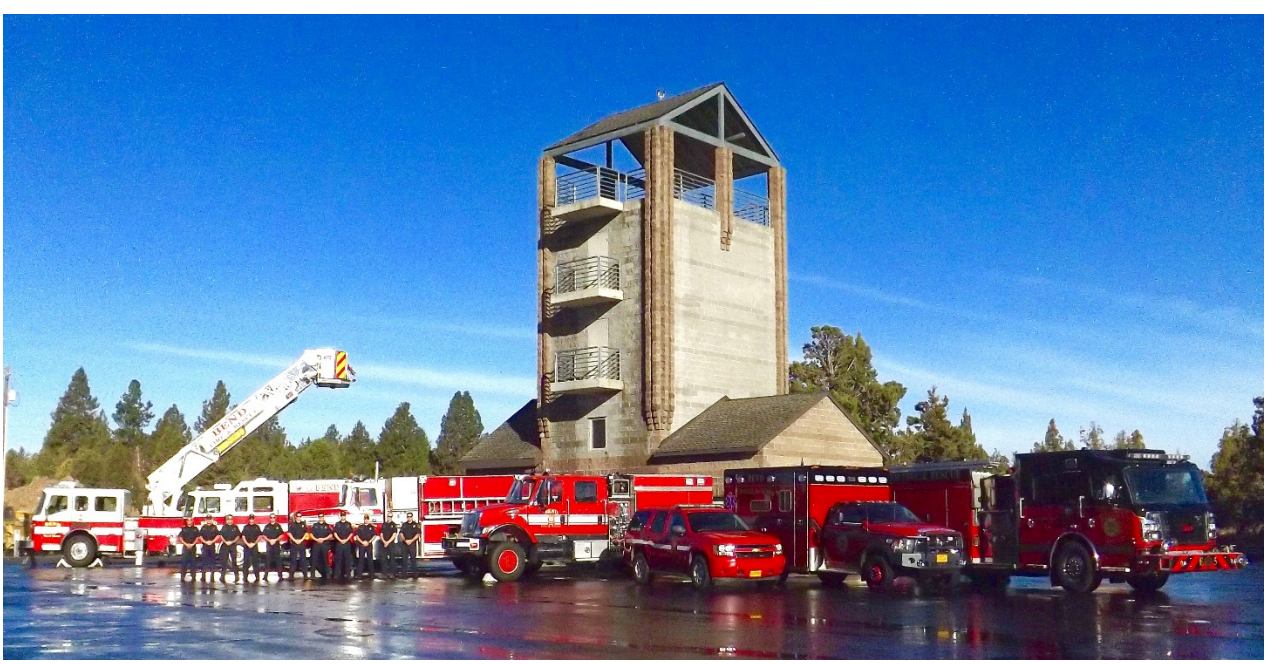
CITY OF BEND

FIRE DEPARTMENT

DESCHUTES RURAL FIRE PROTECTION DISTRICT #2



Standards of Response Cover

2019

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Mission Statement

Protecting lives and supporting our community with compassion, professionalism, and teamwork.

Credo

Honorable in our conduct

Loyal to our mission

Trusted by our community

Risk Statement

It is expected that we will risk our safety to save the life of a fellow human being

With calculated safety precautions, we may risk our safety to protect savable property

We will not risk our safety for life or property that is clearly lost.

Core Values

These attributes make up our core values. We strive to live up to them.

Resilience

We are determined to thrive despite challenges that emerge.

Integrity

We are trustworthy and accountable under all circumstances.

Compassion

We assume the best in others and are dedicated to helping those in need.

Respect

We believe in the value of others.

Optimism

We maintain a positive attitude and seek the best possible outcome.

Humility

We appreciate the strengths of others and have a modest opinion of our own importance.

City of Bend Fire Department
Standards of Response Coverage

Introduction and Purpose

In 2001, the National Fire Protection Association (NFPA), which develops and publishes national standards for all matters related to fire protection, promulgated **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.** This standard, known as **NFPA 1710**, which defines levels of service, deployment capabilities and staffing levels, has been updated several times, most recently in 2016. Any references to NFPA 1710 in this document will refer to the current edition.

Smaller communities, as well as many larger cities, have expressed concern with their ability to adopt and adhere to this standard, as it requires an increase in staffing that many entities cannot afford. The Oregon Fire Chiefs Association (OFCA) and the Oregon Fire District Directors Association (OFDDA) recognized this concern and developed a process for implementing a plan in Oregon communities, known as the **Oregon Fire Service Deployment Standard Process,** shortened to Deployment Plan or Standards of Response Coverage (SORC). This is the process which the BFD follows, and this document is an integral part of the process.

The SORC process allows individual communities to adopt standards which can be validated locally by the Authorities Having Jurisdiction (AHJ), as NFPA 1710 requires. Specifically, the AHJs for the City of Bend Fire Department are the Bend City Council and the Deschutes Rural Fire Protection District #2 Board of Directors.

This process further allows local jurisdictions to implement deployment plans based on their specific local conditions and capacity, as well as regional safety mandates, laws, ordinances, rules, regulations and the organization's capabilities. Creating this plan requires a critical examination of community risk, fire department resources and response capabilities, and desired levels of service.

It is the policy of the Bend Fire Department (BFD) to meet or exceed the NFPA 1710 standards wherever financially or practically possible, but it must be recognized that a department of this size can, by no means, meet all the standards, specifically the response time standards.

In general, the purpose of this document is to address the following:

a) The community's primary risk factors

b) The current response performance of the BFD

c) The limitations imposed on fire department performance

d) Exceptions to performance beyond day to day operations

e) Comparison of BFD's current response performance with national standards

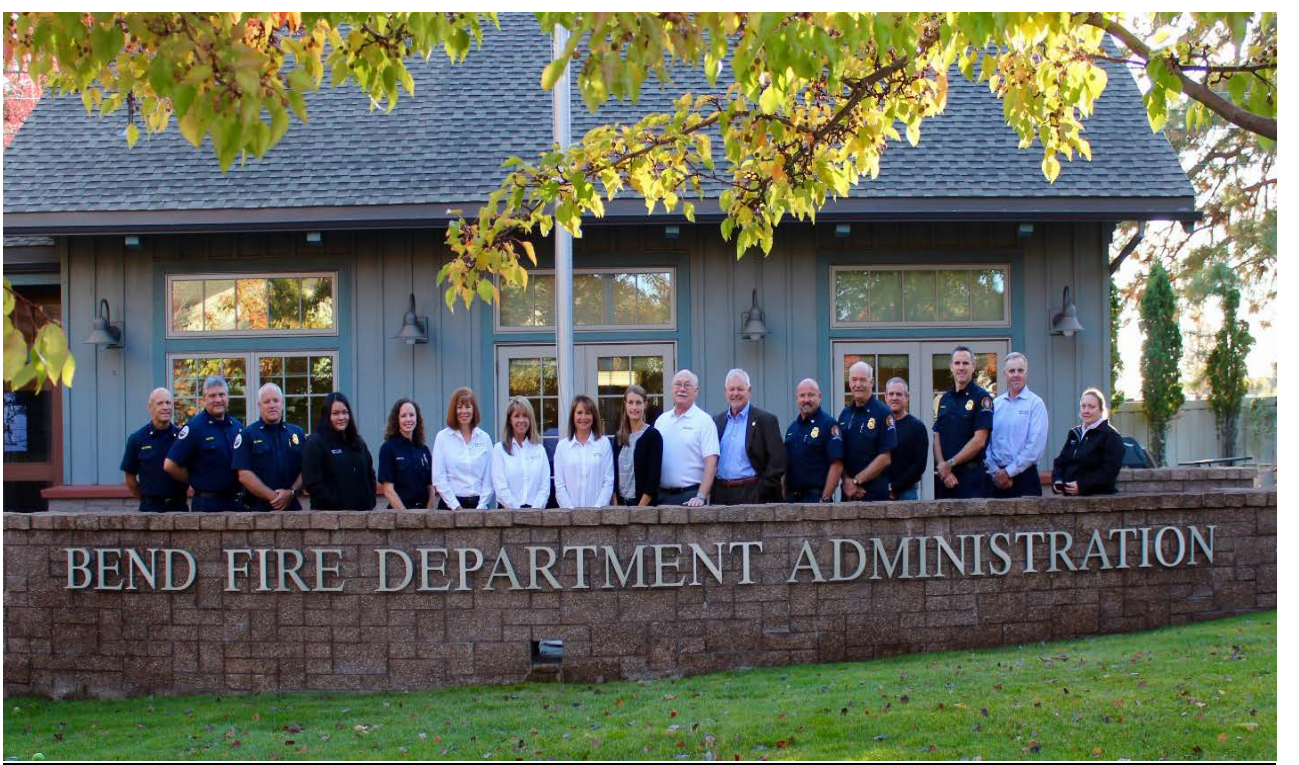
f) Reasonable and attainable response performance goals for the BFD

g) Staffing levels necessary to mitigate incidents

h) Goals and policy recommendations.

Successful implementation of this plan depends upon its acceptance as a “living document.” The AHJs are provided with an annual written report, as required by NFPA 1710. It is anticipated that adjustments and changes will be made to this plan as needed.

In short, this document gives us a framework to define and evaluate our operations baseline, it identifies achievement benchmarks and appropriate levels of service, and it measures our performance over several budget cycles. Further, it informs our policymakers as to our response and community protection capability, and it will identify our future aspirations and goals.



BFD and DCRFPD#2 Management Team

SECTION 1: EXECUTIVE SUMMARY

The City of Bend Fire Department (BFD) is a full-service professional emergency services provider funded by property taxes from the City and the Deschutes County Rural Fire Protection District #2 (DCRFPD#2), and by revenues from department-provided ambulance services. The BFD serves a population of 120,000 residents, along with as many as 40,000 visitors, with about 100 line personnel who staff 3 shifts. Crews are dispatched by Deschutes County 9-1-1 to calls involving fire suppression, rescue situations, motor vehicle accidents, emergency medical services, incidents involving hazardous materials, and many types of service calls, such as illegal debris burning and alarms sounding.

By definition, fire departments engage in risky incidents and issues. The risks to personnel, the organization and the community are complex and dynamic in nature, dependent upon an interplay of factors and random events. The BFD responds to real events which threaten lives and property and works to reduce hazards and danger to both the community and the organization. The interaction of risks, an event and the BFD response to the event through time is the essence of this document.

As the area's population increases, events which threaten life safety, property and community well-being occur at an increasing rate. The BFD and the community have responded to this situation by passing a 5 year local option levy in 2014, designed to raise staffing levels and adjust response patterns. This strategy was successful in reducing response times and increasing both station reliability and resilience to concurrent emergency calls, and a replacement levy has been approved by the voters in 2018.

Although there are many factors influencing the response to and the outcome of a given incident, the BFD has steadily worked to improve its overall ability to respond and mitigate events which threaten our citizens. The large response area, a growing population, a development boom which extends into the wildland-urban interface, and a transportation infrastructure which struggles to keep pace with growth, are just some of the influences on our response. Distance between fire stations has been identified as a factor in extending response times, as well as increasing the safety hazards on scene, because at the beginning of the incident, when it is most chaotic and intense, there are fewer firefighters on scene to complete the critical tasks.

As stated in the Overview, the purpose of this document is to address key elements of the Standards of Response Cover. Below is a summary of the findings discussed in Section 3, Risk Assessment.

A. The Community's Primary Risks

- **a.** Significant increase in total call volume.
- **b.** Significant increase in EMS incidents as a percentage of total.
- **c.** Increase in multiple concurrent incidents
- **d.** Increase in development and population in the wildland-urban interface.
- **e.** Increase in hydrocarbon-based home furnishings, and

- **f.** Increase in lightweight building construction materials

B. The Current BFD Response Performance

- **a.** Call Volume: 10974 in 2018; Fires: 3.7%; EMS: 83.1%
- **b.** 2018 response time for all emergency incidents:
  - **i.** 2018 City Response Time: 0:07:48 (80^{th} percentile), Rural Response Time: 0:11:44 (80^{th} percentile)
- **c.** Witnessed cardiac arrest survival rate, 2017: 54.5%

C. Comparison of BFD's current response performance with national standards

- **a.** NFPA 1710 response time standards: unattainable by cities of Bend's size:
- **b.** National witnessed cardiac arrest survival rate, 2017: 33%

D. Limitations imposed on fire department performance

- **a.** Distance between stations
- **b.** Multiple concurrent calls
- **c.** Growing population
- **d.** Infrastructure not keeping pace with growth
- **e.** Financial constraints
- **f.** Weather events

E. Exceptions to performance beyond day to day operations

- **a.** Unusually influential weather events:
  - **i.** Snow/ice/hail storm
  - **ii.** High wind event
  - **iii.** Dry lightning outbreak
- **b.** Community health issues
  - **i.** Epidemic
- **c.** Long duration episode of multiple concurrent calls
- **d.** Major emergency incidents: derailment, large commercial fire, significant wildland fire
- **e.** Human behavior issues
  - **i.** Active shooter incident
  - **ii.** Events involving large numbers of people

F. Reasonable and attainable response performance goals for the BFD

- **a.** Demonstrate that, over time, a BFD resource will arrive on scene within 6 minutes, for an average emergency response within the City of Bend.
- **b.** Demonstrate that, over time, all Critical Tasks will be completed with at least 14 personnel on scene, on 80% of all **interior working residential structure fires** in both the City of Bend and the Rural Fire District.
- **c.** Demonstrate, over time, a survival rate of at least 50% for witnessed cardiac arrest events in the City of Bend and the Rural Fire District. A **survival i**s defined to be a Return of Spontaneous Circulation (ROSC), with the patient returning to normal life.
- **d.** Demonstrate that, over time, an average emergency response within the DCRFPD#2 will arrive on scene in 9 minutes.

G. Staffing levels necessary to mitigate incidents (within normal range of complexity)

- **a.** Working Structure Fire: 14
- **b.** Witnessed Cardiac Arrest: 9

- **c.** Wildland Fire: 13
- **d.** Motor Vehicle Crash: 9

H. Policy recommendations

- **a.** Response time reduction measures
  - **i.** Address issue of distance between stations
  - **ii.** Prioritize station location near areas of greatest density
  - **iii.** Design stations for optimal turnout and response time
  - **iv.** Plan staff additions in a way that can reduce response time
- **b.** Build community resilience in the wildland/urban interface
- **c.** Commitment to community outreach and trust
- **d.** Commitment to advocate for residential fire sprinkler code
- **e.** Fire and Life Safety Education
  - **i.** Innovations to reach whole community
  - ii. Enhanced community CPR training

Structure fire, Rural District, February 2018

SECTION 2: COMMUNITY BASELINES AND ORGANIZATION DESCRIPTION

A. Bend Fire Department Mission

The BFD Mission Statement is “Protecting lives and supporting our community with compassion, professionalism and teamwork.” The American fire service has come a long way since hostile fires were the most clear and present threat to a community and the only one to which a fire department responded. The modern Fire Service is an all-risk, all-hazard response capability, generally well-supported by the community and responsive to risks not recognized even 50 years ago. The BFD is no exception.

The introduction of Emergency Medical Services (EMS) response to the BFD in 1972 changed everything, including the relationship with the community and the way the BFD viewed and approached emergency calls of all types.

The BFD has been challenged to accept a broad mission that goes far beyond simply extinguishing fires: to protect the lives and property of the community from harm, to bring our best to every call for service, to reduce the risks that our neighborhoods face, and to build community trust and resilience with all the resources, strength and humility that we can. We accept the challenge, understanding and accepting our limitations, as we work to overcome them.

B. Community Overview

The City of Bend, situated near the center of the state, is the largest Oregon city east of the Cascades Range. Founded in 1904 as a lumber mill town, the city was dependent upon the forest resources until the mid-1970’s. As timber supplies dwindled, the tourism, service and tech industries took hold and today remain the economic mainstays of the city. Bend has become an all-season outdoor recreation mecca, with many skiing, mountain biking, fishing and hiking opportunities, and also a premier retirement destination. Summers are hot and dry, with the occasional thunderstorm and typically, very low humidity, while winters tend to be cold, with one or two large snowstorms and a few subzero nights per year. The ecosystem is a fire-based regime, dominated by Ponderosa Pine to the west, with more Juniper and sagebrush to the east. Bend sits at the northwest edge of the Oregon High Desert, with an annual precipitation of just 11", and about 300 days of sunshine.

The City of Bend Fire Department has existed in its current general form since 1919 and is a full service professional **fire protection, rescue and Advanced Life Support (ALS) ambulance transport** agency. Although initially organized to protect the small timber town from the ravages of fire, the BFD has grown and evolved to work closely with the community to provide fire and life safety education, fire prevention, code enforcement and fire cause determination. Significantly, the BFD responds to all emergency medical calls, incidents involving hazardous materials, all types of special rescue situations, and a wide variety of calls for service.

The 164 square mile response district includes the City of Bend and the Deschutes Rural Fire Protection District #2 (DCRFPD#2, or “the District”), with about 90,000 and 25,000 residents, respectively; the Ambulance Service Area (ASA) includes 1450 square miles. An estimated 20,000 tourists visit the area daily, and the regional economist calculates that about 22,000 people per day commute from outside the City to Bend to work. Thus, Bend’s average daytime population hovers around 155,000, at present (2018).

C. Governance Model

The City of Bend is governed by a 7-member City Council, elected by the citizens of Bend. The City Manager reports directly to the Council. The BFD is led by the Fire Chief, who reports to the City Manager. In addition, the BFD maintains a strong contract with the District: the City staffs and operates the organization, and the District owns (and leases to the City) the fire stations. The District's 5 member Board of Directors maintains a high level of communication with the Fire Chief, through the District Manager.

There are four divisions in the department, each headed by a Deputy Chief. The BFD is fiscally supported by the taxpayers of the response districts (the City of Bend and DCRFPD#2), by revenue from ambulance transports, and occasionally is awarded grants from Federal, State or foundation sources. The last 3 annual budgets averaged $24 million.

D. Finances

An efficient modern professional fire department is an expensive entity to operate. The BFD has an annual budget largely funded with property taxes from City and District residents and businesses. The millage rate of $1.185 per thousand dollars of property valuation is among the lowest in the state. Ambulance transport receipts, at around $2M per year, are a significant portion of the annual funding, and the BFD has been successful in securing a series of Federal grants for targeted projects over the past several years.

In 2014, the BFD was successful in winning a $0.20 per thousand, 5 year local option levy totaling $2.2M in the first year. This money is used specifically to fund the innovative tiered (Basic Life Support) BLS response (see below) and the Service Response Vehicle (SRV) programs operated by the Fire Prevention Division. The biggest advantage is a guaranteed infusion of capital to make a significant transformation and improvement to service delivery; the disadvantage is that the BFD will be dependent upon a levy henceforth, in order to maintain the current service level.

Although the procurement of fire suppression and emergency medical response equipment is quite expensive, the BFD has employed several strategies to maintain a safe, cost-effective and highly functional inventory that is compliant with industry standards:

- The BFD purchases an entire fleet (of engines, or ambulances) at one time, financed by Certificates of Participation (COP). In this way, equipment is paid for over time, at a very low interest rate, and the term of the loan is based upon the projected service life of the specific type of equipment.

- The City-District contract stipulates that the City owns the vehicles and equipment and staffs the station, while the District owns (and leases to the BFD) the 5 fire stations. By doing this, the overall operational costs are spread out equitably.

Certain types of equipment, such as Self-Contained Breathing Apparatus (SCBA) and firefighting outerwear (turnouts), must comply with stringent safety standards, including a designated lifespan. When the equipment meets the end of its certifiable life, replacement costs are high. By targeting federally funded grant sources, the BFD has been successful in replacing the entire inventory of SCBA, at a cost of $435,000, and 23 obsolete sets of turnout gear ($55,000), at one time. In addition, several smaller grants from various sources have helped the department procure equipment which otherwise may not have been funded, such as a program to prevent firefighter injury, and an innovative fire and life safety education trailer.

These are the 3 strategies currently used to make the department as efficient as possible.

Building community support through a deliberate media presence and partnering with news sources opened up a fourth critical strategy: the local option levy. Since Oregon property taxes are limited by legislative mandate, local governments have fewer options for augmenting scarce resources. By requesting a multi-year levy from the voters, an agency can acquire the funding necessary to make needed improvements to optimize service delivery.

E. ISO Rating

The Insurance Services Office (ISO) determines insurance classifications for fire agencies across the country. Departments are graded on a 1-10 scale, with one as the most effective and 10 the least effective, based on many criteria. New ISO ratings went into effect on June 1, 2014,

•Residence within 5 road miles of a fire station and within 1,000 feet of a fire hydrant measured by an approved fire vehicle access road is considered an ISO Class 3.

•Residence within 5 road miles of a fire station but not within 1,000 feet of a fire hydrant, measured by an approved fire vehicle access road, is considered an ISO Class 5.

• Effective July 1, 2014, residence between 5 and 7 miles from a fire station, regardless of fire hydrant location, is considered an ISO Class 10W.

•Residence not within 7 road miles of a fire station, regardless of fire hydrant location, is considered an ISO Class 10.

In general, the City of Bend has an ISO rating of 3, and the District has a split rating, based upon the factors listed above.

Insurance companies use these ratings as a guide to help determine insurance premiums within communities. Criteria used include fire department staffing, training, available equipment, the ability to develop and maintain specified fire flows for a designated period of time, water systems and delivery capability, infrastructure and reserve capability. The ISO evaluates a fire department every 10 years: the City of Bend's next rating will take place in 2024.

F. Current levels of service

Personnel: There are 149 members of the Bend Fire Department, including 103 line personnel/first responders, 18 Administrative and Support staff, 7 personnel in the Fire

Prevention Division, and 18 Support Volunteers. The DCRFPD#2 has an Executive Director who manages all BFD facilities.

Divisions

Administration: Responsible for budget, finances, purchasing, human resource services, customer service, overall organizational health, hiring, promotions and retirements.

Fire Operation: Responsible for fire suppression operations, training, vehicle maintenance and purchase, mutual aid agreements, line personnel issues and the orderly continuity of life in the fire stations.

Fire Prevention: Responsible for all fire prevention activities, including fire inspections for fixed facilities and events, fire and life safety education, fire cause determination, response to non-emergency service calls, public and media information, and the Support Volunteer Program.

Emergency Medical Services: Responsible for all aspects of EMS response, including Advanced Life Support (ALS) response, care and transport and the Basic Life Support (BLS) ambulance program, the Quick Response Vehicle (QRV), ordering, purchasing, outfitting and licensing of new ambulances, medical supply procurement, relationship with the Medical Directors at St. Charles Medical Center, medical mutual aid pacts, EMS training and recertification, and protocols and quality assurance.

Fire Prevention service levels:

The Fire Prevention Division delivers an innovative and customer-focused program centered on the **3 E's of Prevention: "Education, Engineering and Enforcement**," with the ultimate goal of preserving the safety and livability to residents and visitors alike, throughout Central Oregon. The Division is staffed with one Deputy Chief/Fire Marshal, four Deputy Fire Marshals and 2 Fire Inspectors. In addition, responsibility for the Support Volunteer Program lies with the Deputy Chief/Fire Marshal, with one Volunteer Liaison and about two dozen Volunteers. Prevention staff support the department's strategic plan and goals of the department through their daily tasks within each of five response districts and the SRV unit. The Volunteers fill a number of essential non-firefighting roles, including daily station mail runs, operating the Rehab Unit on major incidents, fire and life safety education presentations at public events, senior facilities and residence safety checks, and clerical work in the business office.

