

DRAINAGE CONCEPT

FOR

AWAN ESTATES ADDITION
Wichita, Kansas

JULY 2011



City of Wichita/Sedgwick County Subdivision Drainage Plan Checklist



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

Project Name: _____			
Total Area of Project: _____		acres	
Development Type: _____		Other: _____	
Developer Name: _____		Contact: _____	Phone: _____
Email: _____			
Engineer Name: _____		Contact: _____	Phone: _____
Email: _____			

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.		
1.2	Professional Engineer's seal, signature and date on plan cover.		
1.3	Site location map, using color ortho-imagery and showing the project boundaries, a north arrow and an accurate scale.		
1.4	Narrative of the development type, existing conditions and proposed impacts on stormwater runoff, wetlands, riparian zones and floodplains/floodways.		
1.5	Discussion of off-site conditions surrounding the proposed development.		
1.6	Summary table of runoff calculations (pre/post development).		
1.7	Narrative description of the type and function of the permanent structural stormwater management facilities.		
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.		
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.		
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.		
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.		
2.1.5	Location, dimensions and elevations of existing bridges and culvert crossings.		
2.1.6	Location of existing utilities (e.g., water, sewer, gas, electric, cable, etc.) with labels and easement boundaries.		
2.1.7	Groundwater elevations, if 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.		
2.1.9	Land use types per NRCS nomenclature.		
2.1.10	Footprint of existing impervious areas (labeled, area given in acres).		
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).		
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.).		
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).		
2.2.2	A summary table of drainage subbasin hydrologic parameters (subbasin ID, area in acres, curve number, Tc, etc.).		
2.2.3	Table of existing condition runoff curve numbers with supporting data and calculations.		
2.2.4	Table of existing condition times of concentration with supporting data and calculations.		
2.2.5	A summary table of rainfall data used in the hydrologic analysis, and a reference for the source of the data.		
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.		
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.		
3.0 postdevelopment Conditions Information			
3.1 postdevelopment Conditions Drainage Map			
3.1.1	Proposed project boundary.		
3.1.2	on-site and off-site topography: NAVD 88 datum, one-foot contours with spot elevations.		
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.		
3.1.4	Location and description of off-site through-drainage conveyances which are confined to an easement, dedication and/or reserve.		
3.1.5	Footprint of proposed impervious areas, including roads, parking lots, buildings and other structures.		
3.1.6	Location of proposed utilities (e.g., water, sewer, gas, electric, cable, etc.) with labels and easement boundaries.		
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.		
3.1.8	Land use cover per NRCS nomenclature.		
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).		
3.1.10	Proposed limits of land disturbing activity (i.e., grading limits).		
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.)		
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.		
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.		
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.		
3.2.4	Location(s) of stormwater management facilities and any associated drainage easements.		
3.2.5	Proposed energy dissipaters and other channel protection devices.		
3.2.6	Location(s) and dimension(s) of proposed channel, bridge and culvert crossings.		
3.2.7	Normal pool and 100-year pool elevations for ponds and lakes.		
3.2.8	Permanent concrete outfall control structure(s) for ponds.		
3.2.9	Emergency overflow spillways and top of berm elevations for ponds and other volume/peak discharge control facilities.		
3.2.10	Floodplains, ponds, and stormwater management facilities located in reserves.		
3.3 postdevelopment Conditions Hydrology & Hydraulics			
3.3.1	Narrative of the hydrologic analysis methodology used (e.g., unit hydrograph or other approved methods).		

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.).		
3.3.3	Table of postdevelopment condition runoff curve numbers with supporting data and calculations.		
3.3.4	Table of postdevelopment condition times of concentration with supporting data and calculations.		
3.3.5	Cross-sections and other diagrams of existing open channels, bridge and culvert sections and other hydraulic features as		
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.		
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.		
3.3.8	Stage-storage-discharge or other outlet rating curves and inflow/outflow hydrographs for all ponds.		
3.3.9	Demonstrate that the pond contours on the master grading plan and the stage-storage-discharge data are consistent for all ponds.		
3.3.10	Demonstrate that all ponds have one foot of freeboard above the 100-year, 24-hour high water level.		
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.		
3.4 Stormwater Quantity Control Sizing			
3.4.1	Hydraulic sizing calculations for all stormwater management controls.		
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.		
3.4.3	Typical details (including cross-sections where applicable) for outlet structures, embankments, spillways, grade control structures, conveyance channels, etc.		
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.		
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.).		
3.5.3	Water quality volume (total and by facility), with supporting data and calculations.		
3.5.4	% TSS removal value (total and by facility) with supporting data and calculation. Must be equal to or greater than 80%.		
3.5.5	Channel protection volume with supporting data and calculations.		
3.5.6	Water quality volume and channel protection volume orifice size calculations.		
3.5.7	Other calculations required for each stormwater management facility as specified in the Wichita/Sedgwick County Stormwater Manual.		
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.		
4.0 Floodplains			
4.1	Reference the source of flood profile, floodplain, floodway and stream discharge information.		
4.2	Delineation of nearest base flood elevations.		
4.3	Delineation of predevelopment regulatory floodplain/floodway limits using FEMA's current GIS database; limits to be per elevation and scaled location.		
4.4	Delineation of postdevelopment regulatory floodplain/floodway limits; limits to be per elevation and scaled location, with project limits shown.		
4.5	Floodway data table and discharges.		
4.6	Hydrologic and hydraulic study information for local floodplain analysis, unnumbered Zone A elevation determinations and floodplain map revisions or required permits.		
4.7	Regulatory floodway and four natural profile models (10, 50, 100 and 500-year) for existing and postdevelopment conditions.		
4.8	Floodplains and floodways located within a reserve, where necessary.		
4.9	Floodplain cut and fill calculations for volume sensitive basins.		

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").		
5.0 Federal, State and Local Permits			
5.1	US Army Corps of Engineers regulatory program permits (Section 404 permit).		
5.2	Kansas Department of Agriculture - Division of Water Resources Permits (Stream Obstruction, Channel Change, Floodplain Fill, Levee, Water Appropriations, Dam Safety permit, etc.).		
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.		
6.0 Half Scale Preliminary Master Grading Plan			
6.1	One set of plans and associated PDF of plans.		
6.2	Professional Engineer's seal, signature and date.		
6.3	Title block including subdivision name and phase and dated revision documentation.		
6.4	Future phases shown but cross-hatched as information only.		
6.5	Scale, not greater than 1-inch = 60 feet.		
6.6	North arrow.		
6.7	Index or legend key.		
6.8	Benchmarks (minimum of 2) used for site control (NAVD 88 vertical datum).		
6.9	Existing contours of entire site with contour interval of one foot.		
6.10	Proposed contours for channels, ponds, and other permanent stormwater management facilities, with contour interval of one foot.		
6.11	Spot elevations shown to the nearest tenth of a foot for critical locations, including lot and property boundaries.		
6.12	Proposed lot and street layout.		
6.13	Locations of underground storm drains.		
6.14	Overflow locations for storms exceeding storm drain capacity, with elevations.		
6.15	Top elevations of storm drains at all inlets, manholes, and flow line elevations for all outfalls.		
6.16	Locations of open ditches and lakes.		
6.17	Flow direction arrows.		
6.18	Proposed flow line elevations of all open ditches at maximum 100 foot intervals, and 100-year flood elevations thereon.		
6.19	Ponds: Location, bottom elevation, normal pool elevation, 100-year flood elevation, emergency overflow elevation.		
6.20	Proposed top-of-curb elevations at points where drainage will be required to flow over the curb.		
6.21	Platted minimum building opening elevation for each lot, in table form for all lots (excluding basement floor elevations).		
6.22	Standard foundation and elevation detail for slab on grade, full basement, view-out, partial view-out and/or walk-out construction.		
6.23	Top of foundation elevation for each lot.		
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.		
6.25	Indicate that all lots are above the 100-year flood elevation.		
6.26	Indicate that grading around structures conforms to perimeter drainage requirements.		
6.27	Indicate that backyard drainage grading conforms to backyard drainage requirements.		
6.28	Adjacent subdivision lot lines, with lot labels and subdivision names.		
6.29	Boundaries and labels for all easements, rights-of-way and reserves.		
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."		
End of Checklist			

Tab 1. General

Location

The subject property is in the City of Wichita, Sedgwick County, Kansas. The proposed development is north of Kellogg Avenue between East 143rd Street and East 159th Street. The site was previously platted as Belle Terre South Addition. The site includes 88 platted residential lots, 9 streets, and 3 reserves. The site is the southeast quarter of Section 24, Township 27 South, Range 2 East of the 6th P.M. The plat area is 42.2 acres. The site is shown on the USGS Map, Appendix 1.1. The site is also shown on the aerial photograph, Appendix 1.2.

Discussion of Project

Existing

The site was previously platted for residential land use as Belle Terre South Addition. Lots 6-27 of Block 1, Lots 1-56 of Block 6 and Lots 1-10 of Block 7 are being re-platted. Currently these lots are platted, but they have not yet been developed. The site drains from northeast to the southwest. Fourmile creek crosses the southern edge of the property flowing from northwest to southeast. The existing Chelmsford Street flows from north to south and outlets onto the property. Backyards from Belle Terre South flow onto the property from the east.

Proposed

Development Type

The site is being platted as one residential lot. The impervious area is significantly less than what was previously planned. Most of the site will remain as undisturbed area. The basic site is shown on the preliminary plat, Appendix 1. 3. The site is also shown on the final plat, Appendix 1.4. Preliminary site grading is shown on the Master Grading Plan, Appendix 1.5.

Impacts on Stormwater

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

Permanent Structural Stormwater Management Facilities

Since the site will remain virtually unchanged from existing conditions, no permanent structural stormwater management facilities are proposed.

Offsite

Offsite areas north and east of the site drain through the property to Fourmile Creek. They are included in Basins A, B, C, and D.

Summary

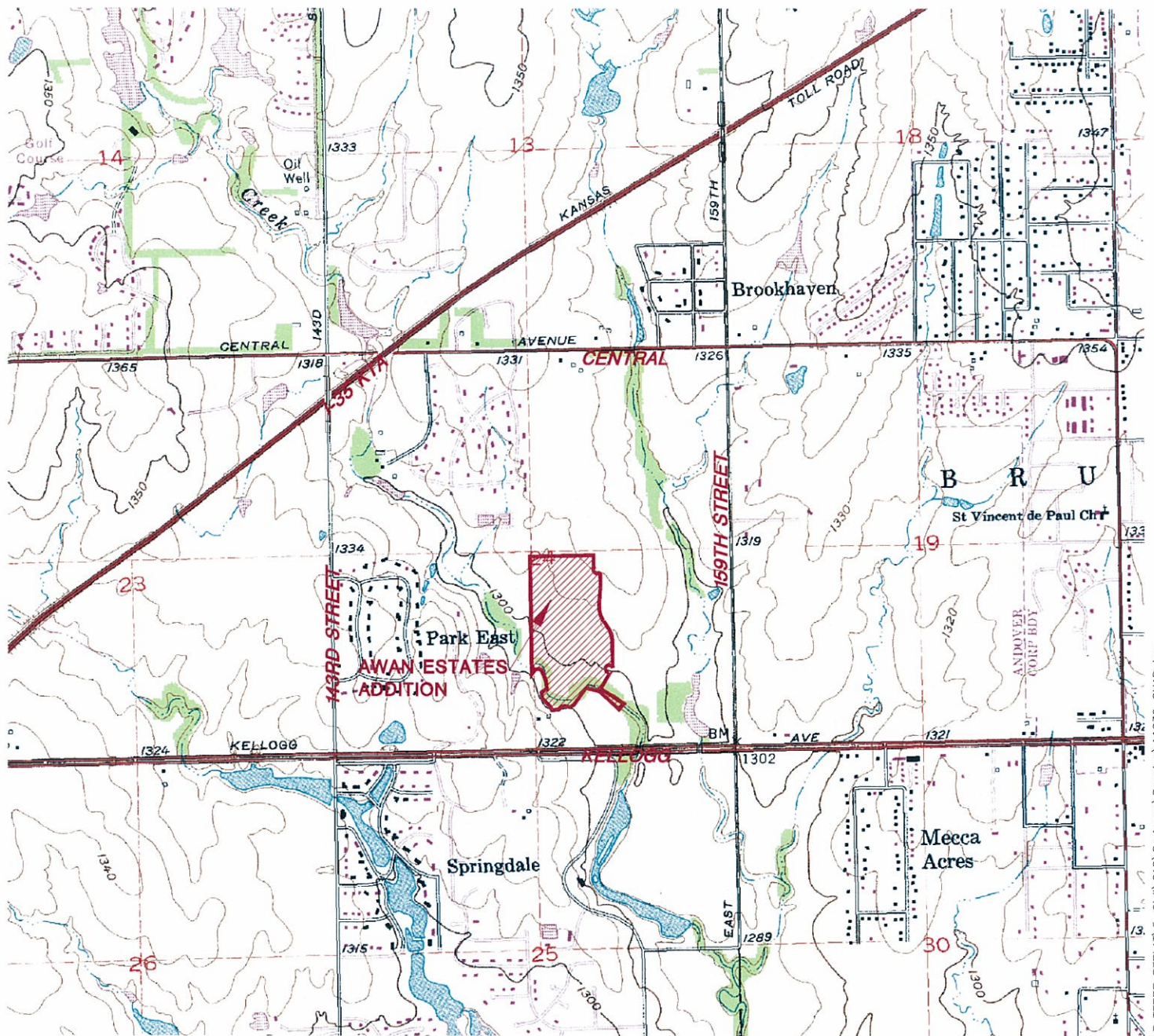
This site will develop as one large residential lot. The construction of this residence will increase the flow rate from the site slightly, Table 1.1. The increase in flow rates is 0.5% or less in all storms. The site is draining directly into Fourmile Creek. The flow rate of Fourmile Creek at this location is 6895 cfs in the 100-year design event. With increases of less than 1 cfs in all design storms, the increased flow rate from this site will be negligible. Because this increase is so small, no onsite detention or water quantity control measures are proposed.

