Bellevue Fire Department
Standards of Response Coverage

Michael E. Eisner, Fire Chief
NFA EFO, CFAI CFOD

Bellevue Fire Department | PO Box 90012 | Bellevue WA, 98009-9012
425-452-6892

Bellevue Fire Department

Standards of Response Coverage team

Eric Keenan, Lieutenant
SORC team leader, Writer, Data analysis

Bruce Kroon, Battalion Chief, NFA EFO
Accreditation Manager, Editor

Babette Bechtold, Sr. Admin. Assistant
Editor

William Lie, Data analyst
RMS reports

Kieron Gillmore, Data Analyst
Structural risk assessment

Midge Tarvid, Sr. GIS analyst
Structural risk assessment

Introduction

The following report serves as the Bellevue Fire Department Standard of Coverage. Its purpose is to assist the Department in ensuring a safe and effective response force for fire suppression, emergency medical services and specialty response situations. The Department's accrediting body, The Commission of Fire Accreditation International (CFAI) defines the Standard of Coverage as, "a rational and systematic way of looking at the basic service provided by an emergency services agency."

In creating this report, the department analyzed many factors including: community profiles, community risks, fire-scene tasks, and both the type and quantity of emergency calls. This analysis drives the department to create performance standards which are also rooted in community expectations. Performance reports will demonstrate that the department is meeting its established standards, and performance outcomes will provide additional support. Ultimately, the analysis of all these factors leads to the justification for the placement and staffing of fire department resources as well as detailed response plans to handle the risks these resources are expected to face.

Contents

Table of Figures

Table of Tables

Hyperlinks throughout the Standard of Response Coverage are intended to give details or support beyond what is described within the document. Most hyperlinks are publicly accessible. However, some hyperlinks are to internally-supported documents or exhibits and are only viewable from a City of Bellevue network computer. Members of the public that are interested viewing a specific internal hyperlink are encouraged to contact the Department's administrative phone number and schedule a meeting with a staff person that will be able to share the information.

Executive Summary

The Bellevue Fire Department's fundamental role is to provide emergency medical, fire suppression, rescue and prevention services that will preserve and protect both life and property in our community. Since its inception in 1965, we have evolved from a single station with traditional roles to a nine-station configuration serving a growing and vibrant community. Throughout the years, we have incorporated efficiencies and services in response to demands. And as a result, we have built a reputation as a leader and innovator in the delivery of emergency services within our region.

Our employees are proud of what they do and who they serve. But, as is often the case in emergency services, the ability to precisely explain our roles is sometimes overly general, vague or even idealistic. In response, this document is designed to explain the details of *what* we do along with the *how* and *why* we operate. Rather than resting on inflexible traditions, we will show that we have set standards based on achieving measurable outcomes, and our performance will be measured according to those standards. These methods of performance measurement and self-evaluation help promote accountability.

We begin with a description of how we began and how we have grown. Each jurisdiction we serve will be described as well as unique facts about climate, population, development and funding.

The balance of this report will describe the resources we use to deliver of our services along with how we staff and respond. One section will detail what the community thinks about our service and how our service is matched to community desires.

The most important section of this report is the community risk assessment. It is a listing of unique and common hazards within our service area and each one is quantified according to frequency of occurrence and potential impact on the community.

The on-scene operations and critical tasks section describes the details of what our responders do when they arrive at emergencies. It is the required tasks that drive us to establish response plans designed to get the right number of personnel and equipment to an emergency to have the greatest chance at a positive outcome.

The *Standards of Response Coverage* culminates with a statistically-based set of performance standards and corresponding measurement reports that will demonstrate that we perform at a high level. Performance outcomes will be reported along with a meaningful display of the resource reliability designed to show areas of the jurisdiction where additional resources or response efficiencies would be most beneficial.

Finally, we express both the need and desire to continue this type of analysis at intervals that allow for corrective adjustments in response performance, resource positioning, and staffing requests.

This document provides a degree of detail and disclosure that is uncommon in the fire service and is a demonstration that the Bellevue Fire Department is committed to meeting the expectations of our leadership and community at a level that is both justified and affordable. It is our desire to uphold the highest standards that our City and Department have been built upon, while striving for new and better methods to deliver vital community services.

Section 1

Description of community served

Legal basis for agency

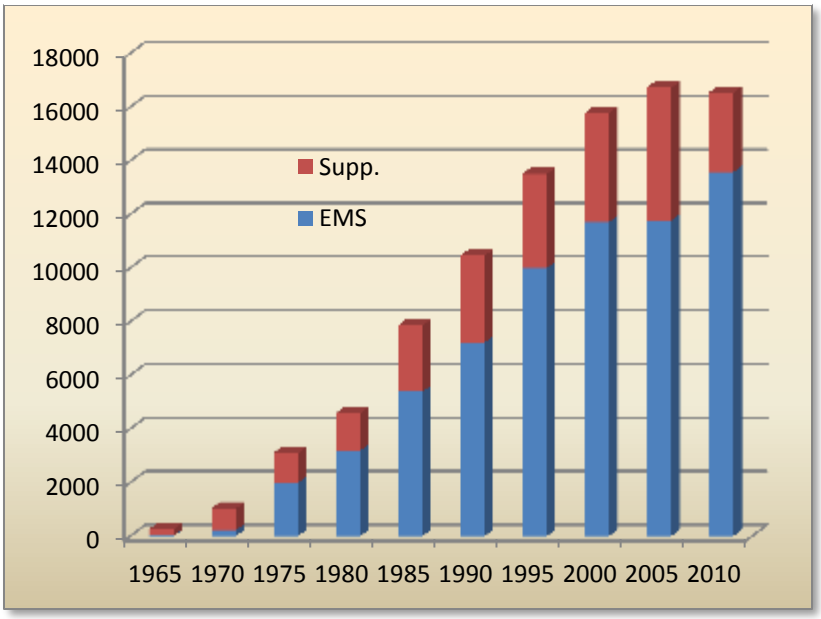
The Bellevue Fire Department was established on January 1, 1965 by the passage of Bellevue ordinance No. 698. In addition to the organizational structure provided in Bellevue City Code, additional rules and regulations exist in Washington State law found primarily in RCW 35.103.

Historical Perspective

The Bellevue Fire Department was first organized in 1965 as an emergency response agency with one fire station and 16 employees, 12 of which worked a three-platoon 24 hour shift schedule. In 1969, the Department merged with King County Fire District 14, which added three additional stations, primarily staffed by volunteers.

The most significant fire department growth was a direct result of the 1979 Fire Protection Master Plan. This plan, adopted in principle by the City Council through the Public Safety Bond issue of 1980, provided an integrated means of addressing existing and future service-level needs within the fire department sphere of influence. The plan was a blueprint for providing a more consistent level of service to at least 80% of the city, instead of the existing 50% coverage. While the facility, resource and personnel growth afforded by the measure may have seemed aggressive at the time, it proved to be visionary and remains a vital part of our current service delivery.

Table 1-1 Incident count by year



In addition to the growth brought through increased investment, the city continued to expand by annexation. The department also grew through the contracting of services to neighboring jurisdictions, but some of the city's greatest growth during the 70's came from the expansion of fire department services in the realm of prehospital care.

Prior to 1970, the Bellevue Fire Department was primarily focused on responding to fires, catastrophic emergencies, fire prevention, code enforcement, and education. At the

time, limited effort was directed toward emergency medical incidents. A growing national movement and a concerted effort by local citizens and physicians put the Department in a place to respond by offering a comprehensive emergency medical response system for the community.

Bellevue began by sending several firefighters to Harborview Medical Center in Seattle to study under the guidance of doctors looking to change the way emergency services were delivered to the community. The Medic One training program, as it is now known, was then in its formative stages. Upon completion of training, the Bellevue Fire Department placed its first Mobile Intensive Care Unit that went into service in the fall of 1972.

The importance of emergency medical service (EMS) cannot be overstated. In 1965, emergency medical responses accounted for 7% of the Department's run activity. Today, EMS accounts for over 70% of emergency response activity. Early recognition of the public's desire for high-quality, emergency medical care is one of the great and lasting achievements of the Department. The Department, along with other regional Medic One providers, takes great pride in what is widely considered one of the most progressive and successful emergency medical response system in the world.

Throughout the period of EMS growth, the City's business and residential components increased as well. In addition to the increasing fire response needs, the importance of fire prevention and code enforcement became clearer. The complexity of modern construction drove the City and Department to adopt modern codes designed to lessen the chances of major fire-loss disasters. The proliferation of office high-rises and high-density residential occupancies, without a significant increase in fire incidents or fire loss, is proof of the effectiveness of the department's code enforcement and prevention programs.

Further proof of progressive code enforcement is found in the City's mandate for fire sprinklers in all new construction that is over 10,000 square feet. The City further incentivizes residential fire suppression in smaller homes by waiving service upgrade fees if homeowners install the systems.

Along with the delivery of emergency services, the events of September 11th 2001 demonstrated the value of effective emergency management. The Department and community recognized the need for better planning in light of the threats surrounding terrorism, natural disasters and man-made catastrophes. Predating the heightened awareness caused by 9/11 and Hurricane Katrina, the department took several steps as far back as 1991 towards improving its response to these situations. The Fire Department's Office of Emergency Management (originally Emergency Preparedness Division) was established to create an emergency operation plan designed to coordinate City departments and regional authorities during a disaster. In addition, the office began working with the community to help citizens and businesses to both prepare for and respond to local disasters.

Profile of governing authority

The City of Bellevue is a non-charter optional code City, operating under Section 35A of the Revised Code of Washington (RCW). It has a Council-City Manager form of government with a seven-member City Council elected by the voters of the City. Council members are elected at large rather than by district. They are responsible for establishing the general guidelines and policies for the City, and each serves a four-year term. The Council elects the Mayor and Deputy Mayor from within its ranks. The Council appoints the City Manager as the City's Chief Executive Officer responsible for carrying out the policies set by the Council. This includes the enforcement of laws and ordinances, the execution of contracts and agreements, and maintenance of peace and order in the City.

The City of Bellevue provides a full range of local government services. These services include police and fire protection; emergency medical services; construction and maintenance of streets and traditional municipal infrastructure; planning and zoning; park and recreational activities; and cultural events.

Additionally, the City operates an equipment maintenance/rental fund and a utility department. The utility department provides sewer, water, and storm and surface water services. Certain Fire Department, utility, information technology, and equipment rental services are also provided on a fee basis to other governmental agencies and neighboring taxing districts.

Conversely, other government agencies provide the City of Bellevue with jail and court services through inter-local agreements. Bellevue residents receive library services from the King County Library System.

Jurisdictions Served

The Bellevue Fire Department directly serves the City of Bellevue and contractually provides services to six neighboring jurisdictions. Those jurisdictions are: Beaux Arts Village, Clyde Hill, Hunts Point, Medina, Newcastle, and Yarrow Point [Figure 1-3]. Annexations of unincorporated areas (Eastgate, Hilltop, and Tamara Hills) into the City of Bellevue added 1.43 square miles in 2012. However, the annexed areas were already receiving Bellevue Fire protection under contract.

Figure 1-1: Washington state

Bellevue

The city of Bellevue is the 5th largest of 281 cities in the State of Washington. It is located on the east shore of Lake Washington near the population and geographical center of the Puget Sound

region. It is just 11 miles east of Seattle and 40 miles north of Tacoma with the mountains of the Cascades towards the east, and Mount Rainier to the south. Bellevue is about three hours north of Portland, Oregon, and two hours south of Vancouver, Canada.

The city's name is derived from a French term for "beautiful view". Under favorable weather conditions, scenic vistas of the Olympic and Cascade Mountains can be viewed from hilltops and high-rise buildings within the city.

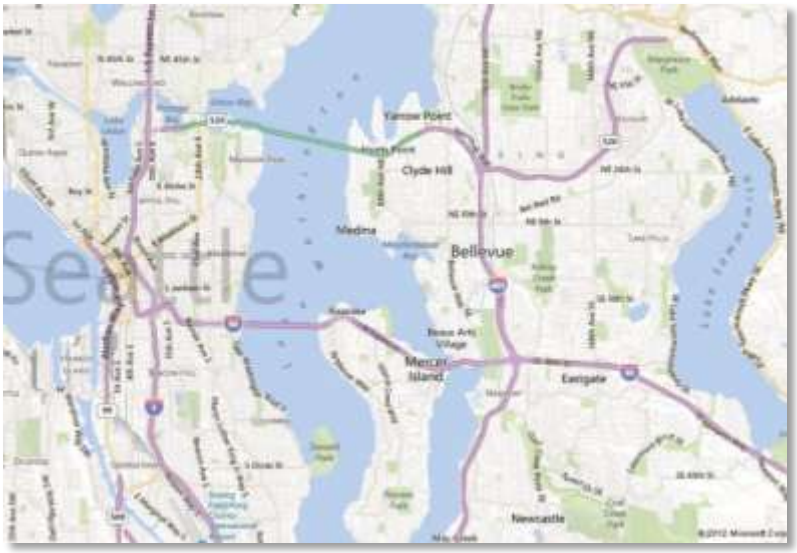
In Bellevue's earliest years, it was primarily known as a "bedroom community" or an extended suburb of Seattle. Since then, the business and retail sectors have grown dramatically and have been the driving force behind the formation of a modern downtown core. Today, the downtown core has 1,300 businesses with about 45,000 employees that have created a premier regional retail economy. Over 145 of these businesses claim Bellevue as their headquarter city. The central business district is home to many well-known companies such as Symetra financial, Expedia travel, Eddie Bauer, Paccar and Puget Sound Energy. T-Mobile USA is headquartered within the city but outside of the central business district in an area known as Factoria. Regional employers such as Microsoft and Boeing have a substantial presence in Bellevue as well.

Bellevue has gained national and regional attention. CNN Money ranked Bellevue the 4th best city to live in their 100 Best Places to Live in America 2010 edition. In 2008, Fortune Small Business magazine named Bellevue the best place in the country to live and launch a business, and Washington CEO magazine named Bellevue 2008 City of the Year.

The city has grown significantly over the past 10 years and Bellevue now has more than 23 million total square feet of office space, a third of which is located downtown. Much of that space supports premier regional shopping complexes such as Bellevue Square and The Bravern.

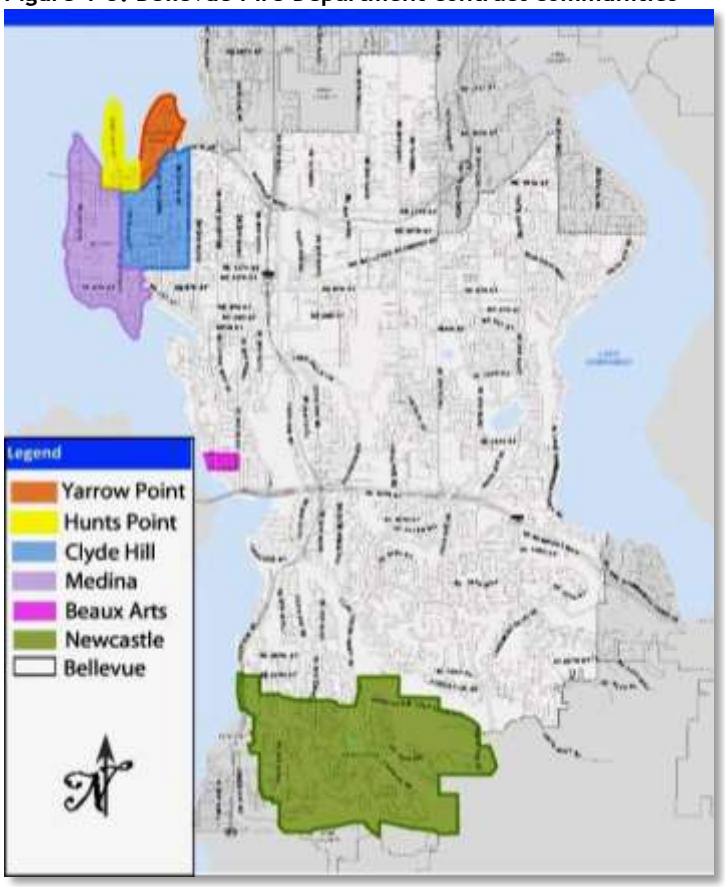
The city lies between Lake Washington to the west and the smaller Lake Sammamish to the east [Figure 1-2]. Much of Bellevue is drained by the small Kelsey Creek watershed, whose source is located in the Larsen and Phantom Lake green belt and whose outlet is near where Interstate 90 meets Lake Washington's eastern shore. The city is bisected by Interstate 405 running north-south, and the southern portion is crossed from east to west by Interstate 90. The State Route 520 freeway roughly delineates the northern reaches of Bellevue.

Figure 1-2: Highway network and surrounding communities



South of I-90 the city surrounds the recently annexed area of

Figure 1-3: Bellevue Fire Department contract communities



Eastgate. South of Eastgate, the city continues up to the western flanks of Cougar Mountain. On top of Cougar Mountain exists the newly incorporated area called Hilltop. To the west of Cougar Mountain includes the Somerset, Coal Creek and Factoria neighborhoods.

Bellevue is bordered by the cities of Kirkland to the north and Redmond to the northeast near the Overlake and Crossroads neighborhoods. Across the short East Channel Bridge, I-90 connects Bellevue to Mercer Island to the southwest. The City of Issaquah lies to the east, along I-90 at the south end of Lake Sammamish. At the south end of Bellevue lies the City of Newcastle, which as stated before, contracts with Bellevue for its fire protection. Beyond the south end of Newcastle lies the city of Renton. Renton, Kirkland, Redmond, Mercer Island and Issaquah have established Fire Departments that provide suppression and EMS services to their citizens.

Beaux Arts Village

Incorporated in 1954, the Town of Beaux Arts Village is located on the eastern shore of Lake Washington just north of the I-90 east channel bridge. With its population of around 300 residents, Beaux Arts is one of the smallest municipalities in Western Washington, yet its proximity to Seattle and the Eastside help make it a highly desirable place to live. The total land area is only 0.1 square miles.

Residents relish the "small town" feel of Beaux Arts, often referring to themselves as "Villagers", as they have since well before incorporation. The streets are narrow and tree-lined. The community is 100 percent residential and the homes are

Table 1-2: Service area assessed values

Jurisdiction	2010 Total Assessed Value*
Bellevue	$34,102,501,792
Beaux Arts Village	$103,758,865
Clyde Hill	$1,438,750,204
Hunts Point	$774,209,944
Medina	$2,547,026,789
Yarrow Point	$747,533,818
Newcastle	$1,899,717,812
Eastgate/Hilltop/Tamara**	$567,950,077
Total	$42,181,449,301

*Real and personal property combined [source]
**annexed into Bellevue in 2012

an eclectic mix of new and vintage, old-fashioned and modern.

Beaux Arts Village was founded in 1908 as an artists' colony and named after the Western Academy of Beaux Arts to which its founders belonged. At the time, one could purchase membership in the Academy for $200. Today, membership in the Academy comes with home ownership.

Table 1-3: 2011 Average home values and taxes

Jurisdiction	Avg.res. Value	Levy Rate	2011 Tax
Bellevue	$563,600	8.7	$4,900.79
Beaux Arts Village	$766,900	9.12	$6,992.24
Clyde Hill	$1,135,100	8.29	$9,404.60
Hunts Point	$3,608,700	7.37	$26,613.04
Medina	$1,886,500	8.06	$16,217.81
Yarrow Point	$1,619,800	7.72	$12,500.94
Newcastle	$517,600	11.57	$5,989.39

Source: King County assessed value and taxes by city

The City of Clyde Hill

The City of Clyde Hill is located in the northwest corner of the department's service area and is also the home of fire station number five. The majority of Clyde Hill is zoned for single-family use with the exception of two commercially zoned areas: a gas station and a Tully's Coffee shop. In addition to a small government zone, the City is home to four schools: two Bellevue district 405 public schools - Clyde Hill Elementary and Chinook Middle School; and two private schools: Bellevue Christian School and Sacred Heart School.

The total land area is about one square mile and according to the 2010 census, there are 1,099 households and 2,985 residents. The city's minimum lot size is 20,000 square feet, although many smaller lots exist which pre-date the incorporation of the City.

Clyde Hill is best described as a low-density residential community, and its minimum lot size requirement is meant to preserve that look and feel. The City works to retain and maintain the original spacious and wooded character of the community and to remain a relatively small, simple and intimate.

The Town of Hunts Point

The Town of Hunts Point is located on the middle of the three land peninsulas that make up "The Points communities". It was incorporated in 1955 and still is comprised of its original 0.3 square mile. There are 186 housing units, 165 households and 394 residents. With the exception of the community center and town hall, the rest of the community is zoned residential. A drive down the community's main access road will show that the

Table 1-4: Square miles per jurisdiction

Jurisdiction (2010)	Square Miles
Bellevue	31.97
Beaux Arts Village	0.09
Clyde Hill	1.06
Hunts Point	0.29
Medina	1.43
Yarrow Point	0.37
Newcastle	4.45
Eastgate/Hilltop/Tamara*	1.43
Total	41.09

*annexed into Bellevue in 2012

typical house is set back from away from road and down toward the water on long, narrow lots.

The Town of Medina

Medina, along with its neighboring cities of Hunts Point and Yarrow point, is often referred to as the "Eastside Gold Coast". The predominantly affluent community occupies 1.4 square miles along the eastern shore of Lake Washington and offers some of the best western views of Seattle. Like its immediate neighbors, the city is almost completely residential with the exception of a small convenience store, a post office, gas station, one public elementary school, two private elementary schools, a country club/golf course and a town hall.

