

FORT WORTH'S REAL WATER LOSS MANAGEMENT PLAN

What We've Learned, Saved, and
How We Progressed to Current Day.

In (4) four months we proactively found;

- *498 leaks.*
- *Saved an estimated 276.5 million gallons of water.*



Reactive

Or

Proactive



EQUIPMENT USED WHILE SURVEYING



Record sounds with ZCorr software to analyze them over time.

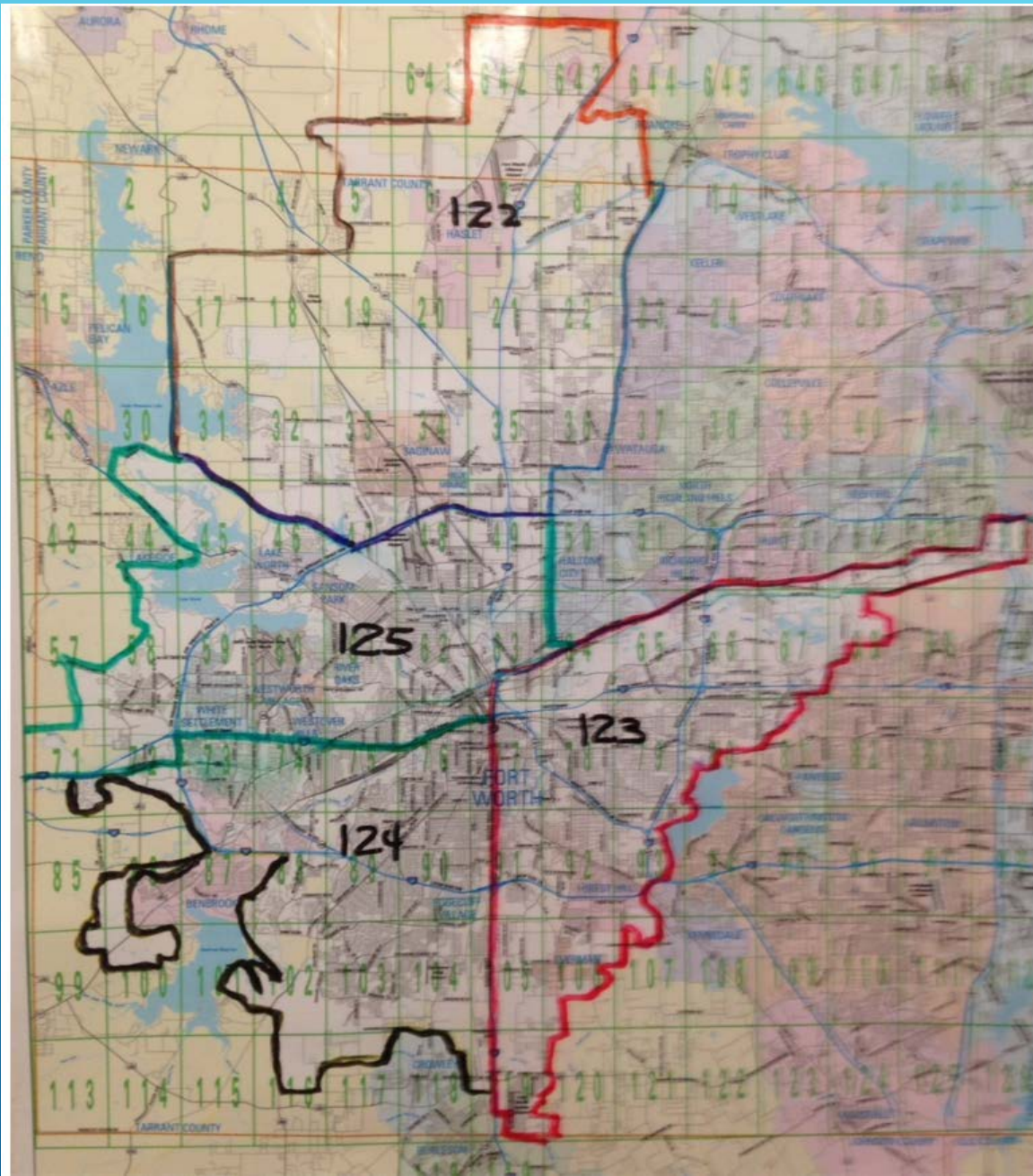


Individual Logger



ZCorr 8-Logger Correlation System





Then we added Loggers.

187 Fixed base loggers (drive by read) covering 229,955 Lf. Installed in the Downtown Area, Hospital and Medical Districts.

Did not produce accurate data. (picked up false leaks, private use)

Time span between readings.(twice a month)

Time spent retrieving data. (2 full days)



IN 2015, I JOINED THE SECTION

During this time we were upgrading our Work order management system, introducing iPads to the group, phasing out laptops and the aging logger system.

Below are just a few of my favorite responses;

"We've always done it this way."

"Because that's what I was told to do."

