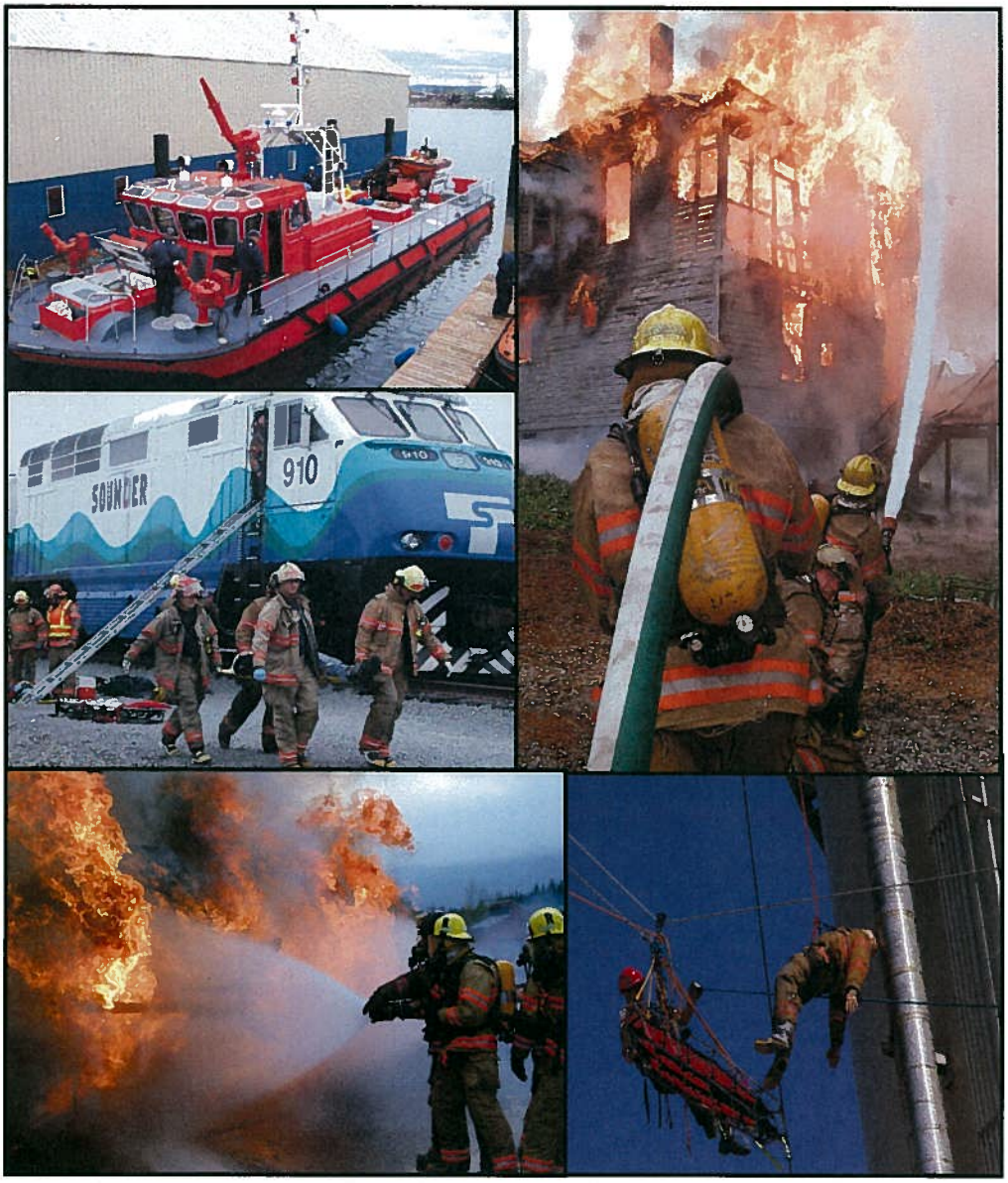
TACOMA FIRE DEPARTMENT



STANDARDS OF COVER 2009

TACOMA FIRE DEPARTMENT
STANDARDS OF COVER

City of Tacoma, Washington
April 2009

BILL BAARSMA
Mayor

JULIE ANDERSON
Deputy Mayor

JAKE FEY
Council Member District 2

RICK TALBERT
Council Member District 4

MARILYN STRICKLAND
Council Member at-large

SPIRO MANTHOU
Council Member District 1

LAUREN WALKER
Council Member District 3

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Council Member District 5

MIKE LONGERGAN
Council Member at-large

ERIC ANDERSON
City Manager

RONALD W. STEPHENS
Fire Chief

STANDARDS OF COVER PLANNING TEAM

Jon Lendosky, Deputy Chief, Emergency Operations
Jim Duggan, Assistant Chief, Emergency Medical Services
Carl Anderson, Fire Code Official
Kevin Donohoe, Battalion Chief
Mike Mitchell, Battalion Chief
Jim Scott, Battalion Chief
Todd Magliocca, Captain
Mike Newhouse, Lieutenant/Paramedic Supervisor
Steve Collins, Lieutenant
Matt Frank, Firefighter/IAFF Local #31 Vice President
Barb Young, Planning and Organizational Performance

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TACOMA FIRE DEPARTMENT
STANDARDS OF COVER

EXECUTIVE SUMMARY

The Tacoma Fire Department (TFD) has a long history and proud tradition of service to the greater Tacoma community. From volunteer bucket brigades and horse-drawn wagons to modern apparatus and service delivery methods, TFD continues to evolve as a progressive and responsive organization. The decision to seek accreditation and the development of this Standards of Cover document are the two most recent examples of TFD's commitment to performance excellence in service to the community.

SERVICE DELIVERY MODEL

The TFD two battalion service delivery model strategically positions the department's 16 engine companies, four ladder companies and five medic companies throughout its nearly 72 square mile service area in a way that ensures TFD is always prepared and ready to provide the following services:

- Fire suppression
- Basic and Advanced Life Support treatment and transport of critically ill or injured patients
- Hazardous materials containment (HazMat)
- Technical rescue (Tech Rescue)
- Marine firefighting and rescue (Marine)

TFD's "full service" operations together with the geographical challenges of the service area have resulted in the implementation of a dual response system whereby every TFD firefighter also is a certified Emergency Medical Technician (EMT) or a Paramedic. In addition, every engine and ladder company and the fireboat carry not only firefighting equipment, but also medical supplies and equipment, including oxygen and automatic external defibrillators (AED) for Basic Life Support (BLS) response.

In addition to emergency response, the TFD engine and ladder companies are assigned to fire code enforcement and public education as well as station and equipment maintenance responsibilities. Assignment of these prevention activities, together with the dual response service delivery system, is the method by which TFD is able to most cost effectively save both lives and property.

PLANNING ZONES

Traditionally, TFD has used engine zones as the basis for planning. Engine zone boundaries are determined by travel time; the distance an engine or ladder can cover in 4 minutes or less. From this point forward, the planning model for TFD

has changed to align with Commission Fire Accreditation International (CFAI) guidelines; dividing the TFD service area into two urban, nine suburban and one rural planning zone according to CFAI criteria.

COMMUNITY RISK ASSESSMENT

The community risk assessment is divided into three categories: Fire, Emergency Medical Services (EMS) and Non-Fire which includes HazMat, Tech Rescue and Marine. Risk definitions were developed for each category and where appropriate segmented into High, Moderate and Low. Each planning zone was assessed for the presence of risk according to those definitions.

Fire risk is defined as the characteristics of the community that generate fire risk persistently over time. Those characteristics are geography, threats to life safety and structures, including those with historic value and those whose loss would have great economic impact. The goal for fire risk mitigation is to keep emergencies from escalating by preventing flashover.

Overall analysis of Fire risk was conducted according to the following criteria:

- Population
- Number of moderate and high risk structures
- Number of low, moderate and high risk fires
- Presence of--
    - Geographical and/or access issues
    - Wildland/urban interface
    - Critical infrastructure -- utilities, transportation, health, education, government
    - Heavy industry
    - Potential for significant economic impact
    - Historical/cultural value

EMS risk is defined as the correlation between the frequency of high acuity medical conditions and community characteristics to determine the need for shorter times to treatment. The goal for EMS risk mitigation is to intervene before damage from the medical condition or traumatic injury becomes irreversible and to decrease the risk of mortality.

Analysis of EMS risk was conducted according to the following criteria:

- Population
- Percentage of population over age 50
- High frequency -- all EMS, high acuity conditions
- Frequency per 1,000 population -- all EMS, high acuity conditions
- Consistent and emerging trends

Non-Fire risk is defined as the structural and geographical characteristics of the community that over time persistently generate risk to life safety and/or the

environment. The goal for Non-Fire risk mitigation is to keep emergencies from escalating to prevent life and property loss and/or adverse impact to the environment. TFD provides Non-Fire risk mitigation via its HazMat, Tech Rescue and Marine services.

Overall analysis of Non-Fire risk was conducted according to the following criteria:

- Population
- Number of Non-Fire incidents
- Presence of--
    - Geographical and/or access issues
    - Wildland/urban interface
    - Critical infrastructure -- utilities, transportation, health, education, government
    - Heavy industry
    - Potential for significant economic impact
    - Historical/cultural value

The overall risk assessment for the TFD service area is as follows:

- Highest risk zones overall
    - Downtown
    - Eastside
    - South West
    - Tideflats
- Lowest risk zones consistently
    - Fircrest
    - Northeast Tacoma
- Zones to watch for emerging risk
    - Fife/Fire District 10 (Fire)
    - South Central (Fire, EMS)
    - South End (EMS, Non-Fire)
    - Upper Tacoma (EMS)
    - West End (Fire)

EMERGENCY RESPONSE ANALYSIS

Analysis of TFD's emergency response capability is a combination of the following factors:

- Cascade of Events to establish time stamps
- Comprehensive Task Analysis to determine the number of personnel and apparatus needed to accomplish certain tasks at an incident
- Comparability to ensure that performance standards are based on industry standards
- Predictability to determine trends which may be used for future planning projections

- Reliability to assess TFD's ability to maintain daily function under routine as well as unexpected situations
- Distribution referring to the geographic location of first due resources for initial emergency response intervention
- Concentration referring to the spacing of multiple resources to ensure there is adequate staff and equipment arriving on scene soon enough to prevent the escalation of the emergency

Overall response analysis was conducted according to the following criteria:

- Overall incident reliability for Fire and EMS
- Specialized apparatus reliability - Medic and Ladder companies
- 2008 Distribution response - all emergency responses, excluding Marine
- 2008 Concentration response - Fire (low, moderate and high risk fires)
- 2008 Concentration response - EMS (ALS and ALS with extrication)

The following conclusions regarding TFD response were drawn based on all of the data cited above:

- Substandard reliability overall in these planning zones--
  - South West
  - Tideflats
  - Eastside
  - South Central
  - South End
- Potential for reliability issues to emerge in these planning zones--
  - Upper Tacoma
  - Downtown
- Reliability above standard in these planning zones--
  - Fircrest
  - Fife/Fire District 10
  - Northeast Tacoma
  - North End
  - West End
- TFD clearly meets the minimum CFAI distribution response standard in all planning zones, except the Tideflats
- TFD consistently exceeds the minimum CFAI concentration response standard for all types of Fire in all planning zones
- TFD urgent support force response is below travel time standards both overall and for the majority of planning zones for both high and moderate risk fires, underscoring the impact of both geography and reliability on response capability
- Both ALS and ALS with extrication concentration response are substandard and declining in most planning zones

PERFORMANCE STANDARDS

The preceding response analysis culminated in the development of the following performance standards.

Distribution - All emergency responses

For 90% of all requests for emergency service, excluding Marine, the first arriving TFD engine or ladder staffed with a minimum of three personnel shall arrive within:

- 7 minutes, 42 seconds total response time for **urban** zones
- 9 minutes total response time for **suburban** zones
- 15 minutes, 30 seconds total response time for **rural** zones

Concentration - Fire

TFD shall arrive in a timely manner with sufficient resources to stop the escalation of the fire by preventing flashover. Initial response resources shall be capable of initiating fire suppression and addressing life safety issues as needed, while providing for the safety of responders and the general public.

Low Risk

For 90% of all low risk fires the effective response force, consisting of one engine or ladder staffed with a minimum of three personnel, shall arrive within:

- 7 minutes, 42 seconds total response time in **urban** zones
- 9 minutes total response time in **suburban** zones
- 15 minutes, 30 seconds total response time in **rural** zones

Moderate Risk

For 90% of all moderate risk fires:

- The effective response force, consisting of one engine and one apparatus and a minimum of 4 personnel, shall arrive within:
    - 12 minutes, 54 seconds total response time in **urban** zones
    - 15 minutes, 30 seconds total response time in **suburban** zones
    - 20 minutes, 42 seconds total response time in **rural** zones
- The urgent support force, consisting of four engines, one ladder, one medic company and one Battalion Chief vehicle for a total of 19 personnel, shall arrive within:
    - 14 minutes, 54 seconds total response time in **urban** zones
    - 17 minutes, 30 seconds total response time in **suburban** zones
    - 22 minutes, 42 seconds total response time in **rural** zones

High Risk

For 90% of all high risk fires:

- The effective response force, consisting of two engines or one engine and one ladder and a minimum of 6 personnel, shall arrive within:
  - 12 minutes, 54 seconds total response time in **urban** zones
  - 15 minutes, 30 seconds total response time in **suburban** zones
  - 20 minutes, 42 seconds total response time in **rural** zones
- The urgent support force, consisting of five engines, two ladders, one medic company and one Battalion Chief vehicle for a total of 25 personnel, shall arrive within:
  - 15 minutes, 54 seconds total response time in **urban** zones
  - 18 minutes, 30 seconds total response time in **suburban** zones
  - 23 minutes, 42 seconds total response time in **rural** zones

Concentration - EMS

TFD shall arrive in a timely manner with personnel sufficiently trained and equipped to initiate medical intervention to decrease the patient's risk of mortality and/or irreversible damage, while providing for the safety of responders. Timely transport of patients to the nearest, most appropriate hospital receiving center will be accomplished in an effective and efficient manner.

Advanced Life Support (ALS)

For 90% of all ALS calls the effective response force consisting of one engine and one medic company and a minimum of 5 personnel shall arrive within 10 minutes, 30 seconds total response time.

ALS with Extrication

For 90% of all ALS calls requiring extrication, the effective response force consisting of one engine, one ladder and one medic company and a minimum of 5 personnel, shall arrive within 11 minutes total response time.

Concentration - Marine Firefighting and Rescue

TFD shall arrive in a timely manner with personnel sufficiently trained and equipped to initiate rescue efforts to prevent life and property loss and/or mitigation efforts to prevent environmental damage while providing for the safety of responders.

For 70% of all Marine firefighting and rescue calls, the TFD fireboat, staffed with a minimum of 3 personnel, shall arrive within 22 minutes, 30 seconds total response time.

Concentration - Technical Rescue

TFD shall arrive in a timely manner with personnel sufficiently trained and equipped to stabilize the incident scene and extricate casualties while protecting the safety of responders and/or additional adverse impact to the environment.

> For 70% of all Technical Rescue calls, the effective response force consisting of one engine, one ladder and one medic company plus Engine 8 and Ladder 2 and a minimum of 14 personnel, shall arrive within 22 minutes, 30 seconds total response time.

Concentration - Hazardous Materials (HazMat)

TFD shall arrive in a timely manner with personnel sufficiently trained and equipped to stabilize and control access to the incident scene, identify and evaluate hazards and isolate or evacuate casualties, while protecting the safety of responders and/or additional adverse impact to the environment.

> For 70% of all HazMat calls requiring operations/technician level response, the effective response force consisting of one engine and one ladder plus Engine 12 and Ladder 4 and a minimum of 12 personnel, shall arrive within 22 minutes, 30 seconds total response time.

RESOURCE ANALYSIS AND RECOMMENDATIONS

The following guidelines provided the framework for the analysis of resources that will be needed to achieve and sustain TFD's performance standards:

- Determination of risk is a function of population, type and number of structures, incident frequency and the presence of or potential for the following additional significant risk factors
    - Geography/access issues
    - Wildland/urban interface
    - Critical infrastructure
    - Heavy industry
    - Economic impact
    - Historical/cultural value
- Evaluation of response is a function of reliability, distribution and concentration
- Increased risk requires increased resource concentration
- Risk + Reliability + Response = Resources
- Resources = Personnel, Apparatus, Facilities and/or Prevention

Recommendations for mitigation based on resource analysis are as follows:

Resource Recommendations - High/Emerging Risk Zones			
People	**Apparatus**	**Facilities**	**Prevention**
• **Eastside and South West**: Add ALS capability to existing engine company (+1 FF/PM) AND/OR new medic company (+2 FF/PM) • **South End**: Make existing ALS engine full-time (+1 FF/PM) AND/OR new medic company (+2 FF/PM) • **Tideflats**: New 4 person engine with ALS capability (+3 FF/EMT, +1 FF/PM)	• 2 engines OR • 1 engine and 1 ladder AND • 1-2 medic companies	New station with associated staffing and apparatus - engine or ladder and medic companies - to mitigate combined proximate risk in Eastside, South End and South West planning zones AND/OR Modifications to existing stations to accommodate additional personnel	• AED placement in Downtown and Tideflats planning zones to mitigate EMS risk associated with higher daytime population • Study correlation between cardiac/stroke and diabetes and possible prevention strategies to mitigate EMS risk • Trauma prevention in Downtown, Eastside and South West planning zones
TOTALS			
3-7 FF/PM (15-35 FTE) **3 FF/EMT (15 FTE)**	**2 engines and 1-2 medic companies** **OR** **1 engine, 1 ladder and 1-2 medic companies**	**1 new station** **AND/OR** **Modifications to existing stations to accommodate additional personnel**	

It is also important to note here that TFD's current staffing model of two Battalion Chiefs overseeing 25 companies (16 engine, 4 ladder, 5 medic) exceeds the generally accepted business practice that calls for a span of control of 5-7 direct reports (or companies in the fire service) per supervisor. The additional staffing recommended here adds up to 4 additional companies, creating the need for at least 2 additional Battalion Chief positions (10 FTE). In addition, TFD would have to modify facilities and acquire additional vehicles to accommodate this additional staffing.

Additional recommendations for low risk zones include:

- **North End**: Consider staffing the existing ALS capable engine with a full-time paramedic to improve EMS response (+1 FF/PM = 5 FTE)
- **Northeast Tacoma**: Consider 4 person engine staffing to improve moderate fire concentration response (+1 FF/EMT = 5 FTE) and/or consider modifications to the ambulance contract to improve ALS response for this planning zone

Additional recommendations specific to Marine response:

- Renovate Station 5 and re-locate fireboat to that site to improve Marine response
- Consider full-time fireboat staffing for existing crew and the addition of a full-time 4th person with ALS capability
    - 4th person increases firefighter safety and operational efficiency
    - Creating ALS capability is supported by data regarding the demand for EMS and search/rescue
- Create back-up Marine response capability
    - Reserve fireboat and/or
    - Rapid response vessel (RRV) for improved Marine response where significant pumping capability is not required

IMPLEMENTATION PLAN

TFD will implement this Standards of Cover plan as follows:

- Recommendations for additional staffing and apparatus will presented for consideration in the City's 2009 mid-biennium budget adjustment and subsequent biennial budgeting processes; the next of which begins in 2010
- New facility recommendations will be integrated into the facilities master planning process slated for completion in 2009
- Prevention recommendations will be forwarded to TFD's public education staff for further research and subsequent program development and implementation

MONITORING AND EVALUATION

The performance standards outlined in this document provide the foundation for TFD's ongoing organizational performance management efforts. They will be incorporated, along with performance measures related to other aspects of department operations, into a "report card" that is reviewed at least quarterly by TFD's senior administrative team.

Along with this quarterly review, all of the performance measures and results will be reviewed as part of the annual TFD strategic plan update, with adjustments to

strategies and/or benchmark targets made accordingly and then reflected in an updated strategic plan document. In addition, the intent is to replace the TFD performance measures currently found in the City's strategic plan with the performance measures outlined in this document.

Standards of Cover performance results will be shared quarterly and the strategic plan update annually with key stakeholders including, but not limited to, the City Council, City Manager, Neighborhood Councils and TFD personnel.

TACOMA FIRE DEPARTMENT
STANDARDS OF COVER

INTRODUCTION

The following report serves as the Tacoma Fire Department (TFD) Standards of Cover document; an analysis of how the department's fixed and mobile resources are deployed to provide fire suppression, emergency medical services, marine firefighting and rescue, technical rescue and hazardous materials response. The purpose of this document is to provide TFD with a sustainable operational foundation that will ensure its resources are deployed in the most effective and efficient manner to mitigate risk to the community.

The process for developing this Standards of Cover document included a detailed risk assessment of the TFD service area, an analysis of TFD response capabilities and the development of performance standards. The combination of those elements provides the basis for the resource recommendations at the end of the report.

BACKGROUND

History[1]

Early explorers, trappers and settlers made their mark in the south Puget Sound, but it was the vision of prominent citizens that convinced the Northern Pacific Railroad to select Tacoma as the western terminus of its transcontinental rail line in 1873. With the railroad, a deep-water port created by Commencement Bay and abundant natural resources, particularly timber, Tacoma was transformed into a center for industry and commerce. "City of Destiny" - "Rails to Sails" - "Lumber Capital of the World" - all are descriptive of Tacoma's place in history.

The 1880s saw the incorporation of the City of Tacoma, population growth from approximately 1,000 to 36,000 residents and a bustling collection of mills and factories and along with that progress an emerging need for fire protection. In fact, the city had already experienced enough of a fire problem to create volunteer fire companies and move to more fire resistive construction methods, particularly downtown, where major fires had already occurred. Amidst a scourge of arson, the city continued to improve fire protection capability with water system improvements and hydrants, city box alerting systems and more volunteer fire companies.

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[1] Clyde Talbot and Ralph Decker, *100 Years of Firefighting in the City of Destiny, Tacoma, Washington*, Pyro Press, 1981

In 1889, Seattle experienced the Great Fire which destroyed most of its business district, wharves and rail terminals. Two weeks later, Tacoma's City Council hired a Fire Chief, placed 24 volunteer firefighters on salary, purchased new equipment and made plans for new fire stations, including a headquarters station.

The rapid growth of the 1880s was followed by a slowdown in the 1890s; attributed primarily to financial trouble with the railroads and the emergence of Seattle during the Klondike gold rush. The city did, however, expand its borders; annexing large areas south and west to the Narrows. The Tacoma Fire Department (TFD) continued its protection of the 200-plus mills, factories and warehouses located primarily downtown and along the waterfront.

From 1900 through World War I (WWI), Tacoma experienced significant expansion and population growth soared during this period. The city limits were largely established, with the exception of northeast Tacoma and other smaller parcels. In 1900, insurance companies threatened higher premiums due to TFD staffing shortages. A disastrous fire occurred at the Wheeler-Osgood mill in Tacoma, the largest mill of its kind on the West Coast. This fire exposed the need for more resources and in subsequent years the department would add additional stations, equipment and personnel. By 1911, TFD had twelve stations. Six of these stations are either currently active in their original locations (Stations 2, 11 and 13) or in close proximity to their predecessors (Stations 1, 4 and 9). When Engine 13 went into service in 1911, it was the last new company formed until 1929.

After WWI, TFD made the technological transition from horse power to complete motorization. Northeast Tacoma was annexed in 1927 and the city's population was nearing 100,000. TFD expanded in 1929 with the addition of four new fire stations (Stations 10, 14, 15 and 16), three new engine companies (Engines 10, 14 and 15) and a fireboat. These additions improved coverage for the Tideflats industrial area, waterways and neighborhoods in south and northeast Tacoma. Station 10 and Station 14 are currently active. Engine 15 was moved to a new location in 2007. A fireboat is still moored at the site of the original Station 16, now Station 18, built in 1929.

In the depression of the 1930s, TFD suffered layoffs and station closures, primarily in the Tideflats and old Tacoma. Despite bad times, TFD forged ahead with the construction of a fire communications center (FCC) and a new fire station, complete with the department's first drill tower. The FCC, built in 1930, is still active. The station, built in 1935, is now designated as Station 4. The drill tower has been demolished.

At the onset of World War II (WWII), the Fire Chief recommended substantial expansion. Heavy industrial growth was occurring in the Tideflats, on Center Street and along South Tacoma Way. In lieu of expansion, the department

initiated mutual aid agreements with surrounding communities. Finally, in 1948 a new fire station was constructed on the Tideflats, housing an engine and the department's fourth ladder company. This station was to augment response capability in the industrial area and residential areas of northeast Tacoma.

Population growth was rapid during the 1940s. In 1946, the City of Tacoma organized its first fire prevention bureau and adopted its first fire code. This ordinance was in part a response to the city's worst multiple fatality fire, the Maefair Apartment fire, where 22 lives were lost in February 1945.

By 1950, Tacoma had over 140,000 citizens. In 1951, a new station was constructed on the west side, near the recently rebuilt Tacoma Narrows Bridge. Station 16 is currently active at this location. Another station emerged in the Nalley Valley with an engine and plans for a fifth ladder company. This station now serves as the home for TFD's Prevention and Preparedness Bureau. TFD began responses to aid calls and established a heavy rescue company during this time period.

In the 1960s, the department moved existing companies to newly built stations. Active at the old headquarters station since 1891, Engine 6 moved to its current location near the Murray Morgan Bridge. Engine 1 and Ladder 1 moved to a new headquarters station because the floor at the old station could not support the weight of new apparatus. Engine 9 moved six blocks west to its current location on 6th Avenue. Mutual aid agreements with University Place and Gig Harbor provided additional resources for west Tacoma. Additionally, TFD opened a training center in the Tideflats area.

The 1970s brought the advent of paramedicine and the subsequent evolution of emergency medical services at TFD. Up until that time Rescue 1 provided specialized rescue capabilities from Station 8. An additional rescue company, Rescue 2, was placed in service in the Hilltop in 1974, thereby creating two paramedic staffed units. Budget problems forced the closure of a station in the Dome District.

