
April 13, 2018

Mike Weisenborn
Project Manager, Development Center
City of Lee's Summit
220 SE Green Street
Lee's Summit, MO 64063

Re: **18-0129 Northpoint Summit Square II Apartments Storm Water Impact Statement**

Mr. Weisenborn:

Per the requirements provided by the City of Lee's Summit's planning code regarding the final development plan submittal for the proposed Summit Square II Apartments, a storm sewer impact analysis has been conducted. The following is a report of the analysis.

PROJECT DESCRIPTION

An approximately 12.8-acre multi-family complex is currently being proposed at the southeast corner of NW Ward Road and NE Tudor Road in Lee's Summit, MO. The complex generally consists of five primary 4/5-story buildings, a courtyard, and associated parking facilities. A site location map has been provided as Exhibit A. The entire site is located within the Little Cedar Creek watershed.

According to the Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map (FIRM) panel number 29095C0417G, dated January 20, 2017, the property lies within OTHER AREAS, ZONE X, defined as areas determined to be outside the 0.2% annual chance floodplain. The FEMA FIRM has been attached as Exhibit B.

In September 2006, a master plan was developed for "Ward Road – Summit Technology Campus". The study was originally conducted by Trabue, Hansen, & Hinshaw, Inc. (THHinc) and was used to analyze the detention needs for the entire Summit Technology Campus based on assumed curve number and time of concentration values for future conditions. A copy of the 2006 master plan study has been provided as Exhibit C.

This report is a supplement to the 2006 master plan study and is intended to determine whether the regional detention system and surrounding storm infrastructure will adequately manage runoff from the site under the conditions proposed herein.

METHODOLOGY

This study was prepared using the provisions of "Section 5600 – Storm Drainage Systems and Facilities" (February 15, 2006) of the Kansas City Metropolitan Chapter of the American Public Works Association (APWA) as adopted and modified for use in the storm facilities design manual provided by the City of Lee's Summit Public Works Department. Pre- and post-development runoff were determined using the curve number methodology described in SCS (now NRCS) Technical Release No. 55 "Urban Hydrology for Small Watersheds" (2nd Edition, June 1986) as provided for in sub-section 5602.2 in APWA 5600. The analyses were performed using the Type II 24-hour storm distribution for the 1-, 10-, and 100-year storm events.

MASTER STUDY EXISTING CONDITIONS

The proposed site lies within sub basins D1 and D3 as designated in the 2006 master study by THHinc. Approximately 43.7% of the site lies within sub basin D1, and 56.3% of the site lies within sub basin D3. Based on the existing parameters set for the corresponding basins in the 2006 master study, the existing runoff has been

modeled. A summary of the existing site hydrology has been provided in Table 1. Refer to Exhibit D for a map of the existing site and Exhibit E for details regarding the determination of existing hydrology.

Table 1. Existing Site Hydrology Based on Master Study Existing Conditions Parameters

Sub Basin	Area (ac.)	Area (%)	Time of Concentration (min.)	CN Value	Q _{100%} (cfs)	Q _{10%} (cfs)	Q _{1%} (cfs)
D1	5.58	43.7	39.0	76	3.97	11.59	20.42
D3	7.20	56.3	48.0	78	5.03	13.89	23.92
Totals	12.78	100.0			9.00	25.48	44.34

MASTER STUDY FUTURE CONDITIONS

At the time of the preliminary analysis reflected in the 2006 master study, the site was assumed office use under future conditions. The curve numbers designated for sub basins D1 and D3 were 92 and 94, respectively. Lag times for the future conditions in the 2006 master study were assumed to be 25% shorter than the existing conditions, yielding times of concentration of 29.4 and 36 minutes for sub basins D1 and D3, respectively. Based on these parameters, runoff from the site during the 1-, 10-, and 100-year storm events have been modeled, and the results are provided in Table 2. Refer to Exhibit F for details regarding the determination of the future site hydrology.

Table 2. Future Site Hydrology Based on Master Study Future Conditions Parameters

Sub Basin	Area (ac.)	Area (%)	Time of Concentration (min.)	CN Value	Q _{100%} (cfs)	Q _{10%} (cfs)	Q _{1%} (cfs)
D1	5.58	43.7	29.4	92	10.67	21.00	31.60
D3	7.20	56.3	36	94	13.01	24.77	36.88
Totals	12.8	100.0			23.68	45.77	68.48

PROPOSED CONDITIONS

The site layout proposed with this application will result in a decrease in the expected runoff from the site as it was evaluated in the 2006 master study. This is largely due to the decrease in impervious area from office to a multi-family development allowing for lower curve numbers to be designated for the site in the model.

A composite curve number analysis based on the approximate percent impervious area of the multi-family use proposed herein reflects the expected reduction in curve number from the assumptions made in the future conditions model of the 2006 master study. The proposed site is approximately 50% impervious yielding a composite curve number for the proposed multi-family use site of 89.00. Refer to Table 3 for details regarding how the composite curve number was calculated for the proposed conditions.

Table 3. Proposed Composite Curve Number

	Impervious Area CN = 98 (paved roads and roofs)	Pervious Area CN = 80 (>75% grass cover; HSG = D)
Area (ac.)	6.4	6.4
$\text{Composite CN Value} = \frac{(6.4 \times 98) + (6.4 \times 80)}{(12.8)} = \underline{\underline{89.00}}$		

From the calculated composite curve number, the proposed development has been modeled to evaluate the estimated site runoff. The results of this analysis have been provided in Table 4. Refer to Exhibit G for details regarding the proposed site hydrology.

Table 4. Proposed Site Hydrology Based on Multi-Family Use

Sub Basin	Area (ac.)	Area (%)	Time of Concentration (min.)	CN Value	Q _{100%} (cfs)	Q _{10%} (cfs)	Q _{1%} (cfs)
D1	5.58	43.7	29.4	89	9.48	19.84	30.61
D3	7.20	56.3	36	89	10.80	22.62	34.93
Totals	12.8	100.0			20.28	42.46	65.54

SUMMARY

The proposed developed will increase the storm water runoff generated on the site due to increased curve numbers and shorter times of concentration. The future conditions model analyzed in the 2006 master study accounted for flows in the design of the regional detention facility. This supplemental storm water impact statement has identified a decrease in the impervious area, and therefore, a decrease in the expected runoff that will be generated from the site under developed conditions. A summary of the runoff modeled under existing conditions, future conditions identified in the 2006 master study, and proposed conditions identified with this submittal has been provided in Table 6.

Table 6. Summary of Expected Site Runoff

Model Description	Q _{100%} (cfs)	Q _{10%} (cfs)	Q _{1%} (cfs)
Master Study Existing Conditions	9.00	25.48	44.34
Master Study Future Conditions	23.68	45.77	68.48
Proposed Conditions (Multi-Family Use)	20.28	42.46	65.54

In addition, it is our opinion that under proposed conditions the runoff generated from the site will not exceed what was expected during the design of the regional detention facility.

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