Smart Utilities
Advanced Monitoring Solutions for Water & Wastewater

PRESENTED BY:
KEN HAYES – SENIOR SALES MANGER
NATIONAL CORE+ TEAM

Today's Agenda

- Introductions
- Who is Core & Main
- What are Advanced Monitoring Solutions?
- Why is Monitoring Important?
- DMA – What Is It?
- Questions

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Who is Core and Main?

Financial Performance:

Market Gap: (NYSE: CNM)

# of Locations:

350+ branches

# of Employees:

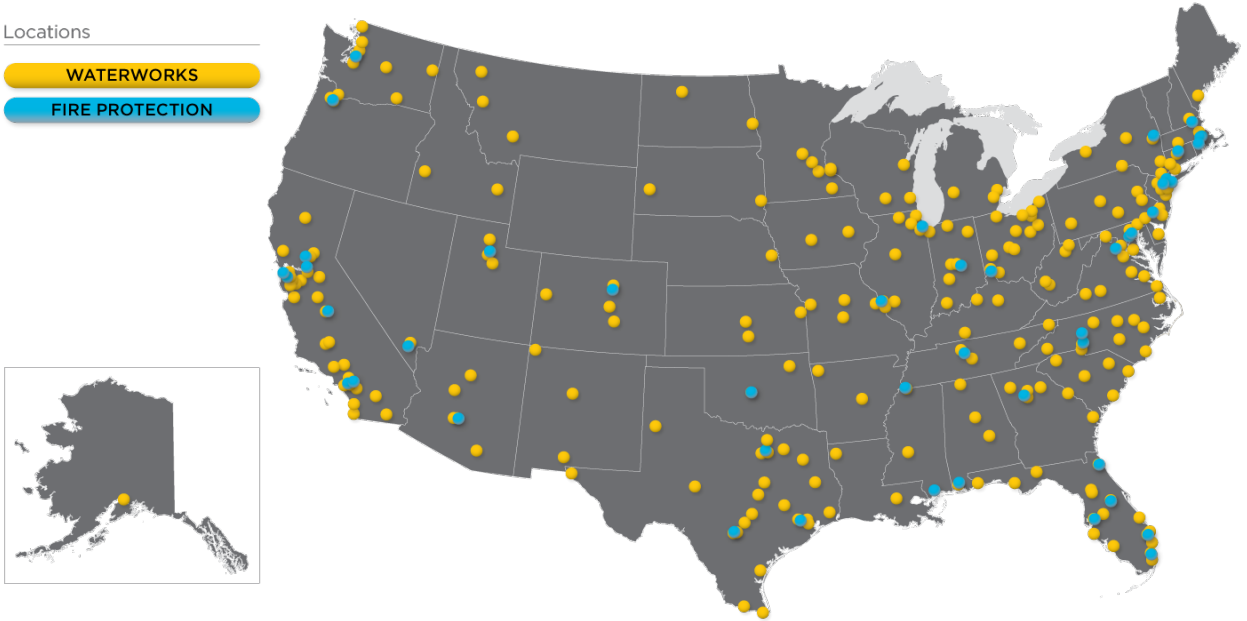
4,100+

History:

100+ years in business

Headquarters:

St. Louis



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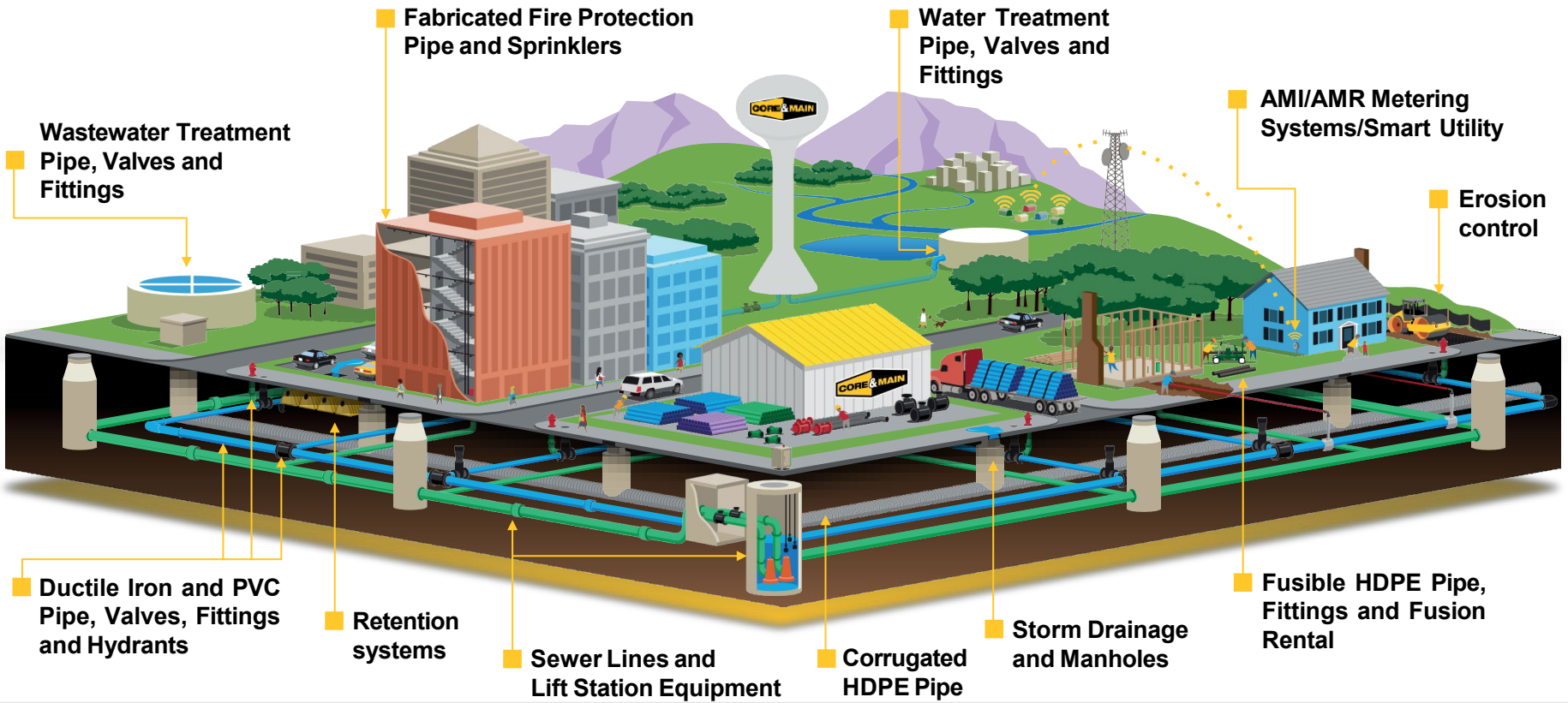
PRODUCTS AND SERVICES



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Implications

- Negative Customer Image
- Bad Press/ Social Media
- Losing Revenue
- Utility Confidence
- Failing Infrastructure
- Service Disruption
- Unplanned Costs
- Complex Agency Reporting
- Regulatory Violations/Fines

Town of Chelmsford cited by MassDEP for sewage violations
PUBLISHED: May 25, 2021 at 5:22 p.m.

State finds 24 'possible violations' after massive Winter Springs fish kill
Department of Environmental protection discovers wastewater plant 'bypassed the filtration and disinfection systems'

Florida Water System Hack Highlights Challenges for Public Utility Cybersecurity
Wednesday, February 24, 2021

Drinking-water quality, ongoing sewage spill: Slidell-area utility cited for violations
BY SARA PAGONES | STAFF WRITER PUBLISHED APR 12, 2021 AT 12:27 PM | UPDATED APR 12, 2021 AT 5:33 PM 2 min to read

MPCA fines Jordan Sands for wastewater violations
Apr 1, 2021

ML&P fined $230K for wastewater effluent violations

Former Sioux City Wastewater Treatment Plant Superintendent Sentenced to Federal Prison for Violating the Clean Water Act

Fort Myers faces over $500,000 in fines for sewage in city water
Updated:February 11, 2021 3:33 PM EST

City of Wooster to Address Violations of Clean Water Act at City's Wastewater Treatment Plant

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Questions to Ponder….

- What are your top issues?
- Have you spent money on particular areas,(i.e. manholes, basins, lift stations, water quality) BUT you still have recurring issues?
- What technology, if any, have you deployed?
- What studies have been performed?
- Have you engaged your engineers and trusted partners in working on issues?

