Does your system have breaks & leaks?

It will.

All water systems leak.


NEXT
LEFT


3
12
28
7
29
18

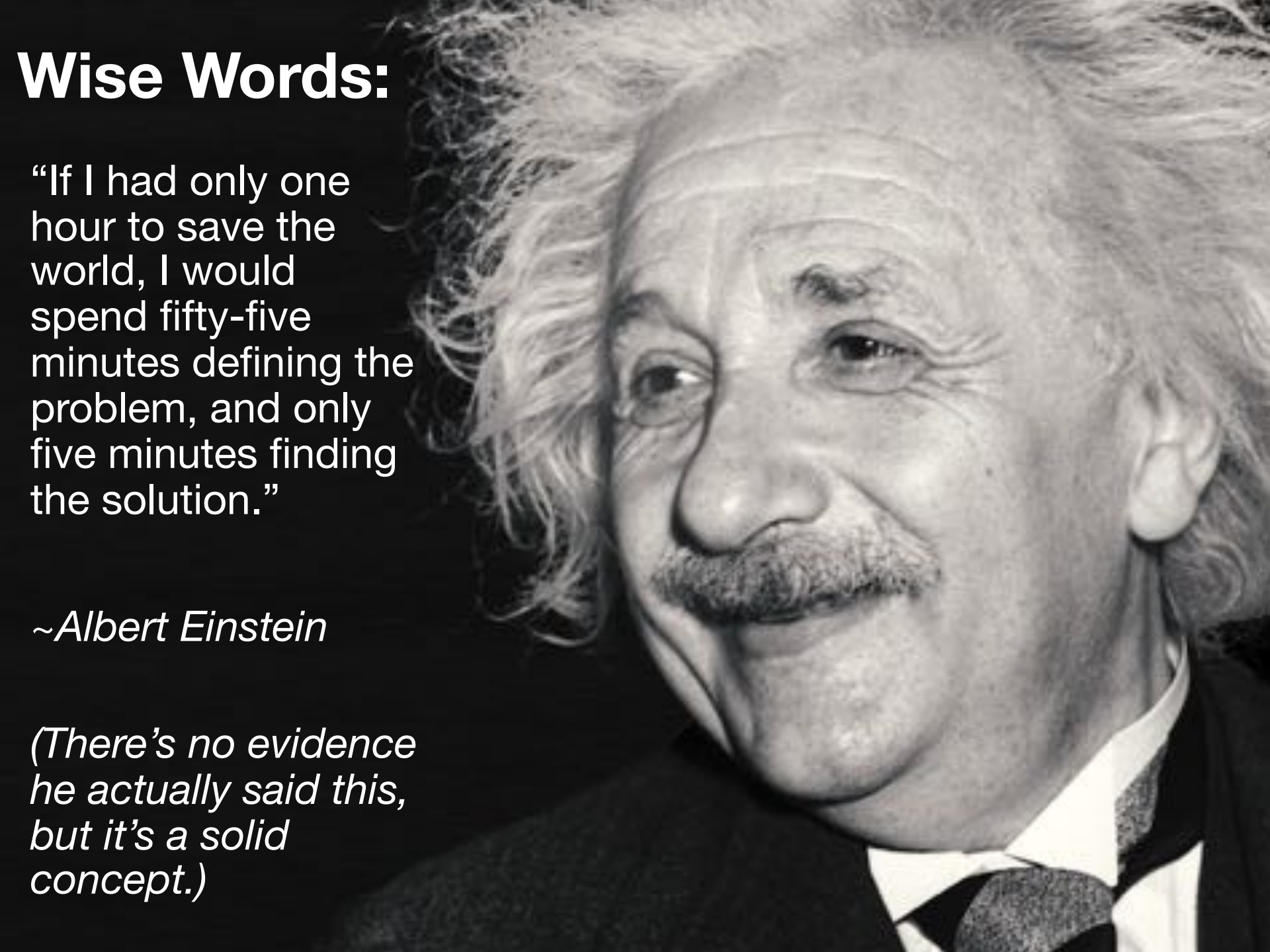

How
Why
What

Wise Words:

"If I had only one hour to save the world, I would spend fifty-five minutes defining the problem, and only five minutes finding the solution."

~Albert Einstein

(There's no evidence he actually said this, but it's a solid concept.)




How
Why
What

Why should we collect data?

Why

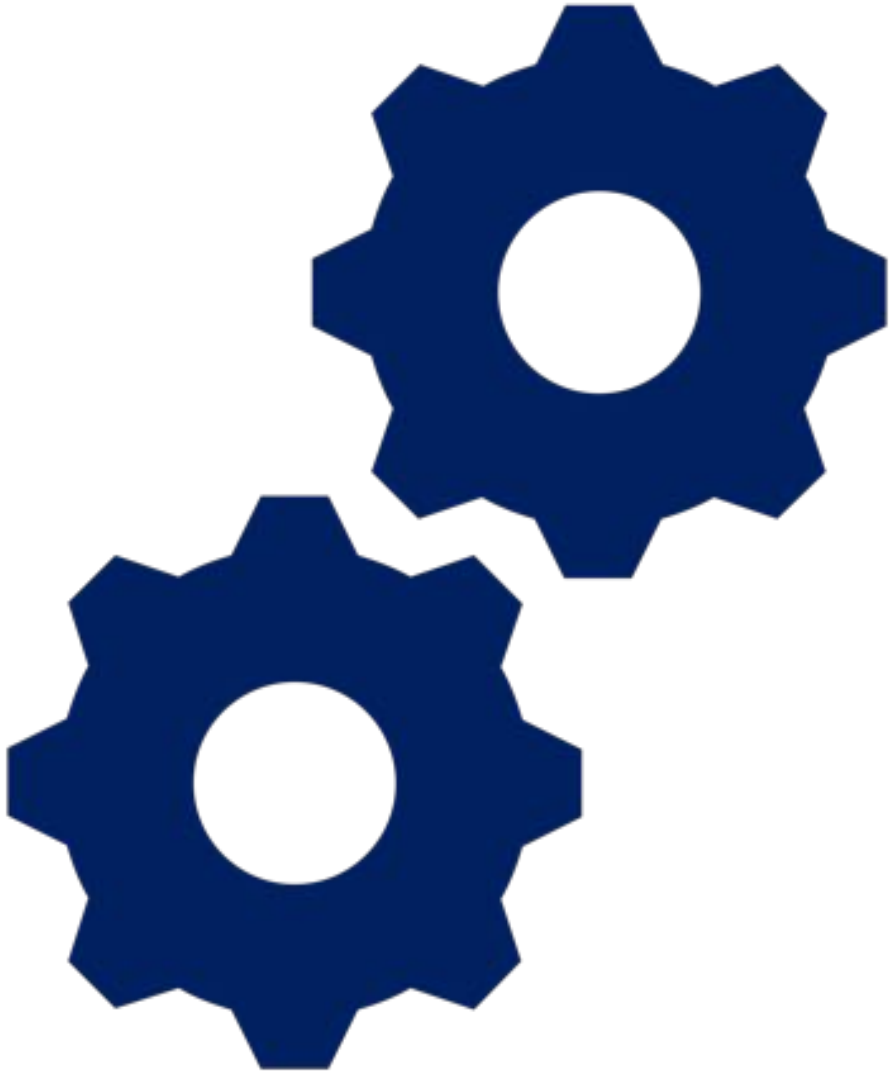
To solve problems.

Why

To answer questions.

Why will guide the ‘what’ and the ‘how.’

Why



Assets

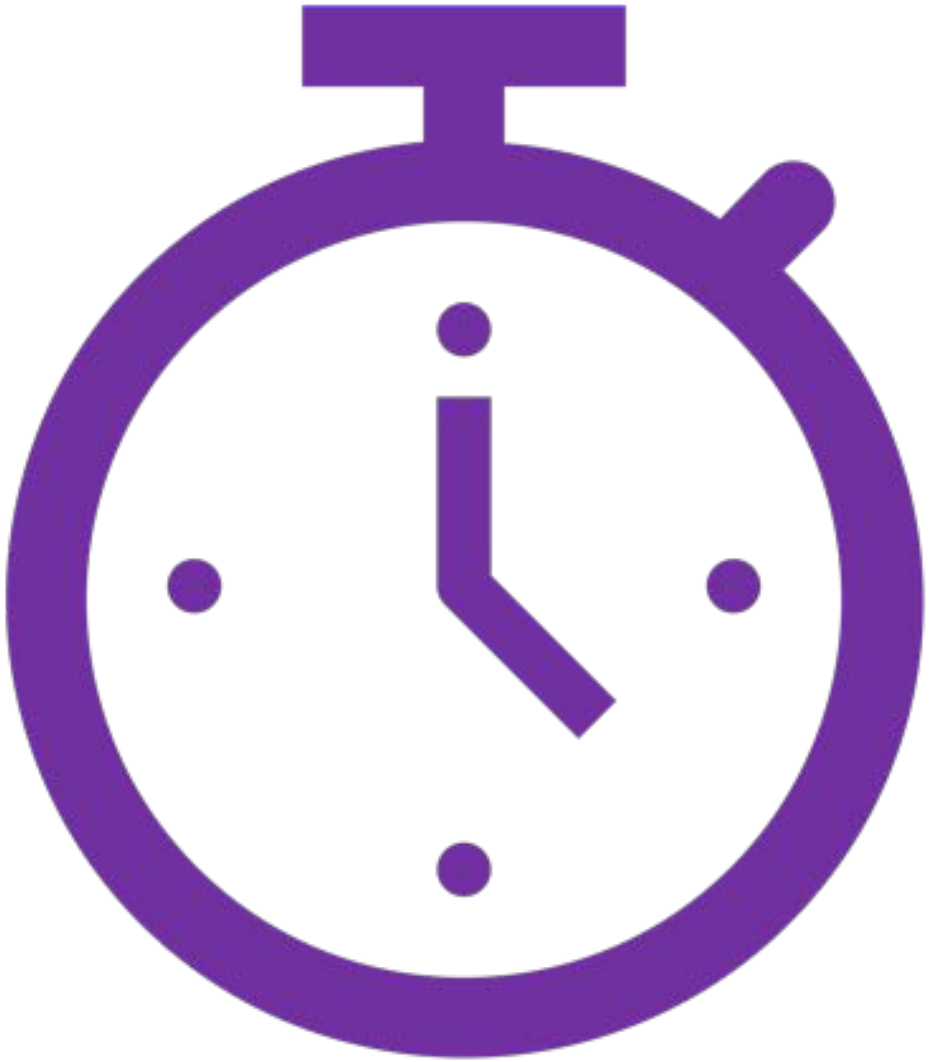
Why

Level of Service

Why

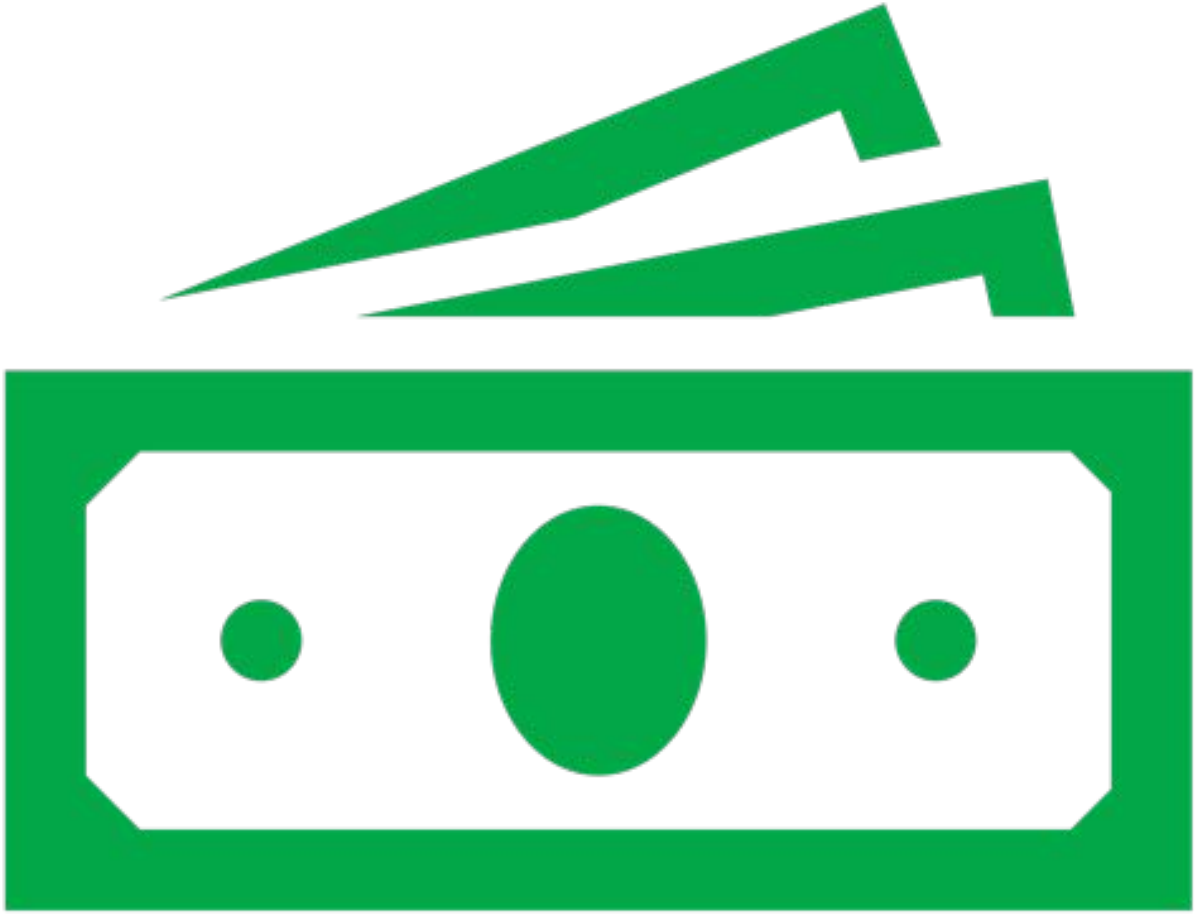
Criticality

Why



Life Cycle

Why



Funding

Asset Management

ASSETS

What assets do you manage, where are they, what condition are they in, what is their useful life, how much are they worth, and what is their energy use?

CRITICALITY

What is the overall business risk based on probability and consequence of asset failure? Is there redundancy to reduce risk?

FUNDING

Do you have funding sources to provide the capital you need for O&M, capital replacement and energy efficiency improvement?

SERVICE LEVEL

What level of service do you want to provide for your customers? How will you measure performance?

LIFE CYCLE

Is there a strategic plan for operating and maintaining system assets? Is a process, based on risk, in place to determine when to repair, rehabilitate or replace assets? Are you considering energy efficiency?

Why

To improve decision making.

What attributes do we collect?

What attributes are relevant?

What

Some basics.

What

What

What

What

What

What

What

What

What was the cause?

What type of repair was done?

What

Image courtesy of the City of Virginia Beach

What

What

Tie breaks to location and specific pieces of pipe.

What

pictures

pictures

pictures.