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

Description	Design Storm Flows (cfs)						
	1-Yr	2-Yr	5-Yr	10-Yr	25-Yr	50-Yr	100-Yr
Existing To Fourmile Creek	64.2	91.2	131.9	161.2	199.6	234.1	273.2
Proposed To Fourmile Creek	64.5	91.7	132.5	161.8	200.2	234.8	273.9
Change (cfs)	0.3	0.5	0.6	0.6	0.6	0.7	0.7
Change (%)	0.5%	0.5%	0.5%	0.4%	0.3%	0.3%	0.3%

Appendix 1.1

USGS Quadrangle Map



SCALE: 1" = 2000'



2000 0 2000 4000



**SECTION 24
TOWNSHIP 27S
RANGE 2 E**

MKEC
ENGINEERING
CONSULTANTS, INC.

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

AWAN ESTATES ADDITION
PROJECT NAME

QUAD MAP
SHEET TITLE

KLA

DESIGN BY:

JULY 2011
DATE

CMJ

DRAWN BY:

11236
JOB NO.

GJA

CHECKED BY:

1 / 1
SHEET/OF

Appendix 1.2
Aerial Photograph



SCALE: 1" = 1000'



1000 0 1000 2000



**SECTION 24
TOWNSHIP 27S
RANGE 2 E**

MKEC
ENGINEERING
CONSULTANTS, INC.

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

AWAN ESTATES ADDITION
PROJECT NAME

AERIAL MAP
SHEET TITLE

KLA
DESIGN BY:

CMJ
DRAWN BY:

GJA
CHECKED BY:

JULY 2011
DATE

11236
JOB NO.

1 / 1
SHEET/OF

Appendix 1.3

Preliminary Plat

LEGEND

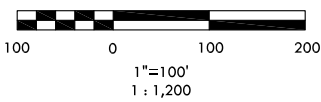
- ☆ - CONIFEROUS TREE & DIAMETER
- - DECIDUOUS TREE & DIAMETER
- SN - SIGN
- ☆ - LIGHT POLE
- PH - POWER POLE AND GUY ANCHOR
- - ELECTRIC BOX / TRANSFORMER
- LP - LIGHT POLE
- SI - STORM WATER INLET
- FH - FIRE HYDRANT
- WV - WATER VALVE
- WM - WATER METER
- WH - WELL HEAD
- TV - TV CONTROL BOX
- TCB - TELEPHONE CONTROL BOX
- SC - SECTION CORNER
- BM - BENCHMARK
- - EASEMENT
- - BUILDING SETBACK
- - FENCE
- - STORM SEWER PIPE
- - WATER LINE
- - SANITARY SEWER LINE
- - GAS LINE
- - GAS PIPELINE
- - TELEPHONE LINE
- - UNDERGROUND ELECTRIC LINE
- - OVERHEAD ELECTRIC
- - FIBER OPTIC CABLE

LEGAL DESCRIPTION

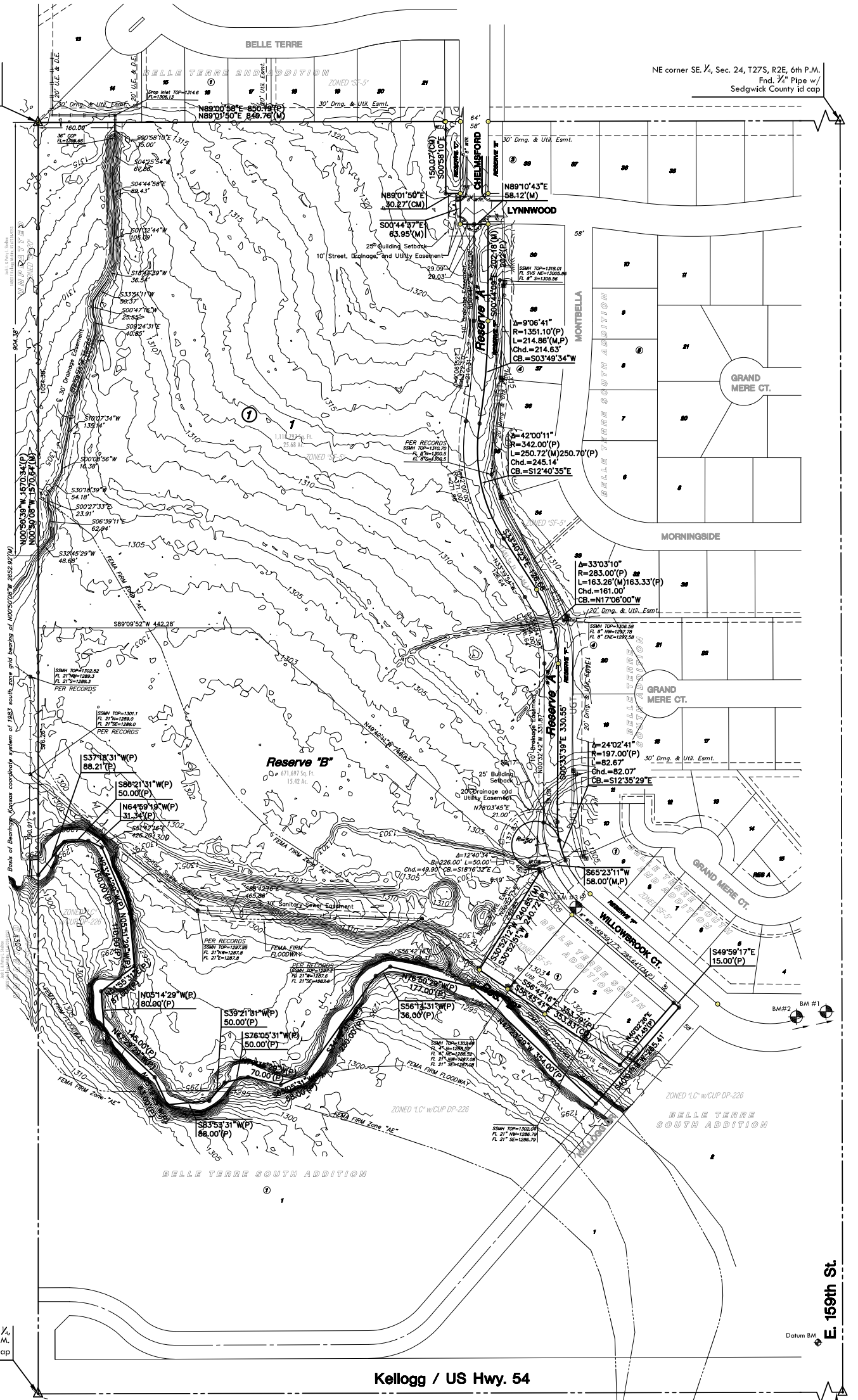
Lots 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26 and 27, Block 1; Lots 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55 and 56, Block 6; and Lots 1, 2, 3, 4, 5, 6, 7, 8, 9 and 10, Block 7; and Reserves B, D and M, all in Belle Terre South, an addition to Sedgwick County, Kansas.

BENCH MARKS

- Datum BM - USGS Standard Tablet, 75' N and 42' E of SE corner, Sec. 24, at US Hwy 54 & 159th St. E. Elev. = 1302.33 (NAVD 88)
- BM #1 - Square cut top curb nose at east end island Willowbrook west of 159th St. E. Elev. = 1306.44 (NAVD 88)
- BM #2 - Square cut top curb nose at south end island Grand Mere north of Willowbrook Elev. = 1306.95 (NAVD 88)
- BM #3 - Square cut top curb SW side of Willowbrook between Lots 4 & 5, Block 1, Belle Terre South Addition. Elev. = 1303.49 (NAVD 88)



SW corner SE 1/4, Sec. 24, T27S, R2E, 6th P.M. Fnd. 3/8" Rebar w/ Baughman id cap

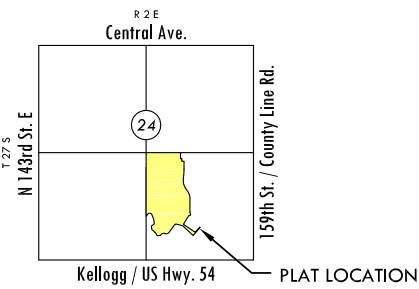


NOTES

1. LOCATION: Lying in east Wichita. The property has access to US-54 and K-96 via 159th Street. Existing surrounding land uses includes rural residential / pasture land, suburban residential, vacant commercial and agricultural production.
2. LOT TOTAL - 1 Residential
3. ANNEXATION: Lies within the City of Wichita annexed by ordinance No. 44-470 dated Dec. 24, 1999.
4. EXISTING USE: vacant platted lots
5. ZONING: SF-5 Single Family Residential District
6. PLAT AREA: Gross - 42.16 Ac. Net - 41.968 Ac.
7. SURVEY DATE: June 6th, 2011 (by MKEC)
8. PUBLIC UTILITIES: Municipal sanitary sewer may be extended determinate upon development plans. Municipal water is available at both the north and south access points.
9. LEGAL DESCRIPTION: As shown hereon
10. ACCESS CONTROLS: none
11. RESERVES: Reserve "A" is platted for private walkways, landscaping, irrigation, berming, monuments, drainage, and utilities. Reserve "B" is platted for private walkways, landscaping, irrigation, monuments, drainage, and floodplain/floodway preservation. The Reserves shall be owned and maintained by the owner(s)/developer, and/or their successors, assigns, and/or a Lot Owner's Association.
12. FLOOD: According to FEMA FIRM Community Unit Panel 20173C0395E, Effective Date Feb. 2nd, 2007; Lot 1 lies within flood zone "X", "Areas determined to be outside the 0.2 % annual chance floodplain." Reserve "B" lies within Zone AE and Floodway Areas in Zone AE. "Base Flood Elevations Determined"; "The Floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood height." The floodway, as indicated shall be the responsibility of the owners until such time as the appropriate governing body exercising jurisdiction elects to assume the responsibility for the maintenance and improvements of the drainage, provided further, that no structure shall be constructed on or within said floodway, nor shall any fill, change of grade, creation of a channel or any other work be carried out without the permission of the City Engineer.
13. DRAINAGE: A drainage report shall accompany this plat.
14. STREETS: A petition for the construction of Willowbrook Court shall be filed including associated stormwater improvements. Improvements are planned for the intersection of Chelmsford and Lynnwood.

NW corner, SE 1/4, Sec. 24, T27S, R2E, 6th P.M. Fnd. 3/8" Rebar thimble 7" below grade

Datum BM, E 159th St.



VICINITY MAP

PRELIMINARY PLAT

A portion of the SE 1/4, Sec. 24, T27S, R2E, 6th P.M.

AWAN ESTATES ADDITION

OWNER / DEVELOPER: NY HOMES LLC, Attn: Muhammad Ahmad

8131 E Harry Unit 410, Wichita, KS 67207

316.993.6175

MKEC
ENGINEERING
CONSULTANTS, INC.