There are 1,165 dwelling units and 1,111 households with a population of 2,969. Notable residents include Microsoft founder Bill Gates and Amazon.com CEO Jeff Bezos. Names like these and other industry leaders make this area a frequent stopping point for presidential fundraising.

Table 1-5: 2010 Population

Jurisdiction	Pop.
Bellevue	122,363
Beaux Arts Village	299
Clyde Hill	2,985
Hunts Point	394
Medina	2,969
Yarrow Point	1,001
Newcastle	10,380
Eastgate/Hilltop/Tamara*	5,554
Total	145,945

*annexed into Bellevue in 2012

The City of Newcastle

Newcastle extends across the southern border of the City of Bellevue and is just north of the City of Renton. Incorporated in 1994, one of its first actions was to begin contracting for fire suppression and EMS services from the Bellevue Fire Department, changing from a fire district that contracted with the Renton Fire Department.

The community is predominantly residential. But unlike the other contract communities that Bellevue serves, Newcastle has a small commercial zone with several grocery stores, shops and small businesses. Perhaps the most notable point of interest here is the Golf Club at Newcastle, a premier public golf course with stunning views of Bellevue, Seattle and the Olympic Mountain ranges.

In September 2012, the Newcastle city council held discussions on whether to begin informal talks with the City of Bellevue concerning possible annexation into Bellevue and disincorporation of Newcastle. At the time of these discussions, Newcastle was expecting a revenue shortfall and various courses of action were under consideration.

The city has 3,117 housing units, 3,028 households and 2,189 families with a population of 10,380. Its total land area is 1.43 square miles.

The Town of Yarrow Point

The easternmost of "the Points communities", Yarrow Point lies on another peninsula extending into Lake Washington just north of Clyde Hill. First homesteaded in the late 1880's,

the Town was incorporated in June 1959 to preserve its unique characteristics in the face of significant changes throughout the greater Puget Sound region. While one-fourth of the homes in Yarrow Point enjoy waterfront locations or water access, the remaining three-quarters offer views ranging from expansive to territorial.

The town is zoned completely as residential with the exception of a town hall. There are 393 housing units over its 0.4 square miles. 2010 census data shows a population of 1,001 people.

Topography and Geology

Bellevue is situated in the area of Western Washington area that is commonly referred to as the Puget Sound region. The waterways of the Puget Sound, along with the Cascade range to the east and the Olympic mountains to west, form a trilogy of major geographic features.

The Bellevue area is mostly low and modestly rolling hills that is situated between Lake Sammamish to the east and Lake Washington to the West. The lack of a sizable watershed means that the few streams that drain into the surrounding lakes are small and not prone to urban flooding.

Elevation varies from near sea-level to about 1,400 feet on the slopes of Cougar Mountain, which is located in the southeast area of the city. Elevation differences become more evident in the winter months when it is not uncommon to get a dusting of snow on the higher hilltops while the lower areas remain clear.

Thirty miles directly to the east are the foothills and mountains of the Cascade Range. Formed mainly through volcanic and tectonic forces, the Cascades form both a geographical and climatological border between the western and eastern portions of the state of Washington. Sixty miles to the southeast is Mount Rainer; the most prominent Cascade Range feature with its 14,410 foot peak visible on clear days.

The hills and lakes in and around Bellevue were mainly formed through glacial processes and the lack of rocky outcroppings and firm bedrock indicates most of the area is a form of deposited glacial till.

Seismic activity is not uncommon as the region is crisscrossed with several major and minor fault lines. Most notably is the Cascadia subduction zone which is located off the western coast of Washington and has been known to cause earthquakes in excess of 8.0. The last major earthquake associated with this fault occurred in 1700 and historic intervals for these quakes are between 300-600 years apart. The next major earthquake associated with this fault is expected to produce widespread destruction throughout western Washington.

Climate

The climate is typically described as coastal mild. The 49° northern latitude would normally lead to appreciably hot summers and equally cold winters. But the close proximity to the Pacific Ocean and Puget Sound means that temperatures are moderated and extremes are

rare. When temperature extremes occur, they typically last for short periods as the weather patterns that brought them are typically fast moving and infrequent.

Table 1-6: Climate data for Bellevue Washington

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Record high °F (°C)	64 (18)	66 (19)	78 (26)	83 (28)	89 (32)	92 (33)	96 (36)	93 (34)	93 (34)	87 (31)	66 (19)	62 (17)	96 (36)
Average high °F (°C)	46 (8)	50 (10)	54 (12)	58 (14)	65 (18)	69 (21)	75 (24)	76 (24)	71 (22)	60 (16)	52 (11)	46 (8)	60 (16)
Average low °F (°C)	35 (2)	36 (2)	38 (3)	42 (6)	47 (8)	52 (11)	55 (13)	57 (14)	52 (11)	46 (8)	40 (4)	35 (2)	45 (7)
Record low °F (°C)	18 (−8)	19 (−7)	28 (−2)	32 (0)	35 (2)	42 (6)	48 (9)	47 (8)	42 (6)	29 (−2)	20 (−7)	10 (−12)	10 (−12)
Precipitation inches (mm)	4.49 (114)	3.67 (93.2)	3.84 (97.5)	2.84 (72.1)	2.10 (53.3)	1.68 (42.7)	0.97 (24.6)	0.97 (24.6)	1.71 (43.4)	3.32 (84.3)	4.92 (125)	5.45 (138.4)	35.96 (913.4)

Population

Detailed population and demographic information for Bellevue can be found in the city's Neighborhood Demographic Profile based on the 2010 census. Also, QuickFacts provided by the US Census Bureau relays basic demographic information about Bellevue and our contract community Newcastle. General demographic information on the other contract communities can be found on Wikipedia entries for those cities here: Beaux Arts, Clyde Hill, Hunts Point, and Medina.

Development

The City of Bellevue and its contract jurisdictions are unique when compared with other cities of similar size. As an urban environment, the area's residential and commercial areas are very prominent, but noticeably absent are the manufacturing, transportation and agriculture sectors. The city's light industrial area known as the "Spring District" is home to two beverage bottling plants, an ice cream plant and a bakery, but the majority of businesses are smaller and they mainly service the needs of the surrounding community (e.g. automotive repair, sales, home construction, and various services). New master plans for the Spring District indicate a move away from what little light industry that is currently there towards an office and residential area.

Also noticeably absent is the lack of a rail corridor and airport. The only rail line through the area was decommissioned in 2009 after the removal of a vital bridge during a highway widening project. The small amount of freight that used the line was redirected onto roads or alternate rail lines. The area's air transportation needs are served by the regional Sea-Tac airport that is a 20 minute drive away.

Expansion of light rail transportation to Bellevue and neighboring cities is expected to occur in about 10 years. The initial line within Seattle has been completed and expansion that is

part of the master plan is already underway. Negotiations between the agency that manages the system and the City of Bellevue are ongoing and are revolving around where to route the line to serve the most people while minimizing impacts on current traffic and development.

The development within Bellevue's central business district (i.e. high-rise area), has driven the city's population and valuation growth. Despite the drastic near-stoppage of construction and development between 2008 and 2012 during the housing crash and economic slowdown, indicators are now pointing towards a rebirth.

Internal tracking of major projects is showing that developers are beginning to proceed on additional central business district construction. Several high-rise projects are entering their final approval stages and construction is eminent. The construction and use of those properties should have the ripple effect of expanding the tax base and reversing the declines of the past four years.

The driving force behind this development is the number of high-tech jobs related to Microsoft and the other major players in that sector. Employers in that sector have found that their workforce's have specific office, urban and social needs. Bellevue's development in recent years has attracted these businesses because their employees find the housing, recreation, entertainment and infrastructure appealing. Bellevue's governing leaders are driven to create a competitive tax structure, pro-business environment and efficient/responsive government to foster this growth.

What is expected to be a major project in terms of cultural significance is the Tateuchi Center, a 2000 seat performing arts center in the downtown core. The project appears to have its base of private funding and the project is in final design review with an expected building permit issuance in 2013.

The City of Bellevue has reached the limit of its growth boundaries with the last annexations of unincorporated area occurring in 2012. Now confined to its borders, growth is still expected as properties are fully developed or redeveloped. The recent trend in residential single-family development is that the old houses built in the 1950's are razed and newer, larger ones are constructed. The growth of higher-density housing is also significant as urbanization continues. The manifestation of urban growth has been the increase in the "five-over-one" buildings (upper floors built with type-5 construction for residential use and a ground-level built with type-1 construction for retail/business) over the past 10 years.

Funding

The department submits budget proposals every two years through a process called "budgeting for outcomes", or internally called "Budget One." The Budget One process puts the emphasis on the community outcomes, not departments. It involves a series of steps that create a government based on available funding, which is then connected to these outcomes and their associated service delivery results. The primary change in the budget process is that all current programs, services and activities must be submitted as "proposals" in order

to: retain ongoing funding, expand existing funding or to fund new programs. All proposals must align with at least one of the community outcomes.

In Budget One, departments are asked to set aside "traditional thinking" during budget preparation. Instead, the focus is on achieving desired "results" for each citywide outcome. Small employee groups called "results teams" were created for each outcome to coordinate and make provisional recommendations on services to be funded for their outcome. Each results team has at least one "subject matter expert" (SME) whose purpose is to give detailed insight on how the proposals meet the community outcome. The results teams are also responsible for ranking the budget proposals in order of importance so that city leaders can ensure funding for what is truly needed. Results teams are also able to exercise "scalability" options in certain proposals to get the right level of service.

Other jurisdictions that follow the same budgeting process can be found in Fort Collins CO, Savannah GA, Redmond WA, and Mesa County CO.

Table 1-7: Bellevue Fire 2013 Budget One proposals

Budget Item	Expenditure	Revenue	Balance
Fire Suppression and EMS	$22,263,103	$5,366,039	$16,897,064
Advance life support Services	$7,005,851	$7,005,851	$0
UASI	$1,421,342	$1,421,342	$0
Management and Support	$1,329,057	$146,676	$1,182,381
Fire Prevention	$1,055,112	$176,607	$878,505
Training Div.	$573,915	$63,130	$510,785
Emergency Management	$447,557	$136,282	$311,275
Facilities and Maintenance	$409,206	$44,571	$364,635
Small Grants and Donations	$342,000	$342,000	$0
Fire station Generators	$78,054	$0	$78,054
Total	$34,925,197	$14,702,498	$20,222,699

Particularly significant in the Bellevue Fire Department budget [Table 1-7] is the ratio of expenditures to revenue. While many jurisdictions would find it notable to have even 20 percent of expenditures from revenue, the Bellevue Fire Department's current ratio is at 42 percent. The most notable source of revenue comes from the contracting of fire services, the funding from the Medic One levy, UASI funding and BLS transport fees.

Section 2

Services provided

The services provided by the Bellevue Fire Department include:

- Fire Suppression
- Emergency Medical Services
    - Basic Life Support, first response and transport
    - Advanced Life Support, first response and transport
- Hazardous Materials "Technician Level" Response
- Specialized Rescue: Trench, confined space, high angle, heavy rescue, structural collapse, surface water rescue.
- Public Education
- Fire Prevention
    - New construction plans review
    - New construction inspection
    - Routine annual inspection
- Emergency Management

The basic organizational structure for these services can be found in our departmental org chart.

Locations of existing fire stations and companies

The Bellevue Fire Department operates out of nine stations within our service area [Figure 2-1]. In addition, four medic units staffed with Bellevue firefighter/paramedics operate out of four locations, two of which are within the Bellevue Fire Department coverage area. The other two medic units operate east of the department's jurisdiction and serve the ALS needs of those communities. All staffing operates under one battalion; however, medic resources operate under a shift supervisor (Medical Service Officer that is within the battalion), that oversees their needs/activities.

Figure 2-1: Station Locations

Fire Department administration offices are located at Bellevue City Hall. However, there is no fire station at city hall.

The locations and staffing of each station is listed in Table 2-1.

Stations mapped in Figure 2-1 show what was historically known as a color-coded "first-due" area. Currently computer aided dispatch (CAD) sends responders to nearby calls by using automatic vehicle locators (AVL) that transmit GPS locations of each available unit. Once the CAD determines the exact location of an emergency, it assigns and notifies the closest response unit.

Table 2-1: Station locations and staffing

Station *Neighborhood*	Location	Companies	Staffing
Station 1 *Enatai, Downtown*	766 Bellevue Way SE, 98004	Battalion 1 Engine 1 Aid 1 (BLS)	2 3 2
Station 2 *Eastgate*	2802 148th Ave SE, 98007	Engine 2 Aid 2 (BLS) Medic 2 (ALS) MSO 5 MCI One	3 2 2 1 cross/select
Station3 *Crossroads*	16100 NE 8th St, 98008	Ladder 3 Aid 3 Rescue 3	5 2 cross/select
Station 4 *Factoria/Somerset*	4216 Factoria Blvd. SE, 98006	Engine 4	3
Station 5 *Clyde Hill/Points*	9621 NE 24th St, 98004	Engine 5 Aid 5 (BLS)	3 cross/select
Station 6 *Bel-Red/Overlake*	1850 132nd Ave NE, 98005	Engine 6 Aid 6 HazMat1	3 cross/select cross/select
Station 7 *Wilburton*	11900 SE 8th St, 98005	Ladder 1 Engine 7	4 cross/select
Station 8 *Lakemont*	5701 Lakemont Blvd. SE, 98006	Engine 8 Air Unit 1	3 cross/select
Station 9 *Newport/Newcastle*	12412 Newcastle Way, 98006	Engine 9	3
Overlake Hospital	1035 116th Ave NE, 98004	Medic 1 (ALS)	2
Outside City Medic Units			
Issaquah	1280 NE Park Dr., Issaquah 98029	Medic 14	2
North Bend	112 W Second St., North Bend 98045	Medic 3	2
		Suppression	38
		Medic EMS	9
		Daily Total	47

Resource Descriptions

Battalion One- A Battalion Chief shift commander responsible for the supervision of all personnel in the battalion. Under the current Department resource configuration, there is a single battalion chief on 24-hour duty.

Figure 2-2: Engine 1 in the Vuecrest neighborhood of West Bellevue

Engines companies – The department currently staffs seven triple-combination fire engines that specialize in fire suppression and EMS. These resources are equipped with a fire pump, hose complement, and 500 gallon water tank. Bellevue's fire engines are rated at a minimum of 1500 GPM.

Ladder companies - The Department currently staffs two ladder companies. Both ladder companies are tillered aerial trucks without a water pump or tank. These resources and the personnel that staff them perform specialty functions at fire and rescue scenes. Specifically, their role is to support forcible entry, ventilation(vertical, horizontal, positive pressure, search, rescue, salvage, overhaul, above-ground ladder operations, and technical rescue (e.g. trench, high angle, confined space, heavy extrication, and surface water).

Aid/Medic Units – The Department currently provides Basic Life Support services (BLS) through the deployment of five Type I/Type III ambulances. Advanced life support (ALS) services are provided through the deployment of four Type I/Type III medic units.

The primary role of these units is the treatment and transport of sick and injured citizens as defined by emergency medical dispatch protocols.

MSO- A Medical Services Officer; a 24 hour shift officer that is responsible for supervision of all On-Duty ALS medic personnel as well as assisting, as needed, on EMS responses. The MSO is an operations officer and may also fulfill fire-scene duties such as safety officer.

Rescue- A specialty apparatus that carries technical rescue equipment that is used by the ladder companies. While the ladder apparatus has basic "jaws-of-life" and rope rescue equipment, the rescue apparatus has additional equipment for trench, heavy and surface water rescue. The rescue is cross/select staffed by On-Duty personnel.

HazMat-A specialty apparatus that carries equipment needed for a technician-level hazmat response. The hazmat apparatus is cross/select staffed by On-Duty personnel.

MCI One-The Medical Supply Unit is a specialty apparatus that carries equipment needed for a mass-casualty incident (MCI). The MSU is cross/select staffed by on-duty personnel.

Air Unit- The air unit is a specialty apparatus that is capable of refilling self-contained breathing apparatus bottles (SCBA). The air unit is cross/select staffed by on duty personnel.

Staffing levels and staffing patterns

The Bellevue Fire Department's minimum daily staffing is 38 suppression personnel and 9 advanced life support (medic) personnel. All suppression and medic personnel work 24 hour shifts on a three-shift, modified Detroit schedule.

The use of "acting above grade" positions ensures that companies are staffed with appropriately qualified personnel. A Firefighter/actor may fill an officer and/or driver role while regularly assigned personnel are on compensated leave. Actors must meet basic training requirements and complete skills during an evaluation period that prove they are able to perform the duties of the position. The use of acting positions also meets a department goal of developing skills in firefighters prior to promotional opportunities.

Compensated leave in the form of vacations, holidays and Kelly days are scheduled a year in advanced and are subject to rules that are designed to minimize department exposure to overtime. In addition, leave is restricted when specialty skills are required to staff a company. For example, the company officer, engineer and acting firefighter on a crew may not take the same day off to ensure that someone with area knowledge is either driving or navigating.

Engine companies are staffed with three personnel: a company officer, engineer/driver and a firefighter. Staffed aid cars (BLS) and medic units (ALS) have two personnel assigned of firefighter or FF/paramedic rank. Ladder 3 is staffed with 5 personnel and the normal response is with two apparatus: a tillered aerial and a pumper. Ladder 1 is staffed with 4 personnel and will only respond with a tillered apparatus unless the type of call (e.g. car fire) necessitates the need for a pumper.

The Battalion Chief, designated as Battalion One, responds in a command SUV with a firefighter staff assistant as the driver.

Two companies, engine 5 and engine 6, are "cross staffed" and will respond with three personnel on either the engine or aid car depending on the type of call. The crew will respond with the fire engine on suppression and service calls, and with the aid car on EMS calls.

All suppression personnel are trained to the EMT-D Basic level and are certified through King County EMS. The paramedics that staff the medic units are trained through the King County Medic One program and are also nationally certified. Bellevue is one of five ALS providers in the county.

Response methods

An emergency response is composed of four steps that when combined make the **total response time** *(TRT)*:

- **Call processing:** begins with phone pickup in the dispatch center and ends when the information from the phone interview is sent to the CAD (Computer Aided Dispatch) to determine an initial response.
    - Each call is classified into one of 114 different "emergency problems". The CAD automatically classifies the problem based on its scope and location with an "incident type". Location is important because most high-value properties have premise classifications that will affect the incident type (e.g. the difference between a single-family residential AFA and a high-rise residential AFA). Once the incident type is determined, one of 51 pre-determined response plans is chosen by the CAD. The breakdown of response plans is: 12 EMS, 17 special rescues and 22 suppression/other.
- **Unit assignment and Unit notification**: This step is near-instantaneous since the CAD uses the jurisdiction-specific response plan to assign the needed response apparatus to the emergency. Additionally, the CAD uses AVL (GPS) information to assign the closest available units. After assignment, Locution instantaneously and simultaneously notifies all assigned response units through an automated voice in the station and alphanumeric personal pagers. An automated voice is also sent out over an 800 MHz dispatch radio channel when airtime is available. However, station and pager notification always precedes the 800 MHz notification.
- **Turnout:** Upon notification, personnel proceed to apparatus and, if needed, don protective clothing that is needed for the emergency response. Once personnel are seated in the vehicle and ready to respond, a touchscreen entry on a mobile data computer (MDC) or a voice report over an 800 MHz tactical channel will notify the dispatch center that they are responding.
- **Travel:** While driving to the call, crews may read updated information over the MDC or may receive important voice messages from a dispatcher over the tactical channel. Dispatchers can monitor the locations of response units and their progress toward the incident. The crew will use an MDC touchscreen or voice report to indicate arrival on scene. First-arriving crews on major emergencies are expected to give appropriate voice size up reports in lieu of touchscreen notifications.

Emergency medical service response

EMS providers in King County use a "tiered EMS response" through the Medic One System that is internationally known for its proficiency and success rates. 911 calls are answered at the call center where trained dispatchers using focused questions employ a criteria-based system to determine both the nature of the call and the appropriate level of care that is needed. Life threatening emergencies such as cardiac events and trauma with shock are given the highest response with both the nearest BLS suppression crew (either aid or engine) along with

the nearest ALS Medic unit. Lesser calls (e.g. falls less than 10 feet, broken bones without shock, anxiety, etc.) are handled by the closest BLS crew only.

The tiered-response plans meet several performance goals. The first one being that the high-level ALS responders will primarily handle calls where their advanced skills are most needed, and less-urgent-but-more-frequent calls are handled by BLS responders. Second, fewer paramedics are needed and the training costs of maintaining their advanced technical skills is minimized.

Of the 51 response plans, 12 are specific to EMS emergencies. A few of the more commonly dispatched EMS calls are as follows:

- Medic response (e.g. Chest Pain, Breathing difficulty): 1 ALS Medic, 1 BLS apparatus (aid, engine or ladder). Total personnel = 4-7
- BLS response (minor falls, general illness, stroke, anxiety, etc.): 1 BLS apparatus (aid, engine or ladder) Total personnel = 2-5
- Cardiac Arrest: 1 ALS medic, 2 BLS apparatus, 1 MSO. Total personnel =7-9
- MVA –BLS (e.g. minor injury, no signs of shock):1 BLS engine/ladder, 1 BLS aid car. Total personnel = 5-8.
- MVA-ALS (e.g. car vs. pedestrian, severe mechanism, signs of shock): 1 ALS Medic, 1 BLS engine/ladder, 1 BLS aid car. Total personnel = 7-10.

