

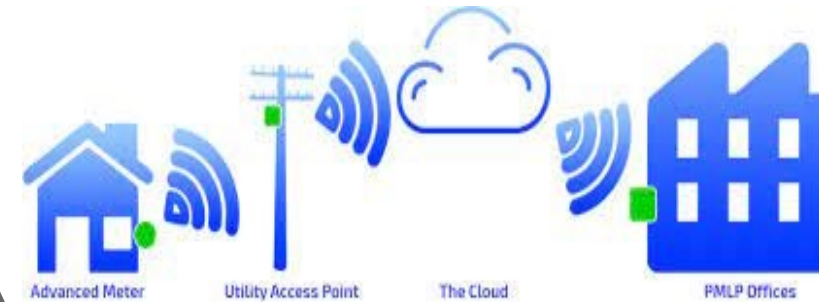


# How Technology Helps Utilities Improve Backflow Programs

Josh Ordway

[josh@veposolutions.com](mailto:josh@veposolutions.com)

315-720-0671



# Presentation Agenda

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- Quickly cover the importance of a backflow program.
- Discuss AI – Artificial Intelligence.
- IoT enabled backflow valves
- How existing AMI (Advanced Metering Infrastructure) and water meters can help with backflow programs.
- Backflow management software

# Benefits to Cross Connection Program

Protect your most precious resource

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## State, County, and Local Requirements

- Regulatory Agencies require water providers to protect against Hazardous cross-connections



## Avoid Pollutants/Contaminants

- Can be a serious health threat
- Must be contained



## WHAT IF YOU DON'T?

- Could be the next water disaster!
- Susceptible to terrorist attacks
- Outbreaks of disease

# Backflow Incidents

Don't let your system be susceptible



## Colorado School

- 8 Kids go to hospital
- Anti-freeze poisoning
- No backflow device



## Funeral Home

- Blood in the water system
- Using a hydraulic aspirator to drain fluids
- Connected to water supply with no backflow



## Burned in the Shower

- Sodium Hydroxide in water
- Near-by chemical company
- Many residents were burned



## Paraquat

- Lethal Pesticide
- Yellow Gushy stuff was coming from people's faucets
- Pressure reduction in water mains due to pump failure
- Cost a lot of money
- Made CBS news

# AI – Artificial Intelligence for Water Industry

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Combines computer science and robust data sets to enable problem solving

# Common AI Websites

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- ChatGPT - <https://chat.openai.com/chat> - writes anything you tell it to
- Dalle 2 – <https://openai.com/dall-e-2/> - creates pictures from text
- Magic Eraser – Removes items from pictures
- Speech From Text – Type your text and then choose a voice
- Thing Translator – Take a picture of something and translate it to a language
- Word Tune – Improves on your writing

# AI Example – Chat GPT

write a love note to my wife Erin, married 22 years, sorry I have to miss our anniversary, but I must attend the backflow show in Lynnwood, WA!

Dear Erin,

As I sit down to write this love note to you, my heart is filled with love and admiration for you. It's hard to believe that we've been married for 22 years now, and yet it feels like just yesterday when we said our vows to each other. I want to start by apologizing for missing our anniversary. It breaks my heart to not be there with you on this special day, but unfortunately, I must attend the backflow show in Lynnwood, WA. Even though I won't be physically present, my thoughts and love will be with you throughout the day.

I want you to know that you are the most important person in my life, and I'm so grateful to have you as my wife. You've been my constant support, my best friend, and the love of my life for all these years. You've stood by me through thick and thin, and your unwavering love has been a source of strength for me.

# AI Example – DALLE - 2



...



Share

Save ▾

“a yellow lab puppy playing in a mud puddle”



Josh × DALL-E

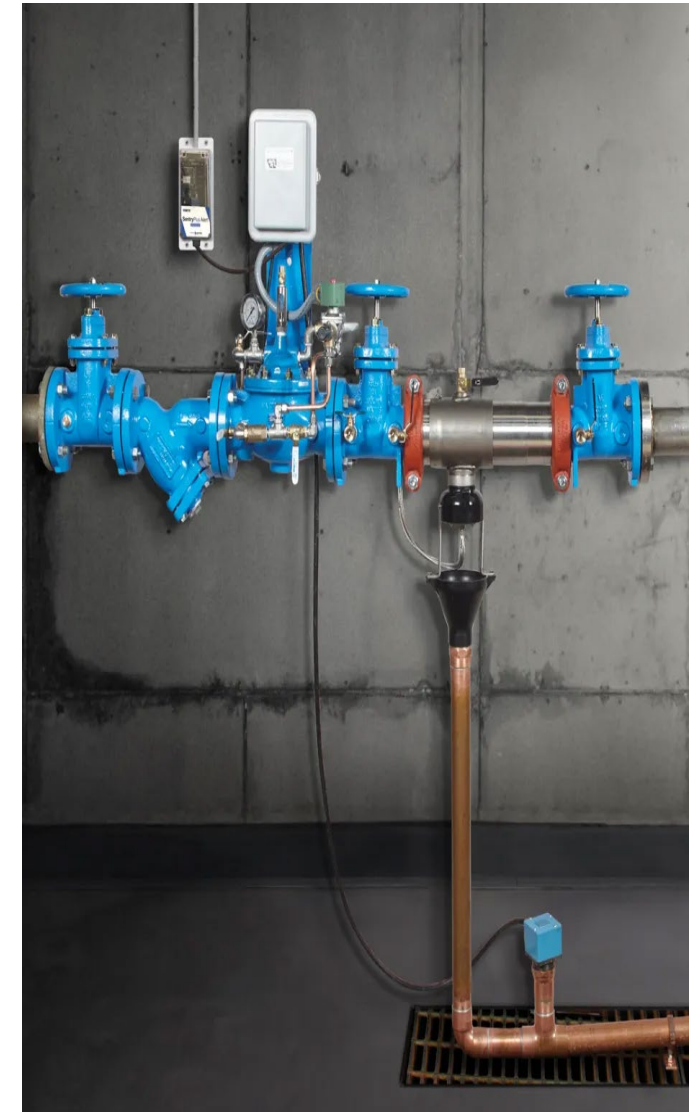
Human & AI



# IoT-Enabled Backflow Valve Monitoring

Protect your most precious resource

- Backflow valve monitors built into new BFPD or retrofitted.
- IoT-enabled sensors used to detect backflow valve position.
- Measure water pressure.
- If failure or unexpected pressure readings, devices can shut off water
- Also alerts manager or owner.
- Access to water supply can also be controlled remotely.



