed Greiffenstein Square.

EXISTING PEAK RUNOFF FOR THE DRAINAGE SUB-BASIN A

Description	C	Tc	I	Area	Q(cfs)
Existing Drainage Area(2 yr.)	.16	15	3.80	0.47	0.29
Existing Drainage Area(5 yr.)	.18	15	4.62	0.47	0.39
Existing Drainage Area(10 yr.)	.24	15	5.21	0.47	0.59
Existing Drainage Area(25 yr.)	.31	15	6.06	0.47	0.88
Existing Drainage Area(100 yr.)	.37	15	7.40	0.47	1.29

Sub-basin B is 0.44 acres in area. Drainage flows south and east across sub-basin B to the outside of the lot where it connects with a natural flow line that directs the drainage south offsite.

The following table summarizes the peak discharge for drainage area sub-basin B which comprises 0.44 acres within the proposed Greiffenstein Square.

EXISTING PEAK RUNOFF FOR THE DRAINAGE SUB-BASIN B

Description	C	Tc	I	Area	Q(cfs)
Existing Drainage Area(2 yr.)	.16	15	3.80	0.44	0.27
Existing Drainage Area(5 yr.)	.18	15	4.62	0.44	0.37
Existing Drainage Area(10 yr.)	.24	15	5.21	0.44	0.55
Existing Drainage Area(25 yr.)	.31	15	6.06	0.44	0.83
Existing Drainage Area(100 yr.)	.37	15	7.40	0.44	1.20

Sub-basin C is 0.07 acres in area. Drainage flows south across sub-basin C to the outside of the lot where it connects with a natural flow line that directs the drainage south to a Cowskin Creek tributary.

The following table summarizes the peak discharge for drainage area sub-basin C which comprises 0.07 acres within the proposed Greiffenstein Square.

EXISTING PEAK RUNOFF FOR THE DRAINAGE SUB-BASIN C

Description	C	Tc	I	Area	Q(cfs)
Existing Drainage Area(2 yr.)	.16	15	3.80	0.07	0.04
Existing Drainage Area(5 yr.)	.18	15	4.62	0.07	0.06
Existing Drainage Area(10 yr.)	.24	15	5.21	0.07	0.09
Existing Drainage Area(25 yr.)	.31	15	6.06	0.07	0.13
Existing Drainage Area(100 yr.)	.37	15	7.40	0.07	0.19

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 all 5 storm events.

The proposed development for this site is calculated using a 3000 s.f. commercial building site. The remainder of the lot will be existing grass.

For developed conditions this site has 2 sub-basins. The drainage from Sub-basin A will flow north to the south drainage ditch of 21st Street West. The drainage from Sub-basin B will flow south and drain into the Cowskin Creek tributary.

The following table summarizes the peak discharge for drainage area sub-basin A which comprises 0.50 acres within the proposed Greiffenstein Square.

EXISTING PEAK RUNOFF FOR THE DRAINAGE SUB-BASIN A

Description	C	C	Tc	I	Area	Q(cfs)
	UL	PL				
Existing Drainage Area(2 yr.)	.16	.87	15	3.80	0.50	0.38
Existing Drainage Area(5 yr.)	.18	.87	15	4.62	0.50	0.51
Existing Drainage Area(10 yr.)	.24	.88	15	5.21	0.50	0.73
Existing Drainage Area(25 yr.)	.31	.88	15	6.06	0.50	1.04
Existing Drainage Area(100 yr.)	.37	.89	15	7.40	0.50	1.48
Wtd C = Urban Lawn B, Parking Lot						

The following table summarizes the peak discharge for drainage area sub-basin B which comprises 0.50 acres within the proposed Greiffenstein Square.

EXISTING PEAK RUNOFF FOR THE DRAINAGE SUB-BASIN B

Description	C	C	Tc	I	Area	Q(cfs)
	UL	PL				
Existing Drainage Area(2 yr.)	.16	.87	15	3.80	0.50	0.38
Existing Drainage Area(5 yr.)	.18	.87	15	4.62	0.50	0.51
Existing Drainage Area(10 yr.)	.24	.88	15	5.21	0.50	0.73
Existing Drainage Area(25 yr.)	.31	.88	15	6.06	0.50	1.04
Existing Drainage Area(100 yr.)	.37	.89	15	7.40	0.50	1.48
Wtd C = Urban Lawn B, Parking Lot						

IV. FLOODPLAIN SUBMITTAL – This property has been removed from the FEMA floodplain located on this plat. See attached documents.

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. SUMMARY DISCUSSION:

The existing combined peak discharge for the proposed development area which is comprised of the three previously described existing drainage sub-basins is 2.68 cfs for the 100 year storm. The developed combined peak discharge for the proposed development area, which is comprised of the two previously described

Greiffenstein Square Drainage Plan (Con't)
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drainage sub-basins is 2.96 cfs for the 100 year storm. The developed peak discharge has been computed as 0.28 cfs more than the existing peak discharge based upon the construction of a 3000 s.f. commercial building that is proposed to be located in the center of the lot. The remainder of each lot shall be existing dense grass. Surface drainage in developed condition has been divided into the north half and south half of the proposed lot. Adequate downstream capacity in the 21st Street North ditch and the Cowskin drainage channel to the north exists in order that the increase in the peak discharge of 0.28 cfs can be accommodated without negative impacts on adjacent properties.

VII. APPENDIX I:

All charts, graphs, tables including a 1"=30' scale drainage plan map are included for review.

APPENDIX

Worksheet 3: Time of concentration (T_c) or travel time (T_t)

Project Greiffenstein Square By CC Date 2/8/2010

Location Sec. 12, T27S, R2W Checked hdf Date

Circle one: Existing _____

Circle one: T_{c-x} T_t through subarea _____

Notes: Space for as many as two segments per flow type can be used for each worksheet.
Include a map, schematic, or description of flow segments.

