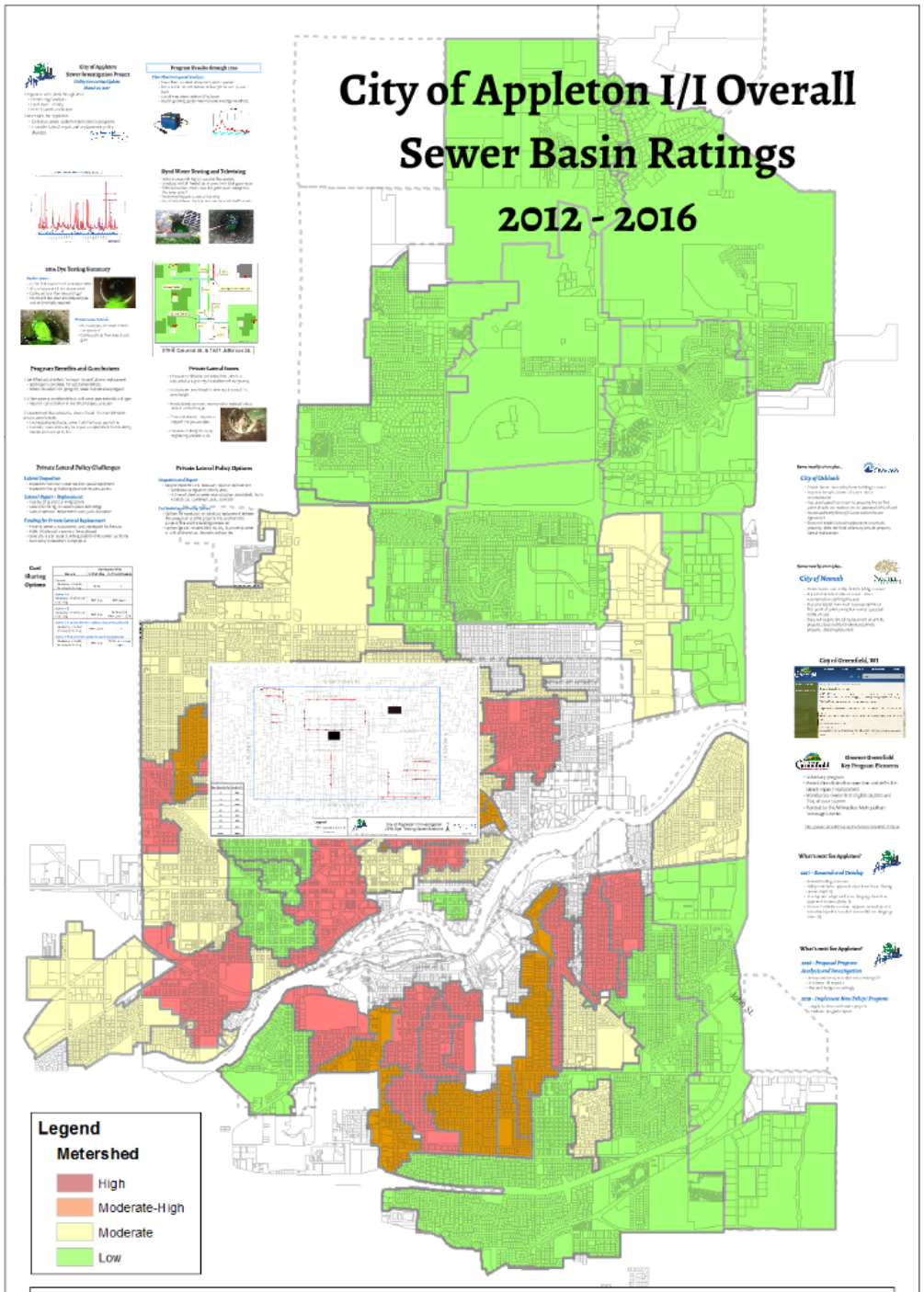
City of Appleton I/I Overall Sewer Basin Ratings 2012 - 2016



2012-2016 Flow Monitoring I/I Quantification
Overall Priority Ratings

N

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July 2016

City of Appleton
Sewer Investigation Project

Utility Committee Update
March 21, 2017

Program Results: 2012 through 2016

- Monitoring/ Analysis
- Dyed Water Testing
- Benefits and Conclusions

Next Steps for Appleton

- Continue sewer system maintenance programs
- Consider lateral repair and replacement policy changes

