LEE'S SUMMIT
MISSOURI

DESIGN AND CONSTRUCTION MANUAL DESIGN MODIFICATION REQUEST

PROJECT NAME: Lee's Summit Station #3

PREMISE ADDRESS: Lee's Summit Station #3 Pryor Road, Lee' s Summit MO 64081

PERMIT NUMBER: PL2018-022

OWNER'S NAME: City of Lee's Summit

TO: The City Engineer

In accordance with the Lee's Summit Design and Construction Manual (DCM) Section 1002.A, I wish to apply for a modification to one or more specification (s). The following articulates my request for your review and action. (NOTE: Cite specific code sections and engineering justification and drawings.)
Please reference our Storm Water Waiver request dated June 14, 2018. Furthermore, this request is requesting relief in regard to APWA Section 5608.4C(1)(a).

SUBMITTED BY:
NAME: _Brian L. Wenninghoff, PE ( ) OWNER (x) OWNER'S AGENT
ADDRESS: 200 NE Missouri Road, Suite 200 Tel.# 816-282-6373
CITY, STATE, ZIP: Lee's Summit, MO 64086
Email: brian.wenninghoff@bartwest.com SIGNATURE: 11/1/2018

FORWARDING MANAGER: Kent Monter RECOMMENDATION (X) APPROVAL ( ) DENIAL

SIGNATURE: KD Monter DATE: 2 NOV 2018

GEORGE BINGER III, P.E. – CITY ENGINEER: (X) APPROVED ( ) DENIED

SIGNATURE: DATE: 11-2-2018

COMMENTS

A COPY MUST BE ATTACHED TO THE APPROVED PLANS

LEE'S SUMMIT FIRE STATION #3

RECEIVED
JUN 15 2018
Development Services

STORM WATER WAIVER REQUEST

Watershed A Storm Water Waiver Request Submitted: April 10, 2018
Resubmitted: June 14, 2018

Proposed Fire Station located in:
SE ¼ of Section 2, Township 47N, Range 32W
Lee's Summit, Jackson County, Missouri

Little Blue River Watershed

Prepared For:
Williams Spurgeon Kuhl & Freshnock Architects Inc.
110 Armour Rd.
North Kansas City, MO 64116
816-300-4101

Bartlett & West
228 NW Executive Way
Lee's Summit, MO 64063
816.525.3562
816.525.9041 fax
www.bartlettwest.com

Table of Contents

1. General Information

Lee's Summit Fire Station #3 is a proposed fire station to be constructed on 2.23 acres of land. The property is just west of Pryor Road and a quarter mile north of SW 3rd Street. This locates the development within the southeast ¼ of Section 2, Township 47N, Range 32W in the Little Blue River watershed of Kansas City, Jackson County, Missouri. This 2.23-acre lot falls inside the overall 64-acre parcel number: 62-240-99-01-00-0-00-000.

Lee's Summit Fire Station #3 Vicinity Map

FEMA Floodplain Classification

FEMA Flood Boundary and Floodway Map Community Panel Number 29095C0416G classifies the Lee's Summit Fire Station #3 property as a "Zone X" Area. Zone X is the FEMA flood insurance rate zone that corresponds to "areas outside the 0.2-percent annual chance floodplain. Refer to Exhibit 1 for Floodplain Map depicting plat location with respect to designated floodplains.

