Fargo Fire Department

2016 Standard of Response Coverage

Table of Contents

Index of Figures and Tables

Introduction

In 2001, the Fargo Fire Department (FFD) developed a comprehensive strategic plan for fire protection in the City of Fargo (the "City"). This plan was called *Fargo Fire Department Emergency Response - 2002 and Beyond*. In the 2002 plan, the department defined the risks and has since been planning for the successful mitigation of emergencies resulting from these risks. In 2008, the department began the process of seeking accredited status through the Commission on Fire Accreditation International (CFAI). One of the required elements of the accreditation process was a standard of cover (SOC). In 2009, the FFD wrote the department's first SOC, which met the requirement and provided a thorough assessment of the community's risks. It also evaluated the fire department's emergency response capabilities. The document contained a significant amount of data that was primarily intended for use by fire department personnel. In 2015 the Fargo Fire Department SOC was re-worked and updated for re-accreditation. This document is an updated version for 2016. Information from this document will be used in the strategic planning in 2016 and following years.

Community Description

Geographic Characteristics of the Service Area

Fargo is the largest city in the state of North Dakota and the county seat of Cass County. In 2015, Fargo's estimated population was 118,456 (U.S. Census Bureau). The city limits are the boundaries for the FFD primary response area. According to the Greater FM Development Corporation, the estimated metropolitan population in 2015 was approximately 224,000 with an additional 30,000 college students. The metropolitan population includes Fargo, along with its neighboring city of Moorhead, Minnesota, West Fargo, North Dakota, and Dilworth, Minnesota. Together they form the Fargo-Moorhead, ND-MN Metropolitan Statistical Area (MSA). The City of Fargo is the crossroads and economic center of a large portion of eastern North Dakota and a portion of northwestern Minnesota. Fargo is a retail, manufacturing, healthcare, and educational hub for the region. Fargo is home to North Dakota State University, with a 2015 fall enrollment of 14,516 students. Figure 1 on the next page is a map of the City of Fargo.

Topography

Fargo sits on the western bank of the Red River of the North in a flat region known as the Red River Valley. The Red River Valley was once part of glacial Lake Agassiz, which drained away about 9,300 years ago. The lake sediments deposited from Lake Agassiz made the land around Fargo some of the richest in the world for agricultural uses.

Climate

Due to its location in the Great Plains and its distance from both mountains and oceans, the City has an extreme continental climate. Table 1 shows the annual average temperature and precipitation for the area.

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Avg high °F	18	24	36	56	69	77	82	81	71	56	37	22
Avg low temperature °F	0	6	19	33	45	55	60	57	47	35	20	6
Precip inches	0.70	0.64	1.30	1.36	2.81	3.90	2.79	2.56	2.57	2.15	1.00	0.83

Table 1. Average Temperature and Precipitation

While the table above illustrates the averages for temperature and precipitation, it does not represent the extremes. During winter, primarily the months of January and February, it is common to have temperatures from -20 to -40°F with a record low temperature of -48°F. In summer months, primarily July and August, temperatures are often above 90°F with a record high of 114°F. Because of the extremely flat terrain, large amounts of precipitation have a significant impact. Snowfall in Fargo averages 40.4 inches per year. However, in the winter of 1996-1997, Fargo received 117 inches of snow. Hot, humid summers can produce severe thunderstorms delivering several inches of rain in a short amount of time.

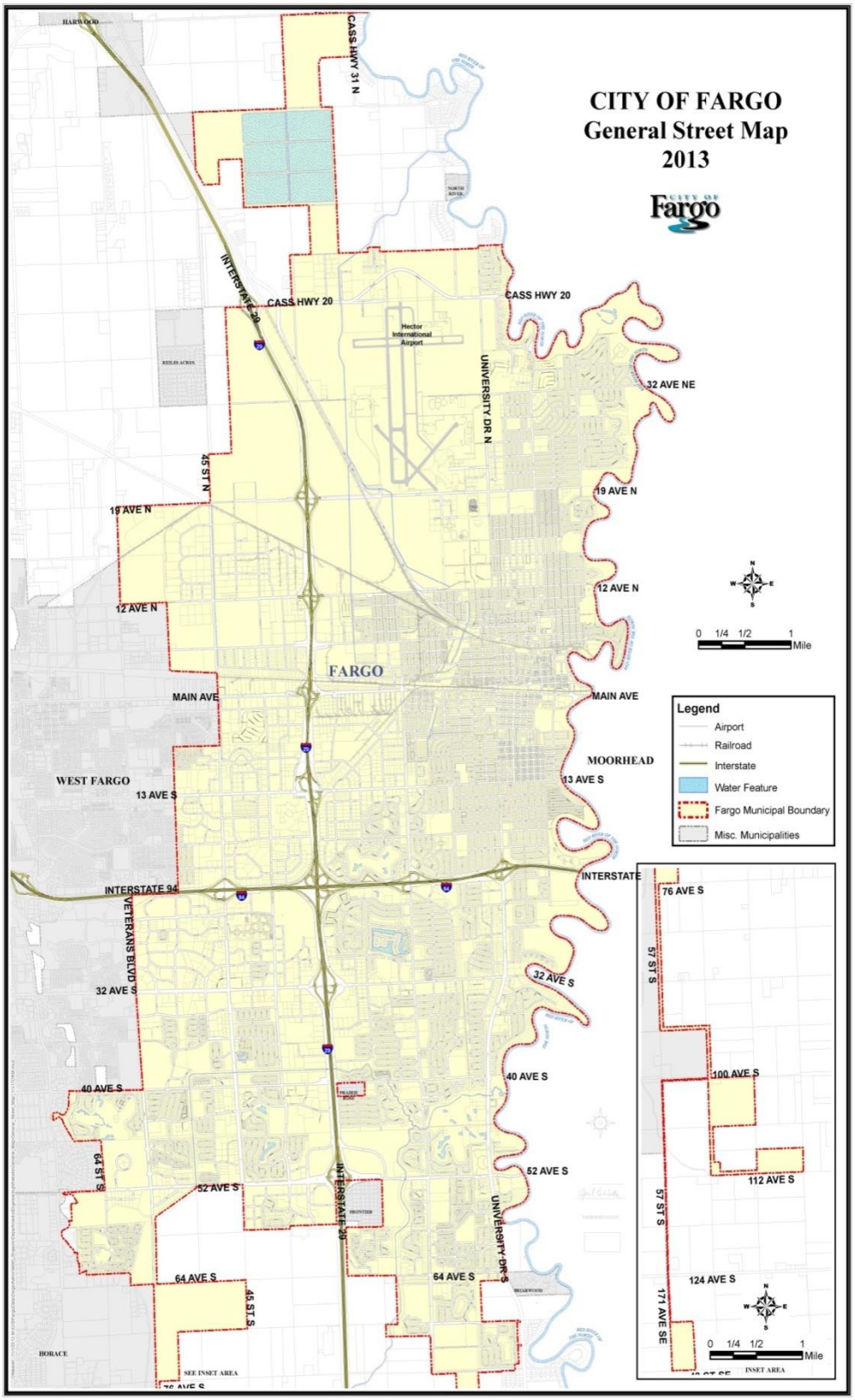


Figure 1. Map of the City of Fargo

Climatic Impact on the Fire Department

While the FFD must be prepared for the wide variances in temperature, the predominant climatic impact on the FFD service delivery is associated with winter conditions. Precautions such as annual checks of all hydrants are taken which helps to identify any hydrants that need service. For any hydrants in need of repair, the deficiencies are corrected, including the pumping out of hydrant barrels that have been found not to drain. The water department adds an anti-freeze solution to these hydrants to ensure they remain available for use. This ensures frozen hydrants are not encountered during an emergency. Apparatus are purchased with enclosed and heated pump compartments to safeguard against pump freeze-up. Fire ground operations are adapted to cope with the frigid temperatures. Hose lines are kept flowing with water to avoid freeze up and ice grippers are distributed for firefighting boots to prevent slips and falls.

The effects of the winter conditions upon the FFD's service delivery are to be expected in North Dakota. Since the formation of the department in 1875, severe changes in weather conditions have been planned for, and successfully adapted to. An occasional increase in response time associated with winter driving conditions is probably the most significant consequence.

Census, Population, and Area

The information in table 2 from the 2007-2012 Census Bureau represents the social, demographic, and economic characteristics for the City of Fargo and how it compares to the United States.

While the information from the figure below indicates that white is the predominant race within the City of Fargo, not all ethnic backgrounds are represented. European refugees are not included. From 1990 to 2003, almost 5,000 refugees from 40 countries resettled in Fargo with one in three coming from Bosnia. During the 1990's, Fargo's immigrant population more than doubled accounting for 12 percent of the City's total population growth (Economic/demographic information, 2009).

Table 2. Demographic Data

	Estimate	Percent	United States
Average household size	2.14	(x)	2.61
Average family size	2.91	(x)	3.21
Population 25 years and over	64,235	(x)	204,336,017
High school graduate or higher	(x)	94.6%	85.7%
Civilian veteran (18 years and over)	7,234	8.5%	9.3%
Disability status	8,673	8.3%	12.0%
Foreign born	6,164	5.8%	12.9%
Speak a language other than English at home	7,175	7.2%	20.5%
Household population	113,658	(x)	309,138,711
Median age (years)	30.2	(x)	37.2
Under 5 years of age	6,694	6.3%	6.5%
65 years and over	10,596	10.0%	13.2%
One race	103,763	97.9%	97.3%
Two or more races	2,242	2.1%	2.7%
White	95,694	90.3%	74.2%
Black or African American	2,716	2.6%	12.6%
American Indian and Alaska Native	1,633	1.5%	0.8%
Asian	3,016	2.8%	4.8%
Native Hawaiian and Other Pacific Islander	51	0.0%	0.2%
Some other race	653	0.6%	4.8%
Hispanic or Latino (of any race)	2,618	2.5%	16.4%
In labor force (16 years and over)	66,509	76.4%	64.7%
Median household income (2007 inflation adjusted)	44,304	(x)	53,046
Median family income (2007 inflation adjusted)	69,401	(x)	64,585
Per capita income (2007 inflation adjusted)	29,187	(x)	28,051
Families below poverty	(x)	7.7%	10.9%
Individuals below poverty	(x)	16.0%	14.9%

The population of the City of Fargo has risen from 61,383 in 1980 to 118,456 in 2015. This represents an increase in population of 93% (U.S. Census Bureau).). See Figure 2.

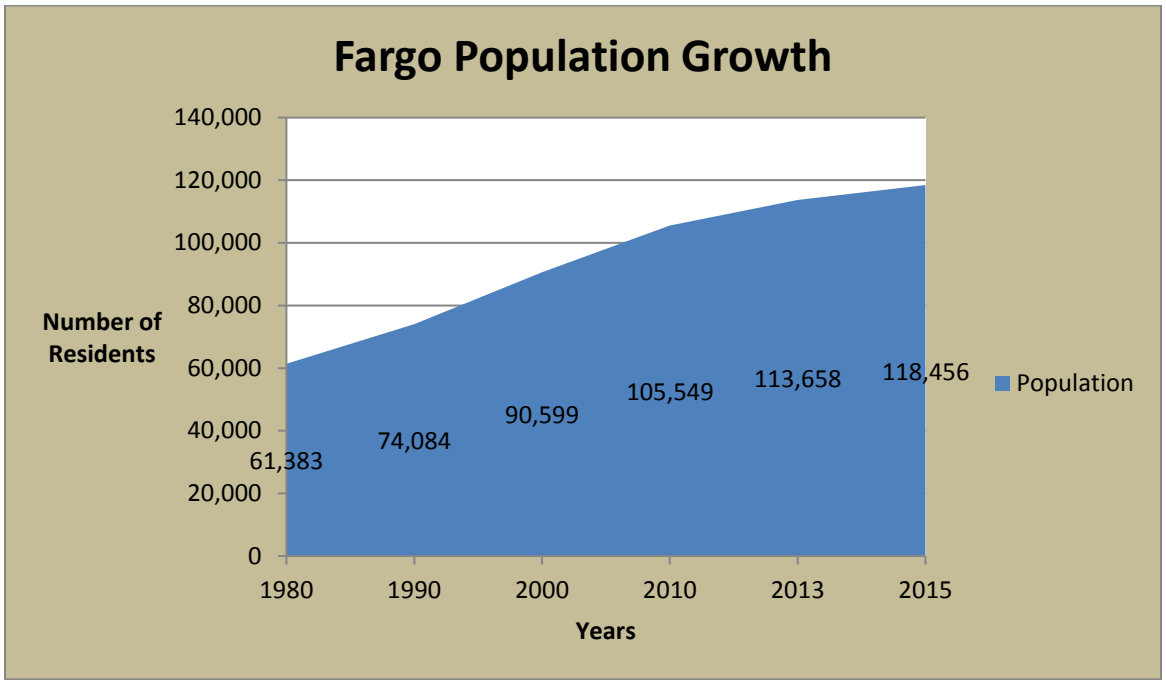


Figure 2. City of Fargo Population Growth

The geographic size of the city grew from 26.71 sq. miles in 1980 to 49.22 sq. miles in the year 2015. This is an increase of 84% (U.S. Census Bureau). See Figure 3.

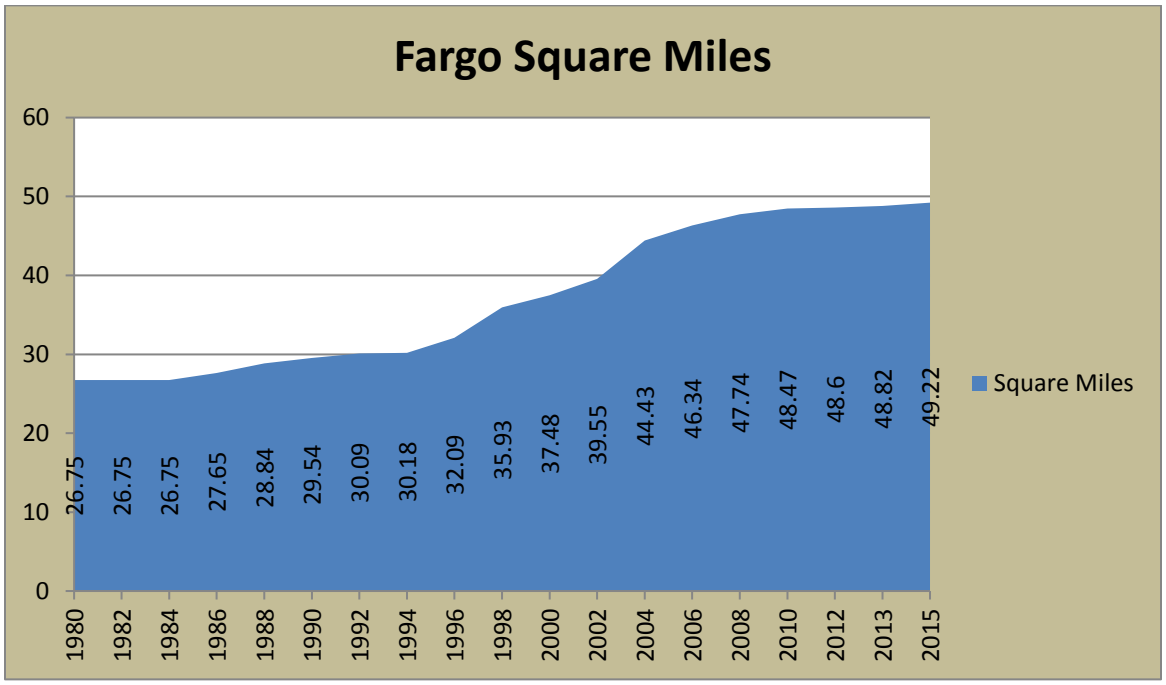


Figure 3. City of Fargo Growth in Square Miles

General Description of Fire Protection

Just as the City has increased in population and area, the FFD has also experienced growth and an increase in the demand for service. In 1980, the fire department operated out of four stations, responding with four engine companies and one ladder company. In 2015, the Fire Department operates out of seven stations, with seven engine companies, two truck companies and two battalion chief vehicles. Both of the trucks have aerial ladders, pumps, and water tanks. In 1981, the Fargo Fire Department responded to 827 calls for service. In the year 2015, responses numbered 9,348, an increase of 1130%.

The FFD of 1980 responded to a broad range of emergencies, but had little specialized training. In 2015, the department provides personnel trained to: Emergency Medical Technician (EMT) level for EMS service; hazmat technician and specialist levels to conduct operations as a North Dakota Regional Hazardous Materials Response Team; technical rescue technician to provide regional response in structural collapse, trench collapse, confined space, and rope rescue; in the use of zodiac boats and equipment for water rescue; in addition to fire suppression activities.

In 1980, fire suppression, fire prevention, and support divisions totaled 85 personnel. Total staffing of the fire department in 2015 is 122 personnel; an increase of 37 personnel in 34 years. Three stations, three engine companies, and one truck company have been added since 1980. The increase in responding vehicles came with a 43.5% increase in staffing.

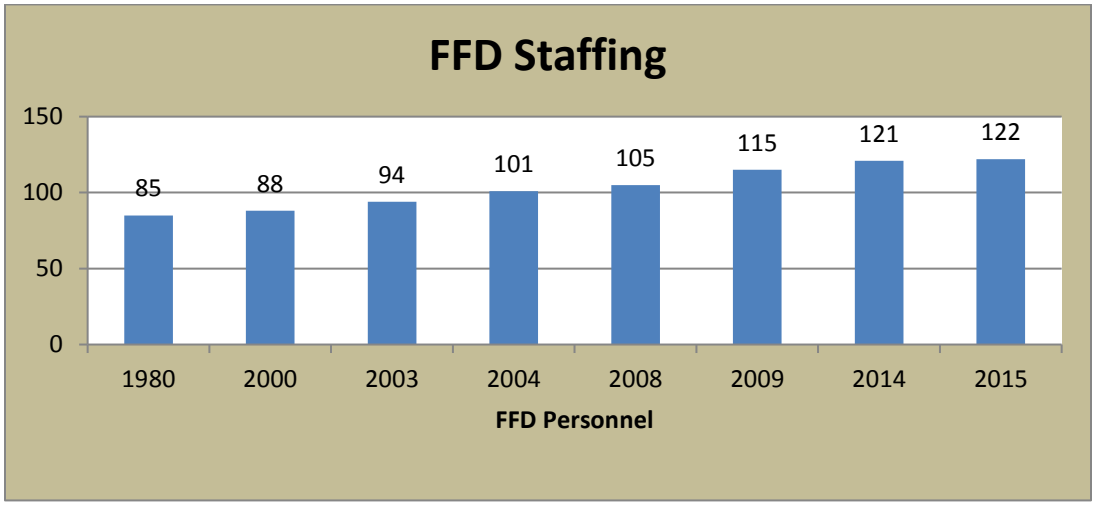


Figure 4. FFD Staffing since 1980

Figure 5 shows the comparison for growth of the City in area, population, and FFD staffing.

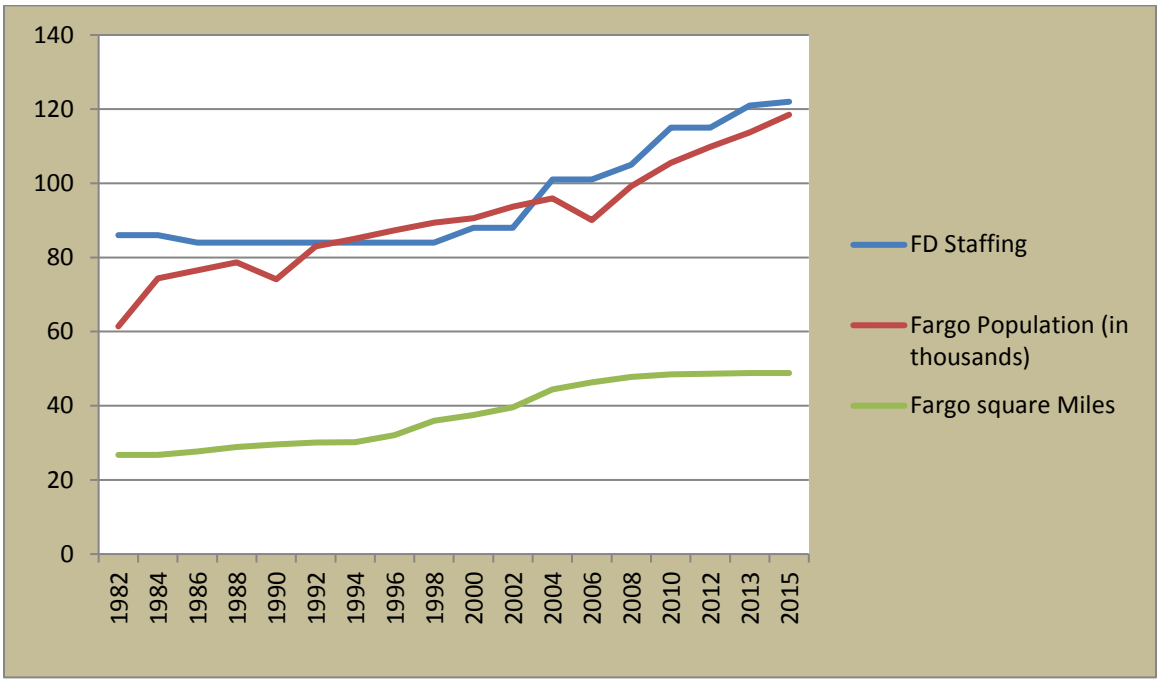


Figure 5. Growth Comparison

The above graph represents the percentage of increase. This graph makes it apparent that the department has been more successful at meeting the needs of the community since the presentation of the 2001 strategic plan to the City Commission.

Staffing, Apparatus, and Stations

Currently within the FFD there are 122 personnel of which 108 are in fire suppression. The suppression division is further divided into three rotating 24 hour shifts of 36 to provide continuous protection to the City of Fargo. The current minimum daily staffing per shift is 29 with seven stations in operation.

Current first line apparatus and staffing includes:

- Seven engine companies with a minimum of three personnel each, one of which is a rescue pumper with additional equipment and air filling capability.
- Two aerial trucks, both with pumps and water tanks, with a minimum of three personnel each.
- Two command units, each with a Battalion Chief.
- One heavy rescue trailer with tow vehicle. When this is needed, it is brought to the scene by engine company or rescue personnel.
- One hazardous materials vehicle. When needed, this vehicle is staffed with engine company personnel.
- Three zodiac inflatable rescue boats with recovery and ice rescue equipment.