The final stage of an EMS response is determining whether a patient needs transportation to an emergency department. ALS transports are only provided by paramedic units and protocols typically determine which ED receives the patient. Life-threatening trauma is typically handled at Harborview Medical Center in Seattle, the county's only level-one trauma center. However, lesser trauma and most other emergencies can be handled at the closest ED or hospital of the patient's choice. BLS transports to Bellevue, Kirkland, Seattle and Issaquah ED's can be handled by Bellevue BLS units. If a patient requests a different ED, private ambulance transport is typically requested and used. ALS units may transport to any ED the patient desires unless traffic, out-of-service duration, or care needs are overriding factors.

In response to budgetary demands, the city of Bellevue authorized BLS fee-for-transport beginning February 2012. As a result, revenues generated from insurance and Medicare reimbursements have helped to offset the cost of providing that service. ALS service is paid for through a county-wide levy and billing is prohibited under the structure of the program.

Suppression

Suppression calls are dispatched according to the 22 pre-determined suppression response plans. In the event of extreme call volume (e.g. severe weather, power outages, etc.) the on-duty battalion chief, or higher, may enact a "resource emergency". During a resource emergency, automatic fire alarms and most unconfirmed problems will only receive a single-engine response.

Some commonly-dispatched suppression response plans are as follows:

- 1st-alarm residential structure fire: 4 engines, 2 ladders, 1 medic unit, 1 staffed aid unit, 1 MSO and 2 battalion chiefs. Total personnel = 29 -30
- 2nd-alarm residential structure fire: 2 engines, 1 ladder, 1 air unit, 1 battalion chief. Total additional personnel = 11-13.
- Single (e.g. dumpster, car, and beauty bark fire): 1 engine. Total personnel = 3.
- Brush Fire: 2 engines, 1 battalion Chief. Total personnel = 8.

Automatic Fire Alarms:

- Residential AFA: 2 engines or 1 engine and 1 ladder. Total personnel = 6-8
- Low Rise Multi Family-Buildings with Interior Hallways: 2 engines, 1 ladder, 1 Battalion Chief. Total personnel = 12-13
- High-rise AFA: 3 engines, 1 ladder, 1 Aid Unit, 1 Battalion Chief and 1 MSO. Total Personnel = 15-16

Rescue

Technical rescue responses are addressed in 17 different plans and some examples are as follows:

- Mass Casualty Incident 1st alarm (MCI): 3 engines, 2 ladders, 2 battalion chief, 2 Aid, 2 Medic, 1 MSO, 1 medical supply unit, 10 private ambulance. Total personnel = 32 + 20 private.
- Trench Rescue: 2 ladders, 3 trench rescue resources, 2 engines, 1 aid unit, 1 medic unit, 1 battalion chief, 1 MSO, 1 air unit. Total personnel = 23-30.
- MVA Rescue: 1 engine, 2 ladders, 1 aid unit, 1 medic unit, 1 battalion chief, 1 MSO. Total personnel = 22.

Automatic aid

The Bellevue Fire department has automatic aid agreements with four neighboring jurisdictions to ensure that the closest unit responds to an emergency.

- Kirkland
- Redmond
- Eastside fire and rescue (Issaquah)
- Mercer Island

Mutual Aid

Mutual aid responses are specified in the King County Fire Resource plan. The department is able to both request and provide resources to regional task forces and strike teams under the agreements in the plan.

Equipment and apparatus available

The department keeps an up-to-date apparatus inventory on its intranet Supply and Maintenance SharePoint site. A December 2012 snapshot listing of this inventory showing department apparatus, assignment and scheduled replacement date can be found here.

Section 3

Community expectations and agency goals

The city of Bellevue conducts a Budget Survey every two years to learn about resident budget priorities, the importance and level of satisfaction with city services and the value residents feel they receive for their tax dollars. The 2012 survey indicated that the services the fire department provides are both highly desired and give high satisfaction.

Of the seven highest-ranked city services, "responding to fires" is number one, and "providing emergency medical services" is number two.[1] In addition, responding to fires and providing emergency medical services ranked first and fourth respectively in a standardized satisfaction rating.[2] "Responding to calls for police", and "Ensuring clean and well-maintained parks and facilities ranked second and third.

When asked whether city services, in general, should be kept the same, decreased or increased, the same survey indicated that 75% of respondents feel that services should remain the same.[3] Only 13 percent of surveyed residents feel that services should be decreased.

In the 2012 performance measures survey, 97 percent of surveyed residents were either "confident" or "very confident" in the Bellevue Fire Department.[4] While there was a drop in those stating "very confident", the demographic that tends to respond "confident" are those that have lived here less than three years. It could be that an increase in the number of new residents is the significant factor in this apparent drop.

A question that tends to linger in the minds of city leaders is, "Is the fire department properly sized?" When residents are asked the same question, most will not know how to answer. However, most would state that the fire department just needs to be able to respond quickly when they are called.

While it is generally true that adding resources usually leads to more successful outcomes (e.g. smaller fires, less property loss, more lives saved), there is also a point of diminishing returns that should not be surpassed.

To address this "right sized" question, the city uses the Budget One process previously mentioned in this document. The City Council endorsed the following seven outcome areas which form the basis for developing the city-wide budget, which in turn funds the various levels of services.

- Economic Growth and Competitiveness
- Healthy and Sustainable Environment

[1] 2012 Budget Survey p. 26
[2] Ibid p. 31
[3] Ibid p. 23
[4] 2012 Bellevue Performance Measures Survey p. 63

- Improved Mobility
- Innovative, Vibrant and Caring Community
- Quality Neighborhoods
- Responsive Government
- Safe Community

All city departments respond to the outcome areas by submitting budget proposals that support the above goals. The budget proposals describe the services that will be provided, the outcomes that will be achieved and the overall costs. Budget proposals are also typically required to have both cost containment options and growth options.

City-wide, cross-department employee teams evaluate the proposals and rank them by importance and sometimes recommend cost adjustments. Ultimately, the important services are funded and lesser ones are sometimes dropped. A packet of recommended service proposals is sent to city leadership for consideration.

Prior to the finalization of the budget, the City also holds three budget hearings and two budget open houses. The end result is that the City can say that the services provided have been thoroughly justified, evaluated and approved.

Agency Goals

The Bellevue Fire Department's agency goals are explained more in-depth our *Strategic Plan*. A summary of the goals are as follows:

I. Keep Our Community Safe

A. Prevent Fire & Medical Emergencies
- Maintain a downward trend in the five year rolling average of total fire loss.
- Maintain a fire loss benchmark lower than the national average.

B. Prepare for Disasters
- Increasing percentage of participants of the Department's disaster preparedness classes who report having taken the steps necessary to be self-sufficient for three days following a disaster.
- Increasing number of City departments prepared to continue operations following a significant emergency event.

C. Provide Timely, Effective, & Consistent Emergency Responses across the Communities We Serve
- Develop an annual performance report documenting the Department's performance with regard to the key performance.

D. Maintain Our Standard of Excellence in Emergency Medical Services
- Continue to achieve a high percentage of positive outcomes in EMS-related calls by meeting or exceeding a cardiac save rate of 45% using the Utstein Criteria.

E. Leverage Regional Partnerships to Enhance the Effectiveness & Efficiency of Our Services

II. Invest in Our Employees & Expertise

A. Continue to Invest in & Find More Efficient Ways to Provide Employee Training
- Consistency in the percentage of residents who agree that Bellevue Fire plans for and is well prepared to respond to emergencies. In 2010, 95% of respondents

reported that this was the case. Survey residents every three years to regularly measure public perception.
- Consistency in the percentage of personnel who report they are well or very well prepared to do their job; 95% indicated this was the case in the 2012 Staff Survey.
- Reductions in the percentage of personnel expressing a desire for more training. In the 2012 Staff Survey, 59% of respondents indicated they would like additional training.

B. Improve Our Internal Communications
- Increases in the percentage of employees reporting they feel "somewhat connected" or "very connected" to the broader Department; 68% of employees indicated this was the case in the 2012 Staff Survey.
- Reductions in the percentage of employees reporting that they fear retribution if they were to raise concerns or expressed criticisms of the Department; 52% of personnel reported they would in the 2012 Staff Survey.

C. Invest in Our Employee's Safety, Health, Career, & Future
- Increases in the percentage of Department personnel reporting that the Department well or very well embodies its Core Value of "Commitment to Employees." In the 2012 Staff Survey, 66% of respondents indicated that this was the case.
- Measure the Wellness Program budget impact after five years to confirm a positive return on investment.

III. Maintain Appropriate Infrastructure

A. Ensure Our Facilities Meet Future Department Needs
- Complete annual facility inspections and update preventative/regular maintenance plans for all facilities.
- Acknowledge 90% of work orders within one to two business days of receipt.
- Maintain at least 85% satisfaction rates in an annual survey of firefighters who use the Training Facility.

B. Employ Technology & Communications Solutions that Provide Efficiencies & Improve Services Technology and communication

C. Ensure All Necessary Apparatus & Equipment are in Good Working Order
- Complete required hose, self-contained breathing apparatus, and ladder testing for all equipment as appropriate.
- Complete preventative apparatus maintenance on schedule 95% of the time.

IV. Strengthen Our Ability To Engage Effectively With Our Public

A. Build the Department's Multicultural Connections and Capabilities

B. Expand Our Opportunities for Effective, Quality Public Engagement
Develop surveys and other mechanisms to efficiently acquire and evaluate the short- and long-term impact of our prevention, preparedness, and medical classes. Measure whether our messages are both being heard and being acted upon by a representative sample of the population of our service area.

ISO Rating

The Bellevue Fire Department maintains a Class 2 rating from the Washington State Survey and Rating Bureau. This rating system used throughout the state is generally considered more rigorous than the more common Insurance Services Office (ISO) rating used throughout the

country. The Class 2 rating places Bellevue in the top 1 percent of the 46,699 rated departments in the U.S. and among the top three departments in the state.

The rating was last conducted in 2004, and the rating bureau will reevaluate the department at its discretion, or at the request of the department.

Section 4

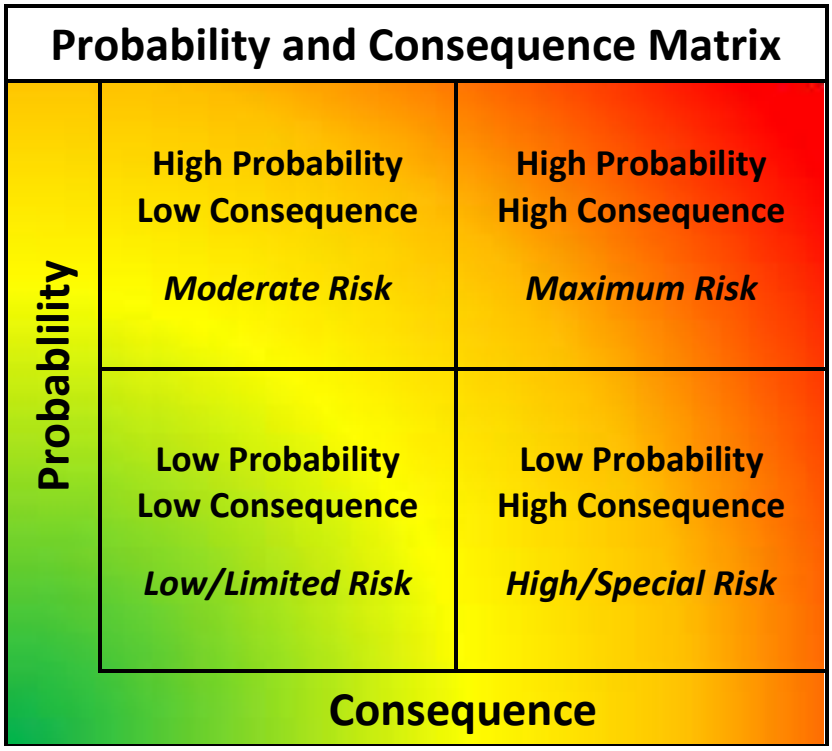
Risk assessment

A comprehensive risk assessment is a critical aspect of standard of response coverage, assisting the Department in quantifying the risks that it faces in the community served. Once those risks are known, the Department is able to determine if the current response resources are sufficiently staffed, equipped, trained and positioned. In this component, the factors that drive the service needs are examined in a precise and scientific manner to determine the response capabilities needed to adequately address the existing risks.

The risks that the Department faces can be natural or man-made. In the past, the ability to analyze these risks has been very limited or non-existent. With the extensive amount of information available from databases, and public research, departments now have the ability to start describing these risks and can even attempt to mitigate them.

A contributing factor in this risk assessment is the description of the community already completed in *Section 1, Description of community served*. This risk analysis section will offer more detail into the various types of risks that are present, but also attempt to describe the probability and consequences of these risks. This classification system is depicted in the probability/consequence matrix. [Figure 4-1].

Figure 4-1: Probability and consequence matrix



The general qualitative and quantitative measurements of each risk are listed within the graphically-designed matrix. The matrix rates consequences on the horizontal axis ranging from minor to catastrophic [Figure 4-2]. Event likelihood (probability) is rated on the vertical axis, ranging from unlikely to highly probable [Figure 4-3]. The grid is further broken down into separate cells which classify the risk based on four distinct types: Low/Limited, Moderate, High/Special and Maximum.

Figure 4-2: Consequence scoring scale-Qualitative measures

Level	Descriptor	Categories of Impact	Description of Impact
1	Minor	*Life Safety*	• Small number of people affected (<10), no fatalities, and small number of minor injuries with first aid treatment. • Minor displacement of people for <6 hours and minor personal support required.
		Economic & Infrastructure	• Minor localized disruption to community services or infrastructure <6 hours.
		Environment	• Minor impact on environment with no lasting effects.
2	Moderate	*Life Safety*	• Limited number of people affected (11 - 50), no fatalities, but some hospitalization and medical treatment required. • Localized displacement of small number of people for 6 – 24 hours. Personal support satisfied through local arrangements.
		Economic & Infrastructure	• Localized damage that is rectified by routine arrangements. • Normal community functioning with some inconvenience
		Environment	• Some impact on environment with short-term effects or small impact on environment with long-term effects.
3	Significant	*Life Safety*	• Significant number of people (51-100) in affected area impacted with multiple fatalities, multiple serious or extensive injuries, and significant hospitalization. • Large number of people displaced for 6 - 24 hours or possibly beyond. • External resources required for personal support.
		Economic & Infrastructure	• Significant damage that requires external resources. • Community only partially functioning, some services unavailable.
		Environment	• Significant impact on environment with medium to long-term effects.
4	Catastrophic	*Life Safety*	• Very large number of people (>100) in affected area(s) impacted with significant numbers of fatalities, large number of people requiring hospitalization with serious injuries with long term effects. • General and widespread displacement for prolonged duration and extensive personal support required.
		Economic & Infrastructure	• Extensive damage to properties in affected area requiring major demolition. • Serious damage to infrastructure causing significant disruption to, or loss of, key services for prolonged period. • Community unable to function without significant support.
		Environment	• Significant long-term impact on environment and/or permanent damage.

Figure 4-3: Probability scoring scale

Level	Descriptor	Indicative chance of occurrence in a given 5-year period	Description
1	Unlikely	2%-25%	Is not expected to occur; and/or no recorded incidents or anecdotal evidence; and/or no recent incidents in associated organizations, facilities or communities; and/or little opportunity, reason or means to occur; may occur once every one hundred years.
2	Possible	26%-50%	Might occur at some time; and/or few, infrequent, random recorded incidents or little anecdotal evidence; and/or very few incidents in associated or comparable organizations, facilities or communities; and/or some opportunity, reason or means to occur; may occur once every twenty years.
3	Probable	51%-75%	Likely to or may occur/recur every 1- 5 years; regular recorded incidents and strong anecdotal evidence and will probably occur in many circumstances.
4	Highly Probable	76%-100%	Likely to or may occur/recur every year or less; high level of recorded incidents and/or strong anecdotal evidence.

Risk assessment process

This section contains an analysis of the various risks considered within the Bellevue Fire Department service area. As part of the analysis, historical and statistical data are used in order to determine trends based on the type and location of the emergency. Additional parameters utilized are: natural barriers or locations for risk potential, mobility of risks, and socio-economic factors that might contribute to the risk within the city, economic impact factors if applicable, and the likelihood for an incident occurring.

The following hazards were identified and considered:

- Natural Hazards
  - Earthquake
  - Severe Weather
  - Flood
- Man-Made Hazards
  - Emergency Medical Service
  - High-Rise Fire
  - Petroleum Pipeline Fire
  - Structure Fires
  - Wildland, Urban Interface Fire

The assessment of each hazard as listed took into consideration the likelihood of the event, the impact on the City itself, and the impact on our emergency services.

The absence of a rail corridor, airport and shipping port preclude the need to conduct such analysis. As a result, the Department has chosen not to conduct risk analysis on railroad, aircraft and shipboard hazards.

Natural Hazards

Earthquake

H HIGH risk| *Likelihood POSSIBLE with SIGNIFICANT community impact*

Definition

An earthquake is a naturally induced shaking of the ground. It is caused by an abrupt shift of rock along a fracture in the Earth's crust called a fault. Within seconds, an earthquake releases stress that has slowly accumulated within the rock. Sometimes the release occurs near the surface and sometimes it comes from deep within the crust.

History

Western Washington is situated in one of the most dynamic seismic locations on the planet. It is located at the collisional boundary of two tectonic plates, and also in between the non-moving mountains of Canada and unending pressure caused by the rotation of the North American plate into the Pacific Plate. The fault zone where this is occurring is called the Juan de Fuca plate and the subduction zone quakes that are common for this type of fault are known for producing mega thrust earthquakes that result in catastrophic damage.

In addition to the Juan de Fuca plate risk, many smaller faults transverse the region and are known for smaller and localized earthquakes. Such shallow-surface quakes tend to have more limited damage and smaller affected areas.

It is considered very likely that we will experience a major earthquake in the next 50 years. Over the last 100 years, a large area of the state has experienced earthquake damage. The majority of the largest earthquakes felt in Washington have occurred in the Puget Sound region between Olympia and the Canadian border, in the Cascade Mountains, and along the Washington-Oregon border. Medium to large magnitude earthquakes (greater than 5.0) have occurred repeatedly in the Puget Sound region. [Table 4-1]

Table 4-1: Regional earthquakes over M4 since 1995

Date	Location	Mag.
2011/11/18	Okanogan	4.6
2009/1/30	Poulsbo	4.5
2007/11/26	Poulsbo	4.0
2005/11/23	Deming	4.0
2003/04/25	Poulsbo	4.8
2002/09/20	Friday Harbor	4.1
2001/11/11	Kamloops BC	4.5
2001/09/13	Spokane	4.0
2001/09/13	Tofino	5.4
2001/07/22	Olympia	4.3
2001/06/10	Satsop	5.0
2001/02/28	Olympia (Nisqually)	6.8
1999/07/02	Satsop	5.8
1998/03/02	Colville	4.0
1997/06/24	Vancouver BC	4.6
1997/06/24	Okanogan	4.6
1997/06/24	Bremerton	4.9
1996/05/02	Duval	5.4
1995/01/28	Tacoma	5.0

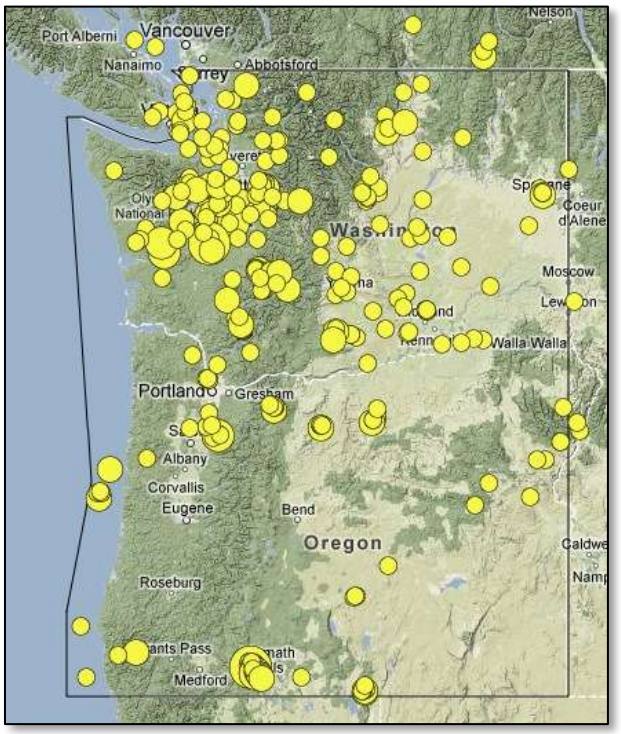
The Department's response plans for earthquakes is described more thoroughly in internal SOP's. In summary, the plan is to move apparatus to safe areas, assess station damage, report assessments to the Battalion Chief via a radio roll call, and then resources will perform an area damage assessment prior to any emergency response. The on-duty Battalion Chief will

then form an area command that will prioritize the incidents and assign resources via a "resource emergency" plan designed to place them at incidents where they will be most effective for the greatest outcome.

Despite the response capabilities of the department, a catastrophic earthquake will quickly deplete those resources and widespread damage is inevitable. The Department's Office of Emergency Management (OEM), along with county and state agencies, encourages residents to plan for these occurrences by maintaining emergency food supplies and abating hazards in their homes and businesses.

The Bellevue OEM has a draft hazard identification risk analysis (HIRA) that contains a more detailed description of the earthquake threat and its potential impacts on the community.

Figure 4-4: Earthquakes over M3 in the northwest since 1993.



Location and Extent

Figure 4-4 shows both the location and intensity of earthquakes in the region since 1993. Earthquake intensity gives a rough indication of its extent. Despite the appearance of many earthquakes, the Bellevue region has only experienced about 10 humanly perceptible earthquakes in the past 20 years.

