

EMERGENCY SERVICES  
MASTER PLAN  
VOLUME 1 OF 2: TECHNICAL REPORT

APTOS/LA SELVA  
FIRE PROTECTION DISTRICT

OCTOBER 11, 2017

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**VOLUME 2 of 2 – Map Atlas (separately bound)**

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## EXECUTIVE SUMMARY

The Aptos/La Selva Fire Protection District (District) retained Citygate Associates, LLC (Citygate) to develop a comprehensive Emergency Services Master Plan, to include Standards of Cover (SOC), community risk, management/administration, staffing, and fiscal assessments, as well as future service demand and alternative service model elements. The goal of this Master Plan is to provide a solid data-based foundation for future District planning.

This Master Plan is presented in several sections, including this Executive Summary outlining the most significant findings and recommendations; the fire station/crew deployment analysis supported by maps and response statistics; assessment of the District's administration/management, staffing, and financial elements; and future service demand and alternative service models. Section 5, beginning on page 92, integrates all of the findings and recommendations presented throughout the report. A separate Map Atlas (Volume 2) contains all of the maps referenced throughout this study. Overall, there are 42 findings and 10 specific action recommendations.

### **POLICY CHOICES FRAMEWORK**

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There are no mandatory federal or state regulations directing the level of fire service staffing, response times, or outcomes. Thus, the level of fire protection services provided are a *local policy decision*, and communities have the level of fire services that they can afford, which is not always the level they may desire. However, the body of regulations on fire services provides that if services are provided at all, they must be done so with the safety of the firefighters and citizens in mind.

### **OVERALL SUMMARY OF DISTRICT FIRE SERVICES**

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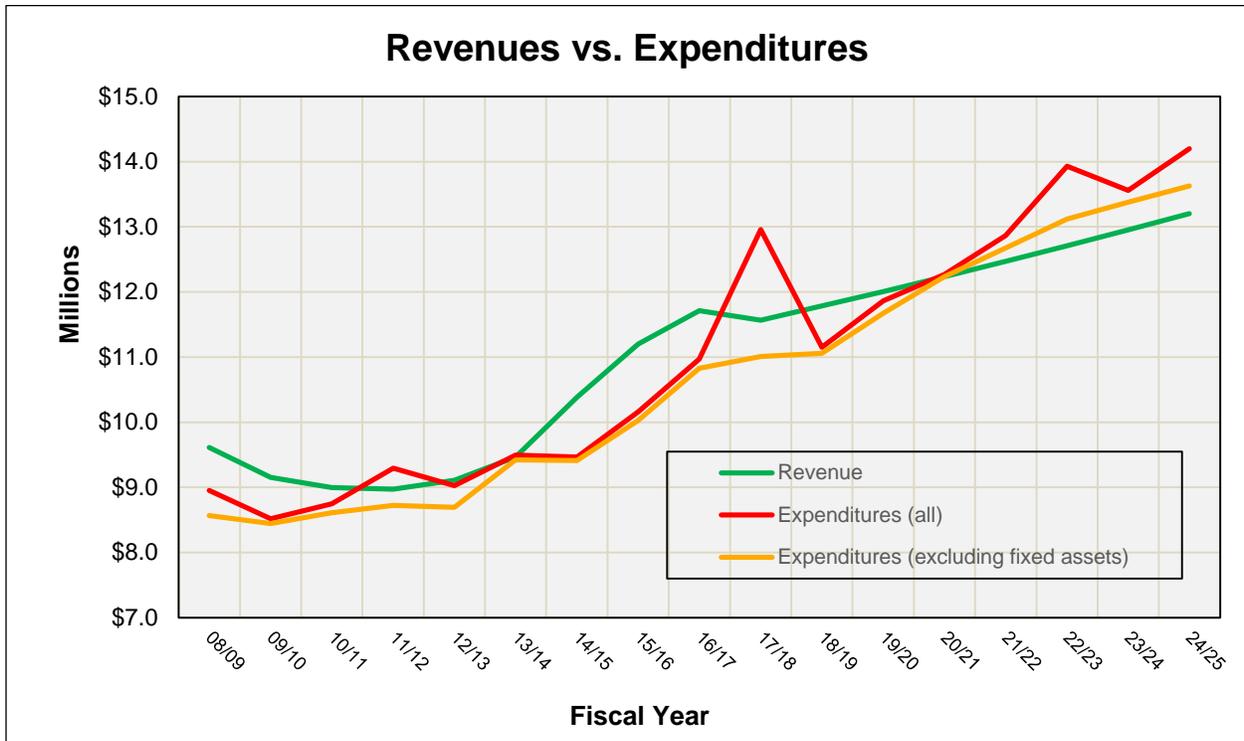
Citygate finds that that the District is well organized to accomplish its mission to serve a predominantly residential and retail/service land use pattern with a geographically challenging road network and daily traffic congestion that make it difficult to serve some areas of the District quickly. Overall, the challenges facing the District can be summarized in three themes: (1) *long-term fiscal viability*; (2) *first-due response performance*; and (3) *administrative/management capacity*.

#### **Challenge #1: Long-Term Fiscal Viability**

While the District has historically maintained a structurally balanced budget by keeping expenditures within annual revenues, the projected budget for fiscal year (FY) 2017–18 will require a \$1.4 million augmentation from the District's end-of-year General Fund balance due to planned capital expenditures of nearly \$2 million. Then, beginning in FY 2020–21, projected

annual expenditures, excluding capital costs, *exceed projected revenues* in each succeeding year, requiring augmentation from the General Fund end-of-year balance to achieve a balanced budget as illustrated in Figure 1.<sup>1</sup> Given this projected increasing annual budget deficit, the District faces a *potential fiscal crisis*, with the potential to exhaust the General Fund balance within the next 10 years.

**Figure 1—Projected Revenue versus Expenditures**



Citygate recommends the following to facilitate long-term fiscal viability:

- ◆ Engage in multiple-year fiscal planning to forecast potential future structural budget deficits.
- ◆ Develop one or more strategies to mitigate future projected structural budget deficits in advance of occurrence.
- ◆ Establish and gradually fund a multi-year capital renewal/replacement plan as funding permits.

<sup>1</sup> Based on 1.5 percent annual revenue growth

- ◆ Establish and maintain restricted reserve funds equivalent to at least 17 percent, and preferably 20 percent or more, of annual operating expenses, to fund other future fiscal liabilities and unanticipated contingencies or emergencies.
- ◆ Develop and adopt fiscal policies conforming to recognized best practices for public agencies.

## **Challenge #2: Initial Unit (First-Due) Response Performance**

Fire service deployment, simply stated, is about the *speed* and *weight* of the response. *Speed* refers to initial response (first-due) of all-risk intervention resources (engines, trucks, and/or rescue ambulances) strategically deployed across a jurisdiction for response to emergencies within a time interval to achieve desired outcomes. *Weight* refers to multiple-unit responses (Effective Response Force or ERF) for more serious emergencies such as building fires, multiple-patient medical emergencies, vehicle collisions with extrication required, or technical rescue incidents. In these situations, a sufficient number of firefighters must be assembled within a reasonable time interval to safely control the emergency and prevent it from escalating into a more serious event.

If desired outcomes include limiting building fire damage to only part of the inside of an affected building and/or minimizing permanent physiological/neurological deficit resulting from medical emergencies, then first-due units should arrive within 7:30 minutes from 9-1-1 notification, and ERF resources should arrive within 11:30 minutes of 9-1-1 notification, all at 90 percent or better reliability. Current first-due response performance is *slower* than this goal by nearly three minutes (35 percent) as shown in Table 1.

**Table 1—90<sup>th</sup> Percentile Call to First Arrival Response Performance**

Incident Location	2016
District-Wide	10:27
Station 1	9:54
Station 2	10:27
Station 3	11:59

Source: Aptos/La Selva FPD incident records; SCR911 CAD records

Numerous factors influence the District’s first-due response performance, including large fire station first-due response areas, longer-than-expected dispatch center call processing and crew turnout time performance, and slower travel times due to the District’s topography, road network, and daily traffic congestion.

Citygate recommends the following to improve first-due response performance:

- ◆ Collaborate with Santa Cruz Regional 9-1-1 to improve call processing performance more in alignment with industry-recognized best practice standards while maintaining dispatch accuracy.
- ◆ Work to improve 90<sup>th</sup> percentile turnout time performance to meet a recommended target of 2:00 minutes or less.
- ◆ As long-term funding permits, consider dynamic deployment of one or more “fast response”<sup>2</sup> units during peak traffic congestion and/or peak service demand periods. This option *should not be considered* until long-term fiscal planning identifies ongoing stable revenues sufficient to support this cost in addition to the other fiscal recommendations identified above.
- ◆ As capital funding permits, consider relocation of Fire Station 3 closer to Highway 1 in the vicinity of San Andreas Road and Seascape Boulevard.

**Challenge #3: Administrative/Management Capacity**

While the District has a highly qualified, capable, and dedicated administrative/management staff, it is *understaffed* to meet current and anticipated future workload as summarized in Table 2. The current headquarters staff is insufficient to handle all of the needed duties by the annual hours shown in the following table.

**Table 2—Administration/Management Workload Gap Summary**

Administrative/Management Function	Workload Capacity Gap	
	Annual Hours	FTE Personnel <sup>1</sup>
Administration / Business Services	980–1,960	0.5–1.0
Fire Prevention	1,960–3,920	1.0–2.0
Training/Safety	980–1,960	0.5–1.0
Operations	320–640	0.16–0.33
<b>Total</b>	<b>4,240–8,480</b>	<b>2.16–4.33</b>

<sup>1</sup> FTE = full-time equivalent positions assuming 1 FTE = 1,960 hours

<sup>2</sup> Smaller (1- to 1/2-ton or less) apparatus with EMS and minimal firefighting service capabilities

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To resolve these gaps, additional administrative support capacity would be needed as prioritized with estimated annual costs in Table 3.

**Table 3—Estimated Administrative/Management Gap Costs (Annual)**

Priority	Administrative/Management Function	FTE <sup>1</sup>	Estimated Annual Cost		
			Low	High	Average
1	Administration / Business Services <sup>2</sup>	0.5–1.0	\$45,689	\$95,042	\$70,365
2	Fire Prevention <sup>3</sup>	1.0–2.0	\$91,377	\$190,083	\$140,730
3	Training/Safety <sup>2</sup>	0.5–1.0	\$45,689	\$95,042	\$70,365
4	Operations <sup>2</sup>	0.16–0.33	\$15,200	\$30,400	\$22,800
<b>Total</b>					<b>\$304,260</b>

<sup>1</sup> FTE = full-time equivalent positions assuming 1 FTE = 1,960 hours

<sup>2</sup> Assumes Administrative Assistant position classification with benefits

<sup>3</sup> Assumes 1 Fire Inspector and 1 Administrative Assistant position classification with benefits

Citygate recommends the District consider the following to enhance its administrative/management capacity:

- ◆ Collaboration with the Central Fire Protection District of Santa Cruz County (Central FPD) to resurrect the Cooperative Prevention Project (CPP).
- ◆ Sharing/consolidation of mid-management staff with the Central FPD, with the Central FPD Battalion Chiefs responsible for shift administration and emergency incident management and the Aptos/La Selva FPD Division Chiefs responsible for administration of both agencies’ operations, emergency medical services, prevention/risk reduction, training, safety, and fleet maintenance programs.
- ◆ Sharing/consolidation of some or all administrative support services, such as accounting, payroll, human resources, risk management, technology management, and/or website / social media administration with the Central FPD or another public agency.
- ◆ As long-term strategic planning and funding permit, provision of additional administrative/management capacity as prioritized in Table 3. This option *should not be considered* until long-term fiscal planning identifies ongoing stable revenues sufficient to support this cost in addition to the other fiscal recommendations identified above.

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## SECTION 1—INTRODUCTION AND BACKGROUND

Citygate Associates, LLC’s Emergency Services Master Plan for the Aptos/La Selva Fire Protection District is presented in this volume. Citygate’s scope of work and corresponding Work Plan was developed consistent with Citygate’s Project Team members’ experience in fire administration and deployment. Citygate utilizes various National Fire Protection Association (NFPA) and Insurance Services Office (ISO) publications as best practice guidelines, along with the self-assessment criteria of the Commission on Fire Accreditation International (CFAI).

### 1.1 REPORT ORGANIZATION

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

Executive Summary: Summary of current District services and significant future challenges.

**Section 1** Introduction and Background: An introduction to the study and background facts about Santa Cruz County and the Fire District.

**Section 2** Standards of Cover Assessment: An overview of the SOC process and detailed analysis of existing deployment policies, outcome expectations, community risk, critical tasks, distribution and concentration effectiveness, reliability and historical response effectiveness, overall deployment evaluation, and viable service delivery alternatives.

**Section 3** Administration, Management, Staffing, and Fiscal Assessment: A comprehensive assessment of the District’s administration and management services, operational and administrative support staffing, and overall fiscal stability.

**Section 4** Future Service Demand and Alternate Service Delivery Models: A detailed analysis of future emergency and non-emergency service demand, evaluation of viable alternative emergency and non-emergency service delivery models, and recommended short- and longer-term strategies.

**Section 5** Findings and Recommendations: A list of all of the findings and recommendations from this study grouped by deployment; administration, management, staffing, and fiscal; and alternative service delivery models.

**Appendix A** Risk Assessment

**Appendix B** Incident Statistical Analysis

### **1.1.1 Goals of the Report**

This report cites findings and makes recommendations, as appropriate, related to each finding. Findings and recommendations throughout Sections 1–4 and Appendices A–B of this report are sequentially numbered. To provide a comprehensive summary, a complete list of all these same findings and recommendations, in order, is included in Section 5.

This document provides technical information about how fire services are provided and legally regulated and how the District currently operates. This information is presented in the form of recommendations and policy choices for consideration by the District and the communities it serves.

The result is a solid technical foundation upon which to understand the advantages and disadvantages of the choices facing District leadership and the communities it serves regarding how best to provide fire services, and more specifically, at what level of desired outcome and expense.

### **1.1.2 Limitations of Report**

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

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

## **1.2 PROJECT APPROACH AND SCOPE OF WORK**

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### **1.2.1 Project Approach and Research Methods**

Citygate utilized multiple sources to gather, understand, and model information about the District for this study. Citygate began by requesting a large amount of background data and information to better understand current costs; service levels; history of service level decisions; and what other prior studies, if any, had to say.

In subsequent site visits, Citygate followed up with focused interviews of the District’s Master Plan team members and other District stakeholders, including a District Board of Directors Study Session on February 23, 2017, to gain public input for this project. Citygate reviewed demographic information about the District and the potential for future growth and development.

While collecting and garnering an understanding of information about the District and its operations, Citygate obtained map and response data from which to model current and projected future fire service deployment, with the goal to identify the location(s) of stations and crew quantities required to best serve the District as it currently exists and to facilitate future deployment planning.

Once Citygate gained an understanding of the District's service area and its fire and non-fire risks, the Citygate team then developed a model of fire services that was tested against the travel time mapping and prior response data to ensure an appropriate fit. This resulted in Citygate being able to propose an approach to both address current needs with effective and efficient use of existing resources, as well as long-range needs as the District continues to evolve. The result is a framework for improving District services while meeting reasonable community expectations and fiscal realities.

Following the deployment analysis, Citygate evaluated the District's administrative and management services, specifically examining responsibilities, capabilities, and workload of the District's four divisions. Citygate also evaluated the administrative staffing allocated to the various District functions, and operational staffing and performance by incident/hazard type. Citygate then conducted a comprehensive evaluation of the District's overall fiscal stability, including an evaluation of revenues, expenditures, capital renewal/replacement, fiscal reserves, debt, unfunded liabilities, and short- and long-term financial planning and projections.

The final element of the Master Plan evaluates future District growth and service demand by risk type and identifies and evaluates potential alternative emergency and non-emergency service delivery models. Citygate identifies long-term strategies, with incremental short- and mid-term goals to achieve identified deployment, administrative, management, staffing, and fiscal recommendations.

### **1.2.2 Project Scope of Work**

Citygate's approach to this Standards of Cover and management/administration assessment involved:

- ◆ Reviewing agency-provided data and information and conducting stakeholder listening sessions with project stakeholders.
- ◆ Utilizing a geographic mapping software program called FireView™ to model fire station travel time coverage.
- ◆ Using an incident response time analysis program called StatsFD™ to review the statistics of prior incident performance, from which results were plotted not only on graphs and charts, but also over Google Earth images using 3D tools.

- ◆ Utilizing the Commission on Fire Accreditation International self-assessment criteria and National Fire Protection Association Standard 1201, Standard for Providing Emergency Services to the Public, and other NFPA standards, as the basis for evaluating support services, including administration, dispatch, fire prevention, safety, training, and facility and equipment maintenance.
- ◆ Reviewing and evaluating the responsibilities, capabilities, staffing levels, and workload of the District's Administrative, Operations, Fire Prevention, and Training/Safety divisions.
- ◆ Evaluating administrative support allocated to the various District functions and divisions.
- ◆ Evaluating operational staffing and performance by incident type.
- ◆ Reviewing and evaluating the District's overall fiscal health, including revenues, expenditures, debt, reserve funds, and long-term fiscal planning.

### ***Future Service Demand and Service Models***

Citygate's assessment of future District service demand and potential alternate service models includes the following elements:

- ◆ Identification and evaluation of future District population and related development growth.
- ◆ Projection of future service demand by risk type.
- ◆ Identification and evaluation of potential alternate service delivery models.
- ◆ Recommendation of appropriate risk-specific response performance goals.
- ◆ Identification of a long-term strategy, including incremental short- and mid-term goals to achieve desired response performance objectives.

## **1.3 FIRE DISTRICT OVERVIEW**

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Located in south-central Santa Cruz County between the City of Capitola and the City of Watsonville, the Aptos/La Selva Fire Protection District encompasses 27 square miles with an estimated population of 30,000, including the unincorporated communities of Aptos, Rio del Mar, Seacliff, Seascapes, Day Valley, and La Selva Beach, as shown in Figure 2. The District is predominantly residential in nature, with more than 12,000 residential and nearly 600 commercial occupancies consisting primarily of retail and service-related businesses. The District's current assessed valuation is \$11.725 million.

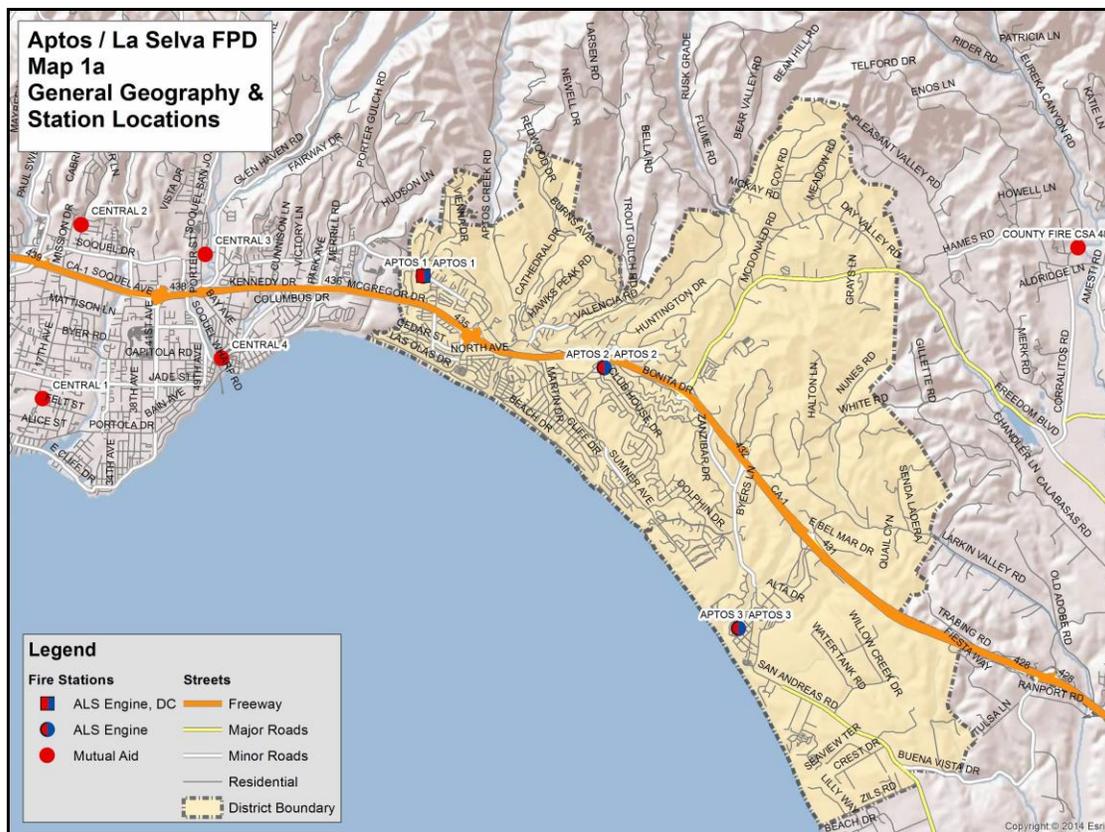
**Aptos/La Selva Fire Protection District**  
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With elevation ranging from sea level to approximately 1,000 feet, the climate is typical of the central California coast with comfortable weather all year. Summer temperatures average in the 70s, with winter temperatures averaging in the 60s. Annual rainfall averages approximately 23 inches, occurring generally from November through March. Winds are generally onshore from the northwest.

Established in 1930, the District was reaffirmed and documented by the Secretary of State in 1958, and it operates under the authority of California Health and Safety Code Section 13800 et seq. (Fire Protection District Law of 1987). The District consolidated with the La Selva Beach Fire Protection District in 1986 and annexed the Day Valley area in 1988, the Spring Valley area in 2006, and the Eastern Boundary area in 2007.

The District provides fire suppression, Advanced Life Support (ALS) pre-hospital emergency medical, rescue, initial hazardous material spill/release, fire prevention, and public education services from three fire stations with 40 employees. The District responds to approximately 2,500 calls for service annually, with dispatch services provided by Santa Cruz Regional 9-1-1 in Santa Cruz, a Joint Powers Authority providing 9-1-1 and dispatch services for multiple public agencies in Santa Cruz and San Benito counties. The District received an ISO Public Protection Class 2 Rating in August 2016.

**Figure 2—Aptos/La Selva Fire Protection District**



### 1.3.1 District Organization

The District is governed by a five-member Board of Directors elected to staggered four-year terms. The Board appoints the Fire Chief, who administers all District services. The District is further organized into four divisions with 39 budgeted positions, as shown in Table 4 and Figure 3.

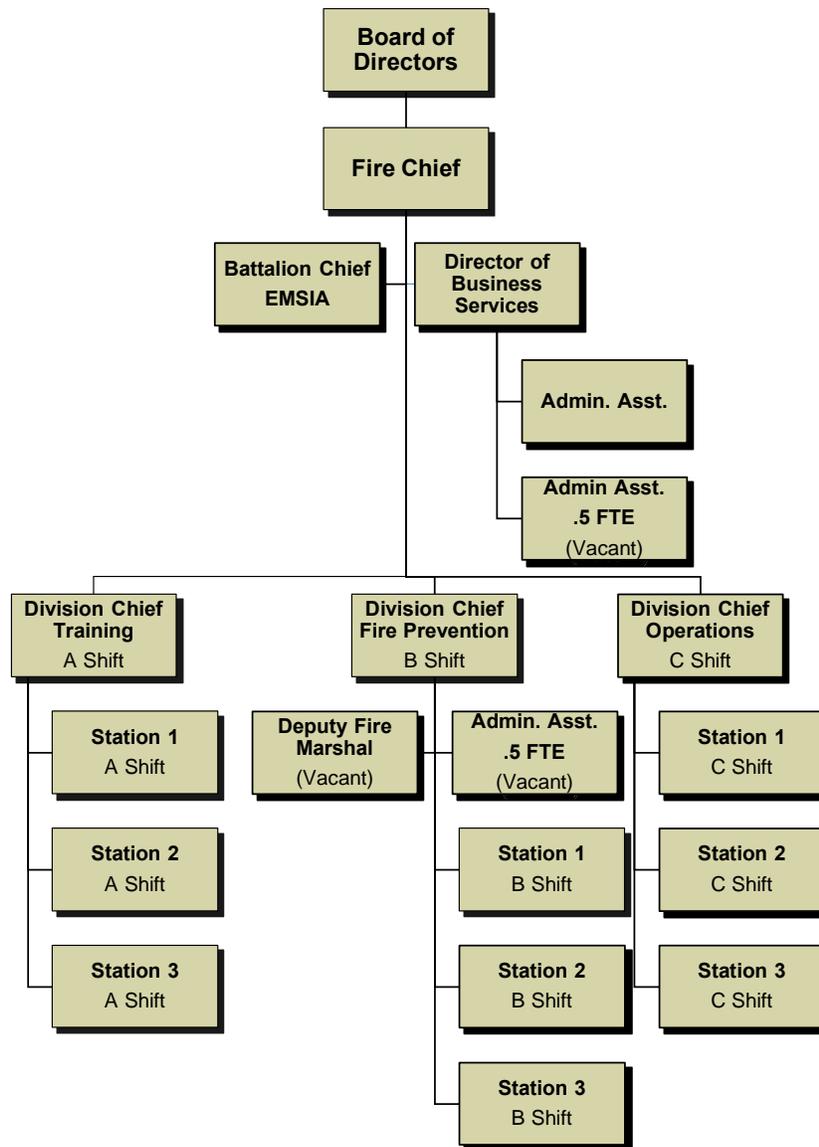
**Table 4—Fire District Organization**

Division	Budgeted Positions
Administration / Business Services	<b>3.5</b>
Operations	<b>32</b>
Fire Prevention	<b>2.5</b>
Training/Safety	<b>1</b>
<b>Total</b>	<b>39</b>

Source: Aptos/La Selva FPD

Figure 3 shows the organizational structure of the District. It should be noted that the Emergency Medical Services Integration Authority (EMSIA) Battalion Chief is not a District employee; the District serves as the host agency for this position funded by the EMSIA, a Joint Powers Authority.

**Figure 3—Aptos/La Selva FPD Organizational Chart**



### 1.3.2 Facilities and Resources

The District provides services from three fire stations as shown in Table 5 and Figure 2.

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**Table 5—Aptos/La Selva FPD Facilities and Assigned Resources**

Station	Station Name	Location	Assigned Resources
1	Aptos	6934 Soquel Drive, Aptos	Engine 3511      Chief 3500    Chief 3505 Engine 3536      Chief 3501    Prev. 3581 Medic 3566        Chief 3502 Utility 3595, 3596    Chief 3504
2	Rio Del Mar	300 Bonita Drive, Rio Del Mar	Engine 3512 Engine 3550 (water tender) Rescue 3560
3	La Selva Beach	312 Estrella Drive, La Selva Beach	Engine 3513 Engine 3510 (reserve)

Source: Aptos/La Selva FPD

Response personnel work a 48/96-hour shift schedule of two consecutive 24-hour days on duty followed by four days off duty. The three Division Chiefs work a rotating four-day, 40-hour workweek, with 24-hour emergency response coverage when their assigned shift is on duty. The District provides services with four Type-1 structural fire engines, one Type-3 wildland fire engine, one 3,000-gallon water tender, one heavy rescue unit, one ambulance, five command vehicles, and three utility/pool vehicles.

## SECTION 2—STANDARDS OF COVER ANALYSIS

This section provides a detailed, in-depth analysis of the District’s current ability to deploy and mitigate emergency risks within its service area. The response analysis uses prior response statistics and geographic mapping to help the District and the community visualize what the current response system can and cannot deliver.

### 2.1 STANDARDS OF COVER PROCESS OVERVIEW

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The core methodology used by Citygate in the scope of its deployment analysis work is outlined in the “Standards of Cover” (SOC) 5<sup>th</sup> and 6<sup>th</sup> Editions, which is a systems-based methodology to fire services deployment as published by the CFAI. The SOC is a systems-based approach assuring that other factors, such as local risk and demographics, help determine the level of protection best fitting the District’s needs. Citygate has adopted this methodology as a comprehensive tool to evaluate fire station locations. Such a systems approach, rather than a one-size-fits-all prescriptive formula, assists elected officials in making informed decisions on fire and emergency medical services (EMS) deployment.

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

Table 6 describes the eight elements of the Standards of Cover process.

**Table 6—Standards of Cover Process Elements**

SOC Element		Description
1	Existing Deployment Policies	A review of current agency deployment policies.
2	Community Outcome Expectations	A review of the community's expectations relative to the agency's response to emergencies.
3	Community Risk Assessment	A review of the assets at risk within the community.
4	Critical Task Analysis	A review of the essential tasks that must be performed and the personnel required to deliver a stated outcome for an Effective Response Force (ERF).
5	Distribution Analysis	A review of the spacing of initial response (first-due) resources (typically engines) to control routine emergencies.
6	Concentration Analysis	A review of the spacing of fire stations so that larger or more complex emergencies receive sufficient resources in a timely manner (ERF).
7	Reliability and Historical Response Effectiveness Analysis	Using recent prior response statistics, determining the percentage of conformance to established response performance goals the existing deployment system delivers.
8	Overall Evaluation	Proposing Standard of Cover statements by risk type as appropriate.

Source: CFAI *Standards of Cover*, 5<sup>th</sup> Edition

Fire service deployment, simply stated, is about the *speed* and *weight* of the response. *Speed* refers to initial response (first-due), all-risk intervention resources (engines, trucks, and/or rescue ambulances) strategically deployed across a jurisdiction for response to emergencies within a specified time interval to control routine to moderate emergencies without the incident escalating to greater size or complexity. *Weight* refers to multiple-unit responses for more serious emergencies such as building fires, multiple-patient medical emergencies, vehicle collisions with extrication required, or technical rescue incidents. In these situations, a sufficient number of firefighters must be assembled within a reasonable time interval to safely control the emergency and prevent it from escalating into a more serious event. Table 7 illustrates this deployment paradigm.

**Table 7—Fire Service Deployment Paradigm**

Element	Description	Purpose
<b>Speed of Response</b>	Travel time of all-risk initial response intervention units strategically located across a jurisdiction.	Controlling routine to moderate emergencies without the incident escalating in size or complexity.
<b>Weight of Response</b>	Number of firefighters in a multiple-resource response for serious emergencies.	Assembling enough firefighters within a reasonable time frame to safely control the emergency without escalation.