Article by Cameron Rapoport

<https://www.workingpressuremag.com/new-technologies-in-backflow-prevention/>

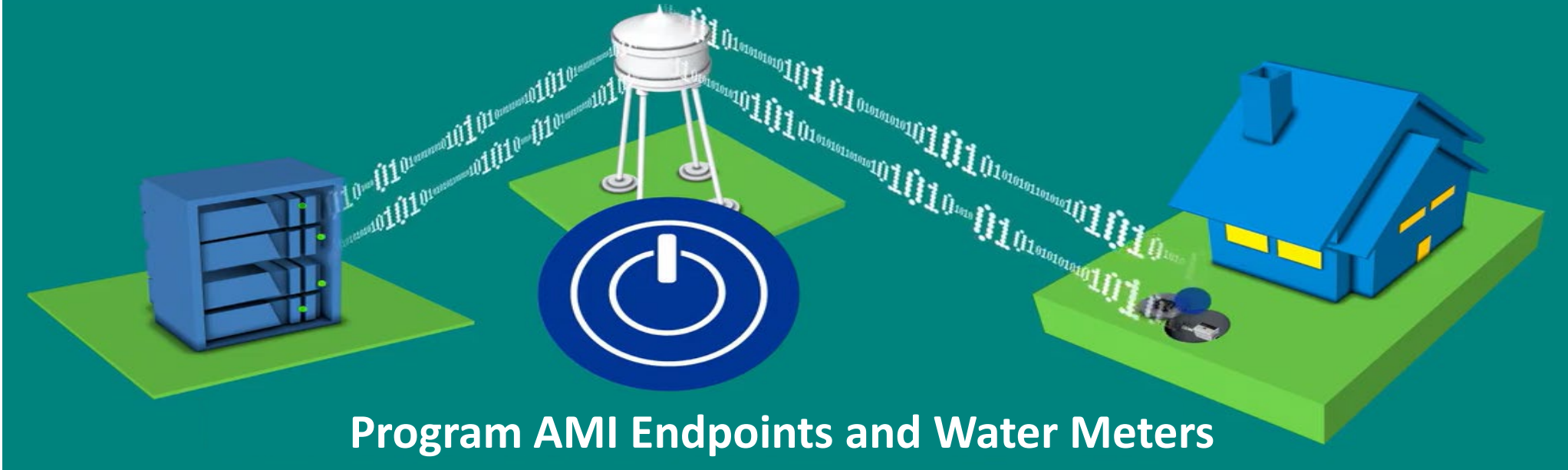
# Why Use IoT-Enabled Valve Monitoring

## **Be informed & proactive instead of reactive**

- Eliminate surprise results from annual backflow preventer inspections
- Receive real-time alerts to backflow valve failure or unexpected drops in pressure – allowing you to act instantly to prevent contamination or damage.
- Remotely shut off water supply to prevent flooding, even when you're not on-site
- Monitor multiple backflow preventers with one online dashboard and enable access to multiple stakeholders

# Using AMI to Identify Backflow

## Use AMI to Help with Backflow Detection!



- Use AMI Endpoints to identify backflow
  - Some endpoints see as low as 1 gallon of backflow
  - Typically, an hourly read interval, so the reading in hour 2 has to be smaller than reading in hour 1

# Using Water Meters to Identify Backflow

Protect your most precious resource

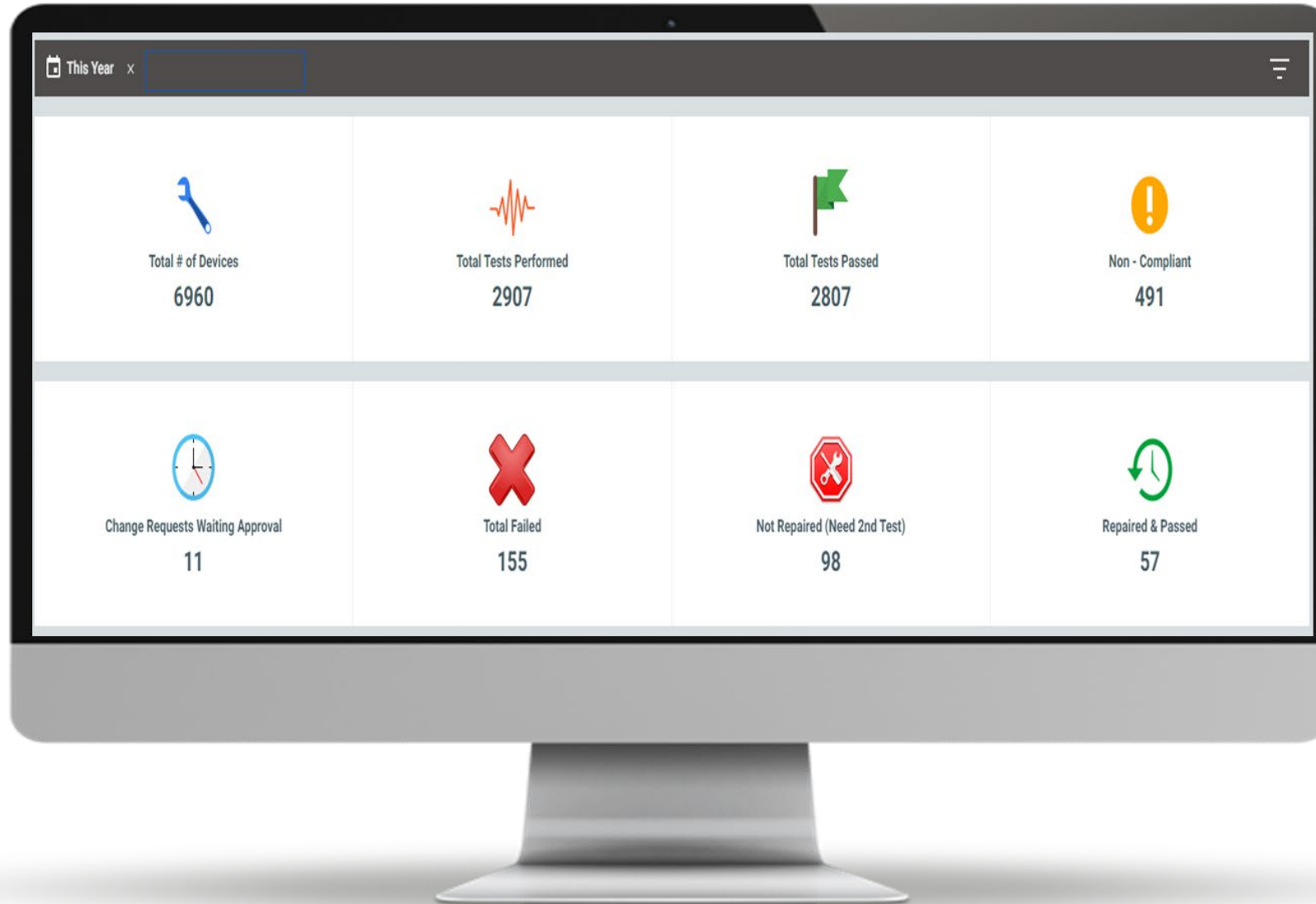
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## Must be Smart Meters or Meters Retrofitted with Smart Registers

- Use Water Meters to identify backflow, doesn't have to be AMI
  - Some meters are programmable for amount of backflow they can identify.
  - EX: Some meters can be programmed to see 1,2,5,10, or 30 gal/min of backflow for a time interval of 1, 2, 4, 6, 8, 10, 15, 30 or 60 min.
  - Meters store alarms and can be transmitted through any type of meter reading system.