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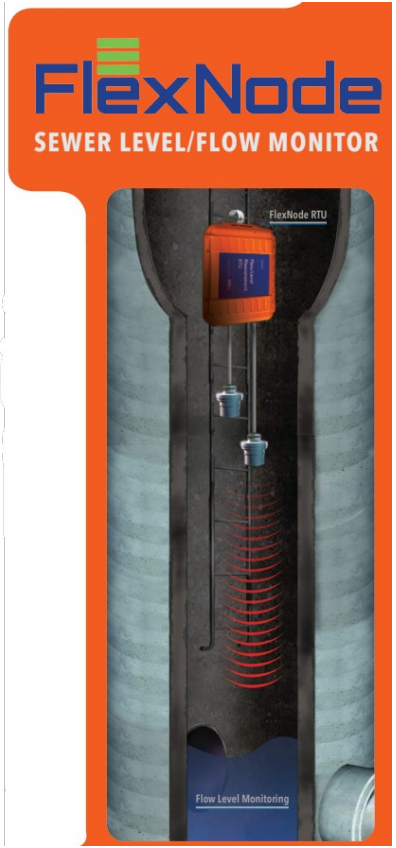
CORE+ AMS WW Solutions

SSO/CSO Level Monitoring

- Proactive Blockage and Overflow Detection and Notification **before an overflow occurs**
- Targeted and efficient resource dispatch to **optimize cleanout** & maintenance activities
- Flow meters, manhole level sensors, network communications
- Integrated data analytics and management platform
- Machine learning-enabled **trend advisories**
- Near real-time **actionable data**



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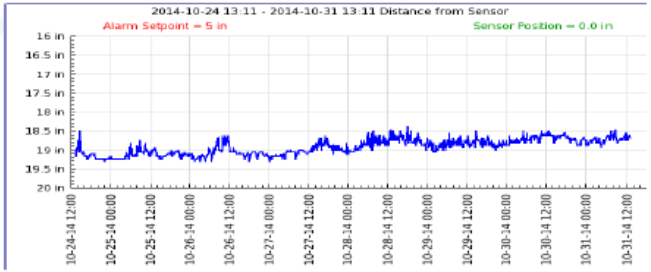
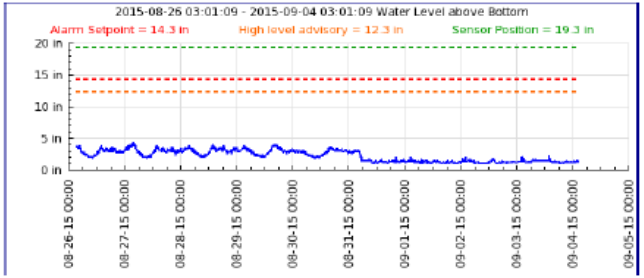
Keeping a close eye on SSO's

Trending Examples



Trend Rise

- Downstream restriction
  - FOG
  - Roots
  - Foreign obstruction
  - Lift station down



Trend Fall

- Upstream restriction
  - FOG
  - Roots
  - Foreign obstruction
  - Lift station down

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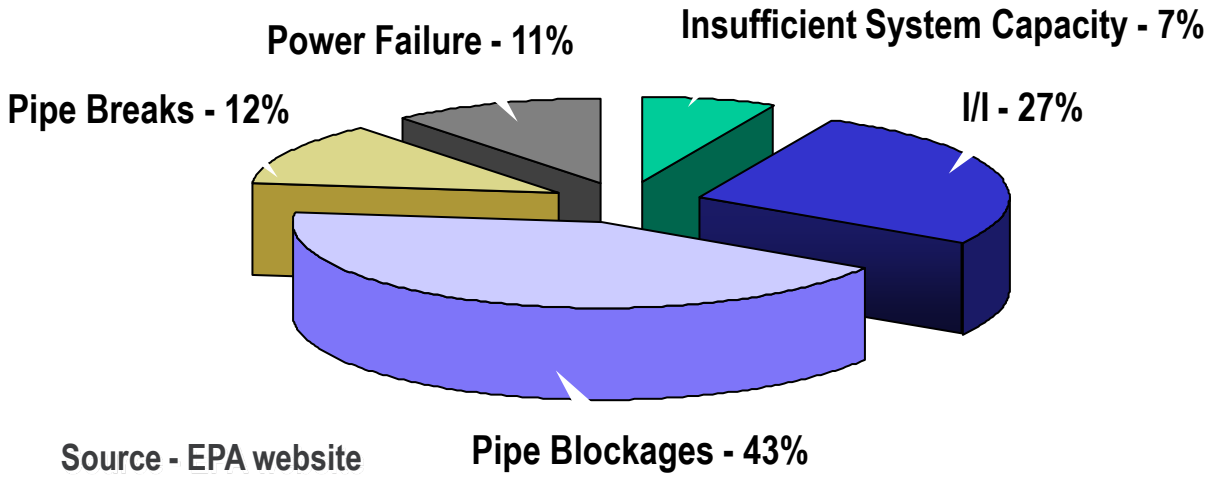
Sanitary Sewer Overflows



Based on a sample of six Cities

Causes of SSOs can vary significantly

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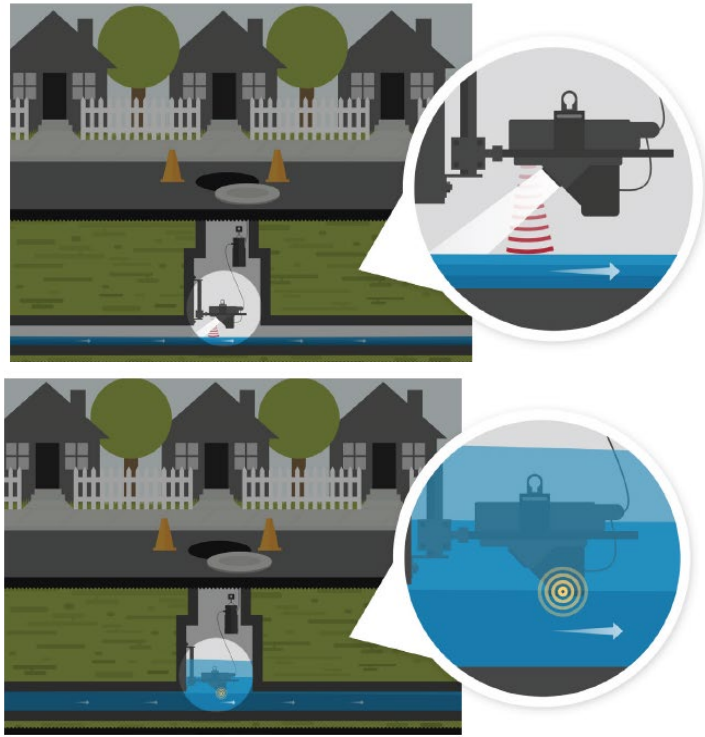
CORE+ AMS WW Solutions

Flow Monitoring & I/I Analysis

- Near real-time identification of rain-derived inflow and infiltration (I/I) **sources**
- Wet and dry **weather pattern analysis**
- Determines **precise amounts** of Inflow & Infiltration
- Prioritizes basin/lift station maintenance activities and **reduces mobilizations**
- Flow/velocity interval measurements, sewer basin rainfall, and the basin's water **consumption data**
- **Actionable data** via dashboards, graphing, reporting, and **machine learning-enabled analytics**



FLO-DAR

Doppler radar captures velocity and ultrasonic measures level

Surcharge Velocity Sensor

Electromagnetic technology and a pressure transducer capture data during surcharge scenario

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CORE+ AMS WW SOLUTIONS

FlexFlow IQ

NON-CONTACT PULSE-RADAR FLOWMETER

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CORE+ AMS WW SOLUTIONS

FlexFlow IQ

NON-CONTACT PULSE-RADAR FLOWMETER

- Alden-Labs Verified and Validated for Accurate Flow Measurement ±0.4inch or ±10mm
- Communicates via Cellular, Satellite, Sensus, LoRaWAN, Itron Gen5 and Modbus
- Simple integration with SCADA, PLC or telemetry systems
- Perfect solution for difficult flow conditions: high solids content, high temperature, shallow and caustic flows, high velocities and large open channels

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CORE+ AMS WW SOLUTIONS

FLEXFLOW IQ

Doppler radar captures velocity and radar measures level

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CORE+ AMS WW SOLUTIONS

SURCHARGE LEVEL SENSOR

Pressure transducer capture data
during surcharge scenario

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CORE+ AMS WW SOLUTIONS

WIRELESS LOGGER

Communicates via Cellular, Satellite, Sensus,
LoRaWAN, Itron Gen5 and Modbus

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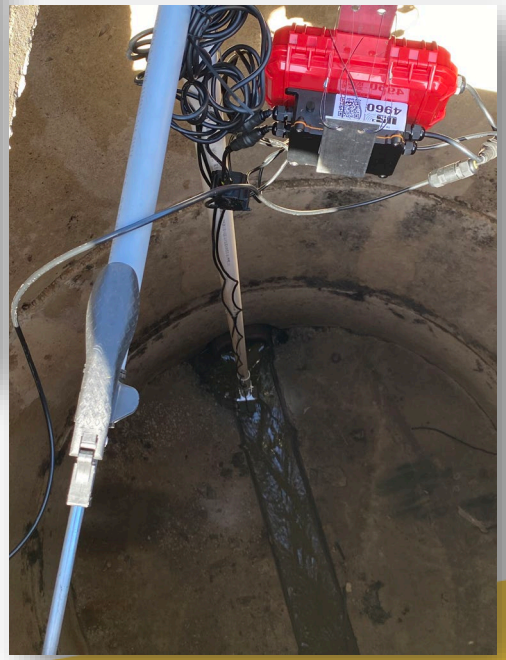
CORE+ AMS WW SOLUTIONS



