



7000 I&I Spy Theory of Operation:

Every sanitary sewer system, regardless of its age, size, or location, contributes inflow and infiltration (I&I) to the municipal wastewater collection and treatment facilities. The cause of excessive I&I is due to an aging infrastructure that has not been adequately maintained. Inflow and infiltration are terms used to describe the ways that groundwater and stormwater enter the sanitary sewer system.

Inflow is water that is dumped into the sewer system through improper connections, such as downspouts and groundwater sump pumps. (Sump pumps that pump only laundry water or other sanitary wastes are not a problem.)

Infiltration is groundwater that enters the sewer system through leaks in the pipe.

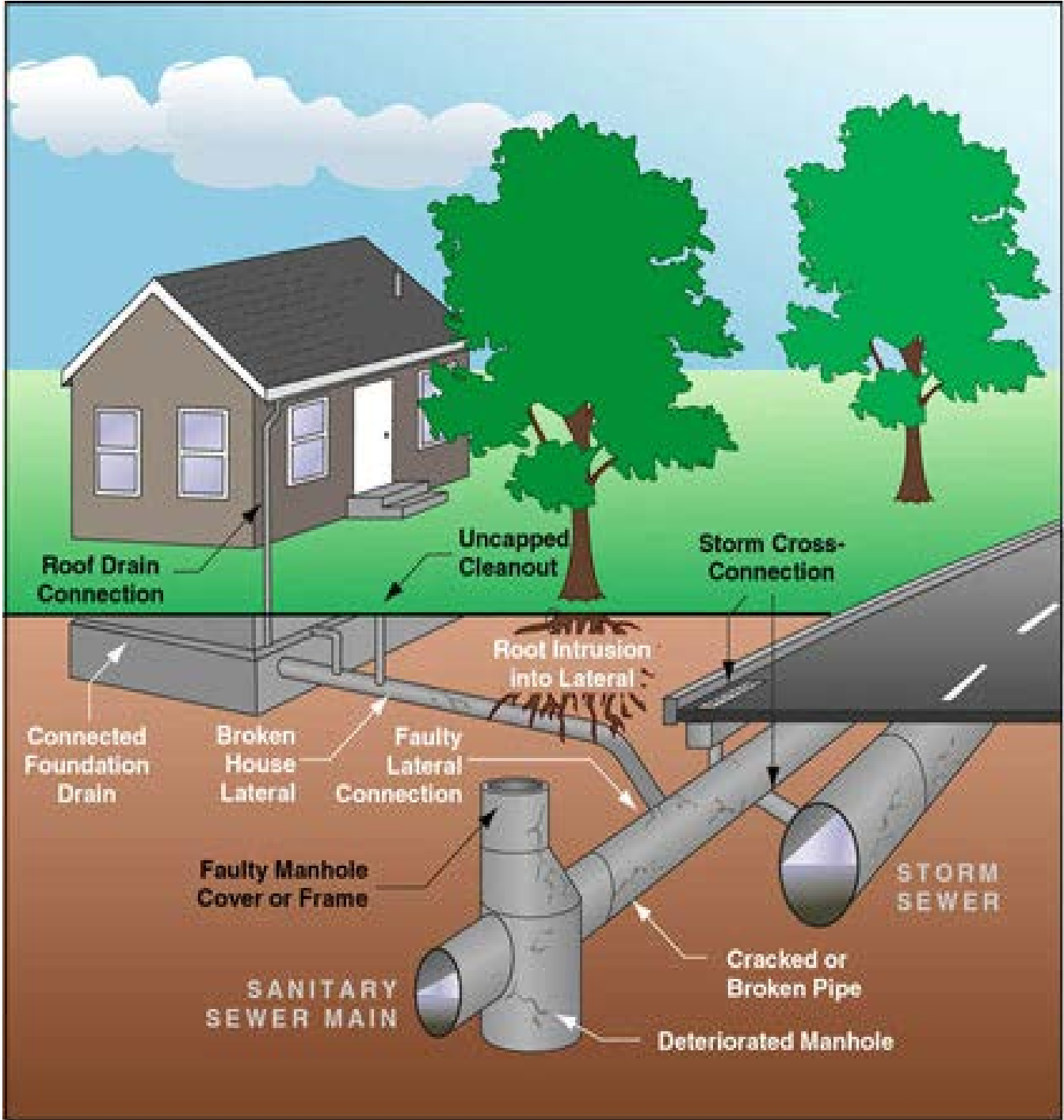
All of this water is called "clear water" (although it may be dirty) to distinguish it from sanitary sewage.

Why is this water a problem?

Clear water belongs in storm sewers or on the surface of the ground, and not in the sanitary sewers. When clear water gets into the sanitary sewers, it must be moved and treated like sanitary waste. Too much clear water often causes sewer backups and overflows when it rains. The water in an overloaded sewer flows at a higher level than normal. If the home has sanitary fixtures or floor drains that are below this higher, overload level, water can flow backward through the sanitary sewer lines into the basement.

Do improper connections really contribute large amounts of clear water to the sanitary sewer system?


Yes, and here's why: An eight-inch sanitary sewer can handle domestic wastewater flow from up to 200 homes, but only eight sump pumps, operating at full capacity, or six homes with downspouts connected to the sewers, will overload this same eight-inch line.



