
LANE
STORMSHAPER
CONTROL THE PERFECT STORM
PATENT PENDING

ABOUT LANE

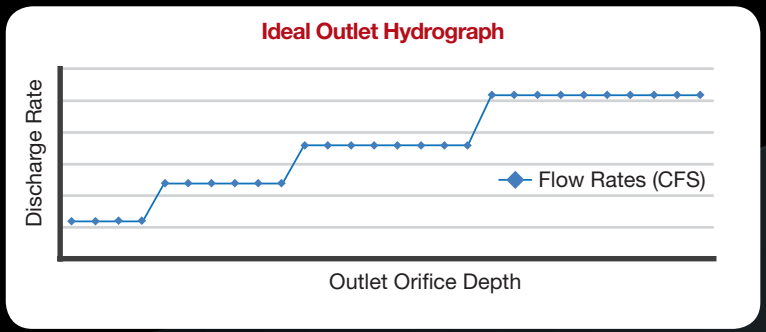
As a full-line manufacturer of corrugated metal and plastic drainage products, Lane Enterprises, Inc. operates a number of plants in the mid-Atlantic, northeastern and southeastern states producing various types of buried structures for the construction industry.

For more than 80 years, Lane has partnered with contractors, engineers, and municipalities to supply reliable products that provide the highest service life, strength, versatility, and economy. Our focus on quality products, responsive customer service, and technical expertise has established a long, proven history of successful partnerships within the industries we serve.

THE STORMSHAPER ADVANTAGE

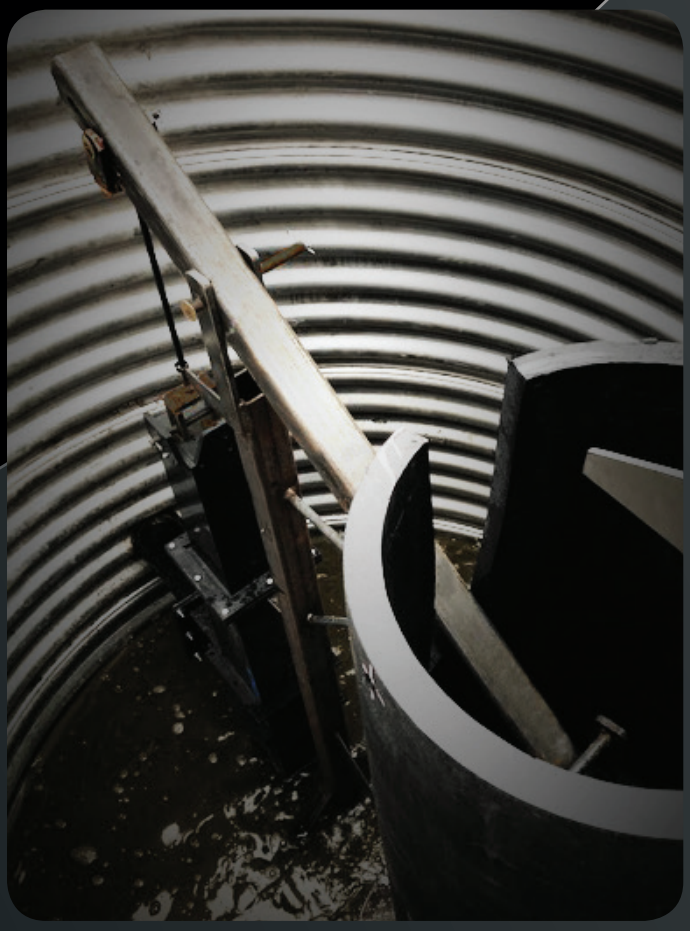
One of the most challenging aspects of any site development design is the control of post-development stormwater flows. The Lane StormShaper is designed to release stormwater from a system at an optimal rate (the rate allowed by local regulations), including multiple storm requirements. The ideal outlet hydrograph will often be a series of jumps in the outlet rate, with each jump corresponding to the transition between one design storm and the next. This means that, as opposed to conventional systems, the storm water will be released at a higher rate early in the storm event.

