DUKE'S ROOTED IN INNOVATION

Pinpointing I&I

Utilizing Microdetection to Pinpoint I&I

Principles, Execution and Information

Matt Grandinetti & Jason Cooper

1

WHAT WE ALREADY KNOW

1. We spend more time looking for I&I than we do fixing it.
2. We often get into a "paralysis by analysis" where we are in a seemingly constant state of inspection ($$).
3. We seem to only get a 1-sided view of our system from the data.
4. Our key stakeholders are constantly pressuring us to be more efficient ($$) and effective when it comes to finding and prioritizing our I&I.

2

General Approach to Locate I&I

1. **Rarely (never) enough budget to "find" and "fix" everything**
2. **Isolate study area into smaller areas to determine which areas warrant limited resources**
3. **Data "density" depends on budget, overall strategy, technology used, and mapping characteristics**

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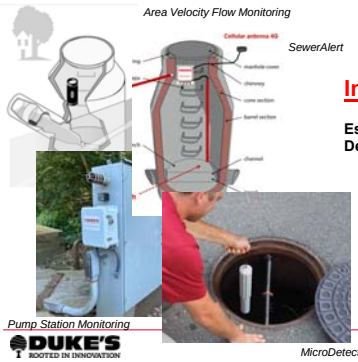


Industry Approaches

Established Monitoring Approaches to Detect and Locate RDII (or I&I)

1. Area Velocity (in Manhole)
2. Lift Station Data / Monitoring
3. Level Only (I&I)
4. Level Only (Alarming)

4

No software, just a regular website. Save it as a favorite.

Data at Lift / Pump Stations

1. Wetwell Level
2. Run Time
3. Pump Current Draw (amps)
4. Force Main Discharge PSI
5. Influent Flow Rate
6. Pump Flow Rate

Web Based Data Platform

100% Turn-Key Service

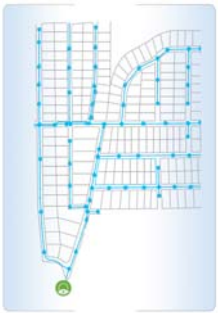
5

FLOW METERS – MAJOR BASIN MONITORING

Portable flow meters monitor operating conditions in major basins in order to quantify the extent of inflow and infiltration.

Hydrographs are then created for each major basin showing increases in wastewater volume during periods of wet weather

Single unit meters are difficult to confirm accuracy.



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PRECISION I&I MICRODETECTION – PINPOINT I&I

Purpose: Pinpoint the contributors of inflow and infiltration within adjacent manholes utilizing precision sensors and auto analytics platform to determine RDII and produce actionable results

WHERE	WHAT	WHEN
Where is the Inflow and infiltration coming from specifically? Which pipes are showing increased RDII?	Is the increase in RDII related to inflow or infiltration related sources? Is it private or public?	When are we seeing the RDII occur? Is it after a 1" or 2" or consecutive rain event pattern?

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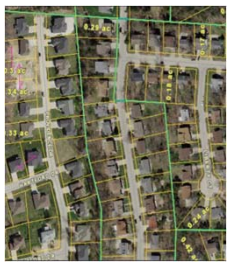
7

What's Involved?

- Tools of the Trade:
  - Ultrasonic Meters
  - Acoustic Monitoring
  - GIS project management



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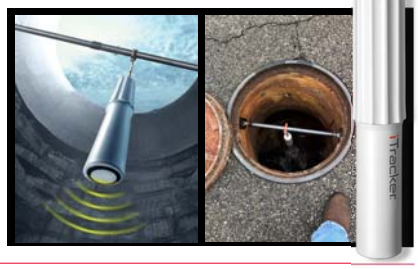
8

PRECISION I&I MICRODETECTION – PINPOINT I&I

- iTrackers® monitor and record changes in wastewater volume as small as 1/10"
- Rapid deployment (20 units installed per day per crew)
- No confined space entry, no drilling into structures to install
- No sensor fouling due to debris build up over sensors
- Bridges the gap between flow meters and inspection CCTV camera equipment to determine RDII patterns in collection system and normally low volume points in the system.



