2022

Community Risk Assessment and Standards of Cover

Stillwater Fire Department
Stillwater, Minnesota

Prepared by:

FITCH & ASSOCIATES

CONSULTANT REPORT

COMMUNITY RISK ASSESSMENT AND STANDARDS OF COVER
STILLWATER FIRE DEPARTMENT, STILLWATER, MN

TABLE OF CONTENTS

INTRODUCTION 1

EXECUTIVE SUMMARY 2

SECTION A – DOCUMENTATION OF AREA CHARACTERISTICS 4

DESCRIPTION OF COMMUNITY SERVED 4

INTRODUCTION 4
LEGAL BASIS 4
HISTORY OF THE AGENCY 5
SERVICE MILESTONES 6
FINANCIAL BASIS 6
Overview *6*
Figure 1: Historical Tax Rate by Year 7
Figure 2: Revenue Source by Percentage 8
Table 1: Revenue by Type 8
Figure 3: Expenditure Percentages by Program Type 9
Table 2: Expenditures by Program Type 9
Table 3: Historical Fire Department Budget by Year 9
Expenditure Controls and Restrictions *10*
Figure 4: City Purchasing Policy Matrix 10

DESCRIPTION OF AREA SERVED 11

Geography *11*
Figure 5: Location of the State of Minnesota 11
Figure 6: Map Stillwater within Minnesota and Washington County 12
Figure 7: Map of City of Stillwater 12
Jurisdiction Served / Mutual/Automatic Aid Responsibilities *12*
Figure 8: Stillwater Fire Department Response Area 13
Transportation Features and Development *14*
Figure 9: Map of Street Network 15
Utilities *15*
Figure 10: Water Infrastructure Map 16
Topography *17*
Physiography *17*
Climate *17*
Table 4: Stillwater, MN Climate 18
Population and Demographic Features *18*
Figure 11: Population of Stillwater Fire Department Response Area 18
Figure 12: Population Per Square Mile of Stillwater Fire Department Response Area 19
Figure 13: Population Density by Census Tract – 2020 19
Figure 14: City of Grant Population and Household History and Projection by Decade 20

Figure 15: May Township Population and Household History and Projection by Decade 20
Figure 16: City of Stillwater Population and Household History and Projection by Decade 21
Figure 17: Stillwater Township Population and Household History and Projection by Decade 21
Figure 18: Age Demographics for City of Stillwater, Washington County and State of Minnesota 22
Figure 19: Income and Poverty for City of Stillwater, Washington County and State of Minnesota 22
Figure 20: Race and Hispanic Origin for City of Stillwater, Washington County and State of Minnesota 23
Figure 21: Discover Stillwater 2018 Lodging Tax Revenue by Quarter 24
Disaster Potentials *24*
Table 5: Overall Hazard Probability 24

SECTION B - DESCRIPTION OF AGENCY PROGRAMS AND SERVICES 26

DESCRIPTION OF AGENCY PROGAMS AND SERVICES 27

ORGANIZATIONAL OVERVIEW 27
Organizational Structure *27*
Figure 22: Organizational Chart 27
Administration, Emergency Services, and Support Staff *29*
Figure 23: 2021 Fire Prevention Tasks 32
SERVICE DELIVERY PROGRAMS 34
Fire Suppression *34*
Rescue *35*
Emergency Medical Services *35*
Hazardous Materials *36*
COMMUNITY EXPECTATIONS AND PERFORMANCE GOALS 36
Stakeholder Input Process *36*
Guiding Principles and Internal Performance Expectations and Goals *36*

SECTION C – ALL HAZARD COMMUNITY RISK ASSESSMENT 37

COMMUNITY RISK ASSESSMENT AND RISK LEVELS 38

RISK ASSESSMENT METHODOLOGIES 38
COMMUNITY-LEVEL RISK ASSESSMENT METHODOLOGY (2-D MODEL) 39
Figure 24: Probability and Consequence Matrix 40
Geospatial Risk *40*
Table 6: Summary of Geospatial Risk Assessment 42
Community Characteristics of Natural Risk *42*
Table 7: Overall Community Hazard Probability 42
Geographic and Weather-Related Risks *43*
Figure 25 : Floodplain Map 43
Figure 26 : Time Spent in Drought Conditions 1950 - 2021 44
Table 8: Summary of Natural Risk Assessment 46
Man-made Risks *46*
Figure 27: Summary of Transportation Risks 47
Man-made Risks *47*
SERVICE DELIVERY PROGRAM RELATED RISK ASSESSMENT METHODOLOGY 48
Methodology *48*
Figure 28: Community Risk Assessment Process 49
Table 9: Probability Risk Matrix 49
Table 10: Consequence Risk Matrix 50

Table 11: Impact Risk Matrix 50
RISK ASSESSMENT BY PROGRAM AREA 51
Fire Suppression Services - High *51*
Table 12: Number of Calls, Number of Responses, and Total Busy Time by Program in 2021 51
Table 13: Total Fire Related Calls by Nature of Call 52
Table 14: Total Fire Related Calls and Average Calls per Day by Month 53
Figure 29: Average Fire Related Calls per Day by Month 53
Table 15: Total Fire Related Calls and Average Calls per Day by Day of Week 54
Figure 30: Average Fire Related Calls per Day by Day of Week 54
Table 16: Total Fire Related Calls and Average Calls per Day by Hour of Day 55
Figure 31: Average Fire Related Calls per Day by Hour of Day 56
Table 17: Number of Responding Units by Fire Related Call Type 57
Figure 32: Heat Map for Fire Calls 58
Figure 33: 3-D Model for Fire Risk 59
Table 18: Critical Tasks for Fire Alarm – Single Family 59
Table 19: Critical Tasks for Fire Alarm – Multi-Family Dwelling/Commercial 60
Table 20: Critical Tasks for Structure Fire – Single Family Dwelling 60
Table 21: Critical Tasks for Structure Fire – Multi-Family Dwelling/Commercial 60
Emergency Medical Services - High *60*
Table 22: Number of Calls, Number of Responses, and Total Busy Time by Program in 2021 61
Table 23: Total EMS Related Calls and Average Calls per Day by Month 62
Figure 34: Average EMS Related Calls per Day by Month 62
Table 24: Total EMS Related Calls and Average Calls per Day by Day of Week 63
Figure 35: Average EMS Related Calls per Day by Day of Week 63
Table 25: Total EMS Related Calls and Average Calls per Day by Hour of Day 64
Figure 36: Average EMS Related Calls per Day by Hour of Day 65
Table 26: Total EMS Related Calls by Nature of Call 65
Table 27: Number of Responding Units by EMS Related Call Type 67
TRANSPORT 68
Table 28: EMS Non-Transport and Transport Calls by Call Type 68
Table 29: Total EMS Calls and EMS Calls with Transports and Average Calls per Day by Hour of Day 69
Figure 37: Average EMS Calls and EMS Calls with Transports per Day by Hour of Day 70
Figure 38: Heat Map for EMS Calls 71
Figure 39: 3-D Model for EMS Risk 72
Table 30: Critical Tasks for EMS Responses - Low Risk 72
Table 31: Critical Tasks for EMS Responses – Moderate/High Risk 72
Table 32: Critical Tasks for EMS Responses - Critical Risk 73
Table 33: Critical Tasks for EMS Response – Low Risk Accident 73
Table 34: Critical Tasks for EMS Response – High Risk Accident 73
Technical Rescue Services - Low *73*
Table 35: Number of Calls, Number of Responses, and Total Busy Time by Program in 2021 74
Figure 40: Heat Map for Rescue Calls 75
Figure 41: 3-D Model for Technical Rescue Risk 76
Table 36: Technical Rescue Incident – Critical Task Analysis 76
Hazardous Materials Services - Low *76*
Table 37: Number of Calls, Number of Responses, and Total Busy Time by Program in 2021 77
Figure 42: Heat Map for Hazmat Calls 78
Figure 43: 3-D Model for Hazmat Risk 79
Table 38: Hazardous Materials – Investigate Odor 79
Table 39: Hazardous Materials – Leak with Isolation/Investigation 80

Table 40: Hazardous Materials – Leak with Mitigation/Rescue 80
Population Density, Development, and Growth *81*
Table 41: 2019 Metropolitan Council Census Data 81
Table 42: Population Density Classification and Projected Population Change 81
Table 43: Comparison of Response Times by Agency to Best Practices and National Experience, 82
Figure 44: Urban and Rural Call Density Map 83
Figure 45: Observed and Hypothetical Growth in Call Volume 84
Table 44: Summary of Man-made Risk Assessment 85

SECTION D – CURRENT DEPLOYMENT, PERFORMANCE AND GPZ RISK ASSESSMENT 86

COMMUNITY RESPONSE HISTORY 87

METHODOLOGY 87
OVERVIEW OF COMMUNITY RESPONSE PERFORMANCE 88
Figure 46: Percentage of Total Incidents by Program 88
Table 45: Number of Incidents by Call Category 89
Table 46: Number of Calls by Call Category 91
Table 47: Number of Calls, Number of Responses, and Total Busy Time by Program – SFD Units in All Jurisdictions 92
Table 48: Overall: Total Calls and Average Calls per Day by Month 93
Figure 47: Overall: Average Calls per Day by Month 94
Table 49: Overall: Total Calls and Average Calls per Day by Day of Week 94
Figure 48: Overall: Average Calls per Day by Day of Week 95
Table 50: Overall: Total Calls and Average Calls per Day by Hour of Day 95
Figure 49: Overall: Average Calls per Day by Hour of Day 97
Table 51: Average Dispatch, Turnout, Travel, and Response Times by Program and Determinant - First Arriving Units 98
Figure 50: Average Dispatch, Turnout, Travel, and Response Times by Program - First Arriving Units 99
Table 52: 90th Percentile Dispatch, Turnout, Travel, and Response Times by Program and Determinant - First Arriving Units 99
Table 53: 90th Percentile Travel Times by Unit Type - First Arriving Units 99

REVIEW OF SYSTEM PERFORMANCE 100

CASCADE OF EVENTS 100
Detection *100*
Call Processing *100*
Turnout Time *101*
Travel Time *101*
Total Response Time *101*
Figure 51: Cascade of Events 101
RESPONSE TIME CONTINUUM 102
Fire *102*
Figure 52: Example of Traditional Time Temperature Curve 102
Figure 53: Ventilation Controlled Time Temperature Curve 103
EMS *103*
Figure 54: CPR Performance Analysis 105
DISTRIBUTION FACTORS 105
Comparison of Demand Zones *105*
9-Minute Travel Time *106*
Table 54: Marginal Fire Station Contribution for 9-Minute Travel Time 106
Figure 55: Marginal Fire Station Contribution for 9-Minute Travel Time 106

Comparison of Workloads by Unit Hour Utilization (UHU) *106*
Table 55: Unit Hour Utilization 108
Figure 56: Unit Hour Utilization 108
CONCENTRATION OF RESOURCES 109
Effective Response Force Capabilities *109*
RELIABILITY FACTORS 109
Overlapped or Simultaneous Call Analysis *109*
Table 56: Overlapped Calls 109
Figure 57: Overlapped Call by Time of Day and Day of Week 2019-2021 110

SECTION E – EVALUATION OF CURRENT DEPLOYMENT AND PERFORMANCE 111

PERFORMANCE OBJECTIVES AND MEASUREMENT 112

PERFORMANCE OBJECTIVES – BENCHMARKS 112
Fire Suppression Services Program *112*
Emergency Medical Services Program *112*
Technical Rescue Services Program *113*
Hazardous Materials Services Program *113*
PERFORMANCE OBJECTIVES – BASELINES 114
Fire Suppression Services Program *114*
Table 57: Fire Service Baseline and Benchmark Comparison of Response Time 114
Table 58: Single Family Structure Fire Critical Task Comparison for Effective Response Force 114
Emergency Medical Services Program *114*
Table 59: EMS Service Baseline and Benchmark Comparison of Response Time for Stillwater Fire 115
Table 60: Cardiac Arrest Critical Task Comparison for Effective Response Force 115
Table 61: Lakeview EMS Response Times 115
Figure 58: Fire and EMS Response Time Comparison 116
Technical Rescue Services Program *116*
Table 62: Technical Rescue Service Baseline and Benchmark Comparison of Response Time 116
Table 63: Technical Rescue Critical Task Comparison for Effective Response Force 116
Hazardous Materials Services Program *117*
Table 64: Hazmat Baseline and Benchmark Comparison of Response Time 117
Table 65: Hazardous Materials Leak with Mitigation/Rescue Critical Task Comparison for Effective Response Force 117

BASELINE PERFORMANCE TABLES 117

BASELINE AND BENCHMARK GAP ANALYSES 117
Table 66: (Moderate Risk) Fire Suppression Gap Analysis 117

SECTION F – PLAN FOR MAINTAINING AND IMPROVING RESPONSE CAPABILITIES 118

COMPLIANCE METHODOLOGY 119

PERFORMANCE EVALUATION AND COMPLIANCE STRATEGY 119
COMPLIANCE VERIFICATION REPORTING 119
CONSTANT IMPROVEMENT STRATEGY 119
Figure 59: Continuous Improvement and Compliance Model 120

SECTION G – OVERALL EVALUATION AND RECOMMENDATIONS 121

OVERALL EVALUATION, CONCLUSIONS, AND RECOMMENDATIONS 122

OVERALL EVALUATION 122
STAFFING 122
Figure 60: Staffing Model Continuum 123
Figure 61: Paid On Call Responses by Day 124
Figure 62: Paid On Call Response by Hour 124
Table 67: Mutual Aid Department Distance and Drive Time 125
ADMINISTRATION 126
DATA 126
OPERATIONS 127
PREVENTION 128
DISPATCH 129
COLLABORATION 130

ATTACHMENTS –

Attachment A – Data Report

INTRODUCTION

The following document functions as the Stillwater Fire Department's (SFD) All Hazard Community Risk Assessment and Standards of Cover statement. The Commission on Fire Accreditation International (CFAI) defines the process, known as "deployment analysis," as a written procedure which determines the distribution and concentration of fixed and mobile resources of an organization. The purpose of completing such a document is to assist the Department in ensuring a safe and effective response force for fire suppression, emergency medical services (EMS), hazardous materials incidents, and technical rescues, and in facilitating activities for domestic preparedness, emergency planning, and disaster response.

Creating a Standards of Cover (SOC) document requires the research, study, and evaluation of a considerable array of community features. The following report will begin with a descriptive overview of both the city of Stillwater and Fire Department. Following this overview, an all-hazards risk assessment provides an analysis of potential risks and describes activities the Department employs to mitigate those risks. Current deployment and performance were assessed to determine the capabilities and capacities that are available. Benchmark statements and baseline performance support SFD's ability to meet distribution and concentration metrics. The report concludes with plans for maintaining and improving capabilities, as well as policy recommendations to address gaps in performance or desired outcomes.

This SOC is a foundation that will allow SFD to update a community risk assessment (CRA) on a regular basis. SFD anticipates that regularly revisiting and revising the SOC and CRA will allow the agency to stay on top of changes in the community as well as enable staff to efficiently plan for resources allocation to provide service to the city.

SFD would like to thank all members for their continued dedication to the citizens and visitors of the City of Stillwater, City of Grant, Stillwater Township, and May Township and for the commitment to continuous improvement embodied by the accreditation process.

EXECUTIVE SUMMARY

In late 2022, the City of Stillwater contracted with Fitch & Associates to objectively evaluate the Stillwater Fire Department's operations, deployment, and staffing. SFD was motivated by the desire to ensure that the current level of performance was meeting the expectations of the community they serve, and that the methodologies utilized to evaluate community risk and response were aligned with the performance goals, performance objectives, and outcome measures established by the fire department administration and the community-driven strategic planning process.

SFD's SOC document is defined by CFAI as the "adopted written policies and procedures that determine the distribution, concentration and reliability of fixed and mobile response forces for fire, emergency medical services, hazardous materials and other technical types of responses". For the elected body and City Administrator to have confidence that SFD is meeting the needs of the community, a complete assessment of the risks must be honestly undertaken. Only after the application of a proven and consistent risk assessment model is made can a fire department develop an SOC performance contract.

It is the responsibility of an agency to provide the city's decision makers with an educated calculation of the expected risk, what resources are available to respond to that risk, and what outcomes can be expected. All these factors play a role in providing the community's emergency services. It is best that communities set response standards based on the identified risks within their jurisdictions. Fire departments that do not apply a valid risk assessment model to their community are not able to adequately educate their community leaders of their true needs. The application of a tested risk assessment model allows the fire department and elected officials to make educated decisions about the level of emergency service they desire.

SFD is committed to the philosophy of risk management that is embedded within the accreditation process. It is this process of risk assessment that is most crucial to the operation of the fire department. In addition, the process of performing continuous risk assessment of the community provides vital information for not only first responders, but for elected officials, City Administrator, and residents as well. Important community policy decisions cannot be made without properly and thoroughly assessing the potential risk.

Armed with this information in this SOC, Department leaders, elected officials, and residents are better informed and can make more educated decisions about the level of emergency service they can anticipate.

This SOC represents that commitment to a comprehensive assessment of our community's risks. The key elements of this SOC include levels of service to be provided, analysis of current response capabilities by geographic area, and recommendations to maximize efficiency of all resources to obtain the best possible emergency response, keeping consistent with community expectations. The Department evaluated the performance of the first arriving unit (distribution) and the arrival of

the effective response force (ERF; concentration). ERF is the minimum number of personnel, equipment, and apparatus needed to mitigate a given type of incident and its level of risk.

Stillwater and its surrounding area are unique being located on the bank of the St. Croix River with a historic downtown that attracts many visitors and special events. The area also has bluffs that have incomparable views that people like to use for recreation. There are many factors in addition to these listed that create risks that are specific to the Stillwater Fire Department.

As you will see throughout the document the Stillwater Fire Department provides a great level of service to the community given its currently available resources. Like many agencies one of the largest struggles the department is facing is the sustainability and reliability of the combination staffing model given the recruitment and retention struggles of paid-on-call staff. There are also some operational improvements the department can make to improve the efficiency and effectiveness of the department.

SECTION A – DOCUMENTATION OF AREA CHARACTERISTICS

DESCRIPTION OF COMMUNITY SERVED

This section provides legal and historical background pertinent to the delivery of emergency service within the Stillwater Fire Department. Included in this section are reviews of the legal and governmental structure, overview of the demographics and physical environment, and characteristics of particular areas for which SFD provides service.

Introduction

The settlement of Stillwater started in the early 1840's before Minnesota became a state. The original industry was a lumbermill which was owned by John McKusick and three other lumberman that opened in 1844. In 1848, Stillwater was platted and had a population of approximately 600, most of which were lumberman. Minnesota became a territory on March 3, 1849. Washington County was the first County in the state and Stillwater was confirmed as the County Seat.

On March 4, 1854, Stillwater was incorporated as a city. John McKusick was elected as the first Mayor of the City of Stillwater. Within Minnesota, Stillwater was the largest incorporated area at the time. The state prison was completed in downtown by 1853. In the 1870's railroads arrived in Stillwater, which expanded markets and the availability of manufactured goods. There was a decline in the lumber industry which also led to a population decline from 13,000 in the 1880s to 7,000 in 1940. During the 1970s the first planned residential development was constructed along Highway 36. Over the years the businesses within Stillwater have changed to include hospitality and local services such as banking and healthcare.[1]

Stillwater Fire Department is a full-service emergency services organization providing for fire suppression, EMS first response, rescue, hazardous materials fire response, prevention, and life safety education to the residents and visitors of Stillwater. The Department serves an area of 53 square miles and a permanent population of nearly 24,777 residents from a single fixed-facility fire station strategically located within the community.

Legal Basis[2]

The City of Stillwater was incorporated on March 4, 1854. On November 18, 1986, the city adopted a City Charter which became effective on January 1, 1987. The City Charter identifies the authority and responsibilities of the City of Stillwater. Article VII of the City Charter establishes the city as a Council-

[1] https://www.wchsmn.org/stillwater/ accessed April 17, 2022

[2] https://library.municode.com/mn/stillwater/codes/code_of_ordinances?nodeId=CH1CH_ARTVIIADAF accessed on April 17, 2022

Administrator form of government. The charter grants the City Administrator the authority to hire, discipline or suspend all city employees except department heads. All department heads within the City of Stillwater must be confirmed, suspended, or terminated by official action of the City Council.

Article IX of the City Charter establishes the fire department and grants the authority to the Fire Chief and City Administrator to determine the ranks and duties within the department. The Fire Chief also has the authority to establish and modify any rules necessary within the department.

History of the Agency

Stillwater Steam Engine Company No. 1 was established by unanimous support of the Stillwater City Council on May 28, 1872. The first fire apparatus was a Silsby steam fire engine. Their first fire occurred on December 2, 1872 at a grocery store. Ironically the second fire responded to was in their own Engine House on December 28, 1872. A hook and ladder wagon was placed into service in 1874. In 1883, the first set of constitution and bylaws were established within the department. The bylaws included an age range of members to be between 18 and 50. A new fire hall located where the post office is now was completed in 1887. The department was to be valued at $25,000 in the 1890s. That value came from an engine, hose carts, trucks, hoses, wagons, horses, and a building.

On July 19, 1917 an American LaFrance combination hose wagon and Brockway truck was received and placed into service allowing five horses to be sold. In 1920 the department had six paid firefighters and one volunteer on duty every day. The annual call volume for the department was 158 in 1941. In those days Stillwater used St. Paul Fire Department as their mutual aid partners. During 1951 there were nine paid members including the Fire Chief.

A labor strike occurred in 1965 due to pay equity issues between Police and Fire staff. It was illegal for firefighters to strike so the City Council fired the entire department and replaced them with a volunteer force. 1973 brought the purchase of a modern 100-foot ladder truck built by Seagrave.

On January 22, 1982 a tragic fire at Brine's Meat Market in downtown occurred. This fire took the lives of two Mahtomedi firefighters and injured three Stillwater firefighters.

During the 1980's and 1990's the insurance rating of the Stillwater Fire Department improved from 5 to 3. This rating change saved citizens and business owners money on their insurance premiums. The staffing of the department in 1995 was seven full-time firefighters and 30 part-time firefighters.

A new shared fire station and armory was opened in 2015. This modern fire station was moved out of downtown to the west side of Stillwater. This fire station includes training features, living quarters, support spaces for the operation and administrative offices.

The Stillwater Fire Department is formally organized as a traditional fire department with the Fire Chief serving as the organization's chief administrative officer. The Fire Chief is supported by a

Deputy Chief-Fire Marshal, full-time Assistant Chief, Volunteer Paid On Call (VPOC) Assistant Chief and Fire Service Specialist.

Frontline career staff are organized into three workgroups with a Captain leading each workgroup. A full-time Firefighter/Engineer is assigned to each workgroup. In addition to the full-time staff each Captain has a VPOC Lieutenant, VPOC Firefighter/Engineers and VPOC Firefighters reporting to them.

The department provides many services to the community including fire suppression, non-transport basic life support emergency medical services, code enforcement inspections, public education, technical rescue, water/ice rescue, and hazardous material initial response.

Service Milestones

Compared to many fire departments in Minnesota, Stillwater Fire Department has a long history with its origin in 1872 at the Stillwater Steam Engine Company No.1. A combination of both career and volunteer staff have served the department for many years. The department has always served well beyond the borders of the city of Stillwater.

The insurance rating of the department has ranged from five to three, its most recent rating is a four. 2015 brought a modern fire station into service for the department and community.

Financial Basis

Overview

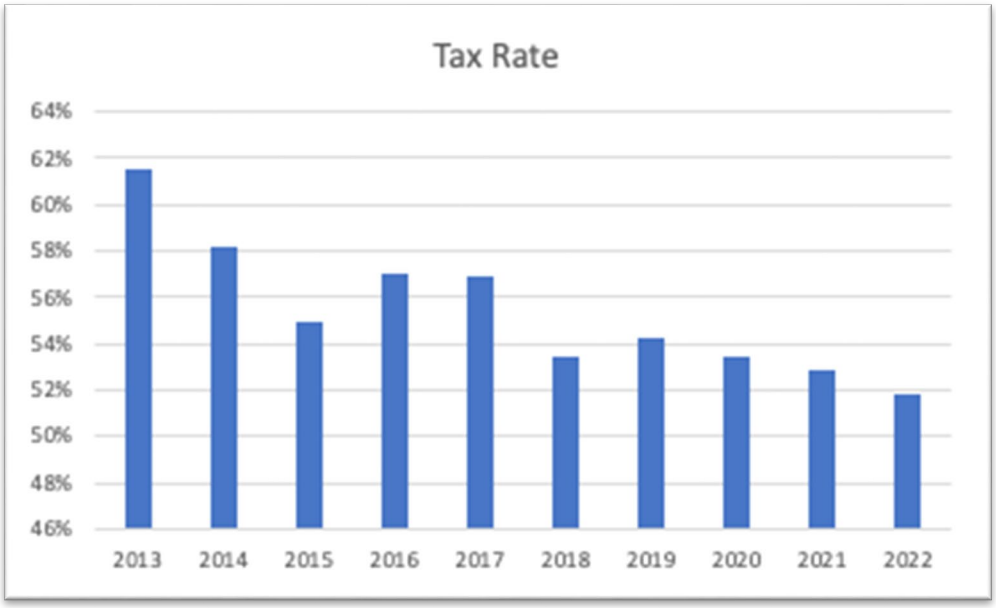
The budget is a tool with which the City can allocate its financial, human, and capital resources in an effective and efficient manner to meet residents' needs. Through the budget process, the City makes decisions on the allocation of human and financial resources to achieve long- and short-term goals and objectives as set forth by the City Council. The City of Stillwater prides itself on being fiscally responsible and providing financial transparency. In 2020 Stillwater was awarded a Certificate of Achievement in Financial Reporting.

In order to provide service to the community Stillwater has an operation budget of over $18 million dollars. When comparing year over year budgets, the 2022 budget required a 6.5 percent tax increase. Although there was a budget increase in 2022 the city also experienced 5.6 percent increase in residential market value and a 7.2 percent increase in tax capacity. During 2022 the city plans to issue $5 million dollars in a bond for capital outlay and street projects.

The city of Stillwater maintains a Aa2 bond rating. During 2021 the city maintained $6.6 million dollars in reserves for unforeseen circumstances.

In recent years due to the COVID-19 Pandemic many changes have occurred. A few of those for Stillwater include allowing temporary outdoor sales for businesses and the allocation of American Rescue Plan Act funds.

Figure 1: Historical Tax Rate by Year



Revenue to fund the city's mission is acquired through a diversity of sources. Property taxes are the top revenue source for the city. Charges for the city's services are the second highest revenue source. The remaining revenue sources each account for single digit percentage contributions to the city's overall revenue.

The fire department contributes to non-property tax revenues through a number of sources. In 2021 the department's contribution to the revenue was $667,665.08. The largest source of revenue from the department is the charges for service to the city of Grant, Stillwater Township and May Township. Minnesota has a fire training reimbursement program from the Minnesota Board of Firefighter Training and Education (MBFTE) which the department leverages to reimburse for training expenses of about $6,000 per year.

There is a restricted revenue source of fire state aid that passes through the city to the Fire Department Relief Association which is a separate non-profit organization that provides retirement benefits to the volunteer fire department staff. This revenue pass-through is required by state law anytime a department has volunteer firefighters who have established a relief association. That pass-through in 2021 was $195,068.75.

Figure 2: Revenue Source by Percentage

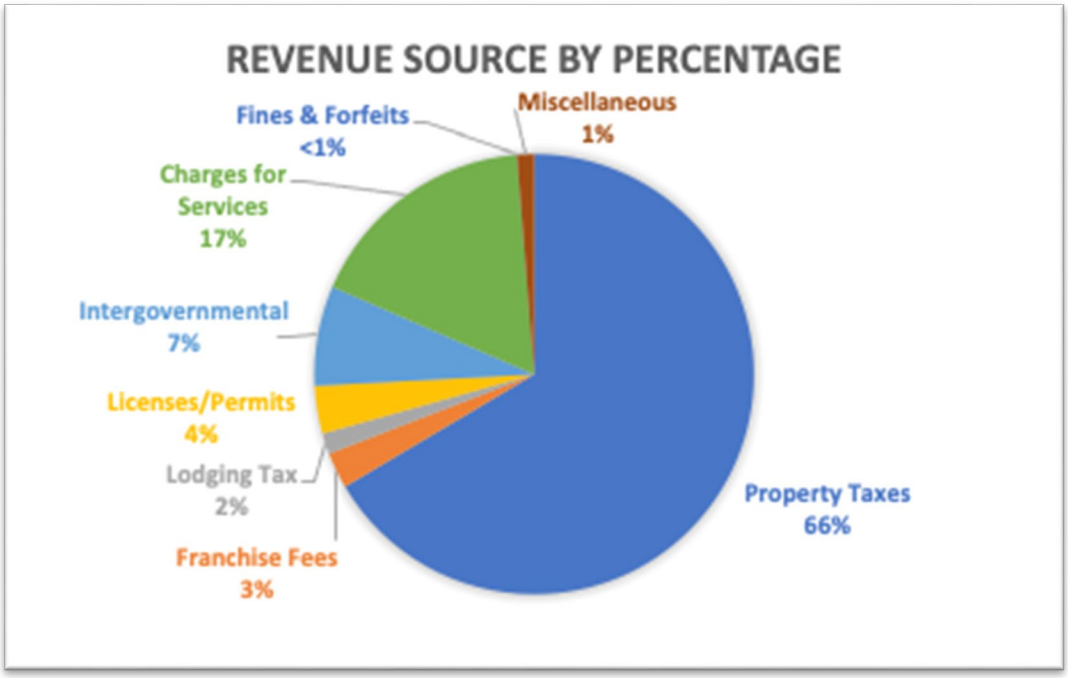


Table 1: Revenue by Type

Revenue Type	Amount	Percentage
Property Taxes	$ 12,032,975	66%
Franchise Fees	$ 480,000	3%
Lodging Tax	$ 275,000	2%
Licenses/Permits	$ 634,605	3%
Intergovernmental	$ 1,327,530	7%
Charges for Services	$ 3,120,726	17%
Fines & Forfeits	$ 80,000	<1%
Miscellaneous	$ 226,037	1%
Total	$ 18,176,873	

The budget for the Fire Department is found in the General Fund of the City. The General Fund accounts for the revenues and expenditures necessary to carry out basic governmental activities of the city such as police and fire protection, recreation, and legal and administrative services. Overall public safety services account for 38 percent of the city's overall budget. The public safety services include fire, police, building inspections and emergency management functions.

Figure 3: Expenditure Percentages by Program Type

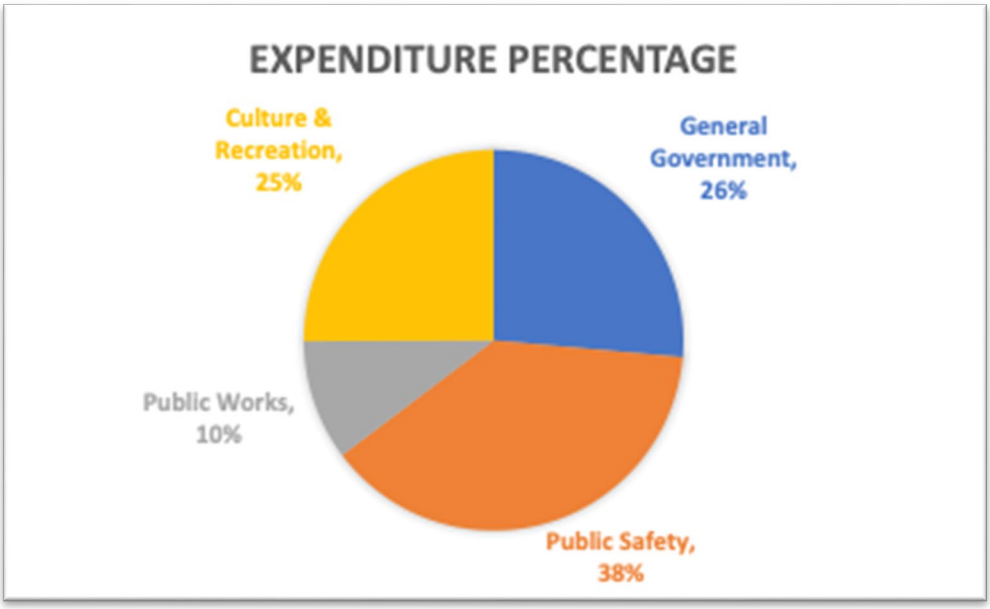


Table 2: Expenditures by Program Type

Expenditure Type	Amount	Expenditure Percentage
General Government	$ 4,884,857	26%
Public Safety	$ 7,085,732	38%
Public Works	$ 1,890,291	10%
Culture & Recreation	$ 4,637,093	25%
Total	$ 18,497,973	

The operating budget and revenues of the fire department have continued to steadily increase year over year. Much of the fire department's budget is dedicated to personnel expenses which continuously increase with cost-of-living adjustments and benefit costs such as health insurance. The capital expenses of the department have larger variation due to the replacement cycle of certain equipment like self-contained breathing apparatus (SCBA) and fire apparatus.

Table 3: Historical Fire Department Budget by Year

Year	2019	2020	2021	2022
Budget	$ 1,988,526	$ 2,140,778	$ 2,213,662	$ 2,316,008
Capital	$ 716,400	$ 497,200	$ 285,700	$ 215,000
Revenue	$ 592,057	$ 615,217	$ 667,665	$ 559,777

Expenditure Controls and Restrictions

The city has a purchasing policy in place to ensure that expenses are authorized in accordance with the city policy and relevant regulations such as state statutes and generally accepted accounting practices. As the expense amounts increase the process requires additional steps and approvals. Any purchase over $50,000 requires the city council to approve the expense.

Figure 4: City Purchasing Policy Matrix

Amount of Purchase	Type of quote required	Approval required by:	Written bid specifications	Sealed bids required	Contract required	Invoice required
Purchases up to $1,000	Not Required	City Clerk; Asst. Public Works Supt.; Police Capt. Deputy Fire Chief; IT Manager	Not Required	No	No	Yes
Purchases $1,000 up to $5,000	At least two written quotes required unless special circumstances are noted	Department Heads	As required based on type of purchase	No	*As required based on type of purchase	Yes; signed by Department Head/ Authorized Signer
Purchases over $5,000 up to $50,000	At least three written quotes required unless special circumstances are noted.	City Administrator	As required based on type of purchase.	As required based on the type of purchase	*Construction projects yes; commodities at discretion of City Administrator	Yes, except for certain construction projects; signed by City Administrator or Deputy Treasurer
Purchases over $50,000 up to $175,000	At least three written quotes required unless special circumstances are noted.	City Council	As required based on type of purchase.	As required based on the type of purchase	**Construction projects yes; commodities at discretion of City Administrator	Yes, except for certain construction projects; signed by City Administrator or Deputy Treasurer
Purchases greater than $175,000	City Clerk must advertise in City's legal newspaper	City Council	Required.	Yes	Yes	Yes, except for certain construction projects (i.e., Local Imp.); signed by City Administrator or Deputy Treasurer

The city also maintains a five-year capital improvement plan that is reviewed annually. Any expense for equipment, facilities or infrastructure improvement that exceeds $5,000 is included in the capital

plan. Within the fire department four smaller response vehicles are leased rather than purchased. The city pays $30,000 per year for the four leased vehicles and the lease term is five years.

DESCRIPTION OF AREA SERVED

Geography

The City of Stillwater is a border city between Minnesota and Wisconsin. Stillwater is located on banks of the St. Croix River in Washington County, Minnesota. Stillwater is located at 45.0560 N and -92.8088 W. Stillwater is known for its tourism that brings tourists from the region to the banks of the St. Croix River in downtown Stillwater. The city is located on the very eastern border of Minnesota. The city is 20 miles northeast of St. Paul, Minnesota. The city features miles of waterfront on the St. Croix River and is a popular tourism destination. All of the tourism supports the city's economic vitality both directly with lodging taxes and indirectly by supporting the many small businesses within the community.

Figure 5: Location of the State of Minnesota

Figure 6: Map Stillwater within Minnesota and Washington County

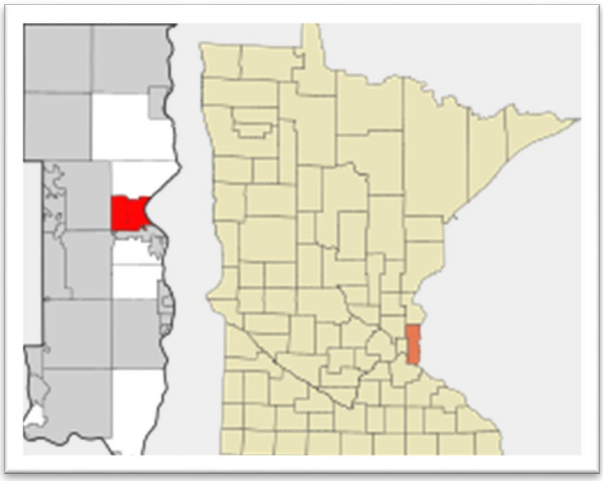
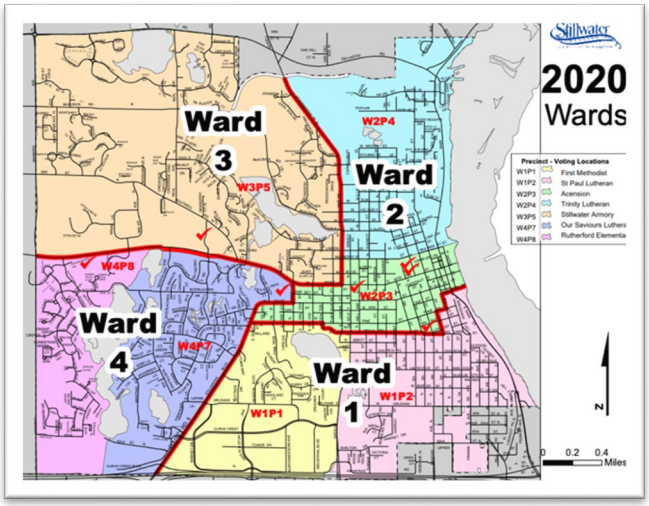


Figure 7: Map of City of Stillwater

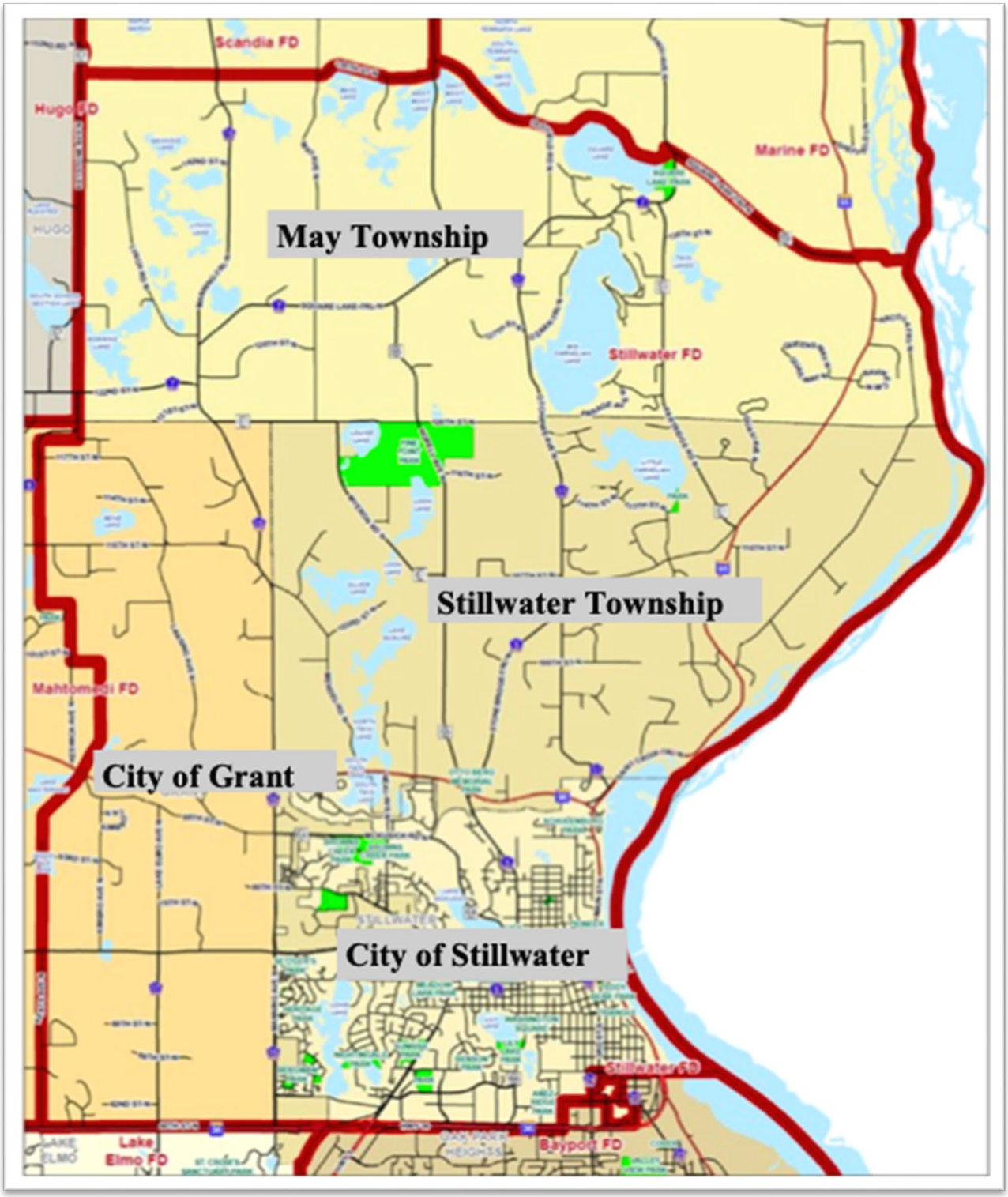


Jurisdiction Served / Mutual/Automatic Aid Responsibilities

The city limits of Stillwater are generally set by the St. Croix River on the east and Manning Avenue to the west. The northern and southern borders are roughly Dellwood Road and Highway 36 respectively. Development over the years has moved to the north and west. There is a plan that may bring Stillwater to a small area just south of Highway 36. Downtown Stillwater has experienced a tremendous amount of redevelopment of existing residential and commercial properties. A majority of redeveloped commercial or mixed-use property is protected by fire sprinklers.

The jurisdictional boundaries of the Stillwater Fire Department go beyond the city limit. Through a long-standing relationship and established contract for fire service the department provides service to parts of the City of Grant, all of Stillwater Township and parts of May Township.

Figure 8: Stillwater Fire Department Response Area



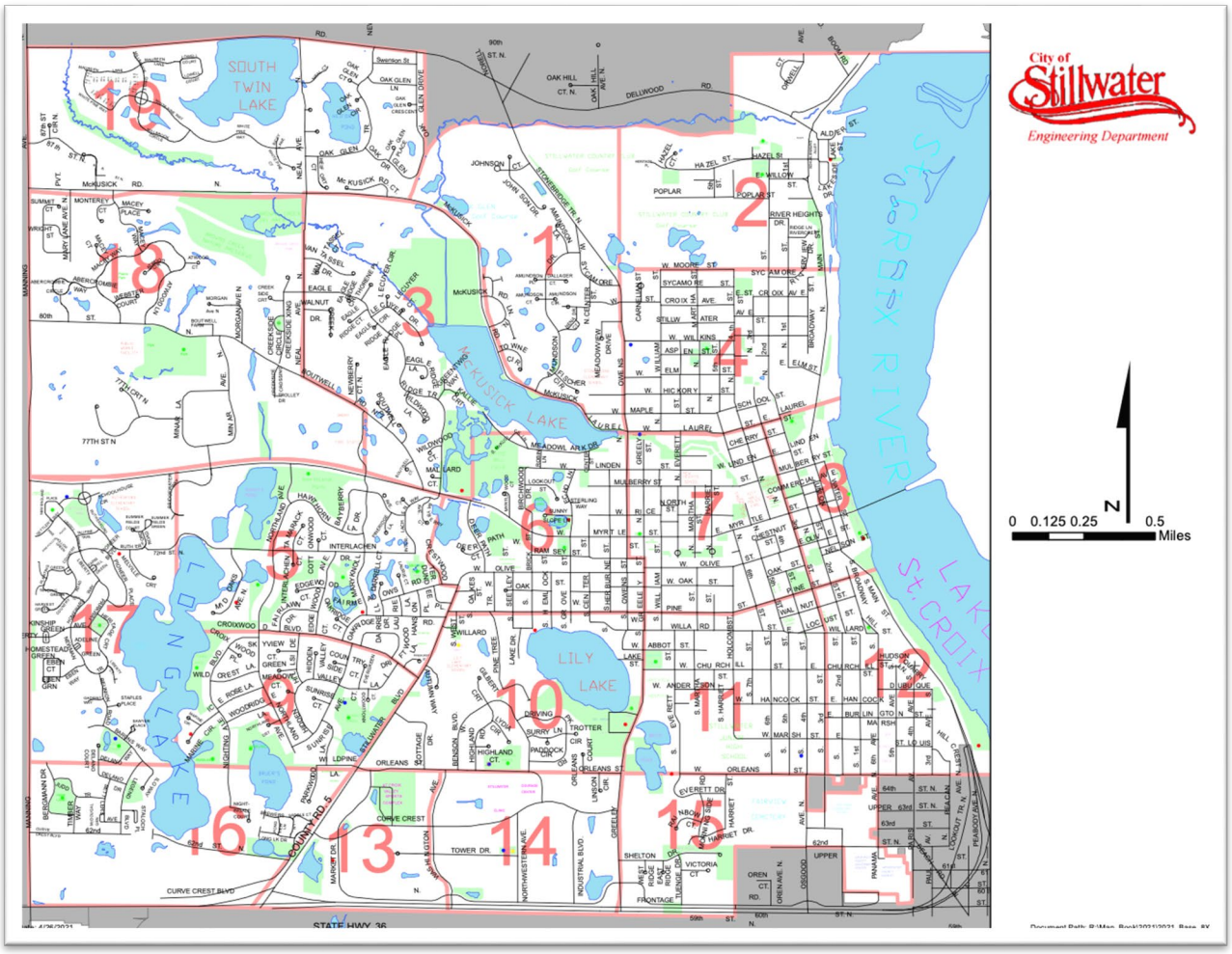
The concept of automatic and mutual aid has developed over the years in the area around Stillwater. Given the vast geography the department is responsible for, they have many agencies that they may give and receive mutual and/or automatic aid from. This includes agencies from Wisconsin.

However, the regional approach to major, specialty, and long-duration events is excellent. Examples may include specialty services such as hazardous materials, water rescue, and multiple alarm events that exceed the department's immediate capabilities.

Transportation Features and Development

The city's street network with 111 miles of roadways is serving the community well but can be challenging at times for the fire department. There are a wide variety of roadways the department must use to respond within its jurisdiction from paved four lane county roads to rural minimally maintained dirt roads. Some of the neighborhood developments also have narrowed roadways with long dead ends. In addition, on street parking on the narrow streets and winter conditions can exacerbate these road network issues. Finally, the historical nature of the downtown area has resulted in large buildings and neighborhoods that often have limited access. Within the department's response area there are many recreational amenities such as the St. Croix River which boasts heavy boat traffic half of the year and recreational trails throughout the area.

Figure 9: Map of Street Network



St. Croix River

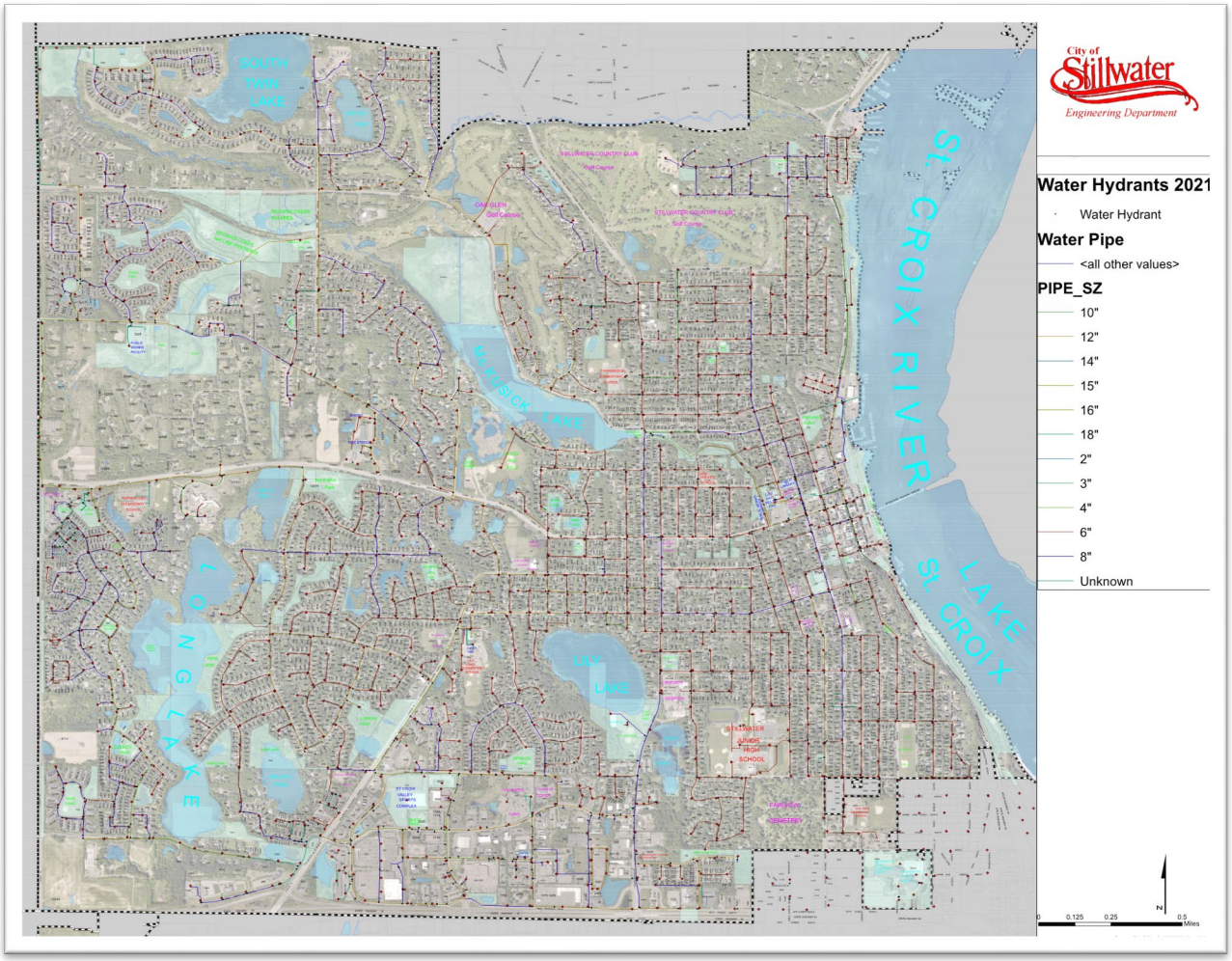
The St. Croix River is a major attraction within the community. Stillwater sits on the western bank of the river. There are five marinas within the response area. These marinas house a wide variety of boats from small recreational watercraft to large yachts with professional crews. During the boating season these watercrafts are in the water and during the off season most of the watercrafts are stored wrapped in plastic in the parking lots or storage buildings on site. The Stillwater area of the St. Croix River is known for its recreation on the waterway. One of the marinas house the fire departments watercraft for river responses.

Utilities

Within the city of Stillwater there is a full-service line of utilities from water, sewer, gas, electric, phone, cable and internet. The city provides water and sewer services within the community. The city's infrastructure assets include 92 miles of sanitary sewer, 105 miles of water mains and 80 miles of storm sewer pipe. The water supply accounts for 40 percent of the insurance rating of the fire

department. In the most recent rating from 2017 the water supply system was given 30.63 points out of 40. Six points were not awarded for the supply system and three points were not awarded in the inspection and flow testing categories.

Figure 10: Water Infrastructure Map



Once you leave the city boundaries to the remaining area of the department's response area, the majority of properties are on well and septic for water and sewer. This leaves the fire department having to haul water to the scene of a fire in those areas. Mutual aid assistance is key to getting enough water hauled to a fire scene in a timely fashion to be effective in a fire suppression effort.

The gas, electric, phone, cable and internet are provided by private utility companies. Outside of the City of Stillwater, in the remaining portions of the response area, many properties have propane with onsite storage instead of an underground natural gas service.

Topography

According to the Metropolitan Council, the City of Stillwater has a total of 9.1 square miles[3]. The overall response area of the department is 53 square miles. Stillwater has significant topography range from 675 feet above sea level at the St. Croix River to 960 feet above sea level on the western edge of the city[4]. There over a 225-foot difference between the river and the top of the hill in downtown Stillwater. This significant change in topography creates risks and challenges for the fire department operation.

Physiography

Stillwater is located in Washington County, Minnesota on the banks of the St. Croix River. The downtown area is along the St. Croix River with the topography gaining elevation as you move west away from the riverbanks. Once you reach the top of the hill from downtown the remaining area of the city is relatively flat . The location and scenery make the area a tourist destination. The landscape in the undeveloped areas can range from heavy tree foliage to open fields.

Climate

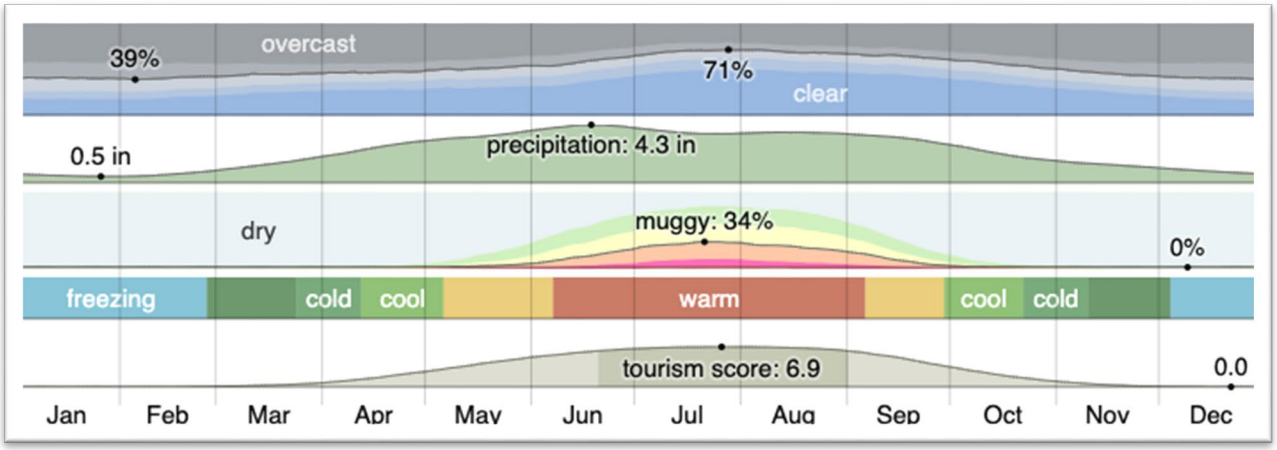
Stillwater has a humid continental climate with warm, humid summers and cold, snowy winters. The average high temperatures ranges from 24 degrees Fahrenheit in January to 81degrees Fahrenheit in July. The average low temperatures range from 9 degrees in January to 62 degrees in July. Stillwater is prone to thunderstorms and tornados during the summer, flooding in the spring and snowstorms during the winter. June is the month that typically brings the most rainfall, averaging 4.2 inches. December is the snowiest month with an average of 4.7 inches of snow. The average precipitation is 28.31 inches[5].

[3]Retrieved from https://stats.metc.state.mn.us/profile/detail.aspx?c=02395969 April 30, 2022

[4] Elevation Finder. Retrieved from https://www.freemaptools.com/elevation-finder.htm on April 30, 2022

[5] Precipitation. Retrieved from https://weather-and-climate.com/average-monthly-precipitation-Rainfall,stillwater-minnesota-us,United-States-of-America on April 30, 2022

Table 4: Stillwater, MN Climate[6]



Population and Demographic Features

Census data does not identify individual townships in Minnesota and does not breakout data for communities less than 5,000. Population shows all four individual local cities/townships. For the remainder of the demographic data only the city of Stillwater will be shown.

Population

Stillwater Fire Department serves a year-round population around 28,000 according to current Metropolitan Council data. The response area has observed manageable growth over the years, experiencing a population increase of just over 1,000 since the last U.S. Census in 2010. The department covers approximate 53 square miles. Population density within the response area ranges from 88 per square mile up to 2,749 people per square mile based on the US Census Tracts.

Figure 11: Population of Stillwater Fire Department Response Area[7]

City or Township	Population, 2010 Census	Population, 2019 Estimate	2010-2019 Population Change	Household, 2010 Census	Household, 2019 Estimate	2010-2019 Household Change
Grant	4,094	4,064	-30	1,463	1,484	21
May Township	2,776	2,722	-54	1,083	1,059	-24
Stillwater*	18,227	19,767	1,540	7,076	7,703	627
Stillwater Township	2,364	1,910	-454	855	714	-141
Total	27,461	28,463	1,002	10,477	10,960	483

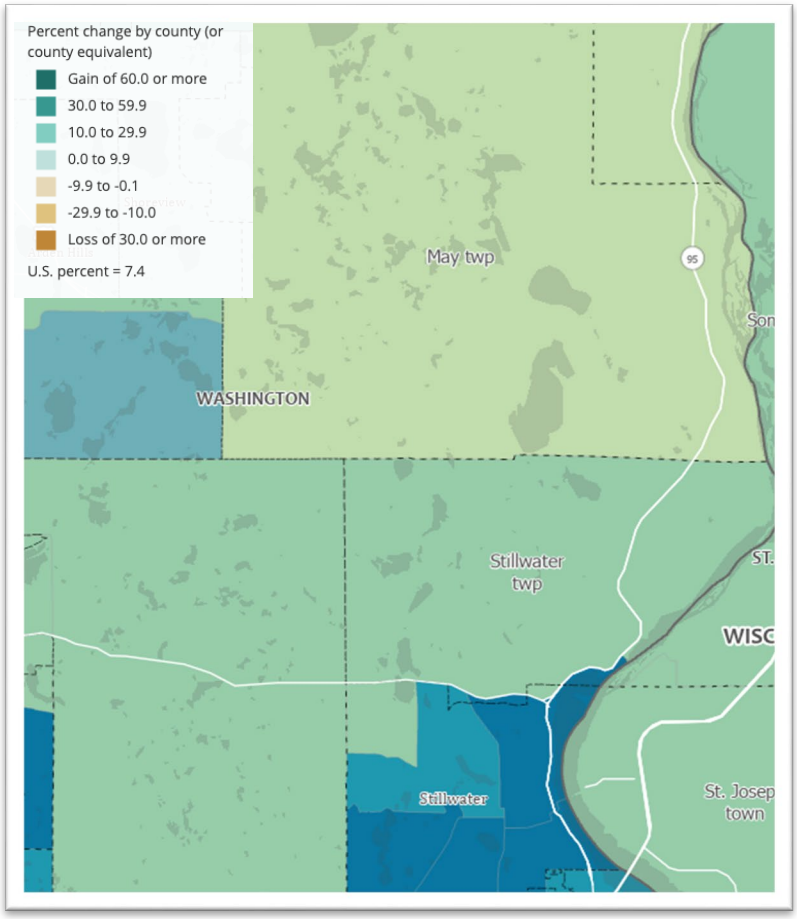
[6] Climate from Weather Spark. Retrieved from https://weatherspark.com/y/11099/Average-Weather-in-Stillwater-Minnesota-United-States-Year-Round on April 30, 2022

[7] Metropolitan Council Community Profiles. Retrieved from https://stats.metc.state.mn.us/profile/detail.aspx?c=02395969 on May 1, 2022

Figure 12: Population Per Square Mile of Stillwater Fire Department Response Area

City/Township	Population/Sq Mile
Grant, City	155
May Township	88
Stillwater, City	2,749
Stillwater Township	283

Figure 13: Population Density by Census Tract – 2020



Population Growth

The projected growth for the city of Stillwater is from 19,394 in 2020 to 23,240 in 2040 with the majority of that increase occurring before 2030. The city of Grant has a relatively flat projection for population growth. In May Township the projections for population increase go from 2,670 to 3,950 in 2040. Stillwater Township projects about a 500 person increase by 2040 from 1,866 to 2,360. The projected population increase amongst all four communities from 2020 to 2040 is 5,910 people.

Figure 14: City of Grant Population and Household History and Projection by Decade

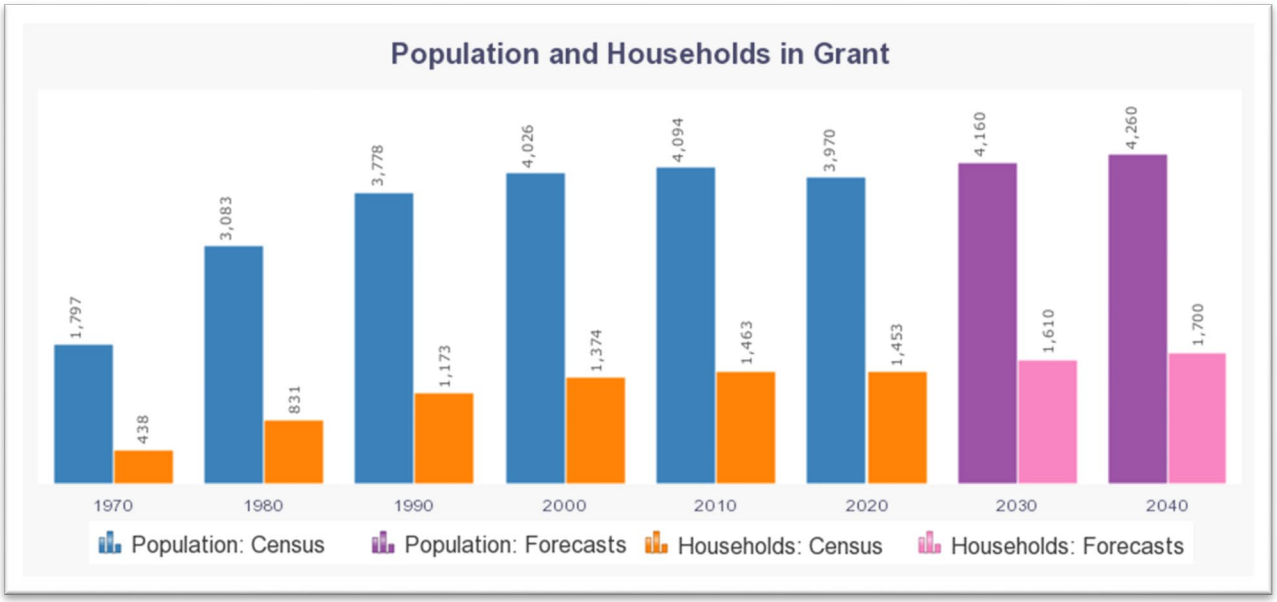


Figure 15: May Township Population and Household History and Projection by Decade

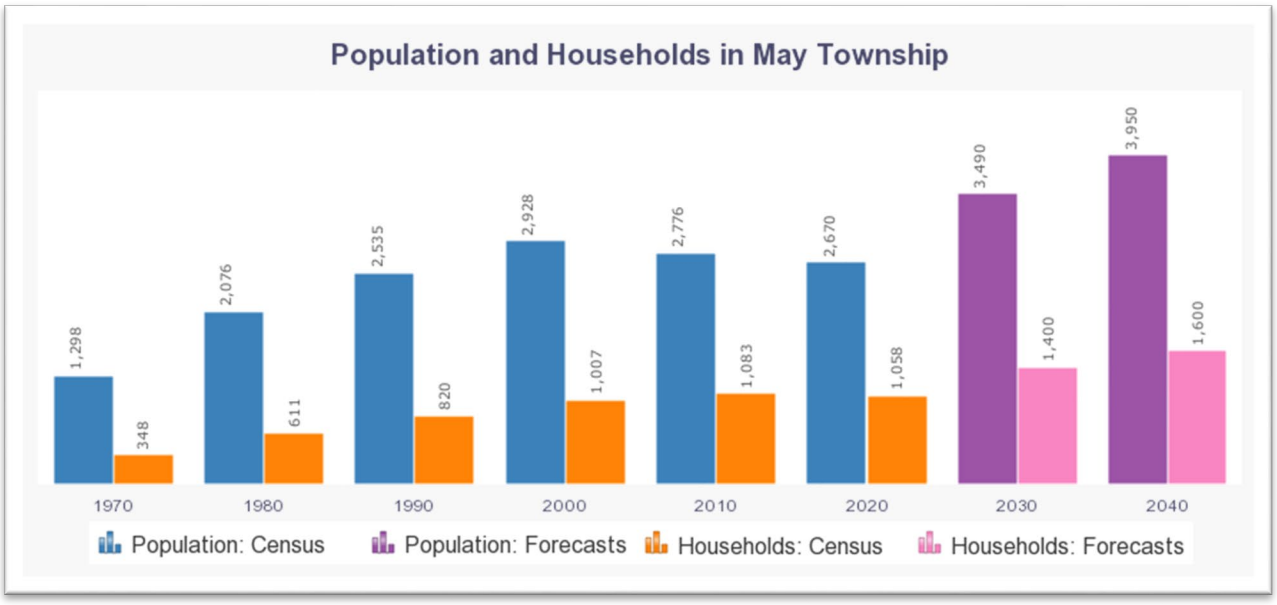


Figure 16: City of Stillwater Population and Household History and Projection by Decade

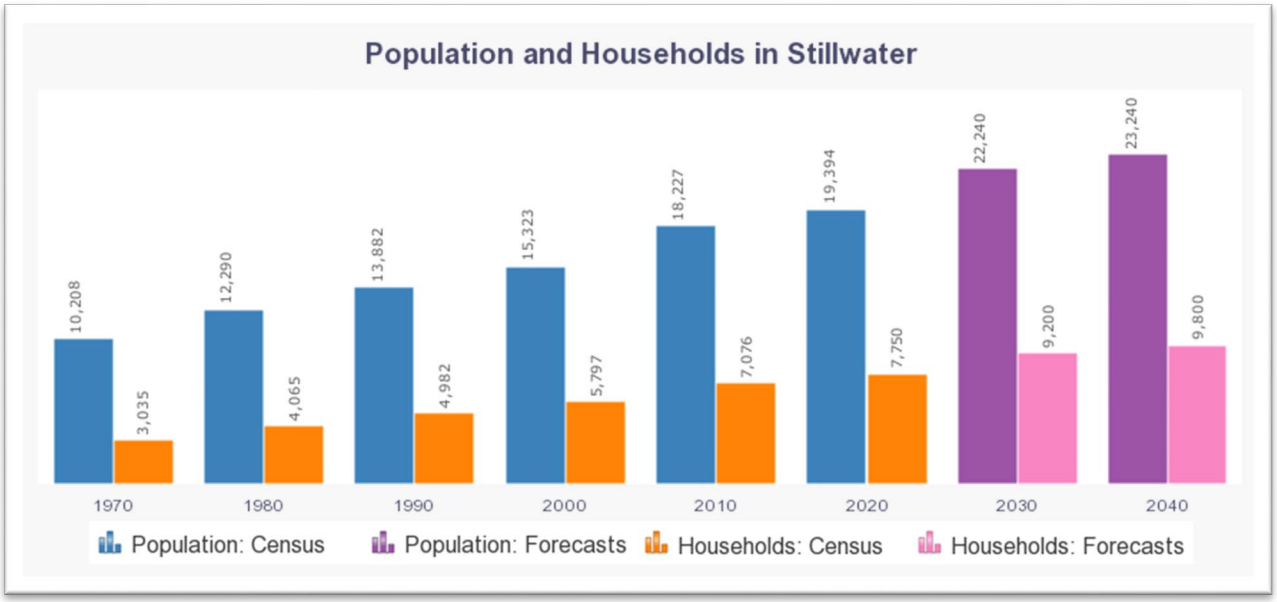
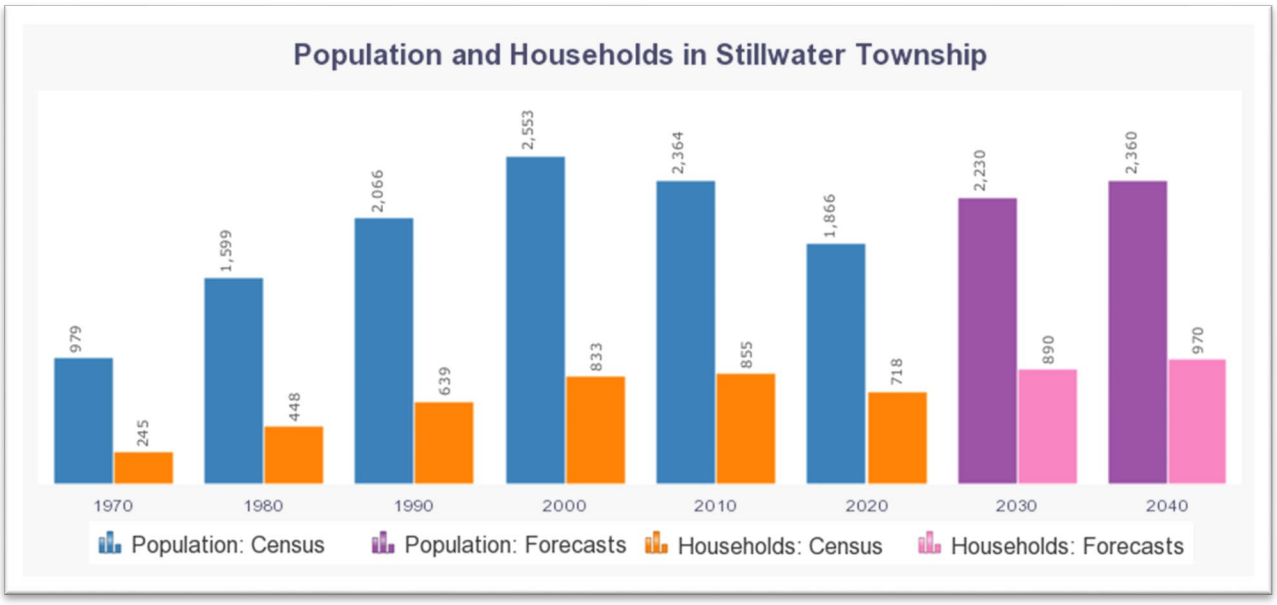


Figure 17: Stillwater Township Population and Household History and Projection by Decade

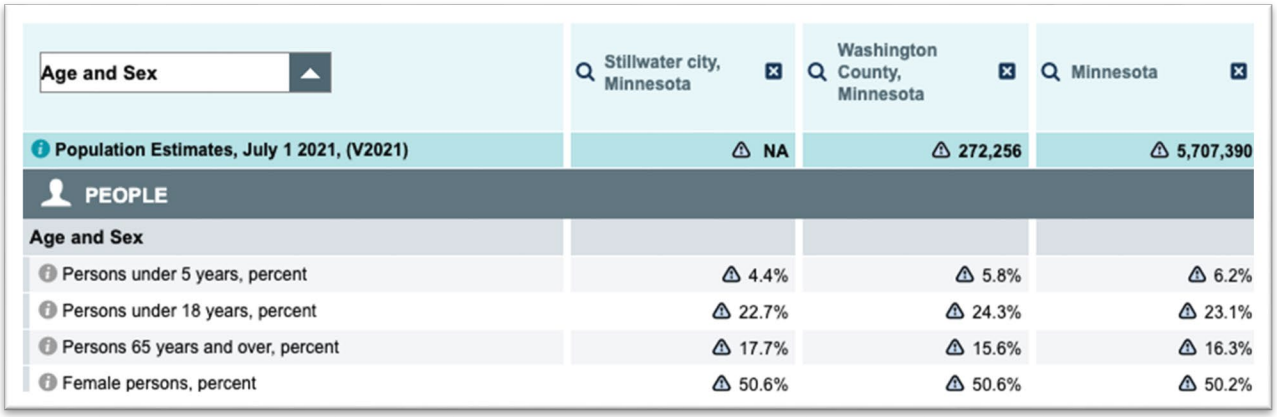


Age Demographics

Generally, older populations and very young populations are considered to be most vulnerable to the frequency and incidents of fire. In addition, older populations historically utilize EMS with greater frequency. It is important to understand, what field crews often recognize intuitively, that the distribution of population risks is not uniform across the jurisdiction. According to this data the age

of the residents, estimates include 4.4% under five years of age and 17.7% over 65 years of age.[8] The city of Stillwater overall has slightly higher concentration of person 65 or over compared to both Washington County and the State of Minnesota.

