Drainage Report

Wichita Destination Development,

To Wichita, Sedgwick County, Kansas

April, 2014

KEMILLER ENGINEERING PA

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Wichita, Kansas 67202
(316) 264-0242

Tab 1
Drainage Report

Drainage Plan Submittal Checklist
Drainage Report
Preliminary Plat
Aerial/Location Map
USGS Map with Area Highlighted

Tab 2:

Previous Studies
Existing Drainage Map

Tab 3:

Proposed Drainage Plan
Hydrological Calculations and Output
Water Quality Volume Calculations

Tab 4:

FIRM Panel

Tab 5:

Federal and Local Permits

Tab 6: Proposed Drainage Plan
Electronic Copy of Report

Tab 1

Drainage Plan Submittal Checklist
Drainage Report
Preliminary Plat
Aerial Photograph/Location Map
USGS map with area highlighted

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:	Wichita Destination Development				
Total Area of Project:	104.7± **acres**				
Development Type:	LI	**Other:**			
Developer Name:		**Contact:**		**Phone:**	
Email:					
Engineer Name:	Kirk Miller	**Contact:**	117 E Lewis	**Phone:**	(316)264 0242
Email:	kirk@kemiller.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	Tab 1.
1.2	Professional Engineer's seal, signature and date on plan cover.	Yes	Cover page of report.
1.3	Site location map, using color ortho-imagery and showing the project boundaries, a north arrow and an accurate scale.	Yes	Tab 1: aerial/location map.
1.4	Narrative of the development type, existing conditions and proposed impacts on stormwater runoff, wetlands, riparian zones and floodplains/floodways.	Yes	Tab 1: report. Tab 2: existing drainage map shows the existing site condition.
1.5	Discussion of off-site conditions surrounding the proposed development.	Yes	Tab 1: report.
1.6	Summary table of runoff calculations (pre/post development).	Yes	Tab 2: existing drainage map.
1.7	Narrative description of the type and function of the permanent structural stormwater management facilities.	Yes	Tab 1: report.
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	Tab 2: existing drainage map. (Topography in relation to NAVD 88 datum)
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	Tab 2: as labeled in existing drainage map.
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	Tab 2: as labeled in existing drainage map.
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	Tab 2: as shown in existing drainage map.
2.1.5	Location, dimensions and elevations of existing bridges and culvert crossings.	No	Tab 2: as shown in existing drainage map.
2.1.6	Location of existing utilities (e.g., water, sewer, gas, electric, cable, etc.) with labels and easement boundaries.	Yes	Tab 2: as shown in existing drainage map.
2.1.7	Groundwater elevations, if applicable.	No	Not applicable.
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	Tab 1 report. Tab 2: existing drainage map.
2.1.9	Land use types per NRCS nomenclature.	No	Not applicable as the land is already developed.
2.1.10	Footprint of existing impervious areas (labeled, area given in acres).	No	Not applicable. Entire site covered by grass.
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	Tab 2 : existing drainage map.
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	Tab 2: existing drainage plan. Undeveloped Tc calculation is shown in existing drainage map with flow paths with existing flow condition.
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	Tab 2: existing drainage map/report.
2.2.2	A summary table of drainage subbasin hydrologic parameters (subbasin ID, area in acres, curve number, Tc, etc.).	Yes	Tab 2: existing drainage map.
2.2.3	Table of existing condition runoff curve numbers with supporting data and calculations.	Yes	Tab 2: existing drainage map.
2.2.4	Table of existing condition times of concentration with supporting data and calculations.	Yes	Tab 2: existing drainage map.
2.2.5	A summary table of rainfall data used in the hydrologic analysis, and a reference for the source of the data.	Yes	Tab 2: existing drainage map.
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.	No	N/A
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	Hydrologic analysis for existing condition is included in existing drainage map. Supporting data, assumed conditions and calculations can be found in drainage plan.
3.0	**postdevelopment Conditions Information**		
3.1	**postdevelopment Conditions Drainage Map**		
3.1.1	Proposed project boundary.	Yes	Tab 3: Proposed drainage plan.
3.1.2	on-site and off-site topography: NAVD 88 datum, one-foot contours with spot elevations.	Yes	Tab 3: Proposed drainage plan/preliminary plat
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	Tab 3: Proposed drainage plan.
3.1.4	Location and description of off-site through-drainage conveyances which are confined to an easement, dedication and/or reserve.	No	N/A.
3.1.5	Footprint of proposed impervious areas, including roads, parking lots, buildings and other structures.	No	N/A. Assumed for analysis. Site plan has not been presented.
3.1.6	Location of proposed utilities (e.g., water, sewer, gas, electric, cable, etc.) with labels and easement boundaries.	No	N/A.
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	HSG for surface soil based on City of Wichita soil group map is included in proposed drainage plan/report.
3.1.8	Land use cover per NRCS nomenclature.	No	N/A.
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	Tab 3: Proposed drainage plan.
3.1.10	Proposed limits of land disturbing activity (i.e., grading limits).	Yes	Tab 3: Proposed drainage plan.
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	Developed drainage plan. Proposed Tc calculation described in proposed drainage plan attached in tab 3.
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	Tab 3: Proposed drainage plan.
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	Tab 3: Proposed drainage plan.
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.	No	Not applicable as the site is less than 40 acre.
3.2.4	Location(s) of stormwater management facilities and any associated drainage easements.	No	Tab 3: Proposed drainage plan.
3.2.5	Proposed energy dissipaters and other channel protection devices.	No	Not applicable as no channel protection devices needed.
3.2.6	Location(s) and dimension(s) of proposed channel, bridge and culvert crossings.	No	N/A.
3.2.7	Normal pool and 100-year pool elevations for ponds and lakes.	Yes	Tab 3: refer table in proposed drainage plan.
3.2.8	Permanent concrete outfall control structure(s) for ponds.	No	Tab 3: Called out in proposed drainage plan.
3.2.9	Emergency overflow spillways and top of berm elevations for ponds and other volume/peak discharge control facilities.	No	Tab 3: Proposed drainage plan. To the creek.
3.2.10	Floodplains, ponds, and stormwater management facilities located in reserves.	No	Tab 3: Proposed drainage plan.
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	Report/Proposed drainage plan.

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	Tab 3: Proposed drainage plan.
3.3.3	Table of postdevelopment condition runoff curve numbers with supporting data and calculations.	Yes	Tab 3: Proposed drainage plan.
3.3.4	Table of postdevelopment condition times of concentration with supporting data and calculations.	Yes	Tab 3: Proposed drainage plan.
3.3.5	Cross-sections and other diagrams of existing open channels, bridge and culvert sections and other hydraulic features as	No	N/A.
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	Tab 3: Proposed drainage plan.
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.	No	Not applicable as the post peak less than or approx. equal to existing peak.
3.3.8	Stage-storage-discharge or other outlet rating curves and inflow/outflow hydrographs for all ponds.	Yes	Tab 3: Hydrologic analysis.
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	Tab 3: Proposed drainage plan.
3.3.10	Demonstrate that all ponds have one foot of freeboard above the 100-year, 24-hour high water level.	Yes	Tab 3: Proposed drainage plan.
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	Tab 3: Proposed drainage plan. The detail of outlet structure is included in drainage plan.
3.4	**Stormwater Quantity Control Sizing**		
3.4.1	Hydraulic sizing calculations for all stormwater management controls.	Yes	Tab 3: Hydrologic analysis, proposed drainage plan.
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	Tab 3: Hydrologic analysis, proposed drainage plan.
3.4.3	Typical details (including cross-sections where applicable) for outlet structures, embankments, spillways, grade control structures, conveyance channels, etc.	No	N/A.
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.	No	N/A.
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.).	No	N/A. Info is not available.
3.5.3	Water quality volume (total and by facility), with supporting data and calculations.	Yes	Tab 3: Proposed drainage plan.
3.5.4	% TSS removal value (total and by facility) with supporting data and calculation. Must be equal to or greater than 80%.	No	N/A. Info is not available.
3.5.5	Channel protection volume with supporting data and calculations.	No	N/A.
3.5.6	Water quality volume and channel protection volume orifice size calculations.	No	N/A.
3.5.7	Other calculations required for each stormwater management facility as specified in the Wichita/Sedgwick County Stormwater Manual.	No	Not applicable.
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.	No	N/A.
4.0	**Floodplains**		
4.1	Reference the source of flood profile, floodplain, floodway and stream discharge information.	Yes	Site is partially in floodplain and the FIRM Panel # is referenced in drainage plan.
4.2	Delineation of nearest base flood elevations.	No	The 100 yr WS is stated in proposed drainage plan.
4.3	Delineation of predevelopment regulatory floodplain/floodway limits using FEMA's current GIS database; limits to be per elevation and scaled location.	No	Not applicable for this site.
4.4	Delineation of postdevelopment regulatory floodplain/floodway limits; limits to be per elevation and scaled location, with project limits shown.	No	Not applicable for this site.
4.5	Floodway data table and discharges.	No	Not applicable for this site.
4.6	Hydrologic and hydraulic study information for local floodplain analysis, unnumbered Zone A elevation determinations and floodplain map revisions or required permits.	Yes	Stated in proposed drainage plan.
4.7	Regulatory floodway and four natural profile models (10, 50, 100 and 500-year) for existing and postdevelopment conditions.	No	Info not available.
4.8	Floodplains and floodways located within a reserve, where necessary.	Yes	Tab 3: Proposed drainage plan.
4.9	Floodplain cut and fill calculations for volume sensitive basins.	Yes	Stated in proposed drainage plan.

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").	No	Not applicable as flood detention is considered for this site.
5.0	**Federal, State and Local Permits**		
5.1	US Army Corps of Engineers regulatory program permits (Section 404 permit)	No	Under process of application. Will be presented to city at later date.
5.2	Kansas Department of Agriculture - Division of Water Resources Permits (Stream Obstruction, Channel Change, Floodplain Fill, Levee, Water Appropriations, Dam Safety permit, etc.).	No	Not applicable at this time.
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.	No	Not applicable for this site.
6.0	**Half Scale Preliminary Master Grading Plan**		
6.1	One set of plans and associated PDF of plans.	Yes	Overall Grading plan is attached.
6.2	Professional Engineer's seal, signature and date.	Yes	Seal is included in cover page of report.
6.3	Title block including subdivision name and phase and dated revision documentation.	Yes	Included.
6.4	Future phases shown but cross-hatched as information only.	No	Included.
6.5	Scale, not greater than 1-inch = 60 feet.	Yes	
6.6	North arrow.	Yes	Sown on all the plans.
6.7	Index or legend key.	Yes	
6.8	Benchmarks (minimum of 2) used for site control (NAVD 88 vertical datum).	Yes	NAVD 88 Datum.
6.9	Existing contours of entire site with contour interval of one foot.	Yes	Included
6.10	Proposed contours for channels, ponds, and other permanent stormwater management facilities, with contour interval of one foot.	Yes	Proposed Drainage Plan/Grading Plan.
6.11	Spot elevations shown to the nearest tenth of a foot for critical locations, including lot and property boundaries.	Yes	Drainage Plan.
6.12	Proposed lot and street layout.	Yes	Plat/Drainage Plan/Grading Plan.
6.13	Locations of underground storm drains.	Yes	Drainage Plan/Grading Plan.
6.14	Overflow locations for storms exceeding storm drain capacity, with elevations.	Yes	Drainage Plan/Grading Plan.
6.15	Top elevations of storm drains at all inlets, manholes, and flow line elevations for all outfalls.	Yes	Drainage Plan/Grading Plan.
6.16	Locations of open ditches and lakes.	Yes	Drainage Plan/Grading Plan.
6.17	Flow direction arrows.	Yes	Drainage Plan/Grading Plan.
6.18	Proposed flow line elevations of all open ditches at maximum 100 foot intervals, and 100-year flood elevations thereon.	Yes	Drainage Plan/Grading Plan.
6.19	Ponds: Location, bottom elevation, normal pool elevation, 100-year flood elevation, emergency overflow elevation.	Yes	Drainage Plan/Grading Plan.
6.20	Proposed top-of-curb elevations at points where drainage will be required to flow over the curb.	No	Not applicable for this site.
6.21	Platted minimum building opening elevation for each lot, in table form for all lots (excluding basement floor elevations).	Yes	Preliminary Plat.
6.22	Standard foundation and elevation detail for slab on grade, full basement, view-out, partial view-out and/or walk-out construction.	No	Not applicable for this site.
6.23	Top of foundation elevation for each lot.	No	Not applicable for this site.
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	Not applicable for this site.
6.25	Indicate that all lots are above the 100-year flood elevation.	Yes	Proposed Drainage Plan/Grading Plan.
6.26	Indicate that grading around structures conforms to perimeter drainage requirements.	Yes	Proposed Drainage Plan/Grading Plan.
6.27	Indicate that backyard drainage grading conforms to backyard drainage requirements.	Yes	Proposed Drainage Plan/Grading Plan.
6.28	Adjacent subdivision lot lines, with lot labels and subdivision names.	Yes	Preliminary plat/ Proposed drainage plan.
6.29	Boundaries and labels for all easements, rights-of-way and reserves.	Yes	Preliminary/final plat.
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	Included in final plat.
End of Checklist			

Drainage Report
Wichita Destination Development

Introduction

The subject property is located at the Northeast corner of Kansas highway 96 and Greenwich Road. The tract of land is bounded by Greenwich Road on West, 27th St. N on North and K-96 on South. There is residential subdivision on the east side. The proposed development is in the west half of the Section 3, Township 27 South, Range 2 East of the 6th Principal Meridian. The site is undeveloped and mostly covered by grass. The total tract of land is approximately 104.70 acres and is currently zoned as limited industrial (CUP DP-333). The proposed use of the land is to develop as a commercial site with addition of buildings, parking lots and other facilities for commercial use.

