Inflow and Infiltration: Stopping the Leaks

City of Wauwatosa Dye Water Projects

November 6, 2013
City of Wauwatosa - Honey Creek Study Area History

- MMSD Indicated Honey Creek study area exceeded the Peak Wet Weather Flow Performance Standards

- City Performed LSSES that included:
  - Sanitary Sewer Manhole Inspections
  - Sanitary Sewer Televising and NASSCO Pipeline Condition Assessment
  - Smoke Testing
  - Sanitary Sewer Flow Monitoring
Honey Creek LSSES Conclusions

- Flow Monitoring data indicated which areas of the Honey Creek were reporting high flows
  - Results of the manhole inspections, smoke testing, and standard CCTV work did not account for the quantity of clear water that was entering the system

- Honey Creek study area was prioritized based on results of LSSES study

- Recommendations were given to address structural deficiencies in Public Sector system and look further into ways to identify clearwater entry from the Private Sector

City chose to perform surcharge dye water testing of the storm sewer within high flow areas in an attempt to identify sources of clearwater entry into the sanitary sewer system
Dye Water Flooding Overview

- Traditional practice that has proven to be an effective method for a variety of purposes

- In this practice, dye flooding is performed in conjunction with CCTV to confirm potential I/I sources that were identified as part of other investigation methods

- Dye water flooding aids in verifying both the presence and quantification of specific defects during an evaluation
Dye Water Flooding Overview

DYE FLOODING PROCESS

STORM SEWER

SANITARY SEWER

LATERAL

SANITARY SEWER
Dye Water Flooding Discharge
The following are examples of standard CCTV performed as part of the 2008 LSSES project shown side-by-side with 2010 CCTV work done with the dye flooding project in the City of Wauwatosa.
Example: New Manhole Leaking
Example: New Manhole Leaking

2008 Standard CCTV

2010 Dye Flood CCTV
Example: Clay Riser Lateral Leaking
Example: Clay Riser Lateral Leaking

2008 Standard CCTV  2010 Dye Flood CCTV
Example: Laterals Leaking after Sanitary Relay of Entire Mainline Sewer
Example: Laterals Leaking after Relay of Entire Mainline Sewer

2008 Standard CCTV  2010 Dye Flood CCTV
Example: New Manhole Leaking around Service Boot Connection
Example: New Manhole Leaking around Service Boot Connection

2008 Standard CCTV
2010 Dye Flood CCTV

INCIDENT CODE: M60
INCIDENT DESCRIPTION: GENERAL OBSERVATION
FEET: 0087.5
COMMENTS: IFILTRATION AT E SIDE MH DYE PRESENT
Example: Joints Leaking near/within PVC Material Change Segment
Example: Mainline Joints and Lateral Leaking in Segmental PVC Relay

2008 Standard CCTV  2010 Dye Flood CCTV
Example: Lateral Leaking adjacent to Storm Sewer CIPP Reline
Example: Lateral Leaking Adjacent to Storm Sewer CIPP Reline

2008 Standard CCTV

2010 Dye Flood CCTV
Honey Creek Study Area Dye Water Flooding Results

- Approximately 80% of laterals crossing mainline storm sewer pipe had dye water witnessed

- Approximately 974 gallons per minute of dyed water entering the sanitary sewer system
  - Public – 204 gpm (21%)
  - Private – 770 gpm (79%)

- Recommended Solutions
  - Sanitary Sewer Lateral Rehabilitation
    - all the way to the foundation of the house
  - Sewer Manhole and Mainline Rehabilitation
  - Need to be performed concurrently
Dye Water Flooding Conclusions

• Standard CCTV is very useful to determine the condition of the existing sewer lines, but does not always show what is happening during high flow events.

• CCTV with dye water flooding will show where leaks are present during a simulated storm event.

• Majority of clear water that leaves the storm system and enters the sanitary system does so through private laterals.

• Presence of storm laterals provides more exit and entry points for migration of water between storm system and sanitary system through laterals and common trenches.

• Knowing where the leaks are located in your system will assist in determining the most cost-effective means to reduce clearwater entry into the system.
QUESTIONS???

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