Use of Acoustic Inspection for Prioritizing Renewal and Replacement Projects at Ft. Jackson, South Carolina

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PRESENTATION OUTLINE

- Acoustic Inspection Overview
- Project Background and Objectives
- Summary of Results
- Conclusion

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SEWER LINE INSPECTION METHODS

Manhole Inspection

ACOUSTIC

Zoom Camera

Push Camera

- CCTV/Robotic Camera
- Pipe Wall Defect Scanners
- Pipe Profiling / Robotic Multi-Sensor

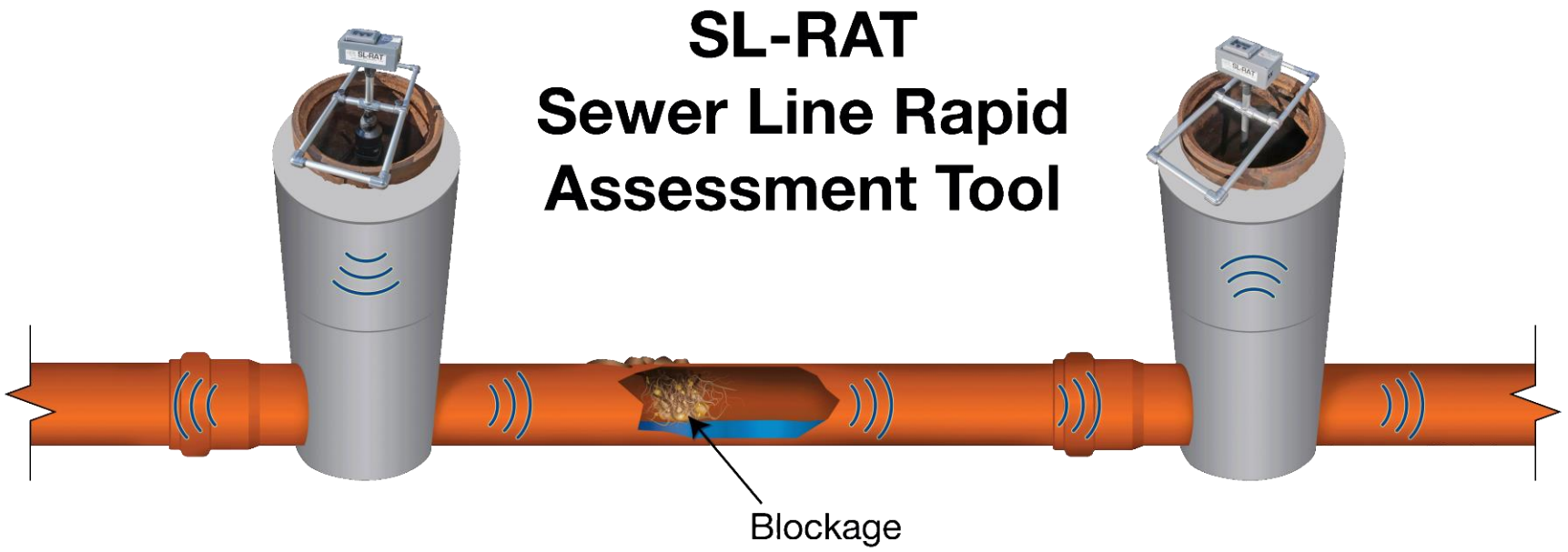
ACTIVE ACOUSTIC PIPE INSPECTION BACKGROUND

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

- Over 2M 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% and Enable Condition Based Maintenance
- Eliminate Repeat and Downstream Overflows
- Post Cleaning – Quality Assurance
- Quick Collection System Condition Assessments When Taking Over New Areas

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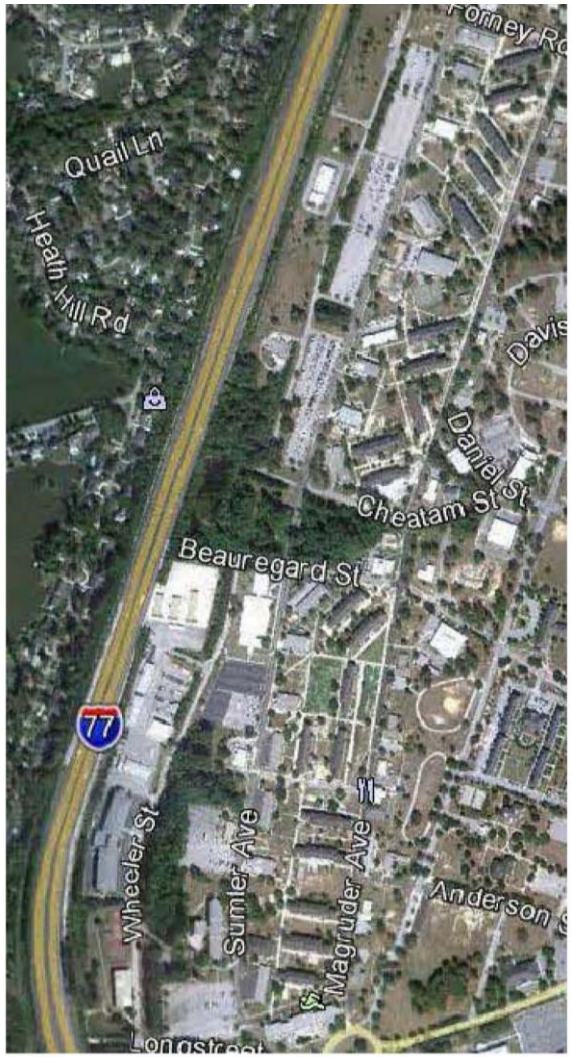
PROJECT BACKGROUND

