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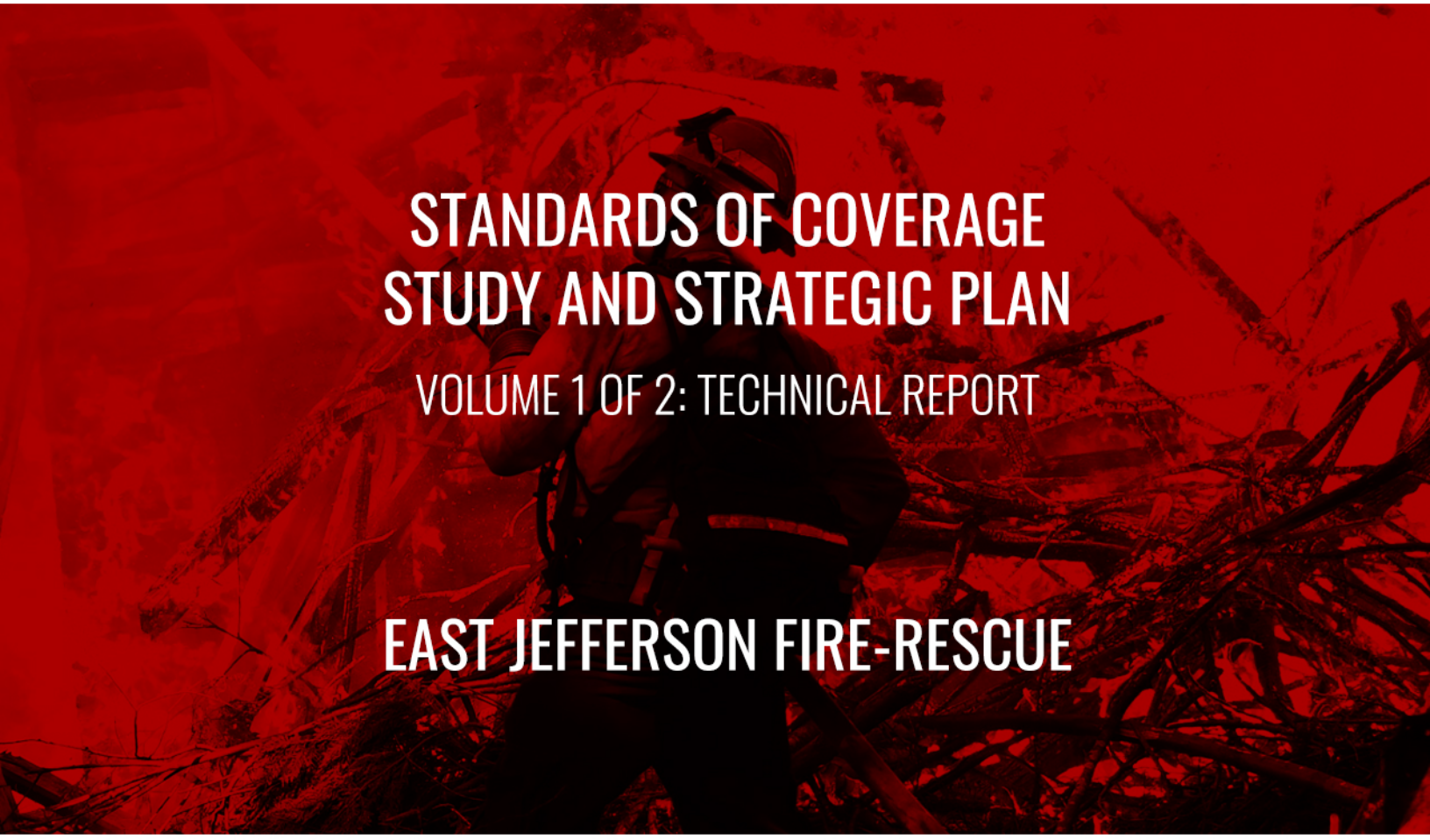

STANDARDS OF COVERAGE STUDY AND STRATEGIC PLAN

VOLUME 1 OF 2: TECHNICAL REPORT

EAST JEFFERSON FIRE-RESCUE

OCTOBER 31, 2022

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EXECUTIVE SUMMARY

The East Jefferson Fire-Rescue (District) retained Citygate Associates, LLC (Citygate) and BERK Consulting, Inc. (BERK) to conduct a Standards of Coverage (SOC) study and develop a Strategic Plan to:

- Evaluate the District's current deployment model, including service demand and response performance.
- Identify opportunities for improvement in delivery of fire, emergency medical, and other technical emergency services to best serve the evolving demographics and service demand needs within the District's service area.
- Evaluate additional or alternate fire station locations for impacts on first-due and Effective Response Force (ERF) travel times.
- Provide analysis, findings, and recommendations in a format suitable for public policy discussion.

Citygate's scope of work and corresponding Work Plan were developed consistent with Citygate's Project Team members' experience in fire administration and deployment. Citygate utilizes various industry-recognized best practice guidelines and criteria in the field of deployment analysis, including National Fire Protection Association (NFPA) standards, the self-assessment criteria of the Commission on Fire Accreditation International (CFAI), Insurance Services Office (ISO) schedules, the Washington Surveying and Rating Bureau (WSRB), and federal and state mandates relative to the provision of emergency services.

This report is presented in two volumes. **Volume 1** includes this Executive Summary and all findings and recommendations; Citygate's deployment analysis, including key elements from the separate Community Risk Assessment and Incident Statistical Analysis reports; and one appendix including the full Community Risk Assessment. **Volume 2** contains all maps referenced throughout this report. Overall, this assessment provides 23 findings and five action recommendations.

POLICY CHOICES FRAMEWORK

There are no mandated federal or state regulations directing any specific level of fire service staffing, response performance, or outcomes. Thus, the level of fire protection services provided is a *local policy decision.* Communities have the level of fire services they can afford and/or choose to "purchase," which may not always be the level of service desired. However, if services are provided at all, local, state, and federal regulations related to firefighter and citizen safety must be followed.

DEPLOYMENT SUMMARY

Citygate's assessment finds the District is appropriately organized to accomplish its mission to serve a diverse urban/suburban/rural population over a large service area. District personnel are committed to providing high-quality customer-based services despite significant capacity and staffing constraints.

The challenges the District faces are similar to those faced by many agencies, and this study should be received as a best practice review and forward-looking planning framework. The City of Port Townsend, Jefferson County Fire District No. 1, and Jefferson County Fire District No. 6 all started as effective volunteer fire departments, later evolving into combination volunteer/career departments, and ultimately consolidating to form East Jefferson Fire-Rescue. This service level evolution is typical of fire services agencies and smaller jurisdictions throughout the U.S. More recently, the District made investments to improve service capacity by adding full-time Battalion Chiefs. As this study will discuss, many smaller fire agencies across the U.S., particularly those in proximity to larger fire agencies offering better compensation and benefits, are under significant stress to recruit and maintain fully authorized staffing levels due to changing socioeconomics.

The most significant challenges facing the District can be summarized in two themes: (1) response capacity staffing, and (2) response performance.

Theme 1: Response Capacity – Staffing

Fire service deployment, simply summarized, is about the *speed* and *weight* of response. *Speed* refers to initial (first-due) response resources—typically engines, ladder trucks, squads, or ambulances strategically deployed across a jurisdiction within a specified time interval to mitigate routine-to-moderate emergencies. *Weight* refers to multiple-unit responses for more serious emergencies such as building fires, multiple-patient medical emergencies, vehicle collisions with extrication required, or technical rescue incidents where enough firefighters must be assembled within a reasonable time interval to safely control the emergency and prevent it from escalating into an even more serious event.

Response capacity does not refer to the number and/or type of apparatus needed to mitigate a specific type of emergency, rather it refers to the appropriate number of firefighters and command staff needed to *safely* perform the critical tasks necessary to control/mitigate the emergency. Within the SOC process, positive outcomes are the goal. From that goal, crew size and response time can be calculated to determine appropriate fire station spacing (distribution and concentration). Serious medical emergencies and building fires have the most severe time constraints.

Typical desired outcomes in *urban/suburban* density communities include preventing permanent impairment or death from medical emergencies where possible and confining building fires to the

room or compartment of origin. To achieve this, the initial (first-due) unit should arrive within 7:00 to 8:00 minutes, before brain death becomes permanent or an incipient building fire expands beyond the room or compartment of origin, and the full multiple-unit Effective Response Force (ERF) should arrive within 11:00 to 12:00 minutes with enough personnel to prevent the emergency from becoming even more serious.

For *rural* density communities, desired outcomes typically include preventing death from a medical emergency where possible and confining building fires to the building of origin, which means that the first-due unit should arrive within 11:00 to 12:00 minutes and the full ERF should arrive within 19:00 to 20:00 minutes.

The NFPA[1] recommends a minimum ERF of 16–17 personnel to safely and effectively perform the rescue, fire suppression, and ventilation tasks needed to control a low hazard single-family residential building fire. Larger single- and multi-family residential and commercial buildings require even more personnel.

Although the District has automatic or mutual aid agreements with its neighboring agencies, the nearest mutual aid resource is the Navy NW Region fire station on Indian Island, which may or may not be available to respond when requested. Port Ludlow, Quilcene, and Brinnon are the only other reasonably close mutual aid resources, and those resources are approximately 15:00–35:00 minutes travel time to the center of the District and significantly longer to the City of Port Townsend.

Given the values to be protected as identified in **Appendix A**, the 68-square-mile service area, a challenging road network, increasing service demand, projected population growth, an increasing simultaneous incident rate, and travel distance and time for auto/mutual aid resources, Citygate finds the District's current, daily on-duty staffing level of nine personnel at three of the six fire stations to be *insufficient* to provide (1) equitable first-unit *speed of response* capacity to all areas of the District for routine to moderate emergencies, *and* (2) the minimum recommended multiple-unit *weight of response* capacity needed for more serious emergencies. Even one low-hazard ERF incident will deplete all on-duty personnel *plus* automatic aid, leaving no resources for a simultaneous incident—which occur 33 percent of the time, and are increasing at an average annual rate of approximately 25 percent.

To (1) improve first-unit *speed of response* capacity and ERF *weight of response* capacity, (2) improve first-unit and ERF travel time coverage and related overall customer service, and (3) reduce reliance on mutual aid resources (Figure A15), Citygate recommends that the District

[1] 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 (2020 Edition).

consider additional daily on-duty staffing in the following suggested *progressive* order, as funding is available:

1. Two-person EMS unit/engine at Station 13 staffed during peak demand hours. At the District's discretion, staffing could be any combination of volunteer, part-time, or full-time personnel.
2. Two-person EMS unit/engine at Station 14 staffed during peak demand hours. At the District's discretion, staffing could be any combination of volunteer, part-time, or full-time personnel.
3. Two-person EMS unit/engine at Station 12 staffed during peak demand hours. At the District's discretion, staffing could be any combination of volunteer, part-time, or full-time personnel.
4. 24-hour two-person staffing at Station 13.
5. 24-hour two-person staffing at Station 14.
6. 24-hour two-person staffing at Station 12.
7. Three-person staffing on Engine 16.
8. Three-person staffing on Engine 15.
9. Three-person staffing on Engine 11.
10. Three-person staffing at all six stations.

Theme 2: Response Performance

Response performance consists of three distinct components: (1) call processing / dispatch, (2) crew turnout, and (3) travel. Call processing / dispatch is the time interval from the initial incident time stamp in the Jefferson County Communications Center (JEFFCOM) until completion of the dispatch notification to the appropriate fire crew(s). Crew turnout is the time interval from completion of the dispatch notification until the start of apparatus movement and includes donning the appropriate protective clothing for the incident type, boarding the apparatus, and buckling seatbelts. Travel is the actual driving time from the start of apparatus movement to arrival at the emergency incident.

As the following table shows, JEFFCOM call processing performance is *nearly double* the recommended 1:30-minute best practice goal; crew turnout performance, at 2:32 minutes, was slightly slower than Citygate's recommended 2:00-minute goal.

Table 1—90th Percentile Response Performance Summary – 2018–2021 (from Table 25)

Response Component	Response Zone	Best Practice			90th Percentile Performance	Difference from Best Practice
		Time	Percent Reliability	Reference		
Call Processing / Dispatch	All	**1:30**	90%	Citygate	**2:54**	**93%**
Crew Turnout	All	**2:00**	90%	Citygate	**2:32**	**27%**
First-Unit Travel	Port Townsend	**4:00**	90%	Citygate NFPA	**8:49**	**120%**
	District-Wide	**8:00**	90%	Citygate	**9:23**	**17%**
First-Unit Call to Arrival	Port Townsend	**7:30**	90%	Citygate	**10:41**	**42%**
	District-Wide	**11:30**	90%	Citygate	**11:28**	**0%**
ERF Call to Arrival	Port Townsend	**11:30**	90%	Citygate	**N/A**	**N/A**
	District-Wide	**19:30**	90%	Citygate	**23:14**	**19%**

While call processing and crew turnout performance may be improved with appropriate training, supervision, and accountability, first-unit travel time is predominantly due to the large, 68 square-mile service area with only three of the six stations staffed with on-duty personnel. This *significantly affects* first-unit call-to-arrival performance—which is a fire agency's true customer service measure—and which, for the District, is *42 percent greater than* the 7:30-minute best practice goal for the City of Port Townsend, but on a District-wide basis meets Citygate's recommended 11:30-minute best practice goal for *rural* areas.

Multiple-unit response performance to more serious incidents, referred to as an Effective Response Force or ERF, was *19 percent slower* than the 19:30-minute best practice goal for *rural* density areas due to the longer travel times of the last arriving units. There were, however, only four incidents over the four-year study period where all ERF resources were needed to mitigate the emergency, and all four were in Station 11's rural response area. It should also be noted that a high percentage of incident records had invalid or questionable CAD timestamps, making these performance calculations suspect.

Citygate's analysis finds that a 5:00-minute urban/suburban travel time goal from Station 16 with an 8:00-minute rural travel time goal from the other five stations should cover 85 percent of the District's public road miles including nearly all of the City of Port Townsend, which is very good rural-level coverage. Citygate thus recommends that the District adopt these differential response performance goals for the City of Port Townsend and the unincorporated rural areas of the District to drive future deployment planning and monitoring of response performance.

By providing additional daily staffing (as funding allows and as recommended in the previous section), both first-unit and multiple-unit ERF response performance—and ultimately customer service—can be expected to improve significantly.

FINDINGS AND RECOMMENDATIONS

Following are Citygate's findings and recommendations as contained throughout this report.

Findings

Finding #1: The District's physical response unit types are appropriate to protect against the hazards likely to impact the service area.

Finding #2: The District has not adopted response performance objectives as required by Washington State code and in conformance with best practice recommendations as published by the Commission on Fire Accreditation International.

Finding #3: The District has a standard response plan that considers risk and establishes an appropriate initial response for each incident type; each type of call for service receives the combination of engines, specialty units, and command officers customarily needed to effectively control that type of incident based on District experience.

Finding #4: Less than 50 percent of the District's public road miles can be expected to be reached within 4:00 minutes travel time by a first-due unit from any of the District's six fire stations to facilitate suburban-level outcomes, including less than half of the City of Port Townsend. This increases to 53 percent of total road miles with automatic aid, and to 68 percent if the travel time is increased to 5:00 minutes, including most of the City of Port Townsend.

Finding #5: Only 7.4 percent of the District's public road miles in the central section of the District can be expected to be reached within 8:00 minutes travel time by a multiple-unit ERF to facilitate suburban-level outcomes for more serious emergencies. This increases to 42 percent of the public road miles, including the southwestern edges of the City of Port Townsend, if the travel time is doubled to 16:00 minutes.

Finding #6: At least two simultaneous incidents are occurring 33 percent of the time.

Finding #7: Station 15's incident workload exceeded the recommended 30 percent workload saturation threshold for 11 hours, or nearly half, of each day in 2021, predominantly due to Medic 17 interfacility transfer activity. When Medic 17 activity is excluded,

maximum hourly station demand is less than 14 percent, well below the recommended 30 percent workload saturation threshold.

Finding #8: At 2:54 minutes, 90th percentile call processing performance by the Jefferson County 9-1-1 Dispatch Center is nearly double (93 percent) the recommended 1:30-minute best practice goal.

Finding #9: At 2:32 minutes, 90th percentile crew turnout performance is *27 percent slower* than the recommended 2:00-minute goal.

Finding #10: At 8:49 minutes, 90th percentile first-unit travel performance in the City of Port Townsend is *120 percent slower* than the recommended 4:00-minute best practice goal for *urban/suburban* areas, while at 9:23 minutes, District-wide first-unit travel performance is *17 percent slower* than the recommended 8:00-minute best practice goal for *rural* areas.

Finding #11: 90th percentile call to first-unit arrival performance, which includes call processing / dispatch, crew turnout, and travel, is *42 percent slower* than the recommended 7:30-minute best practice goal for Port Townsend yet *meets* the recommended 11:30-minute best practice goal for the rural response areas.

Finding #12: Overall service demand increased 6 percent over the four-year study period from January 2018 through December 2021, with EMS demand increasing 8 percent over the same period including a 17 percent increase from 2020 to 2021.

Finding #13: 61 percent of all calls for service were within the City of Port Townsend.

Finding #14: Approximately 18 percent of total service demand occurs in the unstaffed stations' response areas, with peak activity occurring from approximately 8:00 am through 5:00 pm, and Station 13 having the highest service demand of the three unstaffed stations.

Finding #15: The District's population is projected to grow by approximately 35 percent over the next 16 years to 30,000 people by 2038, which will further increase service demand, particularly for EMS-related incidents.

Finding #16: The District's daily staffing level of nine personnel on duty at three of the six fire stations is *insufficient* to provide either (1) equitable first-unit *speed of response* to all areas of the District for routine to moderate emergencies or (2) the minimum recommended multiple-unit *weight of response* needed for more serious emergencies. Additionally, it leaves no resources available for a concurrent incident.

Finding #17: The District's mutual aid partners (except for Navy NW Region on Indian Island) are at least 15:00 to 35:00 minutes travel time to the center of the District and significantly longer to the City of Port Townsend.

Finding #18: District-wide ERF call-to-arrival performance is 3:44 minutes (19 percent) *slower* than the 19:30-minute recommended best practice goal for *rural* areas. There were no ERF incidents in the City of Port Townsend over the four-year study period where the recommended best practice ERF call-to-arrival goal is 11:30 minutes (urban/suburban density).

Finding #19: A 5:00-minute urban/suburban travel time goal for Station 16 with an 8:00-minute rural travel time goal for the other five stations should cover 85 percent of the District's public road miles including nearly all of the City of Port Townsend, which is very good rural-level coverage.

Finding #20: Interfacility transfers increased approximately 16 percent from 2020 to 2021.

Recommendations

Recommendation #1: The District should collaborate with the Jefferson County 9-1-1 Dispatch Center to identify the factors causing slower-than-desired call processing performance and to identify prospective solutions to bring call processing performance into closer alignment with recognized best practice standards to improve overall response performance and customer service.

Recommendation #2: The District should work to identify the factors causing slower-than-desired crew turnout performance, particularly during non-sleep hours, and seek to bring crew turnout performance into closer alignment with the recommended best practice goal to improve overall response performance and customer service.

Recommendation #3: Initiate planning as soon as possible to construct a temporary Fire Station 13 facility at the District's Jefferson County International Airport (Highway 19 / Prospect Avenue) site as soon as funding can be secured pursuant to the deployment recommendations in the following section.

Recommendation #4: Develop a plan to improve the Jefferson County International Airport site to include a permanent fire station, District administrative offices, and other facilities as deemed appropriate by District staff and the Board of Commissioners.

Recommendation #5: Consider maintaining the District's training facilities at Station 15.

Recommendation #6: Consider a fleet maintenance facility at the Station 15 site.

Recommendation #7: Consider selling the residence adjacent to Station 16 to generate revenue for other capital projects.

Recommendation #8: Consider seeking a suitable parcel for permanent Station 14 in the general vicinity of Cape George Road and Hastings Avenue West.

Recommendation #9: Assuming Station 16 cannot be relocated at some future point to a more suitable location closer to the center of the City, consider seeking rights to a more suitable future location for Station 15 to provide improved first-unit and ERF travel time coverage to the western half of the City of Port Townsend.

Recommendation #10: Consider relocating the District's administrative offices to the Jefferson County International Airport site.

Recommendation #11: **Adopt Deployment Goals/Policies**: The District should adopt complete response performance measures to aid deployment planning and monitor performance. Differential goals should be established for urban/suburban and rural areas. The measures of time should be designed to deliver outcomes that will prevent permanent impairment or death from serious medical events where possible and keep small and expanding fires from becoming more serious. With this is mind, Citygate recommends the following response performance goals:

11.1 **Fire Station Distribution**: To treat pre-hospital medical emergencies and control small fires, the first-due unit should arrive within 8:30 minutes within the City of Port Townsend and within 11:30 minutes in the rural District areas 90 percent of the time from receipt of the 9-1-1 call at the Jefferson County Dispatch Center. This equates to a 90-second dispatch time, 2:00-minute crew turnout time, and 5:00-minute travel time (City of Port Townsend) or 8:00-minute travel time (rural response areas).

11.2 **Fire Station Concentration – Multiple-Unit Effective Response Force (ERF) for Serious Emergencies**: To confine building fires near the room or compartment of origin, keep vegetation fires under five acres in size, and treat multiple medical patients at a single incident, a

multiple-unit ERF of at least 13 personnel, including at least one chief officer, should arrive within 11:30 minutes in the City of Port Townsend from the time of 9-1-1 call receipt at the Jefferson County Dispatch Center 90 percent of the time. This equates to 90-second dispatch time, 2:00-minute crew turnout time, and 8:00-minute travel time. The same ERF should arrive within 19:30 minutes in the rural, unincorporated areas of the District from the time of 9-1-1 call receipt at the Jefferson County 9-1-1 Dispatch Center 90 percent of the time. This equates to 90-second dispatch time, 2:00-minute crew turnout time, and 16:00-minute travel time.

11.3 **Hazardous Materials Incidents**: To protect the District's service area from the hazards associated with uncontrolled release of hazardous or toxic materials, the first-due unit should arrive to assess the situation, isolate and deny entry, and determine the need for a Hazardous Materials Response Team within 8:30 minutes within the City of Port Townsend and within 11:30 minutes in the rural, unincorporated areas of the District 90 percent of the time from receipt of the 9-1-1 call at the Jefferson County Dispatch Center. This equates to a 90-second dispatch time, 2:00-minute crew turnout time, and 5:00-minute travel time (City of Port Townsend) or 8:00-minute travel time (rural response areas).

11.4 **Technical Rescue Incidents**: To provide technical rescue services as needed, the first-due unit should arrive to evaluate the situation and initiate rescue actions within 8:30 minutes within the City of Port Townsend and within 11:30 minutes in the rural District response areas 90 percent of the time from the receipt of the 9-1-1 call at the Jefferson County Dispatch Center. This equates to a 90-second dispatch time, 2:00-minute crew turnout time, and 5:00-minute travel time (City of Port Townsend) or 8:00-minute travel time (rural response areas).

Additional resources, as needed, should arrive within 11:30 minutes within the City of Port Townsend, and within 19:30 minutes in the rural District areas to facilitate safe rescue/extrication and delivery of the victim to the appropriate emergency medical care facility.

Recommendation #12: As funding allows, the District should consider additional daily staffing to improve first-due, ERF, and simultaneous incident capacity.

Recommendation #13: The District should initiate planning to develop its Jefferson County International Airport site to prospectively include a fire station, administrative offices, a training facility, and/or other uses as determined appropriate by District staff and Commissioners.

NEXT STEPS

Citygate offers the following suggested, sequential next steps.

Near-Term

- Review and absorb the content, findings, and recommendations of this report.
- Adopt recommended response performance goals.
- Initiate planning to develop the Jefferson County International Airport site to initially include a new temporary Station 13.

Longer-Term

- Develop a strategy to fund additional daily on-duty staffing to improve response performance and customer service as described and recommended in this report.
- Develop a long-range plan to fund facility improvements/relocations as described and recommended in this report.
- Monitor response performance against adopted goals.

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SECTION 1—INTRODUCTION AND BACKGROUND

East Jefferson Fire-Rescue (District) retained Citygate Associates, LLC (Citygate) and BERK Consulting, Inc. (BERK) to conduct a Standards of Coverage (SOC) study and develop a Strategic Plan to:

- Evaluate the District's current deployment model, to include service demand and response performance.
- Identify opportunities for improvement in delivery of fire, emergency medical, and other technical emergency services to best serve the evolving demographics and service demand needs within the District's service area.
- Evaluate additional or alternate fire station locations for impacts on first-due and Effective Response Force (ERF) travel times.
- Provide analysis, findings, and recommendations in a format suitable for public policy discussion.