<u>Sheet Flow</u> (Applicable to T_c only)	Segment ID	Area A	Area B	Area C
1. Surface description (table 3-1)		D Grass	D Grass	D Grass
2. Manning's roughness coeff., n (table 3-1).....		0.24	0.24	0.24
3. Flow length, L (total L \leq 300 feet)..... ft		64	64	64
4. Two-yr 24-hr rainfall, P_2 (3.5" typ. for Sedgwick Co)..... in		3.5	3.5	3.5
5. Land Slope, s..... ft/ft		0.007	0.007	0.007
6. $T_t = \frac{0.007 (nL)^{0.8}}{P_2^{0.5} s^{0.4}}$ Compute $T_t \dots (T_t \times 60) =$ min.		15	15	15

<u>Shallow concentrated flow</u>	Segment ID			
7. Surface description (paved or unpaved).....		U	U	U
8. Flow length, L (1000' max)..... ft		15	15	15
9. Watercourse slope, s..... ft/ft		0.33	0.33	0.33
10. Average velocity, V (figure 3-1)..... ft/s		9.25	9.25	9.25
11. $T_t = \frac{L}{3600 V}$ Compute $T_t \dots (T_t \times 60) =$ min.		0.0	0.0	0.0
	Total	15	15	15

<u>Channel Flow</u>	Segment ID			
12. Cross sectional flow area, a..... ft ²				
13. Wetted perimeter, P_w ft				
14. Hydraulic radius, $r = \frac{a}{P_w}$ Compute r..... ft				
15. Channel slope, s..... ft/ft				
16. Manning's roughness coeff., n.....				
17. $V = \frac{1.49 r^{2/3} s^{1/2}}{n}$ Compute V..... ft/s				
18. Flow Length, L (1000' Max?)..... ft				
19. $T_t = \frac{L}{3600 V}$ Compute $T_t \dots (T_t \times 60) =$ min.				
20. Watershed or subarea T_c or T_t (add T_t in steps 6, 11, and 19)... Tot		15	15	15

Greiffenstein Square
 Sec12, T27S, R2W

Existing B
 Drainage Area = 0.44 Acres

Soil Elandco Silt Loam
 Type B

Time of Concentration 15.00 Minutes

Urban Lawn B				
				Total
2	0.16			0.16
5	0.18			0.18
10	0.24			0.24
25	0.31			0.31
100	0.37			0.37

I	
2	3.80
5	4.62
10	5.21
25	6.06
100	7.40

Peak Flow					
Year	C	I	A	=	Q
					cfs
2	0.16	3.8	0.44		0.27
5	0.18	4.62	0.44		0.37
10	0.24	5.21	0.44		0.55
25	0.31	6.06	0.44		0.83
100	0.37	7.4	0.44		1.20

Greiffenstein Square
 Sec12, T27S, R2W

Existing C
 Drainage Area = 0.07 Acres

Soil Elandco Silt Loam
 Type B

Time of Concentration 15.00 Minutes

Urban Lawn B					Total
2	0.16				0.16
5	0.18				0.18
10	0.24				0.24
25	0.31				0.31
100	0.37				0.37

I	
2	3.80
5	4.62
10	5.21
25	6.06
100	7.40

Peak Flow					
Year	C	I	A	=	Q
					cfs
2	0.16	3.8	0.07		0.04
5	0.18	4.62	0.07		0.06
10	0.24	5.21	0.07		0.09
25	0.31	6.06	0.07		0.13
100	0.37	7.4	0.07		0.19

Worksheet 3: Time of concentration (T_c) or travel time (T_t)

Project Greiffenstein Square By CC Date 2/8/2010

Location Sec. 12,T27S,R2W Checked hdf Date Date

Circle one: Proposed _____

Circle one: T_{c-x} T_t through subarea _____

Notes: Space for as many as two segments per flow type can be used for each worksheet.
Include a map, schematic, or description of flow segments.

<u>Sheet Flow</u> (Applicable to T_c only)	Segment ID	Area A	Area A	Area B	Area B
1. Surface description (table 3-1)		D Grass	D Grass	D Grass	D Grass
2. Manning's roughness coeff., n (table 3-1).....		0.24	0.24	0.24	0.24
3. Flow length, L (total $L \leq 300$ feet)..... ft		64	15	64	15
4. Two-yr 24-hr rainfall, P_2 (3.5"typ. for Sedgwick Co)..... in		3.5	3.5	3.5	3.5
5. Land Slope, s..... ft/ft		0.008	0.3333	0.008	0.333
6. $T_t = \frac{0.007 (nL)^{0.8}}{P_2^{0.5} s^{0.4}}$ Compute $T_t \dots (T_t \times 60) =$ min.		14	1	14	1

<u>Shallow concentrated flow</u>	Segment ID	Area A	Area A	Area B	Area B
7. Surface description (paved or unpaved).....		U		U	
8. Flow length, L (1000' max)..... ft		22		29	
9. Watercourse slope, s..... ft/ft		0.2123		0.1996	
10. Average velocity, V (figure 3-1)..... ft/s		7.5		6	
11. $T_t = \frac{L}{3600 V}$ Compute $T_t \dots (T_t \times 60) =$ min.		0.0		0.1	
Total		15		15	

<u>Channel Flow</u>	Segment ID	Area A	Area A	Area B	Area B
12. Cross sectional flow area, a..... ft ²					
13. Wetted perimeter, P_w ft					
14. Hydraulic radius, $r = \frac{a}{P_w}$ Compute r..... ft					
15. Channel slope, s..... ft/ft					
16. Manning's roughness coeff., n.....					
17. $V = \frac{1.49 r^{2/3} s^{1/2}}{n}$ Compute V..... ft/s					
18. Flow Length, L (1000' Max?)..... ft					
19. $T_t = \frac{L}{3600 V}$ Compute $T_t \dots (T_t \times 60) =$ min.					
20. Watershed or subarea T_c or T_t (add T_t in steps 6, 11, and 19)... Tot		15		15	

Greiffenstein Square
 Sec12, T27S, R2W

Proposed A
 Drainage Area = 0.50 Acres

Soil Elandco Silt Loam
 Type B

Time of Concentration 15.00 Minutes

Urban Lawn B, 3000 S.F. Parking Lot					
WTD	UL B	PL			Total
2	0.16	0.87			0.20
5	0.18	0.87			0.22
10	0.24	0.88			0.28
25	0.31	0.88			0.34
100	0.37	0.89			0.40

I	
2	3.80
5	4.62
10	5.21
25	6.06
100	7.40

Peak Flow						
Year		C	I	A	=	Q
						cfs
2		0.20	3.8	0.50		0.38
5		0.22	4.62	0.50		0.51
10		0.28	5.21	0.50		0.73
25		0.34	6.06	0.50		1.04
100		0.40	7.4	0.50		1.48

Developed Weighted Condition Based on
 1/2 of a 3000 S.F. Parking Lot

Greiffenstein Square
 Sec12, T27S, R2W

Proposed B
 Drainage Area = 0.50 Acres

Soil Elandco Silt Loam
 Type B

Time of Concentration 15.00 Minutes

Urban Lawn B				
	UL B	P L		Total
2	0.16	0.87		0.20
5	0.18	0.87		0.22
10	0.24	0.88		0.28
25	0.31	0.88		0.34
100	0.37	0.89		0.40