In 1980, a new station and engine company were added in Northeast Tacoma. An additional station was built along the waterfront of Commencement Bay to house one of the newly acquired SES (surface effect ship) fireboats. The department created a hazardous materials team, staffed by the company at Station 4. In 1989, responsibility for the hazardous materials team was moved to Station 6. Rescue 3 was placed in service in the Tideflats and would soon start the transition to transport capable medic companies. Subsequent movement resulted in rescue units at Stations 8, 9 and 12.

In 1995 TFD began providing contracted services for the City of Fife/Pierce County Fire District 10 and the Town of Fircrest. This resulted in several changes. Engine 17 moved westward, from the Nalley Valley to Fircrest. Ladder

4 and Rescue 3 moved from the Tideflats station and combined with Fife's engine company (renamed Engine 12) to create a hazmat station in Fife. In addition to satisfying contractual obligations, this move maintained coverage for the Tideflats industrial area. Furthermore, the relocation of State Route 509 enhanced coverage for the I-5 corridor.

Rescue 4 was placed in service at Station 4 in 1995. Station 16 was rebuilt which resulted in the movement of a rescue unit from Station 9 to west Tacoma. Station 6, east of the Murray Morgan Bridge, cross-staffed a nearby fireboat. Staffing of the other fireboat on Commencement Bay was eliminated in 1999, a victim of city budget woes.

Responding to the need for ladder coverage in the south end, the department built a new Station 8 in 2003. Additionally, Ladder 2 moved from Station 2, after having served in that location since 1907 and Ladder 3 moved from Station 13 to Station 9. Engine 8 also moved to the new station after having served in its original location since 1894. Rescue 2 made it a three-company house, with an extra apparatus bay built for future needs. TFD established Rescue 5 at Station 11 to handle increasing workloads. In 2004 Rescue units were renamed Medic companies.

In 2007, Engine 15, a Tideflats company since 1929, was recognized as an increasingly underutilized resource as a result of the 2001 closure of the Hylebos Bridge. Concurrently, the department was experiencing coverage problems in south and east Tacoma. To mitigate those problems, TFD acquired and renovated a small house, built a detached apparatus bay and moved Engine 15 to a new location, south of Station 11 and east of Station 10. The year 2007 also marked the beginning of a partnership with neighboring agency Central Pierce Fire and Rescue (CPFR). Under the terms of this agreement, TFD and CPFR "softened" their jurisdictional borders such that the closest TFD or CPFR unit is dispatched to those portions of the service area where TFD and CPFR have a common border, regardless of in whose jurisdiction the incident is actually located. This arrangement to better serve their constituent communities is supported by joint training efforts and regular check-in/troubleshooting meetings at both the Administration and Battalion Chief levels. The partnership was furthered cemented in October 2008 when TFD began dispatching for CPFR.

Geography[2],[3]

Located along the shores of Commencement Bay in Southern Puget Sound in Pierce County, Tacoma is primarily situated on a plateau that rises approximately 400 feet up from the shoreline. The Cascade Mountains ascend to the east with Mt. Tahoma (Mt. Rainier), the city's picturesque namesake, dominating the

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[2] Tacoma-Pierce County Chamber of Commerce, Relocation Guide Tacoma Pierce County, U.S.A, 2008, p. 6

[3] Wikipedia website.March 2009.<www.en.wikipedia.org/wiki/Tacoma_Washington>

landscape. To the west, the distant spires of the Olympic Mountains emerge above the waters of the sound. Tacoma lies approximately 32 miles south of Seattle, the state's largest city, and approximately 30 miles north of Olympia, the state capital.

The diverse topography and maritime influence create weather conditions that are among the most temperate in the world. Temperatures are mild with typical summer afternoon readings in the 70s and average winter daytime temperatures in the 40s. Most of the 39 inches of annual precipitation falls as rain from October through March with some short-lived accumulations of snow. Although the Tacoma area does not encounter the severe weather conditions seen in other parts of the country, such as hurricanes and tornadoes, it does experience occasional significant rain or wind related damage from flooding, landslides and downed trees. The Tacoma area also is susceptible to other, although less frequent, natural phenomena due to the surrounding geography. These phenomena include earthquakes, volcanic activity and tsunamis which pose a higher risk for casualties to citizens and damage to buildings and infrastructure.

Infrastructure[4,5]

Interstate 5 (I-5) runs the length of the West Coast, from Canada to Mexico, passing directly through Tacoma. The following multi-lane freeways connect communities east and west to I-5:

- State Highway 16 connects Tacoma to Gig Harbor and the Olympic Peninsula via the Narrows Bridges
- The I-705 freeway spur connects downtown Tacoma to I-5
- SR-509 crosses the Port/Tideflats area into northeast Tacoma

The Union Pacific and Burlington Northern Santa Fe Railroads provide freight transportation for Tacoma and Pierce County along with more than 200 trucking firms. Amtrak operates three daily passenger trains north to Seattle and three trains south into Oregon and California, all of which depart from Tacoma. In addition, Washington State Ferries, the largest ferry system in the United States, runs daily ferry service between Point Defiance and Vashon Island.

Commencement Bay, a natural, deep water harbor, together with the presence of two intercontinental railroads and easy access to I-5 provide critical support for the Port of Tacoma, seventh largest container port in North America and an independent municipal corporation operating under state enabled legislation since 1918. The Port uses its 2,400 acres for shipping terminal activity and warehousing, distributing and manufacturing. More than 70% of the Port's international container cargo heads east via rail to major markets such as Chicago, Indianapolis, New York and Boston.

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[4]Tacoma-Pierce County Chamber of Commerce, Relocation Guide Tacoma Pierce County, U.S.A, 2008, p. 7-8

[5] Port of Tacoma U.S.A. website. March 2009.<www.portoftacoma.com>

Demographics

Tacoma is the state's third most populous city with a total population of 201,700; of which 49.7% are males and 50.3% females[6]. Tacoma's age and ethnicity distribution is shown in Tables 1 and 2, respectively. Ethnicity is based on individuals reporting one race alone. In addition, 9% of the White group reported being Hispanic and 5% reported two or more races.

Table 1 - Age Distribution[7]	
> 65	10.2 %
19 - 64	62.6 %
< 18	27.2 %
Median age	34.1

Table 2 - Ethnicity[8]	
White	74 %
Black or African American	12 %
Asian	8 %
Other	3 %
American Indian and Alaskan Native	2 %
Native Hawaiian and Other Pacific Islander	0.5 %

In 2006, Tacoma had approximately 77,000 households with an average household size of 2.5 people.

[6] Tacoma-Pierce County Chamber of Commerce, Relocation Guide Tacoma Pierce County, U.S.A, 2008, p. 6
[7] Tacoma-Pierce County Chamber of Commerce, Relocation Guide Tacoma Pierce County, U.S.A, 2008, p. 6
[8] U.S. Census Bureau, *American Communities Survey*, 2006

Table 3 shows the household type distribution with "Other non-family households" referring to households in which no one was related to the householder.

Table 3 - Household Types[9]	
Married-couple families	39%
Other families	18%
People living alone	34%
Other non-family households	9%

Economic Indicators[10]

Of the 85,000 housing units in Tacoma in 2006:

- 62% were single-unit structures
- 37% were multiple-unit structures
- 15% of the housing units were built since 1990
- Approximately 9% were vacant

Of the occupied housing units, 54% were owner occupied and 46% renter occupied. Additionally, 10% of the households did not have access to a vehicle for private use and 3% did not have access to telephone service.

Median monthly housing costs and the housing cost burden for 2006 are depicted on Tables 4 and 5, respectively.

Table 4 - Median Monthly Housing Costs	
Owners with a mortgage	$1,512
Owners without a mortgage	$ 476
Renters	$ 732

Table 5 - Housing Cost Burden[11]	
Owners with a mortgage	46%
Owners without a mortgage	13%
Renters	48%

[9] U.S. Census Bureau, *American Communities Survey*, 2006
[10] Ibid
[11] Housing cost burden is defined as percentage of housing occupants who pay 30 percent or more of income for housing.

Educational attainment[12] is shown in Table 6. Based on this information, the dropout rate is estimated at 13.1%.

Table 6 - Educational Attainment	
Bachelor's degree or higher	20.6%
High school graduates	86.9%

The 2006 estimated median household income was $51,610[13]. Poverty rates are shown in Table 7.

Table 7 - Poverty Rates[14]	
People age 65 and older	13%
Related children under 18 years	23%
All families	13%
Female head of household families	33%

The major employers in the greater Tacoma area and the number of individuals they employed are listed in Table 8.

Table 8 - Major Employers: All Sectors[15]		
Rank/Name	**Employees**	**Industry**
1. U.S. Army Fort Lewis	38,143	Defense
2. Local Public School Districts (15 total)	13,393	Education
3. U.S. Air Force McChord	11,765	Defense
4. Washington State Employees	8,007	Government
5. MultiCare Health System	5,567	Health Services
6. Franciscan Health System	4,059	Health Services
7. U.S. Army Madigan Hospital	3,647	Military Health Services
8. Pierce County	3,231	Government
9. Washington State Higher Education	2,789	Colleges
10. Safeway Stores, Inc.	2,650	Retail (Grocer)

[12] Tacoma-Pierce County Chamber of Commerce, Relocation Guide Tacoma Pierce County, U.S.A, 2008, p. 6
[13] Ibid
[14] U.S. Census Bureau, *American Communities Survey*, 2006
[15] Tacoma-Pierce County Chamber of Commerce, Relocation Guide Tacoma Pierce County, U.S.A, 2008, p. 6

Tacoma lost 7,500 jobs in 2008 and saw its unemployment rate rise from 5.2% in January 2008 to 7.1% in December 2008 to 9.1% in January 2009.[16] By comparison, the national unemployment rate, seasonally adjusted, is 7.6% and Washington State is 7.8%.

Water Supply

The fixed water supply within the Tacoma Fire Department (TFD) service area is provided by:

- Tacoma Water with a daily supply capacity in excess of 206 million gallons plus 288 million gallons of storage capacity
- The City of Fife with two municipal wells that produce 910,000 gallons per day plus 100,000 gallons stored along with two interties to the Tacoma Water system
- The City of Fircrest with 5 wells with a capacity of 5,145 GPM (gallons per minute) along with tank storage of 1.85 million gallons
- Most of District 10 is served by City of Fife water; however, the City of Milton also provides water service to a small area where it has a common border with the City of Fife and District 10

TFD maintains the following portable and/or alternate sources of water supply:

- 16 engines, each with a minimum 500 gallon capacity
- A 3,300 gallon water tender
- A fireboat capable of providing fire flow of up to 6,000 GPM

TFD also has access to additional water tenders via its mutual aid agreements and relies on State and local water supply plans that encourage adjoining water utilities to share interties (connections) for alternate sources of water.

TFD uses fire hydrants as the primary water supply source for fire suppression operations.

- The hydrants within the TFD service area are generally spaced approximately 500-700 feet on-center at street intersections along water mains installed throughout street grids
- Hydrant spacing is decreased and private hydrants are installed on-site as needed for new industrial, warehouse and other commercial structures where larger fire flow is required in accordance with the 2006 International Fire Code (IFC)
- Portable water supplies are used in the portions of District 10 not served by fire hydrants

[16] Paul Turek.Tacoma MD (Pierce County) Labor Area Summary.Washington State Employment Security Department.January 2009:Page 2-3.March 2009.<www.workforceexplorer.com>

DEPARTMENT OVERVIEW

Service Area Description

The estimated 2008 population for the entire TFD service area is 222,140[17]. The TFD service area covers nearly 72 square miles; encompassing the City of Tacoma, the City of Fife, the Town of Fircrest, Pierce County Fire District 10 (PCFD 10) and the Puyallup Tribe of Indians land. The TFD service area also consists of 44 miles of shoreline bordering 25 square miles of saltwater that includes Commencement Bay, the Thea Foss, Blair and Hylebos waterways, the Narrows and the waters off of Tacoma's Westside plus the Puyallup River. The 2008 assessed value for the TFD service area is nearly $23.9 billion[18].

TFD has contracted since 1995 to provide services to the Town of Fircrest and to PCFD 10, which includes the City of Fife. Under the terms of a 1997 tribal land settlement agreement, 2% of the Puyallup Tribe's gambling profits are earmarked to support the efforts of public safety agencies in Tacoma and Pierce County, including TFD.

Service Delivery Model

The TFD two battalion service delivery model strategically positions the department's 16 engine companies, four ladder companies and five medic companies throughout the TFD service area in a way that ensures TFD is always prepared and ready to provide the following services:

- Fire suppression
- Basic and Advanced Life Support treatment and transport of critically ill or injured patients
- Hazardous materials containment (HazMat)
- Technical rescue (Tech Rescue)
- Marine firefighting and rescue (Marine)

The positioning of TFD resources and staffing levels also is governed by geographical considerations; most notably Commencement Bay, the body of water that contributes to the Port of Tacoma's success, and the steep slopes on either side of the overall Tideflats industrial area. In addition to the challenges they present to land based companies, these geographical features also underscore the need for marine firefighting and rescue capability to further ensure adequate response timeliness and subsequent loss mitigation.

TFD's "full service" operations together with the geographical challenges of the service area have resulted in the implementation of a dual response system whereby every TFD firefighter also is a certified Emergency Medical Technician

[17] Based on yearly estimates of population prepared by the Washington State Office of Financial Management and consultation with TFD and Fire District 10 staff.
[18] Pierce County Assessor's Office: Assessed Value Levy Rates and Taxes

(EMT) or a Paramedic. In addition, every engine and ladder company and the fireboat carry not only firefighting equipment, but also medical supplies and equipment, including oxygen and automatic external defibrillators (AED) for Basic Life Support (BLS) response. In addition to TFD's five paramedic staffed, transport capable medic companies, the department also has two permanently staffed paramedic engine companies for Advanced Life Support (ALS) response; one in Fircrest and one in Northeast Tacoma. Engines 10 and 13 in the South End and the North End, respectively, have ALS capability as staffing allows. The southern planning zones are further supported by the border softening agreement with Central Pierce Fire and Rescue. BLS transport and back up ALS transport have been provided since October 2004 via an exclusive contract with Rural/Metro Ambulance Company.

TFD also has secured temporary funding for additional resources to meet emerging service demands such as:

- Support 30; an engine company put in service to mitigate response issues created by the closure of the Murray Morgan Bridge which crosses the Thea Foss Waterway into the Tideflats
- Medic 6; a peak hour medic company used to support special events and provide training coverage

Further, all of these companies must be prepared to back each other up and to quickly transition from one type of emergency to another anywhere in the service area (e.g., from an EMS call to a fire call to a marine rescue to a hazardous materials spill). If one or more of these companies is already assigned to an incident, then the next closest companies are dispatched and respond. When several companies in one part of the service area are committed to an incident, companies from other locations are moved temporarily into the area with inadequate coverage.

TFD uses its cross-staffed fireboat to respond to large and small vessels in distress, medical emergencies and evacuations, search and rescue, fire protection and environmental mitigation both on the water and for the shoreline that is within the 350-500 foot range of the fireboat's turrets. In addition, the emerging emphasis on homeland security has created another critical role for fireboats. Should the municipal water supply fail, whether as a result of a natural disaster or an act of terrorism, the fireboat serves as a floating hydrant, providing significant firefighting water to land-based fire engines.

TFD response to emergency incidents is supported by a Fire Communications Center (FCC) staffed 24/7/365 with fully trained firefighters who are certified in the State of Washington as EMTs and in emergency medical dispatch (EMD). They also have additional training and/or experience in hazardous materials, rope rescue, confined space, trench rescue, mass casualty incidents and weapons of mass destruction.

In addition to emergency response, the TFD engine and ladder companies are assigned responsibilities related to tool, equipment and station maintenance. They also enforce the fire code by conducting basic fire inspections at over 5,700 structures, as well as providing public education on fire safety and prevention to children and families. These prevention activities together with the dual response system using firefighting and EMS companies to back each other up across the service area is the method by which TFD is able to most cost effectively save both lives and property.

Community Expectations

Prior to the development of the TFD Strategic Plan in 2008, the community expectations for which TFD was accountable could be found in the City's Strategic Plan as part of its goal to achieve a "safe, clean and attractive community"[19] and are delineated in Table 9[20].

Table 9: Community Expectations[21]

Initiative	Outcome	Goal	2005 Data	2006 Data
Improve efficiency and capacity to respond to fire and emergency medical incidents	Reduced dispatch and turnout response time to emergency calls	10 percent increase from 60 percent to 70 percent in number of calls responded to within 6 minutes from time call is received by TFD dispatch to TFD arrival at incident by year 2010	EMS-63.3% Fire- 56.9%	EMS-62.5% Fire- 54.1%
	Prompt delivery of electric shock for cardiac arrest	10 percent per year increase in number of citizens trained in AED operation	4,005	4,684 17% Increase 2005 to 2006

[19] City of Tacoma Strategic Direction 2008-2012, adopted by the City Council April 22, 2008
[20] City of Tacoma Strategic Plan 2005-2010, Outcome Measures
[21] Reporting of this data was suspended in 2007 with the development of the TFD Strategic Plan and the advent of the overall accreditation self-assessment process

Table 9: Community Expectations[21]				
Initiative	**Outcome**	**Goal**	**2005 Data**	**2006 Data**
Accelerate regional efforts to prepare the City to better respond to a terrorist event	Development of a coordinated regional approach to respond to terrorist events that has been planned and practiced	70 percent of the public safety first responders will complete the Homeland Security IS700 course, Introduction to the National Incident Management System by October, 2005	411/432 343/419 320/355	Completed
		100 percent of public safety first responders participate in annual regional exercises by 2008	Department reevaluating measure	MMRS drill planned for 3rd qtr.

The TFD Strategic Plan and the performance measures delineated in it are intended to further reflect community expectations in alignment with the City of Tacoma's strategic direction. They also are intended to be integrated with the Standards of Cover (SOC) baseline and benchmark measures. The ultimate goal is to have these new strategic and SOC measures replace the measures currently in the City's Strategic Plan to ensure consistency with CFAI accreditation standards. Further documentation of TFD's ability to meet community expectations, beyond those related to the City's Strategic Plan, will be part of the response analysis detailed later in this document.

It is also important to note from a community expectation standpoint, that the emergency medical services provided by TFD personnel are a vital link in this community's health care continuum. Tacoma is the home of two tertiary care hospital systems, two Level II trauma centers (one adult, one pediatric) and a highly trained physician community. Both hospital systems have invested millions of dollars in facilities, technology and personnel to support their respective missions of meeting community expectations for the provision of quality health care. Both are major employers making significant investments in the health of this community based on clinical research and best practices, all of which presume the availability of timely pre-hospital (EMS) intervention to ensure the best outcomes for patients, most especially victims of trauma, cardiac arrest and stroke.

Inherent in this is an expectation that the department's relationship with the local hospitals extends beyond the handoff between paramedics and emergency department personnel. TFD staff members have been instrumental in building partnerships with the hospitals and other health and human services providers to address broader community issues such as:

- A Sobering Center to provide a safe place for chronic public inebriants to be cared for outside of the hospital setting, easing the burden on already overcrowded emergency departments and high workload medic companies, allowing them to use their limited resources to care for true medical emergencies

- A county-wide Divert Management plan to improve patient care by minimizing diversion of adult medical patients being transported from the field to Pierce County hospitals

- An exclusive contract with a private ambulance company to improve the quality and continuity of patient care and overall BLS transport service

Planning Zones

Traditionally, TFD has used engine zones as the basis for planning. Engine zone boundaries are determined by travel time; the distance an engine or ladder can cover in 4 minutes or less. From this point forward, the planning model for TFD has changed to align with CFAI guidelines. Subsequent risk, response and resource analysis has been done and future performance will be monitored using the new model.

Specifically, the TFD service area now is divided into two urban, nine suburban and one rural planning zone according to the CFAI criteria shown in Table 10. A planning zone map can be found in Appendix A. A listing of station addresses and assigned apparatus can be found in Appendix B. The four zones with highest overall population and density are highlighted in yellow.

Table 10: TFD Planning Zones				
Planning Zone	**Total population**	**Square miles**	**Population density per square mile**	**Zone type**
Downtown	9,199	3.5	2,652	**Urban**
Eastside	21,775	4.8	4,528	**Suburban**
Fircrest	5,903	1.6	3,625	**Suburban**
Fife/Fire District 10	7,064	7.7	917	**Rural**
North End	24,292	10.9	2,236	**Suburban**
Northeast Tacoma	16,118	4.8	3,349	**Suburban**
South Central	17,894	2.9	6,127	**Suburban**
South End	26,878	5.0	5,353	**Suburban**
South West	23,218	7.6	3,057	**Suburban**
Tideflats	727	10.6	69	**Urban**
Upper Tacoma	26,333	4.7	5,643	**Suburban**
West End	27,366	7.6	3,596	**Suburban**

The planning zones are aligned with census tracts and given names that are commonly recognized by the community at large. The contract areas, Fircrest and Fife/Fire District 10 are set up as separate zones. The Tideflats zone was deemed an Urban zone due to the high daytime worker population which is not reflected in census data and the large number of high risk structures and activities present in that zone. A final note: The population totals listed in Table 10 come from the 2000 census. When added together the total is different than the current 2008 population estimate cited earlier in the document under "Service Area Description".

Based on this new planning model, the TFD service area now can be described as an urban core adjacent to a highly developed industrial area, surrounded by suburban, primarily residential areas, with one rural contract area also in close proximity to the industrial area.

COMMUNITY RISK ASSESSMENT

The community risk assessment is divided into three categories: Fire, EMS and Non-Fire which includes HazMat, Tech Rescue and Marine. Risk definitions were developed for each category and where appropriate segmented into High, Moderate and Low. Each planning zone was assessed for the presence of risk according to those definitions.

Fire Risk Defined

Fire risk is defined as the characteristics of the community that generate fire risk persistently over time. Those characteristics are geography, threats to life safety and structures, including those with historic value and those whose loss would have great economic impact. The goal for fire risk mitigation is to keep emergencies from escalating by preventing flashover.

The first phase of the fire risk assessment undertaken by TFD involved inspecting the 5,700 commercial occupancies in the TFD service area in October 2007 to gather data such as number of employees, average exposure separation, number of floors, square footage, property value, occupancy load, construction type, fire load, available water flow and availability of sprinklers. This was accomplished by assigning all operations, training and fire prevention personnel to conduct the inspections and gather the necessary data. During that month only emergency responses and probationary training took precedence over completing these inspections.

The completed inspection worksheets were turned into a designated person at TFD Headquarters who then input the inspection data into the VISION™ system[22]. VISION™ allows departments to analyze and categorize the risks present in the community and generate an Occupancy Vulnerability Assessment Profile (OVAP) score for all occupancies. The inspection worksheets used by TFD personnel were designed to gather the data needed by the VISION™ system to calculate the OVAP score. The OVAP score is incorporated into the overall Fire risk definitions as depicted on Table 11.

[22] Emergency Reporting User Manual V16.15. Emergency Reporting™ Fire/EMS Records Management. December 11, 2008: p. 137-142. <https://secure.emergencyreporting.com/documents/user_manual.pdf>

Table 11: Fire Risk Definitions		
LOW RISK	**MODERATE RISK**	**HIGH RISK**
OVAP score ≤ 14 and/or	OVAP score 15-39 and/or	OVAP score ≥40 and/or
Required fire flow < 1,000 gpm and/or	Required fire flow < 2,000 gpm and/or	Required fire flow >3,000 gpm and/or
• Shed/outbuilding • Detached garage • Dumpster • Car/vehicle • Grass/low fuel types	• Detached single family dwelling • Mobile home • Multi-family dwelling ≤ 2 stories • Industrial/commercial structure ≤10,000 square feet • Mercantile structure ≤10,000 square feet • Apartment complex ≤25,000 square feet • Public assembly facility 300-1,000 occupancy • Wildland without urban interface • Non-mainline railroad	• Complex of multiple unsprinklered multi-family dwellings • Multi-family dwelling > 2 stories • Industrial/commercial structure > 10,000 square feet • Mercantile structure > 10,000 square feet • Single residential building > 25,000 square feet • Public assembly facility >1,000 occupancy • Wildland with urban interface • Mainline railroad/railyard/tunnel • School • Government building • Hospital • High rise building • Nursing home • Detention facility/jail • Low occupant, high fuel/hazmat load o Refinery o Chemical facility o Storage/tank farm o Warehouse o Marina • Vacant/abandoned building • Ships • Limited access roadways/structures o Freeways o Bridges • Electrical vaults/substations • Pt. Defiance Park • Pt. Defiance Zoo • Pipelines • High density, limited access o Salmon Beach o Prospect Hill

Fire Risk Analysis

The distribution of structural fire risk by planning zone is depicted in Table 12 and Appendix C. Moderate and High risk totals reflect the number of commercial and residential buildings in each planning zone. The top 4 zones for number of moderate and high risk structures are highlighted in yellow. Low risk totals reflect 2008 incident numbers rather than structures since by definition low risk fires either are not structures or are structures that cannot be easily accounted for such as dumpsters, sheds and outbuildings.