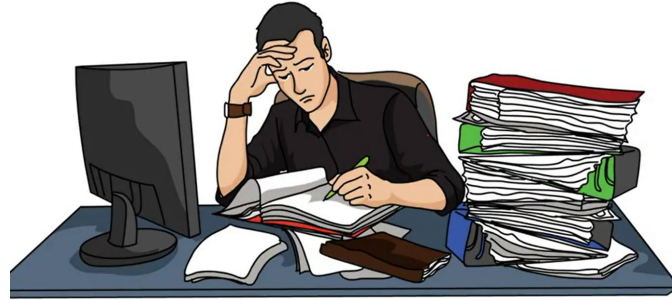
# Backflow Management Software

Protect your most precious resource



# Typical Water Utility Record Keeping Process

1. Water Utility Generates Letters



2. Sends them to Customers via Mail



3. Customer Schedules Tester



4. Tester Performs Test



5. Tester Submits Test to Utility

**VIA FAX  
OR EMAIL**



# Problems with Paperwork

- The wrong form is used
- CAN'T READ
- Form is missing information
- Forms lost in mail or on the fax
- Manual data entry or scans required by the Water Utility
- Difficult to find test result data
- Annual reports take forever to generate



NEW YORK STATE DEPARTMENT OF HEALTH  
Bureau of Public Water Supply Protection  
Empire State Plaza, 547 River Street, Room 400  
Troy, New York 12180-2215

### Report on Test and Maintenance of Backflow Prevention Device

Please use a separate form for each device.

For the year 2019  
 Initial test - Complete entire form  
 Annual test - Complete Part A only

Public Water Supply: GARDEN CITY PARK WATER Account No. \_\_\_\_\_ County \_\_\_\_\_ Block \_\_\_\_\_ Lot \_\_\_\_\_

Facility Name: GUY DR. HOUSE Location of Device: FRONT YARD  
 Address: \_\_\_\_\_ could not read anything on this form

Device Information: Manufacturer: WATSON Type:  RPZ  DCV Model: 450-2 Size (in inches): 1/2 Serial Number: 3030000

Check Valve No. 1: \_\_\_\_\_ Check Valve No. 2: \_\_\_\_\_ Differential Pressure Relief Valve: \_\_\_\_\_ Line Pressure: 60 psi

Test before repair: Leaked Closed light:  Leaked Closed light:  Opened at \_\_\_\_\_ psi Date: 04/09/19  
 Pressure drop across first check valve \_\_\_\_\_ psi M D Y

Describe repairs and materials used: \_\_\_\_\_ Name: \_\_\_\_\_ Repaired by: \_\_\_\_\_  
 Date repaired: \_\_\_\_\_ M D Y

Final test: Closed light:  Closed light:  Opened at \_\_\_\_\_ psi Date: \_\_\_\_\_ M D Y

Water Meter Number: 80647416 Motor Reading: 37200574 Type of Service: (check one) Domestic  Fire  Other

Remarks: (Describe deficiencies: bypasses, outlets below the device, connections between the device and point of entry, missing or inadequate signage, etc.)

Certification: This device  meets,  does NOT meet, the requirements of an acceptable combination device at the time of testing. I hereby certify the foregoing data to be correct.  
 Print Name: ANTHONY TOMA Certified Tester No.: 5466 Signature: \_\_\_\_\_ Expiration Date: 01/31/2022

Property owner's (or owner's agent) certification that test was performed:  
 Print Name: Chris Velisiger Title: Owner Signature: \_\_\_\_\_ Telephone: 5163542925

Certification that installation is in accordance with the approved plans. (To be completed by the design engineer or architect or water supplier.)  
 I hereby certify that this installation is in accordance with the approved plans.

Name: \_\_\_\_\_ Title: \_\_\_\_\_ Date: \_\_\_\_\_ NYS DOH Log # \_\_\_\_\_  
 License Number: \_\_\_\_\_ Phone ( ): \_\_\_\_\_ m d y  
 Representing: \_\_\_\_\_ Describe minor installation changes: \_\_\_\_\_  
 Address: \_\_\_\_\_ City: \_\_\_\_\_ State: \_\_\_\_\_ Zip: \_\_\_\_\_  
 Signature: \_\_\_\_\_

CAN YOU READ THESE?

NEW YORK STATE DEPARTMENT OF HEALTH  
Bureau of Public Water Supply Protection  
Empire State Plaza, 547 River Street, Room 400  
Troy, New York 12180-2215

Report on Test and Maintenance of Backflow Prevention Device

For the year 2019  
 Initial test - Complete entire form  
 Annual test - Complete Part A only

Public Water Supply: \_\_\_\_\_ Account No. \_\_\_\_\_ County \_\_\_\_\_ Block \_\_\_\_\_ Lot \_\_\_\_\_

Facility Name: \_\_\_\_\_ Location of Device: \_\_\_\_\_  
 Address: \_\_\_\_\_

Device Information: Manufacturer: \_\_\_\_\_ Type:  RPZ  DCV Model: \_\_\_\_\_ Size (in inches): \_\_\_\_\_ Serial Number: \_\_\_\_\_

Check Valve No. 1: \_\_\_\_\_ Check Valve No. 2: \_\_\_\_\_ Differential Pressure Relief Valve: \_\_\_\_\_ Line Pressure: \_\_\_\_\_ psi

Test before repair: Leaked Closed light:  Leaked Closed light:  Opened at \_\_\_\_\_ psi Date: \_\_\_\_\_ M D Y  
 Pressure drop across first check valve \_\_\_\_\_ psi

Describe repairs and materials used: \_\_\_\_\_ Name: \_\_\_\_\_ Repaired by: \_\_\_\_\_  
 Date repaired: \_\_\_\_\_ M D Y

Final test: Closed light:  Closed light:  Opened at \_\_\_\_\_ psi Date: \_\_\_\_\_ M D Y

Water Meter Number: \_\_\_\_\_ Motor Reading: \_\_\_\_\_ Type of Service: (check one) Domestic  Fire  Other

Remarks: (Describe deficiencies: bypasses, outlets below the device, connections between the device and point of entry, missing or inadequate signage, etc.)