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

Appendix 1.4

Final Plat

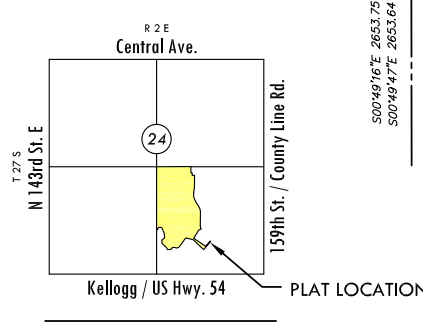
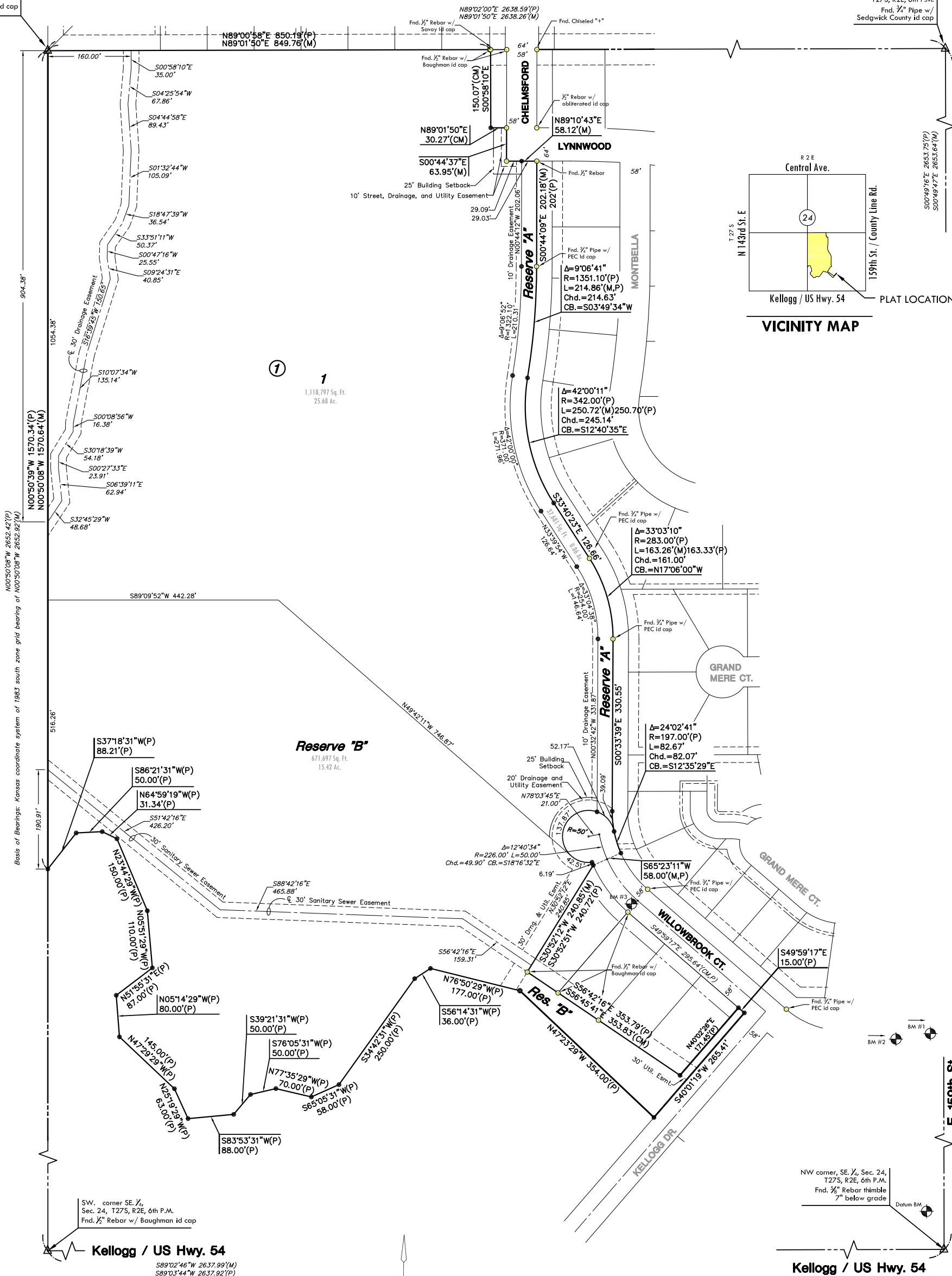
FINAL PLAT

AWAN ESTATES ADDITION

AN ADDITION TO WICHITA, SEDGWICK COUNTY, KANSAS

NW corner, SE 1/4, Sec. 24, T27S, R2E, 6th P.M.
Fnd. 1/2" Baughman id cap

NE corner, SE 1/4, Sec. 24, T27S, R2E, 6th P.M.
Fnd. 3/4" Pipe w/
Sedgwick County id cap



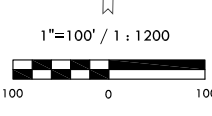
Basis of Bearings: Kansas coordinate system of 1983 south zone grid bearing of N00°50'08"W 2652.42'(P)
N00°50'08"W 1570.34'(P)
N00°50'08"W 1570.64'(M)

SW corner, SE 1/4, Sec. 24, T27S, R2E, 6th P.M.
Fnd. 1/2" Rebar w/ Baughman id cap

NW corner, SE 1/4, Sec. 24, T27S, R2E, 6th P.M.
Fnd. 3/8" Rebar thimble
7" below grade

LEGEND

- △ = Section corner monument found
- = Found survey monument see annotation for type
- = Set 3/8" rebar w/ MKEC CLS 39 id. cap
- (M) = Measured
- (CM) = Calculated from measured
- (P) = Platted



Basis of Bearing: Kansas coordinate system of 1983 south zone grid bearing of N0°50'08"W along the W. line of the SE 1/4, Sec. 24, T27S, R2E, 6th P.M.

This plat is surveyed and platted on NAD83 using Kansas state plane south zone coordinates, modified to the surface, having a combined adjustment scale factor of 1.000120014401728

BENCH MARKS

- Datum BM: USGS Standard Tablet, 75' N and 42' E of SE corner, Sec. 24, at US Hwy 54 & 159th St. E. Elev. = 1302.33 (NAVD 88)
- BM #1: Square cut top curb nose at east end island Willowbrook west of 159th St. E. Elev. = 1306.44 (NAVD 88)
- BM #2: Square cut top curb nose at south end island Grand Mere north of Willowbrook Elev. = 1306.95 (NAVD 88)
- BM #3: Square cut top curb SW side of Willowbrook between Lots 4 & 5, Block 1, Belle Terre South Addition. Elev. = 1303.49 (NAVD 88)

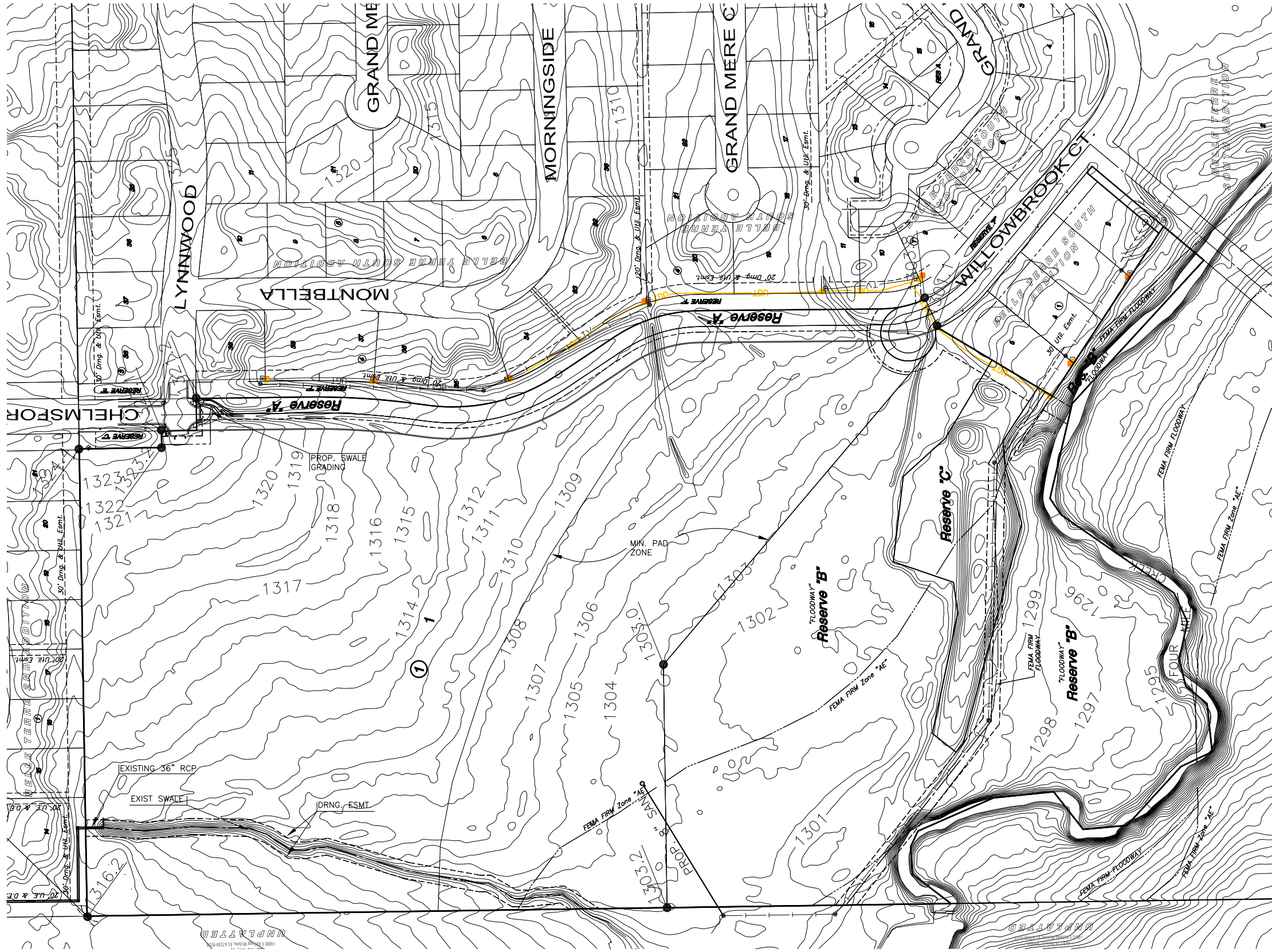
MINIMUM PAD ELEVATIONS LOWEST OPENINGS		
LOTS	BLOCK	ELEVATION NAVD 88
1	1	1305.0

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

Appendix 1.5

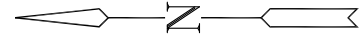
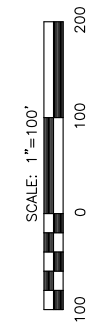
Master Grading Plan



- LEGEND**
- ⊗ - CONIFEROUS TREE
 - - DECIDUOUS TREE
 - ⊙ - SIGN
 - ⊕ - POWER POLE
 - ⊞ - ELECTRIC BOX
 - ⊟ - LIGHT POLE
 - ⊠ - FIRE HYDRANT
 - ⊡ - WATER VALVE
 - ⊢ - WATER METER
 - ⊣ - SECTION CORNER
 - ⊤ - BENCHMARK
 - - - - - EASEMENT
 - - - - - BUILDING SETBACK
 - - - - - FENCE
 - - - - - STORM SEWER PIPE
 - - - - - WATER LINE
 - - - - - SANITARY SEWER LINE
 - - - - - GAS LINE
 - - - - - GAS PIPELINE
 - - - - - TELEPHONE LINE
 - - - - - UNDERGROUND ELEC.
 - - - - - OVERHEAD ELECTRIC
 - - - - - FIBER OPTIC CABLE
 - - SPOT ELEVATION

MIN. PAD

LOT	BLOCK	MIN. PAD (NAVD 88)	100-YR WSEL (NAVD 88)
1	1	1306.4	1303.4



AWAN ESTATES ADDITION
WICHITA, KANSAS
LOT GRADING PLAN

DATE July 11
REVISED _____

DESIGN BY KLA
DRAWN BY CMJ
CHECKED BY GJA

SHEET NUMBER **1**

J:\Projects\2011\1101010236_NY HOMES, BELLE TERRE REPLAT 5-Civil\CAD\Drainage\Drawing\11236_LGP.dwg

Tab 2. Existing Conditions

Datum & Survey

The site is shown in NAVD 88 datum.

Drainage Patterns

The site is currently drains from northeast to southwest. Fourmile Creek that crosses the south edge of the site from northwest to southeast. The site generally sheet flows from northeast to southwest. Chelmsford Street drains from the north to the south and outlets onto the property. Runoff flows through a swale to the south and eventually to Fourmile Creek. Backyards from existing lots in Belle Terre South Addition flow into the swale and continue to the south. An existing natural channel conveys runoff from the north to the south. This runoff exits the property on the west boundary of the site before flowing into Fourmile Creek.

The site and offsite areas have been divided into multiple drainage basins according to the swales that convey the runoff. These basins are shown on the Existing Conditions Drainage Map, Appendix 2.1.

Basin A

Near the northwest corner of the property is Basin A. This basin flows from Belle Terre Addition to the north and into a storm water system. This system flows onto the site through an existing 36" RCP and flows to the south through a channel and into Fourmile Creek.

Basin B

Near the northeast corner of the property, flow from the existing Lynwood Street flows to the west into Chelmsford Street. Runoff from Chelmsford Street flows to the south onto the site. This runoff is conveyed to the south through an existing swale. This swale eventually becomes overland sheet flow once on the property.

Basin C

Along the east edge of the property, flow from backyards of lots in Belle Terre South Addition flows into an existing swale that conveys runoff onto the site. The swale flows from east to west and onto the site and eventually becomes overland sheet flow.

Basin D

Near the southeast corner of the property is Basin D. This basin flows from Willowbrook Court in Belle Terre South Addition and into a swale on the site. This flow continues to the south into Fourmile Creek.

Basin E

Basin E includes most of the site. It is also combined with runoff from other Basins and sheet flows to the southwest into Fourmile Creek.

Groundwater Elevations

Existing groundwater elevations in the surrounding area are approximately 20-30 feet deep according to the Kansas Water Well Database.

Utilities

Water

An existing 8" water line flows along the west side of Chelmsford and the north side of Lynnwood adjacent to the site.

Sanitary Sewer

An existing 21" sanitary sewer line crosses the southern portion of the site from west to east. An existing 8" sanitary sewer line runs from north to south in Belle Terre Addition just west of the property line.

Stormwater

An existing 36" stormwater sewer line discharges onto the site near the northwest corner of the site. There is no other storm water sewer on the site.

Others

Existing underground telephone and cable TV lines are just east of the site in the Belle Terre Addition.

Hydrologic Analysis

The site was modeled using the NRCS Unit Hydrograph Method in HEC-HMS, Appendix 2.2.

Rainfall

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

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

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

Soil Type

The following soil types are located on:

- Irwin Silty Clay Loam, 1 to 3 percent slopes, HSG "D"
- Rosehill Silty Clay, 1 to 3 percent slopes, HSG "D"
- Goessel Silty Clay, 1 to 3 percent slopes, HSG "D"
- Elandco Silty Clay, rarely flooded, HSG "B"

The soil types for use in selecting runoff curve numbers for this site are Hydraulic Soil Groups "C" and "D." The site and drainage basins are shown on the soil survey, Appendix 2.4.

