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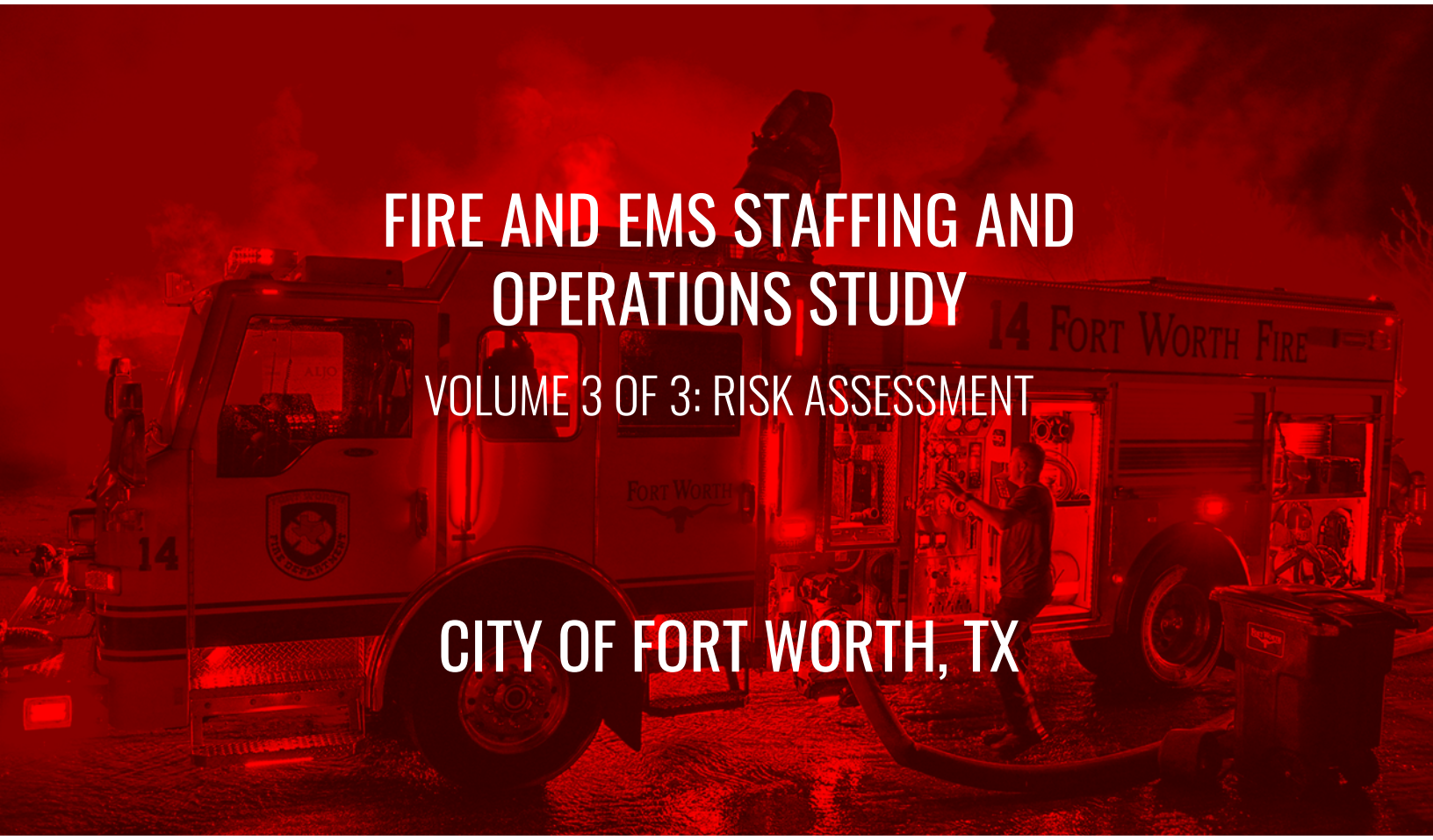

FIRE AND EMS STAFFING AND OPERATIONS STUDY

VOLUME 3 OF 3: RISK ASSESSMENT

CITY OF FORT WORTH, TX

AUGUST 23, 2022

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RISK ASSESSMENT

1.1 COMMUNITY RISK ASSESSMENT

SOC ELEMENT 3 OF 8
COMMUNITY RISK ASSESSMENT

The third element of the Standards of Coverage (SOC) process is a community risk assessment. Within the context of an SOC study, the objectives of a community risk assessment are to:

- Identify the values at risk to be protected within the community or service area.
- Identify the fire and non-fire hazards with the potential to adversely impact the community or service area.
- Quantify the overall risk associated with each hazard.
- Establish a foundation for current/future deployment decisions and risk-reduction/hazard-mitigation planning and evaluation.

A hazard is broadly defined as a situation or condition that can cause or contribute to harm. Examples include fire, medical emergency, vehicle collision, earthquake, flood, etc. Risk is broadly defined as the *probability of hazard occurrence* in combination with the *likely severity of resultant impacts* to people, property, and the community.

1.1.1 Risk Assessment Methodology

The methodology employed by Citygate to assess community risks as an integral element of an SOC deployment analysis incorporates the following elements:

- Identification of geographic risk planning sub-zones appropriate to the community or jurisdiction.
- Identification and quantification, to the extent data is available, of the specific values to be protected within the community or service area.
- Identification of the fire and non-fire hazards to be evaluated relative to services provided by the fire agency.
- Determination of the *probability of occurrence* for each hazard.
- Determination of the *probable consequence severity* of a hazard occurrence.
- Determination of the *impact severity* of a hazard occurrence on the fire agency's overall response capacity.

- Quantification of overall risk for each hazard based on probability of occurrence in combination with probable consequence severity and agency impact.

For this assessment, Citygate used the following data sources to understand the hazards and values to be protected in the City of Fort Worth (City):

- US Census Bureau population and demographic data
- City of Forth Worth geographical information systems data
- City of Fort Worth General Plan and Zoning information
- City and County Hazard Mitigation Plans
- City and Fire Department (Department) data and information.

1.1.2 Risk Assessment Summary

Citygate's evaluation of the values at risk and hazards likely to impact the City yields the following:

1. The Department serves a very diverse urban population with densities ranging from less than 1,000 to more than 18,000 people per square mile over a varied urban land use pattern.
2. The City's population is projected to projected to increase by 31 percent to more than 1.2 million people by 2045.
3. The City has a large inventory of residential and non-residential buildings to protect.
4. The City also has significant economic and other resource values to be protected, as identified in this assessment.
5. The Department's Emergency Management Office has multiple mass emergency notification options available to effectively communicate emergency information to the public in a timely manner.
6. The City's risk for seven hazards related to emergency services provided by the Department range from **Low** to **Extreme**, as summarized in the following table.

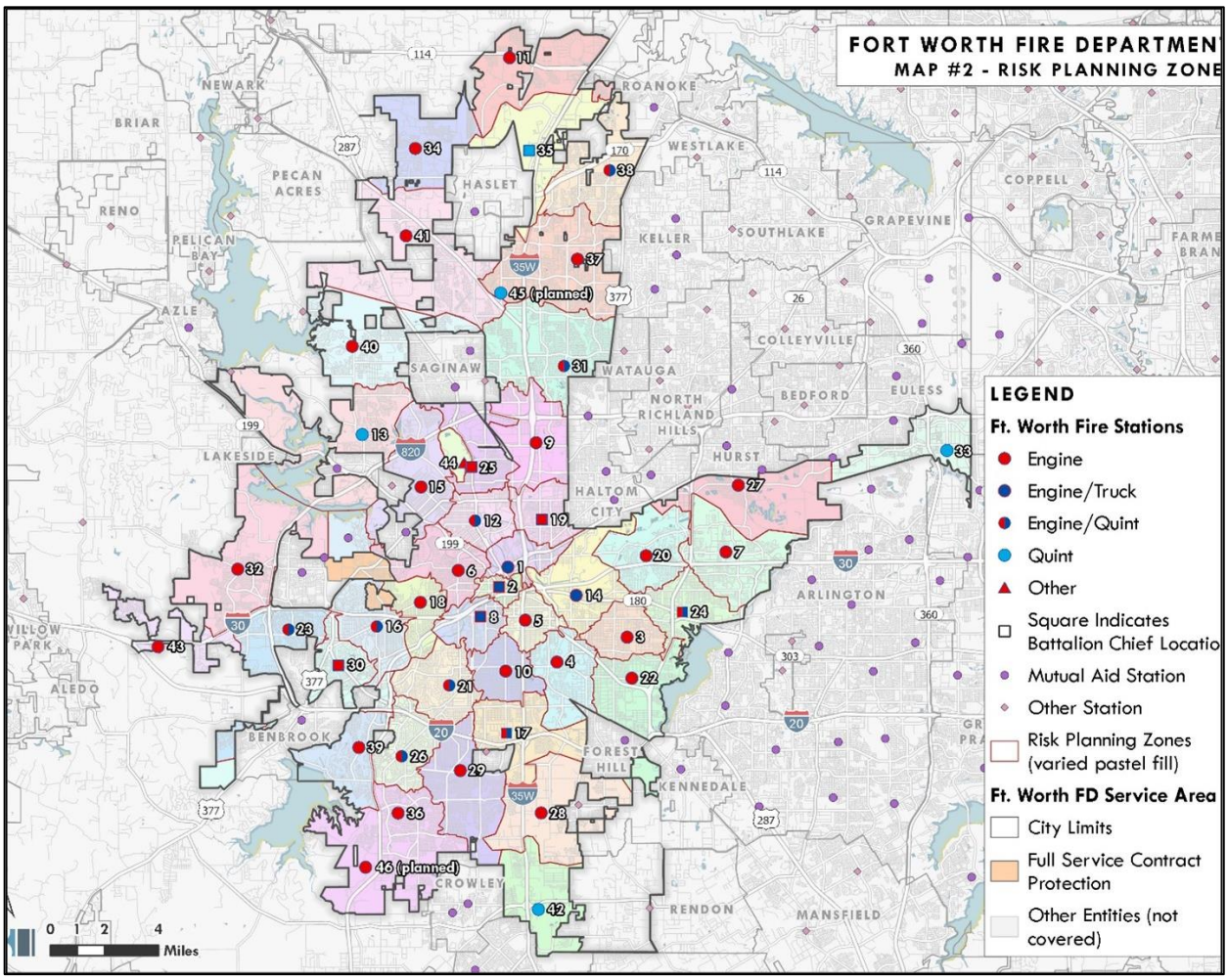
Table 1—Overall Risk by Incident Type

Hazard		Sub-Hazard Type	Risk Rating
1	Building Fire	Single-Family Residential	***High***
		Multi-Family Residential	***High***
		Commercial/Industrial	***High***
		High-Rise	***High***
2	Vegetation/Wildfire	Grass/Vegetation (<1 acre)	***Low***
		Brush (<5 acres)	***Moderate***
		Wildfire/WUI (<25 acres)	***High***
		Wildfire/WUI (>25 acres)	***High***
3	Medical Emergency	BLS only	***Low***
		BLS/ALS	***High***
		ALS	***High***
		Mass Casualty Incident	***High***
		Weapon Mass Destruction	***Extreme***
4	Hazardous Materials	Alarm/Odor Investigation	***Low***
		Hazmat Level 1	***Moderate***
		Hazmat Level 2	***High***
		Hazmat Level 3	***High***
		Hazmat Level 4	***Extreme***
5	Technical Rescue	Elevator Rescue	***Low***
		Trauma / Pin-In	***Moderate***
		Low Angle Rope Rescue	***Moderate***
		Confined Space / Trench Rescue / High Angle Rescue	***Moderate***
		Building Collapse / Natural Disaster	***High***
6	Marine Incident	Water Rescue	***Low***
		Boat Fire/Rescue	***Moderate***
		Marina Fire	***High***
7	Aviation Incident	ARFF Alert 1	***Low***
		ARFF Alert 2	***Moderate***
		ARFF Alert 3	***High***

1.1.3 Risk Planning Zones

The Commission on Fire Accreditation International (CFAI) recommends that jurisdictions establish geographic risk planning zones to better understand risk at a sub-jurisdictional level. For example, portions of a jurisdiction may contain predominantly moderate-risk building occupancies, such as detached single-family residences, while other areas contain high- or maximum-risk occupancies, such as commercial and industrial buildings with a high hazard fire load. If risk were to be evaluated on a jurisdiction-wide basis, the predominant moderate risk could outweigh the high or maximum risk and may not be a significant factor in an overall assessment of risk. If, however, those high- or maximum-risk occupancies are a larger percentage of the risk in a smaller planning zone, then it becomes a more significant risk factor. Another consideration in establishing planning zones is that the jurisdiction's record management system must also track the specific zone for each incident to be able to appropriately evaluate service demand and response performance relative to each specific zone. For this assessment, Citygate utilized 44 planning zones corresponding with existing fire station first-due response areas, as shown on the following map.

Figure 1—Risk Planning Zones



Fire Station Risk Profiles

Following is a map and risk profile of each risk planning zone.

Figure 2—Fire Station 1

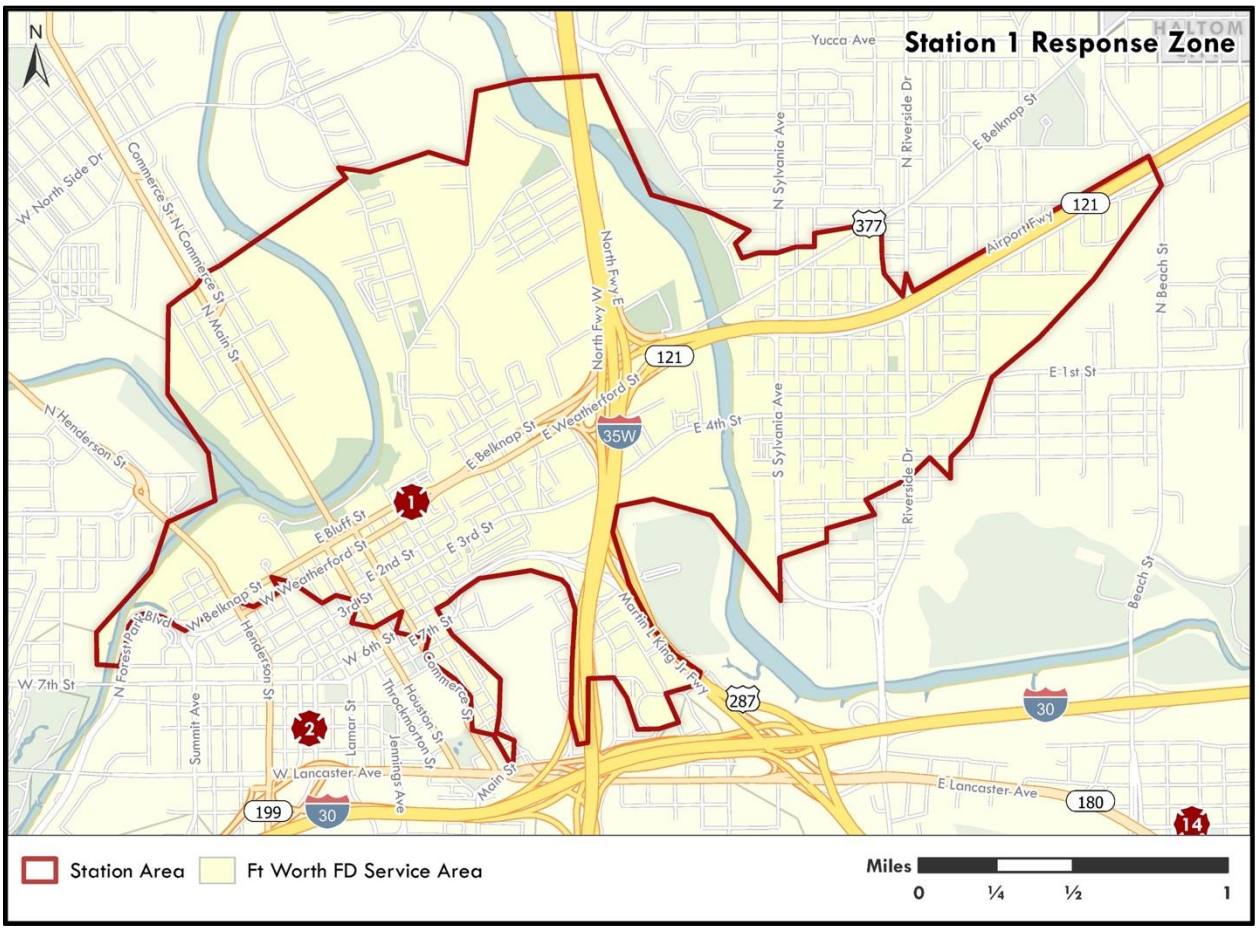


Table 2—Risk Profile – Fire Station 1

Risk Factors			
Total Area (Square Miles)	**3.44**	Total Number of Buildings	**2,673**
Resident Population	**6,321**	Building Density (per Square Mile)	**777**
Daytime Population	**20,156**	High-Risk Occupancies	**28**
Daytime Population Density	**5,858**	High-Rise Buildings (=/>75 feet)	**30**
Nighttime Population Density	**1,837**	Assessed Valuation – Improvements	**$1,289 Million**
Critical Facilities	**5**		

Figure 3—Fire Station 2

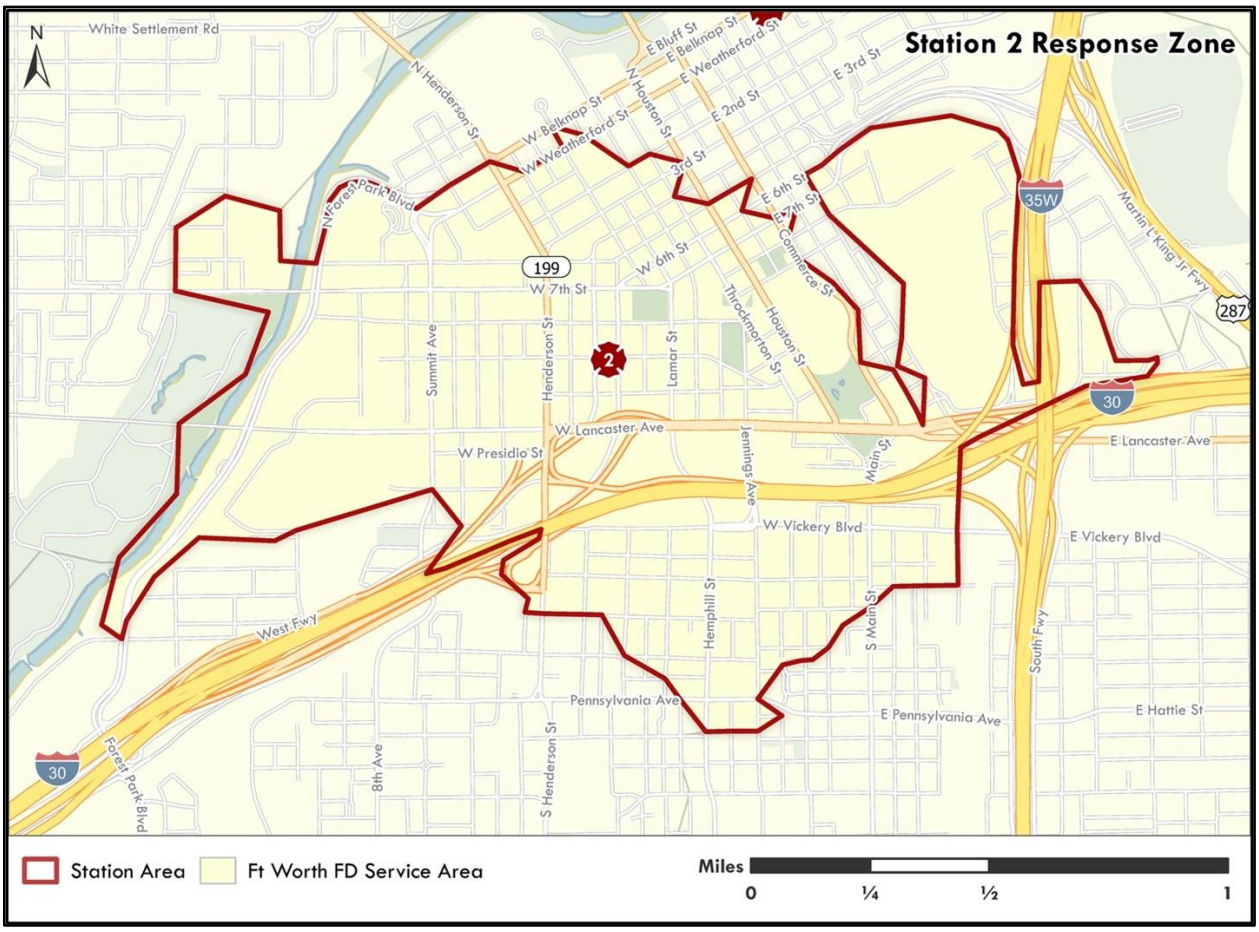


Table 3—Risk Profile – Station 2

Risk Factors			
Total Area (Square Miles)	**1.49**	Total Number of Buildings	**751**
Resident Population	**8,478**	Building Density (per Square Mile)	**503**
Daytime Population	**32,648**	High-Risk Occupancies	**45**
Daytime Population Density	**21,878**	High-Rise Buildings (=/>75 feet)	**69**
Nighttime Population Density	**5,681**	Assessed Valuation – Improvements	**$1,863 Million**
Critical Facilities	**19**		

Figure 4—Fire Station 3

Table 4—Risk Profile – Station 3

Risk Factors			
Total Area (Square Miles)	**4.50**	Total Number of Buildings	**10,135**
Resident Population	**20,740**	Building Density (per Square Mile)	**2,254**
Daytime Population	**804**	High-Risk Occupancies	**13**
Daytime Population Density	**179**	High-Rise Buildings (=/>75 feet)	**0**
Nighttime Population Density	**4,612**	Assessed Valuation – Improvements	**$637 Million**
Critical Facilities	**3**		

Figure 5—Fire Station 4

Table 5—Risk Profile – Station 4

Risk Factors			
Total Area (Square Miles)	**6.56**	Total Number of Buildings	**7,988**
Resident Population	**23,373**	Building Density (per Square Mile)	**1,217**
Daytime Population	**2,340**	High-Risk Occupancies	**27**
Daytime Population Density	**357**	High-Rise Buildings (=/>75 feet)	**0**
Nighttime Population Density	**3,561**	Assessed Valuation – Improvements	**$829 Million**
Critical Facilities	**2**		

Figure 6—Fire Station 5

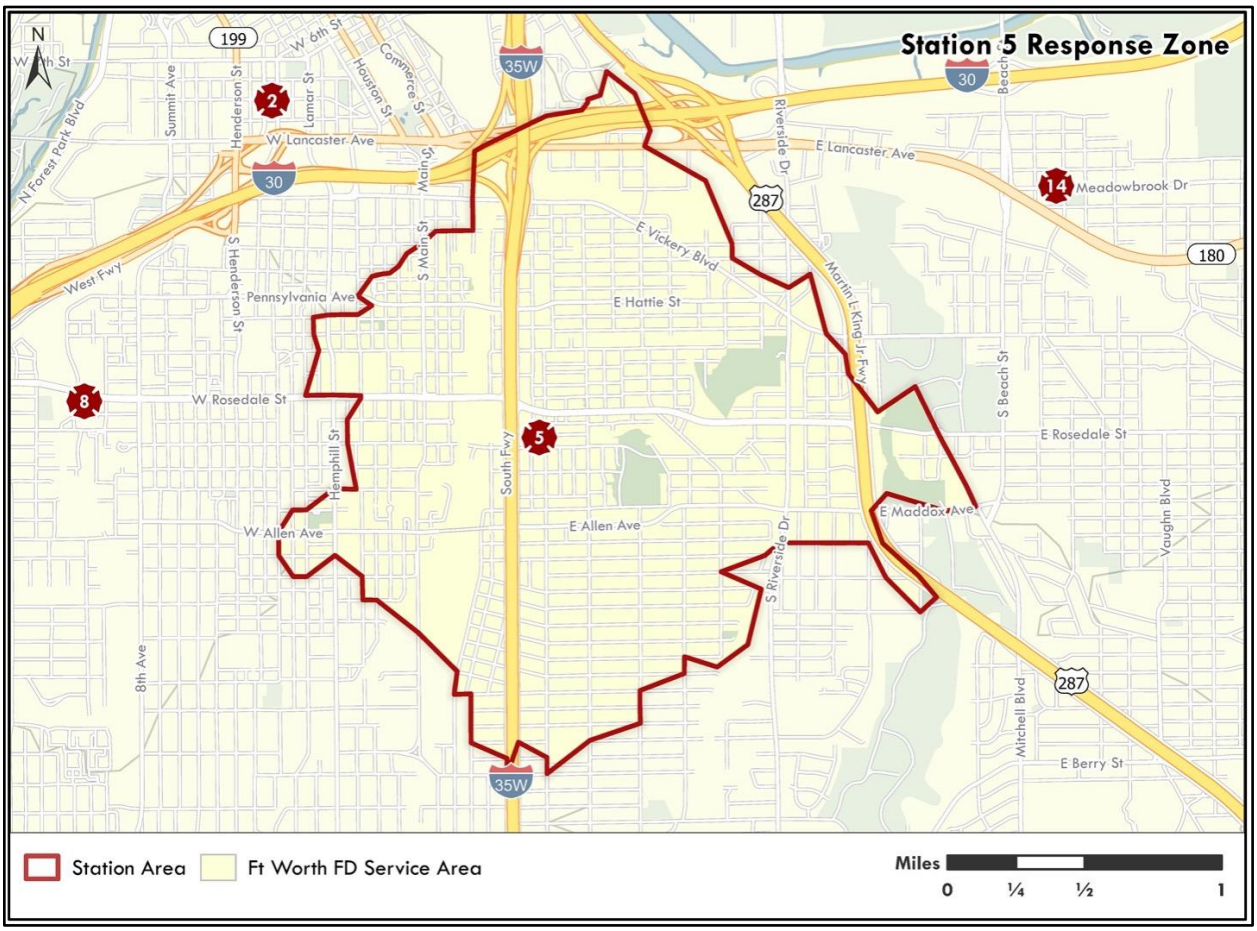


Table 6—Risk Profile – Station 5

Risk Factors			
Total Area (Square Miles)	**3.32**	Total Number of Buildings	**5,544**
Resident Population	**13,574**	Building Density (per Square Mile)	**1,670**
Daytime Population	**9,894**	High-Risk Occupancies	**40**
Daytime Population Density	**2,980**	High-Rise Buildings (=/>75 feet)	**6**
Nighttime Population Density	**4,089**	Assessed Valuation – Improvements	**$850 Million**
Critical Facilities	**15**		

Figure 7—Fire Station 6

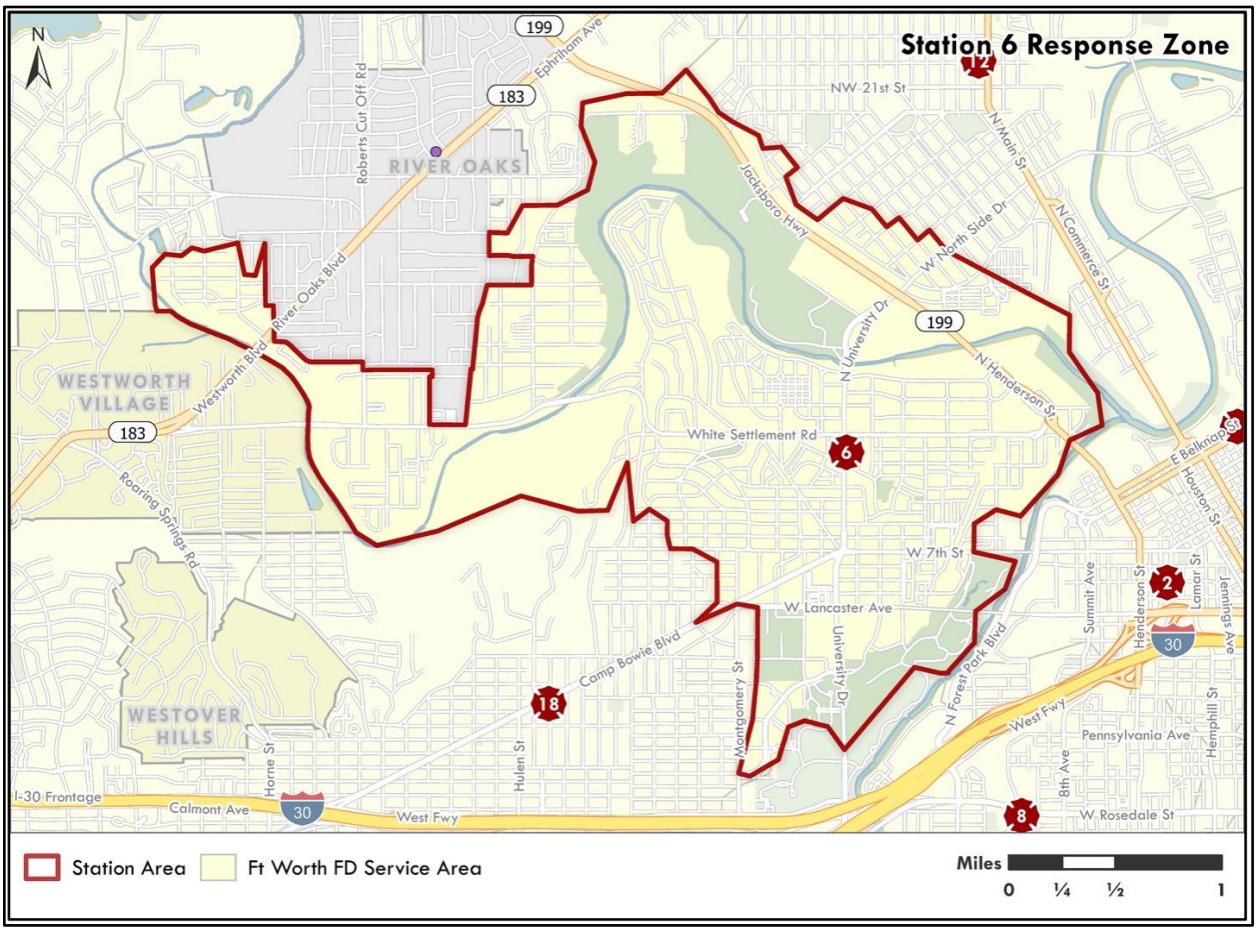


Table 7—Risk Profile – Station 6

Risk Factors			
Total Area (Square Miles)	**6.01**	Total Number of Buildings	**6,287**
Resident Population	**16,726**	Building Density (per Square Mile)	**1,046**
Daytime Population	**27,583**	High-Risk Occupancies	**65**
Daytime Population Density	**4,591**	High-Rise Buildings (=/>75 feet)	**13**
Nighttime Population Density	**2,784**	Assessed Valuation – Improvements	**$2,765 Million**
Critical Facilities	**9**		

Figure 8—Fire Station 7

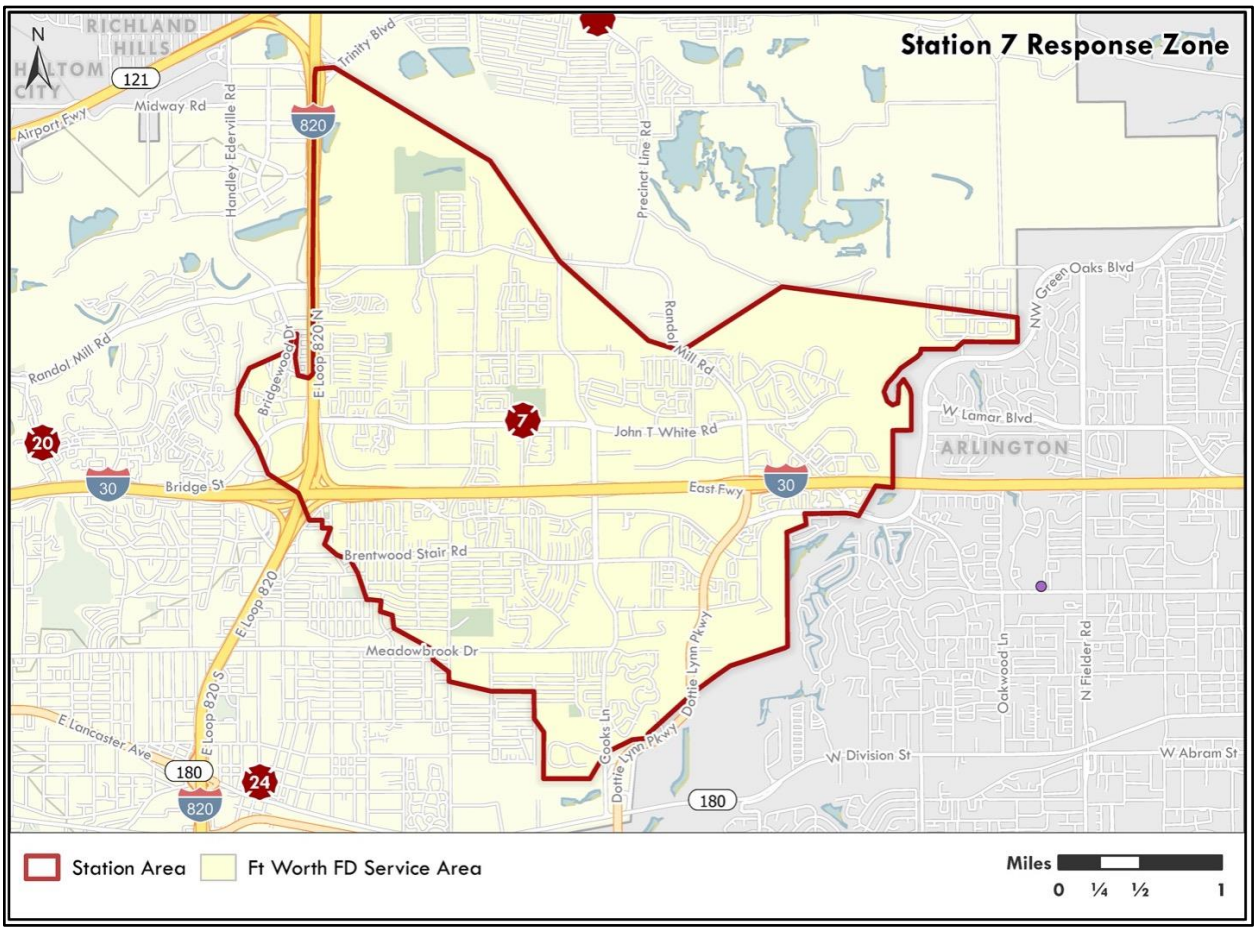


Table 8—Risk Profile – Station 7

Risk Factors			
Total Area (Square Miles)	**9.52**	Total Number of Buildings	**9,799**
Resident Population	**28,528**	Building Density (per Square Mile)	**1,029**
Daytime Population	**4,625**	High-Risk Occupancies	**40**
Daytime Population Density	**486**	High-Rise Buildings (=/>75 feet)	**0**
Nighttime Population Density	**2,997**	Assessed Valuation – Improvements	**$1,548 Million**
Critical Facilities	**1**		