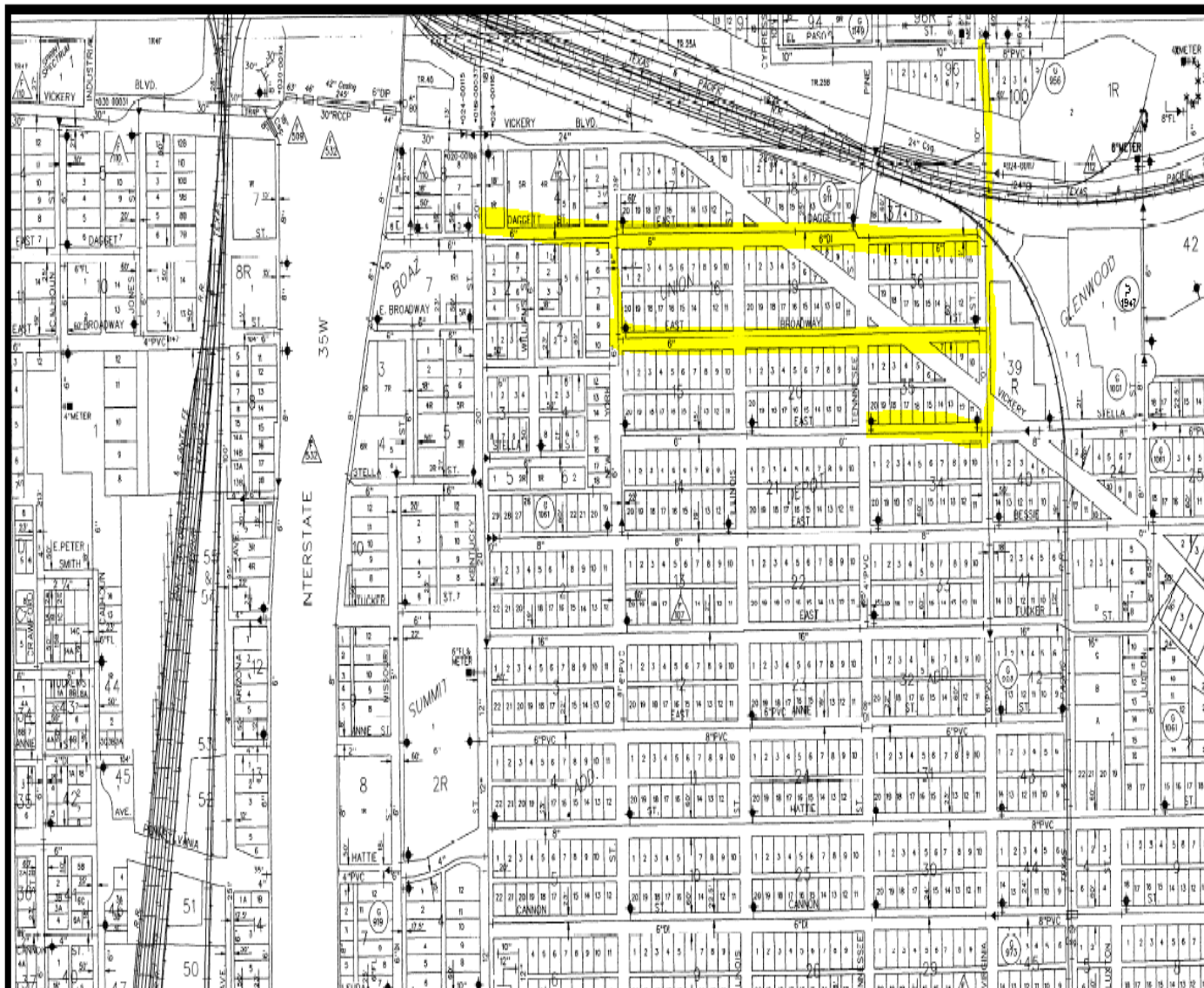
"Someone said we had to-do it this way, but I don't remember who".