I	
2	3.80
5	4.62
10	5.21
25	6.06
100	7.40

Peak Flow						
Year		C	I	A	=	Q
						cfs
2		0.20	3.8	0.50		0.38
5		0.22	4.62	0.50		0.51
10		0.28	5.21	0.50		0.73
25		0.34	6.06	0.50		1.04
100		0.40	7.4	0.50		1.48

Developed Weighted Condition Based on
 1/2 of a 3000 S.F. Parking Lot

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:					
<u>Single Family (Soil Group D)</u>					
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
<u>Multi-Family (Soil Group D)</u>					
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
<u>Single Family (Soil Group C)</u>					
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
<u>Multi-Family (Soil Group C)</u>					
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
<u>Single-Family (Soil Group B)</u>					
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	0.35	0.42	0.52
1 Acre	20	0.33	0.35	0.40	0.51
<u>Multi-Family (Soil Group B)</u>					
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			
		<u>2</u>	<u>5</u>	<u>10</u>	<u>100</u>
<u>Single Family (Soil Group A)</u>					
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
<u>Multi-Family (Soil Group A)</u>					
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):					
<u>Soil Group A</u>					
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
<u>Soil Group B</u>					
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
<u>Soil Group C</u>					
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			
		<u>2</u>	<u>5</u>	<u>10</u>	<u>100</u>
<u>Soil Group D</u>					
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.

SOIL LEGEND

<u>SYMBOL</u>	<u>HYDROLOGIC GROUP</u>	<u>NAME</u>
Aa	B	Albion-Shellabarger sandy loams, 1 to 4 percent slopes
Ab	B	Albion and Shellabarger sandy loams, 7 to 15 percent slopes
Ba	C	Blanket silt loam, 0 to 1 percent slopes
Bb	C	Blanket silt loam, 1 to 3 percent slopes
Ca	B	Canadian fine sandy loam
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 ^{Cf-}	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
Ya	B	Yanoss silt loam, 0 to 1 percent slopes
Yb	B	Yanoss silt loam, 1 to 3 percent slopes
Yc	B	Yanoss silt loam, 3 to 6 percent slopes
Yd	B	Yanoss silt loam, 3 to 6 percent slopes, eroded
Ye	D	Vernon sandy loam, 1 to 3 percent slopes
Yf	D	Vernon sandy loam, 3 to 6 percent slopes
Wa	C	Waldeck sandy loam
Wb	D	Waurika silt loam

RAINFALL INTENSITY TABLE
 SEDGWICK COUNTY
 KANSAS

THIS TABLE CONTAINS AVERAGE RAINFALL INTENSITIES
 IN INCHES PER HOUR.

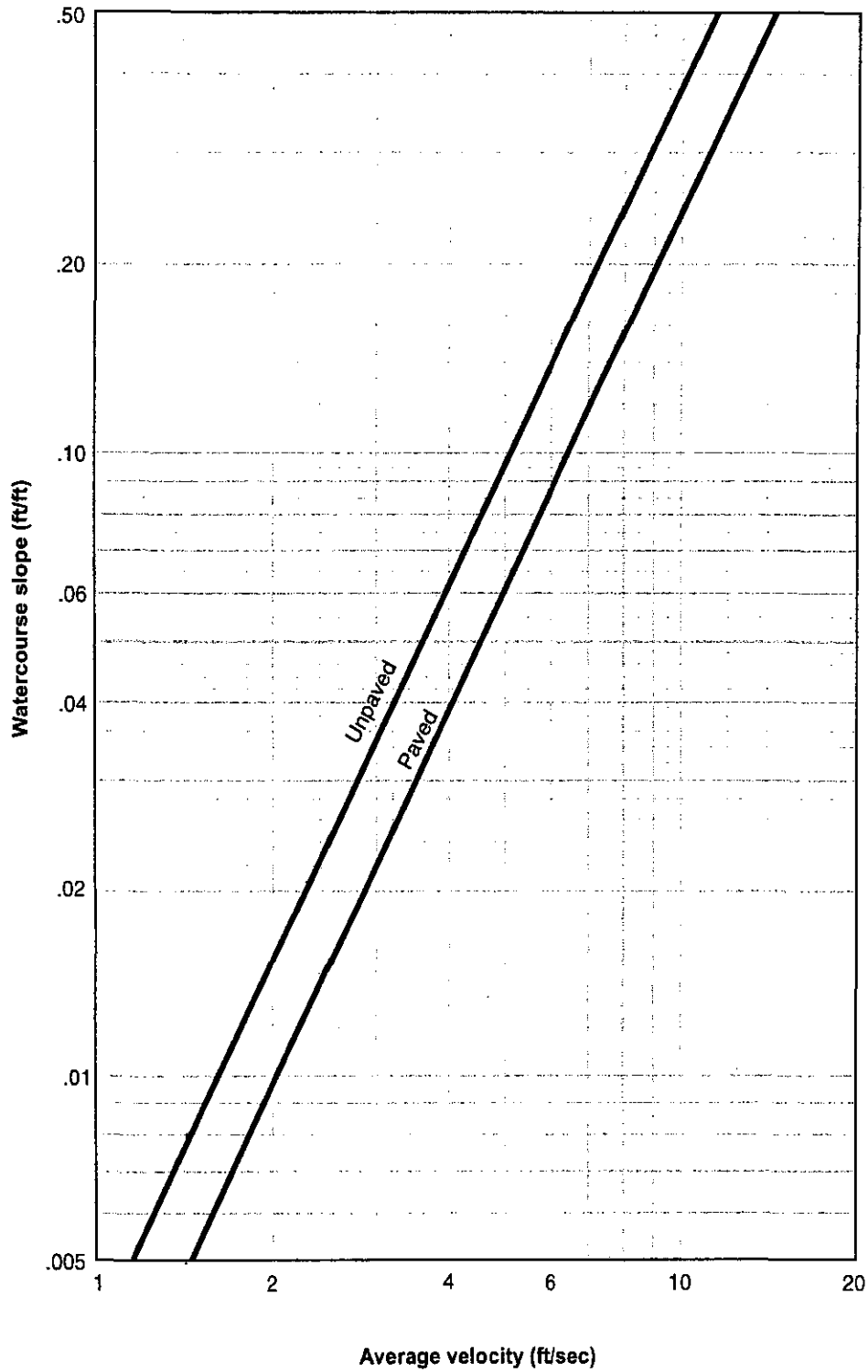
<i>Time of conc.</i> DURATION, HR:MIN	RETURN PERIOD						
	1 YR	2 YR	5 YR	10 YR	25 YR	50 YR	100 YR
0:05	4.91	5.64	6.64	7.38	8.48	9.34	10.20
0:06	4.62	5.34	6.33	7.07	8.15	9.00	9.84
0:07	4.38	5.09	6.08	6.80	7.86	8.69	9.52
0:08	4.17	4.87	5.85	6.56	7.60	8.41	9.22
0:09	4.00	4.68	5.63	6.33	7.34	8.14	8.93
0:10	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