This deployment assessment identifies both current services and desired service levels and then reviews the District's ability to provide them with available resources.

Citygate's scope of work and corresponding Work Plan were developed consistent with Citygate's Project Team members' experience in fire administration and deployment. Citygate utilizes various industry-recognized best practice guidelines and criteria in the field of deployment analysis, including National Fire Protection Association (NFPA) standards, the self-assessment criteria of the Commission on Fire Accreditation International (CFAI), Insurance Services Office (ISO) schedules, the Washington Surveying and Rating Bureau (WSRB), and federal and state mandates relative to emergency services.

1.1 REPORT ORGANIZATION

This report is organized into the following sections. **Volume 2—Map Atlas** is separately bound.

Executive Summary Summarizes fire service policy choices, key deployment challenges, and all findings and recommendations that can be used to strategically guide future deployment planning and decisions.

Section 1 **Introduction and Background**—Describes Citygate's project approach, methodology, and scope of work, as well as an overview of the District and its service area.

Section 2	**Standards of Coverage Analysis**—Describes Citygate's detailed analysis, findings, and recommendations for each of the eight Standards of Coverage elements.
Appendix A	**Community Risk Assessment**—Provides a comprehensive assessment of the fire and non-fire hazards likely to impact the District.

1.1.1 Goals of the Report

Citygate cites findings and makes recommendations, as appropriate, relative to each finding. Findings and recommendations throughout this report are sequentially numbered. A complete list of these same findings and recommendations is provided in the Executive Summary.

This document provides technical information about how fire services are provided and legally regulated and how the District currently operates. Information is presented in the form of recommendations and policy choices for consideration by District leadership. The result is a strong technical foundation upon which to understand the advantages and disadvantages of the choices facing the District regarding the best way to provide fire services and, more specifically, at what level of desired outcome and expense.

1.1.2 Limitations of Report

In the United States, there are no federal or state regulations requiring a specific minimum level of fire services. Each community, through the public policy process, is expected to understand the local fire and non-fire risks and its ability to choose—and fund—its level of fire services. *If* fire services are provided at all, federal and state regulations specify how to safely provide them for the public and for the personnel providing the services.

While this report and technical explanation can provide a framework for the discussion of District services, neither this report nor the Citygate team can make the final decisions, nor can they cost out every possible alternative in detail. Once recommendation implementations receive policy approval, District staff can conduct any final costing and fiscal analyses as typically completed in its normal operating and capital budget preparation cycle.

1.2 Project Approach and Scope of Work

1.2.1 Project Approach and Methodology

Citygate utilized multiple sources to gather, understand, and model information about the District. Citygate requested and reviewed relevant background data and documentation to better understand current service levels, costs, and the history of service level decisions, including prior studies.

Citygate subsequently reviewed demographic information about the District's service area and the potential for future growth and development. Citygate also obtained map and response data from which to model current and projected fire service deployment, with the goal to identify the location(s) of stations and crew quantities required to best serve the District's service area as it currently exists and to facilitate future deployment decisions.

Once Citygate understood the District's service area and its fire and non-fire risks, the Citygate team tested deployment model revisions against the travel time mapping and response data to ensure an appropriate fit. Citygate also evaluated future District service area growth and service demand by risk type. This resulted in Citygate proposing an approach to address current and longer-term needs with effective and efficient use of resources. The result is a framework for enhancing District services while meeting reasonable community expectations and fiscal realities.

1.2.2 Project Scope of Work

Citygate's approach to this Standards of Coverage assessment involved:

- Requesting and reviewing relevant County and District data and information
- Interviewing District staff, elected officials, and other key project stakeholders
- Conducting a comprehensive assessment of the fire and non-fire hazards likely to impact the community relative to services provided by the District
- Utilizing Esri ArcGIS, a geographic mapping software program, to model fire apparatus travel time coverage
- Using StatsFD™, an incident response time analysis program, to analyze prior incident data and plot the results on graphs and geographic mapping exhibits
- Identifying and evaluating future District service area populations and related development growth
- Reviewing service demand by risk type
- Recommending appropriate, risk-specific response performance goals.

1.3 DISTRICT OVERVIEW

Located on the northeastern end of the Quimper Peninsula in Jefferson County, Washington, East Jefferson Fire-Rescue encompasses 68 square miles and a population of approximately 22,200 residents. With a generally flat topography below 250 feet in elevation, the District has short, warm, and dry summers and damp, chilly winters with an annual average of 19 inches of rainfall and less than one foot of snow.

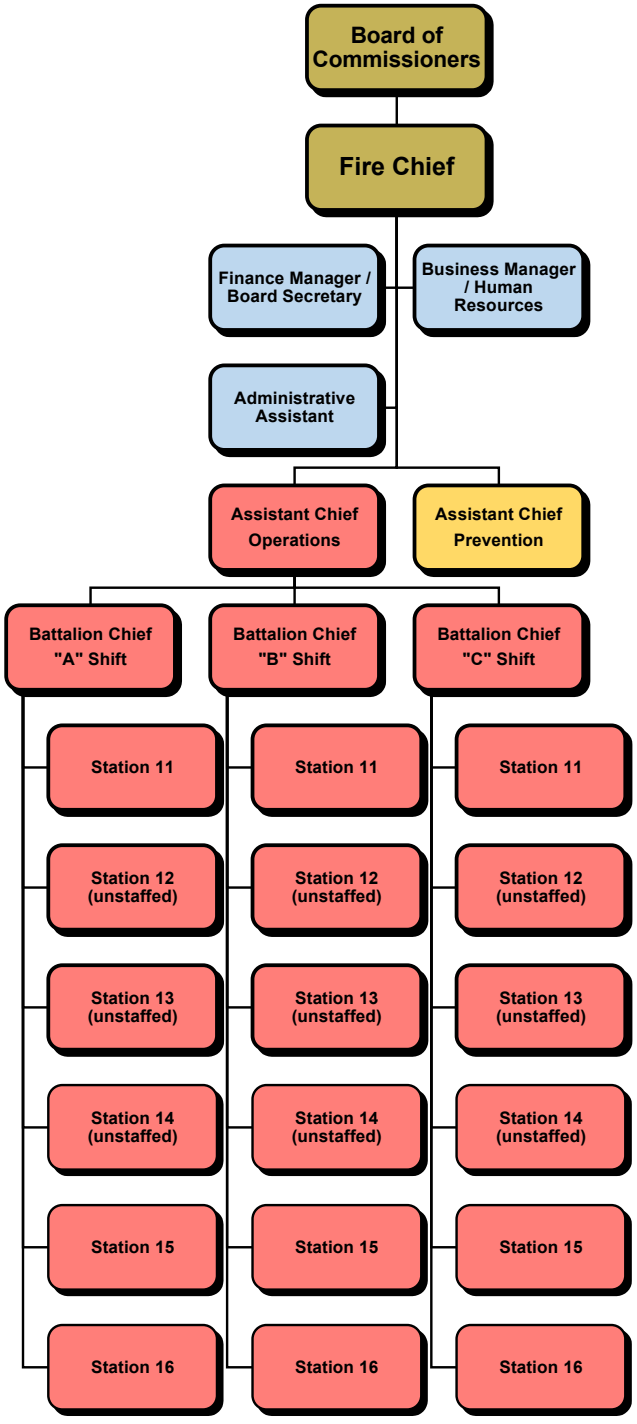
With origins dating back to the late 19th century, the current District was formed in 1948 as the Jefferson County Fire Protection District No. 1 and consolidated with Jefferson County Fire District No. 6 in 2005. The two Districts and the City of Port Townsend consolidated the following year as East Jefferson Fire-Rescue. Governed by a five-member Board of Commissioners elected by the District to staggered six-year terms, the District provides fire suppression, rescue, Basic Life Support (BLS) and Advanced Life Support (ALS) pre-hospital emergency medical services and ambulance transportation, and related services. Services are provided from three staffed fire station facilities and three resident volunteer stations, with a combined staff of 88 personnel including 44 full-time, one part-time, and 43 volunteers.

The District has a daily minimum response staffing of eight personnel cross-staffing fire engines, medic and aid units, ladder truck, water tenders, and other specialty apparatus as needed based on the type of call, plus one Battalion Chief. Daily staffing also includes a two-person ambulance solely dedicated to providing interfacility hospital transfers.

1.3.1 Organization

The District is organized into two divisions as shown in the following figure:

Figure 1—District Organization



1.3.2 Facilities and Resources

The District provides services from three staffed fire stations and three volunteer stations with a minimum daily response staffing of nine personnel as summarized in the following table.

Table 2—District Facilities, Resources, and Daily Response Staffing

Station Number	Address	Year Built	Response Resources	Minimum Daily Staffing
11	9193 Rhody Drive Chimacum, WA	2012	**Engine 11** Medic 11** Aid 11** Tender 11** Brush 11** Investigation 11**	**2**
12	6633 Flagler Rd. Nordland, WA		Engine 12 Aid 12	**0**[1]
13	50 Airport Road Port Townsend, WA	2009	Engine 13 Air 13 Tender 13	**0**[1]
14	3850 Cape George Road Port Townsend, WA		Engine 14	**0**[1]
15	35 Critter Lane Port Townsend, WA	1998 (Remodel 2005)	**Engine 15** Aid 15** Brush 15** Tender 15** Marine 14** **Medic 17**[2]	**2** **2**
16	701 Harrison St. Port Townsend, WA	2005	**Engine 16** **Medic 16** Aid 16** Marine 16** Truck 16**	**2** **2**
Admin.	*24 Seton Rd.* *Port Townsend, WA*		**Chief Officer**	**1**
			Total Daily Staffing	**9**

[1] Volunteer-staffed

[2] Provides interfacility transfers only under agreement with Jefferson Healthcare Medical Center and is not an emergency response resource

1.3.3 Service Capacity

All response personnel are trained to either the Emergency Medical Technician (EMT) level, capable of providing Basic Life Support (BLS) pre-hospital emergency medical care, or EMT-P (Paramedic) level, capable of providing Advanced Life Support (ALS) pre-hospital emergency medical care. The District also provides both BLS and ALS ground ambulance service, including a two-person ambulance crew solely dedicated to providing interfacility transfers from Jefferson Healthcare Medical Center in Port Townsend to other regional healthcare facilities. Air ambulance services, when needed, are provided by Airlift Northwest from Arlington, Seattle, or Bellingham, or by Life Flight from Coupeville or Port Angeles. Emergency room services are provided by Jefferson Healthcare Medical Center in Port Townsend. The nearest trauma center is in Seattle.

Response personnel are also trained to the U.S. Department of Transportation Hazardous Material First Responder Operational level to provide initial hazardous material incident assessment, hazard isolation, and support for the U.S. Navy Hazardous Materials Response Team from the Bangor Submarine Base in Silverdale.

Response personnel are further trained to the confined space awareness, technical rescue operations, and structural collapse levels—with eight personnel trained to the Technical Rescue Technician level and members of the Washington State Region 2 Technical Rescue Task Force.

The District also has automatic or mutual aid agreements with neighboring fire agencies, with the nearest mutual aid resource (Navy Region NW, Indian Island) approximately 10 minutes travel time to the center of the District, and other mutual aid resources 20–45 minutes (or more) travel time from the District.

Finding #1: The District's physical response unit types are appropriate to protect against the hazards likely to impact the service area.

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SECTION 2—STANDARDS OF COVERAGE ANALYSIS

This section provides a detailed analysis of the District's current ability to deploy and mitigate hazards within its service areas. The response analysis uses prior response statistics and geographic mapping to help the District and the communities visualize what the current response system can and cannot deliver.

2.1 STANDARDS OF COVERAGE PROCESS OVERVIEW

The core methodology used by Citygate in the scope of our deployment analysis work is *Standards of Cover*, fifth and sixth editions, which is a systems-based approach to fire department deployment published by the CFAI. This approach uses local risk and demographics to determine the level of protection best fitting a community's needs.

The SOC method evaluates deployment as part of a fire agency's self-assessment process. This approach uses risk and community expectations regarding outcomes to help elected officials make informed decisions regarding fire and EMS deployment levels. Citygate has adopted this multiple-part systems approach as a comprehensive tool to evaluate fire station locations. Depending on the needs of the study, the depth of the components may vary.

In contrast to a one-size-fits-all prescriptive formula, such a systems-based approach to deployment allows for local determination. In this comprehensive approach, each agency can match local needs (risks and expectations) with the costs of various levels of service. In an informed public policy debate, a governing board "purchases" the fire and emergency medical service levels the community needs and can afford.

While working with multiple components to conduct a deployment analysis is admittedly more work, it yields a much better result than using only a singular component. For instance, if only travel time is considered and frequency of multiple calls is not, the analysis could miss overworked companies. If a risk assessment for deployment is not considered and deployment is based only on travel time, a community could under-deploy to incidents.

The following table describes the eight elements of the SOC process.

Table 3—Standards of Coverage Process Elements

SOC Element		Description
1	Existing Deployment System	Overview of the community served, authority to provide services, and current deployment model and performance metrics
2	Community Outcome Expectations	Review of the community's expectations relative to response services provided by the agency
3	Community Risk Assessment	Description of the values to be protected within the service area, and assessment of the fire and non-fire hazards likely to impact the service area
4	Critical Task Analysis	Review of the essential tasks that must be performed and the personnel required to deliver a stated outcome for an Effective Response Force (ERF)
5	Distribution Analysis	Analysis of the spacing of initial response (first-due) resources (typically engines) to control routine emergencies to achieve desired outcomes
6	Concentration Analysis	Analysis of the spacing of fire stations to provide enough resources and personnel (ERF) for larger or more complex emergencies within sufficient time to achieve desired outcomes
7	Reliability and Historical Response Effectiveness Analysis	Using recent incident data, determination of the percentage of conformance to established response performance goals the existing deployment system delivers
8	Overall Evaluation	Proposing Standards of Coverage statements by hazard type as appropriate

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

Fire service deployment, simply summarized, is about the ***speed*** and ***weight*** of response. *Speed* refers to initial response (first-due) of all-hazard intervention resources (e.g., engines, ladder trucks, squads, and ambulances) strategically deployed across a jurisdiction for response to emergencies within a travel-time interval sufficient to control routine-to-moderate emergencies without the incident escalating to greater size or severity. *Weight* refers to multiple-unit responses for more serious emergencies, such as building fires, multiple-patient medical emergencies, vehicle collisions with extrication required, or technical rescue incidents where enough firefighters must be assembled within a time interval to safely control the emergency and prevent it from escalating into an even more serious event. The following table illustrates this deployment paradigm.

Table 4—Fire Service Deployment Paradigm

Element	Description	Purpose
***Speed** of Response*	Response time of initial all-hazard intervention units strategically located across a jurisdiction	Controlling routine to moderate emergencies without the incident escalating in size or complexity
***Weight** of Response*	Number of firefighters in a multiple-unit response for serious emergencies	Assembling enough firefighters within a reasonable time frame to safely control a more complex emergency without escalation

Smaller fires and less complex emergencies require a single- or two-unit response (engine and/or specialty resource) within a relatively short response time. Larger or more complex incidents require more units and personnel to control. In either case, if the crews arrive too late or the total number of personnel is too few for the emergency, they are drawn into an escalating and more dangerous situation. The science of fire crew deployment is to spread crews out across a community or jurisdiction for quick response to keep emergencies small with positive outcomes without spreading resources so far apart that they cannot assemble quickly enough to effectively control more serious emergencies.

2.2 CURRENT DEPLOYMENT

SOC ELEMENT 1 OF 8
EXISTING DEPLOYMENT POLICIES

Nationally recognized standards and best practices suggest using several incremental measurements to define response time. Ideally, the clock start time is when the 9-1-1 dispatcher answers the emergency call. In some cases, the call must then be transferred to a separate fire dispatch center. In this setting, the response time clock starts when the fire dispatch center receives the 9-1-1 call into its computer-aided dispatch (CAD) system. Response time increments include dispatch center call processing and dispatch, response unit boarding (commonly called crew turnout), and actual driving (travel) time.

The District has not yet adopted response performance standards in conformance with Title 52 of the Revised Code of Washington relative to fire department performance measures.[2] NFPA Standard 1710, a recommended deployment standard for career fire departments in urban/suburban areas, recommends initial (first-due) intervention units arrive within 4:00 minutes travel time and recommends arrival of all resources comprising the multiple-unit First Alarm within 8:00 minutes,

[2] Source: Revised Code of Washington Title 52, Chapter 52.33.

at 90 percent or better reliability.[3] In contrast, NFPA Standard 1720, a recommended deployment standard for volunteer fire departments, recommends response units arrive within 9:00–14:00 minutes with 6–15 personnel at 80–90 percent reliability depending on population density, as summarized in the following table.[4]

Table 5—NFPA 1720 Response Standards Summary

Service Zone	Minimum Response Personnel	Response Time[1]	Percent Reliability
Urban[2]	15	≤ 9:00 minutes	90%
Suburban[3]	10	≤ 10:00 minutes	80%
Rural[4]	6	≤ 14:00 minutes	80%

[1] From receipt of dispatch to arrival at incident
[2] Population density > 1,000 per square mile
[3] Population density 500-1,000 per square mile
[4] Population density < 500 per square mile

In addition, the most recent published NFPA best practices have *decreased* the dispatch processing time to 1:00 minute;[5] however, Citygate continues to recommend prior editions' 1:30-minute standard as an achievable best practice goal. Further, for crew turnout, 60 to 80 seconds is nationally recommended; however, in Citygate's experience this is too quick due to the protective clothing that must be donned, fire station floorplan design, or both, and thus Citygate recommends 2:00 minutes as an achievable goal.

If the travel time measures recommended by Citygate and the NFPA are added to dispatch processing and crew turnout times recommended by Citygate and NFPA best practices, then, *for an urban* area, a realistic 90 percent first-due unit response performance goal is 7:30 minutes from the time of the fire dispatch center receiving the call. This includes 1:30-minute call processing / dispatch, 2:00-minute crew turnout, and 4:00-minute travel. For rural areas, Citygate recommends an additional 4:00-minutes travel time for a 90 percent first-due unit response performance goal of 11:30 minutes.

[3] Reference: 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 (2020 Edition).
[4] Reference: NFPA 1720 - Standard for the Organization and Deployment of Fire Suppression Operations, Emergency Medical Operations, and Special Operations to the Public by Career Fire Departments (2020 Edition).
[5] Source: NFPA 1221 – Standard for the Installation, Maintenance, and Use of Emergency Services Communications Systems (2019 Edition).

Finding #2:	The District has not adopted response performance objectives as required by Washington State code and in conformance with best practice recommendations as published by the Commission on Fire Accreditation International.

2.2.1 Current Deployment Model

Resources and Staffing

The District's current deployment resources include six all-risk engines, two type-6 wildland engines, one aerial ladder truck, three 2,500-gallon water tenders, nine ambulances, two boats, and one breathing air support unit—each staffed as needed depending on type of call by eight on-duty response personnel plus a Battalion Chief, for a total daily minimum, year-round continuous staffing of nine personnel operating from the District's three staffed fire stations. A cadre of eight resident volunteers working scheduled shifts as available provide augmented daily staffing but do not count as minimum daily staffing. An additional three volunteers provide incident response from Station 13 as available, and the remaining 32 volunteers provide District support services including serving as Public Information Officer (PIO), photographer, GIS specialist, etc.

The single-role interfacility transfer ambulance and assigned personnel are not considered a response resource or part of the minimum daily response staffing.

Response Plan

The District is an all-hazard fire agency providing the population it protects with services that include fire suppression, pre-hospital basic and paramedic EMS and ambulance, and initial rescue and hazardous material response services.

Given the risks present, the District utilizes a tiered response plan calling for different types and numbers of resources depending on incident/risk type. The Jefferson County 9-1-1 (JEFFCOM) CAD system selects and dispatches the closest and most appropriate resource(s) pursuant to the District's response plan as summarized in the following table.

Table 6—Response Plan by Type of Emergency

Incident Type	Response	Total Staffing
Structure Fire	2 Engines, 1 Ladder or Third Engine, 1 Medic/Aid Unit, 1 Battalion Chief	**9**
Medical Emergency	**BLS:** 1 Aid Unit (BLS) or 1 Medic Unit (ALS) **ALS:** 2 Medic Units (ALS) + 1 Medical Services Officer	**2** **5**
Vegetation Fire	2 Engines, 1 Brush, 1 Water Tender, 1 Battalion Chief	**9**
Vehicle Fire	1 Engine	**2**
Vehicle Collision	2 Engines, 1 Medic Unit, 1 Aid Unit, 1 Battalion Chief	**9**
Hazardous Materials	1 Engine, 1 Aid Unit, 1 Battalion Chief	**5**
Technical Rescue	1 Engine, 1 Aid Unit, 1 Battalion Chief	**5**

Finding #3: The District has a standard response plan that considers risk and establishes an appropriate initial response for each incident type; each type of call for service receives the combination of engines, specialty units, and command officers customarily needed to effectively control that type of incident based on District experience.

2.3 Outcome Expectations

SOC Element 2 of 8
Community Outcome Expectations

The Standards of Coverage process begins by reviewing existing emergency services outcome expectations. This includes determining the purpose of the response system and whether the governing body has adopted any response performance measures. If it has, the time measures used must be understood and reliable data must be available.

The current national best practice is to measure percent completion of a goal (e.g., 90 percent of responses) instead of an average measure. Mathematically, this is called a fractile measure.[6] This is because measuring the average only identifies the central or middle point of response time performance for all calls for service in the data set. Using an average makes it impossible to know how many incidents had response times that were far above or just above the average.

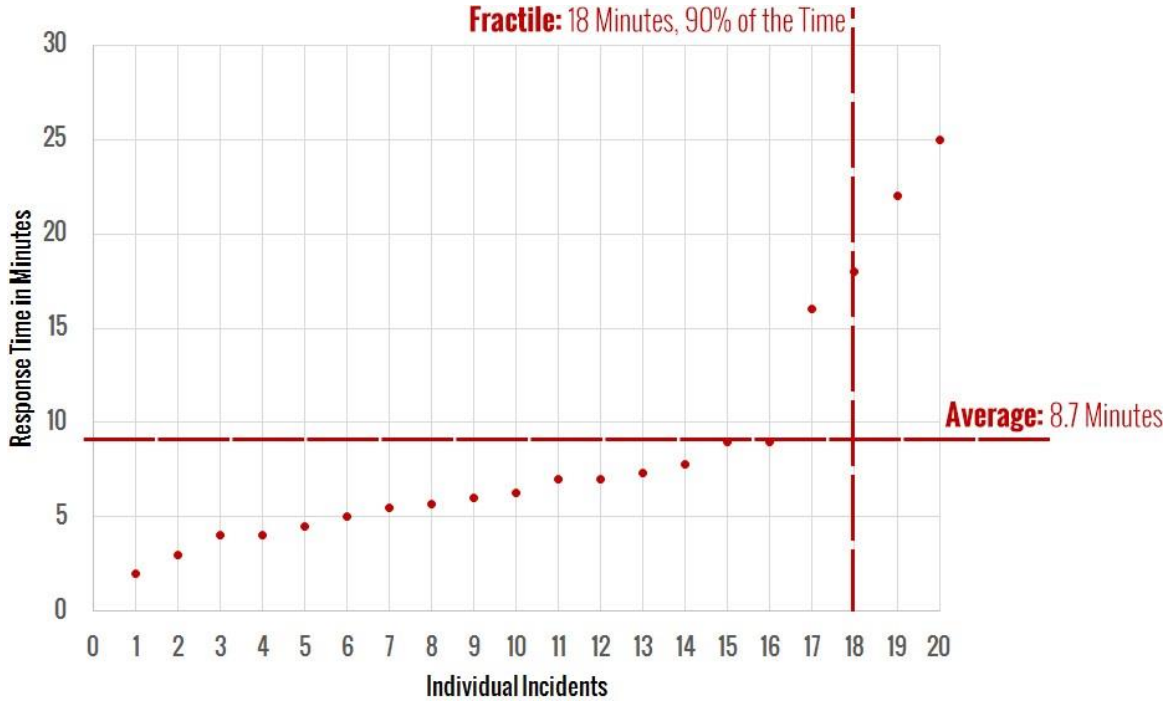
[6] A *fractile* is that point below which a stated fraction of the values lies. The fraction is often given in percent; the term percentile may then be used.