Figure 18: Age Demographics for City of Stillwater, Washington County and State of Minnesota

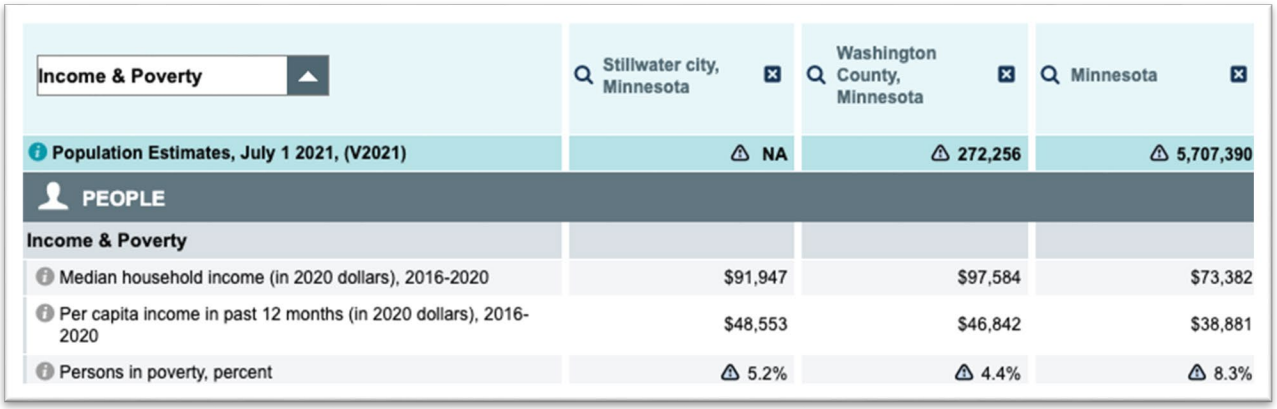


Age and Sex	Stillwater city, Minnesota	Washington County, Minnesota	Minnesota
Population Estimates, July 1 2021, (V2021)	NA	272,256	5,707,390
PEOPLE			
Age and Sex			
Persons under 5 years, percent	4.4%	5.8%	6.2%
Persons under 18 years, percent	22.7%	24.3%	23.1%
Persons 65 years and over, percent	17.7%	15.6%	16.3%
Female persons, percent	50.6%	50.6%	50.2%

Socioeconomic Characteristics

Finally, population alone is not the sole variable that influences demand for services, as socioeconomic and demographic factors have greater influence over demand. Median household income was evaluated to determine the degree to which the community had underprivileged populations. According to the U.S. Census Bureau, (most recent data available) Minnesota median household income is reported at $73,382. The median household income for Stillwater was $91,947 while Washington County's median household income was $97,584.[9]

Figure 19: Income and Poverty for City of Stillwater, Washington County and State of Minnesota



Income & Poverty	Stillwater city, Minnesota	Washington County, Minnesota	Minnesota
Population Estimates, July 1 2021, (V2021)	NA	272,256	5,707,390
PEOPLE			
Income & Poverty			
Median household income (in 2020 dollars), 2016-2020	$91,947	$97,584	$73,382
Per capita income in past 12 months (in 2020 dollars), 2016-2020	$48,553	$46,842	$38,881
Persons in poverty, percent	5.2%	4.4%	8.3%

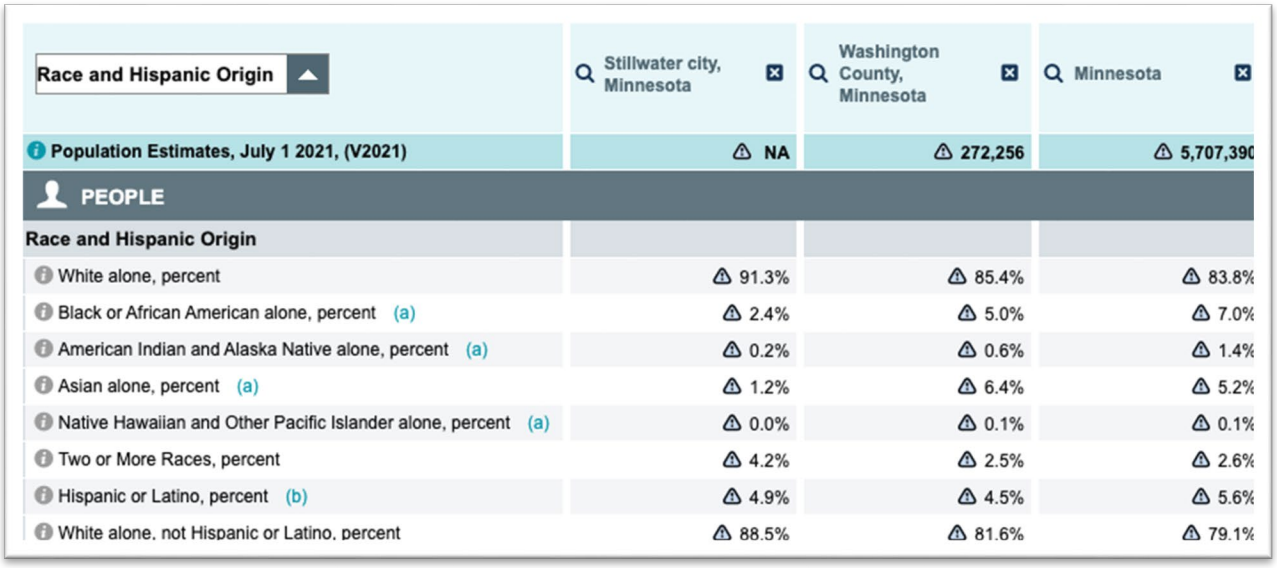
[8] U.S. Census. Quick Facts for City of Stillwater, MN, Washington County, MN, and Minnesota. Retrieved from https://www.census.gov/quickfacts/fact/table/stillwatercityminnesota,washingtoncountyminnesota,MN/PST045221 on May 1, 2022

[9] U.S. Census. Quick Facts for City of Stillwater, MN, Washington County, MN, and Minnesota. Retrieved from https://www.census.gov/quickfacts/fact/table/stillwatercityminnesota,washingtoncountyminnesota,MN/PST045221 on May 1, 2022

Diversity

The city of Stillwater is just over 91% White alone and when excluding White Hispanic and Latino, the White population is 88.5%. Additionally, the population includes 2.4% Black or African American, and 4.9% Hispanic or Latino. Population that identified with two or more races was 4.2%, and Asian was 1.2%. The American Indian and Alaska Native was 0.2%.[10]

Figure 20: Race and Hispanic Origin for City of Stillwater, Washington County and State of Minnesota



Race and Hispanic Origin	Stillwater city, Minnesota	Washington County, Minnesota	Minnesota
Population Estimates, July 1 2021, (V2021)	NA	272,256	5,707,390
PEOPLE			
Race and Hispanic Origin			
White alone, percent	91.3%	85.4%	83.8%
Black or African American alone, percent (a)	2.4%	5.0%	7.0%
American Indian and Alaska Native alone, percent (a)	0.2%	0.6%	1.4%
Asian alone, percent (a)	1.2%	6.4%	5.2%
Native Hawaiian and Other Pacific Islander alone, percent (a)	0.0%	0.1%	0.1%
Two or More Races, percent	4.2%	2.5%	2.6%
Hispanic or Latino, percent (b)	4.9%	4.5%	5.6%
White alone, not Hispanic or Latino, percent	88.5%	81.6%	79.1%

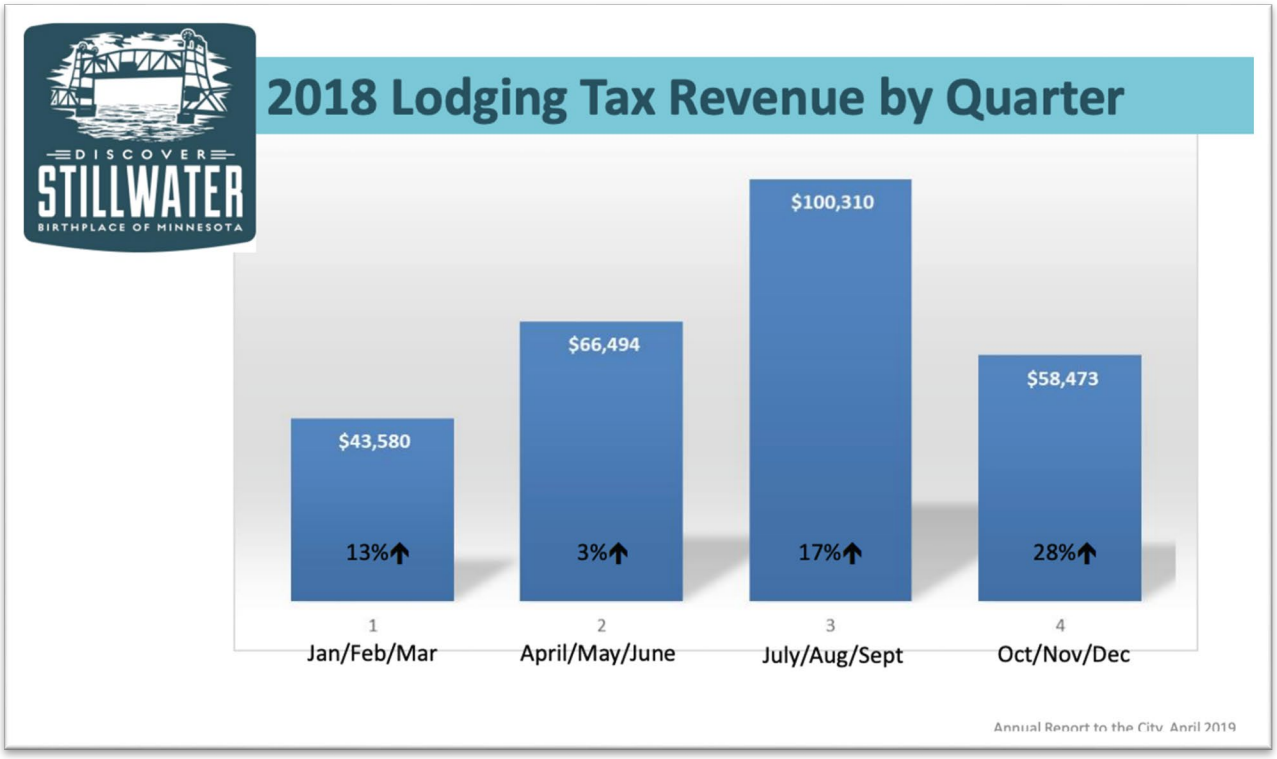
Visitor Population and Economic Impact

Stillwater is a premier visitor and tourism destination in the region. The lodging tax revenue by quarter assists in depicting the third quarter of the year being the seasonal peak of the Stillwater tourism. According to Discover Stillwater's presentation of their Annual Report to the City Council in April 2019, 30 percent of the city's tax revenue comes from tourism.[11] In 2018, the total Lodging Tax collected was $268,857. The economic impact of tourism to Washington County is $566,454,649 of gross sales and private sector employment of 11,781 people according to Minnesota Leisure and Hospitality Industry, 2017.

[10] U.S. Census. Quick Facts for City of Stillwater, MN, Washington County, MN, and Minnesota. Retrieved from https://www.census.gov/quickfacts/fact/table/stillwatercityminnesota,washingtoncountyminnesota,MN/PST045221 on May 1, 2022

[11] Discover Stillwater 2019 Annual Report to the City. Retrieved from https://cityofstillwater.granicus.com/MetaViewer.php?view_id=3&event_id=500&meta_id=78081 on May 1, 2022

Figure 21: Discover Stillwater 2018 Lodging Tax Revenue by Quarter



Disaster Potentials

The City of Stillwater is vulnerable to natural hazards of flooding, severe weather conditions, and tornadoes. In addition, the City is also vulnerable to technological (human-caused) hazards associated with pandemics, hazardous materials spills, Chemical, Biological, Radiological, Nuclear, and Explosive (CBRNE) terrorism, civil disturbances, and transportation accidents. A snapshot of the overall hazard probability is referenced in Table 5. These specific hazards are discussed in detail in the Community Characteristics of Risk section.

Table 5: Overall Hazard Probability[12]

Hazard	Risk Rating
Flood	2.8 – Moderate
Power Outage	2.6 – Moderate
Man-Made Technological Disruption	2.5 – Moderate
Blizzards, Ice and Sleet	2.3 – Moderate
Severe Thunderstorms	2.2 – Moderate
Pandemic Event	1.75 – Low
Wildfire	1.75 – Low
Man-Made Physical Disruption	1.75 - Low
Hazardous Materials Event	1.75 – Low

[12] City of Stillwater – Emergency Operations Plan (Washington County, MN)

Hazard	Risk Rating
Tornado	1.3 – Low
Extreme Temperatures	1.0 – Low
Drought	1.0 – Low
Dam or Levee Failure	1.0 – Low
Radiological Event	1.0 – Low
Water Supply Contamination	1.0 - Low

SECTION B - DESCRIPTION OF AGENCY PROGRAMS AND SERVICES

Organizational Overview

Service Delivery Programs

Community Expectations

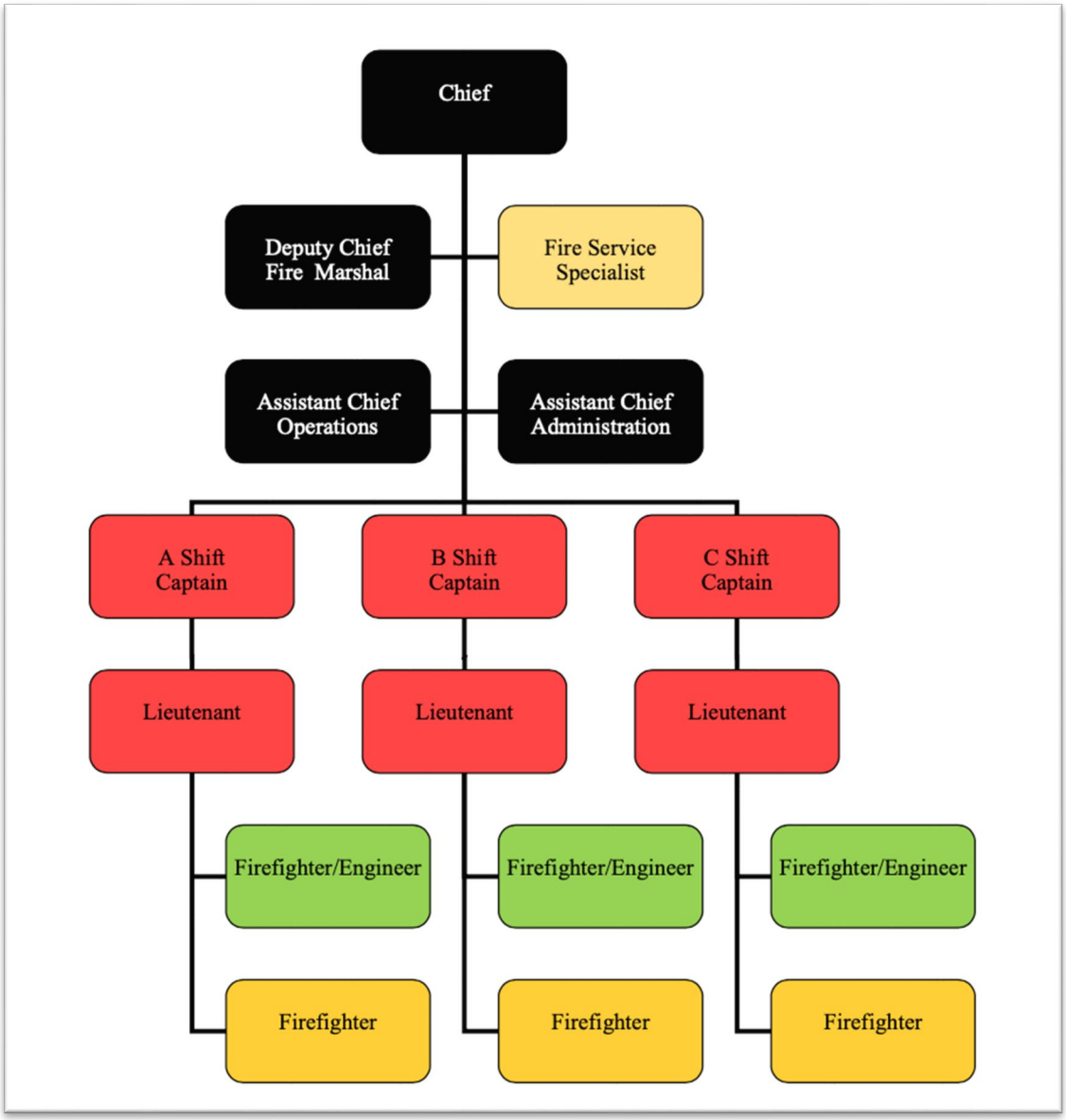
DESCRIPTION OF AGENCY PROGAMS AND SERVICES

Organizational Overview

Organizational Structure

Stillwater Fire Department currently responds to emergency and non-emergency incidents from one fixed facility, with its administrative headquarters building housed within the fire station. The fire station is located at 250 Maryknoll Drive North, Stillwater, MN 55082. Below is an organizational chart that illustrates the general organizational structure for the department.

Figure 22: Organizational Chart



Staffing

The Stillwater Fire Department has a long history of providing service to the community through a combination staffing model. The combination model uses both full-time (career) and paid-on-call staff. Currently there are 14 full-time and 20 paid-on-call staff.

Full-Time Staff

The full-time staff include the Fire Chief, Deputy Chief/Fire Marshal, Assistant Chief – Operations, Three Captains, Seven Firefighter/Engineers and one Fire Service Specialist. All but the Captains and Firefighter/Engineers work administrative roles that are scheduled for a regular 40-hour work week. The Captains and Firefighter/Engineers are arranged into three shifts that are scheduled for 24-hour shifts that average a 56-hour work week. The 24-hour shifts ensure a minimum of two full-time staff are working 24/7. There are three personnel assigned to two of the three shifts and a fourth assigned to the third shift. The shift with four personnel allows the fourth full-time staff to be a float who is moved to cover vacation, turnover and long-term illness on any of the three shifts. The three-shift rotation is the most efficient use of resources to ensure 24-hour coverage. All the full-time staff regularly respond on their off-duty hours to emergencies.

Paid-On-Call

Currently there are 20 paid-on-call staff. This is at least 10 people short of the fully authorized paid-on-call strength. The paid-on-call staff are required to make 25% of the calls they are requested to respond. Not all calls require a paid-on-call response as the full-time staff handle the vast majority of the calls for service. Paid-on-call staff are encouraged to work shifts with the full-time staff but are not required to work any minimum number of hours or shifts. Paid-on-call staff are paid and given an incentive towards their minimum call percentage if they work a shift with the full-time staff. In Stillwater's experience over half of the paid-on-call staff stay less than 2.5 years, of which at least the first year is made up of training. It is also notable that each new staff member costs approximately $14,500. This experience is not unique to Stillwater as this is a struggle state and country wide.

Staffing Summary

Below is a summary of the minimum available staffing.

Minimum Staffing

Available Positions Per Day

Paid-On-Call

Full-Time Third

Fourth Full-Time Float
(Only one, not per shift)

Staffing Level (days)	2020	2021	2022 – August 10
2 Person Staffing	191	109	79
3 Person Staffing	174	256	131
POC Shifts	35	36	28
Benefit Time Use	191	109	79

Administration, Emergency Services, and Support Staff

The department's organizational structure reflects a typical paramilitary fire service organization. The Administrative Team is composed of the Fire Chief, Deputy Chief – Fire Marshal, Assistant Chief – Operations, Assistant Chief – Administration and Fire Service Specialist. The Fire Chief is responsible for the overall fiscal and operational management of the organization and reports directly to the City Administrator. The members of the Administrative Team are tasked with providing oversight and

day-to-day management within the organization, including leading the Operations, Professional Development, Fleet Repair and Maintenance, Public Education, Plan Review, Fire Prevention, Inspection, and Code Enforcement.

Operations Division

The Operations Division is the largest division of the department and is composed of line personnel, that are both career and volunteer paid-on-call. The Assistant Chief of Operations oversees the Division and is supported by three Captains assigned to shift work who are tasked with managing on-duty line personnel and serving as the initial Incident Commander during emergency events. Currently the department has 10 career line personnel assigned across three shifts working 24 hours per shift, composing a 56-hour work week. Each shift currently has an authorized staffing level of 3 personnel assigned, with a minimum daily staffing of 2 personnel on duty each shift. The department also has 20 paid-on-call (POC) firefighters, three of which are officers (one Assistant Chief and two Lieutenants).

Emergency Medical Services

The department provides first response EMS to the service area. Lakeview Hospital EMS provides the paramedic level and transport ambulance services. Medical direction and EMS education is provided by Regions Hospital EMS.

Professional Development

The Deputy Chief oversees the department's training program which provides personnel development and industry-standard fire training functions.

The training program is developed in accordance with established federal, state, and local requirements as well as the ISO Fire Suppression Rating Schedule and the NFPA. The following are training programs that are managed by the Deputy Chief:

- Firefighter I
- Firefighter II
- Emergency Medical Responder (EMR)
- Emergency Medical Technician (EMT)
- EMS Variances
- Hazardous Materials Operation Level
- Terrorism Awareness Training
- Fire Apparatus Operator
- Technical Rescue
- Vehicle Extrication

The department dedicated 2,505 training hours amongst all the staff in 2021.

Special Operations

Stillwater Fire Department provides some special operations rescue services themselves and others through collaborative partnerships. Rope rescue is provided within the department's resources. Water rescue is provided through a partnership with countywide resources. Confined space rescue is provided by Bayport Fire Department. The remainder of the special rescue operations are provided by state regional teams such as hazardous materials and building collapse rescue while Stillwater Fire Department provides first response to those incidents.

Administration

The Fire Chief provides the executive leadership of the Department Administration. The Administration performs risk reduction activities, technical analysis, and administrative support, and manages the supply tasks necessary for the entire Department's function. The Deputy Chief is also responsible for the fire records management systems and emergency response data.

Fire Prevention

Fire Prevention activities are led by the Deputy Chief. This function focuses on all aspects of life safety with the primary objective of reducing preventable deaths, injuries, and property loss through extensive public education programs, fire inspections of rental and commercial properties, and enforcement of the adopted fire codes. Fire Department staff working 24-hour shifts conduct existing building inspections between calls for emergency service.

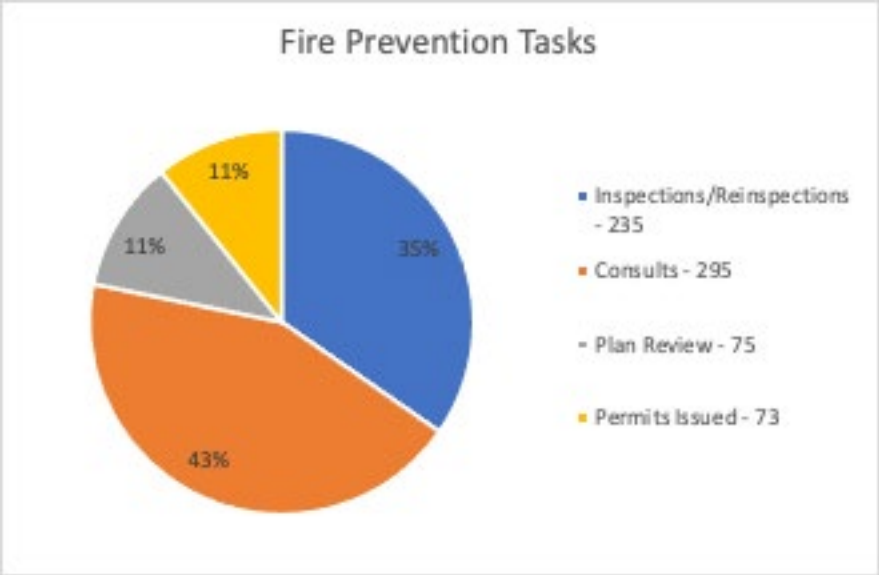
Part of the prevention responsibilities include educating building owners and tenants while conducting fire safety inspections. This promotes voluntary compliance and limits the number of repeat violations in the future. The department has 1,367 inspectable occupancies listed. Since the start of COVID it has been difficult to inspect existing buildings. In 2022, the department has worked to get back to a regular inspection schedule of existing occupancies. The goal is to inspect all occupancies every 4-5 years with assembly occupancies getting inspected more frequently (approximately every 2-3 years). Following the initial inspection, occupancies are given time to correct code violations. Staff then follow up to ensure the identified violations are corrected which leads to at least one additional inspection in most occupancies.

The Deputy Chief has a wide range of other responsibilities in addition to leading the existing occupancy fire safety inspections. These other fire prevention responsibilities include:

- Review and approve the construction plans for new buildings or buildings being renovated.
- Conduct inspections during construction.
- Ensure timely follow-up of complaints/concerns of the community.
- Verify acceptance testing of all fire safety systems.
- Ensure fire protection systems in buildings are repaired.

The department logged 687 fire prevention activities in 2021. The breakdown of the activities is depicted in the chart below.

Figure 23: 2021 Fire Prevention Tasks



Fire & Life Safety Education

Fire department personnel, deliver various presentations to the community throughout the year. Each program is developed to arm the community with knowledge to prevent situations that threaten life safety. The programs also address how to manage emergency situations they may face.

Several of the public education programs include:

- Pre-School and School age education.
- Senior citizen fall prevention.
- Home inspections as requested.
- CPR and Fire Extinguisher use for skilled nursing facilities.
- Child safety seat inspections.

Fire Investigation

Minnesota Statute 299F.04 requires the fire department to investigate all fires where the damage exceeds $100. The investigation includes determining the origin and cause of the fire. In the event of a fatality due to a fire, the department is required to notify the State Fire Marshal's Office. The State Fire Marshal's Office can be used to consult and assist with fire investigation as requested by the local jurisdiction.

911 Communications Center

The Washington County Emergency Communications Response Center (ECRC) serves as the primary Public Safety Answering Point (PSAP) for Stillwater Fire Department's response area. Currently there is no full back up communications center, but one is being built. The Center answers all 911 calls originating in Stillwater Fire Department's response area, 24 hours per day, 365 days per year. The ECRC received 72,410 911 calls and 130,209 non-emergency calls in 2017.[13] Staffing of the ECRC requires 32 staff members, six of whom are supervisors. The minimum number of staff working is four with some times of the day having minimums of six.

The ECRC personnel are the unseen, but extremely important link, in the chain of response to an emergency. When a Public Safety Dispatcher (PSD) answers a call in the ECRC, they become the initial first responder. In addition to trying to determine what type of help is needed, personnel frequently help callers identify their exact location so assistance can be sent to the correct location. This can be a challenge given the number of annual visitors to Stillwater.

Currently the process within the ECRC includes a two-stage dispatch process. This process means one PSD takes the 911 call and determines the location and incident type. A second dispatcher completes the process by dispatching the fire, EMS and police units necessary to respond to the incident.

Programs managed by ECRC include:

- Computer Aided Dispatch (CAD) – The 911 Communications Center uses the CAD to select and quickly verify emergency locations and send apparatus based on the type of call and the call location.
- 800 Mhz trunked radio system – The 911 Communications Center uses the radio system to communicate with public safety responders.
- VHF radio system – This radio system is used to notify fire departments across the county when there is a call for service.
- 911 Phone System – A robust and recently replaced phone system is used to receive the 911 calls both via voice and text.
- Call Triage System – When a 911 call is received the 911 Communications Center uses a scripted program to triage EMS calls and provide pre-arrival instructions to the 911 caller until responders arrive.

Fleet Services

Fleet services for the department are contracted out to two vendors based on the type of maintenance or repair. The two vendors also provide the annual preventative maintenance and

[13] Washington County 911 Communications Center. Retrieved from https://www.co.washington.mn.us/3201/911-Communications-Center on May 3, 2022

vehicle testing necessary to be in compliance with industry best practices. A capital improvement plan is established to plan for the replacement of each vehicle with the smaller vehicles being leased. The department's fleet includes:

- 4 Staff Vehicles*
- 3 Fire Engines
- 2 Brush Trucks
- 1 Medium Rescue Truck
- 1 Water Tender
- 1 Ladder Truck
- 1 Pick Up/Light Rescue*
- 1 Portable Boat
- 1 Fire Boat
- 1 UTV

*Denotes vehicles that are leased through enterprise leasing.

Emergency Management Division

The Emergency Management function is led by the Police Department. The city has an all-hazards Emergency Operations Plan (EOP) outlining potential hazards that could affect the community and steps to mitigate the impacts. By developing and then exercising the All-Hazards Plans, the city strives to minimize the impact of an emergency or disaster to the residents, visitors, property, the environment, and the city's economy.

Service Delivery Programs

Fire Suppression

Stillwater Fire Department provides high-quality fire suppression services within the response area (two cities and two townships). The department also assists surrounding communities as requested through the establishment of mutual-aid agreements. Fire suppression services are currently provided from a single fixed-facility fire station that is strategically located in the city of Stillwater. All members of the department are minimally trained as firefighters and Emergency Medical Responder (EMR), while several members are trained at the Emergency Medical Technician (EMT) level. Minimum staffing per day is currently two career members. In 2021, fire suppression incidents accounted for 14.4% of the total incidents responded to by the department. The following is a description of the department's response resources:

- Three fire engines
- One ladder truck
- Two brush trucks
- One water tender
- One rescue truck
- One rescue pickup truck
- Two boats
- One UTV
- Four staff response vehicles

Rescue

The Stillwater Fire Department provides rope rescue inhouse with their own trained staff. Rope rescue is inclusive of both high and low angle rescue situations. The significant topography changes within the response area creates many areas that could require a rope rescue response.

Water rescue is performed as a county wide effort amongst the fire departments and county sheriff's office. The water rescue response is inclusive of both surface and dive rescue. There are numerous bodies of water within the response area including the St. Croix River that has heavy recreational boat traffic in the summer.

Confined space rescue is provided by Bayport Fire Department as part of their mutual aid agreement with Stillwater Fire Department. These rescues would include entering confined areas that are not easily accessible and could have hazardous air conditions which require specialized equipment to provide fresh air to responders and victims. The Stillwater Fire Department can provide support to the scene from outside of the confined space during these incidents.

Any structural collapse would be handled by Minnesota Task Force 1 which is statewide resource that is staffed by five different fire agencies. While it may take time to assemble Task Force 1, Stillwater Fire Department can provide initial response support from the exterior of the collapsed structure which may include securing utilities, evacuating victims that are not trapped and provide care to patients.

Emergency Medical Services

Stillwater Fire Department provide first response Basic Life Support (BLS) for emergency medical calls within the response area. Lakeview Emergency Medical Services (EMS) provides the Advance Life Support (ALS) ambulance response to the response area. All personnel within the organization are trained and certified to a minimum of Emergency Medical Responder (EMR) while many members are trained at the Emergency Medical Technician (EMT) level. The BLS providers can provide the lifesaving care such as airway management, bleeding control, basic patient assessment and defibrillation using AED. ALS providers can provide interventions including, but not limited to, 12-lead electrocardiograms, synchronized cardioversion, advanced airway management, and

intravenous (IV) fluid and medication administration. During 2021, EMS incidents accounted for 82.1% of the total incidents responded to by Stillwater Fire Department.

Hazardous Materials

The Stillwater Fire Department provides first response to hazardous materials incidents. Simple hazardous materials incidents such as carbon monoxide and natural gas leaks can be handled by Stillwater personnel. Larger and more complex incidents are supported by a statewide hazardous materials response team. The closest statewide hazardous materials response team is in St. Paul Fire Department. The Stillwater Fire Department can provide initial actions prior to the arrival of the statewide team. These initial actions can include denying further entry to the area, prevent further contamination, decontaminate victims and provide care to any patients.

Although the frequency of hazardous materials incidents is relatively low within the department's response area, the potential for a low-frequency high-risk event remains a potential through natural gas leaks, chemical spills, and transportation accidents. All career firefighters are trained to the Hazmat Operations level. In 2021, hazardous materials accounted for 1.4% of the total incidents responded to by the Stillwater Fire Department.

Community Expectations and Performance Goals

Stakeholder Input Process

Through the standards of coverage process stakeholders were engaged in a variety of ways. Initially during the kickoff of the project, a site visit was conducted. During the site visit, a number of stakeholders were interviewed. The stakeholders included full-time staff, paid-on-call staff, dispatch center, and other city staff. The City Administrator, Mayor and City Council Members were also individually interviewed throughout the process. The fire department staff were provided a second opportunity to provide input through a structured online survey process which was anonymous. All these stakeholder input processes informed this standards of coverage document and recommendations.

Guiding Principles and Internal Performance Expectations and Goals

Mission

Our commitment is to protect life and property through dedicated service to the community.

Values

The Fire Department's vision is to provide service to our communities with P.R.I.D.E. – Professionalism, Respect, Integrity, Dedication and Excellence.

SECTION C – ALL HAZARD COMMUNITY RISK ASSESSMENT

Risk Assessment Process

Community Risk Input Factors

Geospatial Risk

Natural Risk

Man-made Risk

Physical Assets Protected

Anticipated Growth

Historical Service Demand and Probability Analyses

COMMUNITY RISK ASSESSMENT AND RISK LEVELS

Risk Assessment Methodologies

The purpose of this section is to describe the process used by the Fire Department in performing an analysis of the community it serves and its potential risks using real-world factors that are both physical and theoretical. To perform a comprehensive risk assessment, it was necessary to analyze physical, economic, sociologic, and demographic aspects of the area served. The assessment of risk is critical for the determination of the number and placement of resources, and the mitigation measures that are required by the department.

The community risk assessment process utilized two risk assessment methodologies, depending on the robustness of available data. First, community-level risks that had insufficient historical response data, utilized a two-dimensional risk assessment tool that balances the probability and consequence of occurrence to identify the relative risk rating. Second, risks (Service Delivery Program Risks) that have sufficient historical data, utilized a three-dimensional assessment tool to identify risks.

Overall risks were identified as geospatial risk, natural risk, and manmade risks. The community risk factors included the following:

Geospatial Risk Factors

- Political and Growth Boundaries
- Construction and Land Use Limitations
- Critical Infrastructure
- Electrical Power
- Natural Gas System
- Water System
- Emergency Communications
- Geographic and Response Barriers

Natural Risk Hazards

- Ground Fires
- Severe Thunderstorm
- Flood (widespread)
- Drought
- Tornado
- Blizzards, Ice and Sleet
- Dam or Levee Failure
- Contagious Disease Outbreaks / Pandemics
- Extreme Temperatures

Man-made Risk Hazards

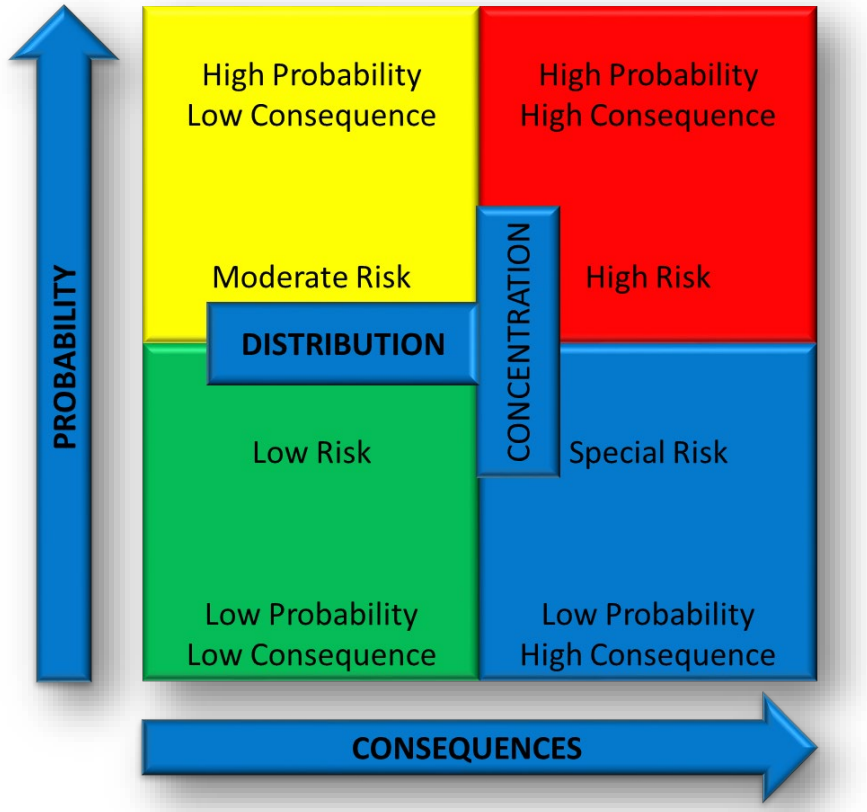
- Transportation Network – Roads
- Transportation Network – Water
- Fire Suppression
- Emergency Medical Service
- Technical Rescue
- Hazardous Materials
- Radiological Event
- Hazardous Materials
- Technological Disruption
- Physical Disruption

Community-Level Risk Assessment Methodology (2-D Model)

The risks that the Department faces can be natural or man-made and fall in various locations on the probability and consequence matrix. Where these risks are located on the matrix has a direct impact on how resources are located within the jurisdiction (distribution) and the overall number of resources required to mitigate the incident (concentration) effectively, through the use of the staffing and deployment model.

The likelihood of an event occurring is located on the vertical axis (probability) with the impact to the community being rated on the horizontal axis (consequence). Each of the major natural and man-made risks evaluated received a clearly defined probability and consequence ranking.

Figure 24: Probability and Consequence Matrix[14]



Geospatial Risk

Political and Growth Boundaries – Low Risk

The City of Stillwater has a long history. The form of government is stable, and the Council serves as the policy group and appoints the City Administrator. The sustainability and stability of the city governance has been evidenced through a global recession and a global pandemic.

Construction and Land Use Limitations – Low Risk

The city has a well-developed comprehensive land use plan that guides development. In addition, the Fire Department is intricately involved with new projects, plans review, code adherence, code enforcement, and cyclical inspections on inspectable properties. In compliance with the Fire Code, automatic sprinkler systems are an integral strategy to reduce risk with applicable new construction.

Critical Infrastructure – High Risk

Failure of critical public or private utility infrastructure can result in a temporary loss of essential functions and/or services that last from just a few minutes to days or more at a time. Public and

[14] CFAI. (2009). Fire & Emergency Service Self-Assessment Manual, 8th (ed.). Chantilly, Virginia: Author. (p. 49)

private utility infrastructure provides essential life supporting services such as: electric power, natural gas, heating and air condition, water, sewage disposal and treatment, storm drainage, communications, and transportation.

Electric – Moderate Risk

Electrical power outages are rather common during storms and will be assessed as an individual risk. However, large or long-duration interruptions in electrical service may have a significant economic impact to the city. In the city there is a single electric provider while the township has two electric service providers. Having a single provider has the potential to have a citywide electric outage.

Water – Low Risk

Loss of a functional water system infrastructure would likely be secondary to the loss of electrical power for a long duration. Single-point interruptions such as a main break may be alleviated with the use of looped mains and linked systems. The water department has sufficient back-up generators and strategies to maintain continuous services during emergent events.

Sewer – Low Risk

Loss of sanitary sewer infrastructure can lead to significant environmental, health, and safety risks, and even to a public health crisis by allowing the unchecked growth of pathogens. The regional sanitary sewer provider has well-developed processes to ensure positive impacts and reduced risks for health, safety, and the environment.

Emergency Communications (E911) – Moderate Risk

The Emergency Communications Center in Washington County has appropriate back-up battery power, generators, and roll-over strategies for critical failures. During nearly all risk scenarios, the Communications Center is one of the most important and vital links to a successful operation by both receiving requests for services from the community as well as communicating with the responding personnel. Currently the communications center does not have a fully redundant back up communications center.

Transportation Network – Low Risk

The city and surrounding service area have a robust transportation network which includes city, county, and state roads. This transportation network is maintained year-round to ensure reliable use of the transportation network.

Geographic and Response Barriers – Low Risk

The response area has a well-developed transportation network. There are a few limitations such as some railroad crossings and long driveways in the rural response area. Within the city there are some developments with narrow roadways and dead ends which are challenging for fire responses

particularly in the winter with piled up snow. Preplanning responses within the department helps with determining the quickest response route to mitigate the challenges to response.

Summary of Geospatial Risks

A summary of the geospatial risk assessment is provided below.

Table 6: Summary of Geospatial Risk Assessment

Geospatial Risk Factors	Probability	Consequence	Risk Rating
Political and Growth Boundaries	Low	Low	Low
Construction and Land Use Limitations	Low	Low	Low
Critical Infrastructure • Electric - Moderate • Water – Low • Electric - Moderate • Sewer – Low • E911- Moderate • Transportation Network – Low	Low	High	High
Geographic and Response Barriers	Low	Low	Low

Community Characteristics of Natural Risk

The risk categories presented in this section are described as hazards that the city may be vulnerable to and can have a significant impact on the local economy, residents of the community, and the city's service delivery capabilities. Hazards were assessed by probability of occurrence and vulnerability as well as the likely impact on the community.

Table 7: Overall Community Hazard Probability

Hazard	Risk Rating
Flood	2.8 – Moderate
Power Outage	2.6 – Moderate
Man-Made Technological Disruption	2.5 – Moderate
Blizzards, Ice and Sleet	2.3 – Moderate
Severe Thunderstorms	2.2 – Moderate
Pandemic Event	1.75 – Low
Wildfire	1.75 – Low
Man-Made Physical Disruption	1.75 - Low
Hazardous Materials Event	1.75 – Low
Tornado	1.3 – Low
Extreme Temperatures	1.0 – Low
Drought	1.0 – Low

Hazard	Risk Rating
Dam or Levee Failure	1.0 – Low
Radiological Event	1.0 – Low
Water Supply Contamination	1.0 - Low

Geographic and Weather-Related Risks

Ground Cover Fires: Low

In 2021 the department was dispatched to five Brush Fires. There is an inherit risk of ground cover fires in the recreational, undeveloped, and agricultural areas within the response area.

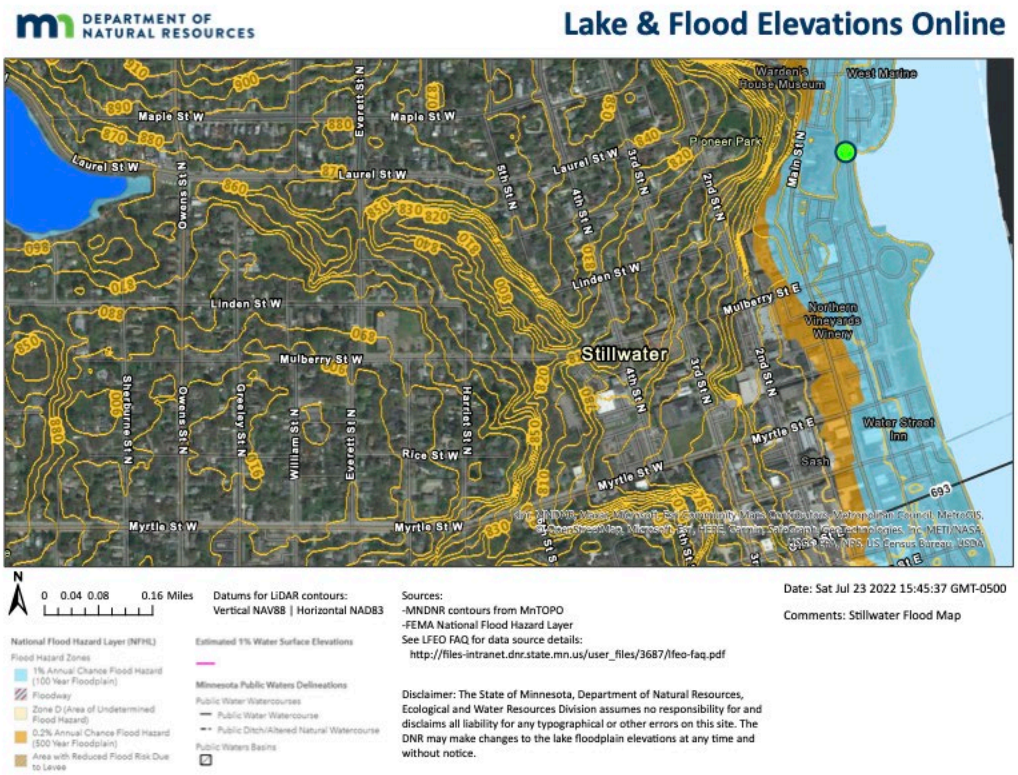
Severe Thunderstorms: Moderate

The City of Stillwater experiences severe thunderstorms regularly during the summer months. These severe thunderstorms can include high wind, tornados, heavy rain, and hail.

Flood: Moderate

The Minnesota Department of Natural Resources map shows that a large portion of downtown Stillwater is within the 100-year floodplain (aqua colored area). There is also a smaller portion of downtown that is within the 500-year floodplain (orange colored area adjacent to aqua colored area).

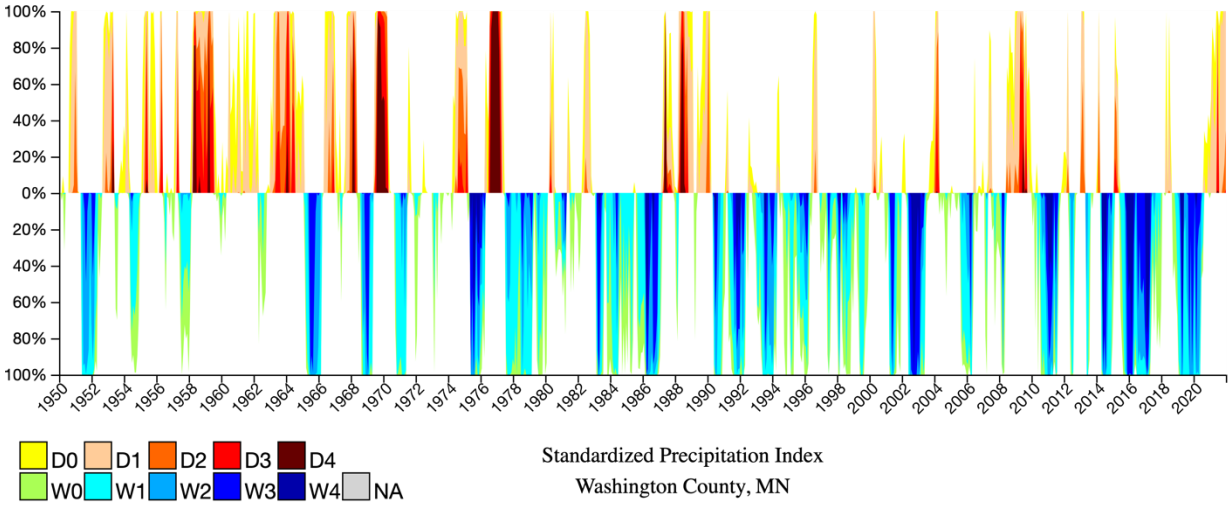
Figure 25 : Floodplain Map



***Drought:* Low**

Drought is caused by lack of precipitation but can be heightened or worsened by other circumstances such as high temperatures, high winds, and low relative humidity. Droughts can result in a shortage of water for consumption and can affect recreation and navigation. Severe droughts can lead to losses of crops, wildlife, and livestock as well as increase the risk of wildfires. The figure below depicts the periods of drought since 1950.

Figure 26 : Time Spent in Drought Conditions 1950 - 2021[15]



***Tornadoes:* Low**

Tornadoes are defined as a violently rotating column of air pendant from a thunderstorm cloud that touches the ground. Tornadoes are classified as category 0 through 5 using the Fujita Tornado Scale. There have been three documented F2 or greater tornados within 10 miles of Stillwater since 1950.[16] According to USA.com extreme weather Stillwater's tornado index is 191.77 compared to 135.90 for Minnesota and 136.45 for the United States. The index is based on historical experience with tornados with a high number indicating a high frequency of tornados.

***Blizzard, Ice and Sleet:* Moderate**

Winter storms can be very disruptive and impact the timeliness the department can reach emergency incidents. Winter storms regularly impact the state of Minnesota. According to USA.com there has been 53 incidents of heavy snow within 50 miles of Stillwater since 1950. While Minnesotans are prepared for winter weather these incidents can still slow responses until the weather system clears and transportation maintenance workers can clear the road network. These winter storms can also negatively affect utilities.

[15] National Integrated Drought Information System. https://www.drought.gov/states/Minnesota/county/Washington

[16] Natural Disaster for Stillwater, MN retrieved from http://www.usa.com/stillwater-mn-natural-disasters-extremes.htm

Dam or Levee Failure: Low

While dam or levee failures are very rare, a failure can have catastrophic impacts flash flooding areas with no warning. Stillwater had a dam failure in 1852 at Mc Kusick Lake. During the 1852 dam failure the flash flood swept away trees and buried buildings leaving eight new acres of land on the riverfront now called Mulberry Point.[17]

Contagious Disease Outbreaks: Low

Minnesota has historically had to mitigate the impacts of mosquito-borne diseases such as the West Nile Virus and tick-borne illnesses such as Lyme's Disease. The high degree of tourism and visitors to the city may introduce additional opportunities for the spread of communicable diseases. However, of specific note is the impact that a global pandemic such as Covid-19 has had on municipalities, businesses, and emergency services.

All indications are that the City of Stillwater has managed the pandemic very well and the economic impact has been manageable. However, the next pandemic may have a different pathology, impact, and/or response mitigation strategy that may result in a different experience.

Extreme Temperatures: Low

Extreme temperatures, both hot and cold weather, can have impacts to a community. Those with unstable housing may not be able afford a climate-controlled environment which can lead to additional demand for emergency services during a stretch of extreme temperatures. In Minnesota not all housing has air conditioning which can also be problematic during hot and humid weather patterns. According to USA.com data for Stillwater since 1950, 40 cold weather and 13 hot weather events have been charted.

[17] Streets in the Landscape retrieved from https://www.ci.stillwater.mn.us/home/showdocument?id=326

Summary of Natural Risks

A summary of the natural risk assessment is provided below.

Table 8: Summary of Natural Risk Assessment

Natural Risk Factors	Probability	Consequence	Risk Rating
Wildland Fire	Low	Low	Low
Severe Thunderstorm	Moderate	Moderate	Moderate
Flood	Low	Moderate	Moderate
Drought	Low	Low	Low
Tornado	Low	Low	Low
Blizzard, Ice and Sleet	Moderate	Moderate	Moderate
Dam or Levee Failure	Low	Low	Low
Contagious Disease Outbreaks / Pandemics	Low	Moderate	Low
Extreme Temperatures	Low	Low	Low

Man-made Risks

Transportation Risks

Aviation: Low

Stillwater Fire Department's service area does not include an airport or any primary Aircraft Rescue and Firefighter (ARFF) responsibilities. A neighboring jurisdiction is home a general aviation airport. Although Stillwater is about 30 miles from Minneapolis/St. Paul airport, depending on the weather commercial airlines may use the airspace as part of the departure or arrival patterns.

Railroad: Low

While the city of Stillwater does not have any active rail lines the City of Grant and the townships have a Canadian Pacific/Canadian North rail line. The rail line can carry a wide variety of materials which can lead to a risk if a collision or derailment where to occur. While there is a risk that a collision or derailment could occur the rail line is in the less populated area of the response area.

Highway: Low

There are two state highways within the response area with State Highway 36 being a major thoroughfare between Minneapolis/St. Paul and Wisconsin. With the exception of Highway 36, the

majority of traffic in the response area is composed of County, City and Township roadways and residential streets. High-risk transportation materials are relatively limited throughout the community which contributes to the low volume of transportation-related hazardous materials events. In 2021, motor vehicle accidents contributed to 4.4% of the department's calls for service.

Waterway: ***Low***

Unique to Stillwater's response area is the St. Croix River. The department is responsible for water rescue for over 8 miles of very active recreational waterways. This active waterway boasts heavy amounts of various sized recreational watercraft during the summer months. There are also five marinas in the response area that house watercrafts year-round and provide dockside fueling.

Figure 27: Summary of Transportation Risks

Man Made Transportation Risk Factors	Probability	Consequence	Risk Rating
Aviation	Low	Moderate	Low
Railroad	Low	Low	Low
Highway	Moderate	Low	Low
Waterway	Low	Low	Low

Man-made Risks

Accidental/Intentional Risks

Technological: ***Low***

With the increasing reliance on technology there is a commensurate increased risk of technology disruption. This disruption can be accidental or intentional. Cyber-attacks on governmental entities have increased from across the world. A disruption not only could interrupt how daily business is conducted but much more severe impacts such as infrastructure like drinking water production and delivery.

Biological: ***Low***

A biological release could potentially introduce a pathogen to an unintended audience. The pathogen could create an isolated issue or a further reaching spread of a pathogen. A release or introduction could occur in a laboratory or potentially in a health care setting with a new illness presenting itself.

Radiological: ***Low***

Many communities have some radiological material in their community whether it is for medical purposes, research and development or industrial manufacturing. Unless a community is home to a

nuclear power plant or large amounts of radiological material the amount of radiological material only poses a small risk of localized concern if there is a release.

Chemical:* *Low

Chemicals are used widely from residential through industrial occupancies. The type of chemical and amounts widely vary. There is also a robust transportation network in Stillwater's response area including highways and railways that carry bulk amounts of chemicals. All these chemicals could pose a risk to life, health and/or the environment if released. The widespread training of firefighters in the recognition and isolation of the chemicals has evolved over the past three decades.

Weapons of Mass Destruction (WMD): Low

WMD is a widespread category that could include many of the categories above that were used for widespread intentional harm purposes. The WMD category could also include items like bombs. Since the tragedy of September 11, 2001 WMD has become a risk and response that most first responders have familiarity.

Service Delivery Program Related Risk Assessment Methodology

Methodology

The risk assessment process utilized a systematic methodology to evaluate the unique risks that are specific to Stillwater Fire Department's response area. The risk is identified through retrospective analyses of historical data.

Service areas that had little quantitative data were analyzed through structured interviews with Department staff members. In an effort to improve clarity, the following terminology is used for the remainder of the risk assessment description and analyses: retrospective risk will use the term Community Service Demands and prospective risk will use the term Community Risks.

The overall community risk assessment process and methods utilized for the department are presented in the figure on the next page.[18]

[18] Olathe Fire Department. (2012). Adapted from Community Risk and Emergency Services Analysis: Standard of Cover. Olathe, Kansas: Author.

Figure 28: Community Risk Assessment Process

Community service demands were analyzed by the incident history, type, locations, and incident frequencies. Within this process, a temporal analysis was completed for each major program area and the frequency of incidents. Each program area evaluated community risks.

This methodology not only provides background to determine options to ensure a sufficient allocation of resources to manage the readiness or preparedness aspects of the deployment strategy, but also balances the costs of readiness with an in-depth understanding of the probability of events through historical analyses.

Probability

Probability is defined as the relative frequency of occurrence of the risk as determined by the RMS system for unique incidents. The following matrix was utilized to calculate a quantitative value for frequency. The ranges were created to afford the maximum value of the preceding frequency prior to graduating to the next most frequent temporal element.

Table 9: Probability Risk Matrix

Incident Frequency	Range-Low	Range-High	Risk Score
Quarterly	0	0.0328	**2**
Monthly	0.0329	0.1424	**4**
Weekly	0.1425	0.99	**6**
Daily	0.991		**8**

Consequence

Consequence is defined as the relative consequence of the event occurring. This measure is generally the most subjective of the three variables. In other words, it reinforces the enhanced value

of an occupancy-level risk approach that is a more refined assessment at the building level rather than the code description. However, value is found in a systematic approach to measuring the potential consequence of differentiated risks in an escalation model.

Table 10: Consequence Risk Matrix

Incident Consequence	Risk Score
Individual / Business	**2**
Multiple People / Businesses	**4**
Multiple People / Businesses / Financial Impact to the Town	**6**
Town Community Region	**8**

Impact

Impact is defined as the relative impact of the event occurring on the Agency. In other words, what is the risk to the Department's resiliency to handle the residual incidents in the community during these events? The following risk matrix utilized an escalating model in 25% increments to Department drawdown based on the critical tasking presented in the next section and the Department's minimum daily staffing. While the department operates out of a single fixed facility with one crew on-duty the 25% model was used to demonstrate the resource draw down based on incident type and the use of the paid-on-call staff. Currently any call for service leaves the department with no on duty resource resiliency and requires paid-on-call staff to respond from home for any additional calls for service.

Table 11: Impact Risk Matrix

Resource Drawdown	Resource Resiliency	Range-Low	Range-High	Score
25%	**75%**	0	1.4	**2**
50%	**50%**	1.5	2.9	**4**
75%	**25%**	3.0	4.4	**6**
>75%	**<25%**	4.5	6.0	**8**

Ultimately, the three dimensions were utilized to create a mathematical score for each variable and create three-dimensional models that are helpful in visualizing the contribution of each variable to the overall risk rating by risk classifications of low, moderate, and high risks.

Risk Assessment by Program Area

Fire Suppression Services - High

The department provides services for the suppression of fires through the use of one fixed facility housing three Engines, one Water Tender, and one Ladder Truck. A chief officer responds from home when no one is in the office to provide command and control activities at significant fire and rescue incidents. The risk with the fire program is that the department averages 0.4 fire calls per day. The consequences can range from an individual person/structure to multiple people/structure and the largest contributor to the high-risk rating is that a single fire related call summons all of the department's resources.

Community Service Demands – Fire

Stillwater Fire responded to a total 334 fire incidents, accounting for 14.4% of the total requests for service during 2021 and averaged 0.9 requests per day. There were 7 structure fires and 12 vehicle fires, accounting for 2.0% and 3.6% of fire related requests for service, respectively. Overall, 48.7% of fire related calls were responded to by one unit, and 27.6% were responded to by two units. For structure fire calls, 71% of calls were responded to by five or more units.

Table 12: Number of Calls, Number of Responses, and Total Busy Time by Program in 2021

Jurisdiction	Program	Number of Calls[1]	Number of Responses[2]	Average Responses per Call	Total Busy Hours	Responses with Time Data[3]	Average Busy Minutes per Response	Average Calls per Day	Average Responses per Day
All[4]	EMS	1,753	2,119	1.2	600.3	2,119	17.0	4.8	5.8
	Fire	152	315	2.1	187.9	315	35.8	0.4	0.9
	Hazmat	32	46	1.4	32.1	46	41.9	0.1	0.1
	Rescue	11	14	1.3	5.3	14	22.5	< 0.1	< 0.1
	Total	**1,948**	**2,494**	**1.3**	**825.6**	**2,494**	**19.9**	**5.3**	**6.8**
Within SFD[4]	EMS	1,750	2,116	1.2	600.1	2,116	17.0	4.8	5.8
	Fire	152	315	2.1	187.9	315	35.8	0.4	0.9
	Hazmat	32	46	1.4	32.1	46	41.9	0.1	0.1
	Rescue	11	14	1.3	5.3	14	22.5	< 0.1	< 0.1
	Total	**1,945**	**2,491**	**1.3**	**825.3**	**2,491**	**19.9**	**5.3**	**6.8**
Outside of SFD[5]	EMS	3	3	1.0	0.3	3	5.3	< 0.1	< 0.1
	Fire	0	--	--	--	--	--	--	--
	Hazmat	0	--	--	--	--	--	--	--
	Rescue	0	--	--	--	--	--	--	--
	Total	**3**	**3**	**1.0**	**0.3**	**3**	**5.3**	**< 0.1**	**< 0.1**

[1]"Number of Calls" reflects an adjusted number of calls following any exclusion activity to align with responses made by valid units assigned to SFD.

[2]"Number of Responses" reflects the total number of records in the data file associated with responses made by valid units assigned to SFD, regardless of calculated busy time.

[3]"Responses with Time Data" reflects the number of records in the data file associated with responses made by valid units assigned to SFD with calculated busy time not otherwise excluded.

[4]Cities considered to be within the SFD jurisdiction included Grant, May Township, Stillwater, Stillwater Township, and "NULL" values, as well as records missing a value for city.

[5]Cities considered to be outside of the SFD jurisdiction included Bayport, Cottage Grove, Hudson, Oak Park Heights, Saint Joseph Township, Saint Paul Park, Somerset, and Woodbury.

Table 13: Total Fire Related Calls by Nature of Call

Nature of Call[1]	Number of Calls	Percentage of Total Fire Service Demand
yFire Initiated Call	172	51.7
yElectrical Hazard	39	11.7
yOdor/Smoke Smell Outside	24	7.2
yFire Outside	19	5.7
yRQ Fire by Public Safety	15	4.5
ySmoke in Structure-No Flames	13	3.9
yFire Vehicle	12	3.6
yStructure Fire-Flames Seen	7	2.1
yFire Report	6	1.8
yBrush Fire	5	1.5
yFire Unknown	5	1.5
yChimney Fire	3	0.9
yElectrical Fire	3	0.9
yFire Dive	3	0.9
yOven Fire Contained to Oven	3	0.9
yMarine Fire	2	0.6
yDumpster Fire	1	0.3
ySevere Weather Alert-ALL	1	0.3
Total	**333**	**100.0**

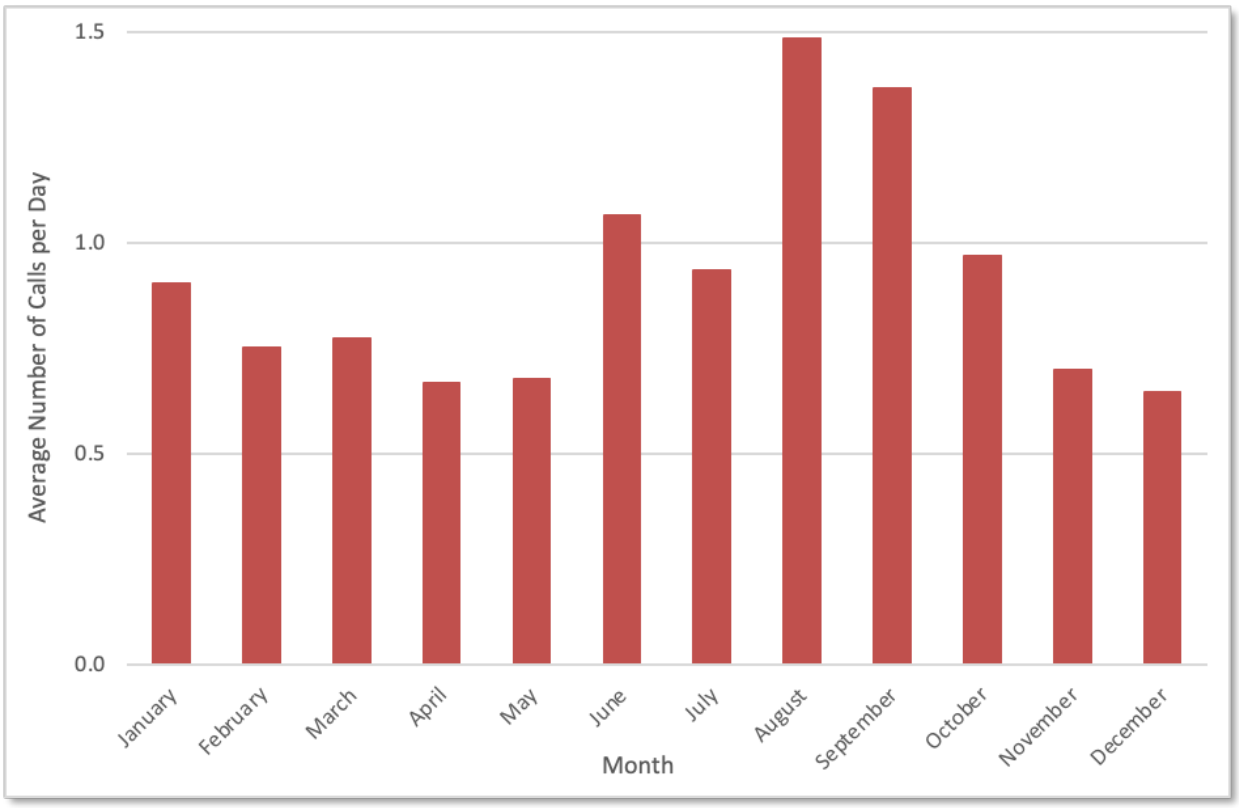
[1]Entries are presented verbatim from the data file

Temporal analyses were conducted to evaluate patterns in community demand for fire related services. These analyses examined the frequency of requests for service in 2021 by month, day of week, and hour of day. Results found that there was variability by month. The three months with the most fire related calls in descending order were: August (1.5 per day), September (1.4 per day), and June (1.0 per day). The four months with the fewest fire related calls in ascending order were: December (0.6 per day), April (0.7 per day), May (0.7 per day) and November (0.7 per day).

Table 14: Total Fire Related Calls and Average Calls per Day by Month

Month	Number of Calls	Average Calls per Day	Call Percentage
January	28	0.9	8.4
February	21	0.8	6.3
March	24	0.8	7.2
April	20	0.7	6.0
May	21	0.7	6.3
June	32	1.1	9.6
July	29	0.9	8.7
August	46	1.5	13.8
September	41	1.4	12.3
October	30	1.0	9.0
November	21	0.7	6.3
December	20	0.6	6.0
Total	**333**	**0.9**	**100.0**

Figure 29: Average Fire Related Calls per Day by Month



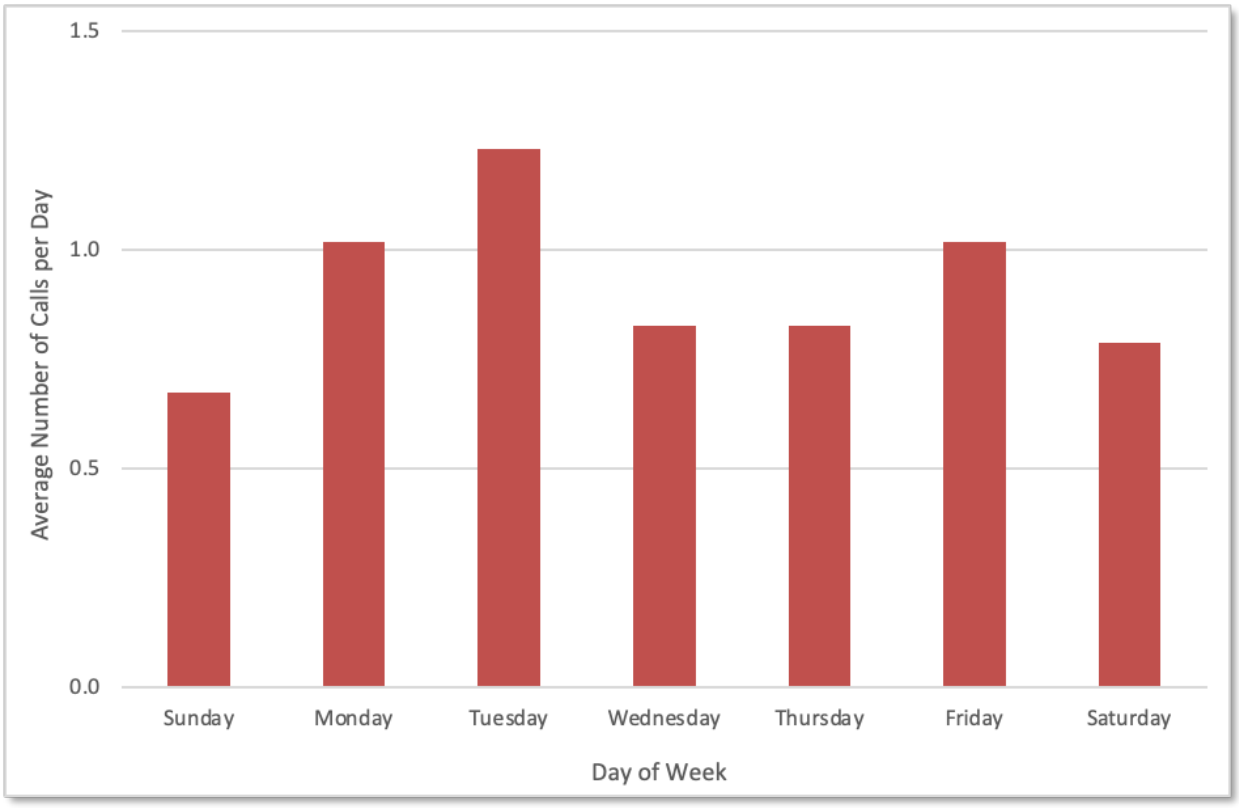
Similar analyses were conducted for fire related calls by day of week. The data revealed that there is slight variability in the demand for services by day of week. The three days with the most fire related calls in descending order were: Tuesday (1.2 per day), Monday (1.0 per day), and Friday (1.0 per day). The four days with the fewest fire related calls in ascending order were: Sunday (0.7 per day), Wednesday (0.8 per day), Thursday (0.8 per day), and Saturday (0.8 per day).

Table 15: Total Fire Related Calls and Average Calls per Day by Day of Week

Day of Week[1]	Number of Calls	Average Calls per Day	Call Percentage
Sunday	35	0.7	10.5
Monday	53	1.0	15.9
Tuesday	64	1.2	19.2
Wednesday	43	0.8	12.9
Thursday	43	0.8	12.9
Friday	54	1.0	16.2
Saturday	41	0.8	12.3
Total	**333**	**0.9**	**100.0**

[1]There were 53 Fridays and 52 of all other days of the week during 2021.

Figure 30: Average Fire Related Calls per Day by Day of Week

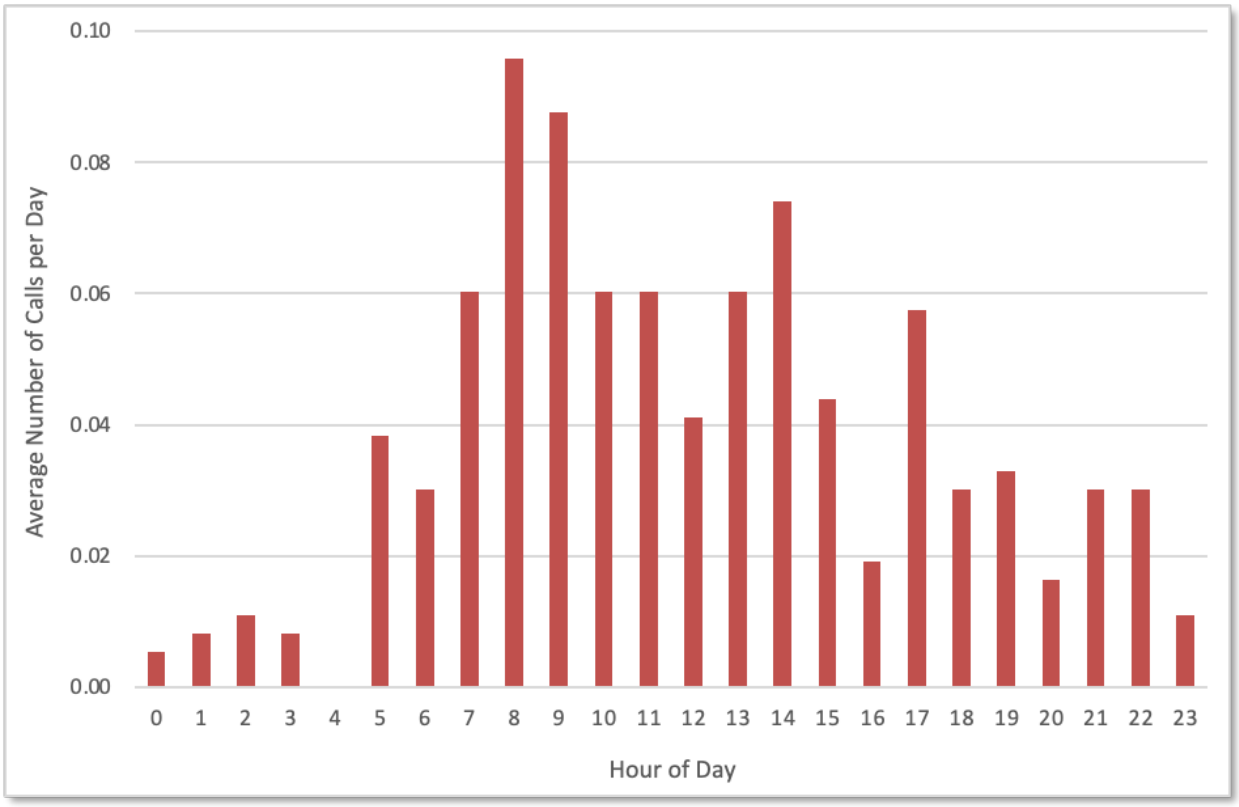


Fire related calls were also evaluated by hour of the day. Some variability exists in the time of day that requests for fire related services were received. The hour between 0400 and 0459 had no demand for fire service. The highest demand for fire related services occurred at 0800 (35 total calls during this hour in 2021), where average number of calls per day during that hour was 0.10.

Table 16: Total Fire Related Calls and Average Calls per Day by Hour of Day

Hour of Day	Number of Calls	Average Calls per Day	Call Percentage
0	2	0.01	0.6
1	3	0.01	0.9
2	4	0.01	1.2
3	3	0.01	0.9
4	0	0.00	0.0
5	14	0.04	4.2
6	11	0.03	3.3
7	22	0.06	6.6
8	35	0.10	10.5
9	32	0.09	9.6
10	22	0.06	6.6
11	22	0.06	6.6
12	15	0.04	4.5
13	22	0.06	6.6
14	27	0.07	8.1
15	16	0.04	4.8
16	7	0.02	2.1
17	21	0.06	6.3
18	11	0.03	3.3
19	12	0.03	3.6
20	6	0.02	1.8
21	11	0.03	3.3
22	11	0.03	3.3
23	4	0.01	1.2
Total	**333**	**0.9**	**100.0**

Figure 31: Average Fire Related Calls per Day by Hour of Day



In addition, the average time on task was evaluated to assess the demand for resources through the lens of time commitment per hour of day. Understanding that many fire related incidents require multi-unit responses, this analysis incorporated unit-level activity. Overall, the department was busy for an average of 35.8 minutes per unit-level response to fire related calls.

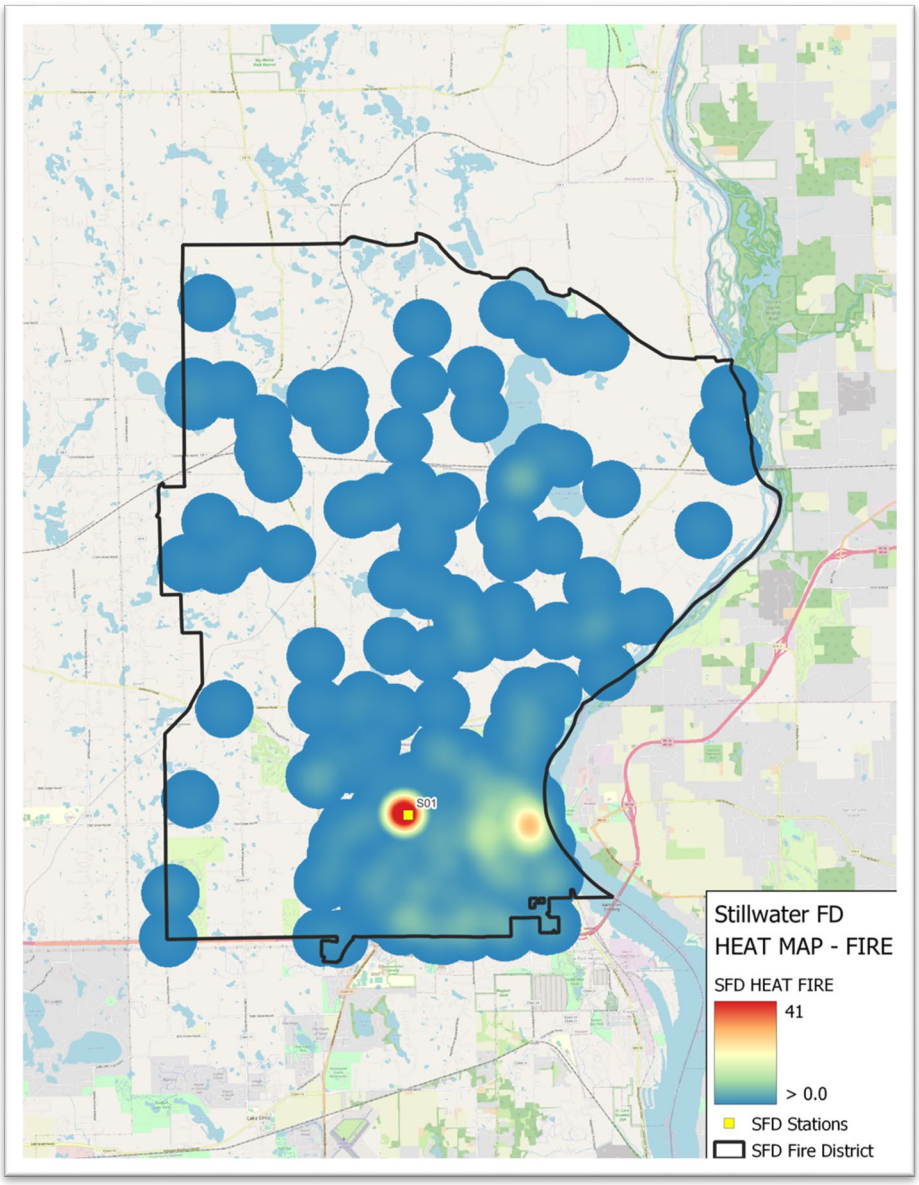
We also analyzed the number of responding units by fire related call type. Overall, 48.7% of fire related calls were responded to by one unit, and 27.6% were responded to by two units. However, for structure fire calls, 71% of calls (5/7) were responded to by five or more units. The maximum number of units responding to a structure fire call was 10, five of which were dispatched at two separate times to the call. The department was busy on structure fire calls for 59.6 hours during 2021, making 39 responses to seven structure fire calls and averaging 5.6 responses per call. Average busy minutes per response was 91.6 minutes.

Table 17: Number of Responding Units by Fire Related Call Type

Call Category	Number of Responding Units							Total
	1	2	3	4	5	6	7 or More	
Agency Assist	11	2	0	0	0	0	0	13
Fire Other	24	19	6	5	4	0	1	59
Hazardous Condition	30	7	1	0	0	0	0	38
Outside Fire	7	9	1	5	1	0	0	23
Structure Fire	0	0	2	0	2	1	2	7
Vehicle Fire	2	5	3	2	0	0	0	12
Total	**74**	**42**	**13**	**12**	**7**	**1**	**3**	**152**
Percentage	**48.7**	**27.6**	**8.6**	**7.9**	**4.6**	**0.7**	**2.0**	**100.0**

Heat maps were created to identify the concentration of the historic demand for service by program area. Therefore, the following mapping will present the relative concentration of service demands by fire. The blue areas have the lowest concentration of demand, and the dark red areas have the highest concentration of demand.

Figure 32: Heat Map for Fire Calls



Occupancy-Level Risk

Occupancy risk was evaluated across the jurisdiction utilizing the most recent internal occupancy-level data available. The available data provided a very limited amount of data to include the address, business name and contact information. There are 1,367 occupancies identified in the departments database. In order to quantify the risk, additional information is necessary such as

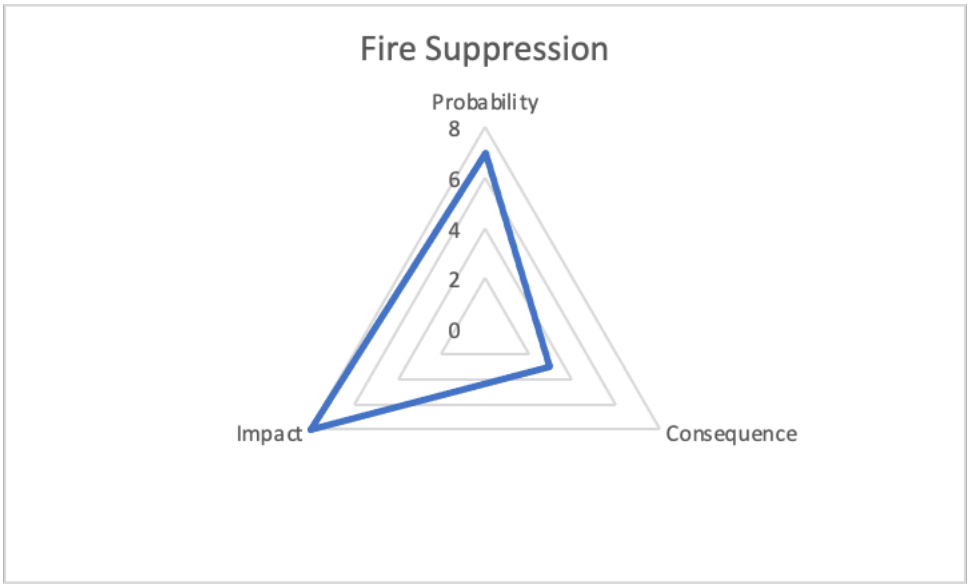
number of stories, occupancy class, presence of automatic sprinkler systems, fire alarms, fire pumps, and standpipes.

Three-Dimensional Risk Analysis – Probability-Consequence-Impact of Fire Event Risk

A three-dimensional risk analysis was completed utilizing three factors of probability, consequence, and impact for the fire program.

When reviewing the 3-D risk models on the following pages, it is clear that the variables with higher risk are probability and impact. This is due to 0.9 fire related calls per day and the resources of the department are depleted with a single fire related call.

Figure 33: 3-D Model for Fire Risk



Critical Task Analysis

The critical tasks were developed by the department staff through a facilitated process that includes recommendations from the CFAI and the NFPA, as well as the current staffing and deployment model operating within the Department. Risks were categorized by program area and stratified by risk. Critical tasks were developed for single family and multi-family dwellings.