Image courtesy of the City of Virginia Beach

Image courtesy of the City of Virginia Beach

Image courtesy of the City of Virginia Beach

What

Other useful information can we get.

What

What

What

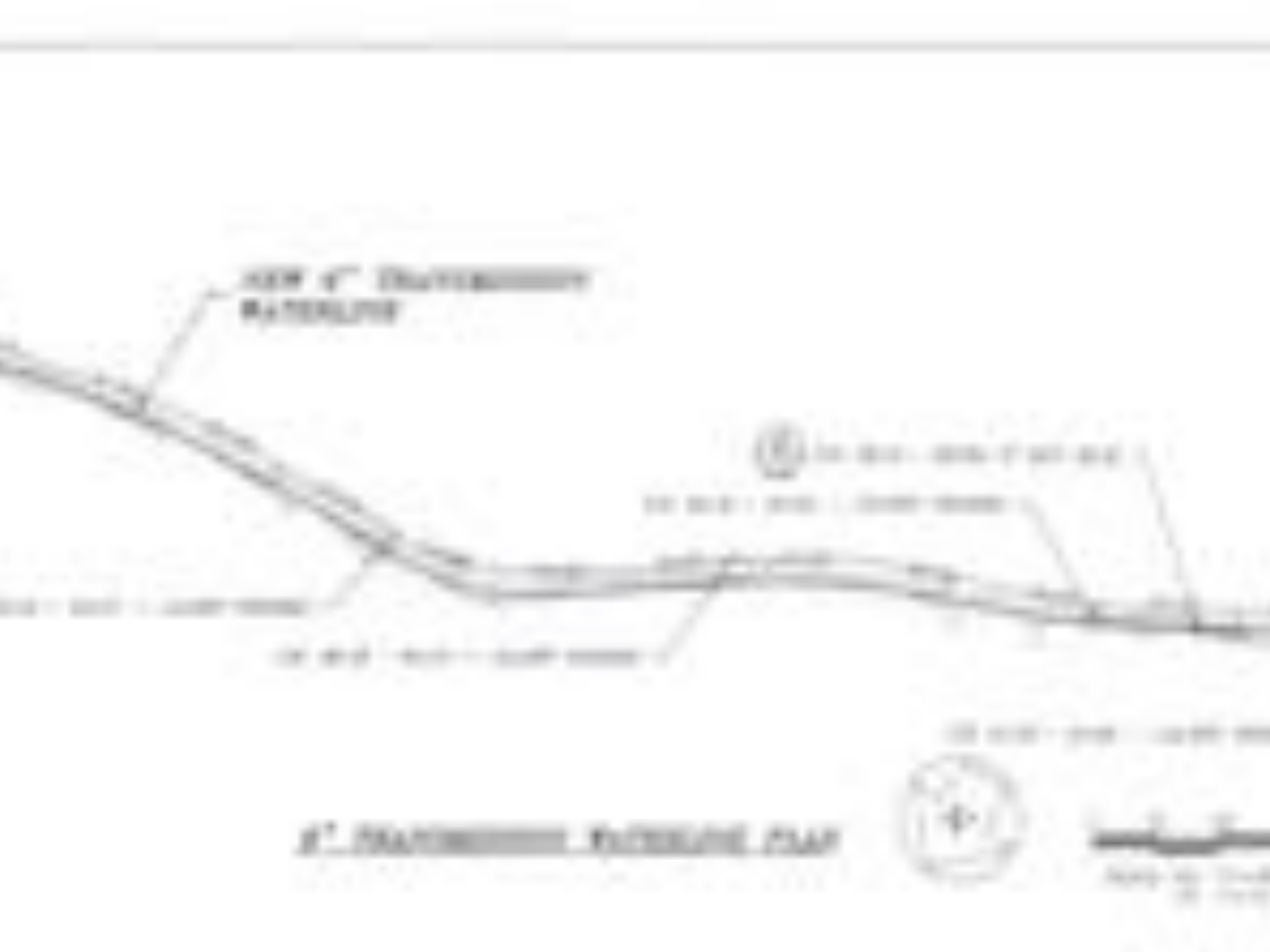
What

Financial
Social
Environmental

What

Triple Bottom Line

What can be verified?



Why & What

Case Studies…

Why

Level of Service

Why

Improved Response Time

What

Goal set at 48 hrs:

- 83% meet Goal
  (71% + 12%)
- 17% miss Goal

Why

Water Loss Estimates

What

What

Put it all together:

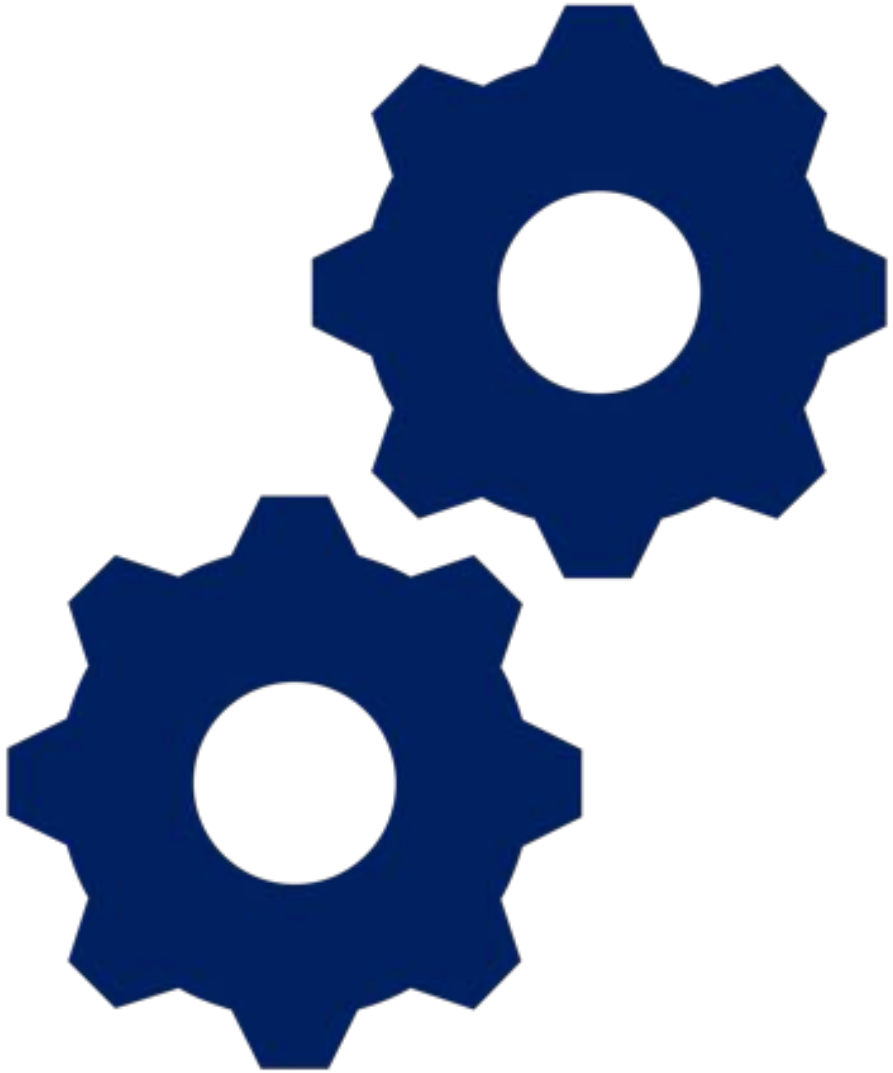
(This is one of many orifice flow formulas)

$$Q = 449 C_d A \sqrt{2gh}$$

Where:

- Q = flow (gmp)
- C_d= discharge coefficient
- A = orifice area (ft^2)
- g = gravity (32.2 ft/s^2)
- h = head (ft)