Figure 9—Fire Station 8

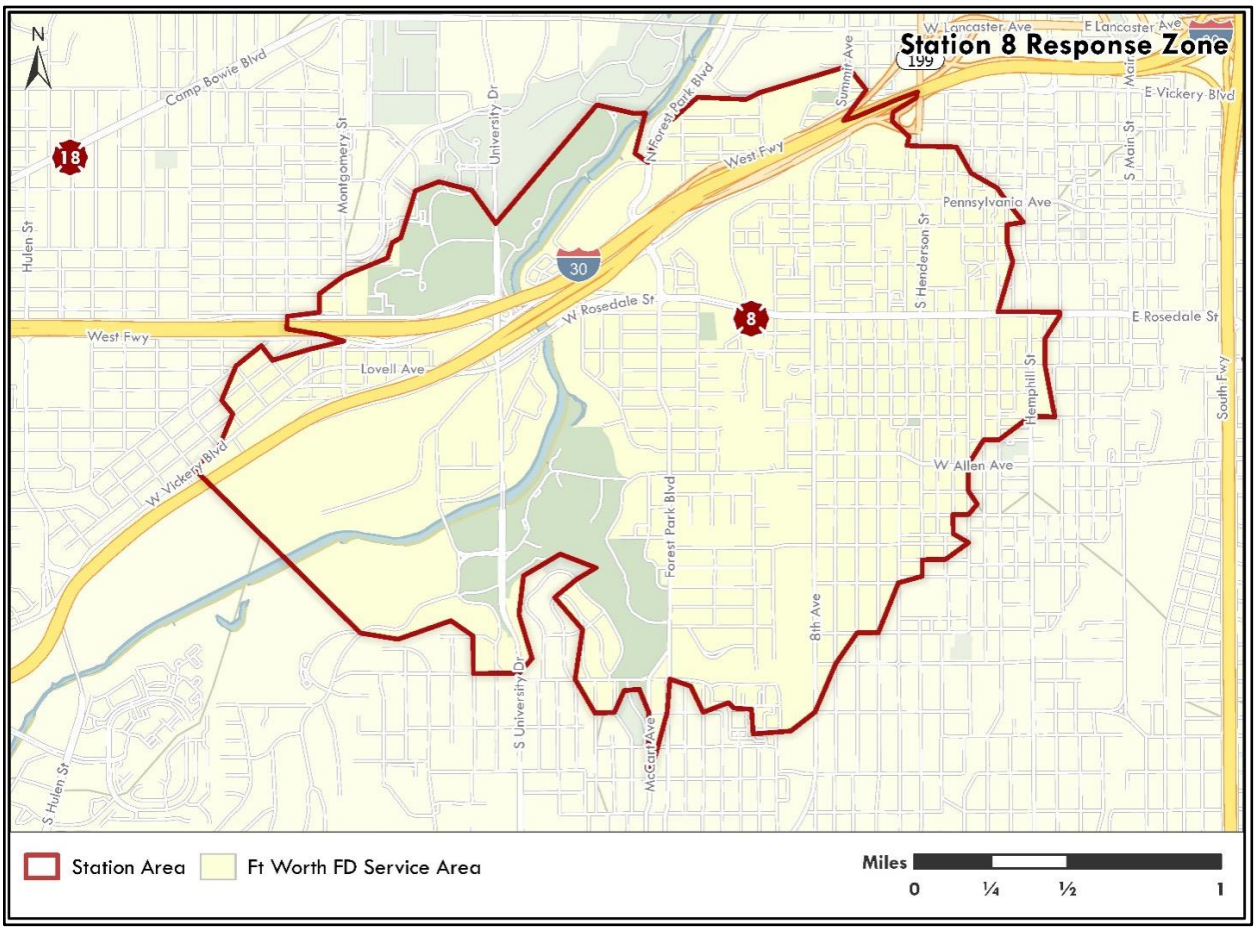


Table 9—Risk Profile – Station 8

Risk Factors			
Total Area (Square Miles)	**3.83**	Total Number of Buildings	**5,022**
Resident Population	**8,833**	Building Density (per Square Mile)	**1,312**
Daytime Population	**30,345**	High-Risk Occupancies	**57**
Daytime Population Density	**7,925**	High-Rise Buildings (=/>75 feet)	**27**
Nighttime Population Density	**2,307**	Assessed Valuation – Improvements	**$2,987 Million**
Critical Facilities	**20**		

Figure 10—Fire Station 9

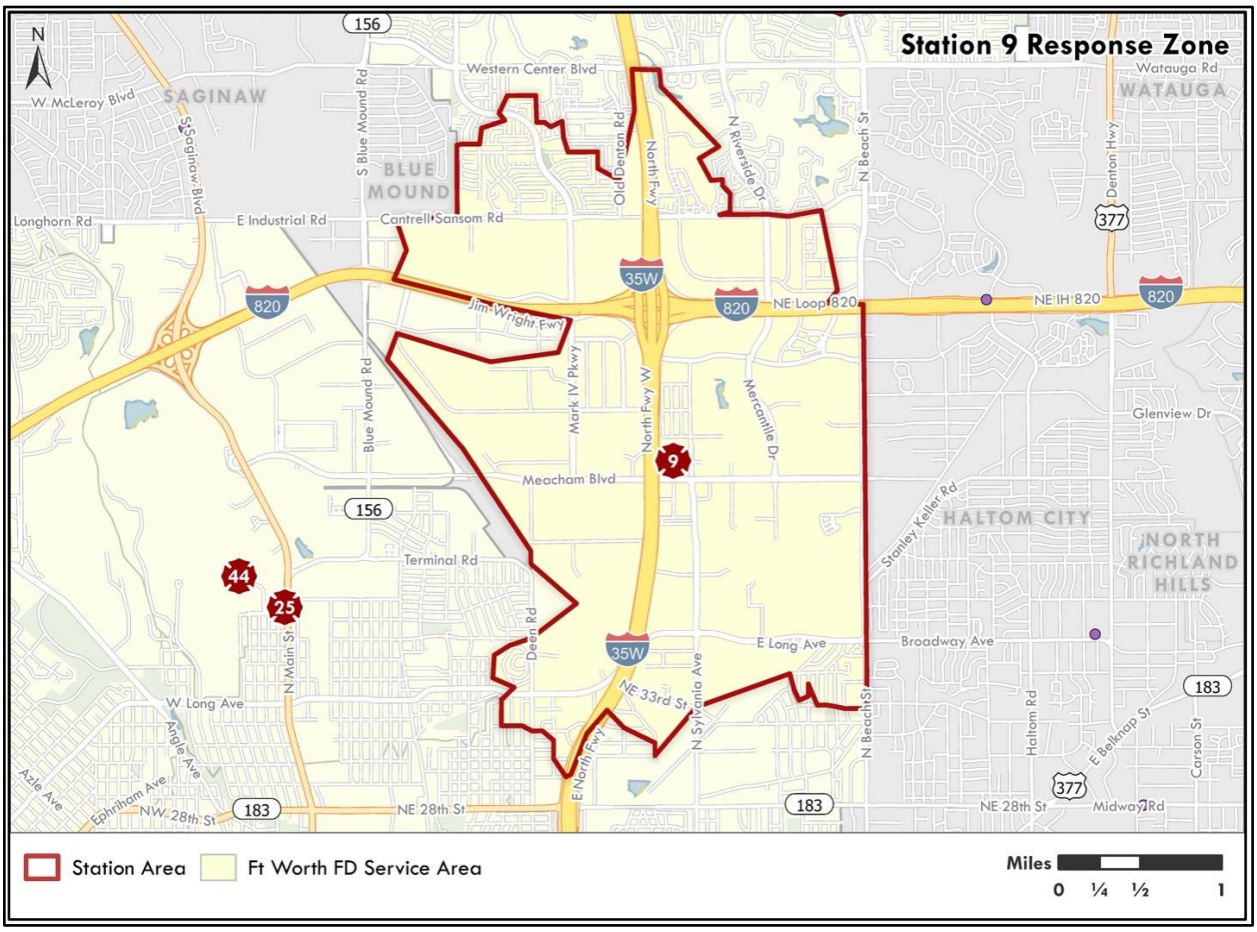


Table 10—Risk Profile – Station 9

Risk Factors			
Total Area (Square Miles)	**8.01**	Total Number of Buildings	**3,580**
Resident Population	**9,720**	Building Density (per Square Mile)	**447**
Daytime Population	**21,068**	High-Risk Occupancies	**33**
Daytime Population Density	**2,630**	High-Rise Buildings (=/>75 feet)	**5**
Nighttime Population Density	**1,213**	Assessed Valuation – Improvements	**$1,203 Million**
Critical Facilities	**1**		

Figure 11—Fire Station 10

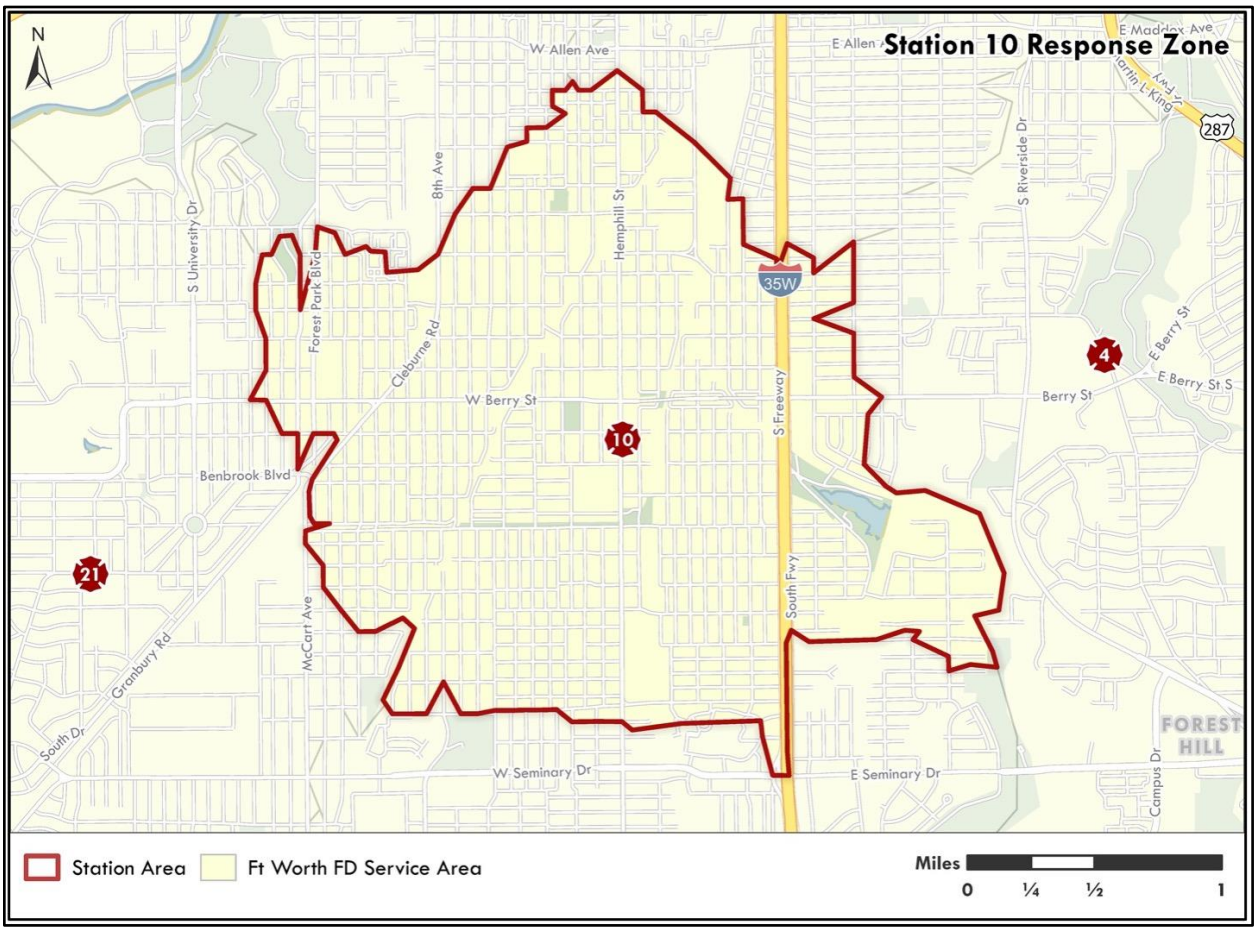


Table 11—Risk Profile – Station 10

Risk Factors			
Total Area (Square Miles)	**4.70**	Total Number of Buildings	**12,645**
Resident Population	**25,103**	Building Density (per Square Mile)	**2,690**
Daytime Population	**5,170**	High-Risk Occupancies	**32**
Daytime Population Density	**1,100**	High-Rise Buildings (=/>75 feet)	**3**
Nighttime Population Density	**5,340**	Assessed Valuation – Improvements	**$985 Million**
Critical Facilities	**4**		

Figure 12—Fire Station 11

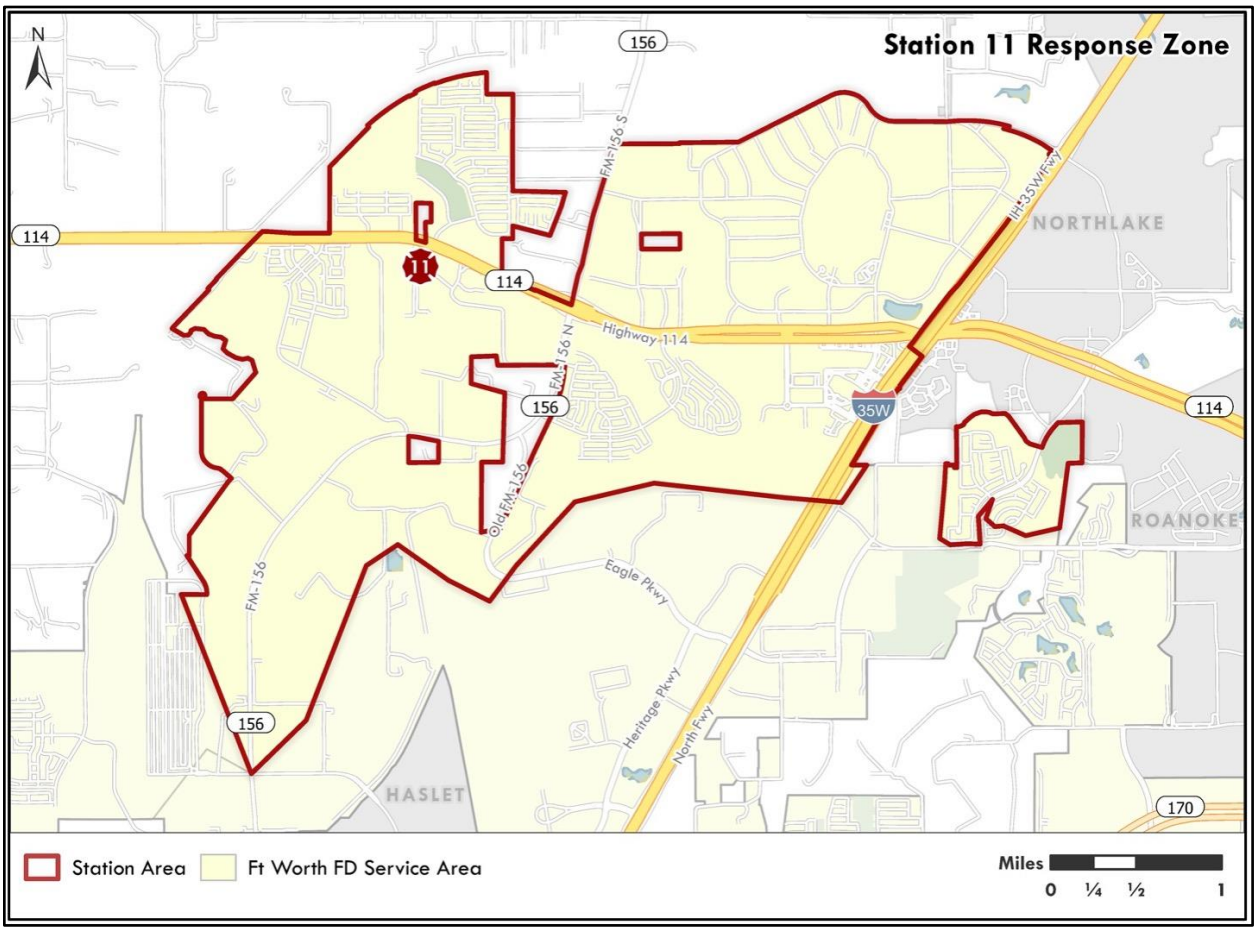


Table 12—Risk Profile – Station 11

Risk Factors			
Total Area (Square Miles)	**10.28**	Total Number of Buildings	**5,300**
Resident Population	**11,077**	Building Density (per Square Mile)	**516**
Daytime Population	**6,487**	High-Risk Occupancies	**12**
Daytime Population Density	**631**	High-Rise Buildings (=/>75 feet)	**3**
Nighttime Population Density	**1,078**	Assessed Valuation – Improvements	**$1,118 Million**
Critical Facilities	**1**		

Figure 13—Fire Station 12

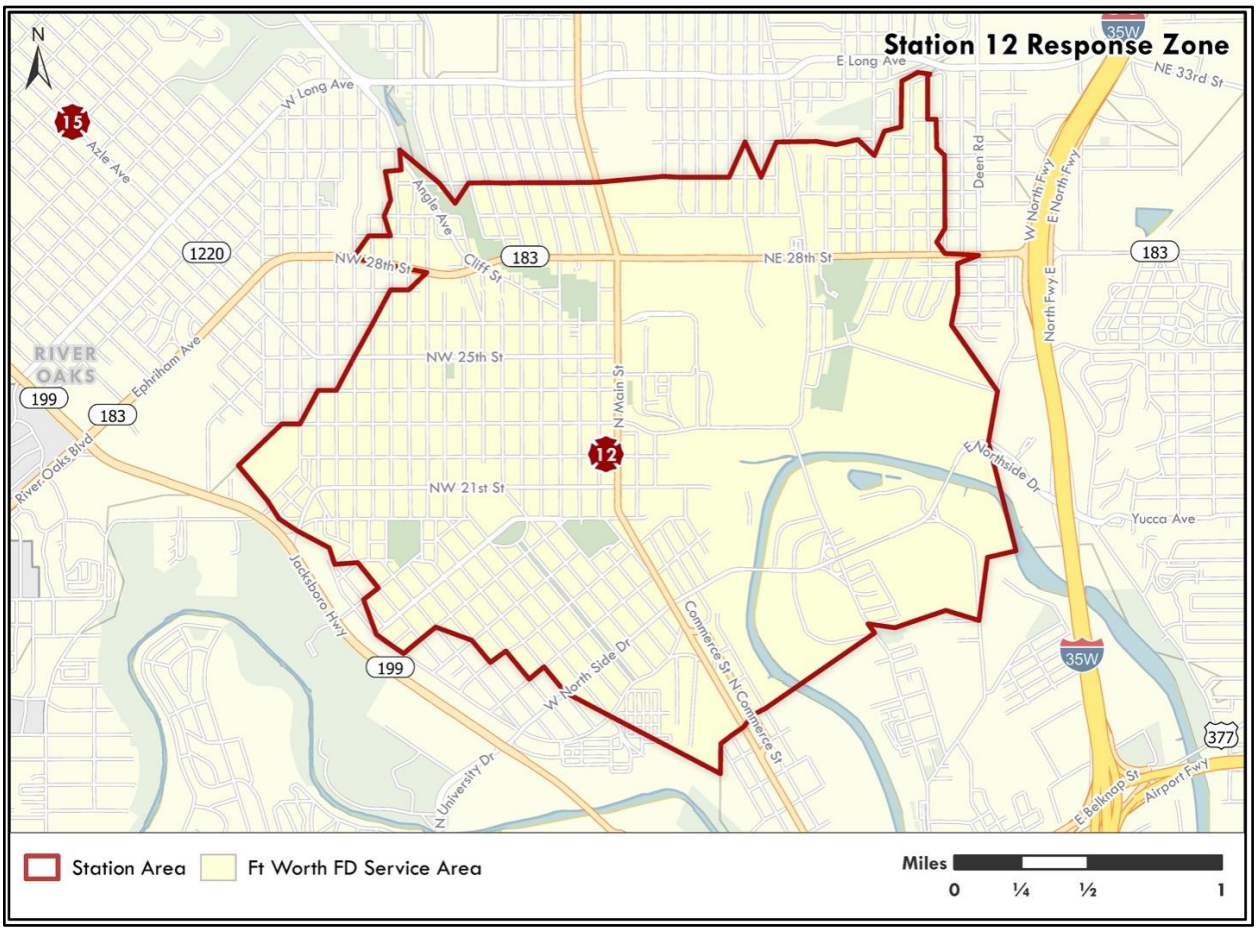


Table 13—Risk Profile – Station 12

Risk Factors			
Total Area (Square Miles)	**4.54**	Total Number of Buildings	**8,018**
Resident Population	**15,656**	Building Density (per Square Mile)	**1,765**
Daytime Population	**7,501**	High-Risk Occupancies	**27**
Daytime Population Density	**1,652**	High-Rise Buildings (=/>75 feet)	**3**
Nighttime Population Density	**3,447**	Assessed Valuation – Improvements	**$796 Million**
Critical Facilities	**34**		

Figure 14—Fire Station 13

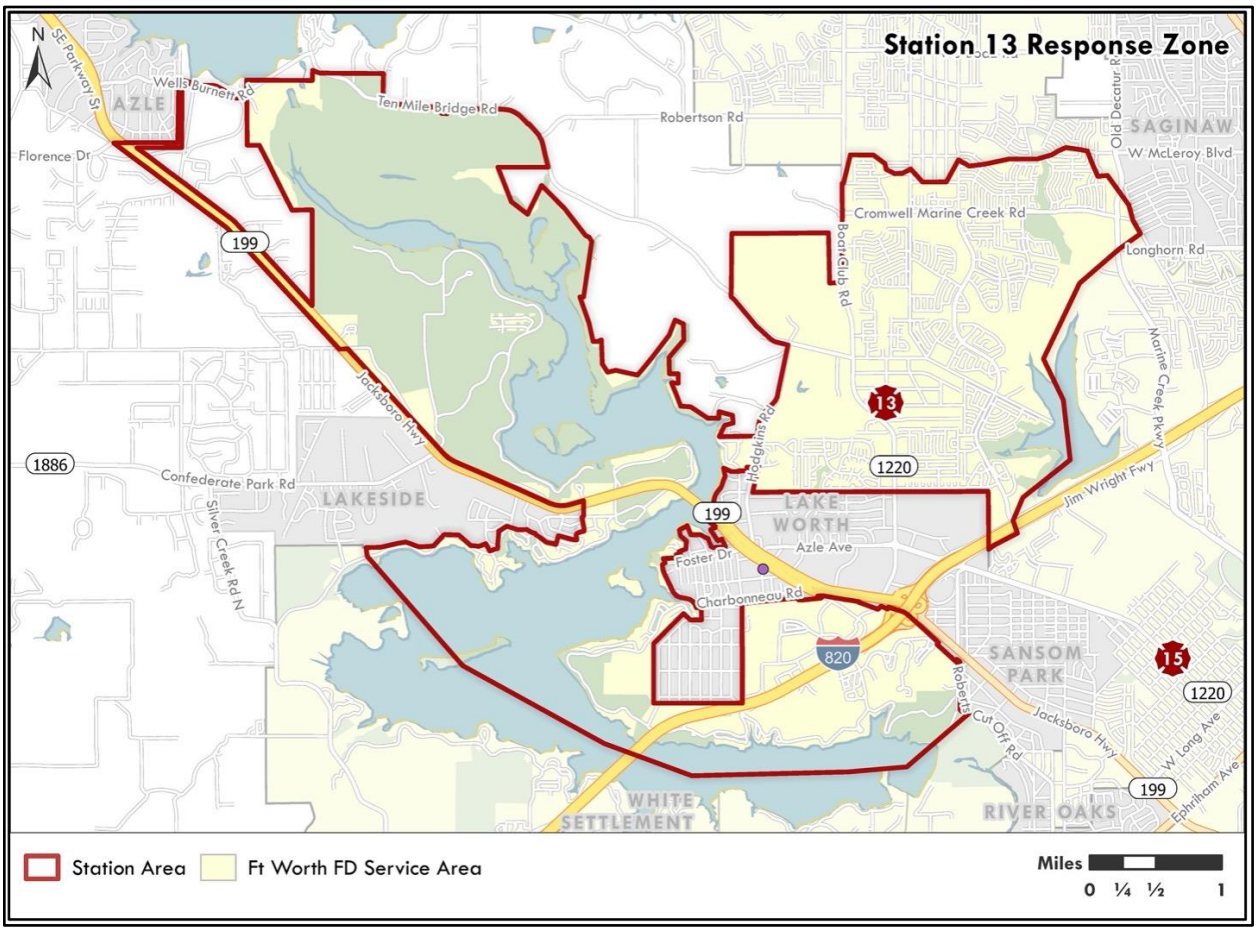


Table 14—Risk Profile – Station 13

Risk Factors			
Total Area (Square Miles)	**17.43**	Total Number of Buildings	**10,461**
Resident Population	**25,622**	Building Density (per Square Mile)	**600**
Daytime Population	**1,960**	High-Risk Occupancies	**17**
Daytime Population Density	**112**	High-Rise Buildings (=/>75 feet)	**0**
Nighttime Population Density	**1,470**	Assessed Valuation – Improvements	**$1,475 Million**
Critical Facilities	**13**		

Figure 15—Fire Station 14

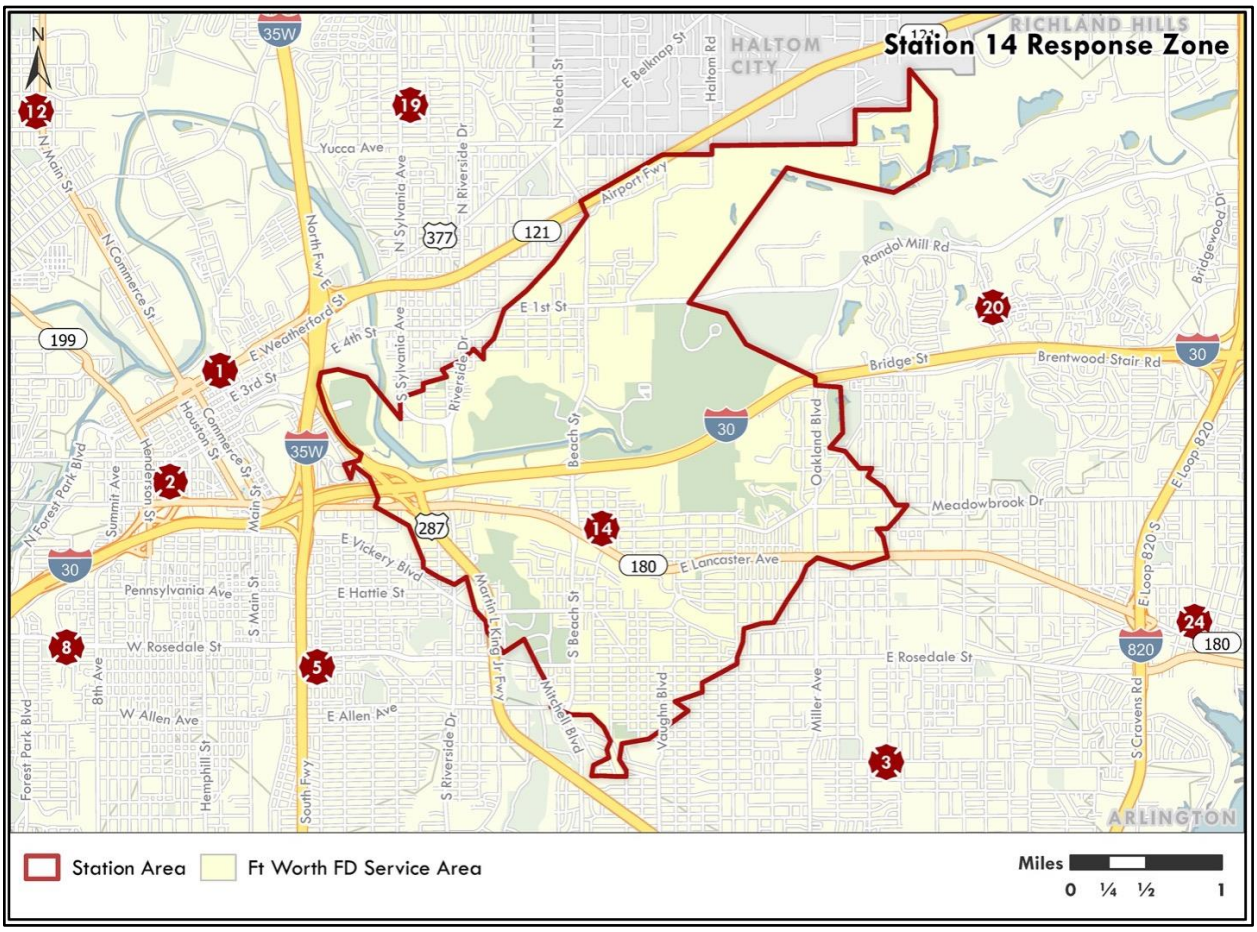


Table 15—Risk Profile – Station 14

Risk Factors			
Total Area (Square Miles)	**8.11**	Total Number of Buildings	**8,307**
Resident Population	**15,439**	Building Density (per Square Mile)	**1,025**
Daytime Population	**7,311**	High-Risk Occupancies	**36**
Daytime Population Density	**902**	High-Rise Buildings (=/>75 feet)	**2**
Nighttime Population Density	**1,905**	Assessed Valuation – Improvements	**$700 Million**
Critical Facilities	**7**		

Figure 16—Fire Station 15

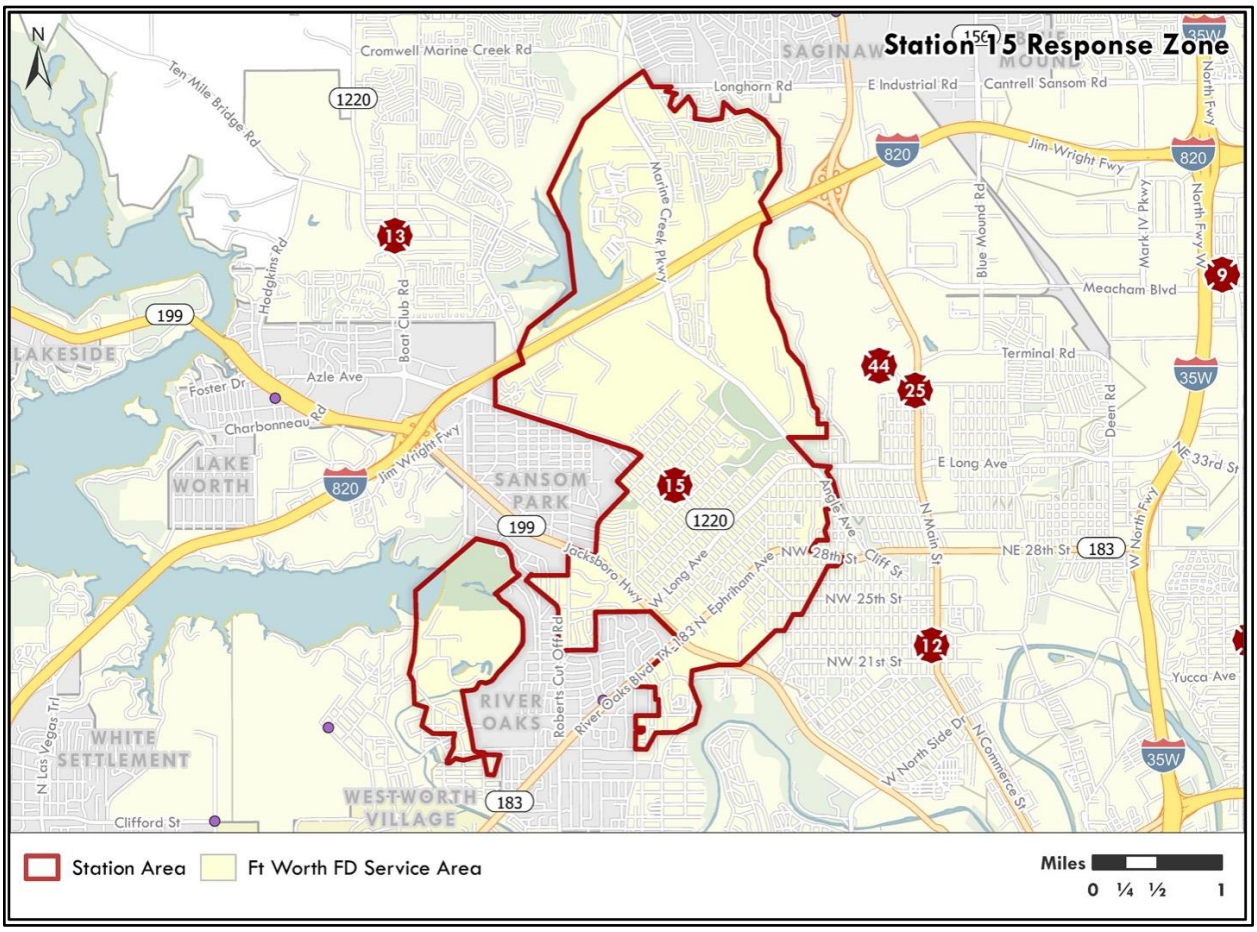


Table 16—Risk Profile – Station15

Risk Factors			
Total Area (Square Miles)	**8.62**	Total Number of Buildings	**11,119**
Resident Population	**28,568**	Building Density (per Square Mile)	**1,290**
Daytime Population	**2,834**	High-Risk Occupancies	**19**
Daytime Population Density	**329**	High-Rise Buildings (=/>75 feet)	**0**
Nighttime Population Density	**3,315**	Assessed Valuation – Improvements	**$1,270 Million**
Critical Facilities	**2**		

Figure 17—Fire Station 16

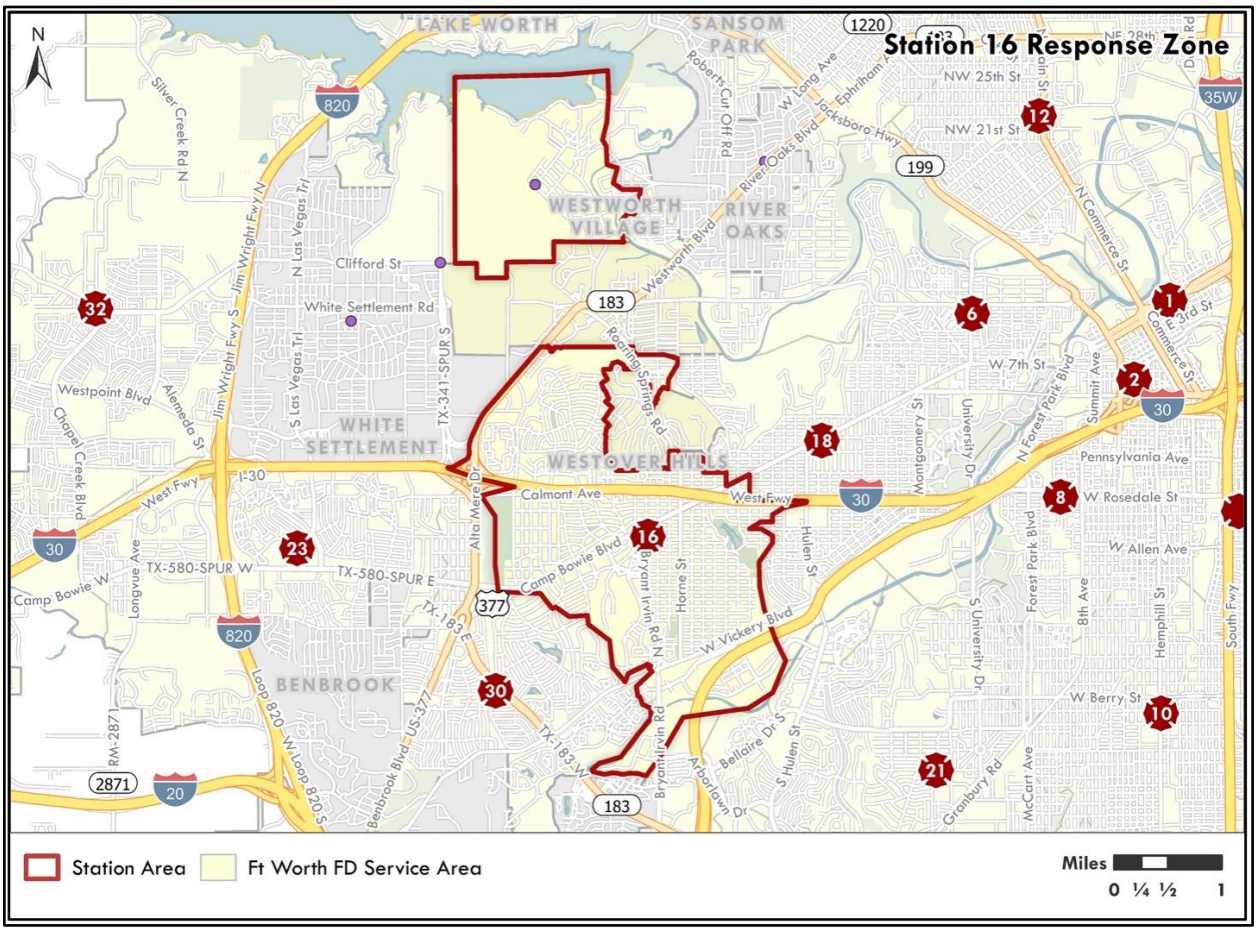


Table 17—Risk Profile – Station 16

Risk Factors			
Total Area (Square Miles)	**8.72**	Total Number of Buildings	**9,633**
Resident Population	**24,300**	Building Density (per Square Mile)	**1,106**
Daytime Population	**13,089**	High-Risk Occupancies	**61**
Daytime Population Density	**1,502**	High-Rise Buildings (=/>75 feet)	**7**
Nighttime Population Density	**2,789**	Assessed Valuation – Improvements	**$1,618 Million**
Critical Facilities	**6**		