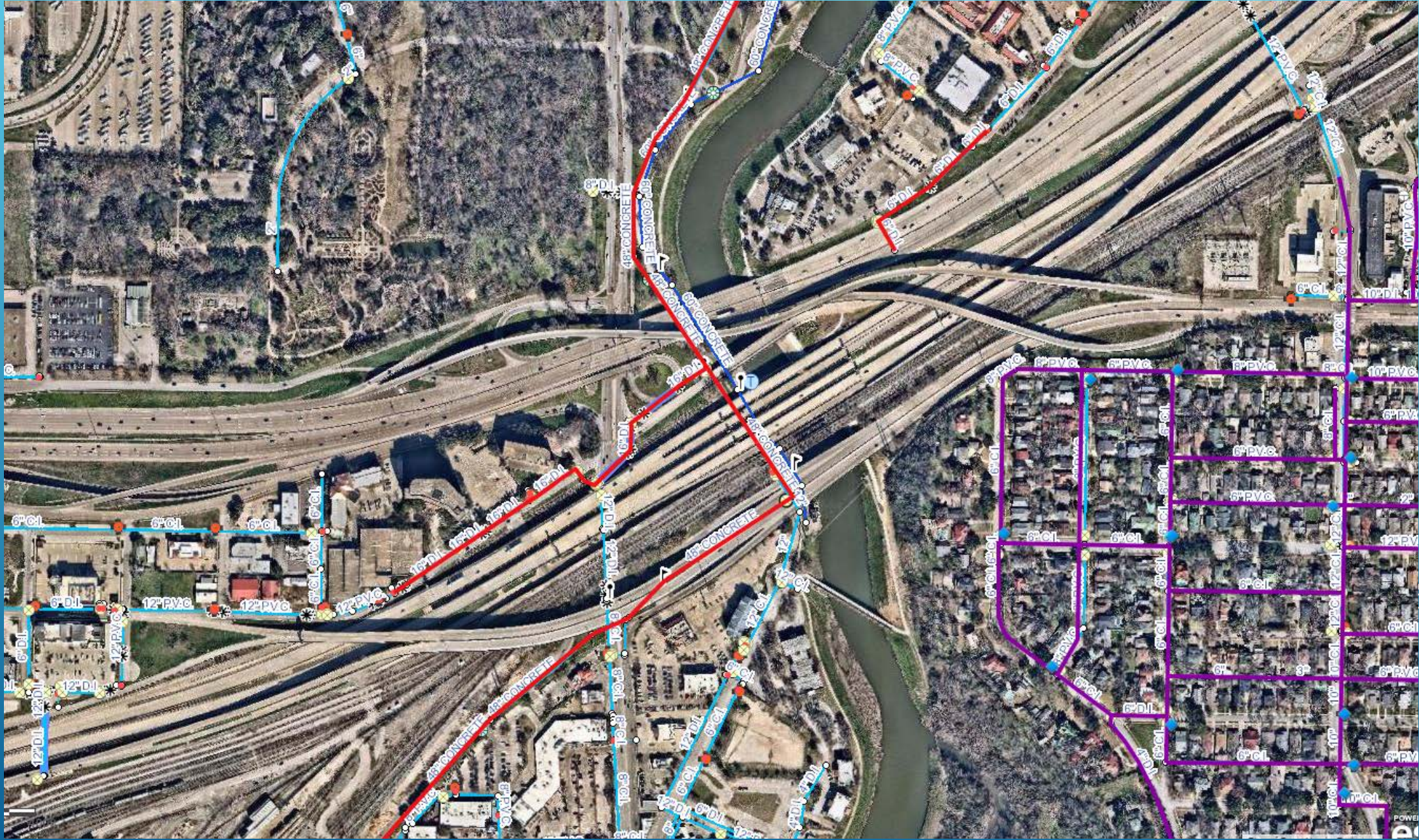
127

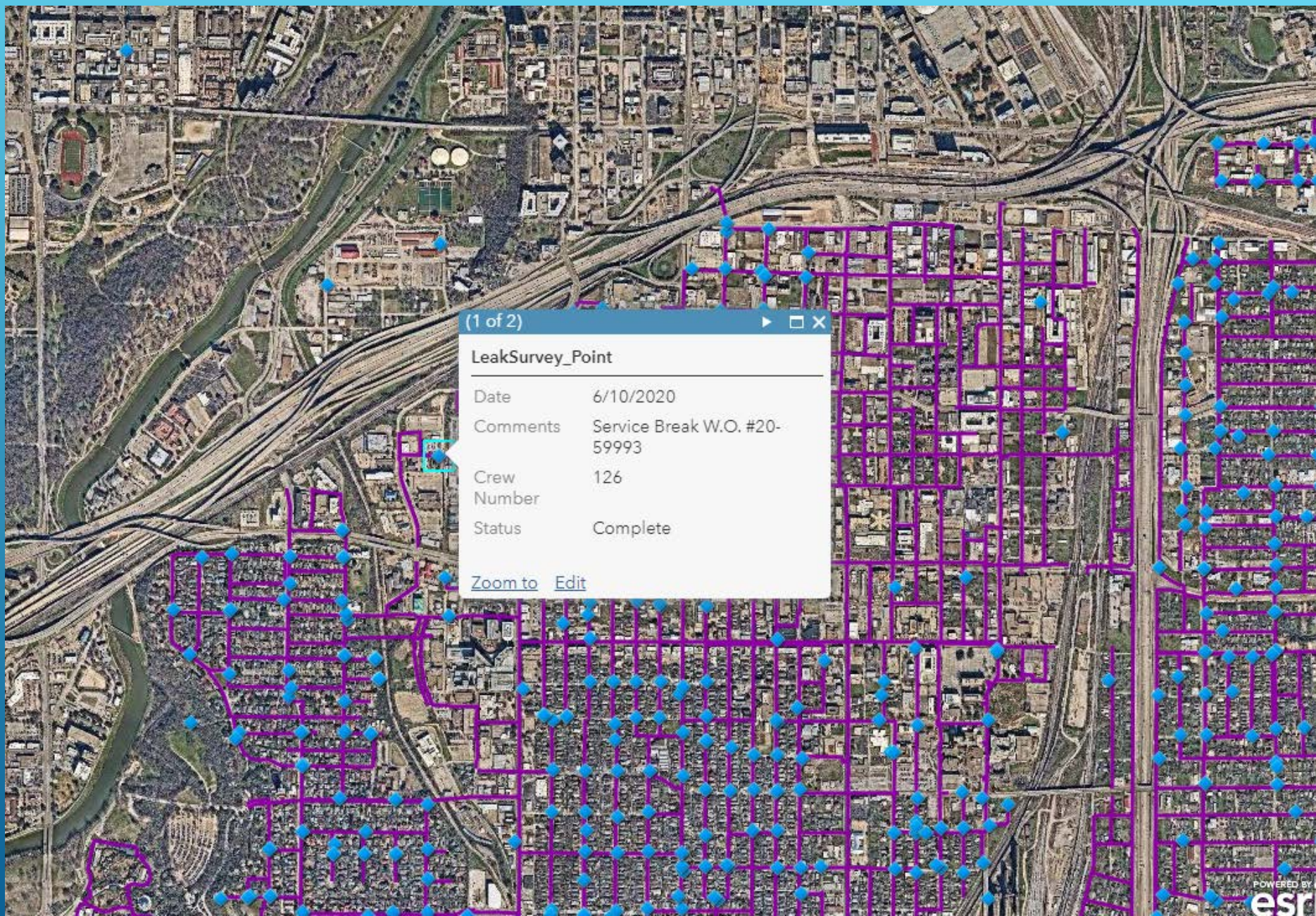
March 2015

2054-388
W

2048-388







- ▶ In 2018, FWWD partnered with Black & Veatch. Together we evaluated our current equipment and our survey methods.

We outlined four pillars that have the greatest effect on controlling or reducing real loss:

1. Speed and quality of repairs.
2. **Active leakage control.**
3. Pressure management.
4. Pipeline and asset management, selection, installation, maintenance, renewal, and replacement.

Date	Area Surveyed	Leak Survey Hours	Miles of Pipe Surveyed	Miles Surveyed per Hour	Main Leaks	Service Leaks	Hydrant Leaks	Valve Leaks	Private Plumbing Leaks	Total Leaks	Leaks Found per Mile	Total Public Volume Saved (MG)	MG Saved per Mile
10/1/2020	NE-4	11	5	3	0	1	1	0	1	3	0.6	1,382,400.00	276,480.00
10/2/2020	NE-4	9	2.5	1	0	0	0	0	0	0	0.0	0.00	0.00
Week 1 Totals		20.0	7.5	4	0	1	1	0	1	3	0.6	1,382,400.00	276,480.00
Averages/day		10.0	3.8	2	0	1	1	0	1	2	0.3	0.00	0.00
10/5/2020	NE-4	0	0	0	0	0	0	0	0	0	0.0	0.00	0.00
10/6/2020	NE-4	6	1.5	1	0	0	0	0	1	0	0.0	0.00	0.00
10/7/2020	NE-4	0	0	0	0	0	0	0	0	0	0.0	0.00	0.00
10/8/2020	NE-4	8	1.5	1	0	4	0	0	3	7	4.6	230,400.00	153,600.00
10/9/2020	NE-4	13	4.6	2	0	0	1	0	1	2	2.3	460,800.00	100,173.00
Week 2 Totals		37.0	7.6	4	0	4	1	0	5	9	6.9	691,200.00	253,773.00
Averages/day		5.4	1.5	1	0	1	0	0	1	2	1.4	0.00	0.00
10/12/2020	NE-4	6.5	3.1	2	0	0	0	0	0	0	0	0.00	0.00
10/13/2020	NE-4	9	2	1	0	2	0	0	3	5	2.5	1,843,200.00	921,600.00
10/14/2020	NE-4	7.5	2.1	1	0	1	0	0	5	6	2.8	921,600.00	438,857.00
10/15/2020	NE-4	15	5	3	0	1	0	0	3	4	0.8	921,600.00	184,320.00
10/16/2020	NE-4	16	4.3	2	0	4	0	0	5	9	2.0	3,686,400.00	857,302.00
Week 3 Totals		54.0	16.5	8	0	8	0	0	16	24	8.1	7,372,800.00	2,402,079.00
Averages/day		10.8	3.3	2	0	2	0	0	3	5	1.6	0.00	0.00