Why

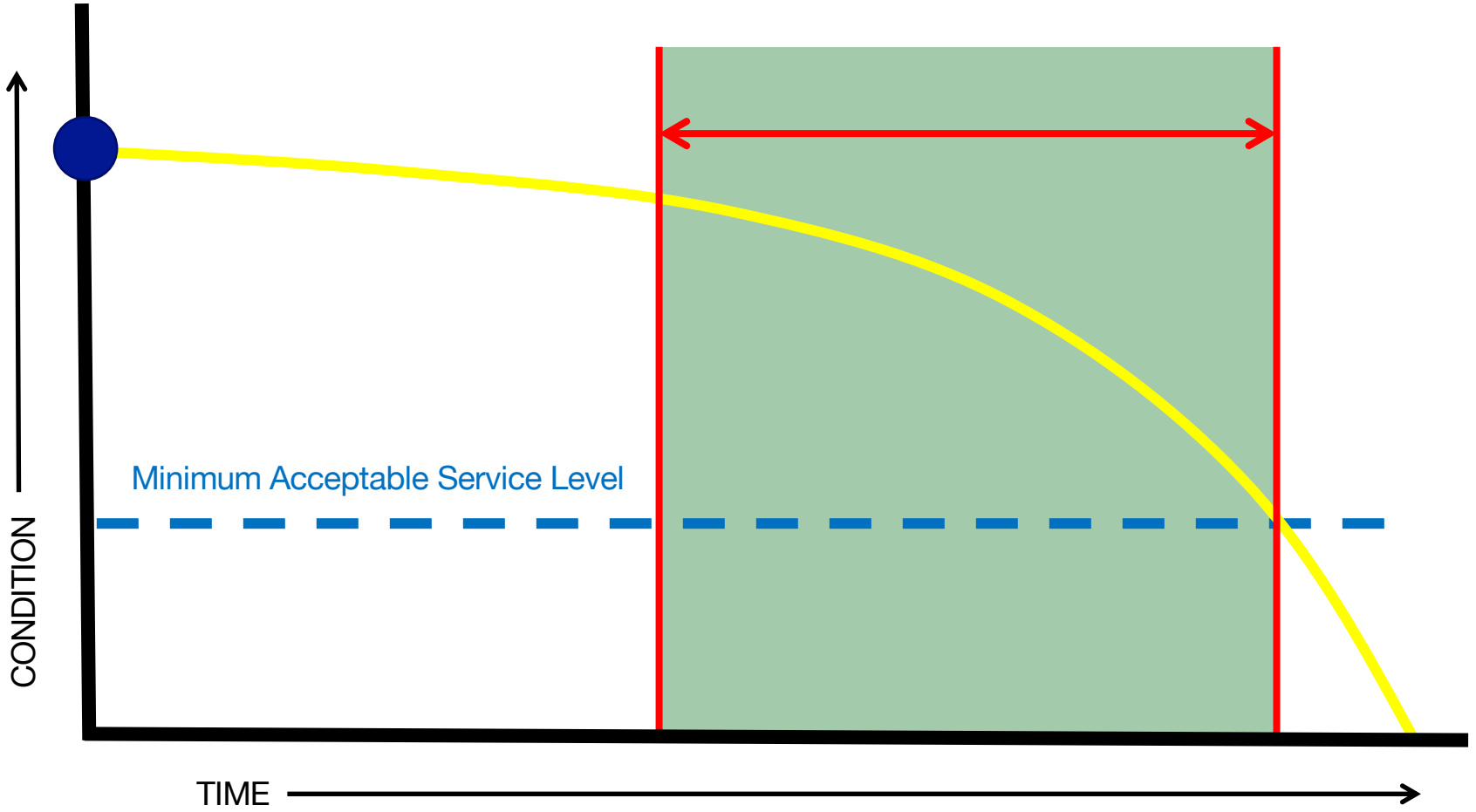


Assets

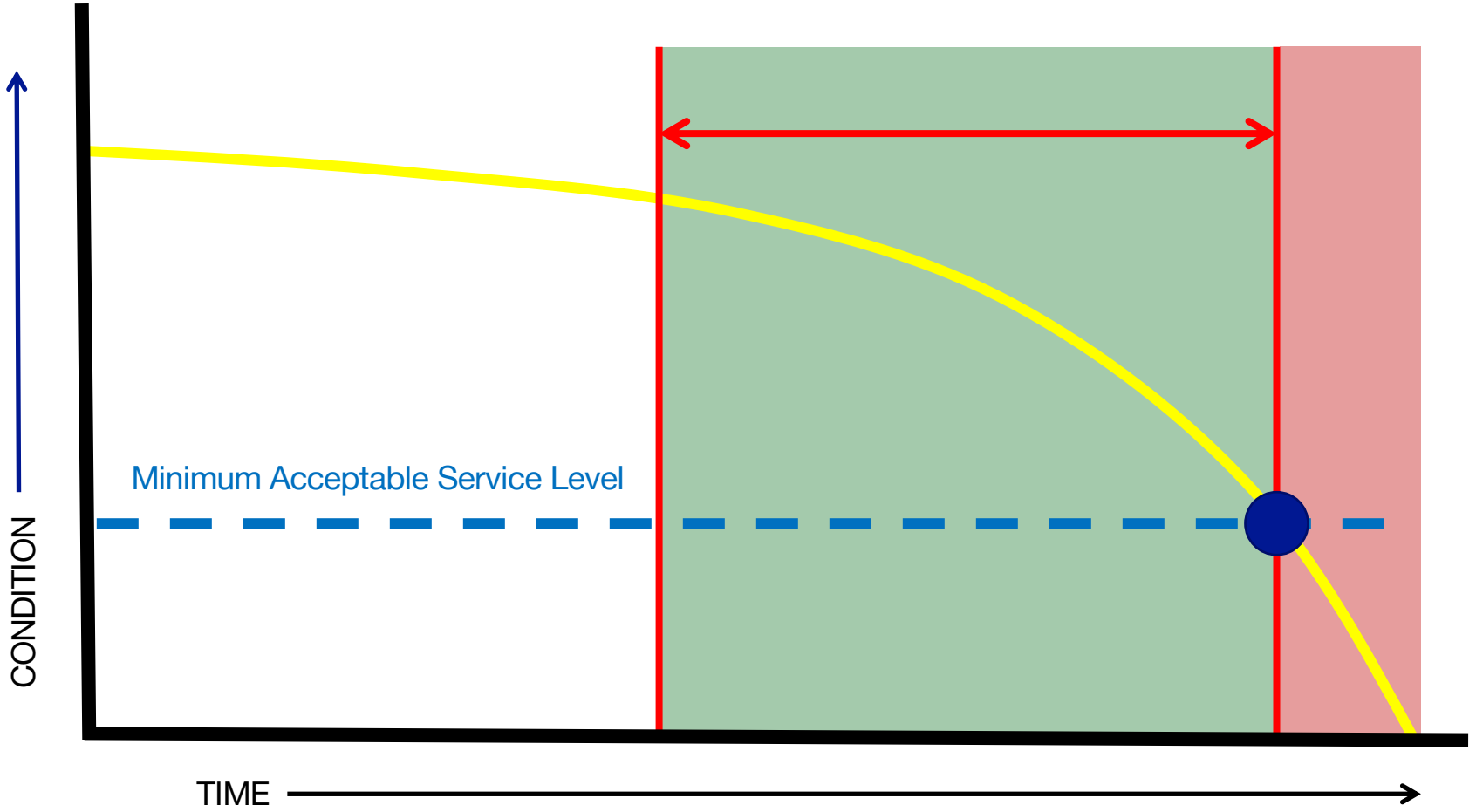
Why

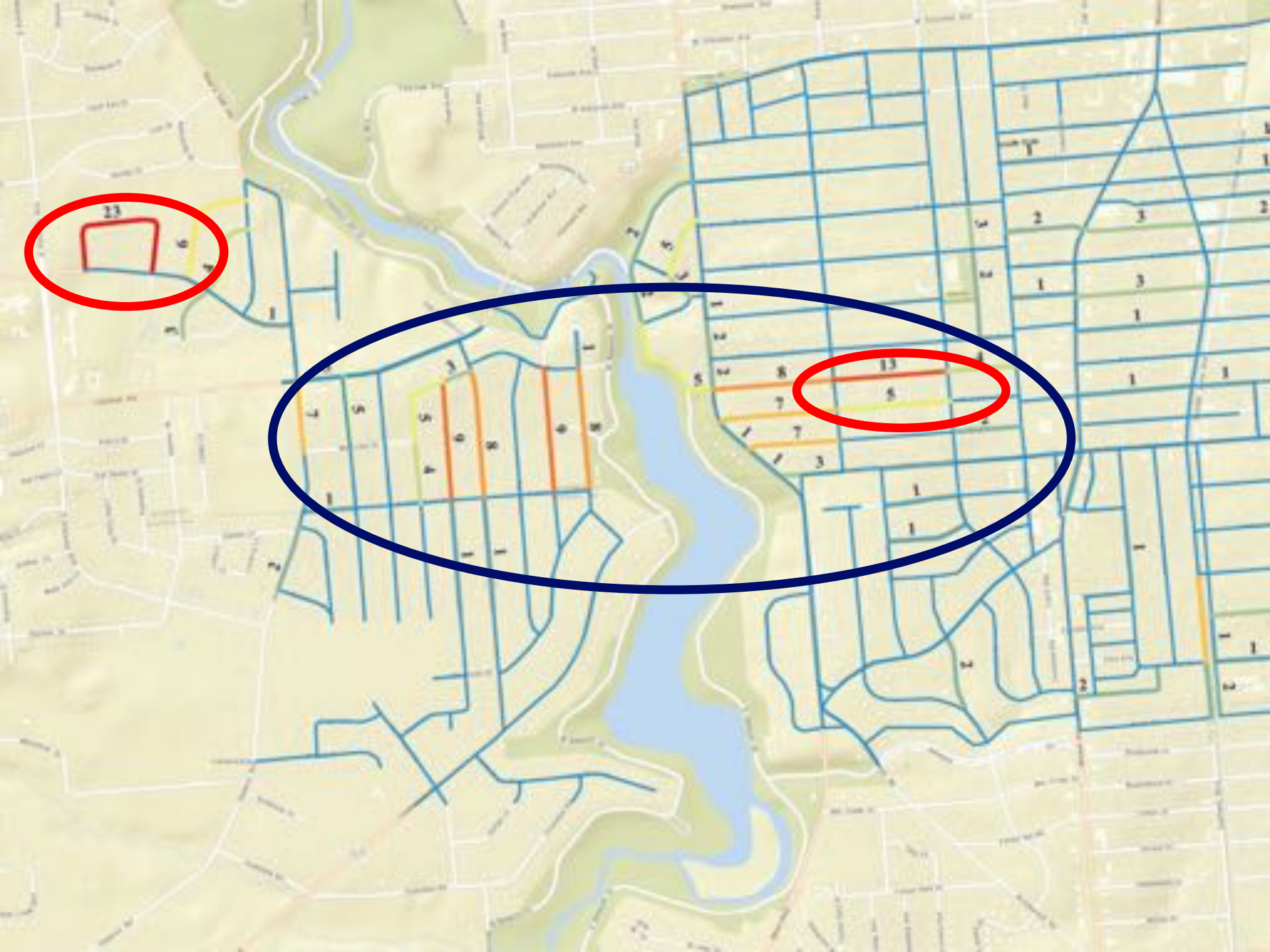
Tracking Pipe Condition

Condition Curve

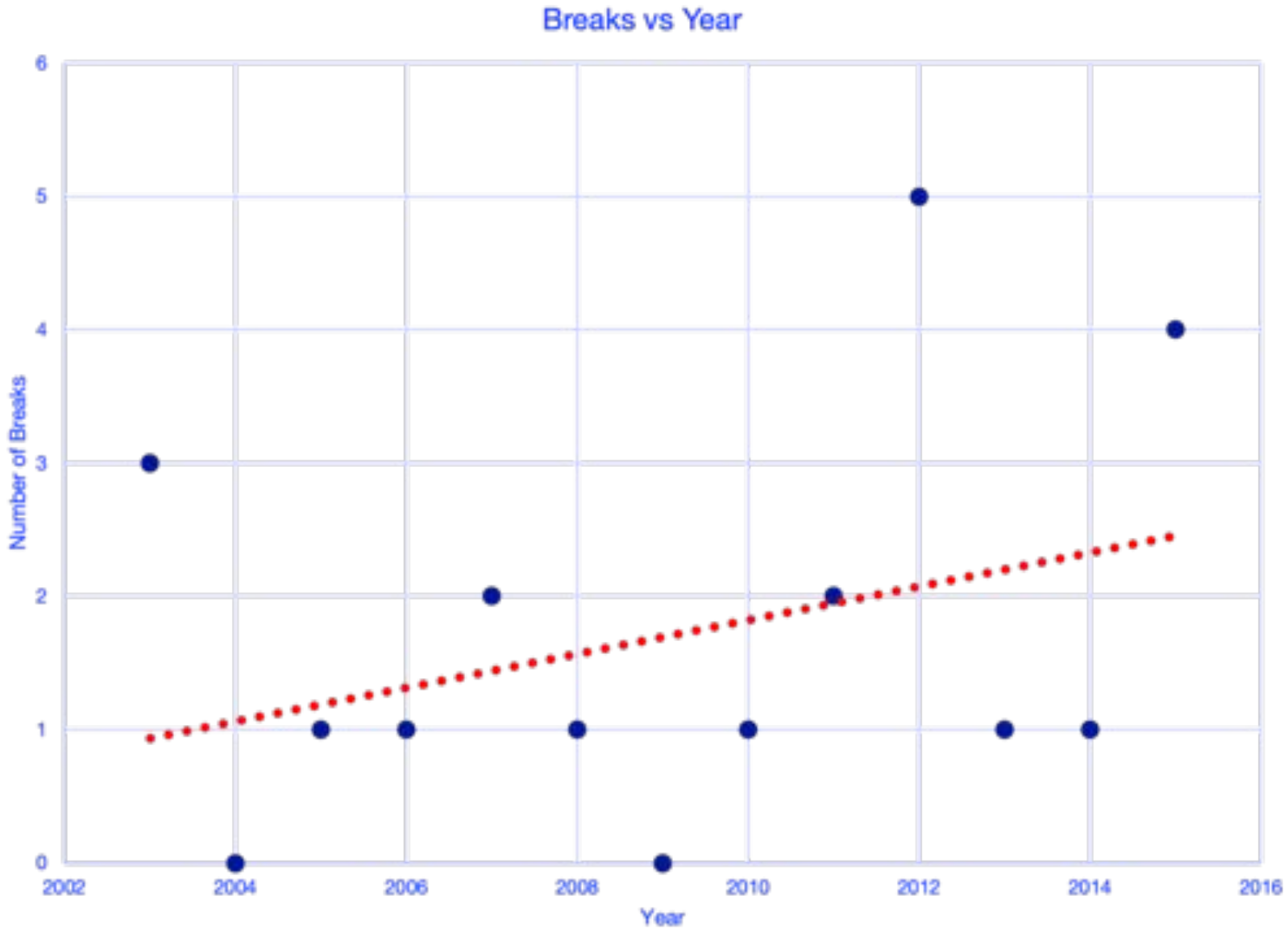


Condition Curve



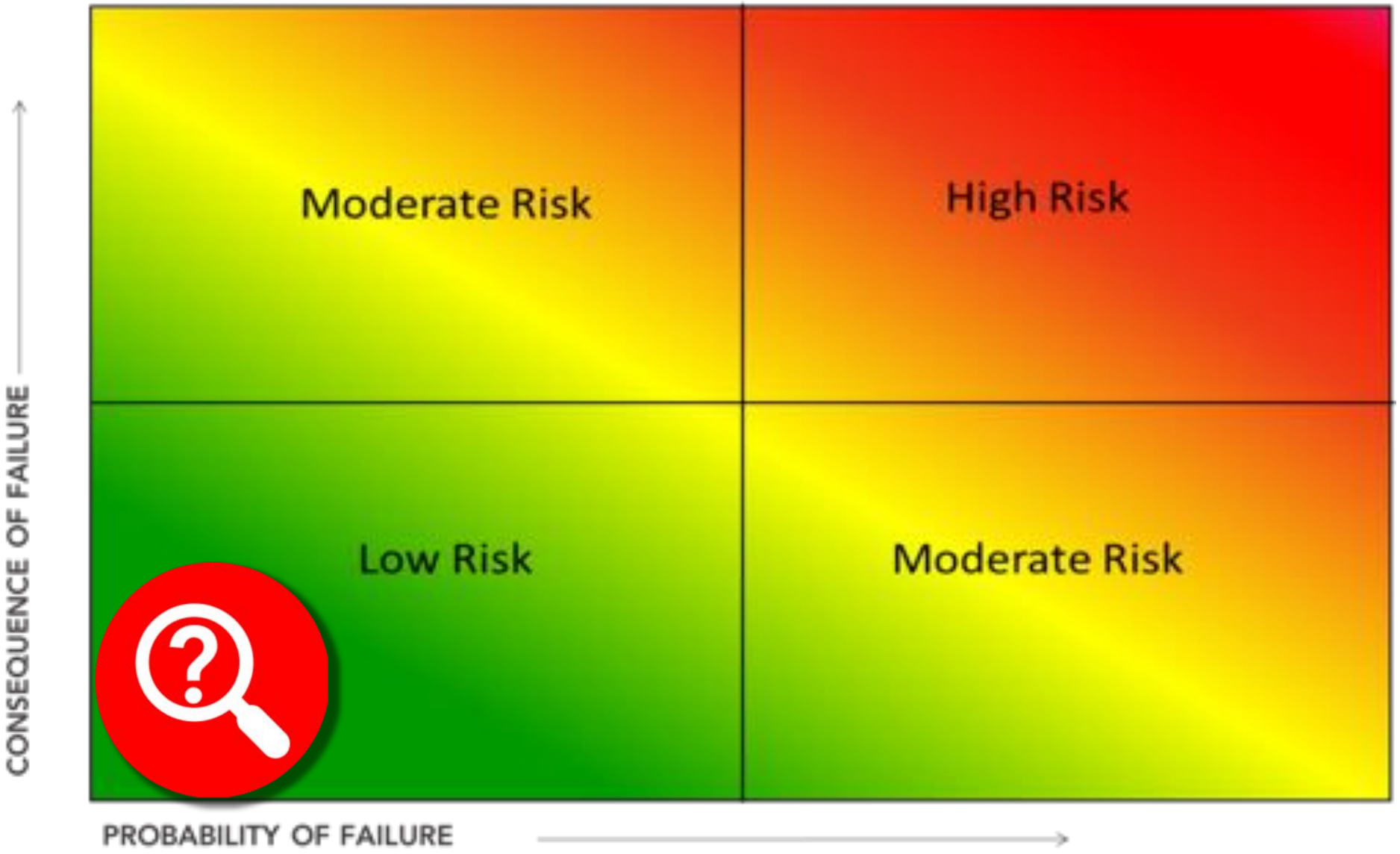


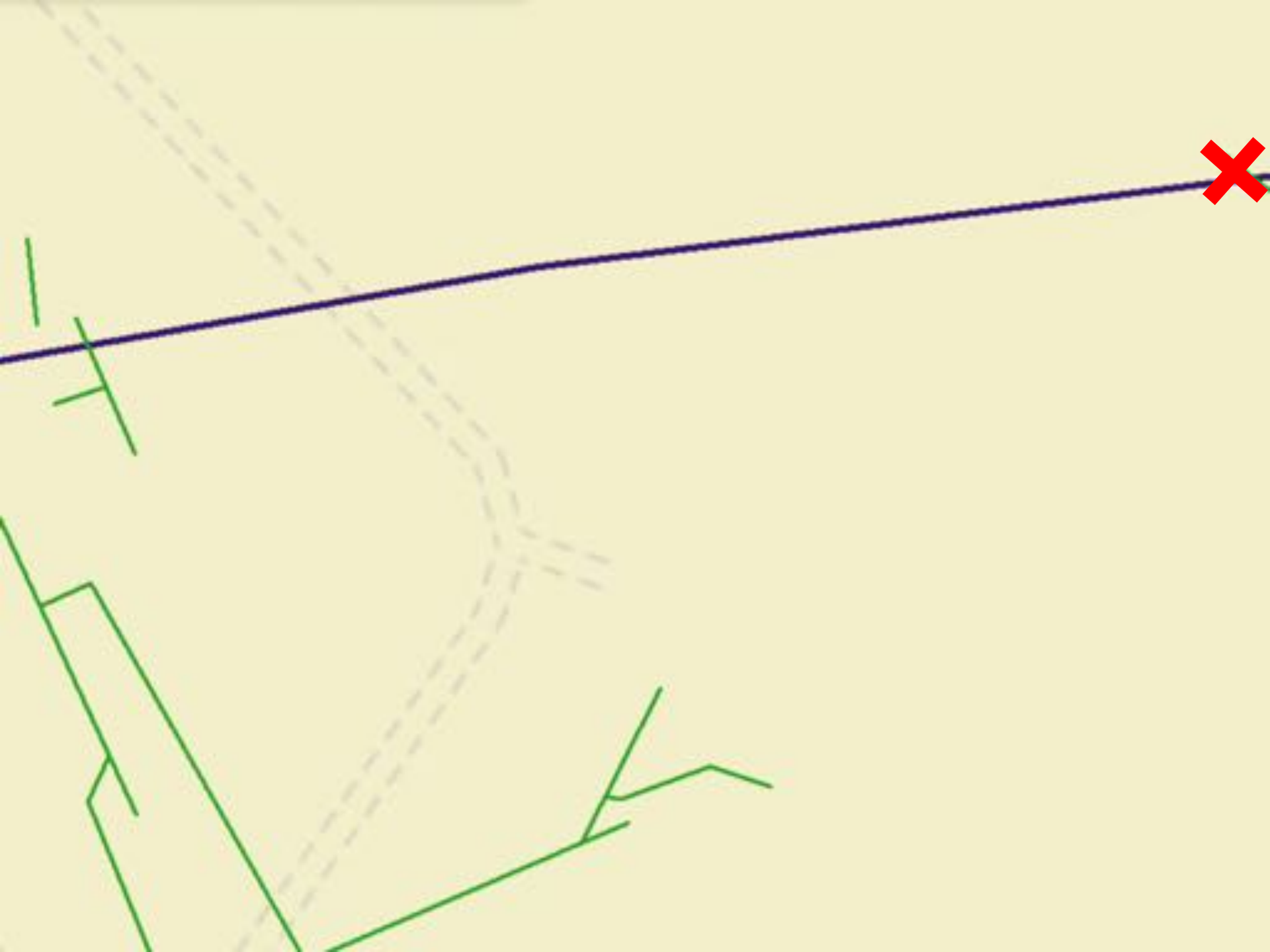

Nadyne Dr. and Meredith Dr.
