Jardon
Engineering & Inspections LLC

REVISED PRELIMINARY DRAINAGE REPORT

FOR:
Sanders Residence
0 Guibal Ave.
Gilroy, CA

DATE:
November 11, 2020

CONTACT:
Rebecca Lindeman, PE
PO Box 772143
Steamboat Springs, CO 80477
303.517.8189
rebecca_jardon@outlook.com

Jardon Engineering & Inspections LLC has prepared this Revised Preliminary Drainage Report to document pre- and post- construction stormwater conditions at the proposed Sanders development located at 0 Guibal Avenue in Gilroy, California. This drainage report addresses specific comments received by Santa Clara County during their initial review of the subject property development plans, as well as adjustments made to accommodate the septic system and leach field. This analysis had been completed in accordance with guidelines stipulated in the Santa Clara County "Drainage Manual", adopted August 14, 2007 and the Low Impact Development (LID) standards issued by Santa Clara County in June 2015. Information in this Preliminary Drainage Report draws from the design drawing, "Preliminary Grading Plan" prepared by Jardon Engineering dated November 2020.

BACKGROUND

Development of a residence is proposed on an approximately 5-acre parcel that currently consists of relatively flat and poorly vegetated agricultural grassland with no permanent structures. It sits at the start of Guibal Avenue, and surrounding properties consist of larger-acreage individual residential properties and small ranches. Proposed development is consistent with surrounding properties and the area. With total drainage less than 50 acres, this parcel is classified as a "very small drainage" per the Drainage Manual. The development proposes to add approximately 5,500 square feet (SF) as a main residence, 1,200 SF as a guest house, and approximately 8,350 SF of garage, shop, and ancillary structure space. Approximately 15,050 SF of structures is proposed as part of this development. It is important to note that driveways and the area around the pool will be constructed of permeable pavement and the drive extending to the rear garage/shop will be aggregate base (permeable).

DRAINAGE

The Rational Method was utilized first to calculate the pre- and post-development total discharge (Q) and compare if they are similar or if additional retention would be required to safely pass the 100-year storm event. The site location is shown on Attachment 1 providing the 18-inch storm event design parameter. The Intensity-Duration-Frequency (IDF) map for the 18-inch event is provided in Attachment 2, taken from Figure B-4 of the Drainage Manual.

RATIONAL METHOD

The Rational Method was selected as appropriate since the development parcel is less than 200 Acres, and while detention ultimately will be necessary, this is considered an appropriate method for Very Small Drainages that include detention.

Pre- and post-drainage was evaluated for the 5- 25- and 100-year storm events using the 18-inch IDF curves. Calculations sheets for these scenarios are included as Attachment 3. Runoff coefficients were referenced from Table 3-1 of the Drainage Manual and set at 0.35 for pre-development assuming Type C soils with coverage and vegetation similar to agriculture. Post-development runoff coefficient was assumed to be 0.40 for Type C soils and assuming low-density residential. Both C values are conservative based on conditions. The remaining variables are defined on the attached computation sheets and are derived from the existing survey data and proposed design.

PO Box 772143
Steamboat Springs, CO 80477
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Rebecca_jardon@outlook.com

Using a maximum slope length of 300-feet, per the Rational Method assumptions, the following summarizes pre- and post-development total discharge:

Basin Condition	Area (acres)	Impervious Area (%)	Runoff	
			Q_5 (cfs)	Q_{100} (cfs)
Design B1	3.03	11%	1.09	4.45
Design B2	0.40	2%	0.00	0.56
Design B3	0.50	23%	0.00	0.53
Design B4	0.40	60%	0.00	0.67
Existing B1	3.73	0.00	0.78	4.28
Existing B2	1.27	0.02	0.87	1.41

Q_{100}

Pre-Development Total = 5.69 cfs

Post-Development Total = 6.20 cfs

Given the increase in runoff from development, although noted as a minor increase, additional swales and retention are included in the Preliminary Grading Plans to allow for routing and storage.