Land Use

The following land uses are located on site:

- Undeveloped, Undisturbed Impervious

Impervious Areas

There is no existing impervious area.

Curve Number

The Curve Numbers (CN) used in calculations were calculated using the NRCS method. The CN values were calculated using the methods set forth in the City of Wichita/Sedgwick County Stormwater Manual, Volume 2, Section 4.3. Curve numbers are the weighted average of the land use and soil type of the drainage basin. Curve numbers range from 76.6 to 92.6.

Time of Concentration

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

Basin Summary

All basins, both onsite and offsite drain through the site and into Fourmile Creek. Most of the runoff sheet flows into Fourmile Creek. The flow rates for each of the basins has been calculated and combined to determine the existing flow rate to Fourmile Creek, Table 2.1.

Table 2.1. Existing Conditions Basin Information.

Basin	Area (ac)	CN	T_c (min.)	1-Yr	2-Yr	5-Yr	10-Yr	25-Yr	50-Yr	100-Yr
A	32.3	89.6	25.6	64.8	84.7	113.2	133.2	158.8	181.4	206.9
B	2.2	92.6	14.1	6.1	7.8	10.3	12.0	14.2	16.2	18.4
C	3.7	61.6	10.8	10.7	13.9	18.5	21.7	25.8	29.4	33.5
D	5.7	92.6	18.3	14.4	18.6	24.4	28.5	33.8	38.4	43.6
E	32.3	76.6	49.3	18.2	29.1	46.1	58.7	75.4	90.6	107.9
Total	76.2	-	-	64.2	91.2	131.9	161.2	199.6	234.1	273.2

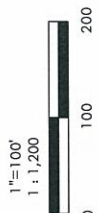
Appendix 2.1

Existing Conditions Map

NW corner, SE 1/4, Sec. 24,
T27S, R2E, 6th P.M.,
Frd. 1/2" Baughman, Id cap

LEGEND

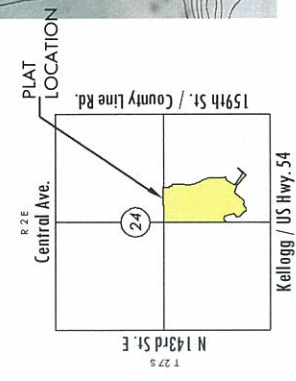
- ★ - CONIFEROUS TREE & DIAMETER
- - DECIDUOUS TREE & DIAMETER
- SN - SIGN
- ✱ - LIGHT POLE
- PK - POWER POLE AND GUY ANCHOR
- EB - ELECTRIC BOX / TRANSFORMER
- LP - LIGHT POLE
- SW - STORM WATER INLET
- PH - FIRE HYDRANT
- WM - WATER VALVE
- WM - WATER METER
- W - WELL HEAD
- TC - TV CONTROL BOX
- SC - SECTION CORNER
- BM - BENCHMARK
- - EASEMENT
- - BUILDING SETBACK
- - FENCE
- - STORM SEWER PIPE
- - WATER LINE
- - SANITARY SEWER LINE
- - GAS PIPELINE
- - TELEPHONE LINE
- - UNDERGROUND ELECTRIC LINE
- - OVERHEAD ELECTRIC
- - FIBER OPTIC CABLE
- - SANITARY SEWER LINE



NW corner, SE 1/4, Sec. 24,
T27S, R2E, 6th P.M.,
Frd. 1/2" Baughman, Id cap
7" below grade

BENCH MARKS

- BM #1 - USGS Standard Tablet, 75' N and 42' E of SE corner, Sec. 24, at US Hwy 54 & 159th St. E. Elev. = 1302.33 (NAVD 88)
- BM #2 - Square cut top curb nose at east end island Willowbrook west of 159th St. E. Elev. = 1306.44 (NAVD 88)
- BM #3 - Square cut top curb nose at south end island Grand Willowbrook west of 159th St. E. Elev. = 1306.95 (NAVD 88)
- BM #4 - Square cut top curb SW side of Willowbrook between Lots 4 & 5, Block 1, Belle Terre South Addition. Elev. = 1303.49 (NAVD 88)



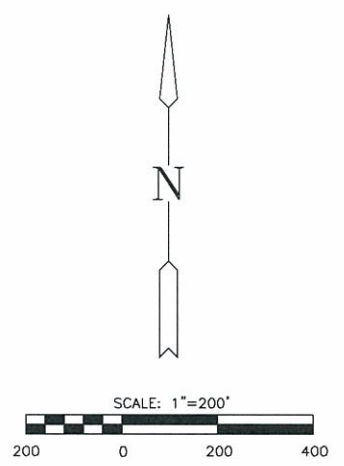
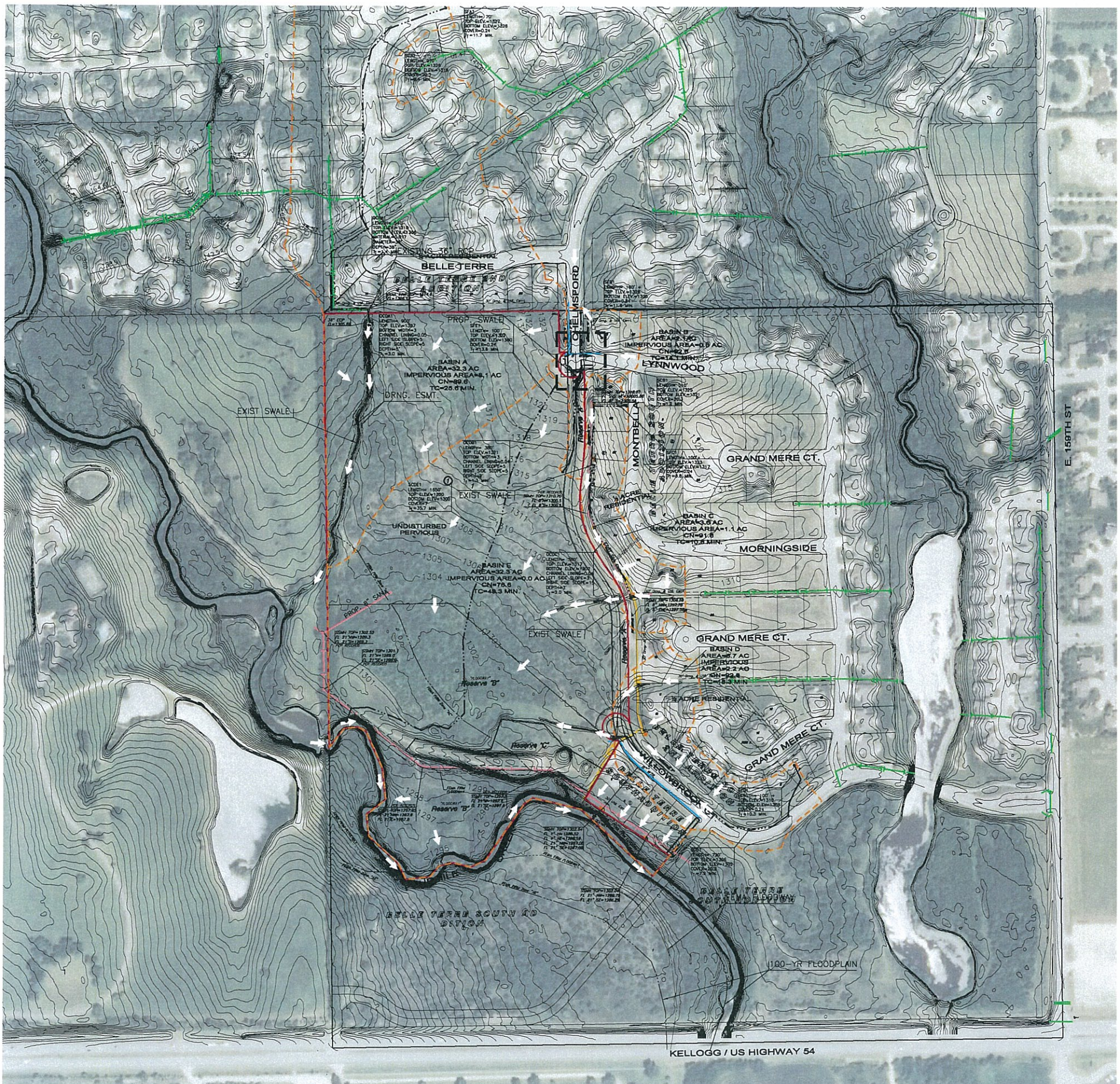
DATE	July 11
REVISED	

DESIGN BY	KLA
DRAWN BY	CMJ
CHECKED BY	GJA

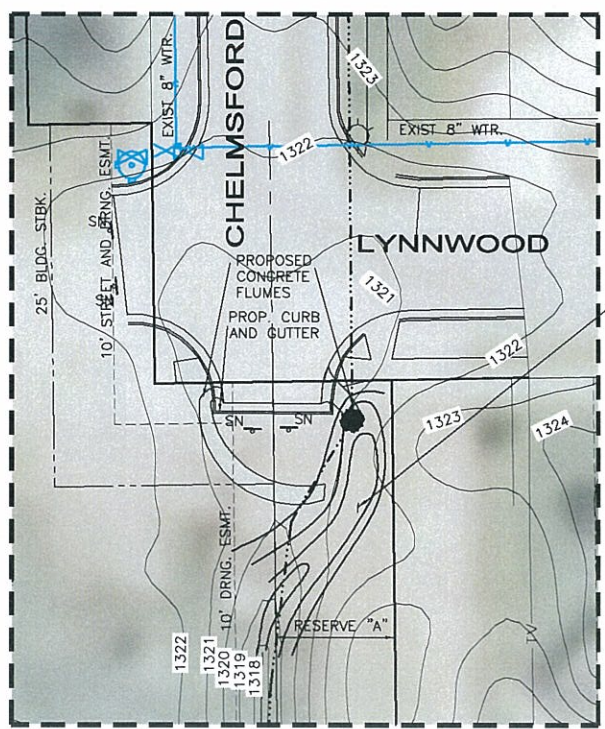
SHEET NUMBER	1
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AWAN ESTATES ADDITION
WICHITA, KANSAS
EXISTING CONDITIONS

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WICHITA, KS. 67206
316-684-9600



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



NTS

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

AWAN ESTATES ADDITION
WICHITA, KANSAS
**EXISTING CONDITIONS AND
OVERALL DRAINAGE MAP**

DATE July 11
REVISED _____

DESIGN BY KLA
DRAWN BY CMJ
CHECKED BY GJA

SHEET NUMBER
1

J:\Projects\2011\1101010236_NY_HOMES_BELLE_TERRERRE_REPLAT5-Civil\CAD\Drainage\11236_Existing_condition_overall_drng.dwg

