InfoSense, Inc
Innovating Acoustic Inspection Technology™

TWO RIVERS UTILITIES

APPLICATION OF ACOUSTIC INSPECTION TECHNOLOGY FOR TWO RIVERS UTILITIES COLLECTION SYSTEM

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2012 NC AWWA-WEA ANNUAL CONFERENCE
RALEIGH, NC

AGENDA

- Acoustic Inspection Overview
- Project Background & Objectives
- Summary of Results
- Conclusions
- Planned Next Steps

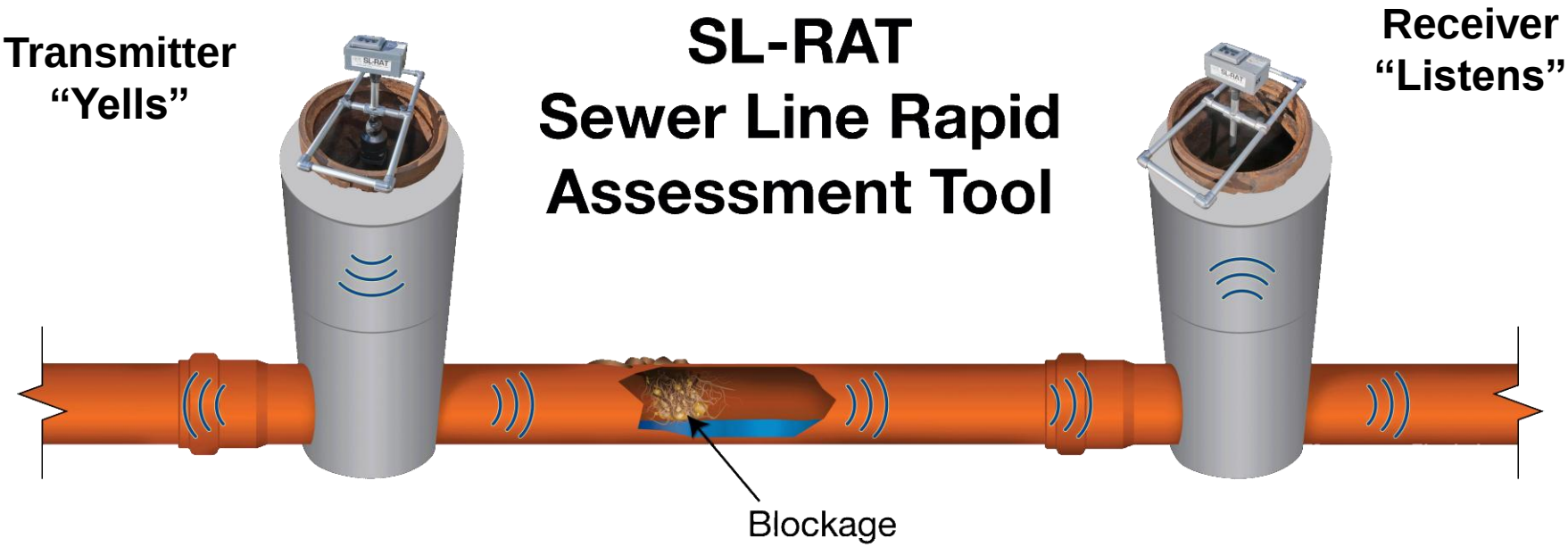
Active Acoustic Pipe Inspection Background

- Patented technology
- Gravity-fed sewer focus
- Developed in Charlotte with CMUD as key partner

- Over 1.3M feet inspected
- Rapid assessment helps better focus cleaning and CCTV resources

Acoustic Inspection Technology

- How Does it Work?



