DRAINAGE REPORT

FOR

SUMMIT CROSSING
WICHITA, KANSAS

REVISED FEBRUARY 2009

CITY OF WICHITA

Public Works, Engineering Division
Final Drainage Plan Submittal Checklist

Reviewer: City of Wichita Date: October 31, 2008

Subdivision Name: Summit Crossing Location: Wichita, Kansas

Total Land Area Of Ownership: 13.4 Acres

Type: ☐ Residential ☑ Commercial ☐ Industrial ☐ Recreation ☐ Municipal ☐ Other

Applicant: ACCN Properties Contact: Craig Nelson Phone #: (316) 943-7111

Engineer: MKEC Engineering Consultants, Inc. Contact: Tara Hancock E.I.T. Phone # (316) 684-9600

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	✔		Figure 1.1		
B. Discussion of development, existing conditions, and proposed impacts on stormwater, wetland, riparian, and flood plain	✔		Tab 1.B		
C. Discussion of offsite conditions	✔		Tab 1.C		
D. Summary of runoff calculations (pre/post development) No increase in peak discharge for all storm series	✔		Tab 1.D, Table 1		
E. Narrative description of the type and function of the permanent best management practices that are incorporated into the site design	✔		Tab 1.E		
F. Copy of the plat	✔		Figure 1.2		
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.)	✔		Figure 1.3		
H. Professional Engineer seal, signature and date on cover of report	✔		Cover		
I. CD of drainage plan in PDF format (one file) and one paper copy bound with this checklist included behind the cover	✔		Tab 1.I		

	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)	✔		Figure 2.1		
B. Runoff Method (Rational, Hydrograph Method, or other approved methods by Engineering)	✔		Tab 2.B		
C. Existing topography (no greater than 2-foot contours, 1-foot recommend)	✔		Figure 2.2		
D. Total Site Area and Total Impervious Area (acres)	✔		Tab 2.D		
E. Benchmarks used for site control	✔		Tab 2.E		
F. Streams, creeks, and waterway labeled	✔		Tab 2.F, Figure 2.3		
G. Predominant soils from USDA soil surveys, and/or on site soil borings	✔		Tab 2.G, Figure 2.4		
H. Location and boundaries of natural features such as wetlands, lakes, and ponds with the normal water elevation noted	✔		Tab 2.H		
I. Location of existing roads, buildings, parking lots and other impervious areas.	✔		Tab 2.I		

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J. Location of existing utilities (e.g., water, sewer, gas, electric) and easements	✔		Tab 2.J		
K. Location of existing conveyance systems such as storm drains, inlets, catch basins, channels, swales, and areas of overland flow	✔		Tab 2.K		
L. Flow paths	✔		Tab 2.L, Figure 2.2		
M. Location and dimensions of existing channels, bridges or culvert crossings	✔		Tab 2.M		
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	✔		Tab 2.N, Table 2, Figure 2.5		
O. Assumed pre-developed runoff curve numbers	✔		Tab 2.O		
P. Existing time of concentrations used in calculations	✔		Tab 2.P, Figure 2.5		
Q. Evaluate immediate downstream drainage capacity, not to exceed more than 0.25 miles downstream of site	✔		Tab 2.Q		
R. Existing structural elevations (e.g., invert of pipes, manholes, etc.)	✔		Tab 2.R		
S. Cross-section data for open channels		✔	N/A		
T. Ground water elevations, if applicable	✔		Tab 2.T		

	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)	✔		Tab 3.A, Table 3, Figure 2.5		
B. Proposed time of concentrations used in calculations	✔		Tab 3.B, Figure 2.5		
C. Assumed post-developed runoff curve numbers	✔		Tab 3.C		
D. Proposed contours for detention facilities (to equal area used in outlet rating curves)	✔		Tab 3.D, Figure 3.1		
E. Preliminary sizing calculations for stormwater controls including contributing drainage area, storage, and outlet configuration	✔		Tab 3.E, Figure 3.1		
F. Stage-storage-discharge or outlet rating curves and inflow and outflow hydrographs for storage facilities	✔		Tab 3.F, Figure 2.5		
G. Final analysis of potential upstream/downstream impact/effects of project, where necessary	✔		Tab 3.G		
H. Existing and proposed structural elevations (e.g., invert of pipes, manholes, etc.)	✔		Tab 3.H		
I. Design water surface elevations and normal pool elevation for ponds.	✔		Tab 3.I		
J. Typical detail for outlet structures, embankments, spillways, grade control structures, conveyance channels, etc. To include height, width, elevation, and/or diameter.	✔		Tab 3.J		
K. Proposed limits of clearing and grading	✔		Tab 3.K		
L. Location of existing and proposed roads, buildings, parking lots and other impervious areas.	✔		Tab 3.L		
M. Location of existing and proposed utilities (e.g., water, sewer) and easements	✔		Tab 3.M, Figure 3.1		
N. Location of existing and proposed conveyance systems such as storm drains, inlets, catch basins, channels, swales, and areas of overland flow	✔		Tab 3.N, Figure 3.1		
O. Preliminary location and dimensions of proposed channel modifications, such as bridge or culvert crossings		✔	N/A		

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P. Preliminary selection and location of stormwater controls	✔		Tab 3.P		
Q. Emergency overflow structure's flow path	✔		Tab 3.Q		
R. Detention facility provides one-foot of freeboard above the HWL and emergency outfall shown (top of berm elevation shown)	✔		Tab 3.R		
S. The 100-year 24-hour HWL delineated on the plan for detention pond	✔		Tab 3.S		
T. Lowest opening elevations table on the plat for structures located adjacent to channels or ponds	✔		Tab 3.T		
U. Stormwater Management Facilities located within a Reserve	✔		Tab 3.U		
V. Maintenance responsibility of stormwater management facility shall be specified in the platters text. (e.g. HOA, Lot Owners Association, or lot)	✔		Tab 3.V		
W. Off-site drainage easements or agreements required, where necessary		✔	N/A		

	Applicant			Engr	
Tab 4. Floodplain Submittal	**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		✔			

	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)	✔		Figure 5.1		
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		✔			

Consulting Engineer Initials _____

Tab 1. Project Narrative

A. Location

The subject property is in the city of Wichita, Sedgwick County, Kansas. The proposed development is located in the southwest Section 10, Township 27 South, Range 2 East. Summit Crossing Addition consists of 13.4 acres of property on the southwest corner of 127th Street East. and East 21st Street North. The site is shown on the USGS Map, Figure 1.1.

B. Discussion of Development

The entire site will be developed as commercial property.

C. Discussion of Offsite

The site is bounded by 127th Street to the east, 21st Street to the north, Lakeside Acres Addition to the south and Trinity Academy to the west.

D. Summary of Runoff

The site generally drains to the west and south. Detention is required under post-project conditions in order to maintain pre-project runoff rates. The pre and post-project runoff rates are shown below.

Comparison of Pre and Post-Development Flow Rates

Description	Area	CN	Design Storm Flows (cfs)			
	acres		2-Yr	5-Yr	10-Yr	100-Yr
Pre-project						
West	2.2	80	3.1	4.9	6.1	10.7
East	11.2	80	11.3	17.6	22.0	38.3
Post-Project						
West	1.0	95	3.1	4.1	4.8	7.3
East	12.4	95	11.2	15.1	17.4	29.8

E. Best Management Practices

The site will be seeded or sodded after construction of grading and utilities are complete. Inlets will be kept clear of debris to ensure proper drainage of the site.

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

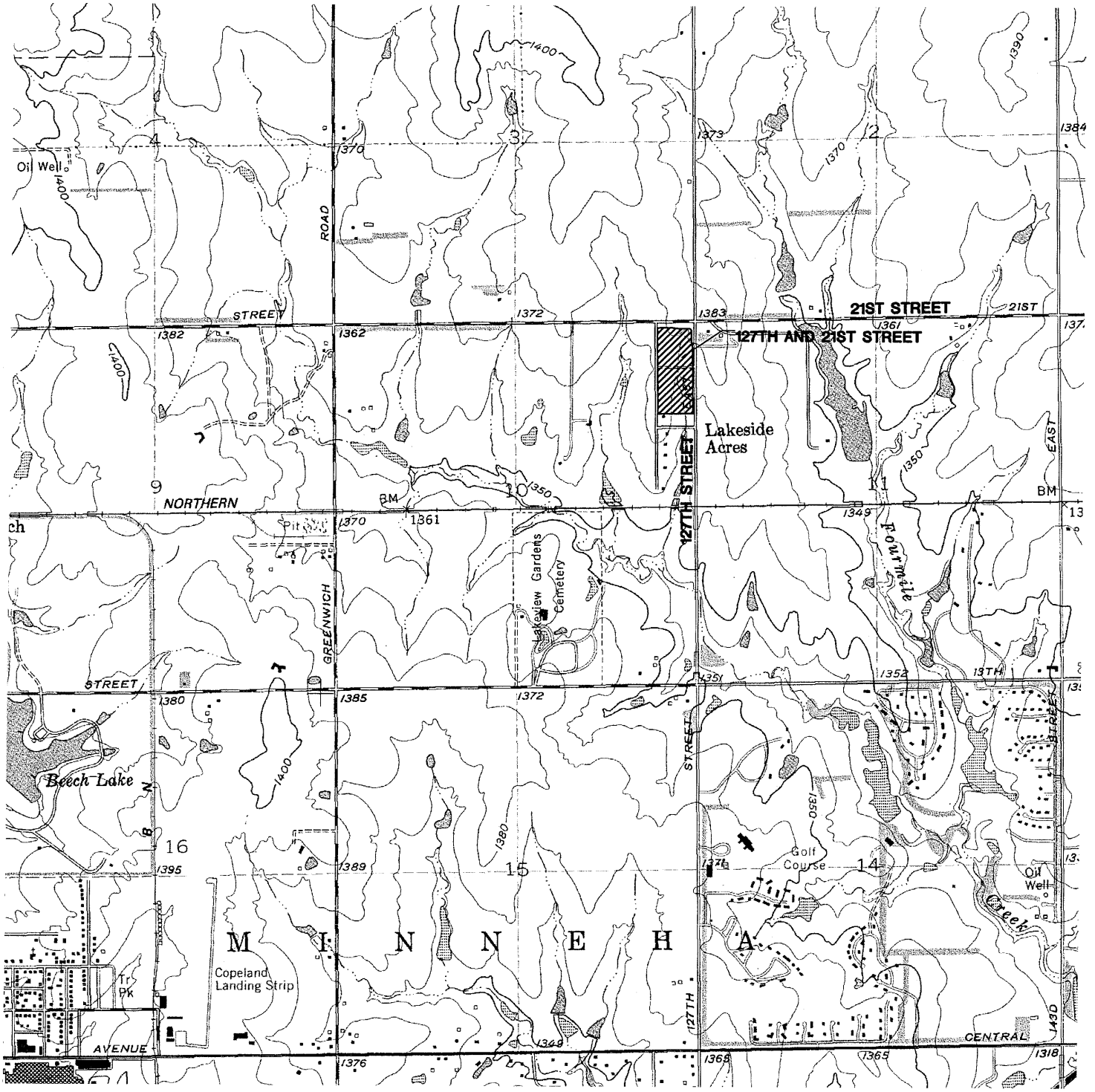
The cover of the report will be signed and dated.

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



SCALE: 1" = 2000'

2000 0 2000 4000

N

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

SUMMIT CROSSING
PROJECT NAME

QUAD MAP
SHEET TITLE

KLA	CMJ	GJA
DESIGN BY:	DRAWN BY:	CHECKED BY:

OCTOBER 2008	08542	1 / 1
DATE	JOB NO.	SHEET/OF

J:\Civil\08542\dwg\DRNG\08542_QUAD.dwg

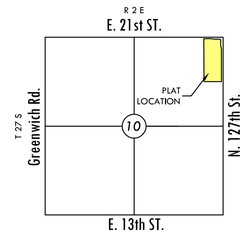
Figure 1.2

Plat

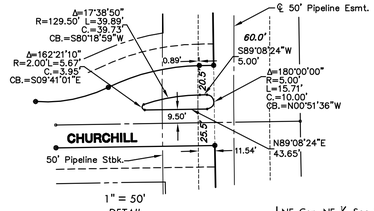
FINAL PLAT

SUMMIT CROSSING ADDITION

AN ADDITION TO WICHITA, SEDGWICK COUNTY, KANSAS



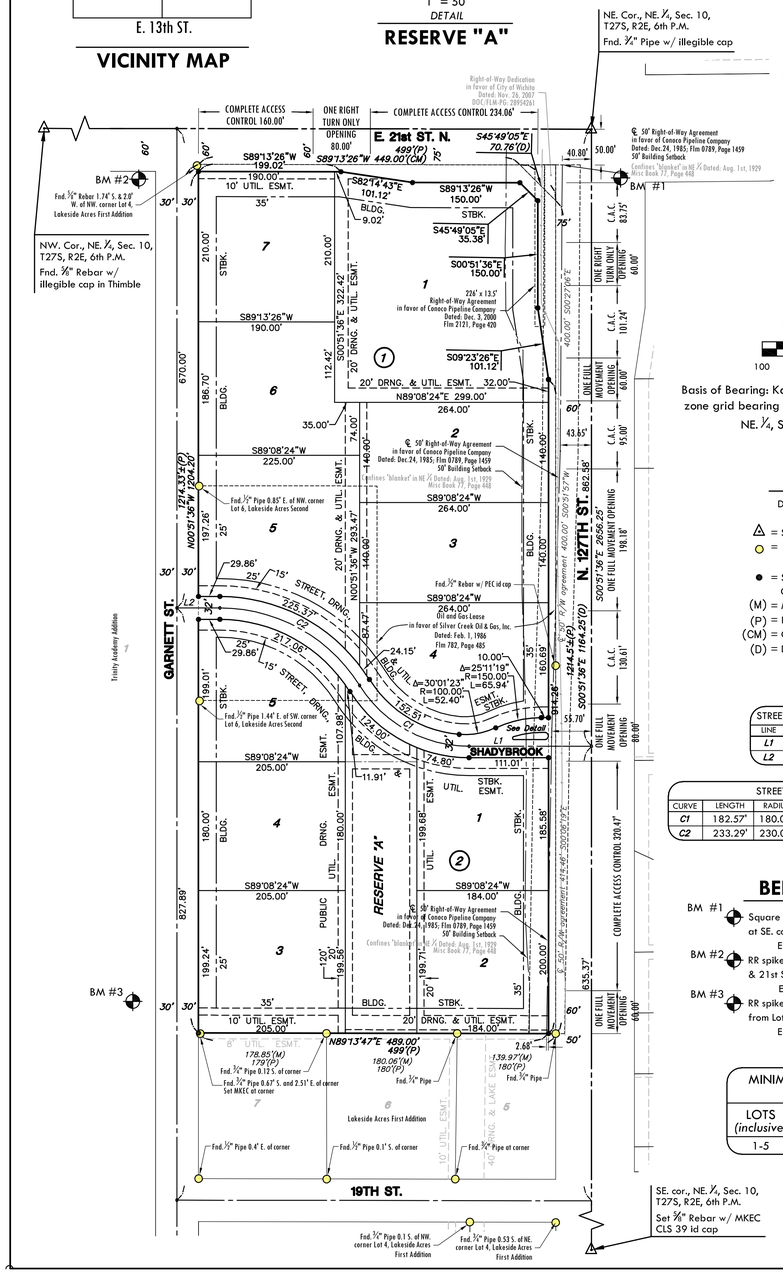
VICINITY MAP



1" = 50'

DETAIL

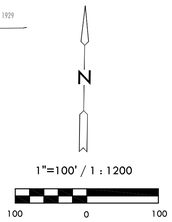
RESERVE "A"



NOTES

Zoning:

1.) This plat shall adhere and conform to the recitals of CUP DP-317 as approved and recorded at the Wichita-Sedgwick County Metropolitan Planning Area Department.



Basis of Bearing: Kansas coordinate system of 1983 south zone grid bearing of S00°51'36"E along the east line of NE. ¼, Sec. 10, T27S, R2E, 6th P.M.

