Reducing I&I Through Inspection & Rehabilitation

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Identifying and Eliminating Private Property I&I

- Source Identification
  - Smoke Testing
  - CCTV Inspection
    - Mainline
    - Laterals
  - Dye Flooding
  - Site Drainage Evaluations
Identifying and Eliminating Private Property I&I

- I&I Reduction/ Elimination
  - Chemical Grouting
    - Manhole, Mainline, Laterals
  - Grout Products
    - Acrylamide
    - Urethane
  - Pros & Cons
  - Lateral Connection Lining
Smoke Testing

• Cost effective
• Fast detection of illegal & cross connections
• Ideal for inflow identification
Smoke Testing
Sewer Inspection

- Sewer systems should be inspected for:
  - Structural condition
  - Debris level verification
  - Sources of infiltration

- Routine Televising Programs
  - 7 -10 year cycle
    - Locate areas with constant I&I problems
    - Identify structural problems before they become a crisis
Mainline Sewer I&I Inspection

- Crawler (large/small diameter)
- Skids
Methods of Lateral Inspection

- **Push camera** – from basement/cleanout
  - Difficult setting up appointments to access house (evenings and weekends)
  - Access to property denied
  - Liability/Property damage
Methods of Lateral Inspection

- Lateral Services – from the main line
- **LETS**

Lateral Evaluation Television System
Dye Water Flooding

• Simulates a rain event
  • Camera placed in sanitary sewer while storm sewer is flooded with local hydrant and non-toxic dye.
  • Entry of dyed water is often noted at joints, laterals, lateral connections and defects.

• Areas of focus
  • Storm sewer is in close proximity to the sanitary sewer laterals or main. (Parallel or Crossing)
  • Locations with frequent rain event back-ups or surcharging.
Wauwatosa, WI - 2010 Dye Flooding Project

• Televise approximately 45,000 feet of 6” to 15” Sanitary Sewer.
  • Priority locations due to frequent back-ups & surcharging.
• Storm sewers ranged from 6” leaders to 48” mains.
  • Flooded from upstream to downstream
• Communication
  • Police & Fire
  • DNR
  • Residence
  • Neighboring communities-DPW
Wauwatosa, WI - 2010 Dye Flooding Project

- Labor & equipment needs:
  - Accurate Maps
  - 2-3 Hydrant meters
  - Four (4) crew members - CCTV Operator, Jet Operator, Two (2) crew members to set & remove plugs. (Confined Space Certified)
  - Non-toxic dye
Joint Infiltration-Dye Water Flooding
Lateral Infiltration- Dye Water Flooding
Drainage Plans & Site Evaluations

• Check list items for visual inspections of private property. (From the rite-of-way)
  • Sump pump discharge visible & operational?
  • Downspout connections plumbed below ground?
  • Yard grade or hard surfaces pitched toward foundation?
  • Noticeable settling or sink holes above lateral in yard?
Techniques for the Rehabilitation of Sanitary Sewers

- **Source Identification**
  - Smoke Testing
  - CCTV Inspection
    - Mainline
    - Laterals
  - Dye Flooding
  - Site Drainage Evaluations
- **I&I Reduction/ Elimination**
  - Chemical Grouting
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Eliminating infiltration is a system wide problem—Where do we start?

Wade & Assoc.
Chemical Grout Stops Infiltration

PERMANENTLY

Manholes – Mainlines - Laterals
Grouting Materials

- Gel Grouts
  - AV-100
  - AV-118
  - Additives
- Urethane Grouts
- Limitations
Grouting Facts*

- Eliminating a 1 GPM leak from a sanitary sewer system will amount to 1,440 GPD or 525,000 gallons per year.
  - Assuming an annual treatment cost of $1.00 per thousand gallons, sealing a single 1 GPM leak could save $525 per year.

- Chemical grouting has been used by thousands of municipalities since 1960 effectively sealing millions of leaks.

*Taken from Avanti International website
Sealing laterals & lateral connections is commanding more attention
Sewer Rehabilitation
Chemical Grouting – Laterals & Connections

- Similar to mainline grouting, special packer positioned at service connection that extends up the lateral 18” to 40’.
- Mainline & lateral must be structurally sound.
- 95% success within first 24”.
- Approximately 75% success at 40’.
Mainline Rehabilitation
Joint Test & Seal Grouting

- Non Structural
- Permanent Repair
- I & I Control
- Cost Effective
- Restrictions
  - Pipe must be in good structural condition
Waterproof Grout Collar
Sealed joint inside sand box
Lateral Rehabilitation
CIPP lining

• Current systems with connection interface
  • Top Hat
Lateral Rehabilitation
CIPP lining

• Current systems with connection interfaces
  • TOP HAT®
  • National Liner®
Lateral Rehabilitation
CIPP lining

- Current systems with connection interface
  - Top Hat
  - National Liner
  - T-LINER