Table 18: Critical Tasks for Fire Alarm – Single Family

Critical Task	Needed Personnel	Current Staff
Command / Control	1	1
Apparatus Operator	1	1
Investigation / Extinguishment	2	1
Total	**4**	**3**

Table 19: Critical Tasks for Fire Alarm – Multi-Family Dwelling/Commercial

Critical Task	Needed Personnel	Current Staff
Command / Control	1	1
Apparatus Operator	1	1
Investigation / Extinguishment	2	2
Ready Reserve	2	0
Total	**6**	**4**

Table 20: Critical Tasks for Structure Fire – Single Family Dwelling

Critical Task	Needed Personnel	Current Staff
Command/Control	1	1
Fire Control	2	2
Ready Reserve (OSHA Required)	2	2
Search and Rescue	2	2
Apparatus Operator	1	1
Water Supply	2	0
Ventilation	2	0
EMS/Rehab	2	0
Tactical Supervisor/Safety	1	1
Total	**15**	**9**

Table 21: Critical Tasks for Structure Fire – Multi-Family Dwelling/Commercial

Critical Task	Needed Personnel	Current Staff
Command/Control	2	1
Fire Control	2	2
Ready Reserve (OSHA Required)	2	2
Search and Rescue	6	2
Apparatus Operator	2	2
Water Supply	2	1
Ventilation	3	1
EMS/Rehab	2	0
Tactical Supervisor/Safety	2	0
Alarm/Sprinkler Control	2	0
Total	**25**	**13**

Emergency Medical Services - High

Stillwater Fire provides Basic Life Support (BLS) first response to EMS responses while Lakeview EMS provides the Advanced Life Support (ALS) care and transport. All personnel in the department are certified to a minimum provider level of Emergency Medical Responder (EMR) or EMT. All personnel are able to size up the medical situation, conduct patient assessment, obtain vital signs and patient medical history, and initiate mitigation efforts.

Community Service Demands

Temporal analyses were conducted to evaluate patterns in community demands for EMS related services. These analyses examined the frequency of requests for service in 2021 by month, day of week, and hour of day. Results found that there was variability by month. The three months with the most EMS related calls in descending order were: July (6.4 per day), September (6.3 per day), and December (6.2 per day). The three months with the fewest EMS related calls in ascending order were: April (4.3 per day), March (4.4 per day), and January (4.5 per day).

Table 22: Number of Calls, Number of Responses, and Total Busy Time by Program in 2021

Jurisdiction	Program	Number of Calls[1]	Number of Responses[2]	Average Responses per Call	Total Busy Hours	Responses with Time Data[3]	Average Busy Minutes per Response	Average Calls per Day	Average Responses per Day
All[4]	EMS	1,753	2,119	1.2	600.3	2,119	17.0	4.8	5.8
	Fire	152	315	2.1	187.9	315	35.8	0.4	0.9
	Hazmat	32	46	1.4	32.1	46	41.9	0.1	0.1
	Rescue	11	14	1.3	5.3	14	22.5	< 0.1	< 0.1
	Total	**1,948**	**2,494**	**1.3**	**825.6**	**2,494**	**19.9**	**5.3**	**6.8**
Within SFD[4]	EMS	1,750	2,116	1.2	600.1	2,116	17.0	4.8	5.8
	Fire	152	315	2.1	187.9	315	35.8	0.4	0.9
	Hazmat	32	46	1.4	32.1	46	41.9	0.1	0.1
	Rescue	11	14	1.3	5.3	14	22.5	< 0.1	< 0.1
	Total	**1,945**	**2,491**	**1.3**	**825.3**	**2,491**	**19.9**	**5.3**	**6.8**
Outside of SFD[5]	EMS	3	3	1.0	0.3	3	5.3	< 0.1	< 0.1
	Fire	0	--	--	--	--	--	--	--
	Hazmat	0	--	--	--	--	--	--	--
	Rescue	0	--	--	--	--	--	--	--
	Total	**3**	**3**	**1.0**	**0.3**	**3**	**5.3**	**< 0.1**	**< 0.1**

[1]"Number of Calls" reflects an adjusted number of calls following any exclusion activity to align with responses made by valid units assigned to SFD.

[2]"Number of Responses" reflects the total number of records in the data file associated with responses made by valid units assigned to SFD, regardless of calculated busy time.

[3]"Responses with Time Data" reflects the number of records in the data file associated with responses made by valid units assigned to SFD with calculated busy time not otherwise excluded.

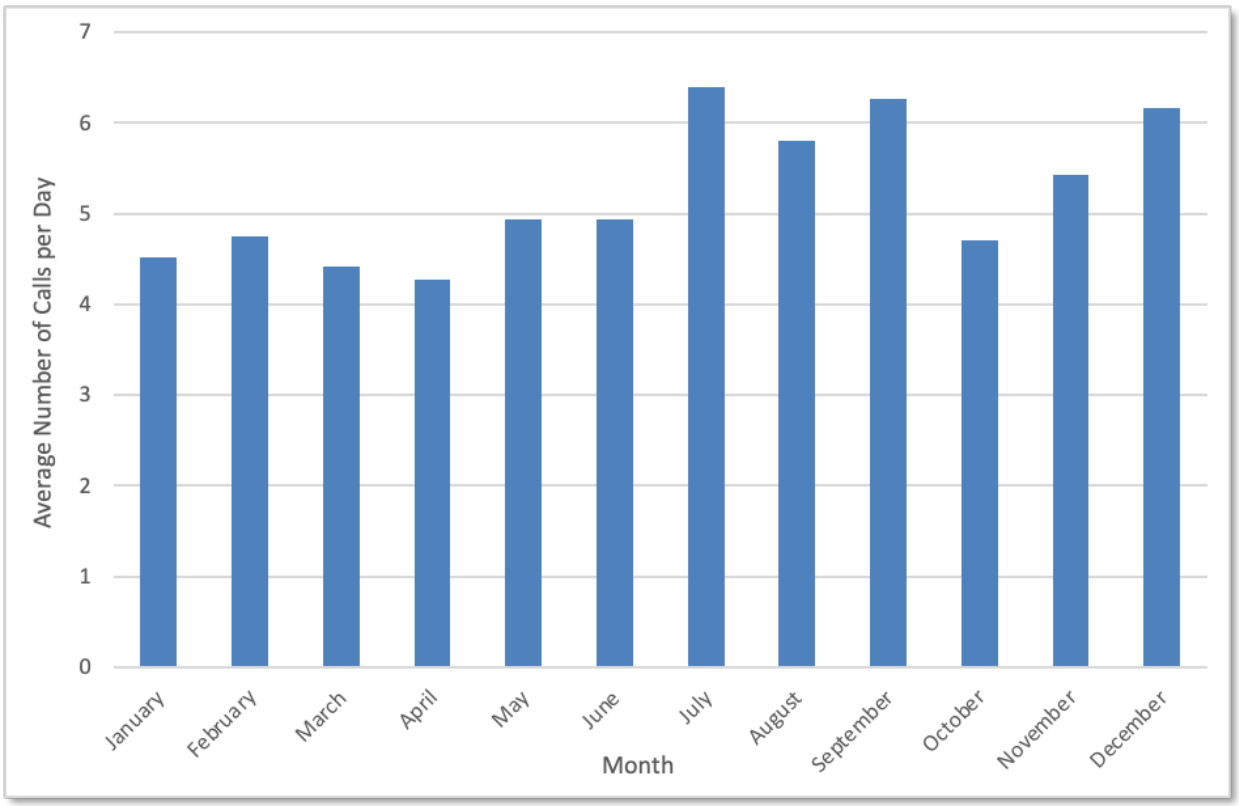
[4]Cities considered to be within the SFD jurisdiction included Grant, May Township, Stillwater, Stillwater Township, and "NULL" values, as well as records missing a value for city.

[5]Cities considered to be outside of the SFD jurisdiction included Bayport, Cottage Grove, Hudson, Oak Park Heights, Saint Joseph Township, Saint Paul Park, Somerset, and Woodbury.

Table 23: Total EMS Related Calls and Average Calls per Day by Month

Month	Number of Calls	Average Calls per Day	Call Percentage
January	140	4.5	7.3
February	133	4.8	7.0
March	137	4.4	7.2
April	128	4.3	6.7
May	153	4.9	8.0
June	148	4.9	7.8
July	198	6.4	10.4
August	180	5.8	9.4
September	188	6.3	9.9
October	146	4.7	7.7
November	163	5.4	8.6
December	191	6.2	10.0
Total	**1,905**	**5.2**	**100.0**

Figure 34: Average EMS Related Calls per Day by Month



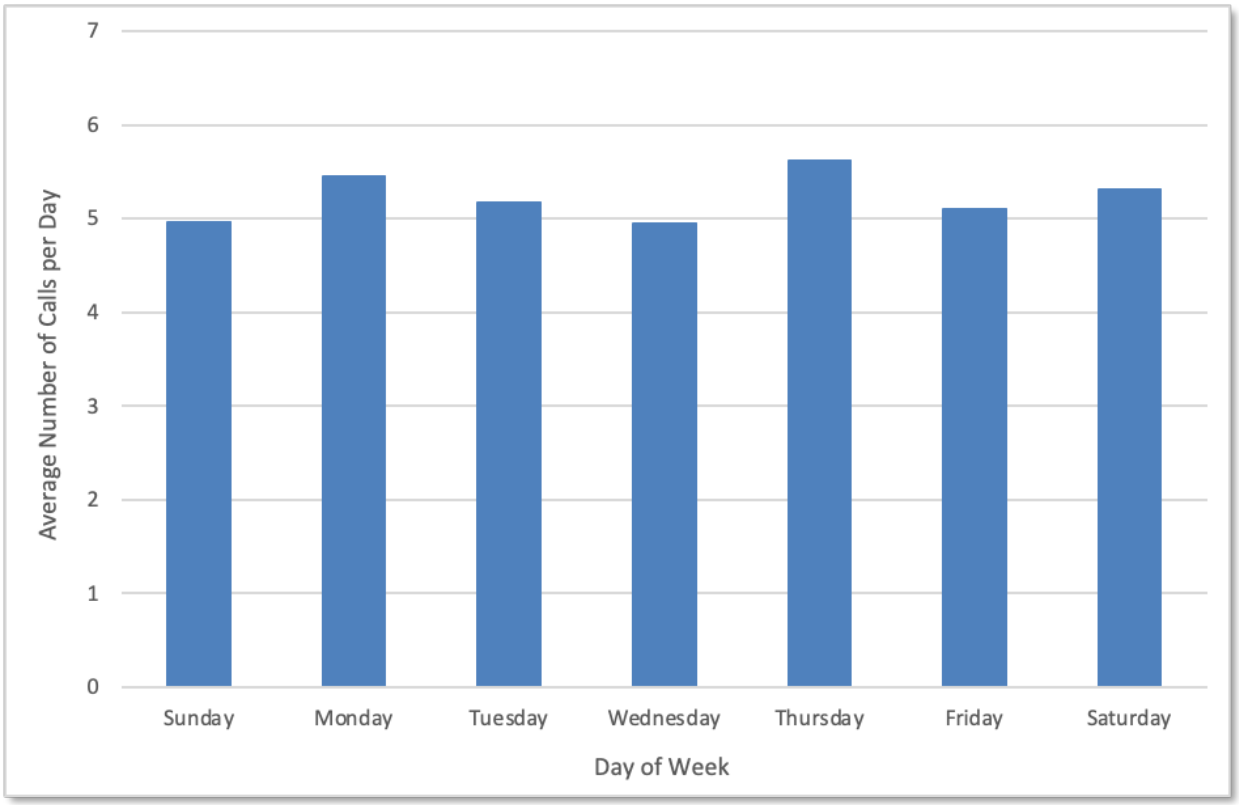
Similar analyses were conducted for EMS related calls by day of week. The data revealed that there was some variability in demand for services by day of week. Thursday had the highest frequency of requests for EMS related services, averaging 5.6 calls per day and accounting for 15.3% of all EMS related calls. Wednesday had the lowest frequency of requests for EMS related services, averaging 4.9 calls per day and accounting for 13.5% of all EMS related calls.

Table 24: Total EMS Related Calls and Average Calls per Day by Day of Week

Day of Week[1]	Number of Calls	Average Calls per Day	Call Percentage
Sunday	258	5.0	13.5
Monday	283	5.4	14.9
Tuesday	269	5.2	14.1
Wednesday	257	4.9	13.5
Thursday	292	5.6	15.3
Friday	270	5.1	14.2
Saturday	276	5.3	14.5
Total	**1,905**	**5.2**	**100.0**

[1]There were 53 Fridays and 52 of all other days of the week during 2021.

Figure 35: Average EMS Related Calls per Day by Day of Week

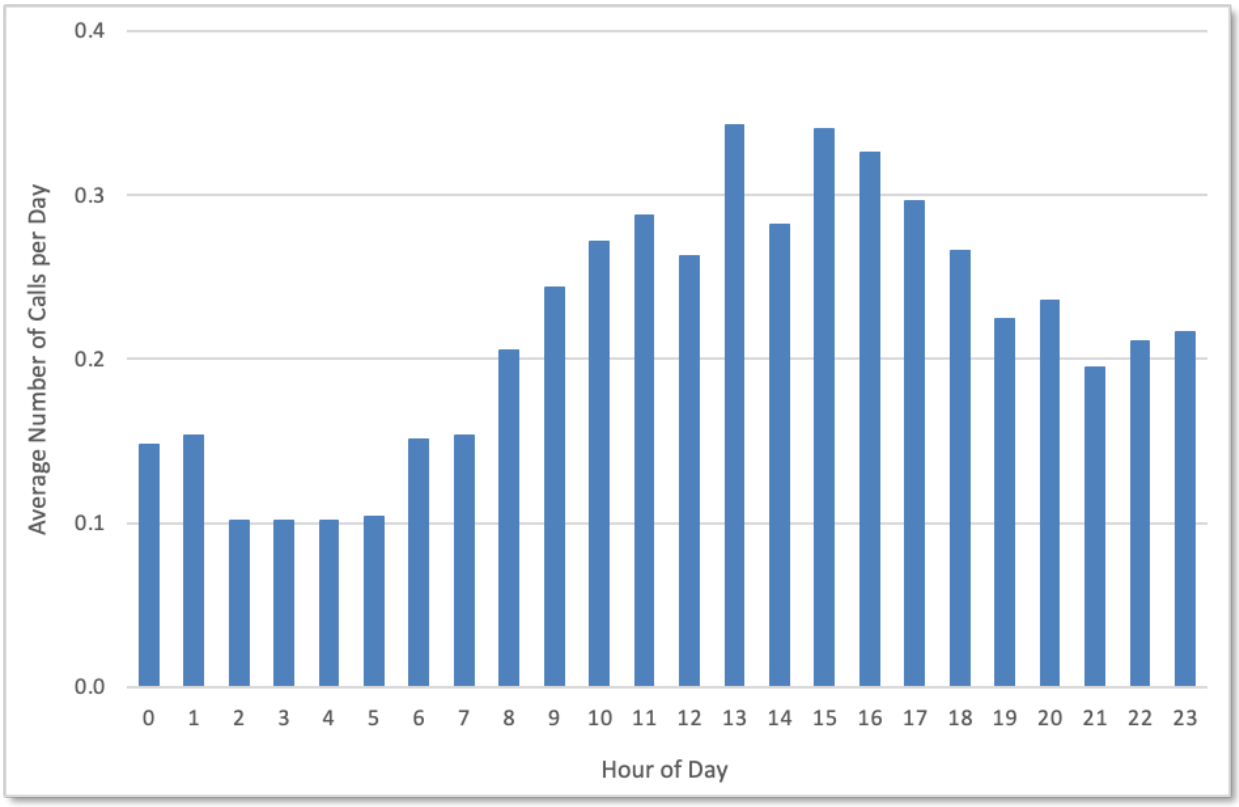


EMS related calls were also evaluated by hour of the day. Some variability exists in the time of day that requests for EMS related services were received. The hours from 0200 to 0559 had the lowest demands, where average number of calls per day for each of those hours was 0.10. The highest demand for EMS related services occurred at 1300 and 1500, where average number of calls per day during that hour was 0.34.

Table 25: Total EMS Related Calls and Average Calls per Day by Hour of Day

Hour of Day	Number of Calls	Average Calls per Day	Call Percentage
0	54	0.15	2.8
1	56	0.15	2.9
2	37	0.10	1.9
3	37	0.10	1.9
4	37	0.10	1.9
5	38	0.10	2.0
6	55	0.15	2.9
7	56	0.15	2.9
8	75	0.21	3.9
9	89	0.24	4.7
10	99	0.27	5.2
11	105	0.29	5.5
12	96	0.26	5.0
13	125	0.34	6.6
14	103	0.28	5.4
15	124	0.34	6.5
16	119	0.33	6.2
17	108	0.30	5.7
18	97	0.27	5.1
19	82	0.22	4.3
20	86	0.24	4.5
21	71	0.19	3.7
22	77	0.21	4.0
23	79	0.22	4.1
Total	**1,905**	**5.2**	**100.0**

Figure 36: Average EMS Related Calls per Day by Hour of Day



EMS related requests accounted for 82.1% of the total requests for service during 2021 and averaged 5.2 requests per day. EMS related incidents are an aggregated category of the various final incident types available in the data file. The Table below provides details for these EMS related incidents by nature of the call (i.e., variable "Code_Description"; entries are presented verbatim from the data file).

Table 26: Total EMS Related Calls by Nature of Call

Nature of Call[1]	Number of Calls	Percentage of Total EMS Demand
yDifficulty Breathing	211	11.1
yFall-1	149	7.8
yFall-3	147	7.7
ySick Person-1	147	7.7
yFire Alarm	125	6.6
yUnconscious Person-1	87	4.6
yUnknown Medical Situation-1	78	4.1
yCardiac/Heart Problems-1	73	3.8
yLift Assist-Non Injury	58	3.0
ySeizure-1	56	2.9

Nature of Call'	Number of Calls	Percentage of Total EMS Demand
yMedical Alarm-2	53	2.8
yMVA: Unknown Injury	51	2.7
yAbdominal Pain/Problem-1	49	2.6
yStroke-1	49	2.6
yFall-2	48	2.5
yVehicle Accident Injury	44	2.3
yPerson In Crisis-1	43	2.3
yRQ EMS by Public Safety-L1	39	2.0
yCPR/Full Arrest	32	1.7
yDiabetic-1	30	1.6
yAccidental OD/Poisoning-1	27	1.4
yChest Pain(Non-Cardiac)-1	26	1.4
yFire Alarm - Water Flow	26	1.4
yBleeding-1	25	1.3
yAllergic Reaction	24	1.3
yFire Alarm Carbon Monoxide	24	1.3
yChest Pain (Non-Cardiac)-1	23	1.2
yBack Pain(Non-Trauma)-1	18	0.9
yUnconscious Person-2	18	0.9
ySuicide or Attempted	17	0.9
yTraumatic Inj/Head Injury-1	14	0.7
yMedical Alarm-1	10	0.5
yRQ EMS Rescue by PublicSafety	9	0.5
yStroke-2	9	0.5
yHeadache-1	7	0.4
yRQ EMS by Public Safety-L3	6	0.3
yTraumatic Inj/Head Injury-2	6	0.3
yAssault Injury-1	4	0.2
yExposure Heat/Cold-1	4	0.2
ySick Person-3	4	0.2
yAbdominal Pain/Problem-2	3	0.2
yAccidental OD/Poisoning-2	3	0.2
yChildbirth/Obstetrics-1	3	0.2
yChoking-1	3	0.2
yMVA: Hit and Run with Injury	3	0.2
yRequest Mutual Aid EMS	3	0.2
yCardiac/Heart Problems-2	2	0.1
yExposure Heat/Cold-2	2	0.1
yMVA: Injury-Entrapment	2	0.1
yAnimal Bite Injury-1	1	0.1

Nature of Call[1]	Number of Calls	Percentage of Total EMS Demand
yBurns-1	1	0.1
yChest Pain(Non-Cardiac)-2	1	0.1
yCO/Inhalation	1	0.1
yDomestic Violence Injury-1	1	0.1
yEye Problem/Injury-1	1	0.1
yHeadache-2	1	0.1
yLE Incident w/ Medical-1	1	0.1
yPerson In Crisis-3	1	0.1
yPossible Death	1	0.1
yStroke-3	1	0.1
Total	**1,905**	**100.0**

[1]Entries are presented verbatim from the data file.

The department dispatched multiple units to 13.4% of EMS related calls (241/1,750). On average, 1.2 units were dispatched per EMS related call (2,119/1,750).

Table 27: Number of Responding Units by EMS Related Call Type

Call Category	Number of Responding Units							
	1	2	3	4	5	6	7 or More	Total
Agency Assist	27	6	0	1	0	0	0	34
Breathing Difficulty	180	6	2	3	0	0	0	191
Cardiac and Stroke	112	17	12	11	0	0	0	152
Fall and Injury	350	26	2	0	0	0	0	378
Fire Alarm	130	36	4	2	0	0	0	172
Illness and Other	516	21	2	1	0	0	0	540
Mutual Aid	1	0	0	0	0	0	0	1
MVA	14	32	31	8	3	2	0	90
Overdose and Psychiatric	43	2	1	0	0	0	0	46
Seizure and Unconsciousness	136	8	2	0	0	0	0	146
Total	**1,509**	**154**	**56**	**26**	**3**	**2**	**0**	**1,750**
Percentage	**86.2**	**8.8**	**3.2**	**1.5**	**0.2**	**0.1**	**0.0**	**100.0**

Transport

The number of EMS calls with at least one response indicating a patient transport totaled 1,305(1,305 of 1,751 total EMS calls; 74.5% transport rate), averaging 3.6 transport EMS calls per day.

Duration of a response is defined as the difference between the unit dispatch date and time and unit clear date and time (i.e., busy time). The average duration of a non-transport EMS related response was 21.8 minutes, and the average duration of a transport EMS related response was 45.2 minutes.

Table 28: EMS Non-Transport and Transport Calls by Call Type

Complaint Reported by Dispatch	Non-Transport		Transport		Total Number of Responses	Transport Rate (%)
	Average Response Duration (Minutes)	Number of Responses	Average Response Duration (Minutes)	Number of Responses		
Abdominal Pain/Problems	20.6	3	40.0	44	47	93.6
Allergic Reaction/Stings	22.7	14	38.6	15	29	51.7
Animal Bite	15.1	1	--	0	1	0.0
Assault/Battery/Abuse Victim	19.6	15	48.4	9	24	37.5
Back Pain (Non-Traumatic)	34.0	1	40.7	20	21	95.2
Breathing Problem	22.3	33	45.4	179	212	84.4
Burns/Explosion	18.0	2	--	0	2	0.0
Carbon Monoxide/Hazmat/Inhalation/CBRN	30.7	4	--	0	4	0.0
Cardiac Arrest/Death	29.4	5	65.0	13	18	72.2
Chest Pain (Non-Traumatic)	22.0	17	47.2	78	95	82.1
Choking	12.7	1	--	0	1	0.0
Convulsions/Seizure	19.4	37	48.4	50	87	57.5
Diabetic Problem	29.2	16	48.0	26	42	61.9
Electrocution/Lightning	--	0	79.0	1	1	100.0
Eye Problem/Injury	--	0	29.2	1	1	100.0
Falls	19.4	105	37.6	190	295	64.4
Headache	25.0	2	32.6	10	12	83.3
Heart Problems/AICD	21.5	7	48.2	34	41	82.9
Heat/Cold Exposure	28.0	1	35.6	4	5	80.0
Hemorrhage/Laceration	22.4	3	38.0	30	33	90.9
Medical Alarm	22.4	9	43.2	12	21	57.1
Medical Transport	--	0	75.3	4	4	100.0
No Other Appropriate Choice	--	0	47.5	15	15	100.0
Overdose/Poisoning/Ingestion	23.3	14	51.5	53	67	79.1
Pregnancy/Childbirth/Miscarriage	--	0	61.6	3	3	100.0

Complaint Reported by Dispatch	Non-Transport		Transport		Total Number of Responses	Transport Rate (%)
	Average Response Duration (Minutes)	Number of Responses	Average Response Duration (Minutes)	Number of Responses		
Psychiatric Problem/Abnormal Behavior/Suicide Attempt	25.2	23	67.6	82	105	78.1
Sick Person	23.9	40	42.5	219	259	84.6
Standby	25.3	1	24.1	1	2	50.0
Stroke/CVA	29.5	9	44.5	47	56	83.9
Traffic/Transportation Incident	19.4	37	41.5	42	79	53.2
Traumatic Injury	16.9	7	47.8	18	25	72.0
Unconscious/Fainting/Near-Fainting	23.0	27	42.5	87	114	76.3
Unknown Problem/Person Down	19.2	12	44.2	18	30	60.0
Total	**21.8**	**446**	**45.2**	**1,305**	**1,751**	**74.5**

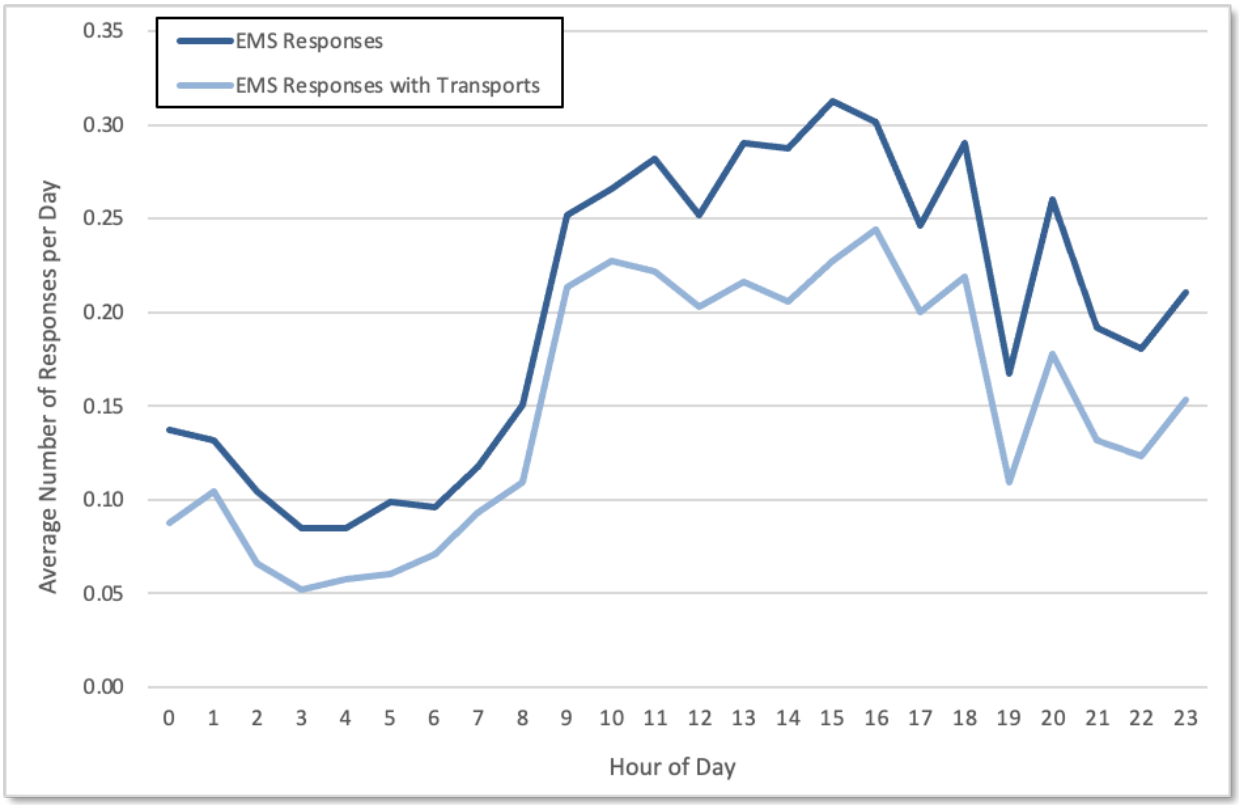
We also analyzed variation of total responses and transport responses by hour of day. The variation of total responses and transport responses followed a similar pattern. The busiest period for transport responses occurred at 1600, with 89 transport responses occurring in 2021 during that hour of the day. The peak transport rate occurred at 1000, wherein 83 of 97 responses (85.6%) resulted in a patient transport.

Table 29: Total EMS Calls and EMS Calls with Transports and Average Calls per Day by Hour of Day

Hour of Day	Number of Responses	Number of Responses with Transports	Average Responses per Day	Average Responses with Transports per Day	Transport Rate (%)
0	50	32	0.14	0.09	64.0
1	48	38	0.13	0.10	79.2
2	38	24	0.10	0.07	63.2
3	31	19	0.08	0.05	61.3
4	31	21	0.08	0.06	67.7
5	36	22	0.10	0.06	61.1
6	35	26	0.10	0.07	74.3
7	43	34	0.12	0.09	79.1
8	55	40	0.15	0.11	72.7
9	92	78	0.25	0.21	84.8
10	97	83	0.27	0.23	85.6
11	103	81	0.28	0.22	78.6
12	92	74	0.25	0.20	80.4
13	106	79	0.29	0.22	74.5
14	105	75	0.29	0.21	71.4

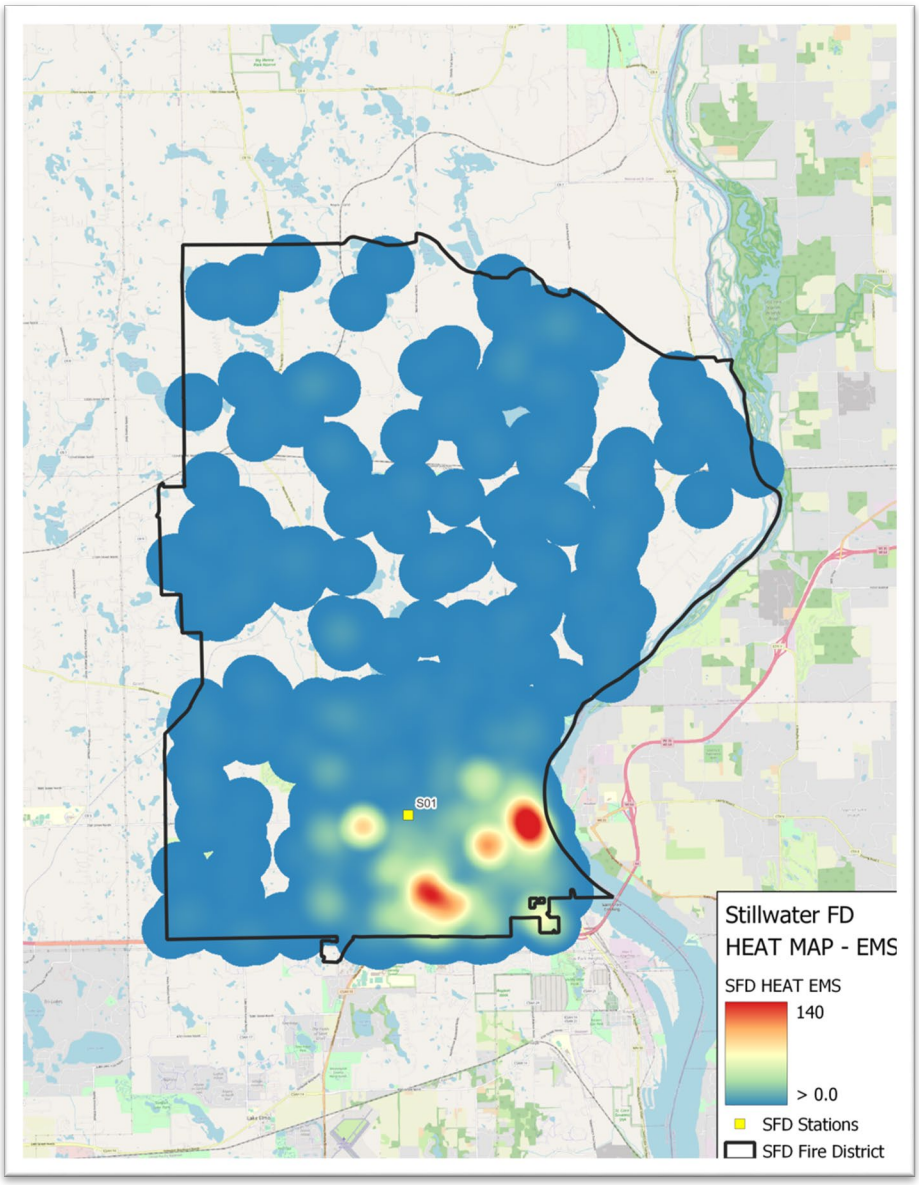
Hour of Day	Number of Responses	Number of Responses with Transports	Average Responses per Day	Average Responses with Transports per Day	Transport Rate (%)
15	114	83	0.31	0.23	72.8
16	110	89	0.30	0.24	80.9
17	90	73	0.25	0.20	81.1
18	106	80	0.29	0.22	75.5
19	61	40	0.17	0.11	65.6
20	95	65	0.26	0.18	68.4
21	70	48	0.19	0.13	68.6
22	66	45	0.18	0.12	68.2
23	77	56	0.21	0.15	72.7
Total	**1,751**	**1,305**	**4.8**	**3.6**	**74.5**

Figure 37: Average EMS Calls and EMS Calls with Transports per Day by Hour of Day



Heat maps were created to identify the concentration of the historic demand for service by program area. Therefore, the following mapping will present the relative concentration of service demands by EMS. The blue areas have the lowest concentration of demand, and the dark red areas have the highest concentration of demand.

Figure 38: Heat Map for EMS Calls

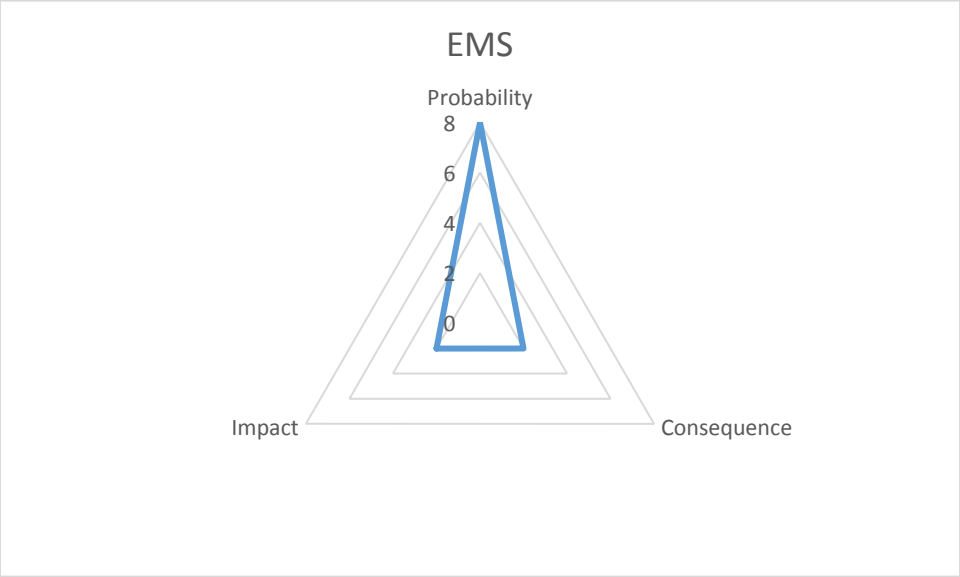


Community Risks

Three-Dimensional Risk Analysis – Probability-Consequence-Impact of EMS Event Risk

A three-dimensional risk analysis was completed utilizing three factors of probability, consequence, and impact for each risk classification/severity within the EMS category/program area. The largest area of risk with EMS is the probability given the demand for EMS is 5.2 calls per day.

Figure 39: 3-D Model for EMS Risk



Critical Task Analysis

In order to align resource allocation and risk for EMS, a critical task analysis was completed. The tables below reflect call types and resource allocations. Only Stillwater Fire resources were analyzed. The resources provided by Lakeview EMS were not captured in this analysis. In general Lakeview EMS provides two paramedics and an ambulance on each EMS call.

Table 30: Critical Tasks for EMS Responses - Low Risk

Critical Task	Needed Personnel	Current Staff
ALS/BLS Evaluation	2	2
Total	**2**	**2**

Table 31: Critical Tasks for EMS Responses – Moderate/High Risk

Critical Task	Needed Personnel	Current Staff
ALS/BLS Evaluation	1	1
EKG/Heart Monitor	1	0
IV Access	1	0
Medication Administration/Treatments	1	0
Patient Removal/Logistics	1	1
Total	**5**	**2**

Table 32: Critical Tasks for EMS Responses - Critical Risk

Critical Task	Needed Personnel	Current Staff
ALS/BLS Evaluation	1	1
EKG/Heart Monitor	1	0
IV Access	1	0
Airway	1	1
Medication Administration/Treatments	1	0
Patient Removal/Logistics	1	1
Lucas Device/CPR	1	1
Communicating with Family	1	0
Total	**8**	**4**

Table 33: Critical Tasks for EMS Response – Low Risk Accident

Critical Task	Needed Personnel	Current Staff
ALS/BLS Evaluation	2	0
Vehicle Evaluation/Extrication	3	3
Total	**5**	**3**

Table 34: Critical Tasks for EMS Response – High Risk Accident

Critical Task	Needed Personnel	Current Staff
ALS/BLS Evaluation	2	0
Extrication	2	2
Vehicle Stabilization	2	0
Incident Commander	1	1
Extrication Group Supervisor	1	0
Hose line	1	0
Apparatus Operator	1	1
Total	**11**	**4**

Technical Rescue Services - Low

Stillwater Fire provides high angle rescue response and an initial response for the other technical rescue disciplines within their service area. The department will respond to technical rescue incidents and is equipped to deny entry and provide initial response to most disciplines. For high angle rescue the department is equipped to extricate and treat injured patients and victims. Department staff are trained to use ropes and equipment to access and remove patients. The remaining disciplines of technical rescue, such as confined space, trench rescue and structural collapse, the department relies on other specialty teams in the region to provide the advanced skills for that discipline. In 2021, Stillwater fire responded to 11 rescue incidents which accounts for 0.5% of the total incidents.

Community Service Demands

Similar to the analyses for hazardous materials, the demand for rescue services is low in relation to the primary program areas. In 2021, there were 11 rescue incidents. The department's data are reproduced in the table below.

Table 35: Number of Calls, Number of Responses, and Total Busy Time by Program in 2021

Jurisdiction	Program	Number of Calls[1]	Number of Responses[2]	Average Responses per Call	Total Busy Hours	Responses with Time Data[3]	Average Busy Minutes per Response	Average Calls per Day	Average Responses per Day
All[4]	EMS	1,753	2,119	1.2	600.3	2,119	17.0	4.8	5.8
	Fire	152	315	2.1	187.9	315	35.8	0.4	0.9
	Hazmat	32	46	1.4	32.1	46	41.9	0.1	0.1
	Rescue	11	14	1.3	5.3	14	22.5	< 0.1	< 0.1
	Total	**1,948**	**2,494**	**1.3**	**825.6**	**2,494**	**19.9**	**5.3**	**6.8**
Within SFD[4]	EMS	1,750	2,116	1.2	600.1	2,116	17.0	4.8	5.8
	Fire	152	315	2.1	187.9	315	35.8	0.4	0.9
	Hazmat	32	46	1.4	32.1	46	41.9	0.1	0.1
	Rescue	11	14	1.3	5.3	14	22.5	< 0.1	< 0.1
	Total	**1,945**	**2,491**	**1.3**	**825.3**	**2,491**	**19.9**	**5.3**	**6.8**
Outside of SFD[5]	EMS	3	3	1.0	0.3	3	5.3	< 0.1	< 0.1
	Fire	0	--	--	--	--	--	--	--
	Hazmat	0	--	--	--	--	--	--	--
	Rescue	0	--	--	--	--	--	--	--
	Total	**3**	**3**	**1.0**	**0.3**	**3**	**5.3**	**< 0.1**	**< 0.1**

[1]"Number of Calls" reflects an adjusted number of calls following any exclusion activity to align with responses made by valid units assigned to SFD.

[2]"Number of Responses" reflects the total number of records in the data file associated with responses made by valid units assigned to SFD, regardless of calculated busy time.

[3]"Responses with Time Data" reflects the number of records in the data file associated with responses made by valid units assigned to SFD with calculated busy time not otherwise excluded.

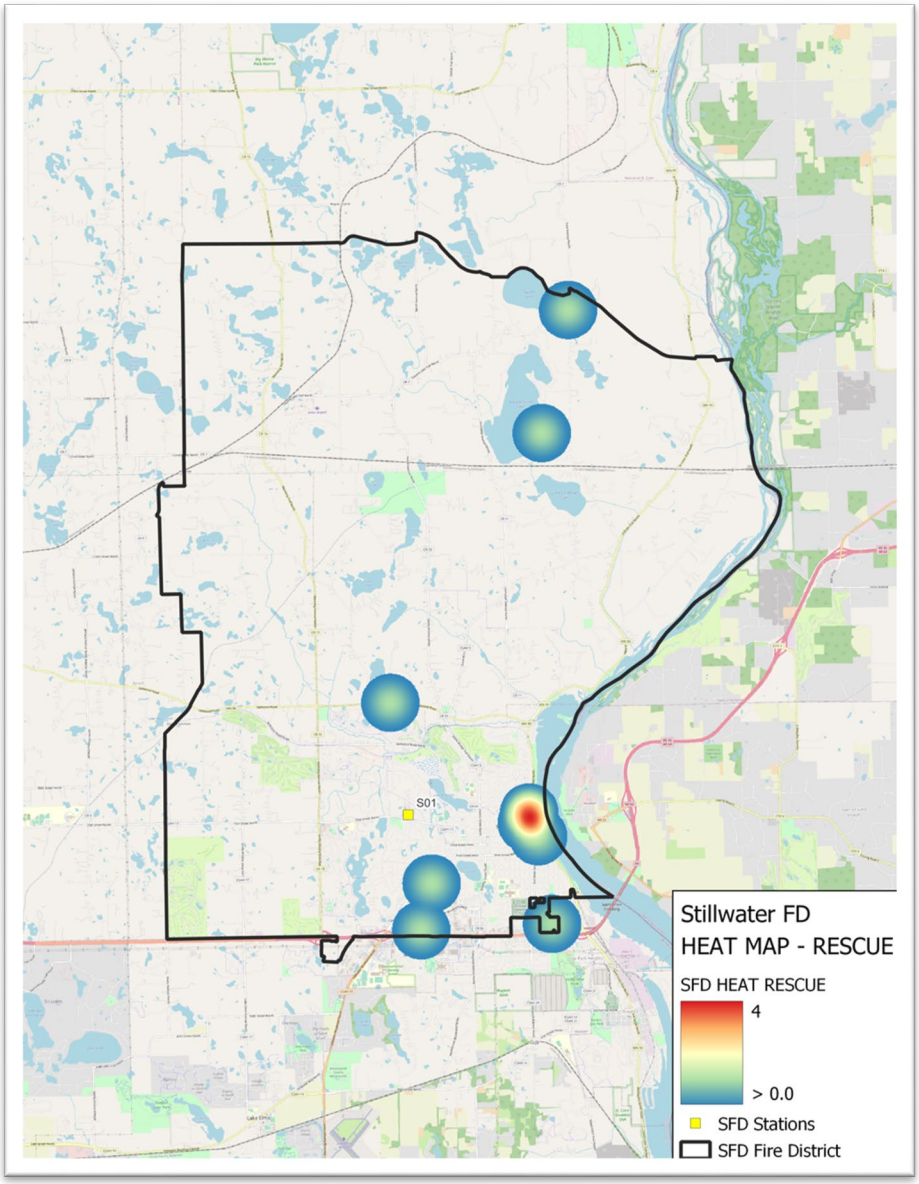
[4]Cities considered to be within the SFD jurisdiction included Grant, May Township, Stillwater, Stillwater Township, and "NULL" values, as well as records missing a value for city.

[5]Cities considered to be outside of the SFD jurisdiction included Bayport, Cottage Grove, Hudson, Oak Park Heights, Saint Joseph Township, Saint Paul Park, Somerset, and Woodbury.

The relatively low call volume renders temporal analyses unreliable since the events will be much more random than in larger data sets. In other words, the results would not be intuitive for decision making and no further analytical analyses were conducted.

However, a geospatial analysis of the requests for special operations that include rescue incidents was conducted and is represented in the figure below. Due to the relatively low frequency of rescue incidents, the geospatial analysis does not suggest a more appropriate location from which to deploy resources for rescue services.

Figure 40: Heat Map for Rescue Calls



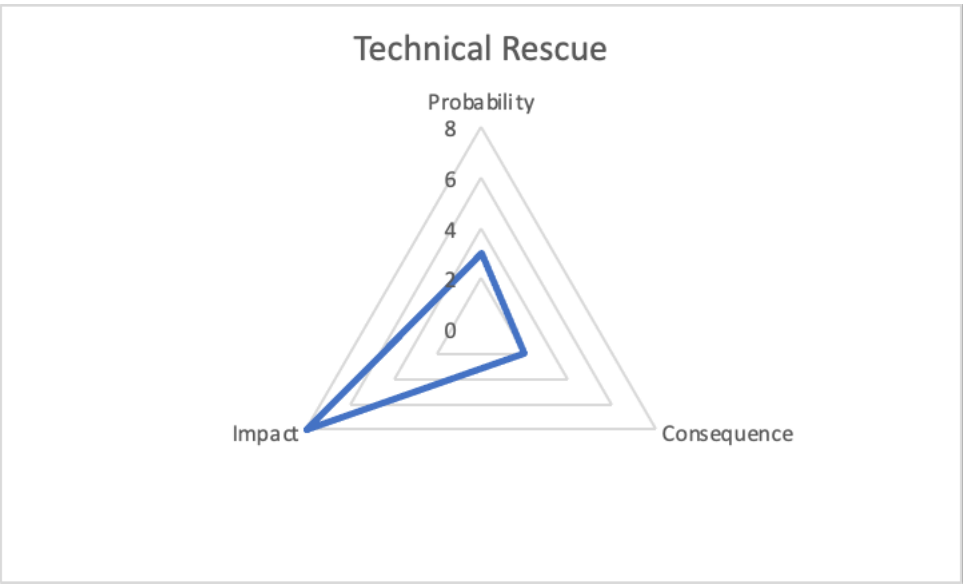
Community Risks

The Department has experienced a historically low demand for technical rescue services.

Three-Dimensional Risk Analysis – Probability-Consequence-Impact of Rescue Event Risk

A three-dimensional risk analysis was completed utilizing three factors of probability, consequence, and impact for each risk classification/severity within the rescue category/program area. The largest area of risk with rescue program is the impact on the department's resources as technical rescue incidents can be resource intensive and long in duration.

Figure 41: 3-D Model for Technical Rescue Risk



Critical Task Analysis

The Department staff analyzed the critical tasks required for the mitigation of the various special operations risks in the community. Critical tasks for various events are presented as well as the resources allocated to each event.

Table 36: Technical Rescue Incident – Critical Task Analysis

Critical Task	Needed Personnel	Current Staff
Incident Commander	1	1
Rescuers	4	2
Rigging	2	2
EMS	2	0
Haul Team	2	3
Tactical Supervision	1	0
Total	**12**	**8**

Hazardous Materials Services - Low

Stillwater Fire responds to hazardous materials incidents and mitigates minor leaks. All fire department personnel are trained to the operations level for hazardous materials, thus making the fire suppression force the first line of response for low-risk incidents. Low-risk incidents would receive a response for early size-up and hazard abatement within their level of training and available resources. These types of hazardous materials incidents would include certain spills and gas leaks. For larger hazardous materials incidents the department relies on the State of Minnesota hazmat teams with St. Paul Fire Department being the closest team. While the state hazmat team responds, the department is able to deny entry, decontaminate victims and monitor the air to determine unsafe areas.

Community Service Demands

Fortunately, the community's demand for hazardous materials services is limited. While there is always potential exposure to hazardous materials risk, the demand for responses is low. This category accounted for 32 unique dispatches in 202. Overall, hazardous materials responses accounted for 1.6% of the total demand for services. Stillwater Fire's data is reproduced in the table on the next page.

Table 37: Number of Calls, Number of Responses, and Total Busy Time by Program in 2021

Jurisdiction	Program	Number of Calls[1]	Number of Responses[2]	Average Responses per Call	Total Busy Hours	Responses with Time Data[3]	Average Busy Minutes per Response	Average Calls per Day	Average Responses per Day
All[4]	EMS	1,753	2,119	1.2	600.3	2,119	17.0	4.8	5.8
	Fire	152	315	2.1	187.9	315	35.8	0.4	0.9
	Hazmat	32	46	1.4	32.1	46	41.9	0.1	0.1
	Rescue	11	14	1.3	5.3	14	22.5	< 0.1	< 0.1
	Total	**1,948**	**2,494**	**1.3**	**825.6**	**2,494**	**19.9**	**5.3**	**6.8**
Within SFD[4]	EMS	1,750	2,116	1.2	600.1	2,116	17.0	4.8	5.8
	Fire	152	315	2.1	187.9	315	35.8	0.4	0.9
	Hazmat	32	46	1.4	32.1	46	41.9	0.1	0.1
	Rescue	11	14	1.3	5.3	14	22.5	< 0.1	< 0.1
	Total	**1,945**	**2,491**	**1.3**	**825.3**	**2,491**	**19.9**	**5.3**	**6.8**
Outside of SFD[5]	EMS	3	3	1.0	0.3	3	5.3	< 0.1	< 0.1
	Fire	0	--	--	--	--	--	--	--
	Hazmat	0	--	--	--	--	--	--	--
	Rescue	0	--	--	--	--	--	--	--
	Total	**3**	**3**	**1.0**	**0.3**	**3**	**5.3**	**< 0.1**	**< 0.1**

[1]"Number of Calls" reflects an adjusted number of calls following any exclusion activity to align with responses made by valid units assigned to SFD.

[2]"Number of Responses" reflects the total number of records in the data file associated with responses made by valid units assigned to SFD, regardless of calculated busy time.

[3]"Responses with Time Data" reflects the number of records in the data file associated with responses made by valid units assigned to SFD with calculated busy time not otherwise excluded.

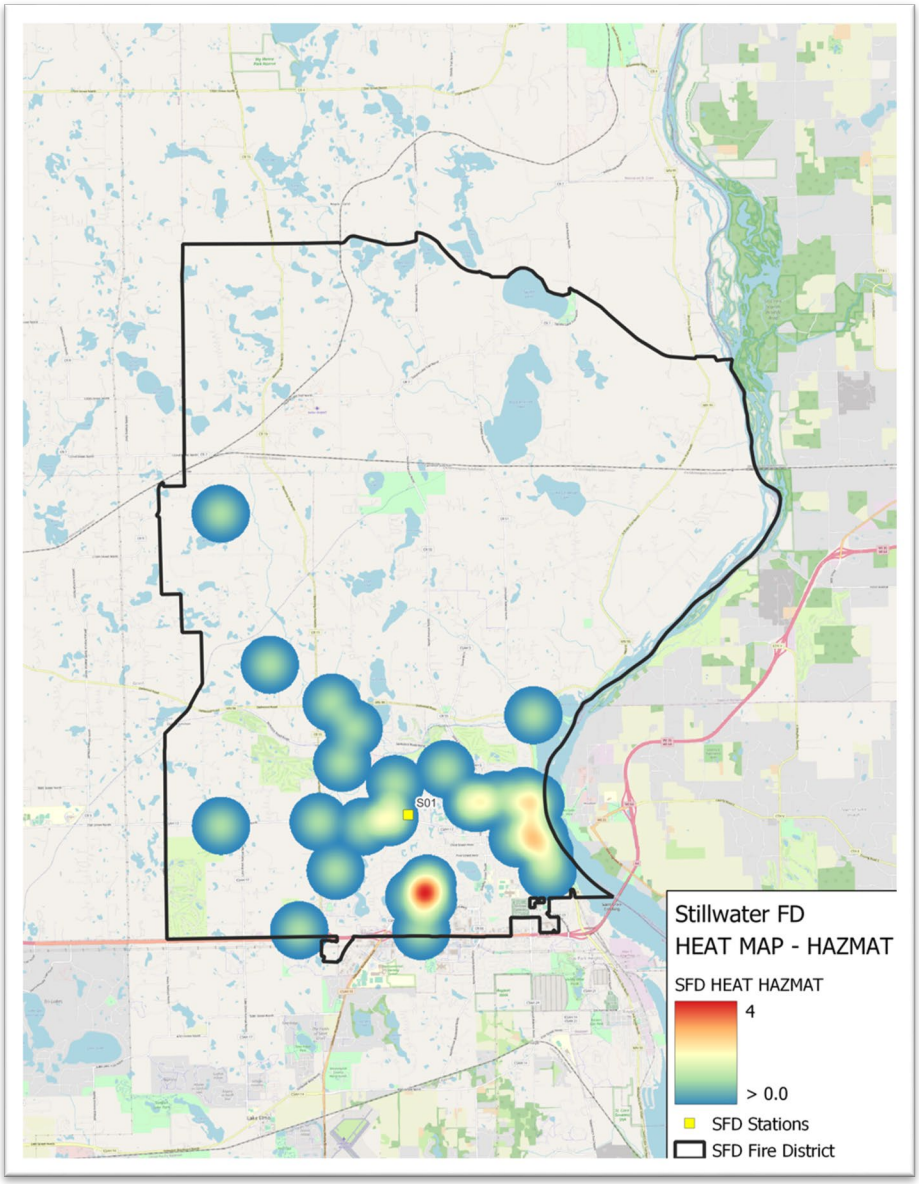
[4]Cities considered to be within the SFD jurisdiction included Grant, May Township, Stillwater, Stillwater Township, and "NULL" values, as well as records missing a value for city.

[5]Cities considered to be outside of the SFD jurisdiction included Bayport, Cottage Grove, Hudson, Oak Park Heights, Saint Joseph Township, Saint Paul Park, Somerset, and Woodbury.

The relatively low call volume renders temporal analyses unreliable since the events will be much more random than in larger data sets. In other words, the results would not be intuitive for decision making and no further analytical analyses were conducted.

However, a geospatial analysis of the requests for special operations incidents that include hazardous materials responses was conducted and is represented in the figure on the next page.

Figure 42: Heat Map for Hazmat Calls



Community Risks

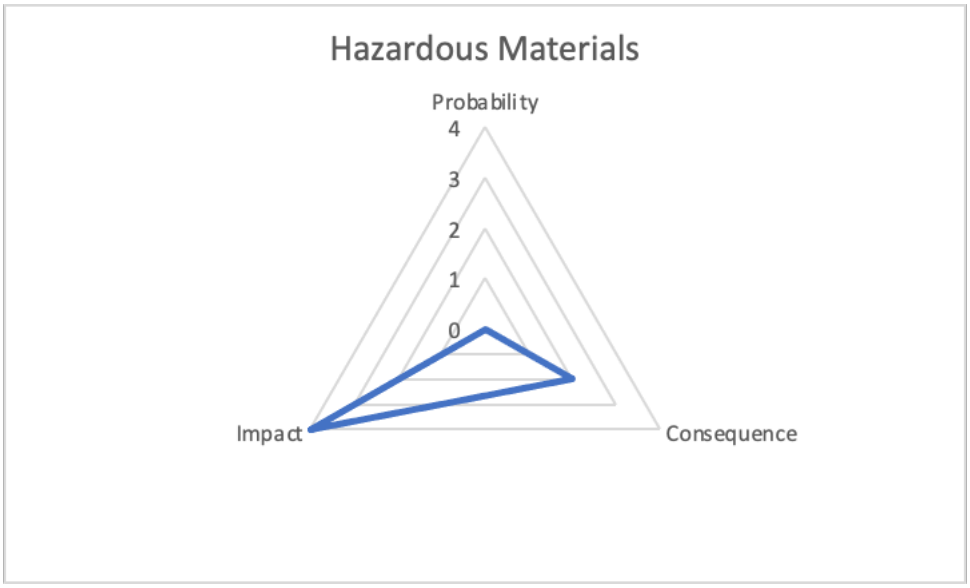
Hazardous materials are part of everyday life and include everything from industrial chemicals and toxic waste to household detergents. Substances are classified as hazardous materials due to their chemical nature and pose a potential risk to life, health, or property if released or improperly used. Hazards can occur during production, storage, transportation, use, or disposal. Emergency incidents can range from a chemical spill on a highway to groundwater contamination by naturally occurring methane gas. Facilities that manufacture, use, or store hazardous materials are required to report them to Local Emergency Planning Committees (LEPCs) by the Emergency Planning and Community Right-to-Know Act (EPCRA). This act is also known as Sara Title III.

The department leadership works collaboratively with the Police department who is responsible for Emergency Management and Washington County Emergency Management to evaluate, assess, and prepare for hazardous materials risks within the community. The historical demand for hazardous materials services within the jurisdiction is relatively limited.

Three-Dimensional Risk Analysis – Probability-Consequence-Impact of HazMat Event Risk

A three-dimensional risk analysis was completed utilizing three factors of probability, consequence, and impact for each risk classification/severity within the fire category/program area. This data was developed from the RMS system "code description" that provides the NFIRS code of the actual event rather than the classification of how it was dispatched. This is a better assessment of the realized risk. A Table for the Code Descriptions are provided in the appendices.

Figure 43: 3-D Model for Hazmat Risk



Critical Task Analysis

Department staff created the critical tasks required for the mitigation of the various hazardous materials risks in the community.

Table 38: Hazardous Materials – Investigate Odor

Critical Task	Needed Personnel	Current Staff
Incident Commander	1	1
Investigate	2	2
Total	**3**	**3**

Table 39: Hazardous Materials – Leak with Isolation/Investigation

Critical Task	Needed Personnel	Current Staff
Incident Commander	1	1
Investigate	2	1
Evacuate	2	1
Total	**5**	**3**

Table 40: Hazardous Materials – Leak with Mitigation/Rescue

Critical Task	Needed Personnel	Current Staff
Incident Commander	1	1
Science	1	0
Response Team	6	4
EMS	4	0
Decon	4	2
Total	**16**	**7**

Population Density, Development, and Growth

Below is the 2019 Metropolitan Council population and household estimates as well as the changes since the 2010 census. The largest increase in population was in the City of Stillwater while the city of Grant and two townships lost population between 2010 and 2019.

Table 41: 2019 Metropolitan Council Census Data

City or Township	Population, 2010 Census	Population, 2019 Estimate	2010-2019 Population Change	Households, 2010 Census	Households, 2019 Estimate	2010-2019 Household Change
Grant *	4,094	4,064	-30	1,463	1,484	21
May township	2,776	2,722	-54	1,083	1,059	-24
Stillwater *	18,227	19,767	1,540	7,076	7,703	627
Stillwater township *	2,364	1,910	-454	855	714	-141
Total	**27,461**	**28,463**	**1002**	**10,477**	**10,960**	**483**

The overall density for the service area varies significantly based on the definitions provided by the CFAI.[19] The Commission's definition is that rural designations are populations less than 1,000 per square mile and suburban is for populations between 1,000 and 2,000 per square mile. The CFAI's definition for an urban density is an incorporated area with over 30,000 people and/or a population density over 2,000 people per square mile. While the City of Stillwater has a population density aligned with the urban density, it does not exceed the 30,000-population threshold. The city aligns better with the suburban classification of density. The following table identifies the population classification based on the CFAI model as well as the projected population change between 2020 and 2040. It is projected that all cities and townships in the service area will have growth in the next two decades.

Table 42: Population Density Classification and Projected Population Change

City/Township	Population/Sq Mile	Classification	2020 Pop	2040 Pop	Populaiton Change
Grant, City	154.8	Rural	3970	4260	290
May Township	87.7	Rural	2670	3950	1280
Stillwater, City	2748.5	Suburban	19394	23240	3846
Stillwater Township	282.9	Rural	1866	2360	494
Totals/Averages	**818.475**	**N/A**	**27900**	**33810**	**5910**

Traditionally, the NFPA 1710 recommended service level for suburban population is that the first due unit is capable of arriving within 6 minutes and 30 seconds, which includes a travel time goal of 4

[19] CFAI. (2009). Fire & Emergency Service Self-Assessment Manual, 8th (ed.). Chantilly, Virginia: Author. (p. 71)

minutes. However, the CFAI has combined urban and suburban densities for first arriving apparatus at a baseline of 5 minutes and 12 seconds with a goal of 4 minutes in the more recently released 9th edition Interpretation Guide that accompanies the 9th edition Self-Assessment Manual.[20] The NFPA 1720 standard which is for volunteer fire departments sets the travel time for suburban densities at 10 minutes and rural densities at 14 minutes.

The Stillwater Fire Department is a combination department comprised of both career and volunteer staff. Given the diversity in both population densities covered and the staffing model used by the department there is not a clear definition on which NFPA standard the department should be working towards. There is no regulatory function that requires a department to meet a specific response time standard. This gives the local policy makers great flexibility determining the appropriate level of service for the community. In *FITCH's* experience using the current response time as the department's baseline and working towards the CFAI response time within the city as a benchmark would be a best practice.

Utilizing the CFAI's traditional recommendations as a guide, rural population densities are afforded a travel time of 13 minutes or less to 90% of the incidents.[21]

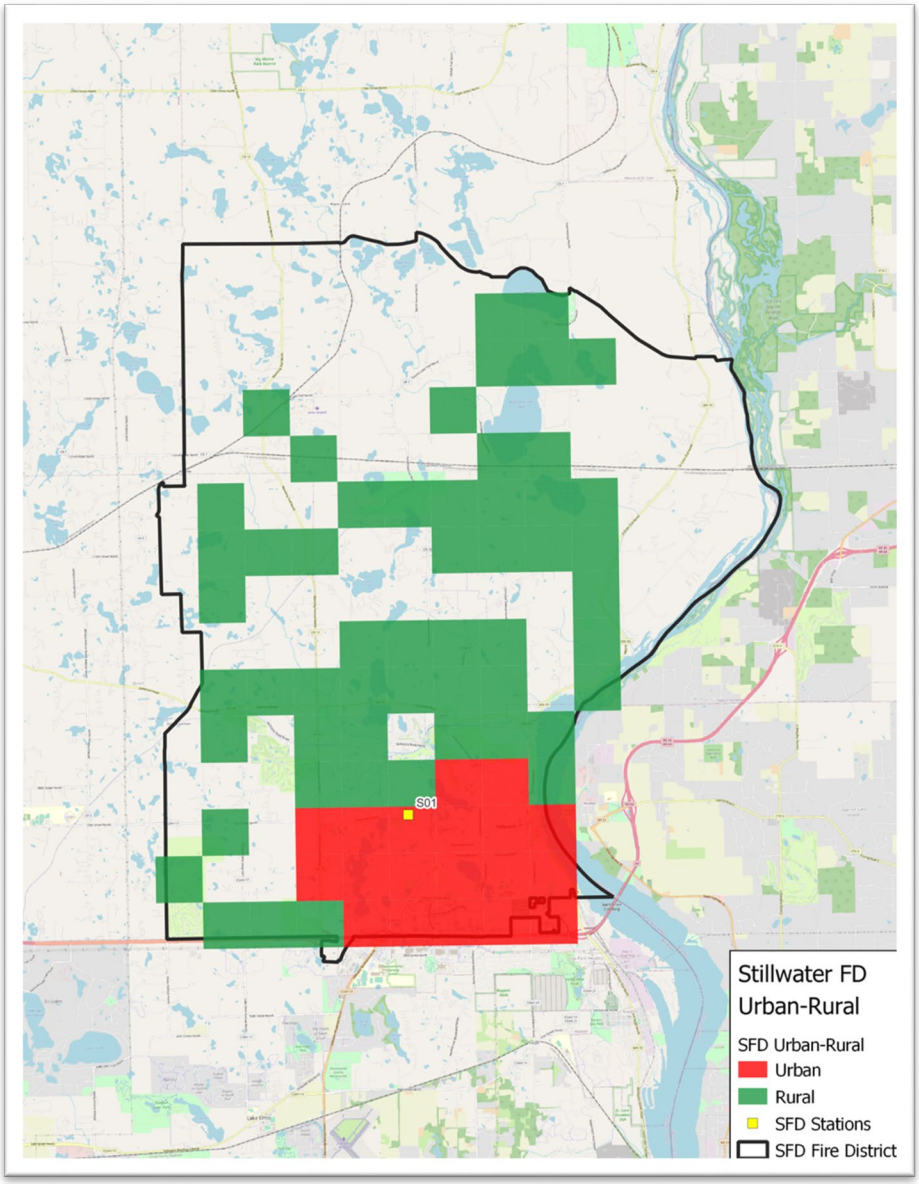
Table 43: Comparison of Response Times by Agency to Best Practices and National Experience[22],[23]

Category	Average Response Time	90th Percentile Response Time	CFAI Turnout Time Baseline 90%	CFAI Baseline 1st Unit Travel 90%	CFAI Total Response Time 90%	NFPA 1221 Dispatch Processing Time 90%	NFPA 1710 Turnout Time 90%	NFPA 1710 Travel Time 90%	NFPA 1710 Total Response 90%	NFPA 1720 Travel Time 80%
Suburban	7:42	11:18	1:30	5:12	7:46	1:04	1:20	4:00	6:24	10:00
Rural	7:42	11:18	1:30	13:00	7:46	1:04	1:20	4:00	6:24	14:00

Additionally, historical call demand analysis was used to identify urban and rural areas of the response area. Since demand often correlates with population density, this method provides a sound approach to understanding the population density of the community from a demand perspective. We calculated call density based on the relative concentration of incidents based on approximately 0.5-mile geographic areas as well as the adjacent 0.5-mile areas. The results demonstrate an urban and rural designation based on call density for services and not based on population. The red areas are designated as urban service areas and the green areas are designated as rural service areas. Any area that is not colored has less than one call every six months in the 0.5-mile area and the adjacent areas.

[20] CFAI. (2016). Fire & Emergency Service Self-Assessment Manual: Interpretation Guide, 9th (ed.). Chantilly, Virginia: Author. (p. 99)
[21] Ibid.
[22] CFAI. (2009). Fire & emergency service self-assessment manual, (8th ed.). Chantilly, Virginia: Author.
[23] National Fire Protection Association. (2016). NFPA 1710, Standard for the Organization and Deployment of Fire Suppression Operations, Emergency Medical Operations, and Special Operations to the Public by Career Fire Departments. Boston, MA: National Fire Protection Association.

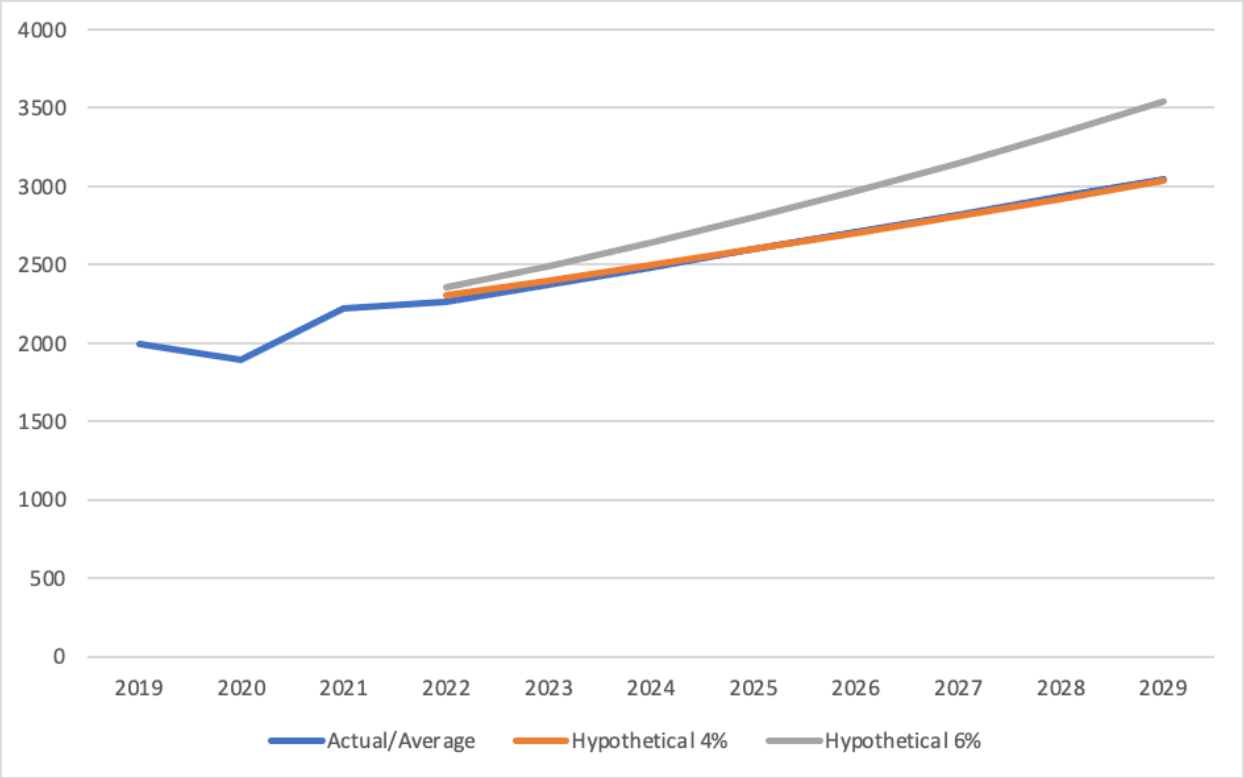
Figure 44: Urban and Rural Call Density Map



An increasing amount of literature is drawing attention to the anticipated acceleration of EMS demand by older populations.[24,25] Coupled with the anticipated growth in elderly population across the U.S.,[26] EMS systems should be evaluating these specific demographic changes in order to better anticipate the rising demand on EMS. Demographic trends indicate population shifts will be more dramatic, with an accompanying dramatic increase in EMS.

During the timeframe of 2019-2021, calls increased from 1,995 to 2,220, with an average increase of 5% each year (i.e., not observed year-over-year growth, but growth averaged over time intervals). The figure below depicts observed growth over the last three years and various hypothetical growth scenarios over the next six years. These projections should be used with caution due to the variability in growth that has been observed across prior years. In all cases, data should be reviewed annually to ensure timely updates to projections.

Figure 45: Observed and Hypothetical Growth in Call Volume



Summary of Man-made Risks

A summary of the man-made risk assessment is provided below.

[24] Clark, M. and FitzGerald, G. (1999). Older people's use of ambulance services: a population-based analysis. J Accid Emerg Med 16:1

[25] Tokuda, Y. et.al. (2010). Ambulance transport of the oldest old in Tokyo: a population based study. J Epidemiol 20:6

[26] See for example An Aging Nation. Accessed November 26, 2017 at https://www.census.gov/library/visualizations/2017/comm/cb17-ff08_older_americans.html.

Table 44: Summary of Man-made Risk Assessment

Manmade Risk Factors	Probability	Consequence	Risk Rating
Fire Suppression	Moderate	Moderate	High
Emergency Medical Services	High	Low	High
Technical Rescue	Low	Low	Low
Hazardous Materials	Low	Low	Low

SECTION D – CURRENT DEPLOYMENT, PERFORMANCE AND GPZ RISK ASSESSMENT

Community Response History

Distribution and Concentration Analyses

Historical Service Demand and Probability Analyses

GPZ Risk and Performance Profiles

COMMUNITY RESPONSE HISTORY

Methodology

We obtained data from the department for calendar years 2019 through 2021. As such, we present three full reporting periods of baseline workload data. It should be noted that two of the three reporting periods were during the COVID-19 pandemic which could have influence the workload. EMS data was unable to be obtained directly from the Lakeview Hospital EMS who is the primary ambulance provider after multiple requests from the Stillwater Fire Department staff. EMS data was obtained from the Minnesota Fire Chiefs Association from 2020 and 2021. This EMS data was procured directly from the Minnesota EMS Regulatory Board (EMSRB) from a public data request (which does not include any private or HIPPA data).

We utilize two distinct measures in this report—call volume and workload. Number of requests for service are defined as "incidents" or "calls" (i.e., call volume). Call volume reflects the number of times a distinct incident was created involving one or more response units, and/or calls received in Stillwater Fire Department's jurisdiction. "Responses" are the number of times that an individual unit (or units) responded to a call (i.e., workload).

Audits of the data files were first conducted to identify any anomalies for attention and reconciliation prior to data analysis. Exclusion criteria were applied to records prior to the analysis of busy and performance time metrics (e.g., dispatch time; turnout time). Entries with negative times or with times of 0 minutes, and entries with extremely high busy or performance times (i.e., outliers) were excluded.

Overview of Community Response Performance

During the calendar year 2021 Stillwater Fire Department received a total of 2,326 unique requests for service. EMS related requests totaled 1,910, accounting for 82.1% of the total call volume, and fire related requests totaled 333, accounting for 14.3% of the total call volume.

Figure 46: Percentage of Total Incidents by Program

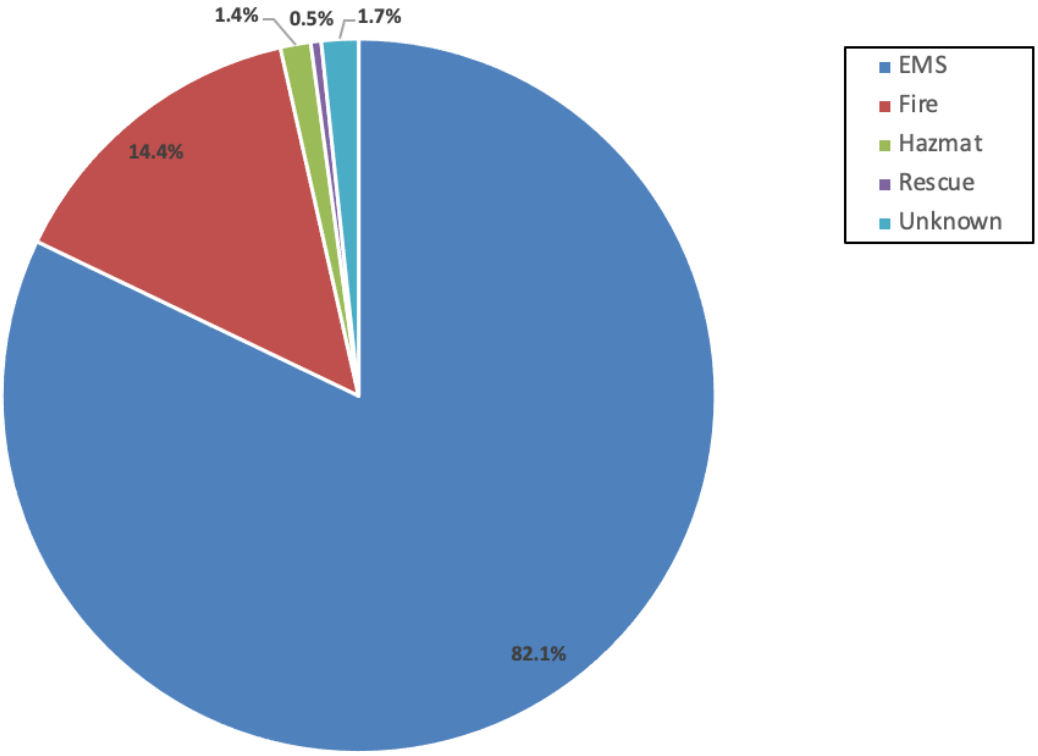


Table 45: Number of Incidents by Call Category

Jurisdiction	Program and Call Type[1]	Number of Calls	Average Calls per Day	Call Percentage
All	**EMS**	**1,910**	**5.2**	**82.1**
	Agency Assist	54	0.1	2.3
	Breathing Difficulty	215	0.6	9.2
	Cardiac and Stroke	167	0.5	7.2
	Fall and Injury	397	1.1	17.1
	Fire Alarm	175	0.5	7.5
	Illness and Other	588	1.6	25.3
	Mutual Aid	3	< 0.1	0.1
	MVA	102	0.3	4.4
	Overdose and Psychiatric	47	0.1	2.0
	Seizure and Unconsciousness	162	0.4	7.0
	Fire	**334**	**0.9**	**14.4**
	Agency Assist	15	< 0.1	0.6
	Fire Other	237	0.6	10.2
	Hazardous Condition	39	0.1	1.7
	Mutual Aid	0	0.0	0.0
	Outside Fire	24	0.1	1.0
	Structure Fire	7	< 0.1	0.3
	Vehicle Fire	12	< 0.1	0.5
	Hazmat	**32**	**0.1**	**1.4**
	Hazmat	32	0.1	1.4
	Rescue	**11**	**< 0.1**	**0.5**
	Rescue	11	< 0.1	0.5
	Unknown[2]	**39**	**0.1**	**1.7**
	Mutual Aid Given	39	0.1	1.7
	Total	**2,326**	**6.4**	**100.0**
Within SFD[3]	**EMS**	**1,905**	**5.2**	**83.5**
	Agency Assist	54	0.1	2.4
	Breathing Difficulty	214	0.6	9.4
	Cardiac and Stroke	166	0.5	7.3
	Fall and Injury	397	1.1	17.4
	Fire Alarm	175	0.5	7.7
	Illness and Other	588	1.6	25.8
	Mutual Aid	3	< 0.1	0.1
	MVA	100	0.3	4.4
	Overdose and Psychiatric	47	0.1	2.1

Jurisdiction	Program and Call Type[1]	Number of Calls	Average Calls per Day	Call Percentage
Within SFD[3]	Seizure and Unconsciousness	161	0.4	7.1
	Fire	**333**	**0.9**	**14.6**
	Agency Assist	15	< 0.1	0.7
	Fire Other	236	0.6	10.3
	Hazardous Condition	39	0.1	1.7
	Mutual Aid	0	0.0	0.0
	Outside Fire	24	0.1	1.1
	Structure Fire	7	< 0.1	0.3
	Vehicle Fire	12	< 0.1	0.5
	Hazmat	**32**	**0.1**	**1.4**
	Hazmat	32	0.1	1.4
	Rescue	**11**	**< 0.1**	**0.5**
	Rescue	11	< 0.1	0.5
	Total	**2,281**	**6.2**	**100.0**
Outside of SFD[4]	**EMS**	**5**	**< 0.1**	**11.1**
	Agency Assist	0	0.0	0.0
	Breathing Difficulty	1	< 0.1	2.2
	Cardiac and Stroke	1	< 0.1	2.2
	Fall and Injury	0	0.0	0.0
	Fire Alarm	0	0.0	0.0
	Illness and Other	0	0.0	0.0
	Mutual Aid	0	0.0	0.0
	MVA	2	< 0.1	4.4
	Overdose and Psychiatric	0	0.0	0.0
	Seizure and Unconsciousness	1	< 0.1	2.2
	Fire	**1**	**< 0.1**	**2.2**
	Agency Assist	0	0.0	0.0
	Fire Other	1	< 0.1	2.2
	Hazardous Condition	0	0.0	0.0
	Mutual Aid	0	0.0	0.0
	Outside Fire	0	0.0	0.0
	Structure Fire	0	0.0	0.0
	Vehicle Fire	0	0.0	0.0
	Hazmat	**0**	**0.0**	**0.0**
	Hazmat	0	0.0	0.0
	Rescue	**0**	**0.0**	**0.0**

Jurisdiction	Program and Call Type[1]	Number of Calls	Average Calls per Day	Call Percentage
	Rescue	0	0.0	0.0
Outside of SFD[4]	**Unknown[2]**	**39**	**0.1**	**86.7**
	Mutual Aid Given	39	0.1	86.7
	Total	**45**	**0.1**	**100.0**

[1]Classifications of incident types from the data file into program and call type category are presented in the Appendix.
[2]Data related to "Mutual Aid Given" records were provided separately by SFD and included incident numbers only such that only call volume could be specified.
[3]Cities considered to be within the SFD jurisdiction included Grant, May Township, Stillwater, Stillwater Township, and "NULL" values, as well as records missing a value for city.
[4]Cities considered to be outside of the SFD jurisdiction included Bayport, Cottage Grove, Hudson, Oak Park Heights, Saint Joseph Township, Saint Paul Park, Somerset, and Woodbury

The department averaged 6.4 calls per day. Responding mutual aid outside of the department's primary response area accounted for 45 calls during 2021.

