

ELM HOLLOW

Storm Drainage Requirements
(Rational Method)

Design Criteria

Intensity Table: PAYSON CITY
Return Period: 25 year storm event

Manhole Volume (Inside Volume)

Volume Inside Manhole:

where,

Inside Diameter (ID) = 5 ft. $V = \frac{\pi * ID^2 * H}{4}$ $V = \frac{\pi * 5^2}{4} * 8$

Section Height (H) = 8 ft.

V= 157.0 cu. ft.

Volume Inside Cone:

V= 34.3 cu. ft.

Volume of Voids in Gravel

Volume Outside of Manhole Section (Using a 4' gravel envelope and a 2' gravel base)

where,

Gravel (OD)= 14 ft.
Manhole (MD)= 6 ft.
Gravel Height (GH)= 10 ft.
Manhole Height (MH)= 8 ft.
% void space (VR)= 40%

$V = \left(\frac{\pi * OD^2}{4} * GH - \frac{\pi * MD^2}{4} * MH \right) * VR$

V= 525.0 cu. ft.

Total Sump Water Storage Volume (per sump)

V= 716.3 cu. ft.

Percolation Area per Sump:

where,

Gravel OD 14 ft.
H = 10 ft.

Side Area:
A=π * H * Gravel OD A=3.14*10*16

Bottom Area:
A=π * (Gravel OD)^2 / 4 A=3.14*(16)^2/4

A= 439.6 sq. ft.

A= 153.9 sq. ft.

A= 593.5 sq. ft.

Subdivision Parameters

Subdivision Name	Skyview Estates Subdivision		
Number of Lots	13		
Total Right of Way Area	0.350	acre =	15246 sq. ft.
Total Lot Area (& Storm Drainage Site)	1.140	acre =	49658 sq. ft.
Total Subdivision Area	1.49	acre =	64904 sq. ft.
Average Roof Area per Home	1225	sq.ft.	
Average Driveway Area per Home	400	sq.ft.	
Average Infiltration Rate	30	min/inch =	2.000 inches/hour

Weighted "C" Value Calculation			
Surface Type	Area	"C" Value	C*A
Roofs	15,925	0.80	12,740
Driveways	5,200	0.90	4,680
Road Section	15,246	0.70	10,672
Landscape/Open Space	28,533	0.15	4,280
Totals	64,904		32,372

Weighted "C" Value = (Total C*A)/(Total Area) 0.499

Drainage Requirement Calculation

Number of Sumps	3	
Infiltration per Sump	0.027	cfs
Total Sump Infiltration	0.082	cfs

THESE CALCULATIONS USE AN ASSUMED PER RATE, AND DO NOT TAKE INTO ACCOUNT THE 130 IF OF UNDERGROUND LID R-TANKS

Duration	Storm Intensity	Weighted "C"	Subdivision Area	Stormwater Flow	Accumulated Flow	Infiltration Rate	Total Infiltration	Required Storage	Available Storage
(min)	(in/hr)		(sq.ft.)	(cfs)	(cf)	(cfs)	(cf)	(cf)	(cf)
5	3.24	0.499	64904	2.43	728	0.082	25	704	2,149
10	2.46	0.499	64904	1.84	1,106	0.082	49	1,057	2,149
15	2.04	0.499	64904	1.53	1,376	0.082	74	1,302	2,149
30	1.38	0.499	64904	1.03	1,861	0.082	148	1,713	2,149
60	0.86	0.499	64904	0.64	2,320	0.082	297	2,023	2,149
120	0.49	0.499	64904	0.37	2,644	0.082	593	2,050	2,149
180	0.36	0.499	64904	0.27	2,913	0.082	890	2,023	2,149
360	0.21	0.499	64904	0.16	3,399	0.082	1,780	1,619	2,149
720	0.13	0.499	64904	0.10	4,208	0.082	3,561	648	2,149
1440	0.07	0.499	64904	0.05	4,532	0.082	7,122	(2,589)	2,149