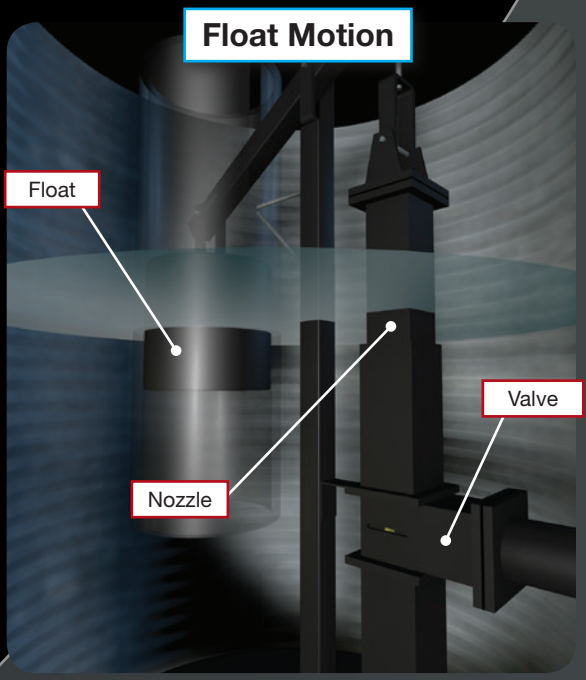
The StormShaper system will allow the designer to 'shape' the actual outlet hydrograph to conform to the ideal outlet strategy. The result is that the detention system can be reduced in size by an average of 30 to 40 percent when compared to conventional outlet designs.

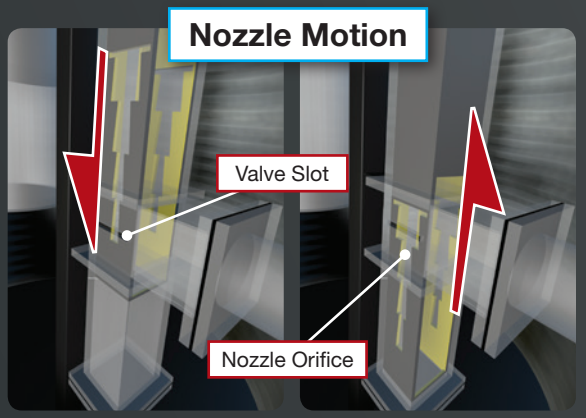


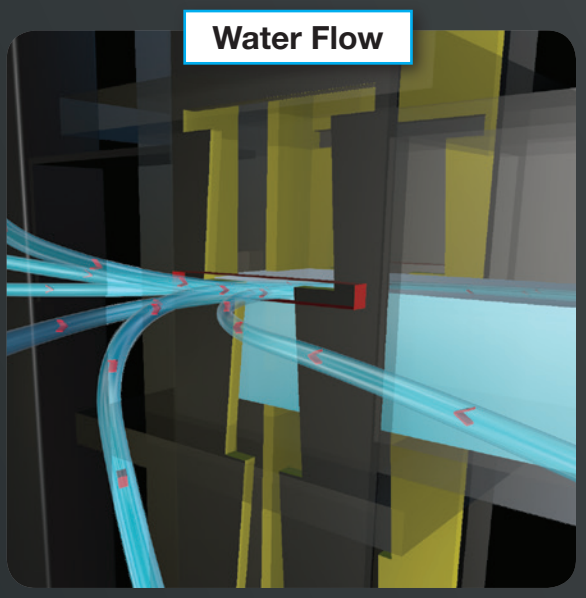
HOW STORMSHAPER WORKS

The StormShaper controls the outlet rate by using a float controlled variable outlet valve, which is normally located in a separate chamber at the outlet end of the system. The variable outlet can be designed to produce virtually any flow rate at any storm water system depth. This is accomplished by using a custom designed project specific orifice pattern in the nozzle, which moves in and out of the control valve. The variable orifice in the nozzle works in conjunction with the stationary constant slot in the valve to produce virtually any desired outlet hydrograph as per local regulations.