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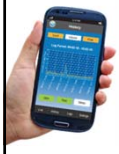
11

CREATE MICROBASINS

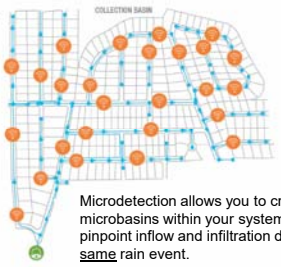


Monitors major basins for signs of I&I

Flow Meter

Pinpoints I&I down to mini and micro-basins

iTracker



Multiple inline linked units are easier to compare accuracy.

When flow meters are used they can be verified against each other

Microdetection allows you to create microbasins within your system to isolate and pinpoint inflow and infiltration during the same rain event.

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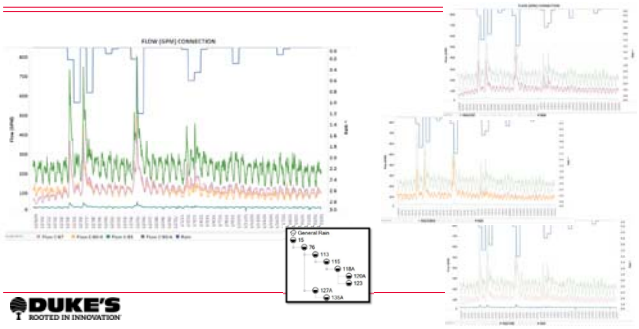
9

CHARTS / GRAPHS – FLOW CONNECTION ANALYSIS



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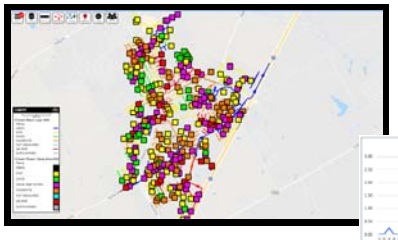
12

PRECISION I&I MICRODETECTION – MASS DEPLOYMENT STRATEGY



Keys to Success:

- Rapid deployment of units
- Estimates RDII in same rain event
- Rain data collected to create local climate
- 60-Day studies
- Installations approximately every 1200LF
- Linking units to each other to pinpoint I&I sources

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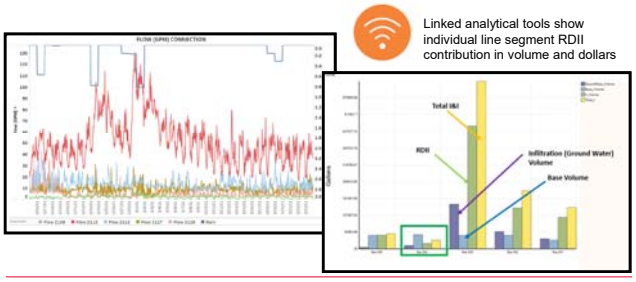
10

MICRO BASIN MONITORING



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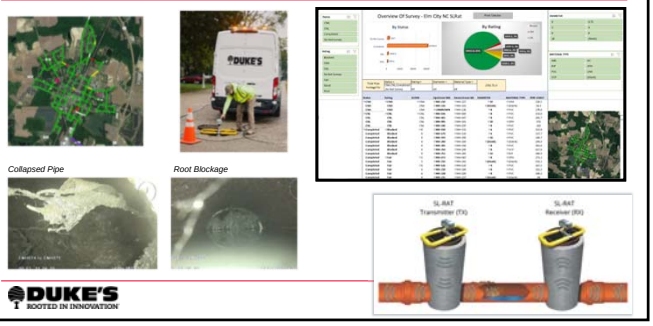
13

13

ACOUSTIC INSPECTION



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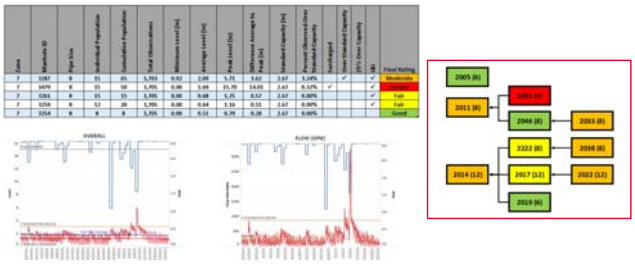
17

17

AUTO ANALYSIS



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14

14

FINAL MAP

Dynamic graphs and charts help narrow down data to determine key pipelines contributing I&I

GIS integration of data for post field inspection data processing and storage

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20

20

What is Acoustic Line Inspection?

