

City of Dallas Fire and EMS Department

**Southwestern Polk
Rural Fire Protection District**

Oregon

Fire and Emergency Services Master Plan

2016



Introduction

The following report serves as the Dallas Fire and EMS Department and Southwestern Polk Rural Fire Protection District Fire and Emergency Services Master Plan (Master Plan). It follows closely the Center for Public Safety Excellence (CPSE) Commission on Fire Accreditation, international (CFAI) Standards of Coverage model that develops written procedures to determine the distribution and concentration of a fire and emergency service agency's fixed and mobile resources. The purpose for completing such a document is to assist the agency in ensuring a safe and effective response force for fire suppression, emergency medical services, and specialty response situations for now and into the future.

Creating a Master Plan document requires that a number of areas be researched, studied, and evaluated. This report will begin with an overview of both the community and the agency. Following this overview, the plan will discuss areas such as community risk assessment, critical task analysis, agency service level objectives, and distribution and concentration measures. Historic population and response workload will be quantified and that information used to project workload into the future. The report will provide analysis of historical performance and will conclude with policy and operational recommendations.

ESCI extends its appreciation to the elected officials and members of the City of Dallas, Southwestern Polk Rural Fire Protection District, the Dallas Fire and EMS Department, and all others who contributed to this plan.

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Executive Summary

This document describes the Dallas Fire and EMS Department/Southwestern Polk Rural Fire Protection District Fire and Emergency Services Master Plan. Community risks, response resources, deployment strategies, and service levels have been evaluated in this study. It establishes response time objectives and standards for measuring the effectiveness of fire department services and the deployment of its resources. It uses historic population and response workload and projected population to determine future response workload. Recommendations are offered that identify initiatives that will bring DFD closer to meeting established performance goals and to manage future increases in response workload.

The Dallas Fire and EMS Department (DFD) is a department of the City of Dallas, a city established and organized under Oregon law. It provides fire protection, emergency medical, and rescue services to the City of Dallas and to Southwestern Polk Rural Fire Protection District by contract. DFD also provide emergency medical and ambulance service to a larger ambulance service area.

The City of Dallas has a resident population of approximately 14,940. SWP has a resident population of approximately 6,100 bringing DFD's total service population to 21,040.

DFD serves an area of approximately 239 square miles including 4.8 square miles in the City of Dallas, 123 square miles in SWP and an additional 111.2 square miles of ambulance service area. DFD operates two fire stations and 13 response apparatus. 9-1-1 calls are answered and dispatched by the Willamette Valley Communications Center, a multi-agency public safety dispatch center.

The Insurance Services Office (ISO) reviews the fire protection resources within communities and provides a Community Fire Protection Rating system from which insurance rates are often based. The rating system evaluates three primary areas: the emergency communication and dispatch system, the fire department, and the community's pressurized hydrant or tanker-based water supply. The overall rating is then expressed as a number between 1 and 10, with 1 being the highest level of protection and 10 being unprotected or nearly so. As of the latest survey (2009 for the City of Dallas and 2013 for Southwestern Polk Rural Fire District) ISO gave the City of Dallas a rating of Class 4 and SWP a rating of Class 6/10.

The analysis completed during this study revealed a number of important findings. These include:

- Total response workload has increase 65 percent over the past ten years.
- 83 percent of all responses are requests for emergency medical service
- Response workload is greatest in the City of Dallas primarily due to its higher population density.
- The current fire department services utilization rate is 153.3 incidents per 1,000 population. This is higher than typical driven by the community's use of the department's ambulance service operation.
- Turnout time for medic units exceeds national guidance by a significant amount.

- Turnout time for fire engines is also quite long reflecting the reality of volunteer staffing of these units.
- The time taken by fire engines to respond to a fire incident is quite long. Interior attack on a structure fire in a non-rescue situation is within 17 minutes in the city and 20 minutes in SWP, 90 percent of the time.
- Volunteer response unit reliability ranges from a low of 28 percent to a high of 69 percent (56 percent overall). This is in part due to slow turnout times (units cancelled before sufficient staffing arrives for the unit to respond), and in part the lack of personnel to staff the unit at all.

In the master planning process, potential service area classifications are broken down into five categories:

- **Metropolitan**—Geography with populations of over 200,000 people in total and a population density predominately over 3,000 people per square mile. These areas are distinguished by inner city neighborhoods and numerous mid-rise and high-rise buildings often interspersed with smaller structures.
- **Urban**—Geography with a population of over 30,000 people and/or a population density predominately over 2,000 people per square mile. These areas are characterized by significant commercial and industrial development, dense neighborhoods, and some mid-rise or high-rise buildings.
- **Suburban**—Geography with a population of 10,000 to 29,999 and/or a population density predominately between 1,000 and 2,000 people per square mile. These areas are characterized by single and multifamily neighborhoods, and smaller commercial developments
- **Rural**—Geography with a total population of less than 10,000 people or with a population density of less than 1,000 people per square mile. These areas are characterized by low density residential, little commercial development, and significant farm or open space uses.
- **Wilderness/Frontier/Undeveloped**—Geography that is both rural and not readily accessible by a publicly or privately maintained road.

DFD's service area, based on population density, is of two classifications: urban and rural. Some of the ambulance service area served by DFD is wilderness/frontier. The community's risk classifications should influence how response resources are distributed now and in the future.

A Performance Statement as well as objectives for the services provided by DFD has been developed. These further define the quality and quantity of service expected by the community and consistently pursued by the department.

Overall Performance Statement

The DFD has adopted the following Performance Statement consisting of its Mission and Performance Objectives:

Performance Statement

Mission

The Mission of the Dallas Fire and EMS Department is to provide emergency services designed to protect the lives and property of the community from the adverse effects of fire, sudden medical emergencies or exposure to dangerous conditions created by either man or nature

In addition to the overall Performance Statement, the following response-specific performance objectives are established by DFD.

a. Dispatch Call Processing Time

Response resources shall be notified of a priority incident within 60 seconds from receipt of the call at the dispatch center 90 percent of the time.

b. Turnout Time

a. Urban

- i. Response personnel shall initiate the response of a unit capable of mitigating an incident to a priority fire and special operations incident within two minutes from notification 90 percent of the time.
- ii. Response personnel shall initiate response to a priority emergency medical incident within 90 seconds from notification 90 percent of the time.

b. Rural

- i. Response personnel shall initiate response of a unit capable of mitigating an incident to a priority fire and special operations incident within 10 minutes from notification 90 percent of the time.
- ii. Response personnel shall initiate response to a priority emergency medical incident within 90 seconds from notification 90 percent of the time.

c. Response time for arrival of the first response unit at a priority fire or special operations incident

- a. **Urban** - The first response unit capable of initiating effective incident intervention shall arrive at a priority fire or special operations incident within seven minutes from notification of response personnel 90 percent of the time.
- b. **Rural** - The first response unit capable of initiating effective incident intervention shall arrive at a priority fire or special operations incident within 20 minutes from notification of response personnel 90 percent of the time.

d. Response time of the first arriving response unit at a priority emergency medical incident

- I. **Urban** - The first response unit capable of initiating effective incident intervention shall arrive at a priority emergency medical incident within six minutes 30 seconds from notification of response personnel 90 percent of the time.
- II. **Rural** - The first response unit capable of initiating effective incident intervention shall arrive at a priority emergency medical incident within 11 minutes 30 seconds from notification of response personnel 90 percent of the time.

- e. Response time for arrival of the effective response force at a moderate risk structure fire**
 - a. Urban** - The full effective response force shall arrive at a moderate risk structure fire within 14 minutes from notification of response personnel 90 percent of the time.
 - b. Rural** - The full effective response force shall arrive at a moderate risk structure fire within 25 minutes from notification of response personnel 90 percent of the time.

The analysis conducted during the evaluation phase of this process identified a number of opportunities to improve service (improvement goals). The following improvement goals are offered for consideration. These goals and specific recommendations for each are described in more detail at the end of this report (Component H).

Recommendations

Improvement Goal A: Formally Adopt Response Performance Goals

In order to provide DFD with clear expectations and to establish a basis for measuring service delivery quality, the Dallas City Council and the SWP Board of Directors should adopt response performance goals.

Improvement Goal B: Redefine the relationship between the City of Dallas and SWP

Policy makers from both jurisdictions should consider revisions to the current partnership. These revisions should focus on creating a more unified and easier to manage DFD organization.

Improvement Goal C: Complete a long-term financial forecast for SWP

SWP should retain the services of a qualified financial analyst to complete a comprehensive long-term financial forecast. This effort will ensure the SWP Board of Directors is fully informed of its future ability to fund its services.

Improvement Goal D: Prepare and present an operating levy to SWP voters

Based on the results of the financial forecast, SWP should engage the community in a discussion to determine its desired level of service based on its willingness to pay for that level of service. An operating levy should be proposed to allow district voters the opportunity to decide whether to fund maintained or improved services or accept less service in the future.

Improvement Goal E: Reduce turnout time

Shortening turnout time will have a positive impact on overall response time and incident outcomes. Particularly within the City of Dallas, implementing in-station staffing will have a very positive impact on incident outcomes. Several options are offered for consideration.

Improvement Goal F: Improve travel time to SWP incidents

SWP should consider moving forward with construction and operation of the “Salt Creek” (Station 140) station to improve response to its northern areas. This option could be included in the operating levy discussion offered in Improvement Goal D.

Improvement Goal H: Consider a single paramedic responder program

Medic unit workload has and will continue to increase. The number of times the back-up medic unit must be staffed is increasing. Recommended is consideration of a single paramedic response unit that would respond to basic life support incidents in place of a medic unit when ambulance transportation to a medical facility likely will not be needed.

Improvement Goal I: Improve the collection, analysis, and utilization of data

Recommendations are offered to improve DFD's ability to collect and use incident data for ongoing performance analysis and to determine if improvement efforts are actually producing a positive result.

Improvement Goal J: Implement or expand active risk management and safety programs

Ensuring safe operations and personnel fitness are very important organizational efforts. Several recommendations are offered to improve DFD's risk and safety programs.

Component A – Description of Community Served

ORGANIZATION OVERVIEW

Governance and Lines of Authority

The City of Dallas was incorporated in 1874. DFD has existed as a fire protection agency within the State of Oregon since 1878. The city is provided the authority to levy taxes and raise revenue for operating an organized fire department.

Southwestern Polk Rural Fire Protection District (SWP) is an Oregon special district first established in 1947. It also has the authority to levy taxes and raise revenue for operating an organized fire district. It began receiving service from the City of Dallas at the time of its creation in 1947.

Policy direction for DFD is provided by a mayor and nine city council members. The mayor and council are provided the necessary power and authority to govern the provision of fire protection and emergency services. The mayor and council appoint a city manager who is responsible for implementing council policy and overseeing the operation of the fire department. The city manager appoints the fire chief.

Policy direction for SWP is provided by a five member Board of Directors that is also provided the necessary power and authority to govern provision of fire protection and emergency services. The City of Dallas Fire Chief implements policy direction via the provisions of the intergovernmental agreement between the City of Dallas and SWP.

The contract between the city and SWP stops short of obligating the city to provide full services to the district. The agreement includes the storage and use of district apparatus at the city fire station, the provision of maintenance to that equipment, the obligation of the city to provide firefighters to staff district apparatus, and for city maintenance of other district apparatus.

The contract provides that the city fire chief may determine the resources to be sent to emergencies, supervise the district funded office administrator, administer day-to-day administrative functions of the district, and provide training to district firefighters. The district however is required to contract separately for its physician supervisor.

The contract stops short of granting the city fire chief full authority to direct all activities of the fire and emergency response system and all supporting functions such a system requires. The district also manages much of its financial activities. For example, SWP pays directly for dispatch services, equipment and personnel protective clothing, station maintenance and repairs, and some training expenses.

SWP has a separate agreement with the City of Falls City. This contract provides that district will provide Falls City Fire Department (FCFD) with apparatus and equipment to be used both in Falls City and in the district. FCFD is to provide personnel to staff and operate this apparatus. SWP pays Falls City an annual amount to support FCFD operations in exchange for response service into the district.

This contract also appears to obligate the “District Fire Chief”, who is the City of Dallas fire chief to management and oversight of aspects of the FCFD operation. The included organizational chart shows the FCFD chief as a subordinate to the City of Dallas fire chief. However, in practice, the Dallas fire chief has authority over FCFD only during response and control of emergencies within SWP territory.

Nowhere in either agreement are there performance based measures to quantify service level expectations of any party.

Organizational Finance

Establishment of financial policy for the DFD is the responsibility of the elected mayor and city council with the city manager, city treasurer, and fire chief responsible for fiscal administration.

The City of Dallas has an assessed valuation of \$887,674,612. SWP has an assessed valuation of \$554,127,250.

The city uses a one-year budget cycle to prepare the operating budget and the capital improvement plan based on a July through June fiscal year. The fire department general fund budget for 2015-16 is \$755,014 for fire department operations, \$1,438,500 for ambulance operations, for a total of \$2,193,514.

The fire department’s operating funds are generated primarily from property taxes, ambulance service fees, service contract payments from SWP, and to a lesser degree, state shared revenues, fees for service, and other revenues.

The figure below lists the amount of non-tax revenue for DFD by type for fiscal year 2015-16.

Figure 1: Generated Revenue – FY 2015-2016

Revenue Type	FY 2015-16 Budget
Ambulance fees	\$1,150,000
SWP Contract	\$192,000
Fire-Med	\$45,000
Grants	
Total	\$1,387,000

The next figure shows the general operating expenditure history for the current and previous two fiscal years. During the three-year period, the department’s overall budget increased 7.3 percent.

Figure 2: Budget/Expenditures by Year, FY 2014 – FY 2016

Expenditures	Actual FY 2013-14	Amended FY 2014-2015	Budget FY 2015-16
Fire Department			
Personnel services	\$368,677	\$265,000	\$278,000
Materials and services	\$278,087	\$344,500	\$331,800
Capital outlay	\$28,101	\$0	\$0
Transfers	\$29,400	\$29,400	\$100,400
Debt service	\$0	\$38,937	\$44,814
Total Fire	\$704,265	\$677,837	\$755,014
Ambulance			
Personnel services	\$902,343	\$997,000	\$1,035,000
Materials and services	\$307,152	\$317,300	\$340,000
Capital outlay	\$0	\$0	\$0
Transfers	\$30,000	\$30,000	\$30,000
Debt service	\$37,303	\$40,810	\$33,500
Total Ambulance	\$1,276,798	\$1,385,110	\$1,438,500
Grand Total	\$1,981,063	\$2,062,947	\$2,193,514

SWP also budgets for some service delivery expenses. It has a tax rate of \$0.8612 per \$1,000 of assessed valuation. The district’s budget for the current and previous two fiscal years is shown in the following figure.

Figure 3: Budget/Expenditures by Year, FY 2014 – FY 2016

	Actual FY 2013-2014	Budget FY 2014-15	Budget FY 2015-16
Personnel services	\$104,122	\$76,420	\$53,789
Materials and services	\$365,284	\$400,359	\$401,728
Capital outlay	\$0	\$0	\$0
Debt service	\$13,383	\$13,383	\$13,383
Contingency	\$0	\$20,000	\$20,000
Total	\$482,789	\$510,162	\$488,900

The total amount from both budgets allocated to paying the cost of delivered emergency and non-emergency services is \$2,461,112¹.

A comprehensive capital improvement and replacement program is important to the long-term financial and operational stability of any fire and emergency medical service organization. Such programs provide

¹ Excludes funds not used for the direct delivery of services such as contingency and accounts for the payment for services by SWP already included in the DFD budget.

systematic development and renewal of the physical assets and rolling-stock of the agency. A capital program must link with the planning process to anticipate and time capital expenditures in a manner that does not adversely influence the operation of the agency or otherwise place the agency in a negative financial position. Items usually included in capital improvement and replacement programs are facilities, apparatus, land acquisition, and other major capital projects. The City of Dallas has a formally adopted and funded capital improvement plan for major equipment. The city's Fleet Management Department provides for the purchase, replacement, and maintenance of vehicles and fire apparatus although there is not a reserve fund that accumulates money for future apparatus purchases. SWP transferred all money from its capital reserve fund to its operating budget this fiscal year.

SERVICE AREA OVERVIEW

Dallas, originally named “Cynthian” or “Cynthiana” was settled in the 1840s. In 1856 the town was move about a mile due to an inadequate water supply.

Dallas residents raised funds to locate a railroad branch in their town and as a result became the county seat of Polk County. At that time the town was renamed “Dallas”.

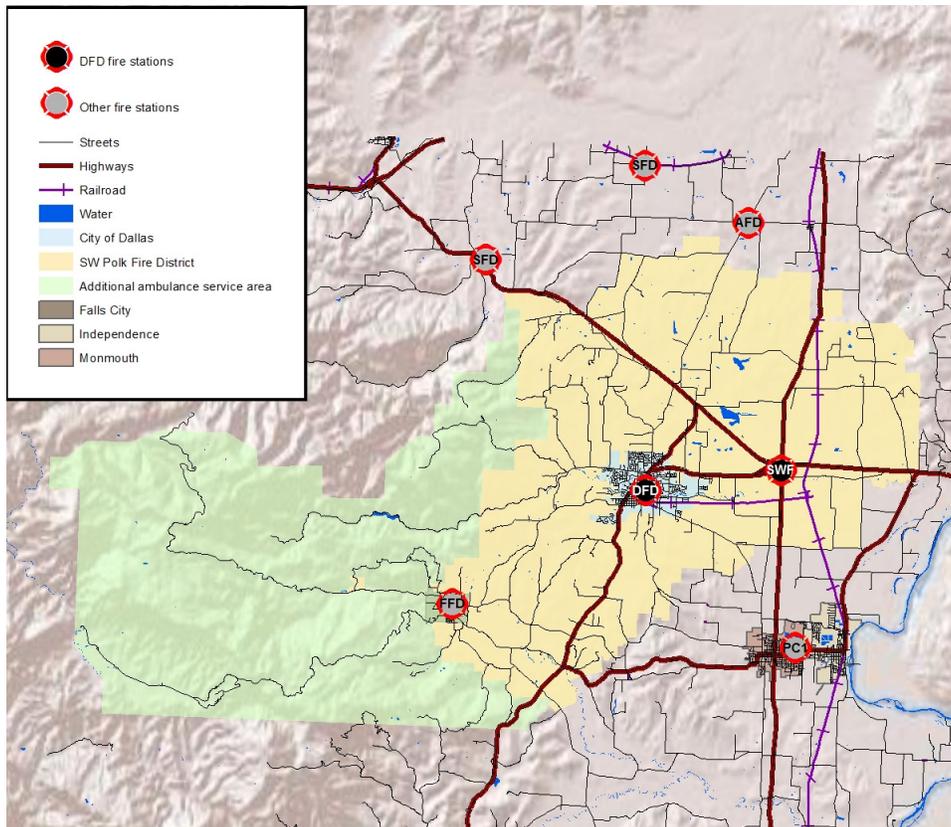
Dallas’s population has grown modestly over the years from 670 residents in 1880 to 14,940 today.

The City of Dallas has an area of approximately 4.8 square miles. Though predominately residential, Dallas has an active downtown, shopping centers, and industry. The largest employers in the city include Forest River, Inc, Dallas Public Schools, Dallas Retirement Village, Polk County, and West Valley Hospital.

SWP is primarily residential and agricultural in nature. There are a number of larger buildings associated with the agricultural operations. Some of the area is also forestland. SWP covers an area of 123 square miles and has an estimated population of 6,100.

DFD also provides ambulance services to 111.2 square miles of area outside the city and SWP for a total service area of 239 square miles.

Figure 4: Dallas Fire and EMS Department Service Area



Component B – Review of Services Provided

SERVICES PROVIDED

DFD’s service area includes all of the City of Dallas and SWP. Its ambulance operation also covers additional territory outside both agencies boundaries. DFD also provides automatic and mutual aid to other agencies within the region. DFD provides a variety of response services, including structural and wildland fire suppression, advanced life support level emergency medical care, and entrapment extrication, and hazardous materials service at the operations level. DFD also supports technical rescue services including high-angle, trench, and confined space.

DFD also provides non-response services including staff training, new construction building plan review and inspection, existing occupancy fire safety inspections, public safety education, emergency preparedness, and fire investigation.

9-1-1 answering and incident dispatching is provided by Willamette Valley Communications Center (WVCC) operated by the City of Salem Police Department.

There are 11 full-time personnel, 20 part-time personnel (8.42 FTE), and 63 volunteer personnel involved in delivering services to the jurisdictions. Staffing coverage for fire and emergency response is through the use of volunteer firefighters. Two ambulances are staffed 24 hours per day by two personnel each. For immediate response, no less than four ambulance personnel are on-duty at all times.

The following figure provides basic information on each of the department’s core services, its general resource capability for that service, and information regarding staff resources for that service.

Figure 5: Core Services Summary

Service	General Resource/Asset Capability	Basic Staffing Capability per Shift
Fire Suppression	2 engines - DFD	4 Chief Officer responders-DFD
	3 engines - SWP	33 suppression-trained volunteers - DFD
	1 ladder trucks - DFD	16 suppression-trained volunteers - SWP
	4 command response units	17 suppression-trained volunteers – FCFD
	1 rescue - DFD	Additional automatic and mutual aid firefighters available
	4 tenders - SWP	
	1 foam unit - SWP	
	Additional automatic and mutual aid engines, aerals, and support units available	
Emergency Medical Services	3 ambulances – ALS equipped	3 emergency medical responders
	4 engines – BLS equipped	23 emergency medical technicians
		2 Intermediate/advanced EMT 17 paramedics

Service	General Resource/Asset Capability	Basic Staffing Capability per Shift
Vehicle Extrication	1 Rescue equipped with hydraulic rescue tools, hand tools, air bags, cutting torch, stabilization cribbing, and combination cutter-spreader hydraulic rescue tool 2 engines equipped with hydraulic rescue tools and hand tools	All firefighters vehicle rescue trained
High-Angle Rescue	For all incidents above the awareness level DFD calls for automatic and mutual aid resources from Salem Fire	All personnel trained to the awareness level.
Trench and Collapse Rescue)	For all incidents above the awareness level DFD calls for automatic and mutual aid resources from Salem Fire	All personnel trained to the awareness level.
Swift-Water Rescue	For all incidents above the awareness level DFD calls for automatic and mutual aid resources from PCSO and Salem Fire	All personnel trained to the awareness level.
Confined Space Rescue	For all incidents above the awareness level DFD calls for automatic and mutual aid resources from Salem Fire	All personnel trained to the awareness level.
Hazardous Materials Response	For all incidents above the awareness level DFD calls for automatic and mutual aid resources from Salem Fire	All personnel trained to the awareness level.

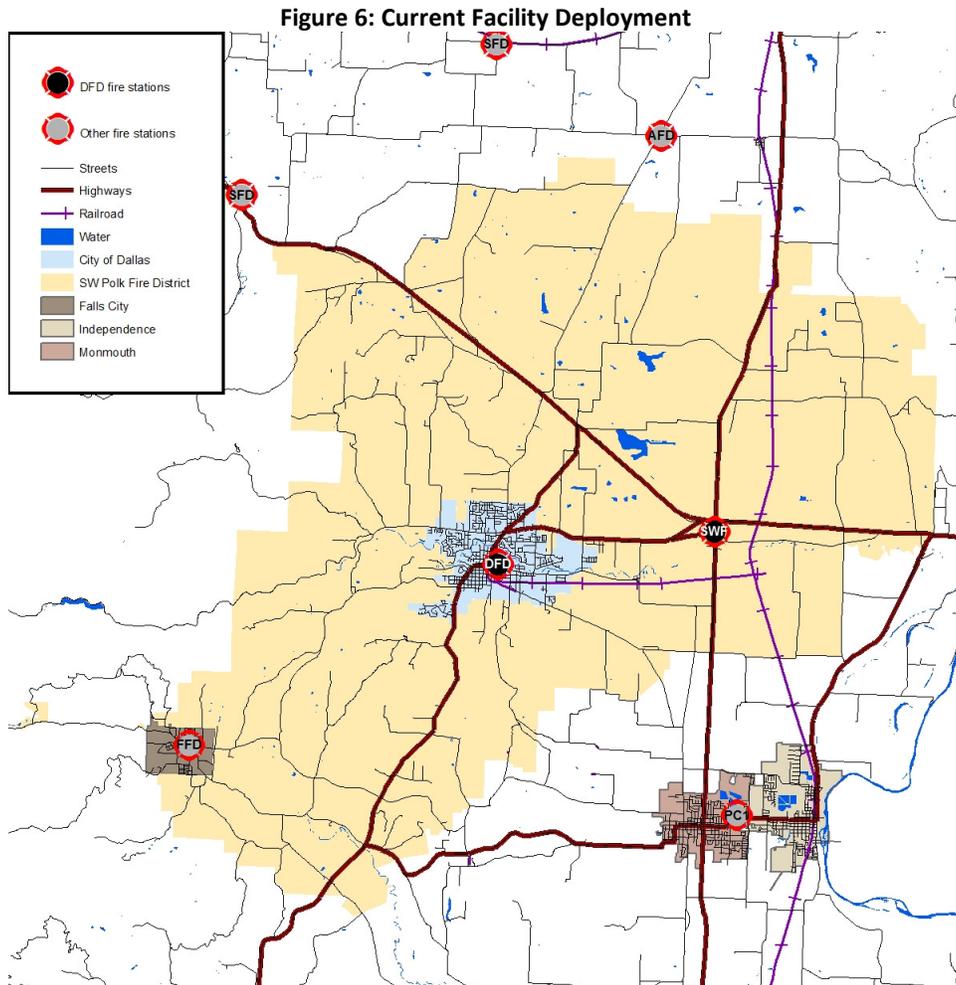
ASSETS AND RESOURCES

Fire Stations

Fire stations play an integral role in the delivery of emergency services for a number of reasons. A station's location will dictate, to a large degree, response times to emergencies. Fire stations also need to be designed to adequately house equipment and apparatus, as well as the firefighters and other personnel assigned to the station.

Station Location and Deployment

The DFD delivers fire, emergency medical service (EMS), and other emergency response from one city-owned fire station located downtown Dallas and one SWP owned station in Rickreall. The following map shows the city and district boundaries, and the locations of DFD and SWP fire stations. It also shows adjacent agency fire stations.



Apparatus

Response vehicles are an important resource of the emergency response system. If emergency personnel cannot arrive quickly due to unreliable transport, or if the equipment does not function properly, then delivery of emergency service is likely compromised. Fire apparatus are unique and expensive pieces of equipment, customized to operate efficiently for a specifically defined mission. The following figure lists apparatus assigned to each of the DFD and SWP fire stations.

Figure 7: DFD Fire Stations and Apparatus

Station	Apparatus	Year built	Condition
Dallas Station 100/110	Engine 101	2015	Excellent
	Engine 102	1995	Fair
	Ladder 101	2003	Good
	Rescue 101	1995	Fair
	Medic 101	2011	Good
	Medic 102	2009	Good
	Medic 103	1998	Poor
	Tender 112	2000	Good
	Engine 110	2001	Fair
SWP Station 130	Engine 137	2000	Good
	Foam 135	2011	Good
	Tender 136	2002	Good
	Tender 134	1981	Poor
FCFD Station 120	Engine 121	2001	Fair
	Tender 124	1999	Good

DFD uses several types of apparatus as shown in the table above. Each type is further described as follows:

- Engine – Primary response unit from each station for most types of service requests. Each is equipped with a pump and carries water.
- Ladder – A specialized apparatus equipped with long ladders, salvage, overhaul equipment, and rescue tools. Used for structure fires, rescues, and other service requests.
- Medic – Vehicles used to provide care to the sick and injured and transport those patients to a medical facility.
- Tender – A vehicle designed to carry large quantities of water to a fire incident. Used for fires in areas without fire hydrants.
- Rescue – A smaller vehicle used to carry specialized rescue equipment to an incident.

STAFFING INFORMATION

DFD provides staffing in four key areas: administration, operations, professional services, and emergency medical services.

Organizational Structure

DFD is organized in the typical top-down hierarchy. The chain of command is identified with common roles for a fire department of this size. DFD has two fire stations that house emergency response resources. The department's multiple facilities, volunteer staffing, and its three-shift, 24-hour-per-day, seven-day-per-week ambulance service operational schedule create numerous internal communications and management challenges. The DFD organizational chart is functional and primary roles are well identified.

Figure 8: Organizational Structure
(To be provided)

Management, Administration and Support Staff

One of the primary responsibilities of a fire department's administration and support staff is to ensure that the operational entities of the organization have the ability to accomplish their service delivery responsibilities to the public. Without sufficient oversight, planning, documentation, training, and maintenance, the operational entities will struggle to perform their duties well. Administration and support services require appropriate resources to function properly.

There are 11 full-time personnel, 20 part-time personnel (8.42 FTE), and 63 volunteer personnel involved in delivering services to the jurisdictions. The fire department's primary management team includes the fire chief, deputy chief for operations, volunteer deputy chiefs, and division chiefs. DFD has four full-time management, administration, and support staff, plus seven chaplains.

Figure 9: Management, Administration, and Support Personnel by Position

Position	Number
Fire Chief	1
Deputy Chief	1
Division Chief	2
Administrative assistant	1
Chaplains	7

Emergency Services Staff

It takes an adequate and well-trained staff of emergency responders to put the community's emergency apparatus and equipment to its best use in mitigating incidents. Insufficient staffing at an emergency decreases the effectiveness of the response and potentially increases damage and injury.

DFD uses volunteer and career personnel to carry out emergency response functions. The following figure shows the distribution of emergency personnel by rank. Note that several personnel listed in the

Management, Administration, and Support Personnel figure above are also emergency responders and are included in the figure below.

Figure 10: Emergency Response Personnel by Rank

Position	Number
Fire Chief	1
Deputy Chief	1
Station Chief - volunteer	1
Assistant Chief - volunteer	1
Division Chiefs	2
Battalion Chief - volunteer	3
Fire Captain - volunteer	8
Fire Apparatus Operator - volunteer	14
Firefighter - volunteer	22
EMS Lieutenant - career	3
EMS Paramedic - career	3
EMS part-time medics	20
Fire Corps/Support	14

DFD provides no less than five personnel on duty at all times. Four of these personnel staff the department’s two ambulances and one is a duty officer. The balance of the response force is other career staff and volunteer personnel. The resident population of the DFD service area is 21,040. DFD provides its community with 0.48 career response personnel per 1,000 population, and 0.23 response personnel per 1,000 population on duty at all times. However, it provides only one firefighting capable person on duty at all times.

Methodology for Incident Staffing

This document will provide an analysis of how well DFD is doing at providing personnel and other resources for incidents within its service area. This data is important and can be an indicator of the effectiveness of its staffing efforts.

For larger incidents, DFD commonly acts together with one or more neighboring fire departments in providing fire and life protection through a coordinated regional response system of mutual and automatic aid agreements. This is particularly true for large structure fires, other high-risk incidents where staffing needs are great, and during periods of significant incident activity. This document will provide an overall view of aggregate staffing provided by DFD and neighboring agencies.

The prompt arrival of at least four personnel is critical for structure fires. Federal regulations (CFR 1910.120) require that personnel entering a building involved in fire must be in groups of two. Further, before personnel can enter a building to extinguish a fire, at least two personnel must be on scene and assigned to conduct search and rescue in case the fire attack crew becomes trapped. This is referred to as the two-in, two-out rule.

There are, however, some exceptions to this regulation. If it is *known* that victims are trapped inside the building, a rescue attempt can be performed without additional personnel ready to intervene outside the structure. Further, there is no requirement that all four arrive on the same response vehicle. Many fire departments rely on more than one unit arriving to initiate interior fire attack. DFD’s volunteer firefighter system does not guarantee certain staffing levels on each apparatus. Typically, DFD must wait for two units, one of which must be an engine, to arrive before it can initiate interior fire attack operations in a non-rescue incident.

