

# Raleigh Fire Department

## March 2023 Power BI Dashboard

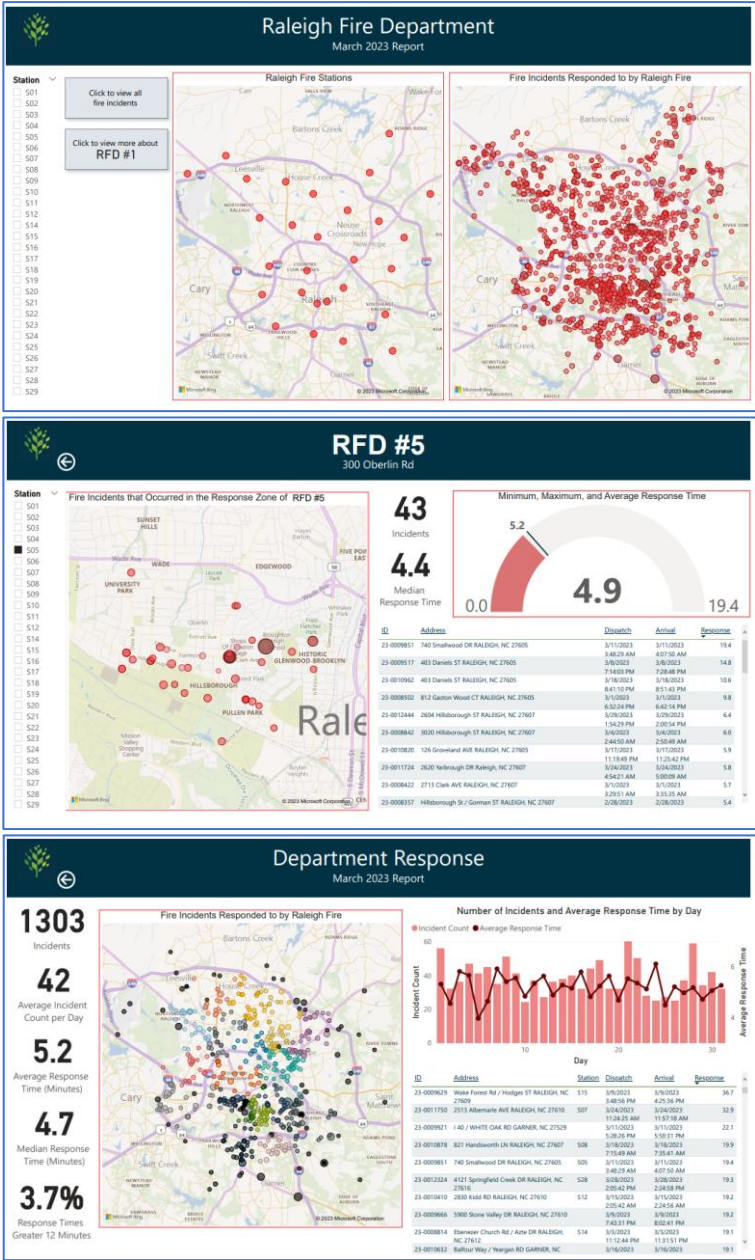
Brianna Hayes  
Information Technology Intern – Enterprise Applications and Data  
City of Raleigh Municipal Government

### Inquiry:

Incident response times could be a major factor as to whether the Raleigh Fire Department can have more stations. So, what are the Raleigh Fire Department's incident response times?

### Applications:

- ArcGIS online
- ArcGIS pro
- Microsoft Excel
- Microsoft Power BI



# Contents

[Title](#)

[Contents](#)

[Dashboard Pages](#)

- [Overview](#)
- [Station Response](#)
- [Department Response](#)

[Data Methods](#)

- [Sources](#)
- [Geospatial Analysis](#)
- [DAX Calculations](#)

Roadblocks

Summary

Learning Outcomes





# Raleigh Fire Department

March 2023 Report

Station

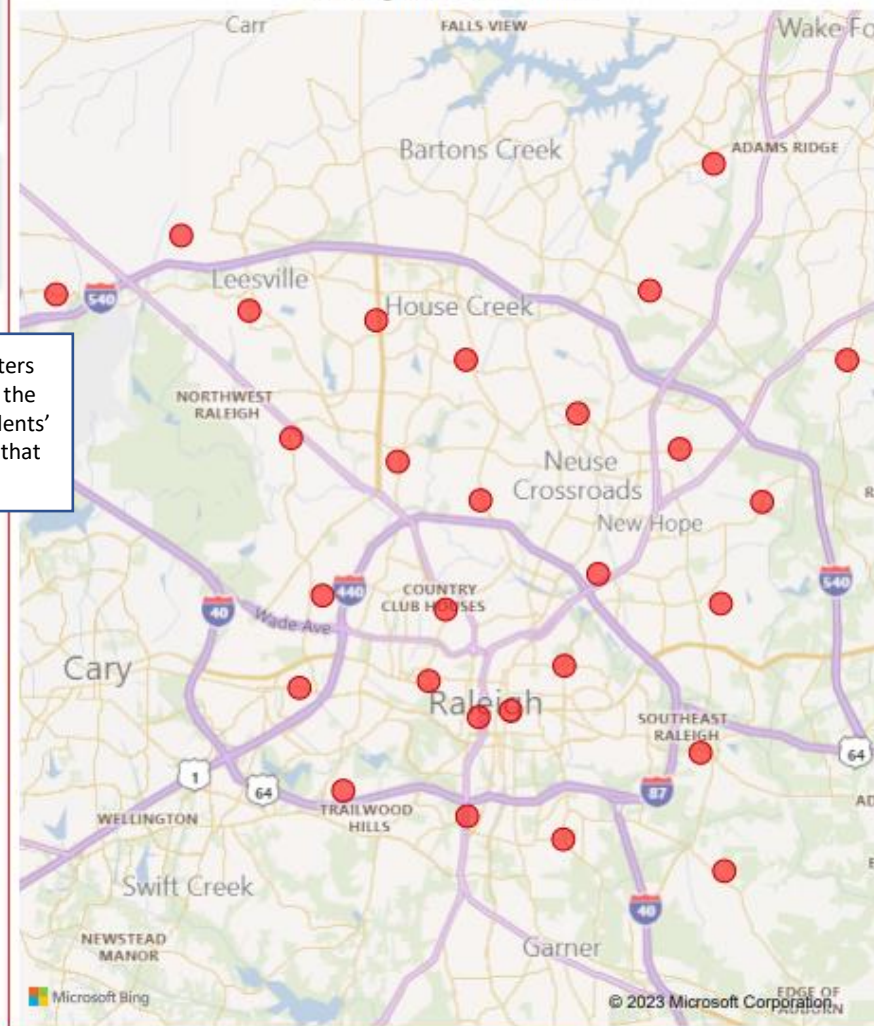
- ☐ S01
- ☐ S02
- ☐ S03
- ☐ S04
- ☐ S05
- ☐ S06
- ☐ S07
- ☐ S08
- ☐ S09
- ☐ S10
- ☐ S11
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- ☐ S16
- ☐ S17
- ☐ S18
- ☐ S19
- ☐ S20
- ☐ S21
- ☐ S22
- ☐ S23
- ☐ S24
- ☐ S25
- ☐ S26
- ☐ S27
- ☐ S28
- ☐ S29