Recurrence and Impact

Table 4-1 lists regional earthquakes with dates and intensities. It is interesting that the region has been seismically "quiet" for about the past 7 years. This quiet period has come after several years of near-constant activity that culminated in the February 2001 6.8 temblor. Seismologists are trying to determine the significance of this "seismic drought". The recurrence classification for this risk is "possible".

None of the earthquakes of the past 50 years have had any significant impact on the City of Bellevue. However, with this type of event, the next one could be the worst one and there should be no attempt to discount future risk based on an insignificant past. It is because of this that the community impact is best classified as "significant".

Severe Weather

M MODERATE risk| *Likelihood PROBABLE with MODERATE community impact*

Definition

Severe weather includes a variety of meteorological phenomena that are detrimental to citizens and/or infrastructure in Bellevue. These atmospheric disturbances are usually characterized by strong winds frequently combined with rain, snow, sleet, hail, ice, thunder, and lightning. This definition includes unusual weather disturbances such as tornadoes or funnel clouds, which appear infrequently in the region. In addition, any heavy snowfall or rain might be considered a severe storm in its own right. Secondary hazards or impacts that can result from severe storms include flooding, landslides, power outages, and closed transportation routes limiting emergency response, increasing pollution, and causing environmental damage.

History

Over the years Bellevue has had a number of instances of severe weather. While not all of these have caused major long-term problems, they all have disrupted people's day-to-day activities and posed a burden, especially on the poor and those with reduced mobility. Table 4-2 lists some of the notable severe storms (weather) in King County.

Table 4-2: Major storm events of the past 18 years

Date	Type	Bellevue Deaths/Injuries	Property Damage
11/01/1994	High Winds	0	0
Description: *Winds were reported 45 to 55 mph in some areas along the Puget Sound with numerous power outages due to fallen tree limbs on power lines.*			
12/30/1994	High Wind	0	0
01/08/1995	Freezing Rain	0	0
Description: *Several reports of icy roads due to early morning, freezing rain were received from the east side of the county were several cars slid off the roads due to slippery conditions*			
12/29/1996	Ice/snow/rain	0	$31.5 (Bellevue)
Description: *The December 26—31 ice/snow/rain storm caused about $315 million in insured and uninsured damage (in all of Washington). The storms directly or indirectly claimed 16 lives and sparked a state of emergency in 30 counties. Seattle normally averages 1.44 inches of precipitation between Dec. 26 and Jan 2. It received8.35 inches during those eight days. The total number of customers without power at one time was nearly 300,000 and some people went a week without power. The damage affected people for weeks.*			
04/03/1997	Lightning	0	0
Description: *A woman holding an umbrella was struck by lightning.*			
08/03/1999	Lightning	0	$650,000

Description: *Over 1000 lightning strikes were recorded in a four-hour period. One man was struck by lightning while standing under a tree, and another man while standing in water next to his boat. At its peak, the storm knocked out power to about 20,000 customers.*			
12/14/2006	High Wind (60-75 mph)	0	$750,000
Description: *Hanukkah Eve Storm, peak winds reached 80 to 90 mph along the coast and elsewhere 60 to 75mph. A few locations had gusts as high 85 mph in the interior. Mountain areas recorded peak wind speeds reached in excess of 100 mph, including 113 mph at Chinook Pass and 100 mph at Sunrise in Mt Rainier National Park. The windstorm, the strongest since the 1993 Inauguration Day Wind Storm, blew down thousands of trees and knocked power out to close to 1.5 million customers in western Washington. The strong winds damaged major transmission lines, power poles and other power utility infrastructure. Trees also fell onto houses, street signs, streetlights, parked cars, fences, railings and rooftops.*			
12/2008	Record Snowfall	0	Unknown
Description: *Record or near-record snowfall impacted most of Western Washington*			
11/22/2010	4-12 Inches of Snow in City.	0	Unknown
Description: *Record or near-record snowfall impacted most of Western Washington with prolonged cold temps.*			
01/2012 16th-22nd	4-6 inches of Snow, Followed by .5 to .75 inches of inches in City	0	Unknown
Description: *Record or near-record snowfall and ice impacted most of Western Washington. -12—0112 State Incident Number. Landslide on Lake Sammamish Parkway damaged 3 homes...2 yellow tags and 1 red tag.*			

Location and extent

Severe weather of all types directly and indirectly affects the entire city. Due to variations in geographic location and elevation, certain areas are more vulnerable to certain types of severe weather than others. Higher elevations are particularly susceptible to snow events. Areas with above-average tree cover are more susceptible to windstorm damage. The green infrastructure map depicts areas with conifer tree cover and those are more at risk. However, conifer cover is more prevalent in open spaces (i.e. parks) and damage in those areas typically has minimal community impact.

Recurrence Rates and Impacts

Hail

To date, the hail storms in the city have not caused significant damage. A local weather condition known as the Puget Sound Convergence Zone is capable of producing hail up ¼" size, but typically no larger. Convergence zone conditions are most common in the winter and spring and rare in the summer and fall. The recurrence rate for this specific risk falls into

the "probable" category with a community impact of "minor". The most significant impact brought on by this risk is a disruption in transportation brought on by localized hail accumulations that result in impassible roads.

Ice storms

Ice storms and/or freezing rain conditions are extremely rare in the city of Bellevue. The City's proximity to the relative warmth of the Puget Sound waters disrupts the ability to create the cold air conditions necessary for freezing rain. In addition, the Cascade Mountain range to the east provides a barrier to the colder inland air of eastern Washington. Lastly, weather fronts from the Pacific are known for quickly scouring away stagnant and colder surface air, thus removing ideal icing conditions. The recurrence rate for this specific risk falls into the "possible" category with a community impact of "minor". The most significant impact brought on by this risk is a disruption in transportation brought on by impassible roads.

Snowstorms

Snowstorms are not uncommon in this lowland region, but they tend to be both brief and without appreciable accumulation. It is fairly rare to have snow conditions that persist longer than 10 days at a time and it is not uncommon to have a snowless year. The moderating effect of the relatively warm Pacific and Puget Sound waters limits the ability of cold air to persist long enough to create snow conditions.

An occasional and disruptive weather condition related to snowstorms in the area is a 6" or more accumulation of snow followed by rain. The absorption of rain into existing snow loads has been known to cause roof collapses, particularly on carports, porches and lightly constructed utility buildings. Weighted braches are also susceptible to breaking and electrical grids can be disrupted.

Loss of electrical power during snowstorms often results in a greater incidence of EMS calls due to the elderly and shut-in population's loss of home heating. Snowstorms also create an increase in EMS incidents as people that would normally drive themselves to the hospital turn to first responders to navigate snowy streets. There is a slightly higher risk of structure fires as people turn to alternate heating sources during power outages and cold spells. There is also a slightly higher risk for CO poisonings due to cooking and heating with outdoor equipment.

The recurrence rate for this specific risk falls into the "probable" category with a community impact of "moderate". The most significant impacts brought on by this risk are a disruption in transportation brought on by impassible roads and power grid failures due to downed lines.

Tornados/Funnel Clouds

Tornados are an extremely rare occurrence in the region. Only a small handful of localized wind damage events are known to have occurred in the Puget Sound area and the national weather service would rate all of them at the F0 to F1 level. This weather event only occurs in association with the Puget Sound Convergence Zone weather phenomena previously

described and areas to the north and south of Bellevue are more likely to be affected. Tornado and/or funnel clouds events in this region, when they do occur, are always very brief and would not affect an area greater than half a football field.

The recurrence rate for this specific risk falls into the "unlikely" category with a community impact of "minor". The most significant impact brought on by this risk is localized property damage.

Windstorms

Wind has played a prominent role in the history of emergencies and disasters impacting the community. Of the major events listed in Table 4-2, windstorms have had the most significant impact on the community and have caused the most damage. Bellevue can expect some wind-related problems on a near-annual basis; however, windstorms such as the 1962 Columbus Day Storm, 1993 Inaugural Day Storm, and the 2006 Hanukah Eve storm brought widespread and significant property damage. Even so, the likelihood of loss-of-life due to these events remains historically low.

Windstorm events, when they do occur, happen during the fall and early winter. There are no incidences of significant windstorms during the spring and summer.

Based on the historical frequency of large windstorms, the recurrence rate for this specific risk falls into the "possible" category with a community impact of "significant". The most significant impacts brought on by this risk are widespread power outages, downed trees blocking transportation routes, and property damage. In addition to the damage, emergency responders experience much higher call volumes and periods of resource depletion.

Flood

L LOW risk| *Likelihood UNLIKELY with MINOR community impact*

Definition

A flood is typically a temporary condition of partial or complete inundation of normally dry land areas from:

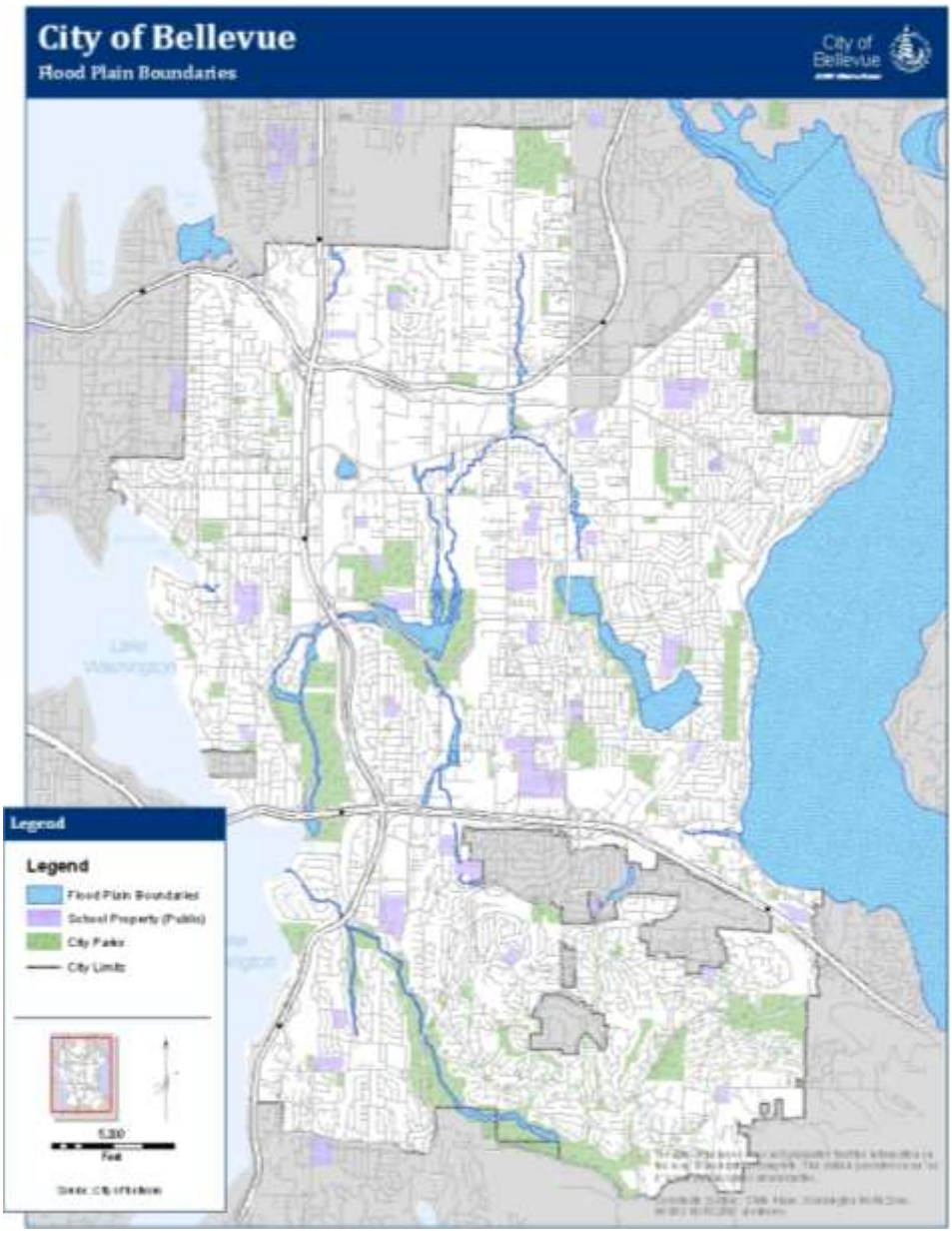
- The overflow of inland or tidal waters,
- The unusual and rapid accumulation or runoff of surface waters from any source, or
- Mudflows or the sudden collapse of shoreline land.

History

Bellevue's flood hazards are primarily based on urban stream/groundwater events. Due to the absence of sizable rivers and no significant watershed, there is no risk to widespread inundation. [Figure 4-5] However, the urbanization of Bellevue and increase in impervious surfaces has led to a slight increase in the risk of localized urban flooding events.

The most severe flooding on Bellevue's major streams and creeks results from low-to-moderate elevation (1,000 to 3,800 feet) snowmelt runoff occurring in conjunction with a prolonged moderate-

Figure 4-5: Flood plain boundaries in Bellevue



to-high intensity rainfall event. This is commonly referred to as a rain-on-snow event. Accumulating snowfall usually occurs for brief periods (one-to-three days) and can be followed by accelerated warming from warm Pacific frontal storm systems arriving from the tropics and containing a significant amount of precipitation. Rain-on-snow events typically result in a sharp rise in stream flow. Occasionally, those streams will overrun their banks.

Flooding in Bellevue usually occurs when runoff exceeds the conveyance capacity of natural and manmade drainage systems. Surface-water runoff volumes in urban stream channels, roadway ditches, culverts and conveyance pipe systems can exceed the available conveyance and storage capacity of such systems. This typically occurs with moderate- to high-intensity storms that can last for several days or occur in succession over a period of weeks. These events are characterized as rainfall of three inches or more in a 24-hour period. Urban area flooding generally occurs gradually and allows time for property owners to identify an impending flood situation and prepare for it. In some areas, however, flooding can occur rapidly and may leave little time for preparation.

In many cases, debris can accumulate in storm water collection systems and reduce the capacity of the system to convey flow. Such a reduction in capacity can lead to more frequent flooding events.

Location and Extent

Bellevue has 235 properties located within the 100-year flood plain defined by FEMA. According to the modeling conducted by the King County Flood Control District, in a 100 year flood event, Bellevue could face up to $10,162,000 in damages to buildings and property.

Bellevue has undertaken considerable effort to manage storm water since 1994. Recent activity has included increasing storage capacity of a regional pond, replacing culverts and conducting levee improvements near the I-405 corridor.

Bellevue is divided into two major drainage basins--Lake Washington and Lake Sammamish, and 26 watersheds or minor basins. A watershed or basin is the land area that drains to a particular body of water, such as a stream or lake. These watersheds range in size from the Wilkens Creek watershed at 900 acres to the Coal Creek watershed at about 4,000 acres. See Figure 4-5.

Recurrence and Impacts

Despite 11 instances of federally-declared flood disasters in King County since 1990, those events had relatively minor effect on the Bellevue area. Significant flooding during those declarations took place in river basins outside of Bellevue. Bellevue only has two properties in the jurisdiction that are susceptible to recurring flooding. Therefore, the likelihood for flooding risk is “unlikely”.

Because impacts to localized flooding are limited to small areas and durations are very short, the impact of this risk is classified as “minor”.

Man-Made Hazards

Emergency Medical Incidents

M MODERATE risk| *Likelihood HIGHLY PROBABLE with MINOR community impact*

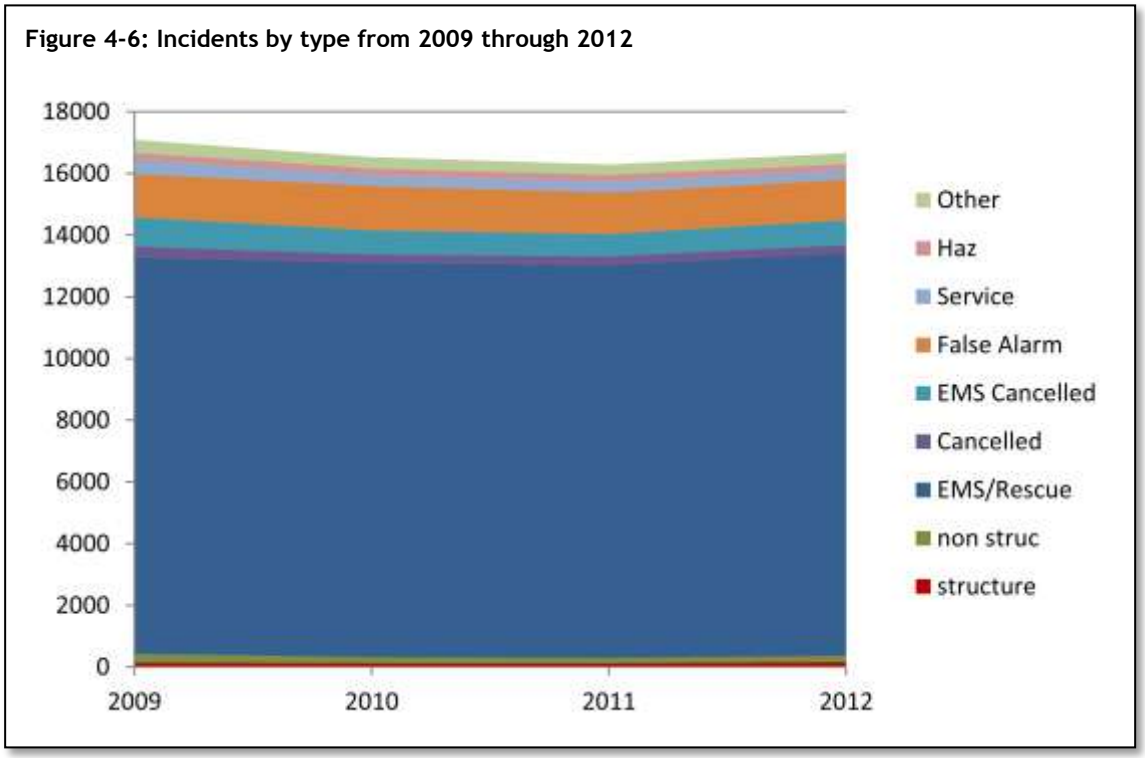
Definition

Emergency medical service is all medical treatment and care which may be rendered at the scene of any medical emergency or while transporting any patient in an ambulance to an appropriate medical facility, including ambulance transportation between medical facilities.

History

EMS incidents represent nearly 80 percent of all Bellevue Fire Department responses. As shown in Figure 4-6, EMS responses have held steady at around 13,000 responses per year while other calls have slightly decreased. EMS responses include all trauma, medical, rescue and motor vehicle accidents.

Figure 4-6: Incidents by type from 2009 through 2012



BLS incidents mostly involve a single patient and typically require a single fire department resource response. ALS incidents are typically two-resource responses: one ALS and one BLS.

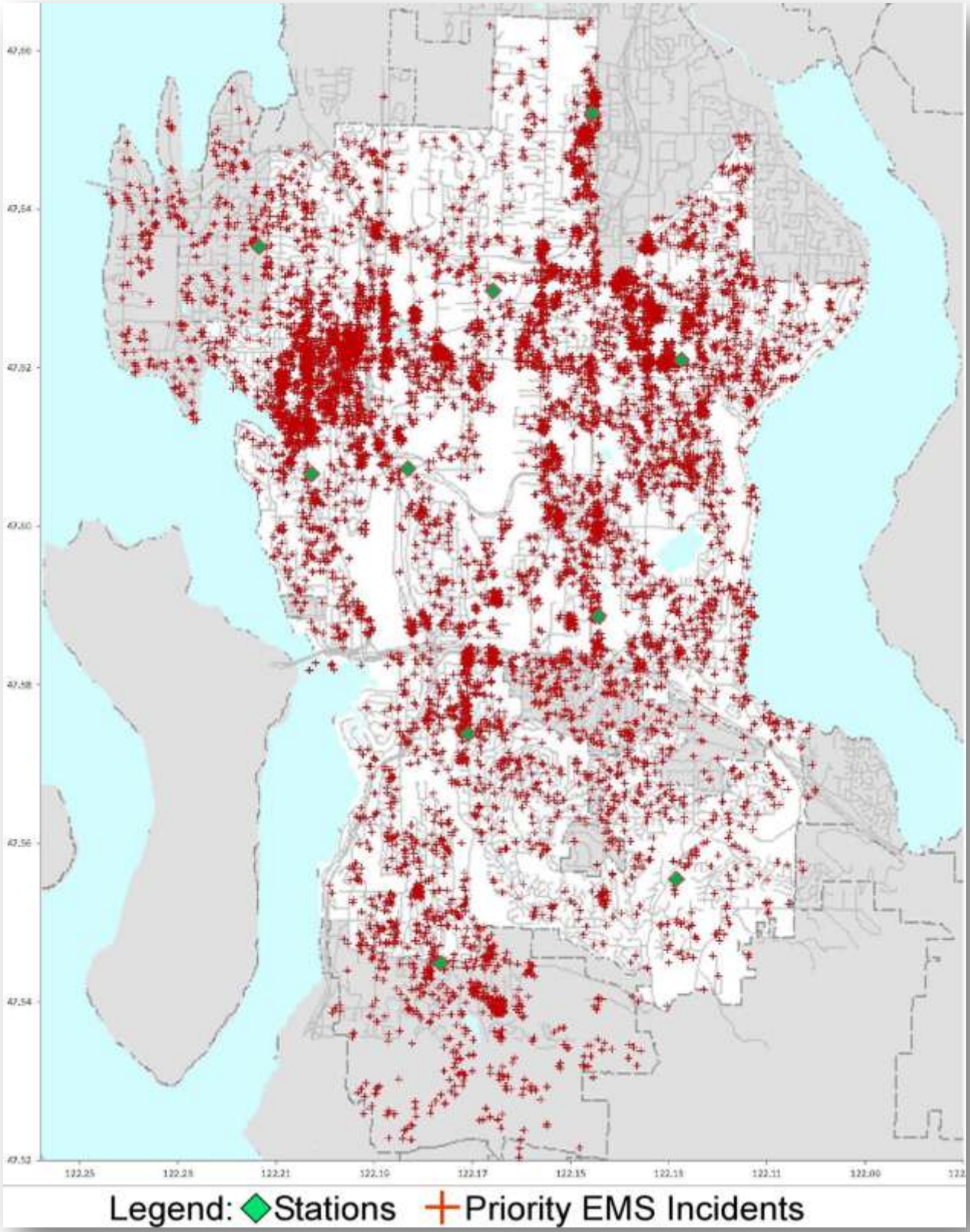
Location and Extent

Figure 4-7 shows all priority EMS responses within the City of Bellevue and contract jurisdictions for 2011. As expected, the greatest concentration of incidents is in the areas that have the highest population densities. The area known as the central business district has the greatest concentration of calls. Other areas with significant concentrations are in the

east Bellevue/Crossroads area, the Overlake area, and 148th Ave NE north of SR 520, Factoria, and high-density housing in the Coal Creek/Newcastle area. Concentrated areas represent the areas with greatest risk for EMS incidents.

