DRAINAGE CONCEPT

FOR

KISER WEST SECOND ADDITION
Wichita, Kansas

MAY 2011

City of Wichita/Sedgwick County
Subdivision Drainage Plan Checklist

Submit completed forms to:
City of Wichita Public Works & Utilities, 455 N. Main 8th Floor, Wichita KS 67202; or
Sedgwick County Stormwater Management, 1144 S. Seneca, Wichita KS 67213.

Project Name:	Kiser West Second Addition				
Total Area of Project:	6.0 **acres**				
Development Type:	Commercial	**Other:**			
Developer Name:	Laham Development	**Contact:**	George Laham	**Phone:**	(316) 292-3950
Email:	george@lahamdevelopment.com				
Engineer Name:	MKEC Eng Cons Inc.	**Contact:**	Kara Anderson	**Phone:**	(316) 684-9600
Email:	kanderson@mkec.com				

Directions:

(1) Fill-out this checklist completely and include it with the Drainage Plan submittal. This checklist should be included in the bound copy, behind the cover sheet for the submittal. Incomplete Drainage Plans and checklists will not be accepted.

*(2) Indicate whether a plan element is included or not included in the submittal by choosing "**Yes**" or "**No**" from the dropdown list in the **"Element Included?**" column. The question must be answered for every plan element for this checklist to be considered complete. An explanation must be provided for all **"No"** answers.*

Drainage Plan Checklist

#	Plan Element Description	Element Included?	Explanation/Notes
1.0	**General**		
1.1	Digital copy of drainage plan, including preliminary Master Grading Plan, preliminary plat and proposed plat, in PDF format and one half size, bound, paper copy.	yes	
1.2	Professional Engineer's seal, signature and date on plan cover.	yes	
1.3	Site location map, using color ortho-imagery and showing the project boundaries, a north arrow and an accurate scale.	yes	
1.4	Narrative of the development type, existing conditions and proposed impacts on stormwater runoff, wetlands, riparian zones and floodplains/floodways.	yes	
1.5	Discussion of off-site conditions surrounding the proposed development.	yes	
1.6	Summary table of runoff calculations (pre/post development).	yes	
1.7	Narrative description of the type and function of the permanent structural stormwater management facilities.	yes	
2.0	**Existing Conditions Information**		
2.1	**Existing Conditions Drainage Map**		
2.1.1	On-site and off-site topography: NAVD 88 datum, one-foot contours with spot elevations	yes	
2.1.2	On-site and off-site drainage features, including perennial and intermittent streams (with names labeled), conveyance systems such as open channels, ditches, swales and areas of overland flow. Flow direction must be indicated by arrows.	yes	
2.1.3	Storm sewer system components, including storm drains, inlets, catch basins, gutters, manholes, headwalls, pipes and culverts. Material and size must be noted for all pipes and culverts.	yes	
2.1.4	Location and boundaries of natural features such as wetlands, lakes, ponds with the normal water elevation noted, rock outcroppings, wooded areas and tree rows.	yes	
2.1.5	Location, dimensions and elevations of existing bridges and culvert crossings.	yes	
2.1.6	Location of existing utilities (e.g., water, sewer, gas, electric, cable, etc.) with labels and easement boundaries.	yes	
2.1.7	Groundwater elevations, if applicable.	yes	
2.1.8	Delineation of predominant soil based on USDA soil surveys and/or on-site soil borings; indicate NRCS soil name and Hydrologic Soil Group for undisturbed surface soils.	yes	
2.1.9	Land use types per NRCS nomenclature.	yes	
2.1.10	Footprint of existing impervious areas (labeled, area given in acres).	yes	
2.1.11	Internal drainage subbasin boundaries used for hydrologic calculations (labeled with ID, total area in acres, impervious area in acres and curve number).	yes	
2.1.12	Time of concentration flow paths. Indicate and label each segment separately (i.e., overland flow, shallow concentrated, channel1, channel2, etc.). For each segment, provide the appropriate data to calculate Tc (e.g., length, slope, cover type, paved/unpaved, roughness parameters, geometric properties, etc.).	yes	
2.2	**Existing Conditions Hydrology and Hydraulics Analysis**		

Drainage Plan Checklist			
#	Plan Element Description	Element Included?	Explanation/Notes
2.2.1	Narrative of the hydrologic analysis methodology used (e.g., unit hydrograph or other approved methods).	yes	
2.2.2	A summary table of drainage subbasin hydrologic parameters (subbasin ID, area in acres, curve number, Tc, etc.).	yes	
2.2.3	Table of existing condition runoff curve numbers with supporting data and calculations.	yes	
2.2.4	Table of existing condition times of concentration with supporting data and calculations.	yes	
2.2.5	A summary table of rainfall data used in the hydrologic analysis, and a reference for the source of the data.	yes	
2.2.6	Cross-sections and other diagrams of existing open channels, bridge and culvert sections and other hydraulic features as required to illustrate the basis for hydraulic analysis.	yes	
2.2.7	Hydrologic and hydraulic analyses for runoff rates, volumes, velocities and elevations. Provide supporting data not specified above and identify assumptions. Include detailed calculations for the 2, 5, 10, 25 & 100-year, 24-hour storm events. Provide results in a tabular form. Provide digital copies of any computer files and models used.	yes	
3.0	**postdevelopment Conditions Information**		
3.1	**postdevelopment Conditions Drainage Map**		
3.1.1	Proposed project boundary.	yes	
3.1.2	on-site and off-site topography: NAVD 88 datum, one-foot contours with spot elevations.	yes	
3.1.3	Existing on-site and off-site drainage features that are to remain after development, including perennial and intermittent streams (with names labeled), conveyance systems such as open channels, ditches, swales and areas of overland flow. Flow direction must be indicated by arrows.	yes	
3.1.4	Location and description of off-site through-drainage conveyances which are confined to an easement, dedication and/or reserve.	yes	
3.1.5	Footprint of proposed impervious areas, including roads, parking lots, buildings and other structures.	yes	
3.1.6	Location of proposed utilities (e.g., water, sewer, gas, electric, cable, etc.) with labels and easement boundaries.	yes	
3.1.7	Delineation of predominant soils, based on anticipated soil textures and NRCS guidelines if different from predevelopment soil conditions; indicate NRCS soil name and Hydrologic Soil Group for surface soils.	yes	
3.1.8	Land use cover per NRCS nomenclature.	yes	
3.1.9	Internal drainage subbasin boundaries used for hydrologic calculations (labeled with ID, total area in acres, impervious area in acres and curve number).	yes	
3.1.10	Proposed limits of land disturbing activity (i.e., grading limits).	yes	
3.1.11	Time of concentration flow paths. Indicate and label each segment separately (i.e., overland flow, shallow concentrated, channel1, channel2, etc.). For each segment, provide the appropriate data to calculate Tc (e.g., length, slope, cover type, paved/unpaved, roughness parameters, geometric properties, etc.).	yes	
3.2	**Proposed Conveyances Map**		
3.2.1	on-site and off-site drainage features, including perennial and intermittent streams (with names labeled), proposed conveyance systems (such as open channels, ditches, swales and areas of overland flow, including backyard drainage). Flow direction must be indicated by arrows.	yes	
3.2.2	Storm sewer system components, including storm drains, inlets, catchbasins, gutters, manholes, headwalls, pipes and culverts. Material and size must be noted for all pipes and culverts.	yes	
3.2.3	For any subbasin or drainage area > 40 acres, show that the stormwater flow is confined to an open channel with required side benches and freeboard, or conformance to applicable policy and design requirements if partially enclosed.	yes	
3.2.4	Location(s) of stormwater management facilities and any associated drainage easements.	yes	
3.2.5	Proposed energy dissipaters and other channel protection devices.	yes	
3.2.6	Location(s) and dimension(s) of proposed channel, bridge and culvert crossings.	yes	
3.2.7	Normal pool and 100-year pool elevations for ponds and lakes.	yes	
3.2.8	Permanent concrete outfall control structure(s) for ponds.	yes	
3.2.9	Emergency overflow spillways and top of berm elevations for ponds and other volume/peak discharge control facilities.	yes	
3.2.10	Floodplains, ponds, and stormwater management facilities located in reserves.	yes	
3.3	**postdevelopment Conditions Hydrology & Hydraulics**		
3.3.1	Narrative of the hydrologic analysis methodology used (e.g., unit hydrograph or other approved methods).	yes	

Drainage Plan Checklist			
#	Plan Element Description	Element Included?	Explanation/Notes
3.3.2	A summary table of drainage subbasin hydrologic parameters (subbasin ID, area in acres, curve number, Tc, etc.).	yes	
3.3.3	Table of postdevelopment condition runoff curve numbers with supporting data and calculations.	yes	
3.3.4	Table of postdevelopment condition times of concentration with supporting data and calculations.	yes	
3.3.5	Cross-sections and other diagrams of existing open channels, bridge and culvert sections and other hydraulic features as	yes	
3.3.6	Hydrologic and hydraulic analyses for runoff rates, volumes, velocities and elevations. Provide supporting data not specified above and identify assumptions. Include detailed calculations for the 2, 5, 10, 25 & 100-year, 24-hour storm events. Provide results in a tabular form. Provide digital copies of any computer files and models used.	yes	
3.3.7	Downstream peak discharge assessment (10% Rule) results and supporting data and calculations. Provide digital copies of any computer files and models used.	yes	
3.3.8	Stage-storage-discharge or other outlet rating curves and inflow/outflow hydrographs for all ponds.	yes	
3.3.9	Demonstrate that the pond contours on the master grading plan and the stage-storage-discharge data are consistent for all ponds.	yes	
3.3.10	Demonstrate that all ponds have one foot of freeboard above the 100-year, 24-hour high water level.	yes	
3.3.11	Demonstrate that runoff from the proposed project site is discharged in the same manner as prior to development, using level spreaders, energy dissipaters, other devices or grading as required, or identify an appropriate flowage easement.	yes	
3.4	**Stormwater Quantity Control Sizing**		
3.4.1	Hydraulic sizing calculations for all stormwater management controls.	yes	
3.4.2	Table(s) listing all stormwater management controls. Present the types, sizes, elevations, flows, velocities and depths for each control, as applicable. Verify that velocities are self-cleaning and non-erosive.	yes	
3.4.3	Typical details (including cross-sections where applicable) for outlet structures, embankments, spillways, grade control structures, conveyance channels, etc.	yes	
3.5	**Stormwater Quality Management Facilities**		
3.5.1	Table(s) listing all stormwater management facilities. Present the description, % TSS removal value, water quality volume handled, contributing drainage area in acres and contributing impervious area in acres.	yes	
3.5.2	Indicate the responsible party for maintenance, as shown in the plat text (i.e., Home Owners Association, Lot Owners Association, property owner, etc.).	yes	
3.5.3	Water quality volume (total and by facility), with supporting data and calculations.	yes	
3.5.4	% TSS removal value (total and by facility) with supporting data and calculation. Must be equal to or greater than 80%.	yes	
3.5.5	Channel protection volume with supporting data and calculations.	yes	
3.5.6	Water quality volume and channel protection volume orifice size calculations.	yes	
3.5.7	Other calculations required for each stormwater management facility as specified in the Wichita/Sedgwick County Stormwater Manual.	yes	
3.5.8	Typical details (including cross-sections where applicable) for outlet structures, embankments, internal grading, forebays and other siltation prefilters, filtration/infiltration media, vegetation, check dams, operational controls, etc.	yes	
4.0	**Floodplains**		
4.1	Reference the source of flood profile, floodplain, floodway and stream discharge information.	yes	
4.2	Delineation of nearest base flood elevations.	N/A	
4.3	Delineation of predevelopment regulatory floodplain/floodway limits using FEMA's current GIS database; limits to be per elevation and scaled location.	N/A	
4.4	Delineation of postdevelopment regulatory floodplain/floodway limits; limits to be per elevation and scaled location, with project limits shown.	N/A	
4.5	Floodway data table and discharges.	N/A	
4.6	Hydrologic and hydraulic study information for local floodplain analysis, unnumbered Zone A elevation determinations and floodplain map revisions or required permits.	N/A	
4.7	Regulatory floodway and four natural profile models (10, 50, 100 and 500-year) for existing and postdevelopment conditions.	N/A	
4.8	Floodplains and floodways located within a reserve, where necessary.	N/A	
4.9	Floodplain cut and fill calculations for volume sensitive basins.	N/A	

Drainage Plan Checklist			
#	Plan Element Description	Element Included?	Explanation/Notes
4.10	Demonstrate that floodway elevations and velocities do not increase due to construction in the floodway ("No Rise Certification").	N/A	
5.0	**Federal, State and Local Permits**		
5.1	US Army Corps of Engineers regulatory program permits (Section 404 permit)	N/A	
5.2	Kansas Department of Agriculture - Division of Water Resources Permits (Stream Obstruction, Channel Change, Floodplain Fill, Levee, Water Appropriations, Dam Safety permit, etc.).	N/A	
5.3	FEMA letters of map change/revision - LOMA, LOMR, LOMR-f, CLOMR, etc.; shall be included and approved when project modifies the limits of the floodplain/floodway.	N/A	
6.0	**Half Scale Preliminary Master Grading Plan**		
6.1	One set of plans and associated PDF of plans.	yes	
6.2	Professional Engineer's seal, signature and date.	no	
6.3	Title block including subdivision name and phase and dated revision documentation.	yes	
6.4	Future phases shown but cross-hatched as information only.	no	no future phases
6.5	Scale, not greater than 1-inch = 60 feet.	yes	
6.6	North arrow.	yes	
6.7	Index or legend key.	yes	
6.8	Benchmarks (minimum of 2) used for site control (NAVD 88 vertical datum).	yes	
6.9	Existing contours of entire site with contour interval of one foot.	yes	
6.10	Proposed contours for channels, ponds, and other permanent stormwater management facilities, with contour interval of one foot.	yes	
6.11	Spot elevations shown to the nearest tenth of a foot for critical locations, including lot and property boundaries.	yes	
6.12	Proposed lot and street layout.	yes	
6.13	Locations of underground storm drains.	yes	
6.14	Overflow locations for storms exceeding storm drain capacity, with elevations.	yes	
6.15	Top elevations of storm drains at all inlets, manholes, and flow line elevations for all outfalls.	yes	
6.16	Locations of open ditches and lakes.	yes	
6.17	Flow direction arrows.	yes	
6.18	Proposed flow line elevations of all open ditches at maximum 100 foot intervals, and 100-year flood elevations thereon.	N/A	
6.19	Ponds: Location, bottom elevation, normal pool elevation, 100-year flood elevation, emergency overflow elevation.	yes	
6.20	Proposed top-of-curb elevations at points where drainage will be required to flow over the curb.	yes	
6.21	Platted minimum building opening elevation for each lot, in table form for all lots (excluding basement floor elevations).	yes	
6.22	Standard foundation and elevation detail for slab on grade, full basement, view-out, partial view-out and/or walk-out construction.	no	Commercial
6.23	Top of foundation elevation for each lot.	no	Commercial
6.24	Notation for builders for each lot as to the type of structure that may be constructed and the view-out, walk-out or pad elevation, as applicable.	no	Commercial
6.25	Indicate that all lots are above the 100-year flood elevation.	yes	
6.26	Indicate that grading around structures conforms to perimeter drainage requirements.	yes	
6.27	Indicate that backyard drainage grading conforms to backyard drainage requirements.	yes	
6.28	Adjacent subdivision lot lines, with lot labels and subdivision names.	yes	
6.29	Boundaries and labels for all easements, rights-of-way and reserves.	yes	
6.30	Statement on proposed final plat: "*A drainage plan has been developed for the subdivision and all drainage easements, rights-of-way, or reserves shall remain at the established grades and remain unobstructed to allow for the conveyance of stormwater.*"	yes	
End of Checklist			

Tab 1. General

Location

The subject property is in the City of Wichita, Sedgwick County, Kansas. The proposed development is south of 13th Street North and West of Greenwich Road. The site is the southeast quarter of Section 16, Township 27 South, Range 2 East of the 6th P.M. The plat area is 6.0 acres. The site is shown on the USGS Map, Appendix 1.1. The site is also shown on the aerial photograph, Appendix 1.2.

Discussion of Project

Existing

The site was previously platted for commercial land use as Kiser West Addition. The site drains from southwest to northeast. The existing elevations range from 1401 near the southwest corner to 1387 near the northeast corner of the site. The site drains to an existing stormwater sewer system along 13th Street and Greenwich Road. The stormwater system flows to the north along Greenwich Road.

Proposed

Development Type

The site is being platted as one lot that is six acres in size. The lot will be used for commercial use. The basic site is shown on the preliminary plat, Appendix 1. 3. The site is also shown on the final plat, Appendix 1.4. Preliminary site grading is shown on the Master Grading Plan, Appendix 1.5.

Impacts on Stormwater

The general pattern of flow will remain the same. There are no wetlands or floodplains on site that will be affected by this development.

Permanent Structural Stormwater Management Facilities

The proposed site will continue to outlet to the stormwater sewer system along 13th Street and Greenwich Roads that flows to the north along Greenwich Road. Water Quality and Channel Protection volumes will need to be incorporated into the final site design.

Offsite

Approximately 8 acres of offsite area flows through the site from the south and west. The flow from offsite combines with flow from onsite and flows into 13th Street and Greenwich Road. The stormwater sewer system in these streets conveys the 5-year storm to the north. Larger storms are conveyed in the street right-of-way.