Click to view all  
fire incidents

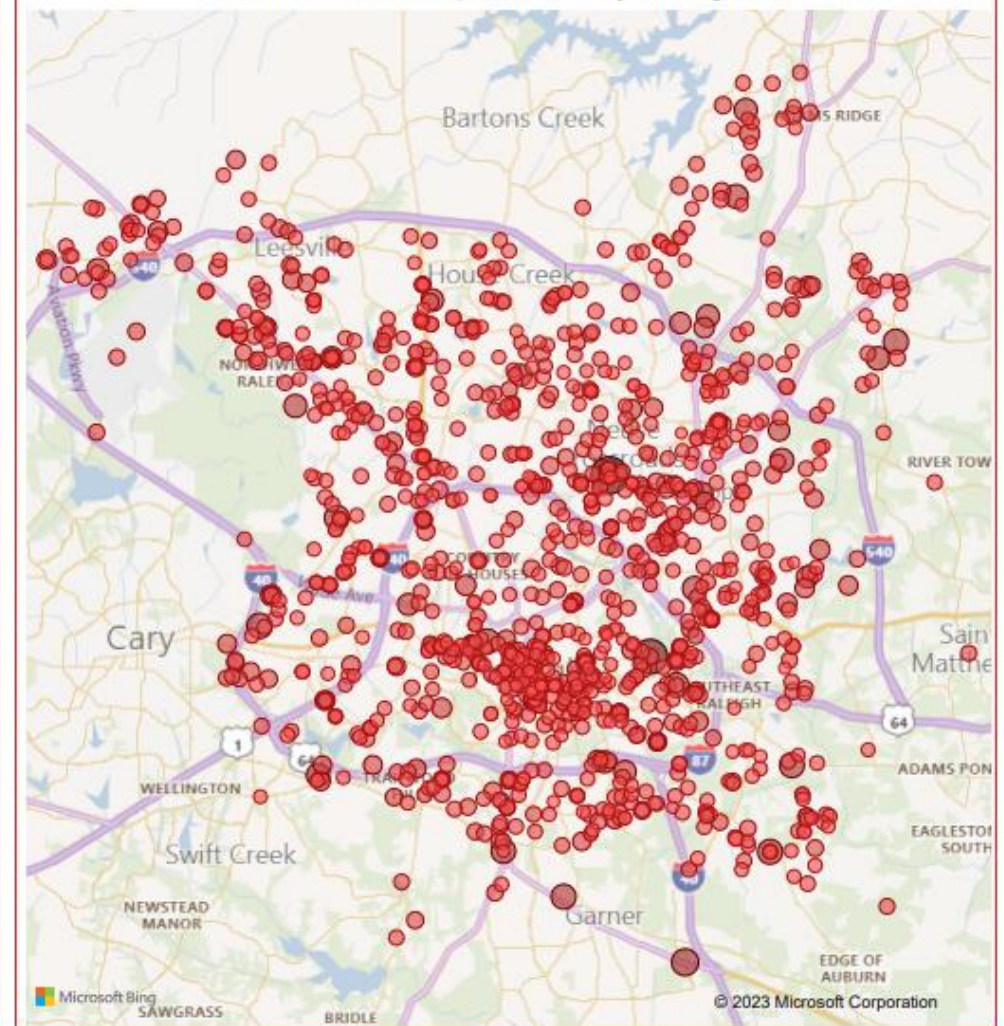
Click to view more about  
**RFD #1**

Selecting a station in the slicer filters  
the 'Raleigh Fire Stations' map to the  
selected station, and the 'Fire Incidents'  
map to incidents that occurred in that  
station's response zone

Raleigh Fire Stations



Fire Incidents Responded to by Raleigh Fire







# Raleigh Fire Department

March 2023 Report

Station

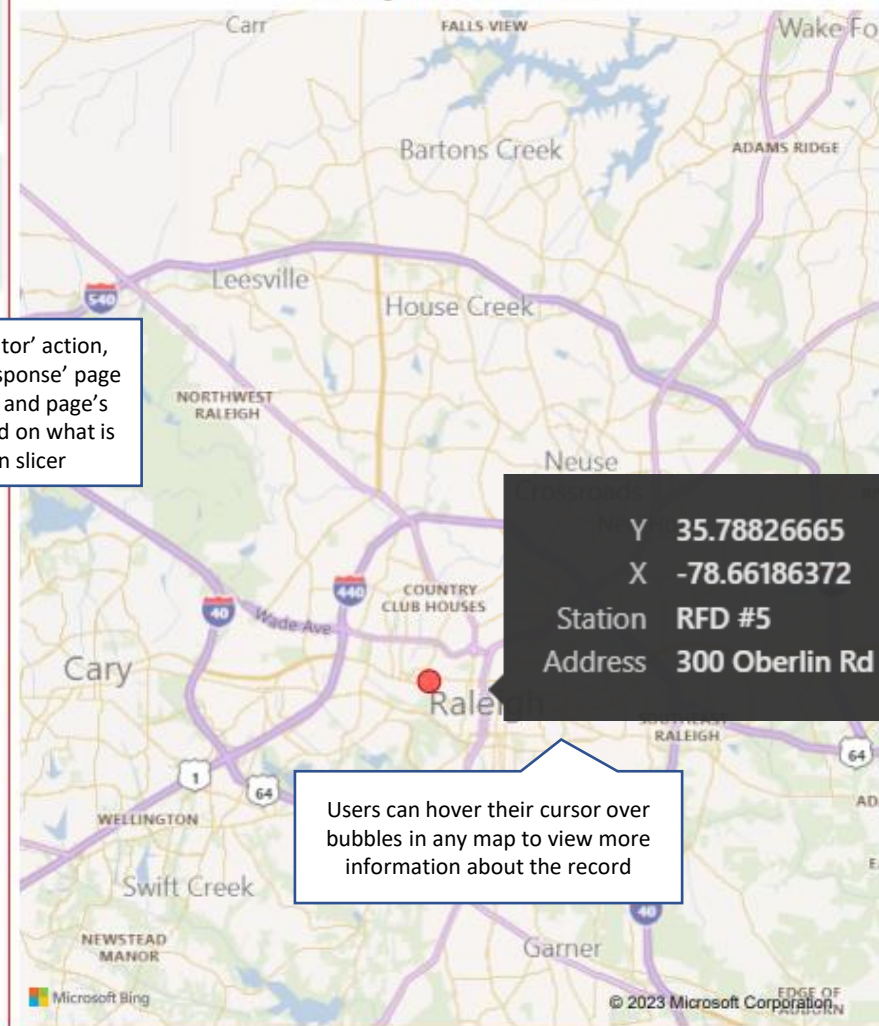
- ☐ S01
- ☐ S02
- ☐ S03
- ☐ S04
- ☒ S05
- ☐ S06
- ☐ S07
- ☐ S08
- ☐ S09
- ☐ S10
- ☐ S11
- ☐ S12
- ☐ S14
- ☐ S15
- ☐ S16
- ☐ S17
- ☐ S18
- ☐ S19
- ☐ S20
- ☐ S21
- ☐ S22
- ☐ S23
- ☐ S24
- ☐ S25
- ☐ S26
- ☐ S27
- ☐ S28
- ☐ S29