WaterRF 4372: Real Loss Component Analysis: A Tool for Economic Water Loss Control

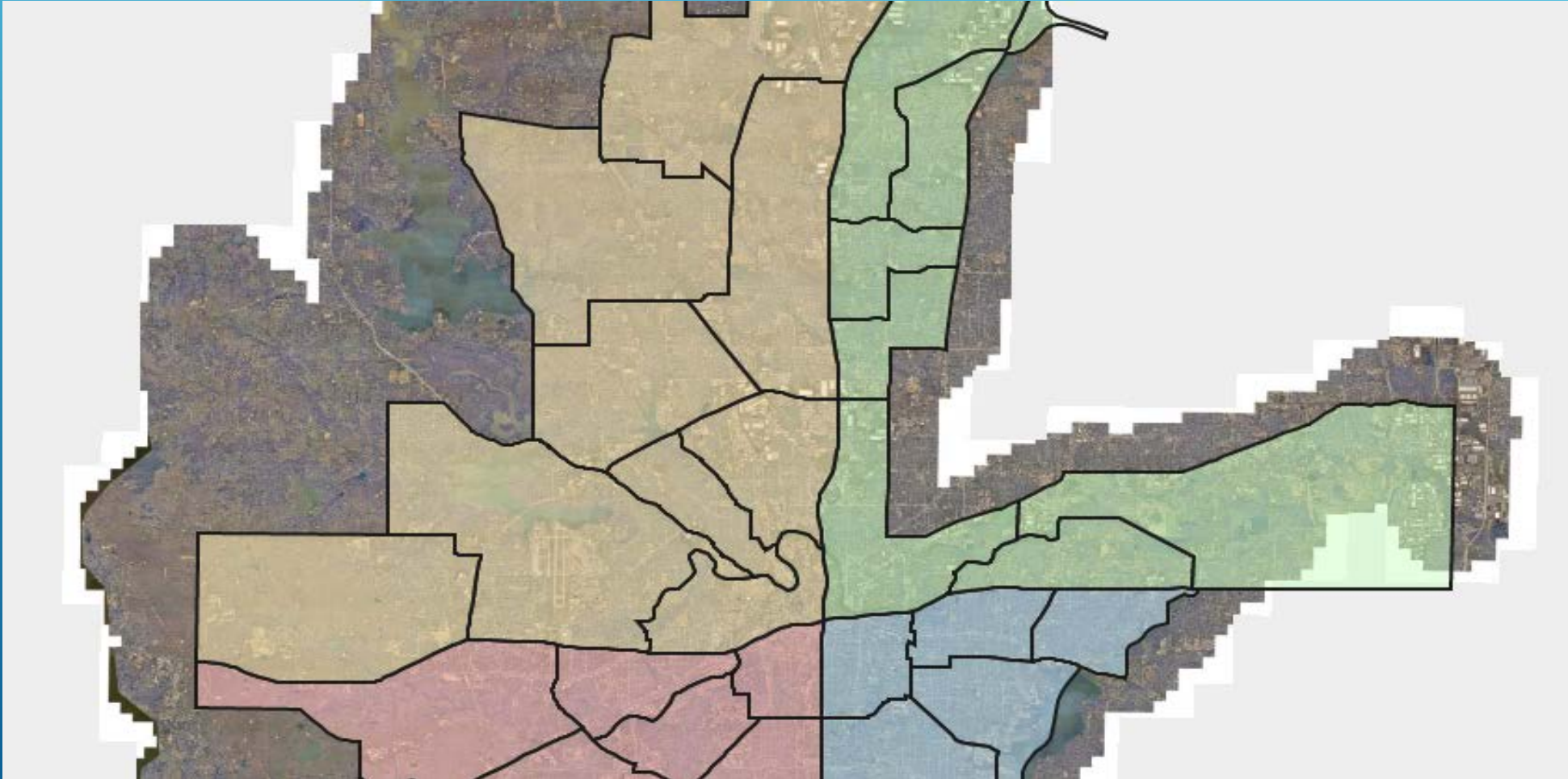
Fig 3.	Assumed Awareness Duration for Unreported									
	Unreported Breaks & Leaks	# of Days Before Detected ⁴	# of Hours Before Detected	Leak/Break Estimated Flow Rate at 60 PSI (GPM)	Amount of Water Lost Before Detected (Gallons)	# of Hours to Repair (# of Hours from Call Received until Line Returned to Service)	Estimated Repair Duration Water Lost (Gallons) ¹	Amount of Water Lost Reported on Work Order (Gallons)	Total Amount of Water Lost (Gallons) ²	Amount of Water Saved ³
	Mains	50	1,200.0	25.7	1,850,400		0		1,850,400	1,850,400
	Fire Hydrants	100	2,400.0	3.2	460,800		0		460,800	460,800
	Services and Valves	100	2,400.0	6.4	921,600		0		921,600	921,600

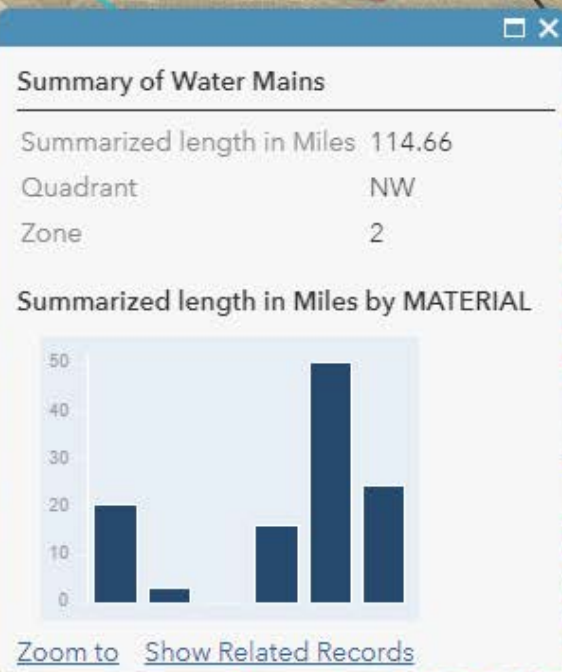
¹Use this value if no lost water amount is reported on the work order.