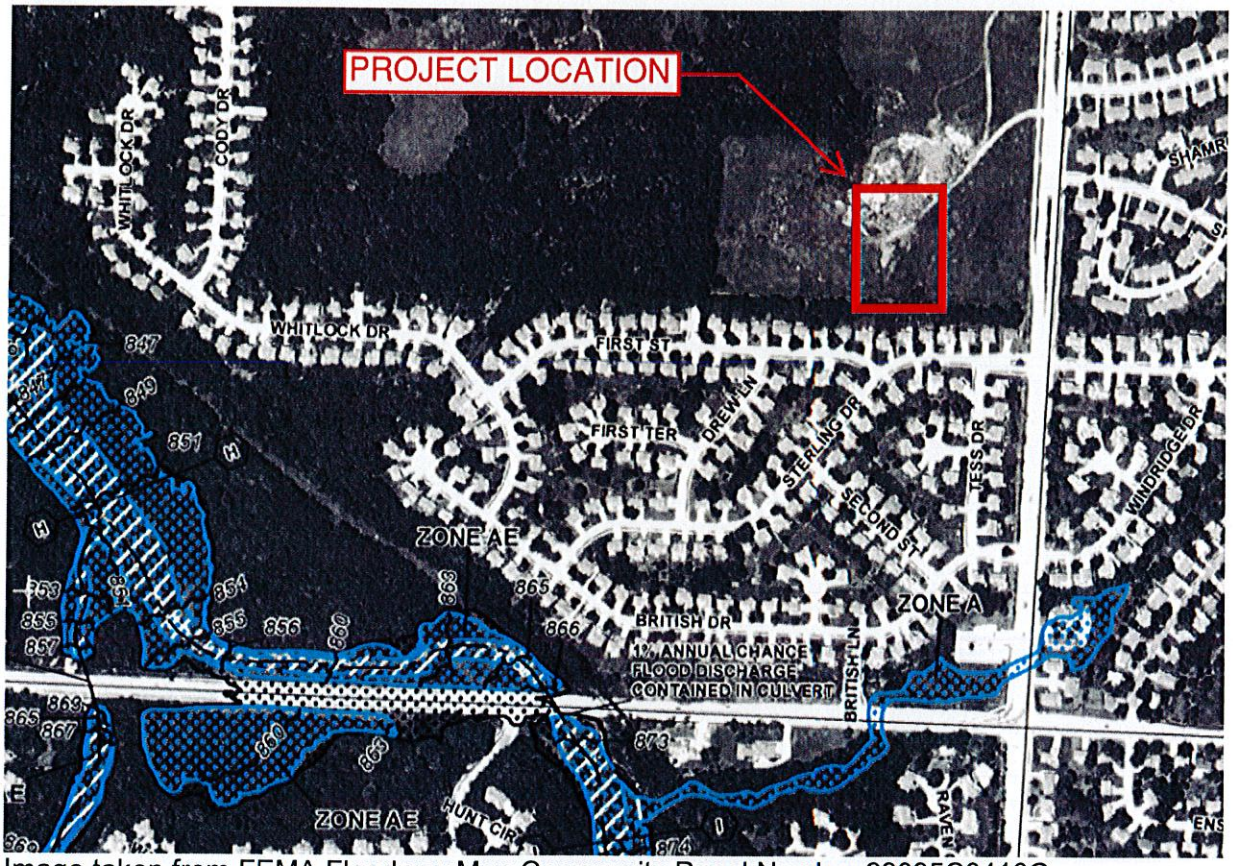


Image taken from FEMA Floodway Map Community Panel Number 29095C0416G

2. Methodology

This Watershed A storm water waiver request has been prepared to request a waiver of the requirements as specified by Section 5600 of the Kansas City Metropolitan Chapter – American Public Works Association (APWA) Standard Specifications & Design Criteria for comprehensive control.

The following methods were used in this study to model proposed conditions for storm water runoff:

- Haestad Methods, Inc. "PondPack" v8i
  TR-55 Unit Hydrograph Method
  - 2-year, 10-year, and 100-year Return Frequency storms
  - 24-Hour SCS Type II Rainfall Distribution
  - SCS Runoff Curve Numbers per SCS TR-55
  - SCS TR-55 Methods for determination of Time of Concentration and Travel Time

3. Existing Conditions:

Under existing conditions, the site is an undeveloped pervious open field. The west half of the site naturally drains west. This area is summarized by Watersheds A and C. The remainder of the site drains south and east towards NW Pryor Road. Refer to Exhibit 1 for existing conditions. Below is a summary of the areas analyzed under existing conditions. Existing conditions show the site to be undisturbed open space in fair condition (grass cover 50 to 75%) using a curve number of 78 for soil group D. The attached soils report shows the existing site to be primarily comprised of moderately well drained soil (Sharpsburg-Urban land complex, 2 to 5 percent slopes).

Watershed A is comprised of two subareas. Subarea A1 represents the portion of Watershed A that is on Lee's Summit Fire Station property. Subarea A2 represents the portion of Watershed A that is off of Fire Station property, but still contributes flow to Point A.