Appendix 2.2

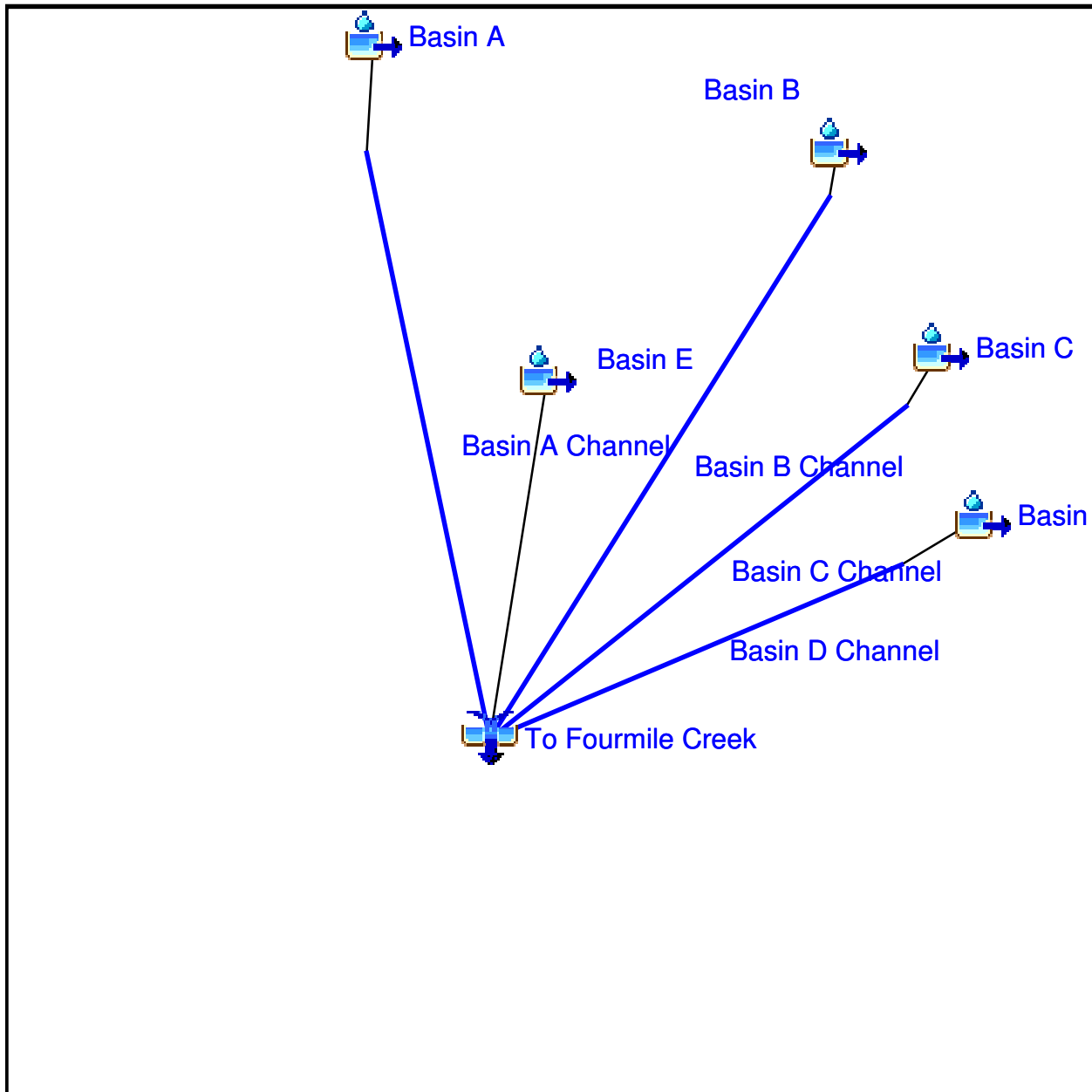
HEC-HMS



HEC-HMS

Project : Awan

Basin Model : Existing
Jul 25 13:56:07 CDT 2011

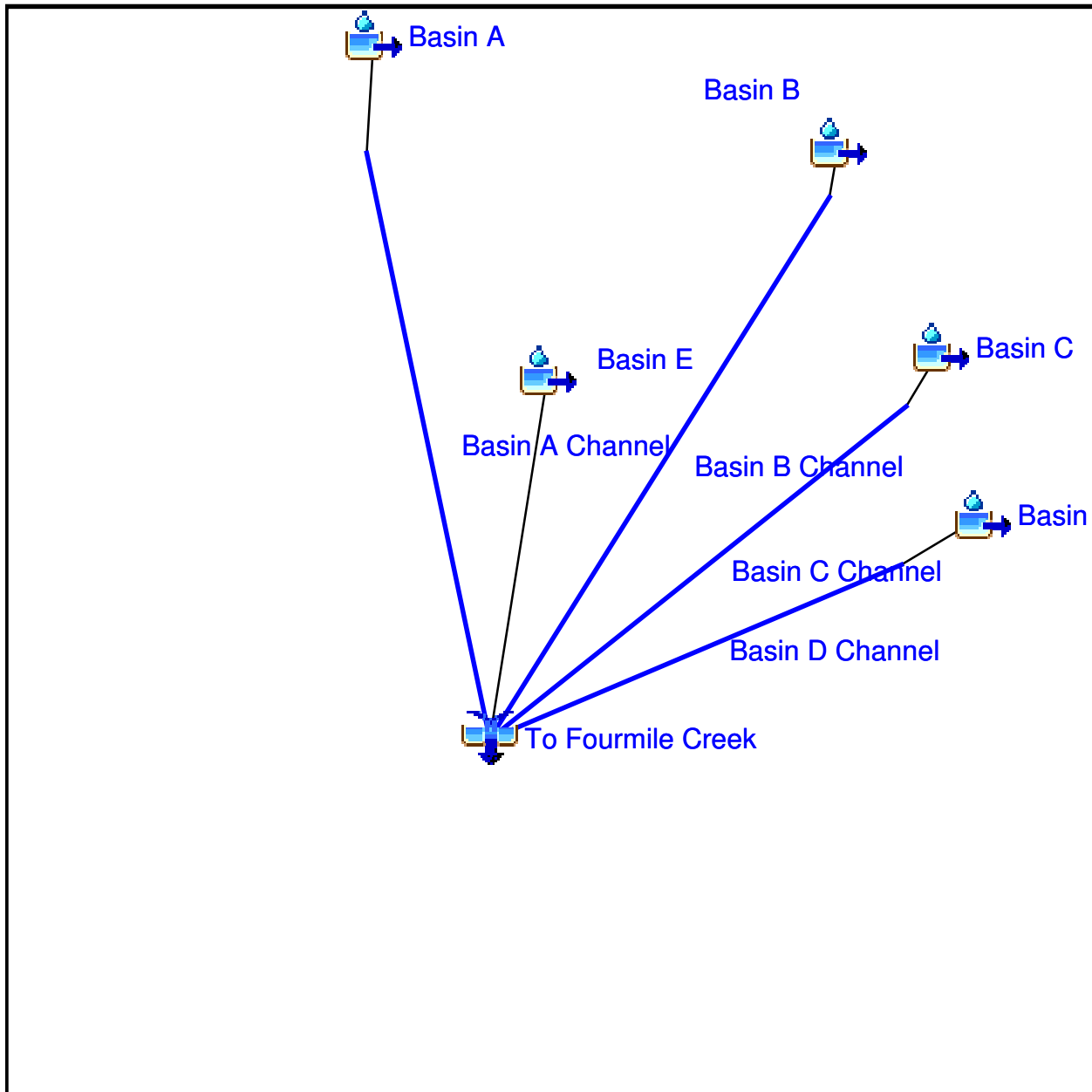




HEC-HMS

Project : Awan

Basin Model : Proposed
Jul 25 13:56:38 CDT 2011



Appendix 2.3

Time of Concentration Calculations

Project	Awan Estates
Feature	Kellogg & 159th Street
Analyst	Kara Anderson
Version	Jul-11
Notes	

Sheet	Subbasin	Number of Segments	Sheet Flow (mins)	Shallow Concentrated Flow (mins)	Open Channel Ditch Flow (mins)	Open Channel Pipe Flow (mins)	Open Channel General Flow (mins)	Other (mins)	Total Tc (mins)	Length (feet)	Drop (feet)	Avg. Slope (%)	Avg. Vel. (fps)	Lag (mins)	Lag (hours)	Area (acres)
1	Basin A	4	11.7	9.4	3.0	1.4	0.0	0.0	25.6	2480	19	0.77	1.61	15.4	0.256	32.3
2	Basin B	3	11.6	1.2	1.3	0.0	0.0	0.0	14.1	690	13	1.88	0.81	8.5	0.141	2.2
3	Basin C	2	8.8	0.0	2.0	0.0	0.0	0.0	10.8	830	16	1.93	1.28	6.5	0.108	3.7
4	Basin D	2	10.3	7.9	0.0	0.0	0.0	0.0	18.3	820	8	0.98	0.75	11.0	0.183	5.7
5	Basin E	2	13.6	35.7	0.0	0.0	0.0	0.0	49.3	1750	22	1.26	0.59	29.6	0.493	32.3
6	0	6	20.3	2.4	0.1	0.2	0.1	4.2	27.3	1350	47	3.48	0.82	16.4	0.273	500
7	0	6	20.3	2.4	0.1	0.2	0.1	4.2	27.3	1350	47	3.48	0.82	16.4	0.273	500
8	0	6	20.3	2.4	0.1	0.2	0.1	4.2	27.3	1350	47	3.48	0.82	16.4	0.273	500
9	0	6	20.3	2.4	0.1	0.2	0.1	4.2	27.3	1350	47	3.48	0.82	16.4	0.273	500
10	0	6	20.3	2.4	0.1	0.2	0.1	4.2	27.3	1350	47	3.48	0.82	16.4	0.273	500
11	0	6	20.3	2.4	0.1	0.2	0.1	4.2	27.3	1350	47	3.48	0.82	16.4	0.273	500
12	0	6	20.3	2.4	0.1	0.2	0.1	4.2	27.3	1350	47	3.48	0.82	16.4	0.273	500
13	0	6	20.3	2.4	0.1	0.2	0.1	4.2	27.3	1350	47	3.48	0.82	16.4	0.273	500
14	0	6	20.3	2.4	0.1	0.2	0.1	4.2	27.3	1350	47	0.00	0.82	16.4	0.273	500
15	0	6	20.3	2.4	0.1	0.2	0.1	4.2	27.3	1350	47	3.48	0.82	16.4	0.273	500
16	0	6	20.3	2.4	0.1	0.2	0.1	4.2	27.3	1350	47	3.48	0.82	16.4	0.273	500
17	0	6	20.3	2.4	0.1	0.2	0.1	4.2	27.3	1350	47	3.48	0.82	16.4	0.273	500
18	0	6	20.3	2.4	0.1	0.2	0.1	4.2	27.3	1350	47	3.48	0.82	16.4	0.273	500
19	0	6	20.3	2.4	0.1	0.2	0.1	4.2	27.3	1350	47	3.48	0.82	16.4	0.273	500
20	0	6	20.3	2.4	0.1	0.2	0.1	4.2	27.3	1350	47	3.48	0.82	16.4	0.273	500
21	0	6	20.3	2.4	0.1	0.2	0.1	4.2	27.3	1350	47	3.48	0.82	16.4	0.273	500
22	0	6	20.3	2.4	0.1	0.2	0.1	4.2	27.3	1350	47	3.48	0.82	16.4	0.273	500
23	0	6	20.3	2.4	0.1	0.2	0.1	4.2	27.3	1350	47	3.48	0.82	16.4	0.273	500
24	0	6	20.3	2.4	0.1	0.2	0.1	4.2	27.3	1350	47	3.48	0.82	16.4	0.273	500
25	0	6	20.3	2.4	0.1	0.2	0.1	4.2	27.3	1350	47	3.48	0.82	16.4	0.273	500
26	0	6	20.3	2.4	0.1	0.2	0.1	4.2	27.3	1350	47	3.48	0.82	16.4	0.273	500

Subbasin Name	Basin A
Drainage Area (ac)	32.3
Drainage Area (sq mi)	0.05046875

Sheet Flow

selected->	Select (0 or 1)	1	0	0	0	0	Total	1 segments
	Length (ft)	70	1	1	1	1		70 feet length
	Top Elevation (ft)	1327	1	1	1	1		
	Bottom Elevation (ft)	1326	1	1	1	1		
	Cover	0.24, Dense grasses	Choose Cover Type	Choose Cover Type	Choose Cover Type	Choose Cover Type		
	Specify alternate "n"							
	Sheet Flow "n" (dim)	0.240	0.000	0.000	0.000	0.000		
	2-yr, 24-hr Rainfall (ins)	3.50	3.50	3.50	3.50	3.50		
	Drop (ft)	1	0	0	0	0		1 feet drop
	Slope (ft/ft)	0.0143	0.0000	0.0000	0.0000	0.0000		
	Slope (%)	1.43	0.00	0.00	0.00	0.00		
	Velocity (fps)	0.10						
	Travel Time (hrs)	0.196						
	Travel Time (mins)	11.74						11.7 mins travel

Shallow Concentrated Flow

selected->	Select (0 or 1)	1	0	0	0	0	Total	1 segments
	Length (ft)	970	1	1	1	1		970 feet length
	Top Elevation (ft)	1326	1	1	1	1		
	Bottom Elevation (ft)	1319	1	1	1	1		
	Cover	20.3, Paved	Choose Cover Type	Choose Cover Type	Choose Cover Type	Choose Cover Type		
	Specify alternate "K"							
	Surface Coeff (dim)	20.30	0.00	0.00	0.00	0.00		
	Drop (ft)	7	0	0	0	0		7 feet drop
	Slope (ft/ft)	0.0072	0.0000	0.0000	0.0000	0.0000		
	Slope (%)	0.72	0.00	0.00	0.00	0.00		
	Velocity (fps)	1.72						
	Travel Time (mins)	9.37						9.4 mins travel

Open Channel Ditch Flow

selected->	Select (0 or 1)	1	0	0	0	0	Total	1 segments
	Length (ft)	900	1	1	1	1		900 feet length
	Top Elevation (ft)	1307	1	1	1	1		
	Bottom Elevation (ft)	1300	1	1	1	1		
	Channel Lining	0.05, Rough Natural Stream	Choose Lining Type	Choose Lining Type	Choose Lining Type	Choose Lining Type		
	Bottom Width (ft)	3.00	0.00	1.00	1.00	1.00		
	Left Side Slope (H:V)	2.00	1.00	1.00	1.00	1.00		
	Right Side Slope (H:V)	2.00	1.00	1.00	1.00	1.00		
	Depth (ft)	5.00	1.00	1.00	1.00	1.00		
	Specify alternate "n"							
	Manning "n" (dim)	0.050	0.000	0.000	0.000	0.000		
	Drop (ft)	7	0	0	0	0		7 feet drop
	Slope (ft/ft)	0.0078	0.0000	0.0000	0.0000	0.0000		
	Slope (%)	0.78	0.00	0.00	0.00	0.00		
	Flow Area (sq ft)	65.00	1.00	2.00	2.00	2.00		
	Wet Perimeter (ft)	25.36	2.83	3.83	3.83	3.83		
	Hydraulic Radius (ft)	2.56	0.35	0.52	0.52	0.52		
	Velocity (fps)	4.92						
	Normal Flow (cfs)	319.9						
selected->	Travel Time (mins)	3.05						3.0 mins travel

Open Channel Pipe Flow

selected->	Select (0 or 1)	1	0	0	0	0	Total	1 segments
	Length (ft)	540	1	1	1	1		540 feet length
	Top Elevation (ft)	1310	1	1	1	1		
	Bottom Elevation (ft)	1306	1	1	1	1		
	Pipe Material	0.017, Rough concrete	Choose Material Type	Choose Material Type	Choose Material Type	Choose Material Type		
	Diameter (ins)	36.00	1.00	1.00	1.00	1.00		
	Flow Depth (ins)	36.00	1.00	1.00	1.00	1.00		
	Specify alternate "n"							
	Manning "n" (dim)	0.017	0.000	0.000	0.000	0.000		
	Drop (ft)	4	0	0	0	0		4 feet drop
	Slope (ft/ft)	0.0074	0.0000	0.0000	0.0000	0.0000		
	Slope (%)	0.74	0.00	0.00	0.00	0.00		
	Theta (radians)	6.283	6.283	6.283	6.283	6.283		
	Flow Area (sq ft)	7.07	0.01	0.01	0.01	0.01		
	Wet Perimeter (ft)	9.42	0.26	0.26	0.26	0.26		
	Hydraulic Radius (ft)	0.75	0.02	0.02	0.02	0.02		
	Velocity (fps)	6.23						
	Normal Flow (cfs)	44.0						
	Travel Time (mins)	1.45						1.4 mins travel