There is previous drainage study exists for this site. The intent of this drainage report is to comply with previous drainage report for the reconfigured reserves and detention basins. The name and area of the offsite drainage sub-basins are kept same for the uniformity except onsite sub-basin are divided in to number of sub-basins.

Current Conditions and Background

The site is served by city of Wichita utilities. The entire site is covered by grass and drains through culverts at two different locations under K-96. There is previous drainage study exist for the proposed land. Approximately 62.7 acres of west property is part of the west basin which drains through the 2-6'X3' culverts. Approximately 47.1 acres of the east property is part of East basin drains through the 2-48" RCPs in existing condition.

The hydrological soil survey map indicates that the entire land is composed of soil group D. The existing drainage pattern indicates that the entire property drains to the south and concentrates at two different locations. The average slope of the ground varies from 1% to 3%.

The drainage structures under K-96 are not big enough to convey 100-year runoff in existing condition as discussed in previous drainage report. As previous record indicated, capacity of drainage structures under K-96 dictates the peak release rate from every site contributing to drainage basin.

There is no established floodplain or flood boundary for this site or the site is not in any FEMA designated 100-yr floodplain. The FIRM panel is attached for reference (panel # 377, map # 20173C0377E).

Offsite Drainage:

West Basin

There are offsite areas from the north and west of the proposed development drains through the west area of the property and there are north and east offsite areas drains through the east property as shown in previous drainage report as attached. There is 60" RCP that conveys the runoff from Greenwich road and areas west of Greenwich road to the subject property. Two 15" RCPs from GBC reserve also conveys runoff to the proposed west part of the property. There is a grass channel to convey the runoff from 60" and two 15" RCPs to the drainage structures at K-96.

East Basin

There is 15" CMP that conveys the runoff from Fairmont reserve on the east part of proposed development. The existing swale/ditch conveys the runoff from the north (GBC Area) to the east part of proposed development.

The attached existing drainage map shows existing features including contours, utilities, and other features. The preliminary plat and existing drainage map show the existing utilities, contours, lot layouts, and proposed easements. The existing drainage attached in tab 2.

Proposed Improvements

The proposed improvement is to develop into a commercial area with zoning Limited Industrial (LI) which will include buildings, parking lots, driveways, road and other facilities for commercial use. The layout of the site can be found in tab 3.

The west sub-basin of west basin mainly consists of retail stores, and restaurants. This sub-basin also takes the offsite runoff from north and east of the property. The offsite runoff will be first detained in proposed north onsite detention basin to accommodate part of the over detention as dictated by size of culverts at K-96. Series of detention/retention ponds are proposed along the south property line to achieve the required onsite detention.

The east sub-basin also consists of retail stores and commercial buildings. The offsite along with the onsite runoff will be detained in proposed onsite detention basin to accommodate the detention requirement. The proposed detention basin is located at the southeast corner of the property. The detention basin is sized to share the over detention from proposed development and allowed to convey the offsite drainage through it. Some of the contributing basins are not developed yet so it is expected to overflow drain towards Greenwich road. The 2-48" RCPS under K-96 will operate at capacity when proposed site and contributing basins are fully developed and the offsite detention basins are built.

Site Hydrological Analysis

Existing and proposed site runoff calculations have been modeled using the SCS Curve Number (CN) method for Type II rainfall distribution. The Values for Curve Number (CN) and Rainfall Depth were established using the *City of Wichita/Sedgwick County Stormwater Manual.* Existing times of concentration were calculated from existing ground conditions and can be found in tab 2. Proposed times of concentration have been modeled using the assumed developed site condition.

Flow generated on and passing through the site from offsite sources was modeled using the US Army Corps of Engineers' Hydrologic Engineering Center's Hydrologic Modeling System (HEC-HMS 3.5) software. The loss method selected was the NRCS Curve Number (CN) method and the synthetic hydrograph selected was the NRCS Unit Hydrograph. The curve number used in the model for the site's disturbed pervious surfaces in Group D soils was 88 as stipulated in Section 4.8, Chapter 4, Volume 2 of the City of Wichita Stormwater Manual. The loss for impervious surfaces was based on the percentage method rather than on a composite CN, as prescribed in Chapter 7 of the HECHMS User's Manual.

The initial abstraction was permitted to be determined by the model based on CN = 88. The transform method used was the NRCS Unit Hydrograph Transform or Lag Time (T_l) based on 60% of the Time of Concentration (T_c) as determined using NRCS methods.

Greenwich West Drainage Basin Description

The west drainage basin (Basin E) of the 109.8 acre (0.1716 square mile) Greenwich North Development is a 62.7 acre (0.098 square mile) fraction of a 191.06 acre (0.2985 square mile) watershed tributary to twin 6 ft. x 3 ft. reinforced concrete box culverts (RCB) under Kansas Highway K-96 located approximately 250 ft. east of the southwest corner of the site. The 128.34 acre (0.2005 square mile) offsite fraction of the watershed drains to the site through a 60 in. diameter Reinforced Concrete Pipe (RCP) under 27th Street located approximately 650 ft. east of the northwest corner of the site. The offsite fraction of the watershed is a mix of developed property and property proposed for development, which are or will be subject to City of Wichita – Sedgwick County storm water management controls. Therefore offsite flow through the site has been modeled assuming such controls are in place. Development in the west drainage basin of the site will be predominately commercial (office/retail) in nature. Storm water management controls in the basin, operating in conjunction with the offsite controls, will limit the 100 year storm peak discharge at the K-96 twin culverts to at or under the predevelopment flow of **226.8 cfs.**

West Basin Sub-basins

As can be seen in the drainage map (Tab 3), the west basin is divided into six sub-basins labeled E-1 through E-6 as described below:

Sub-basin E-1 is a 21.35 acre (0.0334 square mile) tributary to a 3.63 acre detention pond labeled North Reservoir, which is also tributary to the offsite drainage areas north of 27th Street. Its onsite constituents are 9.5 acres of commercial property (85% impervious) south of the reservoir, 11.66 acres of future commercial development (85% impervious) east of the reservoir (100% impervious). The sub-basin's total impervious surface including the 15% portions of the commercial tracts is approximately 85%. The time of concentration based on flow originating in the pervious, grassy golf course surface is 20 minutes with a corresponding lag time of 12 minutes (Tab 3).

Sub-basin E-2 is a 9.8 acre (0.0153 square mile) tract in the southeastern portion of the West Basin, which includes commercial and public street (Woodspring Street) areas. It is directly tributary to the K-96 twin RCB culvert and does not pass through detention. It was modeled assuming 85% impervious surface with a CN of 88 for the pervious rights of way and landscaped areas. It's time of concentration originating in pervious, grassy parkway is 12.79 minutes with a corresponding lag time of 7.67 (Tab 3).

Sub-basin E-3 is a 3.85 acre (0.0060 square mile) tract in the southeastern portion of the West Basin, which includes commercial and public street (Woodspring Street) areas. It is tributary to a 0.41 acre proposed detention pond "South Pond 1". It was also modeled assuming 85% impervious surface with a CN of 88 for the pervious rights of way and landscaped areas. It's time of concentration originating in the pervious, grassy street right of way is 9.59 minutes with a corresponding lag time of 5.76 (Tab 3).

Sub-basin E-4 is a 7.94 acre (0.0124 square mile) tract in the south central portion of the West Basin, which includes commercial and public street (Woodspring Street) areas. It is tributary to a 0.73 acre proposed detention pond "South Pond 2". It was also modeled assuming 85% impervious surface with a CN of 88 for the pervious rights of way and landscaped areas. It's time of concentration originating in the pervious, grassy park way and street right of way is 9.59 minutes with a corresponding lag time of 5.76 (Tab 3).

Sub-basin E-5 is a 18.496 acre (0.0289 square mile) tract in the eastern portion of the West Basin, which includes commercial and public street (Woodspring Street) areas and the southern portion of the golf driving range. It is tributary to a 1.01 acre proposed detention pond "South Pond 3". It was modeled using a 77% impervious surface with a CN of 88 for the pervious rights of way, golf driving range and landscaped areas. It's time of concentration originating in the pervious surface driving range is 17.82 minutes with a corresponding lag time of 10.69 minutes (Tab 3).

Sub-basin E-6 is a 1200 feet long, 1.28 acre (0.002 square mile) grassy strip along the south boundary of the property that drains freely into the K-96 culvert. Its CN is 88 and time of concentration is 17.04 with a corresponding lag time of 10.22.

Greenwich East Drainage Basin Description

The east drainage basin (Basin B) of the 109.8 acres (0.1716 square mile) Greenwich North Development is a 47.104 acre (0.0736 square mile) fraction of a 122.05 acre (0.1907 square mile) watershed tributary to twin 48 inch diameter reinforced concrete pipe (RCP) culverts under Kansas Highway K-96 located approximately 1100 ft. northwest of the southeast corner of the site. The 74.49 acre (0.1171 square mile) offsite fraction of the watershed drains to the site. The offsite fraction of the watershed is a mix of developed property and property proposed for development, which are or will be subject to City of Wichita – Sedgwick County storm water management controls. Therefore offsite flow through the site has been modeled assuming such controls are in place. Development in the east drainage basin of the site will be predominately commercial (office/retail). Storm water management controls in the basin, operating in conjunction with the offsite controls, will limit the 100 year storm peak discharge at the K-96 twin culverts to at or under the predevelopment flow of 207.6 cfs.
Basin B was modeled assuming an 85% impervious surface area with a CN of 88 for the disturbed pervious portions. Its time of concentration is 17.5 minutes with a corresponding lag time of 10.5 minutes. Runoff from the basin with offsite flow will be routed through a proposed 5.4 acre detention pond at the southeast corner of the site.

Water Quality

Water quality volume and water quality flows will be handled in using BMPs for both West and East basins.

BMPs will be required to meet 80% TSS removal for the North Reservoir, South Pond 1, South Pond 2, South Pond 3, and the East Drainage Basin. Said BMP design will be addressed in the PPD phase of the project.

Calculations attached in Tab 3 illustrate the required water quality volume.

Channel Protection

Channel protection volumes (1 yr storm for 24 hrs) will be detained for extended detention in the respective detention basins, and will be further addressed in the PPD phase of the project.

West Basin:
Sub-basin E-1 is a 21.35 acre (0.0334 square mile) area draining into the pond labeled North Reservoir. North Reservoir then outlets and drains to the K-96 Crossing.

Sub-basin E-5 is a 18.496 acre (0.0289 square mile) area draining into the pond labeled South Pond 3. South Pond 3 then flows into South Pond 2.
Sub-basin E-4 is a 7.94 acre (0.0124 square mile) area draining into the pond labeled South Pond 2. South Pond 2 then flows into South Pond 1.
Sub-basin E-3 is a 3.85 acre (0.0060 square mile) area draining into the pond labeled South Pond 1. South Pond 1 then outlets and drains to the K-96 Crossing.