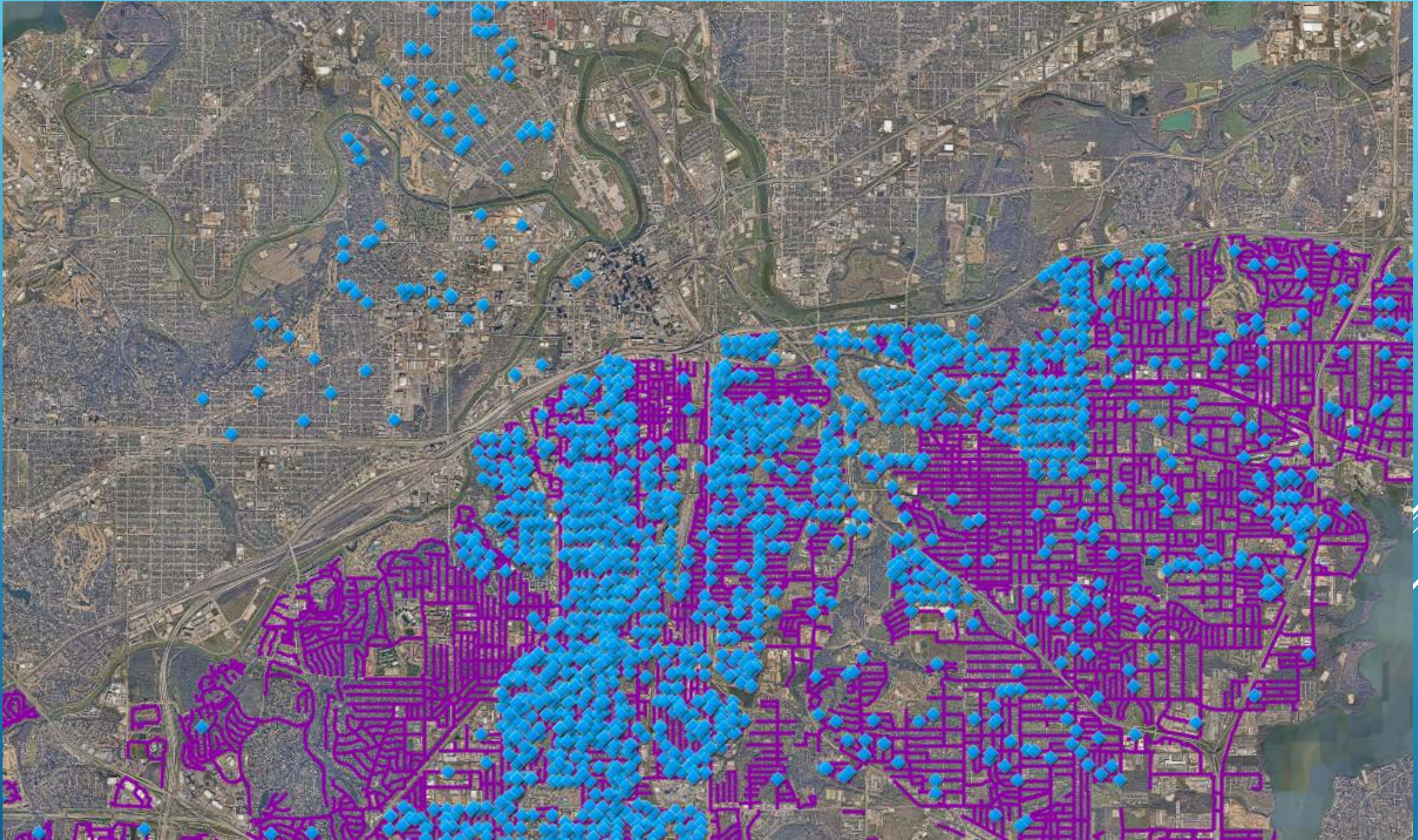
²Uses estimated repair duration water lost, if no amount of water lost is reported on the work order.

³Assumes that leaks would have run the same number of days after detection, as before detection.

FORT WORTH DISTRIBUTION SYSTEM DIVIDED INTO QUADRANTS BY MILES OF PIPE.