Table 12: Structural Fire Risk Distribution

Planning Zone	Low Risk	Moderate Risk	High Risk	Zone Total
Downtown	67	1,108	439	1,614
Eastside	102	6,453	60	6,615
Fircrest	3	2,274	10	2,287
Fife/Fire District 10	66	2,604	139	2,809
North End	74	9,262	86	9,422
Northeast Tacoma	32	5,501	31	5,564
South Central	74	6,344	60	6,478
South End	82	8,923	95	9,100
South West	138	6,875	407	7,420
Tideflats	55	520	256	831
Upper Tacoma	76	8,223	242	8,541
West End	78	7,338	185	7,601
Totals	847	65,425	2,010	68,282

An analysis of the information in Table 12 and Appendix C led to the following observations and conclusions regarding structural fire risk distribution:

Observations	
High Risk	**Moderate Risk**
• The distribution of high risk structures follows the historical railway lines through the Nalley Valley with the most dense distribution Downtown and along South Tacoma Way and Pacific Avenue • Downtown high risk structures are mostly high rises, schools, hospitals and government buildings • There is a high risk heavy industry corridor that runs from the Tideflats planning zone into the Southwest planning zone • There is a concentration of high risk structures, mostly commercial and multi-	• The highest density of moderate risk occurs in the North End, South End, Upper Tacoma and West End planning zones o Distribution is further off the main transportation routes • The Tideflats planning zone has a lower density of moderate risk, mostly in the form of smaller commercial structures and some residential structures along Marine View Drive • Most of the NE Tacoma planning zone has a high density of primarily residential moderate risk structures

Observations	
High Risk	**Moderate Risk**

family, that follow the I-5 corridor through the Southwest and South planning zones
• There is an emerging density of high risk structures in the Fife/District 10 planning zone which is attributed to:
  o Construction of new warehouse with easy freeway access
  o Presence of several multi-family residences
• In the North End, West End, Upper Tacoma and Downtown planning zones high risk density is attributed to the presence of large commercial, retail and/or non-industrial structures, multi-family residences, schools and professional buildings
• The high risk in the South End, Tideflats, Fife/ Fire District 10 planning zones is industrial
• In the South End planning zone high risk also is centered along Pacific Avenue which has a prevalence of large retail and commercial structures as well as multi-family residences
• High risk in the NE Tacoma planning zone is related to the presence of schools and multi-family residences
• The lowest concentration of high risk structures is in the NE Tacoma and far North End planning zones	

Conclusions	
High Risk	**Moderate Risk**

• The distribution of high risk of heavy industry and large commercial/retail structures follows main transport corridors, mostly railways and interstate or state routes
• High risk large commercial, retail and multi-family structures are mostly located near a major arterial or highway or near downtown
• The high risk density in the Fife/Fire District 10 planning zone is attributable to its proximity to the expanding Port of Tacoma
• Trend to watch in Upper Tacoma, South End, Eastside and Downtown planning zones:
  o Increasing vertical density in areas where older, single family homes are being replaced by newer, multi-family structures which may or may not be sprinklered
• Emerging risk:
  o Point Ruston: 800-900 residential units; combined single family, multi-family and high rise in an area that lies partly in the TFD service area and partly outside of it in Ruston
  o Ruston has a volunteer fire department that currently does not have the resources to respond to the new development and no agreement other than mutual aid exists for TFD to respond outside of its service area
  o Continuing Port of Tacoma expansion carries with it the additional risk of decreased road access through the Tideflats planning zone
	• Two planning zones have emerging areas of high density moderate risk
	  o Fife/Fire District 10 with significant development of single family homes in proximity to the high risk Tideflats planning zone
	  o NE Tacoma if the transition from golf course to housing development occurs

In addition, the following types of risk were identified and located in each planning zone:

- Routine fire risk -- Hazards most common to the planning zone
- Maximum or worst fire risk -- Hazards that require the maximum amount of fire protection resources or that would result in the greatest loss of life or property
- Special fire risk -- Hazards which if destroyed would be a critical or essential economic loss to the community; could also include cultural, environmental and historical loss

- Remote or isolated fire risk -- Hazards most distant from other hazards as to be almost unique to the planning zone; or other locally adopted equivalencies

The zone by zone fire risk analysis based on both structural risk distribution and the identification of routine, maximum, special and remote risk is detailed in Table 13.

Table 13: Fire Risk

Zone	Maximum/ Worst Risk	Special Risk	Remote/ Isolated Risk	Risk Analysis
Downtown **Routine Risk** • Condos and high rise buildings • Single family residential • Marinas and docks • Com-mercial and industrial structures • Vacant buildings	• Concentration of high density unsprinklered condos and high rise buildings • Marinas and docks (west side of Foss Waterway) • Low rise sprawling complexes • Large unsprinklered vacant buildings • Concentration of high value older, historic homes along Yakima Ave, going into Old Town • Hotels	• 3 hospitals • Museums • Government buildings • UW Tacoma • Convention Center • Jail • Historic Stadium High School • Theater district • Landmark Convention Center • Grain elevator • Railroad • Electrical vaults • Fire Communications Center • SR 509 • I- 705 • Qwest switch • Historic buildings • Bates Voc Tech		• Highest concentration of high risk structures in the entire TFD service area • High value historic homes have access limited by narrow roads, hilly topography • Several large assembly facilities in older buildings • Presence of critical infrastructure; all of which require high fire flow -- utilities, transportation, health care, public safety • No water on elevated roadways (SR 509 and I-705) • Large vacant buildings present life safety and/or exposure risk to surrounding structures

Table 13: Fire Risk				
Zone	**Maximum/ Worst Risk**	**Special Risk**	**Remote/ Isolated Risk**	**Risk Analysis**
Eastside **Routine Risk** • Single family residential • Multi-family residential • Com-mercial structures	• High density of older residential structures • High assembly occupant load tent at Emerald Queen Casino • Champion Center • Older, unsprinklered commercial corridor • Older, unsprinklered multi-family residences • Retirement/ nursing homes • Tribal Clinic	• Buddhist Temple • Emerald Queen Casino • Schools • Railroad	• Wildland/ urban interface--- gulley with limited access • Railroad runs through gulley • Tribal land	• High density population overall • Significant population for whom English is a second language; impacts problem identification and prevention efforts • Topography challenges create access issues • Tribal land is unregulated from fireworks code enforcement perspective
Fircrest **Routine Risk** • Single family residential • Multi-family residential • Com-mercial structures	• Light commercial development along So. 19th and Regents Blvd. • Some multi-family residential	• Schools • Government buildings		• Primarily single family residential; not too densely populated • Highest risk concentrated along major corridors - So. 19th, Regents Blvd.

Table 13: Fire Risk				
Zone	**Maximum/ Worst Risk**	**Special Risk**	**Remote/ Isolated Risk**	**Risk Analysis**
Fife/Fire District 10 **Routine Risk** • Single family residential • Multi-family residential • Com-mercial and industrial structures	• Older, unsprinklered hotels/motels • Multi-family residential complexes; most unsprinklered • Large warehouses • Bulk oxygen producing plant • Multiple casinos • World Trade Center; multi-story building • Olympic pipeline into Tideflats • Commercial corridor • Manufacturing • Stacked container yard	• I-5 • Hwy. 99 • Railroad • Poodle Dog (historic restaurant) • Business corridor along Hwy 99 and 20th St. E. • Schools • Government buildings	• Fife Heights • Wildland/ urban interface • Rural residential development • Tribal land	• Lower population density overall • Long response times due to topography (Fife Heights) and/or remoteness • Water supply challenges • Higher flood risk area • Rural residential developments have hundreds of homes with limited access; hard to get apparatus into them AND close spacing; essentially rowhouses from a firefighting perspective • Concentrated business district; huge economic impact • Tribal land is unregulated from a building and fireworks code enforcement perspective

Table 13: Fire Risk				
Zone	**Maximum/ Worst Risk**	**Special Risk**	**Remote/ Isolated Risk**	**Risk Analysis**
North End **Routine Risk** • Single family residential • Com-mercial structures • Marinas and docks • Wildland/ urban interface	• Marinas • Nursing homes and retirement communities • Concentration of older, unsprinklered commercial buildings along 6th Ave, waterfront, Old Town, Proctor • Prospect Hill • In the glide path for McChord AFB • Hotel	• Point Defiance Park and Zoo • Old Town • University of Puget Sound • Schools • Ferry dock • Railroad along waterfront • Railroad tunnel • Designated historic homes	• Ruston • Salmon Beach • Yacht Club • Multiple points of wildland/ urban interface (gulches, hillsides)	• High concentration of cultural and historical structures • High concentration of high value and/or historic homes • Topographical challenges; high value homes built on hillsides and/or narrow streets that limit access, some too steep for ladder access • 84 homes on Salmon Beach accessible only by two sets of 200+ step staircases, a dirt path or the water • Ruston unincorporated, developing rapidly and heavily dependent on mutual aid with limited ability to reciprocate • Limited access to wildland/urban interface areas

Table 13: Fire Risk				
Zone	**Maximum/ Worst Risk**	**Special Risk**	**Remote/ Isolated Risk**	**Risk Analysis**
Northeast Tacoma **Routine Risk** • Single family residential • Multi-family residential • Com-mercial structures	• Unsprinklered multi-family residential structures • Centre at Norpoint • Small commercial development • Ashley House; long-term care for critically ill children • Concentration of high value, single family homes	• Centre at Norpoint • Ashley House; long-term care for critically ill children • Schools	• Wildland/ urban interface • Tribal land	• Bedroom community with irregular street grid; not the usual numbering system; makes it hard to locate incident sites, particularly for additional responding units • Most remote from City Center; access challenged by Port development • Delayed response beyond the first in company • Tribal land is unregulated from a fireworks code enforcement perspective • Concentration of high value hillside houses with limited access in slide prone area

Table 13: Fire Risk				
Zone	**Maximum/ Worst Risk**	**Special Risk**	**Remote/ Isolated Risk**	**Risk Analysis**
South Central **Routine Risk** • Single family residential • Multi-family residential • Com-mercial structures	• Concentration of high density residential • Commercial corridor along Pacific Ave., So. 38th • Some high rise	• Government buildings • I-5 • Railroad	• Wildland/ urban interface - gulley along eastern border	• I-5 has limited access and water supply, tanker hazards • High concentration of high density residential structures • Railroad has grade issues in this zone; brakes cause sparks which cause fire in dry season • Limited access to wildland/urban interface areas
South End **Routine Risk** • Single family residential • Multi-family residential • Com-mercial structures	• Commercial corridor with older construction along Pacific Ave, South Hosmer • High density, older single and unsprinklered multi-family residential • Nursing homes • Large vacant buildings		• Wildland/ urban interface along southern edge of zone	• Limited access to wildland/urban interface areas • High concentration of older commercial and residential

Table 13: Fire Risk				
Zone	**Maximum/ Worst Risk**	**Special Risk**	**Remote/ Isolated Risk**	**Risk Analysis**
Southwest **Routine Risk** • Single family residential • Multi-family residential • Com-mercial and industrial structures • Mercantile structures	• Tacoma Mall • High density multi-family residential • Industrial and old retail structures along South Tacoma Way, through the Nalley Valley • General Plastics • Unsprinklered large vacant or storage buildings • In the glide path for McChord AFB	• Tacoma Mall • Schools • Public Safety buildings • Government buildings • Tacoma Public Utilities building • Railroad • Bates Voc-Tech • I-5 • Java Jive (historic restaurant)	• Wildland/ urban interface - So. 35th to So. 56th and So. Tyler to South Tacoma Way	• Second highest concentration of high risk structures; follow Nalley Valley and South Tacoma Way • Concentration of critical infrastructure -- public safety, government, transportation, utilities • I-5 has limited access and water supply, tanker hazards • Some high density residential; multi-family residential has limited access • Large vacant/storage buildings present life safety and/or exposure risk to surrounding structures • Limited access to wildland/urban interface areas

Table 13: Fire Risk				
Zone	**Maximum/ Worst Risk**	**Special Risk**	**Remote/ Isolated Risk**	**Risk Analysis**
Tideflats **Routine Risk** • Commercial and industrial structures • Piers/docks • Shipyards • Manufacturing structures	• Refineries • Piers/Docks • Marinas • Storage warehouses • Casino • Hotels • Shipyards • Industrial structures • Tank farm supplied by Olympic fuel pipeline from refineries • Pipeline from US Oil to McChord • Pipeline from Blair Waterway to US Oil • Older unsprinklered commercial structures along Puyallup Ave. • Stacked container and log yards • Indoor stacked boat storage • Low rise sprawling complexes • Manufacturing structures • Material reclamation yards • Pile of bark at SR 509 and Alexander	• Railroad, including commuter line • Tacoma Dome • Port of Tacoma • Detention facility	• Wildland/ urban interface along Marine View Drive	• Third highest concentration of high risk structures • Access to area limited by waterways, rail lines and failing bridge infrastructure • Low residential population but high daytime worker population • High concentration of large unsprinklered buildings/yards with high fire load • Dependent on private hydrants for water supply at the end of some waterways • Access to wildland/urban interface areas limited by topography; area is prone to landslides • Presence of pipelines increases risk of conflagration • Hard to shut off pipeline quickly so risk to environment is increased • Presence of gas with decreased ability to detect ignition source

Table 13: Fire Risk				
Zone	**Maximum/ Worst Risk**	**Special Risk**	**Remote/ Isolated Risk**	**Risk Analysis**
Tideflats (continued)				also increases fire risk • Potential for huge economic impact • Marinas in fairly remote location so land response is longer; not quickly or easily accessible by water routes either • Decreased water supply and presence of derelict vessels also increases fire risk
Upper Tacoma **Routine Risk** • Single family residential • Multi-family residential • Com-mercial structures	• Older, unsprinklered commercial development along Union Ave, 6th Ave • Several older, unsprinklered residential high rise buildings • High density of older residential structures • Life Center; church, school, residential • Annie Wright; residential school • Concentration of high value older homes • In the glide path for McChord AFB • Cheney Stadium	• Cheney Stadium • Elks Lodge • Historic homes • Annie Wright School • Allenmore Hospital • Schools		• Higher concentration of schools • Life Center primary residential structures unsprinklered • Higher concentration of older construction multi-family residential; many unsprinklered • Concentration of high value older and/or historic homes with limited access ("pie" between Division and 6th Avenue)

Table 13: Fire Risk				
Zone	**Maximum/ Worst Risk**	**Special Risk**	**Remote/ Isolated Risk**	**Risk Analysis**
West End **Routine Risk** • Single family residential • Multi-family residential • Com-mercial structures	• Several nursing homes and retirement communities • Marina • Several older, unsprinklered multi-family units • Commercial development • Juvenile detention facility • High value homes • Narrows Bridges	• Narrows Bridges • Schools • Tacoma Community College • Railroad along shoreline	• Westridge • Wildland/ urban interface-- hillside along shoreline	• Risk dispersed overall; highest concentration along major arterials - Pearl St., 6th Ave. • Concentration of high value homes overlooking water • Narrows Bridges are critical transportation and economic infrastructure; increased fire risk due to no water supply on the old bridge • Westridge -- limited access, concentration of older, unsprinklered multi-family residences • 1 ladder has good access; 2nd ladder delayed response due to distance -- increases risk for commercial response • Fireboat response for marinas, wildland/urban interface also delayed due to distance and potentially to staffing • Limited access to wildland/urban interface areas

Tables 14, 15 and 16 show the number of high, moderate and low risk fires, respectively, by year by planning zone. The top 4 zones are highlighted in yellow.

Table 14: Frequency - High Risk Fires

Zone	2003	2004	2005	2006	2007	2008	Zone total
Downtown	28	12	9	17	21	25	112
Eastside	1	4	4	0	1	1	11
Fircrest	1	0	0	0	1	0	2
Fife/Fire District 10	3	5	3	6	9	3	29
North End	2	1	2	0	0	2	7
Northeast Tacoma	1	4	0	1	1	4	11
South Central	3	3	2	3	6	2	19
South End	5	2	2	4	2	1	16
South West	11	9	9	13	14	7	63
Tideflats	3	17	14	16	12	16	78
Upper Tacoma	4	5	7	4	5	6	31
West End	2	3	3	3	3	2	16
Annual total	64	65	55	67	75	69	395

Table 15: Frequency - Moderate Risk Fires

Zone	2003	2004	2005	2006	2007	2008	Zone total
Downtown	26	20	17	32	23	19	137
Eastside	47	47	36	42	44	43	259
Fircrest	6	6	5	4	3	7	31
Fife/Fire District 10	8	10	8	8	18	11	63
North End	22	24	16	17	29	22	130
Northeast Tacoma	12	13	5	18	10	3	61
South Central	35	39	40	42	37	36	229
South End	38	41	37	34	43	52	245
South West	54	41	52	56	48	35	286
Tideflats	0	5	5	2	4	9	25
Upper Tacoma	48	66	33	51	38	53	289
West End	35	26	31	21	22	29	164
Annual total	331	338	285	327	319	319	1,919

Table 16: Frequency - Low Risk Fires							
Zone	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**Zone total**
Downtown	85	47	81	99	69	67	448
Eastside	143	119	119	132	109	102	724
Fircrest	10	3	9	9	6	3	40
Fife/Fire District 10	62	63	46	61	58	66	356
North End	65	54	51	52	51	74	347
Northeast Tacoma	55	35	45	57	41	32	265
South Central	87	85	80	86	87	74	499
South End	109	107	98	146	89	82	631
South West	177	157	162	210	152	138	996
Tideflats	106	62	42	51	49	55	365
Upper Tacoma	105	90	99	129	89	76	588
West End	98	77	74	85	55	78	467
Annual total	1,102	899	906	1,117	855	847	5,726

Overall analysis of Fire risk was conducted according to the following criteria:

- Population
- Number of moderate (M) and high (H) risk structures
- Number of low (L), moderate (M) and high (H) risk fires
- Presence of--
    - Geographical and/or access issues (G/A)
    - Wildland/urban interface (W/U)
    - Critical infrastructure (CI) -- utilities, transportation, health, education, government
    - Heavy industry (IND)
    - Potential for significant economic impact (EI)
    - Historical/cultural value (HV)

The zone-by-zone Fire risk analysis based on the above criteria is shown in Table 17. The top 4 zones for number of structures and fires and/or presence of one of the other criteria are highlighted in yellow.

Table 17: Zone-by-Zone Fire Risk Analysis

Zone		Structures		Fires			Presence of					
	Pop. Total/ Density	M	H	L	M	H	G/A	W/U	CI	IND	EI	HV
Downtown	9,199/ 2,652	1,108	439	448	137	112	yes	no	yes	no	yes	yes
Eastside	21,775/ 4,528	6,453	60	724	259	11	yes	yes	yes	no	yes	yes
Fircrest	5,903/ 3,625	2,274	10	40	31	2	no	no	yes	no	yes	no
Fife/Fire District 10	7,064/ 917	2,604	139	356	63	29	yes	yes	yes	yes	yes	no
North End	24,292/ 2,236	9,262	86	347	130	7	yes	yes	yes	no	yes	yes
Northeast Tacoma	16,118/ 3,349	5,501	31	265	61	11	yes	yes	yes	no	no	no
South Central	17,894/ 6,127	6,344	60	499	229	19	yes	yes	yes	no	yes	no
South End	26,878/ 5,353	8,923	95	631	245	16	yes	yes	no	no	no	no
South West	23,218/ 3,057	6,875	407	996	286	63	yes	yes	yes	yes	yes	no
Tideflats	727/ 69	520	256	365	25	78	yes	yes	yes	yes	yes	no
Upper Tacoma	26,333/ 5,643	8,223	242	588	289	31	yes	no	yes	no	yes	yes
West End	27,366/ 3,596	7,338	185	467	164	16	yes	yes	yes	no	yes	no

Based on all of the preceding information, the following conclusions can be drawn regarding Fire risk in the TFD service area:

- Planning zones with the highest overall Fire risk
  - South West
  - Upper Tacoma
- Planning zones with highest Fire risk based on presence of high risk structures and incidence of high risk fires
  - Tideflats - also has 5 of 6 other risk indicators
  - Downtown - also has 4 of 6 other risk indicators
- Eastside also high Fire risk based on total number of fires plus presence of 5 of 6 other risk indicators
- South End also high Fire risk based on population plus presence of moderate risk structures and incidence of moderate risk fires

- Areas to monitor for increasing fire risk based on number of incidents and/or presence of other risk factors
    - South Central
    - West End
    - Fife/Fire District 10
- Planning zones with lowest Fire risk
    - Fircrest - has 2 of 6 other risk indicators
    - NE Tacoma - has 3 of 6 other risk indicators

EMS Risk Defined

EMS risk is defined as the correlation between the frequency of high acuity medical conditions and community characteristics to determine the need for shorter times to treatment. The goal for EMS risk mitigation is to intervene before damage from the medical condition or traumatic injury becomes irreversible and to decrease the risk of mortality.

The high acuity medical conditions considered for this community are:

- Cardiac
- Respiratory
- Stroke
- Trauma
- Diabetes

The characteristics considered for this community are:

- Age of population
- Population density (multi-story, multi-family)
- Per capita frequency

EMS Risk Analysis

The frequency of EMS risk by planning zone by year is depicted in Table 18 for all EMS incidents and Table 19 for high acuity incidents. Table 20 shows the frequency of high acuity incidents by condition by zone. The top 4 zones for EMS frequency are highlighted in yellow on each table, although it should be noted that in some instances the difference between the third and fourth highest frequency zones is only a few incidents; even as little as one. The distribution of EMS risk by planning is shown on Appendix D for all EMS incidents and Appendix E for high acuity EMS incidents.

Table 18: EMS Risk Frequency - All Incidents							
Zone	2003	2004	2005	2006	2007	2008	Zone total
Downtown	2,870	3,050	2,927	3,015	3,278	3,331	18,471
Eastside	2,050	2,431	2,645	2,644	2,581	2,573	14,924
Fircrest	372	325	309	373	354	449	2,182
Fife/Fire District 10	861	910	1,132	1,141	1,213	1,274	6,531
North End	1,698	1,559	1,671	1,549	1,669	1,674	9,820
Northeast Tacoma	460	518	470	576	597	628	3,249
South Central	1,719	1,862	1,909	1,919	2,042	2,152	11,603
South End	2,235	2,353	2,475	2,759	2,861	3,110	15,793
South West	2,630	2,840	2,960	3,096	3,131	3,283	17,940
Tideflats	601	652	597	635	545	566	3,596
Upper Tacoma	2,625	2,463	2,818	2,917	3,116	3,119	17,058
West End	2,689	2,781	3,033	2,857	3,136	3,229	17,725
Annual total	20,810	21,744	22,946	23,481	24,523	25,388	138,892

Table 19: EMS Risk Frequency - High Acuity Incidents							
Zone	2003	2004	2005	2006	2007	2008	Zone total
Downtown	586	606	591	654	676	582	3,695
Eastside	414	530	576	581	493	429	3,023
Fircrest	96	79	83	66	95	76	495
Fife/Fire District 10	148	189	176	175	207	174	1,069
North End	363	319	333	279	285	276	1,855
Northeast Tacoma	113	112	109	117	97	116	664
South Central	312	374	390	363	353	390	2,182
South End	452	511	574	576	566	514	3,193
South West	490	531	503	580	560	545	3,209
Tideflats	103	121	110	94	91	92	611
Upper Tacoma	541	488	539	578	586	554	3,286
West End	626	647	670	648	631	462	3,684
Annual total	4,244	4,507	4,654	4,711	4,640	4,210	26,966

Table 20: EMS Risk Frequency - High Acuity Incidents 2003-2008						
Zone	**Cardiac**	**Respiratory**	**Stroke**	**Trauma**	**Diabetes**	**Zone total**
Downtown	1,090	1,090	1,184	237	94	3,695
Eastside	860	1,067	691	226	179	3,023
Fircrest	161	191	97	14	32	495
Fife/Fire District 10	317	321	265	118	48	1,069
North End	601	600	455	94	105	1,855
Northeast Tacoma	242	204	133	46	39	664
South Central	656	701	533	154	138	2,182
South End	999	1,189	652	218	135	3,193
South West	853	1,097	784	298	177	3,209
Tideflats	216	116	132	135	12	611
Upper Tacoma	961	1,144	826	184	171	3,286
West End	1,245	1,337	785	127	190	3,684
Total	8,201	9,057	6,537	1,851	1,320	26,966

Some additional trends can be observed by breaking down high acuity incidents by planning zone and year as shown in Table 21. The top 3 zones by highest frequency are listed for each high acuity condition. There may be more than 3 zones listed if the zones have the same or a very close frequency rate. The year(s) that each planning was first, second, third or fourth in frequency is color coded as listed. Zones not listed did not make the top four in frequency for any condition in any year.

Table 21: EMS Risk Frequency - High Acuity Incidents by Year					
	1st 2nd 3rd 4th				
Zone	Cardiac	Respiratory	Stroke	Trauma	Diabetes
Downtown	2003 2004 2005 2006 2007 2008	2003 2004 2005 2006	2003 2004 2005 2006 2007 2008	2003 2004 2005 2006 2007 2008	2003
Eastside	2005	2004 2005 2006 2008	2004 2005	2003 2004 2005 2006 2007	2004 2005 2006 2007 2008
South End	2003 2004 2005 2006 2007 2008	2003 2004 2005 2006 2007 2008	2006 2007 2008	2004 2005 2006 2007 2008	2007
South West	2004	2007 2008	2003 2004 2005 2006 2007 2008	2003 2004 2005 2006 2007 2008	2003 2004 2006 2007 2008
Upper Tacoma	2003 2006 2007 2008	2003 2007 2008	2003 2006 2007 2008	2003	2003 2004 2005 2006
West End	2003 2004 2005 2006 2007 2008	2003 2004 2005 2006 2007	2003 2004 2005		2003 2004 2005 2006 2007 2008

The population age breakdown for each planning zone, by total and by percentage, is detailed in Table 22. The totals in each planning zone are based on 2000 census data. The top 4 zones by concentration of age by total are highlighted in yellow and by percentage are highlighted in pink.

