CMOM Plan Done – Now What?

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Why CMOM? To protect and – preserve Wisconsin lakes, rivers, waterways, natural resources and our environment
Agenda

- Why Documentation
- Inspection
- Cleaning
- Tools to help
  - Equipment
  - GIS
- New Developments/Connections
- Condition Assessment /Rehabilitation
Very original materials

Clay Pipes from 4000BC
Copyright: Sewerhistory.org

Mesopotamia Sewer
Copyright: Sewerhistory.org

Copyright: Coppermine photos

Manchester Brick Sewer
Why do we need the documentation?

- Provides the documentation to justify rates
  - $ spent – labor and materials
- Document the cause of failure
- Retirements – lose of information
Sewer Inspection Strategies

- DNR-once every 10 years
- Baseline inspection – gather data. Then optimize inspection schedules
- Use closed circuit television (CCTV) cameras
Sewer Inspection History

- Lamping manholes/Visual from manholes
- First CCTV equipment 1946 by boiler companies – CCTV used aboard naval ships for remote reviewing
- In the 1950s RCA corporation – Vidicon imaging tube – smaller cameras/for 8-inch pipes
- 1963 – Contractor /chemical company developed method to seal ground water – needed a CCTV to review.. Thus began
Sewer Inspection

- Sewers Minimum once every 10 years to get a base-line
- Adjust schedule based on cleaning and base-line inspection
- Justify projects
- Provides the “picture” to show public officials
Manhole Inspections

- Manholes tell a story – how are your sewers operating?
  - Debris?
  - Condition?
  - Surcharge or evidence of surcharge?

- Every 5 years as a minimum

- Visual or with zoom cameras
Manhole Inspections

- Manholes should be inspected on a regular basis
- One of the most cost-effective methods to identify I/I
- Can easily be performed by utility crews
- Recommend GPS coordinates during inspections
- Hammer test.. check all manhole steps – can they bear weight
- Steps versus confined space entry
Cameras

Rapid Insight
Envirosight
Lift Station Inspections

- Inspect weekly if possible – monthly maximum
  - Sounds
  - Pump operation
  - Wet well
  - Controls
  - Generator

- Clean wet wells every 6 months or sooner
Lift Station Emergency Operation

- On-site generator
- Portable generator
  - capacity to run lift station
  - Quick disconnect fitting
- 2 independent electric feeds
- Holding capacity – avg design for 24 hrs
- Gasoline/Diesel pump – capacity to run lift station
- NR 110.14 (12)
Rebuild Pumps Versus Replace

- **Rebuild** –
  - typically 50 to 75% of replacement cost -
  - Recommend clarifiers
- **Rebuild life** – ranges from 3 to 20 years
- **Motors** – rewind 50% of the cost
- **Warranty issues** – 90 days rebuild versus 1 year
- **PMs should be the same**
New Sewers/Developments

- Built to comply with NR 110
- Plans & specs to be approved by the City/Village
- Connection fees
- Review pump lift stations
  - The City/Village will have to maintain this – cost associated with this
  - Permanent generators to be installed
New Sewers/Developments Testing

- Inspection criteria
  - Meet specifications
  - Proper bedding ** key for PVC
- Air test for sewers
- Mandrel
- Vacuum test manholes
- CCTV sewers
Sewer Installation

- Lay pipe with use of laser – note GPS is not accurate enough
Air Test – New Sewers/Repairs
Mandrel

- Mandrel – less than 5 percent deflection
- https://www.youtube.com/watch?v=ynNKwDD-5ZE
Vacuum Test Manholes

- https://www.youtube.com/watch?v=vEcsYq5cO28 – C.K. Masonry
Inspect Sewers prior to Owner Acceptance

- No flow – or less than 20% of the pipe diameter
- NASSCO PACP format
- If HDPE (black pipe) – use No. 3 dye to see the pipe
- Verify no defects and the pipe is clean
Cleaning Sewers

- Typically every 3 to 7 years
- Usually have ‘frequently visited areas’
  - Identify
  - Reduce
  - Find the root cause (Fats, oil, grease (FOG), sags, etc)
- Prevent blockages and sanitary sewer overflows (SSOs)
- Cleaning training is critical
CLEANING SEWERS & PUBLIC EDUCATION... Go hand-in-hand
Taken on a train in England

“Toilets” derived from French “act of washing, dressing and preparing oneself”
Tools in the Toolbox

- Geographic Information System (GIS)
- Computerized Management Maintenance System (CMMS)
- Root removal via chemical root control
- Smoke testing
- Dye water flooding
Geographic Information

- **Mobile GIS tools** – leveraging “out-of-the-box” stuff to match your needs
- **Rely on ESRI to maintain the software**
- **Field mobile** (ARC GIS on-line subscription –)
CAD stuff – easily transferred
  – Attribute data
  – Framework - design database based on client
  – ESRI – local government data model
  – Vector – accurate
  – CAD – schematic – might be in the wrong location
  – Overlay

Prioritize next steps
  – Sanitary Sewer
  – Water
  – Stormwater
  – Trees
Condition Assessment Findings

- Review findings
- Review recommendations
- Identify critical equipment
Manhole Repair

- Replace manhole covers with pickholes with solid cover manholes
Manhole Rehabilitation

Chimney seals rings (Cretex)

External chimney seal (Cretex)
Manhole Repair

- Cementious coating $150/VF (Strongseal)
- Cementious with epoxy coating (Raven)
- Structural replacement Armorock (new or rehabilitation)
  - Polymer resin with inert sand and aggregate
  - $750/vertical foot
  - Build
  - New grade rings, frame and cover
  - No scratches -
Cured In Place Pipe (CIPP)

- A structural liner inserted in the pipe
- Watertight (seamless installation)
- Felt sleeve – impregnated with resin
- Inverted into the pipe via manholes (resin on the pipe size)
- Resin cured/hardened with hot water or steam
- Laterals cut out after cured
CIPP Design

- National Association Sewer Service Companies (NASSCO) CIPP guidelines for specifications
- Design determines liner thickness = pipe strength
  - ASTM F1216 design - liner thickness
  - Partially deteriorated – rely on the host pipe for strength
  - Fully deteriorated – stand alone design - does not rely on the host pipe for strength

Minimum 6mils thickness – typical for 8” to 12” pipes
Reinstatement Of Laterals

Reinstate laterals either via man entry (typically 24” or greater) or a robotic cutter
Corrosion/Structural Deficiencies
Summary

- Routine inspection program – initially inspect less than 10 years using closed circuit television cameras
- Pump/Lift Stations – inspections – weekly
- Manholes
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