Summary

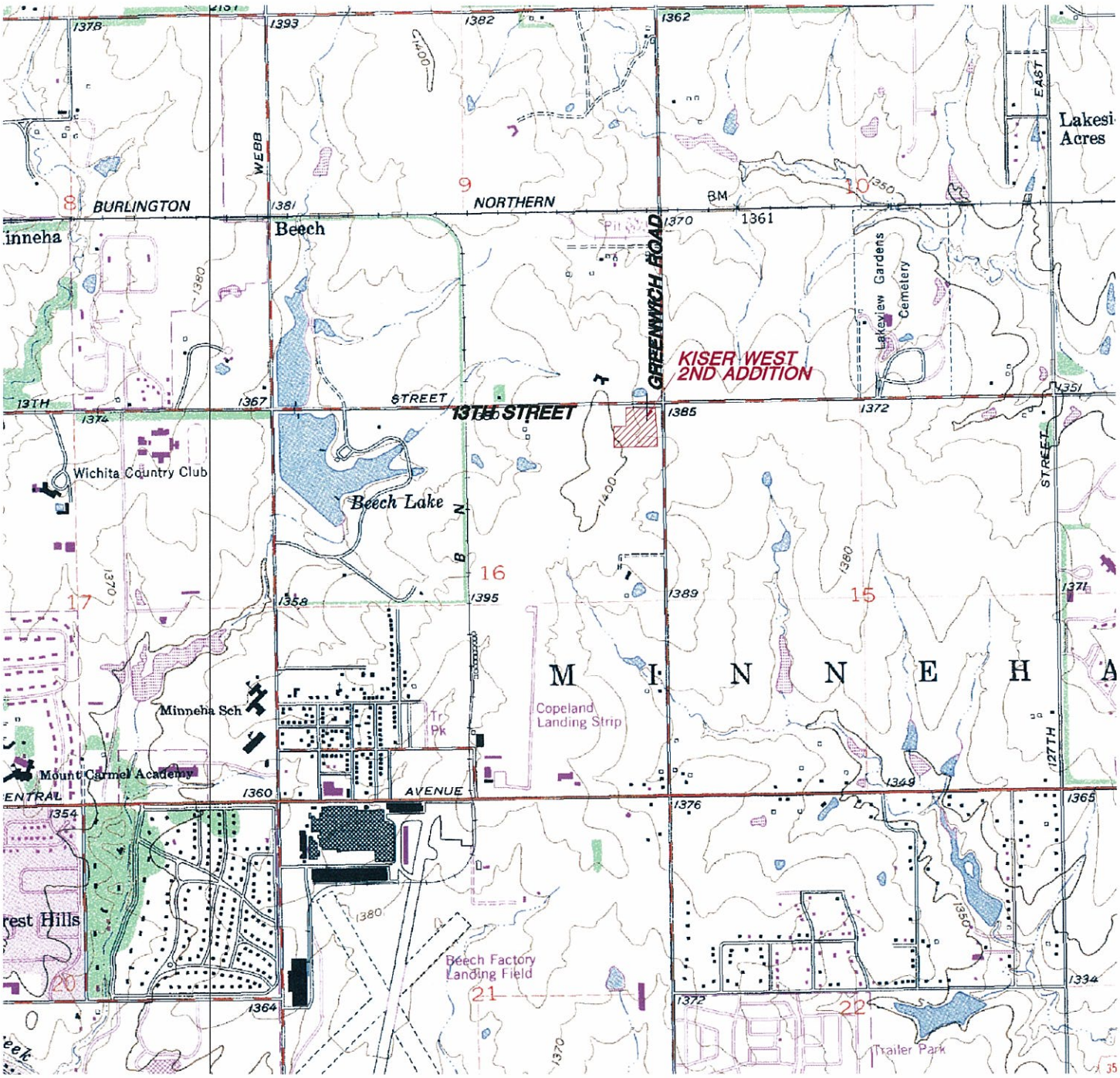
This site will develop as commercial land use. The site and offsite basins will continue to flow from southwest to northeast. The location of water quality, channel protection, and detention has not yet been determined and will be included when a site layout is determined.

Table 1.1. Comparison of Pre and Post-Development Flow Rates

Description	Design Storm Flows (cfs)						
	1-Yr	2-Yr	5-Yr	10-Yr	25-Yr	50-Yr	100-Yr
Pre-Project to 13th & Greenwich	21.6	30.7	45.6	55.6	70.6	82.0	92.0
Post-Proj. to 13th & Greenwich	7.8	18.1	36.1	49.7	68.1	80.5	90.6

Appendix 1.1

USGS Quadrangle Map



SCALE: 1" = 2000'

2000 0 2000 4000

N

SECTION 16
TOWNSHIP 27S
RANGE 2E

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

KISER WEST 2ND ADDITION
PROJECT NAME

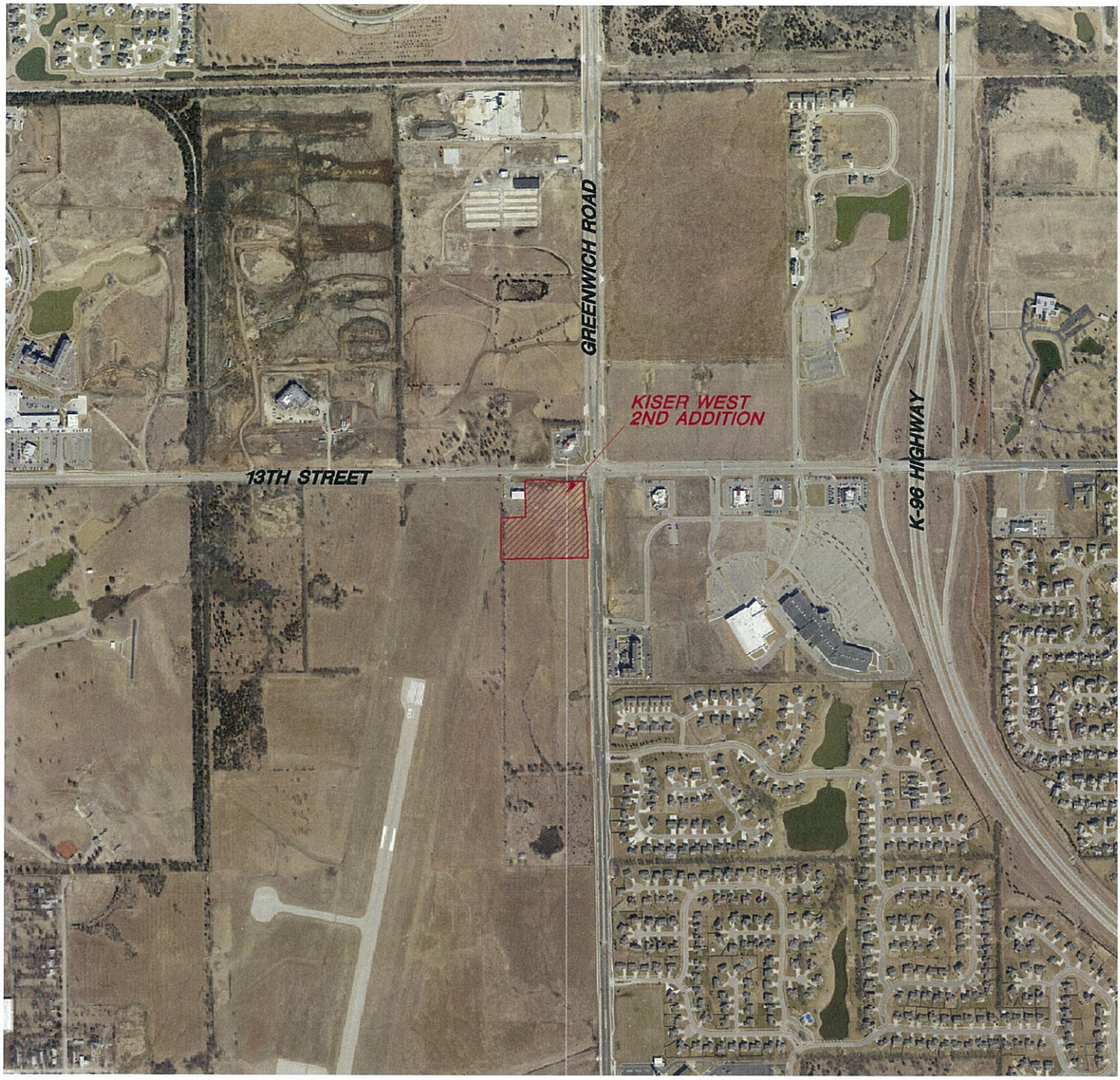
QUAD MAP
SHEET TITLE

KLA	CMJ	GJA
DESIGN BY:	DRAWN BY:	CHECKED BY:
MAY 2011	10514	1 / 1
DATE	JOB NO.	SHEET/OF

J:\Projects\2010\1001010514 Kiser West Second\5-Civil\CAD\Drainage\Drawing\10514_Quad.dwg

Appendix 1.2

Aerial Photograph



SCALE: 1" = 1000'

1000 0 1000 2000

N

SECTION 16
TOWNSHIP 27S
RANGE 2E

MKEC ENGINEERING CONSULTANTS, INC.
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WICHITA, KS. 67206
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AERIAL MAP
SHEET TITLE

KLA	CMJ	GJA
DESIGN BY:	DRAWN BY:	CHECKED BY:
MAY 2011	10514	1 / 1
DATE	JOB NO.	SHEET/OF

J:\Projects\2010\1001010514 Kiser West Second\5-Civil\CAD\Drainage\Drawing\10514_Aerial.dwg

Appendix 1.3

Preliminary Plat

LEGAL DESCRIPTION

Lot 1, EXCEPT, the west 167.40 feet thereof, TOGETHER WITH, Lots 2 and 3, TOGETHER WITH, the north 55.13 feet of Lot 4, all in Block 1, Kiser West Addition, an addition to Wichita, Sedgwick County, Kansas, ALSO, TOGETHER WITH, an unplatted tract of land lying within the Northeast Quarter, of Section 16, Township 27 South, Range 2 East, Wichita, Sedgwick County, Kansas, said tract being more particularly described as follow: BEGINNING at the northwest corner of Lot 3, Block 1, Kiser West Addition, an addition to Wichita, Sedgwick County, Kansas; thence along the west line of said addition on a platted bearing of S01°03'27"E, 280.13 feet; thence S88°56'33"W, 337.33 feet; thence N00°32'23"W, 279.88 feet to the southwest corner of Lot 1, Block 1, said Kiser West Addition; thence along the south lines of Lots 1 and 2, Block 1, said Kiser West Addition, N88°53'55"E, 334.80 feet to the POINT OF BEGINNING.

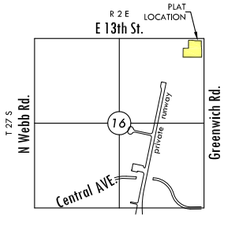
CONTAINING: 261,243 square feet or 6.00 acres of land, more or less.

NOTES

1. LOCATION: Located in the northeast Wichita in a commercial corridor. The property has access to K-96 Expressway via 13th Street. Existing adjoining land uses include: airplane manufacturing runway, retail, restaurants, bank, hotel, entertainment, and senior housing.
2. LOT TOTAL - 1
3. ANNEXATION: Incorporated and a portion unincorporated (an annexation application has been submitted and shall accompany the plat).
4. EXISTING/PROPOSED USES: existing - Vacant field
   proposed - Commercial Development
5. ZONING: Existing zoning is "LI" Limited Industrial and "LC" Limited Commercial with CUP DP-254 restrictions
   Proposed zoning is "GC" General Commercial with CUP DP Industrial "LI" (per associated case ZON2011-15)
6. PLAT AREA: Gross = 6.00 acres / Net =6.00 acres
7. SURVEY DATE: April 18th, 2011 (by MKEC)
8. PUBLIC UTILITIES: Municipal sanitary sewer and water is available.
9. ACCESS / ACCESS CONTROLS: Greenwich Road - as shown hereon 13th Street - as shown hereon.
10. RESERVES: None.
11. FLOOD: According to FEMA FIRM Community Unit Panel 20173C0379E, effective date February 7th, 2007;
    this property lies within flood zone "X", "Areas determined to be outside the 0.2% annual chance floodplain."
12. DRAINAGE: A drainage report shall accompany this plat and be submitted to the Engineering Department.
13. BUILDING SETBACK: As per CUP DP-254 and per Wichita-Sedgwick County Unified Zoning Code.
14. DEED RESTRICTIONS: All present and existing deed restrictions shall be enforced.

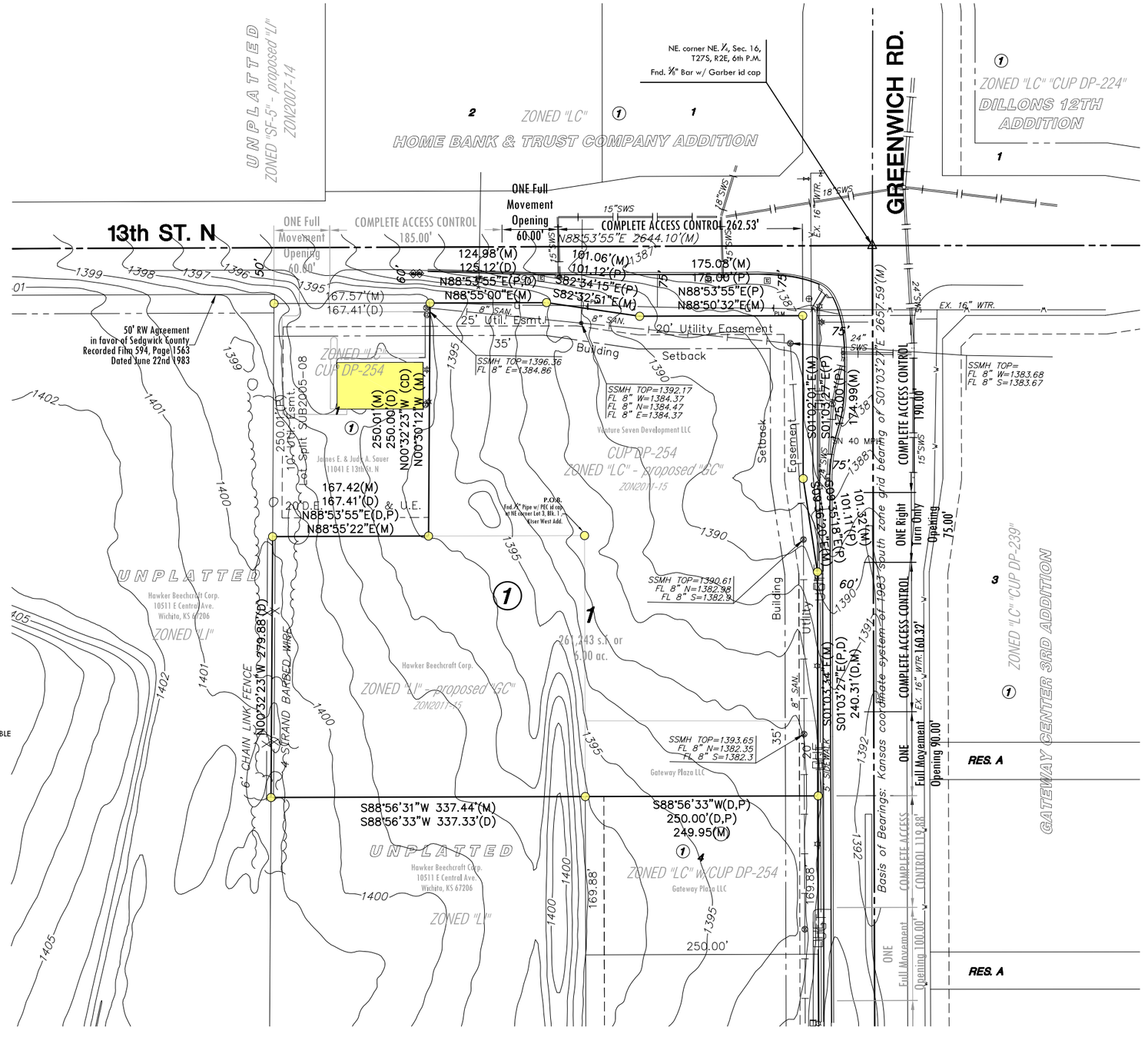
LEGEND

- EDGE OF TREES
- SN - SIGN
- PP - POWER POLE
- LIGHT POLE
- TC - TRAFFIC SIGNAL BOX
- TRAFFIC SIGNAL MANHOLE
- TRAFFIC SIGNAL
- FH - FIRE HYDRANT
- WV - WATER VALVE
- WM - WATER METER
- SWMH - STORM WATER MANHOLE
- SSMH - SANITARY SEWER MANHOLE
- SANITARY SEWER CLEANOUT
- TR - TELEPHONE RISER
- INLET
- GRATE INLET
- SECTION CORNER
- EASEMENT
- BUILDING SETBACK
- FENCE
- STORM SEWER PIPE
- WATER LINE
- SANITARY SEWER LINE
- GAS LINE
- UGT - TELEPHONE LINE
- UGE - UNDERGROUND ELECTRIC LINE
- OHT - OVERHEAD TELEPHONE
- OHE - OVERHEAD ELECTRIC
- FOC - UNDERGROUND FIBER OPTIC CABLE
- U.E. - UTILITY EASEMENT
- D.E. - DRAINAGE EASEMENT
- BUILDING / STRUCTURE



VICINITY MAP

NORTH
1"=60' / 1 : 720
60 0 60



ONE STEP FINAL PLAT

A portion of the SE. ¼, SE. ¼, Sec. 9, T27S, R2E, 6th P.M.

KISER WEST SECOND ADDITION

OWNERS / DEVELOPER: Venture Seven Development, L.L.C. 150 N. Market, Wichita, KS 67202 316-262-6400

Date submitted: May 2nd, 2011
Subdivision Hearing: May 19th, 2011

MAPC Hearing: May 26th, 2011

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

Appendix 1.4

Final Plat

FINAL PLAT

KISER WEST SECOND ADDITION

AN ADDITION TO WICHITA, SEDGWICK COUNTY, KANSAS

CERTIFICATE OF SURVEY

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

Lot 1, EXCEPT, the west 167.40 feet thereof, TOGETHER WITH, Lots 2 and 3, TOGETHER WITH, the north 55.13 feet of Lot 4, all in Block 1, Kiser West Addition, an addition to Wichita, Sedgwick County, Kansas, ALSO, TOGETHER WITH, an unplatted tract of land lying within the Northeast Quarter, of Section 16, Township 27 South, Range 2 East, Wichita, Sedgwick County, Kansas, said tract being more particularly described as follow: BEGINNING at the northwest corner of Lot 3, Block 1, Kiser West Addition, an addition to Wichita, Sedgwick County, Kansas; thence along the west line of said addition on a platted bearing of S01°03'27"E, 280.13 feet; thence S88°56'33"W, 337.33 feet; thence N00°32'23"W, 279.88 feet to the southwest corner of Lot 1, Block 1, said Kiser West Addition; thence along the south lines of Lots 1 and 2, Block 1, said Kiser West Addition, N88°53'55"E, 334.80 feet to the POINT OF BEGINNING.

CONTAINING: 261,243 square feet or 6.00 acres of land, more or less.

All easements, rights-of-ways, building setbacks, access controls, together with any and all other public dedications and/or contingent dedications 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 _____, 2011.