Figure 3-1 Average velocities for estimating travel time for shallow concentrated flow

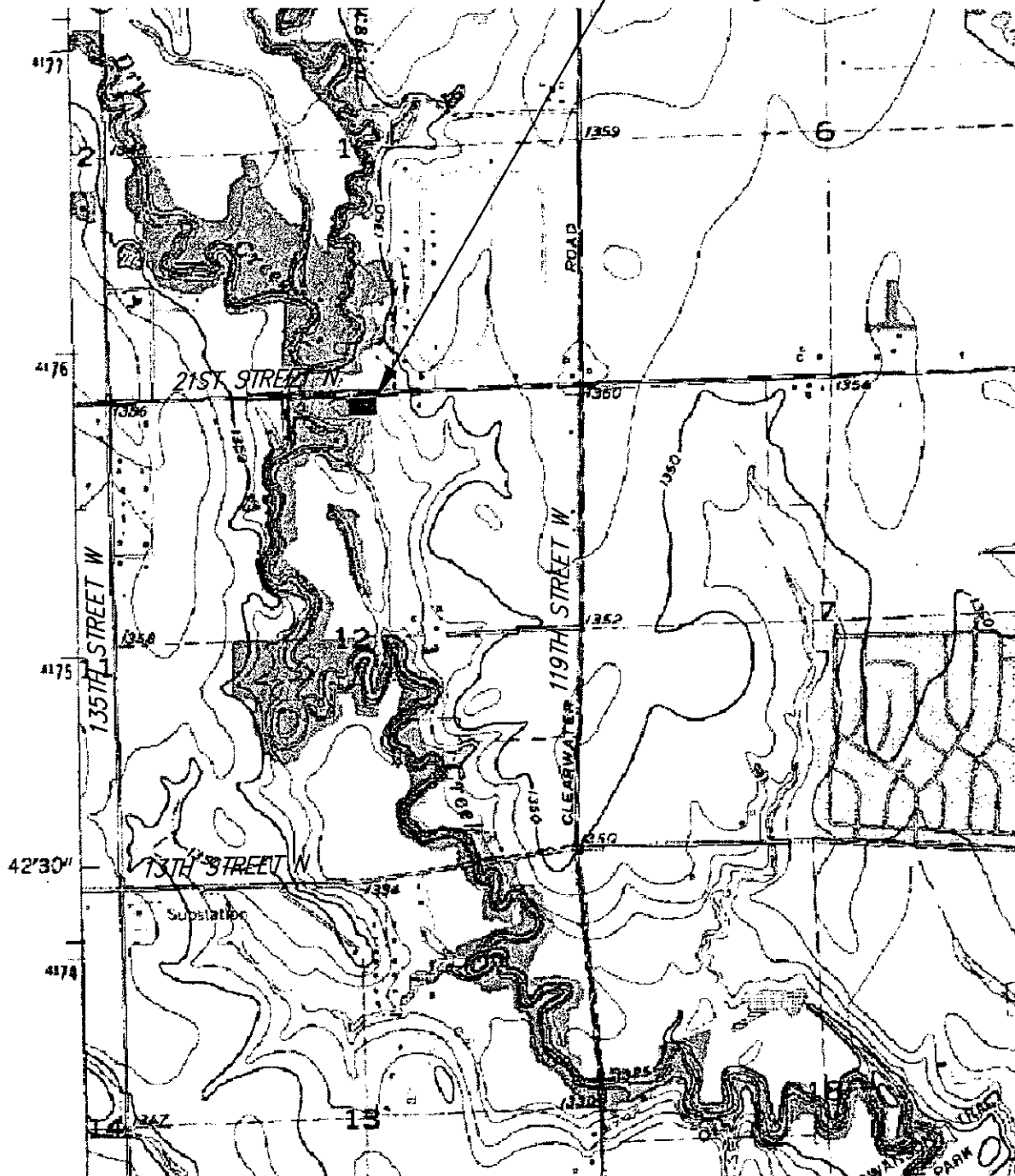


USGS MAP

GREIFFENSTEIN SQUARE

NW Cor., NE Quarter SEC 12, Township 27 South,
Range 2 West, SEDGWICK COUNTY, KANSAS

Project Location



GREIFFENSTEIN SQUARE		
USGS LOCATION MAP		
SEDGWICK COUNTY, KANSAS		
PROJ. NO.: 20101869		
CERTIFIED ENGINEERING DESIGN, P.A.		
CED	1935 WEST MAPLE	
	WICHITA, KANSAS 67213	
PH.(316)262-8808		FAX.(316)262-1669
DESIGNED: HDF	SCALE: NTS	SHEET
DRAWN: CC	DATE: February	1
CHECKED: HDF	CED FILE: Greiffenstein	TOTAL 1

AERIAL MAP
GREIFFENSTEIN SQUARE
 NW Cor., NE Quarter SEC 12, Township 27 South,
 Range 2 West, SEDGWICK COUNTY, KANSAS

Project Location



GREIFFENSTEIN SQUARE		
AERIAL LOCATION MAP		
SEDGWICK COUNTY, KANSAS		
PROJ. NO.: 20101869		
CERTIFIED ENGINEERING DESIGN, P.A.		
1935 WEST MAPLE		
WICHITA, KANSAS 67213		
PH.(316)262-8808 FAX.(316)262-1669		
DESIGNED: HDF	SCALE: NTS	SHEET
DRAWN: CC	DATE: February	1
CHECKED: HDF	CED FILE: Greiffenstein	TOTAL 1

MAP LEGEND

	Area of Interest (AOI)		Very Stony Spot
	Soils		Wet Spot
	Soil Map Units		Other
Special Point Features			
	Blowout	Special Line Features	
	Borrow Pit		Gully
	Clay Spot		Short Steep Slope
	Closed Depression		Other
	Gravel Pit	Political Features	
	Gravelly Spot		Cities
	Landfill	Water Features	
	Lava Flow		Oceans
	Marsh or swamp		Streams and Canals
	Mine or Quarry	Transportation	
	Miscellaneous Water		Rails
	Perennial Water		Interstate Highways
	Rock Outcrop		US Routes
	Saline Spot		Major Roads
	Sandy Spot		Local Roads
	Severely Eroded Spot		
	Sinkhole		
	Slide or Slip		
	Sodic Spot		
	Spoil Area		
	Stony Spot		

MAP INFORMATION

Map Scale: 1:1,500 If printed on A size (8.5" x 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.