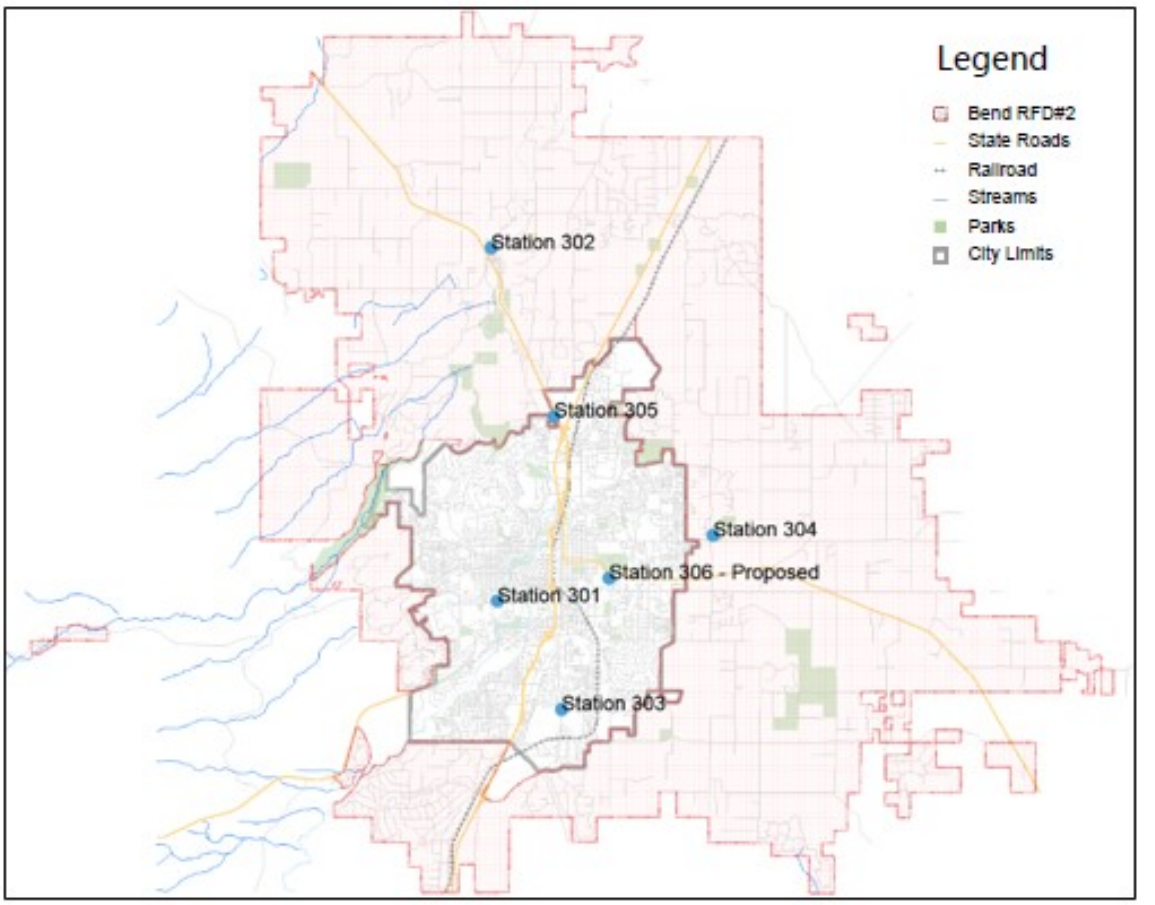
The department's statutory requirement under ORS 476.060 is met through a highly trained and competent Fire Investigation Team that works to determine the cause, origin and circumstance of every fire in the jurisdiction. The Prevention Division has developed one of the most collaborative relationships within Oregon with the City of Bend and Deschutes County Community Development Departments. Prevention staff plays an integral part in every newly constructed residential and commercial development, from concept to project completion. The Division plans to explore the development and implementation of a risk-based inspection program. The Division is completing a Prevention Program Fee Study.

The Fire Prevention Division staffs a Service Response Vehicle (SRV) with one prevention specialist, who responds to all service or non-emergency calls related to fire, fire protection systems, or citizen assistance, 10 hours per day, every day. This arrangement allows an engine company, which would otherwise have to respond, to remain available for true emergency calls. The Prevention staff on the SRV is, at minimum, a Fire Inspector, and also responds to assist at fire calls and may act as fire cause investigator and/or Incident Public Information Officer.

Fire and EMS Operations service levels

The operational staff is divided into three shifts, A, B and C. Each shift (or battalion) works for 48 hours and is then off duty for 96 hours, while the other two shifts take their turns. In Fire Operations, there are three ranks within the bargaining unit (International Association of Firefighters or IAFF Local 227): Fire Captain, Fire Engineer and Firefighter. The bargaining unit also represents all Fire Prevention personnel at the rank of Deputy Fire Marshal and below. The Ambulance Operators (AO) are Emergency Medical Technicians – Basic (EMT-B) Limited Term Employees who respond with the BLS ambulances, accompanied by a Quick Response Paramedic. Although they work on shift, they are not represented by the IAFF, and their term of employment is limited to 3 years.

The BFD occupies 5 fire stations, a training campus and a central administration building. Recommended staffing, 24 hours per day, is 28 personnel. At times, there may be several more staff, depending upon vacation or sick leave usage. Over 80% of calls for service are medical in nature, requiring either a BLS medic unit and a Quick Response Vehicle (QRV) staffed with a Paramedic, or an ALS medic unit (staffed with 2 Paramedics), augmented, if needed, with an Engine response. The certification level of Paramedic is a job requirement to be hired as a Bend Firefighter: all Engine Companies have at least one Firefighter/Paramedic. All response personnel are required to hold a current Oregon EMT certificate, renewable every two years.



City and District boundaries, with station location

There is one Engine Company, comprised of at least 3 personnel, at each station. An Engine typically responds to all fires, ALS medical calls, incidents involving hazardous materials, traffic crashes and calls for public assistance, and it is staffed with at least one Paramedic at all times. The engine is most common piece of fire equipment taken to any given incident, either as an operational tool or as transportation for personnel.

There is also one medic unit (ambulance) at each station. The Tumalo Station is staffed with 3 personnel, so the crew “cross-staffs,” or uses whichever piece of equipment is required by a given call: they take an engine to a fire or an ambulance to a medical emergency.

As mentioned above, the BFD won a 5-year local option levy in 2014 to develop an innovative response model to increase dwindling station reliability, to reduce response times, to place the most appropriate resource on a given scene, and to reduce or eliminate the amount of time no resources were available (due to responses to concurrent multiple calls for service). The Tiered BLS Response Model consists of an ambulance operated by two EMT-B personnel and accompanied by a single Paramedic in a QRV, responding to calls which Dispatch determines to be less-than emergencies. This model allows for appropriate patient care and flexibility of response: the Paramedic assesses the patient

and can either maintain control of the situation if conditions warrant or turn the scene over to the EMTs, remaining available for another call. This model preserves the availability of the ALS units and engine crews for the true emergency calls.

Staffing and equipment for the stations, as of 2018, is as follows:

Station 301, West Station, 7 (day)/ 6 (night)

Staff	Resource
1	Battalion Chief/Shift Commander
3	Engine (Captain, Engineer, Firefighter), cross-staff rescue, brush unit
2	ALS ambulance (Paramedics)
1	Prevention staff in SRV, 10 hrs/day
	Station 302, Tumalo Station, (3)
2	Engine, cross-staff ALS ambulance and heavy brush unit
	Station 303, South Station, (5)
3	Engine, cross-staff heavy brush unit, water tender
3	ALS ambulance
	Station 304, East Station, (8):
3	Engine, cross staff heavy brush unit, water tender
2	ALS ambulance
2	BLS ambulance (Basic EMTs as Ambulance Operators)
1	QRV (Paramedic/Firefighter)
	Station 305, North Station, 5 (day)/ 3 (night):
3	Cross-staff Rescue, Ladder, water tender, engine in reserve
2	Ambulance Operators (BLS), 10 hrs/day

Total minimum staffing: 28/25 5 Engines, 6 ambulances

The workload (call volume) for all categories of incidents has increased dramatically between 2014 and 2018, at an overall rate of 19.7%. Of particular note is the increase in EMS calls, from 7,392 to 8,972 in 5 years. Fire calls increased by almost 40%, from 283 to 395. Figure 1 shows the trends in workload over 5 years, and Figure 2 shows the 2018 monthly workload by incident type. Figure 3 shows the average daily call volume over the last 5 years, to demonstrate the increase in daily workload per shift.

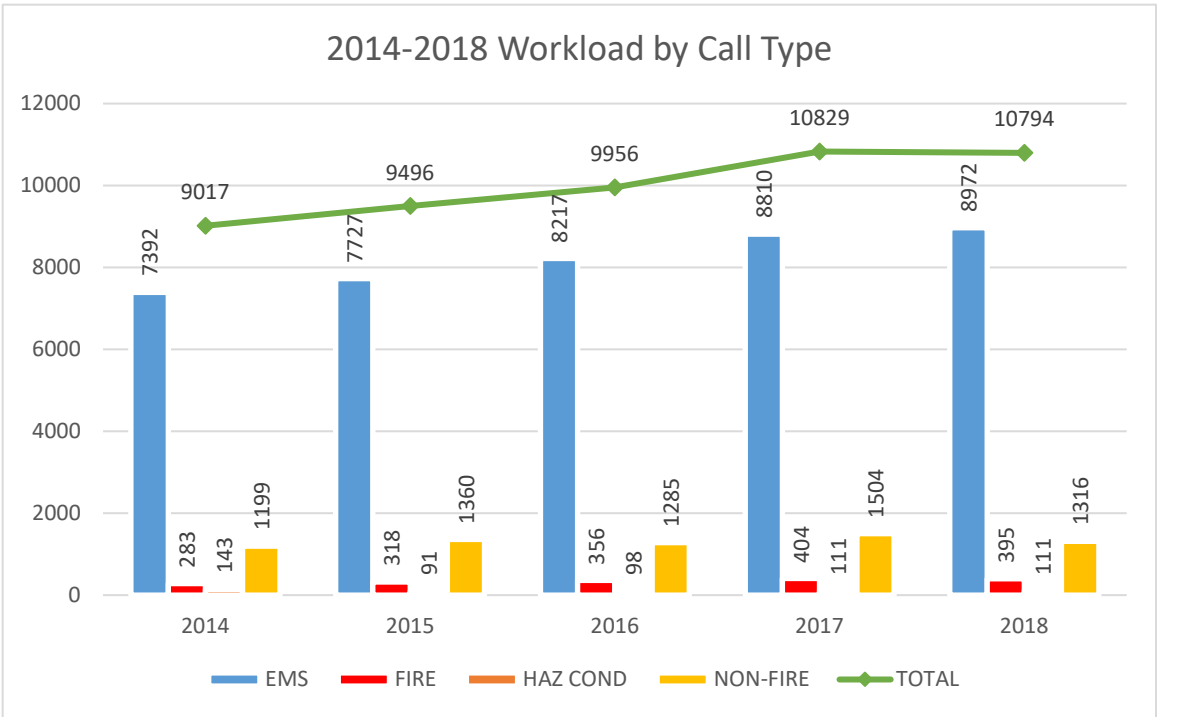


Figure 1

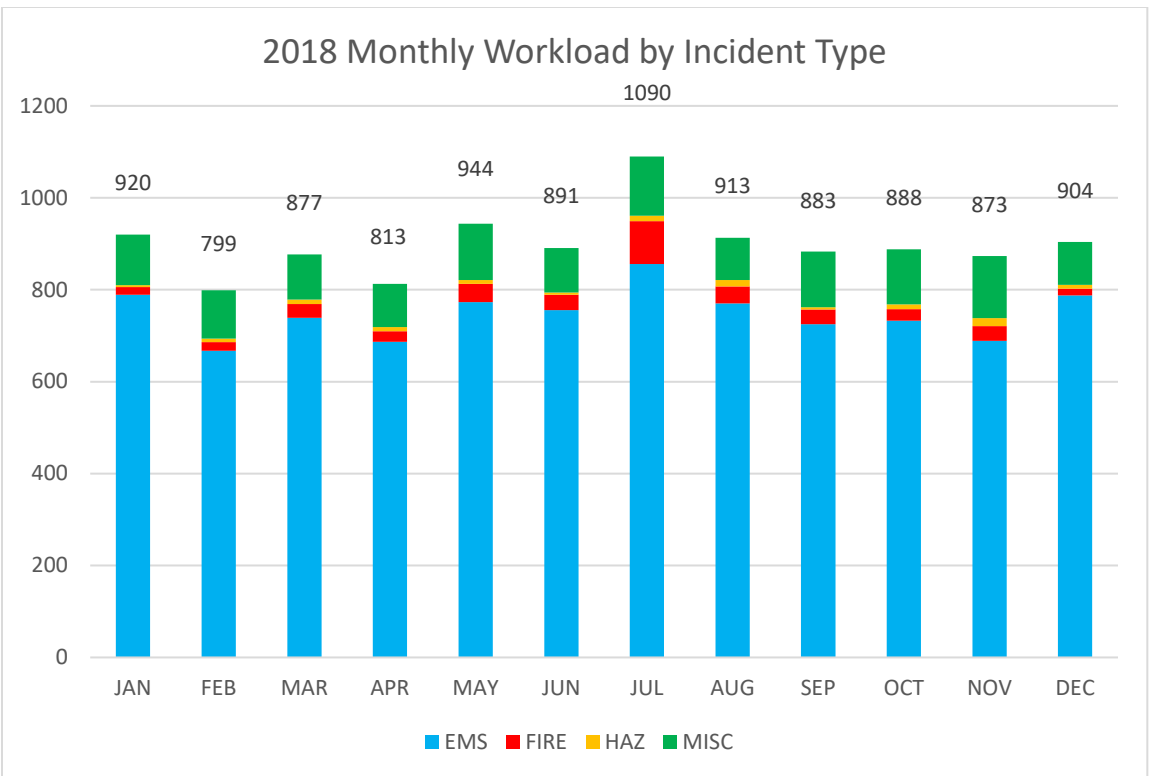


Figure 2

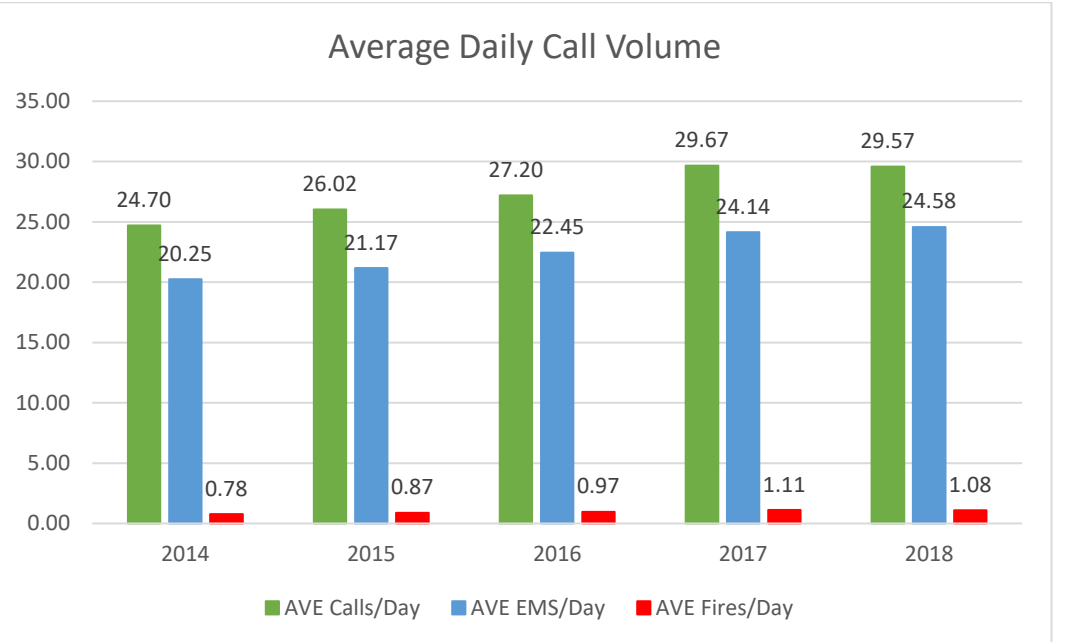


Figure 3

Burn-to-learn training fire

Training

Continual training is a hallmark of a successful emergency response organization, and the BFD is committed to ongoing improvement and refinement of operational effectiveness across all disciplines. Training is the responsibility of the Training and Safety Battalion Chief, who reports to the Deputy Chief of Operations. The Training Center includes a 5-story tower, a warehouse, a drafting cistern and a large classroom/office complex. Training of all types - EMS, fire, hands-on sessions and classes - are scheduled throughout the week, and crews may be found any time of day, in any weather, participating in some form of training. Also, the BFD has installed a teleconference system for stations, so each crew can attend a class while remaining in their own response district.

The Training Division is staffed by the Training/Safety Battalion Chief, a Fire Training Captain and an EMS Training Captain. These individuals also may respond to emergency incidents as needed. The training staff is augmented by line personnel with both the Oregon Fire Instructor qualifications and expertise in relevant subjects.

D**ispatch/Communications**

Deschutes County Communications Agency (DCCA, Dispatch, or DC 911) is the Public Safety Answering Point (PSAP) for the entire county. All public safety calls for service go to that agency, which processes each call and dispatches the appropriate agency resources. Dispatch is the first link in the web of public safety and connects all agencies to each other. The radio system used to dispatch all Deschutes County agencies is owned and maintained by DCCA.

In the past several years, driven by Federal mandates, DCCA has aggressively pursued a major upgrade of the county emergency communications system. Because of poor reception in some areas of our District, this upgrade is essential to maintain firefighter safety and communications. A part of this effort is the acquisition and deployment of mobile data terminals (in the form of iPads) for dispatch information, mapping, response notification and documentation.

Each station has a defined “first-due” response district, as well as “second-due and “third-due” areas, extending out from the station. If an incident occurs in a district where the first-due resource is not available, the designated second-due units are dispatched to respond and generally arrive first. This situation is a key driver of longer response times. DCCA has developed a comprehensive sequencing system for assigning resources to calls, based upon incident information and location. The Computer-Aided Dispatch system (CAD) determines the relative proximity of all stations to a given incident and dispatches the incident-appropriate resources in a sequence to produce the lowest response time.

Mutual Aid

The BFD maintains strong mutual aid agreements with neighboring agencies, including local fire/EMS agencies, the US Forest Service (Deschutes National Forest), the Bureau of Land Management and the Oregon Department of Forestry. Mutual aid is normally requested to augment resources or to provide fire station coverage, while Automatic Aid (Auto-aid) agreements have been established with the closest neighbors, for an automatic

mutual aid response at our boundaries, in order to ensure the quickest response to the most distant areas in the district. These agreements have been established to meet the NFPA Standard 1710, which addresses fire service intergovernmental agreements.

BFD EMS operations are overseen by 2 Physician Advisors from the St. Charles Medical Center Emergency Department, who extend their medical licenses to all BFD personnel responding to medical incidents. Additionally, the City of Bend operational departments (Police, Fire and Public Works) have developed strong working relationships, because City Management has fostered an environment of collaboration. The BFD can also receive aid through the Oregon Mobilization Plan, which provides operational, logistic and incident management support from the State of Oregon when all county (mutual aid) resources have been depleted.

Current Goals and Objectives

The Operational goals, set by the Fire Chief, are the following:

- Demonstrate that, over time, a BFD resource will arrive on scene within 6 minutes, for an average emergency response within the City of Bend.
- Demonstrate that, over time, an average emergency response within the DCRFPD#2 will arrive on scene in 9 minutes.
- Demonstrate that, over time, all Critical Tasks will be completed with at least 14 personnel on scene, on 80% of all **interior working residential structure fires** in both the City of Bend and the Rural Fire District.
- Demonstrate, over time, a survival rate of at least 50% for witnessed cardiac arrest events in the City of Bend and the Rural Fire District. A **survival i**s defined to be a Return of Spontaneous Circulation (ROSC), with the patient returning to normal life.

Training fire

Highland School (Kenwood) gym roof collapse, 2017

SECTION 3: RISK ASSESSMENT

A. General Requirements

The BFD fire protection district boundaries encompass both the City of Bend (32 square miles) and the DCRFPD#2 (132 square miles), for a total area of 164 square miles. Also, the BFD provides fire protection to a small community of about 75 people, 8 miles west of Bend, at the end of Skyliners Road, which, although a part of DCRFPD#2, is not contiguous with the rest of the district. In addition, the BFD is under contract to provide fire protection to several properties outside the District boundaries, including Mt. Bachelor Ski Area, The High Desert Museum, Seventh Mountain Resort and several private residences outside the boundaries. All of these properties are several miles from the rest of the District: Mt. Bachelor Ski Area is about 22 miles from the closest boundary.

The State of Oregon requires that the entire state be within a defined Ambulance Service Area (ASA). The BFD's ASA extends from the crest of the Cascades to a point 68 miles east of Bend on US Highway 20, halfway to the City of Burns; halfway to Sisters; halfway to Redmond; and to the crest of the Lava Butte Pass to the south. A response to the extreme east edge of the ASA can take away valuable resources for several hours. The total area of the Bend Fire ASA is approximately 1450 square miles.

The population of Bend proper, as of mid-2018, was 94,520. The rural district adds about 25,000, the daily tourist tally is about 20,000, and the inbound commuters are estimated to be 22,000, for a total protected population of about 162,000 people. Of these, over 33% are adults at or near retirement age (50 and above). Central Oregon Community College and Oregon State University-Cascades bring the potential for a 4-6,000 student population.

B. Average area protected by initial attack companies

With a total response area of 164 square miles and with 5 engine companies on duty, each company protects about 33 square miles, presuming that all engines are available for service and not occupied with another response. Generally speaking, **extended response times result when an area protected by fire companies exceeds 9 square miles**, according to a draft of the Standards of Response Coverage template released by the Commission on Fire Accreditation International. This means that each BFD station exceeds this standard by almost four fold. Indeed, the distance between the stations means that second and third due units generally report very extended response times to an incident, so that a full structure fire assignment of 3 engines, a medic and a rescue may take 20 minutes or more to arrive on scene.

C. Population density per square mile

Within the Bend Fire response area, there is a wide variation in population density. The more sparsely populated Rural District partially mitigates the densely populated City core. However, the tourist and workday influx adds significant density to the overall district. With about 150,000 people and 164 square miles of area, we find an average of 914 people per square mile.

D. Method used to describe values at risk

Risk assessment in a dynamic community is a complex task, as there are many factors to take into account. The method for doing this is to identify the various factors contributing to community risk, and then to describe the types of hazards and events which may impact the community, combine these with the potential frequency of different incident types, and build a rough risk matrix around low to high frequency of events, and low to high potential for harm.