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 the undersigned property owner of the land above set forth in the Registered Land Surveyor's Certificate, has caused the same to be surveyed and platted into a Lot, and a Block the same to be known as "KISER WEST SECOND ADDITION," an addition to Wichita, Sedgwick County, Kansas.

Easements for the construction and maintenance of public utilities and drainage, as indicated on the accompanying plat are hereby granted to the public.

All abutters rights of access to or from 13th Street over and across the north line and Greenwich Road over and across the east line of "KISER WEST SECOND ADDITION," are hereby granted to the appropriate governing body, as indicated hereon.

A drainage plan has been developed for this plat. All drainage easements, right-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 Community Unit Plan DP-254 as approved and recorded at the Wichita-Sedgwick County Metropolitan Area Planning Department.

VENTURE SEVEN DEVELOPMENT, L.L.C., a Kansas limited liability company

_____, manager
George E. Laham, II, manager
Laham Development Company, L.L.C., a Kansas limited liability company,
manager of Venture Seven Development, L.L.C.

STATE OF KANSAS, SEDGWICK COUNTY} ss:

This instrument was acknowledged before me on ____ day of _____ , 2011, by George E. Laham, II, manager of, Laham Development Company, L.L.C., a Kansas limited liability company, which is the manager of Venture Seven Development, L.L.C., 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

Fidelity Bank, holder of a mortgage on a portion of the above described property, does hereby consent to the plat of "KISER WEST SECOND ADDITION."

Fidelity Bank

_____, Executive Vice President
Timothy B. Nelson, Executive Vice President

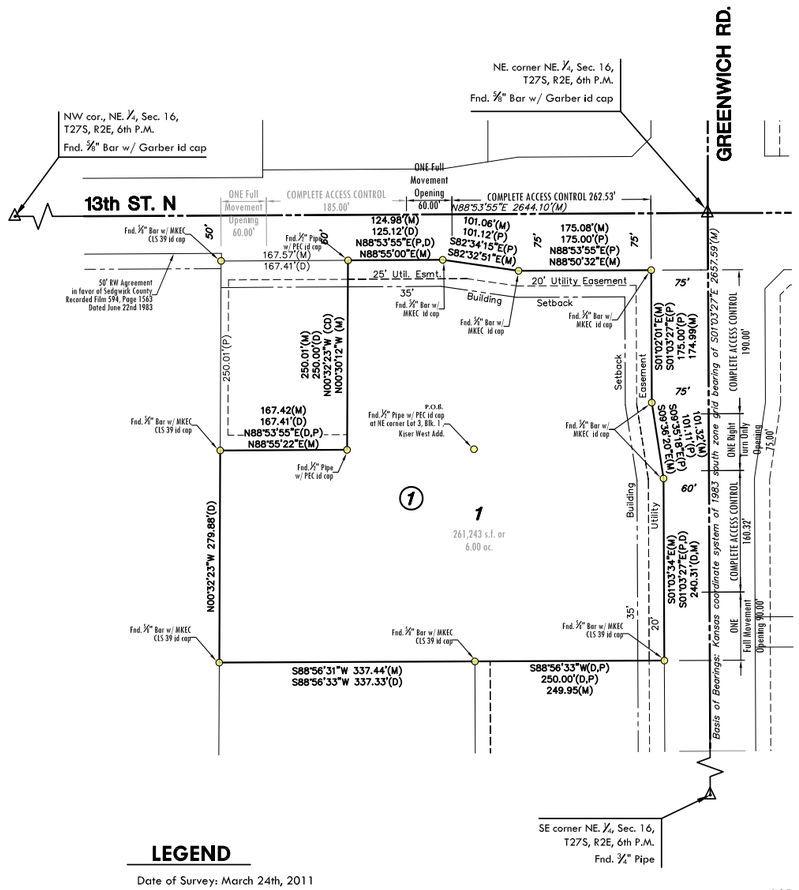
This instrument was acknowledged before me on this ____ day of _____ , 2011, by Timothy B. Nelson, Executive Vice President, Fidelity Bank.

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: _____.



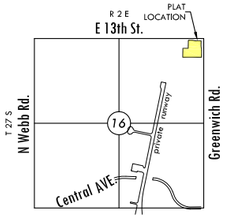
LEGEND

Date of Survey: March 24th, 2011

- △ = Section corner monument found
- ○ = Found ⅝" rebar w/ MKEC CLS 39 id. cap unless otherwise annotated
- ● = Set ⅝" rebar w/ MKEC CLS 39 id. cap
- (M) = Measured
- (CM) = Calculated from measured
- (P) = Platted
- (D) = Described

Basis of Bearing: Kansas coordinate system of 1983 south zone grid bearing of S01°03'27"E along the E. line of the NE. ¼, Sec. 16, T27S, R2E, 6th P.M.

This plat is surveyed and platted on NAD88 using Kansas state plane south zone coordinates, modified to the surface, having a combined adjustment scale factor of 1.000120014401728



VICINITY MAP

PLANNING COMMISSION CERTIFICATE

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

Dated this ____ day of _____ , 2011

WICHITA-SEDGWICK COUNTY METROPOLITAN AREA PLANNING COMMISSION

_____, Chair
Debra Miller Stevens, 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 _____ , 2011

At the direction of the City Council.

_____, Mayor
Carl Brewer, Mayor

Affix City Seal

Attest:
_____, City Clerk
Karen Sublett, City Clerk

TRANSFER RECORD

STATE OF KANSAS, SEDGWICK COUNTY} ss:

Entered on transfer record this ____ day of _____ , 2011

_____, County Clerk
Kelly B. Arnold, County Clerk

Affix County Clerk Seal

REGISTER OF DEEDS CERTIFICATE

STATE OF KANSAS, SEDGWICK COUNTY} ss:

This is to certify that this instrument was filed for record in the Register of Deeds office this day of _____ , 2011, at _____ o'clock _M; and is duly recorded.

_____, Register of Deeds
Bill Meek, Register of Deeds

Attest:

_____, Deputy
Tonya E. Buckingham, Deputy

Affix Register of Deeds Seal

COUNTY SURVEYOR

STATE OF KANSAS, SEDGWICK COUNTY} ss:

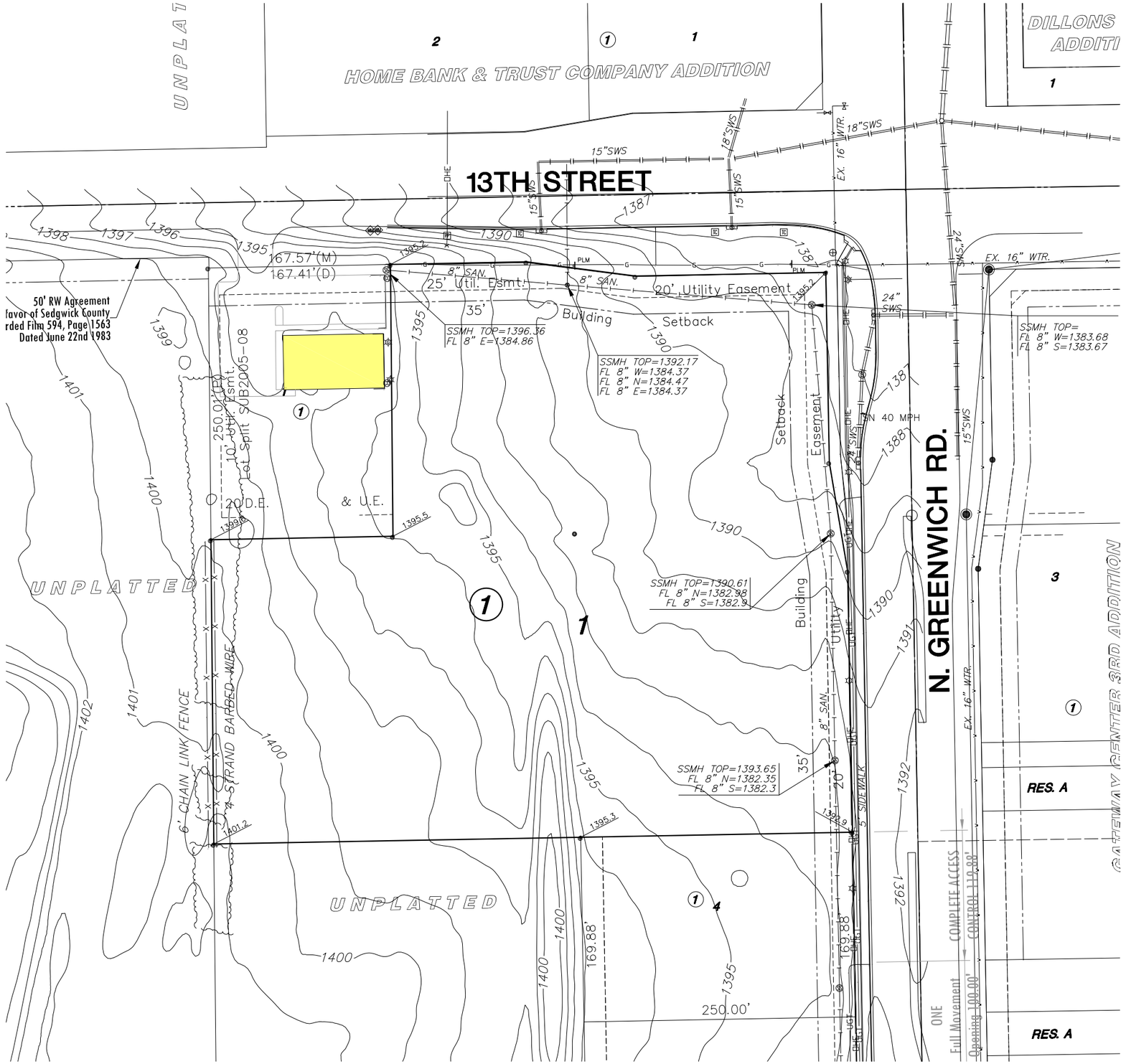
Reviewed in accordance with K.S.A. 58-2005 on this ____ day of _____ , 2011.

_____, 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

Appendix 1.5

Master Grading Plan



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
- 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
- 1395.3 - SPOT ELEVATION

N

SCALE: 1"=50'

0 50 100 150

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

KISER WEST 2ND ADDITION

WICHITA, KANSAS

LOT GRADING PLAN

DATE: May 11

REVISED

DESIGN BY: KLA

DRAWN BY: CMJ

CHECKED BY: GJA

SHEET NUMBER: 1

J:\Projects\2010\1001010514 Kiser West Second\5-Civil\CAD\Drainage\Drawing\10514_LGP.dwg

Tab 2. Existing Conditions

Datum

The site is shown in NAVD 88 datum.

Drainage Patterns

The site is currently drains from southwest to northeast with elevations ranging from 1401 to 1387. Approximately 8 acres drains from offsite onto the property from the south and the west. The existing conditions are shown on the Existing Conditions Drainage Map, Appendix 2.1.

Groundwater Elevations

Existing groundwater elevations in the surrounding area are approximately 20-60 feet deep according to the Kansas Water Well Database.

Utilities

Water

Existing 16" water lines run along the east side of Greenwich Road and cross the intersection of 13th Street and Greenwich Road near the northeast corner of the site.

Sanitary Sewer

Existing 8" sanitary sewer lines flow from west to east along the north boundary of the site and from north to south along the east boundary of the site.

Stormwater

Existing stormwater sewer lines convey runoff from Greenwich Road and 13th Street North to the north in a system that was designed with the Greenwich Road paving project. The existing storm water sewer is sized convey a 5-year design storm.

Others

Existing overhead electric runs along the east boundary of the site. An existing gas line runs along the north boundary of the site.

Hydrologic Analysis

The site was modeled using the NRCS Unit Hydrograph Method in Hydraflow Hydrographs, Appendix 2.2.

Rainfall

Rainfall depths were taken from the City of Wichita/Sedgwick County Stormwater Manual, Volume 2, Section 4.2. Table 2.1 shows the rainfall depths used for each storm.

Table 2.1. Point Rainfall Depths for 24-hour Design Storms.

Description	Rainfall Depth (inches)						
	1-Yr	2-Yr	5-Yr	10-Yr	25-Yr	50-Yr	100-Yr
Sedgwick County	2.8	3.5	4.5	5.2	6.1	6.9	7.8

Soil Type

The following soil types are located on:

- Irwin Silty Clay Loam, 1 to 3 percent slopes, HSG "D"

The soil type for use in selecting runoff curve numbers for this site is Hydraulic Soil Group "D." The site is shown on the soil survey, Appendix 2.4.

Land Use

The following land uses are located on site:

- Undeveloped, Undisturbed Impervious

Impervious Areas

Under existing conditions, there are 0 acres of impervious area on site.

Curve Number

The Curve Numbers (CN) used in calculations were calculated using the NRCS method. A curve number of 84 was used to represent undeveloped conditions. The CN values were calculated using the methods set forth in the City of Wichita/Sedgwick County Stormwater Manual, Volume 2, Section 4.3.

Time of Concentration

The time of concentration was calculated using the SCS and FHWA methods as described in the City of Wichita/Sedgwick County Stormwater Manual, Volume 2, Section 4.4. The time of concentration is the sum of sheet flow, shallow concentrated flow, and channel flow. The flow paths are shown on the Existing Conditions Drainage Map, Appendix 2.1. Calculations for each basin were done in an excel spreadsheet, Appendix 2.3.

Basin Summary

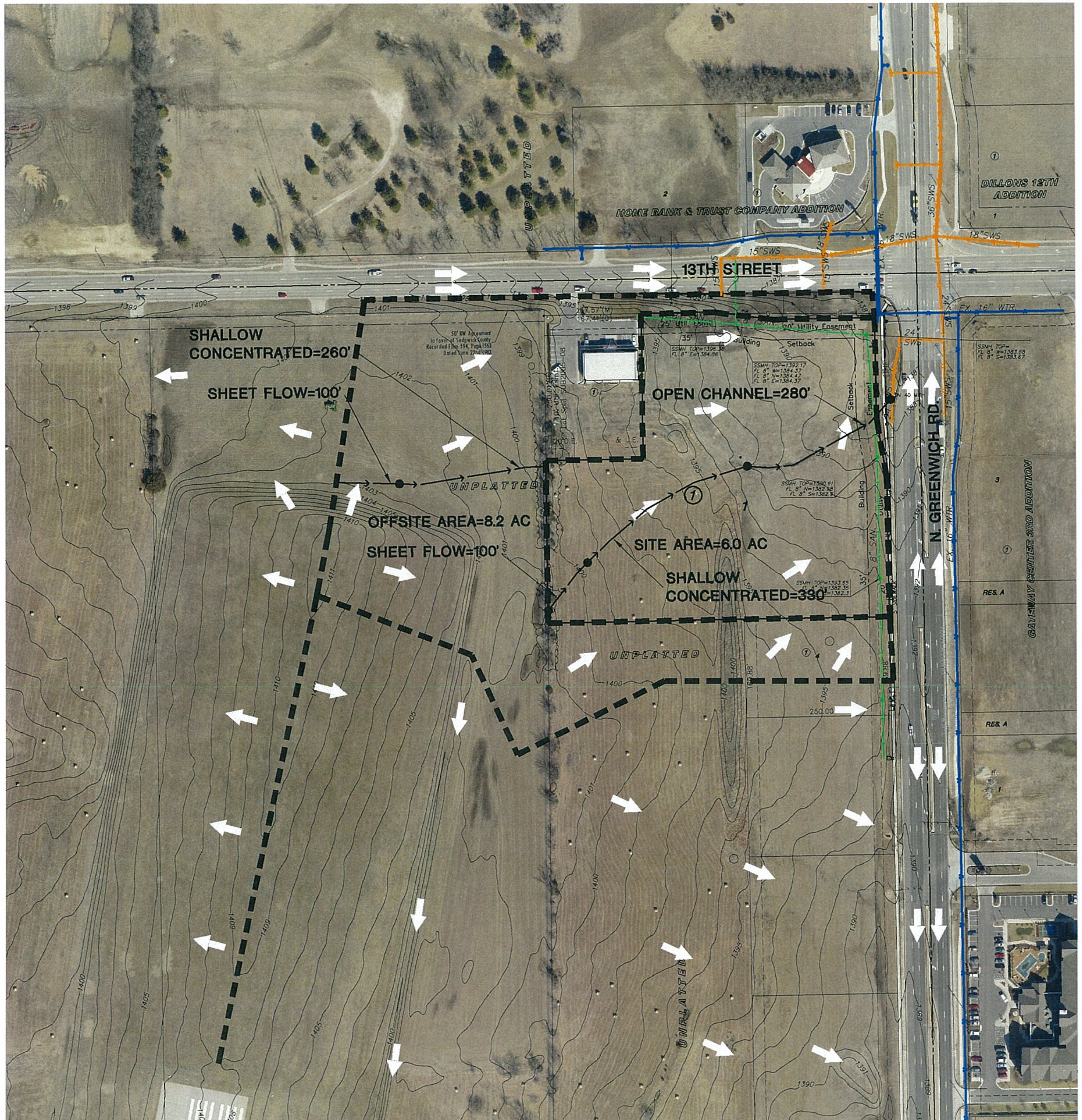
The site and offsite areas drain from southwest to north east into 13th Street and Greenwich Roads. Flow rates describing the on site, off site, and to the streets are shown in Table 2.1 below. Once runoff enters the streets it flows to the north through a storm water sewer system that was designed to convey the 5-year design storm. Flow from larger storms flows through the streets to the north.

Table 2.1. Existing Conditions Basin Information.

