Wake County Fire Services Tanker Study Data Analysis

April 2023 Meeting

WAKE COUNTY
NORTH CAROLINA

Questions Asked

- What are our system capabilities to deliver mobile water?
- Are our resources distributed optimally?
- What are reasonable water deliver expectations?

What do we have?

Unit Name	Agency	Station	Water	Pump	Staffing
AFTA35	Apex	AF5	2000	750	1 drops off of L35
FFTA6	Fairview	FF1	2000	750	24/7 with 1. Not cross staffed
FFTA7	Fairview	FF2	2000	750	Volunteer staffing only
FVTA1	Fuquay	FV1	2000	500	1 will drop off of ladder (staffed 4, 3 minimum) or admin/part timer will take it during the day
FVTA2	Fuquay	FV2	2000	500	1 drops off of ladder (staffed 4, 3 minimum)
FVTA3	Fuquay	FV3	2000	500	1 drops off engine unless it's in station 3's first due. Unless there are 4 at that station (unusual).
FVTA4	Fuquay	FV1	2000	500	1 will drop off of ladder (staffed 4, 3 minimum) or admin/part timer will take it during the day
GFTA12	Garner	GF2	2000	750	1 drops off of engine
GFTA7	Garner	GF1	2000	750	1 drops off of engine
HOTA227	Hopkins	HO	2000	500	In HO 1 drops off engine (or volunteers), 2 off engine for MA
HSTA1	Holly Springs	HS1	1500	500	1 drops off of engine or ladder
KCTA2	Knightdale	KC2	1800	500	3 from engine if engine has 3, 1 from engine if engine has 4
NHTA28	Wake New Hope	NH	2000	500	1 of 5 drops off of another unit
NWTA18	Northern Wake	NW1	2000	750	1 drops off of engine
NWTA28	Northern Wake	NW2	1800	500	2 drops off of engine, possibly a volunteer @ night
NWTA38	Northern Wake	NW3	2000	750	3 drops off of engine
NWTA48	Northern Wake	NW4	2000	500	2 drops off of engine, possibly a volunteer @ night
RVTA157	Rolesville	RV	2000	500	MA: 2 drop off of 152, in RV: volunteers
SCTA2	Swift Creek	SC	2000	500	1 drops off of SCE1 24/7
WETA11	Wendell	WE2	2000	500	2 drop off the engine
WFTA3	Wake Forest	WF3	2000	750	1 drops off of engine
WFTA4	Wake Forest	WF4	2000	500	1 drops off of engine
WWTA198	Western Wake	WW	2000	500	1 drops off of engine
ZFTA98	Zebulon	ZF	2000	750	1 drops off of engine OR a volunteer

- 24 Tankers total
- 47,100 gallons – total Tanker capacity
- Additionally
  (Not including Raleigh and Cary)
  - 71 Engines/Pumpers
  - Totaling an additional 68,000 gallons
- Over 115,000 total gallons

Additionally – out of county mutual aid

Unit Name	Agency	Station	Water	Pump	Staffing
NCTA1811	Chatham	NCH18	1800	1250	2 career staff cross-staff engine with tanker 24/7
NCTA1611	Chatham	NCH16	1250	1250	2 career staff cross-staff engine with tanker 24/7
DFTA17	Durham	DF 17	3000	750	24/7 dedicated staff (1)
DFTA18	Durham	DF 18	3000	750	24/7 dedicated staff (1)
RWTA715	Durham	RW	3000	750	24/7 dedicated staff (1)
BUTA222	Franklin	Bunn			
PFTA76	Franklin	Pilot			Tandem elliptical
YFE41	Franklin	YFD1	1000	1250	Full time staffed 24/7 minimum 3 personnel
YFTA247	Franklin	YFD2	1500	750	2 career staff cross-staff engine with tanker 24/7
YFTA347	Franklin	YFD3	1500	750	part time staff weekdays, volunteer response otherwise
BFTA163	Granville	BF	1800	300	All volunteer
BFE160	Granville	BF	1250	1250	All volunteer
CMFTA144	Granville	CM			Single axle elliptical
ABRTA943	Harnett	ABR	1500	1000	If called, will respond w/4 pd staff 24/7
NWHTA1431	Harnett	NWH1	1500	500	Part time staffed "most" weekdays 8-5. Otherwise volunteers responding from home
NSTA1	Johnston	AL	2000	1000	Full time paid staff, 1 drops off engine
CHTA1	Johnston	CH1	3000	1000	Part time staff weekday days, volunteer staff at night & weekends, 1 drops off engine
50210E2	Johnston	50-210-2	1000	1250	Volunteer response only
50210E1	Johnston	50-210-1	1000	1250	Part time staff weekday days, volunteer staff at night & weekends, 1 drops off engine

- 19 Tankers close enough to Wake County to be relevant to some areas
- Additional ~30,000 gallons of total Tanker capacity

Where are they?