23 Breaks

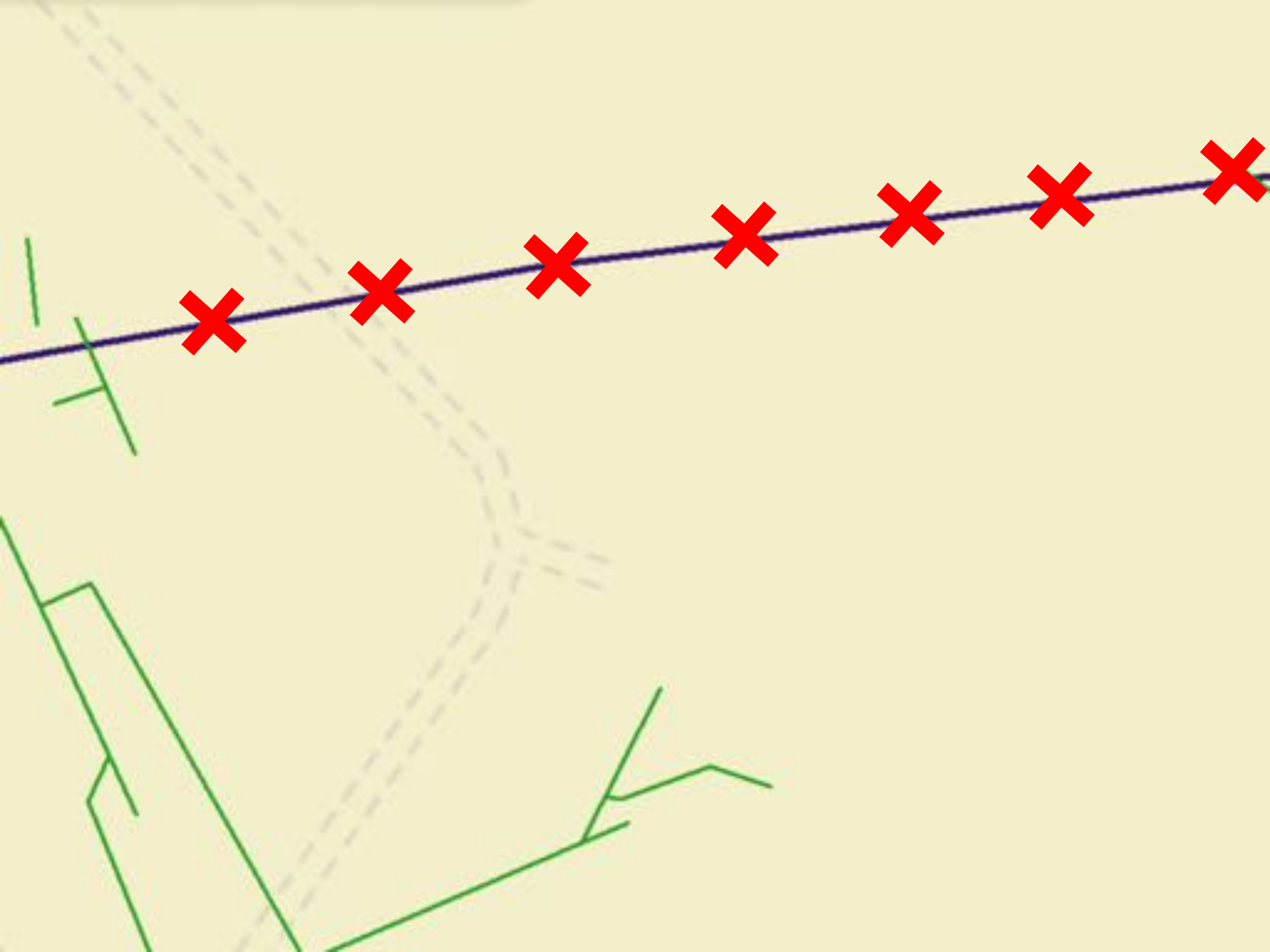

Breaks vs Year
Number of Breaks
Year
0
1
2
3
4
5
6
2002
2004
2006
2008
2010
2012
2014
2016

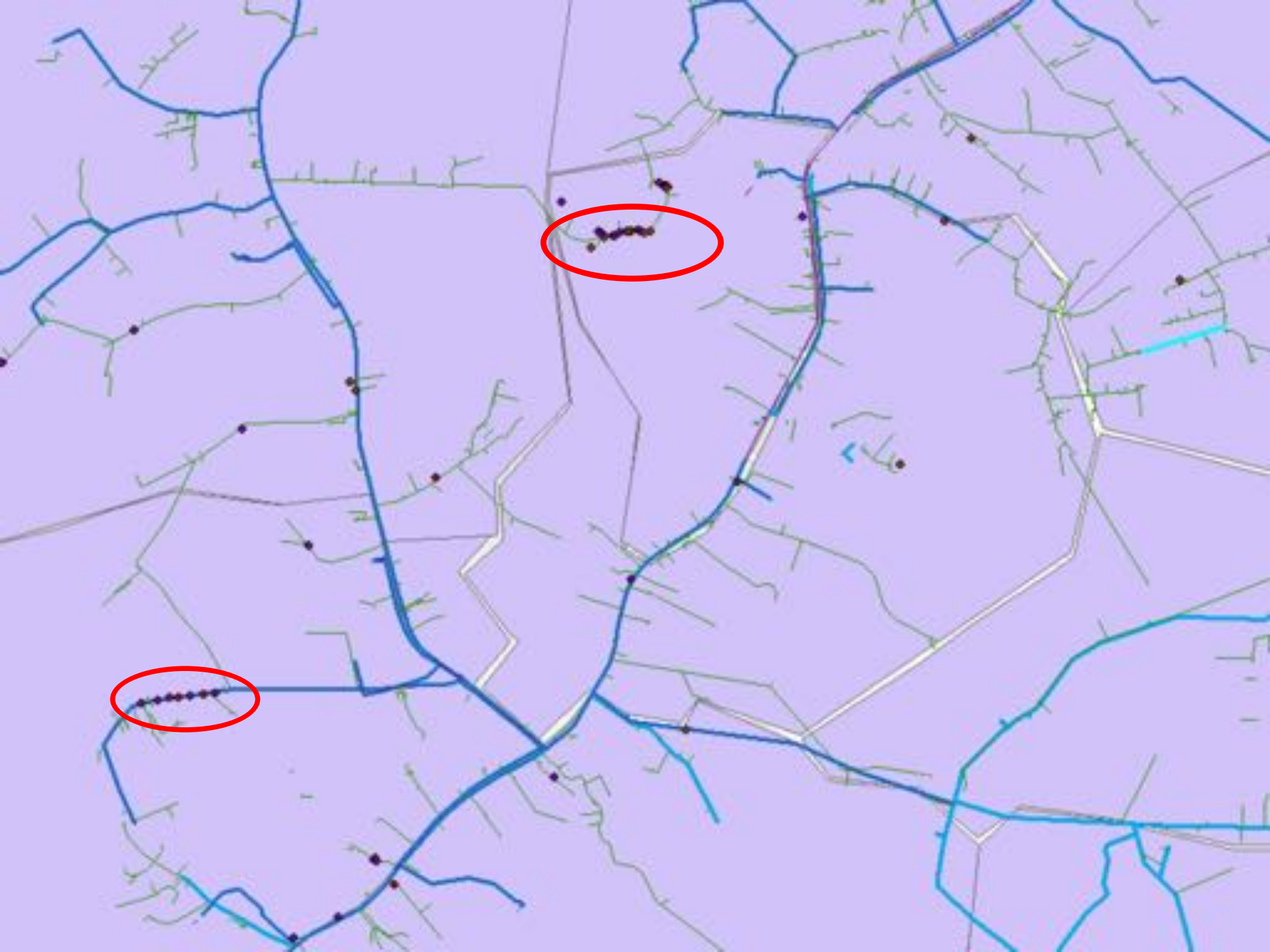
Why

Criticality

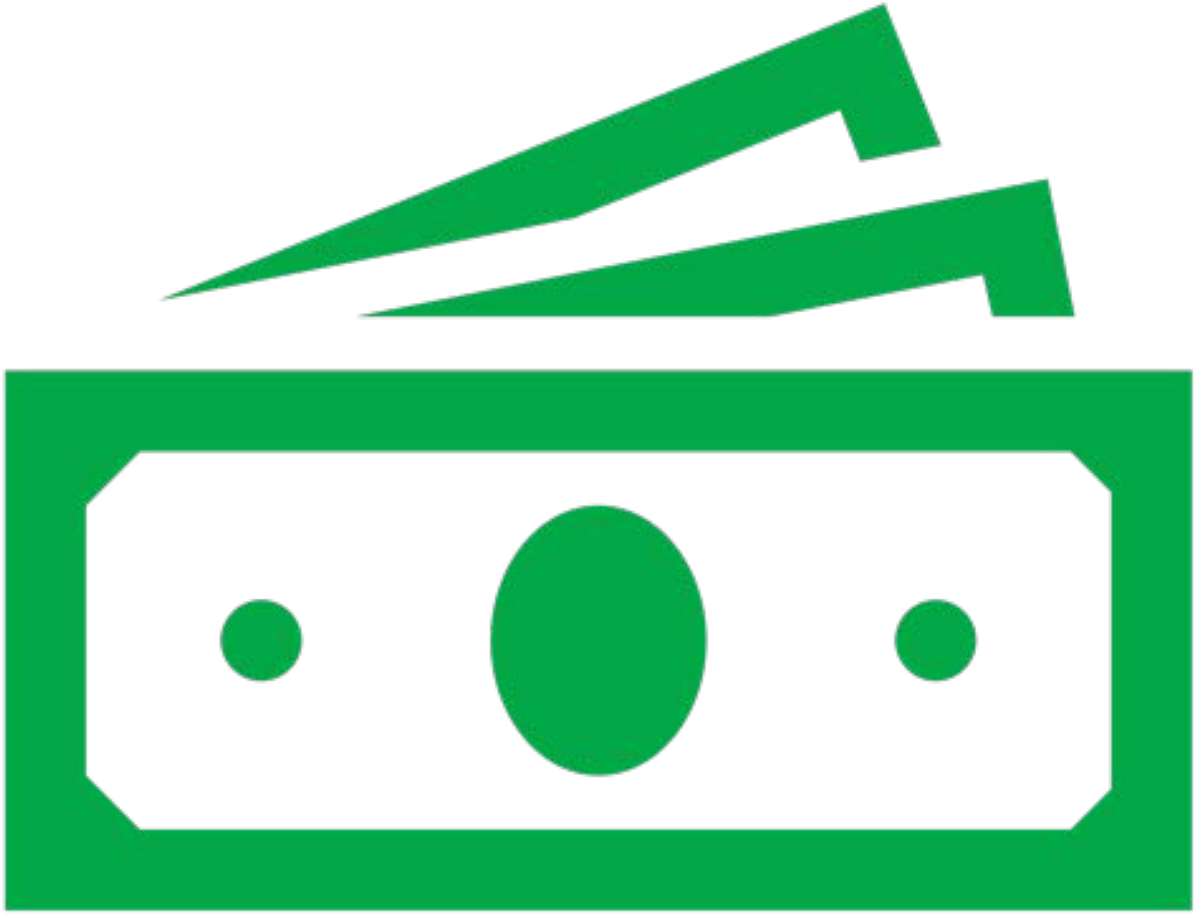

Moderate Risk
High Risk
Low Risk
Moderate Risk
CONSEQUENCE OF FAILURE
PROBABILITY OF FAILURE