The following figure lists each station, response unit, and the staffing assigned to each at minimum staffing. Falls City Fire Department resources are included since they cover a portion of the SWP service area by contract.

Figure 11: Staffing Complement

Station	Apparatus	Minimum On-duty Staffing	Volunteers Assigned to Station
Dallas Station 100/110	Engine 101	0	
	Engine 102	0	
	Ladder 101	0	
	Rescue 101	0	
	Tender 112	0	
	Engine 110	0	
	Medic 101	2	
	Medic 102	2	
	Medic 103	0	33 volunteers
SWP Station 130	Engine 137	0	
	Foam 135	0	
	Tender 136	0	
	Tender 134	0	16 volunteers
Falls City Station 120	Engine 121	0	
	Tender 124	0	17 volunteers
TOTAL		4	66 volunteers

DFD and other fire agencies in the area have developed a very comprehensive system for sharing resources. Regional fire agencies rely on the regional mutual and automatic aid agreement for major structure fires, other higher risk incidents, and during periods of high incident activity. The following figure lists resources available to DFD from other regional agencies.

Figure 12: Automatic and Mutual Aid Resources

Department	Engines	Ladders Trucks	Other (Medics, Tenders, Brush, Rescue, Command)*	Total Available Staffing
Polk County Fire District 1	5	1	3M,3C,3T,1R,2Br	55
Sheridan Fire District	4	1	2M,4Br,3T,2C	45
Falls City Fire Department	2	0	1T,1C	22
Amity Fire District	4	0	2Br,3T,1R,1C	49
Salem Fire Department	11	2	2M,2BC,2T,3Br	6
TOTALS		26	4	177

* M = medic, C = command, Br = brush unit, T = tender, R = rescue

INSURANCE SERVICES OFFICE PUBLIC PROTECTION CLASSIFICATION

The Insurance Services Office (ISO) reviews the fire protection resources within communities and provides a Community Fire Protection Rating system from which insurance rates are often based. The rating system evaluates three primary areas: the emergency communication and dispatch system, the fire department, and the community's pressurized hydrant or tanker-based water supply. The overall rating is then expressed as a number between 1 and 10, with 1 being the highest level of protection and 10 being unprotected or nearly so. As of the latest survey (2009) ISO gave DFD a rating of Class 4. As of the latest survey (2013) ISO gave SWP a rating of Class 6/10.

City of Dallas ISO Review

The emergency communications function includes the capabilities of the call receipt and dispatch system along with the quality and redundancy of communications systems between dispatchers and response units. ISO gave 7.90 points out of a possible 10 points to this element. Minor deficiencies were noted in the alarm circuit integrity monitoring.

The fire department is evaluated on its ability to provide needed apparatus within specified distances of developed property, the pump capacity and equipment carried on those apparatus, and the number of personnel staffing each. In addition, the fire department is evaluated on its training programs and facilities. The city received 26.64 points out of a possible 50 points for this element. Deficiencies included an insufficient number of personnel and deficiencies in the training program. The city received 2.81 points out of a possible 15 for the number of firefighters on duty. The training program received 3.76 out of a possible nine points.

The water system is evaluated on the amount of storage, size of water mains, distribution and condition of fire hydrants, and the ability of the system to deliver needed quantities of water based on specific risks within the service area. The water system received 36.50 points out of a possible 40 points. Minor deficiencies were noted in the fire hydrant inspection program.

When there is a sizable difference between the capability of the fire department and the area's water service a reduction in credit is applied (known as divergence). In this case 7.59 points out of the possible 100 points was deducted due to the difference in capabilities.

Southwestern Polk Rural Fire Protection District ISO Review

For dispatch services, ISO gave 7.90 points out of a possible 10 points to this element. Minor deficiencies were noted in the alarm circuit integrity monitoring.

For fire department capability, SWP received 14.18 points out of a possible 50 points for this element. Deficiencies included insufficient numbers of engine companies and inadequate distribution of response units (an engine should be available within 1.5 road miles of any area and a ladder company within 2.5 miles of any area with buildings three or more stories in height). The fire department received 2.55 points out of a possible 15 for the number of firefighters on duty. The training program received 4.38 out of a possible nine points.

ISO gave the water system 17.77 points out of a possible 40 points. Only a small portion of the SWP service area is served with fire hydrants and water tender supply was not considered adequate.

CURRENT SERVICE DELIVERY OBJECTIVES

The DFD has adopted the following Performance Statement:

Performance Statement

Mission

The Mission of the Dallas Fire and EMS Department is to provide emergency services designed to protect the lives and property of the community from the adverse effects of fire, sudden medical emergencies or exposure to dangerous conditions created by either man or nature

In addition to the overall Performance Statement, the following response-specific performance objectives are established by DFD.

1) Dispatch Call Processing Time

Response resources shall be notified of a priority incident within 60 seconds from receipt of the call at the dispatch center 90 percent of the time.

2) Turnout Time

a. Urban

- i. Response personnel shall initiate the response of a unit capable of mitigating an incident to a priority fire and special operations incident within two minutes from notification 90 percent of the time.
- ii. Response personnel shall initiate response to a priority emergency medical incident within 90 seconds from notification 90 percent of the time.

b. Rural

- i. Response personnel shall initiate response of a unit capable of mitigating an incident to a priority fire and special operations incident within 10 minutes from notification 90 percent of the time.
- ii. Response personnel shall initiate response to a priority emergency medical incident within 90 seconds from notification 90 percent of the time.

3) Response time for arrival of the first response unit at a priority fire or special operations incident

- c. **Urban** - The first response unit capable of initiating effective incident intervention shall arrive at a priority fire or special operations incident within seven minutes from notification of response personnel 90 percent of the time.
- d. **Rural** - The first response unit capable of initiating effective incident intervention shall arrive at a priority fire or special operations incident within 20 minutes from notification of response personnel 90 percent of the time.

4) Response time of the first arriving response unit at a priority emergency medical incident

- III. **Urban** - The first response unit capable of initiating effective incident intervention shall arrive at a priority emergency medical incident within six minutes 30 seconds from notification of response personnel 90 percent of the time.
- IV. **Rural** - The first response unit capable of initiating effective incident intervention shall arrive at a priority emergency medical incident within 11 minutes 30 seconds from notification of response personnel 90 percent of the time.

- 5) Response time for arrival of the effective response force at a moderate risk structure fire**
- c. Urban** - The full effective response force shall arrive at a moderate risk structure fire within 14 minutes from notification of response personnel 90 percent of the time.
 - d. Rural** - The full effective response force shall arrive at a moderate risk structure fire within 25 minutes from notification of response personnel 90 percent of the time.

The DFD is not currently achieving these objectives as will be demonstrated in a later section of this report.

Component C – Review of the Community Expectations for Type and Level of Service

The ultimate goal of any emergency service delivery system is to provide sufficient resources (personnel, apparatus, and equipment) to the scene of an emergency in time to take effective action to minimize the impacts of the emergency. This need applies to fires, medical emergencies, and any other emergency situation to which the fire department responds. Obtaining and understanding the desires and expectations of community stakeholders is an important first step. DFD is committed to incorporating the needs and expectations of residents and policy makers in the service delivery planning process.

It is important to note that the information solicited and provided during this process was provided in the form of “people inputs,” some of which are perceptions as reported by stakeholders. The project team reviewed the information for consistency and frequency of comment to identify specific patterns and/or trends. The observations included in this report were confirmed by multiple sources or the information provided was significant enough to be included. Based on the information review, the team was able to identify a series of observations, recommendations, and needs which are included in this report.

Stakeholder Input

ESCI interviewed a number of community and organizational stakeholders. Questions posed to each sought to learn more about:

1. The community’s expectations of DFD.
2. Which expectations were being met and which were not.
3. Specific concerns about the manner and method in which services are being provided by DFD.
4. Whether the services offered by DFD had value to the community.
5. Whether DFD should offer services it currently does not provide.
6. General overall level of satisfaction with the services and service levels provided by DFD.

Those interviewed included:

- Most members of the Dallas City Council
- Dallas city manager
- SWP Board of Directors
- DFD volunteers
- SWP volunteers
- Falls City city manager and fire chief
- DFD EMS personnel
- DFD administrative staff

Summary of Discussions

External Stakeholders

Everyone interviewed from both jurisdictions expressed great pride in DFD and particularly the volunteer personnel who provide services to the communities. All recognized the contribution provided by volunteers to public safety through their commitment of time and energy to training, apparatus and equipment maintenance, and response to emergencies.

Elected officials expressed their opinion that the strongly public supports its fire department. The community outreach activities conducted by DFD and the volunteer associations are valued.

While all felt that the services delivered by DFD were appropriate, there was a desire to see improved capability in the fire prevention program. This includes both regular fire safety inspections of higher risk buildings and a stronger public safety education delivery.

Current response times were a concern. There is a considerable difference between the expectations for response time as expressed by Dallas city councilors and actual response times provided by DFD. There was a good understanding that this is a result primarily of the all volunteer fire response system and that changes may be in order to improve response performance. Obviously the ability to fund those changes is the concern.

Elected officials from both the City of Dallas and SWP consider the current partnership between the two entities to be positive. Many from each believe the other party is getting more from the relationship than it is providing, however none suggested the partnership should be dissolved.

All were concerned about DFD's ability to manage a growing demand for services. Increasing population, the aging of the population, and other factors were cited. The future need for additional resources to maintain, or even improve, level of service was recognized.

SWP Board members were also concerned about their ability to fund services over the long-term. With a relatively fixed income and ever growing expenses, they recognized the either a reduction in service or an expansion of revenues would need to occur.

Internal Stakeholders

Volunteers from both jurisdictions were largely satisfied with the current environment. Most praised Chief Hertel for his leadership and improving the level of support to them.

Most volunteers agreed that the partnership between the City of Dallas and SWP had value. Many advocated for a greater level of integration between the two agencies. The ability to cross-staff stations, improve joint training, unify response procedures, and generally behave more as a single response force were desired.

DFD volunteers in particular expressed concerns about a growing response workload. Some stated that job responsibilities and the like forced them to make choices about which incidents to respond to and

which not to respond to. Many consider the addition of career staff to both reduce volunteer workload and improve response times as an option that should be strongly considered.

Additionally, DFD volunteers desire a closer working relationship with DFD's Emergency Medical division. Many saw opportunities for improved training and on-scene operations through greater integration.

SWP volunteers also identified the improvements attributed Chief Hertel's efforts. They still had concerns over the responsiveness of administrative support such as purchasing supplies and equipment, and in particular vehicle maintenance and repair. Specific concerns over the quality of vehicle maintenance and repair were offered including vehicles that had to return to the shop because the original issue had not been properly resolved.

Component D – Community Risk Assessment

This section analyzes certain categorical risks that are present within the DFD service area that potentially threaten the people and property within the community and that can create response workload for the DFD. These risks are identified to assist the DFD in identifying where to locate response resources in the types and numbers needed to effectively respond to likely emergencies.

Another good reference describing community risks is the Polk County Multi-Jurisdictional Hazard Mitigation Plan (2009). This document contains a great deal of information regarding risks within the region, including Dallas and SWP.

OVERALL GEOSPATIAL CHARACTERISTICS

The fire service assesses the relative risk of properties based on a number of factors. Properties with high fire and life risk often require greater numbers of personnel and apparatus to effectively mitigate a fire emergency. Staffing and deployment decisions should be made with consideration to the level of risk within geographic sub-areas of a community.

The following community risk assessment has been developed based on intended land uses as described in the City of Dallas and Polk County zoning designations. The following figure translates zoning to categories of relative fire and life risk.

- Low risk – Areas zoned and used for agricultural purposes, open space, and very low-density residential and uses.
- Moderate risk – Areas zoned for medium-density single family properties, small commercial and office uses, low-intensity retail sales, and equivalently sized business activities.
- High risk – Higher-intensity business districts, mixed use areas, high-density residential, industrial, warehousing, and large mercantile centers.

The following figures depict fire and life safety risk based on proposed land uses for the DFD service area.

Figure 13: Fire and Life Safety Risk Based on Zoning – DFD Service Area

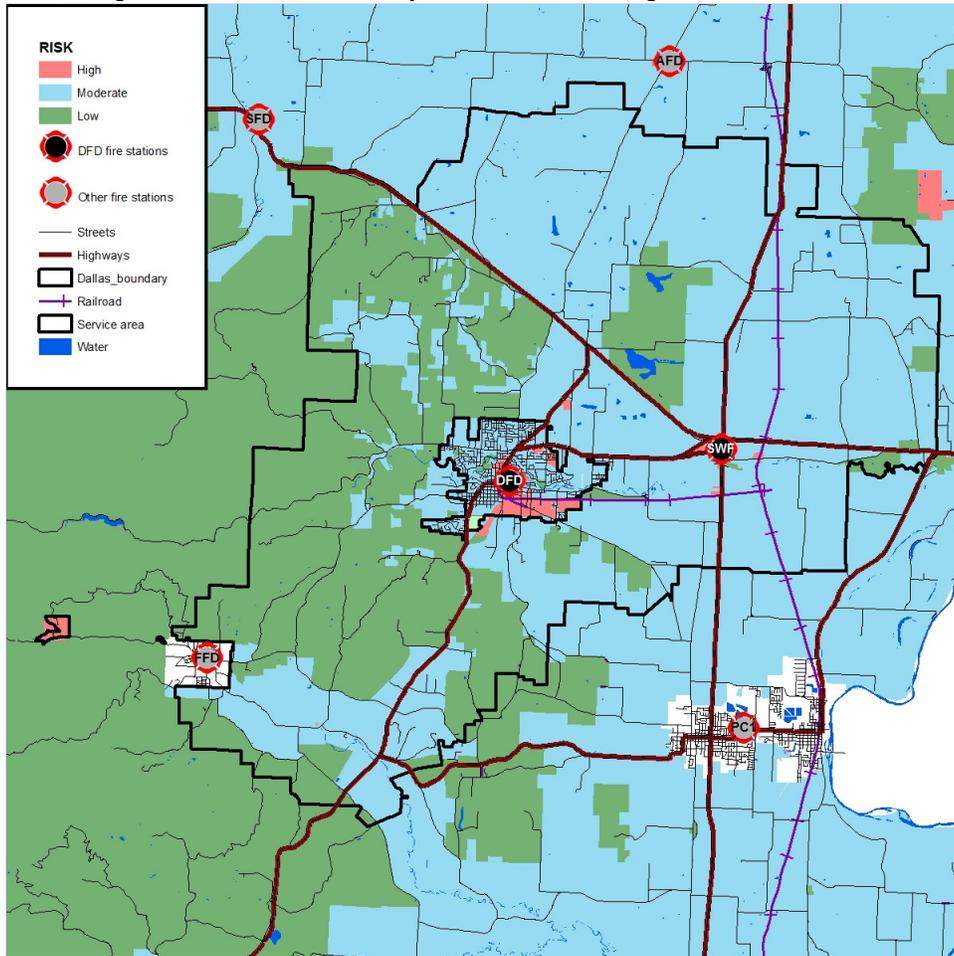
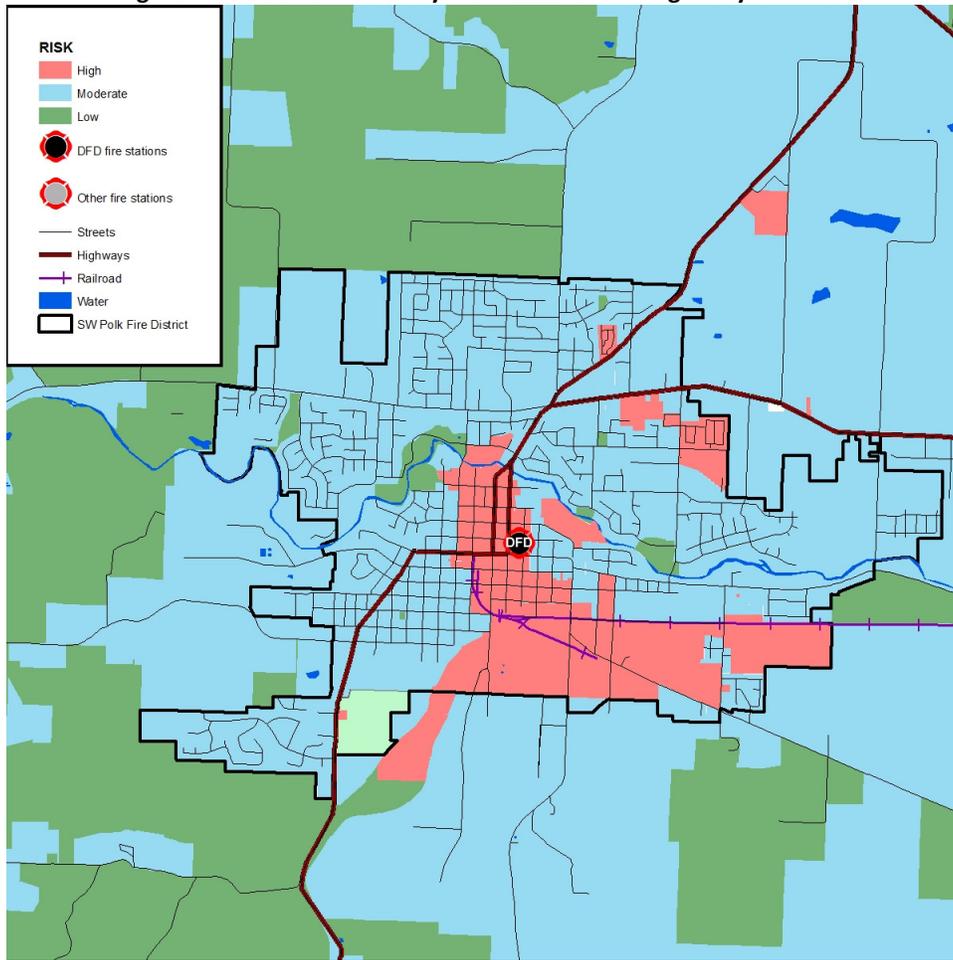


Figure 14: Fire and Life Safety Risk Based on Zoning – City of Dallas



GEOGRAPHIC AND WEATHER-RELATED RISKS

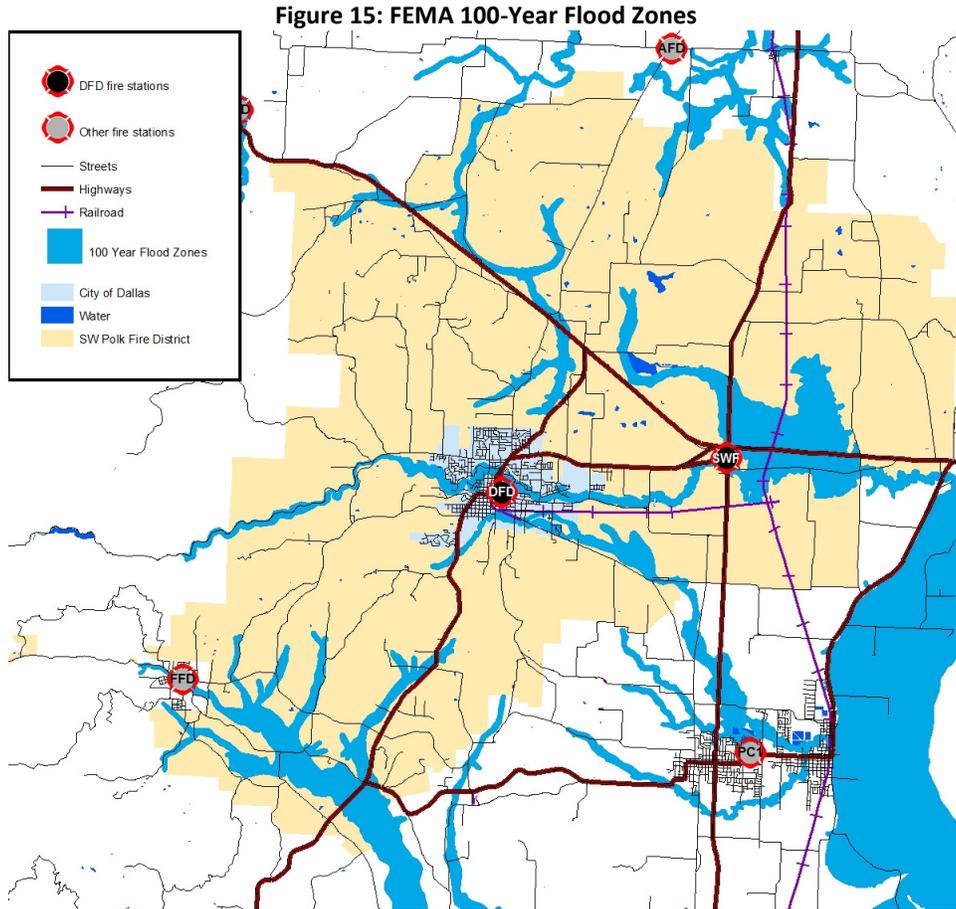
Weather Risk

The Dallas region's climate is influenced by the currents of the Pacific Ocean, producing cool, wet winters and warm, dry summers. Rainfall averages about 40 inches per year. In the winter, the area can get light to moderate snowfall averaging about five to ten inches per year.

Mean high temperatures range from the low 80s in the summer to about 40° F in the winter. Extreme temperatures are rare. 90° F or more temperatures occur only five to 15 times per year. Temperatures below 0° F occur only once every 25 years or so. Extreme weather, though rare, does occur. Thunderstorms, high wind storms, and significant rain events happen infrequently. Recently a tornado passed through the town of Aumsville, just to the east of Salem, causing significant damage.

Flood Risk

Waterway flooding is a risk within the community. During heavy rains, local streams can overflow causing local area flooding. The last significant flood event was in 1996, the result of a tropical rain system causing a rapid melt of the Cascades snowpack. The following figure illustrates the area designated by FEMA as 100-year flood zones. Several fire stations near the 100-year flood zone.

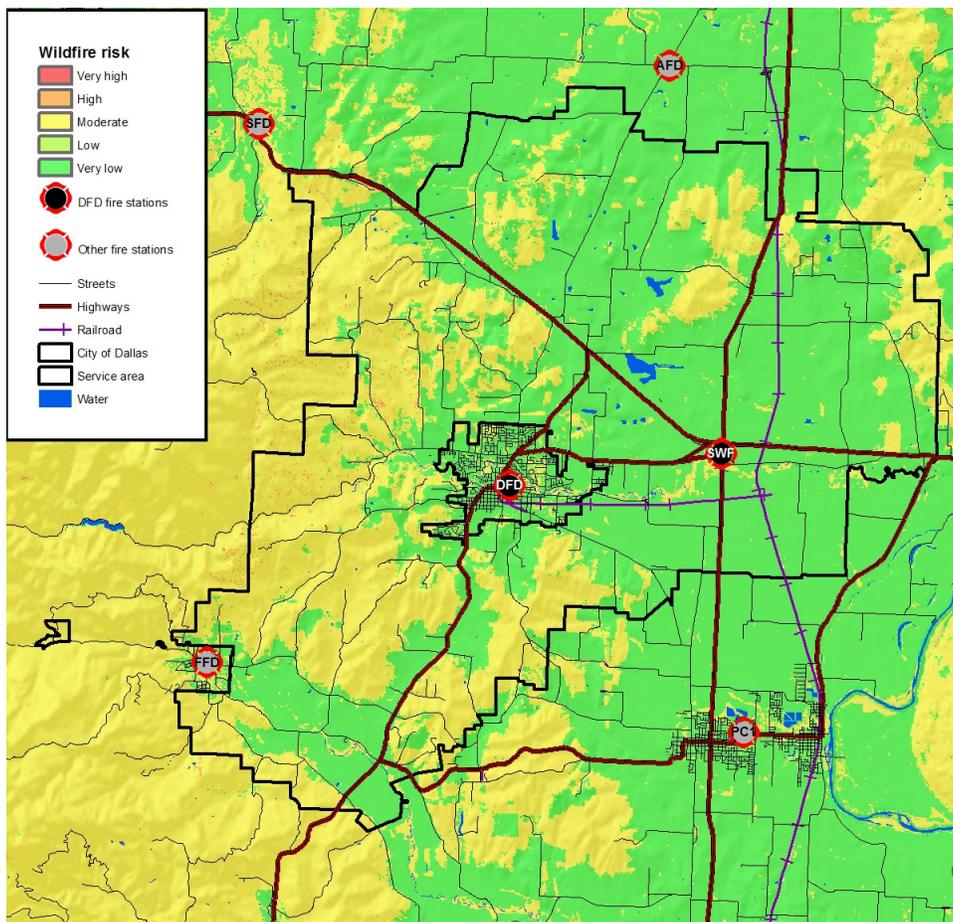


Wildfire Risk

The Dallas area climate, vegetation, and topography make wildland fire a regular but moderate risk to the community. Parts of the DFD service area have homes interspersed with large areas of natural vegetation. Many of these homes are located at the top of moderate to steep slopes, increasing the risk.

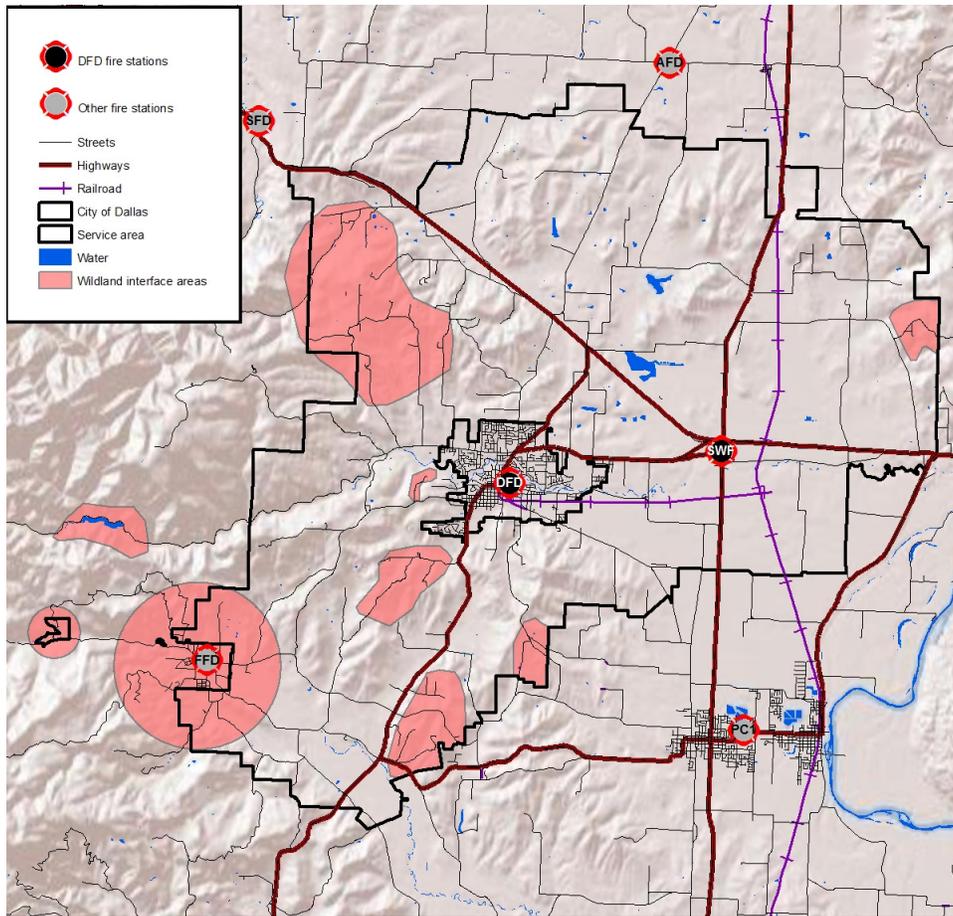
DFD experiences small to moderate, slow moving wildland fires on a regular basis. Warm summer temperatures and strong winds can carry wildland fires into homes. However, fuel types found in this region do not support aggressive fire behavior. The following map illustrates higher risk areas in and near the DFD service area. This information was developed from the Oregon Department of Forestry wildfire risk classification data.

Figure 16: Wildland Fire Hazard



DFD has mapped areas where numerous homes exist in close proximity to forested areas. These locations, known as wildland/urban interface areas pose particular risk since wildfire can more quickly and significantly impact people.

Figure 17: Wildland/Urban Interface Areas

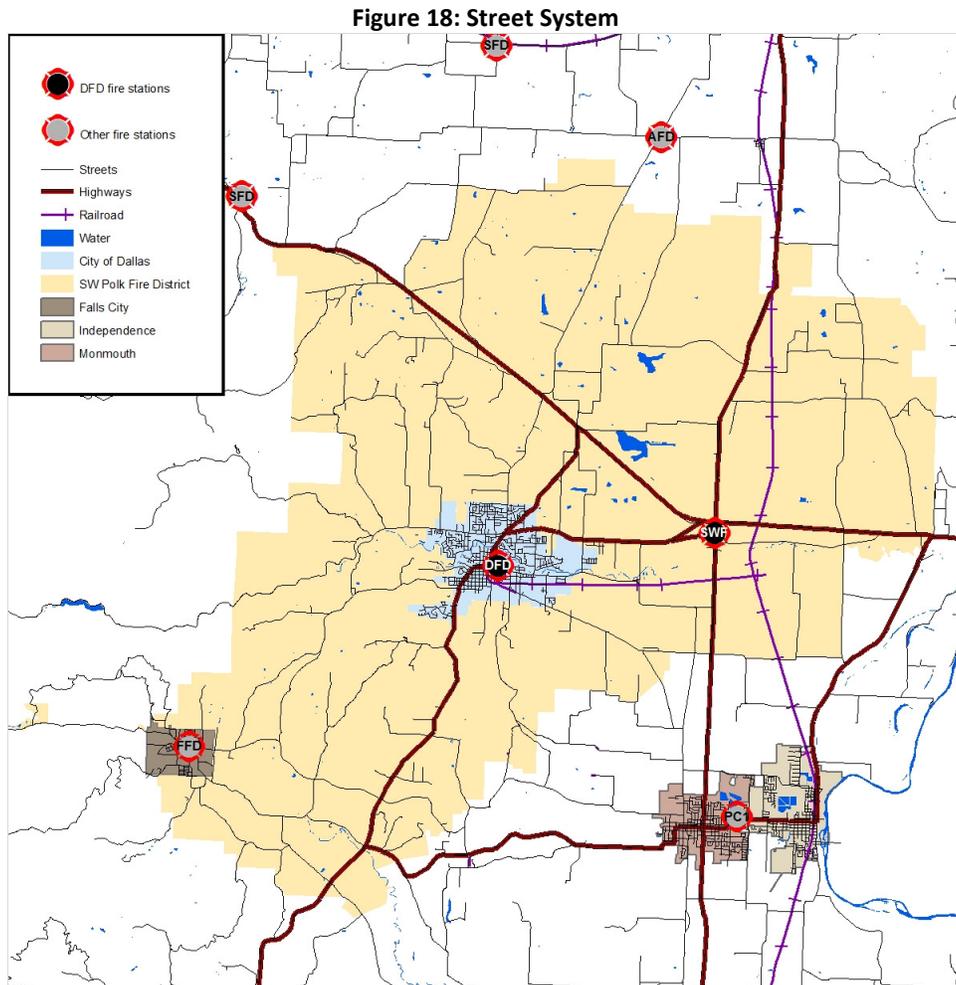


TRANSPORTATION RISKS

Transportation corridors provide necessary access and egress for the department. The configuration of transportation systems can also affect the response capability of emergency services. Limited access freeways and rail lines can interrupt street connectivity, forcing apparatus to negotiate a circuitous route to reach an emergency scene.