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Key:

-  Inflow Source
-  Infiltration Source

 **King County**
 Department of Natural Resources and Parks
 Wastewater Treatment Division
 Regional I/I Control Program



A sewage collection system is comprised of miles of piping. The system is very much like a tree with the trunk being the interceptor line usually 12" or larger in size. The main branches coming from the trunk/interceptor line are 8" collection lines and then even more branches being the laterals to individual homes. With many miles of pipe, the chance for inflow and infiltration is great. Every collection system has some degree of I&I. All of this extra water added to the collection system places unneeded expense on the treatment process and extra wear on the collection system itself. In addition, many causes of I&I are results of actual damage to the system.

The largest problem that faces operation of these collection systems is locating the sources of I&I. I&I problems in a system is never one large leak but a combination of many small leaks. Locating the source of these many small leaks is a huge challenge and the basis for the development of the I&I Spy.

The I&I Spy is a battery powered ultrasonic level measuring device designed to monitor I&I in sewage manholes and cleanouts 4" or larger.

The I&I Spy unit is non-intrusive, portable, battery powered and can store the flow data for its locations for up to 6 weeks. The unit is simply mounted on a supplied bracket in the manhole over the flow. The I&I Spy monitor will then log the height of the flow in the channel continuously for the next 6 weeks. When removed from the manhole, this data can be downloaded to a computer. The flow data is displayed on a graph in inches of height compared to time of day. Under normal flow conditions a standard flow height can be identified. During a rain event or other cause of I&I, an increase in flow height will be recorded by the monitor. Any cause of I&I recorded by the monitor will indicate that the source of the problem is upstream of the location of the I&I Spy. When multiple monitors are used to survey a collection line, the source of the I&I can be narrowed to between two manholes. When operating many or even hundreds of miles of collection system piping, knowing the location of an I&I source to be between two manholes is a great advantage.



SERIES 7000 I&I Spy INFLOW & INFILTRATION MONITOR

- Battery Operated – 6 AA Batteries
- Portable - move from location to location
- Logs up to six weeks of data
- Five minute sample intervals. 24 hrs/day
- Data logged for daily readings
- Permanent data retention
- Operates with Windows 95, 98 or newer



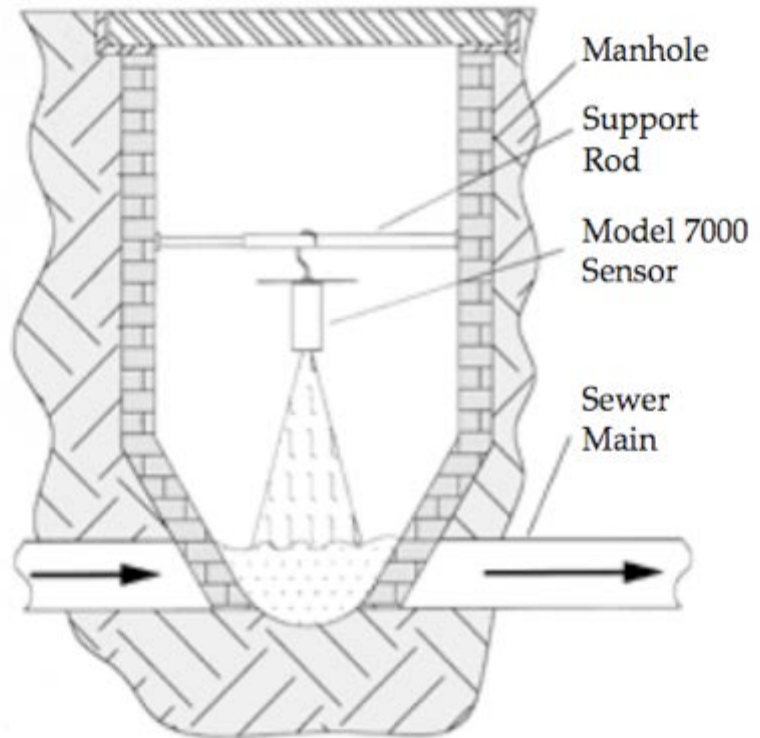
The SERIES 7000 I&I Spy MONITOR is an ultrasonic level-measuring device designed to monitor level or flow in wastewater collection systems, manholes or other application that requires a portable battery powered flow data logger. The 7000 I&I Spy is an easy to operate tool to help locate the source(s) of I&I in a collection system.

Model 7000 Unit includes

- 1-Model 7000 Monitor
- 1-Software Package
- 1-Lifting Rod
- 1-Support Rod

Model 7500 System includes

- 5-Model 7000 Monitors
- 1-Software Package
- 1-Lifting Rod
- 5-Support Rod





SERIES 7000DL

Ultrasonic Depth Logger

- Battery Operated – 6 AA Batteries**
- Portable - move from location to location**
- Logs up to four weeks of data**
- Five minute sample intervals. 24 hrs/day.**
- Data logged for daily readings**
- Permanent data retention**
- Operates with Windows 95, 98 or newer**



The SERIES 7000DL LOGGER is an ultrasonic level-measuring device designed to monitor level or flow in tanks, manholes or other application that requires a portable battery powered level/flow data logger. The 7000DL is designed to monitor levels in applications up to eight(8) feet away from the mounting of the unit. The units can be mounted at the top of a standard manhole and not require a confined space entry

Model 7000DL Unit

- 1 - Software Package
- 1 - Model 7000DL Logger

Model 7500DL System

- 5 - Model 7000DL Loggers
- 1 - Software Package

