

Manhole Infiltration/Inflow-Proper Maintenance to Save on your CIP

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Background

- ▣ 13 Years of Experience Working With Sanitary Sewer Study and Design
- ▣ Capital Improvement Plan Experience
- ▣ System Experience With:
 - Smoke Testing
 - Dye Testing
 - Combined Sewers
 - Flow Metering

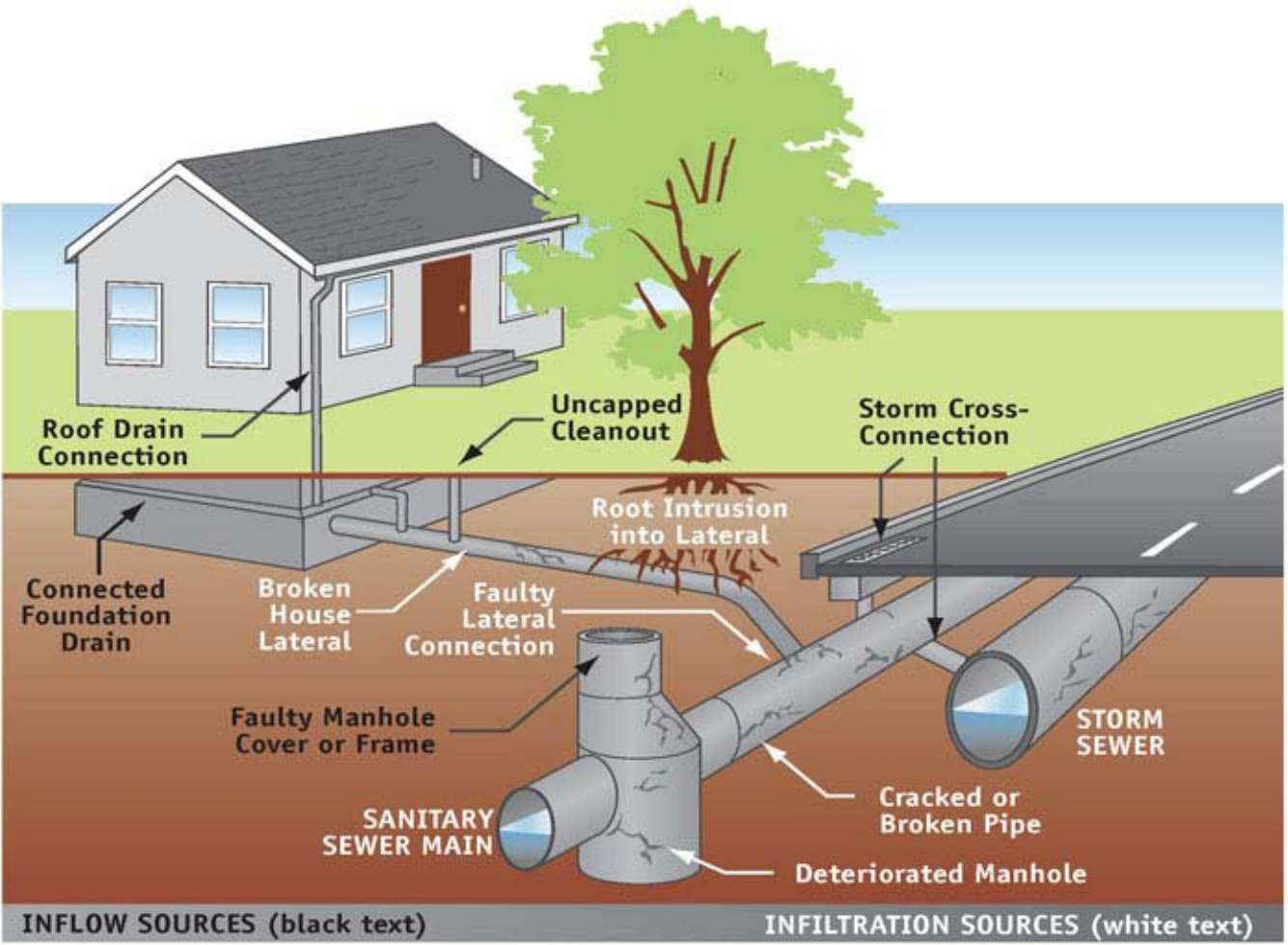
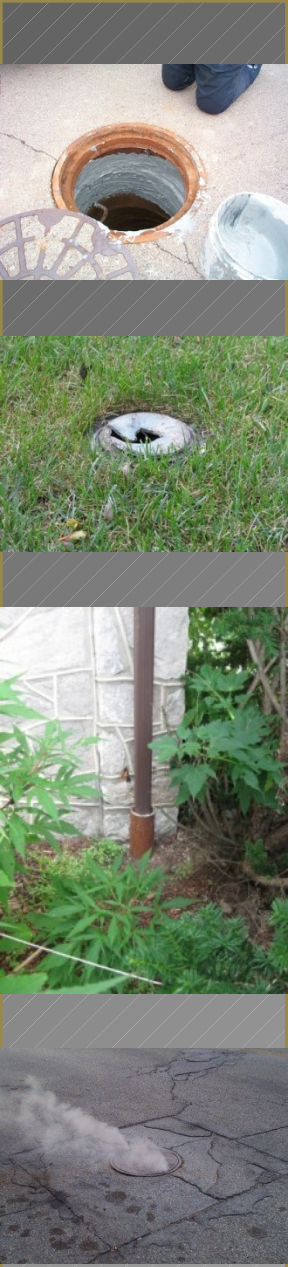


Inflow / Infiltration

- ▣ **Inflow**: is water from rainfall, snowfall or snow melt that enters the sewage system from yard, roof and footing drains, from cross-connections with storm drains, downspouts, and through holes in manhole covers.
- ▣ **Infiltration**: is groundwater that enters sewer pipes and manholes through holes, breaks, joint failures, connection failures and other openings. Infiltration quantities often exhibit seasonal variation in response to groundwater levels.



