

# Performance Audit

October 2022

# Durham Fire Department Response Times



## STAFF

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**Date:** October 24, 2022  
**To:** Audit Services Oversight Committee  
**From:** Germaine Brewington, Director of Audit Services  
**Subject:** Durham Fire Department Response Times Performance Audit

The Audit Services Department staff completed the report for the Durham Fire Department Response Times Performance Audit dated October 2022. The purposes of this audit were to: 1) review Durham Fire Department (DFD) response times to determine if they meet their goals (overall response rates—specifically vertical response rates) established by the DFD; and 2) review the Department/City’s plan to meet increasing demand on DFD services because of growth—including high rise buildings.

This report presents the observations and results of the Response Times Performance Audit. Two recommendations were proposed. In response to these audit recommendations, City Management concur with the recommendations made. The detailed Management Response to the recommendations is included with the attached report.

The Audit Services Department staff would like to acknowledge the contributions of staff from the Durham Fire Department, City-County Planning Department and City-County Inspections Department for providing information to enable the audit process.



## DFD Response Times Performance Audit

October 2022

### Objectives

The objectives of the audit were to:

1. Review Durham Fire Department (DFD) response times to determine if they meet the goals (overall response rates- specifically vertical response rates) established by the Fire Department; and
2. Review the Department/City's plan to meet increasing demand on DFD services because of growth—including high rise buildings.

### Background

The Durham Fire Department has more than 380 trained personnel and 19 fire stations throughout the City to serve the community. The Fire Operations Division of the Durham Fire Department is responsible for:

Emergency response, which includes fire suppression, emergency medical incident stabilization, vehicle extrication and basic response for mitigation of hazardous materials release occurrences and technical rescue incidents, such as swift-water rescue.

## REPORT HIGHLIGHTS

Durham Fire Department (DFD) staff are unable to meet NFPA 1710 authoritative standard service delivery benchmarks. The benchmark is a standard and not a requirement; and many jurisdictions struggle with meeting the guidelines. With that said, the standard is a guide the Department strives to achieve.

Response times are impacted by many factors. These factors include staffing, equipment resources, type of new construction (vertical versus horizontal), and increase in population and the demographics of that population increase.

Audit staff reviewed the methodology used by the Fire Department to tell

their story regarding the need for additional resources due to increased growth in the City. As a result of that review, a more robust analysis is needed which includes factors like the impact of gender and age on increased EMS services or the impact of new construction including vertical construction and building materials on the probability of a significant fire incident. This work still needs to be done.

### WHY THIS AUDIT IS IMPORTANT

This audit is important because the factors: increase in population, increase in construction, and demographics of new residents moving into the City all can impact emergency response times. The City of Durham is growing; and an analysis/study showing the correlation (if any) between these factors and response times should be a part of the methodology to determine impact on service delivery.

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# BACKGROUND

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*DFD is responsible for fire suppression, emergency medical incident stabilization, vehicle extrication, hazardous materials mitigation, swift-water rescue, fire hydrant maintenance and public awareness education for residents.*

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The Durham Fire Department is divided into four battalions, with 19 fire stations located to facilitate the most efficient responses possible to calls for service. Currently, the Department has 380 firefighters designated for first response emergency operations. All persons in the ranks ranging from Firefighter 5 to Division Chief are also certified as emergency medical technicians. The Department’s active fleet includes:

- 16 engine companies
- 3 quint fire truck companies
- 5 ladder companies
- 3 squad companies
- 1 heavy rescue company
- 5 command units
- 6 specialty and/or support vehicles.