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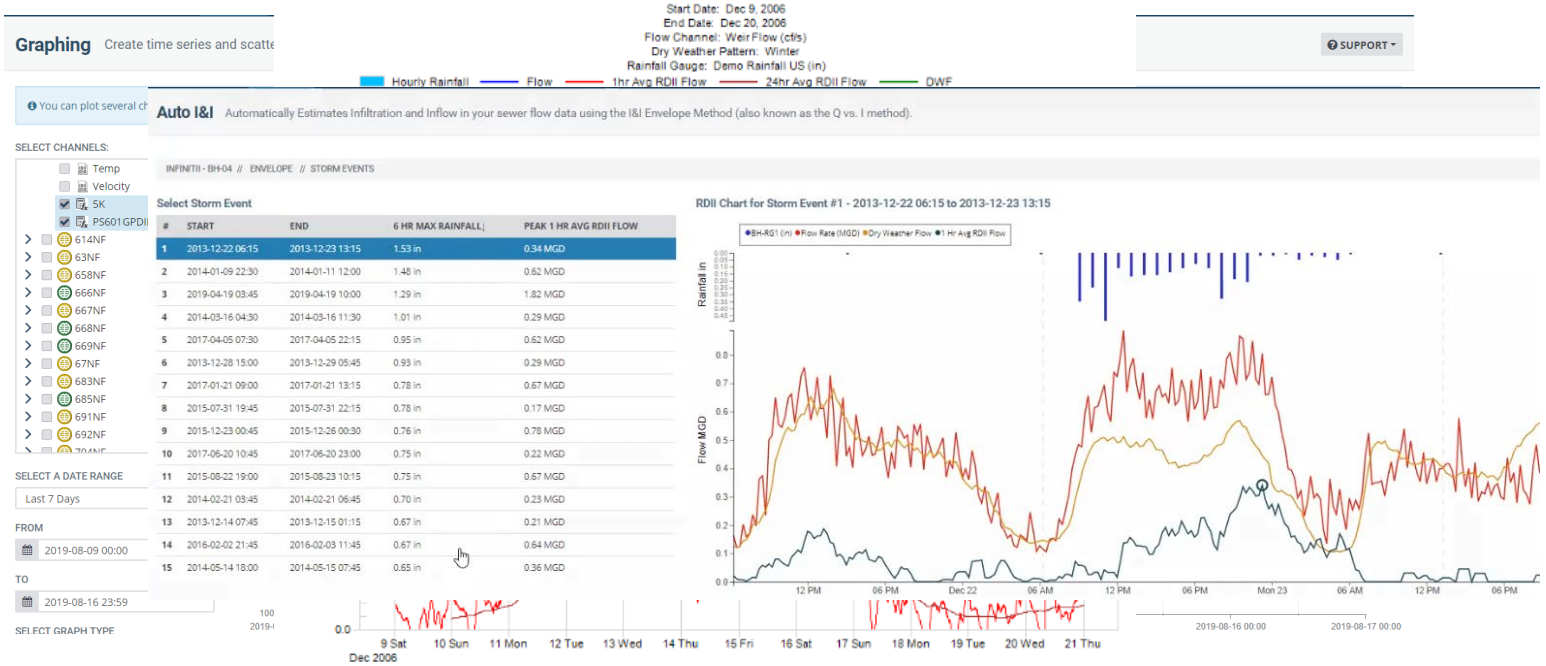
How Do We Use This…



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CORE+ AMS WW Solutions

Environmental Water Quality Monitoring

- Practical and proactive approach to **monitoring water quality** to increase the public health level of service
- Help the utility identify and address conditions leading to **fish kills, algae blooms**, and other environmental issues
- Battery-powered Internet of Things (IoT) devices/sensors and analytics software
- Monitors **water quality parameters** including Pressure, Level, Conductivity, Turbidity, Total Chlorine, Free Chlorine, Temperature, pH, Blue-Green Algae, Chlorophyll, Dissolved Oxygen, and Hydrogen Sulfide

Pump Station Emergency Level Monitoring

- Proactive **monitoring of the levels** inside their sewer pump stations during emergency operating conditions
- Pump station data analysis to ensure the pumps are **operating at optimal energy and performance efficiencies**
- Near real-time **awareness of emergency generators'** operational status and fuel levels
- Route maintenance personnel to **mission-critical infrastructure** requiring the most **urgent intervention**
- Battery-powered Internet of Things (IoT) devices/sensors and analytics software

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Force Main Monitoring

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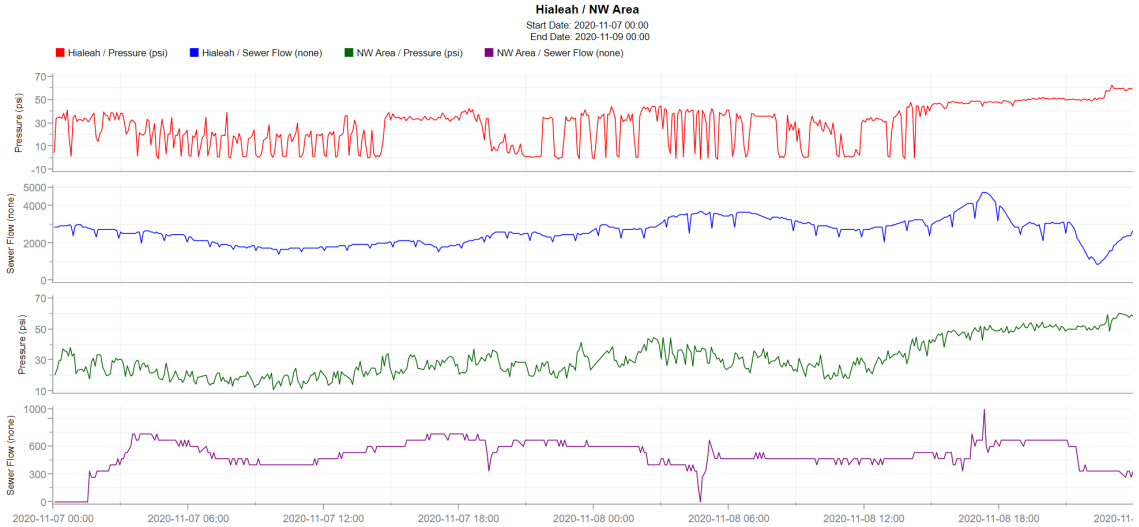
How do we do it?



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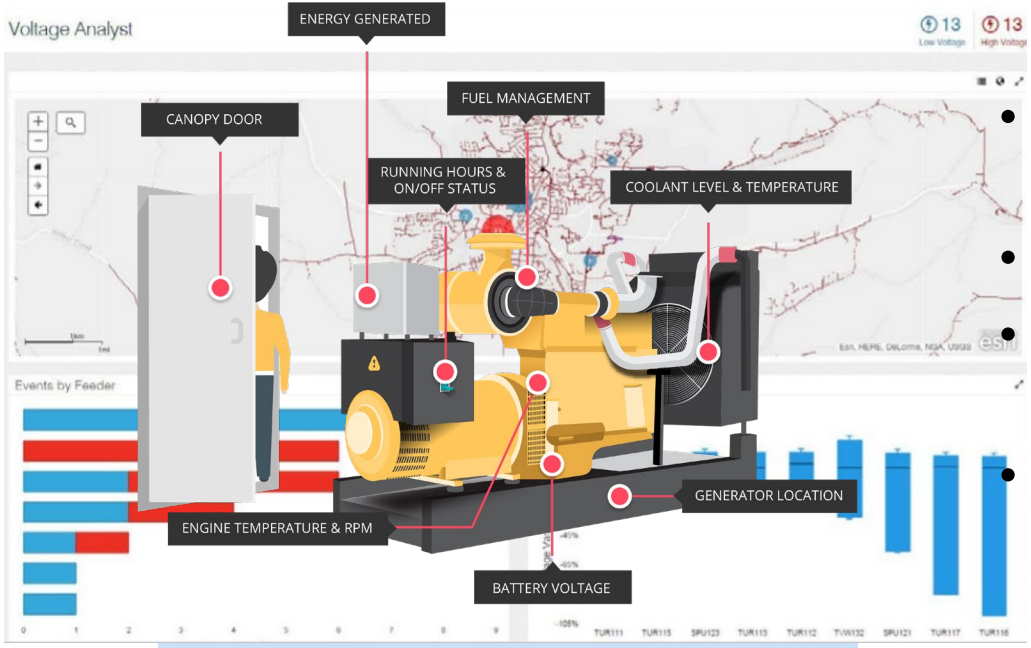
Pump Station Optimization & Resiliency