Certification: This device  meets,  does NOT meet, the requirements of an acceptable combination device at the time of testing. I hereby certify the foregoing data to be correct.  
 Print Name: \_\_\_\_\_ Certified Tester No.: \_\_\_\_\_ Signature: \_\_\_\_\_ Expiration Date: \_\_\_\_\_

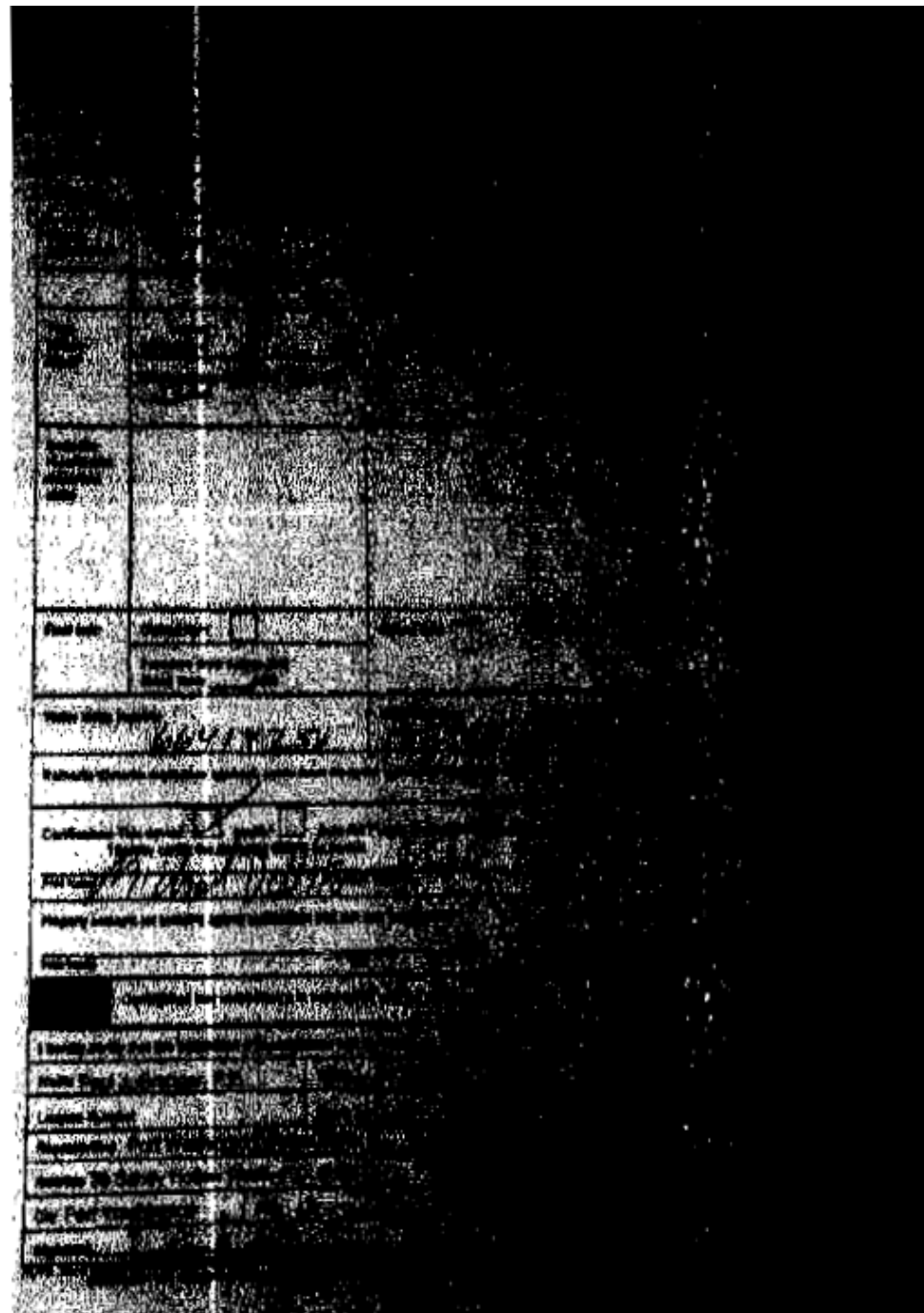
Property owner's (or owner's agent) certification that test was performed:  
 Print Name: \_\_\_\_\_ Title: \_\_\_\_\_ Signature: \_\_\_\_\_ Telephone: \_\_\_\_\_

Certification that installation is in accordance with the approved plans. (To be completed by the design engineer or architect or water supplier.)  
 I hereby certify that this installation is in accordance with the approved plans.

Name: \_\_\_\_\_ Title: \_\_\_\_\_ Date: \_\_\_\_\_ NYS DOH Log # \_\_\_\_\_  
 License Number: \_\_\_\_\_ Phone ( ): \_\_\_\_\_ m d y  
 Representing: \_\_\_\_\_ Describe minor installation changes: \_\_\_\_\_  
 Address: \_\_\_\_\_ City: \_\_\_\_\_ State: \_\_\_\_\_ Zip: \_\_\_\_\_  
 Signature: \_\_\_\_\_



WOW REALLY?



# Benefits to Automating Your Backflow Program with Industry Accepted Software

- Eliminate All Paperwork – Letters and Test Reports
- No More Missing Data or Hard to Read Forms
- Achieve 100% Compliance
- Automated Test Reminders
- Identify Falsified Test Reports