Table 46: Number of Calls by Call Category

Program and Call Type[1]	Number of Calls	Average Calls per Day	Call Percentage
EMS	**1,910**	**5.2**	**82.1**
Agency Assist	54	0.1	2.3
Breathing Difficulty	215	0.6	9.2
Cardiac and Stroke	167	0.5	7.2
Fall and Injury	397	1.1	17.1
Fire Alarm	175	0.5	7.5
Illness and Other	588	1.6	25.3
Mutual Aid	3	< 0.1	0.1
MVA	102	0.3	4.4
Overdose and Psychiatric	47	0.1	2.0
Seizure and Unconsciousness	162	0.4	7.0
Fire	**334**	**0.9**	**14.4**
Agency Assist	15	< 0.1	0.6
Fire Other	237	0.6	10.2
Hazardous Condition	39	0.1	1.7
Mutual Aid	0	0.0	0.0
Outside Fire	24	0.1	1.0
Structure Fire	7	< 0.1	0.3
Vehicle Fire	12	< 0.1	0.5

Program and Call Type[1]	Number of Calls	Average Calls per Day	Call Percentage
Hazmat	**32**	**0.1**	**1.4**
Hazmat	32	0.1	1.4
Rescue	**11**	**< 0.1**	**0.5**
Rescue	11	< 0.1	0.5
Unknown[2]	**39**	**0.1**	**1.7**
Mutual Aid Given	39	0.1	1.7
Total	**2,326**	**6.4**	**100.0**

[1]Classifications of incident types from the data file into program and call type category are presented in the Appendix.
[2]Data related to "Mutual Aid Given" records were provided separately by SFD and included incident numbers only such that only call volume could be specified.

The top two call types the department responds to is illness/other and falls/injuries. Both categories are broad categories that could have low acuity and critically ill patients at the scene.

Table 47: Number of Calls, Number of Responses, and Total Busy Time by Program – SFD Units in All Jurisdictions

Program	Number of Calls[1]	Number of Responses[2]	Average Responses per Call	Total Busy Hours	Responses with Time Data[3]	Average Busy Minutes per Response	Average Calls per Day	Average Responses per Day
EMS	1,753	2,119	1.2	600.3	2,119	17.0	4.8	5.8
Fire	152	315	2.1	187.9	315	35.8	0.4	0.9
Hazmat	32	46	1.4	32.1	46	41.9	0.1	0.1
Rescue	11	14	1.3	5.3	14	22.5	< 0.1	< 0.1
Total	**1,948**	**2,494**	**1.3**	**825.6**	**2,494**	**19.9**	**5.3**	**6.8**

While the department was called to 1,948 calls for service there were 2,494 responses (vehicle movements). The average amount of time each call service lasted was 19.9 minutes with EMS calls being the quickest at 17 minutes per call. Hazmat calls were analyzed and found to be the longest at almost 42 minutes per call.

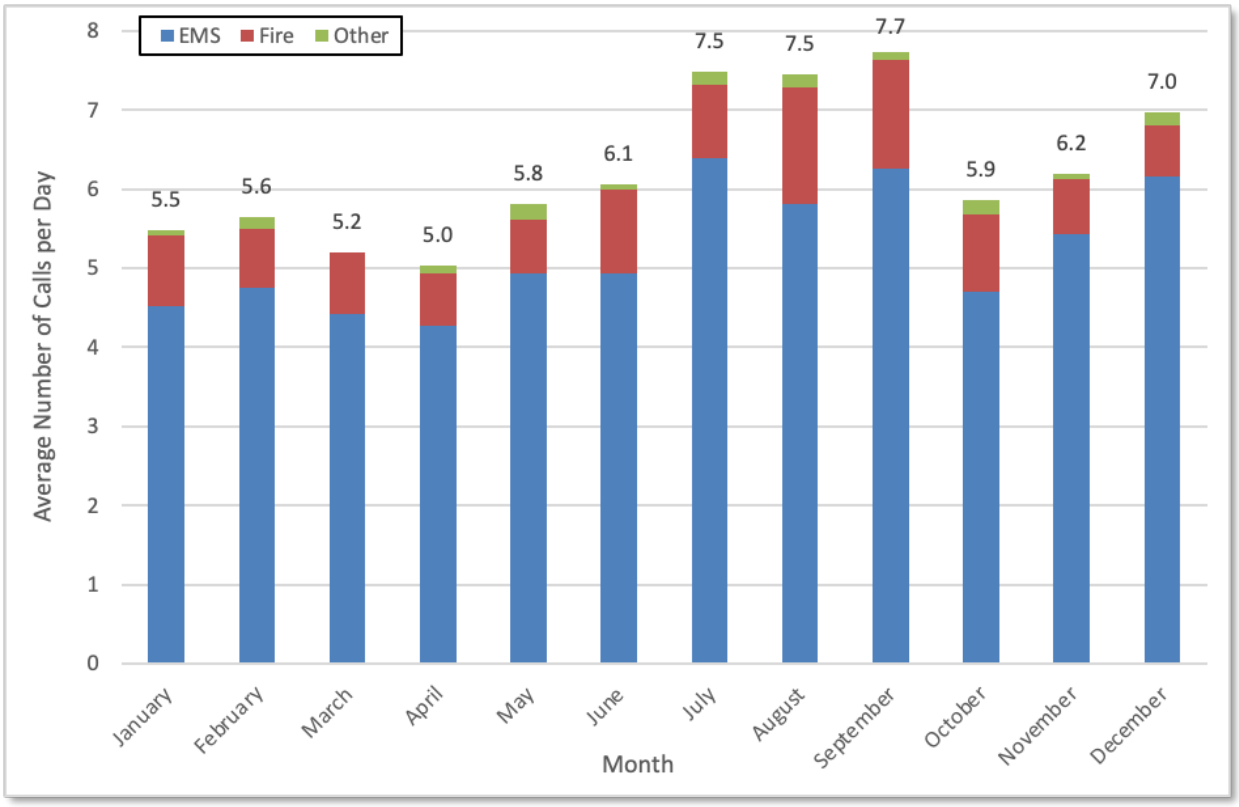
Temporal analyses were conducted to evaluate patterns in community demands. These analyses are based on the 2,326 requests for service received by the department, and examine the frequency of incidents by month, day of week, and hour of day. In the following analyses, calls that were not classified as "EMS" or "Fire" were grouped into an "Other" category for presentation purposes.

Overall, average requests per month ranged from a low of 5.0 calls per day in April to a high of 7.7 calls per day in September. The three months with the most requests for service in descending order were: September (7.7 per day), July (7.5 per day), and August (7.5 per day). The three months with the fewest requests for service in ascending order were: April (5.0 per day), March (5.2 per day), and January (5.5 per day).

Table 48: Overall: Total Calls and Average Calls per Day by Month

Month	Number of Calls	Average Calls per Day	Call Percentage
January	170	5.5	7.5
February	158	5.6	6.9
March	161	5.2	7.1
April	151	5.0	6.6
May	180	5.8	7.9
June	182	6.1	8.0
July	232	7.5	10.2
August	231	7.5	10.1
September	232	7.7	10.2
October	182	5.9	8.0
November	186	6.2	8.2
December	216	7.0	9.5
Total	**2,281**	**6.2**	**100.0**

Figure 47: Overall: Average Calls per Day by Month



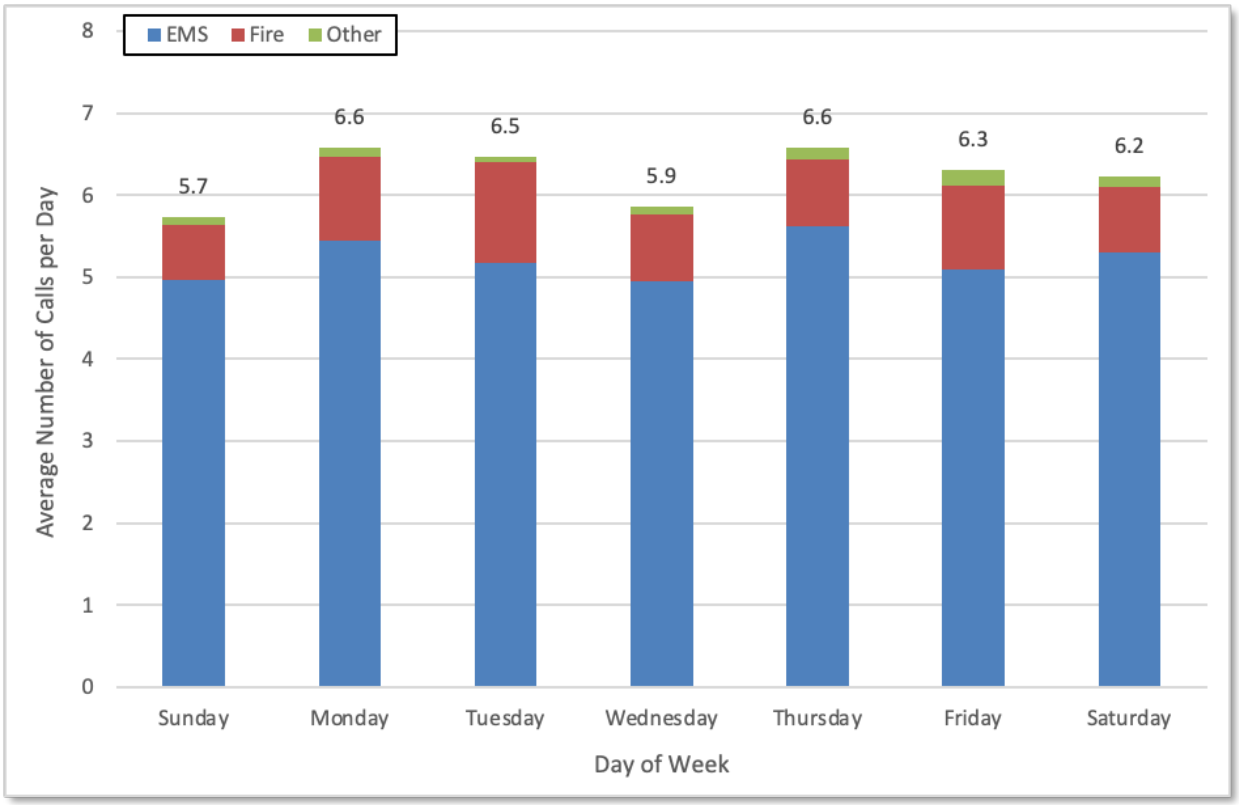
Similar analyses were conducted for requests by day of week. The lowest average number of calls per day occurred on Sunday (5.7 per day), and the highest average number of calls per day occurred on Monday (6.6 per day).

Table 49: Overall: Total Calls and Average Calls per Day by Day of Week

Day of Week[1]	Number of Calls	Average Calls per Day	Call Percentage
Sunday	298	5.7	13.1
Monday	342	6.6	15.0
Tuesday	336	6.5	14.7
Wednesday	305	5.9	13.4
Thursday	342	6.6	15.0
Friday	334	6.3	14.6
Saturday	324	6.2	14.2
Total	**2,281**	**6.2**	**100.0**

[1]There were 53 Fridays and 52 of all other days of the week during 2021.

Figure 47: Overall: Average Calls per Day by Day of Week



Overall demands were also evaluated by hour of day. Variability exists in the time of day that requests for services were received. Peak demand occurred at 1300 (0.41 calls per day). The hours of the day with the lowest average number of calls per day (ranging from 0.10-0.14 per day) were between 0200 and 0500.

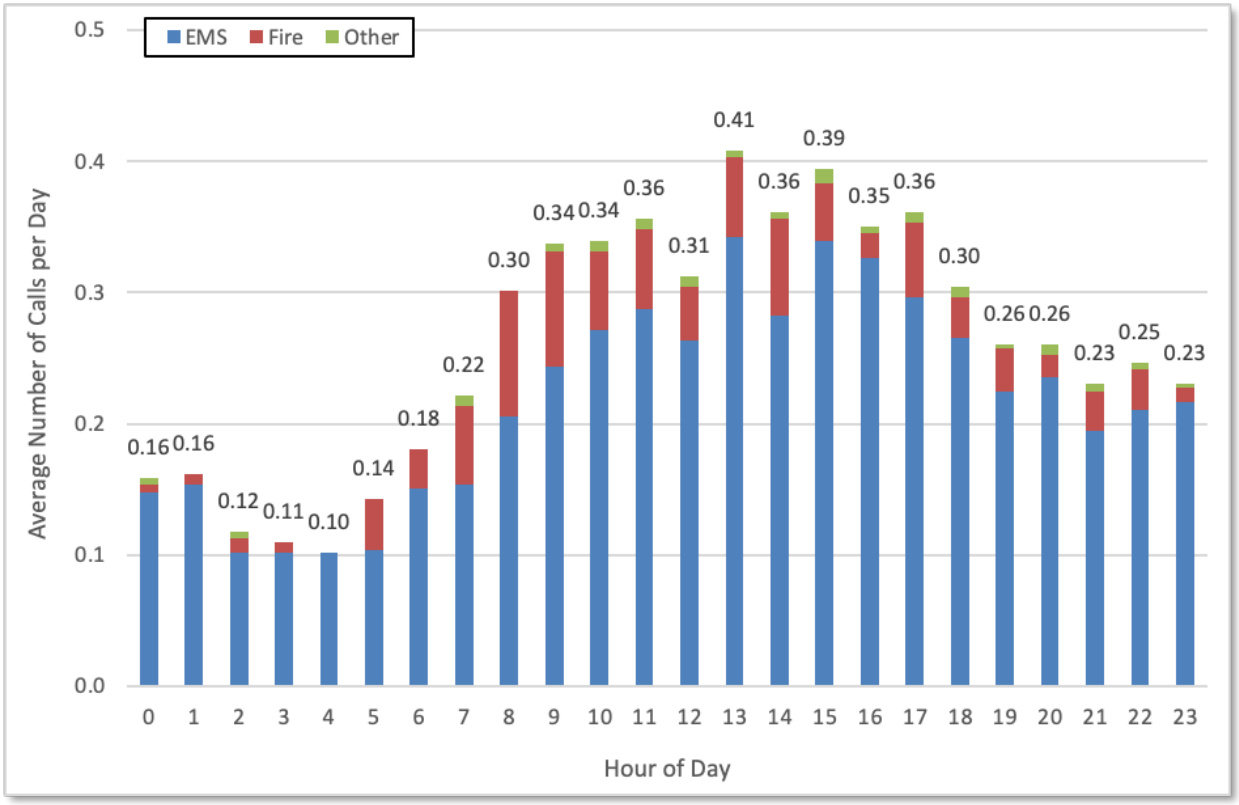
Table 50: Overall: Total Calls and Average Calls per Day by Hour of Day

Hour of Day	Number of Calls	Average Calls per Day	Call Percentage
0	58	0.16	2.5
1	59	0.16	2.6
2	43	0.12	1.9
3	40	0.11	1.8
4	37	0.10	1.6
5	52	0.14	2.3
6	66	0.18	2.9
7	81	0.22	3.6
8	110	0.30	4.8
9	123	0.34	5.4
10	124	0.34	5.4

Hour of Day	Number of Calls	Average Calls per Day	Call Percentage
11	130	0.36	5.7
12	114	0.31	5.0
13	149	0.41	6.5
14	132	0.36	5.8
15	144	0.39	6.3
16	128	0.35	5.6
17	132	0.36	5.8
18	111	0.30	4.9
19	95	0.26	4.2
20	95	0.26	4.2
21	84	0.23	3.7
22	90	0.25	3.9
23	84	0.23	3.7
Total	**2,281**	**6.2**	**100.0**

To provide a more granular understanding of the community's demand for services, this temporal analysis included the average number of calls per hour. In other words, when referring to Figure 49 below, the busiest hour was at 1300 with 149 calls occurring during that hour during 2021. The average number of calls per hour is a daily average for those 149 calls if they were distributed equally across the year (i.e., 149/365 = 0.41). Therefore, the busiest hour per day was at 1300 with an average hourly call volume of 0.41 calls per day.

Figure 49: Overall: Average Calls per Day by Hour of Day



The analysis in this section focuses on performance times related to dispatch, turnout, travel, and response times of first arriving units of distinct incidents.

The average dispatch time was 1.3 minutes. The average turnout time was 1.8 minutes, travel time was 4.6 minutes, and the total average response time was 7.7 minutes.

However, a more conservative and reliable measure of performance is the fractile or percentile. This measure is more robust, or less influenced by outliers, than measures of central tendency such as the average. Best practice is to measure at the 90th percentile. In other words, 90% of all performance is captured, expecting that 10% of the time the department may experience abnormal conditions that would typically be considered an outlier. For example, if the department were to report an average response time of six minutes, then in a normally distributed set of data, half of the responses would be longer than six minutes and half of the responses would be less than six minutes. The 90th

percentile communicates that 9 out of 10 times the department performance is predictable and thus more clearly articulated to policy makers and the community.

The performance for dispatch time at the 90th percentile was 2.1 minutes, turnout time at the 90th percentile was 2.9 minutes, travel time at the 90th percentile was 7.9 minutes, and total response time at the 90th percentile was 11.3 minutes.

Typically, performance varies across call types or categories for a variety of reasons. For example, turnout time may be longer for fire related calls because the crews must dress in their personal protective ensemble (bunker gear) prior to leaving the station, whereas on an EMS incident, they do not. Similarly, the larger fire apparatus may require longer travel and overall response times due to its size and lack of maneuverability.

Table 51: Average Dispatch, Turnout, Travel, and Response Times by Program and Determinant - First Arriving Units

Program	Dispatch Time (Minutes)	Turnout Time (Minutes)	Travel Time (Minutes)	Response Time (Minutes)	Sample Size[1]
EMS	1.3	1.8	4.5	7.6	1,297
Fire	0.5	2.3	5.4	8.2	115
Hazmat	0.4	2.2	5.6	8.2	28
Rescue	0.4	1.7	5.6	7.8	10
Total	**1.3**	**1.8**	**4.6**	**7.7**	**1,450**

[1]Sample sizes reflect the number of responses to emergency calls made by first arriving primary front-line units assigned to SFD; due to missing or excluded time data, sample sizes corresponding to individual table metrics may be smaller.

Figure 50: Average Dispatch, Turnout, Travel, and Response Times by Program - First Arriving Units

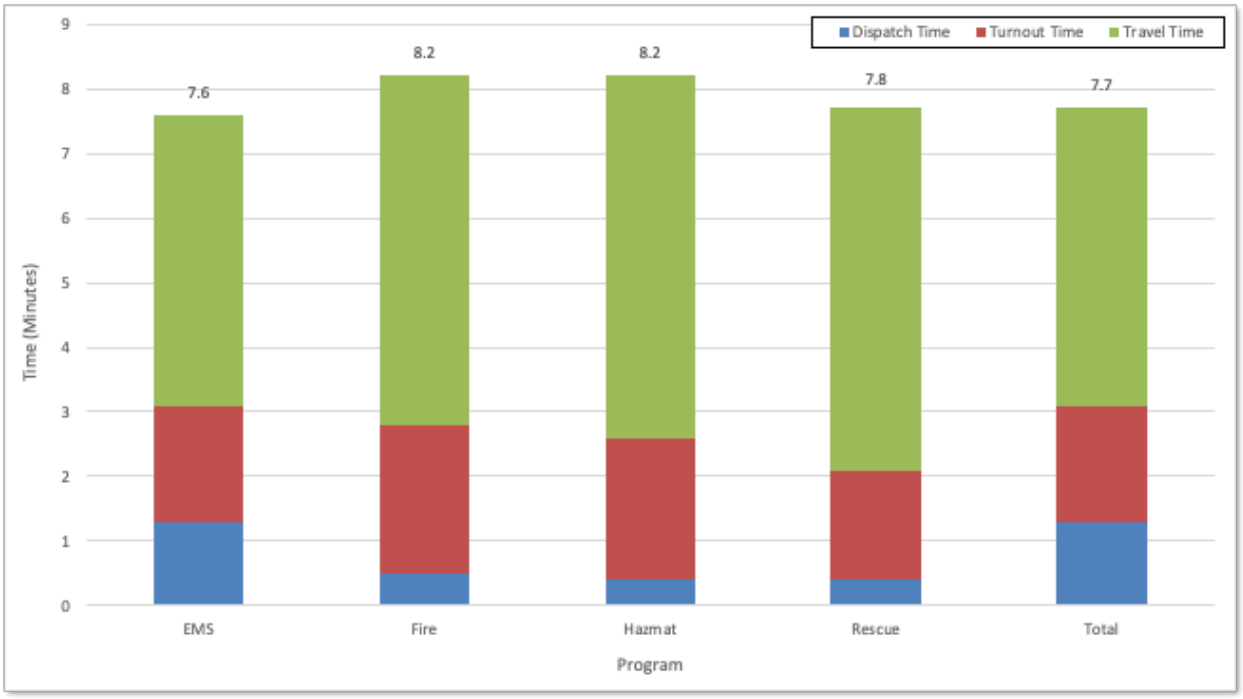


Table 52: 90th Percentile Dispatch, Turnout, Travel, and Response Times by Program and Determinant - First Arriving Units

Program	Dispatch Time (Minutes)	Turnout Time (Minutes)	Travel Time (Minutes)	Response Time (Minutes)	Sample Size[1]
EMS	2.1	2.8	7.6	11.2	1,297
Fire	1.2	3.9	10.1	12.3	115
Hazmat	0.9	3.0	8.6	11.8	28
Rescue	0.9	3.3	9.8	11.6	10
Total	**2.1**	**2.9**	**7.9**	**11.3**	**1,450**

[1]Sample sizes reflect the number of responses to emergency calls made by first arriving primary front-line units assigned to SFD; due to missing or excluded time data, sample sizes corresponding to individual table metrics may be smaller.

Table 53: 90th Percentile Travel Times by Unit Type - First Arriving Units

Unit Type	Travel Time (Minutes)	Number of First Arrivals	Number of First Arrivals with Travel Times
Brush Truck	9.1	54	54
Engine	8.3	425	423
Ladder Truck	--	0	--
Rescue	7.5	971	970
Water Tender	--	0	--
Total	**7.9**	**1,450**	**1,447**

REVIEW OF SYSTEM PERFORMANCE

The first step in determining the current state of the department's deployment model is to establish baseline measures of performance. This analysis is crucial to the ability to discuss alternatives to the status quo and in identifying opportunities for improvement. This portion of the analysis will focus efforts on elements of response time and the cascade of events that lead to timely response with the appropriate apparatus and personnel to mitigate the event. Response time goals should be looked at in terms of total response time, which includes the dispatch or call processing time, turnout time, and travel time, respectively.

Cascade of Events

The cascade of events is the sum of the individual elements of time beginning with a state of normalcy and continuing until normalcy is once again returned through the mitigation of the event. The elements of time that are important to the ultimate outcome of a structure fire or critical medical emergency begin with the initiation of the event. For example, the first on-set of chest pain begins the biological and scientific time clock for heart damage irrespective of when 911 is notified. Similarly, a fire may begin and burn undetected for a period of time before the fire department is notified. The emergency response system does not have control over the time interval for manual recognition or the choice to request assistance.

Therefore, Stillwater Fire Department utilizes quantifiable "hard" data points to measure and manage system performance. These elements include alarm processing, turnout time, travel time, and the time spent on-scene. An example of the cascade of events and the elements of performance utilized by the Department is provided in the figure below.[27]

Detection

Detection is defined as the element of time between the time an event occurs, and someone detects it, and the emergency response system has been notified. This is typically accomplished by calling the 911 Public Safety Answering Point (PSAP). The Washington County Emergency Communications Response Center is a division under the Washington County Sheriff and is responsible for dispatching Stillwater Fire Department.

Call Processing

This is the element of time measured between when Communication Center answers the 911 call, processes the information, and subsequently dispatches Department resources.

[27] Olathe Fire Department. (2012). Adapted from Community Risk and Emergency Services Analysis: Standard of Cover. Olathe, Kansas: Author.

Turnout Time

This is the element of time that is measured between the time the fire department is dispatched or alerted of the emergency incident and the time when the fire apparatus is enroute to the call. The current turnout time at the 90th percentile is 3 minutes and 54 seconds for fire related incidents and 2 minutes and 48 seconds for EMS related incidents. This is substantially higher than the recommended 90 seconds for fire and 60 seconds for EMS related incidents. Future tracking and reporting of this turnout time based on career staff response versus paid-on-call staff response will help in determining the ability to meet best practice. It is expected that the paid-on-call staff may have a much longer turn out time since they are responding from home to the fire station before boarding fire apparatus to respond to calls. For the career staff the turnout time is one of the time segments that can be managed through performance.

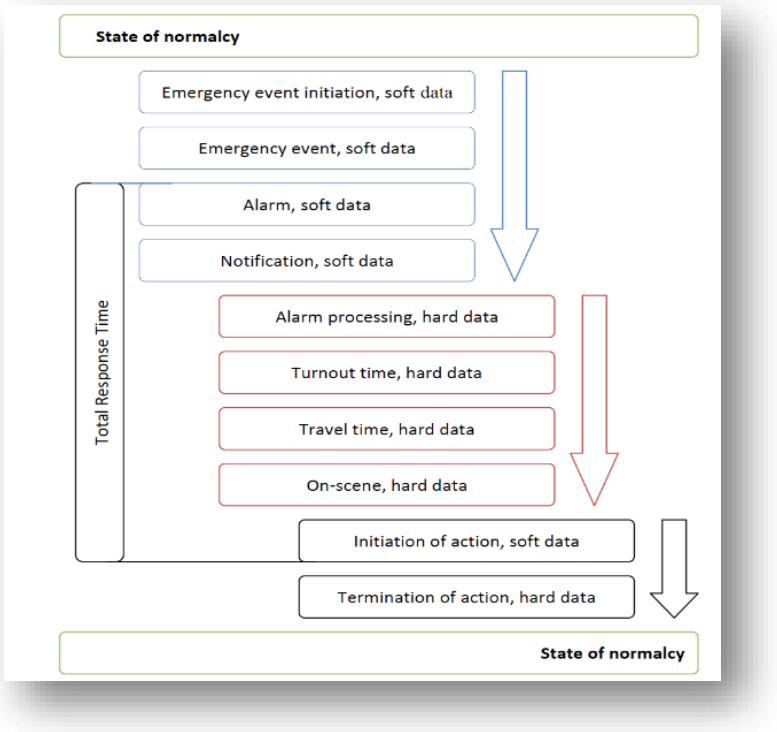
Travel Time

The travel time is the element of time between when the unit went enroute, or began to travel to the incident, and their arrival on scene.

Total Response Time

The total response time is the total time required to arrive on scene beginning with the Communications Center answering the phone request for service and the time that the units arrive on scene.

Figure 48: Cascade of Events



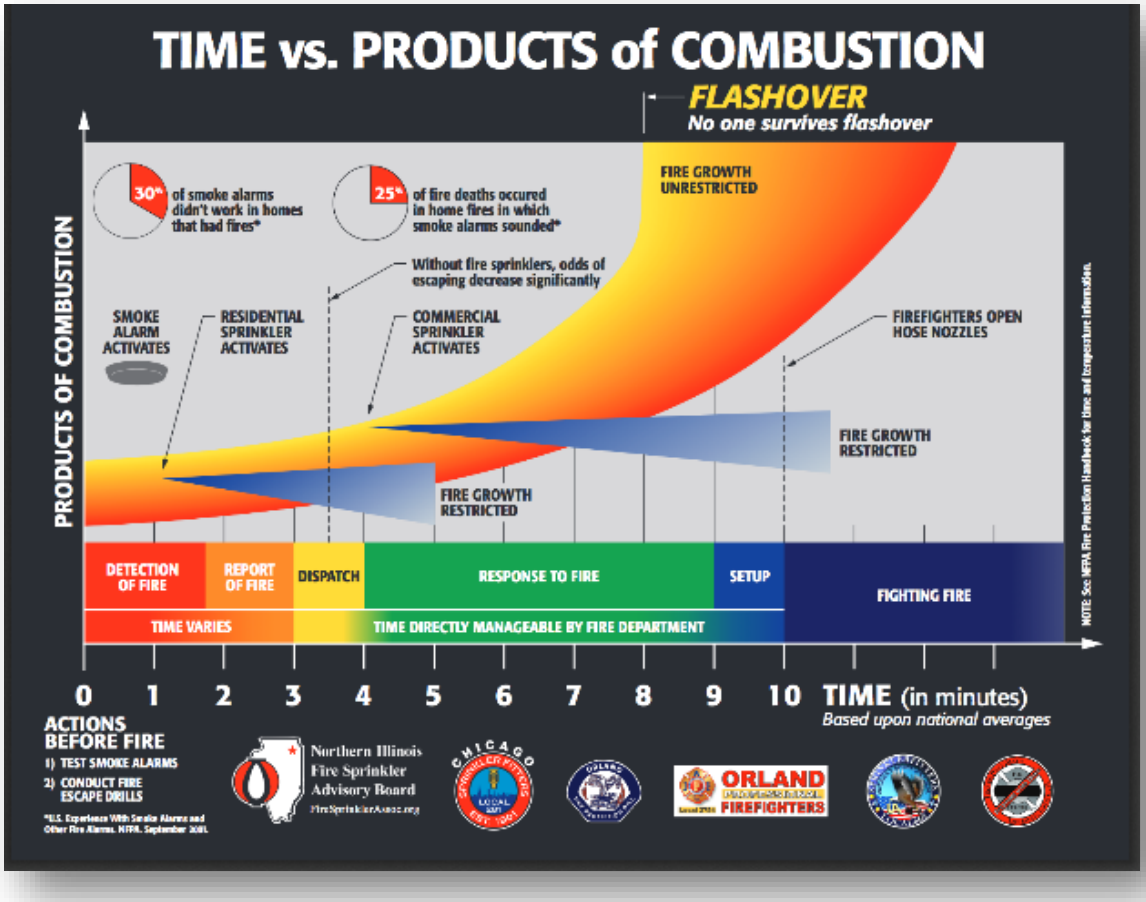
Response Time Continuum

Fire

The number one priority with structural fire incidents is to save lives followed by the minimization of property damage. A direct relationship exists between the timeliness of the response and the survivability of unprotected occupants and property damage. The most identifiable point of fire behavior is flashover.

Flashover is the point in fire growth where the contents of an entire area, including the smoke, reach their ignition temperature, resulting in a rapid-fire growth rendering the area un-survivable by civilians and untenable for firefighters. Best practices would result in the fire department arriving and attacking the fire prior to the point of flashover. A representation of the traditional time temperature curve and the cascade of events is provided on the next page.[28]

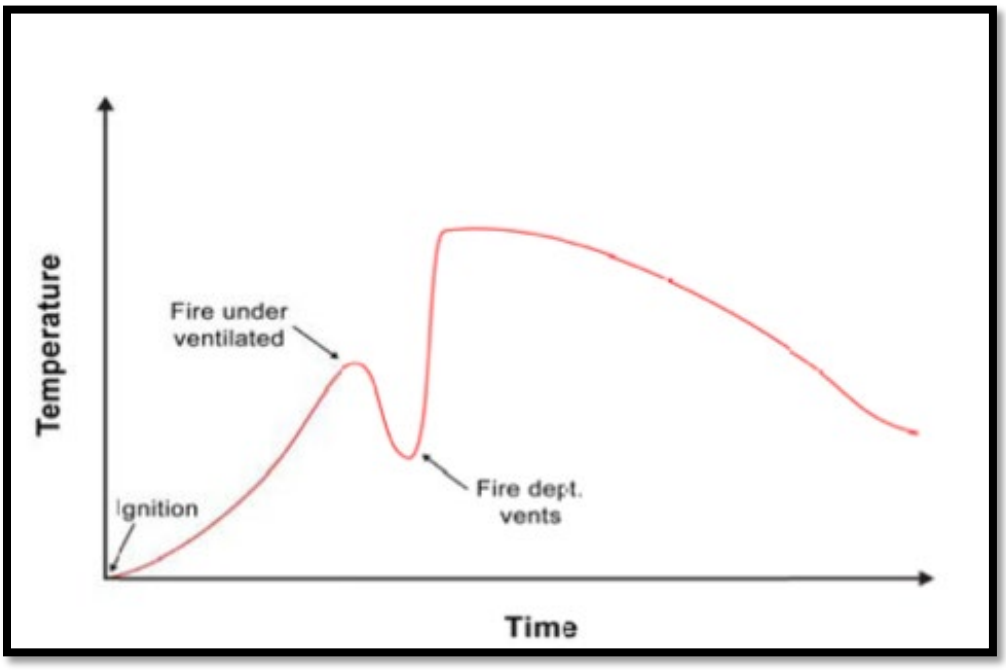
Figure 49: Example of Traditional Time Temperature Curve



[28] Example of Traditional Time Temperature Curve. Retrieved at http://www.usfa.fema.gov/downloads/pdf/coffee-break/time-vs-products-of-combustion.pdf

Recent studies by Underwriter's Laboratories (UL) have found that in compartment fires such as structure fires, flashover occurs within 4 minutes in modern fire environment. Modern home environments differ from traditional home environments with the addition of consumer furnishings made from petroleum-based products such as foam cushions and plastics. A compounding effect is also due to the advances in energy efficiency found in modern windows, insulation, etc. In addition, the UL research has identified an updated time temperature curve due to fires being ventilation-controlled rather than fuel controlled as represented in the traditional time temperature curve. While this ventilation-controlled environment continues to provide a high risk to unprotected occupants to smoke and high heat, it does provide some advantage to property conservation efforts as water may be applied to the fire prior to ventilation and the subsequent flashover. An example of UL's ventilation-controlled time temperature curve is provided below.[29]

Figure 50: Ventilation Controlled Time Temperature Curve



EMS

The effective response to EMS incidents also has a direct correlation with the ability to respond within a specified period. However, unlike structure fires, responding to EMS incidents introduces considerable variability in the level of clinical acuity. From this perspective, the association of response time and clinical outcome varies depending on the severity of the injury or the illness. Research has demonstrated that the overwhelming majority of requests for EMS services are not time sensitive between 5 minutes and 11 minutes for emergency and 13 minutes for non-emergency

[29] UL/NIST Ventilation Controlled Time Temperature Curve. Retrieved from http://www.nist.gov/fire/fire_behavior.cfm

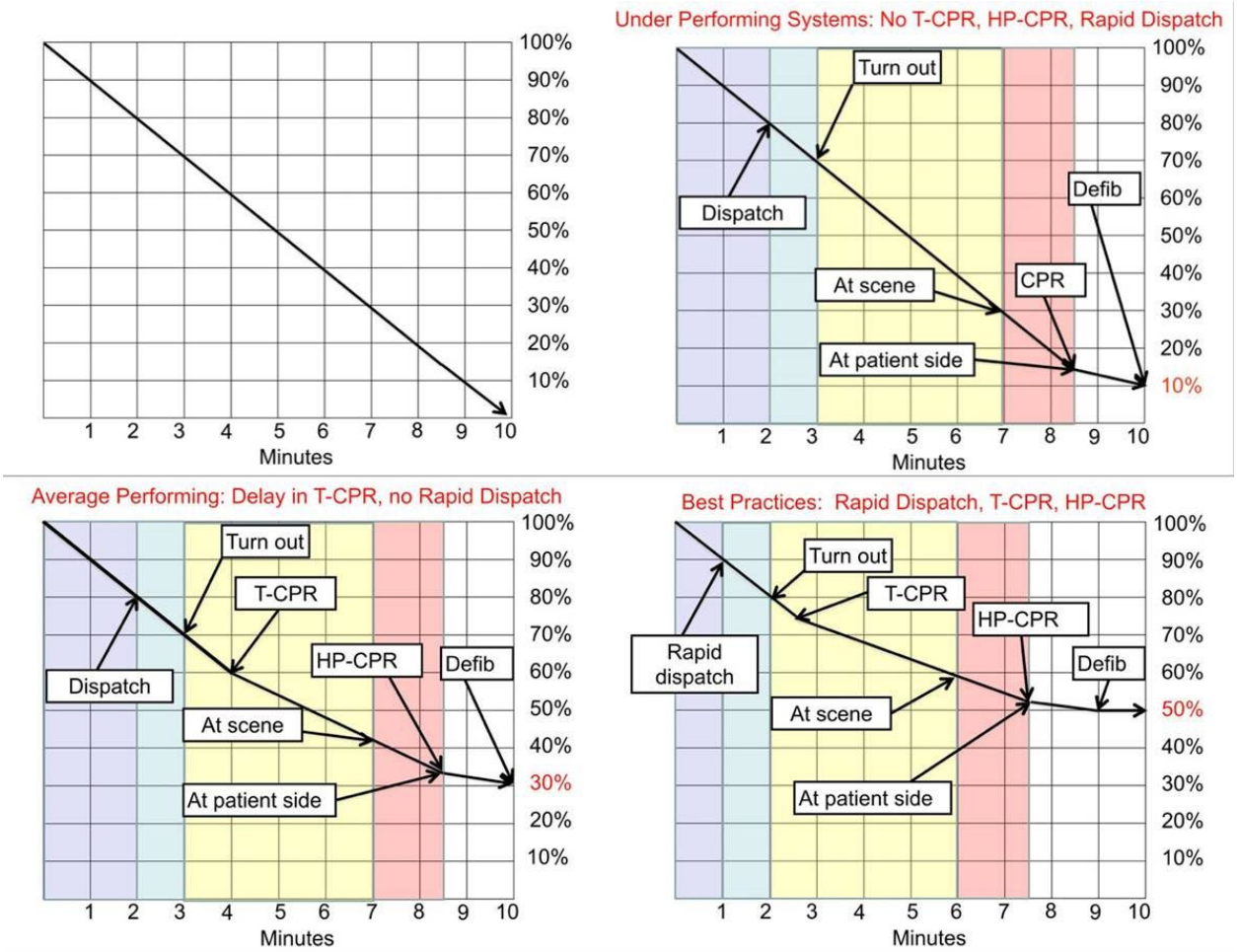
responses.[30] The 12-minute upper threshold is only the upper limit of the available research and is not a clinically significant time measure, as patients were not found to have a significantly different clinical outcome when the 12-minute threshold was exceeded.[31]

Out-of-hospital sudden cardiac arrest is the most identifiable and measured incident type for EMS. In an effort to demonstrate the relationship between response time and clinical outcome, a representation of the cascade of events and the time to defibrillation (shock) is presented below. The American Heart Association (AHA) has determined that brain damage will begin to occur between four and six minutes and become irreversible after 10 minutes without intervention.

Modern sudden cardiac arrest protocols recognize that high quality CPR at the BLS level is a quality intervention until defibrillation can be delivered in shockable rhythms. The figure below is representative of a sudden cardiac arrest that is presenting in a shockable heart rhythm such as Ventricular Fibrillation (V-Fib) or Ventricular Tachycardia (V-Tach). The right axis is reflective of the survivability to discharge.

[30] Blackwell, T.H., & Kaufman, J.S. (April 2002). Response time effectiveness: Comparison of response time and survival in an urban emergency medical services system. *Academic Emergency Medicine,* 9(4): 289-295.
[31] Blackwell, T.H., et al. (Oct-Dec 2009). Lack of association between prehospital response times and patient outcomes. *Prehospital Emergency Care,* 13(4): 444-450.

Figure 51: CPR Performance Analysis[32]



It is important to note that many confounding variables are present in any of the broad response time-to-outcome relationships. For example, the recognition and detection phase previously discussed could have the greatest impact on the efficacy of the response system.

Distribution Factors

Comparison of Demand Zones

Geospatial analyses were completed regarding drive times that incorporated Stillwater Fire Department's current performance and nationally recommended best practices. Drive times from the current fire station was created utilizing existing road miles and impedance for a 9-minute drive time that most closely represents current performance. This analysis suggests that the majority of the jurisdiction should be able to be responded to within 9 minutes travel time for where the majority of the risk is located. The green shading indicates the estimated travel time capabilities from the existing road networks.

[32] Eisenberg, M., MD, PhD. *Who shall live? Who shall die?* Presentation from Seattle / King County Resuscitation Academy.

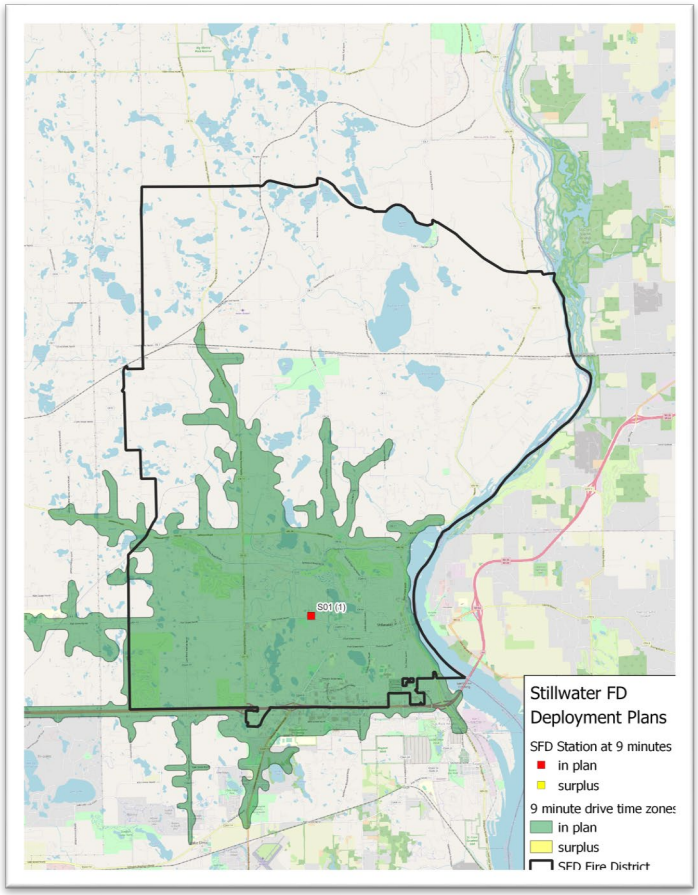
9-Minute Travel Time

A 9-minute travel time analysis was created to evaluate the department's capabilities with the current station configuration. Results suggest that with the current fire station, 90.94% of the incidents could be responded to within 9 minutes or less travel time.

Table 54: Marginal Fire Station Contribution for 9-Minute Travel Time

Rank	Station	Station Capture	Total Capture	Percent Capture
1	Stillwater Fire #1	2068	2068	90.94%

Figure 52: Marginal Fire Station Contribution for 9-Minute Travel Time



Comparison of Workloads by Unit Hour Utilization (UHU)

Another measure, time on task, is necessary to evaluate best practices in efficient system delivery and consider the impact workload has on personnel. Unit Hour Utilization (UHU) determinants were developed by mathematical model. The resulting UHUs represent the proportion of the work period (24 hours) that is utilized responding to requests for service. Historically, the International

Association of Fire Fighters (IAFF) has recommended that 24-hour units utilize 0.30, or 30% workload as an upper threshold.[33] In other words this recommendation would have personnel spend no more than 7.2 hours per day on emergency incidents. These thresholds take into consideration the necessity to accomplish non-emergency activities such as training, health and wellness, public education, and fire and community risk reduction inspections.

The 4th edition of the IAFF EMS Guidebook no longer specifically identifies an upper threshold. However, *FITCH* recommends that an upper unit utilization threshold of approximately 0.30, or 30%, would be considered best practice. In other words, units and personnel should not exceed 30%, or 7.2 hours, of their workday responding to calls. These recommendations are also validated in the literature. For example, in their review of the City of Rolling Meadows, the Illinois Fire Chiefs Association utilized a UHU threshold of 0.30 as an indication to add additional resources.[34] Similarly, in a standards of cover study facilitated by the Center for Public Safety Excellence, the Castle Rock Fire and Rescue Department utilizes a UHU of 0.30 as the upper limit in their standards of cover due to the necessity to accomplish other non-emergency activities.[35]

UHU analyses included units designated by the department as staffed 24-hour per day. Several 24-hour per day units were cross-staffed (i.e., had their busy time combined), as follows:

- Boat 1
- Brush Truck 1
- Brush Truck 2
- Engine 1
- Engine 2
- Engine 3
- Fire Boat 1
- Rescue 1
- Water Tender 1

Additionally, three chief officers were considered weekday staff working 7am-5pm Monday through Friday. These three-unit UHU's were based on the 50 hours per week. The chiefs do respond outside of the daylight Monday through Friday hours.

All units had UHU values < 0.30.

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[33] International Association of Firefighters. (1995). Emergency *Medical Services: A Guidebook for Fire-Based Systems.* California, DC: Author. (p. 11)

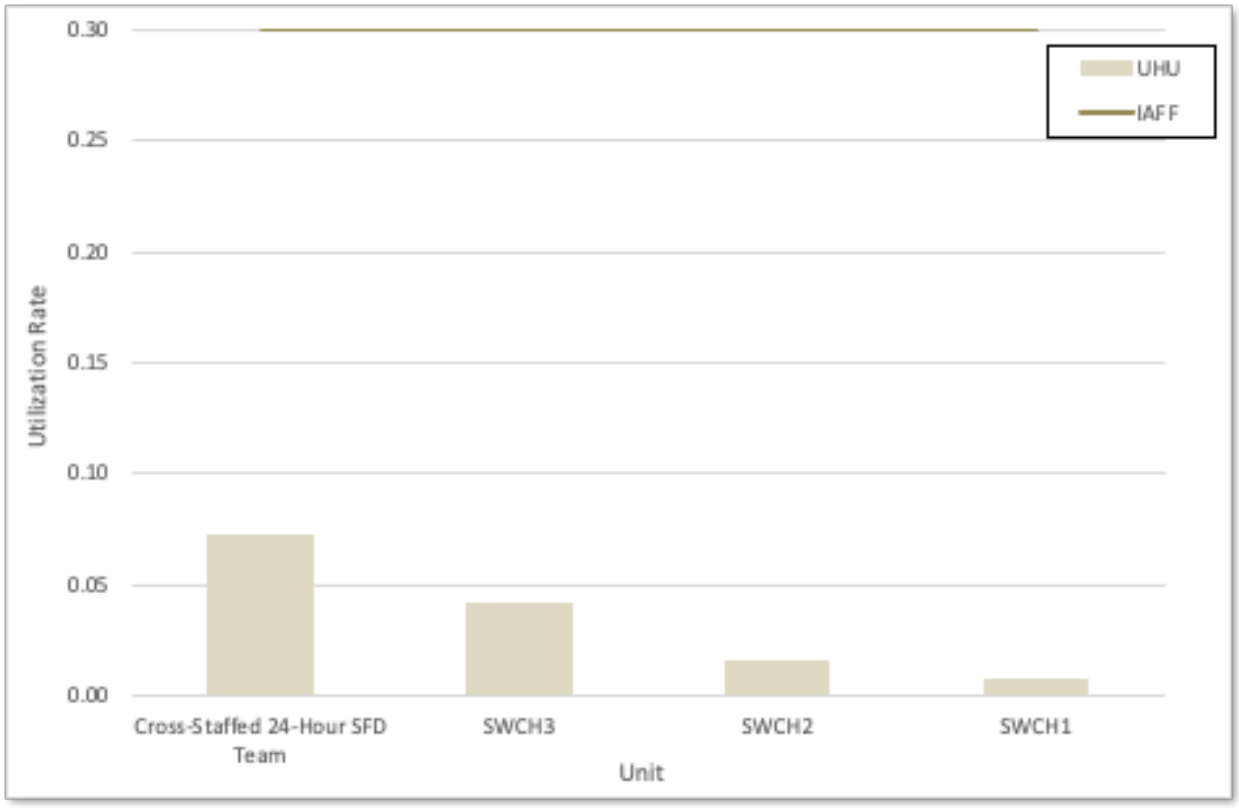
[34] Illinois Fire Chiefs Association. (2012). An *Assessment of Deployment and Station Location: Rolling Meadows Fire Department.* Rolling Meadows, Illinois: Author. (pp. 54-55)

[35] Castle Rock Fire and Rescue Department. (2011). Community *Risk Analysis and Standards of Cover.* Castle Rock, Colorado: Author. (p. 58)

Table 55: Unit Hour Utilization

Staffing Model	Unit ID	Unit Type	Total Busy Hours	UHU Value
24 Hours Per Day	SWAB1	Airboat	632.1	0.07
	SWB1	Brush Truck		
	SWB2	Brush Truck		
	SWE1	Engine		
	SWE2	Engine		
	SWE3	Engine		
	SWFB1	Fire Boat		
	SWR1	Rescue		
	SWT1	Water Tender		
7A-5P M-F	SWCH1	Admin	17.4	0.01
	SWCH2	Admin	40.1	0.02
	SWCH3	Admin	108.1	0.04

Figure 53: Unit Hour Utilization



Concentration of Resources

Effective Response Force Capabilities

The capability of an Effective Response Force (ERF) to assemble in a timely manner with the appropriate personnel, apparatus, and equipment is important to the success of a significant structure fire event. Therefore, it is important to measure the capabilities of assembling an ERF. In most fire departments, the distribution model performs satisfactorily, but it is not uncommon to be challenged to assemble an ERF in the recommended time frames. Several factors affect the capabilities to assemble an ERF, such as the number of fire stations, number of units, and number of personnel on each unit. Each of these policy decisions should be made in relation to the community's specific risks and the willingness to assume risk.

Similar to previous discussion, there are two prevailing recommendations for the time to assemble an ERF for structure fires. First, NFPA 1710 suggests that the ERF should arrive in 8 minutes travel time or less. Second, the CFAI provides a baseline travel time performance objective of 10 minutes and 24 seconds 90% of the time or less as well as a 13-minute travel time ERF for suburban areas. The currently available data was insufficient to provide an ERF time analysis.

Reliability Factors

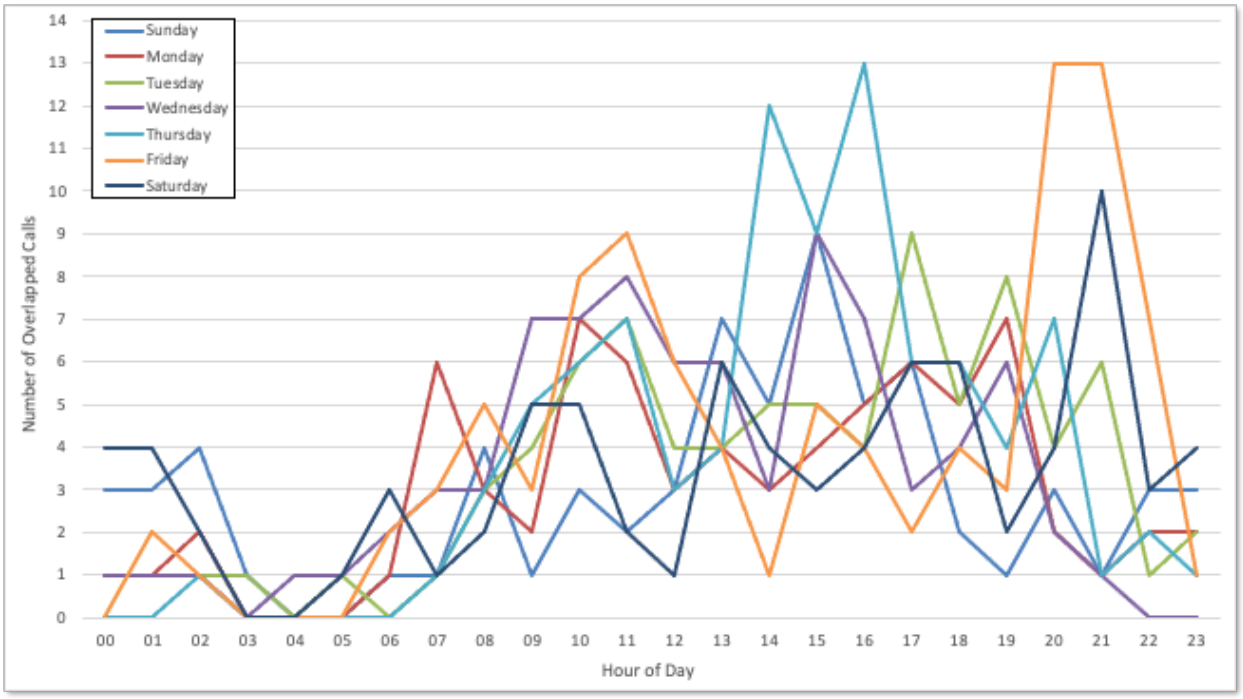
Overlapped or Simultaneous Call Analysis

Overlapped or simultaneous calls are defined as another call being received for the Department while one or more calls are already ongoing in the Department. In general, the larger the call volume in the Department, the greater the likelihood of overlapped calls occurring. The distribution of the demand throughout the day will impact the chance of having overlapped calls. Additionally, the duration of a call plays a significant role; the longer it takes to clear a request, the greater the likelihood of having an overlapping request.

Table 56: Overlapped Calls

Overlapped Calls	Total Calls	Percentage of Overlapped Calls
221	2,220	10.0

Figure 54: Overlapped Call by Time of Day and Day of Week 2019-2021



SECTION E – EVALUATION OF CURRENT DEPLOYMENT AND PERFORMANCE

Baseline Performance Tables

Benchmark Performance Statements

Baseline Performance Statements

Benchmark and Baseline Performance Gap Analysis

PERFORMANCE OBJECTIVES AND MEASUREMENT

Performance Objectives – Benchmarks

This standards of cover document is the first for the Stillwater Fire Department. Therefore, there is not an established benchmark for the programs. Below is a best practice summary for the department to consider adopting as a benchmark to strive for moving forward.

Fire Suppression Services Program

For 90 percent of all structure fire responses, the total response time for the arrival of the first-arriving unit, staffed with three firefighters, shall be 7 minutes and 46 seconds or less in the City of Stillwater and 15 minutes and 36 seconds or less for all rural areas. The first-due unit for all risk levels shall be capable of: providing 500 gallons of water and 1,500 gallons per minute (GPM) pumping capacity; initiating command; requesting additional resources; establishing an attack line, flowing a minimum of 150 gpm; and rescuing at-risk victims. These operations shall be done in accordance with departmental standard operating procedures while providing for the safety of responders and the general public. An additional chief officer should also arrive within the 7 minutes and 46 seconds or less.

For 90 percent of all structure fires, the total response time for the arrival of the effective response force (ERF), staffed with 15 firefighters and officers shall be: 12 minutes and 4 seconds or less in the City of Stillwater and 16 minutes and 4 seconds or less for all rural areas. The ERF shall be capable of: establishing command; appointing a site safety officer; providing an uninterrupted water supply; advancing an attack line and a backup line for fire control; complying with the Occupational Safety and Health Administration (OSHA) requirements of two- in and two-out; completing forcible entry; searching and rescuing at-risk victims; ventilating the structure; controlling utilities; and performing salvage and overhaul. These operations shall be done in accordance with departmental standard operating procedures while providing for the safety of responders and the general public. The department currently provides nine personnel on these responses not including mutual aid resources.

Unless the minimum requirements of OSHA's two-in/two-out rule are met, guidelines established by the department prohibit the entry of personnel into involved structures unless there is an immediate life-safety threat and entry must be made to rescue individuals. Even then, a risk analysis shall be considered as to the viability of victims prior to entry. Fire can be attacked in accordance with best practices by using streams, cooling or removing fuels, or isolating the fire. Otherwise, personnel shall wait until sufficient forces are present to comply with two-in/two-out regulations.

Emergency Medical Services Program

The department relies upon Lakeview EMS, a third-party provider, to complete the effective response force (ERF) component of its EMS program. The initial arriving fire department company

shall have the capabilities of providing first responder medical aid, including AED, until the third-party provider arrives on scene. If the third-party provider unit arrives on scene first, its personnel shall initiate care and the staff from the initial fire department company shall provide support as needed. The department currently provides up to four staff on these responses with Lakeview EMS providing two paramedics. In the most critical of patients such as cardiac arrest an additional two personnel are needed to accomplish all the identified critical tasks.

Technical Rescue Services Program

For 90 percent of all technical rescue incidents, the total response time for the arrival of the first-due unit, staffed with 3 firefighters, shall be: 7 minutes and 46 seconds or less in the City of Stillwater and 15 minutes and 36 seconds or less for all rural areas. The first- due unit shall be capable of: establishing command; sizing up to determine if a technical rescue response is required; requesting additional resources; and providing basic life support to any victim without endangering response personnel. An additional chief officer should also arrive within the 7 minutes and 46 seconds or less.

For 90 percent of all technical rescue incidents, the total response time for the arrival of the effective response force (ERF), staffed with 12 firefighters and officers including the technical response team, shall be: 12 minutes and 4 seconds or less in the City of Stillwater and 16 minutes and 4 seconds or less for all rural areas. The ERF shall be capable of: appointing a site safety officer; establishing patient contact; staging and apparatus set up; providing technical expertise, knowledge, skills, and abilities during technical rescue incidents; and providing first responder medical support. The department currently provides 8 personnel on these responses without the use of any mutual aid assistance.

Hazardous Materials Services Program

For 90 percent of all hazardous materials response incidents, the total response time for the arrival of the first-due unit, staffed with 3 firefighters, shall be: shall be 7 minutes and 46 seconds or less in the City of Stillwater and 15 minutes and 36 seconds or less for all rural areas. The first-due unit shall be capable of: establishing command; sizing up and assessing the situation to determine the presence of a potential hazardous material or explosive device; determining the need for additional resources; estimating the potential harm without intervention; and begin establishing a hot, warm, and cold zone. An additional chief officer should also arrive within the 7 minutes and 46 seconds or less.

For 90 percent of active leaking hazardous materials response incidents requiring mitigation and/or rescue, the total response time for the arrival of the effective response force (ERF) not including the hazardous materials response team (provided by state regional response team) and 16 personnel in: 12 minutes and 4 seconds or less in the City of Stillwater and 16 minutes and 4 seconds or less for all rural areas. The ERF shall be capable of: appointing a site safety officer; and providing the equipment, technical expertise, knowledge, skills, and abilities to mitigate a hazardous materials

incident in accordance with department standard operating guidelines. The department currently provides 7 personnel on these responses without the use of any mutual aid assistance.

Performance Objectives – Baselines

Currently the department does not track responses by effective response force and in most examples does not have the resources to handle critical incidents independently. Therefore, the following baseline information below is based on the difference between current staffing levels and identified needs for each response type.

Fire Suppression Services Program

The department's baseline statements reflect actual performance during 2021. Stillwater Fire does rely on the use of automatic aid from neighboring fire departments to provide its ERF complement of personnel. The actual baseline service level performance is as follows:

Table 57: Fire Service Baseline and Benchmark Comparison of Response Time

Performance	Dispatch	Turnout	Travel[36]	Total
Baseline	1:12	4:54	10:06	12:18
Benchmark	1:04	1:30	5:12/13:00	7:46/15:34

Table 58: Single Family Structure Fire Critical Task Comparison for Effective Response Force

Critical Task	Needed Personnel	Current
Search and Rescue	2	2
Fire Control	2	2
Ready Reserve (OSHA Required)	2	2
Apparatus Operator	1	1
Incident Commander	1	1
Water Supply	2	0
Ventilation	2	0
EMS	2	0
Tactical Supervisor	1	1
Total	**15**	**9**

Emergency Medical Services Program

The department's baseline statements reflect actual performance during 2021. Stillwater Fire works with Lakeview EMS its ambulance provider to provide its ERF complement of personnel. The actual baseline service level performance of Stillwater Fire is as follows:

[36] Travel time is listed for Suburban 4:00 minutes and Rural 10:00 minutes.

Table 59: EMS Service Baseline and Benchmark Comparison of Response Time for Stillwater Fire

Performance	Dispatch	Turnout	Travel[37]	Total
Baseline	2:06	2:48	7:36	11:12
Benchmark	1:04	1:30	5:12/13:00	7:46/15:34

Table 60: Cardiac Arrest Critical Task Comparison for Effective Response Force

Critical Task	Needed Personnel	Current
ALS Evaluation/Lead	1	0
EKG Monitor	1	1
IV/IO Access	1	0
Medication Administration	1	0
Airway	1	1
Patient Removal/Logistics	1	1
Lucas Device/CPR	1	1
Communicating with Family/Online Physician	1	0
Total	**8**	**4**

Lakeview EMS will provide two paramedics on each response. This leaves a gap of at least 2 personnel. The table below shows the 2021 Lakeview EMS response times. It is important to note that Lakeview EMS is dispatched by a different dispatch center than Stillwater Fire Department. This requires Stillwater Fire Department's dispatch center, which is Washington County, to notify Lakeview EMS' dispatch center after receiving the call. There is no current way with the available data to determine the time difference between when Stillwater Fire and Lakeview EMS is dispatched on the same call.

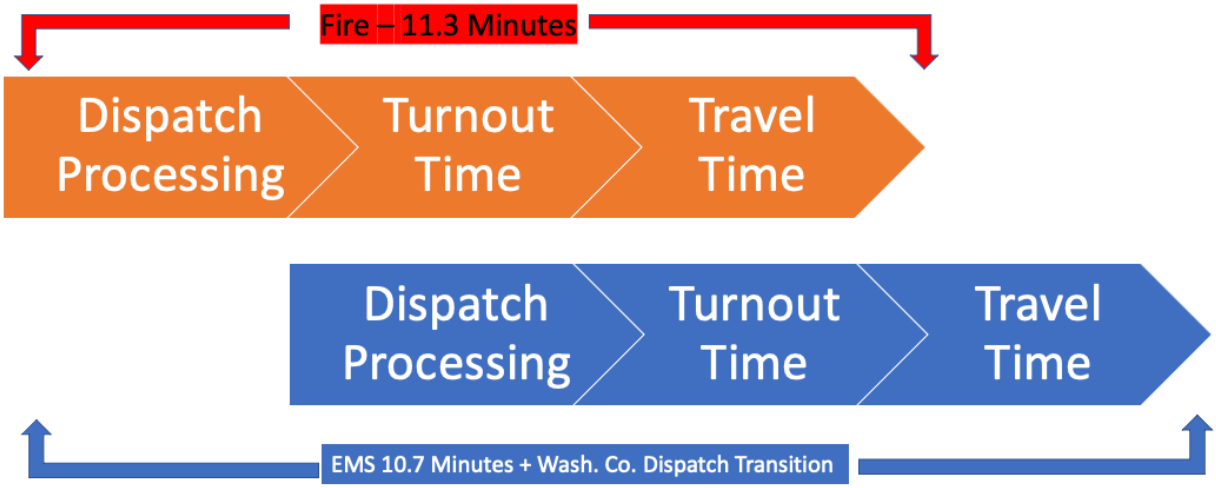
Table 61: Lakeview EMS Response Times

Performance	Dispatch	Turnout	Travel[38]	Total
Average	0:42	0:42	4:54	6:24
90th Percentile	1:18	1:36	9:24	10:42

[37] Travel time is listed for Suburban 4:00 minutes and Rural 10:00 minutes.

[38] Travel time is listed for Suburban 4:00 minutes and Rural 10:00 minutes.

Figure 55: Fire and EMS Response Time Comparison



Technical Rescue Services Program

The department's baseline statements reflect actual performance during 2021. Stillwater Fire does rely on the use of automatic aid from neighboring fire departments to provide its ERF complement of personnel. The actual baseline service level performance is as follows:

Table 62: Technical Rescue Service Baseline and Benchmark Comparison of Response Time

Performance	Dispatch	Turnout	Travel[39]	Total
Baseline	0:54	3:18	9:54	11:36
Benchmark	1:04	1:30	5:12/13:00	7:46/15:34

Table 63: Technical Rescue Critical Task Comparison for Effective Response Force

Critical Task	Needed Personnel	Current
Incident Commander	1	1
Rescuers	4	2
Rigging	2	2
EMS	2	0
Haul Team	2	3
Tactical Supervision	1	0
Total	**12**	**8**

[39] Travel time is listed for Suburban 4:00 minutes and Rural 10:00 minutes.

Hazardous Materials Services Program

The department's baseline statements reflect actual performance during 2021. Stillwater Fire does rely on the use of automatic aid from neighboring fire departments to provide its ERF complement of personnel. The actual baseline service level performance is as follows:

Table 64: Hazmat Baseline and Benchmark Comparison of Response Time

Performance	Dispatch	Turnout	Travel[40]	Total
Baseline	0:54	3:00	8:36	11:48
Benchmark	1:04	1:30	5:12/13:00	7:46/15:34

Table 65: Hazardous Materials Leak with Mitigation/Rescue Critical Task Comparison for Effective Response Force

Critical Task	Needed Personnel	Current
Incident Commander	1	1
Science	1	0
Response Team	6	4
EMS	4	0
Decon	4	2
Total	**16**	**7**

The department relies of the state of Minnesota Hazmat Response Teams to provide the technical response when the incident escalates beyond the department's expertise. The closest response team is St. Paul Fire Department. The state response team bring a minimum of three personnel.

BASELINE PERFORMANCE TABLES

Baseline and Benchmark Gap Analyses

The following assessment creates succinct gap analyses between the current response and identified critical tasks by specific incident type.

Table 66: (Moderate Risk) Fire Suppression Gap Analysis

Incident Type	Staff Gap
Structure Fire	6
Cardiac Arrest	2
Technical Rescue	4
Hazardous Material Leak with Mitigation/Rescue	9

[40] Travel time is listed for Suburban 4:00 minutes and Rural 10:00 minutes.

SECTION F – PLAN FOR MAINTAINING AND IMPROVING RESPONSE CAPABILITIES

Compliance Methodology Model

COMPLIANCE METHODOLOGY

This SOC document is designed to guide the Department to continuously monitor performance, seek areas for improvement, and to clearly articulate service levels and performance to the community we have the privilege of serving. Therefore, the department should establish a Compliance Team to continuously monitor elements of this SOC and make recommendations for system adjustments or improvement. The Compliance Team should include all levels of the organization and both full-time and paid-on-call staff.

Performance Evaluation and Compliance Strategy

The department should evaluate system performance by measuring first due unit performance at the 90th percentile. In addition, the Department will evaluate first due performance by each program area. Measures for the ERF by each program area and risk category will be evaluated annually. Annual reviews should be conducted in the first quarter of each year regarding the previous year. All response performance monitoring will exclusively evaluate emergency responses.

The Compliance Team will determine the strengths, weaknesses, opportunities, and threats of the system performance annually and make recommendations for system adjustments to the Fire Chief. Finally, the department should annually update and evaluate the risk assessment matrices for relevancy and changes in community risk.

Ultimately, it is recommended that outcome measures are adopted and serve as the primary evaluation tool and that the traditional performance objectives and measures presented previously are utilized primarily as a management tool. In this manner, the Department will not be overly sensitized to incremental changes in performance criteria if the outcomes continue to be met.

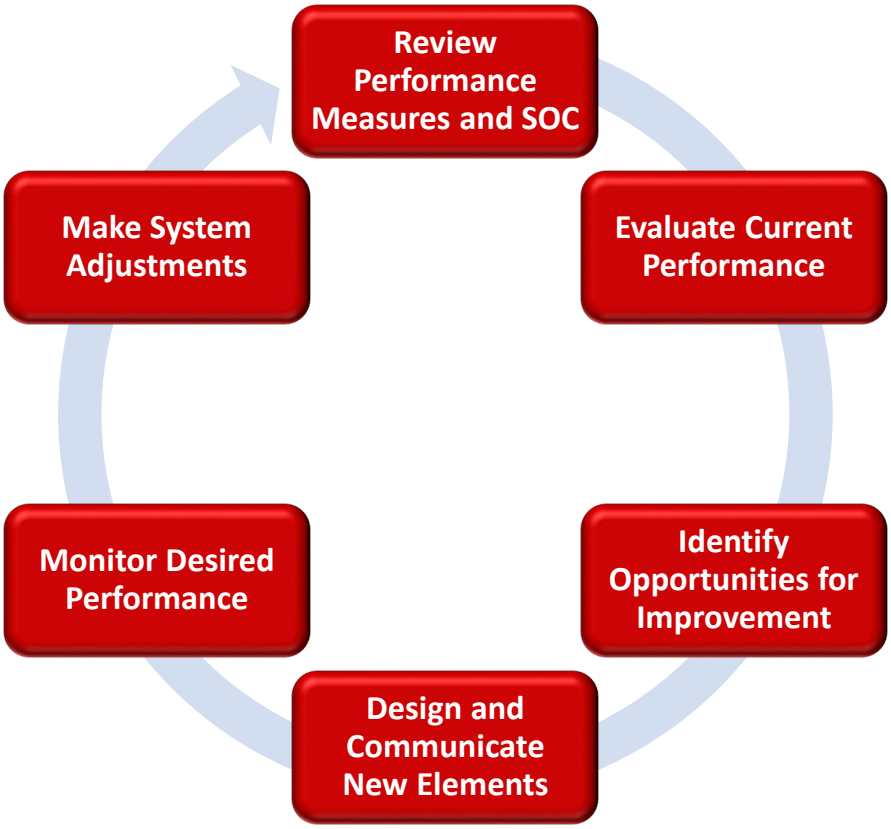
Compliance Verification Reporting

The Compliance Team will communicate results of the period evaluations to the Fire Chief. The Fire Chief will disseminate the results and any system adjustments in a timely manner so that both performance measurement and continuous improvement becomes part of the organization's culture. All performance and risk measures will be reported through the Fire Chief to the City Administrator and the City Council and made available to the community annually.

Constant Improvement Strategy

The Department should follow the conceptual model to facilitate both compliance and continuous improvement.

Figure 56: Continuous Improvement and Compliance Model



SECTION G – OVERALL EVALUATION AND RECOMMENDATIONS

Overall Evaluation

Observations and Recommendations

OVERALL EVALUATION, CONCLUSIONS, AND RECOMMENDATIONS

Overall Evaluation

The overall evaluation is the final component of the SOC process. As a risk-based process that incorporates risk, mitigation, and outcomes measures, the Fire Department and City leadership can more easily discuss service levels, outcomes, and the associated cost allocations based on community risk.

Overall, the department is performing well within the current system. The community enjoys services from a well-trained department. Predominantly, the Department efficiently utilizes its available resources to respond to the unique risks within the service area but are challenged to sustain the current model without additional investment. The paid-on-call model struggles to recruit and retain enough staff to have the capacity to surge personnel to significant incidents within the response area. This has left the full-time staff both on and off duty operating with less-than-ideal numbers of staff on scenes in a timely fashion. There are operational and administrative areas for incremental improvement within the department to improve consistency and engagement.

Staffing

The department is well served with its combination staffing model. The key to a successful fire service is to have a team of staff readily available to quickly surge to an incident when needed 24 hours a day 365 days a year. This has become challenging for the department as the number of paid-on-call staff has continued to decrease and the turnover has increased. The increased turnover of paid-on-call staff has left the department training more staff, of which a high percentage leave within the first 2.5 years of service leaving less experienced staff responding to calls.

In *FITCH's* experience many departments are moving further down the fire department staffing model continuum (shown below) as it has become more challenging to recruit and retain paid-on-call staff. This is presently occurring across much of the Minneapolis/St. Paul metropolitan area. Many departments have moved or are moving to career models such as Oakdale, Woodbury, Plymouth, Roseville, Eagan, Maplewood, and Brooklyn Park. Other departments have moved to a combination department such as Lake Elmo, Mahtomedi, Cottage Grove, Inver Grove Heights, White Bear Lake, Prior Lake, and Savage.

Figure 57: Staffing Model Continuum

Currently the paid-on-call ranks are short at least 10 personnel. The figures below show the day of the week and hour of the day paid-on-call response. At best the department can get 3 paid-on-call staff to respond and at worst the department averages one paid-on-call staff member responding. This has left the full-time staff responding to emergencies in their off-duty time.

While the full-time off-duty response is currently helping the response, it is not likely this is sustainable. The competition for full-time staff has increased across the metropolitan area over the past five years, leaving it unlikely that future career staff will all live within a close proximity to respond back to calls in their off-duty hours. It is also not a best practice to call back off-duty staff regularly during their off-duty hours from a health and wellness perspective.

Figure 58: Paid On Call Responses by Day

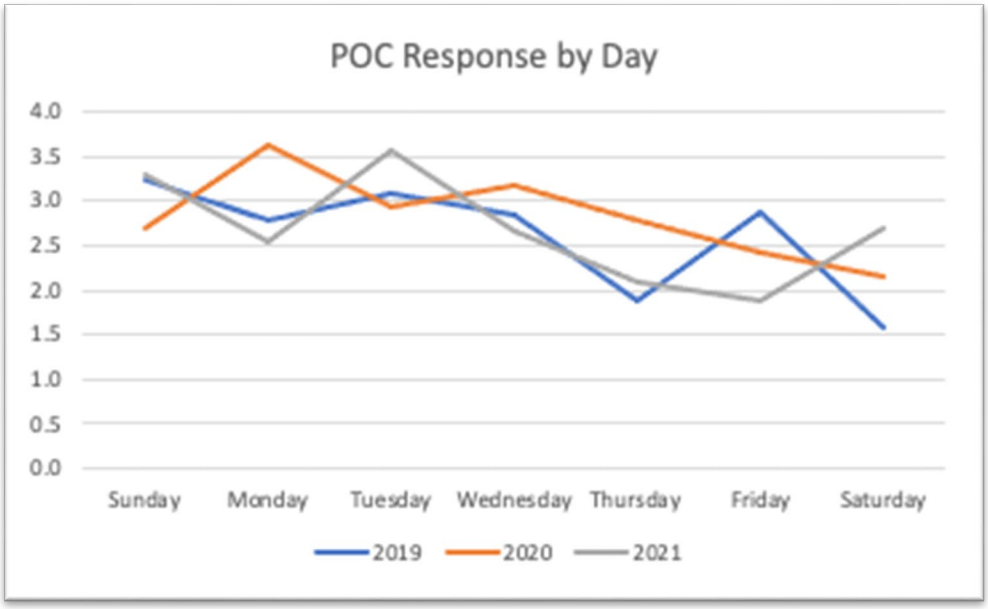
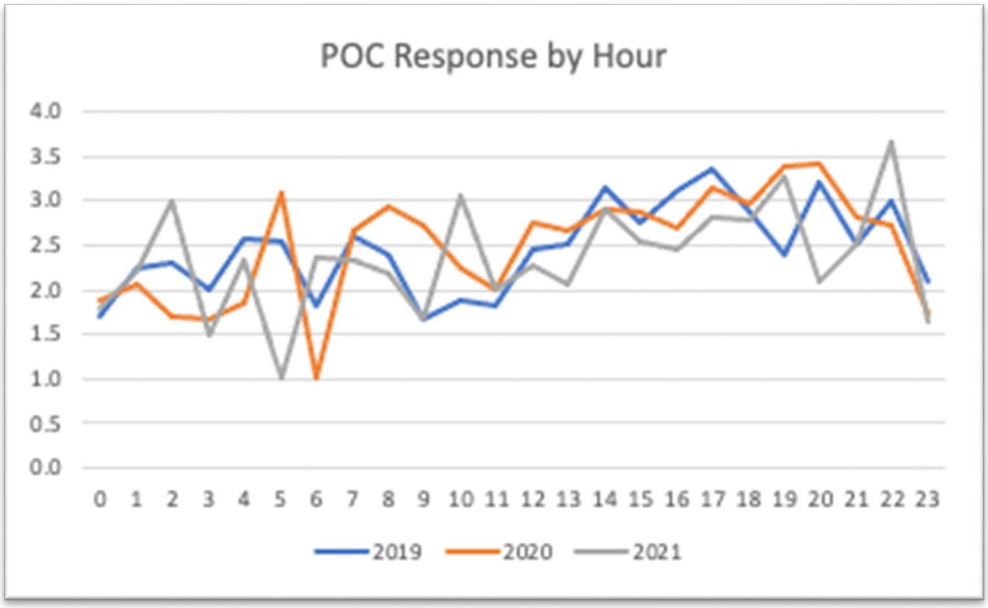


Figure 59: Paid On Call Response by Hour



While mutual aid is helpful in fulfilling the effective response force needs of an incident there is still a need to ensure there are adequate staff to safely handle the initial response to significant incidents. For example, a structure fire OSHA requires a minimum of 5 trained firefighters on scene before firefighters can enter the structure unless there is a confirmed victim to rescue. Waiting for mutual aid to enter a structure for the initial life and property saving tasks may compromise the department's ability to save any structure from searching for potential victims or saving property from unnecessary loss.