Key Features of Acoustic Inspection

- No Flow Contact / No Confined Space Entry
- Simple to use – train operators in minutes
- Low Cost–Pennies/foot
- Rapid Onsite Results – Under 3 min./segment
- Portable < 30 lbs
- GIS Integration – GPS Enabled
- Archive Pipe Segment Blockage Assessments

Acoustic Inspection Applications

- Focus Cleaning Effort – Reduce Cleaning by Over 50% & Enable Condition Based Maintenance
- Eliminate Repeat & Downstream Overflows
- Post Cleaning – Quality Assurance
- Quick Collection System Condition Assessments When Taking Over New Areas

About Two Rivers

- Public Water/Sewer Utility serving Gaston County Municipalities
- Over 550 miles of sewer pipe
- Over 26,000 service points

Overview of the Two Rivers Project

MOTIVATION: MORE EFFECTIVELY DETERMINE PROPER TIME INTERVALS FOR TIME-BASED-MAINTENANCE AREAS

OBJECTIVE: TEST SL-RAT FOR EFFECTIVENESS AT DETECTING BLOCKAGES AND EVALUATE FOR INCORPORATION INTO CLEANING PROGRAM

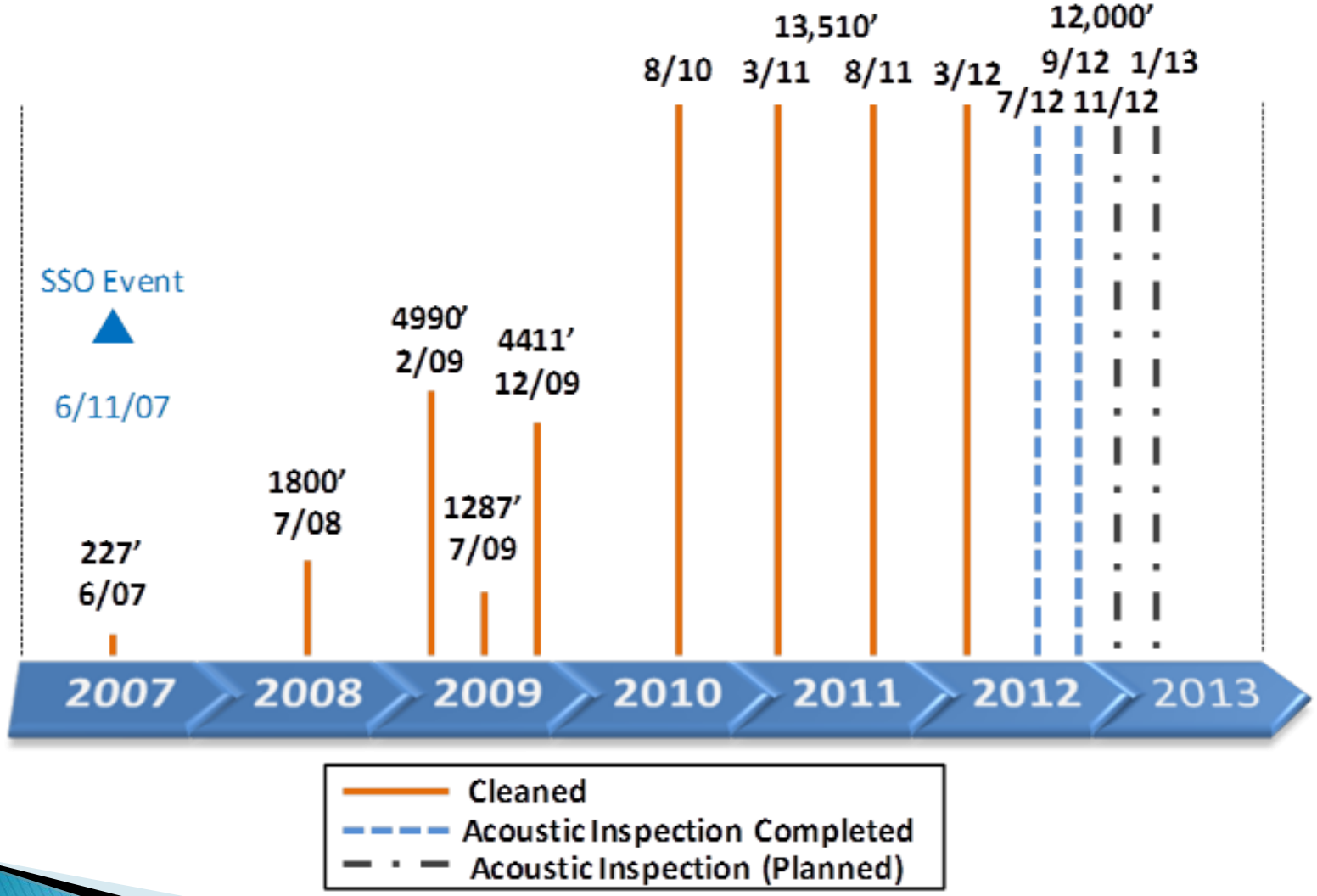
APPROACH: SELECT TEST AREA THAT USES A TBM PROTOCOL TO ACOUSTICALLY EVALUATE PIPE CONDITION VS CLEANING PROTOCOL OVER TIME

