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# Evaluation of Existing Conditions for Rehabilitation

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## A. Introduction

As existing sewers and manholes begin to deteriorate and fail, the traditional response has been to remove and replace them. However, there are alternatives available that can rehabilitate the sewer line or manhole, significantly extending the service life of the installation, normally at a lower dollar cost and with less inconvenience to the general public.

Rehabilitation techniques for sewer lines include cured-in-place pipe, fold-and-formed pipe, pipe sliplining, and pipe bursting. Manhole rehabilitation techniques include resin coating, centrifugally cast mortar, and structural liners.

## B. Evaluating the Condition of the Existing System

The first step in deciding to rehabilitate a sewer pipe and selecting an appropriate rehabilitation technique is to conduct a thorough inspection of the sewer in order to determine the condition of the existing line. This evaluation should include an assessment of the sewer's structural condition, capacity, and the amount of inflow and infiltration (I/I).

- 1. Structural Analysis:** The structural condition of the existing sewer needs to be evaluated in order to determine if the pipe can be rehabilitated, or if complete replacement is necessary. If rehabilitation is a possibility, the existing condition of the pipe may determine the rehabilitation technique necessary.

A structural evaluation should begin by thoroughly cleaning the line by water jetting. This should be followed by a closed-circuit television (CCTV) inspection. The inspection should provide information on the location, type, size, and severity of each defect in the pipe. Defects, which may be identified, include broken sections, longitudinal or circumferential cracks, offset joints, collapses, and corroded sections. In addition to the structural defects, obstacles that might affect the rehabilitation process, such as roots or projecting laterals, should be identified during the televising process. The locations of service connections should also be noted during this process.

Manholes should be visually inspected to identify any significant cracks in the walls, deteriorated inverts, crumbling brick or concrete, or signs of chemical attack.

- 2. Capacity and Inflow and Infiltration Analysis:** A capacity analysis of the existing line should be conducted. The capacity of the existing line should be determined based upon the size and slope of the sewer. The computed sewer capacity should take into account any reduction in size due to the rehabilitation method selected. This computed capacity is compared against future projected sewer flows.

In order to determine future flows for sanitary sewers, current flows should be measured. These flows are measured at various times in order to determine maximum and minimum flows. In

addition, the flows should be measured both during dry weather conditions and during high groundwater and heavy rain conditions in order to identify potential I/I problems.

I/I flows come from several sources. Inflow is water which is dumped into the sanitary sewer system through improper connections, such as downspouts or sump pumps. Infiltration is caused by water leaking into the system through pipe joints, openings in manholes, and other sources. I/I of storm water and groundwater into the sanitary sewer cause unnecessarily high sewer loading at the wastewater treatment plant. These high flows increase treatment costs and reduce the effective capacity of the plant.

Significantly increased readings (compared to those for dry weather) during periods of high groundwater indicate that infiltration is occurring. Sharp flow peaks during rainfall events indicate inflow into the sewer. While rehabilitating the line will likely reduce the amount of infiltration that is occurring, it will do little to cut the amount of inflow. In situations where inflow is identified as a problem, further investigation, such as smoke testing, is warranted to identify the sources of inflow and eliminate them.

After completing the flow monitoring process, future flows are calculated by adjusting the current measured flows for anticipated population growth and increased industrial and commercial usage.

The sewer line should be checked to verify that it has sufficient capacity to carry future flows for the projected life of the rehabilitation.

### **C. Selection of a Rehabilitation Technique**

Based upon the results of the existing system evaluation, a proper rehabilitation technique should be selected. If the condition and capacity of the existing pipe do not require removal and replacement, an appropriate rehabilitation method, as described in the following sections, should be selected.