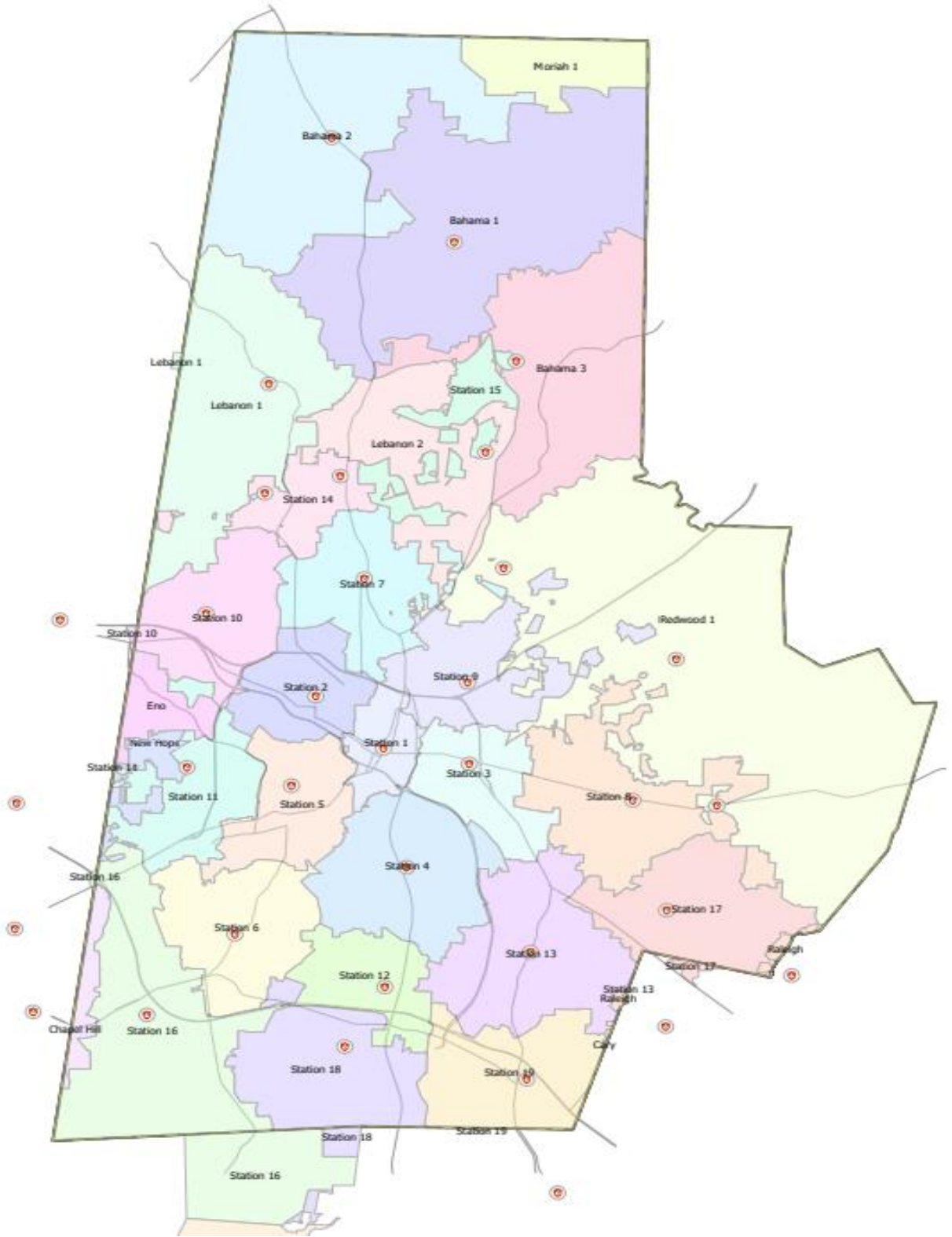
The Fire Operations Division of the Durham Fire Department is responsible for:

emergency response, which includes fire suppression, emergency medical incident stabilization, vehicle extrication and basic response for mitigation of hazardous materials release occurrences and technical rescue incidents, such as swift-water rescue.

In addition to emergency response, the Fire Operations Division maintains approximately 13,000 fire hydrants to ensure operational readiness. Other non-emergency response activities include public education through in-house and out-reach programs. These education programs are one tool the DFD staff use to bring awareness to and meet the needs of all residents and visitors of Durham. Figure 1 below shows the locations of the fire stations in and around Durham County.

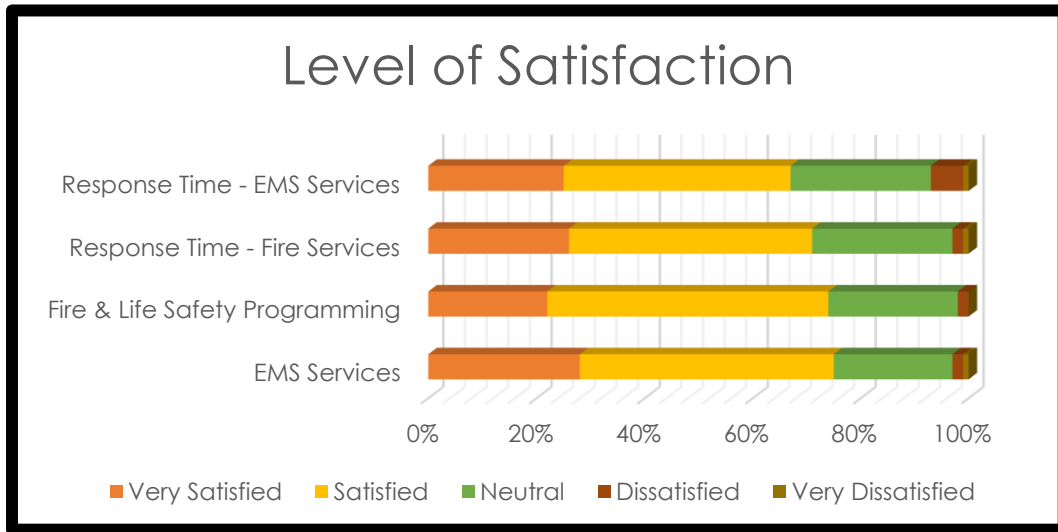


Figure 1. Current map of Durham fire stations servicing within and around Durham County



City of Durham performs a citizen survey to objectively assess resident satisfaction with the delivery of major City services. This survey helps determine priorities for the community, measure trends from previous surveys and compare the City's performance with other communities regionally and nationally. Sixty-seven percent (67%) or more of City of Durham residents are satisfied or very satisfied by the services provided by the Fire Department.

Figure 2: Level of satisfaction for fire services



Level of Satisfaction	Very Satisfied	Satisfied	Neutral	Dissatisfied	Very Dissatisfied
EMS Services	28%	47%	22%	2%	1%
Fire & Life Safety Programming	22%	52%	24%	2%	0%
Response Time - Fire Services	26%	45%	26%	2%	1%
Response Time - EMS Services	25%	42%	26%	6%	1%

## Regulation

In a fire or other emergency, there is one thing that matters almost more than any other—response time. Every other aspect of the job a firefighter performs hinges on the critically important factor of time. A few minutes could be the difference between preserving life and property.

