StormChambers

Frequently Asked Questions

8/2/2019

Content

Who is responsible for the design of the Storm Chamber system?

The project engineer is ultimately responsible for the project's design. We provide suggestions based on over 13 years of experience with the design and installation of our systems. We typically produce a shop drawing of the system layout for review and approval by the project engineer.

What is the warranty of the StormChamber system?

HydroLogic Solutions will warranty each StormChamber unit to the original buyer against defective materials and workmanship for one year from the date of purchase, if installed in accordance with our provided installation instructions. This is consistent with most plastic storm water retention/detention structures because most manufacturers will only warrantee their products for one year.

How are StormChamber systems inspected for sediment build up?

Unlike a manifold pipe system, sediment will be deposited only in row(s) that receive inflow, and mainly in the StormChamber SedimenTraps. Inflow row(s) will have a SedimenTrap in the first and last chamber of the row into which sediment accumulation can be monitored and vacuumed out through the 10" riser pipe directly above each SedimenTrap.

Does the sediment deposited on the stone that does not get into the SedimenTraps restrict infiltration?

No, except in rare instances. The infiltration ability in any infiltration-type system is regulated by the porosity of the underlying soil. Typically, the porosity of sediment deposited in the system will be similar or better than the underlying soil. This is not the case in rare instances when the sediment contains a high percentage of colloidal organic materials. These are composed of fats, fatty acids, proteins, complex sugars and lignin byproducts. Due to these components, colloidal organic materials tend to be "sticky" and can clog void spaces in the stone base. In these situations it is recommended that a pre-treatment unit be placed prior to the inflow.

Why do StormChamber systems not use a manifold pipe system? And does the absence of a head pipe manifold system adversely affect the flow of stormwater through the chamber system?

When the first plastic stormwater chambers first came on the market no header pipe manifold system was utilized and it functioned quite well. The next plastic stormwater system to arrive is affiliated with a HDPE pipe manufacturer. As other plastic chambers came on the market, they followed this lead, with the exception of StormChamber.

Plastic stormwater chamber systems do not need a header pipe manifold system in order to function properly. When the storm water enters into one or more chambers of the chamber system, it flows down into the underlying stone base, spreads throughout it and rises up into the entire chamber system about equally through their open bottoms and their sidewall perforations. The extra material cost, labor cost, additional excavation and stone to accommodate a header pipe manifold system is unwarranted.

The pipe connection(s) between the Start Unit StormChamber accepting the inflow and the adjacent Start Unit StormChamber(s) is not a manifold system. The connection simply provides an overflow escape for highly unusual, high intensity, long duration inflows, functioning similar to emergency spillways for dams. When inflow enters our StormChamber systems, it spreads throughout the stone base and rises up into the chambers.

The “flow line” of a StormChamber system has been designed so that it could also significantly improve upon the functionality of manifold pipe feed systems with respect to sediment retention and removal, as well as water quality enhancement (see “The StormChamber System as a Water Quality Device” under “Downloads” and the video on our home page at www.stormchambers.com).

Some engineers believe that a header pipe manifold system is detrimental to sediment management. When used to fill an initial row before diverting flow down the manifold to feed the other rows of chambers, it is believed that once the initial row is full, the additional flow re-suspends the sediment which is then deposited in the other rows.

Also, we do not sell pipe, unlike some of our competitors.

Are StormChamber systems limited to a 12” inflow pipe?

No. Inflow into a side portal is limited to a 10” pipe; inflow into an end wall is limited to 30” O.D. pipe. Numerous inflows can be accepted at any location into a StormChamber system to accommodate any flow volume requirement.

Is it true that StormChambers do not meet ASTM standards for PE storm water chambers because they contain recycled PE?

The bottom 80% of StormChambers are made from a blend of 50% virgin black high molecular weight, high density polyethylene (HMWHDPE) and 50% recycled HMWPE/high density polyethylene (HDPE). The top 20% is made from 100% virgin orange HMWHDPE. ASTM standard 2922-12 is specific to polyethylene (PE) chambers. Section 4.2, “Rework Material” states, “In lieu of virgin PE, clean rework material generated from the manufacturer’s own chambers may be used, provided the material meets the cell class requirements of 4.1.” StormChambers meet this requirement. Our manufacturer also extrudes the sheets they use to form our StormChambers at the same facility, thereby providing greater control of this process.

