Drainage Report

David and Palmer Addition,

To Wichita, Sedgwick County, Kansas

March, 2014

KEMILLER ENGINEERING PA

117 E. Lewis
Wichita, Kansas 67202
(316) 264-0242

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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:	David and Palmer Addition				
Total Area of Project:	4.15 **acres**				
Development Type:	GC	**Other:**			
Developer Name:		**Contact:**		**Phone:**	
Email:					
Engineer Name:	Gyanendra (Guy) Pokhrel	**Contact:**	516 S Market	**Phone:**	(316)264 0242
Email:	guy@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 6 of report
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 plan. (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	N/A
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	Not applicable fat this time.
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	Grading will follow the flow arrows shown in proposed drainage plan.
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	Cover page of report.
6.4	Future phases shown but cross-hatched as information only.	No	Not applicable for this site.
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.	No	Not applicable.
6.8	Benchmarks (minimum of 2) used for site control (NAVD 88 vertical datum).	Yes	One City BM.
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	Proposed Drainage Plan
6.11	Spot elevations shown to the nearest tenth of a foot for critical locations, including lot and property boundaries.	No	Not applicable.
6.12	Proposed lot and street layout.	No	Not applicable.
6.13	Locations of underground storm drains.	No	
6.14	Overflow locations for storms exceeding storm drain capacity, with elevations.	Yes	Indicated by flow arrows.
6.15	Top elevations of storm drains at all inlets, manholes, and flow line elevations for all outfalls.	Yes	Proposed Drainage Plan
6.16	Locations of open ditches and lakes.	Yes	Proposed Drainage Plan
6.17	Flow direction arrows.	Yes	Proposed Drainage Plan
6.18	Proposed flow line elevations of all open ditches at maximum 100 foot intervals, and 100-year flood elevations thereon.	No	
6.19	Ponds: Location, bottom elevation, normal pool elevation, 100-year flood elevation, emergency overflow elevation.	Yes	Proposed Drainage 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	Stated in report.
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 at this time.
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
6.26	Indicate that grading around structures conforms to perimeter drainage requirements.	No	Not applicable for this site.
6.27	Indicate that backyard drainage grading conforms to backyard drainage requirements.	No	Not applicable for this site.
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
David and Palmer Plat

Introduction

The subject property is located at the southeast corner of 29th Street north and Chisholm creek, west of Fairview Ave. The tract of land is approximately 4.15 acres and is currently zoned as multi family residential. This area is undeveloped and unplated and it covered by grass. 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.

Current Conditions

The site is served by city of Wichita utilities. The entire site is covered by grass and drains to the southeast corner of the property. The soils are of Type B, with an average slope of 0.45%. There is Chisholm creek on the west, adjacent to the property. There is multi family developed area on the northwest, two family (TF-3) partially developed areas on south, multifamily partially developed area on east of the property. There are limited industrial (LI), developed areas on the east of Fairview Avenue.

There are existing stormwater sewers on the 29th St, north of the property and on Fairview Avenue, southeast of the property. The city storm sewers on the 29th St. collect the runoff from street and adjacent properties and drains to the creek. The storm sewers on Fairview collect the runoff from street and adjacent properties and drains to the south and to the west into the creek. The existing drainage pattern indicates that the subject property is draining in to the city storm sewers on the Fairview Ave before discharging to the creek.

There is no established flood boundary or base flood elevation for adjacent Chisholm creek. The base flood elevation available from the city is approximately 1314.20 for the purpose of analysis and establishing the minimum pad elevation for the buildings. The area covered by old Chisholm creek is zoned as zone ‘A’ with incorporated area on FEMA flood map (panel # 355, map # 200328). City of Wichita is in the process of establishing the floodway and floodplain map for this area. There is no sign of existing wetlands although the site is next to the creek

The attached plat with topography and existing drainage map show existing features including contours, utilities, and proposed easements. The existing drainage map is attached in tab 2. The drainage flow arrows indicate the existing flow pattern.

Proposed Improvements

The proposed improvements of site is to develop into a commercial area with zoning General Commercial (GC) which will include buildings, parking lots and other facilities for commercial use. There will be a detention basin on the northwest corner to achieve the required detention and for compensatory storage of lost floodplain storage. A site plan has

not been presented to K.E. Miller engineering during the time of this report preparation. A 15" RCP with flap gate on downstream of proposed pond is recommended to discharge the runoff from the pond to the creek. Internal network of stormsewer network may be required and designed to collect the runoff from the site to the detention basin. A detailed hydraulic analysis shall be performed during the site design phase.

The hydrological analysis were performed with the assumptions of 80% of site will be covered by impervious area. Hydrological models representing the existing and proposed developed conditions were modeled and the output area attached in proposed drainage plan attached in tab 3. Attached drainage plan illustrates that there is no increase in post developed runoff from the property and reserve size is big enough to counter the lost floodplain due to floodplain fill. The attached calculation in drainage plan shows the existing and developed peak runoffs, including assumed coefficients and conditions for each storm events. An approximate hydrological model was developed to check the effect of tail water condition for the detention pond. The peak discharge from the pond happens approx. 37 minutes before the peak flow at the creek. There will be no discharge between peak flow of pond and peak at the creek. In such situation flap gate will be closed to prevent the back flow. A representing pond output hydrograph is attached in tab 3.

Best management practices for erosion control shall be undertaken during the site design phase. Such BMP 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.

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. TR-55 method has been used to calculate the time of concentration. Detention pond routing and peak runoff calculations have been developed by Sim-Route method.

Hydraulic Model

An Analysis of hydraulic characteristics shall be developed to collect the runoff from entire site to the detention basin.

Future Development

There will be addition of buildings, parking lots and other facilities to this site for commercial use. The site may require planning and design of internal stormsewer/surface drain network to collect the runoff from the entire site.