Figure 18—Fire Station 17

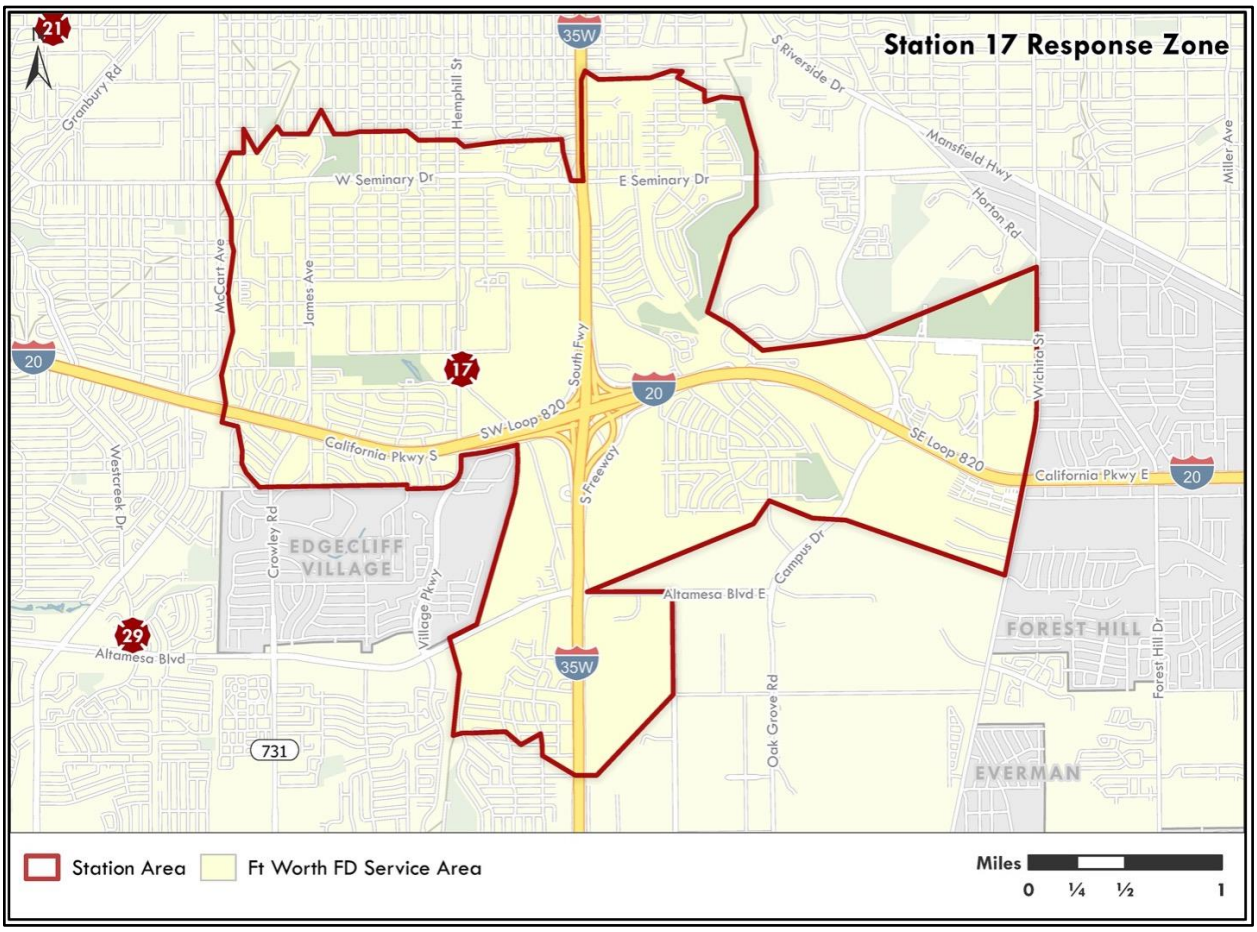


Table 18—Risk Profile – Station 17

Risk Factors			
Total Area (Square Miles)	**8.01**	Total Number of Buildings	**9,981**
Resident Population	**24,653**	Building Density (per Square Mile)	**1,246**
Daytime Population	**14,945**	High-Risk Occupancies	**42**
Daytime Population Density	**1,865**	High-Rise Buildings (=/>75 feet)	**3**
Nighttime Population Density	**3,077**	Assessed Valuation – Improvements	**$1,224 Million**
Critical Facilities	**38**		

Figure 19—Fire Station 18

Table 19—Risk Profile – Station 18

Risk Factors			
Total Area (Square Miles)	**4.29**	Total Number of Buildings	**8,601**
Resident Population	**15,566**	Building Density (per Square Mile)	**2,007**
Daytime Population	**7,878**	High-Risk Occupancies	**33**
Daytime Population Density	**1,838**	High-Rise Buildings (=/>75 feet)	**4**
Nighttime Population Density	**3,633**	Assessed Valuation – Improvements	**$1,548 Million**
Critical Facilities	**5**		

Figure 20—Fire Station 19

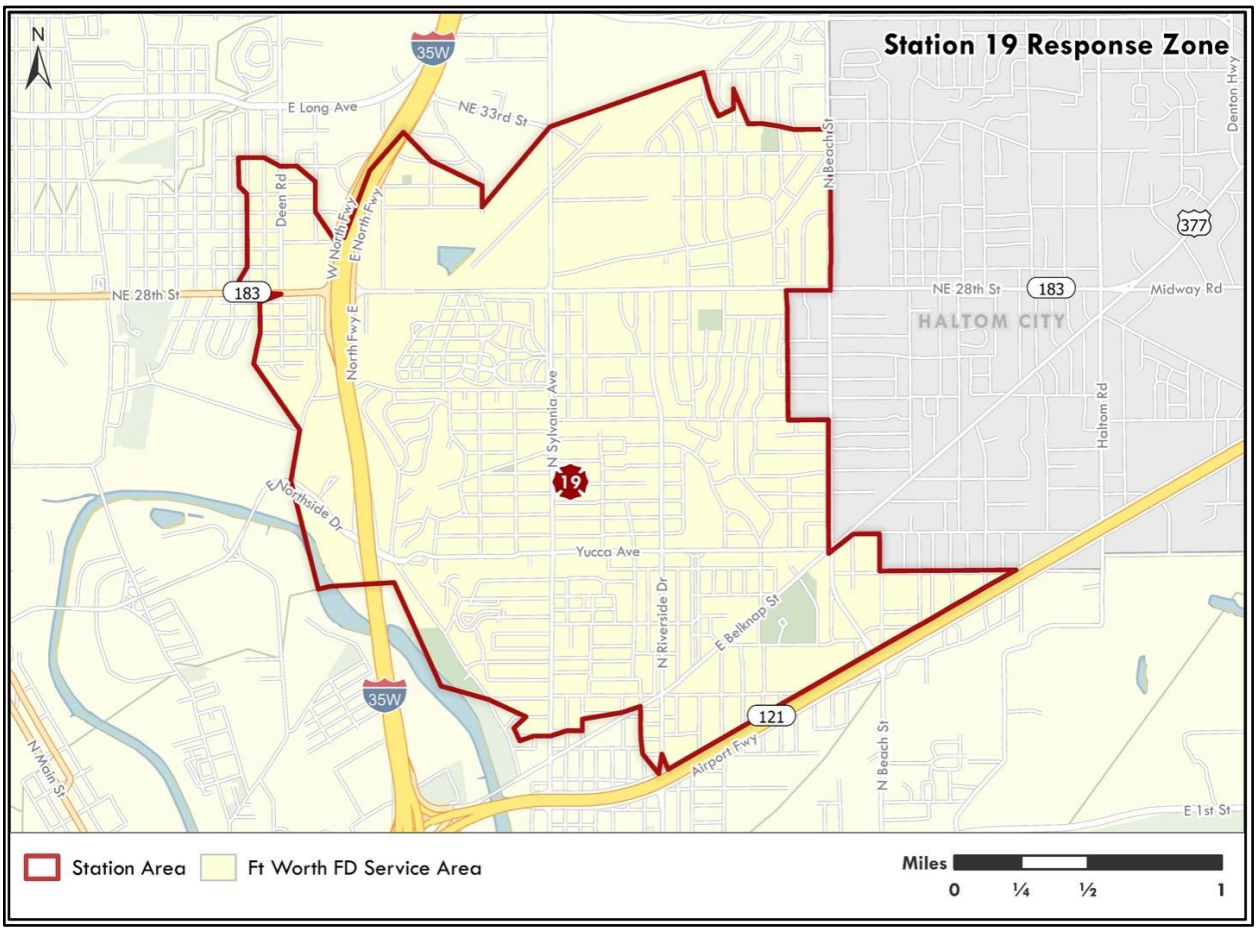


Table 20—Risk Profile – Station 19

Risk Factors			
Total Area (Square Miles)	**4.32**	Total Number of Buildings	**8,832**
Resident Population	**17,317**	Building Density (per Square Mile)	**2,046**
Daytime Population	**5,330**	High-Risk Occupancies	**15**
Daytime Population Density	**1,235**	High-Rise Buildings (=/>75 feet)	**0**
Nighttime Population Density	**4,012**	Assessed Valuation – Improvements	**$905 Million**
Critical Facilities	**3**		

Figure 21—Fire Station 20

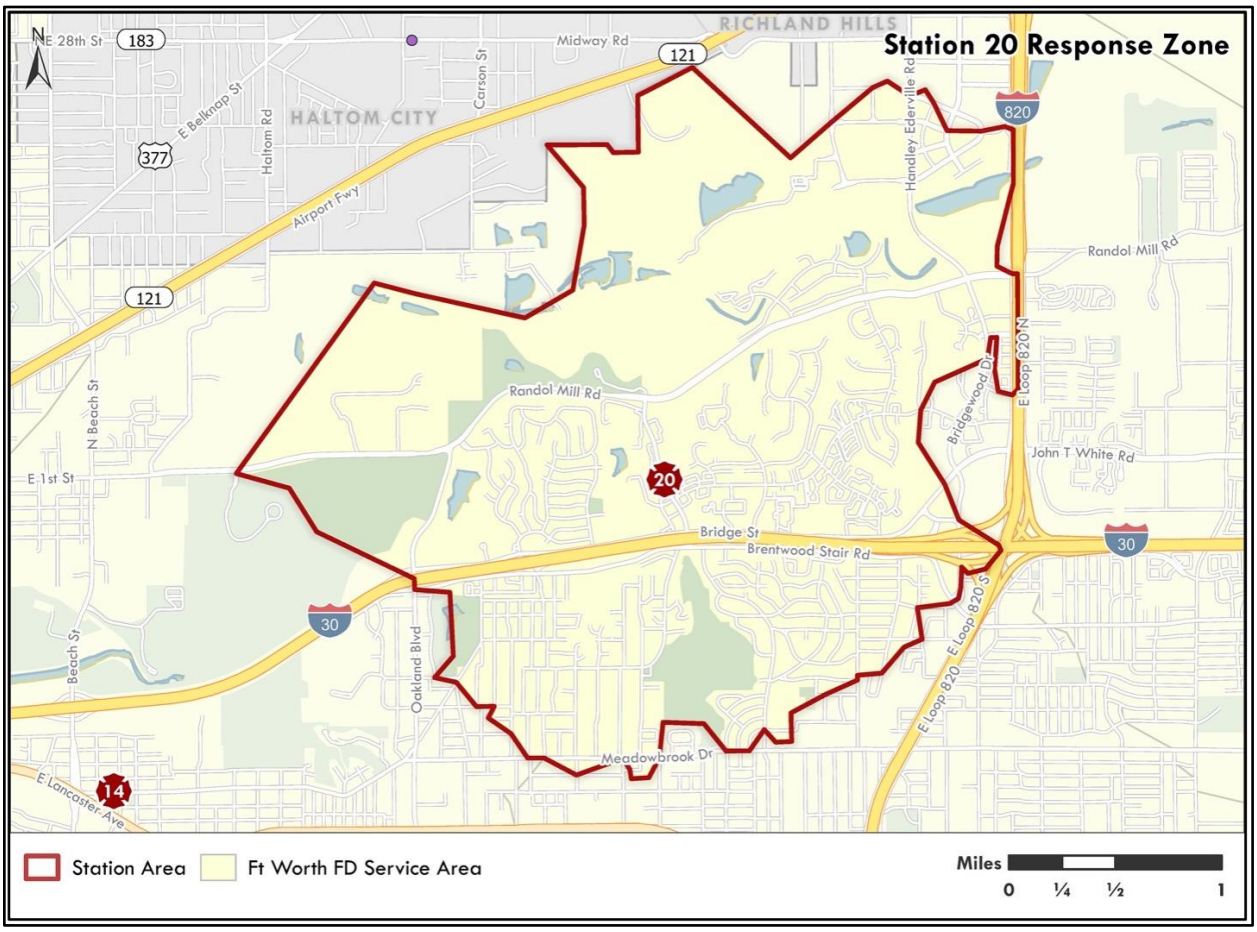


Table 21—Risk Profile – Station 20

Risk Factors			
Total Area (Square Miles)	**7.38**	Total Number of Buildings	**5,277**
Resident Population	**18,482**	Building Density (per Square Mile)	**716**
Daytime Population	**3,599**	High-Risk Occupancies	**36**
Daytime Population Density	**488**	High-Rise Buildings (=/>75 feet)	**1**
Nighttime Population Density	**2,507**	Assessed Valuation – Improvements	**$959 Million**
Critical Facilities	**4**		

Figure 22—Fire Station 21

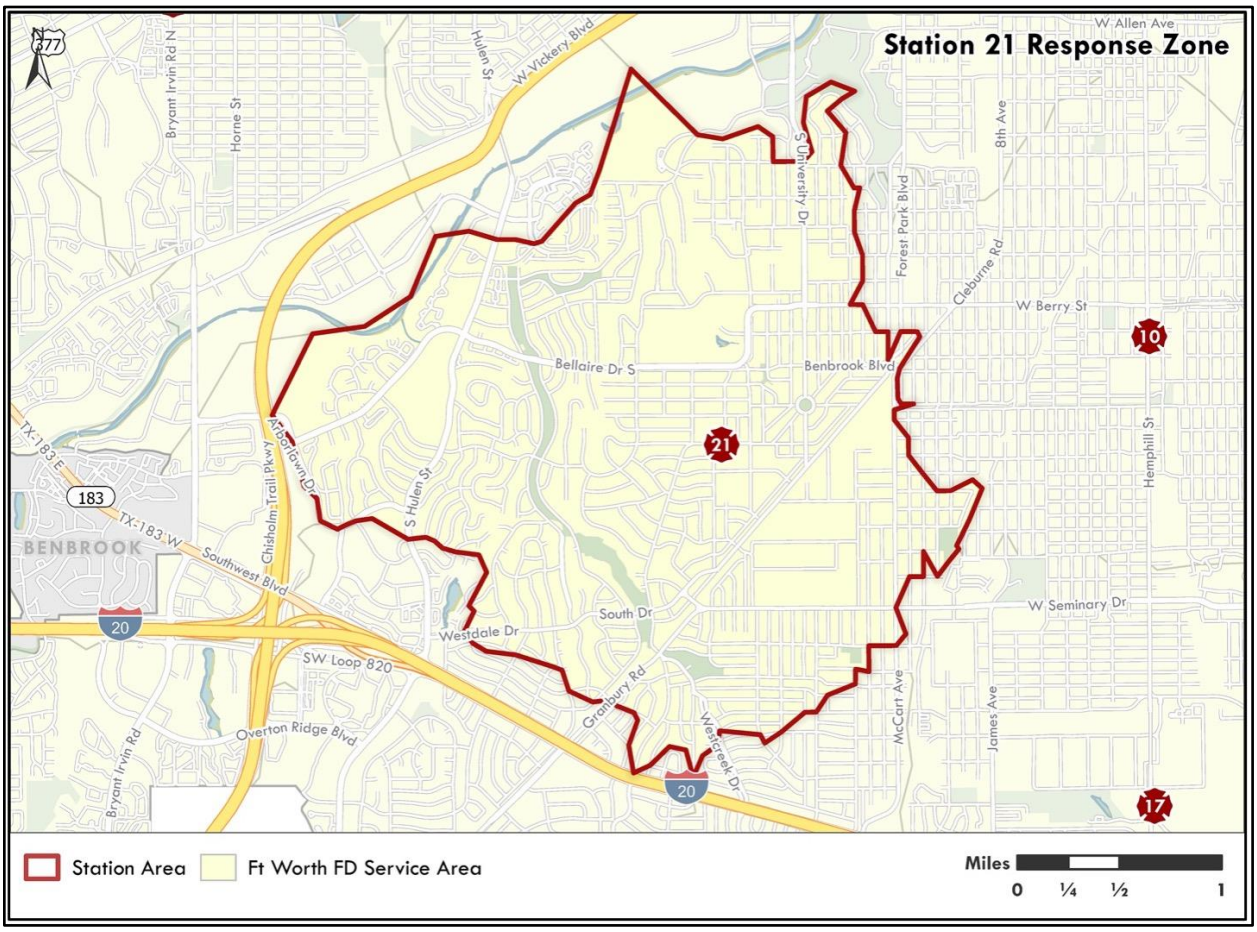


Table 22—Risk Profile – Station 21

Risk Factors			
Total Area (Square Miles)	**6.57**	Total Number of Buildings	**11,816**
Resident Population	**26,694**	Building Density (per Square Mile)	**1,800**
Daytime Population	**9,570**	High-Risk Occupancies	**47**
Daytime Population Density	**1,458**	High-Rise Buildings (=/>75 feet)	**6**
Nighttime Population Density	**4,066**	Assessed Valuation – Improvements	**$2,327 Million**
Critical Facilities	**8**		

Figure 23—Fire Station 22

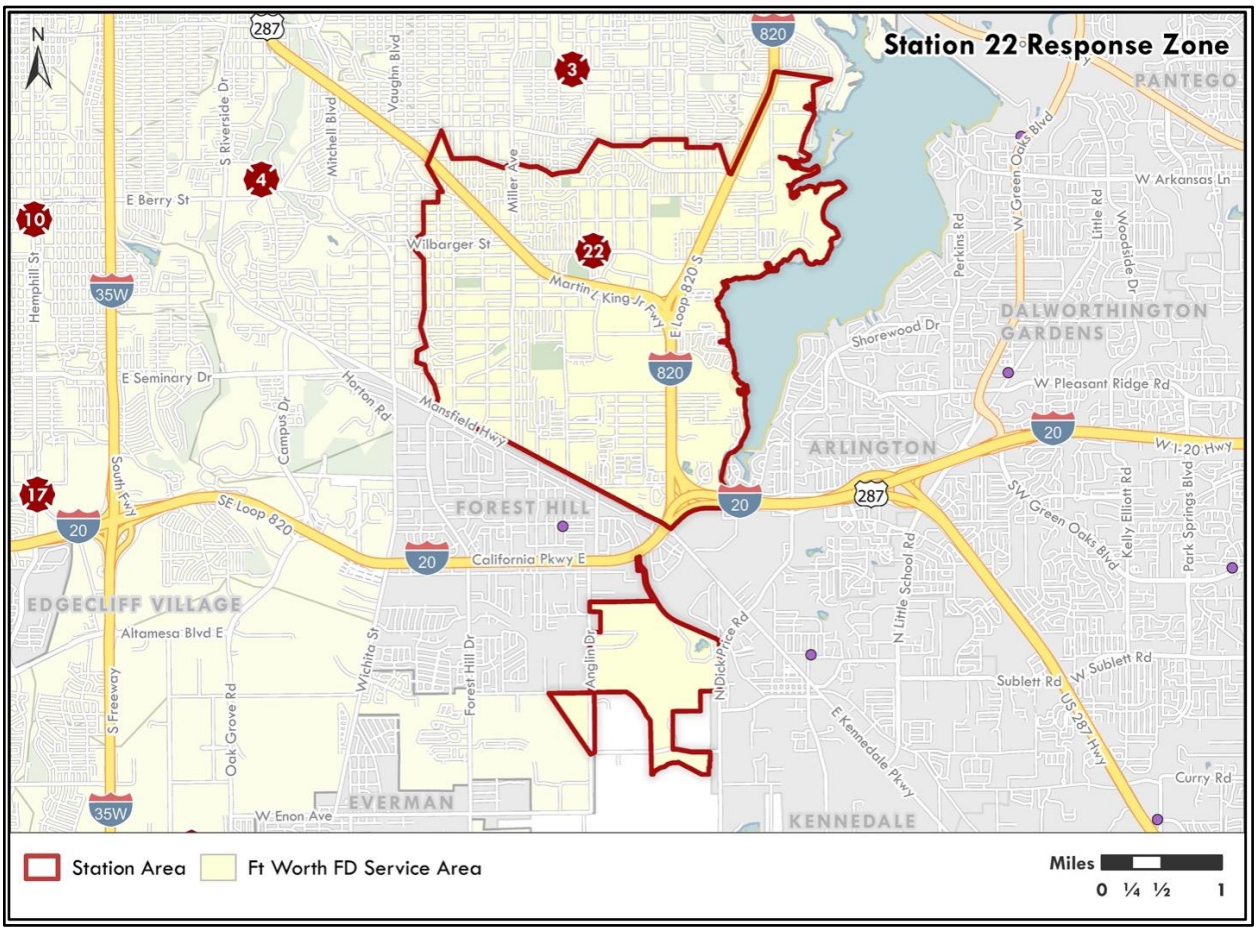


Table 23—Risk Profile – Station 22

Risk Factors			
Total Area (Square Miles)	**8.85**	Total Number of Buildings	**12,004**
Resident Population	**25,687**	Building Density (per Square Mile)	**1,357**
Daytime Population	**6,763**	High-Risk Occupancies	**22**
Daytime Population Density	**765**	High-Rise Buildings (=/>75 feet)	**0**
Nighttime Population Density	**2,904**	Assessed Valuation – Improvements	**$778 Million**
Critical Facilities	**8**		

Figure 24—Fire Station 23

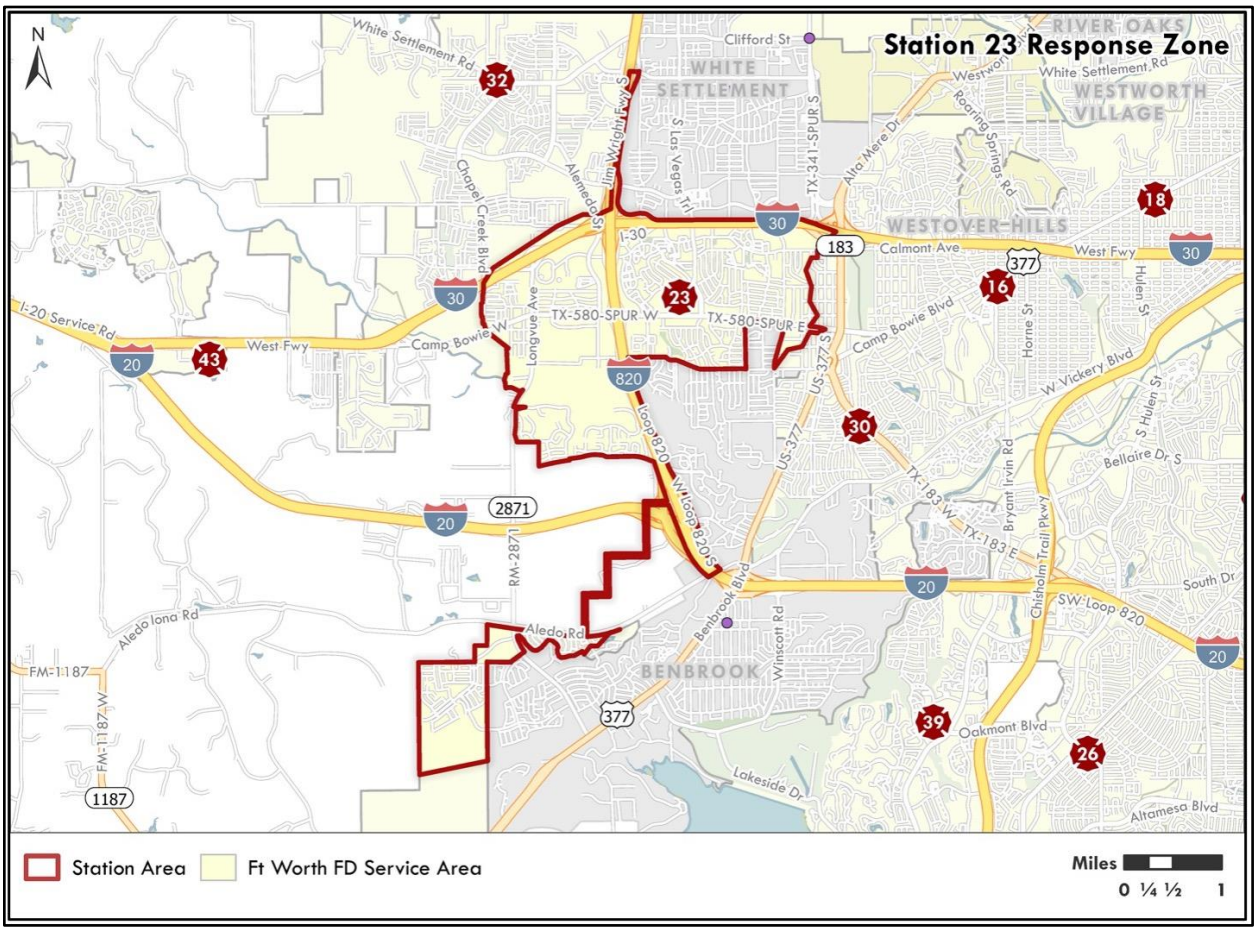


Table 24—Risk Profile – Station 23

Risk Factors			
Total Area (Square Miles)	**7.24**	Total Number of Buildings	**6,326**
Resident Population	**22,538**	Building Density (per Square Mile)	**874**
Daytime Population	**4,712**	High-Risk Occupancies	**45**
Daytime Population Density	**651**	High-Rise Buildings (=/>75 feet)	**0**
Nighttime Population Density	**3,112**	Assessed Valuation – Improvements	**$1,223 Million**
Critical Facilities	**2**		

Figure 25—Fire Station 24

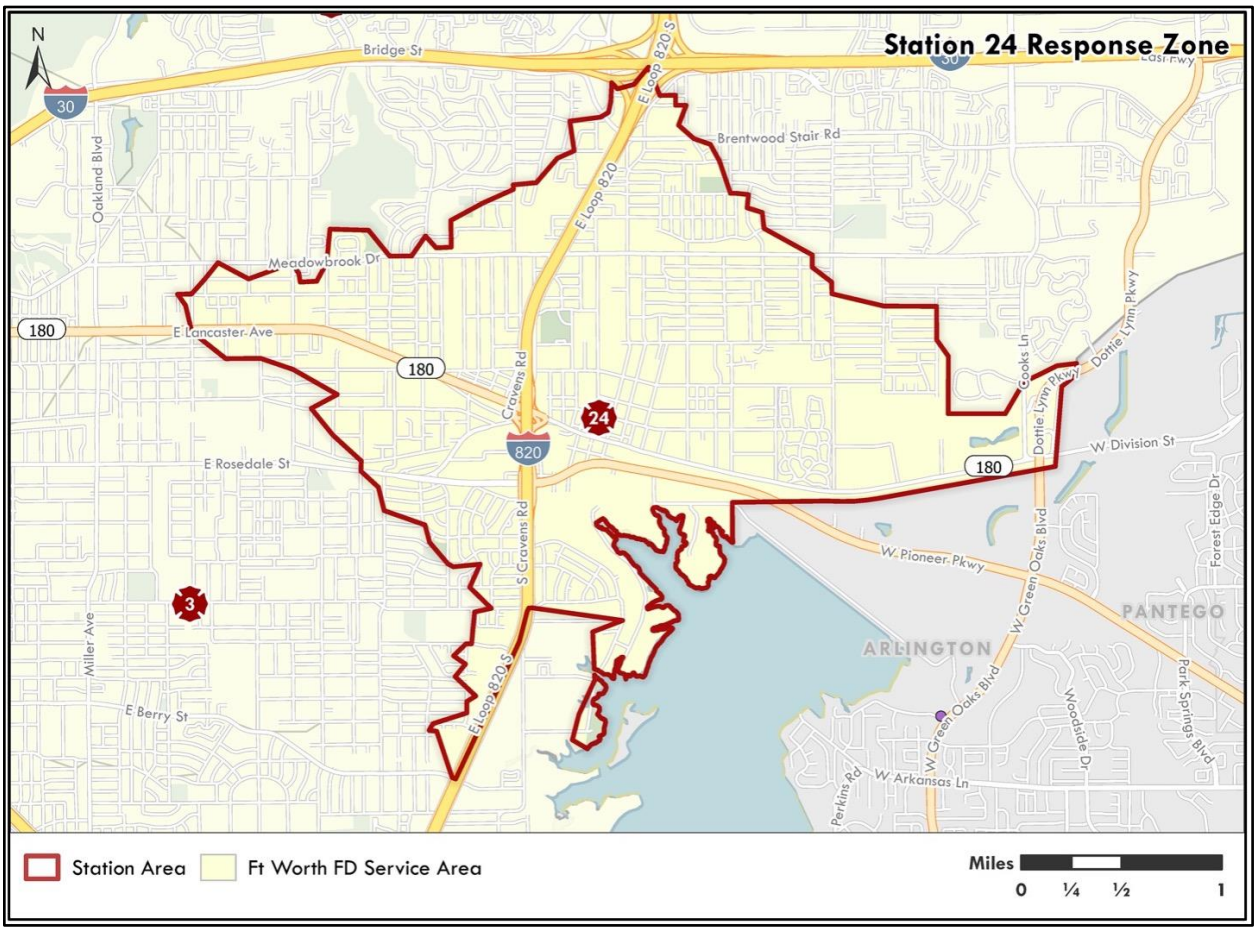


Table 25—Risk Profile – Station 24

Risk Factors			
Total Area (Square Miles)	**5.89**	Total Number of Buildings	**9,503**
Resident Population	**20,211**	Building Density (per Square Mile)	**1,613**
Daytime Population	**3,318**	High-Risk Occupancies	**32**
Daytime Population Density	**563**	High-Rise Buildings (=/>75 feet)	**2**
Nighttime Population Density	**3,431**	Assessed Valuation – Improvements	**$828 Million**
Critical Facilities	**5**		

Figure 26—Fire Station 25

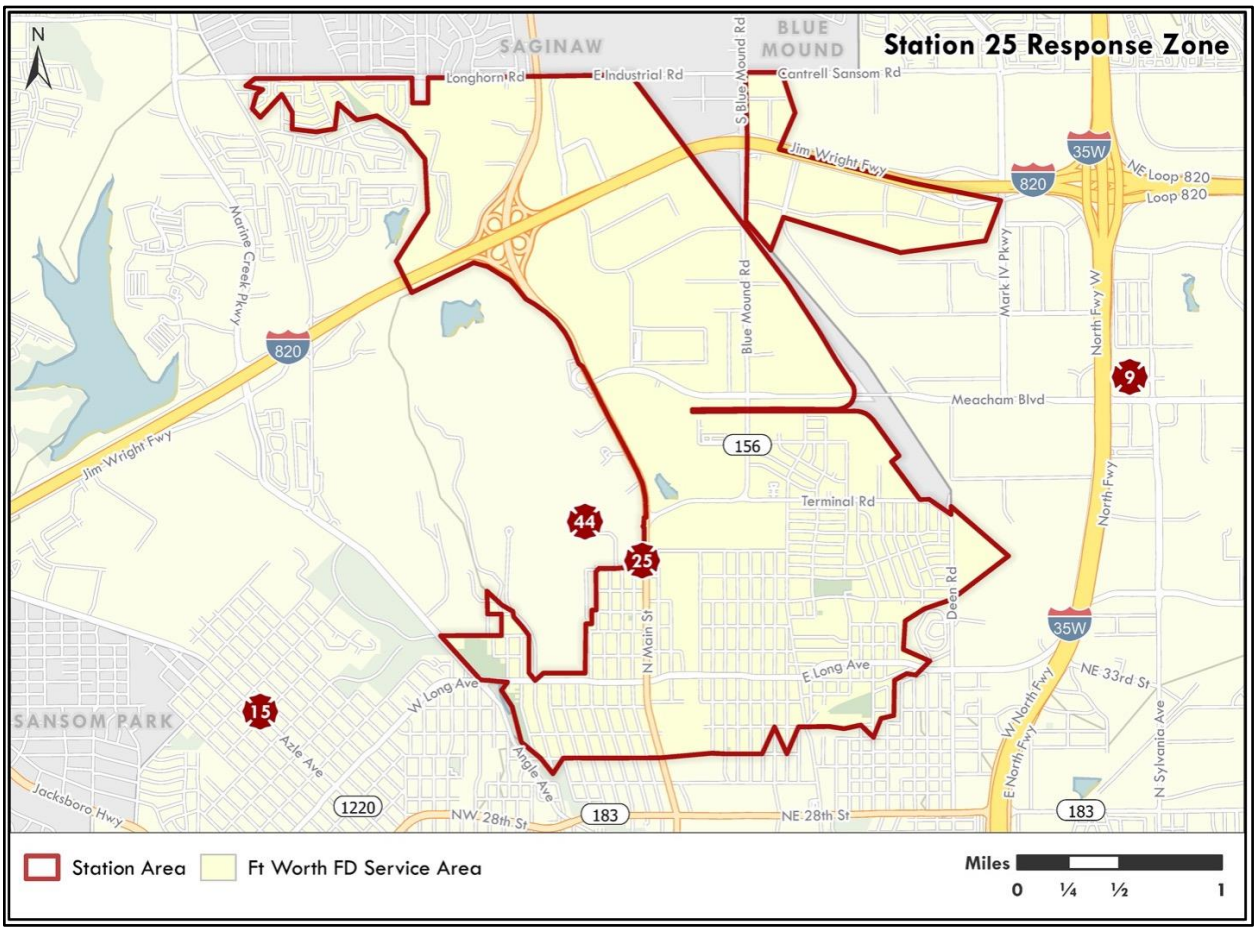


Table 26—Risk Profile – Station 25

Risk Factors			
Total Area (Square Miles)	**5.58**	Total Number of Buildings	**6,776**
Resident Population	**14,174**	Building Density (per Square Mile)	**1,214**
Daytime Population	**7,152**	High-Risk Occupancies	**14**
Daytime Population Density	**1,282**	High-Rise Buildings (=/>75 feet)	**0**
Nighttime Population Density	**2,540**	Assessed Valuation – Improvements	**$980 Million**
Critical Facilities	**3**		