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

## **2.2 CURRENT DEPLOYMENT**

**SOC ELEMENT 1 OF 8**  
**EXISTING DEPLOYMENT**  
**POLICIES**

In February 2005, the District adopted first-due and Effective Response Force (ERF or First Alarm) multiple-unit response performance policy statements, including planning (demand) zones based on fire station first-due response areas and property use as follows:

### ***Distribution (First-Due) Policy Statement***

*For 90 percent of all incidents, the first-due unit shall arrive within six minutes in the suburban demand zone or eight minutes in the rural demand zone.<sup>3</sup> The first-due unit shall be capable of advancing the first line for fire control or starting rescue when a life hazard is present, or providing Advanced Life Support with defibrillation for medical incidents.*

### ***Concentration (ERF) Policy Statement***

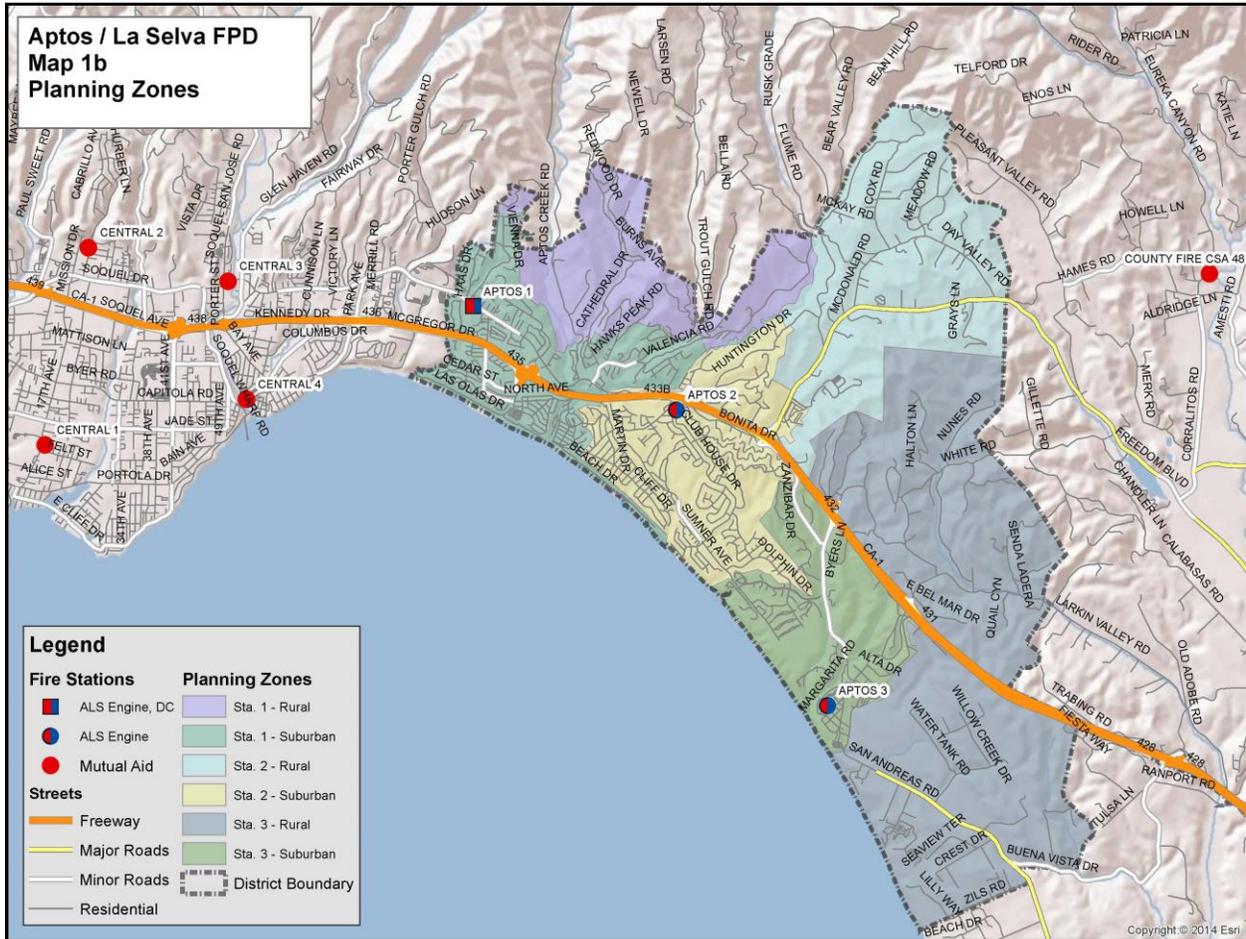
*For 90 percent of all risk areas and for all risk types, an effective response force shall arrive within twelve minutes' total response time, provide 1,500 gallons per minute for firefighting and maintain compliance with all applicable safety mandates. An effective response force for*

<sup>3</sup> The suburban and rural demand zones are shown in Figure 4.

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confirmed structure fires will be 16/17 personnel (five 3-person engines or trucks and 1 Division Chief).

**Figure 4—Aptos/La Selva FPD Demand Zones**



The policy statement further includes the goal of limiting the number of fires that spread beyond the room of origin. The District has good data from its computer-aided dispatch (CAD) system and its records management system (RMS) indicating actual response performance.

**Finding #1:** While the District has adopted response time policies somewhat consistent with industry-recognized best practices, the policies do not define the start time as being either from time of receipt of the 9-1-1 call, fire crew notification, or driving time.

Another source for deployment policy is the local/regional EMS system. Santa Cruz County, like many other California counties, has established an Exclusive Operating Area (EOA) for the

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provision of Advanced Life Support (ALS) emergency ambulance transportation services. Since 1990, American Medical Response, West (AMRW) has been the County’s ambulance transportation provider under a contract administered by the Santa Cruz County Health Services Agency. This is a performance-based contract requiring ALS ambulance response performance, as shown in Table 8.

**Table 8—ALS Ambulance Response Performance Requirements**

Population Density <sup>1</sup>	ALS Ambulance Response Standard <sup>2</sup>
<b>Urban</b>	8:00 minutes or less @ 90% reliability
<b>Suburban</b>	12:00 minutes or less @ 90% reliability
<b>Rural</b>	20:00 minutes or less @ 90% reliability

<sup>1</sup> Urban density: 101–500 per square mile; suburban density: 51–100 per square mile; rural density: 5–50 per square mile

<sup>2</sup> From time of dispatch to time of arrival

Source: Santa Cruz County Emergency Ambulance Agreement

To ensure contract response performance compliance, AMRW has partnered with the Emergency Medical Services Integration Authority (EMSIA), a Joint Powers Authority consisting of 11 Santa Cruz County fire agencies providing ALS first-responder services pursuant to a Prehospital Emergency Medical Services Agreement with AMRW. Under this agreement, the fire agencies provide certain ALS services within their respective service areas, thus enabling AMRW to provide emergency medical and transport services under the County contract with modified (longer) response time requirements, as shown in Table 9. The District is one of the EMSIA member agencies and provides ALS emergency medical services every day of the year from each of its three fire stations.

**Table 9—Santa Cruz County EMS Response Standards**

Population Density <sup>1</sup>	ALS First Responder	ALS Ambulance
<b>Urban</b>	8:00 minutes or less @ 90%	12:00 minutes or less @ 90%
<b>Suburban</b>	12:00 minutes or less @ 90%	18:00 minutes or less @ 90%
<b>Rural</b>	20:00 minutes or less @ 90%	30:00 minutes or less @ 90%

<sup>1</sup> Urban density: 101–500 per square mile; suburban density: 51–100 per square mile; rural density: 5–50 per square mile  
 Source: Santa Cruz County Emergency Ambulance Agreement

A third potential source for deployment policy is the Safety Element of the County General Plan. The only reference to response time standards in the Santa Cruz County General Plan is in

reference to the general prohibition of subdivisions more than a 20-minute response time from the nearest fire station.<sup>4</sup>

National Fire Protection Association (NFPA) Standard 1710,<sup>5</sup> a recommended deployment standard for career fire departments in urban/suburban areas, calls for arrival of the initial (first-due) intervention unit within 6:20 minutes from the time of call receipt in fire dispatch and arrival of all of the resources comprising the First Alarm (Effective Response Force) within 10:20 minutes, 90 percent of the time. The standard further identifies a minimum initial ERF of 14–15 personnel for a fire in a typical 2,000 square-foot, two-story, single-family dwelling without a basement or other exposed buildings.

In Citygate’s experience, very few fire agencies can meet this response performance standard, primarily due to existing resource distribution and the costs associated with re-locating those resources. Citygate therefore recommends that its *urban/suburban* client agencies consider a first-due performance measure of 7:30 minutes or less from fire dispatch notification, 90 percent of the time, and a performance measure of 11:30 minutes or less for arrival of the last ERF resource. For *rural* agencies, Citygate recommends a first-due performance measure of 11:30 minutes or less and an ERF performance measure of 15:30 or less.

### **2.2.1 Current Deployment Model**

#### *Resources and Staffing*

The District’s current deployment model includes three ALS engines staffed with a minimum of three personnel each, including at least one EMT-Paramedic and one Division Chief for a total daily staffing of 10 personnel, as summarized in Table 10.

**Table 10—Aptos/La Selva FPD Deployment Model**

Station		Minimum Daily Staffing
<b>1</b>	Aptos	<b>3</b>
<b>2</b>	Rio Del Mar	<b>3</b>
<b>3</b>	La Selva Beach	<b>3</b>
	Division Chief	<b>1</b>
<b>Total</b>		<b>10</b>

Source: Aptos/La Selva FPD

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<sup>4</sup> Santa Cruz County General Plan, Public Safety and Noise Element, Section 6.5.4(c)

<sup>5</sup> NFPA 1710 – Standard for the Organization and Deployment of Fire Suppression Operations, Emergency Medical Operations, and Special Operations to the Public by Career Fire Departments (2016 Edition)

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As Table 10 shows, the District’s current deployment model does not meet the staffing standards for building fires recommended by NFPA 1710 or, as the critical tasking section of this report will review, provide enough personnel for serious fires; however, in Citygate’s experience, very few suburban/rural agencies are able to meet that standard. The District does have informal automatic mutual aid agreements with the Central Fire Protection District of Santa Cruz County (Central FPD) and County Service Area #48, and is also a signatory to the Santa Cruz County and State of California Mutual Aid Agreements. In addition, the District has immediate access to all CAL FIRE resources for wildland fires occurring in the State Responsibility Area of the District east of Highway 1.

***Response Plan***

The District is an “all-risk” fire agency providing the people it protects with services that include fire suppression, pre-hospital ALS EMS, hazardous material and technical rescue response, and other non-emergency services, including fire prevention, fire safety education, and related services.

Given these risks, the District utilizes a tiered response plan calling for different types and numbers of resources depending on incident/risk type. Santa Cruz Regional 9-1-1’s CAD system selects and dispatches the closest and most appropriate resource types pursuant to the District’s response plan, as shown in Table 11.

**Table 11—Response Plan by Incident Type**

Incident Type	Minimum Resources Dispatched	Total Personnel
Single-Patient EMS	1 Engine, Ambulance	<b>5</b>
Vehicle Accident	2 Engines, Ambulance	<b>8</b>
Vehicle Fire	1/2 Engines <sup>1</sup>	<b>3/6</b>
Building Fire	5 Engines, <sup>2</sup> Division Chief	<b>16/17</b>
Wildland Fire	3 Engines, Water Tender, Division Chief	<b>11</b>
Rescue	1 Engine	<b>3</b>
Hazardous Material	1 Engine, Division Chief	<b>4</b>

<sup>1</sup> Depending on vehicle size

<sup>2</sup> Two engines, one of which may be a truck, are provided by mutual aid agencies

Source: Aptos/La Selva FPD

**Finding #2:** The District has a standard response plan that considers risk and establishes an appropriate initial response for each incident type; each type of call for service receives the combination of engine companies, trucks, ambulances, specialty units, and command officers customarily needed to effectively control that type of incident based on Fire District experience.

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### 2.3 OUTCOME EXPECTATIONS

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**SOC ELEMENT 2 OF 8**  
**COMMUNITY OUTCOME**  
**EXPECTATIONS**

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

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

For example, Figure 5 shows response times for a fictitious fire department. This agency is small and receives 20 calls for service each month. Each response time has been plotted on the following graph from shortest response time to longest response time.

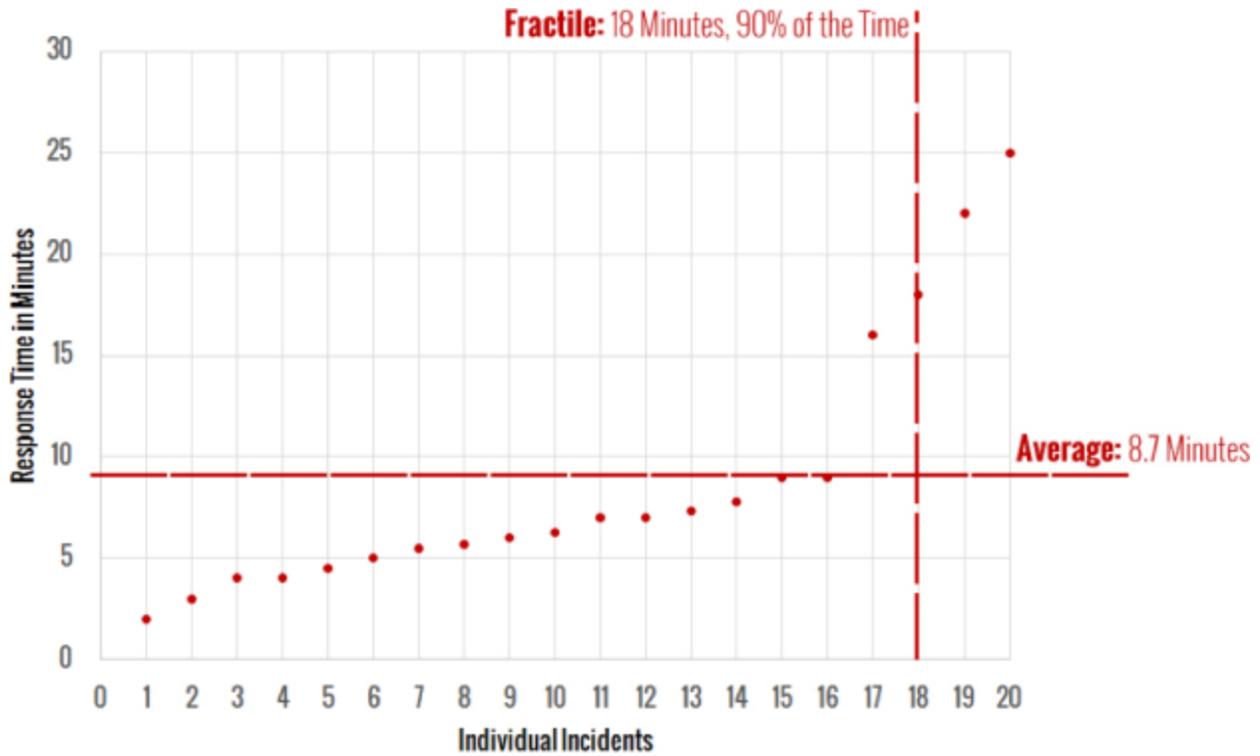
Figure 5 shows that the average response time is 8.7 minutes. However, the average response time fails to properly account for four calls for service with response times far exceeding a threshold in which positive outcomes could be expected. In fact, it is evident in Figure 5 that 20 percent of responses are far too slow, and that this jurisdiction has a potential life-threatening service delivery problem. Average response time as a measurement tool for fire services is simply not sufficient. This is a significant issue in larger cities, if hundreds or thousands of calls are answered far beyond the average point.

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

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<sup>6</sup> A *fractile* is that point below which a stated fraction of the values lie. The fraction is often given in percent; the term percentile may then be used.

**Figure 5—Fractile versus Average Response Time Measurements**



More importantly, within the Standards of Cover process, positive outcomes are the goal, and from that crew size and response time can be calculated to allow appropriate fire station spacing (distribution and concentration). Emergency medical incidents have situations with the most severe time constraints. The brain can only survive 4:00 to 6:00 minutes without oxygen. Heart attacks and other events can cause oxygen deprivation to the brain. Heart attacks make up a small percentage; drowning, choking, trauma constrictions, or other similar events have the same effect. In a building fire, a small incipient fire can grow to involve the entire room in a 6:00- to 8:00-minute timeframe. If fire service response is to achieve positive outcomes in severe emergency medical situations and incipient fire situations, *all* responding crews must arrive, assess the situation, and deploy effective measures before brain death occurs or the fire spreads beyond the room of origin.

Thus, from the time of 9-1-1 receiving the call, an effective deployment system is *beginning* to manage the problem within a 7:00- to 8:00-minute total response time. This is right at the point that brain death is becoming irreversible and the fire has grown to the point of leaving the room of origin and becoming very serious. Thus, the District needs a first-due response goal that is within a range to give the situation hope for a positive outcome. It is important to note the fire or medical emergency continues to deteriorate from the time of inception, not the time the fire engine starts to drive the response route. Ideally, the emergency is noticed immediately and the

9-1-1 system is activated promptly. This step of awareness—calling 9-1-1 and giving the dispatcher accurate information—takes, in the best of circumstances, 1:00 minute. Then crew notification and travel time take additional minutes. Upon arrival, the crew must approach the patient or emergency, assess the situation, and deploy its skills and tools appropriately. Even in easy-to-access situations, this step can take 2:00 minutes or more. This time frame may be increased considerably due to long driveways, apartment buildings with limited access, multi-storied apartments or office complexes, or shopping center buildings.

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

For this report, “total” response time is the sum of the alarm processing, dispatch, crew turnout, and road travel time steps. This is consistent with CFAI best practice recommendations.

## 2.4 COMMUNITY RISK ASSESSMENT

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**SOC ELEMENT 3 OF 8**  
**COMMUNITY RISK**  
**ASSESSMENT**

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

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

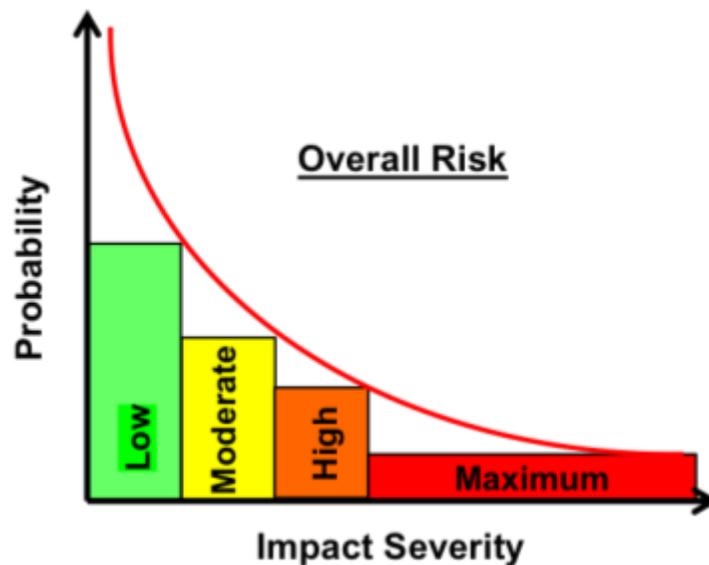
A *hazard* is broadly defined as a situation or condition that can cause or contribute to harm. Examples include fire, medical emergency, vehicle collision, earthquake, flood, etc. *Risk* is broadly defined as the *probability of hazard occurrence* in combination with the *likely severity of resultant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

## 2.4.1 Risk Assessment Methodology

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

- ◆ Identification of geographic planning sub-zones (risk zones) appropriate to the community or jurisdiction.
- ◆ Identification and quantification (to the extent data is available) of the specific values at risk to various hazards within the community or service area.
- ◆ Identification of the fire and non-fire hazards to be evaluated.
- ◆ Determination of the probability of occurrence for each hazard.
- ◆ Identification and evaluation of multiple relevant Impact Severity Factors for each hazard by planning zone using agency/jurisdiction-specific data and information.
- ◆ Quantification of overall risk for each hazard based on probability of occurrence in combination with probable impact severity as shown in Figure 6.

**Figure 6—Overall Risk**



Source: Commission on Fire Accreditation International (CFAI): *Community Risk Assessment: Standards of Cover (6<sup>th</sup> Edition)*

## **2.4.2 Values at Risk**

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

### ***People***

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

- ◆ Nearly 26 percent of the population is under 10 or over 65 years of age
- ◆ The District's population is predominantly White (73.74 percent), followed by Hispanic/Latino (14.35 percent), Asian (5.83 percent), Black/African American (2.58 percent), and other ethnicities (3.51 percent)
- ◆ Of the population over 24 years of age, 76 percent has completed high school or equivalency
- ◆ Of the population over 24 years of age, 58.5 percent has an undergraduate, graduate, or professional degree
- ◆ Nearly 68 percent of the population 16 years of age or older is in the workforce; of those, just over 7 percent are unemployed
- ◆ The population below the federal poverty level is 8.5 percent
- ◆ More than 93 percent of the population has health insurance coverage.

In addition, the District's service area includes more than 12,000 housing units, as well as office, professional services, retail sales, restaurants/bars, motels, churches, schools, government facilities, healthcare facilities, and other non-residential building occupancies.

There are multiple economic, cultural, and natural resources to be protected within the District, as well as several critical facilities, where a hazard occurrence with significant impact severity would likely affect critical public or community services.

The higher population density areas of the District are essentially built-out, with zoning regulations limiting new development to existing town centers and concentrated urban areas. With the exception of the Aptos Village mixed-use project, future development will be predominantly limited to single-family dwellings.

### **2.4.3 Hazard Identification**

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

Following review and evaluation of the hazards identified in the 2015–2020 Santa Cruz County Local Hazard Mitigation Plan, and the fire and non-fire hazards as identified by the CFAI as they relate to services provided by the District, Citygate evaluated the following five hazards for this risk assessment:

1. Building Fire
2. Wildland Fire
3. Medical Emergency
4. Hazardous Materials Release/Spill
5. Technical Rescue

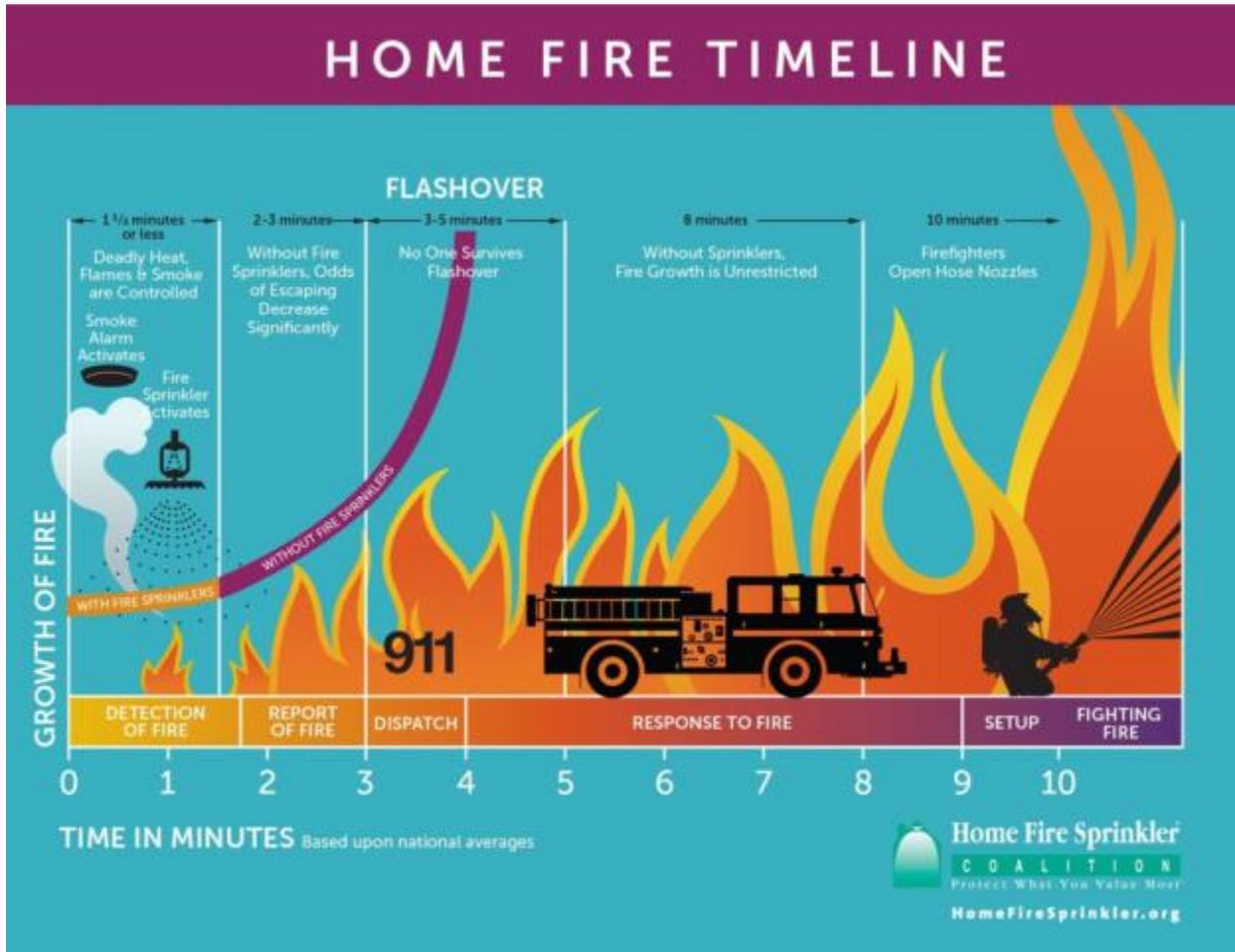
Because building fires and medical emergencies have the most severe time constraints if positive outcomes are to be achieved, following is a brief overview of building fire and medical emergency risk. **Appendix A** contains the full risk assessment for all five hazards.

#### ***Building Fire Risk***

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

Figure 7 illustrates the building fire progression timeline and shows that flashover, which is the point at which the entire room erupts into fire after all the combustible objects in that room reach their ignition temperature, can occur as early as three to five minutes from the initial ignition. Human survival in a room after flashover is extremely improbable.

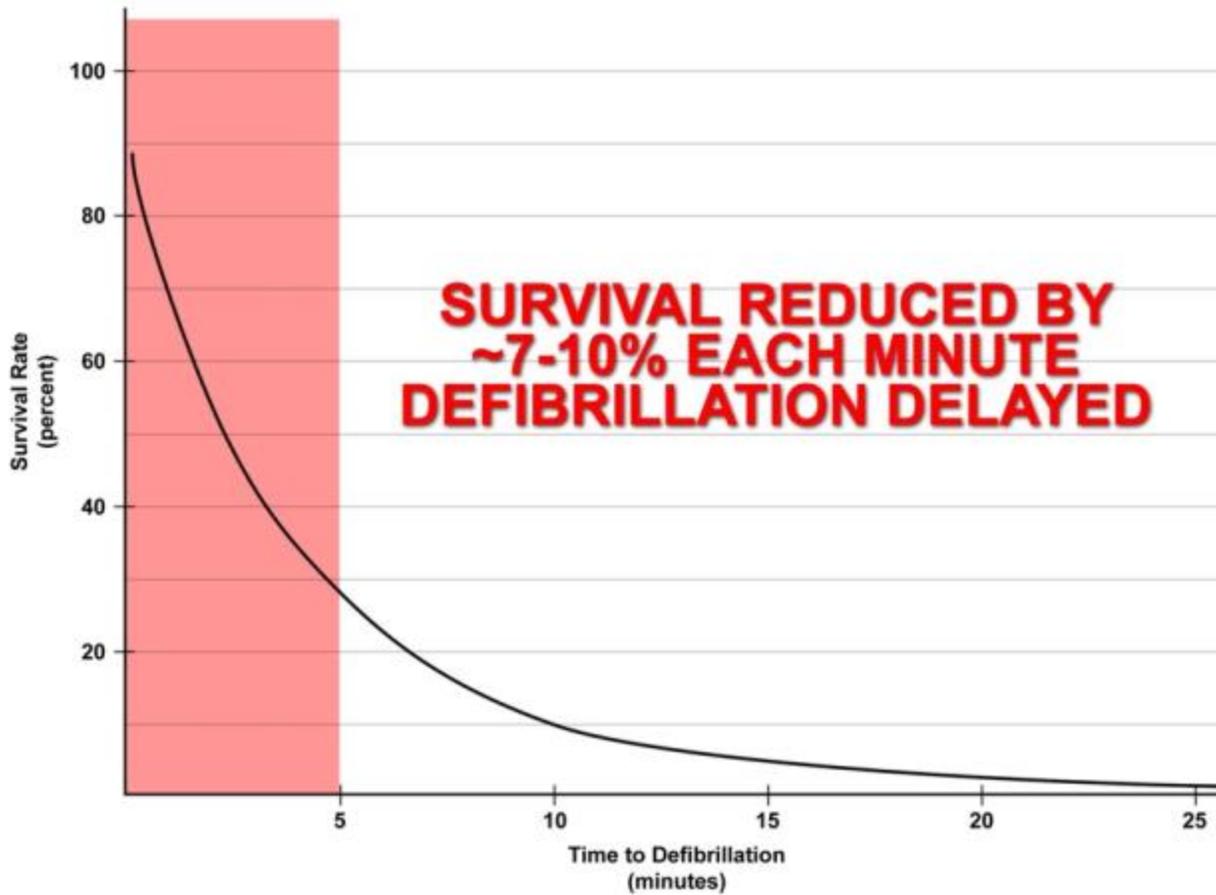
**Figure 7—Building Fire Progression Timeline**



**Medical Emergency Risk**

Fire agency service demand in most jurisdictions today is predominantly for medical emergencies. Figure 8 illustrates the reduced survivability of a cardiac arrest victim as time to defibrillation increases.

**Figure 8—Survival Rate versus Time of Defibrillation**



Source: [www.suddencardiacarrest.com](http://www.suddencardiacarrest.com)

#### 2.4.4 Risk Assessment Summary

Citygate’s evaluation of the values at risk and hazards likely to impact the District yields the overall risk ratings shown in Table 12.

**Table 12—Overall Risk by Hazard**

Hazard		Planning Zone					
		Station 1		Station 2		Station 3	
		Suburban	Rural	Suburban	Rural	Suburban	Rural
1	Building Fire	HIGH	MODERATE	HIGH	MODERATE	HIGH	MODERATE
2	Wildland Fire	HIGH	MAXIMUM	HIGH	MAXIMUM	HIGH	MAXIMUM
3	Medical Emergency	HIGH	HIGH	HIGH	HIGH	HIGH	HIGH
4	Hazardous Material	MODERATE	LOW	MODERATE	LOW	MODERATE	LOW
5	Technical Rescue	MODERATE	MODERATE	MODERATE	MODERATE	MODERATE	MODERATE

Appendix A contains a more in-depth discussion of the risk factors evaluated and resultant risk assessment scoring.