LEGEND

Date of Survey: October 2008

- △ = Section corner Monument Found
- ○ = Found monument see annotation for type
- ● = Set ⅝" Rebar w/ MKEC CLS 39 id. cap
- (M) = Measured
- (P) = Platted
- (CM) = Calculated from measured
- (D) = Described or record

STREET CENTERLINE CURVE TABLE		
LINE	LENGTH	BEARING
L1	171.01'	S89°08'24"W
L2	59.86'	N89°08'24"E

STREET CENTERLINE CURVE TABLE					
CURVE	LENGTH	RADIUS	CHORD	BEARING	DELTA
C1	182.57'	180.00'	174.85'	S61°48'10"E	58°06'52"
C2	233.29'	230.00'	223.41'	N61°48'10"W	58°06'52"

BENCH MARKS

BM #1 — Square cut NE. corner traffic signal MH pad at SE. corner 21st St. & 127th St. E.
Elev. = 1383.69 (NGVD 29)

BM #2 — RR spike N. face PP at SW corner Garnett & 21st St. N.
Elev. = 1377.14 (NGVD 29)

BM #3 — RR spike E. face PP, W. side Garnett, across from Lot 9, Lakeside Acres 2nd Addition.
Elev.= 1373.97 (NGVD 29)

MINIMUM PAD ELEVATIONS *LOWEST OPENINGS*		
LOTS *(inclusive)*	BLOCK	ELEVATION *NGVD*
1-5	2	1367

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 platting of "SUMMIT CROSSING ADDITION", an addition to Wichita, Sedgwick County, Kansas, into Lots, Blocks, a Reserve and Streets, the same being accurately set forth in the accompanying plat and described herein:

Lots 1, 2, 3, 4, 5, 6, 7, 8, and 9, Lakeside Acres Second Addition, Sedgwick County, Kansas, EXCEPT that part of said Lot 5, being described as follows: BEGINNING at the northeast corner of said Lot 5, thence west, along the north line of said Lot 5, a distance of 50 feet; thence southeasterly for a distance of 70.76 feet to a point on the east line of said Lot 5; thence north along said east line, a distance of 50 feet to the POINT OF BEGINNING.

All reserves, streets, utility easements, building setbacks, access controls, and dedications, all within the above described property are hereby vacated and replatted by virtue of K.S.A. 12-512(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 #1257
MKEC Engineering Consultants, Inc.
411 North Webb Road
Wichita, Kansas 67206

OWNER'S CERTIFICATE

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

Easements for the construction and maintenance of public and or private utilities and public sidewalks, as indicated hereon are hereby granted to and for the use of the public. The wall easement is non-exclusive and is platted for the construction and maintenance of a private wall; utilities may cross under the private wall.

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

Reserve "A" is platted for monuments, signs, sidewalks, berms, landscaping, irrigation, and utilities confined by easements. The Reserve shall be owned and maintained by the owner(s) and or a Lot Owner's Association and are reserved for uses stated.

All abutters rights of access to or from 13th Street, over and across the north line of Block 1, "SUMMIT CROSSING ADDITION", are hereby granted to the City of Wichita, provided however, Lots 1 and 2, shall have one full movement opening as indicated hereon. All abutters rights of access to or from 13th Street, over and across the east line of Blocks 1 and 2, "SUMMIT CROSSING ADDITION", are hereby granted to the City of Wichita, provided however, Lots 1, 2, 3, and 4, Block 1 shall have two full movement openings and Lot 2, Block 2 shall have one full movement opening all as indicated hereon.

A drainage plan has been developed for this plat drainage easements, rights-of-way, or 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.

This plat shall adhere and conform to the recitals of C.U.P. DP-317 as approved and recorded at the Wichita-Sedgwick County Metropolitan Area Planning Department.

ACCN ENTERPRISES, LLC, a Kansas limited liability company

_____, Managing Partner
D. Craig Nelson, Managing Partner
ACCN Properties, a Kansas General Partnership, Member, ACCN Enterprises, LLC, a Kansas limited liability company

STATE OF KANSAS, SEDGWICK COUNTY} ss:

This instrument was acknowledged before me on this ____ day of _____, 2009, D. Craig Nelson, Managing Partner of ACCN Properties, a Kansas General Partnership, Member of ACCN Enterprises, 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.

Affix Seal

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

MORTGAGE CERTIFICATE

We INTRUST Bank, N.A. holders of a mortgage on the above described property, do hereby consent to the plat of "SUMMIT CROSSING ADDITION."

INTRUST Bank, N.A.

_____, Executive Vice President
Gary D. Schmitt, Executive Vice President

This instrument was acknowledged before me on this ____ day of _____, 2009, by Gary D. Schmitt, Executive Vice President, INTRUST Bank, N.A..

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

Affix Seal

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

PLANNING COMMISSION CERTIFICATE

This plat of "SUMMIT CROSSING 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

_____, Chair
Darrell Downing, Chair

Attest:

_____, Secretary
John L. Schlegel, Secretary

Affix MAPC Seal

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.

_____, Mayor
Carl Brewer, Mayor

Attest:

_____, City Clerk
Carol Jones, City Clerk

Affix City Seal

TRANSFER RECORD

Entered on transfer record this ____ day of _____, 2009

_____, County Clerk
Don Brace, County Clerk

Affix County Clerk Seal

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.

Affix Register of Deeds Seal

_____, Register of Deeds
Bill Meek, Register of Deeds

Attest:

_____, Deputy
Tonya E. Buckingham, Deputy

COUNTY SURVEYOR

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

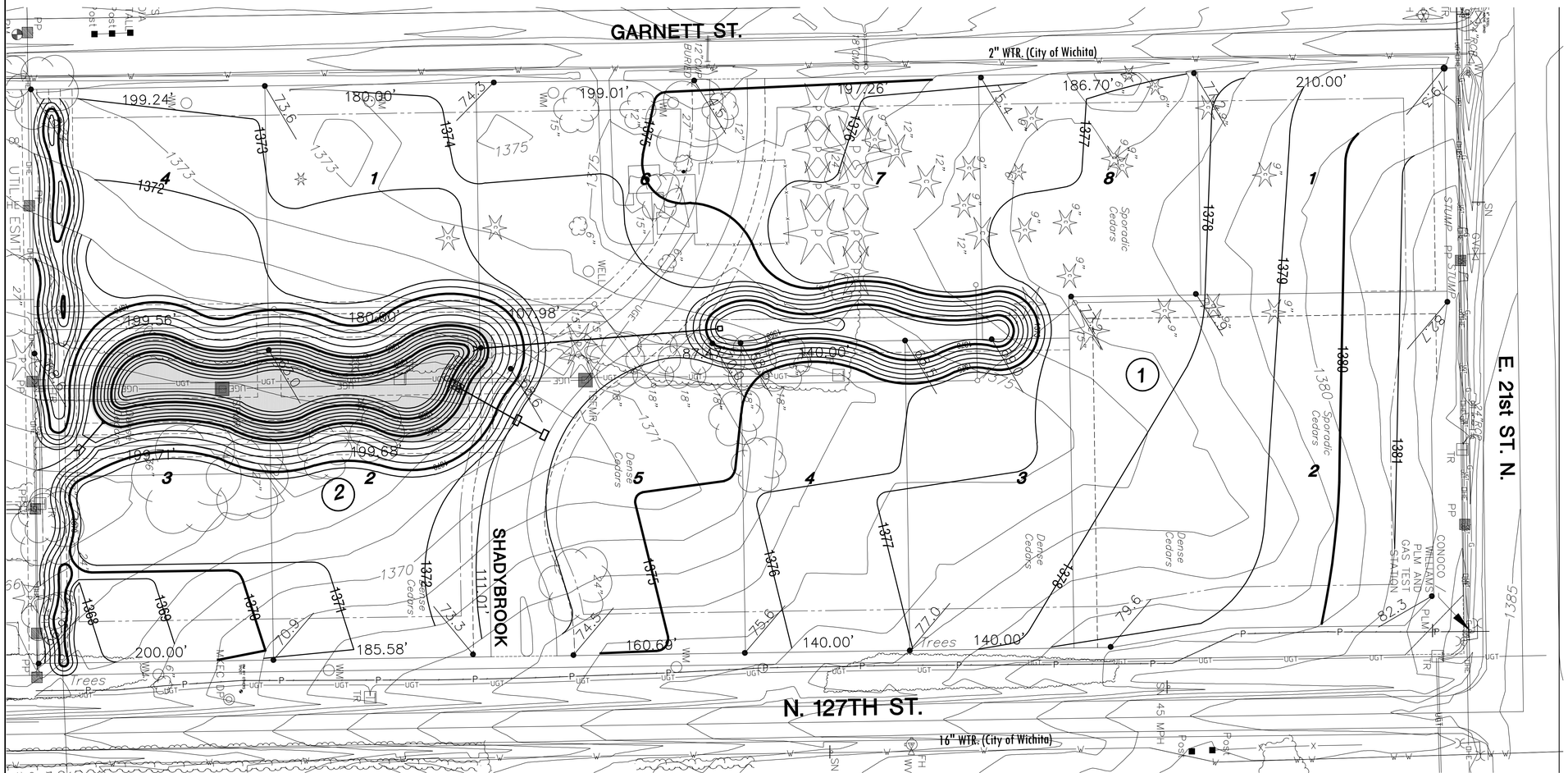
_____, Deputy County Surveyor
Tricia L. Robello, LS #1246
Deputy County Surveyor
Sedgwick County, Kansas

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

L:\Civil\08542\dwg\Final\08542cvr.dwg 11/13/2008 9:01:15 AM CST

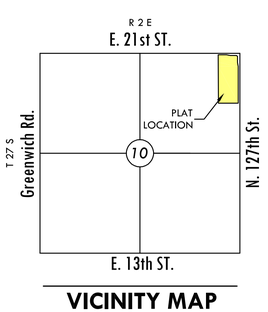
Figure 1.3

Preliminary Grading Plan



LEGEND

- BN - CONIFEROUS TREE
- DN - DECIDUOUS TREE
- SN - SIGN
- PP - POWER POLE
- ELEC BOX - ELECTRIC BOX
- LP - LIGHT POLE
- FH - FIRE HYDRANT
- WV - WATER VALVE
- WM - WATER METER
- SECTION CORNER
- BM - 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
- DRAINAGE SUB BASIN
- DRAINAGE BASIN
- FLOW ARROW
- A17 - AREA FOR SWS SIZING



VICINITY MAP

BM #1 - Square cut NE corner traffic signal MH pad @ SE corner 21st St. & 127th St. E.
Elev. = 1383.69 (NGVD 29)

BM #2 - RR spike N. face PP at SW corner Garnett & 21st St. N.
Elev. = 1377.14 (NGVD 29)

BM #3 - RR spike E. face PP, W. side Garnett, across from Lot 9, Lakeside Acres 2nd Addition.
Elev.= 1373.97 (NGVD 29)

N

SCALE: 1" =50'

0 50 100 150

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

SUMMIT CROSSING

SUMMIT CROSSING
WICHITA, KANSAS

LOT GRADING PLAN

DATE: OCTOBER 2008
REVISED

DESIGN BY: KLA
DRAWN BY: CMJ
CHECKED BY: GJA

SHEET NUMBER: 1

J:\civil\08542\dwg\dmg\08542_LGP.dwg

Tab 2. Existing Conditions Runoff Calculations

A. Orthophotograph

The aerial photograph is included, Figure 2.1.

B. Runoff Method

The SCS method in Hydraflow Hydrographs 2007 was used to determine pre- and post-project runoff rates.

C. Existing Topography

Elevations on the site range from 1382 feet in the north to 1366 feet, in the south. The site drains to the center of the site and to the south. A portion of the site drains south and west. The existing topography is shown on the Existing Conditions Drawing, Figure 2.2.

D. Site Areas

The site is open rural area with a building in the west central portion of the site.

E. Benchmarks

The benchmarks used for survey are as follows:
Benchmark #1: Square cut on NE corner traffic signal manhole pad at SE corner 21st Street and 127th Street East, Elevation = 1383.69

Benchmark #2: Railroad spike north face power pole at SW corner Garnett and 21st Street North, Elevation = 1377.14

Benchmark #3: Railroad spike east face power pole west side of Garnett, across from Lot 9, Lakeside Acres 2nd Addition, Elevation = 1373.97

Benchmarks are shown on Figure 1.2. NGVD 29 datum is used in this report.

F. Streams, Creeks, and Waterways

No portion of the site is included in a regulatory floodplain. The site is in Zone X, areas outside the 0.2% annual chance event, as shown on FIRM Panel 0385E, 0377E and 0379E of 700, Sedgwick County, Kansas February 2, 2007 in Figure 2.3. The nearest floodplain is approximately ¼-mile southwest of the site.

G. Soils

According to the NRCS (SCS) Sedgwick County Soil Survey, Figure 2.4, soils on the site are lime silty clay 3 to 7% slopes (HSG “C”) and Irwin silty clay loam 1 to 3% slopes (Ia, HSG “D”) The Hydraulic Soil Group used to select runoff coefficients and curve numbers is “D”.

H. Natural Features

According to the USGS quadrangle map a channel transects the site; however, the proposed site is the only area contributing to this “channel”. There is no storm sewer under 21st Street that would convey runoff from north of 21st Street to this area.

I. Location of Existing Impervious Areas

A majority of the site is undeveloped open land. There is an existing building in the west central portion of the site.

J. Location of Existing Utilities

There is an existing water line on the east side of 127th Street and the north side of 21st Street. An existing sanitary sewer line runs along the east side of 127th Street. In addition there is a water line on the west side of Garnett Street.

K. Location of Existing Conveyance Systems

There are no stormwater conveyance systems onsite. There are two 24-inch storm sewer pipes under existing drives that convey runoff from the east to the west along the south side of 21st Street. There is one 12-inch corrugated metal pipe (CMP) and one 18-inch CMP under Garnett Street that conveys flow from the east ditch along Garnett to the west.

L. Flow Paths

Flow paths are shown on the Existing Conditions Drawing, Figure 2.2.

M. Location and Sizes of Existing Structures

There is no existing detention or drainage structures onsite.

N. Existing Conditions Hydrologic Analysis

Hydraflow Hydrographs 2007 was used to calculate pre-project runoff rates. The SCS method was used since detention is proposed. There are two basins onsite; the west basin drains to the west and the east basin drains to the south. The pre-project drainage basins are shown on the Existing Conditions drawing, Figure 2.2. The pre-development runoff rates are shown in the table below, calculations are in Figure 2.5.

Pre-Development Flow Rates

Description	Design Storm Flows (cfs)			
	2-Yr	5-Yr	10-Yr	100-Yr
West	3.1	4.9	6.1	10.7
East	11.3	17.6	22.0	38.3

O. Pre-Developed Runoff Curve Numbers

The west and east basin are currently open pasture or rangeland; therefore a curve number of 80 was used to calculate pre-project runoff rates.

P. Existing Time of Concentration

The FAA method in Hydraflow Hydrographs 2007 was used to calculate the time of concentration. The times of concentration and rational coefficients for pre-development conditions are shown in the following table. Time of concentration calculations are in Figure 2.5.

Existing Time of Concentration and Rational Coefficient

Basin	T_c minutes	Rational Coefficient
West	27	0.45
East	38	0.45

Q. Downstream Drainage Capacity

The current downstream drainage capacity will be unaffected by the proposed development.

R. Existing Structural Elevations

There is one building onsite.

