A Review on the Self-Cleansing Design Criteria for Sewer System

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Abstract – Sediment deposits in sewer system had been known to have adverse effects on the hydraulic performance of the system and also on the environment. Thus, the need for sewer system to carry sediment has been recognized for many years and self-cleansing criteria have been proposed in the literature for design purposes. Conventionally, a minimum critical velocity or critical shear stress was specified and although this approach had been successful in many cases; it was appreciated that a minimum critical velocity or critical shear stress which is unrelated to the characteristics and concentration of the sediment or the hydraulic behavior of the sewer could not properly represent the ability of the sewer flows to transport sediments. A more viable approach for self-cleansing design is to incorporate some aspect of the sediment and sewer characteristics into the design criteria; hence, various self-cleansing design criteria for sewer have been proposed in the literature. This paper presents a review on the various self-cleansing design criteria for sewer and proposed some further studies that could be conducted to improve the existing self-cleansing design criteria.

Keywords**:** Sediment, Self-cleansing design, Sewer system

I. INTRODUCTION

SEDIMENT deposition in sewer system had caused many adverse effect such as reduction in hydraulic capacity and environmental pollution due to the high pollutant concentrations that might be released during the erosion of these deposition [1-3]. To reduce sediment deposition, sewer system has been designed to have self-cleansing properties. In the design for sewer system for the purpose of self-cleansing, the system must be able to transport sediment and the system is free from sediment deposit as much as possible. The Construction Industry Research and Information Association (CIRIA), UK defined self-cleansing for sewer design as "An efficient self-cleansing sewer is one having a sediment transport capacity that is sufficient to maintain balance between the amounts of deposition and erosion, with time-averaged depth of sediment deposit that minimizes the combined costs of construction, operation and maintenance" [4, 5]. A search in the literature for self-cleansing design of sewer will generally categorizes the design concepts into three groups namely based on non-deposition of sediment; based on moving of existing sediment on sewer bed; and based on energy slope [6]. The design concepts in each group could be classified further into smaller groups as shown in Figure 1.

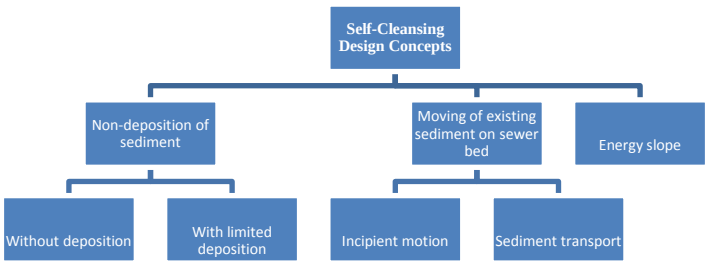

Figure 1 Classification of self-cleansing design concepts from the literature [6, 7]

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