Open Channel General Flow

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

Other (Computed Separately)

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

Total for Subbasin

Segments	4
Length (ft)	2480
Drop (ft)	19
Slope (ft/ft)	0.0077

Subbasin Name	Basin B
Drainage Area (ac)	2.2
Drainage Area (sq mi)	0.0034375

Sheet Flow

selected-->	Select (0 or 1)	1	0	0	0	0	Total	1 segments
	Length (ft)	100	1	1	1	1		100 feet length
	Top Elevation (ft)	1328	1	1	1	1		
	Bottom Elevation (ft)	1325	1	1	1	1		
	Cover	0.24, Dense grasses	Choose Cover Type	Choose Cover Type	Choose Cover Type	Choose Cover Type		
	Specify alternate "n"							
	Sheet Flow "n" (dim)	0.240	0.000	0.000	0.000	0.000		
	2-yr, 24-hr Rainfall (ins)	3.50	3.50	3.50	3.50	3.50		
	Drop (ft)	3	0	0	0	0		3 feet drop
	Slope (ft/ft)	0.0300	0.0000	0.0000	0.0000	0.0000		
	Slope (%)	3.00	0.00	0.00	0.00	0.00		
	Velocity (fps)	0.14						
	Travel Time (hrs)	0.193						
	Travel Time (mins)	11.60						11.6 mins travel

Shallow Concentrated Flow

selected-->	Select (0 or 1)	1	0	0	0	0	Total	1 segments
	Length (ft)	210	1	1	1	1		210 feet length
	Top Elevation (ft)	1325	1	1	1	1		
	Bottom Elevation (ft)	1321	1	1	1	1		
	Cover	20.3, Paved	Choose Cover Type	Choose Cover Type	Choose Cover Type	Choose Cover Type		
	Specify alternate "K"							
	Surface Coeff (dim)	20.30	0.00	0.00	0.00	0.00		
	Drop (ft)	4	0	0	0	0		4 feet drop
	Slope (ft/ft)	0.0190	0.0000	0.0000	0.0000	0.0000		
	Slope (%)	1.90	0.00	0.00	0.00	0.00		
	Velocity (fps)	2.80						
	Travel Time (mins)	1.25						1.2 mins travel

Open Channel Ditch Flow

selected-->	Select (0 or 1)	1	0	0	0	0	Total	1 segments
	Length (ft)	380	1	1	1	1		380 feet length
	Top Elevation (ft)	1321	1	1	1	1		
	Bottom Elevation (ft)	1315	1	1	1	1		
	Channel Lining	0.04, Typical Natural Stream	Choose Lining Type	Choose Lining Type	Choose Lining Type	Choose Lining Type		
	Bottom Width (ft)	3.00	0.00	1.00	1.00	1.00		
	Left Side Slope (H:V)	5.00	1.00	1.00	1.00	1.00		
	Right Side Slope (H:V)	5.00	1.00	1.00	1.00	1.00		
	Depth (ft)	2.00	1.00	1.00	1.00	1.00		
	Specify alternate "n"							
	Manning "n" (dim)	0.040	0.000	0.000	0.000	0.000		
	Drop (ft)	6	0	0	0	0		6 feet drop
	Slope (ft/ft)	0.0158	0.0000	0.0000	0.0000	0.0000		
	Slope (%)	1.58	0.00	0.00	0.00	0.00		
	Flow Area (sq ft)	26.00	1.00	2.00	2.00	2.00		
	Wet Perimeter (ft)	23.40	2.83	3.83	3.83	3.83		
	Hydraulic Radius (ft)	1.11	0.35	0.52	0.52	0.52		
	Velocity (fps)	5.02						
	Normal Flow (cfs)	130.6						
	Travel Time (mins)	1.26						1.3 mins travel

Open Channel Pipe Flow

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

Open Channel General Flow

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

Other (Computed Separately)

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

Total for Subbasin

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

Subbasin Name	Basin C
Drainage Area (ac)	3.7
Drainage Area (sq mi)	0.00578125

Sheet Flow

selected-->	Select (0 or 1)	1	0	0	0	0	Total
	Length (ft)	100	1	1	1	1	1 segments
	Top Elevation (ft)	1323	1	1	1	1	100 feet length
	Bottom Elevation (ft)	1317	1	1	1	1	
	Cover	0.24, Dense grasses	Choose Cover Type	Choose Cover Type	Choose Cover Type	Choose Cover Type	
	Specify alternate "n"						
	Sheet Flow "n" (dim)	0.240	0.000	0.000	0.000	0.000	
	2-yr, 24-hr Rainfall (ins)	3.50	3.50	3.50	3.50	3.50	
	Drop (ft)	6	0	0	0	0	6 feet drop
	Slope (ft/ft)	0.0600	0.0000	0.0000	0.0000	0.0000	
	Slope (%)	6.00	0.00	0.00	0.00	0.00	
	Velocity (fps)	0.19					
	Travel Time (hrs)	0.147					
	Travel Time (mins)	8.79					8.8 mins travel

Shallow Concentrated Flow

	Select (0 or 1)	0	0	0	0	0	Total
	Length (ft)	200	1	1	1	1	0 segments
	Top Elevation (ft)	30	1	1	1	1	0 feet length
	Bottom Elevation (ft)	22	1	1	1	1	
	Cover	7, Short grass pasture	Choose Cover Type	Choose Cover Type	Choose Cover Type	Choose Cover Type	
	Specify alternate "k"						
	Surface Coeff (dim)	7.00	0.00	0.00	0.00	0.00	
	Drop (ft)	8	0	0	0	0	0 feet drop
	Slope (ft/ft)	0.0400	0.0000	0.0000	0.0000	0.0000	
	Slope (%)	4.00	0.00	0.00	0.00	0.00	
	Velocity (fps)						
	Travel Time (mins)						0.0 mins travel

Open Channel Ditch Flow

selected-->	Select (0 or 1)	1	0	0	0	0	Total
	Length (ft)	730	1	1	1	1	1 segments
	Top Elevation (ft)	1317	1	1	1	1	730 feet length
	Bottom Elevation (ft)	1307	1	1	1	1	
	Channel Lining	0.04, Typical Natural Stream	Choose Lining Type	Choose Lining Type	Choose Lining Type	Choose Lining Type	
	Bottom Width (ft)	7.50	0.00	1.00	1.00	1.00	
	Left Side Slope (H:V)	3.00	1.00	1.00	1.00	1.00	
	Right Side Slope (H:V)	15.00	1.00	1.00	1.00	1.00	
	Depth (ft)	3.00	1.00	1.00	1.00	1.00	
	Specify alternate "n"						
	Manning "n" (dim)	0.040	0.000	0.000	0.000	0.000	
	Drop (ft)	10	0	0	0	0	10 feet drop
	Slope (ft/ft)	0.0137	0.0000	0.0000	0.0000	0.0000	
	Slope (%)	1.37	0.00	0.00	0.00	0.00	
	Flow Area (sq ft)	103.50	1.00	2.00	2.00	2.00	
	Wet Perimeter (ft)	62.09	2.83	3.83	3.83	3.83	
	Hydraulic Radius (ft)	1.67	0.35	0.52	0.52	0.52	
	Velocity (fps)	6.13					
	Normal Flow (cfs)	634.4					
	Travel Time (mins)	1.98					2.0 mins travel

Open Channel Pipe Flow

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

Open Channel General Flow

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

Other (Computed Separately)

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

Total for Subbasin

Segments	2
Length (ft)	830
Drop (ft)	16
Slope (ft/ft)	0.0193

Subbasin Name	Basin D
Drainage Area (ac)	5.7
Drainage Area (sq mi)	0.00890625

Sheet Flow

selected->	Select (0 or 1)	1	0	0	0	0	Total
	Length (ft)	100	1	1	1	1	1 segments
	Top Elevation (ft)	1310	1	1	1	1	100 feet length
	Bottom Elevation (ft)	1306	1	1	1	1	
	Cover	0.24, Dense grasses	Choose Cover Type	Choose Cover Type	Choose Cover Type	Choose Cover Type	
	Specify alternate "n"						
	Sheet Flow "n" (dim)	0.240	0.000	0.000	0.000	0.000	
	2-yr, 24-hr Rainfall (ins)	3.50	3.50	3.50	3.50	3.50	
	Drop (ft)	4	0	0	0	0	4 feet drop
	Slope (ft/ft)	0.0400	0.0000	0.0000	0.0000	0.0000	
	Slope (%)	4.00	0.00	0.00	0.00	0.00	
	Velocity (fps)	0.16					
	Travel Time (hrs)	0.172					
	Travel Time (mins)	10.34					10.3 mins travel

Shallow Concentrated Flow

selected->	Select (0 or 1)	1	0	0	0	0	Total
	Length (ft)	720	1	1	1	1	1 segments
	Top Elevation (ft)	1306	1	1	1	1	720 feet length
	Bottom Elevation (ft)	1302	1	1	1	1	
	Cover	20.3, Paved	Choose Cover Type	Choose Cover Type	Choose Cover Type	Choose Cover Type	
	Specify alternate "K"						
	Surface Coeff (dim)	20.30	0.00	0.00	0.00	0.00	
	Drop (ft)	4	0	0	0	0	4 feet drop
	Slope (ft/ft)	0.0056	0.0000	0.0000	0.0000	0.0000	
	Slope (%)	0.56	0.00	0.00	0.00	0.00	
	Velocity (fps)	1.51					
	Travel Time (mins)	7.93					7.9 mins travel

Open Channel Ditch Flow

	Select (0 or 1)	0	0	0	0	0	Total
	Length (ft)	100	1	1	1	1	0 segments
	Top Elevation (ft)	50	1	1	1	1	0 feet length
	Bottom Elevation (ft)	47	1	1	1	1	
	Channel Lining	0.03, Grassed	Choose Lining Type	Choose Lining Type	Choose Lining Type	Choose Lining Type	
	Bottom Width (ft)	25.00	0.00	1.00	1.00	1.00	
	Left Side Slope (H:V)	3.00	1.00	1.00	1.00	1.00	
	Right Side Slope (H:V)	3.00	1.00	1.00	1.00	1.00	
	Depth (ft)	3.00	1.00	1.00	1.00	1.00	
	Specify alternate "n"						
	Manning "n" (dim)	0.030	0.000	0.000	0.000	0.000	
	Drop (ft)	3	0	0	0	0	0 feet drop
	Slope (ft/ft)	0.0300	0.0000	0.0000	0.0000	0.0000	
	Slope (%)	3.00	0.00	0.00	0.00	0.00	
	Flow Area (sq ft)	102.00	1.00	2.00	2.00	2.00	
	Wet Perimeter (ft)	43.97	2.83	3.83	3.83	3.83	
	Hydraulic Radius (ft)	2.32	0.35	0.52	0.52	0.52	
	Velocity (fps)						
	Normal Flow (cfs)						
	Travel Time (mins)						0.0 mins travel

Open Channel Pipe Flow

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

Open Channel General Flow

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

Other (Computed Separately)

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

Total for Subbasin

Segments	2
Length (ft)	820
Drop (ft)	8
Slope (ft/ft)	0.0098

Subbasin Name	Basin E
Drainage Area (ac)	32.3
Drainage Area (sq mi)	0.05046875

Sheet Flow

selected->	Select (0 or 1)	1	0	0	0	0	Total	1 segments
	Length (ft)	100	1	1	1	1		100 feet length
	Top Elevation (ft)	1322	1	1	1	1		
	Bottom Elevation (ft)	1320	1	1	1	1		
	Cover	0.24, Dense grasses	Choose Cover Type	Choose Cover Type	Choose Cover Type	Choose Cover Type		
	Specify alternate "n"							
	Sheet Flow "n" (dim)	0.240	0.000	0.000	0.000	0.000		
	2-yr, 24-hr Rainfall (ins)	3.50	3.50	3.50	3.50	3.50		
	Drop (ft)	2	0	0	0	0		2 feet drop
	Slope (ft/ft)	0.0200	0.0000	0.0000	0.0000	0.0000		
	Slope (%)	2.00	0.00	0.00	0.00	0.00		
	Velocity (fps)	0.12						
	Travel Time (hrs)	0.227						
	Travel Time (mins)	13.64						13.6 mins travel

Shallow Concentrated Flow

selected->	Select (0 or 1)	1	0	0	0	0	Total	1 segments
	Length (ft)	1650	1	1	1	1		### feet length
	Top Elevation (ft)	1320	1	1	1	1		
	Bottom Elevation (ft)	1300	1	1	1	1		
	Cover	7, Short grass pasture	Choose Cover Type	Choose Cover Type	Choose Cover Type	Choose Cover Type		
	Specify alternate "K"							
	Surface Coeff (dim)	7.00	0.00	0.00	0.00	0.00		
	Drop (ft)	20	0	0	0	0		20 feet drop
	Slope (ft/ft)	0.0121	0.0000	0.0000	0.0000	0.0000		
	Slope (%)	1.21	0.00	0.00	0.00	0.00		
	Velocity (fps)	0.77						
	Travel Time (mins)	35.68						35.7 mins travel