S. Open Channels

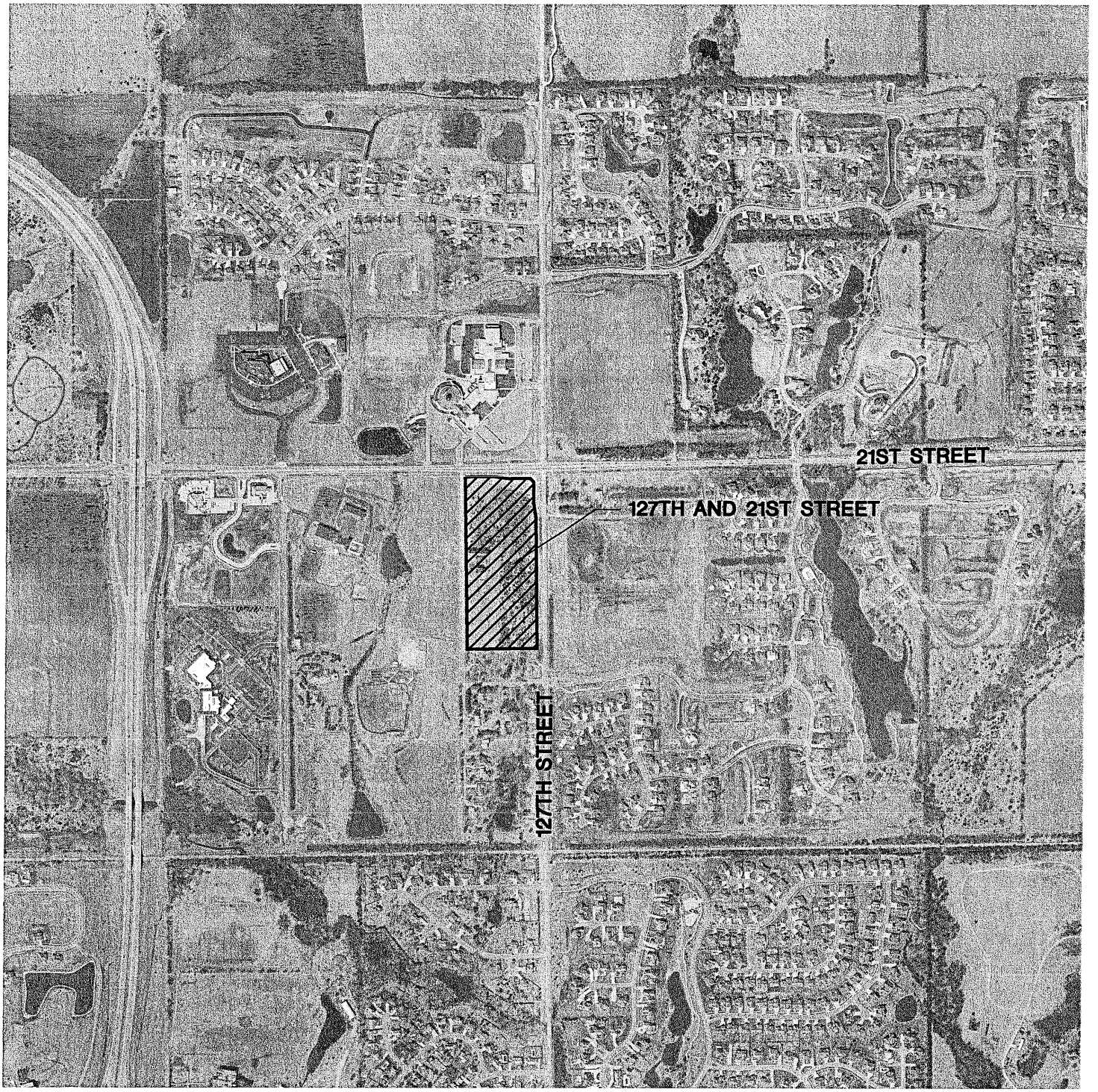
Discussion has begun with the Corps of Engineers to determine if in-fact there is a definable channel onsite.

T. Groundwater Elevations

Groundwater elevations are not applicable for this project.

Figure 2.1

Orthophotograph



SCALE: 1" = 1000'

1000 0 1000 2000

N

MKEC ENGINEERING CONSULTANTS, INC.

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

SUMMIT CROSSING
PROJECT NAME

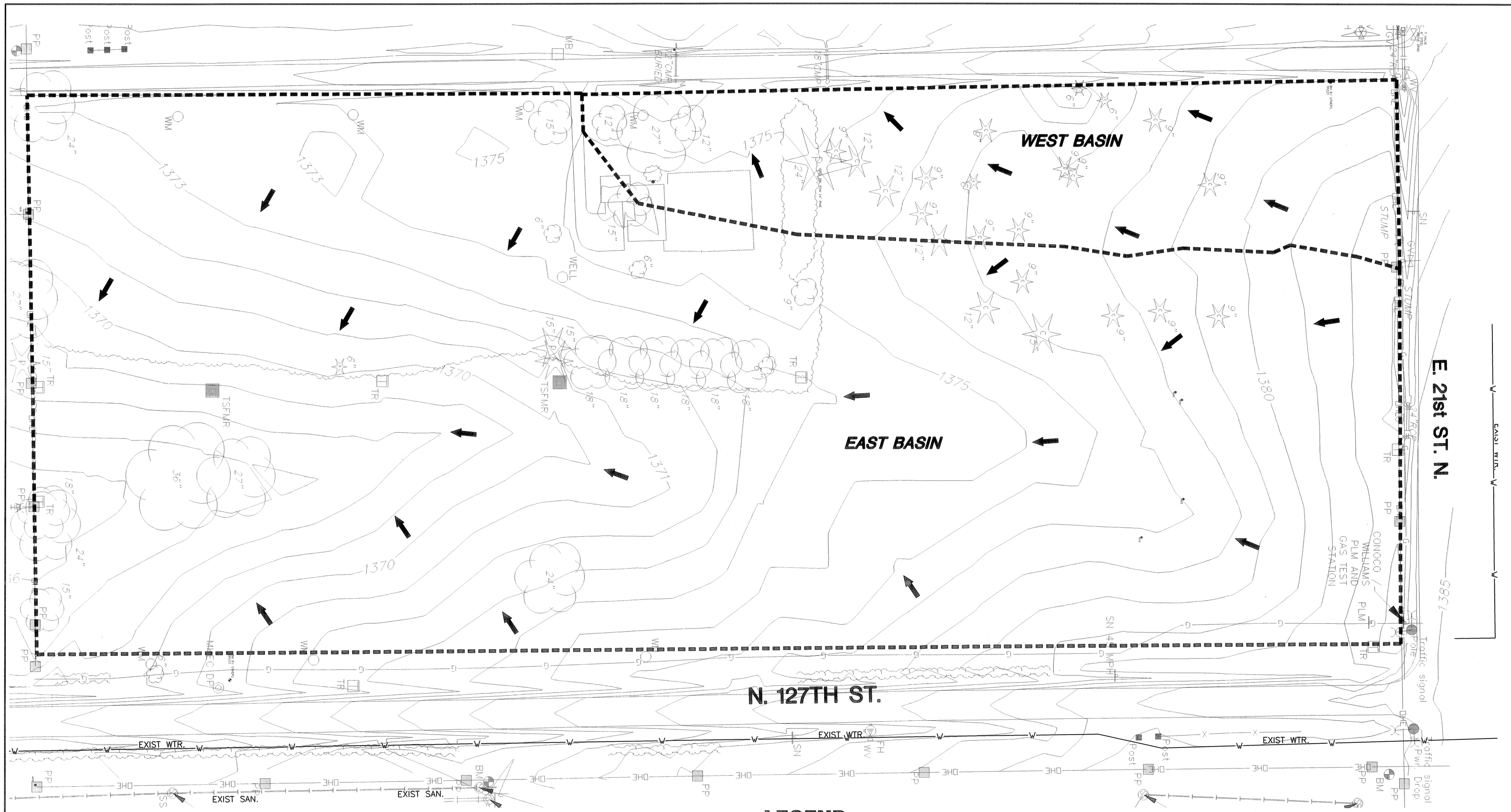
AERIAL MAP
SHEET TITLE

KLA	CMJ	GJA
DESIGN BY:	DRAWN BY:	CHECKED BY:
OCTOBER 2008	08542	1 / 1
DATE	JOB NO.	SHEET/OF

J:\Civil\08542\dwg\DRNG\08542_AERIAL.dwg

Figure 2.2

Existing Conditions Drawing



R 2 E

E. 21st ST.

T 27 S

Greenwich Rd.

PLAT LOCATION

10

N. 127th St.

E. 13th ST.

VICINITY MAP

LEGEND

- CIN - CONIFEROUS TREE
- DIN - DECIDUOUS TREE
- SN - SIGN
- PP - POWER POLE
- ELEC BOX - ELECTRIC BOX
- LP - LIGHT POLE
- FH - FIRE HYDRANT
- WV - WATER VALVE
- WM - WATER METER
- SC - SECTION CORNER
- BM - BENCHMARK
- EASEMENT
- BUILDING SETBACK
- FENCE
- STORM SEWER PIPE
- W - WATER LINE
- SS - SANITARY SEWER LINE
- G - GAS LINE
- P - GAS PIPELINE
- UGT - TELEPHONE LINE
- UGE - UNDERGROUND ELEC.
- OHE - OVERHEAD ELECTRIC
- FOC - FIBER OPTIC CABLE
- DRAINAGE BASIN
- FLOW ARROW

BM #1 - Square cut NE corner traffic signal MH pad @ SE corner 21st St. & 127th St. E.
Elev. = 1383.69 (NGVD 29)

BM #2 - RR spike N. face PP at SW corner Garnett & 21st St. N.
Elev. = 1377.14 (NGVD 29)

BM #3 - RR spike E. face PP, W. side Garnett, across from Lot 9, Lakeside Acres 2nd Addition.
Elev.= 1373.97 (NGVD 29)

N

SCALE: 1"=50'

0 50 100 150

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WICHITA, KS. 67206
316 - 684 - 9600

SUMMIT CROSSING

SUMMIT CROSSING
WICHITA, KANSAS

EXISTING CONDITIONS

DATE: OCTOBER 2008

REVISED

DESIGN BY: KLA

DRAWN BY: CMJ

CHECKED BY: GJA

SHEET NUMBER: 1

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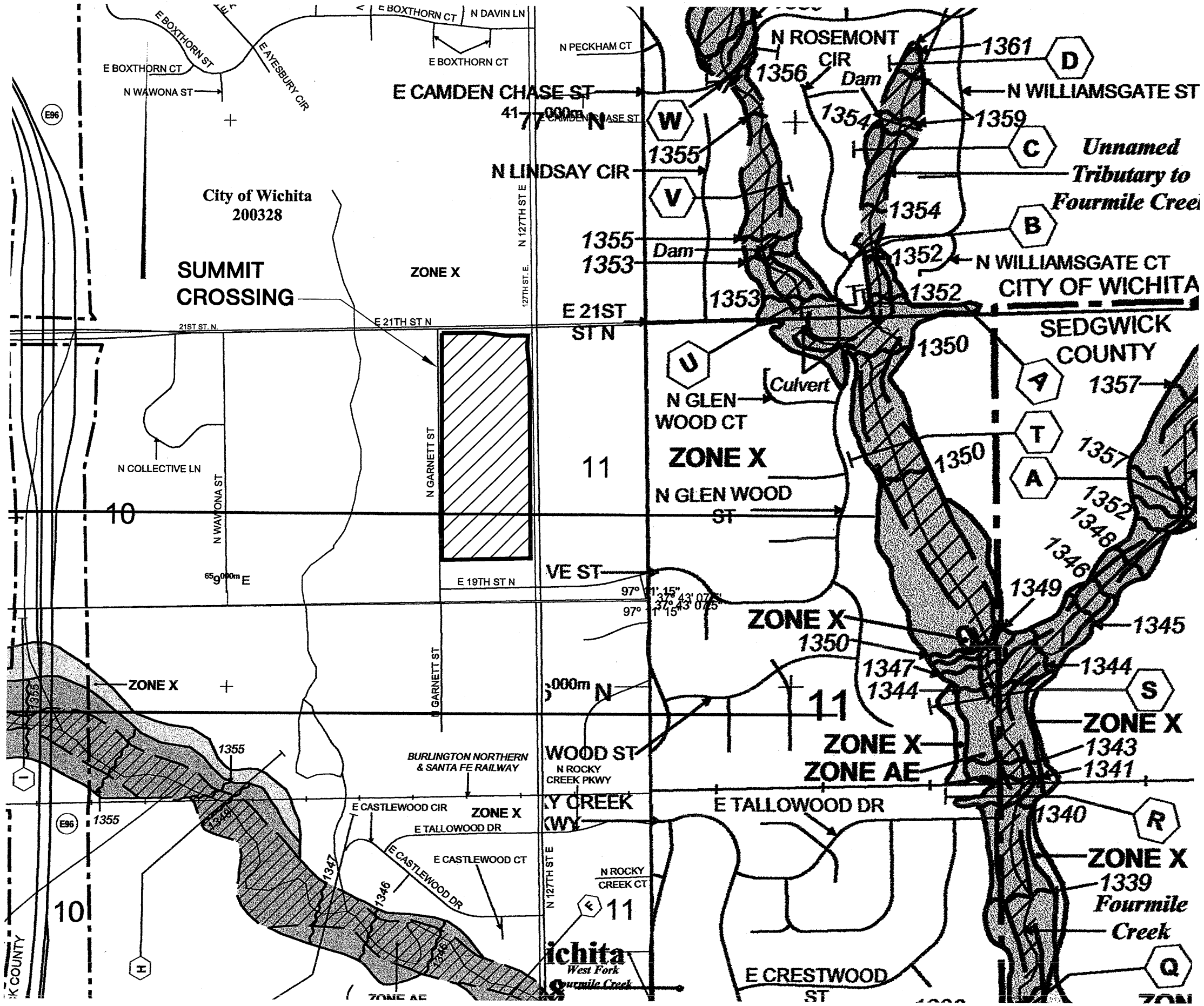
Figure 2.3

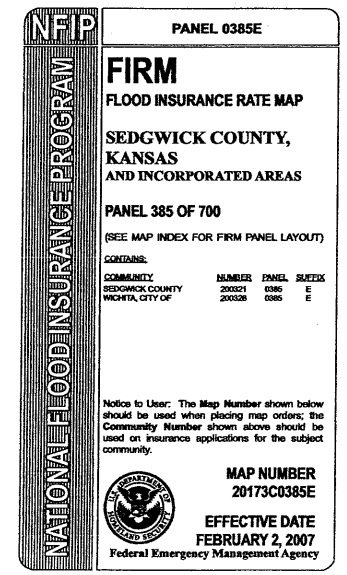
FIRM

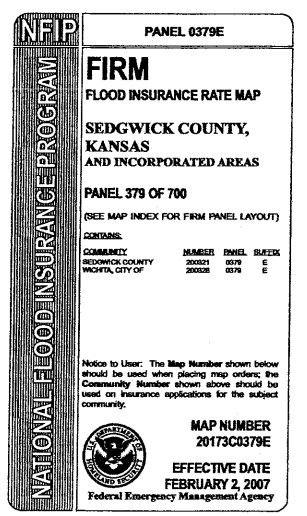


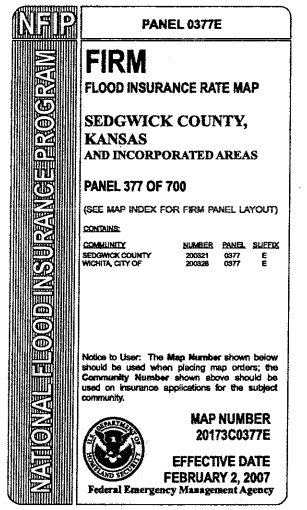
MAP SCALE 1" = 500'

250 0 500 1000 FEET

150 0 150 300 METERS







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CONSULTANTS, INC.
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WICHITA, KS. 67206
316 - 684 - 9600

SUMMIT CROSSING

127TH AND 21ST
WICHITA KANSAS

FIRM MAP

DATE
OCTOBER 2008

REVISED

DESIGN BY
TMH

DRAWN BY
CMJ

CHECKED BY
GJA

SHEET NUMBER
1

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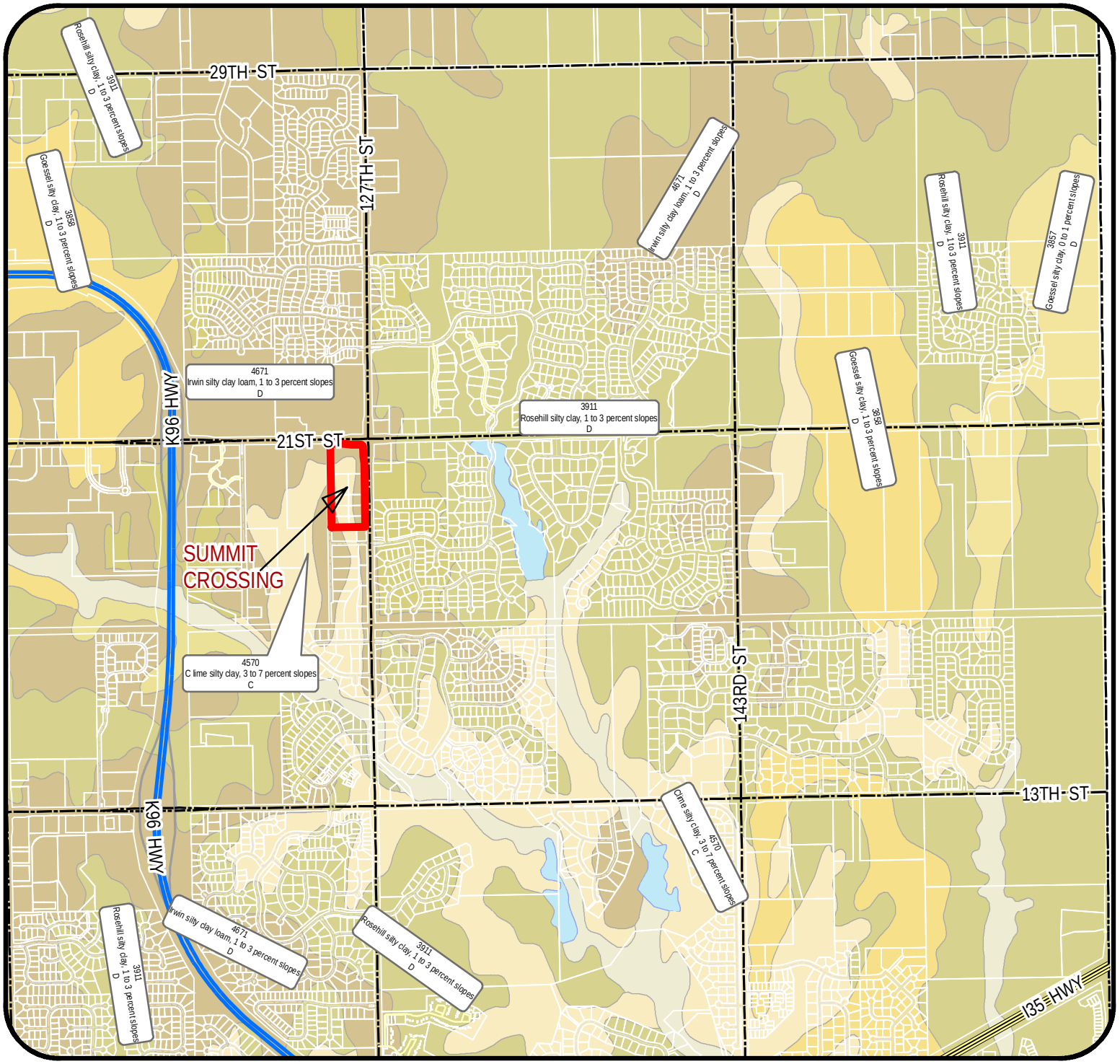
Figure 2.4