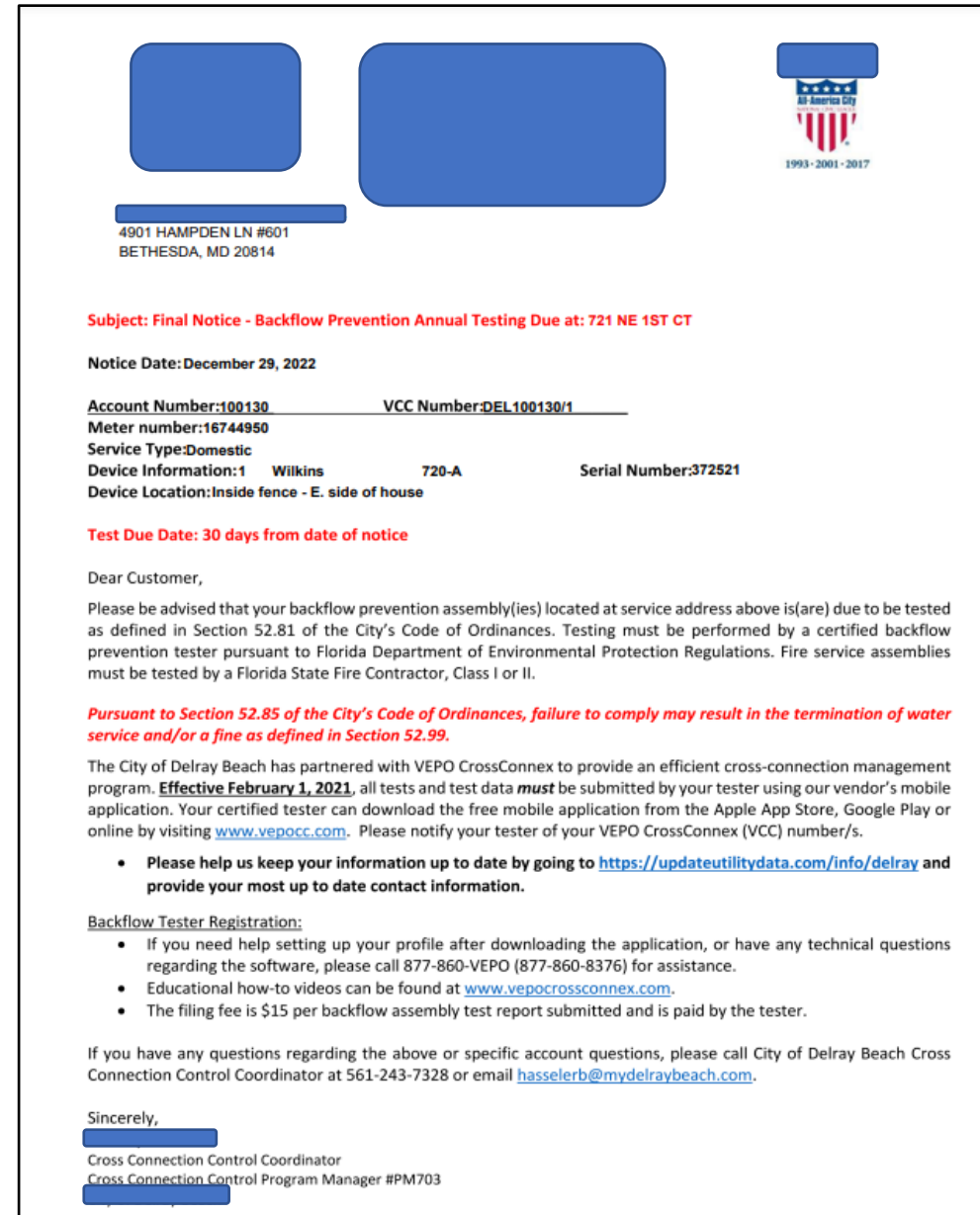
# Benefits to Automating Your Backflow Program with Industry Accepted Software

- Generate Annual Reports
- Reduce/Eliminate Admin Costs for Backflow
- Possibly GENERATE REVENUE!
- Collect Customer Contact Information
- Track all Customer Communications

# Track Communications History with Customers

## EXAMPLE

- Utility has sent multiple notifications.
- Test does not get completed by customer.
- Customer calls because they received a shutoff notice or fine.
- Software allows immediate access to all notifications with Date and Time Stamps



The image shows a utility notification letter with several redacted areas. At the top left, there are two blue rectangular redaction boxes. Below them is the address: 4901 HAMPDEN LN #601, BETHESDA, MD 20814. To the right is the City of Delray Beach logo, featuring a shield with a sun and waves, and the text 'City of Delray Beach' and '1993 - 2001 - 2017'. The subject line is 'Subject: Final Notice - Backflow Prevention Annual Testing Due at: 721 NE 1ST CT'. The notice date is 'December 29, 2022'. The account information includes 'Account Number: 100130', 'VCC Number: DEL100130/1', 'Meter number: 16744950', 'Service Type: Domestic', 'Device Information: 1 Wilkins 720-A', and 'Serial Number: 372521'. The device location is 'Inside fence - E. side of house'. The test due date is '30 days from date of notice'. The letter is addressed to 'Dear Customer,' and contains a paragraph of text about backflow prevention testing. It also includes a redacted signature block at the bottom.

4901 HAMPDEN LN #601  
BETHESDA, MD 20814

**Subject: Final Notice - Backflow Prevention Annual Testing Due at: 721 NE 1ST CT**

Notice Date: December 29, 2022

Account Number: 100130 VCC Number: DEL100130/1  
Meter number: 16744950  
Service Type: Domestic  
Device Information: 1 Wilkins 720-A Serial Number: 372521  
Device Location: Inside fence - E. side of house

**Test Due Date: 30 days from date of notice**

Dear Customer,

Please be advised that your backflow prevention assembly(ies) located at service address above is(are) due to be tested as defined in Section 52.81 of the City's Code of Ordinances. Testing must be performed by a certified backflow prevention tester pursuant to Florida Department of Environmental Protection Regulations. Fire service assemblies must be tested by a Florida State Fire Contractor, Class I or II.

**Pursuant to Section 52.85 of the City's Code of Ordinances, failure to comply may result in the termination of water service and/or a fine as defined in Section 52.99.**

The City of Delray Beach has partnered with VEPO CrossConnex to provide an efficient cross-connection management program. **Effective February 1, 2021**, all tests and test data **must** be submitted by your tester using our vendor's mobile application. Your certified tester can download the free mobile application from the Apple App Store, Google Play or online by visiting [www.vepocc.com](http://www.vepocc.com). Please notify your tester of your VEPO CrossConnex (VCC) number/s.

- Please help us keep your information up to date by going to <https://updateutilitydata.com/info/delray> and provide your most up to date contact information.

**Backflow Tester Registration:**

- If you need help setting up your profile after downloading the application, or have any technical questions regarding the software, please call 877-860-VEPO (877-860-8376) for assistance.
- Educational how-to videos can be found at [www.vepocrossconnex.com](http://www.vepocrossconnex.com).
- The filing fee is \$15 per backflow assembly test report submitted and is paid by the tester.

If you have any questions regarding the above or specific account questions, please call City of Delray Beach Cross Connection Control Coordinator at 561-243-7328 or email [hasselerb@mydelraybeach.com](mailto:hasselerb@mydelraybeach.com).

Sincerely,  
[Redacted Signature]  
Cross Connection Control Coordinator  
Cross Connection Control Program Manager #PM703  
[Redacted Contact Information]