Table 22: Population Age Groups												
Zone	Age 0-4		Age 5-17		Age 18-24		Age 25-49		Age 50-64		Age 65 and up	
Downtown	409	4.4%	803	8.7%	1,195	13.0%	4,434	48.2%	1,158	12.6%	1,200	13.0%
Eastside	1,789	8.2%	5,564	25.6%	1,956	9.0%	7,800	35.8%	2,708	12.4%	1,958	9.0%
Fircrest	303	5.1%	1,059	17.9%	325	5.5%	1,999	33.9%	1,016	17.2%	1,201	20.3%
Fife/Fire District 10	554	7.8%	1,208	17.1%	882	12.5%	2,842	40.2%	973	13.8%	605	8.6%
North End	1,287	5.3%	3,577	14.7%	3,757	15.5%	9,069	37.3%	3,636	15.0%	2,966	12.2%
Northeast Tacoma	1,315	8.2%	3,368	20.9%	1,005	6.2%	7,152	44.4%	2,337	14.5%	941	5.8%
South Central	1,403	7.8%	3,757	21.0%	1,602	9.0%	7,171	40.1%	2,222	12.4%	1,739	9.7%
South End	2,015	7.5%	5,388	20.0%	2,595	9.7%	9,919	36.9%	3,582	13.3%	3,379	12.6%
South West	2,123	9.1%	4,552	19.6%	2,843	12.2%	8,989	38.7%	2,521	10.9%	2,190	9.4%
Tideflats	1	0.1%	58	8.0%	172	23.7%	373	51.3%	108	14.9%	15	2.1%
Upper Tacoma	1,792	6.8%	4,906	18.6%	2,453	9.3%	10,304	39.1%	3,361	12.8%	3,517	13.4%
West End	1,461	5.3%	4,349	15.9%	2,613	9.5%	9,536	34.8%	4,271	15.6%	5,136	18.8%
Population totals	14,452	7.0%	38,589	18.7%	21,398	10.3%	79,588	38.5%	27,893	13.5%	24,847	12.0%

EMS frequency per 1,000 population by planning zone is shown in Table 23 for all EMS incidents and Table 24 for high acuity incidents. The top 4 zones for frequency per 1,000 population are highlighted in yellow on each table.

Table 23: EMS Risk Frequency per 1,000 Population - All Incidents							
Zone	2003	2004	2005	2006	2007	2008	Zone total
Downtown	312	332	318	328	356	362	2,008
Eastside	94	112	121	121	119	118	685
Fircrest	63	55	52	63	60	76	369
Fife/ Fire District 10	122	129	160	161	172	180	924
North End	70	64	69	64	69	69	405
Northeast Tacoma	29	32	29	36	37	39	202
South Central	96	104	107	107	114	120	648
South End	83	87	92	103	106	116	587
South West	113	122	127	133	135	141	771
Tideflats	827	897	821	873	750	778	4,946
Upper Tacoma	100	94	107	111	118	118	648
West End	98	102	111	104	115	118	648
Risk total	101	105	111	114	119	123	673

Table 24: EMS Risk Frequency per 1,000 Population - High Acuity Incidents 2003-2008						
Zone	**Cardiac**	**Respiratory**	**Stroke**	**Trauma**	**Diabetes**	**Zone total**
Downtown	118	118	129	26	10	401
Eastside	39	49	32	10	8	138
Fircrest	27	32	16	2	5	82
Fife/Fire District 10	45	45	38	17	7	152
North End	25	25	19	4	4	77
Northeast Tacoma	15	13	8	3	2	41
South Central	37	39	30	9	8	123
South End	37	44	24	8	5	118
South West	37	47	34	13	8	139
Tideflats	297	160	182	186	1	842
Upper Tacoma	36	43	31	7	6	123
West End	45	49	29	5	7	135
Risk total	40	44	32	9	6	131

Analysis of EMS risk was conducted according to the following criteria:

- Population
- Percentage of population over age 50
- High frequency -- all EMS, high acuity conditions
- Frequency per 1,000 population -- all EMS, high acuity conditions
- Consistent and emerging trends

The zone-by-zone EMS risk analysis based on the above criteria is shown in Table 25. The zones with a top 4 ranking in a given category are highlighted in yellow. The percentages show the cumulative total share of EMS demand per zone over the six year period from 2003-2008. Zone-by-zone trends are captured on Table 26. Zones not listed had no significant EMS risk trends to note at this time.

Table 25: Zone-by-Zone EMS Risk Analysis									
Zone	Pop. total	Pop. den-sity	% Age 50+	High frequency - all EMS		High frequency - high acuity		Fre-quency/ 1,000 - all calls	Fre-quency/ 1,000- high acuity
Downtown	9,199	2,652	25.6	18,471	13.3%	3,695	13.7%	2,008	401
Eastside	21,775	4,528	21.4	14,924	10.7%	3,023	11.2%	685	138
Fircrest	5,903	3,625	37.5	2,182	1.6%	495	1.8%	369	82
Fife/Fire District 10	7,064	917	22.4	6,531	4.7%	1,069	4.0%	924	152
North End	24,292	2,236	27.2	9,820	7.1%	1,855	6.9%	405	77
Northeast Tacoma	16,118	3,349	20.3	3,249	2.3%	664	2.5%	202	41
South Central	17,894	6,127	22.1	11,603	8.7%	2,182	8.1%	648	123
South End	26,878	5,353	25.9	15,793	11.4%	3,193	11.8%	587	118
South West	23,218	3,057	20.3	17,940	12.9%	3,209	11.9%	771	139
Tideflats	727	69	17.0	3,596	2.6%	611	2.3%	4,946	842
Upper Tacoma	26,333	5,643	26.2	17,058	12.3%	3,286	12.2%	648	123
West End	27,366	3,596	34.4	17,725	12.8%	3,684	13.7%	648	135

Table 26: Zone-by-Zone EMS Trends	
Zone	Trends
Downtown	>Consistent #1 ranking all 6 years for high frequency -- all EMS >#1 in stroke all 6 years >Top 4 for trauma and diabetes 5 of 6 years >Top 4 for respiratory 4 of 6 years >#2 for overall frequency per 1,000 for high acuity conditions all 6 years >Almost triple the total frequency per 1,000 for cardiac and trauma >More than 2.5 times the total frequency per 1,000 for respiratory >4 times the total frequency per 1,000 for stroke >More than 1.5 times the total frequency per 1,000 for diabetes
Eastside	>Top 4 for trauma and diabetes 5 of 6 years >Top 4 for respiratory 4 of 6 years >Top 4 for frequency per 1,000 for respiratory and diabetes

Table 26: Zone-by-Zone EMS Trends	
Zone	**Trends**
Fife/Fire District 10	>Consistent #3 rank for overall frequency per 1,000 for high acuity conditions all 6 years >Top 4 for frequency per 1,000 for cardiac, stroke and trauma >Almost double the total frequency per 1,000 for trauma
South Central	>Top 4 for frequency per 1,000 for diabetes
South End	>Top 4 for cardiac, respiratory all 6 years >Top 4 for trauma 5 of 6 years >Emerging trend: top 4 for overall frequency of high acuity in 2007, 2008
South West	>Consistent top 4 ranking all 6 years for high frequency -- all EMS >Top 4 for stroke, trauma all 6 years >#1 for trauma last 3 years >#2 for diabetes 5 of 6 years >Consistent #4 rank for overall frequency per 1,000 for high acuity conditions all 6 years >Top 4 for frequency per 1,000 for stroke, trauma and diabetes >Emerging trend: top 4 for overall frequency of high acuity in 2006, 2008
Tideflats	>Consistent #1 rank for overall frequency per 1,000 for high acuity conditions all 6 years >Over 7 times the total frequency per 1,000 for cardiac >Over 3.5 times the total frequency per 1,000 for respiratory >Over 5.5 times the total frequency per 1,000 for stroke >Over 20 times the total frequency per 1,000 for trauma
Upper Tacoma	>Consistent top 4 ranking all 6 years for high frequency -- all EMS >Top 4 for cardiac, stroke and diabetes 4 of 6 years >Emerging trend: top 4 for overall frequency of high acuity in 2007, 2008
West End	>Consistent top 4 ranking all 6 years for high frequency -- all EMS >#1 for stroke 5 of 6 years >#1 for cardiac 5 of 6 years; #2 the other year >#1 for diabetes 3 of 6 years; top 4 the other 3 years >Top 4 for frequency per 1,000 for cardiac and respiratory

Based on all of the preceding information, the following conclusions can be drawn regarding EMS risk in the TFD service area:

- Overall EMS demand is increasing annually; 22% since 2003
- High acuity EMS demand decreased in 2008 after increasing annually from 2003-2006 followed by a plateau in 2007; probably too soon to tell if this will be a consistent downward trend over time
- Cardiac, stroke and respiratory conditions are consistently the 3 most frequent high acuity conditions in every planning zone with the exception of the Tideflats where trauma replaces respiratory in the top 3 for that zone
- Difficult to correlate age and/or population with EMS risk except in the Upper Tacoma and West End planning zones
- Planning zones with lowest EMS risk are Fircrest, North End and NE Tacoma
- Planning zones with highest **consistent** EMS risk over time based on overall frequency and frequency per 1,000 population:
    - Downtown
    - West End
- Planning zones with high EMS risk based on frequency per 1,000 of high acuity conditions
    - Tideflats (cardiac, stroke, respiratory, trauma)
    - Fife/Fire District 10 (cardiac, stroke, trauma)
    - Eastside (respiratory, diabetes)
    - South West (stroke, trauma, diabetes)
- Of special significance, even with lower total population and population density:
    - Tideflats high acuity frequency per 1,000 is--
        - 20 times higher for trauma overall
        - More than 7 times higher for cardiac overall
        - More than 5 times higher for stroke overall
        - More than 3 times higher for respiratory overall
    - Downtown high acuity frequency per 1,000 is--
        - 4 times higher for stroke overall
        - Almost 3 times higher for cardiac and trauma overall
        - More than double the rate for respiratory overall
- Higher frequency per 1,000 population in the Downtown and Tideflats planning zones can be attributed, at least partially, to the presence of a higher daytime worker population

- Planning zones to watch for emerging EMS risk based on their top 4 ranking for overall frequency of high acuity conditions
    - South End (top 4 in 2007, 2008 for overall high acuity frequency)
    - Upper Tacoma (top 4 in 2007, 2008 for overall high acuity frequency)
- Planning zones to watch for emerging EMS risk based on their top 4 ranking for high acuity frequency per 1,000 population
    - South Central
    - South End
    - Upper Tacoma

Non-Fire Risk Defined

Non-Fire risk is defined as the structural and geographical characteristics of the community that over time persistently generate risk to life safety and/or the environment. The goal for Non-Fire risk mitigation is to keep emergencies from escalating to prevent life and property loss and/or adverse impact to the environment. TFD provides Non-Fire risk mitigation via its Hazardous Materials, Technical Rescue and Marine Firefighting and Rescue services. More specific risk definitions for each of these services are detailed on Table 27.

TABLE 27: Non-Fire Risk Definitions			
	LOW RISK	**MODERATE RISK**	**HIGH RISK**
Hazardous Materials (HazMat)	• Shed/outbuilding • Detached garage • Dumpster • Car/vehicle	• Detached single family dwelling • Mobile home • Industrial/commercial structure ≤ 10,000 square feet • Mercantile structure ≤ 10,000 square feet • Non-mainline railroad	• Industrial/commercial structure > 10,000 square feet • Mercantile structure > 10,000 square feet • Mainline railroad/railyard/tunnel • Vacant/abandoned building • Refinery • Chemical facility • Storage/tank farm • Warehouse • Marina • Pipelines • Accidental or deliberate natural/manmade disasters
Technical Rescue (Tech Rescue)			• High rise buildings • Ships • Bridges • Pt. Defiance Park • Salmon Beach • Natural disasters • Sloped wildland areas • Mainline railroad/railyard/tunnel • Industrial facility • Construction site • The Narrows • Puyallup River • Lakes
Marine Firefighting and Rescue (Fireboat)			• Ships/commercial vessels • Commencement Bay/The Narrows/waterways • 44 miles of shoreline/shoreline structures • Marinas • Private vessels/pleasure crafts • Accidental or deliberate natural/manmade disasters

Non-Fire Risk Analysis

The following types of risk were identified and located in each planning zone:

- Routine Non-Fire risk -- Hazards most common to the planning zone
- Maximum or worst Non-Fire risk -- Hazards that require the maximum amount of Non-Fire protection resources or that would result in the greatest loss of life or property
- Special Non-Fire risk -- Hazards which if destroyed would be a critical or essential economic loss to the community; could also include cultural, environmental and historical loss
- Remote or isolated Non-Fire risk -- Hazards most distant from other hazards as to be almost unique to the planning zone; or other locally adopted equivalencies

The zone by zone risk analysis based on the identification of routine, maximum, special and remote Non-Fire risk is detailed in Table 28. The distribution of Non-Fire risk incident locations, excluding Marine, is depicted in Appendices F and G. Marine incidents cannot be pinpointed to an exact location, however, all incidents occurred on or near water that is part of the 44 miles of shoreline bordering the 25 square miles of the Puget Sound that lies within the TFD service area.

Table 28: Non-Fire Risk

Zone	Maximum or Worst Risk	Special Risk	Remote/ Isolated Risk	Risk Analysis
Downtown **Routine Risk** • High rise buildings • Marinas and docks • Vacant buildings • Com-mercial and industrial structures	• Construction sites • Marinas • Docks • Grain elevator • Railroad • Electrical vaults • Large vacant buildings • Low rise sprawling complexes • Concentration of high density condos and high rise buildings	• 3 hospitals • Museums • Government buildings • UW Tacoma • Convention Center • Jail • Historic Stadium High School • Theater district • Landmark • Jail • Fire Communications Center • SR 509 and I- 705 • Qwest switch • Historic buildings • Bates Voc Tech • Grain elevator • Railroad • Electrical vaults		• Highest risk for tech rescue; mostly steep angle, rope and trench incidents • Consistent with ongoing construction activity in that zone • Consistent with topography in that zone

Table 28: Non-Fire Risk				
Zone	**Maximum or Worst Risk**	**Special Risk**	**Remote/ Isolated Risk**	**Risk Analysis**
Eastside **Routine Risk** • Detached single family dwellings • Wildland/ urban interface	• Construction sites • Railroad	• Buddhist Temple • Emerald Queen Casino • Schools	• Wildland/ urban interface---gulley with limited access • Railroad runs through gulley	• Topography challenges create access issues • High density of single family dwellings and overall population
Fircrest **Routine Risk** • Detached single family dwellings	• Construction sites	• Schools • Government buildings		• Primarily single family residential; not too densely populated
Fife/Fire District 10 **Routine Risk** • Detached single family dwellings • Commercial and industrial structures • Warehouses	• Large warehouses • Bulk oxygen producing plant • Olympic pipeline into the Tideflats • Manufacturing • Construction sites • World Trade Center---multi-story building	• I-5 and Hwy. 99 • Railroad • Poodle Dog • Business corridor along Hwy 99 and 20th St. E. • Schools • Government buildings	• Wildland/ urban interface	• Higher flood risk area • 4th highest risk for HazMat • Incidents in area closest to the Tideflats • Mostly combustible/ flammable liquid release/spills • Long response times due to topography and/or remoteness • Rural residential developments have hundreds of homes with limited access • Concentrated business district; huge economic impact +

Table 28: Non-Fire Risk				
Zone	**Maximum or Worst Risk**	**Special Risk**	**Remote/ Isolated Risk**	**Risk Analysis**
North End **Routine Risk** • Detached single family dwellings • Wildland/ urban interface • Marinas and docks • Commercial structures	• Marinas • Prospect Hill • Yacht Club • Point Defiance Park • Ferry dock • Railroad along waterfront • Railroad tunnel • Construction sites • In the glide path for McChord AFB	• Point Defiance Park and Zoo • Old Town • University of Puget Sound • Schools • Designated historic homes • Hotel	• Ruston • Salmon Beach • Multiple points of wildland/ urban interface (gulches, hillsides)	• Second highest risk for tech rescue; mostly steep angle and rope incidents • Consistent with topography of zone • 84 homes on Salmon Beach accessible only by two sets of 200+ step staircases, a dirt path or the water • Ruston unincorporated and heavily dependent on mutual aid without ability to reciprocate • Limited access to wildland/urban interface
Northeast Tacoma **Routine Risk** • Detached single family dwellings • Commercial structures • Wildland/ urban interface	• Construction sites • Detached single family dwellings • Small commercial development	• Centre at Norpoint • Ashley House (long-term care for critically ill children) • Schools	• Wildland/ urban interface	• Slide prone area • Bedroom community with irregular street grid; not the usual numbering system; makes it hard to locate incident sites -- particularly for additional responding companies • Most remote from City Center; access challenged by Port development

Table 28: Non-Fire Risk				
Zone	**Maximum or Worst Risk**	**Special Risk**	**Remote/ Isolated Risk**	**Risk Analysis**
South Central **Routine Risk** • Detached single family dwellings • Commercial structures • Wildland/ urban interface	• Commercial corridor along Pacific, So. 38th • Some high rise • Construction sites • Railroad • Detached single family dwellings	• Government buildings • I-5 • Railroad	• Wildland/ urban interface - gulley along eastern border	• Concentration of high density single family residential • Limited access to wildland/urban interface areas
South End **Routine Risk** • Detached single family dwellings • Commercial structures • Wildland/ urban interface	• Detached single family dwellings • Commercial corridor along Pacific Ave, So. Hosmer • Construction sites • Railroad		• Wildland/ urban interface along southern edge of zone	• Limited access to wildland/urban interface areas
Southwest **Routine Risk** • Detached single family dwellings • Commercial and industrial structures • Mercantile structures • Vacant buildings • Wildland/ urban interface	• Tacoma Mall • Industrial and retail structures along South Tacoma Way, through the Nalley Valley • General Plastics • Large vacant or storage buildings • In the glide path for McChord AFB • Railroad	• Tacoma Mall • Schools • Public Safety/Govern-ment buildings • Tacoma Public Utilities building • Railroad • Bates Voc-Tech • I-5 • Java Jive	• Wildland/ urban interface - So. 35th to So. 56th and So. Tyler to South Tacoma Way	• Second highest risk for HazMat • Location of incidents follows the historical railway lines through the Nalley Valley • Mostly gas leaks and combustible/ flammable liquid spills/leaks • Limited access to wildland/urban interface areas

Table 28: Non-Fire Risk				
Zone	**Maximum or Worst Risk**	**Special Risk**	**Remote/ Isolated Risk**	**Risk Analysis**
Tideflats **Routine Risk** • Commercial and industrial structures • Marinas • Piers/Docks • Shipyards • Refineries • Warehouses • Wildland/ urban interface	• Construction sites • Railroad, including commuter line • Port of Tacoma • Marinas • Refineries • Piers/Docks • Marinas • Storage warehouses • Shipyards • Industrial structures • Tank farm supplied by Olympic fuel pipeline from refineries • Pipeline from US Oil to McChord • Pipeline from Blair Waterway to US Oil • Commercial structures along Puyallup Ave. • Low rise sprawling complexes • Manufacturing structures	• Tacoma Dome • Detention facility • Railroad, including commuter line • Port of Tacoma • Casino • Hotels	• Wildland/ urban interface along Marine View Drive	• Highest risk zone for HazMat incident • Location of incidents spread out through entire zone • Risk and location consistent with industrial nature of the zone • Mostly chemical releases and combustible/ flammable liquid spills/leaks • Access to area limited by waterways, rail lines and failing bridge infrastructure • Low residential population but high daytime worker population • Access to wildland/urban interface areas limited by topography; area is prone to landslides • Presence of pipelines increases risk • Hard to shut off pipeline quickly so risk to environment is increased • Presence of gas with

Table 28: Non-Fire Risk				
Zone	**Maximum or Worst Risk**	**Special Risk**	**Remote/ Isolated Risk**	**Risk Analysis**
Tideflats (continued)				decreased ability to detect ignition source also increases fire risk • Potential for huge economic impact • Marinas in fairly remote location so land response is longer; not quickly or easily accessible by water routes either
Upper Tacoma **Routine Risk** • Detached single family dwellings • High rise buildings • Commercial structures	• Commercial development along Union Ave, 6th Ave • Residential high rise buildings • Detached single family dwellings • In the glide path for McChord AFB	• Cheney Stadium • Elks Lodge • Historic homes • Allenmore Hospital • Schools		• Third highest risk for tech rescue; mostly steep angle and rope incidents • Consistent with topography of zone

Table 28: Non-Fire Risk				
Zone	**Maximum or Worst Risk**	**Special Risk**	**Remote/ Isolated Risk**	**Risk Analysis**
West End **Routine Risk** • Detached single family dwellings • Commercial structures • Wildland/ urban interface	• Narrows Bridges • Railroad along shoreline • Marinas • Commercial development • Detached single family dwellings	• Narrows Bridges • Schools • Tacoma Community College • Railroad along shoreline	• Wildland/ urban interface -- hillside along shoreline	• Narrows Bridges represent critical transportation and economic infrastructure • 1st ladder has good access; 2nd ladder delayed response due to distance • Fireboat response for marinas, wildland/urban interface also delayed due to distance and potentially to staffing • Limited access to wildland/urban interface areas

Table 29 shows the number of Marine incidents by year and type. Tables 30 and 31 show the number of Tech Rescue and HazMat incidents respectively by year and by planning zone. Tech Rescue is a relatively new discipline for TFD therefore only three years of data is being considered. The top 3 incidents types for Marine and the top 4 zones for Tech Rescue and HazMat incidents are highlighted in yellow.

TABLE 29: Frequency - Marine Firefighting and Rescue Incidents							
Incident Type	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**Type total**
Fire	22	21	7	19	17	13	99
Rupture/Explosion	0	1	1	0	0	0	2
HazMat	2	0	0	0	1	3	6
EMS patient	6	8	14	19	30	19	96
Search and/or Rescue	8	5	5	6	3	2	29
Hazardous Condition	0	0	3	5	4	2	14
Annual total	38	35	30	49	55	39	246

Table 30: Frequency - Tech Rescue Incidents				
Zone	**2006**	**2007**	**2008**	**Zone total**
Downtown	4	1	14	19
Eastside	1	0	0	1
Fircrest	1	0	0	1
Fife/Fire District 10	1	0	0	1
North End	3	3	5	11
Northeast Tacoma	0	0	0	0
South Central	2	0	3	5
South End	2	0	1	3
South West	0	3	1	4
Tideflats	1	1	0	2
Upper Tacoma	0	2	4	6
West End	3	1	1	5
Annual total	18	11	29	58

Table 31: Frequency - HazMat Incidents							
Zone	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**Zone total**
Downtown	35	37	44	39	28	38	221
Eastside	49	35	46	79	51	46	306
Fircrest	7	9	8	16	5	5	50
Fife/ Fire District 10	15	23	14	31	27	28	138
North End	27	38	52	47	48	31	243
Northeast Tacoma	11	17	26	31	17	12	114
South Central	35	42	26	43	37	25	208
South End	49	47	43	81	47	32	299
South West	55	57	47	60	56	54	329
Tideflats	23	33	46	45	52	47	246
Upper Tacoma	30	43	58	58	59	57	305
West End	46	71	63	65	38	26	309
Annual total	382	452	473	595	465	401	2,768

Additional information of interest for each of the Non-Fire response categories includes:

- Marine Firefighting and Rescue
    - The most common incident types for Marine response are--
        - Fire
        - EMS
        - Search and/or rescue
    - Marine fire incidents involve and/or take place in close proximity to high value property such as other boats and marinas
    - The presence of ships crossing Commencement Bay increases the overall risk

- Technical Rescue
    - Most technical rescues fall into one of three categories--
        - High angle rescue (includes electrical lines)
        - Rope rescue
        - Trench rescue

- Hazardous Materials Response
    - The most common incident types for HazMat response are--
        - Combustible or flammable liquid spills and/or leaks
        - Gas leaks
        - Chemical release or toxic condition

Overall analysis of Non-Fire risk was conducted according to the following criteria:

- Population
- Number of Non-Fire incidents
- Presence of--
    - Geographical and/or access issues (G/A)
    - Wildland/urban interface (W/U)
    - Critical infrastructure (CI) -- utilities, transportation, health, education, government
    - Heavy industry (IND)
    - Potential for significant economic impact (EI)
    - Historical/cultural value (HV)

The zone-by-zone Non-Fire risk analysis based on the above criteria is shown in Table 32. The top 4 zones for incidents and/or presence of one of the other criteria are highlighted in yellow.

Table 32: Zone-by-Zone Non-Fire Risk Analysis										
Zone		**Incidents**			**Presence of**					
	Pop. Total/ Density	**Marine**	**Tech Rescue**	**Haz Mat**	**G/A**	**W/U**	**CI**	**IND**	**EI**	**HV**
Downtown	9,199/ 2,652	n/a	19	221	no	no	yes	no	yes	yes
Eastside	21,775/ 4,528	n/a	1	306	yes	yes	yes	no	yes	yes
Fircrest	5,903/ 3,625	n/a	1	50	no	no	yes	no	yes	no
Fife/Fire District 10	7,064/ 917	n/a	1	138	yes	yes	yes	yes	yes	no
North End	24,292/ 2,236	n/a	11	243	yes	yes	yes	no	yes	yes
Northeast Tacoma	16,118/ 3,349	n/a	0	114	yes	yes	yes	no	no	no
South Central	17,894/ 6,127	n/a	5	208	yes	yes	yes	no	yes	no
South End	26,878/ 5,353	n/a	3	299	yes	yes	no	no	no	no
South West	23,218/ 3,057	n/a	4	329	yes	yes	yes	yes	yes	no
Tideflats	727/ 69	n/a	2	246	yes	yes	yes	yes	yes	no
Upper Tacoma	26,333/ 5,643	n/a	6	305	no	no	yes	no	yes	yes
West End	27,366/ 3,596	n/a	5	309	yes	yes	yes	no	yes	no

Based on all of the preceding information, the following conclusions can be drawn regarding Non-Fire risk in the TFD service area:

- Planning zones with the highest overall Non-Fire risk
  - West End
  - Upper Tacoma
- Planning zones with highest HazMat risk based on number of incidents
  - Southwest - also has 5 of 6 other risk indicators
  - Eastside - also has 5 of 6 other risk indicators
- Planning zones with highest Tech Rescue risk based on number of incidents
  - Downtown - also has 3 of 6 other risk indicators
  - North End - also has 5 of 6 other risk indicators
- Areas to watch based on number of incidents and/or the presence of other risk factors
  - South End
- Planning zones with lowest Non-Fire risk
  - Fircrest - has 2 of 6 other risk indicators
  - NE Tacoma - has 3 of 6 other risk indicators

It is also very important to mention here that although the criteria used for risk analysis does not point to the Tideflats as one of the highest risk zones, TFD considers it as such based on the presence of high risk structures and activities that create huge potential for a significant HazMat event with major adverse impact on nearby residential populations and/or the environment.