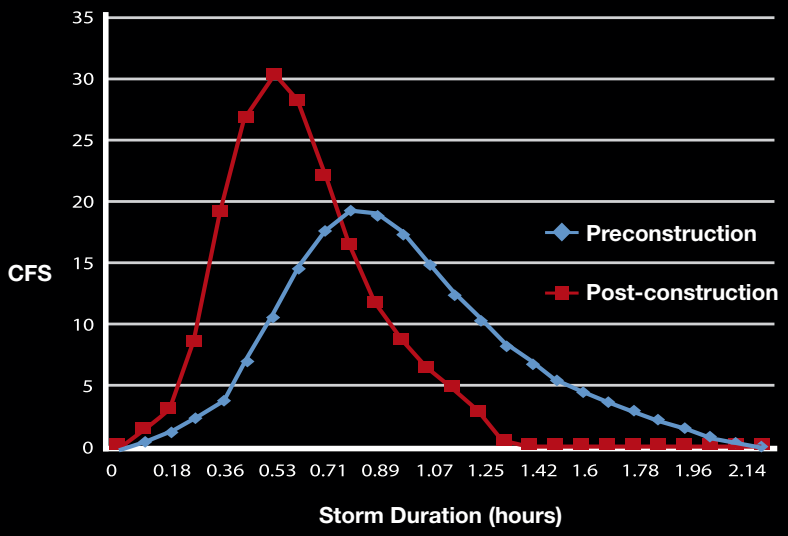




THE SCIENCE BEHIND STORMSHAPER

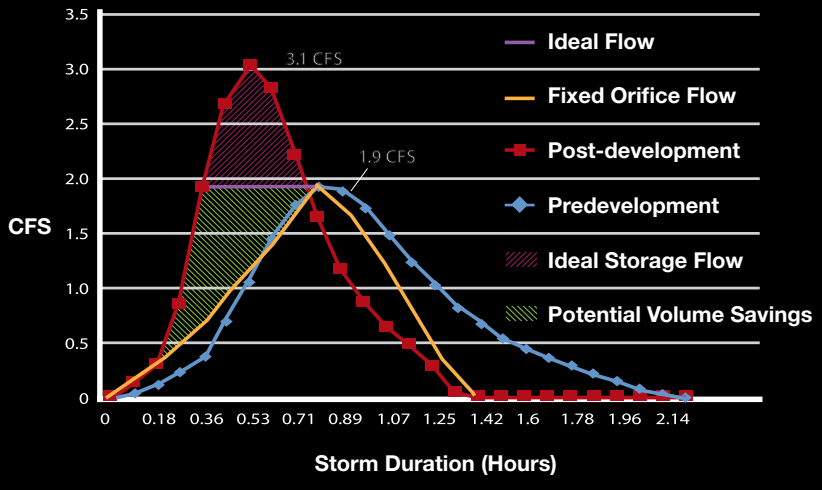
The Lane StormShaper meets regulatory outflow requirements while reducing the volume of required storage by an average of 30 to 40 percent vs. conventional outlet methods. Most regulatory agencies require that the post-construction runoff rate from a site not exceed the maximum preconstruction flow rate for a given design storm. Since a developed site includes a much higher percentage of hard surfaces like roofs and pavements, the unrestricted post-construction outlet hydrograph will almost always have flows higher than the preconstruction maximum. Post-construction flows usually have peak flows that occur much earlier in the rainfall event. Post-construction flow that exceed the allowable pre-construction maximum rates must be stored for later release.

