Smart Management for Small Water Systems

Making Money Saving Water

June 28, 2018 | Lubbock, TX

www.efcnetwork.org

EFCN environmental finance center network

NADO NATIONAL ASSOCIATION OF DEVELOPMENT ORGANIZATIONS

GFOA Government Finance Officers Association

This program is made possible under a cooperative agreement with the U.S. EPA.

About the Environmental Finance Center Network (EFCN)

The Environmental Finance Center Network (EFCN) is a university-based organization creating innovative solutions to the difficult how-to-pay issues of environmental protection and improvement. The EFCN works with the public and private sectors to promote sustainable environmental solutions while bolstering efforts to manage costs.

The Smart Management for Small Water Systems Program

This program is offered free of charge to all who are interested. The Program Team will conduct activities in every state, territory, and the Navajo Nation. All small drinking water systems are eligible to receive free training and technical assistance.

What We Offer

Individualized technical assistance, workshops, small group support, webinars, eLearning, online tools & resources, blogs

The Small Systems Program Team

- Environmental Finance Center at The University of North Carolina at Chapel Hill
- Southwest Environmental Finance Center at the University of New Mexico
- Syracuse University Environmental Finance Center
- Environmental Finance Center at Wichita State University
- EFC West
- Environmental Finance Center at the University of Maryland
- New England Environmental Finance Center at the University of Southern Maine
- Great Lakes Environmental Infrastructure Center
- Government Finance Officers Association (GFOA)
- National Association of Development Organizations (NADO)

UNC Environmental Finance Center

Southwest Environmental Finance Center

Environmental Finance Center, Syracuse University

Wichita State University, Hugo Wall School of Public Affairs, Environmental Finance Center

EFCWest, Environmental Finance Center West

University of Maryland Environmental Finance Center

New England Environmental Finance Center

Government Finance Officers Association

NADO, National Association of Development Organizations

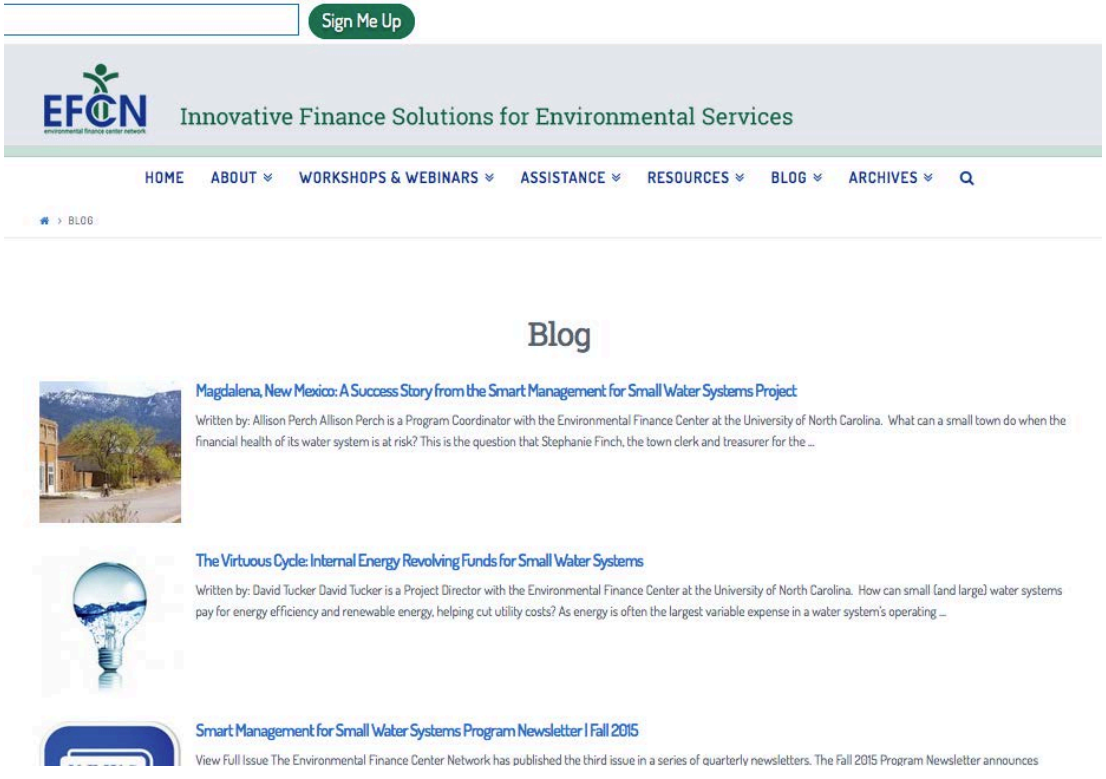
Areas of Expertise

- Asset Management
- Rate Setting and Fiscal Planning
- Communication and Decision-Making Strategies
- Water Loss Control
- Controlling Energy Costs
- Accessing Infrastructure Financing Programs
- Workforce Development
- Water Conservation Finance and Management
- Collaborating with Other Water Systems
- Resiliency Planning
- Managing Drought

Small Systems Blog

Learn more about water finance and management through our Small Systems Blog! Blog posts feature lessons learned from our training and technical assistance, descriptions of available tools, and small systems “success stories.”

efcnetwork.org/small_systems_blog/



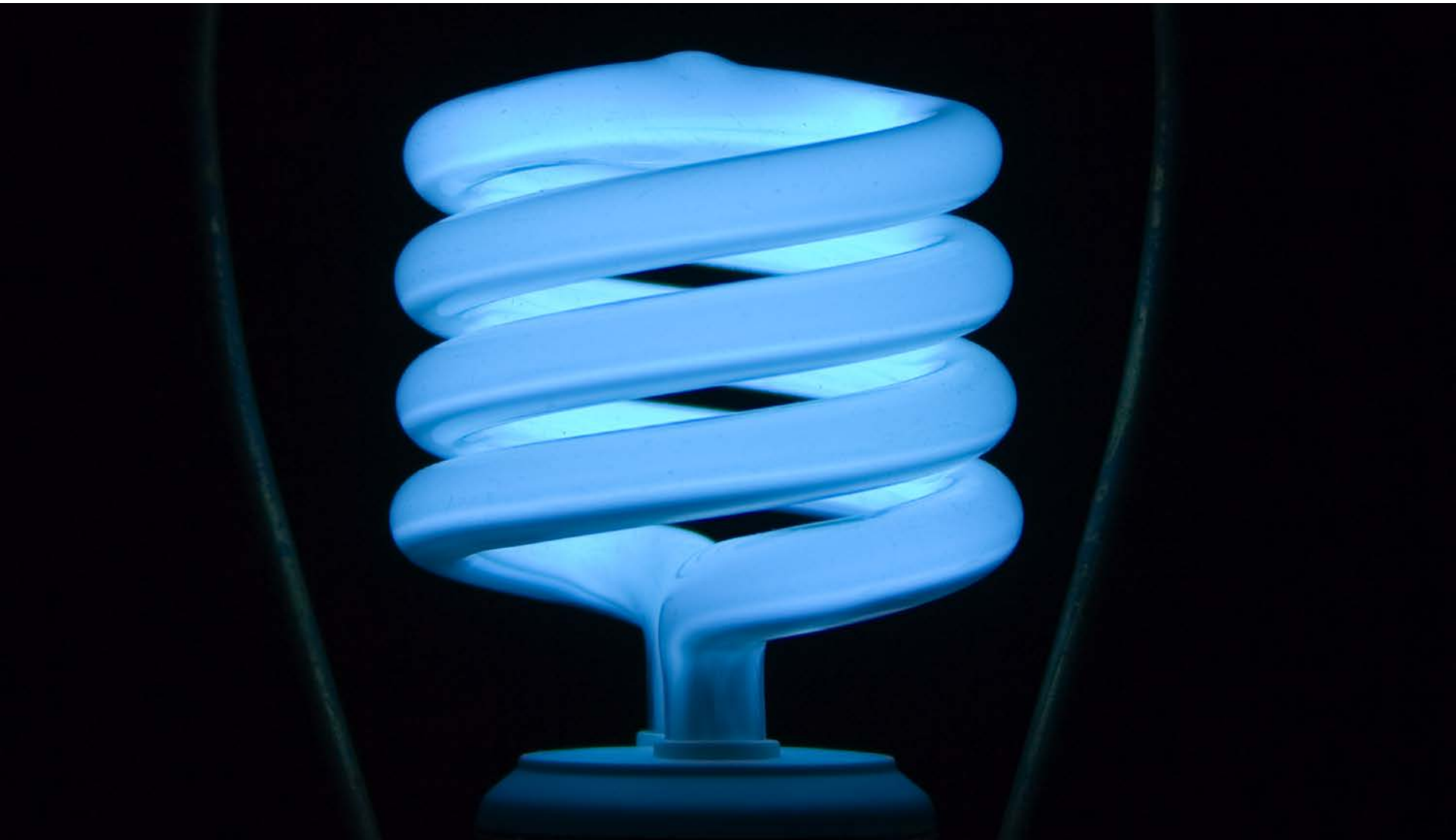
SOUTHWEST
ENVIRONMENTAL
FINANCE CENTER

SCHOOL OF
ENGINEERING

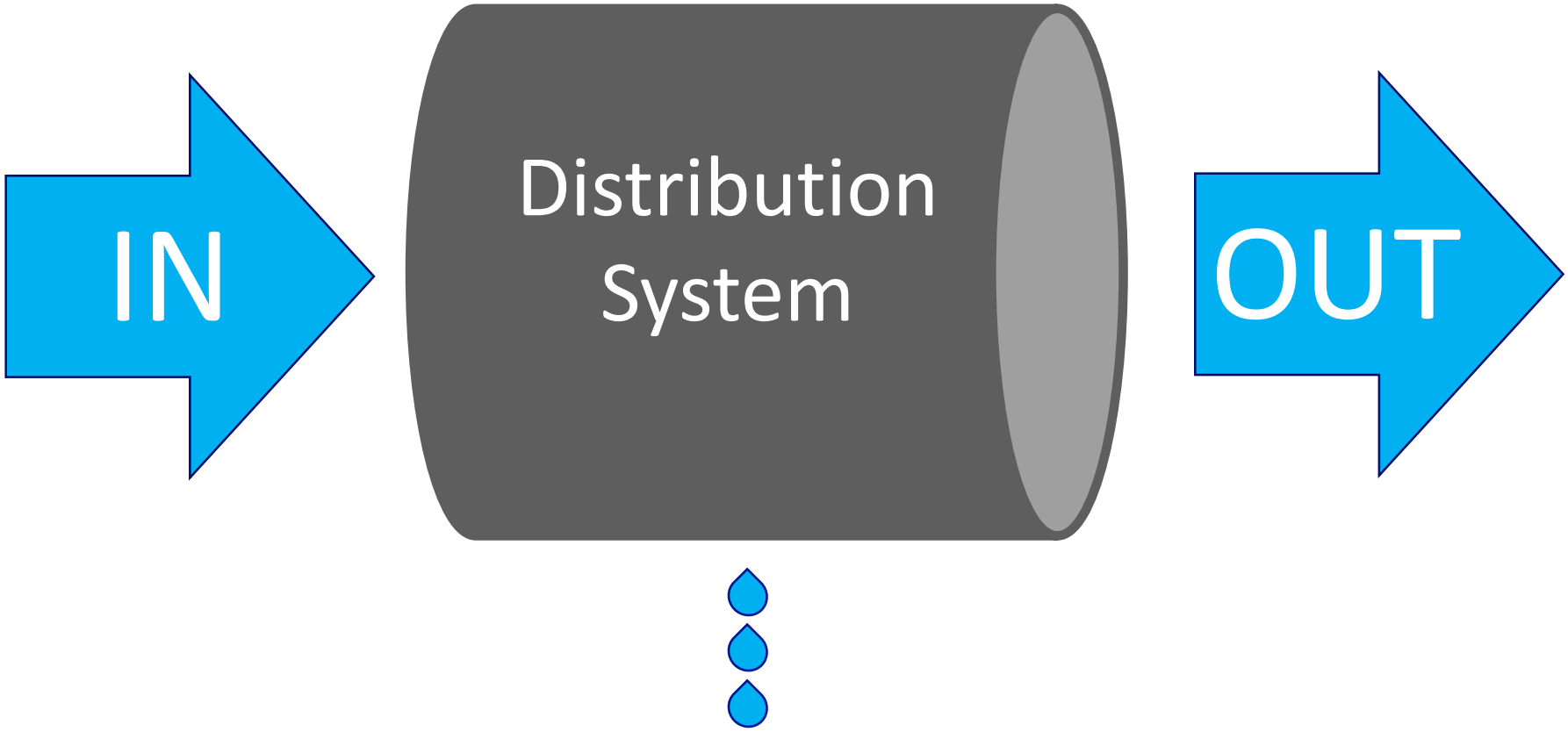
Understanding Non-Revenue Water

Understanding the water balance …

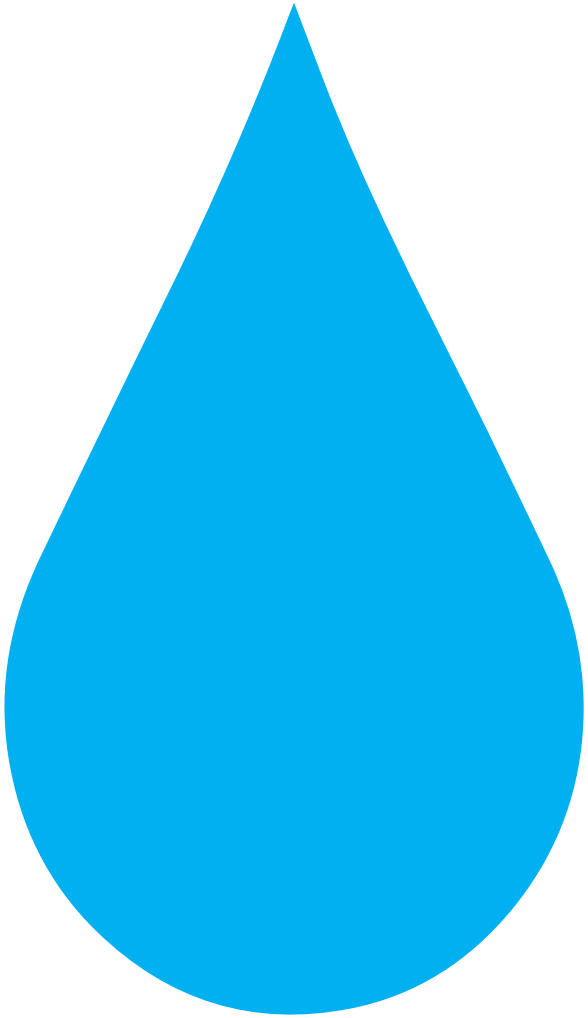
What’s the Big Idea?



What goes in, comes out … somewhere



You’re either getting paid …



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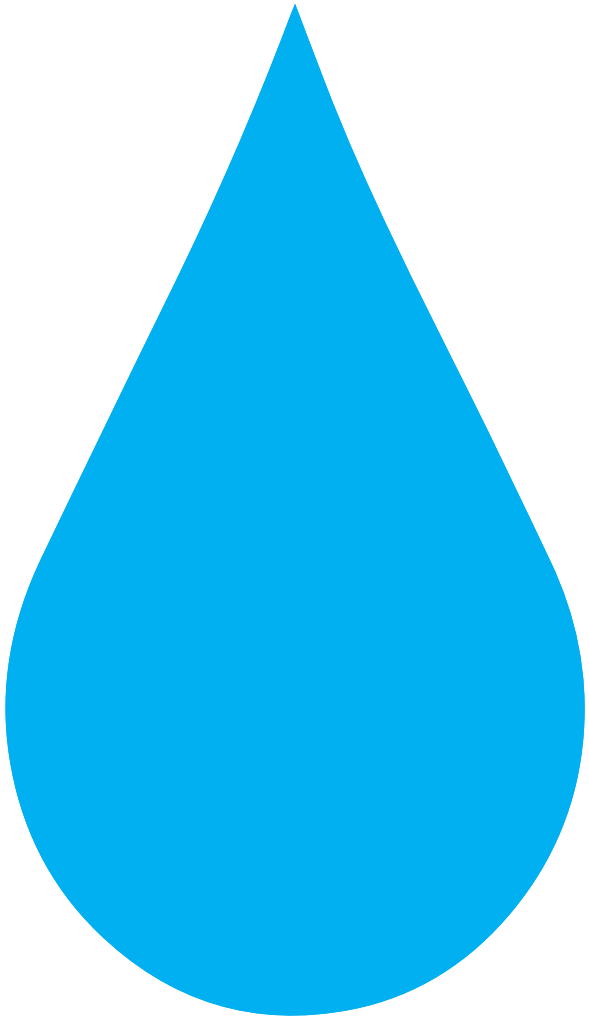
Or you're not.



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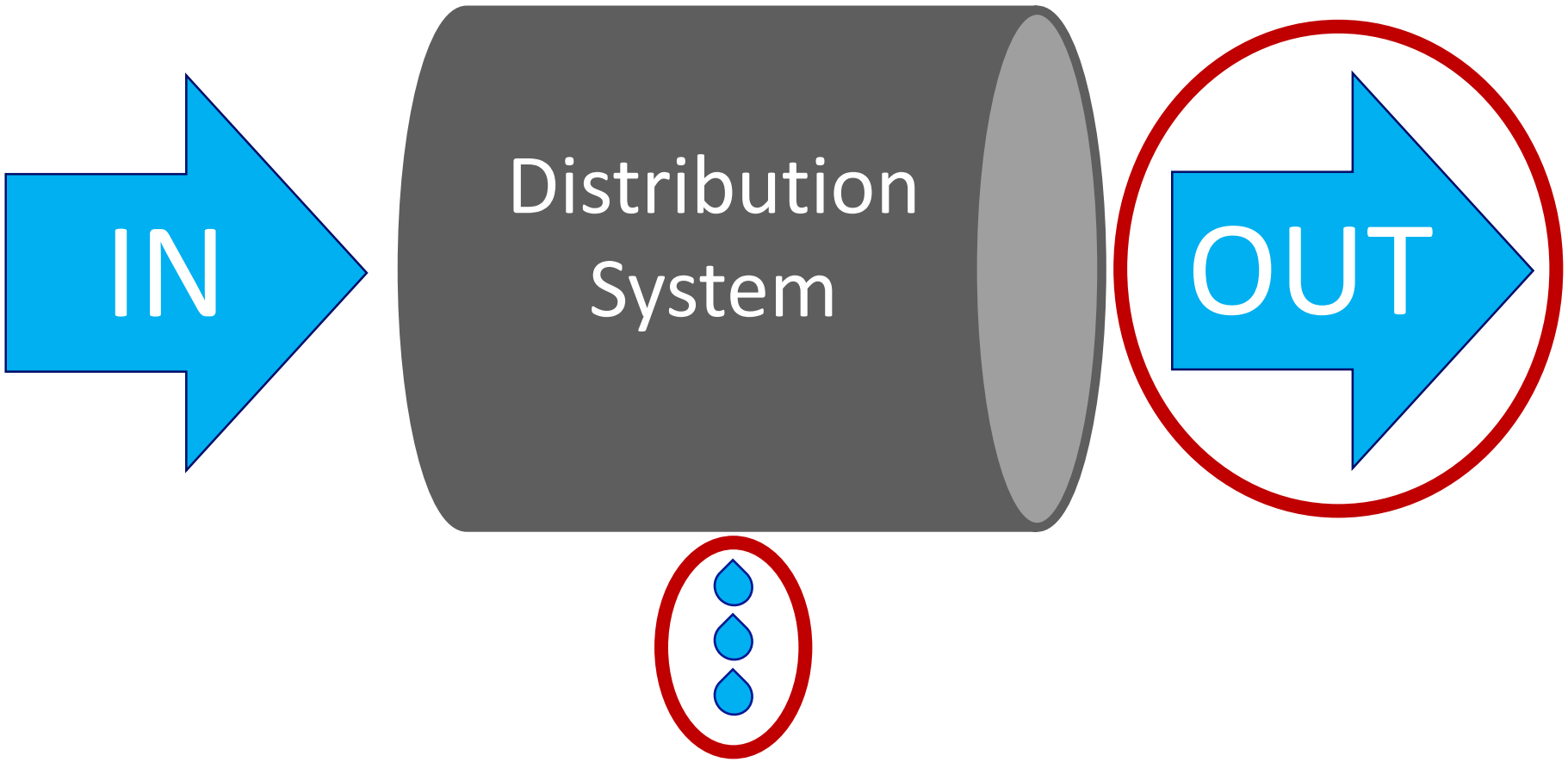
It’s a BLUE and GREEN problem …

It’s a BLUE and GREEN problem …

Water that isn’t going where we want it to.

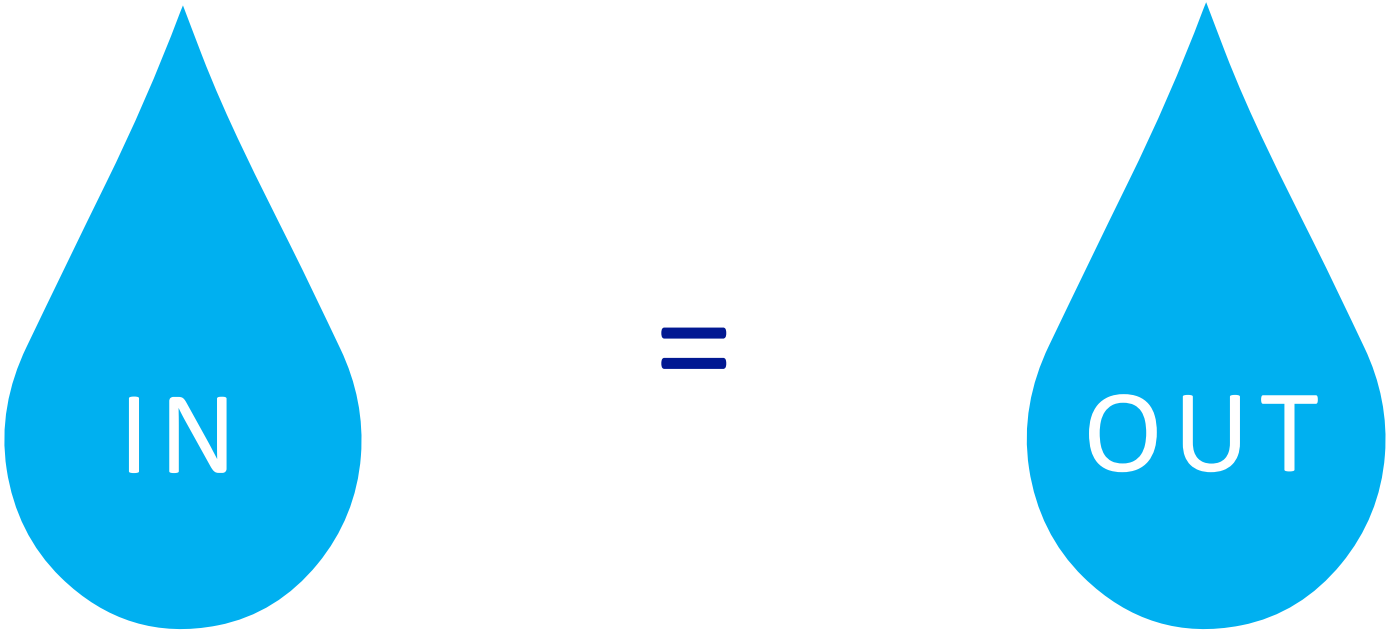
Money that we’re not getting but could be.

We need a way to estimate:



What is the cost of losses?

The Water Balance:



The Water Balance: System Inputs

Volume From Own sources

Or

Imported Water

Or

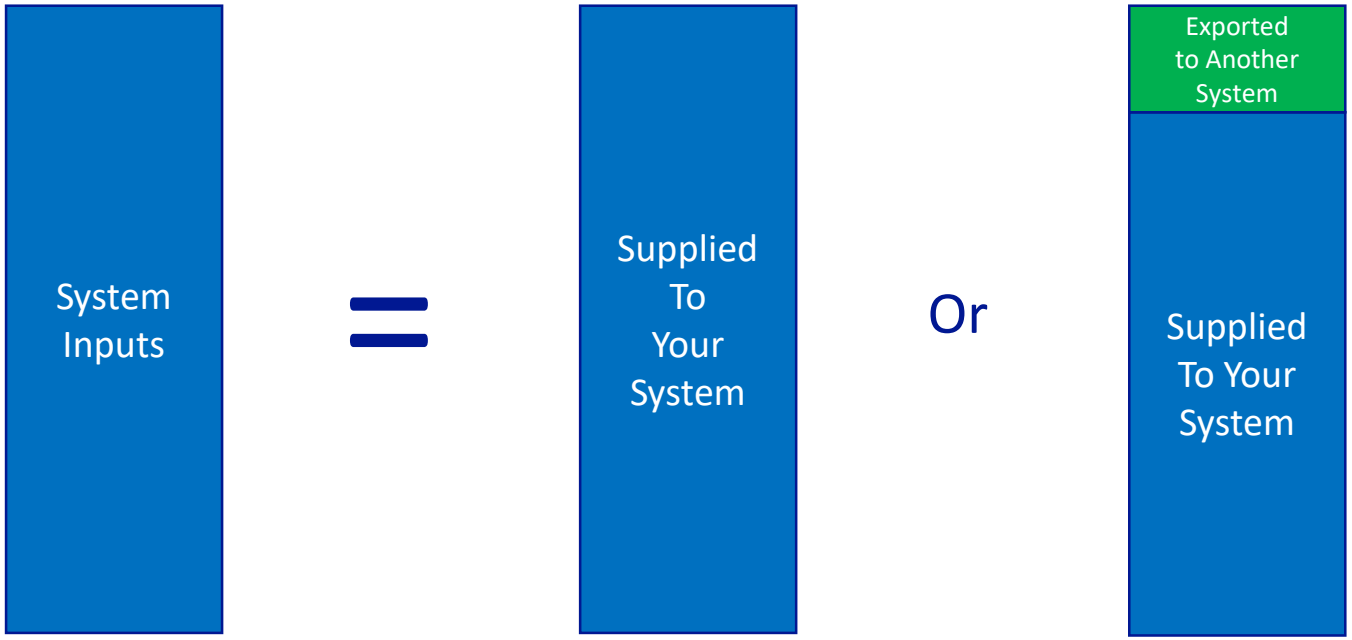
Imported Water

Volume From Own Sources

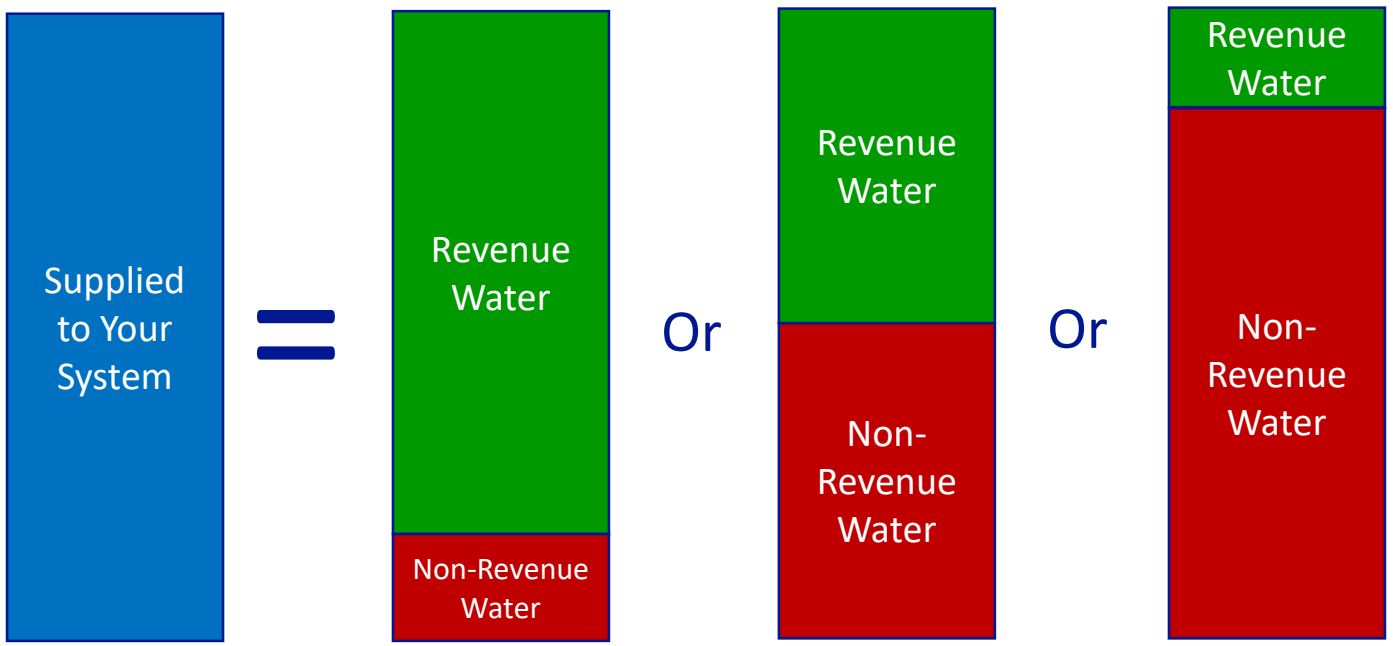
=

System Inputs

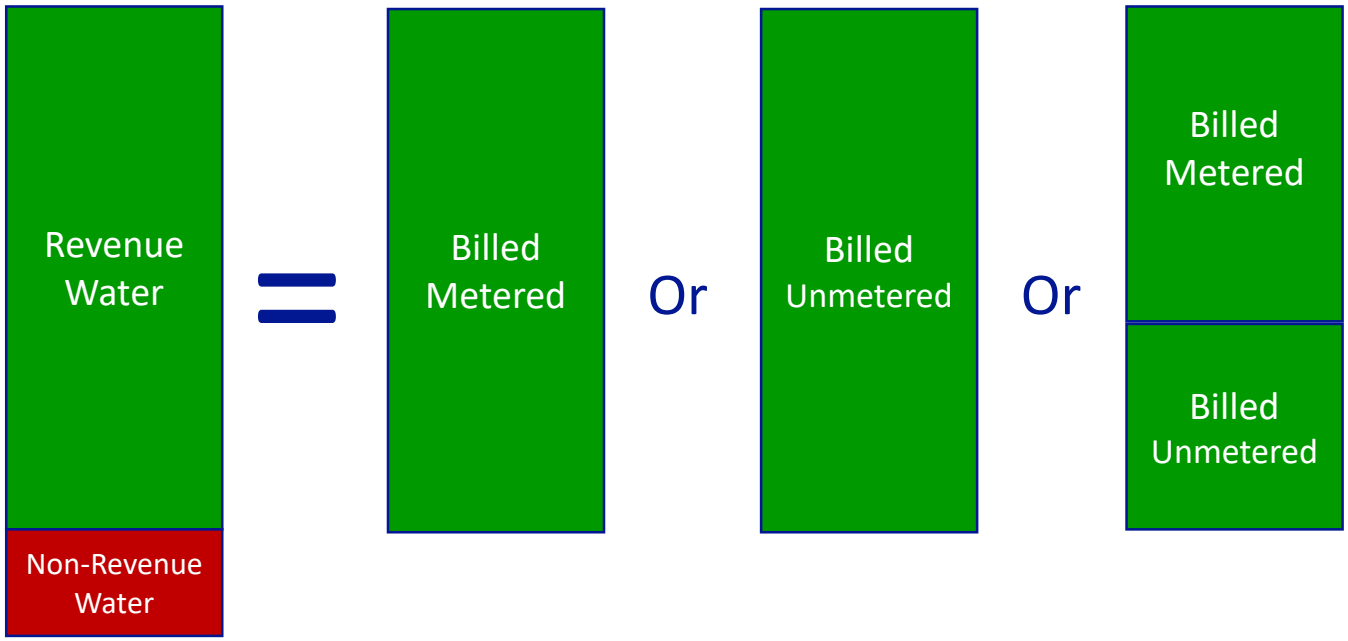
System Inputs are supplied or exported



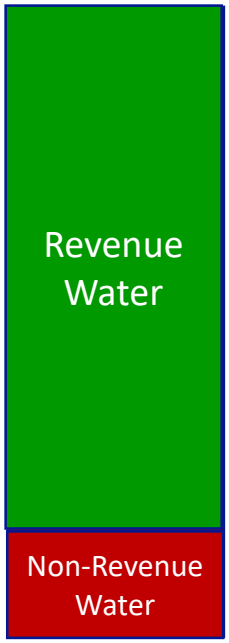
Water either generates revenue, or not …



Revenue Water… Billed & Authorized



Let’s focus on Non-Revenue Water …



Non-revenue water has 3 main components

Non-Revenue Water

=

Broken down further…

=

A bit about terminology…

Theft & Errors = Apparent Losses

NOT PHYSICAL LOSSES

- Water reaches a user
- Volumes are not counted
- Water does not generate revenue

VALUED AT THE PRICE YOU CHARGE CUSTOMERS

And a bit more …

Main Leaks
Service Line Leaks
Storage Leaks & Overflows

=

Real Losses

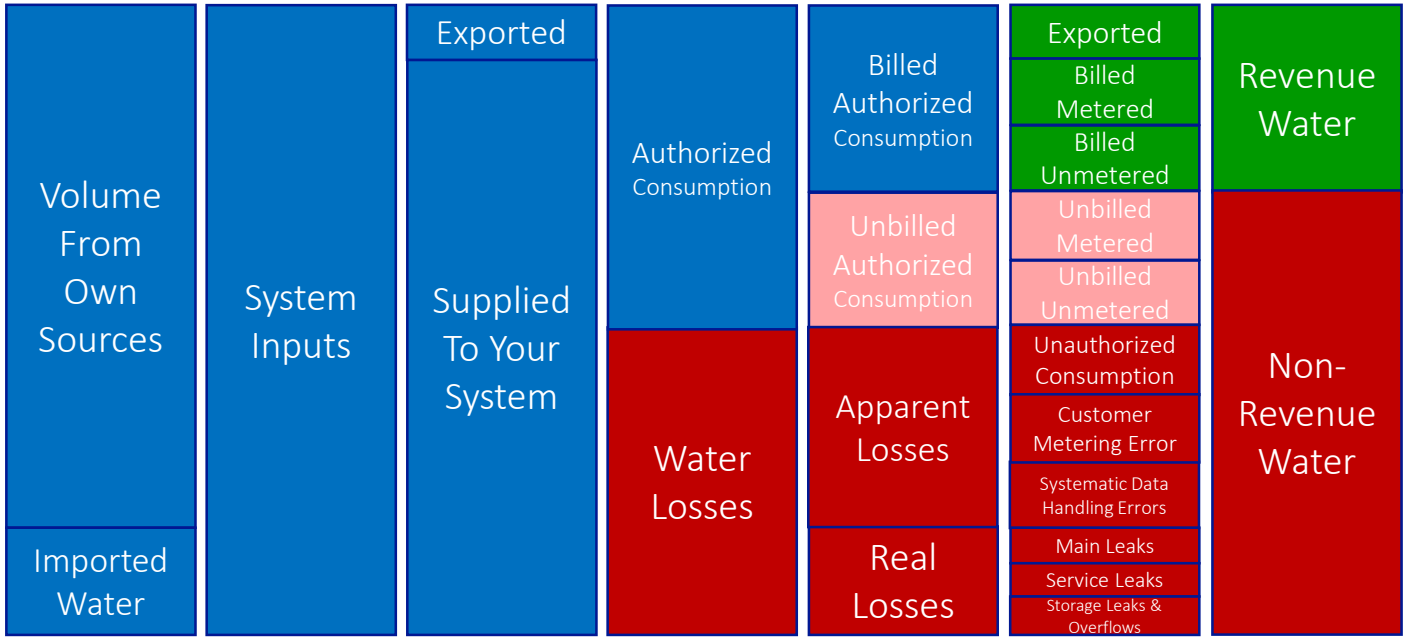
ARE PHYSICAL LOSSES

- Water did not reach a customer
- Difficult if not impossible to measure
- Water does not generate revenue

VALUED AT THE PRICE OF PRODUCTION

You CAN'T directly charge for losses, but all customers pay indirectly

Put together… in a slightly different order …



Remember…

Water that isn’t going where we want it to.

Money that we’re not getting but could be.

THE AWWA WATER AUDIT SOFTWARE

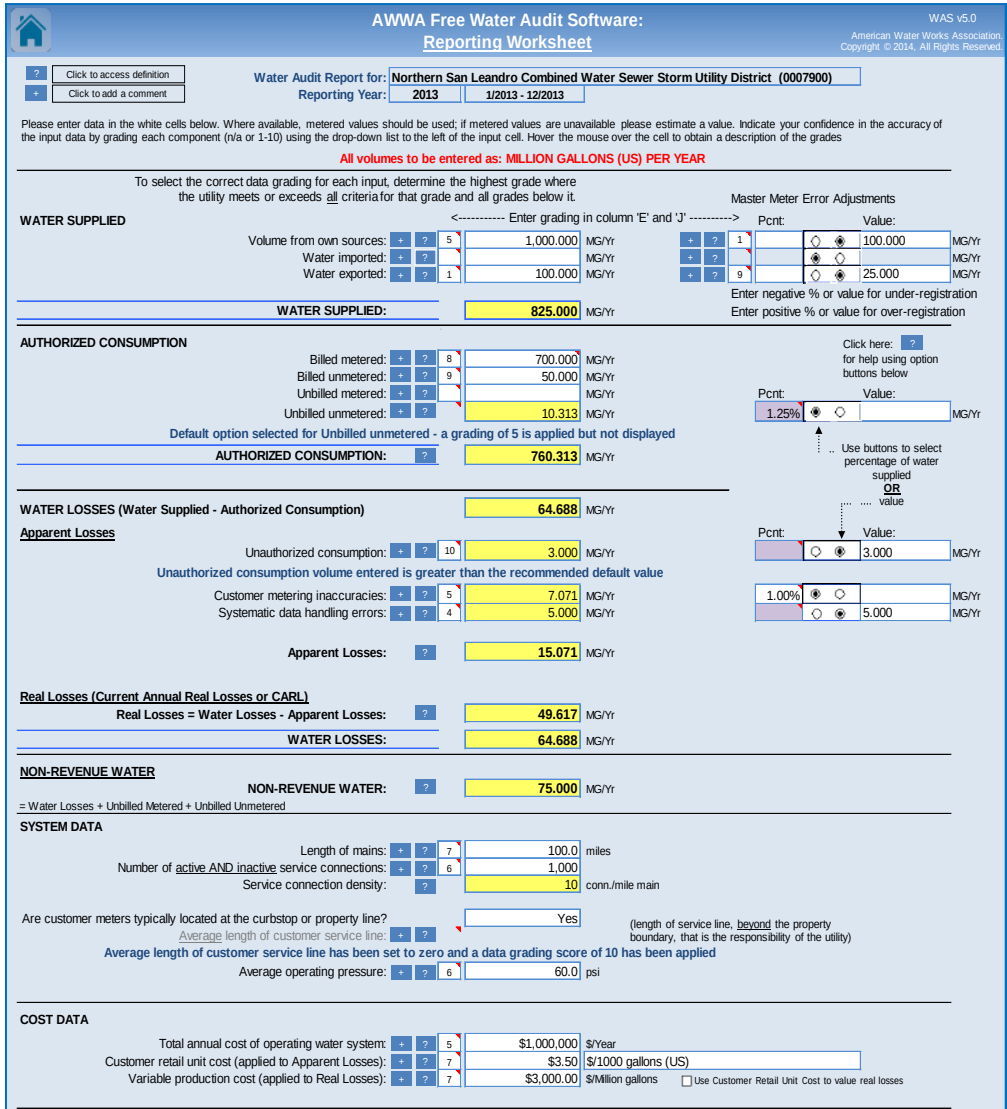
American Water Works Association

Industry Standard (M36)

Free

Excel based

http://awwa.org/waterlosscontrol



Texas Water Development Board

Texas Water Development Board

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Water Loss Audit

Leak Detection | Water Loss Audit Resources | FAQs

Water Loss Audit (New Users)

Water Loss Audit (Registered Users)

The Water Loss Audit should be completed online. The online worksheet should be completed by a responsible party and/or a designated user for the utility. To access the Water Loss Audit Worksheet online you must first register by creating a username and password. The New User link will direct you to that page. Once you have created a username and password, you may use the Registered User link to request access to a particular utility. Once access is approved by TWDB staff you will receive a confirmation by email granting access.