Basin	Area (ac)	CN	T_c (min.)	1-Yr	2-Yr	5-Yr	10-Yr	25-Yr	50-Yr	100-Yr
Off Site	8.2	84.0	22.1	11.7	16.7	24.8	30.2	38.3	44.6	50.0
On Site	6.0	84.0	16.5	10.5	14.8	22.0	26.8	33.9	39.4	44.1
To 13th & Greenwich	14.2	n/a	n/a	21.6	30.7	45.6	55.6	70.6	82.0	92.0

Appendix 2.1

Existing Conditions Map



LEGEND

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

A17 - AREA FOR SWS SIZING

1395.3 - SPOT ELEVATION

-FLOW PATH

N

SCALE: 1" = 100'

100 0 100 200

J:\Projects\2010\1001010514 Kiser West Second\5-Civil\CAD\Drainage\Drawing\10514_Existing.dwg

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

KISER WEST 2ND ADDITION

WICHITA, KANSAS

EXISTING CONDITIONS

DATE May 11

REVISED

DESIGN BY KLA

DRAWN BY CMJ

CHECKED BY GJA

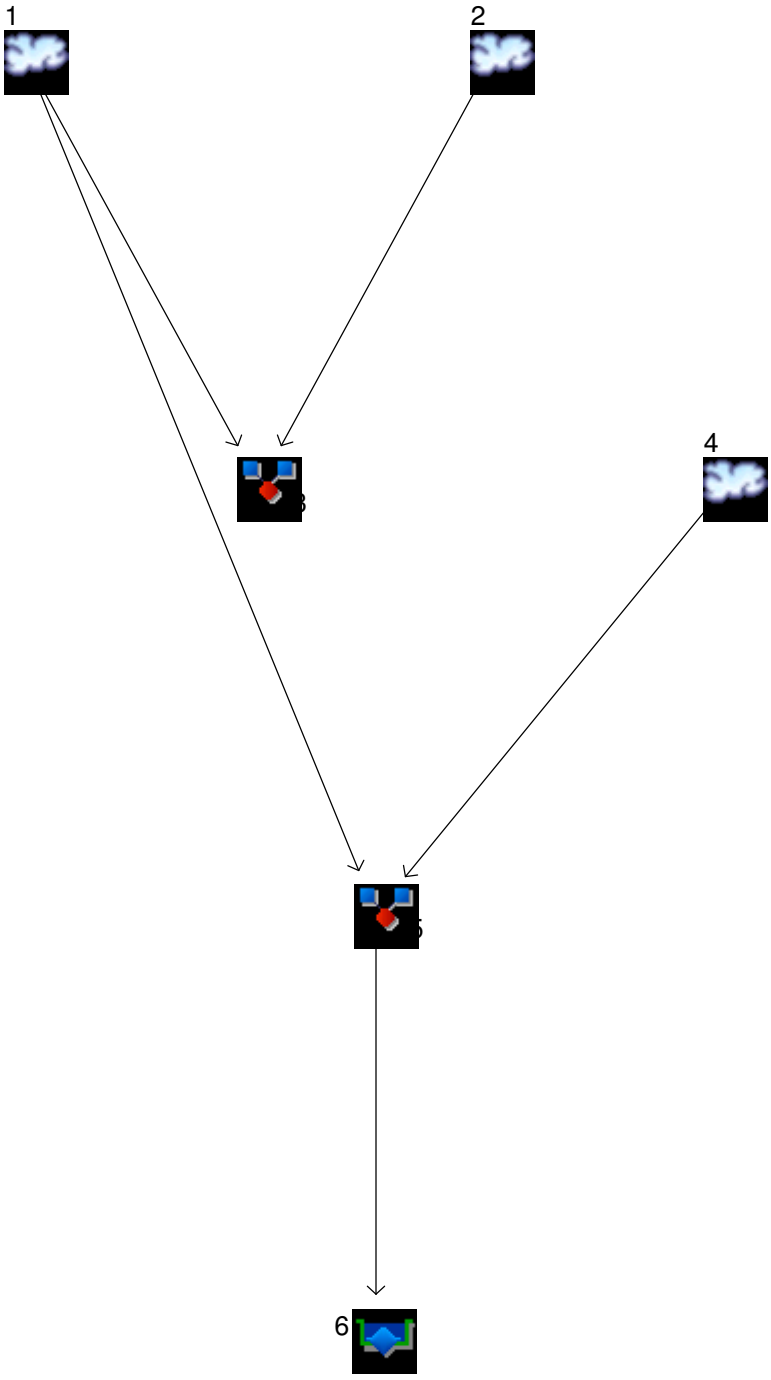
SHEET NUMBER 1

Appendix 2.2

Hydraflow Hydrographs

Watershed Model Schematic

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2009 by Autodesk, Inc. v6.066



Legend

Hyd.	Origin	Description
1	SCS Runoff	Undeveloped Off Site
2	SCS Runoff	Undeveloped On Site
3	Combine	Existing
4	SCS Runoff	Developed Site
5	Combine	Proposed
6	Reservoir	Detention

Hydrograph Return Period Recap

Hyd. No.	Hydrograph type (origin)	Inflow Hyd(s)	Peak Outflow (cfs)								Hydrograph description
			1-Yr	2-Yr	3-Yr	5-Yr	10-Yr	25-Yr	50-Yr	100-Yr	
1	SCS Runoff	------	11.70	16.68	-------	24.80	30.20	38.34	44.55	49.98	Undeveloped Off Site
2	SCS Runoff	------	10.45	14.84	-------	22.00	26.75	33.90	39.36	44.12	Undeveloped On Site
3	Combine	1, 2	21.55	30.68	-------	45.61	55.56	70.57	82.02	92.03	Existing
4	SCS Runoff	------	24.57	30.94	-------	40.89	47.37	57.07	64.44	70.89	Developed Site
5	Combine	1, 4	31.16	40.72	-------	56.00	66.08	81.24	92.81	102.93	Proposed
6	Reservoir	5	7.806	18.10	-------	36.12	49.73	68.10	80.51	90.64	Detention

Hydrograph Summary Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2009 by Autodesk, Inc. v6.066

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	11.70	1	727	0.917	------	------	------	Undeveloped Off Site
2	SCS Runoff	10.45	1	723	0.685	------	------	------	Undeveloped On Site
3	Combine	21.55	1	725	1.602	1, 2	------	------	Existing
4	SCS Runoff	24.57	1	716	1.204	------	------	------	Developed Site
5	Combine	31.16	1	717	2.120	1, 4	------	------	Proposed
6	Reservoir	7.806	1	742	2.114	5	1391.97	0.800	Detention

Hydrograph Summary Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2009 by Autodesk, Inc. v6.066

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	16.68	1	727	1.300	------	------	------	Undeveloped Off Site
2	SCS Runoff	14.84	1	723	0.972	------	------	------	Undeveloped On Site
3	Combine	30.68	1	725	2.272	1, 2	------	------	Existing
4	SCS Runoff	30.94	1	716	1.540	------	------	------	Developed Site
5	Combine	40.72	1	717	2.840	1, 4	------	------	Proposed
6	Reservoir	18.10	1	732	2.833	5	1392.24	0.926	Detention

Hydrograph Summary Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2009 by Autodesk, Inc. v6.066

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	24.80	1	727	1.938	------	------	------	Undeveloped Off Site
2	SCS Runoff	22.00	1	723	1.449	------	------	------	Undeveloped On Site
3	Combine	45.61	1	724	3.387	1, 2	------	------	Existing
4	SCS Runoff	40.89	1	716	2.071	------	------	------	Developed Site
5	Combine	56.00	1	717	4.009	1, 4	------	------	Proposed
6	Reservoir	36.12	1	722	4.002	5	1392.49	1.04	Detention

Hydrograph Summary Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2009 by Autodesk, Inc. v6.066

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	30.20	1	727	2.370	------	------	------	Undeveloped Off Site
2	SCS Runoff	26.75	1	723	1.772	------	------	------	Undeveloped On Site
3	Combine	55.56	1	724	4.142	1, 2	------	------	Existing
4	SCS Runoff	47.37	1	716	2.419	------	------	------	Developed Site
5	Combine	66.08	1	717	4.789	1, 4	------	------	Proposed
6	Reservoir	49.73	1	721	4.783	5	1392.64	1.12	Detention

Hydrograph Summary Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2009 by Autodesk, Inc. v6.066

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	38.34	1	727	3.033	------	------	------	Undeveloped Off Site
2	SCS Runoff	33.90	1	723	2.267	------	------	------	Undeveloped On Site
3	Combine	70.57	1	724	5.300	1, 2	------	------	Existing
4	SCS Runoff	57.07	1	716	2.942	------	------	------	Developed Site
5	Combine	81.24	1	717	5.975	1, 4	------	------	Proposed
6	Reservoir	68.10	1	720	5.968	5	1392.82	1.21	Detention

Hydrograph Summary Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2009 by Autodesk, Inc. v6.066

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	44.55	1	727	3.545	------	------	------	Undeveloped Off Site
2	SCS Runoff	39.36	1	723	2.650	------	------	------	Undeveloped On Site
3	Combine	82.02	1	724	6.196	1, 2	------	------	Existing
4	SCS Runoff	64.44	1	716	3.341	------	------	------	Developed Site
5	Combine	92.81	1	717	6.887	1, 4	------	------	Proposed
6	Reservoir	80.51	1	720	6.880	5	1392.93	1.26	Detention

Hydrograph Summary Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2009 by Autodesk, Inc. v6.066

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	49.98	1	727	3.998	------	------	------	Undeveloped Off Site
2	SCS Runoff	44.12	1	723	2.989	------	------	------	Undeveloped On Site
3	Combine	92.03	1	724	6.987	1, 2	------	------	Existing
4	SCS Runoff	70.89	1	716	3.691	------	------	------	Developed Site
5	Combine	102.93	1	717	7.688	1, 4	------	------	Proposed
6	Reservoir	90.64	1	720	7.682	5	1393.02	1.30	Detention

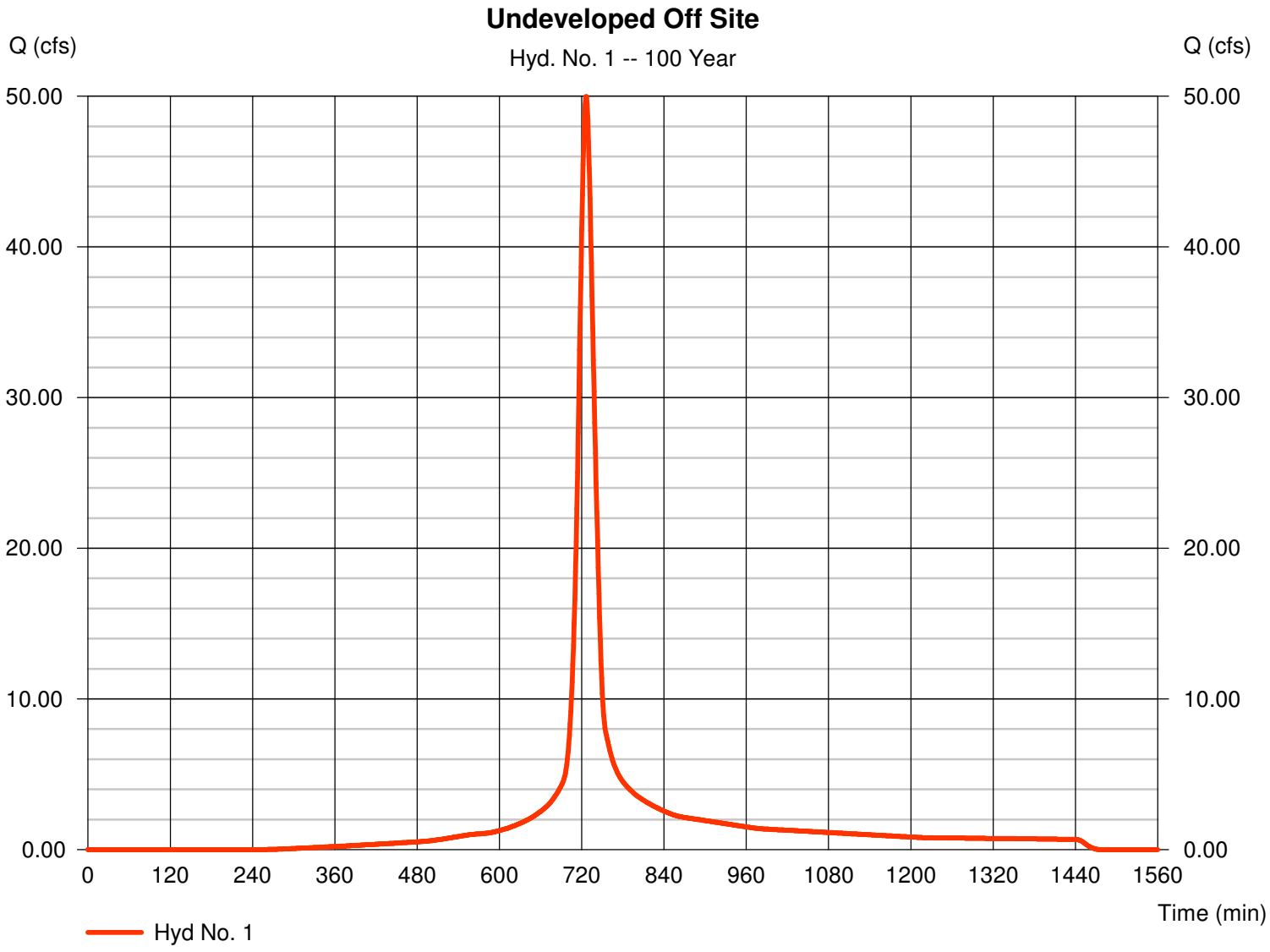
Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2009 by Autodesk, Inc. v6.066 Tuesday, May 10, 2011

Hyd. No. 1

Undeveloped Off Site

Hydrograph type	=	SCS Runoff	Peak discharge	=	49.98 cfs
Storm frequency	=	100 yrs	Time to peak	=	727 min
Time interval	=	1 min	Hyd. volume	=	3.998 acft
Drainage area	=	8.200 ac	Curve number	=	84
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	USER	Time of conc. (Tc)	=	22.10 min
Total precip.	=	7.80 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

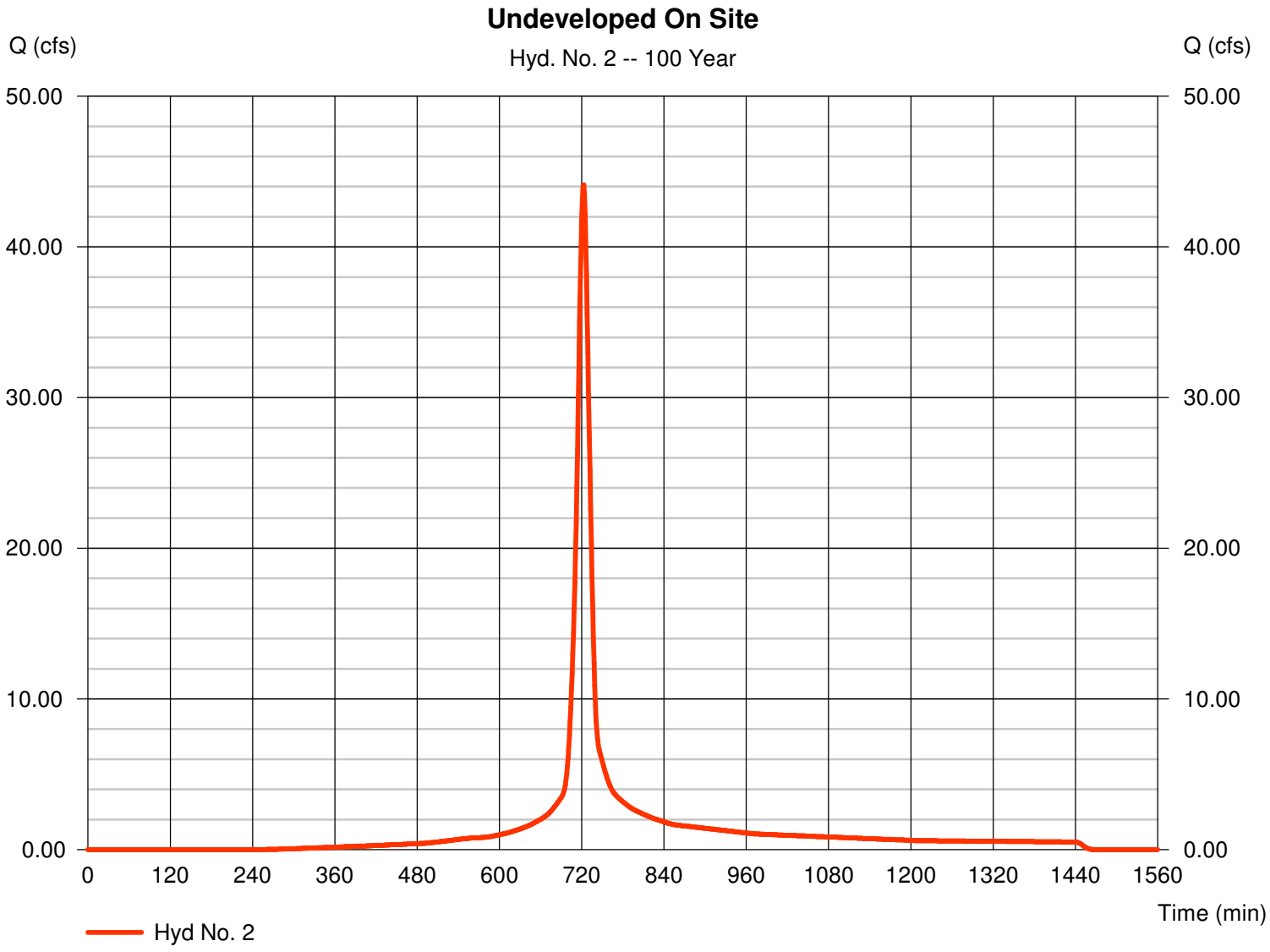


Hydrograph Report

Hyd. No. 2

Undeveloped On Site

Hydrograph type	=	SCS Runoff	Peak discharge	=	44.12 cfs
Storm frequency	=	100 yrs	Time to peak	=	723 min
Time interval	=	1 min	Hyd. volume	=	2.989 acft
Drainage area	=	6.000 ac	Curve number	=	84
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	USER	Time of conc. (Tc)	=	16.50 min
Total precip.	=	7.80 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