**2.5 CRITICAL TASK TIME MEASURES—WHAT MUST BE DONE OVER WHAT TIME FRAME TO ACHIEVE THE STATED OUTCOME EXPECTATION?**

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**SOC ELEMENT 4 OF 8**  
**CRITICAL TASK TIME**  
**STUDY**

Standards of Cover studies use task time information to determine the number of firefighters needed within a timeframe to accomplish the desired fire control objective on moderate residential fires and modest emergency medical incidents. The time it takes to complete one specific task is called an “evolution.” These task time evolutions are shown on Table 13 and Table 14 to demonstrate the amount of time these operations require. These tables start with the time of fire dispatch notification and finish with the outcome achieved. These tables are composite tables from Citygate clients in suburban/rural departments similar to Aptos/La Selva, with units staffed with 3–4 personnel per engine or ladder truck. These tasks and times are also consistent with national published studies.<sup>7</sup> There are several important themes contained in these tables:

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<sup>7</sup> Report on Residential Fireground Field Experiments, National Institute of Standards and Technology Technical Note #1661, April 2010. NFPA 1710, Standard for the Organization and Deployment of Fire Suppression Operations, Emergency Medical Operations, and Special Operations to the Public by Career Fire Departments, 2016 Edition.

- ◆ The evolution test results were obtained at training sites under best-case conditions: clear weather with moderate temperatures. The structure fire response times are from actual events, showing how units arrive at staggered intervals.
- ◆ It takes a considerable amount of time after a task is ordered by command to actually accomplish it and arrive at the desired outcome. *Critical steps* are highlighted in gray in the tables.
- ◆ Task completion time is usually a function of how many personnel are *simultaneously* available. The fewer firefighters available, the longer some tasks will take to complete. Conversely, with more firefighters available, some tasks are completed concurrently.
- ◆ Some tasks must be conducted by a minimum of two firefighters to comply with safety regulations. For example, two firefighters are required to search a smoke-filled room for a victim.

### **2.5.1 Critical Firefighting Tasks**

Table 13 shows company and individual tasks required to control a typical single-family dwelling fire with five engines and one Chief Officer for a total *Effective Response Force* of **16** personnel. These tasks are taken from fire departments' operational procedures, which are consistent with the customary findings of other agencies using the Standards of Cover process. No conditions existed to override the Occupational Safety and Health Administration (OSHA) "2-in/2-out" safety policy, which requires that firefighters enter serious building fires in teams of two, while two more firefighters are outside and immediately ready to rescue them should trouble arise.

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

**Table 13—First Alarm Residential Fire Critical Tasks – 16 Personnel**

Critical Task Description	Task Time <sup>1</sup>	Total Elapsed Time
9-1-1 call	0:00	<b>0:00</b>
9-1-1 call processing/dispatch	1:30	<b>1:30</b>
Crew turnout	2:00	<b>3:30</b>
1 <sup>st</sup> engine travel time to incident (90%)	4:00	<b>7:30</b>
2 <sup>nd</sup> engine travel time to incident (90%)	5:30	<b>9:00</b>
3 <sup>rd</sup> engine travel time to incident (90%)	7:00	<b>10:30</b>
Establish incident command, incident size-up, and conditions report	2:30	
Secure utilities	1:30	
Establish water supply	3:00	
Chief Officer travel time to incident (90%)	8:00	<b>11:30</b>
Deploy attack line to building access point	3:00	
4 <sup>th</sup> engine/truck travel time to incident (90%)	8:00	<b>11:30</b>
Deploy first ladder to roof	3:00	
Deploy second attack line	3:00	
Establish Initial Rapid Intervention Crew (IRIC)	1:00	<b>13:30</b>
Attack team entry/initiate fire suppression	0:15	
Primary victim search	8:00	<b>17:30</b>
Deploy back-up attack line	3:00	
Deploy 2 <sup>nd</sup> ladder to roof	3:00	
Vertical ventilation established	8:00	
Secondary victim search	8:00	
Check for fire extension in attic/hidden spaces	10:00	
<b>Fire contained</b>	<b>5:00</b>	<b>20:45</b>

<sup>1</sup> The task times represent the time needed to complete each individual task. Many of these are happening simultaneously.

The duties in Table 13, grouped together, form an *Effective Response Force* or *First Alarm Assignment*. These distinct tasks must be performed to effectively achieve the desired outcome; arriving on-scene does not stop the escalation of the emergency. While firefighters accomplish these tasks, the incident progression clock keeps running.

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

search/rescue operations commence before the flashover point occurs if the outcome goal is to keep the fire damage in or near the room of origin. In addition, flashover presents a serious danger to both firefighters and any occupants of the building.

A 2010 National Institute of Standards (NIST) study<sup>8</sup> tested multiple crew staffing and arrival timing scenarios relative to the completion of 22 critical tasks for a low-hazard residential building fire using four fire companies (three engines and one truck). The study found that the three-person crews completed all 22 critical tasks nearly 7 percent faster (on average) than the two-person crews, and the four-person crews completed the same tasks nearly 25 percent faster than the three-person crews. These findings support the CFAI critical time task element of the SOC analysis process and the critical task times reflected in Table 13 and Table 14.

### 2.5.2 Critical Medical Emergency Tasks

The District responds to more than 1,400 EMS incidents annually, including vehicle accidents, strokes, heart attacks, difficulty breathing, falls, childbirths, and other medical emergencies.

For comparison, Table 14 summarizes the critical tasks required for a cardiac arrest patient.

**Table 14—Cardiac Arrest Critical Tasks – 3 Personnel<sup>9</sup> + ALS Ambulance**

Critical Task Description	Task Time	Total Elapsed Time
9-1-1 call	0:00	<b>0:00</b>
9-1-1 call processing/dispatch	1:30	<b>1:30</b>
Crew turnout	2:00	<b>3:30</b>
1 <sup>st</sup> engine travel time to incident (90%)	4:00	<b>7:30</b>
Assess patient / start CPR	0:55	
Ambulance travel time to incident	8:00	<b>10:00</b>
Attach cardiac monitor to patient	0:30	
Attach auto pulse CPR unit	0:30	
Establish Intravenous line	2:00	<b>13:55</b>
Initiate bag valve mask ventilation	0:20	
Administer epinephrine	0:30	<b>16:00</b>
Intubate patient	0:40	<b>16:40</b>
Defibrillate patient; positive change in patient rhythm	0:30	<b>17:10</b>
Secure patient on gurney	0:45	<b>17:55</b>
<b><i>Secure patient in ambulance ready for transport</i></b>	2:40	<b>20:35</b>

<sup>8</sup> NIST Technical Note 1661, Report on Residential Fireground Field Experiments (April 2010)

<sup>9</sup> Minimum of one paramedic

### 2.5.3 Critical Task Analysis and Effective Response Force Size

What does a deployment study derive from a critical task analysis? The total task times (as shown in Table 13 and Table 14) to stop the escalation of an emergency must be compared to outcomes. Nationally published fire service “time vs. temperature” tables show that after approximately 4:00 to 5:00 minutes of free burning, a room fire will escalate to the point of flashover. At this point, the entire room is engulfed in fire, the entire building becomes threatened, and human survival near or in the room of fire origin becomes impossible. Additionally, brain death begins to occur within 4:00 to 6:00 minutes of the heart stopping. Thus, the Effective Response Force must arrive in time to prevent these emergency events from becoming worse.

The District’s daily staffing level, combined with two automatic/mutual aid resources, is sufficient to deliver a single Effective Response Force of 16 firefighters to a building fire—if they can arrive in time, which the mapping and statistics sections of this study will show is not always possible. Mitigating an emergency event is a team effort once the units have arrived. This refers to the *weight* of response analogy; if too few personnel arrive too slowly, then the emergency will escalate instead of improving. The outcome times, of course, will be longer and yield less desirable results if the arriving force is later or smaller.

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

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

Previous critical task studies conducted by Citygate and NFPA Standard 1710 find that all units need to arrive with 15+ firefighters within 11:30 minutes (from the time of call) at a room and contents structure fire to be able to *simultaneously and effectively* perform the tasks of rescue, fire suppression, and ventilation.

A question one might ask is, “If fewer firefighters arrive, *what* from the list of tasks mentioned would not be completed?” Most likely, the search team would be delayed, as would ventilation. The attack lines would only consist of two firefighters, which does not allow for rapid movement of the hose line above the first-floor in a multi-story building. Rescue is conducted with only two-person teams; thus, when rescue is essential, other tasks are not completed in a

simultaneous, timely manner. Effective deployment is about the **speed** (*travel time*) and the **weight** (*firefighters*) of the response.

Sixteen initial firefighters could handle a moderate-risk, confined residential fire; however, even an Effective Response Force of 16 personnel will be seriously slowed if the fire is above the first floor in a low-rise apartment building or commercial/industrial building. This is where the capability to add additional personnel and resources to the standard response becomes critical.

Given the fact that the District’s First Alarm plan (ERF) delivers 16 personnel (including mutual aid units) to a moderate risk building fire, it reflects the District’s goal to confine serious building fires to or near the room of origin and to prevent the spread of fire to adjoining buildings. This is a typical desired outcome in urban/suburban areas and requires more firefighters more quickly than the typical rural outcome of keeping the fire contained to the building, not room, of origin.

The District’s current physical response to building fires is, in effect, its de-facto deployment measure to more densely populated suburban areas—if *those areas are within a reasonable travel time from a fire station*. Thus, this becomes the baseline policy for the deployment of firefighters.

## **2.6 DISTRIBUTION AND CONCENTRATION STUDIES—HOW THE LOCATION OF FIRST-DUE AND FIRST ALARM RESOURCES AFFECTS EMERGENCY INCIDENT OUTCOMES**

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### **SOC ELEMENT 5 OF 8 DISTRIBUTION STUDY**

### **SOC ELEMENT 6 OF 8 CONCENTRATION STUDY**

The District is served today by three fire stations deploying three engine companies and one Division Chief as the duty Incident Commander. The District’s headquarters administrative staff is also located at Station 1 in Aptos. It is appropriate to understand using geographic mapping tools what the existing stations do and do not cover within travel time goals, if there are any coverage gaps needing one or more stations, and what, if

anything, to do about them.

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

- ◆ **Distribution** – the spacing of first-due fire units to control routine emergencies before they escalate and require additional resources.
- ◆ **Concentration** – the spacing of fire stations sufficiently close to each other so that more complex emergency incidents can receive sufficient resources from multiple fire stations quickly. As indicated, this is known as the **Effective Response Force**, or, more commonly, the “First Alarm Assignment”—the

collection of a sufficient number of firefighters on scene, delivered within the concentration time goal to stop the escalation of the problem.

To analyze first-due fire unit travel time coverage, Citygate used a geographic mapping tool called FireView™ that can measure theoretical travel time over the street network. For this time calculation, Citygate used the base map and street travel speeds calibrated to actual fire apparatus travel times from previous responses to simulate actual travel time coverage. Using these tools, Citygate ran several deployment tests and measured their impact on various parts of the District. The first-due travel time measure used was 3:00 minutes over the District's suburban road network and 5:00 minutes in rural areas, which is the District's adopted policy statement and desirable outcomes in critical emergencies. When 3:00 minutes are added for dispatch processing and crew turnout time, then the maps effectively show the area covered within 6:00 minutes of Santa Cruz Regional 9-1-1 receiving the request for the first-due unit and 12:00 minutes (9:00-minute travel time) for an Effective Response Force (First Alarm) response. It is important to note that the travel time models for this study do not consider the traffic congestion experienced daily on many of the District's primary travel routes.

## **2.6.1 Deployment Baselines**

### ***Map #1a – General Geography and Station Locations***

Map #1a shows the District boundary and fire station locations, including adjacent agency mutual aid stations. This is a reference map for other maps that follow. Station symbols denote the type of staffed fire apparatus at each station. It is important to remember that all District stations are staffed with a minimum of three personnel, including at least one paramedic.

### ***Map #1b – Planning Zones***

This map shows the initial response (first-due) polygon for each station, as well as the District's suburban/rural demand zone boundary, resulting in the six planning zones used for this study.

### ***Map #2a – Risk Assessment: Critical Facilities***

Map #2a shows the locations of the District's critical facilities as described in Appendix A.1.4.

### ***Map #2b – Risk Assessment: High Needed Fire Flow Locations***

This map displays the locations of buildings within the District with needed fire flow greater than 1,000 gallons per minute as determined by the Insurance Services Office. As the map illustrates, these buildings are located in the commercial zoning areas of the District.

### ***Map #2c – Risk Assessment: Population Density***

Map #2c shows the District's population density, aggregated by census block group, ranging from less than 100 to more than 8,000 per square mile. The higher population density areas are

also the areas where the calls for service and building densities are higher, as shown in Map #5. These are also the areas where the District's Effective Response Force (First Alarm) response times need to be shorter to facilitate desired outcomes.

***Map #2d – Risk Assessment: Non-Hydrant Zones***

This map shows the areas of the District without fire hydrants supplied by a public water system as discussed in Appendix A.1.11 and A.1.12.

***Map #3 – First-Due Unit Distribution: 3:00-Minute First-Due Travel Time Coverage***

Map #3 shows the current distribution of fire stations using the District's first-due response policy of 6:00 minutes, which, given a 3:00-minute goal for call processing, dispatch, and crew turnout time, equates to a 3:00-minute travel time. Green indicates the locations a fire engine could be expected to reach within this time, assuming it is in its station and encounters no traffic congestion. The modeling tool uses actual fire apparatus speed by roadway type.

The purpose of response time modeling is to determine response time coverage across a jurisdiction's geography and station locations. This geo-mapping design is then validated against dispatch time data to reflect actual response times. There should be some overlap between station areas so that a second-due unit can have a chance of an acceptable response time when it responds to a call in another station's first-due response area.

As discussed in Appendix B.1.5, District-wide first-due *travel time* to 90 percent of all incidents ranges, by station area, from 6:38 to 7:24 minutes.

***Map #3a – ISO 1.5-Mile Coverage Areas***

This map displays the Insurance Service Office (ISO) recommendation that urban stations cover a 1.5-mile *distance* response area and, in rural areas, that stations be less than five miles apart. Depending on a jurisdiction's road network, the 1.5-mile measure usually equates to a 3:30- to 4:30-minute travel time. However, a 1.5-mile measure is a reasonable indicator of station spacing and overlap. As can be seen, the 1.5-mile ISO coverage is very good in the core population density areas of the District, and five-mile coverage is also very good in all but the very northeastern area of the District.

***Map #3b – First-Due Unit Distribution: 4:00-Minute First-Due Travel Time Coverage***

Maps #3b shows 4:00-minute travel time coverage. It is apparent that some of the higher population density areas of the District, including the area at the north end of Seacliff State Beach and Seascape Village, are not within 4:00 minutes travel time of a fire station.

***Map #3c – First-Due Unit Distribution: 5:00-Minute and 6:00-Minute First-Due Travel Time Coverage***

This map shows 5:00-minute first-due travel time coverage in green and 6:00-minute first-due travel time coverage in blue. This map shows that all of the higher population density areas of the District, except a few small areas in the very southeastern corner, are within 6:00 minutes travel time of a fire station.

***Map #3d – First-Due Unit Distribution: 4:00-Minute First-Due Travel Time Coverage Using Alternate Station 3 Location***

Map #3d shows 4:00-minute first-due travel time coverage with Station 3 relocated to San Andreas Road and Seascape Boulevard, as recommended in Section 2.8.1.

***Map #3e – First-Due Unit Distribution: 5:00-Minute and 6:00-Minute First-Due Travel Time Coverage Using Alternate Station 3 Location***

This map shows 5:00-minute and 6:00-minute first-due travel time coverage with Station 3 relocated to San Andreas Road and Seascape Boulevard, as recommended in Section 2.8.1.

***Map #4 – Concentration: Effective Response Force (ERF) 9:00-Minute Travel Time Coverage***

Map #4 shows in green where the District’s current response plan should deliver the initial Effective Response Force of 16–17 personnel, including mutual aid, within 9:00 minutes travel time (12:00-minute total response time). As can be seen, most of the higher population density areas of the District are covered, with the exception of the Rio Del Mar Beach and Seascape Village areas.

***Map #4a – Concentration: Effective Response Force (ERF) 10:00-Minute and 11:00-Minute Travel Time Coverage***

This map shows 10:00-minute and 11:00-minute ERF travel time coverage, including mutual aid, which equates to 13:00-minute and 14:00-minute total response time.

As can be seen, essentially all of the higher population density areas of the District are within a 10:00-minute ERF travel time, and nearly the entire District, with the exception of the area southeast of La Selva Village, is within 11:00 minutes ERF travel time.

***Map #4b – 9:00-Minute Truck Travel Time Coverage***

Map #4b shows 9:00-minute travel time coverage for Central FPD Truck 3472, or 12:00-minute total response time. Given the location of this apparatus approximately seven miles northwest of the District’s western boundary, the coverage for this resource is limited to only the northwestern areas of the District. While this resource has unique capabilities useful for building fires and

some technical rescues, its extended travel time to most areas of the District will not contribute to desired outcomes.

***Map #4c – Division Chief 9:00-Minute Travel Time Coverage***

This map displays 9:00-minute travel time coverage for a Division Chief from Station 1. This coverage is very good for the most populated areas of the District and fails to reach only the less-populated areas southeast of La Selva Village and outer northeast areas.

***Map #4d – Concentration: Effective Response Force (ERF) 9:00-Minute Travel Time Coverage Using Alternate Station 3 Location***

Map #4e shows 9:00-minute ERF travel time coverage, including mutual aid, with Station 3 relocated to San Andreas Road and Seascapes Boulevard, as recommended in Section 2.8.1.

***Map #4e – Concentration: Effective Response Force (ERF) 10:00-Minute and 11:00-Minute Travel Time Coverage Using Alternate Station 3 Location***

This map shows 10:00-minute and 11:00-minute ERF travel time coverage, including mutual aid, with Station 3 relocated to San Andreas Road and Seascapes Boulevard, as recommended in Section 2.8.1.

***Map #5 – All Incident Locations***

Map #5 shows the location of all incidents from January 2014 through December 2016. It is apparent that incidents occur on almost every road segment within the District.

***Map #5a – Emergency Medical Services and Rescue Incident Locations***

Map #5a further illustrates only the emergency medical and rescue call locations. With the majority of the calls for service being medical emergencies, virtually all areas of the District require pre-hospital emergency medical services.

***Map #5b – All Fire Type Locations***

This map identifies the location of all fires in the District over the past three years. All fires include any type of fire call, from vehicle to dumpster to building. There are obviously fewer fires than medical or rescue calls. Even given this, it is evident that fires occur in all planning zones, and fires are more concentrated where populations, buildings, and traffic are more densely spaced due to zoning and historic growth over the decades.

***Map #5c – Structure Fire Locations***

Map #5c displays the location of all structure fires over the past three years. While the number of structure fires is a smaller subset of total fires, there are two meaningful findings from this map.

First, there are structure fires in every District planning zone, and second, there are few building fires in the District overall.

The location of many of the building fires parallels the older and higher risk building types in the District in which more significant risk, and the ISO-evaluated buildings, are more common. These areas and buildings pose a significant fire and life loss risk. Additionally, fires in the more complicated building types must be controlled quickly or the losses could be more significant.

***Map #6a – Emergency Medical Services and Rescue Incident Location Densities***

Map #6a examines, by mathematical density, where clusters of emergency medical services incident activity occurred. In this set, the darker density color plots the highest concentration of EMS/rescue incidents. This type of map makes the location of frequent workload more meaningful than just mapping the locations of all EMS incidents, as was done for Map #5a.

This perspective is important because the deployment system needs an overlap of units to ensure the delivery of multiple units when needed for more serious incidents or to handle simultaneous calls for service, as is evident in the higher concentration areas for Station 1 and Station 2.

***Map #6b – All Fire Location Densities***

Map #6b is similar to Map #6a, but shows the hot spots of activity for all types of fires. Again, fire density is greater in the higher population density areas of the District.

***Map #6c – Structure Fire Densities***

Map #6c shows only the building fire workload by density. Similar to Map #6b, building fire density is concentrated in the higher population density areas of the District.

- Finding #3:** First-due travel time coverage of 3:00 minutes, needed to meet the District’s current response performance policy statement, is only available within about 0.5 to 1 mile of each existing fire station without traffic congestion.
- Finding #4:** Most of the higher population density areas of the District are within 4:00 minutes first-due travel time without traffic congestion.
- Finding #5:** Nearly all of the higher population density areas of the District are within 6:00 minutes first-due travel time without traffic congestion.

**Finding #6:** Most of the higher population density areas of the District, with the exception of the Rio Del Mar Beach and Seascape Village areas, are within 9:00 minutes travel time of a multiple-unit Effective Response Force without traffic congestion.

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## 2.7 STATISTICAL ANALYSIS

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**SOC ELEMENT 7 OF 8**  
**RELIABILITY & HISTORICAL**  
**RESPONSE EFFECTIVENESS**  
**STUDIES**

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

### 2.7.1 Service Demand

For 2016, the District responded to 2,557 calls for service (incidents) for an average daily service demand of 7.01 incidents. Of those, 83 (3.25 percent) were fire incidents, 1,494 (58.43 percent) were EMS incidents, and 980 (38.32 percent) were other incidents (e.g., alarm activation with no fire, false alarm, no incident found, public assist, smoke scare, assist other agency, smoke or odor removal, electrical problem, water leak, rescue, hazardous material incident, animal problem, etc.).

As Figure 9 illustrates, service demand for Station 1 is trending upward, while Station 2 has been constant and Station 3 is trending slightly downward.

**Figure 9—Service Demand by Station by Year**

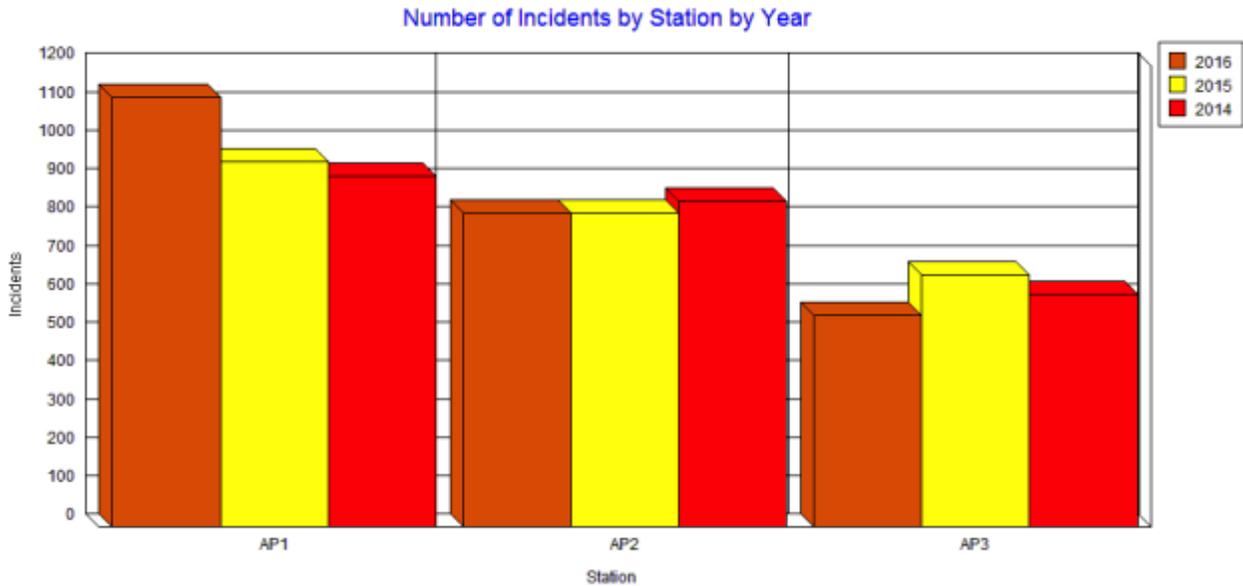
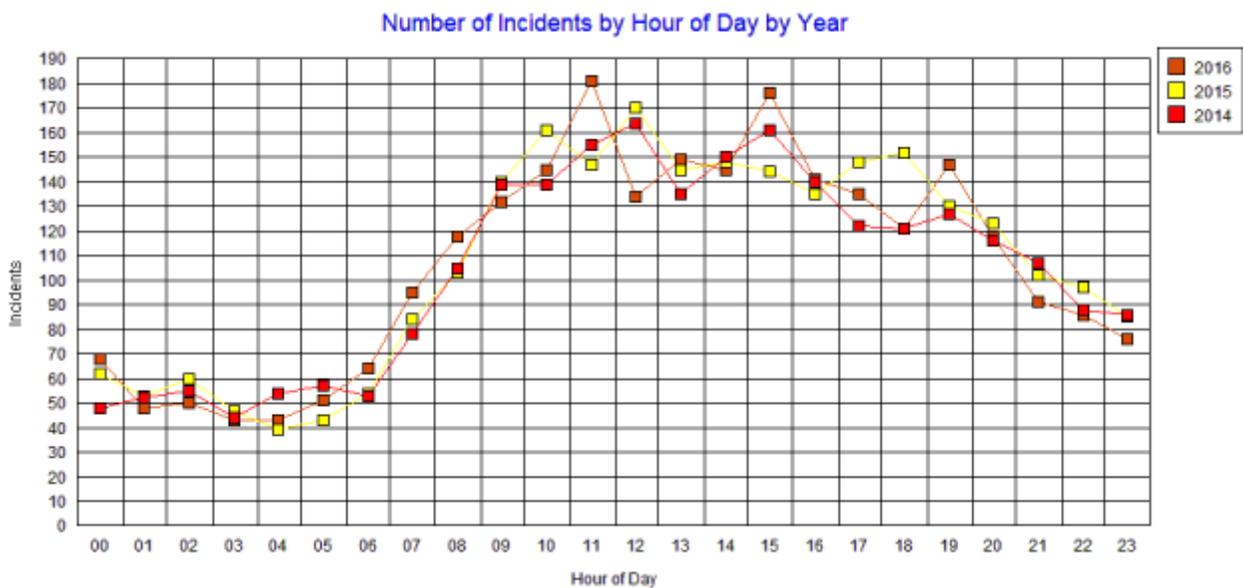


Figure 9 illustrates service demand by hour of day. This service demand curve is typical for urban/suburban departments, with increased service demand during typical business hours and peak demand from approximately 10:00 am to 10:00 pm. Of significance is that service demand occurs during all hours of the day.

**Figure 10—Service Demand by Hour of Day and Year**



## 2.7.2 Operational Performance

Once incident types are quantified, the analysis shifts to the time required to respond to those emergencies. Fractile analyses track the percentage (and count the number) of incidents meeting defined criteria, such as the first apparatus to reach the scene within progressive time segments. Based on national best practice recommendations and Citygate’s experience, this study’s response time test measurement is for the 90 percent call to arrival to be *7:30 minutes or less* for suburban planning (demand) zones. This is comprised of three component elements: call processing time, turnout time, and travel time.

### *Call to First Arrival Performance*

A person needing help in an emergency measures the speed of the fire department response from the time assistance is first requested until the help arrives. As the total measure of customer service, this metric is referred to as “call to first arrival.” As Table 15 shows, 2016 call to first arrival performance failed to meet the District’s current response performance policy for suburban demand zones by 4:27 minutes, or 75 percent. It also failed to meet the District’s current response performance goal for rural demand zones by 2:27 minutes, or 31 percent. While this response performance also fails to meet a goal of 7:30 minutes or less based on best practices to achieve a positive outcome for suburban areas, it is not unexpected due to the longer call processing, turnout, and travel discussed below.

**Table 15—90<sup>th</sup> Percentile Call to First Arrival Performance**

Incident Location	2016
District-Wide	10:27
Station 1	09:54
Station 2	10:27
Station 3	11:59

Source: Aptos/La Selva FPD incident records; SCR911 CAD records

### *Call Processing Time*

*Call processing time* is the time it takes to answer the 9-1-1 call, determine the nature of the emergency, enter information into the computer-aided dispatch system, and dispatch the appropriate resource(s). Best practice<sup>10</sup> is for 90 percent of calls to be dispatched within 90 seconds where no language barriers exist, or medical self-help instructions are not needed.

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<sup>10</sup> NFPA Standard 1221 – Standard for the Installation, Maintenance, and Use of Emergency Services Communications Systems (2016)

**Table 16—90<sup>th</sup> Percentile Call Processing Performance**

Incident Location	2016
<b>District-Wide</b>	<b>3:09</b>
<b>Station 1</b>	3:07
<b>Station 2</b>	3:12
<b>Station 3</b>	2:58

Source: Aptos/La Selva FPD incident records  
and SCR911 CAD data

As Table 16 shows, District-wide call processing performance for 2016 was *more than double* the 90-second best practice goal (1:39). According to District staff, the SCR911 Dispatch Center is often so busy that radio transmissions providing key response performance time stamps are delayed, thus potentially affecting all three response performance data elements. Although the District has no direct control over 9-1-1 call processing performance, it is a significant element of the District’s overall response performance and associated customer service. Citygate suggests that the District collaborate with SCR911 staff to identify ways to improve this performance to a level more in alignment with industry-recognized best practice standards.

***Dispatch to First Arrival Performance***

Dispatch to first arrival performance includes only the crew turnout and travel time elements of the response. Recommended best practice dispatch to arrival performance for urban/suburban areas is 6:00 minutes or less (2:00 minutes turnout time plus 4:00 minutes travel time). Table 17 summarizes the District’s 90<sup>th</sup> percentile dispatch to first arrival performance.

**Table 17—90<sup>th</sup> Percentile Dispatch to First Arrival Performance**

Incident Location	2016
<b>District-Wide</b>	<b>9:11</b>
<b>Station 1</b>	8:28
<b>Station 2</b>	9:00
<b>Station 3</b>	10:31

Source: Aptos/La Selva FPD incident  
records; SCR911 CAD records

***Turnout Time***

*Turnout time* is the time it takes for the crew(s) to hear the dispatch message, confirm the response travel route, don appropriate safety clothing, and board the apparatus for response. While turnout time best practice standard is 60 to 80 seconds,<sup>11</sup> it has long been recognized as a standard rarely met in practical experience. Citygate has long recommended that, due to this and the design of some fire stations, most agencies should be able to reasonably achieve a 2:00-minute crew turnout time at 90 percent compliance.

**Table 18—90<sup>th</sup> Percentile Turnout Time Performance**

Incident Location	2016
District-Wide	2:43
Station 1	2:21
Station 2	2:49
Station 3	2:48

Source: Aptos/La Selva FPD incident records; SCR911 CAD records

As Table 18 shows, District-wide turnout time performance for 2016 failed to meet the recommended 2:00-minute target by 43 seconds (36 percent). According to District staff, this may in part be influenced by delayed radio transmissions due to poor radio communication system coverage in many parts of the District, and/or due to the fact that two of the three stations are two-story buildings with the crew quarters on the second floor.

***Travel Time***

*Travel time* is defined as the time segment that begins with the start of apparatus movement and ends when that apparatus stops moving on arrival at the emergency. It is important to understand that this time segment *does not include* the time required to exit the apparatus and walk to an EMS patient or to deploy a hose line on a fire.