DETENTION SIZING

The proposed drainage swales, check dames, routing of rainfall and added retention basins allow for safe passage of the 100-year storm event. Drainage Basin #1 pre and post development were compared, and calculations are provided as Attachment 4. Pre-development runoff is 4.48 cfs compared to the post-development runoff of 4.45 cfs for the larger basin in the system. Limited detention is required based on the minimal increase in flow expected. The below table summarizes the detention analysis for the 100-year storm event. These account only for detention within basins in Drainage Basin # 1, and do not account for additional reduced velocity, flow rate and retention associated with the drainage swale.

DET Required (CF)	DET Planned (CF)	DET with Porosity of 40% (CF)	Planned minus required (surplus)
530	22,750	9,100	8,570

FIRST FLUSH RETENTION

The first flush rain of 0.2-inches produces approximately 43,500 CF of precipitation. The existing site conditions do not store nor retain any of the first flush rainfall. Assuming designed basin is largely backfilled with stone of a porosity of 40%, and the Rainstore or equivalent system has 94% porosity, the proposed design will retain approximately 20,300 CF immediately, or approximately 47% of the first 0.2" of rainfall, not accounting for routing nor capacity within check dams and swales. Final design will account for these additional storage mechanisms, however note that the current design allows for less runoff volume during the first flush as compared to existing conditions. Providing for onsite detention additionally provides some level of onsite treatment of stormwater runoff as required by LID standards. This design is consistent with green infrastructure and low-maintenance design principals for residential stormwater management.

SUMMARY AND LID STANDARDS

Post development design flows are increased over existing conditions but allow for safe retention and passage of the 100-year storm event. Additionally, existing conditions provide no retention nor treatment of the first 0.2-inch rainfall. The proposed development design improves stormwater quality by routing runoff through drainage swales, check dams, and retention basins or stormwater management features, and allows for 50% retention of the first 0.2-inches of rainfall, which is a significant improvement over existing conditions. This capture meets the intent of the LID for onsite treatment and management of design storm flows through capture, and rainfall harvesting. In addition, the design results in approximately 4.65 acres of the 5-acre parcel either as 100% pervious landscaping, or as permeable pavers, meeting LID standards for infiltration and no-maintenance treatment via infiltration. The drainage design meets the requirements of the 2007 Drainage Manual and the intent of the Low Impact Development standards issued by Santa Clara County.

meet

Prepared By:

Rebecca D. Lindeman, P.E. (CA 67218)