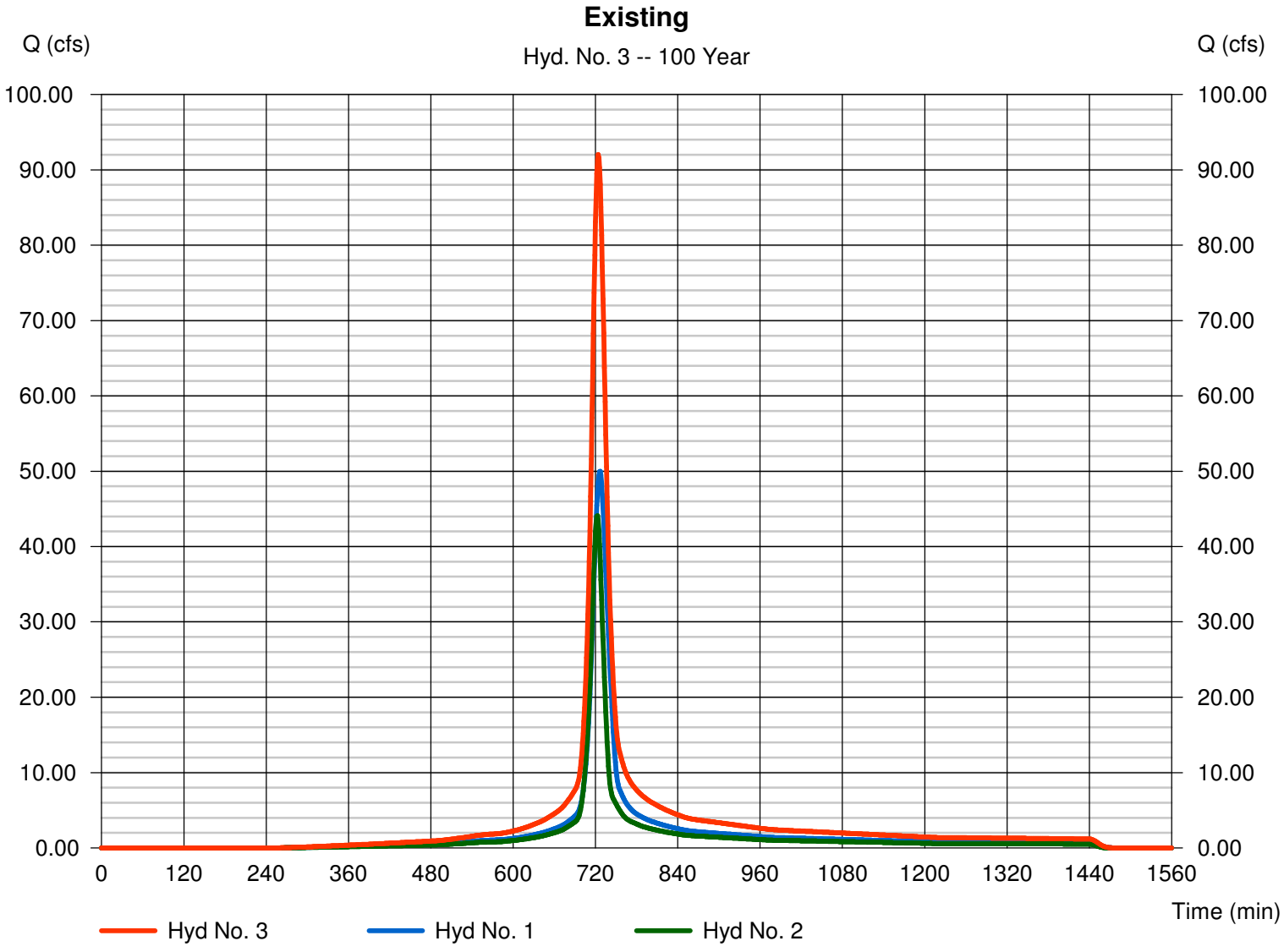


Hydrograph Report

Hyd. No. 3

Existing

Hydrograph type	= Combine	Peak discharge	= 92.03 cfs
Storm frequency	= 100 yrs	Time to peak	= 724 min
Time interval	= 1 min	Hyd. volume	= 6.987 acft
Inflow hyds.	= 1, 2	Contrib. drain. area	= 14.200 ac

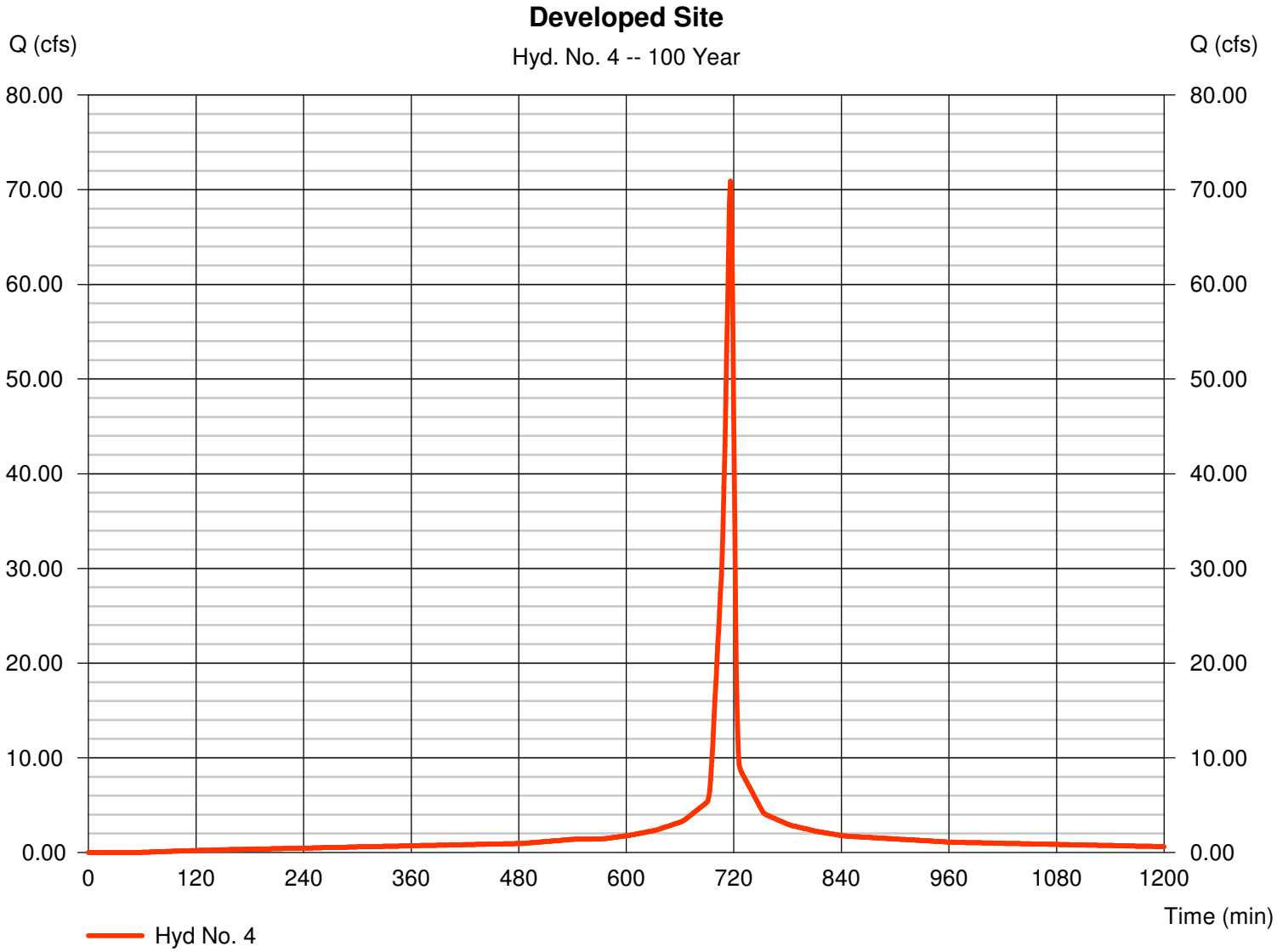


Hydrograph Report

Hyd. No. 4

Developed Site

Hydrograph type	=	SCS Runoff	Peak discharge	=	70.89 cfs
Storm frequency	=	100 yrs	Time to peak	=	716 min
Time interval	=	1 min	Hyd. volume	=	3.691 acft
Drainage area	=	6.000 ac	Curve number	=	96.5
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	USER	Time of conc. (Tc)	=	3.30 min
Total precip.	=	7.80 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

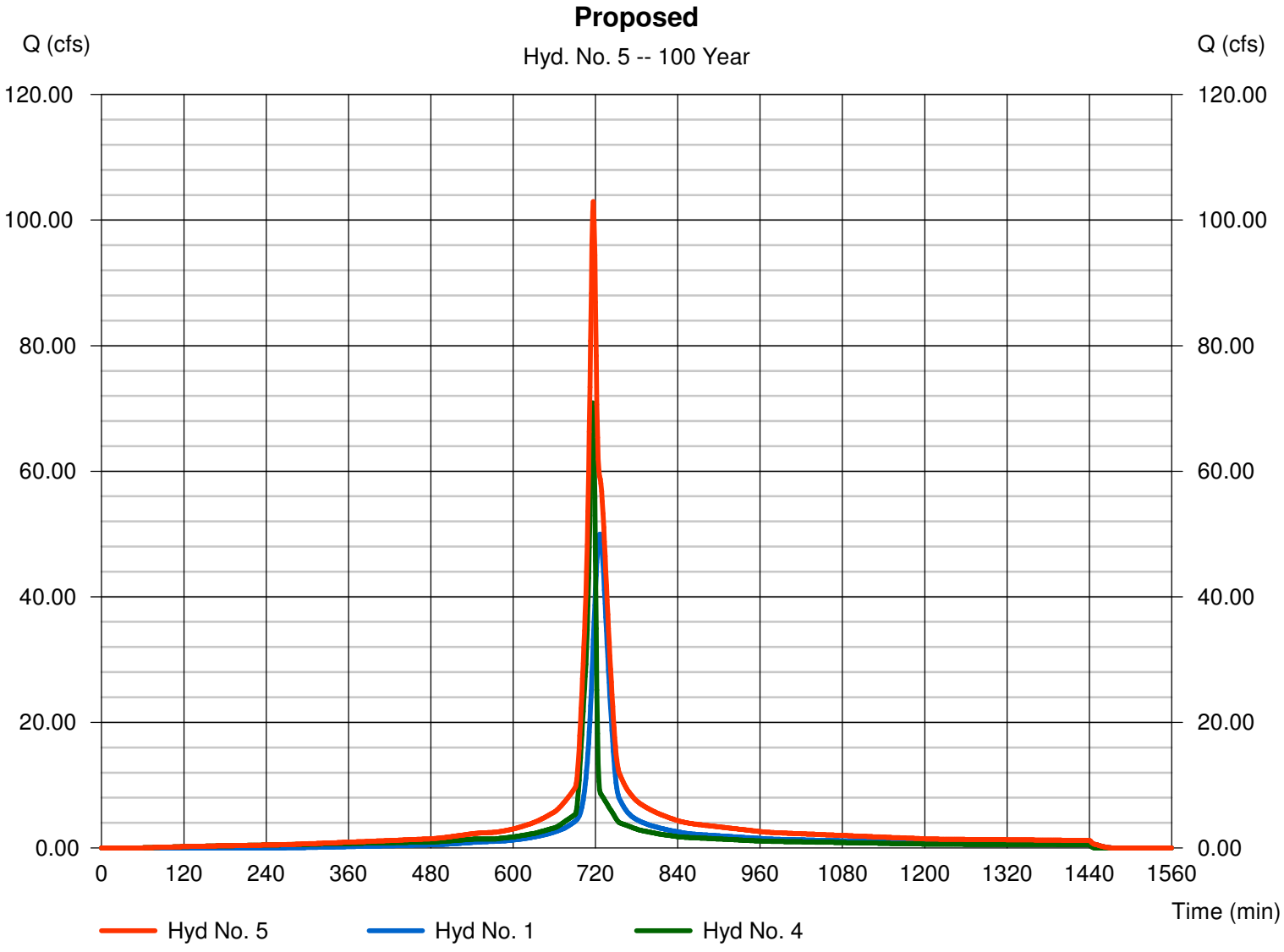


Hydrograph Report

Hyd. No. 5

Proposed

Hydrograph type	= Combine	Peak discharge	= 102.93 cfs
Storm frequency	= 100 yrs	Time to peak	= 717 min
Time interval	= 1 min	Hyd. volume	= 7.688 acft
Inflow hyds.	= 1, 4	Contrib. drain. area	= 14.200 ac



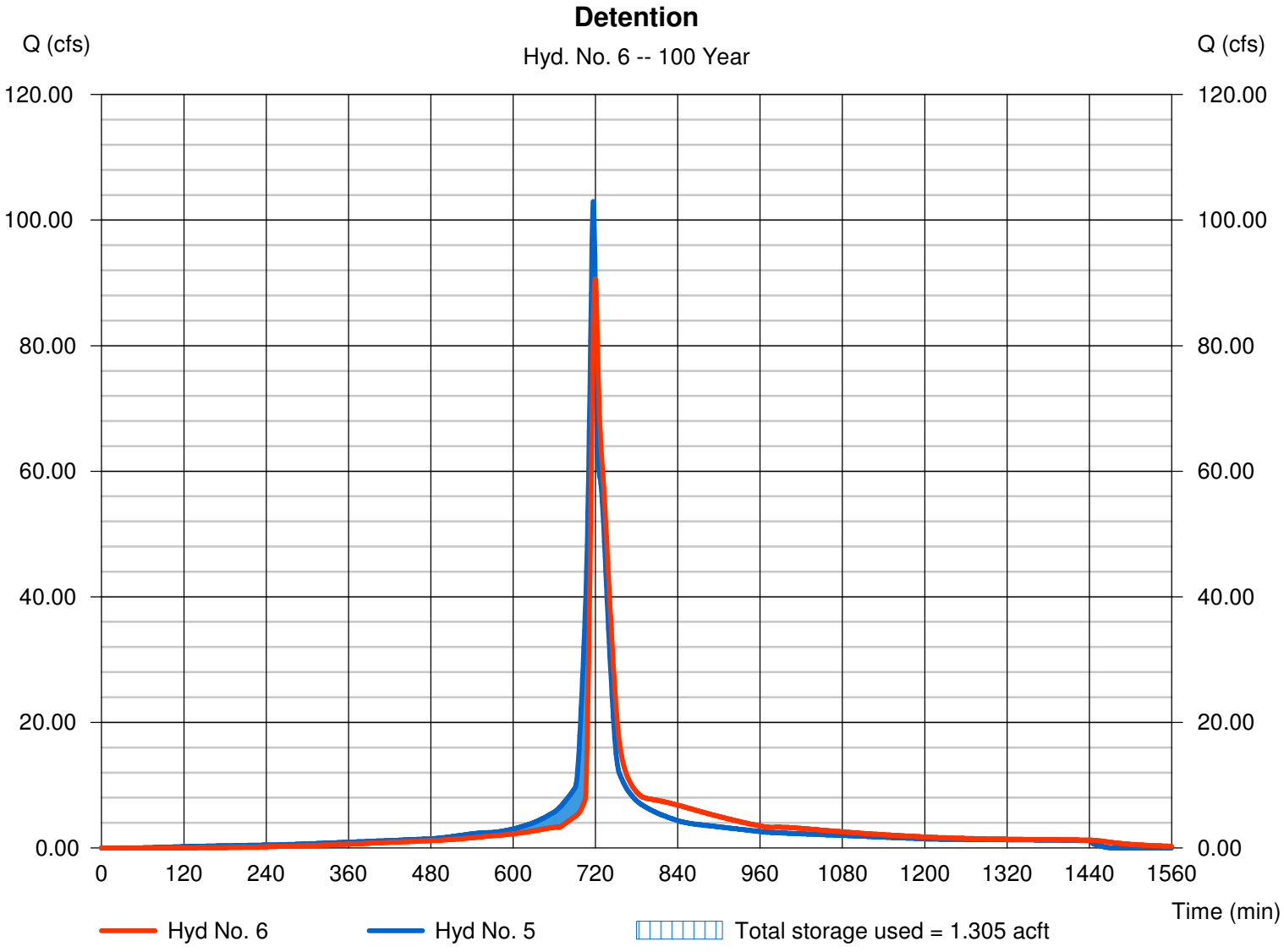
Hydrograph Report

Hyd. No. 6

Detention

Hydrograph type	=	Reservoir	Peak discharge	=	90.64 cfs
Storm frequency	=	100 yrs	Time to peak	=	720 min
Time interval	=	1 min	Hyd. volume	=	7.682 acft
Inflow hyd. No.	=	5 - Proposed	Max. Elevation	=	1393.02 ft
Reservoir name	=	Detention Volume	Max. Storage	=	1.305 acft

Storage Indication method used.