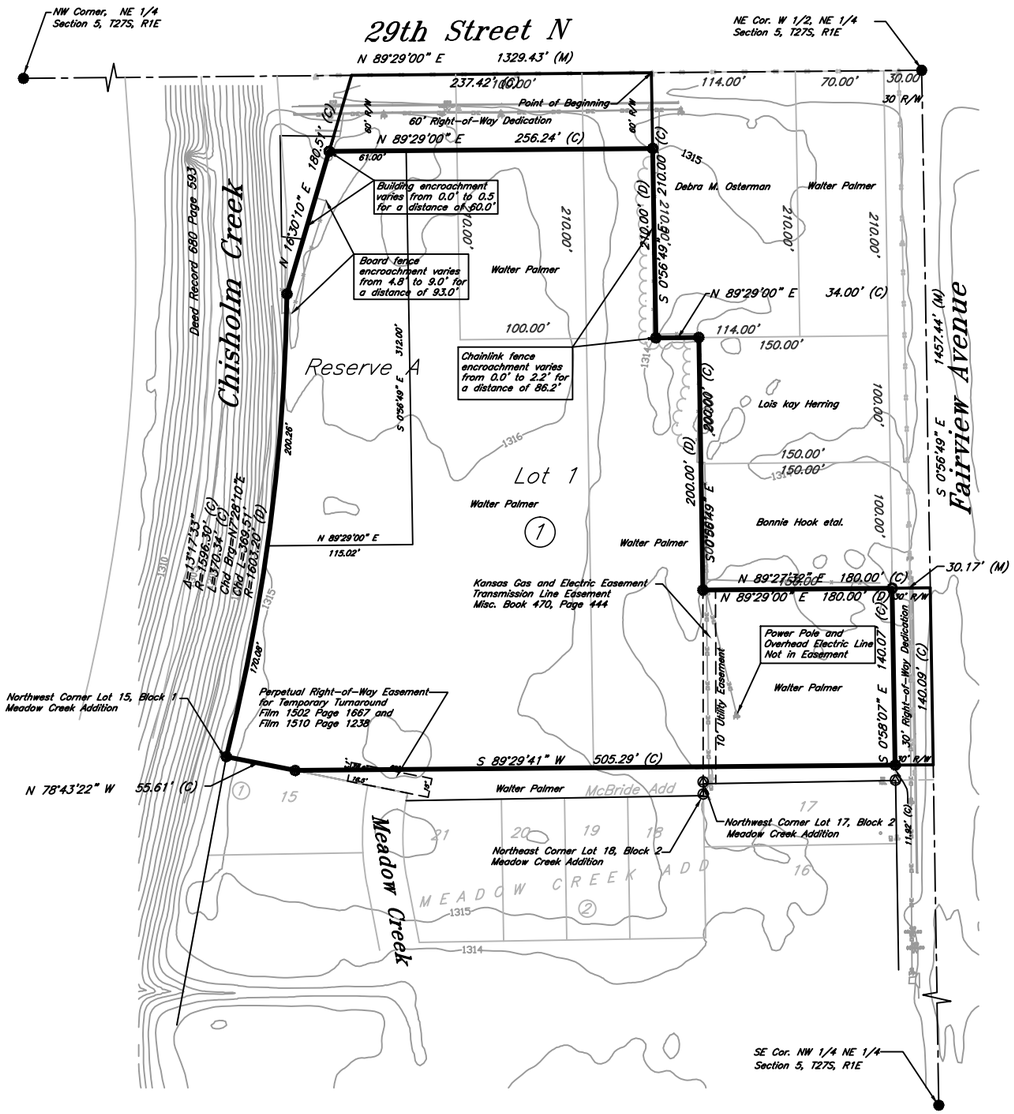
The finish floor of the buildings shall be at least two feet (2') above the base flood elevation (100-yr flood). At this time best available BFE fro this site is approximately 1314.2.

One-Step Final Plat

David & Palmer Addition

Wichita, Sedgwick County, Kansas

Part of the NE 1/4, Section 5, Township 27 South, Range 1 East of the 6th. P.M.



60 30 0 60

(IN FEET)
1 inch = 60 ft.

- Electric Box
- Guy Wire
- Cable Television Pedestal
- Telephone Pedestal
- Water Valve
- Fire Hydrant
- Power Pole
- Treerow
- Sanitary Sewer Manhole
- Overhead Electric
- Sanitary Sewer Line
- 1 ¼" Iron Pipe (found)
- ¾" Iron Pipe (found)
- ⅝" Rebar (found) Mid Kansas
- ⅝" Rebar (set) KEMPA CLS #157
- M Measured
- C Calculated
- D Deeded

NOTES:

Utility locations are from Kansas One-Call.

BENCHMARKS:

Arkansas and 29th St. North
SW corner of intersection approximately 30' South and 28' West of center line of intersection 1317.03 NAVD88.

LOCATION MAP
(For Reference Only)

State of Kansas)
County of Sedgwick) SS

I, Bradley C. Ward, a licensed land surveyor of the State of Kansas, do hereby certify that the following described tract of land was surveyed on the 7th day of February, 2014 and the accompanying final plat prepared and that all the monuments shown herein actually exist and their positions are correctly shown to the best of my knowledge and belief:

LEGAL DESCRIPTION

Commencing at the Northeast corner of the West Half of the Northeast Quarter of Section 5, Township 27 South, Range 1 East thence; S 89°29'00" W, on the North line of said Northeast Quarter, a distance of 214.00 feet; to the Point of Beginning; thence S 0°56'49" E, a distance of 210.00 feet; thence N 89°29'00" E, a distance of 34.00 feet; thence S 0°56'49" E, a distance of 200.00 feet; thence N 89°29'00" E, a distance of 180.00 feet, to the East line of said Northeast Quarter; thence S 0°56'49" E, on the East line of said Northeast Quarter, a distance of 140.09 feet, to the North line of McBride Addition, Wichita, Sedgwick County, Kansas, extended; thence S 89°29'41" W, on the North line of McBride Addition extended, a distance of 505.29 feet, to a point on the North line of Meadow Creek Addition, Wichita, Sedgwick County, Kansas; thence N 78°43'22" W, on the North line of Meadow Creek Addition, a distance of 55.61 feet, to the Northwest corner of Lot 15, Block 1, Meadow Creek Addition; thence on a curve to the left, with a radius of 1596.30, a delta of 13°17'33" and a chord bearing of N 7°28'10" E, a distance of 370.34 feet, on the East line of Chisholm Creek; thence N 16°30'10" E, a distance of 180.51 feet, to the North line of said Northeast Quarter; thence N 89°29'00" E, a distance of 237.42 feet, to the Point of Beginning. EXCEPT the North 60 feet thereof and the East 30 feet thereof for Road Right-of-Way. Tract contains 185,202 square feet or 4.25 acres ±.

All easements and rights-of-way within said tract are hereby vacated by virtue of KSA 12-512b amended.

Bradley C. Ward, L.S. #920

State of Kansas)
County of Sedgwick) SS

Know all men by these presents, that we, the undersigned, have caused the land described in the surveyor's certificate to be platted into a Lot, a Block, and a Reserve, to be known as David & Palmer Addition, Wichita, Sedgwick County, Kansas. Any streets are hereby dedicated to and for the use of the public as denoted on the plat. The access controls are hereby granted to the appropriate governing body as shown hereon. Any easements are hereby granted as indicated for constructing, maintaining, operating, and repairing public utilities. A drainage plan has been developed for the plat and that all drainage easements, rights-of-way, or reserves shall remain at established grades or as modified with the approval of the applicable City or County Engineer, and unobstructed to allow for the conveyance of stormwater. And further, that the land contained herein is held and shall be conveyed subject to any applicable restrictions, reservations and covenants now on file or hereafter filed in the Office of the Register of Deeds of Sedgwick County, Kansas.

By: _____
Walter Palmer (owner)

State of Kansas)
County of Sedgwick) SS

This instrument was acknowledged before me on this _____ day of _____, 2014, by Walter Palmer (Owner).

_____
Notary Public

My Commission Expires: _____

State of Kansas)
City of Wichita) SS

This plat of David & Palmer Addition, Wichita, Sedgwick County, Kansas, has been submitted to and approved by the Wichita-Sedgwick County Metropolitan Area Planning Commission, Wichita, Kansas. Dated this _____ day of _____, 2014.
Wichita-Sedgwick County Metropolitan Area Planning Commission.

_____
David Dennis, Chair

_____
John L. Schlegel, Secretary

State of Kansas)
City of Wichita) SS

This plat approved and all dedications shown hereon accepted by the City Council of the City of Wichita, Kansas, this _____ day of _____, 2014.

At the Direction of the City Council

_____
Carl Brewer, Mayor

_____
Karen Sublett, City Clerk

Entered on transfer record this _____ day of _____, 2014.

_____
Kelly B. Arnold, County Clerk

State of Kansas)
County of Sedgwick) SS

This is to certify that this plat has been filed for record in the Office of the Register of Deeds this _____ day of _____, 2014, at _____ o'clock __M; and is duly recorded.