To put Figure 4-7 in context, it is important to show that despite concentrated incident areas, the Department is still performing well by having a high success rate in meeting our response standards. This is clearly depicted in Figure 6-8 on page 84 where incidents that exceed our baseline response standard are plotted. Incidents that exceed 8 minutes total response time (TRT) are to be expected in any jurisdiction. However, concentrations or clusters would indicate emerging problem areas that would most benefit from either improved response efficiencies or additional response resources.

Figure 4-7: 2011 priority response EMS calls within Bellevue and contract jurisdictions. Note: Plotting of incidents has been slightly dithered to prevent overlapping of incident markers on the same location.



Recurrence and Impacts

EMS incidents are clearly the most prevalent type of response within the jurisdiction, which leads to a probability rating of "highly probable". However, the consequence on the community is best classified as "minor" due to the limited impacts of each individual incident.

Structure Fire

M MEDIUM risk| *Likelihood HIGHLY PROBABLE with MODERATE community impact*

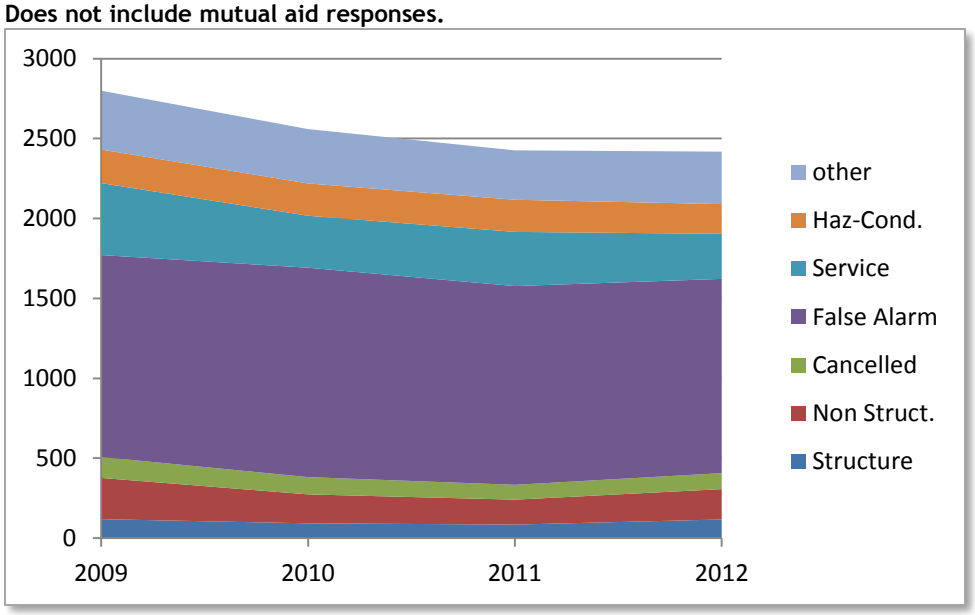
Definition

A structure fire is a fire involving the structural components of various types of buildings and, for the purposes of this document, will also include fires *within* buildings of various types. Fires inside buildings that do not involve the structural components are typically called "room and content fires". Buildings are places where people normally live, work or frequent and can include residences, businesses, assemblies and even storage facilities.

History

Suppression responses account for about 20 percent of all incidents [see Figure 4-6], yet they are some of the most high-profile as well as most demanding of response resources than any other type of incident that the jurisdiction typically faces. Figure 4-8 shows the classification

Figure 4-8: Suppression responses in City of Bellevue and contract jurisdictions. Does not include mutual aid responses.



of suppression responses. It is notable that despite significant growth in both population and number of buildings, suppression responses have not trended upward. In fact, they appear to be decreasing slightly.

The factors that contribute to the decline in suppression responses include: safer home appliances, safer home construction, more durable automobiles as well as fire prevention and safety awareness efforts. The decrease in suppression responses is likely to continue as advancements in all of those areas are made.

Location and Extent

Suppression risk assessment involves three important aspects

- Categorizing each building according to its unique level of risk.
- Quantifying the numbers of each building with similar risk levels.
- Geographically depict the locations and concentrations of risk-assessed buildings.

The Bellevue Fire Department structure fire risk assessment utilized the risk assessment matrix developed for military agencies (DODI 6055.6), which examines eight specific factors including life hazard, mission criticality, special hazards, water supply, building usage, building construction, number of stories, and square footage. Each of these factors were assigned a point total ranging from 1 to 3, and the total number of points determine the risk factor associated with the occupancy and the corresponding response requirements, as outlined below:

Standard of Response Coverage Worksheet
DODI 6055.6

Occupancy address: _____

Date: _____

Life Hazard
High Life Hazard (100>).....3
Medium Life Hazard (25-99).....2
Low Life Hazard (<25).....1

Mission Criticality
Mission Critical 3
Part Mission Critical 2
Non-mission Critical 1

Special Hazards
Hazmat or Explosives Rack Storage/Flammables 3
Small quantities hazmat or explosives.....2
No Special hazards.....1

Water Supply within 800 Feet*
One hydrant less than 1000 GPM 3
One hydrant less than 1000 GPM,
and one hydrant between 500 to 700 GPM.....2
Two hydrants 1000 GPM or greater 1

* Current Information Technology Department GIS data is unable to assign the water supply category due to inability to compute distances. This is primarily due to multiple-building lots on large parcels. Although many buildings would qualify for a "1" (low risk) a default "2" was given to all parcels.

Building Usage
Industrial/Commercial 3
Single Family 2
Office.....1

Building Construction
Type 5 Construction Combustible 3
Type 4 and Type 3 Construction 2
Type 2 and Type 1 Construction 1

Number of Stories
Three or more stories (40 feet or more) 3
Two story building 2
Single Story building.....1

Square Footage
15,000 square feet or greater.....3
7,501 square feet to 14,999 square feet 2
7,500 square feet or less.....1

The total numbers will be added and the following Risk Factor (RF) will be assigned to the occupancy.

TOTAL NUMBER _____

The total numbers will be added and the following Risk Factor (RF) will be assigned to the occupancy.

Total Number	Risk Factor	Response Requirements
8 to 11	RF 1 = Low Risk	Single Engine Response
12 to 16	RF 2 = Moderate Risk	Full Response
17 to 21	RF 3 = High Risk	High Value Response
22 to 24	RF 4 = Special Risk	High Value Response

The department utilized the King County Geographical Information Systems (KCGIS) to calculate information specific to each of the eight factors identified in the military model (DODI 6055.6). Each building type resulted in a report created to determine a Total Risk Factor for each Parcel Identification Number (PIN)/Assessor's File Number (AFN) located within the Bellevue Fire Department's, Fire Suppression/Basic Life Support (BLS) coverage zone. Separate reports where created for Apartments, Single Family Residential, Condominiums, and Commercial buildings.

After determination of the Total Risk Factor for each (PIN/AFN) was made, the data was exported to MS Excel and forwarded to the City of Bellevue Information Technology Department (ITD), Geographic Information Services (GIS) for plotting and graphic representation.

Additionally, ITD GIS evaluated the water supply within 500 feet and available fire flow assessment criteria, as this information was not contained in the KCGIS data. Therefore, a value of two (2) was assigned as the default value for all buildings and ITD GIS adjusted any value which did not meet this assessment criteria.

After this evaluation, each PIN/AFN was plotted and color coded based on the Total Risk Factor determined during the evaluation process. Each Risk factor range was then assigned a color by ITD GIS and a graphic representation was generated to display the corresponding risk factor geographically [Figure 4-9], and the predominant risk factor within a given geographic zone[Figure 4-10]. Four colors are used to depict risk factor: Green, lowest level 1; Yellow, level 2; Orange, level 3; and Red, highest level 4.

Figure 4-9: 2012 Bellevue building risk assessment. Detailed map available for download here.

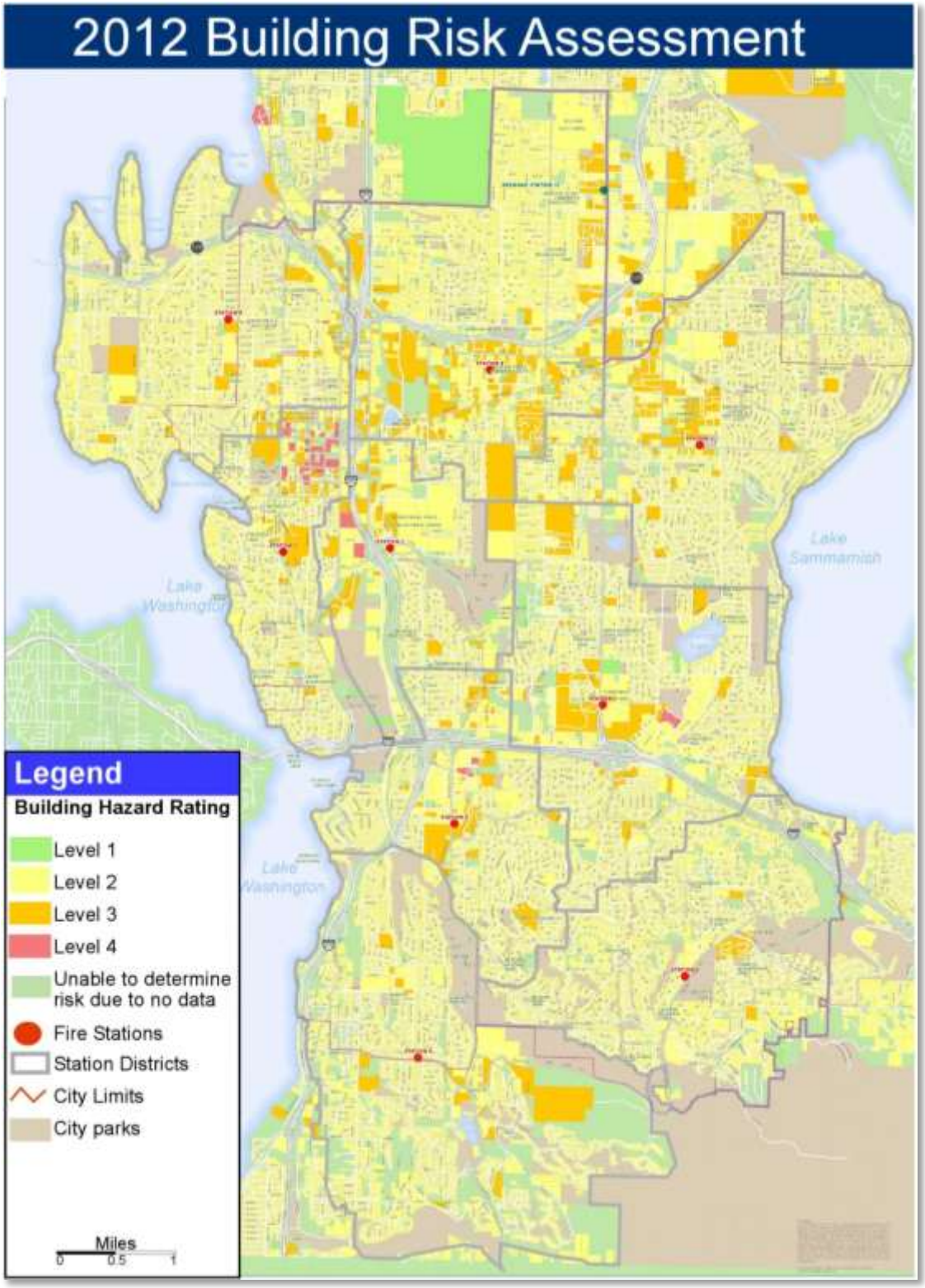
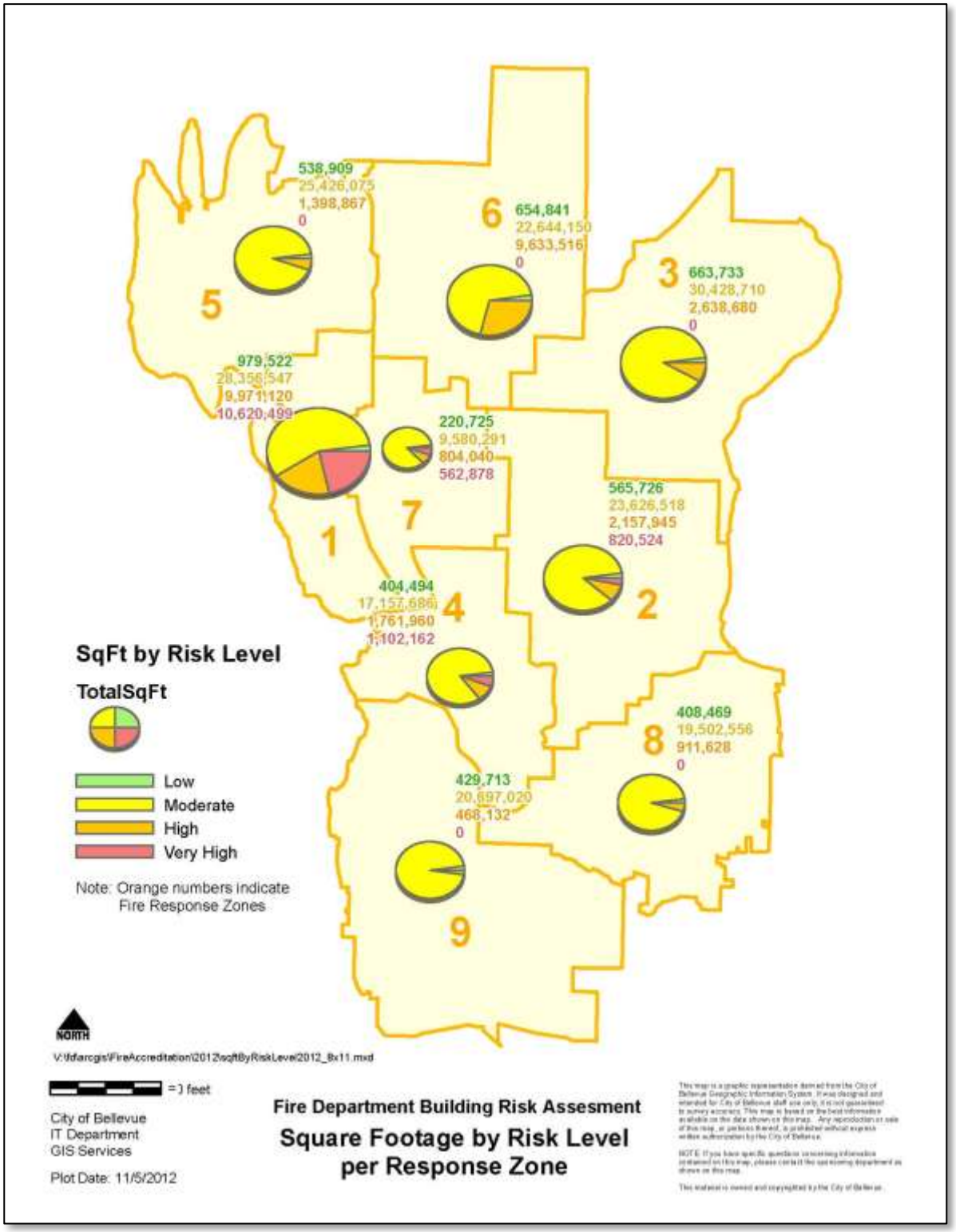


Figure 4-10: Square footage of each risk level in each fire protection zone (Station area). Square footage of each risk is listed with each pie chart.



Based upon the above assessment, the vast majority of the Bellevue Fire Department service is classified as MODERATE risk, with appreciable concentrations of HIGH and VERY HIGH in business districts and the downtown core (e.g. Station 1 area, Factoria, Crossroads and Bel-Red corridor). Low-density single family residential areas are especially easy to identify as they are the bulk of MODERATE risk classifications. High-density residential areas are predominantly HIGH risk, with the exception of High-rise residential, which is VERY HIGH.

The next two tables represent the amount and types of buildings within the jurisdictional area. Columns represent the nine stations in the jurisdiction and the buildings within their first-due are listed below. For reference on station locations, see Figure 2-1 on page 23.

Table 4-3: Number of Occupancies by classification per station service area

Occupancy	Sta 1	Sta 2	Sta 3	Sta 4	Sta 5	Sta 6	Sta 7	Sta 8	Sta 9	Totals
Group A	34	29	32	22	10	23	4	4	9	167
Group B	95	70	59	41	64	215	62	5	14	625
Group E	6	18	17	9	11	11	3	7	6	88
Group F	3	6	4	11	7	68	13	1	4	117
Group I	1	1	3	1	0	4	0	0	1	11
Group M	83	17	28	15	18	85	14	1	7	268
Group NL	2	0	0	0	1	0	1	0	0	4
Group R	2,223	5,445	8,369	3,152	4,845	2,384	1,204	4,756	5,767	38,145
Group S	14	11	5	21	12	68	18	1	6	156
Totals	**2,461**	**5,597**	**8,517**	**3,272**	**4,968**	**2,858**	**1,319**	**4,775**	**5,814**	**39,581**

Recurrence and Impacts

Table 4-4: Square footage of each occupancy type per station service area (in thousands).

Occ. Type	Sta 1	Sta 2	Sta 3	Sta 4	Sta 5	Sta 6	Sta 7	Sta 8	Sta 9	Totals
Group A	596	534	433	359	288	1,039	253	16	202	3,720
Group B	13,152	4,746	1,483	3,680	1,747	5,022	2,782	53	151	32,817
Group E	219	2,325	881	582	521	172	196	201	313	5,410
Group F	37	297	32	150	92	1,731	269	2	34	2,644
Group I	4	3	69	3	0	1,036	0	0	3	1,118
Group M	3,317	520	777	726	322	2,073	595	47	226	8,602
Group R	27,823	18,639	29,413	13,910	23,806	18,730	6,663	20,104	20,233	179,322
Group S	3,827	1,223	98	815	169	2,939	267	1	323	9,660
Total	48,974	28,286	33,187	20,225	26,944	32,742	11,026	20,423	21,486	243,292

Recurrence and impacts of fires are directly related to many factors that are unique to each community. Most of these factors are described earlier in this document and include variables

like population densities, income levels, climate, age of structures and even cultural influences.

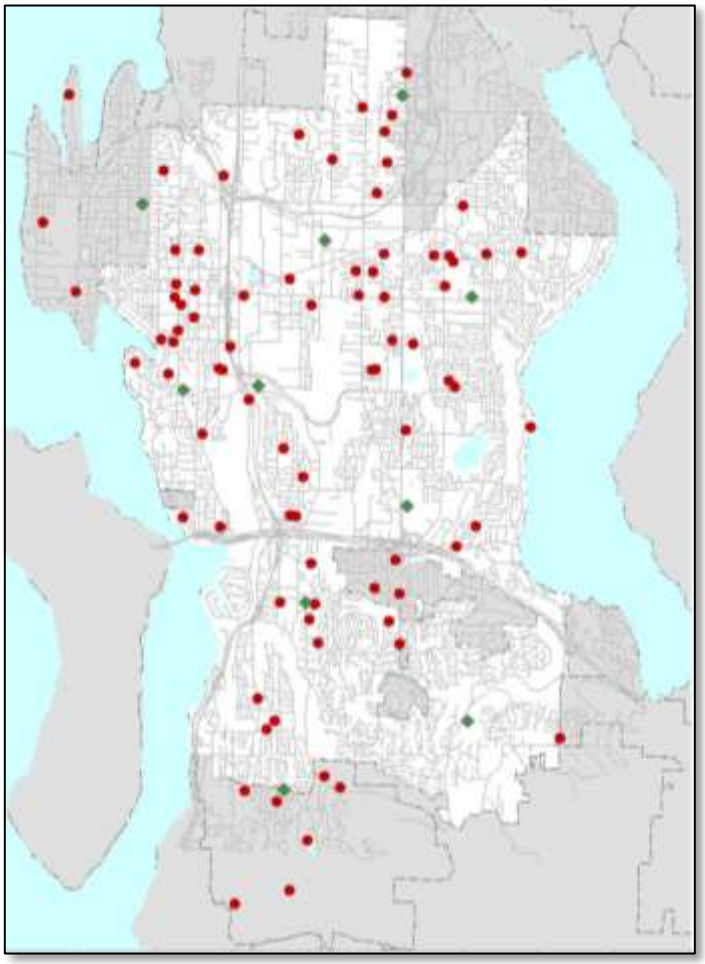
One significant factor in the recurrence of fire, not previously discussed, is the prevention efforts of the jurisdiction. The Department's self-assessment manual has a more complete description of prevention efforts that are ongoing. Both fire prevention staff and line firefighters take a very active role in prevention efforts and the Department believes that these efforts contribute to a safer community by reducing fire hazards.