The department is a bit secluded from rapid mutual aid response based on neighboring agencies proximity and staffing models. It is also challenging to get mutual aid on these significant responses as many of the neighboring agencies are experiencing the same challenges as Stillwater on recruiting and retaining paid-on-call staff as well as getting staff to turnout depending on the time of the day. The table below shows the distances and drive times to neighboring agencies. Of note this does not include the turnout time (time from dispatch to enroute) which is likely around five minutes for POC departments and could be the same for combination departments depending on how many career staff are available to respond.

Table 67: Mutual Aid Department Distance and Drive Time

Department	Distance	Drive Time	Model
Bayport	4.6 miles	11 minutes	POC
Lake Elmo	5.4 miles	11 minutes	Combination
Mahtomedi	5.6 miles	8 minutes	Combination
White Bear Lake	8.5 miles	14 minutes	Combination
Marine on the St. Croix	13.6 miles	18 minutes	POC
Hugo	14.3 miles	20 minutes	POC
Scandia	18.9 miles	24 minutes	POC

Stillwater is home to a historic downtown, significant tourism attraction and many special events. It is important that the department can not only staff the day-to-day operations but to also have adequate resources to provide standby services at many of the large events. It is important to have an adequate daily response to preserve the historic downtown if there is a significant emergency such as a fire.

One solution considered was to require paid-on-call staff to work more hours with full-time staff to bolster the on-duty staffing. It was clear during the site visit that the paid-on-call staff were not interested in being required to work shifts with the full-time staff regardless of what the requirement would be. In *FITCH's* experience the duty crew model which requires paid-on-call staff to work shifts with the full-time staff is a short-term solution that falls apart within five years. The duty crew model also will alienate many of your current paid-on-call staff causing them to resign. There have been a number of departments in the metropolitan area that have tried the duty crew model and every one of them has transitioned to a career model and eliminated their paid-on-call contingent as it had dwindled.

Another fact to consider is the department is on the cuff of losing its senior members on both the full-time and paid-on-call staff sides. This includes all the chief officers in the department. This leaves the department, particularly on the paid-on-call side, with little experience to mentor newer staff and hold officer positions.

FITCH recommends the following actions to ensure a sustainable response model:

1) Add two full-time Firefighter/Engineers to work during the peak demand hours Monday through Friday. This is when there is most likely to have overlapping calls for service and the paid-on-call response is low.

2) Monitor the paid-on-call turnout. If the paid-on-call staff turnout continue to decrease and funding is available, the next two staff additions would be recommended:
    a. Two additional Firefighter/Engineers to increase the peak coverage from Monday through Friday to 100 hours per week.
    b. Two additional Firefighter/Engineers which would bring the 24/7 shift staffing up to five full-time personnel with a minimum of four staff working at all times.

3) Continue to encourage paid-on-call staff to work shifts with full-time staff. This will bolster the staffing levels and allow the paid-on-call staff to get vital experience.

Administration

FITCH has three recommendations for the administration of the department to consider.

1) It is important that the fire staff are clear on their lines of authority and responsibility. A common term in the fire service is the unity of command which ensures that each person has one person they report to. Currently the organizational chart has some ambiguity on which chief the captains report to as it appears all chief officers and captains report to the Fire Chief. The firefighters appear to report to the lieutenants and while that may be true for the paid-on-call staff, the full-time firefighters report to the captains.

2) Succession planning will be important for the department to be prepared for the impending turnover within the leadership ranks. All the chiefs are eligible to retire within the next five years. It will be important that the next generation of chief officers within the department are prepared to step into those positions. The best practice is to develop the next generation of leaders with mentorship of those currently in these roles with opportunities such as formal education, experiencing processes (budgeting, purchasing, etc.), and leadership training sessions (both within and outside the fire service).

3) Implement a collaborative committee with representation of all ranks and both paid-on-call and full-time to address organization wide issues. Some of the topics could include the recruitment and retention of paid-on-call staff and training.

Data

For this report most of the data was procured from the department's records management system as the CAD system from the dispatch center was not structured to provide the necessary data for

this analysis. Recommendations specific to the dispatch center are in another section below. These recommendations are specific to the data within the department's control.

1) The department would benefit from an increased use of the records management system. This would include ensuring the number of staff per apparatus (including mutual aid) are documented and pre-incident value of an occupancy is documented for a fire. There are also additional tools that can be used for reporting and visualizing the available data to monitor risk and performance. One of the challenges will be the disparate systems that are used in the fire service from response data, inspections, pre-plans, and staffing. Finding ways to integrate the information will be beneficial. These improvements will be helpful to monitor performance such as response time, turnout time, ability to meet the effective response force staff and planning for the future of the department.

2) It may be beneficial for the department to evaluate the benefit of the use of an electronic staffing system. The current system is more manual. There are many systems that are more automated and provide information much easier through reports and visual dashboards.

3) There is an opportunity to capture additional risk information while conducting inspections and pre-plans. This includes items like square footage, stories, presence of a basement, and fire features such as a fire sprinkler system. These data points are important as the department tries to become more granular in its response, evaluation of risk within the community and increased preparedness.

Operations

Operationally the department has been flexible in their response (i.e., using a rescue truck to respond to EMS call when staffed above two personnel) and ensured that all personnel receive the minimum required training. There are a few opportunities for improvement:

1) It is vitally important for everyone's safety that policies are understood and followed. The department is using a best practice policy manual. It appears that there may be some cultural resistance by a few adapting to the modern policies. Most concerning of these was some staff's resistance to the commonly referred to two-in two-out policy which requires five staff to be on scene before entering a hazardous environment when there is not a known victim rescue. While it is not ideal to wait for additional staff to arrive at the scene before entering a time sensitive incident. If staff do not wait for additional staff to arrive there is no backup staff on site to rescue the firefighters who enter the hazardous environment if there is an issue.

2) Monitoring EMS response times will be important. In *FITCH's* experience there have been elongating response times in some services and a decreased reliability of response. This will allow the department to better determine the best practice for EMS first response within the

community. The current regulatory environment does not easily allow the local community to require a certain level of performance by the EMS provider.

3) A best practice for dispatching units to a response is to base it on risk. This can be done by the occupancy classification and specific factors to specific occupancies like square footage, height, building construction, fire features such as a fire suppression system, incident type and human occupancies. While this is a time-consuming task it allows for a more efficient utilization of constrained resources and automating the process to bring outside resources when needed.

Prevention

The department has worked to implement risk reduction strategies within the community through education and inspection efforts. Much of these efforts were hampered due to the COVID-19 pandemic. Now that most places are turning to pre-pandemic operations it is an opportunity to re-engage with community risk reduction operations. Below are recommendations to improve the prevention operations with the department:

1) Base the inspections cycle on the risk of the occupancy. Previously the goal within the department was to inspect assembly occupancies every 2-3 years and businesses every 4-5 years. There may be additional categories to consider based on factors such as life risk and fire service features such as a fire suppression and/or alarm system. For example, a facility such as an apartment building with a fire sprinkler system and monitored alarm system may not be inspected as frequently as an apartment that does not have those features unless there are a number of fire calls to that occupancy.

2) Once an inspection cycle is established it is important that the inspections are completed and followed up on within the adopted cycle. The past three years have not been a good sample to compare to see if the department has met their previous inspection cycle due to the COVD-19 pandemic, therefore this recommendation is more about moving forward than any previous comparison.

3) One challenge reported by staff was the ability to accomplish inspections while being subject to calls for service. There were reports that business owners were upset as staff set up inspection and were either unable to make the appointment or were late to the appointment as they were called to respond to an emergency call for service. It will be important moving forward that the department track this interruption in service to quantify the issue and determine what the best solution may be.

Dispatch

While the department does not have any ownership or operational control over the Washington County Emergency Communications Response Center (ECRC) there are important dispatch functions that effect the department and its ability to meet best practices. 911 Dispatch services are provided by the Washington County Sheriff's Office at the ECRC. Many of the recommendations will take collaboration between the ECRC and the department. The following recommendations would help the department get to a best practice operation:

1) The ECRC uses a call taking and pre-arrival software. This allows the Public Safety Dispatcher to be consistent in the questions they ask 911 callers to help determine what type of incident is occurring and the appropriate resources to send to the incident. The pre-arrival software also gives the dispatchers actions to provide the caller while the public safety responders are enroute such as CPR or delivering a baby. While it is a best practice to use a pre-arrival software it is important that the ECRC provides quality assurance of the call taking and pre-arrival use by the dispatchers. Without any quality assurance oversight, it is difficult to know the reliability and effectiveness of the call taking and pre-arrival software.

2) Implementing box alarms for the department will be important for efficiency and consistency of response. Currently the department must request what additional resources they want to respond to an incident. Two steps to implementing this recommendation are:

    a. Move to unit dispatching. Currently the department is dispatched as a station and then the staff determine which unit to respond to the call with. This alters the turnout time and the ability to track which units are available to respond to an incident. Moving to unit dispatching will improve the department's data, consistency of response and reliability of real time unit information.
    b. Implement box alarms. This allows the department to determine what resources are sent based on a specific call type and severity of the incident. This will allow the responding staff to request an additional alarm that will have pre-programed resources for that type of call instead of having to tell the dispatcher that they want specific resources from specific departments. For example, there would be a set of box alarms for structure fires outside the city where there are not fire hydrants and another set of box alarms for structure fires within the city where there are fire hydrants.

3) Use automatic vehicle location (AVL) and closest unit dispatching. AVL dispatching is an industry best practice that will send the closest unit to an incident. This could be configured to include neighboring agencies as those experiencing the emergency generally don't care which department responds, but rather they get the help they need in the quickest fashion. Closest unit dispatching would monitor both the location and the availability of the resources. For example, if a unit from Lake Elmo was clearing an accident close to Hwy 36

and a cardiac arrest was dispatched just north of Hwy 36 and they are the closest available unit, they would be dispatched in addition to the Stillwater Fire resources. While that is one example, the functionality also helps with larger incidents where neighboring resources are called but may not be the closest or available due to the current manual request system.

4) Address based dispatch would be a helpful capability. This would allow the department to tailor their response based on specific risks of individual occupancies. For example, a structure fire at the hospital should get a different response than a structure fire at a single-family home across the street from the hospital. This functionality allows the department to tailor responses to the risk increasing the efficiency and effectiveness of the response.

5) The department should monitor and ensure the ECRC establishes a suitable fully functional back up system. The ECRC was working to establish a fully functional back up system in another city within the county. Prior to the establishment of the backup system, if there was a complete failure of the dispatch center due to an event like a natural disaster, the phone calls would roll over to another county dispatch center but there was limited ability to dispatch responders.

6) Lastly if all the above items were accomplished there could be an opportunity to evaluate the need of the department to respond on all medical calls within the service area. There would need to be a thorough analysis and response matrix created which would need to include notification if an ambulance was going to have a delayed response.

Collaboration

The department collaborates well with the Lakeview EMS and neighboring fire departments. This includes participating in a shared service study previously. In order to continue to operate effectively it is important that the department finds ways to collaborate. Many of the recommendations above will require additional collaboration such as the implementation of box alarms. Training is another great opportunity to continue to pursue.

Attachment A

Data Report

FITCH

July 2022

Data Analysis

Stillwater Fire Department
Stillwater, MN

Prepared by:

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CONSULTANT REPORT

STILLWATER FIRE DEPARTMENT
DRAFT DATA ANALYSIS

TABLE of CONTENTS

METHODOLOGY 1

2021 SNAPSHOT 2

COMMUNITY DEMAND 2

Table 1: Number of Incidents Dispatched by Program and Call Type – All Jurisdictions 2

RESPONSE VOLUME AND BUSY TIME 3

Table 2: Number of Calls, Number of Responses, and Total Busy Time by Program – SFD Units in All Jurisdictions 3

SYSTEM PERFORMANCE 3

Table 3: 90th Percentile Performance Times by Program– First Arriving SFD Units in SFD's Jurisdiction 3

COMMUNITY DEMAND 4

Figure 1: Percentage of Total Incidents by Program – All Jurisdictions 4

Table 4: Number of Incidents Dispatched by Jurisdiction, Program, and Call Type 5

Table 5: Overall: Total Calls and Average Calls per Day by Month 8

Figure 2: Overall: Average Calls per Day by Month 9

Table 6: Overall: Total Calls and Average Calls per Day by Day of Week 10

Figure 3: Overall: Average Calls per Day by Day of Week 10

Table 7: Overall: Total Calls and Average Calls per Day by Hour of Day 11

Figure 4: Overall: Average Calls per Day by Hour of Day 12

COMMUNITY DEMAND FOR EMERGENCY MEDICAL SERVICES 13

Table 8: Total EMS Related Calls and Average Calls per Day by Month 13

Figure 5: Average EMS Related Calls per Day by Month 14

Table 9: Total EMS Related Calls and Average Calls per Day by Day of Week 15

Figure 6: Average EMS Related Calls per Day by Day of Week 15

Table 10: Total EMS Related Calls and Average Calls per Day by Hour of Day 16

Figure 7: Average EMS Related Calls per Day by Hour of Day 17

Table 11: Total EMS Related Calls by Nature of Call 18

COMMUNITY DEMAND FOR FIRE RELATED SERVICES 20

Table 12: Total Fire Related Calls and Average Calls per Day by Month 20

Figure 8: Average Fire Related Calls per Day by Month 21

Table 13: Total Fire Related Calls and Average Calls per Day by Day of Week 22

Figure 9: Average Fire Related Calls per Day by Day of Week 22

Table 14: Total Fire Related Calls and Average Calls per Day by Hour of Day 23

Figure 10: Average Fire Related Calls per Day by Hour of Day 24

Table 15: Total Fire Related Calls by Nature of Call 25

RESPONSE VOLUME AND BUSY TIME 26

Table 16: Number of Calls, Number of Responses, and Total Busy Time by Jurisdiction, Program, and Call Type – SFD Units 26

Table 17: Number of Calls, Number of Responses, and Total Busy Time by Program and Determinant – Outside Agency Units in SFD's Jurisdiction 29

NUMBER OF RESPONDING UNITS 30

Emergency Medical Services *30*
Table 18: Number of Responding SFD Units in SFD's Jurisdiction by EMS Related Call Type 30
Fire Related Services *31*
Table 19: Number of Responding SFD Units in SFD's Jurisdiction by Fire Related Call Type 31
UNIT HOUR UTILIZATION **32**
Table 20: Unit Total Busy Hours 32
Table 21: Unit Hour Utilization and Total Busy Hours with Cross-Staffing 33
Figure 11: Unit Hour Utilization 33
TRANSPORT **34**
Table 22: EMS Non-Transport and Transport Response by Complaint Reported by Dispatch 34
Table 23: Total EMS Responses, EMS Responses with Transports, and Average Responses per Day by Hour of Day 36
Figure 12: Average Responses and Responses with Transports per Day by Hour of Day 37
SYSTEM PERFORMANCE **38**
CASCADE OF EVENTS **38**
Detection *38*
Alarm Processing Time *38*
Turnout Time *38*
Travel Time *39*
Total Response Time *39*
Figure 13: Cascade of Events 39
RESPONSE TIME CONTINUUM **40**
Emergency Medical Services *40*
Figure 14: Cascade of Events for Sudden Cardiac Arrest with Shockable Rhythm 41
Fire Related Services *42*
Figure 15: Example of Traditional Time Temperature Curve 42
Figure 16: Ventilation-Controlled Time Temperature Curve 43
FIRST ARRIVING SFD UNIT PERFORMANCE **44**
Table 24: Average Performance Times by Program – First Arriving SFD Units in SFD's Jurisdiction 45
Table 25: 90th Percentile Performance Times by Program– First Arriving SFD Units in SFD's Jurisdiction 45
Table 26: 90th Percentile Travel Times by Unit Type – First Arriving SFD Units in SFD's Jurisdiction 45
Figure 17: Average Performance Times by Program – First Arriving SFD Units in SFD's Jurisdiction 46
ARRIVING EMS PROVIDER UNIT PERFORMANCE **47**
Table 27: Average and 90th Percentile Performance Times – Arriving EMS Provider Units in Stillwater and Grant 47
OVERLAPPED CALLS ANALYSIS **48**
Table 28: Overlapped Calls 48
BASELINE DATA **49**
COMMUNITY DEMAND **49**
Table 29: Number of Incidents Dispatched by Jurisdiction, Program, Call Type, and Reporting Period 49
RESPONSE VOLUME AND BUSY TIME **52**
Table 30: Number of Calls, Number of Responses, and Total Busy Time by Jurisdiction and Reporting Period – SFD Units 52
Table 31: Number of Calls, Number of Responses, and Total Busy Time by Reporting Period – Outside Agency Units in SFD's Jurisdiction 53
OVERLAPPED CALLS ANALYSIS **54**
Table 32: Overlapped Calls by Reporting Period – SFD's Jurisdiction 54
Table 33: Overlapped Calls by Reporting Period, Day of Week, and Hour of Day – SFD's Jurisdiction 54

Figure 18: Overlapped Calls by Day of Week and Hour of Day – SFD's Jurisdiction in 2019-2021 56
Figure 19: Overlapped Calls by Day of Week and Hour of Day – SFD's Jurisdiction in 2019 57
Figure 20: Overlapped Calls by Day of Week and Hour of Day – SFD's Jurisdiction in 2020 58
Figure 21: Overlapped Calls by Day of Week and Hour of Day – SFD's Jurisdiction in 2021 59

GIS 60

Table 34 : Marginal Fire Station Contribution for 9-Minute Travel Time 60
Figure 22: Marginal Fire Station Contribution for 9-Minute Travel Time 61

EVALUATION OF VARIOUS DISTRIBUTION MODELS 61

Table 35: Marginal Fire Station Contribution for 6-Minute Travel Time 61
Figure 23: Marginal Fire Station Contribution for 6-Minute Travel Time 62
Table 36: Marginal Fire Station Contribution for 7-Minute Travel Time 62
Figure 24: Marginal Fire Station Contribution for 7-Minute Travel Time 63
Table 37: Marginal Fire Station Contribution for 8-Minute Travel Time 63
Figure 25: Marginal Fire Station Contribution for 8-Minute Travel Time 64
Table 38 : Marginal Fire Station Contribution for 9-Minute Travel Time 64
Figure 26: Marginal Fire Station Contribution for 9-Minute Travel Time 65
Table 39: Marginal Fire Station Contribution for 10-Minute Travel Time 65
Figure 27: Marginal Fire Station Contribution for 10-Minute Travel Time 66
Table 40: Marginal Fire Station Contribution Summary 66

OPTIMIZED STATION DISTRIBUTION PLANS 66

Table 41: Optimized Station Deployment Plan 6-Minute Travel Time 67
Figure 28: Optimized Station Deployment Plan 6-Minute Travel Time 68
Table 42: Optimized Station Deployment Plan 7-Minute Travel Time 68
Figure 29: Optimized Station Deployment Plan 7-Minute Travel Time 69
Table 43: Optimized Station Deployment Plan 8-Minute Travel Time 69
Figure 30: Optimized Station Deployment Plan 8-Minute Travel Time 70
Table 44: Optimized Station Deployment Plan 9-Minute Travel Time 70
Figure 31: Optimized Station Deployment Plan 9-Minute Travel Time 71
Table 45: Optimized Station Deployment Plan 10-Minute Travel Time 71
Figure 32: Optimized Station Deployment Plan 10-Minute Travel Time 72
Table 46: Optimized Station Deployment Plan Summary 72

DISTRIBUTION OF DEMAND BY PROGRAM AREAS 73

Figure 33: Heat Map for All 2021 Incidents 73
Figure 34: Heat Map for Fire Related Incidents 74
Figure 35: Heat Map for EMS Related Incidents 75
Figure 36: Heat Map for Rescue Related Incidents 76
Figure 37: Heat Map for HAZMAT Related Incidents 77

URBAN/RURAL DENSITY 77

Figure 38: Urban and Rural Call Density Map with Current Station 78
Figure 39: Paid-On-Call Responses by Month 79
Figure 40: Paid-On-Call Responses by Day of Week 79
Figure 41: Paid-On-Call Response by Hour of the Day 80

PAID-ON-CALL STAFF SURVEY 81

Figure 42: Paid-On-Call Staff Survey Question 1 81
Figure 43: Paid-On-Call Staff Survey Question 2 82
Figure 44: Paid-On-Call Staff Survey Question 3 82
Figure 45: Paid-On-Call Staff Survey Question 4 83
Figure 46: Paid-On-Call Staff Survey Question 6 83

Figure 47: Paid-On-Call Staff Survey Question 7 84
Figure 48: Paid-On-Call Staff Survey Question 8 84
Figure 49: Paid-On-Call Staff Survey Question 9 85
Figure 50: Paid-On-Call Staff Survey Question 10 85
Figure 51: Paid-On-Call Staff Survey Question 12 86
Figure 52: Paid-On-Call Staff Survey Question 13 87
Figure 53: Paid-On-Call Staff Survey Question 14 87
Figure 54: Paid-On-Call Staff Survey Question 16 88
Figure 55: Paid-On-Call Staff Survey Question 17 88
Figure 56: Paid-On-Call Staff Survey Question 18 89
Figure 57: Paid-On-Call Staff Survey Question 19 89
Figure 58: Paid-On-Call Staff Survey Question 21 90
Figure 59: Paid-On-Call Staff Survey Question 22 90
Figure 60: Paid-On-Call Staff Survey Question 23 91
Figure 61: Paid-On-Call Staff Survey Question 24 91

FULL-TIME STAFF SURVEY 94

Figure 62: Full-Time Staff Survey Question 1 94
Figure 63: Full-Time Staff Survey Question 2 95
Figure 64: Full-Time Staff Survey Question 3 95
Figure 65: Full-Time Staff Survey Question 4 96
Figure 66: Full-Time Staff Survey Question 6 97
Figure 67: Full-Time Staff Survey Question 7 97
Figure 68: Full-Time Staff Survey Question 8 98
Figure 69: Full-Time Staff Survey Question 9 98
Figure 70: Full-Time Staff Survey Question 10 99
Figure 71: Full-Time Staff Survey Question 12 100
Figure 72: Full-Time Staff Survey Question 13 100
Figure 73: Full-Time Staff Survey Question 14 101
Figure 74: Full-Time Staff Survey Question 16 102
Figure 75: Full-Time Staff Survey Question 17 102
Figure 76: Full-Time Staff Survey Question 18 103
Figure 77: Full-Time Staff Survey Question 19 103
Figure 78: Full-Time Staff Survey Question 21 104
Figure 79: Full-Time Staff Survey Question 22 105
Figure 80: Full-Time Staff Survey Question 23 105
Figure 81: Full-Time Staff Survey Question 24 106
Figure 82: Full-Time Staff Survey Question 26 107
Figure 83: Full-Time Staff Survey Question 27 108

APPENDIX 110

Table 47: Unit IDs Not Considered Valid Responding Units – 2018-2022 110
Table 48: Exclusions from Data File for Response Volume and Busy Time Analyses – 2018-2022 112
Table 49: Exclusions from Data File for Performance Time Analyses – 2018-2022 113
Table 50: Classification of Incident Description into Program and Call Category 114

METHODOLOGY

We obtained data files from Stillwater Fire Department (SFD) spanning May 22, 2018 through April 20, 2022. Based on the date range of data provided, three full calendar years of data were available for baseline analysis, as presented in the last section of this report (i.e., 2019, 2020, and 2021). The comprehensive data report (i.e., all sections prior to the baseline section) were based on data from the 2021 calendar year spanning January 1, 2021 through December 31, 2021.

We utilize two distinct measures in this report—call volume and workload. Requests for service are defined as "incidents" or "calls" (i.e., call volume). Call volume reflects the number of times a distinct incident was created involving one or more SFD units, and/or calls received in SFD's jurisdiction. "Responses" are the number of times that an individual unit (or units) responded to a call (i.e., workload).

Audits of the data files were first conducted to identify any anomalies for attention and reconciliation prior to data analysis (Tables 34 through 36 in the Appendix). No records were excluded prior to call volume and temporal analyses, as there were no fully duplicated records wherein values for all variables were identical, and there were no "Problem" values identified for exclusion by SFD leadership.

Exclusion criteria were applied to records prior to response volume and busy time analyses (Tables 34 and 35), and additional exclusion criteria were applied to records prior to the analysis of performance time metrics (e.g., dispatch time; turnout time; Table 36). Entries with negative times or with times of zero minutes, and entries with extremely high busy or performance times (i.e., outliers) were excluded. Classification of responses into call categories and program areas based on incident type (i.e., "Problem") appear in Table 37 in the Appendix.

Responses were also classified based on call priority status and role of the responding unit. Analyses of performance times focused on emergency (lights and sirens) responses from SFD's first arriving primary front-line units for all unique incidents. Priority status was based on "Problem" values, as classified by SFD leadership. SFD units considered by department leadership to be primary front-line units appropriate for inclusion in performance time analyses included brush trucks, engines, the ladder truck, rescue units, and the water tender. The majority of analyses related to performance (e.g., travel time) were restricted based on these classifications to include only primary front-line units responding as emergency (lights and sirens) responses and are identified in the report where applicable.

Any reduced sample sizes due to missing or excluded data are noted in the report where applicable.

2021 SNAPSHOT

Community Demand

Table 1: Number of Incidents Dispatched by Program and Call Type – All Jurisdictions

Program and Call Type[1]	Number of Calls	Average Calls per Day	Call Percentage
EMS	**1,910**	**5.2**	**82.1**
Agency Assist	54	0.1	2.3
Breathing Difficulty	215	0.6	9.2
Cardiac and Stroke	167	0.5	7.2
Fall and Injury	397	1.1	17.1
Fire Alarm	175	0.5	7.5
Illness and Other	588	1.6	25.3
Mutual Aid	3	< 0.1	0.1
MVA	102	0.3	4.4
Overdose and Psychiatric	47	0.1	2.0
Seizure and Unconsciousness	162	0.4	7.0
Fire	**334**	**0.9**	**14.4**
Agency Assist	15	< 0.1	0.6
Fire Other	237	0.6	10.2
Hazardous Condition	39	0.1	1.7
Mutual Aid	0	0.0	0.0
Outside Fire	24	0.1	1.0
Structure Fire	7	< 0.1	0.3
Vehicle Fire	12	< 0.1	0.5
Hazmat	**32**	**0.1**	**1.4**
Hazmat	32	0.1	1.4
Rescue	**11**	**< 0.1**	**0.5**
Rescue	11	< 0.1	0.5
Unknown[2]	**39**	**0.1**	**1.7**
Mutual Aid Given	39	0.1	1.7
Total	**2,326**	**6.4**	**100.0**

[1]Classifications of incident types from the data file into program and call type category are presented in the Appendix.
[2]Data related to "Mutual Aid Given" records were provided separately by SFD and included incident numbers only such that only call volume could be specified.

Response Volume and Busy Time

Table 2: Number of Calls, Number of Responses, and Total Busy Time by Program – SFD Units in All Jurisdictions

Program	Number of Calls[1]	Number of Responses[2]	Average Responses per Call	Total Busy Hours	Responses with Time Data[3]	Average Busy Minutes per Response	Average Calls per Day	Average Responses per Day
EMS	1,753	2,119	1.2	600.3	2,119	17.0	4.8	5.8
Fire	152	315	2.1	187.9	315	35.8	0.4	0.9
Hazmat	32	46	1.4	32.1	46	41.9	0.1	0.1
Rescue	11	14	1.3	5.3	14	22.5	< 0.1	< 0.1
Total	**1,948**	**2,494**	**1.3**	**825.6**	**2,494**	**19.9**	**5.3**	**6.8**

[1]"Number of Calls" reflects an adjusted number of calls following any exclusion activity to align with responses made by valid units assigned to SFD.
[2]"Number of Responses" reflects the total number of records in the data file associated with responses made by valid units assigned to SFD, regardless of calculated busy time.
[3]"Responses with Time Data" reflects the number of records in the data file associated with responses made by valid units assigned to SFD with calculated busy time not otherwise excluded.

System Performance

Table 3: 90th Percentile Performance Times by Program– First Arriving SFD Units in SFD's Jurisdiction

Program	Dispatch Time (Minutes)	Turnout Time (Minutes)	Travel Time (Minutes)	Response Time (Minutes)	Sample Size[1]
EMS	4.4	< 0.1	7.6	11.2	1,297
Fire	4.5	< 0.1	10.1	12.3	115
Hazmat	3.1	< 0.1	8.6	11.8	28
Rescue	4.1	< 0.1	9.8	11.6	10
Total	**4.4**	**< 0.1**	**7.9**	**11.3**	**1,450**

[1]Sample sizes reflect the number of responses to emergency calls made by first arriving primary front-line units assigned to SFD; due to missing or excluded time data, sample sizes corresponding to individual table metrics may be smaller.

COMMUNITY DEMAND

During the 2021 reporting period (i.e., January 1, 2021 to December 31, 2021; hereinafter referred to as 2021), community demand from all jurisdictions for SFD services included calls related to the program areas of EMS (*n* = 1,910; 82.1%), fire (*n* = 334; 14.4%), hazmat (*n* = 32; 1.4%), rescue (*n* = 11; 0.5%), and unknown (all mutual aid given calls; *n* = 39; 1.7%; Figure 1; Table 4). Requests for service from the community across all programs and jurisdictions during 2021 totaled 2,326, averaging 6.4 calls per day.

Classifications of incident types from the data file into program and call type category are presented in Table 37 in the Appendix.

Figure 1: Percentage of Total Incidents by Program – All Jurisdictions

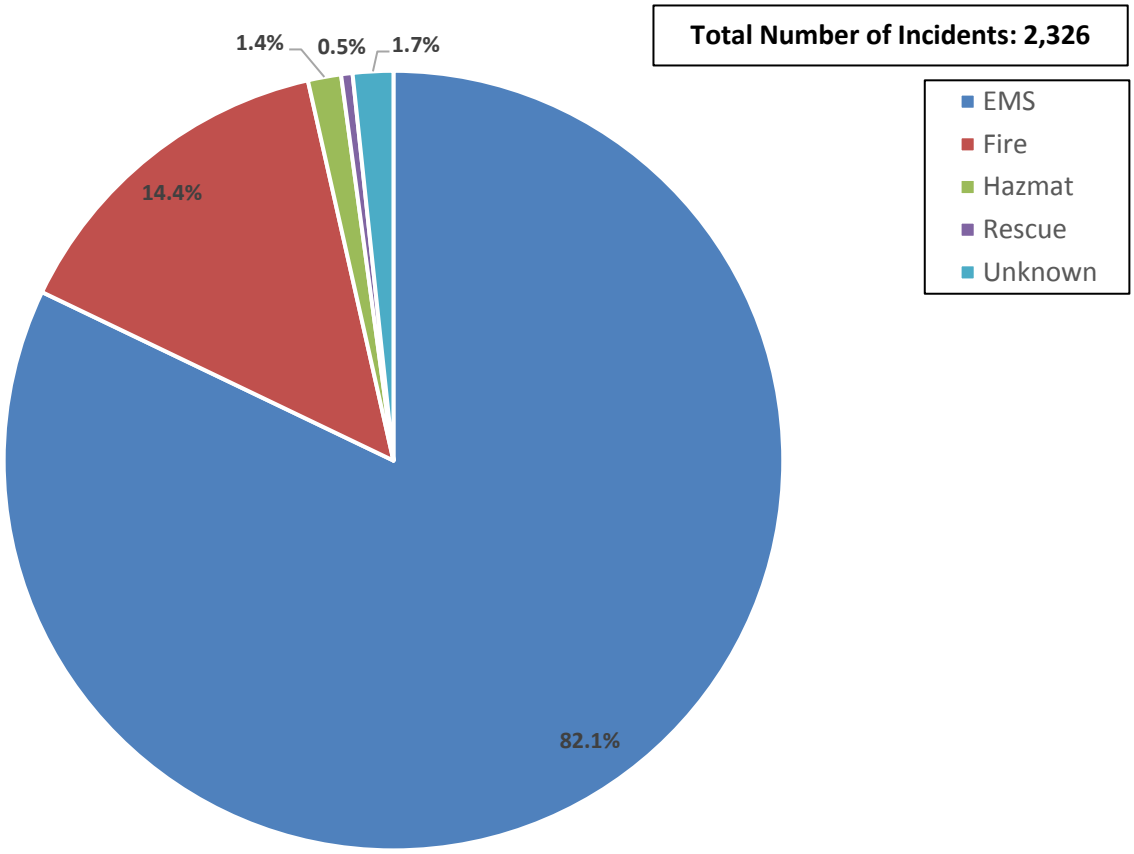


Table 4: Number of Incidents Dispatched by Jurisdiction, Program, and Call Type

Jurisdiction	Program and Call Type[1]	Number of Calls	Average Calls per Day	Call Percentage
All	**EMS**	**1,910**	**5.2**	**82.1**
	Agency Assist	54	0.1	2.3
	Breathing Difficulty	215	0.6	9.2
	Cardiac and Stroke	167	0.5	7.2
	Fall and Injury	397	1.1	17.1
	Fire Alarm	175	0.5	7.5
	Illness and Other	588	1.6	25.3
	Mutual Aid	3	< 0.1	0.1
	MVA	102	0.3	4.4
	Overdose and Psychiatric	47	0.1	2.0
	Seizure and Unconsciousness	162	0.4	7.0
	Fire	**334**	**0.9**	**14.4**
	Agency Assist	15	< 0.1	0.6
	Fire Other	237	0.6	10.2
	Hazardous Condition	39	0.1	1.7
	Mutual Aid	0	0.0	0.0
	Outside Fire	24	0.1	1.0
	Structure Fire	7	< 0.1	0.3
	Vehicle Fire	12	< 0.1	0.5
	Hazmat	**32**	**0.1**	**1.4**
	Hazmat	32	0.1	1.4
	Rescue	**11**	**< 0.1**	**0.5**
	Rescue	11	< 0.1	0.5
	Unknown[2]	**39**	**0.1**	**1.7**
	Mutual Aid Given	39	0.1	1.7
	Total	**2,326**	**6.4**	**100.0**
Within SFD[3]	**EMS**	**1,905**	**5.2**	**83.5**
	Agency Assist	54	0.1	2.4
	Breathing Difficulty	214	0.6	9.4
	Cardiac and Stroke	166	0.5	7.3
	Fall and Injury	397	1.1	17.4
	Fire Alarm	175	0.5	7.7
	Illness and Other	588	1.6	25.8
	Mutual Aid	3	< 0.1	0.1
	MVA	100	0.3	4.4
	Overdose and Psychiatric	47	0.1	2.1

Jurisdiction	Program and Call Type[1]	Number of Calls	Average Calls per Day	Call Percentage
Within SFD[3]	Seizure and Unconsciousness	161	0.4	7.1
	Fire	**333**	**0.9**	**14.6**
	Agency Assist	15	< 0.1	0.7
	Fire Other	236	0.6	10.3
	Hazardous Condition	39	0.1	1.7
	Mutual Aid	0	0.0	0.0
	Outside Fire	24	0.1	1.1
	Structure Fire	7	< 0.1	0.3
	Vehicle Fire	12	< 0.1	0.5
	Hazmat	**32**	**0.1**	**1.4**
	Hazmat	32	0.1	1.4
	Rescue	**11**	**< 0.1**	**0.5**
	Rescue	11	< 0.1	0.5
	Total	**2,281**	**6.2**	**100.0**
Outside of SFD[4]	**EMS**	**5**	**< 0.1**	**11.1**
	Agency Assist	0	0.0	0.0
	Breathing Difficulty	1	< 0.1	2.2
	Cardiac and Stroke	1	< 0.1	2.2
	Fall and Injury	0	0.0	0.0
	Fire Alarm	0	0.0	0.0
	Illness and Other	0	0.0	0.0
	Mutual Aid	0	0.0	0.0
	MVA	2	< 0.1	4.4
	Overdose and Psychiatric	0	0.0	0.0
	Seizure and Unconsciousness	1	< 0.1	2.2
	Fire	**1**	**< 0.1**	**2.2**
	Agency Assist	0	0.0	0.0
	Fire Other	1	< 0.1	2.2
	Hazardous Condition	0	0.0	0.0
	Mutual Aid	0	0.0	0.0
	Outside Fire	0	0.0	0.0
	Structure Fire	0	0.0	0.0
	Vehicle Fire	0	0.0	0.0
	Hazmat	**0**	**0.0**	**0.0**
	Hazmat	0	0.0	0.0
	Rescue	**0**	**0.0**	**0.0**
	Rescue	0	0.0	0.0

Jurisdiction	Program and Call Type[1]	Number of Calls	Average Calls per Day	Call Percentage
Outside of SFD[4]	**Unknown[2]**	**39**	**0.1**	**86.7**
	Mutual Aid Given	39	0.1	86.7
	Total	**45**	**0.1**	**100.0**

[1]Classifications of incident types from the data file into program and call type category are presented in the Appendix.
[2]Data related to "Mutual Aid Given" records were provided separately by SFD and included incident numbers only such that only call volume could be specified.
[3]Cities considered to be within the SFD jurisdiction included Grant, May Township, Stillwater, Stillwater Township, and "NULL" values, as well as records missing a value for city.
[4]Cities considered to be outside of the SFD jurisdiction included Bayport, Cottage Grove, Hudson, Oak Park Heights, Saint Joseph Township, Saint Paul Park, Somerset, and Woodbury.

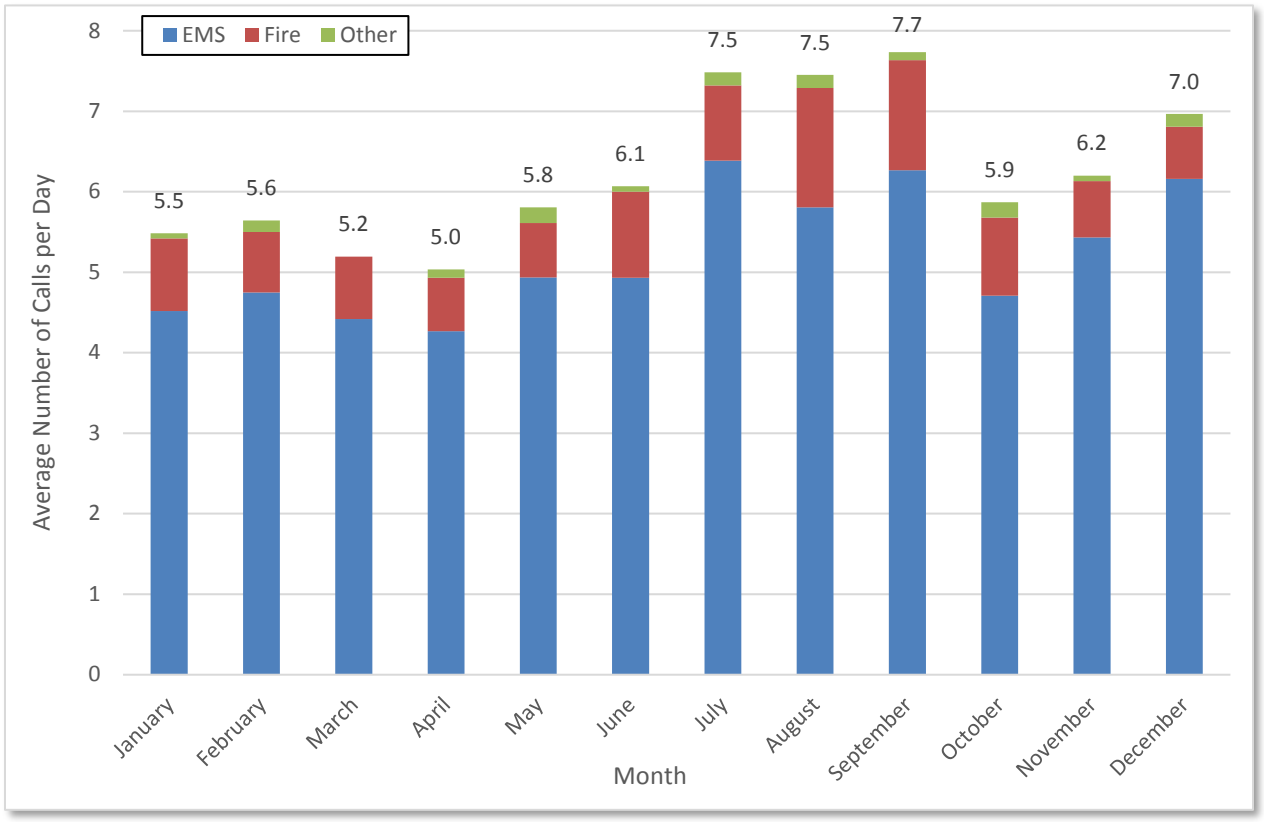
Temporal analyses were conducted to evaluate patterns in community demands. These analyses are based on the 2,281 total requests for service received from the community within SFD's jurisdiction during 2021, and examine the frequency of incidents by month, day of week, and hour of day.

Overall, average requests per month ranged from a low of 5.0 calls per day in April to a high of 7.7 calls per day in September (Table 5; Figure 2). The three months with the most requests for service in descending order were: September (7.7 per day), July (7.5 per day), and August (7.5 per day). The three months with the fewest requests for service in ascending order were: April (5.0 per day), March (5.2 per day), and January (5.5 per day).

Table 5: Overall: Total Calls and Average Calls per Day by Month

Month	Number of Calls	Average Calls per Day	Call Percentage
January	170	5.5	7.5
February	158	5.6	6.9
March	161	5.2	7.1
April	151	5.0	6.6
May	180	5.8	7.9
June	182	6.1	8.0
July	232	7.5	10.2
August	231	7.5	10.1
September	232	7.7	10.2
October	182	5.9	8.0
November	186	6.2	8.2
December	216	7.0	9.5
Total	**2,281**	**6.2**	**100.0**

Figure 2: Overall: Average Calls per Day by Month



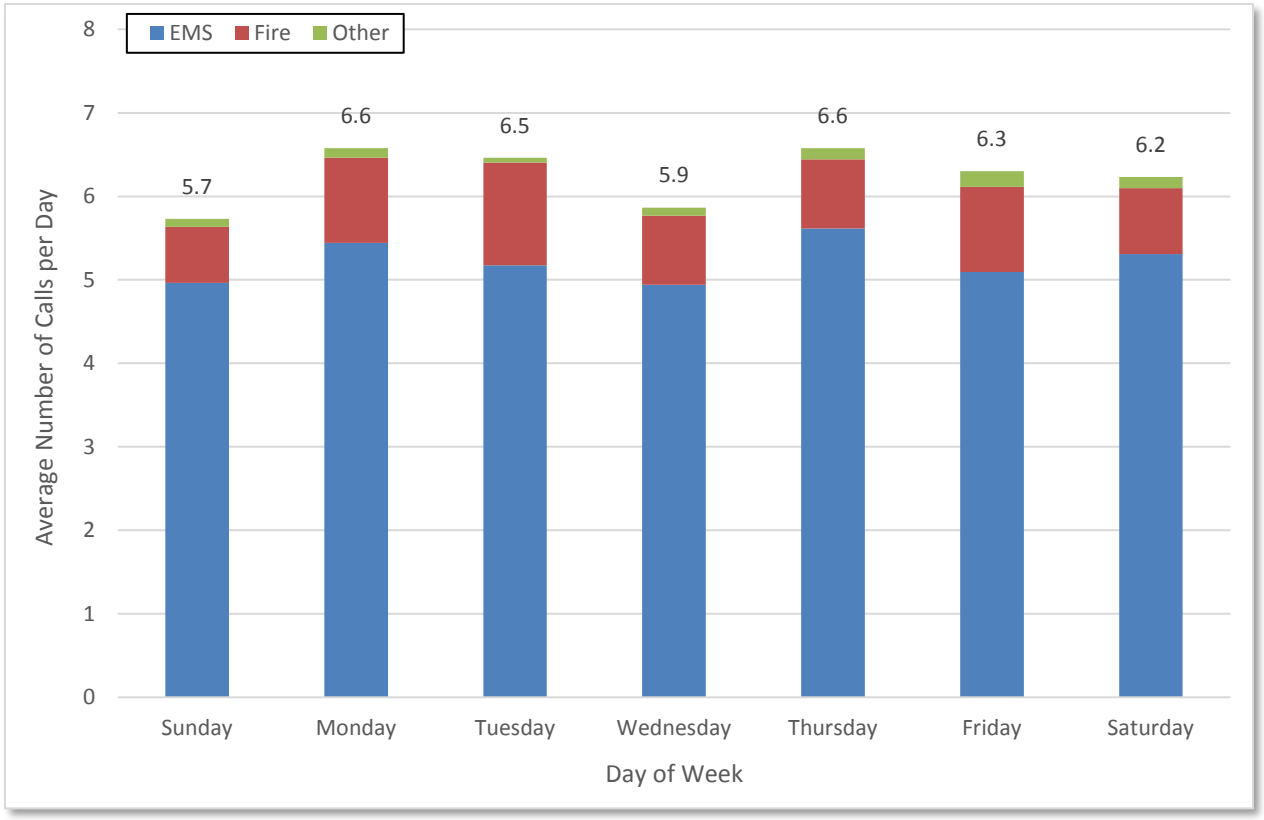
Similar analyses were conducted for requests by day of week (Table 6; Figure 3). The lowest average number of calls per day occurred on Sunday (5.7 per day), and the highest average number of calls per day occurred on Monday (6.6 per day).

Table 6: Overall: Total Calls and Average Calls per Day by Day of Week

Day of Week[1]	Number of Calls	Average Calls per Day	Call Percentage
Sunday	298	5.7	13.1
Monday	342	6.6	15.0
Tuesday	336	6.5	14.7
Wednesday	305	5.9	13.4
Thursday	342	6.6	15.0
Friday	334	6.3	14.6
Saturday	324	6.2	14.2
Total	**2,281**	**6.2**	**100.0**

[1]There were 53 Fridays and 52 of all other days of the week during 2021.

Figure 3: Overall: Average Calls per Day by Day of Week



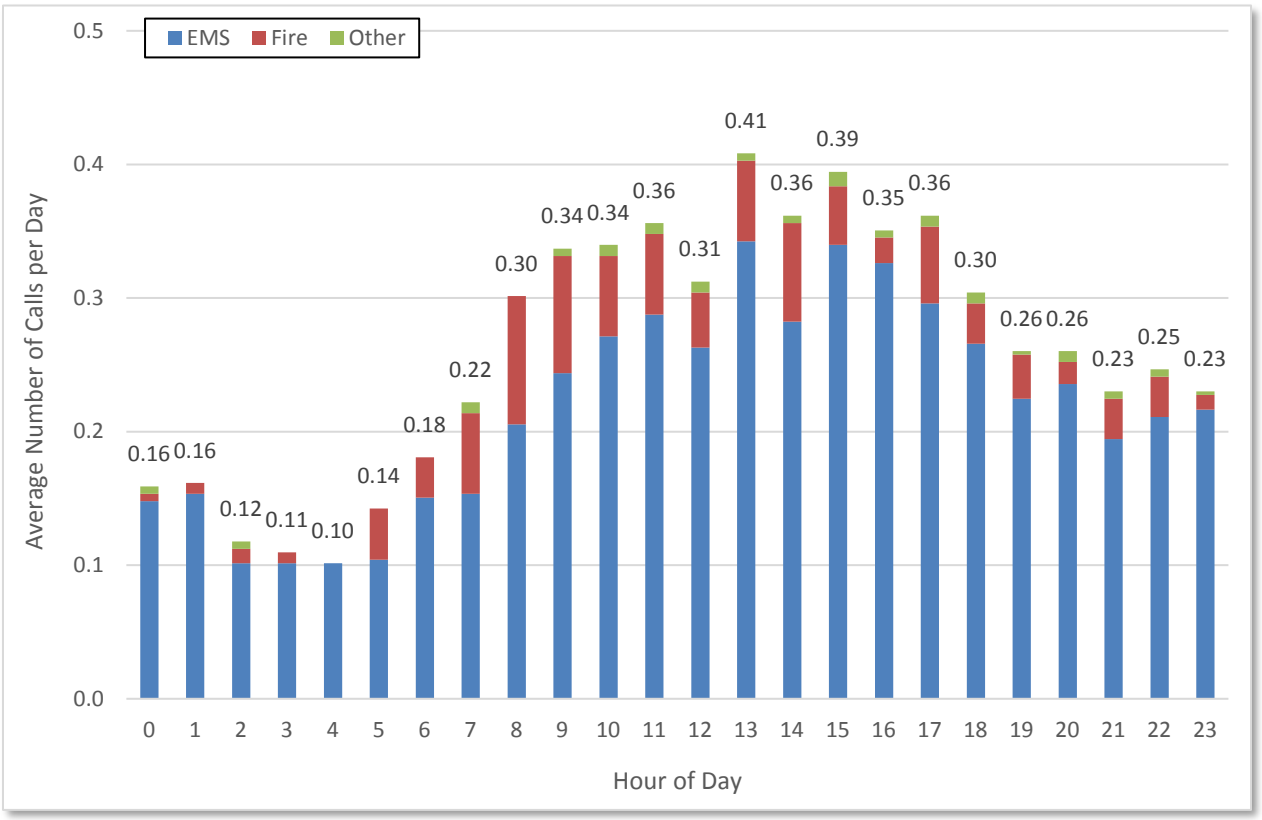
Overall demands were also evaluated by hour of the day (Table 7; Figure 4). Variability exists in the time of day that requests for services were received. Peak demand occurred at 1300 (0.41 average calls per day during that hour in 2021). The hours of the day with the lowest average number of calls per day (range 0.10 to 0.14) were between 0200 and 0500.

Table 7: Overall: Total Calls and Average Calls per Day by Hour of Day

Hour of Day	Number of Calls	Average Calls per Day	Call Percentage
0	58	0.16	2.5
1	59	0.16	2.6
2	43	0.12	1.9
3	40	0.11	1.8
4	37	0.10	1.6
5	52	0.14	2.3
6	66	0.18	2.9
7	81	0.22	3.6
8	110	0.30	4.8
9	123	0.34	5.4
10	124	0.34	5.4
11	130	0.36	5.7
12	114	0.31	5.0
13	149	0.41	6.5
14	132	0.36	5.8
15	144	0.39	6.3
16	128	0.35	5.6
17	132	0.36	5.8
18	111	0.30	4.9
19	95	0.26	4.2
20	95	0.26	4.2
21	84	0.23	3.7
22	90	0.25	3.9
23	84	0.23	3.7
Total	**2,281**	**6.2**	**100.0**

To provide a more granular understanding of the community's demand for services, this temporal analysis included the average number of calls per day by hour of day. In other words, when referring to Figure 4 below, the busiest hour was at 1300 with 149 calls occurring during that hour in 2021. The average number of calls per day for that hour is a daily average for the 149 calls if they were distributed equally across the year (i.e., 149/365 = 0.41).

Figure 4: Overall: Average Calls per Day by Hour of Day



Community Demand for Emergency Medical Services

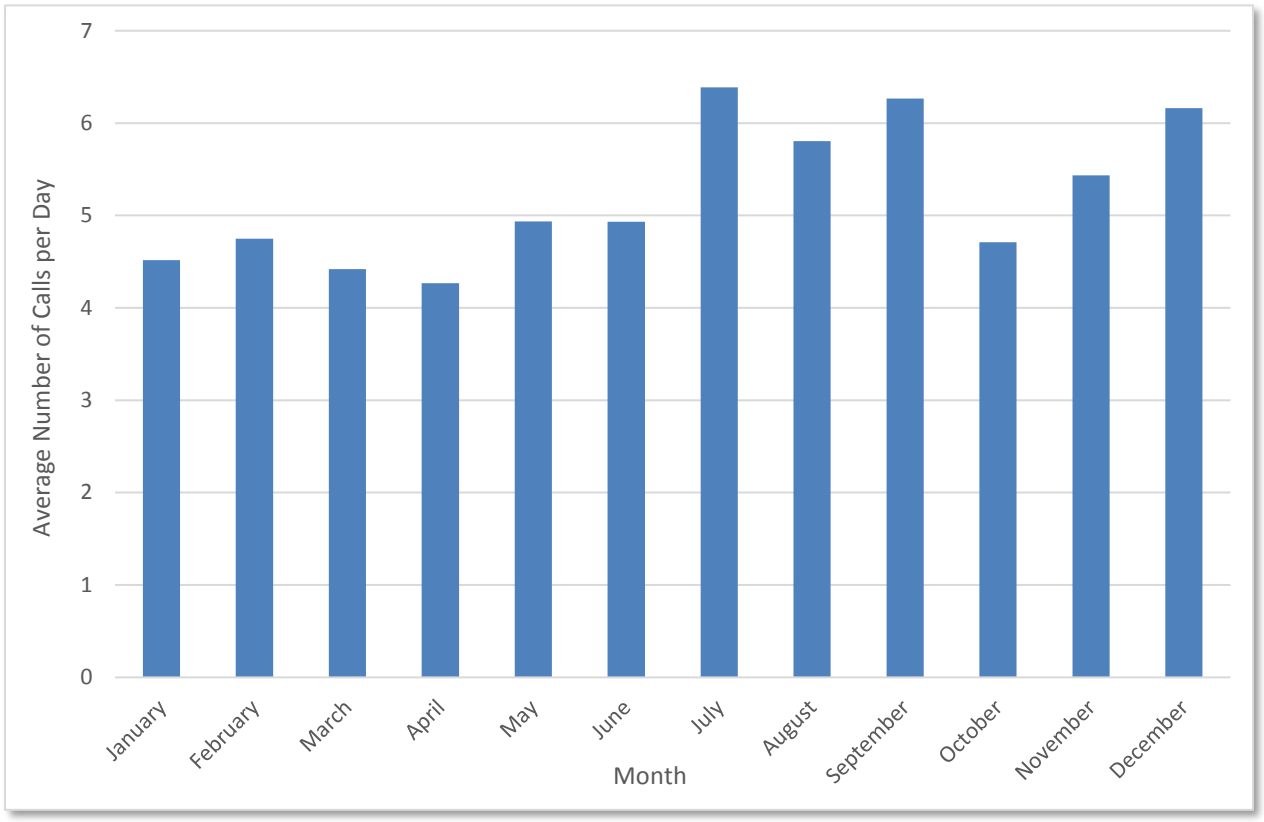
Temporal analyses were conducted to evaluate patterns in community demand for EMS related services. These analyses are based on the 1,905 total EMS related requests for service received from the community within SFD's jurisdiction during 2021 and examine the frequency of requests for service by month, day of week, and hour of day.

Results found that there was some variability by month (Table 8; Figure 5). The three months with the most EMS related calls in descending order were: July (6.4 per day), September (6.3 per day), and December (6.2 per day). The three months with the fewest EMS related calls in ascending order were: April (4.3 per day), March (4.4 per day), and January (4.5 per day).

Table 8: Total EMS Related Calls and Average Calls per Day by Month

Month	Number of Calls	Average Calls per Day	Call Percentage
January	140	4.5	7.3
February	133	4.8	7.0
March	137	4.4	7.2
April	128	4.3	6.7
May	153	4.9	8.0
June	148	4.9	7.8
July	198	6.4	10.4
August	180	5.8	9.4
September	188	6.3	9.9
October	146	4.7	7.7
November	163	5.4	8.6
December	191	6.2	10.0
Total	**1,905**	**5.2**	**100.0**

Figure 5: Average EMS Related Calls per Day by Month



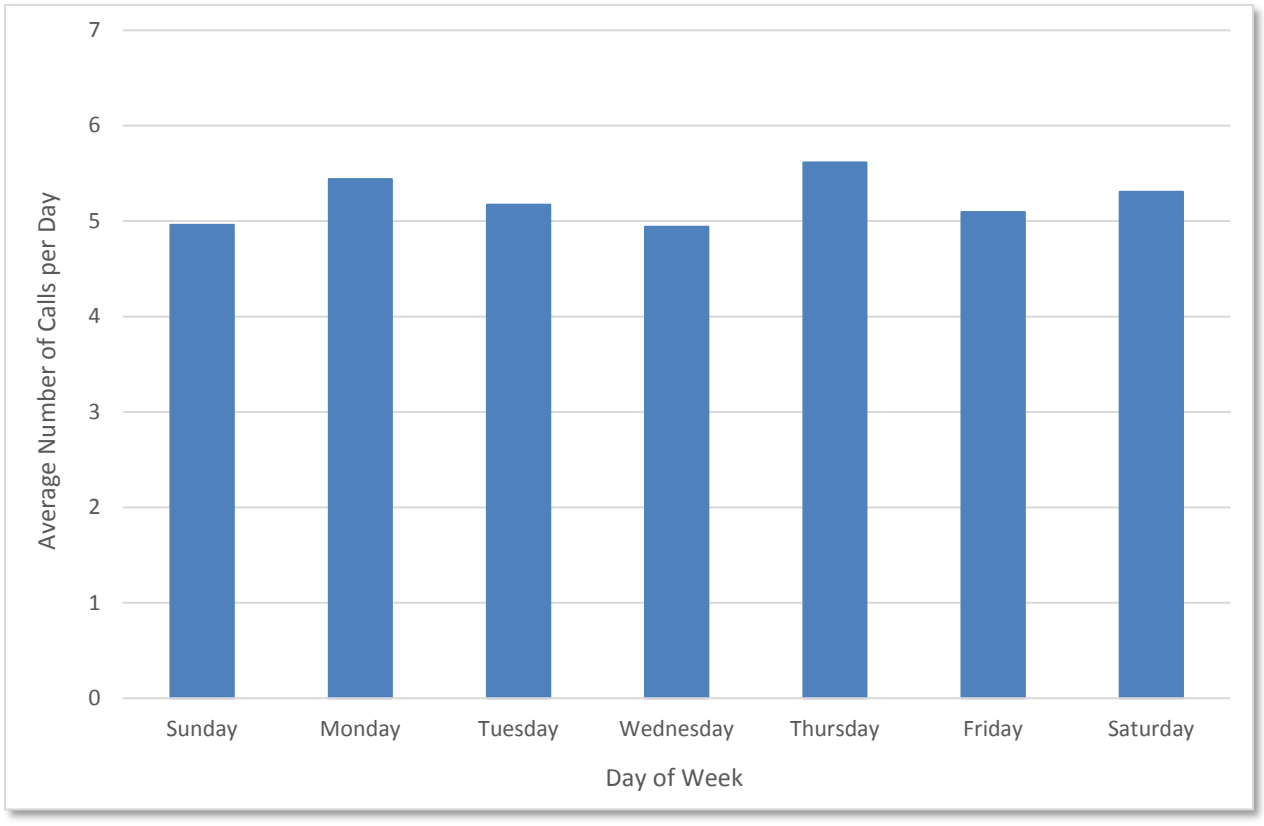
Similar analyses were conducted for EMS related calls by day of week (Table 9; Figure 6). The data revealed that there was some variability in demand for services by day of week. Thursday had the highest frequency of requests for EMS related services, averaging 5.6 calls per day and accounting for 15.3% of all EMS related calls. Wednesday had the lowest frequency of requests for EMS related services, averaging 4.9 calls per day and accounting for 13.5% of all EMS related calls.

Table 9: Total EMS Related Calls and Average Calls per Day by Day of Week

Day of Week[1]	Number of Calls	Average Calls per Day	Call Percentage
Sunday	258	5.0	13.5
Monday	283	5.4	14.9
Tuesday	269	5.2	14.1
Wednesday	257	4.9	13.5
Thursday	292	5.6	15.3
Friday	270	5.1	14.2
Saturday	276	5.3	14.5
Total	**1,905**	**5.2**	**100.0**

[1]There were 53 Fridays and 52 of all other days of the week during 2021.

Figure 6: Average EMS Related Calls per Day by Day of Week

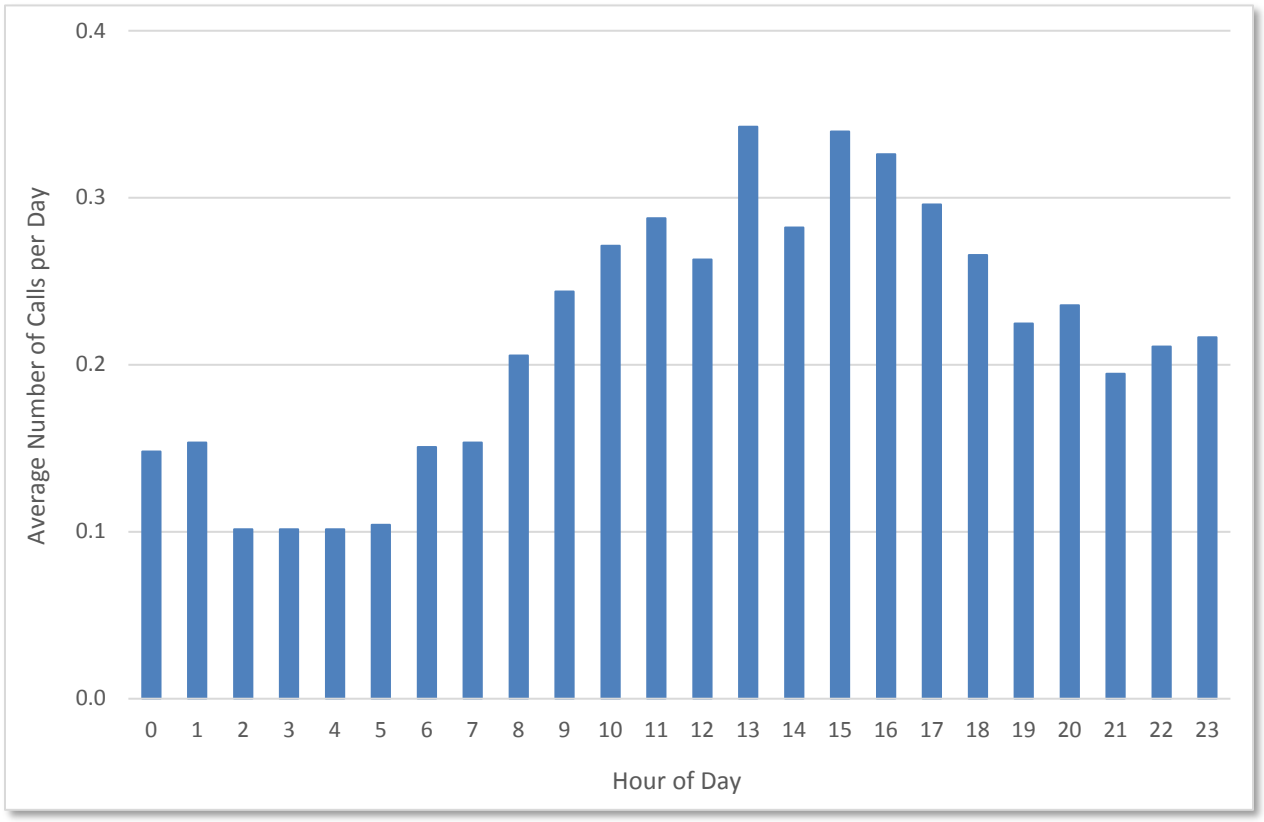


EMS related calls were also evaluated by hour of the day (Table 10; Figure 7). Variability exists in the time of day that requests for EMS related services were received. The hours from 0200 to 0500 had the lowest demands, when average number of calls per day for each of those hours was 0.10. The highest demand for EMS related services occurred at 1300, when average number of calls per day during that hour was 0.34.

Table 10: Total EMS Related Calls and Average Calls per Day by Hour of Day

Hour of Day	Number of Calls	Average Calls per Day	Call Percentage
0	54	0.15	2.8
1	56	0.15	2.9
2	37	0.10	1.9
3	37	0.10	1.9
4	37	0.10	1.9
5	38	0.10	2.0
6	55	0.15	2.9
7	56	0.15	2.9
8	75	0.21	3.9
9	89	0.24	4.7
10	99	0.27	5.2
11	105	0.29	5.5
12	96	0.26	5.0
13	125	0.34	6.6
14	103	0.28	5.4
15	124	0.34	6.5
16	119	0.33	6.2
17	108	0.30	5.7
18	97	0.27	5.1
19	82	0.22	4.3
20	86	0.24	4.5
21	71	0.19	3.7
22	77	0.21	4.0
23	79	0.22	4.1
Total	**1,905**	**5.2**	**100.0**

Figure 7: Average EMS Related Calls per Day by Hour of Day



EMS related requests within SFD's jurisdiction accounted for 83.5% of the total requests for service during 2021 and averaged 5.2 requests per day (Figure 1; Table 4). EMS related incidents are an aggregated category of the various incident types available in the data file. Table 11 provides details for these EMS related incidents by nature of the call (i.e., variable "Problem" in the data file; entries are presented verbatim from the data file).

Table 11: Total EMS Related Calls by Nature of Call

Nature of Call'	Number of Calls	Percentage of Total EMS Demand
yDifficulty Breathing	211	11.1
yFall-1	149	7.8
yFall-3	147	7.7
ySick Person-1	147	7.7
yFire Alarm	125	6.6
yUnconscious Person-1	87	4.6
yUnknown Medical Situation-1	78	4.1
yCardiac/Heart Problems-1	73	3.8
yLift Assist-Non-Injury	58	3.0
ySeizure-1	56	2.9
yMedical Alarm-2	53	2.8
yMVA: Unknown Injury	51	2.7
yAbdominal Pain/Problem-1	49	2.6
yStroke-1	49	2.6
yFall-2	48	2.5
yVehicle Accident Injury	44	2.3
yPerson In Crisis-1	43	2.3
yRQ EMS by Public Safety-L1	39	2.0
yCPR/Full Arrest	32	1.7
yDiabetic-1	30	1.6
yAccidental OD/Poisoning-1	27	1.4
yChest Pain(Non-Cardiac)-1	26	1.4
yFire Alarm - Water Flow	26	1.4
yBleeding-1	25	1.3
yAllergic Reaction	24	1.3
yFire Alarm Carbon Monoxide	24	1.3
yChest Pain (Non-Cardiac)-1	23	1.2
yBack Pain(Non-Trauma)-1	18	0.9
yUnconscious Person-2	18	0.9
ySuicide or Attempted	17	0.9
yTraumatic Inj/Head Injury-1	14	0.7
yMedical Alarm-1	10	0.5
yRQ EMS Rescue by PublicSafety	9	0.5

Nature of Call[1]	Number of Calls	Percentage of Total EMS Demand
yStroke-2	9	0.5
yHeadache-1	7	0.4
yRQ EMS by Public Safety-L3	6	0.3
yTraumatic Inj/Head Injury-2	6	0.3
yAssault Injury-1	4	0.2
yExposure Heat/Cold-1	4	0.2
ySick Person-3	4	0.2
yAbdominal Pain/Problem-2	3	0.2
yAccidental OD/Poisoning-2	3	0.2
yChildbirth/Obstetrics-1	3	0.2
yChoking-1	3	0.2
yMVA: Hit and Run with Injury	3	0.2
yRequest Mutual Aid EMS	3	0.2
yCardiac/Heart Problems-2	2	0.1
yExposure Heat/Cold-2	2	0.1
yMVA: Injury-Entrapment	2	0.1
yAnimal Bite Injury-1	1	0.1
yBurns-1	1	0.1
yChest Pain(Non-Cardiac)-2	1	0.1
yCO/Inhalation	1	0.1
yDomestic Violence Injury-1	1	0.1
yEye Problem/Injury-1	1	0.1
yHeadache-2	1	0.1
yLE Incident w/ Medical-1	1	0.1
yPerson In Crisis-3	1	0.1
yPossible Death	1	0.1
yStroke-3	1	0.1
Total	**1,905**	**100.0**

[1]Entries are presented verbatim from the data file.

Community Demand for Fire Related Services

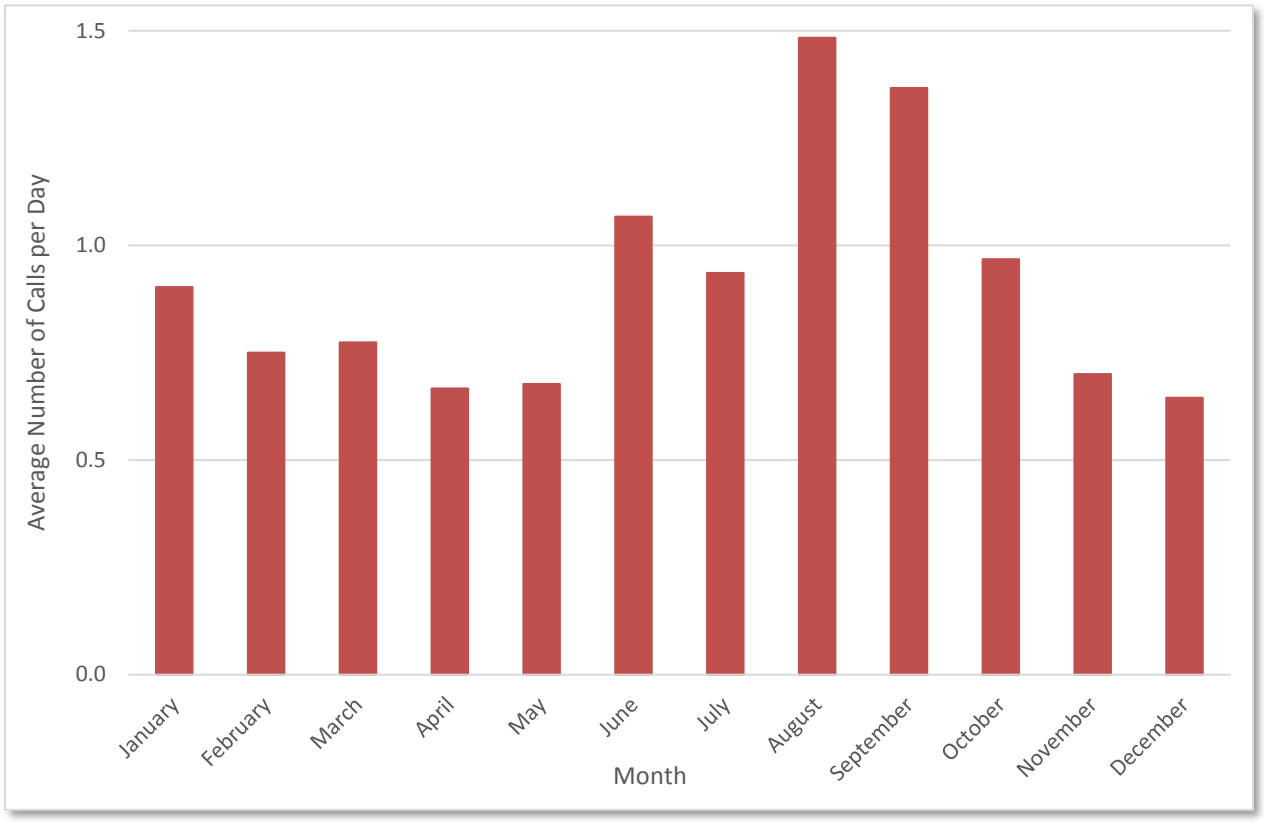
Temporal analyses were conducted to evaluate patterns in community demand for fire related services. These analyses are based on the 333 total fire related requests for service received from the community within SFD's jurisdiction during 2021 and examine the frequency of requests for service by month, day of week, and hour of day.

Results found that there was variability by month (Table 12; Figure 8). The three months with the most fire related calls in descending order were: August (1.5 per day), September (1.4 per day), and June (1.1 per day). The three months with the fewest fire related calls in ascending order were: December (0.6 per day), April (0.7 per day), and May (0.7 per day).

Table 12: Total Fire Related Calls and Average Calls per Day by Month

Month	Number of Calls	Average Calls per Day	Call Percentage
January	28	0.9	8.4
February	21	0.8	6.3
March	24	0.8	7.2
April	20	0.7	6.0
May	21	0.7	6.3
June	32	1.1	9.6
July	29	0.9	8.7
August	46	1.5	13.8
September	41	1.4	12.3
October	30	1.0	9.0
November	21	0.7	6.3
December	20	0.6	6.0
Total	**333**	**0.9**	**100.0**

Figure 8: Average Fire Related Calls per Day by Month



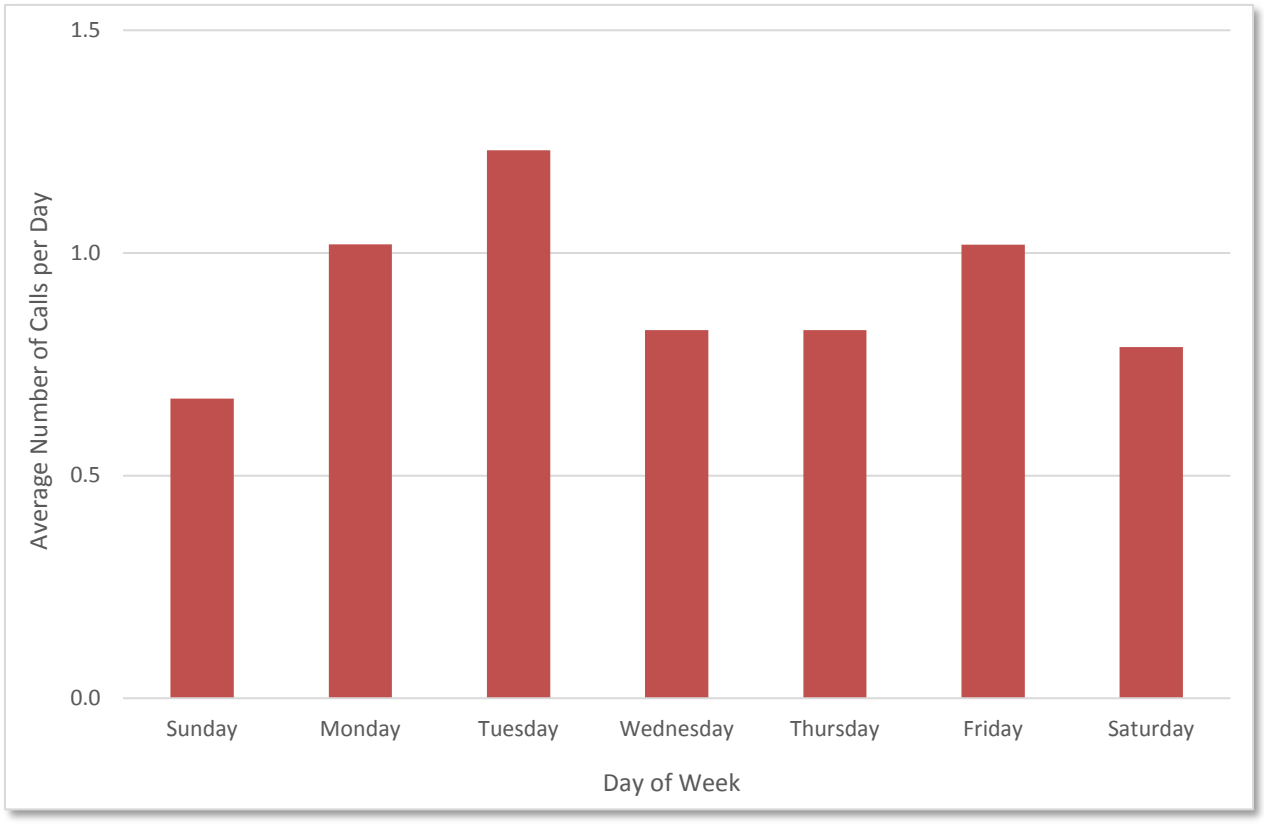
Similar analyses were conducted for fire related calls by day of week (Table 13; Figure 9). The data revealed that there is some variability in the demand for services by day of week. The three days with the most fire related calls in descending order were: Tuesday (1.2 per day), Monday (1.0 per day), and Friday (1.0 per day). The three days with the fewest fire related calls in ascending order were: Sunday (0.7 per day), Saturday (0.8 per day), and Thursday (0.8 per day).

Table 13: Total Fire Related Calls and Average Calls per Day by Day of Week

Day of Week[1]	Number of Calls	Average Calls per Day	Call Percentage
Sunday	35	0.7	10.5
Monday	53	1.0	15.9
Tuesday	64	1.2	19.2
Wednesday	43	0.8	12.9
Thursday	43	0.8	12.9
Friday	54	1.0	16.2
Saturday	41	0.8	12.3
Total	**333**	**0.9**	**100.0**

[1]There were 53 Fridays and 52 of all other days of the week during 2021.