_____
Bill Meek, Register of Deeds

_____
Tonya Buckingham, Deputy

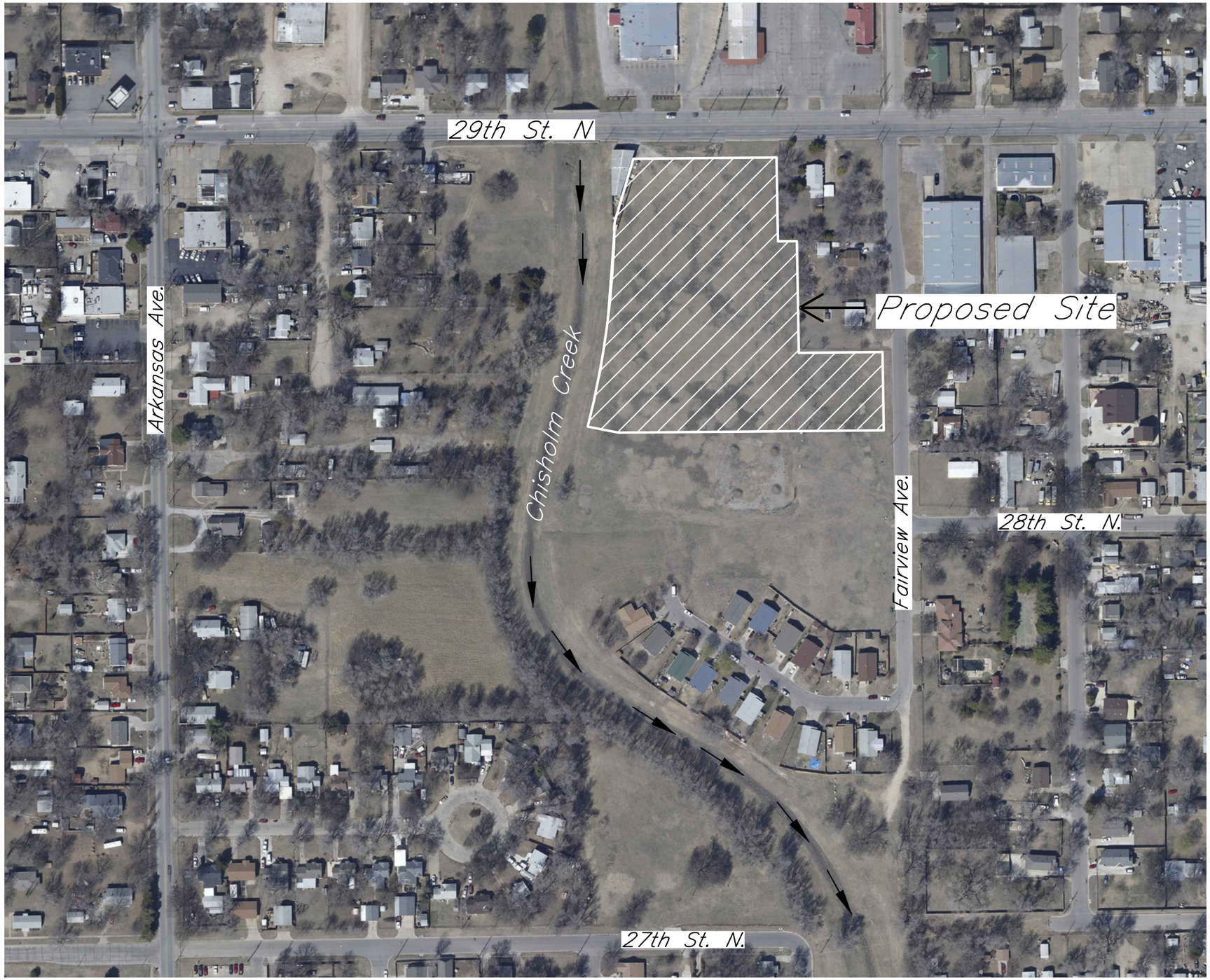
Reviewed in accordance with K.S.A. 58-2005 on this _____ day of _____, 2014