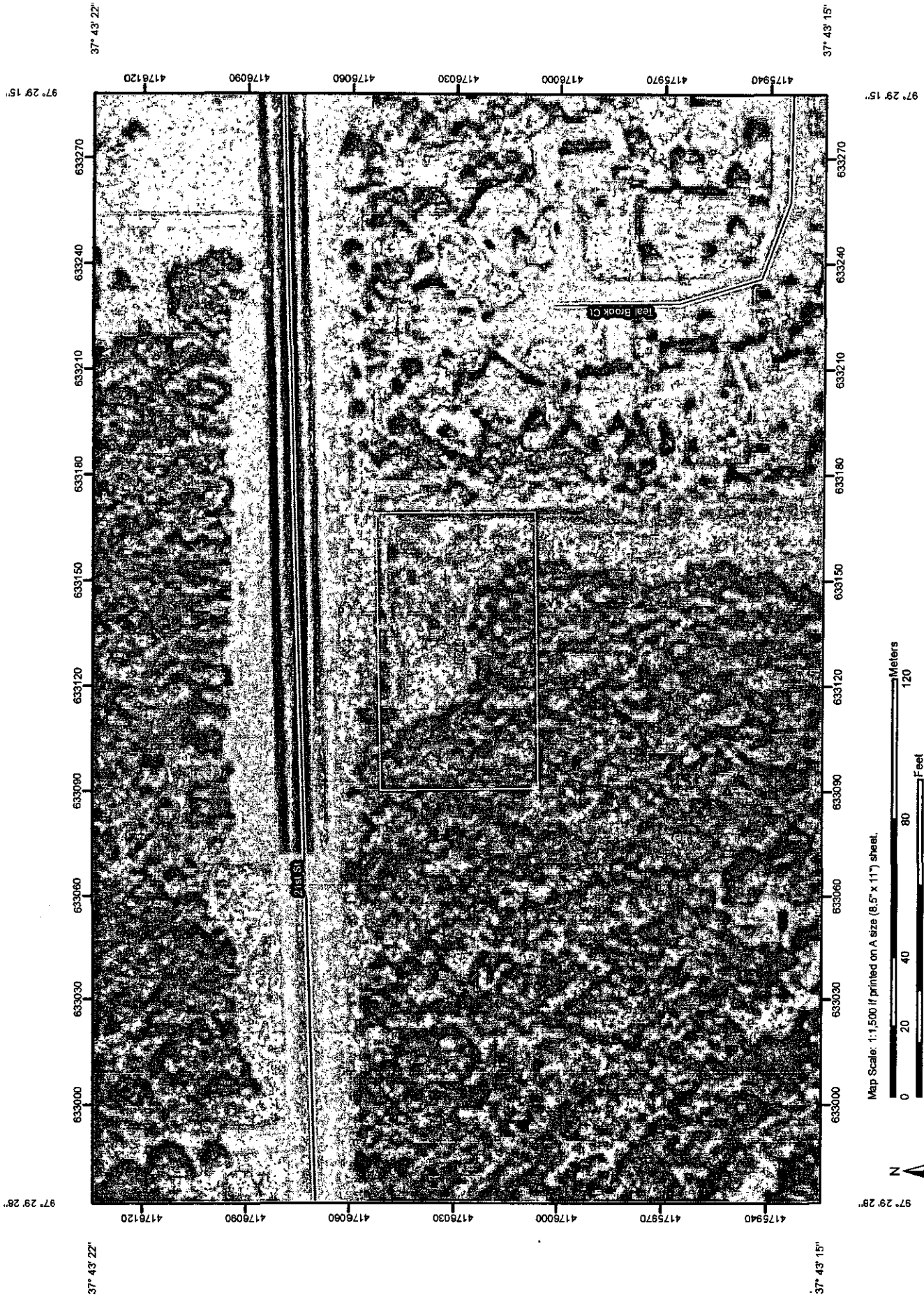
Source of Map: Natural Resources Conservation Service
 Web Soil Survey URL: <http://websoilsurvey.nrcs.usda.gov>
 Coordinate System: UTM Zone 14N NAD83

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 6, Dec 22, 2009
 Date(s) aerial images were photographed: 7/1/2006

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.

Soil Map—Sedgwick County, Kansas
(Greifenstein Square)



Hydrologic Soil Group

Hydrologic Soil Group— Summary by Map Unit — Sedgwick County, Kansas				
Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
6244	Elandco silt loam, rarely flooded	B	0.9	100.0%
Totals for Area of Interest			0.9	100.0%

Description

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Lower



Sedgwick County
Register of Deeds - Bill Meek
DOC.#/FLM-PG: 29078508

Receipt #: 1723828
Pages Recorded: 2
Cashier Initials: KL

Recording Fee: \$12.00
Authorized By: 

Date Recorded: 7/23/2009 2:18:54 PM



Grantor	<u>SAVOY COMPANY PA</u>
Grantee	<u>UNPLATTED</u>
Type of Document	<u>SURVEYS FILED AS PLATS</u>
Recording Fees	<u>\$12.00</u>
Mtg Reg Tax	<u>\$0.00</u>
Total Amount	<u>\$12.00</u>
Return Address	<u>SAVOY COMPANY PA</u>
	<u>433 S HYDRAULIC</u>
	<u>WICHITA KS 67211-1911</u>
	<u> </u>