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*In an emergency, response time is the most important factor.*

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An example of a common scenario in fire departments across the country follows. A resident has a fire or emergency medical situation and calls 911. Call intake information is gathered, the tones go off, crews are dispatched, and firefighters turn out and arrive on scene to mitigate the situation. Hidden among these everyday actions are hundreds of data points, important clues to understanding whether the department has enough resources to address emergencies in the community.

The scope of services provided by the Durham Fire Department is covered by *NFPA 1710: Standard for the Organization and Deployment of Fire Suppression Operations, Emergency Medical Operations, and Special Operations to the Public by Career Fire Departments*. NFPA 1710 is considered an industry benchmark for emergency response times, staffing and other requirements. This benchmark is a standard and not a requirement.

Per Durham Fire Department management, “Adherence to NFPA standards, such as 1710, is extremely important as they provide an industry standard of care. The industry standard of care, as established by NFPA 1710, is often used as evidence in a negligence suit after a Firefighter is injured or killed in the line-of-duty. As Attorney Curt Varone<sup>1</sup> (a legal expert in law and the fire service) states, “On balance, NFPA 1710 does provide an important objective measure of the standard of care that the reasonably prudent fire department would take.” Not following NFPA 1710 can increase the risk to the City of not complying with general duty requirements for safety.

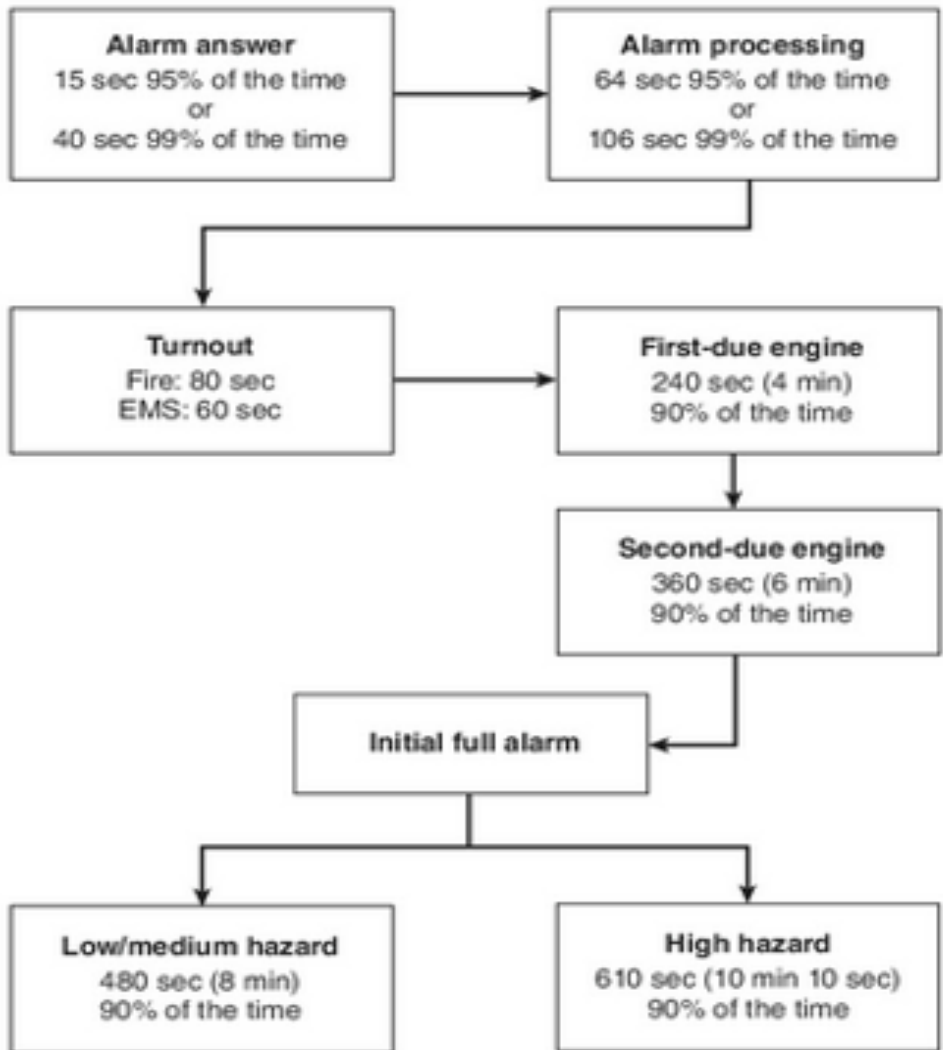
Per NFPA 1710 the following objectives shown in Figure 2 below are the standards for delivery.