Click to view all  
fire incidents

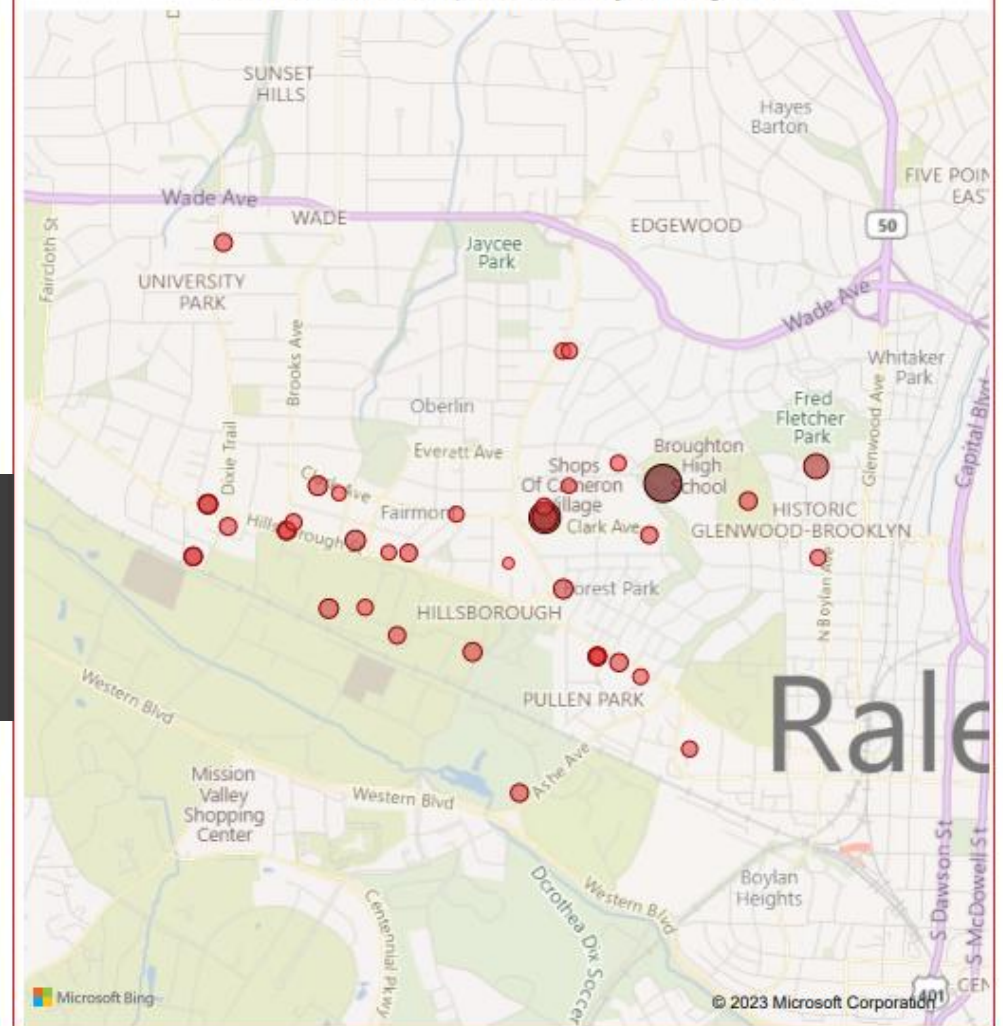
Click to view more about  
**RFD #5**

Button has a 'page navigator' action,  
directing to the 'station response' page  
when clicked. The button and page's  
information changes based on what is  
selected in the station slicer

Raleigh Fire Stations



Fire Incidents Responded to by Raleigh Fire





# RFD #5

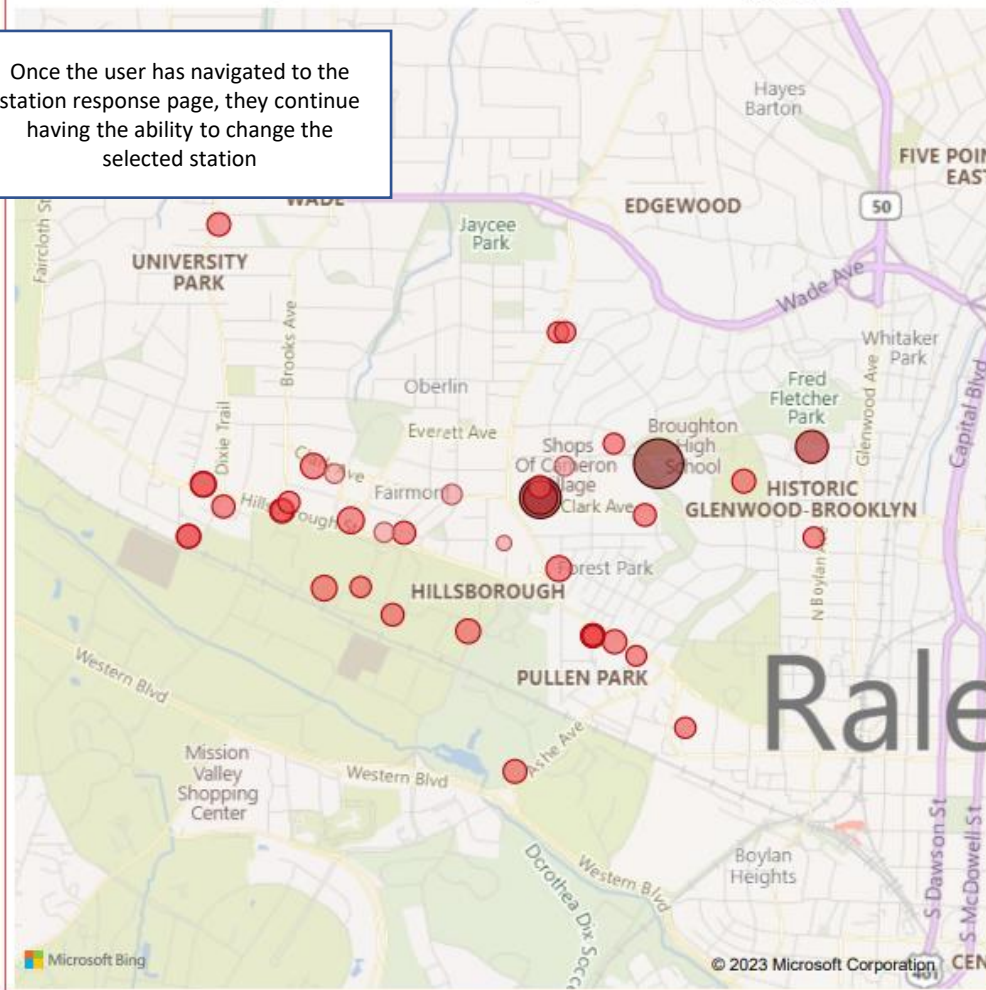
300 Oberlin Rd

## Station

- ☐ S01
- ☐ S02
- ☐ S03
- ☐ S04
- ☒ S05
- ☐ S06
- ☐ S07
- ☐ S08
- ☐ S09
- ☐ S10
- ☐ S11
- ☐ S12
- ☐ S14
- ☐ S15
- ☐ S16
- ☐ S17
- ☐ S18
- ☐ S19
- ☐ S20
- ☐ S21
- ☐ S22
- ☐ S23
- ☐ S24
- ☐ S25
- ☐ S26
- ☐ S27
- ☐ S28
- ☐ S29

## Fire Incidents that Occurred in the Response Zone of RFD #5

Once the user has navigated to the station response page, they continue having the ability to change the selected station



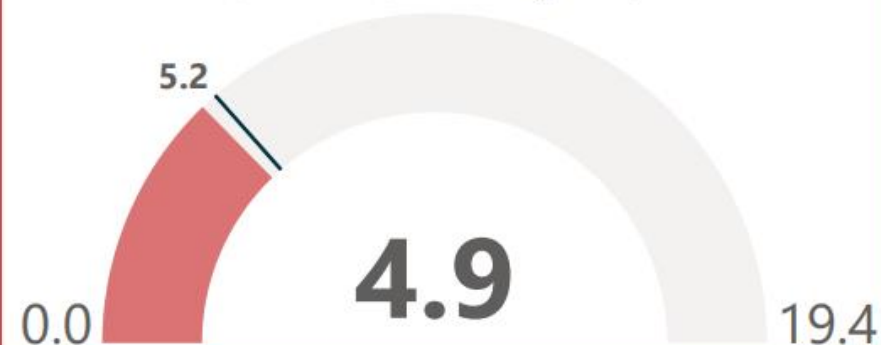
# 43

Incidents

# 4.4

Median Response  
Time (Minutes)