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

14013/Palmer Preliminary Plat.dwg 3-10-14

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

March 13, 2014

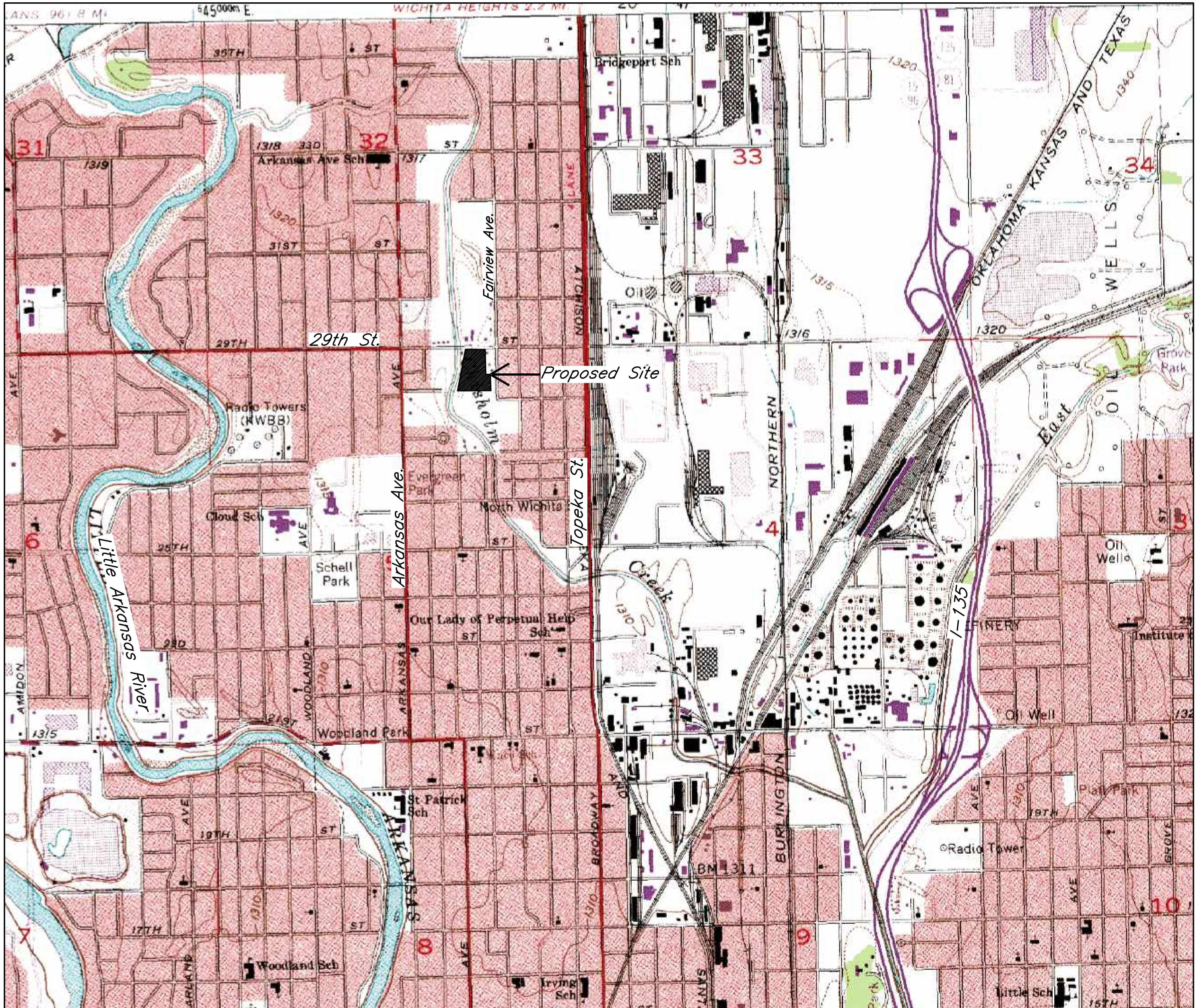


not to scale

David and Palmer Addition
Aerial/Location Map
Wichita, Kansas

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

PROJECT NUMBER			
KEM NO. 14013	FILE	DATE 03/2014	SHEET 1.0
DESIGN GP	DRAWN GP	REVISED	



not to scale

March 12, 2014

David and Palmer Addition

USGS Map

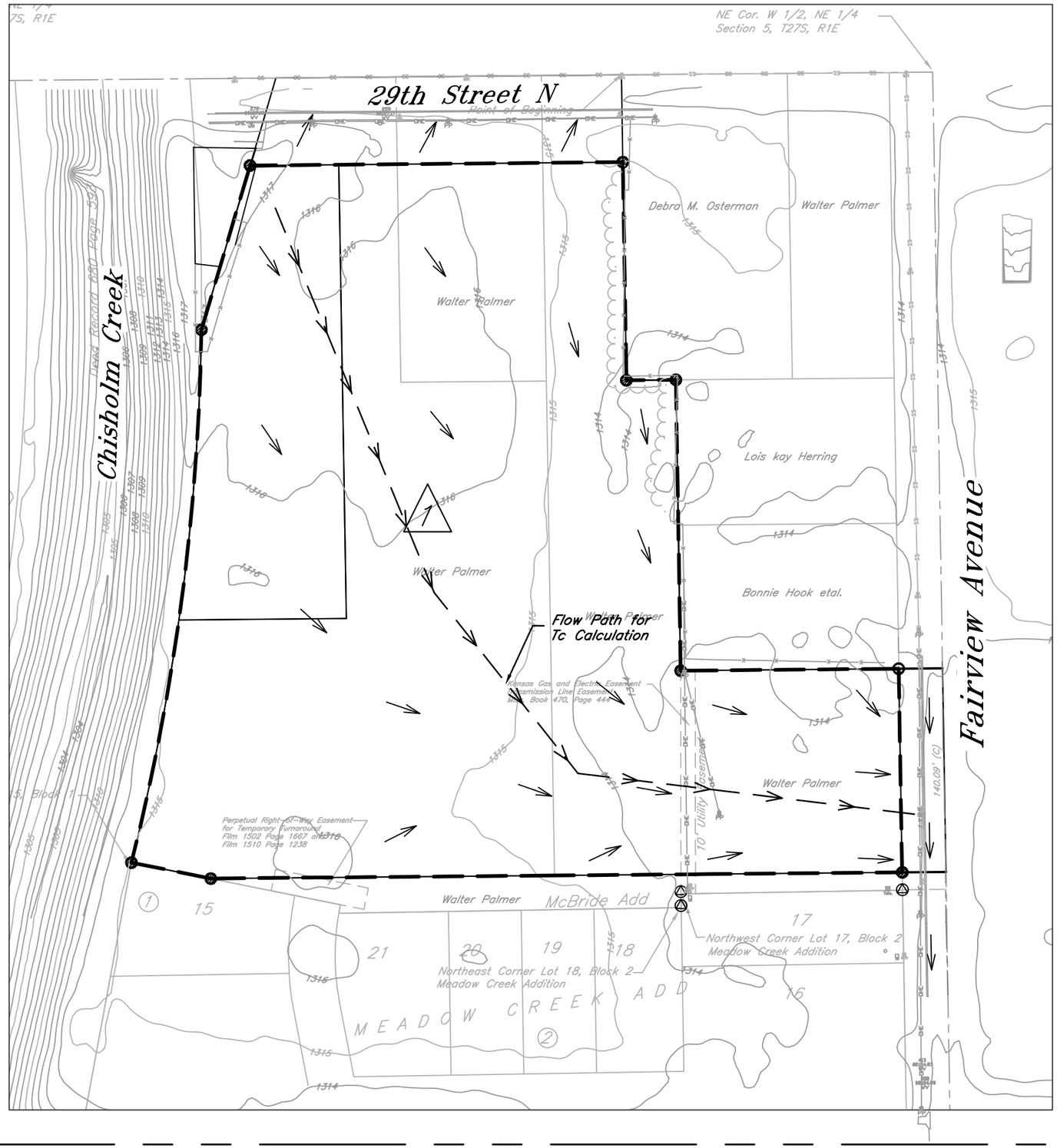
Wichita, Kansas

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

PROJECT NUMBER			SHEET
KEM NO. 14013	FILE	DATE 03/2014	1.0
DESIGN GP	DRAWN GP	REVISED	

Tab 2:

Existing Drainage Map



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

EXITING CONDITION:
Drainage Area = 4.15 acres
Soil Group =B (as per COW HSG map)
Impervious Area= 0.0% , Disturbed Pervious Area= 0%,
Undisturbed Pervious Area = 100%, CN= 71
Time of Concentration (Tc)= 25.1 Minutes (TR–55 Method)

UNDEVELOPED SITE									
DRAINAGE AREA	ACRES	Tc Mins	CN	Q2	Q5	Q10	Q25	Q100	REMARKS
On-site Basin	4.15	25.1	71	3.97	6.83	9.01	11.95	17.79	Draining to Creek through SWS System at Fairview

BENCHMARKS:
Arkansas and 29th St. North
SW corner of intersection approximately 30' South and 28' West of center line of intersection 1317.03 NAVD88.

1 *Onsite drainage basin, Area = 4.15 acres*

Drainage Basin Boundary

40 0 20 40 80 160

(IN FEET)
1 inch = 40 ft.

