

# OVERALL STORMWATER PLAN CALCULATIONS

Caledonia Center (Lot 1)  
Caledonia Center Amended Plat (Lots 4, 5, 6, 7, 8, 9, 10, 11)  
Caledonia Center Amended Plat Two (Lots 2A and 3A)  
Parcel ID 4-0047-S013-00-0004.12

November 13, 2020

Project #16-0042-000G



CIVIL ENGINEERING / SURVEYING / PLANNING / LANDSCAPE ARCHITECTURE

# cole<sup>®</sup>

1520 South Fifth Street  
Suite 307  
St. Charles, MO 63303  
636.978.7508 tel

## TABLE OF CONTENTS

- A. EXECUTIVE SUMMARY
- B. INTRODUCTION
  - 1. Evaluation of Existing Conditions
  - 2. Evaluation of Proposed Conditions
- C. DETENTION OF DIFFERENTIAL RUNOFF
  - 1. Overall Methodology
  - 2. Outfall #1
  - 3. Outfall #2
  - 4. Outfall #3
  - 5. Outfall #4
- D. CONCLUSION

## A. EXECUTIVE SUMMARY

The purpose of this overall stormwater plan is to demonstrate that all existing and proposed improvements on properties located within Caledonia Center (Lot 1), Caledonia Center Amended Plat (Lots 4, 5, 6, 7, 8, 9, 10, and 11), Caledonia Center Amended Plat Two (Lots 2A and 3A), and St. Charles County Parcel 4-0047-S013-00-0004.12 meet the City of O'Fallon's detention of differential runoff stormwater management criteria without requiring any further construction or alteration of stormwater BMPs.

The original stormwater plan for this development was designed and approved in 2005 in the plans titled "Caledonia Phase 1 Improvement Plans" prepared by Cole. At that time, the development included the parcel currently occupied by the Regal O'Fallon movie theater (St. Charles County Parcel ID 4-0047-S013-00-0004.12) and area originally platted as "Caledonia Center" in 2017 (excludes the former Drury parcel). The existing conditions are taken from the topographic survey used as the design basis for the "Caledonia Phase 1 Improvement Plans".

The proposed conditions represent the current improvements and future developable area for this site. At this time, the overall development consists of the parcel currently occupied by the Regal O'Fallon movie theater (St. Charles County Parcel ID 4-0047-S013-00-0004.12), Caledonia Center (Lot 1), Caledonia Center Amended Plat (Lots 4, 5, 6, 7, 8, 9, 10, and 11), and Caledonia Center Amended Plat Two (Lots 2A and 3A).

This report and the accompanying drainage area maps include detailed calculations which demonstrate that the current improvements and future developable area comply with the City of O'Fallon's requirement that the post-developed stormwater runoff discharge for all new developments are less than or equal to the pre-developed stormwater runoff discharge from the site.

## B. INTRODUCTION

### 1. Evaluation of Existing Conditions

The existing conditions are taken from the topographic survey used as the design basis for the plan set titled "Caledonia Phase 1 Improvement Plans" prepared by Cole and approved by the City of O'Fallon in 2005. At the time of the survey, the entire subject area was undeveloped. Refer to Appendix A for the pre-developed conditions drainage area map.

There are four outfalls identified in the existing conditions model. Outfall #1 is located at the southwest corner of the project area at the end of an existing 36" RCP. Outfall #2 is located at southeast corner of the project area at the end of a pipe draining the existing on-site pond. Outfall #3 is located near the northwest corner of the project area at the end of an existing 30" RCP under Caledonia Drive.

Outfall #4 is located along the west side of the project area at the end of an existing 36" RCP under Caledonia Drive.

## 2. Evaluation of Proposed Conditions

The proposed conditions represent the current improvements and future developable area for this site. At this time, the overall development consists of the parcel currently occupied by the Regal O'Fallon movie theater (St. Charles County Parcel ID 4-0047-S013-00-0004.12), Caledonia Center (Lot 1), Caledonia Center Amended Plat (Lots 4, 5, 6, 7, 8, 9, 10, and 11), and Caledonia Center Amended Plat Two (Lots 2A and 3A). Refer to Appendix B for the post-developed conditions drainage area map.