# Benefits to Testers

Automates Redundant Data Entry – Tester Info

Autofill Test Forms

Simplifies the Test Process – No Complex Forms

Tracks Customer Due Dates

Automated Reminder Notifications to Testers

Don't Have to Track Utility Test Forms

Automatic Test Form Submission

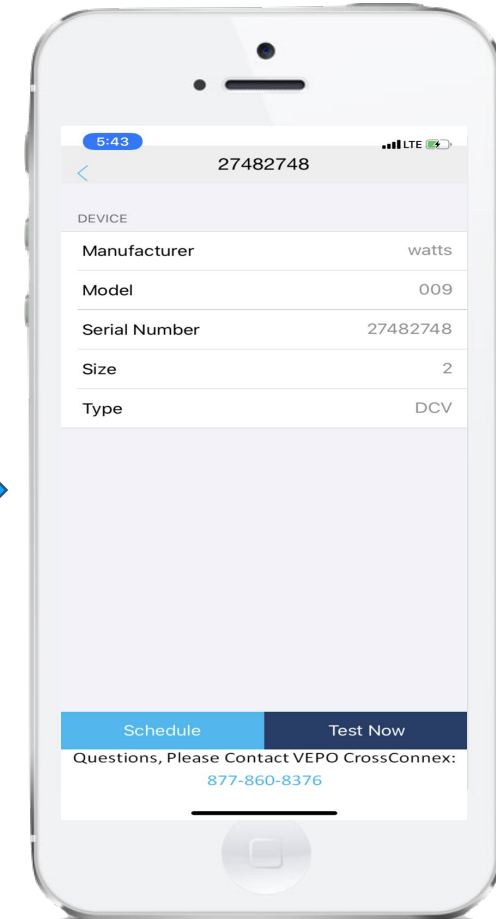
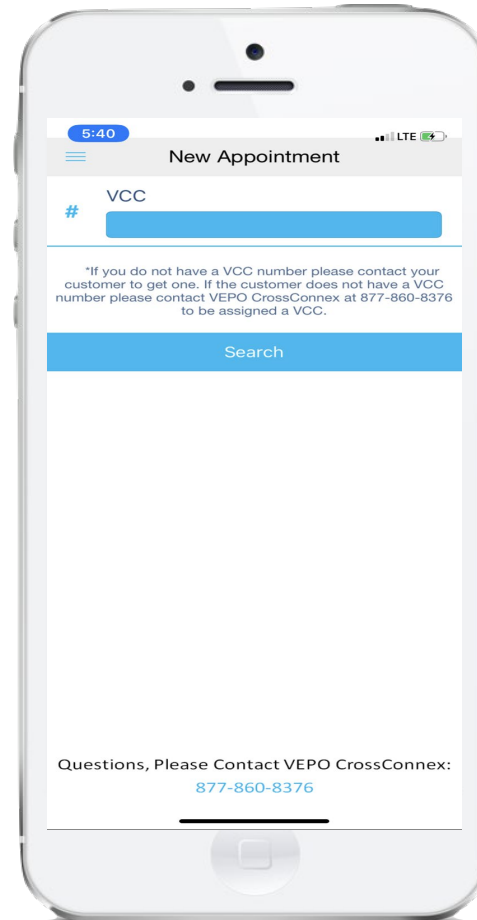
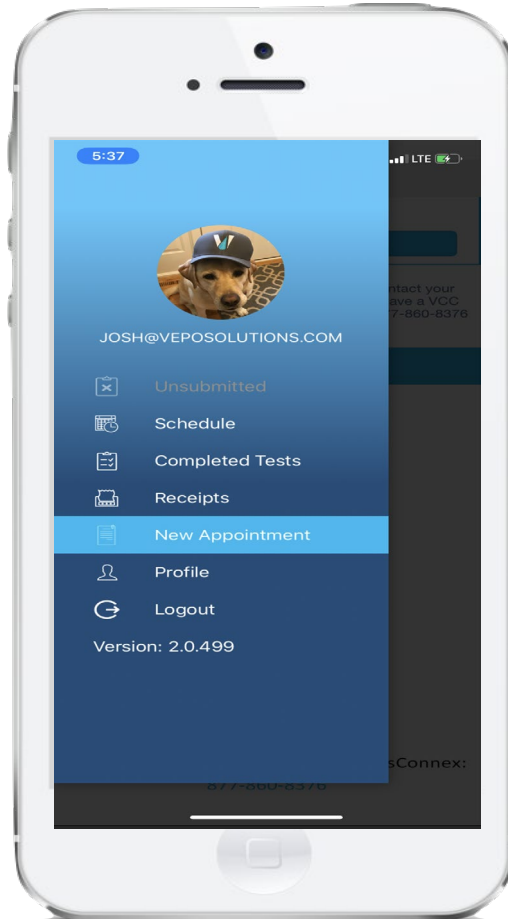
# What Features to Look for in a Backflow Management Software