- Ft. Jackson, SC
  - Established in 1917
  - Trains 50% of the Army's Basic Combat Training Load
  - 52,000 acres – 1,160 buildings
  - ~20 miles of sanitary sewer lines
  - System was privatized in 2006, currently managed by Palmetto State Utility Services

PROJECT BACKGROUND

- Water and sewer system was privatized in 2007, currently managed by Palmetto State Utility Services (PSUS)
- 50 year own and operate contract
- Specific Area of Study
  - 7,174 feet along I-77
  - 18” – 24” Diameter
  - All inspected with CCTV



PROJECT OBJECTIVES

SL-RAT is primarily used as a prioritization tool for cleaning/camera operations in 6” to 12” sanitary sewer lines

- Evaluate acoustic inspection as a tool for renewal and replacement projects
- Test the acoustic device in larger diameter pipes (18” to 24”)
- Compare acoustic inspection results with CCTV inspection

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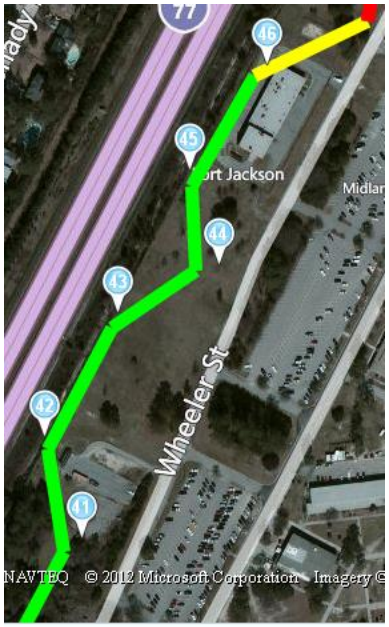
SUMMARY OF RESULTS

- Performed 32 Acoustic Measurements (9,963 ft) (included several repeat measurements for verification)

SUMMARY OF RESULTS

- Acoustic inspection performed in less than 5 hours
- 26 unique segments inspected (7,900 ft)



Legend:
SL-RAT In Field
Pipe Assessment
0:
1-3:
4-6:
7-10:

SUMMARY OF RESULTS

- Good correlation with CCTV results, particularly when the pipe showed significant structural issues or blockages

Acoustic Score: 3

Acoustic Score: 3

SUMMARY OF RESULTS

- Acoustic scores seemed slightly higher than normal for pipes with minor obstructions or blockages

Acoustic Score: 9

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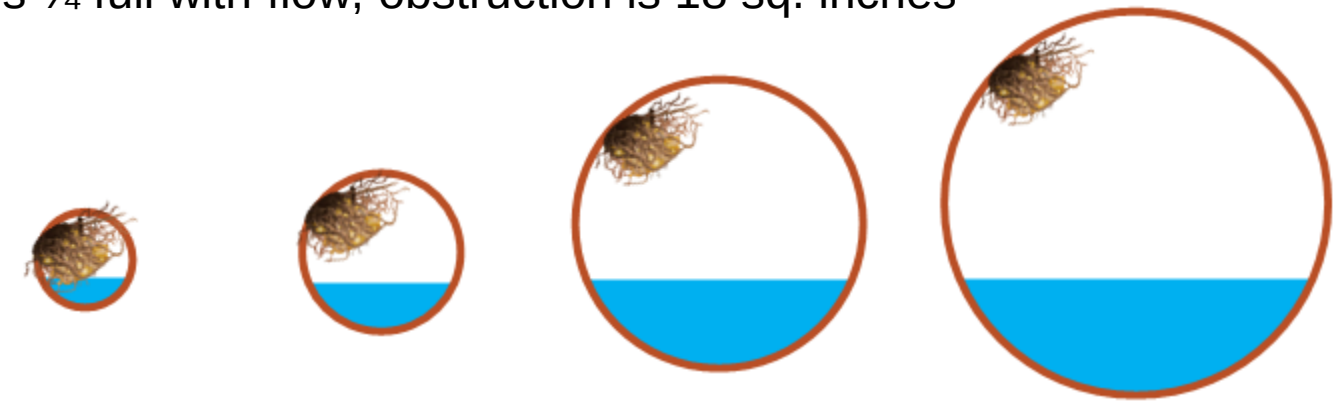
CONCLUSION

- At larger diameters, more surface area available for sound to travel through and around blockages
- Roots, FOG, and other obstructions still reflect and absorb sound
- Acoustic inspection is still viable, but may need to be more conservative on acoustic values at larger pipe diameters

CONCLUSION (cont.)

- Comparison of open surface area at various pipe diameters
  - Assume pipe is ¼ full with flow, obstruction is 18 sq. inches



Diameter	6 inches	10 inches	18 inches	24 inches
Total surface area (sq.in)	28.3	78.5	254.5	452.4
% blocked	89%	48%	32%	29%

CONCLUSION (cont.)

- 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

QUESTIONS?

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