Figure 27—Fire Station 26

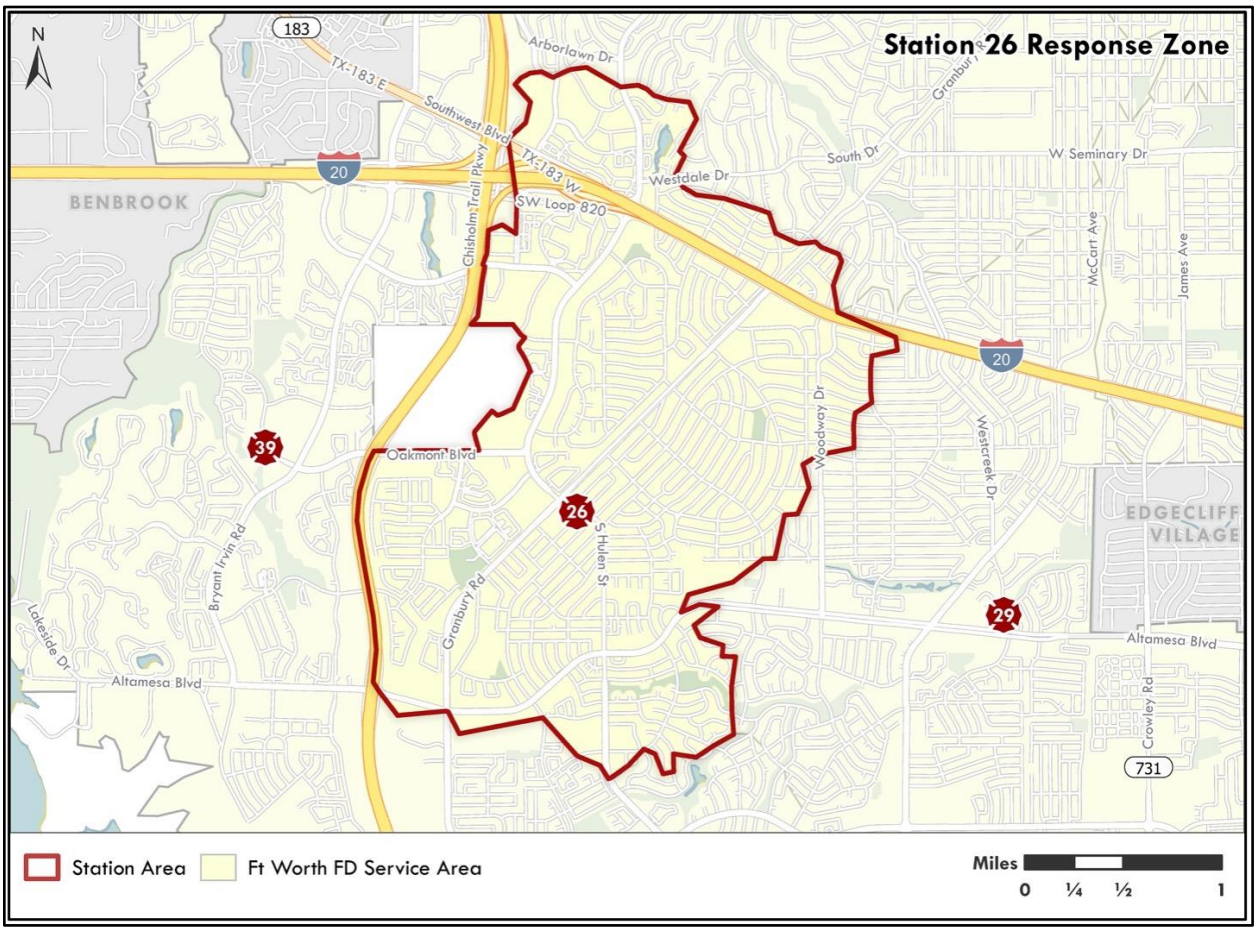


Table 27—Risk Profile – Station 26

Risk Factors			
Total Area (Square Miles)	**5.57**	Total Number of Buildings	**8,897**
Resident Population	**26,224**	Building Density (per Square Mile)	**1,596**
Daytime Population	**12,591**	High-Risk Occupancies	**53**
Daytime Population Density	**2,259**	High-Rise Buildings (=/>75 feet)	**4**
Nighttime Population Density	**4,706**	Assessed Valuation – Improvements	**$1,764 Million**
Critical Facilities	**4**		

Figure 28—Fire Station 27

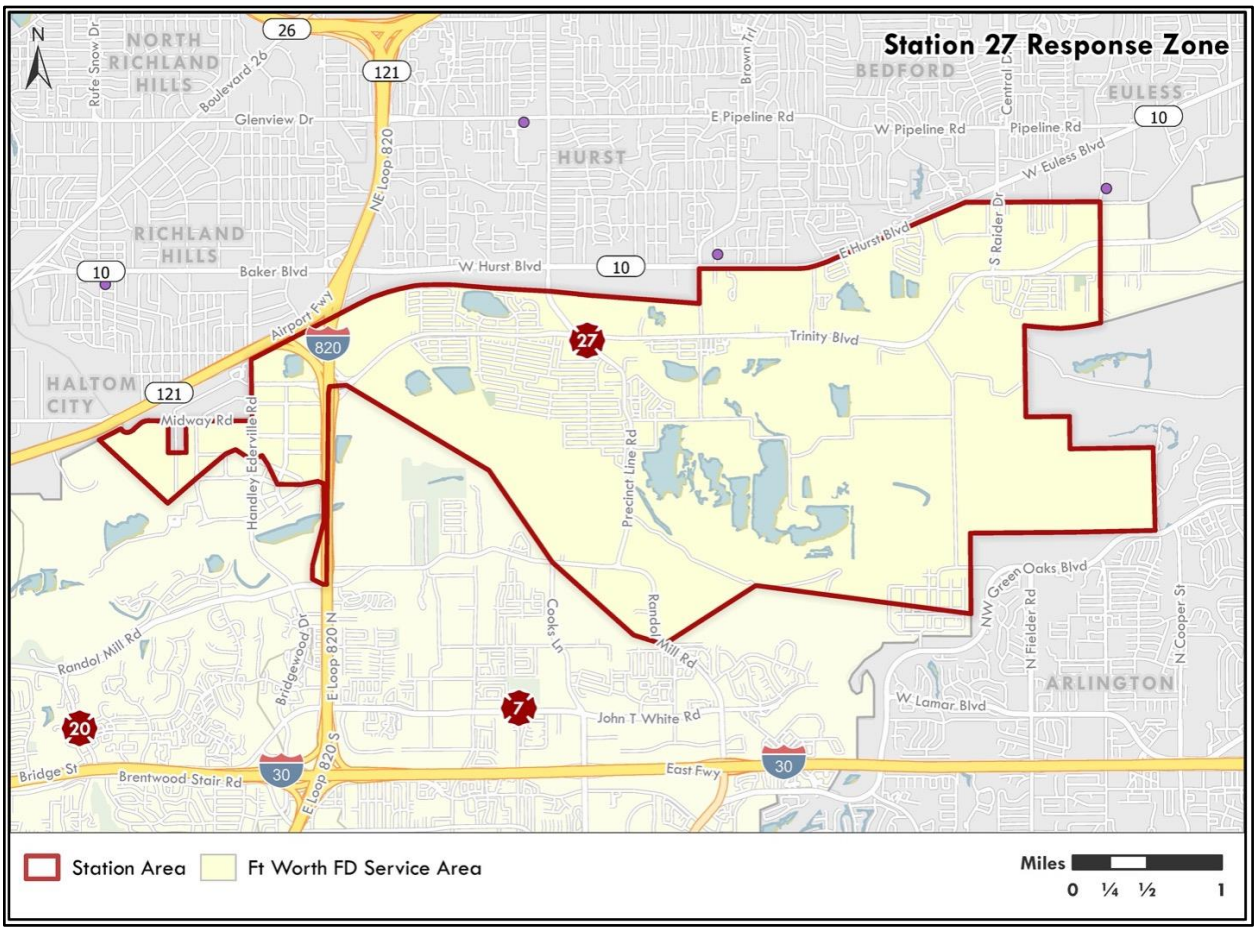


Table 28—Risk Profile – Station 27

Risk Factors			
Total Area (Square Miles)	**10.60**	Total Number of Buildings	**5,770**
Resident Population	**12,193**	Building Density (per Square Mile)	**544**
Daytime Population	**9,398**	High-Risk Occupancies	**6**
Daytime Population Density	**887**	High-Rise Buildings (=/>75 feet)	**0**
Nighttime Population Density	**1,150**	Assessed Valuation – Improvements	**$1,045 Million**
Critical Facilities	**2**		

Figure 29—Fire Station 28

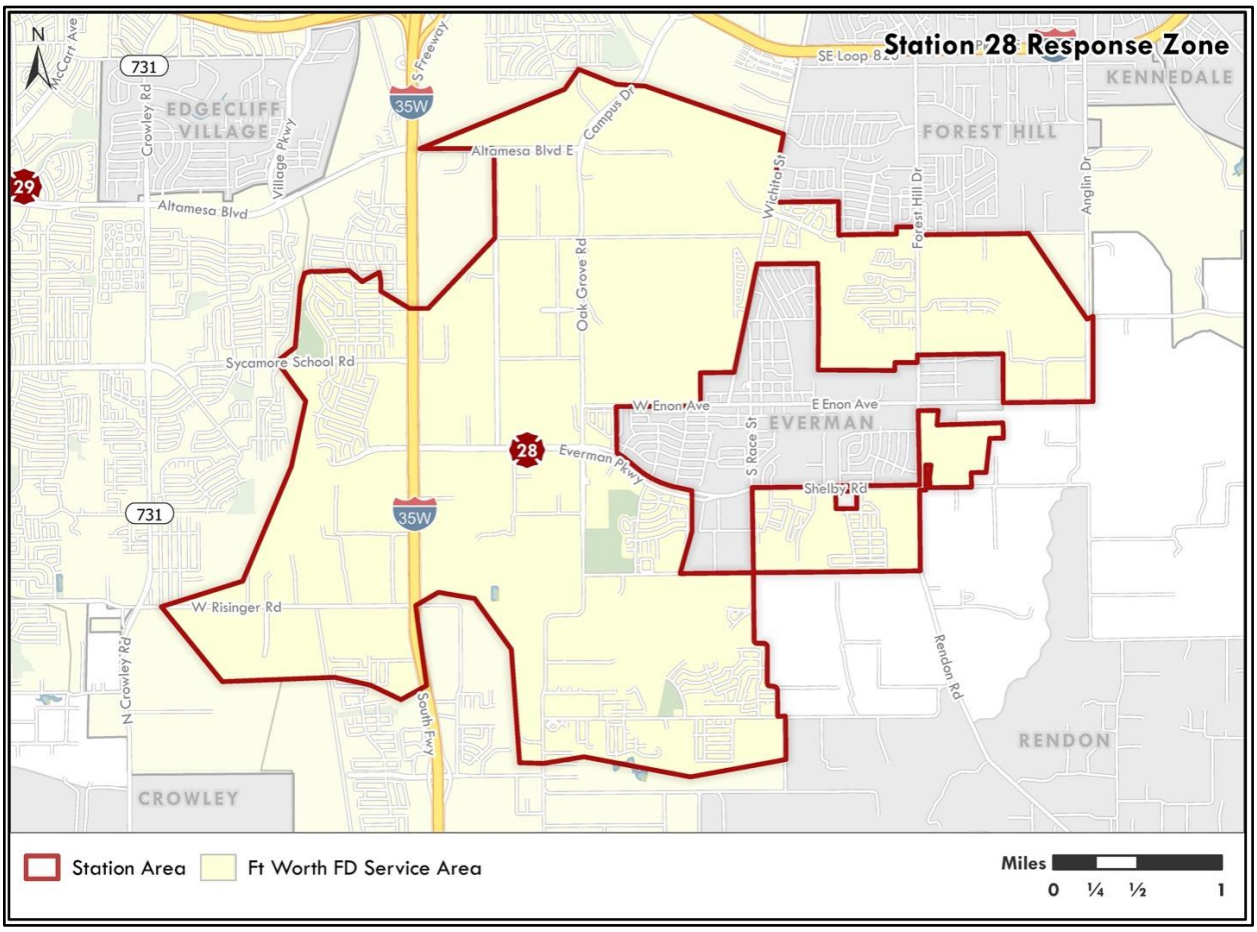


Table 29—Risk Profile – Station 28

Risk Factors			
Total Area (Square Miles)	**10.78**	Total Number of Buildings	**6,104**
Resident Population	**14,831**	Building Density (per Square Mile)	**566**
Daytime Population	**6,365**	High-Risk Occupancies	**8**
Daytime Population Density	**591**	High-Rise Buildings (=/>75 feet)	**0**
Nighttime Population Density	**1,376**	Assessed Valuation – Improvements	**$1,110 Million**
Critical Facilities	**1**		

Figure 30—Fire Station 29

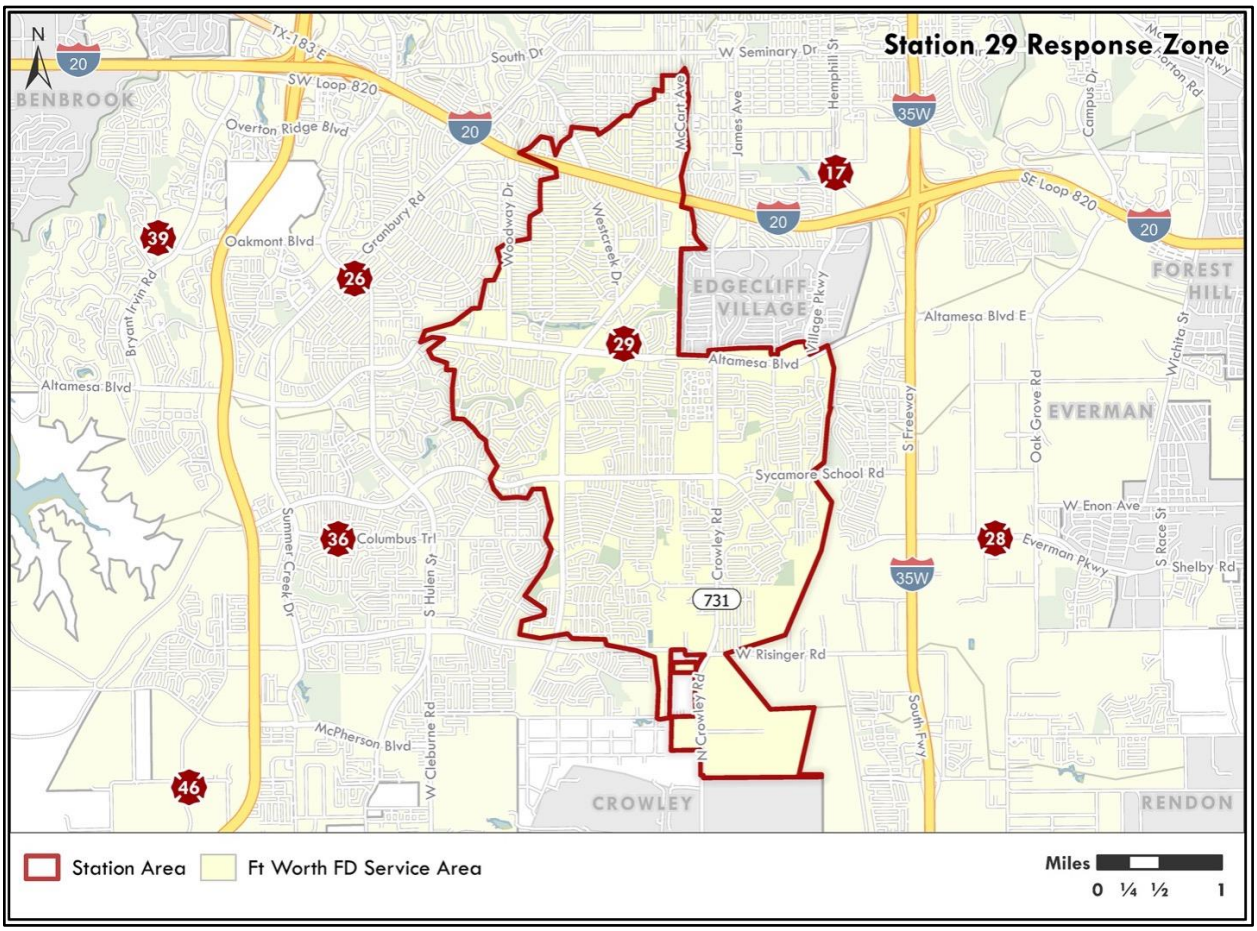


Table 30—Risk Profile – Station 29

Risk Factors			
Total Area (Square Miles)	**9.52**	Total Number of Buildings	**19,140**
Resident Population	**50,713**	Building Density (per Square Mile)	**2,010**
Daytime Population	**4,260**	High-Risk Occupancies	**37**
Daytime Population Density	**447**	High-Rise Buildings (=/>75 feet)	**0**
Nighttime Population Density	**5,327**	Assessed Valuation – Improvements	**$2,318 Million**
Critical Facilities	**2**		

Figure 31—Fire Station 30

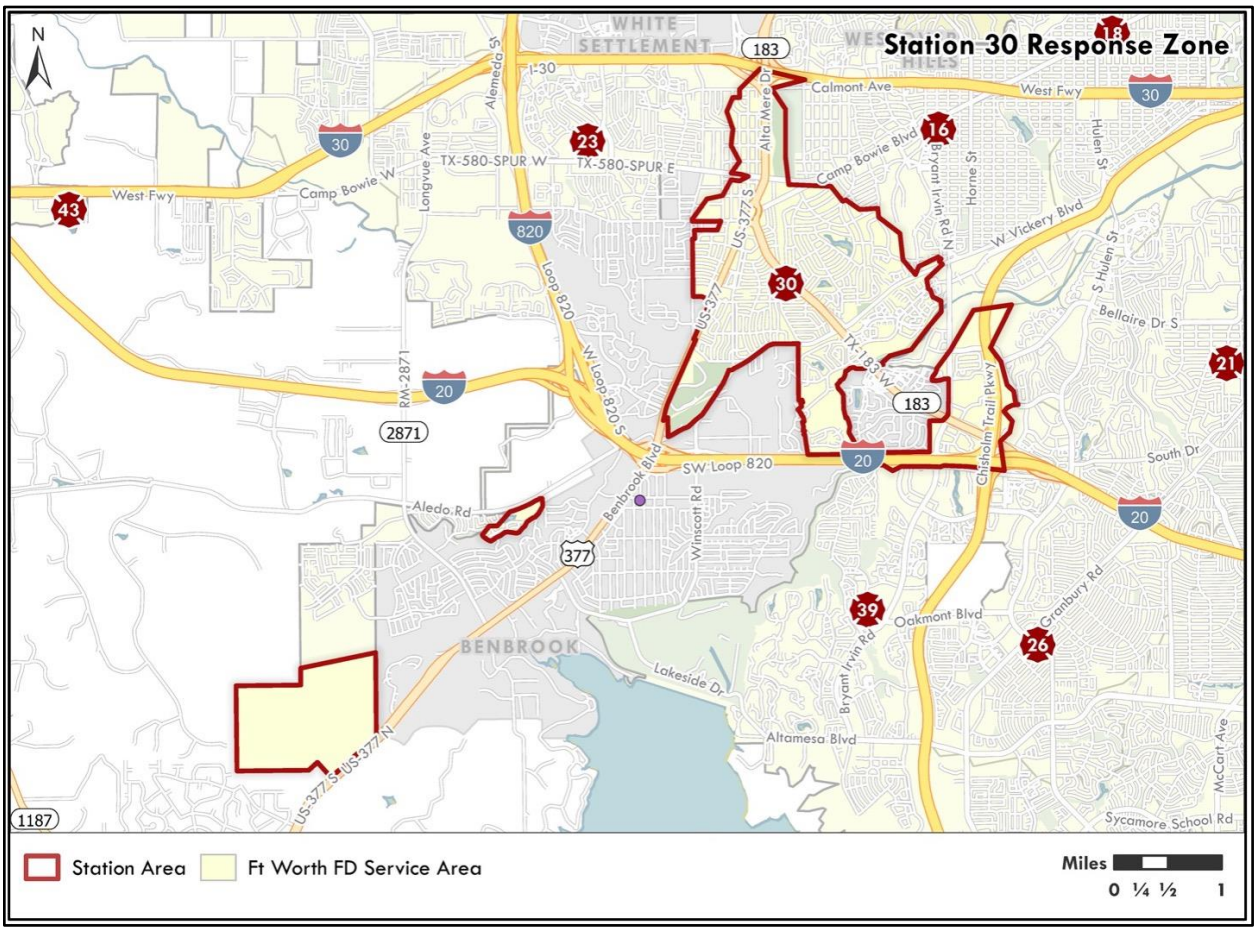


Table 31—Risk Profile – Station 30

Risk Factors			
Total Area (Square Miles)	**6.30**	Total Number of Buildings	**7,027**
Resident Population	**16,538**	Building Density (per Square Mile)	**1,115**
Daytime Population	**6,144**	High-Risk Occupancies	**26**
Daytime Population Density	**975**	High-Rise Buildings (=/>75 feet)	**1**
Nighttime Population Density	**2,625**	Assessed Valuation – Improvements	**$1,168 Million**
Critical Facilities	**7**		

Figure 32—Fire Station 31

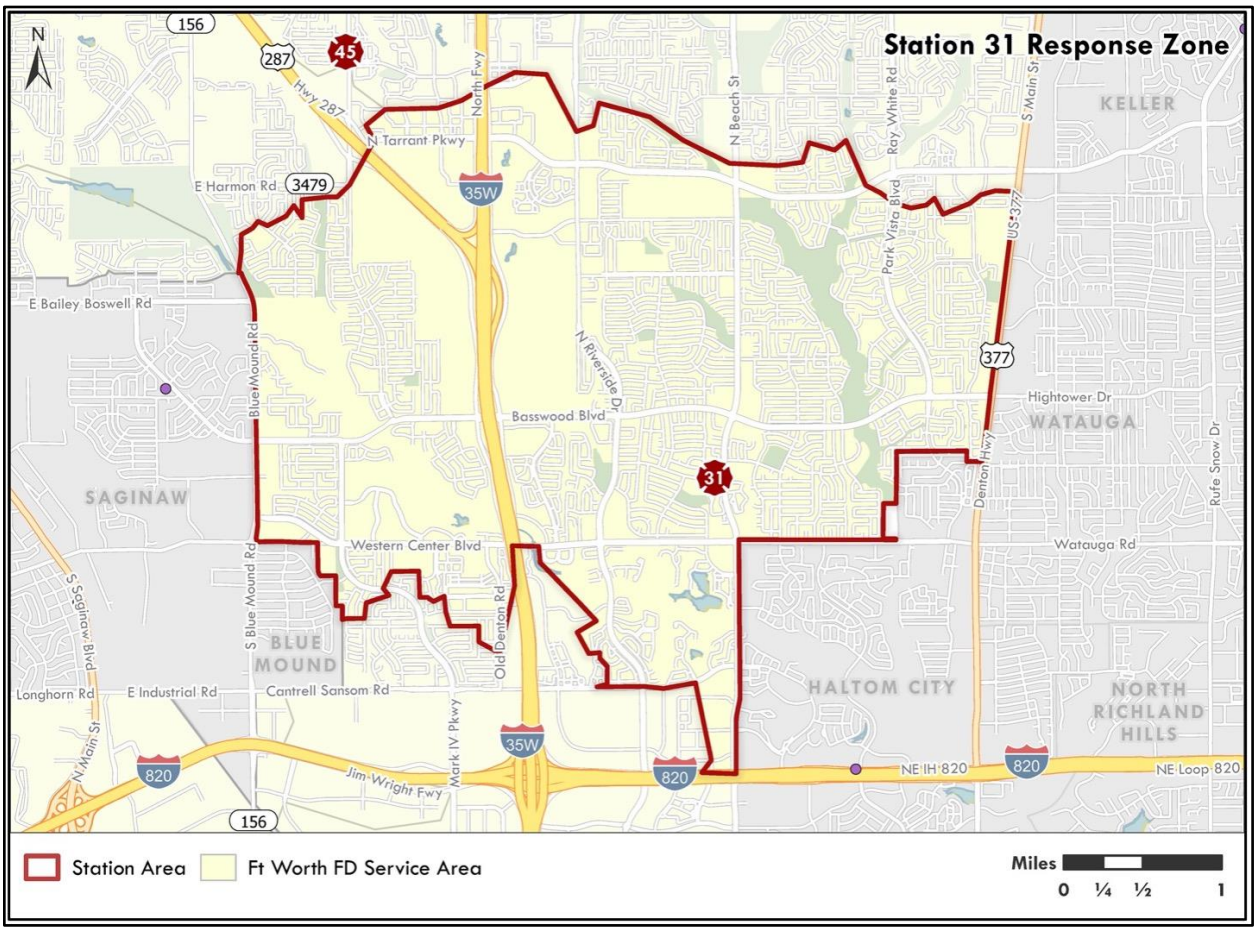


Table 32—Risk Profile – Station 31

Risk Factors			
Total Area (Square Miles)	**12.91**	Total Number of Buildings	**23,172**
Resident Population	**66,240**	Building Density (per Square Mile)	**1,795**
Daytime Population	**9,425**	High-Risk Occupancies	**30**
Daytime Population Density	**730**	High-Rise Buildings (=/>75 feet)	**1**
Nighttime Population Density	**5,130**	Assessed Valuation – Improvements	**$4,175 Million**
Critical Facilities	**2**		

Figure 33—Fire Station 32

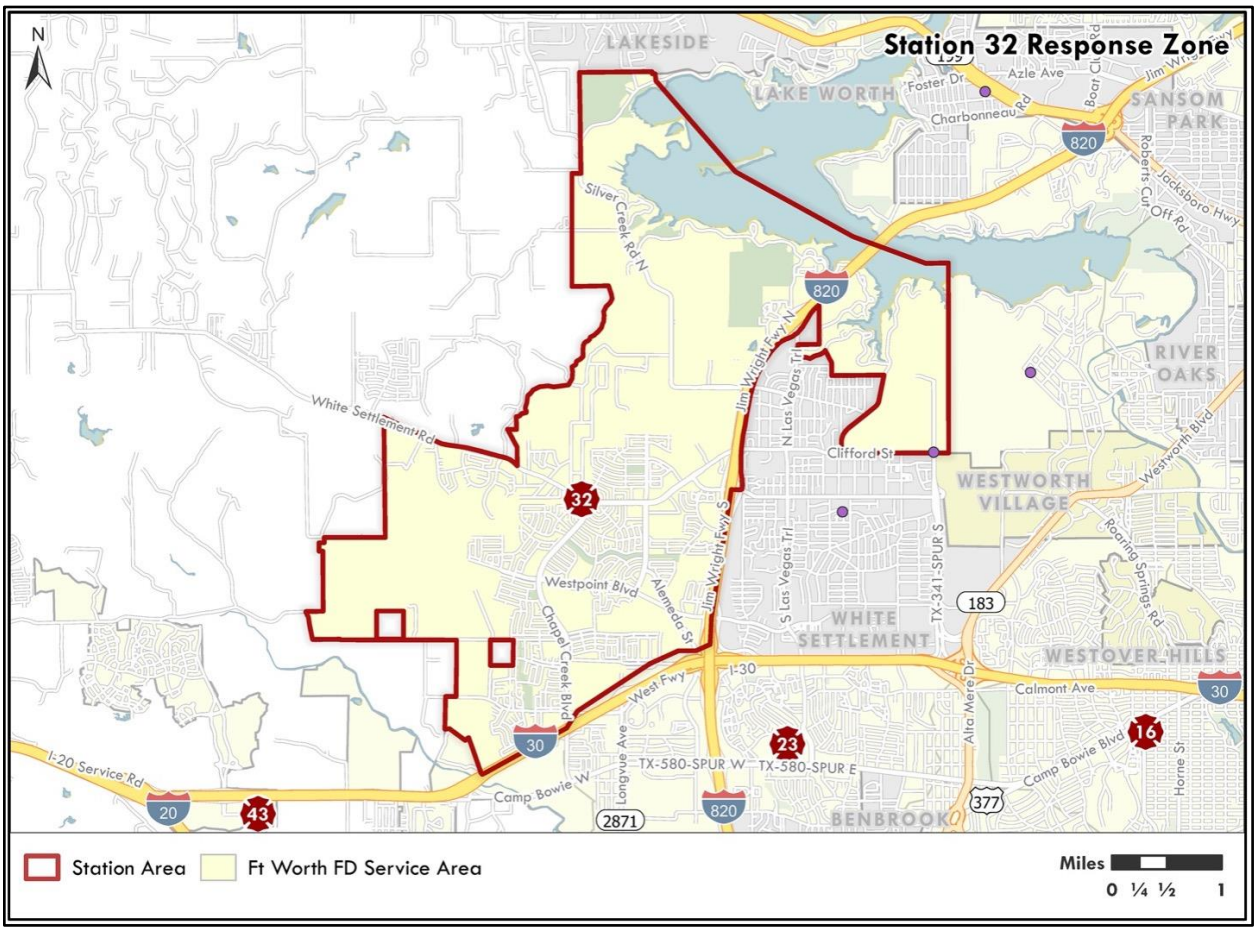


Table 33—Risk Profile – Station 32

Risk Factors			
Total Area (Square Miles)	**15.25**	Total Number of Buildings	**10,560**
Resident Population	**21,034**	Building Density (per Square Mile)	**693**
Daytime Population	**20,440**	High-Risk Occupancies	**8**
Daytime Population Density	**1,341**	High-Rise Buildings (=/>75 feet)	**0**
Nighttime Population Density	**1,380**	Assessed Valuation – Improvements	**$1,367 Million**
Critical Facilities	**5**		

Figure 34—Fire Station 33

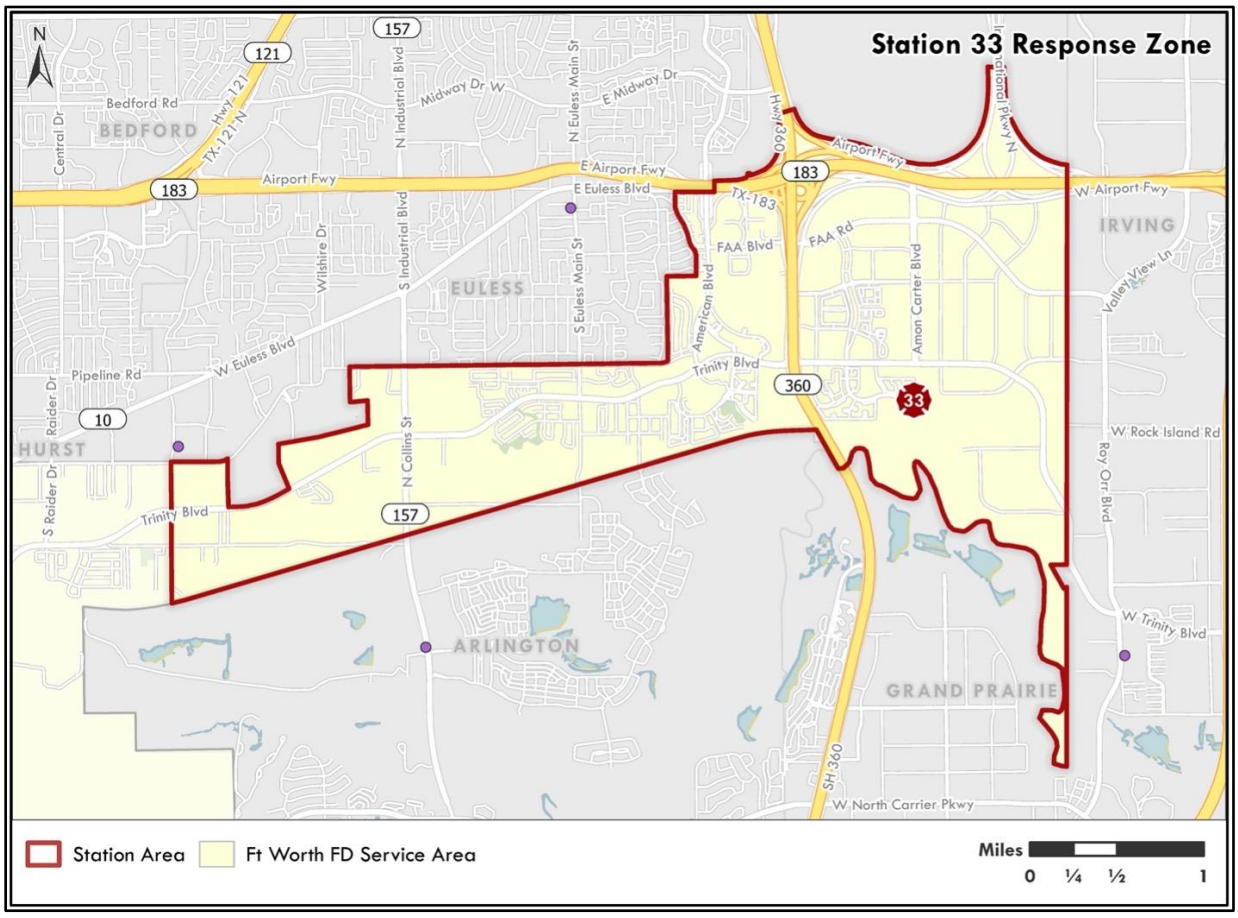


Table 34—Risk Profile – Station 33

Risk Factors			
Total Area (Square Miles)	**6.55**	Total Number of Buildings	**3,034**
Resident Population	**15,487**	Building Density (per Square Mile)	**463**
Daytime Population	**52,244**	High-Risk Occupancies	**25**
Daytime Population Density	**7,976**	High-Rise Buildings (=/>75 feet)	**6**
Nighttime Population Density	**2,364**	Assessed Valuation – Improvements	**$2,224 Million**
Critical Facilities	**1**		

