Peak Discharge Reduction attributable to Stormwater Harvesting

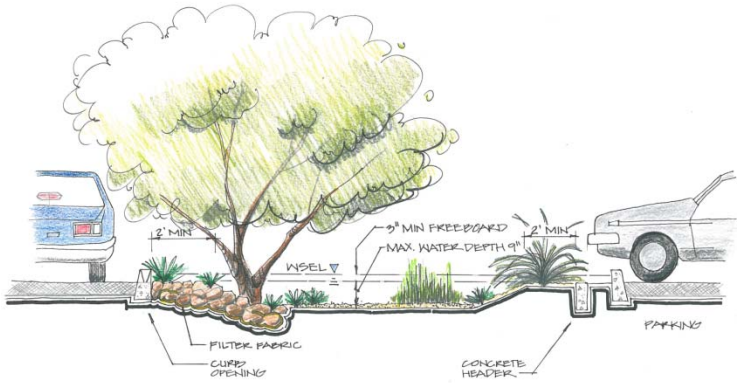
MS4 Statewide Summit

June 18, 2013

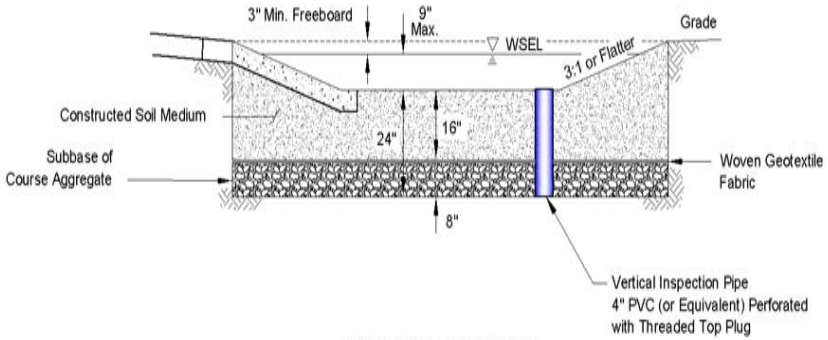
Pima County Regional FLOOD CONTROL DISTRICT

What Counts as Stormwater Harvesting?

- Excavated earthen areas or bioretention basins



STORMWATER HARVESTING BASIN
ADJACENT TO A PARKING AREA



BIORETENTION BASIN
SCALE: N.T.S.

Quantifying the Reduction in Peak Discharge

- Rainfall and runoff measurements at a Sierra Vista subdivision were collected by the USGS
- EPA's StormWater Management Model (SWMM) was used to model the subdivision and reproduced the observed runoff results within an acceptable level of error
- Several scales of stormwater harvesting were modeled with SWMM to obtain modeled runoff
  - Harvesting volume as approx. 10%, 25%, 50% and 86% of developed conditions runoff

The Stormwater Harvesting Factor

- The Basin Volume/Post-Developed Runoff Volume was plotted against modeled % peak discharge reduction.
- The resulting best fit equation can be used to estimate the peak discharge reduction for any given value of Basin Volume/Post-Developed Runoff Volume.
- The estimated % peak discharge reduction is the Stormwater Harvesting Factor

Table of Stormwater Harvesting Factors

Table 3.1 . Storm Water Harvesting Factors (H_{rp}) for Peak Discharge Rate Reduction Based on Volume Retained (X_{rp})

X_{rp}	H_{rp}	X_{rp}	H_{rp}	X_{rp}	H_{rp}
<0.10	0.000	0.40	0.390	0.71	0.711
0.10	0.009	0.41	0.402	0.72	0.720
0.11	0.023	0.42	0.413	0.73	0.729
0.12	0.037	0.43	0.425	0.74	0.738
0.13	0.051	0.44	0.436	0.75	0.747
0.14	0.064	0.45	0.447	0.76	0.756
0.15	0.078	0.46	0.458	0.77	0.765
0.16	0.091	0.47	0.469	0.78	0.773
0.17	0.104	0.48	0.480	0.79	0.782
0.18	0.118	0.49	0.491	0.80	0.790
0.19	0.131	0.50	0.502	0.81	0.799
0.20	0.144	0.51	0.513	0.82	0.807
0.21	0.157	0.52	0.523	0.83	0.816
0.22	0.170	0.53	0.534	0.84	0.824
0.23	0.183	0.54	0.544	0.85	0.832
0.24	0.196	0.55	0.555	0.86	0.840
0.25	0.208	0.56	0.565	0.87	0.848
0.26	0.221	0.57	0.575	0.88	0.856
0.27	0.234	0.58	0.586	0.89	0.864
0.28	0.246	0.59	0.596	0.90	0.871
0.29	0.259	0.60	0.606	0.91	0.879
0.30	0.271	0.61	0.616	0.92	0.887
0.31	0.283	0.62	0.626	0.93	0.894
0.32	0.295	0.63	0.635	0.94	0.902
0.33	0.308	0.64	0.645	0.95	0.909
0.34	0.320	0.65	0.655	0.96	0.916
0.35	0.332	0.66	0.664	0.97	0.923
0.36	0.343	0.67	0.674	0.98	0.930
0.37	0.355	0.68	0.683	0.99	0.938
0.38	0.367	0.69	0.693	≥1.00	0.945
0.39	0.379	0.70	0.702		

Volume Retained

Reduction in Peak Discharge

20% Volume Retention

14% Reduction in Peak Discharge

No Routing Required!

- All you need are:
  - Volume of stormwater harvesting
  - Volume of post-developed runoff
  - Pre- and post-developed conditions peak discharge values
- *Well…maybe a little more in site design before living happily ever after*