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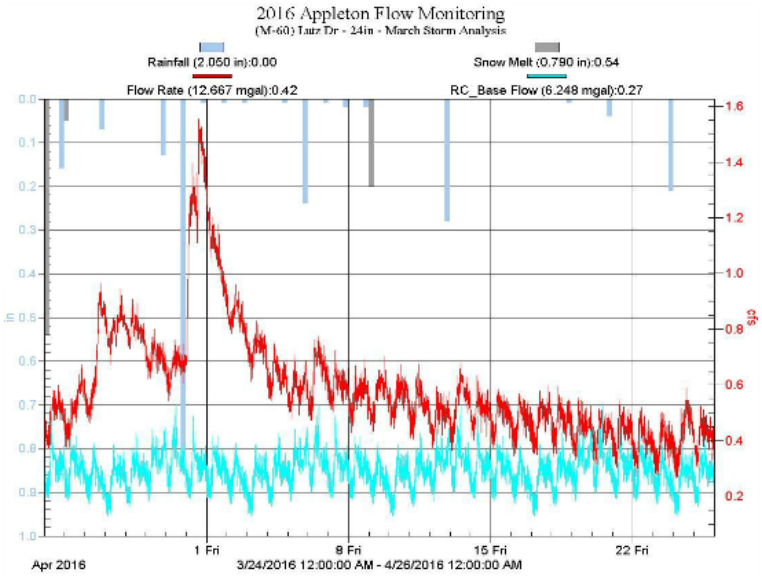
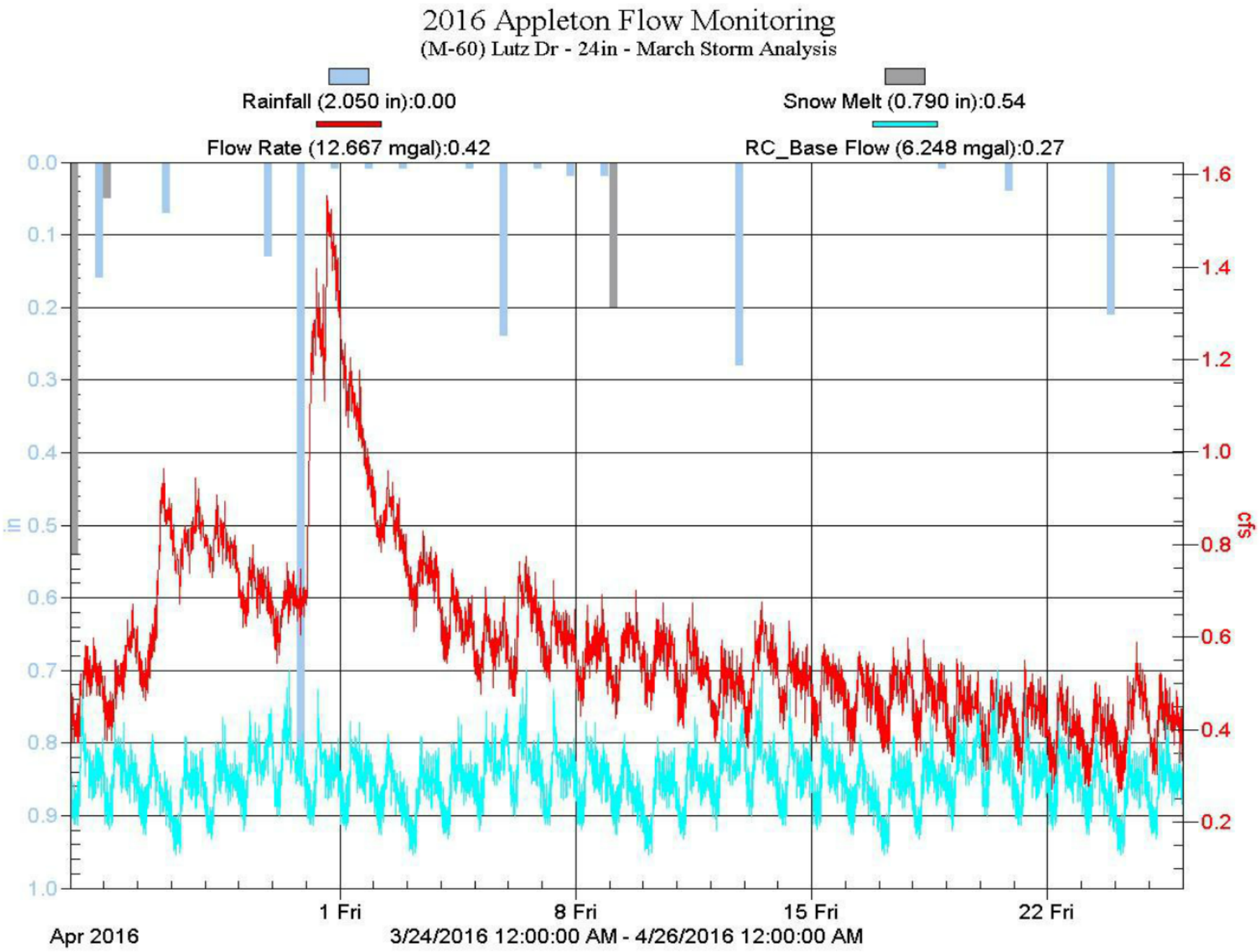
Beyond Surveying and Engineering