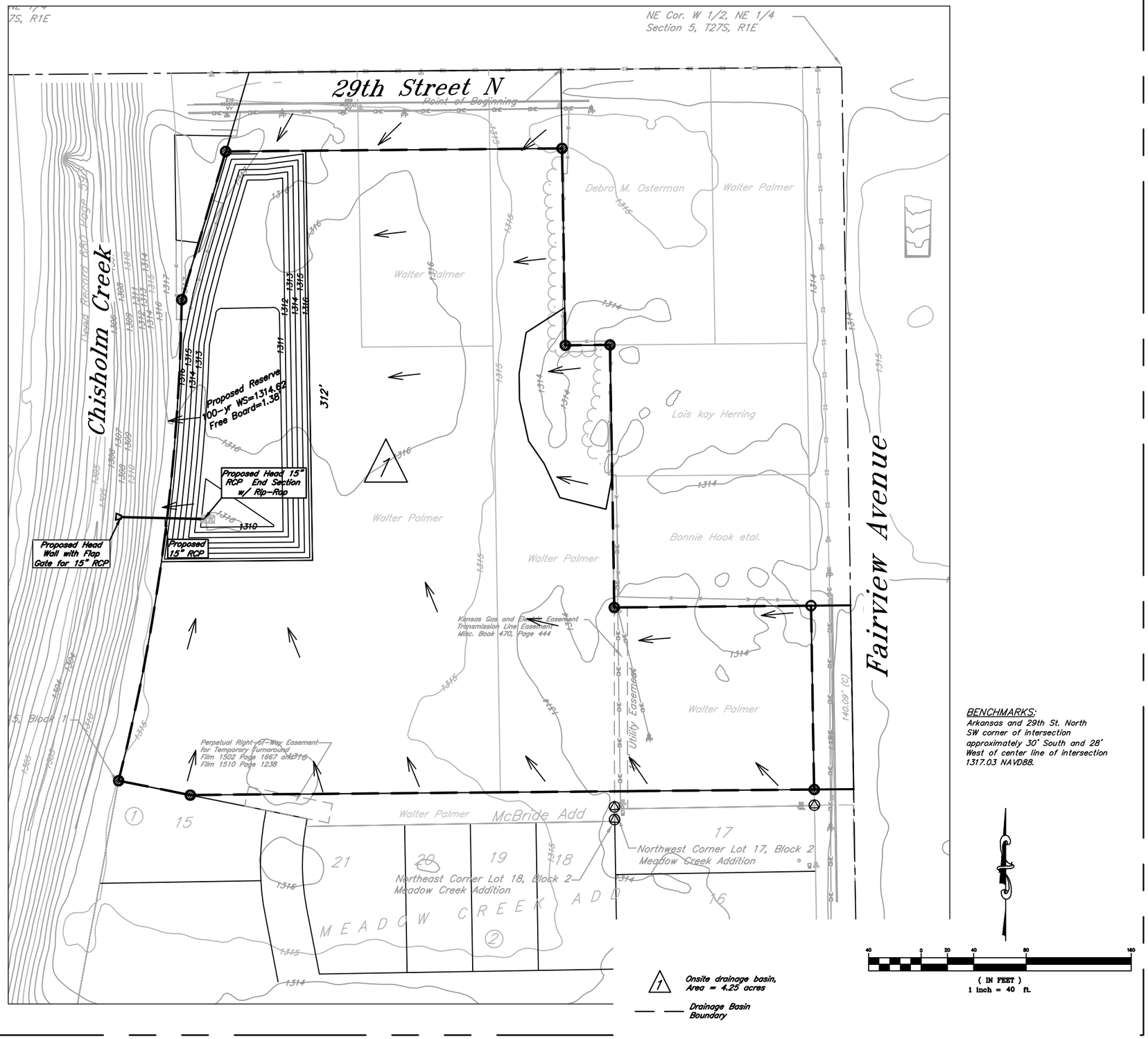
David & Palmer Addition
Ex. Drainage Map
Wichita, Kansas

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

PROJECT NUMBER			
KEM NO. 14013	FILE	DATE 02/2014	SHEET 1.0
DESIGN GP	DRAWN GP	REVISED	

Tab 3:

Proposed Drainage Plan
Hydrological Calculations



BENCHMARKS:
Arkansas and 29th St. North
SW corner of intersection
approximately 30' South and 28'
West of center line of intersection
1317.03 NAVD88.

Project Narrative:

The site is located at the southeast corner of 29th St. N and Chisholm Creek, west of Fairview Ave. The tract of land is approximately 4.15 acres and is currently zoned as multi family residential. The proposed site is undeveloped and covered by grass. The propose use of land is to develop into commercial site with addition of buildings, parking and other facilities for commercial use. The existing drainage pattern indicates that the entire basin drains towards southeast corner of property and then to the storm sewer inlets at Fairview Ave. The collected runoff then drains to the Chisholm creek further south of the property.

Water Quality and TSS Removal Calculation

The water quality volume and runoff for the proposed development shall be handled through the proprietary system and/or extended detention basin and/or BMPs or Combination of such. Proprietary system could be Hydroguard, CDS unit, snouts or similar products. The location of such BMPs shall be decided in site design. The water quality BMPs shall be designed to handle 80% TSS removal from the entire site before it drains to the creek. Following table shows the water quality volume and runoff calculations.

Water Quality Volume (WQv) Calculation

Calculation for water quality volume (WQv=P*Rv*A/12)				Soil Group 'B'		
85th percentile storm event (1.2 inches),P =	1.20	inches		Calulation of Rv		
Total area, A =	4.15	acres			Coeff.	Area
Rainfall Coeff, Rv, =	0.800			Coeff for undisturbed area, R_{VU}=	0.03	0.00
Required Vol. for Water Quality =	**0.332**	ac-ft		Coeff for turf cover,disturbed, R_{VT}=	0.20	0.83
Corresponding Water Quality Peak Flow =	**3.22**	cfs		Coeff for impervious area, R_{VI}=	0.95	3.32
				Weighted, Rv =	**0.800**	

Channel Protection Volume (CPv)

The Channel protection volume detention (1-yr storm for 24 hrs) is not required as the total disturbance of proposed development does not exceed 5.0 acres.

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

EXITING CONDITION:
Drainage Area = 4.15 acres
Soil Group =B (as per COW HSG map)
Impervious Area= 0.0% , Disturbed Pervious Area= 0%,
Undisturbed Pervious Area = 100%, CN= 71
Time of Concentration (Tc)= 25.1 Minutes

UNDEVELOPED SITE									
DRAINAGE AREA	ACRES	Tc Mins	CN	Q2	Q5	Q10	Q25	Q100	REMARKS
On-site Basin	4.15	25.1	71	3.97	6.83	9.01	11.95	17.79	Draining to Creek through SWS System at Fairview

DEVELOPED CONDITION:
Total Area, A = 4.15 acres
Impervious Area = 80% (assumed for commercial development after accounting size of reserve)
Disturbed Pervious Area= 20%, Soil Group =B (as per COW HSG map)
CN= 95, Time of Concentration (Tc)= 14.1 Minutes (100 ft sheet flow @ 1.0%, 100 ft shallow concn flow @1.0% and rest of pipe flow @0.3% assumed for analysis)

DEVELOPED SITE									
DRAINAGE AREA	ACRES	Tc Mins	CN	Q2	Q5	Q10	Q25	Q100	REMARKS
On-site Basin	4.15	14.1	95	15.22	19.98	23.30	27.54	35.52	Draining to Proposed Detention Basin

OUTFLOW							
DRAINAGE AREA	ACRES	Q2	Q5	Q10	Q25	Q100	REMARKS
On-site	4.15	4.77	5.76	6.33	6.98	8.02	Draining to Creek
Water Surface Elevation		1311.71	1312.06	1312.29	1312.58	1313.44	

Notes:

1. *Existing and developed flows are calculated using the SCS hydrograph method. "CN" & "Runoff Depth" values are established from "City of Wichita Stormwater Design Manual." Time of concentration (Tc) are calculated using TR-55 method.*
2. *The developed peak flows are calculated for the Type II rainfall distribution for 24 hours. The peak flows are routed to the Chisholm creek after detention.*
3. *An approximate hydrological models for creek were developed to check the effect of tailwater. At 100- yr event the pond peaks before the creek. In between two peak times there will be no discharge from the pond due to water surface elevation in creek. In such situation flap gate will be closed to prevent the backflow.*
4. *The peak out flow and corresponding water surface elevation shown on table are the peak outflow and water surface before the creek peaks.*
5. *Chisholm creek that runs along the west property line is designated as Zone A in FEMA flood map (FIRM 20173C0355E, dated February 2, 2007).*
6. *The positive overflows from the entire site shall be maintained to the creek.*
7. *Series of stormsewer network may be required during site design to route the runoff from entire site to the detention basin.*
8. *Potentially 0.2 ac-ft of flood storage can be lost due to grading activity. The compensatory storage shall be considered in reserve for lost flood storage.*