Reference:

<sup>1</sup>Varone, C. (2012). *NFPA 1710 Staffing and Legal Mandates*. Fire Law Blog. Retrieved from: [NFPA 1710 Staffing and Legal Mandates - Fire Law Blog](#)



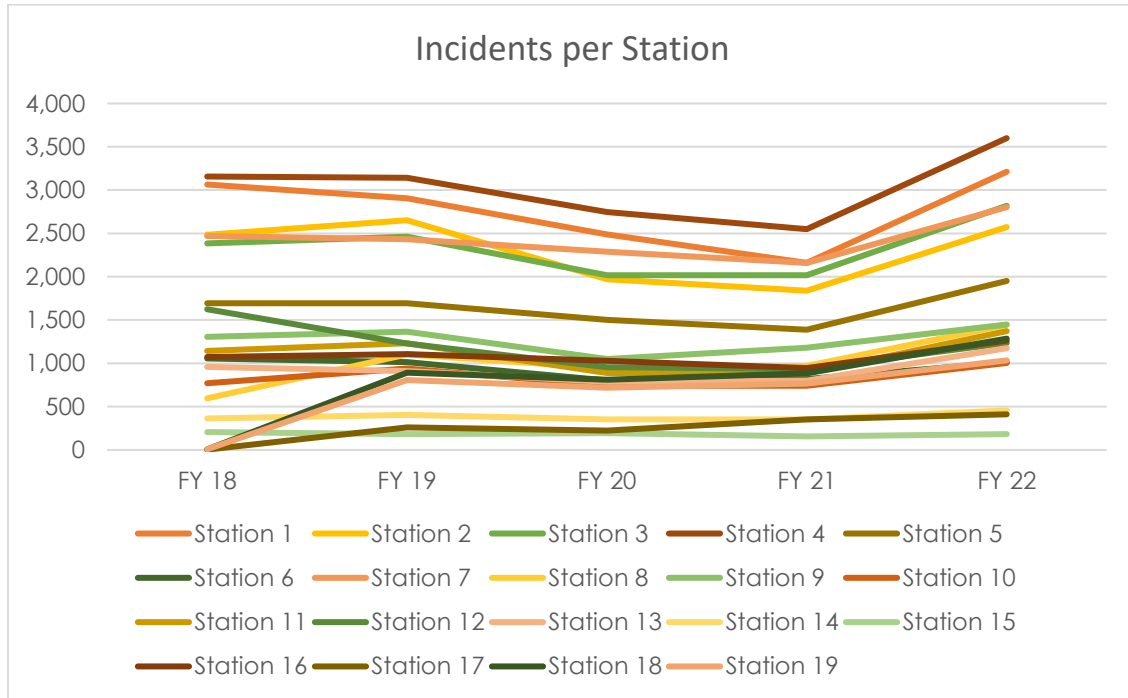
Figure 2. NFPA 1710 Response Objectives



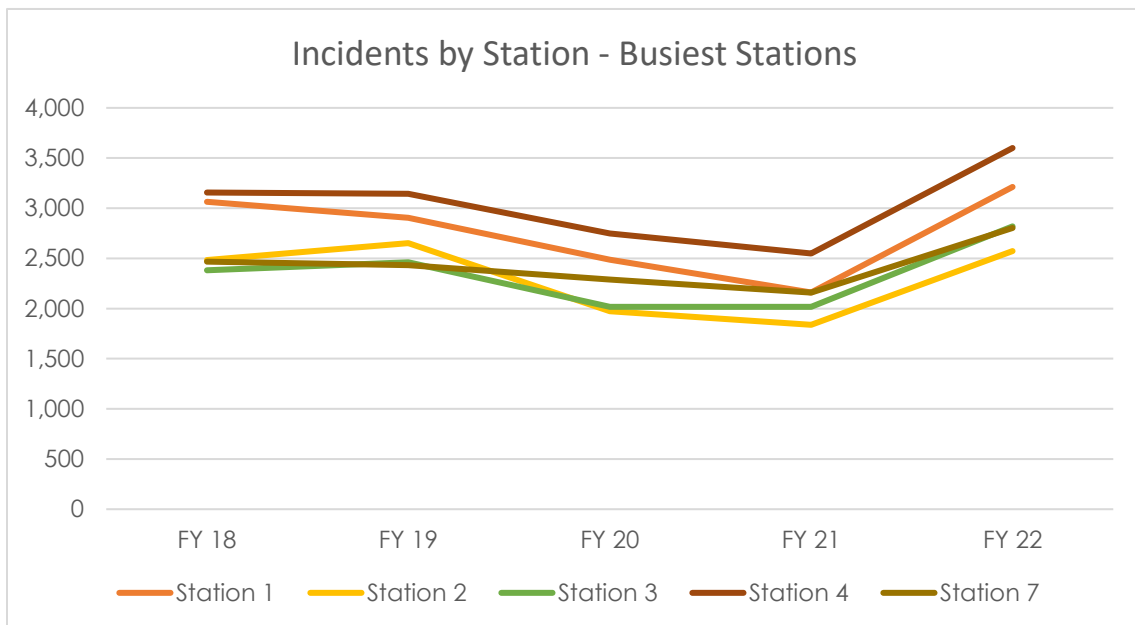
## Incident statistics

Graphs 1-3 below highlight information across fiscal years (FYs) on incidents per station as well as incidents by type.