Pond No. 1 - Detention Volume

Pond Data

Trapezoid - Bottom L x W = 125.0 x 125.0 ft, Side slope = 4.00:1, Bottom elev. = 1390.00 ft, Depth = 3.20 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (acft)	Total storage (acft)
0.00	1390.00	15,625	0.000	0.000
0.32	1390.32	16,272	0.117	0.117
0.64	1390.64	16,931	0.122	0.239
0.96	1390.96	17,604	0.127	0.366
1.28	1391.28	18,290	0.132	0.498
1.60	1391.60	18,989	0.137	0.635
1.92	1391.92	19,701	0.142	0.777
2.24	1392.24	20,426	0.147	0.924
2.56	1392.56	21,164	0.153	1.077
2.88	1392.88	21,916	0.158	1.235
3.20	1393.20	22,680	0.164	1.399

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 12.00	0.00	0.00	0.00
Span (in)	= 12.00	0.00	0.00	0.00
No. Barrels	= 2	0	0	0
Invert El. (ft)	= 1390.00	0.00	0.00	0.00
Length (ft)	= 50.00	0.00	0.00	0.00
Slope (%)	= 0.40	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)	= 30.00	0.00	0.00	0.00
Crest El. (ft)	= 1392.00	0.00	0.00	0.00
Weir Coeff.	= 2.60	3.33	3.33	3.33
Weir Type	= Broad	---	---	---
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	1390.00	0.00	---	---	---	0.00	---	---	---	---	---	0.000
0.03	0.012	1390.03	0.01 oc	---	---	---	0.00	---	---	---	---	---	0.008
0.06	0.023	1390.06	0.04 oc	---	---	---	0.00	---	---	---	---	---	0.036
0.10	0.035	1390.10	0.08 oc	---	---	---	0.00	---	---	---	---	---	0.081
0.13	0.047	1390.13	0.14 ic	---	---	---	0.00	---	---	---	---	---	0.143
0.16	0.059	1390.16	0.22 ic	---	---	---	0.00	---	---	---	---	---	0.221
0.19	0.070	1390.19	0.32 ic	---	---	---	0.00	---	---	---	---	---	0.315
0.22	0.082	1390.22	0.42 oc	---	---	---	0.00	---	---	---	---	---	0.419
0.26	0.094	1390.26	0.53 oc	---	---	---	0.00	---	---	---	---	---	0.535
0.29	0.105	1390.29	0.66 oc	---	---	---	0.00	---	---	---	---	---	0.659
0.32	0.117	1390.32	0.79 oc	---	---	---	0.00	---	---	---	---	---	0.789
0.35	0.129	1390.35	0.93 oc	---	---	---	0.00	---	---	---	---	---	0.927
0.38	0.142	1390.38	1.07 oc	---	---	---	0.00	---	---	---	---	---	1.069
0.42	0.154	1390.42	1.22 oc	---	---	---	0.00	---	---	---	---	---	1.217
0.45	0.166	1390.45	1.37 oc	---	---	---	0.00	---	---	---	---	---	1.367
0.48	0.178	1390.48	1.52 oc	---	---	---	0.00	---	---	---	---	---	1.520
0.51	0.190	1390.51	1.67 oc	---	---	---	0.00	---	---	---	---	---	1.675
0.54	0.203	1390.54	1.83 oc	---	---	---	0.00	---	---	---	---	---	1.825
0.58	0.215	1390.58	1.98 oc	---	---	---	0.00	---	---	---	---	---	1.978
0.61	0.227	1390.61	2.13 oc	---	---	---	0.00	---	---	---	---	---	2.132
0.64	0.239	1390.64	2.28 oc	---	---	---	0.00	---	---	---	---	---	2.281
0.67	0.252	1390.67	2.43 oc	---	---	---	0.00	---	---	---	---	---	2.426
0.70	0.264	1390.70	2.57 oc	---	---	---	0.00	---	---	---	---	---	2.567
0.74	0.277	1390.74	2.70 oc	---	---	---	0.00	---	---	---	---	---	2.700
0.77	0.290	1390.77	2.83 oc	---	---	---	0.00	---	---	---	---	---	2.829
0.80	0.303	1390.80	2.95 oc	---	---	---	0.00	---	---	---	---	---	2.947
0.83	0.315	1390.83	3.06 oc	---	---	---	0.00	---	---	---	---	---	3.055
0.86	0.328	1390.86	3.15 oc	---	---	---	0.00	---	---	---	---	---	3.149
0.90	0.341	1390.90	3.23 oc	---	---	---	0.00	---	---	---	---	---	3.228
0.93	0.353	1390.93	3.29 oc	---	---	---	0.00	---	---	---	---	---	3.286
0.96	0.366	1390.96	3.32 oc	---	---	---	0.00	---	---	---	---	---	3.315
0.99	0.379	1390.99	3.29 oc	---	---	---	0.00	---	---	---	---	---	3.286
1.02	0.392	1391.02	3.42 oc	---	---	---	0.00	---	---	---	---	---	3.415

Continues on next page...

Detention Volume

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
1.06	0.405	1391.06	3.65 oc	---	---	---	0.00	---	---	---	---	---	3.651
1.09	0.419	1391.09	3.87 oc	---	---	---	0.00	---	---	---	---	---	3.873
1.12	0.432	1391.12	4.08 oc	---	---	---	0.00	---	---	---	---	---	4.082
1.15	0.445	1391.15	4.28 oc	---	---	---	0.00	---	---	---	---	---	4.281
1.18	0.458	1391.18	4.47 oc	---	---	---	0.00	---	---	---	---	---	4.472
1.22	0.471	1391.22	4.65 oc	---	---	---	0.00	---	---	---	---	---	4.654
1.25	0.485	1391.25	4.83 oc	---	---	---	0.00	---	---	---	---	---	4.830
1.28	0.498	1391.28	5.00 oc	---	---	---	0.00	---	---	---	---	---	5.001
1.31	0.511	1391.31	5.16 oc	---	---	---	0.00	---	---	---	---	---	5.165
1.34	0.525	1391.34	5.32 oc	---	---	---	0.00	---	---	---	---	---	5.324
1.38	0.539	1391.38	5.48 oc	---	---	---	0.00	---	---	---	---	---	5.478
1.41	0.553	1391.41	5.63 oc	---	---	---	0.00	---	---	---	---	---	5.628
1.44	0.566	1391.44	5.77 oc	---	---	---	0.00	---	---	---	---	---	5.774
1.47	0.580	1391.47	5.92 oc	---	---	---	0.00	---	---	---	---	---	5.917
1.50	0.594	1391.50	6.06 oc	---	---	---	0.00	---	---	---	---	---	6.056
1.54	0.607	1391.54	6.19 oc	---	---	---	0.00	---	---	---	---	---	6.192
1.57	0.621	1391.57	6.32 oc	---	---	---	0.00	---	---	---	---	---	6.325
1.60	0.635	1391.60	6.46 oc	---	---	---	0.00	---	---	---	---	---	6.456
1.63	0.649	1391.63	6.58 oc	---	---	---	0.00	---	---	---	---	---	6.584
1.66	0.663	1391.66	6.71 oc	---	---	---	0.00	---	---	---	---	---	6.709
1.70	0.677	1391.70	6.83 oc	---	---	---	0.00	---	---	---	---	---	6.832
1.73	0.692	1391.73	6.95 oc	---	---	---	0.00	---	---	---	---	---	6.953
1.76	0.706	1391.76	7.07 oc	---	---	---	0.00	---	---	---	---	---	7.072
1.79	0.720	1391.79	7.19 oc	---	---	---	0.00	---	---	---	---	---	7.189
1.82	0.734	1391.82	7.30 oc	---	---	---	0.00	---	---	---	---	---	7.304
1.86	0.748	1391.86	7.42 oc	---	---	---	0.00	---	---	---	---	---	7.417
1.89	0.763	1391.89	7.53 oc	---	---	---	0.00	---	---	---	---	---	7.528
1.92	0.777	1391.92	7.64 oc	---	---	---	0.00	---	---	---	---	---	7.639
1.95	0.792	1391.95	7.75 oc	---	---	---	0.00	---	---	---	---	---	7.747
1.98	0.806	1391.98	7.85 oc	---	---	---	0.00	---	---	---	---	---	7.854
2.02	0.821	1392.02	7.96 oc	---	---	---	0.16	---	---	---	---	---	8.117
2.05	0.836	1392.05	8.06 oc	---	---	---	0.82	---	---	---	---	---	8.883
2.08	0.850	1392.08	8.17 oc	---	---	---	1.76	---	---	---	---	---	9.930
2.11	0.865	1392.11	8.27 oc	---	---	---	2.92	---	---	---	---	---	11.19
2.14	0.880	1392.14	8.37 oc	---	---	---	4.26	---	---	---	---	---	12.63
2.18	0.895	1392.18	8.47 oc	---	---	---	5.75	---	---	---	---	---	14.22
2.21	0.909	1392.21	8.56 oc	---	---	---	7.39	---	---	---	---	---	15.96
2.24	0.924	1392.24	8.66 oc	---	---	---	9.17	---	---	---	---	---	17.83
2.27	0.939	1392.27	8.76 oc	---	---	---	11.06	---	---	---	---	---	19.82
2.30	0.955	1392.30	8.85 oc	---	---	---	13.07	---	---	---	---	---	21.92
2.34	0.970	1392.34	8.95 oc	---	---	---	15.19	---	---	---	---	---	24.13
2.37	0.985	1392.37	9.04 oc	---	---	---	17.41	---	---	---	---	---	26.45
2.40	1.001	1392.40	9.13 oc	---	---	---	19.73	---	---	---	---	---	28.86
2.43	1.016	1392.43	9.22 oc	---	---	---	22.14	---	---	---	---	---	31.36
2.46	1.031	1392.46	9.31 oc	---	---	---	24.64	---	---	---	---	---	33.95
2.50	1.046	1392.50	9.40 oc	---	---	---	27.23	---	---	---	---	---	36.63
2.53	1.062	1392.53	9.49 oc	---	---	---	29.91	---	---	---	---	---	39.40
2.56	1.077	1392.56	9.58 oc	---	---	---	32.69	---	---	---	---	---	42.27
2.59	1.093	1392.59	9.66 oc	---	---	---	35.53	---	---	---	---	---	45.19
2.62	1.109	1392.62	9.75 oc	---	---	---	38.45	---	---	---	---	---	48.20
2.66	1.124	1392.66	9.83 oc	---	---	---	41.44	---	---	---	---	---	51.28
2.69	1.140	1392.69	9.92 oc	---	---	---	44.51	---	---	---	---	---	54.43
2.72	1.156	1392.72	10.00 oc	---	---	---	47.65	---	---	---	---	---	57.65
2.75	1.172	1392.75	10.08 oc	---	---	---	50.86	---	---	---	---	---	60.95
2.78	1.188	1392.78	10.17 oc	---	---	---	54.14	---	---	---	---	---	64.31
2.82	1.204	1392.82	10.25 oc	---	---	---	57.49	---	---	---	---	---	67.73
2.85	1.219	1392.85	10.33 oc	---	---	---	60.90	---	---	---	---	---	71.23
2.88	1.235	1392.88	10.41 oc	---	---	---	64.39	---	---	---	---	---	74.80
2.91	1.252	1392.91	10.49 oc	---	---	---	67.93	---	---	---	---	---	78.42
2.94	1.268	1392.94	10.57 oc	---	---	---	71.54	---	---	---	---	---	82.11
2.98	1.284	1392.98	10.65 oc	---	---	---	75.20	---	---	---	---	---	85.85
3.01	1.301	1393.01	10.73 oc	---	---	---	78.93	---	---	---	---	---	89.66
3.04	1.317	1393.04	10.80 oc	---	---	---	82.72	---	---	---	---	---	93.52
3.07	1.333	1393.07	10.88 oc	---	---	---	86.56	---	---	---	---	---	97.44
3.10	1.350	1393.10	10.96 oc	---	---	---	90.46	---	---	---	---	---	101.42
3.14	1.366	1393.14	11.03 oc	---	---	---	94.42	---	---	---	---	---	105.46
3.17	1.383	1393.17	11.11 oc	---	---	---	98.44	---	---	---	---	---	109.55
3.20	1.399	1393.20	11.18 oc	---	---	---	102.53	---	---	---	---	---	113.71

...End

Appendix 2.3

Time of Concentration Calculations

Project	Kiser West Second Addition
Feature	
Analyst	Kara Anderson
Version	5/6/2011
Notes	

Sheet	Subbasin	Number of Segments	Sheet Flow (mins)	Shallow Concentrated Flow (mins)	Open Channel Ditch Flow (mins)	Open Channel Pipe Flow (mins)	Open Channel General Flow (mins)	Other (mins)	Total Tc (mins)	Length (feet)	Drop (feet)	Avg. Slope (%)	Avg. Vel. (fps)	Lag (mins)	Lag (hours)	Area (acres)
1	Offsite Basin	2	16.3	5.8	0.0	0.0	0.0	0.0	22.1	360	4	0.97	0.27	13.2	0.221	8.2
2	site Existing Conditi	3	9.4	5.4	1.8	0.0	0.0	0.0	16.5	690	13	1.88	0.70	9.9	0.165	6
3	ite Proposed Cond	3	1.2	1.7	0.0	0.4	0.0	0.0	3.3	700	13	1.86	3.56	2.0	0.033	6
4	0	6	20.3	2.4	0.1	0.2	0.1	4.2	27.3	1350	47	3.48	0.82	16.4	0.273	500
5	0	6	20.3	2.4	0.1	0.2	0.1	4.2	27.3	1350	47	3.48	0.82	16.4	0.273	500
6	0	6	20.3	2.4	0.1	0.2	0.1	4.2	27.3	1350	47	3.48	0.82	16.4	0.273	500
7	0	6	20.3	2.4	0.1	0.2	0.1	4.2	27.3	1350	47	3.48	0.82	16.4	0.273	500
8	0	6	20.3	2.4	0.1	0.2	0.1	4.2	27.3	1350	47	3.48	0.82	16.4	0.273	500
9	0	6	20.3	2.4	0.1	0.2	0.1	4.2	27.3	1350	47	3.48	0.82	16.4	0.273	500
10	0	6	20.3	2.4	0.1	0.2	0.1	4.2	27.3	1350	47	3.48	0.82	16.4	0.273	500
11	0	6	20.3	2.4	0.1	0.2	0.1	4.2	27.3	1350	47	3.48	0.82	16.4	0.273	500
12	0	6	20.3	2.4	0.1	0.2	0.1	4.2	27.3	1350	47	3.48	0.82	16.4	0.273	500
13	0	6	20.3	2.4	0.1	0.2	0.1	4.2	27.3	1350	47	3.48	0.82	16.4	0.273	500
14	0	6	20.3	2.4	0.1	0.2	0.1	4.2	27.3	1350	47	0.00	0.82	16.4	0.273	500
15	0	6	20.3	2.4	0.1	0.2	0.1	4.2	27.3	1350	47	3.48	0.82	16.4	0.273	500
16	0	6	20.3	2.4	0.1	0.2	0.1	4.2	27.3	1350	47	3.48	0.82	16.4	0.273	500
17	0	6	20.3	2.4	0.1	0.2	0.1	4.2	27.3	1350	47	3.48	0.82	16.4	0.273	500
18	0	6	20.3	2.4	0.1	0.2	0.1	4.2	27.3	1350	47	3.48	0.82	16.4	0.273	500
19	0	6	20.3	2.4	0.1	0.2	0.1	4.2	27.3	1350	47	3.48	0.82	16.4	0.273	500
20	0	6	20.3	2.4	0.1	0.2	0.1	4.2	27.3	1350	47	3.48	0.82	16.4	0.273	500
21	0	6	20.3	2.4	0.1	0.2	0.1	4.2	27.3	1350	47	3.48	0.82	16.4	0.273	500
22	0	6	20.3	2.4	0.1	0.2	0.1	4.2	27.3	1350	47	3.48	0.82	16.4	0.273	500
23	0	6	20.3	2.4	0.1	0.2	0.1	4.2	27.3	1350	47	3.48	0.82	16.4	0.273	500
24	0	6	20.3	2.4	0.1	0.2	0.1	4.2	27.3	1350	47	3.48	0.82	16.4	0.273	500
25	0	6	20.3	2.4	0.1	0.2	0.1	4.2	27.3	1350	47	3.48	0.82	16.4	0.273	500
26	0	6	20.3	2.4	0.1	0.2	0.1	4.2	27.3	1350	47	3.48	0.82	16.4	0.273	500

Subbasin Name	Offsite Basin
Drainage Area (ac)	8.2
Drainage Area (sq mi)	0.0128125

Sheet Flow

selected>>							Total
	Select (0 or 1)	1	0	0	0	0	1 segments
	Length (ft)	100	1	1	1	1	100 feet length
	Top Elevation (ft)	1403	1	1	1	1	
	Bottom Elevation (ft)	1403	1	1	1	1	
	Cover	0.15, Short grass prairie	0.011, Concrete, asphalt, etc.	Choose Cover Type	Choose Cover Type	Choose Cover Type	
	Specify alternate "n"						
	Sheet Flow "n" (dim)	0.150	0.011	0.000	0.000	0.000	
	2-yr, 24-hr Rainfall (ins)	3.50	3.50	3.50	3.50	3.50	
	Drop (ft)	1	0	0	0	0	1 feet drop
	Slope (ft/ft)	0.0050	0.0000	0.0000	0.0000	0.0000	
	Slope (%)	0.50	0.00	0.00	0.00	0.00	
	Velocity (fps)	0.10					
	Travel Time (hrs)	0.272					
	Travel Time (mins)	16.31					16.3 mins travel

Shallow Concentrated Flow

selected>>							Total
	Select (0 or 1)	1	0	0	0	0	1 segments
	Length (ft)	260	1	1	1	1	260 feet length
	Top Elevation (ft)	1402.5	1	1	1	1	
	Bottom Elevation (ft)	1400	1	1	1	1	
	Cover	7, Short grass pasture	Choose Cover Type	Choose Cover Type	Choose Cover Type	Choose Cover Type	
	Specify alternate "K"						
	Surface Coeff (dim)	7.00	0.00	0.00	0.00	0.00	
	Drop (ft)	3	0	0	0	0	3 feet drop
	Slope (ft/ft)	0.0115	0.0000	0.0000	0.0000	0.0000	
	Slope (%)	1.15	0.00	0.00	0.00	0.00	
	Velocity (fps)	0.75					
	Travel Time (mins)	5.76					5.8 mins travel

Open Channel Ditch Flow

						Total
Select (0 or 1)	0	0	0	0	0	0 segments
Length (ft)	100	1	1	1	1	0 feet length
Top Elevation (ft)	50	1	1	1	1	
Bottom Elevation (ft)	47	1	1	1	1	
Channel Lining	0.03, Smooth Natural Stream	Choose Lining Type	Choose Lining Type	Choose Lining Type	Choose Lining Type	
Bottom Width (ft)	0.00	0.00	1.00	1.00	1.00	
Left Side Slope (H:V)	3.00	1.00	1.00	1.00	1.00	
Right Side Slope (H:V)	3.00	1.00	1.00	1.00	1.00	
Depth (ft)	0.50	1.00	1.00	1.00	1.00	
Specify alternate "n"						
Manning "n" (dim)	0.030	0.000	0.000	0.000	0.000	
Drop (ft)	3	0	0	0	0	0 feet drop
Slope (ft/ft)	0.0300	0.0000	0.0000	0.0000	0.0000	
Slope (%)	3.00	0.00	0.00	0.00	0.00	
Flow Area (sq ft)	0.75	1.00	2.00	2.00	2.00	
Wet Perimeter (ft)	3.16	2.83	3.83	3.83	3.83	
Hydraulic Radius (ft)	0.24	0.35	0.52	0.52	0.52	
Velocity (fps)						
Normal Flow (cfs)						
Travel Time (mins)						0.0 mins travel