In this particular single design storm example, any flow over 19 CFS must be stored, either above or below ground. However, in a conventional outlet design, since a fixed orifice at the invert of the system controls the outflow rate, the flow cannot reach the maximum allowable flow rate until the system is completely full and the fixed orifice is subjected to its maximum design depth. This results in a storage system which is larger than what is necessary in order to meet agency regulations.



The optimal storage volume is the area beneath the post-development curve and above the ideal outflow line, as shown below in the area shaded in red. However, since a commonly used fixed orifice at the flowline cannot release the ideal flow until the system has become completely full, the typical retention/detention system must also store the entire volume beneath the post-development curve and the fixed orifice flow line, as shown in green. In the example to the right, this means that the system must store about twice the volume that the regulations actually require.

DETENTION SYSTEM HYDROGRAPH

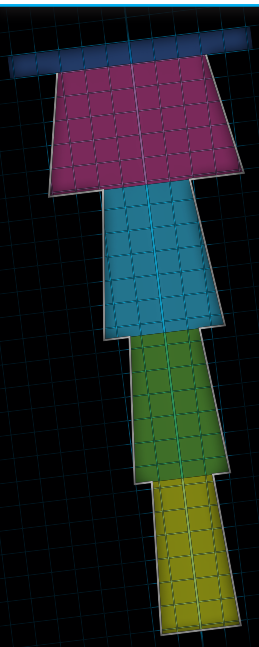


The ideal outlet control method would release storm water at the maximum allowable discharge rate as soon as possible. The conventional system cannot do this and must be oversized to compensate for the less than optimal discharge method. This means that the typical conventional retention/detention pond or underground system is oversized, sometimes by as much as double, which means that an optimal flow rate system could save as much as 50 percent of the system cost.

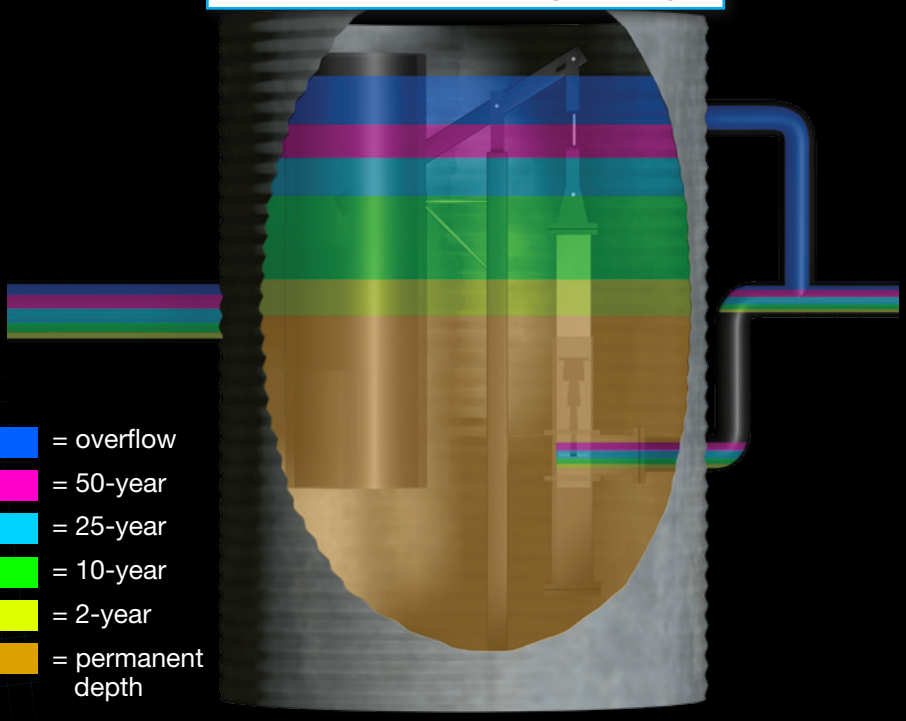
Of course most systems are designed to deal with multiple storms, which are much more complicated to model hydraulically. However, the StormShaper can be designed to produce virtually any outlet hydrograph no matter how complicated, simply by designing it into the nozzle orifice pattern. The Lane engineering team will assist the consulting engineer to achieve the smallest possible storage volume and meet all regulatory requirements. Lane StormShaper designs can be incorporated into HydroCAD so that they can be submitted for agency approval.