- Best Management Practices
- Agriculture
- Literature
- Resources
- Education
- Outreach
- Municipal

- Water Conservation Plans
- Water Conservation Plan ~ Utility Profile

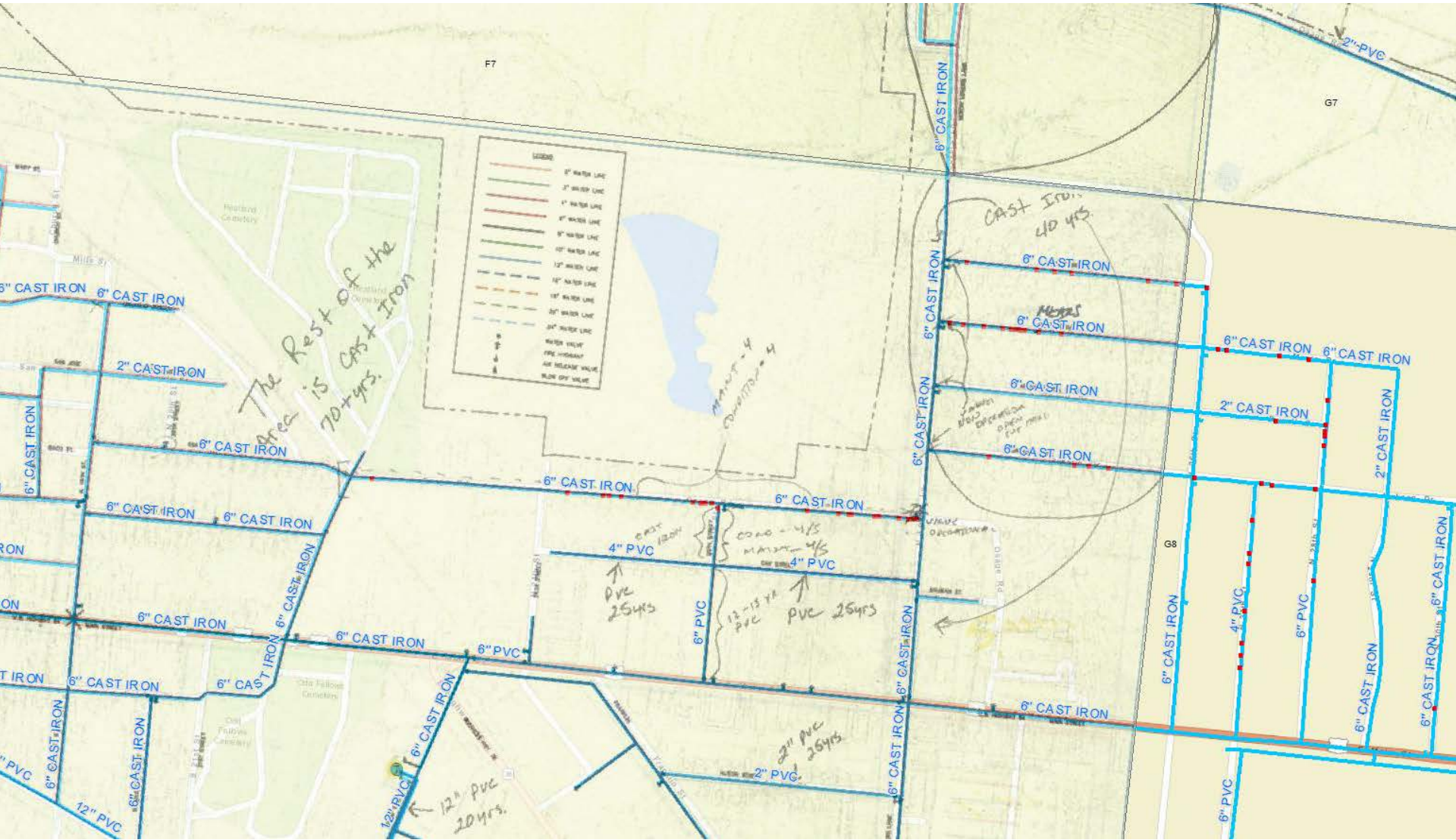
www.twdb.texas.gov/conservation/municipal/waterloss/index.asp

DATA CATEGORIES:

Water supplied to your system

Water supplied to customers

System characteristics



Financial information

Other information

With this data you can calculate Non-Revenue Water

Setting Parameters

Audit Timeframe:

The Audit covers a 1 year period

Can be calendar or fiscal year

Pick one and stick with it

Setting Parameters

Audit Boundaries:

The Audit covers a specific area

Can be whole system or part

Have defined entry & exit points

Setting Parameters

Consistent Units of Measure:

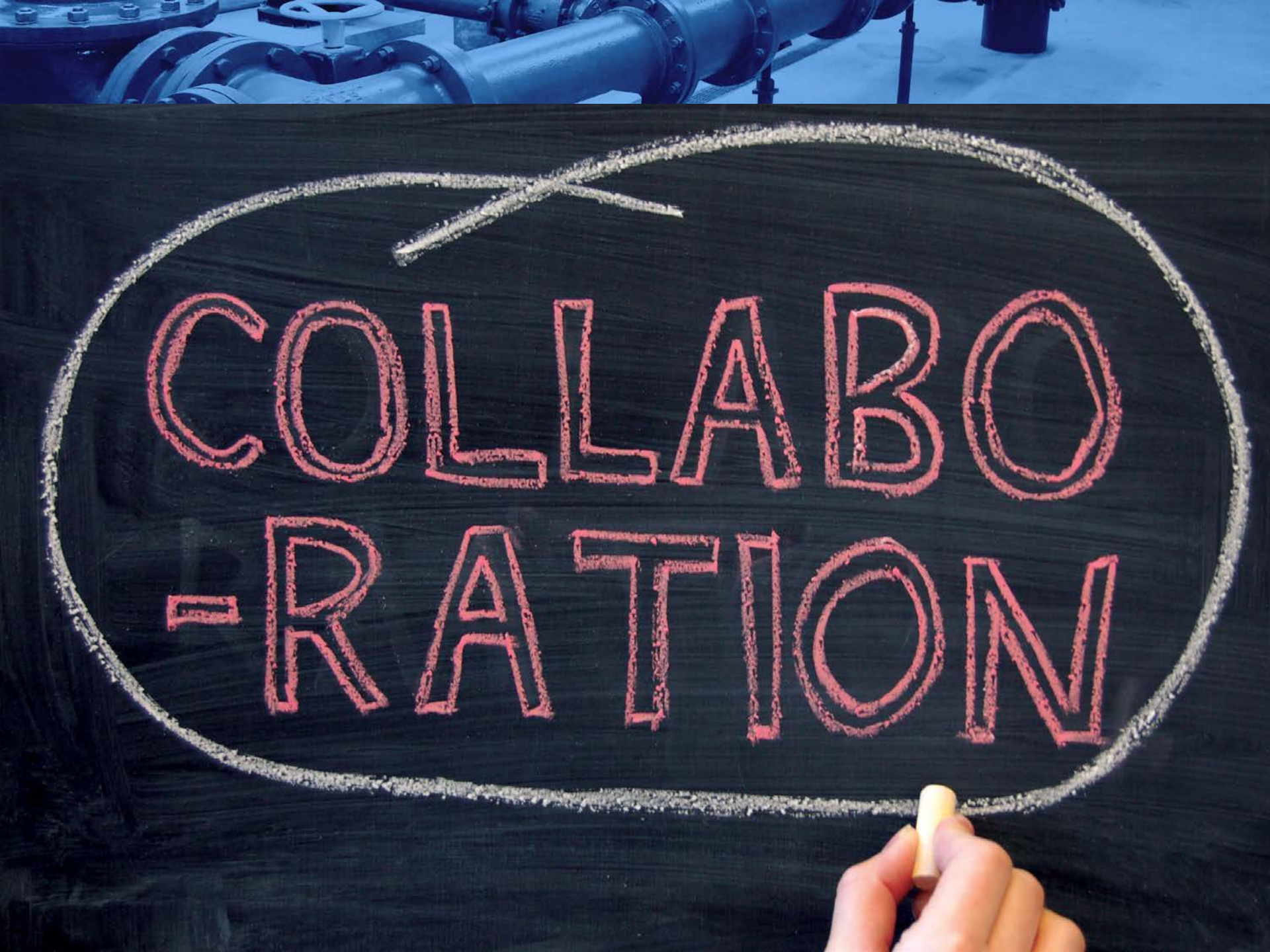
Use Millions of Gallons, or

Megaliters, or

Acre Feet

Considerations:

START SOMEWHERE
AND
DO WHAT YOU CAN

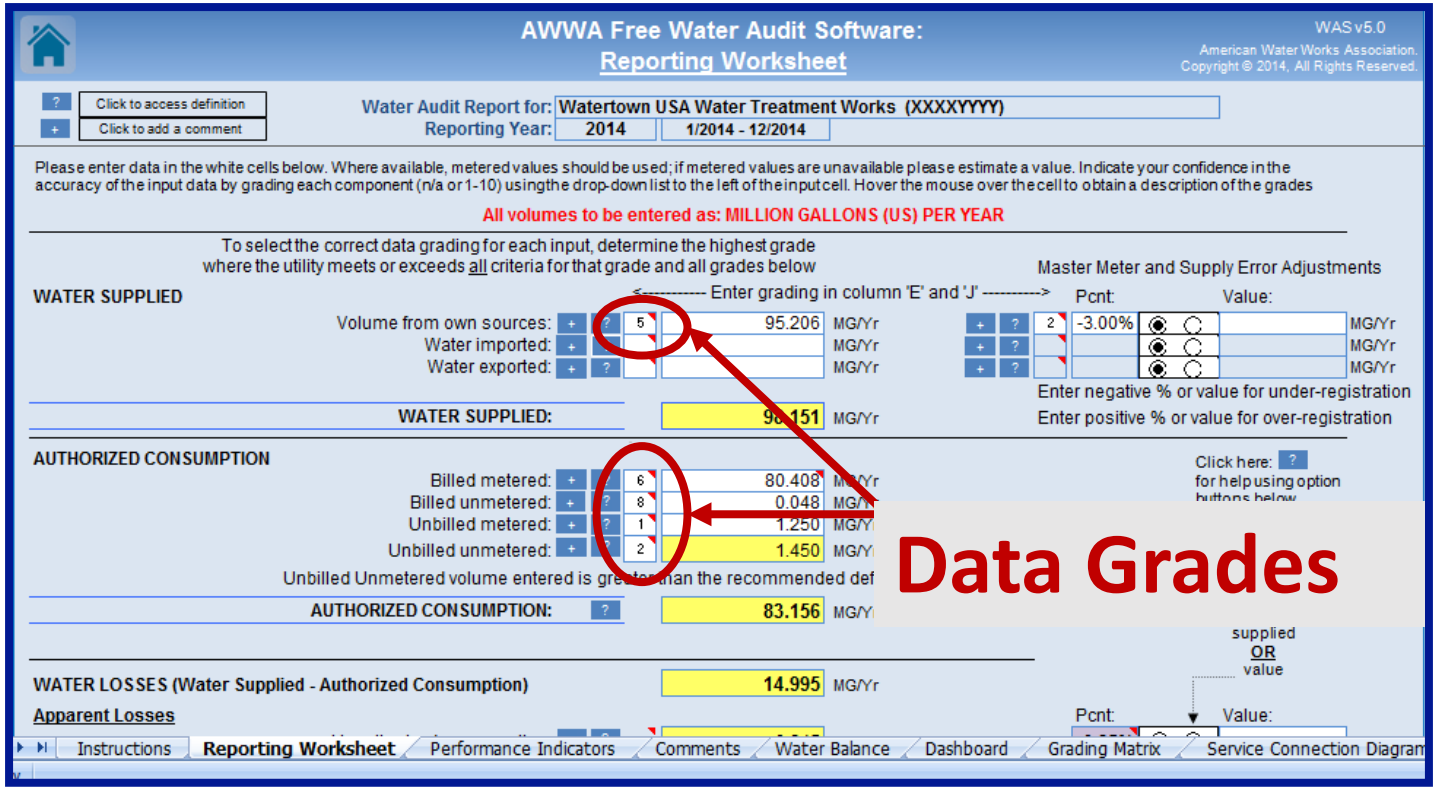

COLLABO
-RATION

Is the data you obtain going to be completely acurate?

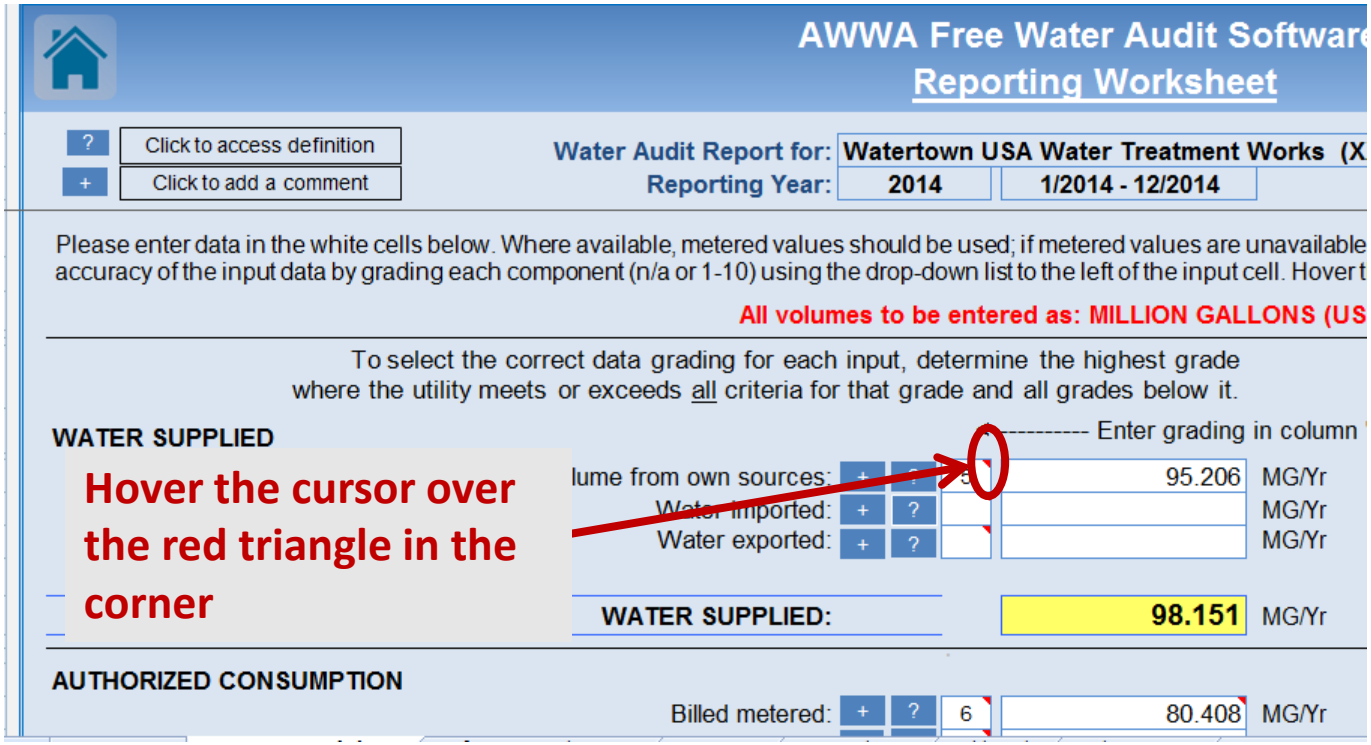
Why or why not?

Data Grades

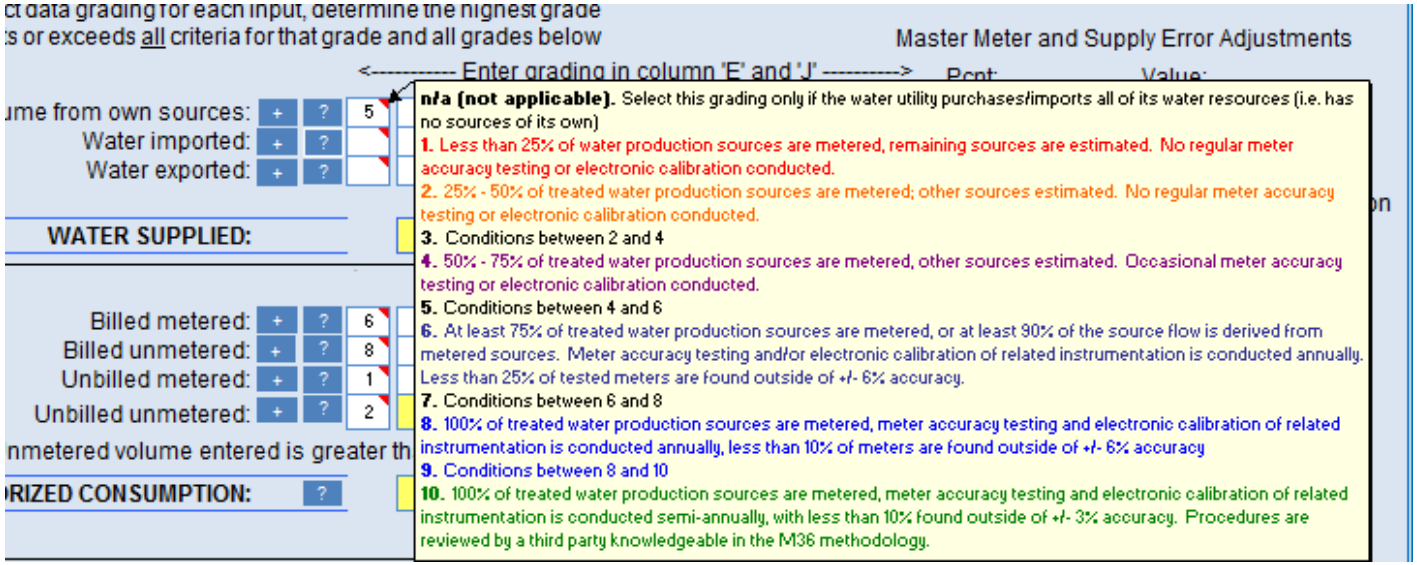
Data Grade Entry …



What Grade Should I Use?



What Grade Should I Use?

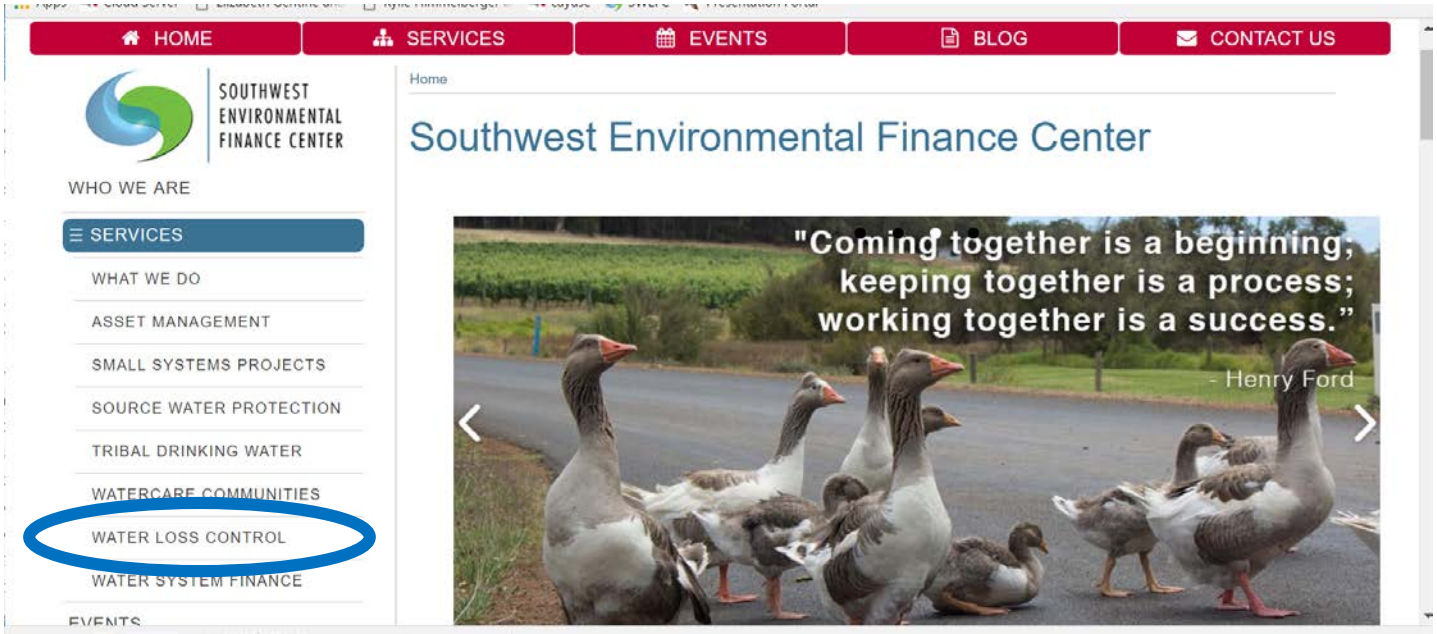


The Data Grades will show up in a pop-up box.

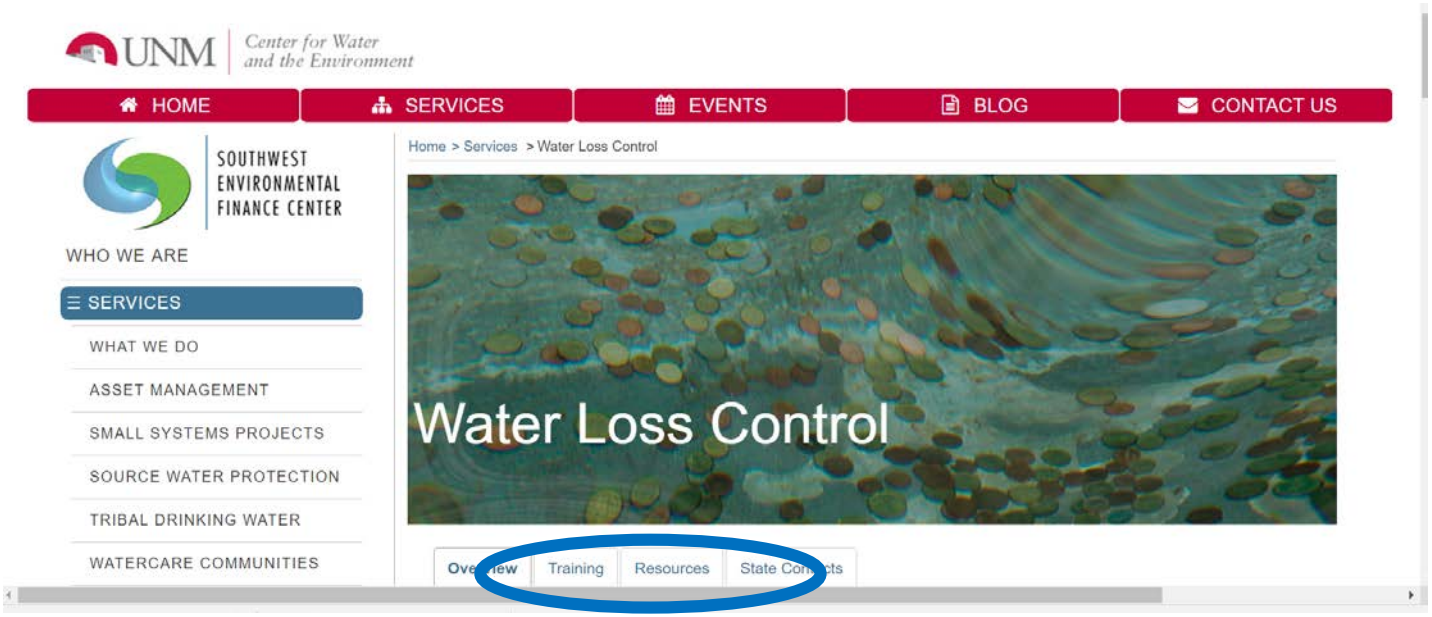
An Easier Way …

Volume from own sources		
GRADE	✓	DESCRIPTION
n/a		Select this grading only if the water utility purchases/imports all of its water resources (i.e. has no sources of its own)
1		Less than 25% of water production sources are metered, remaining sources are estimated.
		No regular meter accuracy testing or electronic calibration conducted.
2		25% - 50% of treated water production sources are metered; other sources estimated.
		No regular meter accuracy testing or electronic calibration conducted.
3		Conditions between 2 and 4
4		50% - 75% of treated water production sources are metered, other sources estimated.
		Occasional meter accuracy testing or electronic calibration conducted
5		Conditions between 4 and 6
6		At least 75% of treated water production sources are metered, or at least 90% of the source flow is derived from metered sources.
		Meter accuracy testing and/or electronic calibration of related instrumentation is conducted annually.
		Less than 25% of tested meters are found outside of +/- 6% accuracy.
7		Conditions between 6 and 8
8		100% of treated water production sources are metered,
		Meter accuracy testing and electronic calibration of related instrumentation is conducted annually,
		Less than 10% of meters are found outside of +/- 6% accuracy
9		Conditions between 8 and 10
10		100% of treated water production sources are metered,
		Meter accuracy testing and electronic calibration of related instrumentation is conducted semi-annually, with less than 10% found outside of +/- 3% accuracy.
		Procedures are reviewed by a third party knowledgeable in the M36 methodology

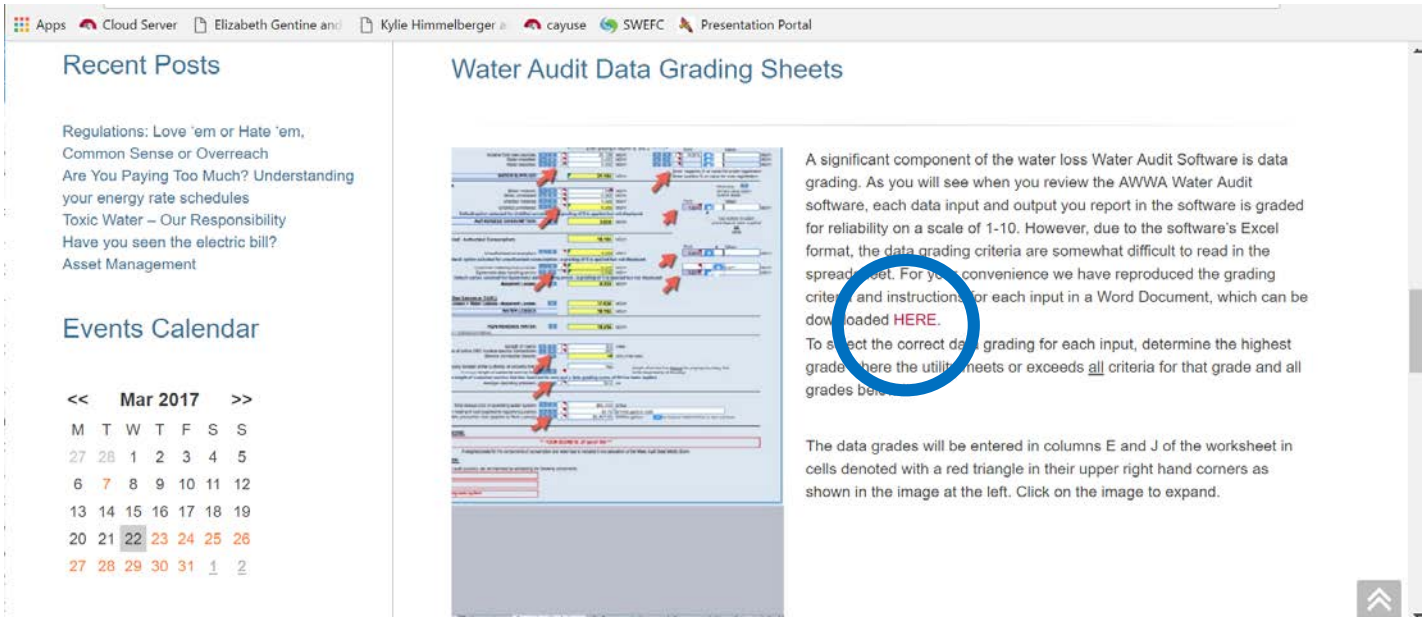
An Easier Way …



An Easier Way …



An Easier Way …



A New (Beta) Grading Tool …

Southwest Environmental Finance Center

WATER LOSS AUDIT DATA VALIDITY WORKSHEET

BETA Ver. 0.4 Date: 4/12/2017
ADAPTED FROM THE AWWA WATER AUDIT SOFTWARE 2016

	A	B	C	D
5	**DV01**	**VOLUME FROM OWN SOURCES:**		
6	**No.**	**Question**	**Answer (Select most appropriate answer from pull down menu):**	
7	1	Does your utility import/purchase ALL of it's water supply (i.e.utility has no sources of its own)		
8	2	What percentage of your water production sources are metered?		
9	3	How often are the meters tested and/or calibrated for accuracy?		
10	4	If you test your meters, how accurate are they?		
11	5	Are your procedures reviewed by a 3rd party knowledgeable about M36 methodology?		
12			**Data Validity Score:**	**0**
13				
14	**DV02**	**VOLUME FROM OWN SOURCES MASTER METER AND SUPPLY ERROR ADJUSTMENT:**		
15	**No.**	**Question**	**Answer (Select most appropriate answer from pull down menu):**	
16	1	Are your sources of supply metered?		
17	2	How are tank/storage elevation changes employed in calculating 'volume from own sources' component?		
18	3	How is your production supply volume logged and reviewed?		
19	4	How and when is source meter data adjusted to account for error?		
20	5	N/A - Leave answer field blank		
21			**Data Validity Score:**	**0**

A New (Beta) Grading Tool …

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BETA Ver. 0.4 Date: 4/12/2017
ADAPTED FROM THE AWWA WATER AUDIT SOFTWARE 2016

	A	B	C	D
1				
2				
3				
4				
5	**DV01**	**VOLUME FROM OWN SOURCES:**		
6	**No.**	**Question**	**Answer (Select most appropriate answer from pull down menu):**	
7	1	Does your utility import/purchase ALL of it's water supply (i.e.utility has no sources of its own)	1 - Yes (SKIP REST OF QUESTION 1 AND PROCEED TO DV03)	
8	2	N/A - Leave answer field blank		
9	3	N/A - Leave answer field blank		
10	4	N/A - Leave answer field blank		
11	5	N/A - Leave answer field blank		
12			**Data Validity Score:**	**N/A**
13				
14	**DV02**	**VOLUME FROM OWN SOURCES MASTER METER AND SUPPLY ERROR ADJUSTMENT:**		
15	**No.**	**Question**	**Answer (Select most appropriate answer from pull down menu):**	
16	1	N/A - Leave answer field blank		
17	2	N/A - Leave answer field blank		
18	3	N/A - Leave answer field blank		
19	4	N/A - Leave answer field blank		
20	5	N/A - Leave answer field blank		
21			**Data Validity Score:**	**N/A**

Be Honest About Grading

1hon·est \'ä-nəst\ *adj* [ME, fr. AF, fr. L *honestus* honorable, fr. *honos, honor* honor] **1** : free from deception : TRUTHFUL; *also* : GENUINE, REAL **2** : REPUTABLE **3** : CREDITABLE ⟨an ~ day's work⟩ **4** : marked by integrity **5** : FRANK ◆ ***Synonyms*** UPRIGHT, JUST, CONSCIENTIOUS, HONORABLE — **hon·est·ly** *adv* — **hon·es·ty** \-nə-stē\ *n*

The right data grade accurately reflects your practices.

Overall Data Validity Score

AWWA Free Water Audit Software:
Reporting Worksheet

WAS v5.0
American Water Works Assoc
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? Click to access definition
\+ Click to add a comment

Water Audit Report for: Watertown USA Water Treatment Works (XXXXYYYY)
Reporting Year: 2014 1/2014 - 12/2014

WATER AUDIT DATA VALIDITY SCORE:

*** YOUR SCORE IS: 49 out of 100 ***

A weighted scale for the components of consumption and water loss is included in the calculation of the Water Audit Data Validity Score

PRIORITY AREAS FOR ATTENTION:

Based on the information provided, audit accuracy can be improved by addressing the following components:

1: Volume from own sources
2: Unbilled metered
3: Customer metering inaccuracies

Your Data Validity Score

Overall Data Validity Score

AWWA Free Water Audit Software:
Reporting Worksheet

WAS
American Water Works A
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? Click to access definition
+ Click to add a comment

Water Audit Report for: Green Valley Water System (XXXXXXXX)
Reporting Year: 2012 1/2012 - 12/2012

COST DATA

Total annual cost of operating water system:	4	$400,000	$/Year	
Customer retail unit cost (applied to Apparent Losses):	1	$2.00	$/1000 gallons (US)	
Variable production cost (applied to Real Losses):	1	$2,000.00	$/Million gallons	Use Customer Retail Unit Cost to value real losse

Retail costs are less than (or equal to) production costs; please review and correct if necessary

WATER AUDIT DATA VALIDITY SCORE:

Add a grading value for 2 parameter(s) to enable an audit score to be calculated

PRIORITY AREAS FOR ATTENTION:

Based on the information provided, audit accuracy can be improved by addressing the following components:

1: Volume from own sources
2: Billed metered
3: Billed unmetered

If you miss any grades you will get a message

What Response To Low Scores?

AWWA Free Water Audit Software:
Reporting Worksheet

WAS v5.
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Overall Data Validity Score

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2: Unbilled metered
3: Customer metering inaccuracies

Priority Areas for Increasing Validity Score

Grading Matrix For Action

AWWA Free Water Audit Software: Grading Matrix — American Water Works Association

The grading assigned to each audit component and the corresponding recommended improvements and actions are highlighted in yellow. Audit accuracy is likely to be improved by prioritizing those items shown in red

Grading >>>	n/a	1	2	3	4	5	6	7	8	9
WATER SUPPLIED										
Volume from own sources:	Select this grading only if the water utility purchases/imports all of its water resources (i.e. has no sources of its own)	Less than 25% of water production sources are metered, remaining sources are estimated. No regular meter accuracy testing or electronic calibration conducted.	25% - 50% of treated water production sources are metered; other sources estimated. No regular meter accuracy testing or electronic calibration conducted.	Conditions between 2 and 4	50% - 75% of treated water production sources are metered, other sources estimated. Occasional meter accuracy testing or electronic calibration conducted.	Conditions between 4 and 6	At least 75% of treated water production sources are metered, or at least 90% of the source flow is derived from metered sources. Meter accuracy testing and/or electronic calibration of related instrumentation is conducted annually. Less than 25% of tested meters are found outside of +/- 6% accuracy.	Conditions between 6 and 8	100% of treated water production sources are metered, meter accuracy testing and electronic calibration of related instrumentation is conducted annually, less than 10% of meters are found outside of +/- 6% accuracy	Conditions bet 8 and 10
Improvements to attain higher data grading for "Volume from own Sources" component:		to qualify for 2: Organize and launch efforts to collect data for determining volume from own sources	to qualify for 4: Locate all water production sources on maps and in the field, launch meter accuracy testing for existing meters, begin to install meters on unmetered water production sources and replace any obsolete/defective meter		to qualify for 6: Formalize annual meter accuracy testing for all source meters; specify the frequency of testing. Complete installation of meters on unmetered water production sources and complete replacement of all obsolete/defective meters.		to qualify for 8: Conduct annual meter accuracy testing and calibration of related instrumentation on all meter installations on a regular basis. Complete project to install new, or replace defective existing, meters so that entire production meter population is metered. Repair or replace meters outside of +/- 6% accuracy.		to qualify for 10: Maintain annual meter accuracy testing and calibrati related instrumentation for all meter installations. Re replace meters outside of +/- 3% accuracy. Investigat meter technology; pilot one or more replacements v innovative meters in attempt to further improve met accuracy.	
Volume from own sources master meter and supply error adjustment:	Select n/a only if the water utility fails to have meters on its sources of supply	Inventory information on meters and paper records of measured volumes exist but are incomplete and/or in a very crude condition; data error cannot be determined	No automatic datalogging of production volumes; daily readings are scribed on paper records without any accountability controls. Flows are not balanced across the water distribution system: tank/storage elevation changes are not employed in calculating the "Volume from own sources" component and archived flow data	Conditions between 2 and 4	Production meter data is logged automatically in electronic format and reviewed at least on a monthly basis with necessary corrections implemented. "Volume from own sources" tabulations include estimate of daily changes in tanks/storage facilities. Meter data is adjusted when gross data errors occur, or occasional meter testing	Conditions between 4 and 6	Hourly production meter data logged automatically & reviewed on at least a weekly basis. Data is adjusted to correct gross error when meter/instrumentation equipment malfunction is detected; and/or error is confirmed by meter accuracy testing. Tank/storage facility elevation changes are automatically used in calculating a balanced "Volume from own sources"	Conditions between 6 and 8	Continuous production meter data is logged automatically & reviewed each business day. Data is adjusted to correct gross error from detected meter/instrumentation equipment malfunction and/or results of meter accuracy testing. Tank/storage facility elevation changes are automatically used in "Volume from own sources" tabulations and data	Conditions bet 8 and 10

Instructions | Reporting Worksheet | Performance Indicators | Comments | Water Balance | Dashboard | **Grading Matrix** | Service Connection Diagram | ...

Ready Calculate 80%

Action Items For Improving Individual Grades

WHAT TO DO NEXT: LOOK AT THE TOOLBOX

Helps to Address	The Toolbox (Basic)	Cost Range
Data Validity, Data Results Out of Range	1 - Validation of supply & consumption volumes; Look for Data Grade Improvements	Low-Mid
Validity, Billed Unmetered Use, Unbilled Unmetered Use	2 - Estimating and tracking unmetered use	Low
Validity	3 – Master Meter Annual Testing Program	Low - Mid
Validity; Other Benefits Related to Asset Inventory & Management	4 – Mapping the System	Low - Mid
Authorized, Unbilled usage	5 – Review Policies & Procedures for unbilled customers	Low
Authorized, Unbilled Use	7 - Installing meters on unmetered connections	Mid
Unbilled unmetered	6 - Unidirectional flushing program	Low
Customer metering inaccuracy	8 - Meter testing & replacement	Mid-High
Unauthorized Use	9 - Theft Deterrence	Low - Mid
Systematic Data Handling Errors	10 - Billing system audit	Low-Mid
Real Losses	11 – Collecting & Analyzing Break Data	Low
Real Losses	12 - Improve speed/quality of repairs	Low
Real Losses	13 - Locate & eliminate pressure transients (surges, water hammer)	Low-Mid
Real Losses	14 – Night Flow Analysis	Mid
Real Losses	15 - Reduce peak and overall pressure	Mid-High
Real Losses: Leakage on Mains	16 – Main Replacement	High
Real Losses: Leakage on Services	17 – Service Replacement	Mid - High
Real Losses: Unreported Leaks	18 - Acoustic leak survey	Mid
Real Losses: Overflows and Leakage on Storage Tanks	19 – Tank Management, Data Collection, & Inspection	Low

If you take the time to do a water audit and check the data there are cost benefits to doing it.

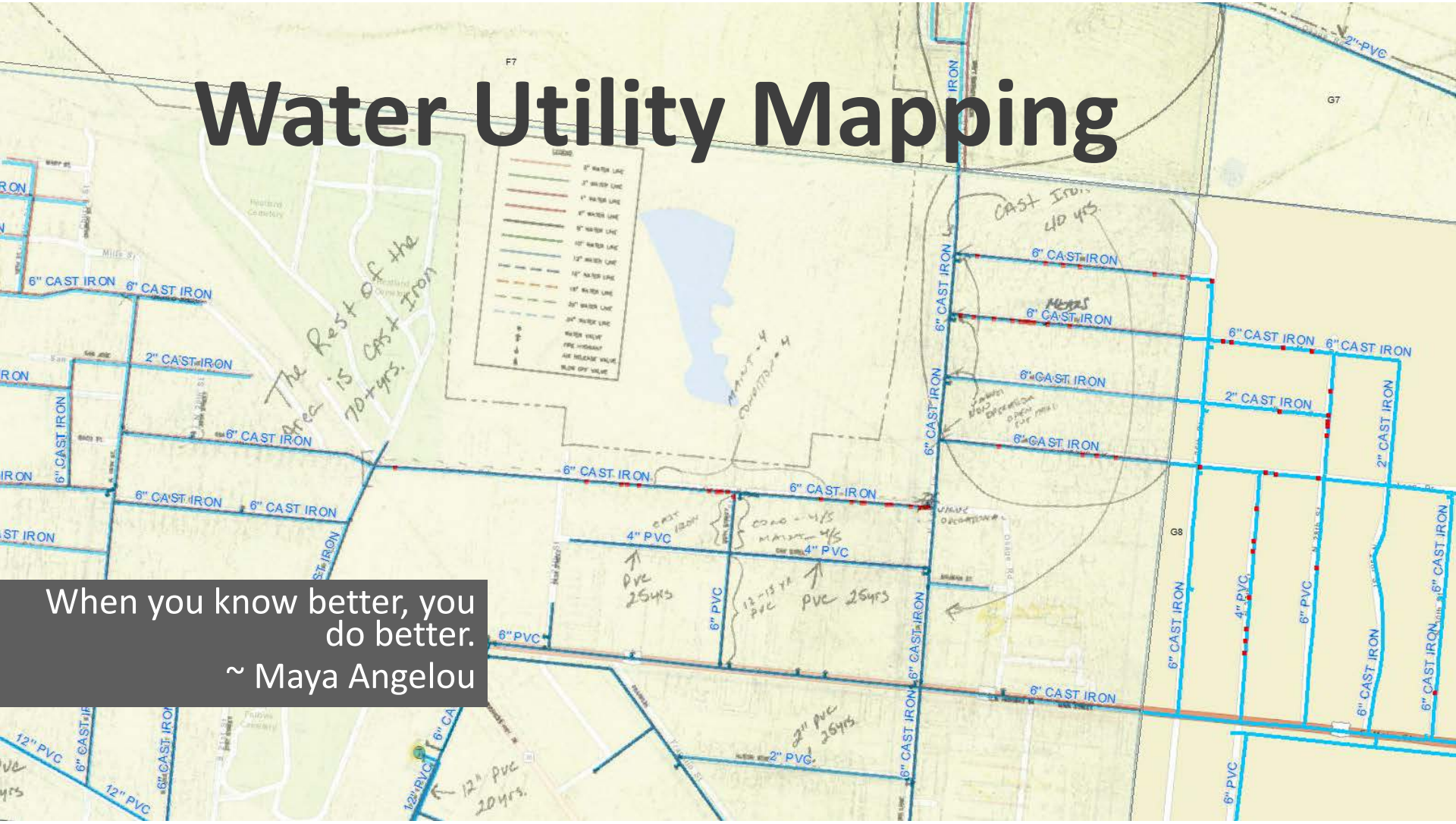
What can you do at your own facility

Don't Let what you
can't do stop you from
doing what you can do.

Questions?

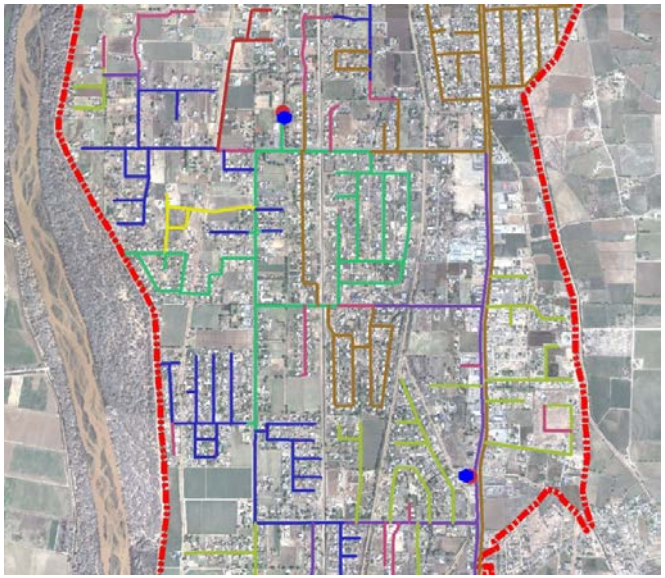
Break time …

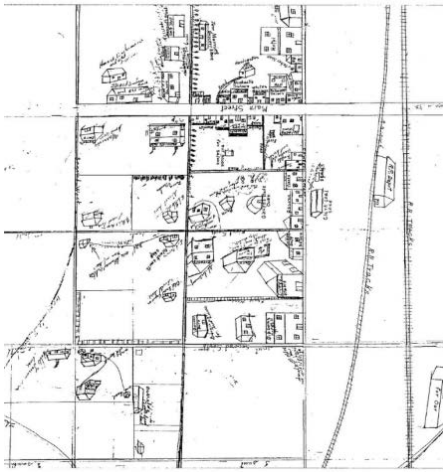
Water Utility Mapping

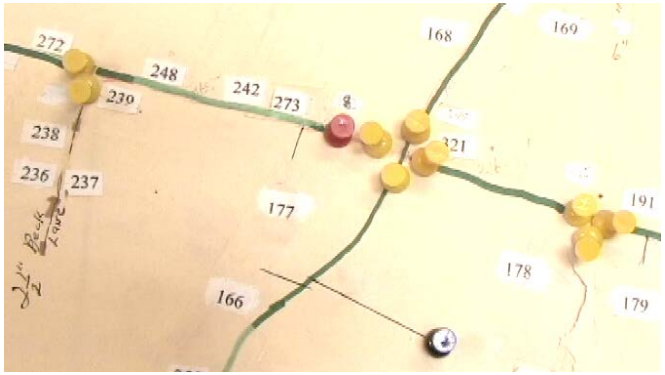


So what is a map?

"a diagrammatic representation of an area of land or sea showing physical features, cities, roads, **etc**."







ALL TYPES OF MAPS CAN BE USEFUL

We tend to think of maps in terms of:

What & Where

So, let’s start with them.

What assets do you own?

Which would be helpful on a map?
Start with things that will help you the most.







You most likely have a lot more data to start with than you think you do

Be on the look out between "what you know" and "what you think you know"

CONSIDERATIONS:

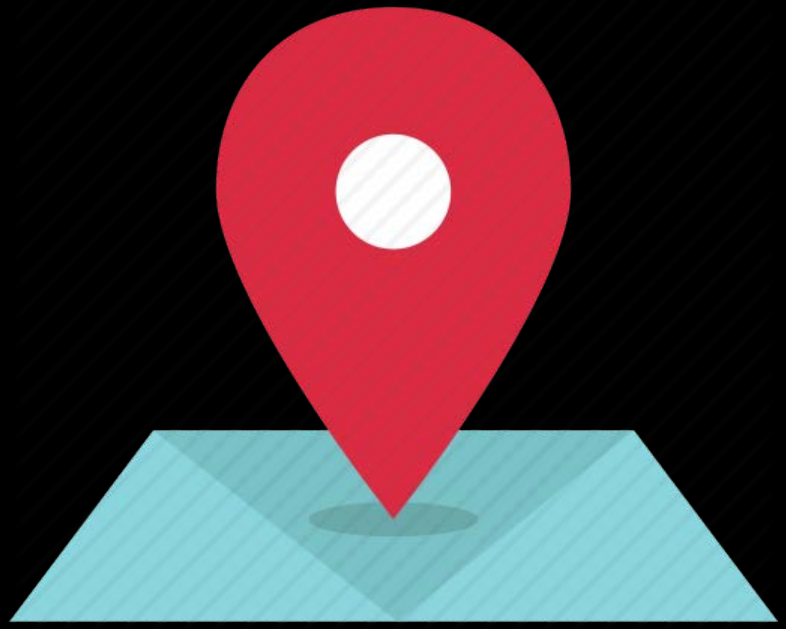
Some data wasn’t generated for mapping.

