

# PRELIMINARY AS BUILT MICRO STORM WATER DRAINAGE STUDY

For:  
**DOUGLAS STATION COMMERCIAL PARK**  
**LOTS 1 THRU 10 & TRACT "A"**  
Lee's Summit, Jackson County, Missouri

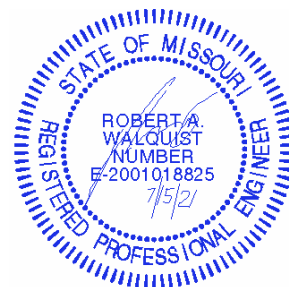
*Water Sheds:  
Little Cedar Creek Water shed*

*July 15, 2021*



**PREPARED BY:**

**Quist Engineering Inc.**  
821 NE Columbus St.  
Lee's Summit, MO 64063  
Phone: (816) 550-5675



Robert Walquist, PE

## **TABLE OF CONTENTS**

- 1. Report Cover Sheet**
- 2. Table of Contents**
- 3. General Information & Site Conditions**
- 4. Overview of the Proposed Design**
- 5. Conclusions & Recommendations**
- 6. Exhibits**

### **3. GENERAL INFORMATION AND SITE CONDITIONS.**

This study is to evaluate the existing regional basin for the “Douglas Station Commercial Park” Subdivision in Lee’s Summit, Jackson County, Missouri. The total site area = 25.03 acres

The site is currently fully developed commercial land less lot 10. The site drains northwest into the existing regional basin. The existing regional basin is located on Tract A and is owned by “Douglas Station LLC” believed to be the original developer or owners association. All flow to the existing basin is from underground conveyance system that enters the basin from the north east corner of the basin from a 54” pipe.

The original design of the basin shows 24.5 acres of the development flowing into the basin. We feel that existing contours and conveyance systems does route 24.5ac to the existing basin. The original design shows an additional 27ac off site area flows thru the site into the basin from the south across lot 10. We found that this is accurate. The off site area flowing onto lot 10 is the out fall from a detention basin from a commercial development to the south of lot 10.

The current condition of the basin is poor with lots of trees and vegetation. The contours of the basin do not match the original design. (See the Storm Drainage Plan)

### **4. OVERVIEW OF THE PROPOSED DESIGN**

The storm drainage study was preformed to evaluate the original design and as built performance of the existing regional basin. The original design was to restrict the runoff from the developed site to the pre development conditions for the 25 yr storm event

Current APWA standards. The following max runoff rate; the 2yr less than or equal to 0.5 cfs/acre, the 10yr less than or equal to 2.0 cfs/acre, and the 100yr less than or equal to 3.0 cfs/acre.

### **5. METHODOLOGY & EVALUATION OF EXISTING DETENTION DESIGN**

Currently there is 24.5 acres of onsite developed area flowing to the existing basin along with 27aces of offsite area. Total flow to basin is 24.5 onsite area and 27ac off site area. (See The Drainage area map.)

The current basin outfall structure is a 48” cmp pipe with no structure of restrictive plate.

All calculation for the detention basin was done using the Software Hydra flow. This program utilized the SCS Method to model the different storm events. The following "CN" values where used:

<b>On Site</b>	<b>CN</b>
Pre Development	74
Post Development	88

## General Modeling Information

<u>Hyd #</u>	<u>Description</u>
1	Pre development runoff from the site (Area 24ac CN= 74)
2	Total on site area draining into Existing Basin (Area 24ac CN= 88)
3	Total off site area draining into Existing Basin (Area =27ac CN=78)
4	Total combined runoff of hyd #2 and #23that will flow into Existing Basin
5	Total flow out of the Existing Basin

## Required Pre-Development Flow Rates

The following are the runoff rate for the different storm events for the pre development 25 ac site:

<u>Storm Event</u>	<u>Runoff (cfs) (HYD #1)</u>
2yr	9.68
10yr	46.72
25yr	79.85
50yr	103.52
100yr	130.54

The following are the required Current APWA maximum runoff rate for the different storm events for the post development 25 ac site:

<u>Storm Event</u>	<u>max rates</u>	<u>Runoff (cfs)</u>
2yr	0.5 x 25	12.5
10yr	2.0 x 25	50
100yr	3.0 x 25	75

## Per & Post-Development Flow Rates for the Development

The following is the summary of the modal (See Hydrologic Modal for additional calculations)

### As Designed

<u>Storm Event</u>	Total On Site running into Basin (cfs) (HYD # 2)	Total Off Site running into Basin (cfs) (HYD # 3)	Total combined runoff into Basin (cfs) (HYD #4)	Total runoff form the Basin cfs) (HYD #5)	Total site Runoff (cfs) (HYD #5 - #3)	<u>Max Elevation</u>
2yr	30.45	13.11	41.07	31.50	18.39 > 9.68	974.80
10yr	79.87	49.70	122.39	97.89	48.19 > 46.72	977.80
25yr	117.21	81.52	187.07	136.19	54.67 < 79.85	979.76
50yr	103.83	103.83	231.51	155.07	52.85 < 103.52	981.26
100yr	170.41	129.07	281.32	-	- > 130.54	over weir

## As Built

<u>Storm Event</u>	Total On Site running into Basin (cfs) (HYD # 2)	Total Off Site running into Basin (cfs) (HYD # 3)	Total combined runoff into Basin (cfs) (HYD #4)	Total runoff form the Basin cfs) (HYD #5)	Total site Runoff (cfs) (HYD #5 - #3)	<u>Max Elevation</u>
2yr	30.45	13.11	41.07	38.69	25.58 > 9.68	975.23
10yr	79.87	49.70	122.39	105.75	56.05 > 46.72	978.08
25yr	117.21	81.52	187.07	---	---> 79.85	over weir
50yr	103.83	103.83	231.51	---	---> 103.52	over weir
100yr	170.41	129.07	281.32	---	---> 130.54	over weir

## 7. Conclusion & Recommendations

We feel that the Existing basin is in disrepair and needs to be cleaned out of all vegetation and regarded to original design. It is worthy to note that the outfall pipe from the existing basin is within 500 feet of a designated 100yr flood plan. We feel that after the recommended maintenance of the original basin it will operate as designed.

## 8. Exhibits:

- **SITE LOCATION MAP**
- **USGS MAP**
- **AERIAL VIEW**
- **FIRMET MAP**
- **CITY OUFALL MAP**
- **STORM DRAINAGE MAP**
- **HYDROLOGIC MODEL**