The priorities which every Incident Commander considers on every call, are, in descending order, the following:

Life safety
Incident stabilization
Property conservation

It is logical to apply these three priorities to hazards and risks associated with the Bend area, in order to arrive at a description of the risk and to clarify the risk matrix.

For example, a massive earthquake will fit into the low frequency/high risk field, and we can confidently say that life safety and property will be seriously compromised during such an event.

E. Factors affecting community risk

What draws people to Bend - friendly town, pristine beauty and active lifestyle - also creates unique risk categories that challenge emergency services and the community's resilience to recover from a disaster. The City of Bend and the District have a history of a rapid population growth and development, creating a demand that outpaces the BFD's ability to fund services at the same rate. Although a high growth rate brings the City more tax revenues, it also creates heavier vehicular traffic, stressing the infrastructure. Traffic growth always outpaces infrastructure repair and improvement, so emergency incident response time tends to increase.

Bend's fire risk mirrors the national and western regional fire problem. What is true for the nation - home fires cause the majority of all civilian fire deaths, injuries and property loss due to fire - is true in Bend. The demand for residential development continues to push into the wild land urban interface. Across the country, especially in the western United States, people are drawn to live in high fire risk areas such as the wildland urban interface. Compounding this issue is the influx of residents who are unfamiliar with Bend's fire history and the elevated wildfire risk east of the Cascades. In addition, the aging population contributes to a community risk that impacts call types, call volume and response times. There are many factors affecting community risk: it is helpful to group them in related categories.

1. Weather/Topography/Physical features
    a. Climate
    b. Seasonal issues
    c. Terrain
    d. Waterways
    e. Fuel types and wildfire risk.
2. Pre-incident factors
    a. Local culture: attitudes and experience of the population, over time
    b. Fire prevention efforts: is prevention a community priority?
    c. Bend's Physical infrastructure: fluidity and connectivity of road travel
    d. Code enforcement: government willingness to prioritize safety
    e. The built environment: structures and occupancies
    f. Department culture
    g. Water supply
    h. BFD response equipment
3. Pre-response factors
    a. Public Safety Answering Point (9-1-1) reliability and effectiveness
    b. Public Safety activity level
    c. Weather conditions
4. Response factors
    a. Alerting and notification
    b. Mobility and access to scene: road conditions, potential obstacles
    c. Call level/station reliability: units in station or busy with concurrent calls
    d. Response time
5. Incident factors

a. Crew competence/training
b. Incident management
c. Staffing levels
d. Reflex time: time from arrival to water on fire
e. Mutual aid: agreements and auto-aid

Although this is not an all-inclusive list, it is a comprehensive compendium of factors that influence both the probability and the course of an incident, as well as the mitigation process and efforts.

Steep angle rescue training

Weather/Topography/Physical features

Climate: At 3600 feet above sea level and east of the Cascade Range, the Bend area sees very dry summers with low relative humidity, punctuated by lightning storms which may be without rain, often leading to multiple fire starts in the wildland areas, taxing our resources. Especially west of the Deschutes River, the density of the fuel bed, coupled with the fuel types (vegetation) lend itself to easy ignition, long flame lengths and a high rate of fire spread.

The winters are cold, with occasional snow accumulations in excess of 6 inches. Temperatures occasionally reach below 0 degrees F, and in emergency response, extreme cold slows every operation down, and tire chains are often required to maintain traction, which slows response times. Cold snaps rarely last more than several days, but very cold weather generates an abnormally high number of calls for service, with many broken plumbing and sprinkler lines.

The southern portion of the District is higher in elevation, and thus has colder temperatures and more moisture. In Deschutes River Woods, snow is significantly deeper and stays on the ground longer than in Bend.

Seasonal issues: Rarely, Bend is subjected to heavy downpours, which can cause localized flooding in underpasses and low areas. In the past few years, the City of Bend has markedly improved the stormwater management facilities, so this risk factor is receding. The occasional heavy snowfall, such as occurred in winter 2016-2017, has a profound effect, not only on the accessibility of any given location, but also on the condition of both people and structures to whom we respond. Excessive heat and cold can produce an increase in medical calls, and rarely, ice has blocked the Deschutes River upstream of Mirror Pond, causing damaging floods.

Terrain: Although much of the area is relatively flat, there are plenty of areas with steep terrain. The challenges that these conditions pose are difficult and slow responses in snow conditions (when chains are necessary), the risk of freezing equipment, and slippery working conditions.
There are several buttes, notably Awbrey and Overturf Buttes, with residential development: snow and ice accumulations on the steep roads can make quick access challenging. The river divides the city, with few bridges and, in some areas, steep canyon walls. This feature forces us to choose our routes carefully.
In addition, since the Bend area is renowned for outdoor recreation, the risk of someone having an emergency in steep terrain is significant.

Waterways: Waterways in the Bend area include the Deschutes River and several irrigation canals, which draw water from the river and move it to agricultural areas. In both features, the water moves swiftly, and access is unrestricted, creating a serious hazard to the community. Waterways can block our passage in wildland fire situations, and the river's steep canyon reaches impose both a barrier for fire suppression and an access issue. Bridges are few and far between, forcing response patterns to conform. An associated risk factor is the uncertain condition of many of the bridges which cross the canals – many may simply not be strong enough to carry the weight of an engine.

Fuel types and wildfire risk: The ecosystem east of the Cascades is known as a "fire regime," meaning that the biological environment is dependent on and adapted to occasional large fires. Much of the vegetation (fuels) are predisposed to ignite and burn readily, by virtue of their chemical composition and the normal low summertime humidity, creating a community-wide risk throughout the summer, on an annual basis. This is actually the highest risk which our community faces.

Pre-incident factors

The local culture of Bend has always understood that fire can be used as a tool, sometimes inappropriately. People may use fire to clear fields, and often they forget how quickly the wind can come up and how easily fire can be carried by the light fuels. This occurs mainly in the spring. Traditionally, people in Bend have burned debris and trash in piles or barrels, and although this is now prohibited in the city proper (although not in the District), improper and illegal burning continues to contribute to the call volume.

Fire prevention efforts: Ongoing fire and life safety education, coupled with consistent fire prevention efforts and messaging, regular fire inspections and a robust community outreach certainly help to reduce community risk. However, fires and other emergency incidents continue to occur with the same essential causes and relative frequency. The BFD is currently exploring new ways to reach people, primarily through social media avenues, and innovative safety education through a fire and life safety education trailer, utilizing Volunteers.

The Bend physical infrastructure - roads, bridges, railways, pipelines and the traffic control system – both facilitates and impedes response travel. The City's road system has evolved over time, and obsolete travel patterns are still imbedded in the infrastructure. An example of this is the ease of traveling north and south s compared with more problematic east-west travel.

Modernization has improved the road system capacity to some extent, as local governments have adopted modern transportation planning concepts, but higher volumes of vehicles can overwhelm the system, making emergency vehicle passage uncertain. For example, Bend has 32 roundabouts, many on main routes of travel. When traffic is light to moderate, roundabouts help emergency responders proceed smoothly through intersections; however, when traffic is heavy, a roundabout can become impassible and negatively impact response time. Roadways, well-maintained and lighted, with standard signage, help keep response times to a minimum, while poorly maintained roads, or roads with non-standard street signs, can slow the response. Railroad tracks present no impediment unless a train happens to be occupying the line, in which case there can be a significant delay. Bend Fire crews learn from the first day on the job to avoid the tracks, if at all possible: this can mean a longer response time.
There are two major highways with the BFD response area: US Hwy 97 (north-south) and US Hwy 20 (East-West), which has a more circuitous route through town.

It is important to keep in mind that the principle of travel time is not speed, but the ability to keep moving. Increasing a responding vehicle speed gains only a few second and heightens the sense of urgency in the crew. Traveling at a slower, safer speed with the ability to avoid stopping until arrival on scene is a more balanced approach. A crash involving a responding fire apparatus not only increases the response time to the proximate incident, risks injury to many people and distracts from the original call, but in the longer run, it also damages community trust and agency reputation.

The Opticom system, which assists response vehicles by prioritizing the traffic lights for emergency response, has been a boon to response time and safety. Responding crews are prohibited from running full speed through red lights and stop signs, and lights and sirens are a request, not a demand, for the right of way. Emphasizing this tenet in driver training has created a safer response process which builds community trust and still allows crews to arrive on scene in a timely manner.

Probably the greatest issue with the road system is simply that it is inadequate for the volume of traffic which it must carry, coupled with almost continual road construction and maintenance. These two factors combine to demonstrate a low level of resilience in the road system, so that if a major thoroughfare, such as the Bend Parkway, is blocked for any length of time, traffic is backed up to unmanageable levels before adequate detours can

be determined and established. The impact on the BFD is that responding to a call anywhere near the blocked road is virtually impossible, and crews are likely not to know that the route is blocked. The result is a potentially unacceptably long response time to a critical call for service.

Code enforcement: Economic development efforts in Bend seek to attract a more diverse economy. The City of Bend has been able to transform industrial land previously used for the timber industry into a vibrant entertainment, retail and services related to tourism, as well as high density urban housing. This in-fill increases the population and demands for services in an already high call volume response district. Bend also attracts industry on the leading edge of creativity such as microbreweries, distilleries and cannabis. These trailblazers create a set of challenges that are not necessarily addressed in existing codes or established industry practices. The BFD collaborates with the City's Community Development Department to inspect facilities and enforce life safety codes, basing code enforcement and public fire and life safety education on risk models derived from predictive analysis, and guided by data-driven decision making.
BFD officers are empowered to issue cease and desist orders to events they consider hazardous. Although this is a rare occasion, it demonstrates that the BFD values community risk recognition and reduction.

The built environment: Clearly, in structure firefighting, buildings on fire are the firefighter's workplace, and in Bend, there is a wide range of age, quality, occupancy, condition and risk reduction infrastructure in the built environment. Although life safety codes have matured and improved, Bend has many structures which were built before codes were adopted, and like most communities, a good number of buildings which may not meet current standards.
A majority of Bend structures built in the past 40 years are constructed with lightweight combustible materials, such as oriented strandboard and engineered lumber, which have little to no reserve strength under fire conditions. This factor presents a high probability of early structural collapse under fire conditions, making interior fire attack more dangerous for firefighters. Moving to a defensive posture early in the fire is operationally safer but makes the destruction of the building inevitable.

In addition, the contents of structures are now predominantly made of hydrocarbons (plastics, derived from petrochemicals), which burn hotter, more readily and with more toxic byproducts than those of 25 or more years ago. The risk of hotter fires with flashover (simultaneous combustion of all contents in a room: unsurvivable) has increased with the hydrocarbon contents: the saving grace is that firefighters are better trained and prepared for type of fire, and they have adjusted and refined their tactical approach.

Although residential sprinkler systems have been shown to reduce the risk of a devastating fire and respond far more rapidly than any fire department, and they are readily available, they have yet to be adopted by this community. When that occurs, the risk of fire injury and property damage will be considerably diminished, and firefighter safety will be enhanced.

The BFD Culture: As the department culture has grown and changed over time, it has become less of a risk factor. At present, firefighters see themselves as professionals who provide top level essential services to the community with compassion and integrity, in a

timely manner. Care must be taken to see that the culture remains a positive force within the ranks, keeping community safety and risk reduction as the top priority.

Water Supply: The City of Bend water supply comes from both a recently improved surface water collection/distribution system and from 20 deep wells. In addition, several private water companies provide water service to areas within the DCRFPD#2. All these agencies have made continual improvements to their systems over the past few years, with the City system being the most reliable. The greatest risk is in areas that either have no hydrants or have widely scattered and low volume hydrants. In responses to those areas, the BFD must develop a continuous water supply using water tenders, portable reservoirs, a drafting engine and a shuttle system. This takes time and manpower: we often rely on mutual aid from other departments for this.

BFD response equipment: The responding apparatus and all the tools on board must be in excellent working order on every call, to help ensure a positive outcome. At this time, BFD has a fleet of 6 new engines, 7 new ambulances, 4 brush (interface) engines, 3 water tenders, 2 rescue units in good working order, and a ladder truck with a long maintenance record. The department has made a strong effort to upgrade and maintain the entire inventory of tools. The riskiest piece of equipment is the Ladder Truck, because aerial apparatus tend to be inherently high maintenance, it is an aging piece of equipment, and the company which built it no longer exists. In most fire situations, it is not a critical piece, but on large, complex structure fires in mid-rise buildings, it is critically important to have the ability to work at height.

The BFD has a Logistics Technician who repairs equipment efficiently, a mechanic at the City Shops who is certified to work on fire apparatus, and a commitment to maintaining all tools in optimal condition.

Pre-response factors

Public Safety Answering Point (PSAP): The Deschutes County Communications Agency (DCCA, Dispatch, or Deschutes 9-1-1) is the PSAP for all of Deschutes County. All 9-1-1 calls are received, processed and dispatched from DCCA. In the past, every public safety agency had different protocols and response requirements, which meant that the dispatchers had to conform to multiple ways of doing things, often simultaneously, every time a new call was received. This slowed the dispatch process and increased total response time. About 15 years ago, all regional fire agencies began to participate in the Central Oregon Fire Operations Group (COFOG), which intentionally set about to standardize common dispatch, response, radio and operations practices. One by one, the agencies addressed procedures methodically and collaboratively to standardize and regionalize operations. In 2007, a parallel effort began to align all radio systems for reliable interoperability, and DCCA has completed a total upgrade and expansion of the radio network. The acquisition of standardized radios for all departments has just been completed through a regional grant from FEMA. The risks presented by the current PSAP include high call volume and low staffing, the opportunity for information distortion, system failures and inaccurate/conflicting information from callers.

Public safety activity level: The variable activity level of a response system is a risk factor: a high level of activity by any local public safety agency impacts the others, with increased radio traffic, reduced resource availability, and community confusion and

concern. Generally speaking, when there are more people in the area, public safety activity increases, and we can predict spikes in activity at certain times, such as the 4th of July (traditionally our busiest day of the year, by far).

Weather conditions: Certain weather conditions, such as lightning or high winds, predictably increase fire activity. Thunderstorms, common in the spring and summer, produce either widespread lightning strikes (igniting wildland as well as striking houses), torrential rains, or both. Adverse weather conditions also can slow responses: snow and ice make driving hazardous, and extreme cold slows all operations down. Extreme cold produces many more response to frozen pipes and heating system fires. Hot and windy conditions, with the area's typical low humidity, are ideal conditions for rapid fire spread, with potentially devastating results. It is an understatement to say that we are weather-dependent. The weather prior to and at the time of an incident has a significant influence on the situation outcome.

Response factors

Alerting and notification: A major set of factors is how people at the incident are alerted and how 9-1-1 is notified of the event. When Deschutes 9-1-1 receives a call for assistance, it takes about one minute to process the information and determine the most appropriate resource to respond. Crews are alerted by Dispatch with a series of station-specific radio tones, a radio announcement, and they also receive the call via electronic transmission to their smartphones and department-issued tablets. In addition, the lights in the responding station are turned on automatically. If there is no response from a dispatched crew within 5 minutes, the dispatcher repeats the process. If crews are not in station at the time of the call, they still have the radio dispatch and the electronic means, so a missed call is exceptionally rare.

Mobility and access: Road and weather conditions at the time of a call are critical risk factors. This includes road construction, traffic density, time of day, season and other factors which put pressure on the infrastructure. Specific locations may have significant response issues, such as substandard bridges and culverts, or poorly maintained dirt roads.

Call levels and station reliability: Station, or Response Reliability is the probability that a given crew is **available for dispatch in their response district** when a call for service is received from somewhere in that district. If the crew is either already occupied with another call or is outside of their response district (training, for example), that crew is unavailable for dispatch and the next closest available crew must be dispatched, resulting in a longer travel/response time. Frequently, there are multiple concurrent calls, so that in a given district, the second, third or sometimes even fourth due resource is dispatched to a call. Response times are commensurately longer when first-due stations are not available.

Response reliability is a measure of emergency service depth an agency has. Ideally, at 100% response reliability, every call would be handled by the closest station with adequate personnel and the appropriate apparatus: this would keep response times to a minimum. However, since this requires vast resources, few, if any, communities can afford this level of service.

The answer is a compromise and a system to provide backup response capabilities when the closest resource is on a prior response, at training, out of service for mechanical problems or other assignments. This is the routine situation for most fire departments. Establishing the acceptable amount of risk and response reliability is where some national standards come into play, specifically, the American Heart Association (AHA) and the NFPA. The standards for total response time are based upon a reasonable probability for saving life and property. If response times for cardiac arrest, for example, are too long, studies have clearly shown declining patient outcomes. If fire response times increase, incipient fires can escape the room of origin, with an escalating threat to life and property.

This is why measuring response reliability becomes so important. If crews are responding into another station's response areas to provide a backup response for a crew engaged on a call, response times increase. In some instances, other agencies are requested to provide mutual aid response when all BFD crews are occupied on calls and another incident occurs. In fact, virtually all fire calls require at least 2 engine companies, and all critical ALS calls are assigned at least one engine, in addition to the responding medic unit. So, for Bend, critical calls (Charlie, Delta and Echo) seriously draw down resources and lead to extended response times for the subsequent calls, if crews are still engaged on the first one.

Response time: Response time elements are a cascade of events. One must keep in mind that some of the intervals described below can be directly influenced by the fire service (turnout interval and travel interval) and the 911 center (call processing time), while others are influenced indirectly (through public education, engineering initiatives, and standards).

Careful definition of terminology is essential to any conversation about response performance standards. It becomes even more critical when an organization attempts to benchmark its performance against other providers. The following definitions are standardized for discussion of response performance parameters within the BFD, and they also comply with the Oregon Deployment Process and NFPA 1710.

Time Points and Time Intervals

The **response performance continuum** is composed of the following time points and time intervals:

> ***Event Initiation****:* The point at which events occur which may ultimately result in an emergency response system activation. Precipitating factors can occur seconds, minutes, hours, or even days before a point of awareness is reached. An example is the patient who ignores chest discomfort for days until it reaches a critical point at which he makes the decision to seek assistance (point of awareness). It is rarely possible to quantify the point at which event initiation occurs.
>
> ***Discovery of Event****:* The point at which a human being or technologic "sentinel" (i.e. smoke alarm, heat detector, etc.) becomes aware of conditions that require an

activation of the emergency response system. This is considered the point of awareness.

***Alarm**:* The point at which awareness triggers an effort to notify the emergency response system. An example of this is the transmittal of a local alarm to a public safety answering point (PSAP = 9-1-1). Again, it can be difficult to determine the time interval during which this process occurs.

***Alarm Transfer Time or Alarm Transmission Interval Time**:* the interval between the awareness point and the alarm point. This interval can be significant, as when the alarm is transmitted to a distant commercial alarm monitoring organization, which then retransmits the alarm to the DC 9-1-1 dispatch facility.

***Alarm Notification**:* The point at which an alarm is received by DC9-1-1, via phone or electronic means.

Alarm Processing Interval: The interval between the first ring of the 9-1-1 telephone at the dispatch center and the time the Dispatcher activates responder alerting devices. This interval can be broken down in to two additional parameters: "**call taker interval**" (the interval from the first ring of the 9-1-1 telephone until the call taker transfers the call to the dispatcher) and "**dispatcher interval**" (the interval from the time when the call taker transfers the call to the dispatcher until the dispatcher activates responder). NFPA 1221 sets the following standards for call receiving and dispatching:

7.4.1: 95% of alarms received on emergency lines shall be answered within 15 seconds and 99% of alarms shall be answered within 40 seconds
7.4.2: (with the exception of certain call types specified in 7.4.2.2) 90% of call processing and dispatching shall be completed within 64 seconds, and 95% of call processing and dispatching shall be completed within 106 seconds (NFPA 1221, 2016 Edition).

***Turnout Time Interval**:* The interval between the activation of station and/or company alerting devices and the time when the responding crew either activates the "responding" signal by the apparatus (passage through a photoelectric beam in the opening of the apparatus bay door) or notifies dispatch by radio or electronic means that the company is responding.

During the turnout interval, crews cease other activities, don appropriate protective clothing, determine the location of the call, board and start the fire equipment or ambulance. It is expected that the "responding" signal will be given when the personnel are aboard the apparatus, properly secured, wearing the appropriate safety gear and the apparatus begins its response. For BFD crews in station, this occurs automatically when the apparatus proceeds through the opening in the bay door – the Ztron system.

NFPA 1710 sets a standard of 1 minute (60 sec.) for EMS incidents and 1 minute 20 seconds (80 sec.) for fire incidents turnout interval. For the reasons listed below, BFD has been unable to attain this objective.

- Factors affecting turnout time include time of day, station size and layout and security features, type of call (donning fire protection gear takes considerably longer), and activities at time of call.
- The BFD has a true cross-staffed dual response system in one station (302), and a partial cross-staff situation in all other stations. If a structure fire is dispatched, the crew responds with a Type 1 Engine, if it is a wildland fire, they must load their gear on the brush engine and respond with that unit. Because of this personnel must carry their personal protective equipment (PPE) with them in a large bag, which must be removed from apparatus to be donned or also moved from apparatus to apparatus based on call type. This process takes more time and is a factor for increased turnout times. The BFD has established a goal of 90 seconds for emergency responses and are currently reaching that goal 53% time (data analysis 2018), 71% of the time we have a turnout time of less than 2 minutes (120 seconds), and 92% of the time less than 3 minutes (180 seconds).
- The crew is not always together when an alarm is received, and at times, one member may be in such a position or location as to require additional time to respond.
- If the call is for a medical response, the crew may respond in their house uniform. However, if the call is a motor vehicle accident (MVA) or a fire, the crew is required to don their PPE before responding to the alarm. If the responding crew is driving at the time of dispatch, they must pull over to don their PPE. These activities take additional time.

***Enroute Time**:* The point at which the responding apparatus notify the dispatch center that they are responding to the alarm.
***Arrival (or on-scene) Time**:* The point at which the responding unit arrives on scene. Arrival is determined by actual physical arrival at the address of the emergency, as transmitted by Dispatch.

***Travel Time Interval**:* Begins with **enroute time** and ends with **arrival time**.

***Response Time**:* The interval from **dispatch time to arrival time** (turnout time plus travel time)

***Total Response Time**:* Time from receipt of call at the first answering point to arrival of first responding unit on scene. This represents the response time from the perception of the person requesting service.

- The NFPA 1710 standard states, for the initial company response: "The fire department's fire suppression resources shall be deployed to provide for the arrival of an engine company within a 240-second travel time to 90 percent of the incidents…"
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***Initiation of Action/Intervention Time**:* The point at which mitigation operations begin, including size-up, resource deployment, patient evaluation, etc. This time will vary, depending on scene access such as malls, multi-story buildings, river canyon, etc. Tracking this time is difficult and is identified to document arrival on scene.

***Control and Mitigate Event**:* The incident is under control and actions are taken to bring the event back to normalcy.

***Enroute to Hospital Time**:* The point at which a transporting ambulance departs the incident scene, enroute to the hospital with a patient.

***Arrival at Hospital Time**:* The point at which the ambulance arrives at the hospital with the patient.

***Termination of Incident or Available out of Quarters Time**:* The point at which unit(s) has completed the assignment and is available to respond to another call. This occurs by voice communication to dispatch or via mobile computer terminal.

***Customer Interval**:* It includes those factors that, in the customer's perception, reflect the performance of the BFD, whether or not we directly control those elements. This interval adds the call processing interval to the response interval.