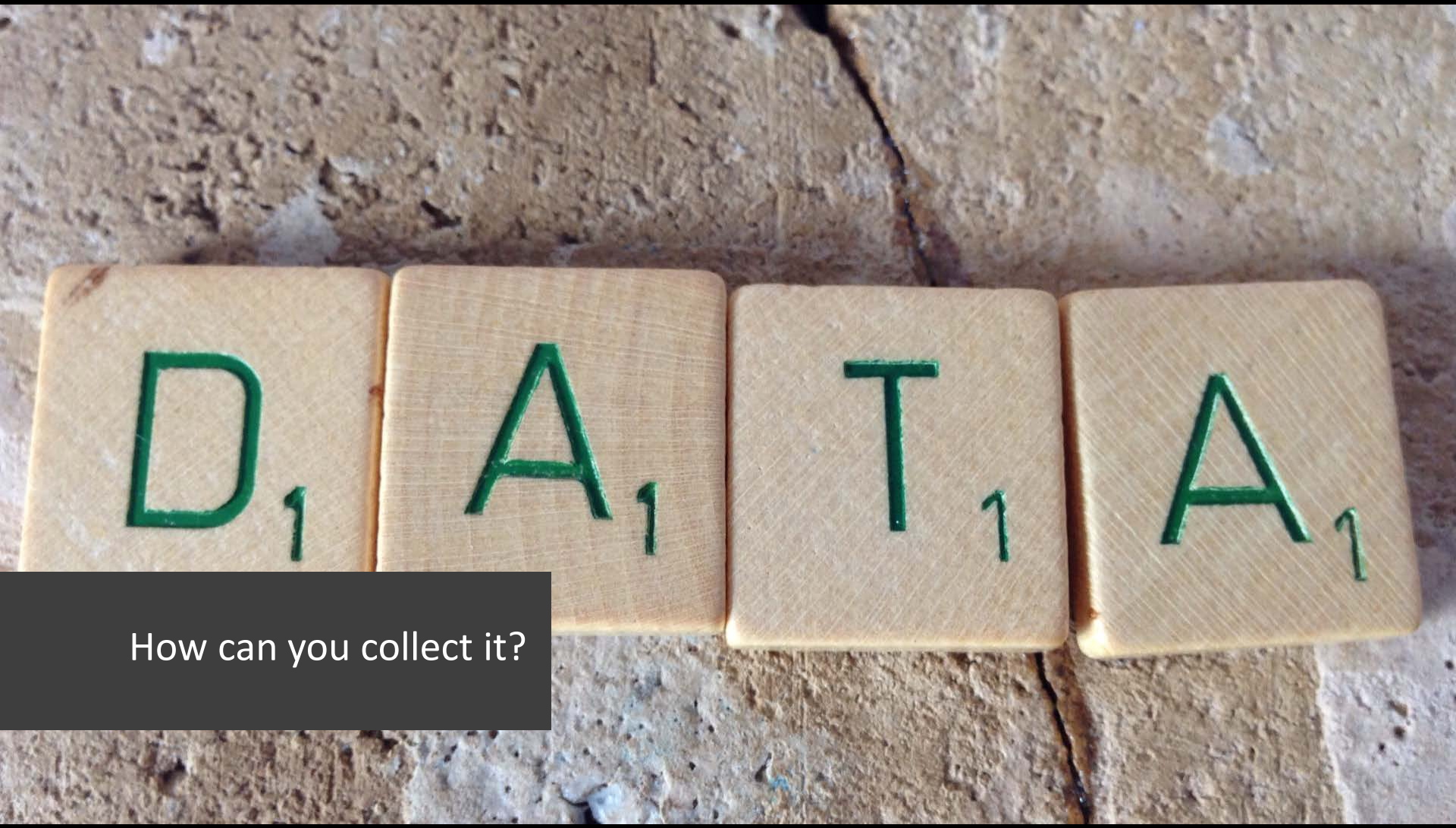
It may be great for its intended purpose but…

there will be issues/anomalies/inaccuracy/concerns.

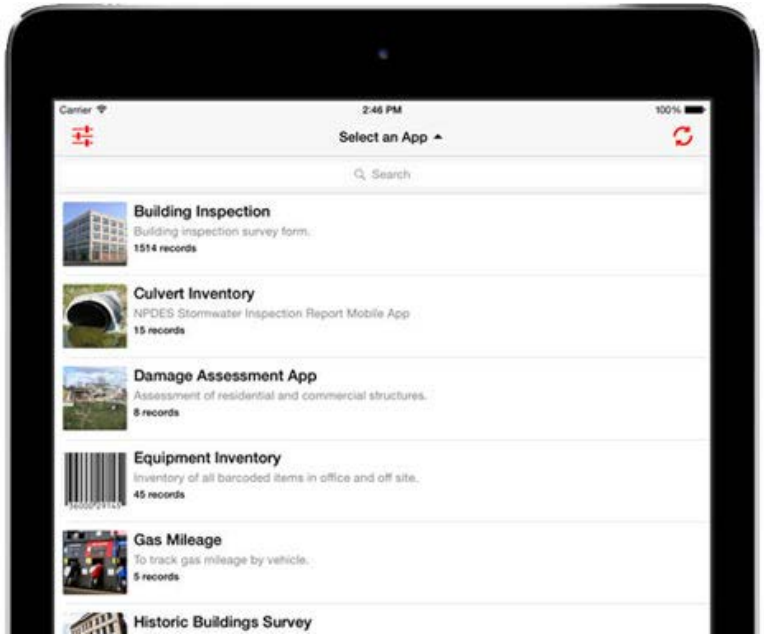
Over time you can change how you collect data.

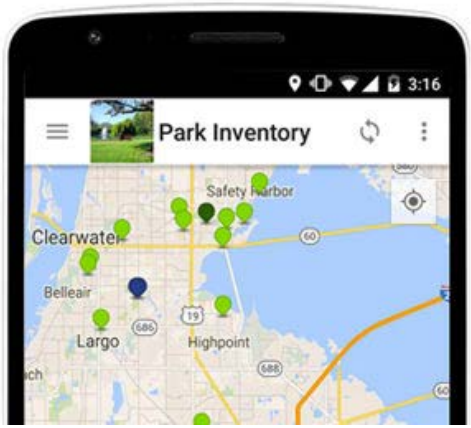
Where?




DATA
How can you collect it?

Equipment & Software: How to choose





Apps – many choices

QGIS

fulcrum

MAPPING IS ABOUT PROCESS

1

PLAN

Decide what you want to collect, what tools and software you need, and what time frame you're working in.

2

COLLECT

Go out and get your data: location info, office info, other info

3

COMBINE SOURCES

Pull together useful data from other available sources.

4

PROOF DATA

Review your data. Does it make sense? Are there conflicts?

5

MAKE MAPS, USE THEM & IMPROVE THEM

Use your maps, improve them and keep them current. A tool that isn't used is worthless.


Maps can tell you much more than what & where…
Who?
When?
Why?
How much?
How?
6" CAST IRON
12" PVC
4" PVC
6" PVC

Example options:

Operational status?
Pressure?
Acceptable usage?
Condition?
Is it part of flushing program?
What's the testing schedule?
What's the hydrant color?
What does the color mean?
Is it locked?
Who has keys?

Break Data:

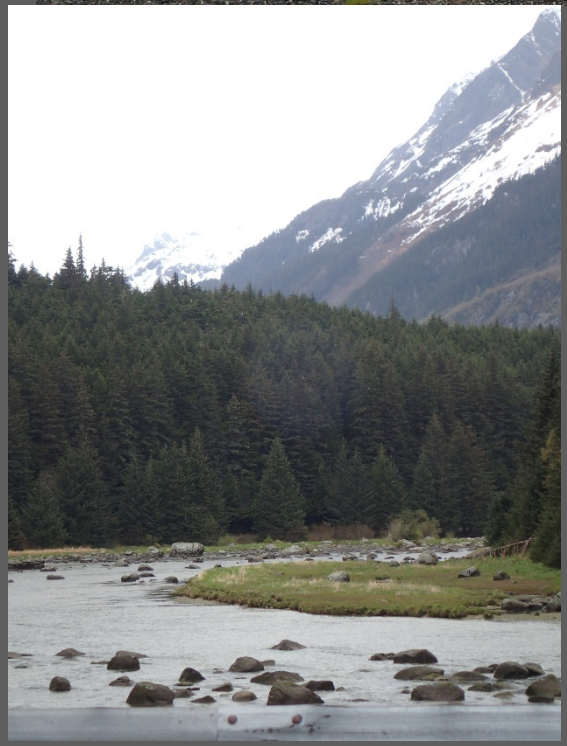
- Real Water Loss Control
- Capital Improvement planning
- Prioritizing Pipe Replacement
- Estimating Condition & Useful Life

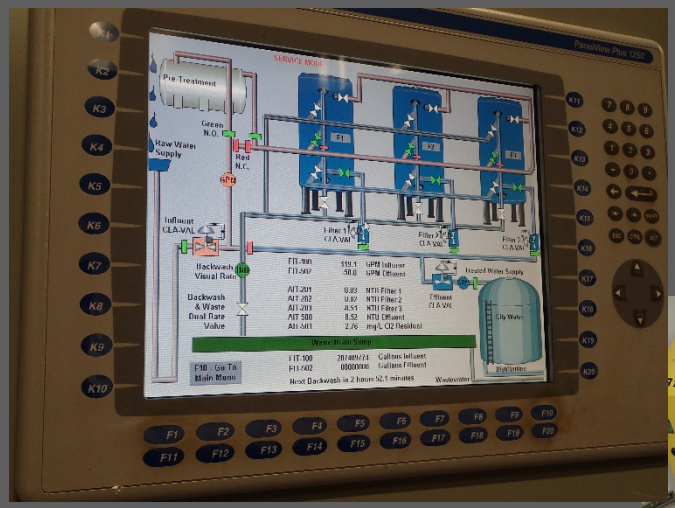
What other data can we consider?

Getting started

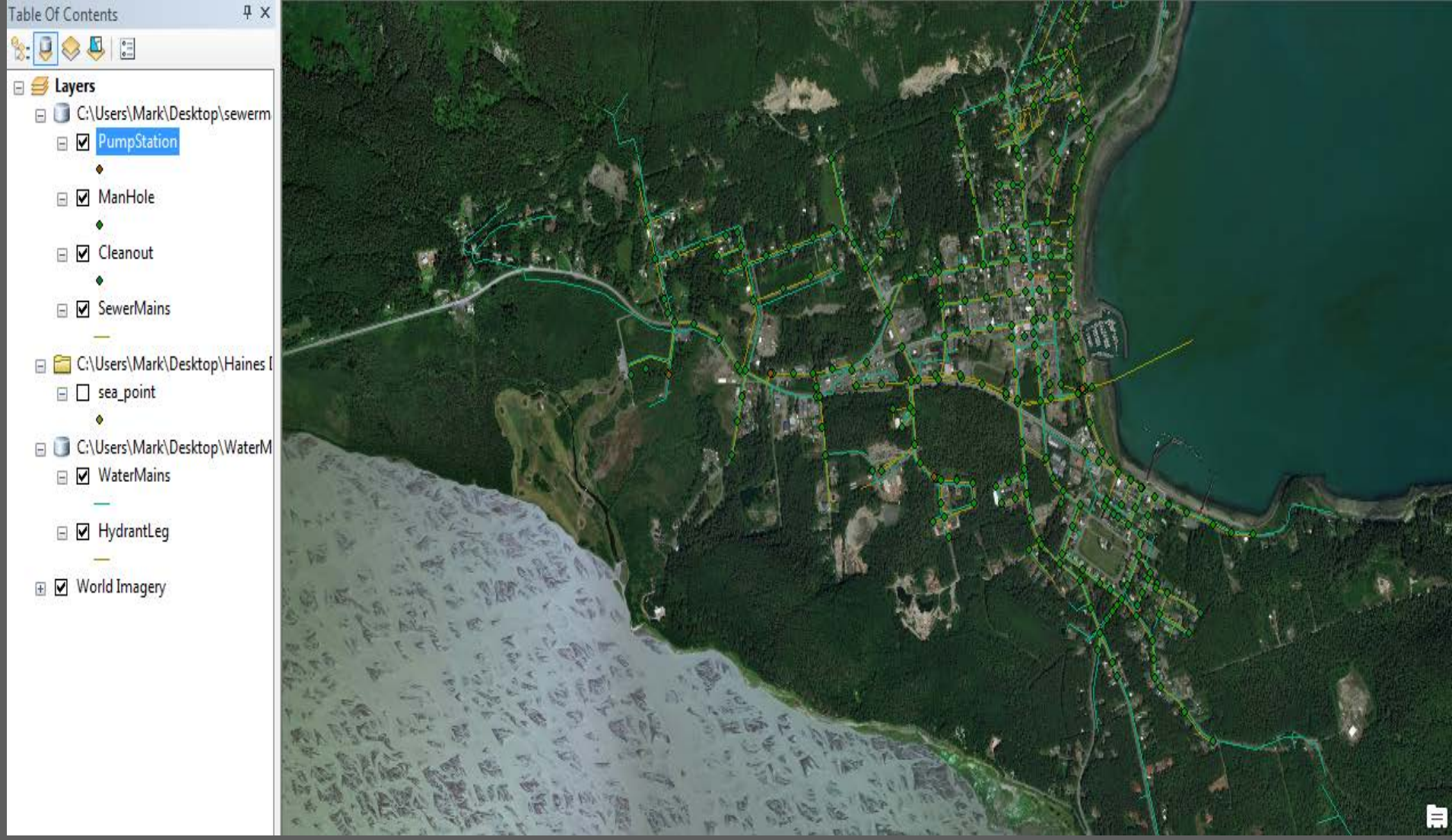
An example


WELCOME
TO
HAINES




Pre-Treatment
Raw Water Supply
Green N.O.
Red N.C.
Influent CLA-VAL
Backwash & Waste Dual Rate Valve
Backwash Visual Rate
Filter 1 CLA-VAL
Filter 2 CLA-VAL
Filter 3 CLA-VAL
Effluent CLA-VAL
Treated Water Supply
City Water
Waste Water Sump
Plant Drains
Wastewater
F10 - Go To Main Menu
Next Backwash in 2 hours 52.1 minutes

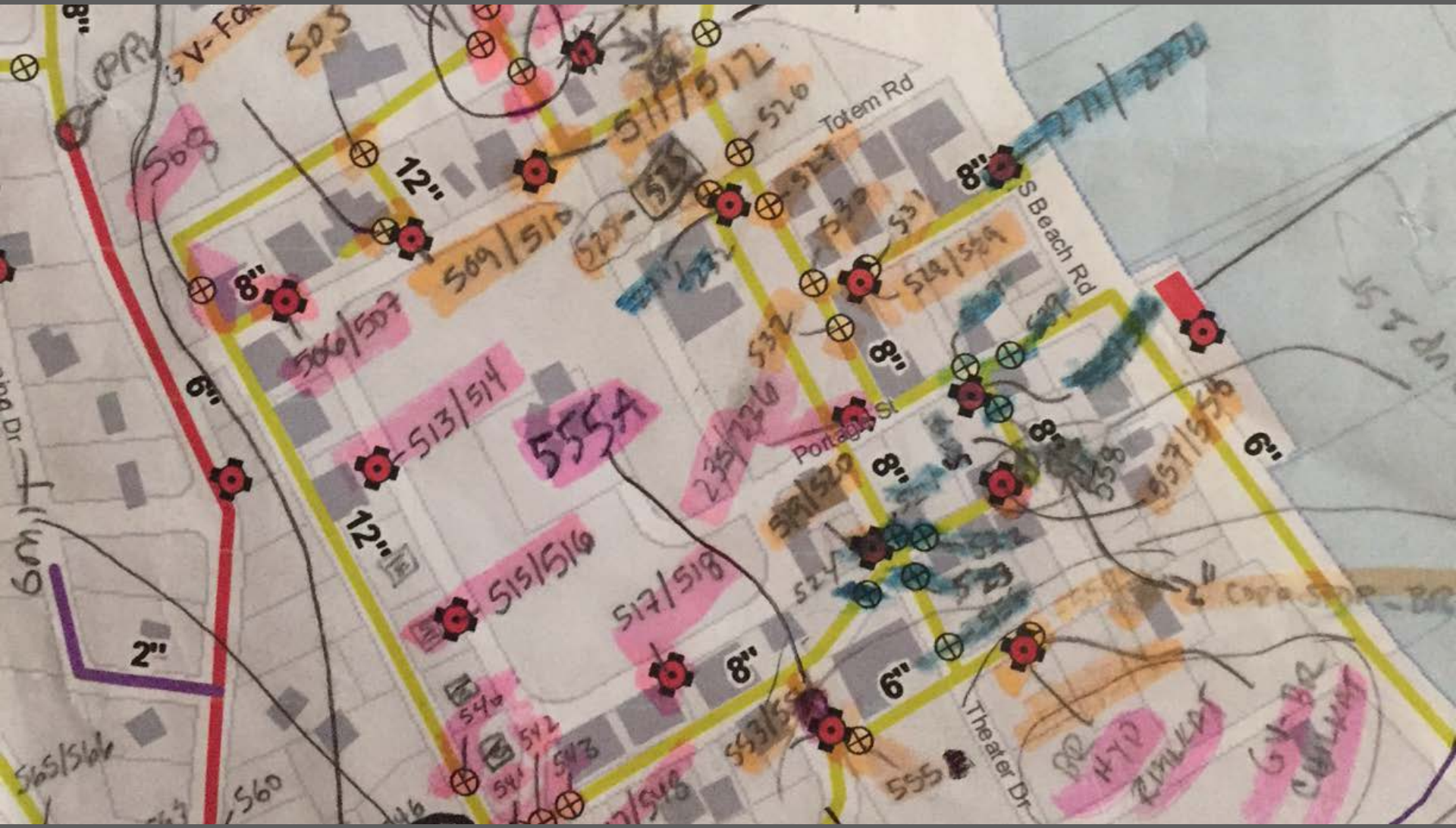

OMEGA
KAESER
STC



Starting Point: Existing ARCGIS Base Map from Planning Department

Establish naming convention by region and create collection forms before going into the field:

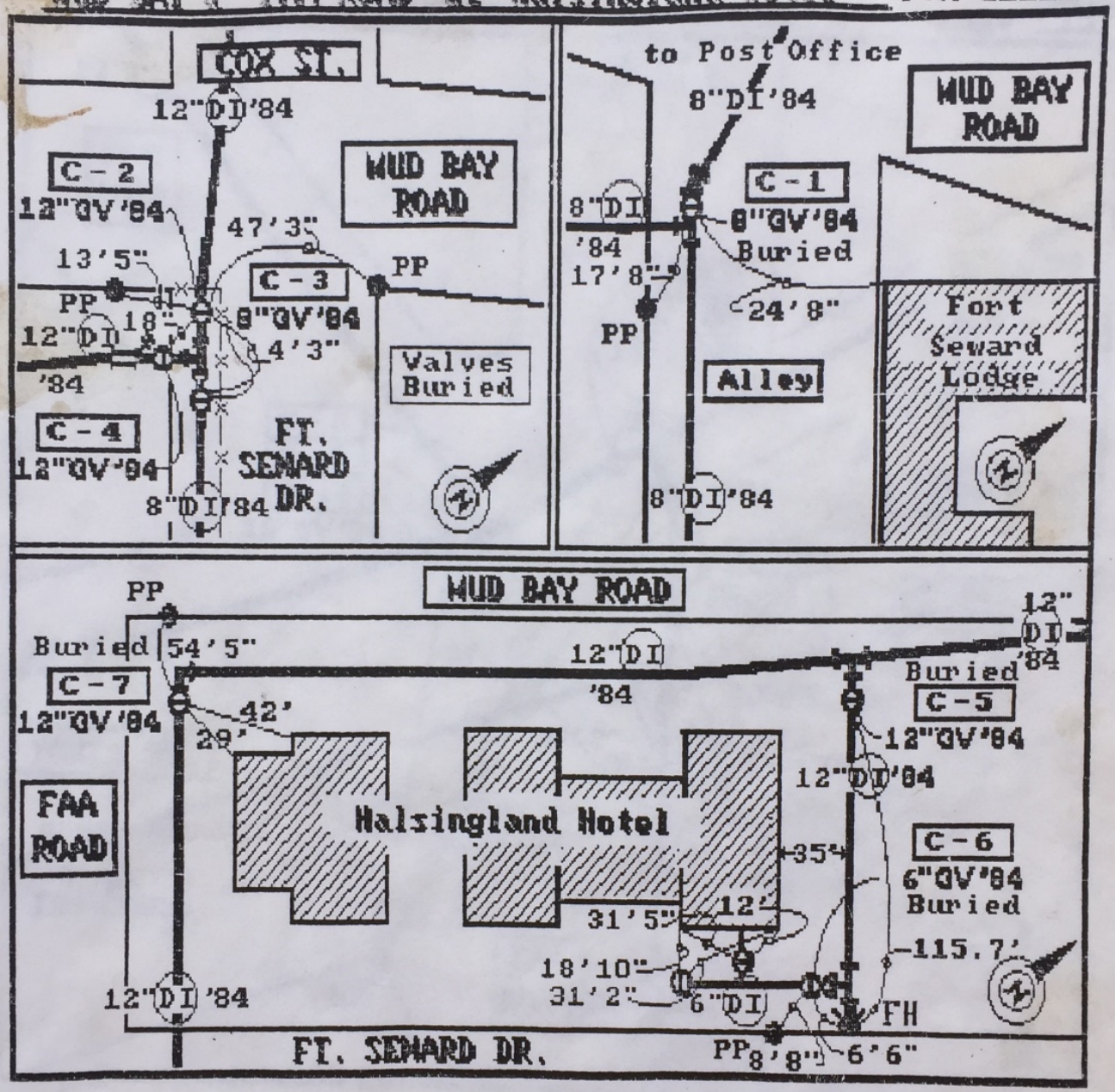
MH – BR – XXX
CO – 1M – XXX
HYD – GR – XXX


Totem Rd
S Beach Rd
Portage St
Theater Dr
555A
555
12"
8"
6"
2"

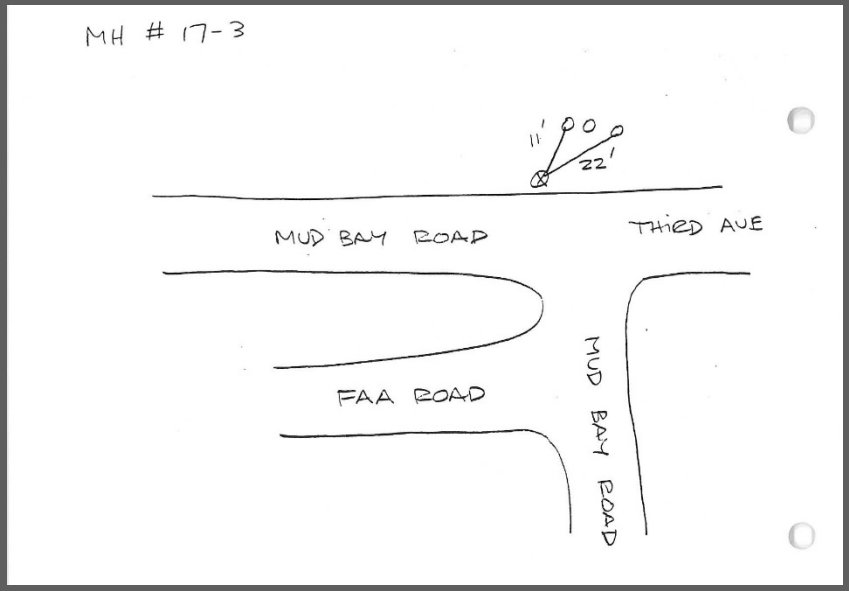
Summary of Field Work

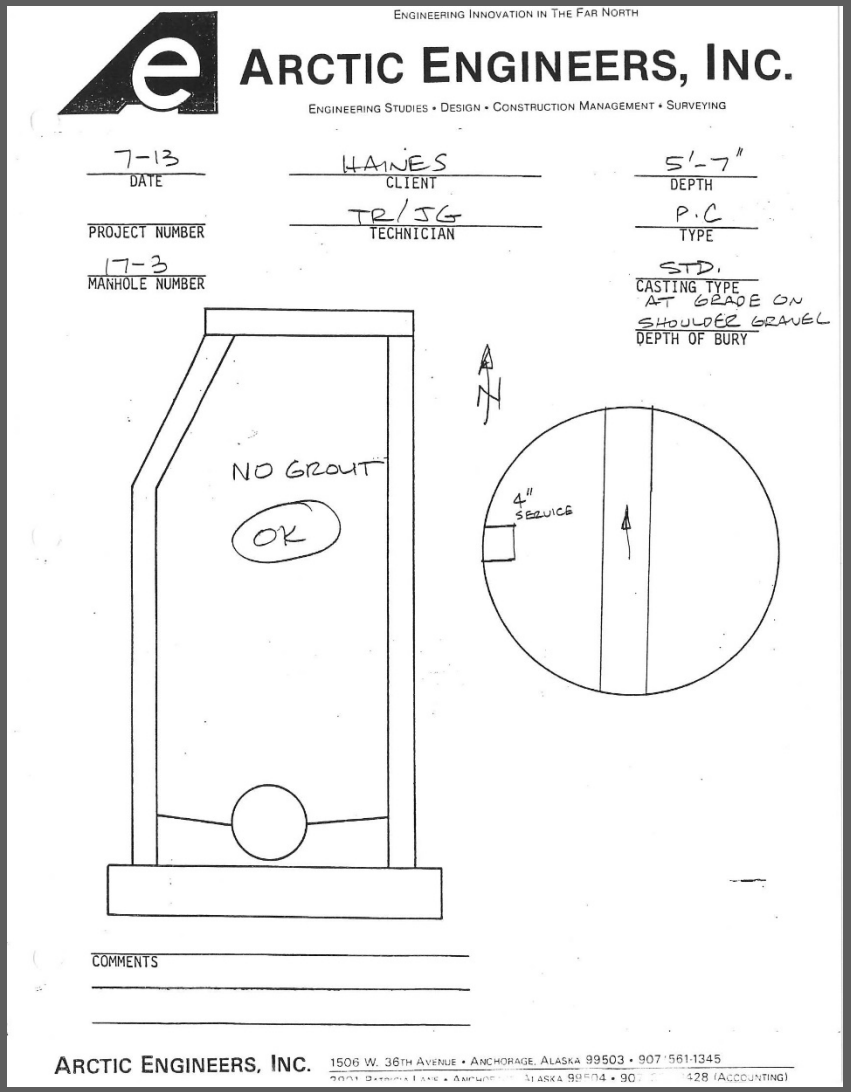
- **1,218 Assets Inventoried**
- 417 Valves
- 182 Fire Hydrants
- 232 Sewer Manholes
- 28 Sewer Clean Outs
- 4 Drinking Water Sources
- 3 Drinking Water Treatment Plants
- Pressure Regulating Valves
- Air Relief Valves
- 6 Sewer Lift Stations
- Sewer Treatment Plant
- Mobile Assets


YOUNG RD
LUTAK RD
LUTAK RD
HWY 7
7
MUD BAY RD
MUD BAY RD


COX ST.
12"DI'84
C-2
12"GV'84
MUD BAY ROAD
47'3"
13'5"
PP
C-3
8"GV'84
PP
12"DI
18"
'84
4'3"
Valves Buried
C-4
12"GV'84
FT. SEWARD DR.
8"DI'84
to Post Office
8"DI'84
MUD BAY ROAD
C-1
8"DI
'84
8"GV'84
Buried
17'8"
PP
24'8"
Alley
Fort Seward Lodge
8"DI'84
MUD BAY ROAD
PP
Buried
54'5"
12"DI
'84
12"
DI
'84
Buried
C-7
12"GV'84
42'
29'
C-5
12"GV'84
12"DI'84
FAA ROAD
Halsingland Hotel
35'
C-6
6"GV'84
Buried
31'5"
12'
115.7'
18'10"
31'2"
6"DI
DG
FH
12"DI'84
FT. SEWARD DR.
PP
8'8"
6'6"

SEWER: AS-BUILT DRAWINGS





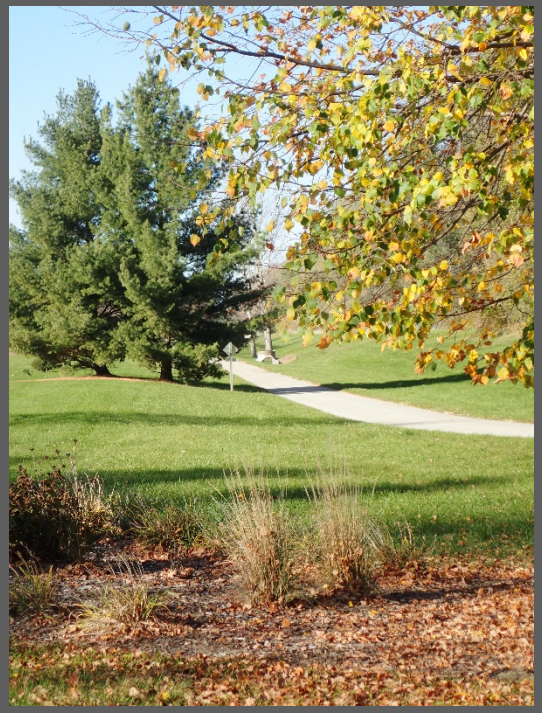
Knowledge Management

“Good” Map Made Better

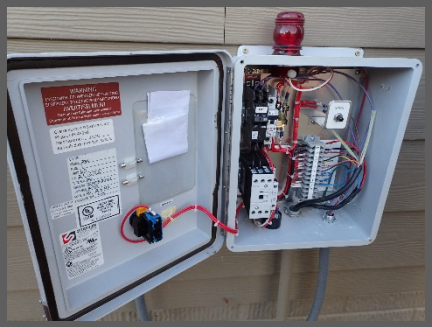
Example of making maps more valuable


Johnston
THRIVE. EVERY DAY.