Program Results through 2016

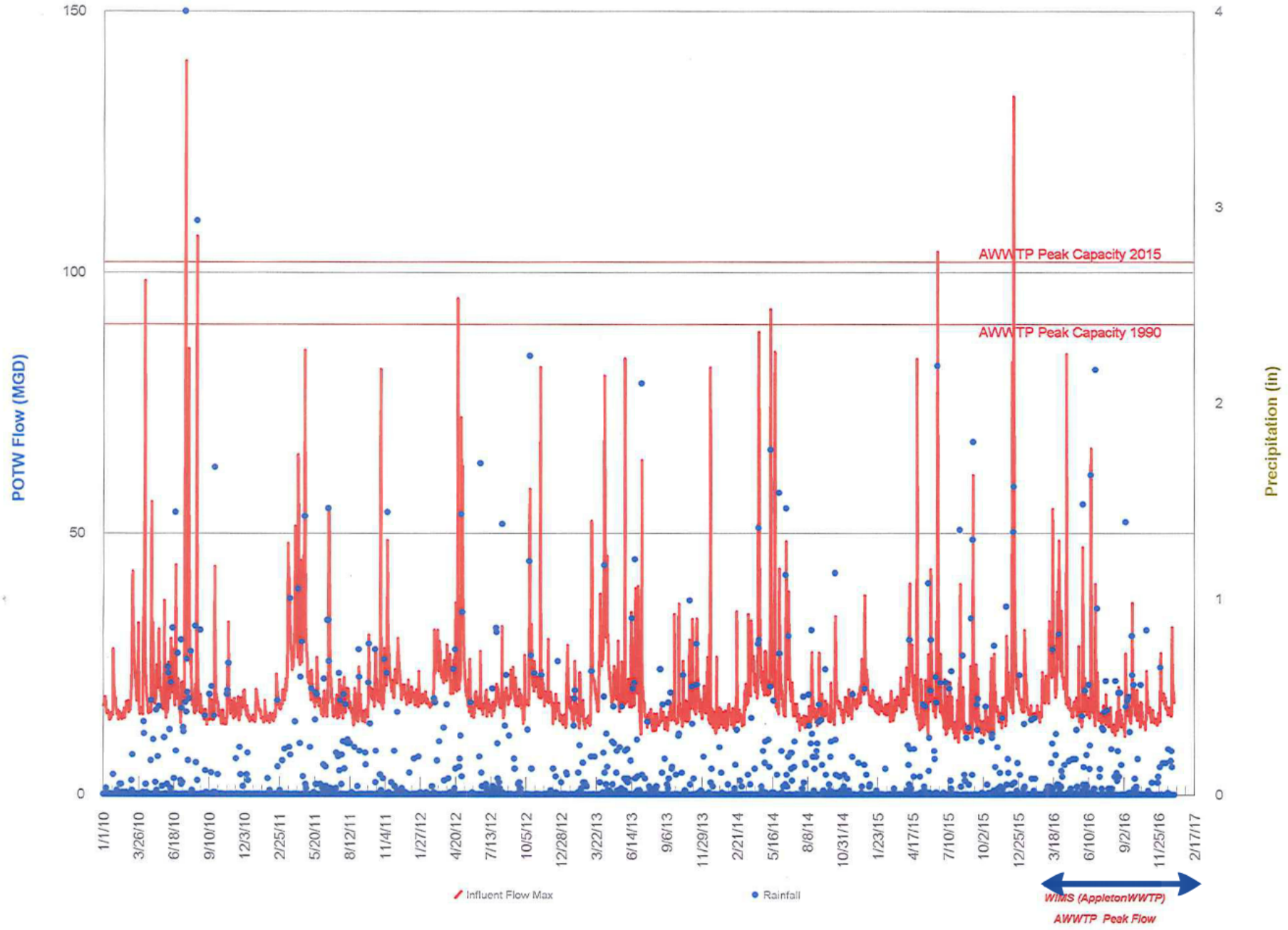
Flow Monitoring and Analysis

- Sewer flows recorded during wet and dry periods
- Data used to rate infiltration/ inflow (I/I) impact by sewer basin
- Overall map shows relative I/I by basin
- Resulting ratings guide more intensive investigative efforts