Soil Survey



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SUMMIT CROSSING

Project Name:

Soil Survey - Sedgwick County, KS

Sheet Title:

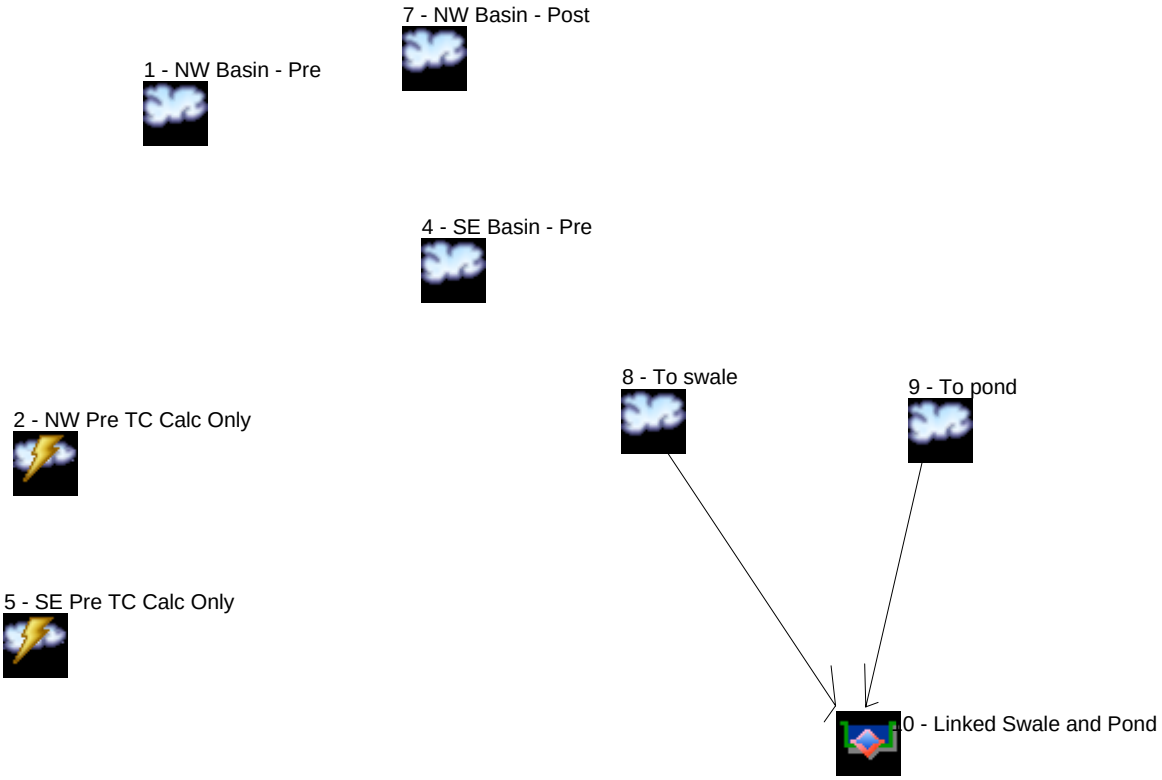
MKEC ENGINEERING CONSULTANTS, INC.

CMJ	Oct. 2008
Drawn By:	Date:
TMH/KLA	08542
Design / Review:	Job No.:

Figure 2.5

Hydraflow Hydrographs

Watershed Model Schematic



Legend

Hyd.	Origin	Description
1	SCS Runoff	NW Basin - Pre
2	Rational	NW Pre TC Calc Only
4	SCS Runoff	SE Basin - Pre
5	Rational	SE Pre TC Calc Only
7	SCS Runoff	NW Basin - Post
8	SCS Runoff	To swale
9	SCS Runoff	To pond
10	Reservoir(i)	Linked Swale and Pond

Hydrograph Return Period Recap

Hydraflow Hydrographs by Intelisolve v9.22

Hyd. No.	Hydrograph type (origin)	Inflow Hyd(s)	Peak Outflow (cfs)								Hydrograph description
			1-Yr	2-Yr	3-Yr	5-Yr	10-Yr	25-Yr	50-Yr	100-Yr	
1	SCS Runoff	-------	-------	3.128	-------	4.905	6.119	-------	-------	10.66	NW Basin - Pre
2	Rational	-------	-------	0.128	-------	0.154	0.179	-------	-------	0.256	NW Pre TC Calc Only
4	SCS Runoff	-------	-------	11.30	-------	17.63	21.95	-------	-------	38.33	SE Basin - Pre
5	Rational	-------	-------	0.104	-------	0.128	0.149	-------	-------	0.215	SE Pre TC Calc Only
7	SCS Runoff	-------	-------	3.091	-------	4.141	4.823	-------	-------	7.289	NW Basin - Post
8	SCS Runoff	-------	-------	21.94	-------	29.40	34.24	-------	-------	51.75	To swale
9	SCS Runoff	-------	-------	16.38	-------	21.95	25.56	-------	-------	38.63	To pond
10	Reservoir(i)	8, 9	-------	11.36	-------	16.25	20.75	-------	-------	35.95	Linked Swale and Pond

Hydrograph Summary Report

Hydraflow Hydrographs by Intelisolve v9.22

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Hyd. volume (acft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (acft)	Hydrograph description
1	SCS Runoff	3.128	6	732	0.297	----	------	------	NW Basin - Pre
2	Rational	0.128	1	27	0.005	----	------	------	NW Pre TC Calc Only
4	SCS Runoff	11.30	6	744	1.475	----	------	------	SE Basin - Pre
5	Rational	0.104	1	38	0.005	----	------	------	SE Pre TC Calc Only
7	SCS Runoff	3.091	6	720	0.228	----	------	------	NW Basin - Post
8	SCS Runoff	21.94	6	720	1.619	----	------	------	To swale
9	SCS Runoff	16.38	6	720	1.209	----	------	------	To pond
10	Reservoir(i)	11.36	6	750	2.828	8, 9	1370.28	1.25	Linked Swale and Pond

Hydrograph Summary Report

Hydraflow Hydrographs by Intelisolve v9.22

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Hyd. volume (acft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (acft)	Hydrograph description
1	SCS Runoff	4.905	6	726	0.459	----	------	------	NW Basin - Pre
2	Rational	0.154	1	27	0.006	----	------	------	NW Pre TC Calc Only
4	SCS Runoff	17.63	6	744	2.279	----	------	------	SE Basin - Pre
5	Rational	0.128	1	38	0.007	----	------	------	SE Pre TC Calc Only
7	SCS Runoff	4.141	6	720	0.310	----	------	------	NW Basin - Post
8	SCS Runoff	29.40	6	720	2.204	----	------	------	To swale
9	SCS Runoff	21.95	6	720	1.646	----	------	------	To pond
10	Reservoir(i)	16.25	6	744	3.849	8, 9	1370.95	1.61	Linked Swale and Pond

Hydrograph Summary Report

Hydraflow Hydrographs by Intelisolve v9.22

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Hyd. volume (acft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (acft)	Hydrograph description
1	SCS Runoff	6.119	6	726	0.571	----	------	------	NW Basin - Pre
2	Rational	0.179	1	27	0.007	----	------	------	NW Pre TC Calc Only
4	SCS Runoff	21.95	6	738	2.832	----	------	------	SE Basin - Pre
5	Rational	0.149	1	38	0.008	----	------	------	SE Pre TC Calc Only
7	SCS Runoff	4.823	6	720	0.365	----	------	------	NW Basin - Post
8	SCS Runoff	34.24	6	720	2.589	----	------	------	To swale
9	SCS Runoff	25.56	6	720	1.933	----	------	------	To pond
10	Reservoir(i)	20.75	6	738	4.525	8, 9	1371.40	1.82	Linked Swale and Pond

Hydraflow Table of Contents

100 - Year

Hydrograph Summary Report

Hydraflow Hydrographs by Intelisolve v9.22

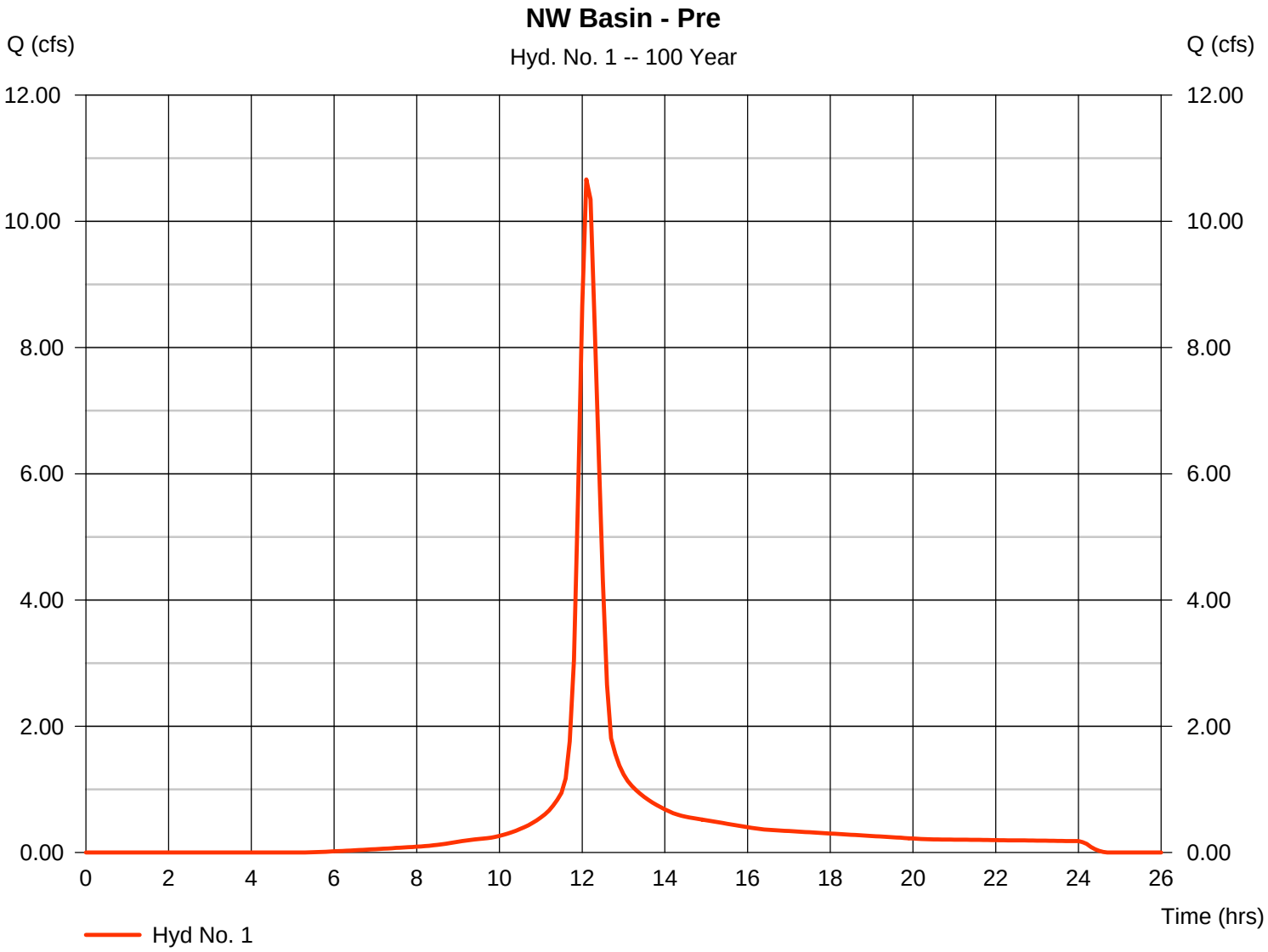
Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Hyd. volume (acft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (acft)	Hydrograph description
1	SCS Runoff	10.66	6	726	0.997	----	------	------	NW Basin - Pre
2	Rational	0.256	1	27	0.010	----	------	------	NW Pre TC Calc Only
4	SCS Runoff	38.33	6	738	4.948	----	------	------	SE Basin - Pre
5	Rational	0.215	1	38	0.011	----	------	------	SE Pre TC Calc Only
7	SCS Runoff	7.289	6	720	0.563	----	------	------	NW Basin - Post
8	SCS Runoff	51.75	6	720	3.995	----	------	------	To swale
9	SCS Runoff	38.63	6	720	2.982	----	------	------	To pond
10	Reservoir(i)	35.95	6	732	6.979	8, 9	1373.12	2.54	Linked Swale and Pond

Hydrograph Report

Hyd. No. 1

NW Basin - Pre

Hydrograph type	=	SCS Runoff	Peak discharge	=	10.66 cfs
Storm frequency	=	100 yrs	Time to peak	=	12.10 hrs
Time interval	=	6 min	Hyd. volume	=	0.997 acft
Drainage area	=	2.200 ac	Curve number	=	80
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	USER	Time of conc. (Tc)	=	27.00 min
Total precip.	=	7.80 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