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<sup>11</sup> NFPA 1710 – Standard for the Organization and Deployment of Fire Suppression Operations, Emergency Medical Operations, and Special Operations to the Public by Career Fire Departments (2016)

**First-Due Travel Time**

Best practice standards for first-due travel time is 4:00 minutes or less for urban demand zones,<sup>12</sup> and 8:00 minutes or less for rural demand zones.<sup>13</sup>

**Table 19—90<sup>th</sup> Percentile First-Due Travel Time Performance**

Incident Location	2016
District-Wide	6:57
Station 1	6:40
Station 2	6:58
Station 3	8:12

Source: Aptos/La Selva FPD incident records; SCR911 CAD records

As Table 19 shows, first-due travel time performance for 2016 failed to meet the recommended 4:00-minute goal for urban areas by nearly 75 percent (2:57); however, there are several reasons for this, including large first-due response areas, topography, a predominantly curvilinear road network, and morning/afternoon traffic congestion on Highway 1 and surface streets.

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<sup>12</sup> NFPA 1710 – Standard for the Organization and Deployment of Fire Suppression Operations, Emergency Medical Operations, and Special Operations to the Public by Career Fire Departments (2016)

<sup>13</sup> Citygate-recommended first-due travel time goal based on NFPA 1720 standard for rural areas: arrival of six or more personnel within 14:00 minutes of receipt of dispatch

### Effective Response Force Travel Time

The District’s Effective Response Force (ERF or First Alarm) for building fires is five engines and one Chief Officer. Best practice standards for ERF travel time is 8:00 minutes or less for urban/suburban areas<sup>14</sup> and 12:00 minutes or less for rural areas.<sup>15</sup>

**Table 20—90<sup>th</sup> Percentile ERF Travel Time Performance**

Incident Location	2016
District-Wide	16:46
Station 1	16:46
Station 2	12:55
Station 3	N/A

Source: Aptos/La Selva FPD incident records; SCR911 CAD records

As Table 20 shows, ERF travel time performance for 2016 was *more than double* the recommended 8:00-minute goal for suburban areas; however, there are several reasons for this, including the District’s topography, a predominantly curvilinear road network, morning/afternoon traffic congestion, and the fourth and fifth ERF resources coming from a neighboring agency with longer travel distances/times. It is also important to note that there were only nine incidents where a full ERF arrived pursuant to simultaneous dispatch (i.e., not a supplemental resource request), comprising 1.9 percent of all fire incidents and 0.01 percent of all calls for service over the three-year data set. This information should be considered with caution, as these sample sizes are very small and can readily change significantly from year-to-year depending on the exact locations of the fires, the various units’ availability to respond, and travel times.

### 2.7.3 Simultaneous Incident Activity

Simultaneous incident activity measures the percentage of concurrent or overlapping incidents. For multiple-station departments, simultaneous incident activity in different station areas may have very little operational impact. However, simultaneous incidents within a single station

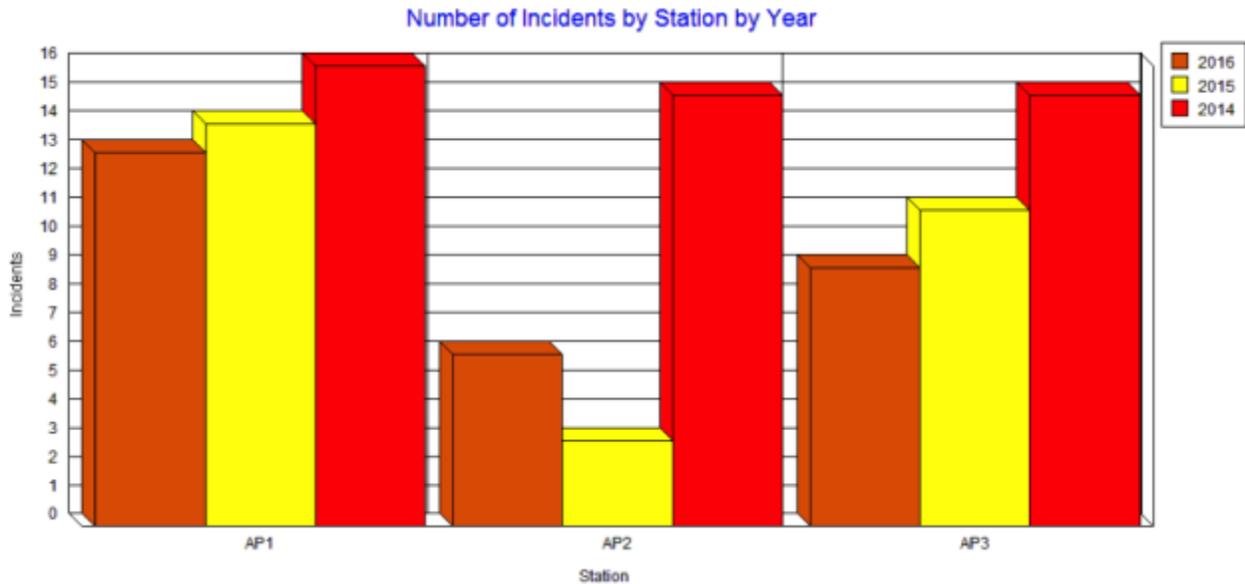
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<sup>14</sup> NFPA 1710 – Standard for the Organization and Deployment of Fire Suppression Operations, Emergency Medical Operations, and Special Operations to the Public by Career Fire Departments (2016)

<sup>15</sup> NFPA 1720 – Standard for the Organization and Deployment of Fire Suppression Operations, Emergency Medical Operations, and Special Operations to the Public by Volunteer Fire Departments (2014) 14:00 minutes or less response time standard from receipt of dispatch notification *minus* Citygate-recommended 2:00-minute turnout time goal

response area can result in significantly longer response times because the second or successive concurrent call must be handled by an engine/resource from a more distant station.

**Figure 11—Simultaneous Incident Activity within Same Station Response Area**



As Figure 11 shows, with less than 16 single-station area simultaneous incidents annually, and the downward trend, simultaneous incident activity within a single station response area has very minimal impact on District first-due response performance.

#### 2.7.4 Statistical Analysis Summary

Citygate’s analysis of the most recent three calendar years of incident data yields the following conclusions. See **Appendix B** for the full statistical analysis.

- ◆ There are approximately 2,500 calls for service annually, or about 7.01 per day
- ◆ Annual service demand is trending up slowly
- ◆ 3.25 percent of calls were fire incidents
- ◆ 58.43 percent were EMS incidents
- ◆ 38.32 percent were other incidents (e.g., alarm activation with no fire, false alarm, no incident found, public assist, smoke scare, assist other agency, smoke or odor removal, electrical problem, water leak, rescue, hazardous material incident, animal problem, etc.)
- ◆ Station 1 has the highest service demand, followed by Station 2 and then Station 3
- ◆ Nearly 8 percent of calls were aid to other jurisdictions

- ◆ Simultaneous incidents have very minimal impact on first-due response times
- ◆ Overall District hourly station service demand and unit-hour utilization percentages are well below recommended maximum saturation rates
- ◆ 9-1-1 call processing and dispatch performance for 2016 fails to meet a 90-second best practice standard by 99 seconds (110 percent)
- ◆ Fire crew turnout time fails to meet a Citygate-recommended goal of 2:00 minutes or less by 41 seconds (34 percent)
- ◆ First-due travel time performance fails to meet a recommended 4:00-minute goal for urban areas by nearly 43 percent
- ◆ Effective Response Force (multiple-unit First Alarm) travel time performance fails to meet a recommended 8:00-minute goal for suburban areas by 78 percent for 2015 and 106 percent for 2016
- ◆ Dispatch to first arrival performance *fails to meet* a positive-outcome-based, best practice goal of 6:00 minutes or less for the suburban planning zones
- ◆ Call to first arrival performance fails to meet the District's current response performance policy for suburban demand zones by 4:06 minutes (67 percent), as well as failing by 2:06 minutes (25 percent) for rural demand zones.

## **2.8 OVERALL EVALUATION**

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**SOC ELEMENT 8 OF 8**  
**OVERALL EVALUATION**

The District serves a predominantly residential and retail/service land use pattern with a geographically challenging road network and daily traffic congestion that make it difficult to serve some areas of the District quickly. The District's overall size, topography, large geographic fire station response areas, predominantly curvilinear road network, daily traffic congestion, and 9-1-1 call processing and fire crew turnout times failing to meet best practice recommendations also challenge the District's ability to respond to emergencies in sufficient time to achieve desired outcomes.

While the state Fire Code requires fire sprinklers even in residential dwellings, it will be many more decades before enough homes are replaced or remodeled with automatic fire sprinklers. If desired outcomes include limiting building fire damage to only part of the inside of an affected building and/or minimizing permanent physiological/neurological deficit resulting from medical emergencies, then the District will need both first-due and ERF coverage in all demand/planning zones consistent with Citygate's response performance recommendations of first-due arrival within 7:30 minutes from 9-1-1 notification and ERF arrival within 11:30 minutes of 9-1-1 notification, all at 90 percent or better reliability.

The District is not meeting its current distribution (first-due) response performance policy, which states, “*For 90 percent of all incidents, the first-due unit shall arrive within six minutes in the suburban demand zone or eight minutes in the rural demand zone.*” Actual District-wide first-due (call to arrival) response performance is 10:06 minutes from receipt of the 9-1-1 call, or 67 percent slower for the suburban demand/planning zones and 25 percent slower for the rural demand/planning zones. This longer response performance is due to large geographic station response areas, longer-than-expected dispatch center call processing and crew turnout time performance, and longer travel times due to District topography, road network, and daily traffic congestion. Travel time modeling using current fire station locations indicates that the District *should* be able to achieve best practice 7:30-minute first-due response performance in most of the higher population density and related building risk areas of the District *assuming call processing and crew turnout time performance meet best practice standards and no traffic congestion exists.*

### **2.8.1 Response Performance Gap Analysis**

The next step in this analysis is to look at the size, location, and risks in the gap areas beyond the 7:30-minute first-due response time goal for positive outcomes. Assuming call processing and turnout times within a Citygate-recommended total of 3:00 to 3:30 minutes, that leaves 4:00 to 4:30 minutes for travel time. As shown in Map #3b, areas of the District not covered in 4:00 minutes travel time include:

- Gap Area #1:** The western corner of the District generally bounded by Highway 1 on the north, Mar Vista Drive on the east, Monterey Bay on the south, and New Brighton State Beach on the west.
- Gap Area #2:** The area north of Highway 1 generally bounded by the District boundary on the north, Valencia Creek on the east, Trout Gulch Road on the south, and Nisene Marks State Park on the west.
- Gap Area #3:** The entire area northeast of Highway 1 east of Huntington Drive, with the exception of the roads southwest of the Huntington Drive / Wallace Road intersection and Freedom Boulevard southwest of Santa Fe Ridge.
- Gap Area #4:** Much of the area southwest of Highway 1 between Station 2 and Station 3, including the Seascape Beach Resort area.
- Gap Area #5:** Most of the District area south of Highway 1 and east of La Selva Beach Village.

Another factor to evaluate is the values at risk within these gap coverage areas, the two most significant of which are people and buildings. As Map #2c shows, the population density in most of these gap areas is less than 500 per square mile, with the exception of all or portions of gap areas #1 and #2 with a population density of 1,001–2,500 per square mile, gap area #4 with a

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population density of 1,000–5,000 per square mile, and a portion of gap area #5 with a population density of 500–1,000 per square mile. These gap areas are also predominantly residential in nature, with some scattered light commercial uses, particularly in the beach/resort areas south of Highway 1 in gap area #4.

For gap area #4, with the highest population density and related building risk of all five gap areas, first-due response performance could be significantly improved by re-locating Station 3 to the vicinity of San Andreas Road and Seascapes Boulevard. Maps 3d, 3e, 4d, and 4e show first-due and ERF travel time coverage from this location. While this would enhance first-due and ERF response performance for a higher population density and building risk area, there would be a corresponding reduction in first-due and ERF response performance for the lower population density and building risk area to the southeast of La Selva Beach Village.

**Recommendation #1:** As capital planning and funding permit, consider relocating Fire Station 3 closer to Highway 1 in the vicinity of San Andreas Road and Seascapes Boulevard to provide enhanced first-due and Effective Response Force travel time coverage for higher risk areas of the District.

For gap area #1, with the second highest population density and related building risk, first-due response performance could only be practically improved by relocating Station 1 southeast, closer to State Park Drive. This is impractical not only due to cost, but also because it would result in a corresponding first-due response performance reduction for a similar population density and building risk area at the northwest corner of the District.

For gap area #5, most of which has a population density of 500–1,000 per square mile, first-due response performance could be improved by relocating Station 3 to the southeast of La Selva Beach Village; however, this would result in a corresponding first-due response performance reduction to the higher population density and related risk area to the northwest of the village. Adding an additional fire station in this area of the District is impractical given the cost and low service demand.

For gap area #2 and gap area #3, with the predominantly lowest population density and related building risk (less than 500 per square mile), first-due and ERF response performance could only be practically improved by adding additional staffed resources within those areas, which is impractical given the cost and low service demand.

Absent reduced call processing and crew turnout times as discussed in Appendix B.1.5, and/or one or more alternative deployment strategies as further discussed in Section 4.2, longer-than-

desired first-due and ERF response times will adversely impact incident outcomes in the less populated, outer parts of the District.

**2.8.2 Recommended Response Performance Goals**

It is apparent from the GIS element of this study that the District’s service area includes very diverse population densities and topography. In such districts, Citygate recommends agencies adopt tiered service level measures reflective of the lighter risks and populations to be protected in the more rural areas. Doing so provides the shortest response times for the higher intensity risks in the urban/suburban areas while still providing a reasonable service level for the lower risk rural areas. Given the differential population density and risks within the District’s service area, consideration could be given to a tiered response time policy, as shown in Table 21.

**Table 21—Recommended Response Time Goals by Population Density (in Minutes)**

Population Density (Per Square Mile)	First-Due		Effective Response Force <sup>1</sup>	
	Travel Time	Total Response Time	Travel Time	Total Response Time
>1,000	4:00	7:30	8:00	11:30
≤1,000	7:00	10:30	14:00	17:30

<sup>1</sup> Minimum of 16 personnel, including at least 1 Chief Officer

Based on the technical analysis and findings contained in this Standards of Coverage assessment, Citygate offers the following deployment recommendations:

**Recommendation #2:** **Adopt Updated Deployment Policies:** The District’s Board of Directors should adopt updated, complete performance measures to aid deployment planning and to monitor performance. The measures of time should be designed to deliver outcomes that will save patients medically salvageable upon arrival and to keep small but serious fires from becoming more serious. With this in mind, Citygate recommends the following measures for the District’s planning zones:

- 2.1 Distribution of Fire Stations: To treat pre-hospital medical emergencies and control small fires, the first-due unit should arrive within 7:30 minutes, 90 percent of the time from the receipt of the 9-1-1 call in suburban planning zones and within 10:30 minutes in rural planning zones. This equates to a 90-second dispatch time, 2:00-minute company turnout time, and 4:00-minute (suburban zones) or 7:00-minute (rural zones) travel time.
- 2.2 Multiple-Unit Effective Response Force (ERF) for Serious Emergencies: In the suburban planning zones, to confine building fires near the room of origin, keep wildland fires under three acres in size, and treat multiple medical patients at a single incident, a multiple-unit ERF of at least 16 personnel, including at least one Chief Officer, should arrive within 11:30 minutes from the time of 9-1-1 call receipt in fire dispatch, 90 percent of the time. For the rural planning zones, the ERF should arrive within 17:30 minutes. This equates to a 90-second dispatch time, 2:00-minute company turnout time, and 8:00-minute (suburban zones) or 14:00-minute (rural zones) travel time fire station spacing.
- 2.3 Hazardous Materials Response: Provide hazardous materials response designed to protect the community from the hazards associated with uncontrolled release of hazardous and toxic materials. The fundamental mission of the District response is to minimize or halt the release of a hazardous substance so it has minimal impact on the community. This can be achieved with a first-due total response time of 7:30 minutes (suburban zones) or 10:30 minutes (rural zones) to provide initial hazard evaluation and/or mitigation actions. After the initial evaluation is completed, a determination can be made whether to request additional resources from the regional hazardous materials team.

**2.4** Technical Rescue: Respond to technical rescue emergencies as efficiently and effectively as possible with enough trained personnel to facilitate a successful rescue with a first-due total response time of 7:30 minutes (suburban zones) or 10:30 minutes (rural zones) to evaluate the situation and/or initiate rescue actions. Following the initial evaluation, assemble additional resources as needed within a total response time of 11:30 minutes (suburban zones) or 17:30 minutes (rural zones) to safely complete rescue/extrication and delivery of the victim to the appropriate emergency medical care facility.

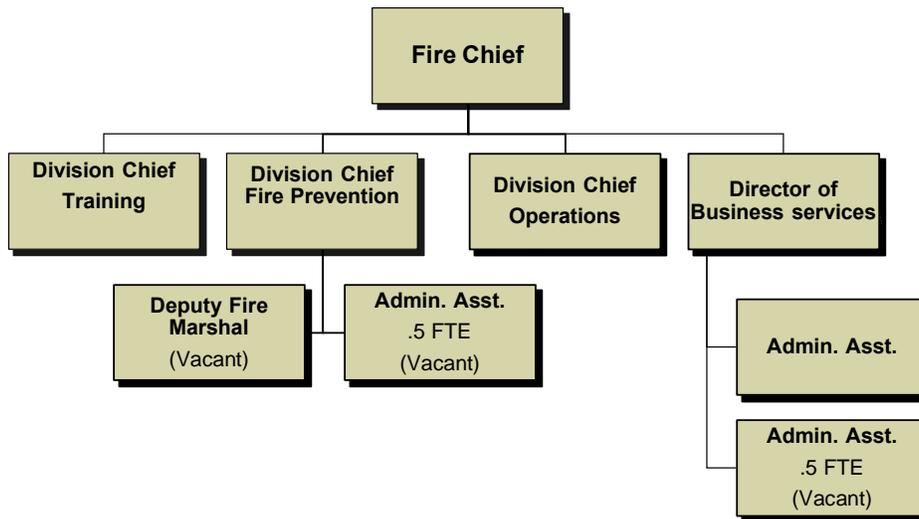
## SECTION 3—ADMINISTRATION, MANAGEMENT, STAFFING, AND FISCAL ASSESSMENT

This section provides a detailed assessment of the District’s administration and management functions, operational and support staffing, and financial condition.

### 3.1 ADMINISTRATION/MANAGEMENT ASSESSMENT

The District’s administration/management organization includes the Fire Chief, three Division Chiefs, a Business Services Director, two Administrative Assistants (one position is shared between Business Services and Fire Prevention), and a Deputy Fire Marshal for a total of eight positions, as illustrated in Figure 12. The Emergency Medical Services Integration Authority (EMSIA) Battalion Chief is employed by the District; however, the position serves and is jointly funded by the 11 participating Santa Cruz County EMSIA fire agencies. Two of the support staff positions are currently vacant as noted.

**Figure 12—Administrative/Management Organization**



This organizational staff is responsible for administering and managing all District functions and services, including overall District administration, human resources, accounting, budgeting, risk management, policies/procedures, information technology, training, safety, fire prevention, public education/information, fire investigation, coordination with other local/regional service providers/stakeholders, and other related responsibilities.

For this assessment, Citygate administered a Strengths, Weaknesses, Opportunities, Threats (SWOT) questionnaire, and also conducted a workload analysis followed by individual interviews, for each administrative/management position to:

- ◆ Identify primary and secondary responsibilities
- ◆ Identify percentage of time currently allocated to each responsibility
- ◆ Identify workload gaps: what is not being performed or is not being performed to desired/expected levels.

Overall, there seemed to be a general consensus among District staff that, prior to the current vacancies, most if not all administration/management responsibilities were being appropriately completed within expected timeframes. The unfilled vacancies, however, have severely strained the staff's ability to keep up not only with mandatory daily/weekly/monthly responsibilities, but also other best public agency business practices, including strategic, organizational, and operational planning; policy/guideline development and review; community outreach, communication, and education; community risk reduction; professional development and education; collaboration with local/regional partners/stakeholders; and workforce accountability.

Citygate's assessment of the District's administration and management functions yielded the following.

### **3.1.1 Administration / Business Services Division**

The District's Administration / Business Services Division staff includes the Fire Chief, Business Services Director, and associated Administrative Assistant support staff. Key Administration / Business Services Division responsibilities include:

- ◆ Board of Directors agendas, reports, meetings, and related support
- ◆ District website / social media management
- ◆ Budget development and management
- ◆ Accounting/payroll
- ◆ Human resources
- ◆ Employee benefits management
- ◆ Risk management
- ◆ Technology systems management
- ◆ Strategic and fiscal planning
- ◆ Special projects

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- ◆ Fire Chief support
- ◆ Division Chief support
- ◆ Public information
- ◆ Public contacts

Citygate's review of the District's Administration / Business Services Division yielded the following:

- ◆ Strengths:
  - Committed, well-qualified staff
  - Strong administrative skills for a small agency
  - Strong community support
  - Good customer service
  - Operationally focused
  - Adequately funded
  - Compensation/benefits facilitate recruitment of high-quality personnel
- ◆ Weaknesses/concerns:
  - Long-term master, strategic, and fiscal planning
  - Long-term fiscal health/viability
  - Business systems efficiency
  - Available administrative staff support (unfilled vacancies)
  - Redundant administrative support services capacity (absences/vacancies)
  - Capacity for special projects
  - Division Chief organizational model
  - Workforce accountability
  - Internal organizational focus versus external community focus
  - Professional development/education of administrative/management staff
  - Succession planning

- ◆ Opportunities:
  - CFAI Accreditation self-assessment
  - Reorganization to enhance service delivery / support services
  - Alternative deployment model
  - Additional services/infrastructure
- ◆ Threats:
  - Fiscal sustainability
  - Single primary revenue source (property tax)
  - Long-term vision/planning

Citygate’s Administration / Business Services Division workload analysis yielded the following gaps and the estimated annual hours to close those gaps:

**Table 22—Administration / Business Services Workload Gap Analysis Summary**

Workload Gap Description	Estimated Additional Annual Capacity Needed (Hours)
Master, strategic, fiscal planning	160–320
Redundant administrative services capacity	330–660
Surge capacity for special projects	160–320
Fire Chief administrative support	330–660
<b>Total Additional Hours</b>	<b>980–1,960</b>
<b>Equivalent Personnel Capacity (FTE)<sup>1</sup></b>	<b>0.5–1.0</b>

<sup>1</sup> FTE = full-time equivalent positions assuming 1 FTE = 1,960 hours annually

**Finding #7:** The District’s Administration / Business Services Division has numerous significant strengths; it also lacks sufficient capacity to ensure appropriate business services redundancy, workforce accountability, professional development, succession planning, special projects capacity, and long-term strategic and fiscal planning. Citygate estimates an additional 0.5–1.0 positions would close these gaps.

### **3.1.2 Fire Prevention Division**

The District's Fire Prevention Division staff includes one Division Chief with limited administrative staff support. Key Fire Prevention Division responsibilities include:

- ◆ California Fire Code adoption/enforcement
- ◆ Mandated occupancy annual inspections
- ◆ Annual business occupancy inspections
- ◆ Fire hydrant inspections, testing, and maintenance
- ◆ New development/construction plan review and related inspections
- ◆ Permit management and technical inspections
- ◆ Weed abatement program management
- ◆ Pre-fire plan development, training, and management
- ◆ Fire safety education programs
- ◆ Fire investigations
- ◆ Facilities planning, maintenance, improvements, and security
- ◆ Program compliance with applicable laws and regulations
- ◆ Program conformance with recognized best practices
- ◆ Response to emergency incidents
- ◆ Supervision of assigned shift personnel
- ◆ Participation in required training
- ◆ Professional development
- ◆ Other District-wide administrative responsibilities including policy/procedure development/updating, budget development and management, special projects as assigned, and general oversight/management of assigned program(s)

Citygate's review of the District's Fire Prevention Division yielded the following:

- ◆ Strengths:
  - Committed, well-qualified staff
  - More than 500 pre-fire and commercial occupancy plans on file

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- ◆ Weaknesses/concerns:
  - Current workload gaps (one and a half assigned positions are vacant)
  - Limited available administrative staff support
  - Division Chief operational responsibilities limit available time to focus on Fire Prevention Division responsibilities
  - Fire Prevention Division strategic planning
  - Wildland-urban interface (WUI) pre-fire plans
  - CSG inspection services contract oversight and data management
  - Increasing post-recession construction activity
  - Annual fire hydrant inspections
  - WUI mitigation initiatives/projects
- ◆ Opportunities:
  - Shared fire prevention services with the Central FPD
- ◆ Threats:
  - Ability to maintain non-mandated inspection goals
  - Potential WUI fire damage

Citygate’s Fire Prevention Division workload analysis yielded the following gaps and the estimated annual hours to close those gaps:

**Table 23—Fire Prevention Workload Gap Analysis Summary**

Workload Gap Description	Estimated Additional Annual Capacity Needed (hours)
Mandated/annual inspections	980–1,960
Pre-fire plans	100–200
Surge capacity for special projects	100–200
Fire/life safety education programs	100–200
Community outreach	100–200
Data management	100–200
Administrative support	480–960
<b>Total Additional Hours</b>	<b>1,960–3,920</b>
<b>Equivalent Personnel Capacity (FTE)<sup>1</sup></b>	<b>1.0–2.0</b>

<sup>1</sup> FTE = full-time equivalent positions assuming 1 FTE = 1,960 hours annually

**Finding #8:** The District’s Fire Prevention Division also has significant strengths, but lacks sufficient capacity to meet current Division goals and objectives, including fire safety inspections, code enforcement, fire hydrant inspections, wildland-urban interface mitigation initiatives, and data management. Citygate estimates an additional 1.0–2.0 positions would close these gaps.

### 3.1.3 Training/Safety Division

The District’s Training and Safety Division staff includes one Division Chief with limited administrative staff support. Key Training and Safety Division responsibilities include:

- ◆ Annual training plan
- ◆ Training records data management
- ◆ Position task book development/updating
- ◆ Training resources acquisition and maintenance
- ◆ New Firefighter Academy training oversight
- ◆ Management of all required training
- ◆ Company Officer / Chief Officer professional development

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- ◆ Career development of all District personnel
- ◆ Cooperative Training Program (CTP) monthly training schedule
- ◆ Training delivery oversight
- ◆ District Injury/Illness Prevention Plan (IIPP) management
- ◆ Community Emergency Response Team (CERT) program management
- ◆ Program compliance with applicable laws and regulations
- ◆ Program conformance with recognized best practices
- ◆ Response to emergency incidents
- ◆ Supervision of assigned shift personnel
- ◆ Participation in required training
- ◆ Professional development
- ◆ Other District-wide administrative responsibilities including policy/procedure development/updating, budget development and management, special projects as assigned, and general oversight/management of assigned program(s)

Citygate's review of the District's Training and Safety Division yielded the following:

- ◆ Strengths:
  - Committed, well-qualified staff
  - Cooperative Training Program with the Central FPD and the City of Watsonville
  - Board of Directors support for training program
  - Participation in Santa Cruz County Training Officers Association
- ◆ Weaknesses/concerns:
  - Available administrative staff support
  - Division Chief operational responsibilities limit available time to focus on Training and Safety Division responsibilities
  - TargetSolutions data systems familiarity for effective utilization
  - Lack of a local live fire training facility

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- Training/Safety Division information sharing / business continuity planning
- CERT program capacity
- Health/safety program not fully developed
- Lack of a dedicated Safety Committee
- ◆ Opportunities:
  - Shared training staff with the Central FPD
  - Program partnership with Cabrillo College
- ◆ Threats:
  - Increasingly limited locations available suitable for in-service operational training
  - Lack of centralized facility suitable for multi-company training

Citygate’s Training/Safety Division workload analysis yielded the following gaps and the estimated annual hours to close those gaps:

**Table 24—Training/Safety Workload Gap Analysis Summary**

Workload Gap Description	Estimated Additional Annual Capacity Needed (Hours)
Company Officer / Chief Officer professional development	160–320
Data records management	96–192
CTP monthly training oversight	192–384
Health and safety program	192–384
CERT program	192–384
Administrative support	148–296
<b>Total Additional Hours</b>	<b>980–1,960</b>
<b>Equivalent Personnel Capacity (FTE)<sup>1</sup></b>	<b>0.5–1.0</b>

<sup>1</sup> FTE = full-time equivalent positions assuming 1 FTE = 1,960 hours annually

**Finding #9:** The District’s Training and Safety Division has many strengths, but lacks sufficient capacity to ensure appropriate data management, program/succession continuity planning, Community Emergency Response Team program activities, and health and safety program development and related training. Citygate estimates an additional 0.5–1.0 positions would close these gaps.

### **3.1.4 Operations Division**

The District’s Operations Division administrative/management staff includes one Division Chief with limited administrative staff support. Key Operations Division responsibilities include:

- ◆ EMS
- ◆ Fleet maintenance / apparatus committee
- ◆ Agency CAD Liaison to Santa Cruz Regional 9–1–1
- ◆ EMSIA drug inventory management
- ◆ Designated Infectious Control Officer (DICO)
- ◆ NFIRS reporting and incident records quality control
- ◆ Mobile information systems management
- ◆ Daily operational staffing management
- ◆ Program compliance with applicable laws and regulations
- ◆ Program conformance with recognized best practices
- ◆ Response to emergency incidents
- ◆ Supervision of assigned shift personnel
- ◆ Participation in required training
- ◆ Professional development
- ◆ Other District-wide administrative responsibilities including policy/procedure development/updating, budget development and management, special projects as assigned, and general oversight/management of assigned program(s)

Citygate’s review of the Operations Division yielded the following:

- ◆ **Strengths:**
  - Community support
  - Customer service
  - Regional collaboration/cooperation
  - Funding of essential apparatus and equipment
- ◆ **Weaknesses/concerns:**
  - Limited administrative support
  - EMSIA narcotic inventory accounting/tracking system
  - Limited Division Chief position experience
- ◆ **Opportunities:**
  - Shared services with neighboring agencies, including purchasing, records management, staffing accountability, program management, and emergency response
- ◆ **Threats:**
  - Lack of succession planning
  - Generational changes in the workforce
  - High regional cost of living (employee impacts)

Citygate’s Operations Division administrative/management workload analysis yielded the following gaps and the estimated annual hours to close those gaps:

**Table 25—Operations Workload Gap Analysis Summary**

Workload Gap Description	Estimated Additional Annual Capacity Needed (Hours)
Program administrative support	240–480
Succession planning/implementation	80–160
<b>Total Additional Hours</b>	<b>320–640</b>
<b>Equivalent Personnel Capacity (FTE)<sup>1</sup></b>	<b>0.16–0.33</b>

<sup>1</sup> FTE = full-time equivalent positions assuming 1 FTE = 1,960 hours annually

**Finding #10:** The District’s Operations Division lacks sufficient administrative support capacity to ensure appropriate incident data quality assurance, succession development planning/implementation, and special projects capacity. Citygate estimates an additional 0.16–0.33 FTE technical administrative capacity is needed to close these gaps.