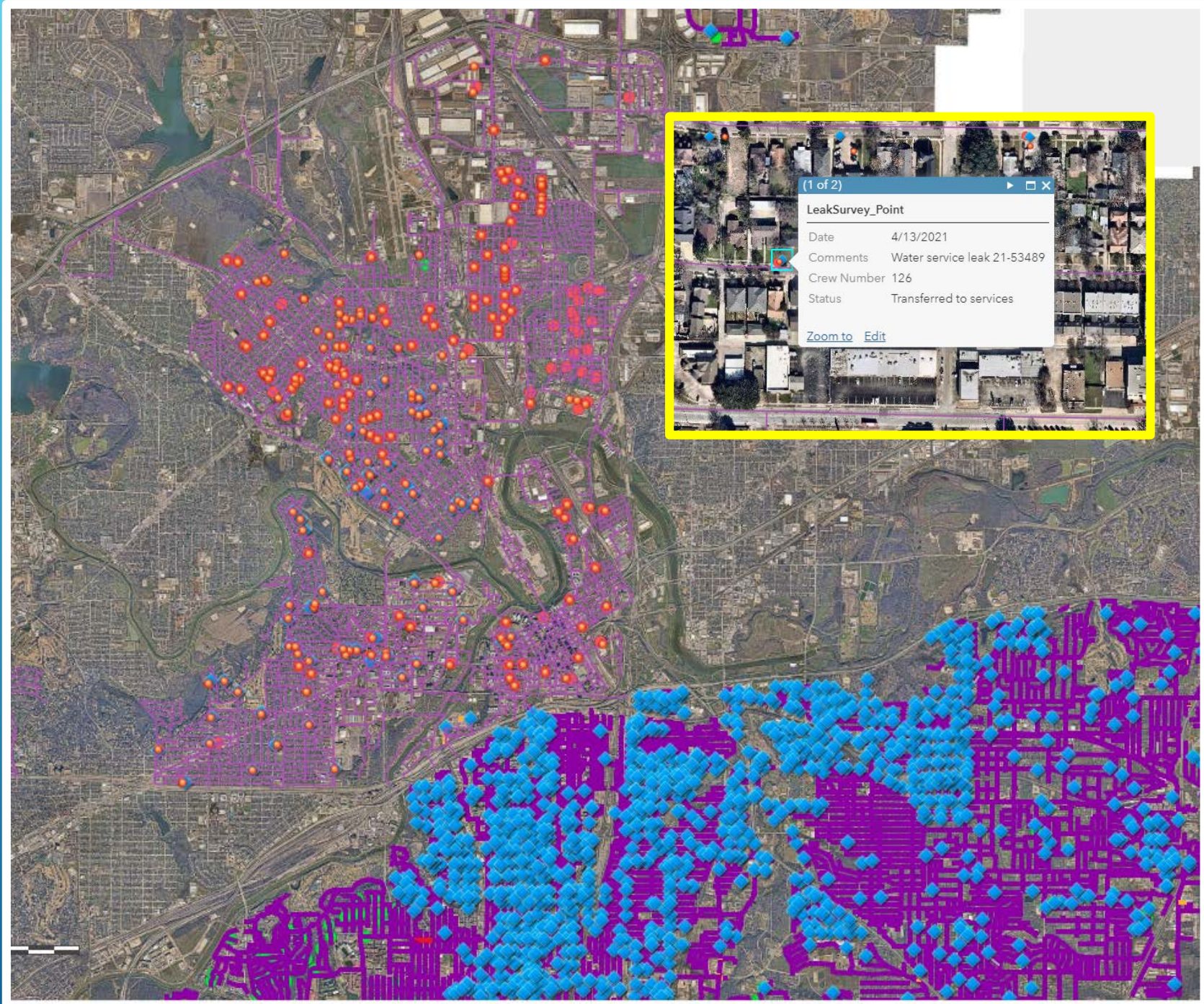


THIS IS A VIEW OF OUR GIS MAP SHOWING SURVEY PROGRESS.

THE UPPER LEFT THIN PURPLE LINES, WITH RED/YELLOW DOTS ARE LEAK SOUNDS FOUND ON THE CONTRACTOR SURVEY.

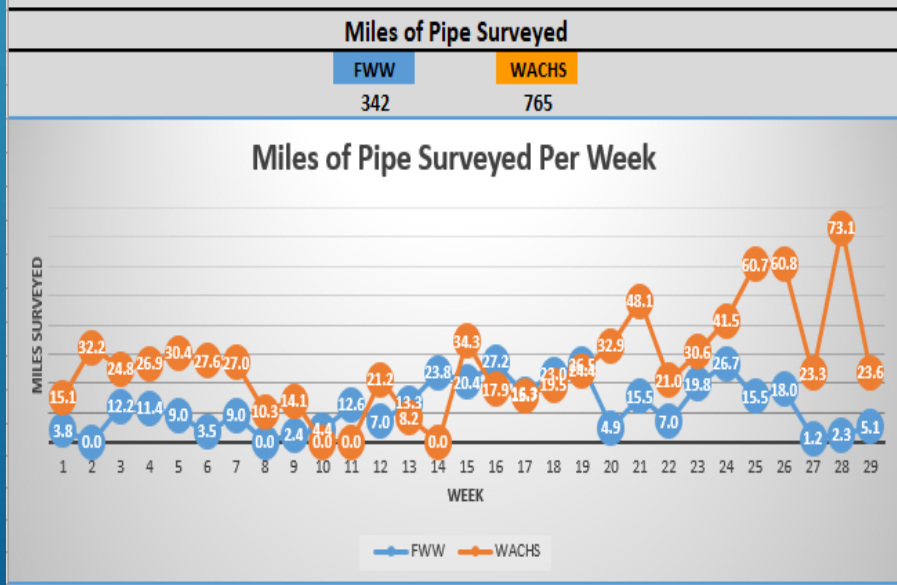
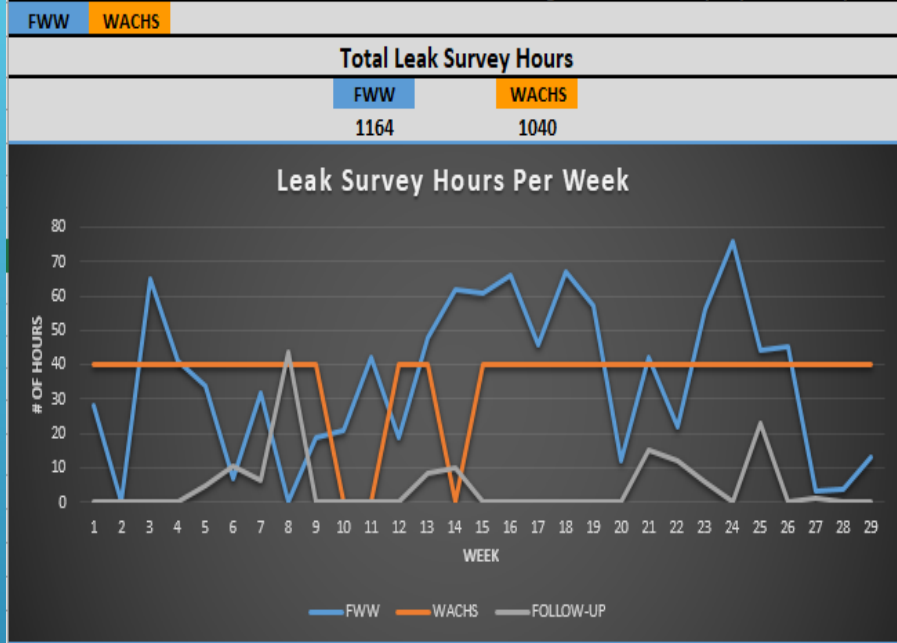
LOWER RIGHT, THICK PURPLE LINES, FWW SURVEYED LINES WITH BLUE DOTS AS WORK ORDERS CREATED.