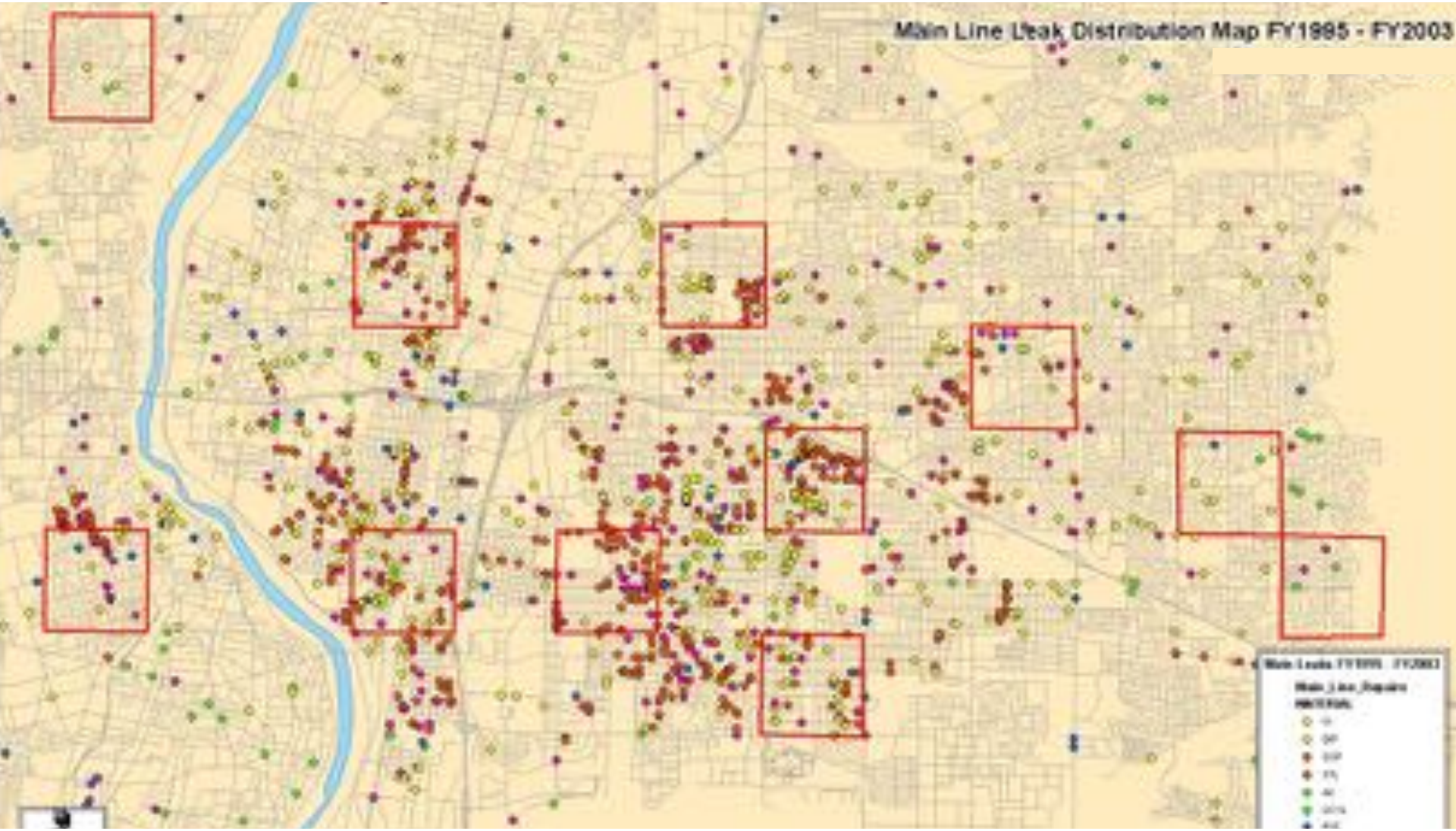
Why

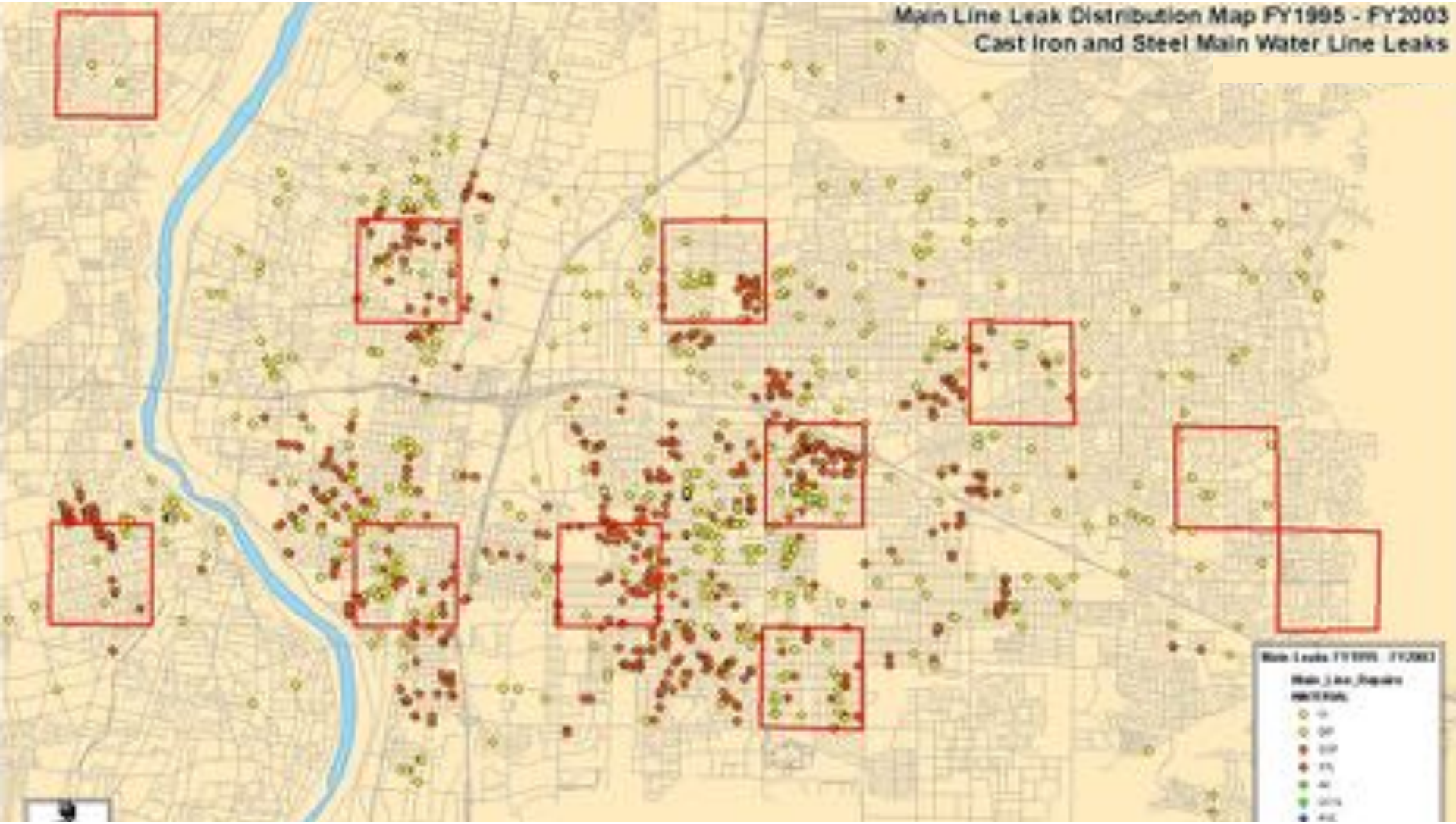


Funding

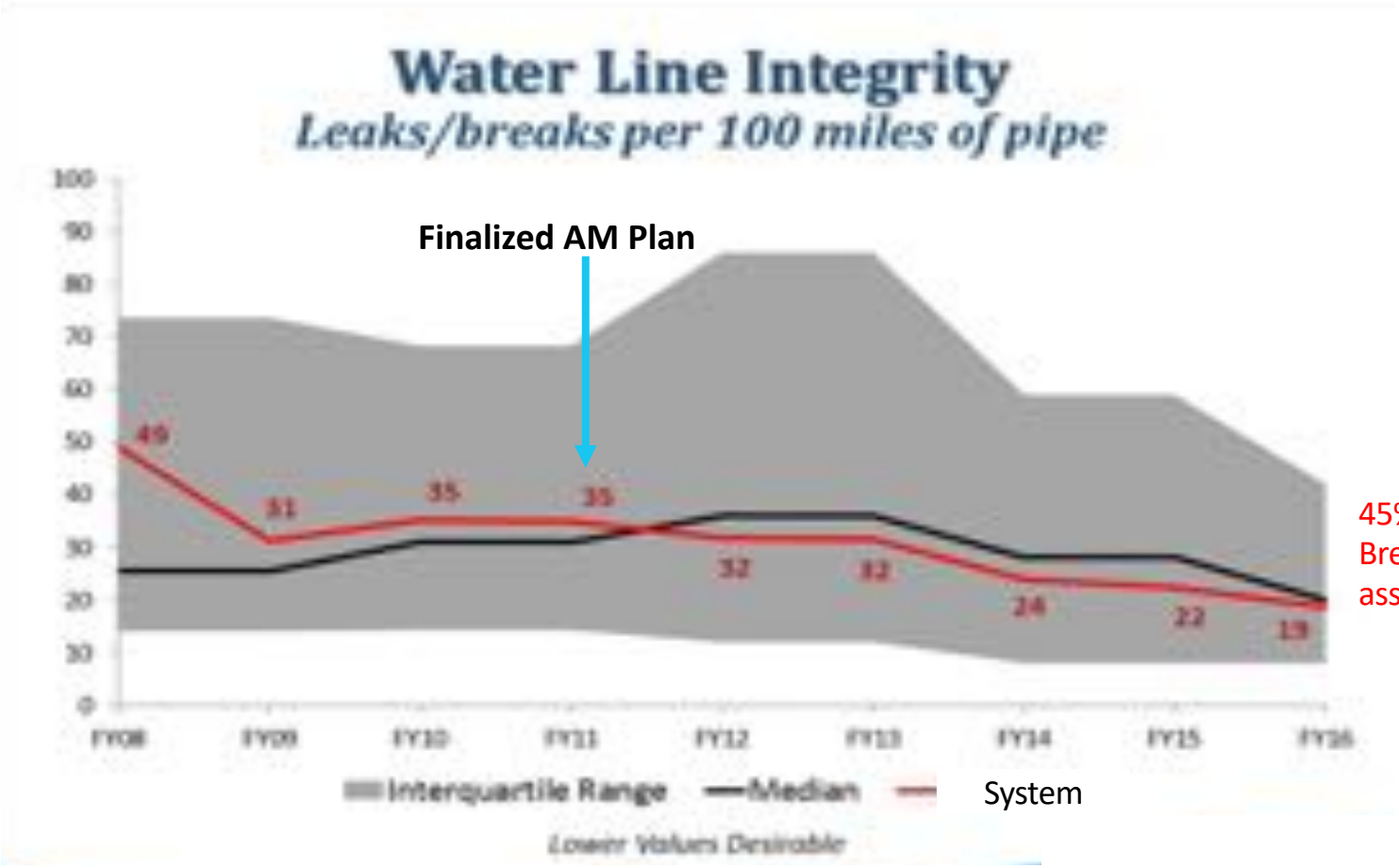
Why

Effective use of budgeted funds.


Main Line Leak Distribution Map FY1995 - FY2003

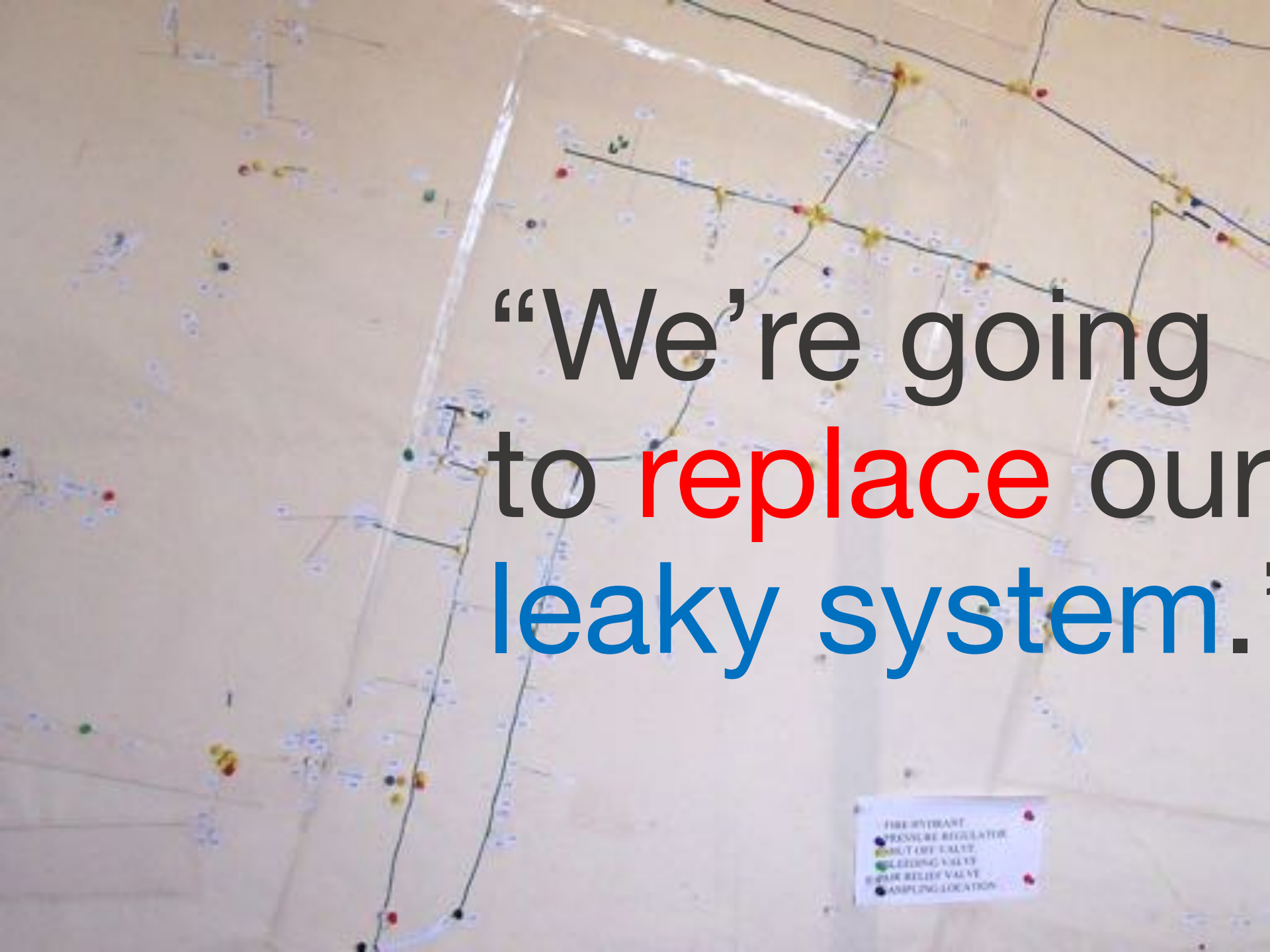

Main Line Leak Distribution Map FY1995 - FY2003
Cast Iron and Steel Main Water Line Leaks


Small Diameter Leak Detection Program
Grid Selection
Legend
Cast Iron Waterlines
Steel Waterlines
CCYL Waterlines
DIP Waterlines
PVC Waterlines
AC Waterlines
ROW
Zone Grid Selection
Hydroscope Zones



45% Reduction in Break Rate (and associated costs)

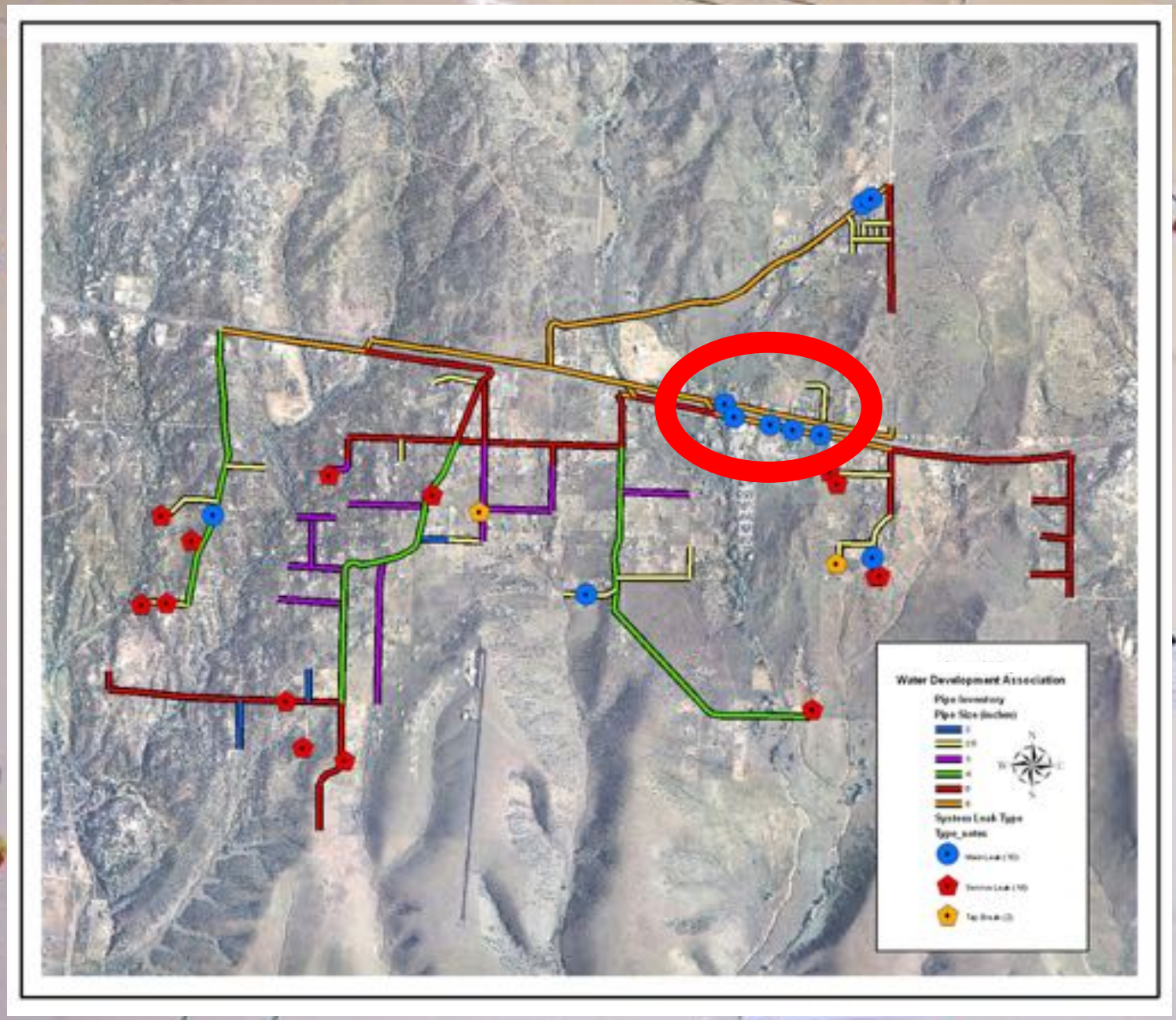
Why Capital Improvement Planning


"We're going
to replace our
leaky system."