## C. DETENTION OF DIFFERENTIAL RUNOFF

### 1. Overall Methodology

The City of O'Fallon requires that the post-developed stormwater runoff discharge for all new developments are less than or equal to the pre-developed stormwater runoff discharge from the site for the 2-year, 15-year, 25-year and 100-year storm events. The purpose of this report is to demonstrate that all existing and proposed improvements on properties located within Caledonia Center (Lot 1), Caledonia Center Amended Plat (Lots 4, 5, 6, 7, 8, 9, 10, and 11), Caledonia Center Amended Plat Two (Lots 2A and 3A), and St. Charles County Parcel 4-0047-S013-00-0004.12 meet this requirement without mandating any further construction or alteration of stormwater BMPs as future projects progress.

In order to provide a very conservative calculation, it was assumed that all post-developed drainage areas within the limits of the project property would be 95% impervious. Some lots within the project property have already been developed, and all are below the 95% impervious assumption, with some areas (notably the soccer fields) well below that assumption.

Below, we have provided a detailed summary of the comparison of pre-developed and post-developed runoff rates at each of the four site outfall points.

## 2. Outfall #1

Outfall #1 is located at the southwest corner of the project area at the end of an existing 36" RCP. In the pre-developed condition, the tributary area to Outfall #1 (Drainage Area A) includes almost half of the project area. In the post-developed condition, the tributary area to Outfall #1 (Drainage Areas 1, 2, 3, and 4) includes approximately one-third of the project area along with some off-site portions to the north and west of the project area. The tributary area decreased significantly in the post-developed condition and calculations confirmed that stormwater runoff was less than pre-developed conditions for the required storm events.

OUTFALL 1				
CONDITION	Q <sub>2</sub> (CFS)	Q <sub>15</sub> (CFS)	Q <sub>25</sub> (CFS)	Q <sub>100</sub> (CFS)
PRE-DEVELOPED	24.18	39.33	48.58	62.04
POST-DEVELOPED	24.18	38.99	48.11	61.57
DIFFERENTIAL	0.00	-0.34	-0.47	-0.47
CHECK	OK	OK	OK	OK

## 3. Outfall #2

Outfall #2 is located at southeast corner of the project area at the end of a pipe draining the existing on-site pond. In the pre-developed condition, the tributary area to Outfall #2 (Drainage Areas B, C, D, E, F, and G) includes approximately one-third of the project area, along with a section of the adjacent Interstate 64 right-of-way that is conveyed onto the site. In the post-developed condition, the tributary area to Outfall #2 (Drainage Areas 5, 6, 7, 8, 9, 10, and 11) includes approximately over half of the project area along with a portion of the adjacent Interstate 64 right-of-way that is conveyed onto the site.

The stormwater runoff at Outfall #2 is controlled by the outlet structure within the existing detention pond at the southeast corner of the project site. The detention pond and outlet structure was designed as part of the plan set titled "Caledonia Phase 1 Improvement Plans" prepared by Cole and approved by the City of O'Fallon in 2005. In order to demonstrate compliance with the City's stormwater requirements, this report shows that the initial post-developed stormwater runoff to Outfall #2 based on current conditions is less than the calculated post-developed stormwater runoff in the 2005 plans. This would insure that the "after detention" stormwater runoff rates presented in the 2005 plans would not be increased. Therefore, we can then compare the "after detention" runoff rates at Outfall #2 from the 2005 plans to the pre-developed conditions runoff rate at Outfall #2 to show no increase.

OUTFALL 2				
CONDITION	Q <sub>2</sub> (CFS)	Q <sub>15</sub> (CFS)	Q <sub>25</sub> (CFS)	Q <sub>100</sub> (CFS)
PRE-DEVELOPED	30.16	49.02	60.55	77.34
POST-DEVELOPED*	78.73	126.86	156.54	200.29
POST-DEVELOPED	78.08	125.98	155.46	198.91
AFTER DETENTION*	28.92	37.51	41.78	47.41
DIFFERENTIAL	-1.24	-11.51	-18.77	-29.93
CHECK	OK	OK	OK	OK
* CALCULATIONS PER ORIGINALLY APPROVED "CALEDONIA" PLANS FROM 2005				

#### 4. Outfall #3

Outfall #3 is located near the northwest corner of the project area at the end of an existing 30" RCP under Caledonia Drive. In the pre-developed condition, the tributary area to Outfall #3 (Drainage Area H) includes the very northwest corner of the project area along with the adjacent Highway DD right-of-way which is conveyed to the site. In the post-developed condition, the tributary area to Outfall #3 (Drainage Areas 12 and 13) again includes the very northwest corner of the project area along with the adjacent Highway DD right-of-way which is conveyed to the site. The tributary area decreased significantly in the post-developed condition and calculations confirmed that stormwater runoff was less than pre-developed conditions for the required storm events.