Figure 35—Fire Station 34

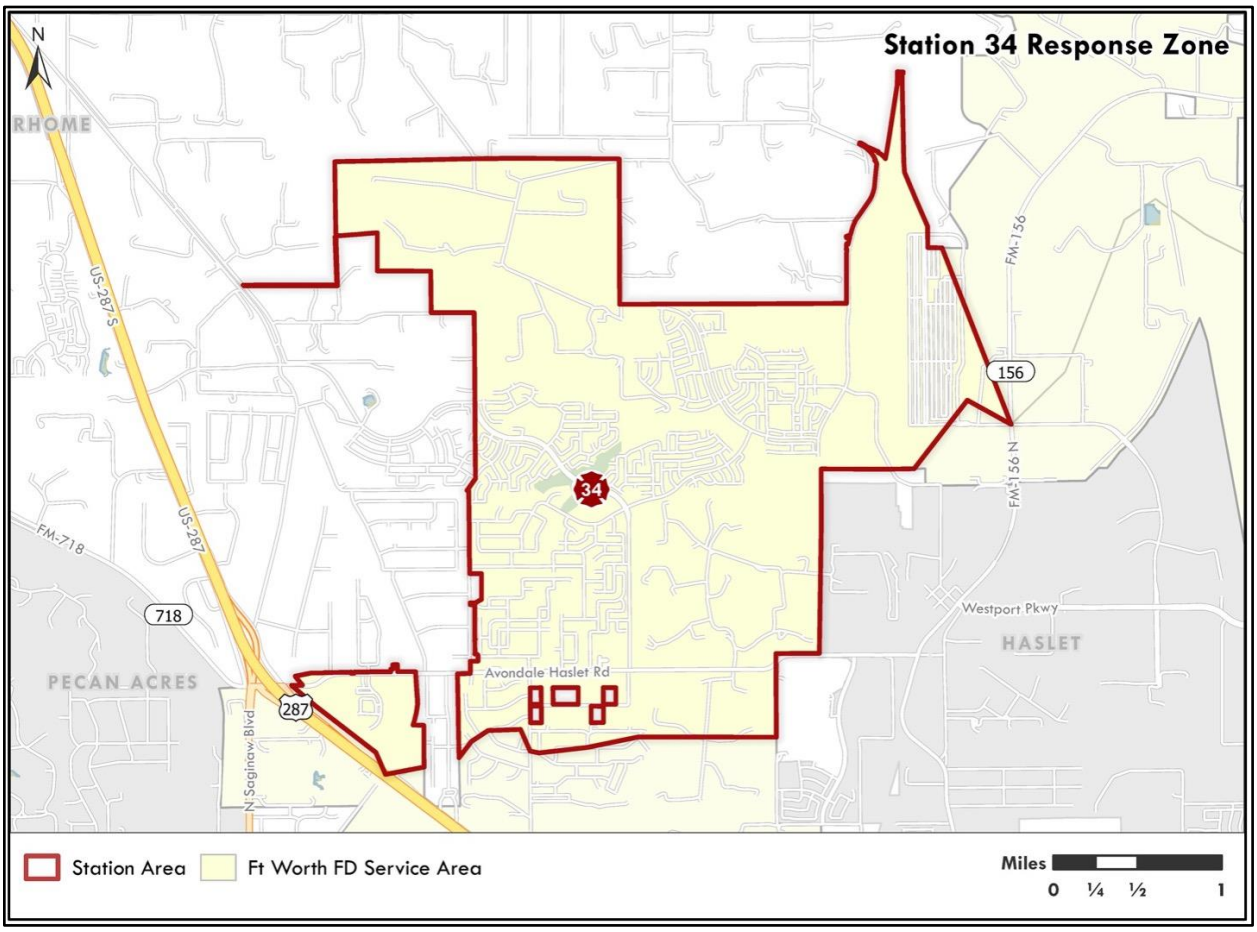


Table 35—Risk Profile – Station 34

Risk Factors			
Total Area (Square Miles)	**8.08**	Total Number of Buildings	**5,323**
Resident Population	**12,720**	Building Density (per Square Mile)	**659**
Daytime Population	**1,042**	High-Risk Occupancies	**2**
Daytime Population Density	**129**	High-Rise Buildings (=/>75 feet)	**0**
Nighttime Population Density	**1,574**	Assessed Valuation – Improvements	**$940 Million**
Critical Facilities	**1**		

Figure 36—Fire Station 35

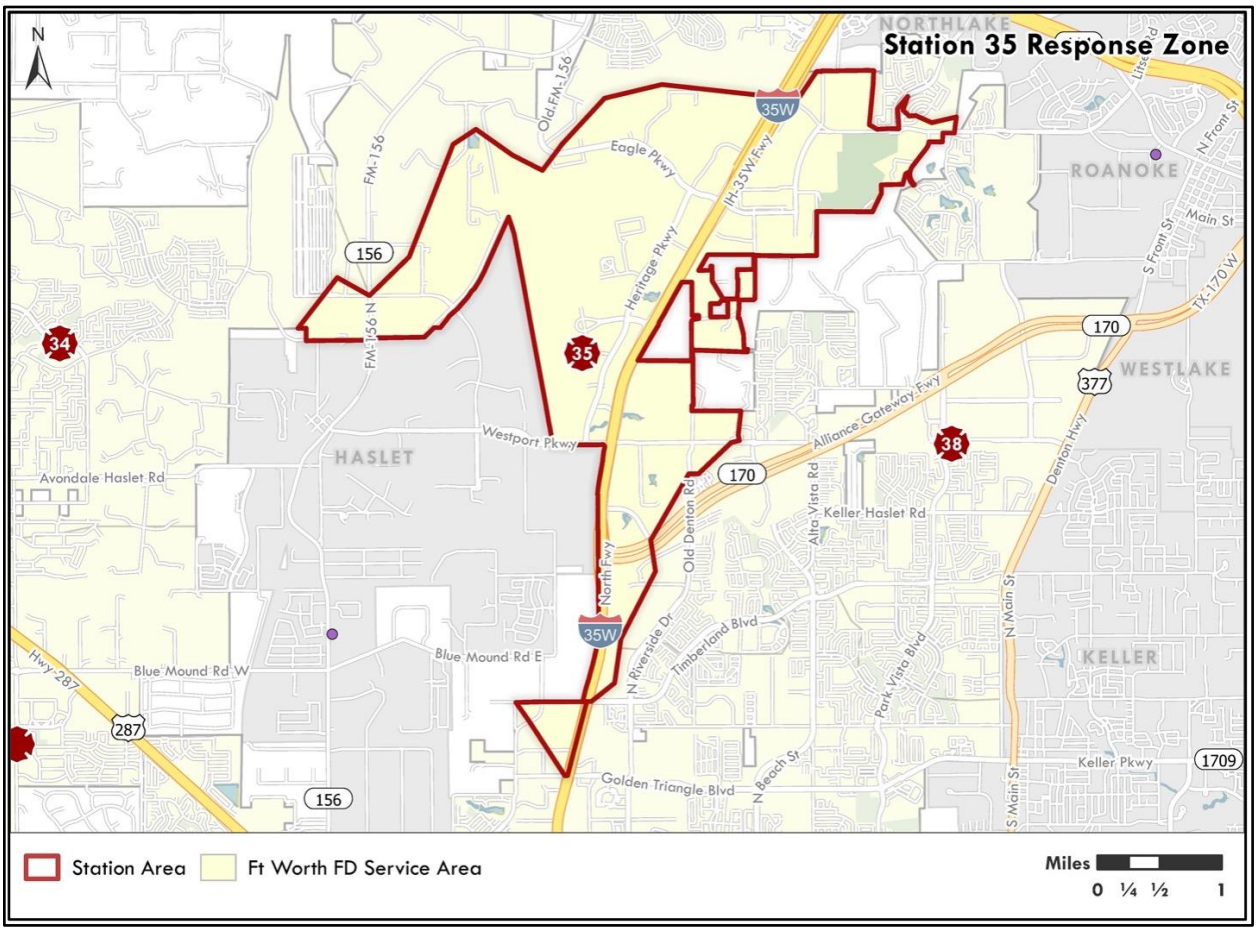


Table 36—Risk Profile – Station 35

Risk Factors			
Total Area (Square Miles)	**8.08**	Total Number of Buildings	**437**
Resident Population	**918**	Building Density (per Square Mile)	**54**
Daytime Population	**11,415**	High-Risk Occupancies	**4**
Daytime Population Density	**1,412**	High-Rise Buildings (=/>75 feet)	**2**
Nighttime Population Density	**114**	Assessed Valuation – Improvements	**$586 Million**
Critical Facilities	**1**		

Figure 37—Fire Station 36

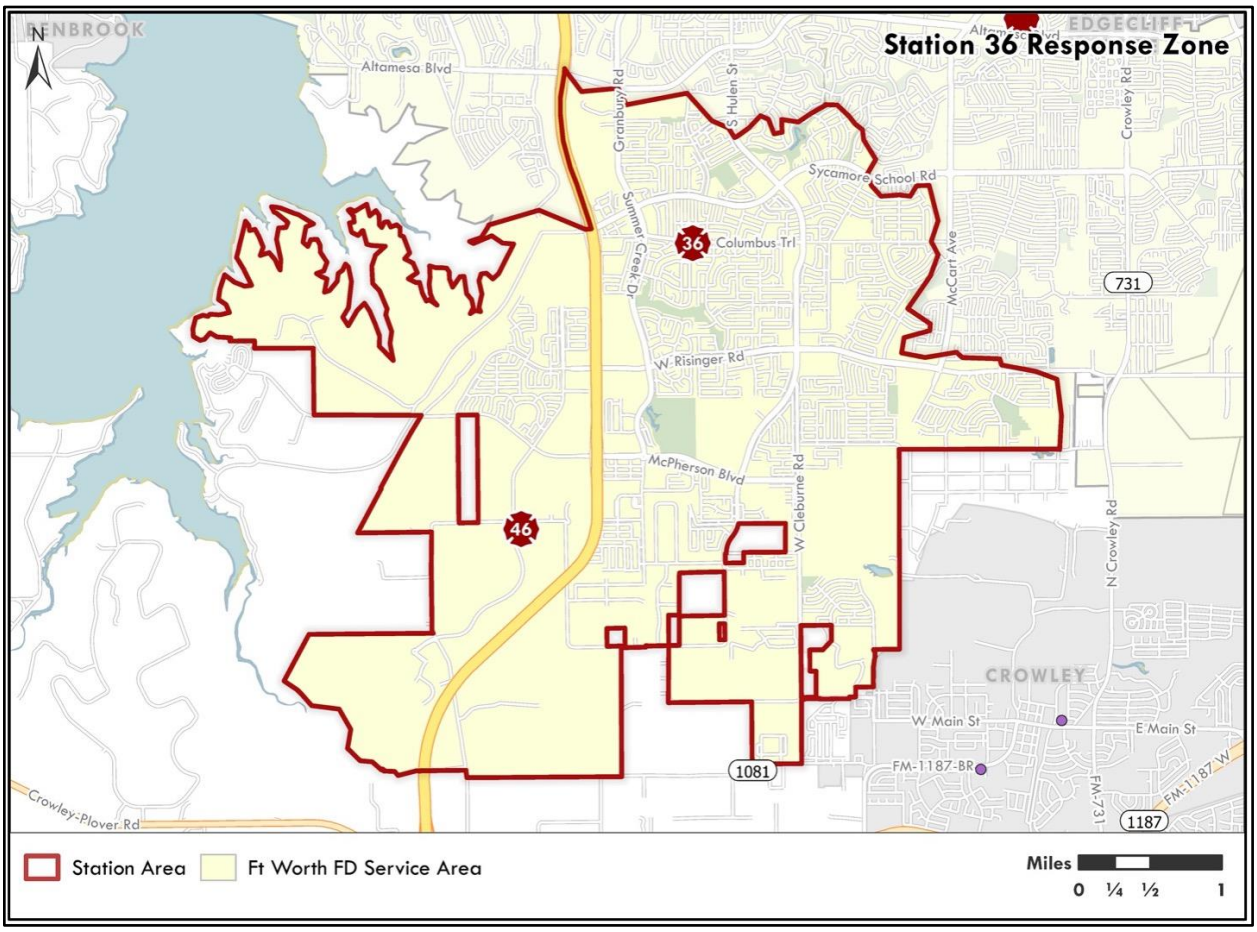


Table 37—Risk Profile – Station 36

Risk Factors			
Total Area (Square Miles)	**15.99**	Total Number of Buildings	**16,362**
Resident Population	**39,906**	Building Density (per Square Mile)	**1,023**
Daytime Population	**1,171**	High-Risk Occupancies	**35**
Daytime Population Density	**73**	High-Rise Buildings (=/>75 feet)	**0**
Nighttime Population Density	**2,496**	Assessed Valuation – Improvements	**$2,539 Million**
Critical Facilities	**11**		

Figure 38—Fire Station 37

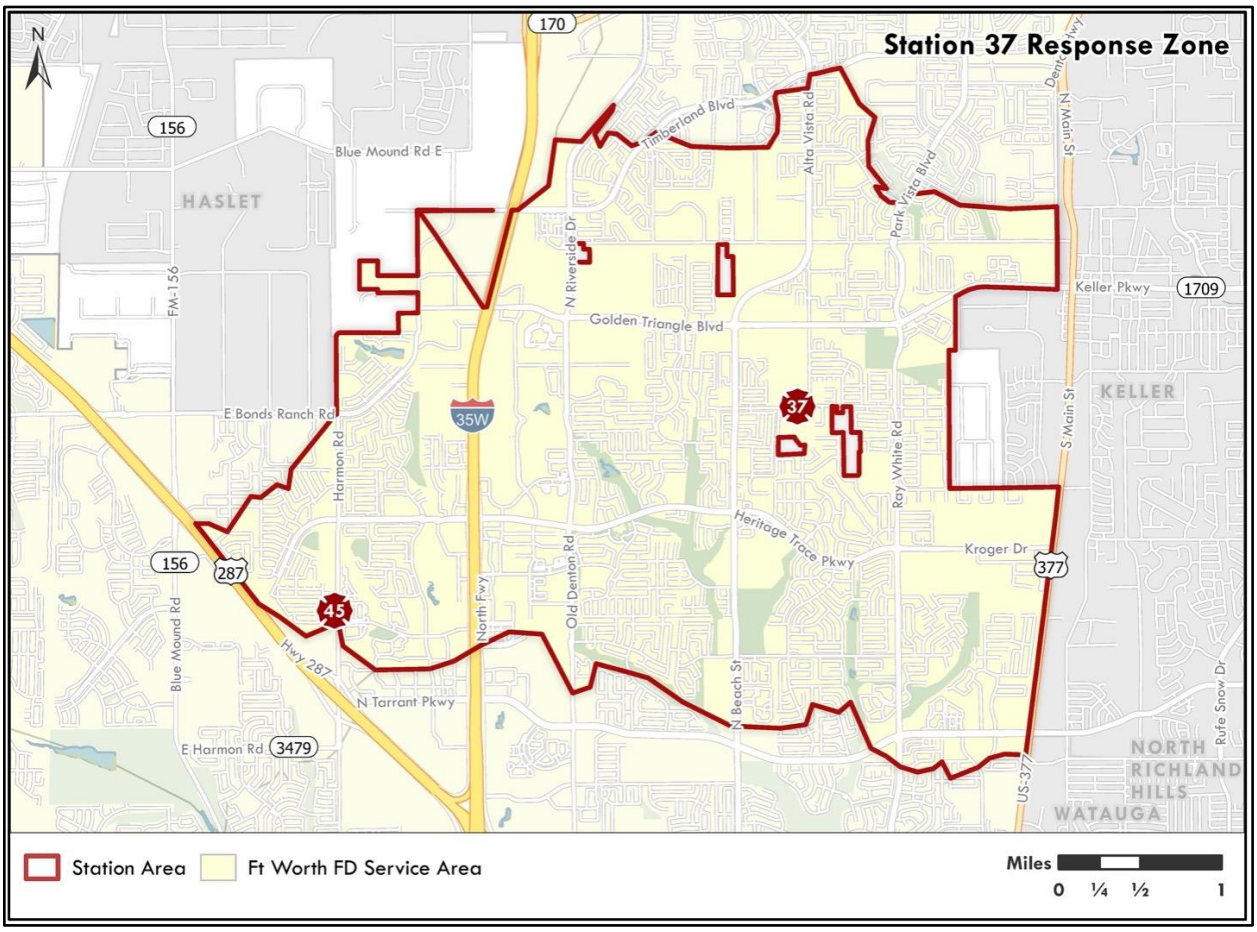


Table 38—Risk Profile – Station 37

Risk Factors			
Total Area (Square Miles)	**13.56**	Total Number of Buildings	**22,214**
Resident Population	**66,096**	Building Density (per Square Mile)	**1,638**
Daytime Population	**12,366**	High-Risk Occupancies	**40**
Daytime Population Density	**912**	High-Rise Buildings (=/>75 feet)	**1**
Nighttime Population Density	**4,874**	Assessed Valuation – Improvements	**$4,996 Million**
Critical Facilities	**5**		

Figure 39—Fire Station 38

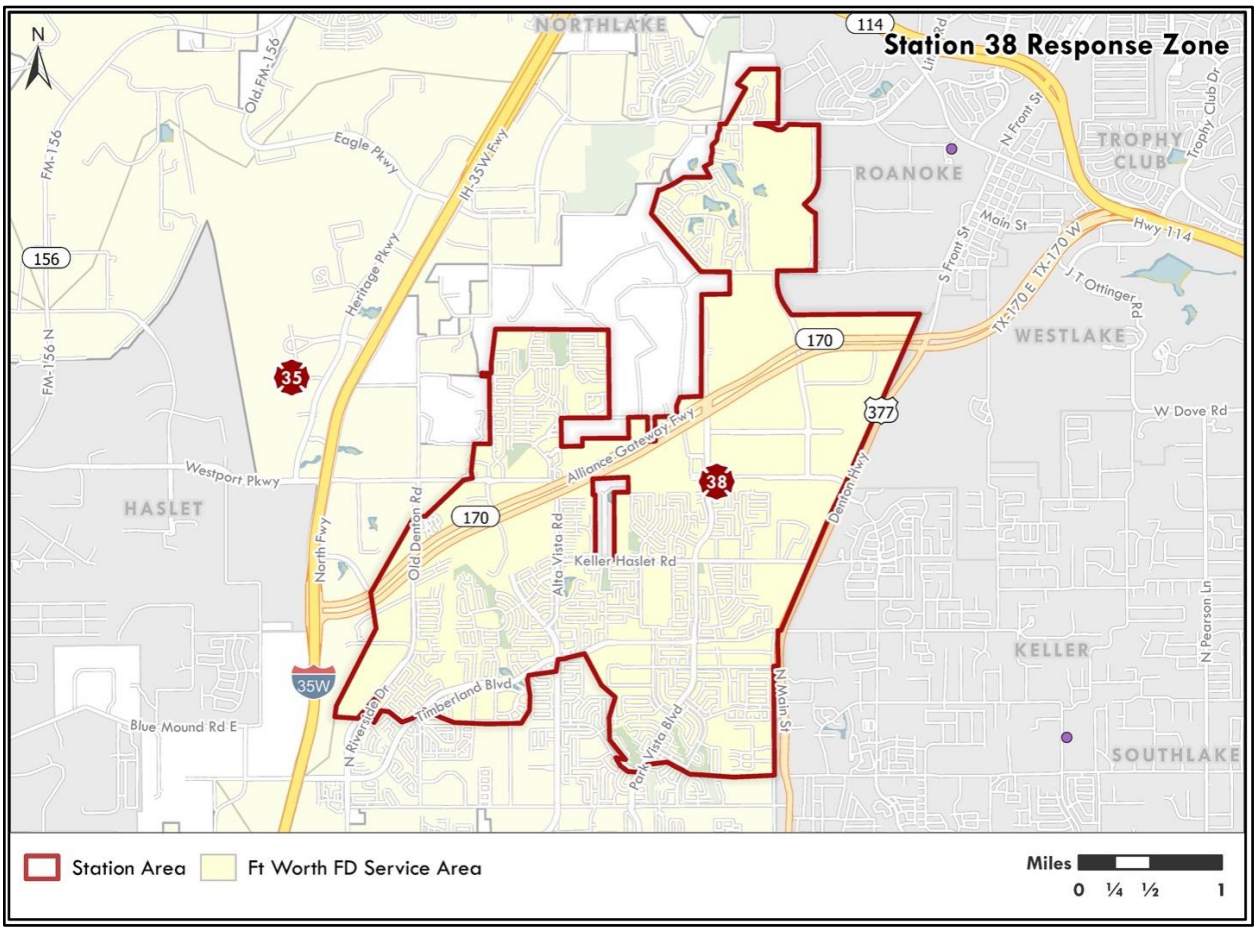


Table 39—Risk Profile – Station 38

Risk Factors			
Total Area (Square Miles)	**8.79**	Total Number of Buildings	**11,194**
Resident Population	**30,028**	Building Density (per Square Mile)	**1,274**
Daytime Population	**11,578**	High-Risk Occupancies	**3**
Daytime Population Density	**1,317**	High-Rise Buildings (=/>75 feet)	**0**
Nighttime Population Density	**3,416**	Assessed Valuation – Improvements	**$3,294 Million**
Critical Facilities	**1**		

Figure 40—Fire Station 39

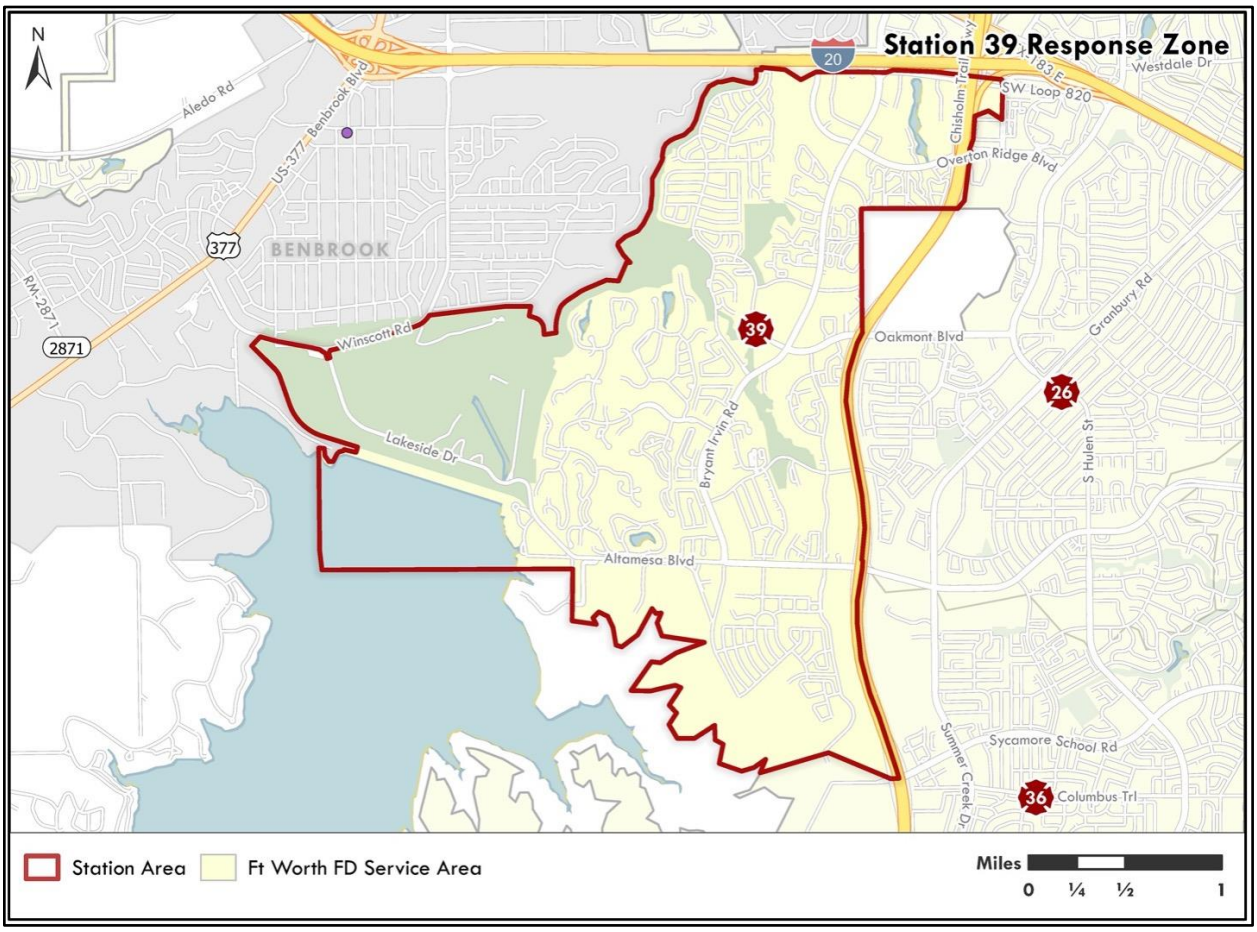


Table 40—Risk Profile – Station 39

Risk Factors			
Total Area (Square Miles)	**6.65**	Total Number of Buildings	**3,696**
Resident Population	**12,216**	Building Density (per Square Mile)	**556**
Daytime Population	**8,115**	High-Risk Occupancies	**36**
Daytime Population Density	**1,220**	High-Rise Buildings (=/>75 feet)	**2**
Nighttime Population Density	**1,837**	Assessed Valuation – Improvements	**$1,784 Million**
Critical Facilities	**1**		

Figure 41—Fire Station 40

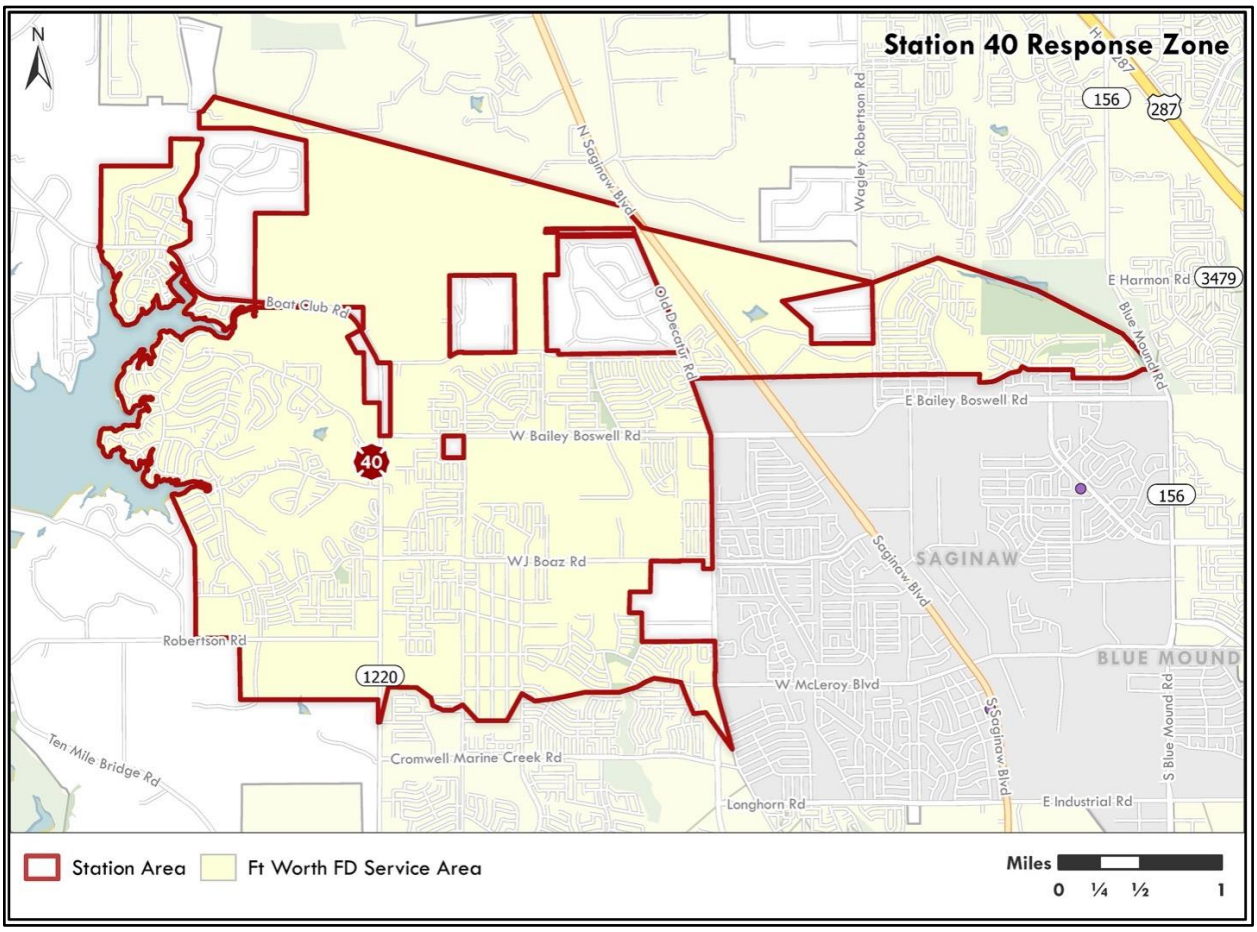


Table 41—Risk Profile – Station 40

Risk Factors			
Total Area (Square Miles)	**11.01**	Total Number of Buildings	**12,462**
Resident Population	**28,090**	Building Density (per Square Mile)	**1,132**
Daytime Population	**1,505**	High-Risk Occupancies	**7**
Daytime Population Density	**137**	High-Rise Buildings (=/>75 feet)	**0**
Nighttime Population Density	**2,552**	Assessed Valuation – Improvements	**$1,898 Million**
Critical Facilities	**2**		

Figure 42—Fire Station 41

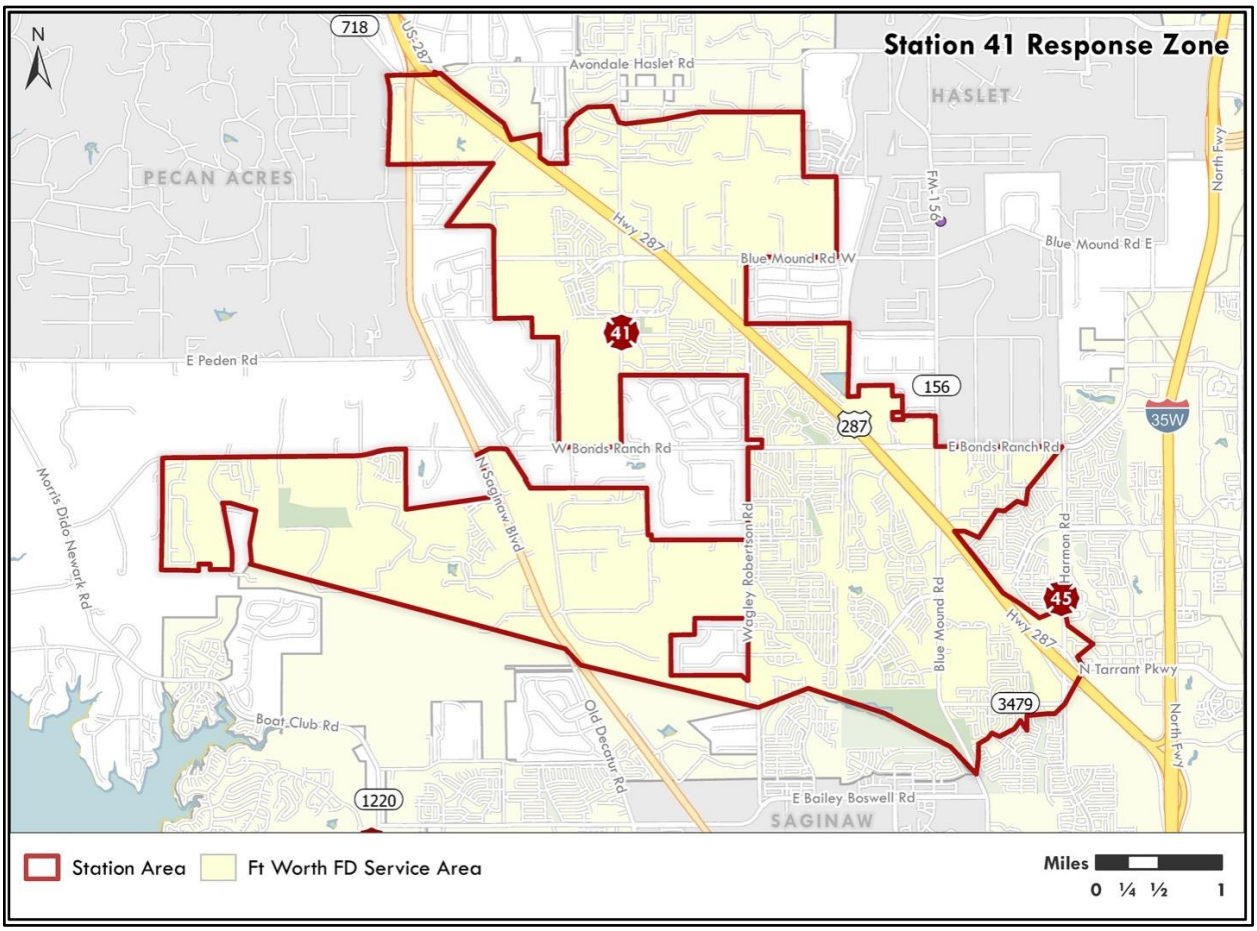


Table 42—Risk Profile – Station 41

Risk Factors			
Total Area (Square Miles)	**16.29**	Total Number of Buildings	**10,847**
Resident Population	**22,254**	Building Density (per Square Mile)	**666**
Daytime Population	**1,754**	High-Risk Occupancies	**4**
Daytime Population Density	**108**	High-Rise Buildings (=/>75 feet)	**0**
Nighttime Population Density	**1,366**	Assessed Valuation – Improvements	**$1,675 Million**
Critical Facilities	**6**		

Figure 43—Fire Station 42

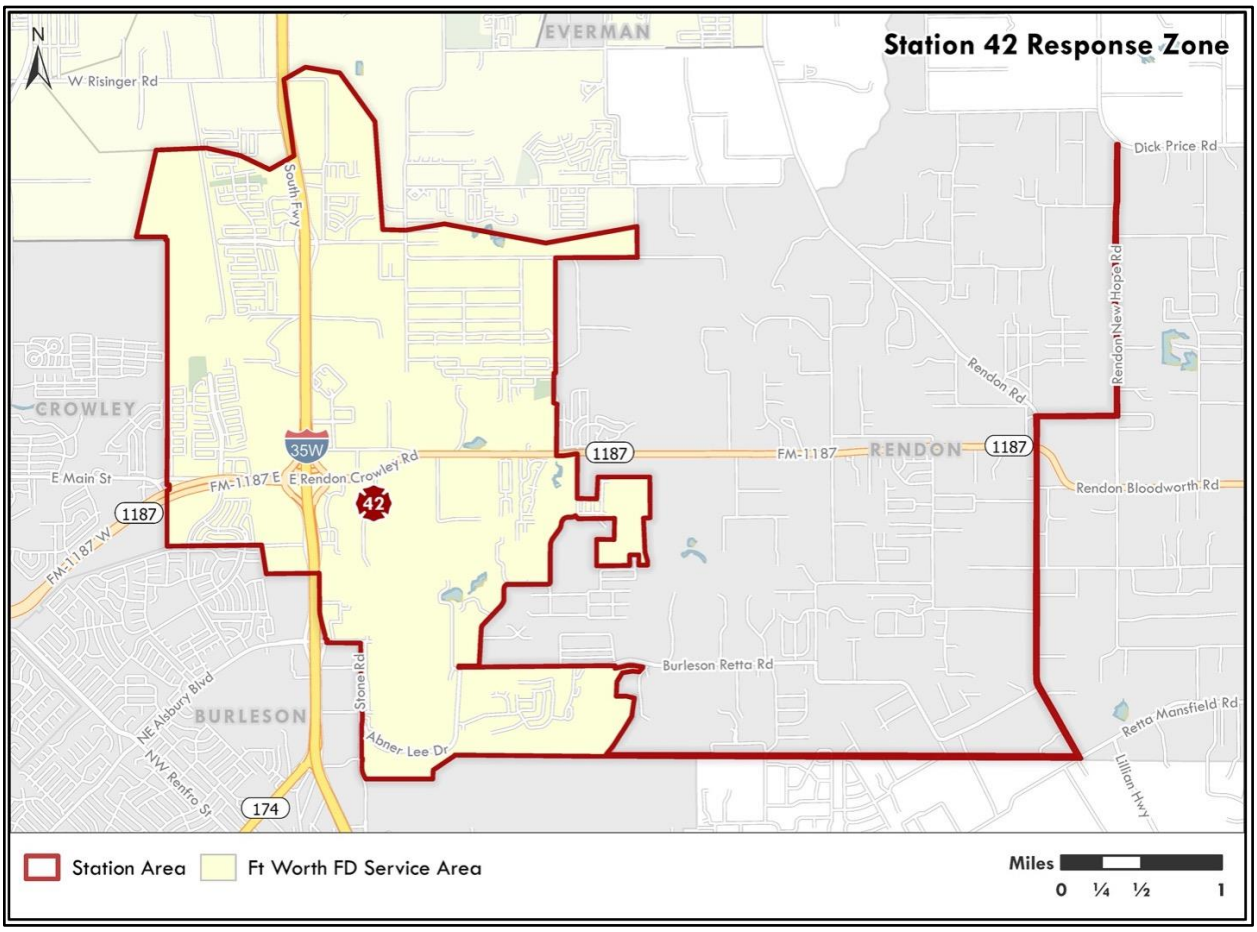


Table 43—Risk Profile – Station 42

Risk Factors			
Total Area (Square Miles)	**7.97**	Total Number of Buildings	**5,892**
Resident Population	**12,594**	Building Density (per Square Mile)	**739**
Daytime Population	**4,335**	High-Risk Occupancies	**24**
Daytime Population Density	**544**	High-Rise Buildings (=/>75 feet)	**1**
Nighttime Population Density	**1,580**	Assessed Valuation – Improvements	**$971 Million**
Critical Facilities	**1**		