Major Retail Area Chosen

- ~13,000 feet 8” pipe – mix of Ductile Iron & PVC

PHASE I **PHASE II** **PHASE III**

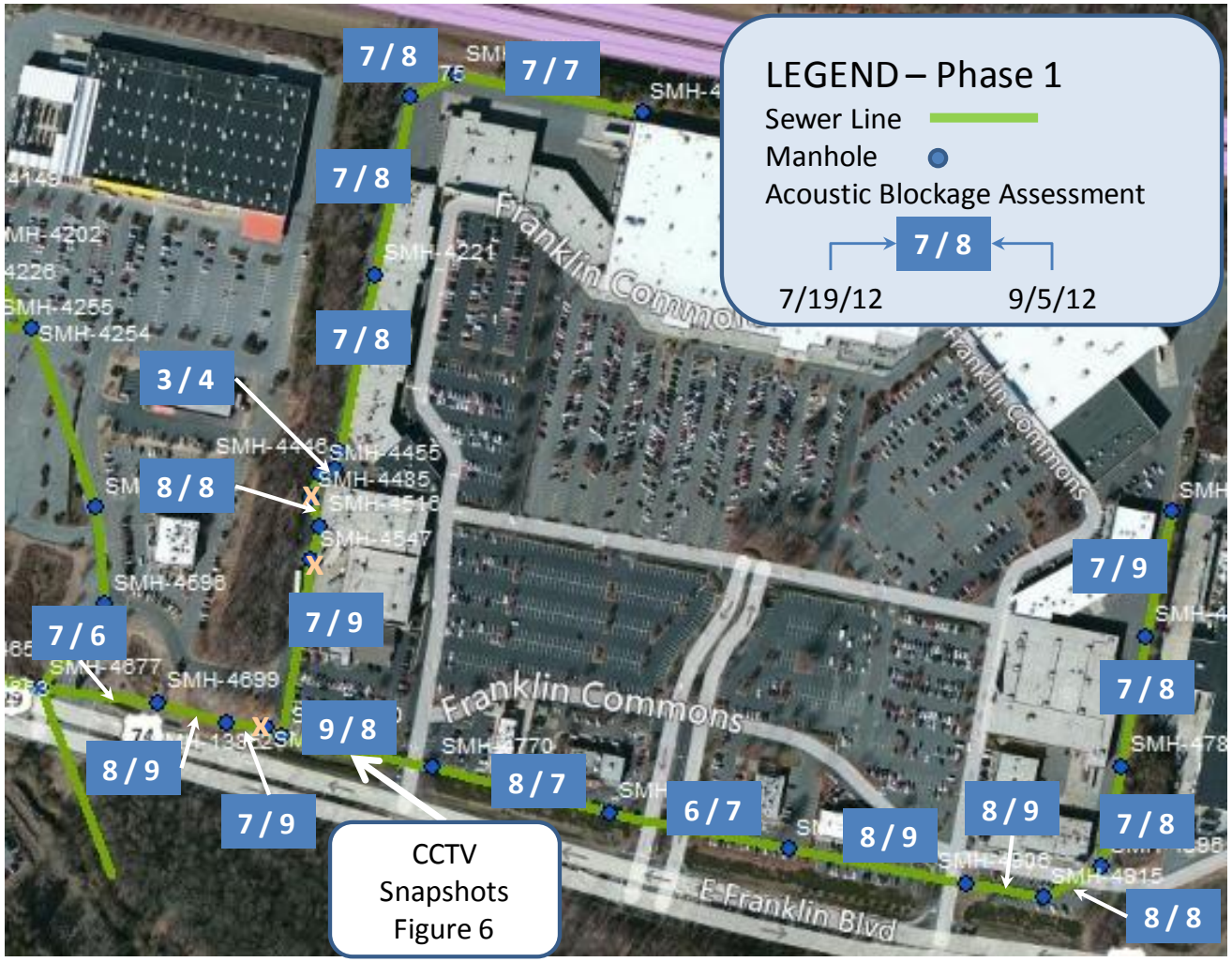
Franklin Square Maintenance Timeline



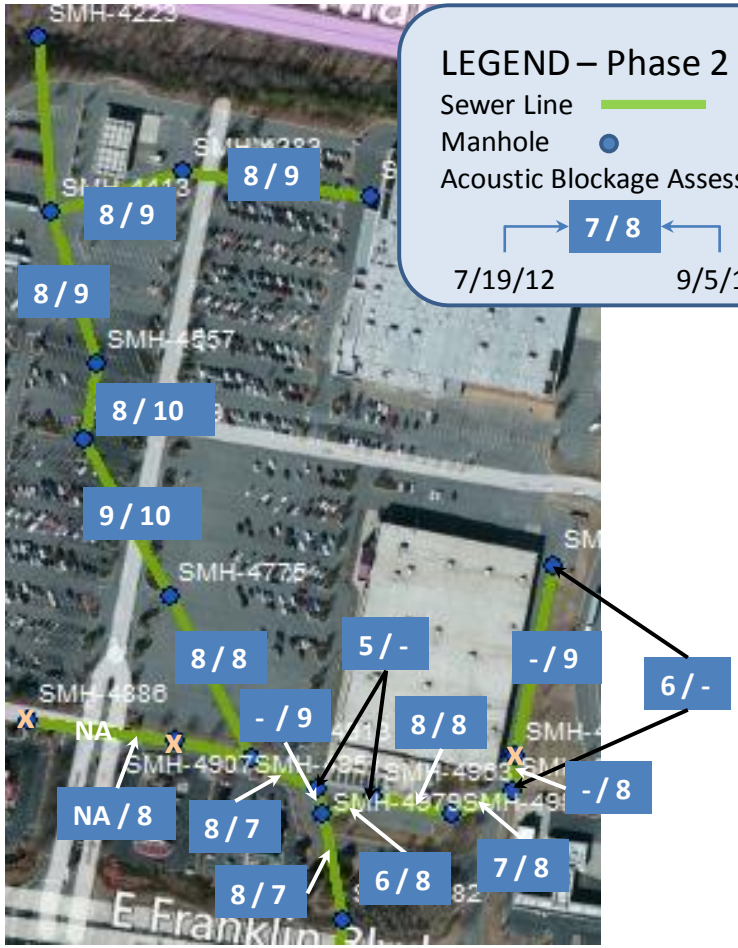
How the work was done

- Utilized Two Rivers field crew of 2 operators
- Trained crew **AND** inspected 12,000 feet in < 5 hours
- Averaged **2300 – 2600 feet/hour** over two runs
- Conducted two inspection regimes July 2012 & September 2012 – so far