## Minimum, Maximum, and Average Response Time



ID	Address	Dispatch	Arrival	Response
23-0009851	740 Smallwood DR RALEIGH, NC 27605	3/11/2023 3:48:29 AM	3/11/2023 4:07:50 AM	19.4
23-0009517	403 Daniels ST RALEIGH, NC 27605	3/8/2023 7:14:03 PM	3/8/2023 7:28:48 PM	14.8
23-0010962	403 Daniels ST RALEIGH, NC 27605	3/18/2023 8:41:10 PM	3/18/2023 8:51:43 PM	10.6
23-0008502	812 Gaston Wood CT RALEIGH, NC 27605	3/1/2023 6:32:24 PM	3/1/2023 6:42:14 PM	9.8
23-0012444	2604 Hillsborough ST RALEIGH, NC 27607	3/29/2023 1:54:29 PM	3/29/2023 2:00:54 PM	6.4
23-0008842	3020 Hillsborough ST RALEIGH, NC 27607	3/4/2023 2:44:50 AM	3/4/2023 2:50:49 AM	6.0
23-0010820	126 Groveland AVE RALEIGH, NC 27605	3/17/2023 11:19:49 PM	3/17/2023 11:25:42 PM	5.9
23-0011724	2620 Yarbrough DR Raleigh, NC 27607	3/24/2023 4:54:21 AM	3/24/2023 5:00:09 AM	5.8
23-0008422	2713 Clark AVE RALEIGH, NC 27607	3/1/2023 3:29:51 AM	3/1/2023 3:35:35 AM	5.7
23-0008357	Hillsborough St / Gorman ST RALEIGH, NC 27607	2/28/2023 7:16:15 PM	2/28/2023 7:21:38 PM	5.4





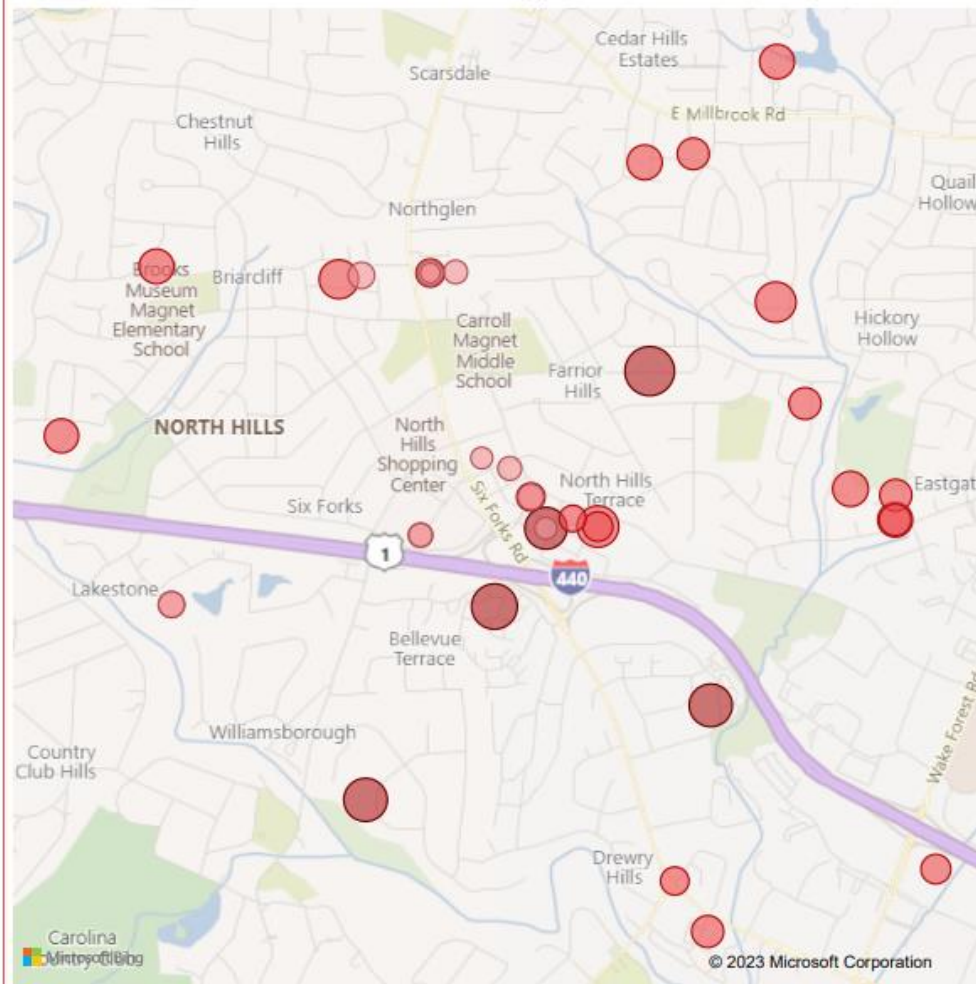
# RFD #9

4465 Six Forks Rd

## Station

- ☐ S01
- ☐ S02
- ☐ S03
- ☐ S04
- ☐ S05
- ☐ S06
- ☐ S07
- ☐ S08
- ☒ S09
- ☐ S10
- ☐ S11
- ☐ S12
- ☐ S14
- ☐ S15
- ☐ S16
- ☐ S17
- ☐ S18
- ☐ S19
- ☐ S20
- ☐ S21
- ☐ S22
- ☐ S23
- ☐ S24
- ☐ S25
- ☐ S26
- ☐ S27
- ☐ S28
- ☐ S29

## Fire Incidents that Occurred in the Response Zone of RFD #9



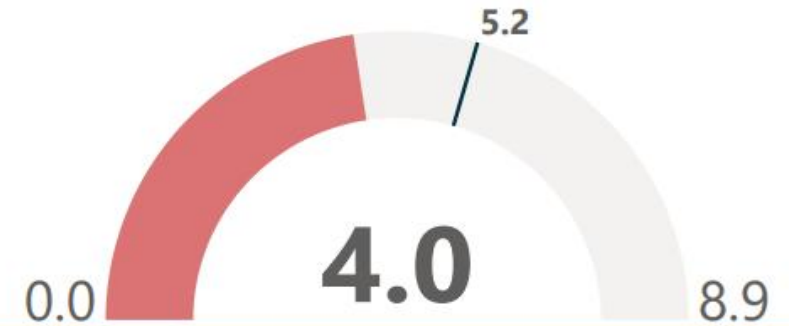
40

Incidents

3.8

Median Response  
Time (Minutes)

## Minimum, Maximum, and Average Response Time



ID	Address	Dispatch	Arrival	Response
23-0012448	2001 Latimer RD RALEIGH, NC 27609	3/29/2023 2:30:51 PM	3/29/2023 2:39:44 PM	8.9
23-0009231	411 Fig Vine DR RALEIGH, NC 27609	3/6/2023 7:17:39 PM	3/6/2023 7:25:34 PM	7.9
23-0010522	420 Drummond DR RALEIGH, NC 27609	3/15/2023 8:35:58 PM	3/15/2023 8:43:19 PM	7.4
23-0010325	4009 Barrett DR RALEIGH, NC 27609	3/14/2023 2:27:51 PM	3/14/2023 2:35:05 PM	7.2
23-0010400	160 PARK AT NORTH HILLS ST RALEIGH, NC 27609	3/14/2023 11:31:18 PM	3/14/2023 11:38:18 PM	7.0
23-0011093	4030 Cardinal North Hills ST RALEIGH, NC 27609	3/19/2023 7:59:57 PM	3/19/2023 8:06:50 PM	6.9
23-0010435	533 Harvard ST RALEIGH, NC 27609	3/15/2023 9:01:27 AM	3/15/2023 9:08:02 AM	6.6
23-0012339	212 Ellwood DR RALEIGH, NC 27609	3/28/2023 4:29:35 PM	3/28/2023 4:35:50 PM	6.3
23-0012616	909 Emory LN RALEIGH, NC 27609	3/30/2023 8:49:34 PM	3/30/2023 8:54:52 PM	5.3
23-0008568	5209 Edgewood RD RALEIGH, NC 27609	3/2/2023 5:35:47 AM	3/2/2023 5:40:57 AM	5.2