An associated impact of a structure fires is fire deaths. Bellevue averages less than one fire death per year and in most of these cases there are the following contributing factors of:

- No working smoke detector.
- Alcohol or drug intoxication.
- Combination of the two.

Combine active prevention work, relatively modern building construction and an educated and moderately affluent population, and the Department's overall structure fire risk is both manageable and moderate. However, high-rise structures pose a special risk and those are separately assessed in the next sub-section.

Figure 4-11: 2011 Structure fire and content fire responses (i.e. NFIRS 11X calls). Incidents are plotted as red circles and stations are green diamonds.



The recurrence of priority structure fire responses in the city of Bellevue ranges between 80 and 100 incidences per year [Figure 4-11]. About half of those responses involve fires confined to the object in the room that started the fire (e.g. fire confined to stovetop or oven). The other half involves structural components and those fires tend to be the most damaging. About two-thirds of all suppression responses occur in areas zoned as residential.

The recurrence for structure fires in the city of Bellevue is "highly probable" based on historical data. The department's success at confining fires to their room of origin [Figure 6-6 page 81] typically results in less loss and less impact on the community. Therefore, the consequences

on the greater community from a structure fire are classified as “moderate”. The resulting overall risk assessment for this hazard within the city of Bellevue is “moderate”.

High-rise Fires

S HIGH/SPECIAL risk| *Likelihood UNLIKELY with CATASTROPHIC community impact*

Definition

A high-rise fire is a fire involving the structural components of a building having floors more than 75 feet above the lowest level of fire department vehicle access.

History

High-rise development in the City of Bellevue has been one of the major components of the city's growth over the past 20 years. As the region's high-tech sectors have grown, so has the need for high-rise office spaces and the benefits that they provide for their employees. As recently as 10 years ago, Bellevue's use of high-rises was predominantly for business purposes. However, recent development of residential high-rises has increased the resident population of the downtown core as well as contributed the most to the city's overall population growth.

Figure 4-12: Bellevue's central business district aerial view looking southeast ca. 2009.

With the exception of two high-rise buildings in the downtown core, all but two were built with fixed fire sprinkler suppression systems. The two high-rises that were built prior to the code requirements for fire sprinklers are now partially sprinklered and retrofits are required as occupancy spaces undergo major renovation. The prevalence of fire protection and modern construction in this jurisdiction is a major factor in the *Recurrence and Impacts* section below. Bellevue presents a unique and lower risk level when compared to cities with older high-rises.

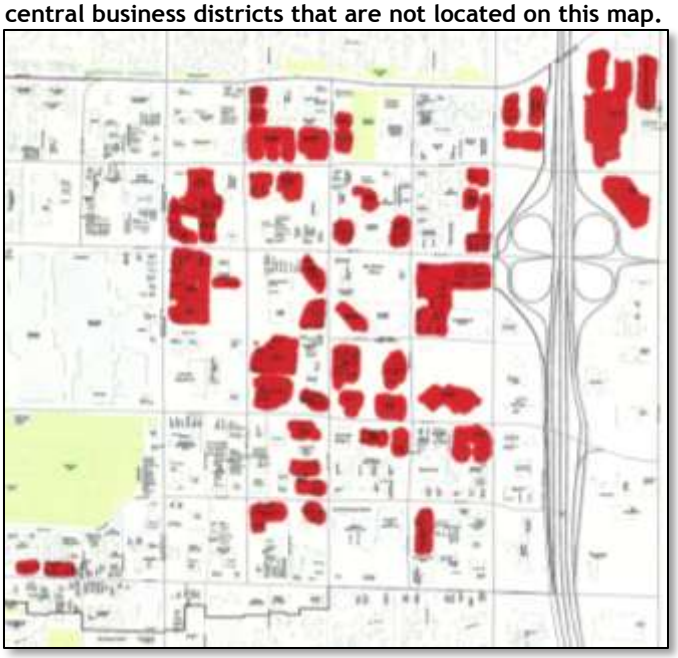
At present, Bellevue's building code has limited the height of high-rises to around 40 stories or less. The height restriction is variable based on the location of the property within the core

and the base elevation. The city's tallest high-rise structures are the twin 43 story towers called Bellevue Towers.

Location and Extent

Figure 4-13 illustrates the locations of most of the high-rise developments within the city. There are approximately 50 high-rise structures in the jursidictional area. Current development is limited to one high-rise under construction.

Figure 4-13: High-rise locations in the central business district. About 10 additional buildings exist outside the central business districts that are not located on this map.



Recurrence and Impacts

In the past 20 years there have been less than five reported fires in all high-rise buildings within Bellevue. In every case, automatic sprinklers and/or hood-and-duct systems have successfully confined and/or suppressed the fires prior to the arrival of firefighters and prevented fire spread to structural components. The existence of modern construction and state-of-the-art suppression systems throughout the jurisdictional area results in a significantly decreased community risk. Due to suppression system monitoring, smoke detectors and pull stations throughout the high-rise buildings, malicious or false automatic fire alarms are a prevalent recurring problem [Figure 9-1 page 90] The Department utilizes a progressive "preventable response" enforcement program to identify and correct system malfunctions that create false alarms.

The recurrence for high-rise fires in the city of Bellevue is "unlikely". Although there have been fires, they have been controlled by suppression systems. As a result, there has not been a significantly impactful fire in this jurisdiction to date. Nationally, the recurrence of destructive high-rise fires in sprinklered building remains very low. Even so, the impact of a destructive high-rise fire remains classified as "catastrophic" because the risk of both substantial life and property loss from a fire is very high. Additionally, it has been identified that high-rise structures represent a "special risk" due to the vertical access challenges that responders will face. The associated life risk of high-density occupancies along with the personnel and equipment needed to sustain an offensive attack heighten the risk of this hazard.

Wildland/Urban Interface Fire

L LOW risk| *Likelihood POSSIBLE with MINOR community impact*

Definition

A wildland/urban interface (WUI) area is a geographic area in which structures and other human development meets or intermingles with wildland or vegetative fuels. A WUI fire is a fire located in that geographic area.

History

There are some locations within Bellevue city limits where structural developments meet and intermingle with the wildland areas. This condition gives rise to the possibility of WUI fires, especially when weather conditions are dry and vegetation fuels are abundant. Compared to other areas of the region, the risk in this jurisdiction is low.

The climate of the region limits the possibility of this risk significantly. A "dry season" typically occurs in the months of July through mid-September. However, despite periods of dryness that can reach 50-60 days, the prevailing mild temperatures do not facilitate the extreme drying that is needed for a high-risk WUI fire. Also uncommon are the high winds that drive uncontrolled WUI fires. High-wind events are highly uncommon in the summer and early fall when WUI risk is highest. When high-wind events have occurred in late fall and early winter, fire danger has already returned to "low".

The City has not had a single life lost due to a WUI fire and there has not been a structure lost due to WUI fire for at least 20 years.

Figure 4-14: High-risk WUI fire zones in the state of Washington.
Source: Washington Department of Natural Resources

Additionally, the Washington Department of Natural Resources (WDNR) has not classified the Seattle/Bellevue region as an "area of risk" [Figure 4-14]. By deduction, this jurisdiction is either low risk or no risk.

Location and Extent

Small roadside fires, grass or brush fires, and beauty bark fires are not uncommon during the dry portion of the year. They can occur

anywhere in the jurisdictional boundary and no area is less susceptible than others. The extent of damage is typically very small and it is very rare that one would exceed one acre in total size.

Recurrence and Impacts

Based on information from past fire occurrences and information from the WDNR, the probability for a WUI fire is a twenty-year-or-less occurrence, or "possible". This risk analysis does not include small roadside fires or beauty bark fires as a factor in recurrence.

The historic impacts of WUI fires in the Bellevue jurisdiction have been minimal or "minor". The overall classification for this risk is "low".

Petroleum Pipeline Fire

H HIGH/SPECIAL risk| *Likelihood UNLIKELY with SIGNIFICANT community impact*

Definition

A petroleum pipeline is a conduit used for the transport of liquid petroleum products and is distinctly different than a natural gas pipeline. A petroleum pipeline fire is a fire involving the products that have leaked or escaped from that conduit.

Description

The Olympic Pipeline is a 400-mile underground pipeline extending from refineries in northwest Washington to Portland, Oregon. This pipeline carries refined liquid petroleum products such as diesel, aviation fuel and gasoline. The pipeline extends approximately 10 miles through the center of Bellevue from NE 60th Street at the City's northern border to SE 59th Way at the City's southern border. The easement follows a close approximation of the 136th Ave NE line and the Puget Sound Energy transmission line utility corridor. The pipeline route is clearly marked with right-of-way or "warning marker signs [Figure 4-15], but the signs do not indicate the precise location of the pipe. A pipeline location map is available internally, but will not be published as part of this document.

Figure 4-15: Sample pipeline warning sign

Built in 1965, the pipeline serves the transportation energy needs of the region by delivering an average of 18.7 million gallons of fuel each day to both Sea-Tac airport and to tank farm refuelers that supply the region's service stations. Without the pipeline, it would take an average of 1,800 tanker trucks per day to deliver the same amount of fuel.

The pipeline consists of two separate steel pipes that, for most of the 400 mile length, lays side-by-side. One pipe is 16 inches in diameter and the other is 20 inches. Pressures, fluid characteristics, and rates of flow are monitored and controlled remotely by telemetry from central control or dispatch rooms equipped with Supervisory Control and Data Acquisition Systems (SCADA). The control center is staffed 24 hours a day, 7 days a week.

Other facts about the pipeline include:

- The pipeline is buried between 30 and 48 inches in depth. It is also 8 feet deep and encased in additional steel protection where it crosses under roads and railroad tracks.
- The pipeline is constructed of carbon steel with walls .281 inches thick and caries a small electrical charge to reduce corrosion.
- 60% of the time the pipeline carries gasoline that travels at about 4 mph producing 5,900 gpm at pressures between 250 and 1440 psi.

- Flow and pressure are controlled by computers in Olympics' Control Center in Renton. Shut down of the pipeline for maintenance or emergency is done by using valve blocks located throughout the system. Olympic uses three types of valve blocks:
    - Check Valves that prevent backflow
    - Hand-operated valves (HOV's) are shut by Olympic personnel only, in the field. An HOV takes approximately 2 to 8 minutes to shut once the person arrives at the valve site (which can take anywhere from 5 to 60 minutes).
    - Remotely-operated valves (ROV's) are controlled by Olympics' Control Center in Renton. It takes approximately 45 to 90 seconds to completely close the valve using a computer-enhanced system.

History

There have been no incidences of pipeline fires or leaks within the city of Bellevue. However, this particular pipeline has had incidents that resulted in both environmental contamination and loss of life.

Figure 4-16: Aerial photo of damage area from 1999 Bellingham Olympic Pipeline rupture and fire. The rupture occurred upstream to the right of the photo. Resulting fire extended several hundred feet on both sides of creek.

The most notable incident occurred on, June 10, 1999, when the 16-inch fuel line ruptured in Bellingham, WA, spilling 277,200 gallons of gasoline into Hanna and Whatcom creeks[Figure 4-16]. The volatile fuel found an ignition source and the ensuing explosion killed three children playing near the creeks. The massive fireball sent a plume of smoke 30,000 feet into the air, visible from Anacortes to Vancouver, B.C., Canada. The rupture was traced to a cascading series of failures instead of one particular problem or event.

The Bellingham incident brought closer scrutiny of pipeline operations and the safety features that are to be used to prevent future spills. The software that controls the pipeline has a leak detection system that gives operators the ability to detect unusual conditions and begin shutdown procedures when leak conditions are possible. Automated valve and pump shutdown is designed to prevent another catastrophe.

Pipeline damage in the US due to malicious or terrorist acts has not occurred and has not been factored into this risk analysis.

Location and Extent

Anecdotal evidence of prior pipeline ruptures indicates that leaks and ruptures can result in spills of several hundred gallons to over one-hundred thousand gallons. However, some of the greatest spills occurred during the early history of the pipeline when automation and monitoring was more limited or non-existent. As such, a catastrophic rupture with a near-immediate pipeline shutdown can still result in a spill well of well over ten thousand gallons. Where the spill occurs, where it travels to and whether it finds an ignition source will largely determine the extent of possible damage. Low lying areas near the pipeline are most at risk for this hazard.

Recurrence and Impacts

Despite more strict EPA reporting measures for spills, pipeline safety appears to be improving with smaller and less impactful spills. Therefore, this hazard has less frequency risk within the jurisdiction than even a standard highway tanker spill. However, aging infrastructure and rupture risks due to seismic events may put the community at more risk. Given all factors, the recurrence risk remains low in the "unlikely" category.

Given that pipeline incidents continue to occur in this country, and many for undetermined reasons, the community is still at risk. The combination of: a highly flammable liquid, in large quantities, and in urban environment translates into a significant consequence risk that approaches the "catastrophic" level. Response and recovery from a significant pipeline event would deplete the response and mitigation abilities of the jurisdiction. Given the high consequence classification, this hazard is a "high/special" risk.

Section 5

On-scene operations and critical tasks

On scene operations, critical tasking and an effective response force are the key elements of the Department standards of response coverage. Ultimately those factors determine staffing levels, resource types, resource numbers, and expected duties performed at incidents. The ability to perform duties or tasks has a direct influence on the outcome of a situation. Emergency incidents require tasks for mitigation, training and guidelines define tasks, tasks are performed by employees and employees arrive on resources that are strategically pre-positioned.

On-scene Operations

The variables of fire growth dynamics, along with property and life risks, combine to determine the fire ground tasks required to mitigate losses. The tasks are interrelated but can be separated into two basic types; suppression and/or rescue. Suppression tasks are those related to getting water on the fire or fire load, while rescue tasks are those related to finding trapped victims and safely removing them from the structure.

Fire control tasks are generally accomplished by using one of two methods; hand held hose lines or fixed master streams. The decision to use hand lines or master streams depends upon the stage of the fire, water supply, personnel available and the recognized threat to life and property. If the fire is in the pre-flashover stage [see Figure 6-1 page 74], fire fighters can make an offensive fire attack into the building by using hand lines. Properly positioned hand lines can quickly extinguish fires or protect trapped victims until they can safely exit the building.

If the fire is in the post-flashover stage and has extended beyond the capacity or mobility of hand-held hoses, or if structural damage is a threat to fire fighters safety, the structure is typically declared lost. In this situation, master streams are typically deployed to extinguish the fire to keep it from advancing to surrounding exposures. First-arriving fire fighters may use a transitional “defensive-to-offensive” strategy (discussed below) to limit or abate an environment suspected of presenting an immediate danger to life or health (IDLH) for trapped victims while awaiting the arrival of additional resources to mount a more aggressive offensive attack.

Life safety tasks are based upon a number of variables including: the number of occupants, their location, their status, and their ability to take self-preserving action. For example, ambulatory adults need less assistance than those with restricted mobility. The very young and the elderly may require more assistance.

Before initiating operations, the incident commander must select an appropriate initial strategy, namely: offensive, defensive or transitional. Each strategy has its own critical task demands

- **Offensive Strategy** – This strategy typically employs an aggressive seat-of-the-fire attack by the first-arriving responders. The top priorities of this strategy are to: immediately stabilize the incident, rescue trapped victims and/or minimize property losses. Because the objective is to confine and extinguish the fire in in a specific area, the ultimate goal of protecting life in unaffected areas can be achieved simultaneously. The offensive strategy is a preferred fire attack method because its use has dual benefit. Before its use, responders must take into account the; survivability for fire victims, dangers to responders, and availability of needed resources.
- **Defensive Strategy** – This strategy generally consists of an exterior attack designed to either confine the fire to the structure of origin; or, block a fire's expansion by taking a stand at a defensible position. No attempts are made to rescue civilian victims from the active fire area due to either non-survivable conditions or structural risks that outweigh the chances of success. Nearly all firefighting is performed from outside the structure or from unaffected areas on or in the structure.
- **Transitional Strategy** - A transitional strategy is utilized in the face of changing resource levels or changing fire conditions. In the case of a transitional "defensive to offensive" attack, an initial exterior attack would be utilized while awaiting the arrival of sufficient resources to safely mount an offensive attack or until a large fire can be controlled sufficiently to permit a safe interior attack. Conversely, a transitional "offensive to defensive" strategy may be employed when fire spread renders a building unsafe for continued interior operations.

Critical Tasks

Critical tasks are those items that must be conducted in a timely manner by response personnel in order to ensure the highest chance of mitigating an emergency situation. Critical tasks are important for all emergency types whether it be an uncontrolled fire, sudden cardiac arrest or an extrication rescue. Tasks, properly executed at a fire suppression incident can prevent property loss and/or civilian death. EMS tasks such as CPR, defibrillation, advanced airway management and drug therapy can increase a patient's survivability chances.

As mentioned in Section 2 *Response methods page 27*:

> *Each call is classified into one of 114 different "emergency problems". The CAD automatically classifies the problem based on its scope and location with an "incident type". Location is important because most high-value properties have premise classifications that will affect the incident type (*e.g. *the difference between a residential AFA and a high-rise residential AFA). Once the incident type is*

determined, one of 51 pre-determined response plans is chosen by the CAD. The breakdown of response plans is: 12 EMS, 17 special rescues and 22 suppression/other.

Response plans are based on the *initial* as well as *subsequent alarm* task-needs for each incident type. When the department determines that a particular incident type requires a change in standard resources assignment, the response plan is modified. In addition, the on-scene crew or incident commander always has the option to request additional resources to assist with specific tasks.

Suppression tasks

As the assigned resources arrive at an incident, the incident commander (IC) must coordinate actions/tasks in a timely manner to begin mitigating the emergency. In an effort to streamline the actions of initially dispatched crews, the Department, along with nearby jurisdictions, created *Best Practices for Offensive Fire Attack*. *[External link here]*. The purpose of *Best Practices* is to pre-assign common tasks to resources by the order they arrive on-scene. The benefit achieved is that the IC, usually the first-arriving officer, spends less time giving commands and more time managing his own initial tasks. However, there is flexibility in the plans by allowing IC's to exercise discretion and make assignments that deviate from those that are pre-designated.

Table 5-1: BE-Full+Medic Response Plan

Residential Structure Fire: 1st alarm		
Type	**Number**	**Staffing**
Engine	4	12
Ladder	2	9
Aid	1	2
Medic	1	2
Batt Chief	2	3-4
MSO	1	1
Total	11	29-30

For illustration, the response plan for a residential structure fire [Table 5-1] along with the associated assignments shown in *Best Practices*, and table of typical tasks [Table 5-2] is shown below. Since the tasks shown in Table 5-2 are common for most structure fires, the staffing needed to achieve these tasks is the basis for the Bellevue Fire Department "effective firefighting force" standard [see Baseline and Benchmark Standards section 6, specifically Table 6-5 page 78].

Table 5-2: Sample task assignments for 1st alarm residential structure fire.

Task	People
Incident Command	2
Fire attack	2
Pump operator	1
Backup line/2 in 2 out	2
Search and rescue	2
Ventilation	3
RIC	2
Safety	1
Hose support	2
Total	17

Best practices for a residential structure fire

1st Arriving Engine Company

The first-arriving Engine Company shall establish Command, address water supply, and lay the first attack line. Complete an accurate size-up to confirm tactics and assignments.

2nd Arriving Engine Company

The second-arriving Engine Company should ensure a water supply and assist with attack line advancement. A backup line may be laid for egress protection.

3rd Arriving Engine Company

The third-arriving Engine Company shall lay an exposure line, conduct primary search of exposure areas, and check for extension.

4th Arriving Engine Company

The fourth-arriving Engine Company shall be responsible for RIC unless otherwise directed by the IC.

1st Arriving Ladder

The first-arriving Ladder's first priority is to perform a search. If immediate ventilation is needed for the fire attack and search to take place, search may be passed to the 2nd due Ladder or assigned to another company by the Incident Commander. Considerations might include no life hazard, heavy smoke/heat conditions, top floor fire, or commercial structure.

2nd Arriving Ladder

The second-arriving Ladder shall perform ventilation, if not already initiated.

Other Ladder Company functions to support fire ground operations will include:

- Laddering
- Forcible entry
- Overhaul
- Utilities
- Salvage

Best practices/tasks for other suppression incidents

The *Best Practices* document is designed to give initial considerations and initial task assignments on a wide variety of other incidents. More detailed descriptions of those tasks are found in the plans for: (note—all links below are internal, but *Best Practices* is accessible from the external link above)

- Fires in Structures with Multiple Floors
- Front Door Tactics
- Standpipe Operations
- Basement Fires Page
- Attic Fires Page
- Residential Attached Garage Fires
- Fires in Multi-Family Dwellings
- Commercial Fires
- High-rise Fires

EMS Tasks

Specific tasks on EMS incidents are dependent on the type of call and established patient care guidelines. Basic life Support incidents are covered under *EMT patient care protocols 2012*

and can vary from very minor (e.g. small, "not sick" etc.) to life threatening (e.g. stroke). Advanced Life Support incidents and specific treatment guidelines are covered under the *Paramedic Pocket Guide 2012*. However, the broad range of EMS topics covered in initial training, continuing education and textbook resources provide even greater detail on specific tasks/treatments for EMS situations.