OUTFALL 3				
CONDITION	Q <sub>2</sub> (CFS)	Q <sub>15</sub> (CFS)	Q <sub>25</sub> (CFS)	Q <sub>100</sub> (CFS)
PRE-DEVELOPED	6.79	11.01	13.59	17.37
POST-DEVELOPED	4.09	6.61	8.16	10.44
DIFFERENTIAL	-2.70	-4.40	-5.43	-6.94
CHECK	OK	OK	OK	OK

## 5. Outfall #4

Outfall #4 is located along the west side of the project area at the end of an existing 36" RCP under Caledonia Drive. In the pre-developed condition, the tributary area to Outfall #4 (Drainage Area I) includes a small area along the west side of the project area. In the post-developed conditions, the existing 36" RCP has been abandoned and plugged and there is no stormwater runoff.

OUTFALL 4				
CONDITION	Q <sub>2</sub> (CFS)	Q <sub>15</sub> (CFS)	Q <sub>25</sub> (CFS)	Q <sub>100</sub> (CFS)
PRE-DEVELOPED	1.12	1.81	2.24	2.86
POST-DEVELOPED	0.00	0.00	0.00	0.00
DIFFERENTIAL	-1.12	-1.81	-2.24	-2.86
CHECK	OK	OK	OK	OK