Overall Risk Analysis

Table 33 shows the planning zones identified as highest risk in each category.

Table 33: Overall Risk

Zone	Fire Risk	EMS Risk	Non-Fire Risk
Downtown	X	X	X
Eastside	X	X	X
Fircrest			
Fife/Fire District 10		X	
North End			X
Northeast Tacoma			
South Central			
South End	X		
South West	X	X	X
Tideflats	X	X	X
Upper Tacoma	X		X
West End		X	X

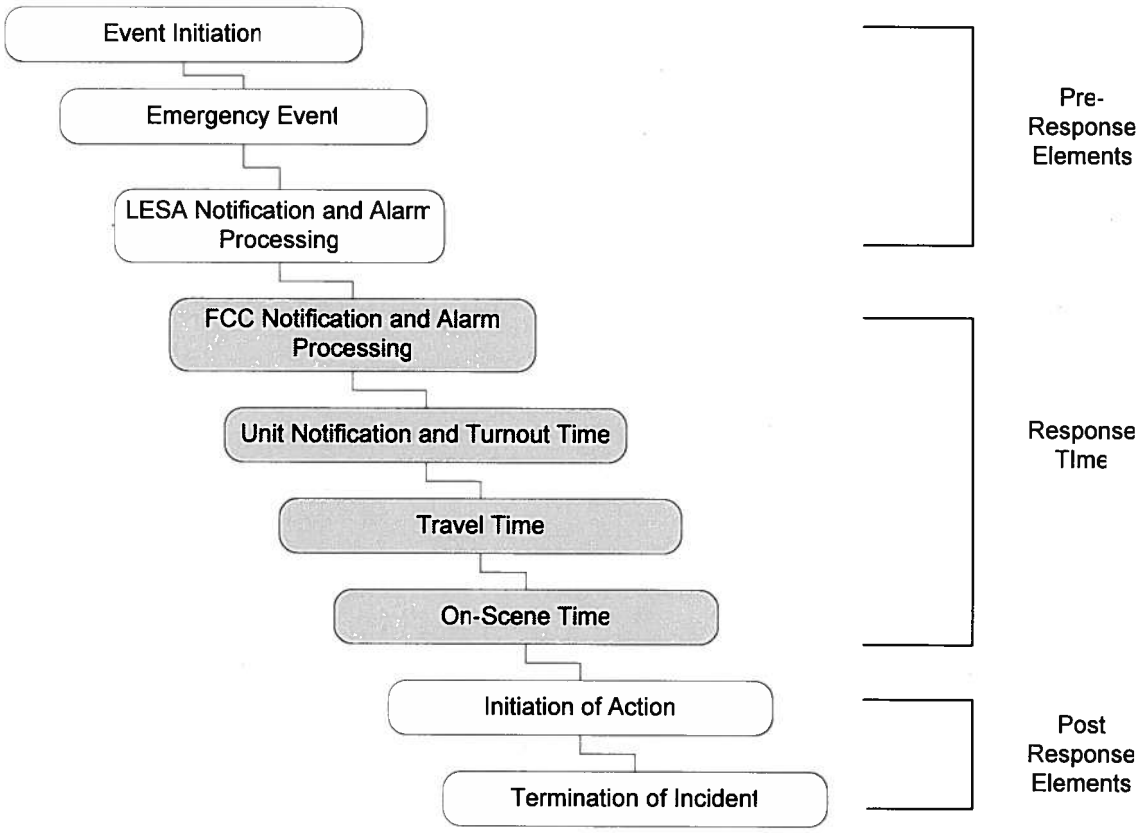
The overall risk assessment for the TFD service area is as follows:

- Highest risk zones overall
  - Downtown
  - Eastside
  - South West
  - Tideflats
- Lowest risk zones consistently
  - Fircrest
  - Northeast Tacoma
- Zones to watch for emerging risk
  - Fife/Fire District 10 (Fire)
  - South Central (Fire, EMS)
  - South End (EMS, Non-Fire)
  - Upper Tacoma (EMS)
  - West End (Fire)

EMERGENCY RESPONSE ASSESSMENT

Cascade of Events

TFD uses the following cascade of events to establish time stamps for response elements over which TFD has control; specifically, FCC notification and alarm processing (dispatch), unit notification and turnout time (turnout), travel time and on-scene time. These time stamps provide the foundation for the baseline and benchmark performance standards detailed later in this document.



It is also important to note here that TFD Administration is actively working on ways to resolve lingering concerns about the reliability and timeliness of one of the pre-response elements over which TFD has no control; LESA Notification and Alarm Processing. LESA (Law Enforcement Support Agency) receives all law enforcement, fire and EMS calls to the 9-1-1 system and then triages the fire and EMS calls to TFD. There is a significant lag time between when LESA receives those calls and then transmits them to the TFD Fire Communications Center (FCC) for dispatch of TFD personnel. The proposed solution is to carve out all the fire and EMS calls from the 9-1-1 system and handle them via a co-located or consolidated Fire/EMS dispatch center. Representatives from TFD's FCC and Lakewood Fire, the other major fire/EMS dispatcher in the county,

along with other county fire service agencies have been meeting regularly for the last several months to evaluate the feasibility of the proposed solution. A decision is expected by the end of 2009.

Comprehensive Task Analysis

The tasks for Fire incidents are divided into three categories and based on the specific needs of the incident, assigned in order of urgency as firefighting personnel arrive on the scene:

- Critical - Tasks assigned to initiate mitigation to prevent life and/or property loss
- Urgent - Tasks assigned to further control and stabilize the incident
- Subsequent - Tasks assigned to further support the incident through to termination

The tasks for EMS incidents are divided into Critical and Subsequent categories and as with Fire incidents assigned to personnel in order of urgency based on the specific needs of the patient. The sequence of critical tasks at an EMS incident may vary depending on the mechanism of injury and/or the nature of the illness. The effective response force resource requirements listed on the EMS Comprehensive Task Analysis are for the care of one critical patient with provisions for fire suppression, extrication and/or landing zone operations as needed. Every additional critical patient would require an additional dedicated effective response force of 2 Firefighter/Paramedics and 3 Firefighter/EMTs. In addition, it is important to note that if the number of patients for a particular incident triggers a mass casualty response, the Incident Commander would expand the incident management system to call in additional resources as needed to provide other vital incident support functions such as safety, accountability and private ambulances for transport back up.

The tasks for Non-Fire incidents also are divided into Critical and Subsequent categories and as with Fire and EMS incidents assigned to TFD personnel in order of urgency based on the specific needs of the incident. In addition it is important to note the following for each of the Non-Fire services:

Marine Firefighting and Rescue

- Encompasses above surface emergency operations for which the TFD fireboat is deployed as the primary apparatus
- Fireboat staffing is provided by a cross-trained engine crew
- The fireboat is a unique regional resource used by surrounding jurisdictions per mutual aid agreements as well as by TFD within its own service area
- The fireboat may require support from other land-based companies for larger incidents determined by the Incident Commander to be beyond the capability of the fireboat crew

Technical Rescue

- The identified tasks are universal to most or all of TFD's three tech rescue disciplines--
    - Rope rescue
    - Confined space rescue
    - Trench rescue
- The personnel resources for a technical rescue response are allocated to support a six sided approach; top, bottom and four sides
- The personnel resource requirements include technician and operations trained personnel called in by the Incident Commander as necessary and appropriate
- The number of personnel required to rescue casualties and/or provide emergency medical services is per casualty

Hazardous Materials

- The Incident Commander may call in additional appropriately trained personnel and/or outside agency support depending on the specific needs of the incident (e.g., law enforcement to help control access to the scene)
- The number of personnel required to rescue casualties and/or provide emergency medical services is per casualty

The comprehensive task analyses for Fire, EMS, Marine, Technical Rescue and Hazardous Materials response can be found in Appendices H-L, respectively.

Comparability

TFD performance standards for the cascade of events response elements cited previously were set with the following external standards and guidelines in mind:

- NFPA 1221, Chapter 7.4.2[23] for dispatch
- NFPA 1001, Chapter 5.1.1.2[24] for turnout
- NFPA 1710, Chapter 4.1.2.1(1)[25] for turnout
- NFPA 1710, Chapter 4.1.2.1(2)[26] for fire response
- NFPA 1500, Chapter 8.5.7[27] for "Two In/Two Out" standards

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[23] 95% of emergency call processing and dispatching shall be completed within 60 seconds, and 99% of call processing and dispatching shall be completed within 90 seconds

[24] Firefighters should have the ability to don protective clothing within one minute

[25] One minute (60 seconds) for turnout time

[26] Four minutes (240 seconds) or less for arrival of the first arriving engine company at a fire suppression incident and/or 9 minutes (480 seconds) or less for the deployment of a full first alarm assignment at a fire suppression incident

[27] In the initial stages of an incident where only one crew is operating in the hazardous area at a working structural fire, a minimum of four individuals shall be required, consisting of two individuals working as a crew in the hazardous area and two individuals present outside this hazardous area available for assistance or rescue at emergency operations where entry into the danger area is required

- CFAI Fire & Emergency Service Self-Assessment Manual, p. 72 for Fire travel time standards[28]
- NFPA 1710, Chapter 5.3.3.4.3[29] for ALS response
- NFPA 1710, Chapter 4.1.2.2[30] for performance measures

TFD performance standards for dispatch, turnout and travel time are shown below. Baseline and benchmark total response time standards specific to Fire, EMS and Non-Fire emergency response are detailed later in this document.

It also should be noted here that TFD was unable to produce credible, meaningful baseline data for Non-Fire concentration response and as a result, the trends identified based on this data may not be completely accurate. Non-Fire performance standards, therefore, were set based on anecdotal data and guidance from TFD personnel with expertise in these disciplines and may need to be adjusted in the future as data reliability improves.

For instance, the Marine response standards were set based on water temperature and hypothermia risk. Once data credibility can be improved TFD hopes to further refine the Marine Firefighting and Rescue concentration measures, setting response standards by:

- Areas on the water to reflect differences in travel time capability due to distance and allowable boat speeds
    - Commencement Bay to include Thea Foss Waterway
    - Tideflats
    - Narrows
- Time of day if data indicates such a need

Opportunities to improve Non-Fire response data will be addressed as part of the department's information systems master planning process slated for completion by the end of 2009.

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[28] Urban zone - 5 minutes, 12 seconds travel for effective response force and 10 minutes 24 seconds for urgent support force; Suburban zone - 6 minutes 30 seconds travel for effective response force and 13 minutes travel for urgent support force; Rural zone - 13 minutes for effective response force and 18 minutes 12 seconds for urgent support force; all 70% of the time

[29] When provided, the fire department's EMS for providing ALS shall be deployed to provide for the arrival of an ALS company within an 8-minute response time to 90 percent of the incidents

[30] The fire department shall establish a performance objective of not less than 90 percent for the achievement of each response time objective specified in 4.1.2.1

Response Element	Standard	Rationale
Dispatch	60 seconds, 90% of the time	Starting with 90% standard with a goal of increasing to 95% once 90% performance is achieved and can be sustained for a reasonable period of time
Turnout	90 seconds, 90% of the time	TFD believes NFPA 1710 standard of 60 seconds is unrealistic and unsafe; this standard reflects 60 second standard for general skills (NFPA 1001) plus an additional 30 seconds to get safely situated in the apparatus with seat belt secure
Travel	**Fire** - 90% of the time Urban zone - 5 minutes, 12 seconds travel for first in and 10 minutes 24 seconds for effective response force; Suburban zone - 6 minutes 30 seconds travel for first in and 13 minutes travel for effective response force; Rural zone - 13 minutes for first in and 18 minutes 12 seconds for effective response force	Starting with CFAI and State minimum travel time standards with a goal of raising those standards incrementally as current performance goals are achieved and then sustained for a reasonable period of time
	EMS - 8 minutes 90% of the time for ALS and 8 minutes, 30 seconds for ALS with extrication	EMS standards consistent with NFPA 1710; an additional 30 seconds is added to ALS with extrication to allow for the additional apparatus (ladder) needed for these incidents
	Non-Fire - standards set for total response time based on anecdotal data and guidance from TFD personnel with specific expertise	Non-Fire standards based on anecdotal data and guidance from TFD personnel with specific expertise in the absence of specific external time standards

Predictability

Fire risk predictability is shown by risk type by hour of the day on Table 34 and for all fires by hour of the day for all planning zones for on Table 35.

TABLE 34

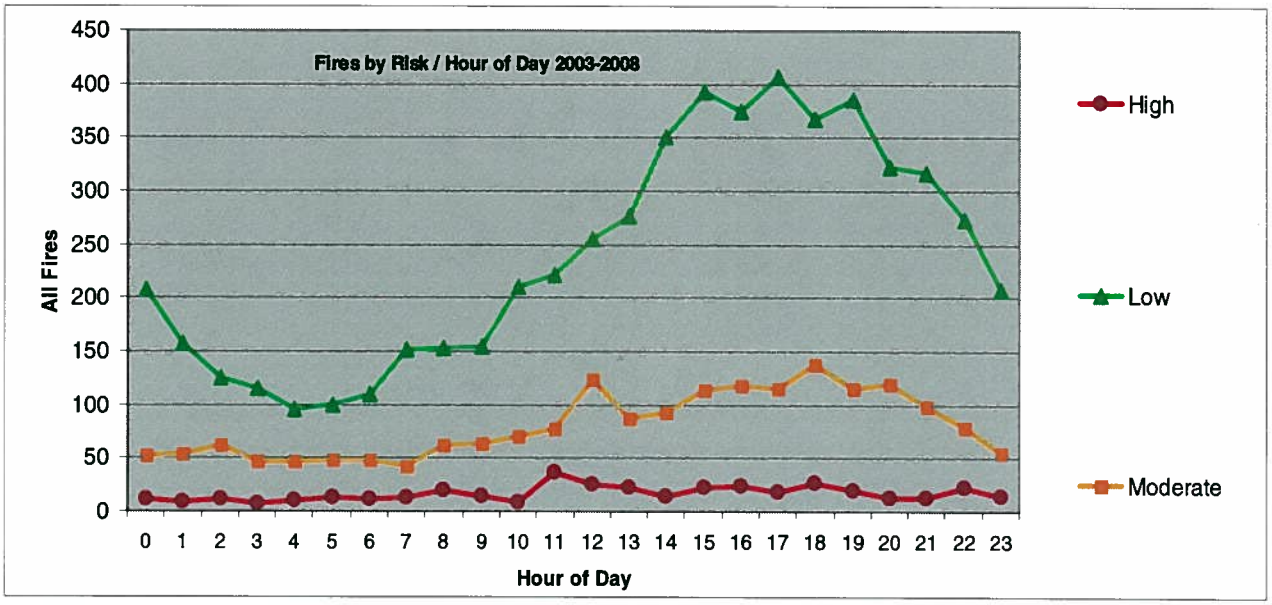
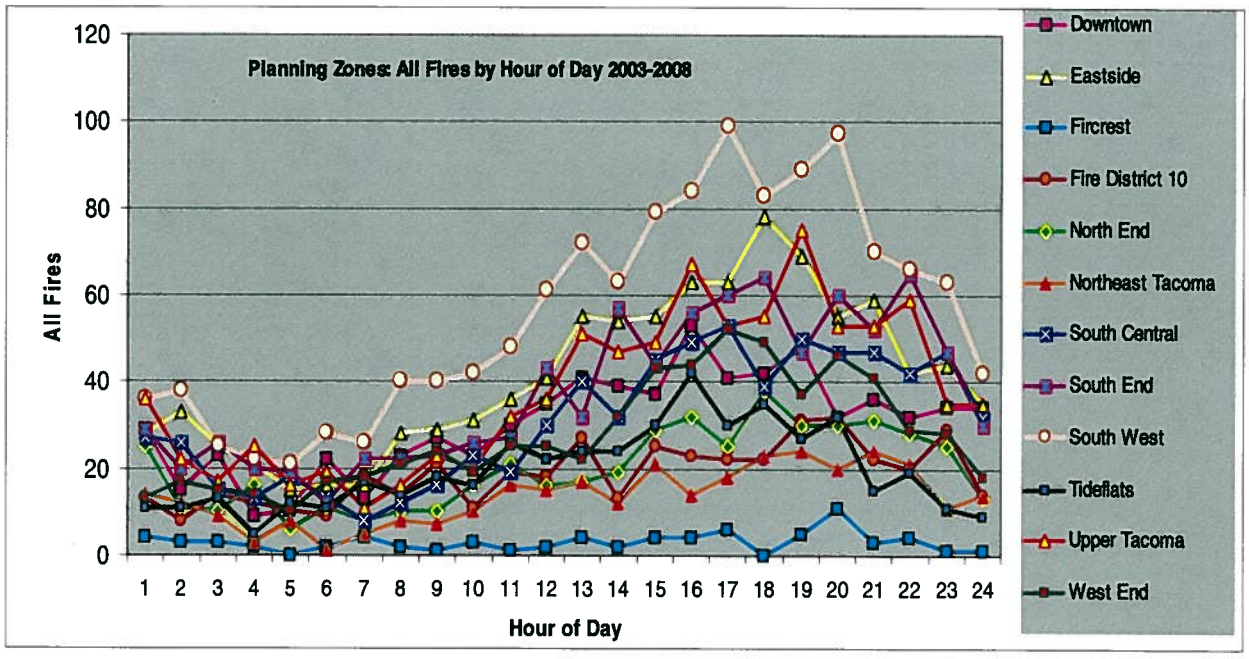


TABLE 35



EMS risk predictability is shown for all EMS incidents by planning zone by hour on Table 36 and for high acuity EMS incidents by hour on Table 37.

TABLE 36

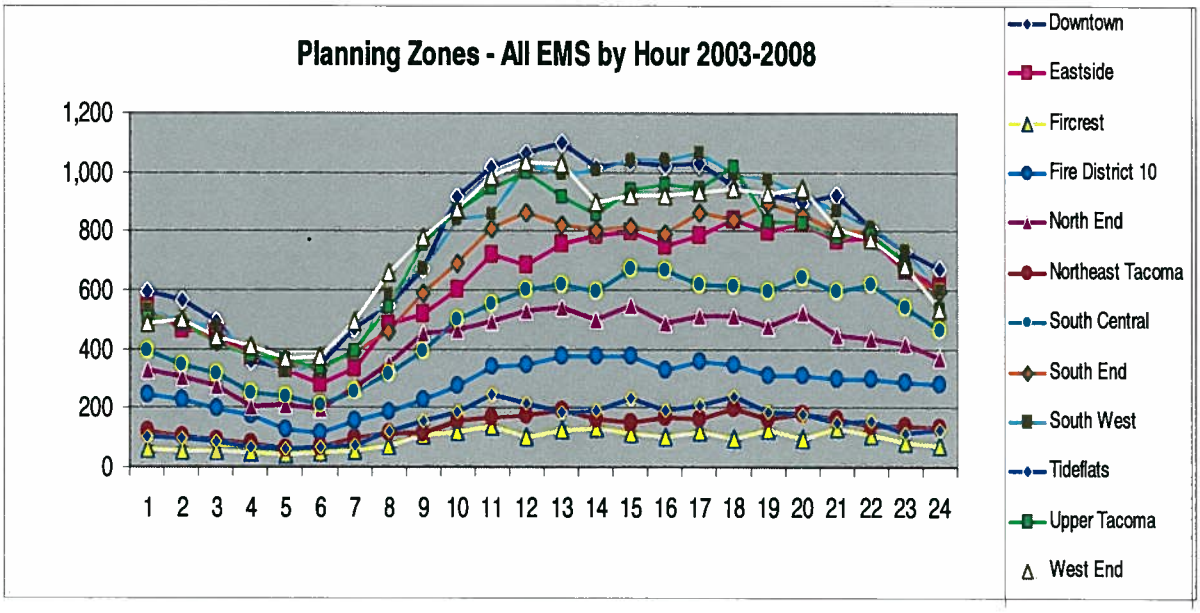
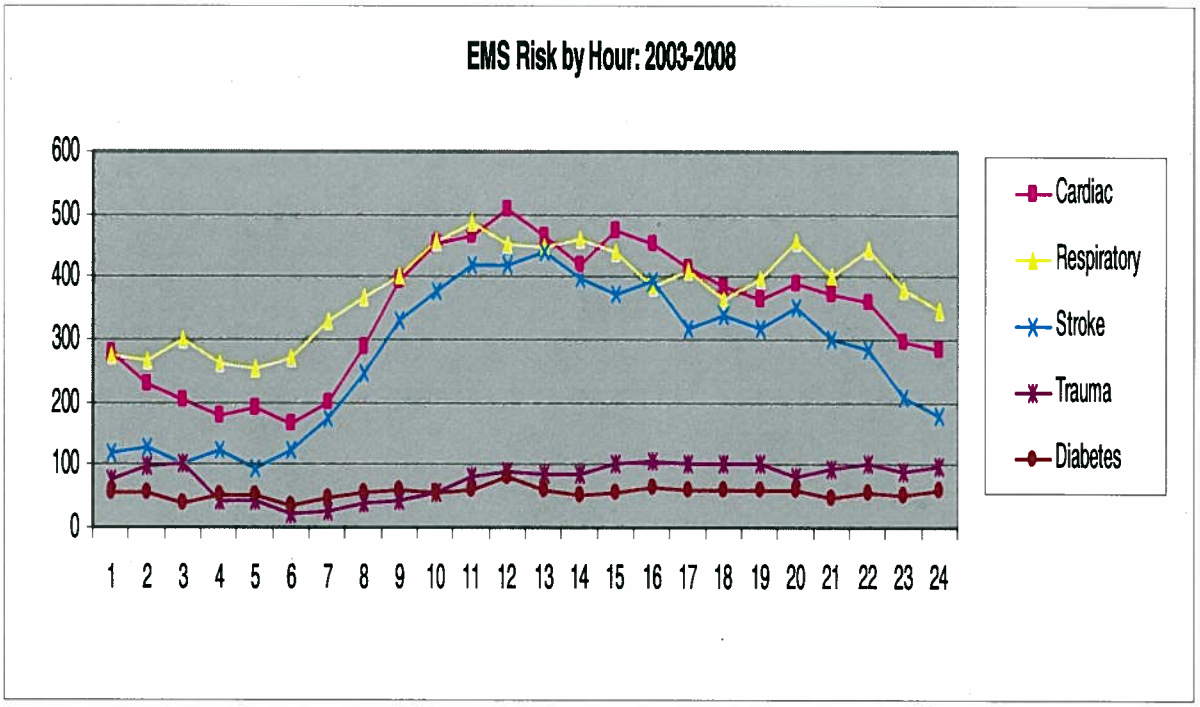


TABLE 37



This data shows that:

- Overall fire risk escalates in most planning zones between 7 a.m. and 8 p.m. with spikes at around 1 p.m., 5 p.m. and 8 p.m.
- High risk fires appear to present a persistent risk throughout the day
- Moderate risk fires are more likely to occur between noon and 6 p.m.
- Low risk fires also are more likely to occur in the afternoon, with the peak time between 2 p.m. and 7 p.m.
- EMS calls appear to increase between 6 a.m. and 5 p.m. followed by a plateau until gradually tapering off after 10 p.m.
    - This trend seems consistent across planning zones
- The trends for high acuity EMS calls are
    - Cardiac - Increasing between 6 a.m. and noon, tapering off with another spike around 3 p.m. and then gradually decreasing throughout the rest of the day
    - Respiratory - Increasing between 6 a.m. and 11 a.m., tapering off with another spike between 8 p.m. and 10 p.m. then gradually decreasing throughout the rest of the day
    - Stroke - Increasing between 6 a.m. and 1 p.m., tapering off with another spike around 4 p.m. and then gradually decreasing throughout the rest of the day
    - Trauma - Increasing between 1 a.m. and 3 a.m., decreasing between 4 a.m. and 7 a.m. then plateaus with another spike between 3 p.m. and 7 p.m.
    - Diabetes - These calls remain at a fairly constant level throughout the day

Reliability

TFD looked at reliability in two ways:

- **Incident reliability**: Percentage of time the first due engine or ladder was first in for its assigned zone for Fire and EMS calls; used to determine workload of the first due company and the extent to which EMS calls adversely impact ability to respond to Fire calls
- **Specialized apparatus reliability**: Percentage of time first due ladder or medic companies are first in for their assigned zones; used to determine if there is an adequate number of companies available for response

The reliability standard is set at 75% -- three-quarters of first due TFD apparatus are expected to be the first to arrive in their assigned response zones. It is also important to note that reliability is likely to become less important over time as the technology for AVL (automatic vehicle locator) capability is implemented and refined. AVL allows for dispatch according to which unit is closest to the incident scene rather than by assigned zone.

Tables 38 and 39 show incident reliability for Fire and EMS, respectively. Tables 40 and 41 show Ladder and Medic company reliability, respectively. The zones with substandard reliability are highlighted in yellow on each of the tables.