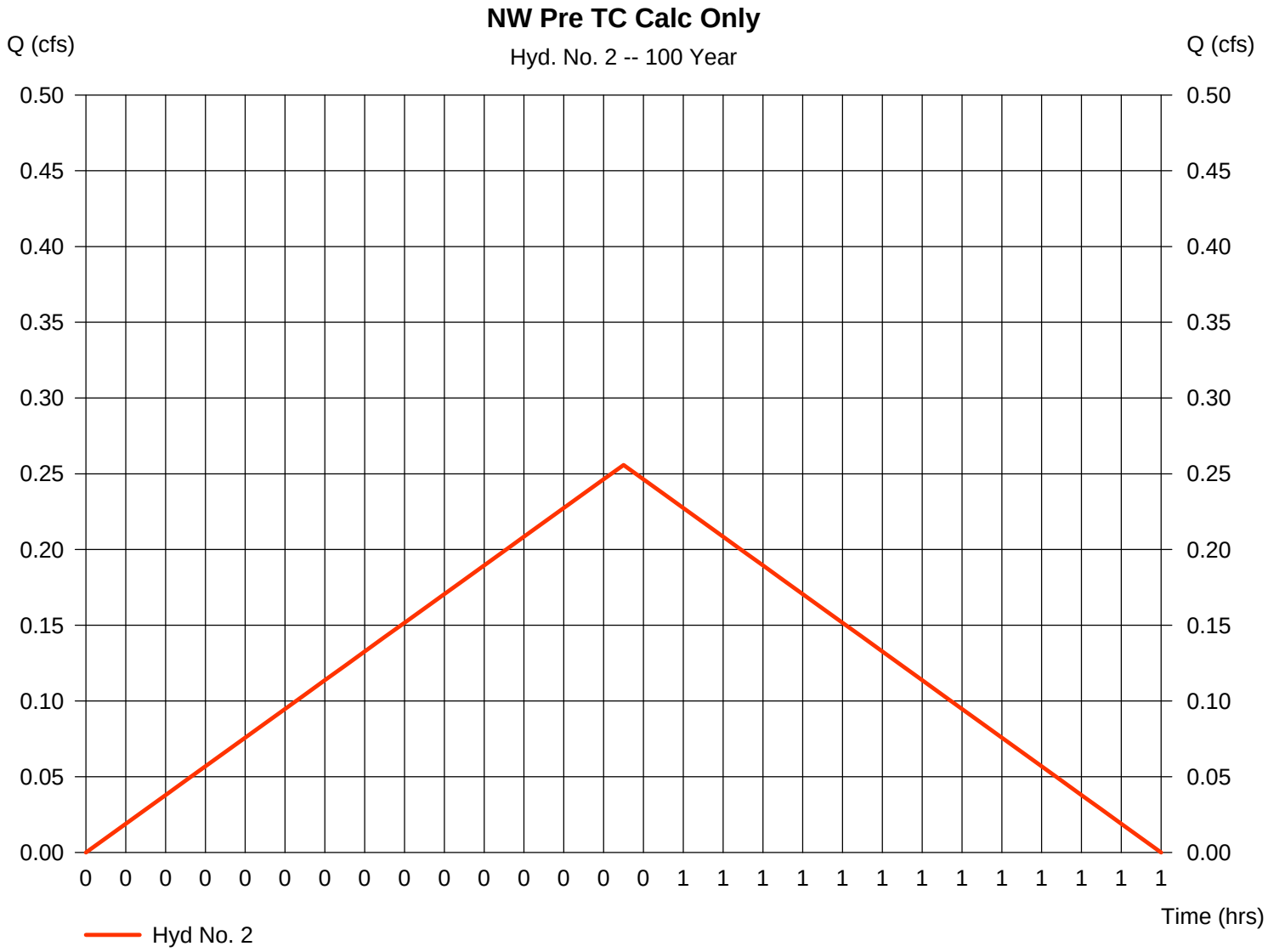


Hydrograph Report

Hyd. No. 2

NW Pre TC Calc Only

Hydrograph type	=	Rational	Peak discharge	=	0.256 cfs
Storm frequency	=	100 yrs	Time to peak	=	0.45 hrs
Time interval	=	1 min	Hyd. volume	=	0.010 acft
Drainage area	=	0.100 ac	Runoff coeff.	=	0.45
Intensity	=	5.685 in/hr	Tc by FAA	=	27.00 min
IDF Curve	=	Sedgwick County.IDF	Asc/Rec limb fact	=	1/1



FAA Formula Tc Worksheet

Hyd. No. 2

NW Pre TC Calc Only

Description

Flow length (ft)	= 620.00
Watercourse slope (%)	= 1.30
Runoff coefficient (C)	= 0.45

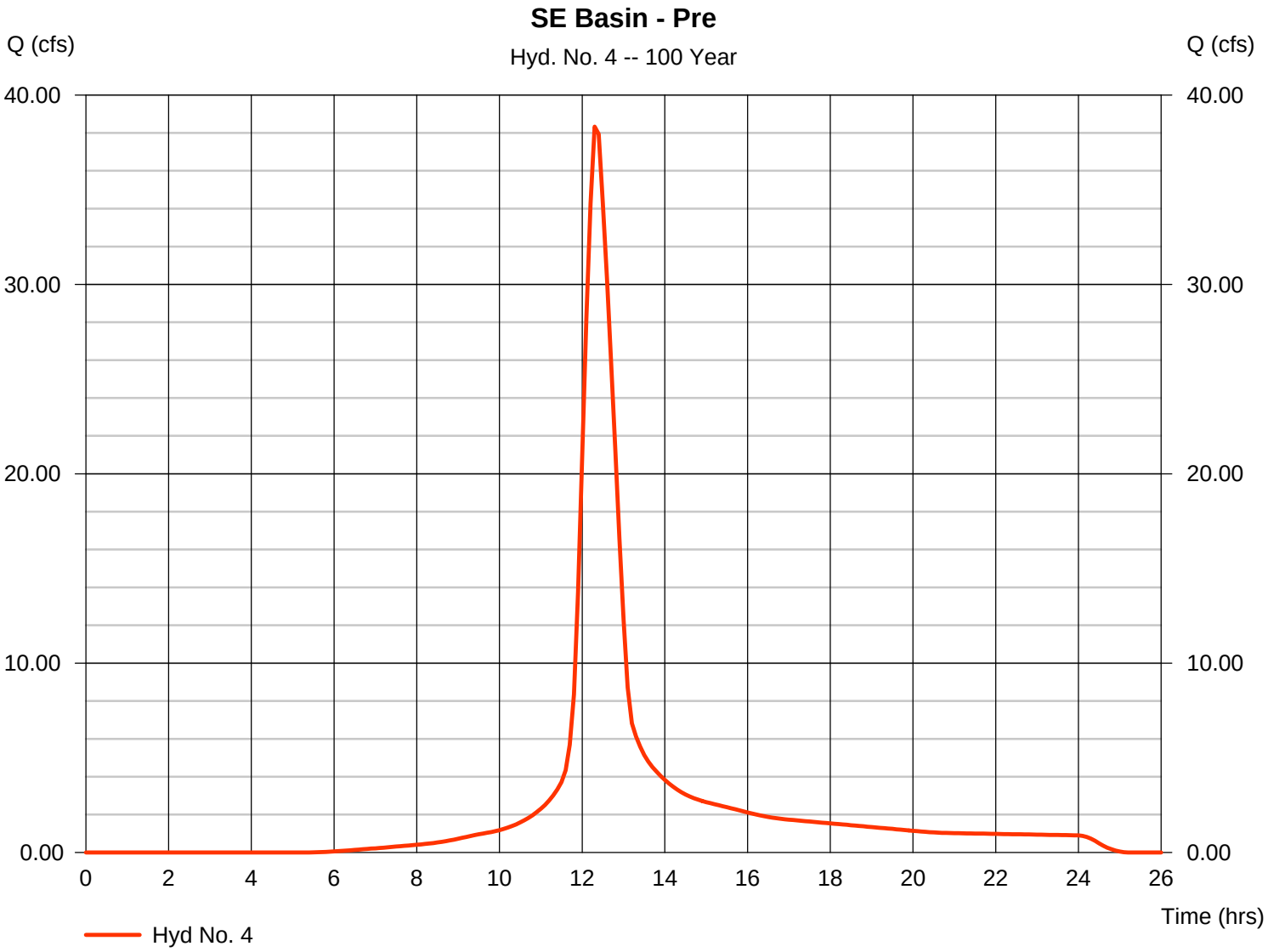
Time of Conc. (min) = 27

Hydrograph Report

Hyd. No. 4

SE Basin - Pre

Hydrograph type	=	SCS Runoff	Peak discharge	=	38.33 cfs
Storm frequency	=	100 yrs	Time to peak	=	12.30 hrs
Time interval	=	6 min	Hyd. volume	=	4.948 acft
Drainage area	=	11.200 ac	Curve number	=	80
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	USER	Time of conc. (Tc)	=	40.00 min
Total precip.	=	7.80 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

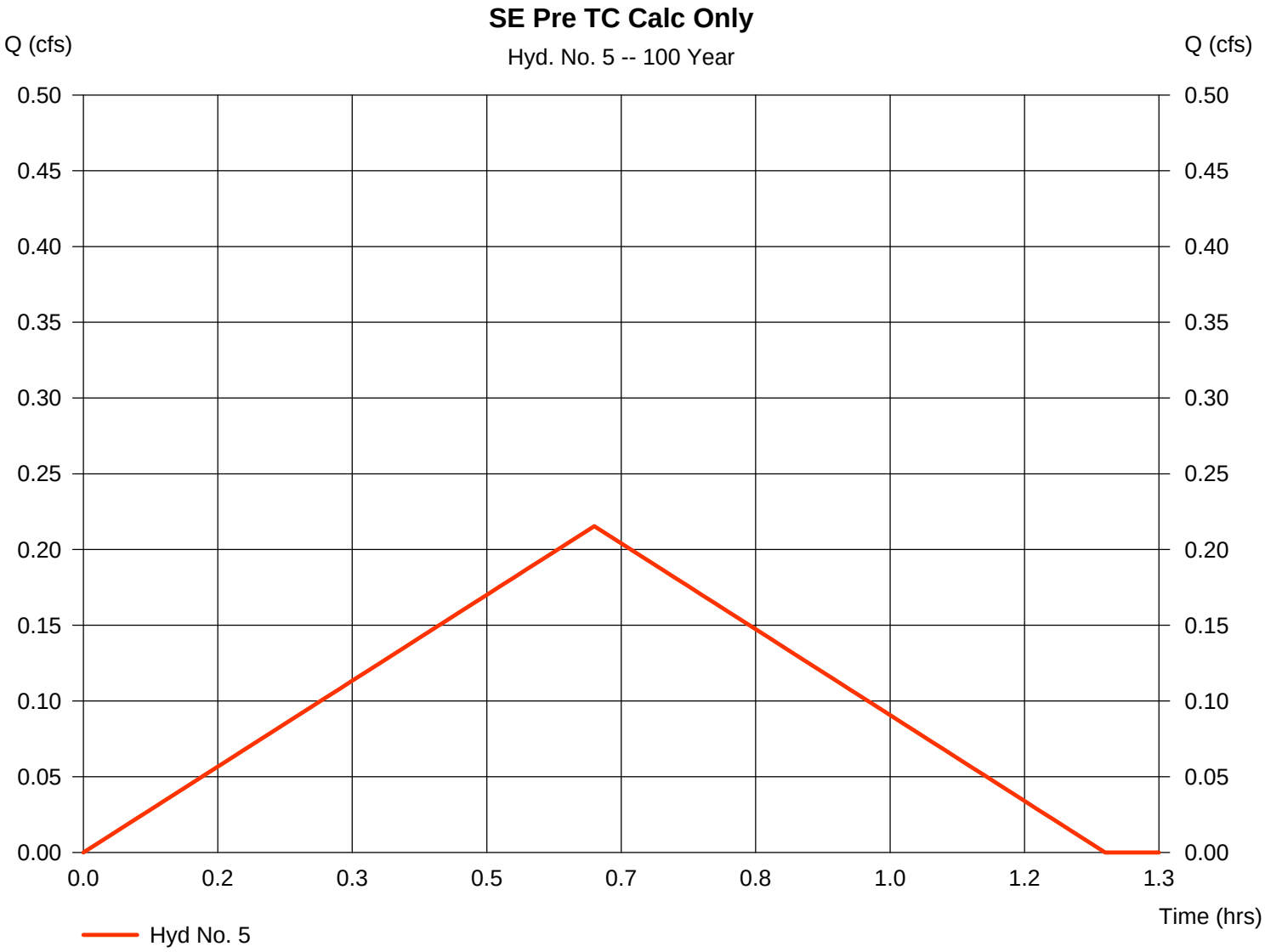


Hydrograph Report

Hyd. No. 5

SE Pre TC Calc Only

Hydrograph type	=	Rational	Peak discharge	=	0.215 cfs
Storm frequency	=	100 yrs	Time to peak	=	0.63 hrs
Time interval	=	1 min	Hyd. volume	=	0.011 acft
Drainage area	=	0.100 ac	Runoff coeff.	=	0.45
Intensity	=	4.787 in/hr	Tc by FAA	=	38.00 min
IDF Curve	=	Sedgwick County.IDF	Asc/Rec limb fact	=	1/1



FAA Formula Tc Worksheet

Hyd. No. 5

SE Pre TC Calc Only

Description

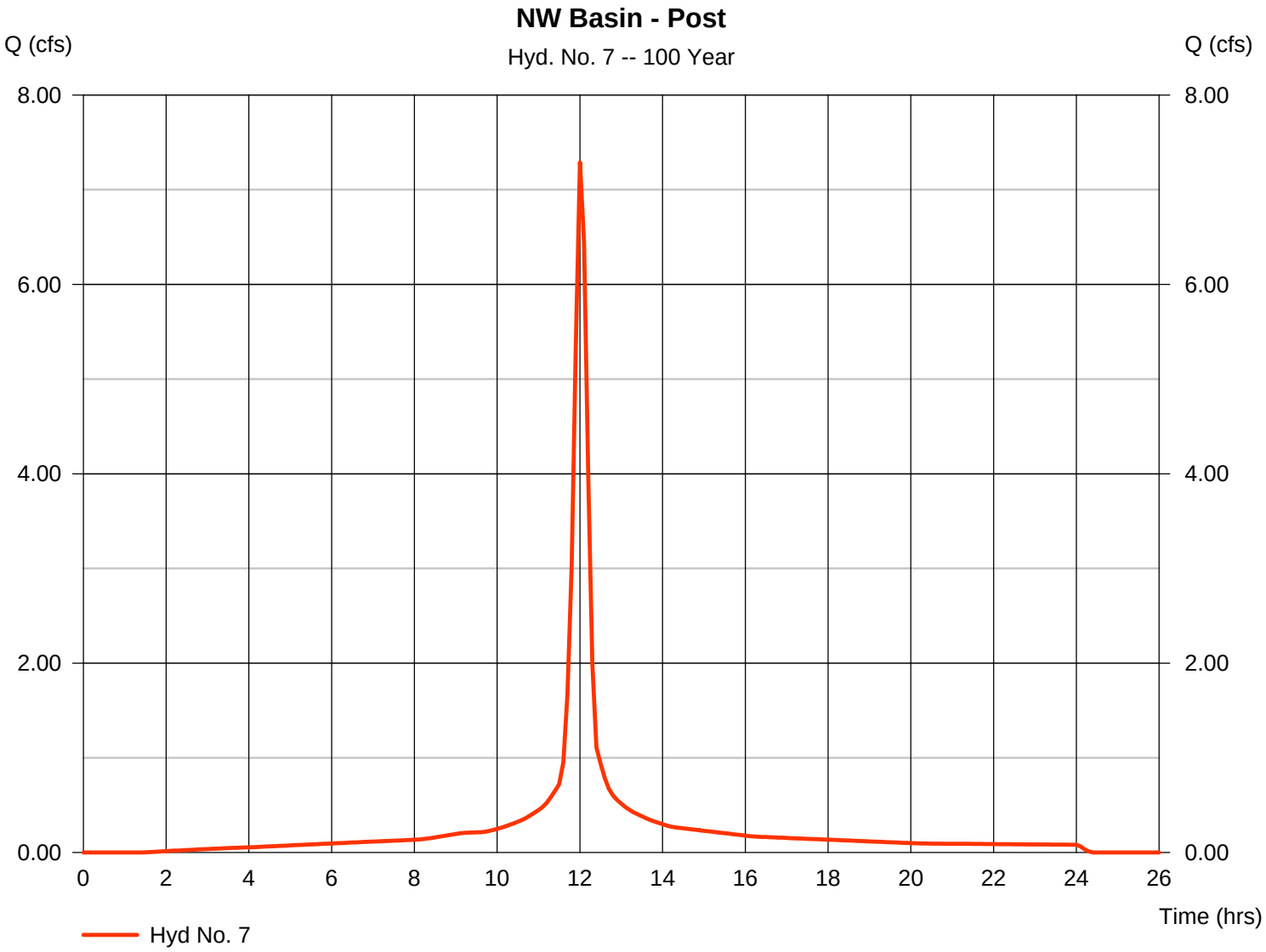
Flow length (ft)	= 1200.00
Watercourse slope (%)	= 1.25
Runoff coefficient (C)	= 0.45
Time of Conc. (min)	**= 38**

Hydrograph Report

Hyd. No. 7

NW Basin - Post

Hydrograph type	=	SCS Runoff	Peak discharge	=	7.289 cfs
Storm frequency	=	100 yrs	Time to peak	=	12.00 hrs
Time interval	=	6 min	Hyd. volume	=	0.563 acft
Drainage area	=	1.000 ac	Curve number	=	95
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	USER	Time of conc. (Tc)	=	15.00 min
Total precip.	=	7.80 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