Roads

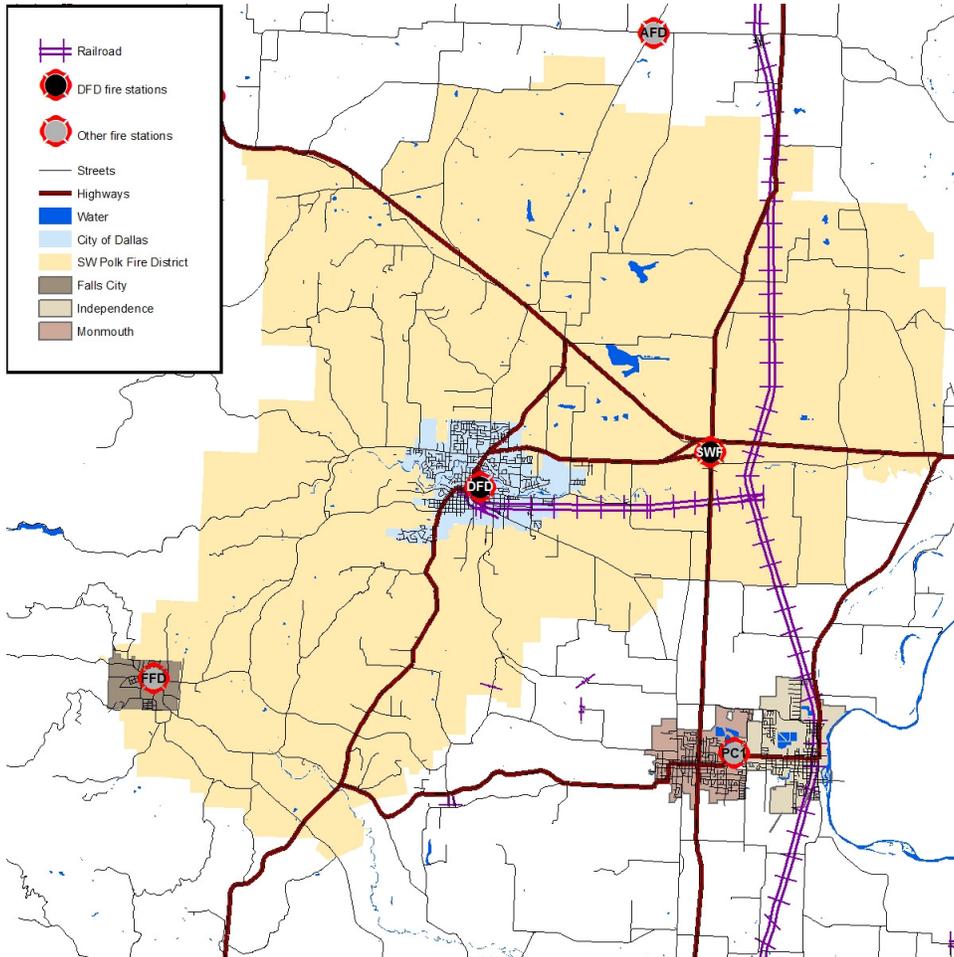
Surface streets dominate the DFD service area. A number of state highways and other major roads provide collector and arterial level traffic circulation. The balance of the department's service has a mix of relatively well interconnected street networks, neighborhoods characterized by cul-de-sacs and other dead end street systems, and rural roadways. Traffic signals within the service area are equipped with signal pre-emption equipment. This provides a significant response time performance advantage as well as better safety for motorists.



Railroads

Portland and Western Railroad operates a rail line in the western portion of DFD's service area. A currently unused spur line travels from this main line to the City of Dallas.

Figure 19: Railroads



Airport

There are no airports in the DFD service area.

PHYSICAL ASSETS PROTECTED

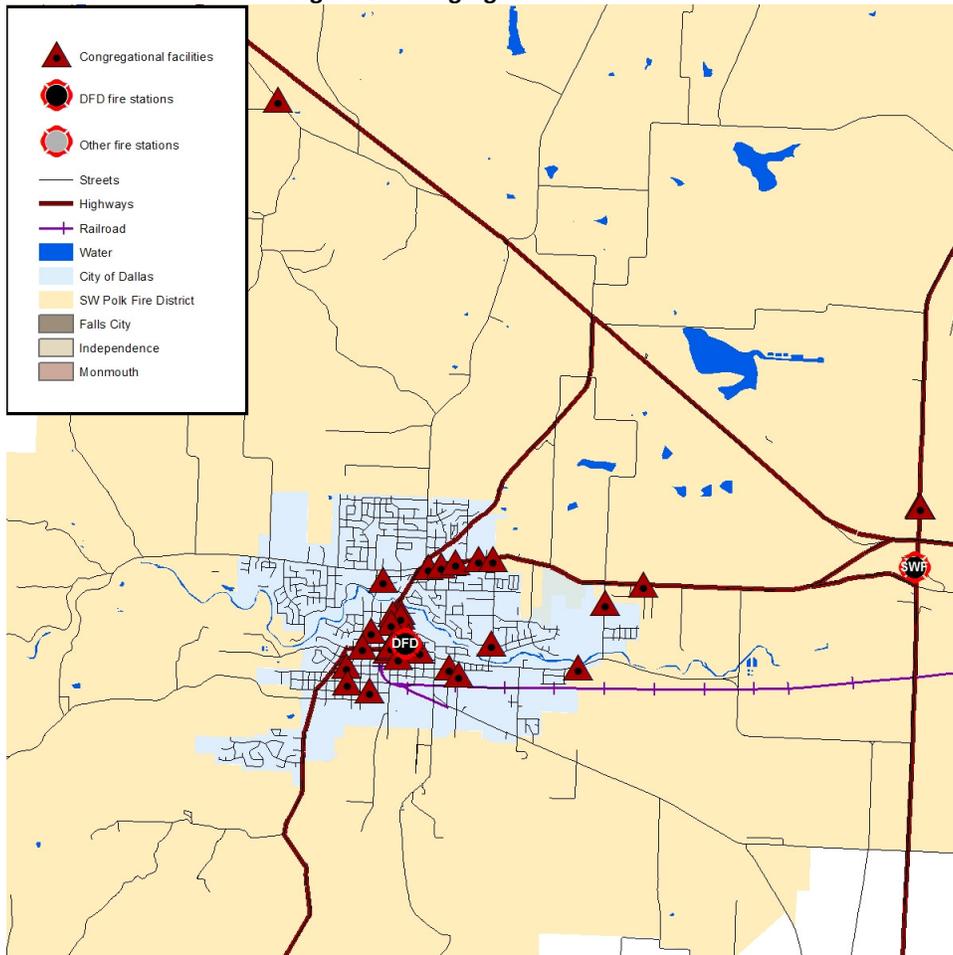
Many buildings in the city are used for purposes that create more significant risk than others. High occupancy buildings, facilities providing care to vulnerable populations, and others may require greater numbers of emergency response resources during an emergency. This section draws on information from DFD records and other sources.

Congregational

Numerous buildings lie within the DFD service area in which large numbers of people gather for entertainment, worship, and such. A variety of nightclubs, theaters, and other entertainment venues exist primarily in the downtown area.

These facilities present additional risk, primarily for mass casualty incidents. Fire, criminal mischief, and potentially terrorism, could cause a major medical emergency requiring significant emergency service resources. The following figure shows the locations of buildings identified as congregational facilities.

Figure 20: Congregational Facilities

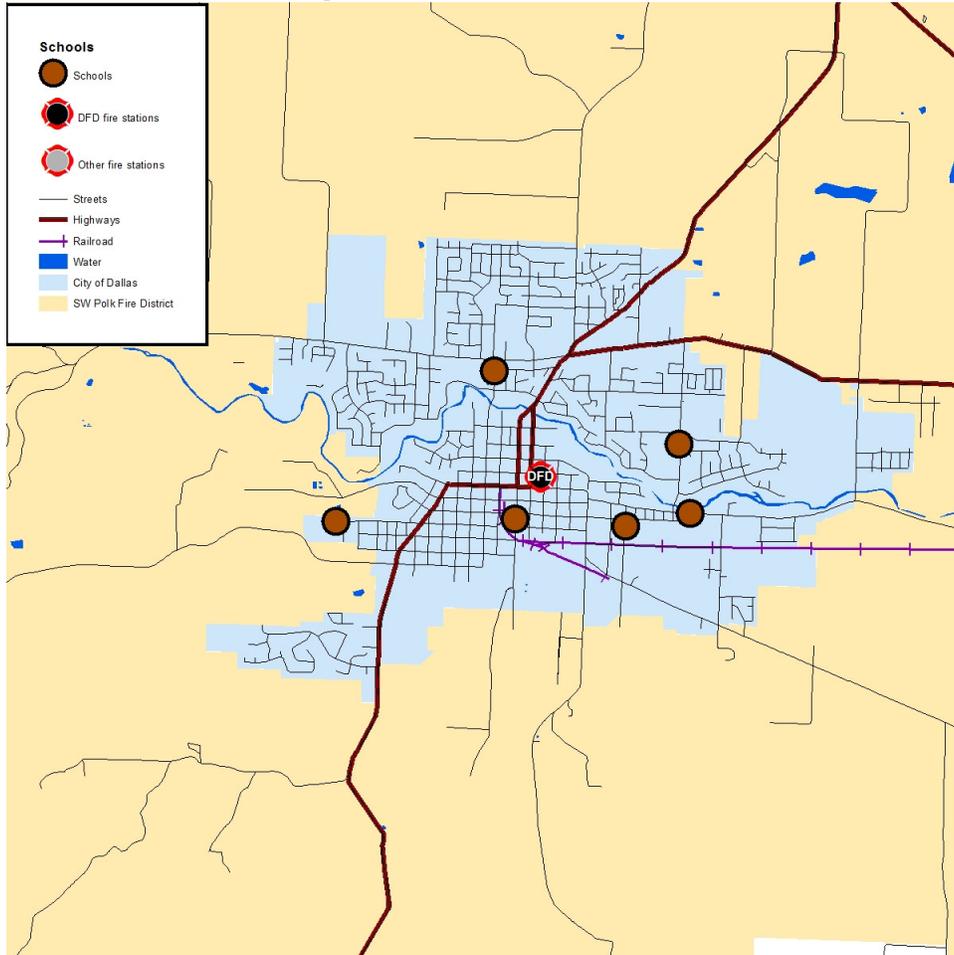


Schools/Day Care

Several school districts overlay the DFD service area. The Dallas School District serves most of the community. Current enrollment is approximately 3,200 students.

The following figure shows the locations of the District's six school facilities. All are located within the City of Dallas.

Figure 21: Public School Facilities

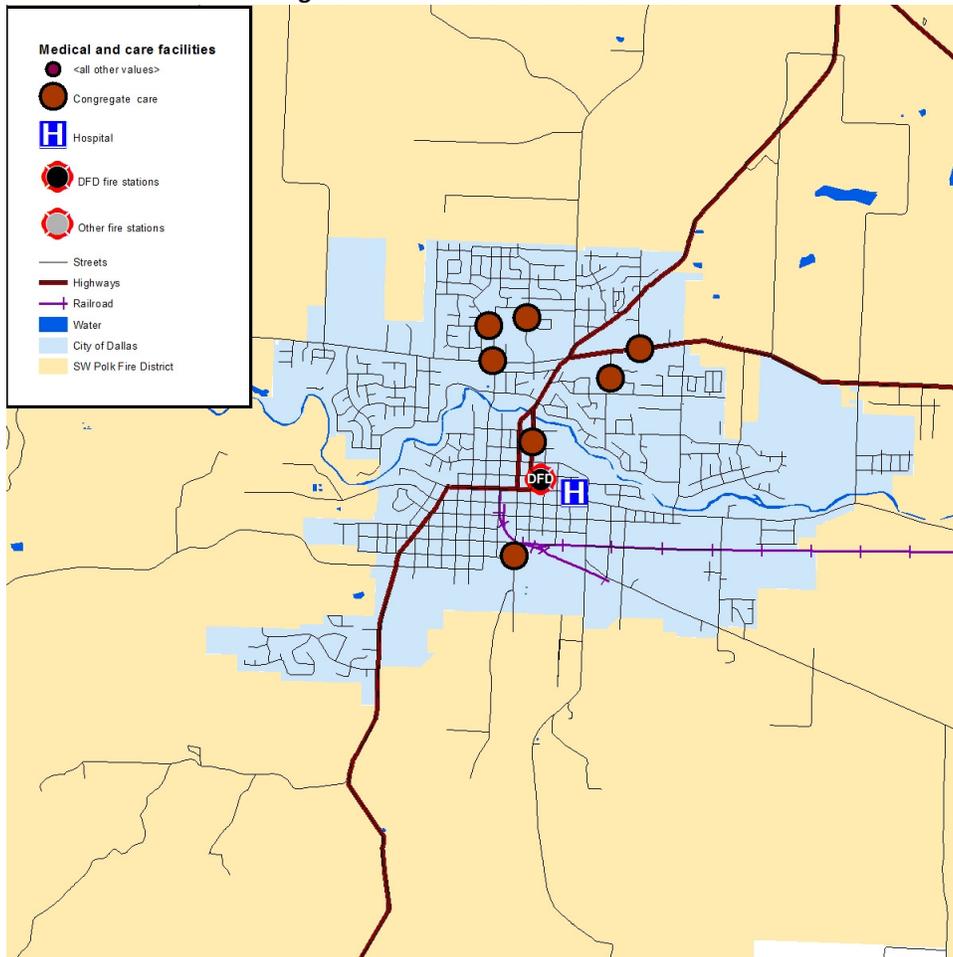


Medical and Congregate Care Facilities

Medical and congregate care facilities, particularly hospitals and nursing homes, house vulnerable populations. Although these facilities are generally built of highly fire resistive construction with built-in fire suppression, emergencies can occur that require the quick movement of patients away from the hazard.

The following figure shows the location of the one hospital and the congregate care and assisted living facilities. All are located within the City of Dallas.

Figure 22: Medical and Care Facilities

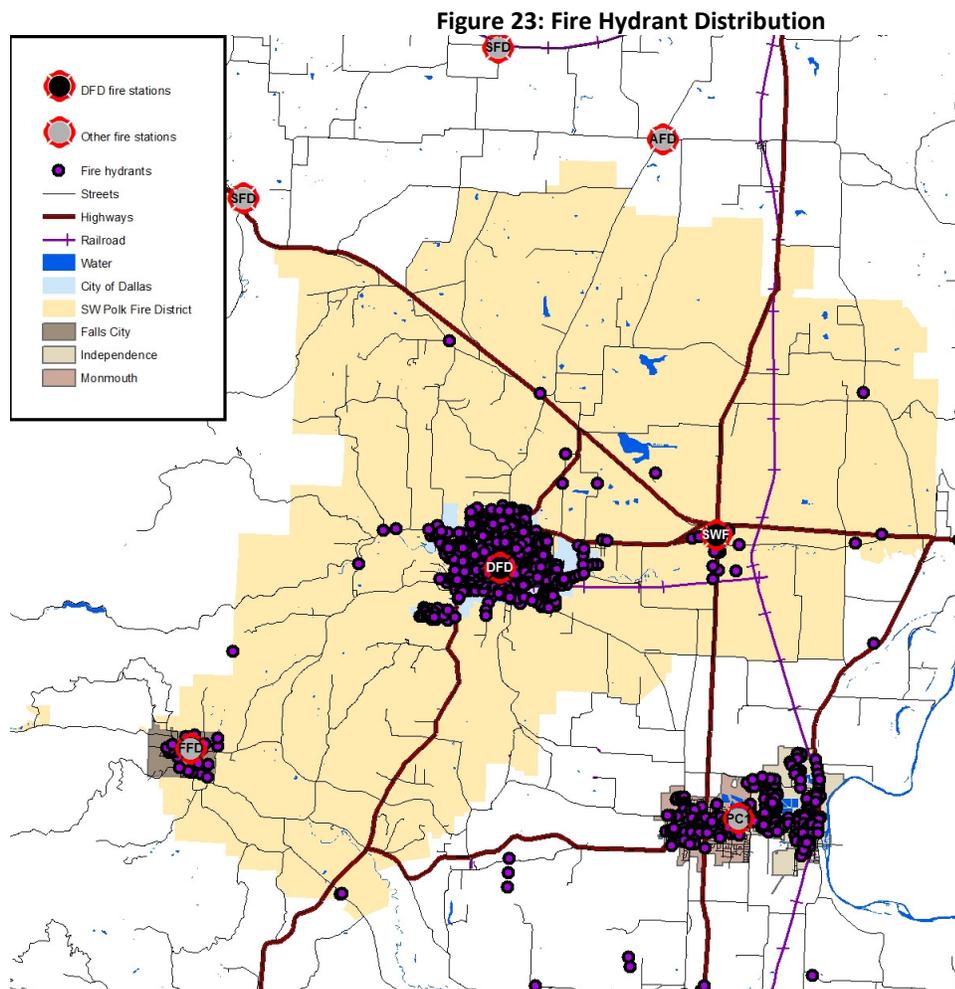


Other Critical Infrastructure

In this section, other types of infrastructure critical to a community are discussed in general terms. Though DFD does not have any unusual critical community infrastructure, it is important the fire department plan for emergencies at any of these facilities.

Water Distribution

The most obvious concern to the fire department is the water reservoir, water main, and fire hydrant system. Providing sufficient storage, distribution, and access to this valuable firefighting resource through well-distributed fire hydrants is very important. The following figure shows that fire hydrants are distributed through virtually all developed areas within the City of Dallas and in some portions of SWP.



Communications

Emergency communication centers and the associated transmitting and receiving equipment are essential facilities for emergency response. Willamette Valley Communications Center provides call receipt and dispatch service to a number of regional fire agencies. Though not located within the DFD service area, this center provides for the answering of 9-1-1 calls for help, dispatching of fire and other emergency responders, and important support to the incident management function.

There are other communication facilities and equipment that are equally important to the community and government operations within the DFD service area. These are the telephone company central offices and the transmission lines of local telephone service providers. Internet service providers, along with wireless cellular communication providers, provide essential communication capabilities for the community as well as emergency personnel through their facilities and equipment.

Energy

Previously discussed community services, from communications to traffic signals to normal operations, require the use of energy. Whether it is electricity generation and transmission systems, fuel distribution and storage tanks, or natural gas pipelines and regulator stations, the community is dependent upon energy sources.

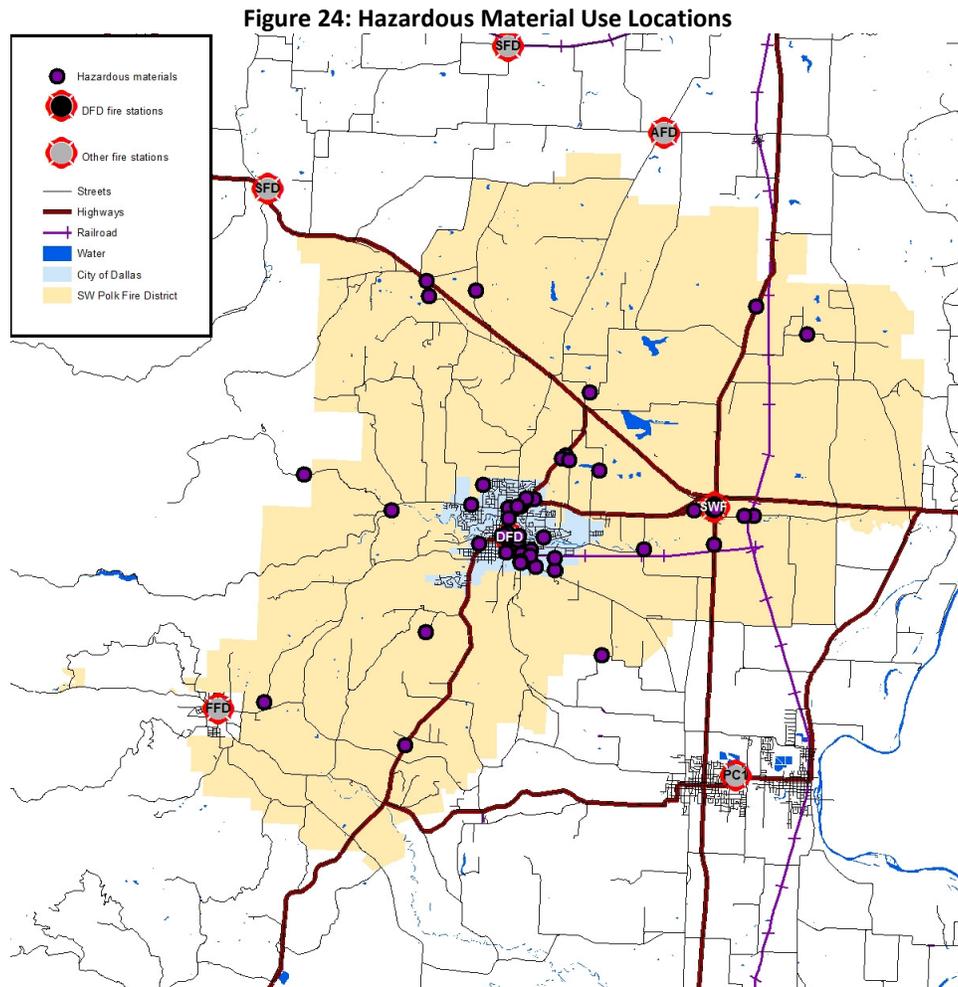
Structural Risks

Certain buildings, their contents, functions, and size present a greater firefighting challenge and require special equipment, operations, and training. Information for this section has been drawn from DFD records and the Insurance Services Office (ISO) database.

Hazardous Materials

Buildings that have been identified as containing hazardous materials can create a dangerous environment to the community as well as the firefighters during a spill or fire. Special equipment such as protective clothing and sensors, along with specialized training, is necessary to successfully mitigate a hazardous materials incident.

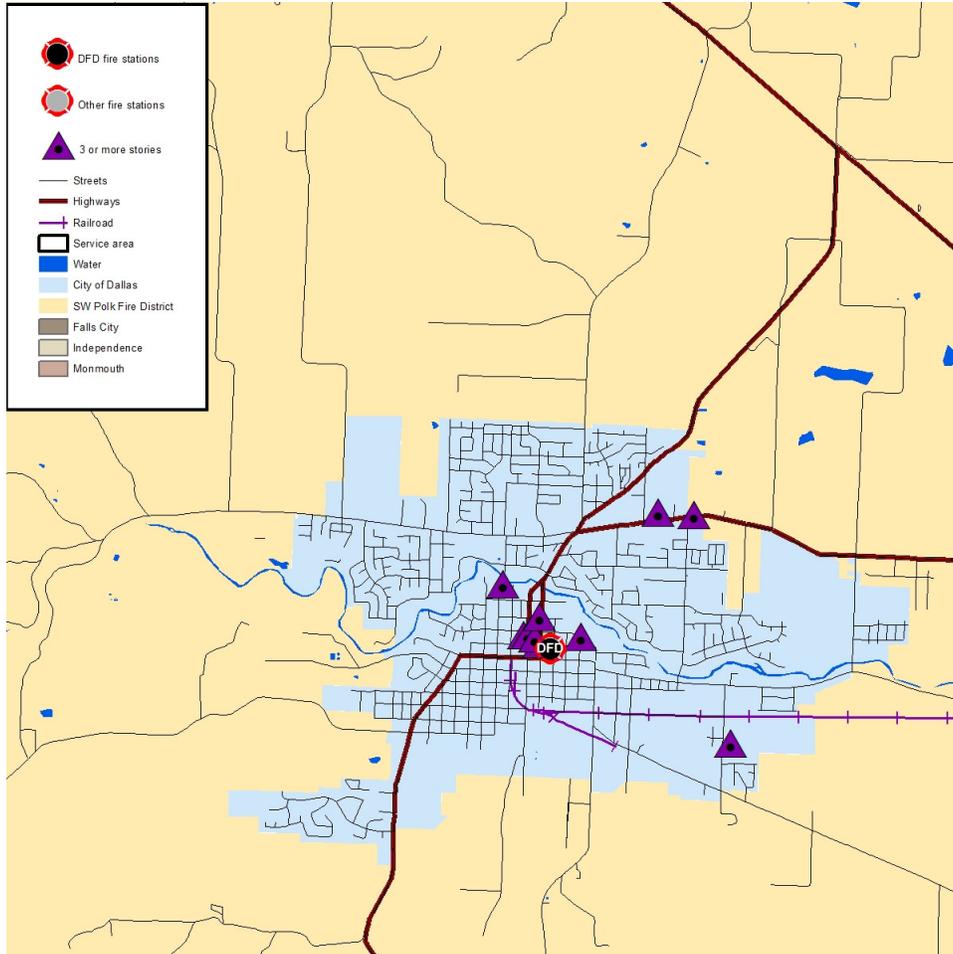
The DFD provides operations level hazardous materials emergency response supported by other agencies within the region. The following figure shows the locations of the facilities classified as using more than small quantities of hazardous materials.



Buildings Three or More Stories in Height

The Insurance Services Office calls for a ladder truck within two and one half miles of developed areas containing buildings three or more stories in height. Accessing the upper floors and roof of buildings this tall typically requires ladder truck capability as ground ladders may not provide access. The following figure shows the locations of many of the buildings in DFD service area three or more stories in height.

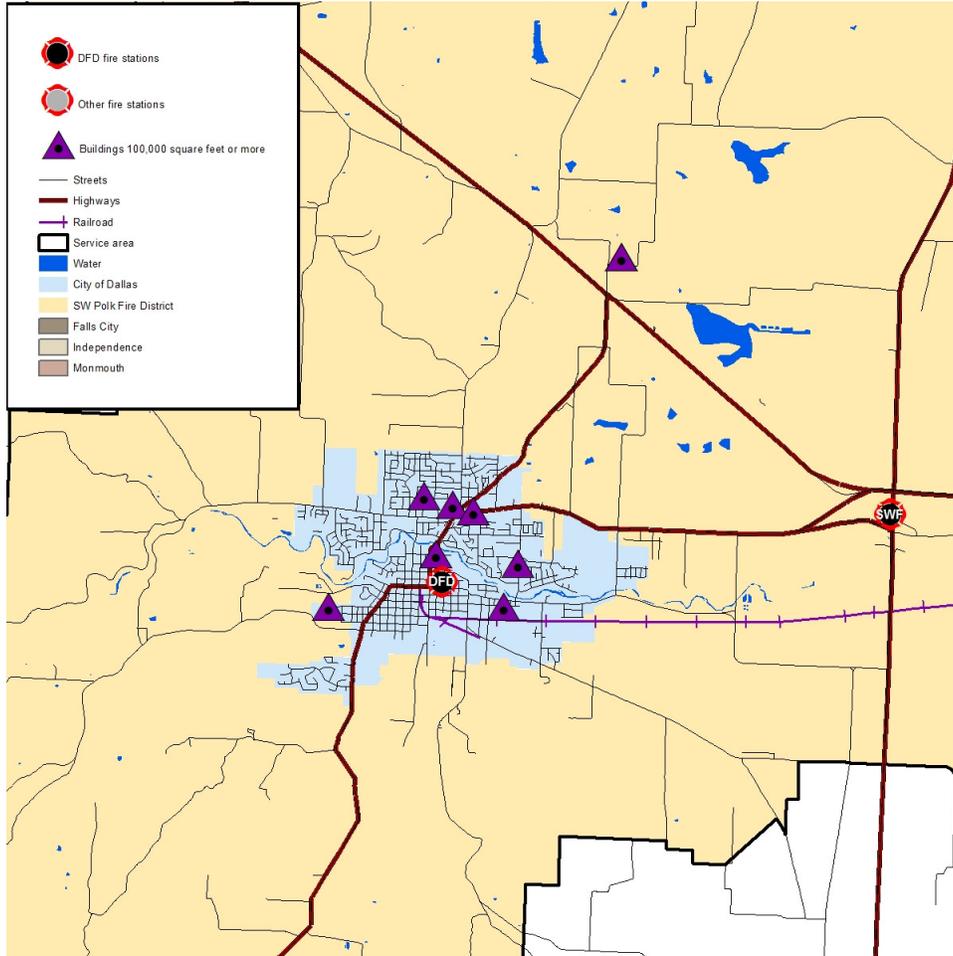
Figure 25: Buildings Three or More Stories in Height



Large Square Footage Buildings

Large buildings, such as warehouses, malls, and large “box” stores require greater volumes of water for firefighting and require more firefighters to advance hose lines long distances into the building. The following figure shows the locations of buildings 100,000 square feet and larger according to the ISO database.

Figure 26: Buildings – 100,000 Square Feet and Larger

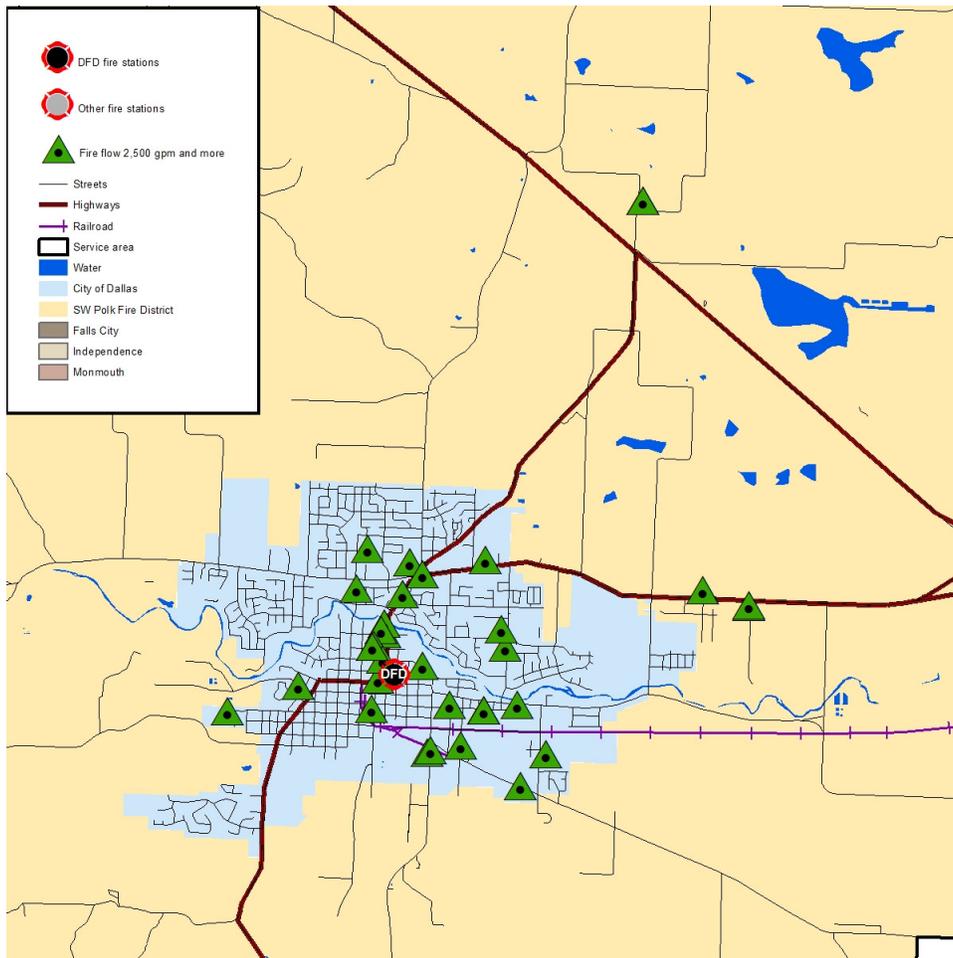


Needed Fire Flow

The Insurance Services Office (ISO) inspects buildings within a community to develop an estimate of “needed fire flow” (NFF) or the amount of water flow (in gallons per minute [gpmGPM]) that a fire department would need to produce in order to suppress the fire in a building based on its height, square footage, construction material, and roof type, among other factors.