Date: 11/16/2020

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PRELIMINARY DRAINAGE REPORT

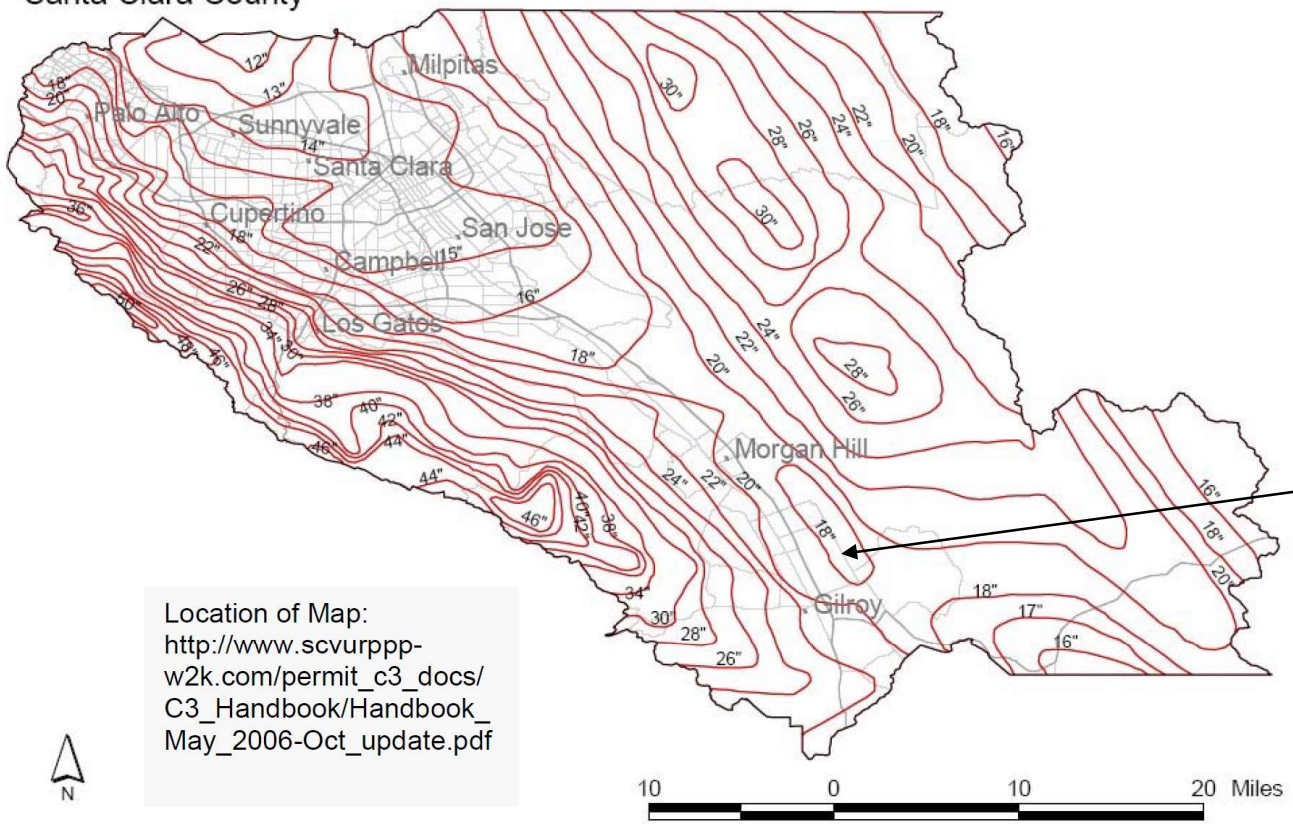
Attachments

PO Box 772143
Steamboat Springs, CO 80477
303.517.8189
Rebecca_jardon@outlook.com

Attachment 1

Site Precipitation

Figure A-2
Mean Annual Precipitation Map
Santa Clara County



Location of Map:
http://www.scvurppp-w2k.com/permit_c3_docs/C3_Handbook/Handbook_May_2006-Oct_update.pdf

SOURCE: Santa Clara Valley Water District, Mean Annual Precipitation Map, San Francisco & Monterey Bay Region, 1998