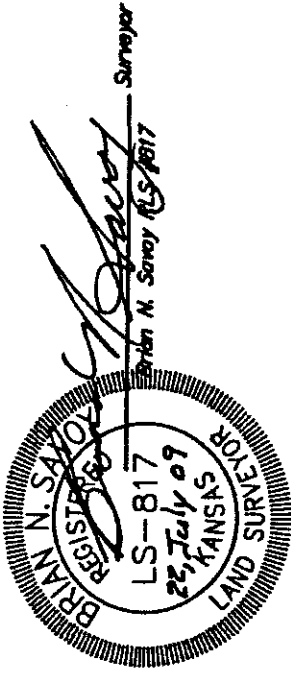
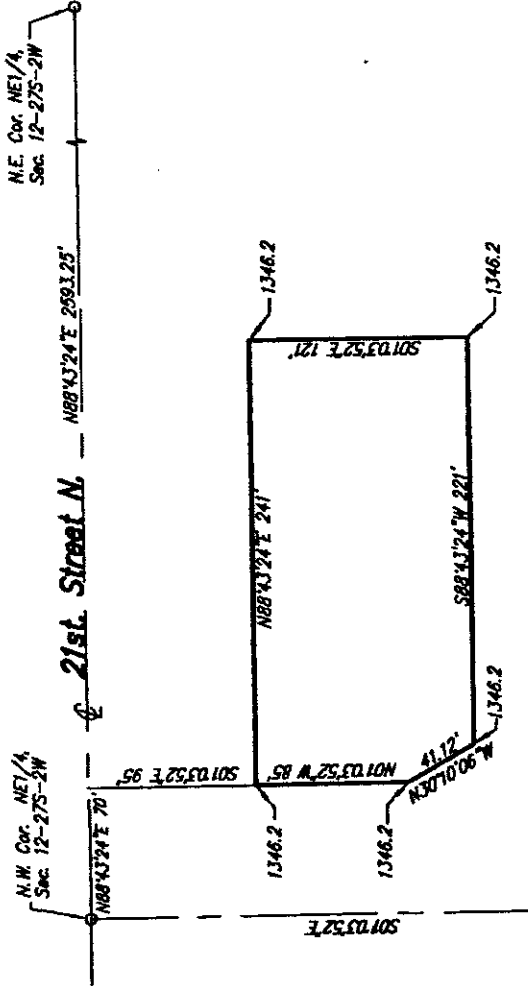
EXHIBIT

Letter Of Map Amendment Sedgwick County, Kansas

July 22, 2009

LEGAL DESCRIPTION:

That part of the NE1/4 of Sec. 12, Twp. 27-S, R-2-W of the 6th P.M., Sedgwick County, Kansas, described as commencing at the N.W. Corner of said NE1/4; thence N88°43'24"E along the north line of said NE1/4, 70 feet; thence S01°03'52"E, parallel with the west line of said NE1/4, 95 feet to a place of beginning; thence N88°43'24"E, 241 feet; thence S01°03'52"E, 121 feet; thence S88°43'24"W, 221 feet; thence N30°10'06"W, 41.12 feet; thence N01°03'52"W, 85 feet to the place of beginning.



State of Kansas) SS
Sedgwick County)

The foregoing instrument acknowledged before me, this 22nd day of July, 2009, by Brian N. Sawoy a Registered Land Surveyor in the State of Kansas.

Linda S. Hamby
Notary Public



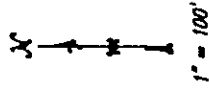
My App't. Exp. 10-30-2011



Savoy Company, P.A.
Land Surveyors

PH (316) 265-0026
FAX (316) 265-0275
www.savoyco.com

July 22, 2009
PROJECT NO. 08CC09259 P



Survey Datum = NAVD 83
Latitude: 37.721
Longitude: -97.469


000029078508



Federal Emergency Management Agency

Washington, D.C. 20472

LETTER OF MAP REVISION BASED ON FILL DETERMINATION DOCUMENT (REMOVAL)

COMMUNITY AND MAP PANEL INFORMATION				LEGAL PROPERTY DESCRIPTION				
COMMUNITY	SEDGWICK COUNTY, KANSAS (Unincorporated Areas)			A portion of Section 12, Township 27 South, Range 2 West, as described in the Statutory Warranty Deed, recorded as Document No. 28911611, in the Office of the Register of Deeds, Sedgwick County, Kansas. The portion of the property more particularly describe by the following metes and bounds:				
	COMMUNITY NO.: 200321							
AFFECTED MAP PANEL	NUMBER: 20173C0330E DATE: 2/2/2007							
FLOODING SOURCE: COWSKIN CREEK				APPROXIMATE LATITUDE & LONGITUDE OF PROPERTY: 37.721, -97.489 SOURCE OF LAT & LONG: GOOGLE EARTH DATUM: WGS84				
DETERMINATION								
LOT	BLOCK/ SECTION	SUBDIVISION	STREET	OUTCOME WHAT IS REMOVED FROM THE SFHA	FLOOD ZONE	1% ANNUAL CHANCE FLOOD ELEVATION (NAVD 88)	LOWEST ADJACENT GRADE ELEVATION (NAVD 88)	LOWEST LOT ELEVATION (NAVD 88)
-	-	-	12807 West 21st Street North	Portion of Property	X (unshaded)	1345.5 feet	-	1346.2 feet
Special Flood Hazard Area (SFHA) - The SFHA is an area that would be inundated by the flood having a 1-percent chance of being equaled or exceeded in any given year (base flood).								
ADDITIONAL CONSIDERATIONS (Please refer to the appropriate section on Attachment 1 for the additional considerations listed below.)								
LEGAL PROPERTY DESCRIPTION				STUDY UNDERWAY				
FILL RECOMMENDATION								
PORTIONS REMAIN IN THE SFHA								
<p>This document provides the Federal Emergency Management Agency's determination regarding a request for a Letter of Map Revision based on Fill for the property described above. Using the information submitted and the effective National Flood Insurance Program (NFIP) map, we have determined that the described portion(s) of the property(ies) is/are not located in the SFHA, an area inundated by the flood having a 1-percent chance of being equaled or exceeded in any given year (base flood). This document revises the effective NFIP map to remove the subject property from the SFHA located on the effective NFIP map; therefore, the Federal mandatory flood insurance requirement does not apply. However, the lender has the option to continue the flood insurance requirement to protect its financial risk on the loan. A Preferred Risk Policy (PRP) is available for buildings located outside the SFHA. Information about the PRP and how one can apply is enclosed.</p>								
<p>This determination is based on the flood data presently available. The enclosed documents provide additional information regarding this determination. If you have any questions about this document, please contact the FEMA Map Assistance Center toll free at (877) 336-2627 (877-FEMA MAP) or by letter addressed to the Federal Emergency Management Agency, LOMC Clearinghouse, 6730 Santa Barbara Court, Elkridge, MD 21075.</p>								
 Kevin C. Long, Acting Chief Engineering Management Branch Mitigation Directorate								



Federal Emergency Management Agency

Washington, D.C. 20472

October 16, 2009

THE HONORABLE DAVE UNRUH
CHAIRMAN, BOARD OF COMMISSIONERS
COUNTY COURTHOUSE
525 NORTH MAIN STREET
WICHITA, KS 67203

CASE NO.: 09-07-1860A
COMMUNITY: SEDGWICK COUNTY, KANSAS
(UNINCORPORATED AREAS)
COMMUNITY NO.: 200321

DEAR MR. UNRUH:

This is in reference to a request that the Federal Emergency Management Agency (FEMA) determine if the property described in the enclosed document is located within an identified Special Flood Hazard Area, the area that would be inundated by the flood having a 1-percent chance of being equaled or exceeded in any given year (base flood), on the effective National Flood Insurance Program (NFIP) map. Using the information submitted and the effective NFIP map, our determination is shown on the attached Letter of Map Revision based on Fill (LOMR-F) Determination Document. This determination document provides additional information regarding the effective NFIP map, the legal description of the property and our determination.