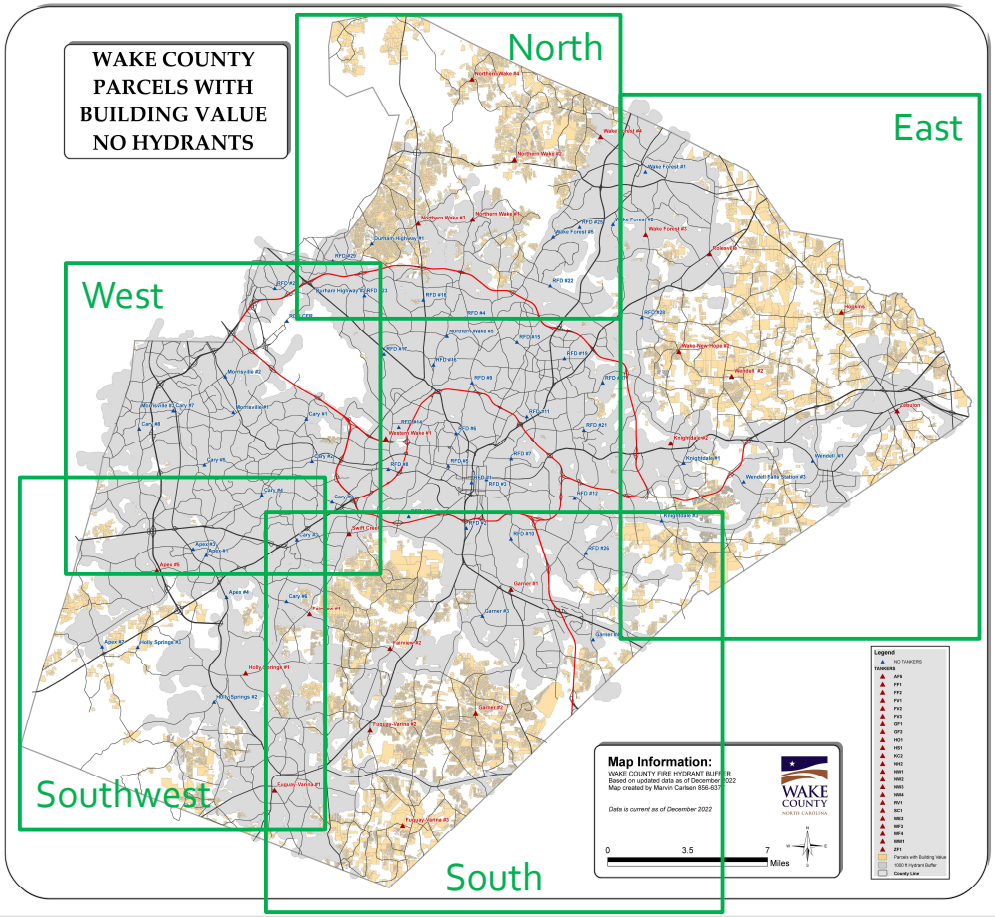
Equally as important:

Are they where we need them?

Not just ANY map

- Show all parcels in unincorporated Wake County
- Remove parcels with $0 building value
- Remove parcels that touch a 1000ft hydrant buffer
- Add tanker locations

Where are they?