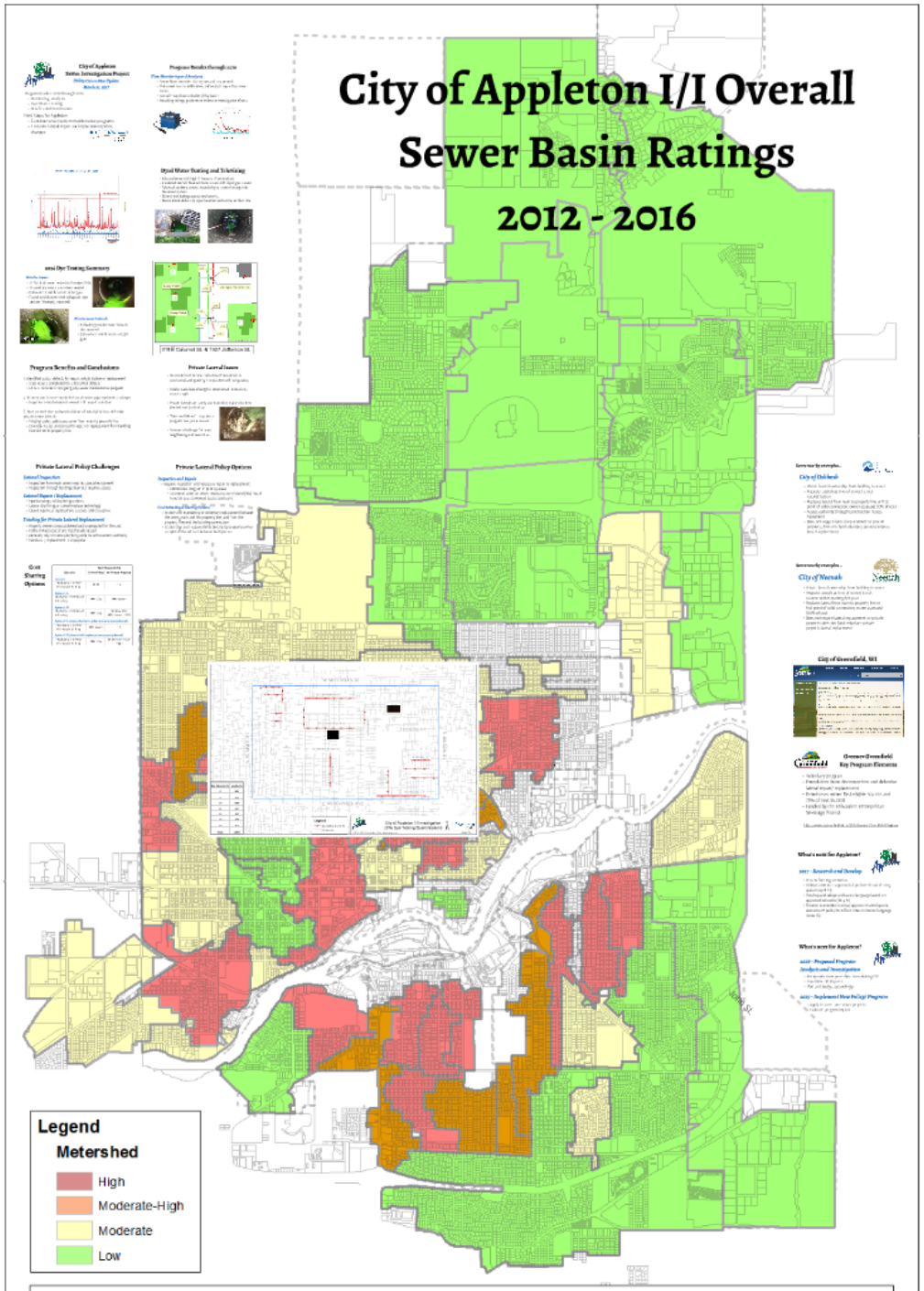



2016 Appleton Flow Monitoring
(M-60) Lutz Dr - 24in - March Storm Analysis
Rainfall (2.050 in):0.00
Snow Melt (0.790 in):0.54
Flow Rate (12.667 mgal):0.42
RC_Base Flow (6.248 mgal):0.27
in
cfs
0.0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1.0
1.6
1.4
1.2
1.0
0.8
0.6
0.4
0.2
1 Fri
8 Fri
15 Fri
22 Fri
Apr 2016
3/24/2016 12:00:00 AM - 4/26/2016 12:00:00 AM

AWWTP Influent Maximum Flow 2010-2016



City of Appleton I/I Overall Sewer Basin Ratings 2012 - 2016



2012-2016 Flow Monitoring I/I Quantification
Overall Priority Ratings

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July 2016

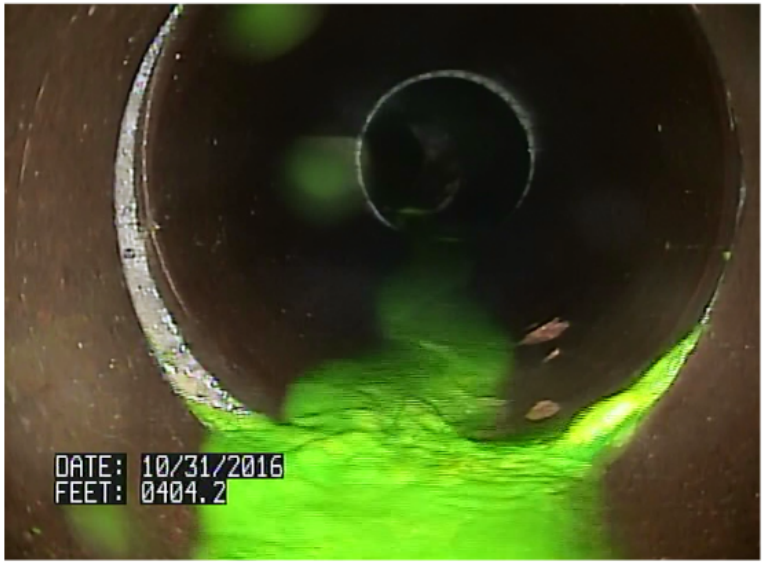
Dyed Water Testing and Televising

- Selected areas with high I/I based on flow analysis
- Simulated rainfall; flooded storm sewers with dyed green water
- Televised sanitary sewers; recorded green water leakage into the sewer system
- Determined leakage source and severity
- Documented defects by type, location and estimated flow rate

2016 Dye Testing Summary

Mainline Sewers

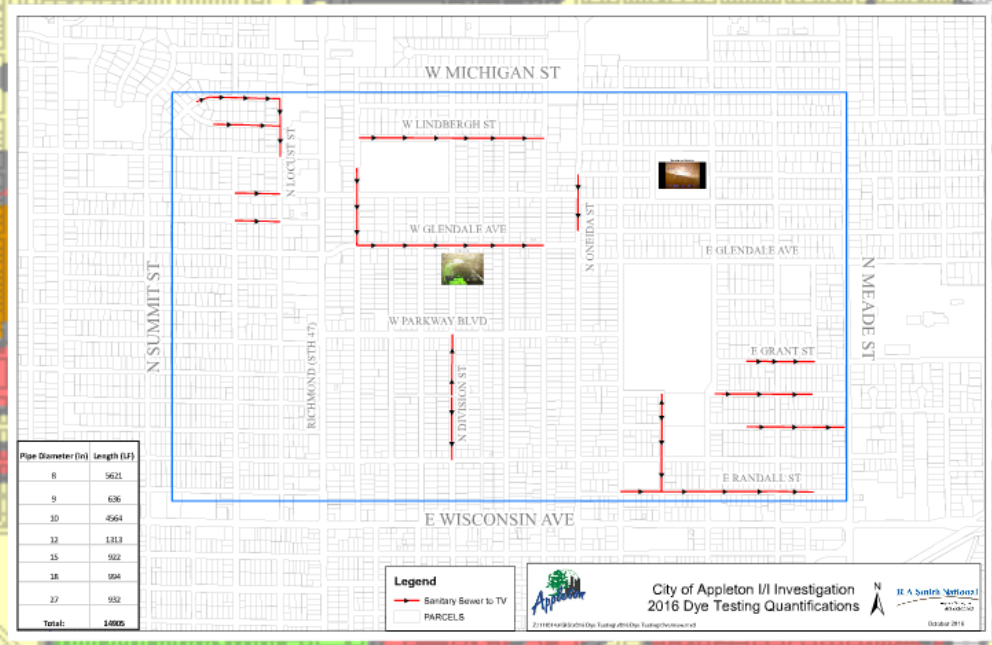
- 14,316 lf of sewer tested in October 2016
- 56 sanitary sewer leaks documented
- Estimated total flow rate of 67 gpm
- Found and documented collapsed pipe section (Promptly repaired)