For example, the following figure shows response times for a hypothetical small fire department that receives 20 calls for service each month. Each response time has been plotted on the graph from shortest to longest response time.

This figure shows that the average response time is 8.7 minutes. However, the average response time fails to properly account for four calls for service with response times far exceeding a threshold in which positive outcomes could be expected. In fact, it is evident in Figure 2 that 20 percent of responses are far too slow, and that this hypothetical jurisdiction has a potential life-threatening service delivery problem. Average response time as a fire service delivery measurement is simply not sufficient. This is a significant issue in larger cities if hundreds or thousands of calls are answered far beyond the average response time.

By using the fractile measurement with 90 percent of responses in mind, this small jurisdiction has a response time of 18:00 minutes, 90 percent of the time. Stated another way, 90 percent of all responses are 18:00 minutes or less. This fractile measurement is far more accurate at reflecting the service delivery situation of this small agency.

Figure 2—Fractile versus Average Response Time Measurements



More importantly, within the SOC process, positive outcomes are the goal. From that, crew size and response time can be calculated to provide appropriate fire station spacing (distribution and concentration) to achieve the desired goal. Some medical emergencies include situations with the most severe time constraints. The brain can only survive 4:00 to 6:00 minutes without oxygen. Cardiac arrests make up a small percentage of events that can cause oxygen deprivation to the

brain, along with drowning, choking, trauma constrictions, or other similar events. In a building fire, a small incipient fire can grow to involve the entire room in a 6:00- to 8:00-minute time frame. If fire service response is to achieve positive outcomes in severe emergency medical situations and incipient fire situations, *all* responding crews must arrive, assess the situation, and deploy effective measures before brain death occurs or before the fire spreads beyond the room of origin.

Therefore, from the time of 9-1-1 receiving a call, an effective deployment system is *beginning* to manage the problem within a 7:00- to 8:00-minute total response time. This is right at the point when brain death is becoming irreversible, and a building fire has grown to the point of leaving the room of origin and becoming very serious. Consequently, the District needs a first-due response goal that is within a range to give people in the situation hope for a positive outcome. It is important to note that the fire or medical emergency continues to deteriorate from the time of inception, not from the time the fire engine starts to drive the response route. Ideally, the emergency is noticed immediately, and the 9-1-1 system is activated promptly. This step of awareness—calling 9-1-1 and giving the dispatcher accurate information—takes at least one minute in the best of circumstances. Crew notification and travel time take additional minutes. Upon arrival, the crew must approach the patient or emergency, assess the situation, and appropriately deploy its skills and tools. Even in easy-to-access situations, this step can take 2:00 minutes or more. This time frame may be increased considerably due to long driveways, apartment buildings with limited access, multiple-story buildings, rural highways, or wildland and recreation areas.

Unfortunately, there are times when the emergency has become too severe, even before the 9-1-1 notification or fire department response, for the responding crew to reverse; however, when an appropriate response time policy is combined with a well-designed deployment system, only anomalies like bad weather, poor traffic conditions, or multiple emergencies slow down the response system. As a result, a properly designed system gives residents the hope of a positive outcome for their tax-dollar expenditure.

For this report, total response time is the sum of JEFFCOM call processing / dispatch, crew turnout, and travel time steps, which is consistent with NFPA and CFAI best practice recommendations.

2.4 COMMUNITY RISK ASSESSMENT

SOC ELEMENT 3 OF 8
COMMUNITY RISK ASSESSMENT

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

- Identify and quantify the values at risk to be protected within the community or service area.

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

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

2.4.1 Risk Assessment Methodology

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

- Identification of geographic planning sub-zones (risk zones) appropriate to the community or jurisdiction
- Identification and quantification, to the extent data is available, of the values at risk to various hazards within the community or service area
- Identification of the fire and non-fire hazards to be evaluated
- Determination of the probability of occurrence for each hazard
- Identification of the *probable* impact severity of a hazard occurrence
- Quantification of overall risk for each hazard based on probability of occurrence in combination with probable impact severity according to the following table.

Figure 3—Overall Risk

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

2.4.2 Values to Be Protected

Broadly defined, *values* are those tangibles of significant importance or value to the community or jurisdiction that are potentially at risk of harm or damage from a hazard occurrence. Values at risk typically include people, critical facilities/infrastructure, buildings, and key economic, cultural, historic, or natural resources.

People

Residents, employees, visitors, and travelers in a community or jurisdiction are vulnerable to harm from a hazard occurrence. Particularly vulnerable are specific at-risk populations, including those unable to care for themselves or self-evacuate in the event of an emergency. At-risk populations typically include children younger than 10 years of age, the elderly, and people housed in institutional settings. Key demographic data for the District service area includes the following:[7]

- 40 percent of the population is under 10 years or over 65 years of age.
- The District's population is predominantly Caucasian (90 percent), followed by Hispanic/Latino (5 percent and also counted as Caucasian), other ethnicities (6 percent), Asian (2 percent), and Black / African American (1 percent).
- Of the population over 24 years of age, more than 96 percent has completed high school or equivalency.
- Of the population over 24 years of age, 51 percent has an undergraduate degree, while 24 percent has a graduate or professional degree.
- More than 96 percent of the population 15 years of age or older is in the workforce; of those, 4 percent are unemployed.
- Median household income is nearly $59,000.
- 14 percent of the service area population is below the federal poverty level.
- Only 4.1 percent of the service area population does not have health insurance coverage.

The Jefferson County Board of Commissioners has adopted regional growth projections based on the recommendations of the Joint Growth Management Steering Committee (JGMSC) that project the Port Townsend Urban Growth Area population will increase by an estimated 1.13 percent annually to 2038, and the Port Hadlock/Irondale Urban Growth Area will increase an estimated 1.48 percent over the same period.[8] Applying these growth rates to the 2020 District population

[7] Source: ESRI Community Profile (2020).
[8] Source: Jefferson County Board of Commissioners Resolution Number 38-15 (October 26, 2015).

results in a projected 2038 District population of approximately 30,000, or an average District-wide annualized growth rate of approximately 2.2 percent.

Buildings

The District's service area includes just over 12,500 housing units, as well as more than 1,200 businesses,[9] including office, professional services, retail sales, restaurants/bars, motels, churches, schools, government facilities, healthcare facilities, and other business types as described in **Appendix A**.

Critical Facilities

The U.S. Department of Homeland Security defines Critical Infrastructure / Key Resources as those physical assets essential to the public health and safety, economic vitality, and resilience of a community, such as lifeline utilities infrastructure, telecommunications infrastructure, essential government services facilities, public safety facilities, schools, hospitals, airports, etc. The District identified 16 critical facilities within its service area as summarized in **Appendix A**. A hazard occurrence with significant impact severity affecting one or more of these facilities would likely adversely impact critical public or community services.

Cultural, Economic, Historic and Natural Resources

The District has multiple cultural, economic, historic, and natural resources to protect, as identified in **Appendix A**.

2.4.3 Hazard Identification

Citygate utilizes prior risk studies where available, fire and non-fire hazards as identified by the CFAI, and data and information specific to the agency/jurisdiction to identify the hazards to be evaluated for this report.

Following an evaluation of the hazards identified in the Jefferson County All Hazard Mitigation Plan, and the fire and non-fire hazards identified by the CFAI as they relate to services provided by the District, Citygate evaluated the following six hazards for this risk assessment:

1. Building fire
2. Vegetation/wildfire
3. Medical emergency
4. Hazardous material release/spill

[9] Source: ESRI Community Analyst, Community Profile (2020) and Business Summary (2020).

5. Technical rescue
6. Marine incident

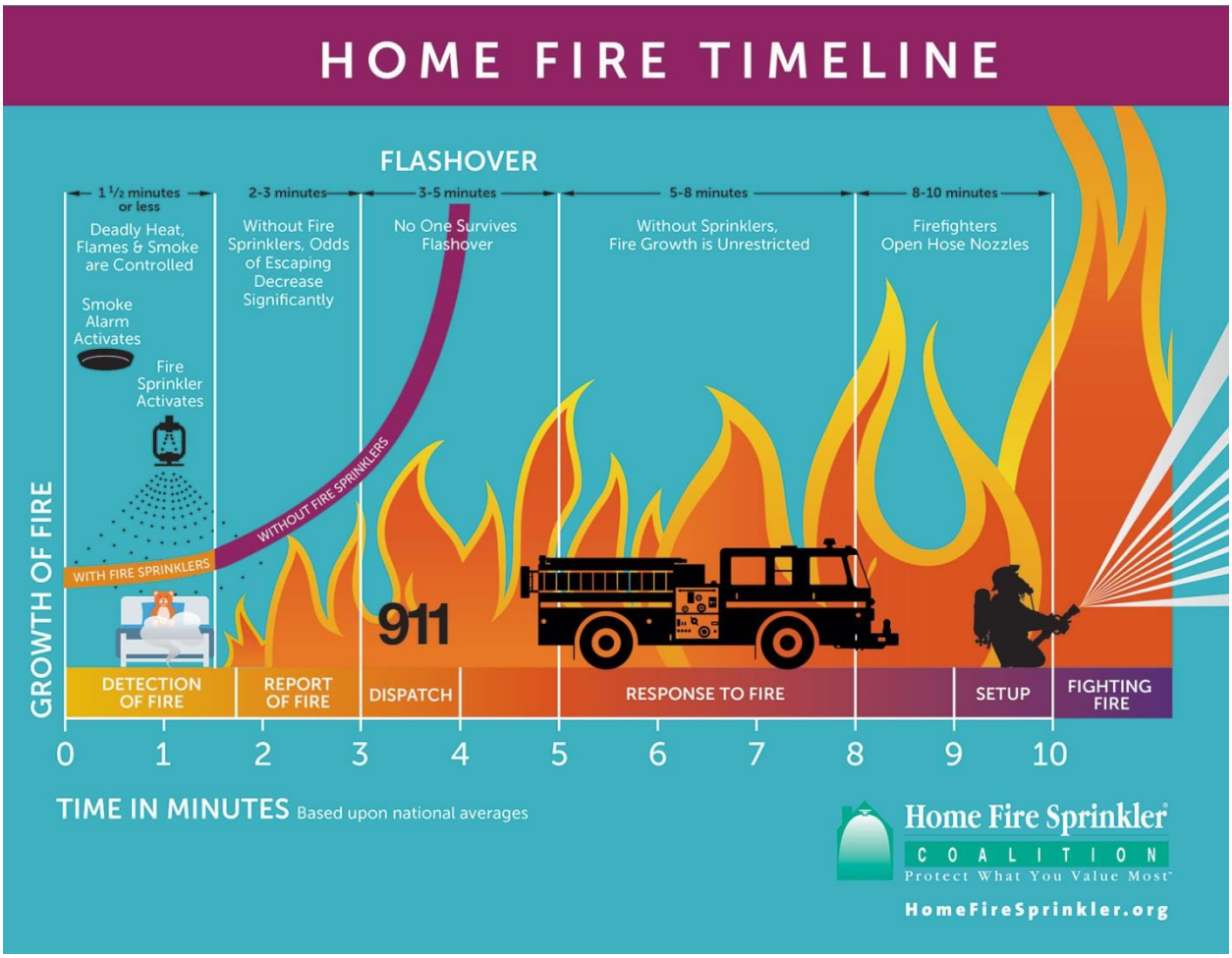
Because building fires and medical emergencies have the most severe time constraints if positive outcomes are to be achieved, the following is a brief overview of building fire and medical emergency risk. **Appendix A** contains the full risk assessment for all six hazards.

Building Fire Risk

One of the primary hazards in any community is building fire. Building fire risk factors include building size, age, construction type, density, occupancy, number of stories above ground level, required fire flow, proximity to other buildings, built-in fire protection/alarm systems, available fire suppression water supply, building fire service capacity, fire suppression resource deployment (distribution/concentration), staffing, and response time.

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

Figure 4—Building Fire Progression Timeline

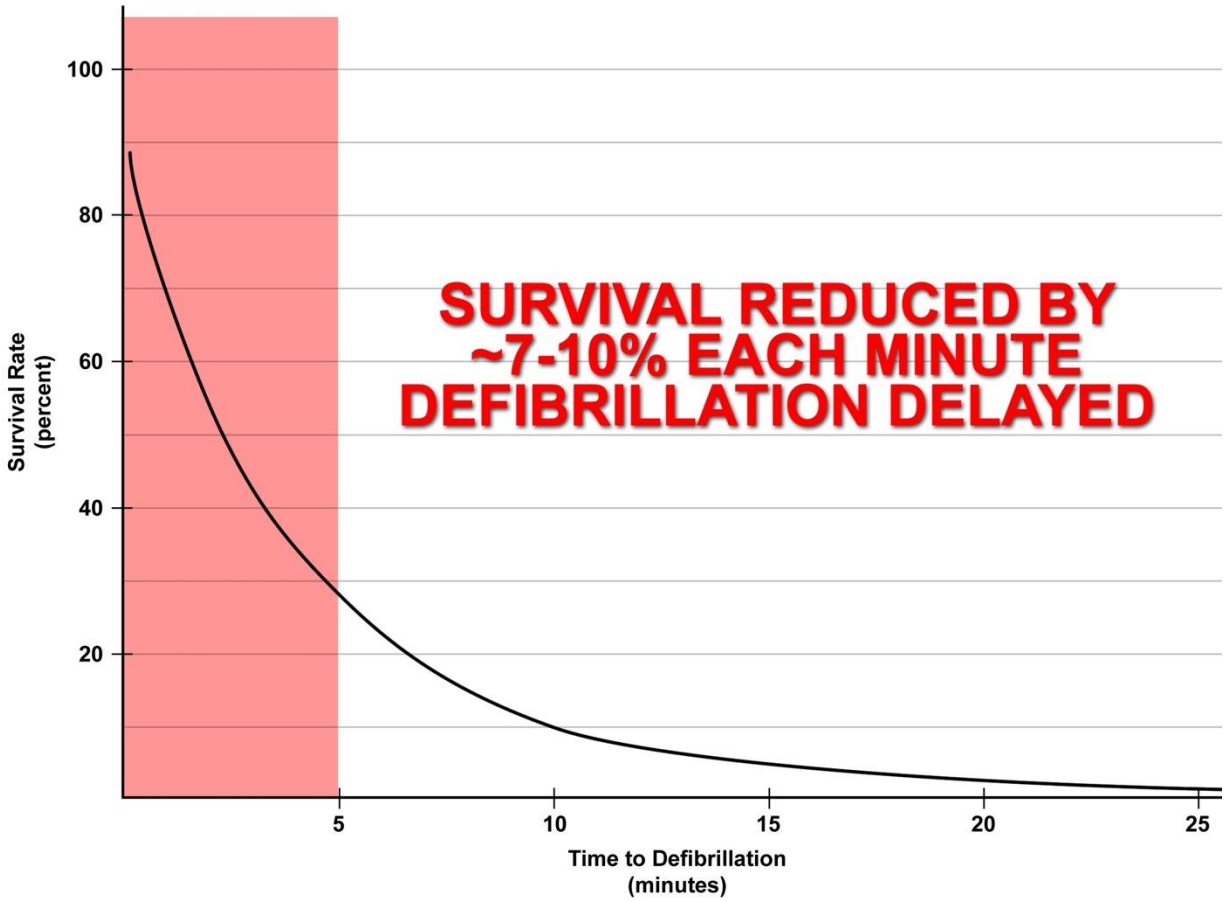


Source: http://www.firesprinklerassoc.org.

Medical Emergency Risk

Fire agency service demand in most jurisdictions is predominantly for medical emergencies. The following figure illustrates the reduced survivability of a cardiac arrest victim as time to defibrillation increases.

Figure 5—Survival Rate versus Time of Defibrillation



The District currently provides both BLS and ALS pre-hospital emergency medical services, with operational personnel trained to the EMT or EMT-Paramedic level.

2.4.4 Risk Assessment Summary

Citygate's assessment of the values at risk and hazards likely to impact the District's service area yields the following. See **Appendix A** for the full risk assessment.

1. The District serves a diverse urban/suburban/rural population with densities ranging from fewer than 100 to more than 2,500 people per square mile over a varied land use pattern.
2. The District's population is projected to increase approximately 35 percent to 30,000 people over the next 16 years to 2038.
3. The service area includes both residential and non-residential building occupancies to protect.

4. The District has economic and other resource values to be protected, as identified in **Appendix A**.

5. Jefferson County has a mass emergency notification system to alert the public of disaster or emergency information in a timely manner.

6. The District's overall risk for six hazards related to services provided ranges from **Low** to **High**, as summarized in the following table.

Table 7—Overall Risk by Hazard

Hazard	Planning Zone					
	Station 11	Station 12	Station 13	Station 14	Station 15	Station 16
Building Fire	*Moderate*	*Moderate*	*Moderate*	*Moderate*	*Moderate*	*High*
Vegetation/Wildfire	*Moderate*	*Moderate*	*Moderate*	*Moderate*	*Moderate*	*Moderate*
Medical Emergency	*High*	*High*	*High*	*High*	*High*	*High*
Hazardous Materials	*Moderate*	*Low*	*Moderate*	*Low*	*Moderate*	*Moderate*
Technical Rescue	*Moderate*	*Moderate*	*Moderate*	*Moderate*	*Moderate*	*Moderate*
Marine Incident	*Moderate*	*Moderate*	*Moderate*	*Moderate*	*Moderate*	*Moderate*

2.5 Critical Task Time Measures—What Must Be Done over What Time Frame to Achieve the Stated Outcome Expectation?

SOC Element 4 of 8
Critical Task Time Study

SOC studies use critical task information to determine the number of firefighters needed within a time frame to achieve desired objectives on fire and emergency medical incidents. Table 8 and Table 9 illustrate critical tasks typical of building fire and medical emergency incidents, including the minimum number of personnel required to complete each task. These tables are composites from Citygate clients like the District, with units staffed with two to three personnel per engine or ladder truck. It is important to understand the following relative to these tables:

- It can take considerable time after a task is ordered by command to complete the task and achieve the desired outcome.
- Task completion time is usually a function of the number of personnel that are *simultaneously* available. The fewer firefighters available, the longer some tasks will take to complete. Conversely, with more firefighters available, some tasks are completed concurrently.

- Some tasks must be conducted by a minimum of two firefighters to comply with safety regulations. For example, two firefighters are required to search a smoke-filled room for a victim.

2.5.1 Critical Firefighting Tasks

Table 8 illustrates the critical tasks required to control a typical single-family dwelling fire with three District response units and a total ERF of two engines, one ladder truck or third engine (automatic aid), one ALS medic unit, one BLS aid unit, and one chief officer, totaling 13 personnel. These tasks are taken from similarly staffed career fire departments' operational procedures, which are consistent with the customary findings of other agencies using the SOC process. No conditions exist to override the Occupational Safety and Health Administration (OSHA) two-in/two-out safety policy, which requires firefighters enter atmospheres that are immediately dangerous to life and health, such as building fires, in teams of two while two more firefighters are outside, immediately ready to rescue them should trouble arise.

Scenario: *Simulated approximately 2,000-square-foot, two-story, residential fire with unknown rescue situation. Responding companies receive dispatch information typical for a witnessed fire. Upon arrival, they find approximately 50 percent of the second floor involved in fire.*

Table 8—First Alarm Residential Fire Critical Tasks – 13 Personnel

Critical Task Description		Personnel Required
First-Due Engine		
1	Conditions report	**1**
2	Establish supply line to hydrant	**2**
3	Deploy initial fire attack line to point of building access	**1–2**
4	Operate pump and charge attack line	**1**
5	Or skip the above and establish incident command	**1**
6	Conduct primary search within OSHA regulations	**2**
Second-Due Engine		
1	If necessary, establish supply line to hydrant	**1–2**
2	Deploy an attack or backup attack line	**1–2**
3	Establish initial Rapid Intervention Crew	**2**
Truck / Third-Due Engine		
1	Conduct initial search and rescue, if not already completed	**2**
2	Deploy ground ladders to roof	**1–2**
3	Establish horizontal or vertical building ventilation	**1–2**
4	Open concealed spaces as required	**2**
Chief Officer		
1	Transfer of incident command from first-in Company Officer	**1**
2	Establish incident command and safety	**1**
Medic/Aid Units		
1	Establish incident rehab	**2–3**
2	Support incident operations as assigned	**3**
3	Treat/transport suppression personnel/civilians as needed	**2–3**

Grouped together, the duties in the previous table form an ERF, or First Alarm Assignment. These distinct tasks must be performed to effectively achieve the desired outcome; arriving on-scene does not stop the emergency from escalating. While firefighters accomplish these tasks, the incident progression clock keeps running.

Fire in a building can double in size during its free-burn period before fire suppression is initiated. Many studies have shown that a small fire can spread to engulf an entire room in fewer than 4:00 to 5:00 minutes after free burning has started. Once the room is completely superheated and involved in fire (known as flashover), the fire will spread quickly throughout the structure and into

the attic and walls. For this reason, it is imperative that fire suppression and search/rescue operations commence before the flashover point occurs if the outcome goal is to keep fire damage in or near the room of origin. In addition, flashover presents a life-threatening situation to both firefighters and any occupants of the building.

2.5.2 Critical Medical Emergency Tasks

The District responded to more than 3,500 EMS incidents in 2021, including vehicle accidents, strokes, heart attacks, difficulty breathing, falls, childbirths, and other medical emergencies. For comparison, the following table summarizes the critical tasks required for a cardiac arrest patient.

Table 9—Cardiac Arrest Critical Tasks – Two 2-Person ALS Medic Units + Medical Services Officer (5 Personnel)

Critical Task		Personnel Required	Critical Task Description
1	Chest compressions	**1–2**	Compression of chest to circulate blood
2	Ventilate/oxygenate	**1–2**	Mouth-to-mouth, bag-valve-mask, apply O_2
3	Airway control	**1–2**	Manual techniques/intubation/cricothyroidotomy
4	Defibrillate	**1–2**	Electrical defibrillation of dysrhythmia
5	Establish I.V.	**1–2**	Peripheral or central intravenous access
6	Control hemorrhage	**1–2**	Direct pressure, pressure bandage, tourniquet
7	Splint fractures	**2–3**	Manual, board splint, HARE traction, spine
8	Interpret ECG	**2**	Identify type and treat dysrhythmia
9	Administer drugs	**2**	Administer appropriate pharmacological agents
10	Spinal immobilization	**2–5**	Prevent or limit paralysis to extremities
11	Extricate patient	**3–4**	Remove patient from vehicle, entrapment
12	Patient charting	**1–2**	Record vitals, treatments administered, etc.
13	Hospital communication	**1–2**	Receive treatment orders from physician
14	Treat en route to hospital	**2–3**	Continue to treat/monitor/transport patient

2.5.3 Critical Task Analysis and Effective Response Force Size

The time required to complete the critical tasks necessary to stop the escalation of an emergency (as shown in Table 8 and Table 9) must be compared to outcomes. As shown in nationally published fire service time-versus-temperature tables, after approximately 3:00 to 5:00 minutes of free burning in an enclosed room, a building fire will escalate to the point of flashover. At this point, the entire room is engulfed in fire, the fire extends rapidly both horizontally and vertically, and human survival near or in the room of fire origin becomes impossible. Additionally,

irreversible brain damage begins to occur within 4:00 to 6:00 minutes of the heart stopping. The ERF must arrive in time to prevent these emergency events from worsening.

The District's daily staffing, including automatic aid, provides an ERF of 13 firefighters to a building fire—if they can arrive in time, which the statistical analysis of this report will discuss in depth. Mitigating an emergency event is a team effort once the units have arrived. This refers to the *weight* of response analogy: if too few personnel arrive too slowly, the emergency will escalate instead of improving. The outcome times, of course, will be longer and yield less-desirable results if the arriving force is smaller or arrives later.

The quantity of staffing and the arrival time frame can be critical in a serious fire. Fires in older or multiple-story buildings could require the initial firefighters to rescue trapped or immobile occupants. If the ERF is too small, rescue and firefighting operations *cannot* be conducted simultaneously.

Fires and complex medical incidents require that additional units arrive in time to complete an effective intervention. Time is one factor that comes from *proper station placement*. Good performance also comes from *adequate staffing* and training. However, where fire stations are spaced too far apart, and one unit must cover another unit's area or multiple units are needed, these units can be too far away, and the emergency will escalate, result in a less-than-desirable outcome, or both.