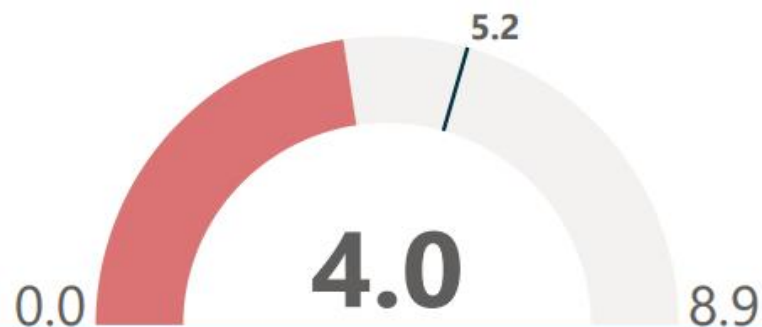
4465 Six Forks Rd

<input type="checkbox"/>	S01
<input type="checkbox"/>	S02
<input type="checkbox"/>	S03
<input type="checkbox"/>	S04
<input type="checkbox"/>	S05
<input type="checkbox"/>	S06
<input type="checkbox"/>	S07
<input type="checkbox"/>	S08
<input checked="" type="checkbox"/>	S09
<input type="checkbox"/>	S10
<input type="checkbox"/>	S11
<input type="checkbox"/>	S12
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<input type="checkbox"/>	S23
<input type="checkbox"/>	S24
<input type="checkbox"/>	S25
<input type="checkbox"/>	S26
<input type="checkbox"/>	S27
<input type="checkbox"/>	S28
<input type="checkbox"/>	S29

[illegible]

23-0008568 5209 Edgewood RD RALEIGH, NC 27609

Median Response  
Time (Minutes)



ID	Address	Dispatch	Arrival	Response
23-0012448	2001 Latimer RD RALEIGH, NC 27609	3/29/2023 2:30:51 PM	3/29/2023 2:39:44 PM	8.9
23-0009231	411 Fig Vine DR RALEIGH, NC 27609	3/6/2023 7:17:39 PM	3/6/2023 7:25:34 PM	7.9
35.823312428	420 DRIVING DR RALEIGH, NC 27609	3/15/2023 8:35:58 PM	3/15/2023 8:43:19 PM	7.4
-78.632289	DR RALEIGH, NC 27609	3/14/2023 2:27:51 PM	3/14/2023 2:35:05 PM	7.2
3.5	100 PARK AT NORTH HILLS ST RALEIGH, NC 27609	3/14/2023 11:31:18 PM	3/14/2023 11:38:18 PM	7.0
23-0010221	100 PARK AT NORTH HILLS ST RALEIGH, NC 27609	3/19/2023 7:59:57 PM	3/19/2023 8:06:50 PM	6.9
Rowan St / Six Forks RD RALEIGH, NC 27609		3/15/2023 9:01:27 AM	3/15/2023 9:08:02 AM	6.6
3/13/2023 7:41:40 PM		3/28/2023 4:29:35 PM	3/28/2023 4:35:50 PM	6.3
3/13/2023 7:45:08 PM		3/30/2023 8:49:34 PM	3/30/2023 8:54:52 PM	5.3
23-0008568	5209 Edgewood RD RALEIGH, NC 27609	3/2/2023 5:35:47 AM	3/2/2023 5:40:57 AM	5.2





# Department Response

March 2023 Report

1303

Incidents

42

Average Incident  
Count per Day

5.2

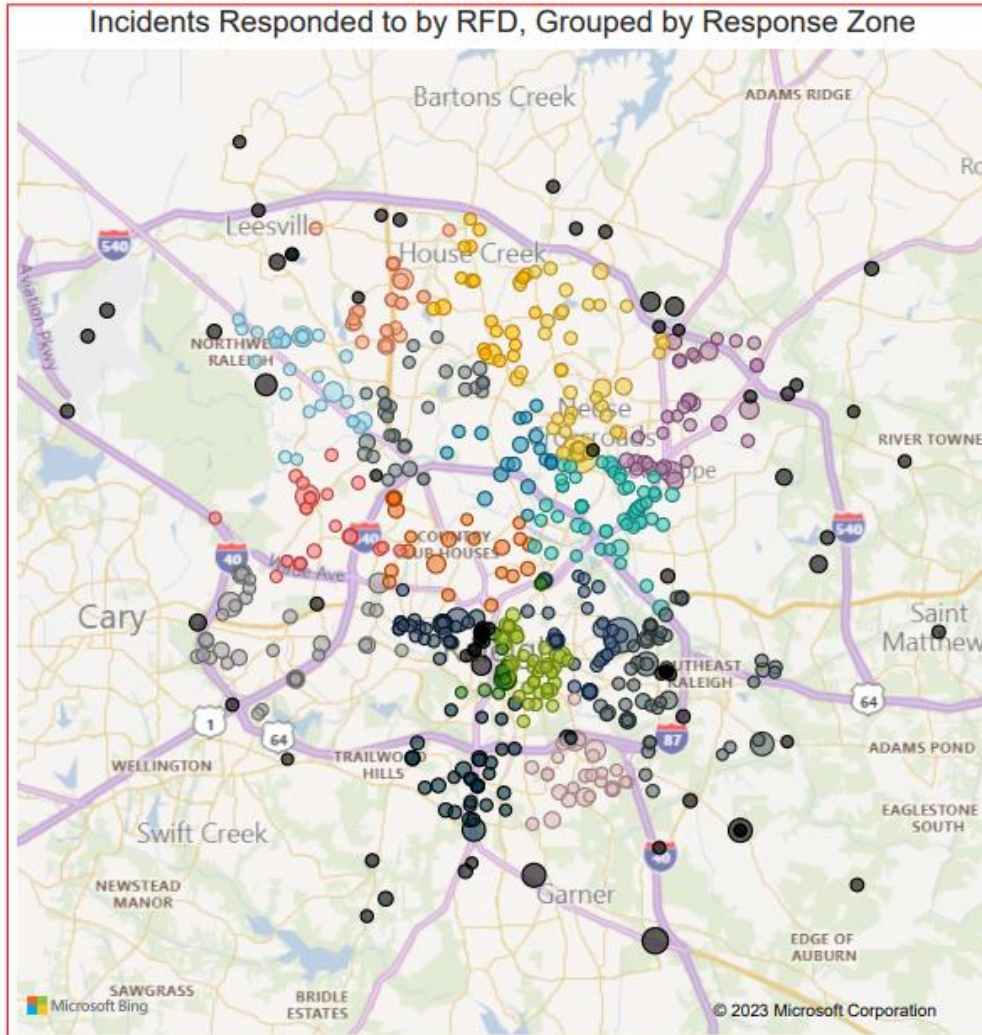
Average Response  
Time (Minutes)