THE SMALL INSET IN THE UPPER RIGHT, IS LEAK FOUND BY THE CONTRACTOR A WORK ORDER MADE AND SENT FOR REPAIR.

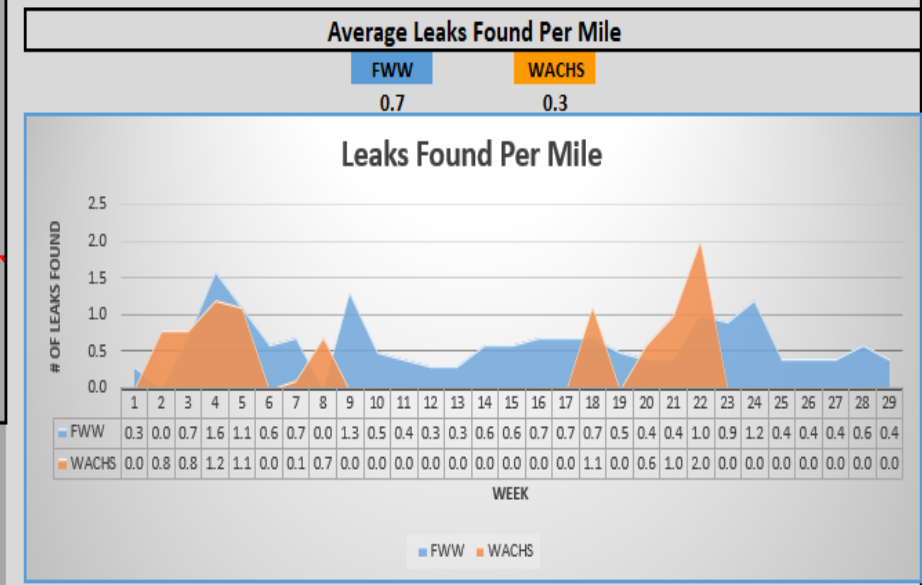
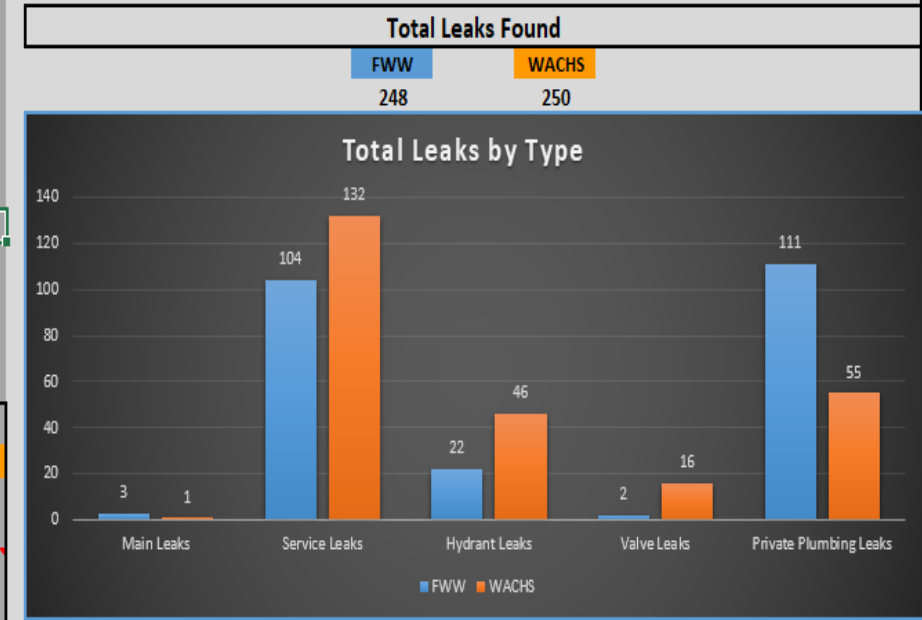


FWW VS WACHS Leak Detection Comparison - 3/7/21 - 9/26/21												
Attributes	Week 1		Week 2		Week 3		Week 4		Week 5		Week 6	
Surveyor	FWW	WACHS	FWW	WACHS	FWW	WACHS	FWW	WACHS	FWW	WACHS	FWW	WACHS
Total Leak Survey Hours		40		40		40		40		40		40
Fw/W Leak Survey Hours	28		0		65		41		34		7	
Fw/W Follow-up Hours Spent	0		0		0		0		5		10	
Miles of Pipe Surveyed	3.8	15.1	0.0	32.2	12.2	24.8	11.4	26.9	9.0	30.4	3.5	27.6
Miles Surveyed per Hour	0.1	0.4	0.0	0.8	0.2	0.6	0.3	0.7	0.3	0.8	0.5	0.7
Main Leaks	0	0	0	0	0	0	0	0	1	0	0	1
Service Leaks	0	0	0	0	4	7	7	13	3	23	0	20
Hydrant Leaks	0	0	0	0	1	6	1	2	1	9	0	2
Valve Leaks	0	0	0	0	0	2	0	2	2	2	0	2
Private Plumbing Leaks	1	0	0	0	4	4	10	4	3	3	2	4
Total Leaks	1	0	0	0	9	19	18	21	10	37	2	29
Leaks Found per Mile	0.3	0.0	0.0	0.0	0.7	0.8	1.6	0.8	1.1	1.2	0.6	1.1
Total Public Volume Saved (Gal.	0	0	0	0	4,147,200	11,059,200	6,912,000	14,745,600	6,919,200	27,187,200	0	23,047,200
Gallons Saved per Mile	0	0	0	0	339,934	445,397	606,316	548,164	768,800	894,316	0	835,649