East Basin:
Basin B is a 47.104 acre (0.0736 square mile) area draining into the proposed 5.4 acre detention pond at the southeast corner of the site

Calculations attached in Tab 3 illustrate the required channel protection shown in the 24-hr hydrograph separation.

Best Management Practices

Best management practices for erosion control shall be undertaken during the site design. Such BMPs shall include ditch checks in the proposed swales, inlet protection at all inlets, silt fences where applicable, and sediment ponds within the detention basins. The erosion control plan will have to constantly evolve as the site develops.

Hydraulic Model

An analysis of hydraulic characteristics shall be developed during the site design to collect the runoff from entire site to the corresponding detention basin.

Future Development

The entire basins will be developed in phases. There will be addition of buildings, parking lots and other facilities to this site for commercial use. The site will require planning and design of internal stormsewer and/or surface drain network to collect the runoff from the entire site. Hydraulic models shall be developed during site design of each phase of development.

The lowest opening of the buildings shall be kept at least two feet (2') above 100 year water surface of closet/corresponding detention pond.

Federal, State and Local Permits

Refer to Tab 5.

May 13 , 2014-3:30pm
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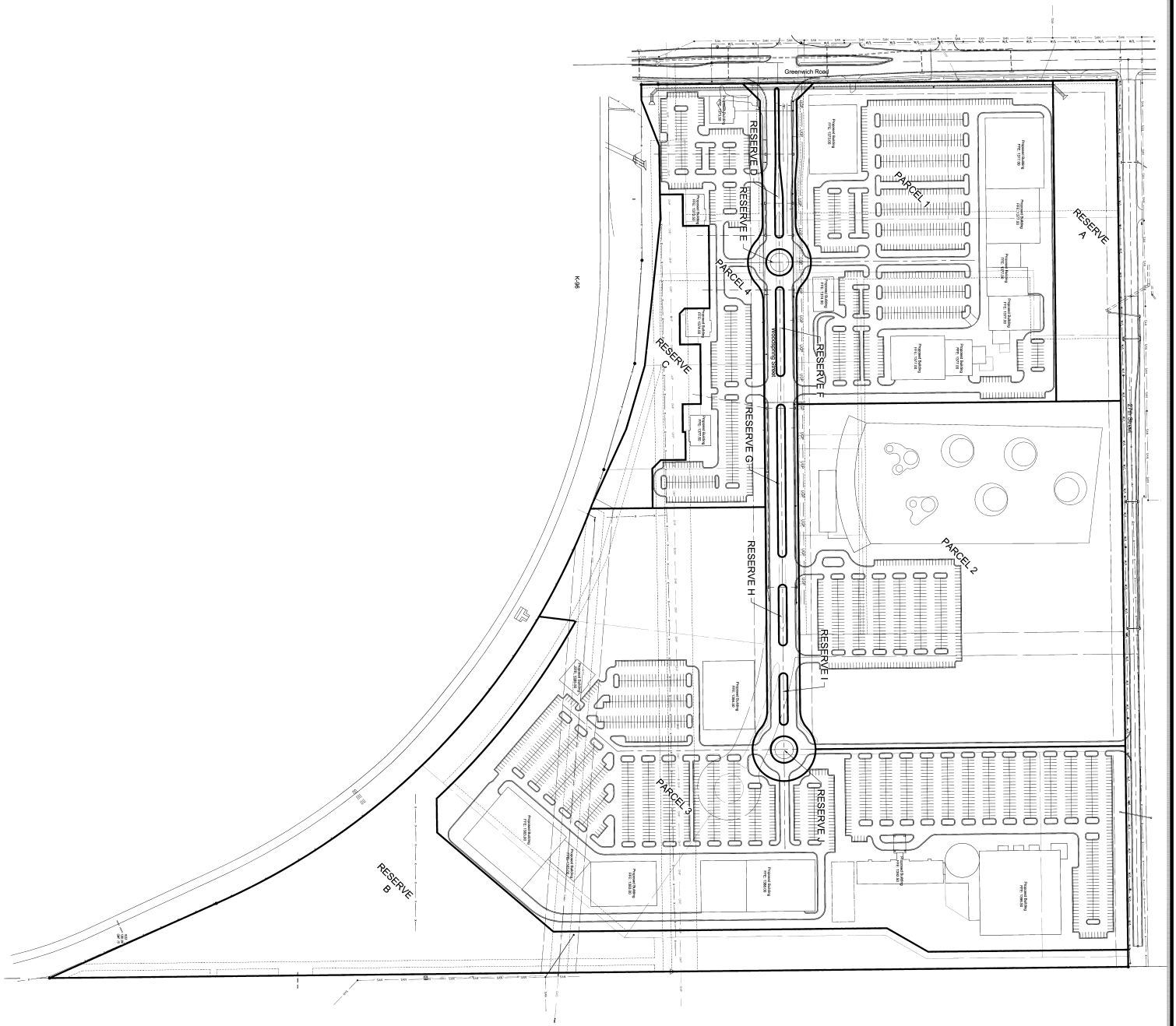


Renaissance Infrastructure Consulting
1158 Cambridge Circle Drive
Kansas City, Kansas 66103
913.317.9100
www.ric-consult.com

NO	BY	DD	DATE	REVISION
	XXX	XXX	X/XX/XX	ORIGINAL SUBMITTAL

Property Exhibit

Preliminary Site Layout

14-0112
K-96 Destination
Wichita, Kansas

Sheet
Exhibit A

not to scale

K-96 and Greenwich
Aerial/Location Map
Wichita, Kansas

KEMILLER ENGINEERING PA
117 E. Lewis, Wichita, KS 67202 (316)264-0242

PROJECT NUMBER			
KEM NO. 14014	FILE	DATE 05/2014	SHEET 1.0
DESIGN GP	DRAWN GP	REVISED	

not to scale

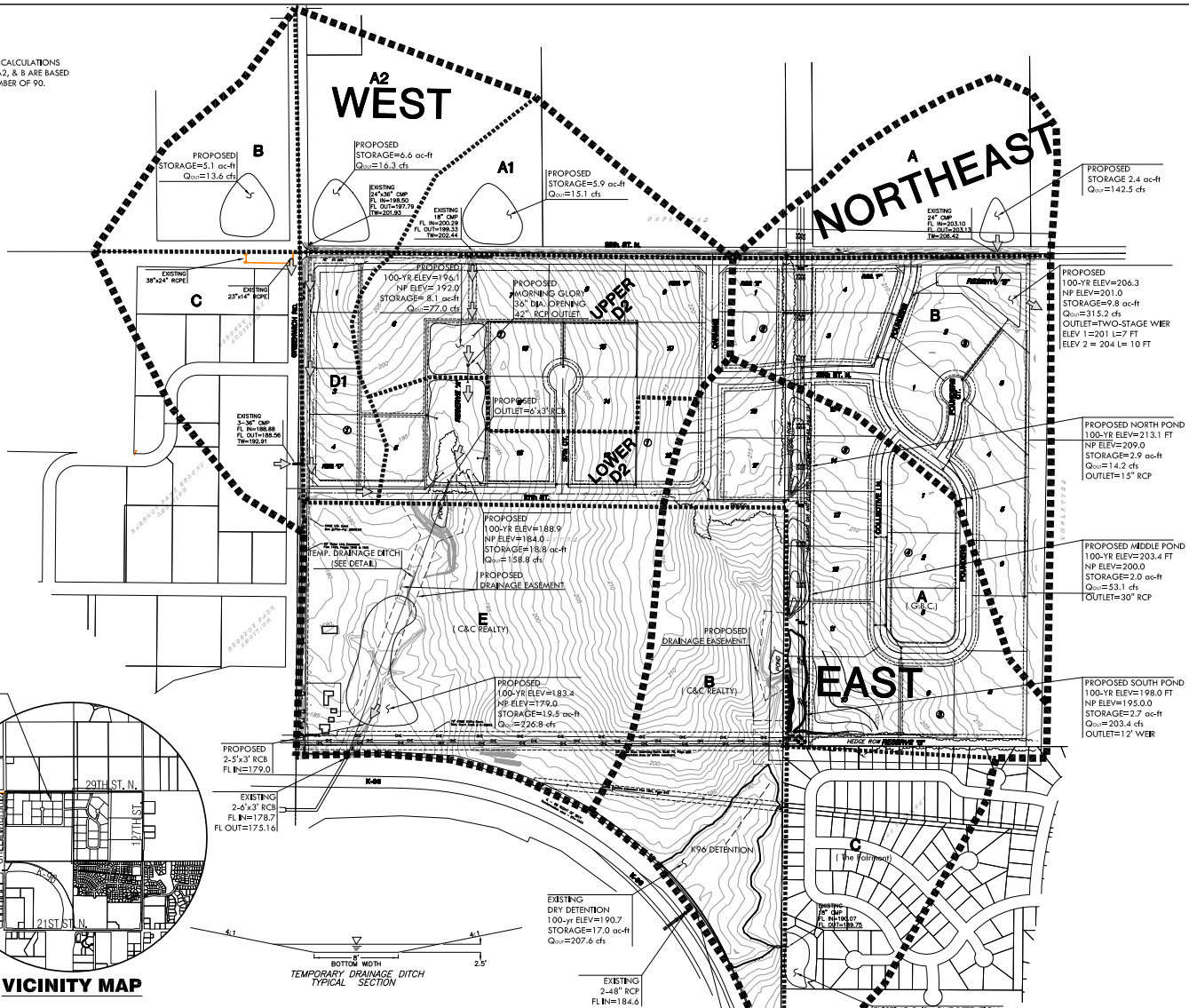
K-96 and Greenwich
GIS Map
Wichita, Kansas

KEMILLER ENGINEERING PA
117 E. Lewis, Wichita, KS 67202 (316)264-0242

PROJECT NUMBER			
KEM NO. 14014	FILE	DATE 05/2014	SHEET 1.0
DESIGN GP	DRAWN GP	REVISED	

Tab 2:

Previous Studies
Existing Drainage Map



NOTES

1. ZONING: Existing - SF-20 and RR
   Proposed - LI upon annexation w/ P.O.
2. ANNEXATION: An application for annexation shall be submitted to the City of Wichita
3. PUBLIC UTILITIES: Shall be extended to site by petitions
4. EXISTING USE: Vacant Land and Cultivated Fields
5. PLAT AREA: Gross= 158.81 Ac.
   Net =155.65 Ac.
6. SURVEY DATE: May 12th, 2005 (by MKEC)
7. MINIMUM PADS: As shown on the Final Drainage Plan
8. LOT TOTAL - 42
9. RESERVES USES: Open space, drainage, utilities, in designated locations, monuments, landscaping, and irrigation.

BENCH MARK

BM #1 Brass Disc on top of curb in front of fire hydrant, Lot 1, Block 1, Recency Park Addition, an Addition to Wichita, Sedgwick County, KS

Elev.=191.56 (City of Wichita)
1378.96 (NGVD 29)

LEGEND

- Sec. Corner
- Fnd. Prop. Corner
- GAS METER
- SANITARY SEWER MANHOLE
- POWER POLE/GUY ANCHOR
- ELECTRIC BOX
- SIGN
- GATE
- TREES
- EDGE OF TREES
- POLE
- HIGH TENSION POWER LINE
- FIRE HYDRANT
- WATER VALVE
- WATER METER
- TELEPHONE RISER
- FENCE
- STORM SEWER PIPE
- WATER LINE
- SANITARY SEWER LINE
- GAS LINE
- TELEPHONE LINE
- OVERHEAD ELECTRIC
- ZONED PARCELS
- STREET DEDICATION WIDTH VARIES 60' ALONG S.L. 75' AT INTERSECTION
- WATERSHED BOUNDARIES
- DRAINAGE BOUNDARIES
- DRAINAGE AREAS
- DA EAST - WATERSHED AREAS
- FLOW DIRECTION

REVISED: JANUARY 2007
ADDED KGE POND IN THE EAST WATERSHED.
MODIFIED OUTLET STRUCTURES IN THE WEST AND NORTHEAST WATERSHEDS.