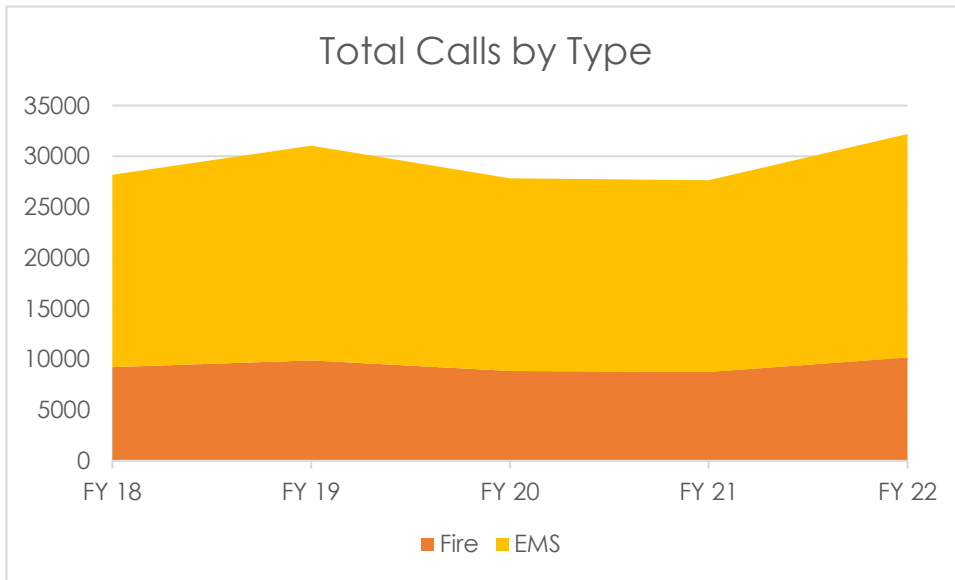
Graph 1. Total incidents for FY 2018 to FY 2022 (March 2022)



Graph 2. Number of incidents on busiest stations for FY 2018 to FY 2022 (March 2022)



Graph 3. Total incidents by type for FY 2019 to FY 2022 (March 2022)



Per Graph 3 above, 32% of incidents were fire related incidents and 68% were EMS related incidents.

## OBJECTIVES

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The objectives of the audit were to:

- review Durham Fire Department’s response times to determine if they meet the goals (overall response rates- specifically vertical response rates) established by the Fire Department; and
- review the Department/City’s plan to meet increasing demand on DFD services because of growth—including high rise buildings.

## FINDINGS AND RECOMMENDATIONS

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*Room exists to enhance analysis with available data.*

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The Durham Fire Department recognizes the impact of growth on services they provide. At present, additional resources are requested during the budget process. While the Department explains their budget requests during the budget cycle, there is room for enhancing the analysis being performed based on available data. Analysis to show the impact of future growth on service delivery for the Department can be enhanced. In addition, the methodology can be enhanced to determine if and when additional resources are needed as a result of the impact of growth. Developing a methodology or identifying key indicators on when to add resources is a difficult task; however, utilizing effective planning techniques and modern technology can assist in this process.

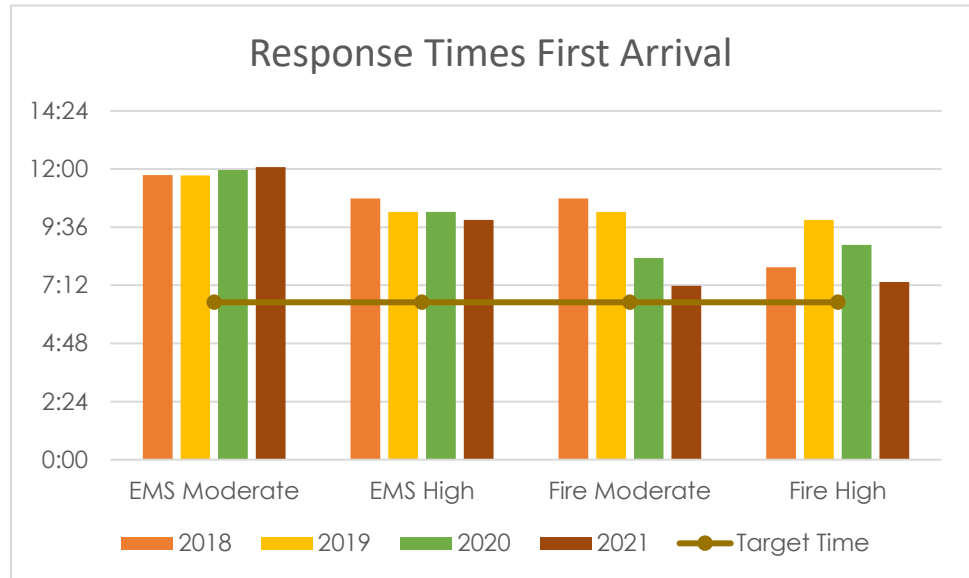
### **Finding 1. Durham Fire Department response times are higher than NFPA 1710 standard benchmarks.**

Audit Services staff analyzed response times data provided by the Durham Fire Department (DFD) staff and compared the results with NFPA 1710 benchmarks. Durham Fire Department response times are above NFPA 1710 recommended times for EMS and Fire incidents of moderate and high risk.

Graph 4 below highlights EMS and Fire first arrival response times for moderate and high-risk incidents for FY 2018-2021. The NFPA 1710

response benchmark target time for first alarm is 6 minutes and 30 seconds.

Graph 4. EMS and fire first arrival response times for moderate and high-risk incidents



**Recommendation 1:** The Durham Fire Department staff should continue monitoring response times to ensure service delivery is within acceptable levels based on the City’s risk tolerance.

**Value Added:** *Risk Reduction, Efficiency*

**DEPARTMENTAL RESPONSE: MANAGEMENT CONCURS;  
IMPLEMENTATION DATE: CONTINUOUS  
SEE [PAGE 18](#) FOR DEPARTMENT’S FULL RESPONSE**

**Finding 2.** The current methodology to identify additional resources should be enhanced to incorporate the impact on service delivery of development and population growth.