REQUIRED ORIFICE AREAS

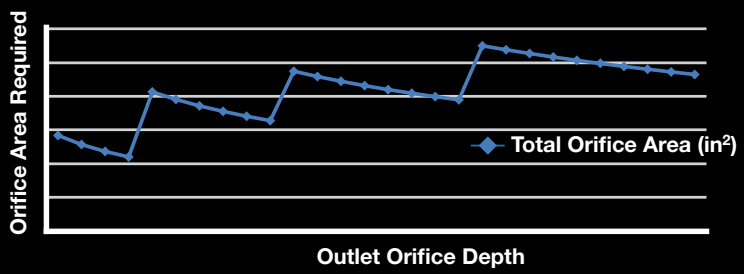
Nozzle Orifice Pattern



Multiple Storm Storage Design



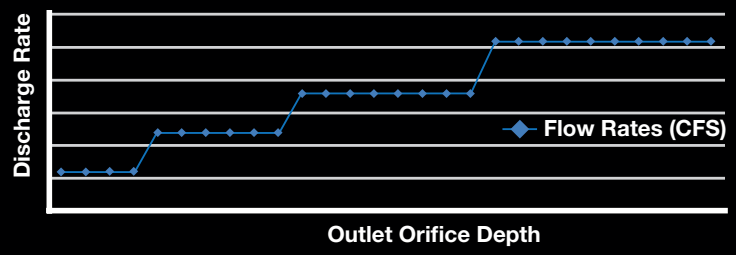
In order to produce the ideal outlet hydrograph, the variable orifice must change as the system fills. As the system fills, the head on the orifice increases. This means that the orifice must tighten slightly within each design storm section in order to keep the flow rate constant for that storm section. This results in a nozzle pattern which typically looks like the above."