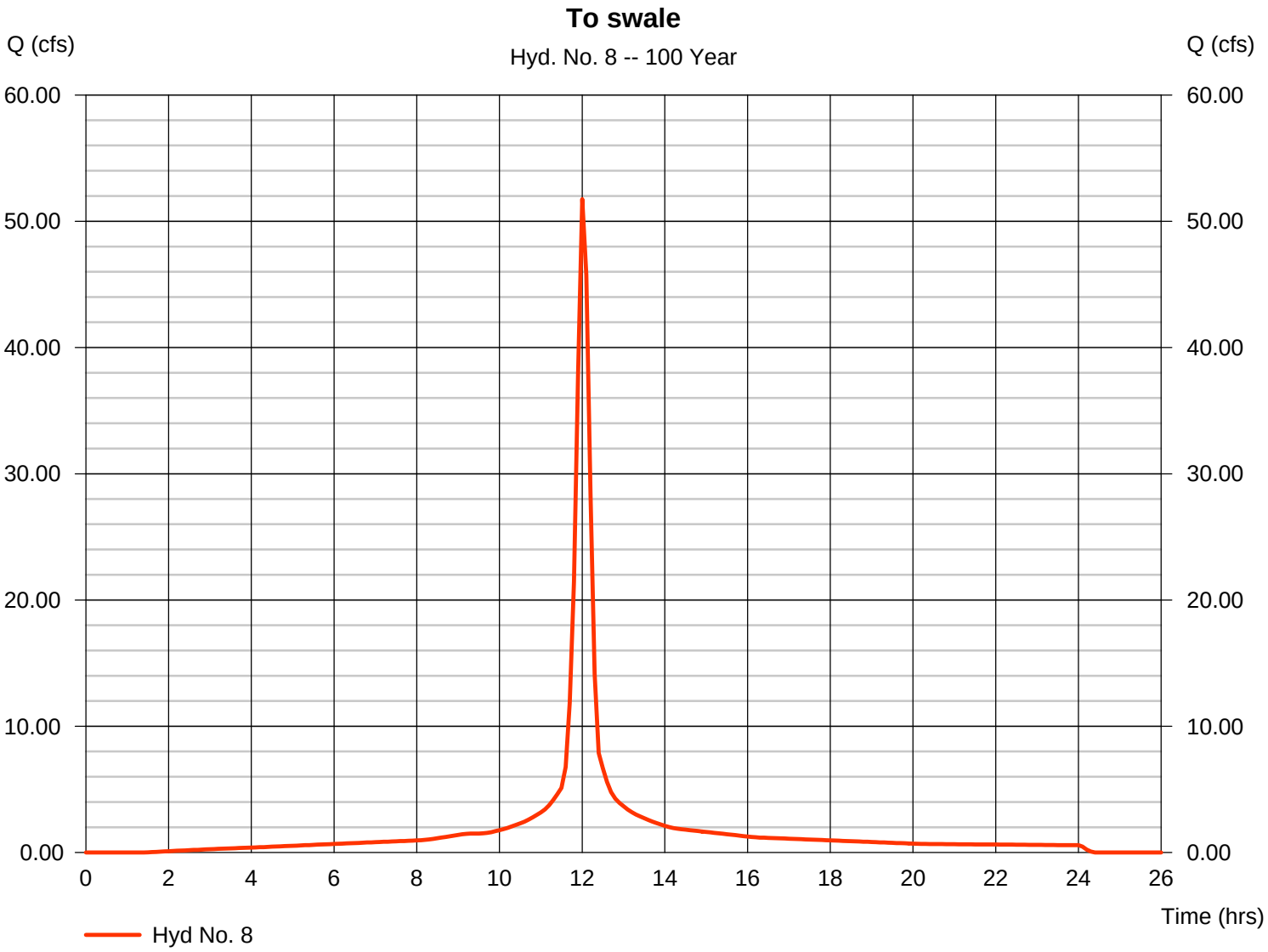


Hydrograph Report

Hyd. No. 8

To swale

Hydrograph type	=	SCS Runoff	Peak discharge	=	51.75 cfs
Storm frequency	=	100 yrs	Time to peak	=	12.00 hrs
Time interval	=	6 min	Hyd. volume	=	3.995 acft
Drainage area	=	7.100 ac	Curve number	=	95
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	USER	Time of conc. (Tc)	=	15.00 min
Total precip.	=	7.80 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

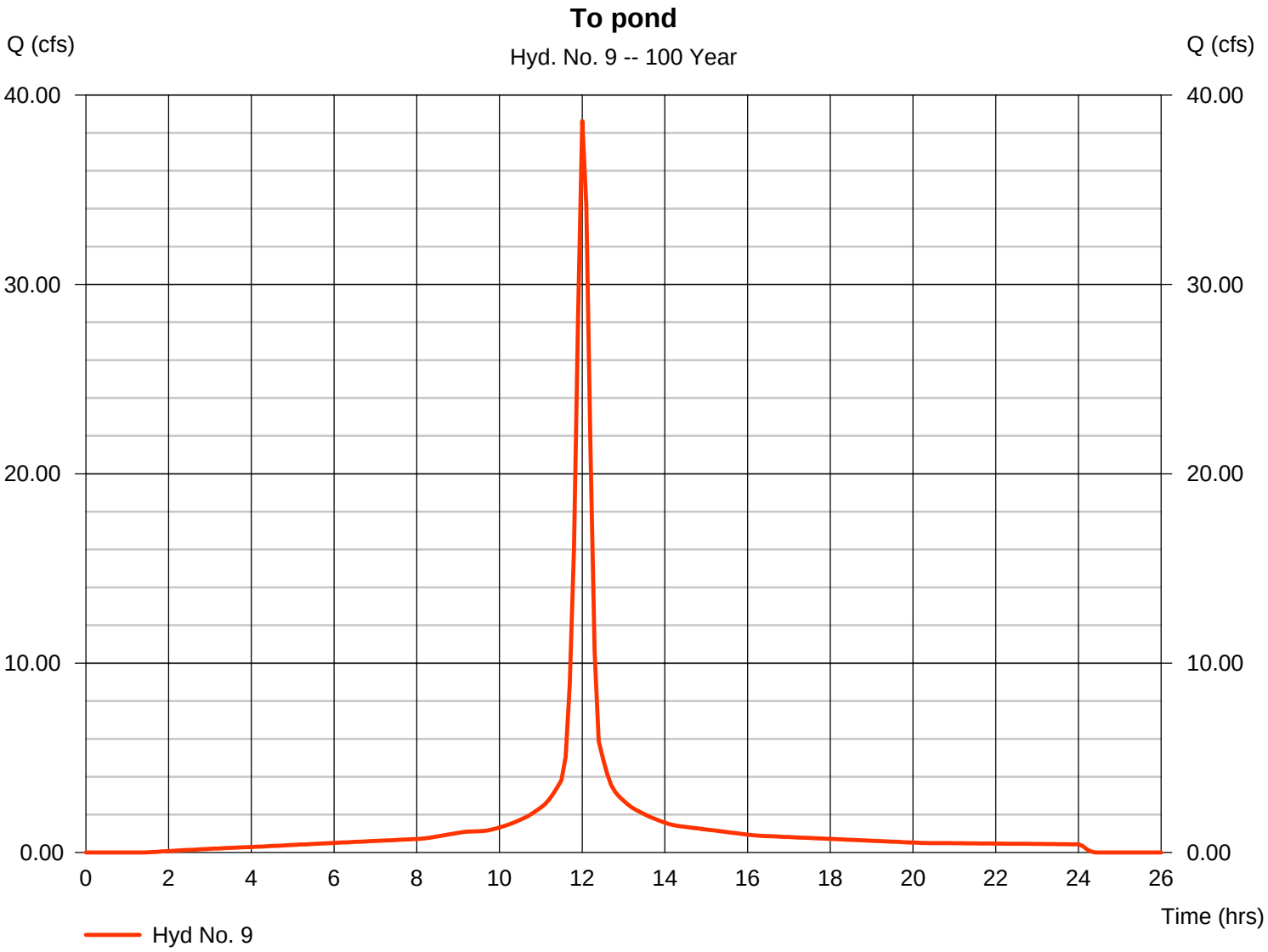


Hydrograph Report

Hyd. No. 9

To pond

Hydrograph type	=	SCS Runoff	Peak discharge	=	38.63 cfs
Storm frequency	=	100 yrs	Time to peak	=	12.00 hrs
Time interval	=	6 min	Hyd. volume	=	2.982 acft
Drainage area	=	5.300 ac	Curve number	=	95
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	USER	Time of conc. (Tc)	=	15.00 min
Total precip.	=	7.80 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484



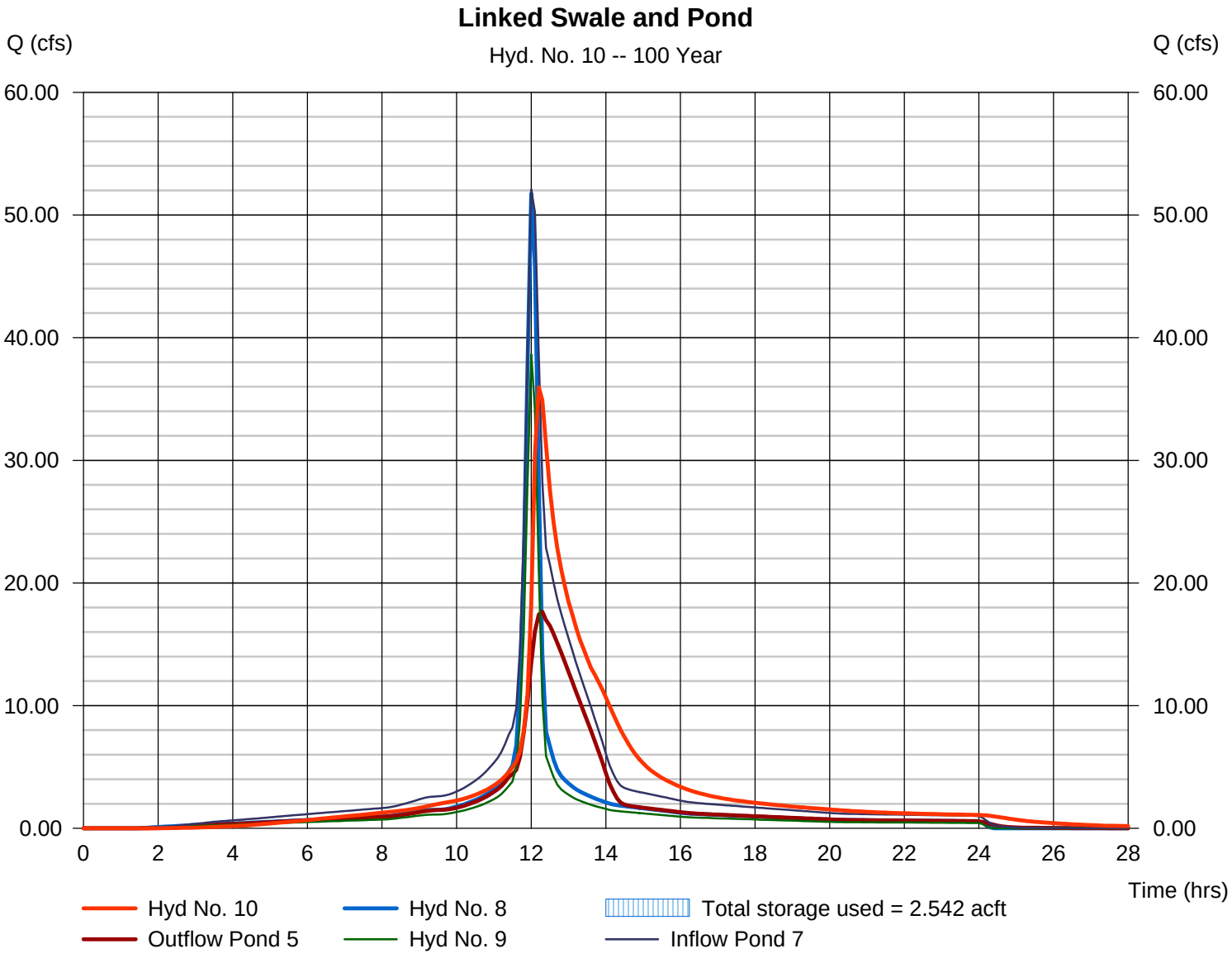
Hydrograph Report

Hyd. No. 10

Linked Swale and Pond

Hydrograph type	=	Reservoir (Interconnected)	Peak discharge	=	35.95 cfs
Storm frequency	=	100 yrs	Time to peak	=	12.20 hrs
Time interval	=	6 min	Hyd. volume	=	6.979 acft
Upper Pond			**Lower Pond**		
Pond name	=	Swale	Pond name	=	SE Pond 2 areas - we
Inflow hyd.	=	8 - To swale	Other Inflow hyd.	=	9 - To pond
Max. Elevation	=	1373.12 ft	Max. Elevation	=	1368.14 ft
Max. Storage	=	1.107 acft	Max. Storage	=	1.435 acft

Interconnected Pond Routing. Storage Indication method used.



Pond No. 5 - Swale

Pond Data

Contours - User-defined contour areas. Conic method used for volume calculation. Begining Elevation = 1368.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (acft)	Total storage (acft)
0.00	1368.00	00	0.000	0.000
1.00	1369.00	7,427	0.057	0.057
1.50	1369.50	11,530	0.108	0.165
2.00	1370.00	11,530	0.132	0.297
2.50	1370.50	11,530	0.132	0.429
3.00	1371.00	11,530	0.132	0.562
3.50	1371.50	11,530	0.132	0.694
4.00	1372.00	11,530	0.132	0.826
4.50	1372.50	11,530	0.132	0.959
5.00	1373.00	11,530	0.132	1.091
5.50	1373.50	11,530	0.132	1.223

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 18.00	0.00	0.00	0.00
Span (in)	= 18.00	0.00	0.00	0.00
No. Barrels	= 1	0	0	0
Invert El. (ft)	= 1368.00	0.00	0.00	0.00
Length (ft)	= 0.00	0.00	0.00	0.00
Slope (%)	= 0.00	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	No	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 0.00	0.00	0.00	0.00
Crest El. (ft)	= 0.00	0.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= ---	---	---	---
Multi-Stage	= No	No	No	No

Exfil.(in/hr) = 0.000 (by Wet area)

TW Elev. (ft) = 0.00

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).

Stage / Storage / Discharge Table

Stage ft	Storage acft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
0.00	0.000	1368.00	0.00	---	---	---	---	---	---	---	---	---	0.000
0.10	0.006	1368.10	0.05 ic	---	---	---	---	---	---	---	---	---	0.055
0.20	0.011	1368.20	0.21 ic	---	---	---	---	---	---	---	---	---	0.213
0.30	0.017	1368.30	0.47 ic	---	---	---	---	---	---	---	---	---	0.471
0.40	0.023	1368.40	0.81 ic	---	---	---	---	---	---	---	---	---	0.815
0.50	0.028	1368.50	1.24 ic	---	---	---	---	---	---	---	---	---	1.243
0.60	0.034	1368.60	1.74 ic	---	---	---	---	---	---	---	---	---	1.741
0.70	0.040	1368.70	2.31 ic	---	---	---	---	---	---	---	---	---	2.306
0.80	0.045	1368.80	2.92 ic	---	---	---	---	---	---	---	---	---	2.921
0.90	0.051	1368.90	3.57 ic	---	---	---	---	---	---	---	---	---	3.574
1.00	0.057	1369.00	4.26 ic	---	---	---	---	---	---	---	---	---	4.265
1.05	0.068	1369.05	4.62 ic	---	---	---	---	---	---	---	---	---	4.615
1.10	0.078	1369.10	4.96 ic	---	---	---	---	---	---	---	---	---	4.964
1.15	0.089	1369.15	5.31 ic	---	---	---	---	---	---	---	---	---	5.312
1.20	0.100	1369.20	5.65 ic	---	---	---	---	---	---	---	---	---	5.654
1.25	0.111	1369.25	5.99 ic	---	---	---	---	---	---	---	---	---	5.992
1.30	0.122	1369.30	6.32 ic	---	---	---	---	---	---	---	---	---	6.320
1.35	0.132	1369.35	6.63 ic	---	---	---	---	---	---	---	---	---	6.629
1.40	0.143	1369.40	6.92 ic	---	---	---	---	---	---	---	---	---	6.919
1.45	0.154	1369.45	7.17 ic	---	---	---	---	---	---	---	---	---	7.174
1.50	0.165	1369.50	7.37 ic	---	---	---	---	---	---	---	---	---	7.368
1.55	0.178	1369.55	7.61 ic	---	---	---	---	---	---	---	---	---	7.610
1.60	0.191	1369.60	7.84 ic	---	---	---	---	---	---	---	---	---	7.844
1.65	0.204	1369.65	8.07 ic	---	---	---	---	---	---	---	---	---	8.072
1.70	0.218	1369.70	8.29 ic	---	---	---	---	---	---	---	---	---	8.293
1.75	0.231	1369.75	8.51 ic	---	---	---	---	---	---	---	---	---	8.509
1.80	0.244	1369.80	8.72 ic	---	---	---	---	---	---	---	---	---	8.719
1.85	0.257	1369.85	8.92 ic	---	---	---	---	---	---	---	---	---	8.924
1.90	0.271	1369.90	9.13 ic	---	---	---	---	---	---	---	---	---	9.125
1.95	0.284	1369.95	9.32 ic	---	---	---	---	---	---	---	---	---	9.321
2.00	0.297	1370.00	9.51 ic	---	---	---	---	---	---	---	---	---	9.512
2.05	0.310	1370.05	9.70 ic	---	---	---	---	---	---	---	---	---	9.700
2.10	0.324	1370.10	9.89 ic	---	---	---	---	---	---	---	---	---	9.885
2.15	0.337	1370.15	10.07 ic	---	---	---	---	---	---	---	---	---	10.07

Continues on next page...