Previous critical task studies conducted by Citygate, the National Institute of Standards and Technology (NIST), and NFPA Standard 1710 find that all units must arrive with 17 or more firefighters within 11:30 minutes from the time of call at a residential room-and-contents structure fire to be able to perform the tasks of rescue, fire suppression, and ventilation *simultaneously and effectively*.

A question one might ask is, "If fewer firefighters arrive, *what* from the list of tasks mentioned would not be completed?" Most likely, the search team would be delayed, as would ventilation. The attack lines would only consist of two firefighters, which does not allow for rapid movement of the hose line above the first floor in a multiple-story building. Rescue is conducted with at least two-person teams; thus, when rescue is essential, other tasks are not completed in a simultaneous, timely manner. Effective deployment is about the **speed** *(travel time)* and the **weight** *(number of firefighters)* of the response.

Thirteen initial response personnel are *marginally sufficient* to mitigate a low-hazard confined building fire; however, even this ERF will be seriously delayed if the fire is above the first floor in a low-rise apartment building or commercial/industrial building. This is where the capability to add additional personnel and resources to the standard response becomes critical.

The District's ERF plan delivers 13 personnel to a building fire, reflecting a goal to confine serious building fires to or near the room or compartment of origin and to prevent the spread of fire to

adjoining buildings. This is a typical desired outcome in urban/suburban areas and requires more firefighters more quickly than the typical rural outcome of keeping the fire contained to the building, not room, of origin.

The District's current physical response to building fires is, in effect, its de-facto deployment measure—*if those areas are within a reasonable travel time from the needed number of fire stations*. Therefore, this becomes the baseline policy for the deployment of firefighters.

2.6 Distribution and Concentration Studies—How the Location of First-Due and First Alarm Resources Affects Emergency Incident Outcomes

SOC Element 5 of 8
Distribution Study

SOC Element 6 of 8
Concentration Study

The District provides services from three staffed fire stations and three volunteer stations deploying the resources and staffing identified in Table 2. Using geographic mapping tools, it is appropriate to understand what the existing stations do and do not cover within travel time goals, if there are any coverage gaps needing one or more stations, and what, if anything, to do about them.

In brief, there are two geographic perspectives to fire station deployment:

- **Distribution** – the spacing of first-due fire units to control routine emergencies before they escalate and require additional resources.
- **Concentration** – the spacing of fire stations sufficiently close to each other so that more complex emergency incidents can quickly receive sufficient resources from multiple fire stations. As indicated, this is known as the **Effective Response Force** (ERF), or, more commonly, the First Alarm Assignment—the collection of a sufficient number of firefighters on scene, delivered within the concentration time goal to stop the escalation of the problem.

To analyze first-due fire unit travel time coverage, Citygate used Esri ArcGIS, a geographic mapping tool that can measure theoretical travel time over a road network. Using this tool, Citygate ran several deployment tests and measured their impact on various parts of the District's service area, including urban area 4:00-minute and 5:00-minute first-due travel, rural area 8:00-minute first-due travel, urban area 8:00-minute ERF travel, and rural area 16:00-minute ERF travel for positive outcomes.

2.6.1 Deployment Baselines

All maps referenced can be found in **Volume 2—Map Atlas**.

Map #1—General District Geography, Station Locations, and Response Resource Types

Map #1 shows the District and City of Port Townsend boundaries and District and automatic/mutual aid fire station locations. This is a reference map for other maps that follow.

Map #2—Risk Planning Zones

This map shows the six risk planning zones used for this study, as recommended by the CFAI, which are the same as each station's initial (first-due) response area, which are shown in unique colors.

Map #2a—Risk: Population Density

Map #2a shows the resident population density by census block across the District's service area. People drive EMS incident demand, and the highest population density areas are typically the locations with the highest EMS demand. As Map #2a shows, the District's population density ranges from fewer than 100 to more than 2,500 people per square mile.

Map #3—Distribution: 4:00-Minute First-Due Travel Time Coverage

Map #3 shows in green the 50 percent of the District's 325-mile public road network that a fire engine should be expected to reach within 4:00 minutes travel time from the current six fire station locations. Ideally, there should be some overlap between station areas so that a second-due unit has the potential for an acceptable response time when it responds to a call in a different station's first-due response area.

Map #3a—Distribution: 4:00-Minute First-Due Travel with Auto Aid

This map shows in purple the additional 3.1 percent of 4:00-minute *urban* first-due travel time coverage with automatic mutual aid from the Navy Region NW on Indian Island.

Map #3b—Distribution: 5:00-Minute First-Due Travel

Map #3b shows that increasing the first-due travel time goal to 5:00 minutes provides a *15 percent increase* in coverage to 68 percent of the District's total public road miles, which is reasonable *rural-level* coverage.

Map #3c—Distribution: 5:00-Minute First-Due Travel from Staffed Stations with Auto Aid

Map #3c shows that only 49 percent of the District's road network can be expected to be reached within a travel time of 5:00 minutes from the three staffed stations with automatic aid from the Navy Region NW on Indian Island.

Map #3d—Distribution: 8:00-Minute First-Due Travel from Staffed Stations with Auto Aid

This map shows that increasing the first-due travel time goal to 8:00 minutes improves coverage from the three staffed stations with automatic aid from the Navy Region NW to 77 percent of total road miles, which is good rural-level coverage including nearly all of the City of Port Townsend.

Map #3e—Distribution: 5:00-Minute First-Due Travel from Station 16; 8:00-Minute Travel from all Other Stations

Map #3e shows the 85 percent of the District's road network that can be expected to be reached within 5:00 minutes travel time from Station 16 and 8:00 minutes travel time from Stations 11, 12, 13, 14, and 15 without automatic aid, which is good *urban* coverage in the City of Port Townsend and *rural* coverage in the remainder of the District.

Map #4—Insurance Services Office 1.5-Mile Coverage Areas

Map #4 displays the 35 percent of the District's road network within the ISO-recommended 1.5-mile *distance* response area. Depending on a jurisdiction's road network, the 1.5-mile measure typically equates to 3:30- to 4:00-minute travel time; however, a 1.5-mile measure is a reasonable indicator of station spacing and overlap.

Map #5—Concentration: 8:00-Minute Effective Response Force Travel

Map #5 shows the road segments where the District's current response plan should deliver a minimum initial ERF of two engines, one mutual aid resource, one medic unit, one aid unit, and one Battalion Chief within a travel time of 8:00 minutes. As the map illustrates, only 7.4 percent of the District's public road miles in the center of the District can be expected to be reached within the 8:00-minute travel time by that multiple-unit ERF, including none of the City of Port Townsend. As might be expected, this is *very poor* urban/suburban ERF travel time coverage.

Map #5a—Concentration: 16:00-Minute ERF Travel

Map #5a shows that 42 percent of the District's public road miles can be reached by that same multiple-unit ERF if the travel time is doubled to 16:00 minutes, still focused on the central area of the District but reaching as far north as the southwestern edge of Port Townsend and about as far south as Gibbs Lake Road. While a significant improvement over the 8:00-minute ERF travel time coverage, this still does not reach nearly all of the City of Port Townsend. The factor limiting ERF travel time coverage is the furthest ERF engine from Navy Region Northwest on Indian Island.

Map #6—8:00-Minute Ladder Truck Travel

This map shows the 31 percent of the District's public road miles that the ladder truck can be expected to reach in 8:00 minutes travel time from Station 16, including nearly all of the City of Port Townsend.

Map #7—8:00-Minute Battalion Chief Travel

Map #7 displays the 45 percent of public road miles that a Battalion Chief can be expected to reach in a travel time of 8:00 minutes from the District's Administrative Headquarters, which includes the highest population density areas of the District.

Map #8—All Incident Locations

Map #8 shows the locations of all incidents over the four-year study period, which occur on virtually every road segment of the District's service area. The higher population density areas in and around the cities of Port Townsend and Irondale naturally have the highest demand, but all major roads and rural areas also have service demand.

Map #9—Emergency Medical Services and Rescue Incident Locations

This map illustrates only the emergency medical and rescue incident locations over the four-year study period. With most of the calls for service being EMS-related, virtually all of the District's service area needs pre-hospital EMS response. This data is consistent with the population density Map #2a since human activities, such as driving or recreation, drive EMS calls for service.

Map #10—All Fire Locations

Map #10 identifies the location of all fires within the District's service area over the four-year period. This includes any type of fire incident, including vehicle, dumpster, vegetation, and building fires. There are obviously fewer fires than medical or rescue calls; however, fires occur in all areas of the District.

Map #11—Building Fire Locations

This map displays the location of all building fire incidents. While the number of building fires is a smaller subset of total fires, there are two meaningful findings from this map. First, building fires occur throughout the District, and second, there are a relatively small number of building fires overall, which in Citygate's experience is consistent with other similar communities in the western United States. Regardless of the small overall quantity, these fires still need at least a minimum response—which means that a standby force is necessary throughout the District's service area.

Map #12—Emergency Medical Services and Rescue Incident Location Densities

Map #12 shows by mathematical density where clusters of EMS and rescue incident activity occurred over the four-year study period. In this set, the darker density color plots the highest concentration of EMS and rescue incidents. This type of map makes the location of frequent workload more meaningful than simply mapping the locations of all EMS and rescue incidents, as shown in Map #9.

This perspective is important because the deployment system needs an overlap of units to ensure the delivery of multiple units when needed for more serious incidents or to handle simultaneous calls for service, as is evident for the higher medical incident density areas of the District's service area. This measure of deployment also shows that the fire stations are located in or near the main hot spot areas.

Map #13—All Fire Location Densities

This map shows the hot spots of activity for all types of fires as shown in Map #10. Fire density is greater in the higher building/population density neighborhoods.

Map #14—All Building Fire Location Densities

Map #14 shows the hot spots for building fire activity as shown in Map #11, with the greatest hotspots in Station 15 and 16 response areas.

Map #15—Station 15 All Incident Densities

This map shows the hot spots of *all* incident activity from Station 15 over the four-year period.

2.6.2 Road Mile Coverage Measures

In addition to the visual displays of coverage the maps provide, the following table summarizes expected travel time coverage.

Table 10—Travel Time Coverage Summary

Map Number	Travel Time Measure	Total Public Road Miles	Miles Covered	Percent of Total Miles Covered
3	4:00-Minute First-Due	325	**161**	**49.6%**
3a	4:00-Minute First-Due with Auto Aid	325	**171**	**52.7%**
3b	5:00-Minute First-Due	325	**220**	**67.6%**
3c	5:00-Minute First-Due (staffed only) with Auto Aid	325	**159**	**48.9%**
3d	8:00-Minute First-Due (staffed only) with Auto Aid	325	**251**	**77.3%**
3e	5:00-Minute First-Due Station 16; 8:00-Minute All Others	325	**277**	**85.0%**
4	ISO 1.5-Mile Station Spacing	325	**115**	**35.3%**
5	8:00-Minute ERF	325	**24**	**7.4%**
5a	16:00-Minute ERF	325	**138**	**42.3%**
6	8:00-Minute Truck from Station 16	325	**102**	**31.4%**
7	8:00-Minute Battalion Chief from Admin.	325	**146**	**44.8%**

Finding #4: Less than 50 percent of the District's public road miles can be expected to be reached within 4:00 minutes travel time by a first-due unit from any of the District's six fire stations to facilitate suburban-level outcomes, including less than half of the City of Port Townsend. This increases to 53 percent of total road miles with automatic aid, and to 68 percent if the travel time is increased to 5:00 minutes, including most of the City of Port Townsend.

Finding #5: Only 7.4 percent of the District's public road miles in the central section of the District can be expected to be reached within 8:00 minutes travel time by a multiple-unit ERF to facilitate suburban-level outcomes for more serious emergencies. This increases to 42 percent of the public road miles, including the southwestern edges of the City of Port Townsend, if the travel time is doubled to 16:00 minutes.

2.7 STATISTICAL ANALYSIS

SOC ELEMENT 7 OF 8
RELIABILITY & HISTORICAL RESPONSE EFFECTIVENESS

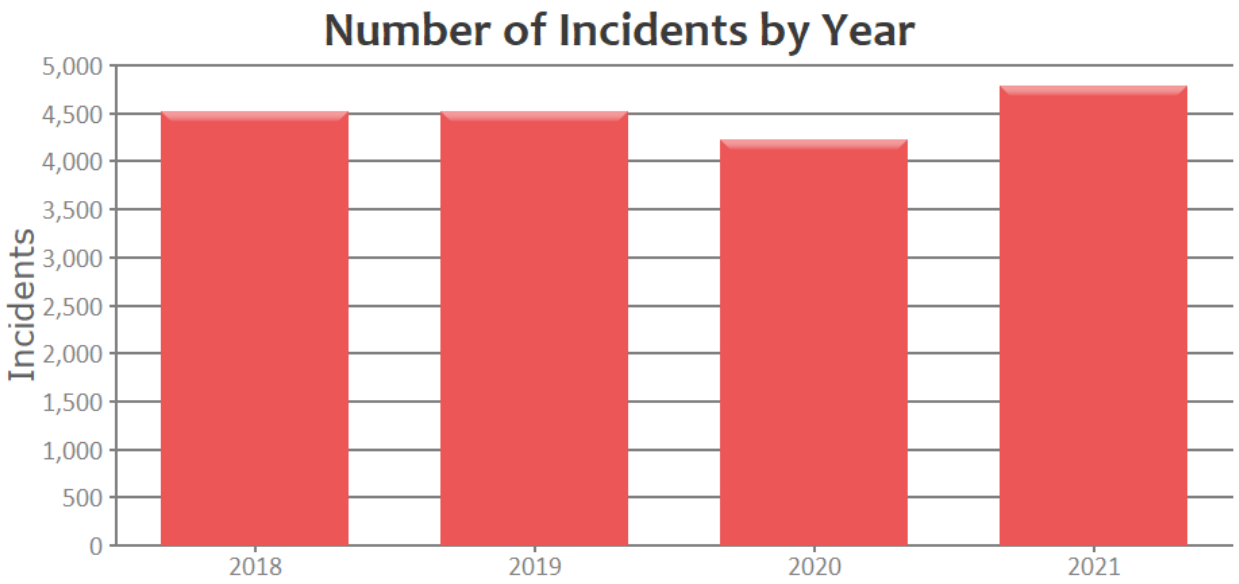
The maps described in **Section 2.6** and presented in **Volume 2—Map Atlas** show the ideal situation for response times and response effectiveness given no units out of position or simultaneous calls for service. Examination of the response time data provides a picture of actual response performance with simultaneous calls, rush hour traffic congestion, units out of position, and delayed travel time for events such as periods of severe weather.

The following subsections provide summary statistical information regarding the District and its services.

2.7.1 Demand for Service

The District provided four years of data from multiple sources covering the period from January 1, 2018, through December 31, 2021, including 18,069 incidents, as summarized in the following figure.

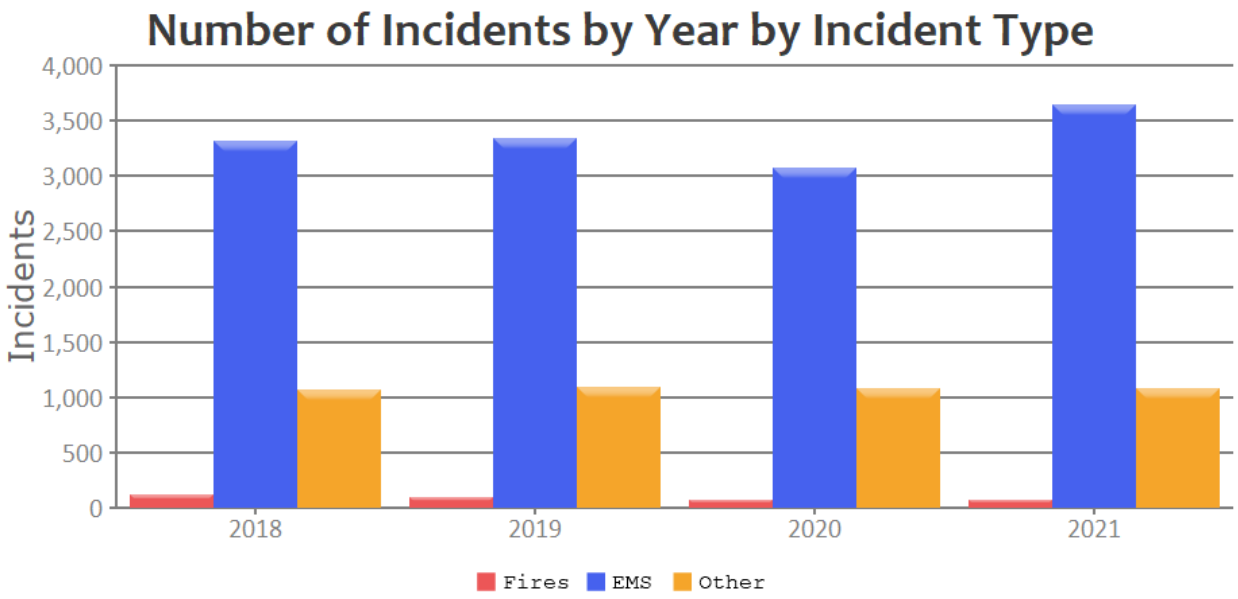
Figure 6—Total Service Demand by Year



In 2021, the District responded to 4,794 incidents, for an average daily service demand of 13.13 incidents. Of these, 1.50 percent were fire incidents, 76.03 percent were EMS incidents, and 22.47 percent were other incident types. As the previous figure illustrates, overall annual service demand decreased 6.5 percent in 2020, and then increased 13.25 percent in 2021.

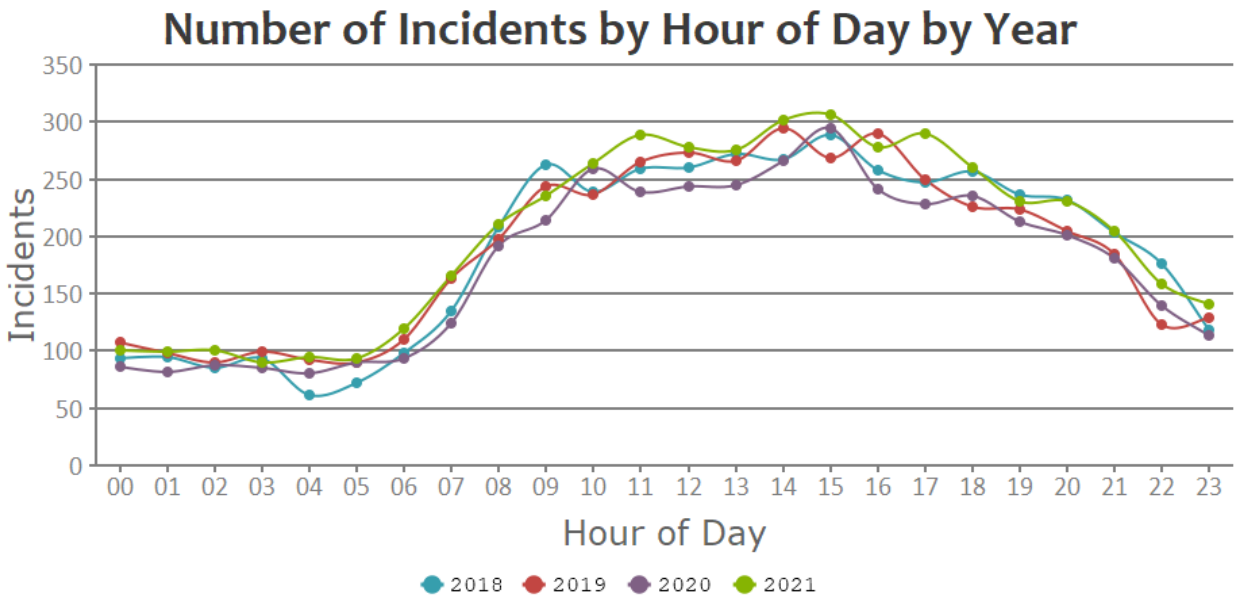
The following figure shows the annual number of incidents by incident type. As with total service demand in the previous figure, EMS incidents decreased in 2020 before increasing in 2021 The number of fire and other incident types remained relatively constant over the four-year study period.

Figure 7—Annual Service Demand by Incident Type



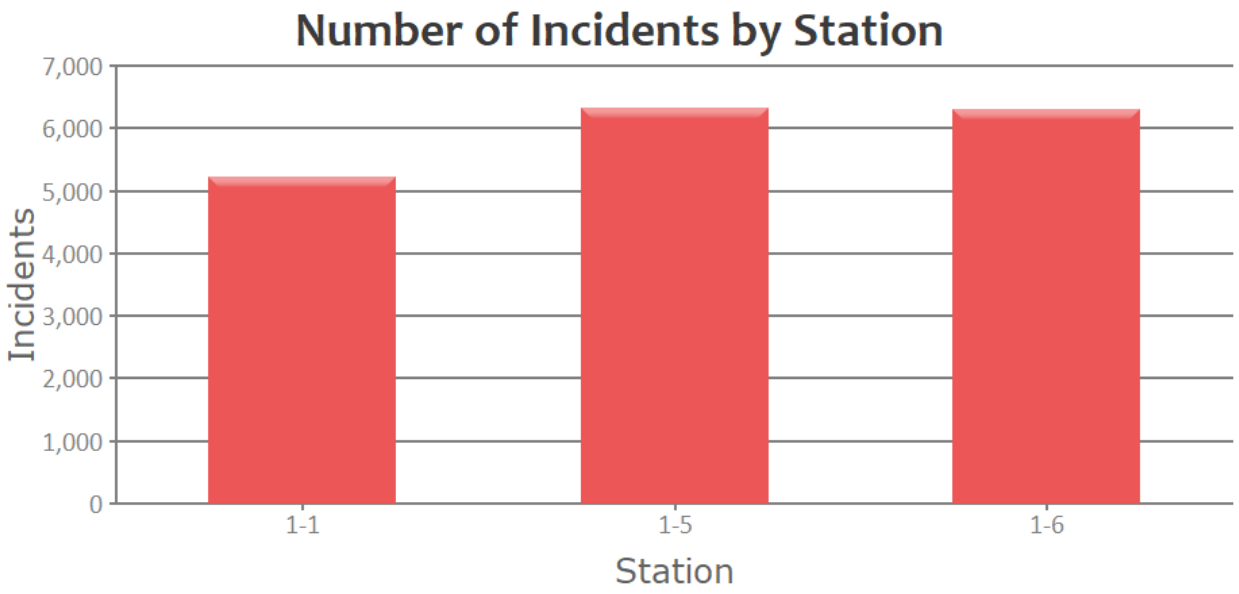
The following figure shows service demand by hour of day by year.

Figure 8—Service Demand by Hour of Day and Year



The following figure shows that Station 16 had the highest service demand over the four-year study and Station 11 had the lowest.

Figure 9—Service Demand by Station Area (2018–2021)



The following table summarizes service demand for the volunteer station service areas over the four-year study.

Table 11—Service Demand – Volunteer Stations

Year	Sta. 12	Sta. 13	Sta. 14	Total
2018	111	501	159	**771**
2019	111	429	232	**772**
2020	134	480	188	**802**
2021	133	538	209	**880**
Total	**489**	**1,948**	**788**	**3,225**

The following table lists service demand by incident type for the four-year study. Only incident types with more than 100 calls for service over the study period are shown. Although not shown, building fires ranked 22nd on this list.

Table 12—Service Demand by Incident Type (2018–2021)

Incident Type	2018	2019	2020	2021	Total
321 EMS call, excluding vehicle accident with injury	3,128	3,191	2,884	3,402	**12,605**
554 Assist invalid	261	278	270	253	**1,062**
611 Dispatched and canceled en route	130	126	162	160	**578**
500 Service call, other	56	77	87	73	**293**
622 No incident found on arrival of incident address	66	72	77	53	**268**
320 Emergency medical service, other	56	24	54	101	**235**
322 Vehicle accident with injuries	61	55	42	45	**203**
600 Good intent call, other	54	37	60	50	**201**
561 Unauthorized burning	44	40	43	62	**189**
324 Motor vehicle accident no injuries	45	40	48	42	**175**
733 Smoke detector activation due to malfunction	51	47	47	19	**164**
743 Smoke detector activation, no fire – unintentional	41	46	27	28	**142**
551 Assist police or other governmental agency	30	33	20	19	**102**

The following table ranks incidents by property use. The highest rankings for incidents by property use are one- or two-family dwellings. Only those property uses with more than 100 incident responses in the last four years are shown.