Table 38: Incident Reliability - Fire

Zone	2003	2004	2005	2006	2007	2008	Zone %
Downtown	68.6%	74.3%	68.9%	69.1%	70.4%	77.6%	71.1%
Eastside	69.4%	75.9%	72.8%	71.5%	71.8%	74.5%	72.5%
Fircrest	58.8%	88.9%	84.6%	76.9%	90.0%	77.8%	77.5%
Fife/Fire District 10	91.0%	79.2%	79.6%	85.1%	86.3%	89.5%	85.3%
North End	82.4%	73.6%	81.8%	76.9%	77.6%	81.6%	79.2%
Northeast Tacoma	76.7%	81.0%	75.6%	87.8%	84.4%	93.9%	83.1%
South Central	62.5%	66.4%	69.2%	59.3%	64.7%	69.9%	65.2%
South End	70.6%	69.2%	69.1%	72.6%	64.6%	71.2%	69.7%
South West	59.1%	69.7%	73.4%	64.0%	74.0%	69.6%	68.0%
Tideflats	68.3%	65.0%	58.2%	64.3%	64.6%	67.6%	65.2%
Upper Tacoma	71.9%	77.5%	78.9%	66.7%	76.6%	75.8%	74.1%
West End	75.0%	82.0%	69.4%	72.8%	79.2%	66.0%	73.9%
Annual %	70.0%	73.4%	72.6%	70.1%	73.1%	74.4%	

Table 39: Incident Reliability - EMS

Zone	2003	2004	2005	2006	2007	2008	Zone %
Downtown	81.7%	82.7%	81.2%	78.8%	79.8%	80.4%	80.7%
Eastside	71.5%	69.6%	71.4%	70.3%	69.4%	74.6%	71.1%
Fircrest	77.8%	87.2%	77.7%	82.2%	78.4%	82.0%	80.9%
Fife/Fire District 10	91.3%	95.2%	94.0%	94.1%	94.1%	94.0%	93.9%
North End	81.9%	81.3%	82.5%	80.5%	85.2%	82.2%	82.3%
Northeast Tacoma	87.6%	87.3%	91.1%	85.9%	90.3%	87.1%	88.1%
South Central	66.4%	74.8%	75.1%	71.7%	75.7%	74.6%	73.2%
South End	69.6%	72.0%	71.9%	70.0%	71.9%	73.9%	71.6%
South West	66.2%	74.4%	73.9%	71.3%	76.0%	74.5%	72.9%
Tideflats	63.1%	61.4%	61.9%	61.1%	65.6%	68.1%	63.4%
Upper Tacoma	78.3%	81.0%	80.3%	77.3%	80.6%	81.7%	79.9%
West End	80.0%	80.6%	78.8%	76.9%	76.7%	74.6%	77.8%
Annual %	75.5%	77.8%	77.6%	75.4%	77.7%	77.9%	

Table 40: Specialized Apparatus Reliability - Medic						
Zone	**2004**	**2005**	**2006**	**2007**	**2008**	**Zone %**
Downtown	71.0%	69.7%	72.0%	69.9%	66.8%	69.8%
Eastside	71.3%	71.1%	73.5%	74.2%	70.8%	72.2%
Fircrest	70.3%	70.6%	75.0%	77.6%	73.3%	73.5%
Fife/Fire District 10	81.8%	78.1%	83.7%	81.9%	85.1%	82.2%
North End	74.7%	70.4%	71.2%	75.4%	68.8%	72.1%
Northeast Tacoma	86.8%	83.5%	84.7%	84.1%	84.4%	84.7%
South Central	71.2%	69.6%	71.0%	70.5%	65.9%	69.4%
South End	59.6%	62.6%	62.0%	63.1%	62.3%	62.0%
South West	67.7%	63.2%	65.1%	60.8%	66.9%	64.7%
Tideflats	56.2%	53.6%	54.5%	59.6%	58.9%	56.5%
Upper Tacoma	66.7%	67.0%	69.3%	68.9%	70.1%	68.5%
West End	80.3%	79.1%	75.9%	78.8%	76.9%	78.2%
Annual %	70.7%	69.4%	70.4%	70.6%	69.6%	

Table 41: Specialized Apparatus Reliability - Ladder						
Zone	**2004**	**2005**	**2006**	**2007**	**2008**	**Zone %**
Downtown	86.7%	94.1%	85.3%	86.2%	82.8%	86.6%
Eastside	79.2%	70.3%	65.6%	66.7%	68.9%	70.2%
Fircrest	33.3%	85.7%	100%	100%	87.5%	84.6%
Fife/Fire District 10	84.8%	73.3%	93.6%	89.1%	86.0%	85.6%
North End	81.6%	86.0%	83.3%	97.4%	91.1%	88.1%
Northeast Tacoma	100%	100%	100%	85.7%	100%	96.8%
South Central	82.5%	83.0%	78.8%	92.8%	87.5%	85.4%
South End	88.1%	95.9%	94.3%	91.2%	94.3%	93.1%
South West	79.3%	76.6%	76.8%	75.7%	84.3%	78.3%
Tideflats	74.6%	44.7%	62.7%	77.9%	61.4%	64.3%
Upper Tacoma	78.2%	78.9%	76.3%	84.6%	87.4%	81.1%
West End	97.1%	94.7%	83.7%	96.9%	92.3%	92.5%
Annual %	82.2%	78.3%	79.7%	83.8%	83.4%	

Based on all of the preceding data, the following conclusions can be drawn regarding reliability:

- Annual overall Fire response reliability has remained consistently below 75% for the last six years with some improvement in the last two years
- Annual overall EMS response reliability has remained consistently above 75% for the last six years with some improvement in the last two years
- Overall workload appears to adversely impact incident reliability in the following planning zones--
    - Eastside
    - South Central
    - South End
    - South West
    - Tideflats
- Additionally, incident reliability for Fire only is substandard in the following planning zones; meaning EMS calls appear to adversely impact ability to respond reliably to Fire calls
    - Downtown
    - Upper Tacoma
    - West End
- Specialized apparatus reliability is substandard in the following planning zones:
    - Medic companies: Downtown, Eastside, Fircrest, North End, South Central, South End, South West, Tideflats, Upper Tacoma
        - The three lowest reliability zones are Tideflats, South End and South West
    - Ladder companies: Eastside, Tideflats

Distribution

Distribution refers to the geographic location of first due resources for initial emergency response intervention. For TFD, distribution is measured by the percentage of time first in companies arrive for all emergency responses, excluding Marine, within the following prescribed CFAI travel times for urban, suburban and rural planning zones:

- Urban - 5 minutes, 12 seconds 70% of the time
- Suburban - 6 minutes, 30 seconds 70% of the time
- Rural - 13 minutes 70% of the time

Zone types for the TFD service area were assigned based on total population or population density as previously detailed in Table 10. TFD performance against these standards is shown in Table 42. Zones with substandard CFAI response (<70%) are highlighted in yellow.

Table 42: Distribution							
Zone	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**Zone %**
Downtown	96.0%	95.6%	95.0%	93.6%	94.1%	94.3%	94.7%
Eastside	92.1%	90.7%	89.5%	89.7%	90.4%	92.3%	90.7%
Fircrest	91.8%	93.2%	92.0%	91.0%	91.6%	88.8%	91.3%
Fife/Fire District 10	99.2%	98.9%	98.6%	98.0%	97.9%	98.6%	98.5%
North End	93.8%	92.1%	90.6%	89.9%	91.0%	89.9%	91.2%
Northeast Tacoma	80.3%	85.1%	79.8%	80.2%	75.1%	71.8%	78.5%
South Central	96.4%	96.9%	96.9%	96.4%	96.1%	96.0%	96.4%
South End	88.3%	89.4%	89.6%	87.9%	90.6%	89.0%	89.1%
South West	94.0%	93.9%	92.7%	92.5%	92.9%	90.8%	92.7%
Tideflats	74.6%	73.5%	68.5%	69.5%	66.8%	65.3%	69.8%
Upper Tacoma	98.1%	97.0%	96.8%	96.0%	96.1%	96.8%	96.8%
West End	94.2%	94.2%	93.3%	91.8%	91.3%	91.1%	92.6%
Annual %	93.4%	93.1%	92.4%	91.5%	92.0%	91.6%	92.3%

TFD clearly meets the minimum CFAI distribution response standard in all planning zones, except the Tideflats. Also noteworthy is the fact that although the distribution time standard is being met in Northeast Tacoma, the response to that zone is significantly lower than for other planning zones.

Concentration

While distribution is about first due response, concentration is about the spacing of multiple resources to ensure there is adequate staff and equipment arriving on scene soon enough to prevent the escalation of the emergency. Resource concentration is measured by the percentage of time an effective response force can arrive on scene within the prescribed travel time frames. Personnel and apparatus comprising an effective response force can be found on Appendices H - L.

Concentration measures used for this analysis are as follows:

Fire (based on CFAI standards)

- **Urban** - 10 minutes, 24 seconds 70% of the time
- **Suburban** - 13 minutes 70% of the time
- **Rural** - 18 minutes, 12 seconds 70% of the time

EMS (based on NFPA standards)

- **ALS** - 8 minutes 90% of the time
- **ALS with extrication** - 8 minutes, 30 seconds 90% of the time

The concentration measures for an urgent support force for ***Fire*** are as follows:

Moderate Risk

- **Urban** - 12 minutes, 24 seconds 70% of the time
- **Suburban** - 15 minutes 70% of the time
- **Rural** - 20 minutes, 12 seconds 70% of the time

High Risk

- **Urban** - 13 minutes, 24 seconds 70% of the time
- **Suburban** - 16 minutes 70% of the time
- **Rural** - 21 minutes, 12 seconds 70% of the time

TFD performance against these standards is shown in Tables 43, 44 and 45 for effective response force arrival at high, moderate and low risk fires respectively. Zones without percentages noted did not have any fires in that risk category. The zones with travel times below the CFAI minimum (<70%) are highlighted in yellow.

Table 43: Concentration - High Risk Fires

Zone	2003	2004	2005	2006	2007	2008	Zone %
Downtown	95.5%	100%	100%	76.9%	94.4%	95.0%	93.3%
Eastside	100%	100%	100%	--	--	100%	100%
Fircrest	--	--	--	--	--	--	--
Fife/Fire District 10	100%	100%	100%	50.0%	100%	100%	86.7%
North End	100%	--	100%	--	--	100%	100%
Northeast Tacoma	100%	100%	--	100%	--	100%	100%
South Central	100%	100%	100%	100%	100%	0.0%	92.3%
South End	100%	100%	100%	100%	100%	100%	100%
South West	85.7%	100%	66.7%	87.5%	91.7%	100%	89.5%
Tideflats	100%	73.3%	77.8%	100%	66.7%	84.6%	79.2%
Upper Tacoma	75%	66.7%	100%	100%	75.0%	100%	87.0%
West End	100%	100%	100%	100%	100%	100%	100%
Annual %	93.3%	87.8%	90.0%	85.4%	89.1%	92.5%	89.8%

Table 44: Concentration - Moderate Risk Fires							
Zone	2003	2004	2005	2006	2007	2008	Zone %
Downtown	94.4%	100%	100%	95.8%	93.3%	100%	96.9%
Eastside	93.9%	96.9%	100%	96.7%	92.6%	96.6%	96.0%
Fircrest	75.0%	50.0%	100%	100%	100%	100%	90.5%
Fife/Fire District 10	83.3%	83.3%	100%	100%	75.0%	87.5%	86.4%
North End	81.3%	100%	81.8%	81.8%	100%	88.2%	89.8%
Northeast Tacoma	100%	83.3%	50.0%	77.8%	66.7%	100%	78.6%
South Central	92.0%	96.4%	93.3%	100%	96.4%	96.6%	95.9%
South End	100%	100%	100%	95.5%	85.7%	94.1%	95.7%
South West	97.4%	90.6%	95.5%	95.7%	93.5%	96.8%	95.1%
Tideflats	--	100%	100%	50.0%	100%	100%	95.7%
Upper Tacoma	96.8%	100%	100%	93.0%	100%	95.7%	97.2%
West End	91.7%	100%	94.4%	100%	100%	88.9%	95.5%
Annual %	93.8%	96.5%	95.9%	94.7%	93.0%	95.1%	94.8%

Table 45: Concentration - Low Risk Fires							
Zone	2003	2004	2005	2006	2007	2008	Zone %
Downtown	95.1%	90.5%	91.1%	92.6%	100%	95.0%	94.1%
Eastside	92.1%	91.0%	92.9%	98.4%	95.3%	97.8%	94.5%
Fircrest	90.0%	66.7%	100%	100%	100%	100%	95.0%
Fife/Fire District 10	98.2%	95.0%	100%	93.4%	91.1%	96.9%	95.6%
North End	95.2%	94.3%	88.2%	91.7%	95.9%	95.7%	93.7%
Northeast Tacoma	92.0%	100%	87.8%	96.4%	86.1%	96.4%	93.0%
South Central	92.8%	97.6%	90.9%	92.7%	95.1%	94.1%	93.9%
South End	89.3%	96.0%	94.4%	94.2%	87.4%	88.9%	92.0%
South West	91.7%	94.7%	95.5%	93.1%	92.7%	88.1%	92.8%
Tideflats	90.2%	88.1%	85.0%	96.0%	95.7%	88.2%	90.5%
Upper Tacoma	95.0%	96.5%	96.9%	96.8%	92.0%	94.4%	95.4%
West End	98.9%	95.9%	95.8%	90.0%	90.2%	94.6%	94.6%
Annual %	93.3%	94.4%	93.4%	94.3%	93.1%	93.2%	93.6%

Based on the preceding data, the following conclusions can be reached regarding concentration response for Fire incidents:

- TFD consistently exceeds the minimum CFAI concentration response standard for all types of Fire in all planning zones
    - There is some sporadic variation from year to year where a zone did not meet standard in a particular year, but never more than one zone in a year

Tables 46 and 47 show performance against standards for an urgent support force for high and moderate risk fires respectively. Zones without percentages noted did not have any fires in that risk category. The zones with substandard response (<70%) are highlighted in yellow. Personnel and apparatus totals for an urgent support force can be found in Appendix H.

Table 46: Concentration - Urgent Support Force for High Risk Fires[31]

Zone	2003	2004	2005	2006	2007	2008	Zone %
Downtown	0.0%	0.0%		0.0%	66.7%	0.0%	16.7%
Eastside	---	---	---	---	---	0.0%	0.0%
Fircrest	---	---	---	---	---	---	---
Fife/Fire District 10	---	---	---	---	100.0%	---	100.0%
North End	---	---	---	---	---	100.0%	100.0%
Northeast Tacoma	---	0.0%	---	0.0%	---	---	0.0%
South Central	---	---	---	0.0%	0.0%	---	0.0%
South End	100.0%	---	---	---	---	100.0%	100.0%
South West	0.0%	0.0%	---	---	100.0%	100.0%	80.0%
Tideflats	---	---	---	0.0%	50.0%	85.7%	66.7%
Upper Tacoma	---	---	---	---	---	0.0%	0.0%
West End	---	---	0.0%	---	---	---	0.0%
Annual %	20.0%	0.0%	0.0%	0.0%	73.3%	62.5%	47.8%

[31] Only 2007 and 2008 data is meaningful since that is when TFD added a fifth engine to initial dispatch; also should be noted that the small number of fires included in this data set tends to skew results

Table 47: Concentration - Urgent Support Force for Moderate Risk Fires							
Zone	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**Zone %**
Downtown	71.4%	57.1%	0.0%	85.7%	66.7%	75.0%	66.7%
Eastside	60.0%	40.0%	80.0%	70.0%	42.9%	53.8%	55.8%
Fircrest	0.0%	0.0%	100%	---	100%	50.0%	42.9%
Fife/Fire District 10	50.0%	100%	0.0%	0.0%	75.0%	100%	61.5%
North End	88.9%	40.0%	100%	25.0%	75.0%	0.0%	55.3%
Northeast Tacoma	0.0%	75.0%	100%	0.0%	0.0%	0.0%	26.7%
South Central	80.0%	66.7%	69.2%	83.3%	77.8%	50.0%	72.1%
South End	90.9%	46.7%	60.0%	70.0%	63.6%	70.6%	66.2%
South West	57.1%	78.6%	81.3%	57.1%	91.7%	60.0%	70.1%
Tideflats		100.0%	100%	100%	---	100%	100%
Upper Tacoma	84.6%	71.4%	62.5%	80.0%	100%	64.7%	75.6%
West End	83.3%	71.4%	60.0%	60.0%	40.0%	80.0%	64.6%
Annual %	72.2%	61.1%	68.8%	68.8%	65.3%	62.4%	66.1%

Based on the preceding data it is clear that TFD urgent support force response is below travel time standards both overall and for the majority of planning zones for both high and moderate risk fires, underscoring the impact of both geography and reliability on response capability.

Tables 48 and 49 show performance against standards for an effective response force for EMS concentration response for ALS and ALS with extrication, respectively. The zones with substandard travel time response (<90%) are highlighted in yellow.

Table 48: Concentration - ALS							
Zone	2003	2004	2005	2006	2007	2008	Zone %
Downtown	95.0%	95.1%	96.1%	94.3%	93.8%	93.2%	94.5%
Eastside	87.1%	88.9%	89.5%	89.1%	86.6%	85.0%	87.7%
Fircrest	88.2%	84.6%	77.9%	73.9%	74.5%	74.7%	78.8%
Fife/Fire District 10	85.8%	83.4%	81.8%	86.9%	81.5%	85.0%	84.0%
North End	87.5%	86.6%	82.5%	81.3%	78.1%	71.9%	81.2%
Northeast Tacoma	19.9%	19.6%	19.1%	21.7%	14.9%	12.6%	17.8%
South Central	92.7%	95.7%	95.4%	93.7%	93.7%	91.0%	93.6%
South End	77.3%	81.4%	80.3%	77.5%	76.2%	71.8%	77.2%
South West	86.1%	88.9%	83.4%	83.0%	79.5%	78.0%	82.7%
Tideflats	87.0%	80.8%	83.2%	81.0%	81.7%	74.7%	81.2%
Upper Tacoma	95.4%	95.8%	96.2%	95.4%	94.5%	93.2%	95.0%
West End	87.7%	90.0%	86.6%	84.4%	82.2%	80.9%	85.1%
Annual %	87.0%	87.9%	86.7%	85.3%	83.5%	81.5%	

Table 49: Concentration - ALS with Extrication							
Zone	2003	2004	2005	2006	2007	2008	Zone %
Downtown	100.0%	88.9%	81.8%	77.8%	85.7%	88.9%	85.9%
Eastside	75.0%	84.6%	91.7%	93.3%	83.3%	71.4%	85.7%
Fircrest	---	---	---	---	100.0%	---	100.0%
Fife/Fire District 10	77.8%	91.3%	73.3%	77.3%	69.6%	69.6%	76.3%
North End	100.0%	100.0%	80.0%	100.0%	80.0%	66.7%	84.6%
Northeast Tacoma	50.0%	83.3%	100.0%	100.0%	50.0%	50.0%	72.7%
South Central	71.4%	83.3%	92.3%	100.0%	80.0%	90.0%	85.7%
South End	75.0%	50.0%	84.6%	80.0%	66.7%	44.4%	66.7%
South West	81.5%	90.6%	84.9%	77.6%	80.9%	73.8%	80.5%
Tideflats	83.3%	50.0%	80.6%	56.8%	72.0%	69.2%	68.6%
Upper Tacoma	80.0%	83.3%	100.0%	76.5%	100.0%	100.0%	89.2%
West End	66.7%	50.0%	72.7%	63.6%	100.0%	70.0%	69.8%
Annual %	80.2%	80.5%	83.5%	75.5%	78.6%	74.5%	

As with the urgent support force, the data clearly shows that:

- ALS concentration response is substandard overall for all planning zones except Downtown, South Central and Upper Tacoma
    - The concentration response for NE Tacoma is particularly troublesome, however, some of that risk is mitigated by the presence of a paramedic staffed engine to provide initial ALS intervention until the medic company arrives
- ALS with extrication response is substandard in all zones except Fircrest

Overall response analysis was conducted according to the following criteria:

- Overall incident reliability for Fire and EMS
- Specialized apparatus reliability - Medic (MED) and Ladder (LAD)
- 2008 Distribution response - all emergency responses, excluding Marine (DIST)
- 2008 Concentration response - Fire (low, moderate and high risk fires)
- 2008 Concentration response - EMS (ALS and ALS with extrication)

The zone-by-zone response analysis based on the above criteria is shown in Table 50. The zones with substandard reliability and response are highlighted in yellow.

Table 50: Zone-by-Zone Response Analysis

Zone	Reliability				DIST	Concentration				
	Fire	EMS	MED	LAD		Fire: ≥70%			EMS: ≥90%	
	≥75%	≥75%	≥75%	≥75%	≥70%	H	M	L	ALS	ALSE
Downtown	71.1%	80.7%	69.8%	86.6%	94.7%	93.3%	96.9%	94.1%	94.5%	85.9%
Eastside	72.5%	71.1%	72.2%	70.2%	90.7%	100%	96.0%	94.5%	87.7%	85.7%
Fircrest	77.5%	80.9%	73.5%	84.6%	91.3%	--	90.5%	95.0%	78.8%	100.0%
Fife/Fire District 10	85.3%	93.9%	82.2%	85.6%	98.5%	86.7%	86.4%	95.6%	84.0%	76.3%
North End	79.2%	82.3%	72.1%	88.1%	91.2%	100%	89.8%	93.7%	81.2%	84.6%
Northeast Tacoma	83.1%	88.1%	84.7%	96.8%	78.5%	100%	78.6%	93.0%	17.8%	72.7%
South Central	65.2%	73.2%	69.4%	85.4%	96.4%	92.3%	95.9%	93.9%	93.6%	85.7%
South End	69.7%	71.6%	62.0%	93.1%	89.1%	100%	95.7%	92.0%	77.2%	66.7%
South West	68.0%	72.9%	64.7%	78.3%	92.7%	89.5%	95.1%	92.8%	82.7%	80.5%
Tideflats	65.2%	63.4%	56.5%	64.3%	69.8%	79.2%	95.7%	90.5%	81.2%	68.6%
Upper Tacoma	74.1%	79.9%	68.5%	81.1%	96.8%	87.0%	97.2%	95.4%	95.0%	89.2%
West End	73.9%	77.8%	78.2%	92.5%	92.6%	100%	95.5%	94.6%	85.1%	69.8%

Based on all of the preceding information, the following conclusions can be drawn regarding TFD response:

- Substandard reliability overall in these planning zones--
    - South West
    - Tideflats
    - Eastside
    - South Central
    - South End
- Potential for reliability issues to emerge in these planning zones--
    - Upper Tacoma
    - Downtown
- Reliability above standard in these planning zones--
    - Fircrest
    - Fife/Fire District 10
    - Northeast Tacoma
    - North End
    - West End
- TFD clearly meets the minimum CFAI distribution response standard in all planning zones, except the Tideflats
- TFD consistently exceeds the minimum CFAI concentration response standard for all types of Fire in all planning zones
- TFD urgent support force response is below travel time standards both overall and for the majority of planning zones for both high and moderate risk fires, underscoring the impact of both geography and reliability on response capability
- Both ALS concentration and ALS response with extrication are substandard and declining in most planning zones

Performance Standards

TFD has established the following baselines and benchmarks for ongoing department performance monitoring. Keeping in mind the financial realities of being a municipal department and the fact that this more structured approach to performance monitoring is new to TFD; benchmarks have been set to either maintain the 2008 response levels or to achieve a desired level of response as with the NFPA response standards for EMS. As TFD gains more experience with the discipline of ongoing performance monitoring and information systems issues are addressed to improve data collection, benchmarks will be adjusted accordingly through an annual review process. Table 51 details the specific baseline and benchmark measures. All of the measures reflect travel time, with the exception of dispatch and turnout.

Table 51: Baselines and Benchmarks				
Measure	**Standard**		**Baseline**	**Benchmark**
	Min:Sec	**%**	**%**	**%**
Dispatch[32]	1:00	90%	59.3%	90%
Turnout[33]	1:30	90%	75.9%	90%
Distribution - all emergency response[34]	(U) 5:12 (S) 6:30 (R)13:00	70%	92.3%	90%
Concentration- Low Risk Fire[35]	(U) 5:12 (S) 6:30 (R)13:00	70%	93.6%	90%
Concentration- Moderate Risk Fire[36]	(U) 10:24 (S) 13:00 (R) 18:12	70%	94.8%	90%
Concentration - High Risk Fire[37]	(U) 10:24 (S)13:00 (R)18:12	70%	89.8%	90%
Concentration - Urgent Support Force for Moderate Risk Fire[38]	(U) 12:24 (S)15:00 (R) 20:12	70%	62.4%	70%
Concentration - Urgent Support Force for High Risk Fire[39]	(U) 13:24 (S)16:00 (R) 21:12	70%	62.5%	70%
Concentration- ALS	8:00	90%	81.5%[40]	90%
Concentration- ALS with extrication	8:30	90%	74.5%[41]	90%
Concentration - Marine Firefighting and Rescue	20:00	70%	Unable to determine	70%
Concentration - Technical Rescue	20:00	70%	Unable to determine	70%
Concentration - Hazardous Materials	20:00	70%	Unable to determine	70%

[32] Dispatch times had been improving each year, from a low of 25.3% in 2003 to a high of 65.3% in 2007, until the implementation of the call taker-dispatcher model and new technology along with dispatching for Central Pierce Fire and Rescue in 2008. Steady improvement is expected to resume once the new system stabilizes.

[33] Turnout times are impacted in the two-story TFD stations; these issues will be factored into the master facilities planning process relative to how facility design could improve turnout capability

[34] Travel times listed by planning zone type: Urban (U), Suburban (S), Rural (R)

[35] Ibid

[36] Ibid

[37] Ibid

[38] Ibid

[39] Ibid

[40] Based on 2008 performance

[41] Ibid

When all of the above response elements are combined, TFD is committed to the following levels of service to **reduce preventable life and property loss**[42]:

Distribution - All emergency responses[43]

For 90% of all requests for emergency service the first arriving TFD engine or ladder staffed with a minimum of three personnel shall arrive within:

- 7 minutes, 42 seconds total response time[44] for **urban** zones
- 9 minutes total response time for **suburban** zones
- 15 minutes, 30 seconds total response time for **rural** zones

Concentration - Fire

TFD shall arrive in a timely manner with sufficient resources to stop the escalation of the fire by preventing flashover. Initial response resources shall be capable of initiating fire suppression and addressing life safety issues as needed, while providing for the safety of responders and the general public.