Open Channel Ditch Flow

	Select (0 or 1)	0	0	0	0	0	Total	0 segments
	Length (ft)	100	1	1	1	1		0 feet length
	Top Elevation (ft)	50	1	1	1	1		
	Bottom Elevation (ft)	47	1	1	1	1		
	Channel Lining	0.03, Grassed	Choose Lining Type	Choose Lining Type	Choose Lining Type	Choose Lining Type		
	Bottom Width (ft)	25.00	0.00	1.00	1.00	1.00		
	Left Side Slope (H:V)	3.00	1.00	1.00	1.00	1.00		
	Right Side Slope (H:V)	3.00	1.00	1.00	1.00	1.00		
	Depth (ft)	3.00	1.00	1.00	1.00	1.00		
	Specify alternate "n"							
	Manning "n" (dim)	0.030	0.000	0.000	0.000	0.000		
	Drop (ft)	3	0	0	0	0		0 feet drop
	Slope (ft/ft)	0.0300	0.0000	0.0000	0.0000	0.0000		
	Slope (%)	3.00	0.00	0.00	0.00	0.00		
	Flow Area (sq ft)	102.00	1.00	2.00	2.00	2.00		
	Wet Perimeter (ft)	43.97	2.83	3.83	3.83	3.83		
	Hydraulic Radius (ft)	2.32	0.35	0.52	0.52	0.52		
	Velocity (fps)							
	Normal Flow (cfs)							
	Travel Time (mins)							0.0 mins travel

Open Channel Pipe Flow

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

Open Channel General Flow

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

Other (Computed Separately)

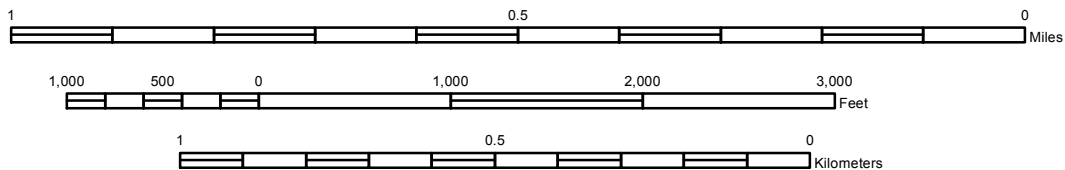
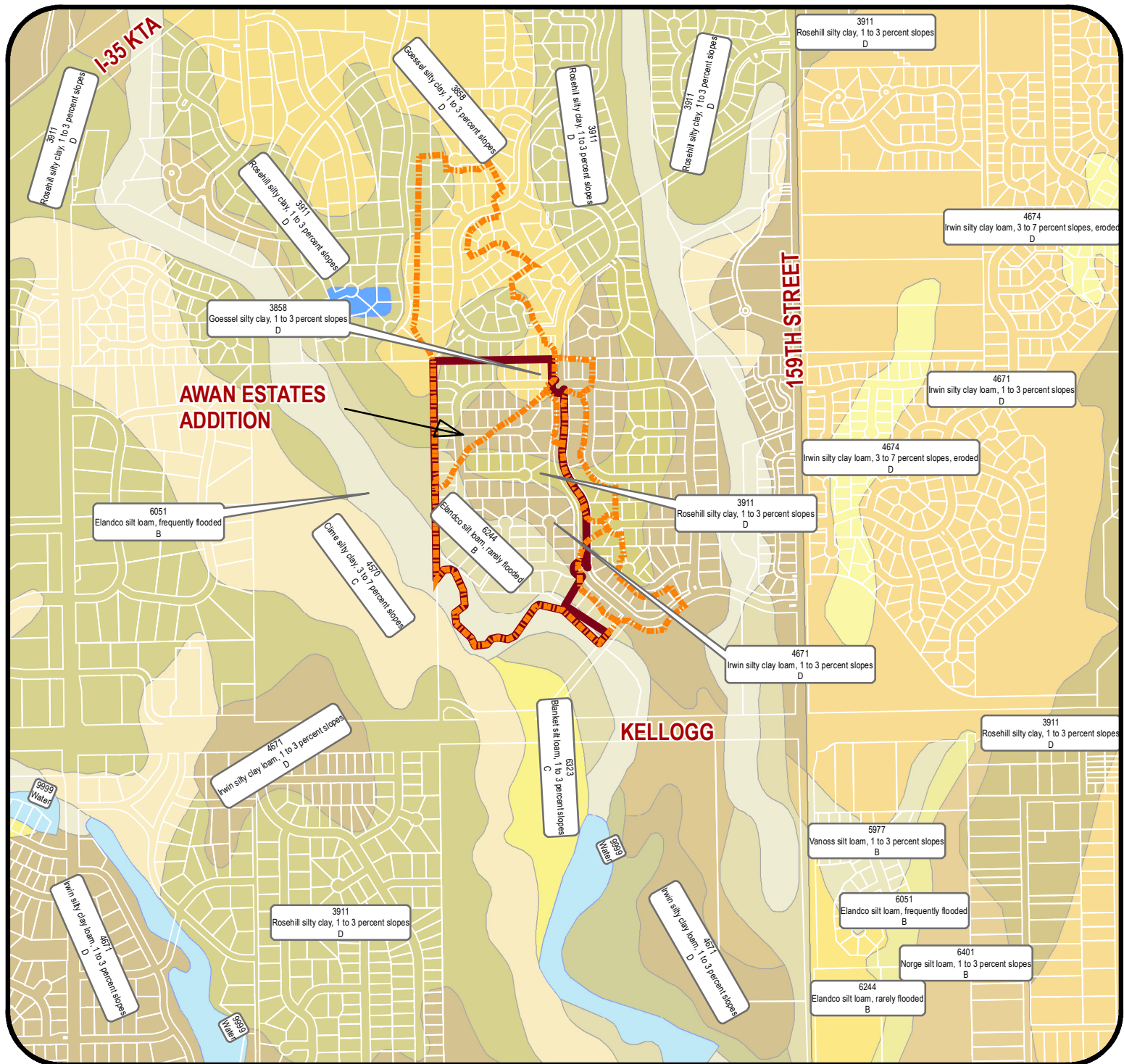
	Select (0 or 1)	0	0	0	0	0	Total	0 segments
	Length (ft)	500	1	1	1	1		0 feet length
	Drop (ft)	10	1	1	1	1		0 feet drop
	Velocity (fps)	2.00	1.00	1.00	1.00	1.00		
	Slope (ft/ft)	0.0200	1.0000	1.0000	1.0000	1.0000		
	Slope (%)	2.00	100.00	100.00	100.00	100.00		
	Travel Time (mins)							0.0 mins travel

Total for Subbasin

Segments	2
Length (ft)	1750
Drop (ft)	22
Slope (ft/ft)	0.0126

Appendix 2.4

Soil Survey



AWAN ESTATES ADDITION

Project Name:
Soil Survey - Sedgwick County, KS
 Sheet Title:



CMJ	JULY 2011
Drawn By: KLA/GJA	Date: 11236
Design / Review:	Job No.:

Tab 3. Proposed Conditions

Datum

The site is shown in NAVD 88 datum.

Drainage Patterns

The site will continue to drain to Fourmile Creek. The proposed conditions are shown on the Proposed Conditions Drainage Map, Appendix 3.1.

Groundwater Elevations

Existing groundwater elevations in the surrounding area are approximately 20-30 feet deep according to the Kansas Water Well Database.

Utilities

Water

Water service is provided by the existing 8" water line near the northeast corner of the site.

Sanitary Sewer

A sanitary sewer line will be constructed from Lot 1, Block 1 to an existing sanitary sewer manhole on the existing 21" line west of the property.

Stormwater

No stormwater sewer pipe systems are proposed for the site. Open channels will convey runoff from offsite to Fourmile Creek.

Hydrologic Analysis

The site was modeled using the NRCS Unit Hydrograph Method in HEC-HMS, Appendix 2.2.

Rainfall

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

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

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

Soil Type

The following soil types are located on:

- Irwin Silty Clay Loam, 1 to 3 percent slopes, HSG "D"
- Rosehill Silty Clay, 1 to 3 percent slopes, HSG "D"
- Goessel Silty Clay, 1 to 3 percent slopes, HSG "D"
- Elandco Silty Clay, rarely flooded, HSG "B"

The soil types for use in selecting runoff curve numbers for this site are Hydraulic Soil Groups "C" and "D." The site and drainage basins are shown on the soil survey, Appendix 2.4.

Land Use

The following land uses are located on site:

- Residential

There will be one residential house on the 42.2 acre property.

Impervious Areas

Under proposed conditions, there will be approximately 0.2 acres of impervious area in Basin E. The site will have approximately 0.5% impervious area.

Curve Number

The Curve Numbers (CN) used in calculations were calculated using the NRCS method. The CN values were calculated using the methods set forth in the City of Wichita/Sedgwick County Stormwater Manual, Volume 2, Section 4.3. Curve numbers are the weighted average of the land use and soil type of the drainage basin. Curve numbers range from 76.9 to 92.6. The curve number of Basin E was increased by 0.3 to represent the additional impervious area of the proposed residence.

Time of Concentration

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

Basin Summary

The site and offsite areas will continue to flow from north to south into Fourmile Creek. The flow rate from Basin E has increased slightly due to the construction of the proposed house. Proposed flow rates are shown in Table 3.2.

Table 3.2. Proposed Conditions Basin Information.

Basin	Area (ac)	CN	T_c (min.)	1-Yr	2-Yr	5-Yr	10-Yr	25-Yr	50-Yr	100-Yr
A	32.3	89.6	25.6	64.8	84.7	113.2	133.2	158.8	181.4	206.9
B	2.2	92.6	14.1	6.1	7.8	10.3	12.0	14.2	16.2	18.4
C	3.7	61.6	10.8	10.7	13.9	18.5	21.7	25.8	29.4	33.5
D	5.7	92.6	18.3	14.4	18.6	24.4	28.5	33.8	38.4	43.6
E	32.3	76.9	49.3	18.6	29.6	46.7	59.3	76.1	91.3	108.6
Total	76.2	-	-	64.5	91.7	132.5	161.8	200.2	234.8	273.9

Stormwater Quality Management

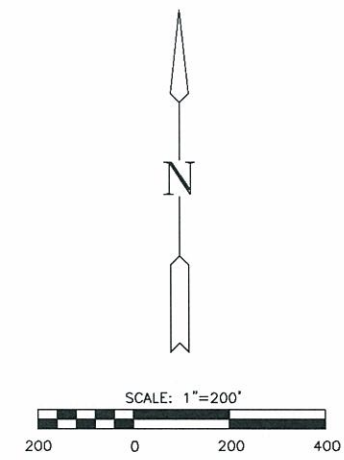
The developed portion of the property will flow through undisturbed area that will serve as a filter to remove pollutants.

Stormwater Quantity Management

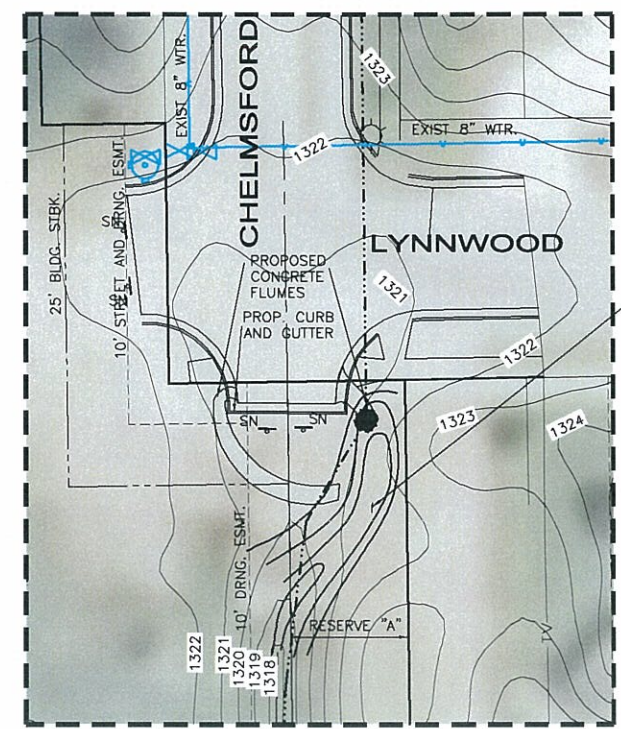
With the development of the site there is very little increase to the peak flow rates from the property. The storm water quantity is significantly improved from the previously platted 88 residential lots. No stormwater quantity management facilities are proposed for the site.