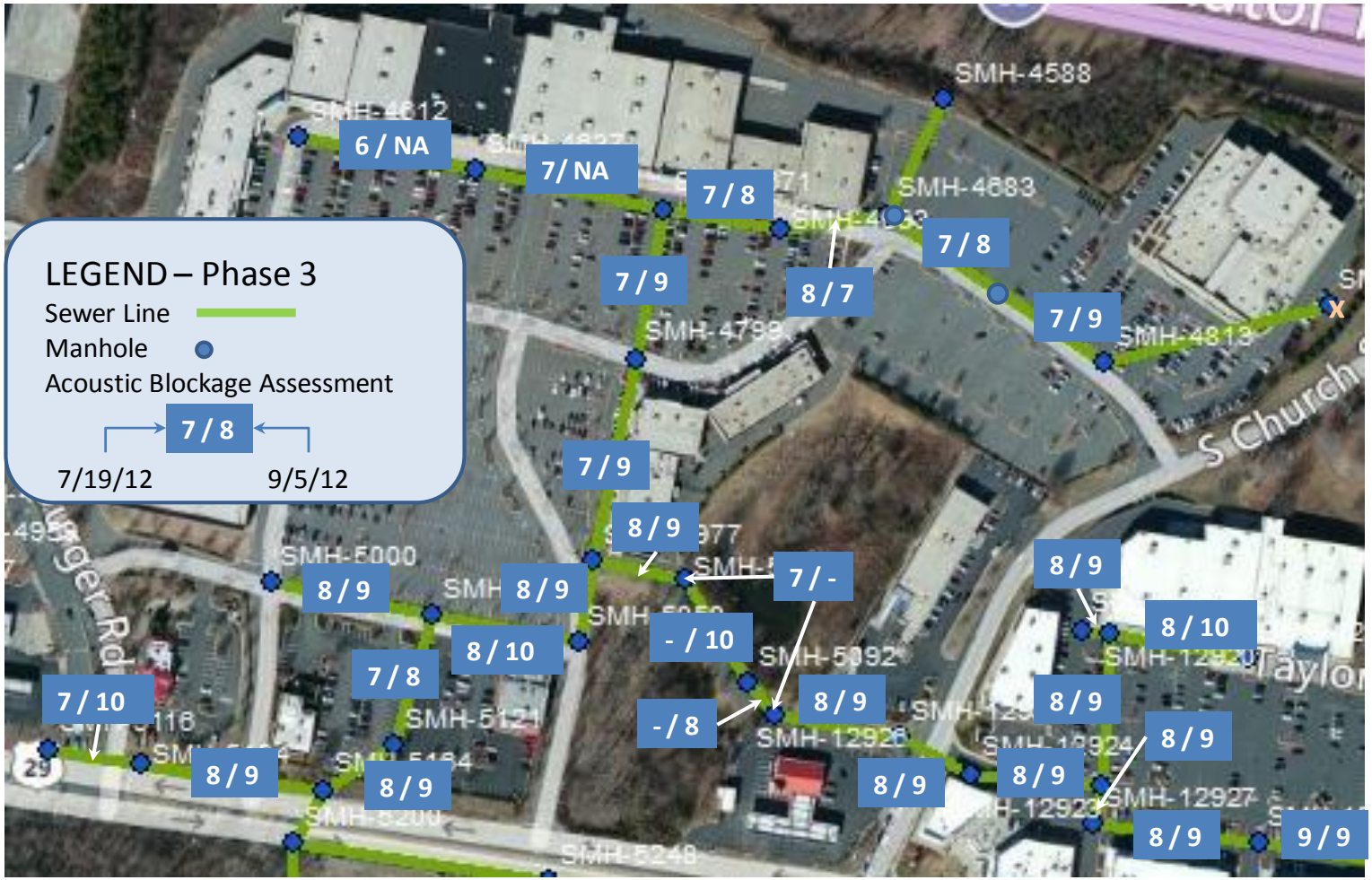
Phase I Acoustic Inspection Results



Phase II Acoustic Results



Phase III Acoustic Results



Project Conclusions & Next Steps

CONCLUSIONS

- Delayed cleaning schedule using Acoustic Inspection CBM protocol
- Blockage assessments improved between SL-RAT inspections
- Enables targeted cleaning of specific segments