Emergency incident response time is 1) a performance benchmark for fire departments, 2) a critical factor in determining an incident outcome and 3) the result of complex interaction of many factors. That is why the standard for response time includes the phrase "…80% of the time."

Incident/Scene factors

Crew competence/training: In the past several years, the BFD has developed a strong and comprehensive training program, staffed with a Battalion Chief and two Training Captains. Every day, there is some sort of training, either in station or at the Training Facility, with a 5 story tower, many various training props and numerous wrecked vehicles for extrication training. Each station is equipped with teleconferencing equipment, so that some training can be decentralized, and the crews are able to remain available for calls in each response district. The Special Rescue Team completes 8 hours of additional, specialized training every month and passes that training on to all crews.
Training staff focuses the daily work on specific operational aspects, aimed toward a quarterly company skills assessment. This approach has fostered greater crew competence and coherence. Because of the enhanced and sustained level of quality training, crew competence is increasing, decreasing the risk of incompetent operations.

Incident management: The BFD has adopted the Blue Card Incident Management System, a nationwide standard for handling all types of emergency calls. This system, developed by respected fire officers from Phoenix, AZ, simplifies, standardizes and organizes the communications and incident planning functions for virtually any type of incident. The BFD requires each officer to complete all the training and to pass a practical assessment. In addition, DC 9-1-1 has adopted the Blue Card system, and it is expected in the near future that all Central Oregon fire agencies will do the same.

The adoption of Blue Card has improved fire scene operations by standardizing and controlling communications and creating a logical flow of planning and task completion. This has reduced the risks of miscommunication and freelancing behavior.

Staffing levels: Staffing levels can add to the risk that the BFD faces, because they have historically been low, compared to the population. Although staffing has increased dramatically in the past 3 years, in part due to the BLS Ambulance program, continued population growth and a sustained building boom have conspired to keep ahead of the BFD staffing profile.
Although the BFD has 102 total line personnel, recommended staffing per shift is 28, spread over 5 stations and 3 shifts. Each shift is allowed 4 vacancies for vacation/holiday, and extra staffing is available to cover sick and injury leave. It is rare to have staffing over minimum; in fact, most days the Battalion Chief has to hire at least one additional member on overtime to cover a vacancy. The BFD's comparatively low level of staffing can be viewed as a risk factor, particularly when one factors in the frequency of multiple simultaneous calls. Two ambulance calls can occupy between 4 and 10 people (2-4 crews), pulling resources away from an incident requiring high staffing.

Mutual aid: Because most fire departments experience critical staff drawdown during extended operations, they will typically develop agreements with their neighboring departments to help each other, free of charge, for up to a certain duration, if and when forces in one jurisdiction needs assistance, either on a large incident or to assist with multiple calls. Strong mutual aid agreements foster a high degree of collaboration, especially when the aid is fairly reciprocal. The BFD has maintained long-standing mutual aid agreements with all fire response agencies in the region. With large and complex fire situations, mutual aid response is critical to reducing risk, either from the initial incident or with subsequent calls for service.
A related practice which the BFD uses is automatic aid (or auto-aid), where there is a pre-arranged response to areas which are near the boundary between two fire agencies. For example, Bend and Redmond Fire have an auto-aid agreement within a mile on each side of the mutual boundary, so that specified units from both agencies respond to a call automatically. Not only is this a good operational practice, but also it builds a strong bond between agencies in the long term.

F. Community Risk Reduction measures

The basic job of the fire department is to recognize, contain, reduce and minimize the effects of risks to the community. It is understood that risks are inherent in all human endeavors and in the natural world in which we live. It is not possible to enumerate, describe and eliminate every risk a community might face. However, it is incumbent upon us to stay vigilant, flexible and responsive to changing conditions and to minimize harm to the community and its citizens to the best of our ability. In addition, developing community resilience is a key part of reducing and managing risk, so that the community itself is engaged in the process of protecting itself from the effects of risk.
Fire prevention efforts, in collaboration with other public agencies, a sustained fire and life safety education program and community outreach are all critical components of community risk reduction measures. As the City evolves and grows, new risks come into play (opioid addiction, wildland-urban interface, aging population, etc) to which we must respond, not only with staffing and equipment for the proximate incident, but also with prevention and education measures to reduce the community risk.

G. Risks to the Community

One way to view community risk is to rank various types of incidents according to severity of threat and/or likelihood of occurrence.

Brush Fire, Awbrey Butte, 2007

1. Maximum Risk

a. Wildfire: The Bend area has experienced many destructive wildfires over the past few decades - including the Awbrey Hall (1990) and the Skeleton (1996). As a result, the BFD and the District helped create Project Wildfire and the FireFree program, 2 educational and mitigation programs which seek to involve homeowners in the process of mitigating high fuel loads (vegetation). In addition, the Deschutes National Forest has a fuels reduction program which strives to reduce the amount of flammable vegetation around major highways and developments. This effort also serves to underscore the importance of fuels reduction to the entire community. However, Bend is situated in a fire-adapted ecosystem, and as such, fuels (grasses, brush, trees **and** wooden structures) are more receptive to ignition than non-fire-adapted environments. This knowledge motivates a sustained effort in the fuels reduction and fire education arena. The land management agencies, the City of Bend and Deschutes County, along with other local agencies, have developed a cohesive strategy for managing the risk of wildfire and all its ramifications and community impacts. This is the most significant fire and life safety threat to our community.

2. **Significant Risk**
    a. **Structure Fire**: can be any fire within an enclosed building. This can be as small as a fire in a flue or a microwave oven, the contents of a single room on fire ("room and contents fire"), or flames coming from every window. The National Fire Incident Reporting System (NFIRS) which we use, combines all fires within a structure under that heading. For the past 2 decades, Bend has averaged about 100 structure fires annually. Although most of these fires are relatively small, all have potential to threaten life and cause damage, and they are generally very labor- and time-intensive, pulling resources away from other calls. In addition, structure fires place firefighters at higher risk, both for injuries sustained on the incident and for long-term health issues. Structure fires tend to release toxic material into the environment, placing the neighborhood at a higher health risk.
    Just a few decades ago, houses were furnished with items largely made from natural material - wood, wool, cotton, leather - things that can burn, but slowly enough that people generally had time to exit the structure. Now Americans tend to build and furnish homes with a large amount of items that are made of hydrocarbons (petroleum), which burn hotter, faster and far more toxically than before. In this fire environment, there is little time to escape, and a house can be a total loss before the fire department arrives. The risk to the firefighters, occupants, the community and the airshed has increased,
    Natural gas incidents: As natural gas use becomes more widespread, the risk of leaks into enclosed spaces, with a potential for explosion, becomes more critical. With increased construction and population in Bend, there has been a dramatic rise in the number of gas leaks from broken lines. In the past 5 years, the number of responses to gas leaks has doubled, from 11 in 2011 to 78 in 2016. If natural gas migrates into a structure and reaches its explosive mixture with air, any source of ignition can cause the gas to ignite explosively, destroy the structure, and endanger the community.
    b. **Weather-related incidents:** This category includes winter snowstorms, wind events, heat waves, lightning storms and the results from these and other types of weather phenomena. Although there is little that one can do about the weather, the BFD typically responds to many calls for service within each significant event, from buildings collapsed by snow to trees down on houses, to structures and dry brush hit by lightning. Apart from the obvious risks posed by these events, the effect to the BFD is that response to other critical calls for service is (or can be) compromised or delayed.
    c. **Epidemic:** This category acknowledges the fact that the fire service in general, and the BFD in particular, must deal with risks that were outside its purview just a few decades ago. As a community health factor, epidemic (Bird Flu, HIV, opioid addiction) can pose a significant risk to all residents, and it falls to the BFD to respond first. With a robust planning capability, every emerging risk has received the attention it requires.

3. **Routine Risk**
    a. Every emergency response organization incurs a certain level of risk, whether it be slips and falls on the station floor, a traffic crash involving responding apparatus, incident-related activities or the longer term health

risks inherent in the industry. The BFD takes every safety measure that is practically possible, abiding by OR-OSHA rules and meeting NFPA standards whenever possible, as well as other recognized standards, to keep both employees and those whom we contact in the course of our work as safe as possible.

b. Every agency also incurs a level of "organizational risk" based upon the culture of the agency. If the culture of an organization does not value training, for example, employees will tend to be poorly trained and less that optimally effective. A high level of organizational, or cultural, risk exposes the agency to lawsuits which can drain valuable resources. If, for example, it is the cultural norm to dismiss workplace harassment issues, the chances for a successful lawsuit are high, and the resulting settlement will damage not only the budget, but also the community's trust.

1. The BFD has actively chosen, through the stated Core Values and Credo, a cultural model which reduces and minimizes the risks described here. Although there is always a level of organizational risk, it is far lower than that of an organization without an intentional culture.

c. Regional population increase: the Bend area is experiencing a sustained population growth period, which started shortly after the 2008-2009 recession ended. An increase in population in an area like Central Oregon has always brought more people into the forestlands, with the predictable resulting in an increase in human-caused fires (https://www.newsdeeply.com/water/articles/2016/11/28/new-study-finds-surprising-culprit-drives-forest-fire-behavior). With more frequency and intensity of wildland fires from climate change, coupled with a higher potential for fire starts, wildland fire risks will continue to increase for all land management and fire suppression agencies.

Population increase brings a serious impact to the transportation system. As the area grows, the transportation infrastructure of Bend becomes less adequate for our population: it is built for a smaller population. When the system is stressed (a Parkway exit closed for a fire or wreck, for example), traffic backs up to the point that responding apparatus cannot access the incident or any other incident along that particular route. Coupling road construction project blockages with a blocking emergency presents a serious risk anytime the transient population increases, because response times can increase to unacceptable levels before anyone can arrive to handle an incident.

4. Remote Risk

a. This community faces several serious, yet remote risks that pose the threat of disaster. When the BFD becomes aware of a possible, even unlikely, risk, contingency planning is assigned and completed. If the threat disappears, such as a potential flu epidemic that fails to materialize, the plans are shelved but not discarded, and the planning process is reinforced. There are risks that eventually will be actualized, and since the effect may be so great, a collaborative regional planning effort is an ongoing process.

i. Cascadia Subduction Zone Earthquake: US Geological Survey studies have definitely determined that the Pacific Northwest coast has experienced major subduction zone earthquakes within a long term period of between 250 and 525 years, over the past 10,000

years. http://oregonstate.edu/ua/ncs/archives/2012/jul/13-year-cascadia-study-complete-%E2%80%93-and-earthquake-risk-looms-large). Events of this magnitude will wreak extreme devastation on the Coast and wide areas of the Willamette Valley, and such a quake will certainly affect Central Oregon. The risk factor is that the Bend/Redmond area is officially designated the Recovery and Restoration center for all of Western Oregon, and the effects of both the quake and the influx of people (refugees and long term helpers) will have both immediate and long-lasting repercussions across the region. This event, as unpredictable as it is, looms large in the world of emergency disaster planning, and preparation efforts across Central Oregon have been ongoing for several years as the research becomes more widely read and accepted. There is no doubt that such an earthquake will happen, quite likely within a few decades. It is a remote but very real risk. "*Now that we understand our vulnerability to mega-quakes and tsunami, we need to develop a culture that is prepared at a level commensurate with the risk,"* says Patrick Corcoran, OSU Hazards Outreach Specialist*. "Unlike Japan, which has frequent earthquakes and thus is more culturally prepared for them, we in the Pacific Northwest have not had a mega-quake since European settlement. And since we have no culture or earthquakes, we have no culture of preparedness."*

ii. Oil train derailment: Burlington Northern Santa Fe Railroad (BNSF) runs a main line through the middle of Bend, and in the past few years, as crude oil has been extracted from the North Dakota oilfields, the company has been transporting greater quantities of oil to refineries in California, through Bend. Across North America, in the past several years, there have been dozens of oil train derailments, causing devastating fires, injuries and deaths, along with environmental and property damage. Although this is a recent phenomenon, the community is very aware of the hazards associated with oil trains and looks to the BFD to respond appropriately. As with other remote but very real risks, the BFD has developed plans and training for handling such an incident.

H. Primary Community Risk Factors

1. From 2012 through 2018, the BFD total call volume has increased from 8201 to 10974, or 33.8%. Although daily staffing has increased from 18 to 28 and the number of available response units has increased from 6 to 11, multiple concurrent incidents has become the norm in Bend..

2. Since 2012 our EMS responses, as a percentage of total calls, have increased from 6736 to 8972 in 2018 (33%). Although there is significant potential for life and property loss in fire incidents, the greatest risk to life occurs on a daily basis in EMS incidents.

3. As the total number of emergency incidents rises, with more multiple concurrent calls, response time improvements are endangered, and the risk of inadequate resources becomes more likely.

4. Increasing population has led to greater development in the wildland-urban interface, creating a higher risk of human caused wildland fires and putting more structures at risk in such an incident.

5. With increasing population comes greater infrastructure use, resulting in greater wear and tear on the infrastructure and a higher likelihood of crash incidents.

6. The increase in hydrocarbon based home furnishings makes structure fires burn hotter, more intensely and with greater toxic products of combustion, leading to a greater likelihood of flashover earlier in the incident and endangering both occupants and firefighters. Time-temperature studies demonstrate a much higher fire growth curve than even 3 decades ago.

7. In the past 2-3 decades, there has been a strong movement in the building industry toward lightweight building materials. These materials, although engineered, permitted and approved for structural integrity, are prone to rapid and catastrophic failure in fire conditions, leading to early building collapse and for life safety, a need for fire response to arrive ever earlier in the incident.

I. Summary of risks

Fire departments have always faced risky incidents, generally in a static culture. The past several decades have seen great advances in technology, which have enhance modern living, but also have increased our exposure to risk. Eliminating all risks is impractical: there will always be an acceptable level of risk, and in that context, a certain level of risk can make a community more resilient and stronger.

In addition, the risks to the organization have increased, both in legal and financial terms and with respect to community trust and support. By choosing and adopting a strongly positive and respectful culture, the organization can minimize workplace risks such as harassment or unsafe conditions. Threats to financial stability, such as rising costs, negative economic trends and aging facilities must be recognized early enough to plan minimization strategies.

In the dynamic process of change, new and significant risks appear to pop up overnight: Oil Trains, Active Shooter, wildfire concerns, Subduction Zone Earthquake, flu epidemics, etc. The best mitigation strategy is to exercise due diligence, scrupulous research and strongly collaborative planning, anticipate new issues and train personnel accordingly.

The BFD has always found a way to respond. It is wise to be realistic about what the BFD can do and to acknowledge what the BFD is not able to do when extraordinary risk factors come into play.

House saved from brush fire, Awbrey Butte, 2007

SECTION 4: STANDARDS, GOALS AND OBJECTIVES

A. Externally imposed standards and guidelines

All applicable National Fire Protection Association (NFPA) standards, including the following specific documents. This list is by no means all-inclusive:

- NFPA 1710: represents the driving force behind the deployment process. This document promulgates instructive standards for both turnout and travel time performance on a percentile basis. Most significantly, NFPA 1710 states that fire departments will have a deployment plan, and in addition, that they will address areas where response performance is deemed substandard through an explanation of the relevant factors. [1]

[1] NFPA 1710, 1.2.1 Purpose, 1.2.2., and 1.3 Equivalency

- Fire departments of BFD's size cannot meet all of the NFPA 1710 standards, and this document, the Standards of Response Coverage, is recognized as a surrogate for NFPA 1710, with the understanding that the BFD will strive to meet as much of the standard as possible.
- NFPA 1221: is the national standard for communication systems and dispatching for emergency agencies and impacts both our local communication center (911) and all fire service agencies.
- NFPA 295: Standard for Rural and Forest Fire Protection
- NFPA 472: Standard for Professional Competence of Responders to Hazardous Materials/Weapons of Mass Destruction Incidents
- NFPA 1670: Standard on Operations and Training for Technical Search and Rescue Incidents
- NFPA 1143: Standard for Wildland Fire Management
- Oregon Health Division – Oregon Administrative Rules Chapter 333, Emergency Medical Services & Trauma Services
- Insurance Services Office (ISO) – Leading source of information about property/casualty insurance risk. Establishes ISO rating for fire departments which determines insurance rates for constituents.
- Oregon Department of Public Safety Standards and Training, DPSST ORS 181, OAR 838
- The Federal Occupational Health and Safety Act (Federal – OSHA) and State of Oregon OSHA rules dictate firefighter safety and have established minimum standards for communications, safety officers, incident command, equipment, and most significantly, parameters on when firefighters can enter **immediately dangerous to life and health** (IDLH) environments[2]. The IDLH staffing requirements from OSHA, known in the fire service as "2-in, 2-out," is the primary reason for the development of fire response staffing which can meet search and rescue objectives with the first-due fire apparatus.

B. Bend Fire Department Performance Statements

INITIAL UNIT RESPONSE TIME – Performance Statements for <u>all</u> Emergency Incidents

<u>City of Bend</u>

Current Performance Statement: For **80%** of all incidents, the first due unit shall arrive within **8.75 minutes** (turnout time + travel time) response time. The first due unit shall be able to advance an attack line on a fire, provide ALS care on EMS incidents and, for incidents involving life hazard, begin rescue efforts.

[2] OR-OSHA 1910.134(g)(4)

[The NFPA 1710 standard is 5.3 minutes (320 seconds: 80 second turnout time + 240 second travel time) response time for initial response on fire and special operation responses and 5 minutes for EMS responses, 90% of the time.]

Goal Performance Statement:
For **80%** of all incidents, the first due unit shall arrive within **8.5 minutes** (turnout time + travel time) response time. The first due unit shall be able to advance an attack line on a fire, provide ALS care on EMS incidents and for incidents involving life hazard, begin rescue efforts.

Deschutes County Rural Fire Protection District #2
Current Performance Statement: For **80%** of all incidents, the first due apparatus shall arrive within **12.25 minutes** (turnout time + travel time) response time. The first due unit shall be able to advance a fire control line on the fire, provide ALS care on EMS incidents, and, for incidents involving life hazard, begin rescue efforts.

Goal Performance Statement: For **80%** of all incidents, the first due apparatus shall arrive within **12 minutes** (turnout time + travel time) response time. The first due unit shall be able to advance a fire control hose line to the fire, provide ALS care on EMS incidents and, for incidents involving life hazard, begin rescue efforts.

Ambulance Service Area – "Frontier" Area Outside of Fire District
Current Performance Statement: For **80%** of all incidents, the first due apparatus shall arrive within **35 minutes** (turnout time + travel time) response time. The first due unit shall be capable of providing ALS care on EMS incidents.
Goal Performance Statement: For **80%** of all incidents, the first due apparatus shall arrive within **35 minutes** (turnout time + travel time) response time. The first due unit shall be capable of providing ALS care on EMS incidents.

STRUCTURE FIRE EFFECTIVE RESPONSE FORCE TIME – Performance Statements:
City of Bend
Current Performance Statement: Within the city limits of Bend and where adequate water flow is available from fire hydrants, the initial Effective Response Force (ERF - 14 personnel) shall arrive within 21 minutes (turnout time + travel time) 80% of the time, be able to provide a minimum of 400 gallons per minute (gpm) for 30 minutes and establish an effective water flow application rate of 300 gpm from two handlines, each of which shall have a minimum of 100 gpm.

(NFPA 1710 states an initial full first alarm assignment will arrive within 9 minutes 20 seconds (turnout time + travel time) to 90 percent of the incidents with a minimum of 400 gpm for 30 minutes and establish an effective water flow application rate of 300 gpm from two handlines, each of which shall have a minimum of 100 gpm).

Goal Performance Statement: Within the city limits of Bend, the initial ERF (14 personnel) shall arrive within 18 minutes (turnout time + travel time) 80% of the time, be able to provide a minimum of 400 gpm for 30 minutes and establish an effective water flow

application rate of 300 gpm from two handlines, each of which shall have a minimum of 100 gpm.

Deschutes County Rural Fire Protection District #2

Current Performance Statement: Within the boundaries of DCRFPD #2, the ERF (14 personnel) shall arrive within 26 minutes (turnout time + travel time) 80% of the time and be able to provide a minimum of 200 gpm sustained water flow for 20 minutes. Insurance Services Office (ISO) Criteria for Class 8B: The minimum fire flow must be able to start within 5 minutes of the arrival of first Engine Company and the water supply must be able to deliver an uninterrupted minimum fire flow of 200 gpm for 20 minutes. The department must be able to deliver the minimum fire flow to at least 85% of the built-upon areas of the community within 5 road miles of a recognized fire station.

Goal Performance Statement: Within the fire protection district of DCRFPD #2, the ERF (14 personnel) shall arrive within 18 minutes (turnout time + travel time) 80% of the time, and be able to provide a minimum of 250 gpm fire flow for 2 hours duration without interruption.

Insurance Services Office (ISO) Criteria for Class 8: There must be a minimum water supply of 250 gpm for a 2 hour duration for the entire fire protection in the area. If the fire department delivers the 250 gpm through tanker shuttle, large diameter hose, or other alternative water supply, the water must be available within five minutes of the arrival of the first-due apparatus, and the department must maintain the flow, without interruption, for the two-hour duration.

WILDLAND FIRE EFFECTIVE RESPONSE FORCE TIME – Performance Statements

City of Bend

Current Performance Statement: Within the city of Bend, the initial ERF (10-13 personnel) shall arrive within 15 minutes (turnout + travel time) 80% of the time, be able to establish an anchor point and begin flanking the fire perimeter.

Goal Performance Statement: Within the city of Bend the initial Effective Response Force (7-9 personnel) shall arrive within 15 minutes (turnout + travel time) 80% of the time and be able to establish an anchor point and begin flanking the fire perimeter.

Deschutes County Rural Fire Protection District #2

Current Performance Statement: Within the DCRFPD #2, the ERF (10-13 personnel) shall arrive within 22 minutes (turnout + travel time) 80% of the time and be able to establish an anchor point and begin flanking the fire perimeter.

Goal Performance Statement: Within the DCRFPD #2 the ERF (10-13 personnel) shall arrive within 22 minutes (turnout + travel time) 80% of the time and be able to establish an anchor point and begin flanking the fire perimeter.

EMS EFFECTIVE RESPONSE FORCE INCIDENTS WITH 2 OR MORE COMPANIES – Performance Statements

City of Bend

Current Performance Statement: Within the City of Bend, the initial ERF for EMS incidents requiring 2 companies or more (5 or more personnel) shall arrive within 13.5 minutes (turnout + travel time) or less 80% of the time.

Goal Performance Statement: Within the City of Bend, the initial ERF for EMS incidents requiring 2 companies or more (5 or more personnel) shall arrive within 12 minutes (turnout + travel time) or less 80% of the time.

Deschutes County Rural Fire Protection District #2

Current Performance Statement: Within the DCRFPD #2, the initial ERF for EMS incidents requiring 2 companies or more (5 or more personnel) shall arrive within 18 minutes (turnout + travel time) or less 80% of the time.

Goal Performance Statement: Within the DCRFPD #2 the initial Effective Response Force for EMS incidents requiring 2 companies or more (5 or more personnel) shall arrive within 17.5 minutes (turnout + travel time) or less 80% of the time.