- Turn your Pump Station into an accurate flow meter.
- Advanced Pump Curve Analysis
- Emergency Generator and Wet Well Level Monitoring
- Energy Integration and Analysis

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CORE+ AMS WW Solutions

FlexFlow IQ Integrates with Lift Station Monitoring

- Lift Station Monitoring
- AC Power
- Pump Failure Alarm
- Wet Well Monitoring

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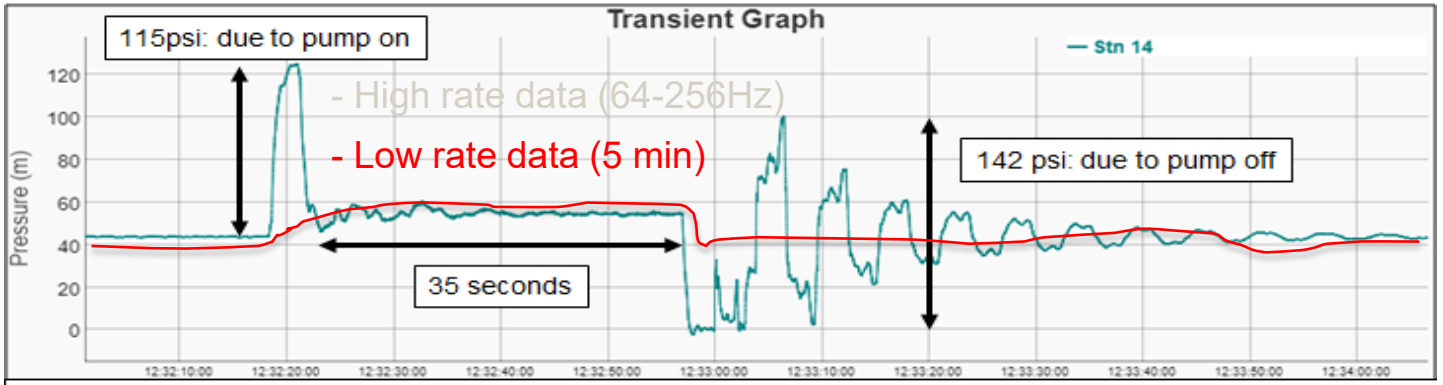
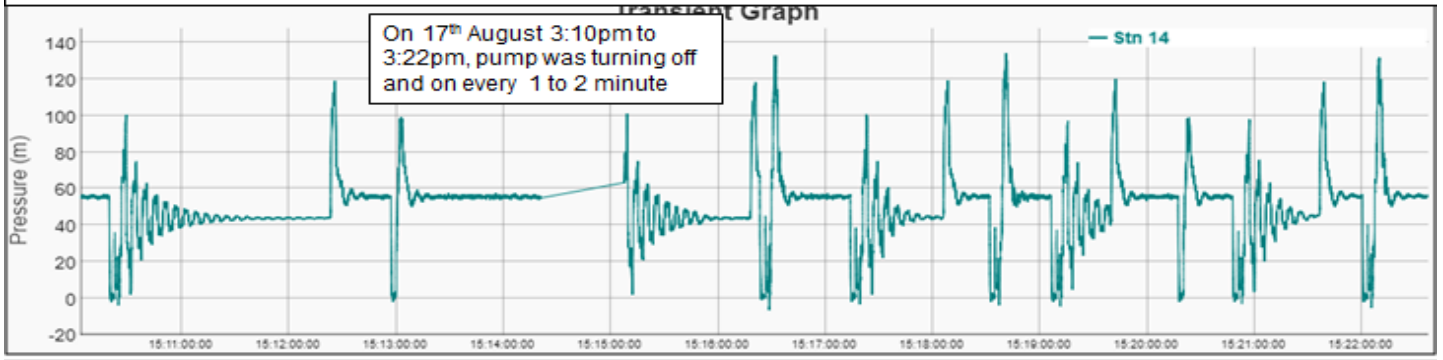
What do we do with the data?



Instances when pump is turning on and off at very fast intervals – recommend to check if it is possible to optimise the pumping operation and reduce frequency of pump start/stop so as to reduce frequency of the damaging transients



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CORE+ AMS Solutions

Water Quality Composite Sampling

- **Industrial Pollution Monitoring**
- Identify common compounds and other water quality characteristics
  - Conventional: Ammonia as N, Biochemical Oxygen on Demand (BOD), Total Suspended Solids (TSS)
  - Toxic: Cyanide
  - Metals: Arsenic, Cadmium, Chromium, Copper, Lead, Mercury, Molybdenum, Nickel, Selenium, Silver, Zinc
  - Salts: Total Dissolved Solids (TDS), Chloride
- Device **captures hourly water samples** throughout a 24-hour period
- Utility or state-certified lab for **analysis & reporting**

Collection System Capacity Study

- Identify **planned development impacts**
- Temporary flow metering at **specific wastewater collection system points**
- Considerations for site plans, current collection system **observed capacity, I&I impacts**
- Professional Engineer analysis **executive summary and detailed supporting data** on the expected impacts on the existing wastewater system capacity (CMOM)
- Short-Term/Long-Term **Capacity Study report**

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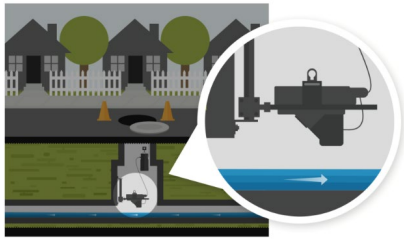
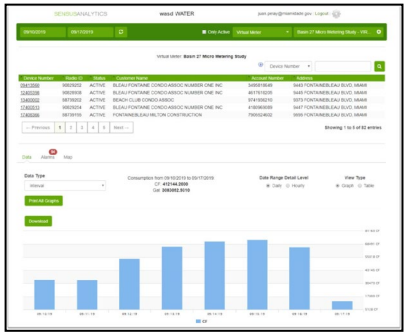
What does WW AMI look like?