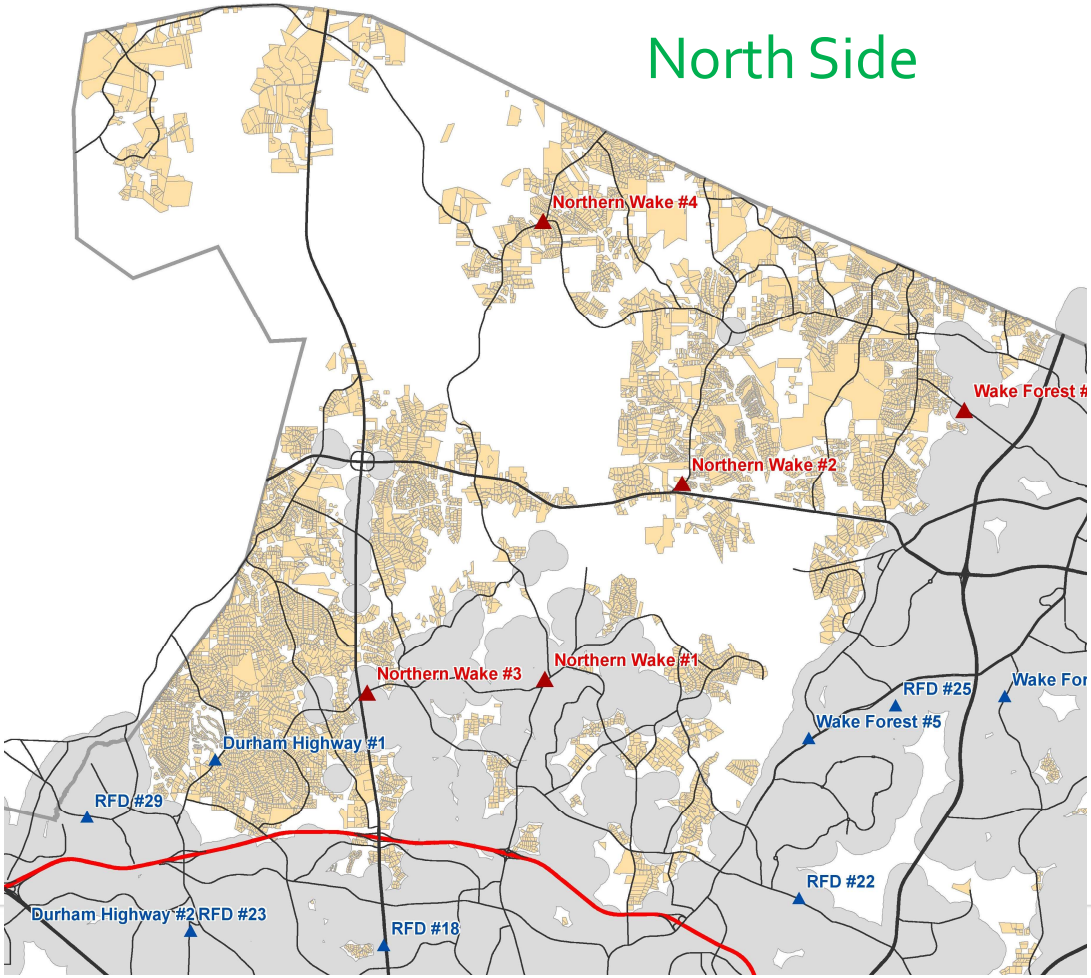


This is busy!

- Grey = 1000ft hydrant buffer
  - All hydrants in Wake County
- Tan = Wake County parcels with building value greater than $0
- Red text/markers = Tanker location
- Blue text/markers = Fire station without tankers

Where are they?