Attachment 2

18" IDF

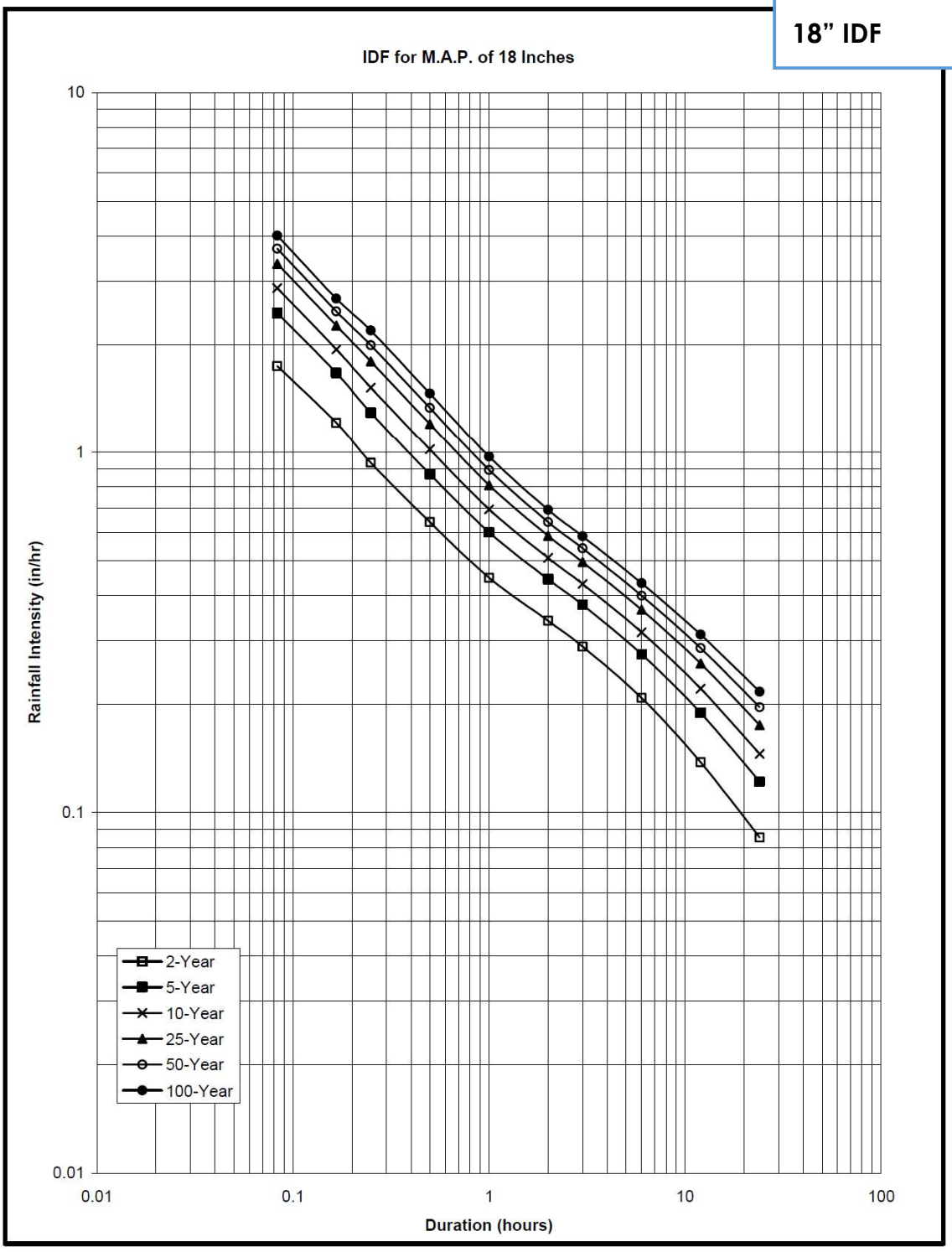


Figure B-4: IDF for M.A. P. of 18 Inches

RATIONAL METHOD RUNOFF ANALYSIS

Job #	1876-001	Date:	November 13, 2020
Job Name	Sanders Residence	Revised:	RDL
Designed by:	RDL		

Attachment 3

Pre- and Post-Development Q

Existing Basin #1

BASIN CHARACTERISTICS				TIME OF CONCENTRATION								RESULTS				
	Area, ac	% imp	Soil Type	Overland Flow - Surface Type 1		Overland Flow - Surface Type 2		Channel Flow		Tc, min	Event	C	*i*, in/hr	A, acres	Q, cfs
Landscape	3.73	0.0%	C	Surface Imperviousness	0.02	Surface Imperviousness	0.02	Land Surface	Tillage/Field	Minimum	1.25 YR				
Asphalt Parking & Walkways	0.00	100%		Length, ft	300	Length, ft		Length, ft	0	Tc, min	2-YR				
Roof	0.00	90%	P2	Slope, percent	2.8748	Slope, percent	2.8748	Slope, ft/ft	0.0200	5.0	5-YR	0.15	1.4	3.73	0.78
Gravel	0.00	40%	1.4	Runoff Coefficient	0.35	Runoff Coefficient	0.35	Conveyance Coefficient	5	Final	10-YR				
Other	0.00	0%						Velocity, ft/s	0.7	Tc, min	25-YR	0.37	1.9	3.73	2.61
	3.73	0%		Ti, min=	16.4	Ti, min=	0.0	Tt, min=	0.0	**16.4**	**100-YR**	**0.50**	**2.3**	**3.73**	**4.28**

Existing Basin #2

BASIN CHARACTERISTICS				TIME OF CONCENTRATION								RESULTS				
	Area, ac	% imp	Soil Type	Overland Flow - Surface Type 1		Overland Flow - Surface Type 2		Channel Flow		Tc, min	Event	C	*i*, in/hr	A, acres	Q, cfs
Landscape	1.27	2%	C	Surface Imperviousness	0.02	Surface Imperviousness	0.02	Land Surface	Tillage/Field	Minimum	1.25 YR				
Asphalt Parking & Walkways	0.00	100%		Length, ft	300	Length, ft		Length, ft	0	Tc, min	2-YR				
Roof	0.00	90%	P2	Slope, percent	2.2457	Slope, percent	2.2457	Slope, ft/ft	1.0000	5.0	5-YR	0.16	1.3	1.27	0.28
Gravel	0.00	40%	1.4	Runoff Coefficient	0.35	Runoff Coefficient	0.35	Conveyance Coefficient	5	Final	10-YR				
Other	0.00	0%						Velocity, ft/s	5.0	Tc, min	25-YR	0.38	1.8	1.27	0.87
	1.27	2%		Ti, min=	17.9	Ti, min=	0.0	Tt, min=	0.0	**17.9**	**100-YR**	**0.51**	**2.2**	**1.27**	**1.41**