Appendix 3.1

Proposed Conditions Drainage Map



- LEGEND**
- ⊗ - CONIFEROUS TREE
 - ⊙ - DECIDUOUS TREE
 - ⊙ - SIGN
 - ⊙ - POWER POLE
 - ⊙ - ELECTRIC BOX
 - ⊙ - LIGHT POLE
 - ⊙ - FIRE HYDRANT
 - ⊙ - WATER VALVE
 - ⊙ - WATER METER
 - ⊙ - SECTION CORNER
 - ⊙ - BENCHMARK
 - - - - - EASEMENT
 - - - - - BUILDING SETBACK
 - - - - - FENCE
 - - - - - STORM SEWER PIPE
 - - - - - WATER LINE
 - - - - - SANITARY SEWER LINE
 - - - - - GAS LINE
 - - - - - GAS PIPELINE
 - - - - - TELEPHONE LINE
 - - - - - UNDERGROUND ELEC.
 - - - - - OVERHEAD ELECTRIC
 - - - - - FIBER OPTIC CABLE
 - - - - - DRAINAGE SUB BASIN
 - - - - - DRAINAGE BASIN
 - - FLOW ARROW
 - A17 - AREA FOR SWS SIZING
 - - - - - SITE BOUNDARY



NTS

AWAN ESTATES ADDITION
WICHITA, KANSAS
**PROPOSED CONDITIONS AND
OVERALL DRAINAGE MAP**

DATE	July 11
REVISED	

DESIGN BY	KLA
DRAWN BY	CMJ
CHECKED BY	GJA

SHEET NUMBER	1
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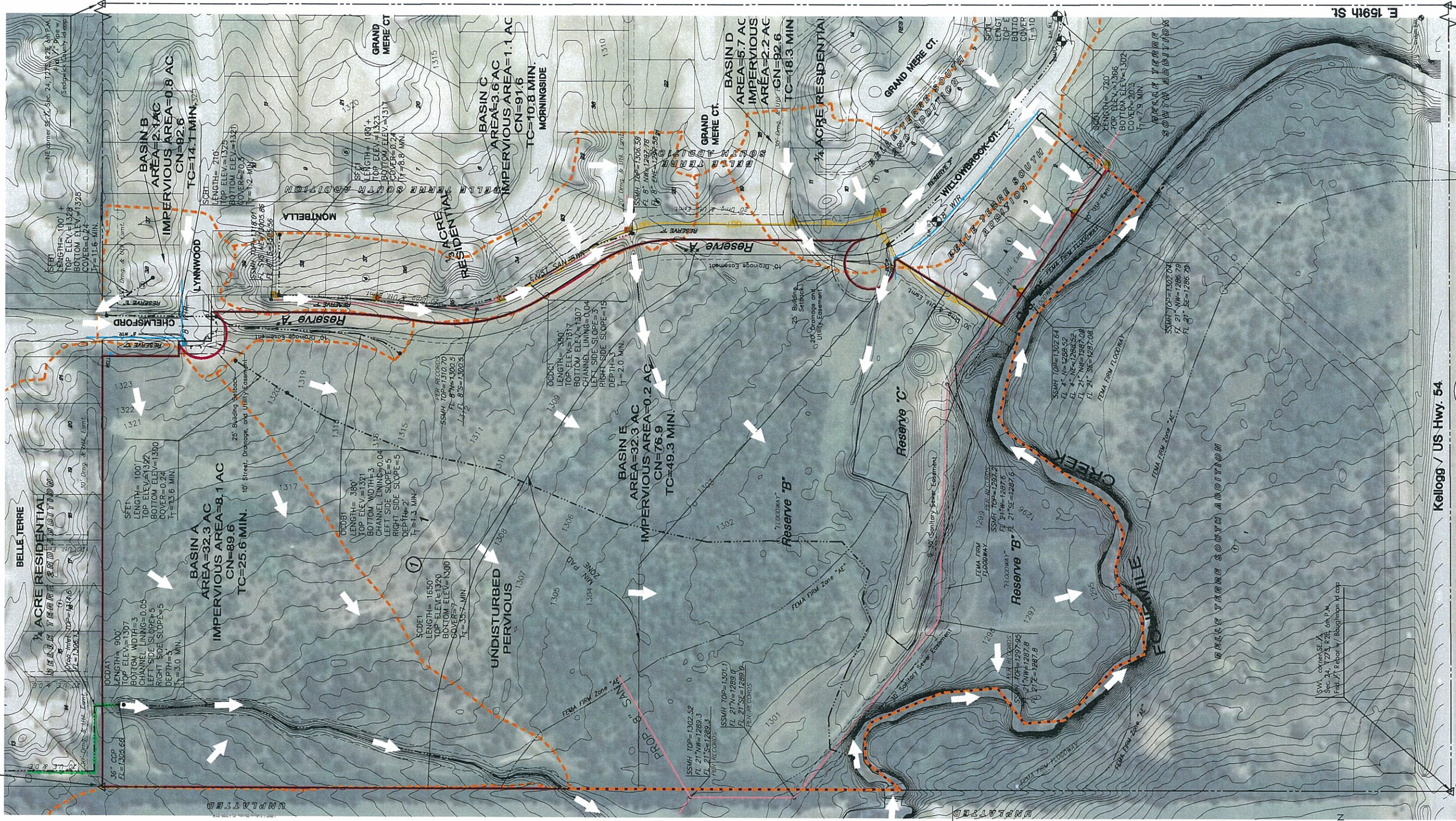
Appendix 3.2

Drainage and Utility Plan

NW corner, SE 1/4, Sec. 24,
T27S, R2E, 6th P.M.,
Frd. 1/2" Baughman Id cop

LEGEND

- CONIFEROUS TREE & DIAMETER
- DECIDUOUS TREE & DIAMETER
- SIGN
- LIGHT POLE
- POWER POLE AND GUY ANCHOR
- ELECTRIC BOX / TRANSFORMER
- LIGHT POLE
- STORM WATER INLET
- FIRE HYDRANT
- WATER METER
- WATER VALVE
- WELL HEAD
- TV CONTROL BOX
- TELEPHONE CONTROL BOX
- SECTION CORNER
- BENCHMARK
- EASEMENT
- BUILDING SETBACK
- FENCE
- STORM SEWER PIPE
- WATER LINE
- SANITARY SEWER LINE
- GAS LINE
- TELEPHONE LINE
- UNDERGROUND ELECTRIC LINE
- OVERHEAD ELECTRIC
- FIBER OPTIC CABLE
- SANITARY SEWER LINE



NW corner, SE 1/4, Sec. 24,
T27S, R2E, 6th P.M.,
Frd. 1/2" Rebar thimble
7" below grade



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

AWAN ESTATES ADDITION

WICHITA, KANSAS

DRAINAGE AND UTILITY PLAN

DATE	July 11
REVISED	

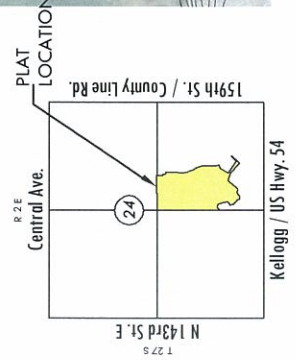
DESIGN BY	KLA
DRAWN BY	CMJ
CHECKED BY	GJA

SHEET NUMBER	1
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MIN. PAD		
LOT	BLOCK	MIN. PAD (NAVD 88)
1	1	1306.4 1303.4

BENCH MARKS

- USGS Standard Tabled, 7'5" N and 42' E of SE corner, Sec. 24, at US Hwy 54 & 159th St. E. Elev. = 1307.33 (NAVD 88)
- Square cut top curb nose at east end island Willowbrook west of 159th St. E. Elev. = 1306.44 (NAVD 88)
- Square cut top curb nose at south end island Grand Mere north of Willowbrook Elev. = 1306.95 (NAVD 88)
- Square cut top curb SW side of Willowbrook between Lots 4 & 5, Block 1, Belle Terre South Addition. Elev. = 1303.49 (NAVD 88)



VICINITY MAP

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Tab 4. Floodplains

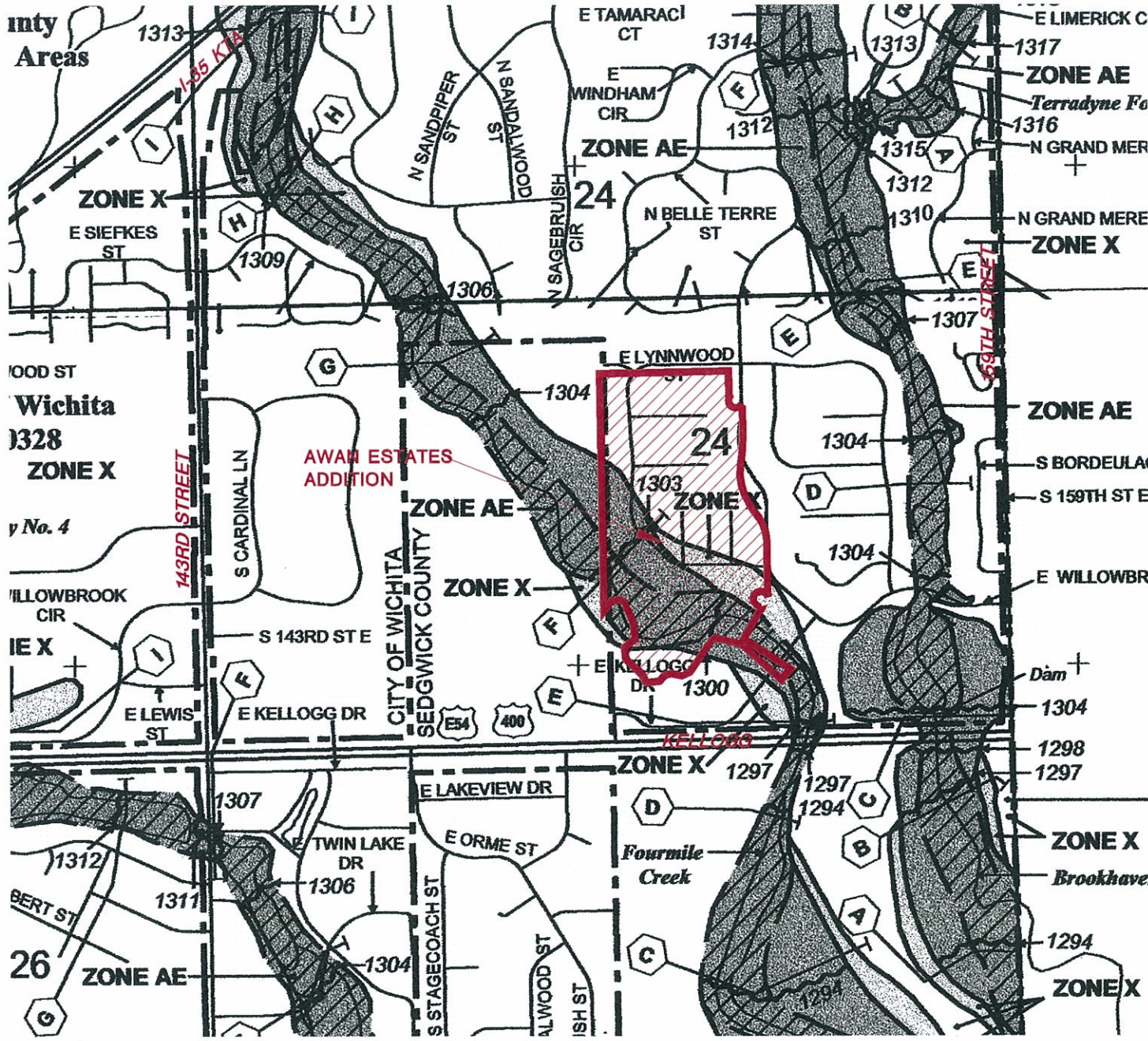
FEMA FIRM

The northern portion of the site is in Zone X according to FIRM panel 20173C0395E, Appendix 4.1. Zone A floodplain surrounds Fourmile Creek on the southern edge of the property.

The hydraulic model of Fourmile Creek is being updated to reflect proposed changes to Kellogg. This model was used to determine the minimum pad elevation required for this plat. The 100-year water surface elevation at the upstream end of the property is an elevation of 1303.4 at cross section 19.05. The 100-year water surface elevation near the center of the site is 1302.4 at cross section 18.84. The 100-year peak flow rate through this property is 6895 cfs according to this model.

Appendix 4.1

Flood Insurance Rate Map (FIRM)



NFIP
NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0395E

FIRM
 FLOOD INSURANCE RATE MAP
 SEDGWICK COUNTY,
 KANSAS
 AND INCORPORATED AREAS

PANEL 395 OF 700
 (SEE MAP INDEX FOR FIRM PANEL LAYOUT)

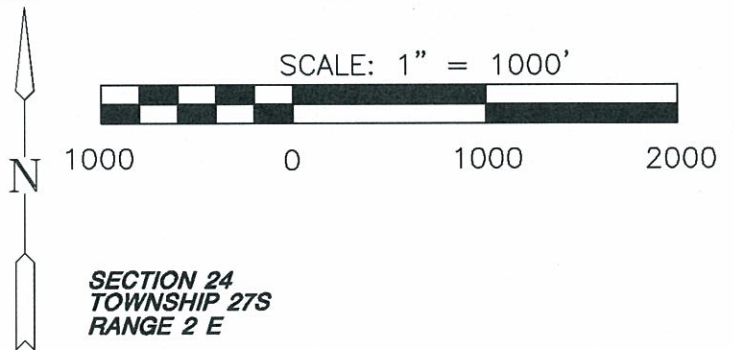
CONTAINS:
 COMMUNITY: SEDGWICK COUNTY
 WICHITA, CITY OF

NUMBER: 20021
 PANEL: 0395
 EFFECTIVE DATE: FEBRUARY 2, 2007

MAP NUMBER: 20173C0395E

Effective Date: FEBRUARY 2, 2007
 Federal Emergency Management Agency

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.



MKEC
 ENGINEERING
 CONSULTANTS, INC.

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

AWAN ESTATES ADDITION
 PROJECT NAME

FIRM MAP
 SHEET TITLE

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

DATE: JULY 2011 JOB NO.: 11236 SHEET/OF: 1 / 1

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