### 3.1.5 Administration/Management Assessment Summary

Overall, Citygate’s assessment of the District’s administration/management functions finds that while it has highly qualified and capable staff, it is understaffed to meet current workload expectations, as summarized in Table 26. Citygate further believes that future administrative/management workload, absent the District taking on substantial additional service responsibilities, is unlikely to change significantly in the foreseeable future.

**Table 26—Administration/Management Workload Gap Summary**

Administrative/Management Function	Workload Capacity Gap	
	Annual Hours	FTE Personnel <sup>1</sup>
Administration / Business Services	980–1,960	0.5–1.0
Fire Prevention	1,960–3,920	1.0–2.0
Training/Safety	980–1,960	0.5–1.0
Operations	320–640	0.16–0.33
<b>Total</b>	<b>4,240–8,480</b>	<b>2.16–4.33</b>

<sup>1</sup> FTE = full-time equivalent positions assuming 1 FTE = 1,960 hours

**Finding #11:** The District’s administration/management functions are understaffed to meet current workload; future workload is not expected to change substantively absent the District taking on additional service responsibilities.

**Finding #12:** Given the small headquarters staff, especially in Business Services, accounting, payroll, and EMS quality assurance, the District has a major exposure to critical services interruption if one person is absent for more than a very short time.

### **3.2 OPERATIONAL STAFFING ASSESSMENT**

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The District’s daily operational staffing includes a total of 10 personnel, as summarized in Table 27. As noted in Section 2.2.1, the District also receives operational mutual aid from the Central FPD, County Service Area #48, and the City of Watsonville to achieve an Effective Response Force for certain emergency incident types. The District is also signatory to the Santa Cruz County and State of California Mutual Aid Agreements. In addition, the District has immediate access to all CAL FIRE resources for wildland fires occurring in the State Responsibility Area of the District east of Highway 1.

**Table 27—Daily Operational Staffing**

<b>Station</b>		<b>Minimum Daily Staffing</b>
<b>1</b>	Aptos	<b>3</b>
<b>2</b>	Rio Del Mar	<b>3</b>
<b>3</b>	La Selva Beach	<b>3</b>
	Division Chief	<b>1</b>
<b>Total</b>		<b>10</b>

Source: Aptos/La Selva FPD

As also discussed in Section 2.2.1, the District is an “all-risk” fire agency providing fire suppression, pre-hospital ALS emergency medical, hazardous material, and technical rescue services. The District has developed a tiered response plan calling for different types and number of resources depending on incident/risk type. Santa Cruz Regional 9-1-1’s computer-aided dispatch (CAD) system selects and dispatches the closest and most appropriate resource types pursuant to the District’s response plan as shown in Table 28.

**Table 28—Response Plan by Incident Type**

Incident Type	Minimum Resources Dispatched	Total Personnel
Single-Patient EMS	1 Engine, Ambulance	<b>5</b>
Vehicle Accident	2 Engines, Ambulance	<b>8</b>
Vehicle Fire	1/2 Engines <sup>1</sup>	<b>3/6</b>
Building Fire	5 Engines, <sup>2</sup> Division Chief	<b>16/17</b>
Wildland Fire	3 Engines, Water Tender, Division Chief	<b>11</b>
Rescue	1 Engine	<b>3</b>
Hazardous Material	1 Engine, Division Chief	<b>4</b>

<sup>1</sup> Depending on vehicle size

<sup>2</sup> Two engines, one of which may be a truck, are provided by mutual aid agencies

Source: Aptos/La Selva FPD

Given the overall risk rating for each hazard by planning zone in Table 12, Citygate finds the District’s response plan for each hazard appropriate and consistent with other agencies of similar size, demographics, risk, and service capacity.

**Finding #13:** The District’s emergency incident staffing is appropriate for the risks to be protected.

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### **3.3 FISCAL ASSESSMENT**

#### **3.3.1 Fiscal Policies and Procedures**

##### ***Budgeting Practices***

The District prepares and adopts a preliminary budget on or before June 30 of each year, as required by the California Health and Safety Code (Fire Protection District Law of 1987). Fire district budgets must also conform to the accounting and budgeting procedures contained in Title 2 of the California Code of Regulations. The District’s annual budget is a line item list of General Fund revenues and expenditures, including the accounts into which the various revenues and expenditures are assigned, with aggregate totals for revenue, salaries and benefits, and services and supplies. Fixed asset expenditures, typically referred to as capital expenditures, as well as a designated amount for contingency, are also included in the total budget appropriation for the given fiscal year.

Following adoption, the expenditures set forth in the preliminary budget are considered appropriated, with the exception of capital expenditures and new employee positions, until a final budget is adopted by the District Board of Directors on or before October 1. Published

District budgets reviewed for this assessment reflect a budget resolution adopted in September of each year.

Multiple documents used to develop the District’s annual budget were reviewed for this assessment, including fiscal data since fiscal year (FY) 1994–95 and fiscal projections to FY 2024–25. From the documents reviewed, it is evident that the District is tracking both revenues and expenditures on a multi-year basis, providing data to evaluate revenue and expenditure trends over time.

**Finding #14:** The District tracks revenues and expenditures on a multiple-year basis consistent with recognized best practice recommendations.

The District’s current budget document does not clearly identify the process/activities involved in creating the budget, implementing it, and evaluating it for delivery of services and capital items. Neither does the current budget indicate the mission of the budget process. Current best practice budget recommendations<sup>16</sup> for government agencies include:

- ◆ Incorporating a long-term perspective
- ◆ Establishing linkages to broad organizational goals
- ◆ Focusing budget decisions on results and outcomes
- ◆ Involving and promoting effective communication with stakeholders
- ◆ Providing incentives to government management and employees.

**Finding #15:** The District’s current budget process does not appear to completely align with best practice recommendations of the Government Financial Officers Association (GFOA).

**Recommendation #3:** The District should consider adopting a budget process to include all of the elements recommended by the Government Financial Officers Association (GFOA).

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<sup>16</sup> Government Finance Officers Association (GFOA), *Recommended Budget Practices from the National Advisory Council on State and Local Budgeting*. <http://www.gfoa.org/print/451>  
Also, *Incorporating the Capital Budget into the Budget Document*. <http://gfoa.org/print/446>

### ***Fiscal Policies***

Although this assessment identified adopted fiscal policies relating to purchasing procedures and accounts payable, District staff has also developed and implemented fiscally related Standard Operating Procedures (SOPs) for claims, timekeeping, payroll, fixed assets, and business-related travel. Other fiscally related business processes, including short- to mid-range fiscal planning, are also largely consistent with recommended best practices for public agencies.

While there may well be an understanding within the organization and the Board of Directors about general financial policies that are included when staff is preparing the budget for consideration, recommending a course of action about a financial matter, or conducting financial transactions, institutional understandings *cannot* substitute for sound written financial policies to ensure that public agencies:

- ◆ Institutionalize sound financial management practices.
- ◆ Clarify strategic intent to provide best value to those served by the District.
- ◆ Define boundaries for the financial actions of staff and a policy framework in which staff can innovate to realize the organization’s strategic intent.
- ◆ Promote long-term and strategic financial thinking.
- ◆ Manage the District’s financial risks.
- ◆ Act within recognized fiscal best practices.

Basic financial policies that all public agencies should consider formally adopting include:<sup>17</sup>

- ◆ Policy regarding general fund reserves and the conditions under which they can be used, and establishing any type of restricted and/or strategic reserve(s).
- ◆ Policy regarding use of debt, including permissible debt instruments.
- ◆ Investment policy to provide guidance on investment of public funds.
- ◆ Accounting and financial reporting policies that endorse key accounting principles and ensure external audits are properly performed.
- ◆ Risk management and internal controls and procurement policies.
- ◆ Long-term financial planning policy that commits the agency to taking a long-term approach to financial health.

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<sup>17</sup> Government Finance Officers Association (GFOA), *Adopting Financial Policies*. <http://gfoa.org/print/5023>

- ◆ Policy requiring a structurally balanced budget, meaning a budget where recurring expenditures (those expected to be funded every year to maintain service levels) do not exceed recurring revenues. Capital asset costs are typically not considered a recurring expense, because although some capital expense may be incurred each year, there is generally more flexibility to defer capital expenditures than other recurring costs.
- ◆ Policy related to capital asset planning, budgeting, and maintenance/renewal and replacement.
- ◆ Policy related to revenue identification and generation.
- ◆ Policy related to expenditures concerning how best to use the agency's financial resources.
- ◆ Operating budget policies that describe essential features of the budget development process and form, as well as principles that guide budget-related decisions.

**Finding #16:** With the exception of policies relating to purchasing and accounts payable, the District Board of Directors has not adopted other relevant fiscal policies consistent with best practice recommendations for public agencies.

**Recommendation #4:** The District should establish formal fiscal policies as recommended by the Government Financial Officers Association (GFOA). The District should also review its current fiscal policies to ensure conformance with best practice recommendations for public agencies.

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### 3.3.2 Revenues

Table 29, Table 30, and Figure 13 show recent historical and projected District revenues.

**Table 29—Revenue History (In Thousand Dollars)**

Revenue Source	FY 2008–09	FY 2009–10	FY 2010–11	FY 2011–12	FY 2012–13	FY 2013–14	FY 2014–15	FY 2015–16	FY 2016–17
Property Tax – Secured	8,480.05	8,241.86	8,273.68	8,237.25	8,199.27	8,650.57	9,329.52	9,910.90	10,448.88
Property Tax – Unsecured	216.62	206.37	202.17	199.66	187.63	181.46	212.82	230.29	233.13
Property Tax – Supplemental	96.38	62.51	68.41	54.54	28.78	66.92	95.42	182.19	165.18
Special District Tax	130.55	130.72	131.14	130.98	131.07	130.81	131.06	130.97	131.22
Interest and Property Income	4.32	10.43	10.27	8.34	5.11	5.89	8.84	18.23	12.14
Revenue from Other Agency(s)	494.78	326.74	133.76	170.07	368.19	192.66	229.90	306.72	436.29
Charges for Services	112.87	128.77	123.89	113.42	116.22	161.44	286.35	281.12	265.76
Other Revenue	76.75	32.20	46.76	48.69	44.43	55.63	89.22	139.91	15.23
PERS Refund / Asset Sales	1.82	11.68	3.88	10.00	25.50	21.25	0.00	0.00	5.47
<b>Total Revenues</b>	<b>9,614.14</b>	<b>9,151.28</b>	<b>8,993.94</b>	<b>8,972.95</b>	<b>9,106.20</b>	<b>9,466.64</b>	<b>10,383.13</b>	<b>11,200.34</b>	<b>11,713.30</b>

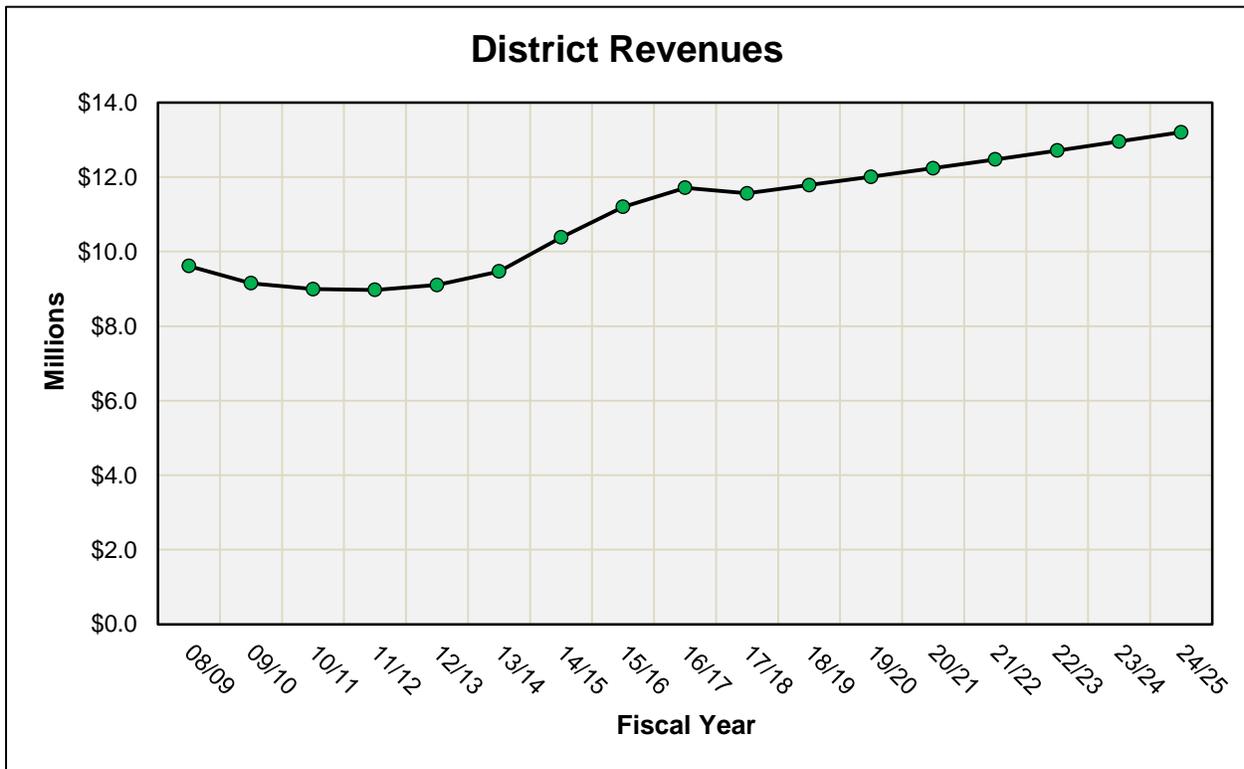
Source: Aptos/La Selva FPD financial records

**Table 30—Projected Revenues (In Thousand Dollars)**

Revenue Source	FY 2017–18	FY 2018–19	FY 2019–20	FY 2020–21	FY 2021–22	FY 2022–23	FY 2023–24	FY 2024–25
Property Tax – Secured	10,657.86	10,871.02	11,088.44	11,310.21	11,536.41	11,767.14	12,002.48	12,242.53
Property Tax – Unsecured	237.79	242.55	247.40	252.35	257.39	262.54	267.79	273.15
Property Tax – Supplemental	163.41	166.58	169.82	173.12	176.48	179.91	183.41	186.98
Special District Tax	131.22	131.22	131.22	131.22	131.22	131.22	131.22	131.22
Interest and Property Income	10.52	8.11	6.31	5.49	5.49	5.49	5.49	5.49
Revenue from Other Agency(s)	71.78	71.78	71.78	71.78	71.78	71.78	71.78	71.78
Charges for Services	277.47	277.47	277.47	277.47	285.77	285.77	285.77	285.77
Other Revenue	15.23	15.23	15.23	15.23	6.93	6.93	6.93	6.93
PERS Refund / Asset Sales	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<b>Total Revenues</b>	<b>11,565.30</b>	<b>11,783.96</b>	<b>12,007.66</b>	<b>12,236.87</b>	<b>12,471.48</b>	<b>12,710.79</b>	<b>12,954.89</b>	<b>13,203.86</b>

Source: Aptos/La Selva FPD fiscal projections (projected 1.5 percent annual revenue growth from FY 2017/18 – FY 2024/25)

**Figure 13—District Revenues by Year**



As Table 29 shows, more than 95 percent of FY 16–17 revenues are derived from property taxes. Of the different revenues sources used to support local government services, secured property taxes can be reliable and predictable over time, but are also subject to fluctuation as economic factors affect property values. Supplemental property taxes can also fluctuate when the local market intersects with factors affecting the local/regional economy.

Secured property tax revenue has more than tripled in the 22 years from FY 1995–96 (\$3.13 million) to FY 2016–17 (\$10.46 million); however, this period also includes three years of secured property tax decline from FY 2008–09 through FY 2012–13 during the economic downturn. Supplemental property tax also reflects substantial growth over the 22-year period; however, this revenue source represents less than one percent of total District revenue.

In 1982, the Aptos Fire Protection District adopted a Special Tax for fire protection services pursuant to approval by District voters. Also in 1982, the La Selva Fire Protection District adopted a similar special assessment. When Aptos and La Selva FPDs consolidated in 1987, both assessments continued in effect for their respective response areas. In 1987, the Aptos FPD Special Tax was applied to the Day Valley area as a Local Agency Formation Commission (LAFCo) condition of annexation to the consolidated fire district. In 2004, the Aptos Special Tax was also applied to the Spring Valley area as a condition of annexation. Neither the Aptos FPD

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Special Tax nor the La Selva FPD assessment ordinance contain language allowing for an increase in the annual assessment to offset inflation. These special property taxes currently generate approximately \$131,000 annually.

**Finding #17:** Neither of the District’s special tax assessments include a provision to increase the assessment to offset inflation.

As Table 29 and Figure 13 illustrate, total District revenues have increased an average of 2.6 percent annually since FY 2008–09, including a decline from FY 2009–10 through FY 2013–14. *Total revenue* is projected to increase an average of 1.5 percent annually over the next eight years to \$13.2 million in FY 2024–25.

Although recent annual *total* revenue growth has averaged 2.6 percent,<sup>18</sup> District staff collaborates closely with the Santa Cruz County Auditor-Controller’s office to project future year property tax revenue, and uses the same 1.97 percent projected *property tax growth* rate as the County. In Citygate’s opinion, this is an appropriate methodology that is also consistent with public agency fiscal best practice.

### 3.3.3 Expenditures

Table 31, Table 32, and Figure 14 show recent historical and projected District expenditures.

**Table 31—Expenditure History (In Thousand Dollars)**

Expenditure Category	FY 2008–09	FY 2009–10	FY 2010–11	FY 2011–12	FY 2012–13	FY 2013–14	FY 2014–15	FY 2015–16	FY 2016–17
Employee Salaries	4,668.64	4,703.30	4,684.66	4,696.97	4,765.74	5,247.61	5,480.75	5,662.57	5,828.76
Employee Benefits	1,059.64	909.98	1,026.09	987.72	1,026.68	1,267.24	1,331.33	1,442.78	1,775.91
Retirement	1,771.01	1,852.87	1,807.10	2,051.24	2,011.92	2,043.94	1,785.93	2,074.28	2,163.13
<b>Total Personnel Expenditures</b>	<b>7,499.29</b>	<b>7,466.15</b>	<b>7,517.86</b>	<b>7,735.94</b>	<b>7,804.35</b>	<b>8,558.79</b>	<b>8,598.01</b>	<b>9,179.62</b>	<b>9,767.79</b>
Services and Supplies	877.57	787.33	987.77	879.82	783.30	807.88	815.94	847.96	1,062.17
Debt Charges	188.91	188.91	104.80	104.80	104.80	52.40	0.00	0.00	0.00
Capital Expenditures	576.13	75.07	137.34	573.11	213.86	73.18	52.97	129.18	141.47
<b>Total Expenditures</b>	<b>9,141.91</b>	<b>8,517.46</b>	<b>8,747.76</b>	<b>9,293.66</b>	<b>9,027.77</b>	<b>9,477.78</b>	<b>9,443.70</b>	<b>10,156.77</b>	<b>10,971.43</b>

Source: Aptos/La Selva FPD financial records

<sup>18</sup> FY 2008/09 – FY 2015/16

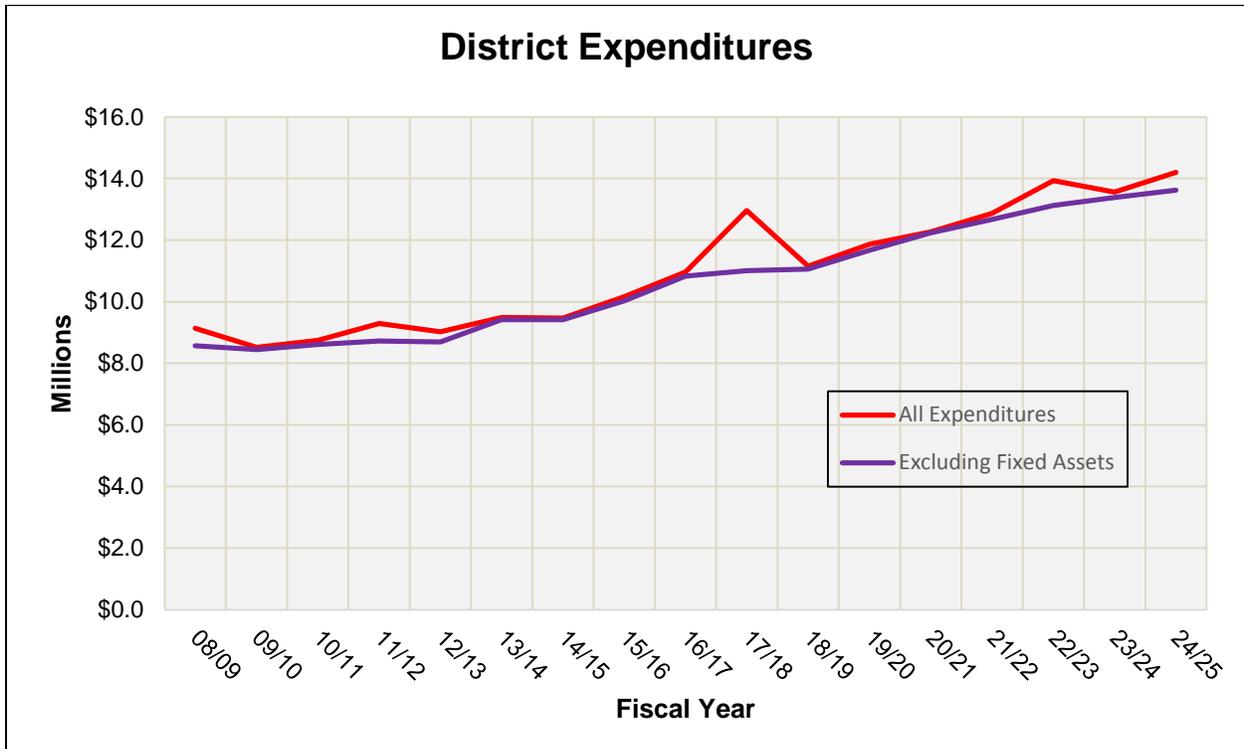
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**Table 32—Projected Expenditures (In Thousand Dollars)**

Expenditure Category	FY 2017–18	FY 2018–19	FY 2019–20	FY 2020–21	FY 2021–22	FY 2022–23	FY 2023–24	FY 2024–25
Employee Salaries	5,986.10	6,093.71	6,184.31	6,238.31	6,321.19	6,401.97	6,483.91	6,566.67
Employee Benefits	1,940.26	2,040.17	2,193.14	2,328.65	2,494.81	2,614.76	2,739.82	2,849.07
Retirement	1,495.83	1,774.43	2,106.78	2,347.30	2,593.50	2,803.68	2,816.47	2,829.38
<b>Total Personnel Expenditures</b>	<b>9,422.19</b>	<b>9,908.32</b>	<b>10,484.24</b>	<b>10,914.26</b>	<b>11,409.50</b>	<b>11,820.41</b>	<b>12,040.20</b>	<b>12,245.12</b>
Services and Supplies	1,585.20	1,151.60	1,187.81	1,323.44	1,263.15	1,301.04	1,340.07	1,380.28
Debt Charges	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Capital Expenditures	1,951.32	91.06	189.90	33.28	193.93	811.00	179.95	573.72
<b>Total Expenditures</b>	<b>12,958.70</b>	<b>11,150.97</b>	<b>11,861.95</b>	<b>12,270.99</b>	<b>12,866.58</b>	<b>13,932.45</b>	<b>13,560.23</b>	<b>14,199.12</b>

Source: Aptos/La Selva FPD fiscal projections

**Figure 14—District Expenditures by Year**



As Table 31 and Table 32 show, annual operating expenditures, excluding fixed assets, increased an average of 3.03 percent from FY 2008–09 to FY 2016–17 and are projected to increase an average of 2.92 percent annually to FY 2024–25.

### ***Personnel Costs***

As Table 31 shows, employee salaries, benefits, and retirement costs have increased 30.25 percent from \$7.5 million in FY 2008–09 to \$9.77 million in FY 2016–17, comprising an average of 89.52 percent of total annual expenditures, excluding fixed asset costs over the same period. As shown in Table 31, personnel costs are projected to increase an average of 2.9 percent annually over the next eight years to \$12.25 million in FY 2024–25.

### ***Services and Supplies Costs***

Services and supplies costs, as shown in Table 31, have increased 21.04 percent from \$878,000 in FY 2008–09 to \$1.06 million in FY 2016-17, representing an average of 9.5 percent of total annual expenditures, excluding fixed assets over the same period. As Table 31 shows, services and supplies costs are projected to increase 5.11 percent annually over the next eight years to \$1.38 million in FY 2024–25, representing 10.13 percent of total annual expenditures, excluding fixed assets in the end year.

### ***Capital Costs***

The District has historically included fixed asset costs, commonly referred to as capital expenditures, as an element of its annual operating budget. Over the previous nine fiscal years, capital expenditures have averaged \$219,000 annually, ranging from a low of \$53,000 in FY 2014–15 to a high of \$576,000 in FY 2008–09, comprising 0.56 to 6.3 percent of total annual expenditures over that period, as shown in Table 31.

Capital expenditures are projected to be \$4.02 million over the current and next seven fiscal years to 2024–25, averaging \$503,000 annually or 3.81 percent of total projected expenditures. Planned capital expenditures include two engines, one water tender, fire station furnishings, physical fitness equipment, self-contained breathing apparatus test equipment, and information technology equipment. District staff has prepared a series of detailed schedules for capital equipment replacement, which could serve as the beginning of a more formal capital improvement program (CIP) and budget.

The District’s practice of including capital costs in its annual operating budget does not align with public agency fiscal best practices<sup>19</sup> that recommend capital costs be funded independently of an agency’s annual operating budget. These best practices recommend developing a multiple-year Capital Plan and budget that is then incorporated into the agency’s annual budget. A typical Capital Plan and budget includes:

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<sup>19</sup> Government Finance Officers Association (GFOA), *Recommended Budget Practices from the National Advisory Council on State and Local Budgeting*. <http://www.gfoa.org/print/451>

Also, *Incorporating the Capital Budget into the Budget Document*. <http://gfoa.org/print/446>

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- ◆ A definition of *capital asset*, frequently including expected asset life and a minimum cost threshold.
- ◆ A distinct section of the annual budget allocated to the capital budget.
- ◆ All projects and funding sources in the capital budget, including any debt service to be associated with a given project.
- ◆ An outline in the capital budget of the process of adopting the budget, the process for prioritization and evaluation of projects for funding, and the process for reporting on the status and expected completion dates of new and ongoing capital projects.
- ◆ A good description of each project, noting those projects that are part of regular replacement cycles and that have an impact on the annual operating budget. The purpose of the project item and the funding source should also be described.

**Finding #18:** The District lacks a Capital Plan funded independently of the annual operating budget consistent with fiscal best practices for public agencies.

**Recommendation #5:** The District should consider developing a multiple-year Capital Plan funded independently of the annual operating budget consistent with fiscal best practice recommendations for public agencies.

### 3.3.4 Revenues versus Expenditures

Table 33 and Table 34 compare recent historical and projected revenue to expenditures.

**Table 33—Revenue versus Expenditure History (In Thousand Dollars)**

Category	FY 2008–09	FY 2009–10	FY 2010–11	FY 2011–12	FY 2012–13	FY 2013–14	FY 2014–15	FY 2015–16	FY 2016–17
Revenues	9,614.14	9,151.28	8,993.94	8,972.95	9,106.20	9,466.64	10,383.13	11,200.34	11,713.30
Expenditures <sup>1</sup>	9,141.91	8,517.46	8,747.76	9,293.66	9,027.77	9,477.78	9,443.70	10,156.77	10,971.43
<b>Revenue vs. Expenditures<sup>1</sup></b>	<b>472.23</b>	<b>633.82</b>	<b>246.18</b>	<b>-320.72</b>	<b>78.43</b>	<b>-11.15</b>	<b>939.43</b>	<b>1,043.57</b>	<b>741.87</b>
Expenditures <sup>2</sup>	8,565.78	8,442.40	8,610.42	8,720.55	8,692.45	9,419.06	9,413.95	10,027.58	10,829.97
<b>Revenue vs. Expenditures<sup>2</sup></b>	<b>1,048.36</b>	<b>708.88</b>	<b>383.52</b>	<b>252.40</b>	<b>413.75</b>	<b>47.57</b>	<b>969.18</b>	<b>1,172.75</b>	<b>883.34</b>

<sup>1</sup> All expenditures

<sup>2</sup> All expenditures *excluding* fixed assets

Source: Aptos/La Selva FPD financial records

**Table 34—Projected Revenue versus Expenditures (In Thousand Dollars)**

Category	FY 2017–18	FY 2018–19	FY 2019–20	FY 2020–21	FY 2021–22	FY 2022–23	FY 2023–24	FY 2024–25
Revenues	11,565.30	11,783.96	12,007.66	12,236.87	12,471.48	12,710.79	12,954.89	13,203.86
Expenditures <sup>1</sup>	12,958.70	11,150.97	11,861.95	12,270.99	12,866.58	13,932.45	13,560.23	14,199.12
<b>Revenue vs. Expenditures<sup>1</sup></b>	<b>-1,393.41</b>	<b>632.99</b>	<b>145.72</b>	<b>-34.13</b>	<b>-395.10</b>	<b>-1,221.66</b>	<b>-605.34</b>	<b>-995.26</b>
Expenditures <sup>2</sup>	11,007.39	11,059.91	11,672.05	12,237.71	12,672.65	13,121.45	13,380.28	13,625.39
<b>Revenue vs. Expenditures<sup>2</sup></b>	<b>557.91</b>	<b>724.05</b>	<b>335.62</b>	<b>-0.84</b>	<b>-201.17</b>	<b>-410.66</b>	<b>-425.39</b>	<b>-421.53</b>

<sup>1</sup> All expenditures

<sup>2</sup> All expenditures *excluding* fixed assets

Source: Aptos/La Selva FPD fiscal projections

As Table 33 shows, recent annual revenues have exceeded expenditures, including fixed assets, for all but two years, the difference ranging from \$78,000 in FY 2012–13 to \$1.04 million in FY 2015–16. Expenditures *exceeded* revenues in FYs 2011–12 (\$321,000) and 2013–14 (\$11,000). In reviewing the District’s fiscal history since FY 1994–95, it appears the District’s practice has been to utilize excess revenue over operating expenditures to fund capital costs for any given fiscal year. This strategy has been based on an ending year General Fund balance that has historically ranged from 20 to 29 percent of expenditures.