Figure 9: Average Fire Related Calls per Day by Day of Week

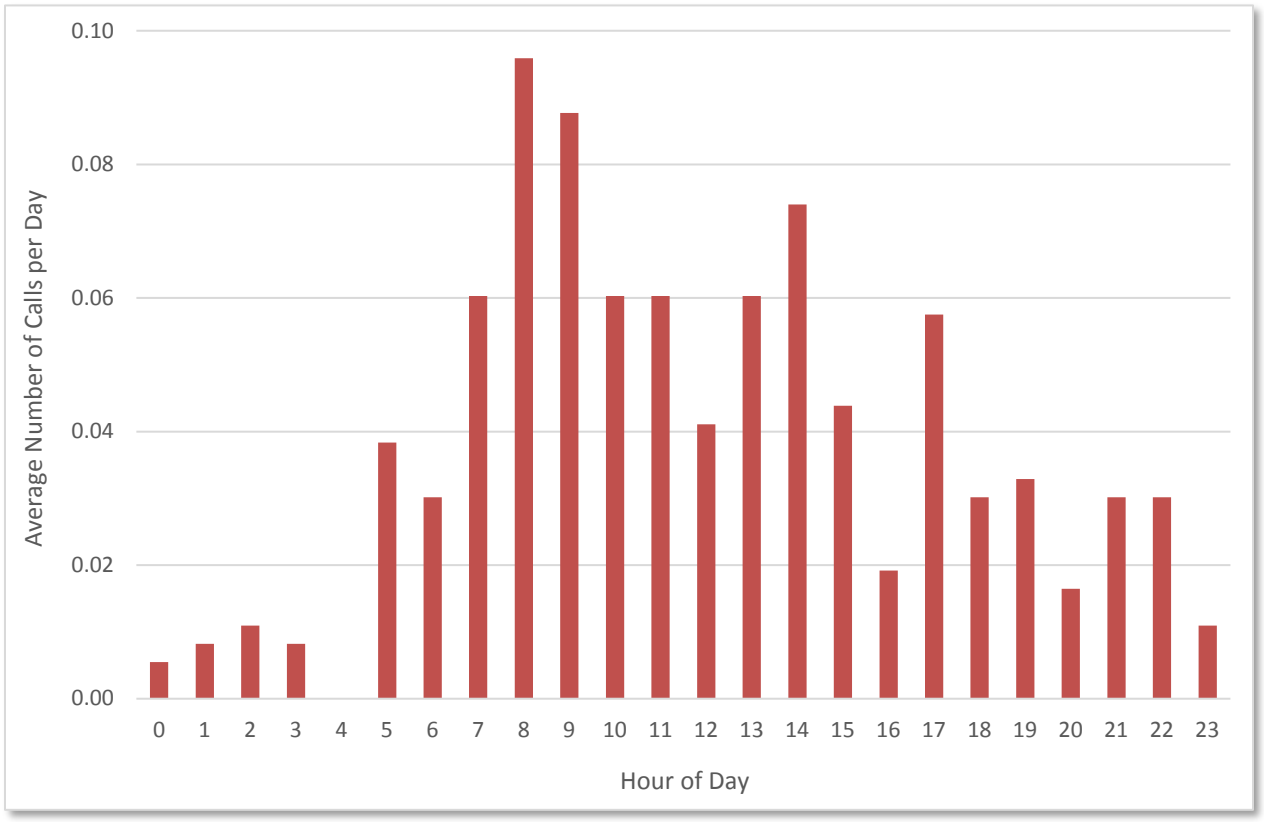


Fire related calls were also evaluated by hour of the day (Table 14; Figure 10). Some variability exists in the time of day that requests for fire related services were received. The hours between 2300 and 0400 had the lowest demands, when average number of calls per day for each of those hours ranged from 0.00 to 0.01. The highest demand for fire related services occurred at 0800 (35 total fire calls during that hour in 2021), when average number of calls per day during that hour was 0.10.

Table 14: Total Fire Related Calls and Average Calls per Day by Hour of Day

Hour of Day	Number of Calls	Average Calls per Day	Call Percentage
0	2	0.01	0.6
1	3	0.01	0.9
2	4	0.01	1.2
3	3	0.01	0.9
4	0	0.00	0.0
5	14	0.04	4.2
6	11	0.03	3.3
7	22	0.06	6.6
8	35	0.10	10.5
9	32	0.09	9.6
10	22	0.06	6.6
11	22	0.06	6.6
12	15	0.04	4.5
13	22	0.06	6.6
14	27	0.07	8.1
15	16	0.04	4.8
16	7	0.02	2.1
17	21	0.06	6.3
18	11	0.03	3.3
19	12	0.03	3.6
20	6	0.02	1.8
21	11	0.03	3.3
22	11	0.03	3.3
23	4	0.01	1.2
Total	**333**	**0.9**	**100.0**

Figure 10: Average Fire Related Calls per Day by Hour of Day



Fire related requests within SFD's jurisdiction accounted for 14.6% of the total requests for service during 2021 and averaged 0.9 requests per day (Figure 1; Table 4). Fire related incidents are an aggregated category of the various initial incident types available in the data file. Table 15 provides details for these fire related incidents by nature of the call (i.e., variable "Problem" in the data file; entries are presented verbatim from the data file).

Table 15: Total Fire Related Calls by Nature of Call

Nature of Call[1]	Number of Calls	Percentage of Total Fire Service Demand
yFire Initiated Call	172	51.7
yElectrical Hazard	39	11.7
yOdor/Smoke Smell Outside	24	7.2
yFire Outside	19	5.7
yRQ Fire by Public Safety	15	4.5
ySmoke in Structure-No Flames	13	3.9
yFire Vehicle	12	3.6
yStructure Fire-Flames Seen	7	2.1
yFire Report	6	1.8
yBrush Fire	5	1.5
yFire Unknown	5	1.5
yChimney Fire	3	0.9
yElectrical Fire	3	0.9
yFire Dive	3	0.9
yOven Fire Contained to Oven	3	0.9
yMarine Fire	2	0.6
yDumpster Fire	1	0.3
ySevere Weather Alert-ALL	1	0.3
Total	**333**	**100.0**

[1]Entries are presented verbatim from the data file.

RESPONSE VOLUME AND BUSY TIME

Busy time, or time on task, was measured from unit dispatch date and time to unit clear date and time. All units assigned to SFD made 2,494 responses across all jurisdictions and were busy on calls for a total of 825.6 hours during 2021 (Table 16). Overall, average busy minutes per response was 19.9 minutes, and average number of responses per call was 1.3. Data related to 39 mutual aid given calls were not available.

Table 16: Number of Calls, Number of Responses, and Total Busy Time by Jurisdiction, Program, and Call Type – SFD Units

Jurisdiction	Program and Call Type	Number of Calls[1]	Number of Responses[2]	Average Responses per Call	Total Busy Hours	Responses with Time Data[3]	Average Busy Minutes per Response	Average Calls per Day	Average Responses per Day
All	**EMS**	**1,753**	**2,119**	**1.2**	**600.3**	**2,119**	**17.0**	**4.8**	**5.8**
	Agency Assist	*34*	*43*	*1.3*	*12.2*	*43*	*17.1*	*0.1*	*0.1*
	Breathing Difficulty	*191*	*210*	*1.1*	*61.5*	*210*	*17.6*	*0.5*	*0.6*
	Cardiac and Stroke	*153*	*227*	*1.5*	*74.7*	*227*	*19.7*	*0.4*	*0.6*
	Fall and Injury	*378*	*408*	*1.1*	*116.6*	*408*	*17.1*	*1.0*	*1.1*
	Fire Alarm	*172*	*222*	*1.3*	*58.6*	*222*	*15.8*	*0.5*	*0.6*
	Illness and Other	*540*	*568*	*1.1*	*151.3*	*568*	*16.0*	*1.5*	*1.6*
	Mutual Aid	*1*	*1*	*1.0*	*0.1*	*1*	*3.3*	*< 0.1*	*< 0.1*
	MVA	*91*	*231*	*2.5*	*62.6*	*231*	*16.3*	*0.2*	*0.6*
	Overdose and Psychiatric[4]	*46*	*50*	*1.1*	*19.4*	*50*	*23.3*	*0.1*	*0.1*
	Seizure and Unconsciousness	*147*	*159*	*1.1*	*43.5*	*159*	*16.4*	*0.4*	*0.4*
	Fire	**152**	**315**	**2.1**	**187.9**	**315**	**35.8**	**0.4**	**0.9**
	Agency Assist	*13*	*15*	*1.2*	*4.4*	*15*	*17.6*	*< 0.1*	*< 0.1*
	Fire Other	*59*	*132*	*2.2*	*66.5*	*132*	*30.2*	*0.2*	*0.4*
	Hazardous Condition	*38*	*47*	*1.2*	*20.6*	*47*	*26.3*	*0.1*	*0.1*
	Outside Fire	*23*	*53*	*2.3*	*23.1*	*53*	*26.1*	*0.1*	*0.1*
	Structure Fire	*7*	*39*	*5.6*	*59.6*	*39*	*91.6*	*< 0.1*	*0.1*
	Vehicle Fire	*12*	*29*	*2.4*	*13.7*	*29*	*28.4*	*< 0.1*	*0.1*
	Hazmat	**32**	**46**	**1.4**	**32.1**	**46**	**41.9**	**0.1**	**0.1**
	Rescue	**11**	**14**	**1.3**	**5.3**	**14**	**22.5**	**< 0.1**	**< 0.1**

Jurisdiction	Program and Call Type	Number of Calls[1]	Number of Responses[2]	Average Responses per Call	Total Busy Hours	Responses with Time Data[3]	Average Busy Minutes per Response	Average Calls per Day	Average Responses per Day
	Total	**1,948**	**2,494**	**1.3**	**825.6**	**2,494**	**19.9**	**5.3**	**6.8**
Within SFD[5]	**EMS**	**1,750**	**2,116**	**1.2**	**600.1**	**2,116**	**17.0**	**4.8**	**5.8**
	Agency Assist	34	43	1.3	12.2	43	17.1	0.1	0.1
	Breathing Difficulty	191	210	1.1	61.5	210	17.6	0.5	0.6
	Cardiac and Stroke	152	226	1.5	74.5	226	19.8	0.4	0.6
	Fall and Injury	378	408	1.1	116.6	408	17.1	1.0	1.1
	Fire Alarm	172	222	1.3	58.6	222	15.8	0.5	0.6
	Illness and Other	540	568	1.1	151.3	568	16.0	1.5	1.6
	Mutual Aid	1	1	1.0	0.1	1	3.3	< 0.1	< 0.1
	MVA	90	230	2.6	62.5	230	16.3	0.2	0.6
	Overdose and Psychiatric[4]	46	50	1.1	19.4	50	23.3	0.1	0.1
	Seizure and Unconsciousness	146	158	1.1	43.5	158	16.5	0.4	0.4
	Fire	**152**	**315**	**2.1**	**187.9**	**315**	**35.8**	**0.4**	**0.9**
	Agency Assist	13	15	1.2	4.4	15	17.6	< 0.1	< 0.1
	Fire Other	59	132	2.2	66.5	132	30.2	0.2	0.4
	Hazardous Condition	38	47	1.2	20.6	47	26.3	0.1	0.1
	Outside Fire	23	53	2.3	23.1	53	26.1	0.1	0.1
	Structure Fire	7	39	5.6	59.6	39	91.6	< 0.1	0.1
	Vehicle Fire	12	29	2.4	13.7	29	28.4	< 0.1	0.1
	Hazmat	**32**	**46**	**1.4**	**32.1**	**46**	**41.9**	**0.1**	**0.1**
	Rescue	**11**	**14**	**1.3**	**5.3**	**14**	**22.5**	**< 0.1**	**< 0.1**
	Total	**1,945**	**2,491**	**1.3**	**825.3**	**2,491**	**19.9**	**5.3**	**6.8**

Jurisdiction	Program	Number of Calls[1]	Number of Responses[2]	Average Responses per Call	Total Busy Hours	Responses with Time Data[3]	Average Busy Minutes per Response	Average Calls per Day	Average Responses per Day
Outside of SFD[6]	**EMS**	**3**	**3**	**1.0**	**0.3**	**3**	**5.3**	**< 0.1**	**< 0.1**
	Agency Assist	*0*	--	--	--	--	--	--	--
	Breathing Difficulty	*0*	--	--	--	--	--	--	--
	Cardiac and Stroke	*1*	*1*	*1.0*	*0.1*	*1*	*7.6*	*< 0.1*	*< 0.1*
	Fall and Injury	*0*	--	--	--	--	--	--	--
	Fire Alarm	*0*	--	--	--	--	--	--	--
	Illness and Other	*0*	--	--	--	--	--	--	--
	Mutual Aid	*0*	--	--	--	--	--	--	--
	MVA	*1*	*1*	*1.0*	*0.1*	*1*	*7.0*	*< 0.1*	*< 0.1*
	Overdose and Psychiatric	*0*	--	--	--	--	--	--	--
	Seizure and Unconsciousness	*1*	*1*	*1.0*	*0.0*	*1*	*1.3*	*< 0.1*	*< 0.1*
	Fire	**0**	**--**	**--**	**--**	**--**	**--**	**--**	**--**
	Agency Assist	*0*	--	--	--	--	--	--	--
	Fire Other	*0*	--	--	--	--	--	--	--
	Hazardous Condition	*0*	--	--	--	--	--	--	--
	Outside Fire	*0*	--	--	--	--	--	--	--
	Structure Fire	*0*	--	--	--	--	--	--	--
	Vehicle Fire	*0*	--	--	--	--	--	--	--
	Hazmat	**0**	**--**	**--**	**--**	**--**	**--**	**--**	**--**
	Rescue	**0**	**--**	**--**	**--**	**--**	**--**	**--**	**--**
	Total	**3**	**3**	**1.0**	**0.3**	**3**	**5.3**	**< 0.1**	**< 0.1**

[1]"Number of Calls" reflects an adjusted number of calls following any exclusion activity to align with responses made by valid units assigned to SFD.
[2]"Number of Responses" reflects the total number of records in the data file associated with responses made by valid units assigned to SFD, regardless of calculated busy time.
[3]"Responses with Time Data" reflects the number of records in the data file associated with responses made by valid units assigned to SFD with calculated busy time not otherwise excluded.
[4]Includes 26 "Accidental OD/Poisoning-1" calls, three "Accidental OD/Poisoning-2" calls, and 17 "Suicide or Attempted" calls, based on "Problem" values in the data file.
[5]Cities considered to be within the SFD jurisdiction included Grant, May Township, Stillwater, Stillwater Township, and "NULL" values, as well as records missing a value for city.
[6]Cities considered to be outside of the SFD jurisdiction included Bayport, Cottage Grove, Hudson, Oak Park Heights, Saint Joseph Township, Saint Paul Park, Somerset, and Woodbury.

Although data related to the 39 mutual aid given calls were restricted to incident numbers only, estimates are offered for additional busy hours based on the metrics derived from observed data during 2021. Because the sample size of observed data for calls outside of SFD's jurisdiction is so small, metrics derived from the "All" jurisdictions calculations were used.

Assuming that SFD responded with approximately 1.3 units per each of the 39 mutual aid given calls, it is estimated that SFD units made an additional 50.7 responses during 2021, for an estimated total of 2,545 responses. Assuming also that SFD units spent an average of 19.9 minutes on task during each of those responses, it is estimated that SFD units contributed an additional 1,008.9 minutes or 16.8 busy hours to total busy hours during 2021, for an estimated total of 842.4 busy hours.

Overall, all units assigned to outside agencies responding to calls within SFD's jurisdiction made 46 responses and were busy on calls for a total of 49.1 hours during 2021 (Table 17). Overall, average busy minutes per response was 64.0 minutes, and average number of responses per call was 1.9.

Table 17: Number of Calls, Number of Responses, and Total Busy Time by Program and Determinant – Outside Agency Units in SFD's Jurisdiction

Program	Number of Calls[1]	Number of Responses[2]	Average Responses per Call	Total Busy Hours	Responses with Time Data[3]	Average Busy Minutes per Response	Average Calls per Day	Average Responses per Day
EMS	10	11	1.1	3.5	11	19.3	< 0.1	< 0.1
Fire	12	33	2.8	45.5	33	82.7	< 0.1	0.1
Hazmat	2	2	1.0	< 0.1	2	0.8	< 0.1	< 0.1
Rescue	0	--	--	--	--	--	--	--
Total	**24**	**46**	**1.9**	**49.1**	**46**	**64.0**	**0.1**	**0.1**

[1]"Number of Calls" reflects an adjusted number of calls following any exclusion activity to align with responses made by units assigned to outside agencies.
[2]"Number of Responses" reflects the total number of records in the data file associated with responses made by units assigned to outside agencies, regardless of calculated busy time.
[3]"Responses with Time Data" reflects the number of records in the data file associated with responses made by units assigned to outside agencies with calculated busy time not otherwise excluded.

Number of Responding Units

Emergency Medical Services

We analyzed number of responding SFD units to calls within SFD's jurisdiction by EMS related call type (Table 18). Overall, 86.2% of EMS related calls were responded to by one unit, 8.8% were responded to by two units, and 3.2% were responded to by three units. Average number of responses per call was 1.2 (Table 16).

Table 18: Number of Responding SFD Units in SFD's Jurisdiction by EMS Related Call Type

Call Category	Number of Responding Units							
	1	2	3	4	5	6	7 or More	Total
Agency Assist	27	6	0	1	0	0	0	34
Breathing Difficulty	180	6	2	3	0	0	0	191
Cardiac and Stroke	112	17	12	11	0	0	0	152
Fall and Injury	350	26	2	0	0	0	0	378
Fire Alarm	130	36	4	2	0	0	0	172
Illness and Other	516	21	2	1	0	0	0	540
Mutual Aid	1	0	0	0	0	0	0	1
MVA	14	32	31	8	3	2	0	90
Overdose and Psychiatric	43	2	1	0	0	0	0	46
Seizure and Unconsciousness	136	8	2	0	0	0	0	146
Total	**1,509**	**154**	**56**	**26**	**3**	**2**	**0**	**1,750**
Percentage	**86.2**	**8.8**	**3.2**	**1.5**	**0.2**	**0.1**	**0.0**	**100.0**

Fire Related Services

We also analyzed number of responding SFD units to calls within SFD's jurisdiction by fire related call type (Table 19). Overall, 48.7% of fire related calls were responded to by one unit, 27.6% were responded to by two units, and 8.6% were responded to by three units. Average number of responses per call was 2.1 (Table 16).

For structure fires, 71.4% of calls (5/7) were responded to by five or more SFD units (Table 19). The maximum number of SFD units responding to a structure fire call during 2021 was 10 (i.e., five different SFD units dispatched twice each to the same structure fire call over time). SFD units were busy on structure fire calls for 59.6 hours during 2021, making 39 responses to seven structure fire calls and averaging 5.6 responses per call. Average busy minutes per response was 91.6 minutes.

Table 19: Number of Responding SFD Units in SFD's Jurisdiction by Fire Related Call Type

Call Category	Number of Responding Units							Total
	1	2	3	4	5	6	7 or More	
Agency Assist	11	2	0	0	0	0	0	13
Fire Other	24	19	6	5	4	0	1	59
Hazardous Condition	30	7	1	0	0	0	0	38
Outside Fire	7	9	1	5	1	0	0	23
Structure Fire	0	0	2	0	2	1	2	7
Vehicle Fire	2	5	3	2	0	0	0	12
Total	**74**	**42**	**13**	**12**	**7**	**1**	**3**	**152**
Percentage	**48.7**	**27.6**	**8.6**	**7.9**	**4.6**	**0.7**	**2.0**	**100.0**

Unit Hour Utilization

Time on task is necessary to evaluate best practices in efficient system delivery and consider the impact workload has on personnel. Unit Hour Utilization (UHU) values represent the proportion of the work period (e.g., 24 hours) that is utilized responding to requests for service.

Historically, the International Association of Fire Fighters (IAFF) has recommended that 24-hour units utilize 0.30, or 30% workload as an upper threshold.[1] In other words, this recommendation would have personnel spend no more than 7.2 hours per day on emergency incidents. These thresholds take into consideration the necessity to accomplish non-emergency activities such as training, health and wellness, public education, and fire inspections. The 4th edition of the IAFF EMS Guidebook no longer specifically identifies an upper threshold. However, *FITCH* recommends that an upper unit utilization threshold of approximately 0.30, or 30%, would be considered best practice. In other words, units and personnel should not exceed 30%, or 7.2 hours, of their workday responding to calls. These recommendations are also validated in the literature. For example, in their review of the City of Rolling Meadows, the Illinois Fire Chiefs Association utilized a UHU threshold of 0.30 as an indication to add additional resources.[2] Similarly, in a standards of cover study facilitated by the Center for Public Safety Excellence, the Castle Rock Fire and Rescue Department utilizes a UHU of 0.30 as the upper limit in their standards of cover due to the necessity to accomplish other non-emergency activities.[3]

Unit busy time analyses included all SFD units designated by the SFD leadership team as valid units (Table 20), whereas UHU calculations are only reported for units identified by SFD leadership as 24-hour-per-day units or as 7A-5P M-F units (i.e., no on-call units; Table 21; Figure 11). All units and cross-staffed teams had UHU values < 0.30 (Figure 11).

Table 20: Unit Total Busy Hours

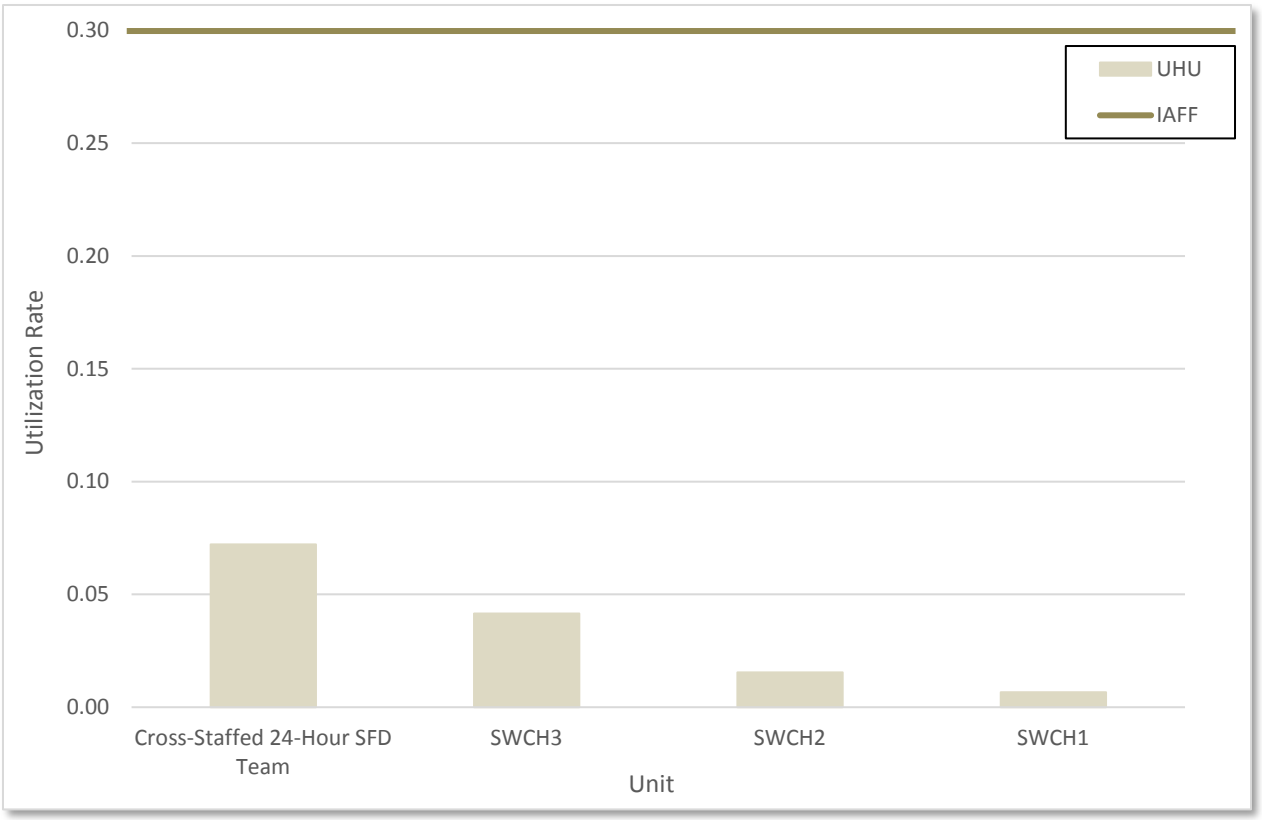
Unit ID	Unit Type	Total Busy Hours	Unit ID	Unit Type	Total Busy Hours
SWAB1	Airboat	1.0	SWE1	Engine	94.9
SWB1	Brush Truck	31.4	SWE2	Engine	2.9
SWB2	Brush Truck	11.3	SWE3	Engine	108.0
SWCH1	Admin	17.4	SWFB1	Fire Boat	3.4
SWCH2	Admin	40.1	SWL1	Ladder Truck	10.1
SWCH3	Admin	108.1	SWR1	Rescue	369.6
SWCH4	Admin	17.8	SWT1	Water Tender	9.7
Total					**825.6**

[1] International Association of Firefighters. (1995). Emergency *Medical Services: A Guidebook for Fire-Based Systems.* Washington, DC: Author. (p. 11)
[2] Illinois Fire Chiefs Association. (2012). An *Assessment of Deployment and Station Location: Rolling Meadows Fire Department.* Rolling Meadows, Illinois: Author. (pp. 54-55)
[3] Castle Rock Fire and Rescue Department. (2011). Community *Risk Analysis and Standards of Cover.* Castle Rock, Colorado: Author. (p. 58)

Table 21: Unit Hour Utilization and Total Busy Hours with Cross-Staffing

Staffing Model	Unit ID	Unit Type	Total Busy Hours	UHU Value
24 Hours Per Day	SWAB1	Airboat	632.1	0.07
	SWB1	Brush Truck		
	SWB2	Brush Truck		
	SWE1	Engine		
	SWE2	Engine		
	SWE3	Engine		
	SWFB1	Fire Boat		
	SWR1	Rescue		
	SWT1	Water Tender		
7A-5P M-F	SWCH1	Admin	17.4	0.01
	SWCH2	Admin	40.1	0.02
	SWCH3	Admin	108.1	0.04

Figure 11: Unit Hour Utilization



TRANSPORT

We analyzed outcomes of EMS related responses appearing in a separate EMS provider data file provided by SFD. Records reflected responses from EMS providers Allina Health EMS – North Metro, Lakeview EMS, My Health Fairview, and Maplewood EMS within the cities of Stillwater and Grant. Responses were considered to be transport responses if the value for the incident disposition variable reported "Treated and Transported by this EMS Unit." Each unique record ID in the data file was considered to represent one unique EMS response. There were 1,751 unique IDs appearing in the data file.

The number of unique EMS related responses indicating a patient transport during 2021 totaled 1,305 (1,305 of 1,751 total EMS related responses; 74.5% transport rate; Table 22), averaging 3.6 transport responses per day (Table 23). Duration of a response is defined as the difference between the unit dispatch date and time and unit clear date and time (i.e., busy time). The average duration of a non-transport EMS related response was 21.8 minutes, and the average duration of a transport EMS related response was 45.2 minutes.

Table 22: EMS Non-Transport and Transport Response by Complaint Reported by Dispatch

	Non-Transport		Transport			
Complaint Reported by Dispatch	Average Response Duration (Minutes)	Number of Responses	Average Response Duration (Minutes)	Number of Responses	Total Number of Responses	Transport Rate (%)
Abdominal Pain/Problems	20.6	3	40.0	44	47	93.6
Allergic Reaction/Stings	22.7	14	38.6	15	29	51.7
Animal Bite	15.1	1	--	0	1	0.0
Assault/Battery/Abuse Victim	19.6	15	48.4	9	24	37.5
Back Pain (Non-Traumatic)	34.0	1	40.7	20	21	95.2
Breathing Problem	22.3	33	45.4	179	212	84.4
Burns/Explosion	18.0	2	--	0	2	0.0
Carbon Monoxide/Hazmat/Inhalation/CBRN	30.7	4	--	0	4	0.0
Cardiac Arrest/Death	29.4	5	65.0	13	18	72.2
Chest Pain (Non-Traumatic)	22.0	17	47.2	78	95	82.1

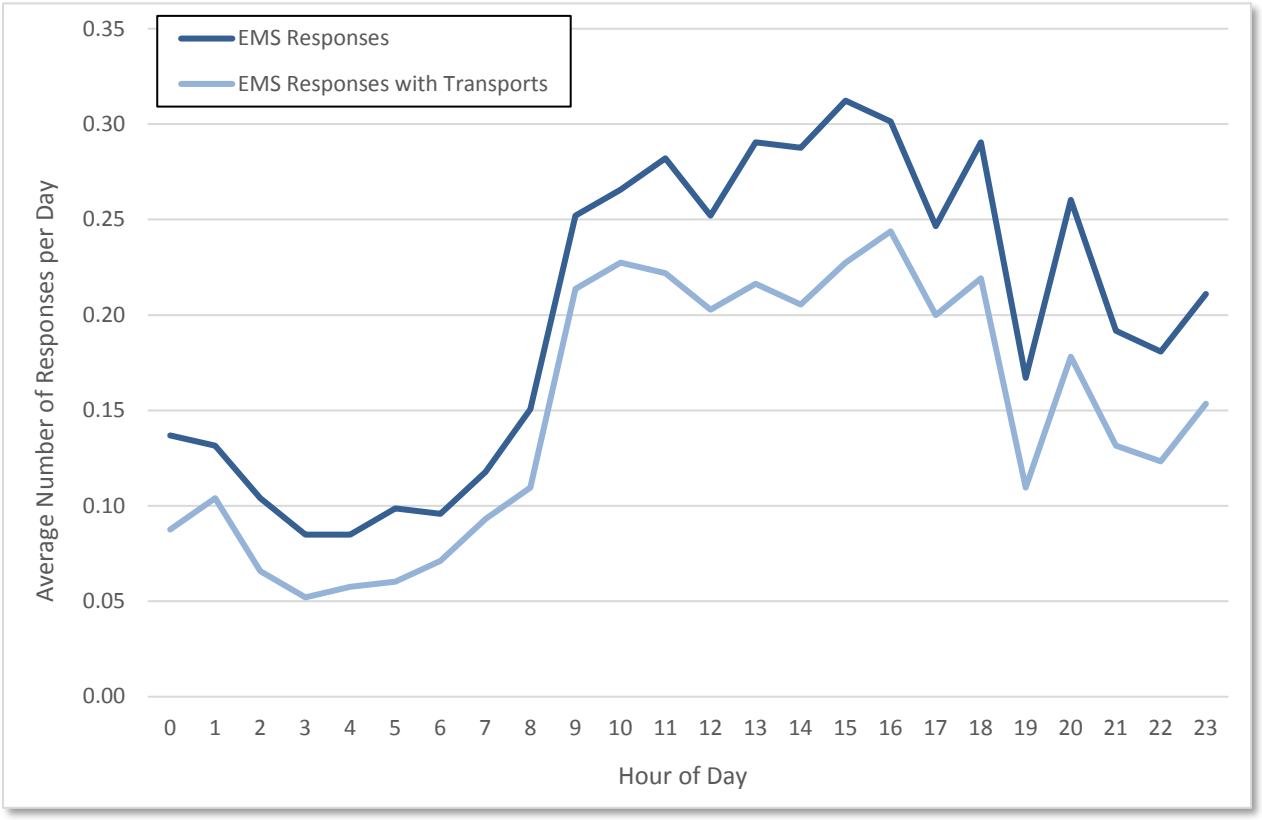
Complaint Reported by Dispatch	Non-Transport		Transport		Total Number of Responses	Transport Rate (%)
	Average Response Duration (Minutes)	Number of Responses	Average Response Duration (Minutes)	Number of Responses		
Choking	12.7	1	--	0	1	0.0
Convulsions/Seizure	19.4	37	48.4	50	87	57.5
Diabetic Problem	29.2	16	48.0	26	42	61.9
Electrocution/Lightning	--	0	79.0	1	1	100.0
Eye Problem/Injury	--	0	29.2	1	1	100.0
Falls	19.4	105	37.6	190	295	64.4
Headache	25.0	2	32.6	10	12	83.3
Heart Problems/AICD	21.5	7	48.2	34	41	82.9
Heat/Cold Exposure	28.0	1	35.6	4	5	80.0
Hemorrhage/Laceration	22.4	3	38.0	30	33	90.9
Medical Alarm	22.4	9	43.2	12	21	57.1
Medical Transport	--	0	75.3	4	4	100.0
No Other Appropriate Choice	--	0	47.5	15	15	100.0
Overdose/Poisoning/Ingestion	23.3	14	51.5	53	67	79.1
Pregnancy/Childbirth/Miscarriage	--	0	61.6	3	3	100.0
Psychiatric Problem/Abnormal Behavior/Suicide Attempt	25.2	23	67.6	82	105	78.1
Sick Person	23.9	40	42.5	219	259	84.6
Standby	25.3	1	24.1	1	2	50.0
Stroke/CVA	29.5	9	44.5	47	56	83.9
Traffic/Transportation Incident	19.4	37	41.5	42	79	53.2
Traumatic Injury	16.9	7	47.8	18	25	72.0
Unconscious/Fainting/Near-Fainting	23.0	27	42.5	87	114	76.3
Unknown Problem/Person Down	19.2	12	44.2	18	30	60.0
Total	**21.8**	**446**	**45.2**	**1,305**	**1,751**	**74.5**

We also analyzed variation of total responses and transport responses by hour of day (Table 23; Figure 12). The variation of total responses and transport responses followed a similar pattern. The busiest period for transport responses occurred at 1600, with 89 transport responses occurring in 2021 during that hour of the day. The peak transport rate occurred at 1000, wherein 83 of 97 responses (85.6%) resulted in a patient transport.

Table 23: Total EMS Responses, EMS Responses with Transports, and Average Responses per Day by Hour of Day

Hour of Day	Number of Responses	Number of Responses with Transports	Average Responses per Day	Average Responses with Transports per Day	Transport Rate (%)
0	50	32	0.14	0.09	64.0
1	48	38	0.13	0.10	79.2
2	38	24	0.10	0.07	63.2
3	31	19	0.08	0.05	61.3
4	31	21	0.08	0.06	67.7
5	36	22	0.10	0.06	61.1
6	35	26	0.10	0.07	74.3
7	43	34	0.12	0.09	79.1
8	55	40	0.15	0.11	72.7
9	92	78	0.25	0.21	84.8
10	97	83	0.27	0.23	85.6
11	103	81	0.28	0.22	78.6
12	92	74	0.25	0.20	80.4
13	106	79	0.29	0.22	74.5
14	105	75	0.29	0.21	71.4
15	114	83	0.31	0.23	72.8
16	110	89	0.30	0.24	80.9
17	90	73	0.25	0.20	81.1
18	106	80	0.29	0.22	75.5
19	61	40	0.17	0.11	65.6
20	95	65	0.26	0.18	68.4
21	70	48	0.19	0.13	68.6
22	66	45	0.18	0.12	68.2
23	77	56	0.21	0.15	72.7
Total	**1,751**	**1,305**	**4.8**	**3.6**	**74.5**

Figure 12: Average Responses and Responses with Transports per Day by Hour of Day



SYSTEM PERFORMANCE

The first step in determining the current state of the system's deployment model is to establish baseline measures of performance. This analysis is crucial to the ability to discuss alternatives to the status quo and in identifying opportunities for improvement. This portion of the analysis will focus efforts on elements of response time and the cascade of events that lead to timely response with the appropriate apparatus and personnel to mitigate the event. Response time goals should be examined in terms of total reflex time, or total response time, which includes the dispatch or alarm processing time, turnout time, and travel time.

Cascade of Events

The cascade of events is the sum of the individual elements of time beginning with a state of normalcy and continuing until normalcy is once again restored through the mitigation of the event. The elements of time that are important to the ultimate outcome of a structure fire or critical medical emergency begin with the initiation of the event. For example, the first onset of chest pain begins the biological and scientific time clock for heart damage irrespective of when 911 is notified. Similarly, a fire may begin and burn undetected for a period of time before the fire department is notified. The emergency response system does not have control over the time interval for recognition or the choice to request assistance.

Therefore, the department utilizes quantifiable "hard" data points to measure and manage system performance. These elements include alarm processing time, turnout time, travel time, and total response time. An example of the cascade of events and the elements of performance utilized by the department is provided on the next page (Figure 13).[4]

Detection

Detection is the element of time between the time an event occurs (when someone detects it), and the time the emergency response system has been notified. This is typically accomplished by calling the 911 Primary Safety Answering Point (PSAP).

Alarm Processing Time

Alarm processing time (or dispatch time) is the element of time measured between when 911 answers the 911 call, processes the information, and subsequently dispatches departmental units.

Turnout Time

Turnout time is the element of time that is measured between the time the department is dispatched or alerted of the emergency incident, and the time when the unit is en route to the call.

[4] Olathe Fire Department. (2012). Adapted from Community Risk and Emergency Services Analysis: Standard of Cover. Olathe, Kansas: Author.

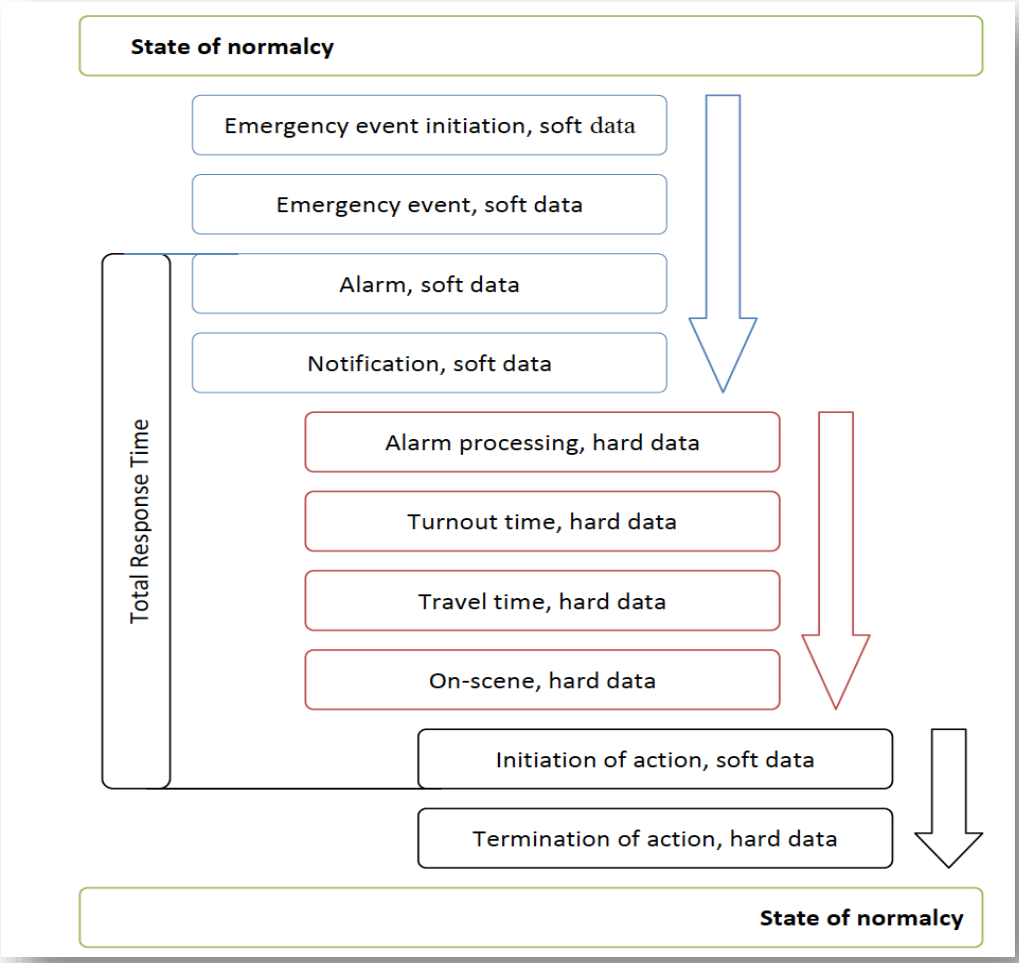
Travel Time

Travel time is the element of time between when a unit went en route, or began to travel to the incident, and the unit's arrival on scene.

Total Response Time

Total response time, or total reflex time, is the total time required to arrive on scene beginning with 911 answering the phone request for service and the time that the units arrive on scene.

Figure 13: Cascade of Events



Response Time Continuum

Emergency Medical Services

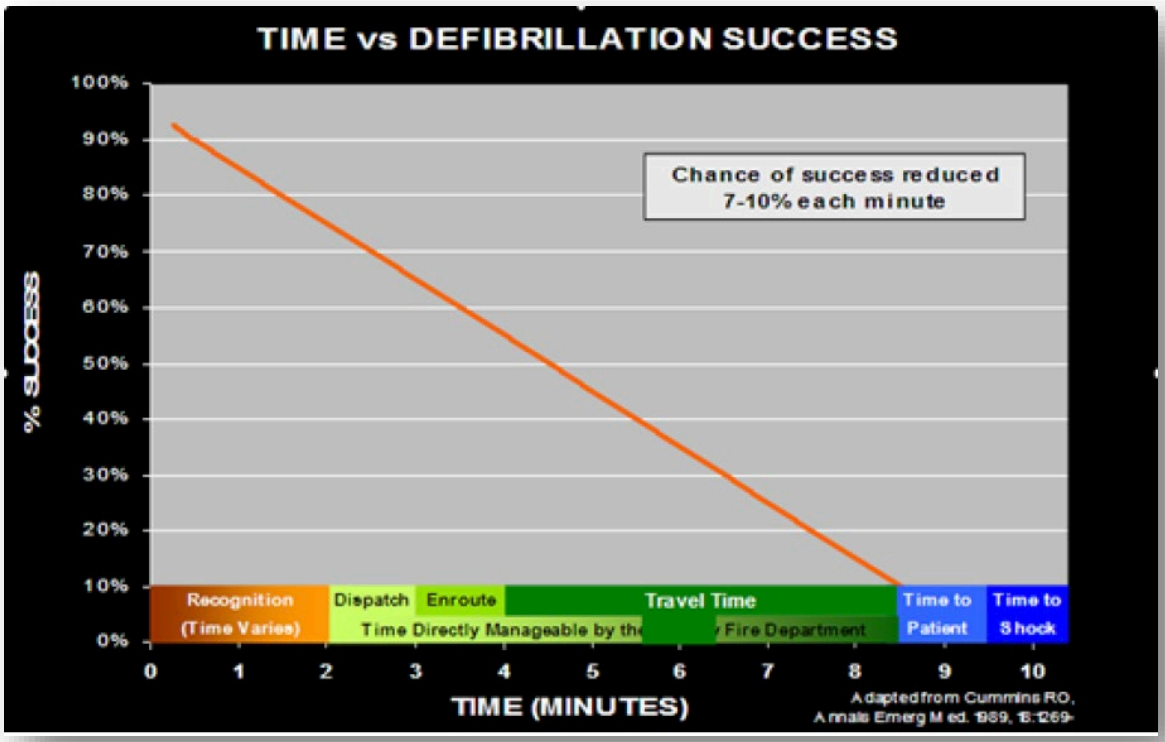
The effective response to EMS incidents has a direct correlation to the ability to respond within a specified period of time. However, unlike structure fires, responding to EMS incidents introduces considerable variability in the level of clinical acuity. From this perspective, the association of response time and clinical outcome varies depending on the severity of the injury or the illness. Research has demonstrated that the overwhelming majority of requests for EMS are not time sensitive between five minutes and 11 minutes for emergency responses and 13 minutes for non-emergency responses.[5] The 12-minute upper threshold is only the upper limit of the available research and is not a clinically significant time measure, as patients were not found to have a significantly different clinical outcome when the 12-minute threshold was exceeded.[6]

Out-of-hospital sudden cardiac arrest is the most identifiable and measured incident type for EMS. In an effort to demonstrate the relationship between response time and clinical outcome, a representation of the cascade of events and the time to defibrillation (shock) is presented in Figure 14. The American Heart Association (AHA) has determined that brain damage will begin to occur between four and six minutes and become irreversible after ten minutes without intervention.

Modern sudden cardiac arrest protocols recognize that high quality Cardio-Pulmonary Resuscitation (CPR) at the Basic Life Support (BLS) level is a quality intervention until defibrillation can be delivered in shockable rhythms. Figure 14[7] on the next page is representative of a sudden cardiac arrest that is presenting in a shockable heart rhythm such as Ventricular Fibrillation or Ventricular Tachycardia.

[5] Blackwell, T.H., & Kaufman, J.S. (April 2002). Response time effectiveness: Comparison of response time and survival in an urban emergency medical services system. *Academic Emergency Medicine,* 9(4): 289-295.
[6] Blackwell, T.H., et al. (Oct-Dec 2009). Lack of association between prehospital response times and patient outcomes. *Prehospital Emergency Care,* 13(4): 444-450.
[7] Olathe Fire Department. (2012). Adapted from Community Risk and Emergency Services Analysis: Standard of Cover. Olathe, Kansas: Author.

Figure 14: Cascade of Events for Sudden Cardiac Arrest with Shockable Rhythm

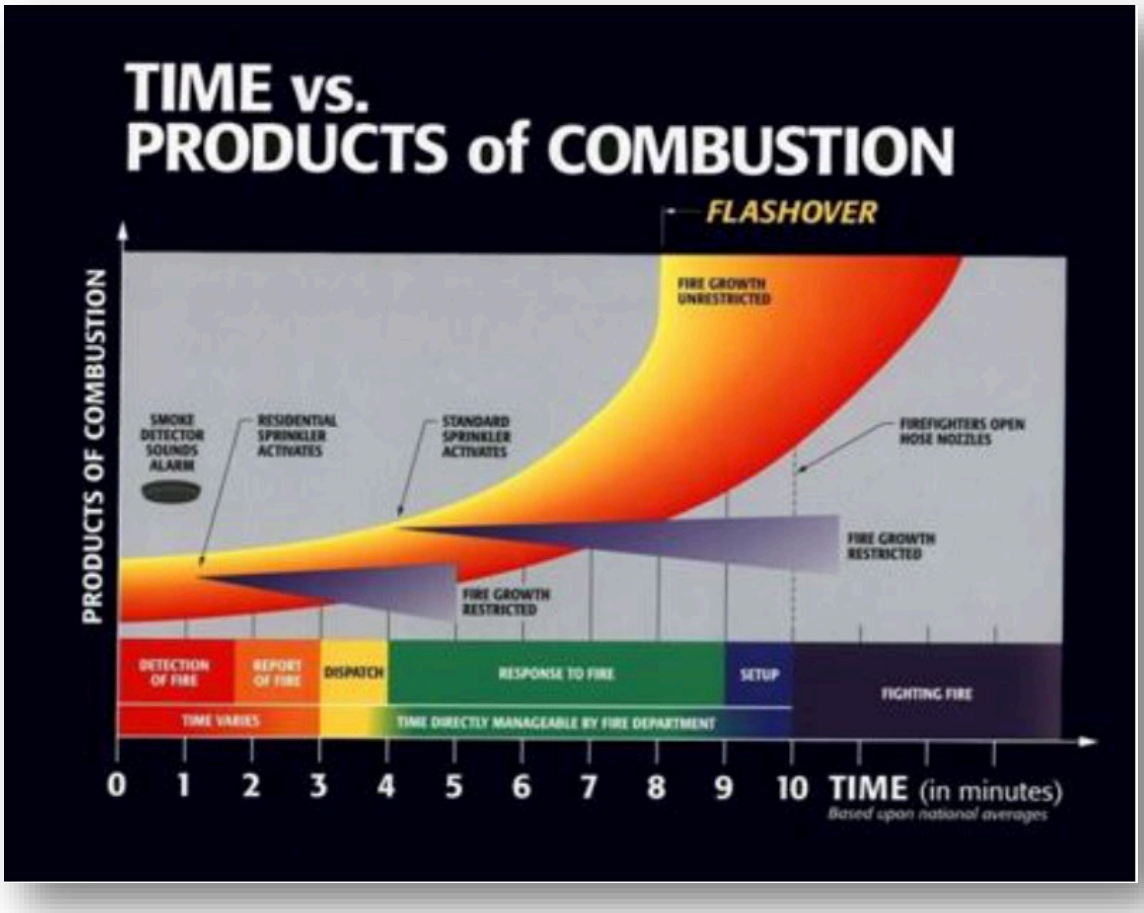


Fire Related Services

The number one priority with structural fire incidents is to save lives followed by the minimization of property damage. A direct relationship exists between the timeliness of the response and the survivability of unprotected occupants and property damage. The most identifiable point of fire behavior is flashover.

Flashover is the point in fire growth where the contents of an entire area, including the smoke, reach their ignition temperature, resulting in a rapid-fire growth rendering the area un-survivable by civilians and untenable for firefighters. Best practices would result in the fire department arriving and attacking the fire prior to the point of flashover. A representation of the traditional time temperature curve and the cascade of events is provided in Figure 15.[8]

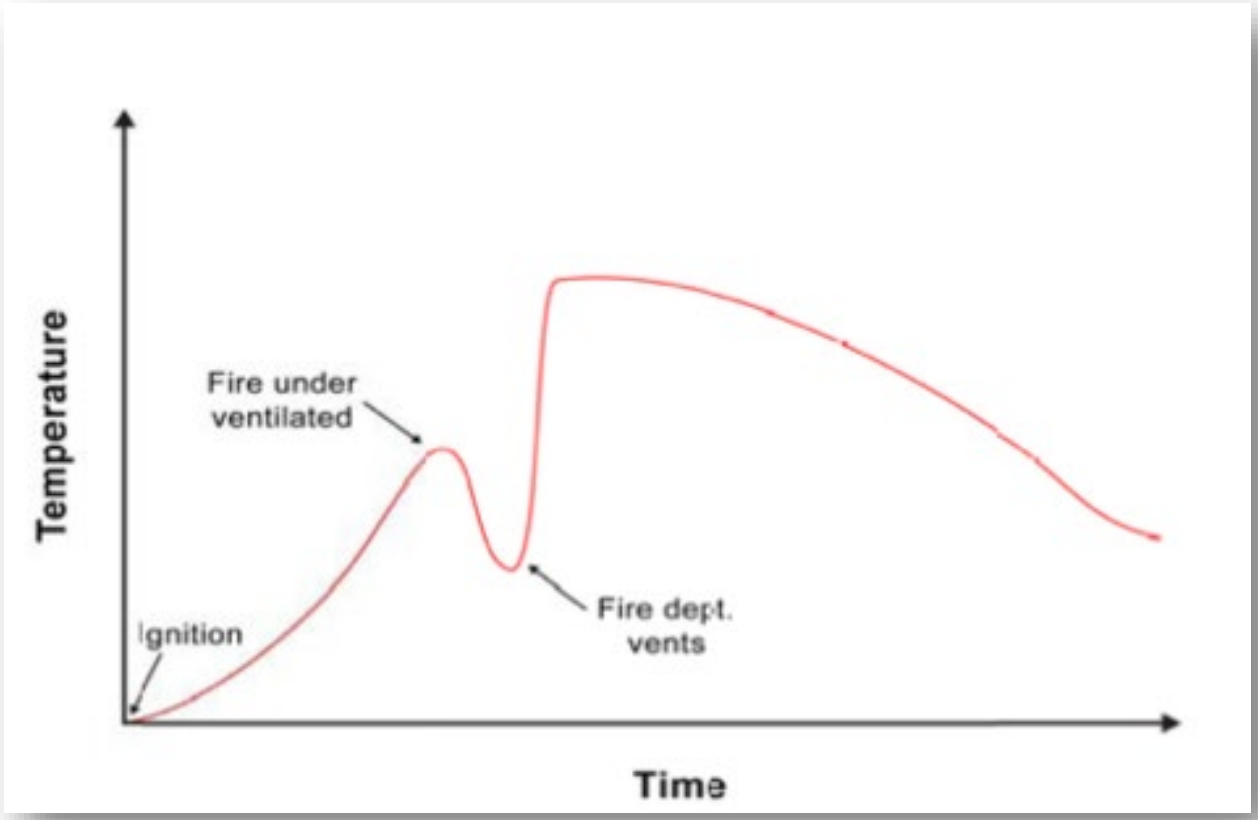
Figure 15: Example of Traditional Time Temperature Curve



[8] Example of Traditional Time Temperature Curve. Retrieved at http://www.usfa.fema.gov/downloads/pdf/coffee-break/time-vs-products-of-combustion.pdf

Recent studies by Underwriter's Laboratories (UL) have found that in compartment fires such as structure fires, flashover occurs within four minutes in modern fire environment. In addition, the UL research has identified an updated time temperature curve due to fires being ventilation-controlled rather than fuel-controlled as represented in the traditional time temperature curve. While this ventilation-controlled environment continues to provide a high risk to unprotected occupants to smoke and high heat, it does provide some advantage to property conservation efforts, as water may be applied to the fire prior to ventilation and the subsequent flashover. An example of UL's ventilation-controlled time temperature curve is provided in Figure 16.[9]

Figure 16: Ventilation-Controlled Time Temperature Curve



[9] UL/NIST Ventilation Controlled Time Temperature Curve. Retrieved from http://www.nist.gov/fire/fire_behavior.cfm

First Arriving SFD Unit Performance

The analyses in this section focus on performance times related to dispatch (or alarm processing), turnout, travel, and response times, as follows:

"Dispatch Time" was calculated as Unit Assigned Date and Time minus Response Date and Time
"Turnout Time" was calculated as Unit Enroute Date and Time minus Unit Assigned Date and Time
"Travel Time" was calculated as Unit Arrival Date and Time minus Unit Enroute Date and Time
"Response Time" was calculated as Unit Arrival Date and Time minus Response Date and Time

"Response Time" may also be calculated by summing relevant dispatch, turnout, and travel times, and "Average Response Time" may be derived by summing relevant average dispatch, turnout, and travel times, but only when the sample data used during calculation of the outcomes are identical for all three outcomes.

Average performance times and performance times at the 90th percentile are reported in this section. The 90th percentile is presented as a more conservative and reliable measure of performance, as this measure is often more robust, or less influenced by outliers, than measures of central tendency such as the average. Best practice is to measure at the 90th percentile. In other words, 90% of all performance is captured, expecting that 10% of the time the department may experience abnormal conditions that would typically be considered outliers. For example, if the department were to report an *average* response time of six minutes, then in a normally distributed set of data, half of the responses would be longer than six minutes and half of the responses would be shorter than six minutes. Utilizing six minutes as an example again, a *90th percentile value* of six minutes communicates that 9 out of 10 times, the department performance is six minutes or better (faster) and is therefore more predictable and more clearly articulated to policy makers and the community. Note, however, that the sum of the 90th percentile values for dispatch, turnout, and travel times is not equivalent to the 90th percentile response time.

Analyses of performance times focused on emergency (lights and sirens) responses from SFD's first arriving primary front-line units for all unique incidents. Priority status was based on "Problem" values, as classified by SFD leadership. SFD units considered by department leadership to be primary front-line units appropriate for inclusion in performance time analyses included brush trucks, engines, the ladder truck, rescue units, and the water tender.

During the audit and exclusion process, calculated times with negative or zero values were excluded from all related analyses, and calculated times considered to be outliers were also excluded from all related analyses (see Appendix for more details).

Average and 90th percentile dispatch, turnout, travel, and response times by program are presented in Tables 24 and 25, respectively. Average dispatch, turnout, travel, and response times by program are depicted in Figure 17. Lastly, 90th percentile travel times by unit type are presented in Table 26.

Table 24: Average Performance Times by Program – First Arriving SFD Units in SFD's Jurisdiction

Program	Dispatch Time (Minutes)	Turnout Time (Minutes)	Travel Time (Minutes)	Response Time (Minutes)	Sample Size[1]
EMS	1.3	1.8	4.5	7.6	1,297
Fire	0.5	2.3	5.4	8.2	115
Hazmat	0.4	2.2	5.6	8.2	28
Rescue	0.4	1.7	5.6	7.8	10
Total	**1.3**	**1.8**	**4.6**	**7.7**	**1,450**

[1]Sample sizes reflect the number of responses to emergency calls made by first arriving primary front-line units assigned to SFD; due to missing or excluded time data, sample sizes corresponding to individual table metrics may be smaller.

Table 25: 90th Percentile Performance Times by Program– First Arriving SFD Units in SFD's Jurisdiction

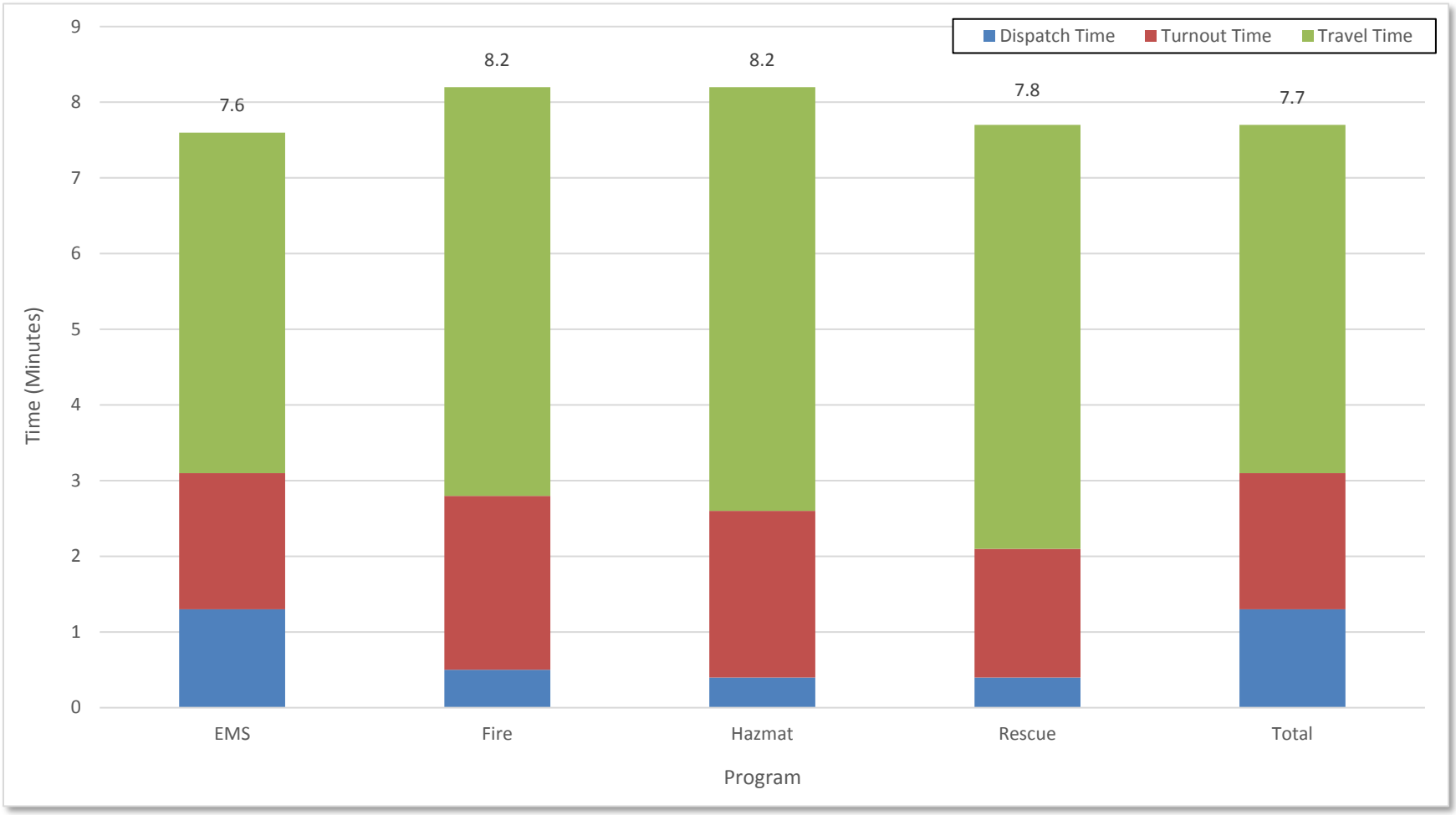
Program	Dispatch Time (Minutes)	Turnout Time (Minutes)	Travel Time (Minutes)	Response Time (Minutes)	Sample Size[1]
EMS	2.1	2.8	7.6	11.2	1,297
Fire	1.2	3.9	10.1	12.3	115
Hazmat	0.9	3.0	8.6	11.8	28
Rescue	0.9	3.3	9.8	11.6	10
Total	**2.1**	**2.9**	**7.9**	**11.3**	**1,450**

[1]Sample sizes reflect the number of responses to emergency calls made by first arriving primary front-line units assigned to SFD; due to missing or excluded time data, sample sizes corresponding to individual table metrics may be smaller.

Table 26: 90th Percentile Travel Times by Unit Type – First Arriving SFD Units in SFD's Jurisdiction

Unit Type	Travel Time (Minutes)	Number of First Arrivals	Number of First Arrivals with Travel Times
Brush Truck	9.1	54	54
Engine	8.3	425	423
Ladder Truck	--	0	--
Rescue	7.5	971	970
Water Tender	--	0	--
Total	**7.9**	**1,450**	**1,447**

Figure 17: Average Performance Times by Program – First Arriving SFD Units in SFD's Jurisdiction



Arriving EMS Provider Unit Performance

Table 27: Average and 90th Percentile Performance Times – Arriving EMS Provider Units in Stillwater and Grant

Metric	Dispatch Time (Minutes)	Turnout Time (Minutes)	Travel Time (Minutes)	Response Time (Minutes)	Sample Size[1]
Average	0.7	0.7	4.9	6.4	1,742
90th Percentile	1.3	1.6	9.4	10.7	1,742

[1]Sample sizes reflect the number of responses to calls made by arriving EMS provider units; due to missing or excluded time data, sample sizes corresponding to individual table metrics may be smaller.

Overlapped Calls Analysis

Overlapped or simultaneous calls are defined as another call being received for the department while one or more calls are already ongoing by the department. If there is an ongoing call in the department's jurisdiction wherein all units have not yet been cleared, and one or more requests for service subsequently originate from the department's jurisdiction, then the subsequent call or calls would be captured as overlapping.

Understanding the percentage of overlapped calls may help to determine the number of units to staff. In general, the larger the call volume for a department, the greater the likelihood of overlapped calls occurring. The distribution of the demand throughout the day will impact the chance of having overlapped calls. Additionally, the duration of a call plays a significant role; the longer it takes to clear a request, the greater the likelihood of having an overlapping request.

The percentage of overlapped calls during 2021 within the SFD jurisdiction was 10.0% (221/2,220; Table 28).

Table 28: Overlapped Calls

Overlapped Calls	Total Calls	Percentage of Overlapped Calls
221	2,220	10.0

BASELINE DATA

Community Demand

From the reporting periods of 2019 to 2021, year-over-year (YoY) growth related to total call volume across all jurisdictions ranged from -5.4% to 16.7% (Table 29). Average number of calls per day across all jurisdictions increased from 5.8 in 2019 to 6.4 in 2021. The decrease in call volume during 2020 is likely attributable to the impact from the Covid-19 pandemic response.

Table 29: Number of Incidents Dispatched by Jurisdiction, Program, Call Type, and Reporting Period

Jurisdiction	Program and Call Type[1]	Reporting Period[2] 2019	2020	2021
All	**EMS**	**1,688**	**1,628**	**1,910**
	Agency Assist	27	44	54
	Breathing Difficulty	202	206	215
	Cardiac and Stroke	163	146	167
	Fall and Injury	305	304	397
	Fire Alarm	174	150	175
	Illness and Other	460	495	588
	Mutual Aid	17	17	3
	MVA	99	70	102
	Overdose and Psychiatric	67	43	47
	Seizure and Unconsciousness	174	153	162
	Fire	**347**	**285**	**334**
	Agency Assist	27	8	15
	Fire Other	232	174	237
	Hazardous Condition	47	40	39
	Mutual Aid	2	1	0
	Outside Fire	19	35	24
	Structure Fire	9	13	7
	Vehicle Fire	11	14	12
	Hazmat	**35**	**30**	**32**
	Hazmat	35	30	32
	Rescue	**10**	**14**	**11**
	Rescue	10	14	11
	Unknown[3]	**27**	**36**	**39**
	Mutual Aid Given	27	36	39
	Total	**2,107**	**1,993**	**2,326**
	Average Calls per Day[4]	**5.8**	**5.4**	**6.4**
	YoY Growth	**N/A**	**-5.4%**	**16.7%**

Jurisdiction	Program and Call Type[1]	Reporting Period[2] 2019	2020	2021
Jurisdiction	Program and Call Type[1]	Reporting Period[2] 2019	2020	2021
Within SFD[5]	**EMS**	**1,682**	**1,626**	**1,905**
	Agency Assist	27	44	54
	Breathing Difficulty	200	206	214
	Cardiac and Stroke	163	146	166
	Fall and Injury	304	304	397
	Fire Alarm	172	149	175
	Illness and Other	460	495	588
	Mutual Aid	17	17	3
	MVA	98	70	100
	Overdose and Psychiatric	67	43	47
	Seizure and Unconsciousness	174	152	161
	Fire	**346**	**283**	**333**
	Agency Assist	27	8	15
	Fire Other	232	172	236
	Hazardous Condition	47	40	39
	Mutual Aid	1	1	0
	Outside Fire	19	35	24
	Structure Fire	9	13	7
	Vehicle Fire	11	14	12
	Hazmat	**35**	**30**	**32**
	Hazmat	35	30	32
	Rescue	**10**	**14**	**11**
	Rescue	10	14	11
	Total	**2,073**	**1,953**	**2,281**
	Average Calls per Day[4]	**5.7**	**5.3**	**6.2**
	YoY Growth	**N/A**	**-5.8%**	**16.8%**
Outside of SFD[6]	**EMS**	**6**	**2**	**5**
	Agency Assist	0	0	0
	Breathing Difficulty	2	0	1
	Cardiac and Stroke	0	0	1
	Fall and Injury	1	0	0
	Fire Alarm	2	1	0
	Illness and Other	0	0	0
	Mutual Aid	0	0	0
	MVA	1	0	2

Jurisdiction	Program and Call Type[1]	Reporting Period[2] 2019	2020	2021
	Overdose and Psychiatric	0	0	0
	Seizure and Unconsciousness	0	1	1
Outside of SFD[6]	**Fire**	**1**	**2**	**1**
	Agency Assist	0	0	0
	Fire Other	0	2	1
	Hazardous Condition	0	0	0
	Mutual Aid	1	0	0
	Outside Fire	0	0	0
	Structure Fire	0	0	0
	Vehicle Fire	0	0	0
	Hazmat	**0**	**0**	**0**
	Hazmat	0	0	0
	Rescue	**0**	**0**	**0**
	Rescue	0	0	0
	Unknown[3]	**27**	**36**	**39**
	Mutual Aid Given	27	36	39
	Total	**34**	**40**	**45**
	Average Calls per Day[4]	**0.1**	**0.1**	**0.1**
	YoY Growth	**N/A**	**17.6%**	**12.5%**

[1]Classifications of incident types from the data file into program and call type category are presented in the Appendix.
[2]Reporting periods reflect calendar years spanning January 1 to December 31 of each respective reporting period.
[3]Data related to "Mutual Aid Given" records were provided separately by SFD and included incident numbers only such that only call volume could be specified.
[4]Reporting period 2020 contained 366 days due to inclusion of leap year date February 29, 2020; the other reporting periods each contained 365 days.
[5]Cities considered to be within the SFD jurisdiction included Grant, May Township, Stillwater, Stillwater Township, and "NULL" values, as well as records missing a value for city.
[6]Cities considered to be outside of the SFD jurisdiction included Bayport, Cottage Grove, Hudson, Oak Park Heights, Saint Joseph Township, Saint Paul Park, Somerset, and Woodbury.

Response Volume and Busy Time

From the reporting periods of 2019 to 2021, the total number of responses to calls made by units assigned to SFD across all jurisdictions increased from 2,367 (average 6.5 responses per day) to 2,494 (average 6.8 responses per day; Table 30). Total busy hours decreased from 853.1 hours in 2019 to 825.6 hours in 2021, as average busy minutes per response decreased from 21.6 minutes in 2019 to 19.9 minutes in 2021. Due to the decrease in call volume during 2020 that is likely attributable to the impact from the Covid-19 pandemic response, reductions in number of responses and total busy hours were observed as well, as expected.

Table 30: Number of Calls, Number of Responses, and Total Busy Time by Jurisdiction and Reporting Period – SFD Units

Jurisdiction	Reporting Period[1]	Number of Calls[2]	Number of Responses[3]	Average Responses per Call	Total Busy Hours	Responses with Time Data[4]	Average Busy Minutes per Response	Average Calls per Day[5]	Average Responses per Day[5]
All	2019	1,840	2,367	1.3	853.1	2,367	21.6	5.0	6.5
	2020	1,720	2,229	1.3	771.6	2,229	20.8	4.7	6.1
	2021	1,948	2,494	1.3	825.6	2,494	19.9	5.3	6.8
Within SFD[6]	2019	1,837	2,362	1.3	851.9	2,362	21.6	5.0	6.5
	2020	1,719	2,228	1.3	771.6	2,228	20.8	4.7	6.1
	2021	1,945	2,491	1.3	825.3	2,491	19.9	5.3	6.8
Outside of SFD[7]	2019	3	5	1.7	1.1	5	13.7	< 0.1	< 0.1
	2020	1	1	1.0	< 0.1	1	0.1	< 0.1	< 0.1
	2021	3	3	1.0	0.3	3	5.3	< 0.1	< 0.1

[1]Reporting periods reflect calendar years spanning January 1 to December 31 of each respective reporting period.
[2]"Number of Calls" reflects an adjusted number of calls to align with responses made by valid units assigned to SFD.
[3]"Number of Responses" reflects the total number of records in the data file associated with responses made by valid units assigned to SFD, regardless of calculated busy time.
[4]"Responses with Time Data" reflects the number of records in the data file associated with responses made by valid units assigned to SFD with calculated busy time not otherwise excluded.
[5]Reporting period 2020 contained 366 days due to inclusion of leap year date February 29, 2020; the other reporting periods each contained 365 days.
[6]Cities considered to be within the SFD jurisdiction included Grant, May Township, Stillwater, Stillwater Township, and "NULL" values, as well as records missing a value for city.
[7]Cities considered to be outside of the SFD jurisdiction included Bayport, Cottage Grove, Hudson, Oak Park Heights, Saint Joseph Township, Saint Paul Park, Somerset, and Woodbury.

From the reporting periods of 2019 to 2021, the total number of responses to calls made by units assigned to outside agencies in SFD's jurisdiction decreased from 54 in 2019 to 46 in 2021 (Table 31). Total busy hours decreased from 60.7 hours in 2019 to 49.1 hours in 2021.

Table 31: Number of Calls, Number of Responses, and Total Busy Time by Reporting Period – Outside Agency Units in SFD's Jurisdiction

Reporting Period[1]	Number of Calls[2]	Number of Responses[3]	Average Responses per Call	Total Busy Hours	Responses with Time Data[4]	Average Busy Minutes per Response	Average Calls per Day[5]	Average Responses per Day[5]
2019	24	54	2.3	60.7	53	68.7	0.1	0.1
2020	31	92	3.0	79.5	92	51.9	0.1	0.3
2021	24	46	1.9	49.1	46	64.0	0.1	0.1

[1]Reporting periods reflect calendar years spanning January 1 to December 31 of each respective reporting period.
[2]"Number of Calls" reflects an adjusted number of calls to align with responses made by units assigned to outside agencies.
[3]"Number of Responses" reflects the total number of records in the data file associated with responses made by units assigned to outside agencies, regardless of calculated busy time.
[4]"Responses with Time Data" reflects the number of records in the data file associated with responses made by units assigned to outside agencies with calculated busy time not otherwise excluded.
[5]Reporting period 2020 contained 366 days due to inclusion of leap year date February 29, 2020; the other reporting periods each contained 365 days.