Swale

Stage / Storage / Discharge Table

Stage ft	Storage acft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
2.20	0.350	1370.20	10.25 ic	---	---	---	---	---	---	---	---	---	10.25
2.25	0.363	1370.25	10.42 ic	---	---	---	---	---	---	---	---	---	10.42
2.30	0.376	1370.30	10.59 ic	---	---	---	---	---	---	---	---	---	10.59
2.35	0.390	1370.35	10.76 ic	---	---	---	---	---	---	---	---	---	10.76
2.40	0.403	1370.40	10.93 ic	---	---	---	---	---	---	---	---	---	10.93
2.45	0.416	1370.45	11.09 ic	---	---	---	---	---	---	---	---	---	11.09
2.50	0.429	1370.50	11.25 ic	---	---	---	---	---	---	---	---	---	11.25
2.55	0.443	1370.55	11.41 ic	---	---	---	---	---	---	---	---	---	11.41
2.60	0.456	1370.60	11.57 ic	---	---	---	---	---	---	---	---	---	11.57
2.65	0.469	1370.65	11.73 ic	---	---	---	---	---	---	---	---	---	11.73
2.70	0.482	1370.70	11.88 ic	---	---	---	---	---	---	---	---	---	11.88
2.75	0.496	1370.75	12.03 ic	---	---	---	---	---	---	---	---	---	12.03
2.80	0.509	1370.80	12.18 ic	---	---	---	---	---	---	---	---	---	12.18
2.85	0.522	1370.85	12.33 ic	---	---	---	---	---	---	---	---	---	12.33
2.90	0.535	1370.90	12.48 ic	---	---	---	---	---	---	---	---	---	12.48
2.95	0.549	1370.95	12.62 ic	---	---	---	---	---	---	---	---	---	12.62
3.00	0.562	1371.00	12.76 ic	---	---	---	---	---	---	---	---	---	12.76
3.05	0.575	1371.05	12.90 ic	---	---	---	---	---	---	---	---	---	12.90
3.10	0.588	1371.10	13.04 ic	---	---	---	---	---	---	---	---	---	13.04
3.15	0.601	1371.15	13.18 ic	---	---	---	---	---	---	---	---	---	13.18
3.20	0.615	1371.20	13.32 ic	---	---	---	---	---	---	---	---	---	13.32
3.25	0.628	1371.25	13.45 ic	---	---	---	---	---	---	---	---	---	13.45
3.30	0.641	1371.30	13.59 ic	---	---	---	---	---	---	---	---	---	13.59
3.35	0.654	1371.35	13.72 ic	---	---	---	---	---	---	---	---	---	13.72
3.40	0.668	1371.40	13.85 ic	---	---	---	---	---	---	---	---	---	13.85
3.45	0.681	1371.45	13.98 ic	---	---	---	---	---	---	---	---	---	13.98
3.50	0.694	1371.50	14.11 ic	---	---	---	---	---	---	---	---	---	14.11
3.55	0.707	1371.55	14.24 ic	---	---	---	---	---	---	---	---	---	14.24
3.60	0.721	1371.60	14.36 ic	---	---	---	---	---	---	---	---	---	14.36
3.65	0.734	1371.65	14.49 ic	---	---	---	---	---	---	---	---	---	14.49
3.70	0.747	1371.70	14.61 ic	---	---	---	---	---	---	---	---	---	14.61
3.75	0.760	1371.75	14.74 ic	---	---	---	---	---	---	---	---	---	14.74
3.80	0.773	1371.80	14.86 ic	---	---	---	---	---	---	---	---	---	14.86
3.85	0.787	1371.85	14.98 ic	---	---	---	---	---	---	---	---	---	14.98
3.90	0.800	1371.90	15.10 ic	---	---	---	---	---	---	---	---	---	15.10
3.95	0.813	1371.95	15.22 ic	---	---	---	---	---	---	---	---	---	15.22
4.00	0.826	1372.00	15.34 ic	---	---	---	---	---	---	---	---	---	15.34
4.05	0.840	1372.05	15.46 ic	---	---	---	---	---	---	---	---	---	15.46
4.10	0.853	1372.10	15.57 ic	---	---	---	---	---	---	---	---	---	15.57
4.15	0.866	1372.15	15.69 ic	---	---	---	---	---	---	---	---	---	15.69
4.20	0.879	1372.20	15.80 ic	---	---	---	---	---	---	---	---	---	15.80
4.25	0.893	1372.25	15.92 ic	---	---	---	---	---	---	---	---	---	15.92
4.30	0.906	1372.30	16.03 ic	---	---	---	---	---	---	---	---	---	16.03
4.35	0.919	1372.35	16.14 ic	---	---	---	---	---	---	---	---	---	16.14
4.40	0.932	1372.40	16.25 ic	---	---	---	---	---	---	---	---	---	16.25
4.45	0.946	1372.45	16.37 ic	---	---	---	---	---	---	---	---	---	16.37
4.50	0.959	1372.50	16.48 ic	---	---	---	---	---	---	---	---	---	16.48
4.55	0.972	1372.55	16.58 ic	---	---	---	---	---	---	---	---	---	16.58
4.60	0.985	1372.60	16.69 ic	---	---	---	---	---	---	---	---	---	16.69
4.65	0.998	1372.65	16.80 ic	---	---	---	---	---	---	---	---	---	16.80
4.70	1.012	1372.70	16.91 ic	---	---	---	---	---	---	---	---	---	16.91
4.75	1.025	1372.75	17.02 ic	---	---	---	---	---	---	---	---	---	17.02
4.80	1.038	1372.80	17.12 ic	---	---	---	---	---	---	---	---	---	17.12
4.85	1.051	1372.85	17.23 ic	---	---	---	---	---	---	---	---	---	17.23
4.90	1.065	1372.90	17.33 ic	---	---	---	---	---	---	---	---	---	17.33
4.95	1.078	1372.95	17.44 ic	---	---	---	---	---	---	---	---	---	17.44
5.00	1.091	1373.00	17.54 ic	---	---	---	---	---	---	---	---	---	17.54
5.05	1.104	1373.05	17.64 ic	---	---	---	---	---	---	---	---	---	17.64
5.10	1.118	1373.10	17.74 ic	---	---	---	---	---	---	---	---	---	17.74
5.15	1.131	1373.15	17.85 ic	---	---	---	---	---	---	---	---	---	17.85
5.20	1.144	1373.20	17.95 ic	---	---	---	---	---	---	---	---	---	17.95
5.25	1.157	1373.25	18.05 ic	---	---	---	---	---	---	---	---	---	18.05
5.30	1.170	1373.30	18.15 ic	---	---	---	---	---	---	---	---	---	18.15
5.35	1.184	1373.35	18.25 ic	---	---	---	---	---	---	---	---	---	18.25
5.40	1.197	1373.40	18.35 ic	---	---	---	---	---	---	---	---	---	18.35
5.45	1.210	1373.45	18.45 ic	---	---	---	---	---	---	---	---	---	18.45
5.50	1.223	1373.50	18.54 ic	---	---	---	---	---	---	---	---	---	18.54

...End

Pond No. 7 - SE Pond 2 areas - weir

Pond Data

Contours - User-defined contour areas. Conic method used for volume calculation. Begining Elevation = 1366.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (acft)	Total storage (acft)
0.00	1366.00	25,752	0.000	0.000
1.00	1367.00	29,126	0.629	0.629
2.00	1368.00	32,601	0.708	1.338
3.00	1369.00	36,177	0.789	2.127

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 0.00	0.00	0.00	0.00
Span (in)	= 0.00	0.00	0.00	0.00
No. Barrels	= 0	0	0	0
Invert El. (ft)	= 0.00	0.00	0.00	0.00
Length (ft)	= 0.00	0.00	0.00	0.00
Slope (%)	= 0.00	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	No	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 0.00	2.00	0.00	8.00
Crest El. (ft)	= 1366.00	1366.00	0.00	1367.50
Weir Coeff.	= 0.33	3.33	3.33	3.33
Weir Type	= 15 degV	Rect	---	Rect
Multi-Stage	= No	No	No	No

Exfil.(in/hr) = 0.000 (by Contour)

TW Elev. (ft) = 0.00

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).

Stage / Storage / Discharge Table

Stage ft	Storage acft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
0.00	0.000	1366.00	---	---	---	---	---	0.00	---	0.00	---	---	0.000
0.10	0.063	1366.10	---	---	---	---	0.00	0.21	---	0.00	---	---	0.212
0.20	0.126	1366.20	---	---	---	---	0.01	0.60	---	0.00	---	---	0.601
0.30	0.189	1366.30	---	---	---	---	0.02	1.09	---	0.00	---	---	1.110
0.40	0.252	1366.40	---	---	---	---	0.03	1.68	---	0.00	---	---	1.718
0.50	0.315	1366.50	---	---	---	---	0.06	2.35	---	0.00	---	---	2.413
0.60	0.378	1366.60	---	---	---	---	0.09	3.09	---	0.00	---	---	3.187
0.70	0.441	1366.70	---	---	---	---	0.14	3.90	---	0.00	---	---	4.036
0.80	0.504	1366.80	---	---	---	---	0.19	4.76	---	0.00	---	---	4.955
0.90	0.567	1366.90	---	---	---	---	0.26	5.68	---	0.00	---	---	5.941
1.00	0.629	1367.00	---	---	---	---	0.33	6.66	---	0.00	---	---	6.994
1.10	0.700	1367.10	---	---	---	---	0.42	7.68	---	0.00	---	---	8.107
1.20	0.771	1367.20	---	---	---	---	0.53	8.75	---	0.00	---	---	9.281
1.30	0.842	1367.30	---	---	---	---	0.64	9.87	---	0.00	---	---	10.51
1.40	0.913	1367.40	---	---	---	---	0.77	11.03	---	0.00	---	---	11.81
1.50	0.983	1367.50	---	---	---	---	0.92	12.23	---	0.00	---	---	13.15
1.60	1.054	1367.60	---	---	---	---	1.08	13.48	---	0.84	---	---	15.40
1.70	1.125	1367.70	---	---	---	---	1.26	14.76	---	2.38	---	---	18.40
1.80	1.196	1367.80	---	---	---	---	1.45	16.08	---	4.37	---	---	21.91
1.90	1.267	1367.90	---	---	---	---	1.66	17.44	---	6.73	---	---	25.83
2.00	1.338	1368.00	---	---	---	---	1.89	18.84	---	9.42	---	---	30.15
2.10	1.416	1368.10	---	---	---	---	2.13	20.27	---	12.38	---	---	34.78
2.20	1.495	1368.20	---	---	---	---	2.40	21.73	---	15.60	---	---	39.73
2.30	1.574	1368.30	---	---	---	---	2.68	23.23	---	19.06	---	---	44.97
2.40	1.653	1368.40	---	---	---	---	2.98	24.76	---	22.74	---	---	50.48
2.50	1.732	1368.50	---	---	---	---	3.30	26.32	---	26.64	---	---	56.26
2.60	1.811	1368.60	---	---	---	---	3.64	27.92	---	30.73	---	---	62.29
2.70	1.890	1368.70	---	---	---	---	4.00	29.54	---	35.01	---	---	68.56
2.80	1.969	1368.80	---	---	---	---	4.38	31.20	---	39.48	---	---	75.06
2.90	2.048	1368.90	---	---	---	---	4.78	32.89	---	44.12	---	---	81.79
3.00	2.127	1369.00	---	---	---	---	5.21	34.61	---	48.94	---	---	88.75

Hydraflow Rainfall Report

Return Period (Yrs)	Intensity-Duration-Frequency Equation Coefficients (FHA)			
	B	D	E	(N/A)
1	0.0000	0.0000	0.0000	--------
2	76.3137	14.3000	0.8844	--------
3	0.0000	0.0000	0.0000	--------
5	52.6224	11.2000	0.7497	--------
10	55.1841	11.1000	0.7229	--------
25	60.7012	11.1000	0.7068	--------
50	66.9222	11.3000	0.7004	--------
100	62.2794	10.1000	0.6624	--------

File name: Sedgwick County.IDF

Intensity = B / (Tc + D)^E

Return Period (Yrs)	Intensity Values (in/hr)											
	5 min	10	15	20	25	30	35	40	45	50	55	60
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	5.57	4.54	3.85	3.35	2.97	2.67	2.43	2.23	2.06	1.92	1.80	1.69
3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5	6.52	5.33	4.55	3.99	3.57	3.24	2.97	2.75	2.57	2.41	2.27	2.15
10	7.40	6.09	5.22	4.60	4.13	3.76	3.46	3.21	3.00	2.82	2.67	2.53
25	8.51	7.03	6.05	5.35	4.81	4.39	4.05	3.76	3.52	3.32	3.14	2.98
50	9.47	7.86	6.78	6.00	5.41	4.94	4.56	4.24	3.98	3.75	3.55	3.37
100	10.31	8.53	7.37	6.53	5.90	5.40	5.00	4.66	4.37	4.13	3.92	3.73

Tc = time in minutes. Values may exceed 60.

Precip. file name: sgco.pcp

Storm Distribution	Rainfall Precipitation Table (in)							
	1-yr	2-yr	3-yr	5-yr	10-yr	25-yr	50-yr	100-yr
SCS 24-hour	0.00	3.48	0.00	4.55	5.25	6.30	7.10	7.80
SCS 6-Hr	0.00	1.80	0.00	0.00	2.60	0.00	0.00	4.00
Huff-1st	0.00	1.55	0.00	2.75	4.00	5.38	6.50	8.00
Huff-2nd	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-3rd	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-4th	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-Indy	0.00	1.55	0.00	2.75	4.00	5.38	6.50	8.00
Custom	0.00	3.48	0.00	4.55	5.25	6.10	6.98	7.80

Tab 3. Post-Development Hydrologic Analysis

A. Proposed Conditions Hydrologic and Hydraulic Analysis

The post-project drainage boundaries are shown on the Drainage and Utility plan Figure 3.1 The rational method in Hydraflow Hydrographs 2007 was used to determine the post-development flow rates. These flows are shown below; calculations are in Figure 2.5.

Post-Development Flow Rates

Basin	Design Storms			
	2-Yr	5-Yr	10-Yr	100-Yr
West Basin Flow Rate (cfs)	3.1	4.1	4.8	7.3
East Basin Flow Rate (cfs)	11.2	15.1	17.4	29.8

B. Proposed Time of Concentration

A post-project time of concentration of 15 minutes was used for the west and east basins.

C. Assumed Post-Developed Curve Numbers

A curve number of 95 was used to represent commercial land use.

D. Proposed Contours for Detention

A detention area is proposed in the south central portion of the site. The proposed contours are in Figure 2.5. The proposed bottom of the swale is 1368.0; the 100-year water surface elevation is 1373.1. A retaining wall is proposed to minimize the area of the drainage easement. The normal pool for the pond is 1366.0; the proposed 100-year water surface elevation is 1368.1.

E. Preliminary SWS Sizing Calculations

Because of the adequate natural grade onsite, extensive storm +sewer is not proposed. A portion of the site drainage will be directed via overland flow to the swale and/or detention pond. Other areas will drain to the pond via the proposed street and two curb inlets.

F. Stage-Storage-Discharge

The stage-storage-discharge for the proposed swale and pond are in the tables below and in the Figure 2.5. The outlet structures control stormwater runoff rates such that the release rates from the pond for the 2, 5, 10 and 100-year storms do not exceed pre-project flow rates.