C. Other Bend Fire Department Performance Principles and Guides

Closest forces: The BFD uses the "Closest Forces" concept, where the qualified resource **nearest** a reported incident will respond. The Deschutes 9-1-1 computer aided dispatch system (CAD) is set up to fulfill this mandate. When all units are available in station, this is straightforward. Having resources out of station, either returning from a call, completing station errands or involved in training complicates the process of determining which unit is actually closest. Although dispatchers use the system as carefully as possible, at times they must consult with the BC to determine which unit is closest. The BC has the authority to reroute a resource from one response to another, depending on the reported severity. For example, if a crew is responding to an illegal burning call while a house fire is reported, the BC may reroute the all units to the house fire and request a more distant resource for the initial call.

In addition, if a crew is available for a call while out of station (returning from Training, for example), passing through another response district and they happen to be closer to the call location, that crew is expected to "jump the call," or notify Dispatch that they will respond.

Deschutes 9-1-1 plans to establish a new CAD system by 2019 which will locate units by GPS, optimizing the closest forces concept.

PPI/SOG

The BFD has developed a set of guiding policies (**Policy, Procedure and Instruction**, or **PPI**) and Standard Operating Guidelines (SOGs), in order to ensure that all personnel are working toward common goals within the constraints of organizational operational

boundaries. The PPIs are essentially the organization's "laws," while the SOGs offer guidance on specific types of incidents and operations. Together they give crews a solid framework of what is or is not acceptable behavior and procedure. They are reviewed and updated on an ongoing basis. Although they are not available to the general public, these documents can be found by contacting the Bend Fire Department, as reference for this document.

Turnout times: As noted in Section 2 above, the BFD has a turnout time standard, codified in Policy, Procedure and Instruction (PPI) 1500-002:

"**INSTRUCTIONS**

1.1 The roll-out standard for emergency responses is 90 seconds.
The roll-out standard for non-emergency (non-lights and sirens) responses is 3.0 minutes."

Blue Card Incident Command:
The Blue Card Command system was adopted by the BFD in 2014 to standardize the hazard zone organization and communication. Blue Card adoption also provided a certification and continuing education system for Incident Commanders (IC) for common strategic and tactical emergency operations conducted on less complex events, such as a small brush fire or a car fire. Although only company officers achieve certification as IC, all members participate in training, resulting in the normalization of the expected communication model while operating inside a hazard zone. Radio discipline is stronger, reducing confusion and enhancing communications, as well as eliminating unnecessary radio traffic. The end results are superior firefighter safety and accountability. Every company officer and the IC knows where their firefighters are, and the radio is clear for firefighters to inform the IC if they encounter difficulties.

Another benefit of Blue Card Command is predictability in hazard zone assignments. The training heavily emphasizes matching strategic and tactical priorities with the current problem, and each strategy and tactic has a set of assignments that responding crews can expect to receive from the IC. This level of predictability is achieved through repetition in realistic computer based simulations that enable the users to respond to what they see on the screen. Multiple views are available for different responding apparatus, from the first arriving engine to the Battalion Chief. The continuing education modules required to maintain certification as a Blue Card IC further reinforce the lessons taught in the initial certification process.

Medical Control:
The City of Bend contracts with two St. Charles Medical Center (SCMC) Emergency Department physicians to serve as Medical Director and Assistant Medical Director for the BFD. These doctors also facilitate monthly Case Reviews every month, where specific EMS calls are reviewed and critiqued. In addition, they assist with the Continuing Quality Assurance Program (QA), they evaluate the skill level of employees through an annual ambulance ride-along program, and they help mitigate any medical-related issues. These are key elements in maintaining and building the strength of BFD's EMS response system.

All of BFD's medical operations are sanctioned and permitted under the Medical Directors' state Physician Licenses, and every BFD employee is required to hold a

current Oregon Health Authority EMT license at the Basic, Intermediate or Paramedic level. Paramedic certification is required of new firefighters and must be maintained in good standing for a minimum of 7 years.

Garage fire, 2016

SECTION 5: CRITICAL TASK CAPABILITY

Kate's Place Fire, 2016

1. FIRE RESPONSE

A. Strategic Priorities

The three strategic priorities through which we view every incident are always, in order of consideration, **Life Safety, Incident Stabilization,** and **Property Conservation.** (The sole exception is an incident involving hazardous materials, in which case **Environmental Protection** is considered before **Property Conservation**.)

B. Risk Statement

Risk assessment, Standards, Goals and Objectives, and the Capabilities and Limitations of our response force are the elements of a Standard of Response Cover which will determine staffing levels, station placement and acceptable level of risk to the community.

- ***It is expected that we will risk our safety to save the life of a fellow human being.***
- ***With calculated safety precautions, we may risk our safety to protect savable property.***
- ***We will not risk our safety for life or property that is clearly lost.***

C. Dispatching the Incident Response

Every location within our response boundaries has a pre-determined response assignment (or "run card") for any type of incident that might occur. In addition, each response is tiered into "alarms:" a First Alarm Assignment is comprised of all the resources that one might

expect to mitigate a typical incident (of whatever type is reported). Greater alarms (2nd Alarm, 3rd Alarm) are assignments comprised of resources, always stationed more distant from the incident location, which can respond if the incident grows beyond the capability of the prior alarm assignment, and each additional alarm is requested by the Incident Commander according to need. The assignments are determined by a sophisticated Computer-Aided Dispatch program which meets or exceeds industry standards.

In addition, every call which is dispatched (by 9-1-1) is assigned a severity designation - **Alpha, Bravo, Charlie, Delta, Echo,** or **Omega** – by the dispatcher, based on the information provided by the caller(s) in response to specific dispatch questions. Incident information from a caller may or may not be reliable, depending upon the individual's state of mind and perceptions. The Severity Designation correlates with the number and type of resources assigned to the call:

Alpha: single resource, non-emergency, remote life or safety threat potential

Bravo: single resource, minor potential for life safety threat

Charlie: single resource, fire confined to appliance, minimal life safety threat

Delta: Modified first alarm assignment, smoke visible, potential life safety threat

Echo: Full first alarm assignment, confirmed working fire, high potential life safety threat

Omega: public service calls.

The BFD has developed automatic mutual aid (auto-aid) agreements with Redmond Fire to the north and Sunriver Fire, to the south. Within a defined distance on either side of the district boundaries, run cards assign the closest resources from each department to a given incident. For example, a structure fire near the Bend-Redmond boundary will require two engines, a Rescue and a BC and a water tender from Bend, and an engine and a medic unit from Redmond. This ensures the shortest response time for **all** resources responding to the incident.

D. Critical Tasks

Critical tasks are the essential components of every operation which must be completed in a timely manner for each incident, to mitigate and prevent escalation of the incident, which otherwise may continue to threaten life and property. Every type of emergency incident has a specific set of tasks, which, when completed sequentially, lead to the resolution of the incident, and each task takes a certain number of people and time for successful completion. Also, every incident has a variable set of conditions, such as location, weather, construction type, obstacles and human factors, which alter the amount of time for completion.

The foundation for critical task completion, and thus for a successful incident outcome, is solid, reliable and ongoing training at the crew level. The BFD has, in the past 5 years, significantly upgraded the training program by affirming its high priority through increased

funding and staffing. By choosing to make training a pillar of the BFD culture, the organization has increased the likelihood of successful outcomes.

In order to complete the incident-specific critical tasks in a timely manner, we rely upon an **Effective Response Force** (ERF): the minimum number of well-trained people on scene who can safely operate together to mitigate the incident. Life safety, specific risk factors, time constraints, incident complexity and work load are considerations to determine the number of people required to mitigate the incident efficiently.

Sound data, experience and reliable command training and competence determine the incident resource needs, in order to eliminate life safety threat and stabilize the incident. The goal is to respond with the optimal number of personnel, with the appropriate equipment, at the right time to address the strategic priorities effectively. Too little personnel can compromise responder and occupant safety, while too many responders may leave the BFD short-staffed for an ensuing incident. At the same time, it is wise to have enough extra people to handle unexpected fireground issues.

Individual incident strategies, action plans, tactics and tasks are dictated by resource availability, as well as incident conditions.

As noted in Section 1 above, recommended daily BFD staffing is 28 during the day and 25 at night (one BLS unit and the SRV are assigned 10 hours per day). Four engines are staffed fulltime, and one (Tumalo) is cross-staffed with an ambulance (which means it may not be available for a fire call if the crew is responding to a medical call.) Very rarely (once or twice per year), conditions may briefly occur where staffing is reduced below the recommended level. An example of this occurs when a one or more crews are dispatched to a State-declared Conflagration outside of our response boundaries, and the BC is either in the process of backfilling staffing or there are not enough off-duty people available to fill vacancies. Additionally, when crews are responding to an incident, we do not normally refill the station vacancy for that time, so if several crews are working calls simultaneously, our available staffing drops below the recommended shift level.

The BFD uses mutual aid (codified by longstanding signed agreements) from neighboring departments exclusively to cover stations or calls when our forces are depleted on incidents, NOT for primary response needs when we still have available staffing. The exception to this is our wildland response partners, who may respond to assist us on initial attack on wildland fires inside our response boundaries.

1. Structure fire response

Rules of engagement

The following guidelines provide examples of response criteria for the BFD and exist to provide guidance for predictable incident needs, firefighter safety and community protection. A “Rescue Profile” indicates the potential for someone’s life to be endangered by a particular fire.

Full critical task assignment

Rescue Profile

The determination that a rescue profile exists is based upon specific incident factors, such as occupancy, time of day, location and size of the fire, fuel loading, observed heat and smoke conditions, structural integrity, and a judgment of the potential survivability inside the structure.

Oregon Occupational Safety and Health Administration (OR-OSHA) rules require 4 firefighters to be on scene prior to the initiation of **interior** fire suppression operations. However, with a high rescue profile incident, where firefighters must enter a building to effect a rescue, one engine company (3 people) may take action to perform a rescue, as long as they withdraw from the building as soon as the rescue is made and do not reenter until on-scene staffing meets the required number. Practically speaking, if a rescue is made, personnel will likely be assigned to care for the victim, rendering them unavailable for interior operations. When BFD crews must enter the building without the required outside personnel, it is an extreme situation, where a life will be lost without immediate action. This is called “operating in Rescue Mode.”

Incidents with a high rescue profile indicate a full critical tasking assignment and an immediate need for a full first alarm assignment.

Reports of Smoke or Fire Showing/Multiple Callers

This type of incident may have no known victims inside the building, yet the threat of a working fire inside a structure may lead to a larger incident with an impact on life. If scene personnel determine that there is a low or no rescue profile, interior operations can commence when 4 or more firefighters arrive on scene, and full critical tasking will still be required to handle the incident effectively.

If there are not enough firefighters available to complete full critical tasking, **or** if the conditions inside the building are clearly not survivable, the Incident Commander (IC) will order a **defensive strategy**, using exterior tactical operations to confine the fire to the building and to protect exposed structures. Typically, defensive operations allow for greater fire spread within the structure of origin; however, firefighter safety is not sacrificed for property only, meeting our Risk Statement.

Less than full critical task assignment

Incidents with a low probability of a working fire

Reports of incidents with a low probability of a working fire, such as a smell of smoke or an overheated appliance, with no confirmed report of smoke or fire, will receive a tiered response, to conserve resources. The IC retains the option of upgrading the response to a full first alarm assignment. The critical tasks necessary on a working fire may not be necessary on this type of incident.

A vehicle fire (unless a large commercial truck) or a dumpster fire fall into this category. There is a certain potential for life hazard associated with these types of fire, but they fall outside of the full critical tasking model. Usually, a single engine can handle this type of incident.

Single Engine or SRV Response

An incident with a low level of potential for life hazard or fire spread, such as a debris burn, smoldering materials or a smoke investigation, can be handled by the SRV (one person) or a single engine, if the SRV is not available. However, note that when an engine responds to a call of any type, that resource is committed and unavailable for a higher priority call unless diverted by the Battalion Chief/Shift Commander.

Critical Task Assignments

Critical tasks on structure fires include, but are not limited to, size up, search and rescue, forcible entry operations, applying water to the fire, ventilation, confinement and extinguishment of the fire, pump and water supply operations and firefighter safety coverage. Each of these tasks take time, energy and skill, coupled with continual situational awareness.

The following chart shows the minimum number of people needed to complete the critical tasks in a timely and effective manner. This chart reflects only our first alarm assignments. As noted above, larger or more challenging incidents may require greater alarms, comprised of mutual aid partners, off-duty personnel and reserve apparatus.

Critical Tasks – Structure Fire

Minimum Personnel for an Effective Response Force

Task	Single Family	Commercial/ Multi-Family
Command/Safety/Accountability	1	1
Pump Operations/Water Supply	2	2
Fire Attack	2	4
Fire Ground Support	4	6
RIT / EMS	3	3
Secondary Line	2	2
Incident Total	**14**	**18**

Figure 4

Secondary Support Functions

After the initial Critical Tasks are completed, the incident is well on its way to mitigation. Secondary functions, while not of immediate priority, are necessary for the longer term successful mitigation of the incident, safety of the crews, and the care of those affected.

These tasks include rest/rehab for firefighters, Safety Officer, Public Information Officer, salvage and overhaul, and supplemental staffing for extended operations.

The following chart illustrates the support functions that must be addressed for a fully positive outcome. **Note**: the Incident Commander is responsible for **all** functions until he/she delegates them to someone else. These functions can often be filled by personnel from the initial response, but the IC has the latitude to request additional resources to complete these tasks.

Secondary Support Functions – Structure Fire

Task	Single Family	Commercial/ Multi-Family
EMS	2	2
Rehabilitation	2	2
Safety Officer	1	1
Public Information	1	1
Extended Operations	6	10
Total	**12**	**16**

Figure 5

Mid- and high-rise Buildings and Target Hazards

There are currently more than 15 structures greater than 3 stories in height within the fire protection boundaries. Some are residential, often restricted to vulnerable populations, and many are located in the downtown core. In addition, Bend has numerous “target hazard” buildings, defined as a large structure occupied by many people at one time. The two institutions of higher education in Bend each have multiple such structures. Examples include hospitals, schools and retirement homes. These structures and occupancies present strong operational challenges when they are on fire. Although they pose a high potential life hazard, new building codes, strong safety education initiatives and fire sprinkler requirements have helped reduce the inherent risks of the buildings.

Since these structures intrinsically pose a high risk to life, a significant fire in a target hazard will significantly tax the BFD staffing and logistical capabilities.

Further, Bend’s downtown core has many very old commercial structures which were not built to current building codes. It is vital to remember that most of the old downtown buildings have NOT had a fire sprinkler upgrade. If a fire extends beyond intrinsic fire protection systems (sprinklers and fire protection barrier measures), we will consider the incident to be beyond our staffing capabilities to adopt a committed interior, offensive strategy, and the IC will prepare crews for a defensive stance. Incident priorities will be the safety of responders and the public, the containment of the fire to the building, and the protection of adjacent exposures.

A large fire in a core downtown building or a target hazard will most likely require at least a second alarm assignment, drawing resources from our remaining crews and reaching out to several mutual aid partners. With the resources we have and the call volume we

experience on a daily basis, a large target hazard fire will bring a stiff challenge to our operational capability.

2. Wildland fire response

Most of our wildland fire responses occur in the wildland-urban interface (WUI), where people have built structures and live in terrain dominated by native wildland vegetation: forested areas, brushy terrain and native grassland. A wildland fire (brush, grass and trees on fire) often occurs in areas with a relatively high concentration of structures and may require substantial resources to evacuate residents and manage the incident. It is common to have a multi-agency response to this type of fire, in any part of the city. Our land management agency mutual aid partners include the US Forest Service (USFS), the Bureau of Land Management (BLM), and the Oregon Department of Forestry (ODF). Interagency agreements have predetermined the response assignments, and each year there is a pre-fire season meeting where all agreements are reviewed, and collaboration is reaffirmed.

ODF levies a small fire protection tax on properties on the west side of the District, to fund additional wildland fire protection to that area, which has been determined to pose a higher level of risk. However, ODF crews routinely assist BFD with wildland fire response in all areas of the City and District.

The wildland fire season has generally spanned from June through September and is designated every year, after considering climatic and fuels conditions, by the above land management agencies and the Central Oregon Fire Chief's Association. In the past few years, active wildland fires have started earlier in the season and extended later into the year, possibly as a result of climate changes. Off season wildland incidents are generally handled with a single resource because of the decreased fire danger.

Wildland fires pose several serious threats to the community: obviously a danger to response personnel and community members; even a small wildland fire can ignite adjacent structures; the risk of rapid fire spread; the exposure of the infrastructure to fire; and the drawdown of resources to handle the situation. At times, wildland fires are very staff- and time-intensive, and as a result, the rest of the response area may be understaffed for an extended period of time. Further, extended fire operations during intense fire seasons (such as 1996, 2017 and 2018) are a big draw on the budget.

When a wildland fire exceeds the regional capability to stop it from spreading, we utilize the Oregon Mobilization Plan (Mobe Plan) developed by the State Fire Marshal's Office to request additional resources from around the state. These may include **Task Forces** - generally a group of 5-6 resources assembled from several agencies for the purpose of assisting local units (example: 2 Type 3 Engines, 2 Type 6 Engines, 1 Water Tender and a Leader) – or **Strike Teams** – 4-5 similar units, such as 4 Water Tenders. When all county fire resources have been depleted for a large fire, the IC will contact the County Fire Chief to request further resources via an invocation of the Oregon Conflagration Act. The Governor's invocation allows resources from across the state to be assigned to the incident. Critical tasks for wildland fires include size up, water supply operations, securing an anchor point, developing hose lines, attacking the fire in a flanking operation, removing

fuel from the fire, evacuating people, assessing structural vulnerabilities, and developing a command organization.

Statewide conflagration resources will typically be assigned to secondary support roles, such as triaging, preparing and protecting exposed structures and mop up operations. Although this occurs rarely, these responding resources are critically important to the overall incident outcome. In an extended operation, it is the wildland agencies that will continue the actual suppression operations, and the fire department resources will concentrate on structural protection.

Since fire season is declared when wildland fuels (dead vegetation matter) reach a threshold minimum moisture content and are more receptive to ignition, it is important to understand that **everything that can burn is considered to be fuel by a fire**: when vegetation is more ignitable, so are structures.

Initial Attack (First Alarm) for Wildland Fire Incidents

The following chart demonstrates minimum staffing for the critical tasks on a wildland fire, initial attack. For the vast majority of wildland fires, this is a sufficient staffing model to handle the incident. The BFD fights wildland fires aggressively, because in the Central Oregon ecosystem, fire can move fast, threaten lives and cause great damage in a short amount of time. Over the years, determining whether to act fast with the resources on hand or to upgrade to a large multi-agency incident, requiring air support and out of area resources, has been a critical skill.

Critical Tasks – Wildland Fire

Task	Minimum Personnel
Incident Command / Safety Officer	1
Pump Operations, Water Supply	4
Fire Attack	8
Effective Firefighting Force	**13**

Figure 6

2. EMS/RESCUE RESPONSE

A. EMS

Since over 80% of BFD's call volume is EMS-related, it is critically important to understand the impacts of this area on our overall response capability. The BFD is the sole emergency medical services provider in the response district, and for many years, the personnel in our 5 fire stations cross-staffed fire apparatus and ambulances: a crew responded with the appropriate type of vehicle for the call, and once they were assigned to a call, the station's response district was without a response capability from that station, until the call was terminated. This situation - understaffing and thus having to cross-staff units - was a major reason that our response times were so high, as noted in the 2011-2013 Standards of Cover.

The passage of the Local Option Levy in 2014 enabled the BFD to hire enough Basic level EMTs to staff two BLS Medic Units and a Quick Response Vehicle (QRV) staffed with 1 paramedic. These units now respond to medical calls of a lower severity, preserving the availability of the engines and ALS medic units. In turn, 80th percentile emergency response times have dropped from 08:09 in 2014 to 07:48 in 2018. Figure 7 shows the ALS-BLS divide for 2016.

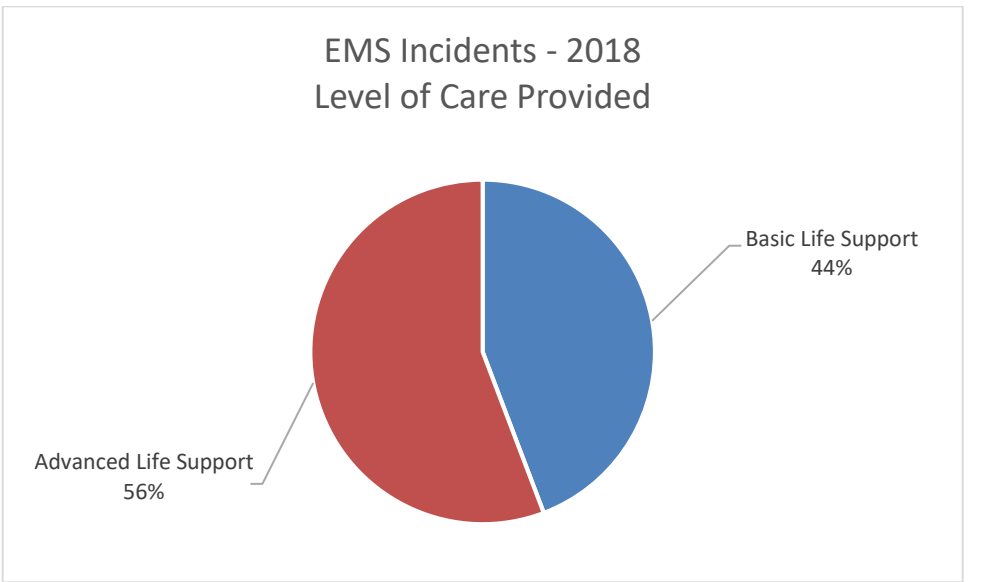


Figure 7

Further adjustments in staffing, again facilitated by the levy funding, have provided the BFD with 4 dedicated engines (crews do not cross-staff an ambulance), 3 dedicated ALS Medic Units and the SRV. These units, coupled with the Tumalo station (which still cross-staffs engine and medic), have given the BFD a measure of response flexibility and have contributed to lowered response times.

Critical tasks for EMS calls include patient assessment, observation, history and vital signs, initial on scene treatment, transport to SCMC, transfer of care and call documentation.

The BFD has made significant improvements in Witnessed Cardiac Arrest (aka Code 99 or Code) responses, with an increase in verifiable saved lives from roughly 20% in 2013 to 71.4% in 2016. This is due to several factors: the adoption and proliferation of High Performance Cardiopulmonary Resuscitation (HPCPR) protocols, the commitment by the Bend Police Department to respond to these calls to assist crews with CPR and defibrillation, an increase in the quality and use of bystander CPR, along with improved Dispatcher-directed CPR by the 9-1-1 caller, and a commitment by leadership to staff the response appropriately. The BFD actively encourages community members to assist by offering a free monthly HPCPR class and by inspiring citizens to use the PulsePoint cell phone notification system to alert them to nearby cardiac events.

The following charts illustrate staffing for critical tasks for non-life threatening, life threatening, and cardiac arrest medical responses.