Low Risk

For 90% of all low risk fires the effective response force, consisting of one engine or ladder staffed with a minimum of three personnel, shall arrive within:

- 7 minutes, 42 seconds total response time in **urban** zones
- 9 minutes total response time in **suburban** zones
- 15 minutes, 30 seconds total response time in **rural** zones

Moderate Risk

For 90% of all moderate risk fires:

- The effective response force, consisting of one engine and one apparatus and a minimum of 4 personnel, shall arrive within:
    - 12 minutes, 54 seconds total response time in **urban** zones
    - 15 minutes, 30 seconds total response time in **suburban** zones
    - 20 minutes, 42 seconds total response time in **rural** zones

[42] TFD Strategic Plan 2008-2012
[43] Excludes Marine response
[44] Total response time equals Dispatch plus Turnout plus Travel time

- The urgent support force, consisting of four engines, one ladder, one medic company and one Battalion Chief vehicle for a total of 19 personnel, shall arrive within:
    - 14 minutes, 54 seconds total response time in **urban** zones
    - 17 minutes, 30 seconds total response time in **suburban** zones
    - 22 minutes, 42 seconds total response time in **rural** zones

High Risk

For 90% of all high risk fires:

- The effective response force, consisting of two engines or one engine and one ladder and a minimum of 6 personnel, shall arrive within:
    - 12 minutes, 54 seconds total response time in **urban** zones
    - 15 minutes, 30 seconds total response time in **suburban** zones
    - 20 minutes, 42 seconds total response time in **rural** zones
- The urgent support force, consisting of five engines, two ladders, one medic company and one Battalion Chief vehicle for a total of 25 personnel, shall arrive within:
    - 15 minutes, 54 seconds total response time in **urban** zones
    - 18 minutes, 30 seconds total response time in **suburban** zones
    - 23 minutes, 42 seconds total response time in **rural** zones

Concentration - EMS

TFD shall arrive in a timely manner with personnel sufficiently trained and equipped initiate medical intervention to decrease the patient's risk of mortality and/or irreversible damage, while providing for the safety of responders. Timely transport of patients to the nearest, most appropriate hospital receiving center will be accomplished in an effective and efficient manner.

Advanced Life Support (ALS)

For 90% of all ALS calls the effective response force consisting of one engine and one medic company and a minimum of 5 personnel shall arrive within 10 minutes, 30 seconds total response time.

ALS with Extrication

For 90% of all ALS calls requiring extrication, the effective response force consisting of one engine, one ladder and one medic company and a minimum of 5 personnel, shall arrive within 11 minutes total response time.

Concentration - Marine Firefighting and Rescue

TFD shall arrive in a timely manner with personnel sufficiently trained and equipped to initiate rescue efforts to prevent life and property loss and/or mitigation efforts to prevent environmental damage while providing for the safety of responders.

> For 70% of all Marine firefighting and rescue calls, the TFD fireboat, staffed with a minimum of 3 personnel, shall arrive within 22 minutes, 30 seconds total response time.

Concentration - Technical Rescue

TFD shall arrive in a timely manner with personnel sufficiently trained and equipped to stabilize the incident scene and extricate casualties while protecting the safety of responders and/or additional adverse impact to the environment.

> For 70% of all Technical Rescue incidents, the effective response force consisting of one engine, one ladder and one medic company plus Engine 8 and Ladder 2 and a minimum of 14 personnel, shall arrive within 22 minutes, 30 seconds total response time.

Concentration - Hazardous Materials (HazMat)

TFD shall arrive in a timely manner with personnel sufficiently trained and equipped to stabilize and control access to the incident scene, identify and evaluate hazards and isolate or evacuate casualties, while protecting the safety of responders and/or additional adverse impact to the environment.

> For 70% of all HazMat incidents requiring operations/technician level response, the effective response force consisting of one engine and one ladder plus Engine 12 and Ladder 4 and a minimum of 12 personnel, shall arrive within 22 minutes, 30 seconds total response time.

RESOURCE ANALYSIS AND RECOMMENDATIONS

The following guidelines provided the framework for the analysis of resources that will be needed to achieve and sustain TFD's performance standards:

- Determination of risk is a function of population, type and number of structures, incident frequency and the presence of or potential for the following additional significant risk factors
    - Geography/access issues
    - Wildland/urban interface
    - Critical infrastructure
    - Heavy industry

    - Economic impact
    - Historical/cultural value
- Evaluation of response is a function of reliability, distribution and concentration
- Increased risk requires increased resource concentration[45]
- Risk + Reliability + Response = Resources
- Resources = Personnel, Apparatus, Facilities and/or Prevention

With this in mind, the following formula was used to determine the resource needs for each planning zone:

Determining Factors[46]	Resources
↑ Risk + ↓ Reliability + ↓ Response	Additional staffing and apparatus at existing station to mitigate workload and/or access issues
↑ Risk + ↑ Reliability + ↓ Response	4 person engine and/or ALS engine staffing to mitigate access issues
2 or more zones with common borders AND ↑ Risk + ↓ Reliability + ↓ Response OR ↗ Risk + ↓ Reliability + ↓ Response	New station with additional staffing and apparatus
↑ Risk + ↓ Reliability + ↑ Response	Monitor reliability for adverse impact on response capability over time
↑ Risk + ↑ Reliability + ↑ Response	Adequate resources for now

[45] Center for Public Safety Excellence and Commission on Fire Accreditation International, *CFAI Standards of Cover, 5th Edition*, 2008

[46] ↑ = increased/above standard; ↓ = decreased/substandard; ↗= emerging/potential

The zone by zone application of the preceding resource analysis formula is displayed in Table 52. Darker gray shaded zones have increased risk along with substandard reliability and at least one area of substandard response. Lighter gray shaded zones are emerging as high risk zones with substandard reliability and at least one area of substandard response.

Table 52: Zone by Zone Resource Analysis

Zone	Risk	Reliability	Response	
			Fire	EMS
Downtown	↑	↗	↑	↗
Eastside	↑	↓	↑	↓
Fircrest	↓	↑	↑	↗
Fife/Fire District 10	↗	↑	↑	↓
North End	↓	↑	↑	↓
Northeast Tacoma	↓	↑	↑	↓
South Central	↗	↓	↑	↗
South End	↗	↓	↑	↓
South West	↑	↓	↑	↓
Tideflats	↑	↓	↓	↓
Upper Tacoma	↗	↗	↑	↗
West End	↗	↑	↑	↓

Recommendations for mitigation based on resource analysis are listed on Table 53.

Table 53: Resource Recommendations - High/Emerging Risk Zones

People	Apparatus	Facilities	Prevention
• **Eastside and South West:** Add ALS capability to existing engine company (+1 FF/PM) AND/OR new medic company (+2 FF/PM) • **South End:** Make existing ALS engine full-time (+1 FF/PM) AND/OR new medic company (+2 FF/PM) • **Tideflats:** New 4 person engine with ALS capability (+3 FF/EMT, +1 FF/PM)	• 2 engines OR • 1 engine and 1 ladder AND • 1-2 medic companies	New station with associated staffing and apparatus- engine or ladder and medic companies to mitigate combined proximate risk in Eastside, South End and South West planning zones AND/OR Modifications to existing stations to accommodate additional personnel	• AED placement in Downtown and Tideflats planning zone to mitigate EMS risk associated with higher daytime population • Study correlation between cardiac/stroke and diabetes and possible prevention strategies to mitigate EMS risk • Trauma prevention in Downtown, Eastside and South West
TOTALS			
3-7 FF/PM (15-35 FTE) **3 FF/EMT (15 FTE)**	**2 engines and 1-2 medic companies** **OR** **1 engine, 1 ladder and 1-2 medic companies**	**1 new station** **AND/OR** **Modifications to existing stations to accommodate additional personnel**	

It is also important to note here that TFD's current staffing model of two Battalion Chiefs overseeing 25 companies (16 engine, 4 ladder, 5 medic) exceeds the generally accepted business practice that calls for a span of control of 5-7 direct reports (or companies in the fire service) per supervisor. The additional staffing recommended here adds up to 4 additional companies, creating the need for at least 2 additional Battalion Chief positions (10 FTE). In addition, TFD would have to modify facilities and acquire additional vehicles to accommodate this additional staffing.

Additional recommendations for low risk zones include:

- **North End**: Consider making existing ALS engine full-time to improve EMS response (+1 FF/PM = 5 FTE)
- **Northeast Tacoma**: Consider 4 person engine staffing to improve moderate fire concentration response (+1 FF/EMT = 5 FTE) and/or consider modifications to the Rural/Metro ambulance contract to improve ALS response for this planning zone

Additional recommendations specific to Marine response:

- Renovate Station 5 and re-locate fireboat to that site to improve Marine response
- Consider full-time fireboat staffing for existing crew and the addition of a full-time 4th person with ALS capability
    - 4th person increases firefighter safety and operational efficiency
    - Creating ALS capability supported by data on demand for EMS and search/rescue
- Create back-up Marine response capability
    - Reserve fireboat and/or
    - Rapid response vessel (RRV) for improved Marine response where significant pumping capability is not required

IMPLEMENTATION PLAN

TFD will implement this Standards of Cover plan as follows:

- Recommendations for additional staffing and apparatus will be presented for consideration in the City's 2009 mid-biennium budget adjustment and subsequent biennial budgeting processes; the next of which begins in 2010
- New facility recommendations will be integrated into the facilities master planning process slated for completion in 2009
    - This process also includes development of funding recommendations to execute the facilities master plan
- Prevention recommendations will be forwarded to TFD's public education staff for further research and subsequent program development and implementation
    - Will likely include partnering with related efforts currently undertaken by other community agencies

It is important to note here that as a municipal department competing with other City departments for budget dollars, TFD will be challenged to find funding for additional staffing and apparatus. If and when that changes, it is expected that additional resources would lead to improved performance and the ability over time to set higher benchmarks, both in terms of response times and fractile

measures. Until then, however, TFD will focus on achieving and maintaining its current benchmark performance measures.

MONITORING AND EVALUATION

The performance standards outlined in this document provide the foundation for TFD's ongoing organizational performance management efforts. They will be incorporated, along with performance measures related to other aspects of department operations, into a "report card" that is reviewed at least quarterly by TFD's senior administrative team.

Along with this quarterly review, all of the performance measures and results will be reviewed as part of the annual TFD strategic plan update, with adjustments to strategies and/or benchmark targets made accordingly and then reflected in an updated strategic plan document. In addition, the intent is to replace the TFD performance measures currently found in the City's strategic plan with the performance measures outlined in this document.

Standards of Cover performance results will be shared quarterly and the strategic plan update annually with key stakeholders including, but not limited to, the City Council, City Manager, Neighborhood Councils and TFD personnel.

GLOSSARY OF TERMS

TERM	DEFINITION
Accountability	Process of tracking assignments and status of personnel at an incident scene
Apparatus	Any rig (excluding inspector vehicles) that can deliver personnel to the scene; type of rig used will depend on availability, timing of arrival on the scene and/or the needs of the incident
Attack Lines	Hoses used to fight fires
Baseline	An internal standard from which something can be judged; comes from what an agency is actually doing
Benchmark	An external standard from which something can be judged; comes from another organization to be used for comparison to an agency baseline
CAD	Computer aided dispatch
Cascade of Events	The continuum of response time elements that describes the initiation, mitigation and ultimate termination of an emergency incident
CFAI	Commission on Fire Accreditation International
Comparability	Method to ensure that department performance standards are based on industry standards and best practices
Comprehensive Task Analysis	A listing of all tasks to be assigned as needed to manage an emergency incident from the point of initial arrival through to termination
Concentration	Percentage of time an effective response force arrives within the prescribed travel time
Critical Tasks	Highest priority tasks assigned to initiate mitigation to prevent life and/or property loss
Distribution	Percentage of time the first in apparatus arrives within the prescribed travel time

TERM	DEFINITION
Effective Response Force	The minimum amount of staffing and equipment that must reach a specific location within a maximum prescribed amount of travel time and is capable of performing initial fire suppression, EMS and/or mitigation
Emergency Event	The point at which an awareness of conditions exists that requires an activation of the emergency response system; may be the recognition by an individual that assistance is needed or may consist of a mechanical or electronic recognition of an event such as smoke or heat detector activation
Event Initiation	The point at which factors occur that may ultimately result in an activation of the emergency response system; precipitating factors can occur seconds, minutes, hours or even days before a point of awareness is reached
FCC Notification and Alarm Processing	The interval of time between when the alarm is received by TFD's Fire Communications Center (FCC) and when it is transmitted to TFD companies
Fire flow	The amount of water needed to control the emergency based on structure, contents and exposure
Fire Load	A measure of the maximum heat that would be released if all the combustibles in a given area burned
First In	First company of firefighters to arrive at an incident scene
Flashover	The condition where all combustibles in the room or confined space have been heated to the point where they release vapors that support combustion, causing all combustibles to ignite simultaneously
Full Complement	Maximum number of personnel and apparatus needed to manage an emergency incident from initial arrival through to termination
Initiation of Action	Time point at which operations to mitigate the event begins; may include size-up, resource deployment, etc.
LESA Notification and Alarm Processing	The interval of time between when a local or central alarm is transmitted to LESA and when it is received by TFD's Fire Communications Center (FCC)

TERM	DEFINITION
NFPA	National Fire Protection Association
Occupancy Load	The calculated number of occupants allowed in a building
On-Scene Time	Time point at which the responding unit arrives on the scene
OVAP	Occupancy vulnerability assessment profile
Predictability	Determination of trends that may be used for future planning projections
Reliability	Percentage of time an apparatus is available to answer a call in its assigned area
Risk Category	A rank or category assigned to an occupancy that reflects the degree of risk to life and property and hence demand on services from a responding agency
Rural Planning Zone	An incorporated or unincorporated area with a total population of less than 10,000 people or with a population density of less than 1,000 people per square mile
Size Up	Initial systematic approach by the first arriving unit to determine the scope of the incident and identify critical problems and hazards
Standards of Cover	Written performance standards that determine the distribution and concentration of fixed and mobile resources and staffing levels for responding to calls for service
Subsequent Tasks	Tasks assigned to later arriving companies to further support the incident through to termination
Suburban Planning Zone	An incorporated or unincorporated area with a total population of less than 10,000 to 29,999 people and/or any area with a population density of 1,000 to 2,000 people per square mile
Travel Time	The time interval between when the unit is En Route until it is On Scene at the incident address
Termination of Incident	Time point at which unit(s) have completed the assignment and are available to respond to another assignment or emergency request

TERM	DEFINITION
Urban Planning Zone	An incorporated or unincorporated area with a total population over 30,000 people and/or a population density of over 2,000 people per square mile
Urgent Support Force	Additional personnel and apparatus assigned as needed to complete tasks that will further control and stabilize an incident scene
Urgent Tasks	Tasks assigned as additional personnel arrive on the scene to further control and stabilize the incident

LIST OF TABLES

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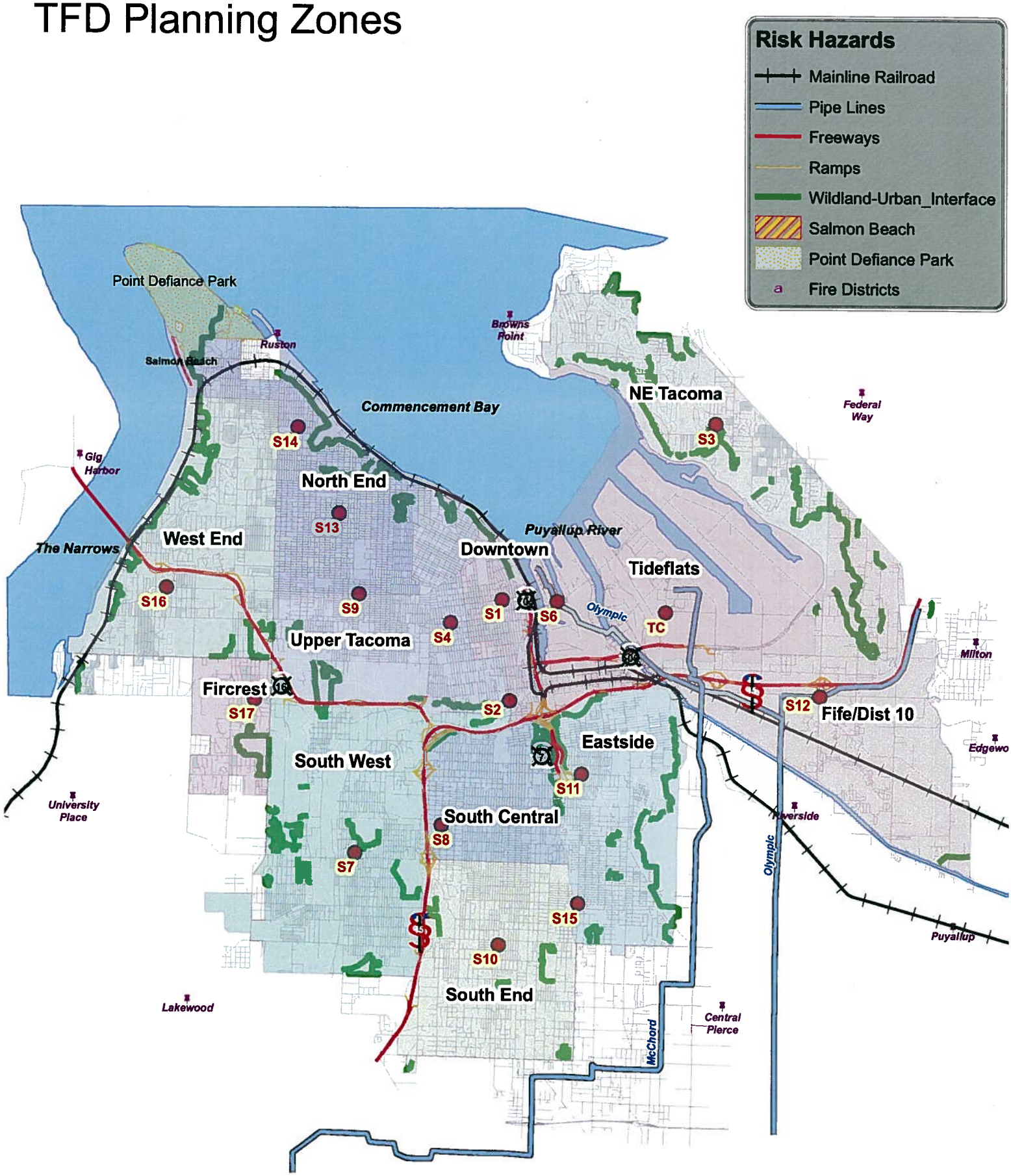
TFD Planning Zones

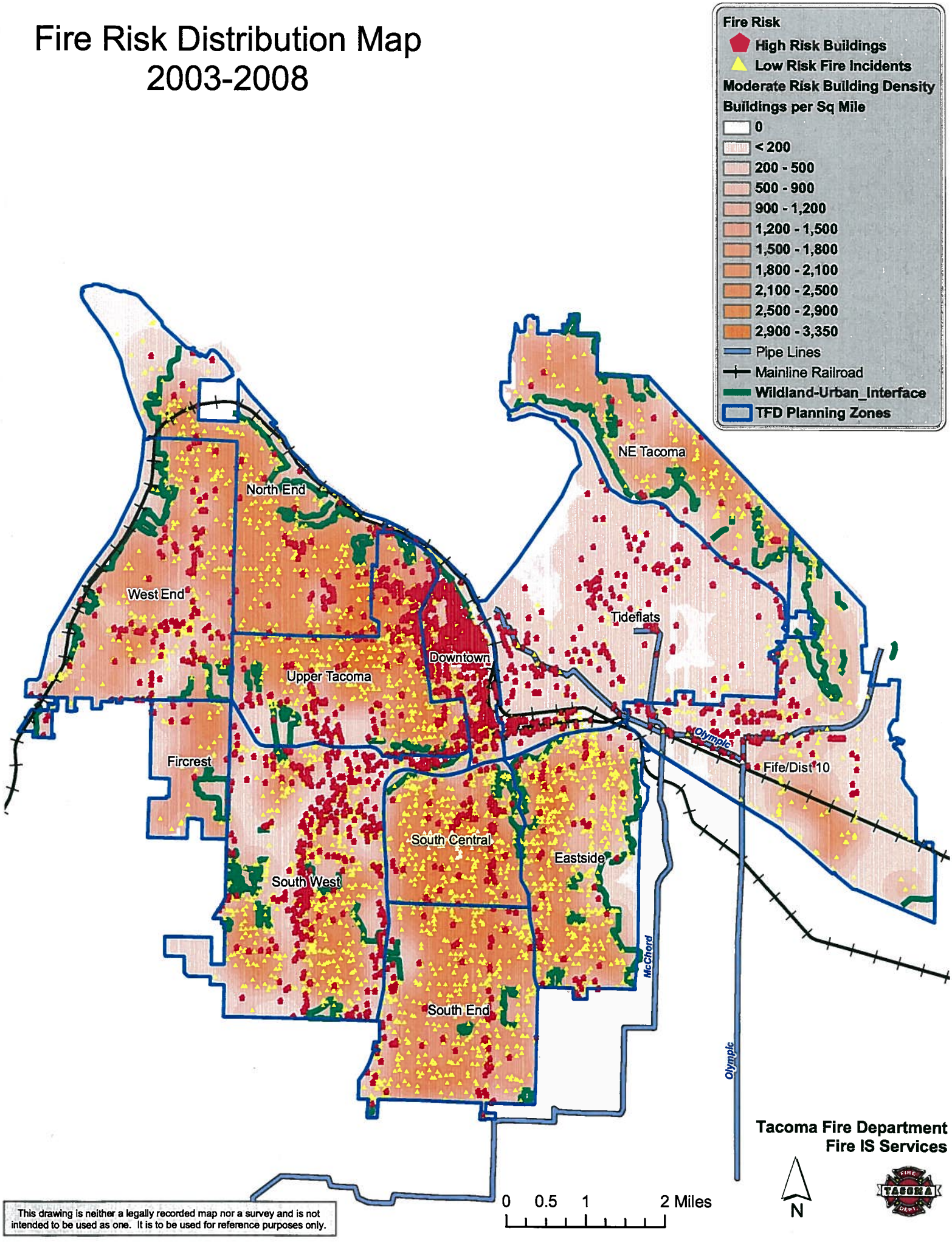


APPENDIX B

STATION	ADDRESS	ASSIGNED APPARATUS[1]			
		E	L	M	B
1	901 Fawcett Avenue	X	X		
2	2701 Tacoma Avenue South	X			X
3	206 Browns Point Boulevard	X			
4	1453 Earnest S. Brazill Street	X		X	
6	1015 East F Street	X			
7	5448 South Warner	X			
8	4911 South Alaska	X	X	X	
9	3502 6th Avenue	X	X		X
10	7247 South Park	X			
11	3802 McKinley Avenue	X		X	
12	2015 54th Avenue East	X	X	X	
13	3825 North 25th	X			
14	4701 North 41st	X			
15	6415 McKinley Avenue	X			
16	7217 6th Avenue	X		X	
17	302 Regents Boulevard	X			

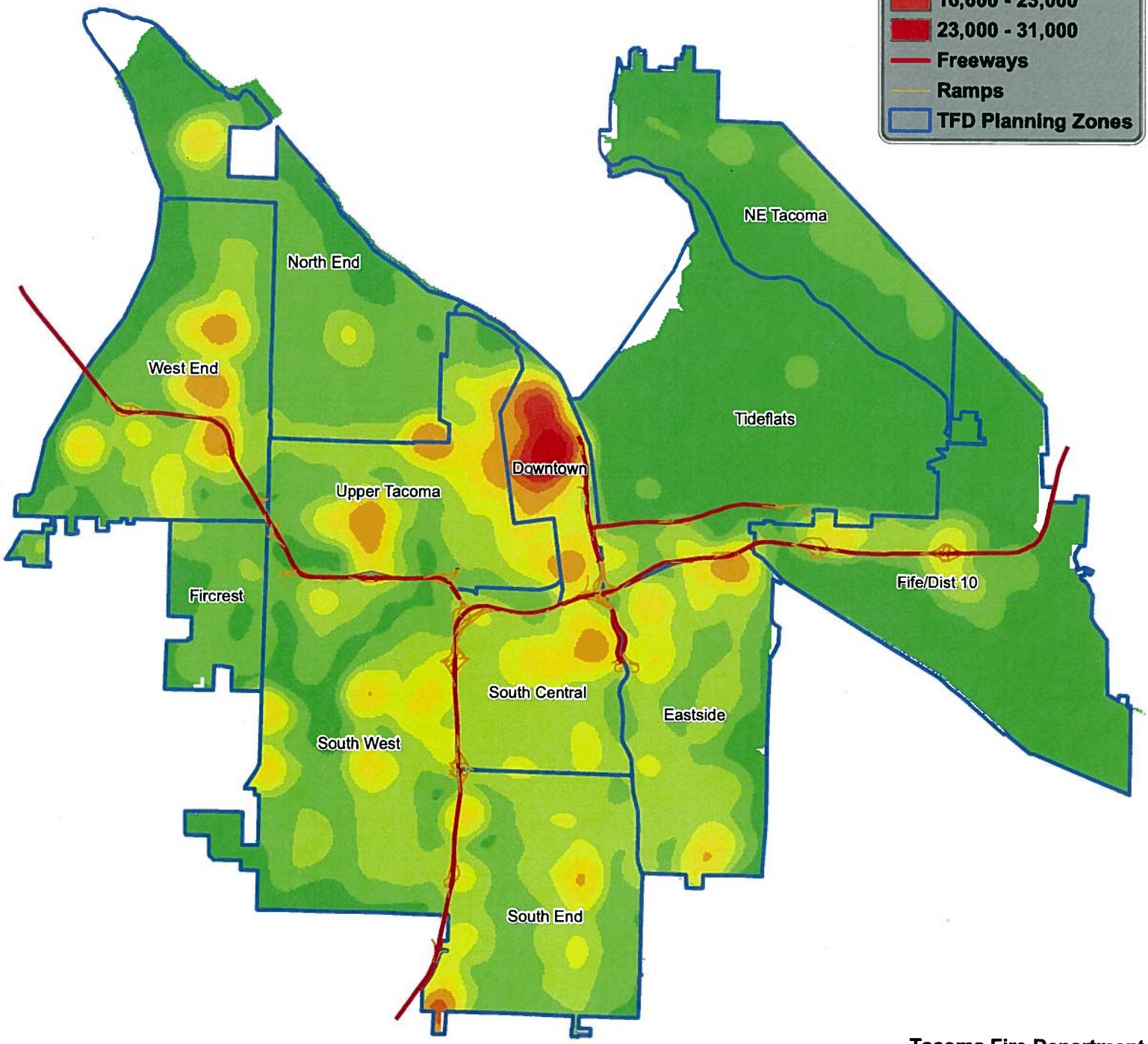
[1] E = Engine; L = Ladder; M = Medic; B = Battalion Chief