Wastewater Data Analysis

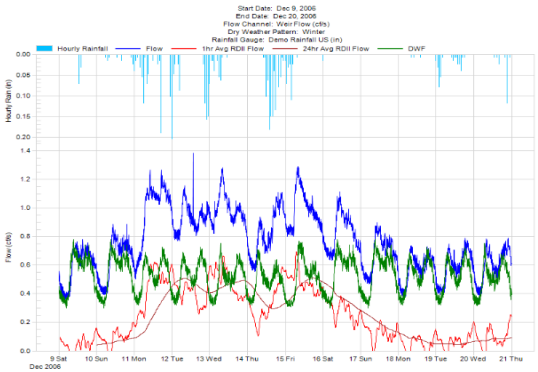


Deploy WW Equipment

Water Data Analysis



Engineering Data Analytics



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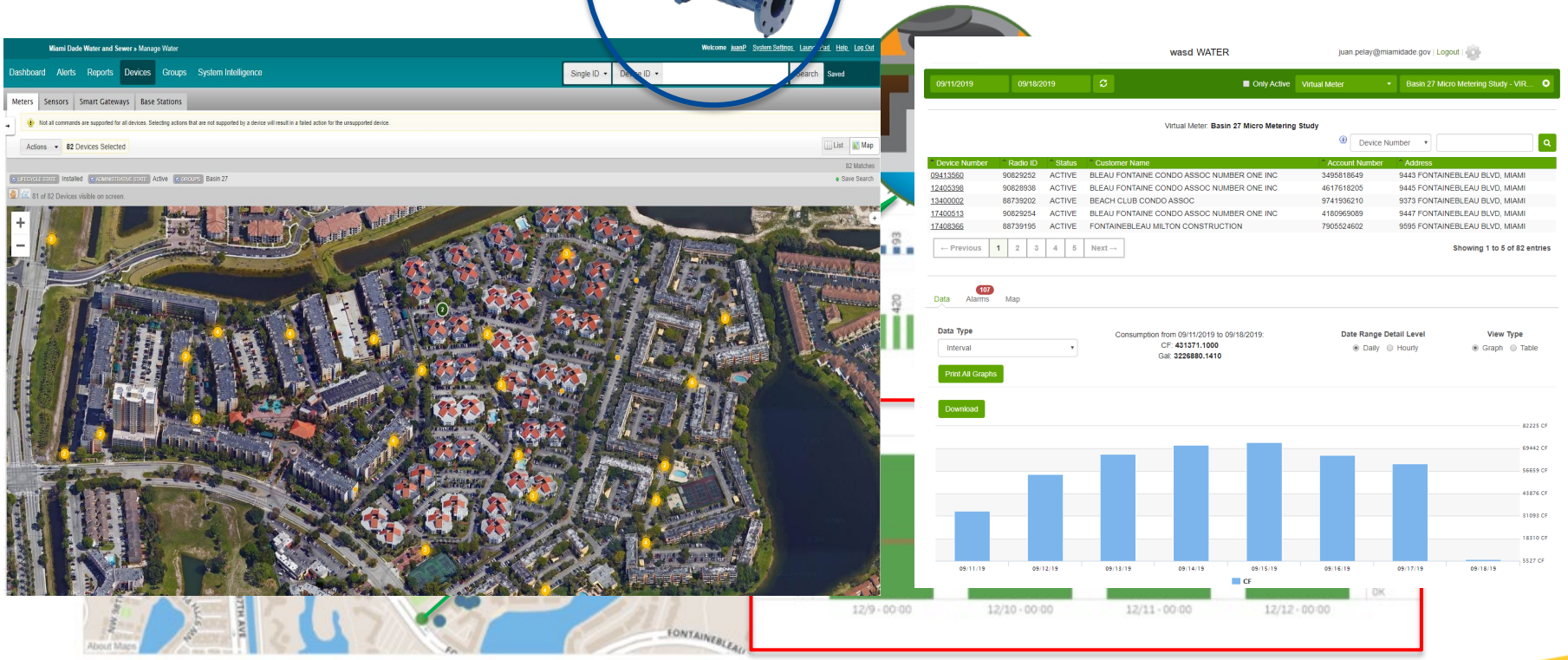
How Does It Work?



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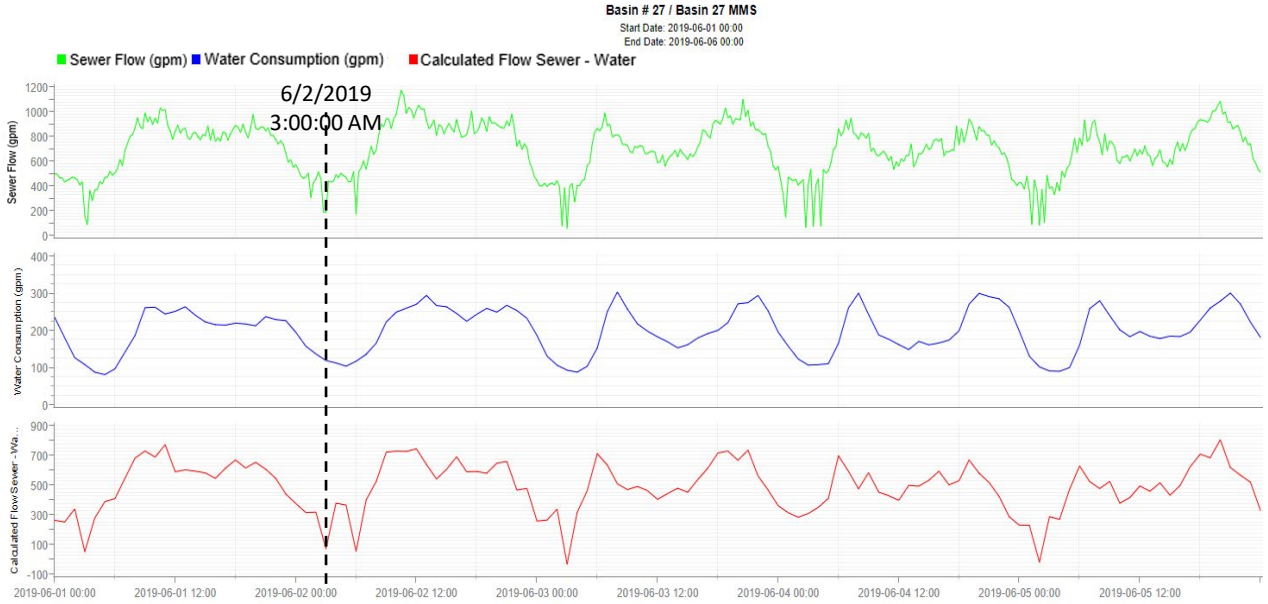
Pilot Basin 27 Results



Date & Time Flow Data Selected			
Date/Time	**Sewer Flow (gpm)**	**Water Flow (gpm)**	**Net Flow (gpm)**
6/2/2019 3:00:00 AM	191.2	119.7	71.5
Net Flow (gpm) =	(Sewer Meter Flow Data) - (Water Consumption Data)		
Net Flow (gpm) =	191.2 - 119.7 = 71.5 gpm		
GPDIM =	((Net Flow)*1440) /Total IDM		
GPDIM =	(71.5 gpm*1440)/34.9		
GPDIM =	**2,949.7**		

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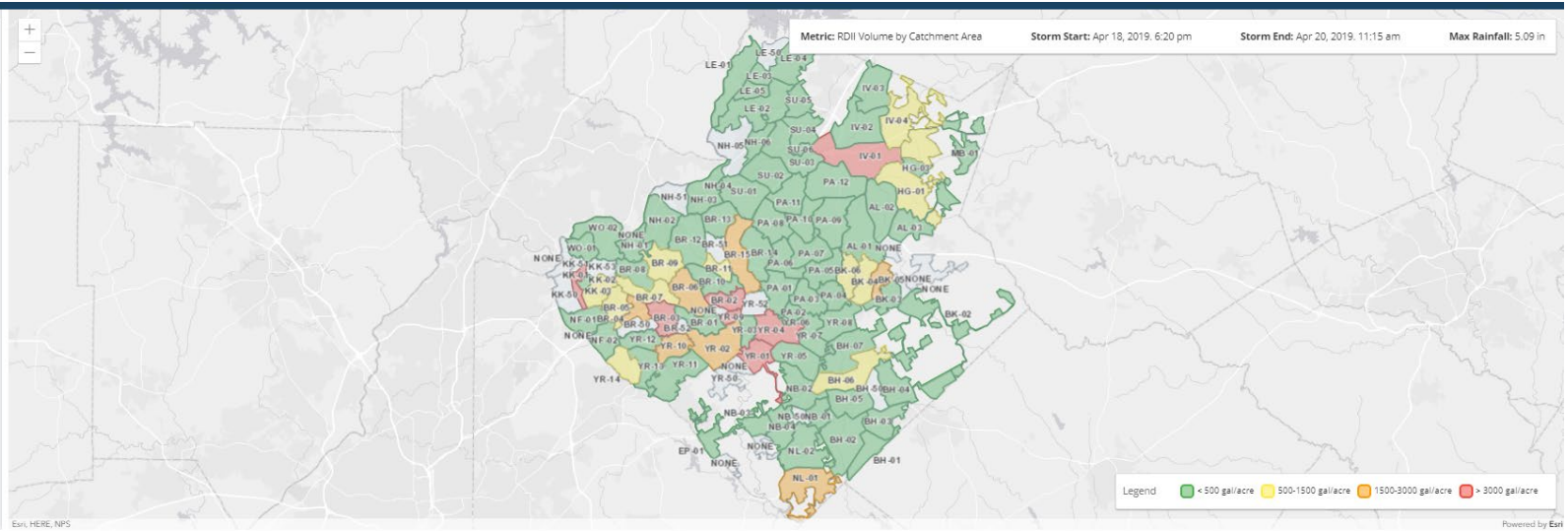
Smart Utility Monitoring

SAT AUG 24 2019
THU AUG 01 2019
WED JUL 31 2019
SAT JUL 13 2019
SAT JUL 13 2019
FRI JUL 05 2019
SUN JUN 23 2019
THU JUN 06 2019
MON JUN 03 2019
SUN JUN 02 2019
MON APR 22 2019
THU APR 18 2019
SUN APR 14 2019
FRI MAR 08 2019
SUN MAR 03 2019
TUE FEB 19 2019
TUE FEB 12 2019
WED JAN 23 2019
WED JAN 02 2019
SAT DEC 29 2018
THU DEC 27 2018
THU DEC 20 2018



Choose Metric:

- **RDII VOLUME BY CATCHMENT AREA (GAL/ACRE)**
- RDII VOLUME BY PIPE LENGTH (GAL/LF)
- RDII FLOW BY PIPE AREA (MGD/IN-MILE)
- PEAK FLOW BY AREA (MGD/ACRE)
- CV RAIN CAPTURED (%)