Table 13—Service Demand by Property Use (2018–2021)

Property Use	2018	2019	2020	2021	Total
419 1- or 2-family dwelling	1,566	1,672	1,749	2,070	**7,057**
331 Hospital – medical or psychiatric	617	563	560	655	**2,395**
429 Multifamily dwellings	440	432	469	449	**1,790**
400 Residential, other	253	308	256	192	**1,009**
311 24-hour care nursing homes, 4 or more persons	239	213	199	244	**895**
960 Street, other	179	107	111	102	**499**
BLANK	66	61	87	136	**350**
361 Jail, prison (not juvenile)	120	68	45	67	**300**
961 Highway or divided highway	76	67	59	79	**281**
962 Residential street, road or residential driveway	57	67	59	68	**251**
900 Outside or special property, other	74	79	47	36	**236**
519 Food and beverage sales, grocery store	60	71	48	56	**235**
459 Residential board and care	42	56	18	40	**156**
965 Vehicle parking area	49	36	24	28	**137**
340 Clinics, doctors' offices, hemodialysis centers	32	35	35	31	**133**
449 Hotel/motel, commercial	22	24	39	42	**127**
300 Health care, detention, and correction, other	34	74	15	4	**127**
888 Fire station	32	29	30	24	**115**
963 Street or road in commercial area	36	35	19	23	**113**
931 Open land or field	31	27	24	26	**108**

2.7.2 Simultaneous Incident Activity

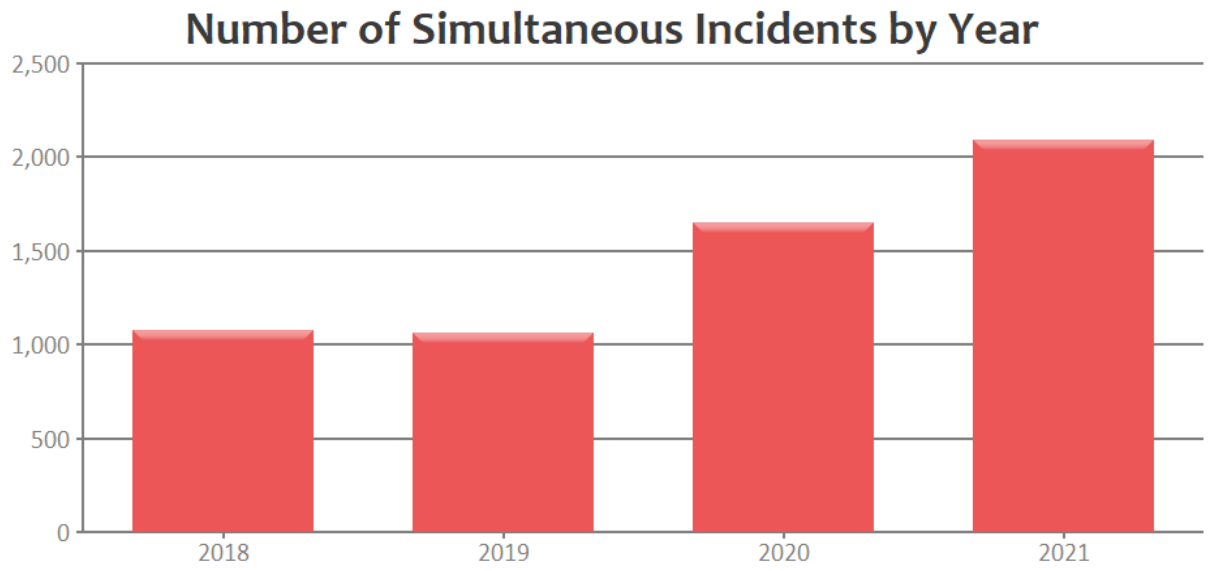
Simultaneous incidents occur when an incident is underway at the time a new incident begins. In 2021, 33 percent of District incidents occurred while one or more other incidents were underway, as summarized in the following table. This analysis *excludes* Medic 17 responses.

Table 14—Simultaneous Incident Activity (2021)

Number of Simultaneous Incidents	Percentage
1 or more	32.6%
2 or more	6.13%
3 or more	1.06%

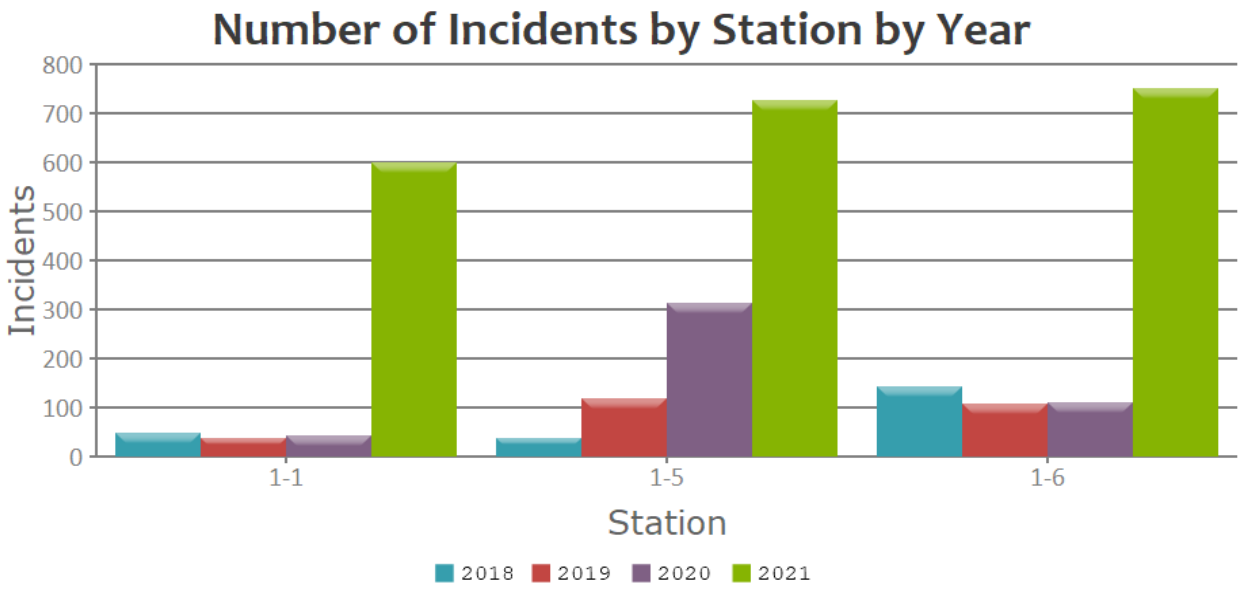
The following figure shows the number of simultaneous incidents is increasing approximately 45 percent annually since 2019.

Figure 10—Number of Simultaneous Incidents by Year



In larger jurisdictions, simultaneous incidents in different station areas have minimal operational impact. However, when simultaneous incidents occur within a single station area there can be significant delays in response times since responding unit(s) must come from a further station. The following figure shows the number of single-station simultaneous incidents by station area by year and illustrates that single-station simultaneous incident activity increased dramatically in 2021.

Figure 11—Single-Station Simultaneous Incidents by Station by Year



Finding #6:	At least two simultaneous incidents are occurring 33 percent of the time.

2.7.3 Station Demand

The following table summarizes overall activity percentages in 2021 for each station by hour of day. The percentage listed is the percent likelihood that a particular station is involved in an incident during a given hour. This considers not only the number of incidents but also the duration of incidents—an important service demand measure for the District since the crew at each station staffs more than one type of apparatus depending on the type of call. As a result, unit-hour utilization (UHU) would not be an accurate measure of how busy each station is throughout the day over one or more years. In Citygate's experience, a UHU or station demand where one crew staffs more than one apparatus of 30 percent or higher over *multiple* consecutive hours becomes the point at which other responsibilities, such as training, do not get completed, and some type of relief capacity should be considered. Note that Station 15's incident workload exceeds the recommended 30 percent saturation threshold for 11 hours—or nearly half of each day—predominantly due to Medic 17 activity, as shown in the UHU section. When Medic 17's hourly workload is subtracted, Station 15's hourly demand in 2021 ranged from 2.11 percent at 2:00 am to only 13.3 percent at 10:00 am, well below the 30 percent workload saturation.

Table 15—Station Demand by Hour (2021)

Hour of Day	Sta. 15	Sta. 11	Sta. 16
00:00	6.63%	6.97%	5.82%
01:00	9.96%	7.67%	6.70%
02:00	9.95%	7.43%	6.36%
03:00	18.41%	5.98%	5.90%
04:00	21.06%	6.84%	4.77%
05:00	16.14%	6.09%	5.33%
06:00	15.85%	10.97%	4.36%
07:00	25.97%	15.01%	7.45%
08:00	34.15%	11.29%	10.48%
09:00	16.93%	18.71%	15.01%
10:00	26.61%	15.36%	18.18%
11:00	26.19%	17.96%	20.10%
12:00	41.13%	16.83%	14.18%
13:00	39.79%	14.78%	15.51%
14:00	52.57%	20.01%	18.57%
15:00	54.97%	15.86%	20.64%
16:00	40.93%	16.15%	14.54%
17:00	46.67%	13.53%	12.33%
18:00	43.33%	14.75%	12.00%
19:00	37.88%	15.07%	10.27%
20:00	40.45%	16.28%	10.58%
21:00	32.39%	14.64%	12.16%
22:00	14.76%	9.15%	5.96%
23:00	16.88%	6.70%	5.79%
Overall	**28.73%**	**12.67%**	**10.96%**
Runs	**1,811**	**1,449**	**1,518**

Finding #7:	Station 15's incident workload exceeded the recommended 30 percent workload saturation threshold for 11 hours, or nearly half, of each day in 2021, predominantly due to Medic 17 interfacility transfer activity. When Medic 17 activity is excluded, maximum hourly station demand is less than 14 percent, well below the recommended 30 percent workload saturation threshold.

2.7.4 Unit-Hour Utilization

The utilization percentage for apparatus is calculated by two primary factors: the number of responses and the duration of responses. The following tables summarize UHU for the District's engines and EMS units. As the following table shows, except for Medic 17, no engine or EMS unit is nearing the 30 percent UHU workload saturation threshold.

Table 16—Unit-Hour Utilization – Staffed Engines (2021)

Hour of Day	E-15	E-16	E-11
0:00	1.33%	0.53%	0.39%
1:00	3.69%	0.48%	0.09%
2:00	2.98%	1.15%	1.40%
3:00	2.08%	0.34%	0.69%
4:00	1.79%	0.40%	0.23%
5:00	2.76%	0.46%	0.08%
6:00	2.84%	0.81%	0.31%
7:00	3.87%	0.34%	1.71%
8:00	4.53%	1.00%	0.45%
9:00	6.57%	0.72%	1.47%
10:00	4.93%	1.73%	1.58%
11:00	7.19%	0.96%	1.52%
12:00	5.99%	1.96%	1.52%
13:00	4.99%	1.56%	0.70%
14:00	5.86%	2.04%	1.63%
15:00	6.47%	1.88%	1.44%
16:00	5.15%	1.41%	1.13%
17:00	6.65%	1.14%	2.25%
18:00	4.90%	1.15%	1.17%
19:00	5.20%	1.40%	2.08%
20:00	5.88%	4.52%	3.33%
21:00	7.01%	1.41%	2.26%
22:00	3.66%	1.41%	0.79%
23:00	3.50%	0.77%	0.52%
Overall	**4.58%**	**1.23%**	**1.20%**
Runs	**874**	**251**	**225**

Table 17—Unit-Hour Utilization – EMS Units (2021)

Hour of Day	M-17	M-11	A-15	A-16	M-16
00:00	2.67%	7.99%	4.45%	3.34%	3.99%
01:00	4.58%	7.92%	6.87%	3.76%	4.84%
02:00	7.84%	5.05%	4.22%	3.13%	2.90%
03:00	14.73%	6.58%	4.26%	3.53%	4.25%
04:00	17.32%	7.46%	3.23%	3.94%	1.81%
05:00	10.24%	7.07%	5.76%	3.33%	3.85%
06:00	10.81%	11.28%	5.92%	4.67%	1.77%
07:00	20.40%	11.28%	8.02%	5.33%	5.58%
08:00	21.41%	12.48%	14.54%	8.21%	4.87%
09:00	4.08%	17.80%	15.24%	9.10%	11.27%
10:00	13.31%	17.19%	14.87%	10.01%	12.09%
11:00	16.17%	18.76%	14.80%	11.43%	13.31%
12:00	30.57%	14.73%	12.97%	10.61%	8.20%
13:00	30.19%	15.82%	11.14%	10.54%	8.52%
14:00	46.21%	13.86%	12.68%	8.26%	10.30%
15:00	44.17%	13.50%	13.68%	10.26%	10.47%
16:00	30.98%	15.07%	13.11%	7.81%	8.03%
17:00	36.84%	13.74%	10.10%	7.60%	6.05%
18:00	34.00%	16.86%	13.82%	8.45%	6.27%
19:00	32.91%	11.57%	9.99%	5.86%	4.92%
20:00	34.81%	14.81%	11.67%	6.54%	6.07%
21:00	28.05%	15.17%	6.44%	7.59%	6.63%
22:00	7.21%	9.46%	7.33%	5.31%	2.58%
23:00	9.08%	8.07%	8.12%	5.39%	2.86%
Overall	**21.19%**	**12.23%**	**9.72%**	**6.83%**	**6.31%**
Runs	**640**	**1,300**	**1,195**	**1,020**	**787**

2.7.5 Aid Activity

The following table shows that aid activity represents only 4–7 percent of total annual service demand, and aid provided is generally equal to aid received. Aid activity has decreased each year since 2018.

Table 18—Aid Activity by Year

Aid Type	2018	2019	2020	2021	Totals
Aid Received	217	164	109	74	**564**
Aid Provided	120	116	93	96	**425**
Total	**337**	**280**	**202**	**170**	**989**

2.7.6 Response Performance

Measurements for the performance of the first response apparatus to arrive at emergency incidents are the number of minutes and seconds necessary for 90 percent completion of the following response components *for fire and EMS incidents only*:

- Call processing / dispatch
- Crew turnout
- First-unit travel
- Dispatch to arrival
- Call to arrival

Call Processing / Dispatch

Call processing measures the time interval from receipt of the call in the fire dispatch center until completion of the dispatch notification to District response personnel.

Call processing performance depends on what is being measured. If the first incident timestamp takes place at the time the public-safety answering point (PSAP) receives a 9-1-1 call, then call processing includes PSAP time as well as dispatch handling time. Otherwise, the performance represents only a portion of the entire processing operation.

There is another consideration. Not all requests for assistance are received via 9-1-1. Generally, there will be a mix of channels such as land line, cell phone, and fire-unit radio for receiving requests for assistance. Each channel will have a timestamp at a different point in the processing operation. This is not as much of a factor if most requests are received via 9-1-1 PSAP.

While the most recent NFPA best practice recommendation for call processing / dispatch time for high-priority fire and EMS emergencies with a significant threat to life or property loss is 1:00 minute, 90 percent of the time,[10] in Citygate's experience, very few dispatch centers can achieve

[10] Source: NFPA 1221 – Standard for the Installation, Maintenance, and Use of Emergency Services Communications Systems (2019 Edition).

that level of performance. Citygate thus continues to use a 1:30-minute best practice goal for call processing / dispatch performance.

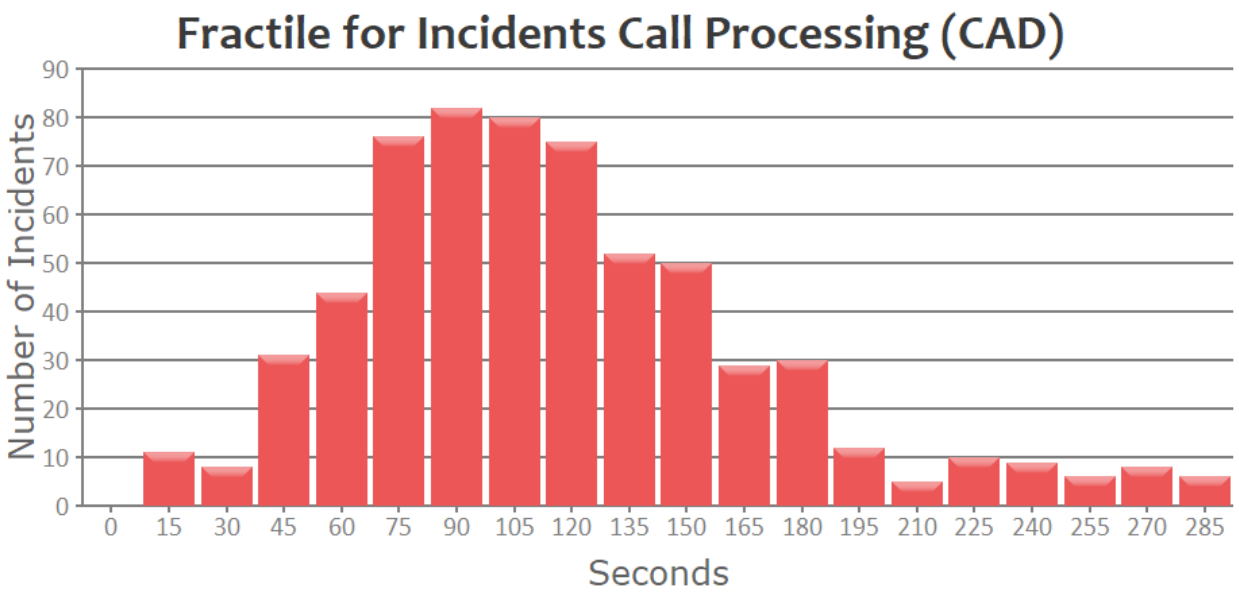
The following table summarizes 90th percentile call processing / dispatch performance over the four-year study period, and shows overall performance is nearly *1:30 minutes* (93 percent) *slower* than the 90-second best practice goal.

Table 19—90th Percentile Call Processing / Dispatch Performance

Call Processing / Dispatch	Overall	2018	2019	2020	2021
District-Wide	2:54	2:48	2:56	3:08	2:56

The following figure illustrates that while most calls are being processed within 120 seconds, with the peak occurring between 75 and 120 seconds, many fire and EMS calls are taking longer.

Figure 12—Fractile Call Processing Performance



Finding #8: At 2:54 minutes, 90th percentile call processing performance by the Jefferson County 9-1-1 Dispatch Center is nearly double (93 percent) the recommended 1:30-minute best practice goal.

Recommendation #1:	The District should collaborate with the Jefferson County 9-1-1 Dispatch Center to identify the factors causing slower than desired call processing performance and to identify prospective solutions to bring call processing performance into closer alignment with recognized best practice standards to improve overall response performance and customer service.

Crew Turnout

Crew turnout measures the time from completion of the dispatch notification to the start of apparatus movement toward the emergency. While the NFPA recommends 60 seconds for medical emergencies and 90 seconds for fire and special service responses, in Citygate's extensive deployment study experience, this goal is very rarely achieved.[11] As a result, Citygate has long recommended a 90th percentile turnout of 2:00 minutes or less as an achievable goal for most agencies, and this is the standard used for this analysis. As the following table illustrates, the District's crew turnout performance is *27 percent slower* than the recommended 2:00-minute goal.

Table 20—90th Percentile Turnout Performance

Crew Turnout	Overall	2018	2019	2020	2021
District-Wide	**2:32**	2:35	2:30	2:230	2:37

The following table shows turnout performance broken down by time of day. AM1 is from midnight to 5:59 am, AM2 is from 6:00 am to 11:59 am, PM1 is from noon to 5:59 pm, and PM2 is from 6:00 pm to 11:59 pm. As the table shows, turnout performance is slowest during sleeping hours (as would be expected); however, it is also slower than the 2:00-minute goal throughout normal workday hours.

Table 21—90th Percentile Turnout Analysis by Six-Hour Time Blocks

Station	AM1	AM2	PM1	PM2
Station 11	3:20	2:26	2:09	2:21
Station 15	2:53	2:16	2:07	2:10
Station 16	3:10	2:25	2:07	2:16

[11] Source: 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 (2020 Edition).

Finding #9:	At 2:32 minutes, 90th percentile crew turnout performance is *27 percent slower* than the recommended 2:00-minute goal.

Recommendation #2:	The District should work to identify the factors causing slower-than-desired crew turnout performance, particularly during non-sleep hours, and seek to bring crew turnout performance into closer alignment with the recommended best practice goal to improve overall response performance and customer service.

First-Unit Travel

Travel measures the time from initial apparatus movement until the apparatus arrives at the incident. Best practice for first-unit travel time is 4:00 minutes or less 90 percent of the time in *urban* areas[12] and 8:00 minutes or less 90 percent of the time in *rural* areas.[13] As the following table shows, 90th percentile first-due travel performance in Port Townsend, at 8:49 minutes, is *more than double* (120 percent) the recommended 4:00-minute best practice goal for *urban/suburban* population density areas, while District-wide first-unit travel performance, at 9:23 minutes, is *17 percent slower* than the recommended 8:00-minute best practice goal for *rural* areas.

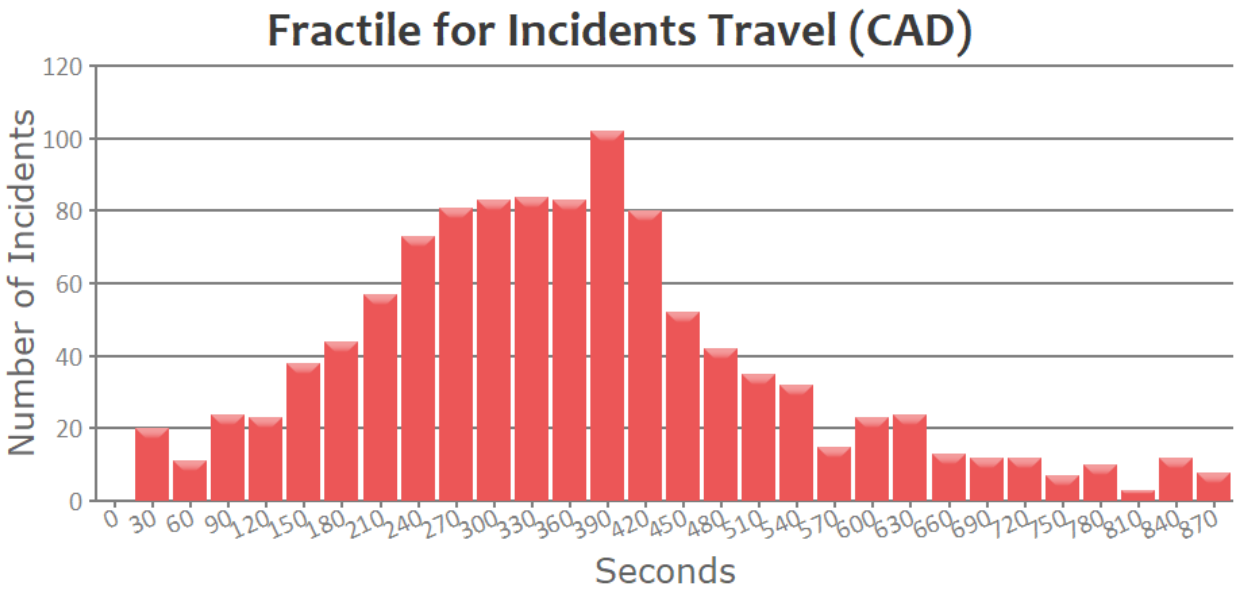
Table 22—90th Percentile First-Unit Travel Performance

First-Unit Travel	Overall	2018	2019	2020	2021
City of Port Townsend	8:49	8:36	8:49	8:46	9:37
District-Wide	9:23	9:00	9:23	9:28	9:52

The following figure shows peak travel performance occurs at 6:30 minutes (390 seconds); however, there are still a significant number of incidents that require longer travel times of up to 15:00 minutes, indicating a good number of emergencies are located in more remote areas of the District.

[12] Source: 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 (2020 Edition).
[13] Citygate-recommended best practice goal.

Figure 13—Fractile First-Unit Travel Performance – District-Wide



Finding #10: At 8:49 minutes, 90th percentile first-unit travel performance in the City of Port Townsend is *120 percent slower* than the recommended 4:00-minute best practice goal for *urban/suburban* areas, while at 9:23 minutes, District-wide first-unit travel performance is *17 percent slower* than the recommended 8:00-minute best practice goal for *rural* areas.