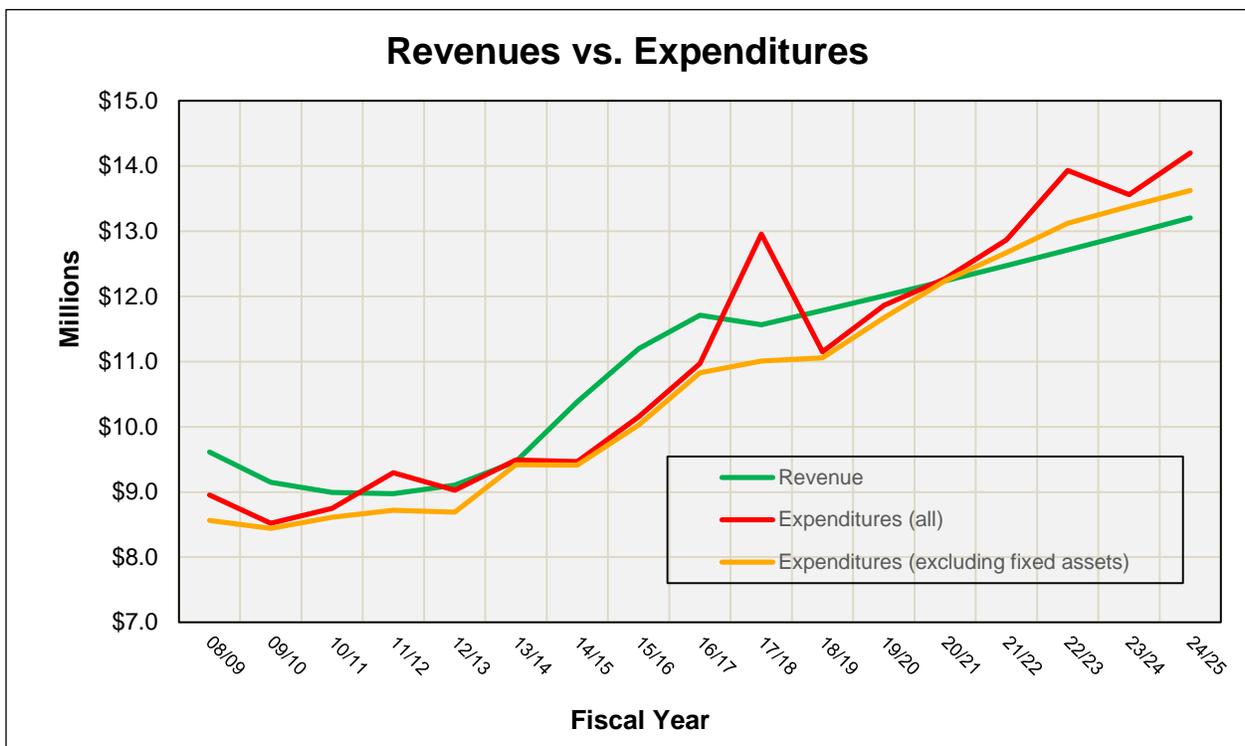
As Table 34 shows, expenditures are projected to exceed revenues next fiscal year (2017–18) by \$1.4 million due to planned capital expenditures. In addition, Table 34 shows that projected expenditures *exceed projected revenue* beginning in FY 2020–21 by \$340,000, with the deficit

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increasing in subsequent years to nearly \$1 million by FY 2024–25.<sup>20</sup> The District’s budget documents would appear to indicate this is due to planned capital expenditures; however, when those are removed from the equation, expenditures still exceed revenues for all five years by as much as nearly \$0.43 million. If these revenue and expenditure projections prove accurate, it is evident that near-term future expenditures, even excluding capital costs, will outpace revenues by 0.1 to 3.28 percent over the five-year period from fiscal years 2020–21 through 2024–25, as illustrated in Figure 15. This is of *significant concern*, particularly as it relates to the end-of-year General Fund balance and the District’s longer-term fiscal outlook.

**Figure 15—Revenue versus Expenditures**



**Finding #19:** Excluding capital costs, expenditures are projected to exceed revenues annually beginning in fiscal year 2020–21 by as much as \$0.43 million.

**Finding #20:** Including planned capital costs, expenditures are projected to exceed revenues by \$1.4 million in fiscal year 2017–18, and by \$0.34 to 1 million in fiscal years 2021–22 through 2024–25.

<sup>20</sup> Based on projected 1.5 percent annual revenue growth

### 3.3.5 Fiscal Reserves

Fiscal documents reviewed for this assessment reference a goal of maintaining the end-of-year General Fund balance at not less than five percent; however, this appears to be calculated on revenues rather than expenditures. Fiscal best practices for public agencies recommend an operating fund balance equal to *at least* two months’ operating expenditures as a fiscal reserve for unanticipated contingencies or emergencies, equating to approximately \$2.14 million, or 16.67 percent of the District’s current budget, including fixed asset costs. Fiscal best practices further recommend that public agencies consider establishing restricted reserve funds to meet future anticipated costs, such as capital asset renewal/replacement, other post-employment benefits (OPEB), or other long-term fiscal liabilities.

Table 35, Table 36, and Figure 16 show the District’s historical and projected end-of-year General Fund balance from fiscal years 2008–09 through 2024–25.<sup>21</sup>

**Table 35—General Fund Balance**

General Fund Category	FY 2008–09	FY 2009–10	FY 2010–11	FY 2011–12	FY 2012–13	FY 2013–14	FY 2014–15	FY 2015–16	FY 2016–17
Revenue	9,614,138	9,151,297	8,993,937	8,972,949	9,106,199	9,466,635	10,383,134	11,200,335	11,713,303
Expenditures	8,952,993	8,328,549	8,642,963	9,188,866	8,801,505	9,439,846	9,466,922	10,156,768	10,971,433
<b>End-of-Year Fund Balance</b>	<b>1,872,873</b>	<b>2,695,621</b>	<b>3,046,595</b>	<b>2,830,678</b>	<b>3,135,372</b>	<b>3,162,161</b>	<b>4,078,373</b>	<b>5,121,940</b>	<b>5,863,810</b>
Pct. of Annual Expenditures	20.92%	32.37%	35.25%	30.81%	35.62%	33.50%	43.08%	50.43%	53.45%

As Table 35 shows, the District has maintained an ending year General Fund balance ranging from 20 to 53 percent of annual expenditures over the previous nine fiscal years.

**Table 36—Projected General Fund Balance**

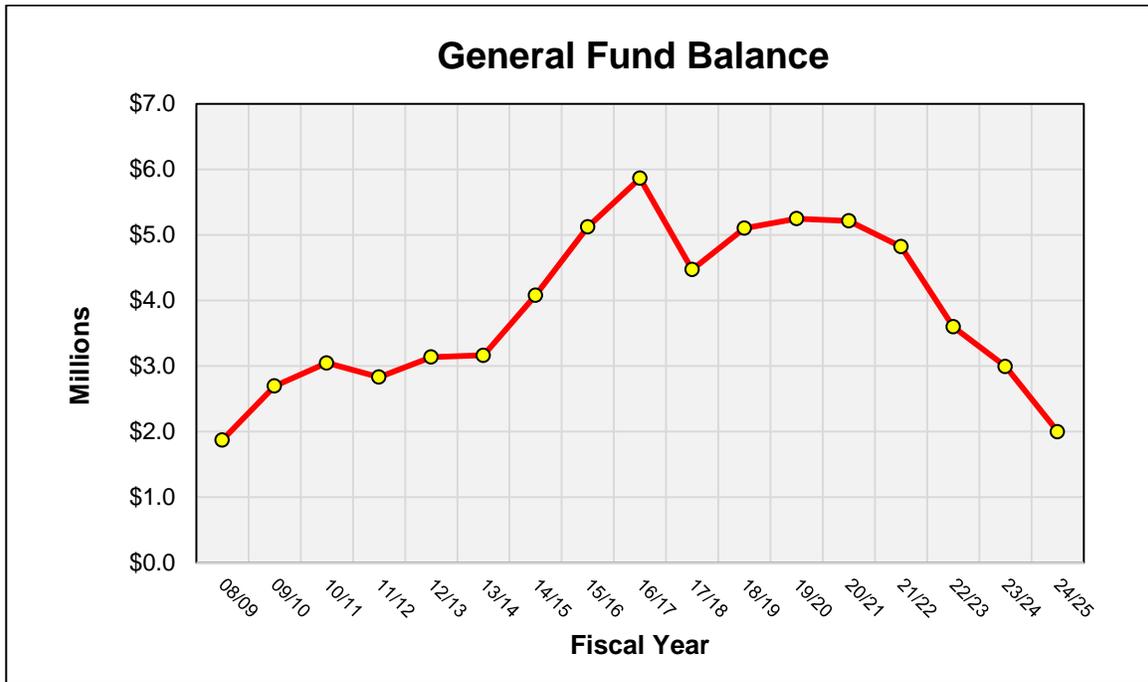
General Fund Category	FY 2017–18	FY 2018–19	FY 2019–20	FY 2020–21	FY 2021–22	FY 2022–23	FY 2023–24	FY 2024–25
Revenue	11,565,295	11,783,962	12,007,663	12,236,867	12,471,484	12,710,792	12,954,885	13,203,861
Expenditures	12,958,701	11,150,974	11,861,948	12,270,994	12,866,581	13,932,454	13,560,226	14,199,114
<b>End-of-Year Fund Balance</b>	<b>4,470,404</b>	<b>5,103,392</b>	<b>5,249,107</b>	<b>5,214,980</b>	<b>4,819,883</b>	<b>3,598,221</b>	<b>2,992,880</b>	<b>1,997,627</b>
Pct. of Annual Expenditures	34.50%	45.77%	44.25%	42.50%	37.46%	25.83%	22.07%	14.07%

Table 36 shows that projected expenditures over the current and next seven fiscal years to 2024–25 will *reduce* the end-of-year General Fund balance to 14 percent of annual expenditures by FY

<sup>21</sup> Based on projected 1.5 percent annual revenue growth

2024–25. This is of *significant concern* relative to the District’s long-term fiscal outlook given the ongoing negative revenue versus expenditure trend previously identified.

**Figure 16—General Fund Balance**



**Recommendation #6:** The District should consider establishing a policy maintaining a General Fund reserve equivalent to at least 17 percent, and preferably 20 percent or more, of annual operating expenses, excluding capital costs.

**Recommendation #7:** The District should consider establishing restricted/strategic reserve funds as appropriate to meet other anticipated future fiscal liabilities, such as capital asset replacement and post-employment employee benefits.

### 3.3.6 Overall Fiscal Evaluation

District revenues have historically exceeded expenditures for most fiscal years, and capital expenditures have been funded utilizing this excess revenue on an annual basis. The District also has a history of maintaining an end-of-year General Fund balance averaging more than 20 percent of budgeted expenditures. This is significant since 95 percent of annual revenues are derived from property taxes subject to economic forces beyond the District’s control, as

illustrated during the recent recession. Although property tax revenue has grown an average of 2.7 percent annually since 2008–09, and total revenues 2.60 percent over the same time period, future revenue projections are appropriately more conservative in alignment with recognized fiscal planning best practices. In Citygate’s opinion, significant property tax base growth is unlikely to occur given that the core populated areas of the District are effectively built-out, limiting new construction and related property tax base growth primarily to single-family residential remodels or new residential construction in the rural areas of the District.

Personnel costs continue to be the single greatest annual expenditure, currently comprising 90 percent of recurring costs. The District is facing a significant increase in its future employee retirement system contributions due to the recent reduction of the CalPERS discount rate. Employee health benefits and workers’ compensation insurance costs continue to escalate as well, and the District also has an unfunded accrued leave liability estimated to be \$793,000 by the end of fiscal year 2017–18. These fiscal liabilities will challenge the District in future years.

While the District has historically maintained a structurally balanced budget by maintaining expenditures within annual revenues, the projected budget for FY 2017–18 will require a \$1.4 million augmentation from the District’s end-of-year General Fund balance due to planned capital expenditures of nearly \$2 million. Then, beginning in FY 2020–21, projected annual operating expenditures, excluding planned capital costs, *exceed projected revenues* in each succeeding year, requiring augmentation from the General Fund reserve to achieve a balanced budget. Given this projected increasing annual budget deficit, the District faces a *potential fiscal crisis*. Failure to maintain a structurally balanced budget could potentially exhaust the District’s General Fund balance within the next 10 years.

In addition to multi-year fiscal planning to ensure long-term sustainability and a structurally balanced annual budget, Citygate recommends that the District establish and gradually fund a multi-year capital renewal/replacement plan, and establish and maintain restricted reserve funds equivalent to at least 17 percent, and preferably 20 percent or more, of annual operating expenses, to fund other future fiscal liabilities and unanticipated contingencies or emergencies. The long-term fiscal planning process should also include strategies to address potential budget deficits before they occur.

**Finding #21:** Based on projected revenues and expenditures, the District faces a potential *continuing structural annual budget deficit* beginning in fiscal year 2020–21.

**Finding #22:** The District faces a *potential critical fiscal crisis* beyond fiscal year 2020–21, with its projected end-of-year General Fund balance potentially exhausted by fiscal year 2026–27.

**Recommendation #8:** The District should engage in multiple-year fiscal planning to ensure long-term fiscal sustainability and a structurally balanced annual budget; establish and gradually fund a multi-year capital renewal/replacement plan; and establish and maintain restricted reserve funds equivalent to at least 17 percent, and preferably 20 percent or more, of annual operating expenses, to fund other future fiscal liabilities and unanticipated contingencies or emergencies.

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## SECTION 4—FUTURE SERVICE DEMAND AND ALTERNATE SERVICE DELIVERY MODELS

### 4.1 FUTURE SERVICE DEMAND

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Service demand (calls for service) for fire agencies is generally a function of population and demographics: higher population densities and lower socio-economic demographics drive service demand up.

As Figure 24 in Appendix A.1.11 illustrates, the District’s population density ranges from less than 100 to more than 8,000 people per square mile, with the higher densities occurring in the greater Aptos, Rio Del Mar, Seacliff, and Seascap areas. The remainder of the District’s service area is predominantly rural, with a significantly lower population density. Also, as Table 40 in Appendix A.1.4 shows, the District’s population is generally well educated, employed, and covered by health insurance. In addition, a majority of the housing units are owner-occupied. Although more than 16 percent of the District’s population is 65 years of age or older, violent crime and poverty rates within the District are low. These factors, in aggregate, tend to result in lower service demand than other communities of similar population density with lower socio-economic demographics.

As discussed in Appendix A.1.5, population and related housing units are projected to increase by a very modest 11.17 percent and 9.46 percent respectively over the next 18 years to 2035, with zoning regulations limiting new development to existing town centers and concentrated urban areas. With the exception of the Aptos Village mixed-use project, future development will be predominantly limited to single-family dwelling units.

Although incident data prior to 2014 was not reviewed for this study, service demand over the past three years has increased less than five percent annually, as shown in Table 70 in Appendix B.1.4. Medical emergencies, the single largest service demand category, have increased an average of only 2.5 percent annually over the past three years. While building fire service demand has trended upward over the past three years, the number of annual building fire incidents remains low.

Given the District’s demographics, zoning regulations, and service demand history, Citygate projects a continued annual service demand increase, averaging approximately 5 percent, over the next 10 years to 2027. This projected service demand increase can be absorbed within the District’s current service capacity.

**Finding #23:** Annual service demand is projected to increase approximately 5 percent annually over the next 10 years to 2027; this increase can be absorbed within the District’s current service capacity.

## **4.2 POTENTIAL ALTERNATIVE SERVICE MODELS**

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### **4.2.1 Operational Deployment Alternatives**

As discussed in Section 2.8, current fire station locations, topography, predominantly curvilinear road network, and daily traffic congestion prevent response times from facilitating positive outcomes for many areas of the District. If desired outcomes include minimizing permanent physiological/neurological deficit resulting from medical emergencies, and/or limiting building fire damage to only part of the inside of an affected building, then the District will need first-due response coverage within a recommended 7:30 minutes from 9-1-1 notification, and ERF response coverage within 11:30 minutes of 9-1-1 notification, in all demand/planning zones.

It is apparent from the GIS element of this study that, given the existing fire station locations within the District and the adjoining fire agencies, there are no opportunities to consolidate fire station locations to enhance service delivery within the Aptos/La Selva Fire Protection District. The next most proximal fire station, Central FPD Station 3, is located 2.3 miles west of Aptos/La Selva Fire Station 1 on Soquel Drive and provides appropriate station distribution spacing for both first-due and ERF travel time coverage.

As discussed in Section 2.8.1, there are currently five areas of the District beyond the recommended 7:30-minute first-due response time performance goal. All or portions of three of those gap areas have a population density greater than 500 per square mile. As suggested, first-due response performance in the gap area with the highest population density and related building risk could be improved by relocating Station 3 closer to Highway 1 in the area of San Andreas Road and Seascapes Boulevard. Improving first-due response performance in the other gap areas is impractical given the District's current station locations and the cost associated with providing additional stations/resources to serve these generally lower population density and service demand areas.

Given the daily traffic congestion during peak commute times on Highway 1 and many of the District's primary travel routes accessing Highway 1, first-due response performance could potentially be improved during these or other high service demand periods by dynamically deploying one or two "fast response"<sup>22</sup> units during these periods. These units could be staffed with two personnel, including at least one paramedic, to provide Advanced Life Support EMS and initial firefighting capability to provide faster response to areas difficult to reach within the preferred 7:30-minute first-due response time during those periods. The District could implement this alternative model at the lowest cost by adding one or two on-duty personnel during these periods, depending on the number of fast response units desired, and concurrently down-staffing the equivalent number of engines to two personnel. This would result in five or six staffed

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<sup>22</sup> Smaller (1- to 1/2-ton or less) apparatus with EMS and minimal firefighting service capabilities

response units during peak traffic congestion and/or service demand periods, which would also provide additional available ERF staffing. However, until the District has a long-term, stable, balanced budget plan, it should not consider adding more line firefighters. There is no assurance at present that the District could afford the expense in only a few years.

Another potential operational alternative involves the sharing of Chief Officers with the adjacent Central FPD. As discussed in Section 1.3.1 and Section 3, the District currently utilizes three Division Chiefs working a 40-hour workweek, with Duty Chief coverage when their assigned shift is on duty, to provide emergency incident command and overall shift administration/supervision, as well as assigned operations, fire prevention, or training and safety administrative program responsibilities.

However, Citygate's assessment of the District's administration/management functions, as discussed in Section 3.1, finds that there is currently insufficient capacity in this model to adequately meet both the operational and administrative responsibilities and program goals and objectives. While some of this could be alleviated with additional administrative support capacity (as discussed in Section 3.1.5), another alternative could involve sharing Division and Battalion Chief responsibilities between the Aptos/La Selva and Central Fire Districts. While this alternative would involve legal, operational, and labor relations issues, it may well be worth consideration by both Districts to enhance operational and administrative efficacy.

#### **4.2.2 Operational Support Systems Alternatives**

While the District already utilizes shared dispatch and fleet maintenance services, as well as shared EMS and training administration, other opportunities exist to share or consolidate other District administrative/support programs/functions. For example, the District could collaborate with the Central FPD to resurrect the Cooperative Prevention Project (CPP). Although this shared fire prevention services program was implemented in June 2014 and terminated by the Central FPD Board of Directors in September 2015, it served as a viable shared services program according to District staff, with one Fire Marshal, one inspector, two administrative staff, and two part-time inspectors meeting the fire prevention program needs of both agencies. With essentially identical California Fire Code amendments, similar data management systems, and similar program goals and objectives, this alternative may be worth consideration in lieu of the District hiring additional personnel to support the fire prevention program.

As discussed in the previous section, another potential opportunity to share/consolidate services with the Central FPD involves sharing mid-management staff, including the Aptos/La Selva Division Chiefs and the Central FPD Battalion Chiefs, with the Battalion Chiefs responsible for shift administration and emergency incident management and the Division Chiefs responsible for administration of both agencies' operations, EMS, prevention/risk reduction, training, safety, and fleet maintenance programs. While this alternative would not provide any fiscal savings, it could

provide enhanced program continuity and efficiencies for both Districts. This could also be another incremental step toward a functional or full consolidation of the two Districts.

Along that same theme, a third alternative could involve the sharing of some or all administrative support services, such as accounting, payroll, human resources, risk management, technology management, and website/social media administration. This alternative could also provide enhanced administrative backup/surge capacity to ensure continuity of essential business services/systems in the event of a prolonged or unanticipated administrative absence.

### 4.2.3 Recommended Program Funding Priorities and Estimated Costs

Given the support staffing analysis from Section 3.1, and the deployment and operational support systems alternatives analysis from Section 4.2.2, Citygate recommends that the District consider the following top three priorities as long-term funding allows. The priorities are shown with estimated annual costs in Table 37.

**Table 37—Programming Priorities with Estimated Costs**

Program Funding Priority		FTE <sup>1</sup>	Estimated Annual Cost		
			Low	High	Average
1	Business Services Support <sup>2</sup>	0.5–1.0	\$45,689	\$95,042	\$93,209
2	Fire Prevention Support <sup>3</sup>	1.0–2.0	\$91,377	\$190,083	\$140,730
3	Fast Response Squads <sup>4</sup>	2.0–4.0	\$475,670	\$583,780	\$529,725
<b>Total</b>					<b>\$763,665</b>

<sup>1</sup> FTE = Full Time Equivalent personnel

<sup>2</sup> Assumes 1 Administrative Assistant position

<sup>3</sup> Assumes 1 Fire Inspector and 1 Administrative Assistant position

<sup>4</sup> Assumes 1 Firefighter and 1 Firefighter-Paramedic position per squad (*does not include* apparatus and other associated operational costs)

Table 38 and Figure 17 summarize the projected fiscal impacts of these recommended program priorities as they influence projected revenues versus expenditures.

**Aptos/La Selva Fire Protection District**  
Emergency Services Master Plan

**Table 38—Projected Fiscal Impact of Recommended Program Priorities**

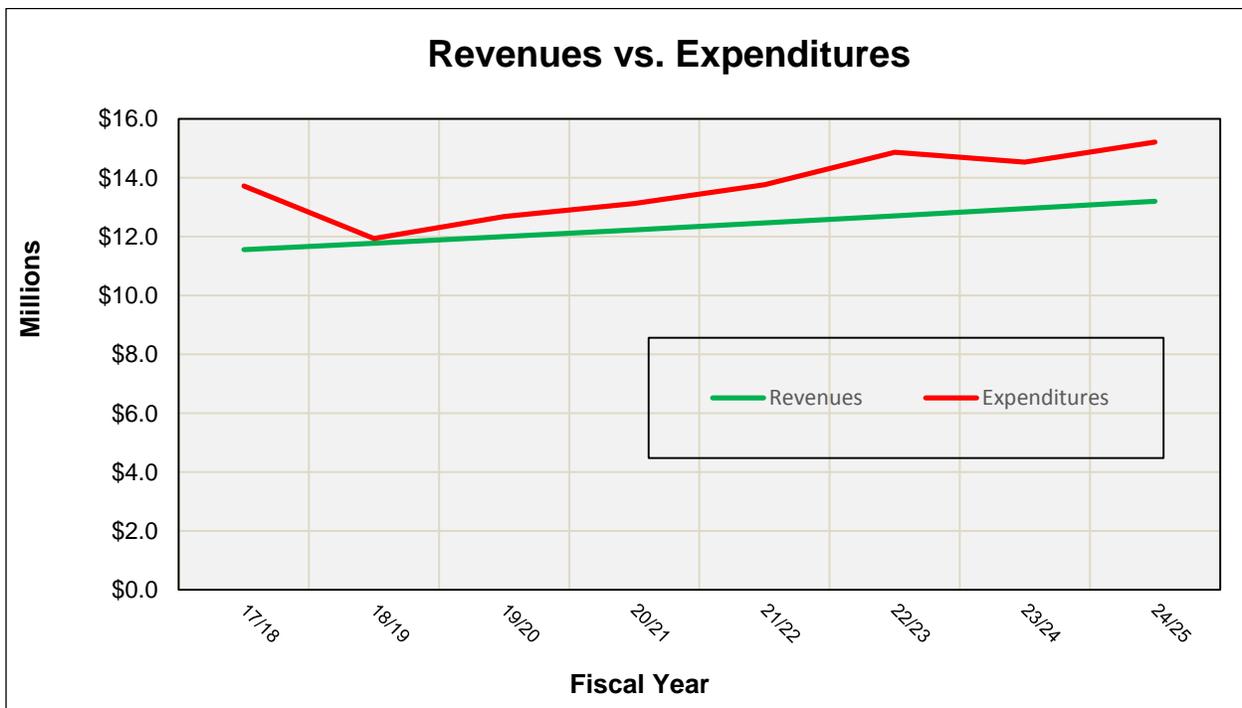
Category	FY 2017-18	FY 2018-19	FY 2019-20	FY 2020-21	FY 2021-22	FY 2022-23	FY 2023-24	FY 2024-25
<b>Projected Revenue</b>	<b>11,565,295</b>	<b>11,783,962</b>	<b>12,007,663</b>	<b>12,236,867</b>	<b>12,471,484</b>	<b>12,710,792</b>	<b>12,954,885</b>	<b>13,203,861</b>
<b>Projected Expenditures</b>	<b>13,722,365</b>	<b>11,946,508</b>	<b>12,690,681</b>	<b>13,134,312</b>	<b>13,765,927</b>	<b>14,869,332</b>	<b>14,536,202</b>	<b>15,215,820</b>
Personnel	9,422,191	9,908,317	10,484,237	10,914,265	11,409,505	11,820,409	12,040,203	12,245,116
Services/Supplies	1,585,195	1,151,597	1,187,810	1,323,444	1,263,148	1,301,042	1,340,074	1,380,276
Capital Expense	1,951,315	91,060	189,901	33,284	193,929	811,002	179,949	573,722
<i>Additional Program Costs<sup>1</sup></i>	<i>763,665</i>	<i>795,534</i>	<i>828,733</i>	<i>863,318</i>	<i>899,346</i>	<i>936,878</i>	<i>975,976</i>	<i>1,016,705</i>
<b>Revenue vs. Expenditures<sup>2</sup></b>	<b>-2,157,070</b>	<b>-162,546</b>	<b>-683,018</b>	<b>-897,445</b>	<b>-1,294,444</b>	<b>-2,158,540</b>	<b>-1,581,317</b>	<b>-2,011,958</b>

<sup>1</sup> Assuming average estimated costs from Table 37

<sup>2</sup> All projected expenditures

Source: Aptos/La Selva FPD fiscal projections

**Figure 17—Revenue versus Expenditures with Program Additions**



As Table 38 and Figure 17 illustrate, the estimated costs for these additional program priorities *significantly exacerbate* the projected negative revenue/expenditure gap going forward, with potential to *deplete the District's fund balance as early as fiscal year 2022-23*. While these suggested program(s) would certainly enhance operational deployment and/or support services efficacy, they should not be considered without additional revenue and/or significant reduction of other ongoing expenditures.

### **4.3 THE PATH AHEAD**

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The purpose of a Master Plan is to provide a guiding framework for the future of an organization, including any relevant projected environmental, risk, and/or related service demand changes, as well as the organization’s ability to fiscally support the services it provides. This Emergency Services Master Plan also includes a Standards of Cover deployment analysis, comparing the District’s current deployment performance against the risks to be protected and nationally recognized best practices. This analysis of response performance forms the basis from which to make recommendations for changes, if any, in fire station locations, equipment types, staffing, and support programs.

Citygate recommends that the District’s next steps be to work through the issues identified in this study over the following timelines:

#### **4.3.1 Short-Term Strategies**

- ◆ Absorb the policy recommendations of this Emergency Services Master Plan.
- ◆ Develop and adopt fiscal policies as recommended in Section 3.3.
- ◆ Engage in multiple-year fiscal planning to ensure long-term fiscal sustainability.
- ◆ Develop a balanced budget multi-year plan before any additional personnel are added. If revenues permit, the District should increase headquarters staff first to ensure redundancy in critical positions and to maintain regulatory oversight.
- ◆ Consider exploring additional shared services with the Central FPD as identified in Section 4.2.
- ◆ Consider evaluating the benefits, if any, of a functional or full consolidation with the Central FPD.

#### **4.3.2 Longer-Term Strategies**

- ◆ Monitor traffic congestion impact trends on response performance.
- ◆ As revenues permit, consider additional business services and fire prevention administrative support as discussed in Section 3.1.
- ◆ Consider evaluating temporary dynamic deployment of Engine 3511 closer to Highway 1 and State Park Drive, and/or Engine 3513 to the vicinity of San Andreas Road and Seascape Boulevard, during peak traffic congestion periods, for impacts on first-due response times during these periods.
- ◆ As revenues and fiscal planning permit, consider dynamic deployment of one or more “fast response” units, capable of providing ALS emergency medical care

## **Aptos/La Selva Fire Protection District**

### *Emergency Services Master Plan*

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and initial fire suppression, to suburban planning zone areas of the District beyond recommended first-due travel times during peak traffic congestion and/or high service demand periods.

- ◆ As capital funding permits, consider relocating Station 3 in the vicinity of San Andreas Road and Seascape Boulevard.

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## SECTION 5—FINDINGS AND RECOMMENDATIONS

Following is a complete list of the findings and recommendations contained in this report, including Appendix A and B, which contain Findings #24-42 and Recommendations #9-10. Findings and recommendations are grouped and presented by subject, beginning with deployment.

### 5.1 DEPLOYMENT FINDINGS AND RECOMMENDATIONS

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- Finding #1:** While the District has adopted response time policies somewhat consistent with industry-recognized best practices, the policies do not define the start time as being either from time of receipt of the 9-1-1 call, fire crew notification, or driving time.
- Finding #2:** The District has a standard response plan that considers risk and establishes an appropriate initial response for each incident type; each type of call for service receives the combination of engine companies, trucks, ambulances, specialty units, and command officers customarily needed to effectively control that type of incident based on Fire District experience.
- Finding #3:** First-due travel time coverage of 3:00 minutes, needed to meet the District's current response performance policy statement, is only available within about 0.5 to 1 mile of each existing fire station without traffic congestion.
- Finding #4:** Most of the higher population density areas of the District are within 4:00 minutes first-due travel time without traffic congestion.
- Finding #5:** Nearly all of the higher population density areas of the District are within 6:00 minutes first-due travel time without traffic congestion.
- Finding #6:** Most of the higher population density areas of the District, with the exception of the Rio Del Mar Beach and Seascape Village areas, are within 9:00 minutes travel time of a multiple-unit Effective Response Force without traffic congestion.
- Finding #24:** The District's population is projected to grow a very modest 11 percent over the next 18 years to 2035.
- Finding #25:** The District's higher population density areas are essentially built-out, with zoning regulations limiting new development to existing town centers and concentrated urban areas.