SITE		CATCHMENT AREA	PIPE LENGTH	PIPE AREA	TOTAL RAINFALL	RDII VOLUME BY CATCHMENT AREA	RDII VOLUME BY PIPE LENGTH	RDII FLOW BY PIPE AREA	PEAK FLOW BY AREA	CV RAIN CAPTURED
AL-01	DETAILS	83798715 ft²	27.78 mi	192.12 in-mile	0 in	0 gal/acre	0 gal/LF	0 MGD/in-mile	0 MGD/acre	0 %
AL-02	DETAILS	85618069 ft²	26.88 mi	246.58 in-mile	3.56 in	76.09 gal/acre	5563.87 gal/LF	0.01 MGD/in-mile	0 MGD/acre	0.08 %
AL-03	DETAILS	70618612 ft²	36.15 mi	231.48 in-mile	3.56 in	462.73 gal/acre	20751.34 gal/LF	0.03 MGD/in-mile	0.001 MGD/acre	0.48 %
AL-04	DETAILS	54587740 ft²	16.23 mi	129.77 in-mile	0 in	0 gal/acre	0 gal/LF	0 MGD/in-mile	0 MGD/acre	0 %
BH-01	DETAILS	78538520 ft²	26.94 mi	316.16 in-mile	0 in	0 gal/acre	0 gal/LF	0 MGD/in-mile	0 MGD/acre	0 %
BH-02	DETAILS	104177468 ft²	21.41 mi	347.47 in-mile	0 in	0 gal/acre	0 gal/LF	0 MGD/in-mile	0 MGD/acre	0 %
BH-03	DETAILS	61257884 ft²	22.09 mi	208.99 in-mile	0 in	0 gal/acre	0 gal/LF	0 MGD/in-mile	0 MGD/acre	0 %
BH-04	DETAILS	98316005 ft²	39.57 mi	263.5 in-mile	4.12 in	358.79 gal/acre	20464.7 gal/LF	0.05 MGD/in-mile	0.002 MGD/acre	0.32 %
BH-05	DETAILS	44936761 ft²	20.46 mi	181.58 in-mile	0 in	0 gal/acre	0 gal/LF	0 MGD/in-mile	0 MGD/acre	0 %

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Smart Utility System

SSO & Basin Maintenance Monitoring

Residential & Commercial Water Meters

Gravity Sewer WW Meter

Volume Water Customer / Volume Sewer Customer

Bulk Water Billing Meters

Bulk WW Billing Meters

YSI Water Quality Buoy

OCEAN OUTFALL

Environmental Monitoring

Ocean Outfall Metering

Alexander Orr WTP

Finished Water Meter

Raw Water Meter

Distribution Meter

Emergency PS Level Monitoring

Monitor & Billing

IPMP

Central District WWTP

Influent WW Meter (Venturis)

DEEP INJECTION WELLS

WW Mag Meters

WW Mag Meters

Force Main Transient Monitoring

Emergency PS Level Monitoring

Gravity Sewer WW Meter

Well Field Water Meters

SOURCE WATER

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Nuuly Project

Green Field: Raymore Commerce Center

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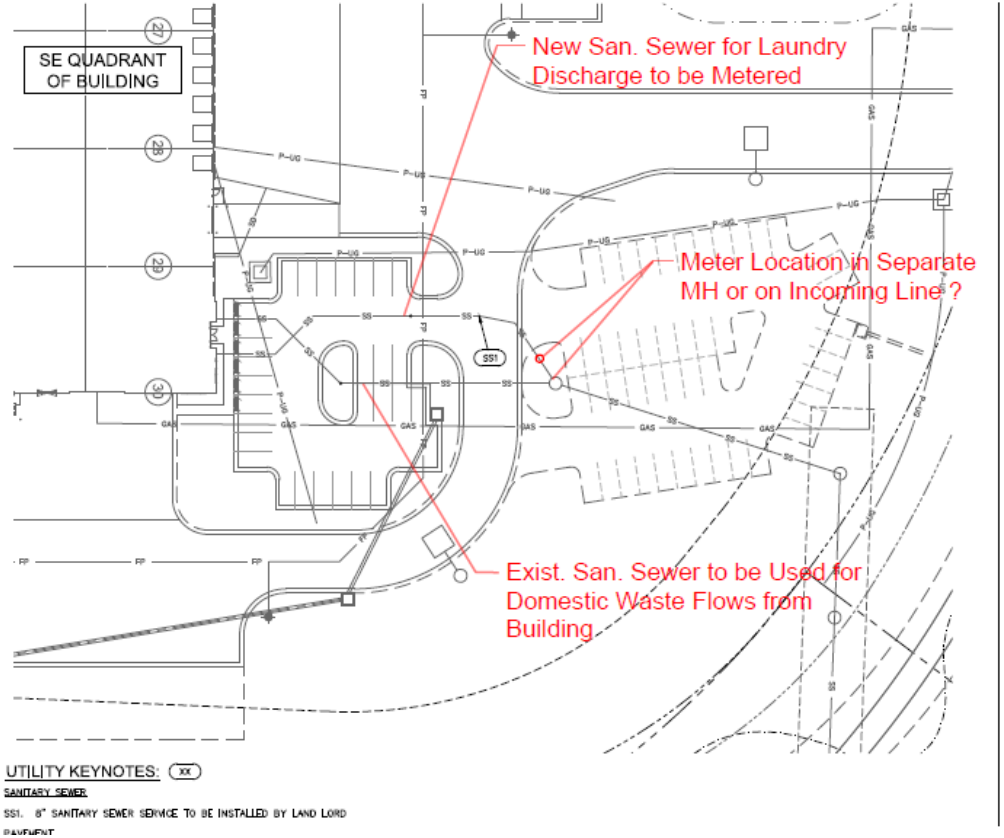
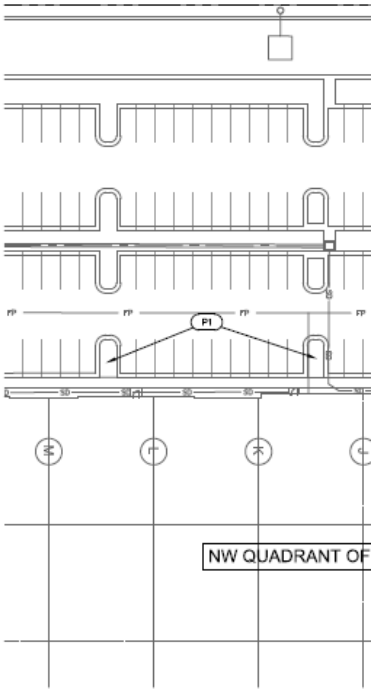
Nuuly Project





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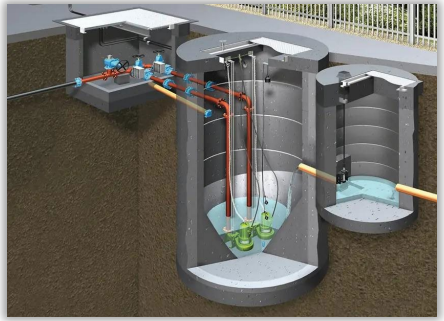
Advanced Monitoring Solutions