What

What type of repair was done?

What


Water Development Association
Pipe Inventory
Pipe Size (inches)
System Leak Type
Type_notes

What

The same attributes are relevant to many problems.

How should I gather & store data?


The Lion's Way
SWEEPERS
Backstreet Child
THE BETTER ANGELS
BLACKWATER


LUDLUM
NO EXIT

Address Or Location: 2800 Chemical Date: January 18 2002 Time Reported: 8:00 AM

Water Main Size: 2" Type Of Water Main: Copper Service Depth: 6.0 Backfilled Used: Fill Dirt

Leak Caused By: Split: ___ Blow Out: ___ Hub Area: ___ Worned Out Bolts: ___ Service Saddle: ___

Galvanize Fittings: ___ Lead Joints: ___ Copper Fittings: ___ Old Repair Clamp: ___ Gaskets: ___

Other Related Problems Might Be: External Corrosion: ___ Pipe Deterioration: ___ Internal Pitting: ___

Surface Condition

Street Surface: Paved Area: ___ Unpaved Area: Yes Sidewalk Area: ___ Driveway Area: ___ Alleyway: ___

Weather Conditions: Icy Roads: ___ Snowing: ___ Rained: ___ Windy: ___ Sunny: Yes Working At Night: ___

Office Information

Reported By: Tina "Dispatcher" Title: City Dispatcher. Previous Breaks In that Area: Yes

Starting Time: 9:00 AM Ending Time: 10:30 AM Traffic Control Removed and Inventoried: Yes

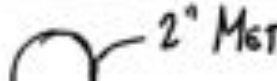
Area Of Town: East: ✓ West: ___ South: ___ North: ___ Line Locate No. : 200202827

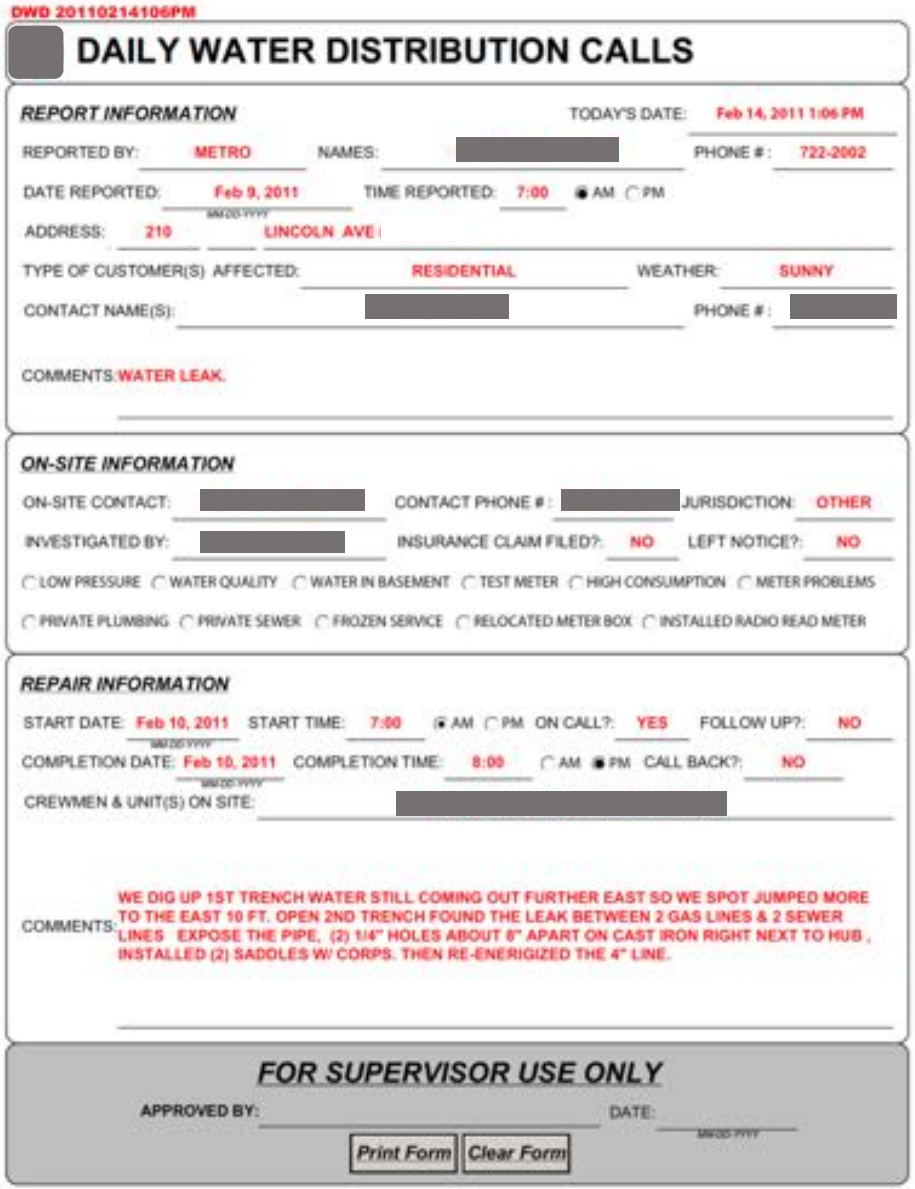
Known Utilities: Gas: ___ Sewer: ___ Phone: Yes Water: ___ Electrical: ___ Cable TV. ___ Other: ___

perty Damage: None

Crew Leader: Ernest Jim Unit 255 Stand-by Call: No Assigned by: P. Silva

Leak Diagram Information





DWD 20110214106PM

DAILY WATER DISTRIBUTION CALLS

REPORT INFORMATION

TODAY'S DATE: Feb 14, 2011 1:06 PM

REPORTED BY: METRO NAMES: [redacted] PHONE #: 722-2002

DATE REPORTED: Feb 9, 2011 (MM/DD/YYYY) TIME REPORTED: 7:00 (•) AM ( ) PM

ADDRESS: 210 LINCOLN AVE

TYPE OF CUSTOMER(S) AFFECTED: RESIDENTIAL WEATHER: SUNNY

CONTACT NAME(S): [redacted] PHONE #: [redacted]

COMMENTS: WATER LEAK.

ON-SITE INFORMATION

ON-SITE CONTACT: [redacted] CONTACT PHONE #: [redacted] JURISDICTION: OTHER

INVESTIGATED BY: [redacted] INSURANCE CLAIM FILED?: NO LEFT NOTICE?: NO

( ) LOW PRESSURE ( ) WATER QUALITY ( ) WATER IN BASEMENT ( ) TEST METER ( ) HIGH CONSUMPTION ( ) METER PROBLEMS

( ) PRIVATE PLUMBING ( ) PRIVATE SEWER ( ) FROZEN SERVICE ( ) RELOCATED METER BOX ( ) INSTALLED RADIO READ METER

REPAIR INFORMATION

START DATE: Feb 10, 2011 (MM/DD/YYYY) START TIME: 7:00 (•) AM ( ) PM ON CALL?: YES FOLLOW UP?: NO

COMPLETION DATE: Feb 10, 2011 (MM/DD/YYYY) COMPLETION TIME: 8:00 ( ) AM (•) PM CALL BACK?: NO

CREWMEN & UNIT(S) ON SITE: [redacted]

COMMENTS: WE DIG UP 1ST TRENCH WATER STILL COMING OUT FURTHER EAST SO WE SPOT JUMPED MORE TO THE EAST 10 FT. OPEN 2ND TRENCH FOUND THE LEAK BETWEEN 2 GAS LINES & 2 SEWER LINES EXPOSE THE PIPE, (2) 1/4" HOLES ABOUT 6" APART ON CAST IRON RIGHT NEXT TO HUB , INSTALLED (2) SADDLES W/ CORPS. THEN RE-ENERIGIZED THE 4" LINE.

FOR SUPERVISOR USE ONLY

APPROVED BY: DATE: (MM/DD/YYYY)

Print Form Clear Form

Pictures?
GPS?
Other?

How

Use formats you can search and sort.

How

GIS

Work order database

Excel, etc.

How can I gather data?

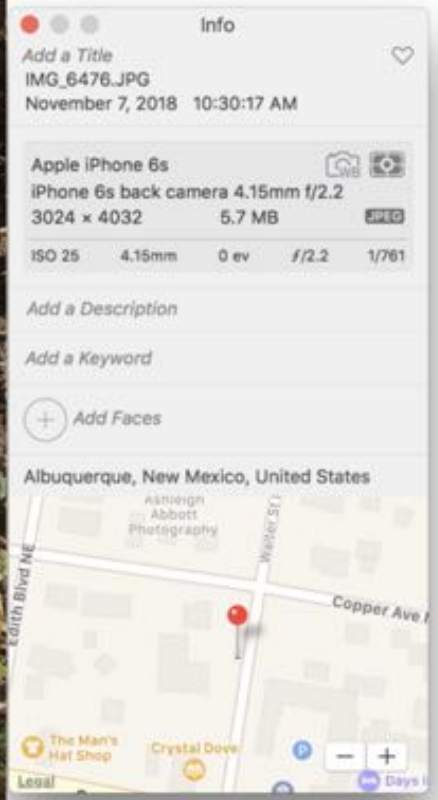
How do I get GPS coordinates?

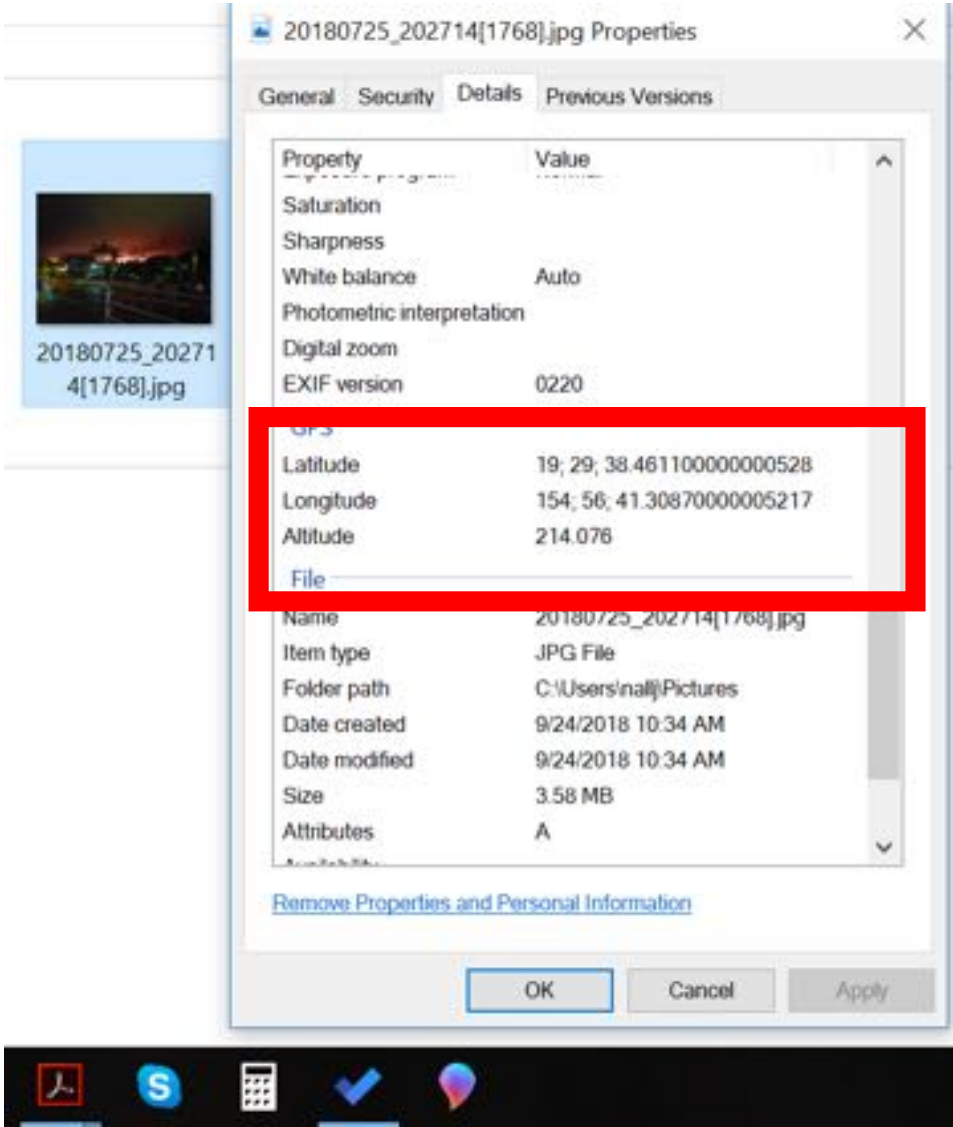
How

How

Your phone: turn on location services for the camera

Image details





How

Image EXIF viewer app.