North Side



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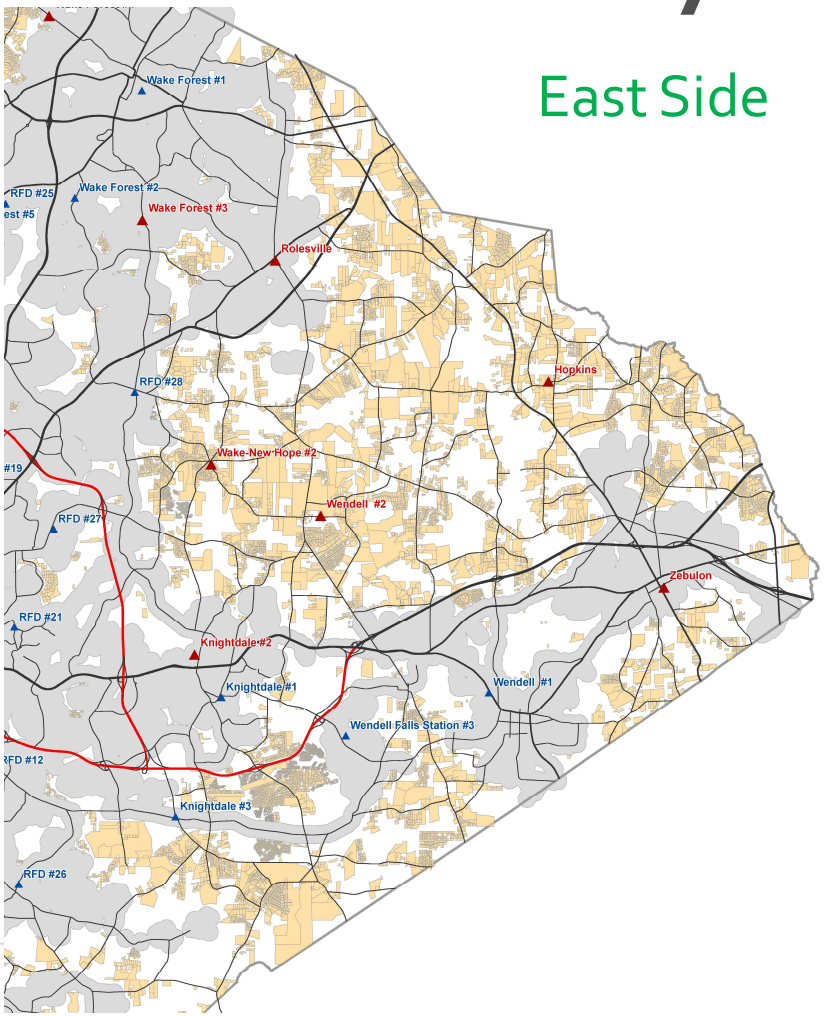
Where are they?

East Side



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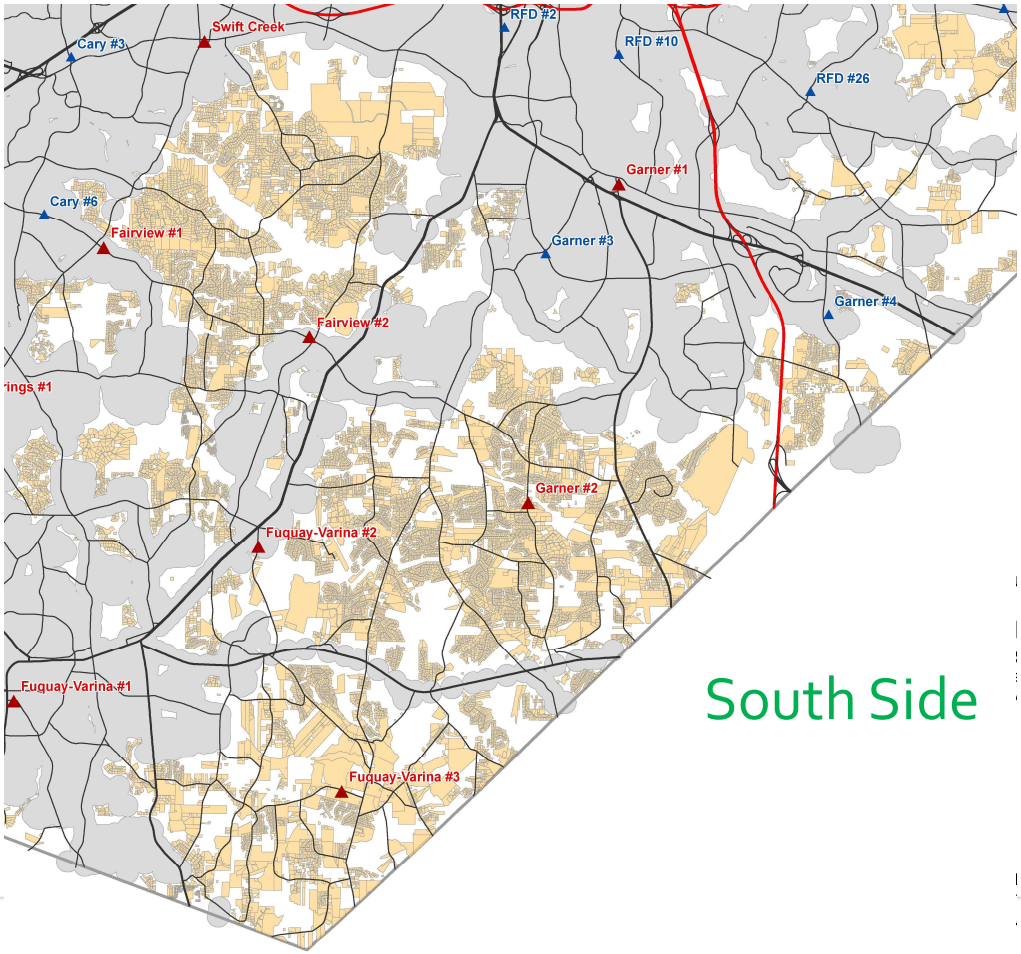