The following map shows the locations of buildings identified by the ISO as having a needed fire flow in excess of 2,500 gallons per minute.

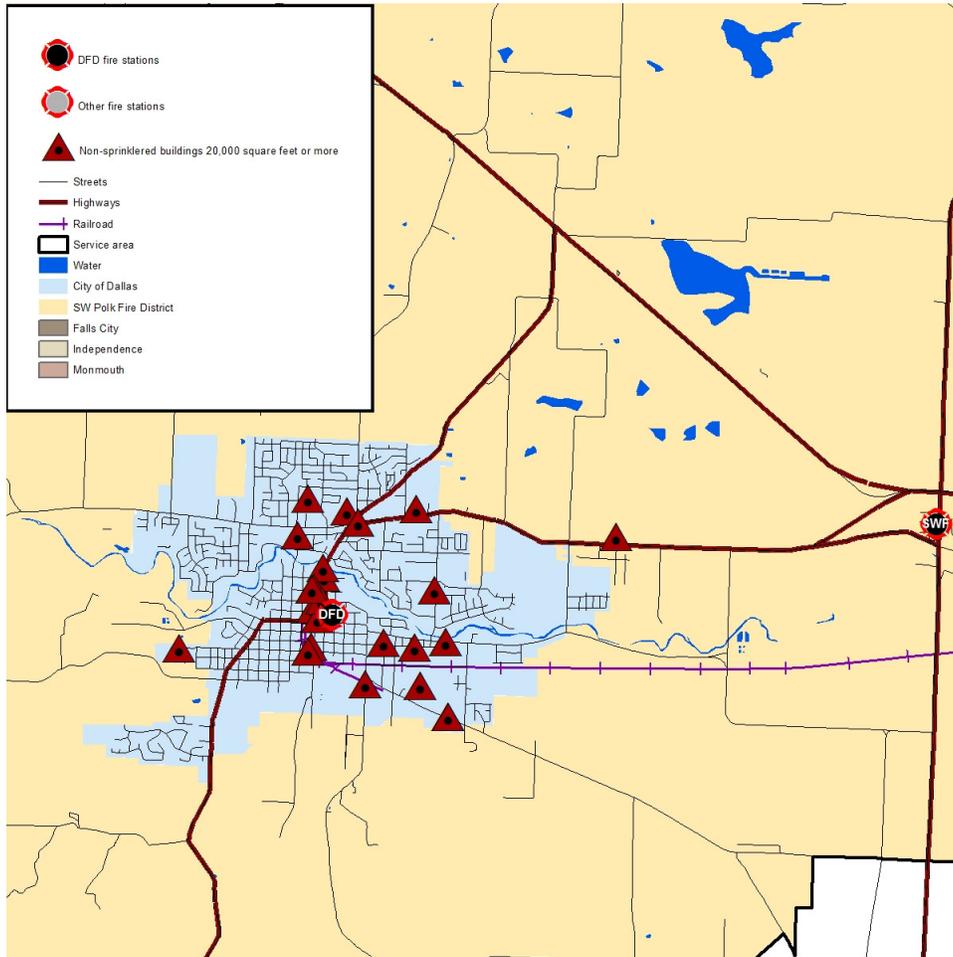
Figure 27: Buildings – Needed Fire Flow 2,500 GPM or more



Unprotected Large Buildings

Buildings that are protected by automatic fire sprinkler systems are much safer from fire than others. While modern building codes now require fire sprinklers in most large buildings, the DFD service area contains a number of large buildings that are not so protected. The following figure shows the locations of non-sprinklered buildings 20,000 square feet and larger according to the ISO database.

Figure 28: Large Buildings not Protected by Fire Sprinkler Systems



Terrorism

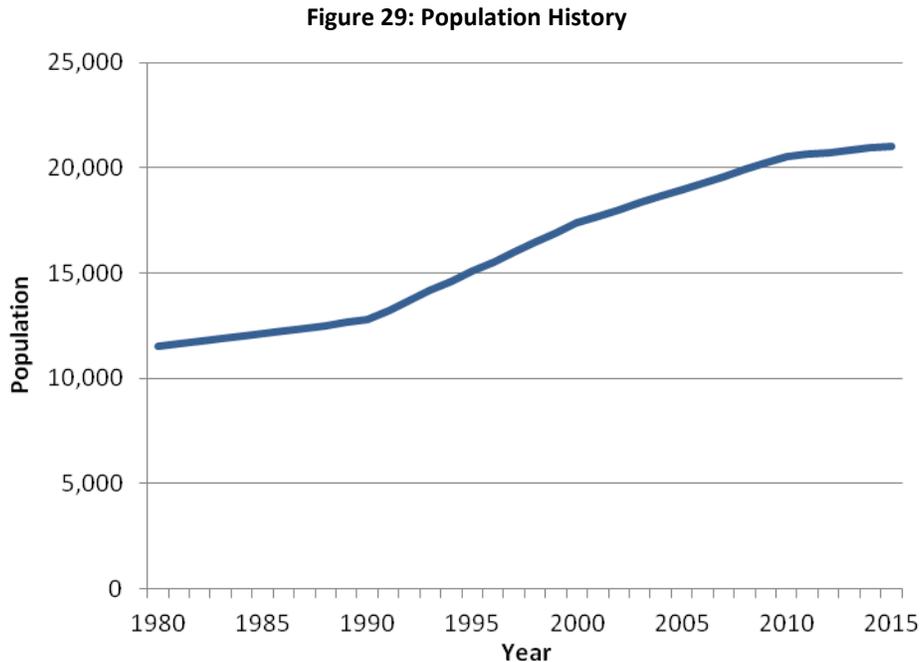
Dallas is a potential target for terrorism. Most of the previous categorized risks in the community are targets for such activity. In addition, the city hosts public gathering events during the year.

Dallas is also in close proximity to the City of Salem, which also has a terrorism risk. DFD may either be impacted by the consequence of a terrorist act in Salem or be asked to support Salem in the aftermath of such an event. The fire department needs to be vigilant in its training and preparedness in the event one or more coordinated acts of terror occur in the region.

POPULATION GROWTH

Current Population Information

DFD's population has grown slowly, with an average annual growth rate of 3.3 percent between 1980 and 2015. At the time of this study, the current service area population is estimated at 22,040. The following figure illustrates resident population growth over the past 25 years.



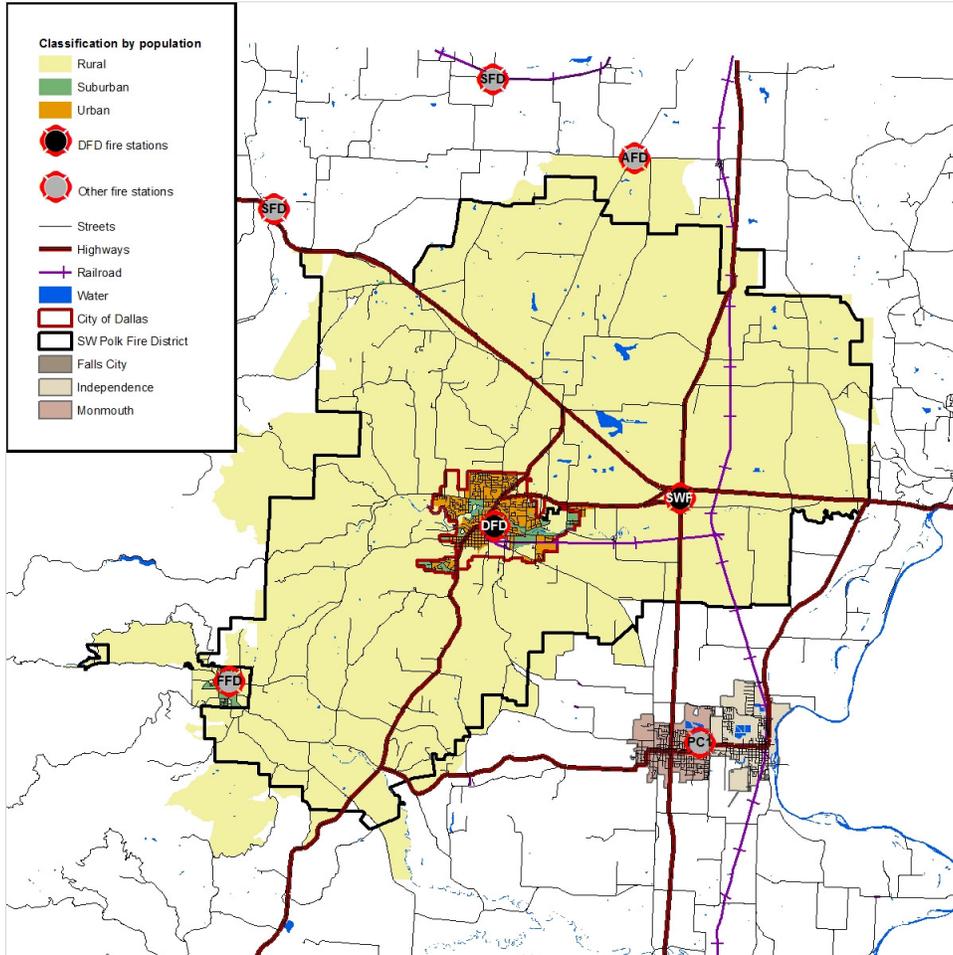
Most communities contain areas with different population densities and property risk allowing the community's policy makers to specify different response performance objectives by geographic area. The classifications are identified as:

- **Metropolitan**—Geography with populations of over 200,000 people in total and a population density predominately over 3,000 people per square mile. These areas are distinguished by inner city neighborhoods, numerous mid-rise and high-rise buildings, often interspersed with smaller structures.
- **Urban**—Geography with a population of over 30,000 people and/or a population density predominately over 2,000 people per square mile. These areas are characterized by significant commercial and industrial development, dense neighborhoods, and some mid-rise or high-rise buildings.
- **Suburban**—Geography with a population of 10,000 to 29,999 and/or a population density predominately between 1,000 and 2,000 people per square mile. These areas are characterized by single and multifamily neighborhoods, and smaller commercial developments
- **Rural**—Geography with a total population of less than 10,000 people or with a population density of less than 1,000 people per square mile. These areas are characterized by low density residential, little commercial development, and significant farm or open space uses.

- **Wilderness/Frontier/Undeveloped**—Geography that is both rural and not readily accessible by a publicly or privately maintained road.

The following figure displays the DFD service area population density by classification based on Census 2010 data. Census data only includes people who live full-time in their home. It does not include people who visit or reside temporarily in a community.

Figure 30: Population Density, 2010

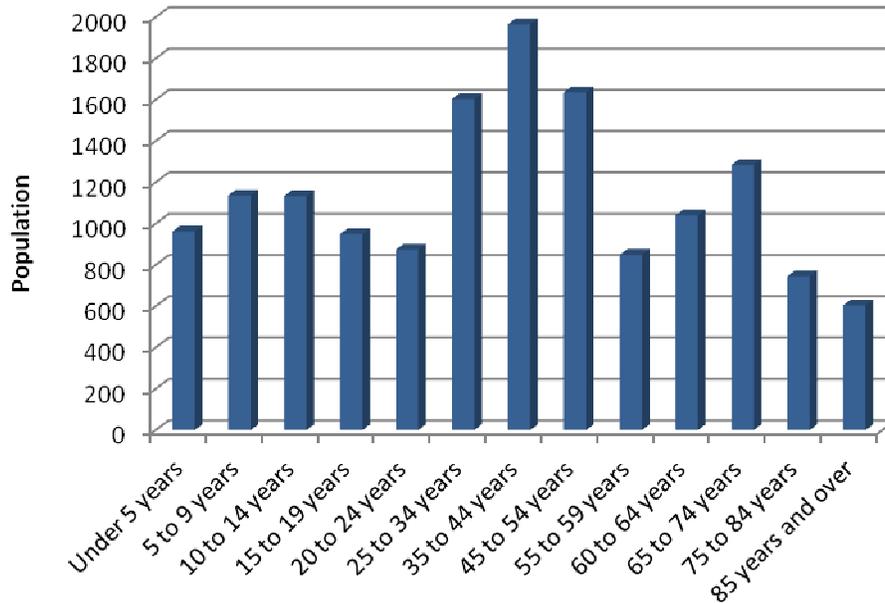


Areas of higher fire and life risk require greater numbers of personnel and apparatus to effectively mitigate emergencies. Areas with a higher incident activity require additional response units to ensure reliable response. Staffing and deployment decisions for different regions of the city should be made in consideration of the level of risk in each.

DFD's service area, based on population density, is of two classifications: urban and rural. The community's risk classifications should influence how response resources are distributed now and in the future. Portions of the ambulance service area served by DFD are wilderness/frontier.

One of the factors that can influence emergency service demand, particularly emergency medical services, is the population's age. The following figure examines the DFD's population segmented by age groups. This data is based on 2014 American Community Survey estimates.

Figure 31: Estimated Population by Age



Based on the preceding figure, 17.8 percent of the population is 65 years of age or older and 6.5 percent of the population is under five years of age. This places a total of 24.3 percent of the area's population within the age groups that are at highest risk in residential fire incidents and account for some of the highest use of emergency medical services. Senior citizens can have difficulty escaping from fire due to physical limitations. Seniors also tend to use emergency medical services more frequently than younger persons. As the population ages, this will create an increase in service demand for emergency medical services.

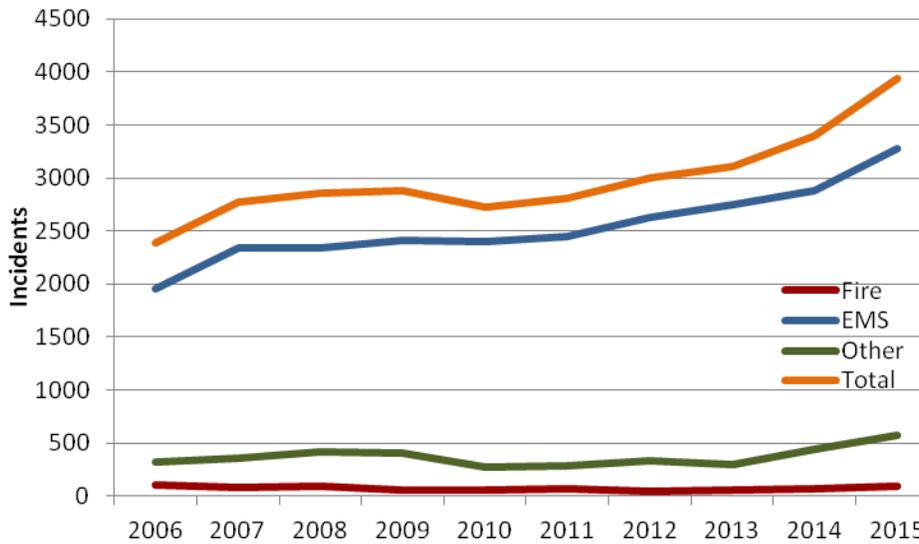
The very young also represent a vulnerable population, both in regard to their ability to escape a structure fire as well as their susceptibility to serious medical ailments such as asthma, traumatic events, choking, or injury from vehicular accidents.

HISTORIC SYSTEM RESPONSE WORKLOAD

Before a full response time analysis is conducted, it is important to first examine the level of workload (service demand) that a fire department experiences. Higher service demands can strain the resources of a department and may result in a negative effect on response time performance.

The following figure illustrates how response workload has changed over time. Total responses have increased 65 percent over the nine years, primarily driven by the increase in emergency medical responses.

Figure 32: Response Workload History, 2005 – 2015



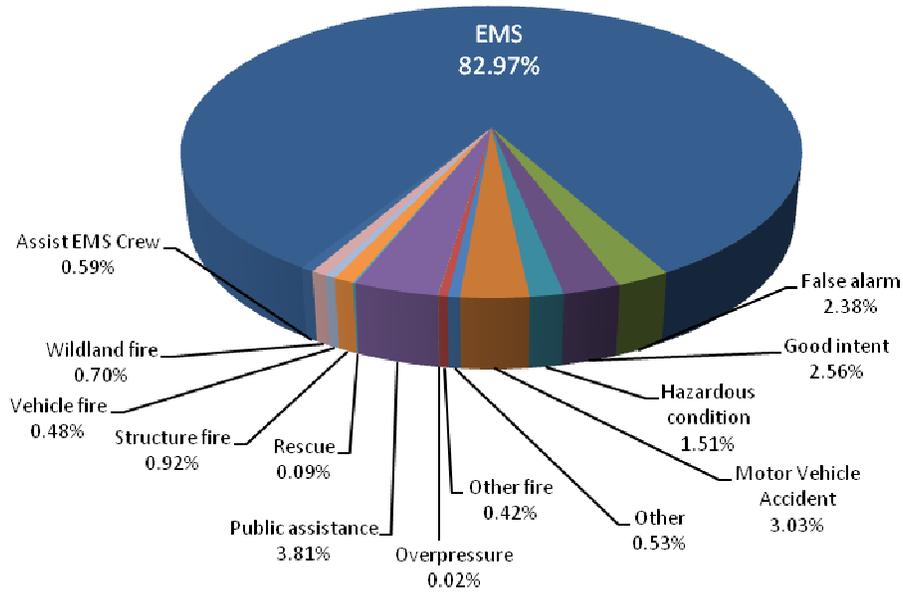
Incident data used for the evaluation of current performance was all responses made between October 1, 2013 and September 30, 2014 (2014) and all responses between October 1, 2014 and September 30, 2015 (2015). The following figure lists total responses for each year.

Figure 33: Responses by Year

	2014	2015	Total
City of Dallas	2,546	2,829	5,375
SW Polk Rural Fire District	632	432	1,064
Mutual Aid to other agencies	102	90	192
Total	3,280	3,351	6,631

The next figure shows responses by type of incident for the combined study period. Emergency medical type responses (EMS and motor vehicle accidents) are the most common at 86 percent of total responses.

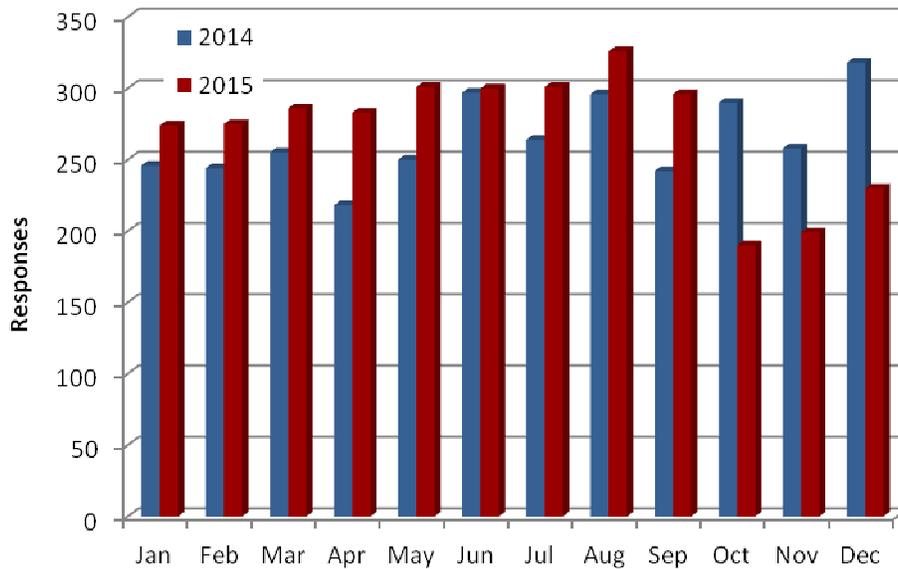
Figure 34: Responses by Type of Incident



Temporal Analysis

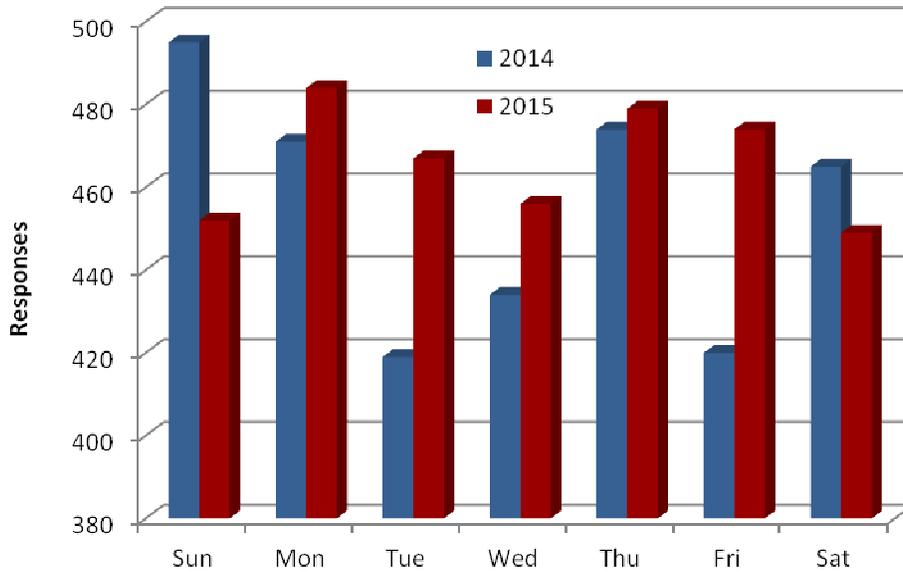
A review of incidents by time of occurrence also reveals when the greatest response demand is occurring. The following figures show how activity and demand changes for DFD based on various measures of time. The following figure shows response activity during the study period by month. Summer months tend to be the busiest.

Figure 35: Monthly Response Workload



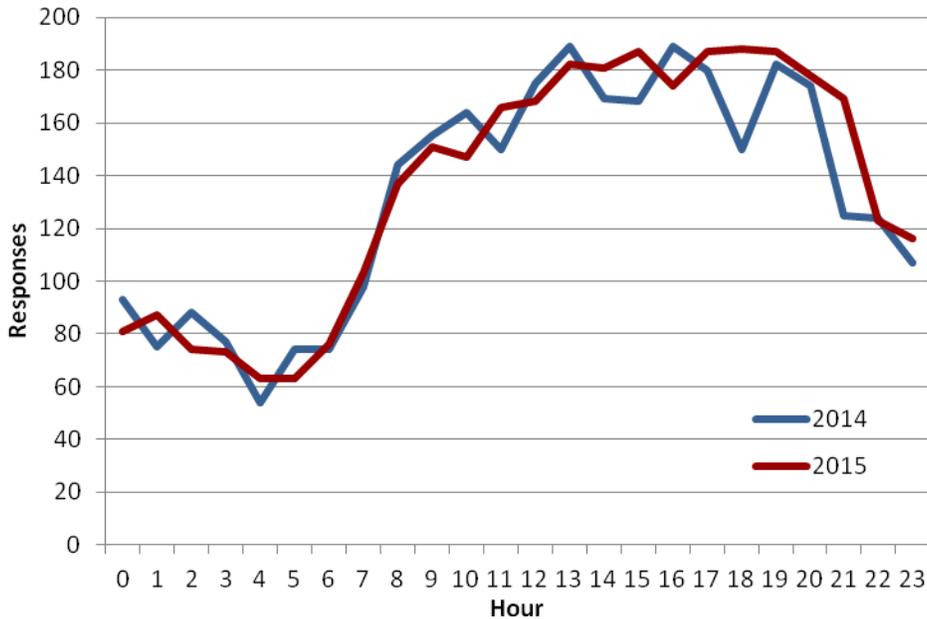
Next, response workload is compared by day of week. Activity by day of week varied considerably between 2014 and 2015.

Figure 36: Daily Response Workload



The time analysis that always shows significant variation is response activity by hour of day. Response workload directly correlates with the activity of people, with workload increasing during daytime hours and decreasing during nighttime hours as shown in the following figure. Incident activity is at its highest between 8:00 AM and 8:00 PM.

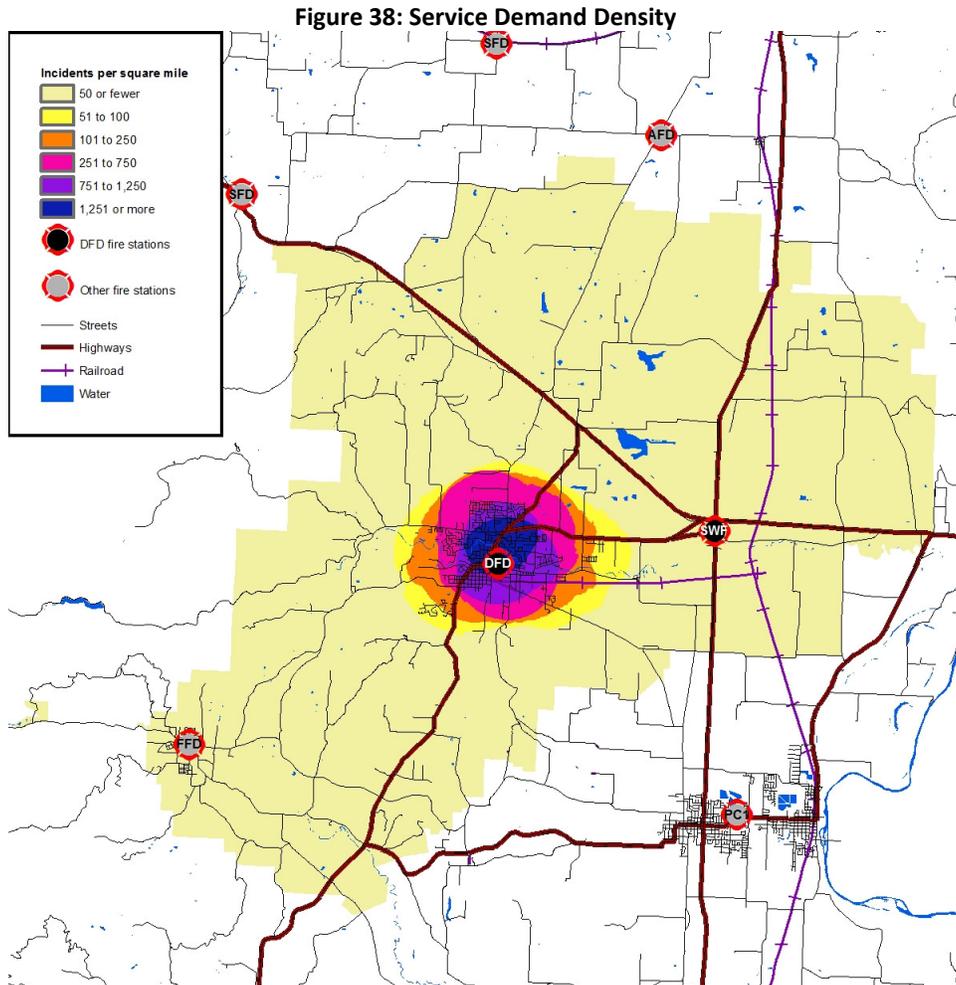
Figure 37: Hourly Response Workload



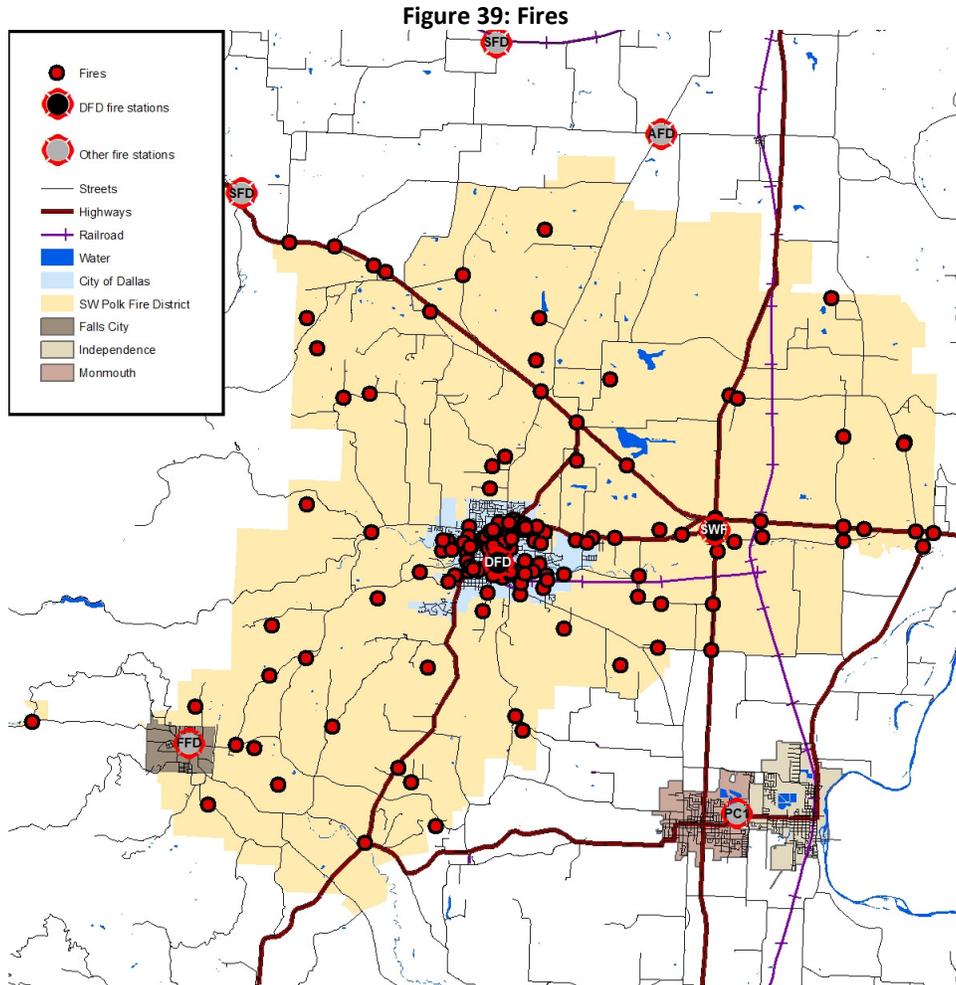
Spatial Analysis

In addition to the temporal analysis of the current service demand, it is useful to examine geographic distribution of service demand. The following figure series indicates the distribution of emergency incidents in the DFD service area during the study period.

The first figure displays the number of incidents per square mile within various parts of the service area. The area of greatest service demand is within the City of Dallas.