First-Unit Call to Arrival

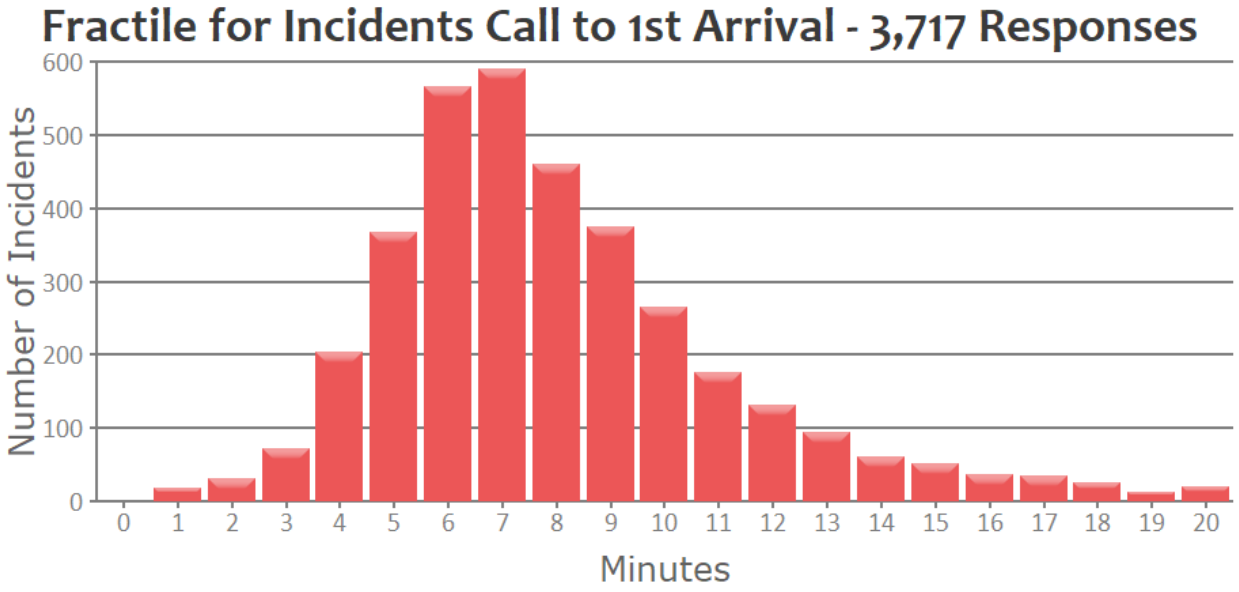
Call to arrival measures the interval from receipt of the 9-1-1 request for assistance until the first responding apparatus arrives at the emergency. This is a fire agency's *true* customer service performance measure. Citygate recommends a 7:30-minute call-to-arrival performance goal at 90 percent reliability to facilitate desired outcomes in *urban/suburban population density* areas, including 1:30 minutes for call processing / dispatch, 2:00 minutes for crew turnout, and 4:00 minutes for travel. Citygate further recommends an 11:30-minute call-to-arrival goal at 90 percent reliability in *rural* areas. The following table shows that call to first-unit arrival performance in the City of Port Townsend, at 10:41 minutes, is *42 percent slower* than the recommended 7:30-minute best practice goal for urban/suburban areas, while District-wide first-unit call-to-arrival performance, at 11:28 minutes, is *meeting* the recommended 11:30-minute best practice goal for *rural* areas.

Table 23—90th Percentile Call to First-Unit Arrival Performance

Call to First Unit Arrival	Overall	2018	2019	2020	2021
City of Port Townsend	10:41	10:27	10:24	10:30	11:09
District-Wide	11:28	11:12	11:20	11:31	11:42

The following figure shows peak dispatch-to-arrival performance at 7:00 minutes, however the right-shifted graph shows the large number of incidents with longer call-to-arrival performance.

Figure 14—Fractile First-Unit Call-to-Arrival Performance



Finding #11: 90th percentile call to first-unit arrival performance, which includes call processing / dispatch, crew turnout, and travel, is *42 percent slower* than the recommended 7:30-minute best practice goal for urban/suburban population density areas yet *meets* the recommended 11:30-minute best practice goal for rural areas.

ERF Call to Arrival

ERF call to arrival measures the time from receipt of the 9-1-1 request for assistance to arrival of the *last* ERF resource and includes all three response components (call processing / dispatch, crew turnout, and travel). There were only six building fire incidents over the four-year study period where the entire ERF response group (three engines, or two engines and one ladder truck, one ALS Medic Unit, one BLS Aid Unit, and one Chief Officer) arrived at the incident, with two of those

not meeting outlier limitations. The following table summarizes 90th percentile ERF call-to-arrival performance for the remaining four building fire incidents, all of which occurred in Station 11's response area.

Table 24—90th Percentile ERF Call-to-Arrival Performance

ERF Call to Arrival	Overall	2018	2019	2020	2021
District-Wide	**23:14**	23:14	22:04	n/a	n/a

As the table shows, ERF call-to-arrival performance was *102 percent slower* than the recommended 11:30-minute best practice goal for *urban/suburban population density* areas, however it was only *19 percent slower* than the 19:30-minute recommended best practice goal for *rural* areas where the incidents occurred. It is also important to note that small data sets like this are very volatile.

2.8 Overall Evaluation

The District serves a diverse urban to rural population density over a widely varied land-use pattern typical of other similar-sized northwestern jurisdictions.

SOC Element 8 of 8
Overall Evaluation

Overall service demand increased 6 percent over the four-year study period from January 2018 through December 2021, with EMS demand increasing 8 percent over the same period, including a 17 percent increase from 2020 to 2021. In addition, 61 percent of all calls for service were within the City of Port Townsend, which is to be expected given its higher population density than the more rural areas of the District. Approximately 18 percent of annual calls for service occurred in the unstaffed stations' response areas as summarized in Table 11, and peak activity within these unstaffed stations' response areas occurred from approximately 8:00 am to 5:00 pm, with the highest service demand in Station 13's response area with an average of 1.3 calls for service per day. The District's population is projected to grow by approximately 35 percent over the next 16 years to 30,000 people by 2038, which will further increase service demand, particularly for EMS-related incidents.

Even where state or local fire codes require fire sprinklers in residential dwellings, it will be many more decades before enough homes are remodeled with automatic fire sprinklers. If desired outcomes include limiting building fire damage to only part of the inside of an affected building or minimizing permanent impairment or death resulting from a medical emergency, then *urban/suburban* population density areas of the District will need both first-due unit and multiple-unit ERF coverage consistent with Citygate response performance recommendations, starting with a first-due unit arrival within 8:30 minutes from 9-1-1 dispatch notification and an ERF arrival within 11:30 minutes of 9-1-1 notification, all at 90 percent or better reliability.

The District's daily staffing level of nine personnel on duty at three of the six fire stations is *insufficient* to provide either (1) equitable first-unit *speed of response* to all areas of the District for routine to moderate emergencies or (2) the minimum recommended multiple-unit *weight of response* needed for more serious emergencies. Even one low-risk ERF incident will deplete all on-duty personnel *plus* automatic aid, leaving no resources for a concurrent incident—which occurs 33 percent of the time and is increasing at an average annual rate of approximately 25 percent.

Although the District has automatic or mutual aid agreements with its neighboring agencies, the nearest mutual aid resource is the Navy NW Region fire station on Indian Island, which may or may not be available to respond when requested. Port Ludlow, Quilcene, and Brinnon are the only other reasonably close mutual aid resources, and those resources are approximately 15–35 minutes travel time to the center of the District and significantly longer to the City of Port Townsend.

As described in detail in Section 2.7.6 and summarized in the following table, call processing performance is *significantly slower* than the recommended 1:30-minute best practice goal. First-unit travel time performance over the four-year study period was also *more than double* the 4:00-minute best practice goal for the City of Port Townsend. On a District-wide basis, however, first-due travel performance was only 17 percent slower than Citygate's recommended 8:00-minute best practice goal for rural areas. Crew turnout performance, at 2:32 minutes, was only slightly slower that Citygate's recommended 2:00-minute goal, and crew awareness and accountability can likely bring that into conformance with the goal. ERF call-to-arrival performance was 19 percent slower than the recommended 19:30-minute goal for rural areas, and it should be noted that there were only four incidents over the four-year study period where all ERF resources arrived at the incident within outlier criteria, and all four were in Station 11's response area. It should also be noted that a high percentage of incident records had invalid or questionable CAD timestamps, making these performance calculations suspect. Citygate recommends the District collaborate with Jefferson County Communications Center management to identify factors causing invalid and questionable timestamps and (suspected) poor call processing performance and identify solution(s) to bring call processing performance into closer alignment with recognized industry best practices.

Table 25—90th Percentile Response Performance Summary (2018–2021)

Response Component	Response Zone	Best Practice			90th Percentile Performance	Difference from Best Practice
		Time	Percent Reliability	Reference		
Call Processing / Dispatch	All	**1:30**	90%	Citygate	**2:54**	**93%**
Crew Turnout	All	**2:00**	90%	Citygate	**2:32**	**27%**
First-Unit Travel	Port Townsend	**4:00**	90%	Citygate NFPA	**8:49**	**120%**
	District-Wide	**8:00**	90%	Citygate	**9:23**	**17%**
First-Unit Call to Arrival	Port Townsend	**7:30**	90%	Citygate	**10:41**	**42%**
	District-Wide	**11:30**	90%	Citygate	**11:28**	**0%**
ERF Call to Arrival	Port Townsend	**11:30**	90%	Citygate	**N/A**	**N/A**
	District-Wide	**19:30**	90%	Citygate	**23:14**	**19%**

In terms of emergency incident workload, no single fire station or response resource, is approaching workload saturation. Medic 17's interfacility transfer workload, however, exceeded the 30 percent threshold over 11 hours of each day in 2021.

Citygate finds that the District's current six station locations should provide 4:00-minute first-due travel time coverage to slightly more than half of the District's public road miles with automatic aid, and that increases to 68 percent of total public road miles at 5:00 minutes travel time. Travel time coverage from just the three staffed stations with automatic aid ranges from 49 percent at 5:00 minutes travel, including only about half of the City of Port Townsend, to 77 percent at 8:00 minutes travel including all of Port Townsend. A 5:00-minute urban/suburban travel time goal from Station 16 with 8:00-minute rural travel time goal from the other five stations should cover 85 percent of the District's public road miles including nearly all of the City of Port Townsend, which is very good rural-level coverage.

Interfacility transfer activity occurs at all hours of the day—with peak activity occurring from about 10:00 am through 9:00 pm—and increased approximately 16 percent from 2020 to 2021. Simultaneous interfacility transfer requests occur 5.6 percent of the time, primarily impacting Aid 16, but also impacting the other medic and aid units at the three staffed stations. Simultaneous interfacility transfers increased significantly in 2021 from the previous year.

2.8.1 Facilities Review

As part of this study, Citygate was tasked to provide a macro-level review of the District's six stations, rental residence behind Station 16, and 10-acre unimproved parcel at the Jefferson County International Airport for future District use.

- **Station 11** – 9193 Rhody Drive, Chimacum

  Located adjacent to Highway 19 and Center Road, Station 11 was constructed in 2012 on a 1.46-acre parcel owned by the District and is the newest fire station facility. The station has three back-in, double-deep apparatus bays and living/sleeping facilities for five personnel. The facility is in good condition, with no room for expansion, and is suitably located to serve the southern section of the District with very good access to primary response routes. It is within 4:00 minutes travel time to the higher population density areas of Port Hadlock-Irondale.

- **Station 12** – 6633 Flagler Road, Nordland

  Located on a 1.06-acre parcel owned by the District on the west side of Highway 116 on Marrowstone Island, Station 12 a volunteer station with two two-bay garages. A separate modular building is planned to house up to three on-duty personnel. The station is well-located along the primary travel route in the southern third of the island to serve the rural population density there and to provide access to the rest of the District via the Highway 116 bridge over the Port Townsend ship canal.

- **Station 13** – 50 Airport Road, Port Townsend

  Located on the northwest quadrant of Highway 19/Airport Cutoff Road and Airport Road at the Jefferson County International Airport, Station 13 is a three-bay apparatus building with no living, sleeping, or bathroom facilities leased from the Port of Port Townsend. The site currently has no sewer/septic system and is only used to store apparatus.

- **Station 14** – 3850 Cape George Road, Port Townsend

  Located on a .93-acre parcel at the northwest corner of Cape George Road and Goss Road in Cape George Colony, Station 14 is a three-bay facility with a large meeting room, commercial kitchen, and small office leased from the Cape George Colony Club. The facility is used to house one engine, an antique fire truck, and ARES RACES and amateur ham radio network equipment, and has room to add crew living and sleeping facilities with major improvements. The facility is suitably located to serve the Cape George and Beckett Point area of the District; however, it is remotely located for ERF responses to the remainder of the District at 4.2 miles and 7 minutes travel time to Highway 20, the nearest primary response route.

- **Station 15** – 35 Critter Lane, Port Townsend

  Constructed in 1998 on a 5.99-acre parcel owned by the District and adjacent to the Jefferson County Solid Waste Facility, Station 15 was remodeled in 2005 to include

living/sleeping accommodations for seven personnel and three double-deep drive through apparatus bays. The facility also houses the District's three-story training tower and burn box. The station has only partial air conditioning (one-half of building), and some equipment and training props are unable to be stored indoors or covered to protect them from the elements. The station needs major roof and gutter repairs, and heating/cooling upgrades. The station is reasonably well located to serve the higher-population density areas of west of the City of Port Townsend and is within one mile of Highway 20 for ERF responses to other areas of the District.

- **Station 16** – 701 Harrison Street, Port Townsend

  Located on a .25-acre parcel owned by the District on the northwest corner of Lawrence Street and Harrison Street and five blocks northwest of the Port Townsend Ferry Terminal, Station 16 is a two-story facility with living/sleeping facilities for five personnel and four large apparatus bays. According to District staff, the facility has been plagued with plumbing and structural issues since it was constructed in 2005. In addition, water leaks into the building's south side, the apparatus bay doors need constant maintenance/repair, and portions of the heating/cooling system need replacement. Due to the small parcel size, there is no room for expansion. The station is poorly located to serve the City of Port Townsend, with more than half of the City's street segments beyond 4:00-minute urban/suburban best practice travel time coverage as shown in Map #3 (**Volume 2—Map Atlas**). The station is also poorly located for 8:00-minute ERF travel time coverage outside the City.

- **District Administration** – 24 Seton Road, Port Townsend

  The District leases an approximately 5,000 square-foot administrative office building on the southeast corner of Highway 20 and Seton Road south of the City of Port Townsend. The building includes office space for the Fire Chief, two Assistant Chiefs, three Battalion Chiefs, and three administrative staff. The building also has a meeting/training room that can serve as an Alternate Emergency Operations Center. The facility is in good condition and suitably located for its purpose; however, it lacks sufficient space for current and future functional needs.

- **Single-family residence** – 735 Harrison Street, Port Townsend

  The District also owns a single-family residence on a .12-acre parcel adjacent to Station 16 that is currently a rental unit. With required setbacks, the parcel is likely too small to accommodate any significant expansion of the building.

- **Unimproved parcels** – Highway 19/Airport Cutoff Road at Prospect Avenue

  The District owns an 8.25-acre unimproved parcel and an adjacent 6.86-acre unimproved parcel on the south side of the Jefferson County International Airport with access to Highway 19/Airport Cutoff Road at Prospect Avenue. These parcels were acquired with a concept vision as a future District Headquarters and fire station. The site is suitably sized to accommodate both a District Administrative Headquarters and fire station, and potentially also the District's training facility. The site provides very good access to Highway 19 as a primary response route, and fair access to Highway 20. According to District staff, a new road connecting the two highways in that vicinity has been discussed, which would make this location even more desirable as a fire station location.

Facilities Findings and Recommendations

From this review, Citygate offers the following recommendations for the District's consideration in its short-term and long-term capital planning:

Recommendation #3:	Initiate planning as soon as possible to construct a temporary Fire Station 13 facility at the District's Jefferson County International Airport (Highway 19 / Prospect Avenue) site as soon as funding can be secured pursuant to the deployment recommendations in the following section.
Recommendation #4:	Develop a plan to improve the Jefferson County International Airport site to include a permanent fire station, District administrative offices, and other facilities as deemed appropriate by District staff and the Board of Commissioners.
Recommendation #5:	Consider maintaining the District's training facilities at Station 15.
Recommendation #6:	Consider a fleet maintenance facility at the Station 15 site.
Recommendation #7:	Consider selling the residence adjacent to Station 16 to generate revenue for other capital projects.

Recommendation #8:	Consider seeking a suitable parcel for permanent Station 14 in the general vicinity of Cape George Road and Hastings Avenue West.
Recommendation #9:	Assuming Station 16 cannot be relocated at some future point to a more suitable location closer to the center of the City, consider seeking rights to a more suitable future location for Station 15 to provide improved first-unit and ERF travel time coverage to the western half of the City of Port Townsend.
Recommendation #10:	Consider relocating the District's administrative offices to the Jefferson County International Airport site.

2.8.2 Deployment Summary

Given the values to be protected and the risks and demographics identified in **Appendix A**, in combination with the 68-square-mile service area, challenging road network, increasing service demand, projected population growth, increasing simultaneous incident rate, and travel distance/time for auto/mutual aid resources, Citygate recommends that the District consider providing additional daily on-duty staffing in the following suggested progressive order as funding is available to (1) improve first-unit *speed of response* capacity and ERF *weight of response* capacity, (2) improve first-unit and ERF travel time coverage and related overall customer service, and (3) reduce reliance on mutual aid resources:

1. Two-person EMS unit/engine at Station 13 staffed during peak demand hours. At the District's discretion, staffing could be any combination of volunteer, part-time, or full-time personnel.
2. Two-person EMS unit/engine at Station 14 staffed during peak demand hours. At the District's discretion, staffing could be any combination of volunteer, part-time, or full-time personnel.
3. Two-person EMS unit/engine at Station 12 staffed during peak demand hours. At the District's discretion, staffing could be any combination of volunteer, part-time, or full-time personnel.
4. 24-hour two-person staffing at Station 13.
5. 24-hour two-person staffing at Station 14.
6. 24-hour two-person staffing at Station 12.

7. Three-person staffing on Engine 16.
8. Three-person staffing on Engine 15.
9. Three-person staffing on Engine 11.
10. Three-person staffing at all six stations.

In addition, given the size and diversity of its service area, Citygate recommends that the District adopt differential response performance goals for the City of Port Townsend and the unincorporated rural areas of the District to drive future deployment planning and monitoring of response performance.

Deployment Findings and Recommendations

Citygate's evaluation of the District's current deployment and staffing yields the following findings and recommendations.

Finding #12: Overall service demand increased 6 percent over the four-year study period from January 2018 through December 2021, with EMS demand increasing 8 percent over the same period including a 17 percent increase from 2020 to 2021.

Finding #13: 61 percent of all calls for service were within the City of Port Townsend.

Finding #14: Approximately 18 percent of total service demand occurs in the unstaffed stations' response areas with peak activity occurring from approximately 8:00 am through 5:00 pm, and Station 13 having the highest service demand of the three unstaffed stations.

Finding #15: The District's population is projected to grow by approximately 35 percent over the next 16 years to 30,000 people by 2038, which will further increase service demand, particularly for EMS-related incidents.

Finding #16: The District's daily staffing level of nine personnel on duty at three of the six fire stations is *insufficient* to provide either (1) equitable first-unit *speed of response* to all areas of the District for routine to moderate emergencies or (2) the minimum recommended multiple-unit *weight of response* needed for more serious emergencies. Additionally, it leaves no resources available for a concurrent incident.

Finding #17: The District's mutual aid partners (except for Navy NW Region on Indian Island) are at least 15:00 to 35:00 minutes travel time to the center of the District and significantly longer to the City of Port Townsend.

Finding #18: District-wide ERF call-to-arrival performance is 3:44 minutes (19 percent) *slower* than the 19:30-minute recommended best practice goal for *rural* areas. There were no ERF incidents in the City of Port Townsend over the four-year study period where the recommended best practice ERF call-to-arrival goal is 11:30 minutes (urban/suburban density).

Finding #19: A 5:00-minute urban/suburban travel time goal for Station 16 with an 8:00-minute rural travel time goal for the other five stations should cover 85 percent of the District's public road miles including nearly all of the City of Port Townsend, which is very good rural-level coverage.

Finding #20: Interfacility transfers increased approximately 16 percent from 2020 to 2021.

Recommendation #11: **Adopt Deployment Goals/Policies**: The District should adopt complete response performance measures to aid deployment planning and monitor performance. Differential goals should be established for urban/suburban and rural areas. The measures of time should be designed to deliver outcomes that will prevent permanent impairment or death from serious medical events where possible and keep small and expanding fires from becoming more serious. With this is mind, Citygate recommends the following response performance goals:

11.1 **Fire Station Distribution**: To treat pre-hospital medical emergencies and control small fires, the first-due unit should arrive within 8:30 minutes within the City of Port Townsend and within 11:30 minutes in the rural District areas 90 percent of the time from receipt of the 9-1-1 call at the Jefferson County Dispatch Center. This equates to a 90-second dispatch time, 2:00-minute crew turnout time, and 5:00-minute travel time (City of Port Townsend) or 8:00-minute travel time (rural response areas).

11.2 **Fire Station Concentration – Multiple-Unit Effective Response Force (ERF) for Serious Emergencies**: To confine building fires near the room or compartment of origin, keep vegetation fires under five acres in size, and treat multiple medical patients at a single incident, a multiple-unit ERF of at least 13 personnel, including at least one chief officer, should arrive within 11:30 minutes in the City of Port Townsend from the time of 9-1-1 call receipt at the Jefferson County Dispatch Center 90 percent of the time. This equates to 90-second dispatch time, 2:00-minute crew turnout time, and 8:00-minute travel time. The same ERF should arrive within 19:30 minutes in the rural, unincorporated areas of the District from the time of 9-1-1 call receipt at the Jefferson County 9-1-1 Dispatch Center 90 percent of the time. This equates to 90-second dispatch time, 2:00-minute crew turnout time, and 16:00-minute travel time.

11.3 **Hazardous Materials Incidents**: To protect the District's service area from the hazards associated with uncontrolled release of hazardous or toxic materials, the first-due unit should arrive to assess the situation, isolate and deny entry, and determine the need for a Hazardous Materials Response Team within 8:30 minutes within the City of Port Townsend and within 11:30 minutes in the rural, unincorporated areas of the District 90 percent of the time from receipt of the 9-1-1 call at the Jefferson County Dispatch Center. This equates to a 90-second dispatch time, 2:00-minute crew turnout time, and 5:00-minute travel time (City of Port Townsend) or 8:00-minute travel time (rural response areas).

11.4 **Technical Rescue Incidents**: To provide technical rescue services as needed, the first-due unit should arrive to evaluate the situation and initiate rescue actions within 8:30 minutes within the City of Port Townsend and within 11:30 minutes in the rural District response areas 90 percent of the time from the receipt of the 9-1-1 call at the Jefferson County Dispatch Center. This equates to a 90-second dispatch time, 2:00-minute crew turnout time, and 5:00-minute travel time (City of Port Townsend) or 8:00-minute travel time (rural response areas).

Additional resources, as needed, should arrive within 11:30 minutes within the City of Port Townsend, and within 19:30 minutes in the rural District areas to facilitate safe rescue/extrication and delivery of the victim to the appropriate emergency medical care facility.

Recommendation #12: As funding allows, the District should consider additional daily staffing to improve first-due, ERF, and simultaneous incident capacity.

Recommendation #13: The District should initiate planning to develop its Jefferson County International Airport site to prospectively include a fire station, administrative offices, a training facility, and/or other uses as determined appropriate by District staff and Commissioners.

2.8.3 Fire Station Siting Considerations

Over more than two decades conducting deployment studies for agencies and jurisdictions of all sizes, Citygate has developed the following four guidelines for consideration in siting fire stations:

1. Serve the most people in the shortest travel time possible.
2. Provide a 360-degree service area within the station's desired first-due travel time goal.
3. Avoid political, natural, or human-built barriers within the first-due travel time goal.
4. Provide immediate or at least rapid access to the primary response travel routes in all cardinal directions.

APPENDIX A—COMMUNITY RISK ASSESSMENT

A.1 COMMUNITY RISK ASSESSMENT

SOC ELEMENT 3 OF 8
COMMUNITY RISK ASSESSMENT

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

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

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

A.1.1 Risk Assessment Methodology

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

- Identification of geographic planning sub-zones (risk zones) appropriate to the community or jurisdiction.
- Identification and quantification, to the extent data is available, of the specific values at risk to various hazards within the community or service area.
- Identification of the fire and non-fire hazards to be evaluated.
- Determination of the probability of occurrence for each identified hazard.
- Determination of *probable* impact severity of a hazard occurrence by planning zone.
- Determination of overall risk by hazard using the following template.