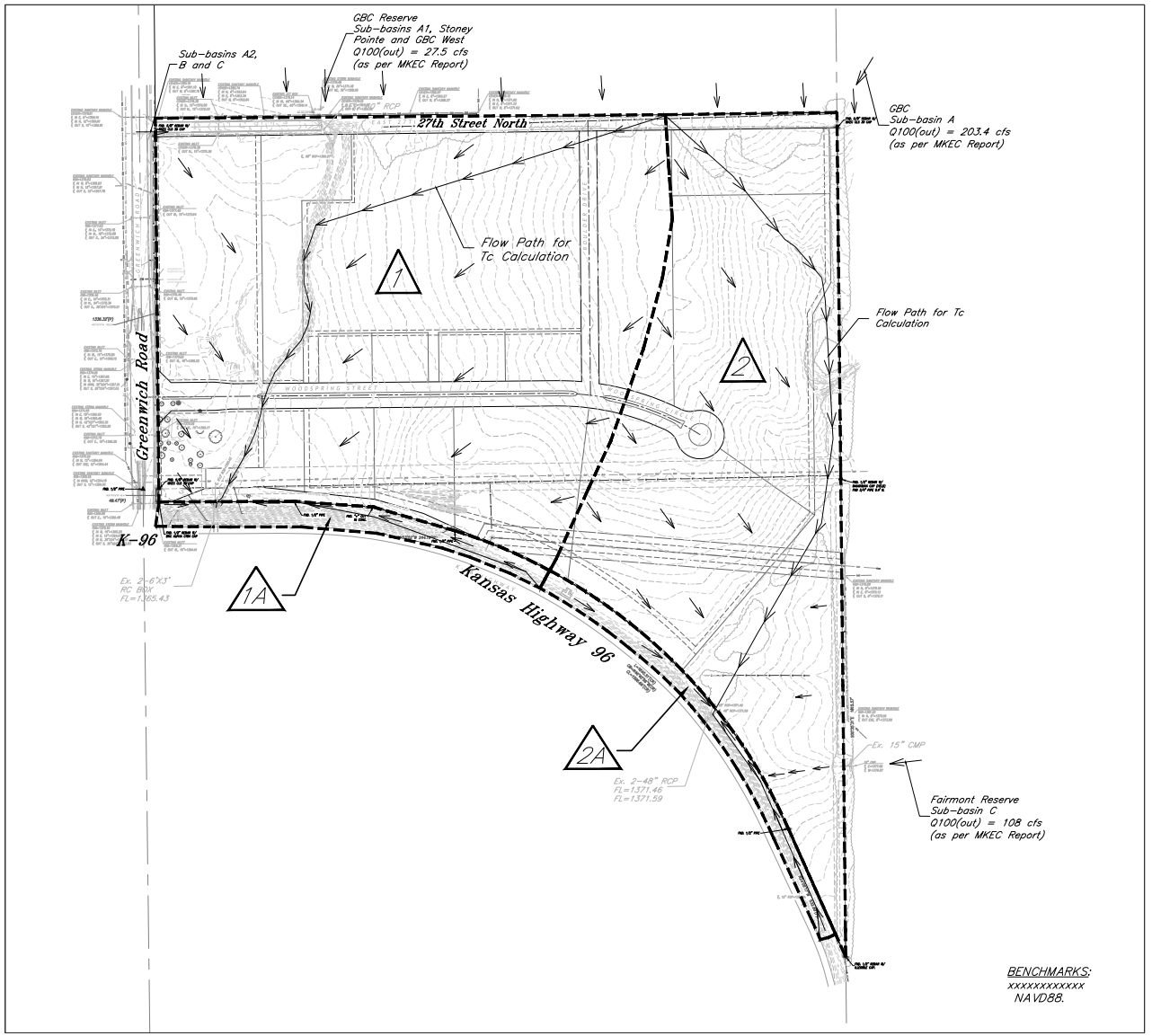
PROPOSED DETENTION PLAN

GREENWICH BUSINESS CENTER ADDITION

OWNER / DEVELOPER: Ritchie Development Corporation 8100 E. 22nd North, #1000 Wichita, KS 67226-2310 (316) 684-7300

Date: August, 2005

MKEC ENGINEERING CONSULTANTS, INC.
411 N. WEBB ROAD
WICHITA, KS. 67206
(316) 687-2900
www.mkec.com



Undeveloped Runoff Calculations (2-, 5-, 10-, 25-, and 100-yr)

EXITING CONDITION:
WEST BASIN:
WEST SUB BASIN E

Onsite Drainage Basin 1.
Drainage Area = 64.41 acres (0.1006 Sq. Miles)
Soil Group =D (as per COW HSG map)
Impervious Area= 0.0% , Disturbed Pervious Area= 0%,
Undisturbed Pervious Area = 100%, CN= 80
Average slope of groud = 1.2%
Time of Concentration (Tc)= 19.4 Minutes (TR-55 Method)
Lag Time = 11.64 Minutes

Offsite Drainage Basin 1A.
Drainage Area = 3.08 acres (0.0048 Sq. Miles)
Soil Group =D (as per COW HSG map)
Impervious Area= 0.0% , Disturbed Pervious Area= 100%,
CN= 84
Average slope of groud = 1.0%
Time of Concentration (Tc)= 15.4 Minutes (TR-55 Method)
Lag Time = 9.2 Minutes

EXISTING CONDITION (SUB BASIN E)

DRAINAGE AREA	ACRES	Tc Mins	CN	Lag Time	Q2	Q5	Q10	Q25	Q100	REMARKS
On-site Basin (1)	64.41	19.4	80	11.6	128.0	203.5	250.1	299.4	400.3	Part of West Basin, Draining to 2-6x3 RC Box Culverts
Off-site Basin (1A)	3.08	15.4	84	9.2	8.0	12.1	14.6	17.9	22.5	Part of West Basin, Draining to 2-6x3 RC Box Culverts

EAST BASIN:
EAST SUB BASIN B

Onsite Drainage Basin 2.
Drainage Area = 44.92 acres =0.0702 Sq. Miles
Soil Group =D (as per COW HSG map)
Impervious Area= 0.0% , Disturbed Pervious Area= 0%,
Undisturbed Pervious Area = 100%, CN= 80
Average slope of groud = 1.2%
Time of Concentration (Tc)= 19.5 Minutes (TR-55 Method)
Lag Time = 11.64 Minutes

Offsite Drainage Basin 2A.
Drainage Area = 2.79 acres = 0.0044 Sq. Miles
Soil Group =D (as per COW HSG map)
Impervious Area= 0.0% , Disturbed Pervious Area= 100%,
CN= 84
Average slope of groud = 1.7%
Time of Concentration (Tc)= 11.7 Minutes (TR-55 Method)
Lag Time = 7.02 Minutes

EXISTING CONDITION (SUB BASIN B)

DRAINAGE AREA	ACRES	Tc Mins	CN	Lag Time	Q2	Q5	Q10	Q25	Q100	REMARKS
On-site Basin (2)	44.92	19.5	80	11.7	89.3	142.0	174.5	218.5	279.3	Part of West Basin, Draining to 2-48" RCP
Off-site Basin (2A)	2.79	11.7	84	7.0	8.0	12.1	14.6	18.0	22.5	Part of West Basin, Draining to 2-48" RCP

1 Onsite drainage basin, Part of West Watershed Area = 61.55 acres
2 Onsite drainage basin, Part of East Watershed Area = 44.07 acres
1A Offsite drainage basin, Part of East Watershed Area = 3.08 acres
2A Offsite drainage basin, Part of West Watershed Area = 2.79 acres
Basin Boundary

200 0 100 200 400 800
(IN FEET)
1 inch = 200 ft.

K-96 & Greenwich
Ex. Drainage Map
Wichita, Kansas

KEMILLER ENGINEERING PA
117 E. Lewis, Wichita, KS 67202 (316)264-0242

PROJECT NUMBER
KEM NO. 14014 | FILE | DATE 04/2014 | SHEET 1.0
DESIGN GP | DRAWN GP | REVISED

Tab 3:

Proposed Drainage Plan
Hydrological Calculations and Output
Water Quality Volume Calculations

May 13 , 2014-3:30pm
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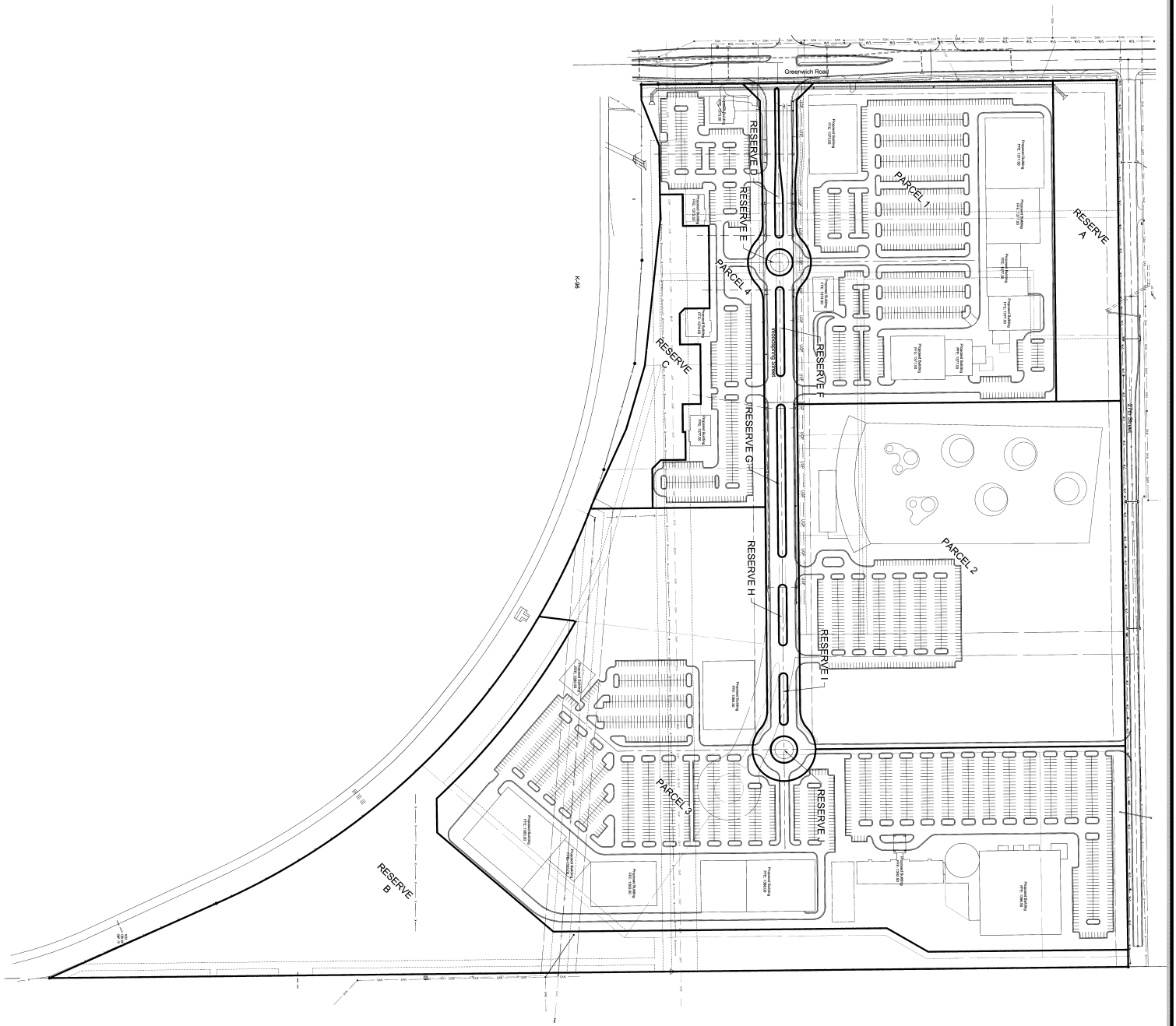