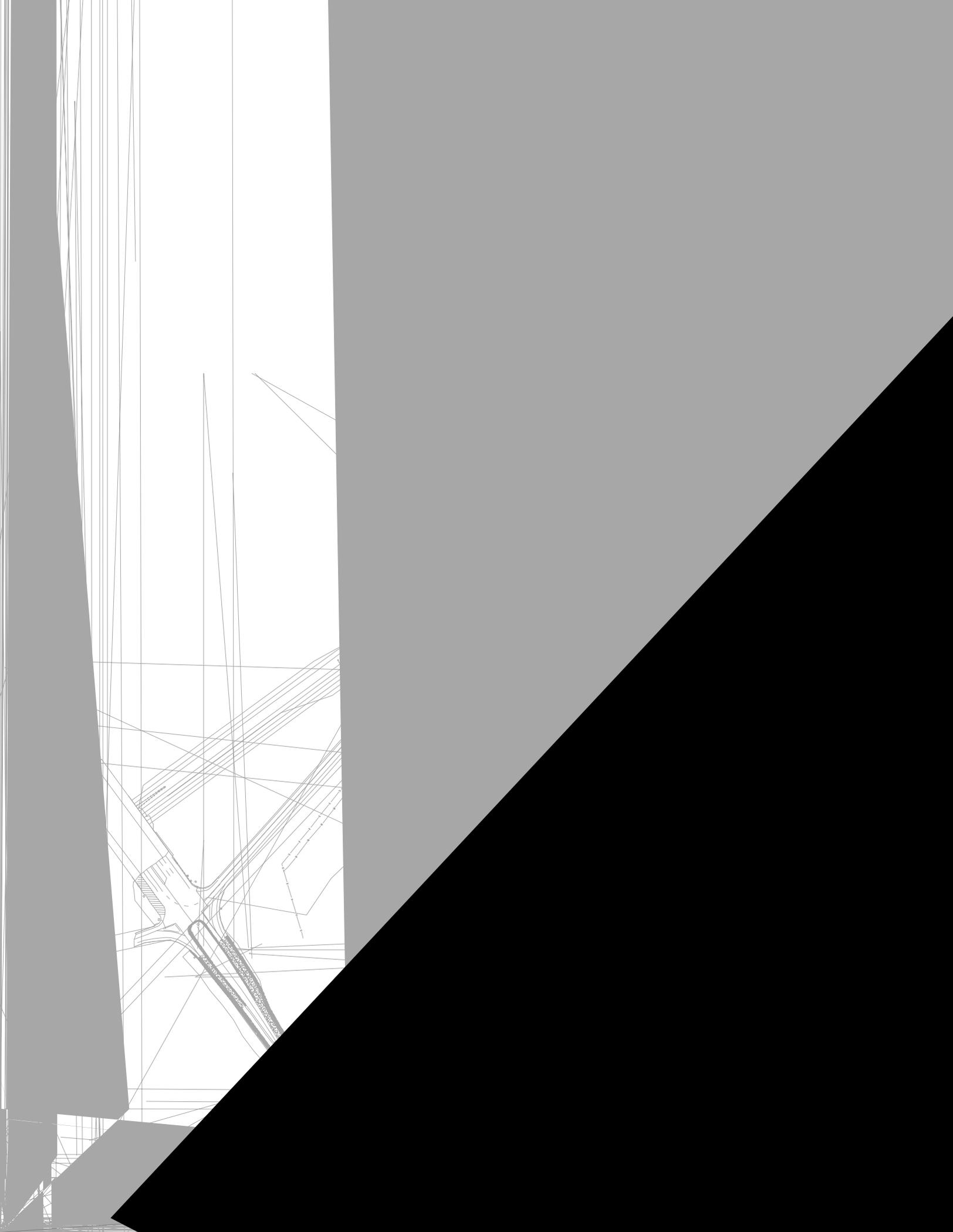
## D. CONCLUSION

The pre-developed and post-developed condition drainage area maps and calculations have been included in Appendices A, B and C for reference. A full pre-developed / post-developed comparison table is also included in Appendix C.

Based on the calculations provided in this report, the current development within the project area complies with the City of O'Fallon's detention of differential runoff stormwater requirements. More importantly, all future development within the defined project area will not require any further construction or alteration of stormwater BMP's as long as each development's impervious area does not exceed 95% of their individual site.

APPENDIX A

Drainage Area Map (Pre-Developed Conditions)



APPENDIX B

Drainage Area Map (Post-Developed Conditions)



APPENDIX C  
Drainage Area Calculations

**DRAINAGE AREA CALCULATIONS**

PRE-DEVELOPED CONDITIONS						
	AREA TYPE	P.I. FACTOR (2-YEAR)	P.I. FACTOR (15-YEAR)	P.I. FACTOR (25-YEAR)	P.I. FACTOR (100-YEAR)	
	PERVIOUS	1.15	1.87	2.31	2.95	
	IMPERVIOUS	2.39	3.85	4.75	6.08	

\* FOR CONTINUITY, THESE P.I. FACTORS MATCH THE P.I. FACTORS USED IN THE ORIGINALLY APPROVED "CALEDONIA" PLANS FROM 2005

OUTFALL 1										
DRAINAGE AREA	PERVIOUS AREA (ACRES)	IMPERVIOUS AREA (ACRES)	TOTAL AREA (ACRES)	O <sub>2</sub> (CFS)	P.I. FACTOR (15-YEAR)	O <sub>15</sub> (CFS)	P.I. FACTOR (25-YEAR)	O <sub>25</sub> (CFS)	P.I. FACTOR (100-YEAR)	O <sub>100</sub> (CFS)
A	21.03	0.00	21.03	24.18	1.87	39.33	2.31	48.58	2.95	62.04
TOTAL	21.03	0.00	21.03	24.18		39.33		48.58		62.04

OUTFALL 2										
DRAINAGE AREA	PERVIOUS AREA (ACRES)	IMPERVIOUS AREA (ACRES)	TOTAL AREA (ACRES)	O <sub>2</sub> (CFS)	P.I. FACTOR (2-YEAR)	O <sub>15</sub> (CFS)	P.I. FACTOR (15-YEAR)	O <sub>25</sub> (CFS)	P.I. FACTOR (100-YEAR)	O <sub>100</sub> (CFS)
B	19.09	0.00	19.09	21.95	1.15	35.70	1.87	44.10	2.95	56.32
C	1.16	0.00	1.16	1.33	1.15	2.17	1.87	2.68	2.95	3.42
D	0.00	0.77	0.77	1.84	2.39	2.96	4.75	3.66	6.08	4.68
E	0.41	0.00	0.41	0.47	1.15	0.77	2.31	0.95	2.95	1.21
F	0.97	0.00	0.97	1.12	1.15	1.81	2.31	2.24	2.95	2.86
G	3.00	0.00	3.00	3.45	1.15	5.61	2.31	6.93	2.95	8.85
TOTAL	24.63	0.77	25.40	30.16		49.02		60.55		77.34

