OOWA ONTARIO
Onsite Wastewater Association

OOWA's Guidance Document Series:
Flow Distribution

Produced by the OOWA Onsite Technical Committee

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1.0 Overview and Objectives

Flow distribution is defined as the process of conveying wastewater or effluent to more than one component of a sewage system.

All onsite wastewater systems include flow distribution. Examples include distributing septic tank effluent to multiple runs in a leaching bed, distributing effluent among multiple cells in a large leaching bed or multiple independent leaching beds, or splitting septic tank effluent among multiple advanced treatment units.

Good flow distribution is important because it allows for proper treatment and infiltration of septic tank effluent to occur within leaching beds. Effluent must be split evenly between all runs in a leaching bed in order to utilize the entire bed. On the other hand, uneven or poor flow splitting can lead to overloading portions of the leaching bed and premature failure. Proper distribution of flow among multiple treatment units allows the system to perform as intended.

Typical methods of flow distribution include gravity distribution using symmetrical tee headers, distribution boxes and siphons, and pressure-based distribution using pumps, distribution valves and orifice plates.

The choice of gravity or pressure flow distribution depends on owner preferences, site conditions, and size of the system. In general, small systems tend to use gravity-based distribution methods while larger systems tend to use pump-based distribution methods. In some instances, pump-based flow distribution is a regulatory requirement. For example, the Ontario Building Code (OBC) Sentence 8.6.1.3.(1) notes that at least one pump or a siphon must be used where the total length of distribution pipe or leaching chamber is 150 m or more. The rationale behind this requirement is that a slug dose by the pump or siphon will improve the movement of effluent throughout a leaching bed as compared to trickle flow (MOE 1982).

For large systems, the Ministry's Design Guideline for Sewage Works (MOE 2008) notes that pumps provide the most reliable means of alternately dosing multiple leaching beds, with the pump typically discharging to a distribution box and subsequent gravity flow to the laterals.

This guidance document discusses the recommended ways and means of distributing flow over a physical space. However, flow can also be distributed over time by, for example, using timer control for pumps and balancing tanks to store flow over one or multiple days. Flow distribution over time is not discussed here, and the reader is referred to OOWA's other guidance documents on flow balancing and pump chambers.

Note this document discusses current practices. Inspection of existing systems may reveal flow distribution techniques which are no longer in common use, such as a header fed from one end or a fantail arrangement. These older configurations which are not in current use are not discussed here.

2.0 Gravity Distribution

Gravity flow distribution considers siphons, distribution boxes and headers. Refer to Appendix II for diagrams illustrating flow splitting configurations.

2.1 Siphons

A siphon is a method of providing a volume-based dose to the leaching bed as an alternative to a pump that does not require any mechanical components. A siphon works well in situations with sloping sites, where adequate fall can be achieved from the depth of the siphon chamber below grade, to the leaching bed, as there is a significant pressure differential required between the siphon and the leaching bed. See references section for links to Onsite Installer 2014 & 2015 articles. Historically, siphons were commonly used in larger commercial sewage systems to provide dosing to large in-ground leaching beds, but pump systems are now most commonly used.

The siphon consists primarily of a bell and a trap, and is typically housed in a siphon chamber. As the effluent level rises in the tank, it eventually provides enough pressure to trip the siphon, which releases the volume of liquid that has accumulated, providing a set volume dose to the bed. The leaching bed must be at a lower elevation than the siphon, which may preclude its use on sites that are relatively flat, or if a raised leaching bed is required.

Considerations for siphon design:

- Is there adequate fall from the location of the siphon to the leaching bed?
- Required dosing volume and size of siphon chamber
- Size of siphon and discharge diameter
- Provide venting and a high-level alarm on the siphon chamber
- Provide access for regular inspection and maintenance
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It is important to recognize that siphons themselves do not split the flow. The siphon merely doses the leaching bed with a slug of wastewater. It is the larger slug volume which is presumed to push the wastewater to more laterals and flow farther along each lateral as compared to trickle flow.

Although they do not contain mechanical or moving parts, siphons can still malfunction and should be inspected regularly. Siphons can be susceptible to leaking or clogging, and require regular