Fire Risk Distribution Map
2003-2008



Tacoma Fire Department
Fire IS Services

EMS Risk Distribution Map
All Incidents Density
2003-2008

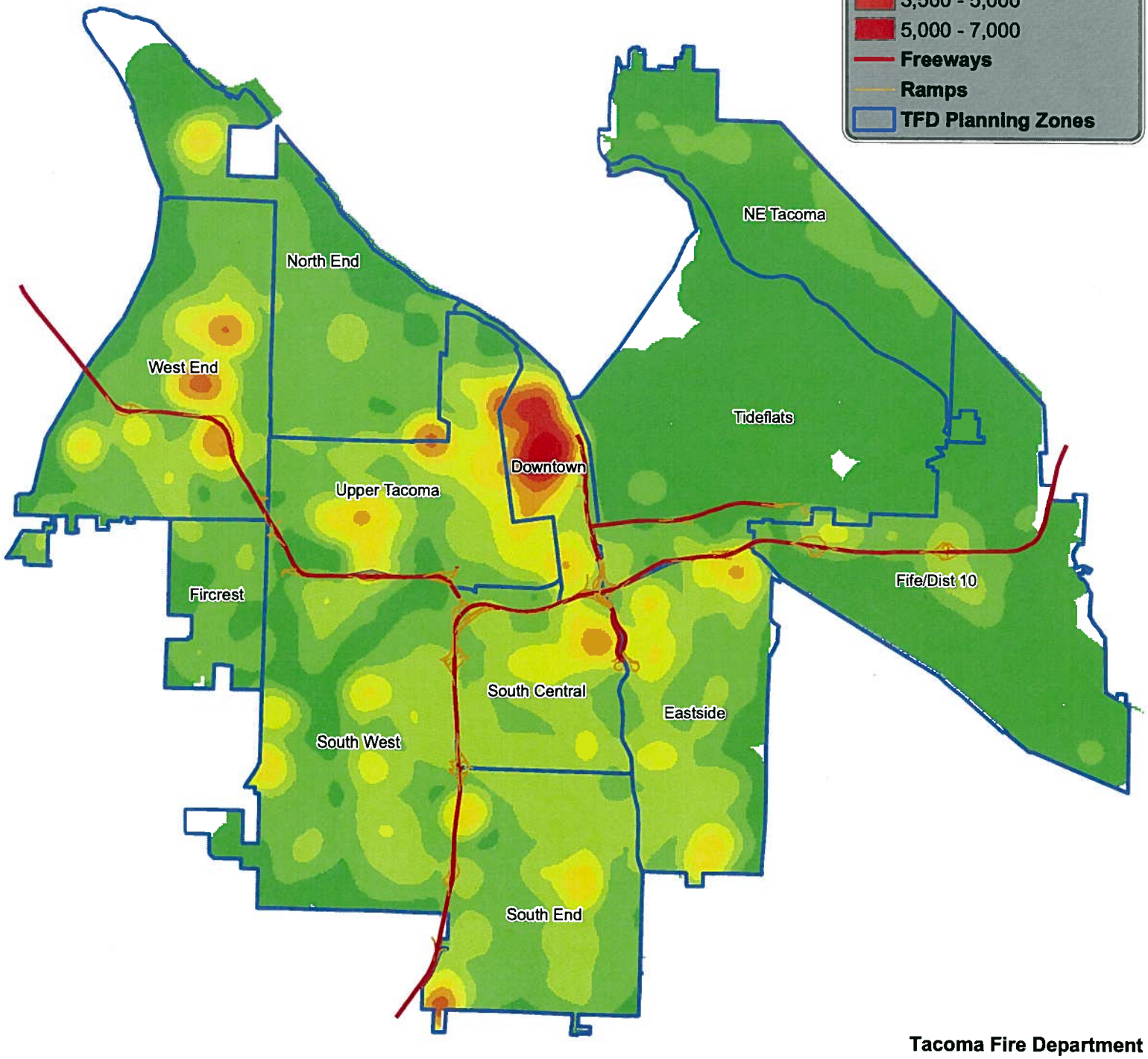


0 0.5 1 2 Miles

Tacoma Fire Department
Fire IS Services

This drawing is neither a legally recorded map nor a survey and is not intended to be used as one. It is to be used for reference purposes only.

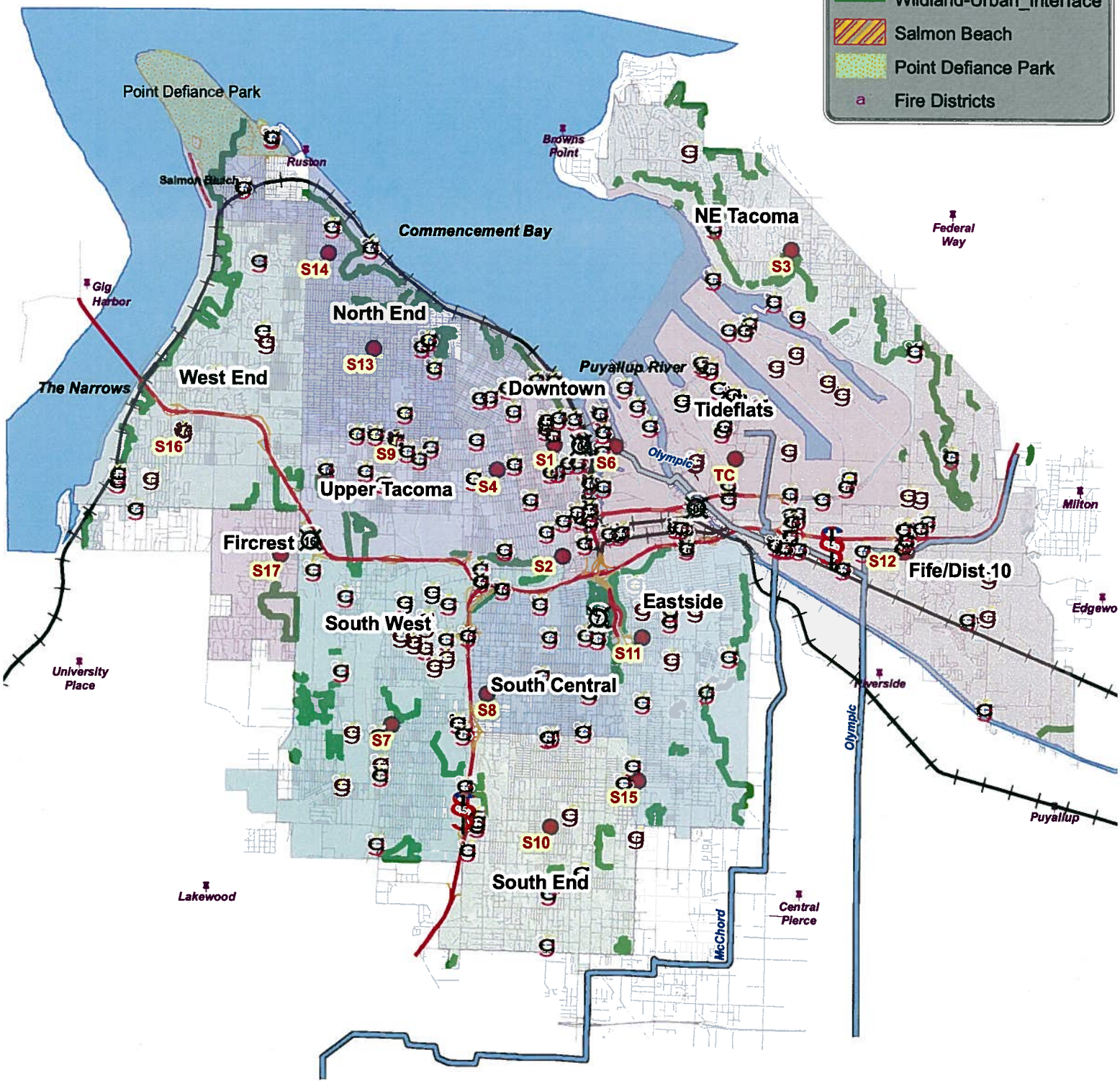
EMS Risk Distribution Map
High Acuity Incident Density
2003-2008



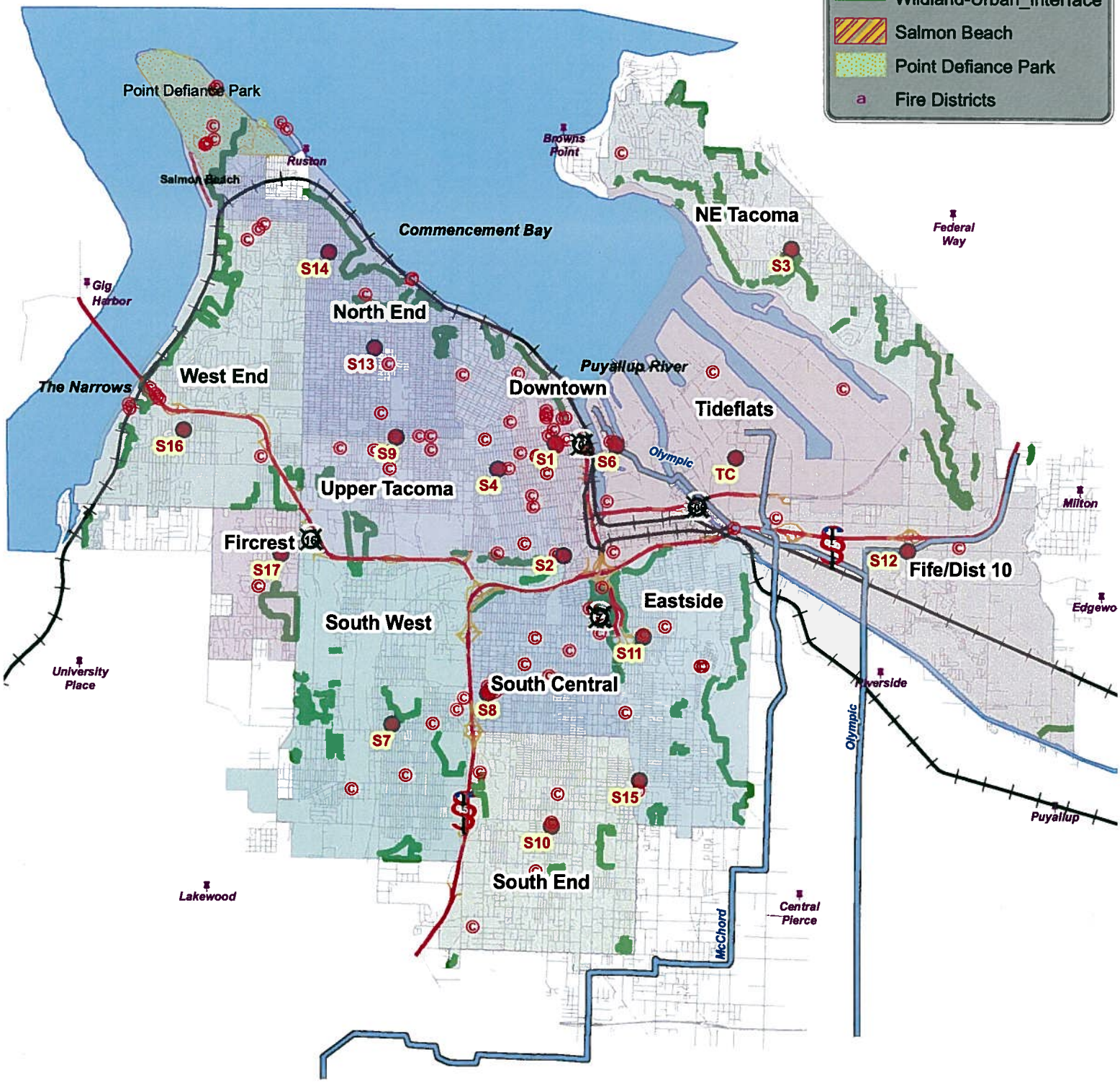
Tacoma Fire Department
Fire IS Services

This drawing is neither a legally recorded map nor a survey and is not intended to be used as one. It is to be used for reference purposes only.

Hazmat Risk Distribution Map
2003-2008



Tech Rescue Risk Distribution Map 2003-2008



APPENDIX H: TACOMA FIRE DEPARTMENT
COMPREHENSIVE TASK ANALYSIS - FIRE

TASKS	LOW RISK		MODERATE RISK		HIGH RISK	
CRITICAL: Tasks assigned to initiate fire suppression and address life safety	Personnel	Apparatus	Personnel	Apparatus	Personnel	Apparatus
Establish Command and control	1*	1 engine	1*/***	1 apparatus	1*/***	1 engine or ladder
Size up	*	1 engine	*/***	1 apparatus	*/***	1 engine or ladder
Accountability	*	1 engine	*	1 apparatus	*/***	1 engine or ladder
Safety	*	1 engine	*	1 apparatus	*/***	1 engine or ladder
Pump operations	1	1 engine	1	1 engine	1	1 engine or ladder
Establish attack lines	*+1	1 engine	2	1 engine	2	1 engine
Search and rescue	---	---	2**	1 apparatus	2**	1 engine or ladder
Ventilation	---	---	2**	1 apparatus	2	1 ladder
TOTAL: EFFECTIVE RESPONSE FORCE	3	1 engine	4	1 engine and 1 apparatus	6	2 engines OR 1 engine and 1 ladder
URGENT: Tasks assigned as additional personnel arrive on the scene to further control/stabilize the incident	Personnel	Apparatus	Personnel	Apparatus	Personnel	Apparatus
Permanent water supply	***	1 engine	0-2***	0-1 engine	2-4***	1-2 engines
Forcible entry	***	1 engine	0-4***	0-2 apparatus	4-6***	2-3 apparatus
Establish back-up lines	---	---	2-4	1-2 engines	4-6	2-3 engines
Establish exposure lines	---	---	0-4	0-2 engines	4-6	2-3 engines
Transfer Command	---	---	1-2	1st BC/ISO vehicle	2-6	1st BC/ISO vehicle
Additional safety			1	1st BC/ISO vehicle	1	1st BC/ISO vehicle
Rapid Intervention Crew (RIC)	---	---	2-4	1-2 apparatus	4-8	2-4 apparatus
Emergency Medical Services: BLS	**	1 engine	**	1 engine	**	1 engine
Emergency Medical Services: ALS	---	---	0-4***	0-2 medic companies	4***	2 medic companies
TOTAL: URGENT SUPPORT FORCE	3	1 engine	19	4 engines 1 ladder 1 medic company 1 BC/ISO vehicle	25	5 engines 2 ladders 1 medic company 1 BC/ISO vehicle
SUBSEQUENT: Tasks assigned to further support the incident through to termination	Personnel	Apparatus	Personnel	Apparatus	Personnel	Apparatus
Additional Command and Safety/Accountability support			2	2nd BC/ISO vehicle	2	2nd BC/ISO vehicle
Salvage and overhaul	---	---	2***	1 apparatus	4-8***	2-3 apparatus
Utilities	---	---	0-2***	0-1 apparatus	4***	2 apparatus
Rehab	---	---	2	1 medic company	4-6	2-3 medic companies
Air/light support	---	---	0-2**	0-1 apparatus	2-4	1-2 apparatus
Stand-by	---	---	2-4	1-2 apparatus	4-8	2-3 apparatus
Lobby control	---	---	---	---	0-6**	0-2 apparatus
Systems	---	---	0-4**/***	0-2 apparatus	4-6**/***	1-2 apparatus
TOTAL: FULL COMPLEMENT	3	1 engine	20 - 60	1-6 engines 1-2 ladders 2 BC/ISO vehicles 1 private ambulance 1-2 medic companies 3-13 apparatus	49 - 125	6-11 engines 2-4 ladders 2 ISO/BC vehicles 2-5 medic companies 5-12 apparatus

*One person can manage all of these tasks.
**These tasks are assigned as needed.
***Personnel may be assigned to other tasks once this task is complete.

Approved by SORC team 012909

APPENDIX I: TACOMA FIRE DEPARTMENT
COMPREHENSIVE TASK ANALYSIS - EMS

Task	Personnel			Apparatus
CRITICAL: Tasks assigned to initiate medical intervention to decrease mortality risk	FF/EMT	FF/PM	Other	
Command and control	1*/***		--	1st engine or ladder
Fire suppression	0-3**	--	--	1st engine or ladder
Gain access to patient	2**/***			1st engine or ladder
Initial assessment	*	--	--	1st engine or ladder
Chest compressions	0-1**	--	--	1st engine or ladder
Ventilation	1-2**/***	--	--	1st engine or ladder
AED operations	0-2**	--	--	1st engine or ladder
Basic airway management - adjuncts, oxygen, administration, c-spine	2*	--	--	1st engine or ladder
Control bleeding	1**/***	--	--	1st engine or ladder
Monitor vital signs	1***	--	--	1st engine or ladder
IV set up	1***	--	--	1st engine or ladder
Extrication	0-3**	--	--	1 ladder
Full spinal immobilization	3-4**/***	--	--	
Ongoing patient assessment/EKG		1***		1st medic company
Initiate IV	--	1**/***	--	1st medic company
Equipment set up	--	1***	--	1st medic company
Advanced airway management	--	1***	--	1st medic company
Administer meds	0-2***	1-2**/***	--	1st engine or ladder 1st medic company
Family member/bystander info	*	--	--	1st engine or ladder
Documenting vital patient info	*	--	--	1st engine or ladder
Patient report to transport personnel	1***	--	--	1st engine or ladder
Load patient into transport vehicle	2-7**/***	1**/***	--	1st engine or ladder 2nd engine or ladder 1st medic company
Contact base station/receiving center	1**/***	1*/**	--	1st engine or ladder 1st medic company
Transport patient	0-3**/***	2**/***	--	1st engine or ladder 1st medic company
TOTAL: EFFECTIVE RESPONSE FORCE	3-6	0-2	--	1 engine 1 medic company 1 ladder
SUBSEQUENT: Tasks assigned to further support the incident through to termination	FF/EMT	FF/PM	Other	Apparatus
Transfer Command			0-2**	1 BC/ISO vehicle
Establish/manage landing zone operations	0-4**	--		0-2 engines
Clean up biohazard waste	1***	--	--	
Transfer patient to hospital personnel	2-7**/***	2**/***	--	1st engine or ladder 1st medic company
TOTAL: FULL COMPLEMENT	3-18	1-2	0-2	1-4 engines 0-2 ladders 1 medic company 1 BC/ISO vehicle

*One person can manage all of these tasks.
**These tasks are assigned as needed.
***Personnel may be assigned to other tasks once this task is complete.

Approved by SORC Team February 12, 2009

APPENDIX J: TACOMA FIRE DEPARTMENT COMPREHENSIVE TASK ANALYSIS - MARINE FIREFIGHTING AND RESCUE

Task	Personnel	Apparatus
CRITICAL: Tasks assigned to initiate mitigation to prevent life and/or property loss and/or environmental damage		
Incident command/control/size up	1*	Fireboat
Safety	*	Fireboat
Accountability	*	Fireboat
Vessel management/crew supervision	*	Fireboat
Piloting the boat	1	Fireboat
Search and rescue (in water)	1-2**/***	Fireboat
Fire suppression	1-2**/***	Fireboat
Emergency medical services	1-2**/***	Fireboat
Recovery (people)	1-2**/***	Fireboat
Small vessel stabilization[1]	1-2**/***	Fireboat
Begin environmental mitigation	1-2**/***	Fireboat
Supplemental water supply[2]	1-2**/***	Fireboat
TOTAL: EFFECTIVE RESPONSE FORCE	3	1 Fireboat
SUBSEQUENT: Tasks assigned to further support the incident through to termination	**Personnel**	**Apparatus**
Transfer Command	0-2**	1 BC/ISO
Assist law enforcement	2**/***	Fireboat
Coordinate below surface operations support	2**/***	Fireboat External resources
Coordinate salvage and retrieval (property)	2**/***	Fireboat External resources
TOTAL: FULL COMPLEMENT	3-5 plus external resources	1 Fireboat 1 Battalion Chief/ISO External resources

[1] Efforts made to keep a vessel from sinking, capsizing or grounding and/or to prevent environmental damage and/or fuel spills.
[2] Use of the fireboat's pumping capacity to augment land-based fire suppression capability.

*One person may be able to manage all of these tasks.
**These tasks are assigned as needed.
***Personnel may be assigned to other tasks once this one is complete.

Approved by SORC Team February 12, 2009

APPENDIX K: TACOMA FIRE DEPARTMENT
COMPREHENSIVE TASK ANALYSIS - TECHNICAL RESCUE

Task	Personnel	Apparatus
CRITICAL: **Tasks assigned to initiate rescue to prevent life loss**		
Incident Command/control/size up	1*/***	1st engine/ladder
Incident safety	*	1st engine/ladder
Accountability	*	1st engine/ladder
Manage tech rescue operations	*	1st engine/ladder
Tech rescue safety	0-1**	1st engine/ladder 1 BC/ISO vehicle
Isolate and deny entry	1-6**/***	1-2 engines/ladders
Lock out/tag out	0-6**/***	1-2 engines/ladders
Ventilation/atmospheric monitoring	2-4**/***	1-2 engines/ladders
EMS treatment in tech rescue environment	2-5**/***	1 engine/ladder 1 medic company
Back up entry team(s)	0-4**/***	1-2 engines/ladders
Scene stabilization	6-14**/***	1 engine 1 ladder 1 medic company Engine 8 Ladder 2
TOTAL: EFFECTIVE RESPONSE FORCE	6-14	1 engine 1 ladder 1 medic company Engine 8 Ladder 2
SUBSEQUENT: **Tasks assigned to further support the incident through to termination**	**Personnel**	**Apparatus**
Transfer Command	0-2**	1st BC/ISO vehicle
Additional Command support	0-2**	2nd BC/ISO vehicle
Logistical support	1-3**/***	1 engine/ladder
Equipment set-up	2-4**/***	1-2 engines/ladders
Set up and operate air supply	0-3 **	AIR 42
Equipment deployment/operations	2-35**/***	6 engines 3 ladders 2 medic companies 2 BC/ISO vehicles HM 44 TR 48
Making entry for reconnaissance/rescue	1-2**/***	1 engine/ladder
Casualty packaging	1-4**/***	1 engine/ladder 1 medic company
Casualty extrication	1-6**/***	1-2 engine/ladder 1 medic company
EMS treatment post extrication	2-5**/***	1 engine/ladder 1 medic company
Incident termination	1-8**/***	1-3 engines/ladders
TOTAL: FULL COMPLEMENT	6-38	6 engines 3 ladders 2 medic companies 2 BC/ISO vehicles HM 44 AIR 42 TR 48

*One person may be able to manage all of these tasks.
**These tasks are assigned as needed.
***Personnel may be assigned to other tasks once this one is complete.

Approved by SORC Team February 12, 2009

APPENDIX L: TACOMA FIRE DEPARTMENT
COMPREHENSIVE TASK ANALYSIS: HAZMAT

Task	Personnel	Apparatus
CRITICAL: Tasks assigned to initiate mitigation to prevent life/property loss and/or environmental damage		
Establish Command and control	1*/***	1 engine or ladder
Size up	*/***	1 engine or ladder
Accountability	*/***	1 engine or ladder
Safety	*/***	1 engine or ladder
Manage HazMat operations	*	1 engine/ladder
HazMat safety	0-1**/***	1 engine/ladder Engine 12 Ladder 3
Identify hazardous materials	1-5**/***	1 engine/ladder
Evaluate hazards	1-5**/***	1 engine/ladder
Control access to the scene	1-12**/***	1 engine 1 ladder Engine 12 Ladder 3
Establish incident control zones	1-12**/***	1 engine 1 ladder Engine 12 Ladder 3
Isolate and/or evacuate people in hot and warm zones	1-12**/***	1 engine 1 ladder Engine 12 Ladder 3
TOTAL: EFFECTIVE RESPONSE FORCE	3-12	1 engine 1 ladder Engine 12 Ladder 3
SUBSEQUENT: Tasks assigned to later arriving resources to further support the incident through to termination		
Transfer Command	0-2**	1 BC/ISO vehicle
Select PPE	1-2**/***	1 engine/ladder
Extinguish fire	2-32**/***	4 engines 2 ladders Engine 12 Ladder 3 2 medic companies 2 BC/ISO vehicles

APPENDIX L: TACOMA FIRE DEPARTMENT COMPREHENSIVE TASK ANALYSIS: HAZMAT

Task	Personnel	Apparatus
Cool hazardous material container(s)	2-12**/***	1-4 engines/ladders
Confine and contain hazardous material release	2-32**/***	4 engines 2 ladders Engine 12 Ladder 3 2 medic companies 2 BC/ISO vehicles
Stop further hazardous material release	2-8**/***	1-3 engines/ladders
Coordinate hazard removal	1-3**/***	1 engine/ladder
Rescue casualties	2-6**/***	1-2 engines/ladders
Decontaminate people, equipment and/or apparatus	2-32**/***	4 engines 2 ladders Engine 12 Ladder 3 2 medic companies 2 BC/ISO vehicles
Provide emergency medical services	2-5**/***	1 engine/ladder I medic company
Dispose of contaminated clothing and/or equipment	1-6**/***	1-2 engines/ladders
Demobilize and terminate TFD involvement	1-3**/***	1 engine/ladder
Rehab TFD personnel	2-8**/***	1-2 engines/ladders 1 medic company
TOTAL: FULL COMPLEMENT	3-32	4 engines 2 ladders Engine 12 Ladder 3 2 medic companies 2 BC/ISO vehicles

*One person may be able to handle all of these tasks
** These tasks are assigned as needed
***Personnel may be assigned to other tasks once this one is complete

Approved by SORC team 022609