OUTFALL 3										
DRAINAGE AREA	PERVIOUS AREA (ACRES)	IMPERVIOUS AREA (ACRES)	TOTAL AREA (ACRES)	O <sub>2</sub> (CFS)	P.I. FACTOR (2-YEAR)	O <sub>15</sub> (CFS)	P.I. FACTOR (15-YEAR)	O <sub>25</sub> (CFS)	P.I. FACTOR (100-YEAR)	O <sub>100</sub> (CFS)
H	4.24	0.80	5.04	6.79	1.35	11.01	2.18	13.59	3.45	17.37
TOTAL	4.24	0.80	5.04	6.79		11.01		13.59		17.37

OUTFALL 4										
DRAINAGE AREA	PERVIOUS AREA (ACRES)	IMPERVIOUS AREA (ACRES)	TOTAL AREA (ACRES)	O <sub>2</sub> (CFS)	P.I. FACTOR (2-YEAR)	O <sub>15</sub> (CFS)	P.I. FACTOR (15-YEAR)	O <sub>25</sub> (CFS)	P.I. FACTOR (100-YEAR)	O <sub>100</sub> (CFS)
I	0.68	0.14	0.82	1.12	1.36	1.81	2.21	2.24	3.48	2.86
TOTAL	0.68	0.14	0.82	1.12		1.81		2.24		2.86

**DRAINAGE AREA CALCULATIONS**

**POST-DEVELOPED CONDITIONS**

AREA TYPE	P.I. FACTOR (2-YEAR)	P.I. FACTOR (15-YEAR)	P.I. FACTOR (25-YEAR)	P.I. FACTOR (100-YEAR)
PERVIOUS	1.15	1.87	2.31	2.95
IMPERVIOUS	2.39	3.85	4.75	6.08

\* FOR CONTINUITY, THESE P.I. FACTORS MATCH THE P.I. FACTORS USED IN THE ORIGINALLY APPROVED "CALEDONIA" PLANS FROM 2005

**OUTFALL 1**

DRAINAGE AREA	PERVIOUS AREA (ACRES)	IMPERVIOUS AREA (ACRES)	TOTAL AREA (ACRES)	P.I. FACTOR (2-YEAR)	O <sub>2</sub> (CFS)	P.I. FACTOR (15-YEAR)	O <sub>15</sub> (CFS)	P.I. FACTOR (25-YEAR)	O <sub>25</sub> (CFS)	P.I. FACTOR (100-YEAR)	O <sub>100</sub> (CFS)
1	0.97	0.00	0.97	1.15	1.12	1.87	1.81	2.31	2.24	2.95	2.86
2	0.23	0.45	0.68	1.97	1.34	3.18	2.16	3.92	2.67	5.02	3.41
3*	0.45	8.63	9.08	2.33	21.14	3.75	34.06	4.63	42.02	5.92	53.79
4	0.51	0.00	0.51	1.15	0.59	1.87	0.95	2.31	1.18	2.95	1.50
<b>TOTAL</b>	<b>2.16</b>	<b>9.08</b>	<b>11.24</b>		<b>24.18</b>		<b>38.99</b>		<b>48.11</b>		<b>61.57</b>

**OUTFALL 2**

DRAINAGE AREA	PERVIOUS AREA (ACRES)	IMPERVIOUS AREA (ACRES)	TOTAL AREA (ACRES)	P.I. FACTOR (2-YEAR)	O <sub>2</sub> (CFS)	P.I. FACTOR (15-YEAR)	O <sub>15</sub> (CFS)	P.I. FACTOR (25-YEAR)	O <sub>25</sub> (CFS)	P.I. FACTOR (100-YEAR)	O <sub>100</sub> (CFS)
5	1.16	0.00	1.16	1.15	1.33	1.87	2.17	2.31	2.68	2.95	3.42
6*	1.39	26.39	27.78	2.33	64.67	3.75	104.20	4.63	128.56	5.92	164.55
7	4.52	0.00	4.52	1.15	5.20	1.87	8.45	2.31	10.44	2.95	13.33
8	0.00	0.77	0.77	2.39	1.84	3.85	2.96	4.75	3.66	6.08	4.68
9	0.41	0.00	0.41	1.15	0.47	1.87	0.77	2.31	0.95	2.95	1.21
10	0.97	0.00	0.97	1.15	1.12	1.87	1.81	2.31	2.24	2.95	2.86
11	3.00	0.00	3.00	1.15	3.45	1.87	5.61	2.31	6.93	2.95	8.85
<b>TOTAL</b>	<b>11.45</b>	<b>27.16</b>	<b>38.61</b>		<b>78.08</b>		<b>125.98</b>		<b>155.46</b>		<b>198.91</b>