Distance 1	599
Distance 2	411

** Calcuation sheet adapted from FPSE

RATIONAL METHOD RUNOFF ANALYSIS

Job #	1876-001	Date:	November 13, 2020
Job Name	Sanders Residence	Revised:	RDL
Designed by:	MDM		

Proposed Basin #1

BASIN CHARACTERISTICS				TIME OF CONCENTRATION								RESULTS			
	Area, ac	% imp	Soil Type	Overland Flow - Surface Type 1		Overland Flow - Surface Type 2		Channel Flow		Tc, min	Event	C	*i*, in/hr	A, acres	Q, cfs
Landscape	2.63	2%	C	Surface Imperviousness	0.1	Surface Imperviousness	0	Land Surface	Grassed Waterways	Minimum	1.25 YR				
Asphalt Parking & Walkways	0.04	100%		Length, ft	125	Length, ft	0	Length, ft	340	Tc, min	2-YR				
Roof	0.20	90%	P2	Slope, percent	4.4000	Slope, percent	1.0000	Slope, ft/ft	0.0200	5.0	5-YR	0.22	1.7	3.03	1.09
Gravel	0.15	40%	1.4	Runoff Coefficient	0.4	Runoff Coefficient	0.4	Conveyance Coefficient	15	Final	10-YR				
Other	0.00	0%						Velocity, ft/s	2.1	Tc, min	25-YR	0.42	2.3	3.03	2.84
	3.03	11%		Ti, min=	8.6	Ti, min=	0.0	Tt, min=	2.7	**11.3**	**100-YR**	**0.53**	**2.8**	**3.03**	**4.45**

Proposed Basin #2

BASIN CHARACTERISTICS				TIME OF CONCENTRATION								RESULTS			
	Area, ac	% imp	Soil Type	Overland Flow - Surface Type 1		Overland Flow - Surface Type 2		Channel Flow		Tc, min	Event	C	*i*, in/hr	A, acres	Q, cfs
Landscape	0.40	2%	C	Surface Imperviousness	0.02	Surface Imperviousness	0	Land Surface	Paved Areas and Shallow Swales	Minimum	1.25 YR				
Asphalt Parking & Walkways	0.00	100%		Length, ft	190	Length, ft	0	Length, ft	0	Tc, min	2-YR				
Roof	0.00	90%	P2	Slope, percent	3.7500	Slope, percent	1.0000	Slope, ft/ft	1.0000	5.0	5-YR	0.16	1.7	0.40	0.11
Gravel	0.00	40%	1.4	Runoff Coefficient	0.4	Runoff Coefficient	0.4	Conveyance Coefficient	20	Final	10-YR				
Other	0.00	0%						Velocity, ft/s	20.0	Tc, min	25-YR	0.38	2.3	0.40	0.34
	0.40	2%		Ti, min=	11.2	Ti, min=	0.0	Tt, min=	0.0	**11.2**	**100-YR**	**0.51**	**2.8**	**0.40**	**0.56**

Proposed Basin #3

BASIN CHARACTERISTICS				TIME OF CONCENTRATION								RESULTS			
	Area, ac	% imp	Soil Type	Overland Flow - Surface Type 1		Overland Flow - Surface Type 2		Channel Flow		Tc, min	Event	C	*i*, in/hr	A, acres	Q, cfs
Landscape	0.34	2%	C	Surface Imperviousness	0.2	Surface Imperviousness	0.02	Land Surface	Grassed Waterways	Minimum	1.25 YR				
Asphalt Parking & Walkways	0.01	100%		Length, ft	120	Length, ft	130	Length, ft	0	Tc, min	2-YR				
Roof	0.08	90%	P2	Slope, percent	2.0000	Slope, percent	1.7000	Slope, ft/ft	1.0000	5.0	5-YR	0.28	1.1	0.50	0.16
Gravel	0.07	40%	1.4	Runoff Coefficient	0.4	Runoff Coefficient	0.4	Conveyance Coefficient	15	Final	10-YR				
Other	0.00	0%						Velocity, ft/s	15.0	Tc, min	25-YR	0.45	1.6	0.50	0.36
	0.50	23%		Ti, min=	11.0	Ti, min=	12.0	Tt, min=	0.0	**23.0**	**100-YR**	**0.56**	**1.9**	**0.50**	**0.53**