4.7

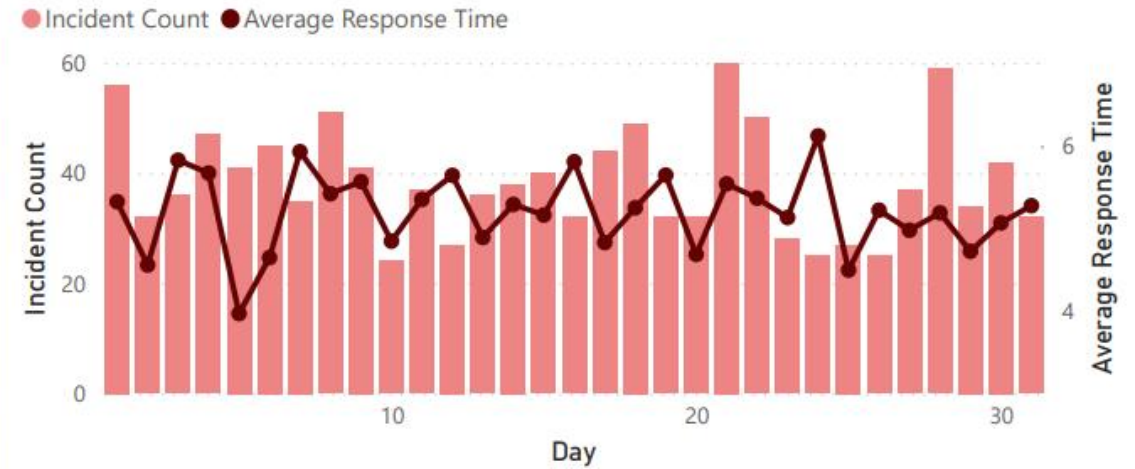
Median Response  
Time (Minutes)

3.7%

Response Times  
Greater 12 Minutes



## Number of Incidents and Average Response Time by Day



ID	Address	Station	Dispatch	Arrival	Response
23-0009629	Wake Forest Rd / Hodges ST RALEIGH, NC 27609	S15	3/9/2023 3:48:56 PM	3/9/2023 4:25:36 PM	36.7
23-0011750	2513 Albemarle AVE RALEIGH, NC 27610	S07	3/24/2023 11:24:25 AM	3/24/2023 11:57:18 AM	32.9
23-0009921	I 40 / WHITE OAK RD GARNER, NC 27529		3/11/2023 5:28:26 PM	3/11/2023 5:50:31 PM	22.1
23-0010878	821 Handsworth LN RALEIGH, NC 27607	S08	3/18/2023 7:15:49 AM	3/18/2023 7:35:41 AM	19.9
23-0009851	740 Smallwood DR RALEIGH, NC 27605	S05	3/11/2023 3:48:29 AM	3/11/2023 4:07:50 AM	19.4
23-0012324	4121 Springfield Creek DR RALEIGH, NC 27616	S28	3/28/2023 2:05:42 PM	3/28/2023 2:24:58 PM	19.3
23-0010410	2830 Kidd RD RALEIGH, NC 27610	S12	3/15/2023 2:05:42 AM	3/15/2023 2:24:56 AM	19.2
23-0009666	5900 Stone Valley DR RALEIGH, NC 27610		3/9/2023 7:43:31 PM	3/9/2023 8:02:41 PM	19.2
23-0008814	Ebenezer Church Rd / Azte DR RALEIGH,	S14	3/3/2023	3/3/2023	19.1





# Department Response

March 2023 Report

59

Incidents

42

Average Incident  
Count per Day

5.2

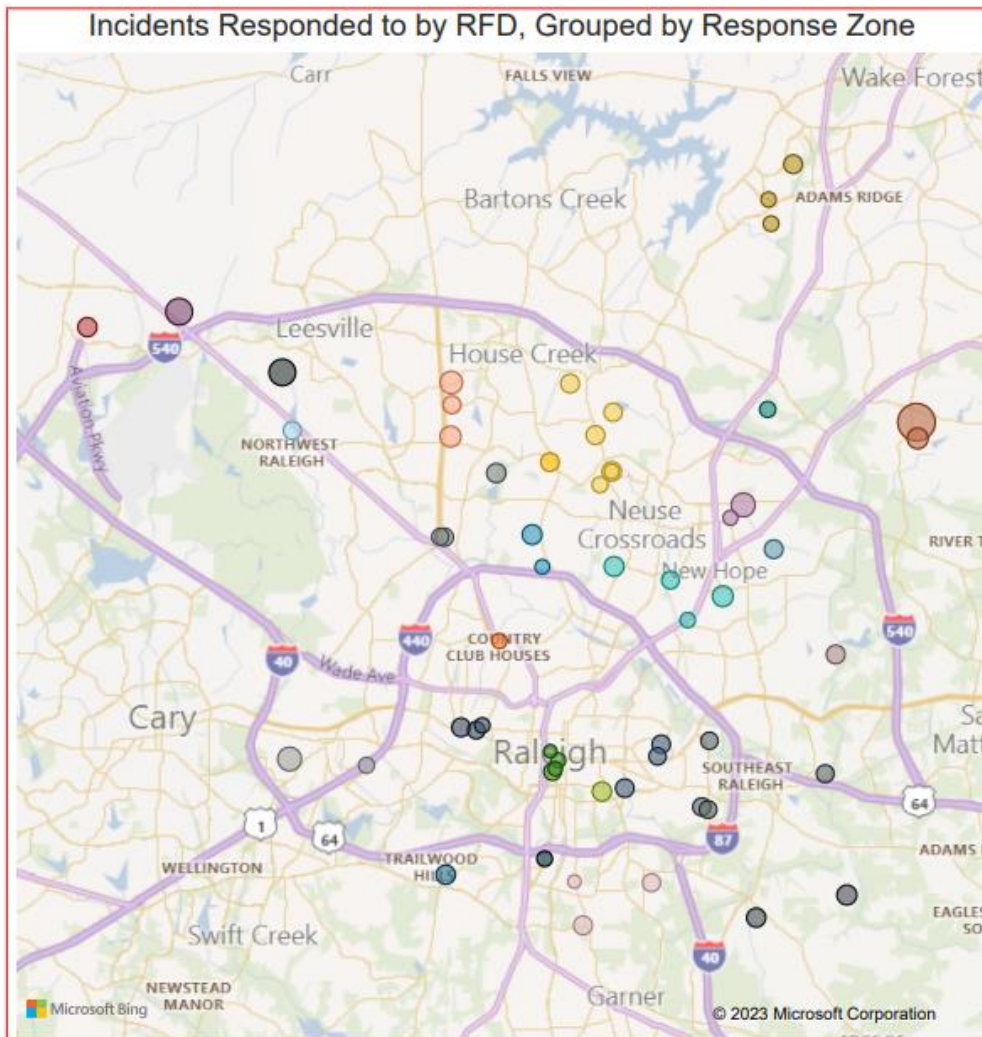
Average Response  
Time (Minutes)

5.1

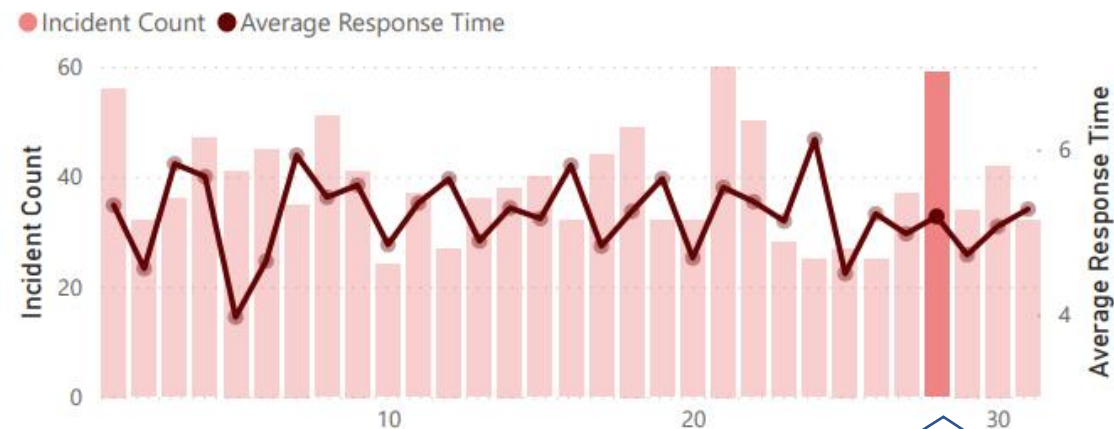
Median Response  
Time (Minutes)