On-scene crews have the responsibility to determine if the number of personnel on-hand is sufficient to meet the patient care needs for the situation. Tasks such as airway management, IV placement, wound care, documentation, spine immobilization, extrication, etc., vary significantly from call to call. As such, an exhaustive list of those tasks as well as the number of people required to fulfill them is unable to account for the variety of EMS situations and the needs of each. Therefore, this document will not attempt to describe the personnel needed to perform specific tasks on specific EMS incidents.

Special Response Tasks

Incident response guidelines for special rescue and HazMat incidents are agency-specific documents. Response plans are designed to send resources with proper equipment and specialty-trained personnel. Those personnel are expected to follow the practices outlined found in the documents. (Note: guidelines are internally linked only)

- Confined Space Rescue
- Rope Rescue
- Trench Rescue
- Vehicle Extrication
- Hazmat

Section 6

Performance Objectives and Performance Reports

The Department's service objectives are based on a thorough consideration of all the preceding sections:

- Community profile
- Community Risks
- Task analysis
- Community expectations that are based on surveys and funding commitments
- Evolving service demands

First, the Department's service area can best be classified as "urban". While the downtown core is beginning to resemble a metropolitan classification, the total jurisdiction population remains under the 200,000-resident threshold needed for the higher rating. While a jurisdiction-wide "urban" classification seems simplistic or overly convenient, the population densities and the near-uniformity of the residential areas are able to support this decision. In addition, the recurrence and locations of suppression incidents also indicates a mostly-uniform risk level throughout the service area [see Figure 4-11].

Second, while the risk analysis has shown a broad spectrum of hazards in the jurisdiction, the concentration of highest risks near the more developed areas is properly addressed by the current positioning of response resources. Additionally, the modern construction and advanced fire protection that is typical for special-risk occupancies in this jurisdiction help to lessen the overall community risk.

Third, the Department's task analysis for the range of emergency problems has led to the creation of detailed response plans. The Department is committed to meeting the response plan needs both through the utilization of our own resources and the sharing of resources by our neighbors. Achieving overall service objective is contingent upon the Department's ability to position and dispatch needed resources to specific emergencies.

Fourth, the expectations of the community are clearly stated in the 2012 Budget survey. The 2012 Budget survey found that residents consider "responding to fires" (ranked first) and "providing emergency medical service" (ranked second) as very critical, core services. In the same survey, citizens gave those same two areas a ranking of first and second respectively in regards to satisfaction rank. This is evidence that the services provided by the Department are both valued by the community, and meeting their expectations.

Lastly, monitoring reports will help the Department determine the changing service demands. Those service demands will, in turn, cause the department to look for ways to optimize

performance and improve overall outcomes. For example, EMS service demands or increased call volume in specific areas will lead the Department to consider revising resource staffing and/or positioning.

Operational objectives

The overall objective of a response, whether a fire or EMS emergency, is:

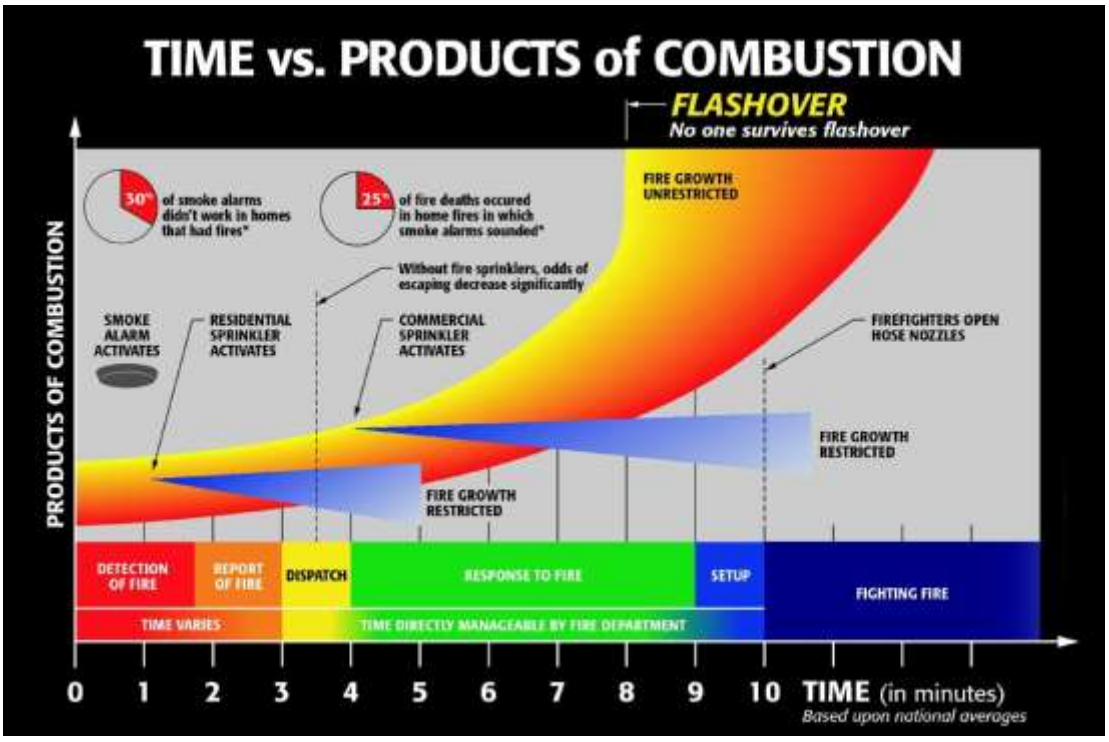
Getting the…
…properly trained responders, and the
…right equipment, at the
…right time, to a
…given emergency,
…to have the best chance of achieving the desired outcome.

Because of the wide variety of conditions at each emergency, it is often complicated to attempt to define department capabilities in light of desired outcomes. With staffing, equipment and even the types of calls remaining mostly constant, the remaining variable is *time*.

As is often the case, time determines success or failure in emergency situations. Ideally, the actions taken by responding personnel should stop further harm or damage from taking place. As is the case in many emergencies, the more time that passes before responders can intervene, the less chance there is of limiting damages or even death.

The illustration that best depicts the effect of time on a fire emergency is the time vs.

Figure 6-1: Time vs. products of combustion



products of combustion chart [Figure 6-1].

In summary, the stage of the fire affects both staffing and equipment needs. Early smoke detector notification or early suppression by installed fire protection systems can have a significant impact on restricting (or stopping) fire growth. However, if neither of these mitigation sources is present, the fire suppression forces must arrive within a certain timeframe and additional time is required to adequately apply water to the fire. This suppression effort must occur prior to the flashover stage to have the most beneficial results.

In addition, the crew's proficiency at fulfilling their tasks has a direct impact on time. The inability to quickly deploy a hose line or a delay in giving a fire ground assignment will invariably prolong the time that a fire has to develop.

Table 6-1: The chain of survival

Type of Care for Sudden Cardiac Arrest Victims after Collapse	Chance of Survival
No care after collapse	0%
No CPR and delayed defibrillation (after 10 minutes)	0-2%
CPR from a non-medical person (such as a bystander or family member) begun within 2 minutes, but delayed defibrillation	2-8%
CPR and defibrillation within 8 minutes	20%
CPR and defibrillation within 4 minutes; paramedic help within 8 minutes	43%

The same principle applies to EMS responses. Total response time performance (911 call to intervention) and its relationship to cardiac-arrest survival have been examined extensively. Agencies that can incorporate CPR trained citizens with early defibrillation (from either bystanders or responders) and rapid ALS interventions are known to have higher cardiac arrest survival rates.

Due to *time's* significance in successful outcomes, aside from cardiac arrest save rate and success rate at confining fires to the room of origin, it is *the only other* factor measured in department performance reports and is the basis of the baseline and benchmark standards.

Baseline and Benchmark Standards

The Bellevue Fire Department has established ***baseline*** performance standards in the following areas. The Department's performance will meet or exceed these standards.

- Priority response Emergency Medical Service (EMS), first-arriving total response time (TRT).
  The first unit shall arrive on-scene in less than 8 minutes TRT, no less than 90% of the time. [Table 6-2]
- Priority response non-EMS, first-arriving TRT
  The first unit shall arrive on-scene in less than 8 minutes 20 seconds, no less than 90% of the time. [Table 6-3]

- TRT of first-arriving engine/ladder on full responses where at least 15 personnel arrive on-scene.
  The first engine or ladder on full responses shall arrive on-scene in less than 8 minutes, no less than 90% of the time. [Table 6-4]
- TRT of a 17-person Effective Firefighting Force (EFF)
  The EFF shall arrive on-scene in less than 12 minutes, no less than 90% of the time. [Table 6-5 and Figure 6-2]

  Note: Total Response Time begins with 911 phone pickup at the dispatch center. TRT includes alarm handling, turnout time and travel time. Time ends when the responding unit arrives on-scene.

Fractile Factoid

Performance standards described with percentages are commonly referred to as "fractiles". Accredited departments prefer this reporting method over other statistical methods like "average response time" because fractiles state the *performance that is expected to occur*. When a fractile standard is set at a 90% level, it means the agency will *meet* or *beat* the given time standard in *at least* nine responses out of ten.

The Bellevue Fire Department has established ***benchmark*** performance standards in the same areas addressed in the baseline standards. Benchmark standards are, by definition, more difficult and not regularly achieved. Benchmarks depict the highest level of service and serve the purpose of motivating the department to higher performance.

- Priority response Emergency Medical Service (EMS), first-arriving total response time (TRT). TRT=Call Processing+Notification+Turnout+Travel [see Response methods pg 27]
  The first unit shall arrive on-scene in less than 6 minutes TRT, no less than 90% of the time. [Table 6-2].
- Priority response non-EMS, first-arriving total response time
  The first unit shall arrive on-scene in less than 6 minute TRT, no less than 90% of the time. [Table 6-3]
- Total response time of first-arriving engine/ladder on full responses where at least 15 personnel arrive on-scene.
  The first engine or ladder on full responses shall arrive on-scene in less than 6 minute TRTs, no less than 90% of the time. [Table 6-4]
- Total response time of 17-person Effective Firefighting Force (EFF). An EFF will have at least chief officer, one ladder, and one engine company.
  The EFF shall arrive on-scene in less than 10 minutes, no less than 90% of the time. [Table 6-5]

The Department will report performance, but not set standards, in the following areas.

- 90th fractile dispatch alarm handling time… [Figure 6-3]
  - Priority EMS
  - Priority Non-EMS (suppression)
  - All priority responses combined
- 90th fractile turnout time of first arriving unit on… [Figure 6-4].

  - Priority EMS
  - Priority Non-EMS (suppression)
  - All priority responses combined
- 90th fractile travel times for first arriving unit on…[Figure 6-5]
  - Priority EMS
  - Priority Non-EMS (suppression)
  - All priority responses combined

The department will also report performance outcomes in the following areas.

- Success rate of confining fires to the room of origin. [Figure 6-6]
- Five year running Utstein cardiac arrest save rate.[Figure 6-7]

Performance Reports

Performance reports are the actual result measurements of the Department in comparison to the established baseline and benchmark standards. In addition to the most recent year of performance, the Department will report the prior three years for a total of four years of historical reporting. Historical reporting is important if only to see the performance trends as they evolve. For example, an improvement in performance, whether it be in a specific area or overall, can be credited to steps taken to make those gains (e.g. faster alarm handling). Likewise, worsening performance can often be attributed to factors such as cuts in staffing or increased turnout time.

Baseline and Benchmark performance report tables

Table 6-2: Total response time (TRT) performance of first-arriving unit on priority EMS responses

		Baseline		*Benchmark*
Year	**Resp's**	**Arr <= 8 min**	**90th Fractile**	**Arr <= 6 min**
Bellevue standard		>= 90%	<= 8 min	>= 90%
2009	8,938	92.69%	7:25	71.14%
2010	9,323	92.61%	7:26	70.47%
2011	9,710	90.67%	7:34	68.53%
2012	10,037	90.63%	7:33	68.92%

Table 6-3: Total response time (TRT) performance of first-arriving unit on priority non-EMS responses

		Baseline		*Benchmark*
Year	**Resp's**	**Arr <= 8 min 20 sec**	**90th Fractile**	**Arr < =6 min**
Bellevue standard		>= 90%	<= 8 min 20 sec	>= 90%
2009	1,945	93.28%	7:32	64.32%
2010	1,821	92.59%	7:34	63.06%
2011	1,766	90.89%	8:10	60.61%
2012	1,692	91.55%	8:07	60.05%

Table 6-4: Total response time (TRT) performance of first arriving engine/ladder on a priority full response where at least 15 personnel arrive on scene.

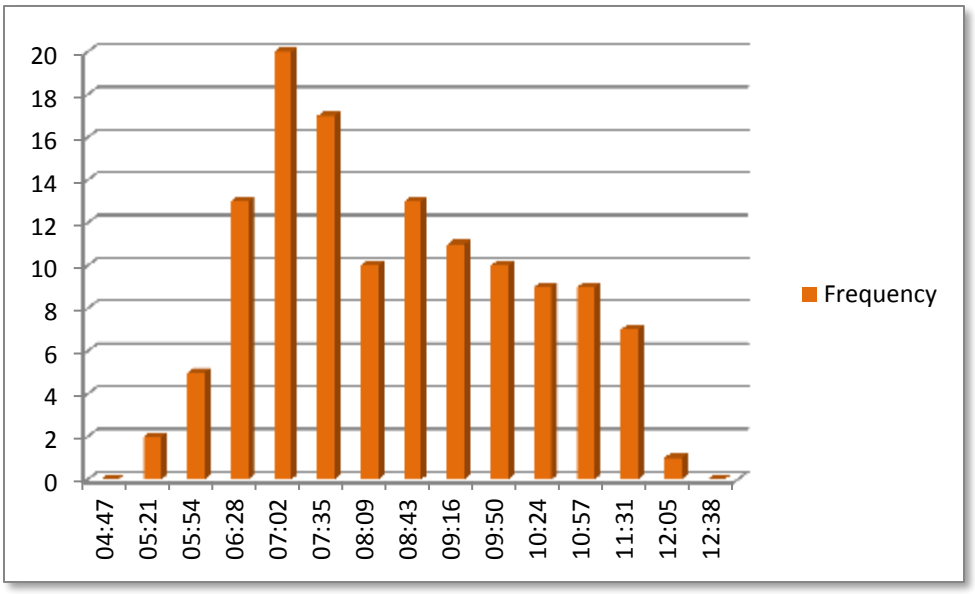
		Baseline		*Benchmark*
Year	**Resp's**	**Arv <= 8 min**	**90th Fractile**	**Arv <= 6 min**
Bellevue Standard		>= 90%	<= 8 min	>= 90%
2009	210	96.20%	7:19	65.02%
2010	191	96.85%	7:10	64.40%
2011	190	95.26%	7:28	68.42%
2012	160	95.63%	7:14	67.50%

Commentary: Table 6-4, while similar in nature Table 6-3, is able to show better response performance for first-arriving apparatus on suppression incidents for one main reason; the data used for Table 6-4has the highest integrity because the reported responses are confirmed priority. Table 6-4 shows TRT for a first-arriving ladder/engine on calls where a 15-person firefighting force is assembled. The general reality is that the first-arriving apparatus on these types of calls has, in almost every case, responded with lights and sirens (emergency response). Whereas, the more numerous non-EMS calls in Table 6-3 include many single-engine responses that where either non-emergency from the beginning or downgraded after dispatch. If the company officer completing the RMS entry does not uncheck the default "priority response" box, the non-emergency response with poor TRT performance would be included in the analysis of Table 6-3. It is our belief that non-emergency responses are negatively affecting this report. Therefore, Table 6-4, while using fewer responses, but ones that are most-assuredly emergency, is a better reflection of first-arriving apparatus on a priority non-EMS call.

Table 6-5: Total response time (TRT) performance to assemble a 17-person effective firefighting force (EFF) with at least one engine, one ladder and one battalion Chief.

		Baseline		*Benchmark*
Year	**Resp's**	**Arv < 12 min**	**90th Fractile**	**Arv < 10 min**
Bellevue Standard		>= 90%	<= 12 min	>= 90%
2009	155	92.90%	11:39	74.19%
2010	146	97.94%	11:10	77.40%
2011	142	92.25%	11:34	73.94%
2012	122	92.50%	11:46	66.67%

Figure 6-2: Bell curve frequency of 90th fractile, 17-person EFF TRT for 2011. Graph is typical for other years in Table 6-5. The horizontal scale is Time.



Other performance reports

The department will report, but does not establish standards, in the following areas: alarm handling time, turnout time, travel time, confinement to the room of origin and cardiac arrest save rate . The first three figures have a CFAI recommended baseline standard plotted as a lavender line.

Figure 6-3: 90th fractile dispatch alarm handling time

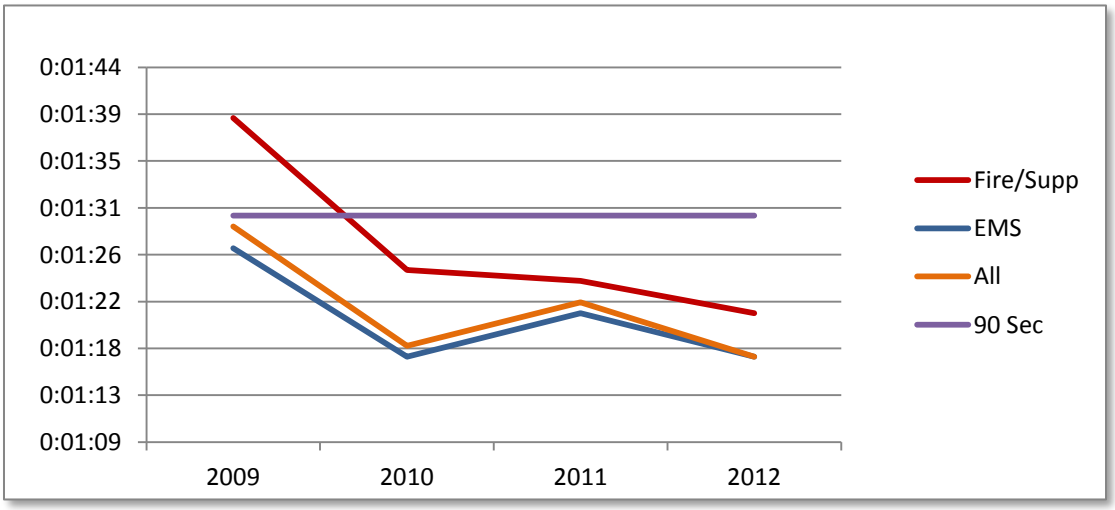


Figure 6-4: 90th fractile turnout time of first-arriving unit on a priority response

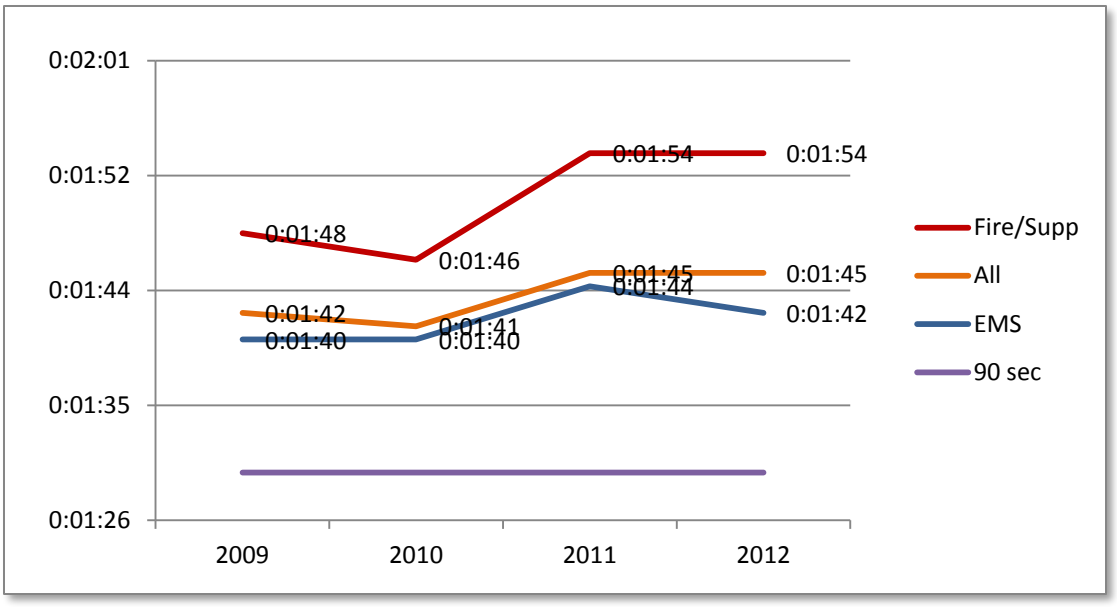


Figure 6-5: 90th fractile travel time of first-arriving unit on priority responses