Existing Conditions - Watershed Summary

Watershed	Subarea	Pervious Area (acres)	Impervious Area (acres)	Total Area (acres)	Pervious CN:	Impervious CN:	Composite CN:	Tc (hrs)	Notes
A	A1	0.70	0.00	0.70	78	98	78.00	0.180	Onsite Predeveloped Area
	A2	0.93	0.00	0.93	78	98	78.00		Offsite Predeveloped Area
B		1.02	0.00	1.02	78	98	78.00	0.170	Onsite Predeveloped Area
C		0.51	0.00	0.51	78	98	78.00	0.150	Onsite Predeveloped Area
		3.16	**0.00**	**3.16**					

TIME OF CONCENTRATION

	Overland flow			Ditch/Channel Flow			Curb flow			Total	DA
DA	Length	C	Time	Length	Velocity	Time	Length	Velocity	Time	Length	Ti
Exist A	100	0.40	8.74	410	3	2.28	0	7	0.00	510	11.02
Exist B	100	0.40	8.74	287	3	1.59	0	7	0.00	387	10.34
Exist C	100	0.40	8.74	241	3	1.34	0	7	0.00	341	10.08

Under existing conditions, with a total area of 1.63 acres, the 2, 10 and 100-year peak flows form Watershed A are 3.27 ft^3/s, 6.58 ft^3/s, and 11.07 ft^3/s respectively.

4. Proposed Conditions:

Under proposed conditions Subarea A1 is reduced to a small yet fairly impervious narrow portion on the west side of the proposed development that will flow undetained offsite. Being offsite, Subarea A2 remains undisturbed. Refer to Exhibit 2 for proposed conditions. Below is a summary of the areas analyzed under proposed conditions.

Proposed Conditions - Watershed Summary

Watershed	Subarea	Pervious Area (acres)	Impervious Area (acres)	Total Area (acres)	Pervious CN:	Impervious CN:	Composite CN:	Tc (hrs)	Notes
A	A1	0.15	0.12	0.27	78	98	86.89	0.080	Onsite Undetained Area
	A2	0.93	0.00	0.93	78	98	78.00		Offsite Undetained Area
B		0.75	1.18	1.93	78	98	90.23	0.080	Detained by Pond B
C		0.03	0.00	0.03	78	98	78.00	0.140	Onsite Undetained Area
		1.86	**1.30**	**3.16**					

TIME OF CONCENTRATION

	Overland flow			Ditch/Channel Flow			Curb flow			Total	DA
DA	Length	C	Time	Length	Velocity	Time	Length	Velocity	Time	Length	Ti
Prop A	100	0.90	2.50	410	3	2.28	0	7	0.00	510	5.00
Prop B	100	0.90	2.50	200	3	1.11	171	7	0.41	471	5.00
Prop C	98	0.40	8.65	0	3	0.00	0	7	0.00	98	8.65

Under proposed conditions, with a total area of 1.20 acres the 2, 10 and 100-year peak flows from Watershed A are 3.00 ft^3/s, 5.83 ft^3/s, and 9.62 ft^3/s respectively.

For storm water detention and peak flow management The City of Lee's Summit requires comprehensive flood control under section 5608 of the February 16, 2011 issue of "APWA Section 5600". This section specifies that this development's maximum release rate for post-development peak discharges shall be as follows:

- 50% (2-year) storm peak rate less than or equal to 0.5 ft^3/s per site acre.
- 10% (10-year) storm peak rate less than or equal to 2.0 ft^3/s per site acre.
- 1% (100-year) storm peak rate less than or equal to 3.0 ft^3/s per site acre.

For the Kansas City area, the 2-year, 10-year and 100-year 24-Hour SCS Type II rainfall depths are 3.5 inches, 5.3 inches and 7.7 inches respectively.

The following summarizes Watershed A by comparing existing peak discharges vs. allowable peak discharges vs. proposed peak discharges.

Proposed Peak Discharges - Point A

	Subarea	Return Event	Existing Drainage Area (acres)	Existing Peak Discharge (cfs)	Allowable Proposed Peak Discharge* (cfs/acre)	Allowable Proposed Peak Discharge (cfs)	
Point A	A1	100-yr	0.70	NA	3.00	2.10	Proposed Peak Discharge (cfs)
		10-yr	0.70	NA	2.00	1.40	
		2-yr	0.70	NA	0.50	0.35	
	A2**	100-yr	0.93	6.32	NA	6.32	
		10-yr	0.93	3.76	NA	3.76	
		2-yr	0.93	1.87	NA	1.87	
	Σ	100-yr		11.07		8.42	9.62
	Σ	10-yr		6.58		5.16	5.83
	Σ	2-yr		3.27		2.22	3.00

*Allow able proposed peak discharge for developed areas is based on allow able APWA 5600 post-development discharges for Comprehensive Control.