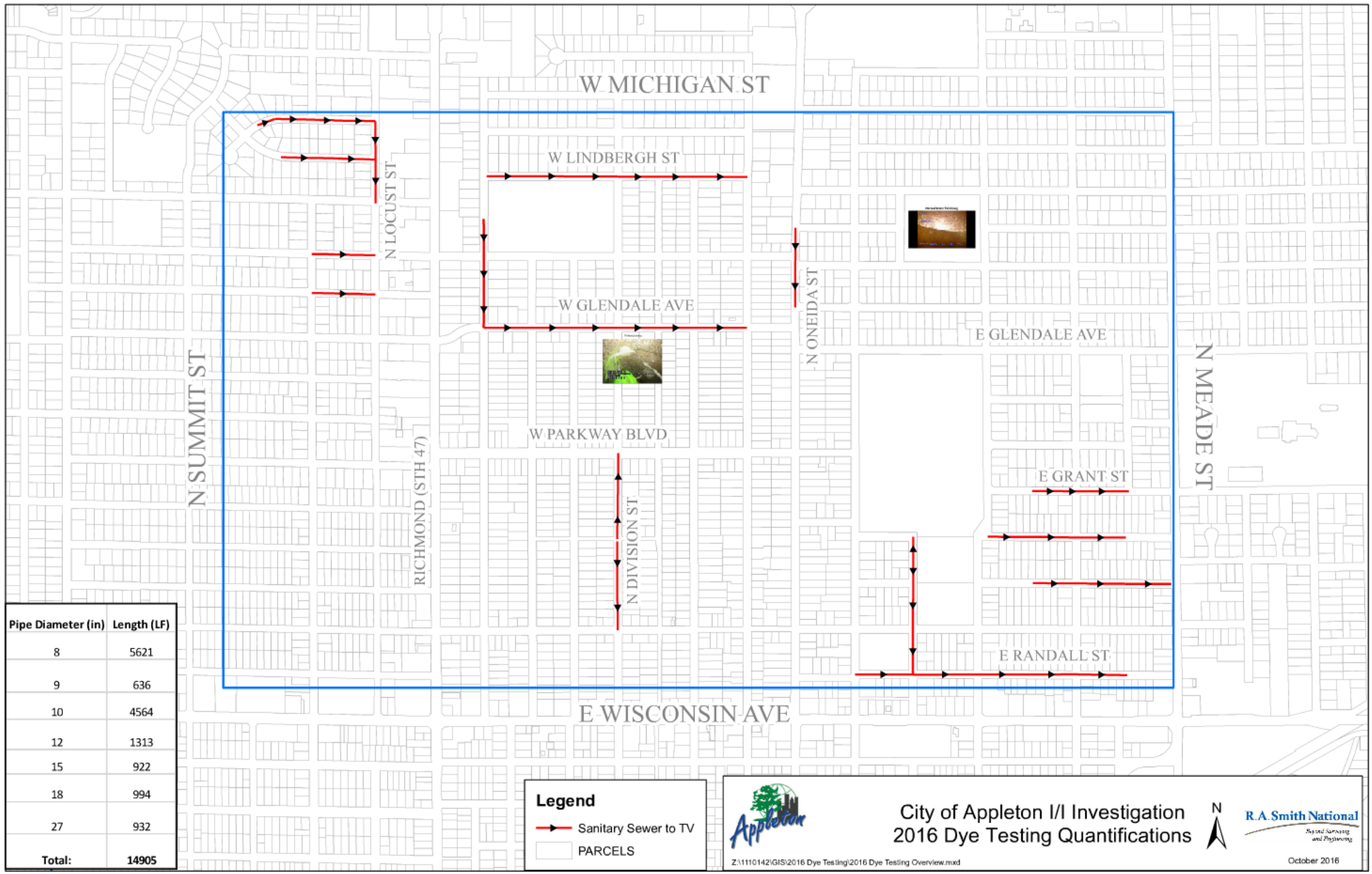
Private Sewer Laterals

- 61 leaking private sewer laterals documented
- Estimated total flow rate of 220 gpm

sibility rivate Property
N/A
00% Owner
0/50 to 25 ft % Owner > 25 ft
perty lateral)
N/A
y lateral)
0 entire private length



Pipe Diameter (in)	Length (LF)
8	5621
9	636
10	4564
12	1313
15	922
18	994
27	932
Total:	14905



Pipe Diameter (in)	Length (LF)
8	5621
9	636
10	4564
12	1313
15	922
18	994
27	932
Total:	**14905**