Reserve apparatus includes:

- Three engines.
- One 103' aerial truck with platform, 250 gallon water tank, 1250 gpm pump.
- One rescue truck.

Fire station locations and assigned apparatus:

Station 1 (637 NP Ave. N)

- Engine Company 801.
- Command Officer Battalion 1.
- One Zodiac.
- Station 1 houses the Administrative and Support Staff (six) and the Fire Prevention Bureau (five).

Station 2 (3020 25 St S)

- Engine Company 802.
- One Zodiac.

Station 3 (1101 25 Ave N)

- Engine Company 803.
- One Zodiac.
- Ice rescue equipment.

Station 4 (2701 1 Ave N)

- Engine Company 804, which is a Rescue Pumper.
- Truck 1. This truck is an aerial ladder company with a 103' ladder with a platform, 250 gallon water tank, 1250 gpm pump, and equipment to deal with auto extrication and other rescue.
- Heavy rescue trailer with a reserve truck (Truck 4) as tow vehicle. The heavy rescue trailer contains additional equipment to deal with trench and structural collapse rescues.
- This is the location of the FFD's training facility, which includes a burn building and training tower.

- The Fire Training Captain has an office at this station.

Station 5 (930 40St S)
- Engine Company 805.
- One reserve engine.

Station 6 (4630 15 AV N)
- Engine Company 806.
- One reserve engine.
- One reserve truck (Truck 3), which is a standby 103' aerial ladder truck with platform, 250 gallon tank, and 1250 gpm pump.
- A regional TRT trailer with tow vehicle. This vehicle is available to respond in the city or to a regional area for technical rescue situations.
- A RIT training trailer and an SCBA training trailer.
- A salvage trailer, which contains extra tarps, plywood sheeting, and lumber to close up buildings. It also contains an insulation vacuum for removing cellulose insulation during overhaul.
- Station 6 houses an indoor confined space trainer and has capabilities for indoor rope rescue training. Adjoining classroom facilities are available in the public safety portion of the building, along with offices housing the City and County Emergency Managers.
- The City of Fargo Emergency manager office who is a FFD Battalion Chief.
- The EMS Coordinator/PR Officer Captain has an office here.

Station 7 (3957 Village Lane)
- Engine Company 807.
- Command Officer Battalion 2.
- Truck 2. This is a 103' aerial ladder truck with a nozzle, a 500-gallon water tank, and a 1500 gpm pump. Truck 2 also carries equipment to deal with auto extrication and other rescues.
- Hazardous Materials Response unit (857).

Truck Responses

The FFD has two aerial ladder apparatus. Truck 1 is located at Station 4, has a 103' foot aerial ladder with a platform, a 1250 gpm pump, and a 250 gallon water tank. Truck 2 is located at Station 7, has a 103' aerial ladder, a 1500 gpm pump, and a 500 gallon water tank. Both trucks are also equipped with large rescue tools for auto extrication and additional equipment for rescue operations. Only one truck is included on each dispatch for a fire run, accident, or rescue call. If needed, either truck can respond to a call anywhere in the City if requested by the incident

commander. Truck company primary response areas are depicted in Figure 6 below.

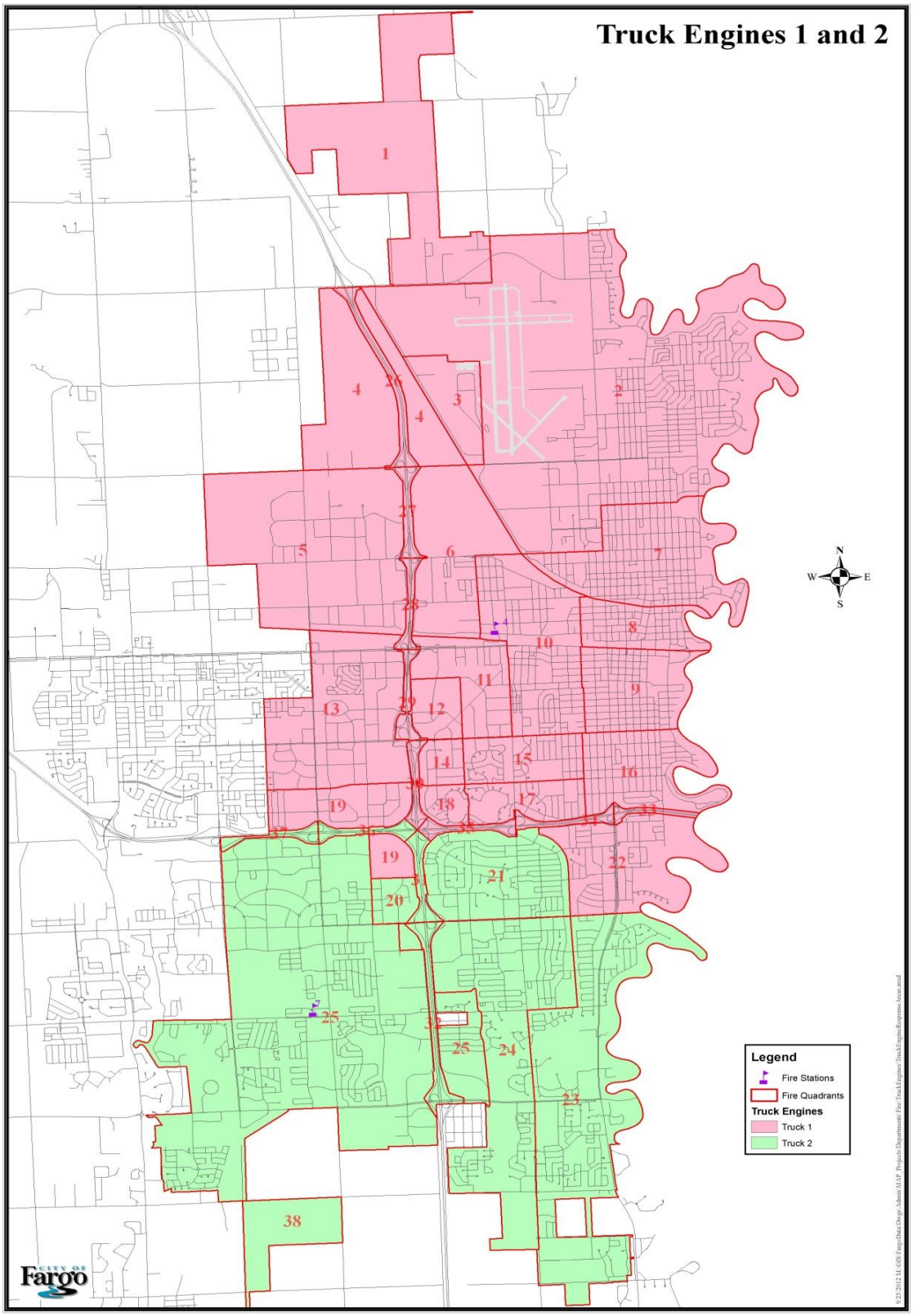


Figure 6. Truck Response Areas

Battalion Chief Responses

As part of reorganization in 2013, the FFD moved from one Assistant Chief on each shift to two Battalion Chiefs on each shift. Battalion Chief 1 is responsible for the personnel and runs in PZ's 1, 3 and 4. Battalion Chief 2 is responsible for the personnel and runs in PZ's 2, 5, 6, and 7.

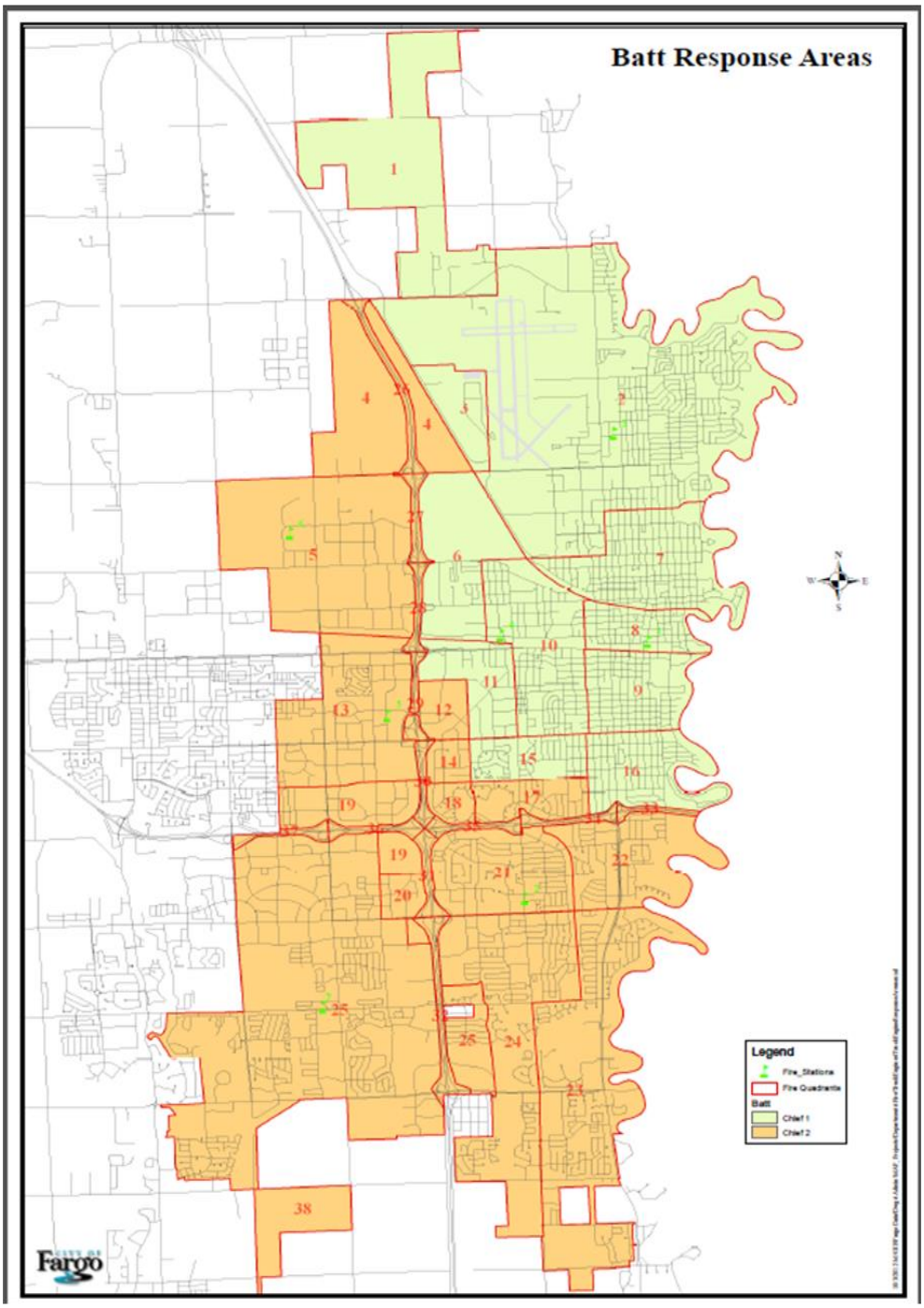


Figure 7. Battalion Chief Response Areas

Description of Loss and Injury

Fire Loss

Figure 8 shows the total fire related dollar loss from 2011 to 2015. Higher than normal loss incidents include: In 2012; an apartment building under construction burned that resulted in a $1,000,000 loss.

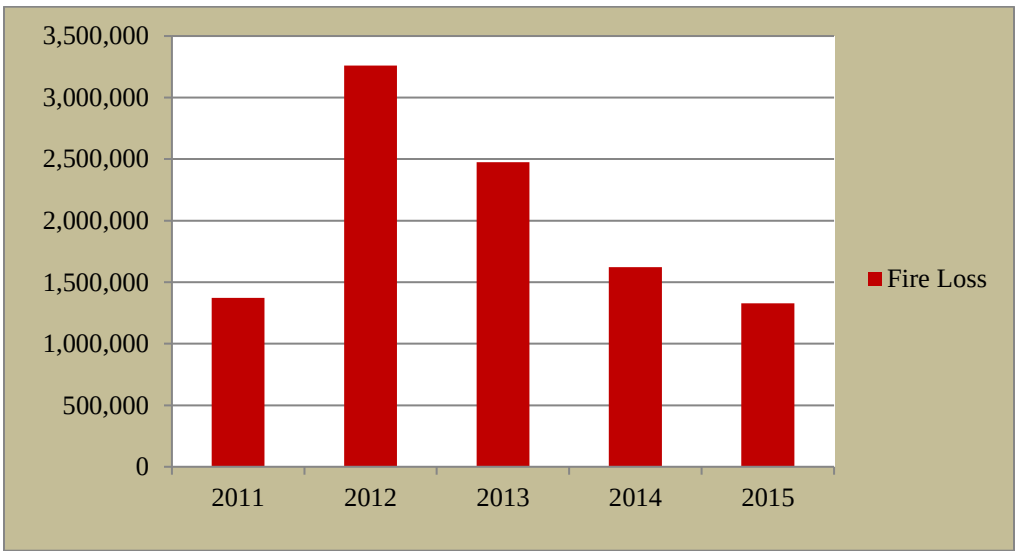


Figure 8. Total Fire Loss in Dollars

Fire Related Civilian Deaths and Injuries

In the NFPA report *Fire Loss in the United States During 2013*, from 2008 to 2013, communities with a population of 50,000 to 99,999 averaged 0.72 fire deaths per 100,000 people nationally and 0.80 fire deaths per 100,000 people in the Midwest region. Fargo's average during the same time is .67. The NFPA report shows civilian injuries were 5.67 nationally and 5.47 in the Midwest region per 100,000 people. Fargo's average during the same time period is 4.5.

Death and injury rates are difficult to trend due to the low occurrence of death and injury from fire in Fargo. One catastrophic fire could change trends dramatically. Fire injuries are also difficult to compare due to civilians not reporting injuries when the fire department is not called or when they seek treatment on their own. Figure 9 is a chart showing civilian deaths and injuries from 2011 to 2015.

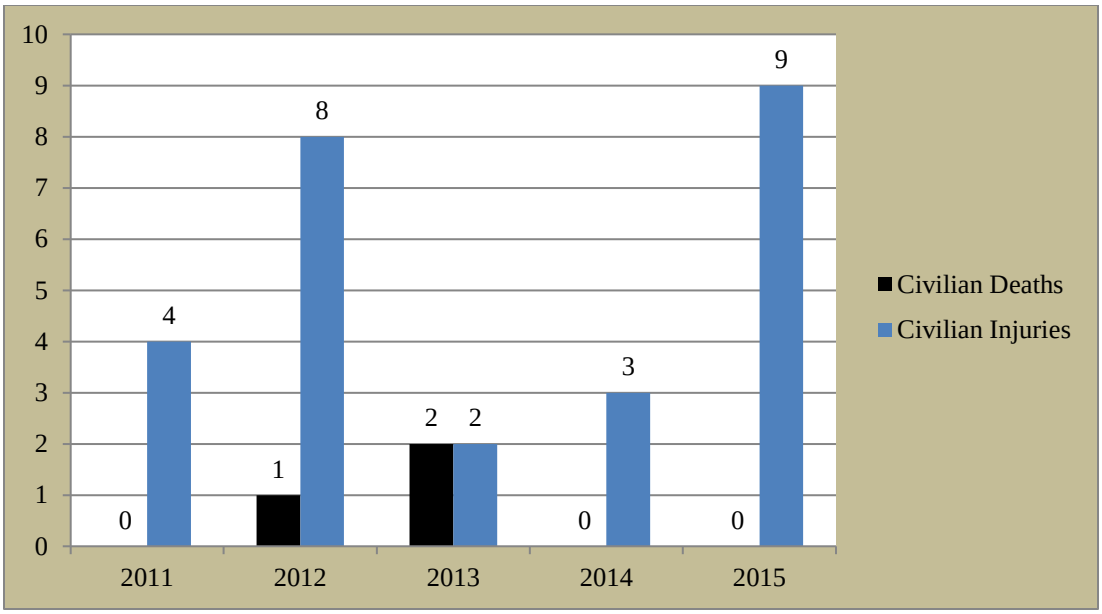


Figure 9. Civilian Deaths and Injuries 2011-2015

It has been demonstrated that socioeconomic factors impact the demand for fire department services. Fire deaths in the biggest cities are roughly 50% higher than in small cities, but fire deaths in rural communities with populations less than 5,000 are more than 100% higher. The peak rates in very small and very large communities are concurrent with high poverty rates in these two types of communities.

Firefighter Injuries

Figure 10 represents the number of reported firefighter injuries in the FFD from 2011 to 2015. The number of firefighter injuries has increased in recent years mostly because of a change in reporting procedures. The City of Fargo began to more rigorously enforce Worker's Compensation requirements in the last few years. These requirements set the expectation that firefighters report any injury, whether or not the individual seeks medical attention. In the past, this was not emphasized and many small injuries did not get reported when the individuals did not seek medical attention. More reports of small injuries can result in the potential for changes that improve safety.

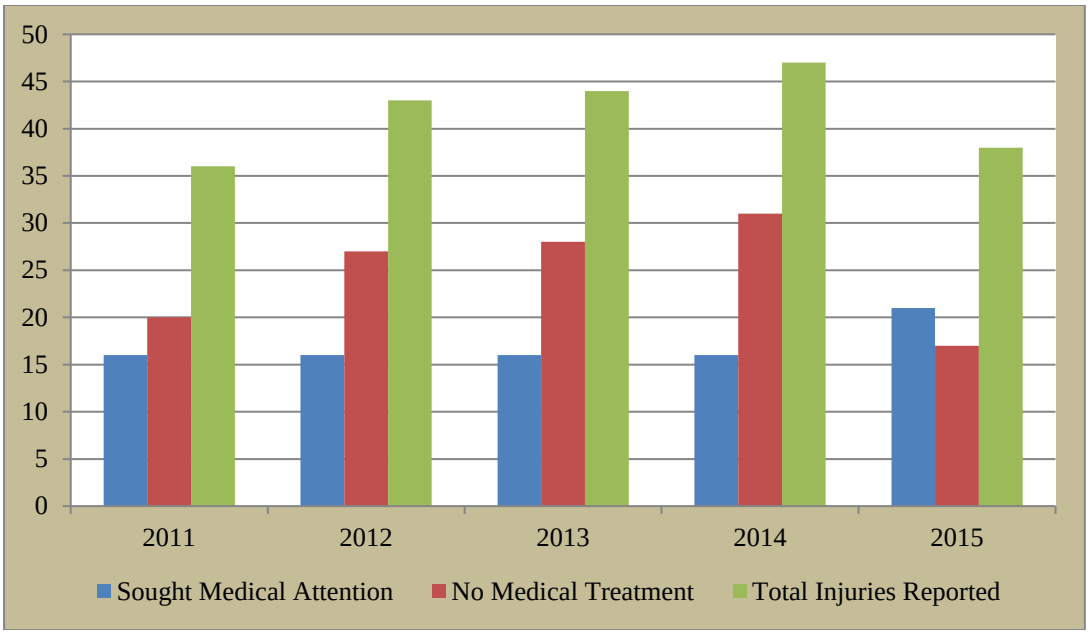


Figure 10. Firefighter Injuries, 2011-2015

Risk Assessment

Introduction

In a risk management model, risk is the possibility of loss or injury. Because risk is a possibility, it has an element of uncertainty, which can be estimated and, to a certain extent, can be controlled or managed. The consideration of risks raises the following questions:

- What areas of the City pose the maximum fire risk? These are the risks that require the maximum amount of fire protection resources or which would result in the greatest loss of life or property.
- What properties, if destroyed, would be a critical or essential economic loss to the community? The loss of commercial property, particularly manufacturing firms that employ a large number people, would have a significant negative impact on the community.
- What are the greatest non-fire risks? These are risks such as transportation networks, hazardous materials, and natural disasters.

These questions were used as the basis for the following risk assessment. This assessment breaks the City down into planning zones, defines risk categories, and analyzes several risk factors within each zone.

Planning Zones

The FFD uses first due engine company response zones as its planning zones (PZ). Figure 9 is a map depicting the nine current planning zones. The far south section of Engine 802's response area will in the next three to five years be the location of another fire station. For planning purposes, this area is designated PZ 8. In 2015, PZ 9 was established and borders the southern edge of PZ 7. Growth and emergency response in this area will be monitored for future planning purposes.

Figure 11. Map of Planning Zones

Risk Categories

The FFD has established three categories of risk; these categories are identified as low, moderate and high. Low risks are considered to be primarily single unit calls. Moderate risks are those that threaten a small number of people or have a limited impact on the economy. Single-family houses, twin homes, and small commercial buildings are the bulk of the properties that make up the moderate risk category. Using criteria in the *International Fire Code*, the leadership of the Fargo Fire Department theorized that single story buildings less than 6,500 square feet were a moderate risk. 6,500 square feet was chosen because that square footage was correlated to an occupancy load of 300. Occupancy loads in public assemblies greater than 300 hundred are deemed a higher risk in the *International Fire Code* and have several higher standards for fire protection, such as a need for sprinkler systems, alarm systems, and greater exiting requirements.

LOW RISK

Low risk includes:

- Vehicle fires.
- Carbon monoxide calls.
- Grass fires.
- EMS calls.
- Automobile accidents up to two vehicles.
- Storage shed and other small outbuilding fires.
- Dumpster fires.

MODERATE RISK

Moderate risk includes:

- Single family houses.
- Twin homes.
- Mobile homes.
- One story commercial buildings under 6,500 square feet.
- Detached garages.
- Apartments with less than four units.
- Vehicle crashes on the interstate or involving more than two vehicles.

HIGH RISK

High risk includes:

- Hospitals.
- Nursing homes.
- Schools.
- Apartment buildings greater than four units.
- Commercial buildings greater than one story or greater than 6,500 square feet.
- Public assemblies.
- Manufacturing.
- Businesses that store or use reportable amounts of hazardous materials.