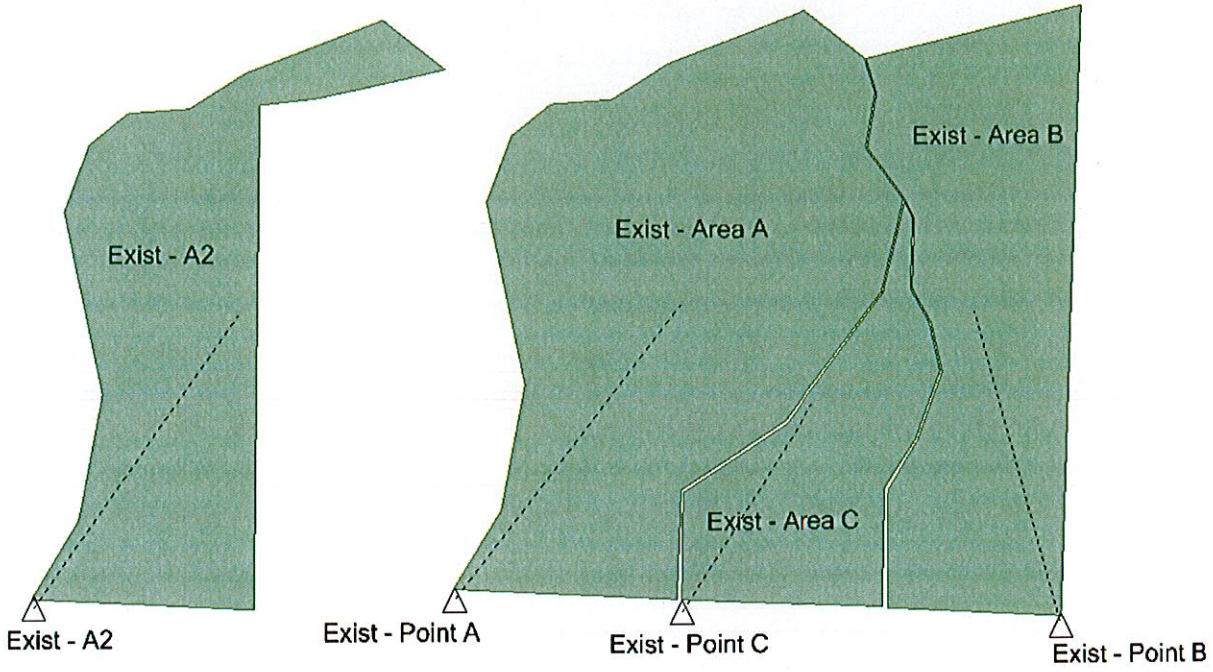
**Allow able proposed peak discharges for offsite areas are equal to existing conditions.