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NO	BY	DD	DATE	REVISION
	XXX	XXX	X/XX/XX	ORIGINAL SUBMITTAL

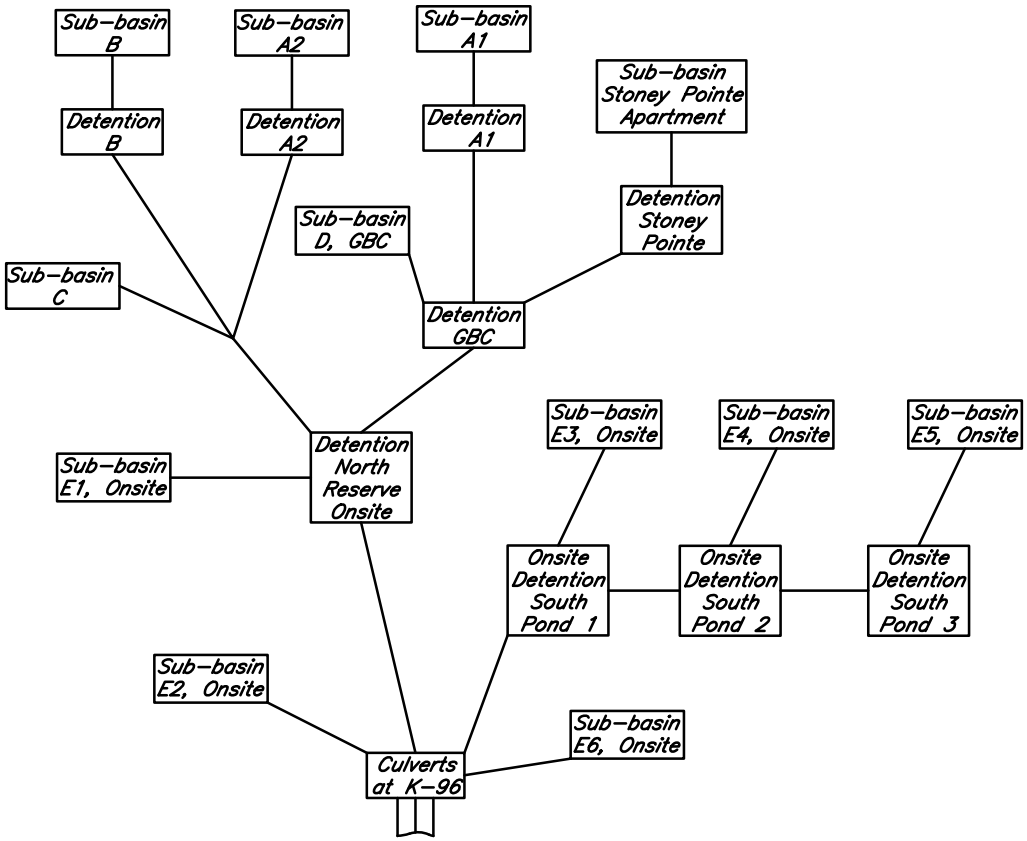
Property Exhibit

Preliminary Site Layout

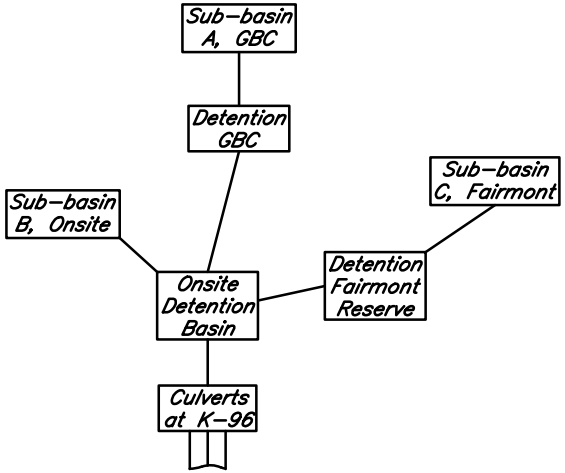
14-0112
K-96 Destination
Wichita, Kansas

Sheet
Exhibit A

HEC HMS MODEL LAYOUT



WEST BASIN



EAST BASIN

KEMILLER ENGINEERING PA

PROJECT NUMBER

KEM NO.	FILE	DATE	SHEET
DESIGN	DRAWN	REVISED	

Sumarry Table (100-yr Event), West Basin				
Hydrologic Element	**Driange Area, acres**	**Peak Discarge, cfs**	**Storage Volume at Peak (ac-ft)**	**Peak Water Elevation, ft**
GBC Reserve (Offsite North)	97.88	27.9	21.7	1377.9
Area B, A2 and C Junction 1 (Offsite Northwest)	165.72	221.1	-	-
North Detention Basin (Onsite)	187.10	116.9	19.9	1374.7
Onsite Detention South Pond 1 (Onsite)	30.27	124.2	1	1372.2
Onsite Detention South Pond 2 (Onsite)	26.43	118.5	1.8	1372.7
Onsite Detention South Pond 3 (Onsite)	18.5	90.4	5.1	1376.5
Culverts at K-96	228.4	224.5	-	-

Sumarry Table (100-yr Event), East Basin				
Hydrologic Element	**Driange Area, acres**	**Peak Discarge, cfs**	**Storage Volume at Peak (ac-ft)**	**Peak Water Elevation, ft**
Area A (Part of GBC)	43.20	312.2	-	-
Area B (Onsite)	47.10	287.6	-	-
Area C (Fairmont Sub Division)	31.70	187.9	-	-
Detention Basin for Area A	43.20	203.6	5.7	1383.0
Fairmont Detention Basin	31.74	108.3	6.0	1381.3
Proposed Onsite Detention Basin	122.05	108.4	15.4	1376.7

WEST SUB-BASIN						
Water Quality Volume (WQv) Calculation						
Calculation for water quality volume (WQv=P*Rv*A/12)				Soil Group 'D'		
85th percentile storm event (1.2 inches),P =	1.20	inches		Calulation of Rv		
Total area, A =	64.41	acres			Coeff.	Area
Rainfall Coeff, Rv, =	0.845	cf		Coeff for undisturbed area,R_{VU}=	0.05	0.00
Required Vol. for Water Quality =	**5.44**	ac-ft		Coeff for turf cover,disturbed,R_{VT}=	0.25	9.66
Corresponding Water Quality Peak Flow =	**53.58**	cfs		Coeff for impervious area, R_{VI}=	0.95	54.75
				Weighted, Rv =	**0.845**	

Water Quality Peak Flow Calculation		
Aera=	64.41	acres
WQv=	1.014	inches
Pond and Swamp Factor, Fp=	0.700	
Calculated CN=	98.3	
S=	0.174	inches
Ia=	0.035	inches
Ia/P=	0.029	
qu	750.0	cfs/sq.mi/in
Water quality peak flow	**53.58**	**cfs**

EAST SUB-BASIN						
Water Quality Volume (WQv) Calculation						
Calculation for water quality volume (WQv=P*Rv*A/12)				Soil Group 'D'		
85th percentile storm event (1.2 inches),P =	1.20	inches		Calulation of Rv		
Total area, A =	44.92	acres			Coeff.	Area
Rainfall Coeff, Rv, =	0.845	cf		Coeff for undisturbed area,R_{VU}=	0.05	0.00
Required Vol. for Water Quality =	**3.80**	ac-ft		Coeff for turf cover,disturbed,R_{VT}=	0.25	6.74
Corresponding Water Quality Peak Flow =	**37.36**	cfs		Coeff for impervious area, R_{VI}=	0.95	38.18
				Weighted, Rv =	**0.845**	

Water Quality Peak Flow Calculation		
Aera=	44.92	acres
WQv=	1.014	inches
Pond and Swamp Factor, Fp=	0.700	
Calculated CN=	98.3	
S=	0.174	inches
Ia=	0.035	inches
Ia/P=	0.029	
qu	750.0	cfs/sq.mi/in
Water quality peak flow	**37.36**	**cfs**

Time (hours)	North Pond Runoff (cfs)(inflow)	North Pond TxQ	North Pond Runoff (cfs)(outflow)	North Pond TxQ
0	0	0.00	0.00	0.00
0.5	0.2	0.10	0.10	0.05
1	0.2	0.20	0.30	0.30
1.5	0.2	0.30	0.30	0.45
2	0.3	0.60	0.40	0.80
2.5	0.3	0.75	0.40	1.00
3	0.3	0.90	0.40	1.20
3.5	0.3	1.05	0.50	1.75
4	0.3	1.20	0.50	2.00
4.5	0.3	1.35	0.50	2.25
5	0.3	1.50	0.60	3.00
5.5	0.4	2.20	0.60	3.30
6	0.4	2.40	0.60	3.60
6.5	0.4	2.60	0.70	4.55
7	0.4	2.80	0.70	4.90
7.5	0.5	3.75	0.70	5.25
8.5	0.5	4.25	0.80	6.80
9	0.6	5.40	0.80	7.20
9.5	0.7	6.65	0.90	8.55
10	0.8	8.00	1.00	10.00
10.5	1	10.50	1.00	10.50
11	1.3	14.30	1.1	12.10
11.5	2.1	24.15	1.1	12.65
12	18.7	224.40	1.3	15.60
12.5	5	62.50	1.6	20.00
13	1.9	24.70	1.6	20.80
13.5	1.3	17.55	1.6	21.60
14	1	14.00	1.7	23.80
14.5	0.9	13.05	1.7	24.65
15.5	0.7	10.85	1.7	26.35
16	0.6	9.60	1.7	27.20
16.5	0.5	8.25	1.7	28.05
17	0.5	8.50	1.7	28.90
17.5	0.5	8.75	1.8	31.50
18	0.5	9.00	1.8	32.40
18.5	0.4	7.40	1.8	33.30
19	0.4	7.60	1.8	34.20
19.5	0.4	7.80	1.8	35.10
20	0.3	6.00	1.8	36.00
20.5	0.3	6.15	1.8	36.90
21	0.3	6.30	1.8	37.80
21.5	0.3	6.45	1.8	38.70
22	0.3	6.60	1.8	39.60
22.5	0.3	6.75	1.8	40.50
23	0.3	6.90	1.8	41.40
23.5	0.3	7.05	1.8	42.30
24	0.3	7.20	1.8	43.20

24.5	0	0.00	1.8	44.10
25	0	0.00	1.8	45.00
25.5	0	0.00	1.8	45.90
26	0	0.00	1.8	46.80
26.5	0	0.00	1.8	47.70
27	0	0.00	1.8	48.60
27.5	0	0.00	1.8	49.50
28	0	0.00	1.8	50.40
28.5	0	0.00	1.8	51.30
29	0	0.00	1.8	52.20
29.5	0	0.00	1.8	53.10
30	0	0.00	1.8	54.00
30.5	0	0.00	1.8	54.90
31	0	0.00	1.8	55.80
31.5	0	0.00	1.8	56.70
32	0	0.00	1.8	57.60
32.5	0	0.00	1.8	58.50
33	0	0.00	1.7	56.10
33.5	0	0.00	1.7	56.95
34	0	0.00	1.7	57.80
34.5	0	0.00	1.7	58.65
35	0	0.00	1.7	59.50
38	0	0.00	1.7	64.60
38.5	0	0.00	1.7	65.45
39	0	0.00	1.7	66.30
39.5	0	0.00	1.7	67.15
40	0	0.00	1.7	68.00
40.5	0	0.00	1.7	68.85
41	0	0.00	1.7	69.70
41.5	0	0.00	1.7	70.55
42	0	0.00	1.7	71.40
42.5	0	0.00	1.7	72.25
43	0	0.00	1.7	73.10
43.5	0	0.00	1.7	73.95
44	0	0.00	1.6	70.40
44.5	0	0.00	1.6	71.20
45	0	0.00	1.6	72.00
45.5	0	0.00	1.6	72.80
46	0	0.00	1.6	73.60
46.5	0	0.00	1.6	74.40
47	0	0.00	1.6	75.20
47.5	0	0.00	1.6	76.00
48	0	0.00	1.6	76.80
48.5	0	0.00	1.6	77.60
49	0	0.00	1.6	78.40
49.5	0	0.00	1.6	79.20
50	0	0.00	1.6	80.00
50.5	0	0.00	1.6	80.80
51	0	0.00	1.6	81.60
51.5	0	0.00	1.6	82.40
52	0	0.00	1.6	83.20