Inflow / Infiltration Types



Potential Manhole Infiltration and Inflow

- ▣ Illegal Sump Connections
- ▣ Drain Spouts
- ▣ Cracked Walls
- ▣ Old Clay / Brick
- ▣ Improper Pipe Connections
- ▣ Leaking Chimney
- ▣ Improper Casting



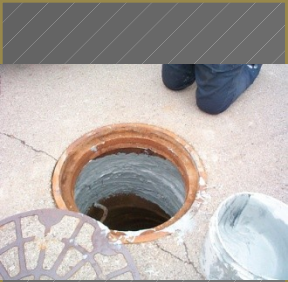
Methods of Detecting I/I

- ▣ Dye Testing
- ▣ Smoke Testing of Manholes
- ▣ Flow Monitoring of Pipes and/or Manholes
- ▣ TV Video Inspections
- ▣ Manual Inspections of Manhole Covers/Lids and Existing Conditions of Walls



Average Impact of I/I

- ▣ Foundation Drain = 6,000 gpd per house
 - 400 homes at 10% = 250,000 gpd
- ▣ Manhole Leak = 7,200 gpd per manhole
 - 500 manholes at 10% = 360,000 gpd



What Does I/I Cost?

- ▣ Sewer Backup Costs and Liability
- ▣ Potential Fines for Pumping
- ▣ Added Cost to Treat Flow at Plant
- ▣ Added Labor Costs
- ▣ Capital Costs if Not Addressed



Typical Manhole Cost Analysis

- ▣ Manhole Insert = ***\$250 each***
- ▣ Manhole Seal = ***\$500 each***
- ▣ Manhole Casting = ***\$500 each***
- ▣ Manhole Grouting = ***\$750 each***

Total Maintenance = ***\$2000 each***

vs

Replace Manhole = ***\$5000 - \$10,000 each***



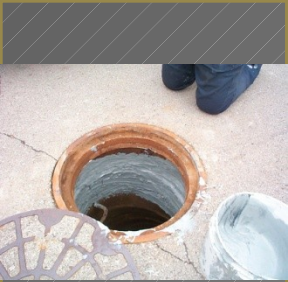
Maintenance vs Capital Improvements

- ▣ 2 to 5 Times Less Expensive
- ▣ \$'s Go Farther
- ▣ Annual Expense That is Manageable
- ▣ Continuous Improvement Approach
- ▣ Municipal Staff



Reasons to Reduce I/I

- ▣ Impact on WWTP Capital Needs
 - Upgrade to Equipment
- ▣ Damage to the Environment
- ▣ Health Hazard
- ▣ Economic Cost
 - Added Operating Costs
 - Electric Usage



Methods of Reducing I/I

- ▣ Disconnect All Known Illegal Hook Ups
- ▣ Replace Leaky or Old Manhole Covers
- ▣ Grout and Seal Interior or Exterior of Manhole Walls



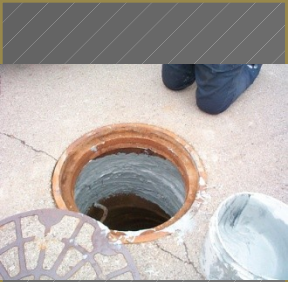
Methods of Reducing I/I

- ▣ Chimney Seals
- ▣ Replace or Fix Pipes with Cured In Place Piping
- ▣ Educate Homeowners and the Public



Educating the Public

- ▣ Inform Homeowners of Their Responsibilities
- ▣ Cross Connection Inspections
- ▣ Educate Public to the Cost to Treat I/I
- ▣ Lower Maintenance Costs



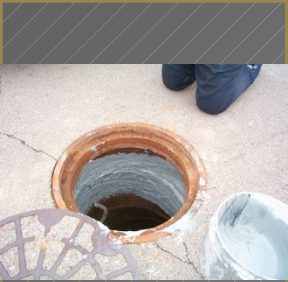
How to Save on Your CIP

- ▣ Update Sewer Ordinance
- ▣ Regular Inspection of Manholes
- ▣ Develop a Maintenance Program with Annual Budget
- ▣ Update Development Standards



What YOU Can Do to Help

- ▣ Help Reduce I/I, Take This Information Learned Today and Apply it in Your Community.
- ▣ Reducing I/I in the Manholes and Pipes Throughout a Community Can Save Money for Everyone.
- ▣ Taking the Extra Step and Doing Things Right with Maintenance Over Time Will Help Everyone Save Money.



Questions/Comments/Concerns?



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