NEXT STEPS

- Develop CBM based cleaning schedule
- Continue gathering trend data on blockage condition
- Integrate into cleaning ops & business processes

In Summary…

- Inspection is much Cheaper than Cleaning
- Acoustic Inspection is an Effective Method to Make Blockage Assessments
  - Quick
  - Cheap
  - Easy / Safe
- Acoustic Inspection Enables CBM Capability
- Acoustic Inspection Does Not Replace Cleaning or Detailed Inspection
  - Helps Determine how to Effectively Deploy Cleaning and CCTV resources

For More Information

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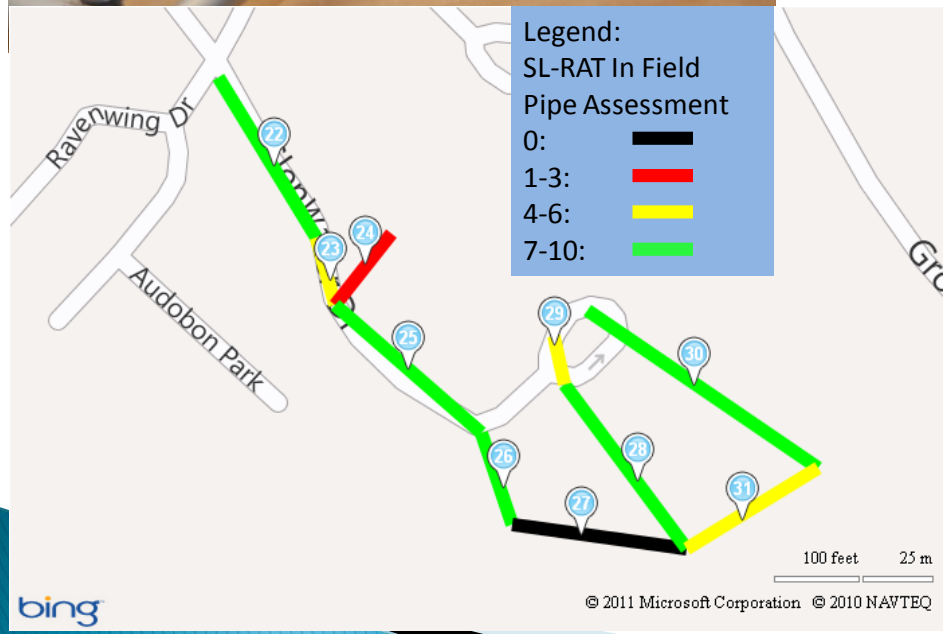
APPENDIX

Historical Archive – SL-DOG



- Sewer Line Data Organizer – SL-DOG
- Convert Assessment Data to Actions
- Better Schedule Cleaning Activities
- Better Management of Inspection Activities
- Improve Your Collection Cleaning Effectiveness

Operating Cost – Less than $0.10/ft

- Typical Industry Values : Cleaning Crew $1.00/foot
- Estimated Acoustic Inspection Crew

Number of Crew Members	2
Annual Fully Loaded Salary Per Crew Member	$68,000
Annual Equipment Costs (Including Truck & SL-RAT)	$24,000
Work Days Per Year	251
Onsite Work Hours Per Day	5.5
SL- RAT Average Number of Segments Inspected Per Hour	6
Average Sewer Line Segment Length in feet	220
Cost Per Foot	$0.09/ft