Infiltration & Inflow

Understanding How Stormwater & Groundwater Increase Sewer Treatment Costs

Presented by Southeast Pipe Survey, Inc.

Infiltration & Inflow Defined

- **Infiltration**
  - groundwater that enters sanitary sewer systems through cracks and/or leaks in the sanitary sewer pipes. Cracks or leaks in pipes or manholes may be caused by age related deterioration, loose joints, poor design, installation or maintenance errors, damage or root infiltration.

SOUTHEAST PIPE SURVEY

Infiltration

- Root Infiltration

SOUTHEAST PIPE SURVEY

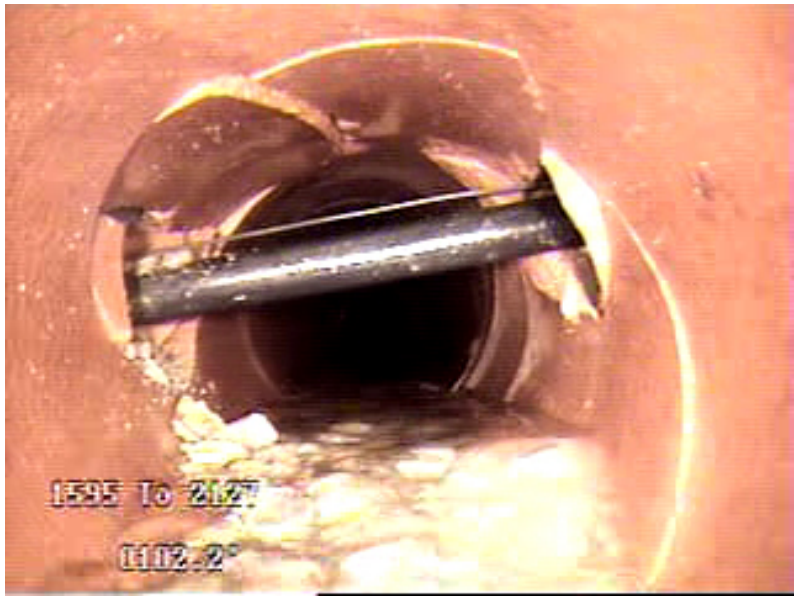
Infiltration

- Loose Joints

SOUTHEAST PIPE SURVEY

Infiltration

- Poor Design



SOUTHEAST PIPE SURVEY

Infiltration

- Installation or Maintenance Errors

SOUTHEAST PIPE SURVEY

Infiltration

- Age Related Deterioration

SOUTHEAST PIPE SURVEY

Infiltration & Inflow Defined

- **Inflow**
  - stormwater that enters into sanitary sewer systems at points of direct connection to the systems

SOUTHEAST PIPE SURVEY

Possible Inflow Source Locations

- footing/foundation drains
- roof drains or leaders
- Downspouts
- drains from window wells
- outdoor basement stairwells

SOUTHEAST PIPE SURVEY

Possible Inflow Source Locations

drains from driveways, groundwater/basement sump pumps

SOUTHEAST PIPE SURVEY

Possible Inflow Source Locations

streams

SOUTHEAST PIPE SURVEY

Impact on the Community

- Wastewater treatment becomes even more expensive when treating the additional “clear” water.
- Sanitary sewer overflows release wastewater and potential pathogens onto streets, into waterways, and basements increasing potential health risks
- Older communities located downstream from overloaded sewer systems will experience the most overflows and basement backups because of their low location in the watershed.
- Sanitary sewer systems in older communities not only carry their own wastewater and inflow and infiltration, they also receive the wastewater flow from the upstream neighboring community's sewer systems

SOUTHEAST PIPE SURVEY

Impact on the Community

- Overflow costs are associated with road and waterway cleanup and the potential for fines if the overflow problem is not corrected
- sewer system backups into basements or households can result in litigation and potential liabilities for the responsible city or agency
- Eventually, new homes or businesses may not be allowed to connect to the sanitary sewer system if the inflow and infiltration issues are not corrected, increasing costs to residents as a new sanitary sewer systems are installed or potentially lowering housing values due to the inability to develop land for future growth.
- Overflow occurrences put public health at risk and violate state and federal environmental regulations

SOUTHEAST PIPE SURVEY

Impact on the Treatment Plant

- Given a water treatment plant which processes 100 million gallons per day. During a rainfall the workload could triple to 300 million gallons/day.
  - Additional costs will eventually be passed on to the customer.
  - Life expectancy of expensive pumps is reduced with the excessive workload
- I&I reduction could increase the lifetime capacity of a treatment plant as well as the waste transporting system.

SOUTHEAST PIPE SURVEY

Locating Points where Inflow & Infiltration Occur

- Use existing data:
  - observed overflows
  - measured or observed surcharges
  - reported bypasses
  - customer backup complaints
  - chronic maintenance activities
  - other...

SOUTHEAST PIPE SURVEY

Locating Points where Inflow & Infiltration Occur

- Map the data
- Rainfall records can be added to show possible correlations

SOUTHEAST PIPE SURVEY

Locating Points where Inflow & Infiltration Occur

- Flow Monitoring

SOUTHEAST PIPE SURVEY

Locating Points where Inflow & Infiltration are Occurring

- Smoke Testing

SOUTHEAST PIPE SURVEY

Locating Points where Inflow & Infiltration are Occurring

- Visual Inspection with CCTV

SOUTHEAST PIPE SURVEY

Solving the Problem

- **CIPP (Cured-in-Place) Pipe Lining**
  - Utilizes Existing pipe as a form to make a tight fitting lining that:
    - prevents and stops deterioration of the host pipe
    - can carry all applied groundwater, soil and surface loads
    - is equivalent to a new pipeline
- **Sliplining**
  - In the sliplining process, a winch cable is inserted through the existing line and then attached to the front of the new liner.
  - The new liner pipe is then pulled or pushed into the existing pipe, laterals are reconnected, ends are sealed at each manhole and the annular space is grouted.
- **Pipebursting**
  - Pipelines are burst and new pipe is simultaneously pulled into place.
- **Open-Cut**
  - Replacement

SOUTHEAST PIPE SURVEY

Lesson Summary

- **Infiltration** is groundwater that enters sanitary sewer systems through cracks and/or leaks in the sanitary sewer pipes. Cracks or leaks in pipes or manholes may be caused by age related deterioration, loose joints, poor design, installation or maintenance errors, damage or root infiltration.
- **Inflow** is stormwater that enters into sanitary sewer systems at points of direct connection to the systems
- **Overflows** can impact human health, community services, and water treatment costs
- **Locating** the sources of infiltration and inflow can be done through various modern technical methods
- **Resolving** problems can be done using a method appropriate for the type of defect. Some methods may be selected based on budget constraints.

SOUTHEAST PIPE SURVEY

Thank you for attending!

David R. Herrin
Southeast Pipe Survey, Inc.
3523 Williams Street
Patterson, GA 31557-0477
912-647-2847 x231
912-647-2869 fax
www.southeastpipe.com

SOUTHEAST PIPE SURVEY