Open Channel Pipe Flow

						Total
Select (0 or 1)	0	0	0	0	0	0 segments
Length (ft)	290	1	1	1	1	0 feet length
Top Elevation (ft)	1360	1	1	1	1	
Bottom Elevation (ft)	1359	1	1	1	1	
Pipe Material	0.017, Rough concrete	Choose Material Type	Choose Material Type	Choose Material Type	Choose Material Type	
Diameter (ins)	15.00	1.00	1.00	1.00	1.00	
Flow Depth (ins)	15.00	1.00	1.00	1.00	1.00	
Specify alternate "n"						
Manning "n" (dim)	0.017	0.000	0.000	0.000	0.000	
Drop (ft)	1	0	0	0	0	0 feet drop
Slope (ft/ft)	0.0034	0.0000	0.0000	0.0000	0.0000	
Slope (%)	0.34	0.00	0.00	0.00	0.00	
Theta (radians)	6.283	6.283	6.283	6.283	6.283	
Flow Area (sq ft)	1.23	0.01	0.01	0.01	0.01	
Wet Perimeter (ft)	3.93	0.26	0.26	0.26	0.26	
Hydraulic Radius (ft)	0.31	0.02	0.02	0.02	0.02	
Velocity (fps)						
Normal Flow (cfs)						
Travel Time (mins)						0.0 mins travel

Open Channel General Flow

						Total
Select (0 or 1)	0	0	0	0	0	0 segments
Length (ft)	150	1	1	1	1	0 feet length
Top Elevation (ft)	30	1	1	1	1	
Bottom Elevation (ft)	26	1	1	1	1	
Hydraulic Radius (ft)	2.30	1.00	1.00	1.00	1.00	
Channel Lining	0.025, Clean Earth	Choose Cover Type	Choose Cover Type	Choose Cover Type	Choose Cover Type	
Specify alternate "n"						
Manning "n" (dim)	0.025	0.000	0.000	0.000	0.000	
Drop (ft)	4	0	0	0	0	0 feet drop
Slope (ft/ft)	0.0267	0.0000	0.0000	0.0000	0.0000	
Slope (%)	2.67	0.00	0.00	0.00	0.00	
Velocity (fps)						
Travel Time (mins)						0.0 mins travel

Other (Computed Separately)

						Total
Select (0 or 1)	0	0	0	0	0	0 segments
Length (ft)	500	1	1	1	1	0 feet length
Drop (ft)	10	1	1	1	1	0 feet drop
Velocity (fps)	2.00	1.00	1.00	1.00	1.00	
Slope (ft/ft)	0.0200	1.0000	1.0000	1.0000	1.0000	
Slope (%)	2.00	100.00	100.00	100.00	100.00	
Travel Time (mins)						0.0 mins travel

Total for Subbasin

Segments	2
Length (ft)	360
Drop (ft)	4
Slope (ft/ft)	0.0097

Subbasin Name	Onsite Existing Conditio
Drainage Area (ac)	6
Drainage Area (sq mi)	0.009375

Sheet Flow

selected>>							Total
	Select (0 or 1)	1	0	0	0	0	1 segments
	Length (ft)	100	1	1	1	1	100 feet length
	Top Elevation (ft)	1401	1	1	1	1	
	Bottom Elevation (ft)	1399	1	1	1	1	
	Cover	0.15, Short grass prairie	Choose Cover Type	Choose Cover Type	Choose Cover Type	Choose Cover Type	
	Specify alternate "n"						
	Sheet Flow "n" (dim)	0.150	0.000	0.000	0.000	0.000	
	2-yr, 24-hr Rainfall (ins)	3.50	3.50	3.50	3.50	3.50	
	Drop (ft)	2	0	0	0	0	2 feet drop
	Slope (ft/ft)	0.0200	0.0000	0.0000	0.0000	0.0000	
	Slope (%)	2.00	0.00	0.00	0.00	0.00	
	Velocity (fps)	0.18					
	Travel Time (hrs)	0.156					
	Travel Time (mins)	9.37					9.4 mins travel

Shallow Concentrated Flow

selected>>							Total
	Select (0 or 1)	1	0	0	0	0	1 segments
	Length (ft)	330	1	1	1	1	330 feet length
	Top Elevation (ft)	1399	1	1	1	1	
	Bottom Elevation (ft)	1392	1	1	1	1	
	Cover	7, Short grass pasture	Choose Cover Type	Choose Cover Type	Choose Cover Type	Choose Cover Type	
	Specify alternate "K"						
	Surface Coeff (dim)	7.00	0.00	0.00	0.00	0.00	
	Drop (ft)	7	0	0	0	0	7 feet drop
	Slope (ft/ft)	0.0212	0.0000	0.0000	0.0000	0.0000	
	Slope (%)	2.12	0.00	0.00	0.00	0.00	
	Velocity (fps)	1.02					
	Travel Time (mins)	5.39					5.4 mins travel

Open Channel Ditch Flow

selected>>							Total
	Select (0 or 1)	1	0	0	0	0	1 segments
	Length (ft)	260	1	1	1	1	260 feet length
	Top Elevation (ft)	1392	1	1	1	1	
	Bottom Elevation (ft)	1388	1	1	1	1	
	Channel Lining	0.03, Grassed	Choose Lining Type	Choose Lining Type	Choose Lining Type	Choose Lining Type	
	Bottom Width (ft)	0.00	0.00	1.00	1.00	1.00	
	Left Side Slope (H:V)	10.00	1.00	1.00	1.00	1.00	
	Right Side Slope (H:V)	10.00	1.00	1.00	1.00	1.00	
	Depth (ft)	0.50	1.00	1.00	1.00	1.00	
	Specify alternate "n"						
	Manning "n" (dim)	0.030	0.000	0.000	0.000	0.000	
	Drop (ft)	4	0	0	0	0	4 feet drop
	Slope (ft/ft)	0.0154	0.0000	0.0000	0.0000	0.0000	
	Slope (%)	1.54	0.00	0.00	0.00	0.00	
	Flow Area (sq ft)	2.50	1.00	2.00	2.00	2.00	
	Wet Perimeter (ft)	10.05	2.83	3.83	3.83	3.83	
	Hydraulic Radius (ft)	0.25	0.35	0.52	0.52	0.52	
	Velocity (fps)	2.44					
	Normal Flow (cfs)	6.1					
	Travel Time (mins)	1.78					1.8 mins travel

Open Channel Pipe Flow

						Total
Select (0 or 1)	0	0	0	0	0	0 segments
Length (ft)	100	1	1	1	1	0 feet length
Top Elevation (ft)	20	1	1	1	1	
Bottom Elevation (ft)	18	1	1	1	1	
Pipe Material	0.017, Rough concrete	Choose Material Type	Choose Material Type	Choose Material Type	Choose Material Type	
Diameter (ins)	24.00	1.00	1.00	1.00	1.00	
Flow Depth (ins)	24.00	1.00	1.00	1.00	1.00	
Specify alternate "n"						
Manning "n" (dim)	0.017	0.000	0.000	0.000	0.000	
Drop (ft)	2	0	0	0	0	0 feet drop
Slope (ft/ft)	0.0200	0.0000	0.0000	0.0000	0.0000	
Slope (%)	2.00	0.00	0.00	0.00	0.00	
Theta (radians)	6.283	6.283	6.283	6.283	6.283	
Flow Area (sq ft)	3.14	0.01	0.01	0.01	0.01	
Wet Perimeter (ft)	6.28	0.26	0.26	0.26	0.26	
Hydraulic Radius (ft)	0.50	0.02	0.02	0.02	0.02	
Velocity (fps)						
Normal Flow (cfs)						
Travel Time (mins)						0.0 mins travel

Open Channel General Flow

						Total
Select (0 or 1)	0	0	0	0	0	0 segments
Length (ft)	150	1	1	1	1	0 feet length
Top Elevation (ft)	30	1	1	1	1	
Bottom Elevation (ft)	26	1	1	1	1	
Hydraulic Radius (ft)	2.30	1.00	1.00	1.00	1.00	
Channel Lining	0.025, Clean Earth	Choose Cover Type	Choose Cover Type	Choose Cover Type	Choose Cover Type	
Specify alternate "n"						
Manning "n" (dim)	0.025	0.000	0.000	0.000	0.000	
Drop (ft)	4	0	0	0	0	0 feet drop
Slope (ft/ft)	0.0267	0.0000	0.0000	0.0000	0.0000	
Slope (%)	2.67	0.00	0.00	0.00	0.00	
Velocity (fps)						
Travel Time (mins)						0.0 mins travel

Other (Computed Separately)

						Total
Select (0 or 1)	0	0	0	0	0	0 segments
Length (ft)	500	1	1	1	1	0 feet length
Drop (ft)	10	1	1	1	1	0 feet drop
Velocity (fps)	2.00	1.00	1.00	1.00	1.00	
Slope (ft/ft)	0.0200	1.0000	1.0000	1.0000	1.0000	
Slope (%)	2.00	100.00	100.00	100.00	100.00	
Travel Time (mins)						0.0 mins travel

Total for Subbasin

Segments	3
Length (ft)	690
Drop (ft)	13
Slope (ft/ft)	0.0188

Subbasin Name	On Site Proposed Cond
Drainage Area (ac)	6
Drainage Area (sq mi)	0.009375

Sheet Flow

							Total
selected>>	Select (0 or 1)	1	0	0	0	0	1 segments
	Length (ft)	100	1	1	1	1	100 feet length
	Top Elevation (ft)	1401	1	1	1	1	
	Bottom Elevation (ft)	1399	1	1	1	1	
	Cover	0.011, Concrete, asphalt, etc.	Choose Cover Type	Choose Cover Type	Choose Cover Type	Choose Cover Type	
	Specify alternate "n"						
	Sheet Flow "n" (dim)	0.011	0.000	0.000	0.000	0.000	
	2-yr, 24-hr Rainfall (ins)	3.50	3.50	3.50	3.50	3.50	
	Drop (ft)	2	0	0	0	0	2 feet drop
	Slope (ft/ft)	0.0200	0.0000	0.0000	0.0000	0.0000	
	Slope (%)	2.00	0.00	0.00	0.00	0.00	
	Velocity (fps)	1.44					
	Travel Time (hrs)	0.019					
	Travel Time (mins)	1.16					1.2 mins travel

Shallow Concentrated Flow

							Total
selected>>	Select (0 or 1)	1	0	0	0	0	1 segments
	Length (ft)	300	1	1	1	1	300 feet length
	Top Elevation (ft)	1399	1	1	1	1	
	Bottom Elevation (ft)	1393	1	1	1	1	
	Cover	20.3, Paved	Choose Cover Type	Choose Cover Type	Choose Cover Type	Choose Cover Type	
	Specify alternate "K"						
	Surface Coeff (dim)	20.30	0.00	0.00	0.00	0.00	
	Drop (ft)	6	0	0	0	0	6 feet drop
	Slope (ft/ft)	0.0200	0.0000	0.0000	0.0000	0.0000	
	Slope (%)	2.00	0.00	0.00	0.00	0.00	
	Velocity (fps)	2.87					
	Travel Time (mins)	1.74					1.7 mins travel

Open Channel Ditch Flow

							Total
	Select (0 or 1)	0	0	0	0	0	0 segments
	Length (ft)	300	1	1	1	1	0 feet length
	Top Elevation (ft)	1393	1	1	1	1	
	Bottom Elevation (ft)	1388	1	1	1	1	
	Channel Lining	0.03, Grassed	Choose Lining Type	Choose Lining Type	Choose Lining Type	Choose Lining Type	
	Bottom Width (ft)	25.00	0.00	1.00	1.00	1.00	
	Left Side Slope (H:V)	3.00	1.00	1.00	1.00	1.00	
	Right Side Slope (H:V)	3.00	1.00	1.00	1.00	1.00	
	Depth (ft)	3.00	1.00	1.00	1.00	1.00	
	Specify alternate "n"						
	Manning "n" (dim)	0.030	0.000	0.000	0.000	0.000	
	Drop (ft)	5	0	0	0	0	0 feet drop
	Slope (ft/ft)	0.0167	0.0000	0.0000	0.0000	0.0000	
	Slope (%)	1.67	0.00	0.00	0.00	0.00	
	Flow Area (sq ft)	102.00	1.00	2.00	2.00	2.00	
	Wet Perimeter (ft)	43.97	2.83	3.83	3.83	3.83	
	Hydraulic Radius (ft)	2.32	0.35	0.52	0.52	0.52	
	Velocity (fps)						
	Normal Flow (cfs)						
selected>>	Travel Time (mins)						0.0 mins travel

Open Channel Pipe Flow

							Total
	Select (0 or 1)	1	0	0	0	0	1 segments
	Length (ft)	300	1	1	1	1	300 feet length
	Top Elevation (ft)	1393	1	1	1	1	
	Bottom Elevation (ft)	1388	1	1	1	1	
	Pipe Material	0.012, Smooth concrete	Choose Material Type	Choose Material Type	Choose Material Type	Choose Material Type	
	Diameter (ins)	36.00	1.00	1.00	1.00	1.00	
	Flow Depth (ins)	36.00	1.00	1.00	1.00	1.00	
	Specify alternate "n"						
	Manning "n" (dim)	0.012	0.000	0.000	0.000	0.000	
	Drop (ft)	5	0	0	0	0	5 feet drop
	Slope (ft/ft)	0.0167	0.0000	0.0000	0.0000	0.0000	
	Slope (%)	1.67	0.00	0.00	0.00	0.00	
	Theta (radians)	6.283	6.283	6.283	6.283	6.283	
	Flow Area (sq ft)	7.07	0.01	0.01	0.01	0.01	
	Wet Perimeter (ft)	9.42	0.26	0.26	0.26	0.26	
	Hydraulic Radius (ft)	0.75	0.02	0.02	0.02	0.02	
	Velocity (fps)	13.23					
	Normal Flow (cfs)	93.5					
	Travel Time (mins)	0.38					0.4 mins travel

Open Channel General Flow

							Total
	Select (0 or 1)	0	0	0	0	0	0 segments
	Length (ft)	150	1	1	1	1	0 feet length
	Top Elevation (ft)	30	1	1	1	1	
	Bottom Elevation (ft)	26	1	1	1	1	
	Hydraulic Radius (ft)	2.30	1.00	1.00	1.00	1.00	
	Channel Lining	0.025, Clean Earth	Choose Cover Type	Choose Cover Type	Choose Cover Type	Choose Cover Type	
	Specify alternate "n"						
	Manning "n" (dim)	0.025	0.000	0.000	0.000	0.000	
	Drop (ft)	4	0	0	0	0	0 feet drop
	Slope (ft/ft)	0.0267	0.0000	0.0000	0.0000	0.0000	
	Slope (%)	2.67	0.00	0.00	0.00	0.00	
	Velocity (fps)						
	Travel Time (mins)						0.0 mins travel

Other (Computed Separately)

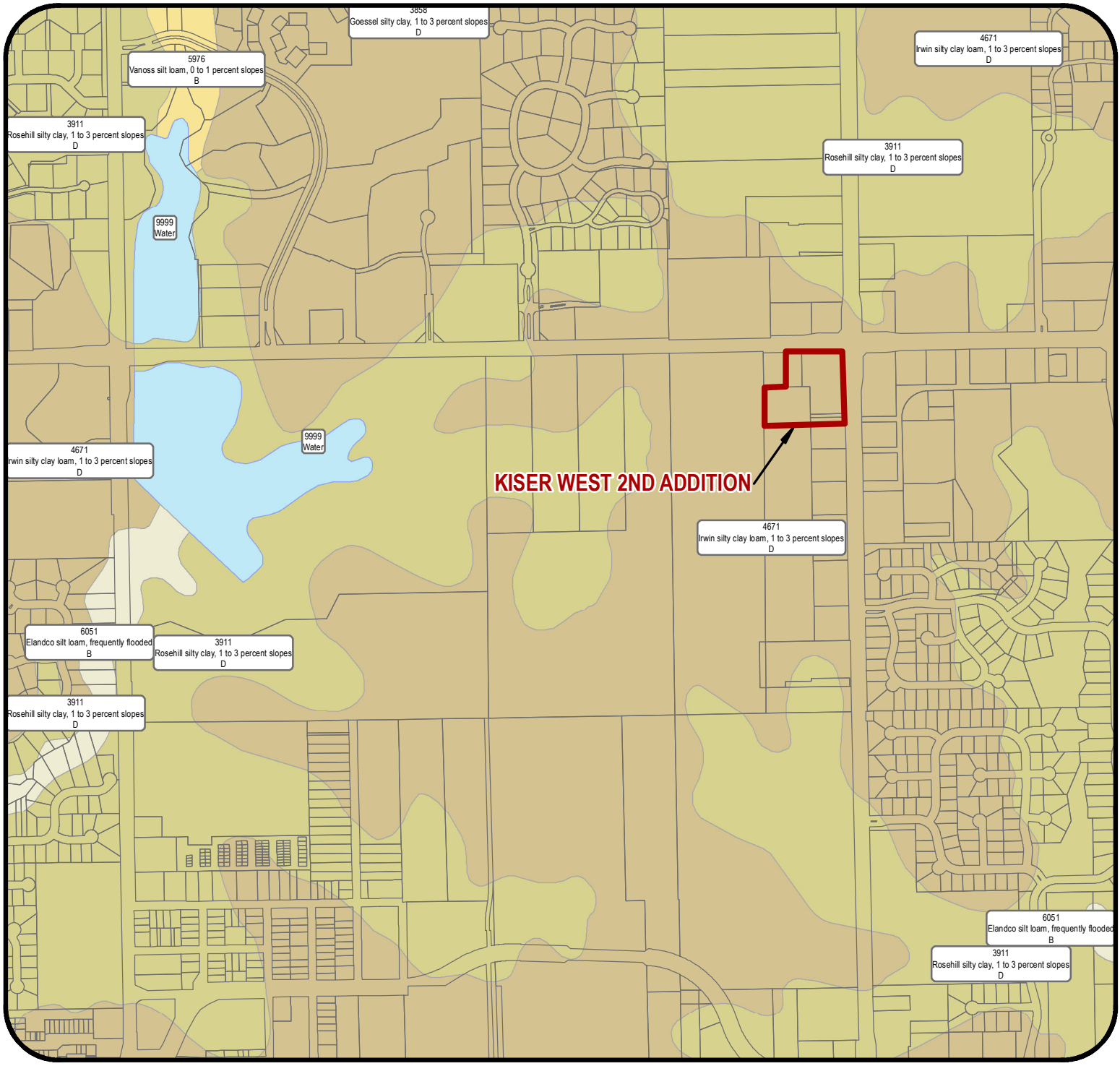
						Total
Select (0 or 1)	0	0	0	0	0	0 segments
Length (ft)	500	1	1	1	1	0 feet length
Drop (ft)	10	1	1	1	1	0 feet drop
Velocity (fps)	2.00	1.00	1.00	1.00	1.00	
Slope (ft/ft)	0.0200	1.0000	1.0000	1.0000	1.0000	
Slope (%)	2.00	100.00	100.00	100.00	100.00	
Travel Time (mins)						0.0 mins travel

Total for Subbasin

Segments	3
Length (ft)	700
Drop (ft)	13
Slope (ft/ft)	0.0186

Appendix 2.4

Soil Survey



1 0.5 0 Miles

1,000 500 0 1,000 2,000 3,000 Feet

1 0.5 0 Kilometers

N W E S

Kiser West Second Addition
Project Name:

Soil Survey - Sedgwick County, KS
Sheet Title:

MKEC

CMJ	May 2011
Drawn By:	Date:
KLA/GJA	10514
Design / Review:	Job No.:

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Tab 3. Proposed Conditions

Datum

The site is shown in NAVD 88 datum.