**OUTFALL 3**

DRAINAGE AREA	PERVIOUS AREA (ACRES)	IMPERVIOUS AREA (ACRES)	TOTAL AREA (ACRES)	P.I. FACTOR (2-YEAR)	O <sub>2</sub> (CFS)	P.I. FACTOR (15-YEAR)	O <sub>15</sub> (CFS)	P.I. FACTOR (25-YEAR)	O <sub>25</sub> (CFS)	P.I. FACTOR (100-YEAR)	O <sub>100</sub> (CFS)
12*	0.03	0.48	0.50	2.33	1.16	3.75	1.88	4.63	2.31	5.92	2.96
13	1.40	0.55	1.95	1.50	2.92	2.43	4.74	3.00	5.85	3.83	7.47
<b>TOTAL</b>	<b>1.43</b>	<b>1.03</b>	<b>2.45</b>		<b>4.09</b>		<b>6.61</b>		<b>8.16</b>		<b>10.44</b>

**OUTFALL 4**

DRAINAGE AREA	PERVIOUS AREA (ACRES)	IMPERVIOUS AREA (ACRES)	TOTAL AREA (ACRES)	P.I. FACTOR (2-YEAR)	O <sub>2</sub> (CFS)	P.I. FACTOR (15-YEAR)	O <sub>15</sub> (CFS)	P.I. FACTOR (25-YEAR)	O <sub>25</sub> (CFS)	P.I. FACTOR (100-YEAR)	O <sub>100</sub> (CFS)
<b>TOTAL</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>		<b>0.00</b>		<b>0.00</b>		<b>0.00</b>		<b>0.00</b>

\* ASSUME THIS DEVELOPABLE AREA WITHIN PROPERTY BOUNDARY IS 95% IMPERVIOUS

**DRAINAGE AREA CALCULATIONS**

**PRE-DEVELOPED VERSUS POST-DEVELOPED**

**OUTFALL 1**

CONDITION	Q <sub>2</sub> (CFS)	Q <sub>15</sub> (CFS)	Q <sub>25</sub> (CFS)	Q <sub>100</sub> (CFS)
PRE-DEVELOPED	24.18	39.33	48.58	62.04
POST-DEVELOPED	24.18	38.99	48.11	61.57
DIFFERENTIAL	0.00	-0.34	-0.47	-0.47
CHECK	OK	OK	OK	OK

**OUTFALL 2**

CONDITION	Q <sub>2</sub> (CFS)	Q <sub>15</sub> (CFS)	Q <sub>25</sub> (CFS)	Q <sub>100</sub> (CFS)
PRE-DEVELOPED	30.16	49.02	60.55	77.34
POST-DEVELOPED*	78.73	126.86	156.54	200.29
POST-DEVELOPED	78.08	125.98	155.46	198.91
AFTER DETENTION*	28.92	37.51	41.78	47.41
DIFFERENTIAL	-1.24	-11.51	-18.77	-29.93
CHECK	OK	OK	OK	OK

\* CALCULATIONS PER ORIGINALLY APPROVED "CALEDONIA" PLANS FROM 2005

**OUTFALL 3**

CONDITION	Q <sub>2</sub> (CFS)	Q <sub>15</sub> (CFS)	Q <sub>25</sub> (CFS)	Q <sub>100</sub> (CFS)
PRE-DEVELOPED	6.79	11.01	13.59	17.37
POST-DEVELOPED	4.09	6.61	8.16	10.44
DIFFERENTIAL	-2.70	-4.40	-5.43	-6.94
CHECK	OK	OK	OK	OK

**OUTFALL 4**

CONDITION	Q <sub>2</sub> (CFS)	Q <sub>15</sub> (CFS)	Q <sub>25</sub> (CFS)	Q <sub>100</sub> (CFS)
PRE-DEVELOPED	1.12	1.81	2.24	2.86
POST-DEVELOPED	0.00	0.00	0.00	0.00
DIFFERENTIAL	-1.12	-1.81	-2.24	-2.86
CHECK	OK	OK	OK	OK