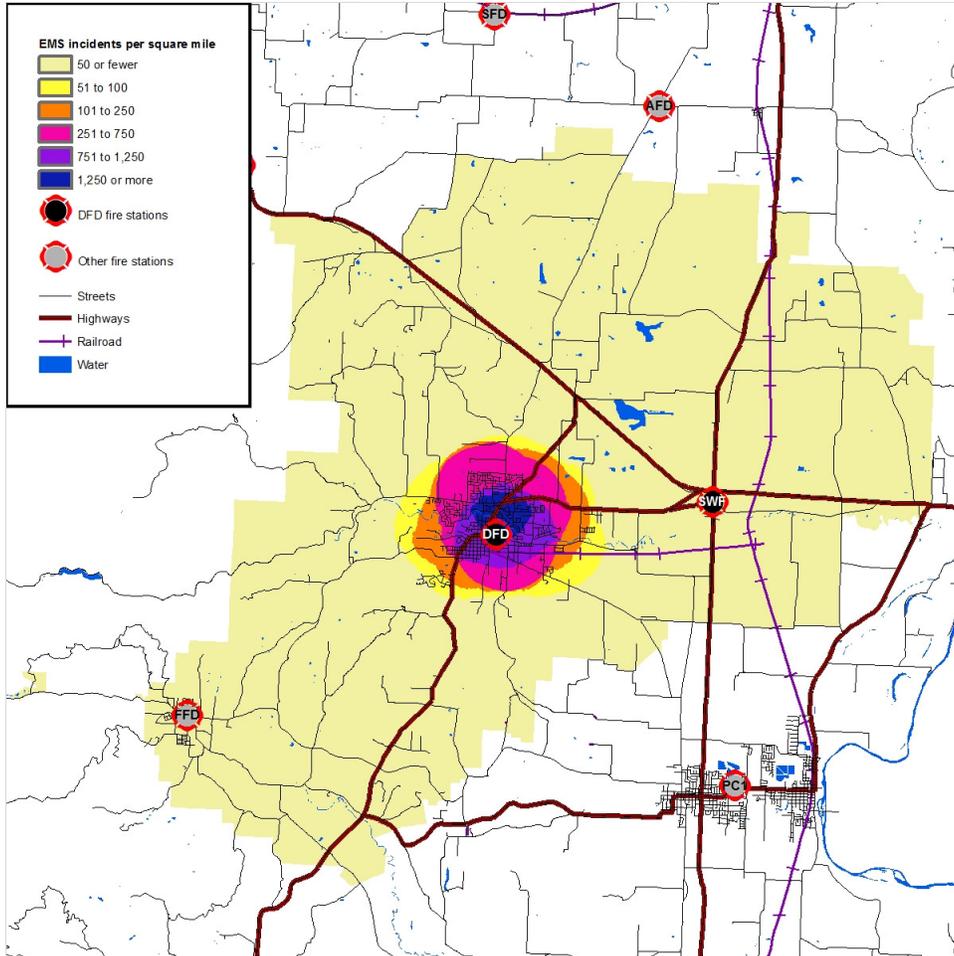


The preceding figure reflects all calls served by DFD. Service demand can vary by area based on incident type. The following figure displays the location of the fires in the service area during the study period. This illustrates that fire incidents are most concentrated in the City of Dallas.



Similarly, emergency medical incidents also occur in greater concentration in areas of higher population density. The following figure displays emergency medical incidents per square mile during the study period.

Figure 40: Emergency Medical Incidents per Square Mile



STATION AND UNIT WORKLOAD ANALYSIS

A review of workload by station and response unit can reveal much about response time performance. Although fire stations and response units may be distributed in a manner to provide quick response, that level of performance can only be obtained when the response unit is available in its primary service area. If a response unit is already on an incident and a concurrent request for service is received, a more distant response unit will need to be dispatched. This will increase response times.

Fire Station Workload

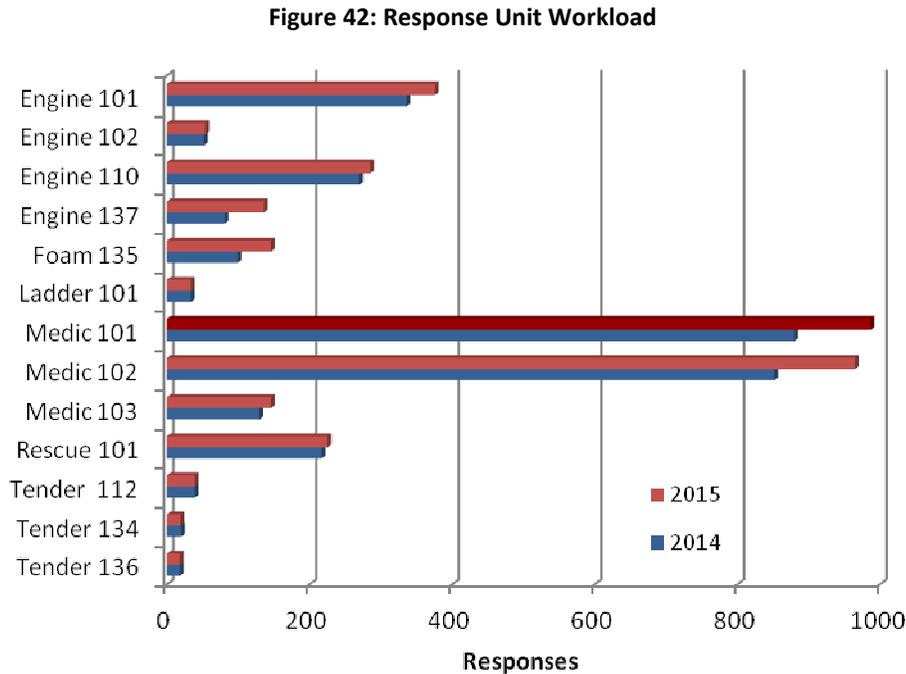
As noted earlier, response workload is not evenly distributed across the DFD’s service area. Areas of higher population typically present a greater demand for fire department services. The following table lists DFD response activity by fire station area during the study period.

Figure 41: Responses by Fire Station Area

Station	2014	2015	Total
Dallas Station 100/110	2,546	2,829	5,374
SWP Station 130	632	432	1,064
Other agency station areas	102	90	192
Total	3,280	3,351	6,631

Response Unit Workload

The workload on individual response units during the study period is shown in the following table. Individual response unit workload can be greater than the workload in its home station area. Many incidents, such as structure fires, require more than one response unit.



The amount of time a given unit is committed to an incident is also an important workload factor. The following table illustrates the average time each unit was committed to an incident, from initial dispatch until it cleared the scene.

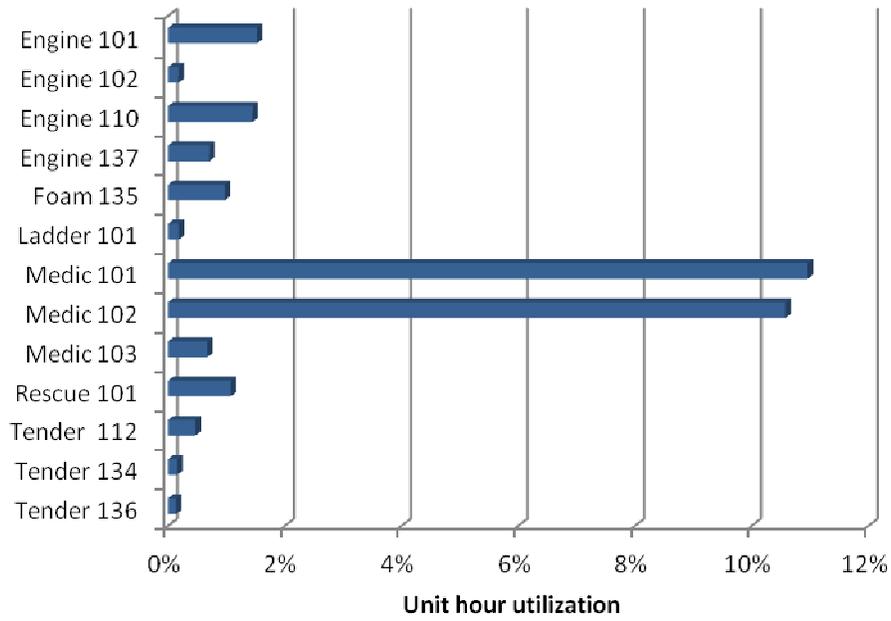
Figure 43: Average Time Committed to an Incident by Unit

Unit	Total responses during study period	Average minutes per response
Engine 101	712	22.53
Engine 102	106	18.18
Engine 110	555	27.47
Engine 137	217	34.28
Foam 135	245	41.79
Ladder 101	68	28.66
Medic 101	1,867	61.73
Medic 102	1,817	61.19
Medic 103	276	25.60
Rescue 101	442	25.60
Tender 112	78	63.28
Tender 134	39	42.50
Tender 136	36	39.98

Unit hour utilization is an important workload indicator. It is calculated by dividing the total time a unit is committed to all incidents during a year divided by the total time in a year. Expressed as a percentage, it describes the amount of time a unit is not available for response since it is already committed to an incident. The larger the percentage, the greater a unit’s utilization, and the less available it is for assignment to an incident.

Unit hour utilization is an important statistic to monitor for those fire agencies using percentile-based performance standards, as does DFD. In DFD’s case, where performance is measured at the 90th percentile, unit hour utilization greater than 10 percent means that the response unit may not be able to provide on-time response to its 90 percent target even if response is its only activity. Only Medic 101 and 102 exceed 10 percent unit hour utilization.

Figure 44: Unit Hour Utilization

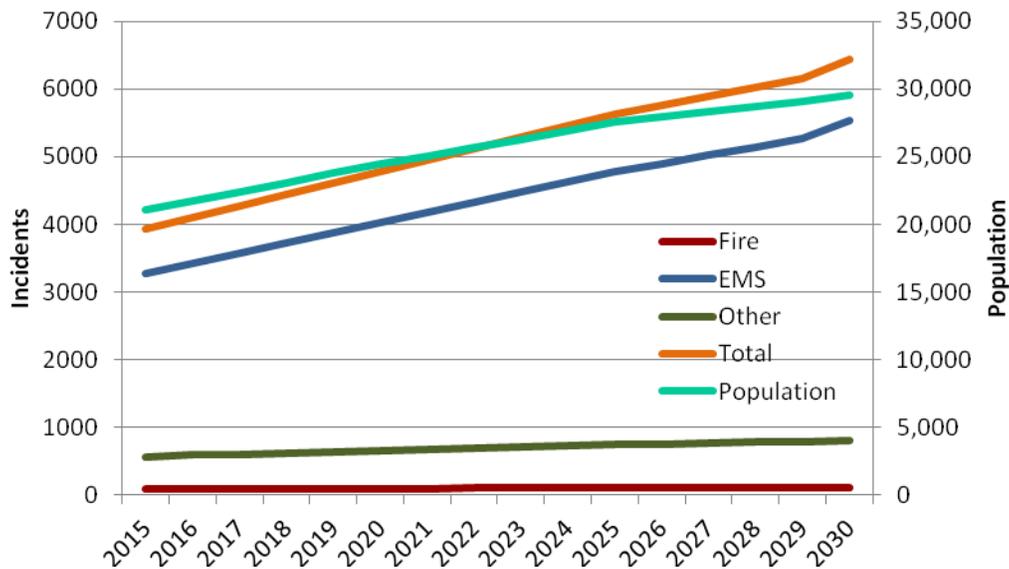


POPULATION AND INCIDENT WORKLOAD FORECAST

A population forecast for the City of Dallas and Polk County was prepared by the Oregon Office of Economic Analysis and published in 2004. Population growth for the City of Dallas was at the time forecast to reach 31,154 by the year 2030. Very modest growth was forecast for unincorporated Polk County.

The 2008 recession impacted community growth such that the current population does not match the forecast. Forecast estimates were used but reduced by the same percentage current population compares to forecast population. Using the revised population forecast and utilization rates for the various emergency services requested of DFD, the following population and workload forecast was prepared.

Figure 45: Population and Workload Forecast



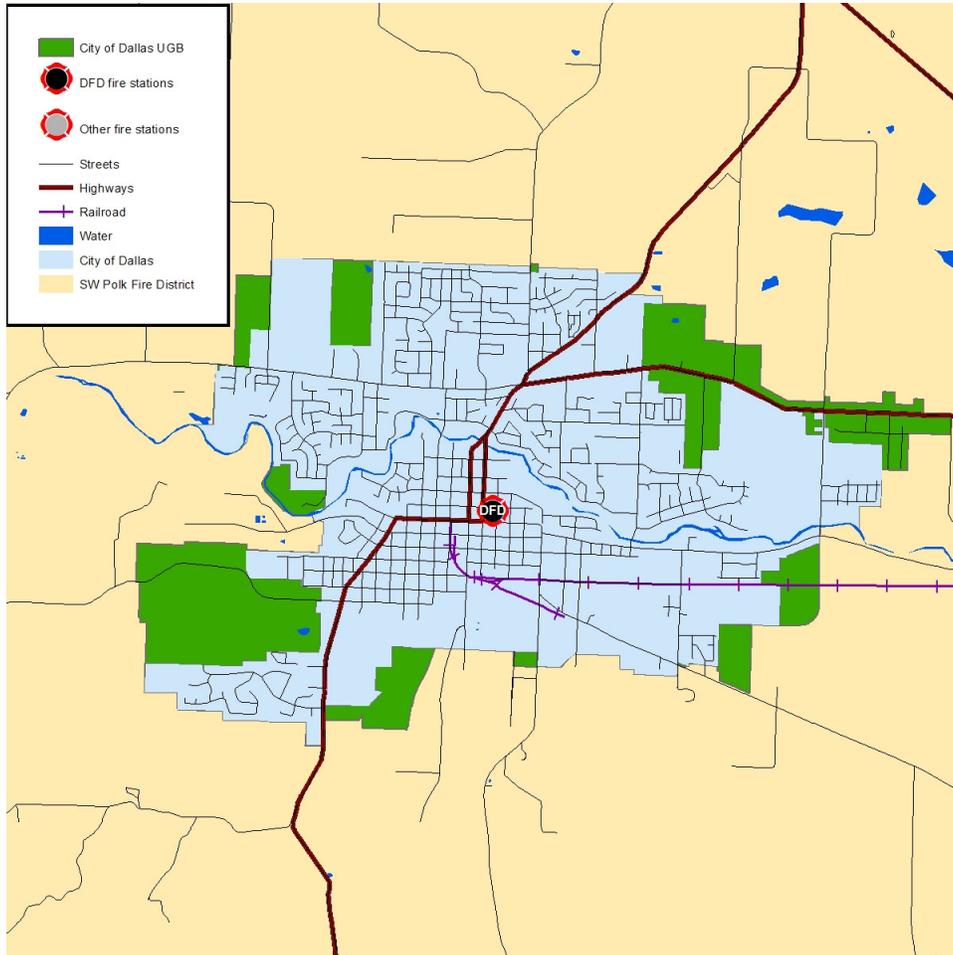
The revised population forecast suggests that the city’s population will grow to 22,140 by the year 2030. It also suggests the SWP population will grow to 7,381 by the same year. Total DFD response workload could reach 6,643 annual calls for service with EMS incidents increasing at a faster pace than fire and other types of incidents due in large part to the aging population. Most of the increased workload will occur within the City of Dallas.

Future development is expected to focus primarily in industrial area near the Forest River plant. There are several subdivisions under construction or planned for construction. Additional development in the city will primarily be in-fill and redevelopment. Since land use restrictions in SWP limit property uses, new development will be very limited.

The City of Dallas does have the opportunity to increase its boundaries through annexation. The city's urban growth boundary is depicted in the following figure. Annexation of these areas would allow more intense development than currently exists. There is no current plan or timeline for when these areas might be annexed.

While more intense development in these areas would increase population and result in increased response workload for DFD, all the area would still be within the DFD five minute travel time standard.

Figure 46: City of Dallas Urban Growth Boundary



COMPONENT E – CRITICAL TASKING AND ALARM ASSIGNMENTS

The DFD service area has both a densely populated urban environment and a sparsely population rural environment. As such, it contains an elevated number, density, and distribution of risk. Its rural areas present unique challenges such as wildland fires. The fire department should have the resources needed to effectively mitigate the incidents that have the highest potential to negatively impact the community. As the actual or potential risk increases, the need for higher numbers of personnel and apparatus also increases. With each type of incident and corresponding risk, specific critical tasks need to be accomplished and certain numbers and types of apparatus should be dispatched. This section considers the community’s identified risks and illustrates the number of personnel that are necessary to accomplish the critical tasks at an emergency.

Tasks that must be performed at a fire can be broken down into two key components: life safety and fire flow. Life safety tasks are based on the number of building occupants, and their location, status, and ability to take self-preservation action. Life safety related tasks involve the search, rescue, and evacuation of victims. The fire flow component involves delivering sufficient water to extinguish the fire and create an environment within the building that allows entry by firefighters.

The number and types of tasks needing simultaneous action will dictate the minimum number of firefighters required to combat different types of fires. In the absence of adequate personnel to perform concurrent action, the command officer must prioritize the tasks and complete some in chronological order, rather than concurrently. These tasks include:

- Command
- Scene safety
- Search and rescue
- Fire attack
- Water supply
- Pump operation
- Ventilation
- Backup/rapid intervention

Critical task analysis also applies to non-fire type emergencies including medical, technical rescue, and hazardous materials emergencies. Numerous simultaneous tasks must be completed to effectively control an emergency. The department’s ability to muster needed numbers of trained personnel quickly enough to make a difference is critical to successful incident outcomes.

The following figure illustrates the minimum emergency incident staffing recommendations of the Commission on Fire Accreditation, International, a private organization that, upon request, evaluates fire departments and provides accreditation to those meeting minimum standards.

The following definitions apply to the figure:

Low Risk—Minor incidents involving small fires (fire flow less than 250 gallons per minute), single patient non-life threatening medical incidents, minor rescues, small fuel spills, and small wildland fires without unusual weather or fire behavior.

Moderate Risk—Moderate risk incidents involving fires in single-family dwellings and equivalently sized commercial office properties (fire flow between 250 gallons per minute to 1,000 gallons per minute), life threatening medical emergencies, hazardous materials emergencies requiring specialized skills and equipment, rescues involving specialized skills and equipment, and larger wildland fires.

High Risk—High risk incidents involving fires in larger commercial properties with sustained attack (fire flows more than 1,000 gallons per minute), multiple patient medical incidents, major releases of hazardous materials, high risk rescues, and wildland fires with extreme weather or fire behavior.

Figure 47: Staffing Recommendations Based on Risk

Incident Type	High Risk	Moderate Risk	Low Risk
Structure Fire	29	15	6
Emergency Medical Service	12	4	2
Rescue	15	8	3
Hazardous Materials	39	20	3
Wildland Fire	41 (Red Flag level)	20	7

The DFD has developed the following Critical Task analyses for various incident types. Further it has defined, based on current unit staffing levels, the number and type of apparatus needed to deliver sufficient numbers of personnel to meet the critical tasking identified. ESCI’s review of the Critical Task analysis concludes that all are generally in keeping with industry standards and provide the minimum number of personnel needed for effective incident operations.

Establishing resource levels needed for various types of emergencies is a uniquely local decision. Factors influencing local decisions for incident staffing include the type of equipment operated, training levels of responders, operating procedures, geography, traffic, and the nature of building and other risks being protected.

CRITICAL TASKING

Critical tasks are those activities that must be conducted early on and in a timely manner by firefighters at emergency incidents in order to control the situation, stop loss, and to perform necessary tasks required for a medical emergency. DFD is responsible for assuring that responding companies are capable of performing all of the described tasks in a prompt, efficient, and safe manner. These are the minimum number of personnel needed by incident type. More personnel will be needed for incidents of increased complexity or size.

Structure Fire (Hydranted)

Task	Number of Personnel
Command/Safety	1
Pump Operations	1
Attack Line	2
Back-up Line	2
Search and Rescue	2
Ventilation	2
RIT	3
Other (hydrant)	1
Medical	2
Total	16

Structure Fire (Non-Hydranted)

Task	Number of Personnel
Command/Safety	1
Pump Operations	1
Attack Line	2
Back-up Line	2
Search and Rescue	2
Ventilation	2
RIT	3
Tender Operator	2
Medical	2
Total	17

Wildland/Urban Interface & Non-Structure Fire High Risk (Hydranted)

Task	Number of Personnel
Command/Safety	1
Pump Operations/Lookout	1
Attack Line	2
Back-up Line	2
Hydrant-Water Supply	1
Structure Protection	2
Total	9

Wildland/Urban Interface & Non-Structure Fire High Risk (Non-Hydranted)

Task	Number of Personnel
Command/Safety	1
Pump Operations/Lookout	1
Attack Line	2
Back-up Line	2
Tender Operator	2
Structure Protection	3
Total	11

Non-Structure Fire Low Risk (Hydranted & Non-Hydranted)

Task	Number of Personnel
Command/Safety	1
Pump Operations	1
Attack Line	2
Total	4

Aircraft Emergency

Task	Number of Personnel
Command/Safety	1
Pump Operations	1
Attack Line	2
Rescue/Back-up Line	3
Emergency Medical Care	2
Total	9

Odor Non-Smoke

Task	Number of Personnel
Command/Safety	1
Total	1

Smoke in Structure (Hydranted)

Task	Number of Personnel
Command/Safety	1
Pump Operations	1
Attack Line/ Investigation/Search and Rescue	2
Back-up Line	2
Medical	2
RIT/Ventilation	3
Other (hydrant)	1
Total	12

Smoke in Structure (Non-Hydranted)

Task	Number of Personnel
Command/Safety	1
Pump Operations	1
Attack Line/ Investigation/Search and Rescue	2
Back-up Line	2
Medical	2
RIT/Ventilation	3
Tender Operator	1
Total	12

Outdoor Smoke Investigation (Hydranted & Non-Hydranted)

Task	Number of Personnel
Command/Safety	1
Total	1

Hazardous Materials

Task	Number of Personnel
Command/Safety	1
Research/Support	3
Total	4

Emergency Medical Aid (priority 1 calls)

Task	Number of Personnel
Patient Management	1
Patient Care	1
Documentation/Support	2
Total	4

Emergency Medical Aid

Task	Number of Personnel
Patient Management	1
Patient Care/Documentation	1
Total	2

Major Medical Response (10+ Patients)

Task	Number of Personnel
Incident Command/Safety	1
Triage	1
Treatment Manager	1
Patient Care	6
Transportation Manager	1
Documentation	1
Total	11

Motor Vehicle Accident (Non Trapped)

Task	Number of Personnel
Command/Safety	1
Scene Management/Documentation	1
Patient Care/Extrication	4
Total	6

Motor Vehicle Accident (Trapped)

Task	Number of Personnel
Command/Safety	1
Scene Management	1
Patient Care	2
Pump Operator/Suppression Line	2
Extrication/Vehicle Stabilization	3
Total	9

Technical Rescue – Water

Task	Number of Personnel
Command/Safety	1
Support Team	3
Total	4

Technical Rescue – Rope

Task	Number of Personnel
Command/Safety	1
Support Team	3
Total	4

Technical Rescue – Confined Space

Task	Number of Personnel
Command/Safety	1
Support Team	3
Total	4

Technical Rescue – Trench

Task	Number of Personnel
Command/Safety	1
Support Team	3
Total	4

ALARM ASSIGNMENTS

In order to ensure sufficient personnel and apparatus are dispatched to an emergency event the following first alarm response assignments have been established. “Total Staffing Needed” is the number identified in the Critical Tasking analysis above. The number of personnel and apparatus required to mitigate an active and complex working incident will require additional resources above and beyond the numbers listed below.

Structure Fire (Hydranted)

Unit Type	Number of Units	Total Personnel
Engine	3	9
Ladder	1	4
Duty Officer	1	1
Medic	1	2
Total Staffing Provided		16
Total Staffing Needed		16

Structure Fire (Non-Hydranted)

Unit Type	Number of Units	Total Personnel
Engine	3	9
Tender	2	4
Duty Officer	1	1
Medic	1	2
Total Staffing Provided		16
Total Staffing Needed		17

Wildland/Urban Interface & Non-Structure Fire High Risk (Hydranted)

Unit Type	Number of Units	Total Personnel
Engine	2	6
Tender	1	2
Duty Officer	1	1
Total Staffing Provided		9
Total Staffing Needed		9

Wildland/Urban Interface & Non-Structure Fire High Risk (Non-Hydranted)

Unit Type	Number of Units	Total Personnel
Engine	2	6
Tender	2	4
Duty Officer	1	1
Total Staffing Provided		11
Total Staffing Needed		11

Non-Structure Fire Low Risk (Hydranted & Non-Hydranted)

Unit Type	Number of Units	Total Personnel
Engine	1	3
Duty Officer	1	1
Total Staffing Provided		4
Total Staffing Needed		4

Aircraft Emergency

Unit Type	Number of Units	Total Personnel
Engine	1	3
Medic	1	2
Rescue	1	3
Duty Officer	1	1
Total Staffing Provided		9
Total Staffing Needed		9

Odor of Smoke (Hydranted & Non-Hydranted)

Unit Type	Number of Units	Total Personnel
Duty Officer	1	1
Total Staffing Provided		1
Total Staffing Needed		1

Smoke in Structure (Hydranted)

Unit Type	Number of Units	Total Personnel
Engine	2	6
Ladder	1	4
Duty Officer	1	1
Medic	1	2
Total Staffing Provided		13
Total Staffing Needed		12

Smoke in Structure (Non-Hydranted)

Unit Type	Number of Units	Total Personnel
Engine	2	6
Tender	2	4
Duty Officer	1	1
Total Staffing Provided		11
Total Staffing Needed		12

Outdoor Smoke Investigation (Hydranted & Non-Hydranted)

Unit Type	Number of Units	Total Personnel
Duty Officer	1	1
Total Staffing Provided		1
Total Staffing Needed		1

Hazardous Materials

Unit Type	Number of Units	Total Personnel
Engine	1	3
Duty Officer	1	1
Total Staffing Provided		4
Total Staffing Needed		4

Emergency Medical Service (priority 1 calls)

Unit Type	Number of Units	Total Personnel
Engine, Medic or QRU	1	2-3
Medic	1	2
Total Staffing Provided		4-5
Total Staffing Needed		4

Emergency Medical Service

Unit Type	Number of Units	Total Personnel
Medic	1	2
Total Staffing Provided		2
Total Staffing Needed		2

Major Medical (10+ Patients)

Unit Type	Number of Units	Total Personnel
Engine	1	3
Rescue	1	3
Medic	2	4
Duty Officer	1	1
Total Staffing Provided		11
Total Staffing Needed		11

Motor Vehicle Accident (Non-Trapped)

Unit Type	Number of Units	Total Personnel
Rescue	1	3
Medic	1	2
Duty Officer	1	1
Total Staffing Provided		6
Total Staffing Needed		6

Motor Vehicle Accident (Trapped)

Unit Type	Number of Units	Total Personnel
Engine	1	3
Rescue	1	3
Medic	1	2
Duty Officer	1	1
Total Staffing Provided		9
Total Staffing Needed		9

Technical Rescue – Water

Unit Type	Number of Units	Total Personnel
Engine	1	3
Duty Officer	1	1
Total Staffing Provided		4
Total Staffing Needed		4

Technical Rescue – Rope

Unit Type	Number of Units	Total Personnel
Engine	1	3
Duty Officer	1	1
Total Staffing Provided		4
Total Staffing Needed		4

Technical Rescue – Confined space

Unit Type	Number of Units	Total Personnel
Engine	1	3
Duty Officer	1	1
Total Staffing Provided		4
Total Staffing Needed		4

Technical Rescue – Trench

Unit Type	Number of Units	Total Personnel
Engine	1	3
Duty Officer	1	1
Total Staffing Provided		4
Total Staffing Needed		4

Component F – Review of Historical System Performance

Incident data for the period between October 1, 2013, and September 30, 2015 (study period), was evaluated in detail to determine DFD’s current performance. Data was obtained from DFD incident reports and the dispatch center’s computer aided dispatch system. Incidents within the City of Dallas were evaluated separately from incidents within SWP.

Only incidents occurring within the DFD service area that were dispatched as a “priority” are included in the analysis. Priority incidents involve emergencies to which the fire department initiated a “code 3” (using warning lights and sirens) response. There were 3,202 such incidents in the City of Dallas and 889 such incidents within SWP during the study period. Incidents initially dispatched as non-emergency responses were excluded.

Performance is reported based on what the incident was believed to be at the time of dispatch. That is the point at which the type and level of response is determined.

Each phase of the incident response sequence was evaluated to determine current performance. This allows an analysis of each individual phase to determine where opportunities might exist for improvement.

The total incident response time continuum consists of several steps, beginning with initiation of the incident and concluding with the appropriate mitigation of the incident. The time required for each of the components varies. The policies and practices of the fire department directly influence some of the steps.

DFD’s response performance was compared to its internally identified response performance objectives. Those are summarized below. Note that for turnout time and response time the objectives measure the first unit to respond or arrive that is capable of initiating effective incident mitigation. For many incidents that could be any response unit. For fires that is only an engine.

Figure 48: Summary of DFD Performance Objectives

Response Interval	City of Dallas	Southwestern Polk Rural Fire District
Dispatch call processing	Within 60 seconds, 90% of the time	Within 60 seconds, 90% of the time
Turnout time		
Fire and Special Ops	Within 2 minutes, 90% of the time	Within 10 minutes, 90% of the time
Emergency medical	Within 90 seconds, 90% of the time	Within 90 seconds, 90% of the time
Response time		
Fire and Special ops	Within 7 minutes, 90% of the time	Within 20 minutes, 90% of the time
Emergency medical	Within 6:30, 90% of the time	Within 11:30, 90% of the time
Full effective response force	Within 14 minutes , 90% of the time	Within 25 minutes, 90% of the time

In keeping with industry standards, all response time elements are reported at the 90th percentile. Percentile reporting is a methodology by which response times are sorted from least to greatest, and a “line” is drawn at a certain percentage of the calls to determine the percentile. The point at which the “line” crosses the 90th percentile, for example, is the percentile time performance. Thus, 90 percent of times were at or less than the result. Only 10 percent were longer.

Percentile differs greatly from average. Averaging calculates response times by adding all response times together and then dividing the total number of minutes by the total number of responses (mean average). Measuring and reporting average response times is not recommended. Using averages does not give a clear picture of response performance because it does not clearly identify the number and extent of events with times beyond the stated performance objective.

What follows is a detailed description and review of each phase of the response time continuum. All phases will be compared to the DFD response performance objectives.

Detection

The detection of a fire (or medical incident) may occur immediately if someone happens to be present or if an automatic system is functioning. Otherwise, detection may be delayed, sometimes for a considerable period. The time period for this phase begins with the inception of the emergency and ends when the emergency is detected. It is largely outside the control of the fire department and not a part of the event sequence that is reliably measurable.

Call Processing

Most emergency incidents are reported by telephone to the 9-1-1 center. Call takers must quickly elicit accurate information about the nature and location of the incident from persons who are apt to be excited. A citizen well-trained in how to report emergencies can reduce the time required for this phase. The dispatcher must identify the correct units based on incident type and location, dispatch them to the emergency, and continue to update information about the emergency while the units respond. This phase typically begins when the 9-1-1 call is answered at the primary answer point (PSAP) and ends when response personnel are notified of the emergency.

Willamette Valley Communications Center (WVCC) is the PSAP and dispatch center for the City of Dallas and SWP. All 9-1-1 calls are answered at WVCC. A call taker questions the caller and transfers that information to a dispatcher who notifies appropriate response units of the incident, tracks unit response, and provides additional support.

Call processing time begins when the call is received at the dispatch center (WVCC) and ends when response units are notified of the incident. DFD objectives prescribe that this phase should occur within 60 seconds 90 percent of the time. The following figures lists the call processing time for all priority incidents during the study period within the city and SWP, as well as by specific incident types.

Overall, the time from first notification to WVCC until notification of response personnel is within 42 seconds 90 percent of the time for incidents that occurred within the city and within 1 minute 6 seconds 90 percent of the time for incidents that occurred within SWP.