Critical Tasks - Non-Life Threatening Medical Response

Task	Minimum Personnel
Primary Medic / Incident Commander	1
Driver/ Information	1
Total	**2**

Figure 8

Critical Tasks- Life Threatening Medical Response

Task	Minimum Personnel
Primary Medic / Incident Commander	1
Driver/ Information	1
Treatment and Care	3
Total	**5**

Figure 9

Critical Tasks – Witnessed Cardiac Arrest Response

Task	Minimum Personnel
Command/Monitor	1
Charting	1
Airway management	2
CPR	3
Doppler/Pulse check	1
IO/Medications	1
Effective Force	**9**

Figure 10

B. TRAFFIC CRASH INCIDENTS

Incidents on the highway involving vehicular crashes vary widely in severity. The BFD annually responds to several hundred traffic crashes with injury or injury potential. This type of incident is designated either Injury/Low Mechanism (lower speed roadway) or Injury/High Mechanism, where higher speed and impact forces are expected and where patient entrapment or ejection can be anticipated. Equipment that responds consists of a Medic Unit, an Engine, a Rescue Truck and a Battalion Chief.

Critical tasks at a traffic crash include size up, scene control and hazard mitigation, patient triage, treatment and transport, as well as vehicle stabilization and extrication, if necessary. At times, especially with a High Mechanism incident, crews are requested by law enforcement to stand by to provide lighting and fire protection after patient treatment

and transport. In addition, with critical incidents, an air ambulance (helicopter) may be requested through Dispatch. Fire/EMS and law enforcement personnel have built strong working relationships and cooperation to handle these calls.

The following charts illustrate the critical task staffing for both Injury/Low Mechanism and Injury/High Mechanism traffic crashes. Incidents involving multiple patients normally require one ambulance per critical patient or two non-life-threatened patients.

Injury MVA/Low Mechanism

Task	Minimum Personnel
Incident Commander	1
Scene Control/ Hazard Mitigation/ Safety	1
Driver / Information	1
Patient triage, Treatment, and Care	2
Total	**5**

Figure 11

Injury MVA/High Mechanism/ Entrapment

Task	Minimum Personnel
Incident Commander	1
Scene Control/ Hazard Mitigation	1
Driver / Information	1
Patient Triage, Treatment, and Care	3
Extrication	3
Total	**9**

Figure 12

C. SPECIAL RESCUE

While all BFD members are trained in the fundamentals of technical rescue, the BFD maintains a Special Rescue Operations Team to provide a higher level of technical response to complex rescue incidents. The team, consisting of 13 members from all 3 shifts, completes intensive rescue training on a monthly basis. They are available for swiftwater, steep angle, trench, confined space and ice rescue, whenever a duty crew encounters an incident requiring a higher level of expertise. This includes very complex extrication operations. The BFD has a heavy rescue, a rescue trailer full of tools and equipment, an inflatable boat for water rescues, and a medium duty rescue truck to supplement existing equipment.

The team presents rescue training to all members: on any given incident, everyone knows the basics, and if more technical assistance is needed, it can easily be requested through Dispatch. The BFD Special Rescue Operations Team trains and works with Deschutes County Search and Rescue as a mutual aid resource to meet critical tasking needs.

Critical tasks for special rescue include Incident Command, Safety Officer, Technicians such as Riggers, a Haul Team, Cutting, Shoring and Air Resources, and Equipment Monitor.

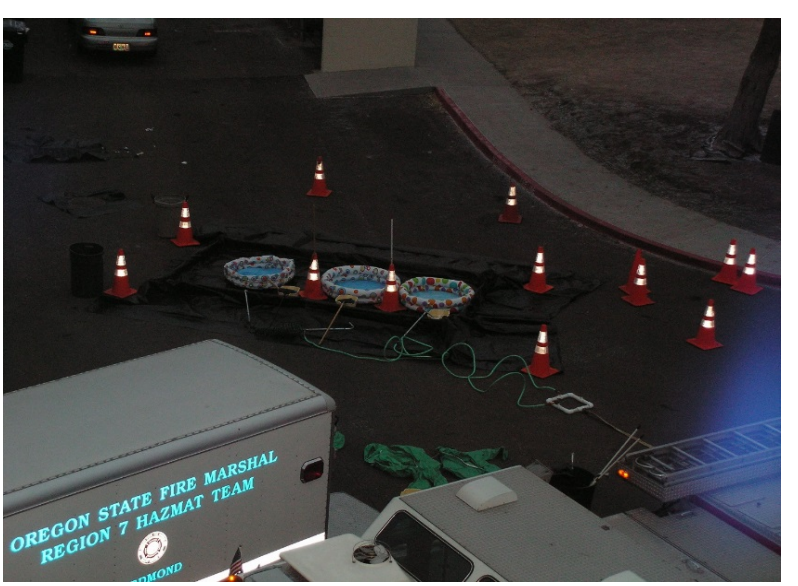
Technical rescue operations span a wide range of possible scenarios, but in general, between 12 and 21 people are needed to complete critical tasks. The Team is supplemented by duty crews responding as initial resources.

The following chart details the critical staffing for an ice rescue operation and is typical of most kinds of rescue response.

Ice Rescue

Task	Victim Identified
Incident Command	1
Safety/Accountability	Same as IC
Rescue Group	4
Riggers	4
Haul Team	3
Total	**12**

Figure 13



Decon area set up

3. INCIDENTS INVOLVING HAZARDOUS MATERIALS (HAZMAT)

Although small incidents involving hazardous materials (small gas leaks, fuel spills, odor investigations) are quite common and are handled by a single engine or the SRV, larger

incidents of this type can be dangerous, both to responders and to the community. In fact, the recent publicity surrounding derailments and subsequent large fires involving crude oil trains has captured the community's interest, since oil trains pass through Bend regularly.

Between 2015 and 2018, the BFD responded to natural gas leaks at a rate of about 6.5 per month. Most were small gas lines leaking outdoors, but breaks in larger, high pressure lines and gas leaks indoors can be quite serious and lengthy, with street closures, power lines disconnected and building evacuations. This operation is time and labor intensive, yet critical, given the potential consequences of a natural gas ignition, for community protection.

The BFD is not equipped, trained or qualified to mitigate large and complex incidents involving hazardous materials (hazmat), or to plug leaks in large containers, but the organization will always respond with the resources most appropriate for the situation, to set up Incident Command, assess the situation, initiate evacuation decisions, make required official notifications, call for additional resources, protect people and exposures, and collaborate with responding technical experts. As in the case of Special Rescue, all crews have a foundation of knowledge on hazmat response, both in order to maintain their personal safety, but also to optimize community safety. This type of incident is often complex, so the State of Oregon has designated 13 HazMat Response Teams across the entire state. Since the State Team serving Bend responds from Salem Fire Dept., it is critically important that BFD crews have the knowledge, skills and abilities to keep themselves out of harm's way during the Team's long response time..

Although Bend has several fixed sites with large quantities of hazmat, the highest risk to our community comes from an incident involving the commercial transportation of dangerous materials, by railroad or truck. BFD resources responding to such an incident are only a first response to what is likely to be an extended, complex and technical operation.

Critical tasks for hazmat incidents include size up, product identification, restricted area identification and denial of entry, community information release, official notifications (to the State of Oregon Emergency Response System, to activate a HazMat team), EMS standby, exposure protection, waterway protection (with dikes, berms and dams), the assignment of a Safety Officer and the establishment of Incident Command. In the event of a large hazmat release, the general course of action is to define and evacuate a "hot zone," identify and protect exposures, build a command team and request a HazMat team, which is at least 2 .5 hours away. If hazardous materials are on fire in large quantities, the BFD is most likely to allow the product to burn, in order to minimize the environmental damage.

Hazmat calls are quite time-consuming, and resources will be needed on scene for an extended period. The effect of this can be to make response to subsequent incidents understaffed.

The chart below illustrates the critical task staffing for a full response to an incident involving hazmat.

Critical Tasks for Hazardous Material Response (full response)

Task	Minimum Personnel
Incident Command	1
Dedicated Safety Officer	1
Fire Protection	4
Medical standby	2
Spill control / leak detection / isolation	6
Effective Force	**14**

Figure 14

4. CONCLUSION

When the Standards of Cover were adopted in 2013, staffing levels were such that one structure fire and one medical call were enough to completely deplete all resources. A third incident of any consequence was handled either by off duty callback personnel or by mutual aid resources. Calls for service were often clustered within a time period, so that for several hours per month, all units were assigned to calls and there was literally no one to answer another.

Collaboration with other City resources, an increase in funding and staffing, and an innovative, yet fiscally responsible initiative, has led the BFD to a point where, with recommended daily staffing of 28, the shift crews can confidently handle a working structure fire simultaneously with the background workload: 2 ALS and 1 BLS medical calls. This would have been inconceivable in 2013. The increase in staffing, coupled with a more appropriate response system, have almost eliminated the time without available resources, while at the same time reducing response times and increasing station reliability. In fact, the average monthly amount of time without resources in 2013 was 3.6 hours: staffing and operational changes have reduced that to only .23 hours per month without resources in 2016, almost 16 times less.

Although the staffing numbers suggest that the BFD could **almost** staff simultaneous two working fires, this is not possible, because not all staff are assigned to engines, and not all staff are qualified to fill all the required roles. Mutual aid crews will respond to assist when this eventuality occurs.

The BFD responds to about 100 working structure fires per year, of widely varying magnitude. However, a cardiac arrest call, a technical rescue, a major traffic crash or hazmat incident and a working fire (structure or wildland) are equivalent in duration, criticality and staffing needs.

As the population grows (Bend's growth rate: 4%/year), and in spite of the Prevention Division's best efforts, the BFD call volume data currently suggest that the number of calls may increase by about 10% per year. The BFD will face an increased likelihood of not only simultaneous large incidents, but also more clusters of incidents within a given time period. In addition, during the wildland fire season, an emergency request for our resources to

staff a Task Force will draw down on-duty staffing quickly, with a potential for understaffing until backfill with off-duty members is completed. In the past two years (2017-2018) multiple crews and apparatus have been dispatched to major California fires 3 times. It is likely that these requests will increase, which can leave the BFD at a temporary disadvantage.

The ability to supply an Effective Response Force is one of two critical factors which influence the outcome of an incident: the other is the Response Time, or the amount of time required to deliver the ERF to the scene. This will be the subject of Section 6.

SECTION 6: RESPONSE TIME ANALYSIS - RESOURCE DISTRIBUTION, CONCENTRATION AND RELIABILITY

The location and concentration of resources, along with resource status (reliability), are major contributing factors in the duration of response time. Understanding these factors will lead to policy decisions which help manage and significantly reduce the response time, improving both firefighter and community safety.

1. The Significance of Time in emergency operations

Because an emergency incident, either fire or medical, grows progressively more damaging as time passes from its beginning point, the duration of time from the initial alarm until the arrival of crews is a primary factor in the mitigation operations and the outcome of the incident. Since the fire service exists to prevent and minimize death, injury, damage and long term ill effects of incidents, efforts to analyze and reduce incident response time are beneficial to the community wellbeing.

“Time is the critical element when an emergency is reported. Fire growth can expand at a rate of many times its volume per minute. Time is the critical factor for the rescue of occupants and the application of extinguishing agents to minimize loss.
The time segment between fire ignition and the start of fire suppression has a direct relationship to fire loss. The delivery of emergency medical services is also time critical. Survival rates for some types of medical emergencies are dependent on rapid intervention by trained emergency medical personnel. In most cases, the sooner trained fire or emergency medical rescue personnel arrive, the greater the chance for survival and conservation of property.” (ESRI White paper: GIS for Fire Station Location and Response Protocol,” pp4-5, 2007)

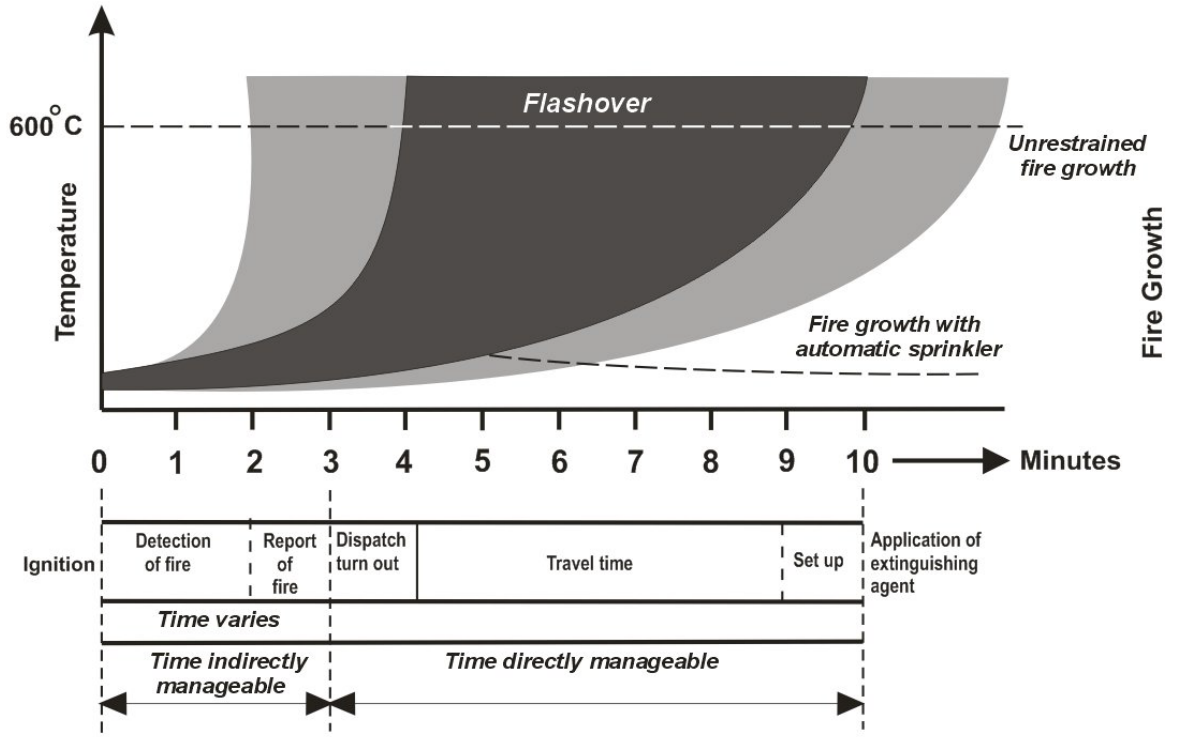
One particular dangerous stage of fire growth, **flashover**, occurs when the room and its contents can no longer absorb heat, and everything contained in the room ignites rapidly at the same time. This is a non-survivable event, even for firefighters in protective gear. Although flashover cannot be exactly predicted, it typically occurs between 4 and 10 minutes after free burning starts, and an imminent flashover presents observable warning signs. **In order to save the life of a trapped fire victim, it is critically important that enough firefighters arrive on scene far enough ahead of flashover to effect a rescue**

safely. People, including firefighters, caught in a flashover rarely survive, and a structure which has sustained one is generally razed after the fire.

Flashover, courtesy of Life Safety Services

The longer it takes for an Effective Response Force (ERF) to assemble on scene (coming from several stations), the harder the initial arriving units must work to complete all critical tasks. The longer an incident is understaffed, the higher the potential for firefighter injury, the less efficient the operation is, and the more time that units are unavailable for other calls. It is in the best interests of the community for an ERF to arrive in as short a time as possible with the appropriate equipment.

The diagram below, from an ESRI White Paper on the importance of response time and fire station location, demonstrates the potential for flashover in an unrestrained fire (no water applied), and it also shows the positive effect of an automatic sprinkler system on fire growth.



This diagram illustrates fire growth over time and the sequence of events that may occur from ignition to suppression. Depending on the size of the room, contents of the room, and available oxygen, flashover can occur in less than 2 or more than 10 minutes. Flashover occurs most frequently between 4 and 10 minutes.
Figure 15

"The delivery of emergency medical services (EMS) by first responders is also time-critical for many types of injuries and events. If a person has a heart attack and cardiopulmonary resuscitation (CPR) is started within four minutes, the victim's chances of leaving the hospital alive are almost four times greater than if the victim did not receive CPR until after four minutes.
(ESRI White Paper: GIS for Fire Station Location and Response Protocol," p. 7, 2007).

One way that the BFD manages response time in cardiac arrests is by utilizing the skills, availability and response speed of law enforcement. Since Bend Police Department (BPD) personnel are always deployed on the roads, they have completed CPR training, carry defibrillators in their cars and respond to assist: this collaboration has reduced response time to cardiac arrests into the range where survival is more likely.

The BFD also presents CPR classes to citizens who sign up, on a monthly basis. Research demonstrates that bystander CPR is a critical factor in enhancing survival chances. Early CPR, whether from bystanders or from emergency response personnel, is what defines a shockable, and therefore savable, patient. Figure 16 shows the Bend Fire trend in save rates over the past several years.

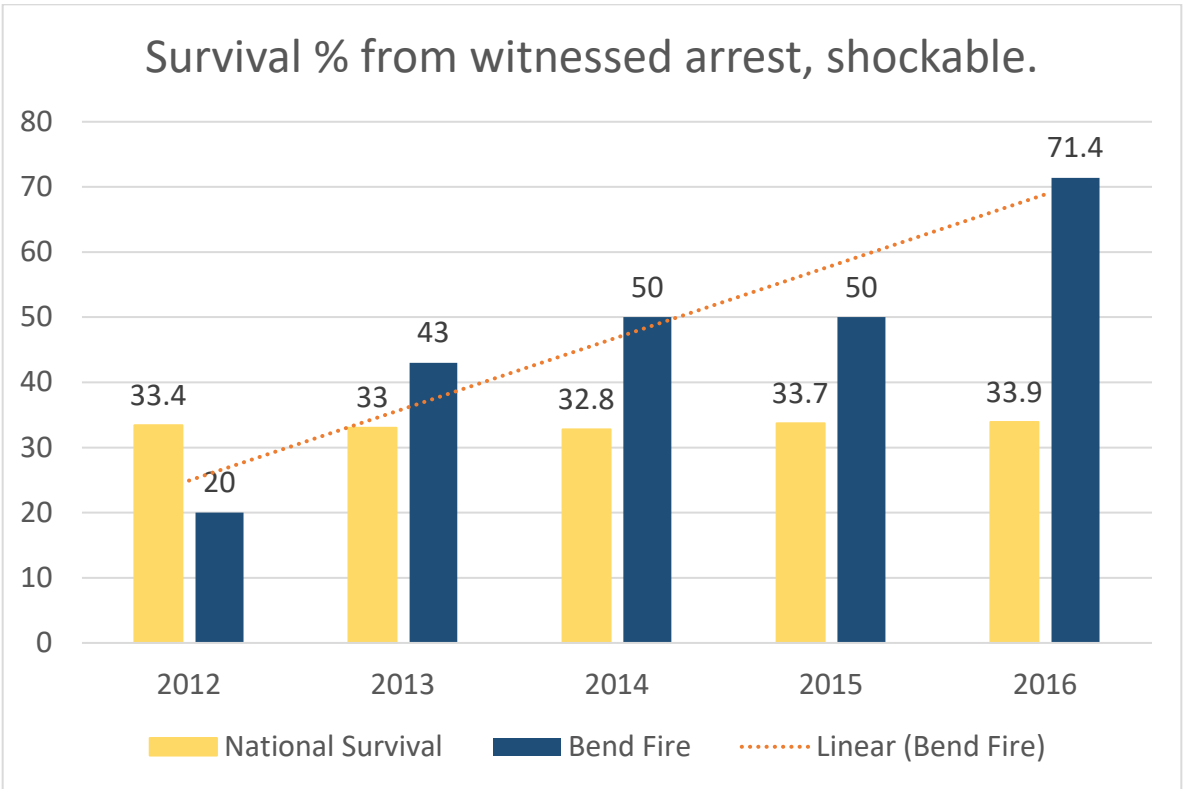


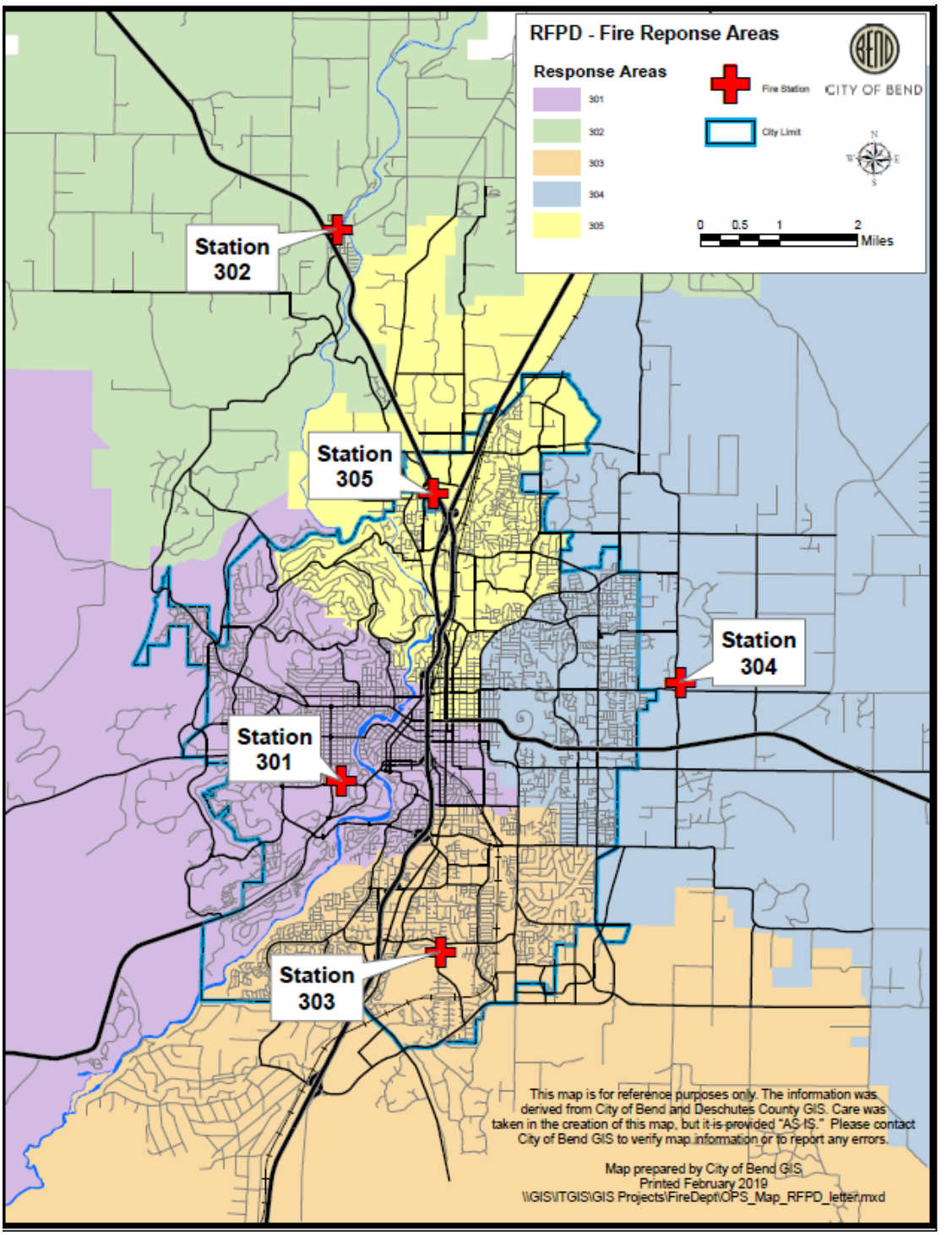
Figure 16

2. Distribution of resources

The effective distribution of resources depends upon the distance between fire stations, traffic patterns and **infrastructure**, population density AND trends, target hazards within the response district, movement restriction factors such as canals, railroad tracks and limited access highways, and incident type and frequency. Since stations are permanent facilities, the location must be well considered and must take into account future development trends and transportation plans. The thoughtful placement of stations is one way to manage response times.