David & Palmer Addition
Drainage Plan
Wichita, Kansas

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

PROJECT NUMBER			
KEM NO. 14013	FILE	DATE 03/2014	SHEET 1.0
DESIGN GP	DRAWN GP	REVISED	

Summary for Pond Detention: DED POND

[86] Warning: Oscillations may require smaller dt

Inflow Area = 4.150 ac, Inflow Depth = 7.20" for 100-yr 24 hr storm event
Inflow = 35.52 cfs @ 12.05 hrs, Volume= 2.491 af
Outflow = 8.02 cfs @ 12.29 hrs, Volume= 2.490 af, Atten= 77%, Lag= 14.1 min
Primary = 8.02 cfs @ 12.29 hrs, Volume= 2.490 af

Routing by Sim-Route method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Peak Elev= 1,313.44' @ 13.18 hrs Surf.Area= 19,711 sf Storage= 43,679 cf

Plug-Flow detention time= 73.3 min calculated for 2.490 af (100% of inflow)
Center-of-Mass det. time= 73.0 min (834.2 - 761.2)

Volume	Invert	Avail.Storage	Storage Description
#1	1,310.00'	103,861 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
1,310.00	1,057	0	0
1,311.00	9,910	5,484	5,484
1,312.00	15,678	12,794	18,278
1,315.00	24,105	59,675	77,952
1,316.00	27,713	25,909	103,861

Device	Routing	Invert	Outlet Devices
#1	Primary	1,310.00'	**15.0" x 75.0' long Culvert** RCP, end-section conforming to fill, Ke= 0.500 Outlet Invert= 1,309.70' S= 0.0040 '/' Cc= 0.900 n= 0.013

Primary OutFlow Max=7.93 cfs @ 12.29 hrs HW=1,313.10' TW=1,310.99' (Dynamic Tailwater)
↳**1=Culvert** (Outlet Controls 7.93 cfs @ 6.46 fps)

Summary for Pond Detention: DED POND

Inflow Area = 4.150 ac, Inflow Depth = 5.51" for 25-yr 24 hr storm event
Inflow = 27.54 cfs @ 12.05 hrs, Volume= 1.906 af
Outflow = 6.98 cfs @ 12.33 hrs, Volume= 1.905 af, Atten= 75%, Lag= 16.5 min
Primary = 6.98 cfs @ 12.33 hrs, Volume= 1.905 af

Routing by Sim-Route method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Peak Elev= 1,312.58' @ 12.33 hrs Surf.Area= 17,312 sf Storage= 27,870 cf

Plug-Flow detention time= 57.9 min calculated for 1.904 af (100% of inflow)
Center-of-Mass det. time= 57.6 min (824.6 - 766.9)

Volume	Invert	Avail.Storage	Storage Description
#1	1,310.00'	103,861 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
1,310.00	1,057	0	0
1,311.00	9,910	5,484	5,484
1,312.00	15,678	12,794	18,278
1,315.00	24,105	59,675	77,952
1,316.00	27,713	25,909	103,861

Device	Routing	Invert	Outlet Devices
#1	Primary	1,310.00'	**15.0" x 75.0' long Culvert** RCP, end-section conforming to fill, Ke= 0.500 Outlet Invert= 1,309.70' S= 0.0040 '/' Cc= 0.900 n= 0.013

Primary OutFlow Max=6.98 cfs @ 12.33 hrs HW=1,312.58' TW=1,310.28' (Dynamic Tailwater)
↳**1=Culvert** (Barrel Controls 6.98 cfs @ 5.69 fps)

Summary for Pond Detention: DED POND

[86] Warning: Oscillations may require smaller dt

Inflow Area = 4.150 ac, Inflow Depth = 4.62" for 10-yr 24 hr storm event
Inflow = 23.30 cfs @ 12.05 hrs, Volume= 1.597 af
Outflow = 6.33 cfs @ 12.31 hrs, Volume= 1.596 af, Atten= 73%, Lag= 15.6 min
Primary = 6.33 cfs @ 12.31 hrs, Volume= 1.596 af

Routing by Sim-Route method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Peak Elev= 1,312.29' @ 12.31 hrs Surf.Area= 16,495 sf Storage= 22,955 cf

Plug-Flow detention time= 48.6 min calculated for 1.596 af (100% of inflow)
Center-of-Mass det. time= 48.2 min (819.2 - 771.0)

Volume	Invert	Avail.Storage	Storage Description
#1	1,310.00'	103,861 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
1,310.00	1,057	0	0
1,311.00	9,910	5,484	5,484
1,312.00	15,678	12,794	18,278
1,315.00	24,105	59,675	77,952
1,316.00	27,713	25,909	103,861

Device	Routing	Invert	Outlet Devices
#1	Primary	1,310.00'	**15.0" x 75.0' long Culvert** RCP, end-section conforming to fill, Ke= 0.500 Outlet Invert= 1,309.70' S= 0.0040 '/' Cc= 0.900 n= 0.013

Primary OutFlow Max=6.33 cfs @ 12.31 hrs HW=1,312.29' TW=1,309.54' (Dynamic Tailwater)
↳**1=Culvert** (Barrel Controls 6.33 cfs @ 5.16 fps)

Summary for Pond Detention: DED POND

[86] Warning: Oscillations may require smaller dt

Inflow Area = 4.150 ac, Inflow Depth = 4.62" for 10-yr 24 hr storm event
Inflow = 23.30 cfs @ 12.05 hrs, Volume= 1.597 af
Outflow = 6.33 cfs @ 12.31 hrs, Volume= 1.596 af, Atten= 73%, Lag= 15.6 min
Primary = 6.33 cfs @ 12.31 hrs, Volume= 1.596 af

Routing by Sim-Route method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Peak Elev= 1,312.29' @ 12.31 hrs Surf.Area= 16,495 sf Storage= 22,955 cf

Plug-Flow detention time= 48.6 min calculated for 1.596 af (100% of inflow)
Center-of-Mass det. time= 48.2 min (819.2 - 771.0)

Volume	Invert	Avail.Storage	Storage Description
#1	1,310.00'	103,861 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
1,310.00	1,057	0	0
1,311.00	9,910	5,484	5,484
1,312.00	15,678	12,794	18,278
1,315.00	24,105	59,675	77,952
1,316.00	27,713	25,909	103,861

Device	Routing	Invert	Outlet Devices
#1	Primary	1,310.00'	**15.0" x 75.0' long Culvert** RCP, end-section conforming to fill, Ke= 0.500 Outlet Invert= 1,309.70' S= 0.0040 '/' Cc= 0.900 n= 0.013

Primary OutFlow Max=6.33 cfs @ 12.31 hrs HW=1,312.29' TW=1,309.54' (Dynamic Tailwater)
↳**1=Culvert** (Barrel Controls 6.33 cfs @ 5.16 fps)

Summary for Pond Detention: DED POND

Inflow Area = 4.150 ac, Inflow Depth = 3.92" for 5-yr 24 hr storm event
Inflow = 19.98 cfs @ 12.05 hrs, Volume= 1.357 af
Outflow = 5.76 cfs @ 12.30 hrs, Volume= 1.357 af, Atten= 71%, Lag= 14.9 min
Primary = 5.76 cfs @ 12.30 hrs, Volume= 1.357 af

Routing by Sim-Route method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Peak Elev= 1,312.06' @ 12.30 hrs Surf.Area= 15,846 sf Storage= 19,220 cf