Figure 49: Call Processing Performance at the 90th Percentile – City of Dallas

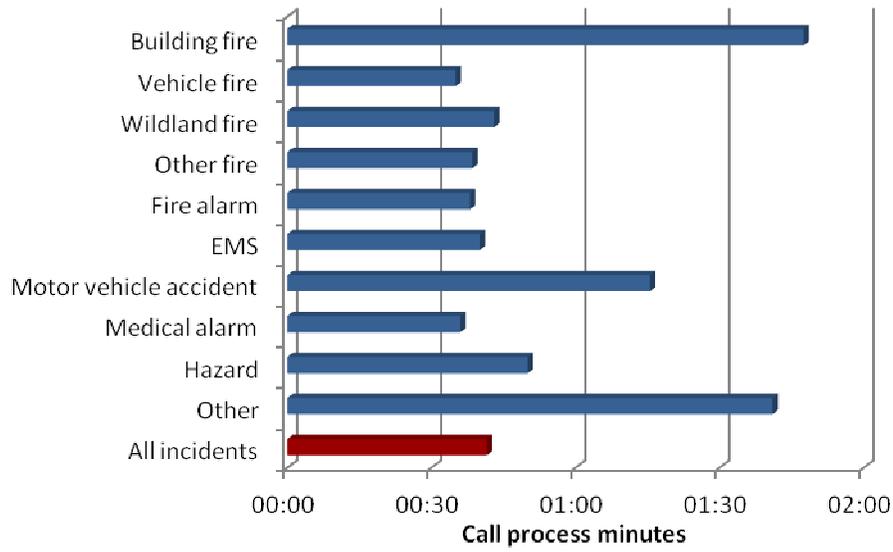
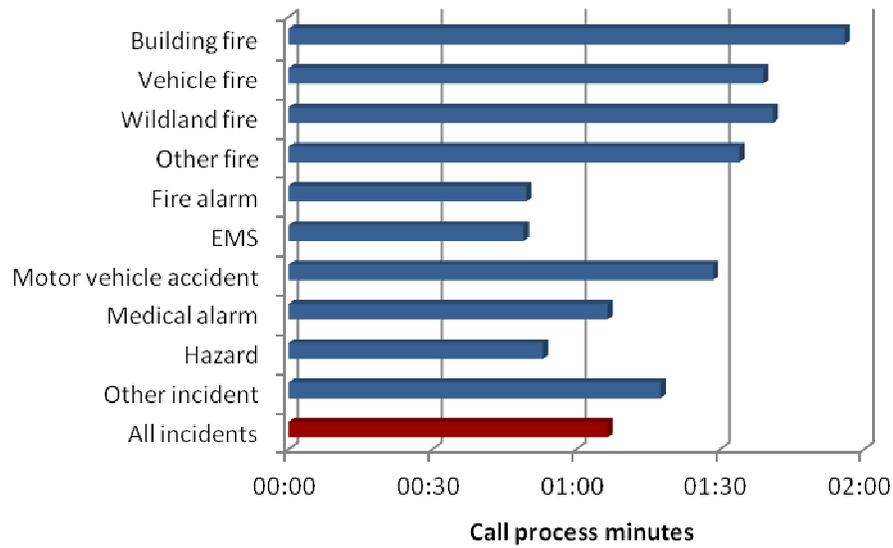


Figure 50: Call Processing Performance at the 90th Percentile - SWP



Activity levels at the dispatch center can affect the time it takes to receive, process, and dispatch a request for service. The following figure shows call processing time at the 90th percentile and number of incidents during the study period by hour of day. Call processing times are variable throughout the day. The variation may relate to incident activity.

Figure 51: Call Processing Time by Hour of Day – City of Dallas

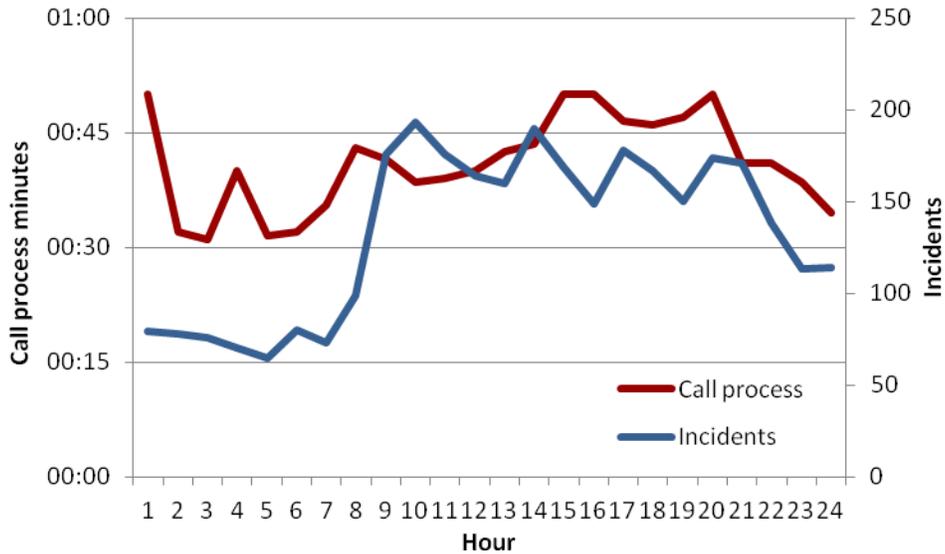
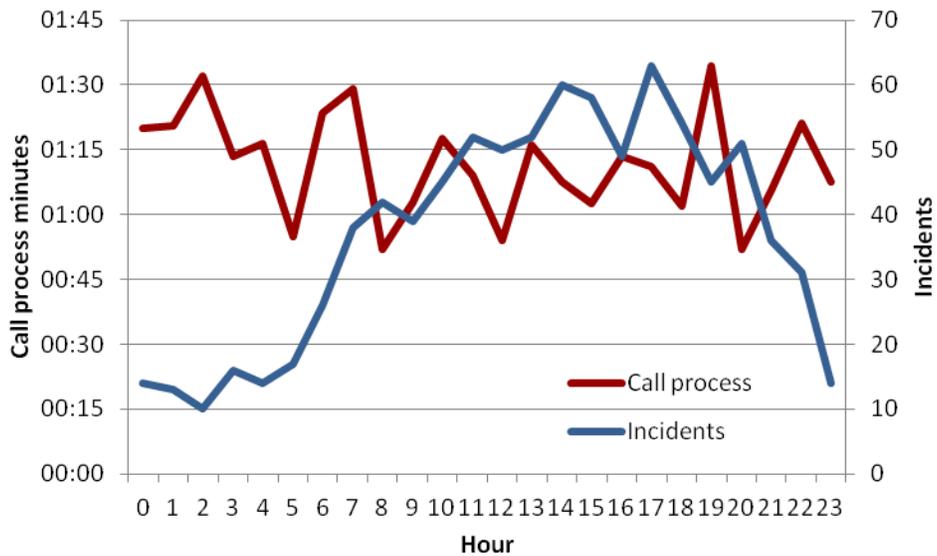


Figure 52: Call Processing Time by Hour of Day – SWP



Turnout Time

Turnout time is a response phase controllable by the fire department. This phase begins at notification of an emergency in progress by the dispatch center and ends when personnel and apparatus begin movement towards the incident location. Personnel must don appropriate equipment, assemble on the response vehicle, and begin travel to the incident. Good training and proper fire station design can minimize the time required for this step.

For fire emergencies only the first fire engine to respond was included since that is the only apparatus type that can effectively mitigate a fire incident. For all other incident types the first unit enroute of any type was included.

The following figures illustrate turnout time for incidents within the city and within SWP for the first appropriate response unit to begin the response to incidents during the study period. Turnout time for city incidents was:

- Fire and special operations – within 10 minutes 11 seconds, 90 percent of the time
- Emergency medical – within 3 minutes 0 seconds, 90 percent of the time

Turnout time for SWP incidents was:

- Fire and special operations – within 11 minutes 7 seconds, 90 percent of the time
- Emergency medical – within 3 minutes 9 seconds, 90 percent of the time

Figure 53: Turnout Time Performance – City of Dallas

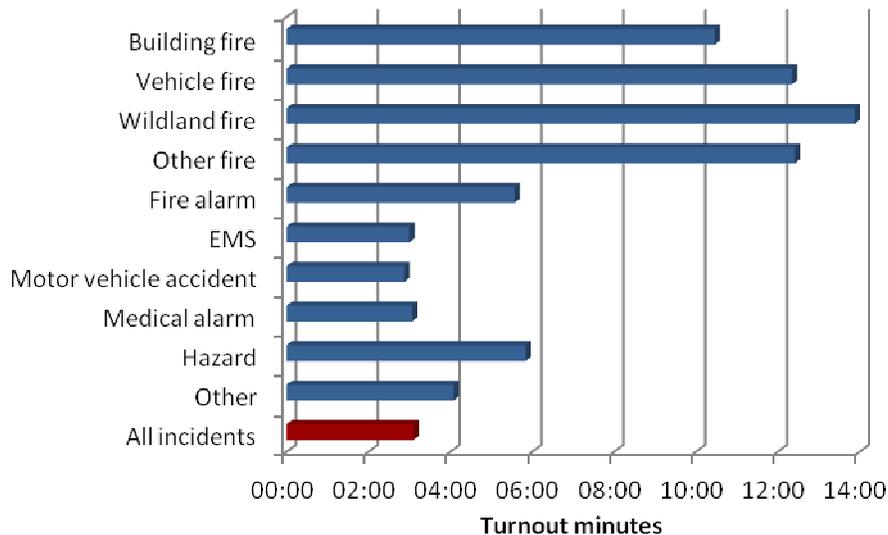
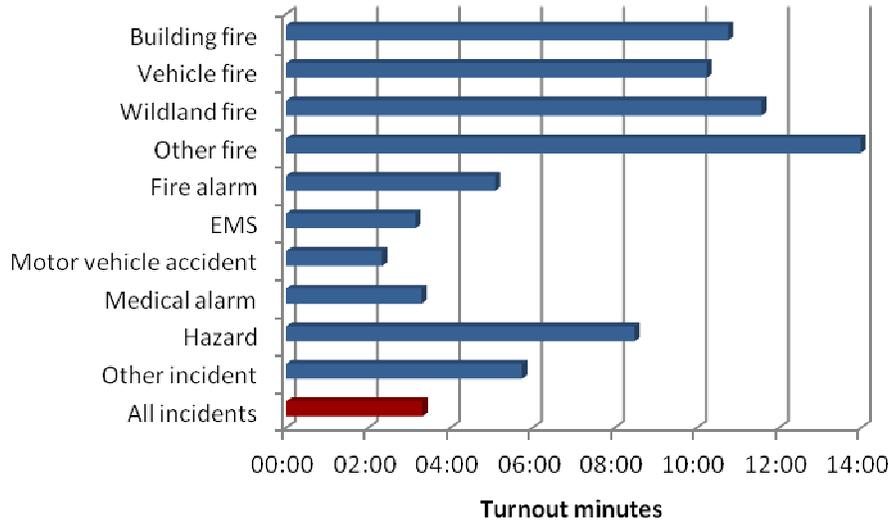


Figure 54: Turnout Time Performance – SWP



To further illustrate fire engine turnout times, the following figure lists turnout time by each fire engine for responses to incidents within the city or within SWP. Fire engine staffing is dependent on volunteers responding from home, work, or elsewhere. Thus turnout times for these units are necessarily quite long.

Figure 55: Fire Engine Turnout Times by Jurisdiction – 90th Percentile

Unit	Turnout - City	Turnout – SWP
E101	10:52	05:03
E102	12:43	NA
E110	09:19	11:05
E137	07:24	12:43

Turnout time can vary by hour of day. In this case turnout time varies by 49 seconds between the early morning hours and daytime hours. The following figures illustrate turnout time for the first unit to respond, not necessarily engines for fire incidents.

Figure 56: Turnout Time by Hour of Day – City of Dallas

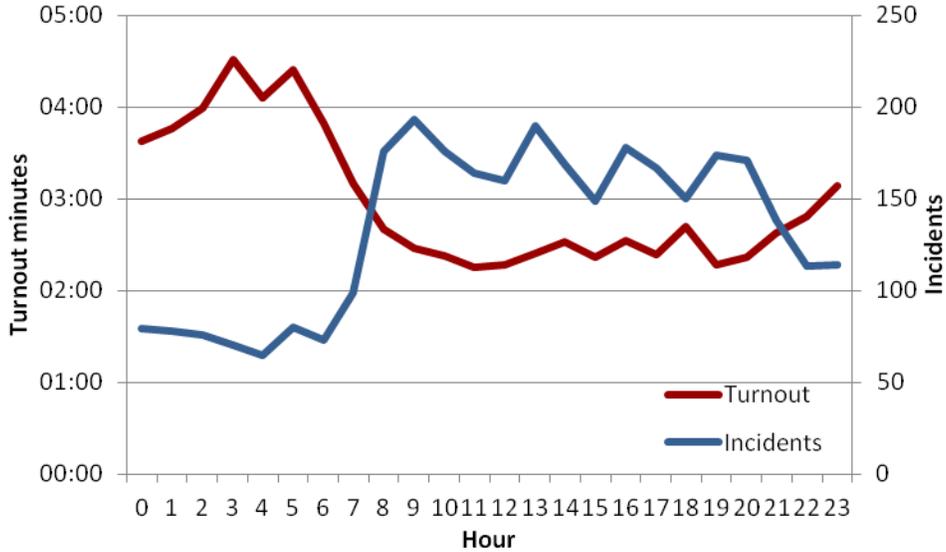
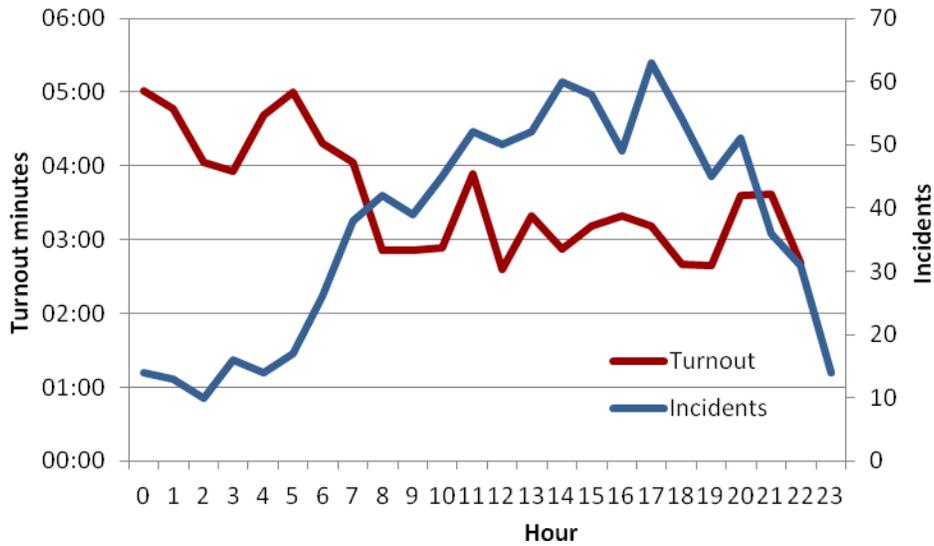


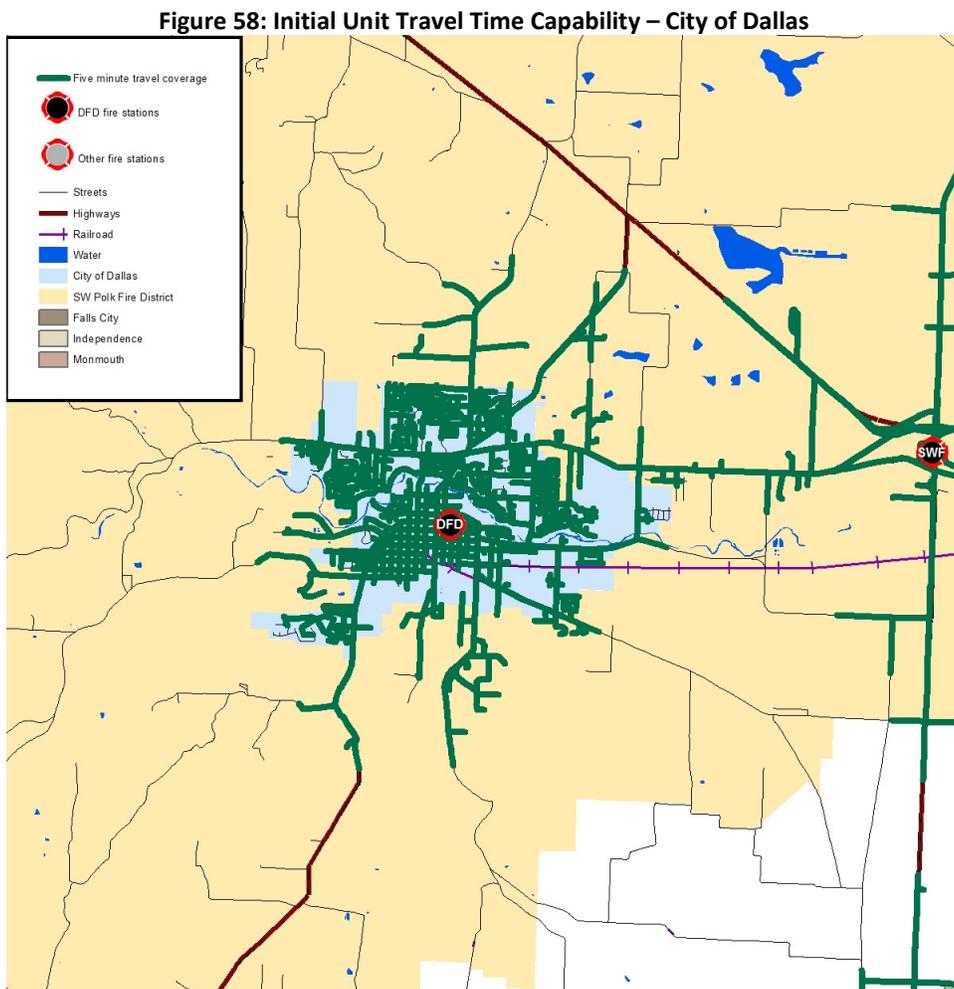
Figure 57: Turnout Time by Hour of Day – SWP



Distribution and Initial Arriving Unit Travel Time

Travel time is potentially the longest of the response phases. The distance between the fire station and the location of the emergency influences response time the most. The quality and connectivity of streets, traffic, driver training, geography, and environmental conditions are also factors. This phase begins with initial apparatus movement towards the incident location and ends when response personnel and apparatus arrive at the emergency's location. Within the DFD objectives, five minutes is allowed for the first response unit to travel to an incident within the city and 10 minutes within SWP.

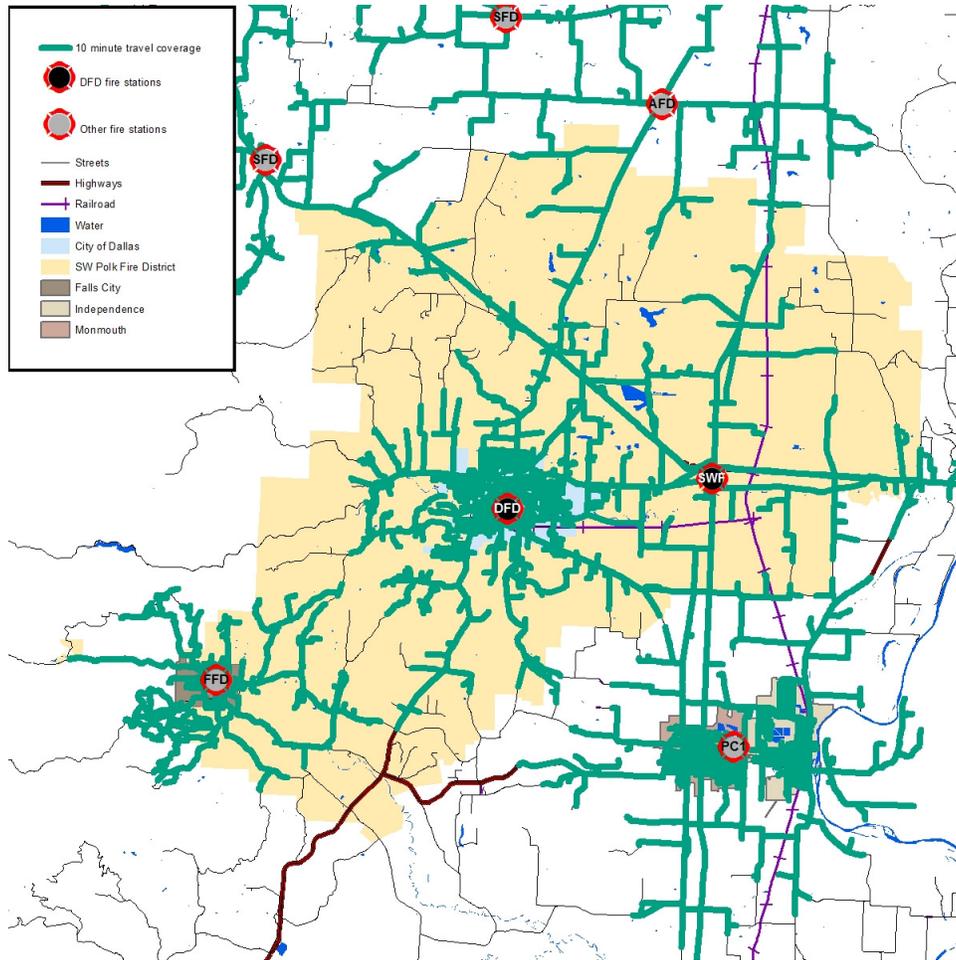
The following figure illustrates the street sections that can be reached from all DFD fire stations and adjacent agency stations providing automatic aid in five minutes of travel time. It is based on actual road travel speeds adjusted to account for turning, stops, and acceleration.



All of the City of Dallas is within five travel minutes of a fire station. Automatic aid agencies provide no five minute travel coverage within the city.

The next figure illustrates the street sections that can be reached from all DFD fire stations and adjacent agency stations providing automatic aid in 10 minutes of travel time. It is also based on actual road travel speeds adjusted to account for turning, stops, and acceleration.

Figure 59: Initial Unit Travel Time Capability – SWP



There are some areas of the district that are not within 10 travel minutes of a fire station. Mutual and automatic aid stations do provide some 10 minute coverage within the district that is not provided by either DFD station.

The following figure lists travel time for all priority incidents as well as specific incident types. Overall, travel time for non-fire incidents within the city is within six minutes 11 seconds 90 percent of the time. For fire incidents travel time for the first engine was 9 minutes 10 seconds.

Travel time for non-fire incidents in SWP was 13 minutes 15 seconds. For fire incidents travel time for the first engine was 13 minutes 57 seconds.

Figure 60: Travel Time Performance – First Arriving Unit – City of Dallas

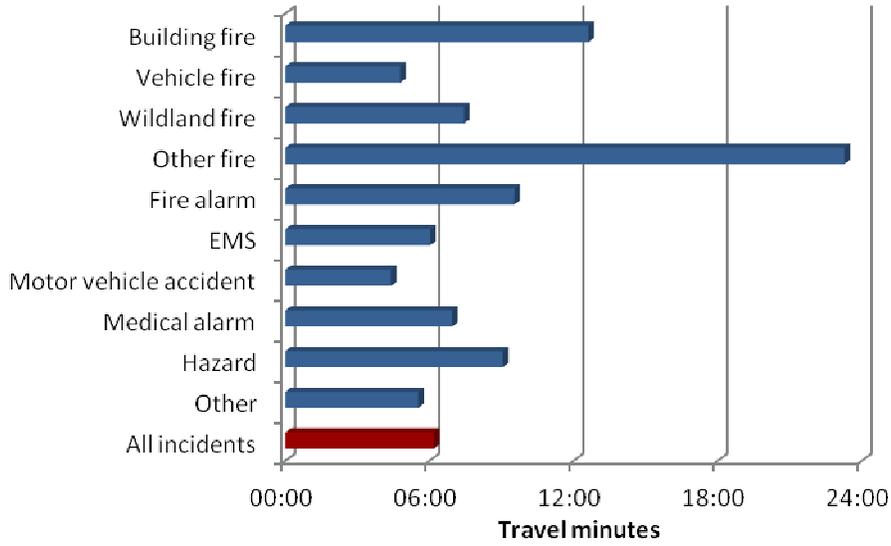
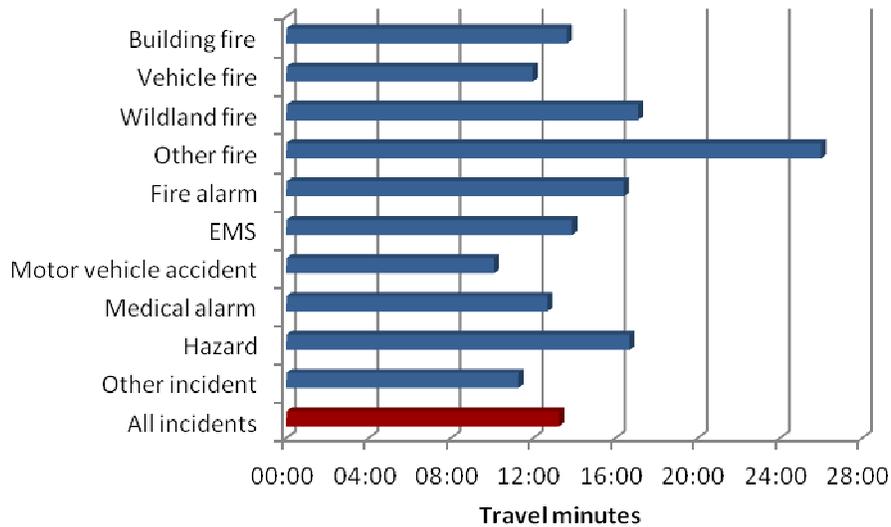


Figure 61: Travel Time Performance – First Arriving Unit - SWP



Travel time can, in some situations, vary considerably by time of day. Heavy traffic at morning and evening rush hour can slow fire department response. Concurrent incidents can also increase travel time since units from more distant stations would need to respond. The following figures show travel time for the first arriving unit, not necessarily an engine for fire incidents.

Figure 62: Overall Travel Time and Incidents by Hour of Day – First Arriving Unit – City of Dallas

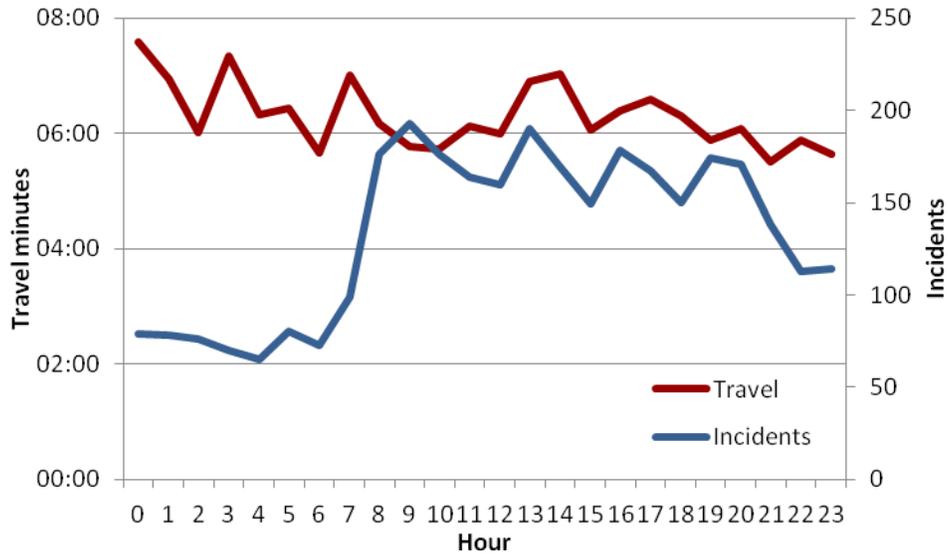
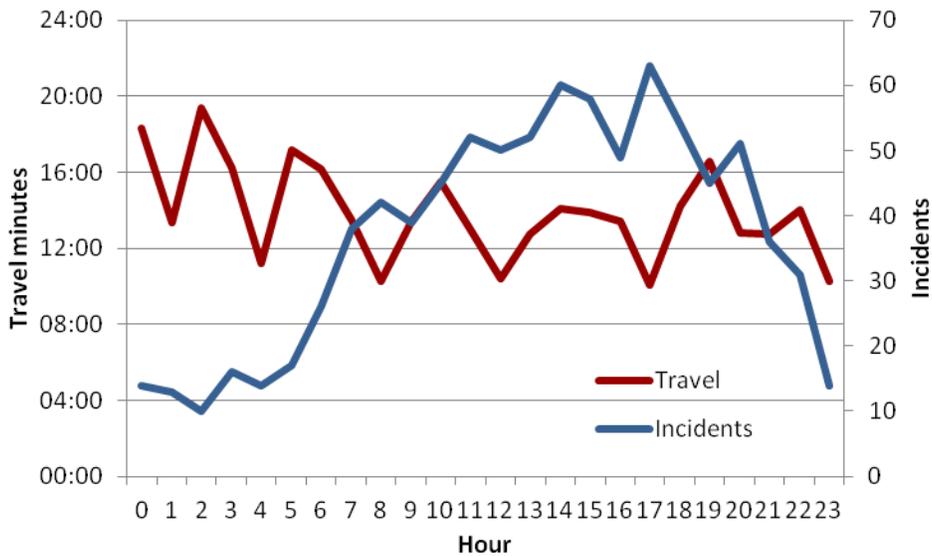


Figure 63: Overall Travel Time and Incidents by Hour of Day – First Arriving Unit – SWP

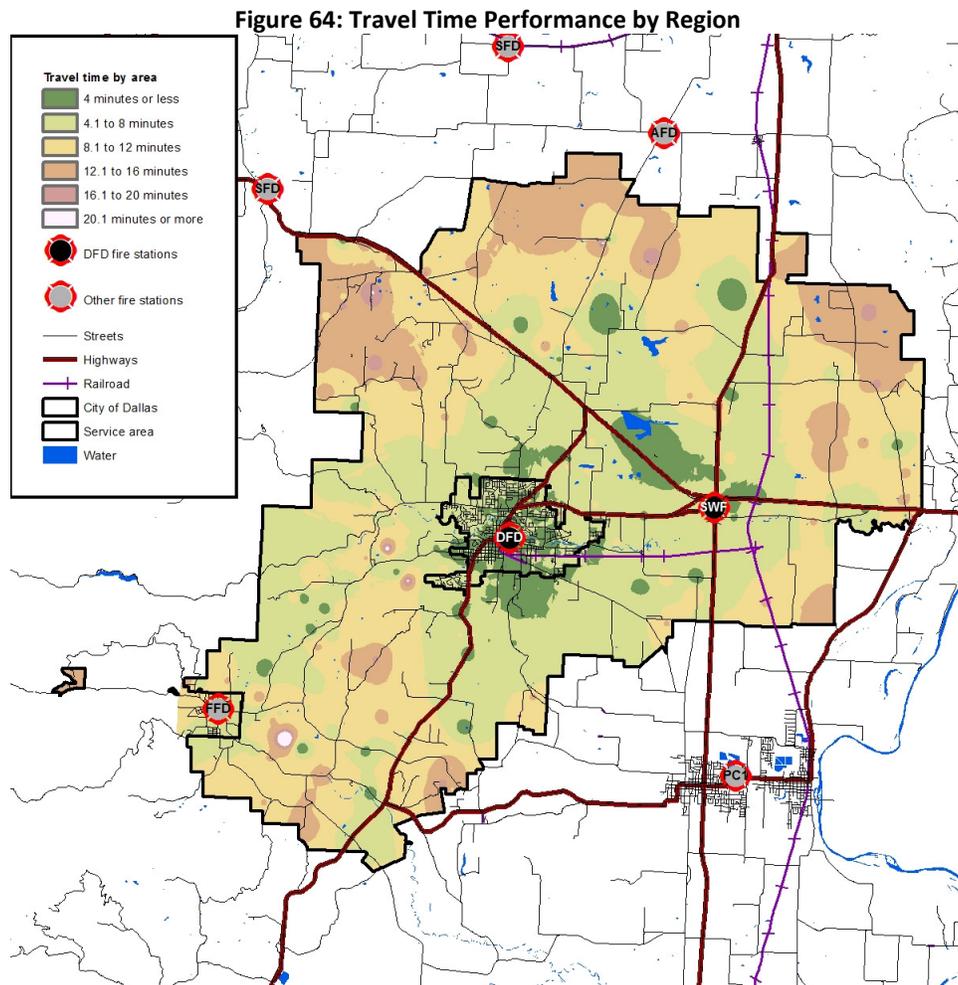


In order to provide on-time response, a response unit must be within five travel minutes of the incident in the city and within 10 travel minutes of an incident in SWP. Incidents were reviewed to identify how many were within four travel minutes of a fire station. During the study period 3,069 of the 3,176 priority incidents within the city (96.6 percent) occurred within five travel minutes of a fire station. During the same period, 701 of the 886 priority incidents within SWP (79.1 percent) occurred within 10 travel minutes of a fire station.