Based on information provided by the City-County Planning Department, a significant amount of future growth is expected. Growth may or may not



create an instantaneous demand in service. The demand for services will be based on several factors such as the nature of the occupancy (age, mobility, gender, etc.) and the hazards that are present (sprinklers present, building materials used, etc.). Figure 3 below shows parcels approved for development and constructed parcels. The blue constructed parcels indicate areas where a building permit has been approved and construction has occurred or is currently being built. The orange areas indicate projects and cases that currently do not have construction permits approved and are currently pending future development.

Part of this growth also includes an increase in high rise buildings in Durham. See Figure 4 below. Based on data provided by the City-County Inspections Department, approximately 15 high rise buildings more than 7 stories and 782 buildings less than 7 stories were developed from January 2017 to August 2022. There are many high-rise structures that will also be part of future development. DFD has not analyzed the potential impact of this growth on service delivery.

Figure 3. Pending and Under Construction Development

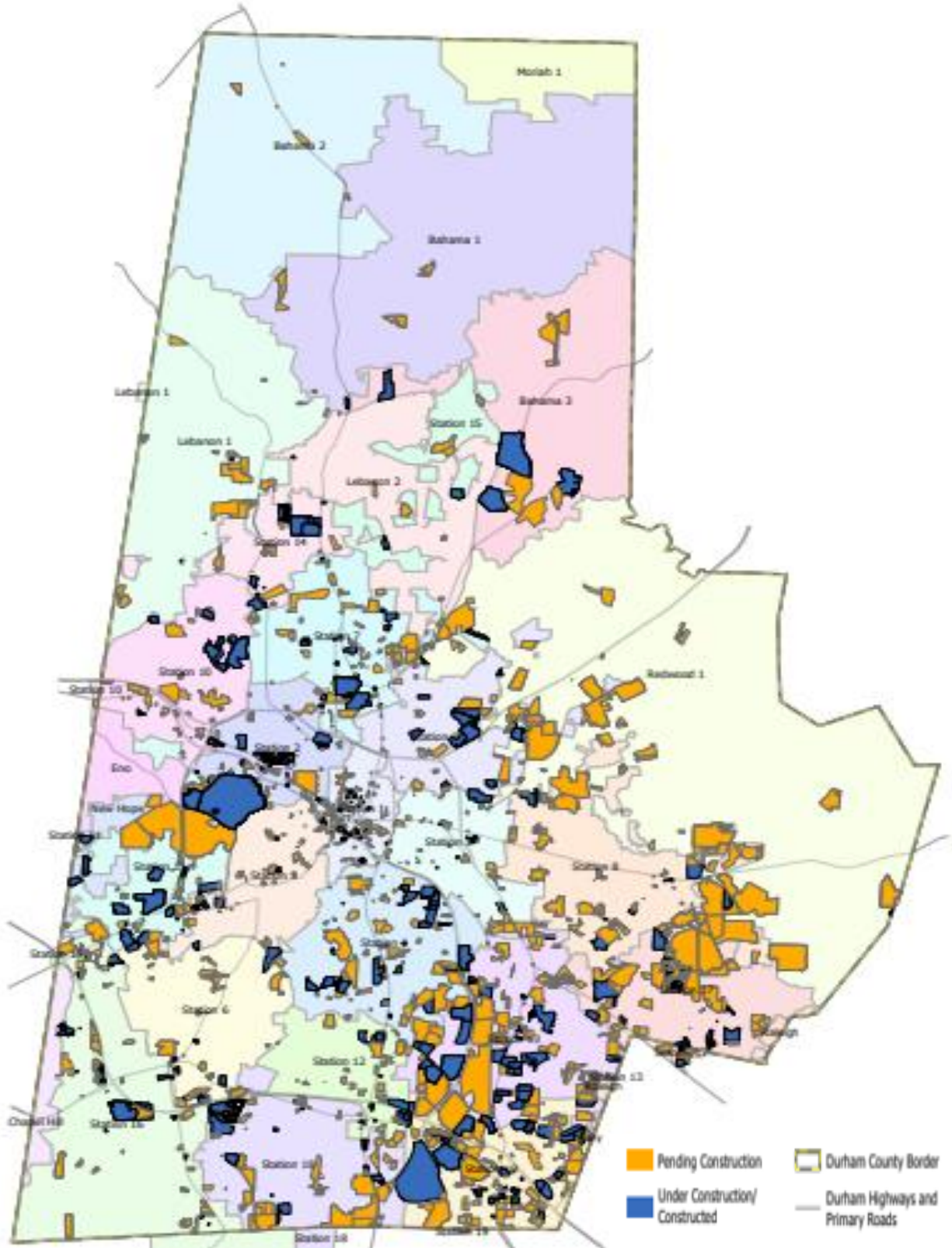
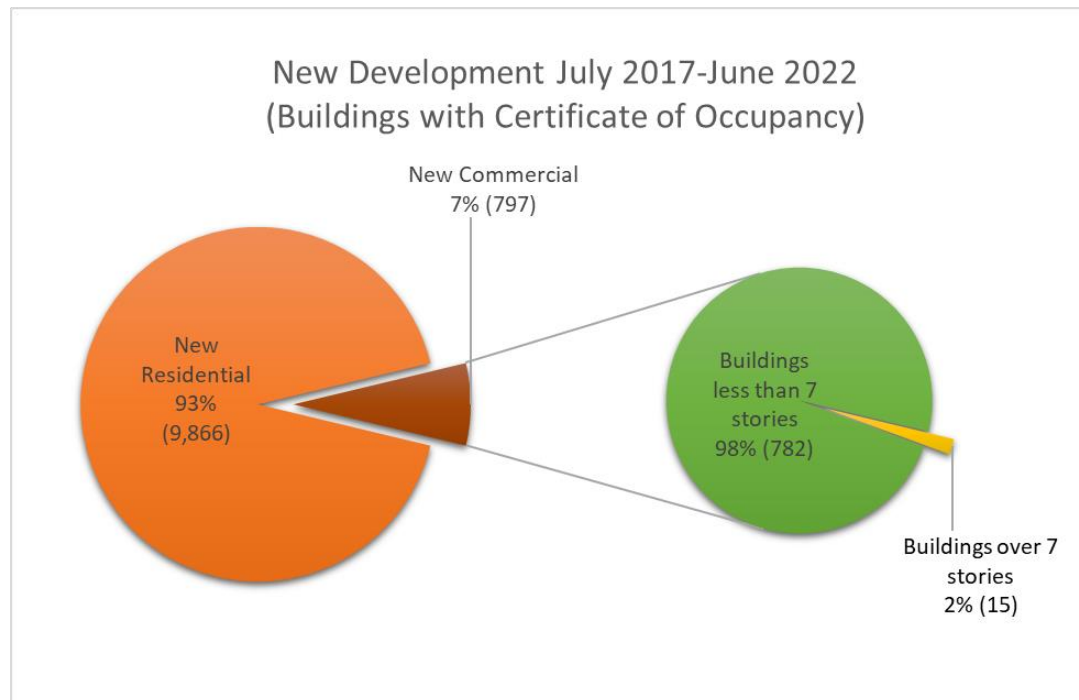