South Side

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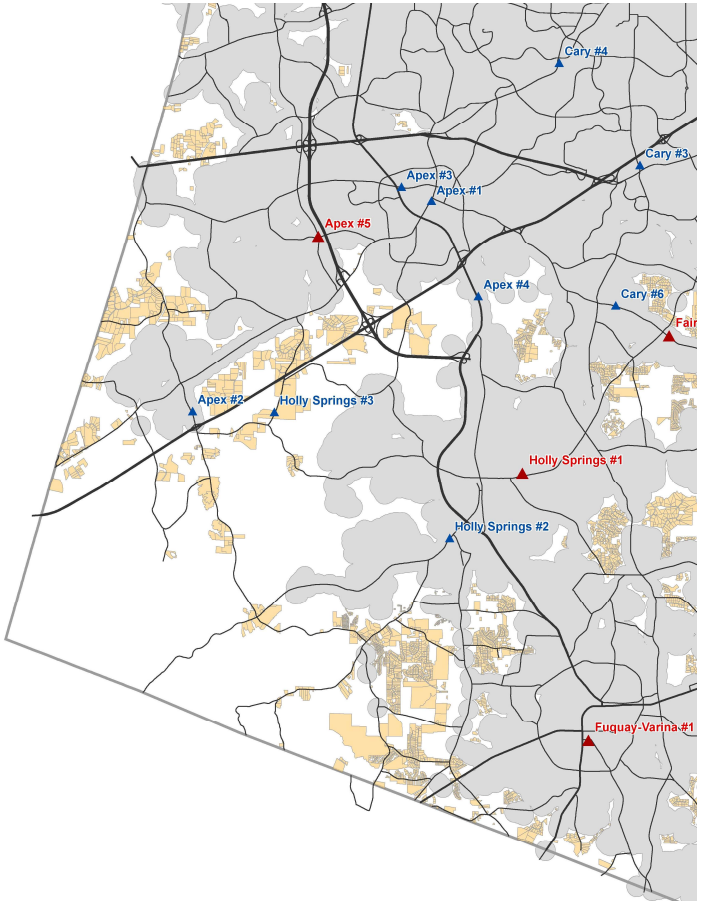
Where are they?