Verizon 2:39 PM 26%

IMG_6491.JPG

IMG_6491.JPG 19 minutes ago
4032 x 3024 (4.9 MB) Midtown - University,Albu…

f/2.2	1/339 seconds	ISO 25
4 mm		iPhone 6s

Aperture (F-number)	f/2.2
ISO Sensitivity	ISO 25
Focal Length	4 mm
Focal Length in 35 mm	29 mm

Delete Photo | Remove Location | Remove EXIF | Edit EXIF

All Photos | Albums | Favorites | Settings | Help

Exif Viewer Lite

Verizon 2:27 PM 28%

IMG_6492.JPG

User Comment	
Keywords	
Title	
Headline	
Caption	
GPS	35.083389° -106.625167°
GPS Direction	281.157562244518 8 M

Map Location Open in Map app

Delete Photo | Remove Location | Remove EXIF | Edit EXIF

All Photos | Albums | Favorites | Settings | Help

Verizon 2:31 PM 27%

IMG_6494.JPG

IMG_6494.JPG 11 minutes ago

4032 x 3024 (4.8 MB) Midtown - University,Albu…

f/2.2	1/337 seconds	ISO 25
4 mm		iPhone 6s

Aperture (F-number)	f/2.2
ISO Sensitivity	ISO 25
Focal Length	4 mm
Focal Length in 35 mm	29 mm

Delete Photo | Remove Location | Remove EXIF | Edit EXIF

All Photos | Albums | Favorites | Settings | Help

Exif Viewer Lite

Verizon 2:28 PM 28%

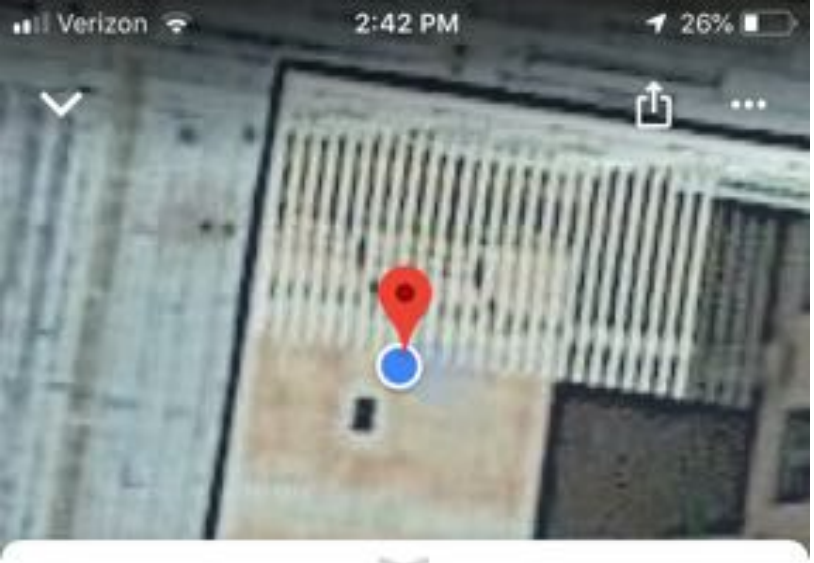
IMG_6493.JPG

SerialNumber	
User Comment	
Keywords	
Title	
Headline	
Caption	
GPS	35.083370° -106.625197°
GPS Direction	277.269958467928 M

Map Location Open in Map app

Delete Photo | Remove Location | Remove EXIF | Edit EXIF

All Photos | Albums | Favorites | Settings | Help



Dropped Pin

near Central Campus, Albuquerque, NM, USA

Start (1 min) | Directions

SAVE | LABEL | SHARE | DOWNLOAD

Measure distance

JAMES

Albuquerque, NM, USA

35°05'00.1"N
106°37'32.2"W
goo.gl

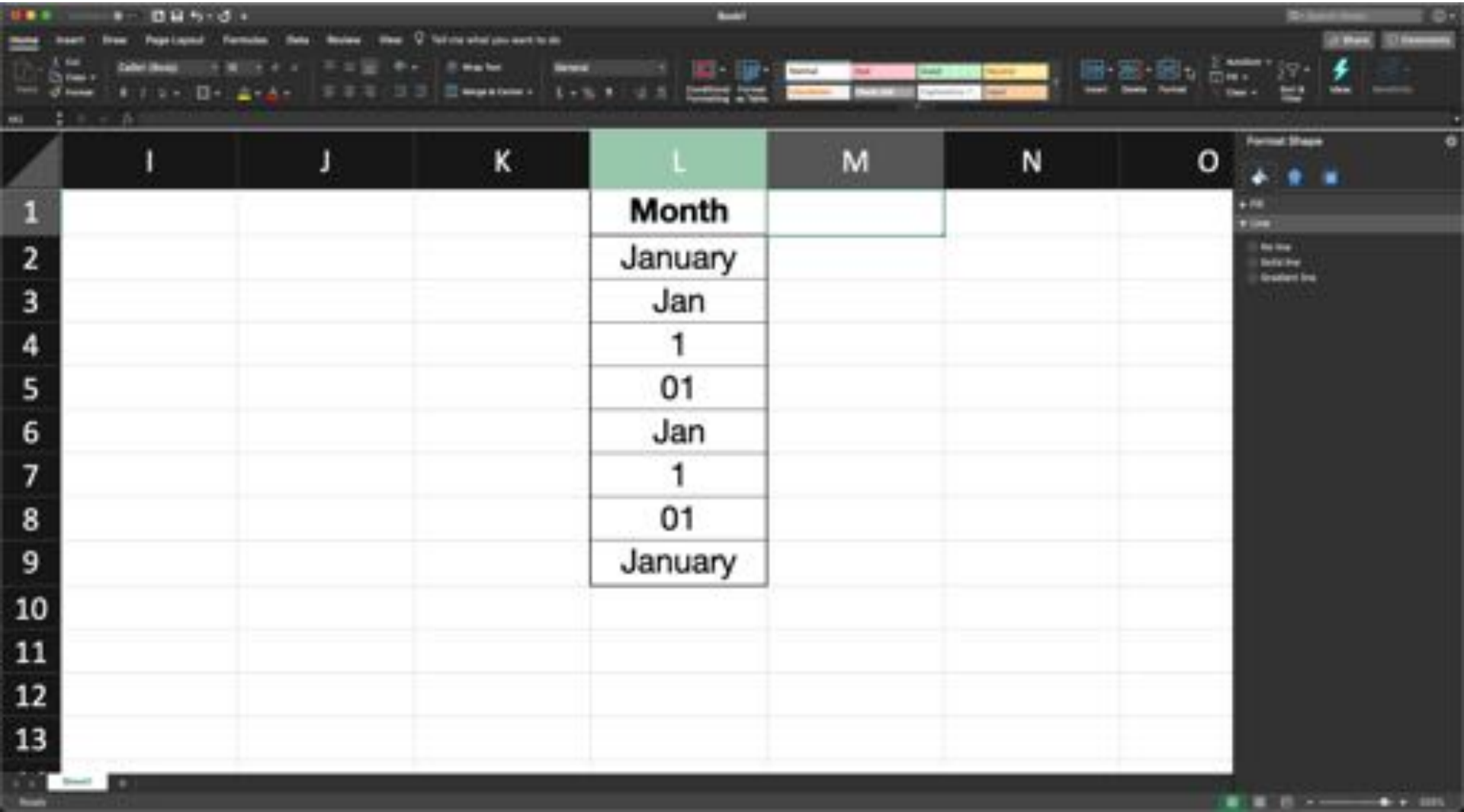
Dropped Pin
near Central Campus,
Albuquerque, NM, USA

Delivered

iMessage

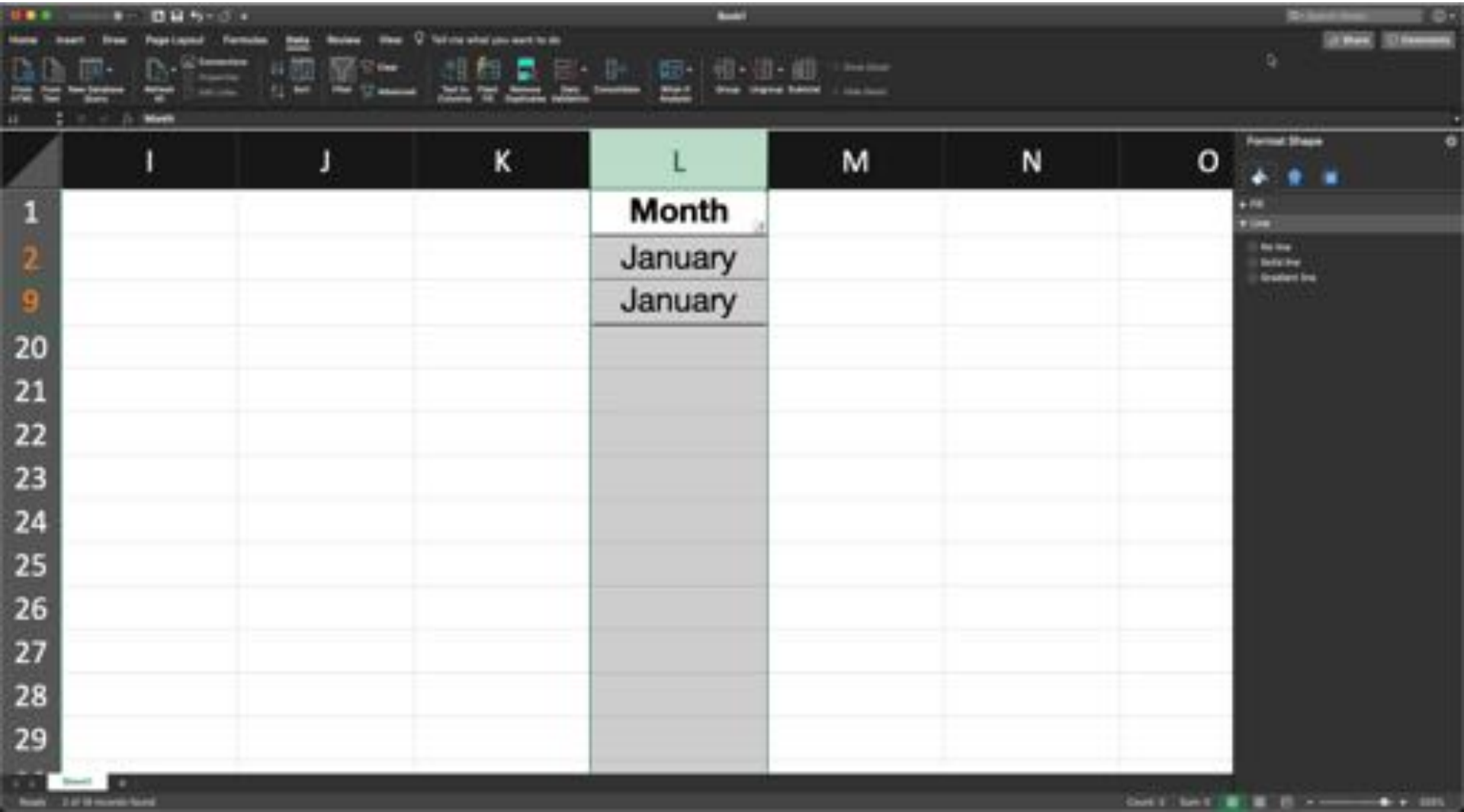

GNSS SURVEYOR
SPEED
0.0
ALTITUDE
1478
ACCURACY
36.6
GPS
Bad Elf
GPS Track
Latitude:
Longitude:
Position Accuracy
46.1 ft
Horizontal Accuracy
37.1 ft
Vertical Accuracy
UTC Time:

Data format:



	I	J	K	L	M	N	O
1				Month			
2				January			
3				Jan			
4				1			
5				01			
6				Jan			
7				1			
8				01			
9				January			
10							
11							
12							
13							

Data format:



How

Consistency matters. Apps can help you.

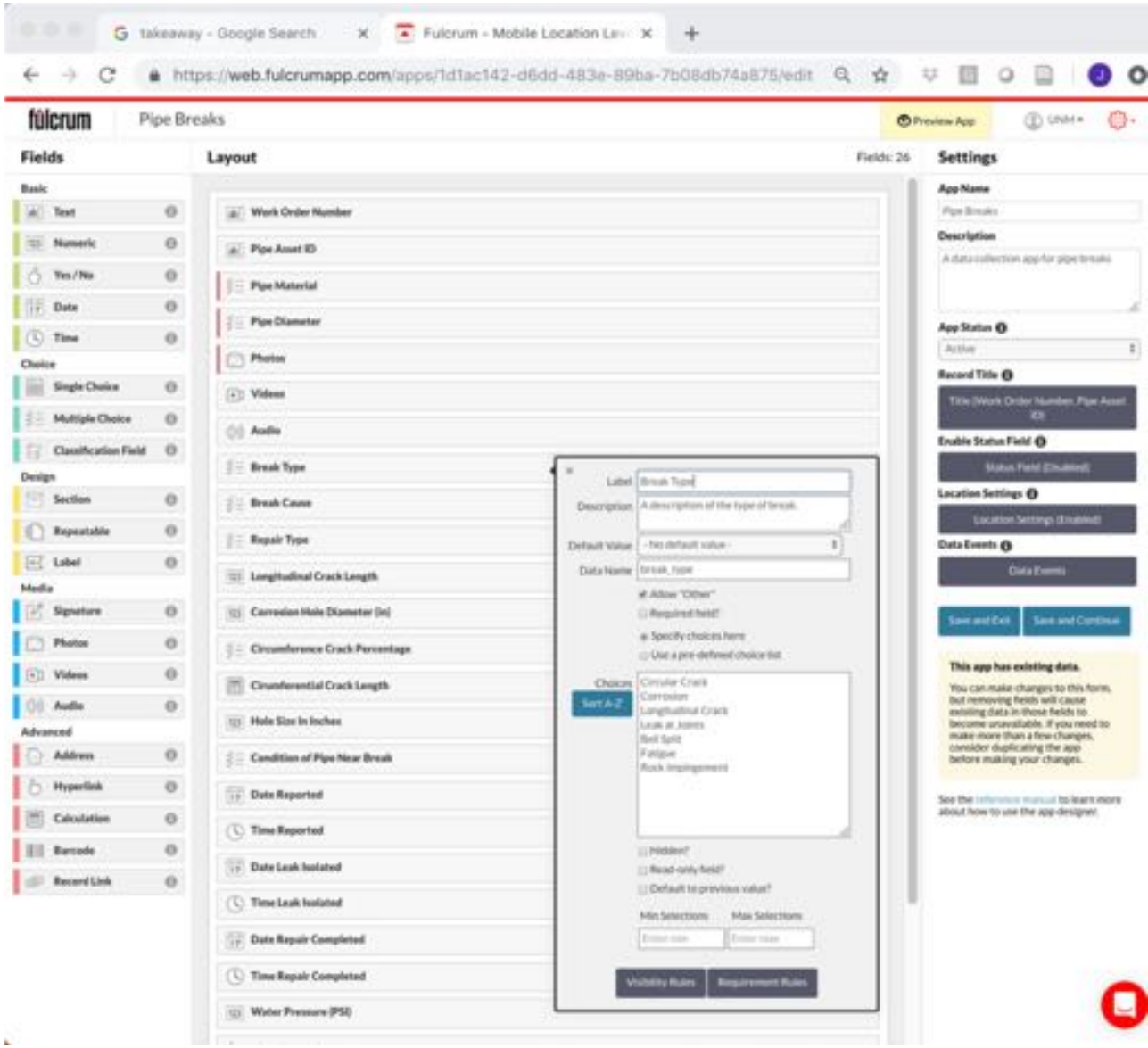
How

Use phone & tablet based collection apps.

