

Georgia Department of Public Health

Georgia Onsite Sewage Management Systems

Background on Design Criteria for Peak Sewage Flow for Onsite Wastewater Treatment Systems in Georgia

Background

Determining wastewater flows and characteristics is fundamental to successfully designing on-site sewage management systems. Historically, “Sewage Flow Schedules” tables have appeared in textbooks, equipment manufacturer’s literature, and in the *Manual of Septic Tank Practices* (US Public Health Service, 1967). Eventually, state regulatory agencies adopted these flow tables or modified existing tables for use based upon their own studies and experience.

Georgia adopted Section “J” of the *Georgia Manual for On-site Sewage Management Systems* based upon a mixture of studies and experience according to the manual entitled *Management of Small Flows* (US Environmental Protection Agency (US-EPA), 1978), and the EPA *Onsite Wastewater Treatment Systems Manual, (US-EPA 2002)* figures. Typical “Sewage Flow Schedule” tables are based upon estimates of the volume of wastewater generated at peak conditions. These estimates include system leakage, fixture peak flow measurement, and assumptions concerning occupancy patterns, i.e. the assumption that a household consists of two people per bedroom. Extensive studies, summarized by the EPA have shown that average total daily water use for individuals and non domestic facilities is about 40 percent less than commonly referred to water use figures as presented in “Sewage Flow Schedule” tables.

Why the Differences?

The explanation for the differences between average or typical measured water use and design sewage flows listed in Section “J” of the *Georgia Manual for On-site Sewage Management Systems* is justified by the following: The typical measured water use values do not take into consideration flow variations between days of use, e.g. unusually heavy water consumption generated by occasional guests during holidays or periodic extended occupancy, weather events compromising septic systems, system leakage, or fluctuations in wastewater strength characteristic that occur at the single system scale and are lost in the usage averages of large populations surveys.

Table 1: US EPA Typical Hydraulic Use vs. Georgia Design Flows

User Unit	EPA Typical Water Use gpd	GA Design Flow gpd
Residential – per Bedroom	120*	150
Restaurant – per Seat	10	50
Office/factory – per Person	13	25
Hotel (resort) – per Guest	50	75
Theater – per Seat	3	5
Hospital – per Bed	165	300

* Two persons per bedroom at a median flow of 60 gallons/day/person

The differences associated with wastewater strength are of particular importance for non residential facilities such as restaurants. Although a restaurant may only generate 20 gallons of wastewater per seat, the strength of the wastewater as measured by biochemical oxygen demand (BOD5) and total suspended solids (TSS) can be 2 to 3 times stronger than residential wastewater. All else being equal, a soil absorption field will clog more quickly when a stronger wastewater effluent is introduced for dispersal as compared to common residential strength wastes. To account for possible high strength wastewater and the resulting increase in the rate of soil clogging, the Georgia Manual's *Sewage Flow Schedule, Table JT-1* lists a design loading rate that is higher in volume of wastewater normally expected to be generated per use. This design loading rate results in the construction of a larger absorption field than would be associated with just using hydraulic loading calculations only. The intended result is the installation of an absorption field having approximately the same life expectancy of a residential system.

Design Considerations

The use of safety factors is common place in all aspects of engineering. It would be unwise to design a bridge to support only the weight of a typical 40-ton tractor-trailer since it is known that heavier trucks may drive over the bridge. Equally unwise would be to design an on-site sewage treatment system without including built-in design safety factors. The Environmental Protection Agency has also recognized the need for a factor of safety when designing these systems. The *Onsite Wastewater Treatment and Disposal Design Manual* (EPA, 2002), states "To account for the potential variability in the wastewater characteristics at a particular dwelling or establishment versus; that of the average, conservative predictions or factors of safety are typically utilized."

Conclusion

Table JT-1 of the *Georgia Manual for On-site Sewage Management Systems* provides design sewage flows which are to be used for the proper sizing of an on-site wastewater treatment system. These design flows are typically greater than the actual volume of wastewater generated from each specified facility.

As a result, when used in conjunction with Section "F", "Disposal Systems", of the *Manual*, a reasonable factor of safety is included in the final design. The design sewage flows presented in Table JT-1 of the *Manual* is required to be used in estimating wastewater flows when sizing on-site wastewater treatment systems.

References

U.S. Environmental Protection Agency. 1978. *Management of Small Waste Flows*. Publication Number EPA-600/2-78-173. M.E.R.L. Cincinnati, Ohio

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