- Finding #26:** With the exception of the Aptos Village mixed-use project, future development will be predominantly limited to single-family dwellings.
- Finding #27:** Most of the District’s service area east of Highway 1 is within a *Moderate* or *High* wildland Fire Hazard Severity Zone (FHSZ), as identified by the California Department of Forestry and Fire Protection (CAL FIRE).
- Finding #28:** Much of the District’s service area west of Highway 1 lies within a *Moderate* or *High* wildland FHSZ, as recommended by the California Department of Forestry and Fire Protection (CAL FIRE).
- Finding #29:** The District has established a goal to inspect every parcel east of Highway 1 within the State Responsibility Area at least every four years to ensure that required defensible space is appropriately established and maintained.
- Finding #30:** The San Mateo / Santa Cruz County Community Wildfire Protection Plan identifies two high-priority wildland fire mitigation project areas within the District, including the Redwood Drive community and the area where the Trabing Fire burned in 2008.
- Finding #31:** The County has established appropriate emergency evacuation protocols, procedures, and resources in its Emergency Operations Plan.
- Finding #32:** The County has established a mass emergency telephone notification system to effectively communicate emergency information to the public in a timely manner.
- Finding #33:** The County regularly utilizes, validates, and evaluates its emergency evacuation protocols, procedures, and resources to ensure ongoing emergency evacuation readiness and effectiveness.
- Finding #34:** The District’s day-of-week and month-of-year service demand are fairly consistent, indicating the need for a consistent 24-hour-per-day, seven-days-per-week fire and EMS emergency response system.
- Finding #35:** Out of all incident activity in 2016, 13.41 percent involved two or more simultaneous (concurrent) incidents.
- Finding #36:** Simultaneous incident activity *within the same station response area* minimally impacts District first-due response times, involving 1.1 percent of all calls for service in 2016.

- Finding #37:** Overall District hourly station service demand and unit-hour utilization percentages are well below recommended maximum saturation rates.
- Finding #38:** Whenever Medic 3566 is activated to provide surge capacity for the Santa Cruz County pre-hospital emergency medical system, Engine 3511 is unstaffed/unavailable for emergency response; to date, this has negligibly impacted the District's overall emergency response capability.
- Finding #39:** Call processing times for 90 percent of the District's incidents fail to meet recommended best practices by a significant margin (99 seconds), and a significantly low percentage of dispatch records have a call processing time stamp within expected parameters.
- Finding #40:** Turnout time performance appears to consistently fail to meet a recommended target of 2:00 minutes or less by a significant margin.
- Finding #41:** Effective Response Force travel times in many areas of the District are significantly longer than the 8:00 minutes or less recommended for a positive outcome and to meet best practices for a suburban area.
- Finding #42:** Call to first arrival performance of 10:27 minutes *fails to meet* the District's current response performance policy of 6:00 minutes or less for suburban demand zones by 67 percent (4:06 minutes), as well as failing to meet its current 8:00 minutes or less response performance policy for rural demand zones by 25 percent (2:04 minutes). This response performance also fails to meet a best practice recommended response performance goal of 7:30 minutes or less for suburban areas due to large geographic station response areas, longer-than-expected dispatch center call processing and crew turnout time performance, and longer travel times due to the topography, road network, and daily traffic congestion within the District.

If the District could save 99 seconds in dispatch and 43 seconds in crew turnout time, the resultant 2:22 minutes, when subtracted from the actual call to arrival time of 10:27 minutes, lowers call to arrival to 8:05 minutes, substantially closer to best practices, *without additional fire stations*.

- Recommendation #1:** As capital planning and funding permit, consider relocating Fire Station 3 closer to Highway 1 in the vicinity of San Andreas Road and Seascapes Boulevard to provide enhanced first-due and Effective Response Force travel time coverage for higher risk areas of the District.

**Recommendation #2:** **Adopt Updated Deployment Policies:** The District's Board of Directors should adopt updated, complete performance measures to aid deployment planning and to monitor performance. The measures of time should be designed to deliver outcomes that will save patients medically salvageable upon arrival and to keep small but serious fires from becoming more serious. With this in mind, Citygate recommends the following measures for the District's planning zones:

- 2.1 Distribution of Fire Stations:** To treat pre-hospital medical emergencies and control small fires, the first-due unit should arrive within 7:30 minutes, 90 percent of the time from the receipt of the 9-1-1 call in suburban planning zones and within 10:30 minutes in rural planning zones. This equates to a 90-second dispatch time, 2:00-minute company turnout time, and 4:00-minute (suburban zones) or 7:00-minute (rural zones) travel time.
- 2.2 Multiple-Unit Effective Response Force (ERF) for Serious Emergencies:** In the suburban planning zones, to confine building fires near the room of origin, keep wildland fires under three acres in size, and treat multiple medical patients at a single incident, a multiple-unit ERF of at least 16 personnel, including at least one Chief Officer, should arrive within 11:30 minutes from the time of 9-1-1 call receipt in fire dispatch, 90 percent of the time. For the rural planning zones, the ERF should arrive within 17:30 minutes. This equates to a 90-second dispatch time, 2:00-minute company turnout time, and 8:00-minute (suburban zones) or 14:00-minute (rural zones) travel time fire station spacing.
- 2.3 Hazardous Materials Response:** Provide hazardous materials response designed to protect the community from the hazards associated with uncontrolled release of hazardous and toxic materials. The fundamental mission of the District response is to minimize or halt the release of a hazardous substance so it has minimal impact on the community. This can be achieved with a first-due total response time of 7:30 minutes (suburban zones) or 10:30 minutes (rural zones) to provide initial hazard evaluation and/or mitigation actions. After the initial evaluation is completed, a determination can be made whether to request

additional resources from the regional hazardous materials team.

- 2.4** Technical Rescue: Respond to technical rescue emergencies as efficiently and effectively as possible with enough trained personnel to facilitate a successful rescue with a first-due total response time of 7:30 minutes (suburban zones) or 10:30 minutes (rural zones) to evaluate the situation and/or initiate rescue actions. Following the initial evaluation, assemble additional resources as needed within a total response time of 11:30 minutes (suburban zones) or 17:30 minutes (rural zones) to safely complete rescue/extrication and delivery of the victim to the appropriate emergency medical care facility.

**Recommendation #9:** Collaborate with Santa Cruz Regional 9-1-1 to improve call processing performance more in alignment with industry-recognized best practice standards while maintaining dispatch accuracy.

**Recommendation #10:** Evaluate actual turnout time performance compared to study findings and, as appropriate, work to improve 90<sup>th</sup> percentile turnout time performance to meet a recommended target of 2:00 minutes or less.

## **5.2 ADMINISTRATION, MANAGEMENT, STAFFING, AND FISCAL FINDINGS AND RECOMMENDATIONS**

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**Finding #7:** The District’s administrative function has numerous significant strengths; it also lacks sufficient capacity to ensure appropriate business services redundancy, workforce accountability, professional development, succession planning, special projects capacity, and long-term strategic and fiscal planning. Citygate estimates an additional 0.5–1.0 positions would close these gaps.

**Finding #8:** The District’s Fire Prevention Division also has significant strengths, but lacks sufficient capacity to meet current Division goals and objectives, including fire safety inspections, code enforcement, fire hydrant inspections, wildland-urban interface mitigation initiatives, and data management. Citygate estimates an additional 1.0–2.0 positions would close these gaps.

**Finding #9:** The District’s Training and Safety Division has many strengths, but lacks sufficient capacity to ensure appropriate data management, program/succession continuity planning, Community Emergency Response Team program activities,

and health and safety program development and related training. Citygate estimates an additional 0.5–1.0 positions would close these gaps.

- Finding #10:** The District’s Operations Division lacks sufficient administrative support capacity to ensure appropriate incident data quality assurance, succession development planning/implementation, and special projects capacity. Citygate estimates an additional 0.16–0.33 FTE technical administrative capacity is needed to close these gaps.
- Finding #11:** The District’s administration/management functions are understaffed to meet current workload; future workload is not expected to change substantively absent the District taking on additional service responsibilities.
- Finding #12:** Given the small headquarters staff, especially in Business Services, accounting, payroll, and EMS quality assurance, the District has a major exposure to critical services interruption if one person is absent for more than a very short time.
- Finding #13:** The District’s emergency incident staffing is appropriate for the risks to be protected.
- Finding #14:** The District tracks revenues and expenditures on a multiple-year basis consistent with recognized best practice recommendations.
- Finding #15:** The District’s current budget process does not appear to completely align with best practice recommendations of the Government Financial Officers Association (GFOA).
- Finding #16:** With the exception of policies relating to purchasing and accounts payable, the District Board of Directors has not adopted other relevant fiscal policies consistent with best practice recommendations for public agencies.
- Finding #17:** Neither of the District’s special tax assessments include a provision to increase the assessment to offset inflation.
- Finding #18:** The District lacks a Capital Plan funded independently of the annual operating budget consistent with fiscal best practices for public agencies.
- Finding #19:** Excluding capital costs, expenditures are projected to exceed revenues annually beginning in fiscal year 2020–21 by as much as \$0.43 million.

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**Finding #20:** *Including planned capital costs, expenditures are projected to exceed revenues by \$1.4 million in fiscal year 2017–18, and by \$0.34 to 1 million in fiscal years 2021–22 through 2024–25.*

**Finding #21:** Based on projected revenues and expenditures, the District faces a potential *continuing structural annual budget deficit* beginning in fiscal year 2020–21.

**Finding #22:** The District faces a *potential critical fiscal crisis* beyond fiscal year 2020–21, with its projected end-of-year General Fund balance potentially exhausted by fiscal year 2026–27.

**Recommendation #3:** The District should consider adopting a budget process to include all of the elements recommended by the Government Financial Officers Association (GFOA).

**Recommendation #4:** The District should establish formal fiscal policies as recommended by the Government Financial Officers Association (GFOA). The District should also review its current fiscal policies to ensure conformance with best practice recommendations for public agencies.

**Recommendation #5:** The District should consider developing a multiple-year Capital Plan funded independently of the annual operating budget consistent with fiscal best practice recommendations for public agencies.

**Recommendation #6:** The District should consider establishing a policy maintaining a General Fund reserve equivalent to at least 17 percent, and preferably 20 percent or more, of annual operating expenses, excluding capital costs.

**Recommendation #7:** The District should consider establishing restricted/strategic reserve funds as appropriate to meet other anticipated future fiscal liabilities, such as capital asset replacement and post-employment employee benefits.

**Recommendation #8:** The District should engage in multiple-year fiscal planning to ensure long-term fiscal sustainability and a structurally balanced annual budget; establish and gradually fund a multi-year capital renewal/replacement plan; and establish and maintain restricted reserve funds equivalent to at least 17 percent, and preferably 20 percent or more, of annual operating expenses, to fund other future fiscal liabilities and unanticipated contingencies or emergencies.

**5.3 FUTURE SERVICE DEMAND AND ALTERNATE SERVICE DELIVERY MODELS FINDING**

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**Finding #23:** Annual service demand is projected to increase approximately 5 percent annually over the next 10 years to 2027; this increase can be absorbed within the District’s current service capacity.

# **APPENDIX A**

# **RISK ASSESSMENT**

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## APPENDIX A—RISK ASSESSMENT

### A.1 COMMUNITY RISK ASSESSMENT

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**SOC ELEMENT 3 OF 8**  
**COMMUNITY RISK**  
**ASSESSMENT**

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

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

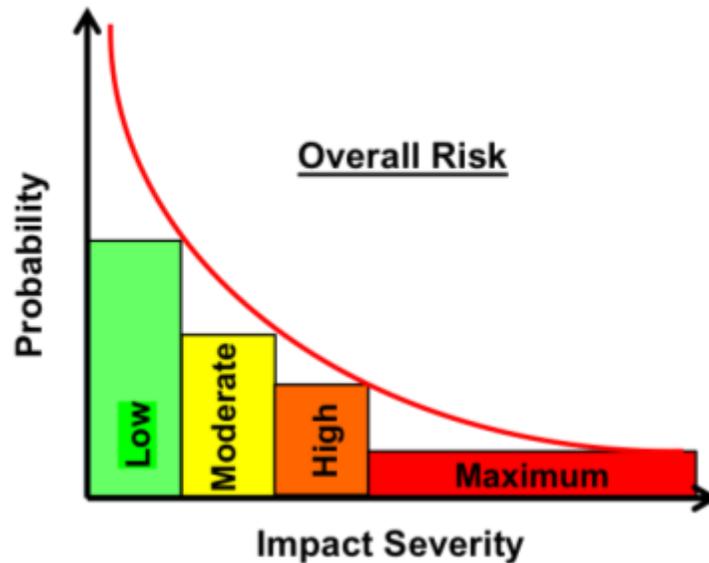
A *hazard* is broadly defined as a situation or condition that can cause or contribute to harm. Examples include fire, medical emergency, vehicle collision, earthquake, flood, etc. *Risk* is broadly defined as the *probability of hazard occurrence* in combination with the *likely severity of resultant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

#### A.1.1 Risk Assessment Methodology

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

- ◆ Identification of geographic planning sub-zones (risk zones) appropriate to the community or jurisdiction.
- ◆ Identification and quantification (to the extent data is available) of the specific values at risk to various hazards within the community or service area.
- ◆ Identification of the fire and non-fire hazards to be evaluated.
- ◆ Determination of the probability of occurrence for each hazard.
- ◆ Identification and evaluation of multiple relevant Impact Severity Factors for each hazard by planning zone using agency/jurisdiction-specific data and information.
- ◆ Quantification of overall risk for each hazard based on probability of occurrence in combination with probable impact severity as shown in Figure 18.

**Figure 18—Overall Risk**



Source: Commission on Fire Accreditation International (CFAI): *Community Risk Assessment: Standards of Cover (6<sup>th</sup> Edition)*

Citygate used multiple data sources for this study to understand the hazards and values to be protected in the District as follows:

- ◆ U.S. Census Bureau population and demographic data
- ◆ Insurance Services Office (ISO) building fire flow and construction data
- ◆ Santa Cruz County Geographical Information Systems (GIS) data
- ◆ Santa Cruz County General Plan and Zoning information
- ◆ Santa Cruz County Local Hazard Mitigation Plan 2015–2020
- ◆ Fire District data and information

### A.1.2 Risk Assessment Summary

Citygate’s evaluation of the values at risk and hazards likely to impact the District’s service area yields the following conclusions.

1. The District’s service area includes urban population densities along the Highway 1 corridor and rural population densities in most of the other areas.

2. The District’s population is stable, and is projected to grow only 11.17 percent over the next 18 years to 2035.
3. The District includes a mix of residential, commercial, office, educational, and other non-residential uses typical of other central coast communities of similar size and demographics.
4. The District has economic, cultural, historic, and natural resource values to be protected, as identified in this assessment.
5. The District’s overall risk for five hazards related to emergency services provided range from **LOW** to **MAXIMUM**, as shown in Table 39.

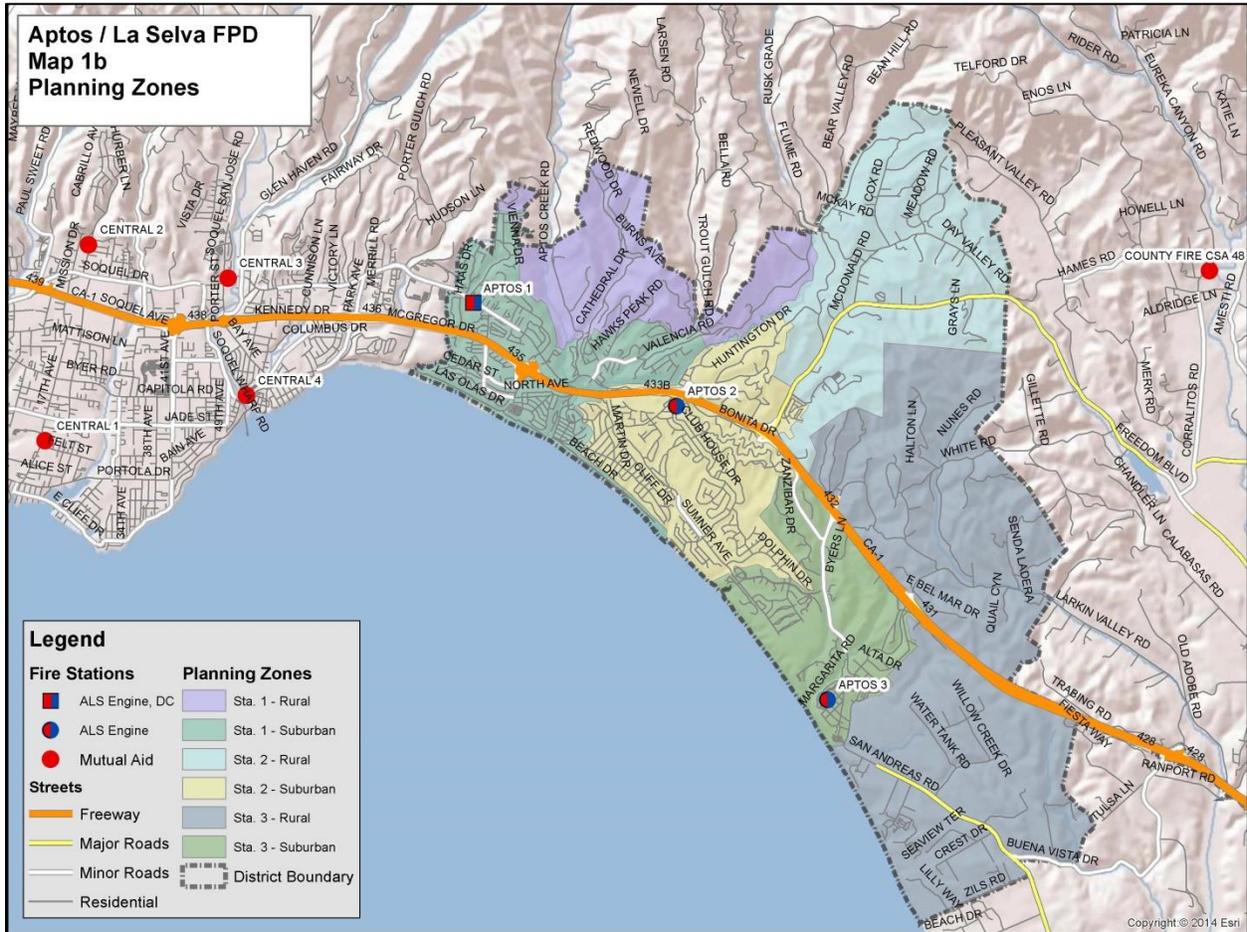
**Table 39—Overall Risk by Hazard**

Hazard		Planning Zone					
		Station 1		Station 2		Station 3	
		Suburban	Rural	Suburban	Rural	Suburban	Rural
1	<b>Building Fire</b>	HIGH	MODERATE	HIGH	MODERATE	HIGH	MODERATE
2	<b>Wildland Fire</b>	HIGH	MAXIMUM	HIGH	MAXIMUM	HIGH	MAXIMUM
3	<b>Medical Emergency</b>	HIGH	HIGH	HIGH	HIGH	HIGH	HIGH
4	<b>Hazardous Material</b>	MODERATE	LOW	MODERATE	LOW	MODERATE	LOW
5	<b>Technical Rescue</b>	MODERATE	MODERATE	MODERATE	MODERATE	MODERATE	MODERATE

### A.1.3 Planning Zones

The Commission on Fire Accreditation International (CFAI) recommends that jurisdictions establish geographic planning zones to better understand risk at a sub-jurisdictional level. For example, portions of a jurisdiction may contain predominantly moderate risk building occupancies, such as detached single-family residences, while other areas contain high or maximum risk occupancies, such as commercial and industrial buildings with a high hazard fire load. If risk were to be evaluated on a jurisdiction-wide basis, the predominant moderate risk could outweigh the high or maximum risk and may not be a significant factor in an overall assessment of risk. If, however, those high or maximum risk occupancies are a larger percentage of the risk in a smaller planning zone, then it becomes a more significant risk factor. Another consideration in establishing planning zones is that the jurisdiction’s record management system must also track the specific zone for each incident to be able to appropriately evaluate service demand and response performance relative to each specific zone. For this assessment, Citygate utilized six planning zones incorporating each fire station’s first-due response areas divided by the District’s suburban/rural demand zone boundary, as shown in Figure 19.

**Figure 19—Risk Planning Zones**



### A.1.4 Values at Risk

This section identifies, describes, and quantifies (as data is available) the values at risk to be protected within the District’s service area. *Values at risk*, broadly defined, are things of significant importance or value to the community or jurisdiction potentially at risk of harm or damage from a hazard occurrence. Values at risk typically include people, critical facilities/infrastructure, buildings, and key economic, cultural, historic, and/or natural resources.

#### *People*

Residents, employees, visitors, and travelers through a community or jurisdiction are vulnerable to harm from a hazard occurrence. Particularly vulnerable are specific at-risk populations, including those unable to care for themselves or self-evacuate in the event of an emergency. At-risk populations typically include children less than 10 years of age, the elderly, and people housed in institutional settings. Table 40 summarizes key District demographic data.

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**Table 40—Key Demographic Data**

Demographic	2015	Percentage
<b>Population</b>	<b>30,000</b>	
Under 10 years	2,821	9.40%
10–19 years	3,914	13.05%
20–64 years	18,330	61.10%
65–74 years	3,019	10.06%
75 years and older	1,916	6.39%
Median age	47.2	N/A
<b>Housing Units</b>	<b>12,223</b>	
Owner-Occupied	6,757	55.29%
Renter-Occupied	4,315	35.31%
Median Household Size	2.57	N/A
<b>Ethnicity</b>		
White	22,121	73.74%
Hispanic/Latino	4,305	14.35%
Black/African American	773	2.58%
Asian	1,749	5.83%
Other	1,052	3.51%
<b>Education (population over 24 yrs. of age)</b>	<b>20,719</b>	<b>69.06%</b>
High School Graduate	15,834	76.42%
Undergraduate Degree	8,241	39.78%
Graduate/Professional Degree	3,889	18.77%
<b>Employment (population over 15 yrs. of age)</b>	<b>25,030</b>	<b>83.43%</b>
In Labor Force	16,925	67.62%
Employed	15,678	92.64%
Population Below Poverty Level	2,560	8.53%
Population with Health Insurance Coverage	28,022	93.41%

Source: U.S. Census Bureau, Aptos/La Selva FPD, and Citygate estimates

Of note from Table 40 is the following:

- ◆ Nearly 26 percent of the population is under 10 or over 65 years of age
- ◆ The District's population is predominantly White (73.74 percent), followed by Hispanic/Latino (14.35 percent), Asian (5.83 percent), Black/African American (2.58 percent), and other ethnicities (3.51 percent)
- ◆ Of the population over 24 years of age, 76 percent has completed high school or equivalency
- ◆ Of the population over 24 years of age, 58.5 percent has an undergraduate, graduate, or professional degree
- ◆ Nearly 68 percent of the population 16 years of age or older is in the workforce; of those, just over 7 percent are unemployed
- ◆ The population below the federal poverty level is 8.5 percent
- ◆ More than 93 percent of the population has health insurance coverage.

### ***Buildings***

The District's service area includes more than 12,000 housing units, as well as office, professional services, retail sales, restaurants/bars, motels, churches, schools, government facilities, healthcare facilities, and other non-residential buildings. No data was available to determine District building inventory by occupancy classification.

### ***Building Occupancy Risk Categories***

CFAI identifies four risk categories that relate to building occupancy, as follows:

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

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

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

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

### ***Critical Facilities/Infrastructure***

The U.S. Department of Homeland Security defines “Critical Facilities / Key Resources” (CIKR) as those physical assets essential to the public health and safety, economic vitality, and resilience of a community. For this assessment, the District identified numerous critical facilities. A hazard occurrence with significant impact severity affecting one or more of these facilities would likely adversely impact critical public or community services.

### ***Economic Resources***

The District’s two primary economic resources are the Rancho Del Mar shopping center at State Park Drive and Soquel Drive, with 105 tenant businesses, and the Deluxe Shopping Center at Rio Del Mar Boulevard and Clubhouse Drive, with 60 tenant businesses.

### ***Natural Resources***

The District’s service area includes 7.6 miles of Pacific Ocean coastline, which is also part of the Monterey Bay National Marine Sanctuary, a federally protected area. Other natural resources include the 10,000-acre Nisene Marks State Park; Polo Fields and Triangle Parks; a riparian corridor/wildlife preserve along Highway 1 from Loma Prieta to La Selva; Seacliff, Platform, and Manressa State Beaches; and Aptos Creek, Mangels Gulch, Trout Creek, and Valencia Creek drainages.

### ***Cultural/Historic Resources***

The District has approximately 12 historic buildings within its service area, including the Apple Barn, Bayview Hotel, and several single-family dwellings.

## **A.1.5 Future Growth and Development**

### ***Land Use***

The Santa Cruz County General Plan establishes seven land use goals as follows:

1. To provide an organized and functional balance of urban, rural, and agricultural land use that maintains environmental quality; enhances economic vitality; protects the public health, safety, and welfare; and preserves the quality of life in the unincorporated areas of the County

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2. To achieve patterns of rural residential development that are compatible with the physical limitations of the land, the natural and cultural resources of the County, the availability of public services, and protection of the natural environment
3. To provide urban residential areas within the Urban Services Line, which are protected from noise, traffic congestion, natural hazards, and other objectionable influences of nonresidential land use; and to establish a variety of residential land use categories and dwelling unit densities offering a diverse choice of housing opportunities
4. To provide adequate facilities to meet the shopping, service, and employment needs of County residents and area visitors in a manner compatible with adjacent residential development, availability of public facilities, protection of natural resources, and maintenance of environmental quality and high standards of urban design
5. To ensure adequate present and future availability of land for both public and quasi-public facility uses, including schools, hospitals, cemeteries, sanitary landfills, and water supply and sewage treatment facilities
6. To develop an efficient land use pattern that improves the area's jobs/housing balance and thereby reduces the total amount of vehicle miles traveled and reduces polluting emissions
7. To continue using village, town, community, and specific plans to provide a planning framework to guide future public and private improvements in town centers and other concentrated urban and rural areas; to provide a higher level of planning detail and public involvement; and to promote economic vitality and coherent community design within the unique town center areas, which are community focal points for living, working, shopping, and visiting.

In addition, the Aptos Village Plan identifies 13 elements of the community vision:

1. A Village Common at the heart of the community
2. A new east-west street to connect Trout Gulch and Aptos Creek Roads
3. A new north-south street connecting Soquel Drive to the new east-west street, intersecting at a Village Common, to provide a face of the new Village Core area to the vehicles and pedestrians using Soquel Drive and to connect the existing Village businesses to the new area
4. Improvement of Aptos Creek Road to become a well-announced entrance to Nisene Marks State Park

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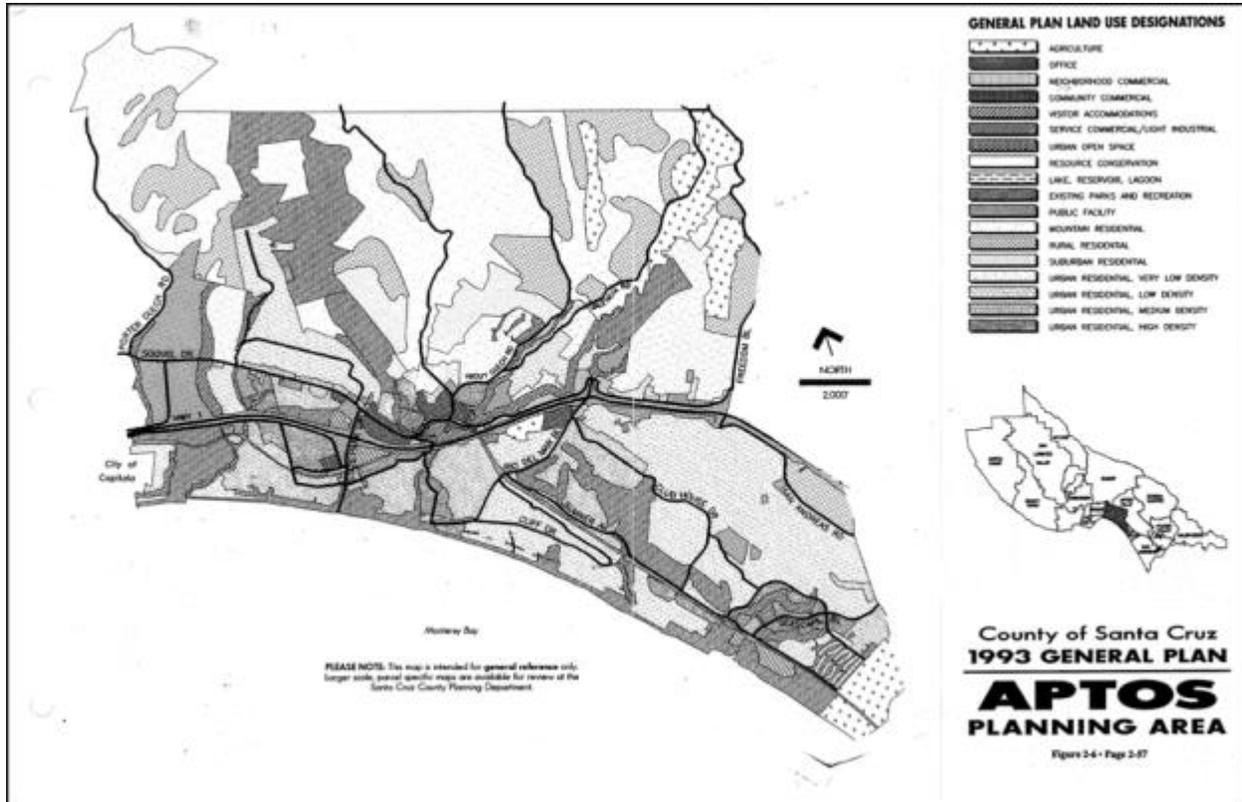
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5. An active public recreational use area, such as a skate park or bike park
6. New housing developed as a transitional edge to the existing residential neighborhoods, with commercial and mixed commercial and residential uses in the interior of the Village
7. Acknowledgement of the rich history of Aptos Village through the placement of plaques, monuments, and signs that recognize historical uses, events, and people that formed Aptos Village
8. A network of sidewalks making it pleasant to be a pedestrian in the Village
9. Abundant parking, both on and off street, to make shopping convenient; to enhance the Village atmosphere, most off-street parking will be located behind buildings
10. Well-landscaped streets to give the Village a pleasant and inviting ambience
11. A mix of housing, shopping, dining, community services, and employment to make the Village a colorful, friendly place and one that complements the scale of the current Village area
12. A method to protect and encourage a mix of uses in the Hihn subdivision east of Trout Gulch Road
13. A way to include the area south of Soquel Drive as a vibrant and integral part of the overall commercial area of the Village.

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Figure 20 illustrates the various land use designations for the Aptos Planning Area.