Plug-Flow detention time= 43.1 min calculated for 1.357 af (100% of inflow)
Center-of-Mass det. time= 42.7 min (817.6 - 774.9)

Volume	Invert	Avail.Storage	Storage Description
#1	1,310.00'	103,861 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
1,310.00	1,057	0	0
1,311.00	9,910	5,484	5,484
1,312.00	15,678	12,794	18,278
1,315.00	24,105	59,675	77,952
1,316.00	27,713	25,909	103,861

Device	Routing	Invert	Outlet Devices
#1	Primary	1,310.00'	**15.0" x 75.0' long Culvert** RCP, end-section conforming to fill, Ke= 0.500 Outlet Invert= 1,309.70' S= 0.0040 '/' Cc= 0.900 n= 0.013

Primary OutFlow Max=5.76 cfs @ 12.30 hrs HW=1,312.06' TW=1,308.90' (Dynamic Tailwater)
↳**1=Culvert** (Barrel Controls 5.76 cfs @ 4.69 fps)

Summary for Pond Detention: DED POND

Inflow Area = 4.150 ac, Inflow Depth = 2.94" for 2-yr 24 hr storm event
Inflow = 15.22 cfs @ 12.05 hrs, Volume= 1.016 af
Outflow = 4.77 cfs @ 12.28 hrs, Volume= 1.016 af, Atten= 69%, Lag= 14.0 min
Primary = 4.77 cfs @ 12.28 hrs, Volume= 1.016 af

Routing by Sim-Route method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Peak Elev= 1,311.71' @ 12.28 hrs Surf.Area= 14,022 sf Storage= 14,014 cf

Plug-Flow detention time= 40.7 min calculated for 1.016 af (100% of inflow)
Center-of-Mass det. time= 40.2 min (822.4 - 782.3)

Volume	Invert	Avail.Storage	Storage Description
#1	1,310.00'	103,861 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
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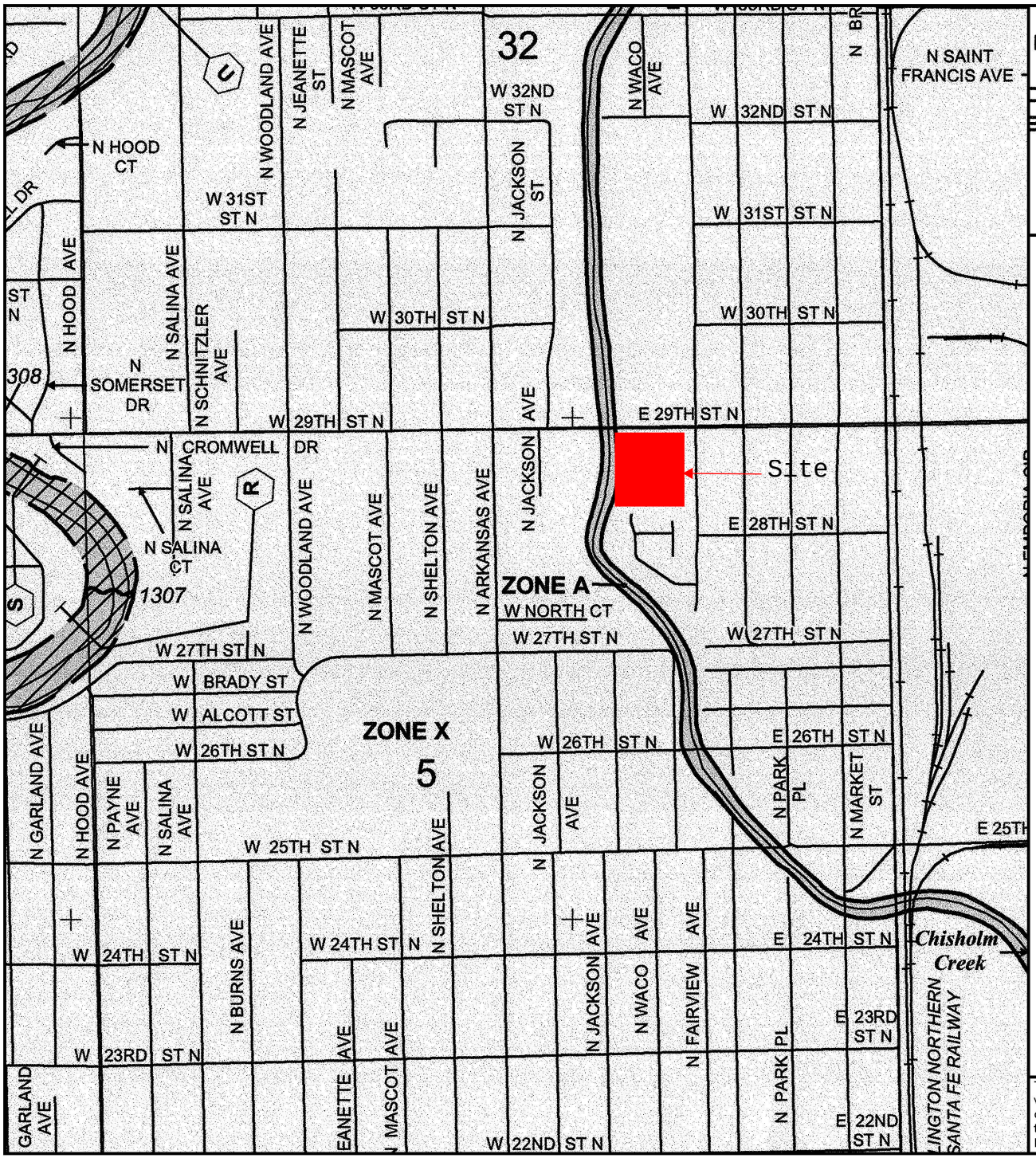
#1	Primary	1,310.00'	**15.0" x 75.0' long Culvert** RCP, end-section conforming to fill, Ke= 0.500 Outlet Invert= 1,309.70' S= 0.0040 '/' Cc= 0.900 n= 0.013

Primary OutFlow Max=4.77 cfs @ 12.28 hrs HW=1,311.71' TW=1,307.86' (Dynamic Tailwater)
↳**1=Culvert** (Barrel Controls 4.77 cfs @ 3.89 fps)

Tab 4:

FIRM Panel



MAP SCALE 1" = 1000'

1000 2000 FEET

0 300 600 METERS

PANEL 0355E

FIRM

FLOOD INSURANCE RATE MAP

SEDGWICK COUNTY, KANSAS AND INCORPORATED AREAS

PANEL 355 OF 700

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
WICHITA, CITY OF	200328	0355	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
20173C0355E