OTHER RISK

There are several other types of non-fire situations, which could occur that require a unique response depending on the type of call. The FFD has trained personnel in these specialty areas as well as the necessary equipment. These risks include:

- Structural collapse.
- Confined space.
- Trench rescue.
- High angle rescue.
- Water / ice rescue.
- Hazardous materials response.

Risk Data

The FFD has been accumulating information on buildings through the inspection process for several years. The department has data on building class (occupancy type), type of construction, type of roof, number of stories, number of apartments or units, and fire protection systems. The current data is gathered and stored in New World's Windows based computer aided dispatch/record management system (CAD/RMS). Until March of 2011, the FFD used Fire House software as the records management program. At that time, the FFD began using Aegis New World software. Due to technical aspects of using New World, it took a considerable amount of time to get apparatus times reported accurately. For this reason, some of the data from 2011 and 2012 shows some inconsistencies. At this time, the FFD continues to evaluate how this information can be used in future risk assessments. Currently, several computer programs and data bases are being used to analyze this data, which include:

- Aegis New World software – current records management system.
- Fire House software - record management system used through 2011.
- ARCMAP software - application to view and edit geographic data.
- StatsFD software - analyzes emergency response data. (formerly NFIRS 5 Alive)
- City of Fargo Assessor's data base.
- City of Fargo Engineer's data base.
- Fargo Moorhead Metropolitan Council of Governments (METROCOG) 2005 job analysis.
- TIER II reports.

In order to analyze the various risk data, the FFD has integrated the department's RMS, as well as the databases from other City departments and other agencies into the ARCMAP and StatsFD computer programs. With these programs, a picture is developed that identifies those areas of greatest risk and demand for service.

Population Density

While assessing risk, population density is one factor that is often considered. The Commission on Fire Accreditation International (CFAI) has established different response time categories for different levels of population density as part of its accreditation process. These categories are:

- Metropolitan – Population over 3,001 per square mile.
- Urban – Population between 2,001 and 3,000 per square mile.
- Suburban – Population between 1,001 and 2,000 per square mile.
- Rural – Population less than 1,001.

The CFAI response time standards for Metropolitan and Urban areas are the same. PZ's 1, 2, and 5 meet the definition for a Metropolitan area. PZ's 3, 4, 7, and 8 are all considered Urban. PZ 6 does not technically meet the definition for Urban because it is an industrial area that has a high work population, but likely meets the Urban definition during the day. PZ 9 has a population density that meets the rural definition, but it is in the beginning stages of new development. In summary, the FFD uses the response time standards for Urban/Metropolitan areas for all planning zones.

In the case of PZ 3, the population density is distorted by the airport property, which is a large area that has no population. If the population density of the core area of the planning zone is calculated, a population density is found that is significantly higher and falls within the urban category. For planning purposes, PZ 3 will be considered Urban.

As described above PZ 6 is mostly an industrial park with a consequently low residential population. In 2004, the Fargo Fire Department opened Station 6 in that zone because of the large number of industries in the area and their substantial economic value. Though the population density is low enough to be considered rural, the department has chosen to use the response standards for urban areas in PZ 6.

Building Risk

The Great Fargo Fire of 1893 consumed most of the City. The oldest existing structures today were built after the fire and in the early 1900's. The downtown area has the oldest commercial buildings; most of which are of ordinary construction. A large urban renewal project eliminated many of the oldest structures in the downtown area and Renaissance Zone funding has stimulated updating existing structures as well as new construction in the downtown area. Remodeled buildings were, and are, required to be brought up to the most current fire code.

The majority of construction is wood frame. Most residential structures are one or two stories with larger three story multifamily dwellings in the newer areas. In order to quantify specific building risk, the overall number and value of property was evaluated. Within each planning zone, the City of Fargo Assessor's data was used to count all residential and commercial structures along with their total values. The types of residential structures were broken down into apartments and condos, single family, and commercial. The apartment and condo section includes the number of buildings as well as the number of total units. Table 3 shows these properties by planning zone.

Table 3. Residential and Commercial Occupancies

	Apartment and Condo				Single Family			Commercial		
Planning Zone	Number of Apt Buildings	Number of Apt Units	Number of Condo Units	Value	Number of S.F. Units	Number of Town Home Units	Value	Number of Units	Value	Total Value
PZ 1	295	3627	462	$221,999,200	4537	59	$652,251,900	1069	$864,825,400	$1,739,076,500
PZ 2	302	5444	1196	$430,985,600	3,960	1,022	$1,007,558,870	446	$515,481,900	$1,954,026,370
PZ 3	110	1651	290	$90,619,700	3,502	64	$651,461,500	486	$702,860,600	$1,444,941,800
PZ 4	94	1450	212	$72,643,400	2193	126	$284,046,400	873	$515,480,800	$872,170,600
PZ 5	238	6088	413	$335,159,400	316	277	$91,528,300	556	$839,335,292	$1,266,022,992
PZ 6	0	0	0	$0	11	0	$1,046,500	423	$351,579,300	$352,625,800
PZ 7	204	4229	193	$351,074,295	2,070	986	$721,338,800	565	$679,819,900	$1,752,232,995
PZ 8	29	381	59	$68,659,600	1,740	228	$496,069,700	174	$132,385,800	$697,115,100
PZ 9	0	0	0	$0	139	29	$27,609,500	61	$60,452,200	$88,061,700

This data represented a good overview of single family property within each planning zone. However, a more detailed examination of apartments and commercial property was required for several reasons. For example, newer apartment buildings on the south side of the City are more expensive than older apartment buildings in older sections of the City. Newer buildings are built and maintained to stricter codes and have a lower associated life safety risk. Also, the number of buildings has the drawback of not differentiating between sizes of buildings. For instance, using strictly the number of commercial buildings does not account for the difference in risk between a corner convenience store and a shopping mall.

The value and number of structures were evaluated to clarify the relation between risk and size of buildings. The number and value of the properties within each planning zone was totaled for various sized buildings based on the square footage in the Assessor database. As discussed above, a square footage of 6,500 square feet was theorized to be a valid break point between moderate and high risk. After that level was assessed, buildings were examined on 10,000 sq. ft. increments to look for relations to risk at various size buildings. Table 4 shows these totals.

Table 4. Building Number and Value by Planning Zone

	> 6,500 sq ft		> 10K sq ft		> 20K sq ft		> 30K sq ft		> 40K sq ft	
PZ 1	475	$870,493,400	342	$806,019,300	180	$690,355,000	121	$603,516,900	75	$508,579,600
PZ 2	405	$729,234,700	298	$664,390,700	184	$557,331,000	81	$421,704,700	54	$361,362,400
PZ 3	187	$602,823,900	142	$579,859,400	107	$550,820,900	82	$505,979,900	62	$448,066,200
PZ 4	343	$431,144,800	234	$380,559,100	95	$282,732,700	55	$234,831,700	40	$208,797,800
PZ 5	487	$1,022,553,192	395	$951,263,192	261	$822,757,092	138	$653,569,792	83	$539,365,292
PZ 6	182	$306,345,800	140	$287,916,300	84	$248,749,000	64	$221,186,600	50	$197,871,500
PZ 7	361	$837,594,195	277	$774,935,095	183	$655458095	146	$588,703,695	86	$455,032,300
PZ 8	38	$139,515,700	31	$133,230,300	19	$115,910,100	13	$107,506,300	7	$92,751,200
PZ9	21	$31,881,800	17	$30,019,400	3	$19,369,300	1	$17,105,000	1	$17,105,000

The value of the properties is judged to be less pertinent for the reasons mentioned earlier. The number of properties was judged to have validity for risk. The higher square footages did not appear to add any significant information. It was the consensus of the chief officers of the department, that 6,500 square feet was a logical dividing line for all occupancies. In buildings smaller than 6,500 square feet, the risk to life and the economy is decreased and those buildings are likely to be one story. Though different arguments could be made for different square footages for different occupancy, 6,500 sq. ft. was chosen as a reasonable breaking point for all types of commercial and multifamily occupancies. As a means of verifying the legitimacy of this threshold, calculations were made on the total dollar loss due to fire and the number of runs made to these buildings. Of all the structures within the City that are in the assessor's database, structures greater than 6,500 square feet make up less than 10% of total. From 2010 through 2014, this 10% accounted for approximately 58% of the total fire related dollar loss. Figure 12 is a map showing the buildings with a square footage greater than 6,500 that were deemed high risk buildings.

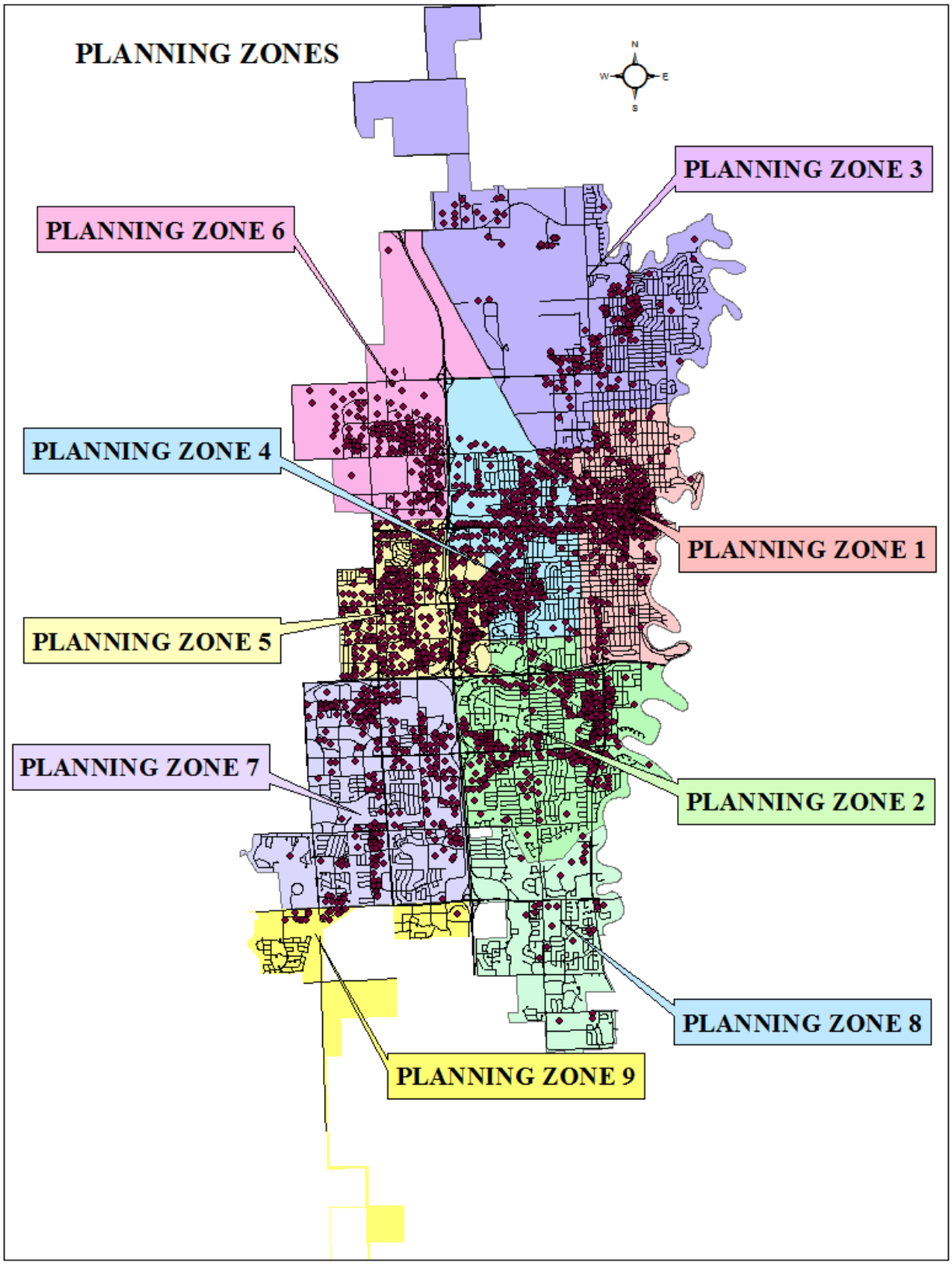


Figure 12. High Risk Buildings 6500 Square Feet and Larger

One weakness to using the high risk buildings as defined is that it does not take into consideration any tax exempt property. While the FFD has fire prevention inspection data on these properties, the City of Fargo Assessor's database does not track much of the information for tax exempt properties. Most public buildings have no pertinent building information available because these building are not assessed. Information on nonprofits such as some hospitals, some nursing homes, churches, and private schools is not available unless the properties were privately owned in the past. Past attempts by the Assessors to allot time to gather the information have not been successful. The tax status is an attribute that can be searched for in ARCMAP. Figure 13 shows all of the tax exempt properties in the City of Fargo. This map will be consulted when specific areas are examined to look for the possibility of additional risk.

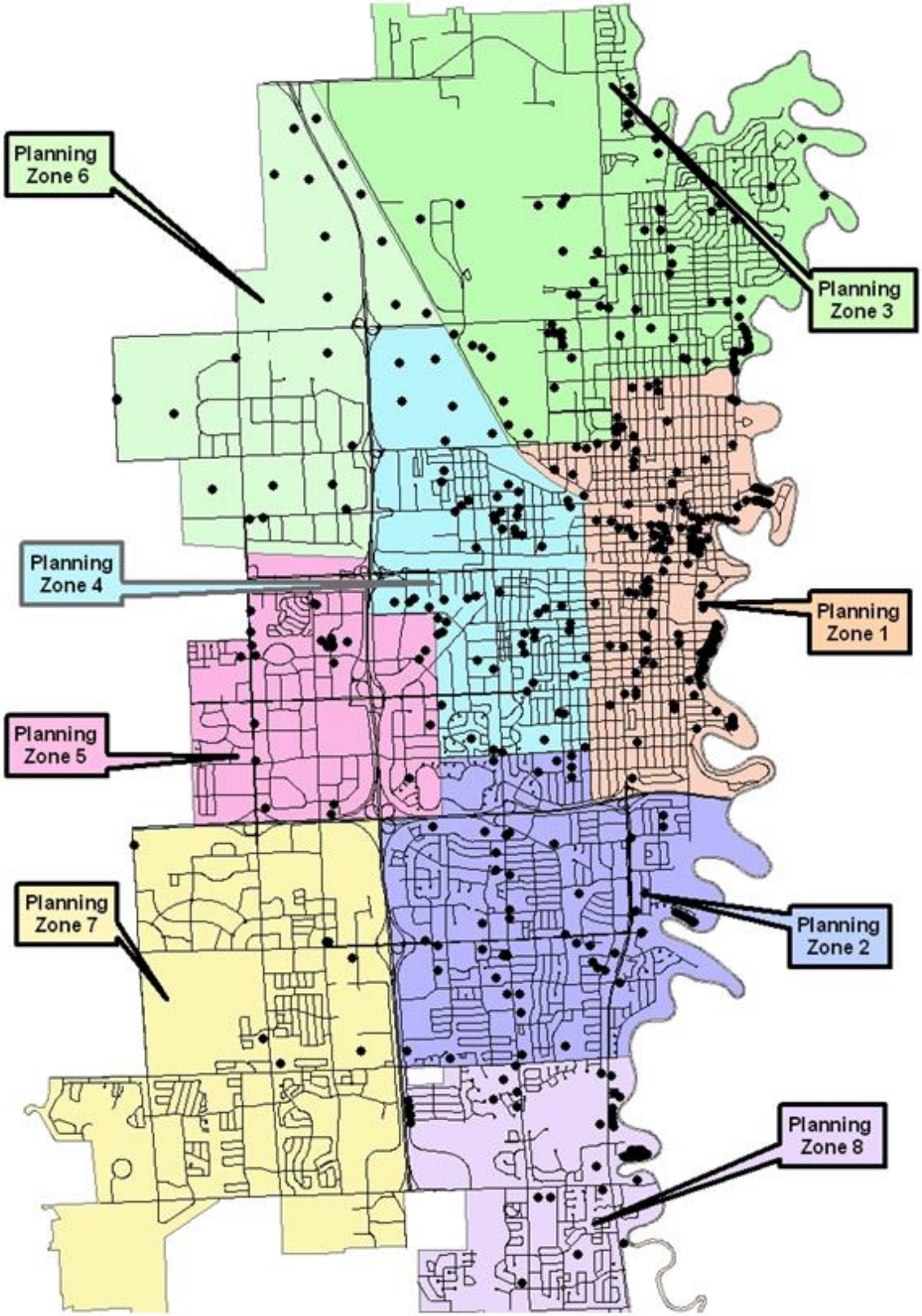


Figure 13. Map of Tax Exempt Properties

In assessing the high risk buildings in Figure 12, it is easy to see the downtown area, in PZ 1, has the greatest concentration of high risk buildings and with the remainder scattered throughout the core of the City. The risk in the north part of the City in PZ 3 is under-represented when the exempt properties are considered. North Dakota State University (NDSU) is located north of 12th Avenue and west of North University Drive. The majority of the 125 buildings on campus are represented in the Assessor database by one exempt parcel. There are a variety of fire risks on the NDSU campus. Only twenty-seven of the buildings are sprinklered. There is a large concentration of students in the dormitories, which are not all sprinklered. Scattered throughout the campus are many different types of hazardous materials of various undocumented quantities. The campus has several large arenas including the Fargo Dome. The Fargo Dome is on NDSU property but is owned by the City of Fargo. It has had crowds of up to 27,000 people with events on 90 to 100 days per year and a total attendance of over 400,000 people per year. There are also two other areas of town where NDSU has a presence. They have expanded downtown in PZ 1 and have 3 large buildings which are all sprinklered. They also have 9 farm buildings which are mostly in PZ 6, one of which is a large Equine Center.

Multi-story Buildings

Fargo is not a very "vertical city" with only 93 structures four to six stories tall. There are only 24 buildings over six stories tall, 15 of which are in Station 1's response area. Of these, only four are over ten stories; the Fargo High Rise being the tallest at 22 stories. See Table 5.

Table 5. Multi-story Buildings by Planning Zone

Planning Zone	Bldgs. 4 to 6 Stories	Bldgs. Over 7 Stories
PZ 1	66	15
PZ 2	1	1
PZ 3	6	6
PZ 4	2	0
PZ 5	6	2
PZ 6	4	0
PZ 7	7	0
PZ 8	1	0
PZ 9	0	0

Fire Flow

Another important element in a risk assessment is the evaluation of the available water supply for firefighting needs. In 2004, the City of Fargo retained an independent engineering firm, Advanced Engineering and Environmental Services, Inc., to do a detailed analysis of the water distribution system and prepare a water distribution master plan. For the purpose of this risk assessment, the portion of the study which evaluated pressures and capacities in regards to fire protection was examined. Because the Fargo Fire Department uses the International Fire Code to determine needed fire flow, the parameters for the study were based off of these requirements. The study indicated that there was enough total storage within the entire distribution system to meet the fire protection requirements of 8,000 gpm for a duration of four hours. The fire flow analysis indicated that there are 30 hydrants in single family residential areas and 227 hydrants in multi-family/commercial areas that do not meet the requirement of 1,000 gpm for single family homes up to 3,600 sq. ft. and 3,500 gpm for multi-family and commercial property. The bulk of these properties are located in the older sections of the City (primarily PZ 1), which have older six inch cast iron pipe water mains. These mains are on the current water main replacement schedule. In 2014, there were 16 hydrants and 7,815 feet of water main replaced as part of the water department's replacement plan. A detailed map of these locations is in the Water Distribution Master Plan Document. Also, based on the ISO survey dated February 2014, the City scored 38.56 out of a possible 40 for water supply. This translates to a Class 1 rating for water supply, and the current FFD ISO rating is a Class 2.

Based on the results of the water distribution study along with the current hydrant maintenance plan, the FFD is confident that the City water distribution system is sufficient for firefighting needs. Although there are isolated areas with lower than required needed fire flow (NFF), the FFD considers this to be a very small percentage of the community and does not feel it is of significant risk (Advanced Engineering and Environmental Services, Inc., 2004).

Fire Suppression Systems

Fire suppression sprinkler systems are important factors in reducing risk. The Fargo Fire Department tracks the location of all sprinklered buildings in the City. Unfortunately, this database cannot be combined with the City Assessor's data to determine directly the number of high risk buildings that are either sprinklered or not. To approximately gauge the impact of

sprinklers, the number of sprinklered buildings in each planning zone was compared to the number of high risk buildings. This ratio was put in a percentage format for the comparison of planning zones. Figure 14 shows the percentage of each planning zone.

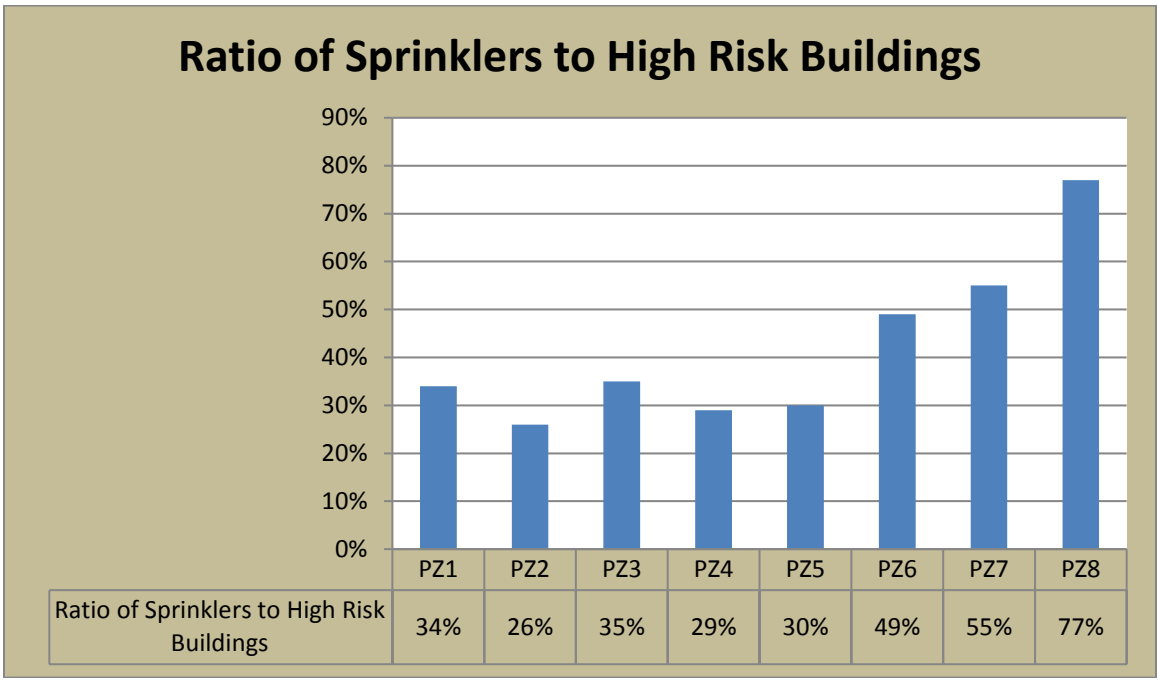


Figure 14. Percentage of Sprinklered High Risk Buildings by Planning Zone

The chart demonstrates PZ 1, 2, 4 and 5 have proportionally fewer sprinklered buildings. PZ 6, 7 and 8 have a greater percentage of new buildings which were built to stricter fire codes and are therefore more likely to have sprinkler systems. This is the most reasonable explanation for these planning zones higher percentages. PZ 3 was adjusted to include NDSU's buildings. These were not in the original database but were added to more accurately reflect the risk.