52.5	0	0.00	1.5	78.75
53	0	0.00	1.5	79.50
53.5	0	0.00	1.5	80.25
54	0	0.00	1.5	81.00
54.5	0	0.00	1.5	81.75
55	0	0.00	1.5	82.50
55.5	0	0.00	1.5	83.25
56	0	0.00	1.5	84.00
56.5	0	0.00	1.5	84.75
57	0	0.00	1.5	85.50
57.5	0	0.00	1.5	86.25
58	0	0.00	1.5	87.00
58.5	0	0.00	1.5	87.75
59	0	0.00	1.4	82.60
59.5	0	0.00	1.4	83.30
60	0	0.00	1.4	84.00
60.5	0	0.00	1.4	84.70
61	0	0.00	1.4	85.40
61.5	0	0.00	1.4	86.10
62	0	0.00	1.4	86.80
62.5	0	0.00	1.4	87.50
63	0	0.00	1.4	88.20
63.5	0	0.00	1.4	88.90
64	0	0.00	1.4	89.60
64.5	0	0.00	1.4	90.30
65	0	0.00	1.4	91.00
65.5	0	0.00	1.4	91.70
66	0	0.00	1.3	85.80
66.5	0	0.00	1.3	86.45
67	0	0.00	1.3	87.10
67.5	0	0.00	1.3	87.75
68	0	0.00	1.3	88.40
68.5	0	0.00	1.3	89.05
69	0	0.00	1.3	89.70
69.5	0	0.00	1.3	90.35
70	0	0.00	1.3	91.00
70.5	0	0.00	1.3	91.65
71	0	0.00	1.3	92.30
71.5	0	0.00	1.3	92.95
72	0	0.00	1.3	93.60
72.5	0	0.00	1.2	87.00
73	0	0.00	1.2	87.60
73.5	0	0.00	1.2	88.20
74	0	0.00	1.2	88.80
74.5	0	0.00	1.2	89.40
75	0	0.00	1.2	90.00
75.5	0	0.00	1.2	90.60
76	0	0.00	1.2	91.20
76.5	0	0.00	1.2	91.80
77	0	0.00	1.2	92.40
77.5	0	0.00	1.2	93.00

78	0	0.00	1.2	93.60
78.5	0	0.00	1.2	94.20
79	0	0.00	1.1	86.90
79.5	0	0.00	1.1	87.45
80	0	0.00	1.1	88.00
80.5	0	0.00	1.1	88.55
81	0	0.00	1.1	89.10
81.5	0	0.00	1.1	89.65
82	0	0.00	1.1	90.20
82.5	0	0.00	1.1	90.75
83	0	0.00	1.1	91.30
83.5	0	0.00	1.1	91.85
84	0	0.00	1.1	92.40
84.5	0	0.00	1.1	92.95
85	0	0.00	1.1	93.50
85.5	0	0.00	1.1	94.05
86	0	0.00	1	86.00
86.5	0	0.00	1	86.50
87	0	0.00	1	87.00
87.5	0	0.00	0.9	78.75
88	0	0.00	0.9	79.20
88.5	0	0.00	0.9	79.65
89	0	0.00	0.8	71.20
89.5	0	0.00	0.8	71.60
90	0	0.00	0.8	72.00
90.5	0	0.00	0.7	63.35
91	0	0.00	0.7	63.70
91.5	0	0.00	0.7	64.05
92	0	0.00	0.7	64.40
92.5	0	0.00	0.6	55.50
93	0	0.00	0.6	55.80
93.5	0	0.00	0.6	56.10
94	0	0.00	0.6	56.40
94.5	0	0.00	0.6	56.70
95	0	0.00	0.5	47.50
95.5	0	0.00	0.5	47.75
96	0	0.00	0.5	48.00
Total	278.4	3430.19	1532.70	70753.55
Centroid.		**12.32108836**	**46.16268676**	

Seperation between inflow and outflow hydrographs = 33.84

Time (hours)	Pond 1		Pond 2		Pond 3		Pond 1	
	Runoff (cfs)(inflow)	TxQ	Runoff (cfs)(inflow	TxQ	Runoff (cfs)(inflow)	TxQ	Runoff (cfs)(outflow)	TxQ
0	0	0.00	0.00	0.00	0.00	0.00	0	0.00
0.5	0	0.00	0.00	0.00	0.20	0.10	0.1	0.05
1	0	0.00	0.00	0.00	0.20	0.20	0.1	0.10
1.5	0	0.00	0.00	0.00	0.20	0.30	0.1	0.15
2	0	0.00	0.00	0.00	0.20	0.40	0.1	0.20
2.5	0	0.00	0.00	0.00	0.20	0.50	0.1	0.25
3	0.1	0.30	0.00	0.00	0.20	0.60	0.1	0.30
3.5	0.1	0.35	0.00	0.00	0.30	1.05	0.1	0.35
4	0.1	0.40	0.00	0.00	0.30	1.20	0.1	0.40
4.5	0.1	0.45	0.00	0.00	0.30	1.35	0.1	0.45
5	0.1	0.50	0.00	0.00	0.30	1.50	0.2	1.00
5.5	0.1	0.55	0.00	0.00	0.30	1.65	0.2	1.10
6	0.1	0.60	0.00	0.00	0.30	1.80	0.2	1.20
6.5	0.1	0.65	0.00	0.00	0.40	2.60	0.2	1.30
7	0.1	0.70	0.00	0.00	0.40	2.80	0.2	1.40
7.5	0.1	0.75	0.00	0.00	0.40	3.00	0.2	1.50
8	0.1	0.80	0.00	0.00	0.40	3.20	0.2	1.60
8.5	0.1	0.85	0.00	0.00	0.50	4.25	0.2	1.70
9	0.1	0.90	0.00	0.00	0.60	5.40	0.2	1.80
9.5	0.1	0.95	0.00	0.00	0.60	5.70	0.3	2.85
10	0.1	1.00	0.00	0.00	0.70	7.00	0.3	3.00
10.5	0.2	2.10	0.00	0.00	0.90	9.45	0.3	3.15
11	0.3	3.30	0	0.00	1.2	13.20	0.3	3.30
11.5	0.4	4.60	0.1	1.15	1.8	20.70	0.4	4.60
12	4.6	55.20	2.9	34.80	16.2	194.40	0.8	9.60
12.5	0.5	6.25	0.8	10.00	4.3	53.75	1	12.50
13	0.3	3.90	0.4	5.20	1.6	20.80	1	13.00
13.5	0.2	2.70	0.3	4.05	1.1	14.85	1	13.50
14	0.2	2.80	0.2	2.80	0.9	12.60	1	14.00
14.5	0.1	1.45	0.2	2.90	0.7	10.15	0.9	13.05
15	0.1	1.50	0.2	3.00	0.7	10.50	0.9	13.50
15.5	0.1	1.55	0.2	3.10	0.6	9.30	0.9	13.95
16	0.1	1.60	0.1	1.60	0.5	8.00	0.9	14.40
16.5	0.1	1.65	0.1	1.65	0.5	8.25	0.8	13.20
17	0.1	1.70	0.1	1.70	0.4	6.80	0.8	13.60
17.5	0.1	1.75	0.1	1.75	0.4	7.00	0.8	14.00
18	0.1	1.80	0.1	1.80	0.4	7.20	0.8	14.40
18.5	0.1	1.85	0.1	1.85	0.4	7.40	0.8	14.80
19	0.1	1.90	0.1	1.90	0.3	5.70	0.8	15.20
19.5	0.1	1.95	0.1	1.95	0.3	5.85	0.7	13.65
20	0.1	2.00	0.1	2.00	0.3	6.00	0.7	14.00
20.5	0.1	2.05	0.1	2.05	0.3	6.15	0.7	14.35
21	0.1	2.10	0.1	2.10	0.3	6.30	0.7	14.70
21.5	0.1	2.15	0.1	2.15	0.3	6.45	0.7	15.05
22	0.1	2.20	0.1	2.20	0.3	6.60	0.7	15.40
22.5	0.1	2.25	0.1	2.25	0.3	6.75	0.7	15.75

23	0.1	2.30	0.1	2.30	0.2	4.60	0.7	16.10
23.5	0	0.00	0.1	2.35	0.2	4.70	0.7	16.45
24	0	0.00	0.1	2.40	0.2	4.80	0.7	16.80
24.5	0	0.00	0	0.00	0	0.00	0.6	14.70
25	0	0.00	0	0.00	0	0.00	0.6	15.00
25.5	0	0.00	0	0.00	0	0.00	0.6	15.30
26	0	0.00	0	0.00	0	0.00	0.6	15.60
26.5	0	0.00	0	0.00	0	0.00	0.6	15.90
27	0	0.00	0	0.00	0	0.00	0.6	16.20
27.5	0	0.00	0	0.00	0	0.00	0.6	16.50
28	0	0.00	0	0.00	0	0.00	0.6	16.80
28.5	0	0.00	0	0.00	0	0.00	0.5	14.25
29	0	0.00	0	0.00	0	0.00	0.5	14.50
29.5	0	0.00	0	0.00	0	0.00	0.5	14.75
30	0	0.00	0	0.00	0	0.00	0.5	15.00
30.5	0	0.00	0	0.00	0	0.00	0.5	15.25
31	0	0.00	0	0.00	0	0.00	0.5	15.50
31.5	0	0.00	0	0.00	0	0.00	0.5	15.75
32	0	0.00	0	0.00	0	0.00	0.5	16.00
32.5	0	0.00	0	0.00	0	0.00	0.5	16.25
33	0	0.00	0	0.00	0	0.00	0.5	16.50
33.5	0	0.00	0	0.00	0	0.00	0.5	16.75
34	0	0.00	0	0.00	0	0.00	0.5	17.00
34.5	0	0.00	0	0.00	0	0.00	0.5	17.25
35	0	0.00	0	0.00	0	0.00	0.4	14.00
35.5	0	0.00	0	0.00	0	0.00	0.4	14.20
36	0	0.00	0	0.00	0	0.00	0.4	14.40
36.5	0	0.00	0	0.00	0	0.00	0.4	14.60
37	0	0.00	0	0.00	0	0.00	0.4	14.80
37.5	0	0.00	0	0.00	0	0.00	0.4	15.00
38	0	0.00	0	0.00	0	0.00	0.4	15.20
38.5	0	0.00	0	0.00	0	0.00	0.4	15.40
39	0	0.00	0	0.00	0	0.00	0.4	15.60
39.5	0	0.00	0	0.00	0	0.00	0.4	15.80
40	0	0.00	0	0.00	0	0.00	0.4	16.00
40.5	0	0.00	0	0.00	0	0.00	0.4	16.20
41	0	0.00	0	0.00	0	0.00	0.4	16.40
41.5	0	0.00	0	0.00	0	0.00	0.4	16.60
42	0	0.00	0	0.00	0	0.00	0.4	16.80
42.5	0	0.00	0	0.00	0	0.00	0.4	17.00
43	0	0.00	0	0.00	0	0.00	0.4	17.20
43.5	0	0.00	0	0.00	0	0.00	0.3	13.05
44	0	0.00	0	0.00	0	0.00	0.3	13.20
44.5	0	0.00	0	0.00	0	0.00	0.3	13.35
45	0	0.00	0	0.00	0	0.00	0.3	13.50
45.5	0	0.00	0	0.00	0	0.00	0.3	13.65
46	0	0.00	0	0.00	0	0.00	0.3	13.80
46.5	0	0.00	0	0.00	0	0.00	0.3	13.95
47	0	0.00	0	0.00	0	0.00	0.3	14.10
47.5	0	0.00	0	0.00	0	0.00	0.3	14.25
48	0	0.00	0	0.00	0	0.00	0.3	14.40
48.5	0	0.00	0	0.00	0	0.00	0.3	14.55