EFFECTIVE DATE
FEBRUARY 2, 2007

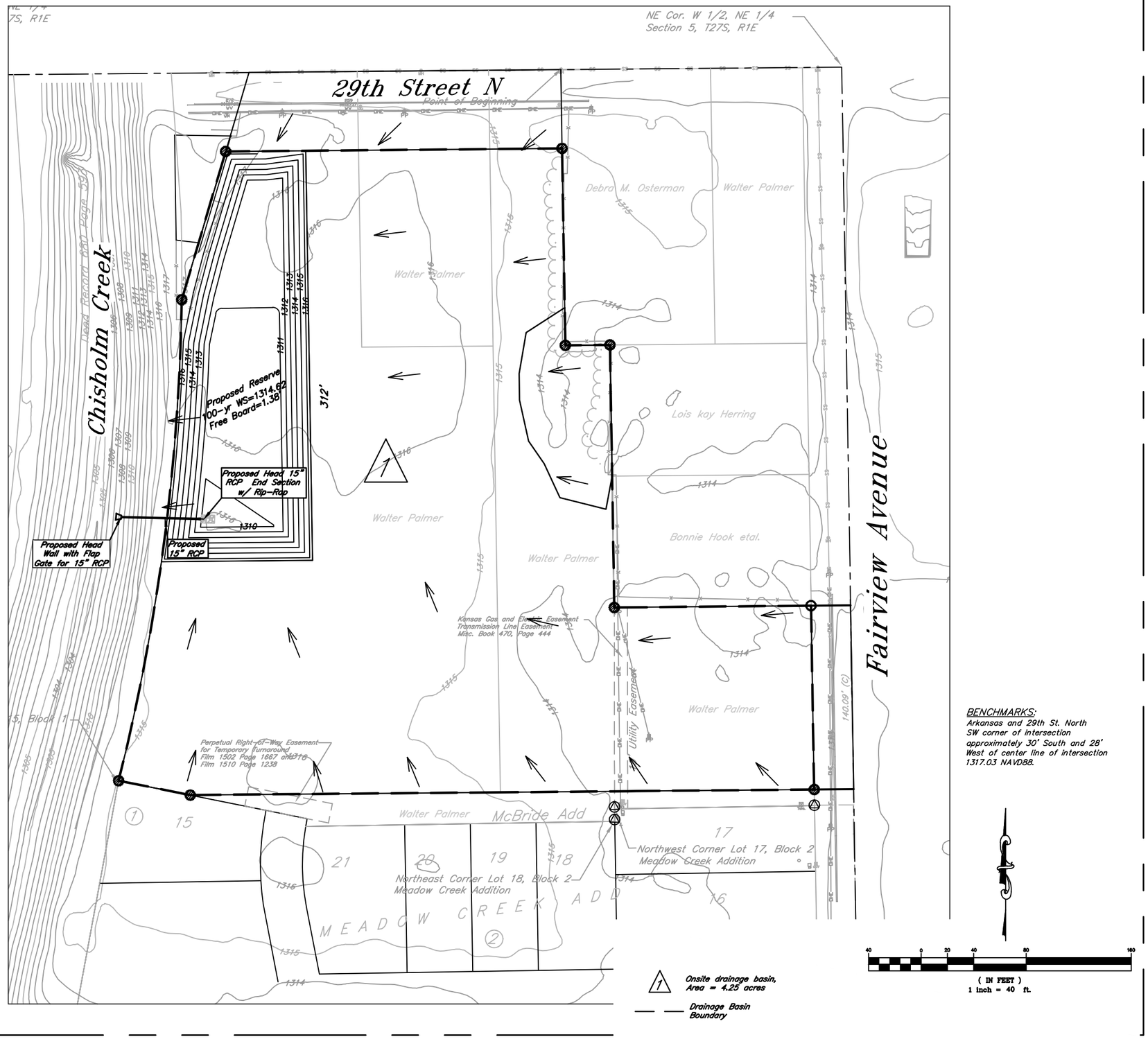
Federal Emergency Management Agency

Tab 5:

Not applicable

Tab 6:

Proposed Drainage Plan
Electronic copies of report



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1317.03 NAVD88.

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Water Quality and TSS Removal Calculation

The water quality volume and runoff for the proposed development shall be handled through the proprietary system and/or extended detention basin and/or BMPs or Combination of such. Proprietary system could be Hydroguard, CDS unit, snouts or similar products. The location of such BMPs shall be decided in site design. The water quality BMPs shall be designed to handle 80% TSS removal from the entire site before it drains to the creek. Following table shows the water quality volume and runoff calculations.

Water Quality Volume (WQv) Calculation

Calculation for water quality volume (WQv=P*Rv*A/12)				Soil Group 'B'		
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Rainfall Coeff, Rv, =	0.800			Coeff for undisturbed area, R_{VU}=	0.03	0.00
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Corresponding Water Quality Peak Flow =	**3.22**	cfs		Coeff for impervious area, R_{VI}=	0.95	3.32
				Weighted, Rv =	**0.800**	

Channel Protection Volume (CPv)

The Channel protection volume detention (1-yr storm for 24 hrs) is not required as the total disturbance of proposed development does not exceed 5.0 acres.

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

EXITING CONDITION:
Drainage Area = 4.15 acres
Soil Group =B (as per COW HSG map)
Impervious Area= 0.0% , Disturbed Pervious Area= 0%,
Undisturbed Pervious Area = 100%, CN= 71
Time of Concentration (Tc)= 25.1 Minutes

UNDEVELOPED SITE									
DRAINAGE AREA	ACRES	Tc Mins	CN	Q2	Q5	Q10	Q25	Q100	REMARKS
On-site Basin	4.15	25.1	71	3.97	6.83	9.01	11.95	17.79	Draining to Creek through SWS System at Fairview

DEVELOPED CONDITION:
Total Area, A = 4.15 acres
Impervious Area = 80% (assumed for commercial development after accounting size of reserve)
Disturbed Pervious Area= 20%, Soil Group =B (as per COW HSG map)
CN= 95, Time of Concentration (Tc)= 14.1 Minutes (100 ft sheet flow @ 1.0%, 100 ft shallow concn flow @1.0% and rest of pipe flow @0.3% assumed for analysis)

DEVELOPED SITE									
DRAINAGE AREA	ACRES	Tc Mins	CN	Q2	Q5	Q10	Q25	Q100	REMARKS
On-site Basin	4.15	14.1	95	15.22	19.98	23.30	27.54	35.52	Draining to Proposed Detention Basin

OUTFLOW							
DRAINAGE AREA	ACRES	Q2	Q5	Q10	Q25	Q100	REMARKS
On-site	4.15	4.77	5.76	6.33	6.98	8.02	Draining to Creek
Water Surface Elevation		1311.71	1312.06	1312.29	1312.58	1313.44	

Notes:

1. *Existing and developed flows are calculated using the SCS hydrograph method. "CN" & "Runoff Depth" values are established from "City of Wichita Stormwater Design Manual." Time of concentration (Tc) are calculated using TR-55 method.*
2. *The developed peak flows are calculated for the Type II rainfall distribution for 24 hours. The peak flows are routed to the Chisholm creek after detention.*
3. *An approximate hydrological models for creek were developed to check the effect of tailwater. At 100- yr event the pond peaks before the creek. In between two peak times there will be no discharge from the pond due to water surface elevation in creek. In such situation flap gate will be closed to prevent the backflow.*
4. *The peak out flow and corresponding water surface elevation shown on table are the peak outflow and water surface before the creek peaks.*
5. *Chisholm creek that runs along the west property line is designated as Zone A in FEMA flood map (FIRM 20173C0355E, dated February 2, 2007).*
6. *The positive overflows from the entire site shall be maintained to the creek.*
7. *Series of stormsewer network may be required during site design to route the runoff from entire site to the detention basin.*
8. *Potentially 0.2 ac-ft of flood storage can be lost due to grading activity. The compensatory storage shall be considered in reserve for lost flood storage.*

David & Palmer Addition
Drainage Plan
Wichita, Kansas

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PROJECT NUMBER			
KEM NO. 14013	FILE	DATE 03/2014	SHEET 1.0
DESIGN GP	DRAWN GP	REVISED	