all reduced by −13% −11% −8%

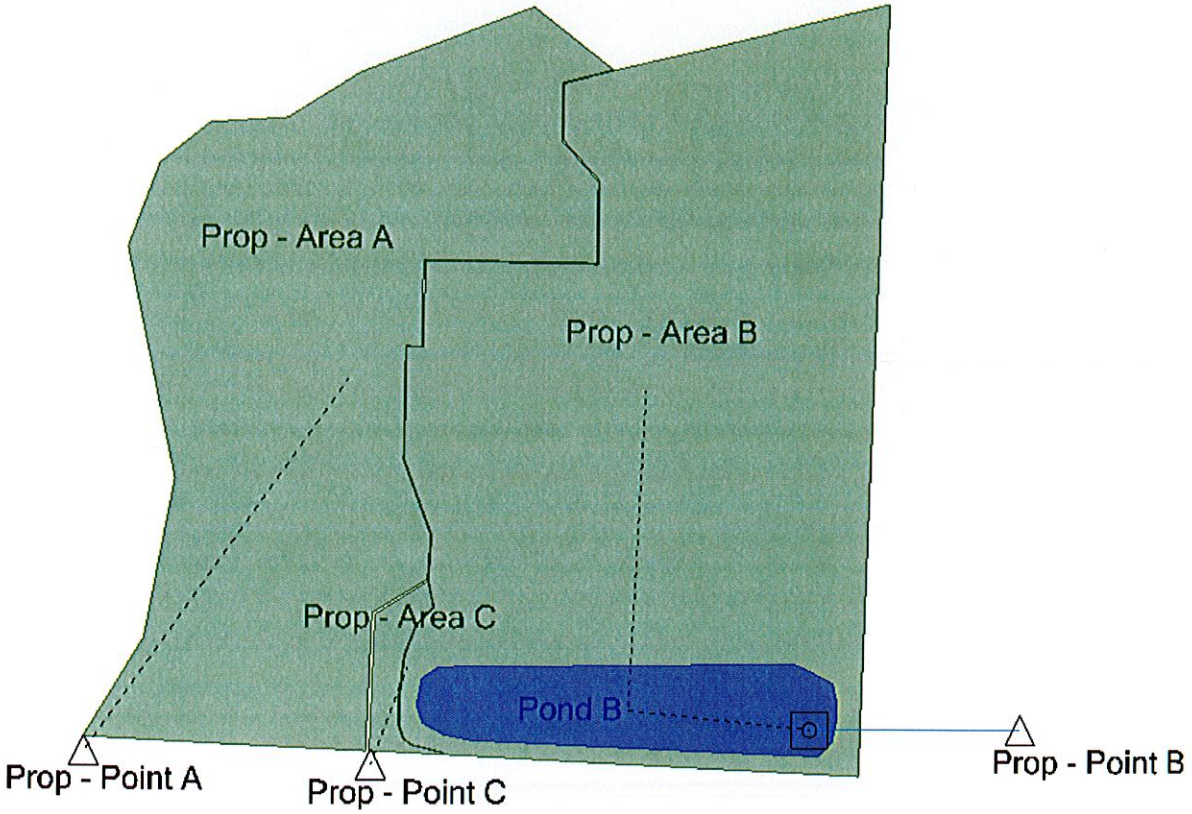
6/2018

While it is true that the proposed peak discharges at Point A do exceed the allowable peak discharges, it should be noted that the proposed peak discharges for all three events are actually less than existing conditions. This is because Watersed A was reduced in size from 1.63 acres to 1.20 acres under proposed conditions. Also, these flows for Watershed A will be attenuated further with the future planned regional detention basin offsite. Due to the tight constraints of the site which prevents all storm water from being routed to the detention pond, no additional BMPs could be implemented for this area.

Existing Conditions Model



Proposed Conditions Model



Existing and Proposed Conditions – 2-Year Event

Scenario Summary

Scenario:	TR-55 (KC Metro) - Synthetic Curve, 2 yrs	
Output Increment:	0.010	hours
Duration:	35.000	hours

Storm Summary

Return Event Tag:	2_YR	
Total Depth:	3.5	in
Rainfall Type:	Time-Depth Curve	
Storm Event:	TypeII 24hr (3.5 in)	