Southwest Side

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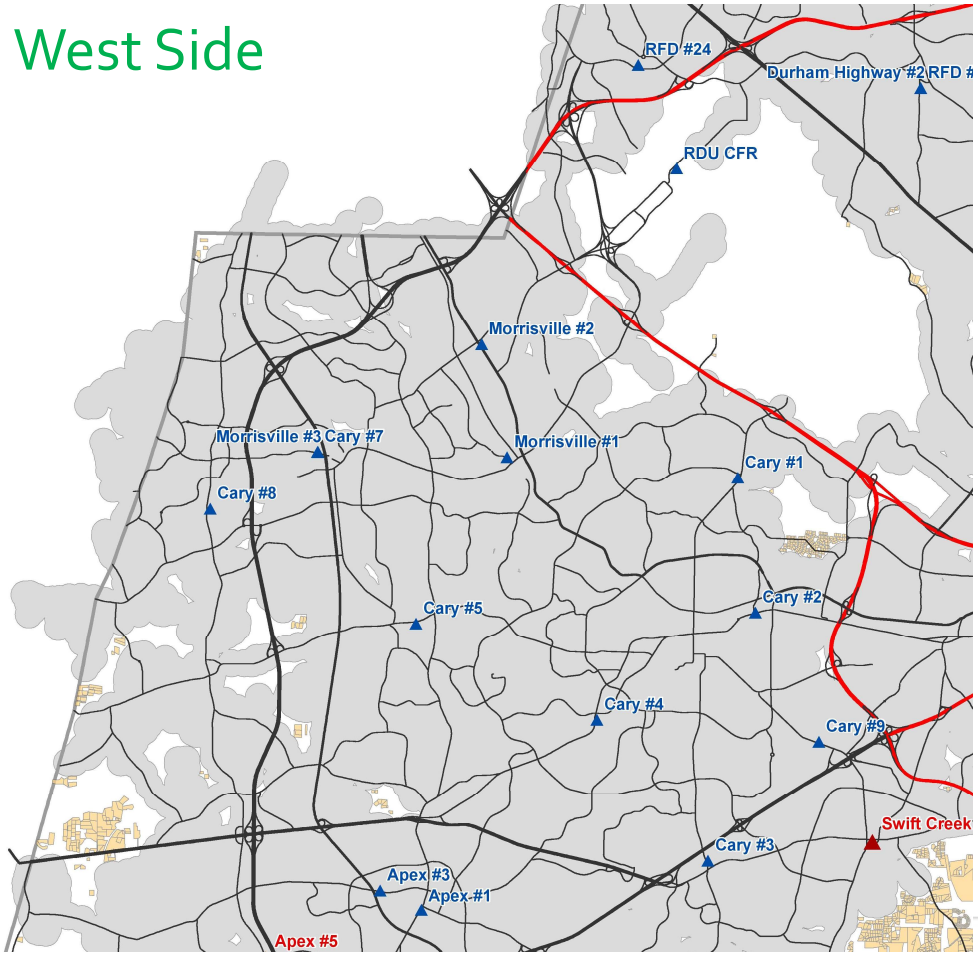
Where are they?

West Side



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Where are they?

Summary

- Tankers are in the right places
  - When taking other factors (staffing) into consideration
- No major holes identified
- Would like to back this up with response time data

Tanker response time analysis

What should our target r arrival be?

- Like a tanker E

How many tank ?

- Take in n engines/pumpers?

How much WATER do we need?

NFPA 1142

What does it say about water required for single family structures?

$$\text{Required water (gallons)} = \frac{\text{square feet x 15*}}{7}$$

Example:

4000 sqft house

$$\frac{4000 \times 15}{7} = \sim 8500 \text{ gallons}$$

*Assuming single story, 10 ft ceilings and 10ft attic height (worst case scenario).

NFPA 1142

Example:

8500 gallon target for a 4000 sqft house

- 21 out of our 24 tankers are 2000 gallons
- 54 out of our 71 engines/pumpers are 1000 gallons or more

3 engines/pumpers = 3000 gallons
3 tankers = 6000 gallons
9000 gallons total

But how big are our houses?
What should we plan for?

What Does the 90th Percentile Mean?

If we have 10 houses, we can arrange them from smallest to largest

Average
2500 sqft

Planning based on "Average" means you're unprepared for an unknown percentage of situations - based on the distribution of your data.

What Does the 90th Percentile Mean?