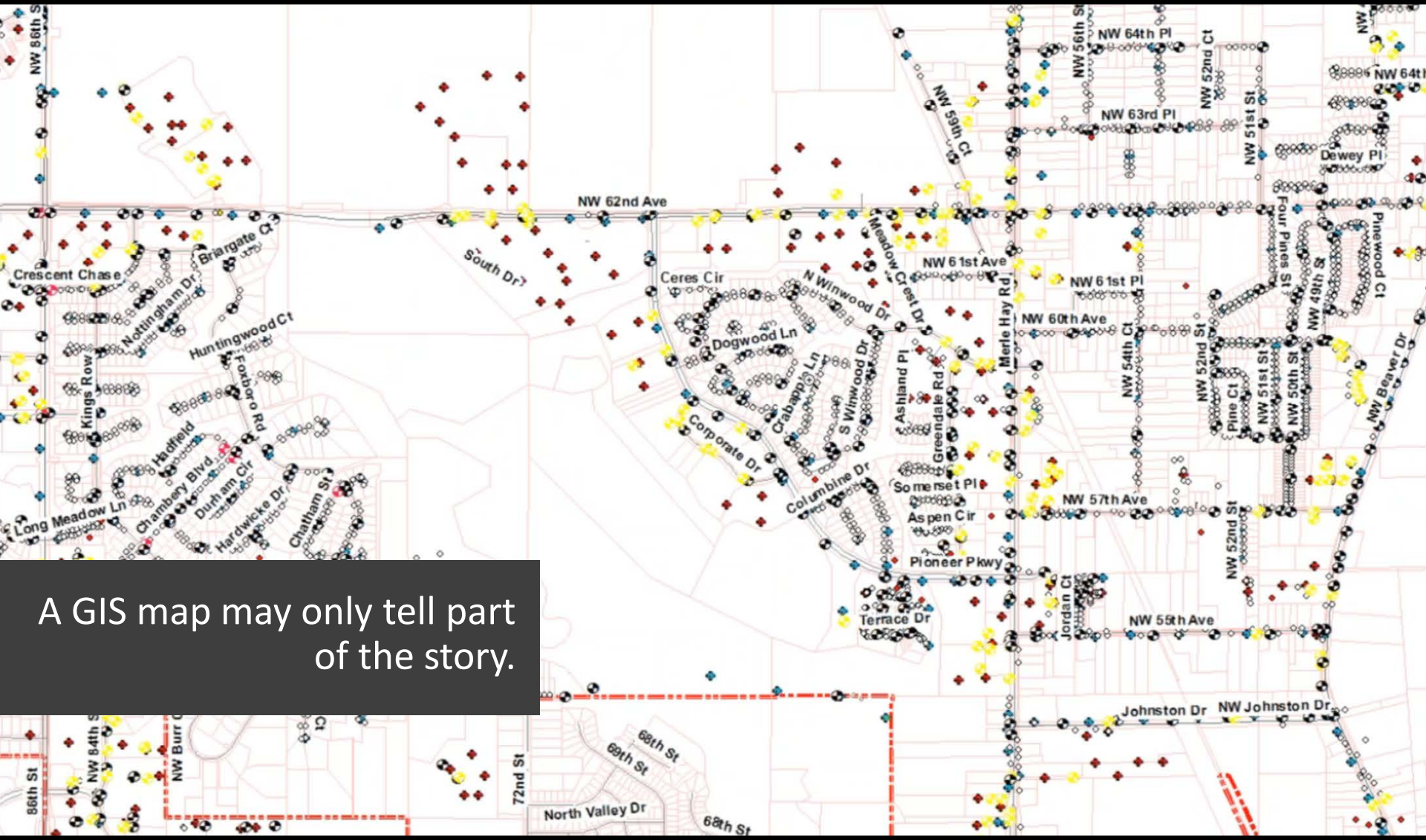

Johnston
CITY HALL



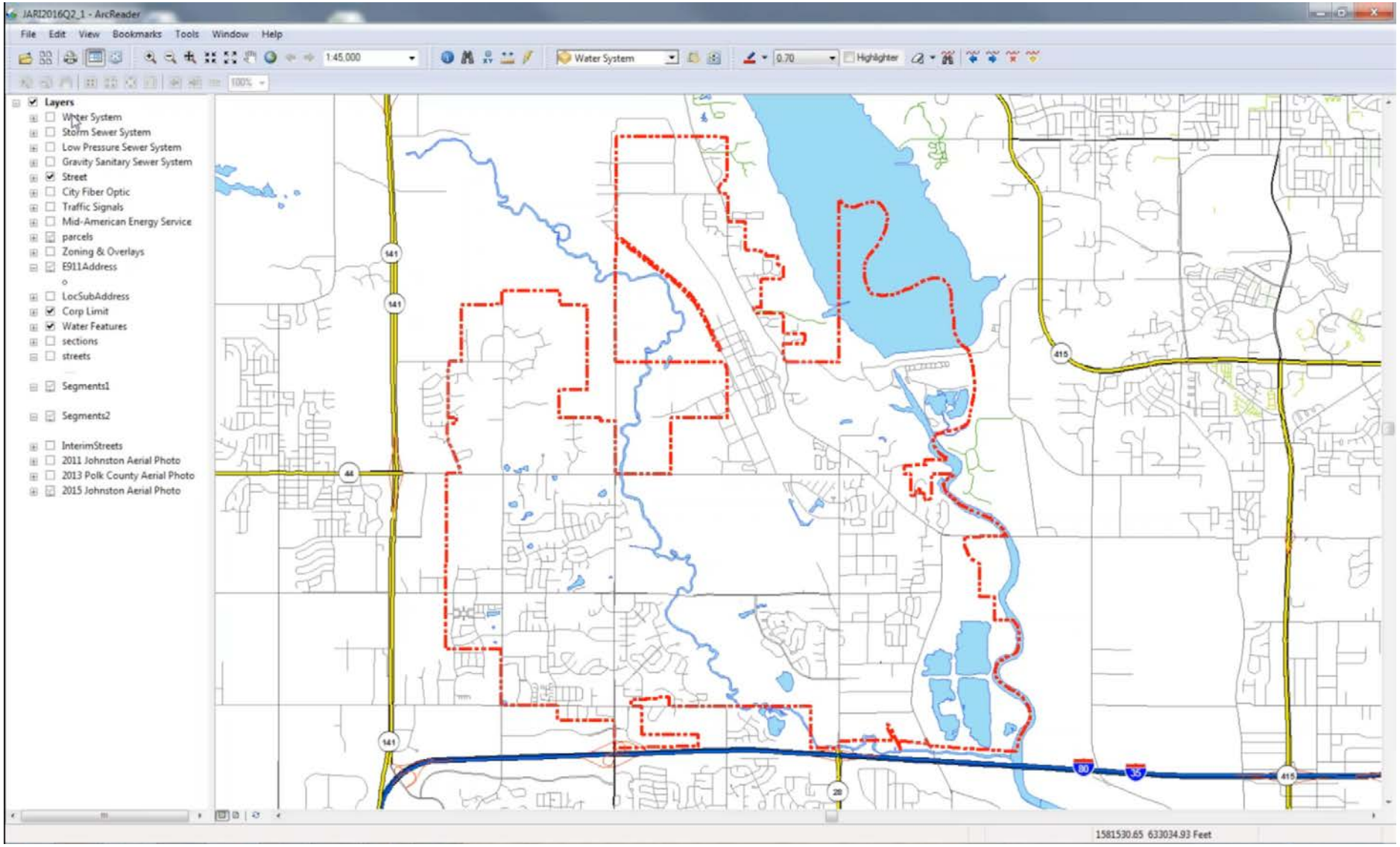

NYLOPLAST

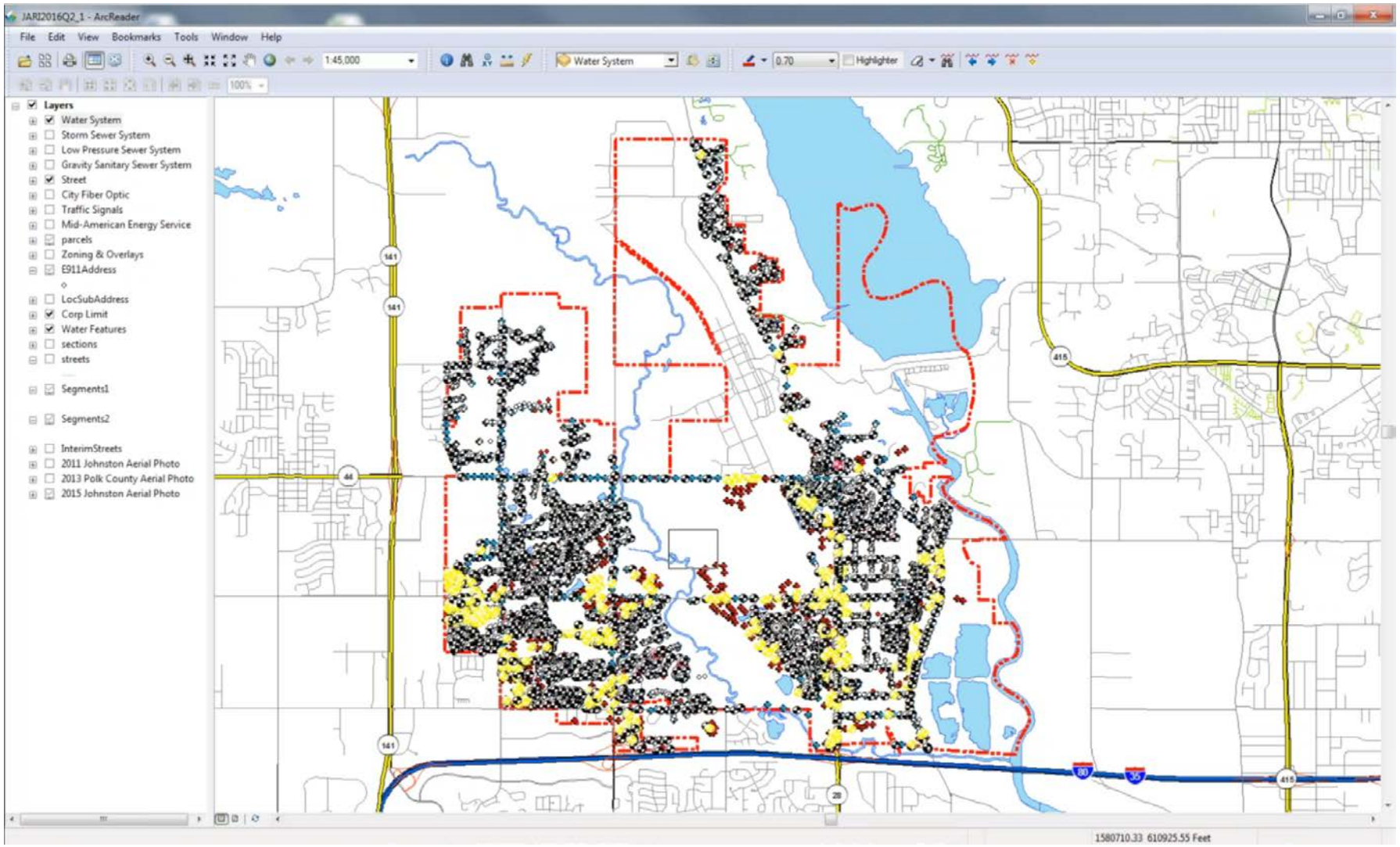


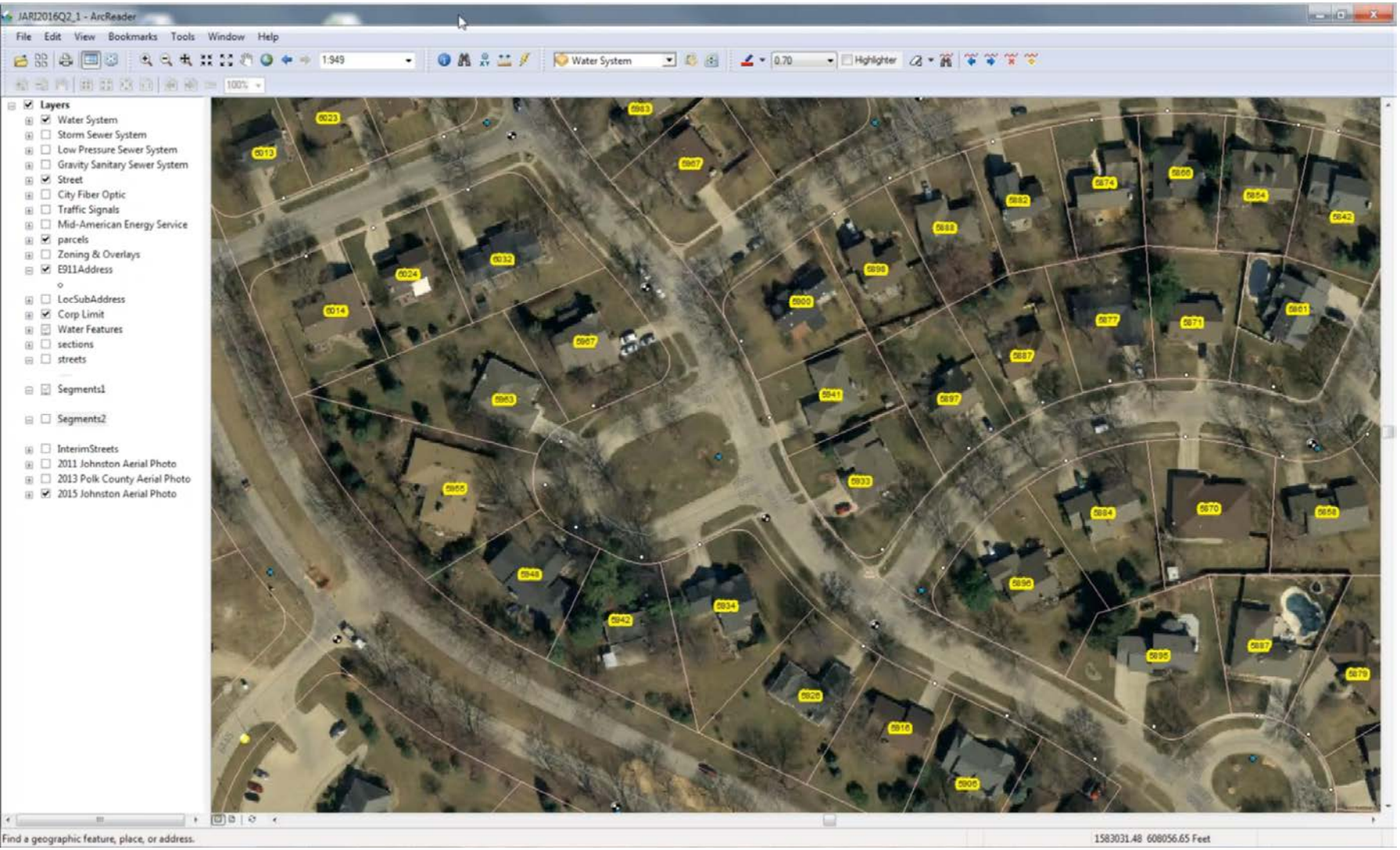

NEENAH FOUNDRY CO
NEENAH WI

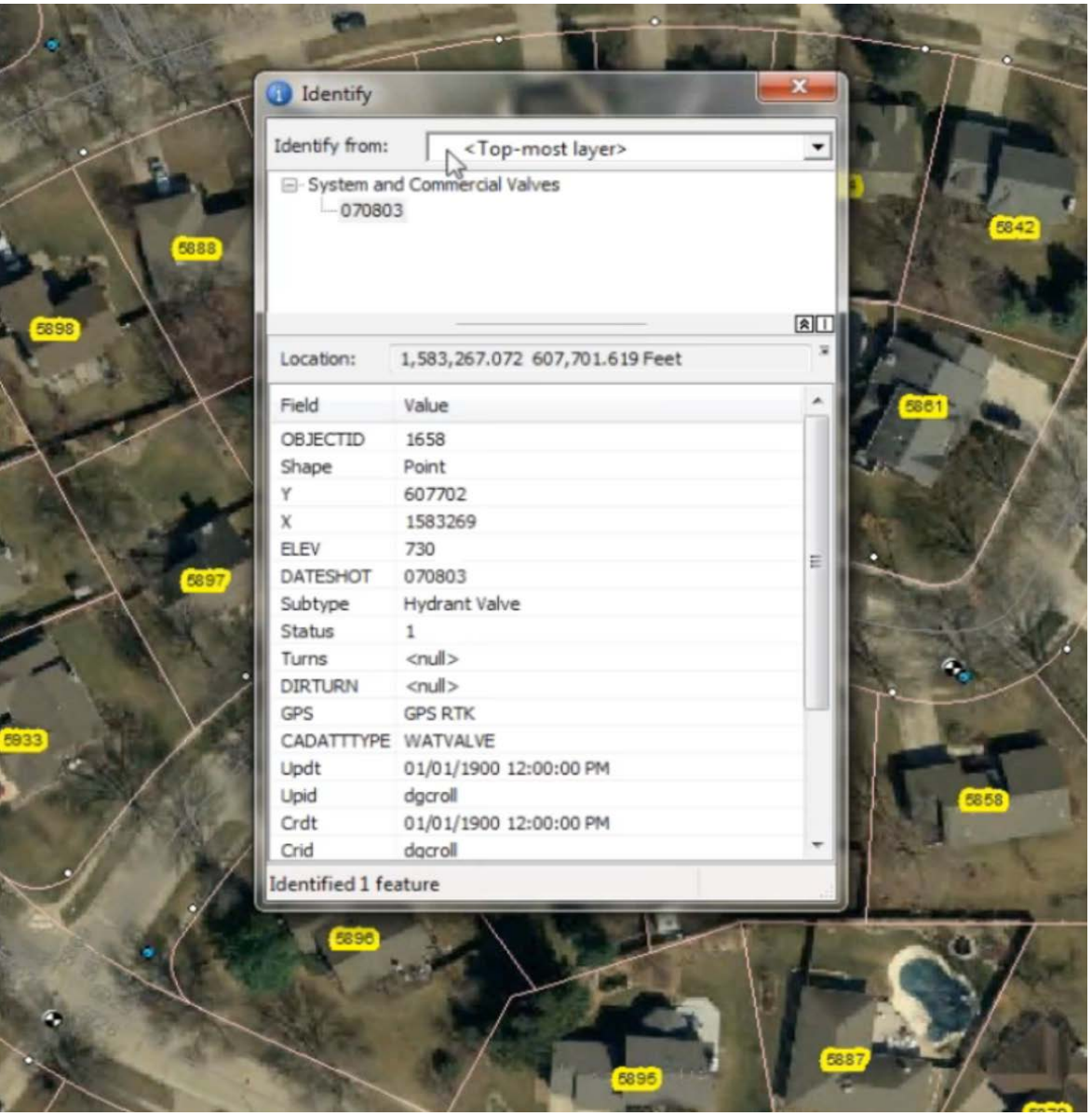


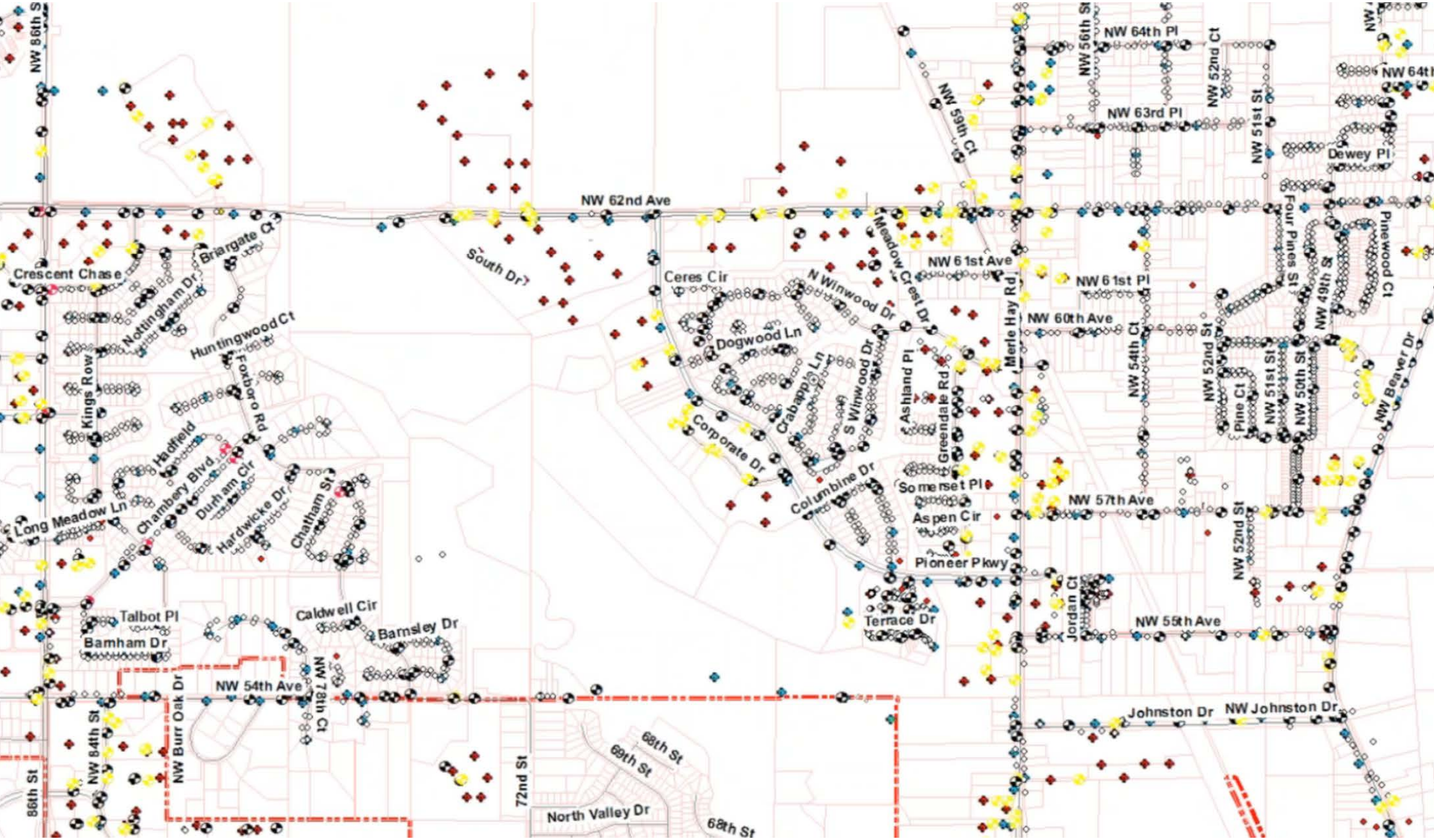
A GIS map may only tell part of the story.


JARI2016Q2_1 - ArcReader
File Edit View Bookmarks Tools Window Help
1:45,000
Water System
0.70
Highlighter
Layers
Water System
Storm Sewer System
Low Pressure Sewer System
Gravity Sanitary Sewer System
Street
City Fiber Optic
Traffic Signals
Mid-American Energy Service
parcels
Zoning & Overlays
E911Address
LocSubAddress
Corp Limit
Water Features
sections
streets
Segments1
Segments2
InterimStreets
2011 Johnston Aerial Photo
2013 Polk County Aerial Photo
2015 Johnston Aerial Photo
141
44
415
80
35
28
1581530.65 633034.93 Feet


JARI2016Q2_1 - ArcReader
File Edit View Bookmarks Tools Window Help
1:45,000
Water System
0.70
Highlighter
Layers
Water System
Storm Sewer System
Low Pressure Sewer System
Gravity Sanitary Sewer System
Street
City Fiber Optic
Traffic Signals
Mid-American Energy Service
parcels
Zoning & Overlays
E911Address
LocSubAddress
Corp Limit
Water Features
sections
streets
Segments1
Segments2
InterimStreets
2011 Johnston Aerial Photo
2013 Polk County Aerial Photo
2015 Johnston Aerial Photo
141
44
415
80
35
28
1580710.33 610925.55 Feet


JARI2016Q2_1 - ArcReader
File Edit View Bookmarks Tools Window Help
1:949
Water System
0.70
Highlighter
Layers
Water System
Storm Sewer System
Low Pressure Sewer System
Gravity Sanitary Sewer System
Street
City Fiber Optic
Traffic Signals
Mid-American Energy Service
parcels
Zoning & Overlays
E911Address
LocSubAddress
Corp Limit
Water Features
sections
streets
Segments1
Segments2
InterimStreets
2011 Johnston Aerial Photo
2013 Polk County Aerial Photo
2015 Johnston Aerial Photo
Find a geographic feature, place, or address.
1583031.48 608056.65 Feet


Identify
Identify from:
<Top-most layer>
System and Commercial Valves
070803
Location:
1,583,267.072 607,701.619 Feet
Field
Value
OBJECTID
1658
Shape
Point
Y
607702
X
1583269
ELEV
730
DATESHOT
070803
Subtype
Hydrant Valve
Status
1
Turns
<null>
DIRTURN
<null>
GPS
GPS RTK
CADATTTYPE
WATVALVE
Updt
01/01/1900 12:00:00 PM
Upid
dgcroll
Crdt
01/01/1900 12:00:00 PM
Crid
dgcroll
Identified 1 feature
5888
5898
5897
5933
5896
5895
5887
5858
5861
5842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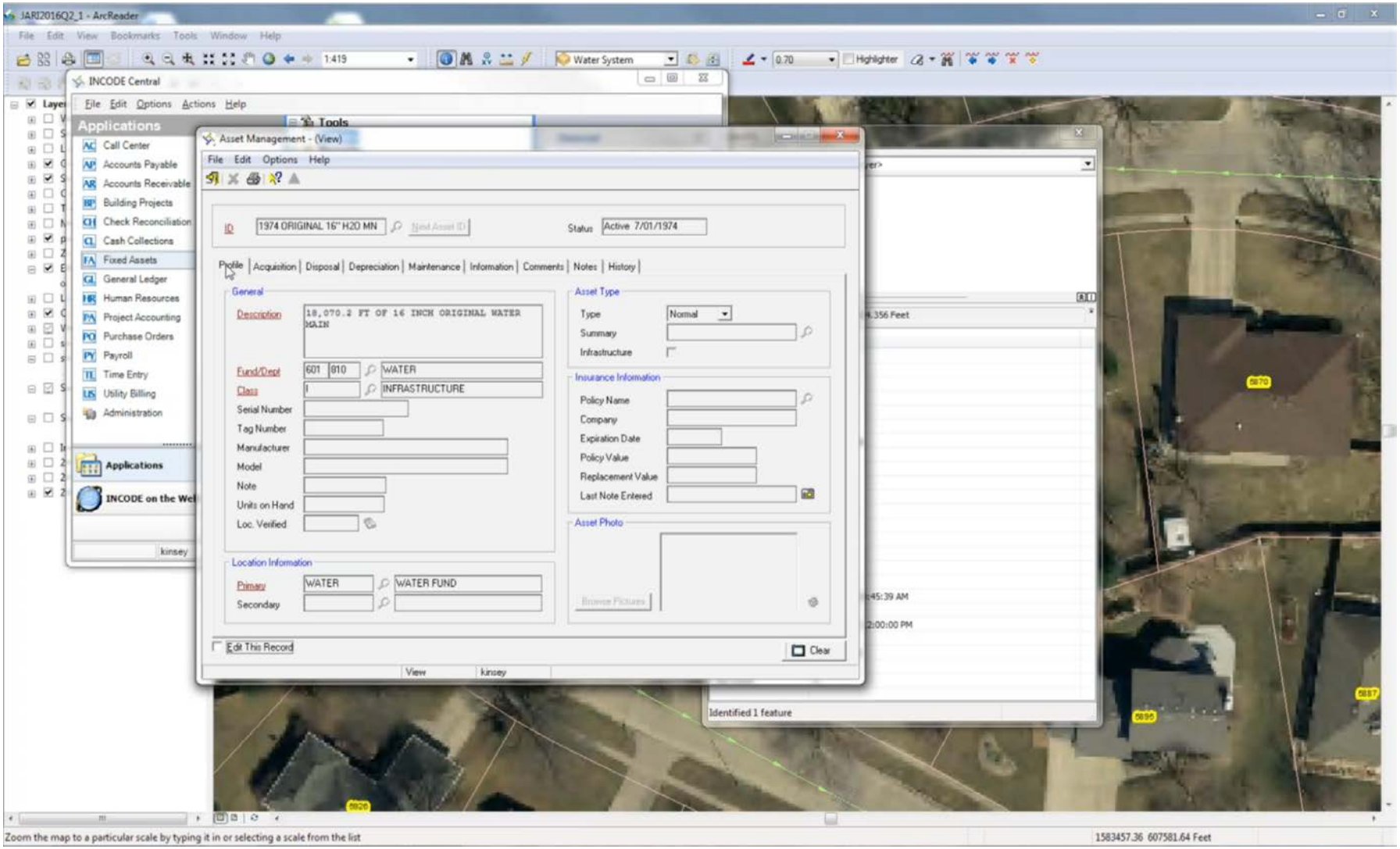
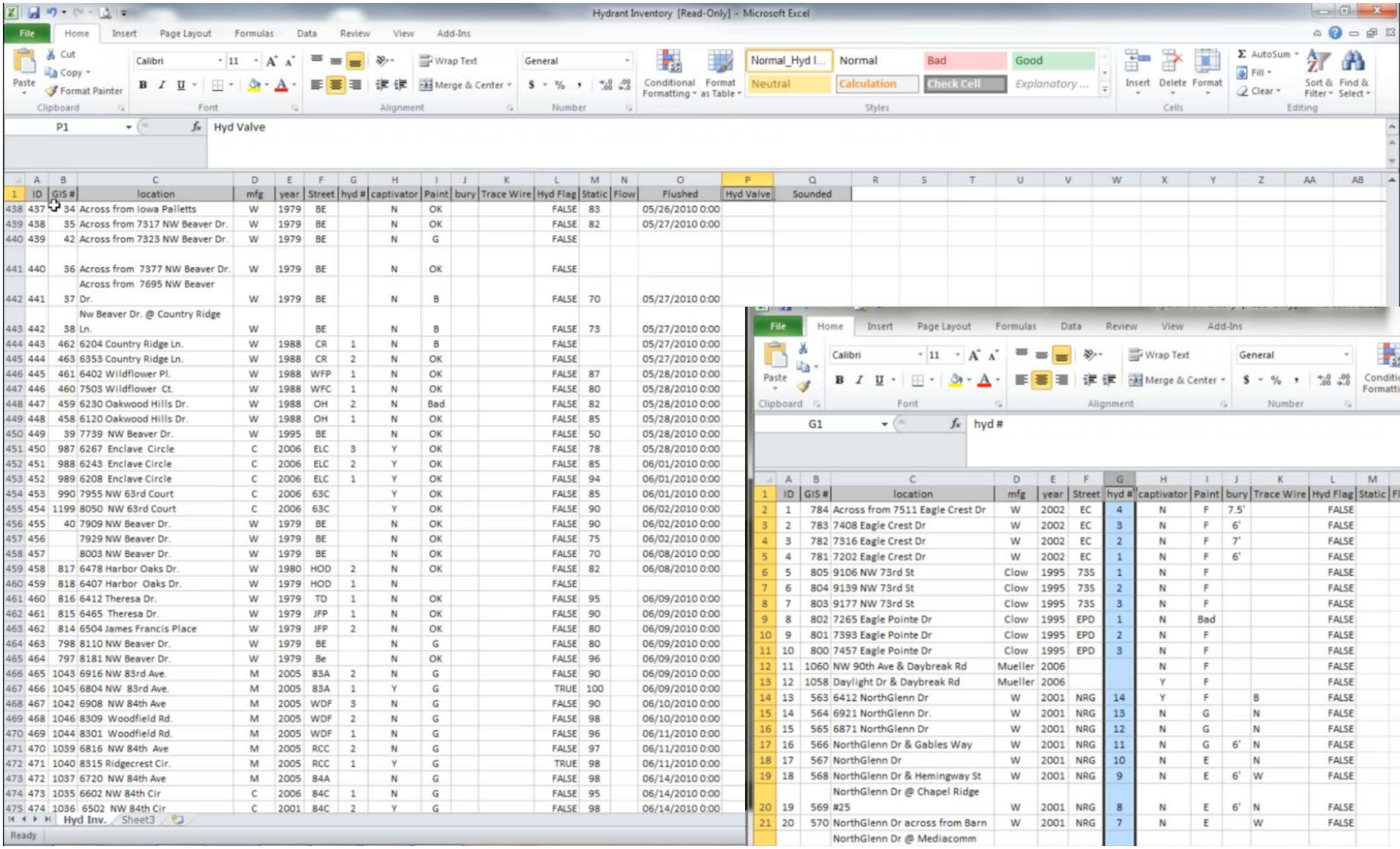
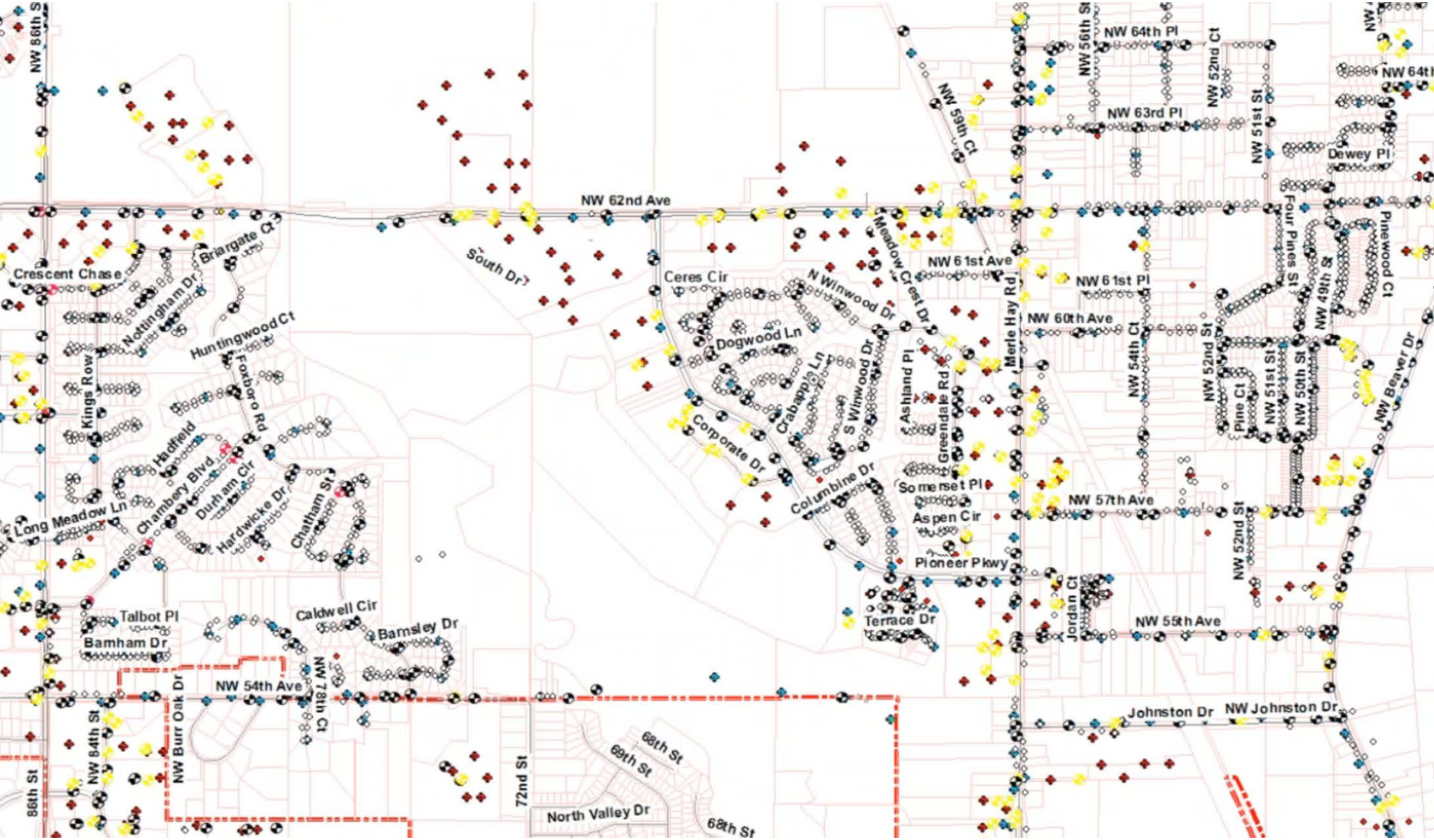
NW 61st Ave
NW 61st Pl
NW 60th Ave
NW 57th Ave
NW 55th Ave
NW 54th Ave
NW 64th Pl
NW 63rd Pl
NW 59th Ct
NW 56th St
NW 52nd Ct
NW 51st St
Dewey Pl
Four Pines St
Pinewood Ct
NW 49th St
NW 52nd St
NW 54th Ct
NW 51st St
NW 50th St
Pine Ct
NW Beaver Dr
Merle Hay Rd
Meadow Crest Dr
N Winwood Dr
S Winwood Dr
Dogwood Ln
Cabana Ln
Ashland Pl
Greendale Rd
Corporate Dr
Columbine Dr
Somerset Pl
Aspen Cir
Pioneer Pkwy
Terrace Dr
Jordan Ct
Ceres Cir
South Dr
Crescent Chase
Briargate Ct
Nottingham Dr
Huntingwood Ct
Foxboro Rd
Kings Row
Hadfield
Chambery Blvd
Durham Cir
Hardwicke Dr
Chatham St
Long Meadow Ln
Talbot Pl
Barnham Dr
Caldwell Cir
Barnsley Dr
NW 78th Ct
NW Burr Oak Dr
NW 84th St
86th St
72nd St
North Valley Dr
68th St
69th St
Johnston Dr
NW Johnston Dr


JARI2016Q2_1 - ArcReader
File Edit View Bookmarks Tools Window Help
INCODE Central
File Edit Options Actions Help
Applications
Call Center
Accounts Payable
Accounts Receivable
Building Projects
Check Reconciliation
Cash Collections
Fixed Assets
General Ledger
Human Resources
Project Accounting
Purchase Orders
Payroll
Time Entry
Utility Billing
Administration
Tools
Asset Management - (View)
File Edit Options Help
ID 1974 ORIGINAL 16" H2O MN
Status Active 7/01/1974
Profile | Acquisition | Disposal | Depreciation | Maintenance | Information | Comments | Notes | History
General
Description 18,070.2 FT OF 16 INCH ORIGINAL WATER MAIN
Fund/Dept 601 010 WATER
Class 1 INFRASTRUCTURE
Serial Number
Tag Number
Manufacturer
Model
Note
Units on Hand
Loc. Verified
Location Information
Primary WATER WATER FUND
Secondary
Asset Type
Type Normal
Summary
Infrastructure
Insurance Information
Policy Name
Company
Expiration Date
Policy Value
Replacement Value
Last Note Entered
Asset Photo
Browse Pictures
Edit This Record
Clear
View kinsey
kinsey
Identified 1 feature
Zoom the map to a particular scale by typing it in or selecting a scale from the list
1583457.36 607581.64 Feet


Hydrant Inventory [Read-Only] - Microsoft Excel
File Home Insert Page Layout Formulas Data Review View Add-Ins
P1
Hyd Valve
ID GIS # location mfg year Street hyd # captivator Paint bury Trace Wire Hyd Flag Static Flow Flushed Hyd Valve Sounded
437 34 Across from Iowa Palletts W 1979 BE N OK FALSE 83 05/26/2010 0:00
438 35 Across from 7317 NW Beaver Dr. W 1979 BE N OK FALSE 82 05/27/2010 0:00
439 42 Across from 7323 NW Beaver Dr. W 1979 BE N G FALSE
440 36 Across from 7377 NW Beaver Dr. W 1979 BE N OK FALSE
441 37 Across from 7695 NW Beaver Dr. W 1979 BE N B FALSE 70 05/27/2010 0:00
442 38 Nw Beaver Dr. @ Country Ridge Ln. W BE N B FALSE 73 05/27/2010 0:00
443 462 6204 Country Ridge Ln. W 1988 CR 1 N B FALSE 05/27/2010 0:00
444 463 6353 Country Ridge Ln. W 1988 CR 2 N OK FALSE 05/27/2010 0:00
445 461 6402 Wildflower Pl. W 1988 WFP 1 N OK FALSE 87 05/28/2010 0:00
446 460 7503 Wildflower Ct. W 1988 WFC 1 N OK FALSE 80 05/28/2010 0:00
447 459 6230 Oakwood Hills Dr. W 1988 OH 2 N Bad FALSE 82 05/28/2010 0:00
448 458 6120 Oakwood Hills Dr. W 1988 OH 1 N OK FALSE 85 05/28/2010 0:00
449 39 7739 NW Beaver Dr. W 1995 BE N OK FALSE 50 05/28/2010 0:00
450 987 6267 Enclave Circle C 2006 ELC 3 Y OK FALSE 78 05/28/2010 0:00
451 988 6243 Enclave Circle C 2006 ELC 2 Y OK FALSE 85 06/01/2010 0:00
452 989 6208 Enclave Circle C 2006 ELC 1 Y OK FALSE 94 06/01/2010 0:00
453 990 7955 NW 63rd Court C 2006 63C Y OK FALSE 85 06/01/2010 0:00
454 1199 8050 NW 63rd Court C 2006 63C Y OK FALSE 90 06/02/2010 0:00
455 40 7909 NW Beaver Dr. W 1979 BE N OK FALSE 90 06/02/2010 0:00
456 7929 NW Beaver Dr. W 1979 BE N OK FALSE 75 06/02/2010 0:00
457 8003 NW Beaver Dr. W 1979 BE N OK FALSE 70 06/08/2010 0:00
458 817 6478 Harbor Oaks Dr. W 1980 HOD 2 N OK FALSE 82 06/08/2010 0:00
459 818 6407 Harbor Oaks Dr. W 1979 HOD 1 N FALSE
460 816 6412 Theresa Dr. W 1979 TD 1 N OK FALSE 95 06/09/2010 0:00
461 815 6465 Theresa Dr. W 1979 JFP 1 N OK FALSE 90 06/09/2010 0:00
462 814 6504 James Francis Place W 1979 JFP 2 N OK FALSE 80 06/09/2010 0:00
463 798 8110 NW Beaver Dr. W 1979 BE N G FALSE 80 06/09/2010 0:00
464 797 8181 NW Beaver Dr. W 1979 Be N OK FALSE 96 06/09/2010 0:00
465 1043 6916 NW 83rd Ave. M 2005 83A 2 N G FALSE 90 06/09/2010 0:00
466 1045 6804 NW 83rd Ave. M 2005 83A 1 Y G TRUE 100 06/09/2010 0:00
467 1042 6908 NW 84th Ave M 2005 WDF 3 N G FALSE 90 06/10/2010 0:00
468 1046 8309 Woodfield Rd. M 2005 WDF 2 N G FALSE 98 06/10/2010 0:00
469 1044 8301 Woodfield Rd. M 2005 WDF 1 N G FALSE 96 06/11/2010 0:00
470 1039 6816 NW 84th Ave M 2005 RCC 2 N G FALSE 97 06/11/2010 0:00
471 1040 8315 Ridgecrest Cir. M 2005 RCC 1 Y G TRUE 98 06/11/2010 0:00
472 1037 6720 NW 84th Ave M 2005 84A N G FALSE 98 06/14/2010 0:00
473 1035 6602 NW 84th Cir C 2006 84C 1 N G FALSE 95 06/14/2010 0:00
474 1036 6502 NW 84th Cir C 2001 84C 2 Y G FALSE 98 06/14/2010 0:00
Hyd Inv. Sheet3
Ready
G1
hyd #
ID GIS # location mfg year Street hyd # captivator Paint bury Trace Wire Hyd Flag Static
1 784 Across from 7511 Eagle Crest Dr W 2002 EC 4 N F 7.5' FALSE
2 783 7408 Eagle Crest Dr W 2002 EC 3 N F 6' FALSE
3 782 7316 Eagle Crest Dr W 2002 EC 2 N F 7' FALSE
4 781 7202 Eagle Crest Dr W 2002 EC 1 N F 6' FALSE
5 805 9106 NW 73rd St Clow 1995 73S 1 N F FALSE
6 804 9139 NW 73rd St Clow 1995 73S 2 N F FALSE
7 803 9177 NW 73rd St Clow 1995 73S 3 N F FALSE
8 802 7265 Eagle Pointe Dr Clow 1995 EPD 1 N Bad FALSE
9 801 7393 Eagle Pointe Dr Clow 1995 EPD 2 N F FALSE
10 800 7457 Eagle Pointe Dr Clow 1995 EPD 3 N F FALSE
11 1060 NW 90th Ave & Daybreak Rd Mueller 2006 N F FALSE
12 1058 Daylight Dr & Daybreak Rd Mueller 2006 Y F FALSE
13 563 6412 NorthGlenn Dr W 2001 NRG 14 Y F B FALSE
14 564 6921 NorthGlenn Dr. W 2001 NRG 13 N G N FALSE
15 565 6871 NorthGlenn Dr W 2001 NRG 12 N G N FALSE
16 566 NorthGlenn Dr & Gables Way W 2001 NRG 11 N G 6' N FALSE
17 567 NorthGlenn Dr W 2001 NRG 10 N E N FALSE
18 568 NorthGlenn Dr & Hemingway St W 2001 NRG 9 N E 6' W FALSE
19 569 NorthGlenn Dr @ Chapel Ridge #25 W 2001 NRG 8 N E 6' N FALSE
20 570 NorthGlenn Dr across from Barn W 2001 NRG 7 N E W FALSE
NorthGlenn Dr @ Mediacomm


NW 62nd Ave
NW 61st Ave
NW 61st Pl
NW 60th Ave
NW 57th Ave
NW 55th Ave
NW 54th Ave
NW 64th Pl
NW 63rd Pl
NW 59th Ct
NW 56th St
NW 52nd Ct
NW 51st St
Dewey Pl
Four Pines St
Pinewood Ct
NW 49th St
NW 52nd St
NW 54th Ct
NW 51st St
NW 50th St
Pine Ct
NW Beaver Dr
Merle Hay Rd
Meadow Crest Dr
N Winwood Dr
S Winwood Dr
Dogwood Ln
Cabana Ln
Ashland Pl
Greendale Rd
Corporate Dr
Columbine Dr
Somerset Pl
Aspen Cir
Pioneer Pkwy
Terrace Dr
Jordan Ct
Ceres Cir
South Dr
Crescent Chase
Briargate Ct
Nottingham Dr
Huntingwood Ct
Foxboro Rd
Kings Row
Hadfield
Chambery Blvd
Durham Cir
Hardwicke Dr
Chatham St
Long Meadow Ln
Talbot Pl
Barnham Dr
Caldwell Cir
Barnsley Dr
NW 78th Ct
NW Burr Oak Dr
NW 84th St
86th St
72nd St
North Valley Dr
68th St
69th St
Johnston Dr
NW Johnston Dr

I HAVE INFORMATION

I know something, I have information in my possession (in my head, my notebook, my truck, etc.)

DATA IS DIGITIZED & SHARED

My data and data from other sources is digitized and combined.

WE KNOW MORE

The collective data and knowledge is now available to all.

I DOCUMENT IT

My information gets written down, or otherwise formally documented for use by others

DATA IS COMBINED, ANALYZED & VISUALIZED

Use appropriate tools (pushpins, GIS, etc.) to analyze and visualize the combined data.

The whole is more valuable than the individual parts.

We've harnessed the collective knowledge…

… to make better, data-driven, decisions.

Questions?

Data driven replacement decisions

Water line replacement – data needs and options

Pipe Replacement is Expensive.. So need to be judicious about replacement

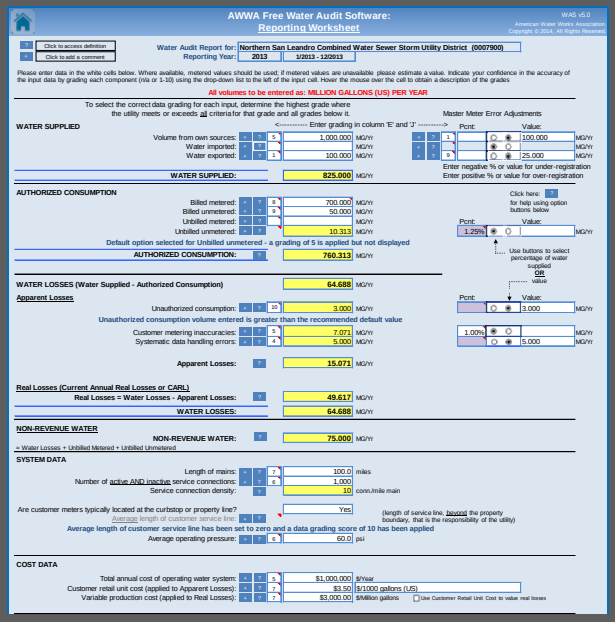
Needs to be based on DATA!!

Past Breakage is A Good Indicator of Future Performance

WRF Report 4326

Break Data: Good Data to Assess Pipe Quality & Time for Replacement

Uses for Data



AWWA Free Water Audit Software: Reporting Worksheet

WAS v5.0

American Water Works Association. Copyright © 2014, All Rights Reserved.

Water Audit Report for: Northern San Leandro Combined Water Sewer Storm Utility District (0007900)

Reporting Year: 2013 (1/2013 - 12/2013)

Please enter data in the white cells below. Where available, metered values should be used; if metered values are unavailable please estimate a value. Indicate your confidence in the accuracy of the input data by grading each component (n/a or 1-10) using the drop-down list to the left of the input cell. Hover the mouse over the cell to obtain a description of the grades

All volumes to be entered as: MILLION GALLONS (US) PER YEAR

To select the correct data grading for each input, determine the highest grade where the utility meets or exceeds all criteria for that grade and all grades below it.

Enter grading in column 'E' and 'J'

Master Meter Error Adjustments

WATER SUPPLIED		Pcnt:	Value:	
Volume from own sources:	1,000.000 MG/Yr		100.000	MG/Yr
Water imported:	MG/Yr			MG/Yr
Water exported:	100.000 MG/Yr		25.000	MG/Yr
WATER SUPPLIED:	825.000 MG/Yr			

Enter negative % or value for under-registration

Enter positive % or value for over-registration

AUTHORIZED CONSUMPTION			
Billed metered:	700.000 MG/Yr		
Billed unmetered:	50.000 MG/Yr		
Unbilled metered:	MG/Yr		
Unbilled unmetered:	10.313 MG/Yr	1.25%	MG/Yr
AUTHORIZED CONSUMPTION:	760.313 MG/Yr		

Default option selected for Unbilled unmetered - a grading of 5 is applied but not displayed

Click here: for help using option buttons below

Use buttons to select percentage of water supplied OR value

WATER LOSSES (Water Supplied - Authorized Consumption)	64.688 MG/Yr		
Apparent Losses		Pcnt:	Value:
Unauthorized consumption:	3.000 MG/Yr		3.000 MG/Yr
Unauthorized consumption volume entered is greater than the recommended default value			
Customer metering inaccuracies:	7.071 MG/Yr	1.00%	MG/Yr
Systematic data handling errors:	5.000 MG/Yr		5.000 MG/Yr
Apparent Losses:	15.071 MG/Yr		
Real Losses (Current Annual Real Losses or CARL)			
Real Losses = Water Losses - Apparent Losses:	49.617 MG/Yr		
WATER LOSSES:	64.688 MG/Yr		

NON-REVENUE WATER	
NON-REVENUE WATER:	75.000 MG/Yr

= Water Losses + Unbilled Metered + Unbilled Unmetered

SYSTEM DATA		
Length of mains:	100.0	miles
Number of active AND inactive service connections:	1,000	
Service connection density:	10	conn./mile main
Are customer meters typically located at the curbstop or property line?	Yes	(length of service line, beyond the property boundary, that is the responsibility of the utility)
Average length of customer service line has been set to zero and a data grading score of 10 has been applied		
Average operating pressure:	60.0	psi

COST DATA		
Total annual cost of operating water system:	$1,000,000	$/Year
Customer retail unit cost (applied to Apparent Losses):	$3.50	$/1000 gallons (US)
Variable production cost (applied to Real Losses):	$3,000.00	$/Million gallons

Use Customer Retail Unit Cost to value real losses

Compare to Results of Water Audit

Pipe Replacement

Other???

