Rainstore3 Inlet Design

When designing the inlets to a Rainstore3 subsurface water storage system, there are a few items to consider beyond the calculations of water volume, velocity and pipe size. These items include: 1) Whether pipe should be used at all; 2) Centralized storage or De-centralized storage chambers to allow for various water quality issues; 3) Method of water filtration / treatment; 4) Location of inlet conveyance and method; 5) Flow Restrictions; and 6) Pipe Materials.

Alternative Inlet Methods

While pipe will usually be the first form of inlet method that comes to mind, it may not be the best choice in every given situation. For instance, if runoff from a certain surface will carry various forms of sediment, trash and / or vehicular pollutants, then a porous pavement cross-section placed directly above the Rainstore3 chamber would provide pre-filtration of the runoff before water enters the top of the chamber.

With our standard materials used for Grasspave2 and Gravelpave2 porous pavements, the filter area can be smaller than the source runoff surface, depending upon the design rainfall rate (see table below).

Porous Filter Inlet Area to Runoff Area

Assume Filter Section Percolation Rate of 36 inches per hour (.05 cf/min)

Rainfall Rate-in / hr	Rate-cf / min	Runoff Surface to Filter Surface
1.0	0.0014	36.00
1.5	0.0021	24.00
2.0	0.0028	18.00
2.5	0.0035	14.40
3.0	0.0042	12.00
3.5	0.0049	10.29
4.0	0.0056	9.00
4.5	0.0063	8.00
5.0	0.0069	7.20
5.5	0.0076	6.55
6.0	0.0083	6.00

The filter area may be also be larger or smaller than the footprint of the chamber, but if larger, then Draincore2 should be used to capture filtered runoff from the bottom of the base course and convey to the top of the chamber. Use of the Draincore2 conveyance technique can also be valuable when very shallow depths are encountered due to high groundwater, rock, or other obstruction.

Centralized Storage?

The simple construction and modular nature of Rainstore3 will allow consideration and use of multiple storage chambers placed in locations responsive to space available and variable runoff sources (roof, asphalt pavement, service pavement, etc.), which also allows alternative inlet designs responsive to filtration / treatment demands of each source. This decentralized storage system can minimize need for pipe (conveyance) and / or expensive structural filtration devices.

Inlet Pipe Location
Water entering the chamber via pipe can enter at any level of the storage chamber – top or side. Pipe entry on the floor of the chamber should be avoided due to potential for uneven settling in the pipe trench.

To avoid backflow of water into filter structures and renewing contact with pollutants, it would be best to create a hydraulic break by placing the inlet conduit at the top of the chamber. This would also maximize the storage capacity of the chamber at the same time.

The best method to accomplish a "top entry mode" is to make a transition conveyance device from the pipe and / or structure (catch basin, manhole, filter structure, etc.) using layer(s) of Rainstore3. In this manner, cover depths can be kept minimal while maintaining structural load bearing capacity. As Rainstore3 contains approximately 40% of the free flow area of pipe in an enclosed horizontal conveyance mode, the transition ratio of: pipe end area to Raintore3 end area would be 1:2.5, with inverts level. (See Rainstore3 Conveyance table below.) Vertical flow rates are equal to 96% of pipe area – essentially equal.

Side entry of pipe to Rainstore3 works similarly to the pipe transition method – make sure the Rainstore3 wall is equal to at least 2.5 times the end area of the inlet pipe, and butt the pipe up to the spacer bars surrounding each Rainstore3 cell. Make sure that as the chambers begin to fill to the invert level of the inlet pipe, that water backing up into the pipe is not compromised in quality. This is also a good time to determine need for an overflow outfall device, unless flooding back through the inlet system to the pavement surface is not critical.

Low Backpressure
Due to the nature of water to find the path of least resistance, water will leave the end of the pipe as a solid stream, but immediately find 1.5" deep paths of low resistance in all directions (sides, above, and below) in front of the cell columns, causing very little backpressure to flow. Water passing between the first rows of columns will accelerate very briefly before entering the void behind the first columns and dropping. For those designers concerned with any source of backpressure, once the end of the pipe has been located against the cells, the spacer bars within the pipe end area can be removed.

Pipe Materials
The choice of pipe material used is totally dependent upon the criteria established by the Designer and / or local authority. Any type of pipe material can be connected to Rainstore3 storage chambers.

If any other issues or questions arise, please contact our Technical Support department for assistance.

Rainstore3 Storage Capacity Chart

Rainstore3 allows for conveyance of water, plus storage, with 40% of the x-sectional area available for water movement.

One Meter Width Rainstore3 - Multiple Layers

# R3 Layers	depth-in	depth-m	vol-cf	vol-m3	vol-gal	sq ft	m2
1	4	0.1	0.9	0.024	0.61	0.49	0.046
2	8	0.2	1.7	0.049	1.22	0.98	0.091
3	12	0.3	2.6	0.073	1.83	1.47	0.137
4	16	0.4	3.4	0.097	2.44	1.96	0.182
5	20	0.5	4.3	0.122	3.05	2.45	0.228
6	24	0.6	5.2	0.146	3.65	2.94	0.273
7	28	0.7	6.0	0.171	4.26	3.43	0.319
8	32	0.8	6.9	0.195	4.87	3.92	0.364
9	36	0.9	7.7	0.219	5.48	4.41	0.410
10	40	1	8.6	0.244	6.09	4.90	0.455
11	44	1.1	9.5	0.268	6.70	5.39	0.501
12	48	1.2	10.3	0.292	7.31	5.88	0.546
13	52	1.3	11.2	0.317	7.92	6.36	0.592
14	56	1.4	12.1	0.341	8.53	6.85	0.637
15	60	1.5	12.9	0.365	9.14	7.34	0.683
16	64	1.6	13.8	0.390	9.75	7.83	0.728
17	68	1.7	14.6	0.414	10.36	8.32	0.774
18	72	1.8	15.5	0.439	10.96	8.81	0.819
19	76	1.9	16.4	0.463	11.57	9.30	0.865
20	80	2	17.2	0.487	12.18	9.79	0.910
21*	84	2.1*	18.1	0.512	12.79	10.28	0.956
22*	88	2.2*	18.9	0.536	13.4	10.77	1.001
23*	92	2.3*	19.8	0.560	14.01	11.26	1.047
24*	96	2.4*	20.7	0.585	14.62	11.75	1.092

* Depths greater than 2.0 meters require special side wall support.