Non-Fire Risks

Transportation

Like most commercial centers, Fargo is a transportation center. The City is at the crossroads of two interstate highways, has an international airport, and two major rail lines. Commercial passengers are served through five major airlines as well as Amtrak and Jefferson Bus Lines. As a transportation center, there is risk from mass casualty incidents as well as a significant risk from hazardous materials transportation.

The two rail lines are major arteries that carry up to 100 trains per day. There are a wide variety of products carried on these trains, but several trains per day carry a wide variety of hazardous chemicals, many associated with agriculture such as anhydrous ammonia. There are also several trains a day carrying ethanol and Bakken crude oil from the western part of the state, which has recently demonstrated to be a serious concern. These trains cross through PZ 1, 3, 4, 5 and 6.

I-94 runs east and west through the City. It crosses the Red River on the border of PZ 1 and PZ2. The bridge over the river has been the site of many vehicle crashes but recently had a de-icing system installed which made the bridge safer. I-29 runs north and south through the City. Both interstates have large numbers of over the road trucks carrying hazardous materials that pass through the City daily.

Hector International Airport and the North Dakota Air National Guard Base (NDANG) are each located within the City within PZ 3. The airport and NDANG are approximate to each other and share the same runways. The flight mission for the NDANG has been eliminated. Because the flight mission has been eliminated, the NDANG fire department was reduced to a weekend training mission as a deployable firefighting unit. The Fargo Fire Department has taken over the primary fire protection for structures on the base. The Fargo Fire Department provides response to the Hector International Airport terminal buildings and other privately owned facilities/structures located on or near airport property. The Fargo Fire Department is not the primary aircraft crash/rescue fire agency for the airport. The Hector Airport Authority established its own fire department in October of 2014 that is staffed 24 hours and provides crash/rescue fire protection for the air field. The FFD assists the Hector Airport FD with emergencies on the air field through a memorandum of understanding (MOU).

Pipelines

Two pipeline corridors run through the City. These carry refined petroleum products such as gasoline, fuel oil, and jet fuel. The pipelines cross the river in PZ 2 and cross PZ 2, 5 and 6. One corridor carries a six inch and a ten-inch pipeline. The other right of way has one ten-inch pipeline.

Terrorist Threats

A number of potential targets have been identified within the City. Fargo, on a national level, is not considered a likely terrorist target but as a regional center with gatherings of large number of people, it does have some risk. The Federal Court House has been the site of a number of high profile cases in the past few decades. The Fargo Dome and Scheels Arena regularly see large crowds of people. West Acres Shopping Mall is a regional shopping destination. North Dakota State University has received protests over their handling of animals. There is a clinic located in downtown Fargo that provides services to terminate pregnancy, which has been the target of violence and protests. Though none of these are major concerns on a national level, they are the most important terrorist targets in the City of Fargo and, as such, have some associated risk.

Rivers & Lakes

Because of the flat terrain, there is an annual threat of flooding. The Red River of the North borders the entire eastern side of the City of Fargo. The Red River is unique in the fact that it flows north into the ice and colder temperatures. The City is located between two other rivers that join with the Red. The Wild Rice River joins the Red River approximately two miles south of Fargo and the Sheyenne River joins the Red River approximately five miles north of the City. The Wild Rice is a much smaller river but during the spring it carries almost as much water as the Red. In addition, when the Sheyenne River exceeds 22 feet it breaks out and spills into the Wild Rice River increasing the level of flooding in Fargo. Ice jams on any of these three rivers has a significant impact on the severity of flooding. During normal river conditions the rescue potential is low risk, but significant flooding is considered high risk in the fact that there is the potential for large scale rescues in the event of a levee breach. Various levels of evacuation & contingency plans have been developed for such an event. Flooding is also considered high risk because of the potential to cause significant damage to property and to the economy. (The most recent significant floods are described under Natural Disasters.)

The Red River has some recreational traffic including fishing, boating, and kayaking near the man-made dams. These were changed from low head dams which created an extreme drowning potential to areas of rip rap which make the area safer, but still hold some risk of water accidents. During the winter, unstable ice conditions pose a risk. The river is the major source of water for both Fargo and Moorhead, therefore, is vulnerable to a chemical spill with potential

consequences beyond normal environmental concerns. A hazardous materials spill in the Red River could be a serious incident that could demand considerable resources for a substantial amount of time. The river borders PZ 1, PZ 2, PZ 3, and PZ8.

Located within the City are several small man-made lakes and water containment areas. The lakes are located within residential areas and pose the typical water related risks. The lakes are primarily for cosmetic purposes. Small, non-motorized watercraft can be used but there is very little recreational activity. While there is always the possibility of an accident, to date there have been very few calls for service related to the lakes. During severe thunderstorms and spring flooding, water containment areas and drainage canals are often at full capacity. There have been calls for service involving these areas; typically they involve motorized vehicles. The bulk of these lakes and containment areas are located within PZ 2, PZ7, and PZ 8.

Hazardous Materials

Hazardous materials have proven to be a challenge for most fire departments. Along with the risk from hazardous chemicals as a transportation center, there are many sites in the City that have sizeable amounts of hazardous chemicals stored and used on site. The department inspects all commercial buildings and tracks the amount of hazardous materials stored in all buildings. The department does not have an efficient means of integrating that information into computer programs used in this analysis. One means of locating businesses that use or store chemicals is through The Superfund Amendments and Reauthorization Act (SARA), which requires all businesses to report to state and local officials substantial quantities of hazardous chemicals stored on the premises. The quantities vary based on the type of the chemical and the type of facility. Though the quantities and types are not available for analysis with the present system, the location of all businesses with reportable amounts of chemicals can be viewed with ARCMAP. Figure 15 is a map showing the businesses that have SARA reportable quantities of chemicals. The majority of these are in PZ 1, PZ 4 and PZ 6. With data and experience from fire inspections, the department knows that the major areas of concern for hazardous materials use and storage are in PZ 4 and PZ 6. These areas have the most concern because of the manufacturing and storage facilities that populate the industrial park areas located in these two planning zones. Fargo does not have any large chemical manufacturing. The map below also

identifies the locations of pipelines, railroads, and interstate highways in relation to planning zones.

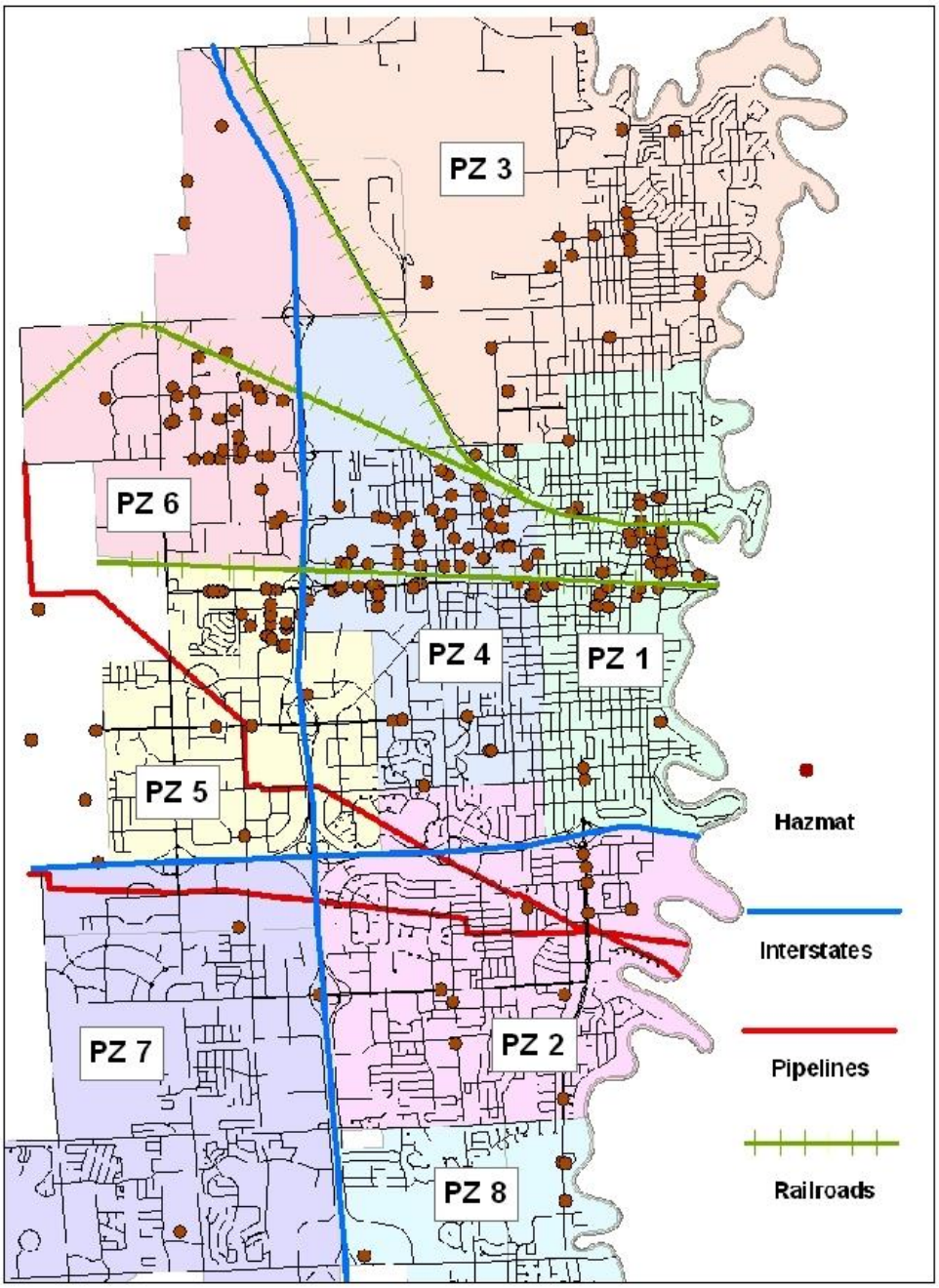


Figure 15. Businesses with SARA Reportable Quantities of Chemicals

Natural Disasters

Potential natural disaster risks primarily include springtime flooding, summer thunderstorms, tornadoes, and winter blizzards and snowstorms.

During recent years, the Red River of the North has passed into flood stage at least once per year. During most years, flooding is minor. However, about every decade the City experiences a devastating flood. The Red River flood of 1997 had been the most severe flood of the river since 1826. On April 17th 1997, the Red River crested in Fargo at 39.5 feet which is 22 feet above flood stage; at that time the second highest crest in recorded history. While there were some properties lost to flooding, dike-building efforts were able to prevent the water from flooding into a majority of the City. On March 28, 2009 the Red River crested at 40.8 feet, making it the highest recorded flood in Fargo's history. This was considered a level one disaster bringing in many Federal and State resources. Because of the outpouring of volunteers and the efforts of all the agencies involved, temporary levees and dikes were built to the 43-foot level resulting in flood damage to the City being held to a minimum. Since 1997 significant efforts have been made to lessen the effects of severe flooding within the City. However, as a result of this flooding FEMA has adjusted the flood plain elevations for this region, which has forced a significant number of property owners within the city to purchase flood insurance. Because of this reoccurring threat and additional financial burden placed on property owners, the number one priority for the city leaders is obtaining permanent flood protection. A flood diversion project has been developed and approved by congressional authority however; all of the funding needed to complete the project has not been acquired.

Severe thunderstorms and tornados are potential disaster risks of summer. Most thunderstorm activity occurs in June, July, and August with August being the most active month. Fargo averages 35 thunderstorms per year. Tornados are an ever present threat associated with thunderstorms. Fargo suffered severe loss of life and property damage when struck by an F5 tornado on June 20, 1957. Tragically, 10 people lost their lives due to the tornado.

The City is known for its long, cold, snowy winters and blizzard conditions. Heavy snow accumulation has caused roofs to collapse and during blizzards snow blocked streets makes

travel with fire trucks difficult. Double digit sub-zero winter temperatures require precautions to maintain an effective water supply. Apparatus and fire ground operations are adapted to help deal with the frigid temperatures. The FFD has a good working relationship with the street department and during blizzard events, the Street Department responds quickly at our request to open blocked streets.

Economic Risks

The Fargo Fire Department considers the protection of the economy a primary strategy in planning for fire protection. One means of assessing risk to the economy is an assessment of jobs. In table 6 are the ten largest employers in the City of Fargo according to the Greater Fargo Moorhead Economic Development Corporation.

Table 6. City of Fargo's Largest Employers

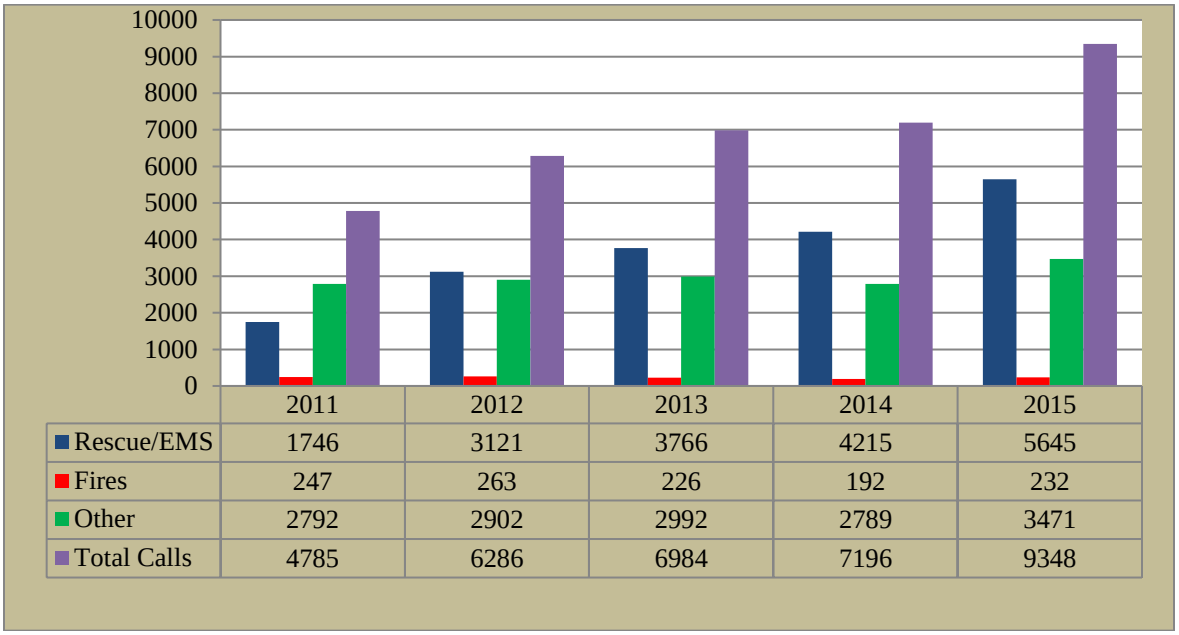
	City of Fargo's Largest Employers	**FTE***
1	Sanford Fargo Medical Center	6664
2	North Dakota State University	4232
3	Essentia Health	3167
4	Fargo Public School District No. One	1816
5	Noridian Healthcare Solutions	1666
6	Fargo VA Medical Center	1022
7	Blue Cross Blue Shield of ND	961
8	US Bank	955
9	City of Fargo	881
10	Microsoft	877
	*FTE=Full-time employee equivalents	

The Fargo Moorhead Metropolitan Council of Governments (Metro COG) assembles census data for each specific area of the City to determine traffic patterns for the metropolitan area. It breaks the information into small parcels that make it easy to assign specific information to specific areas, such as planning zones. The census data provides the number and type of jobs for each particular area.

Demand for Service

Total Calls for Service

Combined with the level of risk, an analysis of demand for service is important to assess the need for fire suppression resources. First, an overview of the number and types of incidents in the entire jurisdiction is useful to see the general demands on the fire protection system. Figure 16 shows the number and type of calls per year.



	2011	2012	2013	2014	2015
Rescue/EMS	1746	3121	3766	4215	5645
Fires	247	263	226	192	232
Other	2792	2902	2992	2789	3471
Total Calls	4785	6286	6984	7196	9348

Figure 16. Total Calls for Service 2011-2015

The FFD provides BLS medical service, but does not provide patient transport. Personnel are required to be trained to, and maintain, the NREMT certification level. The local ambulance service, FM Ambulance, a wholly owned subsidiary of Sanford Health, provides the primary ALS care and patient transport.

Medical calls are prioritized using the Medical Priority Dispatch System, which codes medicals on a severity scale from A-E. Through 2012, the FFD was taking medical runs coded either D or E. It was determined that this type of dispatching would eliminate calls where we do not have a positive impact, therefore increasing unit reliability. In 2012, the FFD also began taking runs coded C in an attempt to decrease our dispatch time. This increased the run volume significantly for medical runs. Reducing call processing time for EMS calls has been an ongoing challenge.

In an attempt to further reduce the call processing time, in March of 2015, dispatches were sent based on chief complaint. The EMD process is continued by dispatchers and if it results in an A or B code before our arrival, company officers can make the determination to continue or cancel on the call. The Red River Regional Dispatch Center dispatches for numerous agencies in two counties in two states and is not under direct control of the City of Fargo. FFD staff continue to work with the dispatch center to find ways to bring the times to levels that align with national standards.

Calls by Occupancy Type

In order to identify any trends, it is also important to look at where calls for service occur. Table 7 is a breakdown of total calls for service by occupancy type for 2015. Table 8 shows just structure fires.

Table 7. 2015 Calls by Occupancy Type

Total of Calls by Occupancy Type 2014	EMS	Fire	Other
429 Multifamily dwellings	1792	70	1283
419 1 or 2 family dwelling	900	36	522
963 Street or road in commercial area	637	11	169
962 Residential street, road or residential driveway	231	12	105
965 Vehicle parking area	271	35	93
311 24-hour care Nursing homes, 4 or more persons	141	1	118
599 Business office	57	0	26
449 Hotel/motel, commercial	159	8	92
161 Restaurant or cafeteria	113	6	54
331 Hospital - medical or psychiatric	54	1	64
961 Highway or divided highway	59	7	27
460 Dormitory type residence, other	22	1	50
960 Street, other	2	0	2
241 Adult education center, college classroom	11	1	60
700 Manufacturing, processing	17	1	27
322 Alcohol or substance abuse recovery center	372	3	97
131 Church, mosque, synagogue, temple, chapel	22	0	22
162 Bar or nightclub	67	1	17
340 Clinics, doctor's offices, hemodialysis centers	33	0	22
Other	685	38	561

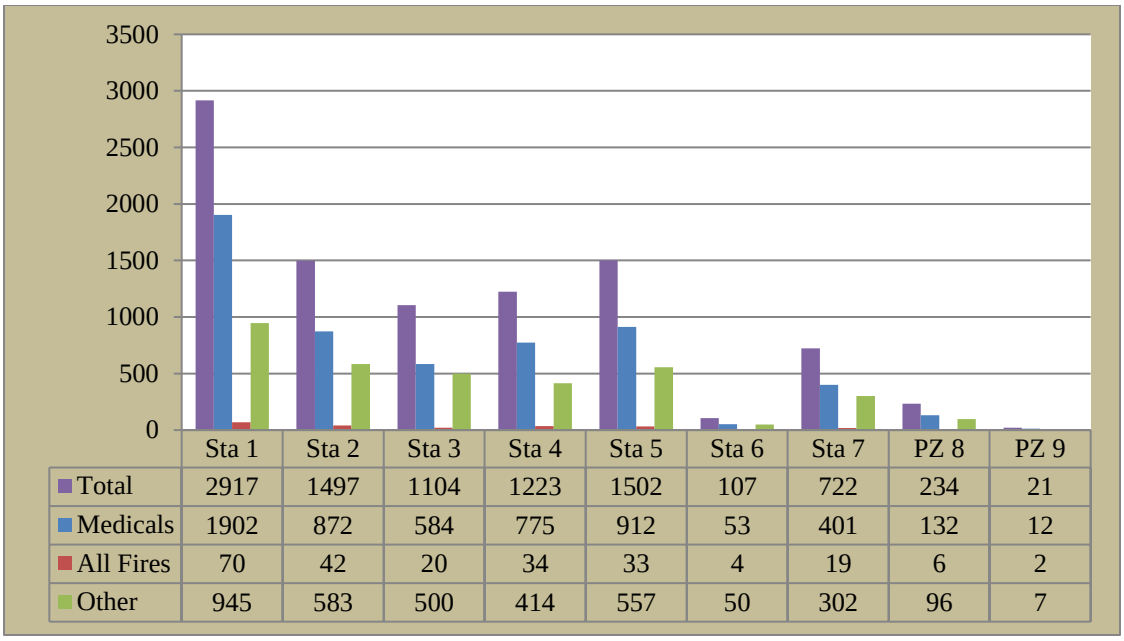
*Other includes detached garage fires, dumpster fires, grass fires, and other fires not associated with a specific occupancy.