Table A26—Overall Risk Categories

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

Citygate used the following data sources for this study to understand the hazards and values to be protected in the East Jefferson Fire-Rescue District (District):

- U. S. Census Bureau population and demographic data
- City and County General Plan and Zoning information
- City and County Geographical Information Systems (GIS) data
- Jefferson County September 2016 All Hazard Mitigation Plan (AHMP)
- Jefferson County Comprehensive Emergency Management Plan
- District data and information

A.1.2 Risk Assessment Summary

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

1. The District serves a diverse urban/suburban/rural population with densities ranging from fewer than 100 to more than 2,500 people per square mile over a varied land use pattern.
2. The District's population is projected to increase approximately 35 percent to 30,000 people over the next 16 years to 2038.
3. The service area includes both residential and non-residential buildings to protect.
4. The District has economic and other resource values to be protected as identified in this assessment.
5. Jefferson County has a mass emergency notification system to alert the public of disaster or emergency information in a timely manner.

6. The District's overall risk for six hazards related to services provided ranges from **Low** to **High**, as summarized in the following table.

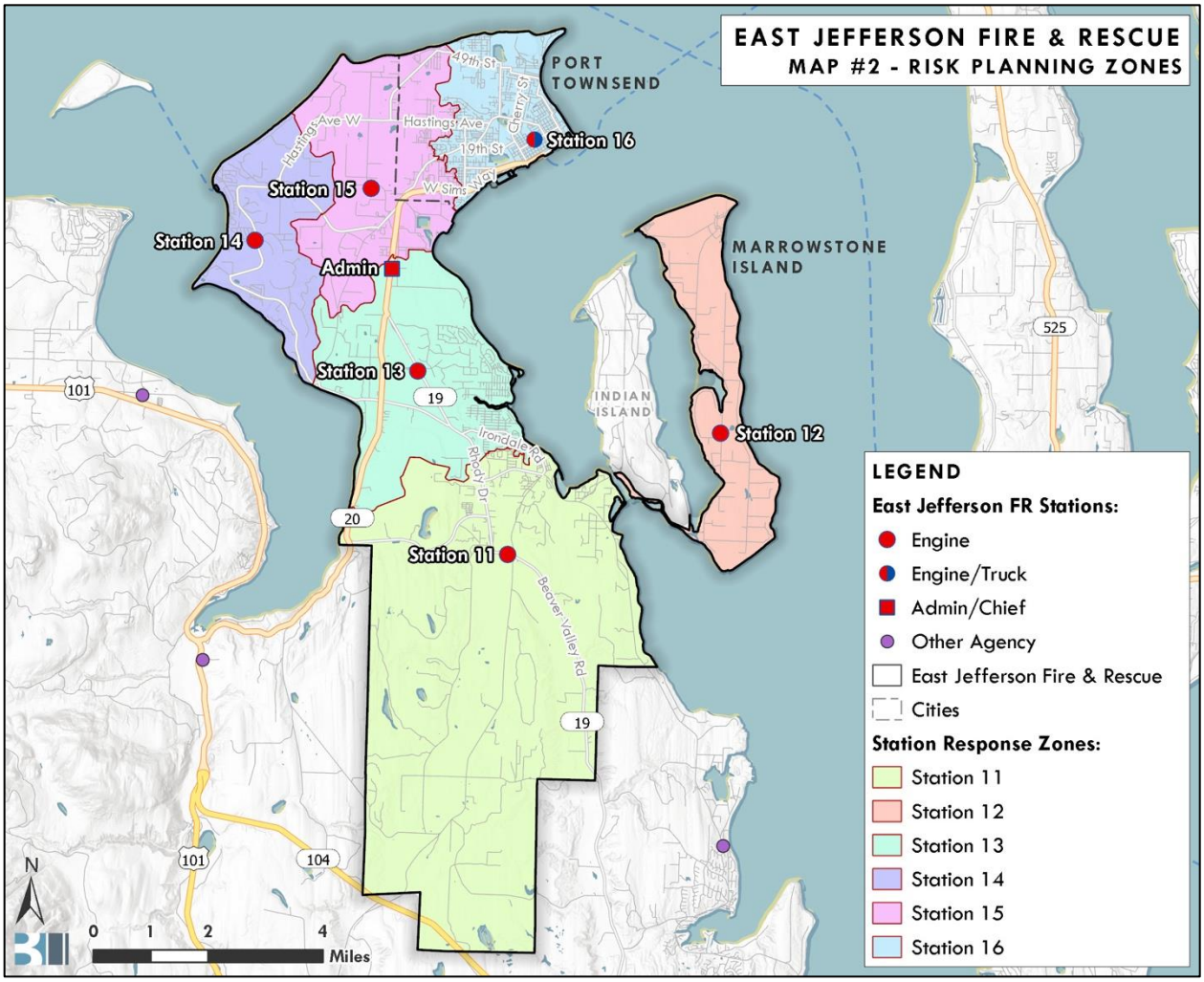
Table A27—Overall Risk by Hazard

Hazard	Planning Zone					
	Station 11	Station 12	Station 13	Station 14	Station 15	Station 16
Building Fire	*Moderate*	*Moderate*	*Moderate*	*Moderate*	*Moderate*	*High*
Vegetation/Wildfire	*Moderate*	*Moderate*	*Moderate*	*Moderate*	*Moderate*	*Moderate*
Medical Emergency	*High*	*High*	*High*	*High*	*High*	*High*
Hazardous Materials	*Moderate*	*Low*	*Moderate*	*Low*	*Moderate*	*Moderate*
Technical Rescue	*Moderate*	*Moderate*	*Moderate*	*Moderate*	*Moderate*	*Moderate*
Marine Incident	*Moderate*	*Moderate*	*Moderate*	*Moderate*	*Moderate*	*Moderate*

A.1.3 Planning Zones

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

Figure A15—Risk Planning Zones



A.1.4 Values at Risk to Be Protected

Values at risk, broadly defined, are tangibles of significant importance or value to the community or jurisdiction potentially at risk of harm or damage from a hazard occurrence. Values at risk typically include people, critical facilities/infrastructure, buildings, and key economic, cultural, historic, or natural resources.

People

Residents, employees, visitors, and travelers in a community or jurisdiction are vulnerable to harm from a hazard occurrence. Particularly vulnerable are specific at-risk populations, including those unable to care for themselves or self-evacuate in the event of an emergency. At-risk populations typically include children younger than 10 years of age, the elderly, and people housed in

institutional settings. The following table summarizes key demographic data for the District's service area.

Table A28—Key Demographic Data – District Service Area

Demographic	2021
Population	**22,215**
Under 10 years	6.90%
10–14 years	4.30%
15–64 years	55.60%
65–74 years	20.50%
75 years and older	12.60%
Median age	56.9
Daytime population	22,555
Housing Units	**12,563**
Owner-Occupied	62.70%
Renter-Occupied	22.80%
Vacant	14.50%
Average Household Size	2.05
Median Home Value	$373,153
Ethnicity	
Caucasian	90.20%
Hispanic/Latino (counted as Caucasian)	4.80%
Asian	2.40%
Black / African American	1.09%
Other	6.31%
Diversity Index	26.00%
Education (Population over 24 Years of Age)	**18,120**
High School Graduate	96.20%
Undergraduate Degree	51.20%
Graduate/Professional Degree	24.40%
Employment (Population over 15 Years of Age)	**9,621**
In Labor Force	95.60%
Unemployed	4.40%
Median Household Income	$58,629
Population below Poverty Level	14.20%
Population without Health Insurance Coverage	4.10%

Source: Esri Community Analyst (2021) and U.S. Census Bureau

Of note from the previous table is:

- 40 percent of the population is under 10 years or over 65 years of age.
- The District's population is predominantly Caucasian (90 percent), followed by Hispanic/Latino (5 percent and counted as Caucasian), other ethnicities (6 percent), Asian (2 percent), and Black / African American (1 percent).
- Of the population over 24 years of age, more than 96 percent has completed high school or equivalency.
- Of the population over 24 years of age, 51 percent has an undergraduate degree, while 24 percent has a graduate or professional degree.
- More than 96 percent of the population 15 years of age or older is in the workforce; of those, 4 percent are unemployed.
- Median household income is nearly $59,000.
- 14 percent of the service area population is below the federal poverty level.
- Only 4.1 percent of the service area population does not have health insurance coverage.

The Jefferson County Board of Commissioners has adopted regional growth projections based on the recommendations of the Joint Growth Management Steering Committee (JGMSC) that project the Port Townsend Urban Growth Area population will increase by an estimated 1.13 percent annually to 2038, and the Port Hadlock/Irondale Urban Growth Area will increase an estimated 1.48 percent over the same period.[14] Applying these growth rates to the 2020 District population results in a projected 2038 District population of approximately 30,000, or an average District-wide annualized growth rate of approximately 2.2 percent.

Buildings

The District's service area includes just over 12,500 housing units, as well as more than 1,200 businesses, including office, professional services, retail sales, restaurants/bars, motels, churches, schools, government facilities, healthcare facilities, and other business types.[15]

Building Occupancy Risk Categories

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

[14] Source: Jefferson County Board of Commissioners Resolution Number 38-15 (October 26, 2015).
[15] Source: ESRI Community Analyst, Community Profile (2020) and Business Summary (2020).

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

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

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

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

The District identified 29 high- or maximum-risk building uses as they relate to the CFAI building fire risk categories, as summarized in the following table.

Table A29—Building Occupancy Inventory by Risk Category

Building Occupancy Classification		Number[1]	Risk Category[2]
A-1	Assembly	1	***High***
H	Hazardous	7	***Maximum***
R-1	Hotel/Motel	10	***High***
R-2	Multi-Family Residential	7	***High***
R-2.1	Residential Care	4	***High***
	Total	**29**	

[1] Source: East Jefferson Fire-Rescue
[2] CFAI *Standards of Cover* (Fifth Edition)

Critical Facilities

The U.S. Department of Homeland Security defines critical infrastructure and key resources as those physical assets essential to the public health and safety, economic vitality, and resilience of a community, such as lifeline utilities infrastructure, telecommunications infrastructure, essential government services facilities, public safety facilities, schools, hospitals, airports, etc. The District has identified 16 critical facilities, as shown in the following table and Map #2b (**Volume 2—Map**

Atlas). A hazard occurrence with significant impact severity affecting one or more of these facilities would likely adversely impact critical public or community services.

Table A30—Critical Facilities

Critical Facility Category	Number of Facilities
Government Services	1
Healthcare	1
Infrastructure	1
Military	1
Public Safety	9
Transportation	2
Utility	1
Total	**16**

Source: East Jefferson Fire-Rescue

Economic Resources

The City of Port Townsend's Historic District and waterfront retail district are popular tourist attractions. In addition to tourism, key economic drivers include the Port Townsend Paper Mill, Jefferson Healthcare, maritime trades, manufacturing, and timber.

Natural Resources

Natural resources within the District's service area include:

- Straight of San Juan de Fuca
- Discovery Bay
- Anderson Lake
- Fort Townsend Historical State Park
- Kinney Point State Park
- Mystery Bay State Park
- Fort Flagler Historical State Park
- Gibbs Lake County Park
- Fort Worden Historical State Park

- North Beach County Park
- Kah Tai Lagoon Nature Park
- County Parks

Cultural/Historic Resources

Cultural and historical resources within the District include:

- Puget Sound Coast Artillery Museum
- Point Wilson Lighthouse
- Jefferson Museum of Art and History
- Rothschild House Museum
- Port Townsend Aero Museum

A.1.5 Hazard Identification

Citygate utilizes prior risk studies where available, fire and non-fire hazards as identified by the CFAI, and agency/jurisdiction-specific data and information to identify the hazards to be evaluated for this study. The Jefferson County AHMP identifies and addresses the following 26 hazards:[16]

- Natural hazards
  - Avalanche
  - Damaging winds
  - Drought
  - Earthquake
  - Flood
  - Heat wave
  - Landslides
  - Public health emergency
  - Tornado
  - Tsunami/seiche

[16] Source: 2016 Jefferson County All Hazard Mitigation Plan, Section II.

- Volcanic event / ash fall
- Wildfire / forest / urban interface fires
- Winter storms

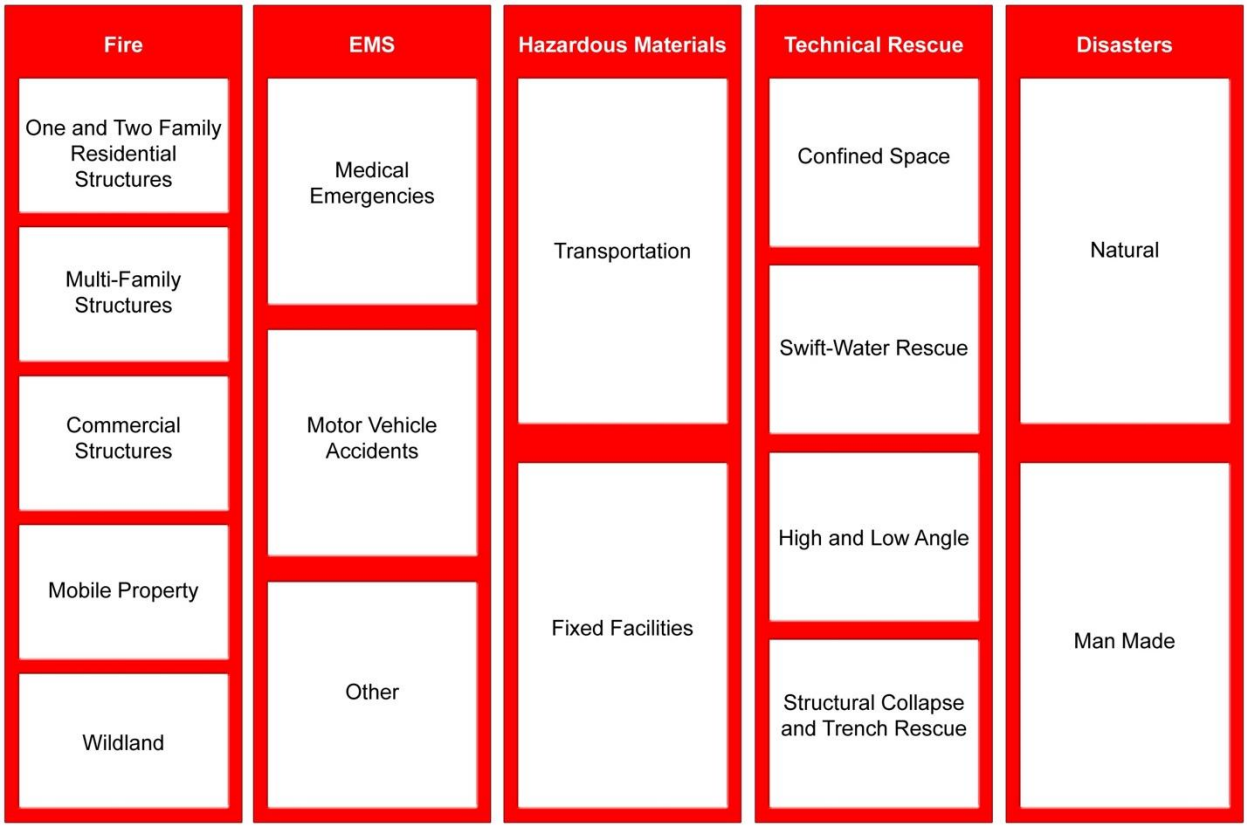
◆ Man-made hazards

- Aircraft mishap
- Bankruptcy
- Civil disturbance
- Dam failure
- Hazardous materials incident
- Major fire activity
- Major law enforcement activity
- Marine oil spill
- Maritime emergency
- Military ordinance incident
- Power outage
- Terrorism
- Water shortage / sewer failure

Although the District has no legal authority or responsibility to mitigate any of these hazards other than wildfire and hazardous material incidents, it does provide services related to other hazards, including fire suppression, emergency medical services, technical rescue, and hazardous materials response.

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

Figure A16—Commission on Fire Accreditation International Hazard Categories



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

Pursuant to review and evaluation of the hazards identified in the Jefferson County AHMP and the fire and non-fire hazards as identified by the CFAI as they relate to services provided by the District, Citygate evaluated the following six hazards for this risk assessment:

1. Building fire
2. Vegetation/wildfire
3. Medical emergency
4. Hazardous material release/spill
5. Technical rescue
6. Marine incident

A.1.6 Service Capacity

Service capacity refers to the District's available response force; the size, types, and condition of its response fleet and any specialized equipment; core and specialized performance capabilities

and competencies; resource distribution and concentration; availability of automatic or mutual aid; and any other agency-specific factors influencing its ability to meet current and prospective future service demand relative to the risks to be protected.

The District's service capacity for fire and non-fire risk consists of 11 personnel on duty daily staffing three engines and two ambulances (one is a single-role interfacility transfer ambulance by agreement with Jefferson Healthcare) and one chief officer, operating from three of the District's six fire stations. On-duty staffing is augmented by resident volunteer firefighters working scheduled shifts at one of the three staffed stations. The other three stations are staffed by volunteers responding from home or work as available when paged for an incident.

The District provides services with six Type-1 structural engines, two wildland engines, one aerial ladder truck, three water tenders, one air support unit, three Advanced Life Support (ALS) ambulances (one is single-role used for interfacility transfers only), four Basic Life Support (BLS) ambulances, and two boats.

All response personnel are trained to either the Emergency Medical Technician (EMT) level, capable of providing BLS pre-hospital emergency medical care, or EMT-Paramedic (Paramedic) level, capable of providing ALS pre-hospital emergency medical care. The District provides BLS/ALS ground ambulance transportation services, and at least three EMT-Paramedics are on duty daily. When needed, air ambulance services are provided by the U.S. Coast Guard, U.S. Navy, Airlift Northwest from Arlington, Seattle, or Bellingham; or by LifeFlight from Coupeville or Port Angeles. Emergency Room services are available at Jefferson Healthcare Medical Center in Port Townsend. Harborview Medical Center (Seattle) and St. Michael Medical Center (Silverdale) are the nearest trauma centers.

Response personnel are also trained to the US Department of Transportation Hazardous Material First Responder Operational level to provide initial hazardous material incident assessment, hazard isolation, and support for a hazardous material response team. Hazardous material emergency response is available from Navy Region Northwest at Naval Base Kitsap.

All response personnel are further trained to the Confined Space Awareness and Technical Rescue Operational level, including structural collapse. District response resources include technical rescue equipment, and eight personnel are further trained to the Technician level and are also members of the Washington State Region 2 Response Team.

A.1.7 Probability of Occurrence

Probability of occurrence refers to the probability of a future hazard occurrence during a specific period. Because the CFAI agency accreditation process requires annual review of an agency's risk assessment and baseline performance measures, Citygate recommends using the 12 months following completion of an SOC study as an appropriate period for the probability of occurrence

evaluation. The following table describes the five probability of occurrence categories and related characteristics used for this analysis.

Table A31—Probability of Occurrence

Probability	General Characteristics	Expected Frequency of Occurrence
Rare	• Hazard ***may occur*** under unusual conditions.	> 10 years
Unlikely	• Hazard ***could occur*** infrequently. • No recorded or anecdotal evidence of occurrence. • Little opportunity, reason, or means for hazard to occur.	2–10 years
Possible	• Hazard ***should occur*** occasionally. • Infrequent, random recorded or anecdotal evidence of occurrence. • Some opportunity, reason, or means for hazard to occur.	1–23 months
Probable	• Hazard will ***probably occur*** regularly. • Regular recorded or strong anecdotal evidence of occurrence. • Considerable opportunity, reason, or means for hazard to occur.	1–4 weeks
Frequent	• Hazard is ***expected to occur*** frequently. • High level of recorded or anecdotal evidence of regular occurrence. • Strong opportunity, reason, or means for hazard to occur. • Frequent hazard recurrence.	Daily to weekly

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

A.1.8 Impact Severity

Impact severity refers to the extent a hazard occurrence impacts people, buildings, lifeline services, the environment, and the community as a whole. The following table describes the five impact severity categories and related general criteria used for this analysis.

Table A32—Impact Severity

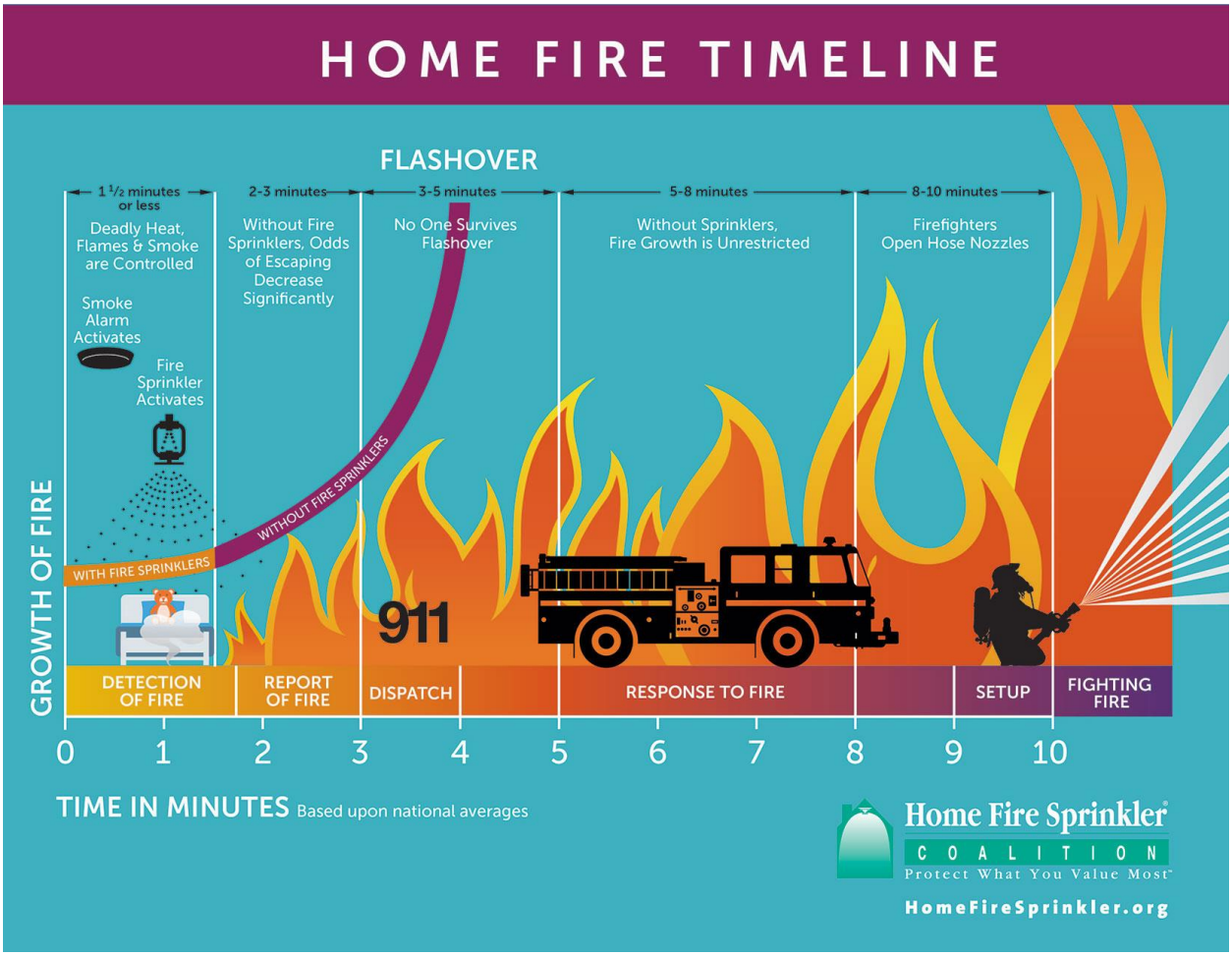
Impact Category	Characteristics
Insignificant	• No injuries or fatalities • Few to no persons displaced for short duration • Little or no personal support required • Inconsequential to no damage • Minimal to no community disruption • No measurable environmental impacts • Minimal to no financial loss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

A.1.9 Building Fire Risk

One of the primary hazards in any community is building fire. Building fire risk factors include building size, age, construction type, density, occupancy, number of stories above ground level, required fire flow, proximity to other buildings, built-in fire protection/alarm systems, available fire suppression water supply, building fire service capacity, fire suppression resource deployment (distribution/concentration), staffing, and response time. Citygate used available data from the District and the US Census Bureau in determining building fire risk.