3.7%

Response Times  
Greater 12 Minutes



## Number of Incidents and Average Response Time by Day



ID	Address	Station	Day		
23-0012324	4121 Springfield Creek DR RALEIGH, NC 27616	S28			
23-0012305	7620 Inspire DR RALEIGH, NC 27617	S29	3/28/2023	3/28/2023	11.4
			10:29:42 AM	10:41:03 AM	
23-0012359	8503 Eden Park DR RALEIGH, NC 27613	S23	3/28/2023	3/28/2023	11.3
			7:50:03 PM	8:01:20 PM	
23-0008368	4400 Spring Forest RD RALEIGH, NC 27616	S19	2/28/2023	2/28/2023	9.2
			8:25:06 PM	8:34:20 PM	
23-0012323	Caprice Ct / Oak Run DR RALEIGH, NC 27606	S08	3/28/2023	3/28/2023	9.2
			2:07:01 PM	2:16:13 PM	
23-0008363	2300 BRIDGEPORT DR RALEIGH, NC 27615	S18	2/28/2023	2/28/2023	8.3
			7:55:03 PM	8:03:19 PM	
23-0012292	2304 Ferguson RD RALEIGH, NC 27612	S18	3/28/2023	3/28/2023	7.2
			5:02:22 AM	5:09:31 AM	
23-0008370	3928 Tyler Bluff LN RALEIGH, NC 27616	S28	2/28/2023	2/28/2023	7.0
			8:25:50 PM	8:32:51 PM	
23-0008365	3505 Rigel CT RALEIGH, NC 27604	S11	2/28/2023	2/28/2023	6.9

# Data Methods

## Sources

- [Raleigh Open Data – Wake County Fire Stations](#)
- [Raleigh Open Data – Fire Incidents Past Month \(March 2023\)](#)
- [Raleigh Open Data – Fire Response Districts](#)

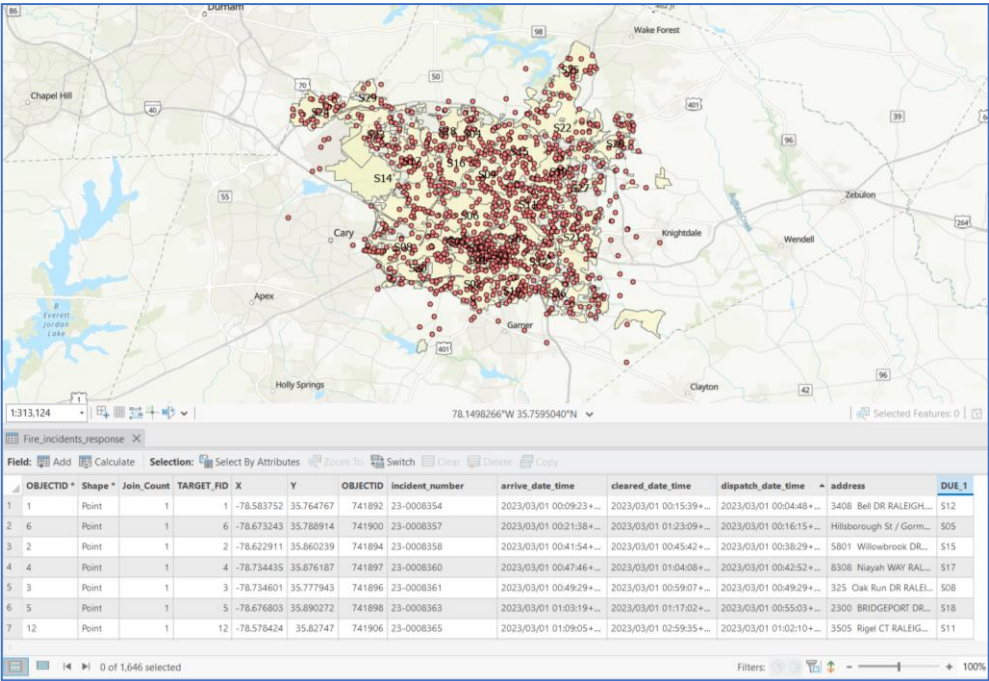
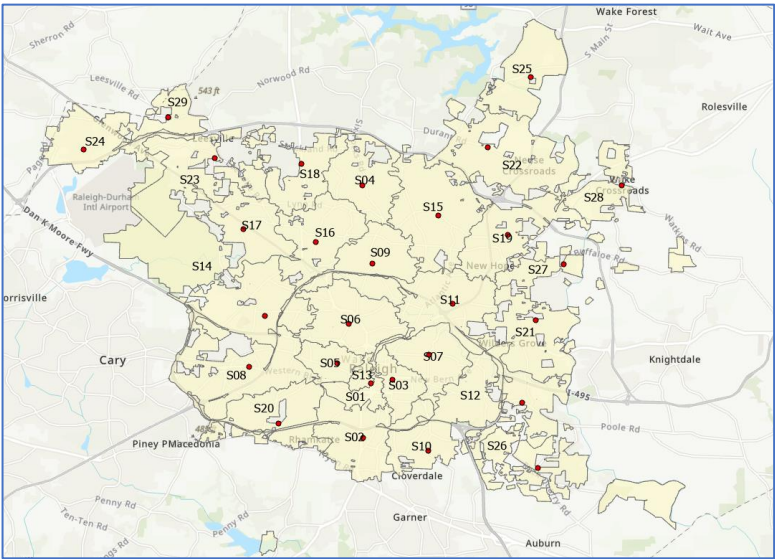
## Geospatial Analysis

All three datasets were downloaded as either a .csv or .shp and imported into ArcGIS pro as point layers (fire station, fire incident) and geometry(fire response districts).

The fire stations dataset included all in Wake County, so it was filtered to only include those belonging to the Raleigh Fire Department.

The fire incident data did not include a primary station responding to each record. Thus, a spatial join was performed to determine which response zone each incident occurred in. While this results in inaccurate statistics for the individual stations, it demonstrates a self-guided, proactive solution that provides insights on the zones and demonstrates ArcGIS skills until a more fit solution is finalized.

The fire incident dataset, now joined with a response station, was then exported from ArcGIS pro and imported into Power BI.





```

1 response_time = DATEDIFF(
2     fire_incidents[dispatch_date_time],
3     fire_incidents[arrive_date_time],
4     SECOND
5 )/60