It is important to note that the ASTM standards are not “law”. It is specifically stated in section 4.1 of ASTM standard F2787-09, “Standard Practice for Structural Design of Thermoplastic Corrugated Wall Stormwater Collection Chambers”, “This practice standardizes recommendations (emphasis added) for designers to adequately address these aspects of chamber design.”

The proof is in the pudding. StormChambers exceed the ASTM load-testing requirement by over four times. Section 5.5 of ASTM standard 2922-12, “Design and Installation Requirement” states, “Chambers shall be structurally designed in accordance with Practice F2787-09.” Section 5.6 of F2728 states, “Chamber material properties shall be based on tests.” Section 9.1 of F2787-09, “Design Qualification” states, “The chamber design shall be qualified with full-scale installation testing of representative chambers under design earth and live loads.” Appendix X.3 of F2787-09, “Design Qualification Testing,” section X3.2 states, “Chambers are field tested to verify their conformance to the structural adequacy requirements of this practice.” Clearly, the bottom line is testing the chambers in accordance with the ASTM standard is ultimately what counts.

Is it true that StormChambers do not meet the ASTM strength-testing standard because they were tested to meet HS-20 loadings instead of HL-93?

The HL-93 designation is exactly the same as HS-20, it is just a new name for it. All other plastic storm water chambers state they were tested to HS-20 loadings. For example, StormTech's June 14, 2011 testing report on their model SC-740 and 310 chambers states, "… SC740 and SC-310 chambers meet the AASHTO LRFD recommended load and resistance factors, when subjected to AASHTO Design Truck (formerly called HS-20) (emphasis added) live loads….". Our testing report uses the older HS-20 designation because the testing was completed prior to the new designation.

Are StormChambers flawed because their design was not based on finite element analysis (FEA) modeling, as required by ASTM Standard F2787 – 09?

Most importantly, finite element analysis modeling is widely recognized by authorities in the field not to be very reliable, particularly for these types of structures. The dynamic interface between an open bottom plastic chamber and the surrounding variable soil properties are impossible to accurately model. As stated by Constantine C. Spyrakos in his book, "Finite Element Analysis in Engineering Practice", "With very few exceptions, such as the static analysis (emphasis added) of simple truss, frame and membrane systems, finite element analysis does not provide "exact" answers". The FEA modeling required by ASTM Standard F2787 – 09 is for a dynamic analysis. As stated in #6 above, that is why the same ASTM standard specifies that field testing is required to verify the FEA modeling.

Notwithstanding the above, FEA was utilized as part of the initial basis of design for our StormChambers in 1999. The analysis was conducted by Quality Engineering and Software Technologies, LLC, Schenectady, New York, under contract to RPI. The analysis demonstrated that our StormChambers met the H-20 Wheel Load requirement. Live, in ground testing that followed, performed in compliance with ASTM standard requirements, showed that the earlier StormChamber modeling actually exceeded the H-20 requirement by three times. Our current model exceeds it by over four times.

Design of the StormChamber was based on consultation with Dr. Daniel Walczyk, and Dr. Thomas Zimmie, professors in the School of Engineering at Rensselaer Polytechnic Institute (RPI) in Troy, NY. Dr. Walczyk is a mechanical engineer and Associate Director of Manufacturing for RPI's Center of Automation Technologies and Systems. In 1999, he was, and still is, a consultant for plastic parts design and thermoforming. Dr. Zimmie is a structural engineer and Professor of Civil Engineering and Geotechnical Engineering. Both also consulted in upgraded modifications of the StormChamber design and its manufacture. These modifications were mainly based on in-vivo testing of 10th scale StormChambers of varying designs.

Engineers at Kintz Plastics in Howes Cave, NY and Peninsula Plastics in Auburn Hills, MI, provided practical design assistance based on their extensive experiences with the design and manufacturing of a competitive HDPE plastic storm water chamber.

During 2001 – 2006, Contech Construction Products was a national distributor of StormChambers. They independently had a finite element analysis performed on our initial StormChamber model. The analysis showed that our StormChambers exceeded the H-20 Wheel Load requirement.

Why are StormChambers the only ones that can be stacked 3 or 4 layers?

It is because StormChambers are made from high molecular weight, high density, polyethylene (HMWHDPE), and are thermo vacuum-formed and specifically designed for heavy loadings. The HMWHDPE material allows StormChambers to flex, rather than crack, under heavy loads. The thermo vacuum-forming process applies stress to the chambers in such a way as to allow the material to better resist loadings and to “spring back”. The StormChambers were specifically designed to maximize load bearing and are made from thicker material than our competitors. See answers above for additional detail.