Storm Runoff Calculations

Wangsgard Property

10/16/2017 KHH

The following runoff calculations are based on the Rainfall - Intensity - Duration Frequency Curve for the Hunstville, Utah area taken from the NOAA Atlas 14 database, using a 100 year storm for (detention/retention), and a 10 year storm for pipe conveyance. Storm water runoff has been calculated for a fully developed site and limited to a release rate of 0.2 cfs/acre.

The calculations are as follows:

1. Drainage Area:

Total Area =	2.25	acre or	98,140	ft^2	
Runoff Coefficients					
	Paved Area		20,670	C =	0.9
	Landscaped Area		37,950	C =	0.2
	Roof		39,520	C =	0.9
Weighted Runoff Coefficient				C =	0.63

2. Rainfall Intensities:

10-yr intensity for a 15 minute TOC - Pipe Capacity	1.70	in/hr

3. Peak Run-off:

Runoff Coefficient	C =	0.63	
Rainfall Intensity	i =	4.54	IN./HR.
Acreage	A =	2.25	ACRES
Q	**Q =**	**6.44**	**cfs**

4. Volume of Run-off for 100-year Storm Event:

C =	0.63	
I =	See Below	in/hr
A =	98140.00	ft^2
Q(out) =	0.45	ft^3/s (0.2 cfs per acre)

time (min)	time (sec)	i (in./hr.)	Q (cfs)	Vol. in (cf)	Vol. out (cf)	Difference (cf)
0	0	0.00	0.00	0.00	0.00	0.00
15	900	4.54	6.49	5841.56	405.54	5436.02
30	1800	3.06	4.37	7874.53	811.07	7063.45
60	3600	1.89	2.70	9727.36	1622.15	8105.21
120	7200	1.11	1.59	11425.79	3244.30	8181.49
180	10800	0.76	1.09	11796.35	4866.45	6929.90
360	21600	0.43	0.62	13340.38	9732.89	3607.48
720	43200	0.27	0.39	16675.47	19465.79	-2790.32
1440	86400	0.16	0.23	19516.48	38931.57	-19415.09

5. Orifice Sizing

Given:	Q =	0.45	cfs		
	2g =	64.4	ft/s²		
	H =	3.00	ft		
	Cd =	0.62		for circular openings	
	R =	SQRT(Q/pi/(0.7*(64.4*H)^0.5))			
	R =	0.13	feet		
		1.55	inches		
	D =	3.10	inches		
	A =	7.53	inches ^2	0.0523	ft ^2

6. Aboveground Basin Sizing

Length	220	
Width	35	
Depth	3	
Top Area	3850	
Bottom Area	1717	
Average Area	2784	
Volume	**8351**	**ft^3**

SUMMARY:

The required storage volume is	**8,181**	**cubic feet**
Orifice size is	**3.10**	**inches**