Drainage Patterns

The site will continue to drain from southwest to northeast. The storm sewer layout on site will need to accommodate offsite flows from the south and west. The proposed conditions are shown on the Proposed Conditions Drainage Map, Appendix 3.1.

Groundwater Elevations

Existing groundwater elevations in the surrounding area are approximately 20-60 feet deep according to the Kansas Water Well Database.

Utilities

Water

Water service is provided by the existing 16" water line near the northeast corner of the site.

Sanitary Sewer

Sanitary sewer service is provided by the existing sewer lines along the north and east sides of the development.

Stormwater

Onsite stormwater sewer will tie into the existing systems along the north and east boundaries of the property. Exact location will be determined when the site layout is determined.

Hydrologic Analysis

The site was modeled using the NRCS Unit Hydrograph Method in Hydraflow Hydrographs, Appendix 2.2.

Rainfall

Rainfall depths were taken from the City of Wichita/Sedgwick County Stormwater Manual, Volume 2, Section 4.2. Table 2.1 shows the rainfall depths used for each storm.

Table 3.1. Point Rainfall Depths for 24-hour Design Storms.

Description	Rainfall Depth (inches)						
	1-Yr	2-Yr	5-Yr	10-Yr	25-Yr	50-Yr	100-Yr
Sedgwick County	2.8	3.5	4.5	5.2	6.1	6.9	7.8

Soil Type

The following soil types are located on:

- Irwin Silty Clay Loam, 1 to 3 percent slopes, HSG "D"

The soil type for use in selecting runoff curve numbers for this site is Hydraulic Soil Group "D." The site is shown on the soil survey, Appendix 2.4.

Land Use

The following land uses are located on site:

- Commercial

Impervious Areas

Under proposed conditions, there are approximately 5.1 acres of impervious area on site. This is based on commercial land use having an average impervious area of 85%. The actual impervious area could be higher or lower depending on final site design.

Curve Number

The Curve Numbers (CN) used in calculations were calculated using the NRCS method A curve number of 96.5 was calculated for the developed basin for a commercial land use that is 85% impervious. The CN values were calculated using the methods set forth in the City of Wichita/Sedgwick County Stormwater Manual, Volume 2, Section 4.3.

Time of Concentration

The time of concentration was calculated using the SCS and FHWA methods as described in the City of Wichita/Sedgwick County Stormwater Manual, Volume 2, Section 4.4. The time of concentration is the sum of sheet flow, shallow concentrated flow, and channel flow. The flow paths are shown on the Existing Conditions Drainage Map, Appendix 2.1. Calculations for each basin were done in an excel spreadsheet, Appendix 2.2.

Basin Summary

The site and offsite areas will continue to flow from southwest to northeast. The site will be designed to convey offsite runoff to the northeast. As are the existing conditions, any flow that cannot be conveyed by the storm water sewer system along 13th Street and Greenwich Road will be conveyed to the north through Greenwich Road. This flow will be conveyed in the curb and gutter within the outside traffic lanes. The existing pipe system was designed to convey the 5-year design storm, which requires these lanes to convey those storms greater than the 5-year storm. Flows leaving the site have been decreased by use of the proposed detention pond.

Table 3.2. Proposed Conditions Basin Information.

Basin	Area (ac)	CN	T_c (min.)	1-Yr	2-Yr	5-Yr	10-Yr	25-Yr	50-Yr	100-Yr
Off Site Flow (cfs)	8.2	84.0	22.1	11.7	16.7	24.8	30.2	38.3	44.6	50.0
On Site Flow (cfs)	6.0	96.5	3.3	24.6	30.7	40.9	47.4	57.1	64.4	70.9
Flow To 13th & Greenwich	14.2	n/a	n/a	7.8	18.1	36.1	49.7	68.1	80.5	90.6
Volume of Detention (ac-ft)	n/a	n/a	n/a	0.8	0.9	1.0	1.1	1.2	1.3	1.3

Stormwater Quality Management

Stormwater Quality Volume has been calculated using a spreadsheet, Appendix 3.3. The water quality volume was calculated to be 0.5 acre-feet. The location of the stormwater quality volume will be addressed when the final site layout is determined. At this time the plan for the proposed layout has not been determine and the location of Water Quality measures is not known.

Stormwater Quantity Management

Stormwater Quantity and Channel Protection Volume has been calculated using a spreadsheet, Appendix 3.4. The Channel Protection Volume was calculated to be 0.8 acre-feet of detention for the site. At this time the plan for the proposed layout has not been determine and the location of detention facilities is not known.

Appendix 3.1

Proposed Conditions Drainage Map

LEGEND

- CON - 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
- SECTION CORNER
- BM - BENCHMARK
- EASEMENT
- BUILDING SETBACK
- FENCE
- STORM SEWER PIPE
- WATER LINE
- SANITARY SEWER LINE
- GAS LINE
- GAS PIPELINE
- TELEPHONE LINE
- UGE - UNDERGROUND ELEC.
- OHE - OVERHEAD ELECTRIC
- FOC - FIBER OPTIC CABLE
- DRAINAGE SUB BASIN
- DRAINAGE BASIN
- FLOW ARROW
- A17 - AREA FOR SWS SIZING
- 1395.3 - SPOT ELEVATION
- FLOW PATH

N

SCALE: 1" = 100'

100 0 100 200

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

KISER WEST 2ND ADDITION

WICHITA, KANSAS

PROPOSED CONDITIONS

DATE: May 11

REVISED

DESIGN BY: KLA

DRAWN BY: CMJ

CHECKED BY: GJA

SHEET NUMBER: 1

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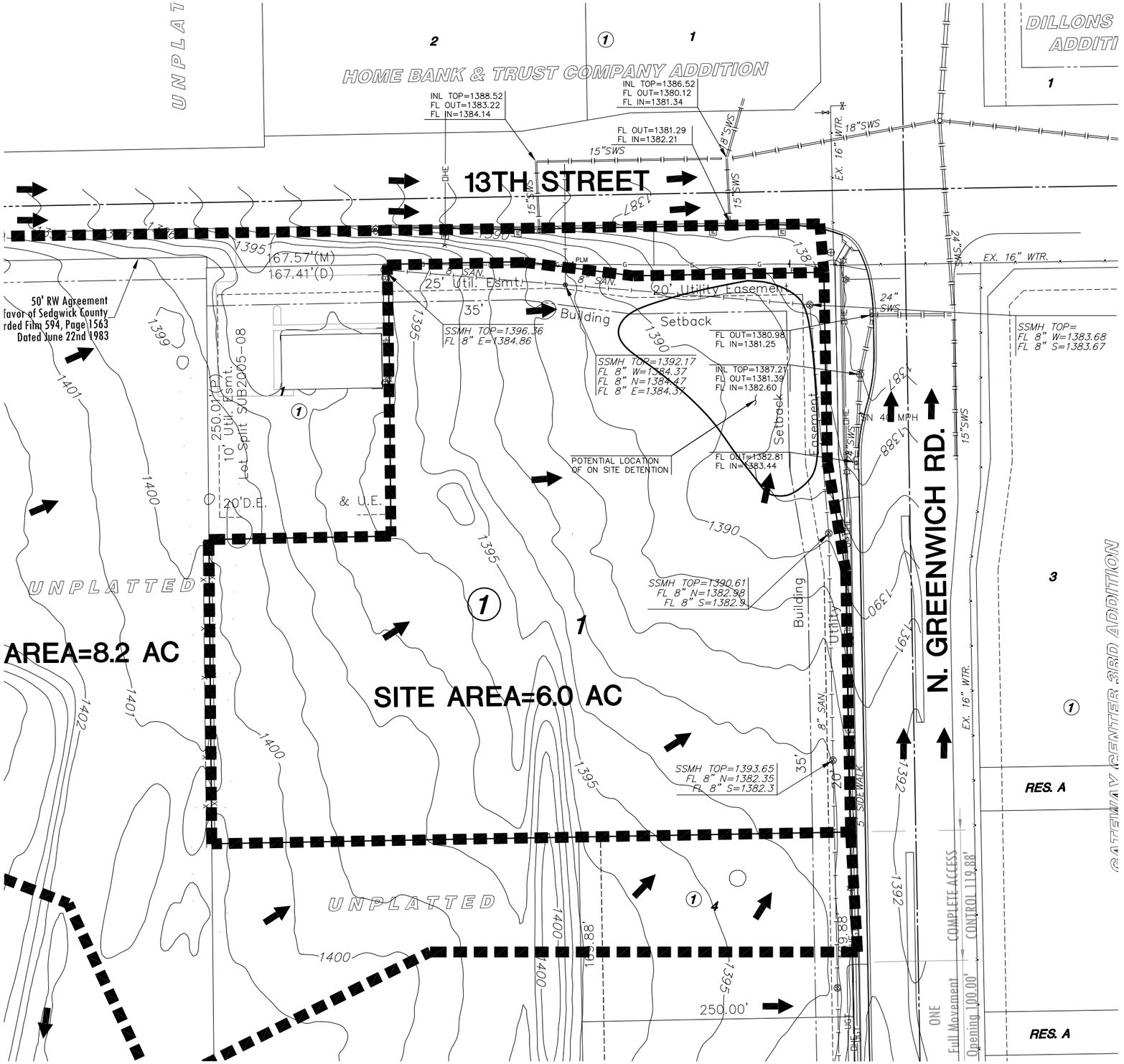
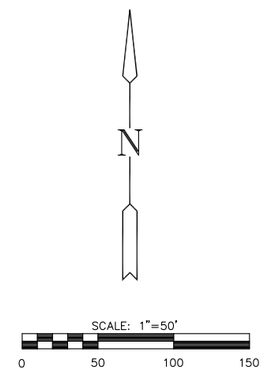
Appendix 3.2

Drainage and Utility Plan



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
- GAS PIPELINE
- TELEPHONE LINE
- UGT - UNDERGROUND ELEC.
- OHE - OVERHEAD ELECTRIC
- FOC - FIBER OPTIC CABLE
- DRAINAGE SUB BASIN
- DRAINAGE BASIN
- FLOW ARROW
- A17 - AREA FOR SWS SIZING



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

KISER WEST 2ND ADDITION

WICHITA, KANSAS

DRAINAGE PLAN

DATE: May 11

REVISED

DESIGN BY: KLA

DRAWN BY: CMJ

CHECKED BY: GJA

SHEET NUMBER: 1

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Appendix 3.3

Water Quality Calculations

Water Quality Calculations

	Hydrologic Soil Group			
Land Use	A	B	C	D
Undisturbed	0.02	0.03	0.04	0.05
Disturbed Pervious	0.15	0.2	0.22	0.25
Impervious Cover	0.95	0.95	0.95	0.95

Table from pg 4-44

P = 1.2 Per pg. 4-43

Site Information

Area impervious	5.1	ac
Area disturbed pervious	0.9	ac
Area undisturbed	0.00	ac
Total Area	6	ac
HSG	D	
R_v =	0.85	
WQ_v =	0.51	ac - ft
Q_{wv} =	1.01	in

Eq 4-24, pg 4-43

Eq 4-25, pg 4-44

Eq 4-26, Pg 4-44

HSG = Hydrologic Soil Group

WQ_v = water quality protection volume (acre-feet)

P = rainfall depth (in)

R_v = volumetric runoff coefficient

Q_{wv} = water quality protection volume (inches)

Appendix 3.4

Channel Protection Volume Calculations

Channel Protection Calculations

P =	2.80	in		
R_v =	0.85			From WQv Tab
A =	6.00	ac		Site Area
FP =	1.00			From Table 4-10
Q_{wv} =	2.37	in	$P*R_v$	pg 4-44
CN =	96.10			pg 4-45
S =	0.41			pg 4-46
I_a =	0.08	in		pg 4-46
I_a/P =	0.03			
Tc=	3.00	min.		From other calculations
Tc=	0.05	hours		
q_u =	1000	$cfs/mi^2/in$		From Figure 4-6, pg 4-24 need tc
Q_{wq} =	22.18	cfs	q_u*A*Q_{wv}	pg. 4-47
Q =	2.37	in		pg 4-26
Q_p =	22.18	cfs	$q_u*A*Q*F_p$	equation 4-18; pg 4-22
q_o/q_i =	0.02			From Figure 4-17
V_s/V_r =	0.65			From Figure 4-18 or equation on pg 4-51
$V_s = CP_v$ =	0.77	ac-ft		pg 4-52

P =	Rainfall Depth (in)
Rv =	volumetric runoff coefficient
A =	Area (acres)
FP =	Pond and Swamp Adjustment Factors
Qwv =	water quality protection volume (inches)
CN	Curve Number
S	pg 4-4
Ia	pg 4-4
qu =	Unit peak discharge
Qwq =	water quality peak flow (cfs)
Q	Excess Rainfall Depth (in)
Qp =	Peak Discharge (cfs)
qo/qi =	Ratio of Outflow to Inflow
Vs/Vr =	Ration of Storage Volume to Runoff Volume

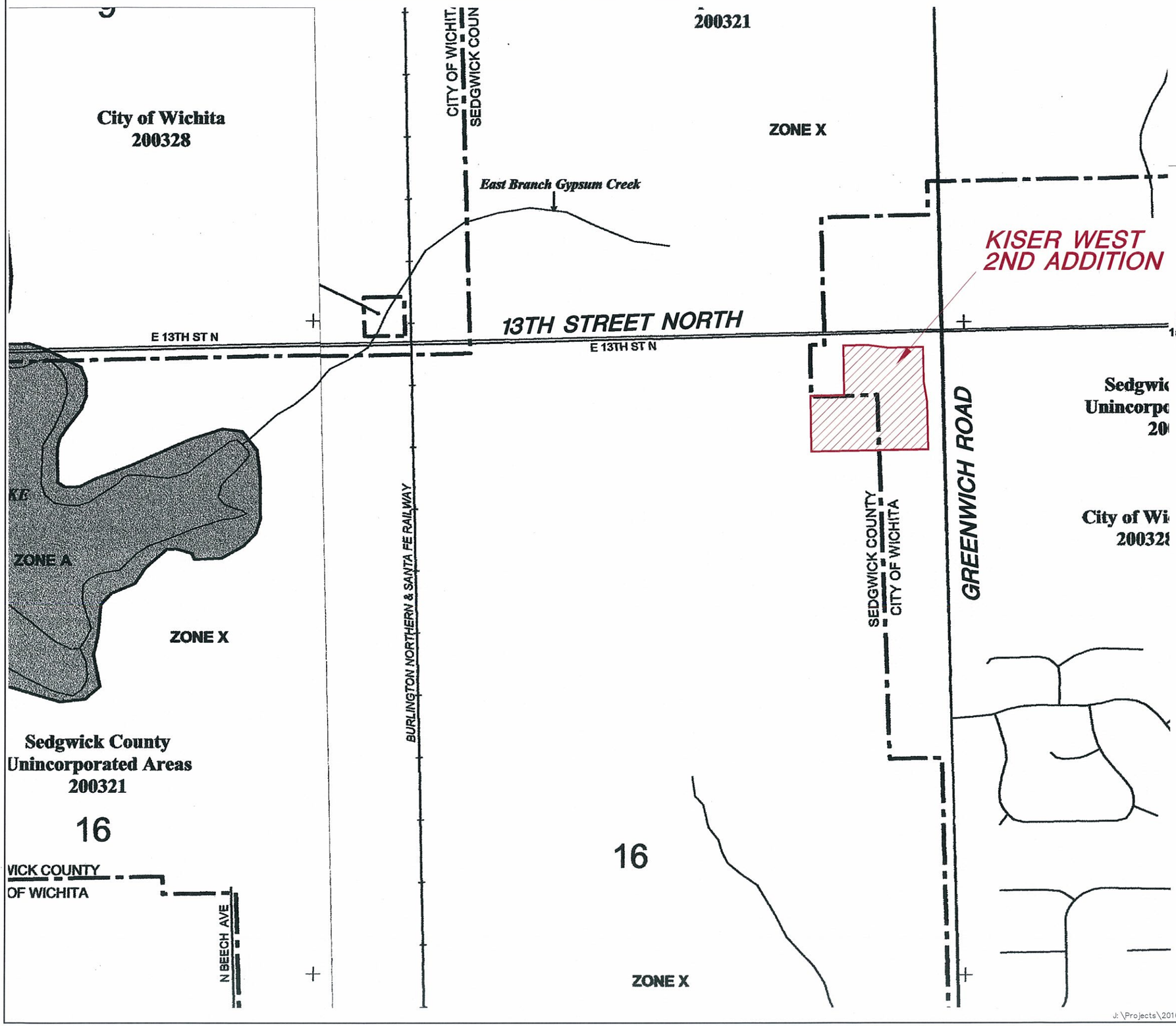
Tab 4. Floodplains

FEMA FIRM

The site is in Zone X according to FIRM panel 20173C0379E, Appendix 4.1. The nearest floodplain is approximately ¾ mile west of the site.

Appendix 4.1

Flood Insurance Rate Map (FIRM)



NFIP

PANEL 0379E

FIRM

FLOOD INSURANCE RATE MAP

SEDGWICK COUNTY, KANSAS AND INCORPORATED AREAS

PANEL 379 OF 700

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
SEDGWICK COUNTY	200321	0379	E
WICHITA, CITY OF	200328	0379	E

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

MAP NUMBER
20173C0379E

EFFECTIVE DATE
FEBRUARY 2, 2007

Federal Emergency Management Agency

NATIONAL FLOOD INSURANCE PROGRAM

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

KISER WEST 2ND ADDITION

WICHITA, KANSAS

FIRM MAP

DATE
MAY 2011

REVISED

DESIGN BY
KLA

DRAWN BY
CMJ

CHECKED BY
GJA

SHEET NUMBER
1

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