- **S**ewer **L**ine **R**apid **A**ssessment **T**ool
- Takes 90 seconds to 3 minutes
- Returns a score of 0-10 for each line
- Has built-in GPS
- Condition/Capacity Assessment
  - Obstructions
    - Roots
    - Grease
    - Foreign Objects
  - Structural Defects
    - Sags/Bellies
    - Offset Joints
    - Protruding Taps
    - Collapsed Pipes
    - Buried Manholes

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16

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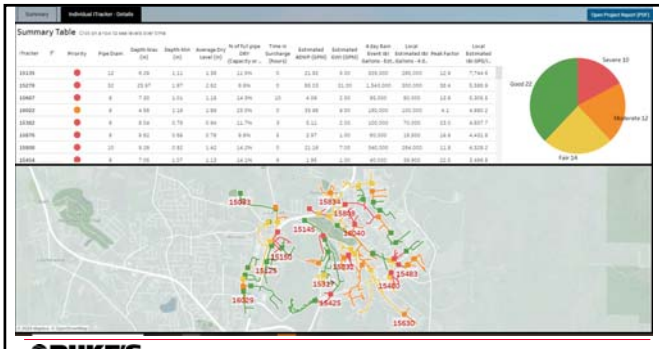

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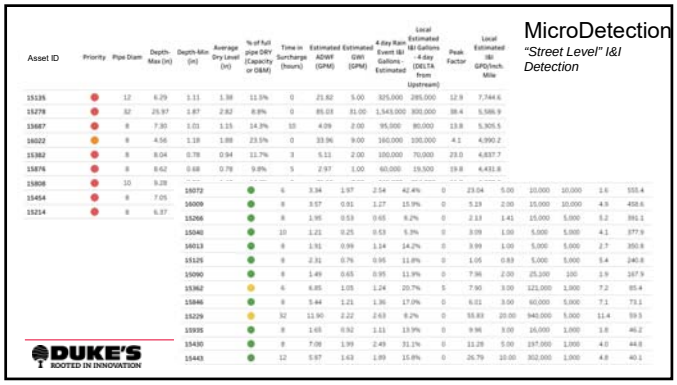
21

21

NJWEA - Fall Tech Transfer 2024 – Infiltration and Inflow



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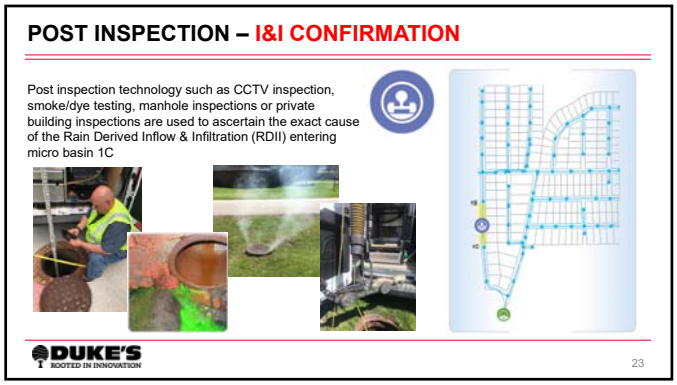

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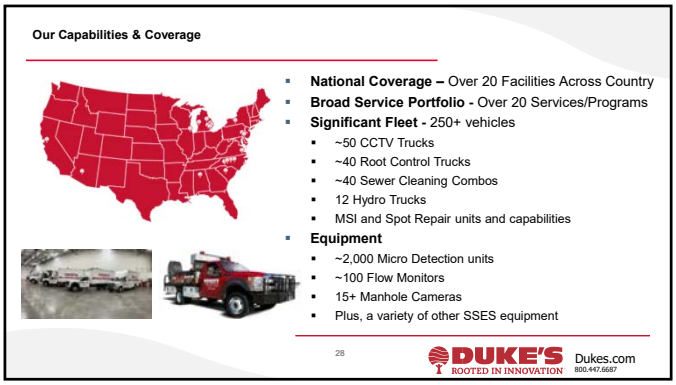

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29