Swale Stage-Storage-Discharge

Stage	Elevation (ft)	Total Storage (ac-ft)	Discharge (cfs)
0.0	1367.5	0.000	0.0
0.5	1368.0	0.006	0.3
1.5	1369.0	0.083	10.8
2.5	1370.0	0.240	18.8
3.5	1371.0	0.449	41.9
4.5	1372.0	0.716	52.5
Outlet Structure	2'x2' Riser Structure with grated top at 1369.7 and 4-6"x12" slots at 1367.5 Riser Structure outlets into a 30" RCP		

Pond Stage-Storage-Discharge

Stage	Elevation (ft)	Total Storage (ac-ft)	Discharge (cfs)
0.0	1366.0	0.000	0.0
1.0	1367.0	0.670	5.8
2.0	1368.0	1.431	15.0
3.0	1369.0	2.255	20.8
4.0	1370.0	3.124	46.5
Outlet Structure	36" RCP with flow line at 1366.0		

G. Analysis of upstream/downstream impact

Runoff flow for all design storms remains relatively the same or decreases from pre to post-development; therefore, upstream/downstream impacts are unchanged from current conditions. The channel downstream of the development was modeled using Hydraflow Express. The channel will be 0.5' deep under proposed conditions, Figure 3.2.

H. Existing and Proposed Structural Elevations

For lots adjacent to the swale and detention pond, minimum pad elevations will be set 3 feet above the 100-year storm event. Minimum pads will be set at 1373.0 for lots adjacent to the proposed swale and 1372.3 for lots adjacent to the proposed pond.

I. Pond Design Elevations

The bottom elevation for the swale is 1367.5; the 100-year water surface elevation is 1371.0. The normal pool for the pond is 1366.0 with a 100-year water surface elevation of 1369.3.

Post-Development Pond Information

Basin	Design Storms			
	2-Yr	5-Yr	10-Yr	100-Yr
Swale Elevation (ft)	1369.9	1370.2	1370.4	1371.0
Pond Elevation (ac-ft)	1367.6	1368.0	1368.3	1369.3
Swale Detention Volume (ac-ft)	0.21	0.28	0.31	.44
Pond Detention Volume (ac-ft)	1.10	1.42	1.64	2.47
Total Detention Volume (ac-ft)	1.3	1.7	2.0	2.5

J. Structure Details

A sketch of the swale outlet structure is shown on the drainage and utility plan. The outlet for the pond will be a pipe.

K. Limits of Clearing and Grading

The site will be cleared and graded.

L. Location of Impervious Areas

Roads, parking areas and buildings will be located as shown on the Drainage and Utility Plan, Figure 3.1.

M. Location of Utilities

Proposed utilities are shown on the Drainage and Utility Plan, Figure 3.1.

N. Location of Conveyance Systems

Proposed grading will direct runoff from the site to the swale and detention pond, Figure 3.1.

O. Location of Channel Modifications

Channel modifications are not applicable to Summit Crossing.

P. Selection and Location of Stormwater Controls

Stormwater controls consist of grading and paving to direct stormwater to the proposed inlets and detention pond.

Q. Emergency Overflow

The escape route will direct runoff away from the lots and to the drainage easements.

R. Freeboard

The proposed detention pond provides 1-foot of freeboard above the 100-year water surface elevation.

S. 100-Year High Water Line

The 100-year water surface elevation for the swale is 1371.0. The100-year water surface elevation for the pond is 1369.3.

T. Lowest Openings

Minimum pads will be set at 1376.1 for lots adjacent to the proposed swale and 1371.1 for lots adjacent to the proposed pond.

U. Stormwater Management Facilities

The swale and detention pond will be confined within a drainage easement.

V. Maintenance Responsibility

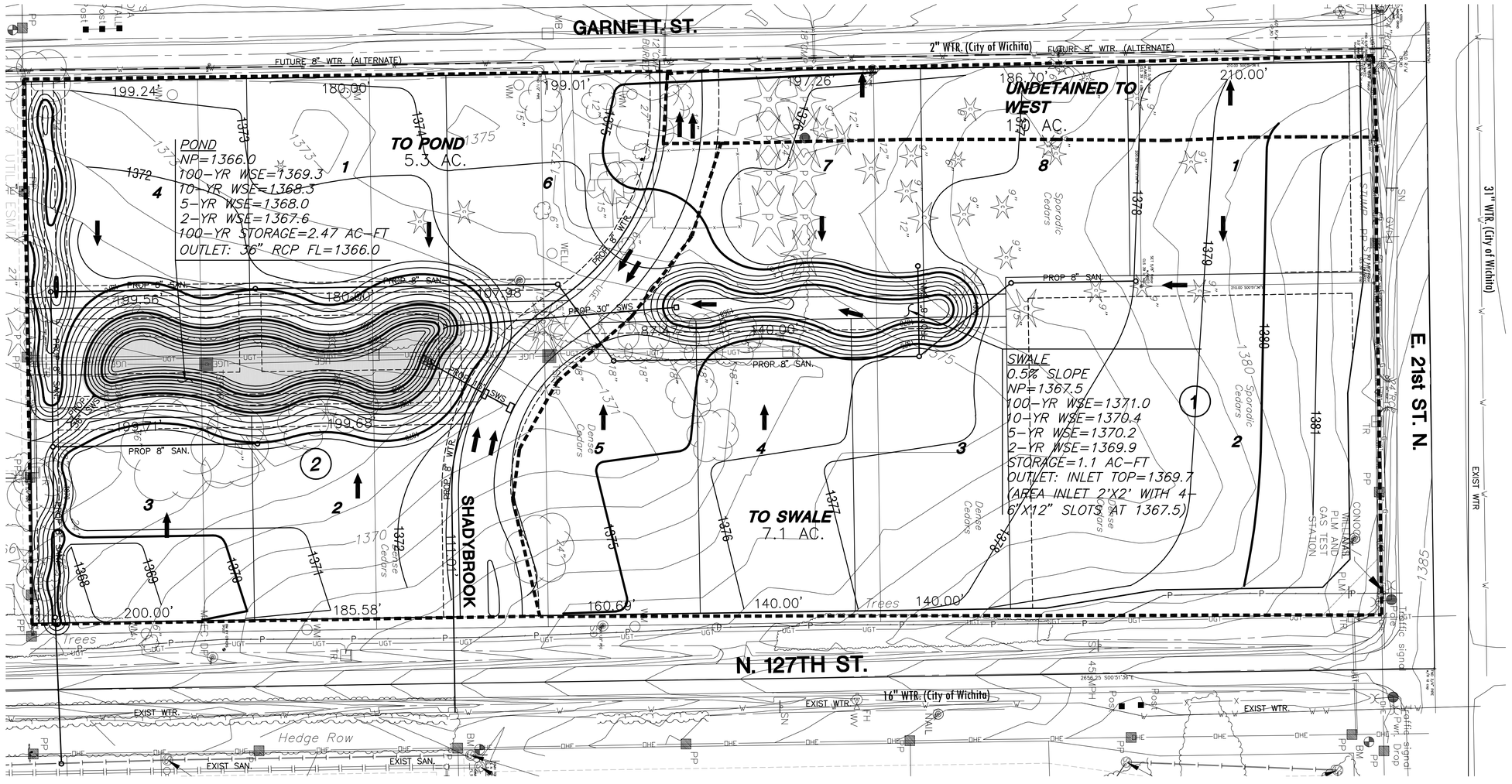
The maintenance of the reserve will be the responsibility of the owner.

W. Offsite-Drainage Easements

Not applicable to Summit Crossing.

Figure 3.1

Drainage and Utility Plan



R 2 E

E. 21st ST.

T 27 S

Greenwich Rd.

PLAT LOCATION

10

N. 127th St.

E. 13th ST.

VICINITY MAP

LEGEND

- 6IN - CONIFEROUS TREE
- 3IN - DECIDUOUS TREE
- SN - SIGN
- PP - POWER POLE
- ELEC BOX - ELECTRIC BOX
- LP - LIGHT POLE
- FH - FIRE HYDRANT
- WV - WATER VALVE
- WM - WATER METER
- SECTION CORNER
- BM - BENCHMARK
- EASEMENT
- BUILDING SETBACK
- FENCE
- STORM SEWER PIPE
- WATER LINE
- SANITARY SEWER LINE
- GAS LINE
- GP - GAS PIPELINE
- UGT - TELEPHONE LINE
- UGE - UNDERGROUND ELEC.
- OHE - OVERHEAD ELECTRIC
- FOC - FIBER OPTIC CABLE
- DRAINAGE SUB BASIN
- DRAINAGE BASIN
- FLOW ARROW
- A17 - AREA FOR SWS SIZING

BENCHMARKS

BM #1 - Square cut NE corner traffic signal MH pad @ SE corner 21st St. & 127th St. E. Elev. = 1383.69 (NGVD 29)

BM #2 - RR spike N. face PP at SW corner Garnett & 21st St. N. Elev. = 1377.14 (NGVD 29)

BM #3 - RR spike E. face PP, W. side Garnett, across from Lot 9, Lakeside Acres 2nd Addition. Elev.= 1373.97 (NGVD 29)

N

SCALE: 1" =50'

0 50 100 150

MINIMUM PAD ELEVATIONS
LOWEST OPENINGS

LOTS *(inclusive)*	BLOCK	ELEVATION *NGVD*
1-4	2	1371.1
6	1	1371.1
3, 4, 5, 7, 8	1	1376.1

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

SUMMIT CROSSING

SUMMIT CROSSING
WICHITA, KANSAS

DRAINAGE & UTILITY PLAN

DATE
OCTOBER 2008

REVISED
NOVEMBER 2008
JANUARY 2009

DESIGN BY
KLA

DRAWN BY
CMJ

CHECKED BY
GJA

SHEET NUMBER
1

J:\Civil\08542\dwg\DRNG\08542_DUP.dwg

Figure 3.2

Hydraflow Express – Channel Model

Channel Report

Hydraflow Express Extension for AutoCAD® Civil 3D® 2009 by Autodesk, Inc. Tuesday, Jan 27 2009

Downstream of Summit Crossing

User-defined

Invert Elev (ft)	= 1365.60
Slope (%)	= 0.30
N-Value	= 0.030

Calculations

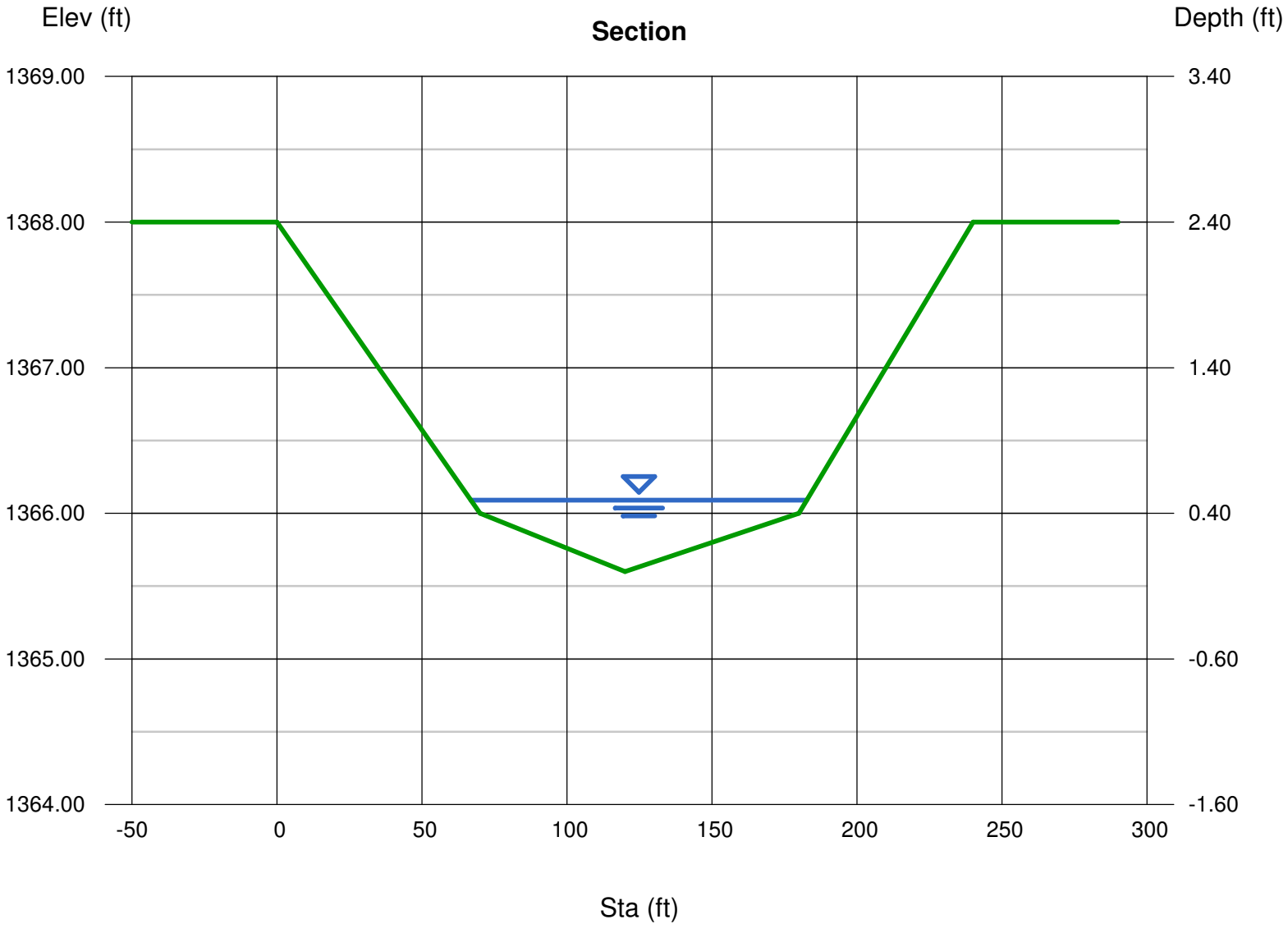
Compute by:	Known Q
Known Q (cfs)	= 36.00

Highlighted

Depth (ft)	= 0.49
Q (cfs)	= 36.00
Area (sqft)	= 32.16
Velocity (ft/s)	= 1.12
Wetted Perim (ft)	= 115.85
Crit Depth, Yc (ft)	= 0.34
Top Width (ft)	= 115.85
EGL (ft)	= 0.51

(Sta, El, n)-(Sta, El, n)...

(0.00, 1368.00)-(70.00, 1366.00, 0.030)-(120.00, 1365.60, 0.030)-(180.00, 1366.00, 0.030)-(210.00, 1367.00, 0.030)-(240.00, 1368.00, 0.030)



Tab 4. Floodplain Submittal

Not applicable to Summit Crossing.

Tab 5. Permits

A. US Army Corps of Engineers

See attached correspondence from USACE, Figure 5.1. Coordination with the Corps is ongoing.

B. Kansas Department of Agriculture

Not applicable to Summit Crossing.

C. Federal Emergency Agency (FEMA)

Not applicable to Summit Crossing.

D. Kansas Department of Transportation

Not applicable to Summit Crossing.

E. Sedgwick County Right-of-way Permit

Not applicable to Summit Crossing.

Figure 5.1

USACE Correspondence

Tara Hancock

From: Reznicek, Sarah M NWK [Sarah.M.Reznicek@usace.army.mil]
Sent: Tuesday, October 28, 2008 1:21 PM
To: Tara Hancock
Subject: RE: 21st Street and 127th Street Wichita, KS

Tara,
I would feel pretty comfortable calling the area uplands if there were no signs of a defined channel, ordinary high water mark, or aquatic habitat.
With the abundace of cedar trees and what looks like native grass I also doubt there would be any wetlands either.

-----Original Message-----
From: Tara Hancock [mailto:thancock@Mkec.com]
Sent: Tuesday, October 28, 2008 10:38 AM
To: Reznicek, Sarah M NWK
Cc: Kara Anderson
Subject: 21st Street and 127th Street Wichita, KS

Hi Sarah,

Hope all is well in El Dorado. There is a project I am working on that has a "blue line" running through it (see attached quad). However, upon further analysis - the only area draining to this "blue line" is the area btwn Garnett and 127th Street (see link to aerial) - there isn't any stormsewer under 21st Street to convey flow from the area north of 21st like it is shown on the quad map. The area contributing to this "blue line" is only about 13.5 acres. Would this be considered a jurisdictional channel?

Live Search Maps
http://maps.live.com/default.aspx?v=2&FORM=LMLTSN&cp=q8m73t6x0qxc&style=b&lvl=1&tilt=-90&dir=0&alt=-1000&scene=21119657&phx=0&phy=0&phscl=1&encType=1

Thanks,

Tara M. Hancock, E.I.T.

MKEC Engineering Consultants, Inc.

411 N. Webb Rd.

Wichita, KS 67206

Email: thancock@mkec.com

Telephone: 316.684.9600

Fax: 316.684.5100