Additional documents are enclosed which provide information regarding the subject property and LOMR-Fs. Please see the List of Enclosures below to determine which documents are enclosed. Other attachments specific to this request may be included as referenced in the Determination/Comment document. If you have any questions about this letter or any of the enclosures, please contact the FEMA Map Assistance Center toll free at (877) 336-2627 (877-FEMA MAP) or by letter addressed to the Federal Emergency Management Agency, LOMC Clearinghouse, 6730 Santa Barbara Court, Elkridge, MD 21075.

Sincerely,

Kevin C. Long, Acting Chief
Engineering Management Branch
Mitigation Directorate

LIST OF ENCLOSURES:

LOMR-F DETERMINATION DOCUMENT (REMOVAL)

cc: State/Commonwealth NFIP Coordinator
Community Map Repository
Region
Mr. Ian Dopps
Mr. Brian Savoy



Federal Emergency Management Agency

Washington, D.C. 20472

LETTER OF MAP REVISION BASED ON FILL DETERMINATION DOCUMENT (REMOVAL)

ATTACHMENT 1 (ADDITIONAL CONSIDERATIONS)

LEGAL PROPERTY DESCRIPTION (CONTINUED)

COMMENCING at the northwest corner of the northeast Quarter of Section 12; thence N88°43'24"E, 70.00 feet; thence S01°03'52"E, 95.00 feet to the POINT OF BEGINNING; thence N88°43'24"E, 241.00 feet; thence S01°03'52"E, 121.00 feet; thence S88°43'24"E, 221.00 feet; thence N30°10'06"W, 41.12 feet; thence N01°03'52"W, 85.00 feet to the POINT OF BEGINNING

FILL RECOMMENDATION (This Additional Consideration applies to the preceding 1 Property.)

The minimum NFIP criteria for removal of the subject area based on fill have been met for this request and the community in which the property is located has certified that the area and any subsequent structure(s) built on the filled area are reasonably safe from flooding. FEMA's Technical Bulletin 10-01 provides guidance for the construction of buildings on land elevated above the base flood elevation through the placement of fill. A copy of Technical Bulletin 10-01 can be obtained by calling the FEMA Map Assistance Center toll free at (877) 336-2627 (877-FEMA MAP) or from our web site at <http://www.fema.gov/mit/tb1001.pdf>. Although the minimum NFIP standards no longer apply to this area, some communities may have floodplain management regulations that are more restrictive and may continue to enforce some or all of their requirements in areas outside the Special Flood Hazard Area.

PORTIONS OF THE PROPERTY REMAIN IN THE SFHA (This Additional Consideration applies to the preceding 1 Property.)

Portions of this property, but not the subject of the Determination/Comment document, may remain in the Special Flood Hazard Area. Therefore, any future construction or substantial improvement on the property remains subject to Federal, State/Commonwealth, and local regulations for floodplain management.

STUDY UNDERWAY (This Additional Consideration applies to all properties in the LOMR-F DETERMINATION DOCUMENT (REMOVAL))

This determination is based on the flood data presently available. However, the Federal Emergency Management Agency is currently revising the National Flood Insurance Program (NFIP) map for the community. New flood data could be generated that may affect this property. When the new NFIP map is issued it will supersede this determination. The Federal requirement for the purchase of flood insurance will then be based on the newly revised NFIP map.

This attachment provides additional information regarding this request. If you have any questions about this attachment, please contact the FEMA Map Assistance Center toll free at (877) 336-2627 (877-FEMA MAP) or by letter addressed to the Federal Emergency Management Agency, LOMC Clearinghouse, 8730 Santa Barbara Court, Elkridge, MD 21075.

Kevin C. Long, Acting Chief
Engineering Management Branch
Mitigation Directorate

DRAINAGE PLAN

GREIFFENSTEIN SQUARE

SW Quarter SEC 25, Township 29 South, Range 3 West, SEDGWICK COUNTY, KANSAS



Legal Description
That part of the west 10 acres of the NE1/2, of the NE1/4 of Sec. 12, Twp. 27-S., R-2-W of the 6th P.M., Sedgwick County, Kansas described as beginning at a point on the east line of said 10 acres, 80 feet south of the N.E. Corner thereof; thence west, parallel with the north line of said NE1/4, 275 feet; thence south, parallel with the east line of said 10 acres, 158 feet; thence east, parallel with the north line of said NE1/4, 275 feet to the east line of said 10 acres; thence north, along the east line of said 10 acres, 158 feet to the place of beginning.

OWNER:
Ian T. & Kamra L. Dopps
12807 W. 21st St. N.
Wichita, Kansas 67235
Phone:

GROSS SIZE OF PLAT:
43,450.00 Sq. Ft. 1.00
Acres

NET SIZE OF PLAT:
43,450.00 Sq. Ft. 1.00
Acres

MINIMUM LOT SIZE:
29,801 Sq. Ft.

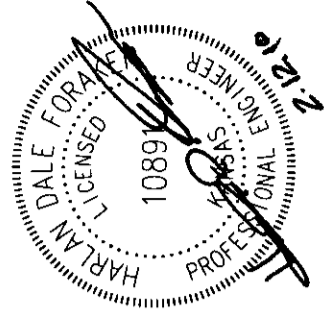
ZONING:
SF-20 - Single Family

CONTROL NUMBER:
252029

BENCHMARK:
Magnetic Nail w/Survey Cap 15.6" E. &
57.2" N. of N.E. Corner of Subject
Property. Elevation=1350.69 NAVD83

LEGEND

- G = GAS MAIN
- W = WATER MAIN
- SS = SANITARY SEWER
- SWS = STORM WATER SEWER
- UGE = UNDER GROUND ELECTRIC
- UGT = UNDER GROUND TELEPHONE
- B.M. = BENCH MARK
- d = SIGN
- SS M.H. = SANITARY SEWER MANHOLE
- = EXISTING/PROPOSED DRAINAGE DIRECTION