Where to look for Leaks

Type of Data That Could be Collected - Field

- Pipe Diameter
- Depth of Cover
- Pipe Material
- Bedding Material
- Condition of Bedding
- Natural Soil Type
- Condition of Pipe Interior
- Condition of Pipe Exterior
- Type of Service Line
- Surface Use and Surface Material
- Length of Pipe Segment
- Containing Repair
- Pipe Protection (if any)
- Type of Joints

Type of Data That Could be Collected - Office

Year of Installation
Backfill Material
Typical Flow in Area of Break
Typical Pressure in Area of Break
Type of Pipe Lining
Pipe Wall Thickness

Environmental Conditions (temperature, depth of frost, weather, soil temperature, water temperature)

Type of Break/Cause of Failure

- Joint Failure
- Corrosion
- Construction Disturbance
- Rock Contact
- Frozen Pipe
- Settlement
- Erosion/Unsupported Pipe
- Poor Construction Practices
- Ground Frost
- High Water Pressure in Pipe
- Traffic Load
- Water Temperature Change
- Unknown

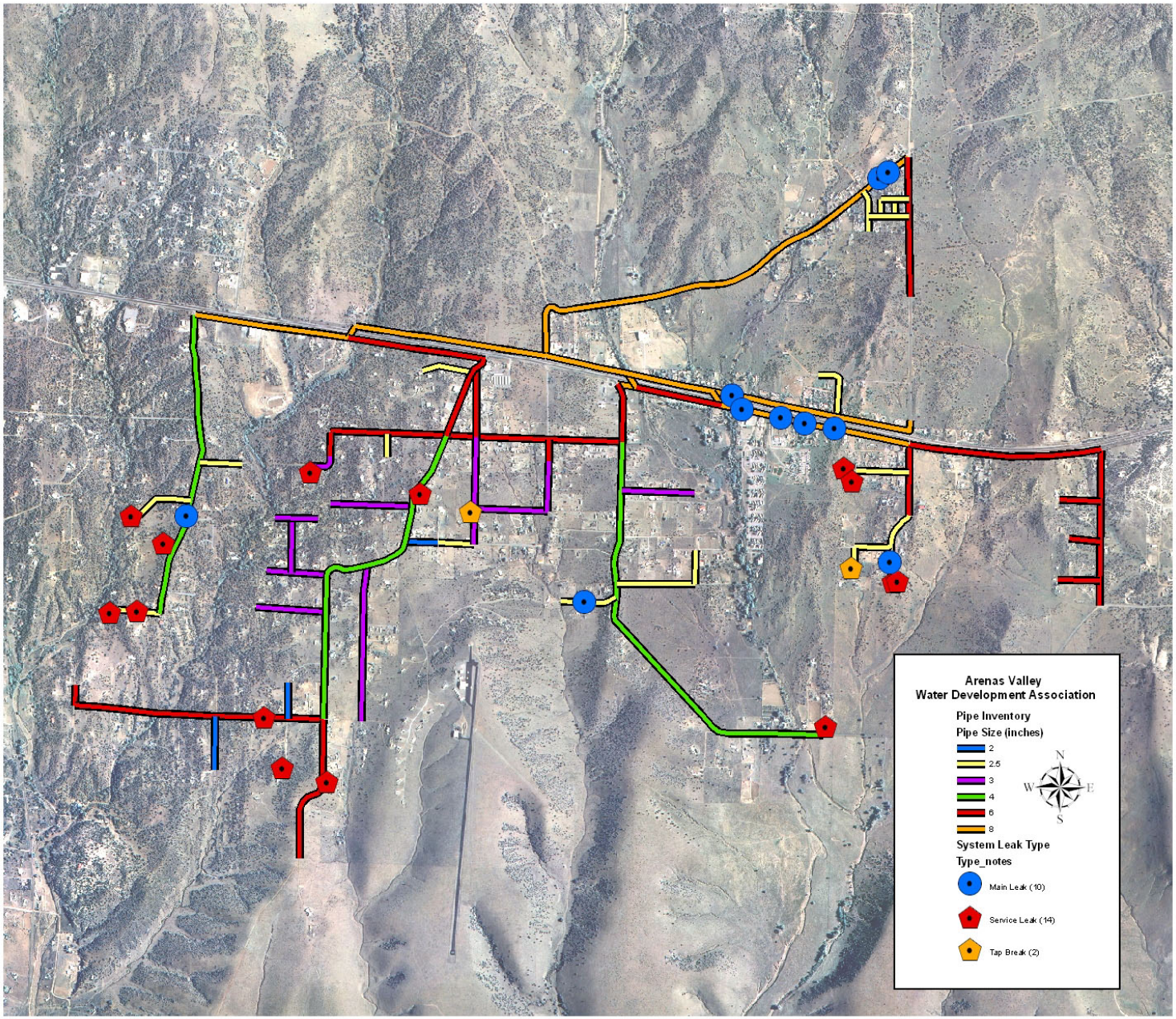
Type of Repair

Repair Types

Repair Clamp
Replace Pipe Section
Replace Valve
Repair Joint
Replace Entire Hydrant
Surface Restoration
Replace Hydrant Parts
Replace Service Connection
Anode Installed
Extended Protection Installed
Other - Specify

Mapping Break Data Can Be Very Helpful

Visualize the data




Gatesville
CITY LIMIT
POP 15751

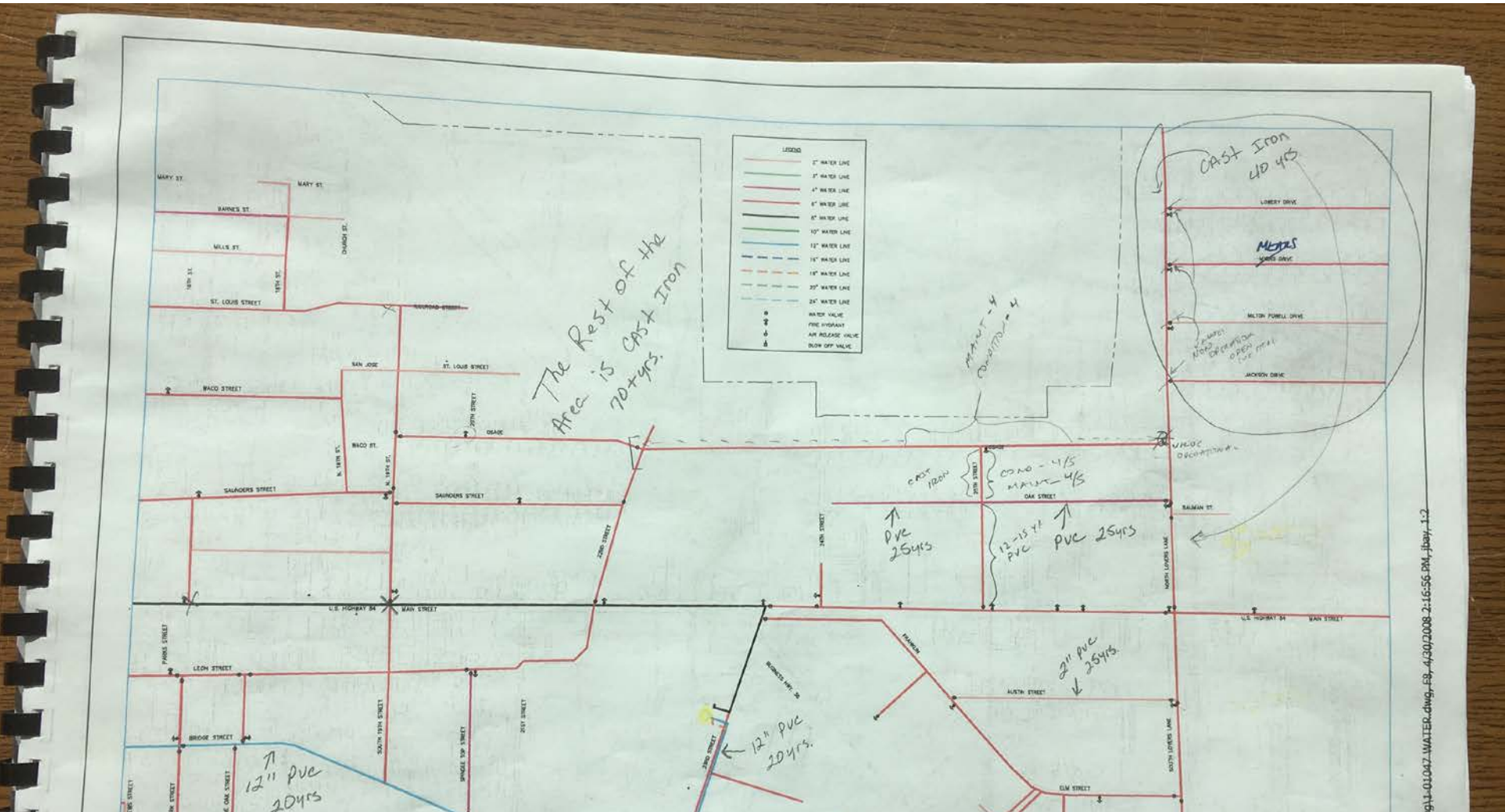

CITY OF
GATESVILLE
WATER BILL
PAYMENT ONLY


GATESVILLE HORNETS
STATE CHAMPS 200


OPC INDUSTRIES INC.
601 W INDUSTRIAL BLVD
CLEBURNE, TX 76031
SULFUR DIOXIDE
UN 1079
PG
INHALATION HAZARD


CITY OF
GATESVILLE
N. FORT HOOD
LIFT STATION
RESTRICTED AREA
FOR ENTRANCE
865-8951
IN CASE OF EMERGENCY
865-2226

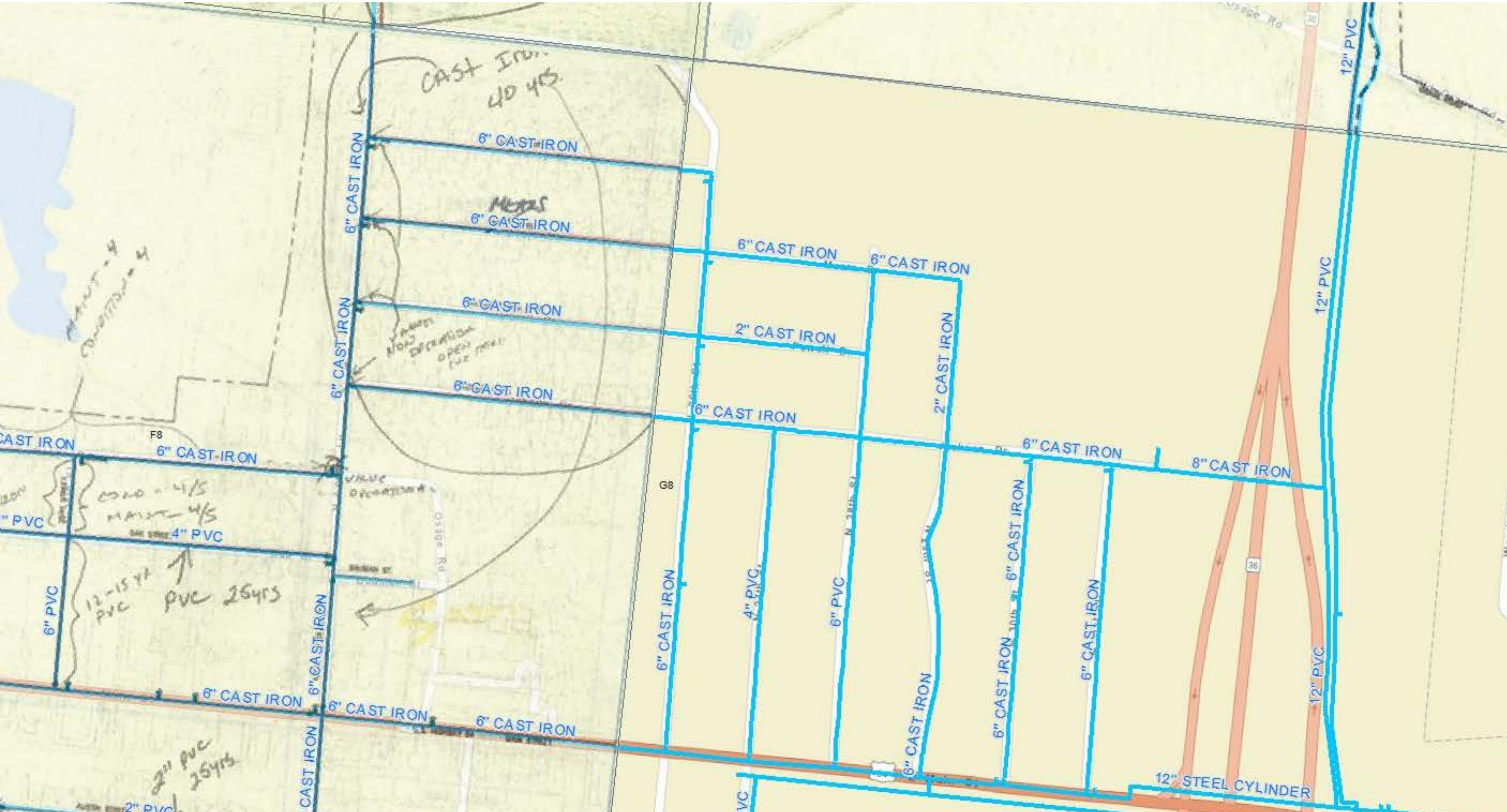
Data in one format: A physical map book



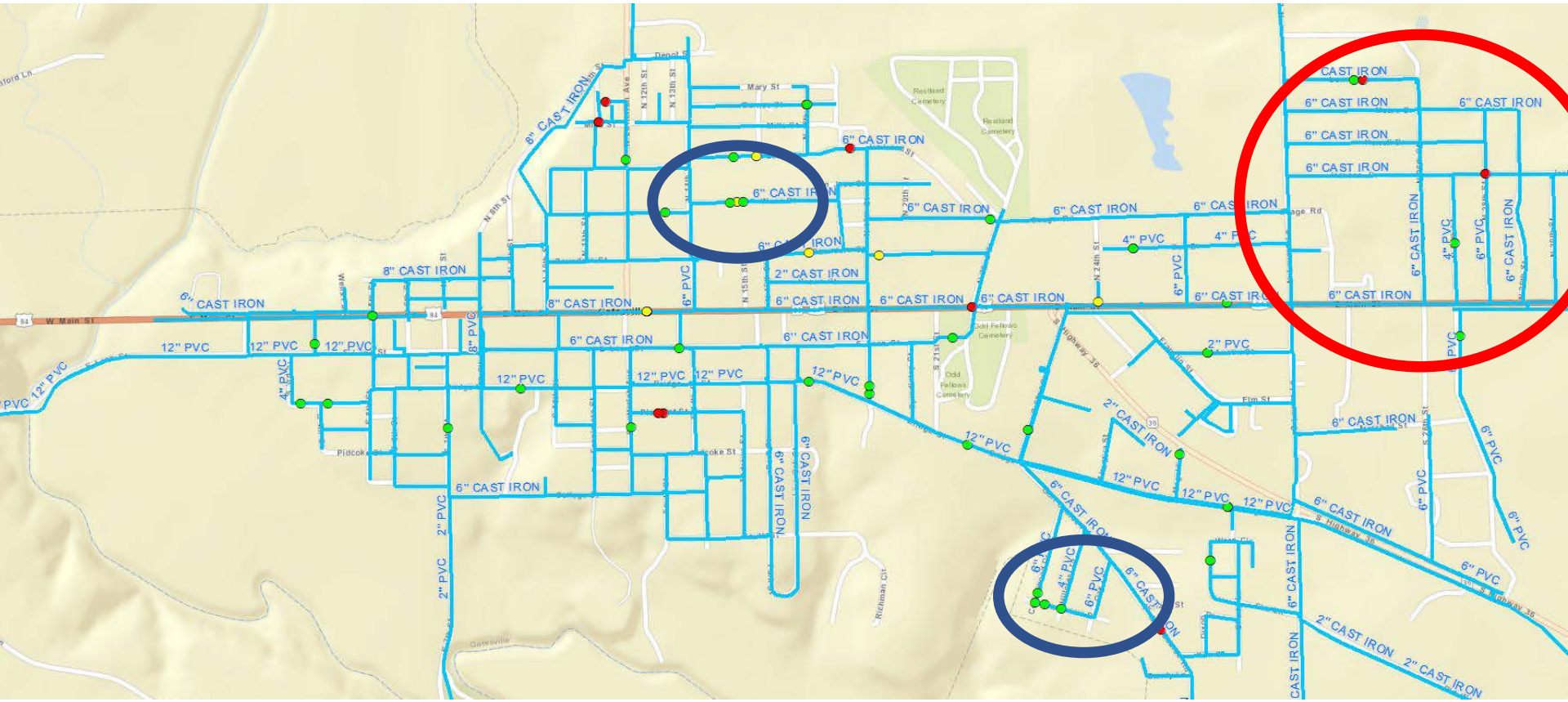
Data in another format: Excel

	A	B	C	D	E	F	G	H	I
1	WATER & SEWER LEAK CALL LOG								
2	WA/SE	DATE	TIME	ADDRESS	USER	CALLED	NOTES	UPDATES	WORK TICKET #
3	WA	2/9/2016	10:38AM	OLD HILLSIDE NURSING HOME	BH	RM	FIRE HYDRANT RUNNING	CREW WORKING ON LINE PER RM @ 10:50AM	48674
4	STREET	2/9/2016	11:24AM	1008 PLEASANT	DD	RM	LEAK IN THE STREET	FIXED	48642
5	SE	2/10/2016	10:00AM	400 FINNIMORE	BH	RM	SEWER BACKED UP AT STREET	UNCLOGGED	48683
6	WA	2/10/2016	10:00AM	3502 RIVER ROAD	BH	RM	A CAR HIT THE FIRE HYDRANT	FIXED DA/CN 2-22-16	48644
7	WA	2/10/2016	10:00AM	CORNER OR 22ND AND WACO	BH	RM	LEAK FILLING UP CULVERT		
8	SE	2/10/2016	10:36AM	2015 WACO STREET	DD	RM	RAW SEWER SHOOTING UP IN AIR FROM CLEAN OUT	UNCLOGGED	48684
9	WA	2/10/2016	3:15PM	1105 S LOVERS LANE	BH	RM	METER LEAK	FIXED	48647
10	WA	2/10/2016	3:30PM	206 FIELDSTONE	DD	RM	LEAK-METER WAS RUN OVER BROKE CUTOFF	FIXED	48648
11	WA	2/10/2016	3:32PM	119 N 28 ST	BH	RM	LEAK @ METER	FIXD	48649
12	WA	2/10/2016	3:57PM	119 N 28 ST	BH	RM	CUSTOMER CALLED AGAIN AND SAID METER LEAK WAS VERY LARGE. CALLED RODNEY TO LET HIM KNOW	FIXED	48649
13	WA	2/11/2016	9:00AM	28TH AND MEARS	BH	RM	WATER SHOOTING OUT OF MANHOLE	FIXED	48687
14	WA	2/11/2016	9:00AM	BLESSINGS BUILDING	BH	RM	WATER LEAK BEHIND BUILDING	FIXED	48671
							CALLED LAST NIGHT AT 8 AND THEY		

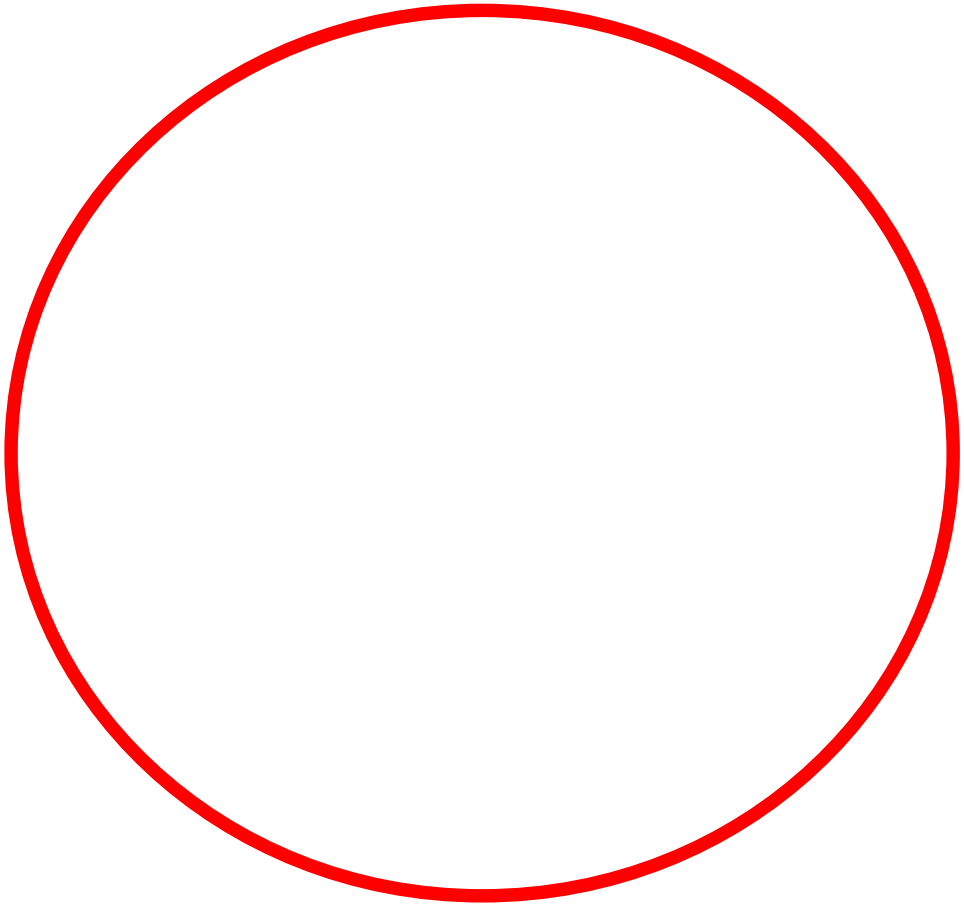
Same data combined in another format: GIS



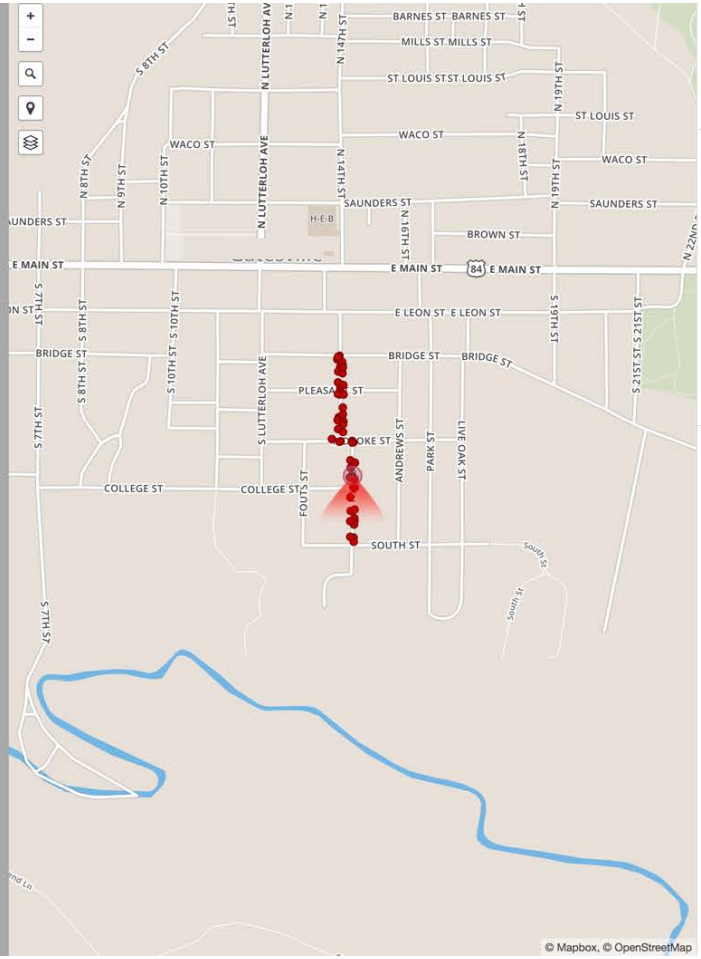
Same data combined in another format: GIS



Close up of same data



20 Years of pavement cuts…



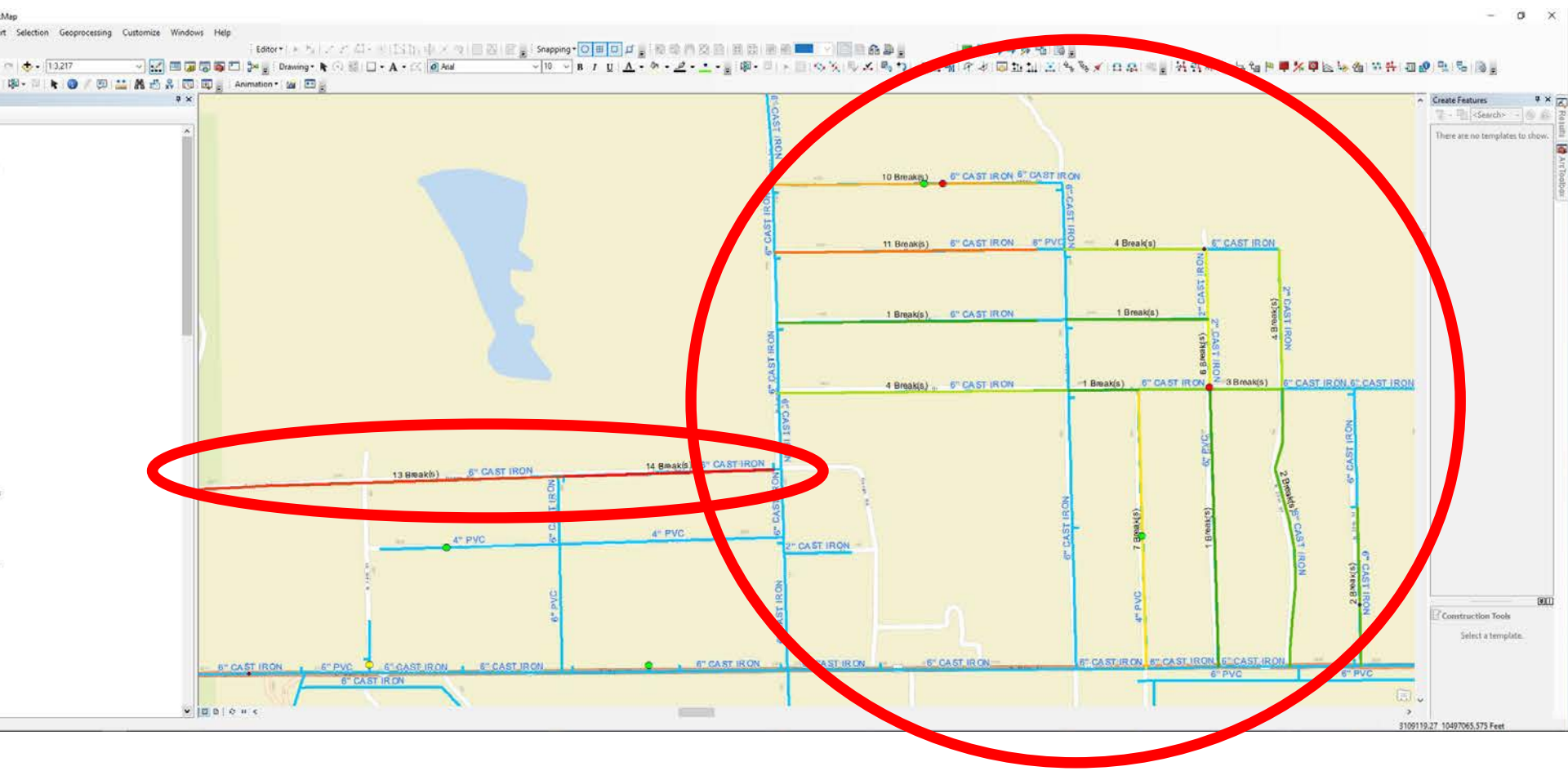
Download

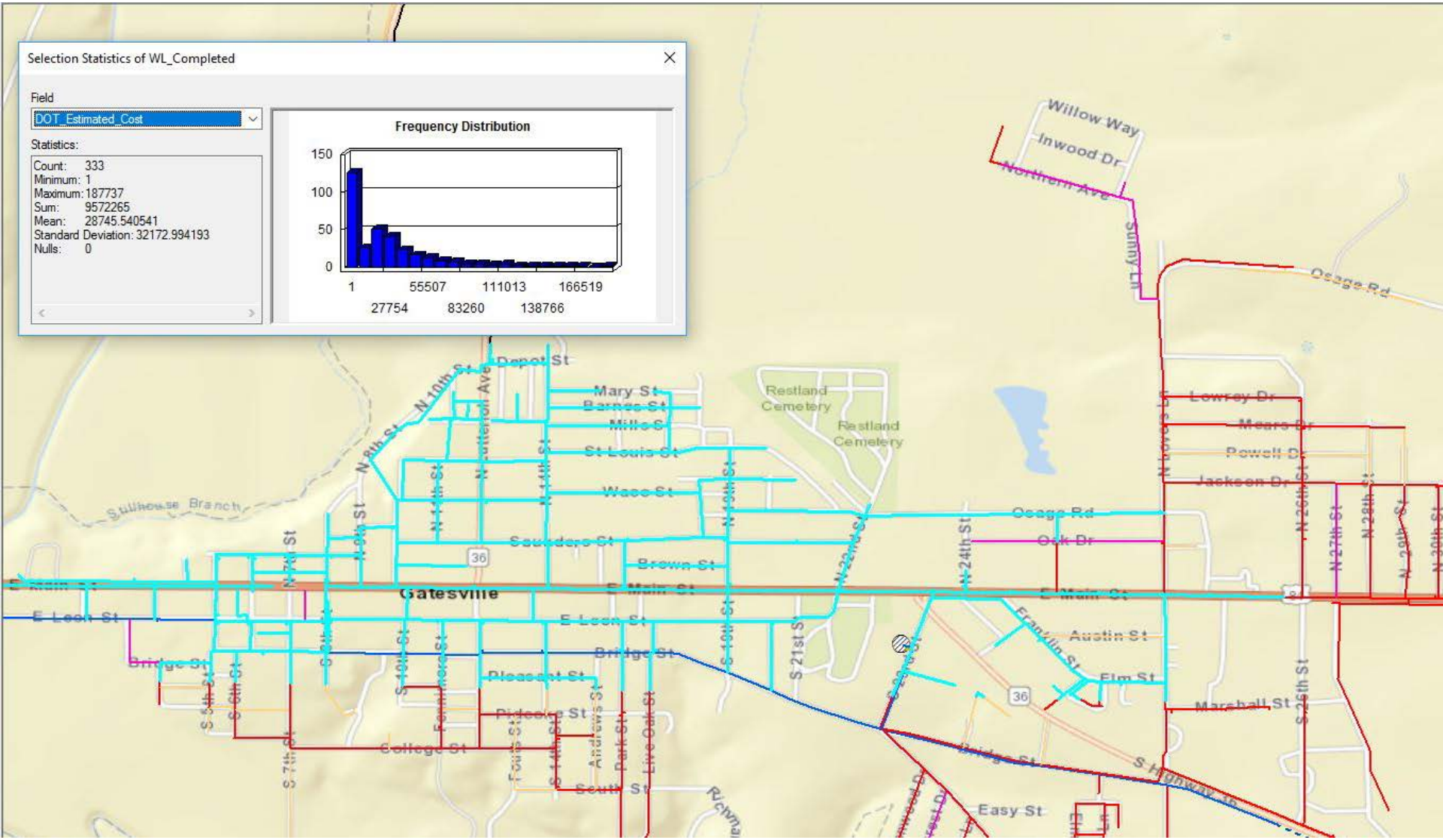
Original
Large
Thumbnail

Metadata

Date:	2017-04-06 13:53:28
Make/Model:	Apple iPhone 6
Software:	Fulcrum iOS 2.14.0 (3057), iOS 10.2.1, Apple, iPhone 6
Dimensions:	810 x 1080 (0.9MP)
Size:	474 KB
Latitude:	
Longitude:	
Accuracy:	
Altitude:	
Direction:	
Distance:	

Combined data from all sources

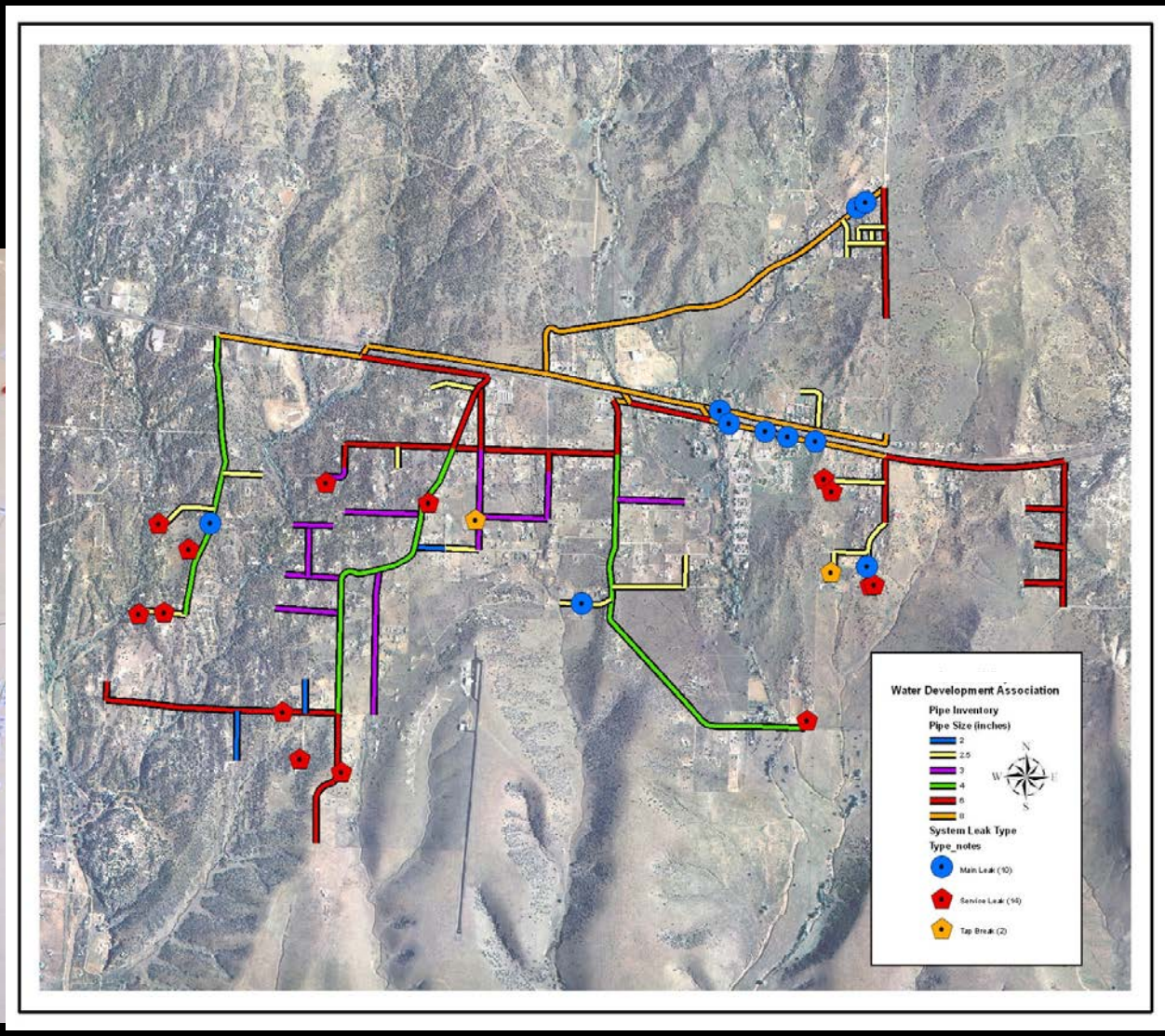



Selection Statistics of WL_Completed
Field
DOT_Estimated_Cost
Statistics:
Count: 333
Minimum: 1
Maximum: 187737
Sum: 9572265
Mean: 28745.540541
Standard Deviation: 32172.994193
Nulls: 0
Frequency Distribution
150
100
50
0
1
55507
111013
166519
27754
83260
138766
Gatesville
Willow Way
Inwood Dr
Northern Ave
Sunny Ln
Osage Rd
Depot St
Mary St
Barnes St
Mills S
St Louis St
Wace St
Saunders St
Brown St
E Main St
E Leon St
Bridge St
Pleasant St
College St
South St
Restland Cemetery
Lowrey Dr
Mears Dr
Powell Dr
Jackson Dr
Oak Dr
Austin St
Elm St
Marshall St
Easy St
Stillhouse Branch
36

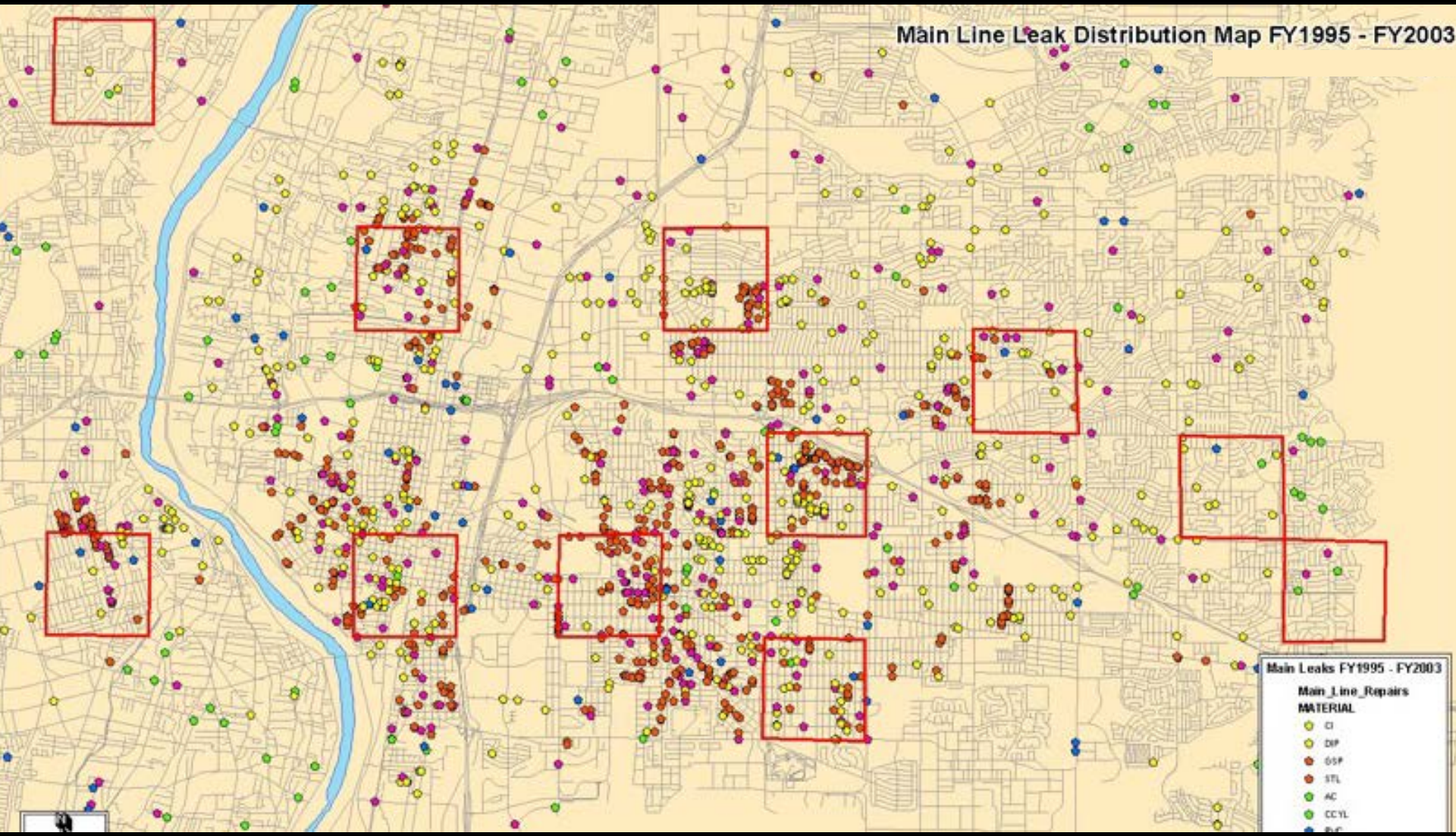
2007 Case Study: Arenas Valley

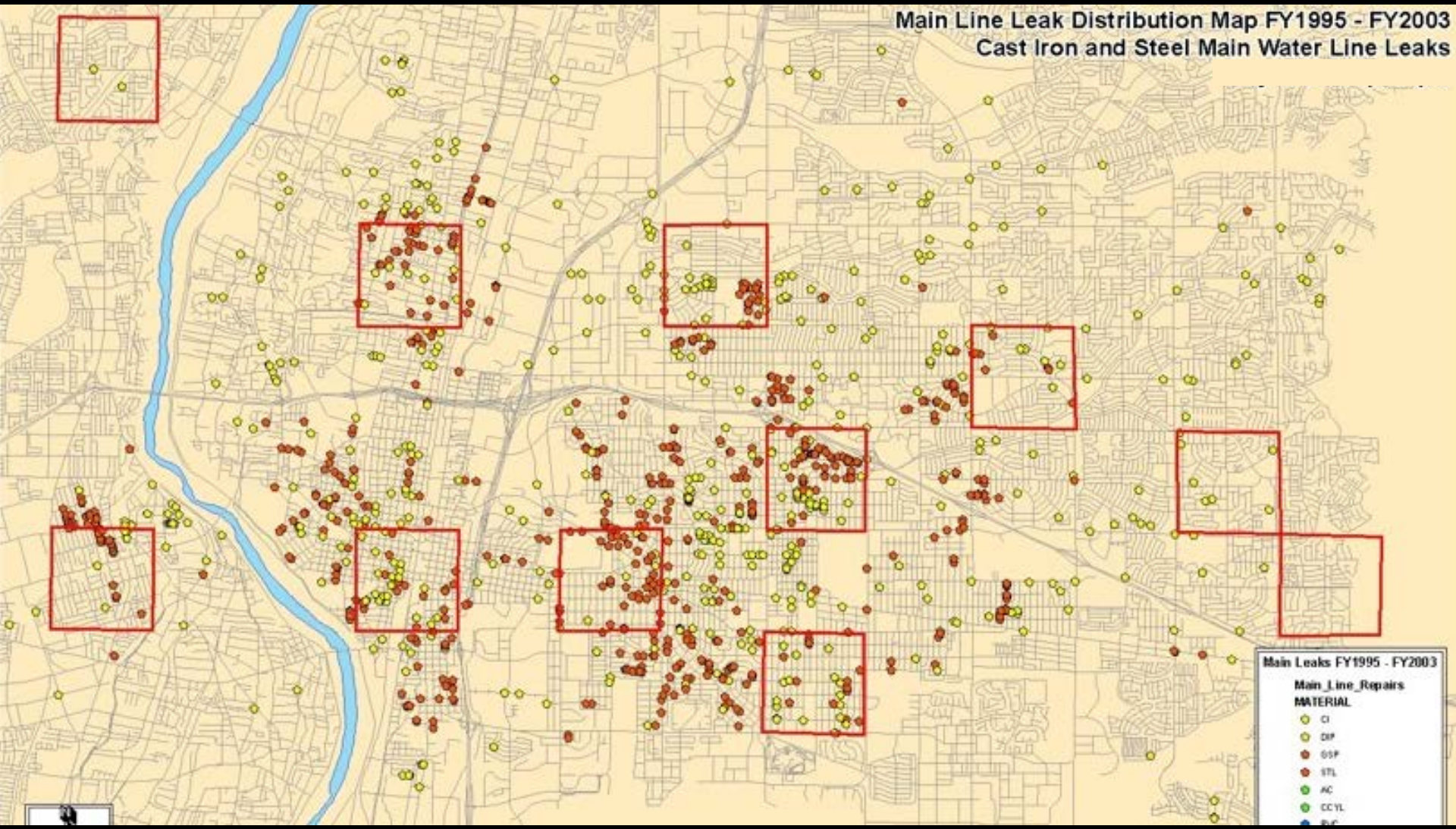
- The water system
  - Buy treated water from Silver City
  - Relatively new (1980s) PVC pipe distribution system
    - ~20 miles of pipe
    - ~430 service connections
    - ~25 hydrants
    - ~100 valves

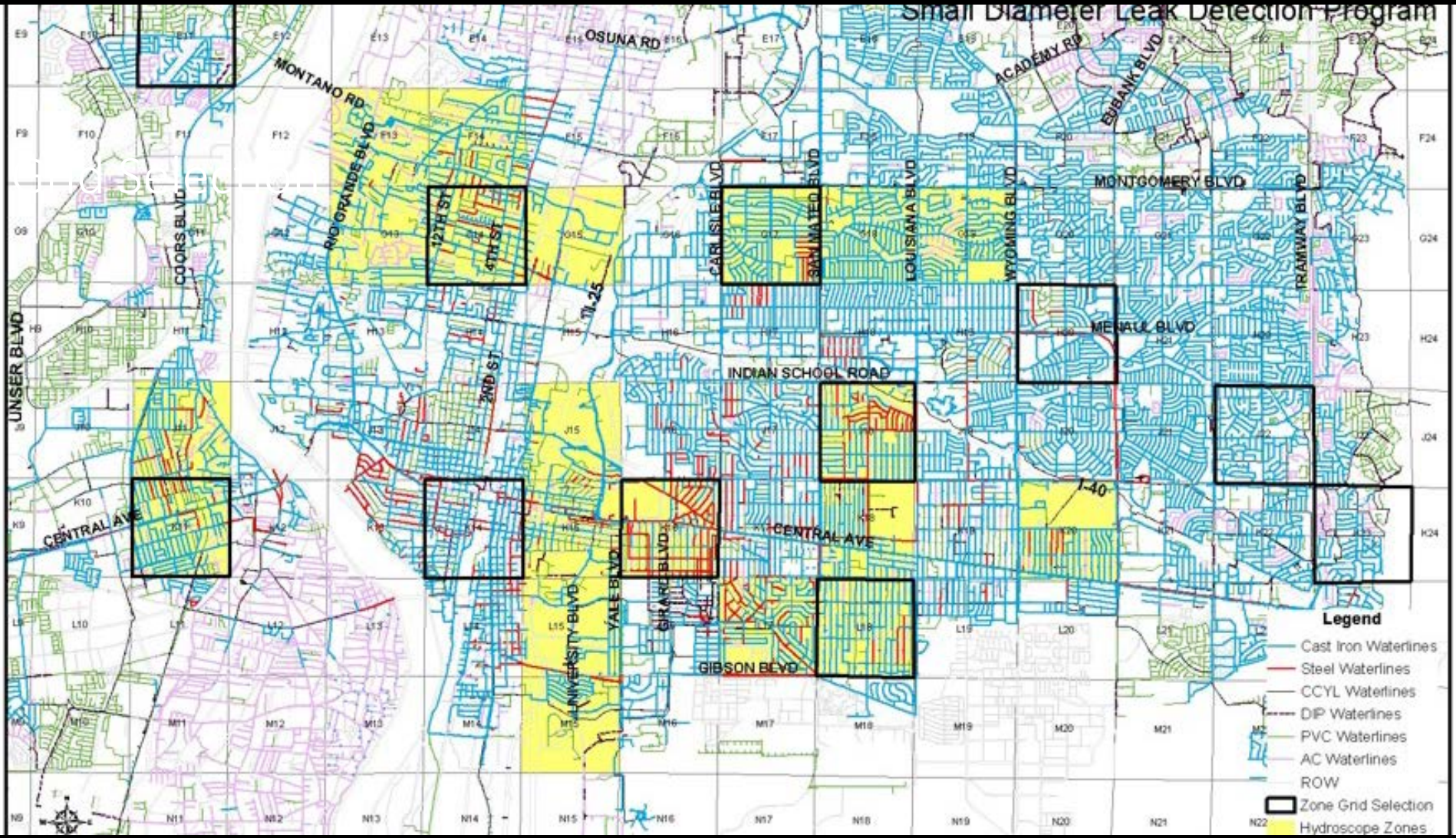

FIRE HYDRANT
PRESSURE REGULATOR
SHUT OFF VALVE
BLEEDING VALVE
AIR RELIEF VALVE
SAMPLING LOCATION


Water Development Association
Pipe Inventory
Pipe Size (inches)
2
2.5
3
4
6
8
N
W
E
S
System Leak Type
Type_notes
Main Leak (10)
Service Leak (14)
Tap Break (2)

Some Examples of Uses of Break Data: ABCWUA Steel Water Lines


Main Line Leak Distribution Map FY1995 - FY2003
Main Leaks FY1995 - FY2003
Main_Line_Repairs
MATERIAL
CI
DIP
GSP
STL
AC
CCYL


Main Line Leak Distribution Map FY1995 - FY2003
Cast Iron and Steel Main Water Line Leaks
Main Leaks FY1995 - FY2003
Main_Line_Repairs
MATERIAL
CI
DIP
GSP
STL
AC
CCYL


Small Diameter Leak Detection Program
OSUNA RD
MONTANO RD
RIO GRANDE BLVD
COORS BLVD
UNSER BLVD
12TH ST
4TH ST
2ND ST
I-25
CARLISLE BLVD
SAN MATEO BLVD
LOUISIANA BLVD
WYOMING BLVD
ACADEMY RD
EUBANK BLVD
MONTGOMERY BLVD
TRAMWAY BLVD
MENAUL BLVD
INDIAN SCHOOL ROAD
I-40
CENTRAL AVE
CENTRAL AVE
GIBSON BLVD
GIRARD BLVD
YALE BLVD
UNIVERSITY BLVD
Legend
Cast Iron Waterlines
Steel Waterlines
CCYL Waterlines
DIP Waterlines
PVC Waterlines
AC Waterlines
ROW
Zone Grid Selection
Hydroscope Zones

Finalized AM Plan

45% Reduction in Break Rate (and associated costs)

System

John Honoré

Natural Hazards Analyst

Texas Division of Emergency Management

Texas Homeland Security

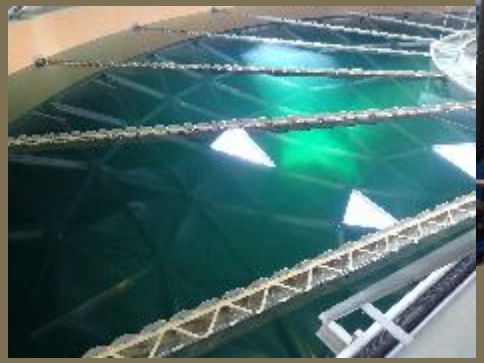
Texas Department of Public Safety

Rates and Fiscal Management

Why Do We Need To Charge for Water?