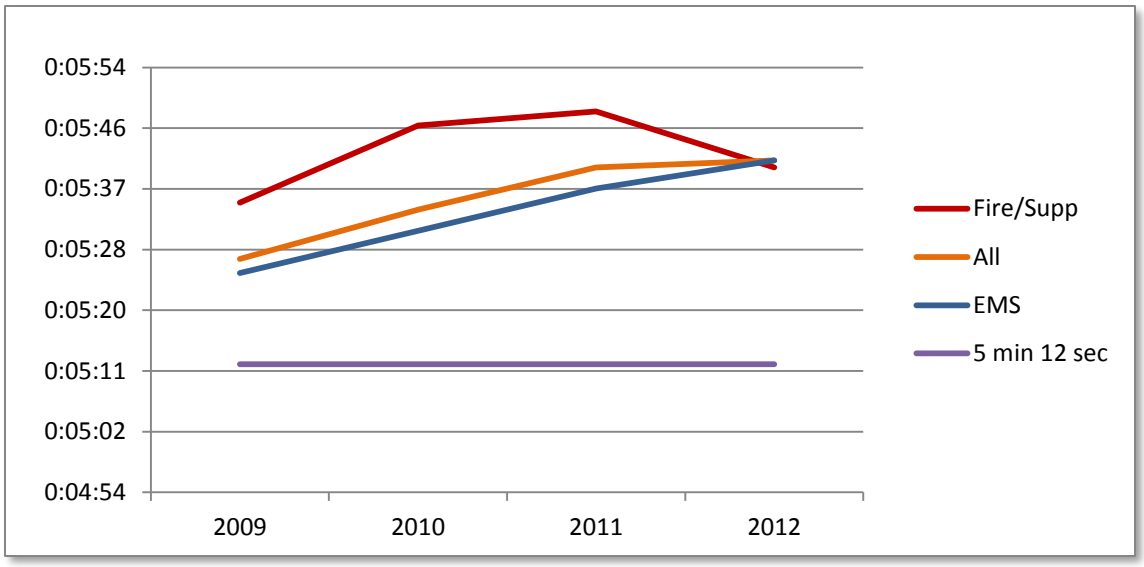
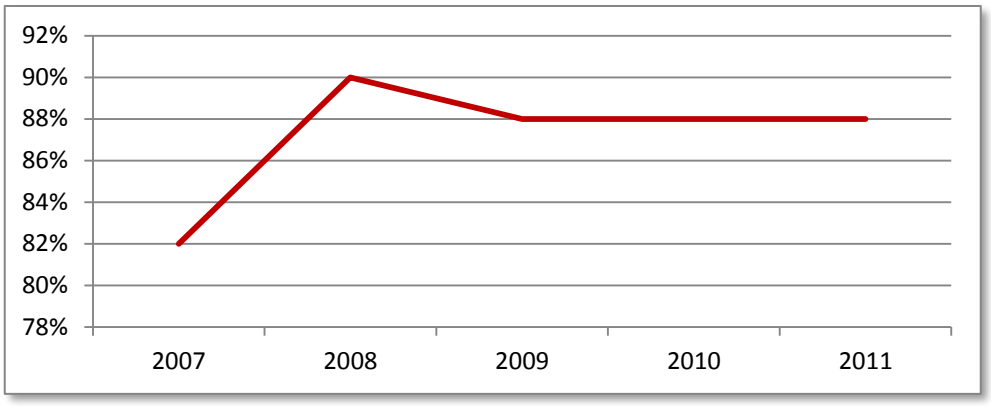
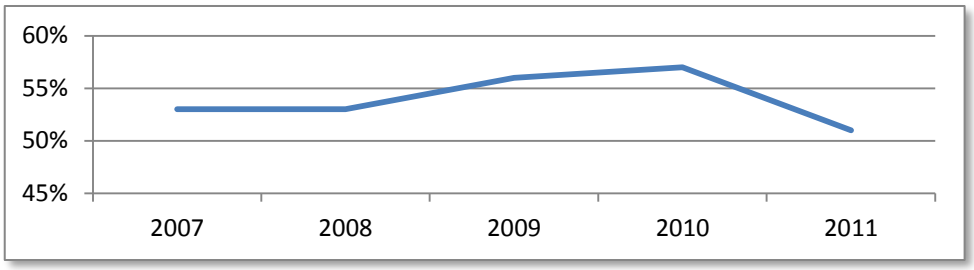


Figure 6-6: Percentage of fires confined to the room of origin.



*Commentary: Bellevue Fire Department's performance in successfully confining fires to the room of origin [*Figure 6-6*] consistently places them in the top percentage of the International City/County Management Association (ICMA) survey results.*

Figure 6-7: Five-year running average of Utstein Cardiac arrest save rate.



The five-year running average for a year is the combined average of that year along with the averages of the previous four years. Due to the limited number of calls that meet the criteria (typically between 10 and 20 calls per year), the running average provides more consistency in the report. Utstein is defined as a pre-arrival, witnessed cardiac arrest due to presumed underlying heart disease with an initial rhythm of ventricular fibrillation when analyzed by the responding EMT's/Paramedics.

Reliability

In general, reliability is the ability of a system to perform and maintain its functions in routine circumstances, as well as in hostile or unexpected circumstances. In the case of emergency services, reliability looks at actual incident history data to measure historical performance in accordance with adopted performance baselines. System reliability revolves around the time it takes to respond to the incident while overcoming distance and traffic conditions. Depicting reliability can accomplish finding answers to questions such as:

- Does the Bellevue Fire Department achieve the goal of meeting its baseline response standards?

- Does the department have sufficient resources in the proper locations to provide coverage for stacked or multiple-response occasions?
- Are there areas within the jurisdiction that have, despite concentrations of incidents, a higher-than-average failure to achieve baseline response standards?

Reliability can be measured or depicted by several different methods. Some jurisdictions track the amount of time that response units are committed to emergencies with the goal of keeping unit availability at or above a certain percentage. The assumption is that out-of-service time results in simultaneous-call response time failure. Other jurisdictions track the number of incident's in a station area that are handled by out-of-district crews with the rationale that this is less-than-desirable because they assume that an out-of-district response time is automatically below standard. However, neither of these methods is a true predictor of degrading performance. In Bellevue's case, AVL dispatches and resource repositioning (coverage for units that are out-of-service for training) *can* and *does* ensure that response time standards are met even in out-of-district responses.

However, a reliability problem does manifest itself in one measureable outcome; failure to meet a response time baseline standard. The value of seeing where these are occurring can help the department understand if response problems are more common in certain areas. The reasoning is that clusters or concentrations of calls that fail to meet response standards highlight areas that would benefit the most from either additional resources or implementation of response efficiencies (e.g. moving a resource closer to the problem area, removal of traffic calming devices, etc.).

One should also bear in mind that failure to meet response time standards can be the result of process problems. For example, an agency's failure to have credible turnout time performance will have a significant impact on response time. Poor data entry (RMS) can also have an effect where non-emergency calls with long response times are misclassified as priority responses. It is only reasonable to expect that turnout time standards and data entry integrity be monitored and maintained before a resource request can be completely justified.

A subtle but appreciable cause of poor response times is unit unavailability due to resource over commitment on low risk/low consequence incidents. Sending too many resources to a low risk/low consequence incident type unnecessarily uses resources that could respond to simultaneous calls. After all, it is not resource "busyness" that determines effectiveness, but rather a justified resource commitment based on the needs of incident. As a result, a credible response plan [Response methods section page 27] is another factor in justifiable reliability reporting.

The following two pages depict reliability performance for the Bellevue fire department jurisdictional area. It is normal for all agencies to have some incidents that exceed response standards. In Bellevue's case, the numbers of below standard EMS and suppression responses are less than 10 percent total, which complies with the overall standards [see Baseline and Benchmark Standards].

Figure 6-8 shows an unremarkable dispersion of EMS calls in excess of 8 minutes. A small cluster of calls in both the central business district and Crossroads/Overlake area is somewhat notable and possibly indicates two separate emerging response-problem areas. Figure 6-9 shows similar results for priority suppression responses, minus the Crossroads concentration. But overall, there does not appear to be any significant response-problem areas.

It is also important to weigh overall call volume with respect to both maps. Those maps are found in the EMS risk assessment section [EMS Figure 4-7, page 49], and appendix [suppression Figure 9-2, page 91].

Figure 6-8: 2011 priority EMS responses that exceed the department baseline response standard of eight minutes (i.e. responses that took longer than 8 minutes total response time).

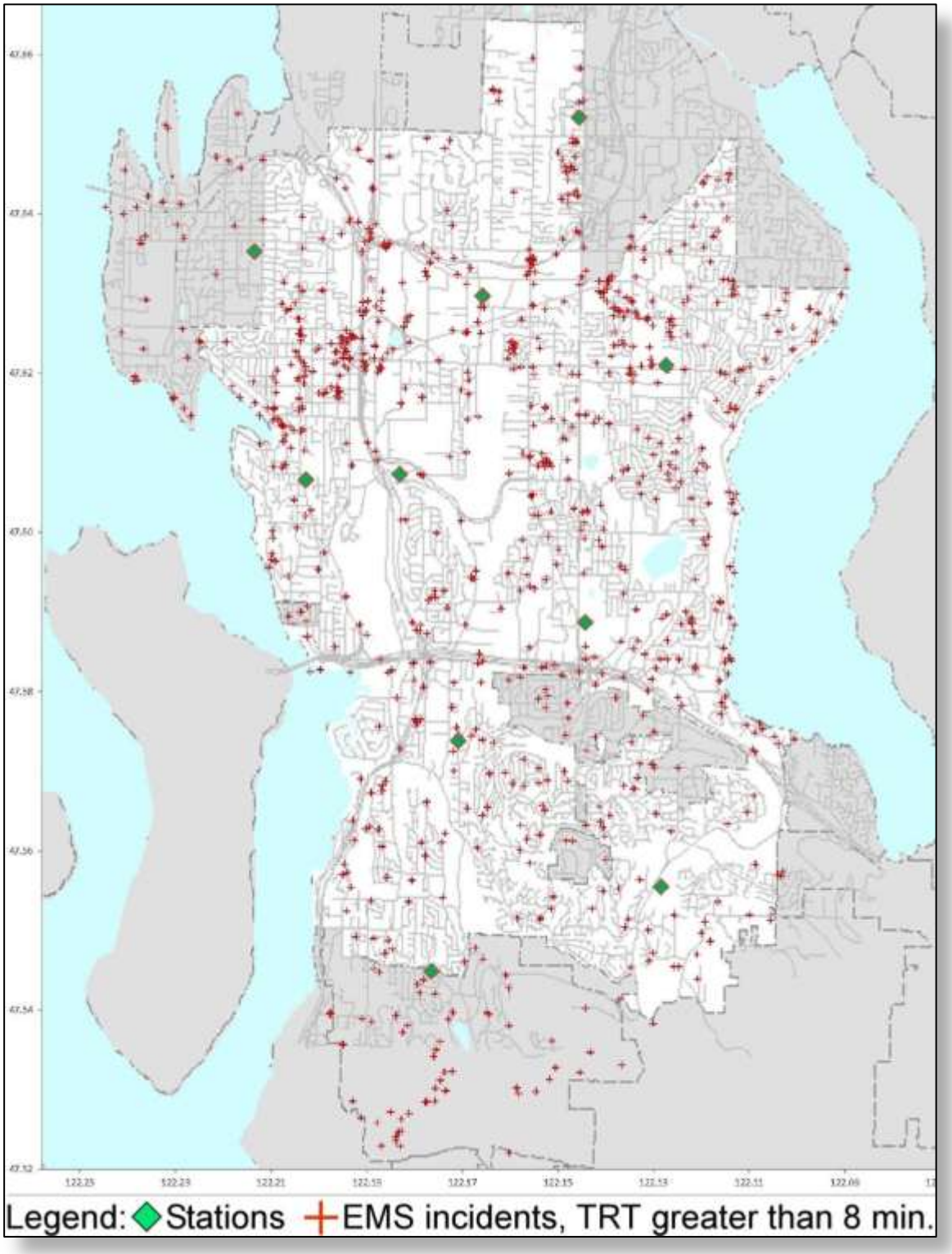
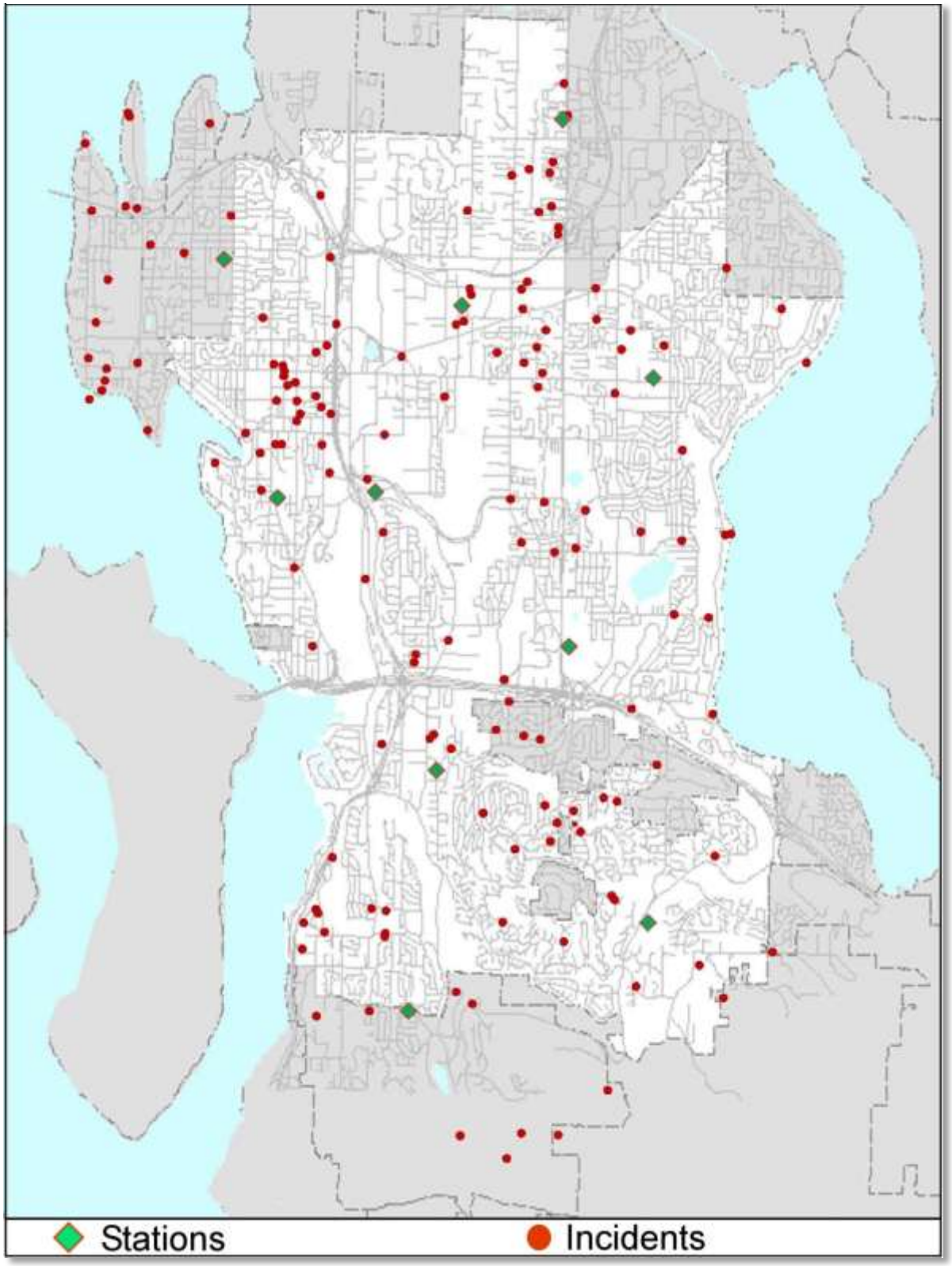


Figure 6-9: 2011 priority suppression responses that have a TRT of 8 minutes, 20 seconds or greater.



Section 7

Compliance methodology

The Department is committed to updating the statistical reports found in this document on an annual basis. In addition, most of the updated reports will be published with the CFAI annual compliance report. Tables will be updated with a four-year historical record and figures will be updated annually and added as attachments to this document.

Turnout time performance reports [sample] are produced on monthly intervals and are then distributed to the platoon battalion chiefs. Battalion chiefs are tasked with reviewing the reports and counseling crews that are falling below Department standards. Battalion chiefs have the discretion to document performance-improvement efforts in this area.

The Department is committed to conducting building risk assessments at five-year intervals that correspond to the re-accreditation timelines.

Of particular value to the Department is the reporting of both the locations of specific incident types and locations of calls that fail to meet established baseline standards. The Department will create these reports on an annual basis, and they will assist the Department in identifying geographical areas with emerging response deficiencies.

The Department is also committed to using the two-year Budget One process for justifying the need and cost for all services that are provided.

Section 8
Overall evaluation

The goal of creating the *Standards of Response Coverage* document is to provide the Bellevue Fire Department with a rational, data-based analysis for the justification and effectiveness of the services provided. The previous seven chapters have helped develop a full inventory of fire, EMS, and other environmental hazards present in the communities served. In light of those risks, the Department can create and better manage a response force that can minimize the impact of those hazards.

In completing the *Standards of Response Coverage*, staff and field personnel have a more comprehensive understanding of the Department's ability to provide fire protection and related services based on actual data. The value of this type of document cannot be understated as it also provides leaders and citizens with a clear picture of the justification for fire department staffing and resources.

The data analysis for this report has revealed the following notable trends that the Department must continue to monitor and possibly address. They are:

- Suppression incidents (Fires, service calls, false alarms, etc.) are not increasing along with population growth, and are actually decreasing slightly.
- EMS incidents appear to have increased in direct proportion to population growth and may actually outpace population growth slightly.
- Automatic fire alarms are a continuing response problem as they degrade resource availability and may affect overall reliability.
- There appears to be a slight worsening in both EMS and suppression response performance. Data entry mistakes may be the contributing factor. Analysis of calls that do not meet response standards typically reveals that they were miss-classified as "priority" when they should have been "non-priority."
- There are some indications that both EMS and suppression response performance is beginning to degrade in the downtown core. Development and population growth in this area appears to be a contributing factor.
- There appears to be more room for improvement in the area of turnout response performance [Figure 6-4]. Data reporting can identify individual crews with sub-standard performance and platoon battalion chiefs are tasked with initiating corrective actions.

Overall, the department is proud of its level of performance and achievements in measureable outcomes. The continued analysis and reporting of performance through documents like this will provide proof of achievement while showing areas where improvements are needed.

Section 9
Appendix

Figure 9-1: 7xx suppression responses (i.e. false automatic fire alarms activations) in 2011. Green diamonds are fire station locations.

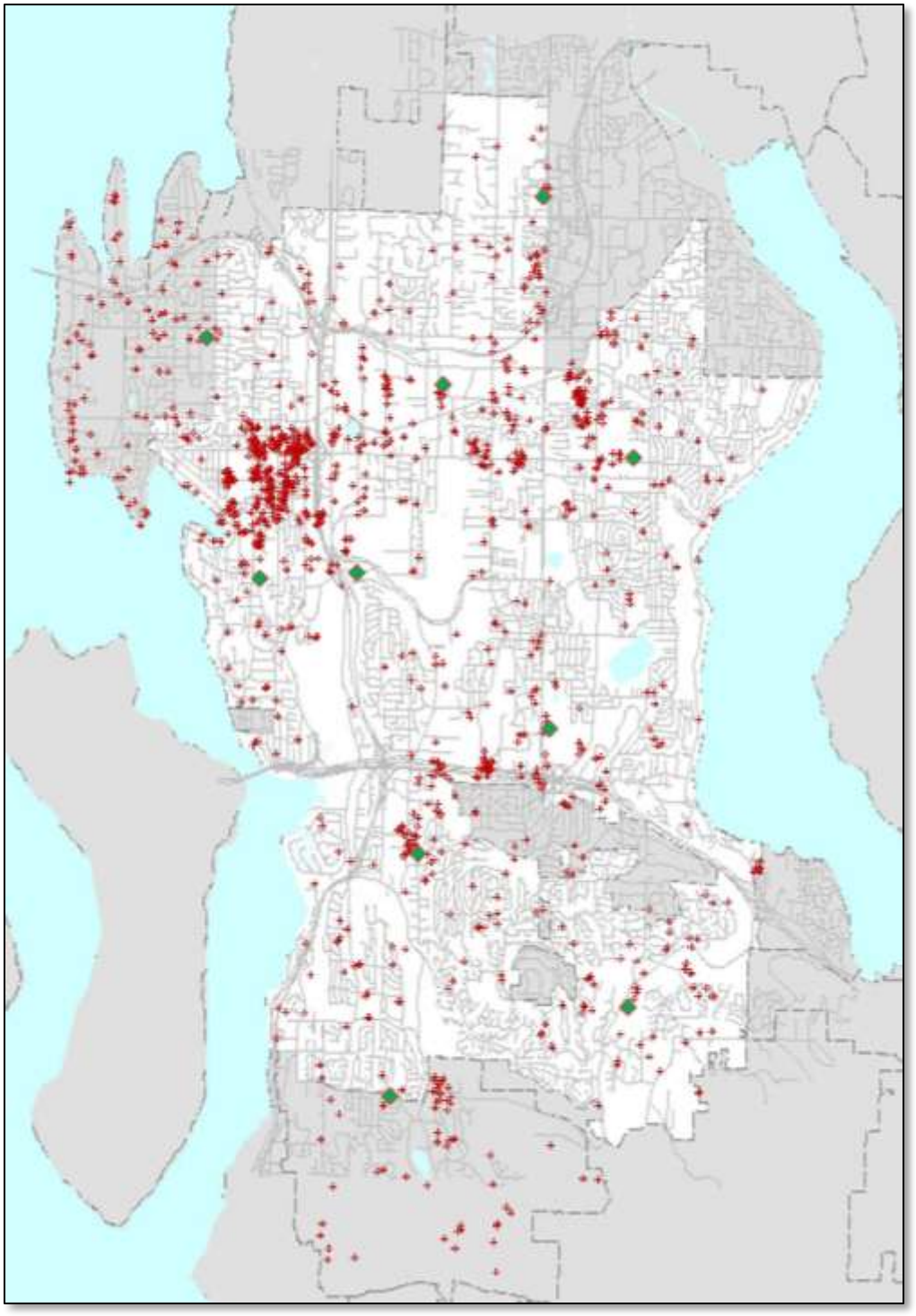


Figure 9-2: 2011 all priority suppression responses.