49	0	0.00	0	0.00	0	0.00	0.3	14.70
49.5	0	0.00	0	0.00	0	0.00	0.3	14.85
50	0	0.00	0	0.00	0	0.00	0.3	15.00
50.5	0	0.00	0	0.00	0	0.00	0.3	15.15
51	0	0.00	0	0.00	0	0.00	0.3	15.30
51.5	0	0.00	0	0.00	0	0.00	0.3	15.45
52	0	0.00	0	0.00	0	0.00	0.3	15.60
52.5	0	0.00	0	0.00	0	0.00	0.3	15.75
53	0	0.00	0	0.00	0	0.00	0.3	15.90
53.5	0	0.00	0	0.00	0	0.00	0.2	10.70
54	0	0.00	0	0.00	0	0.00	0.2	10.80
54.5	0	0.00	0	0.00	0	0.00	0.2	10.90
55	0	0.00	0	0.00	0	0.00	0.2	11.00
55.5	0	0.00	0	0.00	0	0.00	0.2	11.10
56	0	0.00	0	0.00	0	0.00	0.2	11.20
56.5	0	0.00	0	0.00	0	0.00	0.2	11.30
57	0	0.00	0	0.00	0	0.00	0.2	11.40
57.5	0	0.00	0	0.00	0	0.00	0.2	11.50
58	0	0.00	0	0.00	0	0.00	0.2	11.60
58.5	0	0.00	0	0.00	0	0.00	0.2	11.70
59	0	0.00	0	0.00	0	0.00	0.2	11.80
59.5	0	0.00	0	0.00	0	0.00	0.2	11.90
60	0	0.00	0	0.00	0	0.00	0.2	12.00
60.5	0	0.00	0	0.00	0	0.00	0.2	12.10
61	0	0.00	0	0.00	0	0.00	0.2	12.20
61.5	0	0.00	0	0.00	0	0.00	0.2	12.30
62	0	0.00	0	0.00	0	0.00	0.2	12.40
62.5	0	0.00	0	0.00	0	0.00	0.2	12.50
63	0	0.00	0	0.00	0	0.00	0.1	6.30
63.5	0	0.00	0	0.00	0	0.00	0.1	6.35
64	0	0.00	0	0.00	0	0.00	0.1	6.40
64.5	0	0.00	0	0.00	0	0.00	0.1	6.45
65	0	0.00	0	0.00	0	0.00	0.1	6.50
65.5	0	0.00	0	0.00	0	0.00	0.1	6.55
66	0	0.00	0	0.00	0	0.00	0.1	6.60
66.5	0	0.00	0	0.00	0	0.00	0.1	6.65
67	0	0.00	0	0.00	0	0.00	0.1	6.70
67.5	0	0.00	0	0.00	0	0.00	0.1	6.75
68	0	0.00	0	0.00	0	0.00	0.1	6.80
68.5	0	0.00	0	0.00	0	0.00	0.1	6.85
69	0	0.00	0	0.00	0	0.00	0.1	6.90
69.5	0	0.00	0	0.00	0	0.00	0.1	6.95
70	0	0.00	0	0.00	0	0.00	0.1	7.00
70.5	0	0.00	0	0.00	0	0.00	0.1	7.05
71	0	0.00	0	0.00	0	0.00	0.1	7.10
71.5	0	0.00	0	0.00	0	0.00	0.1	7.15
72	0	0.00	0	0.00	0	0.00	0.1	7.20
72.5	0	0.00	0	0.00	0	0.00	0.1	7.25
73	0	0.00	0	0.00	0	0.00	0	0.00
73.5	0	0.00	0	0.00	0	0.00	0	0.00
74	0	0.00	0	0.00	0	0.00	0	0.00
74.5	0	0.00	0	0.00	0	0.00	0	0.00

75	0	0.00	0	0.00	0	0.00	0	0.00
75.5	0	0.00	0	0.00	0	0.00	0	0.00
76	0	0.00	0	0.00	0	0.00	0	0.00
76.5	0	0.00	0	0.00	0	0.00	0	0.00
77	0	0.00	0	0.00	0	0.00	0	0.00
77.5	0	0.00	0	0.00	0	0.00	0	0.00
78	0	0.00	0	0.00	0	0.00	0	0.00
78.5	0	0.00	0	0.00	0	0.00	0	0.00
79	0	0.00	0	0.00	0	0.00	0	0.00
79.5	0	0.00	0	0.00	0	0.00	0	0.00
80	0	0.00	0	0.00	0	0.00	0	0.00
80.5	0	0.00	0	0.00	0	0.00	0	0.00
81	0	0.00	0	0.00	0	0.00	0	0.00
81.5	0	0.00	0	0.00	0	0.00	0	0.00
82	0	0.00	0	0.00	0	0.00	0	0.00
82.5	0	0.00	0	0.00	0	0.00	0	0.00
83	0	0.00	0	0.00	0	0.00	0	0.00
83.5	0	0.00	0	0.00	0	0.00	0	0.00
84	0	0.00	0	0.00	0	0.00	0	0.00
84.5	0	0.00	0	0.00	0	0.00	0	0.00
85	0	0.00	0	0.00	0	0.00	0	0.00
85.5	0	0.00	0	0.00	0	0.00	0	0.00
86	0	0.00	0	0.00	0	0.00	0	0.00
86.5	0	0.00	0	0.00	0	0.00	0	0.00
87	0	0.00	0	0.00	0	0.00	0	0.00
87.5	0	0.00	0	0.00	0	0.00	0	0.00
88	0	0.00	0	0.00	0	0.00	0	0.00
88.5	0	0.00	0	0.00	0	0.00	0	0.00
89	0	0.00	0	0.00	0	0.00	0	0.00
89.5	0	0.00	0	0.00	0	0.00	0	0.00
90	0	0.00	0	0.00	0	0.00	0	0.00
90.5	0	0.00	0	0.00	0	0.00	0	0.00
91	0	0.00	0	0.00	0	0.00	0	0.00
91.5	0	0.00	0	0.00	0	0.00	0	0.00
92	0	0.00	0	0.00	0	0.00	0	0.00
92.5	0	0.00	0	0.00	0	0.00	0	0.00
93	0	0.00	0	0.00	0	0.00	0	0.00
93.5	0	0.00	0	0.00	0	0.00	0	0.00
94	0	0.00	0	0.00	0	0.00	0	0.00
94.5	0	0.00	0	0.00	0	0.00	0	0.00
95	0	0.00	0	0.00	0	0.00	0	0.00
95.5	0	0.00	0	0.00	0	0.00	0	0.00
96	0	0.00	0	0.00	0	0.00	0	0.00
Total	52.4	659.03	37.50	551.07	240.80	2969.03	327.4	9789.95
Centroid.		**12.5768**		**14.6951**		**12.3299**	**Centriod**	**29.9021**
						17.33		
Seperation between inflow and outflow hydrographs =						**15.21**		
						17.57		

Time (hours)	Prop East Reservoir Runoff (cfs) (inflow)	TxQ	Prop East Reservoir Runoff (cfs) (Outflow)	TxQ
0.00	0.00	0.00	0.00	0.00
0.50	0.40	0.20	0.20	0.10
1.00	0.50	0.50	0.30	0.30
1.50	0.50	0.75	0.40	0.60
2.00	0.60	1.20	0.50	1.00
2.50	0.60	1.50	0.50	1.25
3.00	0.60	1.80	0.50	1.50
3.50	0.60	2.10	0.50	1.75
4.50	0.70	3.15	0.50	2.25
5.00	0.70	3.50	0.50	2.50
5.50	0.80	4.40	0.50	2.75
6.00	0.80	4.80	0.50	3.00
6.50	0.90	5.85	0.60	3.90
7.00	0.90	6.30	0.60	4.20
7.50	1.00	7.50	0.60	4.50
8.00	1.00	8.00	0.60	4.80
8.50	1.20	10.20	0.60	5.10
9.00	1.40	12.60	0.60	5.40
9.50	1.50	14.25	0.60	5.70
10.00	1.70	17.00	0.70	7.00
10.50	2.1	22.05	0.7	7.35
11.00	2.9	31.90	0.7	7.70
11.50	4.4	50.60	0.7	8.05
12.00	33.5	402.00	0.8	9.60
12.50	14.1	176.25	2.8	35.00
13.00	4.8	62.40	3.3	42.90
13.50	3	40.50	3.5	47.25
14.00	2.3	32.20	3.6	50.40
14.50	1.9	27.55	3.6	52.20
15.00	1.7	25.50	3.7	55.50
15.50	1.5	23.25	3.7	57.35
16.00	1.4	22.40	3.7	59.20
16.50	1.2	19.80	3.6	59.40
17.00	1.1	18.70	3.6	61.20
17.50	1.1	19.25	3.6	63.00
18.00	1	18.00	3.6	64.80
18.50	0.9	16.65	3.5	64.75
19.00	0.9	17.10	3.5	66.50
19.50	0.8	15.60	3.4	66.30
20.00	0.7	14.00	3.4	68.00
20.50	0.7	14.35	3.3	67.65
21.00	0.7	14.70	3.3	69.30
21.50	0.7	15.05	3.2	68.80
22.00	0.7	15.40	3.2	70.40
22.50	0.6	13.50	3.1	69.75
23.00	0.6	13.80	3.1	71.30
23.50	0.6	14.10	3	70.50

24.00	0.6	14.40	3	72.00
24.50	0.1	2.45	2.9	71.05
25.00	0	0.00	2.8	70.00
25.50	0	0.00	2.7	68.85
26.00	0	0.00	2.7	70.20
26.50	0	0.00	2.6	68.90
27.00	0	0.00	2.5	67.50
27.50	0	0.00	2.4	66.00
28.00	0	0.00	2.4	67.20
28.50	0	0.00	2.3	65.55
29.00	0	0.00	2.3	66.70
29.50	0	0.00	2.2	64.90
30.00	0	0.00	2.1	63.00
30.50	0	0.00	2.1	64.05
31.00	0	0.00	2	62.00
31.50	0	0.00	2	63.00
32.00	0	0.00	1.9	60.80
32.50	0	0.00	1.8	58.50
33.00	0	0.00	1.8	59.40
33.50	0	0.00	1.7	56.95
34.00	0	0.00	1.6	54.40
34.50	0	0.00	1.6	55.20
35.00	0	0.00	1.5	52.50
35.50	0	0.00	1.5	53.25
36.00	0	0.00	1.4	50.40
36.50	0	0.00	1.4	51.10
37.00	0	0.00	1.3	48.10
37.50	0	0.00	1.3	48.75
38.00	0	0.00	1.3	49.40
38.50	0	0.00	1.2	46.20
39.00	0	0.00	1.2	46.80
39.50	0	0.00	1.2	47.40
40.00	0	0.00	1.1	44.00
40.50	0	0.00	1.1	44.55
41.00	0	0.00	1.1	45.10
41.50	0	0.00	1	41.50
42.00	0	0.00	1	42.00
42.50	0	0.00	1	42.50
43.00	0	0.00	1	43.00
43.50	0	0.00	1	43.50
44.00	0	0.00	0.9	39.60
44.50	0	0.00	0.9	40.05
45.00	0	0.00	0.9	40.50
45.50	0	0.00	0.9	40.95
46.00	0	0.00	0.9	41.40
46.50	0	0.00	0.8	37.20
47.00	0	0.00	0.8	37.60
47.50	0	0.00	0.8	38.00
48.00	0	0.00	0.8	38.40
48.50	0	0.00	0.8	38.80
49.00	0	0.00	0.8	39.20
49.50	0	0.00	0.8	39.60