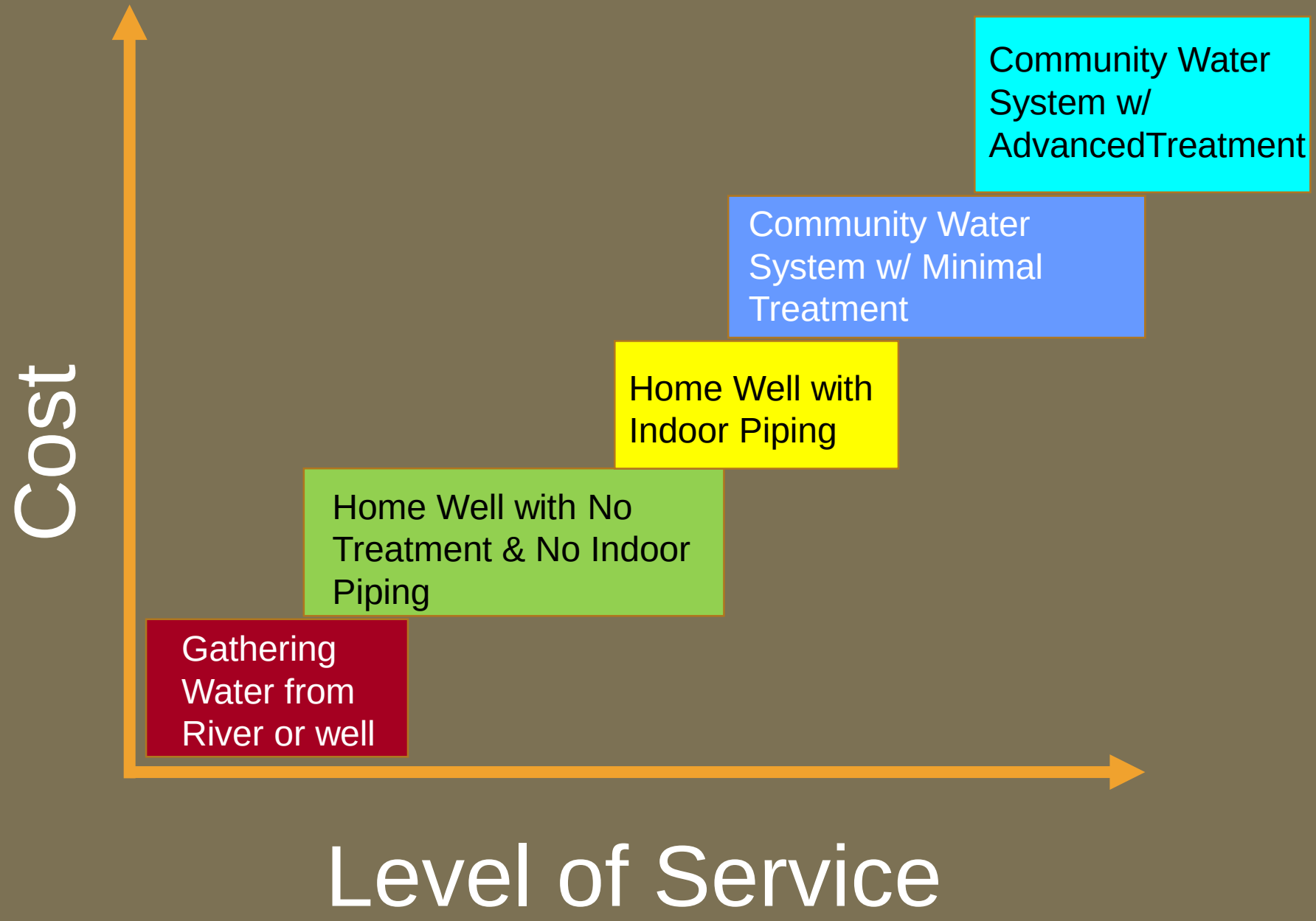
Water Is Free……

But the SERVICE isn't!!!!!

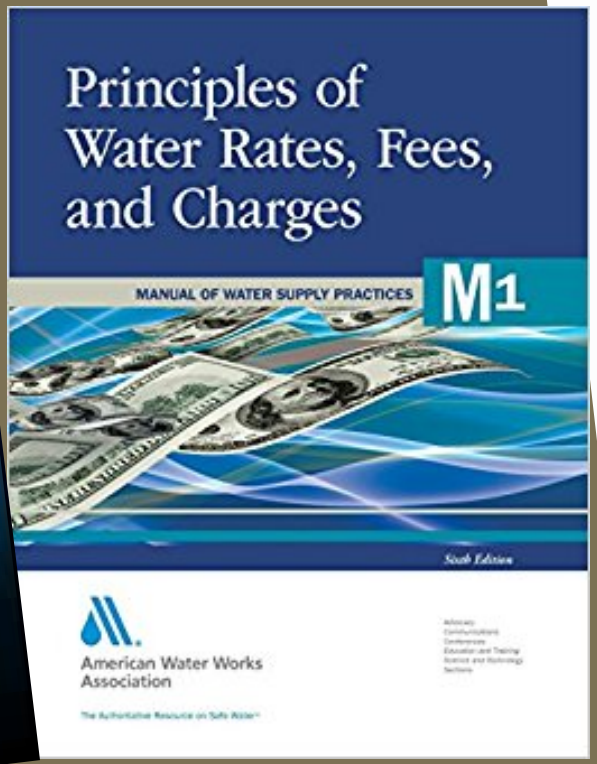


We Want This

But Want to Pay for This


Cost
Community Water System w/ AdvancedTreatment
Community Water System w/ Minimal Treatment
Home Well with Indoor Piping
Home Well with No Treatment & No Indoor Piping
Gathering Water from River or well
Level of Service

To Pay for the Service: Need Customer Revenue

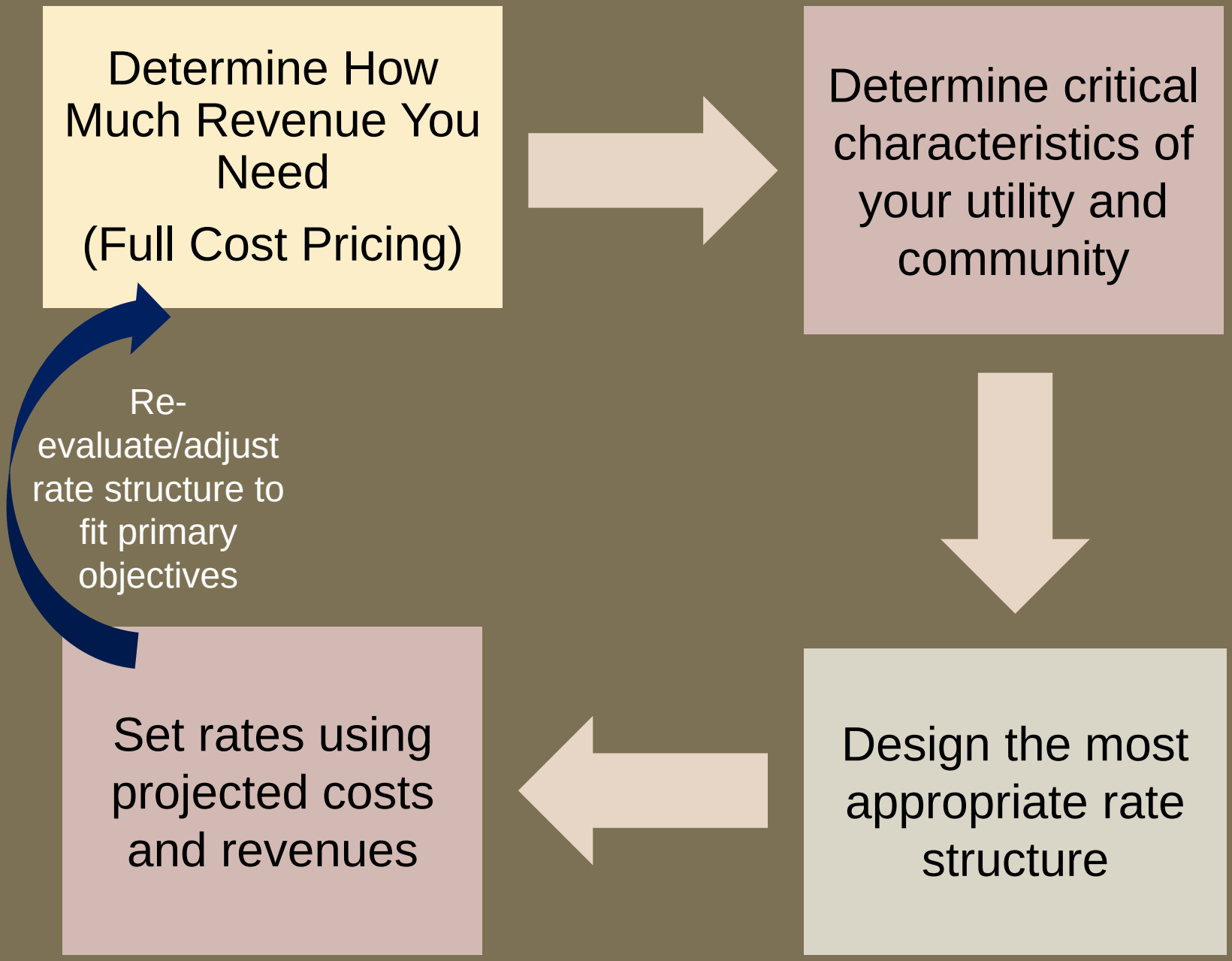


There is no one right answer

Rate Setting is about generating the amount of revenue you need but there is more than one way to get there.

There is no “right” rate

It’s about the policy choices and value judgements you want to make


Determine How Much Revenue You Need
(Full Cost Pricing)
Determine critical characteristics of your utility and community
Design the most appropriate rate structure
Set rates using projected costs and revenues
Re-evaluate/adjust rate structure to fit primary objectives

Determine How Much Revenue You Need

(Full Cost Pricing)

- **Operation and Maintenance**
- **Contingencies for Emergencies**
- **Principal and Interest on Long-Term Debt**
- **Administrative Costs**
- **Professional Services (Legal, Engineering, Accounting)**
- **Repairs and Minor Equipment Replacement**
- **Planned Capital Expenditures**
- **Reserve Accounts**

Determine How Much Revenue You Need

(Full Cost Pricing)

Where to Start:

Last year's budget (line item budget)

At zero

Determine How Much Revenue You Need

(Full Cost Pricing)

Considerations:

Do you have a separate budget for water

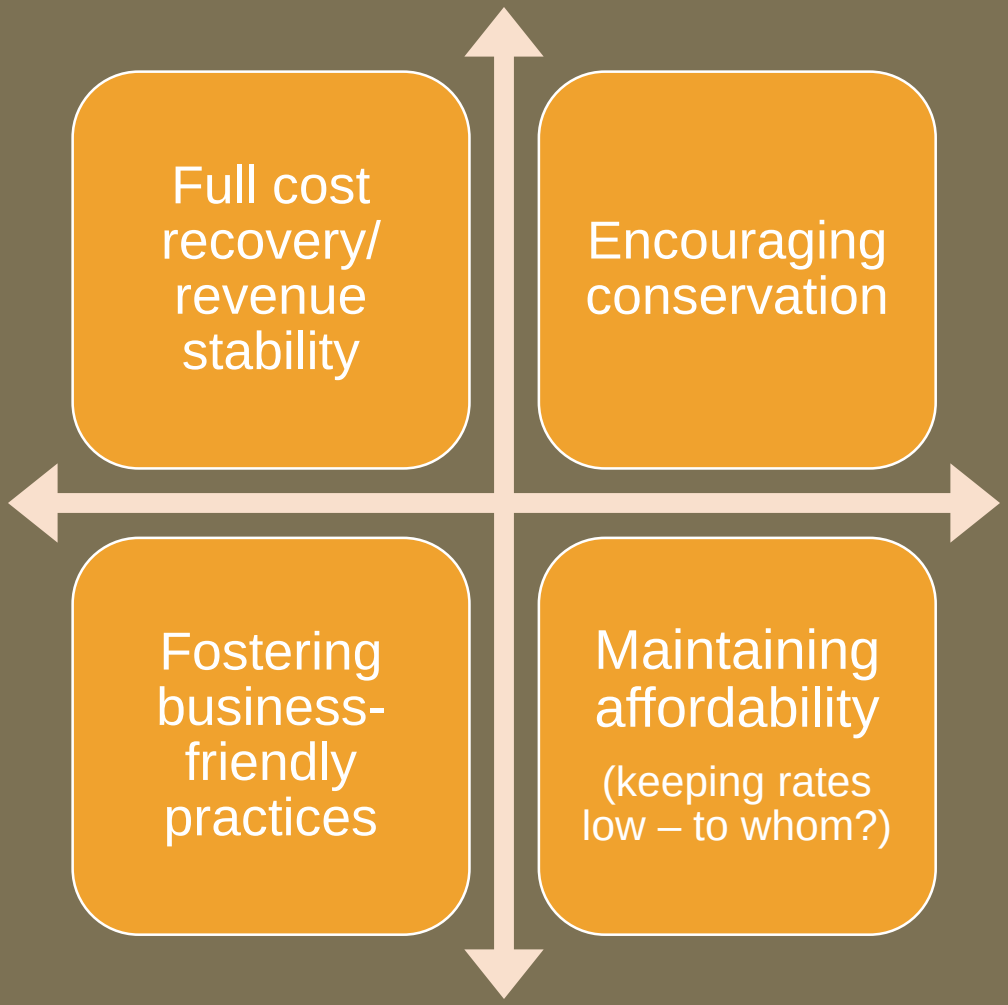
How have costs increased over time? What increases are expected next year?

Remember inflation, changes in customers (usage, numbers, demographics)

Is capital planning complete, based on asset management or good plan?

Are the current costs for O&M, replacement, and repair adequate?

Evaluate the priority of each goal



Determine critical characteristics of your utility and community

1. _____
2. _____
3. _____
4. _____

Refer to this list and focus on the highest ranked objectives when following the guidelines for selecting the appropriate rate structure design.

1. Customer classes/distinction
2. Billing period
3. Base charge
4. Consumption allowance included with base charge
5. Volumetric rate structure
6. (If applicable) Number of blocks, block sizes and rate differentials
7. (Optional) Temporal adjustments
8. Frequency of rate changes

Design the most appropriate rate structure

1. Customer Classes/Distinction

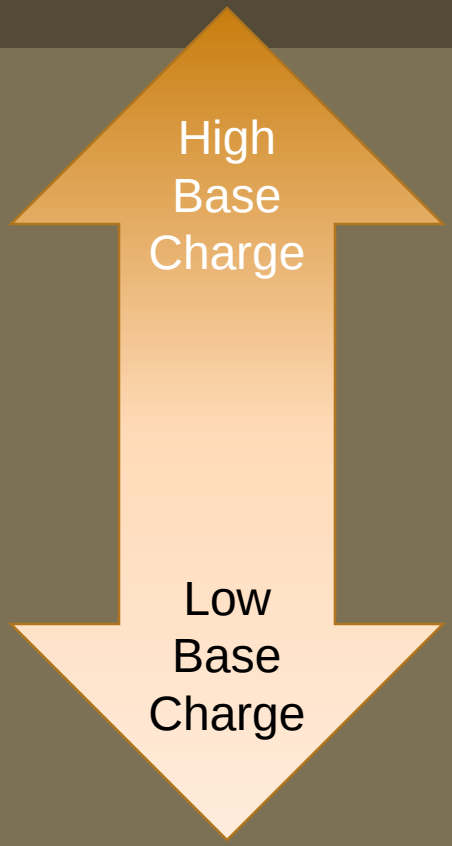
Alternative	Targets
One rate structure for all	All are equal
Separate rate structure for residential, irrigation, commercial, industrial, governmental, or wholesale customers	Specific type of customer
One rate structure, but with different base charges based on meter size	Non-residential or multi-family housing
One rate structure for all, but with blocks that implicitly only target non-residential use	Non-residential
Negotiated rate structure with individual high-use customers (typically an industrial customer)	Only one customer
Different rates for customers outside municipal limits/service area boundaries	“Outside” customers

2. Billing Period

3. Base Charges

PROS

Higher “guaranteed” revenue to pay off the fixed costs;
Higher month-to-month revenue stability



CONS

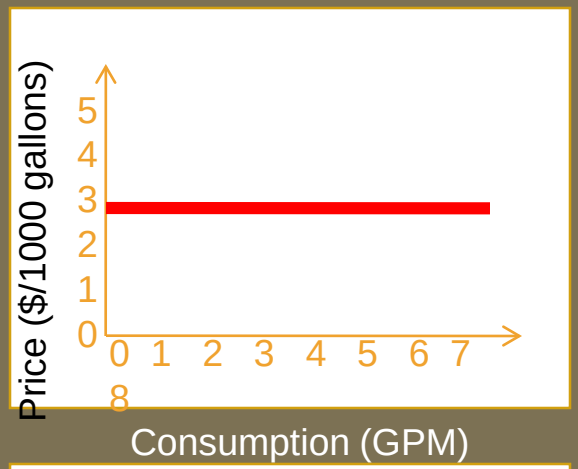
Customers with very low usage are paying a high unit price;
Customers do not witness a significant change in bill if conserve water

Suggestion: Smaller utilities should lean towards higher base charges

4. Consumption Allowance with Base Charge

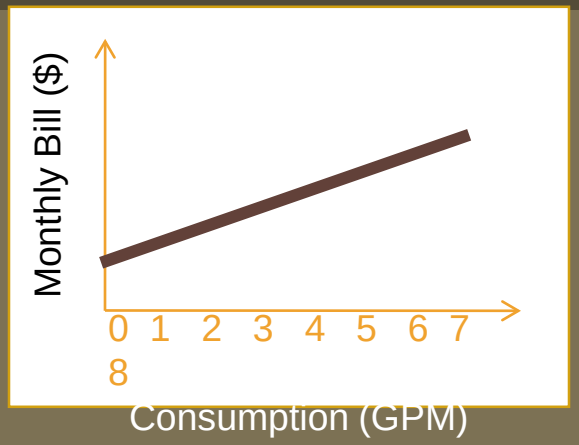
Suggestion: For systems with low base charges, do not include any consumption allowance. For systems with high base charges but wish to encourage conservation, keep consumption allowance low, if any.

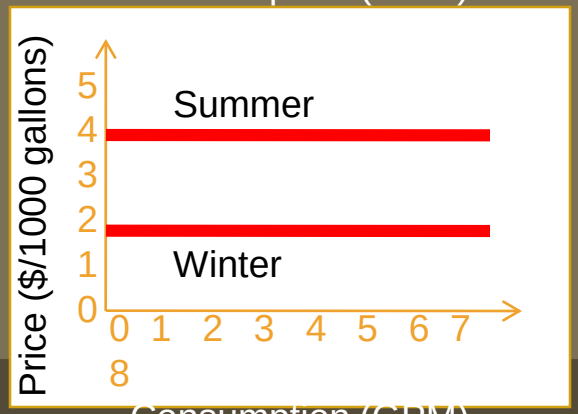
5. Volumetric Rate Structure



Uniform ("Flat") Rates

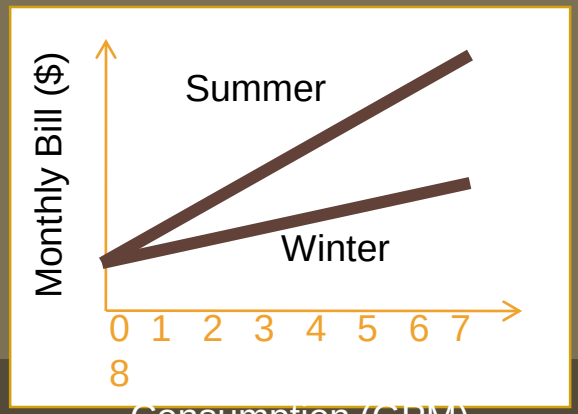
Simple and Fair





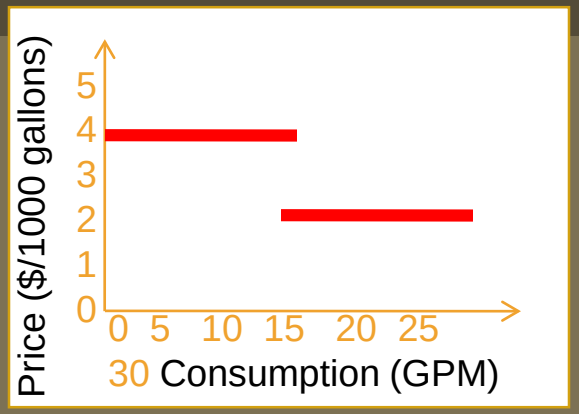
Seasonal (Uniform) Rates

Conservation-oriented, good for seasonal communities



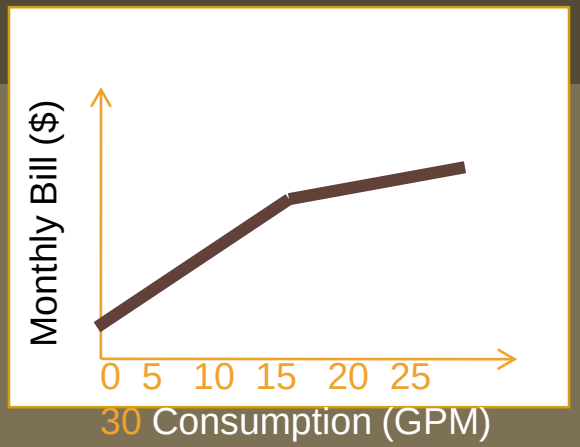
Suggestion: Pick the volumetric rate structure that fits your stated primary objectives best. Do not use decreasing blocks for residential consumption.

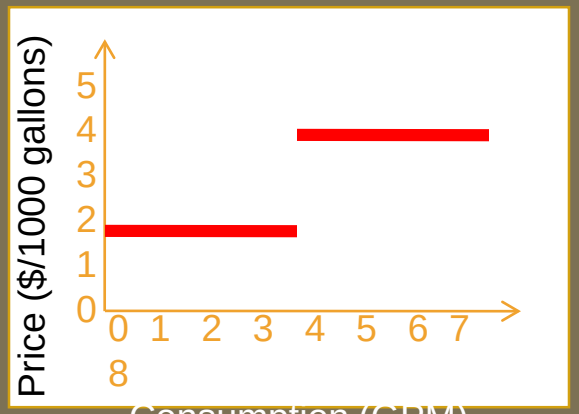
5. Volumetric Rate Structure (Cont.)



Decreasing Block Rates

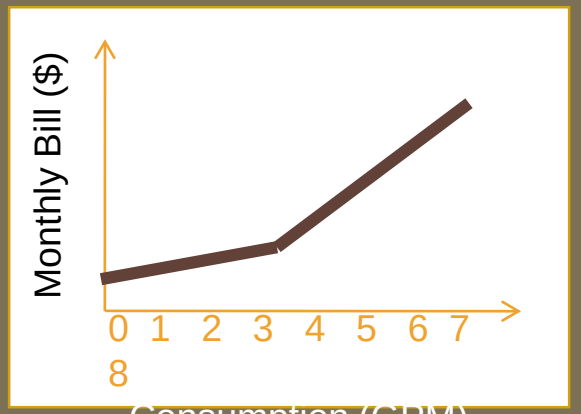
Provide price break for large users (e.g.: commercial). Do not use for residential.





Increasing Block Rates

Conservation-oriented. Consider large families.



Suggestion: Pick the volumetric rate structure that fits your stated primary objectives best. Do not use decreasing blocks for residential consumption.

6. Block Designs (If Applicable)

For block rate structures to be effective:

Decide on the correct number of blocks

Decide on where the blocks should end/start

7. (Optional) Temporal Adjustments

- Prepare for drought in advance: create an ordinance *in advance* to give the utility the ability to raise rates temporarily during a water shortage scenario (sometimes called “drought surcharges”).
- Specify the potential rate increases precisely.
- Rate increases should be substantial to encourage conservation.
- Explicitly state the conditions that would trigger the temporary rate changes on and off. Tie the triggers to your water shortage response plans and water reservoir/well levels.

Note: Temporary rate increases that are significant in magnitude have been shown to be effective methods of encouraging conservation while recovering lost revenue.

8. Frequency of Rate Changes

Decide when and how often you will review your rates. Some alternatives:

- Always review your rates annually (recommended)
- Review your financial health indicators annually, and then review your rates if any of the indicators reflect poor financing
- Pass an ordinance or internal policy to raise rates each year automatically based on inflation

8. Frequency of Rate Changes

Important: Avoid maintaining low rates at the expense of your utility's financial health. It will either lead to a sudden, massive rate increase in the future or to failing systems and endangering public health.

Set rates using projected costs and revenues

Choose the rate structure that best meets your needs, remember there is no “right rate”

There are lots of rate structures that will achieve the correct amount of revenue

Total Estimated Annual Expenses for the Water Utility =

$453,000

Amount Needed for Repair and Replacement Out of Rates for Next Year =

$200,000

Desired Amount for Reserve Accounts =

$150,000

Total Estimated Amount of Revenue Needed =

$803,000

Set rates using projected costs and revenues

Option 1: Flat Rate

Every customer pays $35/month

Total Revenue = $840,000

Option 2: Fixed Fee Plus Variable Rate (1 Block)

Fixed Fee Per Month = $16/month
Block Rate = $3.00/1,000 gallons used

Total Revenue = $813,264

Option 3: Fixed Fee Plus Variable Rate (Increasing Block)

Fixed Fee Per Month = $16/month
Block Rate = 0 to 6,000 gallons $1.80/1,000 gallons, 6,001 – 10,000 gallons, $3.50/1,000 gallons, 10,001 and up $8.00/1,000 gallons

Total Revenue = $804,011

Option 4: Fixed Fee Plus Variable Rate w/ 5,000 Gallons in Base Rate

Fixed Fee Per Month = $29/month
5,000 gallons in Base Rate
Block Rate = 5,001 – 10,000 gallons, $3.50/1,000 gallons, 10,001 and up $8.00/1,000 gallons

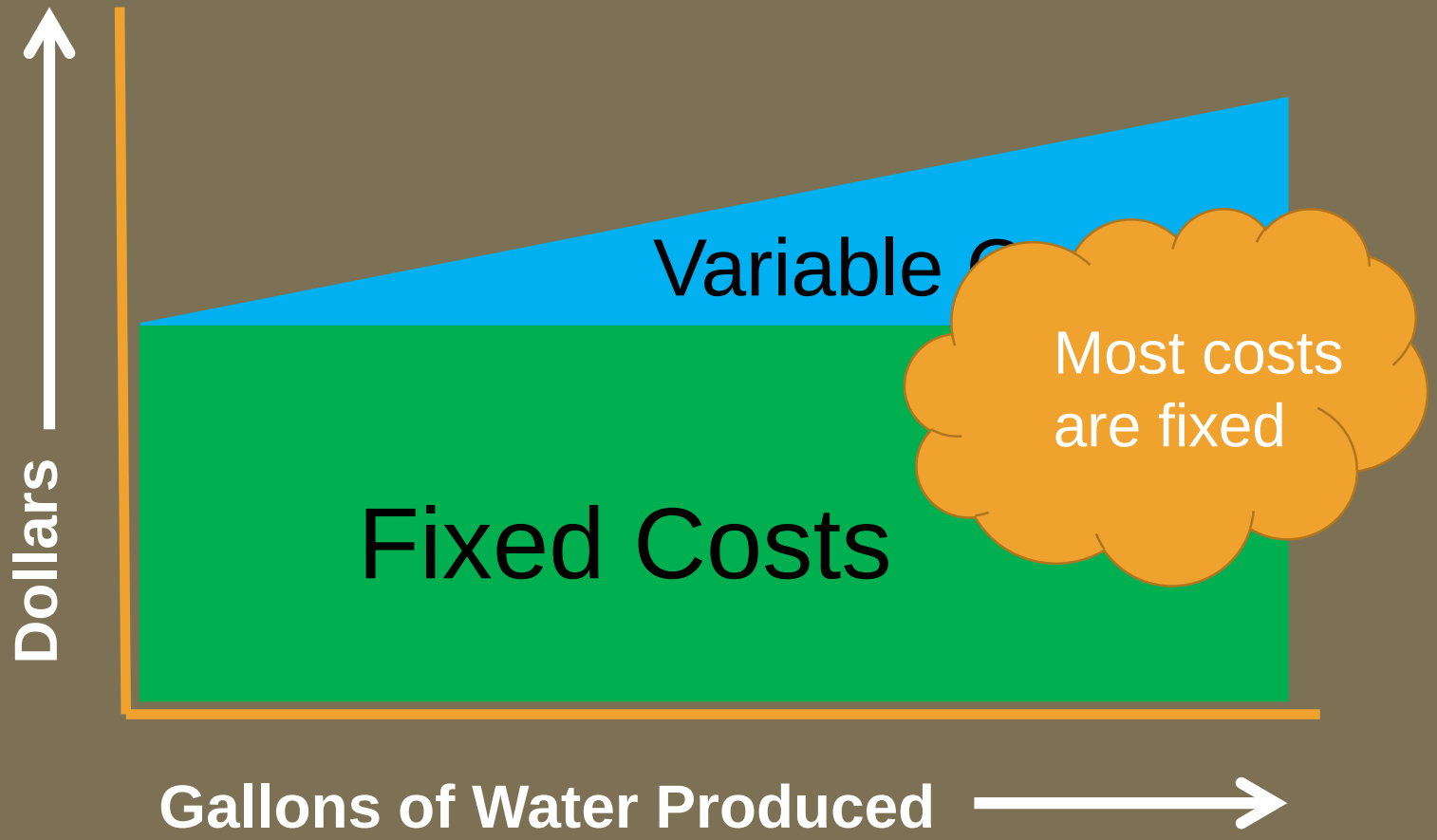
Total Revenue = $820,983

Summary of Revenues

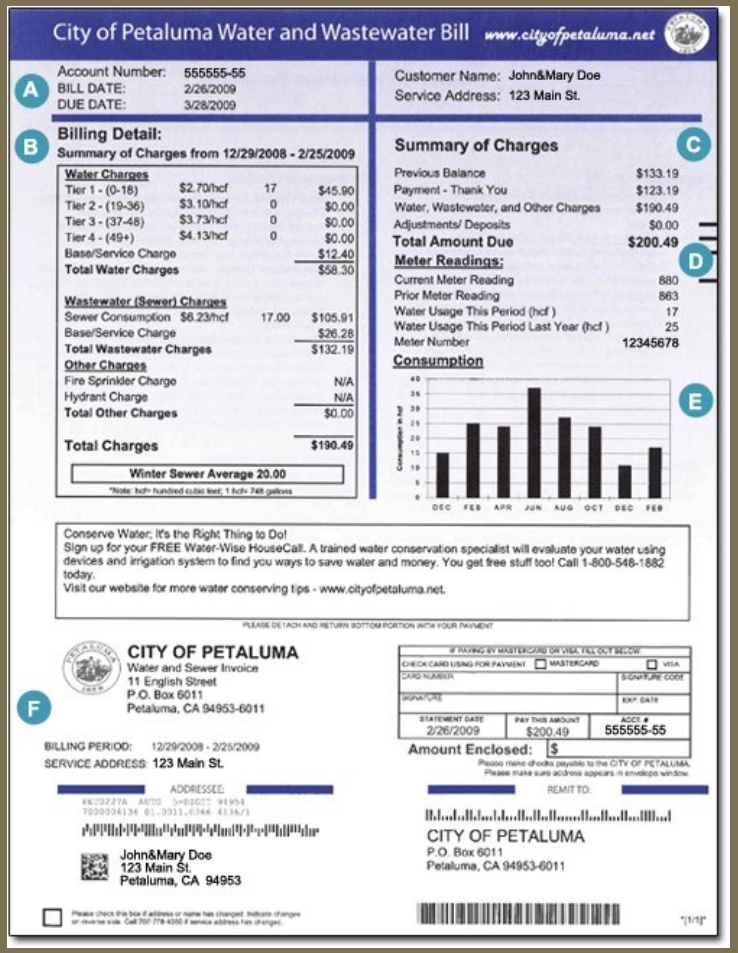
Option	Total Revenue Generated	Total Revenue Needed	Surplus/ Reserves
Option 1	$840,000	$803,000	$37,000
Option 2	$813,264	$803,000	$10,264
Option 3	$804,011	$803,000	$1,011
Option 4	$820,983	$803,000	$17,983

Utility Rates in Time of Drought

Expenses Can Be Fixed or Variable….



Revenue To Cover Expenses Comes Primarily from Customer Rates



City of Petaluma Water and Wastewater Bill www.cityofpetaluma.net

A
Account Number: 555555-55
BILL DATE: 2/26/2009
DUE DATE: 3/28/2009

Customer Name: John&Mary Doe
Service Address: 123 Main St.

B
Billing Detail:
Summary of Charges from 12/29/2008 - 2/25/2009

Water Charges			
Tier 1 - (0-18)	$2.70/hcf	17	$45.90
Tier 2 - (19-36)	$3.10/hcf	0	$0.00
Tier 3 - (37-48)	$3.73/hcf	0	$0.00
Tier 4 - (49+)	$4.13/hcf	0	$0.00
Base/Service Charge			$12.40
Total Water Charges			$58.30
Wastewater (Sewer) Charges			
Sewer Consumption	$6.23/hcf	17.00	$105.91
Base/Service Charge			$26.28
Total Wastewater Charges			$132.19
Other Charges			
Fire Sprinkler Charge			N/A
Hydrant Charge			N/A
Total Other Charges			$0.00
Total Charges			$190.49

Winter Sewer Average 20.00

*Note: hcf= hundred cubic feet; 1 hcf= 748 gallons

C
Summary of Charges

Previous Balance	$133.19
Payment - Thank You	$123.19
Water, Wastewater, and Other Charges	$190.49
Adjustments/ Deposits	$0.00
Total Amount Due	**$200.49**

D
Meter Readings:

Current Meter Reading	880
Prior Meter Reading	863
Water Usage This Period (hcf)	17
Water Usage This Period Last Year (hcf)	25
Meter Number	12345678

Consumption

E

Conserve Water; It's the Right Thing to Do!
Sign up for your FREE Water-Wise HouseCall. A trained water conservation specialist will evaluate your water using devices and irrigation system to find you ways to save water and money. You get free stuff too! Call 1-800-548-1882 today.
Visit our website for more water conserving tips - www.cityofpetaluma.net.

PLEASE DETACH AND RETURN BOTTOM PORTION WITH YOUR PAYMENT

F
CITY OF PETALUMA
Water and Sewer Invoice
11 English Street
P.O. Box 6011
Petaluma, CA 94953-6011

IF PAYING BY MASTERCARD OR VISA, FILL OUT BELOW
CHECK CARD USING FOR PAYMENT ☐ MASTERCARD ☐ VISA
CARD NUMBER | SIGNATURE CODE
SIGNATURE | EXP. DATE

STATEMENT DATE	PAY THIS AMOUNT	ACCT #
2/26/2009	$200.49	555555-55

Amount Enclosed: $

Please make checks payable to the CITY OF PETALUMA
Please make sure address appears in envelope window.

BILLING PERIOD: 12/29/2008 - 2/25/2009
SERVICE ADDRESS: 123 Main St.

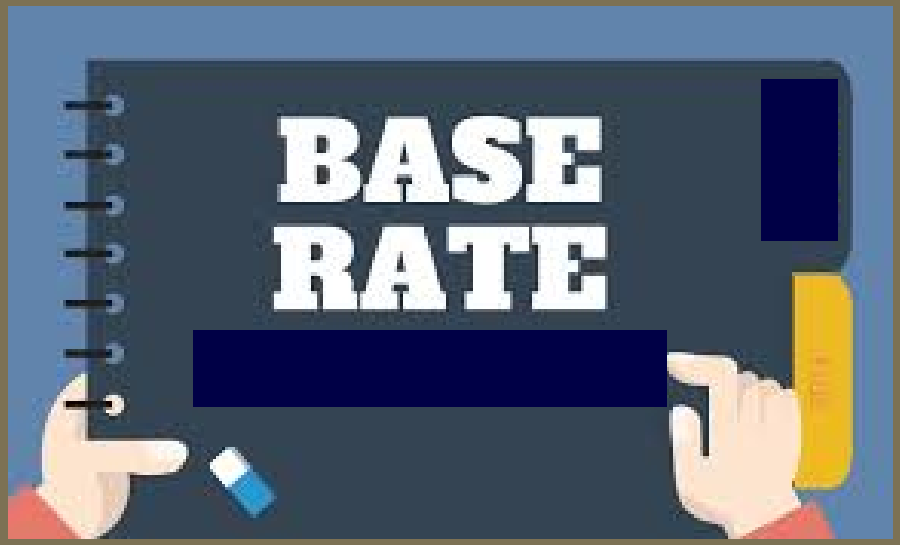
ADDRESSED:
John&Mary Doe
123 Main St.
Petaluma, CA 94953

REMIT TO:
CITY OF PETALUMA
P.O. Box 6011
Petaluma, CA 94953-6011

Please check this box if address or name has changed. Indicate changes on reverse side. Call 707 778-4300 if service address has changed.

"1/1"

How are rates structured?

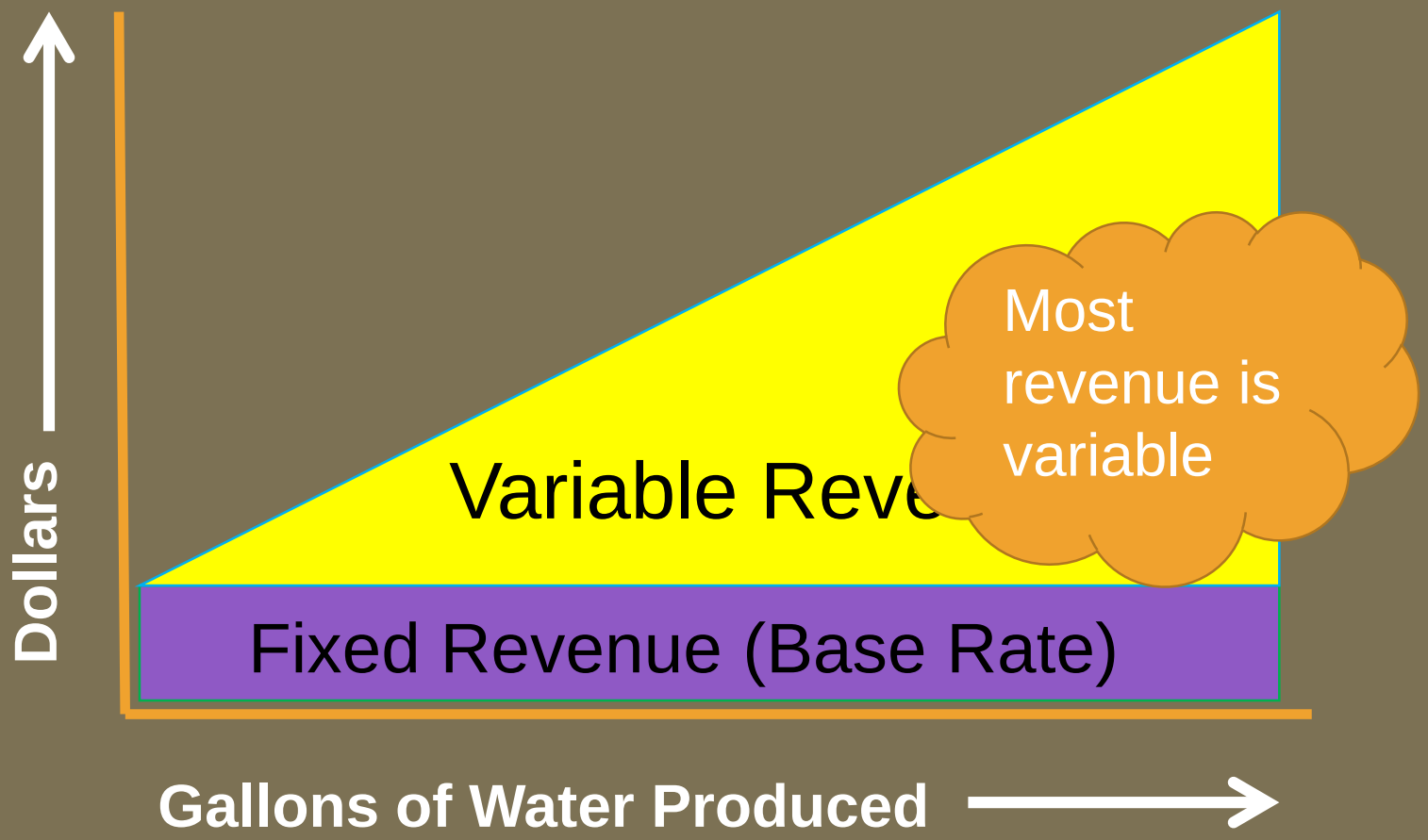


+

VARIABLE
CHARGE

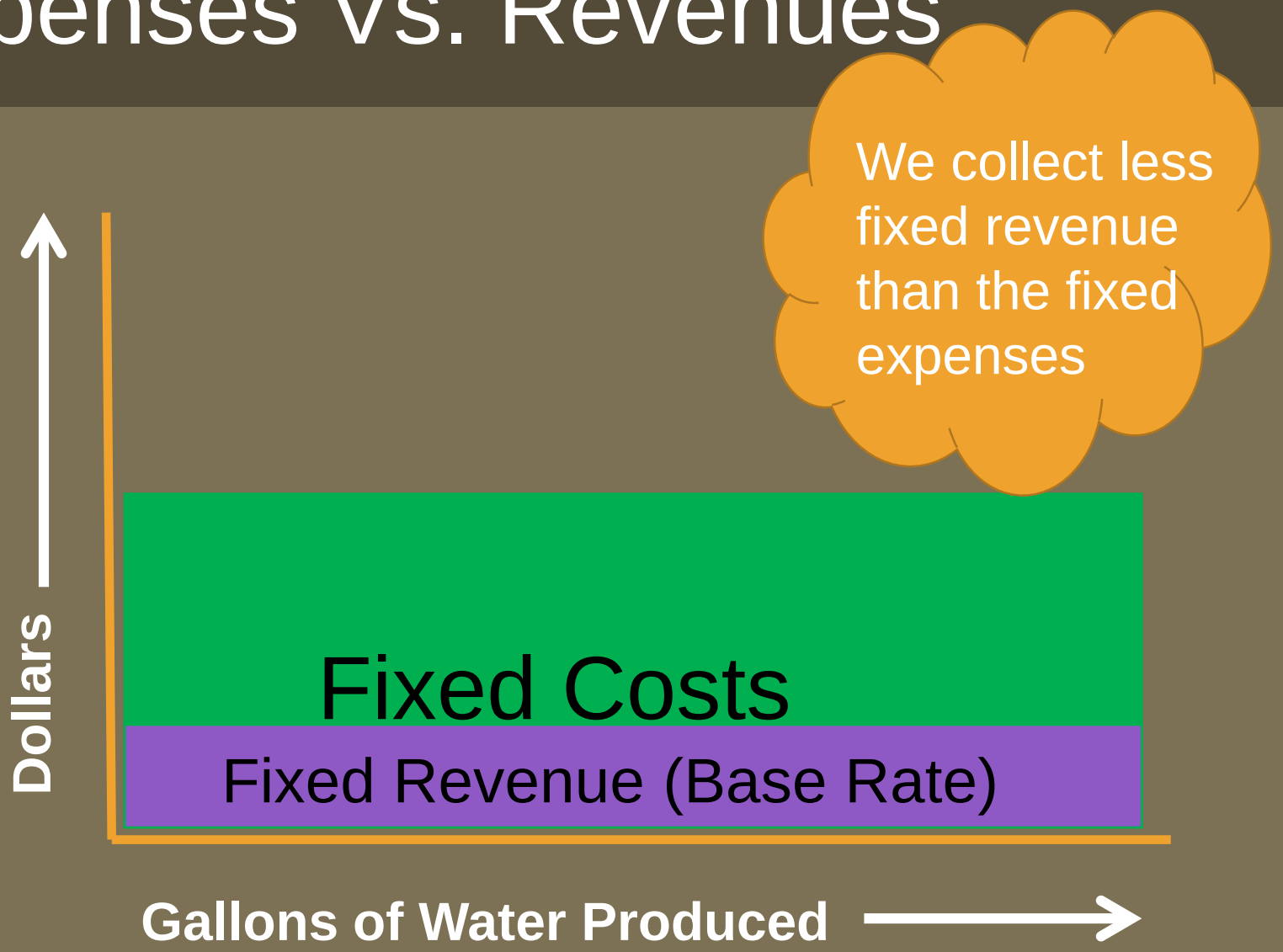
Does most revenue come from the base rate or variable charge?