Water Quality

Sewer Main Breaks

Storm Preparedness

Sanitary Sewer Overflow



Pump Station Early Warning

Volume Sewer Customer I&I Analysis

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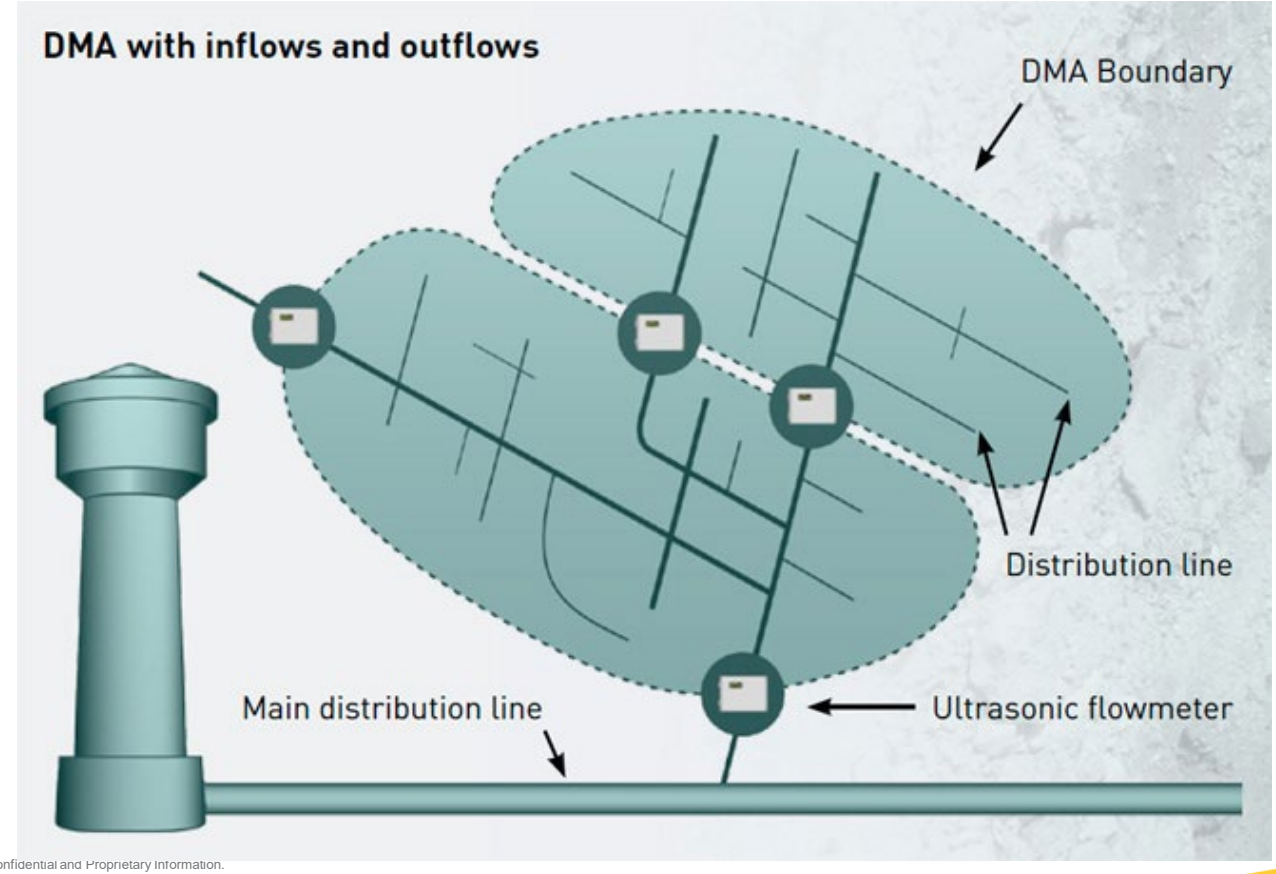
What is District Metering?



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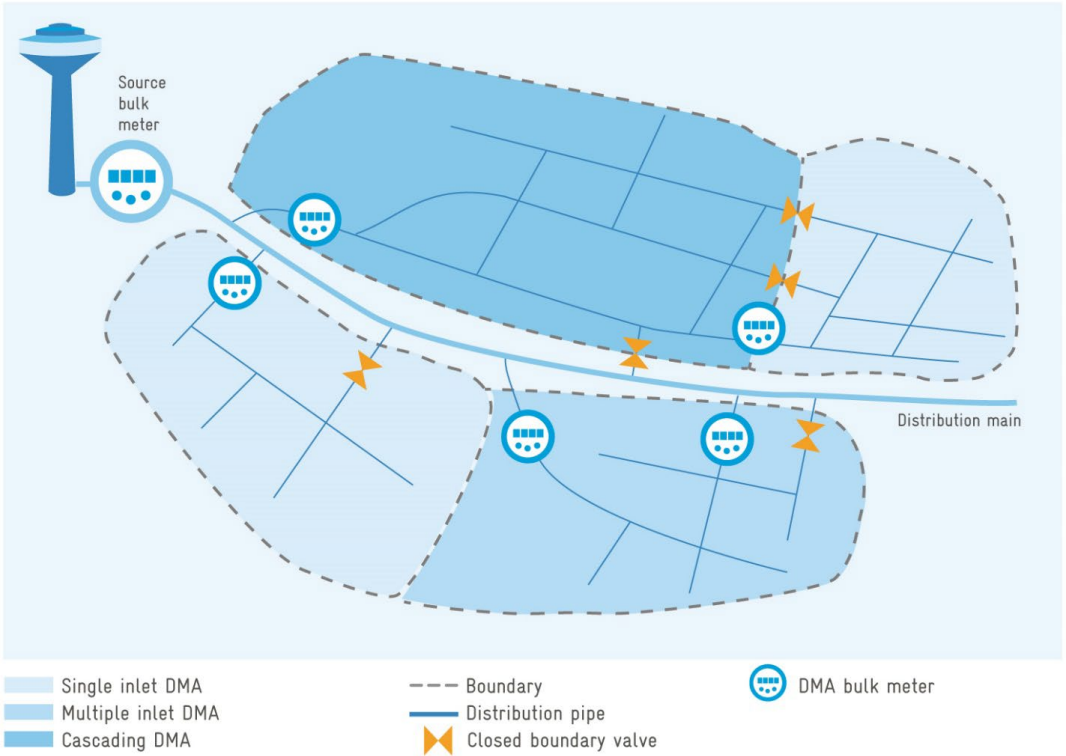
What is District Metering?

Figure 6.2 Typical layout of DMAs, based on [22]



- Segmenting the distribution system
- Analyzing these segments to identify causes of NRW
- Using data to evaluate the effectiveness of remediation and CIP efforts

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How do you build a District Metering Analysis

[District Metering Areas | Sectioning the distribution network | AVK - YouTube]

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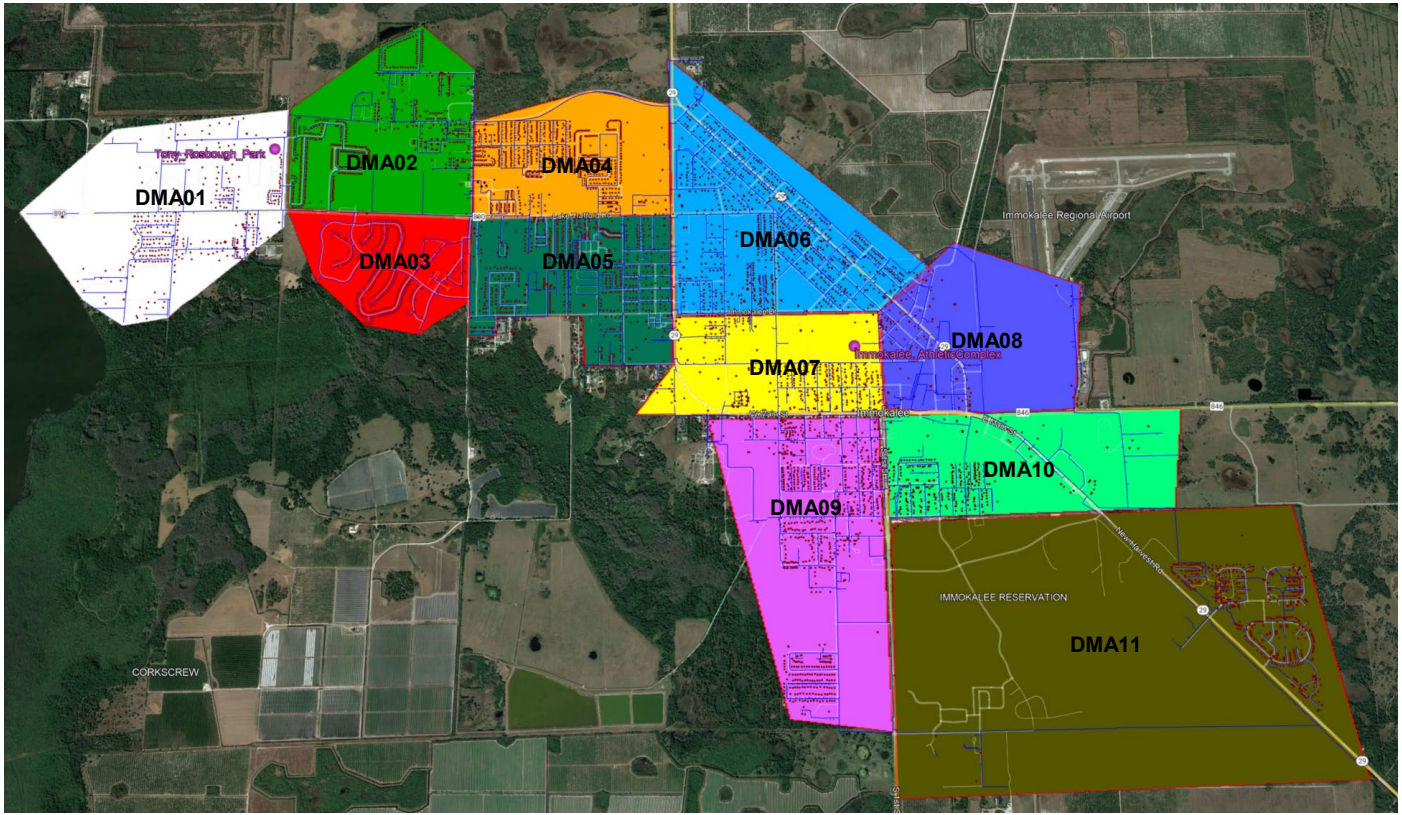
How do you build a District Metering Analysis