Travel Time Performance by Region

Travel time performance by region is variable and influenced by a number of factors such as individual station workload. Additional factors include the size of the station area and the street system serving it. More highly connected, grid patterned, street systems contribute to faster response times than do areas with meandering streets with numerous dead-ends.

The following figure evaluates travel time performance by sub-area using inverse distance weighting analysis (IDW). This process uses travel time for known points (actual incidents) to predict travel time for the area surrounding actual incidents. Better performance is generally noted near fire stations with progressively longer response times for those incidents more distant from the stations.



First Arriving Unit Response Time

Response time is defined as that period between notification of response personnel by the dispatch center that an emergency is in progress until arrival of the first fire department response unit at the emergency. When turnout time and travel time are combined, the DFD performance objectives for response time are as follows:

- 1) Response time for arrival of the first response unit at a priority fire or special operations incident
 - a. Urban - The first response unit capable of initiating effective incident intervention shall arrive at a priority fire or special operations incident within seven minutes from notification of response personnel 90 percent of the time.
 - b. Rural - The first response unit capable of initiating effective incident intervention shall arrive at a priority fire or special operations incident within 20 minutes from notification of response personnel 90 percent of the time.
- 2) Response time of the first arriving response unit at a priority emergency medical incident
 - a. Urban - The first response unit capable of initiating effective incident intervention shall arrive at a priority emergency medical incident within six minutes 30 seconds from notification of response personnel 90 percent of the time.
 - b. Rural - The first response unit capable of initiating effective incident intervention shall arrive at a priority emergency medical incident within 11 minutes 30 seconds from notification of response personnel 90 percent of the time.

Response time for city incidents during the study period was:

- Fire and special operations – within 18 minutes 7 seconds, 90 percent of the time
- Emergency medical – within 8 minutes 9 seconds, 90 percent of the time

Response time for SWP incidents during the study period was:

- Fire and special operations – within 24 minutes 14 seconds, 90 percent of the time
- Emergency medical – within 16 minutes 4 seconds, 90 percent of the time

The following figures illustrate response time for incidents within the city and within SWP for the first appropriate response unit to arrive at the incident during the study period following notification.

Figure 65: Response Time Performance – First Arriving Appropriate Unit – City of Dallas

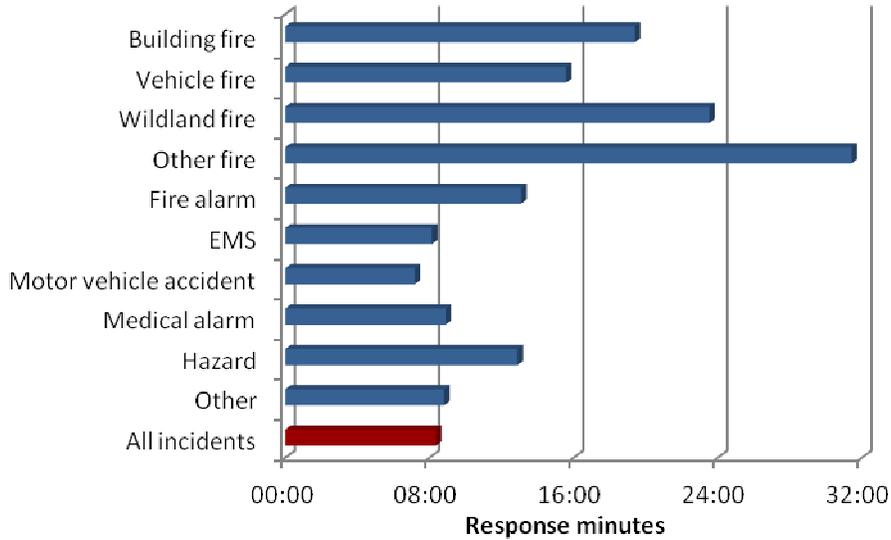
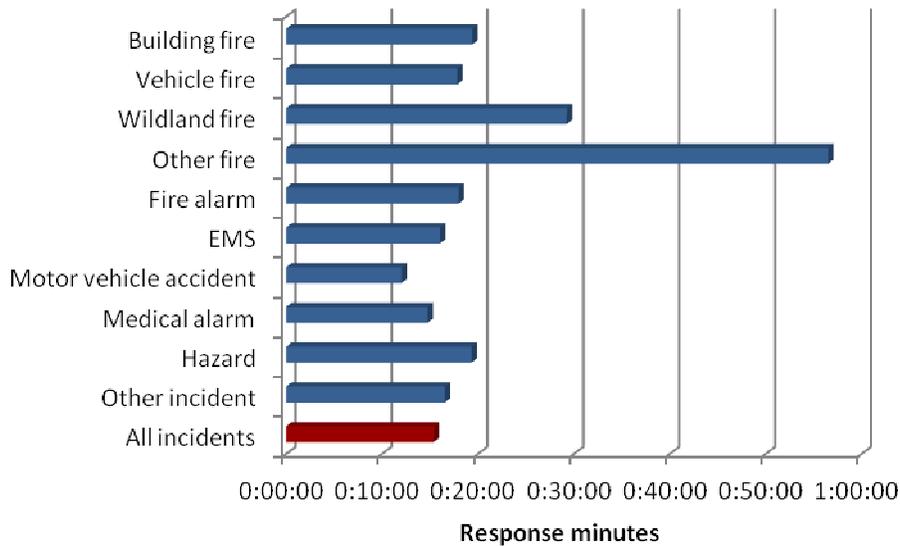


Figure 66: Response Time Performance – First Arriving Appropriate Unit – SWP



The next figure shows response time and number of incidents by hour of day for all incidents. Response time is slowest during the night-time hours and fastest during the day. Generally, DFD’s best response times occur during the period of the day when response activity is at its highest.

Figure 67: Hourly Response Time Performance – First Arriving Unit – City of Dallas

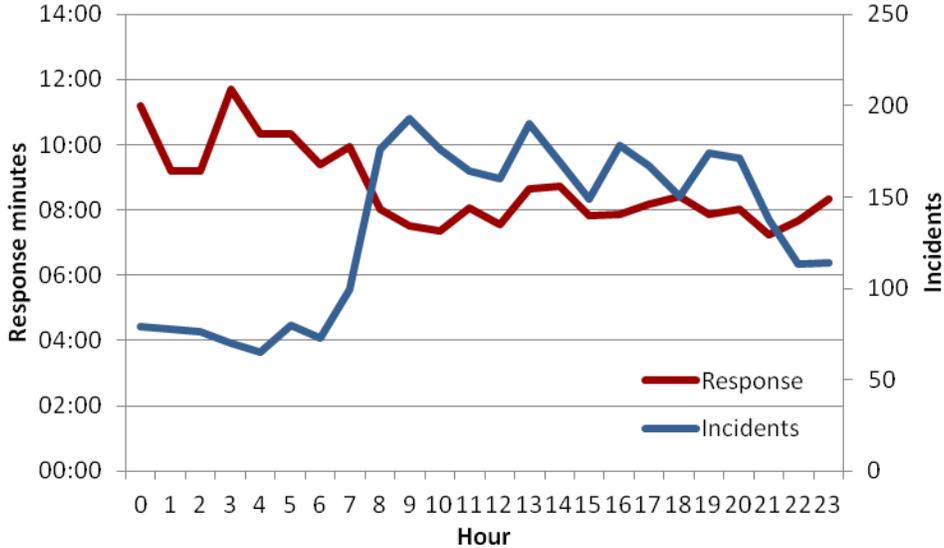
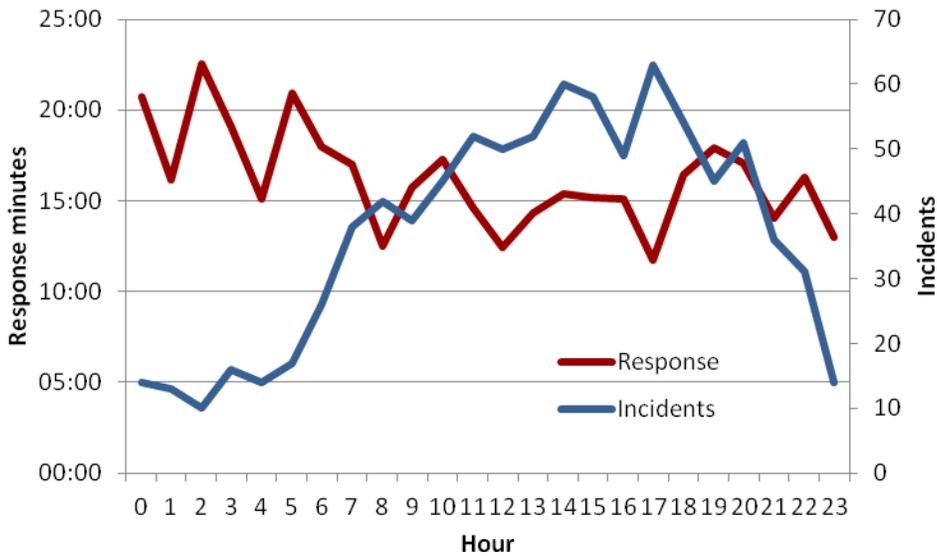


Figure 68: Hourly Response Time Performance – First Arriving Unit – SWP



First Arriving Unit Received to Arrival Time

From the customer's standpoint, response time begins when the emergency occurs. Their first contact with emergency services is when they call for help, usually by dialing 9-1-1. Received to arrival time combines call processing, turnout, and travel time. Combining the DFD standard for response time with call processing time, the received to arrival time standard would be as follows:

- 1) Received to arrival time for arrival of the first response unit at a priority fire or special operations incident
 - a. Urban - The first response unit capable of initiating effective incident intervention shall arrive at a priority fire or special operations incident within seven minutes from receipt of the call at the dispatch center 90 percent of the time.
 - b. Rural - The first response unit capable of initiating effective incident intervention shall arrive at a priority fire or special operations incident within 20 minutes from receipt of the call at the dispatch center 90 percent of the time.
- 2) Received to arrival time of the first arriving response unit at a priority emergency medical incident
 - a. Urban - The first response unit capable of initiating effective incident intervention shall arrive at a priority emergency medical incident within six minutes 30 seconds from receipt of the call at the dispatch center 90 percent of the time.
 - b. Rural - The first response unit capable of initiating effective incident intervention shall arrive at a priority emergency medical incident within 11 minutes 30 seconds from receipt of the call at the dispatch center 90 percent of the time.

Received to arrival time for city incidents during the study period was:

- Fire and special operations – within 19 minutes 19 seconds, 90 percent of the time
- Emergency medical – within 8 minutes 34 seconds, 90 percent of the time

Response time for SWP incidents during the study period was:

- Fire and special operations – within 29 minutes 44 seconds, 90 percent of the time
- Emergency medical – within 16 minutes 44 seconds, 90 percent of the time

The next figures shows received to arrival performance during the study period at the 90th percentile for priority incidents within the city and within SWP from the time the call is received at WVCC until the first unit arrives at the incident location.

Figure 69: Received to Arrival Time – First Arriving Appropriate Unit – City of Dallas

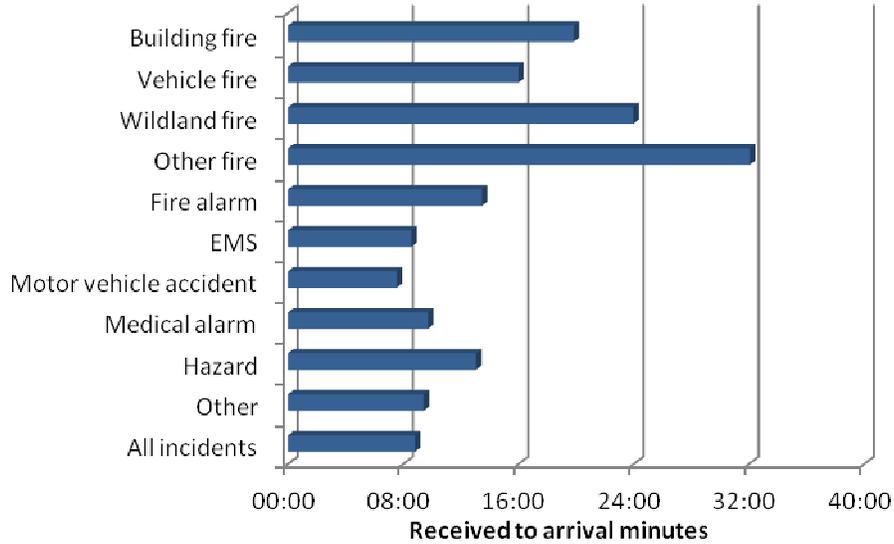
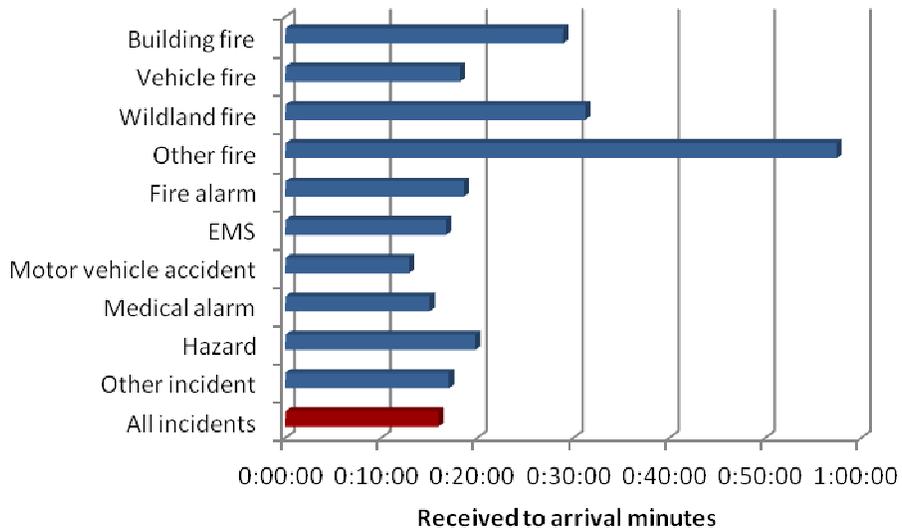


Figure 70: Received to Arrival Time – First Arriving Appropriate Unit – SWP



The next figures show received to arrival performance by time of day also compared to incident activity by time of day. Total response time, from the customer’s standpoint, is quickest during the day and slowest during the early morning hours.

Figure 71: Hourly Received to Arrival Performance – First Arriving Unit – City of Dallas

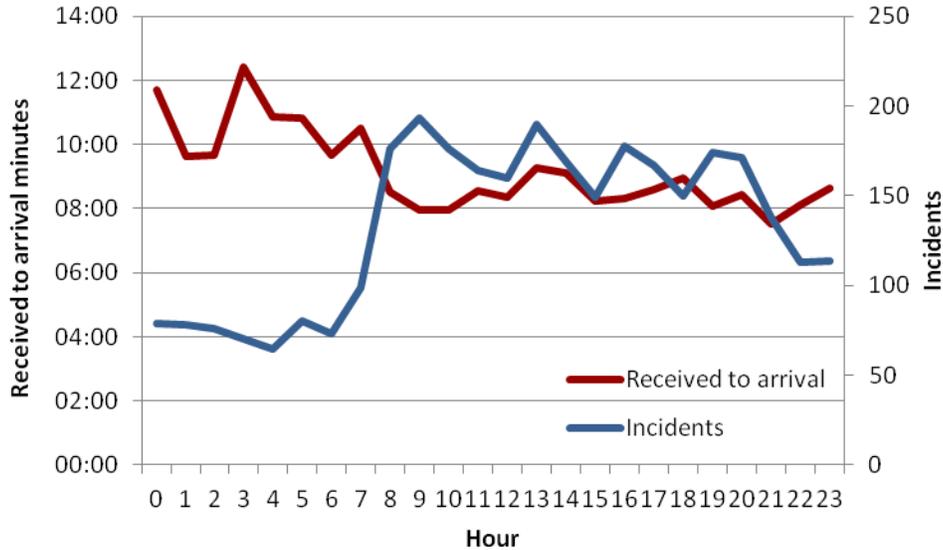
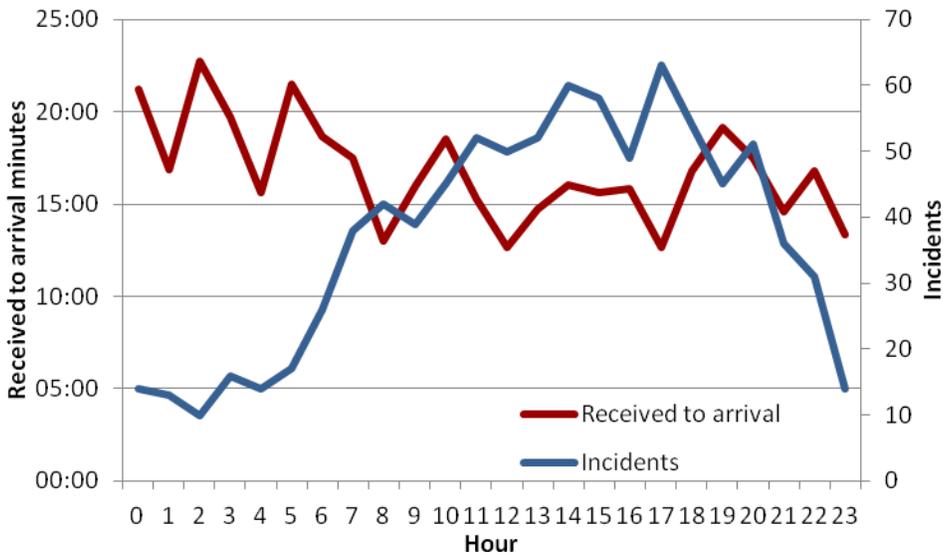


Figure 72: Hourly Received to Arrival Performance – First Arriving Unit – SWP



Concentration and Effective Response Force Capability Analysis

Effective Response Force (ERF) is the number of personnel and apparatus required to be present on the scene of an emergency incident to perform the critical tasks in such a manner to effectively mitigate the incident without unnecessary loss of life and/or property. The ERF is specific to each individual type of incident, and is based on the critical tasks that must be performed. In accordance with DFD objectives, a moderate risk building fire is modeled for this analysis.

The response time objective for the delivery of the full ERF to a moderate risk building fire within the City of Dallas is within 14 minutes 90 percent of the time. Removing the two minute turnout time allowed in the objective, full effective response travel time performance should be within 12 minutes, 90 percent of the time.

The response time performance objective for the delivery of the full ERF to a moderate risk building fire within the SWP is within 25 minutes 90 percent of the time. Removing the 10 minute turnout time allowed in the objectives, full effective travel time performance should be within 15 minutes, 90 percent of the time.

DFD has defined the minimum full effective response force for moderate risk building fires as three fire engines, one ladder truck, a medic unit and a duty officer with a total of 16 firefighters in areas with fire hydrants. In areas without hydrants the minimum effective response force is three engines, two tenders, a medic, and a duty officer.

The minimum full effective response force arrived at three building fires in the City of Dallas during the study period and five in SWP. The following figure lists the time required for each incident to deliver the full effective response force. The calculation of performance at the 90th percentile excludes the two incidents with delivery time of over one hour.

Figure 73: Time to Deliver the Effective Response Force

Incident Jurisdiction	Time to Deliver Effective Response Force
City of Dallas – A	0:15:48
City of Dallas – B	0:27:20
City of Dallas – C	1:09:41
90 th percentile	26:11
SWP – A	0:21:57
SWP – B	1:02:57
SWP – C	0:16:36
SWP – D	0:29:55
SWP – E	0:18:14
90 th percentile	27:32

Achieving the ERF response time objective within the City of Dallas is unlikely. Only two fire engines are based at the Dallas station. Since turnout time for the engine at the Rickreall station is generally 11 minutes, it would have to reach a fire in the city within three minutes travel time, which is not possible.

Achieving the ERF response time in SWP is more likely. Adjacent agency stations provide additional coverage within the 15 minute travel time standard that is needed to complete the delivery of the defined ERF.

Two-in Two-out Compliant Arrival Time

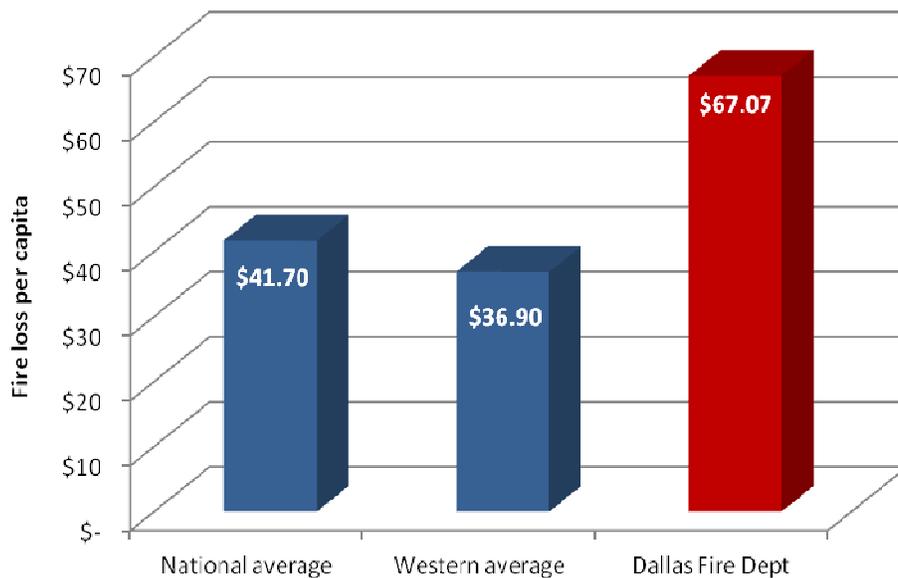
All DFD fire engines and ladder trucks are normally staffed by at least three personnel before it initiates response. Safety regulations require that at least four firefighters be on scene before firefighters can enter a burning building. The only exception is if it is known that a person is inside the building and needs rescue. Current staffing levels on engines generally require the arrival of a second response unit before non-rescue interior firefighting activities can be initiated.

Incident data for building fires during the study period was reviewed to determine the amount of time it took to deliver an engine and at least four personnel to the scene of a building fire from the time of dispatch. According to the data an engine and at least four personnel arrived at a structure fire in the City of Dallas within 17 minutes, 90 percent of the time from the time of initial incident dispatch. In SWP it was within 20 minutes, 90 percent of the time from the time of initial dispatch.

Fire Loss Experience

Since response time is an output rather than an outcome measure it is useful to review actual fire loss experience to determine if current response time performance having a negative impact. The following figure shows fire loss per capita for the DFD service area. Also included is data for similar sized communities nationally and within the western states. It indicates that DFD's fire losses are greater than for fire departments serving similar sized communities. The fire loss rate in the City of Dallas averaged \$51.97 per capita. Within SWP the fire loss rate averaged \$105.79.

Figure 74: Fire Loss Per Capita



Call Concurrency and Reliability

When evaluating the effectiveness of any resource deployment plan, it is necessary to evaluate the workload of the individual response units to determine to what extent their availability for dispatch is affecting the response time performance. In simplest terms, a response unit cannot make it to an incident across the street from its own station in a reasonable time if it is unavailable to be dispatched to that incident because it is committed to another call.

Concurrency

One way to look at resource workload is to examine the number of times multiple incidents happen within the same time frame in each station area. Incidents during the study period were examined to determine the frequency of concurrent incidents within each station's response area. This is important because concurrent incidents can stretch available resources and extend response times.

The following figure shows the number times during the study period that one or more incidents occurred concurrently. This shows that in most cases (4,093) only one incident was in progress at a time. However, 1,883 times there were two incidents in progress at the same time, 405 times there were three incidents in progress at the same time, and once there were six incidents in progress at the same time.

Figure 75: Incident Concurrency

Number of Concurrent Incidents	Number of Occurrences
1	4,093
2	1,883
3	405
4	51
5	6
6	1
7	0

Reliability

In a volunteer staffed system such as DFD, the ability of a response unit to respond to an incident when dispatched is known as unit *reliability*. The reliability analysis is normally done by measuring the number of times response units assigned to incident actually responded to the request.

The lack of a response by a unit can be for three primary reasons. First, an insufficient number of personnel assembled to staff and respond with the unit. Second, the unit was determined not needed by personnel at the incident location before enough personnel assembled to respond that unit. Finally, response personnel may have elected to use a different unit than was originally dispatched. Regardless, the inability to generate a reliable response is a concern.

The following figure illustrates volunteer unit reliability for incidents both in the city and SWP.

Figure 76: Volunteer Response Unit Reliability

Unit	Total Times Dispatched	Responded	Did Not Respond	% Reliable
E101	712	391	321	55%
E102	106	21	85	20%
E110	555	329	226	59%
E137	217	150	67	69%
F135	245	151	94	62%
L101	68	28	40	41%
R101	442	266	176	60%
T112	78	36	42	46%
T134	39	11	28	28%
T136	36	11	25	31%
All units	2,498	1,394	1,104	56%

Component G – Performance Objectives and Performance Measures

DYNAMICS OF FIRE IN BUILDINGS

Most fires within buildings develop in a predictable fashion, unless influenced by highly flammable material. Ignition, or the beginning of a fire, starts the sequence of events. It may take several minutes or even hours from the time of ignition until a flame is visible. This smoldering stage is very dangerous, especially during times when people are sleeping, since large amounts of highly toxic smoke may be generated during this phase.

Once flames do appear, the sequence continues rapidly. Combustible material adjacent to the flame heat and ignite, which in turn heats and ignites other adjacent materials if sufficient oxygen is present. As the objects burn, heated gases accumulate at the ceiling of the room. Some of the gases are flammable and highly toxic.

The spread of the fire from this point continues quickly. Soon the flammable gases at the ceiling as well as other combustible material in the room of origin reach ignition temperature. At that point, an event termed “flashover” occurs; the gases and other material ignite, which in turn ignites everything in the room. Once flashover occurs, damage caused by the fire is significant and the environment within the room can no longer support human life.

Flashover usually occurs about five to eight minutes from the appearance of flame in typically furnished and ventilated buildings. Since flashover has such a dramatic influence on the outcome of a fire event, the goal of any fire agency is to apply water to a fire before flashover occurs.

Although modern codes tend to make fires in newer structures more infrequent, today’s energy-efficient construction (designed to hold heat during the winter) also tends to confine the heat of a hostile fire. In addition, research has shown that modern furnishings generally ignite more quickly and burn hotter (due to synthetics).

In the 1970s, scientists at the National Institute of Standards and Technology found that after a fire broke out, building occupants had about 17 minutes to escape before being overcome by heat and smoke. Today, that estimate is as short as three minutes.² The necessity of effective early warning (smoke alarms), early suppression (fire sprinklers), and firefighters arriving on the scene of a fire in the shortest span of time is more critical now than ever.

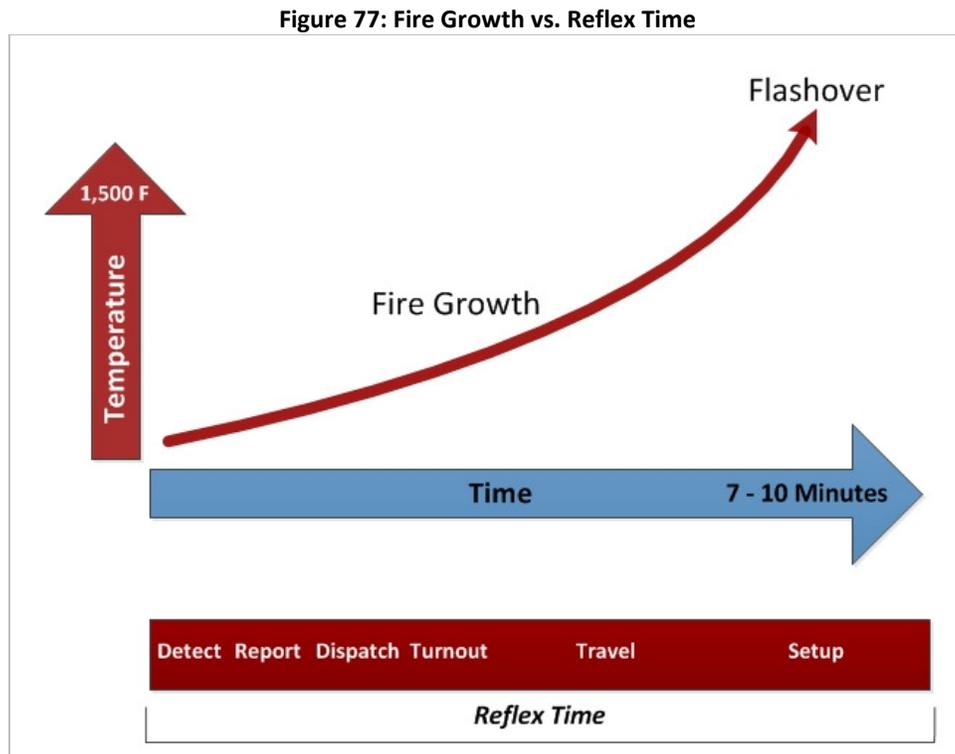
Perhaps as important as preventing flashover is the need to control a fire before it does damage to the structural framing of a building. Materials used to construct buildings today are often less fire resistive than the heavy structural skeletons of older frame buildings. Roof trusses and floor joists are commonly made with lighter materials that are more easily weakened by the effects of fire. “Light weight” roof

² National Institute of Standards and Technology, *Performance of Home Smoke Alarms, Analysis of the Response of Several Available Technologies in Residential Fire Settings*, Bukowski, Richard, et al.

trusses fail after five to seven minutes of direct flame impingement. Plywood I-beam joists can fail after as little as three minutes of flame contact. This creates a dangerous environment for firefighters.

In addition, the contents of buildings today have a much greater potential for heat production than in the past. The widespread use of plastics in furnishings and other building contents rapidly accelerate fire spread and increase the amount of water needed to effectively control a fire. All of these factors make the need for early application of water essential to a successful fire outcome.

A number of events must take place quickly to make it possible to achieve fire suppression prior to flashover. Figure 77 illustrates the sequence of events.



As is apparent by this description of the sequence of events, application of water in time to prevent flashover is a serious challenge for any fire department. It is critical, though, as studies of historical fire losses can demonstrate.

The National Fire Protection Association found that fires contained to the room of origin (typically extinguished prior to or immediately following flashover) had significantly lower rates of death, injury, and property loss when compared to fires that had an opportunity to spread beyond the room of origin (typically extinguished post-flashover). As evidenced in the following figure, fire losses, casualties, and deaths rise significantly as the extent of fire damage increases.