Executive Summary [Nodes] | Executive Summary [Links] | Messages

	Label	Scenario	Return Event (years)	Truncation	Hydrograph Volume (ac-ft)	Time to Peak (hours)	Peak Flow (ft^3/s)	Maximum Water Surface Elevation (ft)	Maximum Pond Storage (ac-ft)
1	Exist - A2	TR-55 (KC Metro) - Synt...	2	None	0.116	12.000	1.87	(N/A)	(N/A)
2	Exist - A2	TR-55 (KC Metro) - Synt...	2	None	0.116	12.000	1.87	(N/A)	(N/A)
3	Exist - Area A	TR-55 (KC Metro) - Synt...	2	None	0.203	12.000	3.27	(N/A)	(N/A)
4	Exist - Area B	TR-55 (KC Metro) - Synt...	2	None	0.127	12.000	2.07	(N/A)	(N/A)
5	Exist - Area C	TR-55 (KC Metro) - Synt...	2	None	0.064	12.000	1.03	(N/A)	(N/A)
6	Exist - Point A	TR-55 (KC Metro) - Synt...	2	None	0.203	12.000	3.27	(N/A)	(N/A)
7	Exist - Point B	TR-55 (KC Metro) - Synt...	2	None	0.127	12.000	2.07	(N/A)	(N/A)
8	Exist - Point C	TR-55 (KC Metro) - Synt...	2	None	0.064	12.000	1.03	(N/A)	(N/A)
9	Pond B (IN)	TR-55 (KC Metro) - Synt...	2	None	0.398	11.930	7.11	(N/A)	(N/A)
10	Pond B (OUT)	TR-55 (KC Metro) - Synt...	2	None	0.310	13.880	0.26	971.66	0.259
11	Prop - Area A	TR-55 (KC Metro) - Synt...	2	None	0.165	11.940	3.00	(N/A)	(N/A)
12	Prop - Area B	TR-55 (KC Metro) - Synt...	2	None	0.398	11.930	7.11	(N/A)	(N/A)
13	Prop - Area C	TR-55 (KC Metro) - Synt...	2	None	0.004	11.980	0.06	(N/A)	(N/A)
14	Prop - Point A	TR-55 (KC Metro) - Synt...	2	None	0.165	11.940	3.00	(N/A)	(N/A)
15	Prop - Point B	TR-55 (KC Metro) - Synt...	2	None	0.310	13.880	0.26	(N/A)	(N/A)
16	Prop - Point C	TR-55 (KC Metro) - Synt...	2	None	0.004	11.980	0.06	(N/A)	(N/A)

Existing and Proposed Conditions – 10-Year Event

Scenario Summary

Scenario:	TR-55 (KC Metro) - Synthetic Curve, 10 yrs	
Output Increment:	0.010	hours
Duration:	35.000	hours

Storm Summary

Return Event Tag:	10_YR	
Total Depth:	5.3	in
Rainfall Type:	Time-Depth Curve	
Storm Event:	TypeII 24hr (5.3 in)	

Executive Summary [Nodes] | Executive Summary [Links] | Messages

	Label	Scenario	Return Event (years)	Truncation	Hydrograph Volume (ac-ft)	Time to Peak (hours)	Peak Flow (ft^3/s)	Maximum Water Surface Elevation (ft)	Maximum Pond Storage (ac-ft)
1	Exist - A2	TR-55 (KC Metro) - Synt...	10	None	0.233	12.000	3.76	(N/A)	(N/A)
2	Exist - A2	TR-55 (KC Metro) - Synt...	10	None	0.233	12.000	3.76	(N/A)	(N/A)
3	Exist - Area A	TR-55 (KC Metro) - Synt...	10	None	0.408	12.000	6.58	(N/A)	(N/A)
4	Exist - Area B	TR-55 (KC Metro) - Synt...	10	None	0.255	11.990	4.17	(N/A)	(N/A)
5	Exist - Area C	TR-55 (KC Metro) - Synt...	10	None	0.128	11.990	2.08	(N/A)	(N/A)
6	Exist - Point A	TR-55 (KC Metro) - Synt...	10	None	0.408	12.000	6.58	(N/A)	(N/A)
7	Exist - Point B	TR-55 (KC Metro) - Synt...	10	None	0.255	11.990	4.17	(N/A)	(N/A)
8	Exist - Point C	TR-55 (KC Metro) - Synt...	10	None	0.128	11.990	2.08	(N/A)	(N/A)
9	Pond B (IN)	TR-55 (KC Metro) - Synt...	10	None	0.681	11.930	11.85	(N/A)	(N/A)
10	Pond B (OUT)	TR-55 (KC Metro) - Synt...	10	None	0.578	12.280	1.53	972.44	0.379
11	Prop - Area A	TR-55 (KC Metro) - Synt...	10	None	0.321	11.930	5.83	(N/A)	(N/A)
12	Prop - Area B	TR-55 (KC Metro) - Synt...	10	None	0.681	11.930	11.85	(N/A)	(N/A)
13	Prop - Area C	TR-55 (KC Metro) - Synt...	10	None	0.008	11.970	0.13	(N/A)	(N/A)
14	Prop - Point A	TR-55 (KC Metro) - Synt...	10	None	0.321	11.930	5.83	(N/A)	(N/A)
15	Prop - Point B	TR-55 (KC Metro) - Synt...	10	None	0.578	12.280	1.53	(N/A)	(N/A)
16	Prop - Point C	TR-55 (KC Metro) - Synt...	10	None	0.008	11.970	0.13	(N/A)	(N/A)