Table 8. 2015 Structure Fires

2015 Structure Fires	Total
419 1 or 2 family dwelling	21
429 Multifamily dwellings	55
881 Parking garage, (detached residential garage)	4
161 Restaurant or cafeteria	2
449 Hotel/motel, commercial	6
322 Alcohol or substance abuse recovery center	2
549 Specialty shop	1
981 Construction site	1
162 Bar or nightclub	1
808 Outbuilding or shed	1
460 Dormitory	1
891 Warehouse	2
614 Steam or heat plant	1
921 Bridge	1
700 Manufacturing	1
311 24 hours Nursing home	1
	101

Calls by Planning Zone

A more thorough look at the individual planning zones allows for a better appraisal of demand for service. Incident data for the last five years has been added to the summary for each planning zone, which follow on pages 44-53. For the ease of comparison, only 2015 data was used in the following graphs to demonstrate the demand in the planning zones. Figure 17 shows the total number of incidents along with the number of medical calls, the number of fires, and the number of other calls for each planning zone. Graphs for the last five years are similar, though all of the planning zones have shown a gradual increase in calls for service over the last three years.



	Sta 1	Sta 2	Sta 3	Sta 4	Sta 5	Sta 6	Sta 7	PZ 8	PZ 9
Total	2917	1497	1104	1223	1502	107	722	234	21
Medicals	1902	872	584	775	912	53	401	132	12
All Fires	70	42	20	34	33	4	19	6	2
Other	945	583	500	414	557	50	302	96	7

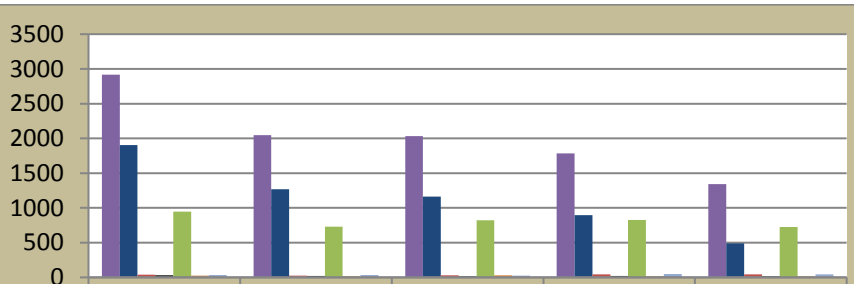
Figure 17. 2015 Calls by Planning Zone

From the chart, it can be seen that PZ 1 has the greatest number of calls. PZ 2, 3, 4 and 5 all have similar numbers to each other. PZ 6,8, and 9 have relatively low numbers of incidents. Most of the planning zones have similar percentages of medicals that range between 50% and 60% with variations from year to year. The exception is PZ 6 where the percentage is consistently lower than the other stations as a result of the fact that PZ 6 is mostly industrial and has a low population base. Planning zones 8 and 9 are zones that are used for tracking purposes only and do not have separate fire stations. They are covered by Stations 2 and 7, respectively.

Summary of Risks by Planning Zone

The information on the following pages is a summary of risks by planning zone.

PZ 1



	2015	2014	2013	2012	2011
Total Calls	2917	2048	2034	1786	1,342
Rescue/ems	1902	1269	1162	897	490
Non Structure fires	40	27	30	44	46
Structure Fires	30	23	18	20	18
Other	945	729	824	825	727
Rescues	27	18	29	17	15
Hazmat	35	34	26	48	46

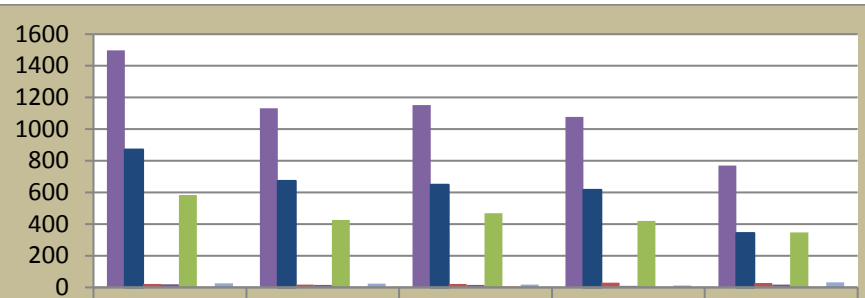
Risk Factors

- Covers 4.43 square miles.
- 2013 population density of 5,091 people per square mile.
- 475 high risk buildings – second highest number of any planning zone.
- 15 buildings seven or more stories in height.
- 66 buildings four- six stories in height.
- 4,596 single family houses and townhomes.
- 19 high risk buildings outside 1.5 mile travel along South University between 13 Ave. So and I-94.
- Low ratio of sprinklered buildings to high risk buildings.
- 42 buildings with reportable amounts of hazardous materials.
- Two railroads pass through the zone.
- Borders I-94.
- Red River of the North travels the length of the east border.
- Highest number of incidents of all types of any planning zone.

Risk Diminishing Factors

No peripheral areas with significant delay in secondary and tertiary responses.

PZ 2



	2015	2014	2013	2012	2011
Total Calls	1497	1131	1152	1078	771
Rescue/Ems	872	673	648	617	343
Non Structure fires	22	17	21	30	28
Structure Fires	20	15	15	10	17
Other	583	426	468	421	347
Rescue	4	3	8	4	3
Hazmat	26	24	17	11	33

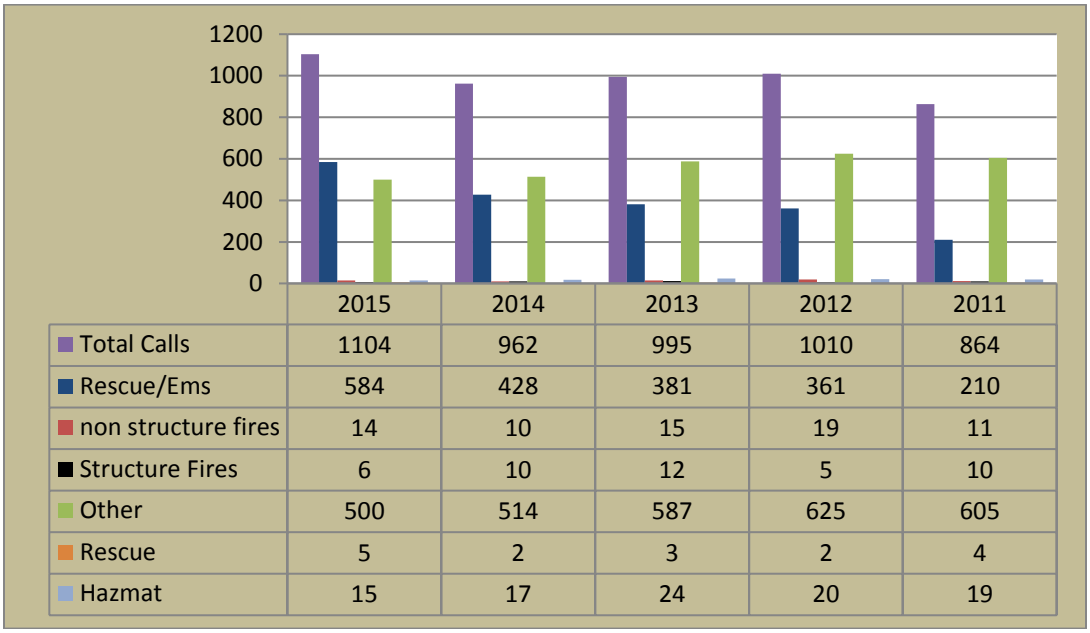
Risk Factors

- Covers 6.12 square miles.
- 2013 population density of 4,046 people per square mile.
- 405 high risk buildings.
- One building seven or more stories in height.
- One building four- six stories in height.
- 4,982 single family houses and townhomes.
- Large number of apartment units with 5,444.
- 19 high risk building outside 1.5 mile travel distance along S. University Dr. between I-94 and 25th Ave. So.
- Low ratio of sprinklered buildings to high risk buildings.
- 13 buildings with reportable amounts of hazardous materials.
- Three petroleum pipelines cross the Red River and traverse the rest of the zone.
- Borders I-94 and I-29.
- Red River travels the length of the east border.
- Second highest number of incidents of all planning zones.
- Peripheral areas with potential delay in secondary and tertiary responses, especially to the south.

Risk Diminishing Factors

- Low number of manufacturing jobs.
- Low number of buildings with reportable amounts of hazardous materials.

PZ 3



	2015	2014	2013	2012	2011
Total Calls	1104	962	995	1010	864
Rescue/Ems	584	428	381	361	210
non structure fires	14	10	15	19	11
Structure Fires	6	10	12	5	10
Other	500	514	587	625	605
Rescue	5	2	3	2	4
Hazmat	15	17	24	20	19

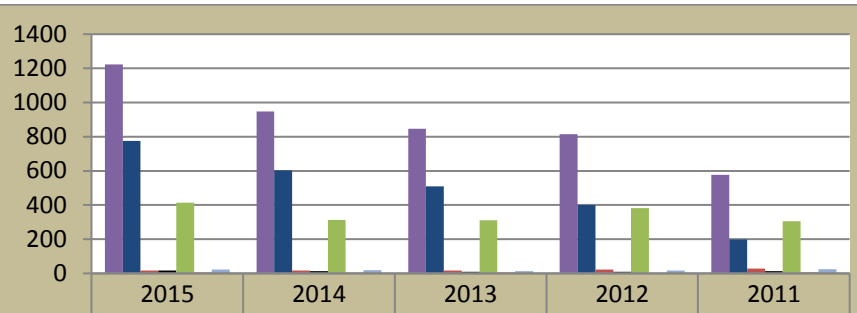
Risks Factors

- Covers 11.73 square miles. Core area approximately 4.31 square miles.
- 2013 population density in its core area of 3,322. This excludes the airport property and sewage lagoons in the calculation.
- 187 high risk buildings, but this does not reflect NDSU.
- Six buildings seven or more stories in height.
- Six buildings four- six stories in height.
- 3,566 single family houses.
- NDSU campus with significant number of people, high risk building and hazardous chemicals. Substantial portion of NDSU campus at edge of or beyond 1.5 mile travel distance.
- Low ratio of sprinklered buildings to high risk buildings.
- 22 buildings with reportable amounts of hazardous materials. NDSU has a wide variety of hazardous chemicals under the reportable amounts.
- Airport with Air/Crash rescue provided by Hector FD.
- One railroad borders this zone.
- Red River travels the length on the east side.
- Number of incidents is substantial.
- Peripheral areas with potential delay in secondary and tertiary responses.

Risk Diminishing Factors

- Low number of manufacturing jobs.

PZ 4



	2015	2014	2013	2012	2011
Total Calls	1223	947	847	815	577
Rescue/Ems	775	604	509	400	199
Non Structure fires	17	17	17	22	29
Structure Fires	17	13	10	10	13
Other	414	313	311	383	305
Rescue	5	4	6	2	7
Hazmat	22	18	14	17	24

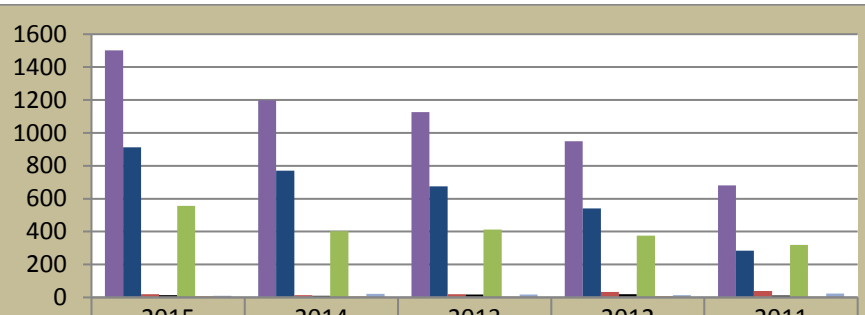
Risks Factors

- Covers 4.63 square miles.
- 2013 population density of 2,205 people per square mile.
- 343 high risk buildings.
- Two buildings four- six stories in height.
- 2,319 single family houses
- Low ratio of sprinklered buildings to high risk buildings.
- 93 buildings with reportable amounts of hazardous materials.
- Two railroads pass through the zone with one switching yard.
- Highest number of manufacturing jobs.
- Substantial number of incidents.

Risk Diminishing Factors

- No peripheral areas with significant expectations of delay in secondary and tertiary responses.

PZ 5



	2015	2014	2013	2012	2011
Total Calls	1502	1198	1126	950	680
Rescue/Ems	912	771	675	541	284
Non Structure fires	19	14	20	34	39
Structure Fires	14	10	18	20	11
Other	557	403	413	375	319
Rescue	7	6	4	8	4
Hazmat	10	22	17	13	23

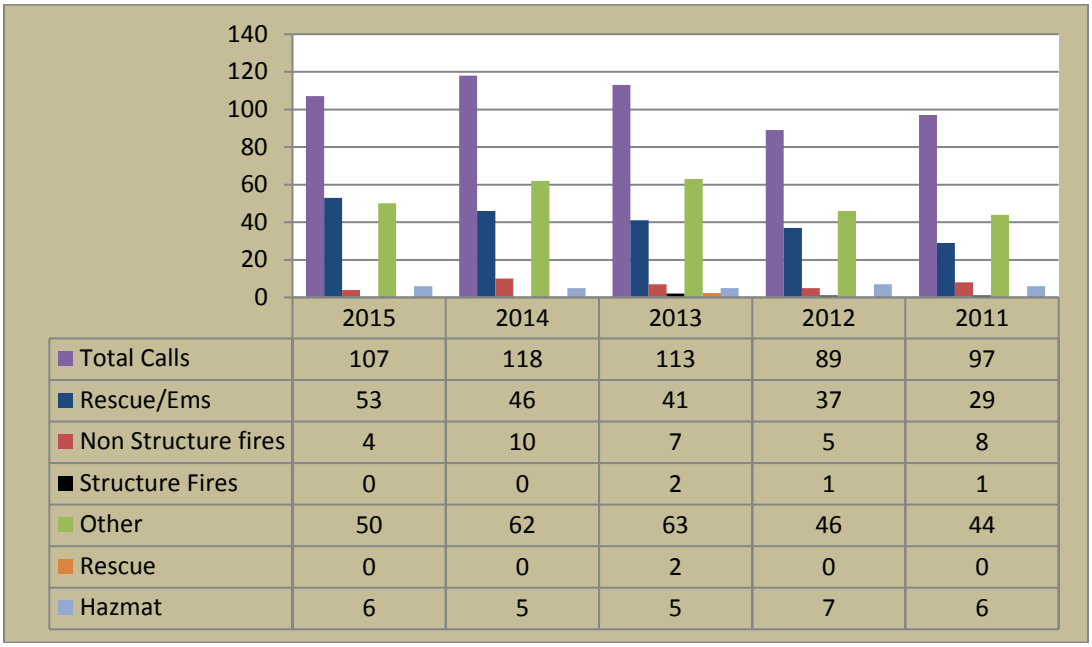
Risk Factors

- Covers 3.69 square miles.
- 2013 population density of 4,487 people per square mile.
- 487 high risk buildings, highest number of any planning zone.
- Two buildings seven or more stories in height.
- Six buildings four- six stories in height.
- 593 single family houses.
- Large number of apartment units with 6,088.
- Low ratio of sprinklered buildings to high risk buildings.
- 31 buildings with reportable amounts of hazardous materials.
- One pipeline passes through the zone.
- One railroad passes through the zone.
- I-29 and I-94 both pass through this zone.
- Third highest number of incidents.

Risk Diminishing Factors

- Limited peripheral areas with significant expectations of delay in secondary and tertiary responses.

PZ 6



	2015	2014	2013	2012	2011
Total Calls	107	118	113	89	97
Rescue/Ems	53	46	41	37	29
Non Structure fires	4	10	7	5	8
Structure Fires	0	0	2	1	1
Other	50	62	63	46	44
Rescue	0	0	2	0	0
Hazmat	6	5	5	7	6

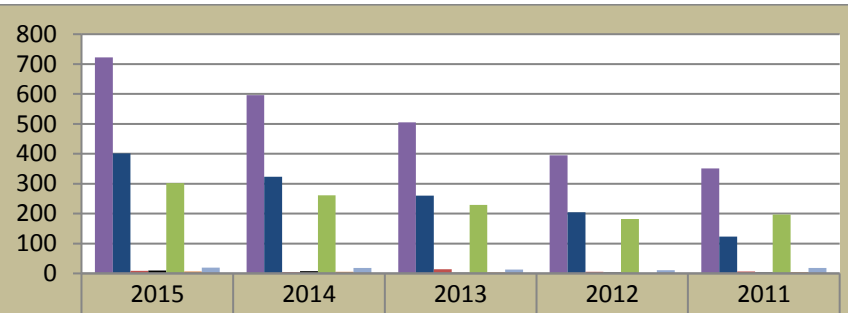
Risk Factors

- Covers 5.41 square miles.
- 182 high risk buildings, many of significant size.
- Four buildings Four- Six stories in height.
- Low ratio of sprinklered to high risk buildings.
- 74 buildings with reportable amounts of hazardous materials.
- One pipeline passes through the zone.
- One railroad passes through the zone.
- I-29 passes through this zone.
- High number of manufacturing jobs.

Risk Diminishing Factors

- 2005 population density that is negligible.
- 11 single family houses.
- Low overall demand for service.
- Low population base decreases demand for medical assists.
- Below average number of high risk buildings.

PZ 7



	2015	2014	2013	2012	2011
Total Calls	722	596	505	395	351
Rescue/Ems	401	323	260	205	123
Non Structure fires	9	4	14	5	6
Structure Fires	10	8	2	3	3
Other	302	261	229	182	197
Rescue	6	5	3	1	4
Hazmat	19	18	13	11	18

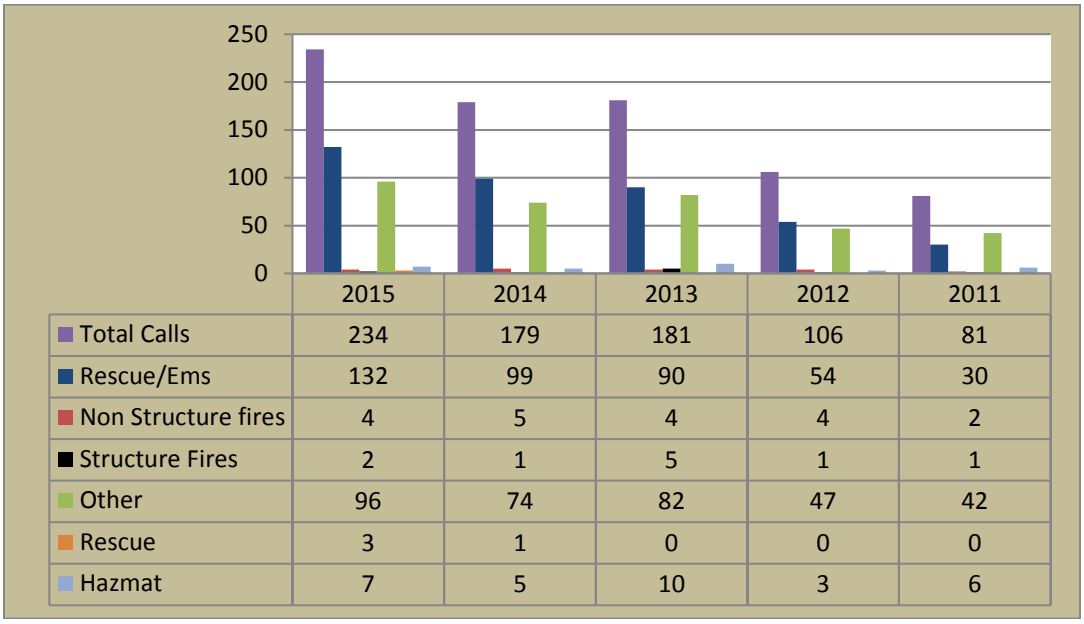
Risk Factors

- Covers 6.95 square miles.
- 2013 population density of 3,035 people per square mile.
- 361 high risk buildings.
- Seven buildings four to six stories in height.
- 3,056 single family houses and townhomes.
- Large number of apartment units with 4,229.
- Peripheral areas with potential delay in secondary and tertiary responses.
- Three buildings with reportable amounts of hazardous materials.
- One pipeline passes through the zone.
- I-29 and I-94 border the zone.
- Small area with no hydrants.
- Third highest number of manufacturing jobs.
- Growing number of incidents.

Risk Diminishing Factors

- Very low number of buildings with reportable amounts of hazardous materials.
- Below average demand for service.
- Comparatively higher ratio of sprinklered buildings.
- Predominately newer construction.

PZ 8



	2015	2014	2013	2012	2011
Total Calls	234	179	181	106	81
Rescue/Ems	132	99	90	54	30
Non Structure fires	4	5	4	4	2
Structure Fires	2	1	5	1	1
Other	96	74	82	47	42
Rescue	3	1	0	0	0
Hazmat	7	5	10	3	6

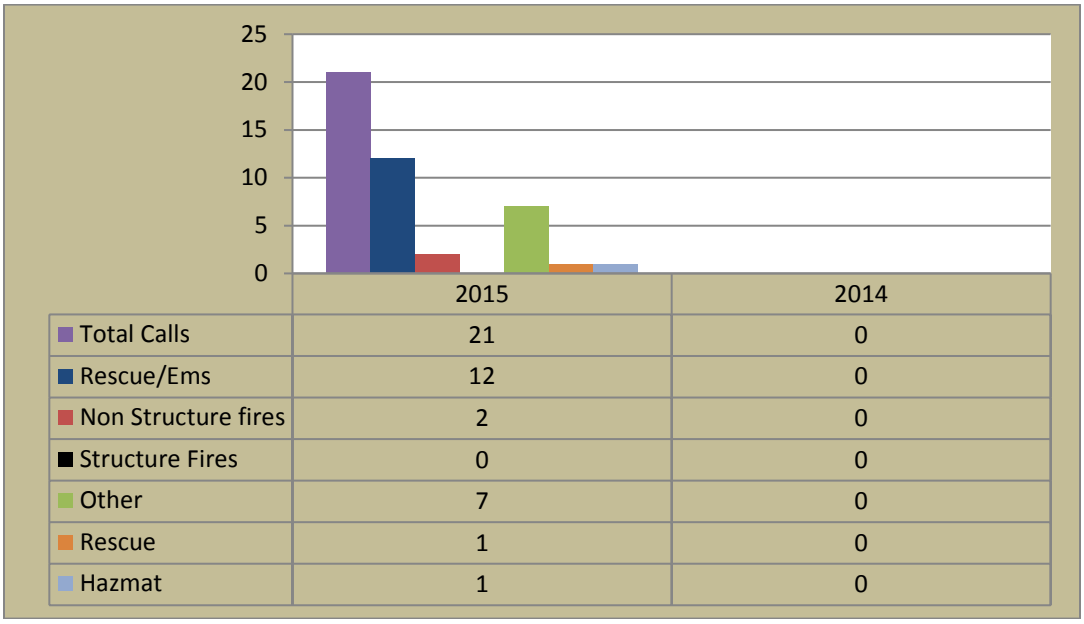
Risk Factors

- Covers 4.17 square miles.
- 2013 population density of 2,485 people per square mile and growing.
- Potential for delay in primary response.
- Peripheral areas with potential delay in secondary and tertiary responses.
- One building four to six stories in height.
- 1,968 single family houses and townhomes.
- Red River travels the length on the east side.
- Four buildings with reportable amounts of hazardous materials.
- I-29 borders this zone.