Proposed Basin #4

BASIN CHARACTERISTICS				TIME OF CONCENTRATION								RESULTS			
	Area, ac	% imp	Soil Type	Overland Flow - Surface Type 1		Overland Flow - Surface Type 2		Channel Flow		Tc, min	Event	C	*i*, in/hr	A, acres	Q, cfs
Landscape	0.15	2%	C	Surface Imperviousness	0.6	Surface Imperviousness	0	Land Surface	Grassed Waterways	Minimum	1.25 YR				
Asphalt Parking & Walkways	0.19	100%		Length, ft	160	Length, ft	0	Length, ft	0	Tc, min	2-YR				
Roof	0.06	90%	P2	Slope, percent	2.3000	Slope, percent	1.0000	Slope, ft/ft	1.0000	5.0	5-YR	0.46	1.6	0.40	0.29
Gravel	0.00	0%	1.4	Runoff Coefficient	0.4	Runoff Coefficient	0.4	Conveyance Coefficient	15	Final	10-YR				
Other	0.00	0%						Velocity, ft/s	15.0	Tc, min	25-YR	0.57	2.2	0.40	0.50
	0.40	60%		Ti, min=	12.1	Ti, min=	0.0	Tt, min=	0.0	**12.1**	**100-YR**	**0.63**	**2.7**	**0.40**	**0.67**

RATIONAL POND VOLUME - PROPOSED POND

Attachment 4

Detention Calcuation Sheet

Job #	Sanders Development	Date:	November 13, 2020
Job Name	Sanders Development	Revised:	
Designed by:	RDL		
Checked by:			

25-YR C*A (ac)	1.26	FROM PROPOSED BASIN #1
100-YR C*A (ac)	1.62	FROM PROPOSED BASIN #1
25-YR Allowable Release (cfs)	2.61	FROM EXISTING BASIN #1
100-YR Allowable Release (cfs)	4.28	FROM EXISTING BASIN #1

25-YEAR EVENT					100-YEAR EVENT				
DURATION (min)	RAINFALL INTENSITY (in/hr)	INFLOW VOLUME[1] (cf)	DISCHARGE VOLUME[2] (cf)	DETENTION VOLUME[3] (cf)	DURATION (min)	RAINFALL INTENSITY (in/hr)	INFLOW VOLUME[1] (cf)	DISCHARGE VOLUME[2] (cf)	DETENTION VOLUME[3] (cf)
5	3.13	1181	783	398	5	5.45	2642	1284	1358
10	2.50	1888	1566	322	10	4.36	4226	2568	1658
15	2.13	2416	2349	67	15	3.72	5410	3852	1558
20					20				
25					25				
30	1.50	3409	4698	-1289	30	2.63	7644	7704	-60
35					35				
40					40				
45					45				
50					50				
55					55				
60	0.88	3972	9395	-5423	60				
Tmax					Tmax				
5.0	3.13	1183	784	398	4.5	3.86	1690	1159	530
25-YEAR DETENTION VOLUME (CF)				**398**	100-YEAR DETENTION VOLUME (CF)				**530**
(AC)				**0.05**	(AC) at proposed depth depth				**0.06**

DET Required (CF)	DET Planned (CF)	Surpluss	DET Accounting for Porosity of stone at 40% (CF)	Planned minus required
530	22,750	22,220	9,100	8,570

[1] Inflow Volume(cf) = Duration(s)*Intensity(in/hr)*CA(ac)

[2] Discharge Volume(cf) = Release(cfs)*Duration(s)

[3] Detention Volume(cf) = Inflow Volume(cf) - Outflow Volume(cf)

Proposed Depth (FT) 5

** Calcuation sheet adapted from FPSE