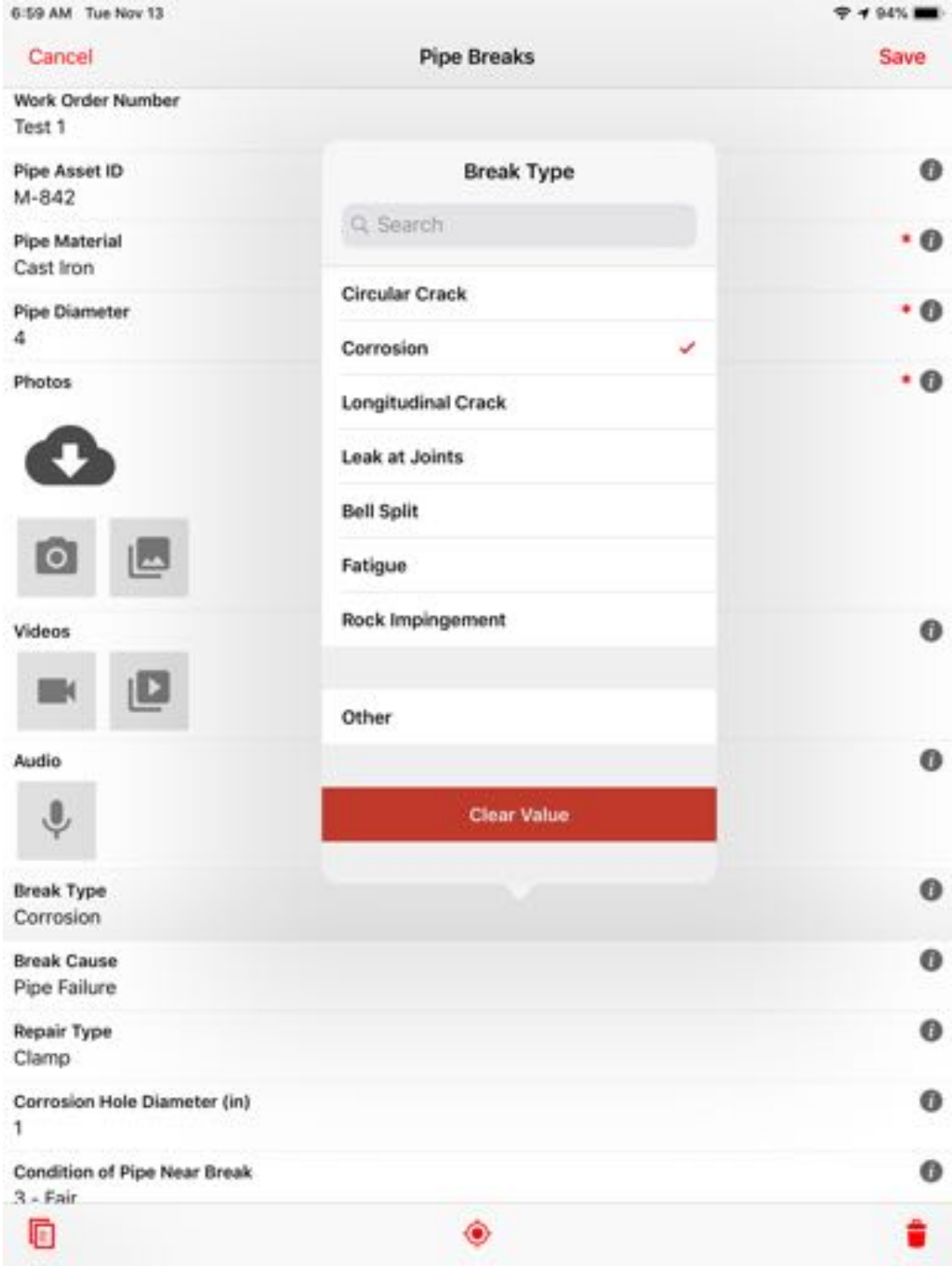
fulcrum

How

How

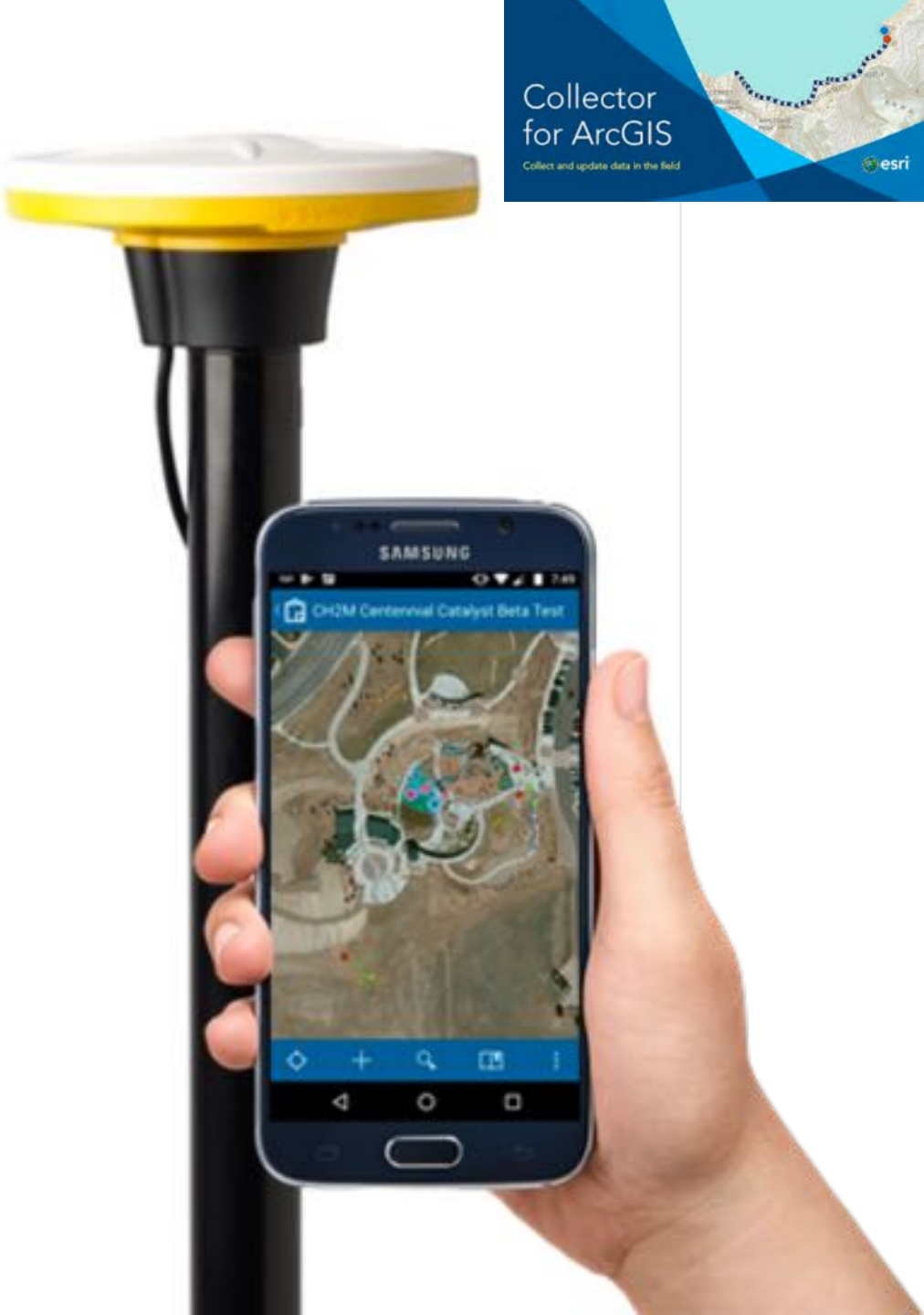

takeaway - Google Search
Fulcrum - Mobile Location La
https://web.fulcrumapp.com/apps/1d1ac142-d6dd-483e-89ba-7b08db74a875/edit
fulcrum
Pipe Breaks
Preview App
Fields
Layout
Fields: 26
Settings
Basic
Text
Numeric
Yes / No
Date
Time
Choice
Single Choice
Multiple Choice
Classification Field
Design
Section
Repeatable
Label
Media
Signature
Photos
Videos
Audio
Advanced
Address
Hyperlink
Calculation
Barcode
Record Link
Work Order Number
Pipe Asset ID
Pipe Material
Pipe Diameter
Photos
Videos
Audio
Break Type
Break Cause
Repair Type
Longitudinal Crack Length
Corrosion Hole Diameter (in)
Circumference Crack Percentage
Circumferential Crack Length
Hole Size In Inches
Condition of Pipe Near Break
Date Reported
Time Reported
Date Leak Isolated
Time Leak Isolated
Date Repair Completed
Time Repair Completed
Water Pressure (PSI)
Label
Break Type
Description
Default Value
- no default value -
Data Name
break_type
Allow "Other"
Required field?
Specify choices here
Use a pre-defined choice list
Choices
Sort A-Z
Circular Crack
Corrosion
Longitudinal Crack
Leak at Joints
Bell Split
Fatigue
Rock Impingement
Hidden?
Read-only field?
Default to previous value?
Min Selections
Max Selections
Visibility Rules
Requirement Rules
App Name
Pipe Breaks
Description
A data collection app for pipe breaks
App Status
Active
Record Title
Title (Work Order Number, Pipe Asset ID)
Enable Status Field
Status Field (Disabled)
Location Settings
Location Settings (Disabled)
Data Events
Data Events
Save and Exit
Save and Continue
This app has existing data.
You can make changes to this form, but removing fields will cause existing data in those fields to become unavailable. If you need to make more than a few changes, consider duplicating the app before making your changes.
See the reference manual to learn more about how to use the app designer.

How

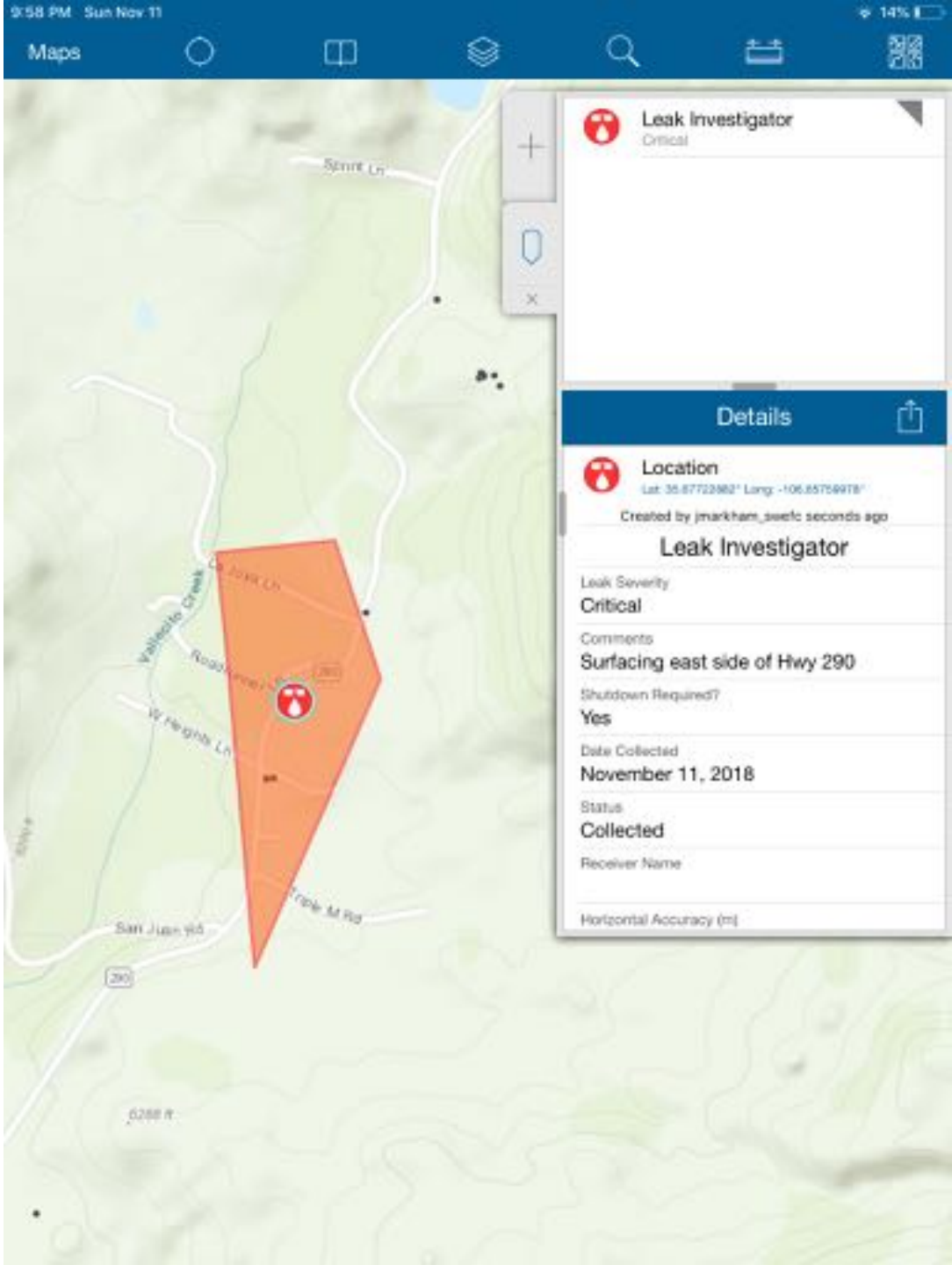

6:59 AM Tue Nov 13
94%
Cancel
Pipe Breaks
Save
Work Order Number
Test 1
Pipe Asset ID
M-842
Pipe Material
Cast Iron
Pipe Diameter
4
Photos
Videos
Audio
Break Type
Corrosion
Break Cause
Pipe Failure
Repair Type
Clamp
Corrosion Hole Diameter (in)
1
Condition of Pipe Near Break
3 - Fair
Break Type
Search
Circular Crack
Corrosion
Longitudinal Crack
Leak at Joints
Bell Split
Fatigue
Rock Impingement
Other
Clear Value

How

How


Collector
for ArcGIS
Collect and update data in the field
esri
SAMSUNG
CH2M Centennial Catalyst Beta Test

How


Maps
Leak Investigator
Critical
Details
Location
Created by jmarkham_swefc seconds ago
Leak Investigator
Leak Severity
Critical
Comments
Surfacing east side of Hwy 290
Shutdown Required?
Yes
Date Collected
November 11, 2018
Status
Collected
Receiver Name
Horizontal Accuracy (m)

How should we store attribute data?

How

Use formats you can analyze.

thank you
danke
謝謝
ngiyabonga
teşekkür ederim
dank je
merci
sukriya
kop khun krap
go raibh mait
dziękuję
terima kasih
감사합니다
ありがとう
arigatō
grazie
takk
sağolun
taiku
ευχαριστώ
рахмат
Баярлалаа
faaletai lava
dhanyavad
dankie
kiitos
hvala
mauruuru
blagodaram
mersi
barka
welalin
tack
misaotra
paldies
grazzi
matondo
gratias ago
gracies
sulpay
chnorakaloutioun
mesi
dekuji
sobodi
najis tuke
kam sah hamnida
lanemirt
rahmet
diolch
dhanyavadagalu
shukriya
djiere dieuf