Overlapped Calls Analysis

Table 32: Overlapped Calls by Reporting Period – SFD's Jurisdiction

Reporting Period	Overlapped Calls	Total Calls	Percentage of Overlapped Calls
2019	181	1,995	9.1
2020	176	1,892	9.3
2021	221	2,220	10.0

Table 33: Overlapped Calls by Reporting Period, Day of Week, and Hour of Day – SFD's Jurisdiction

Reporting Period	Day of Week	Hour of Day																								Total
		00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	
2019	Sunday	0	0	1	1	0	0	0	1	3	1	1	1	0	2	2	0	0	2	0	0	0	0	0	0	15
	Monday	1	0	1	0	0	0	0	2	3	0	4	4	0	1	2	1	2	1	2	3	0	0	1	1	29
	Tuesday	1	0	1	0	0	0	0	0	0	0	1	2	2	0	1	1	1	1	2	2	0	4	1	1	21
	Wednesday	1	0	0	0	0	1	0	3	2	1	4	6	5	3	1	4	3	1	0	0	0	0	0	0	35
	Thursday	0	0	0	0	0	0	0	0	1	1	2	3	2	1	2	5	6	2	1	1	4	0	1	0	32
	Friday	0	0	1	0	0	0	1	1	3	2	0	3	2	0	0	1	2	2	0	3	2	0	0	0	23
	Saturday	0	1	0	0	0	0	2	0	1	4	1	0	1	4	2	1	2	1	0	0	2	3	1	0	26
	Total	**3**	**1**	**4**	**1**	**0**	**1**	**3**	**7**	**13**	**9**	**13**	**19**	**12**	**11**	**10**	**13**	**16**	**10**	**5**	**9**	**8**	**7**	**4**	**2**	**181**
2020	Sunday	3	3	2	0	0	0	0	0	1	0	1	1	2	1	0	4	2	1	2	0	0	1	1	1	3
	Monday	0	1	0	0	0	0	0	2	0	0	2	0	2	1	0	0	0	2	1	2	2	1	1	1	0
	Tuesday	0	0	0	0	0	0	0	0	1	1	1	2	2	0	1	3	2	4	2	2	4	2	0	0	0
	Wednesday	0	1	0	0	1	0	1	0	0	2	3	0	1	1	0	3	2	0	1	4	1	1	0	0	0
	Thursday	0	0	0	0	0	0	0	0	0	2	1	2	0	1	4	0	4	1	4	2	2	1	0	0	0
	Friday	0	1	0	0	0	0	0	1	2	0	3	2	0	0	0	0	1	0	3	0	9	7	7	1	0
	Saturday	2	1	1	0	0	0	0	0	1	1	2	0	0	1	2	0	1	1	4	1	0	3	0	1	2
	Total	**5**	**7**	**3**	**0**	**1**	**0**	**1**	**3**	**5**	**6**	**13**	**7**	**7**	**5**	**7**	**10**	**12**	**9**	**17**	**11**	**18**	**16**	**9**	**4**	**176**

Reporting Period	Day of Week	Hour of Day																							Total
		00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	
2021	Sunday	0	0	1	0	0	0	1	0	0	0	1	0	1	4	3	5	3	3	0	1	3	0	2	2	30
	Monday	0	0	1	0	0	0	1	2	0	2	1	2	1	2	1	3	3	3	2	2	0	0	0	0	26
	Tuesday	0	1	0	1	0	1	0	1	2	3	4	3	0	4	3	1	1	4	1	4	0	0	0	1	35
	Wednesday	0	0	1	0	0	0	1	0	1	4	0	2	0	2	2	2	2	2	3	2	1	0	0	0	25
	Thursday	0	0	1	0	0	0	0	1	2	2	3	2	1	2	6	4	3	3	1	1	1	0	1	1	35
	Friday	0	1	0	0	0	0	1	1	0	1	5	4	4	4	1	4	1	0	1	0	2	6	0	0	36
	Saturday	2	2	1	0	0	1	1	1	0	0	2	2	0	1	0	2	1	4	2	1	2	4	2	3	34
	Total	**2**	**4**	**5**	**1**	**0**	**2**	**5**	**6**	**5**	**12**	**16**	**15**	**7**	**19**	**16**	**21**	**14**	**19**	**10**	**11**	**9**	**10**	**5**	**7**	**221**

Figure 18: Overlapped Calls by Day of Week and Hour of Day – SFD's Jurisdiction in 2019-2021

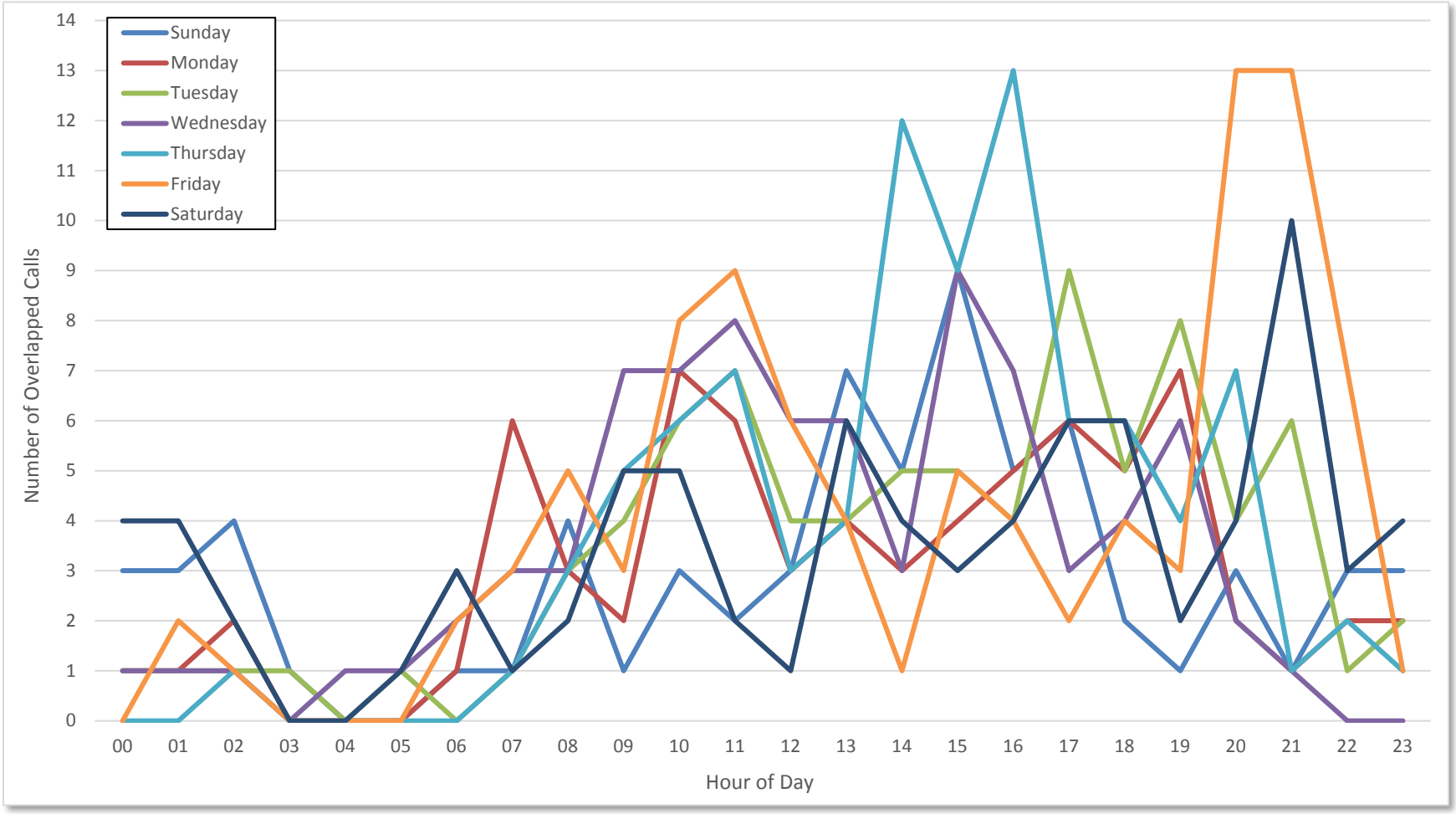


Figure 19: Overlapped Calls by Day of Week and Hour of Day – SFD's Jurisdiction in 2019

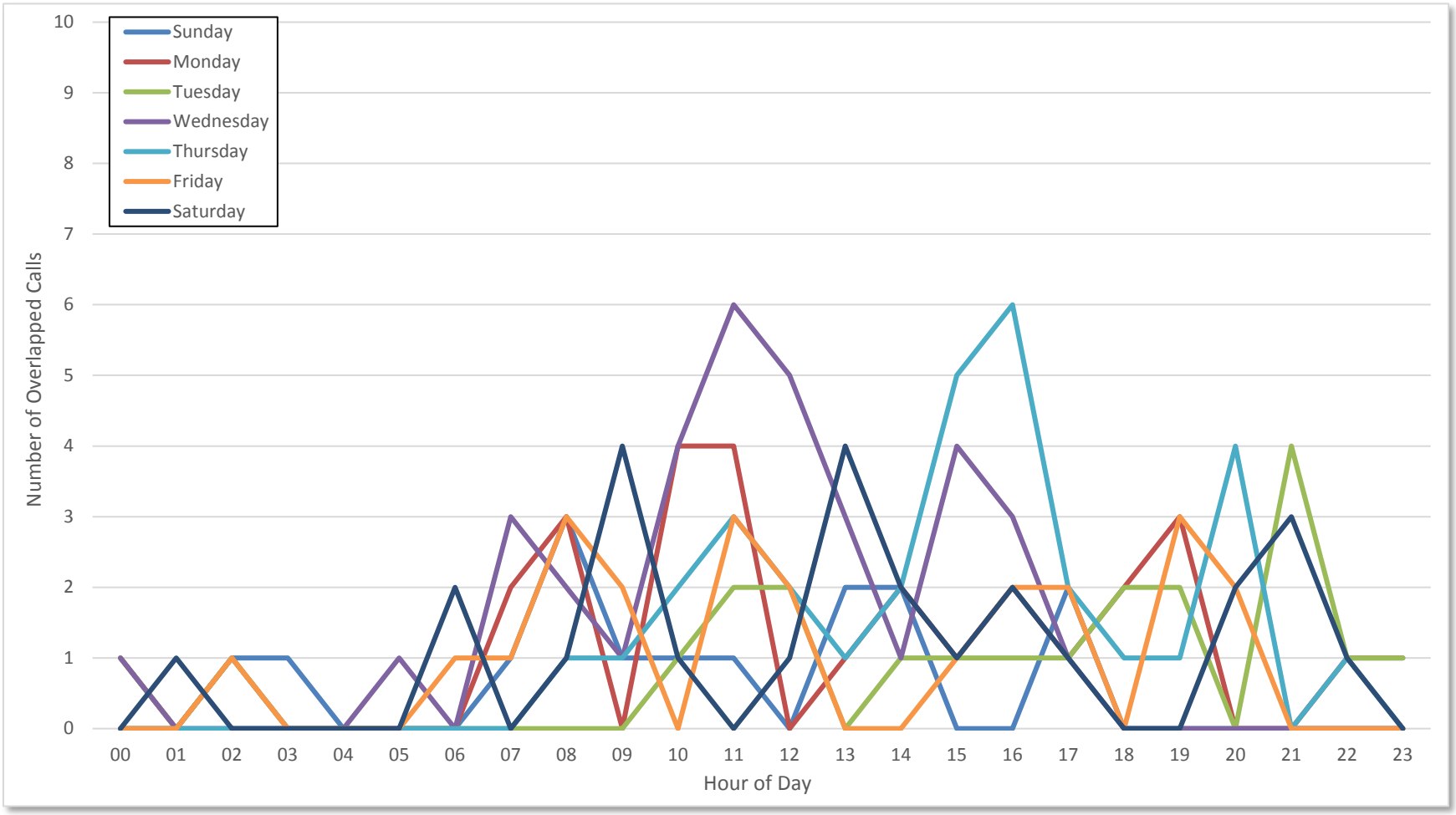


Figure 20: Overlapped Calls by Day of Week and Hour of Day – SFD's Jurisdiction in 2020

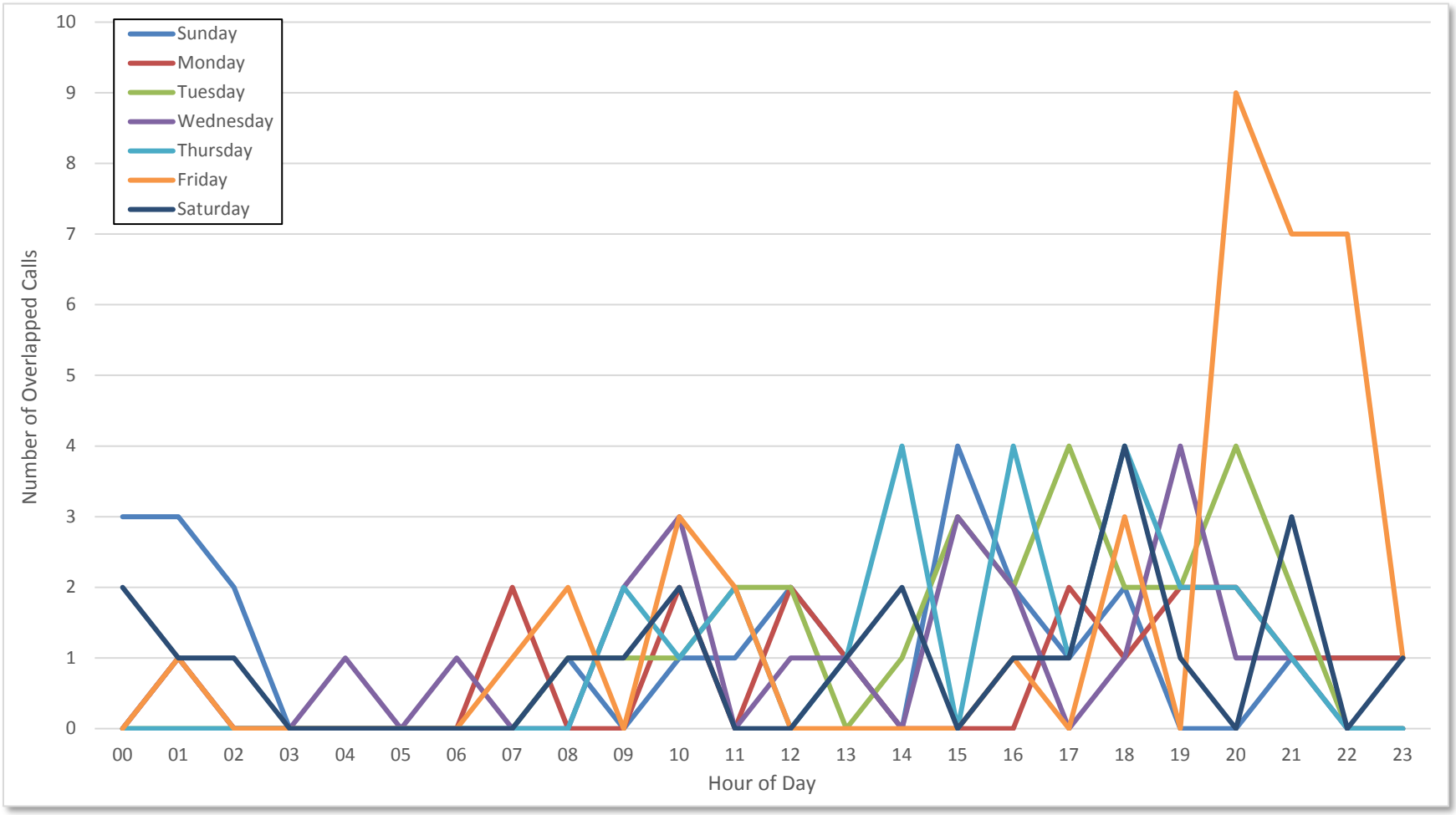
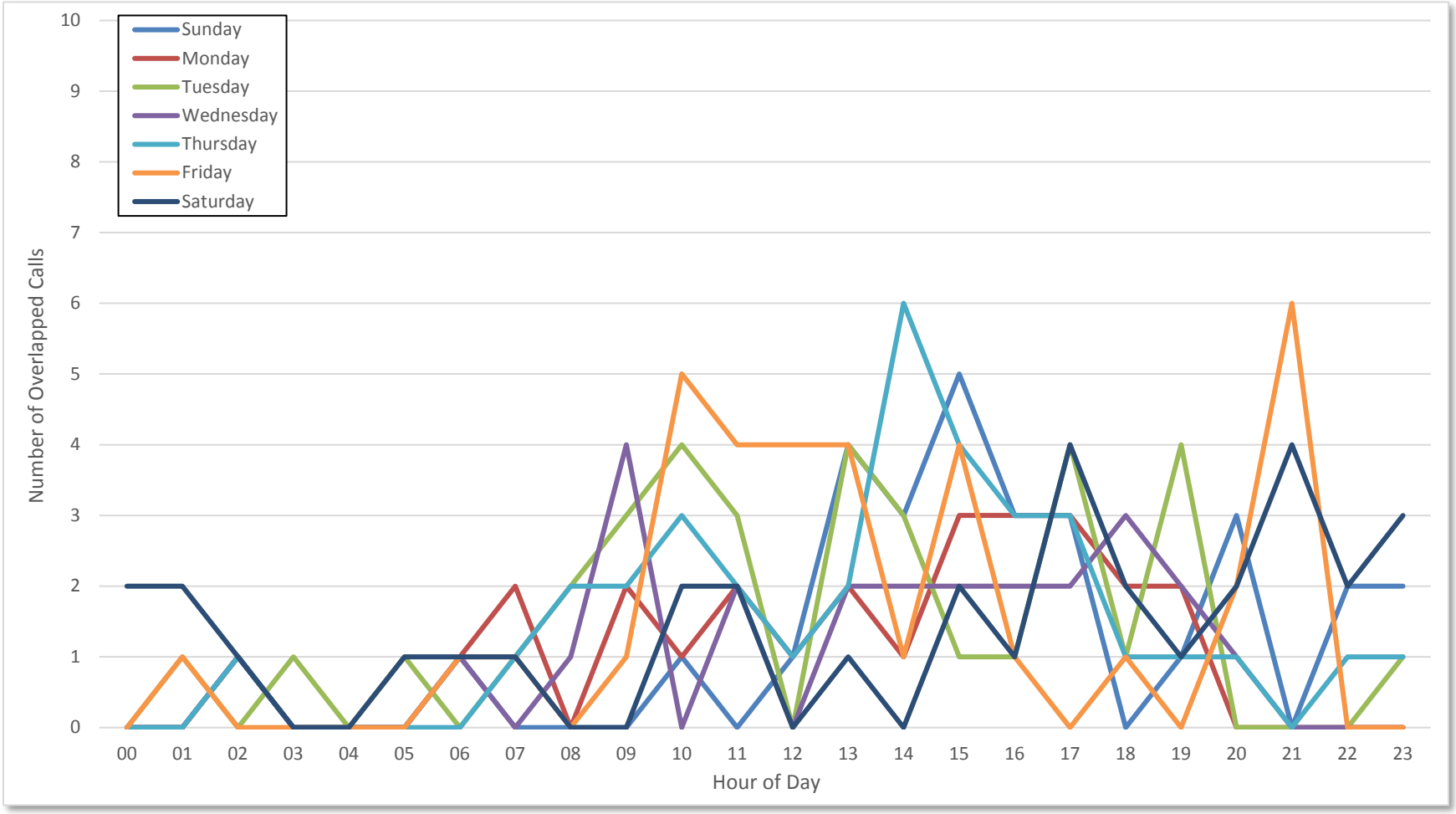


Figure 21: Overlapped Calls by Day of Week and Hour of Day – SFD's Jurisdiction in 2021



GIS

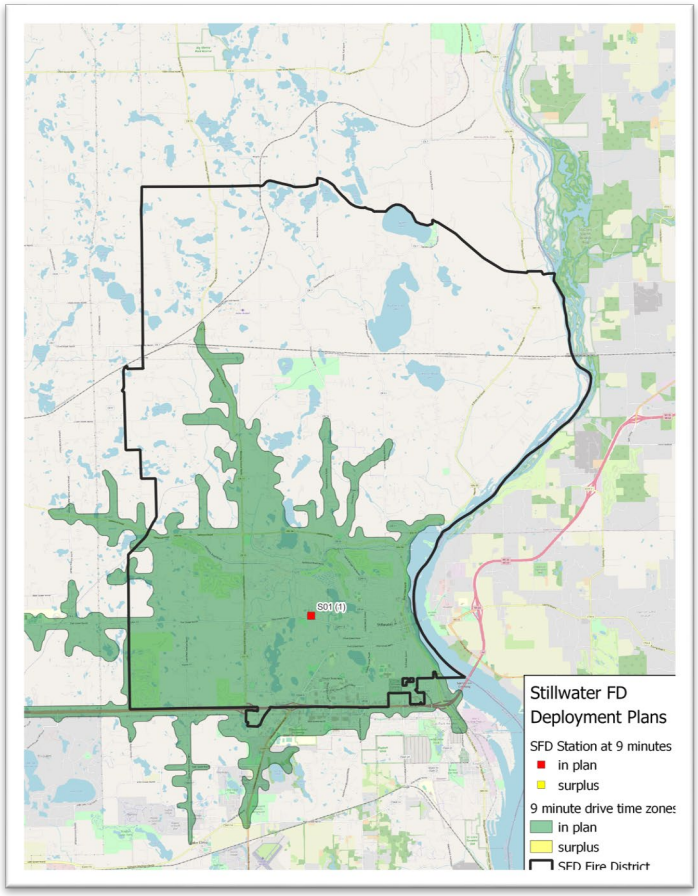
The first step in completing GIS planning analyses is to establish the desired performance parameters. Measures of total response time can be significantly influenced by both internal and external influences. For example, the dispatch time, defined as the time from call creation at the 911-center to the dispatching of units, contributes to the customer's overall response time experience. Another element in the total response time continuum is the turnout time, defined as the time from when the units are notified of the incident until they are actually responding. Turnout time can have a significant impact on the overall response time for the customer and is generally considered under management's control. However, the travel time, defined as the period from when the units are actually responding until arrival at the incident, is a factor of the number of fire stations, the ability to travel unimpeded on the road network, the existing road network's ability to navigate the community, and the availability of the units. Largely, travel time is the most stable variable to utilize in system design regarding response time performance. Therefore, these GIS planning analyses will focus on travel time capability as the unit of measure. Performance for travel time Stillwater Fire Department (SFD) units to emergency calls by program for the calendar year of 2021; hereinafter referred to as 2021.

With the current station location, the department can achieve 90.94% risk coverage within nine minutes travel time.

Table 34 : Marginal Fire Station Contribution for 9-Minute Travel Time

Rank	Station	Station Capture	Total Capture	Percent Capture
1	Stillwater Fire #1	2068	2068	90.94%

Figure 22: Marginal Fire Station Contribution for 9-Minute Travel Time



Evaluation of Various Distribution Models

As previously discussed, these analyses utilized 2021 historical performance as the desired performance for system design. Various configurations of 6-, 7, 8-, 9-, and 10-minute travel times were completed to consider alternatives.

Table 35: Marginal Fire Station Contribution for 6-Minute Travel Time

Rank	Station	Station Capture	Total Capture	Percent Capture
1	Stillwater Fire #1	1485	1485	65.40%

Figure 23: Marginal Fire Station Contribution for 6-Minute Travel Time

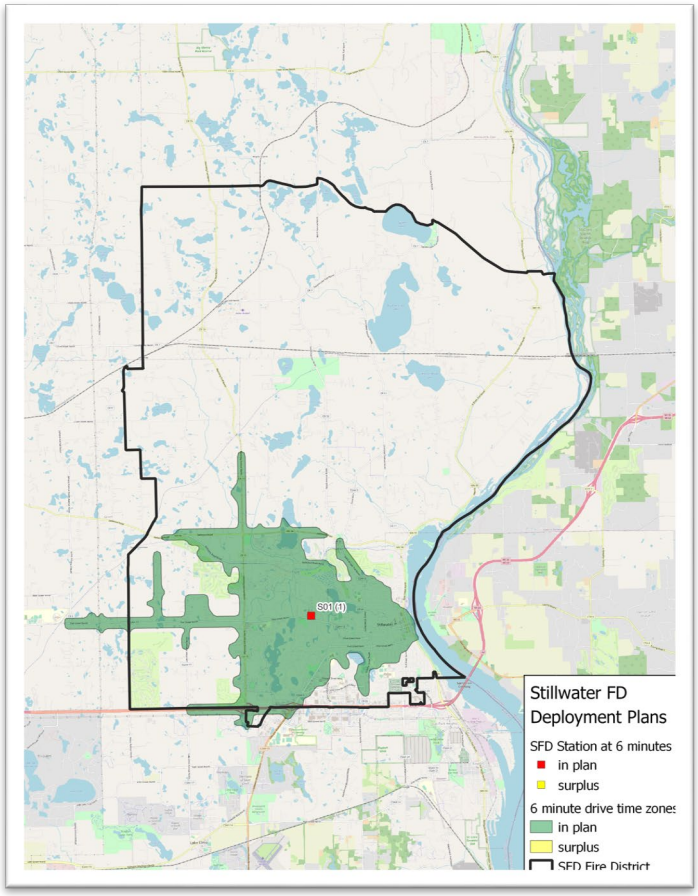


Table 36: Marginal Fire Station Contribution for 7-Minute Travel Time

Rank	Station	Station Capture	Total Capture	Percent Capture
1	Stillwater Fire #1	1720	1720	75.64%

Figure 24: Marginal Fire Station Contribution for 7-Minute Travel Time

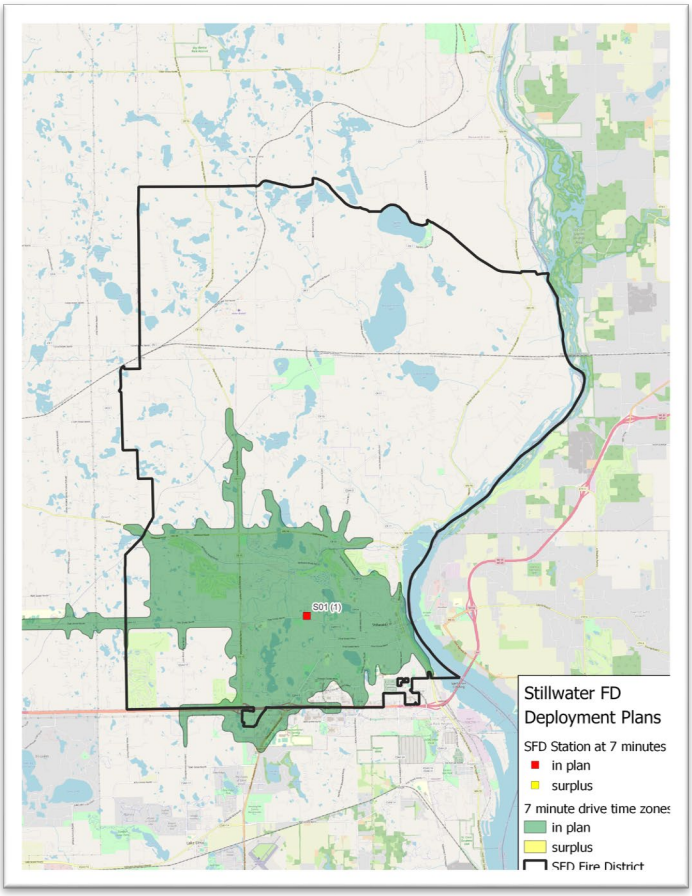


Table 37: Marginal Fire Station Contribution for 8-Minute Travel Time

Rank	Station	Station Capture	Total Capture	Percent Capture
1	Stillwater Fire #1	1943	1934	85.05%

Figure 25: Marginal Fire Station Contribution for 8-Minute Travel Time

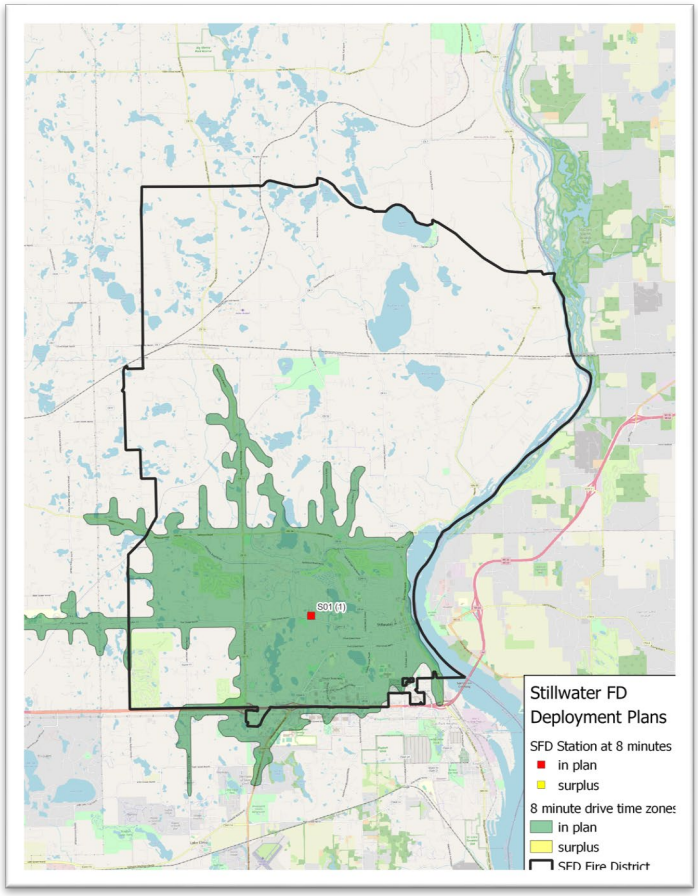


Table 38 : Marginal Fire Station Contribution for 9-Minute Travel Time

Rank	Station	Station Capture	Total Capture	Percent Capture
1	Stillwater Fire #1	2068	2068	90.94%

Figure 26: Marginal Fire Station Contribution for 9-Minute Travel Time

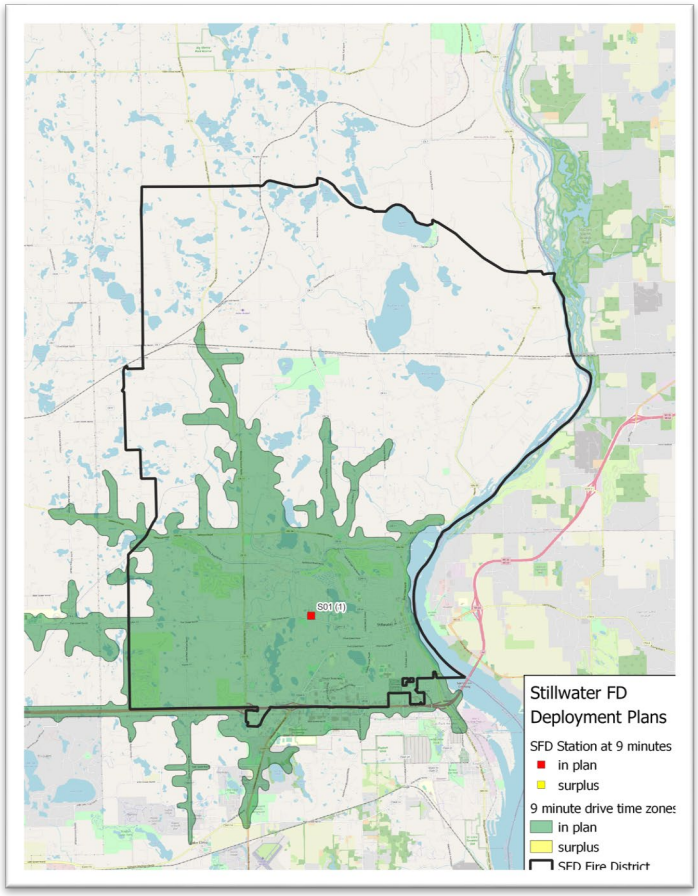


Table 39: Marginal Fire Station Contribution for 10-Minute Travel Time

Rank	Station	Station Capture	Total Capture	Percent Capture
1	Stillwater Fire #1	2,098	2,098	92.26%

Figure 27: Marginal Fire Station Contribution for 10-Minute Travel Time

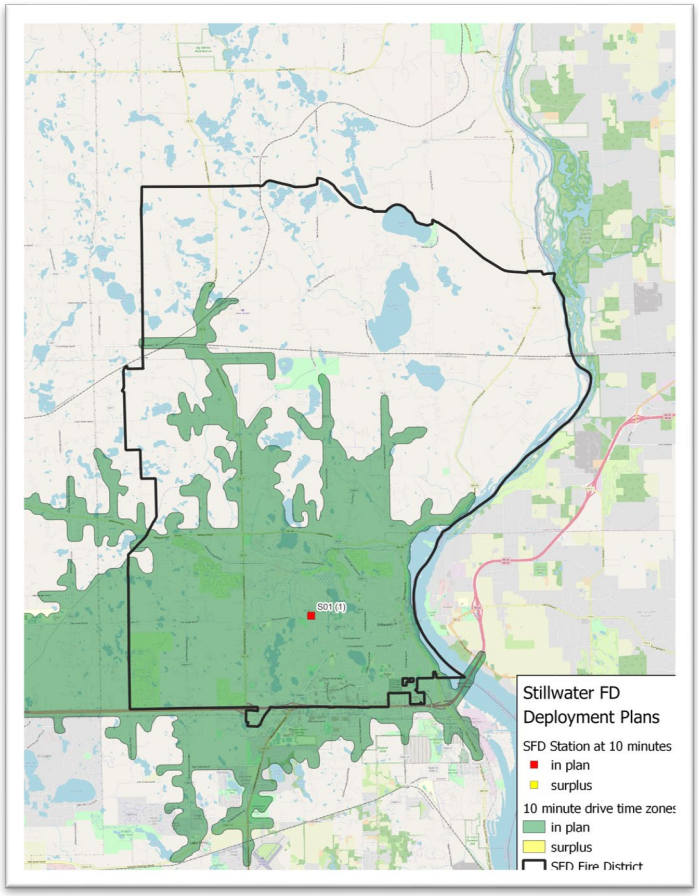


Table 40: Marginal Fire Station Contribution Summary

Travel Time Minutes	1st Station Capture %	1 Station Capture #
6	65.30%	1,485
7	75.64%	1,720
8	85.05%	1.934
9	90.94%	2,068
10	92.26%	2,098

Optimized Station Distribution Plans

Optimized locations were created for the department's consideration. Optimized plans utilize a "white board" approach for any additional fire station location which allows the data to indicate the best station locations. It is understood that stations are placed for a variety of reasons and that few agencies would have the flexibility in land availability, purchase price, capital investment, and political considerations to build a brand-new deployment model. However, these analyses are

beneficial for validating existing stations where applicable and identifying potential areas of future need for new stations.

Analyses were completed to develop an optimized station distribution model for a 6-, 7-, 8-. 9-, and 10-minute travel time. The 6-minute optimized plan below shows that there would need to be three fire stations to meet a 6-minute travel time with a 92.30% fractile compliance. This 6-minute plan also shows that the addition of two fire stations would capture and additional 614 calls within 6-minutes which equals 27% of the incident volume.

Table 41: Optimized Station Deployment Plan 6-Minute Travel Time

Rank	Location	Station Capture	Total Capture	Percent Capture
1	Stillwater Fire #1	1485	1485	65.30%
2	Washington Park	488	1973	86.76%
3	Otto Berg Memorial Park	126	2099	92.30%
4	Square Lake Trl/Northbrook	82	2181	95.91%
5	Manning Trl/115th St. N.	22	2203	96.88%
6	Hwy 95/Stonebridge Trl.	21	2224	97.80%
7	75th St./Lake Elmo Ave.	21	2245	98.72%
8	Lansing Ave/110th St.	6	2251	98.99%
9	12500 Arcola Trl. N.	4	2255	99.16%
10	13500 Manning Trl. N.	3	2258	99.30%
11	102nd St./Ottumwa Ave. N.	1	2259	99.34%
12	14000 May Ave. N.	1	2260	99.38%

Figure 28: Optimized Station Deployment Plan 6-Minute Travel Time

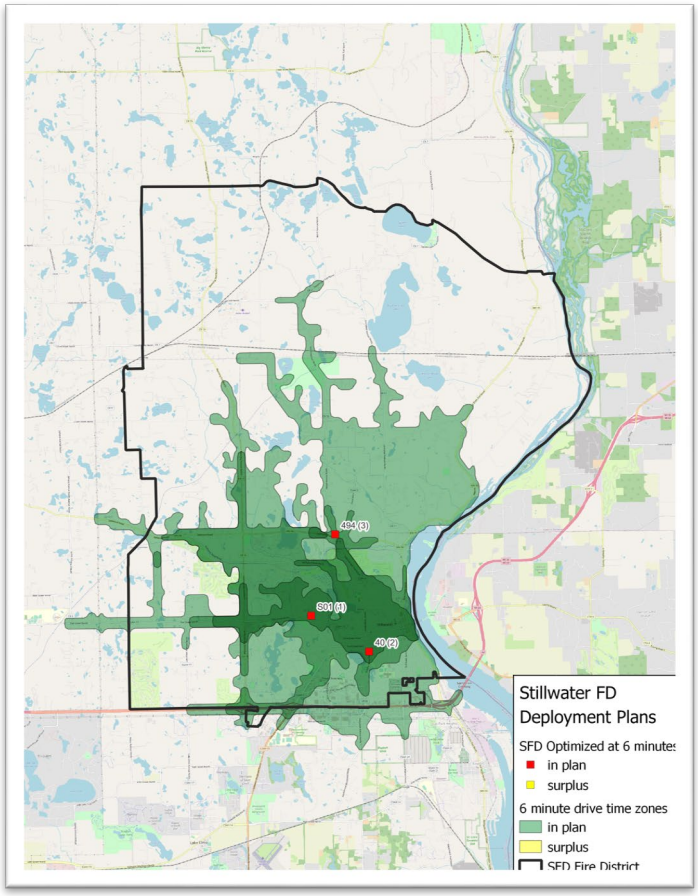


Table 42: Optimized Station Deployment Plan 7-Minute Travel Time

Rank	Location	Station Capture	Total Capture	Percent Capture
1	Stillwater Fire #1	1720	1720	75.64%
2	Myrtle St./Greeley St.	319	2039	89.67%
3	Square Lake Trl/Northbrook	131	2170	95.43%
4	Dellwood Rd/Mendel Rd. N.	42	2212	95.43%
5	11250 Manning Trl. N.	21	2233	98.20%
6	Hwy 95/Stonebridge Trl.	17	2250	98.94%
7	75th St./Lake Elmo Ave.	13	2263	99.52%
8	11250 Lansing Ave. N.	2	2265	99.60%
9	Arcola Bluffs	2	2267	99.69%
10	14000 May Ave. N.	1	2268	99.74%

Figure 29: Optimized Station Deployment Plan 7-Minute Travel Time

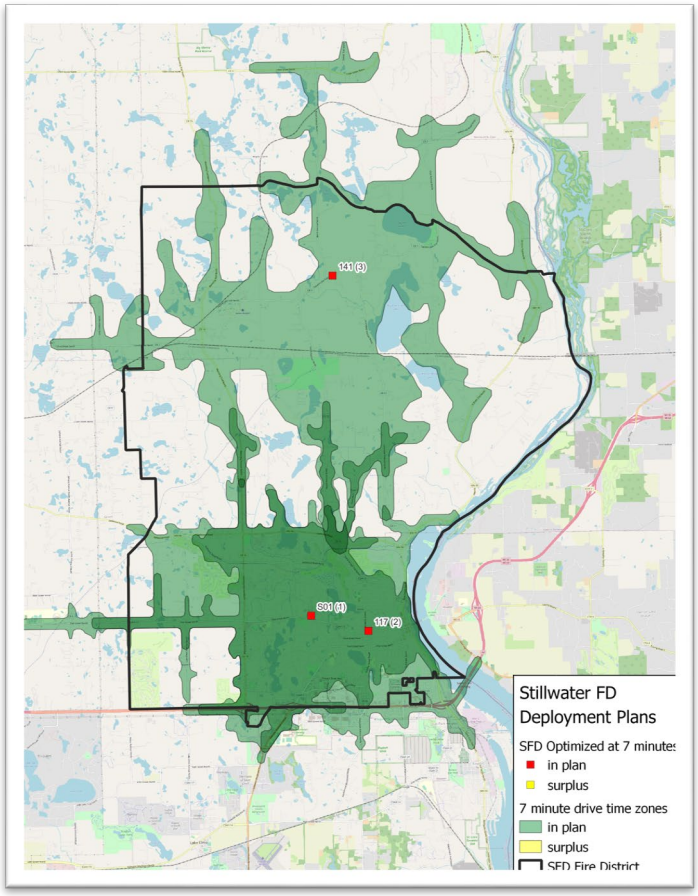


Table 43: Optimized Station Deployment Plan 8-Minute Travel Time

Rank	Location	Station Capture	Total Capture	Percent Capture
1	Stillwater Fire #1	1934	1934	85.05%
2	Hwy 95/Dellwood Rd	200	2134	93.84%
3	Square Lake Trl/Norell	92	2226	97.89%
4	Manning Ave/102nd St.	24	2250	97.89%
5	Hwy 36/Keats Ave.	10	2260	99.38%
6	12900 Arcola Trl. N.	10	2270	99.82%

Figure 30: Optimized Station Deployment Plan 8-Minute Travel Time

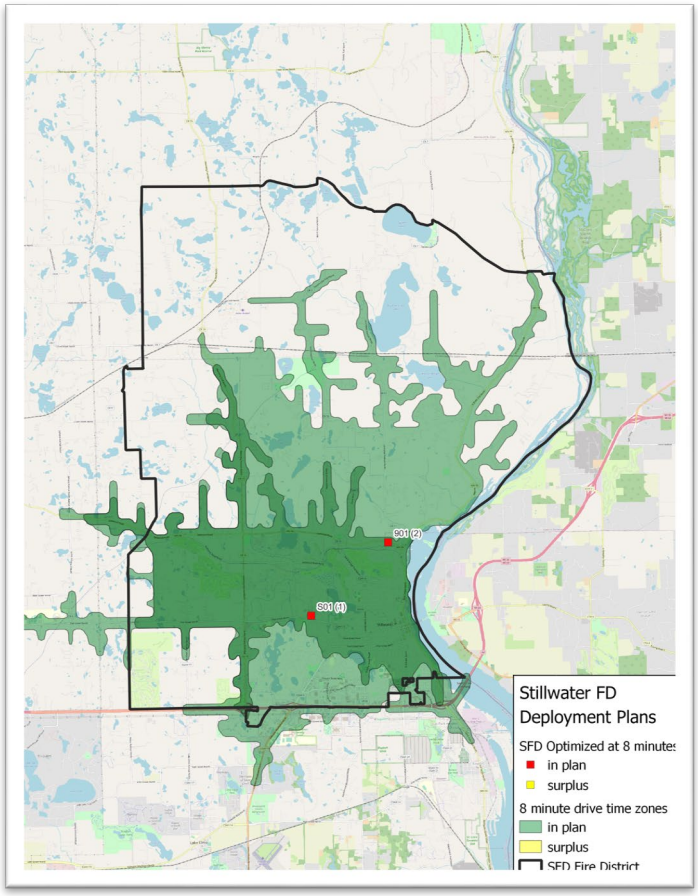


Table 44: Optimized Station Deployment Plan 9-Minute Travel Time

Rank	Location	Station Capture	Total Capture	Percent Capture
1	Stillwater Fire #1	2068	2068	90.94%
2	Square Lake Trl/Northbrook	176	2244	98.68%
3	Manning Ave/97th St. N.	22	2266	99.65%
4	Hwy 95/Boom Site Waterfall	4	2270	99.82%

Figure 31: Optimized Station Deployment Plan 9-Minute Travel Time

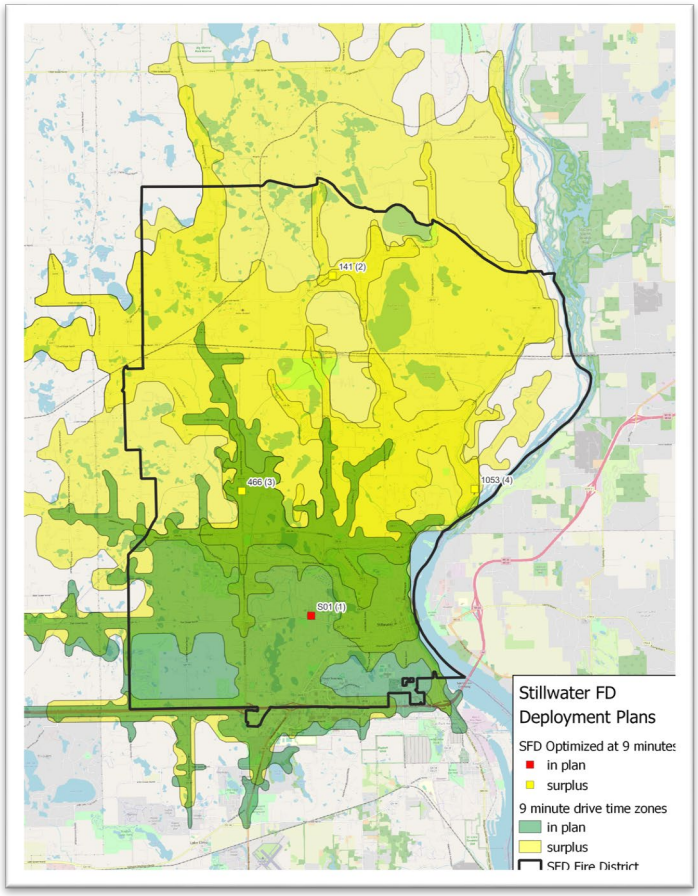
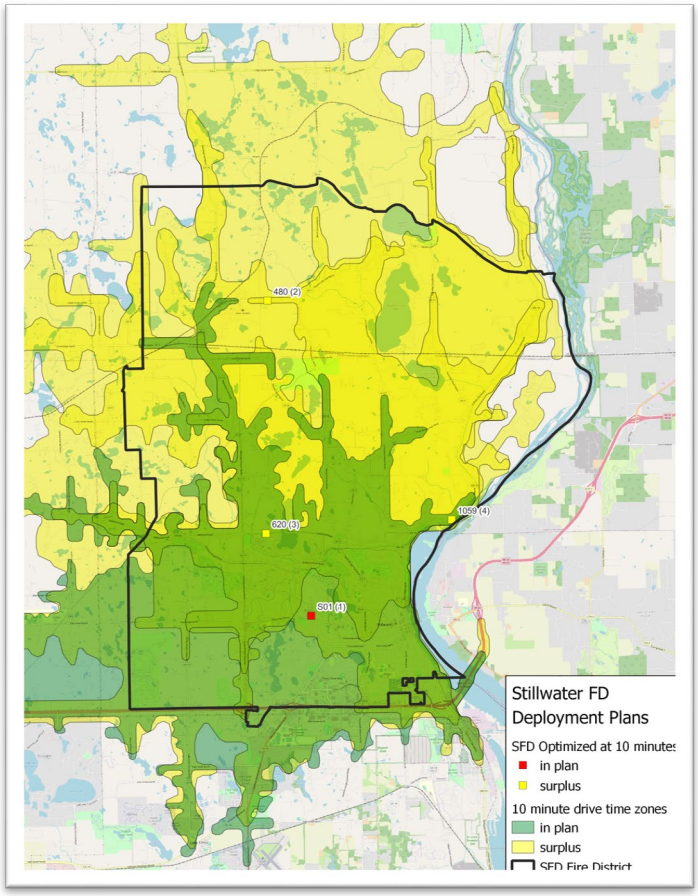


Table 45: Optimized Station Deployment Plan 10-Minute Travel Time

Rank	Location	Station Capture	Total Capture	Percent Capture
1	Stillwater Fire #1	2098	2098	92.26%
2	Square Lake Trl./May Ave	159	2257	99.25%
3	Hwy 96/Millbrook Cir	10	2267	99.69%
4	Hwy 95/Scenic Overlook	4	2271	99.87%

Figure 32: Optimized Station Deployment Plan 10-Minute Travel Time



The optimized deployment plans allow you to compare current performance and identify future investments that could be made to improve a systems performance or efficiency. Given the current deployment analysis shows a travel time of over 85 percent at 8 minutes with the current fire station. There is some opportunity to gain improved travel time performance with optimized response locations if there is a desire to add an additional station in the future.

Table 46: Optimized Station Deployment Plan Summary

Travel Time Minutes	Station Rank											
	1	2	3	4	5	6	7	8	9	10	11	12
6	65.30%	86.76%	92.30%	95.91%	96.88%	97.80%	98.72%	98.99%	99.16%	99.30%	99.34%	99.38%
7	75.64%	89.67%	95.43%	97.27%	98.20%	98.94%	99.52%	99.60%	99.69%	99.74%		
8	85.05%	93.84%	97.89%	98.94%	99.38%	99.82%						
9	90.94%	98.68%	99.65%	99.82%								
10	92.26%	99.25%	99.69%	99.87%								

Distribution of Demand by Program Areas

Heat maps were created to identify the concentration of the historic demand for services by program area. Therefore, the following mapping will present the relative concentration of service demands by fire, EMS, hazmat, and rescue. The blue areas have the lowest concentration of demand and the dark red areas have the highest concentration of demand.

Figure 33: Heat Map for All 2021 Incidents

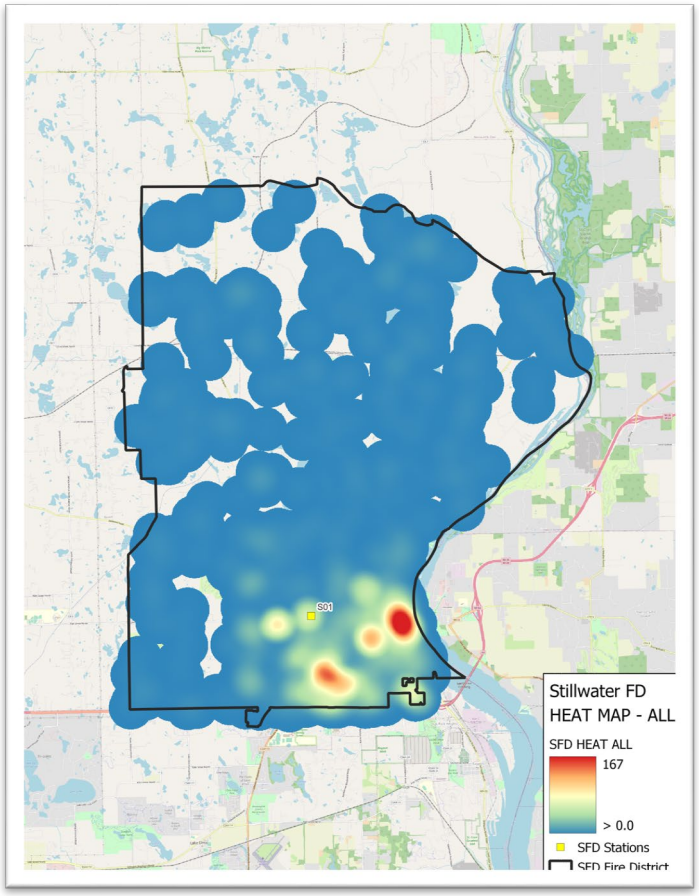


Figure 34: Heat Map for Fire Related Incidents

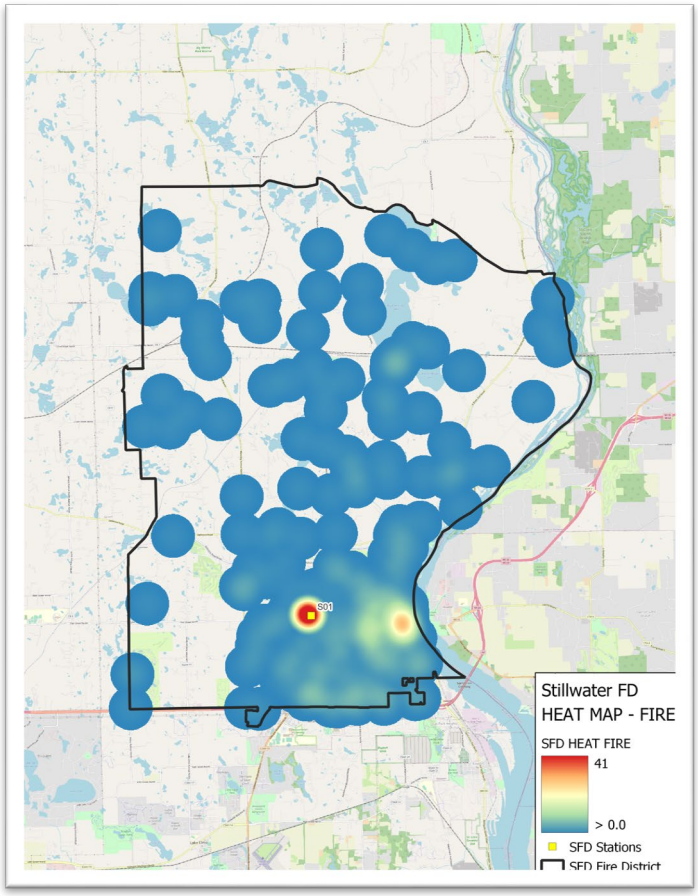


Figure 35: Heat Map for EMS Related Incidents

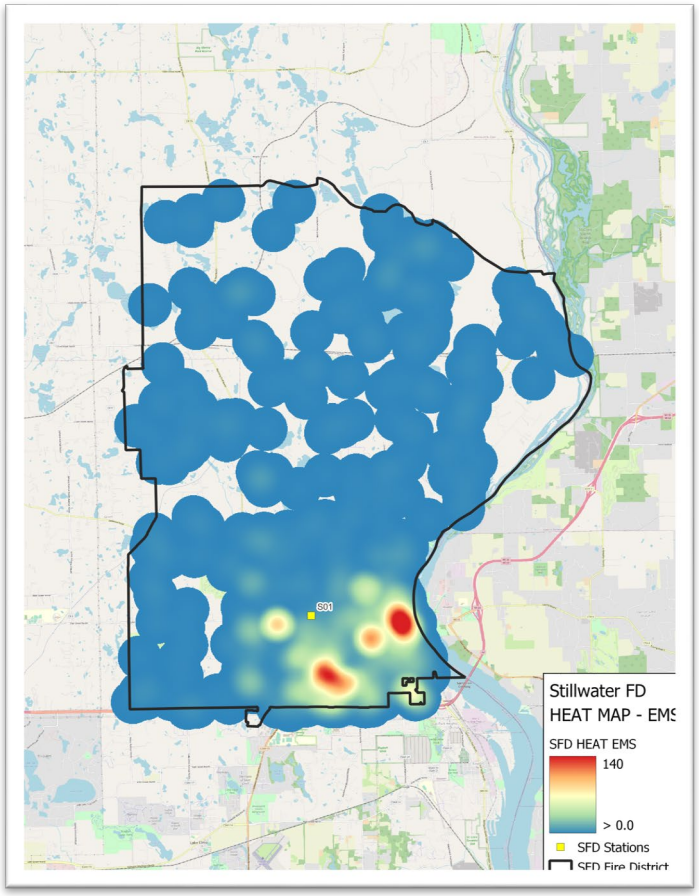


Figure 36: Heat Map for Rescue Related Incidents

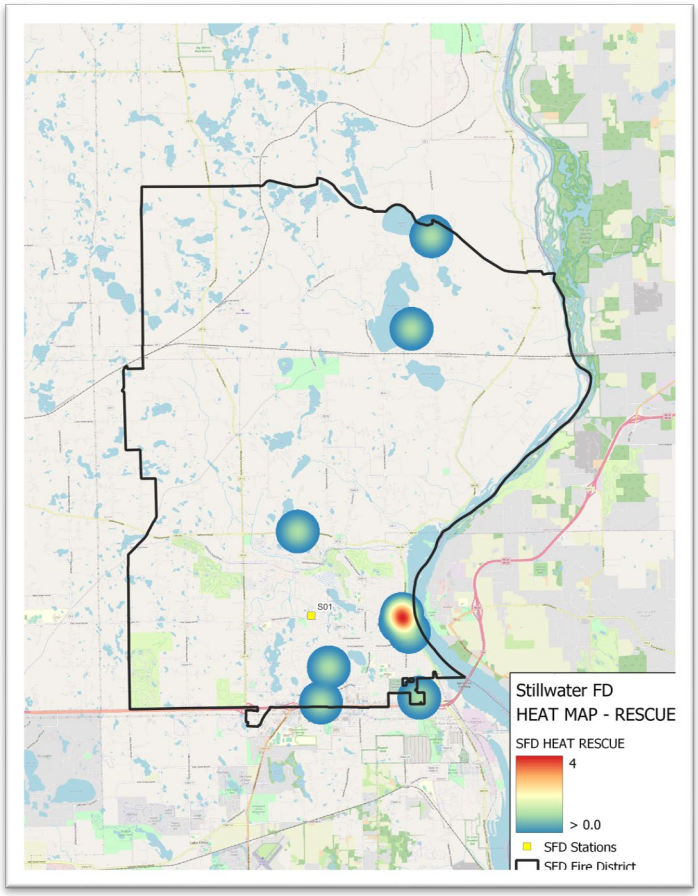
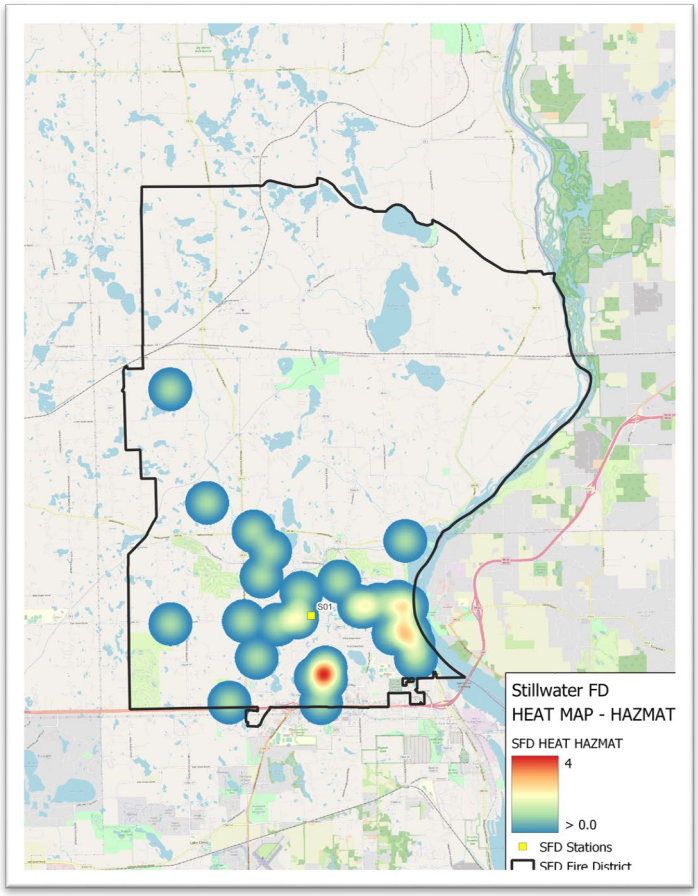


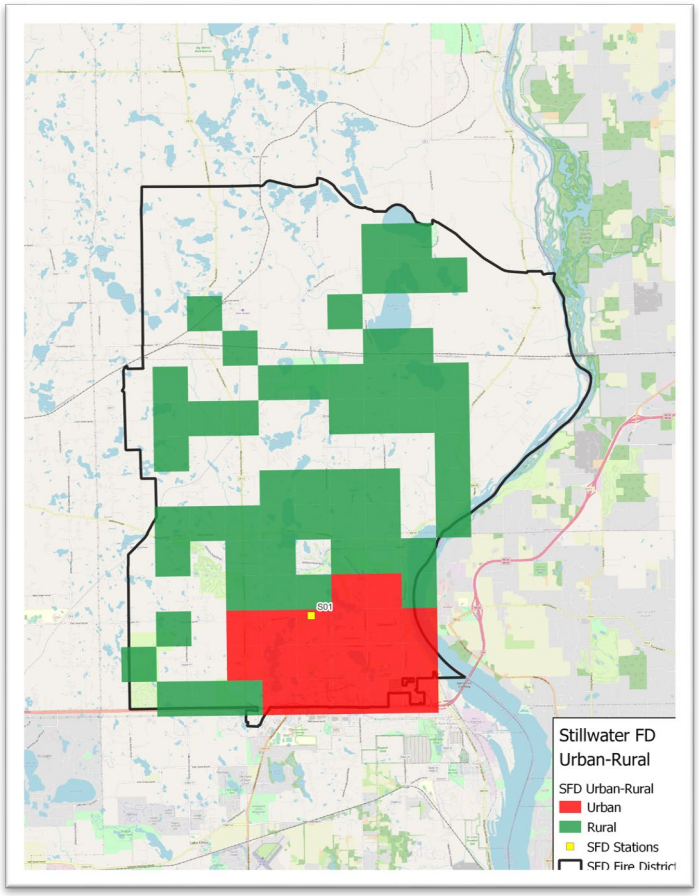
Figure 37: Heat Map for HAZMAT Related Incidents



Urban/Rural Density

Finally, we calculate call density based on the relative concentration of incidents based on approximately 0.5-mile geographic areas as well as the adjacent 0.5-mile areas. The results demonstrate an urban and rural designation based on call density for services and not based on population. The red areas are designated as urban service areas and the green areas are designated as rural service areas. Any area that is not colored has less than one call every six months in the 0.5-mile area and the adjacent areas.

Figure 38: Urban and Rural Call Density Map with Current Station

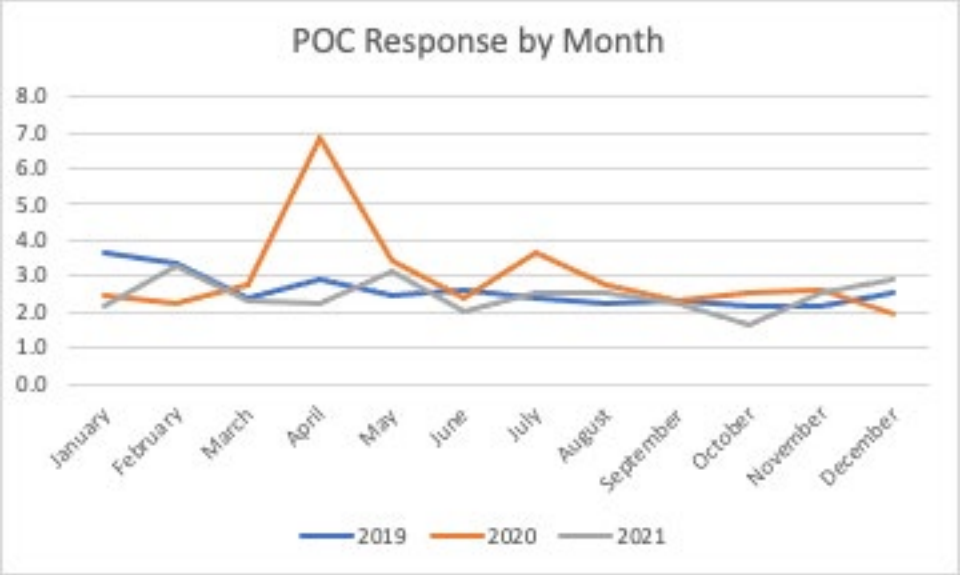


Paid On Call Response Summary

Analysis was conducted using the data provided by the department for the calendar years 2019 through 2021. The data was extracted from the departments records management system Imagetrend which is provided by the Minnesota State Fire Marshal's Office. The data only analyzed the paid-on-call staff's response to incidents they were called to respond to. This analysis does not include chief officer or full-time staff off-duty response to incidents outside of their regularly scheduled work hours.

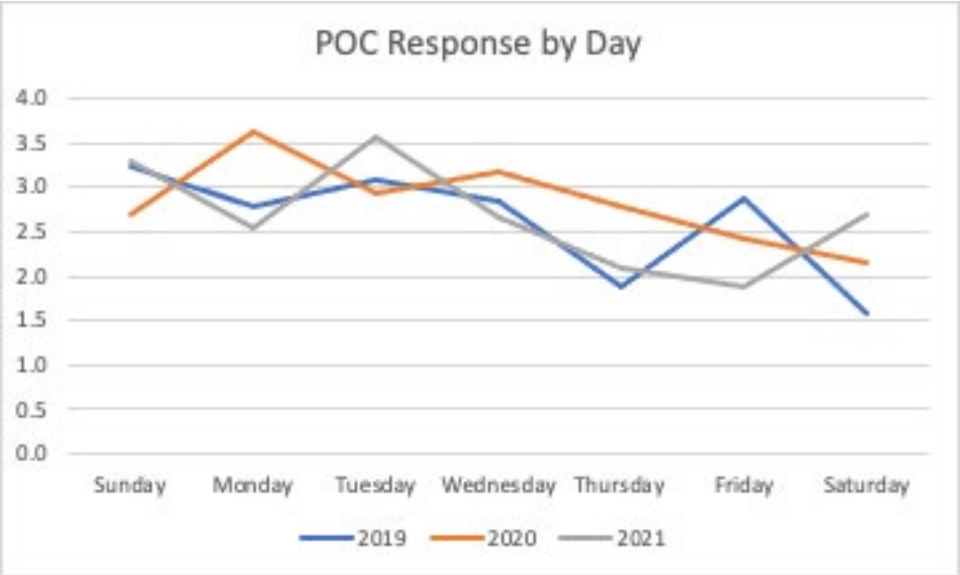
The first analysis looked at the average number of responses by month of the year. The analysis revealed consistent average response by paid-on-call staff between 2-3 personnel per incident. There was an aberrancy in 2020 likely due to the COVID-19 pandemic.

Figure 39: Paid-On-Call Responses by Month



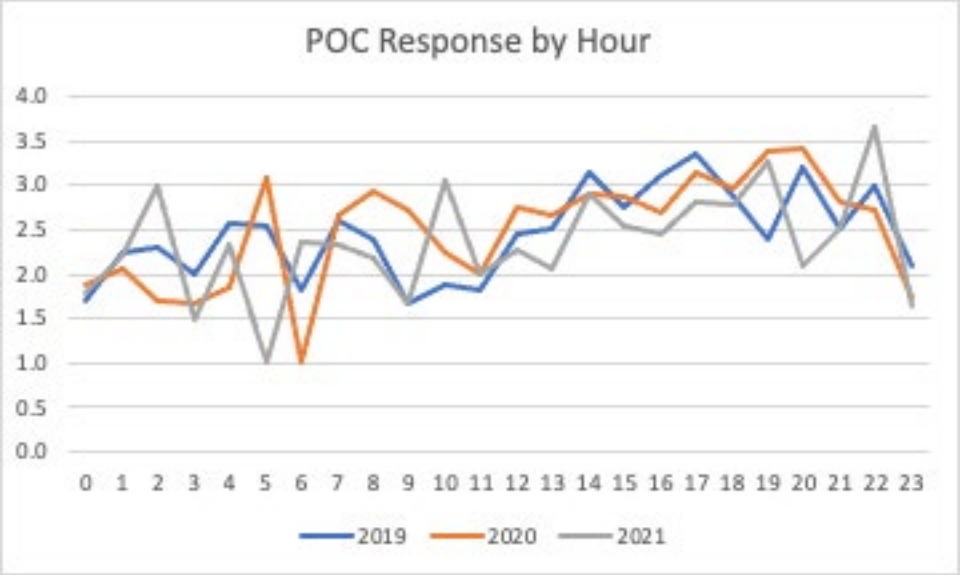
Next the paid-on-call response was analyzed by the day of the week. This analysis showed that there is a distinct trend of more paid-on-call staff responding during the beginning of the week (Sunday) and less staff responding later in the week (Saturday).

Figure 40: Paid-On-Call Responses by Day of Week



The last analysis conducted with this data was by the hour of the day. The hour of the day analysis showed that there was significant variation in response in the first half of the day (0:00-12:00) and a more consistent response in the second half of the day (12:00-0:00). In particular during 2020 and 2021 there were early morning hours that averaged only one paid-on-call personnel responding during that hour.

Figure 41: Paid-On-Call Response by Hour of the Day



The trends shown in the data are not unusual for a paid-on-call department. What the data does depict is the challenge the department experiences getting enough paid-on-call staff to respond to incidents since these incidents usually require multiple personnel to respond on an apparatus. This leaves the reliance on full-time staff to respond off-duty to these incidents to ensure there is a response beyond the on-duty staff.

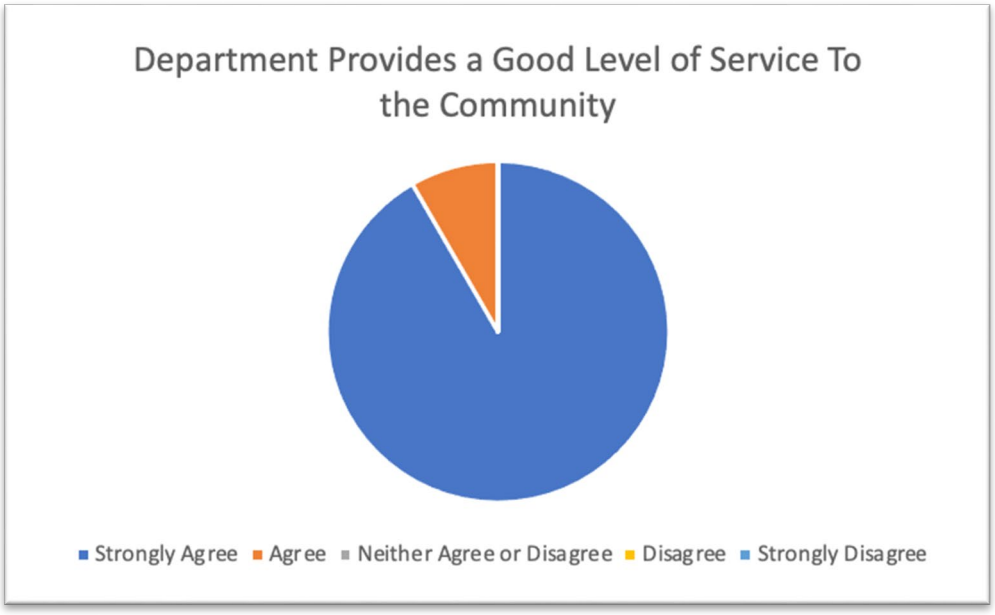
PAID-ON-CALL STAFF SURVEY

Fitch and Associates conducted an onsite visit in February of 2022. During that visit numerous stakeholders were interviewed including the paid-on-call staff. Following the site visit it was determined that an electronic survey would be a good addition to the site visit meeting to give all members of the department an opportunity to provide input. The survey was anonymous and administered solely by *Fitch and Associates* staff.

The electronic surveys were delivered on August 23, 2022, to 18 unique email addresses. Each email address received a unique link to the survey so members could only fill out one survey. Members were able to access the survey until September 2, 2022, with a reminder sent out to those who did not complete the survey a week before the survey closed. There were 11 responses for a rate of 61 percent. There was one incomplete response, the questions that were answered in that incomplete response are included in these survey results. The survey contained 29 questions. All the questions asked and the results are contained in this section.

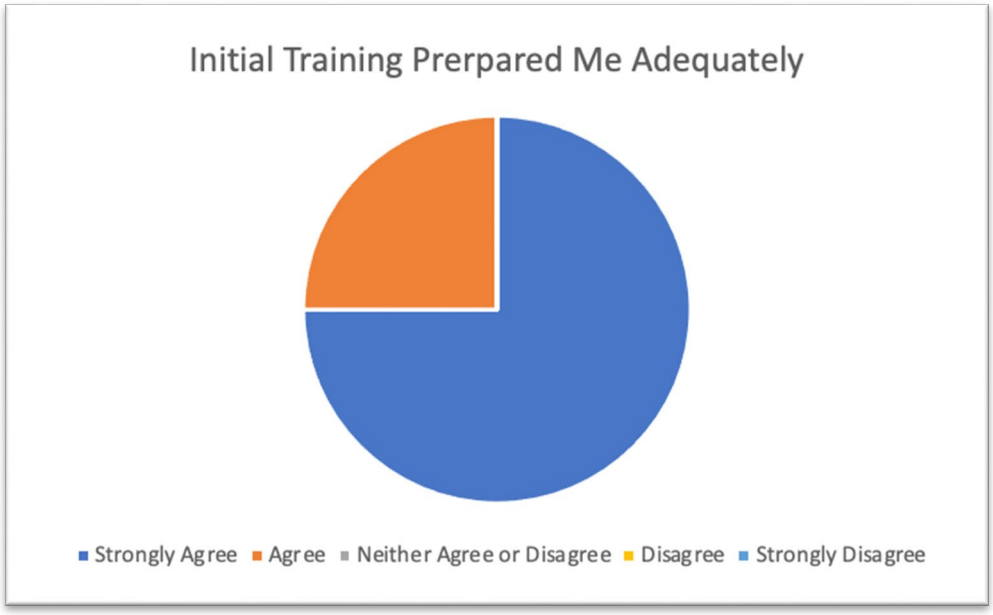
1) I believe that the Stillwater Fire Department provides a good level of service to our community.

Figure 42: Paid-On-Call Staff Survey Question 1



2) When I began my current job at the fire department, the initial training I received regarding fire functions prepared me adequately for the work.

Figure 43: Paid-On-Call Staff Survey Question 2

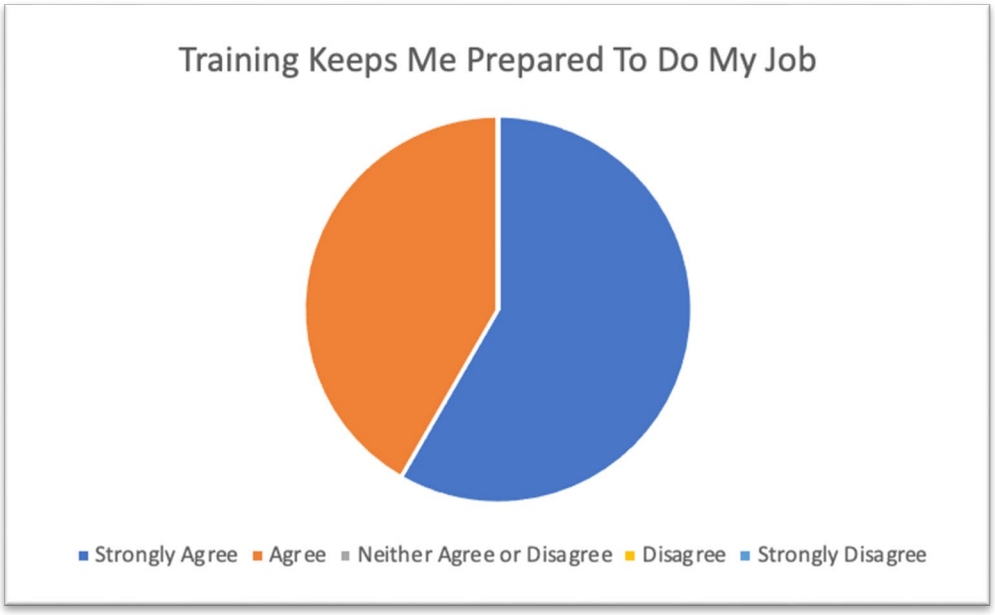


3) The ongoing fire training I receive continues to enhance my skills.

Figure 44: Paid-On-Call Staff Survey Question 3

4) The ongoing training program keeps me adequately trained to perform my job.

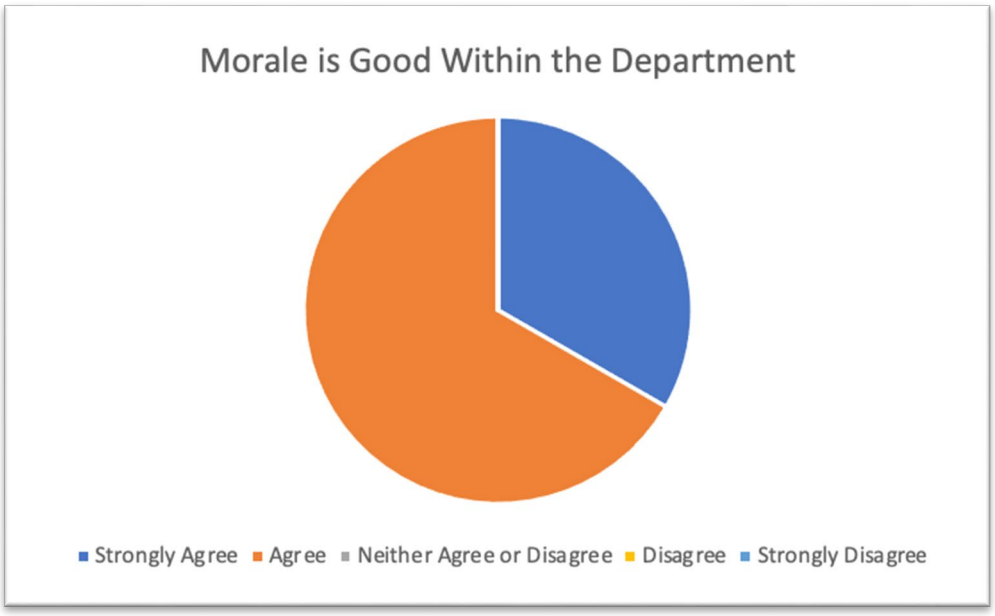
Figure 45: Paid-On-Call Staff Survey Question 4



5) Please provide any comments you have regarding service levels and training that we should consider.
    a. Training is great.
    b. Too much focus on medical for a non ambulance fire department that has an outside/private agency that handles ambulance services.

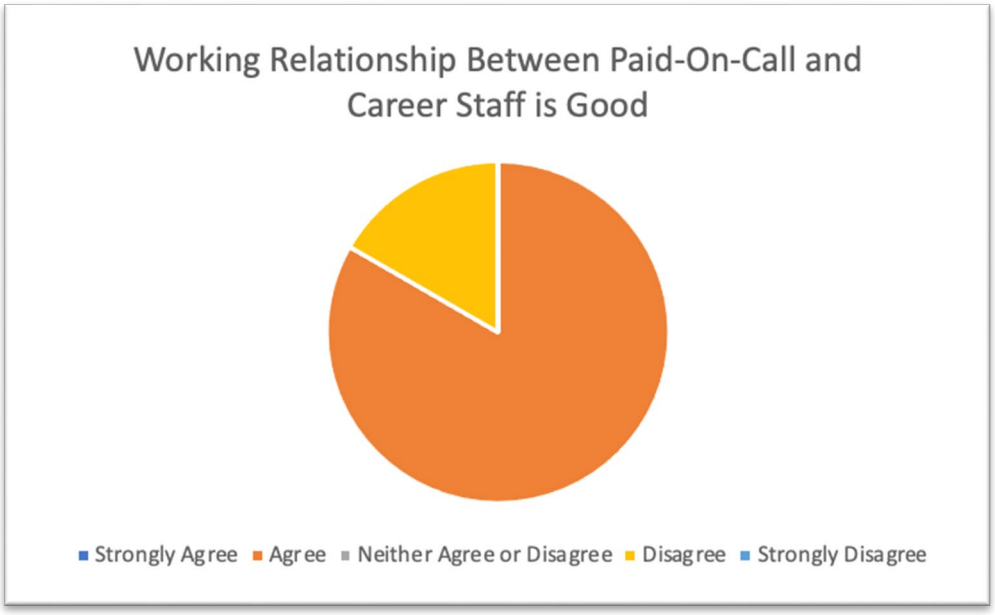
6) I believe that morale within the Fire Department is good.

Figure 46: Paid-On-Call Staff Survey Question 6



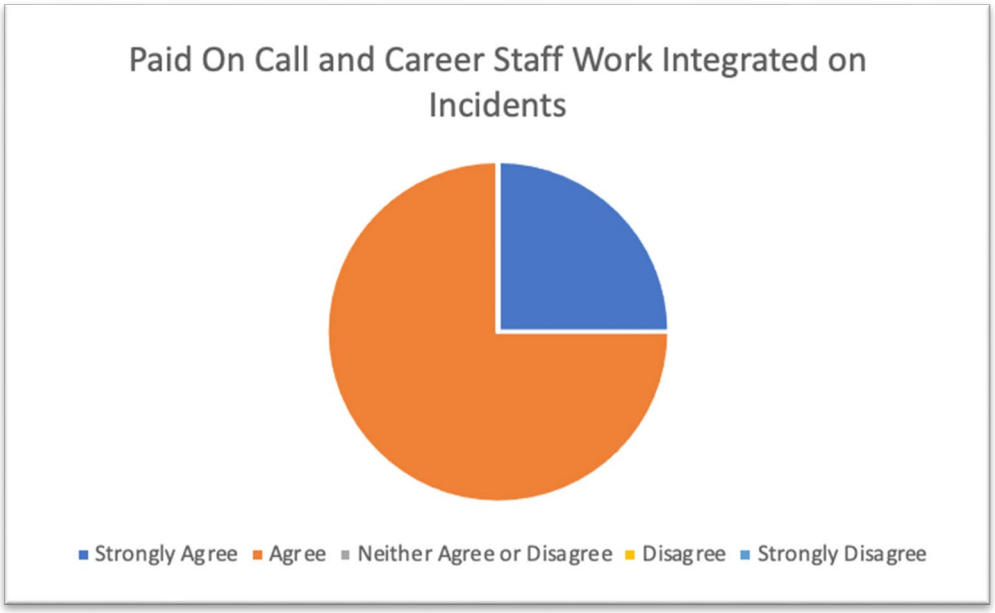
7) I believe that the overall working relationships between paid-on-call fire personnel and full-time personnel are good.

Figure 47: Paid-On-Call Staff Survey Question 7



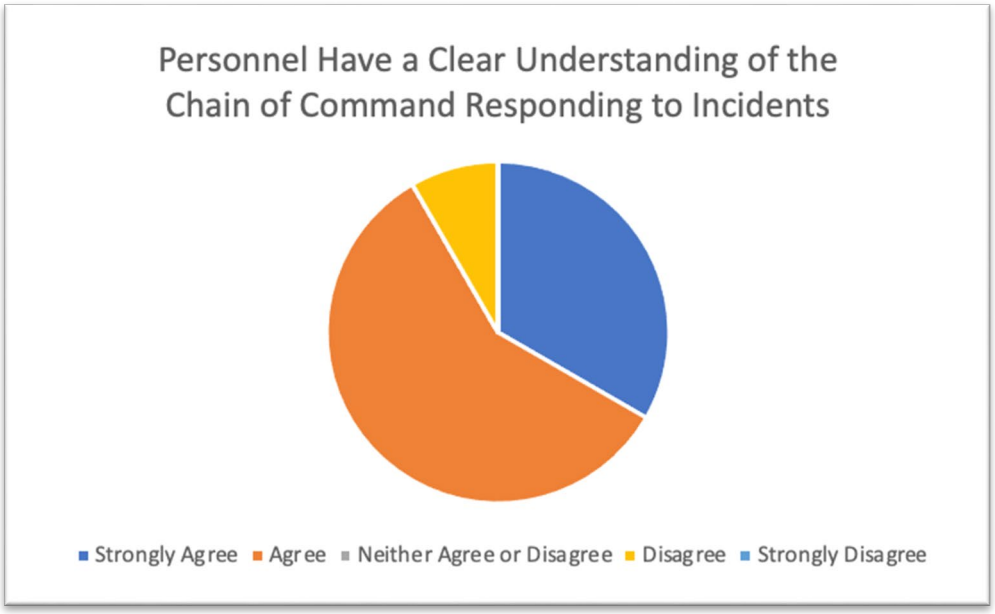
8) Paid-on-call fire personnel and full-time personnel work adequately together and are integrated on calls.