Risk Diminishing Factors

- Low number of high risk buildings (38).
- Comparatively higher ratio of sprinklered to high risk buildings.
- Predominately newer construction.
- Very low number of buildings with reportable amounts of hazardous materials.
- Low number of manufacturing jobs.
- Low demand for service.

PZ 9



	2015	2014
Total Calls	21	0
Rescue/Ems	12	0
Non Structure fires	2	0
Structure Fires	0	0
Other	7	0
Rescue	1	0
Hazmat	1	0

Risk Factors

- Covers 3.04 square miles.
- Current population density at 1,951 people per square mile.
- Limited fire department data.
- Potential for delay in primary response.
- Peripheral areas with potential delay in secondary and tertiary responses.
- 21 high risk buildings.
- 168 single family and townhomes.
- Bordered by PZ 7 on the north, I-29 on the east, and Horace on the west.

Risk Diminishing Factors

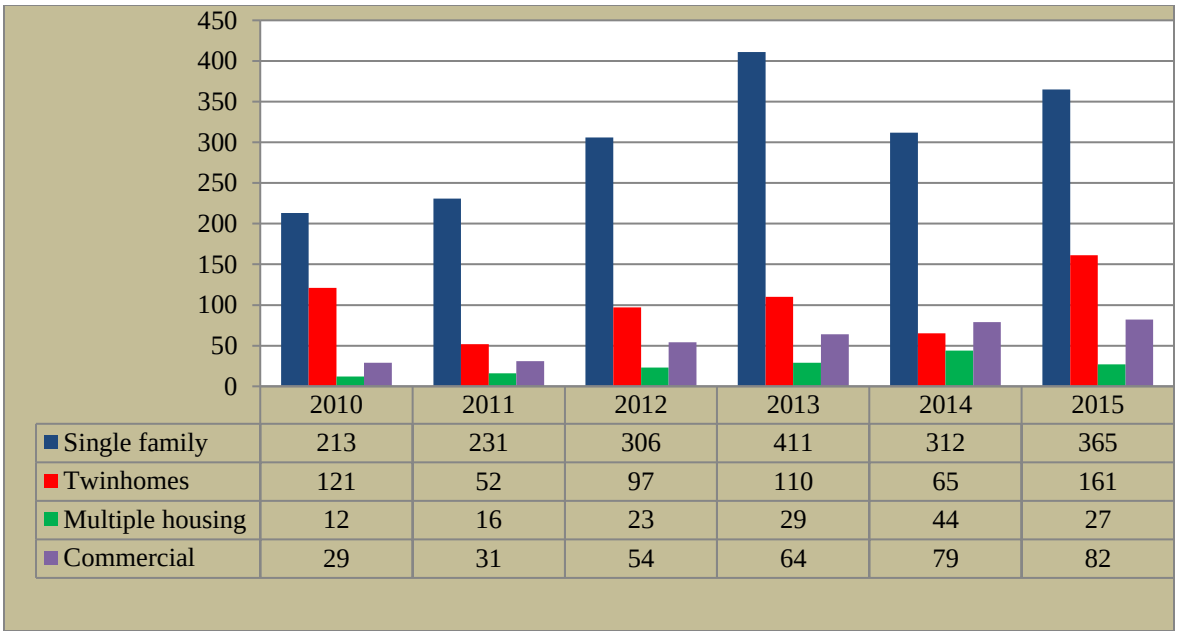
- Will be new construction.
- Currently has a very low demand for service.

Development and Growth within the Planning Zones

The City of Fargo's 2007 growth plan addresses the future development of the City. One item the plan focuses on that has a positive impact on providing fire protection is reducing urban sprawl which results from leapfrog development. Urban sprawl is described as a disorderly pattern of development on the fringes of an urban area. Urban sprawl results in an uneconomical pattern of extended urban services (Heamavihio, 2007). Reducing this type of development would allow for a more efficient fire protection system.

While the growth plan contains plotted areas to the north of the City, the majority of the growth is to the south and west of the City. On the north side of the City, several factors deter growth such as the airport and sewage lagoons. The City is limited in growth to the west due to the City of West Fargo and on the east because of the Red River and state of Minnesota. During the 1980's and early 1990's, the majority of southerly growth occurred between the Red River and I-29. During the spring flood of 1997, river and overland flooding made this area vulnerable. Since that time, the City has been encouraging development west of I-29. An examination of building permits shows the majority of construction has been west of I-29 and a lesser amount of construction on the east of I-29.

The issuance of building permits for new construction is an accurate method of measuring growth within the City and is particularly useful when planning for the fire protection in developing planning zones. In the City of Fargo, 2,952 building permits for new construction were issued between 2010 and 2015. The majority of the housing permits were issued in planning zones 7 and 8. The majority of the commercial permits were issued in planning zones 7, 5, and 6. An increase in development will relate to an increase in the demand for service within the developing planning zones.



	2010	2011	2012	2013	2014	2015
Single family	213	231	306	411	312	365
Twinhomes	121	52	97	110	65	161
Multiple housing	12	16	23	29	44	27
Commercial	29	31	54	64	79	82

Figure 18. Building Permits 2010-2015

The multiple housing category above includes the number of apartment buildings that were permitted in those years. The number of individual units included in those 151 buildings is 4,498. In 2014, the 44 multiple housing buildings included 1,897 individual units. In 2015, the 27 multiple housing units included 902 individual units.

It is anticipated that the number of building permits for new construction will continue to be sizeable for PZ 7 and PZ 8, which in turn will correlate to an increased demand for service in those areas. A new senior high school is now open in PZ 8, and development around this new facility is rapidly increasing. The Fargo Fire Department will continue to monitor the development in PZ 8 and will recommend changes to the fire protection system as necessary.

Coverage of Fire Stations

The total number of high risk buildings in each response zone of the City reflects the overall level of risk in each planning zone but this does not demonstrate where any weaknesses are in the fire protection system. One means of evaluating the levels of protection in the City of Fargo is to use the Insurance Services Office (ISO) standard of 1.5 mile travel distance for engines companies and 2.5 mile travel distances for ladder companies.

The ISO recommends a travel distance of 1.5 miles from a fire station for engine response. This 1.5 mile travel distance provides a good means of determining efficient station location and has become the standard for fire protection systems. The FFD uses the 1.5 mile response areas as a planning guide. Figure 19 shows the coverage of 1.5 miles from each station.

In Figure 20, the shaded areas are within the 1.5 mile response capabilities of the seven current engine companies. The orange dots are high risk buildings. From this map, areas of concern can be identified and analyzed more thoroughly. Obvious areas to consider are the neighborhoods between Station 1 and Station 2 primary response zones, and the south and southwest section of the City. A less obvious concern is the NDSU area. NDSU is in Engine 803's primary response zone, but half of the campus is outside the 1.5 mile travel distance. The risk in this area was described above.

The area between Station 1 and Station 2 along South University Drive is also outside the 1.5 mile response zone of any engine. This area has a large percentage of single family homes, but also has a significant number of small commercial properties, four schools, two churches, and a nursing home.

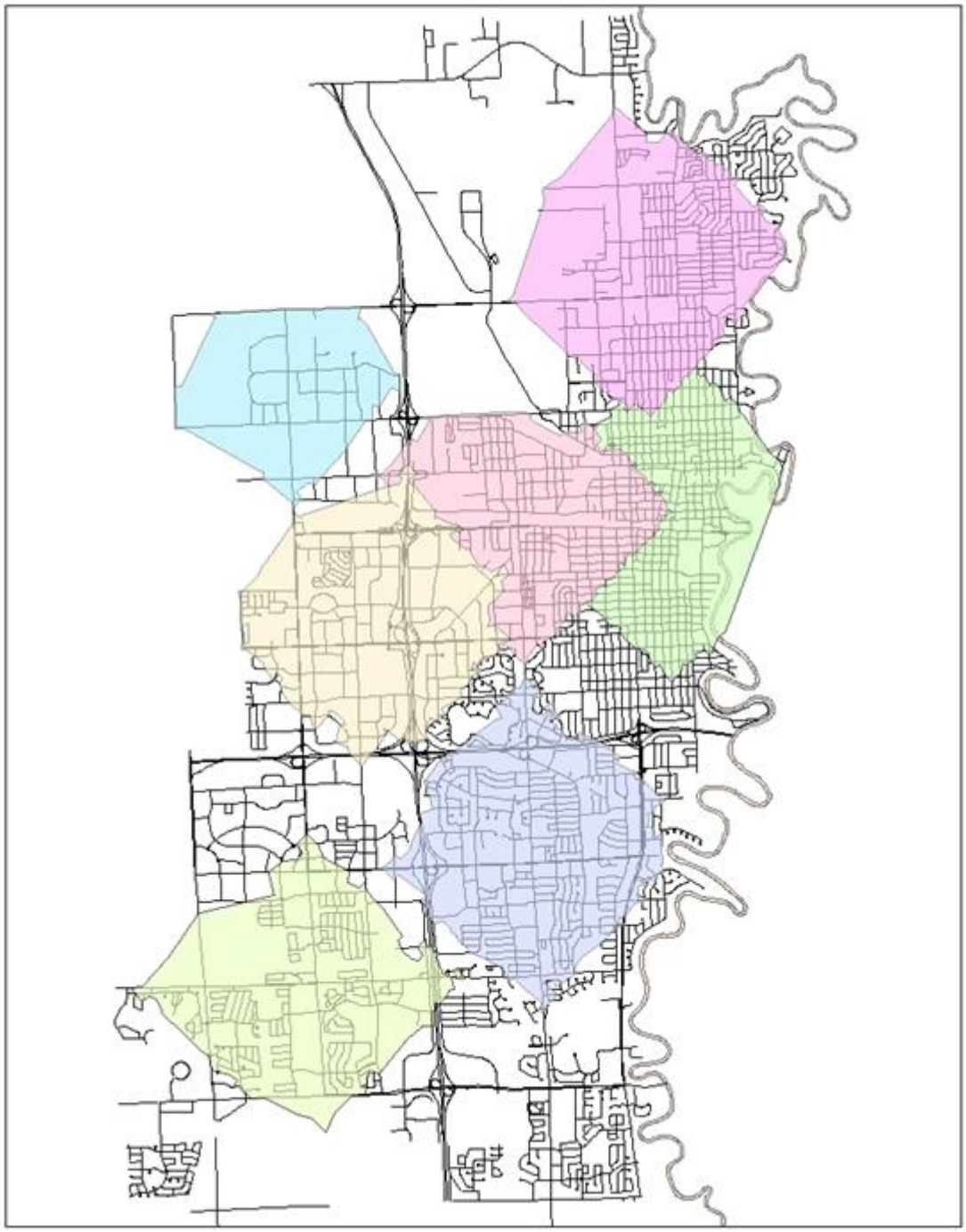


Figure 19. 1.5 Mile Station Travel Distance Coverage

The southwest section of the city is covered by Station 7. There are a considerable number of high risk buildings between Station 7 and Station 5 response zones that are outside the 1.5 mile travel distance. Figure 20 is a map showing these high risk buildings that will not be covered. The area in question, between Station 5 and Station 7, has 112 high risk buildings but only 369

single family dwellings. The map also indicates a considerable amount of duplication in response area between Station 4 and Station 5. It is apparent that Station 5 was built too close to Station 4 for best coverage and when determining a location for Station 7, this overlap in coverage was taken into consideration. If an opportunity presented itself, Station 5 would be relocated, but there are no plans to do so at this time.

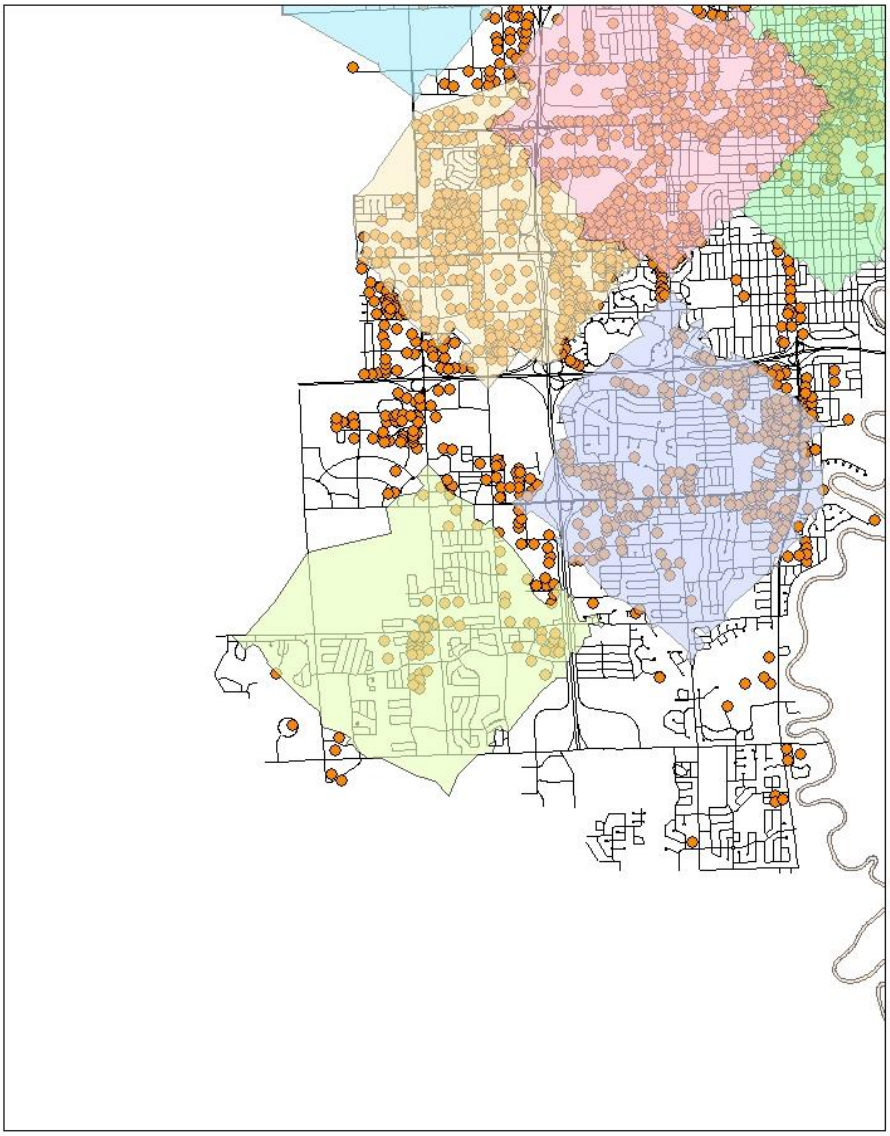
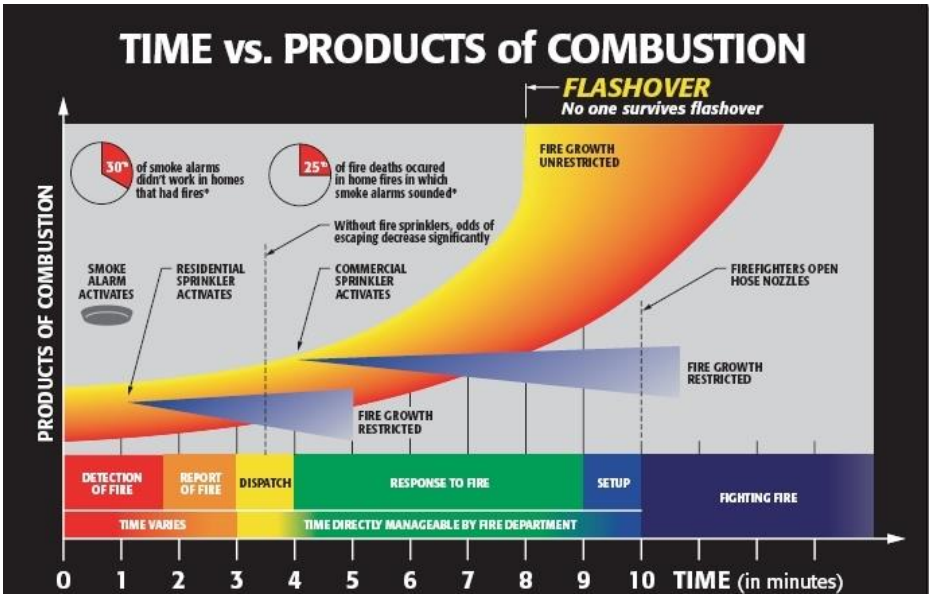


Figure 20. High Risk Buildings in Gap Between Station 5 & Station 7

Methodology of Response

The goal of the FFD is to, when possible; quickly and effectively control all fires in the room of origin. Structure fires can usually be contained in the room or area of origin if they can be extinguished in the pre-flashover stage. While the FFD must be prepared to deal with fires that progress beyond the room of origin, the FFD emphasizes its training and resources on aggressively attacking fires in their room or area of origin. Figure 23 below is the time/temperature curve for a typical structure fire; it shows a flashover time in as little as eight minutes.



http://www.firesprinklerassoc.org/High_Rise/FlashoverChart.pdf

Figure 21. Time vs. Products of Combustion

Fires that cannot be extinguished in the room or area of origin often result in loss of the entire structure. For this reason and in an attempt to comply with NFPA 1710, the FFD has set a travel time benchmark of 4 minutes. The FFD desires to maintain a travel time baseline of at least 5 minutes and 12 seconds or better as set forth in the CFAI FESSAM (Commission on Fire Accreditation International Fire and Emergency Services Self-Assessment Manual) 8th edition for Metropolitan/Urban areas.

EMS calls make up the bulk of the low risk calls for service. The FFD does not consider all medical assist calls to be a primary mission. However, it does consider a timely response to

cardiac and respiratory emergencies very important. Dispatching protocols have reduced the number of fire department responses to non-life threatening medical assist calls, but life threatening emergencies are still considered a priority. Cardiac emergencies are one type of life threatening emergency where time is important. Because the brain typically cannot sustain itself without oxygen, a quick response by trained personnel can mean an increase in heart attack victim survivability. For this reason, the FFD also desires to maintain a minimum baseline travel time of five minutes and twelve seconds and a benchmark of four minutes for travel time to medical emergencies. Additionally, in 2011 the FFD in conjunction with a local hospital established a public access defibrillator program.

Given these goals and the importance of a rapid response, it becomes necessary to determine the amount of resources needed to control emergencies during initial stages.

Critical Tasks and Effective Response Force

In order to establish an effective response force (ERF), the specific tasks necessary to mitigate a given situation are examined. Once these tasks have been identified, the number of personnel and apparatus needed to complete these tasks are determined. The FFD considered the following incident types when assigning the tasks and minimum number of personnel needed for successful mitigation. The emergency situations defined include:

- EMS
- Vehicle crashes.
- Low, moderate, and high risk category fires.
- Hazardous material incidents.
- Water/Ice rescue.
- Technical Rescue - Structural Collapse, Confined space, High Angle and Trench Rescue.

EMS

Task	Firefighters
Record Keeping/Patient Care	1(Company Officer or Firefighter)
Patient Care	1(Firefighter)
ERF	2

This represents a single vehicle response with a minimum of three firefighters. EMS responses involve an engine or truck company with a minimum of three personnel.

All Vehicle Crashes

Task	Firefighters
Incident Command	1 (Battalion Chief)
Traffic Control	2 (Firefighter)
Safety Officer	1 (Company Officer)
Vehicle Stabilization/Patient Care	3 (Firefighters, one may be an officer)
Extrication	3 (Firefighters, one may be an officer)
ERF	10

This response represents one command vehicle staffed with one, two engine companies staffed with three, and one truck company staffed three.

Fires

Low Risk

Task	Firefighters
Incident Command	1(Company Officer)
Pump Operator	1(Engine Driver)
Extinguishment	1-2(Firefighter, Company Officer)
ERF	3

Moderate and High Risk

Task	Firefighters
Incident Command	1 (Battalion Chief)
Attack Line	2 (1st Engine)
Pump Operator	1 (1st Engine Driver)
Search and Rescue	3 (Truck))
Ventilation/Water Supply	3 (2nd Engine)
Back up Line (2nd attack line)	3 (3rd Engine)
RIC/Safety Officer	3 (4th Engine)
ERF	16

16 people represent the minimum number of staff that would respond to moderate and high risk structure fires.

The FFD considers the highest fire risk potential to be high rise structures. Fires in this type of structure would rapidly deplete the initial response resources. In order to fulfill the equipment and personnel requirements needed for a fire in this type of structure; multiple alarms will need to be called. As indicated in SOG 214 the FFD has four levels of alarms beyond the first alarm assignment that are:

- **Second Alarm -1st Alarm plus:**
  - Additional engine from Fargo
  - Notification of other on-duty battalion chief
  - Notify fire marshal with a request for an investigator
  - Notify Fire Chief
  - Contact and request the assistant chief of operations respond as safety officer
  - A second FM Ambulance unit – firefighter rehab and patient treatment (relay approximate number of patients)
  - Salvation Army and Red Cross
  - Fargo Police shift supervisor

- **Third Alarm – 1st and 2nd Alarms plus:**
    - Additional engine from Fargo
    - Additional truck company from Fargo
    - Moorhead fire engine
    - Oncoming shift personnel called back
    - Notify and request off-duty battalion and assistant chiefs respond
- **Fourth Alarm – 1st, 2nd, and 3rd Alarms plus**:
    - Remaining uncommitted Fargo first line apparatus
    - All remaining fire suppression and training division personnel called back
- **Fifth Alarm – 1sr, 2nd, 3rd, and 4th Alarms plus**:
    - West Fargo Fire Department with requested resources

As indicated in high rise SOG 208, if there is confirmation of a fire in a high rise structure the battalion chief in charge can call for these additional alarms at any time or as early as at the initial dispatch. The SOG indicates that a minimum of a third alarm will be called in this situation. With the confirmation of a fire and the activation of a third alarm, the response force would amount to nine apparatus and two command vehicles with a minimum of 29 on-duty personnel, but as many as 36 on-duty personnel. There would also be up to 36 off-duty personnel responding. It is important that if necessary, additional alarms are called early in the incident for high rise fires.