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Identify DMAs

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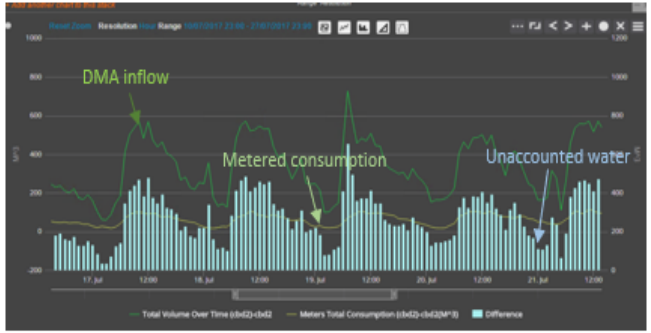
District Metering Software

Virtual District Metering (vDMA) helps utilities create smaller zones in the network and focus efforts on areas with high water loss

Utilities with an existing AMI system already have the foundation for zoned NRW analysis.



vDMA Water Balance

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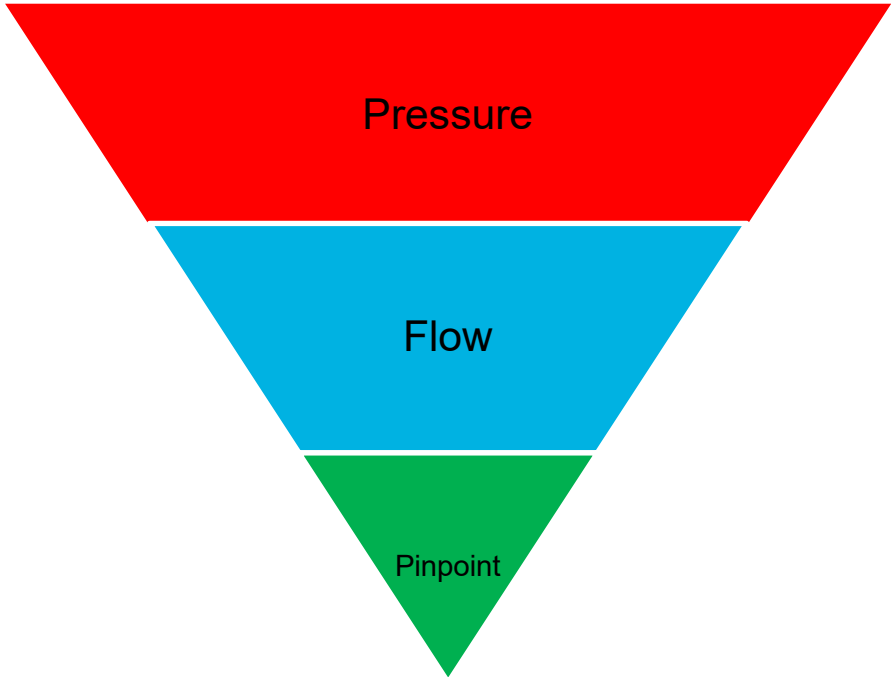
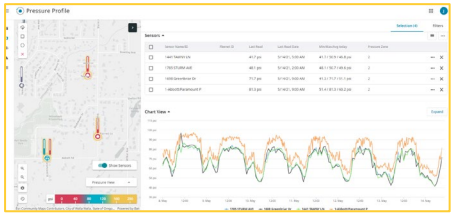
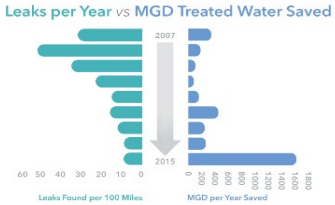
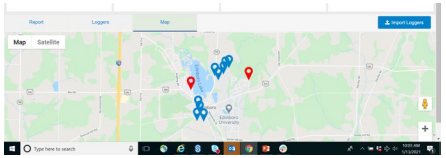
How it all comes together!









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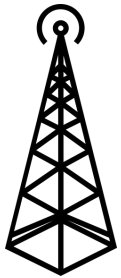
Smart Utility Network

Assets

Intelligent Measurements

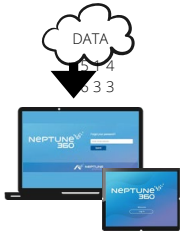
Superior Communications

Less Infrastructure



Smart Network Management

Easy to Use Data Storage & Applications



Insightful Services

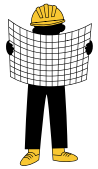
AMI

Users

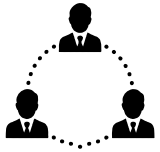
Operations

Customer Service

Accounting



Engineering



Management

Planning

Consultants

Benefits

- Revenue Capture
- Cost Reductions
- Risk Mitigations
- Customer Service
- Enhanced Sustainability
- Asset Optimization

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Integrated Resiliency Solution

Affordability

Emergency Preparedness

LCRR Audit

Sustainable Communities

Operating Efficiencies

Water Loss Management

Advanced I/I Analysis

Optimized Asset Mgmt.

Future Proofing

Resilience

SSO Monitoring

Distribution Level Water Quality Monitoring

Public & Environmental Health

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Data is Everywhere!

Where Utility Data Is Used….

W & WW AMS Deployment	Meter Reading	Billing / CIS Workflow	Customer Service	
Customer Engagement	Customer Accountability	Customer Anomaly Notification	Water Loss Analysis	Integrations
Worker Order Mobility	Automated Processes	Operations	Engineering/ Flow Analysis	Usage Planning
Analytics	Reporting	Financial Management	Revenue Assurance	Executive Oversight

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Go Beyond Smart

Make Your City Brilliant

- **AMS provides off-the-shelf solutions** for
  - Wastewater,
  - Drinking water
  - Freshwater, Source Water
  - Environmental & Industrial monitoring
- Create a **Brilliant City Platform** by combining your existing instrumentation and existing SCADA system with AMI Networks.
- **Web-enable your sensors with IoT RTUs** for secure enterprise-grade solutions into a regulatory & compliance grade cloud platform, providing the highest quality of secure data.

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LCRR – Service Line Identification

- **Provide utility with a service line identification audit**
  - **Pit Set** – Inlet and Outlet side of meter box
    - Expose through digging or potholing
  - **Basement Set** – At minimum service line type at meter set
    - Additional line exposure as necessary

- **Provide utility with searchable, sortable inventory of service line type**
  - **Types identified – with photos**
    - Lead –visual, scratch test at minimum
    - Galvanized requiring replacement
    - Non-lead
    - Lead status unknown
  - **Other audit items available**
    - Meter photos
      - Serial numbers
      - Condition
    - Pit photos
    - Radio photos
    - Customer audit (validate account data against meter data)
    - Rehabilitation of AMI/AMR system (correct/repair non-functioning meters and radios)

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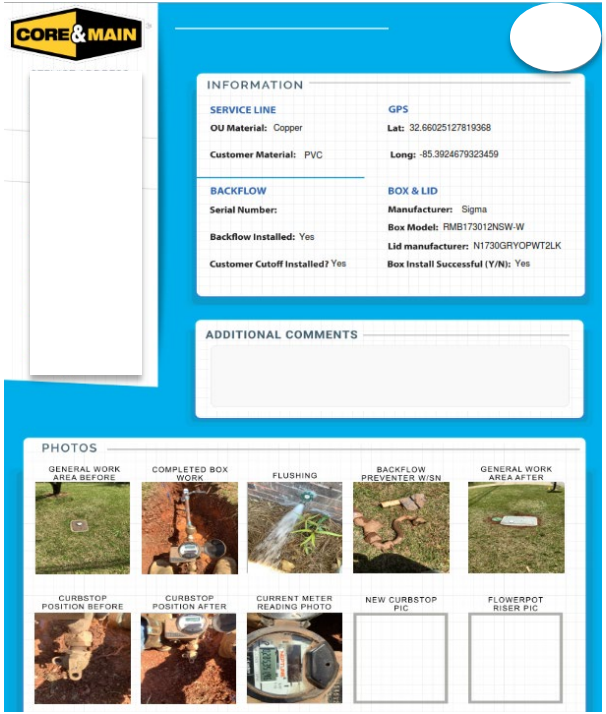
LCRR – Service Line Identification

- **Provide GPS coordinates**
  - Standard
  - Sub-meter
  - Sub-foot
- **Provide interactive map of every customer**
  - Integrate with existing customer portal
- **Provide a customer portal if needed**
- **Provide funding assistance**
  - State SRF
  - Block grants
  - Financing – Government Capital
  - Infrastructure Bill
  - Bundling with existing contracts
- **Provide Scope of Work and Project Development for future line replacement based on survey findings**



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Make momma proud. Eat your veggie

Burgushi: In its prime.

THE COWFISH

SUSHI • BURGER • BAR

Elvis has left the burger.

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