Figure 48: Paid-On-Call Staff Survey Question 8



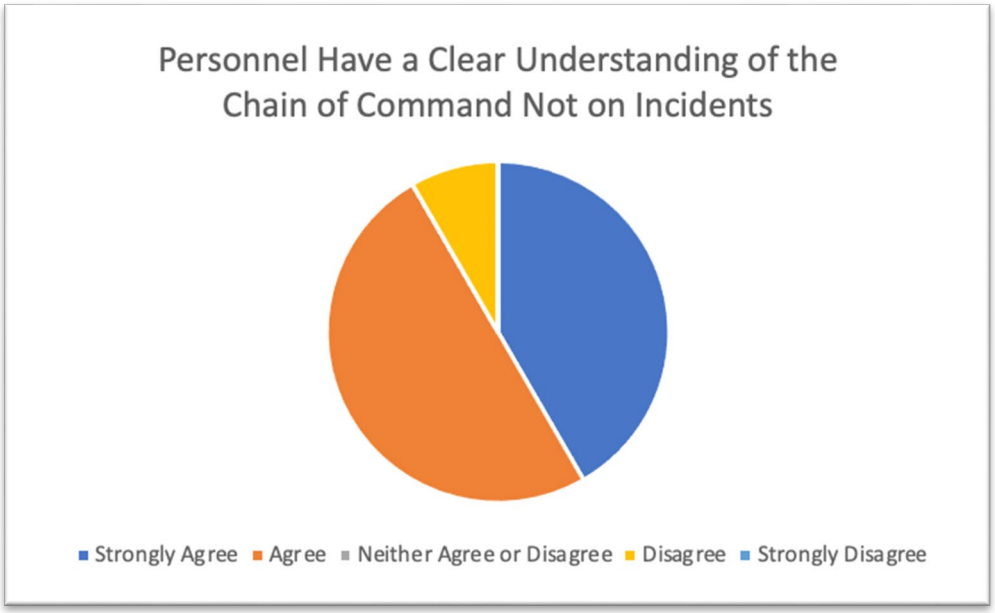
9) Personnel have a clear understanding of the command structure when responding to all emergency related calls.

Figure 49: Paid-On-Call Staff Survey Question 9



10) Personnel have a clear understanding of the command structure when performing to non-emergency duties.

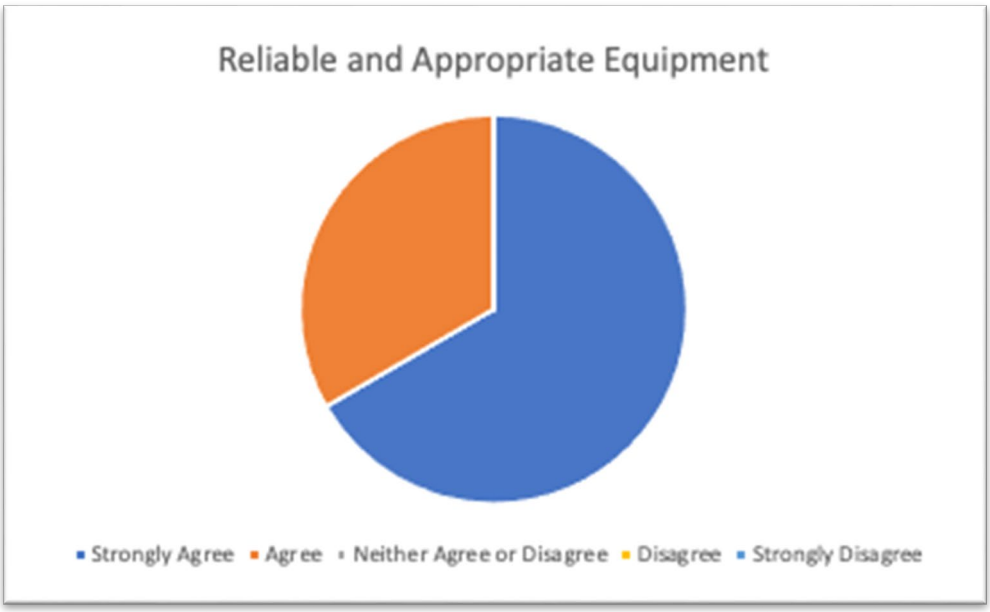
Figure 50: Paid-On-Call Staff Survey Question 10



11) Please provide any comments you have regarding morale and operations that we should consider.
    a. An appointed liaison to handle issues/concerns that arise between full time and part time might be a good idea
    b. Majority of relationships between full and part time are good with a minor exception of full-time staff seemingly having little respect for part time.
    c. During hectic scenes, it can sometimes get confusing which chief to report to for assignments.

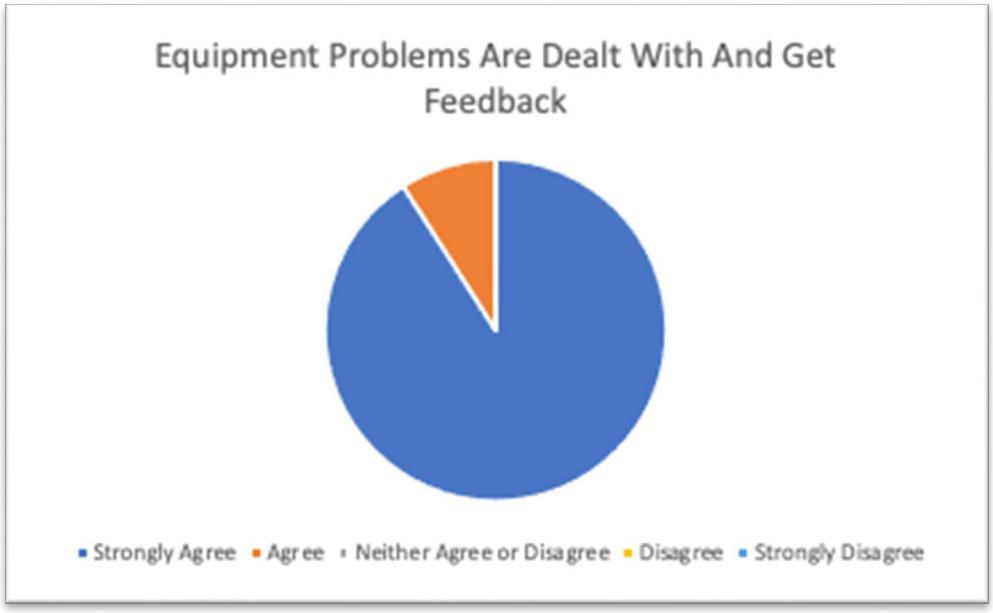
12) The equipment we use for fire and rescue responses is reliable and appropriate to do the job.

Figure 51: Paid-On-Call Staff Survey Question 12



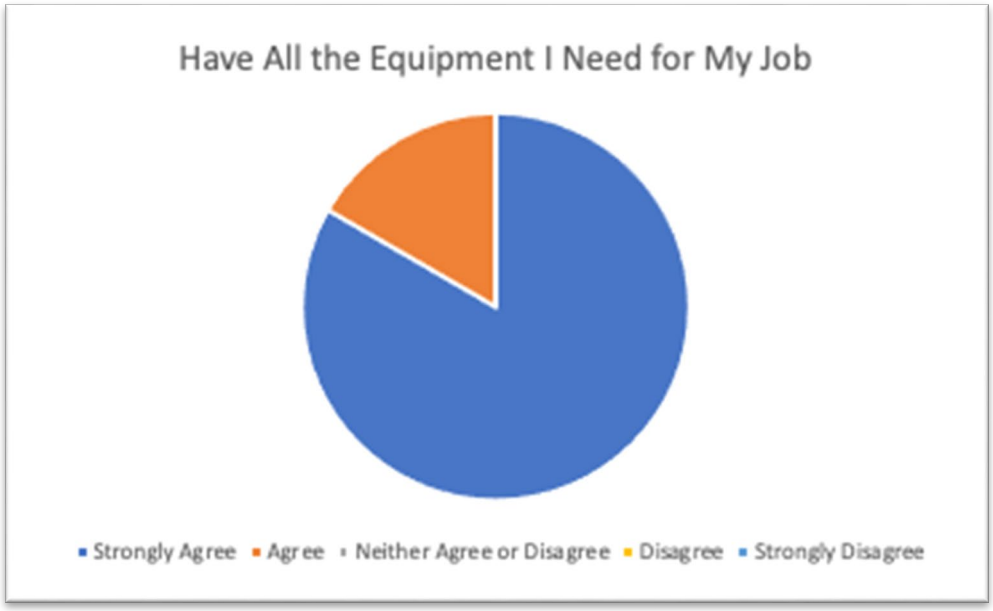
13) Problems with fire service equipment are handled appropriately, and I get feedback on problems I report.

Figure 52: Paid-On-Call Staff Survey Question 13



14) I have all of the required equipment that I need to do my job effectively.

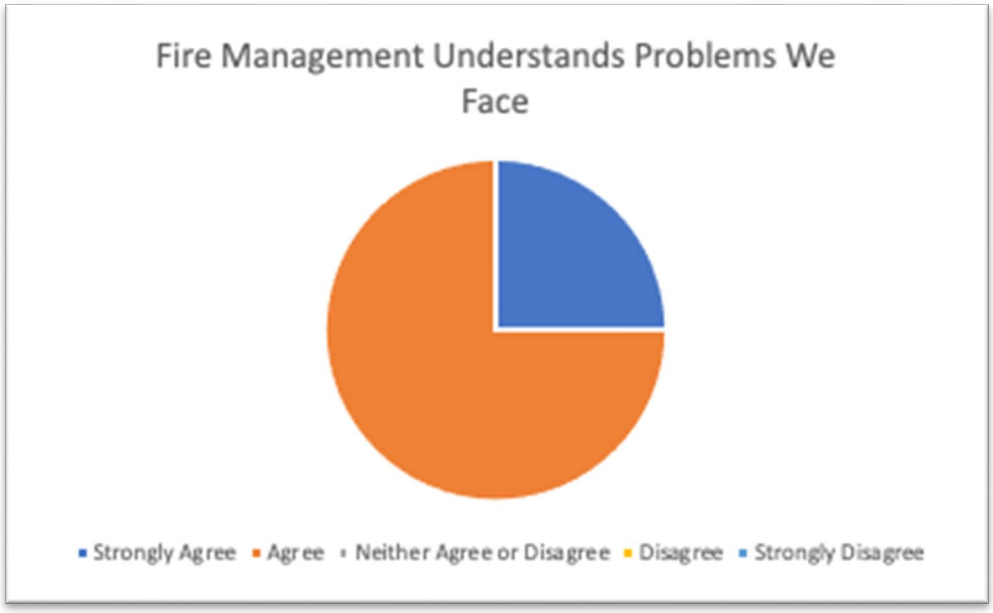
Figure 53: Paid-On-Call Staff Survey Question 14



15) If any, what other equipment do you feel you need to do your job effectively? No Responses

16) Fire Department management/command understands the daily problems we face with our jobs.

Figure 54: Paid-On-Call Staff Survey Question 16

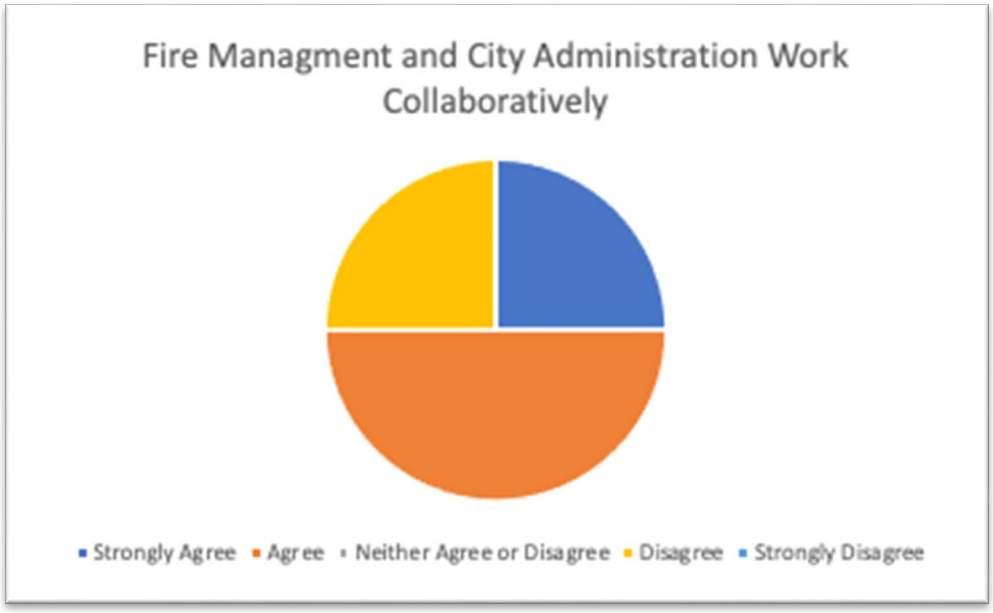


17) Fire Department management deals effectively and transparently with issues of misconduct or unsatisfactory performance that may occur within the Fire Department.

Figure 55: Paid-On-Call Staff Survey Question 17

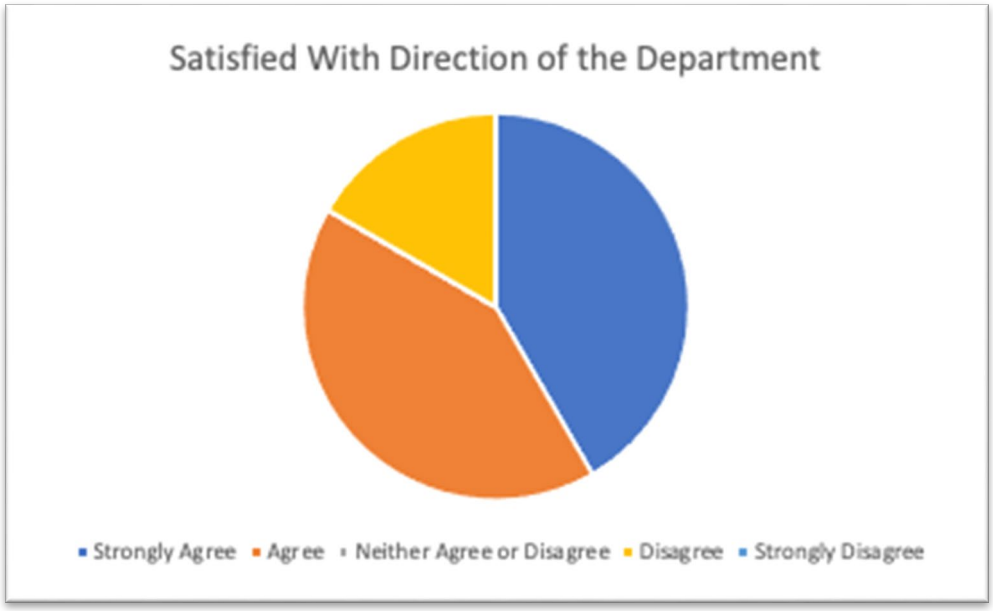
18) City Administration and Fire Department management work collaboratively to fulfill the mission of the fire department.

Figure 56: Paid-On-Call Staff Survey Question 18



19) Overall, I am satisfied with the direction and leadership of the fire administration.

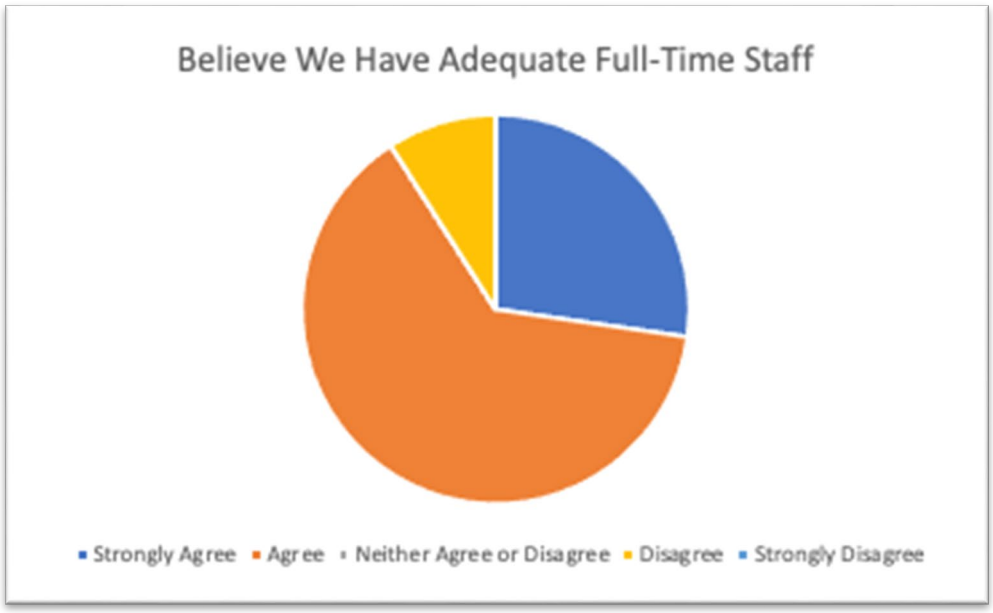
Figure 57: Paid-On-Call Staff Survey Question 19



20) Please provide any comment you have regarding management and supervision that we should consider.
    a. I think communication and leadership training should be provided/required for all those in a leadership position.

21) I believe we have adequate full-time staffing levels.

Figure 58: Paid-On-Call Staff Survey Question 21

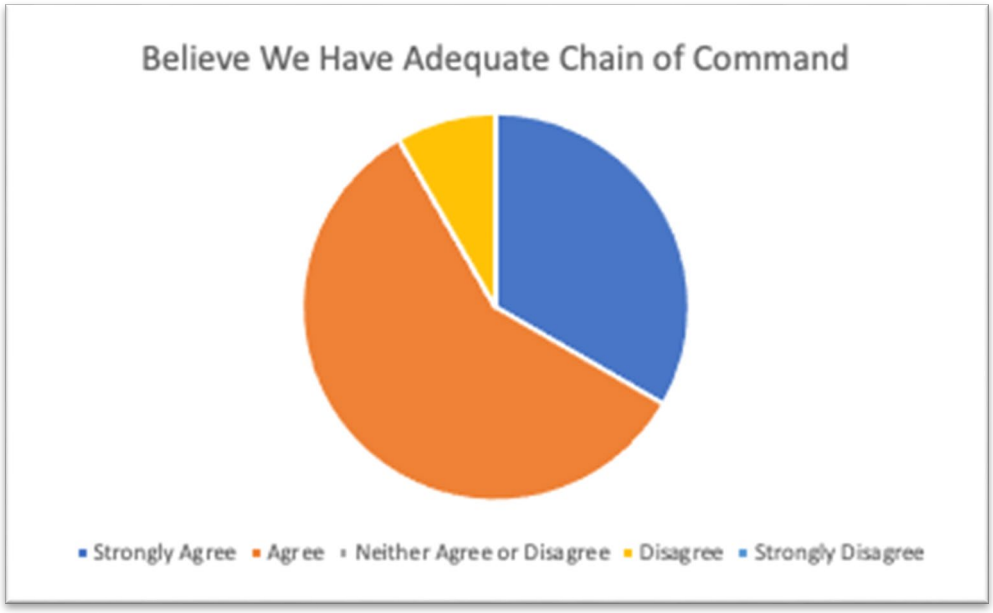


22) I believe we have adequate paid-on-call response requirements.

Figure 59: Paid-On-Call Staff Survey Question 22

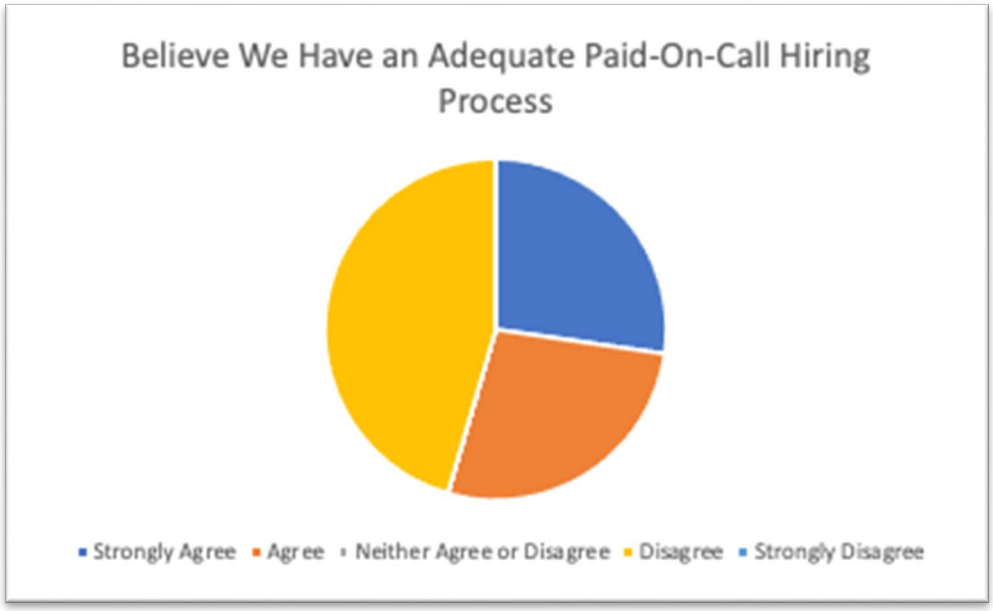
23) I believe I have an adequate chain of command structure.

Figure 60: Paid-On-Call Staff Survey Question 23



24) I believe we have an adequate paid-on-call hiring process.

Figure 61: Paid-On-Call Staff Survey Question 24



25) Please provide any comments you have regarding staffing that we should consider.

a. Believe that the paid-on call people should be more responsible for calls. There is the same group of guys that show up to the majority of calls. Then, there are people who are doing the minimum just to stay on. I do realize the people have families and lives outside of the fire department too.

b. Staffing for POC is hard to recruit and maintain.

26) As a paid-on-call employee, list the three top areas where you believe the fire training can be improved.
    a. Have a specific training leader for the whole department -Better and earlier communication so as to give POCs time to adjust schedules -One leader with a clear training curriculum and timeline to help navigate the requirements and certifications would greatly help. Certain start groups got preferential treatment here and others have been left behind.
    b. 1.) More scenario-based training for specific drills 2.) Training with other departments example: police, Lakeview EMS 3.) Fireground operations
    c. Communication
    d. Employee retention Train how we would respond Repetition
    e. More focus on day-to-day items and less on medical and specialty items.
    f. Some of the Region Blue drills are too specific for EMR- it is great information, but not practical to know every possible patient diagnosis. Could focus more on immediate care while waiting for EMT to arrive.

27) What could be done to recruit and retain paid-on-call staff that is not currently being done? Please include examples of where your ideas are being done if you have them.
    a. The time commitment is pretty difficult to manage for some, especially with full-time jobs and families, etc. Full-time crews need to understand that the POC crew does not do this every day and should take a more constructive coaching approach over being critical and harsh with direction. Especially on those who have been on the crew less than 5 years. Better communication for various drills, events, training requirements, and meetings would be appreciated. Just because you started with a certain group shouldn't require you to have to stay with that group forever. Everyone grows, learns and has different goals here and they should not be limited or forced into that same group after year 1.
    b. We could definitely do more work to recruit qualified candidates Via community outreach. As for retention, I think we'd retain more VPOC personnel if we could foster better communication between VPOC and full-time employees. I can't speak for everyone, but a lot of times I hear comments from VPOC staff that every time we are at the station were usually told that we are doing something wrong.
    c. Lower the number of years it takes to become vested in the relief fund.
    d. Make it more advertised. I am not sure if the community is aware when the fire department is hiring.
    e. Pay? Better advertising for the opportunities Quicker turnaround time from application to hiring.
    f. Most paid-on call are doing for community service not the money, so the more we treat them like employees and less like volunteers the harder it is to retain volunteers.

g. Strongly Disagree

28) Please provide any comments you have regarding being a paid-on-call staff member that we should consider.
   a. These comments are to help. Overall, the department does a world-class job compared to other departments. You can't get everything perfect but some things could be adjusted.
   b. Paid on call staff all gets along great.
   c. I feel like most of us do this in order to help our community. And probably more people would be interested in doing it if they realized it was an option.

29) Do you have any additional comments? No Responses

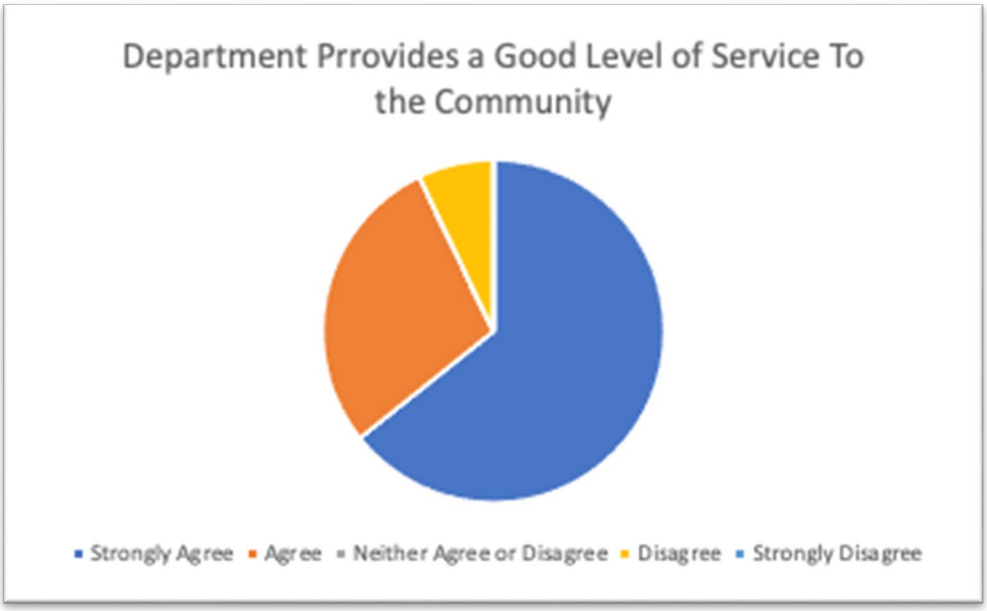
FULL-TIME STAFF SURVEY

Fitch and Associates conducted an onsite visit in February of 2022. During that visit numerous stakeholders were interviewed including the full-time staff. Following the site visit it was determined that an electronic survey would be a good addition to the site visit meeting to give all members of the department an opportunity to provide input. The survey was anonymous and administered solely by *Fitch and Associates* staff.

The electronic surveys were delivered on August 23, 2022, to 14 unique email addresses. Each email address received a unique link to the survey so members could only fill out one survey. Members were able to access the survey until September 2, 2022, with a reminder sent out to those who did not complete the survey a week before the survey closed. There were 14 responses for a rate of 100 percent. There were no incomplete responses. The survey contained 29 questions. All the questions asked and the results are contained in this section.

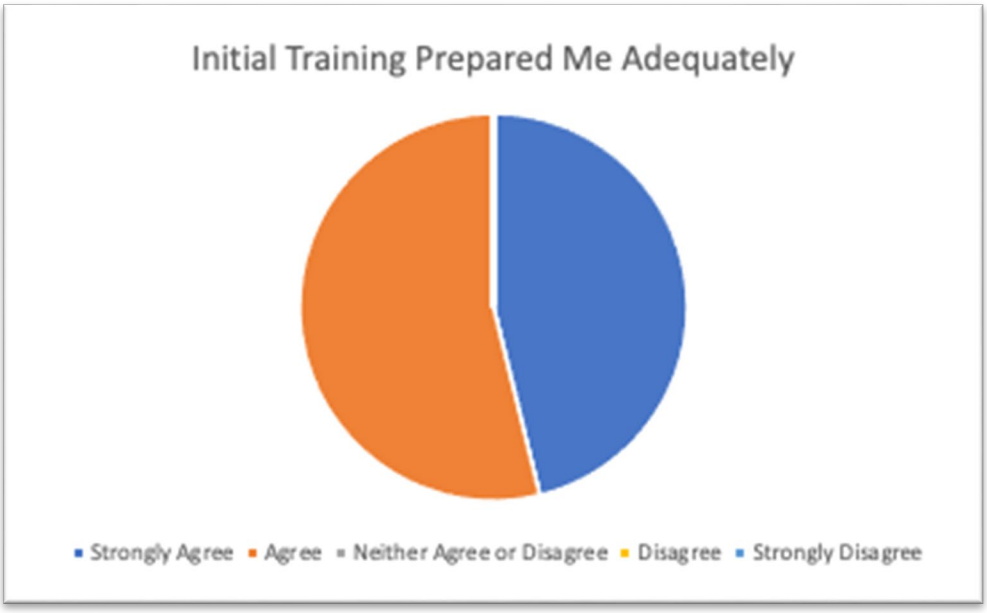
1) I believe that the Stillwater Fire Department provides a good level of service to our community.

Figure 62: Full-Time Staff Survey Question 1



2) When I began my current job at the Fire Department, the initial training I received regarding fire functions prepared me adequately for the work.

Figure 63: Full-Time Staff Survey Question 2



3) The ongoing fire training I receive continues to enhance my skills.

Figure 64: Full-Time Staff Survey Question 3

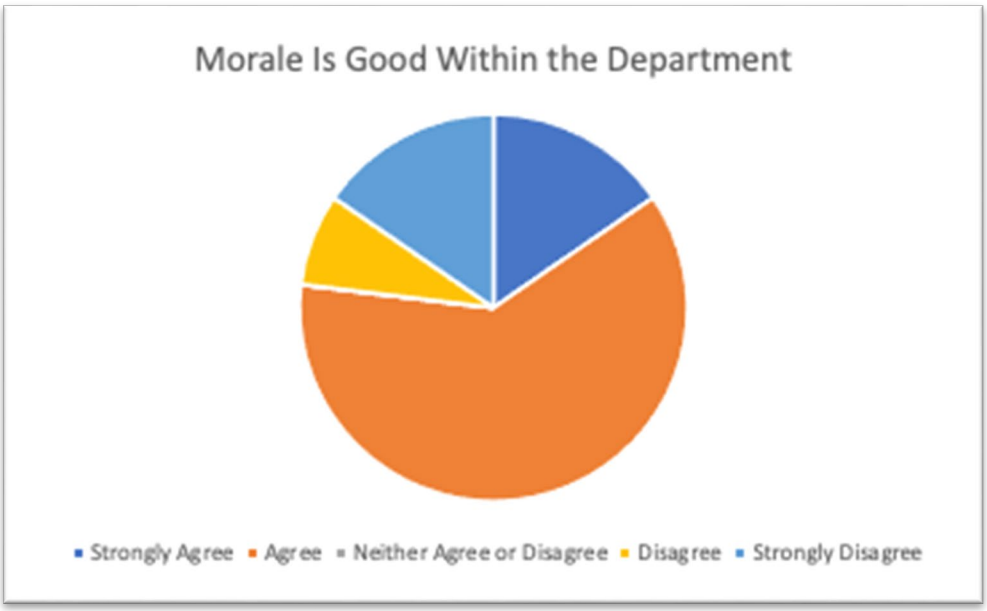
4) The ongoing fire training program keeps me adequately trained to perform my job.

Figure 65: Full-Time Staff Survey Question 4

5) Please provide any comments you have regarding service levels and training that we should consider.
    a. There are always challenges with training full time staff along with part time staff. This gets to be an issue sometimes.
    b. Training opportunities are always available and distributed via email. City is willing to pay for all classes requested.
    c. I believe the department could provide a better service to the city by having an all-fulltime department and or having the part time staff be working set hour duty shifts with the fulltime staff. The part time staff doesn't have the level of experience that the fulltime staff has. The part time staff gets all the same training but lack the experience and time on calls to provide a high level of service.
    d. SFD provides adequate service to the community. However, as turnover continues and the lack of experience and ability to maintain staff the service is suffering. Numerous positions are not being filled due to lack of training and experience on the paid-on-call side. Line officer positions are vacant due to lack of qualified and experienced candidates. The ability to train and promote firefighters to engineer (FAO) positions is increasingly difficult and affects response operations by not being able to get apparatus to respond. Training program needs a dedicated training officer to help improve consistency and ensure competency for all personnel.
    e. You do not train as a full department anymore due to peoples work schedules.
    f. While I believe we provide a good level of service it could be better and more efficient.

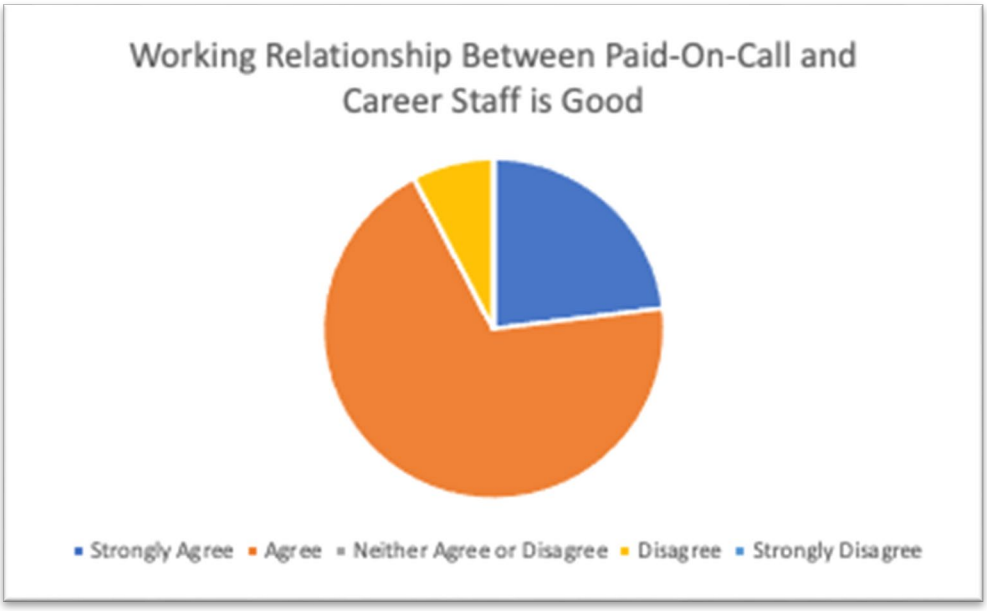
6) I believe that morale within the Fire Department is good.

Figure 66: Full-Time Staff Survey Question 6



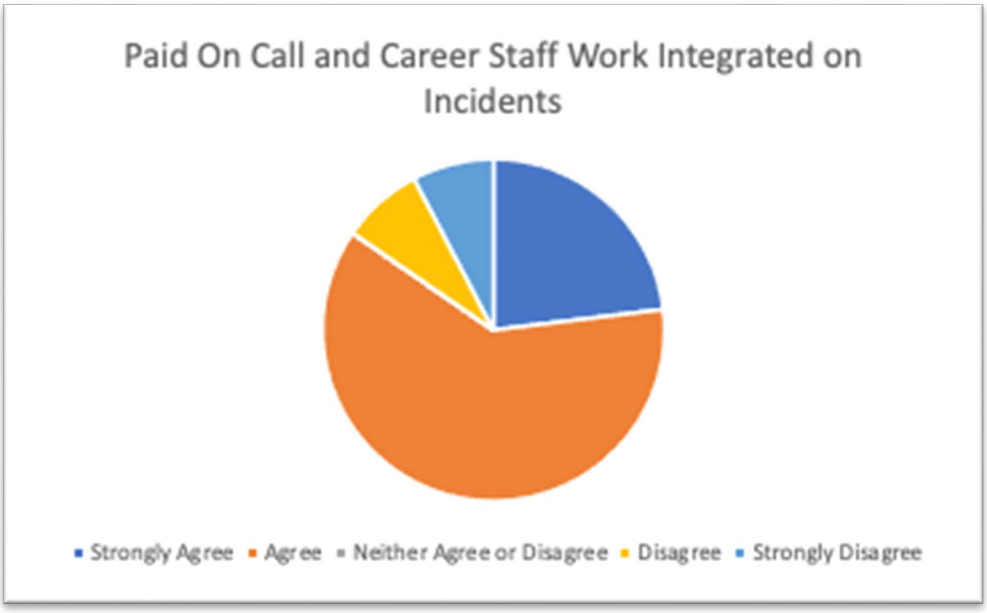
7) I believe that the overall working relationships between paid-on-call fire personnel and full-time personnel are good.

Figure 67: Full-Time Staff Survey Question 7



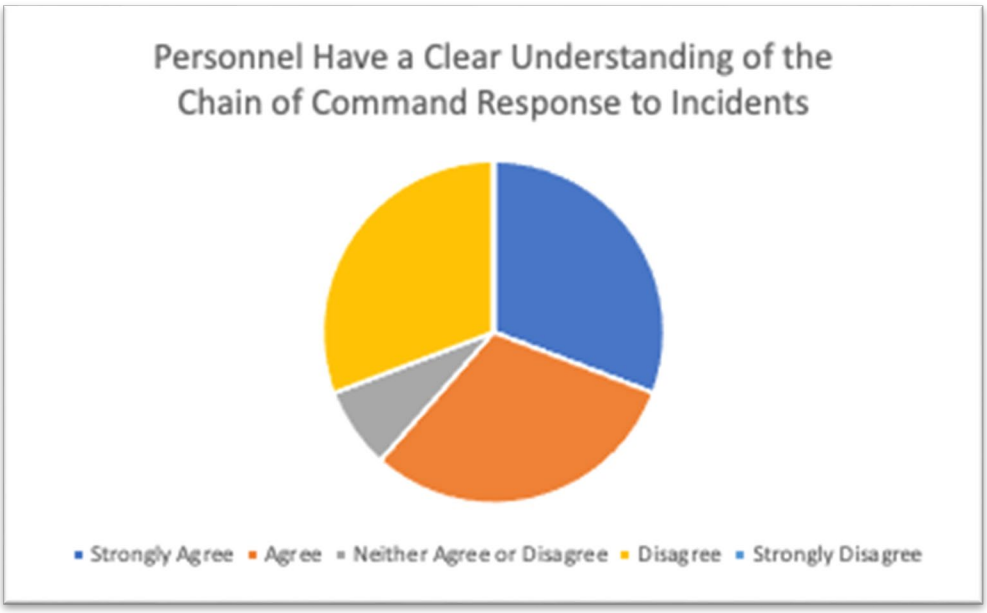
8) Paid-on-call fire personnel and full-time personnel work adequately together and are integrated on calls.

Figure 68: Full-Time Staff Survey Question 8



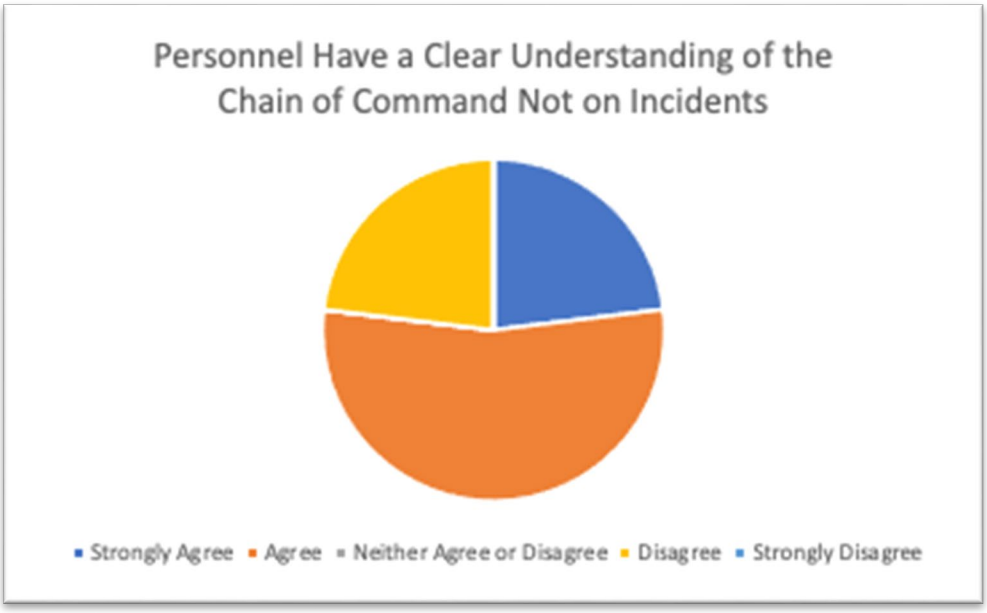
9) Personnel have a clear understanding of the command structure when responding to all emergency related calls.

Figure 69: Full-Time Staff Survey Question 9



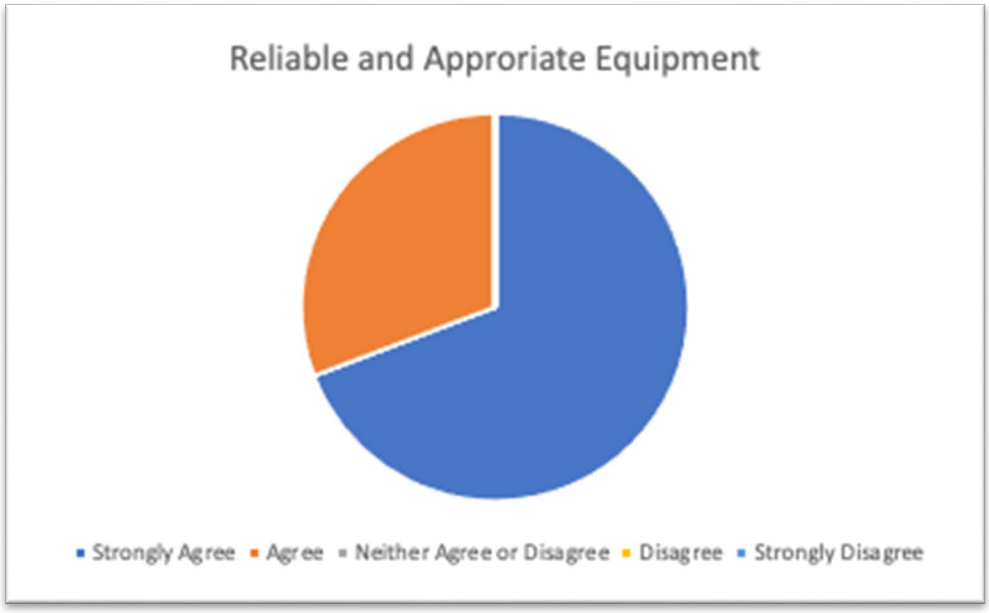
10) Personnel have a clear understanding of the command structure when performing to non-duties.

Figure 70: Full-Time Staff Survey Question 10



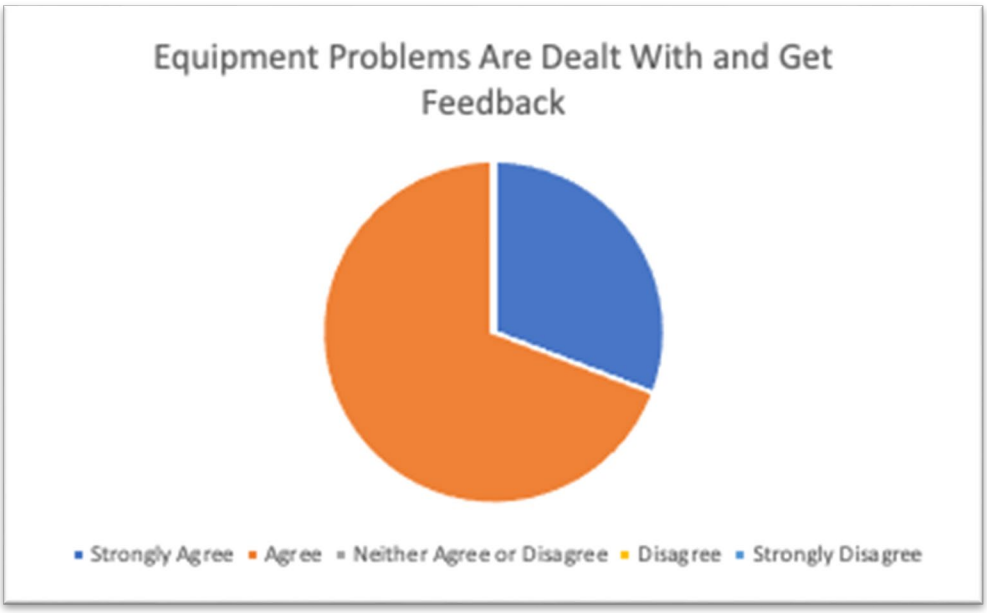
11) Please provide any comments you have regarding morale and operations that we should consider.
    a. Again, part time staff doesn't have the experience that are full time staff does. This causes some issues on calls and training.
    b. I believe the paid-on-call and full-time staff work well together on emergency scenes. Command is established at scenes.
    c. I believe the morale of the department is low because the station is locked up and members of the department don't feel welcomed into the station except for a call.
    d. Part-time staff needs to be better utilized, when possible, to make it all worth their while to do this job. Sometimes command structure is not clear because command is not always clearly transferred from initial responders when a Chief arrives on scene.
    e. Unity of command both on scene and off scene are delineated, however some personnel may not totally understand the interrelationships. Some of this issue is due to the inability and lack of line officer positions currently held in the Department.
    f. Do not get things put out there they want. Demand too much for all extra activities the city has.
    g. Morale within the organization is at a very low point!
12) The equipment we use for fire and rescue responses is reliable and appropriate to do the job.

Figure 71: Full-Time Staff Survey Question 12



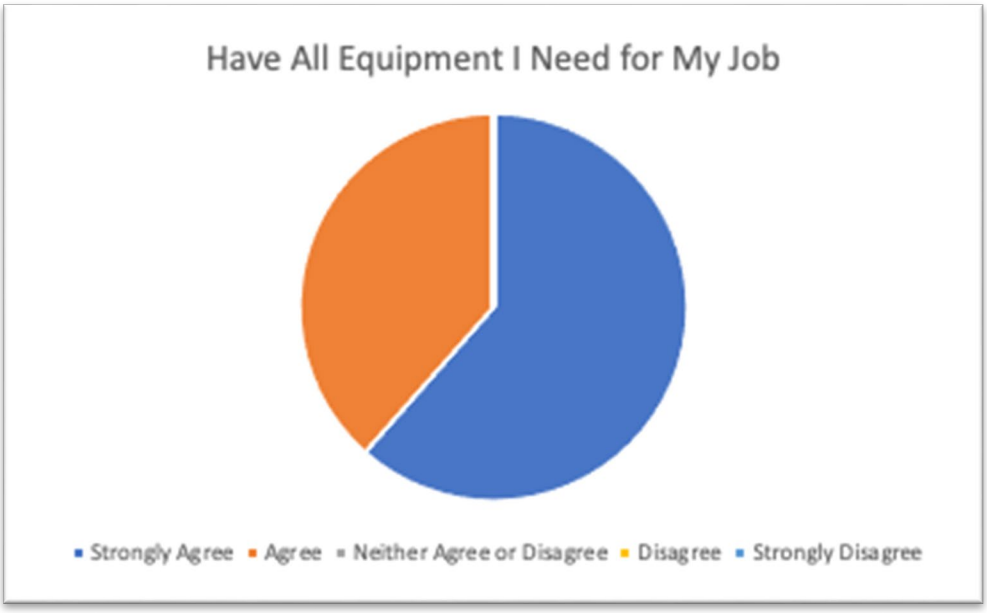
13) Problems with fire service equipment are handled appropriately, and I get feedback on problems I report.

Figure 72: Full-Time Staff Survey Question 13



14) I have all of the required equipment that I need to do my job effectively.

Figure 73: Full-Time Staff Survey Question 14



15) If any, what other equipment do you feel you need to do your job effectively?
    a. None at this time
    b. SFD has a newer fleet with updated equipment that is appropriate for the jobs we are tasked.
    c. FD apparatus and equipment is on a scheduled replacement program. All apparatus have been updated and/or replaced. PPE is ordered and managed annually, and gear is replaced if damaged and/or meets the required retirement date.
    d. Equipment wise the department has it all covered.
    e. Apparatus and equipment have greatly improved over the last 10 years.

16) Fire Department management/command understands the daily problems we face with our jobs.

Figure 74: Full-Time Staff Survey Question 16

17) Fire Department management deals effectively and transparently with issues of misconduct or unsatisfactory performance that may occur within the Fire Department.

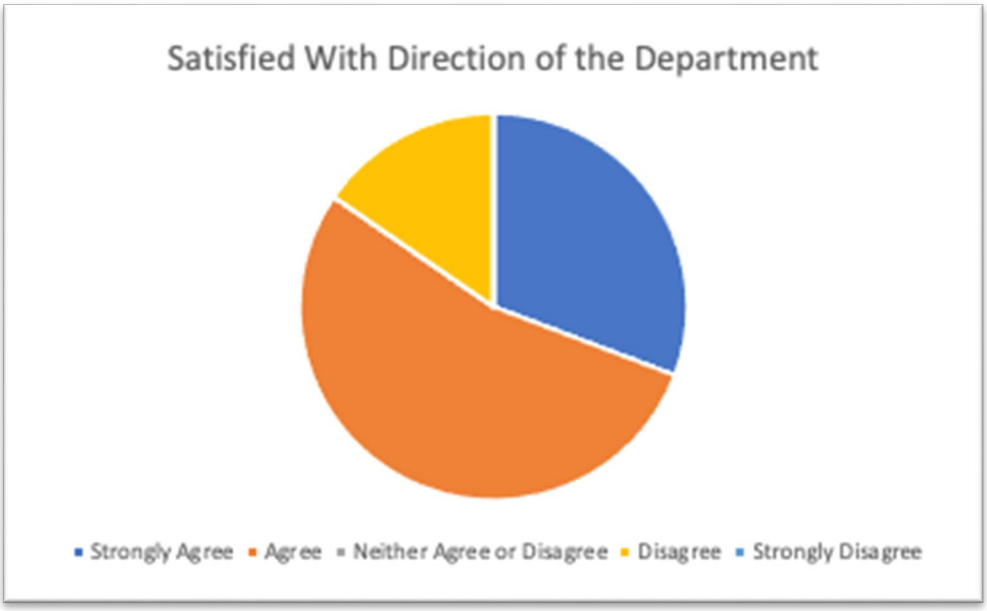
Figure 75: Full-Time Staff Survey Question 17

18) City Administration and Fire Department management work collaboratively to fulfill the mission of the Fire Department.

Figure 76: Full-Time Staff Survey Question 18

19) Overall, I am satisfied with the direction and leadership of the fire administration.

Figure 77: Full-Time Staff Survey Question 19

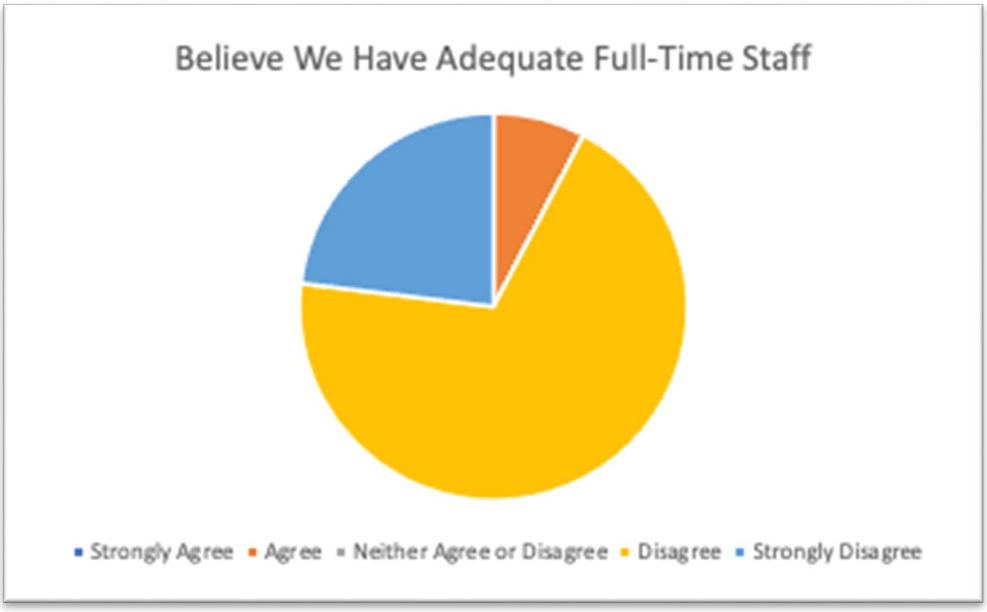


20) Please provide any comments you have regarding management and supervision that we should consider.

a. Leadership within the department works to assure we are meeting the community needs. Most understand that special event requests every week are taxing on staff, but I understand that staffing these events is necessary.
b. I believe that duties and chores are not always distributed evenly or fairly.
c. I believe the chief is over reactive on things that the other chiefs would not put on the tops of their lists.

21) I believe we have adequate full-time staffing levels.

Figure 78: Full-Time Staff Survey Question 21

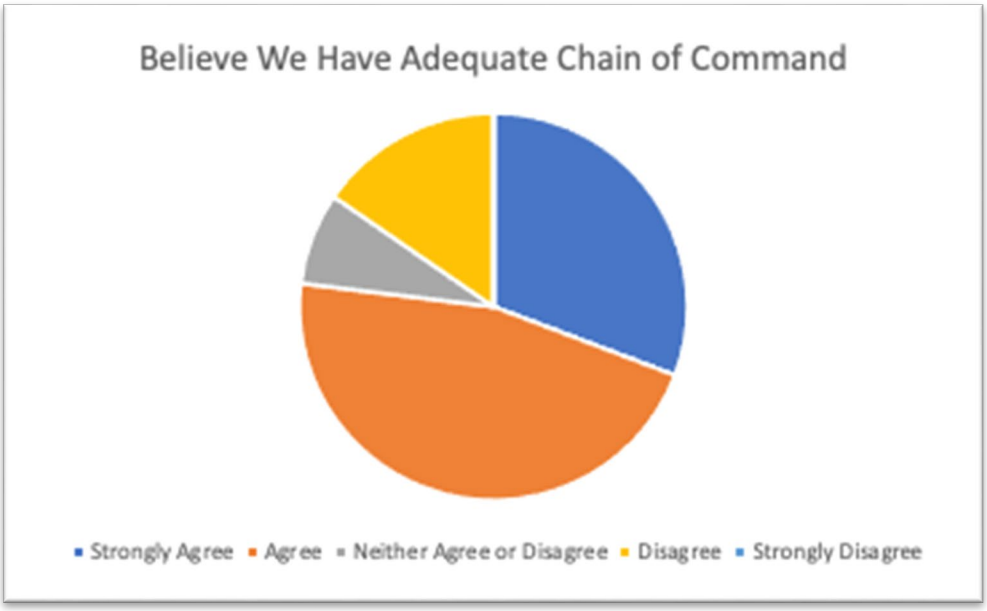


22) I believe we have adequate paid-on-call response requirements.

Figure 79: Full-Time Staff Survey Question 22

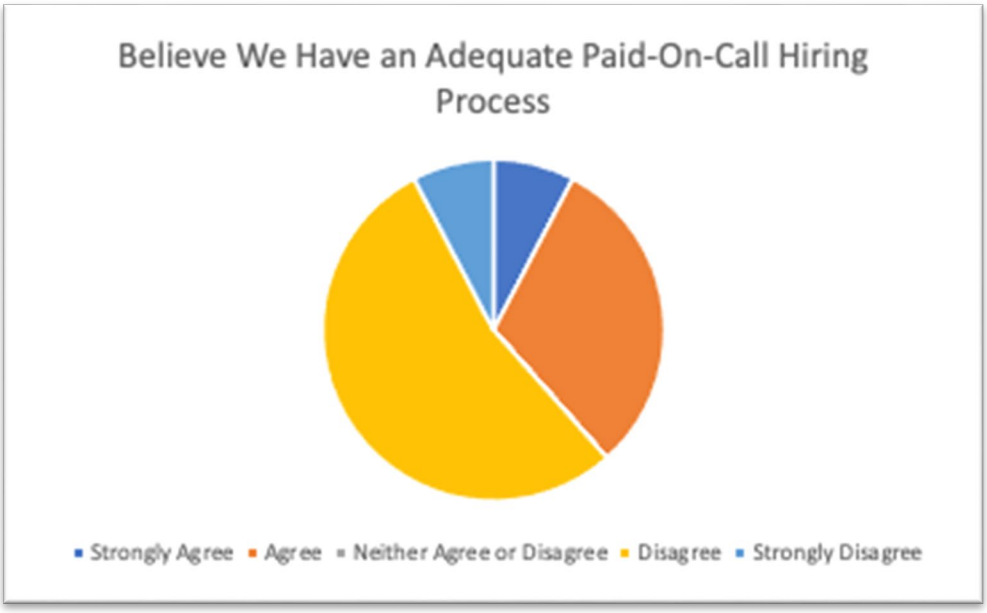
23) I believe I have an adequate chain of command structure.

Figure 80: Full-Time Staff Survey Question 23



24) I believe we have an adequate paid-on-call hiring process.

Figure 81: Full-Time Staff Survey Question 24



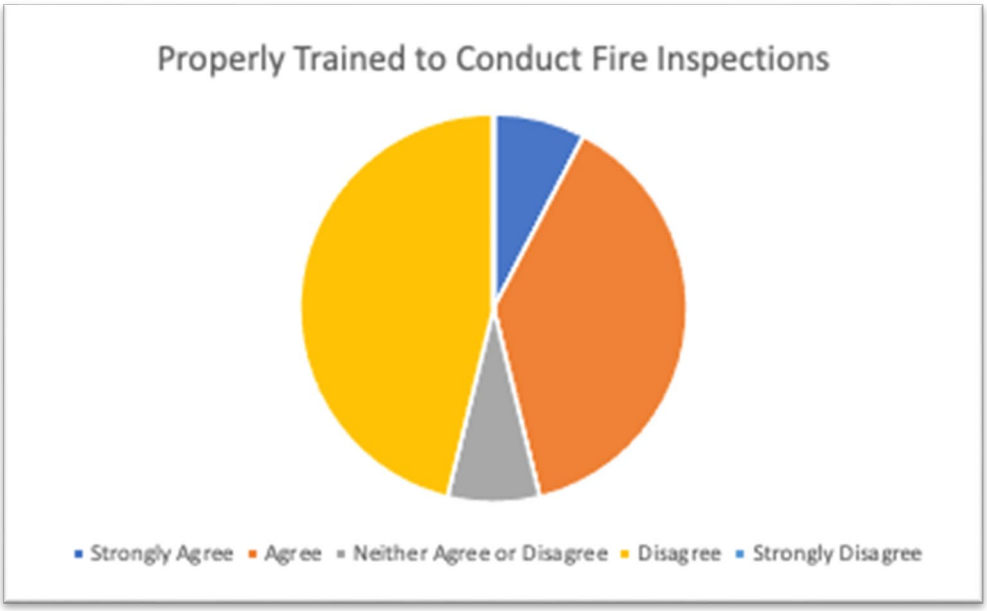
25) Please provide any comments you have regarding staffing that we should consider.

a. Paid-on-call response requirements are adequate at 25%. We have the ability to work shifts anytime to earn percentages and gain experience. The hiring process is thorough but does take several months.
b. I believe that our fulltime staffing level needs to increase to provide a better service and that the paid-on-call way of operating is an outdated system and needs to be moved to part time on duty shift.
c. Paid on call recruiting should be ongoing and year-round.
d. Staffing continues to be the biggest issue facing SFD. On duty staffing does not meet minimum ERF requirements and is usually understaffed due to vacation time and/or sick leave. Paid-on-call requirements are minimal, and it is difficult to get POC personnel to commit to extra duty hours or training. POC personnel are busy on their off time and are not readily accessible on short notice for events or special duty assignments. Chain of command for response is somewhat adequate but SFD lacks adequate positions for fire prevention activities, fire inspection duties, emergency preparedness duties, health and wellness initiatives, etc. The paid-on-call hiring process is somewhat cumbersome and takes way too long. It takes 4-6 months to hire from closing date of the position posting to actually getting someone through the door. Some of this delay is due to the length of time for background checks and the length of time it takes the PD to clear the background. Not entirely sure how to speed this process up but thorough vetting of candidates is extremely important.
e. To keep up with NFPA standards based on the size of our city we should ideally be having a 4-person crew each day. Which means 2 more full time firefighters would be a huge positive during response and operations as a whole.

f. Too regulated on the small things. Harder to get people to apply as it is.
g. Full Time staffing levels are not adequate. If we could get to 4 FF'S per shift (Minimum) we could staff a rescue and Engine daily. This would allow us to handle a large percentage of emergency calls and allow us to meet the OSHA standard of 2 in 2 out.

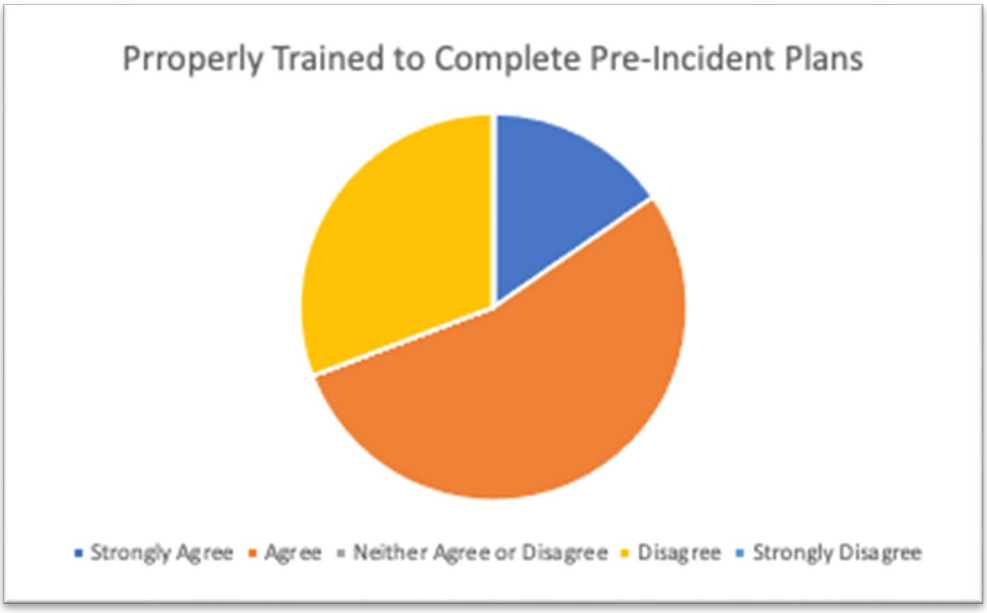
26) I am properly trained to complete fire inspections adequately and effectively.

Figure 82: Full-Time Staff Survey Question 26



27) I am properly trained to edit and develop pre-fire plans.

Figure 83: Full-Time Staff Survey Question 27



28) Please provide any comments you have regarding being a career staff member that we should consider.
    a. We need a dedicated fire inspector to have a good system.
    b. Software programs continue to evolve.
    c. I believe that the fulltime staff provide a high level of skill and just need more staff as calls increase, staff is getting older, and injuries to seems to be increasing.
    d. Flow MSP software is a good tool for pre-planning, but training and implementation was not well coordinated.
    e. I believe that the fulltime staff provide a high level of skill and just need more staff as calls increase, staff is getting older, and injuries to seems to be increasing.
    f. Inspections are done on a company basis and is not necessarily an easy task. Crews may be out on an inspection and may need to leave for a call in the middle of the inspection. Also, crews may be scheduled for an inspection and not show up because they are tied up on a call. This is not very customer service friendly and can create negative impressions of the Department. In addition, if a business owner has questions, they may not get a return answer for several days due to the 24-hour shift work. Again, this is not the best customer service model. SFD is now utilizing a new online pre plan program that is much more user friendly and easier to update than previous paper plans. However, this is a new system and crews are just learning the process.
    g. Fire service has changed dramatically from the time I got on, more and more school. The uppers forget we are a Fire 1st and Rescue 2nd.
    h. could know more info

29) As a full-time employee, list the top three areas where you believe training can be improved.

a. Having enough personnel to complete large drills on shift.
b. Forming a training committee to help with running and designing the training. Utilizing paid-on-call firefighters to assist with teaching drills. Attending more drills than the minimum state requirements.
c. I think that most of the training is good but maybe on some of them we need to have time when not on duty to train.
d. The veteran staff gets tired of the basics, but those basic skill trainings are necessary, especially for the newer staff, therefore those skills must continue to be exercised.
e. 1. Dedicated Training Officer 2. Increased Offsite training 3. Link operational policy to training competencies
f. Know ahead of what is going to be trained on so it can come together that day. Everyone being on the same page, adding more personnel!
g. full department training
h. 1. More hands-on training along with scenario based. 2. Better planning and coordination of drills. Clear objectives and goals of learning not just checking boxes. 3. Company level drills where shifts can train more together as a shift.

30) Do you have any additional comments?

a. I think that it is hard to do inspections and also be responding to call, as the inspections are scheduled and the operator of the business is expecting someone from the department to be there at the set time, most are understanding but it's not very professional for us to ask for their time and then have to cancel and or not show up.
b. I believe that staffing must be in compliance with the 2-in, 2-out rule.
c. The City of Stillwater has changed dramatically over the last 10 + years. The large increase in tourism and special events adds significant risk and call volume to the community. SFD has vast response possibilities based on the diverse geography and community profile. This realization makes it difficult to maintain competency in all areas of incident response such as, high angle rope rescue, dive/water rescue, extrication, civil unrest, high/midrise building response, etc. The need to have an effective response force on duty 24/7 is critical for safe, high quality service. The continued ongoing turnover rate, expense, and inability to hire and maintain paid-on-call staff is affecting moral and operations on a daily basis. The need to move to a different operational model is overdue and needs to be supported and implemented.
d. Would be nice to add more full-time staff, being we get new part time staff and they average maybe years before they leave due to too much time away from family doings or cannot handle it.

APPENDIX

This section reflects the audit, exclusion, and classification activities performed on the data file provided by SFD spanning May 22, 2018 through April 20, 2022. Based on the date range of data provided, three full calendar years of data were available for baseline analysis. The comprehensive data report (i.e., all sections prior to the baseline section) were based on data from the 2021 calendar year spanning January 1, 2021 through December 31, 2021.

The data set originally contained 17,578 records. No records were excluded prior to call volume and temporal analyses, as there were no fully duplicated records wherein values for all variables were identical, and there were no "Problem" values identified for exclusion by SFD leadership. For temporal analyses, year, month, day of week, and hour of day were based on the date and time stamp values for the "Response_Date" variable.

Prior to response volume and busy time analyses, records were examined for duplication of unit response. Unit responses would be considered to be duplicate responses, and subsequently excluded from analyses, if they matched on incident number, responding unit ID, and responding unit dispatch date and time stamp (i.e., to allow for the same unit to be dispatched more than one time to the same incident, but at different times in order to count them as unique unit responses). These criteria resulted in the removal of zero duplicate records.

Records were then audited for validity of the responding unit. Records reporting a unit ID that did not represent a valid responding unit, as identified by SFD leadership (Table 34), were excluded from these and subsequent analyses (*n* = 8,362; Tables 34 and 35).

Table 47: Unit IDs Not Considered Valid Responding Units – 2018-2022

Agency	Unit ID	Frequency (*n*)
SFD	**SFD Total**	**7,877**
	SW1F	1,645
	SW1R	5,181
	SWALL	553
	SWDIVE	9
	SWFRPT	485
	TESTFIRE	4
Outside Agency	**Outside Agency Total**	**217**
	BP10R	1
	BP1F	6
	BP1R	3
	BPALL	38
	EMS Mutual Aid	2
	FDIVE	1

Agency	Unit ID	Frequency (*n*)
Outside Agency	HUALL	4
	HUDDIVE	5
	LEALL	6
	LS10F	1
	LSALL	1
	LSDIVE	9
	MA10A	16
	MA1A	17
	MA1R	1
	MAALL	50
	MADIVE	8
	MRALL	13
	OD10A	5
	OD20A	1
	ODALL	2
	SCALL	3
	SCDIVE	8
	WBDIVE	8
	WLDIVE	8
Unknown	**Unknown Total**	**268**
	Missing	268
Total		**8,362**

Lastly, busy time (i.e., time on task, as measured from unit dispatch date and time to unit clear date and time) was calculated for all remaining records in the data file. No records were missing unit dispatch or unit clear date and time stamps. Records with negative busy times, busy times of zero minutes, and busy times > 24 hours (i.e., considered to be extreme outliers), as applicable, were excluded from analyses (Table 35).

Table 48: Exclusions from Data File for Response Volume and Busy Time Analyses – 2018-2022

Exclusion Activity[1]	Frequency (*n*)	Percent of Total (%)
Total Records in Data Set	**17,578**	**--**
Duplicate Record[2]	0	0.0
Unit ID Not Considered Valid Responding Unit	8,362	47.6
Records Remaining in Data Set	**9,216**	**52.4**
Busy Time Could Not Be Calculated Due to Missing Date and Time Stamps	0	0.0
Unit Dispatch Date and Time to Unit Clear Date and Time (Unit Busy Time) < 0 Minutes[3]	1	< 0.1
Unit Clear Date and Time = Unit Dispatch Date and Time (Unit Busy Time = 0 Minutes)	0	0.0
Unit Dispatch Date and Time to Unit Clear Date and Time (Unit Busy Time) > 24 Hours	0	0.0
Individual Time Values Missing or Excluded	**1**	**< 0.1**

[1]Exclusion activities were sequential, such that frequency data are additive.
[2]Records would be considered duplicates if they matched on incident number, responding unit ID, and responding unit dispatch date and time stamp.
[3]Retained record to reflect response workload but excluded busy time from all related analyses.

Records in the data file related to 2018-2022 valid unit responses were further examined following the calculation of performance time metrics. Calculated times with negative or zero values were excluded from all related analyses, and calculated times considered to be outliers were also excluded from all related analyses (Table 36).

Table 49: Exclusions from Data File for Performance Time Analyses – 2018-2022

Exclusion Activity[1]	Frequency (*n*)	Percent of Total (%)
Total Records in Data Set	**9,216**	**--**
Response Date and Time to Unit Assigned Date and Time (Unit Dispatch Time) < 0 Minutes	0	0.0
Unit Assigned Date and Time = Response Date and Time (Unit Dispatch Time = 0 Minutes)	0	0.0
Response Date and Time to Unit Assigned Date and Time (Unit Dispatch Time) > 30 Minutes[2]	80	0.9
Unit Assigned Date and Time to Unit Enroute Date and Time (Unit Turnout Time) < 0 Minutes	0	0.0
Unit Enroute Date and Time = Unit Assigned Date and Time (Unit Turnout Time = 0 Minutes)[3]	603	6.5
Unit Assigned Date and Time to Unit Enroute Date and Time (Unit Turnout Time) > 30 Minutes[3]	1	< 0.1
Unit Enroute Date and Time to Unit Arrival Date and Time (Unit Travel Time) < 0 Minutes	0	0.0
Unit Arrival Date and Time = Unit Enroute Date and Time (Unit Travel Time = 0 Minutes)[4]	45	< 0.1
Unit Enroute Date and Time to Unit Arrival Date and Time (Unit Travel Time) > 60 Minutes[4]	3	< 0.1
Response Date and Time to Unit Arrival Date and Time (Unit Response Time) > 60 Minutes[5]	0	0.0
Individual Time Values Excluded[6]	**732**	**--**

[1]Exclusion activities were sequential, such that frequency data are additive.
[2]Retained records to reflect response workload but excluded dispatch times and corresponding response times from all related analyses.
[3]Retained records to reflect response workload but excluded turnout times and corresponding response times from all related analyses.
[54]Retained records to reflect response workload but excluded travel times and corresponding response times from all related analyses.
[5]Retained records to reflect response workload but excluded response times from all related analyses.
[6]Plus additional exclusion of corresponding response times, where applicable.

Table 50: Classification of Incident Description into Program and Call Category

Program	Call Category	"Problem" from Data File[1]
EMS	Agency Assist	yRQ EMS by Public Safety -L3
EMS	Agency Assist	yRQ EMS by Public Safety-L1
EMS	Agency Assist	yRQ EMS by Public Safety-L3
EMS	Agency Assist	yRQ EMS Rescue by PublicSafety
EMS	Breathing Difficulty	yChoking-1
EMS	Breathing Difficulty	yDifficulty Breathing
EMS	Breathing Difficulty	yDiving/Drowning-1
EMS	Breathing Difficulty	yDiving/Drowning-2
EMS	Cardiac and Stroke	yCardiac/Heart Problems-1
EMS	Cardiac and Stroke	yCardiac/Heart Problems-2
EMS	Cardiac and Stroke	yCPR/Full Arrest
EMS	Cardiac and Stroke	yStroke-1
EMS	Cardiac and Stroke	yStroke-2
EMS	Cardiac and Stroke	yStroke-3
EMS	Fall and Injury	yAnimal Bite Injury-1
EMS	Fall and Injury	yAnimal Bite Injury-3
EMS	Fall and Injury	yAssault Injury-1
EMS	Fall and Injury	yBleeding-1
EMS	Fall and Injury	yBurns-1
EMS	Fall and Injury	yChest Injury-1
EMS	Fall and Injury	yCritical Incident/Act Shooter
EMS	Fall and Injury	yCSC/Sex Offense Injury
EMS	Fall and Injury	yDomestic Violence Injury-1
EMS	Fall and Injury	yElectrocution-1
EMS	Fall and Injury	yEye Problem/Injury-1
EMS	Fall and Injury	yFall (Non-Truamatic)-1
EMS	Fall and Injury	yFall (Non-Truamatic)-2
EMS	Fall and Injury	yFall-1
EMS	Fall and Injury	yFall-2
EMS	Fall and Injury	yFall-3
EMS	Fall and Injury	yMass Casualty Incident
EMS	Fall and Injury	yShooting with Injuries
EMS	Fall and Injury	yStabbing
EMS	Fall and Injury	yTrauma-1
EMS	Fall and Injury	yTraumatic Inj/Head Injury-1
EMS	Fall and Injury	yTraumatic Inj/Head Injury-2
EMS	Fall and Injury	yTraumatic Inj/Head Injury-3
EMS	Fire Alarm	yFire Alarm
EMS	Fire Alarm	yFire Alarm - Water Flow

Program	Call Category	"Problem" from Data File[1]
EMS	Fire Alarm	yFire Alarm Carbon Monoxide
EMS	Illness and Other	yAbdominal Pain/Problem-1
EMS	Illness and Other	yAbdominal Pain/Problem-2
EMS	Illness and Other	yAbdominal Pain/Problem-3
EMS	Illness and Other	yAllergic Reaction
EMS	Illness and Other	yBack Pain(Non-Trauma)-1
EMS	Illness and Other	yBack Pain(Non-Trauma)-2
EMS	Illness and Other	yBack Pain(Non-Trauma)-3
EMS	Illness and Other	yChest Pain (Non-Cardiac)-1
EMS	Illness and Other	yChest Pain(Non-Cardiac)-1
EMS	Illness and Other	yChest Pain(Non-Cardiac)-2
EMS	Illness and Other	yChildbirth/Obstetrics-1
EMS	Illness and Other	yCO/Inhalation
EMS	Illness and Other	yDiabetic-1
EMS	Illness and Other	yExposure Heat/Cold-1
EMS	Illness and Other	yExposure Heat/Cold-2
EMS	Illness and Other	yHeadache-1
EMS	Illness and Other	yHeadache-2
EMS	Illness and Other	yLE Incident w/ Medical-1
EMS	Illness and Other	yLE Incident w/ Medical-2
EMS	Illness and Other	yLift Assist-Non Injury
EMS	Illness and Other	yMedical Alarm-1
EMS	Illness and Other	yMedical Alarm-2
EMS	Illness and Other	yPerson In Crisis-1
EMS	Illness and Other	yPerson In Crisis-3
EMS	Illness and Other	yPossible Death
EMS	Illness and Other	ySick Person-1
EMS	Illness and Other	ySick Person-3
EMS	Illness and Other	yUnknown Medical Situation-1
EMS	Mutual Aid	yMutual Aid-EMS
EMS	Mutual Aid	yMutual Aid-EMS Plan (In)
EMS	Mutual Aid	yRequest Mutual Aid EMS
EMS	Mutual Aid	yWoodbury EMS Mutual Aid
EMS	MVA	yMVA: Hit and Run with Injury
EMS	MVA	yMVA: Injury-Entrapment
EMS	MVA	yMVA: Unknown Injury
EMS	MVA	yVehicle Accident Injury
EMS	Overdose and Psychiatric	yAccidental OD/Poisoning-1
EMS	Overdose and Psychiatric	yAccidental OD/Poisoning-2
EMS	Overdose and Psychiatric	yEmotionally Disturb Person-1

Program	Call Category	"Problem" from Data File[1]
EMS	Overdose and Psychiatric	yEmotionally Disturb Person-3
EMS	Overdose and Psychiatric	ySuicide or Attempted
EMS	Seizure and Unconsciousness	ySeizure-1
EMS	Seizure and Unconsciousness	yUnconscious Person-1
EMS	Seizure and Unconsciousness	yUnconscious Person-2
Fire	Agency Assist	yPublic Safety Needs Help-1
Fire	Agency Assist	yRQ Fire by Public Safety
Fire	Fire Other	yChimney Fire
Fire	Fire Other	yDumpster Fire
Fire	Fire Other	yElectrical Fire
Fire	Fire Other	yFire Dive
Fire	Fire Other	yFire Initiated Call
Fire	Fire Other	yFire Report
Fire	Fire Other	yFire Unknown
Fire	Fire Other	yMarine Fire
Fire	Fire Other	yOdor/Smoke Smell Outside
Fire	Fire Other	yOven Fire Contained to Oven
Fire	Fire Other	ySevere Weather Alert-ALL
Fire	Fire Other	ySmoke in Structure-No Flames
Fire	Hazardous Condition	yElectrical Hazard
Fire	Hazardous Condition	yElectrical Hazard with Injury
Fire	Hazardous Condition	yExplosion
Fire	Mutual Aid	yMutual Aid-FIRE
Fire	Outside Fire	yBrush Fire
Fire	Outside Fire	yFire Outside
Fire	Structure Fire	yStructure Fire-Flames Seen
Fire	Vehicle Fire	yFire Vehicle
Fire	Vehicle Fire	yFire Vehicle with Injury
Hazmat	Hazmat	yGas Leak
Hazmat	Hazmat	yHAZMAT
Rescue	Rescue	yFire Rescue Incident
Rescue	Rescue	yFire Rescue Incident-3
Rescue	Rescue	yTechnical Rescue
Rescue	Rescue	yWater Emergency

[1]Entries are presented verbatim from the data file.

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