Figure 44—Fire Station 43

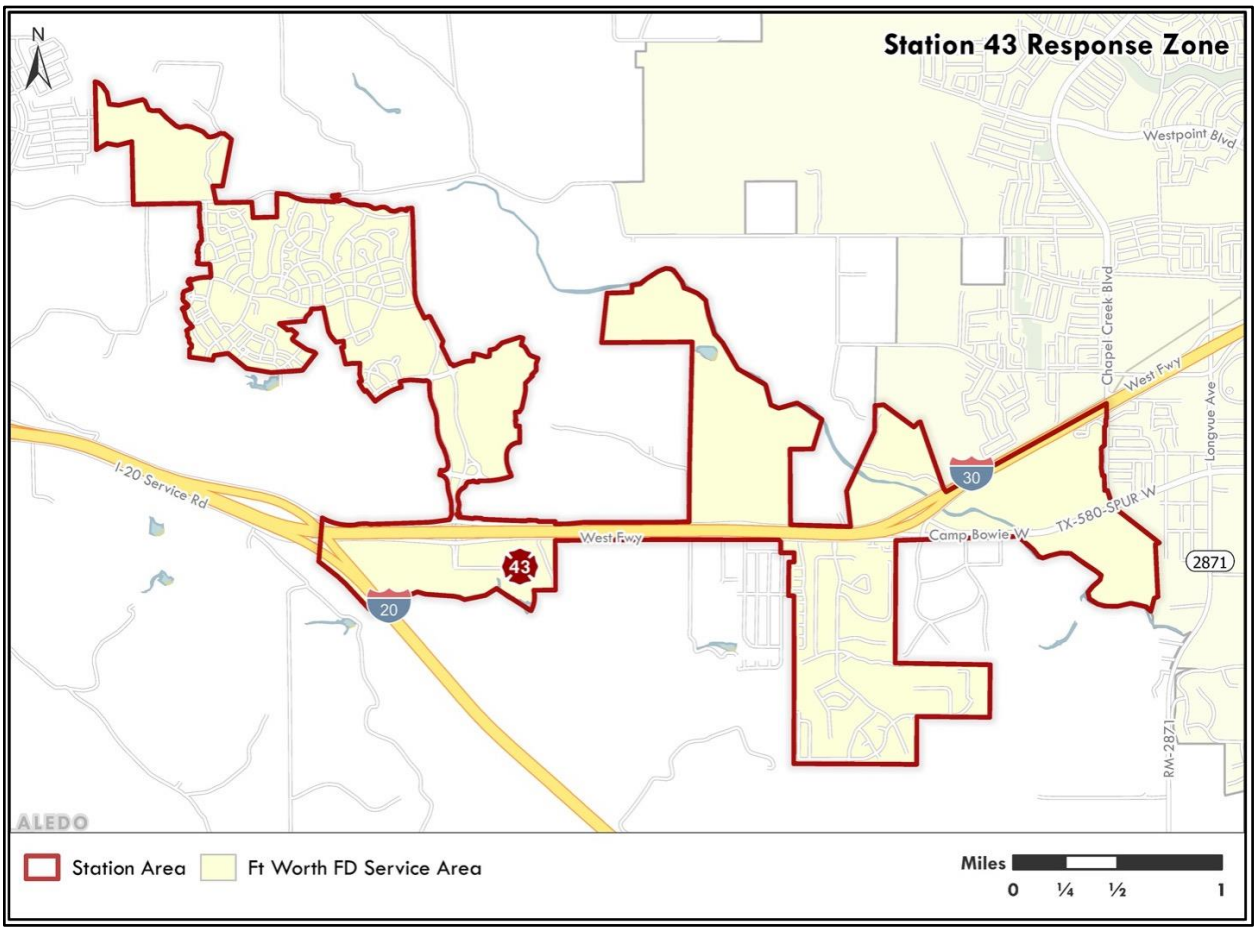


Table 44—Risk Profile – Station 43

Risk Factors			
Total Area (Square Miles)	**3.70**	Total Number of Buildings	**1,613**
Resident Population	**2,617**	Building Density (per Square Mile)	**436**
Daytime Population	**112**	High-Risk Occupancies	**0**
Daytime Population Density	**30**	High-Rise Buildings (=/>75 feet)	**0**
Nighttime Population Density	**708**	Assessed Valuation – Improvements	**$333 Million**
Critical Facilities	**1**		

Figure 45—Fire Station 44

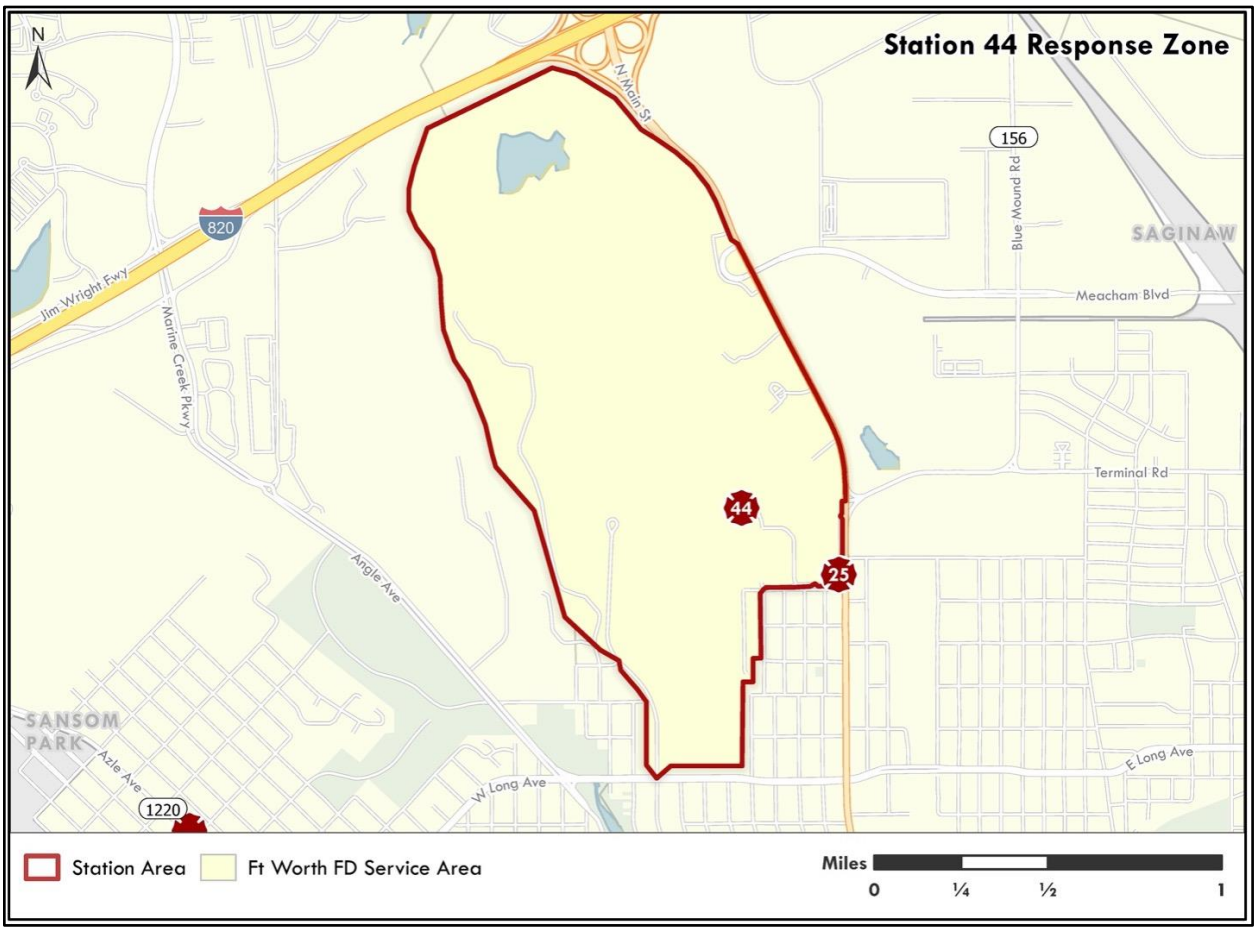


Table 45—Risk Profile – Station 44

Risk Factors			
Total Area (Square Miles)	**1.46**	Total Number of Buildings	**131**
Resident Population	**13**	Building Density (per Square Mile)	**90**
Daytime Population	**950**	High-Risk Occupancies	**0**
Daytime Population Density	**650**	High-Rise Buildings (=/>75 feet)	**0**
Nighttime Population Density	**9**	Assessed Valuation – Improvements	**$150 Million**
Critical Facilities	**2**		

1.1.4 Values at Risk to Be Protected

Values at risk, broadly defined, are tangibles of significant importance or value to the community or jurisdiction potentially at risk of harm or damage from a hazard occurrence. Values at risk

typically include people, critical facilities/infrastructure, buildings, and key economic, cultural, historic, and/or natural resources.

People

Residents, employees, visitors, and travelers in a community or jurisdiction are vulnerable to harm from a hazard occurrence. Particularly vulnerable are specific at-risk populations, including those unable to care for themselves or self-evacuate in the event of an emergency. At-risk populations typically include children less than 10 years of age, the elderly, people housed in institutional settings, households below the federal poverty level, and people living unsheltered. The following table summarizes key demographic data for the City.

Table 46—Key Demographic Data – Fort Worth

Demographic	2021
Population	**930,702**
Under 10 Years	15.90%
10–14 Years	7.50%
15–64 Years	65.50%
65–74 Years	6.80%
75 Years and Older	4.20%
Median Age	33.2
Daytime Population	934,643
Housing Units	**352,672**
Owner-Occupied	55.10%
Renter-Occupied	37.60%
Vacant	7.30%
Average Household Size	2.80
Median Home Value	$221,162
Ethnicity	
White	56.40%
Hispanic/Latino (Counted as White)	36.10%
Asian	4.70%
Black / African American	21.10%
Other	17.80%
Diversity Index	81.5

Demographic	2021
Education (Population over 24 Years of Age)	**585,373**
High School Graduate or Equivalent	83.70%
Undergraduate Degree	31.20%
Graduate/Professional Degree	10.30%
Employment (Population over 15 Years of Age)	**472,774**
In Labor Force	93.70%
Unemployed	6.30%
Median Household Income	$64,147
Population below Poverty Level	13.60%
Disabled Population	7.20%
Population without Health Insurance Coverage	20.40%

Source: ESRI and U.S. Census Bureau

Of note from the previous table is the following:

- Nearly 27 percent of the population is under 10 years or over 65 years of age.
- The City's population is predominantly White (57 percent), followed by Hispanic/Latino (36 percent and also counted as White), Black / African American (21 percent), other ethnicities (18 percent), and Asian (5 percent).
- Of the population over 24 years of age, nearly 84 percent has completed high school or equivalency.
- Of the population over 24 years of age, 41.5 percent has an undergraduate, graduate, or professional degree.
- Of the population 15 years of age or older, 94 percent is in the workforce; 6 percent are unemployed.
- Median household income is slightly more than $64,000.
- The population below the federal poverty level is 13.6 percent.
- Over 20 percent of the population does not have health insurance coverage.

The City's population is projected to increase by 31 percent to more than 1.2 million people by 2045.[1]

Buildings

The City has more than 350,000 residential housing units and a large inventory of other buildings housing manufacturing, research, technology, office, professional services, retail sales, restaurants/bars, motels, churches, schools, storage, government facilities, healthcare facilities, and other occupancy types.[2]

Building Occupancy Risk Categories

The CFAI identifies the following four risk categories that relate to building occupancy:

Low Risk – includes detached garages, storage sheds, outbuildings, and similar building occupancies that pose a relatively low risk of harm to humans or the community if damaged or destroyed by fire.

Moderate Risk – includes detached single-family or two-family dwellings, mobile homes, commercial and industrial buildings less than 10,000 square feet without a high hazard fire load, aircraft, railroad facilities; and similar building occupancies where loss of life or property damage is limited to the single building.

High Risk – includes apartment/condominium buildings, commercial and industrial buildings more than 10,000 square feet without a high hazard fire load, low-occupant load buildings with high fuel loading or hazardous materials, and similar occupancies with potential for substantial loss of life or unusual property damage or financial impact.

Maximum Risk – includes buildings or facilities with unusually high risk requiring an Effective Response Force (ERF) involving a significant augmentation of resources and personnel and where a fire would pose the potential for a catastrophic event involving large loss of life and/or significant economic impact to the community.

Evaluation of the City's building inventory identified 1,193 high/maximum-risk building uses as they relate to the CFAI building fire risk categories, as summarized in the following table.

[1] Source: City of Fort Worth Planning and Data Analytics presentation (February 28, 2022).

[2] Source: Esri Community Analyst – Community Profile (2021).

Table 47—Building Occupancy Inventory by Risk Category

Building Occupancy Classification		Number[1]	Risk Category[2]
A-1	Assembly	127	***High***
H	Hazardous	77	***Maximum***
I	Institutional	172	***High***
R-1	Hotel/Motel	195	***High***
R-2	Multi-Family Residential	528	***High***
R-4	Assisted Living	94	***High***
	Total	**1,193**	

[1] Source: City of Fort Worth

[2] CFAI *Standards of Cover* (Fifth Edition)

Critical Facilities/Infrastructure

The US Department of Homeland Security defines Critical Infrastructure / Key Resources as those physical assets essential to the public health and safety, economic vitality, and resilience of a community, such as lifeline utilities infrastructure, telecommunications infrastructure, essential government services facilities, public safety facilities, schools, hospitals, airports, etc. As summarized in the following table and each preceding Station Area Risk Profile, City staff identified 275 critical facilities and infrastructure. A hazard occurrence with significant impact severity affecting one or more of these facilities would likely adversely impact critical public or community services.

Table 48—Critical Facilities

Critical Facility Category	Number
Communications	12
Community Services	29
Cultural/Historic	22
Government Services	92
Other	13
Public Safety	91
Recreation	5
Transportation	2
Utility	9
Total	**275**

Source: City of Fort Worth Planning and Data Analytics Department

Economic Resources[3]

As the twelfth largest city in the United States—and the second largest city in the Dallas–Fort Worth metroplex, with a population approaching one million people and an area approaching 350 square miles—the City has a robust, diverse economy, with leading business sectors including aerospace, aviation, defense and security, energy, financial services, food processing, information technology, life sciences, manufacturing, and transportation and logistics. Major employers include:

- American Airlines
- Lockheed Martin
- Fort Worth Independent School District
- Naval Air Station Fort Worth Joint Reserve Base
- JPS Health Network / John Peter Smith Hospital
- City of Fort Worth
- Burlington Northern Santa Fe LLC

[3] Source: City of Fort Worth FY 2021 Comprehensive Annual Financial Report, Table 20.

- Tarrant County College
- Alcon Laboratories, Inc.
- Bell Helicopter-Textron, Inc.
- Cook Children's Healthcare System
- Harris Methodist Hospital
- Tarrant County Government

Natural Resources

Significant natural resources to be protected within the City include:

- Lake Worth
- Marion Sansom Park
- Trinity River
- River Legacy Parks
- Fort Worth Nature Center and Refuge
- Tandy Hills Natural Area / Stratford Nature Area

Cultural/Historic Resources

As a vibrant, multicultural city and part of the number one tourist destination in Texas, welcoming more than nine million visitors annually, the City boasts a large inventory of cultural and historic resources, including the historic Stockyards, Billy Bob's Texas, Mule Alley, Sundance Square Entertainment District, Cultural District, Botanic Garden, and the Fort Worth Zoo.

Special/Unique Resources

The following facilities are special or unique resources to be protected:

- BNSF Railway Company Intermodal Facility
- Fort Worth Meachum International Airport and Alliance Airport
- Texas Christian University
- Texas Motor Speedway
- Will Rogers Memorial Center

1.1.5 Hazard Identification

Citygate utilizes prior risk studies where available, fire and non-fire hazards as identified by the CFAI, and agency/jurisdiction-specific data and information to identify the hazards to be evaluated for this study. The 2020 Tarrant County Hazard Mitigation Action Plan identifies the following nine natural hazards likely to impact the county:

1. Drought
2. Earthquake
3. Expansive soils
4. Extreme heat
5. Flooding (including dam failure)
6. Thunderstorms (including hail, wind, and lightning)
7. Tornadoes
8. Wildfires
9. Winter storms

The County Hazard Mitigation Action Plan further identifies technological hazards, including hazardous material events, infectious disease outbreaks, national security hazards, nuclear accidents, power failure, and telecommunications failure.

The City ranked the nine natural hazards as follows:[4]

1. Thunderstorm
2. Flooding
3. Winter storms
4. Tornado
5. Wildfire
6. Extreme heat
7. Drought

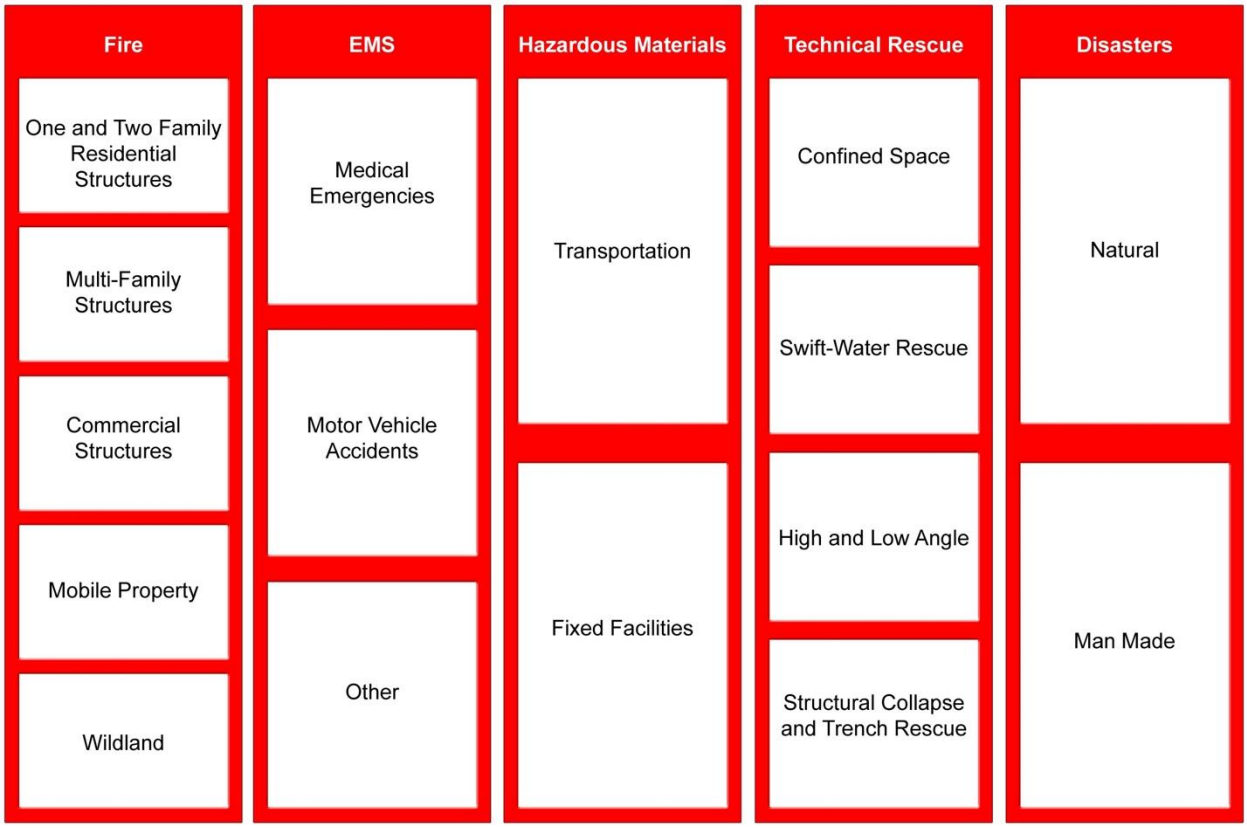
[4] City of Fort Worth Annex (Annex L) to the 2020 Tarrant County Hazard Mitigation Action Plan.

8. Expansive soils
9. Earthquake

Although the Department has no legal authority or responsibility to mitigate any hazards other than possibly for wildfire, it does provide services related to many hazards, including fire suppression, emergency medical services, technical rescue, and hazardous materials response.

The CFAI groups hazards into fire and non-fire categories, as shown in the following figure. Identification, qualification, and quantification of the various fire and non-fire hazards are important factors in evaluating how resources are or can be deployed to mitigate those risks.

Figure 46—Commission on Fire Accreditation International Hazard Categories



Source: CFAI *Standards of Cover* (Fifth Edition).

Subsequent to review and evaluation of the hazards identified in the Tarrant County Hazard Mitigation Action Plan, and the fire and non-fire hazards as identified by the CFAI as they relate to services provided by the Department, Citygate evaluated the following seven hazards for this risk assessment:

1. Building fire

2. Vegetation/wildfire
3. Medical emergency
4. Hazardous material release/spill
5. Technical rescue
6. Marine incident
7. Aviation incident

1.1.6 Service Capacity and Capabilities

Service capacity refers to an agency's available response force; the size, types, and condition of its response fleet and any specialized equipment; core and specialized performance capabilities and competencies; resource distribution and concentration; availability of automatic or mutual aid; and any other agency-specific factors influencing its ability to meet current and prospective future service demand and response performance relative to the risks to be protected.

The Department's service capacity for fire and non-fire risk consists of 244 personnel on duty daily staffing 39 engines, 13 quints (combination engine / ladder truck), three aerial ladder trucks, four Aircraft Rescue Fire Fighting (ARFF) apparatus, one squad, one rehabilitation/PPE apparatus, one paramedic support unit, and seven Battalion Chiefs, all operating from the Department's 44 fire stations. The Department also has one additional rescue, two highway blocker apparatus, one technical rescue squad, 19 Type-6 wildland engines, two water tenders, and five zodiac rescue boats that can be cross-staffed and deployed as needed with on-duty or call-back personnel.

All response personnel are trained to either the Emergency Medical Technician (EMT) level, capable of providing Basic Life Support (BLS) pre-hospital emergency medical care, Advanced Emergency Medical Technician (AEMT) level, capable of providing some advanced pre-hospital medical interventions as authorized by the Medical Director, or EMT-Paramedic (Paramedic) level, capable of providing Advanced Life Support (ALS) pre-hospital emergency medical care. Ground paramedic ambulance service is provided by the Metropolitan Area EMS Authority (MAEMSA), known as MedStar Mobile Healthcare, a government agency established in 1986 through an interlocal cooperative agreement of 15 Tarrant County cities, including Fort Worth. Emergency room services are provided by Baylor Scott and White All Saints Medical Center, Cook Children's Medical Center, John Peter Smith Hospital, Medical City Fort Worth, and Texas Health Harris Methodist Hospital.

Response personnel are also trained to the US Department of Transportation Hazardous Material First Responder Operational level to provide initial hazardous material incident assessment, hazard isolation, and support for the Department's hazardous material response team. The Department has 120 personnel trained to the Hazardous Materials Technician level, with a minimum daily

staffing level of 20 Technicians to cross-staff the Department's Type-1 Hazardous Materials Response Units as needed.[5]

All response personnel are further trained to the Confined Space Awareness level, with 111 personnel trained to the Urban Search and Rescue (USAR) Technician level for confined space, rope rescue, structural collapse, and other heavy rescue operations, with a minimum daily staffing level of 12 Technicians to cross-staff the Department's two heavy rescue squads at Stations 14 and 38. Many of the Department's USAR Technicians also serve on the FEMA Texas Task Force 1.[6]

In addition, the Department maintains two Swift Water and Underwater Search and Rescue Teams, with a minimum daily staffing of four swift-water technicians per team for water-related search, rescue, and recovery operations.

1.1.7 Probability of Occurrence

Probability of occurrence refers to the probability of a future hazard occurrence during a specific period. Because the CFAI agency accreditation process requires annual review of an agency's risk assessment and baseline performance measures, Citygate recommends using the 12 months following completion of an SOC study as an appropriate period for the probability of occurrence evaluation. The following table describes the five probability of occurrence categories and related general characteristics used for this analysis.

[5] Source: Fort Worth Fire Department 2020 Annual Report.

[6] Source: Fort Worth Fire Department 2020 Annual Report.

Table 49—Probability of Occurrence Categories

Probability	General Characteristics	Expected Frequency of Occurrence
Rare	• Hazard ***may occur*** under unusual conditions.	>10 years
Unlikely	• Hazard ***could occur*** infrequently. • No recorded or anecdotal evidence of occurrence. • Little opportunity, reason, or means for hazard to occur.	0–2 years
Possible	• Hazard ***should occur*** occasionally. • Infrequent, random recorded or anecdotal evidence of occurrence. • Some opportunity, reason, or means for hazard to occur.	3–23 months
Probable	• Hazard will ***probably occur*** regularly. • Regular recorded or strong anecdotal evidence of occurrence. • Considerable opportunity, reason, or means for hazard to occur.	2–8 weeks
Frequent	• Hazard is ***expected to occur*** frequently. • High level of recorded or anecdotal evidence of regular occurrence. • Strong opportunity, reason, or means for hazard to occur. • Frequent hazard recurrence.	Daily to weekly

Citygate's SOC assessments use recent multiple-year incident response data to determine the probability of hazard occurrence for the ensuing 12-month period.

1.1.8 Consequence Severity

Consequence severity refers to the magnitude or reasonably expected loss a hazard occurrence has on people, buildings, lifeline services, the environment, and the community as a whole. The following table describes the five consequence severity categories and general characteristics used for this analysis.

Table 50—Consequence Severity Categories

Category	General Characteristics
Insignificant	• No injuries or fatalities • Few to no persons displaced for short duration • Little or no personal support required • Inconsequential to no damage • Minimal to no community disruption • No measurable environmental impacts • Minimal to no financial loss • No wildland Fire Hazard Severity Zones (FHSZs)
Minor	• Few injuries; no fatalities; minor medical treatment only • Some displacement of persons for less than 24 hours • Some personal support required • Some minor damage • Minor community disruption of short duration • Small environmental impacts with no lasting effects • Minor financial loss • No wildland FHSZs
Moderate	• Medical treatment required; some hospitalizations; few fatalities • Localized displaced of persons for less than 24 hours • Personal support satisfied with local resources • Localized damage • Normal community functioning with some inconvenience • No measurable environmental impacts with no long-term effects, or small impacts with long-term effect • Moderate financial loss • Less than 25% of area in *Moderate* or *High* wildland FHSZ
Major	• Extensive injuries; significant hospitalizations; many fatalities • Large number of persons displaced for more than 24 hours • External resources required for personal support • Significant damage • Significant community disruption; some services not available • Some impact to environment with long-term effects • Major financial loss with some financial assistance required • More than 25% of area in *Moderate* or *High* wildland FHSZ; less than 25% in *Very High* wildland FHSZ
Extreme	• Large number of severe injuries requiring hospitalization; significant fatalities • General displacement for extended duration • Extensive personal support required • Extensive damage • Community unable to function without significant external support • Significant impact to environment and/or permanent damage • Catastrophic financial loss; unable to function without significant support • More than 50% of area in *High* wildland FHSZ; more than 25% of area in *Very High* wildland FHSZ

1.1.9 Agency Impact

Agency impact severity refers to the extent a hazard occurrence impacts the Department's ability to (1) provide an ERF appropriate to prevent escalation of the emergency incident, and (2) to maintain sufficient response capacity throughout the City to control other concurrent incidents within desired response goals. The following table describes the five agency impact categories and related general characteristics used for this analysis.

Table 51—Agency Impact Categories

Category	Typical Characteristics
Insignificant	• Hazard occurrence has ***minimal to no*** impact on the agency's ability to maintain full ERF response capacity *and* at least one minor concurrent incident response capacity within each battalion • Typically requires only a single-unit response committed for less than one hour • Single concurrent incident rate less than 5%
Minor	• Hazard occurrence has ***minor*** impact on the agency's ability to maintain full ERF response capacity *and* at least one minor concurrent incident response capacity within each battalion • Typically requires one- or two-unit response committed for less than two hours • Single concurrent incident rate less than 10%
Moderate	• Hazard occurrence has a ***moderate*** impact on the agency's ability to maintain full ERF response capacity *and* at least one minor concurrent incident response capacity within each battalion • Typically requires three- to five-unit response or less than 20 personnel committed for up to six hours • Single concurrent incident rate less than 25%
Major	• Hazard occurrence has a ***major*** impact on the agency's ability to maintain full ERF response capacity *and* at least one minor concurrent incident response capacity within each battalion • Typically requires six- to 10-unit response or up to 40 personnel committed for up to 12 hours • Single concurrent incident rate less than 50%
Extreme	• Hazard occurrence has an ***extreme*** impact on the agency's ability to maintain full ERF response capacity *and* at least one minor concurrent incident response capacity within each battalion • Typically requires more than a 10-unit response or more than 40 personnel committed for more than 12 hours • Single concurrent incident rate greater than 50%

1.1.10 Overall Risk

Overall risk was determined by considering the probability of occurrence, reasonably expected consequence severity, and agency impact according to the following tables.

Table 52—Overall Risk Categories – Insignificant Agency Impact

Probability of Occurrence	Consequence Severity				
	Insignificant	Minor	Moderate	Major	Catastrophic
Rare	*Low*	*Low*	*Low*	*Low*	*High*
Unlikely	*Low*	*Low*	*Low*	*Low*	*High*
Possible	*Low*	*Low*	*Low*	*Moderate*	*High*
Probable	*Low*	*Low*	*Low*	*Moderate*	*High*
Frequent	*Low*	*Low*	*Low*	*Moderate*	*Extreme*

Table 53—Overall Risk Categories – Minor Agency Impact

Probability of Occurrence	Consequence Severity				
	Insignificant	Minor	Moderate	Major	Catastrophic
Rare	*Low*	*Low*	*Low*	*Moderate*	*High*
Unlikely	*Low*	*Low*	*Low*	*Moderate*	*High*
Possible	*Low*	*Low*	*Moderate*	*High*	*High*
Probable	*Low*	*Low*	*Moderate*	*High*	*Extreme*
Frequent	*Low*	*Moderate*	*High*	*High*	*Extreme*

Table 54—Overall Risk Categories – Moderate Agency Impact

Probability of Occurrence	Consequence Severity				
	Insignificant	Minor	Moderate	Major	Catastrophic
Rare	*Low*	*Low*	*Low*	*Moderate*	*High*
Unlikely	*Low*	*Low*	*Moderate*	*High*	*High*
Possible	*Low*	*Low*	*Moderate*	*High*	*Extreme*
Probable	*Low*	*Moderate*	*Moderate*	*High*	*Extreme*
Frequent	*Low*	*Moderate*	*High*	*High*	*Extreme*

Table 55—Overall Risk Categories – Major Agency Impact

Probability of Occurrence	Impact Severity				
	Insignificant	Minor	Moderate	Major	Catastrophic
Rare	*Low*	*Low*	*Moderate*	*High*	*Extreme*
Unlikely	*Low*	*Low*	*Moderate*	*High*	*Extreme*
Possible	*Low*	*Moderate*	*High*	*High*	*Extreme*
Probable	*Low*	*Moderate*	*High*	*High*	*Extreme*
Frequent	*Moderate*	*Moderate*	*High*	*High*	*Extreme*

Table 56—Overall Risk Categories – Extreme Agency Impact

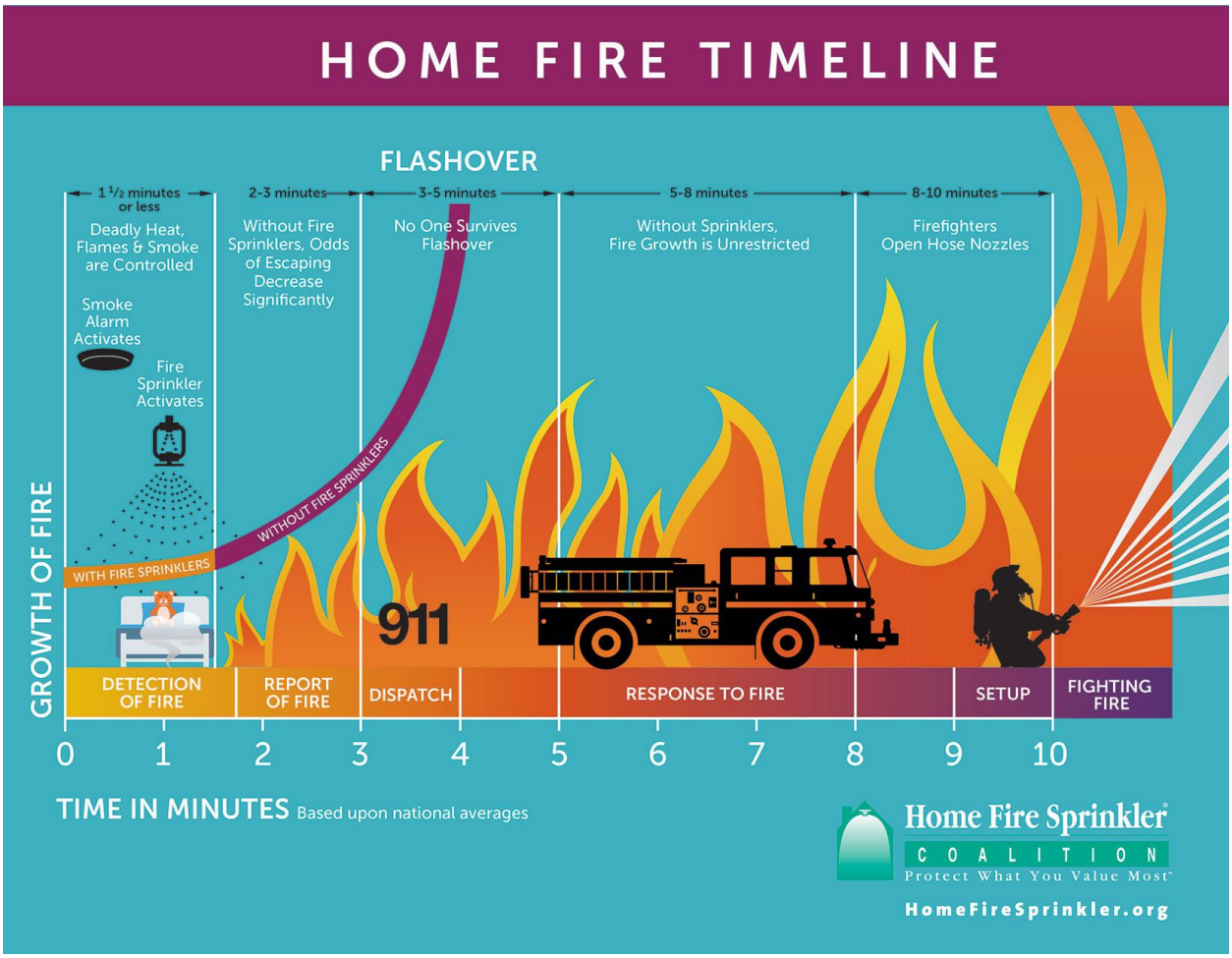
Probability of Occurrence	Impact Severity				
	Insignificant	Minor	Moderate	Major	Catastrophic
Rare	*Low*	*Moderate*	*High*	*High*	*Extreme*
Unlikely	*Low*	*Moderate*	*High*	*High*	*Extreme*
Possible	*Low*	*Moderate*	*High*	*Extreme*	*Extreme*
Probable	*Moderate*	*Moderate*	*High*	*Extreme*	*Extreme*
Frequent	*Moderate*	*Moderate*	*High*	*Extreme*	*Extreme*

1.1.11 Building Fire Risk

One of the primary hazards in any community is building fire. Building fire risk factors include building size, age, construction type, density, occupancy, height above ground level, required fire flow, proximity to other buildings, built-in fire protection/alarm systems, available fire suppression water supply, building fire service capacity, fire suppression resource deployment (distribution/concentration), staffing, and response time. Citygate used available data from the Department and the 2020 internal Community Risk Assessment in determining the City's building fire risk.