Legend

- Sanitary Sewer to TV
- PARCELS

City of Appleton I/I Investigation
2016 Dye Testing Quantifications

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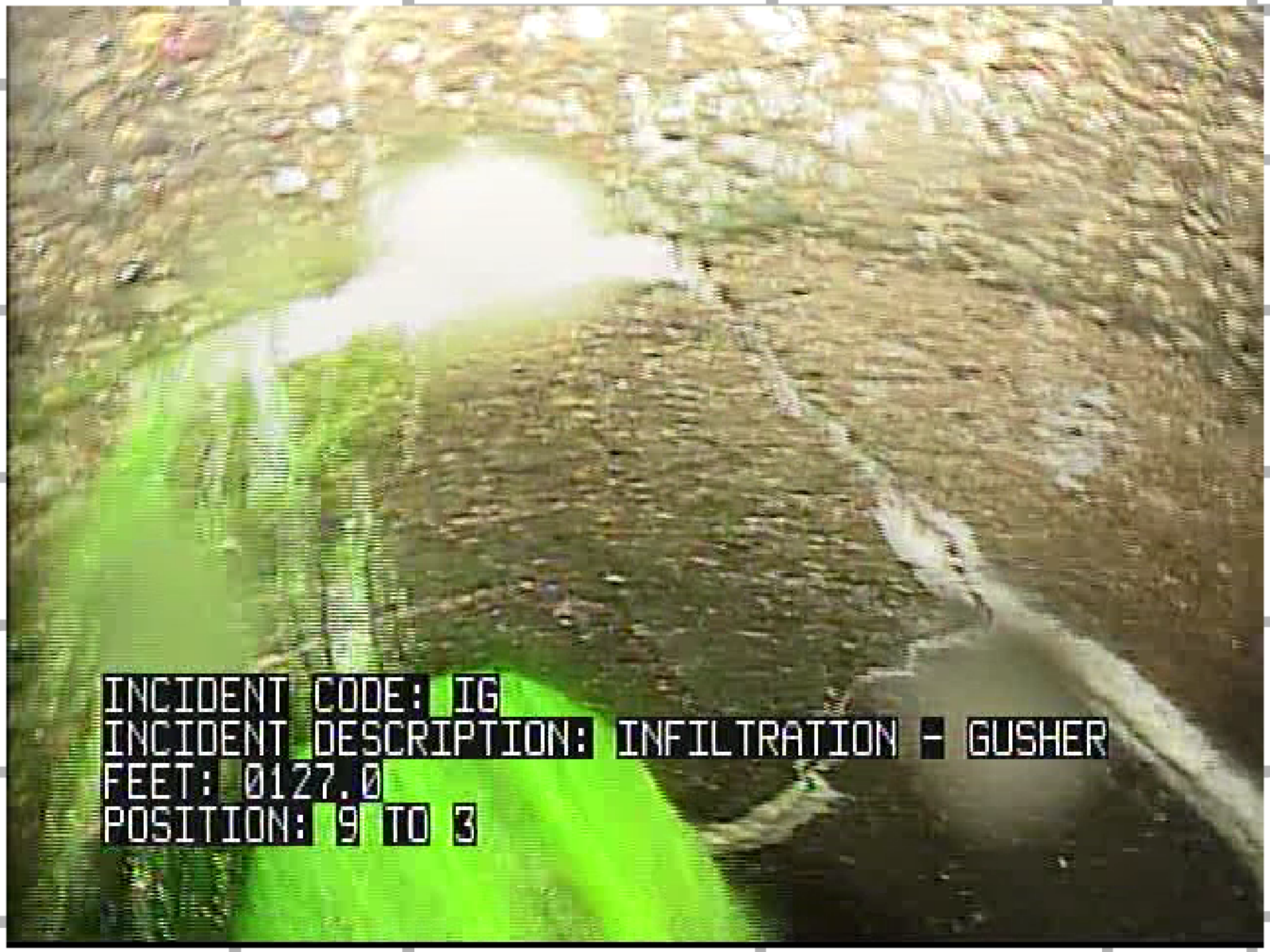
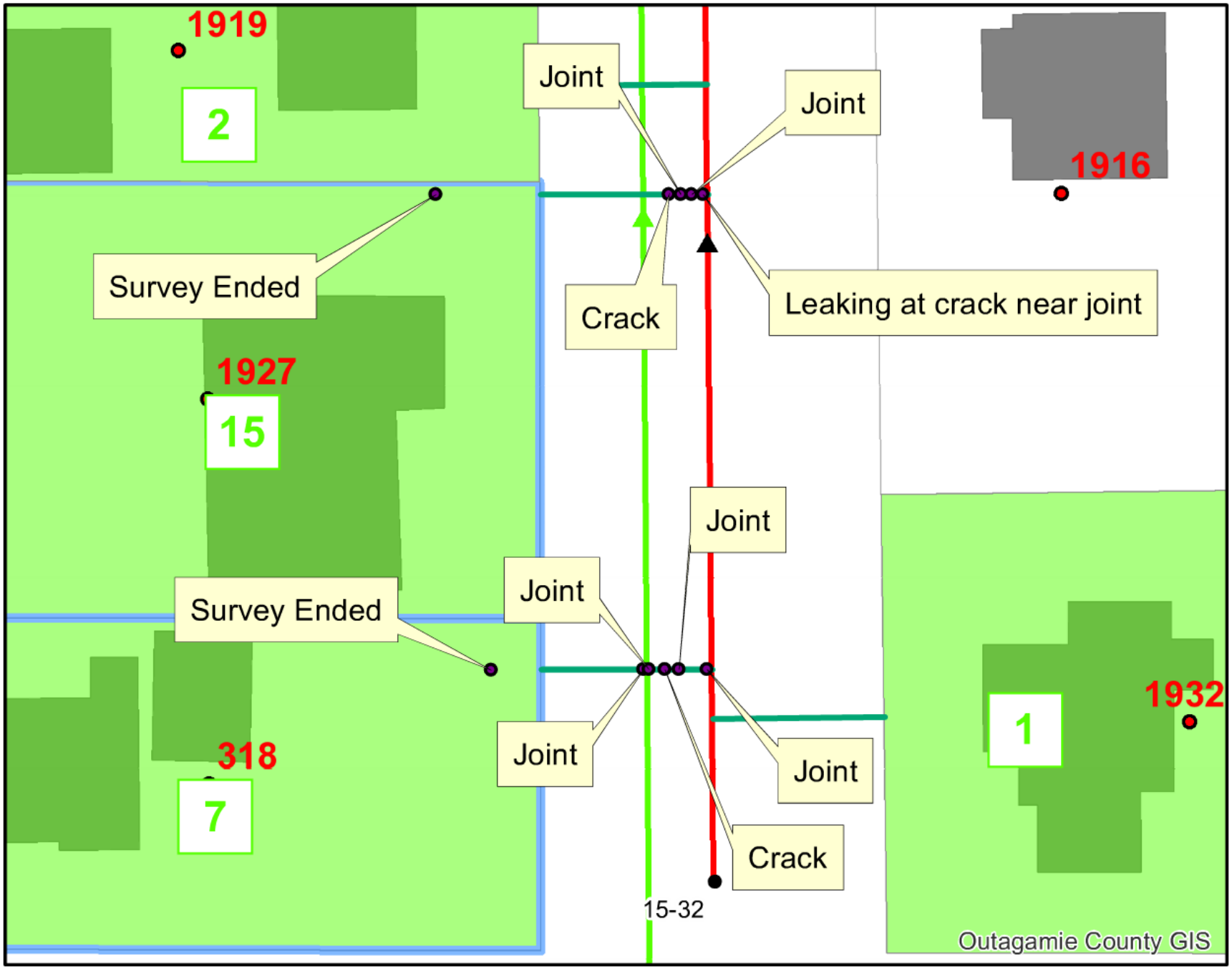
October 2016