Figure 4. Approved Developments Between July 1, 2017 to June 30, 2022



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*Long-term strategies should consider desired level of service and management's risk tolerance for not meeting the standard.*

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A question that must be addressed by City management is when will additional response resources be required to meet Durham Fire Department response goals. There is very little definitive guidance in fire service literature on how this should be accomplished. Long-term strategies should take into consideration how community growth and population attributes impact DFD's workload, and therefore the need for deployment of resources. Data on response times, number of alarms and length of time an apparatus is unavailable could be used to determine current level of service the DFD can provide given their resources. Thresholds should then be established based on risk tolerance and desired level of services that would indicate the need for additional resources.

**Recommendation 2:** The Durham Fire Department should incorporate the impact of future growth on service delivery in their methodology, trigger points and key indicators. In addition, DFD staff should consider using outside experts, e.g., a consultant, ICMA Fellow, etc. to perform a study that incorporates forecasting to determine the impact of future growth on its current resources. Such a study could be the baseline for continuous monitoring on the part of DFD.

**Value Added:** Risk Reduction; Efficiency

**DEPARTMENTAL RESPONSE: MANAGEMENT CONCURS;  
IMPLEMENTATION DATE: FY24 BUDGET PROCESS  
SEE [PAGE 19](#) FOR DEPARTMENT'S FULL RESPONSE**

Value Added Legend



# DEPARTMENTAL RESPONSE TO AUDIT RECOMMENDATIONS

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## Memo

**Date:** October 19, 2022  
**To:** Dr. Germaine F. Brewington, Director of Audit Services  
**From:** Robert J. Zoldos II, Fire Chief  
**Subject:** Management's Response to Recommendations  
Durham Fire Department Response Times Performance Audit

The following is the management's response to the Durham Fire Department Response Times Performance Audit October 24, 2022.

### **Recommendation 1:**

The Durham Fire Department staff should continue monitoring response times to ensure service delivery is within acceptable levels based on the City's risk tolerance.

**Value Added:** Risk Reduction, Efficiency

### **Management's Response:**

We concur. Management is in full agreement with the recommendation.

The DFD does currently monitor response times both to ensure individual response units are meeting expectations but also to ensure that the Effective Response Force (ERF) requirements are being met.

The Deputy Fire Chief of Emergency Services shall be responsible for implementation of this recommendation.

Implementation Date: Continuous



**Recommendation 2:**

The Durham Fire Department should incorporate the impact of future growth on service delivery in their methodology, trigger points and key indicators. In addition, DFD staff should consider using outside experts, e.g., a consultant, ICMA Fellow, etc. to perform a study that incorporates forecasting to determine the impact of future growth on its current resources. Such a study could be the baseline for continuous monitoring on the part of DFD.

**Value Added:** Risk Reduction, Efficiency

**Management's Response:**

We concur. Management is in full agreement with the recommendation.

While the DFD does monitor response times and ERF effectiveness, we lack the tools to conduct a complete and in-depth study of our response abilities. This is compounded by annexations and vertical growth. The DFD will request, through the annual budget process, a service delivery study, and a software tool to help us develop a baseline and provide live updates on needs.

The Deputy Fire Chief for Administrative Services shall be responsible for implementation of this recommendation.