As stated previously, the FFD considers one story commercial properties less than 6500 sq. feet to be moderate risk and those above 6500 sq. feet to be high risk. Currently, the Red River Regional Dispatch Center (RRRDC) does not have the capabilities to dispatch based on these requirements. Present dispatching is based on occupancy types, residential, apartments, or commercial. Therefore, under the current dispatching method all fire related calls involving commercial properties are dispatched as high risk.

Hazardous Materials

The state of North Dakota has divided the state into four regions for hazardous materials incidents. The state then developed four regional response teams to provide resources to local agencies for hazardous materials incidents across the entire state. The Fargo Fire Department is trained and equipped as the Southeast Regional Response Team for the State of North Dakota. Team members are trained to technician level and several to specialist level. All other FFD suppression personnel are trained to a minimum level of hazardous materials operations level.

Engine 807 and Hazmat 857 (Hazardous Materials Response Vehicle) are cross staffed and are dispatched initially for hazardous materials incidents, but mutual aid resources are not dispatched until requested. For moderate risk and less, a command vehicle, the two nearest engines, 807/857, and one truck are dispatched. In high risk buildings, a command vehicle, the three nearest engines, 807/857, and one truck are dispatched. Although 857 is initially dispatched, it does not necessarily respond to every run. In all hazmat incidents, the battalion chief has the discretion as to whether or not 857 should respond to the emergency scene. An example of an incident where the battalion chief might not have 857 respond would be a response to natural gas lines hit during construction. The department relies on Xcel Energy to mitigate most of these types of incidents and 857 is seldom needed.

Hazardous Materials & Natural Gas Leak - High Risk

Task	Firefighters
Incident Commander	1
Hazmat Team leader	1
Recon	2
Air Monitoring	4
Zone Exclusion	4
Science Officer	1
Emergency Decon	2
ERF	16

Hazardous Material & Natural Gas Leak - Moderate Risk

Task	Firefighters
Incident Commander	1
Hazmat Team leader	1
Recon	2
Air Monitoring	4
Zone Exclusion	2
Science Officer	1
Emergency Decon	1
ERF	13

Fuel Leak less than five Gallons

Task	Firefighters
Incident Commander	1
Spill Containment	2
ERF	3

Confirmed small-leaks are handled by one engine.

Water/Ice Rescue

For water and ice rescue, the initial minimum response consists of three engines staffed with three firefighters each, one truck staffed with three, and one battalion chief. Depending on the time of year, one of the three engines will bring with them either the rescue boat (zodiac) or ice rescue equipment. If the situation dictates, the incident commander can request additional boats or ice rescue equipment and personnel. Also, with any incident involving the Red River, the Moorhead Fire Department is dispatched and responds with one boat.

The specific tasks performed by the rope handlers/riggers and support personnel vary depending on the situation. Water flow rates, location of the victim, and rescue versus body recovery are examples of variables, which dictate specific tasks. More detailed explanations of specific tasks are outlined in SOG 505 and SOG 506.

The FFD does not have a dive rescue team. A local organization called Valley Dive Rescue provides this service. The City of Fargo provides funding to this organization and has an agreement with them to provide service. They are part of the initial dispatch on calls involving water rescue. The FFD does have periodic training exercises with the Valley Dive Rescue team.

Water Rescue

Task	Firefighters
Incident Commander	1
Safety	1
Boat Operator/per boat	1
Boat Rescuer/per boat	1
Rope Handlers/Riggers	4
Support Personnel	5
ERF	13

Ice Rescue

Task	Firefighters
Incident Commander	1
Safety	1
Rescuer	1
Backup Rescuer	1
Rope Handler / Riggers	4
Support Personnel	5
ERF	13

Technical Rescue

The state of North Dakota has divided the state into four regions for technical rescue response. The state then developed four regional response teams to provide resources to local agencies for response to technical rescue incidents across the state. The Fargo Fire Department is trained and equipped as the Southeast Regional Response Team for the State of North Dakota.

Structural Collapse

The minimum initial response force for structural collapse consists of three engines staffed with three personnel, two trucks staffed with three personnel, and one battalion chief. Since Station 6 is staffed with personnel trained in rescue operations as well as the necessary specialized equipment, Engine 806 must be one of the engines dispatched. They would bring with them the truck and trailer carrying this equipment. An incident of any magnitude would require a significant amount of additional personnel. With confirmation of a structural collapse, the incident commander can activate the Code Red system and call back all special rescue trained personnel. SOG 503 provides a detailed outline of structural collapse procedures. The FFD has defined our level of response for major incidents through the first four hours of the incident based on available mutual aid resources having a three to four hour response time. The Sioux Falls, SD Fire Department and the Bismarck, ND Fire Department are the primary mutual aid resources for the FFD in structural collapse incidents.

Structural Collapse

Task	Firefighters
Incident Commander	1
Safety	1
Building Triage	2
Shoring Officer	1
Shoring Team	6
Rescuers	2
Backup Rescuers	2
Air Monitoring	1
ERF	16

Confined Space, Trench, High Angle

Confined space, trench, and high angle rescue have a minimum effective response force of three engines staffed with three, one truck staffed with three, and one battalion chief. As was stated earlier with structural collapse, if the situation dictates the need for additional personnel and equipment, the incident commander will call for additional resources.

Confined Space

Task	Firefighters
Incident Commander	1
Safety Officer	1
Operations Officer	1
Rescuers	2
Backup Rescuers	2
Supplied Air Attendant	1
Riggers/Rope Handlers	4
Air Monitoring	1
ERF	13

Trench Rescue

Task	Firefighters
Incident Commander	1
Safety Officer	1
Operations Officer	1
Shoring Team	4
Rescuers/Diggers	5
Air Monitoring	1
ERF	13

High Angle

Task	Firefighters
Incident Commander	1
Safety Officer	1
Rescuers	2
Backup Rescuers	2
Rope Handlers/Riggers	7
ERF	13

Performance Objectives

With the critical tasks and effective response forces defined, performance objectives are established. These objectives outline the goals and desired response times to the various types of emergencies. Performance is measured in two ways; the first is based on the FFD as a whole by incident type, the second is by planning zones.

The response time objectives set for fire and EMS calls for the department as a whole, are established based on the apparatus travel time criteria for Metropolitan/Urban population densities as outlined by the CFAI in the Fire& Emergency Service Self-Assessment Manual. This travel time, combined with the alarm handling and turnout time, make up the stated desired total response time. Though the response time objectives for fire and EMS are the same time, the times are arrived at by different means. This will be explained further in a detailed analysis of the three time elements found in the following section.

With broad objectives defined, more specific objectives for each type of response are established. Later in this document, response times for each planning zone are measured based on their defined criteria. The City as a whole is considered Metropolitan/Urban and the following are department wide performance objectives for various emergencies based on these criteria. The stated response time objectives for hazardous materials and technical rescue are different than for fire and EMS. The response time objectives for technical rescue are based on the best judgment of the FFD administration due to the small number of incidents.

Response to Low Risk

EMS

Goal: Provide basic life support (BLS) with defibrillation when arriving before ALS provider.

Objective1: To have an effective response force on scene in a timely manner to perform the critical tasks outlined above in **Critical Tasks and Effective Response Force EMS.**

Performance measure: Single unit response with a minimum of three people and shall arrive within 8 minutes and 27 seconds total response time 90% of the time when responding emergent.

All vehicle crashes

Goal: Provide patient extrication from motor vehicle crashes and stop the medical condition deterioration of the patient(s) involved in the accident through BLS and defibrillation until arrival of an ALS unit.

Objective1: To have an effective response force on scene in a timely manner to perform the critical tasks outlined above in **Critical Tasks and Effective Response Force Vehicle Crashes.**

Performance measure: Each engine with a minimum of three personnel and a truck company with three personnel. Each engine will have a minimum pump capacity of 1250 gpm. First arriving unit shall arrive within 8 minutes and 27 seconds total response time 90% of the time. The effective response force shall arrive within 13 minutes and 39 seconds total response time 90% of the time.

Fire

Goal: Extinguish small fires without exposure problems to include - vehicle fires, grass fires, dumpster fires, and fires in small outbuildings and storage sheds.

Objective1: To have an effective response force on scene in a timely manner to perform the critical tasks outlined above in **Critical Tasks and Effective Response Force Fires.**

Performance measure: Single engine with a minimum of three personnel and shall arrive within 8 minutes and 14 seconds total response time 90% of the time when responding emergent.

Hazardous Materials

Goal: To contain and recover petroleum and other non-life threatening products in quantities of five gallons or less.

Performance measure: Single engine with a minimum of three personnel. Unit shall arrive in 8 minutes 27 seconds total response 90% of the time when responding emergent.

Response to Moderate Risk

Fire

Goal: Contain the fire to room of origin and provide search and rescue.

Objective1: To have an effective response force on scene in a timely manner to perform the critical tasks outlined above in **Critical Tasks and Effective Response Force Fires.**

Performance measure: Four engines staffed with a minimum of three personnel each, one truck staffed with three personnel, and a battalion chief vehicle staffed with one. Each engine will have a minimum pump capacity of 1250 gpm. First arriving unit shall arrive within 8 minutes 14 seconds total response time 90% of the time. The effective response force shall arrive within 13 minutes and 26 seconds total response time 90% of the time.

Hazardous Material

Goal: To minimize hazards to life and the environment.

Objective1: To have an effective response force on scene in a timely manner to perform the critical tasks outlined above in **Critical Tasks and Effective Response Force Hazardous Materials & Natural Gas Leak**.

Performance measure: Three engines staffed with a minimum of three personnel each (one of the engines must be 807/857), a truck with three personnel, and one battalion chief. First unit shall be on scene within 8 minutes 27 seconds total response time 90% of the time. The total effective response force, which includes 807/857 shall arrive on scene within 20 minutes total response time 90% of the time when responding emergent.

Response to High Risk

Fire

Goal: Contain the fire to room of origin and provide search and rescue.

Objective1: To have an effective response force on scene in a timely manner to perform the critical tasks outlined in section **Critical Tasks and Effective Response Force Fires.**

Performance measure: Four engines staffed with a minimum of three each, a truck company staffed with a minimum of three, and one battalion chief vehicle with a minimum of one. Each engine will have a minimum pump capacity of 1250 gpm. First arriving unit shall arrive within 8 minutes and 14 seconds total response time 90% of the time. Remaining apparatus shall arrive within 13 minutes and 26 seconds total response time 90% of the time when responding emergent.

Hazardous Materials

Goal: To minimize hazards to life and the environment.

Objective1: To have an effective response force on scene in a timely manner to perform the critical tasks outlined in section **Critical Tasks and Effective Response Force Hazardous Materials & Natural Gas Leak**.

Performance measure: Four engines staffed with a minimum of three personnel each (one of the engines must be 807/857), a truck with a minimum of three personnel, and one battalion chief. First unit shall be on scene within 8 minutes 27 seconds total response time 90% of the time.

The total effective response force, which includes 807/857 shall arrive on scene within 20 minutes total response time 90% of the time when responding emergent.

Other Responses

Response to Water/Ice Rescue

Goal: To perform water/ice rescue or body recovery in a timely manner without compromising responder safety.

Objective1: To have an effective response force on scene in a timely manner to perform the critical tasks outlined in section **Critical Tasks and Effective Response Force for Water/ Ice Rescue**

Performance measure: Three engines (each with a zodiac boat and rescue equipment) staffed with a minimum of three personnel per engine, a truck with a minimum of three personnel, and one battalion chief. First arriving unit shall be on scene within 8 minutes and 27 seconds total response time 90% of the time. The first alarm assignment should be on scene within 15 minutes and 24 seconds total response time 90% of the time. This allows 2:30 for hooking up to the boat and slower drive speeds due to towing.

Response to Structural Collapse

Goal: Provide structural stabilization and rescue involving structures that fall into the moderate risk category. For structures beyond moderate risk; response is limited to structural stabilization and rescue for the first four hours of the incident.

Objective1: To have an effective response force on scene in a timely manner to perform the critical tasks outlined in section **Critical Tasks and Effective Response Force Structural Collapse.**

Performance measure: First arriving unit shall arrive within 8 minutes 12 seconds total response time 90% of the time. Remaining apparatus shall be on scene within 30 minutes total response time 90% of the time.

Response to Confined Space, High Angle, Trench Rescue

Goal: To perform confined space, high angle, and trench rescue in a timely manner without compromising responder safety.

Objective1: To have an effective response force on scene in a timely manner to perform the critical tasks outlined in section **Critical Tasks and Effective Response Force for Confined Space, Trench, High Angle.**

Performance measure: First arriving unit shall arrive within 8 minutes 12 seconds total response time 90% of the time. Remaining apparatus shall be on scene within 30 minutes total response time 90% of the time.

Summary of Minimum Effective Response Forces

	Low Risk	**Moderate Risk**	**High Risk**	**Other Responses**	
EMS	3	N/A	N/A	Water/Ice Rescue	13
Vehicle Crashes	10	10	10	Structural Collapse	16
Fire	3	16	16	Con Space, High Angle, Trench	13
Hazmat	3	13	16		

Summary of Desired Baseline and Benchmark Performance Measures

EMS	Baseline – 90%	Benchmark – 90%
Turnout Time	1:18	1:00
Travel Time	5:12	4:00
Total Response Time	8:27	6:30
Vehicle Accidents		
Turnout Time	1:30	1:20
Travel Time 1st App. on Scene	5:12	4:00
Total Response Time 1st App. on Scene	8:27	6:30
Fire		
Turnout Time	1:30	1:20
Travel Time 1st App. on Scene	5:12	4:00
Total Response Time 1st App. on Scene	8:14	6:20
Travel Time 2nd App. on Scene	10:24	8:00
Total Response Time 2nd App. on Scene	13:26	10:20
Travel Time 1st Alarm on Scene	10:24	8:00
Total Response Time 1st Alarm on Scene	13:26	10:20
Hazmat		
Turnout Time	1:30	1:20
Travel Time 1st App on Scene	5:12	4:00
Total Response Time 1st App. on Scene	8:27	6:30
Total Response Time ERF on Scene	20:00	15:00
Water /Ice Rescue		
Turnout Time	2:30	1:00
Travel Time 1st App on Scene	5:12	4:00
Total Response Time 1st App. on Scene	8:27	6:30
Total Response Time ERF on Scene	15:24	14:00
Structural Collapse, Trench, Con Space, High Angle		
Turnout Time	1:30	1:20
Travel Time 1st App on Scene	5:12	4:00
Total Response Time 1st App. on Scene	8:27	6:20
Total Response Time 1st Alarm on Scene	30:00	25:00

Response Time Performance

With the performance measures defined, it is important to determine whether or not the department is meeting these expectations. This is done by analyzing response time data.

To assist with calculating these measurements the computer software StatsFD was used. This software takes data from the current RMS and performs the fractile calculations. The performance measures stated in the above Performance Objective section represents total response time. This time is an accumulation of three separate categories:

Alarm handling time – Represents the time from which a 911 call is answered until the appropriate units are dispatched.

Turn out time – Represents the time from which a fire unit receives the dispatch until it is enroute.

Travel time – The time from which a fire unit goes enroute until it arrives on scene.

Alarm Handling

The FFD uses NFPA Standard 1221 as a guideline for Alarm Handling. The NFPA 1221 Standard of 60 seconds 80% of the time and 106 seconds 95% is used for all calls except EMS, Hazmat, and Technical Rescue. For EMS, Hazmat, and Technical Rescue NFPA 1221 indicates 90 seconds 90% of the time and 120 seconds 99% of the time. An analysis of FFD alarm handling times indicates that times were below our desired standard of performance, especially for EMS incidents. Over the last several years there have been several changes implemented to alarm handling which resulted in some minor improvements. In 2012, the local ambulance company purchased the PRO QA medical dispatching software program through a grant in an effort to improve alarm handling times. It should have resulted in much better alarm handling times, but has not. In 2015, one minute and 30 seconds is reached 54.1% of the time compared to 43.7% in 2014, and 35.6% in 2009. These numbers show some improvement over the years, but the FFD will continue working with the RRRDC to find solutions to bring the alarm handling times to acceptable levels.

Problem Identification

A review of the alarm handling process and time stamping procedure at the RRRDC by the FFD personnel revealed five reasons for the below standard times:

- Inefficient call handling procedures
- Staffing
- Law Enforcement focused culture where speed is less important
- Technical limitations
- ProQA and EMD dispatching protocols

Resolution of inefficient call handling procedures

The RRRDC is a multi-jurisdictional dispatch center, dispatching all public safety agencies in Cass County, North Dakota and Clay County, Minnesota. Dispatchers are required to follow numerous dispatching protocols; these protocols are being simplified to facilitate timelier dispatching. An assistant chief is meeting regularly with the RRRDC to correct the alarm handling issues as they relate to the department. The FFD will continue to monitor and make recommendations to improve this process.

Resolution of technical limitations

One factor that delays alarm handling times is the use of priority dispatching protocols for EMS calls. Since the FFD is a secondary responder to all EMS calls, all EMS calls are screened to determine if an FFD response is needed. The series of questions that are asked delay dispatch, but eliminate an estimated 50% of medical runs where a fire crew would not positively impact the incident. The FFD has also begun to look at other solutions. Because most of the slow alarm handling time problem involves EMS calls, one of the options we may look at involves using "key terminology" to trigger an immediate dispatch. Some examples are "train involved", "gunshot", "stabbing", "unresponsive", etc. If a dispatcher hears any of these terms it would trigger an immediate dispatch of the closest fire unit.

Even with the excessively long alarm handling time, the FFD has used 90 seconds for fire and two minutes for EMS calls when establishing minimum the baseline performance standards for alarm handling. At this point, an alarm handling time of 60 seconds for fire and EMS calls is the department's benchmark. The following chart shows alarm handling times for all incidents

Alarm Handling (All Incidents) - 90th Percentile Times Baseline Performance	2011-2015	2015	2014	2013	2012	2011
Alarm Handling	2:32	2:26	2:44	2:38	2:37	2:42

Turnout Time

The FFD uses a turnout time of 90 seconds 90% of the time as a minimum baseline performance standard for fire and EMS calls. To better align with NFPA 1710 the FFD is now using 80 seconds 90% of the time as a benchmark for fire calls. Hazmat and water rescue calls have baseline turnout times of 1:30 and 2:30 respectively. The FFD had 9,348 incidents in 2015. The FFD's turnout time fractile performance for all incidents at 90% was 78 seconds. For fires turnout time at 90% was 86 seconds. For EMS incidents turnout time at 90% was 75 seconds. The turnout times for all incidents are shown below for the past five years.

Turnout Time (All Incidents) - 90th Percentile Times Baseline Performance	2011-2015	2015	2014	2013	2012	2011
Turnout Time	1:19	1:18	1:17	1:18	1:17	1:26

Travel Time

In the FFD not all apparatus respond to all calls with lights and sirens. For example, if a call comes in for alarms going off in an apartment building, but there is no report of smoke or fire, only the primary engine responds emergent (lights and siren). The remaining responding apparatus respond non-emergent (no lights or siren). If the primary engine arrives and has an indication that this may be more than just alarms going off, then the remaining responding apparatus are upgraded to emergent. Other examples of the types of calls where the FFD responds non emergent include carbon monoxide detector activations, lift assists, police assists, outdoor odor investigations, citizen complaints, and alarm resets. Because of the wide variety of calls to which the FFD responds, there are incidents where it is up to the discretion of the officer in charge whether or not to respond emergent. For the purpose of tracking travel time, only apparatus with a response code of 1, which is emergency response, were analyzed.

Based on the community description outlined in the CFAI Self-Assessment Manual, the City of Fargo collectively falls into the Metropolitan/Urban categories. For both of these categories the CFAI requires a minimum baseline travel time of 5:12 90% of the time for the first arriving unit

and 10:24 90% of the time for the second arriving unit. In 2014, the FFD changed it's benchmarks to match NFPA 1710 which lists 4:00 minutes travel time 90% of the time for the first arriving unit and 8:00 minutes travel for the second arriving unit 90% of the time. The FFD's 2014 travel time for the 1st unit on scene at 90% department wide for all incidents was 5:00 minutes. With PZ8 and PZ9 (where there are not currently fire stations) excluded Fargo has a department wide travel time of 4:50 minutes.

The following chart shows department wide performance for travel time for first arriving and effective response force (ERF) arrival. This data represents all types of responses and represents apparatus that responded emergent and arrived on scene for the last five years.

Travel Time (All Incidents) - 90th Percentile Times Baseline Performance	2011-2015	2015	2014	2013	2012	2011
Travel Time 1st Unit	5:03	4:59	5:00	5:06	4:55	5:06
Travel Time ERF	9:42	9:27	9:26	10:02	9:42	10:07

Total Response Time

The following is the current FFD performance for total response time department wide. The calculations represent apparatus that responded emergent and arrived on scene. The department wide measurements include all incidents where units went emergent and therefore contains many runs not categorized in the more specific measurement groups, such as EMS or Structure Fires. This larger sampling allows for a more confident analysis. The following chart shows the total response times for the last five years.