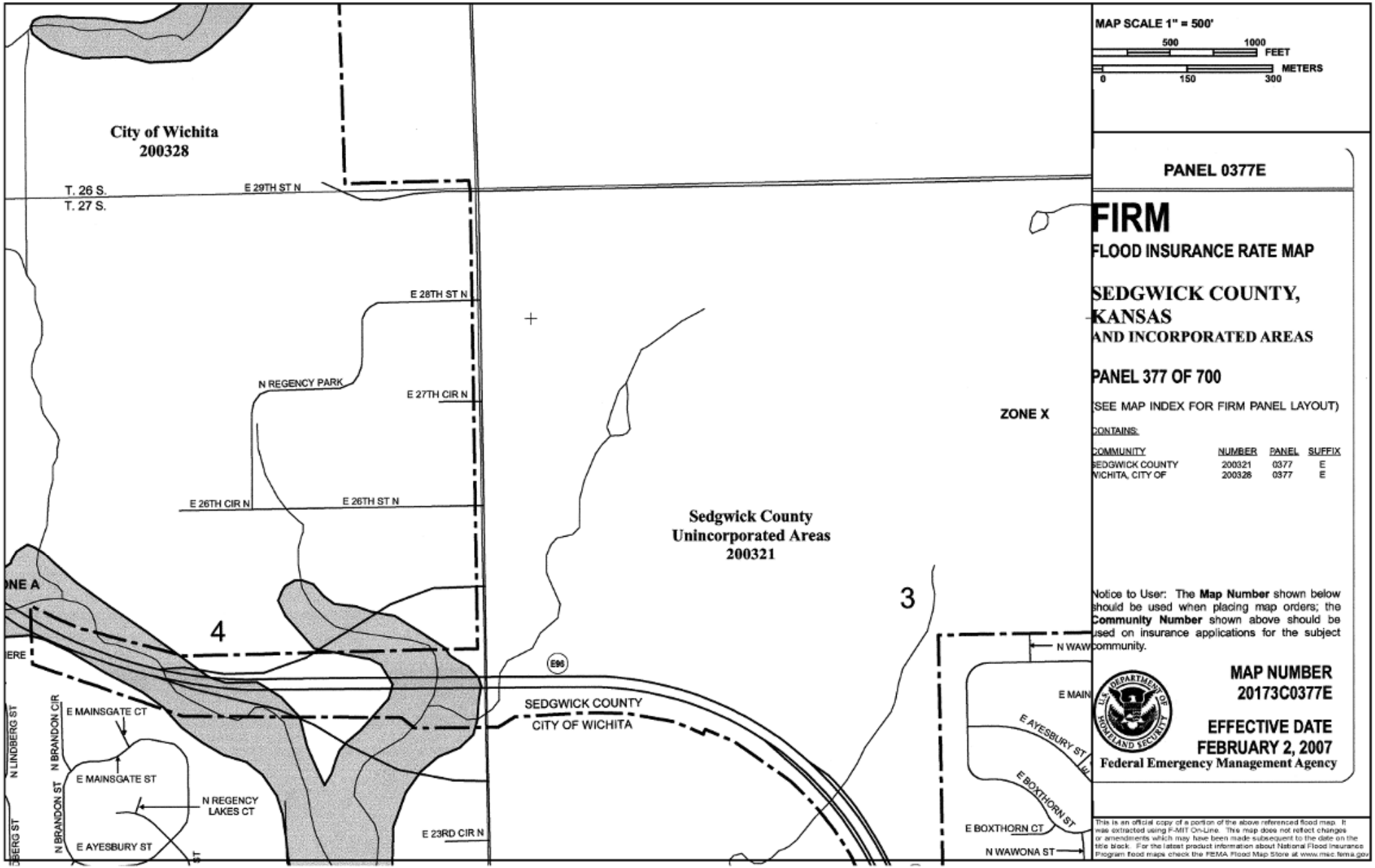
50.00	0	0.00	0.8	40.00
50.50	0	0.00	0.8	40.40
51.00	0	0.00	0.8	40.80
51.50	0	0.00	0.8	41.20
52.00	0	0.00	0.8	41.60
52.50	0	0.00	0.8	42.00
53.00	0	0.00	0.8	42.40
53.50	0	0.00	0.8	42.80
54.00	0	0.00	0.8	43.20
54.50	0	0.00	0.8	43.60
55.00	0	0.00	0.8	44.00
55.50	0	0.00	0.8	44.40
56.00	0	0.00	0.8	44.80
56.50	0	0.00	0.8	45.20
57.00	0	0.00	0.8	45.60
57.50	0	0.00	0.8	46.00
58.00	0	0.00	0.8	46.40
58.50	0	0.00	0.8	46.80
59.00	0	0.00	0.7	41.30
59.50	0	0.00	0.7	41.65
60.00	0	0.00	0.7	42.00
60.50	0	0.00	0.7	42.35
61.00	0	0.00	0.7	42.70
61.50	0	0.00	0.7	43.05
62.00	0	0.00	0.7	43.40
62.50	0	0.00	0.7	43.75
63.00	0	0.00	0.7	44.10
63.50	0	0.00	0.7	44.45
64.00	0	0.00	0.7	44.80
64.50	0	0.00	0.7	45.15
65.00	0	0.00	0.7	45.50
65.50	0	0.00	0.7	45.85
66.00	0	0.00	0.7	46.20
66.50	0	0.00	0.7	46.55
67.00	0	0.00	0.7	46.90
67.50	0	0.00	0.7	47.25
68.00	0	0.00	0.7	47.60
68.50	0	0.00	0.7	47.95
69.00	0	0.00	0.7	48.30
69.50	0	0.00	0.7	48.65
70.00	0	0.00	0.7	49.00
70.50	0	0.00	0.7	49.35
71.00	0	0.00	0.7	49.70
71.50	0	0.00	0.7	50.05
72.00	0	0.00	0.7	50.40
72.50	0	0.00	0.7	50.75
73.00	0	0.00	0.7	51.10
73.50	0	0.00	0.7	51.45
74.00	0	0.00	0.7	51.80
74.50	0	0.00	0.7	52.15
75.00	0	0.00	0.7	52.50
75.50	0	0.00	0.7	52.85

76.00	0	0.00	0.7	53.20
76.50	0	0.00	0.7	53.55
77.00	0	0.00	0.7	53.90
77.50	0	0.00	0.7	54.25
78.00	0	0.00	0.7	54.60
78.50	0	0.00	0.7	54.95
79.00	0	0.00	0.7	55.30
79.50	0	0.00	0.7	55.65
80.00	0	0.00	0.7	56.00
80.50	0	0.00	0.7	56.35
81.00	0	0.00	0.7	56.70
81.50	0	0.00	0.7	57.05
82.00	0	0.00	0.7	57.40
82.50	0	0.00	0.7	57.75
83.00	0	0.00	0.7	58.10
83.50	0	0.00	0.7	58.45
84.00	0	0.00	0.7	58.80
84.50	0	0.00	0.7	59.15
85.00	0	0.00	0.7	59.50
85.50	0	0.00	0.6	51.30
86.00	0	0.00	0.6	51.60
86.50	0	0.00	0.6	51.90
87.00	0	0.00	0.6	52.20
87.50	0	0.00	0.6	52.50
88.00	0	0.00	0.6	52.80
88.50	0	0.00	0.6	53.10
89.00	0	0.00	0.6	53.40
89.50	0	0.00	0.6	53.70
90.00	0	0.00	0.6	54.00
90.50	0	0.00	0.6	54.30
91.00	0	0.00	0.6	54.60
91.50	0	0.00	0.6	54.90
92.00	0	0.00	0.6	55.20
92.50	0	0.00	0.6	55.50
93.00	0	0.00	0.6	55.80
93.50	0	0.00	0.6	56.10
94.00	0	0.00	0.6	56.40
94.50	0	0.00	0.6	56.70
95.00	0	0.00	0.6	57.00
95.50	0	0.00	0.6	57.30
96.00	0	0.00	0.6	57.60
Total	613.10	7588.70	1423.30	53086.02
Centroid.		**12.3775893**		**37.2978407**

Seperation between inflow and outflow hydrographs = 24.92

Tab 4:

FIRM Panel


City of Wichita
200328
T. 26 S.
T. 27 S.
E 29TH ST N
E 28TH ST N
N REGENCY PARK
E 27TH CIR N
E 26TH CIR N
E 26TH ST N
Sedgwick County
Unincorporated Areas
200321
ZONE X
4
3
E96
SEDGWICK COUNTY
CITY OF WICHITA
E MAINSGATE CT
E MAINSGATE ST
N REGENCY
LAKES CT
E AYESBURY ST
E 23RD CIR N
N LINDBERG ST
N BRANDON CIR
N BRANDON ST
E AYESBURY ST
E BOXTHORN ST
E BOXTHORN CT
N WAWONA ST
MAP SCALE 1" = 500'
500
1000
FEET
METERS
0
150
300
PANEL 0377E
FIRM
FLOOD INSURANCE RATE MAP
SEDGWICK COUNTY,
KANSAS
AND INCORPORATED AREAS
PANEL 377 OF 700
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)
CONTAINS:
COMMUNITY NUMBER PANEL SUFFIX
SEDGWICK COUNTY 200321 0377 E
WICHITA, CITY OF 200328 0377 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
20173C0377E
EFFECTIVE DATE
FEBRUARY 2, 2007
Federal Emergency Management Agency
This is an official copy of a portion of the above referenced flood map. It was extracted using F-MIT On-Line. This map does not reflect changes or amendments which may have been made subsequent to the date on the title block. For the latest product information about National Flood Insurance Program flood maps check the FEMA Flood Map Store at www.msc.fema.gov

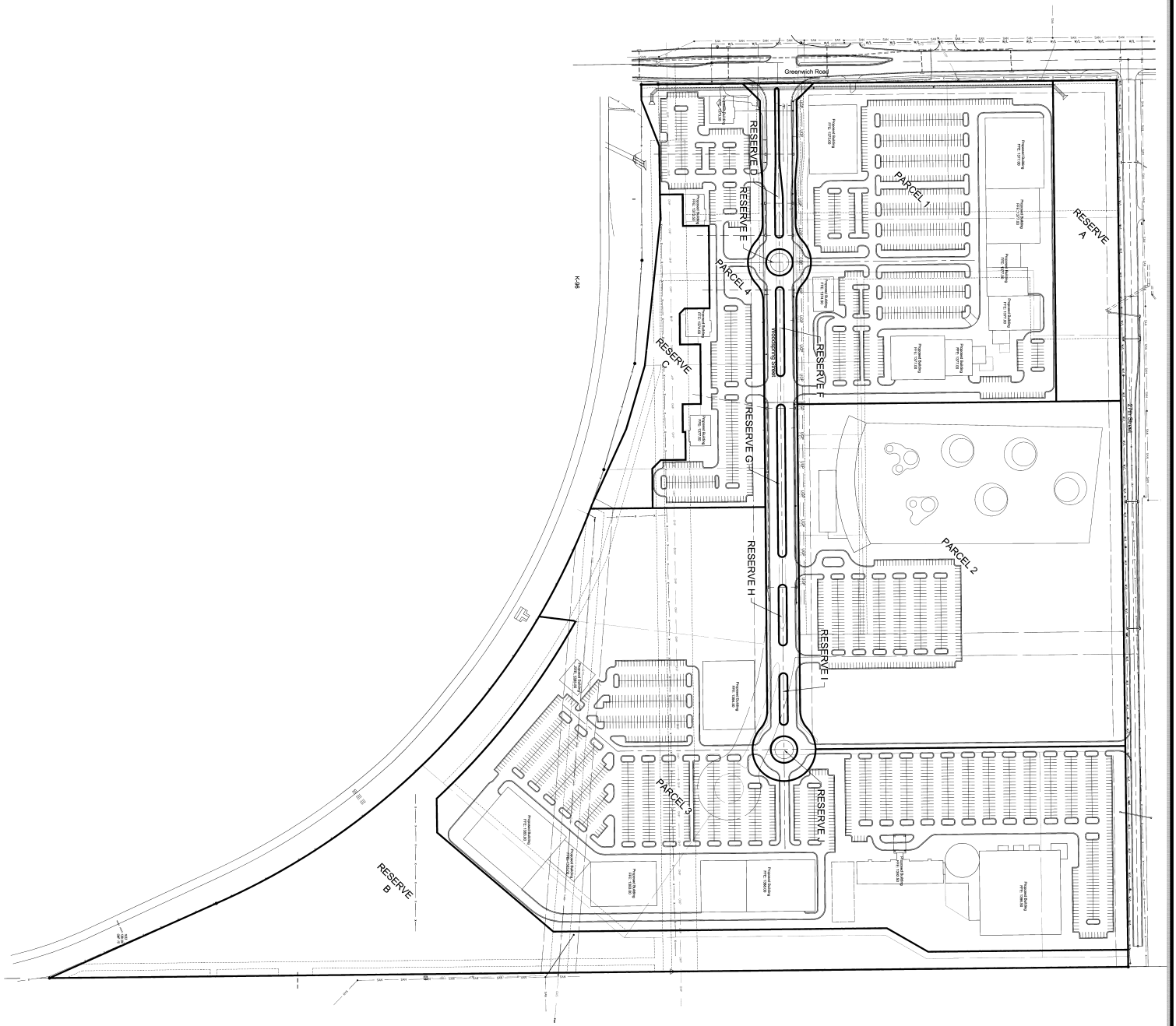
Tab 5:

Wet land determination and remediation letter from US Army Corps of Engineers will be presented to the city at later date. A letter of notice of intent will be submitted to the KDHE during the design phase and a copy will be presented along with PPD during the site design. The proposed improvement will not change previously designated FEMA flood boundary or floodplain.

Tab 6:

Proposed Drainage Plan
Electronic copies of report

May 13 , 2014-3:30pm
Z:\NIC Design\2014\14-0112 Wichita K96 Destination\dwg\14-0112 Base.dwg



Renaissance Infrastructure Consulting
1158 Cambridge Circle Drive
Kansas City, Kansas 66103
913.317.9100
www.ric-consult.com

NO	BY	DD	DATE	REVISION
	XXX	XXX	X/XX/XX	ORIGINAL SUBMITTAL

Property Exhibit

Preliminary Site Layout

14-0112
K-96 Destination
Wichita, Kansas

Sheet
Exhibit A