The Revenue Picture



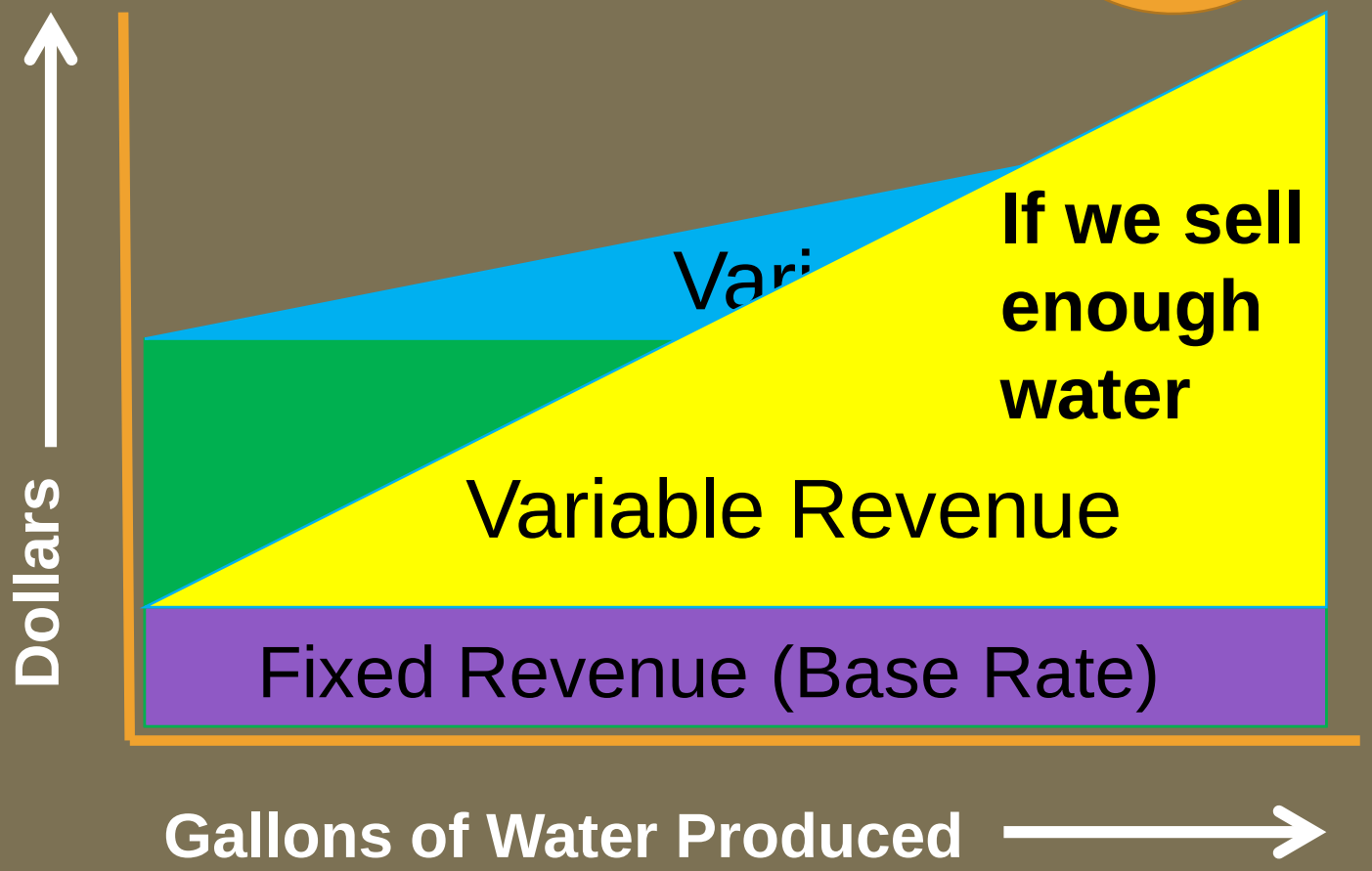
Is there a mismatch?

Expenses Vs. Revenues



Expenses Vs. Rev

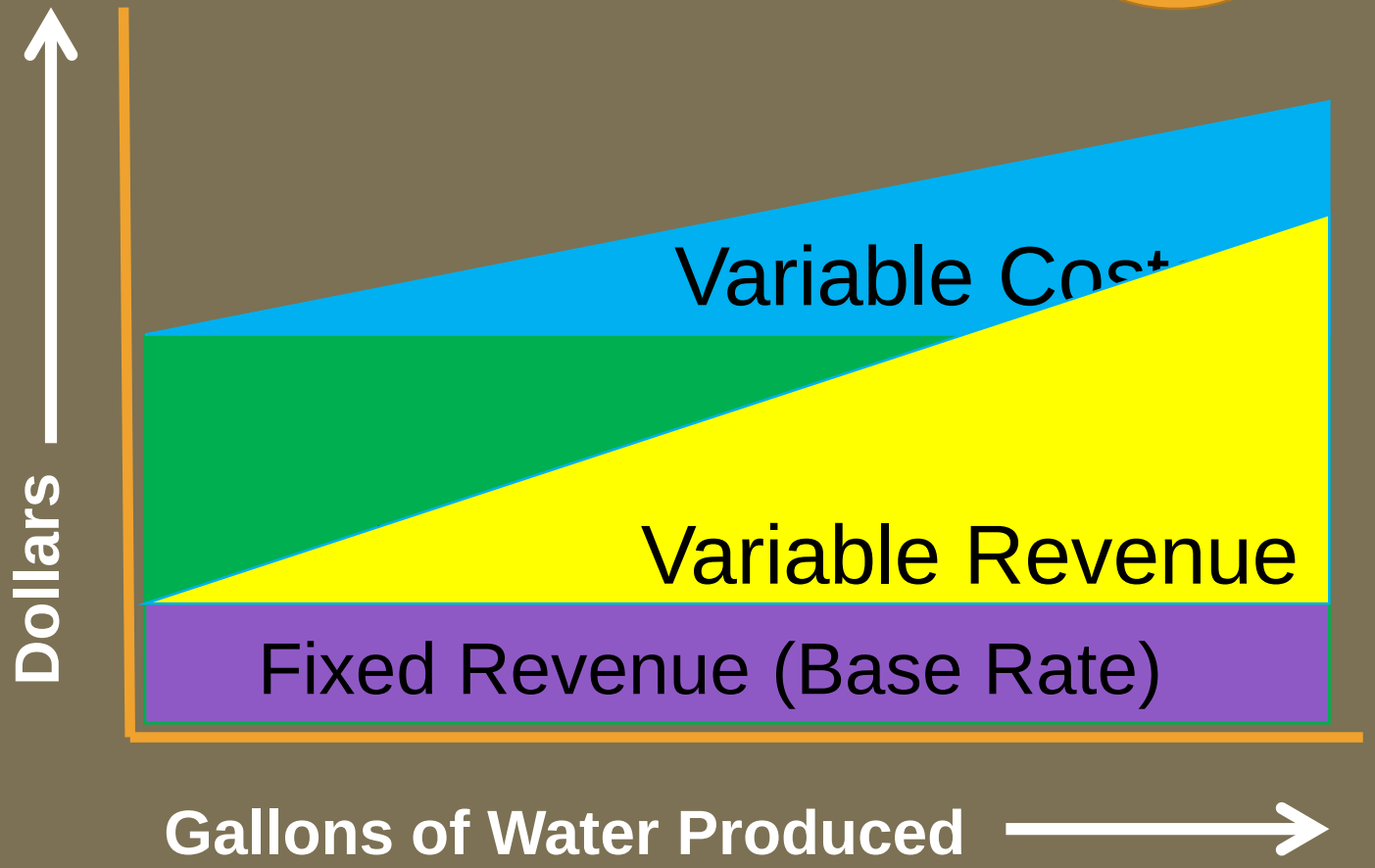
But, we can collect more variable revenue than we need to cover the shortfall……



Expenses Vs. Rev

What happens when customers conserve?

Fixed revenues stay the same but variable revenues decrease



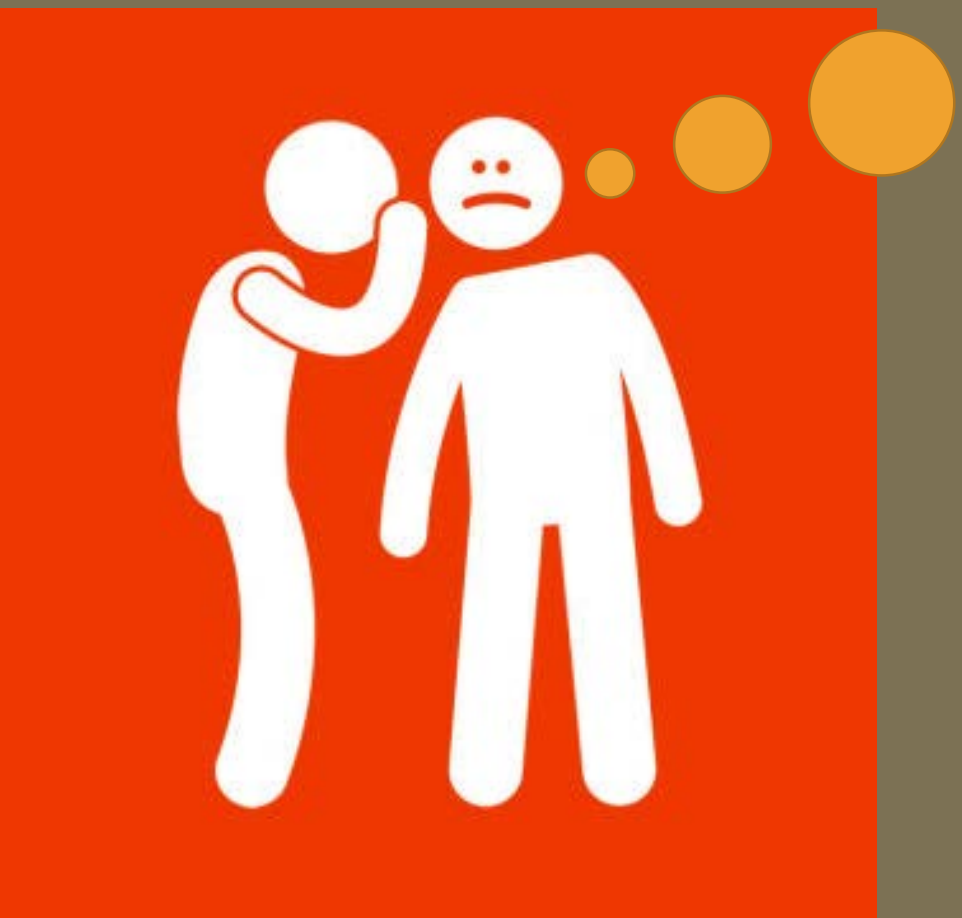
Shortfalls are Possible

Now What?

Rates Have to Rise to Cover Expenses

OR

VARIABLE CHARGE



What do we tell our customers about conserving?

Conserve and you will .....


But...

We Have to Raise Rates

OR

VARIABLE CHARGE

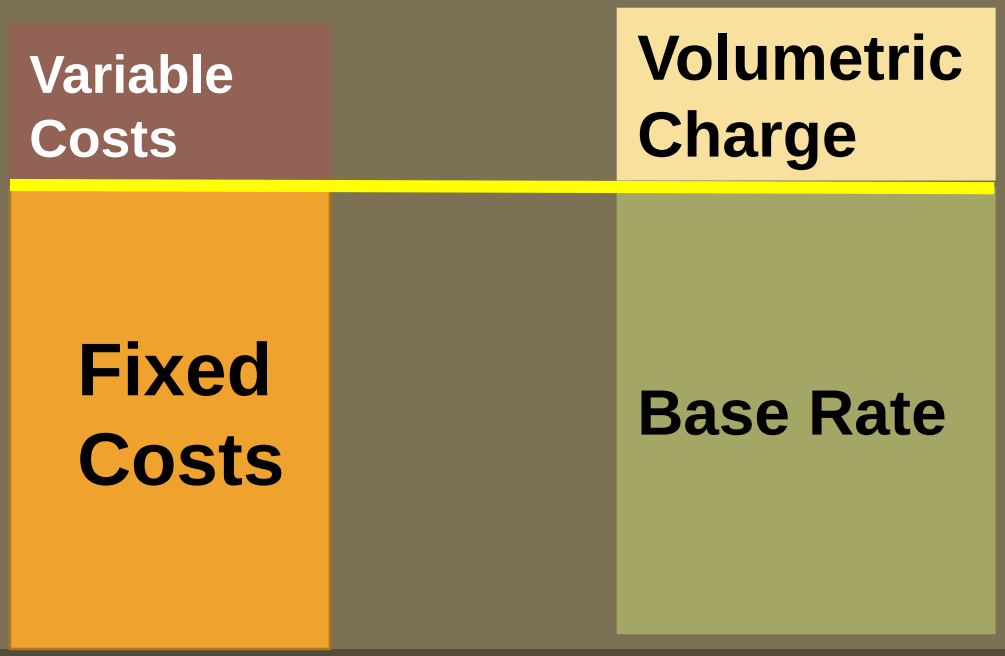
To Cover Shortfalls

“I did what you asked me to do, and you punished me for it”

Water System Loses Credibility

Need Some New Approaches

One Option…



Match Fixed Costs to Base Rate

What are the Up-Sides?

When consumers use less, basic costs are still covered, no revenue shortfall

Water conservation price signals remain for volumetric portion of bills

Water system credibility remains in tact

Nothing's Ever Easy…

Higher base bills will have a disproportionate impact on low income customers

Because so much of bill is base bill, price signal for water conservation may not be sufficient, alone, to prompt conservation

Another Option: Decouple Water Conservation and Cost Savings

Providing excellent water service – need to pay for the service you receive

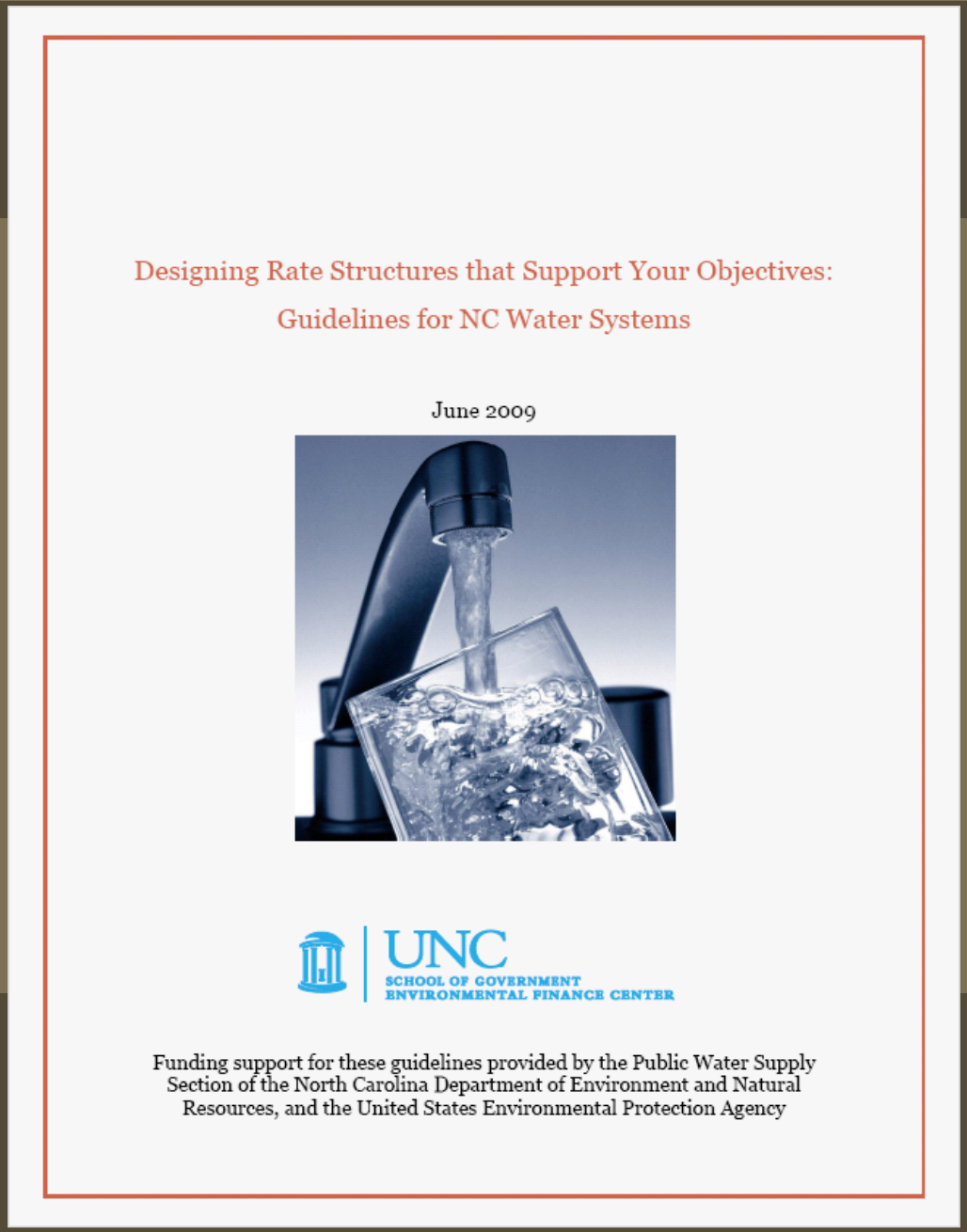
Conserving water so that we can have water now and into the future

Two completely different things

Resource

Free guide written for utility managers in June 2009

http://www.efc.unc.edu/publications/2009/GuidelinesDesigningRateStructures.pdf



Designing Rate Structures that Support Your Objectives:

Guidelines for NC Water Systems

June 2009

UNC
SCHOOL OF GOVERNMENT
ENVIRONMENTAL FINANCE CENTER

Funding support for these guidelines provided by the Public Water Supply Section of the North Carolina Department of Environment and Natural Resources, and the United States Environmental Protection Agency

Short Term

Medium

Short Term

Operating Budget

Reserve Funds

- Operating Cash Reserve Fund — Covers unexpected revenue shortfalls
- Planned Repair/Replacement Reserve Fund (Also called Short-Term Reserve) — Purchase , repair or rehabilitate items with a 1 to 10 year life span
- Planned Capital Improvements Reserve — Construct or upgrade facilities in response to growth or change, including new regulations; can lesson debt load; can pay for pre-construction expenses
- Unscheduled/reactive maintenance or Emergency Reserve — Provide funds for unforeseen repairs or replacement
- Debt Service Reserve — Ensure funds are available to meet debt repayment terms

Reserve Goals and Minimums

Reserve Account	Reserve Goal	Reserve Minimum
Operating Cash Reserves	3 to 6 months' worth of operating and PM	2 months worth of operating and PM
Unscheduled/reactive maintenance or Emergency Reserve	Average expenditure for past 5 years reactive repairs + 10% + current cost of most expensive item not included in spare parts inventory	Amount equal to the most recent typical year's expenditure for reactive repairs + 5% + current cost of most expensive item not included in spare parts inventory
Planned Repair/ Replacement Reserve	Predicted by AM Plan or R&R Schedule	5% of total system replacement cost or 3 months of operating expenses

Reserve Goals and Minimums

Reserve Account	Reserve Goal	Reserve Minimum
Planned Capital Improvements Reserve	Predicted by AM Plan or Capital Improvement Plan	10 to 30% of the future cost of anticipated capital projects
Debt Service Reserve	Specified by loan agency	Level required by debt covenants

Medium


federal
budgeting
timeframe
capacity
provides
programs
needs
long-term
local
effectively
allocate
programming
linking
communities
expenditures
communication
cooperation
state
grant-in-aid
ability
given
projects
Capital
financial
Improvement
Plan
community
improves
planning
resources
decision-making
continuity
tax
limited
major
stakeholders
use
stabilizes
rates
relating
unlimited
helps

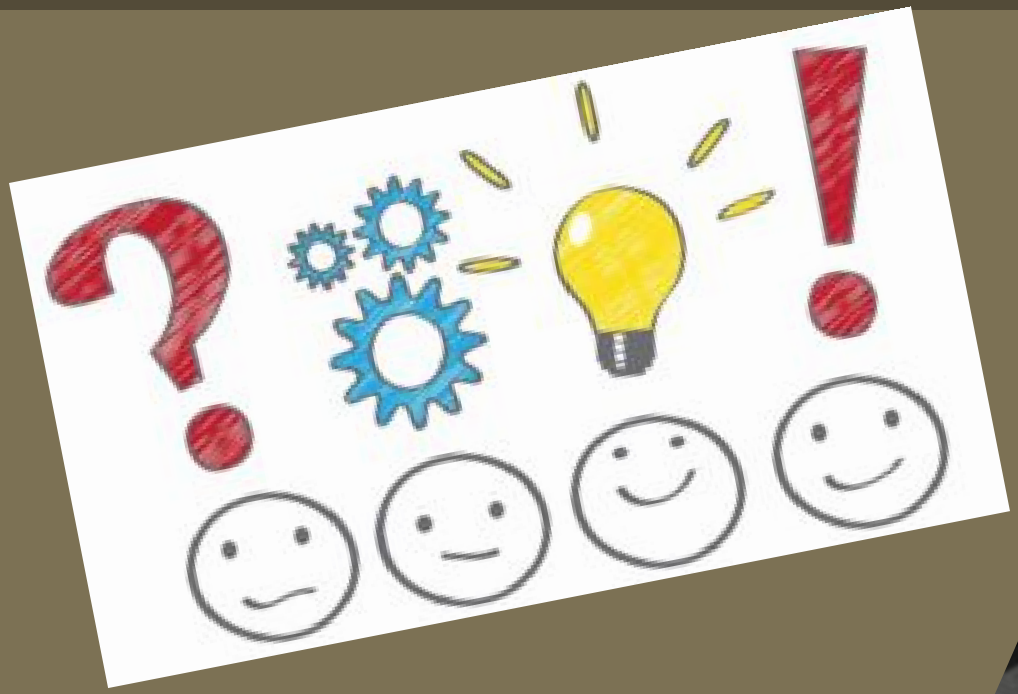

LONG
TERM

Financial Indicators

Financial Ratios

Ratio	What Ratio Measures	Method of Calculation	Levels
Liquidity Ratio	Ability to pay current liabilities	Current assets divided by current liabilities	< 25, cause for concern <1 a major cash liquidity problem
Leverage Ratio (or Debt Ratio)	How much a utility relies on debt	Total liabilities divided by total assets	0.5 or less good
Operating Ratio	The utility's profitability or stability	Operating revenues divided by operating expenses	<1 financial distress 1.25 to 1.5 required by many lenders
Debt Service Coverage Ratio	The utility's ability to pay it's debt	Net Operating income plus current depreciation divided by total debt service	1 = just enough revenue to cover debt 1.15 or greater = required by many lenders

Questions/Comments



Funding Options

Funder presentations

Water System Collaboration

Cooperative Approaches to Drinking Water Challenges

Water System Challenges

Technical

- Infrastructure - Inadequate or aging
- Source – Limited, poor quality/quantity
- Lack a certified operator

Financial

- Limited part time management attention
- Lack of expertise in long-term water system planning or operations

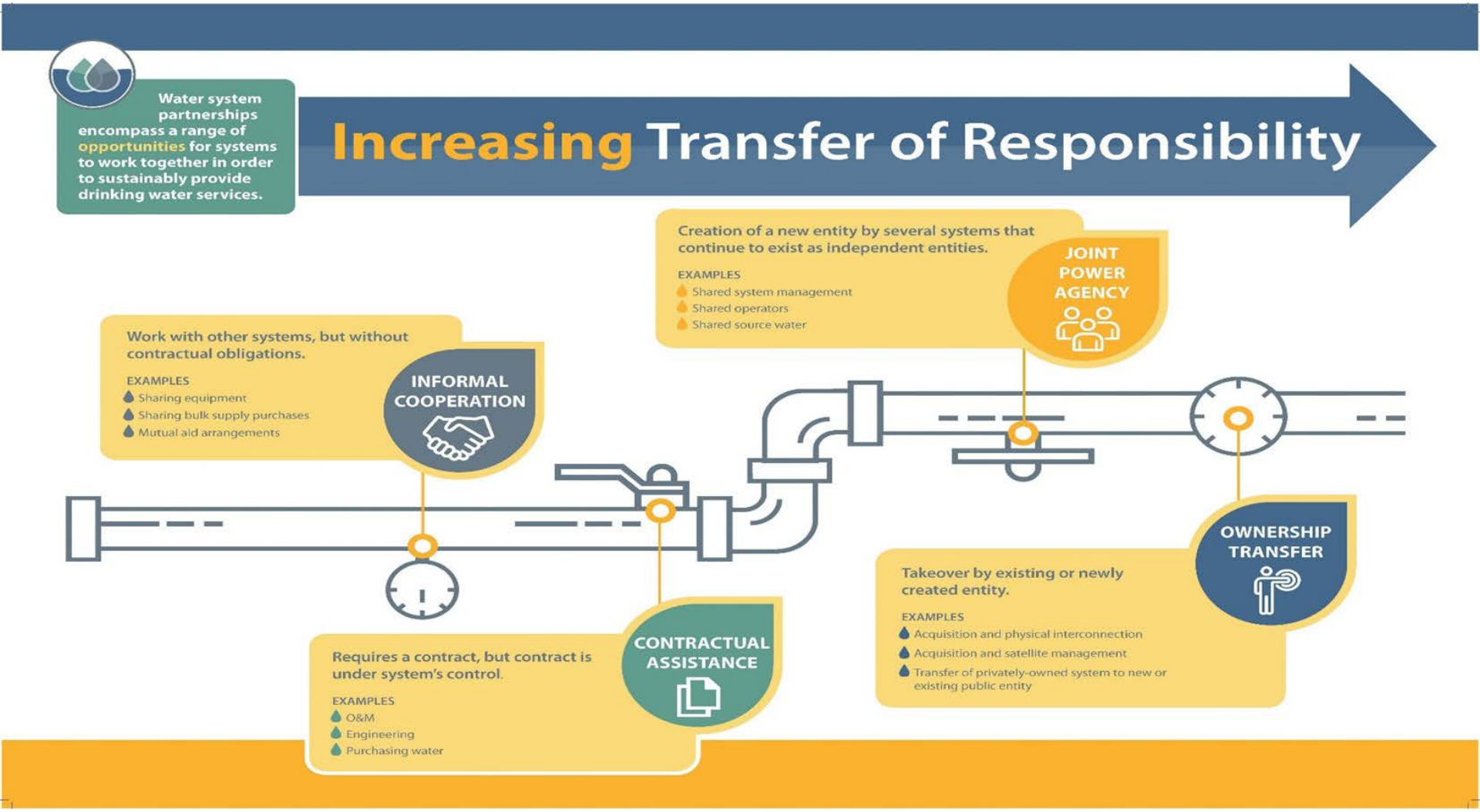
Managerial

- Diseconomies of scale (few households = high costs)
- History of water rates that are too low
- Limited knowledge of financing options

Overcoming Water System Challenges

Water System Partnerships are a **tool** for building capacity

Different Types of Partnerships



Source: EPA Office of Water

Loose, Less Formal Arrangements

Defined, More Formal Arrangements

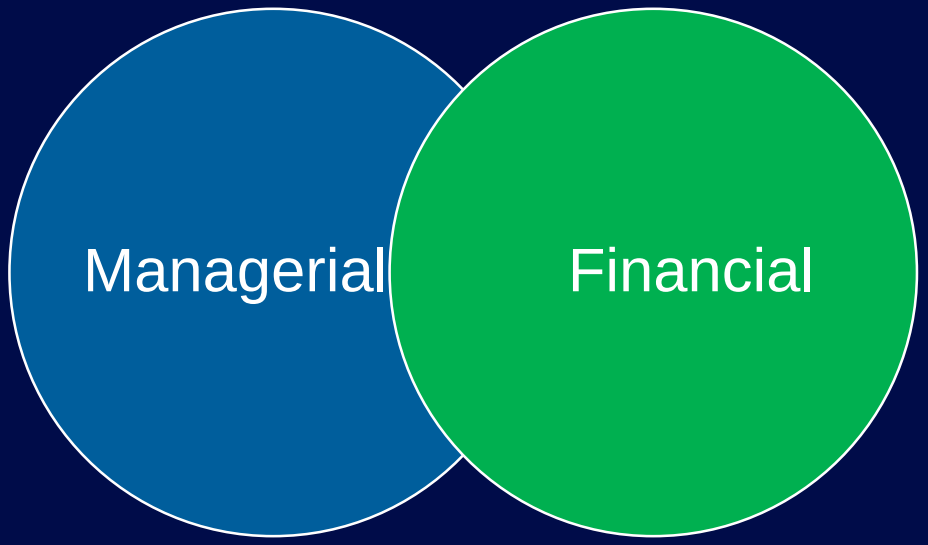
Any kind of collaboration can be helpful


Partnerships
Buying Consortium
Operational Collaboration
Physical Interconnect
Equipment Sharing
Mutual Aid
Emergency Assistance
Financial Collaboration
Regional Entity
Managerial Collaboration
Information Sharing

Less Formal

More Formal

Buying
Consortium

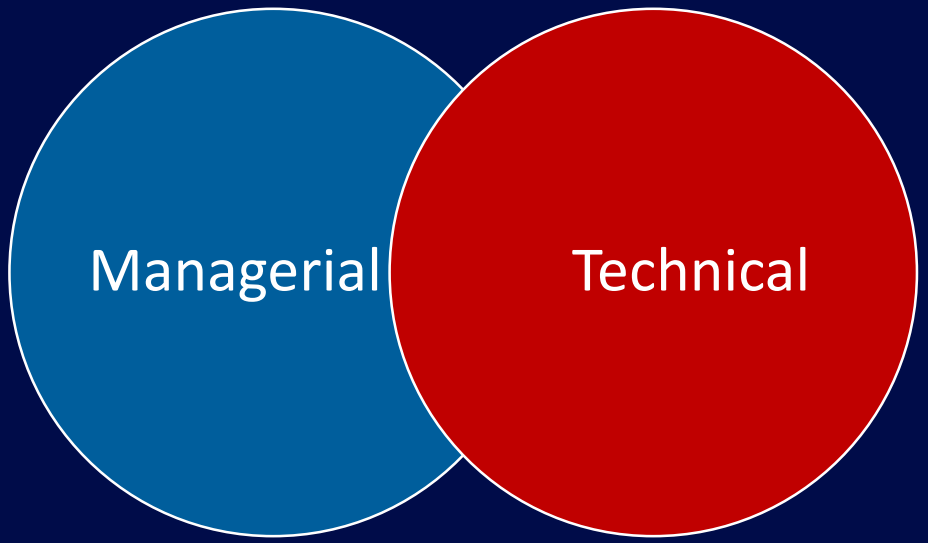


Systems work together to buy equipment or supplies

Less Formal

More Formal

Information Sharing

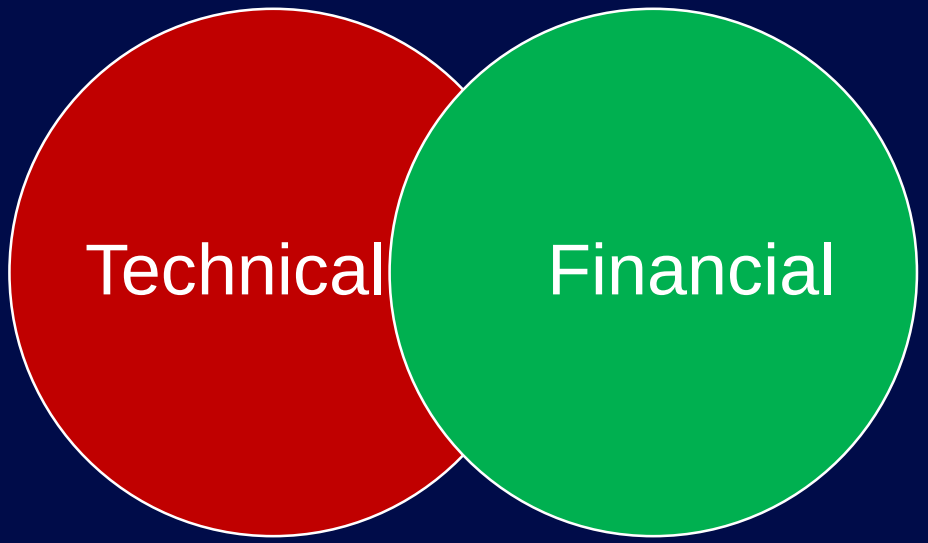


Systems share information regarding regulations, planning, infrastructure

Less Formal

More Formal

Equipment Sharing

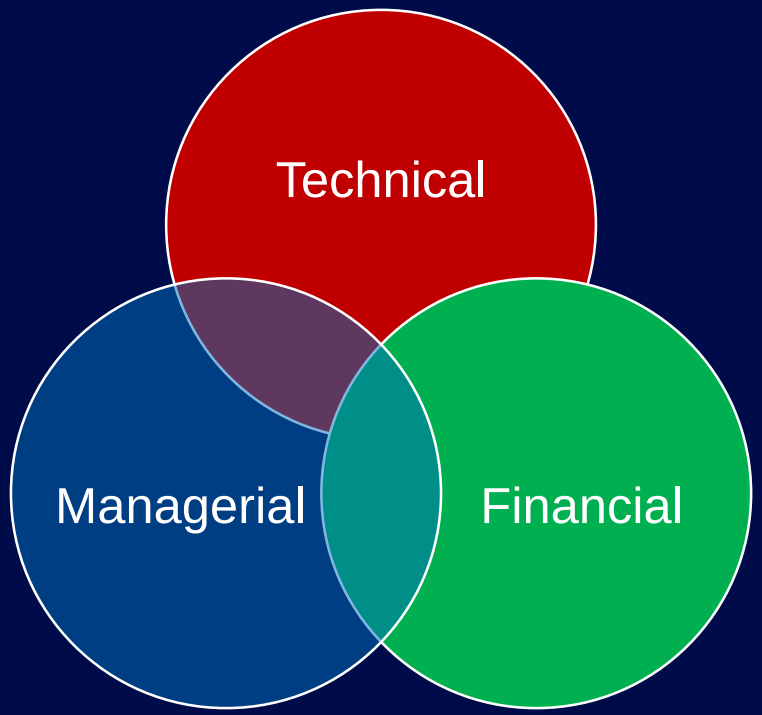


Systems share equipment so each one does not have to buy/own/rent all the equipment they need

Less Formal

More Formal

Mutual Aid/Emergency Assistance

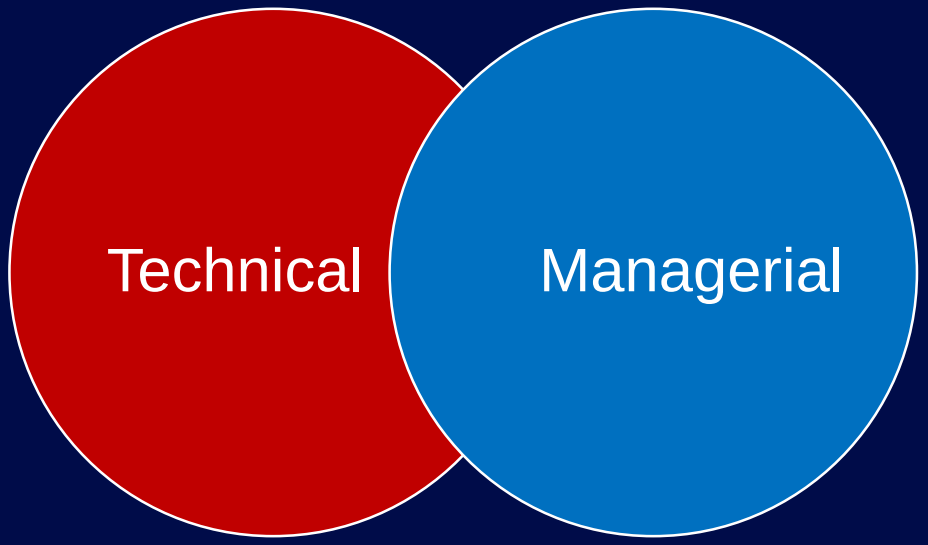


Systems assist each other during an emergency or time of need

Less Formal

More Formal

Emergency Interconnect

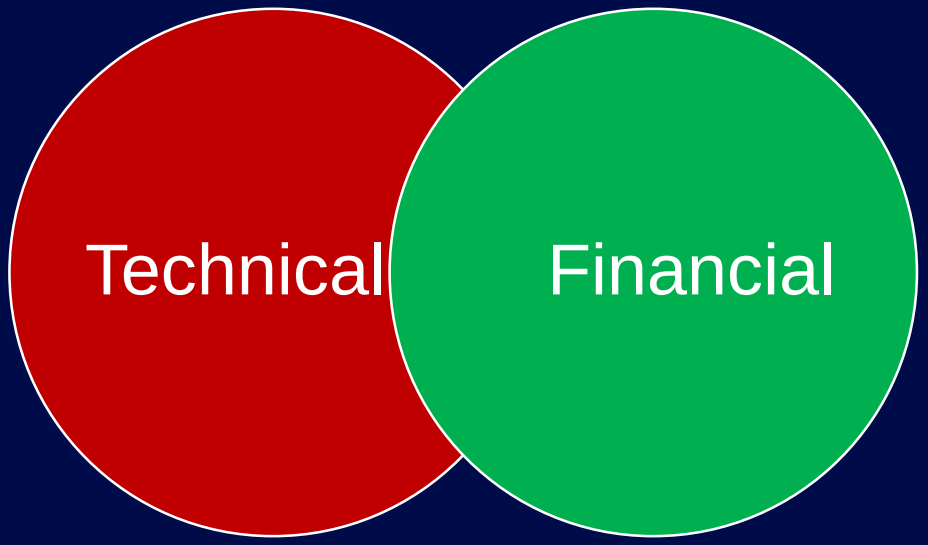


Systems have a physical connection that is only used during emergencies

Less Formal

More Formal

Operational Collaboration

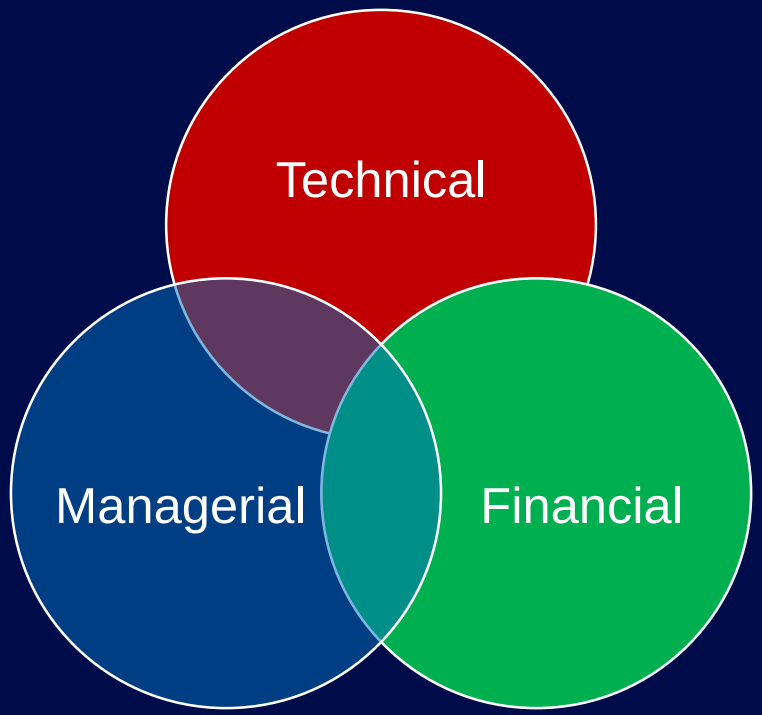


Systems share an operator or contract with the same operator or operation company

Less Formal

More Formal

Managerial Collaboration



Systems share management structure but systems are not interconnected

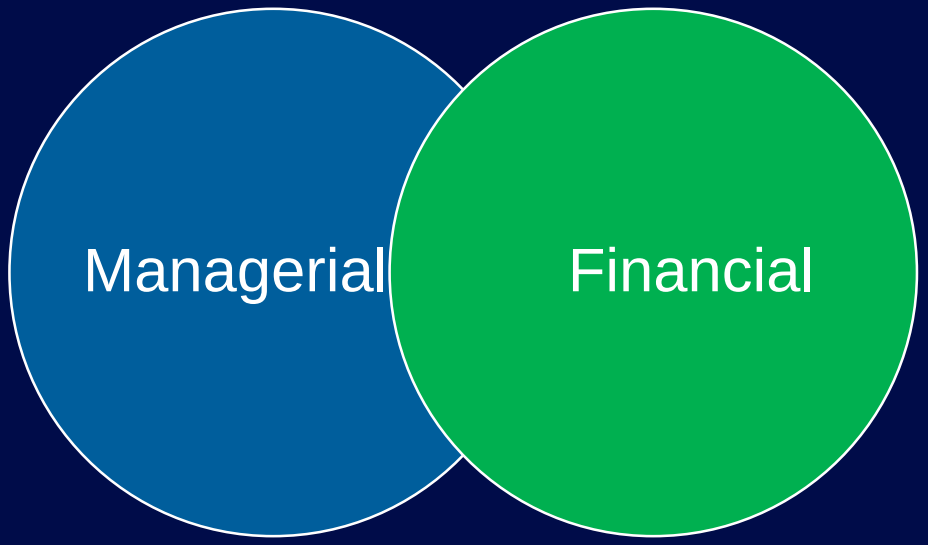
Less Formal

More Formal

Financial Collaboration

Financial Collaboration

Financial Collaboration

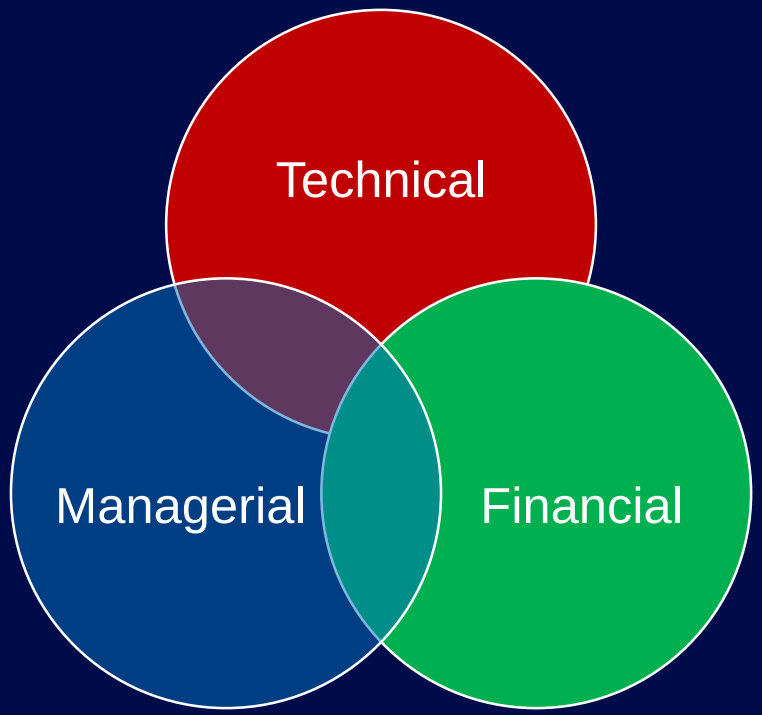


Systems share a financial connection. Many options available.