Each fire station has a response zone, which is defined as the area where the resources from that station can arrive first on scene. As noted above on page 45, the BFD uses the "**Closest Forces**" concept, which provides the basis for our fire dispatch system: the station closest to the location of the incident will respond with the initial resources to mitigate the incident.

Another aspect of distribution of resources is the distance between stations. The locations of these stations were historically determined by growth patterns and verified with fire station locating software. Bend's large response area and varied population density, coupled with the need to optimize traffic patterns, require stations to be located in areas outside the core of the City of Bend to decrease response times for both the City and District. The response area map below shows that the stations tend to be near the



Station locations

City/District boundary, so crews can respond **in** toward the City and **out** into the District.

The BFD operates out of 5 fire stations, with a 6th station to be completed by late 2019, on the City's Pilot Butte Public Works campus. Per the City-District contract, the stations are owned by the District and staffed and equipped by the City. In 2018, driving distance between adjacent stations ranges from 4.2 to 6.4 miles. When the 6th station is completed, the range of distances will be between 2.9 and 4.0 miles, a significant improvement which will reduce response times considerably. It is expected that this will reduce first-due driving distances by 0.5 to 1.2 miles in many areas of the city, potentially lowering first-arriving units' response time by 15-20%.

An issue which the BFD faces is increasing population density in small communities at some distance from a fire station. For example, Deschutes River Woods, a community south of Bend, within the District, is 4.5 miles from the nearest station and has a population of over 5,000. Similarly, the Sundance subdivision to the southeast, with a population of well over 1,000, is 7.4 miles from the closest station: the next closest is 14 miles away. There are, perhaps a half dozen such situations in the District, and the time it takes to travel those distances to an emergency call puts those small communities at a greater risk.

Each fire station houses multiple types of vehicles. Although each station may house 6 pieces of emergency response equipment, staffing for each station is limited to 3 people at Station 302 (Tumalo), 5 at both 303 and 305 (South and North), 7 at Station 301 (West) and 8 at Station 304 (East), for a total daily staffing of 28. At the North Station, the 2 person Ambulance Operator crew is assigned for 12 hours per day, so in the evening, 305 drops to 3. The SRV is on duty 10 hr/day, so the nighttime staffing is 25.

This recommended level of staffing will be maintained even when at least 4 personnel are on sick leave, injury leave, vacation, holiday, or other leave, which is a vast majority of the time. Because staffing takes into account the potential for 4 members to take personal leave time, staffing above this level is possible.

3. Concentration of resources

Operational success depends upon efficiently matching types of resources with expected call types. For example, in northeast Bend there are a number of large retirement homes and assisted living facilities, so the East Station, only a mile from this area, is staffed with two Medic Units, to handle the higher volume of EMS calls.

Generally, however, the BFD is only utilizing this concept loosely, due to local conditions and demands on our system. The local economic, industrial and business areas are not dense enough to utilize this concept in a strict sense. Additionally, varying topography and call volume demands flexibility of response, with a wide variety of incidents, from ice and water incidents to large structure and wildland fire, and from minor scrapes and illnesses to major traffic collisions.

Another way to concentrate resources is by having apparatus positioned to meet the likely needs of the area, (e.g. interface engines are placed at the stations that have the most

significant possibility of a wildland/urban interface fire). The rescue truck with extrication equipment is stationed at the north station near the Bend Parkway and the intersection of US 20 and 97, with easy access to all high speed corridors, where such equipment will most likely be needed. The second rescue is located at the West Station, for easy access to Century Drive.

Station and resource concentration/location to achieve more effective utilization has some historical background in Bend. The District's area has been sparsely populated, as an agricultural land use, since the beginning of Bend. As the city grew, land use and planning regulations reduced the minimum size of buildable lots, even in the more rural areas. An increasing density of homes and population has resulted in an increase in emergency service calls of all types. Although the original placement of fire stations was based on more rural response patterns, the BFD has adapted to changing land use and population growth by placing resources suitable for the most common types of calls in the appropriate stations.

Now that infill and density are mandated by both local and state government, policymakers will need to consider whether the fire stations are too far apart. The BFD, for its part, continually evaluates the placement of apparatus. From the perspective of effective response performance, in 2018, the BFD only met the NFPA standard (first due engine arriving on scene within 5.3 minutes 90% of the time) on 42% of all fire calls, and for a complete first alarm with an effective response force it is approximately twice as long. In some cases, the first arriving equipment was not necessarily an engine company.

There is a limit to the reduction of response times versus the cost of doing so. Even the most efficient system and maximum manpower is, in part, a function of the distance between stations. One way to concentrate resources while reducing response times drastically AND increasing occupant and firefighter safety is the widespread adoption and installation of residential sprinkler systems. The next section of this document will address policy recommendations.

4. Response Reliability

Measuring **response reliability** establishes how much **depth** the emergency service has and if resources are appropriately located.
At 100% response reliability, each call is handled by the closest station, with adequate personnel and the appropriate apparatus, preventing other stations from the need to leave their respective districts to provide cover and keeping response times to a minimum. However, this requires vast resources, and departments with a significant call volume cannot afford this level of service: at any rate, it is impossible to attain, because every response district will have many calls that require a multi-engine response.

One partial solution is a system to provide backup response capabilities when the closest station is on a response, at training, out of service due to mechanical problems, or otherwise unavailable. The BFD also may move a less-busy engine to a vacant station when there are multiple concurrent calls, at the Shift Commander's discretion.

The BFD established the Service Response Vehicle (SRV) in 2015. This unit, staffed by Prevention personnel, responds to an average of 150 calls for service per month. The objective of the SRV is to improve resource reliability within the department by taking non-

emergency fire-related calls, so that fire and medical resources remain available for more emergent incidents. On average, 5 times a month, the SRV response to a non-emergency incident directly has ensured that an engine was available for an actual emergency call in its district. Every call that the SRV handles increases the chance that an engine company will be available for emergency calls.

The SRV also impacts the overall call volume. Since the advent of the SRV, the monthly number of false alarm system calls, and the number of repeated false alarms have dropped. The SRV follows up on all false alarm calls to prevent future incidents. This facet of the operation increases the effective reliability of the building alarm systems. In addition, the SRV assists crews on major incidents such as fires and gas leaks, providing assistance to the Incident Commander with traffic control, public information, phone and radio answering, and fire cause investigation.

Communities typically use national standards such as the American Heart Association (AHA) and the NFPA to determine what is an acceptable level of community risk, e.g. what percent of response reliability is acceptable.

As previously discussed, the standards for total response time are predicated on saving life and property. If response times increase too much in medical responses – such as a cardiac arrest – positive outcomes for patients decline. If response times for fires increase, a small fire will grow rapidly, jeopardizing life and property.

This is why measuring response reliability becomes so important. If crews are responding into other station's response areas to provide a back-up response for a crew already on a previous call, response times become much longer. In some instances, other agencies are called to provide mutual aid response when all crews are on calls and another incident occurs.

The BFD has increased station reliability in several ways: the tiered BLS system which uses basic level EMTs for less than emergency calls, the SRV, the installation of a department-wide teleconferencing system (used for classroom training, so each station's crews can remain in their own response district), and using the Logistics Tech and Support Volunteers to move apparatus to the repair shop (rather than an engine crew).

Response reliability is a key component of risk evaluation and another way to measure response performance. As demonstrated in the data below, City responses are handled by first due stations as follows:

301 (West) 89.25%

303 (South) 90.03%

304 (East) 90.62%

305 (North) 80.96 %

Station 302 (Tumalo) has no City first due area.

This means that for these 4 stations, approximately 10-20% of the time, a crew has to respond from a different station to cover the first due station's call.

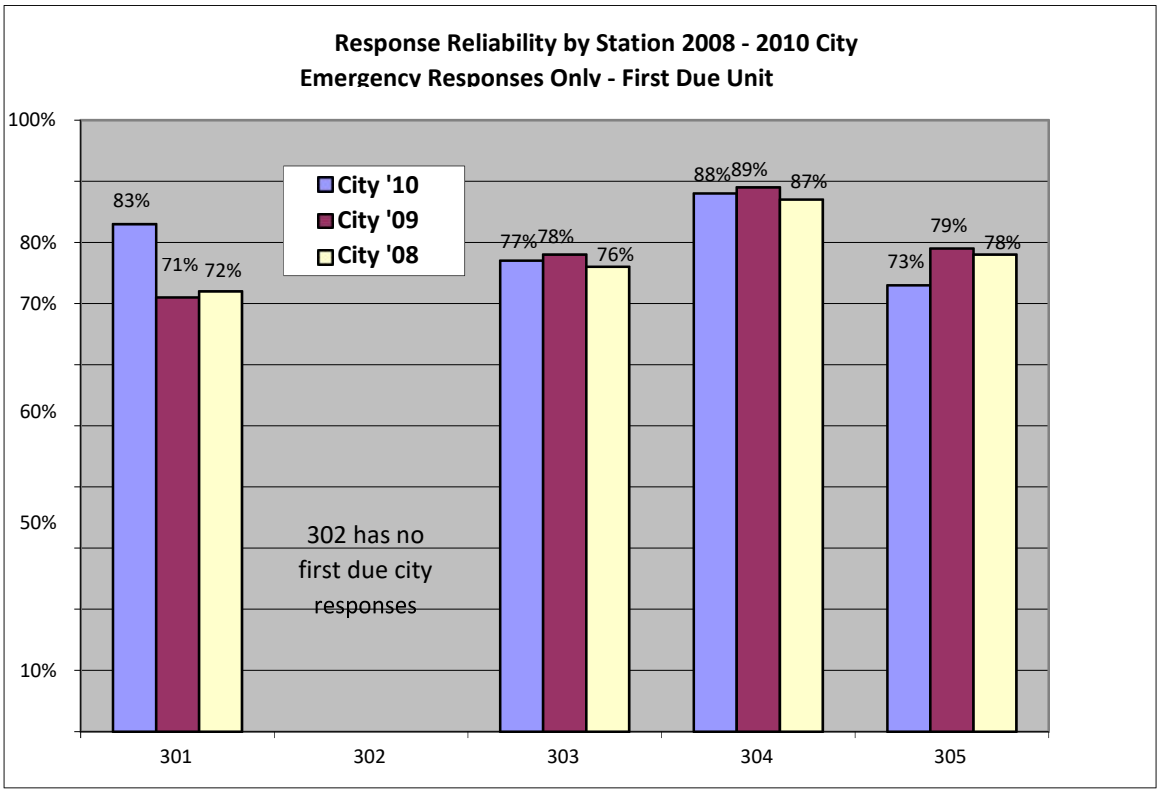


Figure 15: Response Reliability by Station

There is a significant amount of apparatus movement across station response zones. With the number of simultaneous calls increasing and the present status of response reliability, this may indicate a weakness in the system.

Another factor to consider when measuring response reliability is the amount of time that resources are working and thus remain unavailable, by type of call. From an analysis of historical BFD call time data, the following average call durations were determined:

FOR RESPONSES WITHIN THE CITY

- EMS responses with patient transport – average 1 hour and 10 minutes
- EMS responses without patient transport – average 35 minutes
- Structure fires with extensive damage – average 2 hours and 30 minutes
- Structure fires without extensive damage – average 1 hour and 35 minutes
- Brush fires inside city limits – average 1 hour
- Rescue responses – average 1 hour
- Service/public assistance responses – average 1 hour

FOR RESPONSES IN DCRFPD #2

- EMS responses with patient transport – average 1 hour 25 minutes
- EMS responses without patient transport – average 40 minutes
- Structure fires with extensive damage – average 2 hours and 20 minutes
- Structure fires without extensive damage – average 2 hours

- Brush fires – average 2 hours
- Rescue responses – average 3 hours
- Service/public assistance responses – average 30 minutes

These time durations are an average. Complex ALS patient responses often take more than 2 hours; complex rescue incidents may require several hours, and large structure fires can last 6 to 12 hours, a few going more than an entire day. Extensive wildland fires can take days and occupy all local and regional resources.

When response reliability is low because the first-due resource is unavailable, the response time will be measured by how long it takes for the **second-due** resource to arrive on scene as the initial unit. For example, if Station 303's crew (South) is unavailable for a structure fire near Baker Pond in Deschutes River Woods, the next closest crew will be first due and will have to come from Station 301 (West), and the response time will soar, from 7 to 13 minutes.

The more units that are unavailable due to calls, the more distant the first arriving crew will be. An extreme example is that of an emergency incident in the Sundance subdivision, southeast of Bend, with all stations unavailable due to calls **except** Station 302 (Tumalo). The response time will be more than 25 minutes, with a 16.9 mile drive.

Another implication of this situation is that it can take 20 or more minutes before all the units assigned to an incident (the full Effective Response Force) are on scene, because of the distance between stations. This not only makes a good outcome less likely, but it also increases the risk to firefighters, as their workload in a stressful situation is increased by lack of personnel.

By knowing the average duration of time that incidents take, one can get a better feel for the resource allocation issues and lack of response reliability when a unit and its personnel are on one call when another comes in. In 2013, the lack of staffing depth in BFD stations demonstrated the need to have crews dedicated to specific apparatus which would otherwise be unavailable until the responding crew returned from its first incident. With the increase in staffing to build the BLS program, the BFD has addressed this issue, but as the call volume and clustering increases, response reliability lurks as a real concern.

Response reliability will never be 100%, as there are many factors affecting the availability of each piece of equipment and its staff. The BFD has historically had its share of response reliability issues, probably within normal industry limits. Since 2014, with the establishment of the AO/BLS medic program, engine and ALS crews have been demonstrably more reliable in their availability to answer calls for service, but it is a fragile balance. As the population grows, adding new stations and commensurate staff can only improve the situation AND the quality of service.

SECTION 7: STRENGTHS, OPPORTUNITIES AND POLICY RECOMMENDATIONS

The people of the BFD are well-trained, dedicated professionals who work hard every day to master their craft and bring their best to every call for service. The BFD is also a collection of human beings with strengths and limitations, both individual and as an organization. This section will address how we measure our performance, what we do well and the support systems for the successes, the areas we can improve and the things we cannot yet do, and some policy recommendations which may assist in opportunities for improvement.

1. PERFORMANCE MEASUREMENT

One measurement of performance, as documented in the last section, is response time, and it is clear that this is an important factor in the outcome of an incident. Measurement of this factor is accomplished by capturing data from Dispatch's time stamp system, where every radio transaction is recorded. However, **what crews accomplish after they arrive on scene** is a more significant factor in an outcome. The BFD employs several programs to measure our performance. They are listed below in the following section.

2. STRENGTHS AND SUPPORT SYSTEMS

Training Program

The BFD Training Division has been strengthened in the past 12 years. In 2015, we added 2 Training Captains (Fire and EMS), leading to higher quality and more consistent training, with more varied material, better recordkeeping and a major increase in the priority and number of hours of training. There is a renewed dedication to training and "mastering the craft" with all the crews.

In 2018, the average BFD crew trains at least 25 hours per month, or over 200 hours annually. Casual observation shows that the Training Grounds are used virtually every day, including weekends, by at least one crew, more commonly by several. In addition, the classroom is commonly used by several crews per week, and each station is connected to the classroom (and to the other stations) via a fully interactive teleconferencing system. Not only can the crews share training remotely, but they also can remain in their own response districts, enhancing station reliability.

One response issue involving training is that when crews are on the drillground, they are often unavailable to respond to calls, so the next closest unit must take their place. This increases BFD's average response times, and at times may be a critical factor in the outcome of an incident.

Medical Director Case Reviews

As noted in Section 3, the City of Bend contracts with two SCMC Emergency Department physicians to serve as Medical Director and Assistant Medical Director for the BFD. They facilitate monthly Case Reviews where specific EMS calls are reviewed and critiqued. In addition, they assist with the Continuing Quality Assurance Program (QA), evaluate the skill level of employees through an annual ambulance ride-along program and help resolve any medical-related issues. These are key elements in maintaining and building the strength of BFD's EMS response system.

Together they oversee the development of the Medical Protocols which all members must follow when providing patient care. All BFD personnel must have a State of Oregon Health Authority EMT license, either at the Basic, Advanced or Paramedic level, and they operate

strictly under the medical license of the Medical Directors.

EMS Quality Assurance Program

The Continuing Quality Improvement (CQI) committee ensures compliance with Medical Protocols, identifies training opportunities, highlights outstanding clinical performance, and reviews specific illnesses and injuries along with their associated treatments.
Every month, the Committee reviews a variety of emergency responses. This level of review appears to be optimal for immediately identifying and addressing patient care issues. It also allows better data collection, to increase the level of clinical sophistication and to evaluate the latest EMS protocols and equipment. This program is not punitive: on the contrary, many field providers initiate conversations regarding specific patient care issues as part of their effort to improve their performance.

After Action Reports/Tailboard debriefing

Per PPI # 1600-007 (After Action Review), BFD crews complete a "tailboard debriefing" directly after a critical incident, as a fact-finding and training tool, followed up within 14 days by a formal After Action Report (AAR). The Training Chief and the Incident Commander are responsible for this process, which is designed to "improve personnel, unit and system performance" [PPI 1600-007, B 2)].

These post-incident analyses are expressly for fact-finding and operational improvement and in no case are to be used to assign blame or find personal fault. Crews have historically found the process to be quite beneficial, both operationally and personally.

Customer Service Survey

Every 15th person to whom we respond receives a Customer Service Survey card in the mail. About 10% of the recipients complete and return the surveys. Independent feedback is critical to the health of the organization, allowing us to gauge the effectiveness of our operations. A larger sample may be more helpful.

PPIs, Standard Operating Guidelines and Medical Protocols

As noted in Section 3, the BFD has developed and is guided by a set of Policy, Procedure and Instruction (PPI) documents and a book of Standard Operating Guidelines (SOG), and for the EMS operations, a comprehensive set of Standing Orders also known as Medical Protocols. These orders are based upon well-accepted emergency medical practices and are standardized across the State of Oregon. As the BFD EMS operations are overseen by Physician Advisors who extend their medical practice licenses to all responding BFD members, the Standing Orders are a compendium of best practices in the field.

All orders, policies and guidelines are monitored and evaluated on a continual basis, in order to improve all aspects of BFD operations.

Core Values

The 6 Bend Fire Department Core Values – Resilience, Integrity, Compassion, Respect, Optimism and Humility – are not empty words on the wall. The BFD has consciously chosen these values to live up to and exemplify, in order to best serve the community. The intentional culture supports individuals, crews and the organization alike, and we use them in all hiring and promotional decisions. The values have been sharply defined by BFD members, to minimize differences of perception. They are the behavioral foundation of the organization, and as such, offer a source of strength and support.

Mentoring and dedicated leaders

The Fire Chief has instituted a culture of mentoring and passing on valuable leadership knowledge, skills and abilities from one generation to the next, within the organization. Although not formalized training, the informal transfer of information is highly effective, not only in building younger officers, but also in strengthening trust and communication across ranks.

New employees

As mentioned above, the BFD has intentionally adopted an organizational culture based on core values as a model for behavior. We apply these values as a standard when assessing prospective new employees. The result has been an influx of personnel with core values which are well-matched with those of the organization. The values-driven culture of the BFD has significantly added to the strength of the organization.

Collaboration is a hallmark of the BFD, from the top levels working with City leaders to the crews joining forces with other agencies in emergency response. There has been a significant cultural shift in the past 3 decades in Central Oregon, from agencies working alone to productive collaboration. Although born by necessity (large fires, intractable problems), collaboration has become a way of life for intergovernmental operations.

3. OPPORTUNITIES FOR GROWTH

Response times

The importance of time in the delivery of emergency response services cannot be overstated. The most significant factors directly impacting service delivery time:

- Distance between stations: units may have to travel 5-12 miles to arrive on scene. We have a very large response district for the small number of stations which we maintain.
- Station reliability: multiple concurrent calls create a situation where units must travel to other station's response districts as the initial crew.
- Infrastructure: The ability for responders to move smoothly, without stop and go traffic, is critical to keep response times low.

Staffing levels

As the population grows, so does call volume. As noted in Section 4, the BFD can staff a full structure fire assignment plus 3 EMS calls but **cannot** deliver an ERF to a second concurrent structure fire. Two (or more) concurrent fires are rare at this writing but will become more likely as the population expands.

Expand EMS

Emergency Medical Services are in greater and greater demand, and for the BFD, not only does this bring in revenue, but EMS also builds goodwill and trust with the community and develops greater compassion within our workforce. In the future, the BFD will continue to deliver the highest quality service while potentially expanding the range of services available, such as a Community Paramedic, the ability to deliver EMS in a wilderness setting, and post-operational care after a patient is released from the hospital.

Innovation in fire prevention

The American fire service has been delivering the same fire prevention messages for decades, and although the rate of fire occurrence is trending downward, communities still

experience many devastating fires annually.

The BFD sees innovation as an obligation to the community, to raise the level of service, while at the same time maintaining fiscal responsibility and sustainability. Community outreach is a tool to provide fire and life safety education and to include the general population as partners in prevention and safety. Examples include the effective and innovative BLS medic system, the SRV response and the interactive cooking fire/residential sprinkler trailer.

Expanded community communications

The BFD works closely with the news and social media to build community trust and awareness of hazards and how people can protect themselves. Social media presence is especially important for reaching specific demographic segments. We publicize what we do and aim to be transparent with the media, educating reporters and inviting them to produce more in-depth stories, and considering the media to be an equal partner in building community resilience. The BFD has expanded its media presence by collaborating with Bend Police and the City of Bend Communications Department to present a unified "One City" picture. The collaboration extends to Deschutes County Emergency Services and active participation in Joint Information Centers at major incidents.

Since infrastructure has been noted as a risk factor in emergency response, it follows that **Stewardship of resources** includes the obvious 'staying within budgetary boundaries,' but it also includes recognizing financial threats to the organization, such as personal and organizational behaviors which can engender a lawsuit, preventable on-the-job injuries, which are expensive, and living by unimpeachable standards. Although the BFD does not rely on grant funding, there is an aggressive program to win grants for effective (and is some cases innovative) programs which may not otherwise be realized. Examples include FEMA funding for breathing apparatus replacement and radio upgrade (both are required and expensive), and State of Oregon funding for an innovative injury prevention program.

Wildland/Urban Interface and Reducing Community Risk

Workforce Diversity

There is a nation-wide initiative to build diversity into the American Fire Service workforce, and although the Fire Service lags in this area, there is an understanding that responsible diversity will add strength to the organization. For example, researchers are finding that women in the fire service bring unique safety behaviors and contribute to a stronger culture of safety. To ensure that the BFD can diversify its ranks and build safer practices into the operations, it must be able to demonstrate some flexibility and resilience in changing the underlying culture.