Figure 78: Fire Extension in Residential Structures – United States

Extension	Rates per 1,000 Fires		
	Civilian Deaths	Civilian Injuries	Average Dollar Loss Per Fire
Confined to room of origin or smaller	2.44	25.67	\$5,317
Confined to floor of origin	16.18	72.79	\$34,852
Confined to building of origin or larger	27.54	54.26	\$60,064

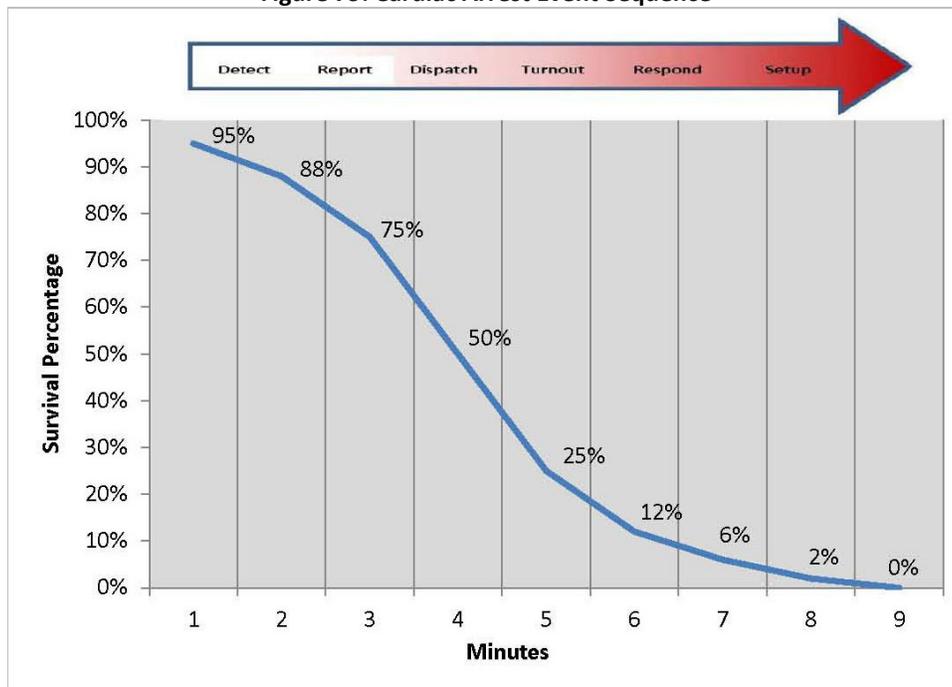
Source: National Fire Protection Association "Home Structure Fires," March 2010

EMERGENCY MEDICAL EVENT SEQUENCE

Cardiac arrest is the most significant life-threatening medical event in emergency medicine today. A victim of cardiac arrest has mere minutes in which to receive lifesaving care if there is to be any hope for resuscitation. The American Heart Association (AHA) issued a set of cardiopulmonary resuscitation guidelines designed to streamline emergency procedures for heart attack victims, and to increase the likelihood of survival. The AHA guidelines include goals for the application of cardiac defibrillation to cardiac arrest victims.

Cardiac arrest survival chances fall by seven to 10 percent for every minute between collapse and defibrillation. Consequently, the AHA recommends cardiac defibrillation within five minutes of cardiac arrest. As with fires, the sequence of events that lead to emergency cardiac care can be graphically illustrated, as in the following figure.

Figure 79: Cardiac Arrest Event Sequence



The percentage of opportunity for recovery from cardiac arrest drops quickly as time progresses. The stages of medical response are very similar to the components described for a fire response. Recent research stresses the importance of rapid cardiac defibrillation and administration of certain medications as a means of improving the opportunity for successful resuscitation and survival.

PEOPLE, TOOLS, AND TIME

Time matters a great deal in the achievement of an effective outcome to an emergency event. Time, however, is not the only factor. Delivering sufficient numbers of properly trained, appropriately equipped personnel within the critical time period completes the equation.

For medical emergencies this can vary based on the nature of the emergency. Many medical emergencies are not time critical. However, for serious trauma, cardiac arrest, or conditions that may lead to cardiac arrest, a rapid response is essential.

Equally critical is delivering enough personnel to the scene to perform all of the concurrent tasks required to deliver quality emergency care. For a cardiac arrest, this can be up to six personnel; two to perform CPR, two to set up and operate advanced medical equipment, one to record the actions taken by emergency care workers, and one to direct patient care.

Thus, for a medical emergency, the real test of performance is the time it takes to provide the personnel and equipment needed to deal effectively with the patient's condition, not necessarily the time it takes for the first person to arrive.

Fire emergencies are even more resource critical. Again, the true test of performance is the time it takes to deliver sufficient personnel to initiate application of water to a fire. This is the only practical method to reverse the continuing internal temperature increases and ultimately prevent flashover. The arrival of one person with a portable radio does not provide fire intervention capability and should not be counted as "arrival" by the fire department.

Component H – Overall Evaluation, Conclusions, and Recommendations

OVERALL EVALUATION

This Fire and Emergency Services Master Plan required the completion of an intensive analysis on all aspects of the DFD deployment and staffing practices. The analysis used various tools to review workload, historical performance, evaluate risk, and validate response and non-response service performance. The analysis relied on the experience of staff officers and their historical perspective combined with historical incident data captured by both the dispatch center and the department's in-house records management system.

The Description of Community Served section provided a general overview of the organization, including governance, lines of authority, finance, and capital and human resources, as well as an overview of the service area including population and geography served. The Review of Services Provided section detailed the core services the organization provides based on general resource/asset capability and basic staffing complements. During the Review of Community Expectations, it was determined that the community had high expectations of the department and felt generally positive about its services.

An overview of community risk was provided to describe the risks DFD is charged with protecting. Geospatial characteristics, topographic and weather risks, transportation network risks, physical assets, and critical infrastructure were reviewed. As a factor of risk, community populations and demographics were evaluated against historic and projected service demand. Population and service demand, over the past decade, has increased and will continue to increase in the future.

Evaluating risk using advanced geographic information systems (GIS) provided an increased understanding of community risk factors, which can lead to an improved deployment policy.

During the analysis of service level objectives, critical tasking assignments were completed for incident types ranging from a basic medical emergency to structure fires. Critical tasking required a review of on-scene staffing capability to mitigate the effects of an emergency. These tasks ultimately determine the resource allocation necessary to achieve a successful operation. The results of the analysis indicate that a moderate risk structure fire required 15 personnel, including command and assistants.

The Review of Historical System Performance evaluated each component of the emergency incident sequence. Total response time included a number of components such as call processing, turnout, and travel. Beyond the response time of the initial arriving units, the additional components of concentration and effective response force, reliability, call concurrency, and resource drawdown were evaluated.

Based on the analysis and considering community expectations, recommendations are offered to improve the delivery of fire and emergency services to the City of Dallas and SWP. It is not expected that all will be implemented in the short term. Some may wait until economic conditions allow their implementation. However, all the recommendations offered chart a course to improved capability and service.

RECOMMENDATIONS

During the course of this study a number of issues, concerns, and opportunities were identified. The following recommendations are intended to accomplish three primary objectives:

1. Define clearly the expected level of performance provided by Dallas Fire and EMS Department.
2. Improve service delivery with no, or minimal, expenditure of funds.
3. Identify service level improvement opportunities that can be implemented as funding becomes available.

The recommendations are described as improvement goals and should be implemented as funding allows. Each will improve DFD's ability to provide effective service to the community.

Improvement Goal A: Formally Adopt Response Performance Goals

A community's desired level of service is a uniquely individual decision. No two communities are exactly alike. Performance goals must be tailored to match community expectations, community conditions, and the ability to pay for the resources necessary to attain the desired level of service.

Levels of service and resource allocation decisions are the responsibility of the community's elected officials, in this case the Dallas City Council and the Southwestern Polk Rural Fire Protection District Board. The policy making bodies must carefully balance the needs and expectations of its citizenry when deciding how to allocate money to all of the services it provides.

Most of the performance goals distinguish between urban areas (within the Dallas city limits) and rural areas (within SWP territory). The density and nature of risks within the urban area suggest faster response performance is warranted.

With this in mind the following are recommended as DFD's fire and life safety response performance goals. These are not levels of service that must be achieved immediately but, instead, are targets for achievement when resources are available to do so.

Call-Processing Performance Goal

The first phase of overall response time is call processing time. This phase begins when the call is received at the dispatch center and ends when response resources are notified of an emergency.

Though much information must be gathered to properly identify the resources needed to respond to the emergency, keeping this time as short as possible has a direct impact on overall response time. National Fire Protection Association Standard 1221 recommends a call be processed by the dispatch center and responders notified within 60 seconds 80 percent of the time (within 90 seconds 90 percent of the time for EMS, hazardous materials, and technical rescue incidents) from the time it receives the call.

Recommended Call Processing Goal:

Response resources shall be notified of a priority incident within 60 seconds from receipt of the call at the dispatch center 90 percent of the time.

- Current performance – Within 48 seconds, 90 percent of the time.

Turnout Time Performance Goal

Turnout time is one area over which the fire department has total control and is not affected by outside influences. Turnout time, or the time between when the call is received by the response units (dispatched) and when the unit is actually enroute to the incident location (responding), affects overall response times. Reducing this time component reduces total response time.

National Fire Protection Association Standard 1710 recommends turnout time performance objectives of 80 seconds or less for fire and special operations response and 60 seconds or less for all other priority responses within urban areas. The reality of a fully volunteer response system dictate that turnout time will be longer. Improving turnout time for fire emergencies will require changes to the all volunteer system. Improving turnout time for medical responses will require different measures. Both will be discussed later in this report.

Recommended Turnout Goal:

a. Urban

- i. Response personnel shall initiate the response of a unit capable of mitigating an incident to a priority fire and special operations incident within two minutes from notification 90 percent of the time.
 - Current performance – within 10 minutes 11 seconds 90 percent of the time
- ii. Response personnel shall initiate response to a priority emergency medical incident within 90 seconds from notification 90 percent of the time.
 - Current performance – within 3 minutes 90 percent of the time

b. Rural

- i. Response personnel shall initiate response of a unit capable of mitigating an incident to a priority fire and special operations incident within 10 minutes from notification 90 percent of the time.
 - Current performance - within 11 minutes 7 seconds 90 percent of the time
- ii. Response personnel shall initiate response to a priority emergency medical incident within 90 seconds from notification 90 percent of the time.
 - Current performance - within 3 minutes 9 seconds 90 percent of the time

Response Time for the First-due Unit Goal

The time required to deliver the first response unit capable of intervening in the emergency includes both turnout time and travel time but not call processing time.

Recommended First-Due Response Time Goal:

- a. Response time for arrival of the first response unit at a priority fire or special operations incident
 - I. Urban - The first response unit capable of initiating effective incident intervention shall arrive at a priority fire or special operations incident within seven minutes from notification of response personnel 90 percent of the time.
 - Current performance – within 18 minutes 7 seconds 90 percent of the time
 - II. Rural - The first response unit capable of initiating effective incident intervention shall arrive at a priority fire or special operations incident within 20 minutes from notification of response personnel 90 percent of the time.
 - Current performance – Within 24 minutes 14 seconds 90 percent of the time
- b. Response time of the first arriving response unit at a priority emergency medical incident
 - I. Urban - The first response unit capable of initiating effective incident intervention shall arrive at a priority emergency medical incident within six minutes 30 seconds from notification of response personnel 90 percent of the time.
 - Current performance – within 8 minutes 9 seconds 90 percent of the time
 - II. Rural - The first response unit capable of initiating effective incident intervention shall arrive at a priority emergency medical incident within 11 minutes 30 seconds from notification of response personnel 90 percent of the time.
 - Current performance – within 16 minutes 4 seconds 90 percent of the time

Effective Response Force Performance Goal

A fire department's resource *concentration* is the spacing of multiple resources close enough together so that an initial "Effective Response Force" (ERF) for a given risk can be assembled on the scene of an emergency within the specific time frame identified in the community's performance goals for that risk type. An initial effective response force is defined as that which will be most likely to stop the escalation of the emergency.

The minimum ERF for moderate risk structure fires in areas with fire hydrants is identified as the arrival of at least three fire engines (9 firefighters), one ladder truck (4 firefighters), and one duty officer vehicle (1 firefighters) and one medic unit (2 personnel) (16 personnel total). In rural areas the two tenders substitute for the ladder truck bringing the total personnel needed to 17. This initial ERF does not necessarily represent the entire alarm assignment, as additional units may be assigned based on long-term incident needs and risks. Additional engines, ladders, or other specialty companies are assigned to higher risk responses in order to accomplish additional critical tasks that are necessary beyond the initial attack and containment.

Recommended Effective Response Force Goal:

- a. Urban - The full effective response force shall arrive at a moderate risk structure fire within 14 minutes from notification of response personnel 90 percent of the time.
 - Current performance – within 26 minutes 11 seconds 90 percent of the time

- b. Rural - The full effective response force shall arrive at a moderate risk structure fire within 25 minutes from notification of response personnel 90 percent of the time.
 - Current performance – within 27 minutes 32 seconds 90 percent of the time

Improvement Goal B: Redefine the relationship between the City of Dallas and SWP

The current arrangement between the City of Dallas and SWP is less a partnership and more a purchase of certain services by SWP from the city. While this does serve some of SWP’s administrative needs and provides additional resources to each, it creates a number of inefficiencies and operational challenges for both.

For example, response personnel are not members of a single organization. This leads to conflict over organizational reporting relationships, operational practices, and an inability to create a unified response system. It also has led to an “us-them” mentality that inhibits the creation of an effective response team.

Operational and administrative inefficiencies also exist. The following are among the many duplications of effort that are required because of the current arrangement:

- Department of Public Safety Standards and Training accreditation
- Pulse Point and Flashalert community notification systems
- Duty officer coverage
- Clinical Laboratory Improvement Amendments (CLIA) registration
- Physician advisor services
- Incident records management
- Policy and standard operating guidelines
- Knox Box program
- Budget development and management
- Accounts receivable and accounts payable
- Payroll
- Insurance
- Workers compensation coverage
- LOSAP
- Volunteer recruitment, application process, and background investigations

The City of Dallas and SWP should consider a more fully integrated arrangement. A new contract is recommended that establishes DFD as the sole provider of service to both jurisdictions. All personnel other than elected officials should be DFD personnel operating under a unified organizational structure.

All responsibility for purchasing supplies, equipment, and services for both jurisdictions should be the DFD's.

Under this arrangement, SWP would retain ownership of its facilities and apparatus. It would budget sufficient funds to cover its own insurance, elections expense, and other items related to the activities of the board of directors. All other funds would be paid to DFD to provide services, maintain apparatus and equipment, train personnel, etc.

The new contract should identify levels of service to be provided by DFD to SWP. These performance expectations should clearly describe standards of performance that can be provided with the funding available from SWP. DFD should report on its provision of service based on these performance expectations on a regular basis so SWP can ensure its receiving value expected.

Improvement Goal C: Complete a long-term financial forecast for SWP

SWP has been increasingly challenged financially. In this current budget year, in order to balance its budget, SWP transferred all money from two reserve funds. Since this money will not be available next year, a serious reconsideration of service capability is needed to ensure financial sustainability over the long-term.

SWP is currently operating at a deficit. In other words it is spending more money than it receives. Since property taxes, the primary source of SWP revenue) are capped at 3 percent plus new development, this deficit is expected to increase over time.

A simple financial forecast was prepared for this report. Future assumptions include:

1. Property tax receipts would increase 3.5 percent per year
2. Personnel services costs would increase 6 percent per year
3. All other expenses would increase 4 percent per year.
4. No contingency funds are spent in any year

The following figure illustrates how this impacts SWP’s ability to continue to fund services. By fiscal year 21-22, SWP will not have any beginning fund balance. Since this is necessary to pay expenses prior to the receipt of property tax revenues in November, SWP will be unable to fund its obligations.

	FY 15-16	FY 16-17	FY 17-18	FY 18-19	FY 19-20	FY 20-21
Revenue						
Beginning balance	\$50,000	\$105,141	\$80,069	\$63,904	\$42,921	\$16,752
Property taxes	\$452,099	\$467,922	\$484,300	\$501,250	\$518,794	\$536,952
Other income	\$7,202	\$7,202	\$7,202	\$7,202	\$7,202	\$7,202
Transfer from other funds	\$64,740					
Total revenue	\$574,041	\$580,265	\$571,571	\$572,357	\$568,917	\$560,906
Expense						
Personnel services	\$53,789	\$69,016	\$73,157	\$77,547	\$82,200	\$87,132
Materials and services	\$401,728	\$417,797	\$434,509	\$451,889	\$469,965	\$488,764
Station 140 payment	\$13,383	\$13,383	\$0	\$0	\$0	\$0
Total expenses	\$468,900	\$500,196	\$507,666	\$529,436	\$552,165	\$575,895
Contingency	\$20,000	\$20,000	\$20,000	\$20,000	\$20,000	\$20,000
Ending fund balance	\$85,141	\$60,069	\$43,904	\$22,921	-\$3,248	-\$34,989

SWP should retain experienced financial assistance to fully detail a long-range financial forecast to better understand its financial future and to develop solutions to ensure its continued ability to provide services.

Improvement Goal D: Prepare and present an operating levy to SWP voters

Given the financial realities identified in the previous Improvement Goal, SWP should begin a comprehensive outreach effort to its voters and taxpayers. The district’s constituents need to be offered detailed information about the potential for reduced levels of service in the future and what options are available.

The results of the recommended long-term financial review should be translated into impacts on the level and types of service that will be sustainable for the long-term. Voters should be given the option to either accept reduced service or provide the additional funding needed to sustain, or even improve, service.

Under Oregon’s tax laws, an operating levy is the only option to generate additional money for the delivery of services. General obligation bonds can only be used for capital construction and purchases. The district’s low (\$0.8612/\$1,000 assessed value) permanent tax rate cannot be increased.

This effort should begin as soon as possible. It should include:

1. Developing several options for service level and funding
2. Conduct community forums to identify the option most likely to be successful based on voter sentiment
3. Determine an appropriate election date for an operating levy if that option is selected
4. Provide detailed information to voters through the media, additional community forums, and other means
5. Submit the levy proposal to voters

SWP's customers should be offered the opportunity to determine the future of their fire and emergency services. Beginning this effort very soon is critically important.

Improvement Goal E: Reduce turnout time

Turnout time, the interval between notification of response personnel and initiation of movement of the responding apparatus to the incident's location, is currently quite long for both medic units and fire apparatus. Shortening this interval will improve incident outcomes.

Medic unit turnout times are longer than national standards would recommend for staffed units. At within 3 minutes 7 seconds 90 percent of the time medic unit turnout time performance is triple the national recommendation of 60 seconds and double the DFD performance goal of 90 seconds.

DFD should review station configuration to determine if there are obstacles to rapid turnout. Solutions could include adding doors between rooms, rearranging furnishings, and adding dispatch alerting system speakers to improve audibility.

DFD should better utilize technology that will support rapid turnout time. In-vehicle computer systems are already installed facilitating determining the best route to the incident. This eliminates the time required to review a map in the station prior to response. However, personnel seem hesitant to utilize this information.

Response personnel performance must also be addressed. Fire department management should regularly prepare information that describes current turnout time performance by individual response crews. Performance expectations should be reinforced and periodic monitoring conducted to determine if improvements are being made and sustained.

Reducing fire apparatus turnout time is more problematic. Current turnout time performance is within 10 minutes 11 seconds 90 percent of the time in the city and within 11 minutes 7 seconds 90 percent of the time within SWP.

Given how fire response units are staffed current turnout times are to be expected. All fire response units are staffed with volunteer responders. During the weekday, career staff will respond on fire response units, but still normally wait for additional volunteers to arrive before initiating response.

Since SWP's service area is primarily rural and its funding options are limited, improving turnout time through staffing of Station 130 is not likely. Some efforts can support reduced turnout time, such as recruiting volunteers from areas closer to the fire station, ensuring the station itself is not an impediment, and training.

However, the City of Dallas is an urban area much more densely populated than the district. Concentrations of attached and closely adjacent structures present greater risk of conflagration than more sparsely developed rural areas. Turnout time for incidents within the city should be reduced. National standards recommend turnout time be within 80 seconds 90 percent of the time for fire and special operations incidents. DFD's performance goal suggests turnout time be within 2 minutes 90 percent of the time. Achieving DFD's performance goal will reduce total response time by more than 8 minutes.

In-station staffing is the only way to appreciably reduce turnout time and should be strongly considered. There are several options that can be considered. All options will require that the Dallas fire station be retrofitted with living quarters. The cost of this addition has not been estimated for this report.

The improvement to be gained is the ability to deliver the first capable fire response resource to an incident much more quickly than can currently be accomplished. Regardless of the staffing method, volunteer responders still play a very important role in the community's emergency response system. Many incident types require more than one response unit. Volunteers will continue to provide the follow-on resources and response to concurrently incidents.

24 hour volunteer stand-by shifts

This option schedules volunteer personnel to work shifts in the fire station. A minimum of three volunteers would be needed per shift in order to initiate response without having to wait for additional volunteers to arrive from home or elsewhere.

This option would impose a significant burden on existing volunteers. DFD does not have enough volunteers currently to implement this option. Particularly it would not have enough volunteers available during the day to work shifts in the station.

An option is to recruit people who would provide in-station staffing on a volunteer or stipend basis (duty shift or resident personnel). Many college fire science program students are looking for opportunities to gain on-the-job experience and training.

There are a number of fire agencies in the region who staff stations in this manner. If DFD pursues this option there are a number of good programs to model from.

Cost: Uniforms and protective equipment - \$3,000 per person
Personnel costs - Dependent on if the duty shift or resident personnel would be offered a stipend.

Weekday career staff - night-time and weekend volunteer standby shifts

This option adds two or three career firefighters to provide weekday response. If two career firefighters were added, one of the administrative staff would need to be available to provide the three personnel needed to initiate immediate response. With three career firefighters this additional burden on administrative staff would not be needed.

Volunteer personnel would be scheduled to work shifts in the station on weekday nights and weekends. But like the previous option DFD does not have enough volunteer responders to implement this program without it imposing a significant burden on volunteers. Implementing a resident or duty-shift program as discussed in the previous option could be workable.

Cost: One-time expenses (uniforms, protective equipment, etc.) - \$10,000
Salary and benefits - \$265,000
Total first year cost - \$275,000

24 hour career staff

The most expensive, but most workable option is to staff the Dallas station 24 hours per day with career staff. Three per shift would be needed. Using a typical shift schedule of 53 hours per week, a total of 10 new employees would be needed. Some additional overtime funds would also be required to pay for replacement personnel for various earned leaves.

One of the three positions needed per shift could also be filled by a resident or duty-shift person. That would reduce the overall cost of this option.

Cost: One-time expenses (uniforms, protective equipment, etc.) - \$30,000
Salary and benefits - \$870,000
Total first year cost - \$900,000

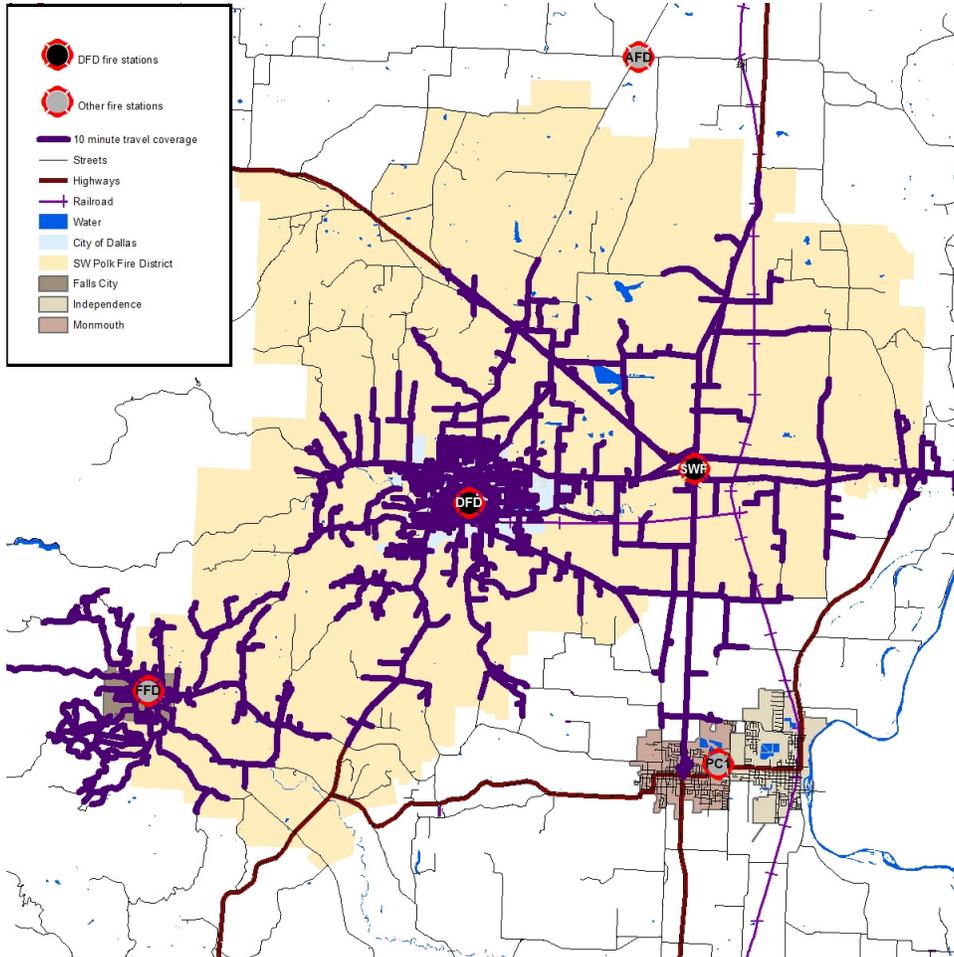
Improvement Goal F: Improve travel time to SWP incidents

Travel times to areas in SWP's northern territory are quite long because of the distance to fire stations as described earlier in this report. Adjacent agencies north of SWP do not provide prompt response for two primary reasons. First, each is dispatched by a different dispatch agency creating time delays. Second, all are volunteer staffed stations with the same turnout time issues as experience by DFD.

Adding response capability to SWP's northern area will provide value. The district has already acquired property just off State Highway 22 that is in a very suitable location. SWP has planned to construct a fire station on this property but has not been able to finance either its construction or the cost of operations.

The following figures illustrate the benefits this new station could provide if constructed. The first shows 10 minute travel coverage using only the DFD, SWP, and Falls City Fire Department stations.

Figure 80: Travel Time Coverage – Current



Developing a closer working relationship between the EMS and fire response functions offers a number of opportunities including:

1. Improved cross-training for staff of both divisions
2. Creating an ability to the staff back-up medic unit with qualified volunteers
3. Integration of incident records data to improve performance analysis
4. Creating greater organizational unity

DFD should continue its efforts to become a more unified organization.

Improvement Goal H: Consider a single paramedic responder program

The community's utilization of emergency medical services (EMS) has been increasing at a relatively rapid pace over the years. In 2006, the public used DFD's EMS services at a rate of 101 requests per 1,000 population. In 2015 that utilization rate had risen to 156 requests per 1,000 population. By 2030 it is projected that utilization will increase to over 180 requests per 1,000 population.

DFD is experiencing an increasing number of times when both staffed medic units are committed to incidents. This requires that personnel be called back to staff the back-up medic unit, or that a medic unit from an adjacent agency be dispatched. Both greatly increase response times.

The back-up medic, Medic 103, was dispatched to 130 incidents in 2014 and 146 incidents in 2015. While these numbers do not justify adding additional full-time resources now, the continued predicted growth in workload eventually will.

Most EMS incident occur during daytime hours; 48 percent between 8:00 am and 5:00 pm. Many requests for EMS assistance are not life-threatening emergencies. During the study period, just over 1,995 of the 5,342 EMS incidents DFD responded to were non-life threatening incidents. Many of these could have been handled by a response resource other than a medic unit.

Fire and EMS agencies across the country have recognized that not every EMS incident needs a fully capable medical response unit. Many agencies are now responding to non-life threatening EMS requests with a single paramedic in a regular vehicle equipped with medical equipment. The types of incidents selected for this level of response are typically those that are not expected to need transportation to a medical facility by ambulance.

DFD should consider implementing this capability as a way to reduce workload on the existing medic units and delay the need to staff another fully capable medic unit. Operating a single paramedic responder program from 8:00 am to 5:00 pm Monday through Friday will reduce medic unit workload and will also reduce the number of times the backup medic unit must be activated.

Implementation will take some effort. There are many similar programs, some in Oregon, which DFD can use as a model. Steps would include but are not limited to:

1. Revising Polk County EMS regulations to allow for a single paramedic responder program
2. Identifying incident types that are appropriate for a single paramedic responder
3. Gaining the approval of DFD's physician advisor
4. Hiring and training a paramedic, purchasing a vehicle, medical equipment and supplies

Cost: Personnel services - Cost for one paramedic - \$?
Vehicle and associated equipment and supplies - \$40,000

Improvement Goal I: Improve the collection, analysis, and utilization of data

DFD captures incident data in two different records management systems (RMS). One system is used to record information about responses by medic units to emergency medical incidents. The other system is used to capture information about responses to fires, EMS responses by fire apparatus, and other incidents. The two systems are not linked.

Responses that use both City of Dallas and SWP resources result in the generation of two incident numbers and two incident records. Attempting to use data from this system for the performance analysis included in this report proved very difficult.

Data captured by WVCC, the dispatch center, proved most reliable and usable for this report. Using WVCC data and GIS analysis, a clear picture of responses, resource workload, and system performance was developed.

In order to provide ongoing system performance analysis, changes should be made to the manner in which DFD captures incident data. These include:

1. Utilize a single system to capture details for every incident, including medic unit responses to emergency medical incidents. This would not replace the system currently used as it also captures patient care information. However, incident details should also be recorded to fire RMS so that a complete picture of DFD response workload can be easily determined. DFD should also explore whether the two systems can be linked to avoid the need for entering information twice.
2. All responses within the DFD service area should have a single incident number regardless of whether the incident occurred in the city or in SWP. This will require a change in incident number assignment at WVCC. This will also allow a complete picture of DFD response workload to be developed and provide a more accurate evaluation of system performance.

DFD should work with its records management system vendor to develop automated reporting tools so that periodic analysis of system performance can be quickly determined. Incident data should also be integrated with GIS tools to provide a spatial representation of incident workload and performance.

Improvement Goal J: Implement or expand active risk management and safety programs

Delivering fire and emergency services is a hazardous occupation. Increasing work load, diminishing resources, changes in building construction methods, and the like require an ever greater focus on safety and risk management.

DFD should continue to develop and improve its policies, procedures, and operating guidelines. Providing clear direction to response personnel and standardizing procedures to the extent possible contribute to a safer working environment. All personnel should receive regular training on operational practices and procedures.

Due to a limited law enforcement presence in unincorporated areas served by DFD at certain times of the day, personnel need to have clear direction and training to ensure their safety.

Long response times increase risk on fire incidents. The longer a fire burns in a building the less stable the structure becomes. Lightweight construction materials fail even more quickly than older types of construction. Personnel need to be well trained in building construction methods and how structural integrity changes under fire conditions. Knowing when to conduct an offensive (interior) fire attack versus defensive (exterior) is critically important.

All personnel must meet applicable training standards. Those who don't should be barred from responding until they have participated in needed training and demonstrated the competence necessary to perform safely and effectively.

Finally, to its credit, DFD has initiated regular medical monitoring of its response personnel. This is vitally important to do. More than half of all firefighter fatalities are stress related resulting in sudden cardiac death. Regular medical monitoring can discover conditions that would put a responder at unnecessary risk. DFD should continue this program and require all responders to participate.

Appendix

Table of Acronyms

AHA	American Heart Association
CFAI	Commission on Fire Accreditation, International
CFR	Code of Federal Regulations
CPSE	Center for Public Safety Excellence
DFD	Dallas Fire and EMS Department
EMS	Emergency medical service
ERF	Effective response force
ESCI	Emergency Services Consulting, International
FCFD	Falls City Fire Department
FEMA	Federal Emergency Management Agency
FTE	Full time equivalent
FY	Fiscal year
GIS	Geographic information system
GPM	Gallons per minute
IDW	Inverse distance weighting
ISO	Insurance Services Office
NFF	Needed fire flow
NFPA	National Fire Protection Association
PCSO	Polk County Sheriff's Office
RMS	Records management system
SWP	Southwestern Polk Rural Fire Protection District
WVCC	Willamette Valley Communications Center