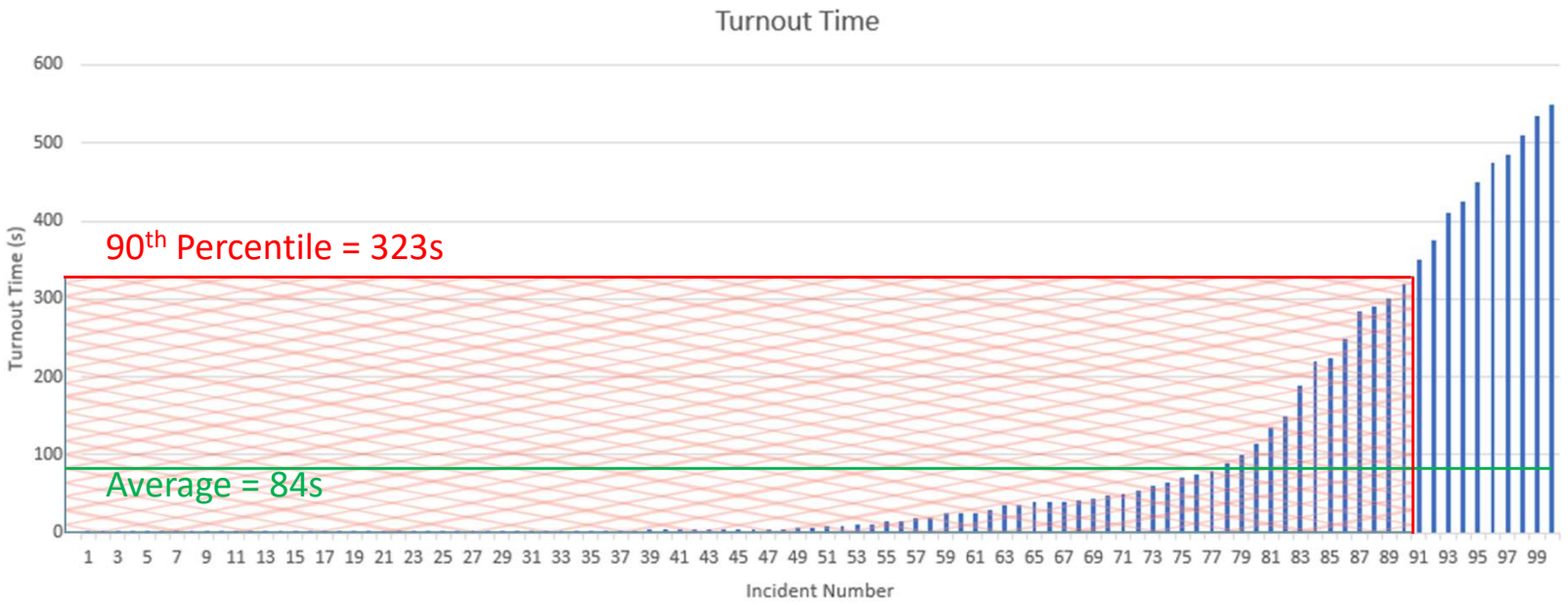
If we have 10 houses, we can arrange them from smallest to largest

90th Percentile

If we prepare for the 90th percentile,
we're ready for all but 10% of situations.

Why not use an average?

Example: Turnout times
100 incidents
Arranged from fastest to slowest turnout



Single family home size in Wake County Fire Tax District

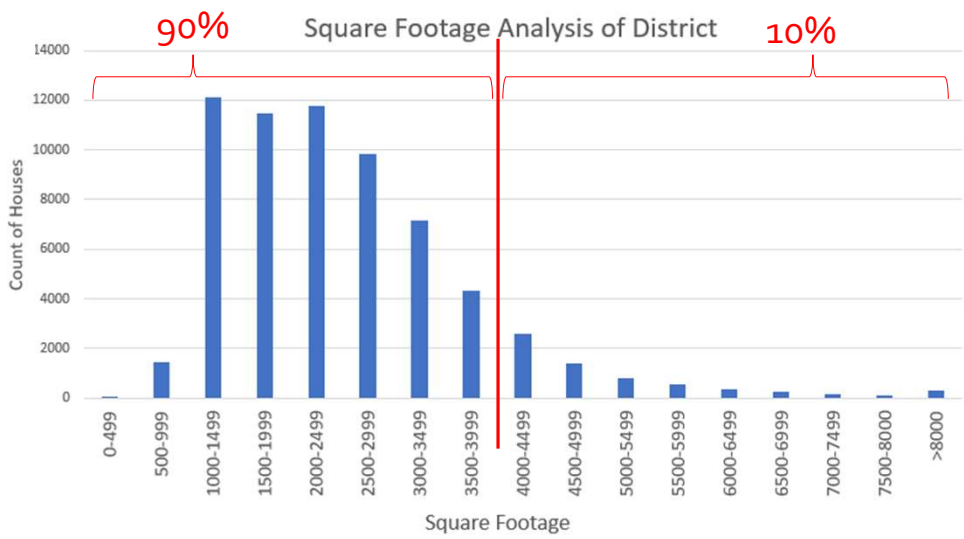
Square Feet	Count	Percentile	Min Gallons
0-499	27	0.0%	1071
500-999	1435	2.3%	2143
1000-1499	12110	20.9%	3214
1500-1999	11484	38.6%	4286
2000-2499	11785	56.8%	5357
2500-2999	9850	72.0%	6429
3000-3499	7170	83.1%	7500
3500-3999	4352	89.8%	8571
4000-4499	2610	93.8%	9643
4500-4999	1415	96.0%	10714
5000-5499	807	97.2%	11786
5500-5999	549	98.1%	12857
6000-6499	373	98.7%	13929
6500-6999	254	99.0%	15000
7000-7499	174	99.3%	16071
7500-8000	134	99.5%	17143
>8000	308	100.0%	18214
Grand Total	64837		

90%

4019 sqft
=8612 gallons

10%

For reference, the average is 2528 sqft (58%)



What do we want to be prepared for?