The following figure illustrates the building fire progression timeline and shows that flashover, which is the point at which the entire room erupts into fire after all the combustible objects in that room reach their ignition temperature, can occur as early as three to five minutes from the initial ignition. Human survival in a room after flashover is extremely improbable.

Figure 47—Building Fire Progression Timeline



Source: http://www.firesprinklerassoc.org.

Population Density

Population density within the City ranges from less than 1,000 to more than 18,000 people per square mile. Although risk analysis across a wide spectrum of other Citygate clients shows no direct correlation between population density and building fire *occurrence*, it is reasonable to conclude that building fire *risk* relative to potential impact on human life is greater as population density increases, particularly in areas with high density, multiple-story buildings.

Water Supply

A reliable public water system providing adequate volume, pressure, and flow duration in close proximity to all buildings is a critical factor in mitigating the potential impact severity of a community's building fire risk. Potable water is provided by the City, and according to Department staff, available fire flow is adequate throughout the City.

Response Capacity

The following table summarizes the Department's multiple-unit ERF for various categories of building fires.

Table 57—Building Fire ERF Resources

Building Fire Type	Effective Response Force	Total Staffing
Residential	4 Engines, 1 Truck/Quint, GEAR-1, MEDIC-1, 1 Air/Lighting, 2 Battalion Chiefs, 2 Investigators	**27**
Commercial	4 Engines, 2 Trucks/Quints, GEAR-1, MEDIC-1, 1 Air/Lighting, 2 Battalion Chiefs	**29**
Highrise	5 Engines, 2 Trucks/Quints, Squad 2 or Additional Engine, GEAR-1, MEDIC-1, 1 Air/Lighting, 3 Battalion Chiefs, 1 Shift Technician, 1 Shift Commander	**40**

Building Fire Service Demand

For the four-year period from October 1, 2017, through September 30, 2021, the City experienced 2,442 building fire incidents comprising 0.50 percent of total service demand over the same period, as summarized in the following tables. Note that 1,445 building fire incidents did not include a station location in the NFIRS "Station" field and are thus not included in the following tables.

Table 58—Building Fire Service Demand – Battalion 1

Hazard	Year	Battalion 1								Total	Percent Total Annual Demand
		4	10	17	21	28	29	36	42		
Building Fire	**RY 17/18**	12	3	9	6	7	14	8	1	**60**	0.25%
	RY 18/19	8	7	8	3	1	11	10	3	**51**	0.20%
	RY 19/20	10	6	9	6	8	4	7	2	**52**	0.21%
	RY 20/21	4	2	11	5	5	5	3	2	**37**	0.13%
	Total	**34**	**18**	**37**	**20**	**21**	**34**	**28**	**8**	**200**	**0.20%**
Percent Total Station Demand		0.22%	0.15%	0.19%	0.22%	0.24%	0.18%	0.23%	0.13%		

Table 59—Building Fire Service Demand – Battalion 2

Hazard	Year	Battalion 2						Total	Percent Total Annual Demand
		1	2	5	6	8	18		
Building Fire	RY 17/18	4	2	9	6	6	6	**33**	0.18%
	RY 18/19	5	2	11	6	4	0	**28**	0.15%
	RY 19/20	3	3	6	5	4	4	**25**	0.14%
	RY 20/21	4	3	6	3	7	3	**26**	0.14%
	Total	**16**	**10**	**32**	**20**	**21**	**13**	**112**	**0.15%**
Percent Total Station Demand		0.15%	0.06%	0.15%	0.22%	0.21%	0.17%		

Table 60—Building Fire Service Demand – Battalion 3

Hazard	Year	Battalion 3						Total	Percent Total Annual Demand
		12	13	15	25	40	44		
Building Fire	RY 17/18	7	6	6	3	3	0	**25**	0.23%
	RY 18/19	6	11	7	2	4	0	**30**	0.27%
	RY 19/20	5	8	7	2	1	0	**23**	0.21%
	RY 20/21	5	11	11	2	2	0	**31**	0.24%
	Total	**23**	**36**	**31**	**9**	**10**	**0**	**109**	**0.24%**
Percent Total Station Demand		0.20%	0.41%	0.28%	0.11%	0.16%	0.00%		

Table 61—Building Fire Service Demand – Battalion 4

Hazard	Year	Battalion 4						Total	Percent Total Annual Demand
		3	7	22	24	27	33		
Building Fire	RY 17/18	4	7	9	6	1	5	**32**	0.16%
	RY 18/19	9	8	16	12	4	6	**55**	0.29%
	RY 19/20	8	8	14	13	0	4	**47**	0.25%
	RY 20/21	9	8	6	15	4	6	**48**	0.23%
	Total	**30**	**31**	**45**	**46**	**9**	**21**	**182**	**0.23%**
Percent Total Station Demand		0.20%	0.21%	0.27%	0.21%	0.22%	0.33%		

Table 62—Building Fire Service Demand – Battalion 5

Hazard	Year	Battalion 5							Total	Percent Total Annual Demand
		16	23	26	30	32	39	43		
Building Fire	RY 17/18	15	20	9	5	3	2	0	**54**	0.27%
	RY 18/19	7	14	8	2	3	4	0	**38**	0.19%
	RY 19/20	12	21	11	4	4	4	0	**56**	0.28%
	RY 20/21	5	24	9	4	3	3	0	**48**	0.21%
	Total	**39**	**79**	**37**	**15**	**13**	**13**	**0**	**196**	**0.24%**
Percent Total Station Demand		0.20%	0.38%	0.19%	0.19%	0.19%	0.15%	0.00%		

Table 63—Building Fire Service Demand – Battalion 6

Hazard	Year	Battalion 6						Total	Percent Total Annual Demand
		11	34	35	37	38	41		
Building Fire	RY 17/18	1	2	0	9	4	2	**18**	0.28%
	RY 18/19	0	1	0	3	3	3	**10**	0.14%
	RY 19/20	3	1	0	7	4	1	**16**	0.22%
	RY 20/21	1	4	0	10	2	0	**17**	0.19%
	Total	**5**	**8**	**0**	**29**	**13**	**6**	**61**	**0.20%**
Percent Total Station Demand		0.17%	0.31%	0.00%	0.23%	0.21%	0.16%		

Table 64—Building Fire Service Demand – Battalion 7

Hazard	Year	Battalion 7					Total	Percent Total Annual Demand
		9	14	19	20	31		
Building Fire	RY 17/18	3	10	2	10	7	**32**	0.20%
	RY 18/19	4	14	3	16	5	**42**	0.25%
	RY 19/20	5	10	2	6	7	**30**	0.18%
	RY 20/21	6	8	1	11	7	**33**	0.18%
	Total	**18**	**42**	**8**	**43**	**26**	**137**	**0.20%**
Percent Total Station Demand		0.24%	0.21%	0.09%	0.34%	0.14%		

As the previous tables illustrate, building fire service demand varied significantly by battalion and station, with Station 23 having the highest overall demand and Stations 43 and 44 the lowest. Total building fire service demand is summarized by year in the following table.

Table 65—Total Building Fire Service Demand by Year

Hazard	Year	Total Hazard Demand	Percent Total Service Demand
Building Fire	RY 17/18	616	0.52%
	RY 18/19	580	0.48%
	RY 19/20	595	0.50%
	RY 20/21	651	0.49%
	Total	**2,442**	**0.50%**

Building Fire Risk Assessment

The following table summarizes Citygate's assessment of the City's building fire risk by hazard sub-type.

Table 66—Building Fire Risk Assessment

Building Fire Risk	Incident Type			
	Single-Family Residential	Apartment / Multi-Family Residential	Commercial / Industrial	High-Rise
Probability of Occurrence	*Frequent*	*Probable*	*Probable*	*Unlikely*
Consequence Severity	*Moderate*	*Moderate*	*Moderate*	*Major*
Impact Severity	*Moderate*	*Major*	*Major*	*Extreme*
Overall Risk	***High***	***High***	***High***	***High***

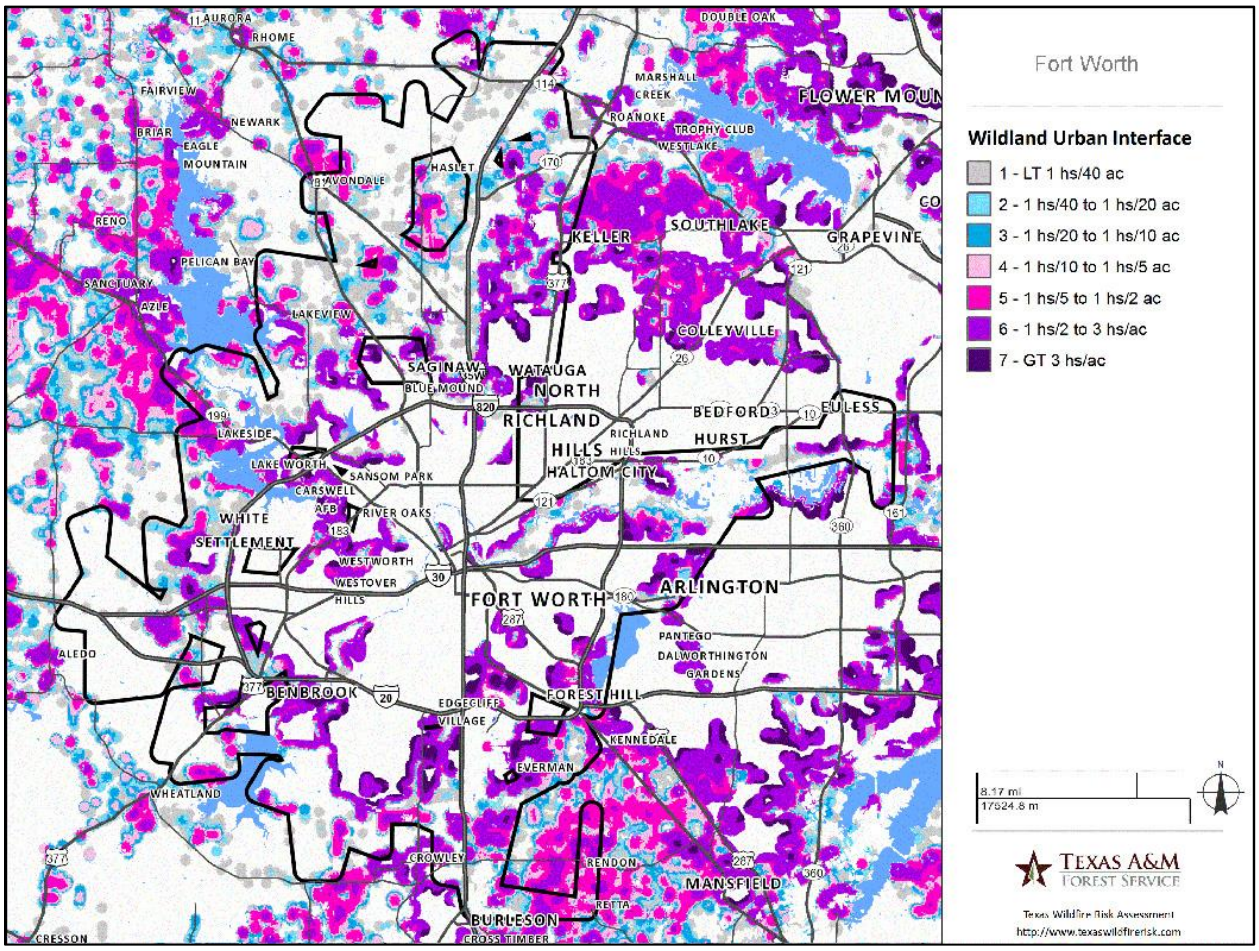
1.1.11 Vegetation/Wildfire Risk

Vegetation/wildfire risk factors include vegetative fuel types and configuration, wildland–urban interface (WUI) areas, weather, topography, prior service demand, water supply, mitigation measures, and vegetation/wildfire response capacity.

A Texas A&M Forest Service wildfire risk report for the City identifies 30.6 percent of the City's population live within the nearly 127,000 acres of WUI where dwellings and other human

improvements exist or are intermixed with undeveloped wildland vegetative fuels.[7] The following map shows the WUI areas of the City with the darker shades indicating higher building densities.

Figure 48—Wildland–Urban Interface (WUI) Housing Densities

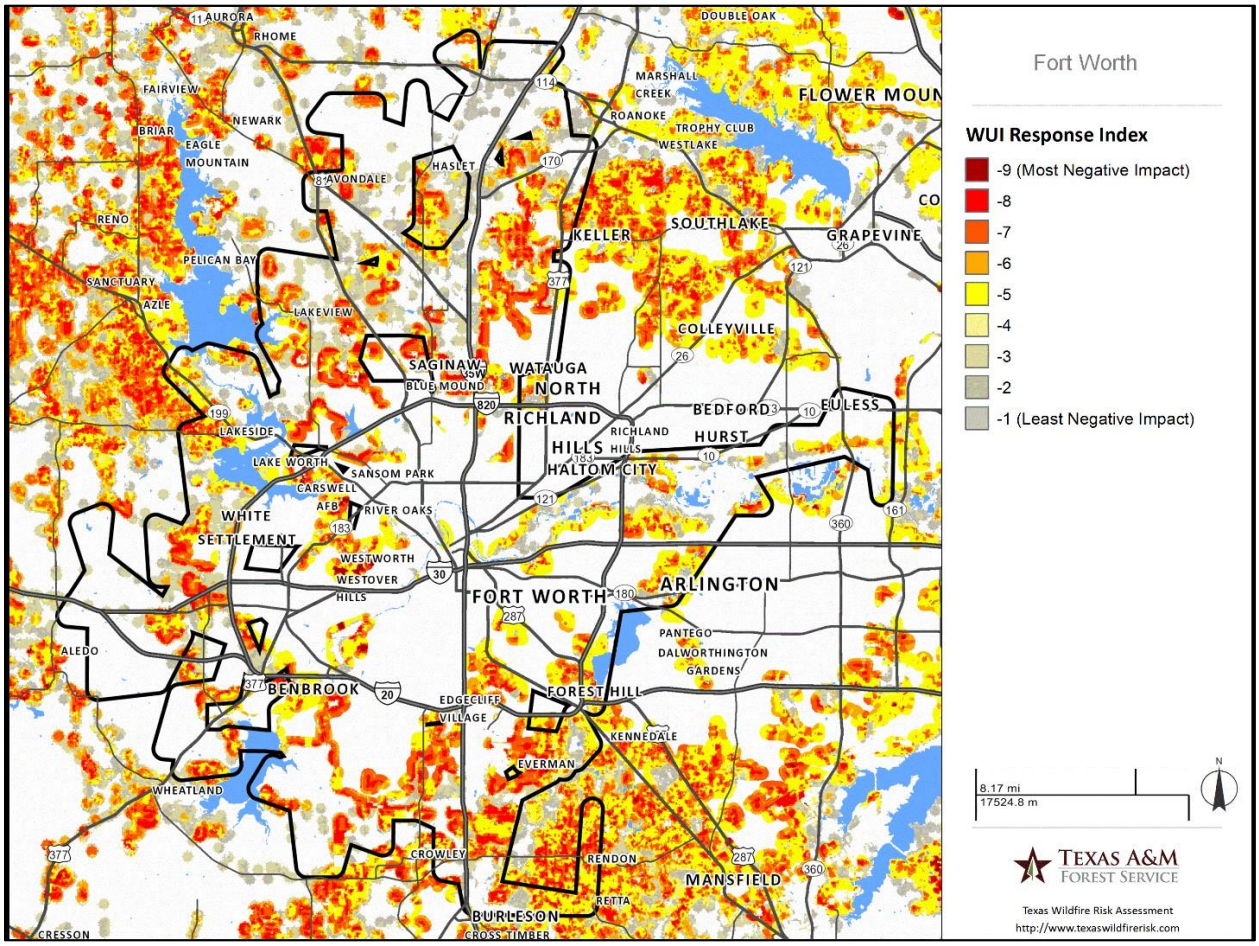


Wildfire Impact Areas

The Texas A&M Forest Service report further includes the following map showing the potential impact of a wildfire on people and homes with the darker shades indicating higher impact severity.

[7] Source: Texas A&M Forest Service, Texas Wildfire Risk Assessment Summary Report for Forth Worth (December 2018).

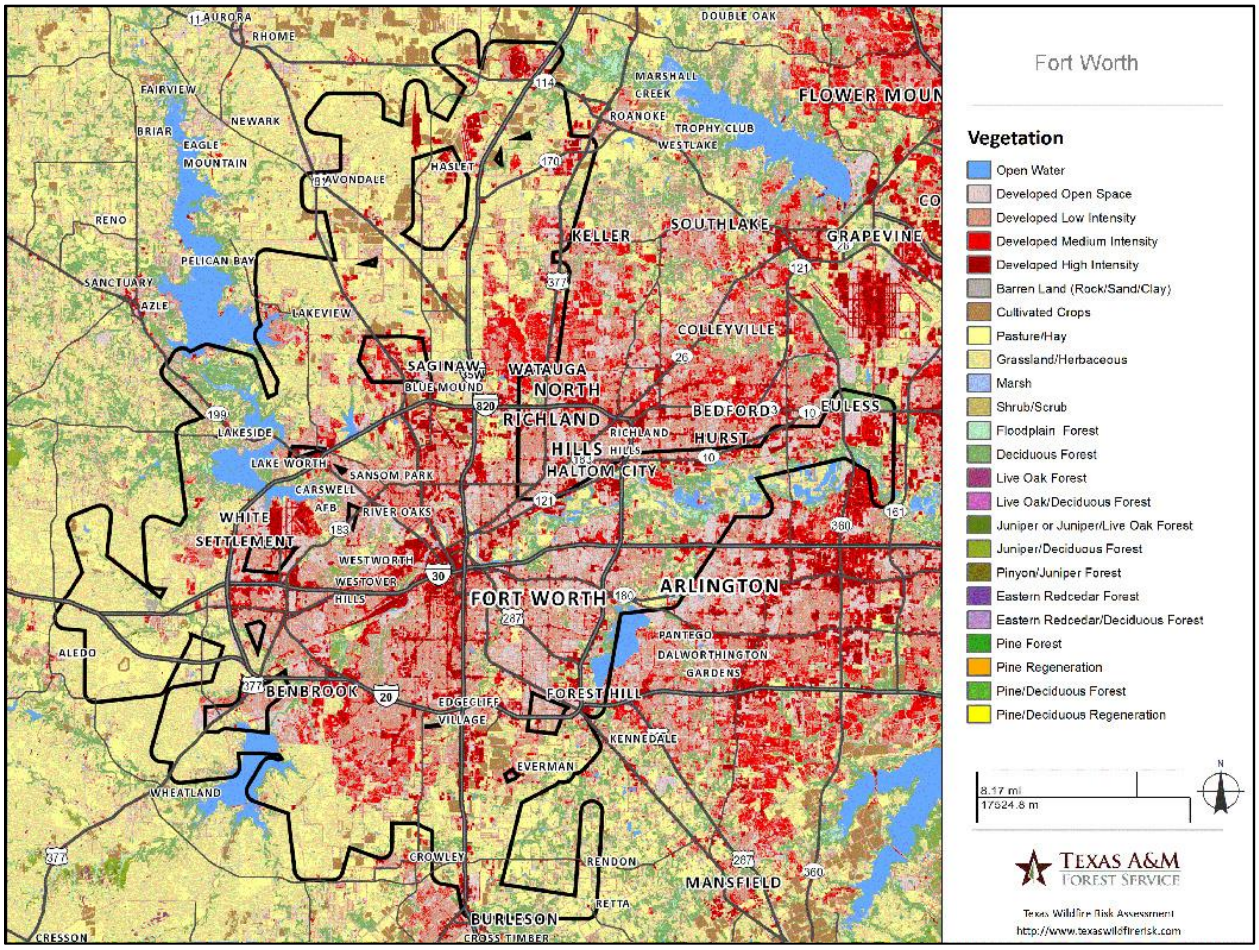
Figure 49—Wildfire Impact Areas



Vegetative/Wildfire Fuels

Vegetative fuel factors influencing fire intensity and spread include fuel type (vegetation species), height, arrangement, density, and moisture. Vegetative fuels within the City, in addition to decorative landscape species, consist of a mix of annual grasses and weeds, invasive species, and mixed deciduous and conifer tree species. Of particular importance is the presence of pine, red cedar, juniper, live oak, and pinyon pine species due to their potential to support passive and active crown burning. Once ignited, vegetation fires can burn intensely and contribute to rapid fire spread under the right fuel, weather, and topographic conditions. The following map shows the density of the various vegetative fuel types.

Figure 50—Vegetative Fuel Types and Density



Weather

Weather elements including temperature, relative humidity, wind, and lightning also affect vegetation/wildland fire potential and behavior. High temperatures and low relative humidity dry out vegetative fuels, creating a situation where fuels will more readily ignite and burn more intensely. Wind is the most significant weather factor influencing vegetation/wildland fire behavior with higher wind speeds increasing fire spread and intensity. Fuel and weather conditions most conducive to vegetation/wildfires generally occur from spring through late fall months; however, above-normal temperatures, drought, and winds can increase that period on either end.

Topography

Vegetation/wildland fires tend to burn more intensely and spread faster when burning uphill and up-canyon, except for a wind-driven downhill or down-canyon fire. The City's generally flat topography has minimal impact on vegetation/wildfire behavior and spread.

Water Supply

Another significant vegetation fire impact severity factor is water supply immediately available for fire suppression. According to Department staff, available fire flow is adequate throughout the City.

Wildfire Hazard Mitigation

Hazard mitigation refers to specific actions or measures taken to prevent a hazard from occurring and/or to minimize the severity of impacts resulting from a hazard occurrence. While none of the hazards subject to this study can be entirely prevented, measures *can* be taken to minimize the impacts when those hazards do occur. The only wildfire mitigation effort identified for this assessment is the pre-incident target hazard identification program.[8]

Wildfire Response Capacity

The following table summarizes the Department's multiple-unit ERF for wildfires.

Table 67—Wildfire Effective Response Force

Wildfire Type	Effective Response Force	Total Staffing
Grass/Brush	1 Engine	**4**
Brush	2 Engines, 3 Brush Trucks, 3 Accompanying Engines, 1 Battalion Chief	**21**

Vegetation/Wildfire Service Demand

The Department responded to 2,331 vegetation/wildfires over the four-year study period, comprising 0.48 percent of total service demand over the same period, as summarized in the following tables. Note that 92 vegetation/wildfire incidents did not include a station location in the NFIRS "Station" field and are thus not included in the following tables.

[8] Source: Fire Department Standard Operating Procedure S 6120 R1 (July 2020).

Table 68—Vegetation/Wildfire Service Demand – Battalion 1

Hazard	Year	Battalion 1								Total	Percent Total Annual Demand
		4	10	17	21	28	29	36	42		
Vegetation/Wildfire	RY 17/18	41	31	39	16	38	11	17	9	**202**	0.83%
	RY 18/19	11	8	11	3	12	4	5	2	**56**	0.22%
	RY 19/20	20	15	22	5	29	6	9	11	**117**	0.47%
	RY 20/21	24	13	22	2	23	11	9	10	**114**	0.40%
	Total	**96**	**67**	**94**	**26**	**102**	**32**	**40**	**32**	**489**	**0.48%**
Percent Total Station Demand		0.61%	0.54%	0.48%	0.29%	1.15%	0.17%	0.33%	0.53%		

Table 69—Vegetation/Wildfire Service Demand – Battalion 2

Hazard	Year	Battalion 2						Total	Percent Total Annual Demand
		1	2	5	6	8	18		
Vegetation/Wildfire	RY 17/18	23	17	28	10	13	8	**99**	0.53%
	RY 18/19	9	5	14	6	3	1	**38**	0.20%
	RY 19/20	13	4	19	10	2	1	**49**	0.28%
	RY 20/21	11	9	30	10	3	5	**68**	0.38%
	Total	**56**	**35**	**91**	**36**	**21**	**15**	**254**	**0.35%**
Percent Total Station Demand		0.52%	0.23%	0.44%	0.40%	0.21%	0.20%		

Table 70—Vegetation/Wildfire Service Demand – Battalion 3

Hazard	Year	Battalion 3						Total	Percent Total Annual Demand
		12	13	15	25	40	44		
Vegetation/Wildfire	RY 17/18	20	33	23	19	12	0	**107**	0.99%
	RY 18/19	5	15	6	6	10	0	**42**	0.38%
	RY 19/20	16	18	18	9	13	0	**74**	0.66%
	RY 20/21	17	11	13	14	4	0	**59**	0.46%
	Total	**58**	**77**	**60**	**48**	**39**	**0**	**282**	**0.62%**
Percent Total Station Demand		0.49%	0.88%	0.55%	0.59%	0.63%	0.00%		

Table 71—Vegetation/Wildfire Service Demand – Battalion 4

Hazard	Year	Battalion 4						Total	Percent Total Annual Demand
		3	7	22	24	27	33		
Vegetation/Wildfire	RY 17/18	25	20	24	26	10	6	**111**	0.56%
	RY 18/19	13	10	3	11	2	4	**43**	0.22%
	RY 19/20	16	15	11	26	8	7	**83**	0.44%
	RY 20/21	13	16	16	19	3	7	**74**	0.35%
	Total	**67**	**61**	**54**	**82**	**23**	**24**	**311**	**0.40%**
Percent Total Station Demand		0.45%	0.41%	0.32%	0.38%	0.55%	0.37%		

Table 72—Vegetation/Wildfire Service Demand – Battalion 5

Hazard	Year	Battalion 5							Total	Percent Total Annual Demand
		16	23	26	30	32	39	43		
Vegetation/Wildfire	RY 17/18	24	50	28	24	20	11	0	**157**	0.80%
	RY 18/19	8	14	4	3	10	3	0	**42**	0.21%
	RY 19/20	17	28	11	10	15	1	0	**82**	0.41%
	RY 20/21	9	23	7	14	16	6	0	**75**	0.32%
	Total	**58**	**115**	**50**	**51**	**61**	**21**	**0**	**356**	**0.43%**
Percent Total Station Demand		0.30%	0.56%	0.25%	0.63%	0.90%	0.25%	0.00%		

Table 73—Vegetation/Wildfire Service Demand – Battalion 6

Hazard	Year	Battalion 6						Total	Percent Total Annual Demand
		11	34	35	37	38	41		
Vegetation/Wildfire	RY 17/18	9	9	10	16	30	18	**92**	1.42%
	RY 18/19	2	3	1	5	7	8	**26**	0.37%
	RY 19/20	3	3	1	7	8	10	**32**	0.43%
	RY 20/21	2	8	5	8	15	17	**55**	0.60%
	Total	**16**	**23**	**17**	**36**	**60**	**53**	**205**	**0.68%**
Percent Total Station Demand		0.55%	0.88%	0.90%	0.28%	0.97%	1.45%		

Table 74—Vegetation/Wildfire Service Demand – Battalion 7

Hazard	Year	Battalion 7					Total	Percent Total Annual Demand
		9	14	19	20	31		
Vegetation/Wildfire	RY 17/18	12	47	22	26	29	**136**	0.83%
	RY 18/19	7	23	11	6	8	**55**	0.33%
	RY 19/20	7	18	6	18	11	**60**	0.37%
	RY 20/21	11	45	10	9	16	**91**	0.51%
	Total	**37**	**133**	**49**	**59**	**64**	**342**	**0.51%**
Percent Total Station Demand		0.49%	0.66%	0.54%	0.47%	0.35%		

The following table summarizes total vegetation/wildfire service demand by year.

Table 75—Total Vegetation/Wildfire Service Demand by Year

Hazard	Year	Total Hazard Demand	Percent Total Service Demand
Vegetation/Wildfire	RY 17/18	937	0.80%
	RY 18/19	314	0.26%
	RY 19/20	528	0.45%
	RY 20/21	552	0.42%
	Total	**2,331**	**0.48%**

Vegetation/Wildfire Risk Assessment

The following table summarizes Citygate's assessment of the City's vegetation/wildfire risk by hazard sub-type.

Table 76—Vegetation/Wildfire Risk Assessment

Vegetation/Wildfire Risk	Incident Type			
	Grass / Vegetation (<1 Acre)	Brush (<5 Acres)	Wildfire/WUI (<25 Acres)	Wildfire/WUI (>25 Acres)
Probability of Occurrence	*Frequent*	*Frequent*	*Frequent*	*Possible*
Consequence Severity	*Minor*	*Minor*	*Moderate*	*Major*
Impact Severity	*Insignificant*	*Minor*	*Moderate*	*Major*
Overall Risk	***Low***	***Moderate***	***High***	***High***

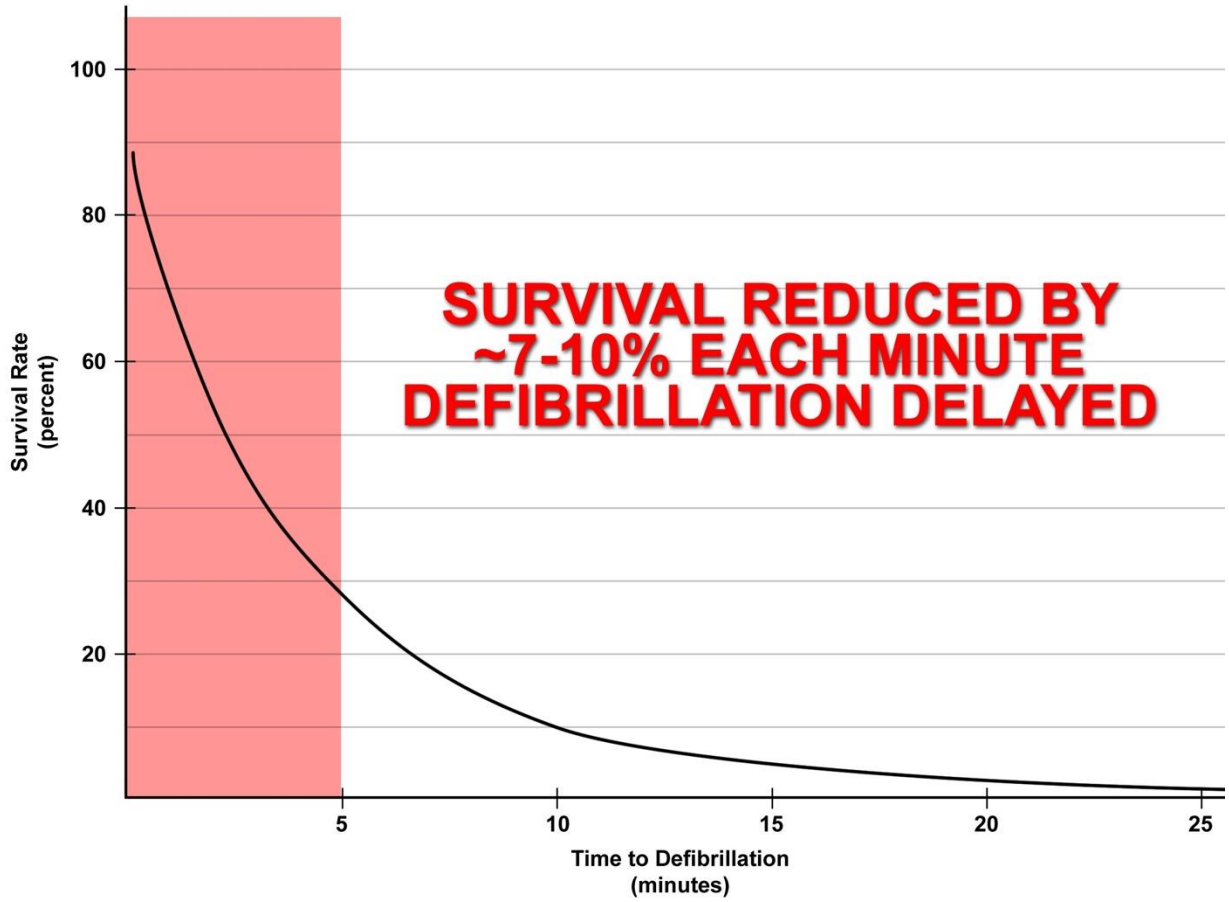
1.1.12 Medical Emergency Risk

Medical emergency risk in most communities is predominantly a function of population density, demographics, violence, health insurance coverage, and vehicle traffic.

Medical emergency risk can also be categorized as either a medical emergency resulting from a traumatic injury or a health-related condition or event. Cardiac arrest is one serious medical emergency among many where there is an interruption or blockage of oxygen to the brain.

The following figure illustrates the reduced survivability of a cardiac arrest victim as time to defibrillation increases. While early defibrillation is one factor in cardiac arrest survivability, other factors can influence survivability as well, such as early CPR and pre-hospital ALS interventions.

Figure 51—Survival Rate versus Time to Defibrillation



Source: www.suddencardiacarrest.org.

Population Density

The City's population density ranges from less than 1,000 to more than 18,000 people per square mile as shown in Map #2a (**Volume 2—Map Atlas**). Risk analysis across a wide spectrum of other Citygate clients shows a direct correlation between population density and the *occurrence* of medical emergencies, particularly in high urban population density zones.

Demographics

Medical emergency risk tends to be higher among older, poorer, less educated, and uninsured populations. As shown in Table 46, 11 percent of the City's population is 65 and older, 16.3 percent of the population over 24 years of age has less than a high school education or equivalent, nearly

14 percent of the population is at or below poverty level, and 20.4 percent of the population does not have health insurance coverage.[9]

Vehicle Traffic

Medical emergency risk tends to be higher in those areas of a community with high daily vehicle traffic volume, particularly those areas with high traffic volume traveling at high speeds. The City's road transportation network includes Highways 20, 30, 35W, 114, 121, 170, 183, 199, and 287; Business Loops M287, 377, 580, and 820; and Chisolm Trail Parkway, carrying an aggregate annual average daily traffic volume of more than 970,000 vehicles.[10]

Medical Emergency Service Demand

Medical emergency service demand over the four-year study period includes more than 294,000 calls for service comprising 60.4 percent of total service demand over the same period, as summarized in the following tables. Note that 1,975 medical emergency incidents did not include a station location in the NFIRS "Station" field and are thus not included in the following tables.

Table 77—Medical Emergency Service Demand – Battalion 1

Hazard	Year	Battalion 1								Total	Percent Total Annual Demand
		4	10	17	21	28	29	36	42		
Medical Emergency	RY 17/18	2,615	1,895	3,078	1,142	1,363	3,077	1,676	613	**15,459**	63.70%
	RY 18/19	2,713	1,960	3,146	1,292	1,314	2,926	1,732	825	**15,908**	63.20%
	RY 19/20	2,682	1,927	2,861	1,185	1,273	2,671	1,855	941	**15,395**	62.28%
	RY 20/21	2,843	2,154	3,008	1,254	1,567	2,837	2,173	1,055	**16,891**	59.97%
	Total	**10,853**	**7,936**	**12,093**	**4,873**	**5,517**	**11,511**	**7,436**	**3,434**	**63,653**	**62.21%**
Percent Total Station Demand		68.93%	64.03%	61.80%	53.51%	62.18%	62.19%	61.24%	57.39%		

[9] Source: ESRI and US Census Bureau.

[10] Source: Texas Department of Transportation Traffic Web Viewer (2020 data).