4. POLICY RECOMMENDATIONS

Response time reduction

Bend's fire stations are too far apart to allow an ERF to arrive within NFPA 1710 standards, and the current goals of resource arrival within 6 minutes in the City and 9 minutes in the District are still not met 100% of the time.

Recommendation: Develop a policy which addresses distance between stations as a driver of optimal ERF arrival, and prioritize locating resources in or near areas of greater population density.

Recommendation: Design fire stations to reduce turnout time (the time from BFD notification

to station departure).

The adoption of the AO program and the concurrent increase in staffing reduced average response time by one minute. Further reductions are likely with the addition of a Training Cover Unit to handle calls for crews that are unavailable due to training commitments, as well as adjustments to the BLS program to optimize its function.

Recommendation: Use response time factors to develop a short and mid-term plan for adding staff, considering assigning a crew to training cover. This may include determining the cost per unit response time reduction.

Build community resilience in the Wildland/Urban Interface (WUI)

Wildland fire encroaching on the built environment is the most significant fire and life safety threat to our community. Central Oregon is in a fire-dependent ecosystem, meaning that fire plays an integral part in the health and resilience of our natural landscapes. In addition, people move to Bend in large part because of the beauty of the natural area, and many of them build homes in the wildland setting, making them vulnerable when fires occur. The BFD and the District work collaboratively with all stakeholders across all landscapes and disciplines in Central Oregon, using the best science, to make meaningful progress toward the three goals of the National Cohesive Wildland Fire Management Strategy:

- Restore and maintain resilient landscapes
- Create fire-adapted communities
- Provide safe and effective wildland fire response

Recommendation: Continue to collaborate with partners in land and fire management agencies and with local government land use planning agencies, using best practices to use wildland-urban interface lands with protection from wildland fire as the top priority, in accordance with recommendations based on science.

Recommendation: Build a sustained community-wide education effort to encourage residents to recognize and protect the “Home Ignition Zone” and to mitigate on-property fuels in a coordinated fashion, creating fire-resilient landscapes.

Community outreach and trust:

The strength of the BFD bond with the community lies in mutual respect, trust and communication. Not only will this bond help the BFD succeed with the local option levy, but also, the community can collaborate with the BFD to reduce the risk of fire and to build a safe, resilient and respectful culture.

Recommendation: Recognize the significance of a commitment by the BFD to be appropriately involved in all facets of community life, in order to develop a safer and resilient community and reduce the risk of fire to lives and property.

Residential sprinklers

The fire service widely uses response times as a measure of performance, with goals of 4-6 minutes from alarm to arrival, depending on the locale. “Response time” does not include the time it takes from arrival on scene to application of water on the fire. The activation time for a residential sprinkler, from what would be a normal point of discovery to application of water is in the 30-60 second range, or 4-12 times faster than an efficient engine company takes to arrive on scene.

Applying sprinkler water early gives the occupants time to escape and affords firefighters greater safety as they enter the building to extinguish the fire.

Recommendation: Actively support and advocate for the adoption of a strong residential fire sprinkler code compliant with the International Fire Code, within the City of Bend and Deschutes County.

Community Education

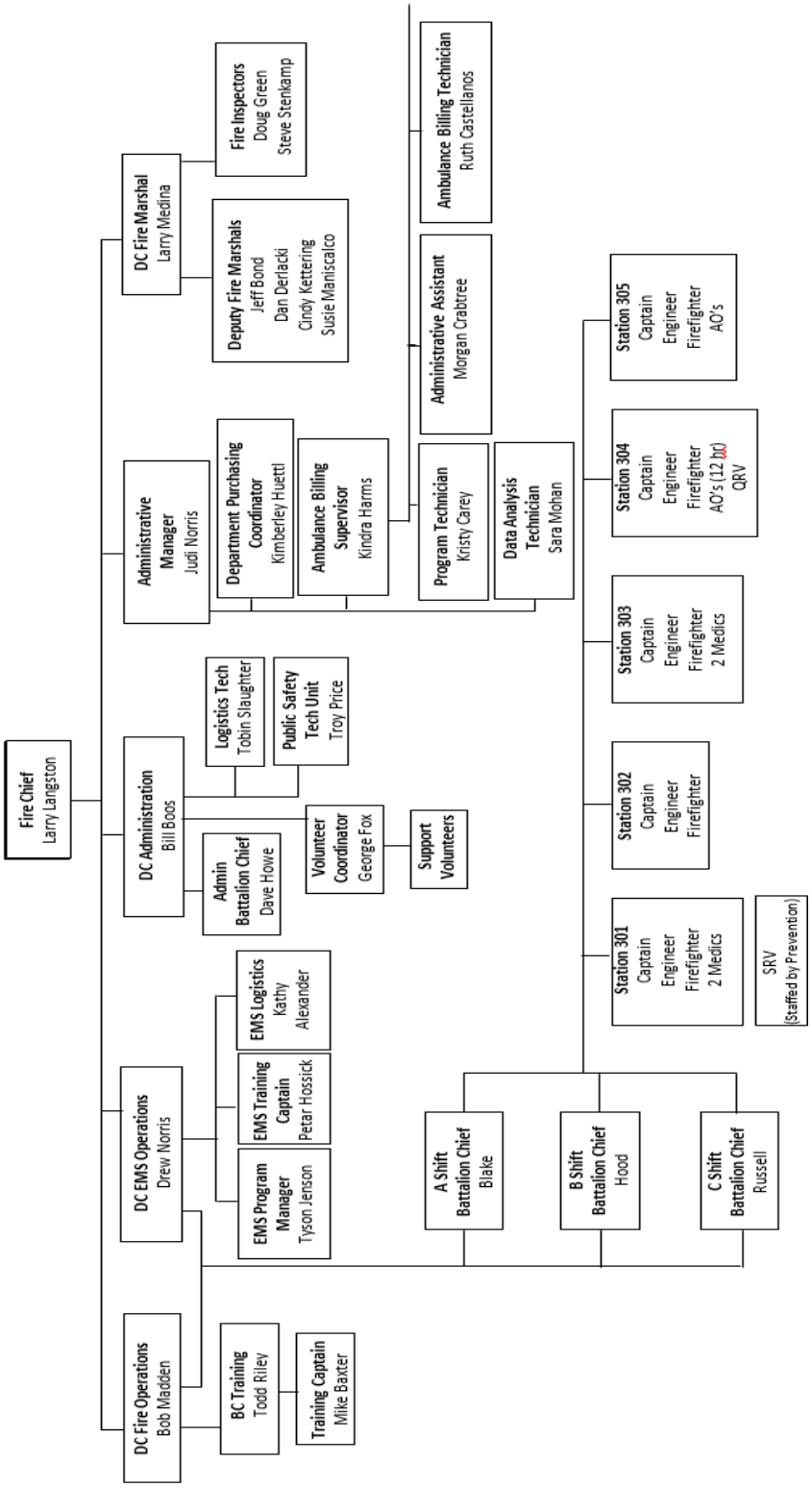
The BFD has a strong Public Education program. Since the community is made up of all ages and learning styles, the BFD works to provide an effective fire and life safety education program with proven age-relevant educational principles. With new technology influencing people's learning styles, innovation can increase the effectiveness of this program. Although firefighters are not trained educators, there are education professionals who are well-equipped to develop and lead an innovative, effective and comprehensive program.

Nationally, data shows that when citizens are trained in CPR, cardiac arrest rates go down. The BFD has launched a citizen CPR academy, and as noted in Section 4, witnessed cardiac arrest survival rates have risen to 70% in Bend. In addition, Oregon State law requires that CPR be taught in Public schools. Increasing our involvement in this effort will enhance the BFD and further improve survivability rates.

Recommendation: Support innovative and collaborative means to reach all parts of the community, with fire/life safety and expanded CPR training.

APPENDIX A

ORGANIZATIONAL CHART



APPENDIX B

BEND FIRE DEPARTMENT

RISK MANAGEMENT PLAN

Introduction

Risk is a widely used and well-understood concept. Essentially, it is the uncertainty about the future, which may result in an adverse outcome. In other words, if we do this, what bad things might happen to us?

Risk is inherent in all human activities, both individual and organizational. Without a certain level of risk, progress and growth are unlikely. As odd as it sounds, a certain level of risk is considered to be optimal. The elimination of all risk is so costly as to be unaffordable, nor is it practical, in the context of everyday life. For example, to **eliminate** the risk of motor vehicle crashes, so much money would have to be spent on both infrastructure and vehicle design that society would be unable to afford many other necessities, such as public safety, health care, quality education, food safety, etc. Doing so would increase other risks beyond a tolerable level. In other words, there is **an expected number** of motor vehicle crashes, fires, pollution, criminal acts, plane crashes that is **above zero.** This is not to say that we like or want these things to happen, but the practicality and cost of **eliminating** their risk is simply not feasible.

In addition, there are unseen benefits to risk: it motivates us to do our best and to operate safely, it can bring out the best in people, it spurs innovation, and it can even bring failure, presenting us with opportunities to learn and grow.

The challenge before us is to recognize and evaluate risks, to find an acceptable level of risk that can benefit us, to take measures that can prevent unacceptable and damaging hazards, and to use risk as an opportunity to improve our organization and our people.

Scope of Plan

The most practical way for an organization to approach risk is to recognize its existence, measure its scope and potential, and manage risks collaboratively. ince it is not practical to eliminate risk, we can either avoid it (simply refuse to respond to fires, drive apparatus or use sharp needles to deliver drugs), or reduce it in a cost-effective manner. his document will address the general menu of risks the Bend Fire Department (BFD) faces and some risk-reduction strategies, using NFPA 1500, Standard for a Fire Department Occupational Safety and Health Program as a guideline for this **Risk Management Plan (RMP)**; however, other areas outside the scope of NFPA 1500 will also be included. The following elements of the Plan will be maintained on an annual basis:

1. review of department operations, activities and facilities in light of this Plan
2. review of the impact of significant or catastrophic events
3. role of the Department Safety Officer (NFPA 1021)
4. evaluation of health and safety policies and guidelines
5. review and evaluate the RMP
6. conduct an NFPA 1500 audit
7. facilities inspection for reducible risk factors

Purpose of Plan

The purposes of developing, implementing and reviewing a Risk Management Plan are:

1. to reduce, as cost and labor effectively as possible, risks encountered by BFD personnel, our customers and our community
2. to reduce the severity of risks that we cannot eliminate
3. to provide as safe and healthy a working environment for BFD personnel as we can, considering the risks inherent in the fire service
4. to establish, monitor, raise and optimize a standard of safety and health for our employees and
5. to develop, collectively and over time, an organizational culture with a reduced level of inherent risks.

Responsibility

It is the responsibility of the Fire Chief to ensure that the department develops, maintains and abides by the RMP.

It is the responsibility of the Department Safety Officer to manage, monitor and maintain the RMP.

It is the responsibility of Battalion Chiefs and Company Officers to evaluate, on a continuing basis, the health, safety and welfare of the crews, to maintain awareness of risk factors, and to support all personnel in the detection and mitigation of risks to health and safety.

It is the responsibility of all BFD personnel to develop, comply with and follow established procedures to ensure firefighter health and safety.

It is the responsibility of all members to play a positive part in community risk reduction programs

Content

Risk management encompasses a full range of measures that may be used to limit, reduce or practically eliminate the probability that an undesirable outcome may occur. Also, risk management includes measures that can be used to reduce or prevent anticipated hazards and hazardous events, or that can reduce the impact or magnitude of such events. Finally, risk management can be incorporated into intentional culture building: risks inherent to a specific organizational culture can be reduced through a concerted, collective effort to change and improve the culture.

The BFD responds to and is involved in incidents and operations which are inherently dangerous. Undesirable outcomes include death and injury to members, damage or loss to the organizations facilities, vehicles and equipment, damage to community trust, and temporary loss of the ability to provide future service to the community.

In addition, there is a significant body of organizational risk which we carry because we are governed by many laws, rules and ordinances.

Risks to the organization can also rise from the basic culture of the group. As an example, if workplace harassment is culturally condoned or ignored, the organization risks facing and losing a major lawsuit, draining the budget and damaging community credibility.

The nature and range of our activities make risk management a critically important and challenging process. We must not only manage our internal (organizational) risk, but also perform our mission of managing, reducing and mitigating the effects of risks to the community.

Risk management consists of many elements, including (but not limited to) liability reduction, insurance, safety and health education and training, operational training, behavioral and legal awareness, enhanced teamwork, among others. This plan establishes both a standard of firefighter health and safety for the daily operations of the department and some guidelines for reducing risk to the organization. The standards define the parameters between which we conduct activities. We use a variety of control measures to ensure compliance with the standards of safety, which include (but are not limited to) Standard Operating Guidelines (SOGs), Policies, Procedures and Instruction (PPI) documents, training, protective clothing and gear, the incident command system, personnel accountability, the use of Incident Safety Officers (ISO), City Policies and guidelines, industry standards promulgated by the National Fire Protection Association (NFPA), the laws and administrative rules of the State of Oregon, as well as our experience and common sense.

Once a risk management process is accepted, disseminated and implemented, the plan must be properly managed, continually evaluated, updated and revised on a regular basis.

Risk Management Model

In order for the Risk Management Plan to be effective, the following components must be included:

- Risk Identification: actual or potential risks in the following areas:
  - operations at incident scenes
  - training
  - vehicle operation
  - facilities
  - personnel health and fitness
  - behavioral and legal issues
- Risk evaluation: the potential for occurrence and the severity of the consequences of a given hazard; the trajectory of an action or incident
- Crew Resource Management: the ability for any member, regardless of rank or seniority, to offer input on observed or potential safety concerns
  - the courage and commitment to maintain a high level of safety awareness
  - A cultural acceptance of assertive communication in the area of safety
- Prioritizing risk: the degree of a hazard, based on the frequency and severity of occurrence
- Control measures: solutions for reduction of real or potential hazards
- Monitoring: evaluation of effectiveness of risk control measures.

- Annual Plan Review:
  - selection of Review Panel
  - Scope of review
  - Action items identified
  - Actions identified and assigned

The key to achieving success with this Plan is **solid, realistic, ongoing, verifiable training** in the areas where we encounter risk. This includes incidents which are of low frequency but high risk, incidents and activities which carry a risk of legal liability for the City and the department, and personal health and fitness issues. This department is committed to providing this training.

Risk Control Plan

Activity area: Structure and wildland firefighting

Frequency/severity: Low/high

Priority: High

Control measures:

1. Develop, adopt and train to consistent and considered Standard Operating Procedures (SOP) which meet or exceed industry standard.
2. Adhere strictly to the SOPs at all emergency incidents.
3. Consistently utilize the National Incident Management System's Incident Command procedures and terminology.
4. Adhere to the Bend Fire Department's Risk Statement
5. 100% compliance with Department Personal Protective Equipment standards, including post-incident laundering.
6. Adhere to NFPA Air Management Standard (1404)
7. Maintain a strong, ongoing SCBA policy and practice.
8. Enforce 100% compliance with Rules of Air Management and radio communications protocols.
9. Assign a trained Incident Safety Officer (ISO) to all working structure fires.
10. Conduct solid, reliable, ongoing, verifiable training in all aspects of firefighting.
11. Maintain accurate and up-to-date training records for all personnel.
12. Work toward completion of Pre-Emergency Surveys (PES) on structures with a target hazard.
13. Utilize Rehab equipment and practices consistently and in a timely manner on all incidents where personnel work strenuously.
14. Conduct Post-Incident Analyses (PIA) on all critical incidents, and utilize the results in further training.
15. Consistently promote and encourage an attitude of safe operation for all personnel, at every incident.
16. Assure that ALS transport capability is on scene at incidents with IDLH atmosphere.
17. Adhere to all Oregon OSHA rules, to include providing an adequate work-rest ratio whenever feasible.
18. Maintain strong working relationships with all mutual aid partners.
19. Complete regular meaningful training sessions with mutual aid partners

Activity area: Vehicle Operation (Emergency & Non-emergency)

Frequency/severity: High/high

Priority: High

Control measures:

1. Adhere to State of Oregon motor vehicle operation laws.
2. Monitor all members' driving records.
3. Maintain a strong and ongoing driver training program for all personnel, ideally in collaboration with the Bend Police Department.
4. Consider requiring a Commercial Driver License for all Apparatus Operator-qualified personnel.
5. Consistently advocate for defensive driving procedures and attitudes.
6. Require use of seat belts 100% of the time, enforce as necessary.
7. Provide ongoing training in the practice, techniques and risk/benefit analysis of emergency vehicle operations.
8. Consider the purchase, adoption and use of an infrared traffic control device system.
9. Develop a policy, procedure and instruction (PPI) on making emergency driving the exception rather than the rule.
10. Establish a strong and ongoing preventive vehicle maintenance program.
11. Consistently and thoroughly document all vehicular accidents involving department vehicles.
12. Collaborate with City Traffic officials to design emergency vehicle safety features into traffic control measures.

Activity area: Emergency medical service operations and delivery

Frequency/severity: High/medium

Priority: Medium

Control measures:

1. Maintain a level of EMS training that meets or exceeds state and national standards.
2. Use available protection from biohazards and pathogens appropriately, and continue to develop and maintain the Exposure Protection program.
3. Utilize appropriate staffing levels to ensure adequate manpower on scene.
4. Maintain a high level of patient confidentiality and incident documentation to limit liability exposure.
5. Implement a professionally sanctioned injury prevention program to address the common causes of firefighter and medic injuries.

Activity area: Natural Disasters

Frequency/severity: Low/high

Priority: High

Control measures:

1. Conduct regular review and exercise of the City Emergency Operations

Plan, involving all appropriate personnel and departments.

2. Ensure compliance with NIMS standards; assist other City departments with same.
3. Connect and communicate with mutual aid partners and agencies on a regular basis, with regards to training and operations.

Activity area: Special Rescue operations

Frequency/severity: Low/high

Priority: Medium

Control measures:

1. Conduct regular and extensive training for Special Rescue Team (SRT) members, with a long term goal of complying with NFPA 1006.
2. Ensure a strong operational foundation for all Fire Department members with an ongoing training program conducted by the SRT.
3. Conduct a regular review and update of equipment and procedures.
4. Establish and maintain strong operational ties with neighboring agencies.
5. Place a high value on the training and development of the SRT.

Activity area: Health and Fitness

Frequency/severity: Low/high

Priority: High

Control measures:

1. Adopt the Wellness Fitness Initiative, or adapt it to fit BFD.
    a. develop fitness policy and oversight
    b. provide access to outside health and fitness consultants
    c. provide regular medical evaluations
    d. provide scheduled time block for fitness and evaluations
    e. an in-house injury rehabilitation and return to duty program
    f. promote behavioral health and stress management through a strong Employee Assistance Program (EAP).
    g. Set up a cost justification system to track Workers Comp and

Sick Leave usage.

h. develop a data collection system for statistical information on members' health, fitness and injury history, for program improvement and members' benefit.

2. Create an environment in which 100% of employees place a high priority on health, fitness and occupational safety.
3. Strive to improve the workout space in each station, by proactive machine maintenance and update, and by enlarging the area.
4. To reduce workplace injuries, retain a physical therapist for all City Departments, with a strong therapy-based injury prevention program.

Activity area: Hazardous materials operations

Frequency/severity: Low/high

Priority: Medium

Control measures:

1. Train to and follow closely the BFD Standard Operating Guidelines which address response to incidents involving hazardous materials.
2. Maintain close ties, including several training sessions yearly, with the Salem HazMat Team, including at least one field exercise per year.
3. Develop response protocols for the facilities and transportation modes and routes which utilize and transport hazardous materials.
4. Develop strong lines of communication with our mutual aid partners, including the Bend Utilities and Bend Streets Departments, in order to respond safely to this type of incident.
5. Provide solid training to Bend Utilities and Bend Streets in hazmat response.
6. Review OSHA 29 and 49 Code of Federal Regulations addressing hazardous materials response, and work toward compliance with NFPA 472 and 473.

Activity area: Non-emergency operations

Frequency/severity: High/low

Priority: Medium

Control measures:

1. Enforce 100% compliance with all appropriate safety requirements and measures for the specific activity (fire cause investigation, inspections, code enforcement, etc.).
2. When operating with potentially hostile, or confrontational people, work in teams of two, and keep law enforcement apprised.
3. Provide high quality training in all non-emergency operations, including risk awareness.

Activity area: Facility use

Frequency/severity: High/low

Priority: Medium

Control measures:

1. Provide ergonomically designed office equipment for all work stations.
2. Develop a monitoring plan for all heating, cooling, ventilation and plumbing systems that may endanger health in the event of a malfunction.
3. Hire licensed and bonded contractors for all work on these systems.
4. Ensure safe outside areas for parking and entering/exiting buildings under icy and inclement weather conditions.
5. Install and maintain appropriate smoke and CO alarms, and fire alarm systems in all occupied department buildings.
6. Provide for constant facility security.

Activity area: Training activities

Frequency/severity: High/medium

Priority: High

Control measures:

1. Utilize and enforce the same safety measures at training as we do at real incident scenes.
2. Ensure that all training props are safe for the activities they are designed for, both prior to training exercises and after use.

3. Empower all personnel to speak up if they observe a potential or actual safety issue.
4. Maintain thorough and detailed training records for all personnel.
5. Ensure, through an evaluation, that each individual has a clear understanding of the risks and safety issues of all activities covered in training.

Activity area: Behavioral and interpersonal issues

Frequency/severity: High/low-high

Priority: High

Control measures:

1. Conduct regular training which addresses workplace harassment issues, with particular focus on risks to the individual and the organization.
2. Write, publish and update regularly a clear policy statement on workplace harassment and bullying, including language stating zero tolerance for discrimination, harassment, violence and hostile work environment.
3. Consult with legal and human resource professionals on any disciplinary actions to be taken.
4. Ensure that all personnel treat each other, co-employees and the general citizenry with integrity, respect and courtesy at all times.
5. Include a wide range of personnel in the regular updating and ratifying of the Department Values and Expectations and the Code of Conduct.
6. Work closely with the City Risk Manager to implement control measures for all types of risk.

Seven General Guidelines for approaching the issue of risk in the workplace:

1. Maintain an attitude of safety and stewardship (watching out for each other and for the organization).

2. Be fully prepared to ask for help, and have a backup plan in case the situation deteriorates.

3. Supervisors MUST allow ALL members, regardless of seniority, to communicate any safety concern they observe. ALL members have the responsibility to speak up if they see a potential safety issue.

3. Report all accidents and near accidents to the Department Safety Officer.

4. Document thoroughly any actions and responses that may have legal and/or liability consequences, both to an individual and to the organization.

5. Before taking action, carefully weigh the risks and benefits, considering the trajectory of your actions.

6. Be a heads up team player, and use common sense.

Monitoring risk

1. Provisions for monitoring the effectiveness of the controls implemented:
    a. The RMP will be monitored on a daily, monthly and annual basis.
2. Recommendations and revisions will be made, based upon the following criteria:
    a. Annual accident and injury data for the preceding year and significant incidents that have occurred during the past year.
    b. Information and suggestions from the Safety Committee and the City Risk Manager.
    c. Information and suggestions from department staff.
    d. The Safety Officer will evaluate the Risk Management Plan on a regular basis, with a plan review and update conducted annually.