CITY_DECOD (All)

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1000-1499	12110	20.9%	3214
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4000-4499	2610	93.8%	9643
4500-4999	1415	96.0%	10714
5000-5499	807	97.2%	11786
5500-5999	549	98.1%	12857
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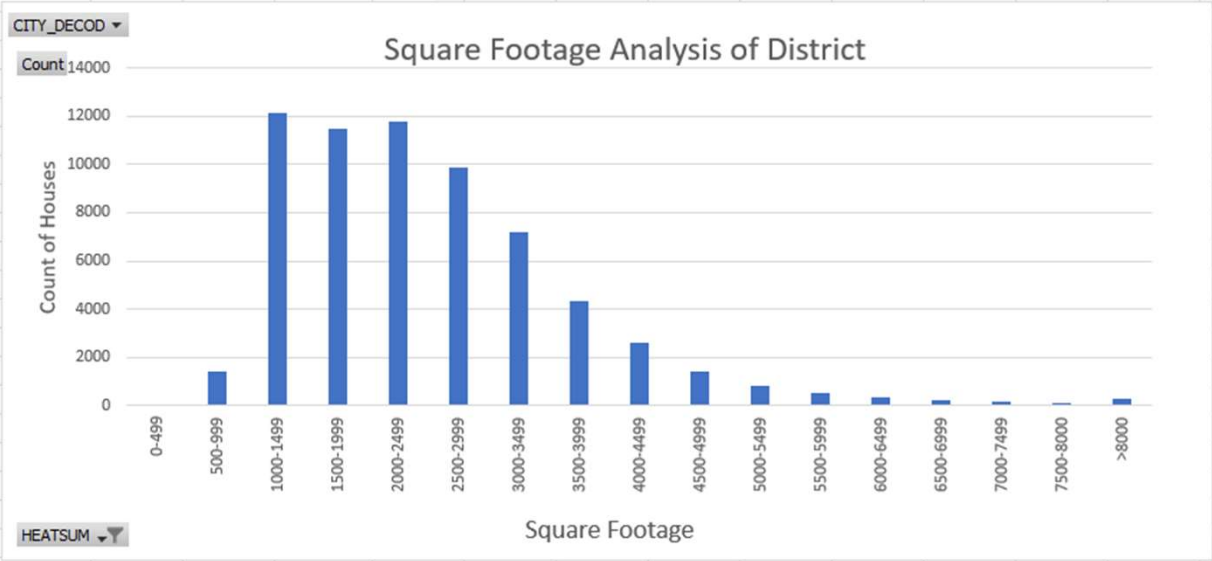
6500-6999	254	99.0%	15000
7000-7499	174	99.3%	16071
7500-8000	134	99.5%	17145
>8000	308	100.0%	
Grand Total	64836		

CITY_DECOD

ALERT	CARY SUBURBAN	DURHAM HIGHWAY	DUTCHVILLE
FURINA	GARNER SUBURBAN	HIPEX	HOLLY SPRINGS RURAL
HOPKINS	MORRISVILLE RURAL	NORTHERN WAKE	ROLESVILLE RURAL
SWIFT CREEK	TEN-TEN	WAKELON	WAKE-NEW HOPE
WAKETTE	WENDELL-HOLMES	WESTERN WAKE	ANGIER
APEX	CARY	DURHAM	FUQUAY-VARINA
GARNER	HOLLY SPRINGS	KNIGHTDALE	MORRISVILLE
RALEIGH	RDU	ROLESVILLE	WAKE FOREST
WENDELL	ZEBULON	(blank)	

Area

County | Municipal



What's next?

Identify goals for water arrival

Something like:

- 1000 gallons within 2 minutes of first arriving unit
- 3000 gallons within 8 minutes of first arriving unit
- 8500 gallons within 15 minutes of first arriving unit

Perform the analysis

Questions…