FWW VS WACHS Leak Detection Comparison - 3/7/21 - 9/26/21

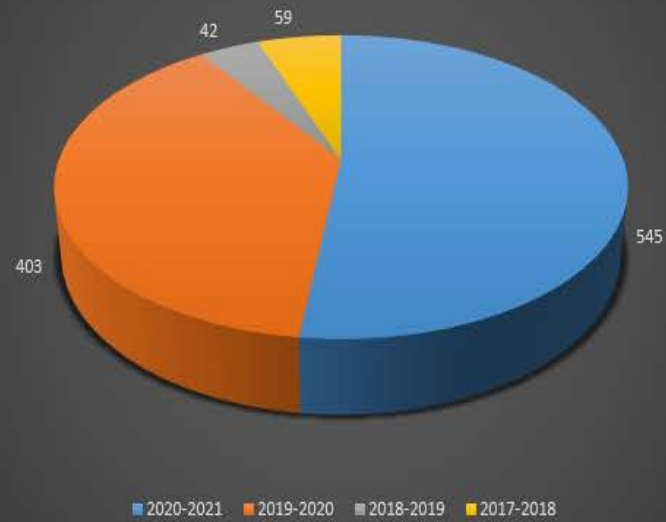


ATTRIBUTES	TOTALS	
	FWW	WACHS
Surveyor		
Total Leak Survey Hours	1164	1040
FWW Leak Survey Hours	1024	-
FWW Follow-up Hours Spent	-	140
Miles of Pipe Surveyed	342	765
Miles Surveyed per Hour	0.3	0.7
Main Leaks	3	1
Service Leaks	104	132
Hydrant Leaks	22	46
Valve Leaks	2	16
Private Plumbing Leaks	111	55
Total Leaks	248	250
Survey Cost (through 9/26/21)	\$ 43,946	\$ 143,048
FWW Follow-up Cost (through 9/26/21)	\$ -	\$ 7,005
Total Survey Cost (through 9/26/21)	\$ 43,946	\$ 150,053
Leaks Found per Mile	0.7	0.3
Total Public Volume Saved (Gal.)	117,064,800	159,444,000
Gallons Saved per Mile	342,736	208,440

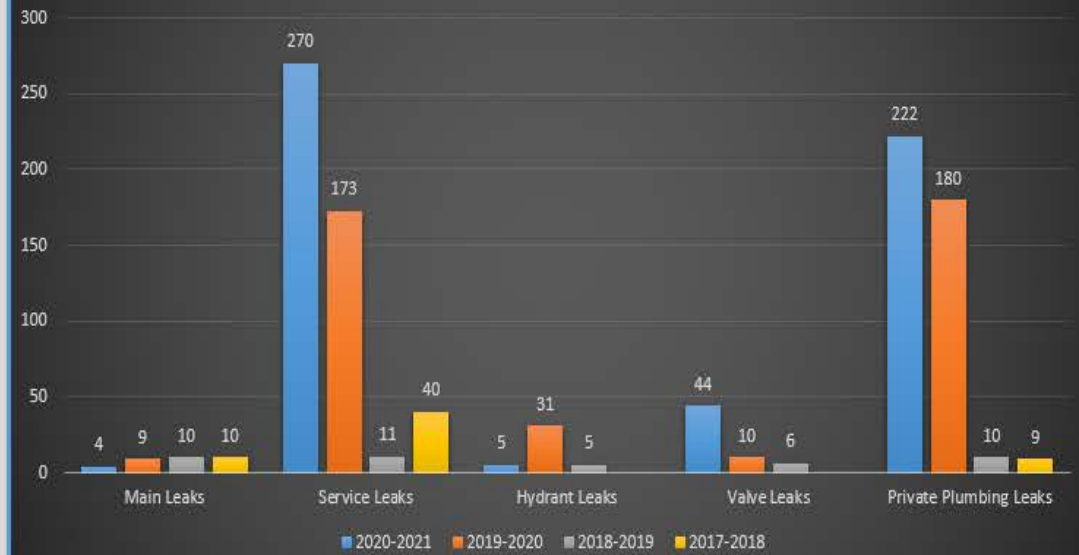


FWW Leak Detection Annual Comparison - 2017-2021

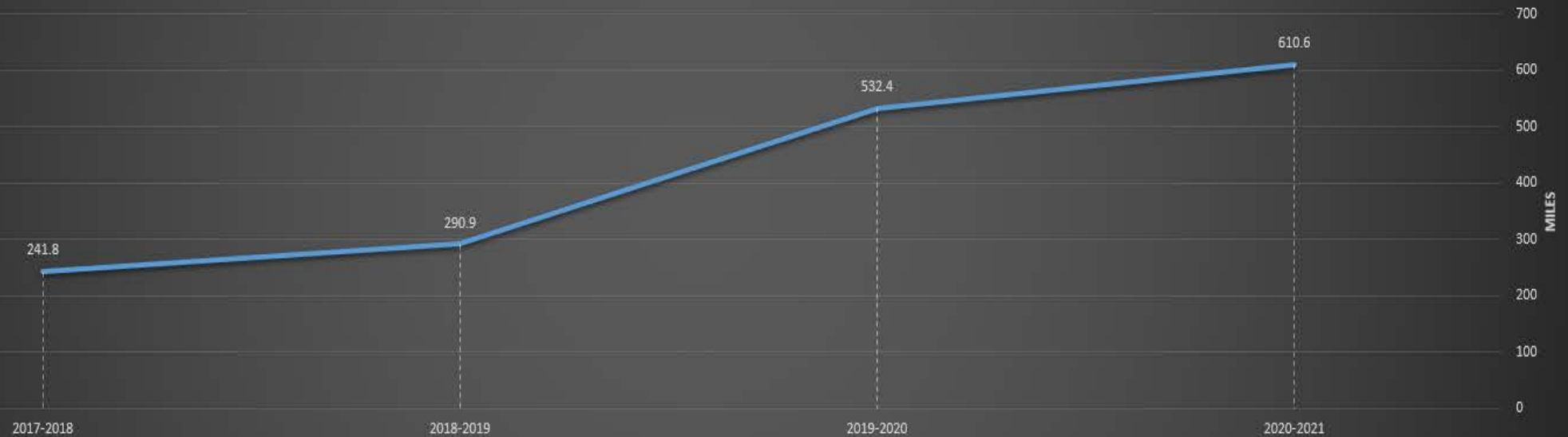
Total Leaks



Total Leaks by Type



Miles of Pipe Surveyed



In Conclusion and..... What the director wants to know.

WACHS Surveyed 765 miles at a cost of \$150,053.

- ▶ Initial contract cost \$143,048.
- ▶ \$7,005 CFW follow up work.
- ▶ This averages out to \$196/mile
- ▶ Divided by the 250 leaks found and confirmed cost FWW about \$600/leak.

FWW Surveyed 342 miles Cost \$43,946 in labor and equipment.

- ▶ This averages out to \$128/mile
- ▶ Divided by the 248 leaks found cost about \$177.20/leak.