```

X	Y	OBJECTID	Incident_number	arrive_date_time	cleared_date_time	dispatch_date_time	address	district	response_time
78.623703	35.769348	741940	23-0008425	3/1/2023 4:08:08 AM	3/1/2023 4:30:32 AM	3/1/2023 4:03:31 AM	726 Quarry ST RALEIGH, NC 27601	S03	4.6
78.628851	35.77878	741942	23-0008410	3/1/2023 1:24:28 AM	3/1/2023 4:58:04 AM	3/1/2023 1:19:57 AM	29 S Swain ST RALEIGH, NC 27601	S03	4.5
78.636762	35.777583	741949	23-0008429	3/1/2023 4:48:41 AM	3/1/2023 5:36:26 AM	3/1/2023 4:45:54 AM	214 S Blount ST RALEIGH, NC 27601	S03	2.8
-78.62684	35.775468	742455	23-0008440	3/1/2023 9:00:13 AM	3/1/2023 9:09:42 AM	3/1/2023 8:55:47 AM	721 E Davie ST RALEIGH, NC 27601	S03	4.4
78.628595	35.772489	742459	23-0008449	3/1/2023 11:51:02 AM	3/1/2023 11:56:51 AM	3/1/2023 11:46:32 AM	701 Bright Creek WAY RALEIGH, NC 27601	S03	4.5
78.628595	35.772489	742479	23-0008492	3/1/2023 5:35:03 PM	3/1/2023 5:38:15 PM	3/1/2023 5:30:20 PM	701 Bright Creek WAY RALEIGH, NC 27601	S03	4.7
78.623951	35.779662	742582	23-0008795	3/3/2023 8:39:42 PM	3/3/2023 8:42:42 PM	3/3/2023 8:35:50 PM	1010 New Bern AVE RALEIGH, NC 27601	S03	3.9
78.630687	35.770734	742584	23-0008796	3/3/2023 8:45:03 PM	3/3/2023 9:00:55 PM	3/3/2023 8:40:27 PM	600 Chavis WAY RALEIGH, NC 27601	S03	4.6
78.621066	35.77212	742590	23-0008813	3/3/2023 11:09:23 PM	3/3/2023 11:20:41 PM	3/3/2023 11:05:29 PM	1214 E LENOIR ST RALEIGH, NC 27610	S03	3.9
78.621066	35.77212	742592	23-0008817	3/3/2023 11:38:30 PM	3/3/2023 11:41:12 PM	3/3/2023 11:32:14 PM	1214 E LENOIR ST RALEIGH, NC 27610	S03	6.3
78.624081	35.776791	742621	23-0008892	3/4/2023 12:32:36 PM	3/4/2023 12:43:11 PM	3/4/2023 12:28:37 PM	216 S State ST RALEIGH, NC 27601	S03	4.0
78.637073	35.777664	742631	23-0008922	3/4/2023 4:42:08 PM	3/4/2023 4:46:25 PM	3/4/2023 4:30:21 PM	216 S Blount ST RALEIGH, NC 27601	S03	11.8
78.624724	35.779779	742667	23-0009019	3/5/2023 6:18:13 AM	3/5/2023 6:27:06 AM	3/5/2023 6:14:46 AM	914 New Bern AVE RALEIGH, NC 27601	S03	3.5
-78.63723	35.771607	742713	23-0009148	3/6/2023 2:28:59 AM	3/6/2023 2:44:46 AM	3/6/2023 2:25:16 AM	118 E South ST RALEIGH, NC 27601	S03	3.7
78.637662	35.788869	742715	23-0009153	3/6/2023 2:58:31 AM	3/6/2023 3:09:09 AM	3/6/2023 2:56:04 AM	15 E PEACE ST RALEIGH, NC 27604	S03	2.5
78.640807	35.780904	742726	23-0009179	3/6/2023 12:05:00 PM	3/6/2023 12:06:02 PM	3/6/2023 12:01:36 PM	99 N Salisbury ST RALEIGH, NC 27603	S03	3.4
-78.63723	35.771607	742727	23-0009181	3/6/2023 12:31:53 PM	3/6/2023 12:43:33 PM	3/6/2023 12:28:33 PM	118 E South ST RALEIGH, NC 27601	S03	3.3
78.635385	35.787024	742731	23-0009194	3/6/2023 3:04:00 PM	3/6/2023 3:07:32 PM	3/6/2023 2:56:14 PM	525 John Haywood WAY RALEIGH, NC 27604	S03	7.8
78.632802	35.774379	742740	23-0009217	3/6/2023 6:04:11 PM	3/6/2023 6:06:59 PM	3/6/2023 6:01:38 PM	450 S East ST RALEIGH, NC 27601	S03	2.6
78.638828	35.789346	742783	23-0009315	3/7/2023 12:33:48 PM	3/7/2023 12:43:48 PM	3/7/2023 12:28:20 PM	721 Halifax ST RALEIGH, NC 27604	S03	5.5
78.618465	35.775846	742816	23-0009419	3/8/2023 12:52:00 AM	3/8/2023 12:57:58 AM	3/8/2023 12:49:16 AM	1300 E Martin ST RALEIGH, NC 27610	S03	2.7
78.637563	35.78643	742822	23-0009430	3/8/2023 2:27:01 AM	3/8/2023 2:49:54 AM	3/8/2023 2:23:43 AM	510 N Wilmington ST RALEIGH, NC 27604	S03	3.3
-78.62783	35.76582	742833	23-0009447	3/8/2023 6:09:17 AM	3/8/2023 6:11:56 AM	3/8/2023 6:04:11 AM	601 Bragg ST RALEIGH, NC 27610	S03	5.1
78.631762	35.77761	742880	23-0009555	3/9/2023 12:46:45 AM	3/9/2023 1:07:13 AM	3/9/2023 12:42:53 AM	500 E Hargett ST RALEIGH, NC 27601	S03	3.9
78.620693	35.779788	742925	23-0009669	3/9/2023 8:31:43 PM	3/9/2023 8:37:14 PM	3/9/2023 8:28:40 PM	N Pettigrew St / Boyer ST RALEIGH, NC 27610	S03	3.1
-78.61824	35.78031	742932	23-0009679	3/9/2023 9:44:15 PM	3/9/2023 9:52:07 PM	3/9/2023 9:41:28 PM	1313 New Bern AVE RALEIGH, NC 27610	S03	2.8
78.636762	35.777583	742966	23-0011208	3/20/2023 4:28:10 PM	3/20/2023 4:34:26 PM	3/20/2023 4:27:43 PM	214 S Blount ST RALEIGH, NC 27601	S03	0.5
-78.63876	35.78688	742972	23-0011224	3/20/2023 7:29:37 PM	3/20/2023 7:47:26 PM	3/20/2023 7:28:48 PM	512 N Salisbury ST RALEIGH, NC 27604	S03	0.8
78.631762	35.77761	742990	23-0011272	3/21/2023 2:23:59 AM	3/21/2023 3:02:11 AM	3/21/2023 2:21:59 AM	500 E Hargett ST RALEIGH, NC 27601	S03	2.0
-78.61901	35.779923	742996	23-0011288	3/21/2023 6:36:54 AM	3/21/2023 6:36:57 AM	3/21/2023 6:20:40 AM	New Bern Ave / Patriot DR RALEIGH, NC 27610	S03	16.2
-78.63403	35.782146	743020	23-0011351	3/21/2023 5:37:26 PM	3/21/2023 5:38:25 PM	3/21/2023 5:34:55 PM	312 E Jones ST RALEIGH, NC 27601	S03	2.5
78.636762	35.777583	743028	23-0011371	3/21/2023 7:59:16 PM	3/21/2023 8:05:52 PM	3/21/2023 7:55:16 PM	214 S Blount ST RALEIGH, NC 27601	S03	4.0

fire\_incidents (1,303 rows) Column: response\_time (477 distinct values)

## DAX Calculations

For this report, response time is defined as the minutes between dispatch and arrival time (both of which are fields in the fire incident dataset).

To calculate response time, I used DAX to create a new column on the fire incident dataset in Power BI and found the minutes between the two times using the DATE\_DIFF() function.

While I am looking for minutes, I used SECOND as the interval in this formula because MINUTE does not consider seconds in its calculations, resulting in whole numbers. For emergency response times, even 30 seconds could make a big difference. Thus, it is important to be precise.

It is also important to use the DATE\_DIFF() function here rather than simply subtracting times. If the fire department is dispatched at 11:59 pm, and the arrival time is 12:05 am, the response time would be inaccurate if subtracted. Date is an important factor.

Words

# Header



Words

# Header

Words

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Words

# Header

# Roadblocks

- a. Response zones not matching with stations
- b. Data formatting issues
- c. Creating relationships between all separate datasets



# Learning Outcomes

Words

● Other ● S13