Total Response Time (All Incidents) - 90th Percentile Times Baseline Performance	2011-2015	2015	2014	2013	2012	2011
Total Response Time 1st Unit	8:28	8:10	8:39	8:54	8:51	7:48
Total Response Time ERF	12:34	12:20	12:13	12:30	12:32	13:44

Response Time Performance by Incident Type

Several of the following response time performance charts have "NA" inside some of the boxes where the 90% times are normally located. The "NA" in these boxes stand for "Not Applicable"

and may be in the box because the actual time for that box is not applicable. This is the case in the EMS response time chart where only one unit responds. The "NA" may also be in the box because there were either no incidents or too few incidents to obtain reliable or accurate response time data. The "NA" boxes within the Technical Rescue and Water/Ice Rescue charts are examples where there were too few incidents in which 2nd Arrival or 1st Alarm Arrival units actually arrived at the scene. This is also the reason that some of the response times for these two charts are very good or very poor because there were less than ten incidents for the specific response time being evaluated, meaning one poor response will result in a slow response time. In the case of the Technical Rescue response times, elevator rescues were included along with high angle rescues to get enough responses to measure 1st Arrival response times.

Structure Fires Response Time Performance

Structure Fires 90th Percentile Times Baseline Performance		**2011-2015**	**2015**	**2014**	**2013**	**2012**	**2011**
Alarm Handling	Pick-up to Dispatch	1:54	1:57	1:40	1:53	2:14	1:54
Turnout Time	Turnout Time 1st Unit	1:36	1:37	1:25	1:29	1:39	1:39
Travel Time	Travel Time 1st Unit **Distribution**	5:07	4:58	4:52	5:08	5:00	4:35
	Travel Time 2nd Unit	6:26	5:59	6:28	6:10	6:36	6:55
	Travel Time ERF **Concentration**	9:28	8:17	9:40	9:44	8:17	12:07
Total Response Time	Total Response Time 1st Unit On Scene **Distribution**	7:39	7:40	7:16	7:39	7:43	7:16
	Total Response Time 2nd Unit On Scene	8:38	8:24	8:35	8:29	8:39	9:03
	Total Response Time ERF **Concentration**	11:32	10:58	11:53	11:32	10:58	13:37

EMS Response Time Performance

EMS 90th Percentile Times Baseline Performance		**2011-2015**	**2015**	**2014**	**2013**	**2012**	**2011**
Alarm Handling	Pick-up to Dispatch	3:31	3:08	2:40	2:41	2:42	2:44
Turnout Time	Turnout Time 1st Unit	1:15	1:16	1:15	1:15	1:14	1:22
Travel Time	Travel Time 1st Unit **Distribution**	5:01	5:02	4:59	5:07	4:53	4:55
	Travel Time ERF **Concentration**	NA	NA	NA	NA	NA	NA
Total Response Time	Total Response Time 1st Unit On Scene **Distribution**	8:46	8:21	7:55	8:06	7:50	8:04
	Total Response Time ERF **Concentration**	NA	NA	NA	NA	NA	NA

Vehicle Accidents Response Time Performance

Vehicle Accidents 90th Percentile Times Baseline Performance		**2011-2015**	**2015**	**2014**	**2013**	**2012**	**2011**
Alarm Handling	Pick-up to Dispatch	2:56	2:41	2:23	2:22	2:21	2:18
Turnout Time	Turnout Time 1st Unit	1:17	1:15	1:14	1:16	1:17	1:30
Travel Time	Travel Time 1st Unit **Distribution**	4:51	4:37	4:24	4:52	4:32	5:00
	Travel Time ERF **Concentration**	7:17	7:47	6:53	7:05	7:17	6:40
Total Response Time	Total Response Time 1st Unit On Scene **Distribution**	8:06	7:25	7:20	7:37	6:58	7:41
	Total Response Time ERF **Concentration**	10:32	11:05	9:45	9:56	9:41	9:33

Hazardous Materials Response Time Performance

Hazardous Materials 90th Percentile Times Baseline Performance		**2011-2015**	**2015**	**2014**	**2013**	**2012**	**2011**
Alarm Handling	Pick-up to Dispatch	2:40	2:51	2:45	2:05	2:35	2:56
Turnout Time	Turnout Time 1st Unit	1:27	1:32	1:27	1:26	1:24	1:30
Travel Time	Travel Time 1st Unit **Distribution**	5:47	4:51	5:12	6:20	5:55	6:09
	Travel Time ERF **Concentration**	11:01	10:43	12:21	11:47	9:50	10:19
Total Response Time	Total Response Time 1st Unit On Scene **Distribution**	8:35	8:12	8:12	8:45	9:04	8:59
	Total Response Time ERF **Concentration**	14:35	13:34	16:19	14:43	14:59	14:47

Water/Ice Rescue Response Time Performance

Water/Ice Rescue 90th Percentile Times Baseline Performance		**2011-2015**	**2015**	**2014**	**2013**	**2012**	**2011**
Alarm Handling	Pick-up to Dispatch	3:11	4:23	2:34	2:56	2:23	2:45
Turnout Time	Turnout Time 1st Unit	2:11	2:48	2:15	2:11	2:11	3:41
Travel Time	Travel Time 1st Unit **Distribution**	5:28	7:02	5:28	6:22	4:41	3:05
	Travel Time ERF **Concentration**	10:29	10:29	6:47	12:23	12:20	NA
Total Response Time	Total Response Time 1st Unit On Scene **Distribution**	8:29	8:17	8:20	9:32	8:29	9:31
	Total Response Time ERF **Concentration**	13:53	12:28	11:24	16:43	16:07	NA

Technical Rescue Response Time Performance

Technical Rescue 90th Percentile Times Baseline Performance		**2011-2015**	**2015**	**2014**	**2013**	**2012**	**2011**
Alarm Handling	Pick-up to Dispatch	2:47	3:01	2:38	2:32	1:46	1:56
Turnout Time	Turnout Time 1st Unit	1:27	1:21	1:08	1:06	1:02	1:08
Travel Time	Travel Time 1st Unit **Distribution**	5:30	5:55	4:12	7:11	3:08	3:31
	Travel Time ERF **Concentration**	NA	NA	NA	NA	NA	NA
Total Response Time	Total Response Time 1st Unit On Scene **Distribution**	8:01	8:17	NA	NA	NA	NA
	Total Response Time ERF **Concentration**	NA	NA	NA	NA	NA	NA

In the past five years there have been very few technical rescue incidents. There were none in 2010 and only one in 2011. They were both high angle rescues. Therefore, there is not sufficient response data to verify the stated performance measure. Based on the results of the response time analysis for the various other identified measures, the FFD staff is confident that the first apparatus on scene response to technical rescue would be similar. The first alarm on scene would also be similar with the exception of the deployment of the technical rescue trailer.

Response Time Performance by Station Area/Planning Zone

The following charts represent station areas/planning zones 1-9, which fall into the metropolitan or urban population categories. Planning zones 8 and 9 do not have a station yet which is noted in the chart. The data represented in the below charts includes all incidents where units responded emergent.

Station 1 Area Response Time Performance

Station 1 90th Percentile Times Baseline Performance		**2011-2015**	**2015**	**2014**	**2013**	**2012**	**2011**
Travel Time	Travel Time 1st Unit **Distribution**	4:28	4:29	4:28	4:29	4:20	4:27
	Travel Time ERF **Concentration**	8:30	9:23	8:09	9:08	7:08	7:33
Total Response Time	Total Response Time 1st Unit On Scene **Distribution**	7:59	7:45	7:54	8:02	7:49	7:41
	Total Response Time ERF **Concentration**	11:19	11:45	10:56	11:39	9:34	10:48

Station 2 Area Response Time Performance

Station 2 90th Percentile Times Baseline Performance		**2011-2015**	**2015**	**2014**	**2013**	**2012**	**2011**
Travel Time	Travel Time 1st Unit **Distribution**	5:08	5:01	5:10	5:23	5:10	5:12
	Travel Time ERF **Concentration**	10:31	8:49	10:40	9:28	11:42	11:14
Total Response Time	Total Response Time 1st Unit On Scene **Distribution**	8:41	8:34	8:41	9:00	8:51	8:34
	Total Response Time ERF **Concentration**	13:10	12:29	12:34	12:30	14:26	14:16

Station 3 Area Response Time Performance

Station 3 90th Percentile Times Baseline Performance		**2011-2015**	**2015**	**2014**	**2013**	**2012**	**2011**
Travel Time	Travel Time 1st Unit **Distribution**	4:58	5:16	5:02	4:51	4:46	4:53
	Travel Time ERF **Concentration**	11:32	12:05	10:26	11:20	9:02	11:32
Total Response Time	Total Response Time 1st Unit On Scene **Distribution**	8:06	7:58	8:09	8:05	8:10	8:01
	Total Response Time ERF **Concentration**	15:36	16:21	12:45	13:49	16:48	15:36

Station 4 Area Response Time Performance

Station 4 90th Percentile Times Baseline Performance		**2011-2015**	**2015**	**2014**	**2013**	**2012**	**2011**
Travel Time	Travel Time 1st Unit **Distribution**	4:39	4:50	4:37	4:33	4:31	4:50
	Travel Time ERF **Concentration**	8:16	7:39	6:38	9:00	8:05	8:38
Total Response Time	Total Response Time 1st Unit On Scene **Distribution**	8:24	8:19	8:15	8:27	8:36	8:56
	Total Response Time ERF **Concentration**	10:55	10:17	9:15	11:33	11:22	11:18

Station 5 Area Response Time Performance

Station 5 90th Percentile Times Baseline Performance		**2011-2015**	**2015**	**2014**	**2013**	**2012**	**2011**
Travel Time	Travel Time 1st Unit **Distribution**	5:00	4:58	5:01	5:00	4:58	5:04
	Travel Time ERF **Concentration**	9:13	8:32	8:51	10:16	9:13	9:39
Total Response Time	Total Response Time 1st Unit On Scene **Distribution**	8:32	8:08	8:34	8:52	8:34	8:27
	Total Response Time ERF **Concentration**	12:23	11:26	12:23	12:50	11:55	12:32

Station 6 Area Response Time Performance

Station 6 90th Percentile Times Baseline Performance		**2011-2015**	**2015**	**2014**	**2013**	**2012**	**2011**
Travel Time	Travel Time 1st Unit **Distribution**	5:51	5:02	6:26	6:06	5:42	6:00
	Travel Time ERF **Concentration**	10:49	NA	10:19	10:21	11:14	10:49
Total Response Time	Total Response Time 1st Unit On Scene **Distribution**	8:50	7:35	9:14	9:23	8:43	8:48
	Total Response Time ERF **Concentration**	13:39	NA	12:24	12:27	13:31	15:40

Station 7 Area Response Time Performance

Station 7 90th Percentile Times Baseline Performance		**2011-2015**	**2015**	**2014**	**2013**	**2012**	**2011**
Travel Time	Travel Time 1st Unit **Distribution**	5:14	5:00	4:53	5:22	5:30	5:55
	Travel Time ERF **Concentration**	10:30	9:33	10:12	8:27	11:16	13:40
Total Response Time	Total Response Time 1st Unit On Scene **Distribution**	8:34	8:01	8:21	8:48	8:53	9:04
	Total Response Time ERF **Concentration**	13:46	12:48	14:37	11:00	13:25	17:16

Planning Zone 8 Response Time Performance (no station)

Planning Zone 8 90th Percentile Times Baseline Performance		**2011-2015**	**2015**	**2014**	**2013**	**2012**	**2011**
Travel Time	Travel Time 1st Unit **Distribution**	7:43	8:03	7:32	7:56	7:38	7:18
	Travel Time ERF **Concentration**	12:27	11:31	13:43	12:27	NA	NA
Total Response Time	Total Response Time 1st Unit On Scene **Distribution**	11:12	11:07	11:13	11:08	11:23	10:57
	Total Response Time ERF **Concentration**	15:09	14:35	16:19	15:09	NA	NA

Planning Zone 9 Response Time Performance (no station)

Planning Zone 9 90th Percentile Times Baseline Performance		**2011-2015**	**2015**	**2014**	**2013**	**2012**	**2011**
Travel Time	Travel Time 1st Unit **Distribution**	7:05	7:05	NA	NA	NA	NA
	Travel Time ERF **Concentration**	NA	NA	NA	NA	NA	NA
Total Response Time	Total Response Time 1st Unit On Scene **Distribution**	10:31	10:31	NA	NA	NA	NA
	Total Response Time ERF **Concentration**	NA	NA	NA	NA	NA	NA

Response Reliability

The FFD refers to response reliability as the percentage of time that a first due unit is available for calls in its primary response zone. If a unit was able to respond to every call for service that it was dispatched to, it would have 100% unit reliability. There are several reasons why a first due unit might not be available for calls in its primary area; responding to another call, training out of area, and equipment failure are a few examples.

The FFD puts emphasis on maintaining adequate City wide emergency response coverage during day to day activities. This is accomplished using several methods. The first is by using technological tools such as GoToMeeting which allows for meetings and classroom training sessions without any units having to leave their primary response area. The second method, which is used when GoToMeeting is not possible, is trading coverage areas. Most other training occurs at Stations 4 and 6. To maintain adequate coverage, units from Stations 4 and 6 are repositioned to cover the response areas of the units attending training. For example, Engine 804 stands by for Engine 802 while 802 is at the training ground. 804 now becomes the primary engine in 802's area. From April until November, this occurs almost daily.

Because the City is long and narrow, the department maintains a policy (AP 204) indicating that whenever possible, there will be units available in the northern and southern most areas, as well as what is considered the core of the City. An example of the department's effort to increase reliability was designating fuel locations throughout the City. In the past, all apparatus were refueled at the City maintenance garage, which meant they had to leave their primary response areas. Now apparatus fill with fuel within their areas.

An analysis was conducted to determine the amount of simultaneous incidents in each planning zone for 2010, 2011, 2012, 2013, and 2014. The following table indicates the results of this analysis. These numbers reflect the number of times two incidents occurred in the same planning zone at the same time.

	Total Runs					Simultaneous Runs					Percentage				
	2011	2012	2013	2014	2015	2011	2012	2013	2014	2015	2011	2012	2013	2014	2015
ST 1	1,342	1,786	2,034	2,048	2,917	53	99	173	136	320	3.90%	5.50%	8.50%	6.64%	10.97%
ST 2	771	1,078	1,152	1,131	1,497	35	36	77	48	101	4.50%	3.30%	6.70%	4.24%	6.74%
ST 3	864	1,010	995	962	1,104	30	36	42	40	52	3.50%	3.50%	4.20%	4.16%	4.71%
ST 4	577	815	847	947	1,223	18	30	32	44	48	3.10%	3.60%	3.80%	4.65%	3.92%
ST 5	680	950	1,126	1,198	1,502	29	33	59	54	83	4.30%	3.50%	5.20%	4.51%	5.53%
ST 6	97	89	113	118	107	6	1	1	5	2	6.20%	1.10%	0.90%	4.24%	1.87%
ST 7	351	395	505	596	722	14	4	9	12	39	4.00%	1.00%	1.80%	2.01%	5.40%
PZ 8	81	106	181	179	234	2	1	1	0	3	2.50%	1.00%	0.60%	0.00%	1.28%
PZ 9	NA	NA	NA	NA	21	NA	NA	NA	NA	0	NA	NA	NA	NA	0.00%
Dept. wide	4,785	6,229	6,953	7,196	9,348	187	240	394	340	648	3.90%	3.80%	5.70%	4.72%	6.93%

This table demonstrates that there are no planning zones within the City that have a high percentage of simultaneous runs. In each planning zone, the primary apparatus is unavailable due to other incidents less than 10% of the time for each of the planning zones. However, the Station 1 response area is approaching 10%, so the FFD will continue to monitor these numbers closely.

Conclusion

The Standard of Cover demonstrates the FFD is able to have an effective response force on the scene of emergencies in a timely manner. However, after close examination the FFD has identified three priority issues. These issues include:

- Improving call processing times
- Land acquisition for a future Station 8
- Relocation of a current fire station

Improving Call Processing Times

The RRRDC is a multi-jurisdictional dispatch center, dispatching all public safety agencies in Cass County, North Dakota and Clay County, Minnesota. Dispatchers are required to perform numerous dispatching protocols. Independently and through the RRRDC Fire and EMS committee, the FFD is working continually with the RRRDC to improve call handling issues as they relate to the fire department and will continue to monitor and make recommendations to improve this process. Having a multi-jurisdictional/agency dispatch center creates a cumbersome process of change. Protocols must be adjusted to accommodate several other agencies, which are sometimes difficult to accomplish quickly.

In 2011, a new Computer Aided Dispatch, Records Management System (CAD/RMS) was implemented that was to have a positive impact on the technical limitations and procedural issues as they related to call processing times. While the new system did result in improvements in many areas, improved call processing times as they relate to EMS continued to be a challenge. In 2012, the RRRDC purchased ProQA software through a grant from Sanford Hospital. This program, which is used by dispatchers to categorize the severity of medical calls, was supposed to be a significant improvement over the older flip card system. Again, no significant improvement has been noted. In 2015, the FFD has established a memorandum of understanding directing the RRRDC to strive to meet the call processing times outlined in NFPA 1221.

- Immediate objective: Seek ways to improve call handling times with current systems and procedures to reach a benchmark of 60 seconds 80% of the time for fires and 1:30 90% of the time for EMS.
- Immediate objective: Regularly evaluate call handing times.

- Immediate objective: Work with RRRDC independently and through the Fire and EMS committee to adjust or modify the ProQA call handling guide.

Land Acquisition for a Future Station 8

The SOC revealed that risk and demand for service are slowly increasing in the far south area of the city east of Interstate 29. The FFD has determined that the risk and demand for service in PZ 8 do warrant the need for a fire station in this area in the next three to five years. Given the construction of the new Davies High School, along with other construction and planned development in this area, it is necessary to immediately secure land for construction of a fire station. This potential increase in risk and demand for service makes the securing of land for a future station appropriate. A three acre lot in the area of 25th Street and 64th Avenue South would be a possible location. The fire department will continue to monitor growth in this area and will assess risk and demand for service on an annual basis. Funds for purchasing an appropriate plot of land need to be identified.

- Immediate objective: Detailed analysis of available land in the area of 25th Street and 64th Avenue South.
- Immediate objective: Regularly monitor development in PZ 8 to determine significant increases in risk.

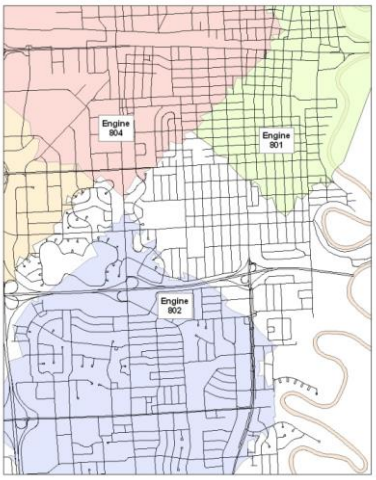
Relocation of Current Fire Stations

Because Fargo is a long, narrow city with very distinct borders on the east & west, it provides unique challenges for determining optimum locations for fire stations. Throughout the years, fire stations have been located, and in some cases relocated, to best meet the city's needs at that time. Relocating fire stations places a significant financial burden on the city and is something that must be planned for very carefully. All factors must be considered and a true need must be demonstrated to warrant this type of expenditure.

Using the ISO guideline of one and one half mile for fire station coverage area, it is obvious to see there is overlap in coverage between Stations 1, 4, 5 and a gap in coverage between Stations 1 & 2 and Stations 5 & 7. However, a closer examination of risk, areas of open land, response times, and demand for service demonstrate that for the most part current fire station locations are situated appropriately to meet the needs of the city. For example, because of the number of high

risk buildings along with the volume of calls in the Station 1 area, the overlap in coverage between Stations 1 & 4 is desirable because of the reduced response time of the truck company and second arriving engine. While it may seem desirable to relocate Station 5 farther to the south and west to eliminate the overlap in coverage between Stations 4 & 5 and reduce the gap between Stations 5 & 7, for several reasons the FFD staff does not feel such a move is viable at this time. First, the area to the southwest of the current Station 5 location is a heavy retail district with no desirable locations for station relocation. Second, the current Station 5 location allows for quick access to the interstate highway, which would no longer be the case if it were moved. Finally, the station is located in a position that allows for quick response to several target hazards.

When considering all factors, the FFD staff does feel the relocation of Station 2 is warranted if an opportunity presented itself. Moving Station 2 farther north and east would accomplish several objectives. First, it would provide a faster response time to the area between Station 1 & 2, which contains a high number of older single family homes, retail, and medical facilities. Currently, Station 2 is located on a busy city street close to a very busy intersection making access in and out of the station difficult. Lastly, the station was built too small and is inadequate for the department's current and future needs. The size of the current apparatus floor limits the type and size of apparatus that can be housed and there is inadequate space for physical fitness equipment and storage.



Ideally, the relocation of Station 2 would coincide with the construction of Station 8. Moving Station 2 without adding Station 8 would increase response times to the very south end of the city. In addition, the ideal location for Station 8 could change depending on where a relocated Station 2 would be placed. The addition of Station 8 would also improve response times in Station 2 and Station 7 primary response areas because Station 8's primary response area would include some of the territory currently covered by those two stations.

- Immediate objective: Identify suitable property for the relocation of Station 2 to the north and east of its current location.

- Immediate objective: Look for opportunities for funding the construction of relocated Station 2 including grant opportunities or Tax Increment Financing.

References

Advanced Engineering and Environmental Services, Inc. (2004, October). Draft Water Distribution System. Fargo.

Economic/demographic information. (2009). Retrieved May 2009, from www.cityoffargo.com: http://www.cityoffargo.com/attachments/d2c29b71-bd49-42e8-8584-af112774a7ab/About_Race.pdf

forecast. (2009). Retrieved May 2009, from Weather.msn.com: http://weather.msn.com/local.aspx?wealocations=wc:USND0115

Heamavihio, A. (2007). *Growth Plan 2007.* Fargo, ND.

U.S. Census Bureau. (2013). Retrieved September 26, 2014, from Census.gov.

U.S. Census Bureau. (2013). Retrieved from www.censusbureau.com.

U.S. Census Bureau, 2008-2012 American Community Survey. (2012). Retrieved September 2014, from U.S. Census Bureau: http://factfinder.census.gov/servlet/ACSSAFFFacts?_event=ChangeGeoContext&geo_id=16000US3825700&_geoContext=&_street=&_county=Fargo&_cityTown=Fargo&_state=04000US38&_zip=&_lang=en&_sse=on&ActiveGeoDiv=&_useEV=&pctxt=fph&pgsl=010&_submenuId=factsheet_1&ds_