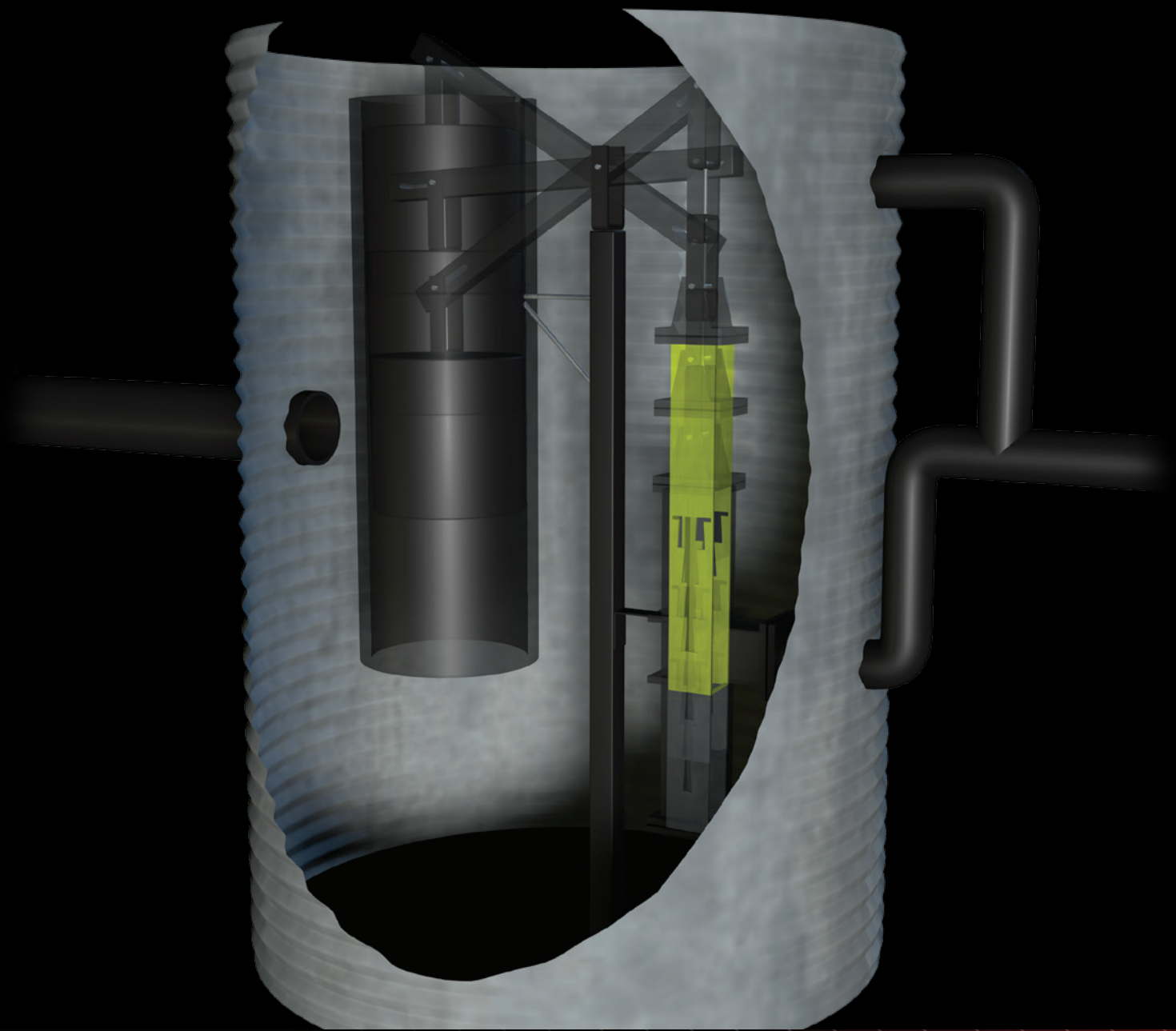


STORMSHAPER

IDEAL OUTLET HYDROGRAPH

Local requirements will dictate the maximum flow rate allowed from the system for each storm that is regulated. Discharging the maximum flow rate allowed as quickly as possible reduces the amount of storage volume and land required. The chart at right depicts how the maximum allowable discharge rate jumps when the system receives successively stronger storms. Designing a system which will follow this ideal outlet hydrograph as closely as possible is the key to saving storage volume and costs.





BENEFITS AND ADVANTAGES

- Saves an average of 35 percent of storage volume.
- Saves land for other uses.
- Quicker construction time.
- Saves labor costs.

TESTED FOR RELIABLE PERFORMANCE

Most storm water systems are designed to outlet at a maximum rate. Normally little attention is paid to optimizing flow rates in order to minimize system size and cost. The StormShaper system has been laboratory tested to ensure that it delivers the outlet flow rates as designed. The StormShaper design concept is extremely adaptable to virtually any desired outlet hydrograph.

YOUR ENGINEERING PARTNER

The Lane Engineering Team provides the highest level of support during the StormShaper design and installation process. Our team will meet with your design engineers to gather necessary project information and design a customized StormShaper outlet control system with the following elements:

- Stormshaper design, including any necessary vault or structure.
- Outlet hydrograph output for incorporation into calculation reports.
- CAD system layout, bill of materials, and drawings for the entire retention/detention system.
- Upstream debris collection recommendations, which will be incorporated in the Lane design to prevent blockage.
- A design that meets regulatory outflow requirements as provided by the design engineer.

Lane engineering will assist the consulting engineer to prepare a HydroCAD modeling submittal to submit to the regulatory agency.

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