Less Formal

More Formal

Regional Entity

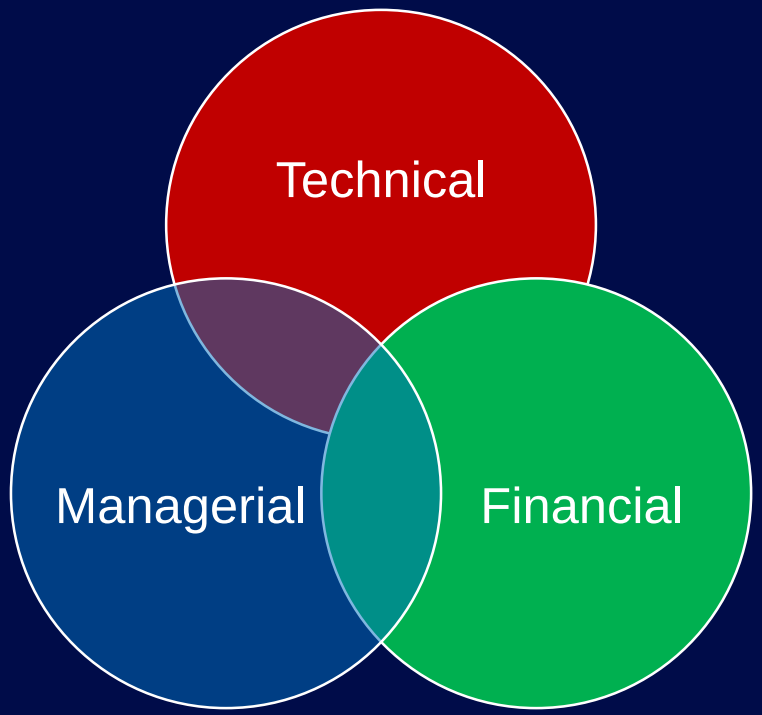


Systems form a regional entity either as a separate option or the only option. All have a role on the board.

Less Formal

More Formal

Systems dissolve into neighboring entity



Systems lose independence. Only one utility remains.

Partnership Benefits – Big Picture

System	State	Customer
• Economies of Scale • Long Term Savings • Improved Customer Service • Planning for Future Operations • Increased TMF Capacity	• Improved Compliance • Potential Reduction in Number of Regulated Systems • Resource Savings • Improved Customer Relations	• Improved Water Quality • Reduced Long Term Costs / Lower Water Bills • Increased Reliability

Motivations for Collaboration
Or
What's in it for me?

- Cost savings!!!!
- Addressing Staffing Needs
- Increased ability to comply with regulations
- Ability to access professional services
- Increased access to necessary equipment and/or supplies

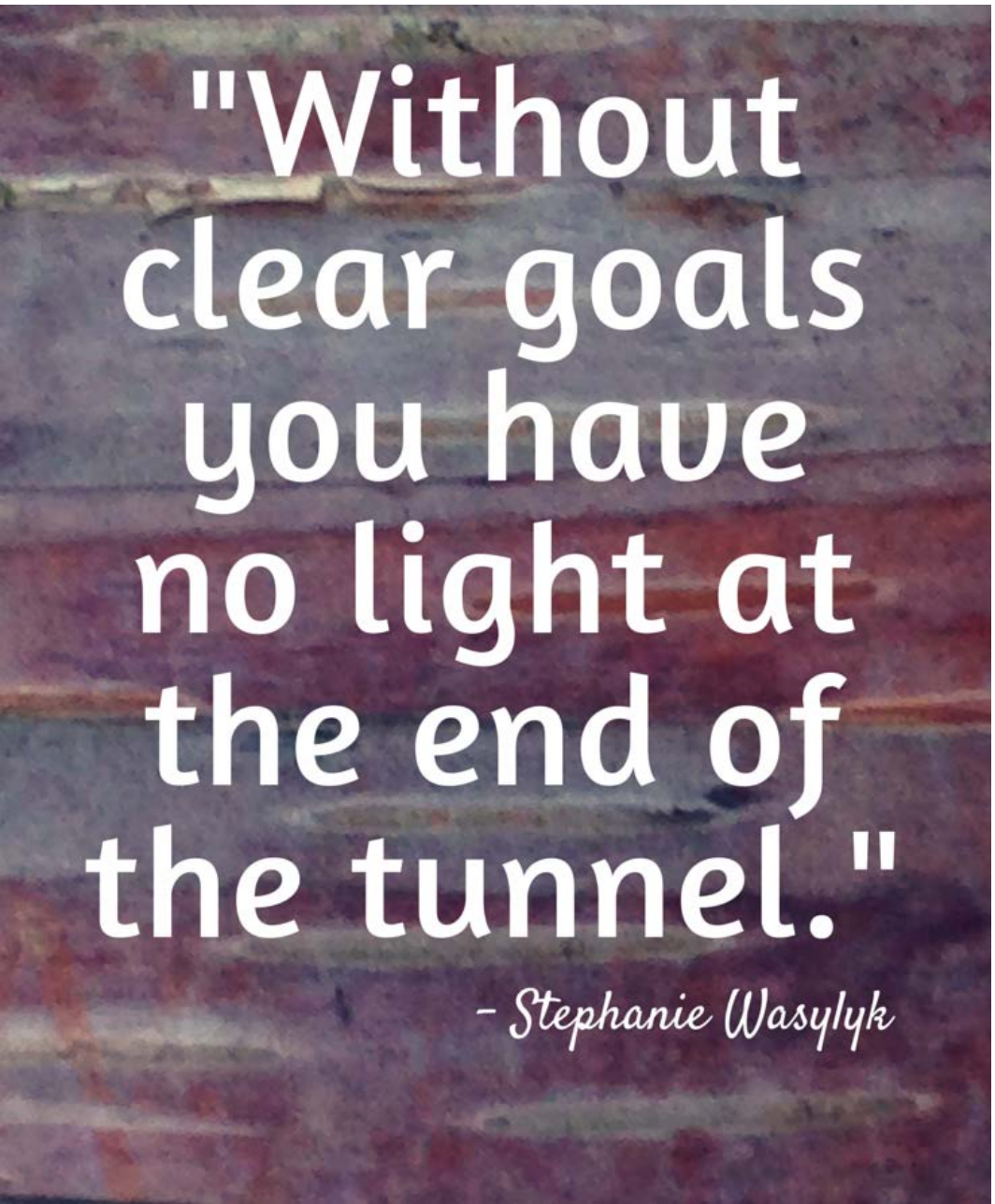
Movement Towards Partnerships

- System are struggling with a complex suite of existing rules requiring simultaneous compliance; as well as key health advisories.
- High expectations on the part of the public for safe drinking water for everyone.
- Water systems need a high level of technical, managerial, and financial capacity to meet all of their obligations.
- Need for leveraging lowered available resources.
- Technology to allow system to work in more informal partnerships exists.

Common Concerns with Collaboration

- Desire for Autonomy
- Mistrust of Other Systems
- Lack of Knowledge of Other Systems
- Lack of Knowledge of the Options
- No Outside Independent Force to Get Collaboration Started

Elements of Successful



It’s important to have a thorough understanding of what you want to get out of the partnership

The organization must have agreement from the leadership on down regarding the goals.

The goals for each party must be clearly articulated to the others.


WiN
WiN
WiN
WiN


SUCCESS


SHORT TERM
LONG TERM


WHAT ARE YOUR
OBLIGATIONS?

Outside or Neutral Facilitation

Look for resources within the community or outside the community to assist in facilitating discussions

Communication is the key

What are the Financial Implications?

Case Studies

Regional Entity for New Supply

- In Central Texas
- Several systems had problems meeting regulatory requirements
- New source could potentially solve the problem
- Formed a regional entity for the sole purpose of securing the new supply
- One member of each water system serves on the board of the new entity
- All individual water systems remain

Shared Operators and Managers for Rural Water Systems

- Several small systems owned and managed by one entity
- Systems wanted to be bought
- Each system financed separately
- Operators on regional basis
- Operators know each others system
- Three levels: Operator, Regional Operator, Head Operator

Sharing Bookkeeping

- Several small systems in southern New Mexico use the same accounting firm
- No connection between systems other than using the same firm
- Systems save considerable $$$ and receive higher level expertise than they would otherwise be able to afford
- Added benefit, “We didn’t want to shut you off, the firm made us”

Buying Consortium

- Entities work together to negotiate agreements for cheaper prices
- Take turns negotiating and leading the consortium
- If a utility won’t take its turn, they are eliminated from the consortium
- No other relationship between systems

Talking Led to Greater Collaboration

- Systems started by talking: Monthly meetings with guest speakers and topics of mutual interest
- Led to a mutual aid agreement
- Led to three utilities interconnecting
- Led to cooperation to obtain legislation
- Led to cooperation to protect utilities from lawsuits

Conversion to Another Utility Type

- Utility started as municipality and became regional Authority

Tools and Resources

Disasters Declared in TX include:

- Hurricanes
- Flooding
- Wildfires / Structure Fires / Road Fires
- Tornadoes
- Straight-Line Winds
- Severe Storms
- Explosions
- Tropical Storms

WARN

Water and Wastewater Agency Response Network

“A mutual aid and assistance network provides water and wastewater utilities with the means to quickly obtain help in the form of personnel, equipment, materials and associated services from other utilities to restore critical operations impacted during an emergency.”

“Becoming a member of a mutual aid and assistance network before an emergency can make all the difference when your community’s water or wastewater system is in need of help. Use the resources below to ensure you have an effective support system in place.”

Contact Us | Sign In | Register

Supporting statewide emergency preparedness, disaster response, and mutual aid for public and private water and wastewater utilities.

Need assistance? Call 866-989-9276 or email info@txwarn.org

Home | About | Training | Mutual Aid Agreement | Resources | News | Incidents

REQUEST ASSISTANCE

Click the link above to request assistance

TXWARN Partners

COMMUNITIES

Welcome to TXWARN!

The mission of the Texas Water/Wastewater Agency Response Network (TXWARN) is to support and promote statewide emergency preparedness, disaster response, and mutual aid assistance for public and private water and wastewater utilities.

Working closely with the TCEQ and the State Emergency Operations Center, TXWARN is prepared to assist water and wastewater utilities in response and recovery during major system outages and increase your preparedness by providing new tools and proven practices that can enhance your utility's readiness to recover should disaster strike.

Become a TXWARN member today!

- Updates on news & events
- Access to online resources
- And much more!

CLICK HERE TO SIGN UP!!

United States Environmental Protection Agency

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Building the Capacity of Drinking Water Systems

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- Building the Capacity of Drinking Water Systems Home
- About Small Systems
- Small System Resources
- Information for States
- Compliance Help
- Capacity Development Partners
- EPA Capacity Development Contacts

Water System Partnerships

Partnerships Home | Meeting Summary | Case Studies | Resources

Drinking water systems face unique challenges in providing affordable drinking water that meets federal and state regulations. These challenges include aging infrastructure, increasing costs and declining rate bases, and limited technical and managerial capabilities. Drinking water systems can overcome these challenges by developing partnerships with other systems.

Partnerships provide opportunities to collaborate on compliance solutions, operations and maintenance activities, and to share costs with other nearby systems. This increases capacity and enables systems to provide safe and affordable water to their communities.

Partnership Benefits

What's New In Water System Partnerships

- Stakeholder Meeting - Summary Notes
- Interactive Case Studies Map
- State Programs Supporting Cooperative Approaches for Drinking Water Systems

Coming Soon

https://www.epa.gov/dwcapacity/water-system-partnerships

Resources Available

Questions?


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ANALYSIS
BENEFIT
QUALITY
QUESTIONNAIRE
TEACHING
ELECTRONIC
MEASURE
INFORMATION
SURVEY


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teşekkür ederim
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SOUTHWEST ENVIRONMENTAL FINANCE CENTER

Heather Himmelberger: heatherh@unm.edu

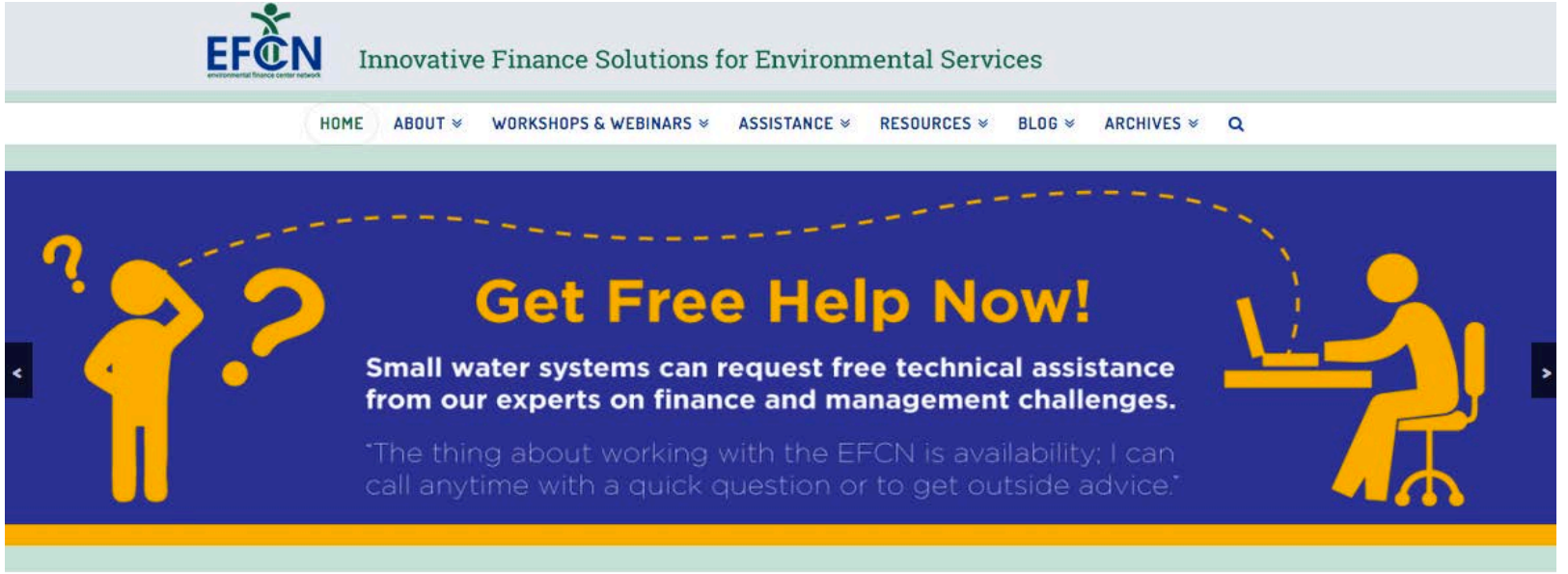
Dawn Nall: dnall@unm.edu

James Markham: jmarkham@unm.edu

Department of Civil Engineering MSC01 1070
1 University of New Mexico, Albuquerque, NM 87131
505-277-0644
swefc@unm.edu
http://southwestefc.unm.edu

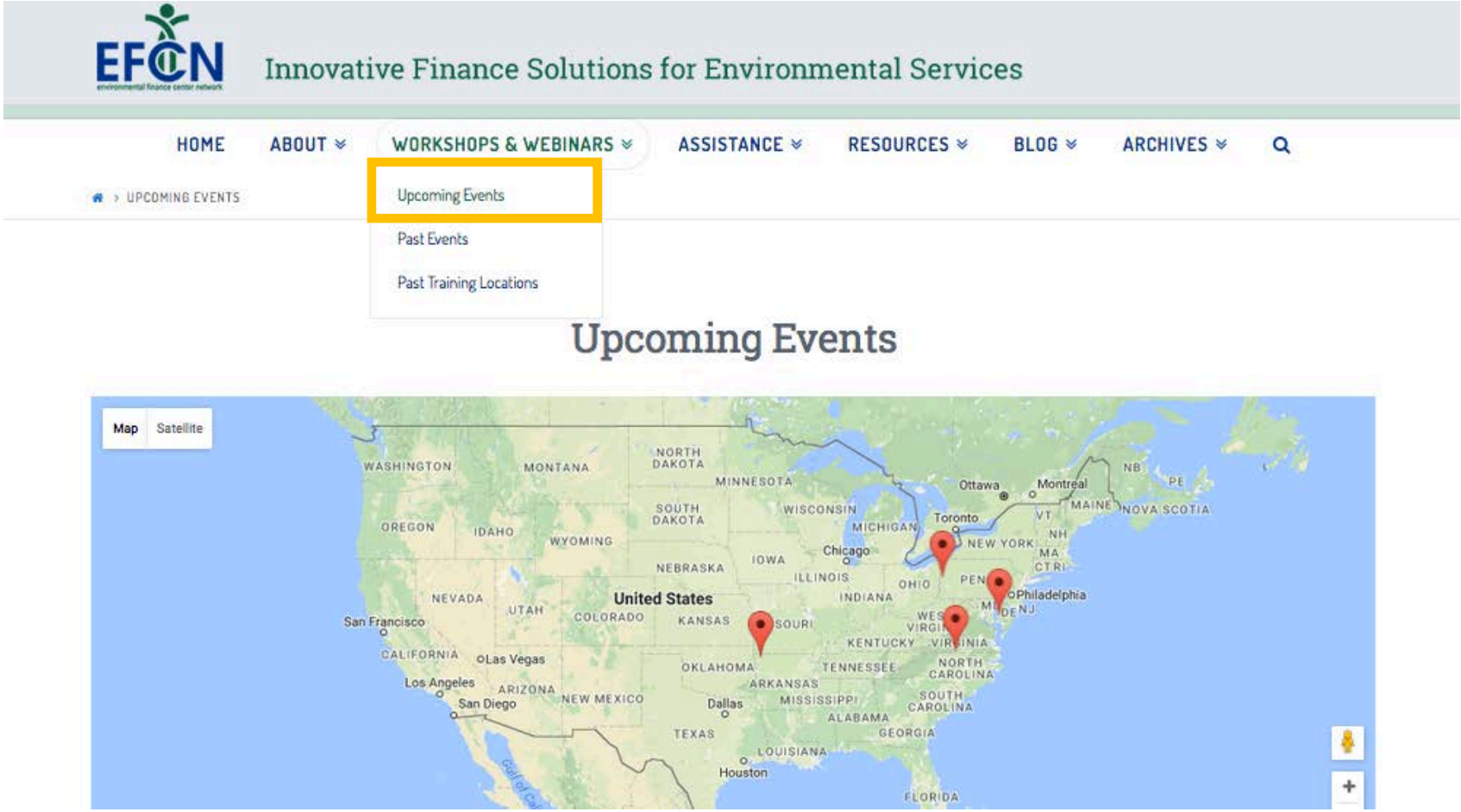
Visit the EFCN Website – *www.efcnetwork.org*

for more information on upcoming events, funding, and resources.



Upcoming Events Calendar

Select “Upcoming Events” under the Workshops & Webinars Tab.

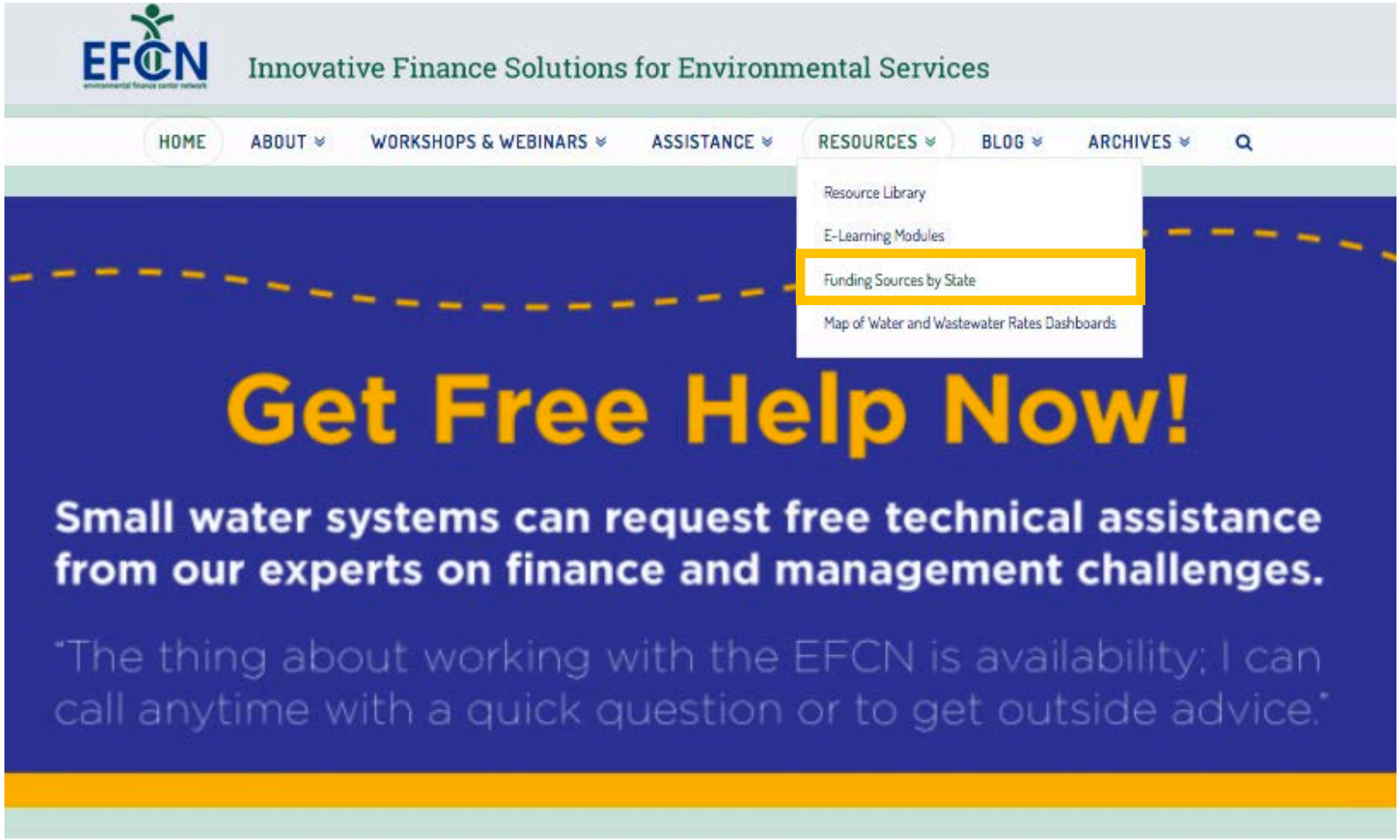


= In Person Event = Webinar

Type	Date/Time	Event
	03/09/2017 2:00 pm - 3:00 pm	WEBINAR I Preparing Winning Financing Applications for Water Infrastructure Projects
	03/22/2017 2:00 pm - 3:00 pm	WEBINAR I Water Audits and Water Loss Control: Entering Your Data into the Spreadsheet
	03/30/2017 9:00 am - 4:30 pm	Maryland I Rates and Finance Workshop for Small Water Systems *Easton Utilities, Easton MD*
	04/04/2017 1:00 pm - 2:00 pm	WEBINAR: Workforce Development: An Overview of Key Components
	05/11/2017 9:00 am - 4:30 pm	Virginia I Rates and Finance Workshop for Small Systems *The Institute for Advanced Learning and Research, Danville Virginia*
	05/25/2017 9:00 am - 4:30 pm	Arkansas I Rates and Finance Workshop for Small Water Systems *Beaver Water District, Lowell AR*
	09/13/2017 9:00 am - 4:30 pm	Pennsylvania I Rates and Finance Workshop for Small Water Systems *Pennsylvania American Water Co, New Castle PA*

Funding Tables By State

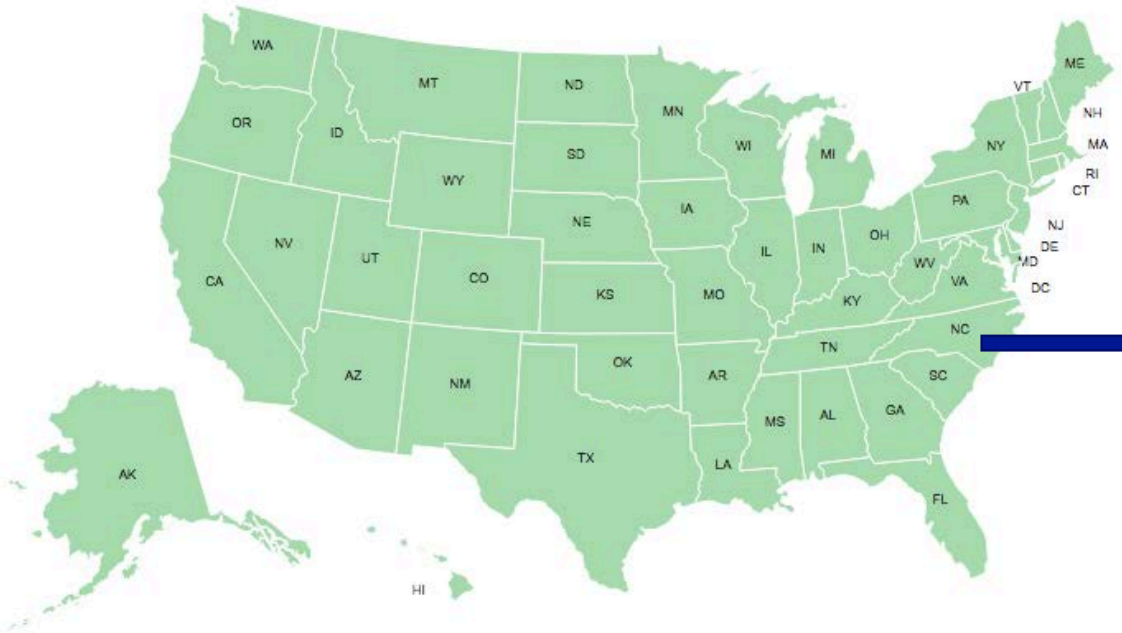
Select “Funding Sources by State” under the Resources Tab.



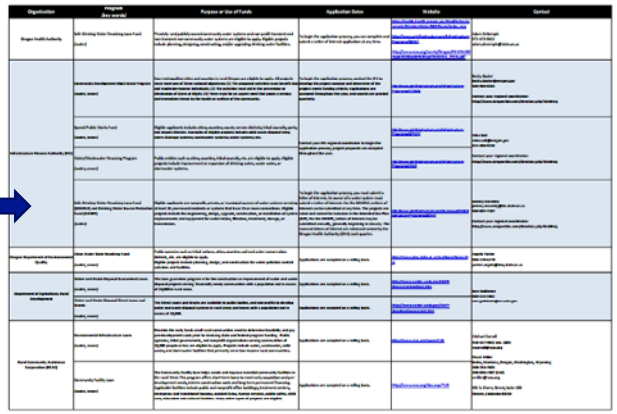
Funding Sources by State

Note: Some states may have additional resources listed below the map.

Click on the map below to view funding sources for each state:

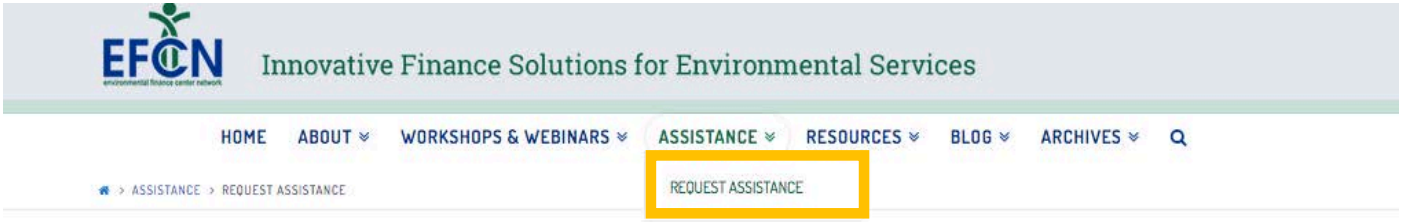


Click on an individual state to view funding table.



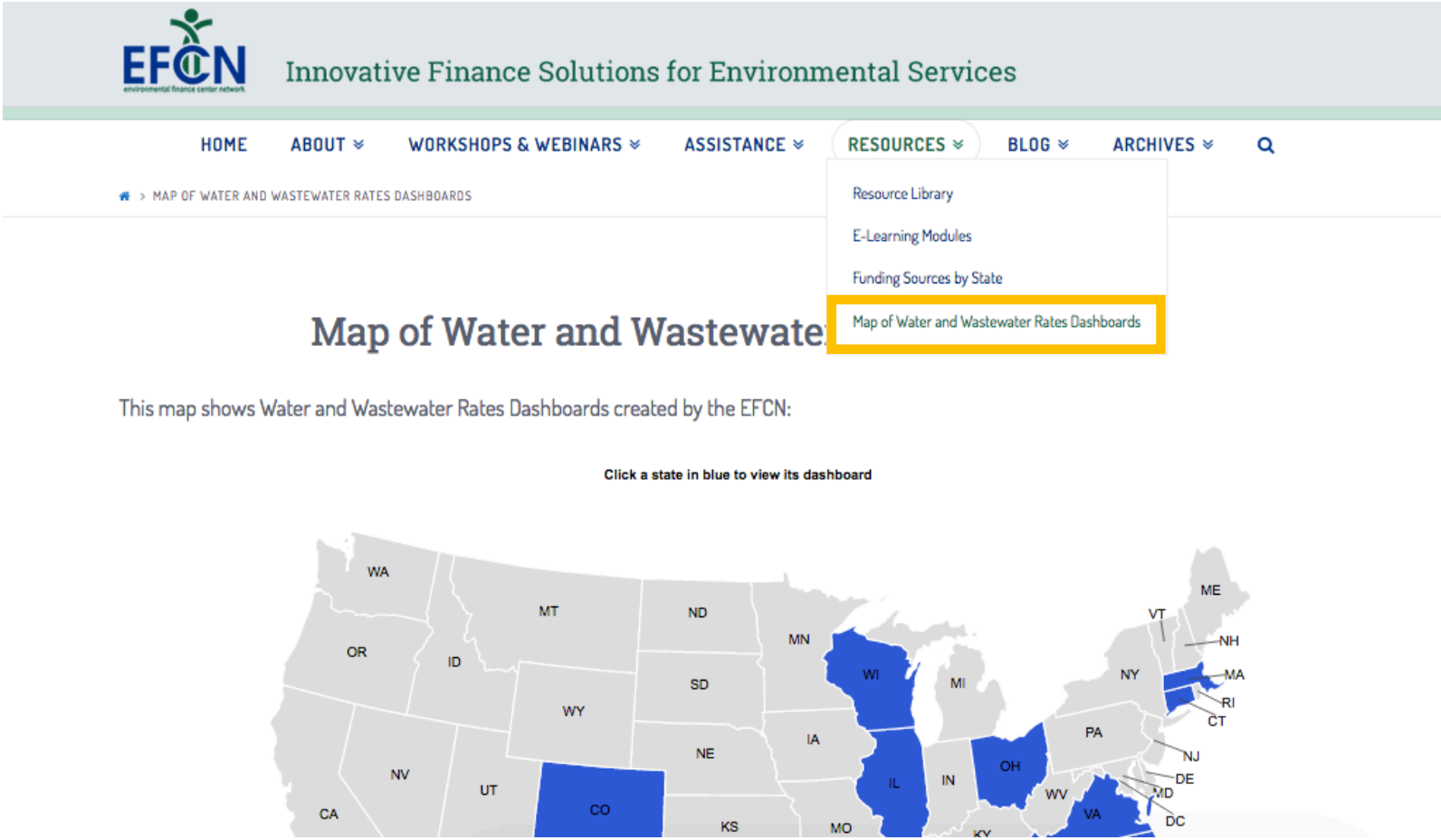
Request Technical Assistance

Select “Request Assistance” under the Assistance Tab off the EFCN homepage to access and submit the TA request form electronically.



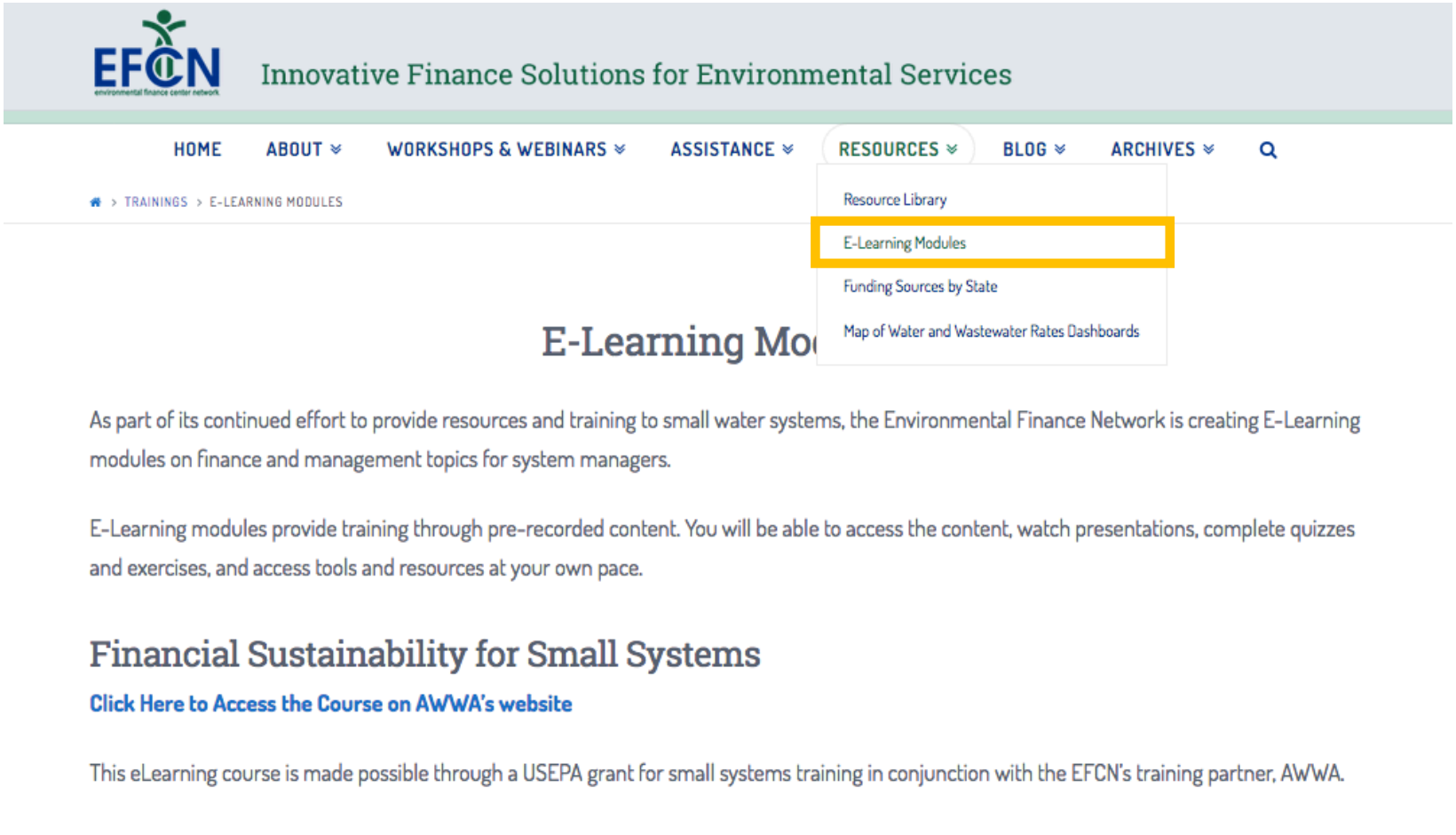
Rates Dashboards

Select “Map of Water and Wastewater Rates Dashboards” under the Resources Tab, and click on any state in blue to view its dashboard.



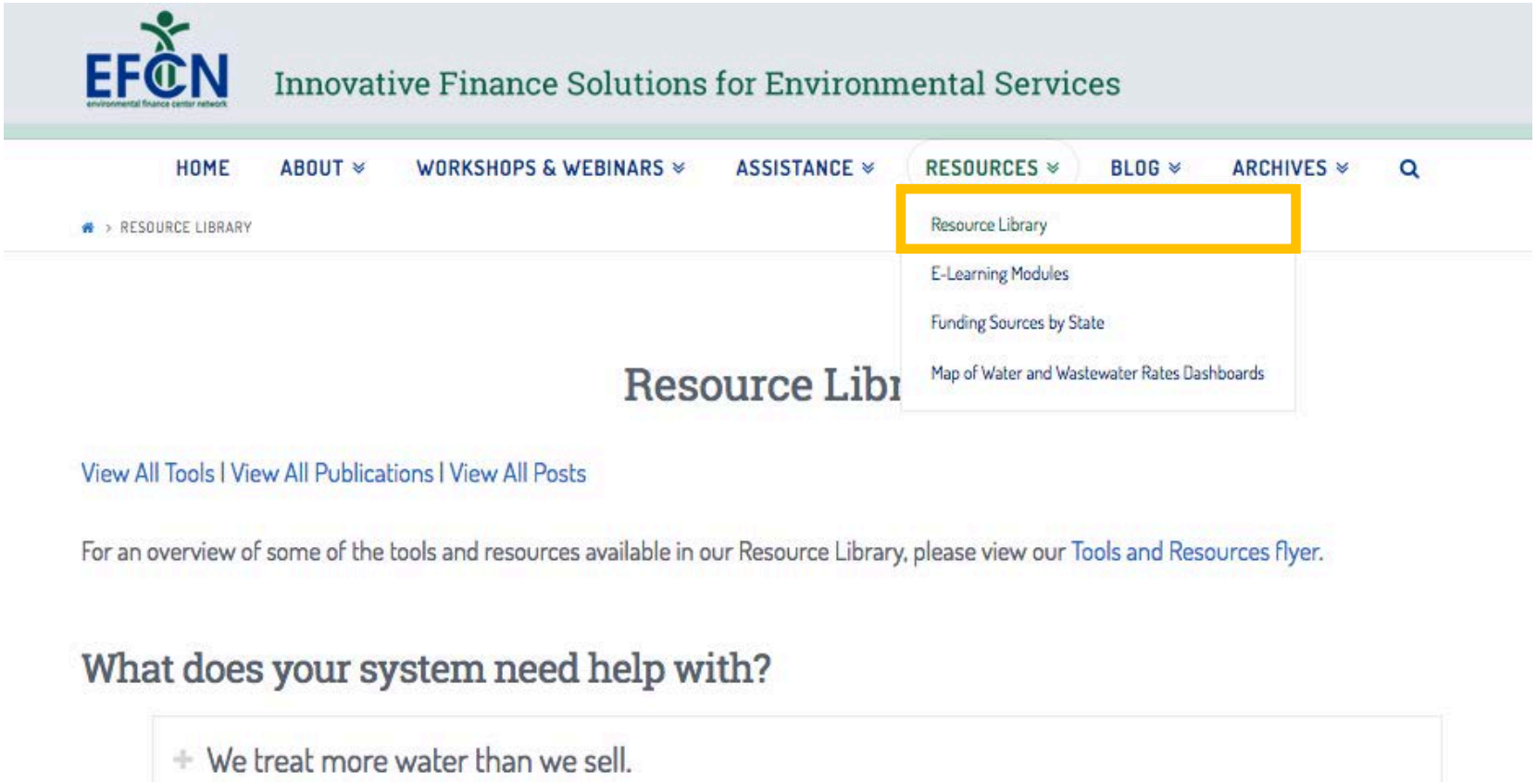
E-Learning Modules

Select “E-Learning Modules” under the Resources Tab off the EFCN homepage.



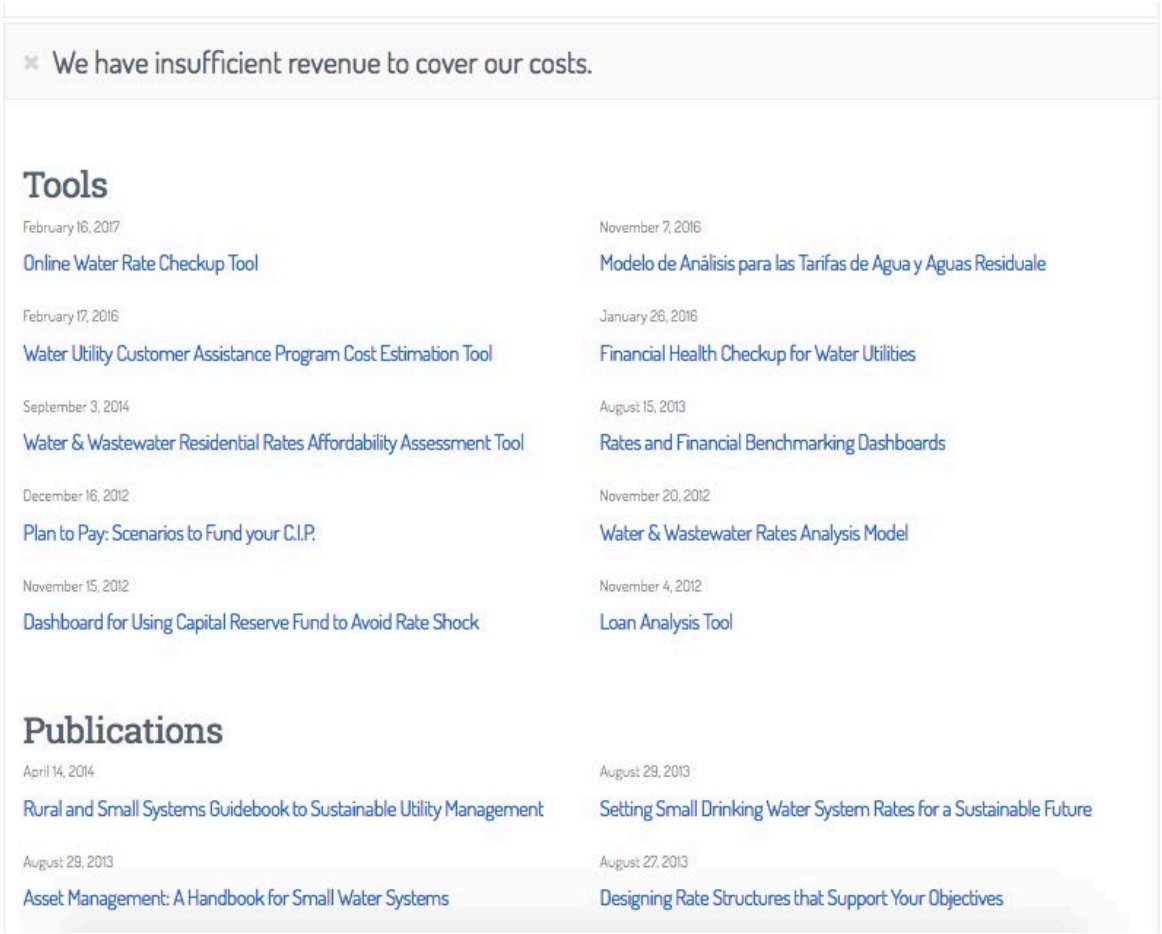
Resource Library

Select “Resource Library” under the Resources Tab off the EFCN homepage.



Resource Library Continued…

Click on a what your system needs help with to reveal tools and publications related to that topic.



Smart Management for Small Water Systems

Thank you for participating today.
We hope to see you at a future workshop!

www.efcnetwork.org

EFCN environmental finance center network

NADO NATIONAL ASSOCIATION OF DEVELOPMENT ORGANIZATIONS

GFOA Government Finance Officers Association