Implementation Date: FY24 Budget Process

# SCOPE, METHODOLOGY, and COMPLIANCE

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## Scope

The scope of the audit included examining current practices to meet established goals for response times; and reviewing the department's strategy related to growth impact on service delivery.

## Methodology

Audit Services Department staff performed the following procedures to accomplish the objectives of the audit. Staff:

- interviewed Durham Fire Department staff responsible for tracking performance metrics and operations;
- interviewed Durham Fire Department staff responsible for budget submissions;
- reviewed performance metrics tracked by DFD to understand demand for DFD services to verify compliance with NFPA 1710 and internal metrics;
- analyzed Durham Fire Department performance metrics (response rates, underutilized time, runs, etc.);
- analyzed requests for services received by the DFD from 2018-2022 overall and by fire districts;
- analyzed requests for service calls by building category;
- determined cause for observations/trends in performance metrics to identify impact with:
  - population growth
  - demographics
  - housing units
- reviewed the DFD Strategic Plan;
- reviewed the strategic planning process to understand how assessment of variables that will have a future impact are considered (how they incorporate risk into long term planning);
- researched how other jurisdictions analyzed risk and incorporated risk into the strategic planning (impact of growth and change in demographics);
- reviewed City's Strategic Plan to understand DFD's responsibilities/role in the City's Plan;
- reviewed the City's 2021 Resident Survey to identify areas of concern as it relates to services provided by the Durham Fire Department;
- reviewed the process of identifying resource needs and how those needs are requested (regular budget and CIP projects), and

- reviewed how other jurisdictions assess growth to determine impact on services

During this engagement, the Audit Services Department staff also maintained awareness for the potential existence of fraud.

## Compliance

Audit Services staff conducted this performance audit per generally accepted government auditing standards. Those standards require that the Audit Services staff plan and perform the audit to obtain sufficient and appropriate evidence to provide a reasonable basis for our findings and conclusions based on the audit objectives. Audit Services staff believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives.

# REPORT AT A GLANCE

Objective	Finding	Recommendation	Department Response	Implementation Date
<p><i>To review Durham Fire Department's response times to determine if they meet the goals (overall response rates- specifically vertical response rates) established by the Fire Department</i></p>	<p><b>Finding 1.</b> Durham Fire Department response times are higher than NFPA 1710 standard benchmarks.</p>	<p><b>Recommendation 1:</b> The Durham Fire Department staff should continue monitoring response times to ensure service delivery is within acceptable levels based on the City's risk tolerance. <b>Value Added:</b> <u>Risk Reduction, Efficiency</u></p>	<p><b>We concur.</b> Management is in full agreement with the recommendation. The DFD does currently monitor response times both to ensure individual response units are meeting expectations but also to ensure that the Effective Response Force (ERF) requirements are being met. The Deputy Fire Chief of Emergency Services shall be responsible for implementation of this recommendation.</p>	<p>Implementation Date: Continuous</p>

Objective	Finding	Recommendation	Department Response	Implementation Date
<p><i>To review the Department/City's plan to meet increasing demand on DFD services because of growth—including high rise buildings.</i></p>	<p><b>Finding 2.</b> The current methodology to identify additional resources should be enhanced to incorporate the impact on service delivery of development and population growth.</p>	<p><b>Recommendation 2:</b> The Durham Fire Department should incorporate the impact of future growth on service delivery in their methodology, trigger points and key indicators. In addition, DFD staff should consider using outside experts, e.g., a consultant, ICMA Fellow, etc. to perform a study that incorporates forecasting to determine the impact of future growth on its current resources. Such a study could be the baseline for continuous monitoring on the part of DFD.</p>	<p><b>We concur.</b> Management is in full agreement with the recommendation. While the DFD does monitor response times and ERF effectiveness, we lack the tools to conduct a complete and in-depth study of our response abilities. This is compounded by annexations and vertical growth. The DFD will request, through the annual budget process, a service delivery study and a software tool to help us develop a baseline and provide live updates on needs. The Deputy Fire Chief for Administrative Services shall be responsible for implementation of this recommendation.</p>	<p>Implementation Date: FY24 Budget Process</p>



# AUDIT SERVICES DEPARTMENT

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The Audit Services Department serves a three-fold role at the City of Durham. Our number one goal is to provide independent, objective assurance that City processes are working effectively. Secondly, we serve as internal fraud examiners when fraud, waste, or abuse is alleged against a City employee or department. Finally, to constantly foster high ethical standards, we provide in-depth ethical training to all City employees on a rolling basis. To learn more, visit our CODI site or our page on the [City of Durham's website](#).



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## Audit Services Oversight Committee (ASOC)

To maintain its organizational independence, the Audit Services Department reports to the Audit Services Oversight Committee (ASOC) at a minimum of four times a year. The ASOC approves all proposed audit plans and completed audits prepared by Audit Services staff.

The Audit Services Oversight Committee is made up of six members: two City Council Members, three resident members, and one alternate City Council Member. The current members include one certified public accountant and persons with business experience. The City Manager is an ex-officio, non-voting member of the ASOC.

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*Resident Member*

**Vice-Chair:** Matthew Ruterbories  
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*City Council Member*

Jillian Johnson  
*City Council Member*

Emily Yeatts  
*Resident Member*

DeDreana Freeman  
*Alternate*  
*City Council Member*

**Non-Voting Member:**  
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*City Manager*

## DISTRIBUTION OF REPORT

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