Normal Sewer Televising

W. Glendale Avenue





318 E Calumet St. & 1927 Jefferson St.

Program Benefits and Conclusions

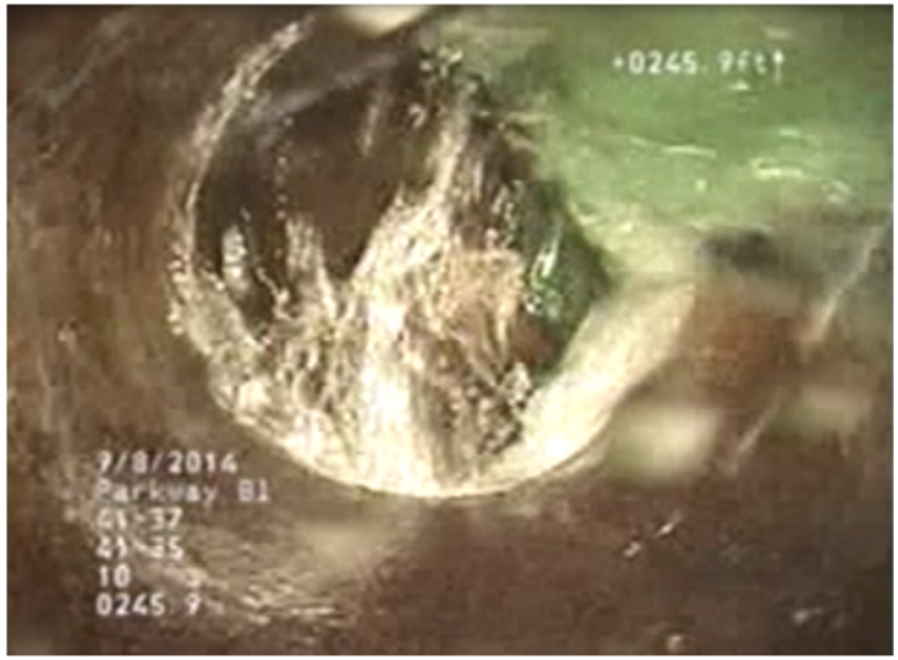
1. Identified actual defects for repair, rehabilitation or replacement
   - Spot repairs completed for substantial defects
   - Others included in on-going City sewer maintenance program

2. Information to correlate defects with sewer pipe materials and ages
   - Input for consideration in overall CIP project selection

3. Documented that substantial share of total I/I is from defective private sewer laterals
   - Existing policy addresses sewer from main to property line
   - Consider issues and policy for repair or replacement from building foundation to property line

Private Lateral Issues

- Clearwater infiltration and inflow from laterals is substantial and growing; the problem will not go away
- Total private lateral length is often equal to total City sewer length
- Private laterals are rarely maintained or replaced unless blocked and backing up
- "Time and Money" - requires a program, not just a project
- Common challenge for many neighboring and peer cities



Private Lateral Policy Challenges

Lateral Inspection

- Inspection from main sewer requires special equipment
- Inspection through building clean-out requires access

Lateral Repair / Replacement

- Pipe bursting and slip lining options
- Lateral slip lining, or cured-in-place technology
- Lateral open-cut replacement is costly and disruptive

Funding for Private Lateral Replacement

- Property owners unaccustomed and unprepared for the cost
- Public-Private cost share must be addressed
- Generally rely on State plumbing code for enforcement authority
- Mandatory replacement is unpopular

Private Lateral Policy Options

Inspection and Repair

- Require inspection and necessary repair or replacement:
  - Continuous program in priority areas
  - At time of street or sewer reconstruction *(Marshfield, North Fond du Lac, Combined Locks, Oshkosh)*