DRAINAGE PLAN
GREIFFENSTEIN SQUARE
SEDGWICK COUNTY, KANSAS
20101869

CERTIFIED ENGINEERING DESIGN, P.A.
GED
1935 WEST MAPLE
WICHITA, KANSAS 67213
PH.(316)262-8808 FAX.(316)262-1669

DESIGNED: HOF	SCALE: 1" = 30'	SHEET
DRAWN: CC	DATE: FEBRUARY 2010	1
CHECKED: HOF	GED FILE: Greiffenstein	TOTAL
		1

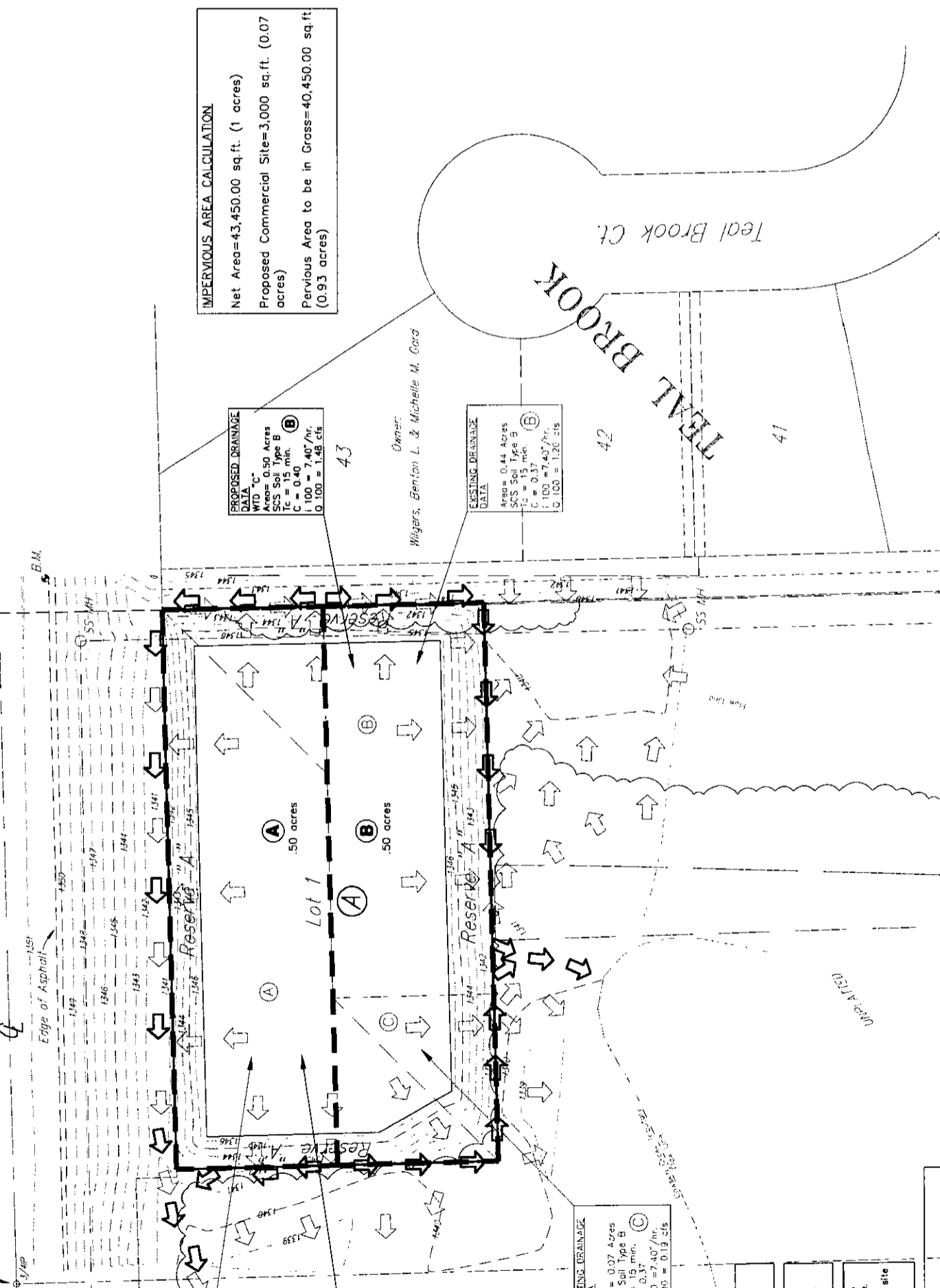
N.W. Cor. NW1/4, NE1/4, Sec. 12-27S-2W

N.E. Cor. W. 10 Acres NE1/2, NE1/4, Sec. 12-27S-2W

N.E. Cor. NE1/4, Sec. 12-27S-2W

N53°43'24"E 2593.85'

21st St. N.



IMPERVIOUS AREA CALCULATION
Net Area=43,450.00 sq.ft. (1 acres)
Proposed Commercial Site=3,000 sq.ft. (0.07 acres)
Pervious Area to be in Gross=40,450.00 sq.ft. (0.93 acres)

PROPOSED DRAINAGE DATA
WTD "C"
Area= 0.50 Acres
SCS Soil Type B
C = 0.37
Tc = 15 min.
I 100 = 7.40"/hr.
O 100 = 1.48 cfs

EXISTING DRAINAGE DATA
Area= 0.44 Acres
SCS Soil Type B
C = 0.37
Tc = 15 min.
I 100 = 7.40"/hr.
O 100 = 1.20 cfs

EXISTING DRAINAGE DATA
Area= 0.07 Acres
SCS Soil Type B
C = 0.37
Tc = 15 min.
I 100 = 7.40"/hr.
O 100 = 0.19 cfs

Note:
Offsite Drainage Agreement Required

Existing Sub-basins = 2.68 cfs
Proposed Sub-basins = 2.96 cfs
Increased = .28 cfs

PROPOSED LAND USE:
One 3000 SF. Commercial Property with remainder of Lot to be native or pasture grass.

A slight increase in the peak discharge results from the development of this site. However, the peak discharge shall be managed to ensure that the increase in peak discharge should not be detrimental.

SURVEYOR'S STATEMENT:
I, THE UNDERSIGNED, A LICENSED PROFESSIONAL ENGINEER AND SURVEYOR, HAVE CONDUCTED A SURVEY OF THE ABOVE PROPERTY AND HAVE FOUND THAT THE INFORMATION CONTAINED HEREIN IS TRUE AND CORRECT TO THE BEST OF MY KNOWLEDGE AND BELIEF. I HAVE NOT GUARANTEED THE ACCURACY OF ANY ELEVATIONS AND NOTIFY ENGINEER OF ANY DISCREPANCIES.