Protect your most precious resource

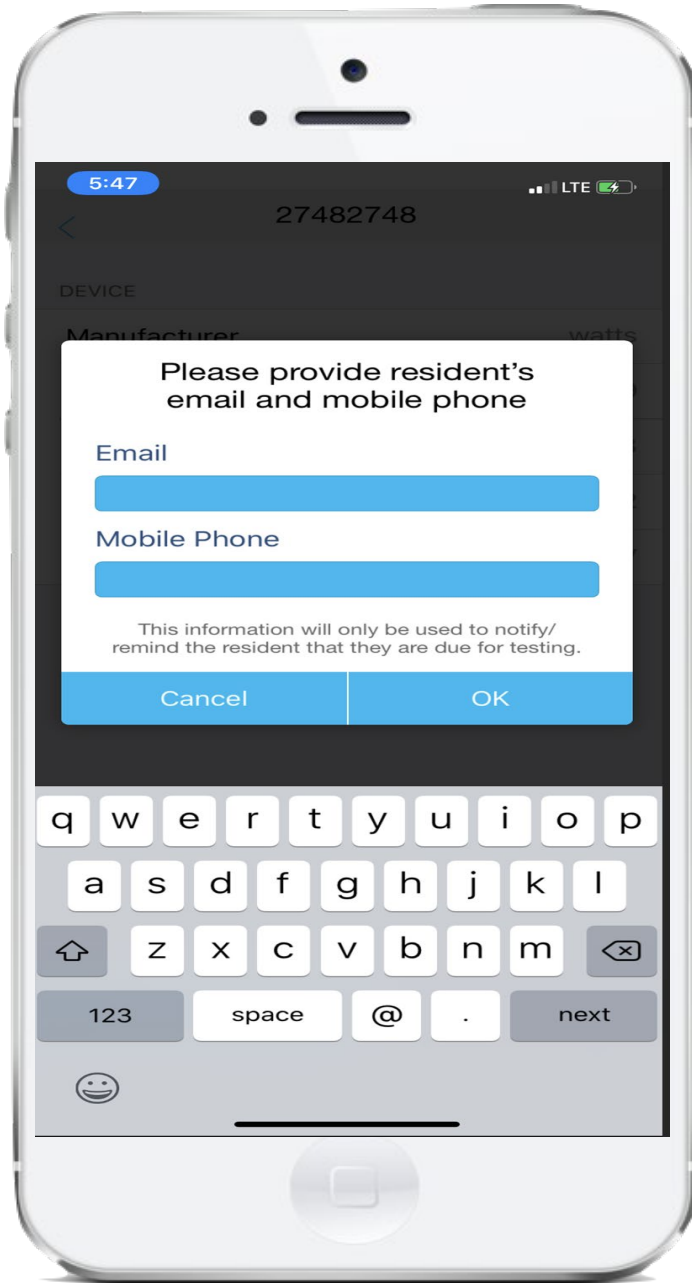


# Simple to Enter Test Data on Mobile Devices or PC

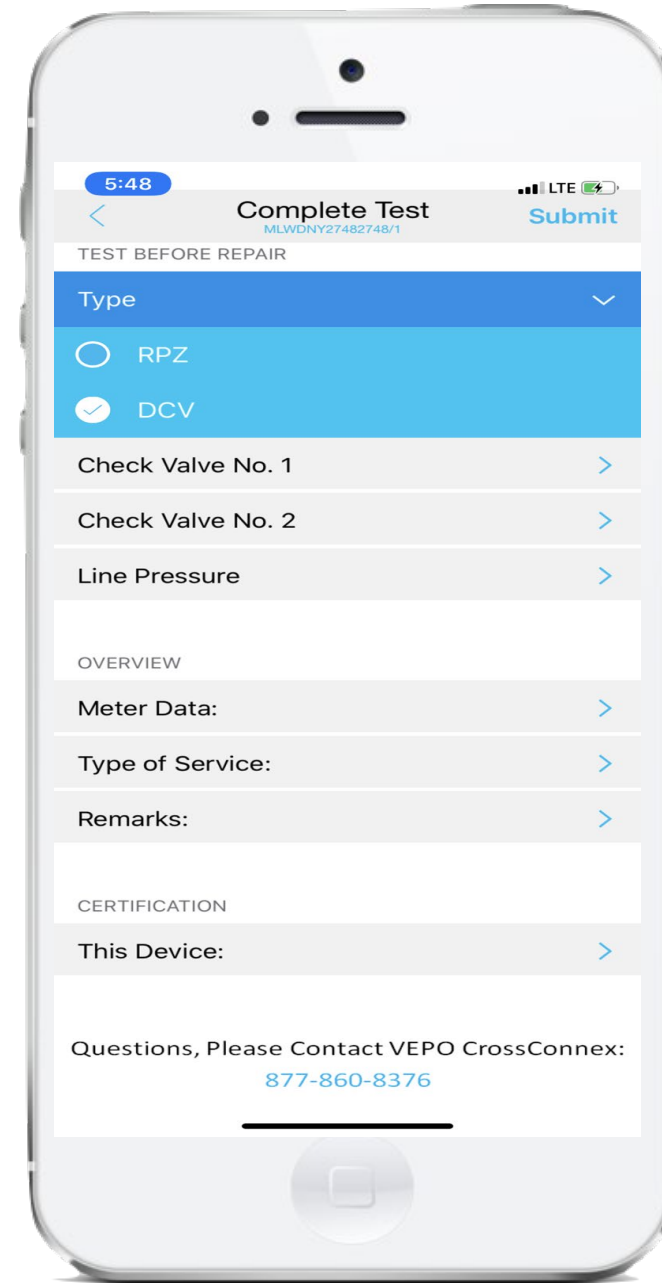
**Backflow Software with  
Mobile App/Web Portal  
Look for Native Mobile App**