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

Figure A17—Building Fire Progression Timeline



Source: http://www.firesprinklerassoc.org

Population Density

Population density within the service area ranges from fewer than 100 to more than 2,500 people per square mile as shown in Map #2a (**Volume 2—Map Atlas)**. Although risk analysis across a wide spectrum of other Citygate clients shows no direct correlation between population density and building fire *occurrence*, it is reasonable to conclude that building fire *risk* relative to potential impact on human life is greater as population density increases, particularly in areas with high density, multiple-story buildings.

Water Supply

A reliable public water system providing adequate volume, pressure, and flow duration near all buildings is a critical factor in mitigating the potential impact severity of a community's building fire risk. Potable water within the District's service area is provided by the City of Port Townsend within the City and by Jefferson County Public Utilities District and private water systems for the remainder of the service area.

District staff was not aware of any areas of the City of Port Townsend with inadequate fire flow; however, most of the service area outside the City has no hydrants at all, or where there are hydrants, they tend to have very low flow rates and pressure. The District mitigates this deficiency by including water tender(s) on fire responses in these areas.

Building Fire Service Demand

Over the four-year study period from January 1, 2018, through December 31, 2021, the District responded to 159 building fire incidents, comprising 0.88 percent of total service demand over the same period, as summarized in the following table.

Table A33—Building Fire Service Demand

Hazard	Year	Planning Zone							Total	Percent of Total Annual Demand
		Station 11	Station 12	Station 13	Station 14	Station 15	Station 16	Other		
Building Fire	**2018**	11	1	8	3	12	18	5	**58**	1.28%
	2019	11	0	4	0	12	14	7	**48**	1.06%
	2020	3	1	2	2	6	5	3	**22**	0.52%
	2021	8	0	3	0	7	5	8	**31**	0.65%
	Total	**33**	**2**	**17**	**5**	**37**	**42**	**23**	**159**	**0.88%**
Percent of Total Station Demand		1.29%	0.41%	0.87%	0.63%	1.28%	0.48%	3.18%		

As the table illustrates, building fire service demand varied across the six planning zones, with the most incidents occurring in Station 16's response zone and the fewest in Station 12's response zone.

Building Fire Risk Assessment

The following table summarizes Citygate's assessment of the District's building fire risk by planning zone.

Table A34—Building Fire Risk Assessment

Building Fire Risk	Planning Zone					
	Station 11	Station 12	Station 13	Station 14	Station 15	Station 16
Probability of Occurrence	*Probable*	*Possible*	*Possible*	*Possible*	*Probable*	*Probable*
Probable Impact Severity	*Moderate*	*Moderate*	*Moderate*	*Moderate*	*Moderate*	*Major*
Overall Risk	***Moderate***	***Moderate***	***Moderate***	***Moderate***	***Moderate***	***High***

A.1.10 Vegetation/Wildfire Risk

Most of the District is susceptible to a vegetation/wildfire. Vegetation/wildland fire risk factors include vegetative fuel types and configuration, weather, topography, prior fire history, water supply, mitigation measures, and wildfire service capacity.

Wildfire Risk Zones

As shown in the following map developed by a University of Washington student, the District lies within a low or moderate wildfire risk zone.

Figure A18—Western Washington Wildfire Risk Zones

Source: Identifying Wildfire Risk Areas in Western Washington State, Matthew Seto, University of Washington-Tacoma (2015)

The Washington Department of Natural Resources also designates Wildland–Urban Interface (WUI) areas of the state where urban or suburban development exists within a wildland vegetation environment prone to fire. These are the areas with at least 20 people per square mile with the most

potential for significant damage to life and property. The following figure shows WUI zones within the City of Port Townsend that contain at least one housing unit per 40 acres with vegetation occupying *less* than 50 percent of the area and the intermix WUI zones that contain at least one housing unit per 40 acres with vegetation occupying *more* than 50 percent of the area.

Figure A19—City of Port Townsend Wildland–Urban Interface Areas

Source: Jefferson County All Hazard Mitigation Plan, page 449

Vegetative Fuels

Vegetative fuel factors influencing fire intensity and spread include fuel type (vegetation species), height, arrangement, density, and moisture. In addition to decorative landscape species, vegetative fuels within the District's service area include both native and non-native annual and perennial plant species, including grasses, weeds, brush, and mostly deciduous and mixed hardwood and conifer tree species. Once ignited, vegetation fires can burn intensely and contribute to rapid fire spread under the right fuel, weather, and topographic conditions.

Weather

Weather elements, including temperature, relative humidity, wind, and lightning, also affect vegetation/wildfire potential and behavior. High temperatures and low relative humidity dry out vegetative fuels, creating a situation where fuels will more readily ignite and burn more intensely. Wind is the most significant weather factor influencing vegetation/wildfire behavior, with higher wind speeds increasing fire spread and intensity. Wildfire season, when vegetation/wildfires are most likely to occur due to fuel and weather conditions, occurs from approximately mid-May through October in Jefferson County. Occasional summer gradients produce higher daytime temperatures, lower relative humidity, and higher offshore winds that elevate the potential for a wildfire.

Topography

Vegetation/wildfires tend to burn more intensely and spread faster when burning uphill and up-canyon, except for a wind-driven downhill or down-canyon fire. The District's generally flat terrain, ranging from sea level to less than 500 feet elevation, minimally influences vegetation/wildfire behavior and spread.

Water Supply

Another significant vegetation/wildfire impact severity factor is water supply immediately available for fire suppression. As discussed in **Section A.1.9**, while available fire flow and pressure is adequate in the City of Port Townsend, it is less than adequate in other areas of the District, and there are many areas of the District without fire hydrants.

Wildfire History[17]

According to the National Fire Incident Reporting System, wildfires burn an average of five to 10 acres annually in Jefferson County. The occurrence of wildfires on the Olympic Peninsula is closely tied to climate and its impact on fire frequency and intensity. The most recent significant wildfire was the lightning-caused Chimney Peak Fire that burned more than 500 acres in 1981. As

[17] Source: Jefferson County All Hazard Mitigation Plan (2016), pages 259 et seq.

communities expand further into forested lands with a desire to maintain wilderness ambiance, WUI fires have become a significant hazard with the potential for significant property destruction and loss of life.

Vegetation/Wildland Fire Service Capacity

The District's vegetation/wildfire service capacity consists of 11 personnel on duty daily staffing three engines and two ambulances, and one chief officer, from three of the District's six fire stations. The other three stations are staffed by volunteers responding from home or work as available when paged for an incident. The District cross-staffs wildland engines as needed at Station 11 (Chimacum) and Station 15 (Port Townsend). The District also has three 2,500-gallon water tenders available from Stations 11, 13, and 15.

Vegetation/Wildland Fire Service Demand

Over the four-year study period, the District responded to 77 vegetation/wildland fires, comprising 0.43 percent of total service demand over the same period, as summarized in the following table.

Table A35—Vegetation/Wildfire Service Demand

Hazard	Year	Planning Zone							Total	Percent of Total Annual Demand
		Station 11	Station 12	Station 13	Station 14	Station 15	Station 16	Other		
Vegetation/Wildfire	2018	3	2	5	0	6	5	10	31	0.69%
	2019	2	0	2	0	2	3	6	15	0.33%
	2020	0	0	1	1	4	2	8	16	0.38%
	2021	3	0	0	1	4	4	3	15	0.31%
	Total	**8**	**2**	**8**	**2**	**16**	**14**	**27**	**77**	**0.43%**
Percent of Total Station Demand		0.31%	0.41%	0.41%	0.25%	0.55%	0.16%	3.73%		

The table shows that vegetation/wildfire service demand varied considerably across the six planning zones, with the most demand in Station 15's planning zone and the fewest in Station 12 and 14's planning zones.

Vegetation/Wildland Fire Risk Assessment

The following table summarizes Citygate's assessment of the District's vegetation/wildfire risk by planning zone.

Table A36—Vegetation/Wildfire Risk Assessment

Vegetation/Wildfire Risk	Planning Zone					
	Station 11	Station 12	Station 13	Station 14	Station 15	Station 16
Probability of Occurrence	*Possible*	*Possible*	*Possible*	*Possible*	*Possible*	*Possible*
Probable Impact Severity	*Moderate*	*Moderate*	*Moderate*	*Moderate*	*Moderate*	*Moderate*
Overall Risk	***Moderate***	***Moderate***	***Moderate***	***Moderate***	***Moderate***	***Moderate***

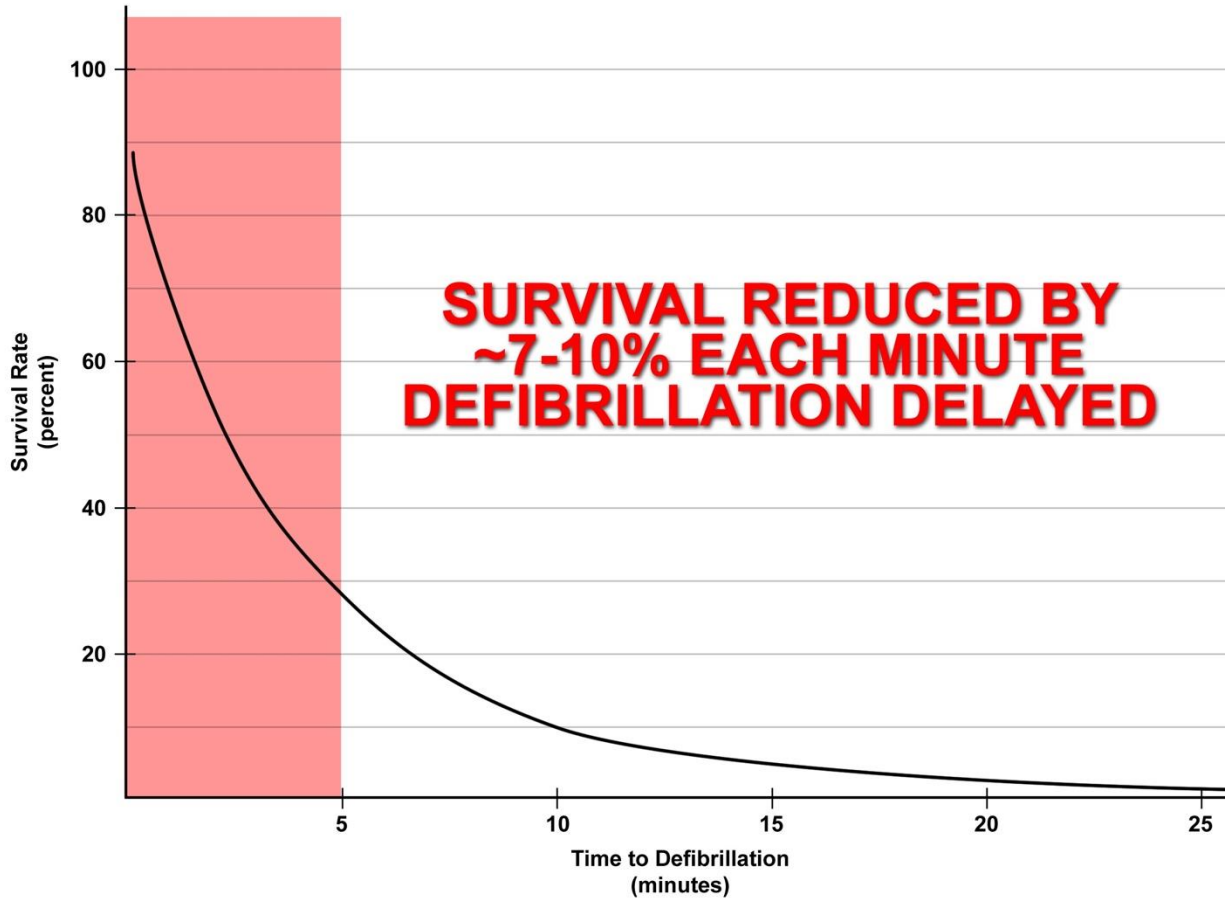
A.1.11 Medical Emergency Risk

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

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

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

Figure A20—Survival Rate versus Time to Defibrillation



Population Density

Population density within the District's service area ranges from fewer than 100 to more than 2,500 people per square mile, as shown in Map #2a (**Volume 2—Map Atlas**). Risk analysis across a wide spectrum of other Citygate clients shows a direct correlation between population density and the *occurrence* of medical emergencies, particularly in high urban population density zones.

Demographics

Medical emergency risk tends to be higher among older, poorer, less educated, and uninsured populations. As shown in Table A28, more than 33 percent of the District's population is 65 and older, nearly 4 percent of the population over 24 years of age has less than a high school education

or equivalent, more than 14 percent of the population is at or below poverty level, and slightly more than 4 percent of the population does not have health insurance coverage.[18]

Vehicle Traffic

Medical emergency risk tends to be higher in those areas of a community with high daily vehicle traffic volume, particularly those areas with high traffic volume traveling at high speeds. The District's transportation network includes State Routes 19, 20, 104, and 116, which carry an aggregate annual average daily traffic volume of more than 25,000 vehicles.[19]

Medical Emergency Service Demand

Medical emergency service demand over the four-year study period includes more than 13,000 calls for service, comprising nearly 74 percent of total service demand over the same period, as summarized in the following table.

Table A37—Medical Emergency Service Demand

Hazard	Year	Planning Zone							Total	Percent of Total Annual Demand
		Station 11	Station 12	Station 13	Station 14	Station 15	Station 16	Other		
Medical Emergency	**2018**	448	85	339	99	508	1,706	71	**3,256**	72.07%
	2019	442	86	285	165	525	1,706	90	**3,299**	72.91%
	2020	401	97	338	118	476	1,513	68	**3,011**	71.15%
	2021	493	89	388	145	594	1,714	105	**3,528**	73.59%
	Total	**1,784**	**357**	**1,350**	**527**	**2,103**	**6,639**	**334**	**13,094**	**72.47%**
Percent of Total Station Demand		69.71%	73.01%	69.30%	66.88%	72.89%	76.52%	46.20%		

As the table shows, medical emergency service demand also varied widely across the six planning zones, with Station 16 having the highest demand and Station 12 the lowest. Overall, the District's medical emergency service demand is typical of other jurisdictions with similar demographics.

Medical Emergency Risk Assessment

The following table summarizes Citygate's assessment of the District's medical emergency risk by planning zone.

[18] Source: Esri Community Analyst and U. S. Census Bureau.
[19] Source: Washington State Department of Transportation (Traffic GeoPortal).

Table A38—Medical Emergency Risk Assessment

Medical Emergency Risk	Planning Zone					
	Station 11	Station 12	Station 13	Station 14	Station 15	Station 16
Probability of Occurrence	*Frequent*	*Frequent*	*Frequent*	*Frequent*	*Frequent*	*Frequent*
Probable Impact Severity	*Moderate*	*Moderate*	*Moderate*	*Moderate*	*Moderate*	*Moderate*
Overall Risk	***High***	***High***	***High***	***High***	***High***	***High***

A.1.12 Hazardous Material Risk

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

Fixed Hazardous Materials Facilities

District staff identified seven facilities within the service area that store, use, or produce significant quantities of hazardous material or waste.

Transportation-Related Hazardous Materials

The District has some transportation-related hazardous material risk as a result of daily truck traffic volume on State Routes 19, 20, 104, and 116, some of which are likely transporting minor to moderate amounts of hazardous commodities.

Population Density

Because hazardous material emergencies have the potential to adversely impact human health, it is logical that the higher the population density, the greater the potential population exposed to a hazardous material release or spill. As shown in Map #2a (**Volume 2—Map Atlas**), population density within the District ranges from fewer than 100 to more than 2,500 people per square mile.

Vulnerable Populations

Persons vulnerable to a hazardous material release/spill include those individuals or groups unable to self-evacuate, generally including children under the age of 10, the elderly, and persons confined to an institution or other setting where they are unable to leave voluntarily. As shown in Table A28, 40 percent of the District's population is under age 10 or is 65 years of age and older.

Emergency Evacuation Planning, Training, Implementation, and Effectiveness

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

The Jefferson County Department of Emergency Management (DEM) is responsible for disaster and emergency planning, preparedness, mitigation, response, and recovery in the unincorporated areas of the County and the City of Port Townsend by Interlocal Agreement. The DEM relies on the national wireless Emergency Alert System for weather-related warnings and notifications and also utilizes Everbridge Nixle, a free, subscription-based, mass emergency notification system that can provide emergency alerts, notifications, and other emergency information to email accounts, cell phones, smartphones, tablets, and landline telephones to disseminate emergency information to the public in a timely manner.

Hazardous Material Service Demand

The District responded to 59 hazardous material incidents over the four-year study period, comprising 0.33 percent of total service demand over the same period, as summarized in the following table.

Table A39—Hazardous Material Service Demand

Hazard	Year	Planning Zone							Total	Percent of Total Annual Demand
		Station 11	Station 12	Station 13	Station 14	Station 15	Station 16	Other		
Hazardous Material	2018	3	0	1	0	5	9	0	18	0.40%
	2019	4	0	3	1	0	10	0	18	0.40%
	2020	2	0	1	1	3	5	0	12	0.28%
	2021	2	0	2	1	1	4	1	11	0.23%
	Total	**11**	**0**	**7**	**3**	**9**	**28**	**1**	**59**	**0.33%**
Percent of Total Station Demand		0.43%	0.00%	0.36%	0.38%	0.31%	0.32%	0.14%		

Hazardous Material Risk Assessment

The following table summarizes Citygate's assessment of the District's hazardous material risk by planning zone.

Table A40—Hazardous Material Risk Assessment

Hazardous Material Risk	Planning Zone					
	Station 11	Station 12	Station 13	Station 14	Station 15	Station 16
Probability of Occurrence	*Possible*	*Possible*	*Possible*	*Possible*	*Possible*	*Possible*
Probable Impact Severity	*Moderate*	*Minor*	*Moderate*	*Minor*	*Moderate*	*Moderate*
Overall Risk	***Moderate***	***Low***	***Moderate***	***Low***	***Moderate***	***Moderate***

A.1.13 Technical Rescue Risk

Technical rescue risk factors include active construction projects; structural collapse potential; confined spaces, such as tanks and underground vaults; bodies of water, including rivers and streams; industrial machinery use; transportation volume; and natural disaster potential including earthquake, flood, landslide, tsunami, etc.

Construction Activity

There is periodic residential, commercial, and infrastructure construction activity occurring within the District.

Confined Spaces

There are tanks, vaults, and temporary open trenches within the District's service area, as well as confined spaces at the paper mill and on boats.

Bodies of Water

Bodies of water within the service area include the Straight of San Juan de Fuca; Discovery Bay; Mystery Bay; Admiralty Inlet; Anderson, Gibbs, and Peterson Lakes; Kah Tai Lagoon; Chimacum Creek; and numerous smaller bodies of water and waterways.

Transportation Volume

Another technical rescue risk factor is transportation-related incidents requiring technical rescue. This risk factor is primarily a function of vehicle, railway, maritime, and aviation traffic. Vehicle traffic volume is the greatest of these factors within the District, with State Routes 19, 20, 104, and 116 carrying an aggregate annual average daily traffic volume of more than 25,000 vehicles.

Earthquake Risk[20]

The Puget Sound region is seismically active, with hundreds of earthquakes occurring each year. While the majority of these events register a magnitude 3.0 or lower on the Richter scale, earthquakes measuring up to magnitude 7.1 have been recorded. Recent studies suggest that earthquakes of a magnitude 8.0 or greater have occurred in the region and that similar seismic events are possible in the future. Several major faults are located in the region, including the Juan De Fuca and North American Plates. Small shallow earthquakes (up to magnitude 4.0) associated with these faults are likely. Shallow earthquakes of greater magnitude are expected to occur infrequently in this area. Historically, more than 1,000 earthquakes are recorded annually in Washington, with significant events in 1949, 1965, and 2001 causing more than $1 billion in damages throughout Puget Sound. Overall, Jefferson County is considered most at-risk and vulnerable to a significant earthquake event.

Flood Risk[21]

Floods occur principally during the winter and early spring months due to prolonged heavy rains, tidal surge, or both. Although floods are a common hazard in Jefferson County, only 1.3 percent of the buildings in the City of Port Townsend are within a designated special flood hazard zone, as are only 4.8 percent of buildings in the unincorporated areas of the county.

Technical Rescue Service Demand

Over the four-year study period, there were 52 technical rescue incidents in the District, comprising only 0.29 percent of total service demand for the same period, as summarized in the following table.

[20] Source: Jefferson County All Hazard Mitigation Plan (2016), pages 123 et seq.
[21] Source: Jefferson County All Hazard Mitigation Plan (2016), pages 153 et seq.

Table A41—Technical Rescue Service Demand

Hazard	Year	Planning Zone							Total	Percent of Total Annual Demand
		Station 11	Station 12	Station 13	Station 14	Station 15	Station 16	Other		
Technical Rescue	2018	0	1	0	2	1	8	1	13	0.29%
	2019	2	1	1	0	0	6	2	12	0.27%
	2020	2	1	1	2	0	5	1	12	0.28%
	2021	0	1	0	0	3	7	4	15	0.31%
	Total	4	4	2	4	4	26	8	52	0.29%
Percent of Total Station Demand		0.16%	0.82%	0.10%	0.51%	0.14%	0.30%	1.11%		

Technical Rescue Risk Assessment

The following table summarizes Citygate's assessment of the District's technical rescue risk by planning zone.

Table A42—Technical Rescue Risk Assessment

Technical Rescue Risk	Planning Zone					
	Station 11	Station 12	Station 13	Station 14	Station 15	Station 16
Probability of Occurrence	*Possible*	*Possible*	*Possible*	*Possible*	*Possible*	*Possible*
Probable Impact Severity	*Moderate*	*Moderate*	*Moderate*	*Moderate*	*Moderate*	*Moderate*
Overall Risk	***Moderate***	***Moderate***	***Moderate***	***Moderate***	***Moderate***	***Moderate***

A.1.14 Marine Incident Risk

Marine incident risk impact severity factors include open water and near-shore recreational activity and watercraft storage and use. Marine incidents include watercraft fires, searches for person(s) in water, and water and watercraft rescues.

Waterways

Port Townsend sits at Admiralty Inlet where the Strait of Juan de Fuca turns south into Puget Sound and through which all the commercial shipping traffic bound for Seattle and Tacoma passes, as well as U.S. Navy vessels. There are also several small marinas within the District, including the Port of Port Townsend, as well as the Washington State Ferry dock in the City of Port Townsend.

Marine Incident Service Capacity

The District has a 33-foot fireboat moored in the Port of Port Townsend and a 22-foot rescue boat stored at Station 15, however the District's marine service response capacity is limited due to a limited cadre of certified operators and deck hands, although the District does not have minimum staffing standards for these positions. According to the Fire Chief, the District is occasionally unable to field a marine response due to staffing. The District is the only emergency response agency with a dedicated marine firefighting and rescue capability in the immediate region.

Marine Incident Service Demand

Over the five-year period evaluated for this study, the Department responded to 47 marine incidents, comprising 0.26 percent of total service demand over the same period, as summarized in the following table.

Table A43—Marine Incident Service Demand

Hazard	Year	Planning Zone							Total	Percent of Total Annual Demand
		Station 11	Station 12	Station 13	Station 14	Station 15	Station 16	Other		
Marine Incident	2018	0	1	0	1	0	5	1	**8**	0.18%
	2019	0	0	2	0	1	8	4	**15**	0.33%
	2020	2	1	0	2	1	7	2	**15**	0.35%
	2021	0	1	0	0	1	5	2	**9**	0.19%
	Total	**2**	**3**	**2**	**3**	**3**	**25**	**9**	**47**	**0.26%**
Percent of Total Station Demand		0.08%	0.61%	0.10%	0.38%	0.10%	0.29%	1.24%		

Marine Incident Risk Assessment

The following table summarizes Citygate's assessment of the District's marine incident risk by planning zone.

Table A44—Marine Incident Risk Assessment

Marine Incident Risk	Planning Zone					
	Station 11	Station 12	Station 13	Station 14	Station 15	Station 16
Probability of Occurrence	*Possible*	*Possible*	*Possible*	*Possible*	*Possible*	*Probable*
Probable Impact Severity	*Moderate*	*Moderate*	*Moderate*	*Moderate*	*Moderate*	*Moderate*
Overall Risk	***Moderate***	***Moderate***	***Moderate***	***Moderate***	***Moderate***	***Moderate***