Existing and Proposed Conditions – 100-Year Event

Scenario Summary

Scenario:	TR-55 (KC Metro) - Synthetic Curve, 100 yr	
Output Increment:	0.010	hours
Duration:	35.000	hours

Storm Summary

Return Event Tag:	100_YR	
Total Depth:	7.7	in
Rainfall Type:	Time-Depth Curve	
Storm Event:	TypeII 24hr (7.7 in)	

Executive Summary [Nodes] | Executive Summary [Links] | Messages

	Label	Scenario	Return Event (years)	Truncation	Hydrograph Volume (ac-ft)	Time to Peak (hours)	Peak Flow (ft^3/s)	Maximum Water Surface Elevation (ft)	Maximum Pond Storage (ac-ft)
1	Exist - A2	TR-55 (KC Metro) - Synt...	100	None	0.397	12.000	6.32	(N/A)	(N/A)
2	Exist - A2	TR-55 (KC Metro) - Synt...	100	None	0.397	12.000	6.32	(N/A)	(N/A)
3	Exist - Area A	TR-55 (KC Metro) - Synt...	100	None	0.696	12.000	11.07	(N/A)	(N/A)
4	Exist - Area B	TR-55 (KC Metro) - Synt...	100	None	0.436	11.990	7.01	(N/A)	(N/A)
5	Exist - Area C	TR-55 (KC Metro) - Synt...	100	None	0.218	11.990	3.51	(N/A)	(N/A)
6	Exist - Point A	TR-55 (KC Metro) - Synt...	100	None	0.696	12.000	11.07	(N/A)	(N/A)
7	Exist - Point B	TR-55 (KC Metro) - Synt...	100	None	0.436	11.990	7.01	(N/A)	(N/A)
8	Exist - Point C	TR-55 (KC Metro) - Synt...	100	None	0.218	11.990	3.51	(N/A)	(N/A)
9	Pond B (IN)	TR-55 (KC Metro) - Synt...	100	None	1.054	11.920	17.88	(N/A)	(N/A)
10	Pond B (OUT)	TR-55 (KC Metro) - Synt...	100	None	0.940	12.190	2.84	973.47	0.576
11	Prop - Area A	TR-55 (KC Metro) - Synt...	100	None	0.537	11.930	9.62	(N/A)	(N/A)
12	Prop - Area B	TR-55 (KC Metro) - Synt...	100	None	1.054	11.920	17.88	(N/A)	(N/A)
13	Prop - Area C	TR-55 (KC Metro) - Synt...	100	None	0.013	11.960	0.22	(N/A)	(N/A)
14	Prop - Point A	TR-55 (KC Metro) - Synt...	100	None	0.537	11.930	9.62	(N/A)	(N/A)
15	Prop - Point B	TR-55 (KC Metro) - Synt...	100	None	0.940	12.190	2.84	(N/A)	(N/A)
16	Prop - Point C	TR-55 (KC Metro) - Synt...	100	None	0.013	11.960	0.22	(N/A)	(N/A)

5. Summary

This Watershed A storm water waiver request has been prepared to request a waiver of the requirements as specified by Section 5600 of the Kansas City Metropolitan Chapter – American Public Works Association (APWA) Standard Specifications & Design Criteria for comprehensive control. This project includes a proposed fire station to be constructed on 2.23 acres of land.

6. Conclusions & Recommendations

Section 5600 of the Kansas City Metropolitan Chapter – APWA Standard Specifications & Design Criteria specifies maximum release rates for post-development peak discharges. For Watershed A the allowable proposed release rates to the west for the undetained area are exceeded. However, it should be noted that the proposed peak discharges for the 2, 10 and 100-year events are actually less than existing conditions. This is because Watershed A was reduced in size from 1.63 acres to 1.20 acres under proposed conditions. Also, these flows for Watershed A will be attenuated further with the future planned regional detention basin offsite. Due to the tight constraints of the site which prevents all storm water from being routed to the detention pond, no additional BMPs could be implemented for this area. Given that the proposed conditions for Watershed A are an improvement over existing peak flows and do not adversely impact downstream residents we request approval of this waiver request to waive the requirements as specified by Section 5600 of the Kansas City Metropolitan Chapter – American Public Works Association (APWA) Standard Specifications & Design Criteria for comprehensive control.

7. Exhibits