

Predicting Mixing Patterns of Overflows from a Square Manhole

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Abstract : During manhole overflows, its contents pollute the immediate environment. Understanding the pollutant transfer characteristics between manhole's incoming sewer and the overflow is therefore of great importance. A square manhole with sides 388 mm by 388 mm and height 700 mm with an overflow facility was used in the laboratory to carry out overflow concentration measurements. Two scenarios were investigated using three flow rates. The first scenario corresponded to when the exit of the pipe becomes blocked and the only exit for the flow is the manhole. The second scenario is when there is an overflow in combination with a pipe exit. The temporal concentration measurements showed that the peak concentration of pollutants in the flow was attenuated between the inlet and the overflow. A deconvolution software was used to predict the Residence time distribution (RTD) and consequently the Cumulative Residence time distribution (CRTD). The CRTDs suggest that complete mixing is occurring between the pipe inlet and the overflow, like what is obtained in a low surcharged manhole. The results also suggest that an instantaneous stirred tank reactor model can describe the mixing characteristics.

Keywords : CRTDs, instantaneous stirred tank reactor model, overflow, square manholes, surcharge, temporal concentration profiles

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