Cost Reduction or Sharing Options

- Options for mandatory or voluntary replacement between the sewer main and the property line, and from the property line and the building connection
- Options for cost responsibility by City, by property owner or split as shared cost between both parties

Cost Sharing Options

Scenario	Cost Responsibility	
	In Rt-of-Way	On Private Property
Current		
Mandatory in R-of-W; Voluntary to Building	50/50	N/A
Option 1-A		
Mandatory in R-of-W and to Building	100% City	100% Owner
Option 1-B		
Mandatory in R-of-W and to Building	100% City	50/50 to 25 ft 100% Owner > 25 ft
Option 2-A (Owner does NOT replace private property lateral)		
Mandatory in R-of-W; Voluntary to Building	100% Owner	N/A
Option 2-B (Owner DOES replace private property lateral)		
Mandatory in R-of-W; Voluntary to Building	100% City	50/50 entire private length

What's next for Appleton?

2017 - Research and Develop

- Review funding scenarios
- Utility Committee approval of preferred cost sharing option (April 11)
- Develop and adopt ordinance language based on approved scenario (May 9)
- Finance Committee review/ approve revised special assessment policy to reflect new ordinance language (June 13)

What's next for Appleton?

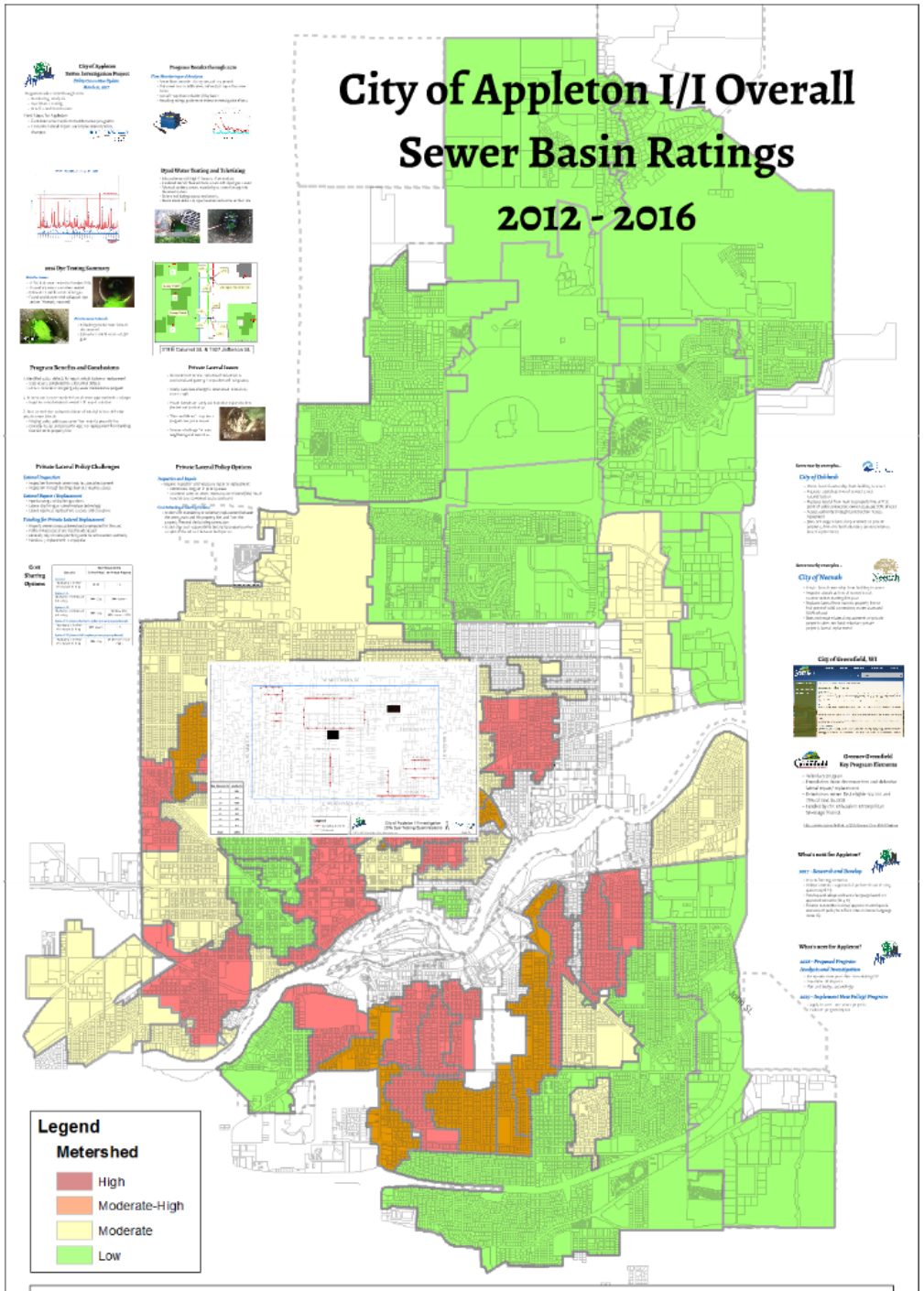
2018 - Proposed Program Analysis and Investigation

- Incorporate new procedure into existing CIP
- Determine all impacts
- Plan and budget accordingly

2019 - Implement New Policy/ Program

- Apply to street and sewer projects
- Evaluate program impact

City of Appleton I/I Overall Sewer Basin Ratings 2012 - 2016



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