Table 78—Medical Emergency Service Demand – Battalion 2

Hazard	Year	Battalion 2						Total	Percent Total Annual Demand
		1	2	5	6	8	18		
Medical Emergency	RY 17/18	1,454	3,823	2,727	1,387	1,263	1,033	**11,687**	62.07%
	RY 18/19	1,729	2,911	3,792	1,262	1,271	999	**11,964**	62.17%
	RY 19/20	1,652	1,683	3,848	1,124	1,248	1,008	**10,563**	60.66%
	RY 20/21	1,602	1,746	3,375	1,317	1,463	1,034	**10,537**	58.59%
	Total	**6,437**	**10,163**	**13,742**	**5,090**	**5,245**	**4,074**	**44,751**	**60.91%**
Percent Total Station Demand		60.09%	65.87%	66.11%	56.94%	52.34%	53.74%		

Table 79—Medical Emergency Service Demand – Battalion 3

Hazard	Year	Battalion 3						Total	Percent Total Annual Demand
		12	13	15	25	40	44		
Medical Emergency	RY 17/18	1,948	1,167	1,695	1,197	683	0	**6,690**	61.70%
	RY 18/19	1,810	1,263	1,623	1,115	811	2	**6,624**	60.02%
	RY 19/20	1,785	1,348	1,665	1,151	830	0	**6,779**	60.73%
	RY 20/21	1,976	1,512	1,655	1,358	1,071	0	**7,572**	59.30%
	Total	**7,519**	**5,290**	**6,638**	**4,821**	**3,395**	**2**	**27,665**	**60.39%**
Percent Total Station Demand		63.95%	60.40%	60.96%	59.27%	54.60%	3.64%		

Table 80—Medical Emergency Service Demand – Battalion 4

Hazard	Year	Battalion 4						Total	Percent Total Annual Demand
		3	7	22	24	27	33		
Medical Emergency	RY 17/18	2,748	2,285	2,618	3,404	512	970	**12,537**	63.74%
	RY 18/19	2,472	2,252	2,518	3,308	544	1,056	**12,150**	63.04%
	RY 19/20	2,440	2,383	2,526	3,444	559	885	**12,237**	65.47%
	RY 20/21	2,472	2,583	2,805	3,536	666	977	**13,039**	62.14%
	Total	**10,132**	**9,503**	**10,467**	**13,692**	**2,281**	**3,888**	**49,963**	**63.56%**
Percent Total Station Demand		68.15%	64.31%	61.87%	63.91%	54.60%	60.29%		

Table 81—Medical Emergency Service Demand – Battalion 5

Hazard	Year	Battalion 5							Total	Percent Total Annual Demand
		16	23	26	30	32	39	43		
Medical Emergency	RY 17/18	2,896	3,323	2,658	1,228	884	1,161	0	**12,150**	61.79%
	RY 18/19	2,791	3,199	2,790	1,211	877	1,202	0	**12,070**	60.67%
	RY 19/20	2,829	3,271	2,866	1,134	874	1,394	0	**12,368**	61.76%
	RY 20/21	3,094	3,517	3,285	1,380	1,061	1,670	0	**14,007**	60.30%
	Total	**11,610**	**13,310**	**11,599**	**4,953**	**3,696**	**5,427**	**0**	**50,595**	**61.10%**
Percent Total Station Demand		60.84%	64.41%	58.99%	61.23%	54.69%	63.44%	0.00%		

Table 82—Medical Emergency Service Demand – Battalion 6

Hazard	Year	Battalion 6						Total	Percent Total Annual Demand
		11	34	35	37	38	41		
Medical Emergency	RY 17/18	297	275	275	1,400	788	319	**3,354**	51.72%
	RY 18/19	352	323	231	1,577	861	443	**3,787**	54.07%
	RY 19/20	360	393	234	1,675	864	492	**4,018**	54.60%
	RY 20/21	435	518	256	2,015	936	670	**4,830**	52.89%
	Total	**1,444**	**1,509**	**996**	**6,667**	**3,449**	**1,924**	**15,989**	**53.33%**
Percent Total Station Demand		50.03%	58.02%	52.95%	52.12%	55.86%	52.76%		

Table 83—Medical Emergency Service Demand – Battalion 7

Hazard	Year	Battalion 7					Total	Percent Total Annual Demand
		9	14	19	20	31		
Medical Emergency	RY 17/18	914	3,388	1,369	1,839	2,366	**9,876**	60.22%
	RY 18/19	959	3,279	1,366	2,061	2,334	**9,999**	59.80%
	RY 19/20	953	3,095	1,404	1,881	2,352	**9,685**	59.40%
	RY 20/21	1,170	3,002	1,509	2,029	2,858	**10,568**	58.77%
	Total	**3,996**	**12,764**	**5,648**	**7,810**	**9,910**	**40,128**	**59.53%**
Percent Total Station Demand		53.20%	63.49%	62.42%	62.38%	54.37%		

As the previous tables show, medical emergency service demand varied significantly by year, battalion, and station. Citywide medical emergency service demand increased 8.3 percent over the four-year study period and 8.4 percent from RY 2019/20 to 2020/21, as summarized in the following table.

Table 84—Total Medical Emergency Service Demand by Year

Hazard	Year	Total Hazard Demand	Percent Total Service Demand
Medical Emergency	RY 17/18	71,927	61.18%
	RY 18/19	73,047	60.79%
	RY 19/20	71,841	60.91%
	RY 20/21	77,904	58.86%
	Total	**294,719**	**60.39%**

Medical Emergency Risk Assessment

The following table summarizes Citygate's assessment of the City's medical emergency risk by hazard sub-type.

Table 85—Medical Emergency Risk Assessment

Medical Emergency Risk	Incident Type				
	BLS Only	BLS/ALS	ALS	Active Shooter / Mass Casualty	WMD
Probability of Occurrence	*Frequent*	*Frequent*	*Frequent*	*Possible*	*Unlikely*
Consequence Severity	*Minor*	*Moderate*	*Moderate*	*Major*	*Catastrophic*
Impact Severity	*Insignificant*	*Minor*	*Minor*	*Major*	*Extreme*
Overall Risk	***Low***	***High***	***High***	***High***	***Extreme***

1.1.13 Hazardous Material Risk

Hazardous material risk factors include fixed facilities that store, use, or produce hazardous chemicals or waste; underground pipelines conveying hazardous materials; aviation, railroad, maritime, and vehicle transportation of hazardous commodities into or through a jurisdiction; vulnerable populations; emergency evacuation planning and related training; and specialized hazardous material service capacity.

Fixed Hazardous Materials Facilities

For this study, the Department identified 58 sites with significant hazardous materials risk. In addition, high-pressure natural gas distribution pipelines are located throughout the City.

Transportation-Related Hazardous Materials

The City also has transportation-related hazardous material risk as a result of its road transportation network that includes Highways 20, 30, 35W, 114, 121, 170, 183, 199, and 287; Business Loops 287, 377, 580, and 820; and Chisolm Trail Parkway, carrying an aggregate annual average daily traffic volume of more than 970,000 vehicles. This traffic volume includes truck traffic, some of which transport hazardous materials.

As one of the largest railway hubs in the US, the City also has transportation-related hazardous material risk due to hundreds of train movements into and through the City daily, many of which are transporting hazardous commodities. BNSF Railway, headquartered in the City, and Union Pacific Railway both have large intermodal freight facilities in the City.

Population Density

Because hazardous material emergencies have the potential to adversely impact human health, it is logical that the higher the population density, the greater the potential population exposed to a hazardous material release or spill. As shown in Map #2b (**Volume 2—Map Atlas**), the City's population density ranges from less than 1,000 to more than 18,000 people per square mile.

Vulnerable Populations

Persons vulnerable to a hazardous material release/spill include those individuals or groups unable to self-evacuate, generally including children under the age of 10, the elderly, and persons confined to an institution or other setting where they are unable to leave voluntarily.

Emergency Evacuation Planning, Training, Implementation, and Effectiveness

Another significant hazardous material impact severity factor is a jurisdiction's shelter-in-place / emergency evacuation planning and training. In the event of a hazardous material release or spill, time can be a critical factor in notifying potentially affected persons, particularly at-risk populations, to either shelter-in-place or evacuate to a safe location. Essential to this process is an effective emergency plan that incorporates one or more mass emergency notification capabilities, as well as pre-established evacuation procedures. It is also essential to conduct regular, periodic exercises involving these two emergency plan elements to evaluate readiness and to identify and remediate any planning and/or training gaps to ensure ongoing emergency incident readiness and effectiveness.

The City's Emergency Operations Plan includes an evacuation component.[11] The City has a free subscription-based mass emergency notification system to provide emergency alerts, notifications, and other emergency information to email accounts, cell phones, smartphones, tablets, and landline telephones. The City also utilizes an outdoor warning system, CASA Weather Radar, and social media to communicate emergency information to the public, including the Accessible Hazard Alert System for those with hearing or visual impairments. The Emergency Management Office also oversees the City's Emergency Operations Center and conducts quarterly training with exercises at least annually.

Hazardous Material Service Demand

The City experienced nearly 4,000 hazardous material incidents over the four-year study period, comprising 0.81 percent of total service demand over the same period, as summarized in the following tables. Note that 70 hazardous material incidents did not include a station location in the NFIRS "Station" field and are thus not included in the following tables.

Table 86—Hazardous Material Service Demand – Battalion 1

Hazard	Year	Battalion 1								Total	Percent Total Annual Demand
		4	10	17	21	28	29	36	42		
Hazardous Material	RY 17/18	21	39	49	39	18	20	23	4	**213**	0.88%
	RY 18/19	21	39	48	28	24	22	13	6	**201**	0.80%
	RY 19/20	21	57	40	33	11	25	17	5	**209**	0.85%
	RY 20/21	19	34	38	49	9	21	12	6	**188**	0.67%
	Total	**82**	**169**	**175**	**149**	**62**	**88**	**65**	**21**	**811**	**0.79%**
Percent Total Station Demand		0.52%	1.36%	0.89%	1.64%	0.70%	0.48%	0.54%	0.35%		

[11] Annex E – Evacuation Plan, Fort Worth Emergency Operations Plan

Table 87—Hazardous Material Service Demand – Battalion 2

Hazard	Year	Battalion 2						Total	Percent Total Annual Demand
		1	2	5	6	8	18		
Hazardous Material	RY 17/18	17	32	28	24	33	33	**167**	0.89%
	RY 18/19	20	26	30	18	28	29	**151**	0.78%
	RY 19/20	14	18	13	33	34	23	**135**	0.78%
	RY 20/21	17	17	19	23	32	31	**139**	0.77%
	Total	**68**	**93**	**90**	**98**	**127**	**116**	**592**	**0.81%**
Percent Total Station Demand		0.63%	0.60%	0.43%	1.10%	1.27%	1.53%		

Table 88—Hazardous Material Service Demand – Battalion 3

Hazard	Year	Battalion 3						Total	Percent Total Annual Demand
		12	13	15	25	40	44		
Hazardous Material	RY 17/18	50	25	24	25	8	0	**132**	1.22%
	RY 18/19	32	25	28	15	13	0	**113**	1.02%
	RY 19/20	42	35	22	22	19	3	**143**	1.28%
	RY 20/21	43	16	52	28	17	4	**160**	1.25%
	Total	**167**	**101**	**126**	**90**	**57**	**7**	**548**	**1.20%**
Percent Total Station Demand		1.42%	1.15%	1.16%	1.11%	0.92%	12.73%		

Table 89—Hazardous Material Service Demand – Battalion 4

Hazard	Year	Battalion 4						Total	Percent Total Annual Demand
		3	7	22	24	27	33		
Hazardous Material	RY 17/18	43	23	27	40	2	10	**145**	0.74%
	RY 18/19	30	15	28	36	7	7	**123**	0.64%
	RY 19/20	36	11	28	30	2	8	**115**	0.62%
	RY 20/21	30	16	28	46	8	9	**137**	0.65%
	Total	**139**	**65**	**111**	**152**	**19**	**34**	**520**	**0.66%**
Percent Total Station Demand		0.93%	0.44%	0.66%	0.71%	0.45%	0.53%		

Table 90—Hazardous Material Service Demand – Battalion 5

Hazard	Year	Battalion 5							Total	Percent Total Annual Demand
		16	23	26	30	32	39	43		
Hazardous Material	RY 17/18	44	18	23	23	19	6	0	**133**	0.68%
	RY 18/19	58	30	21	15	23	9	0	**156**	0.78%
	RY 19/20	45	31	43	15	19	4	0	**157**	0.78%
	RY 20/21	47	24	21	14	15	8	0	**129**	0.56%
	Total	**194**	**103**	**108**	**67**	**76**	**27**	**0**	**575**	**0.69%**
Percent Total Station Demand		1.02%	0.50%	0.55%	0.83%	1.12%	0.32%	0.00%		

Table 91—Hazardous Material Service Demand – Battalion 6

Hazard	Year	Battalion 6						Total	Percent Total Annual Demand
		11	34	35	37	38	41		
Hazardous Material	RY 17/18	8	7	3	32	10	13	**73**	1.13%
	RY 18/19	1	9	8	34	10	10	**72**	1.03%
	RY 19/20	6	7	6	40	14	14	**87**	1.18%
	RY 20/21	10	9	7	34	20	29	**109**	1.19%
	Total	**25**	**32**	**24**	**140**	**54**	**66**	**341**	**1.14%**
Percent Total Station Demand		0.87%	1.23%	1.28%	1.09%	0.87%	1.81%		

Table 92—Hazardous Material Service Demand – Battalion 7

Hazard	Year	Battalion 7					Total	Percent Total Annual Demand
		9	14	19	20	31		
Hazardous Material	RY 17/18	17	33	31	9	42	**132**	0.80%
	RY 18/19	15	17	35	15	40	**122**	0.73%
	RY 19/20	19	24	35	9	25	**112**	0.69%
	RY 20/21	14	32	24	7	33	**110**	0.61%
	Total	**65**	**106**	**125**	**40**	**140**	**476**	**0.71%**
Percent Total Station Demand		0.87%	0.53%	1.38%	0.32%	0.77%		

The following table summarizes Citywide hazardous material service demand by year.

Table 93—Total Hazardous Material Service Demand by Year

Hazard	Year	Total Hazard Demand	Percent Total Service Demand
Hazardous Material	RY 17/18	1,007	0.86%
	RY 18/19	962	0.80%
	RY 19/20	979	0.83%
	RY 20/21	985	0.74%
	Total	**3,933**	**0.81%**

As the previous table shows, Citywide hazardous material service demand was consistent over the four-year study period, varying by less than 5 percent year to year.

Hazardous Materials Risk Assessment

The following table summarizes Citygate's assessment of the City's hazardous material risk by hazard sub-type.

Table 94—Hazardous Material Risk Assessment

Hazardous Material Risk	Incident Type				
	Alarm / Odor Investigation	Hazmat Level 1	Hazmat Level 2	Hazmat Level 3	Hazmat Level 4
Probability of Occurrence	*Frequent*	*Frequent*	*Frequent*	*Probable*	*Possible*
Consequence Severity	*Insignificant*	*Minor*	*Moderate*	*Moderate*	*Major*
Impact Severity	*Minor*	*Minor*	*Moderate*	*Major*	*Extreme*
Overall Risk	***Low***	***Moderate***	***High***	***High***	***Extreme***

1.1.14 Technical Rescue Risk

Technical rescue risk factors include active construction projects; structural collapse potential; confined spaces, such as tanks and underground vaults; industrial machinery use; transportation volume; and natural hazard potential including earthquake, flood, hurricane, landslide, tornado, and tsunami.

Construction Activity

There is continual residential, commercial, industrial, and infrastructure construction activity occurring within the City.

Confined Spaces

There are numerous confined spaces within the City, including tanks, vaults, open trenches, etc.

Transportation Volume

Another technical rescue risk factor is transportation-related incidents requiring technical rescue. This risk factor is primarily a function of vehicle, railway, maritime, and aviation traffic. Vehicle traffic volume is the greatest of these factors within the City, with Highways 20, 30, 35W, 114, 121, 170, 183, 199, and 287; Business Loops 287, 377, 580, and 820; and Chisolm Trail Parkway carrying an aggregate annual average daily traffic volume of more than 970,000 vehicles. There are also hundreds of daily train movements within the City.

Natural Hazard Potential[12]

The Tarrant County Hazard Mitigation Action Plan identifies flooding and tornadoes as the most significant natural hazards for the City relative to probability of occurrence, geographic area affected, and probable extent. Earthquakes are identified as least likely to occur or have a significant impact.

Technical Rescue Service Demand

The Department responded to 1,534 technical rescue incidents over the four-year study period, comprising 0.31 percent of total service demand for the same period, as summarized in the following tables. Note that 121 technical rescue incidents did not include a station location in the NFIRS "Station" field and are thus not included in the following tables.

[12] Source: 2020 Tarrant County Hazard Mitigation Action Plan, City of Fort Worth Annex.

Table 95—Technical Rescue Service Demand – Battalion 1

Hazard	Year	Battalion 1								Total	Percent Total Annual Demand
		4	10	17	21	28	29	36	42		
Technical Rescue	RY 17/18	9	11	17	11	5	3	2	1	**59**	0.24%
	RY 18/19	8	3	5	16	5	3	8	4	**52**	0.21%
	RY 19/20	4	4	12	17	2	3	7	6	**55**	0.22%
	RY 20/21	2	12	2	27	3	4	2	4	**56**	0.20%
	Total	**23**	**30**	**36**	**71**	**15**	**13**	**19**	**15**	**222**	**0.22%**
Percent Total Station Demand		0.15%	0.24%	0.18%	0.78%	0.17%	0.07%	0.16%	0.25%		

Table 96—Technical Rescue Service Demand – Battalion 2

Hazard	Year	Battalion 2						Total	Percent Total Annual Demand
		1	2	5	6	8	18		
Technical Rescue	RY 17/18	21	50	12	18	11	2	**114**	0.61%
	RY 18/19	17	58	14	20	34	2	**145**	0.75%
	RY 19/20	15	54	25	19	39	3	**155**	0.89%
	RY 20/21	22	31	16	14	35	5	**123**	0.68%
	Total	**75**	**193**	**67**	**71**	**119**	**12**	**537**	**0.73%**
Percent Total Station Demand		0.70%	1.25%	0.32%	0.79%	1.19%	0.16%		

Table 97—Technical Rescue Service Demand – Battalion 3

Hazard	Year	Battalion 3						Total	Percent Total Annual Demand
		12	13	15	25	40	44		
Technical Rescue	RY 17/18	11	1	5	7	4	0	**28**	0.26%
	RY 18/19	6	3	5	1	1	0	**16**	0.14%
	RY 19/20	7	3	2	3	3	0	**18**	0.16%
	RY 20/21	8	3	7	8	6	0	**32**	0.25%
	Total	**32**	**10**	**19**	**19**	**14**	**0**	**94**	**0.21%**
Percent Total Station Demand		0.27%	0.11%	0.17%	0.23%	0.23%	0.00%		

Table 98—Technical Rescue Service Demand – Battalion 4

Hazard	Year	Battalion 4						Total	Percent Total Annual Demand
		3	7	22	24	27	33		
Technical Rescue	RY 17/18	9	1	11	18	3	2	**44**	0.22%
	RY 18/19	8	2	17	5	5	1	**38**	0.20%
	RY 19/20	7	6	14	9	1	3	**40**	0.21%
	RY 20/21	4	7	12	7	1	2	**33**	0.16%
	Total	**28**	**16**	**54**	**39**	**10**	**8**	**155**	**0.20%**
Percent Total Station Demand		0.19%	0.11%	0.32%	0.18%	0.24%	0.12%		

Table 99—Technical Rescue Service Demand – Battalion 5

Hazard	Year	Battalion 5							Total	Percent Total Annual Demand
		16	23	26	30	32	39	43		
Technical Rescue	RY 17/18	13	8	21	3	11	5	0	**61**	0.31%
	RY 18/19	12	5	10	5	6	5	0	**43**	0.22%
	RY 19/20	19	10	11	1	3	4	0	**48**	0.24%
	RY 20/21	20	8	17	4	1	8	0	**58**	0.25%
	Total	**64**	**31**	**59**	**13**	**21**	**22**	**0**	**210**	**0.25%**
Percent Total Station Demand		0.34%	0.15%	0.30%	0.16%	0.31%	0.26%	0.00%		

Table 100—Technical Rescue Service Demand – Battalion 6

Hazard	Year	Battalion 6						Total	Percent Total Annual Demand
		11	34	35	37	38	41		
Technical Rescue	RY 17/18	1	0	2	6	1	2	**12**	0.19%
	RY 18/19	1	2	3	7	8	0	**21**	0.30%
	RY 19/20	1	2	4	7	1	0	**15**	0.20%
	RY 20/21	3	1	4	6	5	3	**22**	0.24%
	Total	**6**	**5**	**13**	**26**	**15**	**5**	**70**	**0.23%**
Percent Total Station Demand		0.21%	0.19%	0.69%	0.20%	0.24%	0.14%		

Table 101—Technical Rescue Service Demand – Battalion 7

Hazard	Year	Battalion 7					Total	Percent Total Annual Demand
		9	14	19	20	31		
Technical Rescue	RY 17/18	6	9	6	3	8	**32**	0.20%
	RY 18/19	10	11	2	5	5	**33**	0.20%
	RY 19/20	10	5	1	6	5	**27**	0.17%
	RY 20/21	9	11	4	3	6	**33**	0.18%
	Total	**35**	**36**	**13**	**17**	**24**	**125**	**0.19%**
Percent Total Station Demand		0.47%	0.18%	0.14%	0.14%	0.13%		

The following table summarizes citywide technical rescue service demand by year.

Table 102—Technical Rescue Service Demand by Year

Hazard	Year	Total Hazard Demand	Percent Total Service Demand
Technical Rescue	RY 17/18	373	0.32%
	RY 18/19	384	0.32%
	RY 19/20	395	0.33%
	RY 20/21	382	0.29%
	Total	**1,534**	**0.31%**

As the previous table shows, overall Citywide technical rescue service demand is very low and was consistent over the four-year study period.

Technical Rescue Risk Assessment

The following table summarizes Citygate's assessment of the City's technical rescue risk by hazard sub-type.

Table 103—Technical Rescue Risk Assessment

Technical Rescue Risk	Incident Type				
	Elevator Rescue	Trauma / Pin-In	Low Angle Rope Rescue	Confined Space/ Trench Rescue / High Angle Rescue	Building Collapse / Natural Disaster
Probability of Occurrence	*Probable*	*Probable*	*Probable*	*Probable*	*Unlikely*
Consequence Severity	*Insignificant*	*Moderate*	*Moderate*	*Moderate*	*Major*
Impact Severity	*Insignificant*	*Minor*	*Moderate*	*Moderate*	*Extreme*
Overall Risk	***Low***	***Moderate***	***Moderate***	***Moderate***	***High***

1.1.15 Marine Incident Risk

Marine incident risk factors include open water and near-shore recreational activities and watercraft storage and use in or on waterways within the City.

Bodies of Water/Waterways

Downtown Fort Worth is situated near the confluence of the Clear Fork Trinity River and the West Fork Trinity River, the two largest rivers in the area. Other major waterways include Mary's Creek, Marine Creek, Sycamore Creek, Village Creek, Dry Branch Creek, Little Fossil Creek, Big Fossil Creek, White's Branch, Lake Worth, Marine Creek Reservoir, Benbrook Lake, and numerous other smaller bodies of water and waterways.

Boating and Recreational Activity

There are numerous private boat docks along the shores of Lake Worth, as well as multiple boat ramps and marinas providing public access to the lake.

Marine Incident Service Demand

Over the four-year study period, there were 179 marine incidents comprising 0.04 percent of total service demand in the City, as summarized in the following tables. Note that 45 marine incidents did not include a station location in the NFIRS "Station" field and are thus not included in the following tables.

Table 104—Marine Incident Service Demand – Battalion 1

Hazard	Year	Battalion 1								Total	Percent Total Annual Demand
		4	10	17	21	28	29	36	42		
Marine Incident	RY 17/18	5	3	3	2	0	3	0	0	**16**	0.07%
	RY 18/19	7	0	2	1	0	2	1	0	**13**	0.05%
	RY 19/20	0	0	1	0	1	0	0	0	**2**	0.01%
	RY 20/21	0	0	0	2	0	1	0	0	**3**	0.01%
	Total	**12**	**3**	**6**	**5**	**1**	**6**	**1**	**0**	**34**	**0.22%**
Percent Total Station Demand		0.08%	0.02%	0.03%	0.05%	0.01%	0.03%	0.01%	0.00%		

Table 105—Marine Incident Service Demand – Battalion 2

Hazard	Year	Battalion 2						Total	Percent Total Annual Demand
		1	2	5	6	8	18		
Marine Incident	RY 17/18	2	2	4	1	1	1	**11**	0.06%
	RY 18/19	1	3	3	2	0	0	**9**	0.05%
	RY 19/20	0	2	4	0	0	0	**6**	0.03%
	RY 20/21	1	0	0	0	0	0	**1**	0.01%
	Total	**4**	**7**	**11**	**3**	**1**	**1**	**27**	**0.04%**
Percent Total Station Demand		0.04%	0.05%	0.05%	0.03%	0.01%	0.01%		

Table 106—Marine Incident Service Demand – Battalion 3

Hazard	Year	Battalion 3						Total	Percent Total Annual Demand
		12	13	15	25	40	44		
Marine Incident	RY 17/18	1	1	2	1	0	0	**5**	0.05%
	RY 18/19	1	1	0	1	1	0	**4**	0.04%
	RY 19/20	2	1	1	3	0	0	**7**	0.06%
	RY 20/21	0	0	2	0	0	0	**2**	0.02%
	Total	**4**	**3**	**5**	**5**	**1**	**0**	**18**	**0.04%**
Percent Total Station Demand		0.03%	0.03%	0.05%	0.06%	0.02%	0.00%		

Table 107—Marine Incident Service Demand – Battalion 4

Hazard	Year	Battalion 4						Total	Percent Total Annual Demand
		3	7	22	24	27	33		
Marine Incident	RY 17/18	6	0	3	4	3	0	**16**	0.08%
	RY 18/19	0	0	0	1	1	0	**2**	0.01%
	RY 19/20	1	2	0	0	1	1	**5**	0.03%
	RY 20/21	0	0	0	0	1	0	**1**	0.00%
	Total	**7**	**2**	**3**	**5**	**6**	**1**	**24**	**0.03%**
Percent Total Station Demand		0.05%	0.01%	0.02%	0.02%	0.14%	0.02%		

Table 108—Marine Incident Service Demand – Battalion 5

Hazard	Year	Battalion 5							Total	Percent Total Annual Demand
		16	23	26	30	32	39	43		
Marine Incident	RY 17/18	1	1	0	0	2	0	0	**4**	0.02%
	RY 18/19	0	0	0	0	3	0	0	**3**	0.02%
	RY 19/20	1	0	0	0	3	0	0	**4**	0.02%
	RY 20/21	0	0	0	1	1	0	0	**2**	0.01%
	Total	**2**	**1**	**0**	**1**	**9**	**0**	**0**	**13**	**0.02%**
Percent Total Station Demand		0.01%	0.00%	0.00%	0.01%	0.13%	0.00%	0.00%		

Table 109—Marine Incident Service Demand – Battalion 6

Hazard	Year	Battalion 6						Total	Percent Total Annual Demand
		11	34	35	37	38	41		
Marine Incident	RY 17/18	0	0	0	0	1	1	**2**	0.03%
	RY 18/19	0	0	0	1	1	0	**2**	0.03%
	RY 19/20	1	0	0	0	0	0	**1**	0.01%
	RY 20/21	0	0	0	0	0	2	**2**	0.02%
	Total	**1**	**0**	**0**	**1**	**2**	**3**	**7**	**0.02%**
Percent Total Station Demand		0.03%	0.00%	0.00%	0.01%	0.03%	0.08%		

Table 110—Marine Incident Service Demand – Battalion 7

Hazard	Year	Battalion 7					Total	Percent Total Annual Demand
		9	14	19	20	31		
Marine Incident	RY 17/18	0	5	0	0	0	**5**	0.03%
	RY 18/19	0	3	0	0	0	**3**	0.02%
	RY 19/20	0	0	0	1	0	**1**	0.01%
	RY 20/21	0	2	0	0	0	**2**	0.01%
	Total	**0**	**10**	**0**	**1**	**0**	**11**	**0.02%**
Percent Total Station Demand		0.00%	0.05%	0.00%	0.01%	0.00%		

The following table summarizes Citywide marine incident service demand by year.

Table 111—Total Marine Incident Service Demand by Year

Hazard	Year	Total Hazard Demand	Percent Total Service Demand
Marine Incident	RY 17/18	70	0.06%
	RY 18/19	48	0.04%
	RY 19/20	42	0.04%
	RY 20/21	19	0.01%
	Total	**179**	**0.04%**

Marine Incident Risk Assessment

The following table summarizes Citygate's assessment of the City's marine incident risk by hazard sub-type.

Table 112—Marine Incident Risk Analysis

Marine Risk	Incident Type		
	Water Rescue	Boat Fire/Rescue	Marina Fire
Probability of Occurrence	*Possible*	*Possible*	*Possible*
Consequence Severity	*Moderate*	*Moderate*	*Moderate*
Impact Severity	*Minor*	*Moderate*	*Major*
Overall Risk	***Low***	***Moderate***	***High***

1.1.16 Aviation Incident Risk

Aviation Incident Risk Factors

Aviation incident risk factors include commercial, passenger, and general aviation facilities and aircraft activity into, from, and over the City.

Airports

Fort Worth Meacham International Airport, located five miles north of downtown, is a premier corporate and general aviation airport with four runways, 72 hangars up to 70,000 square feet, a 24-hour FAA Air Traffic Control Tower, and on-site Aircraft Rescue and Fire Fighting (Station 44). Fort Worth Alliance Airport, located in the northern section of the City, supports global logistics, government, and general aviation customers with two runways, four hangars with over 130,000 square feet of space, a 24-hour FAA Air Traffic Control Tower, US Customs, and on-site Aircraft Rescue and Fire Fighting (Station 35). In addition, Naval Air Station Joint Reserve Base Fort Worth, located in the western section of the City on the south side of Lake Worth, is home to Navy, Marine Corps, Air Force, Army, and Texas Air National Guard units and the Lockheed Martin Corporation.

Aviation Incident Service Capacity

Aviation incident service capacity includes the Aircraft Rescue Fire Fighting (ARFF) capability at Fort Worth Meacham International Airport (Station 44) and Fort Worth Alliance Airport (Station 35).

Additional aviation risk service capacity support is available from the Department's daily on-duty force of 244 personnel staffing 59 response apparatus from 44 fire stations. This combined service capacity is adequate to mitigate the City's aviation risk exclusive of multiple serious concurrent events.

Aviation Incident Service Demand

There were 167 aviation incidents over the four-year study period comprising 0.03 percent of total service demand for the same period, as summarized in the following tables. Note that 85 aviation incidents did not include a station location in the NFIRS "Station" field and are thus not included in the following tables.

Table 113—Aviation Incident Service Demand – Battalion 1

Hazard	Year	Battalion 1								Total	Percent Total Annual Demand
		4	10	17	21	28	29	36	42		
Aviation Incident	RY 17/18	0	0	0	0	0	0	0	1	1	0.00%
	RY 18/19	0	0	0	0	0	0	0	1	1	0.00%
	RY 19/20	0	0	0	0	0	0	0	0	0	0.00%
	RY 20/21	0	0	0	0	0	0	0	0	0	0.00%
	Total	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**2**	**2**	**0.00%**
Percent Total Station Demand		0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.03%		

Table 114—Aviation Incident Service Demand – Battalion 2

Hazard	Year	Battalion 2						Total	Percent Total Annual Demand
		1	2	5	6	8	18		
Aviation Incident	RY 17/18	0	0	0	0	0	0	0	0.00%
	RY 18/19	0	0	0	0	0	0	0	0.00%
	RY 19/20	0	0	0	0	0	0	0	0.00%
	RY 20/21	0	0	0	0	0	0	0	0.00%
	Total	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0.00%**
Percent Total Station Demand		0.00%	0.00%	0.00%	0.00%	0.00%	0.00%		

Table 115—Aviation Incident Service Demand – Battalion 3

Hazard	Year	Battalion 3						Total	Percent Total Annual Demand
		12	13	15	25	40	44		
Aviation Incident	RY 17/18	0	0	0	2	0	5	**7**	0.06%
	RY 18/19	1	0	0	1	0	7	**9**	0.08%
	RY 19/20	1	0	0	2	0	10	**13**	0.12%
	RY 20/21	0	1	0	6	1	17	**25**	0.20%
	Total	**2**	**1**	**0**	**11**	**1**	**39**	**54**	**0.12%**
Percent Total Station Demand		0.02%	0.01%	0.00%	0.14%	0.02%	70.91%		

Table 116—Aviation Incident Service Demand – Battalion 4

Hazard	Year	Battalion 4						Total	Percent Total Annual Demand
		3	7	22	24	27	33		
Aviation Incident	RY 17/18	0	0	0	0	0	0	**0**	0.00%
	RY 18/19	0	0	0	0	0	0	**0**	0.00%
	RY 19/20	0	0	0	0	0	0	**0**	0.00%
	RY 20/21	0	0	0	0	0	0	**0**	0.00%
	Total	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0.00%**
Percent Total Station Demand		0.00%	0.00%	0.00%	0.00%	0.00%	0.00%		

Table 117—Aviation Incident Service Demand – Battalion 5

Hazard	Year	Battalion 5							Total	Percent Total Annual Demand
		16	23	26	30	32	39	43		
Aviation Incident	RY 17/18	0	0	0	0	0	0	0	**0**	0.00%
	RY 18/19	0	0	0	0	0	0	0	**0**	0.00%
	RY 19/20	1	0	0	0	0	0	0	**1**	0.00%
	RY 20/21	0	0	0	0	0	0	0	**0**	0.00%
	Total	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**0.00%**
Percent Total Station Demand		0.01%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%		

Table 118—Aviation Incident Service Demand – Battalion 6

Hazard	Year	Battalion 6						Total	Percent Total Annual Demand
		11	34	35	37	38	41		
Aviation Incident	RY 17/18	0	0	5	0	0	0	**5**	0.08%
	RY 18/19	0	0	7	0	0	0	**7**	0.10%
	RY 19/20	0	0	5	0	0	0	**5**	0.07%
	RY 20/21	0	0	8	0	0	0	**8**	0.09%
	Total	**0**	**0**	**25**	**0**	**0**	**0**	**25**	**0.08%**
Percent Total Station Demand		0.00%	0.00%	1.33%	0.00%	0.00%	0.00%		

Table 119—Aviation Incident Service Demand – Battalion 7

Hazard	Year	Battalion 7					Total	Percent Total Annual Demand
		9	14	19	20	31		
Aviation Incident	RY 17/18	0	0	0	0	0	**0**	0.00%
	RY 18/19	0	0	0	0	0	**0**	0.00%
	RY 19/20	0	0	0	0	0	**0**	0.00%
	RY 20/21	0	0	0	0	0	**0**	0.00%
	Total	**0**	**0**	**0**	**0**	**0**	**0**	**0.00%**
Percent Total Station Demand		0.00%	0.00%	0.00%	0.00%	0.00%		

The following table summarizes Citywide aviation incident service demand by year.

Table 120—Total Aviation Incident Service Demand by Year

Hazard	Year	Total Hazard Demand	Percent Total Service Demand
Aviation Incident	RY 17/18	32	0.03%
	RY 18/19	39	0.03%
	RY 19/20	40	0.03%
	RY 20/21	56	0.04%
	Total	**167**	**0.03%**

Aviation Incident Risk Assessment

The following table summarizes Citygate's assessment of the City's aviation incident risk by hazard sub-type.

Table 121—Aviation Incident Risk Analysis

Aviation Incident	Incident Type		
	ARFF Alert 1	ARFF Alert 2	ARFF Alert 3
Probability of Occurrence	*Probable*	*Probable*	*Unlikely*
Consequence Severity	*Minor*	*Moderate*	*Major*
Impact Severity	*Insignificant*	*Moderate*	*Major*
Overall Risk	***Low***	***Moderate***	***High***