# Customer Contact Info



# Test Data Entry



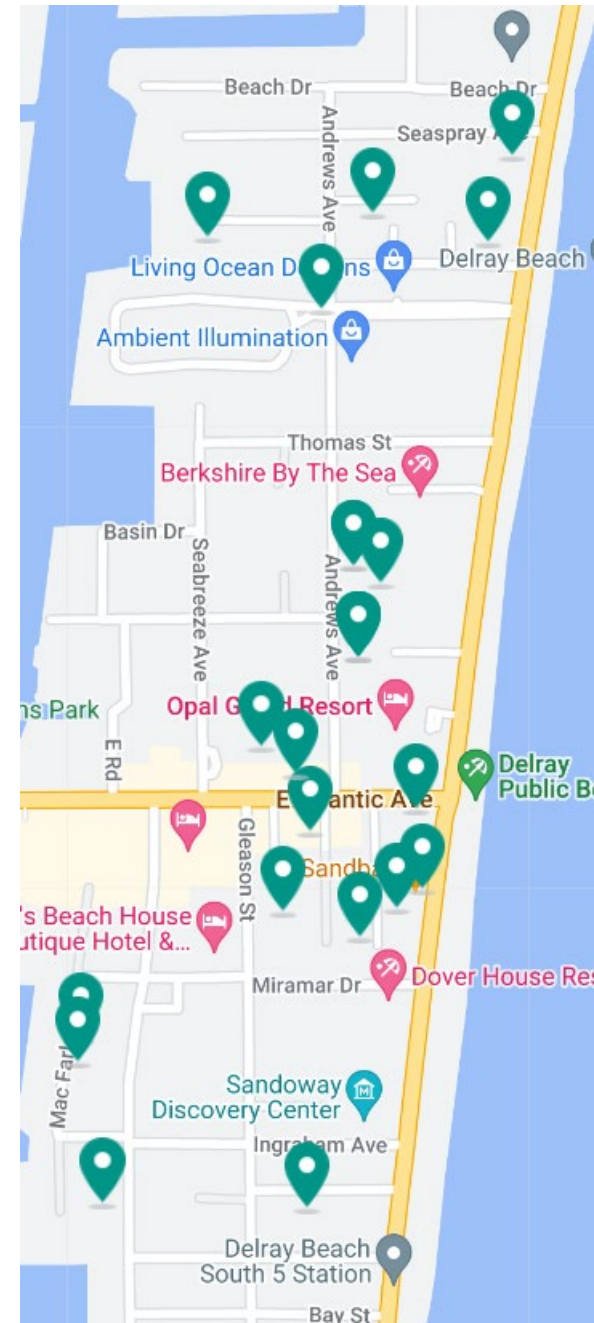


# Example Software Utility Dashboard

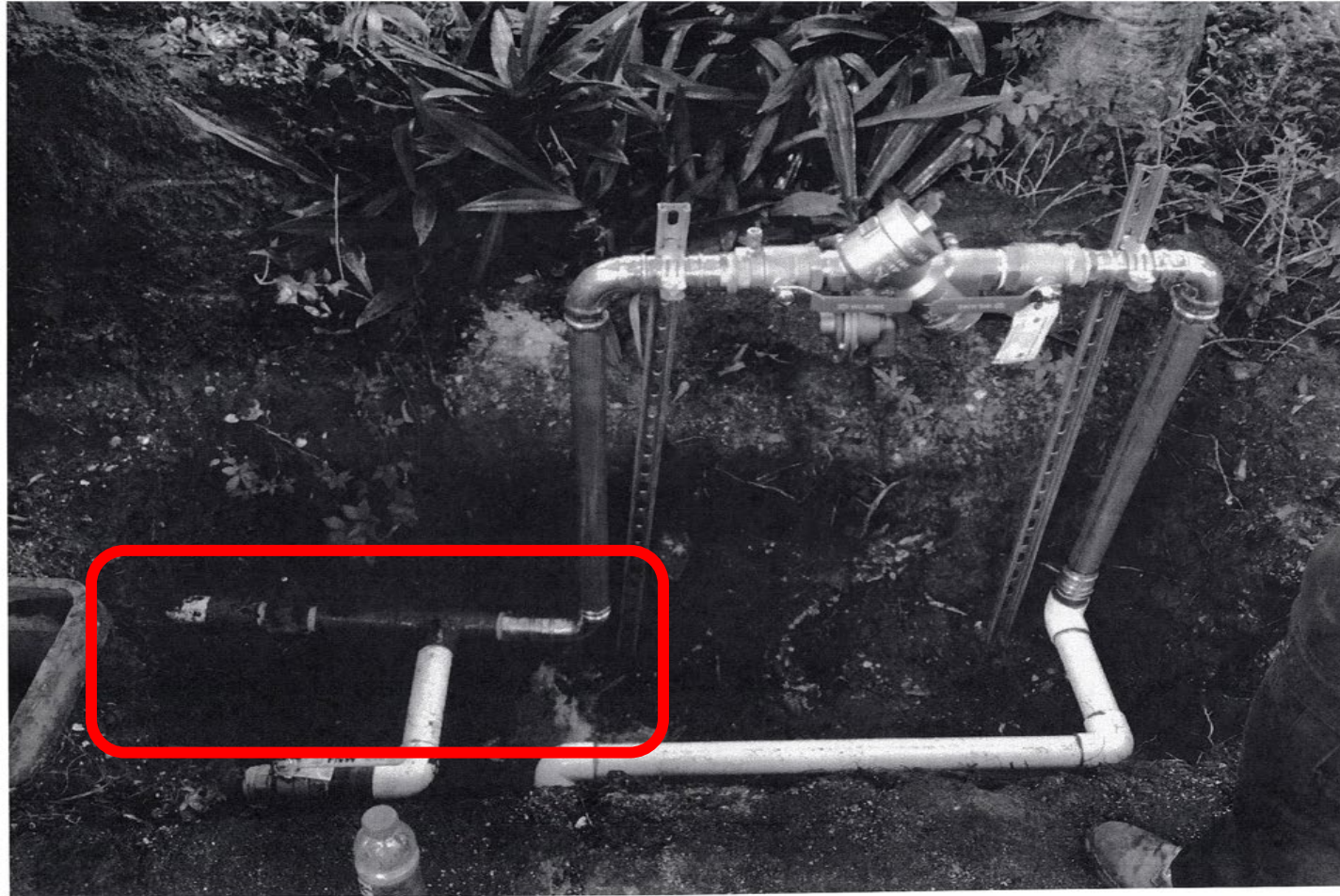


# View Device Details

- Track all device details
- Search on individual device or groups of devices
- Export all data when desired
- Automated device data updates
- Generate custom letters for devices or groups of devices
- Assign devices to internal testers for testing
- Plot device locations on a map
- Review Pictures Submitted by Testers



# Unauthorized Cross Connection Identified by Picture Submitted by Backflow Tester



# Completed Test Form with Automated Process

## Test Forms

- Get Digital Version of Existing Form
- Forms Should be Customizable
- Forms to be Emailed or Text to Customer
- Pre-Populate Device and Customer Data
- Simple Easy Data Entry for Testers
- Test Forms filled without Data Connection
- Run Custom Reports on all Tests
- Capture, pictures, signatures, gps, bar code

NEW YORK STATE DEPARTMENT OF HEALTH  
Bureau of Public Water Supply Protection  
Empire State Plaza - Corning Tower Room 1110  
Albany, NY 12237

**Report on Test and Maintenance of Backflow Prevention Device**

**PART A** Please use a separate form for each device. For the year 2019  
 Initial test - Complete entire form  
 Annual test - Complete Part A only

Public Water Supply: MANHASSET LAKEVILLE WATER DISTRICT Account No. 50606701 County: NASSAU Block: 98 Lot: 70

Facility Name: TAO JIANG & HAIYAN MO Location of Device: Meter pit  
 Address: 38 SOMERSET DR S SPKLR, GREAT NECK, 11020  
 Street City Zip

Device Information: Manufacturer FEBCO Type:  RPZ  DCV Model 850 Size (in inches) 1 Serial Number HB15398

	Check Valve No. 1	Check Valve No. 2	Differential Pressure Relief Valve	Line Pressure <u>100</u> psi
<b>Test before repair</b>	Leaked <input checked="" type="checkbox"/> Closed tight Pressure drop across first check valve <u>2.4</u> psid	Leaked <input type="checkbox"/> Closed tight <input checked="" type="checkbox"/>	Opened at _____ psid	Date: <u>06</u> / <u>13</u> / <u>19</u> M D Y
<b>Describe repairs and materials used</b>				Repaired by _____ Lic # _____ Date repaired: _____ M D Y
<b>Final test</b>	Closed tight <input type="checkbox"/> Pressure drop across first check valve _____ psid	Closed tight <input type="checkbox"/>	Opened at _____ psid	Date: <u>06</u> / <u>13</u> / <u>19</u> M D Y

Water Meter Number: 78606429 Meter Reading: 422620449 Type of Service: (check one)  
 Domestic  Fire  Other irrigation

Remarks (Describe deficiencies: bypasses, outlets before the device, connections between the device and point of entry, missing or inadequate airgaps, etc.)

Certification: This device  meets,  does NOT meet, the requirements of an acceptable containment device at the time of testing  
 I hereby certify the foregoing data to be correct.  
 Eileen curley 866 Signature: [Signature] Expiration Date: 02 / 27 / 2022  
 Print Name Certified Tester No. Telephone

Property owners (or owners agent) certification that test was performed:  
 TAO JIANG & HAIYAN MO Title: [Signature] Telephone: 5167709039  
 Print Name Title Signature Telephone

**PART B** Certification that installation is in accordance with the approved plans. (To be completed by the design engineer or architect or water supplier.)

I hereby certify that this installation is in accordance with the approved plans.

Name \_\_\_\_\_ Title \_\_\_\_\_ Date: \_\_\_\_\_ NYS DOH Log # \_\_\_\_\_  
 License Number \_\_\_\_\_ Phone ( ) \_\_\_\_\_ m d y

Representing \_\_\_\_\_ Describe minor installation changes \_\_\_\_\_  
 Address \_\_\_\_\_  
 City \_\_\_\_\_ State \_\_\_\_\_ Zip \_\_\_\_\_  
 Signature \_\_\_\_\_

NOTE: Send one completed copy to the designated health department representative and one copy to the water supplier within 30 days of the testing device. Notify owner and water supplier immediately if device fails test and repairs cannot immediately be made. DOH- 1013(9/91)

# Data Integration to 3<sup>rd</sup> Party Software

SHARE DATA BETWEEN BACKFLOW AND OTHER  
SOFTWARE WITHIN THE UTILITY  
(3 OPTIONS...)

1. Manual Data Entry – Not really an option
2. File Transfer/Automated File Transfer
3. Applications Programming Interface (API)



# How Automated Software Technology Helps Utilities Improve Backflow Programs?



**Save Money**

---



**Save Time**

---



**Full Compliance**

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The Alternative to Managing Your Cross-Connection Program Manually. Simple, Easy, and Potentially FREE!



THANK YOU

