

**DRAINAGE REPORT
WILLOW CREEK EAST
WICHITA, SEDGWICK COUNTY,
KANSAS**

November 29, 2006

**WILLOW CREEK EAST
DRAINAGE ANALYSIS
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INTRODUCTION

This report contains supporting documentation and calculations for the proposed Willow Creek East development. The proposed site is an undeveloped 15.9 acre tract of land located in the NW ¼ of Section 34 T27S R2E on Harry Street East of Greenwich Road. The area is currently pasture land and the soil type is designated as Rosehill which is in hydrologic group D. An unnamed tributary of Spring Creek runs just off the northwest corner of the plat. The tributary passes under Harry Street through an existing 8’X8’ RCBC. The drainage patterns of the site currently direct the water off the site in two directions. An 8.59 acre tributary area drains to the northwest and into the unnamed tributary of Spring Creek. The second tributary area which drains from the site is a 16.93 acre area which flows to the northeast and drains into the south ditch of Harry Street and thence easterly to a 36 inch culvert passing under Harry Street.

The proposed development will provide detention at the northeast corner of the plat. The proposed development is the first phase of a residential subdivision and therefore will accept runoff from offsite future development. Storm sewer stubs are also designed to accommodate the future development.

HYDROLOGY

The detention analysis and the hydrology for the Harry Street RCBC were performed using HEC-HMS. The times of concentration were calculated using the velocity method and overland flow rates from attachment E of the City of Wichita Drainage Criteria. The parameters and results of the existing and proposed analysis are shown in the tables below.

Existing	Area	CN	TC (min.)	Q2 (cfs)	Q5 (cfs)	Q10 (cfs)	Q25 (cfs)	Q100 (cfs)
NE	16.93	80	43	13.35	20.4	24.81	32.31	45.3
NW	8.59	80	17	12.20	18.54	22.48	29.15	40.65

Proposed	Area	CN	TC (min.)	Q2 (cfs)	Q5 (cfs)	Q10 (cfs)	Q25 (cfs)	Q100 (cfs)
NE	18.74	87	30	24.13	34.19	40.30	50.50	67.79
NW	5.73	85	15	12.02	17.31	20.53	25.98	35.34

The rational method was used to determine peak flow rates for the basins located within the plat. The attached Drainage Plan shows the on site drainage calculations. Storm water sewer design and flow capacities are calculated with Haestad Methods STORM Cad program. Output from this program is included with this report. All starting hydraulic grade line elevations are calculated using the 100 year water surface of the detention pond at elevation 1333.27.

HARRY STREET RCBC

The RCBC under Harry Street has a tributary area of 619 acres with a weighted c factor of 0.69. The analysis of the 2-8'x8' culvert under Harry Street was performed using HY-8. The rational equation was used to determine the $Q_{100}=1427$ cfs. The output is attached in this report and indicates that the 100-year W.S. is 1326.80. Harry Street is overtopped at an elevation of 1327.32. It would be more conservative to base the minimum pad elevations of the houses located upstream of the Harry St. RCBC on the overtop elevation rather than the 100-year water surface. Therefore, the minimum pad elevations of Lots 1-6 of Block 4 shall be 1328.40.

DETENTION POND

The single detention pond will provide sufficient storage to detain the necessary flow from the proposed site and some additional future development. The SCS Type II Rainfall Distribution as modeled by the HEC-HMS program is used for analysis, with a total 100-year – 24 hour rainfall event of 7.8 inches (TR-55). This rainfall model is used for all basins. The attached drainage maps demonstrate the extents of the detained tributary area. The outlet of the pond shall be controlled by a 2-30" RCP culvert which maintains the static pool at 1330.50 and drains into the south ditch of Harry Street and drains east. A summary of the detention pond's performance in the various design storms can be found in the table below.

<u>Design Storm</u>	<u>Peak Inflow (cfs)</u>	<u>Peak Outflow (cfs)</u>	<u>Allowable Release (cfs)</u>	<u>Peak Storage (ac-ft.)</u>	<u>Peak Elevation</u>
2-yr	24.13	12.44	13.35	1.15	1331.84
5-yr	34.19	19.69	20.40	1.50	1332.22
10-yr	40.30	24.25	24.81	1.71	1332.43
25-yr	50.50	31.91	32.31	2.03	1332.77
100-yr	67.79	44.89	45.30	2.54	1333.27

The stage-storage data was calculated by HEC-HMS using the parameters located in the table below.

<u>Stage</u>	<u>Area (ac-ft)</u>
1330.5	0.81
1331	0.84
1332	0.92
1333	1.00
1334	1.08
1335	1.16

The detention pond will have a top of 1334.50 to provide and will provide 1.23 feet of freeboard in the 100-year design storm. Lots 1-8, Block 1 shall have a minimum pad elevations of 1334.50.

EXISTING CONDITIONS

PROPOSED CONDITIONS

HARRY STREET RCBC

DETENTION POND

**EXISTING CONDITIONS
DRAINAGE MAP**

**PROPOSED CONDITIONS
DRAINAGE MAP**

STORM SEWER PROFILES

ADDITIONAL CALCULATIONS