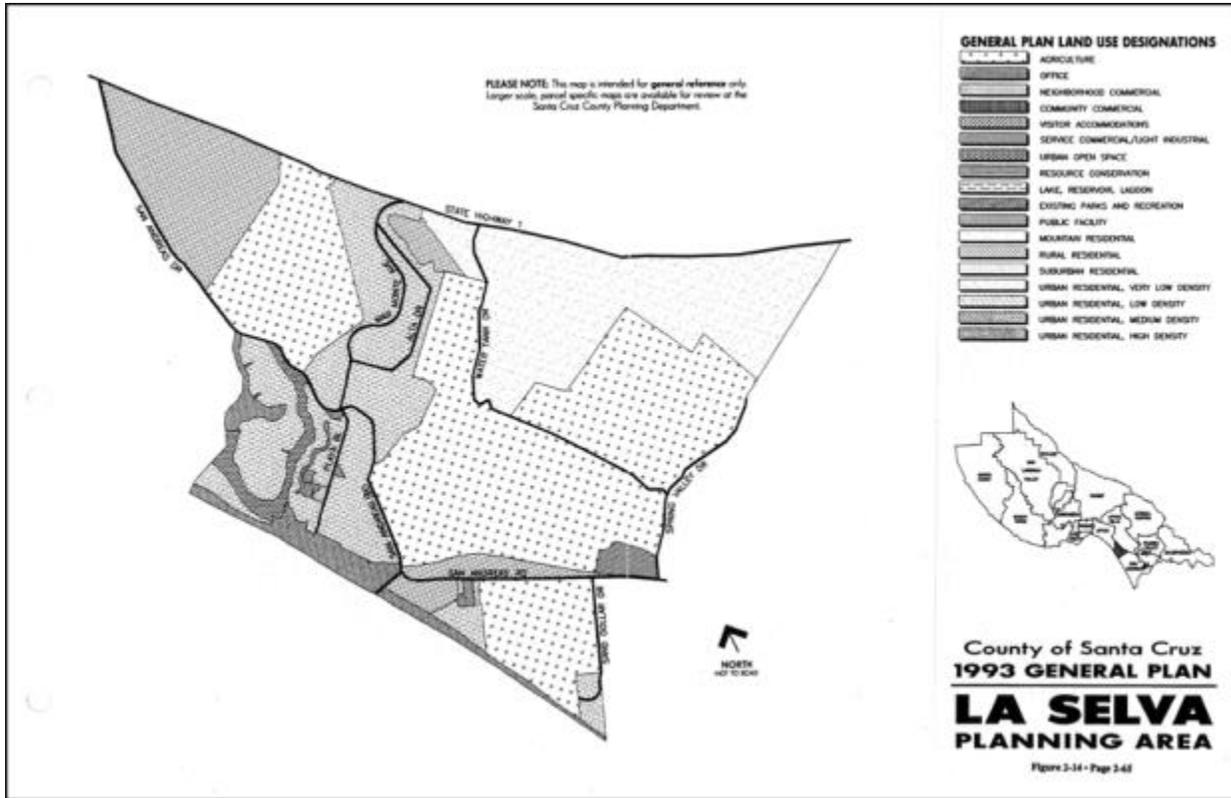
**Figure 20—Aptos Village Planning Area Land Use Map**



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Figure 21 illustrates the various land use designations for the La Selva Planning Area.

**Figure 21—La Selva Planning Area Land Use Map**



***Future Growth***

Table 41 summarizes projected population and housing unit growth within the District to the year 2035.

**Table 41—Projected Population and Housing Growth**

Planning Area	Growth Factor							
	Population				Housing Units			
	2015 <sup>1</sup>	2035 <sup>2</sup>	Projected Growth (Units)	Projected Growth (Percent)	2015 <sup>1</sup>	2035 <sup>2</sup>	Projected Growth (Units)	Projected Growth (Percent)
<b>Aptos CDP</b>	6,048	6,724	676	11.17%	2,583	2,827	244	9.46%
<b>La Selva Beach CDP</b>	2,708	3,010	302	11.17%	1,469	1,608	139	9.46%
<b>Remainder of District<sup>2</sup></b>	21,244	23,617	2,373	11.17%	8,171	8,944	773	9.46%
<b>Total</b>	<b>30,000</b>	<b>33,351</b>	<b>3,351</b>	<b>11.17%</b>	<b>12,223</b>	<b>13,379</b>	<b>1,156</b>	<b>9.46%</b>

<sup>1</sup> U.S. Census Bureau (2015) data

<sup>2</sup> Estimated using AMBAG growth projection rate for Santa Cruz County

As Table 41 shows, population and housing units within the District are projected to grow by a very modest 11.17 percent and 9.46 percent respectively over the next 18 years to 2035. Although no data was available relative to current non-residential development, the Aptos Village Project is an 11.5-acre mixed-use project that will add 69 residential units and 75,000 square feet of retail/office space northeast of Soquel Drive and Trout Gulch Road in Aptos.

**Finding #24:** The District’s population is projected to grow a very modest 11 percent over the next 18 years to 2035.

**Finding #25:** The District’s higher population density areas are essentially built-out, with zoning regulations limiting new development to existing town centers and concentrated urban areas.

**Finding #26:** With the exception of the Aptos Village mixed-use project, future development will be predominantly limited to single-family dwellings.

**A.1.6 Hazard Identification**

Citygate utilizes prior risk studies where available, fire and non-fire hazards as identified by the Commission on Fire Accreditation International (CFAI), and agency/jurisdiction-specific data and information to identify the hazards to be evaluated for this study.

The 2015–2020 Santa Cruz Local Hazard Mitigation Plan (LHMP) identifies five hazards relating to services provided by the District, including earthquake/liquefaction, wildfire, flood, tsunami, and landslide. Although the District has no legal authority or responsibility to mitigate earthquake/ liquefaction, flood, tsunami, or landslide risk other than for District-owned facilities, it does provide services related to these hazards, including fire suppression, emergency medical services, technical rescue, and hazardous materials response.

The CFAI groups hazards into fire and non-fire categories, as shown in Figure 22. Identification, qualification, and quantification of the various fire and non-fire hazards are important factors in evaluating how resources are or can be deployed to mitigate those risks.

**Figure 22—CFAI Hazard Categories**

Fire	EMS	Hazardous Materials	Technical Rescue	Disasters
One and Two Family Residential Structures	Medical Emergencies	Transportation	Confined Space	Natural
Multi-Family Structures			Swift-Water Rescue	
Commercial Structures	Motor Vehicle Accidents	Fixed Facilities	High and Low Angle	
Mobile Property	Other		Structural Collapse and Trench Rescue	
Wildland				

Source: CFAI *Standards of Cover* (5<sup>th</sup> Edition)

Following review and evaluation of the hazards identified in the 2015–2020 Santa Cruz County LHMP, and the fire and non-fire hazards as identified by the CFAI as they relate to services provided by the District, Citygate evaluated the following five hazards for this risk assessment:

1. Building Fire
2. Wildland Fire
3. Medical Emergency
4. Hazardous Materials Release/Spill
5. Technical Rescue

### **A.1.7 Service Capacity**

Service capacity refers to the District’s available response force; the size, types, and condition of its response fleet and any specialized equipment; core and specialized performance capabilities and competencies; resource distribution and concentration; availability of automatic and/or mutual aid; and any other agency-specific factors influencing its ability to meet current and prospective future service demand relative to the risks to be protected.

The District’s service capacity for building fire risk consists of an ERF of 16–17 personnel staffing five Type-1 fire engines<sup>23</sup> and one Chief Officer from the District’s three stations and two adjacent automatic aid stations<sup>24</sup>; the District’s service capacity for wildland fire risk consists of an ERF of 11 personnel staffing three engines, one water tender, and a Chief Officer.

The District’s medical emergency service capacity consists of a daily, on-duty response force of 10 personnel staffing three fire engines, each staffed with a minimum of one EMT-Paramedic capable of providing Advanced Life Support (ALS) pre-hospital emergency medical care, and ALS ground ambulance transportation provided by American Medical Response, West under an exclusive operating area performance-based contract with the Santa Cruz County Health Services Agency. Air ambulance services, when needed, are provided by CalStar from Gilroy or Lifeflight from Stanford Hospital in Palo Alto. There are two hospitals with emergency services in Santa Cruz County: Dominican Hospital in Santa Cruz and Watsonville Community Hospital. Trauma Centers include:

- ◆ Santa Clara Valley Medical Center – San Jose (Level 1)
- ◆ Regional Medical Center – San Jose (Level 2)
- ◆ Stanford Medical Center – Palo Alto (Level 1)

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<sup>23</sup> One Type-1 100-foot aerial ladder truck substituted for one engine depending on incident location

<sup>24</sup> Central Fire Protection District of Santa Cruz County and/or Santa Cruz County Service Area #48

◆ Natividad Medical Center – Salinas (Level 2)

All District response personnel are trained to the U.S. Department of Transportation Hazardous Material First Responder Operational level to provide initial hazardous material incident assessment, hazard isolation, and support for a hazardous material response team. In addition, Scotts Valley Fire District hosts the Santa Cruz County Hazardous Materials Team in partnership with Aptos/La Selva and Central Fire Districts, the Cities of Santa Cruz and Watsonville, and University of California at Santa Cruz. This resource (HAZMAT 1) is cross-staffed as needed with partner agency personnel trained to the Hazardous Material Specialist or Technician level.

All District response personnel are trained to the Low Angle Rope Rescue Operational (LARRO) level. The District is currently working toward a Rescue Systems 1 training level for all response personnel. In addition, the District operates a cross-staffed heavy rescue unit from Station 2 that includes cribbing/shoring, extrication, confined space, and other rescue equipment.

The District also has a Surf Rescue Team consisting of 12 response personnel certified as ocean lifeguards. Although this capability is not required to be available as part of the daily minimum staffing, it is generally available from at least one District station.

**A.1.8 Probability of Occurrence**

*Probability of occurrence* refers to the probability of a future hazard occurrence during a specific time period. Because the CFAI Agency Accreditation process requires annual review of an agency’s risk assessment and baseline performance measures, Citygate recommends using the 12 months following completion of an SOC study as an appropriate period for the probability of occurrence evaluation. Table 42 summarizes the five probability of occurrence categories and related scoring criteria used for this analysis.

**Table 42—Probability of Occurrence Scoring Criteria**

Score	Probability of Occurrence	Description	General Criteria
0	<i>Very Low</i>	Improbable	Hazard occurrence is <i>unlikely</i>
1	<i>Low</i>	Rare	Hazard <i>could occur</i> Historical occurrence less than once every 5 years
2	<i>Moderate</i>	Infrequent	Hazard <i>should occur</i> infrequently Historical occurrence once every 3–5 years
3	<i>High</i>	Likely	Hazard <i>likely to occur</i> regularly Historical occurrence once every 1–3 years
4	<i>Very High</i>	Frequent	Hazard is <i>expected to occur</i> frequently Historical occurrence multiple times per year

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

### **A.1.9 Impact Severity**

Impact severity refers to the extent of a hazard occurrence impacts on people, buildings, lifeline services, the environment, and the community as a whole. Table 43 summarizes the five impact severity categories and related scoring criteria used for this analysis.

**Table 43—Impact Severity Scoring Criteria**

Score	Impact Severity	General Criteria
1	Insignificant	No serious injuries or fatalities expected Few persons displaced for only a short duration Inconsequential or no damage Very minimal or no disruption to community No measurable environmental impacts Little or no financial loss
2	Minor	Some minor injuries; no fatalities expected Some persons displaced for less than 24 hours Some minor damage Minor community disruption; no loss of lifeline services Minimal environmental impacts with no lasting effects Minor financial loss
3	Moderate	Some hospitalizations; some fatalities expected Localized displacement of persons for up to 24 hours Localized damage Normal community functioning with some inconvenience; minor loss of lifeline services Some environmental impacts with no lasting effects, or small environmental impact with long-term effect Moderate financial loss
4	Major	Many serious injuries and hospitalizations Many fatalities expected Significant displacement of many people for more than 24 hours Significant damage requiring external resources Community services disrupted; some lifeline services potentially unavailable Some environmental impacts with long-term effects Major financial loss
5	Catastrophic	Extensive severe injuries and fatalities expected Local/regional hospital capacity impacted Large number of persons displaced for an extended duration Extensive damage Community unable to function without significant support; widespread loss of lifeline services Significant environmental impacts and/or permanent damage Catastrophic financial loss; inability to function without significant financial support

**A.1.10 Overall Risk**

Overall hazard risk is determined by multiplying the *probability of occurrence score* by the *impact severity score*. The resultant total determines the overall *risk ranking* as described in Table 44.

**Table 44—Overall Risk Score and Rating**

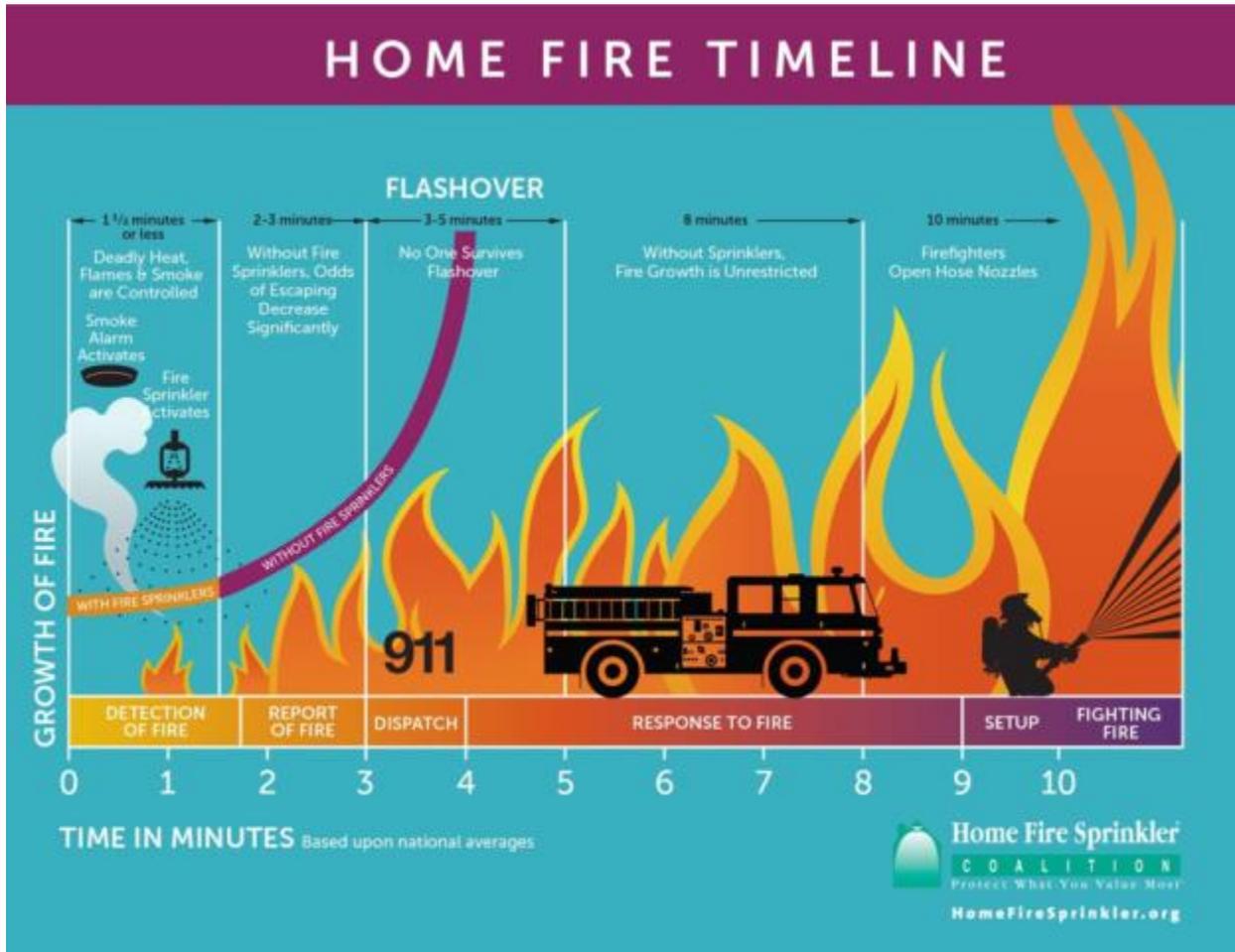
Overall Risk Score	Overall Risk Rating
0–5	<b>LOW</b>
6–11	<b>MODERATE</b>
12–15	<b>HIGH</b>
16–20	<b>MAXIMUM</b>

### A.1.11 Building Fire Risk

One of the primary hazards in any community is building fire. Building fire risk factors include building density, size, age, occupancy, and construction materials and methods, as well as the number of stories, the required fire flow, the proximity to other buildings, built-in fire protection/alarm systems, an available fire suppression water supply, building fire service capacity, fire suppression resource deployment (distribution/concentration), staffing, and response time. Citygate used available data from the District, the U.S. Census Bureau, Association of Monterey Bay Area Governments (AMBAG), and the Insurance Services Office (ISO) to assist in determining the District’s building fire risk.

Figure 23 illustrates the building fire progression timeline and shows that flashover, which is the point at which the entire room erupts into fire after all the combustible objects in that room reach their ignition temperature, can occur as early as three to five minutes from the initial ignition. Human survival in a room after flashover is extremely improbable.

**Figure 23—Building Fire Progression Timeline**

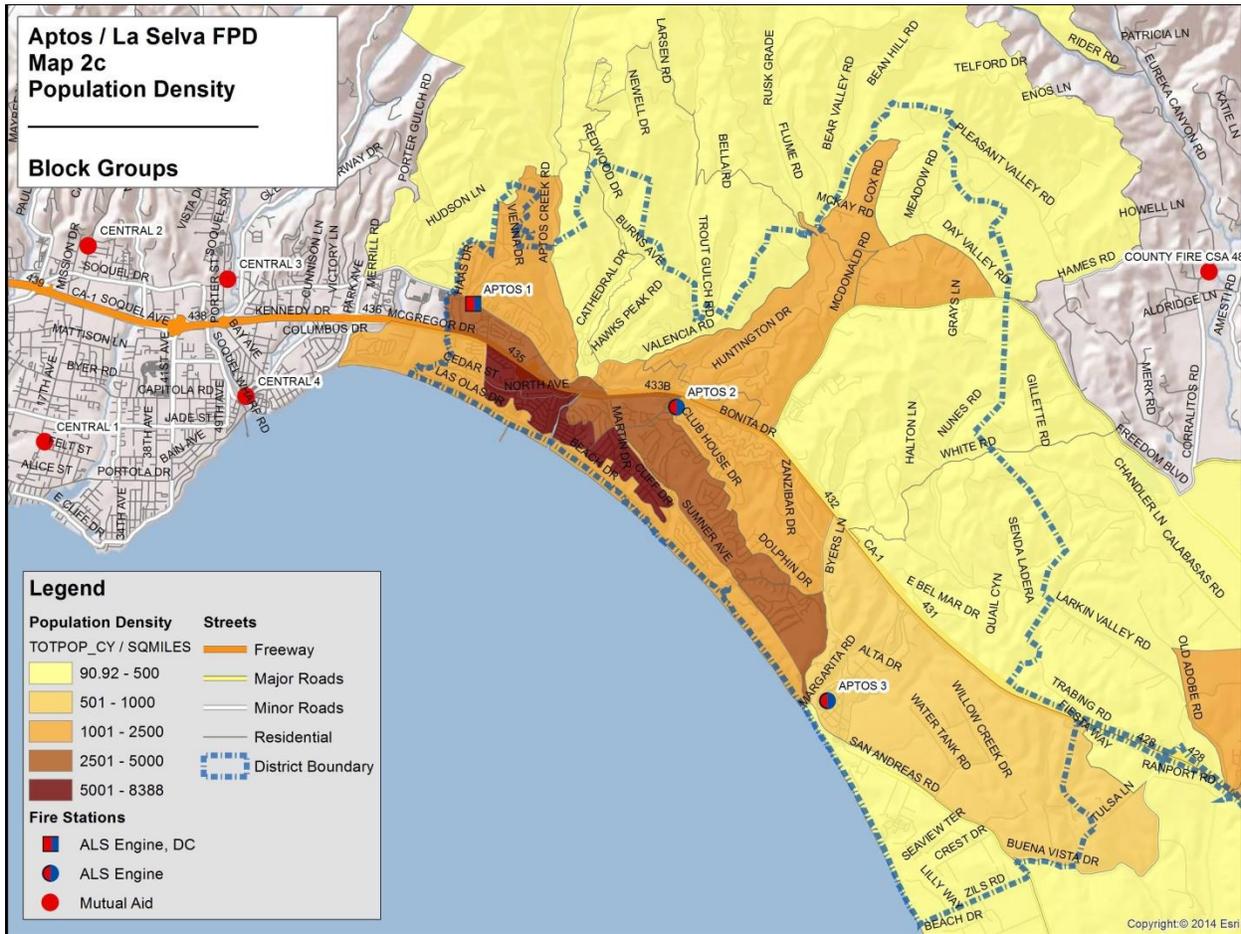


Source: <http://www.firesprinklerassoc.org>

### **Population Density**

Population density within the District ranges from less than 100 to more than 8,000 people per square mile, as illustrated in Figure 24. Although risk analysis across a wide spectrum of other Citygate clients shows no direct correlation between population density and building fire occurrence, it is reasonable to conclude that building fire risk relative to potential impact on human life is greater as population density increases, particularly in areas with high density, multiple-story buildings.

**Figure 24—Population Density**



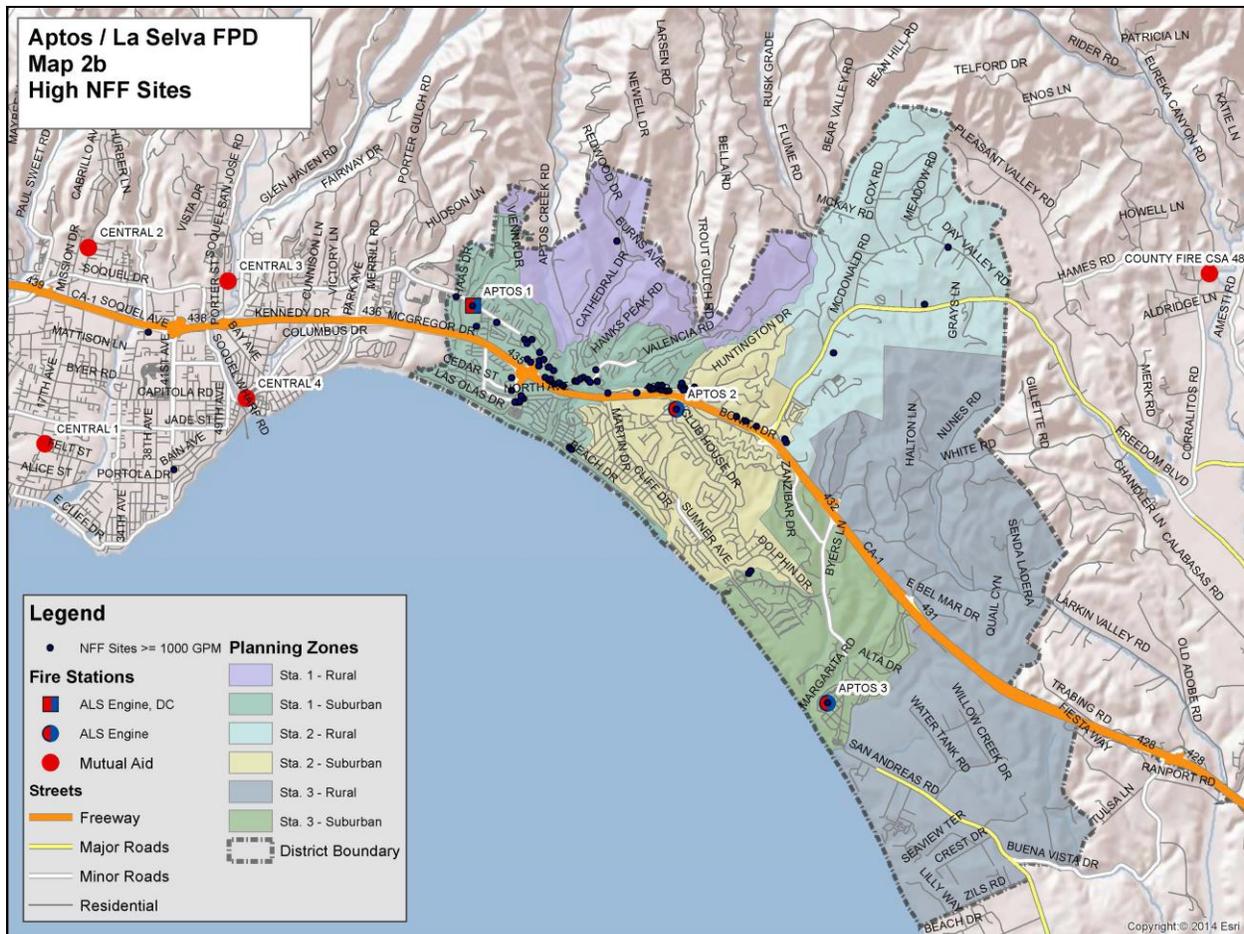
**High Fire Flow Requirements**

One of the many factors evaluated by the Insurance Services Office (ISO) is needed fire flow (NFF), which is the amount of water that would be required in gallons-per-minute (GPM) if the building were seriously involved in fire. For the District, the ISO database identifies 213 buildings evaluated, 84 of which have an NFF greater than 1,000 GPM, as shown in Table 45 and Figure 25.

**Table 45—High Fire Flow Sites**

Risk	Planning Zone						Total
	Station 1		Station 2		Station 3		
	Suburban	Rural	Suburban	Rural	Suburban	Rural	
NFF > 1,000 GPM	44	1	24	12	3	0	84
Percentage of Total	52.4%	1.2%	28.6%	14.3%	3.6%	0.0%	100%

**Figure 25—High Fire Flow Sites**



This is a significant amount of firefighting water to deploy, and a major fire at any one of these buildings would require commitment of the District’s entire on-duty force plus mutual aid. Using a generally accepted figure of 50 gallons-per-minute per firefighter on large building fires, a fire in a building requiring 1,000 gallons-per-minute would require 20 firefighters, which is 3–4

more personnel than the District's current initial building fire ERF of 16–17 personnel. A significant fire in any of these buildings not protected by an automatic fire sprinkler and/or fire detection/alarm system would likely have a high impact severity.

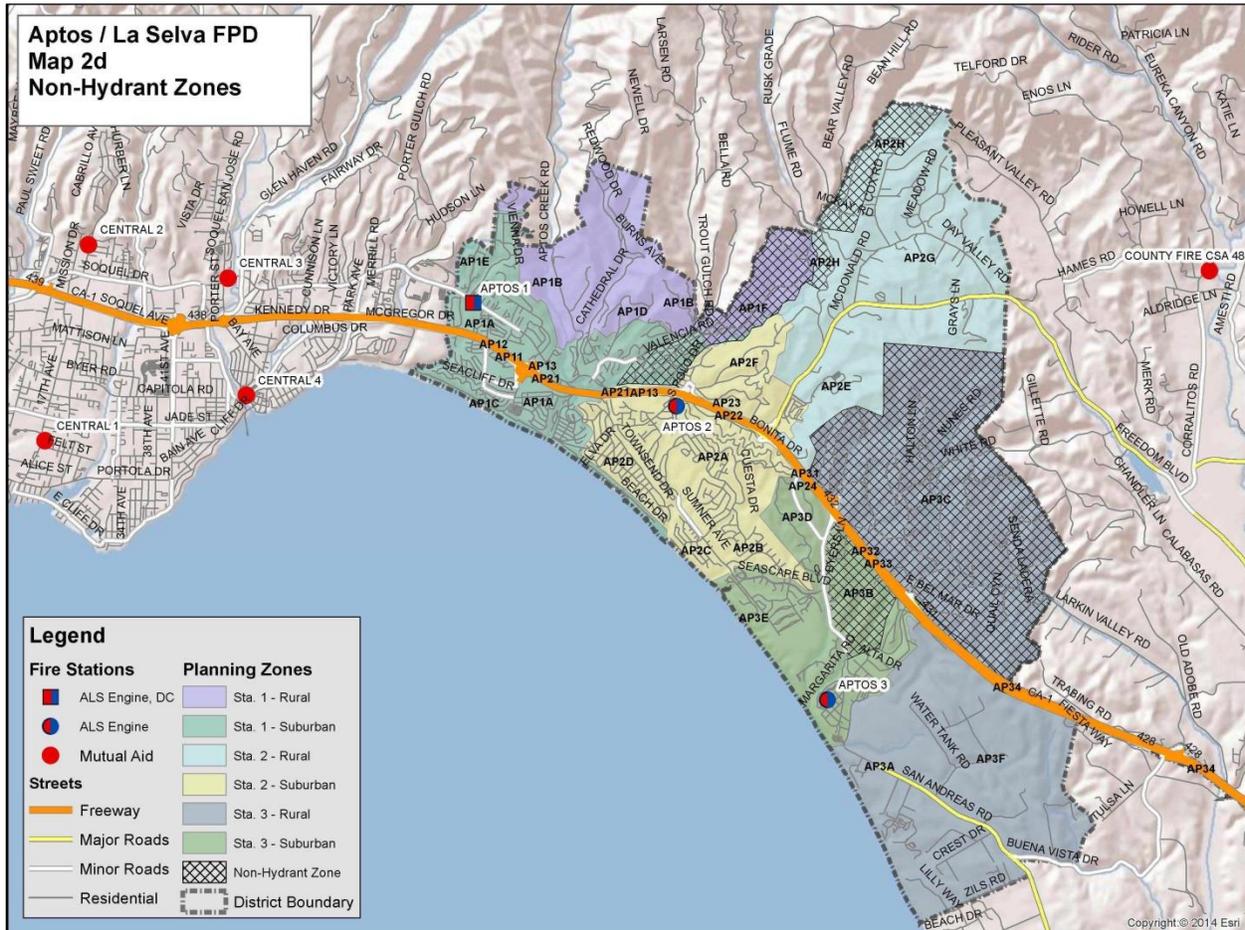
### ***Water Supply***

A reliable public water system providing adequate volume, pressure, and flow duration in close proximity to all buildings is a critical factor in mitigating the potential impact severity of a community's building fire risk. Multiple water utilities provide water for District residents and businesses as follows:

- ◆ Soquel Creek Water District – serves approximately 90 percent of the District
- ◆ Central Water District – serves Cox Road / SE Area
- ◆ Trout Gulch Water District – serves 126 customers
- ◆ San Andreas Water District – serves 60 customers in the south end of the District along the coast

According to District staff, available fire flow is excellent within the suburban demand zone with fire hydrants. It is, however, insufficient or not available in the non-hydrant zones, as shown in Figure 26. This deficiency is partially mitigated with the automatic dispatch of a water tender to all building fires within these zones.

**Figure 26—Non-Hydrant Zones**



***Building Fire Service Demand***

For the three-year period from January 1, 2014, through December 31, 2016, the District experienced 57 building fire incidents comprising 0.82 percent of total service demand over the same period, as summarized in Table 46 and Figure 27.

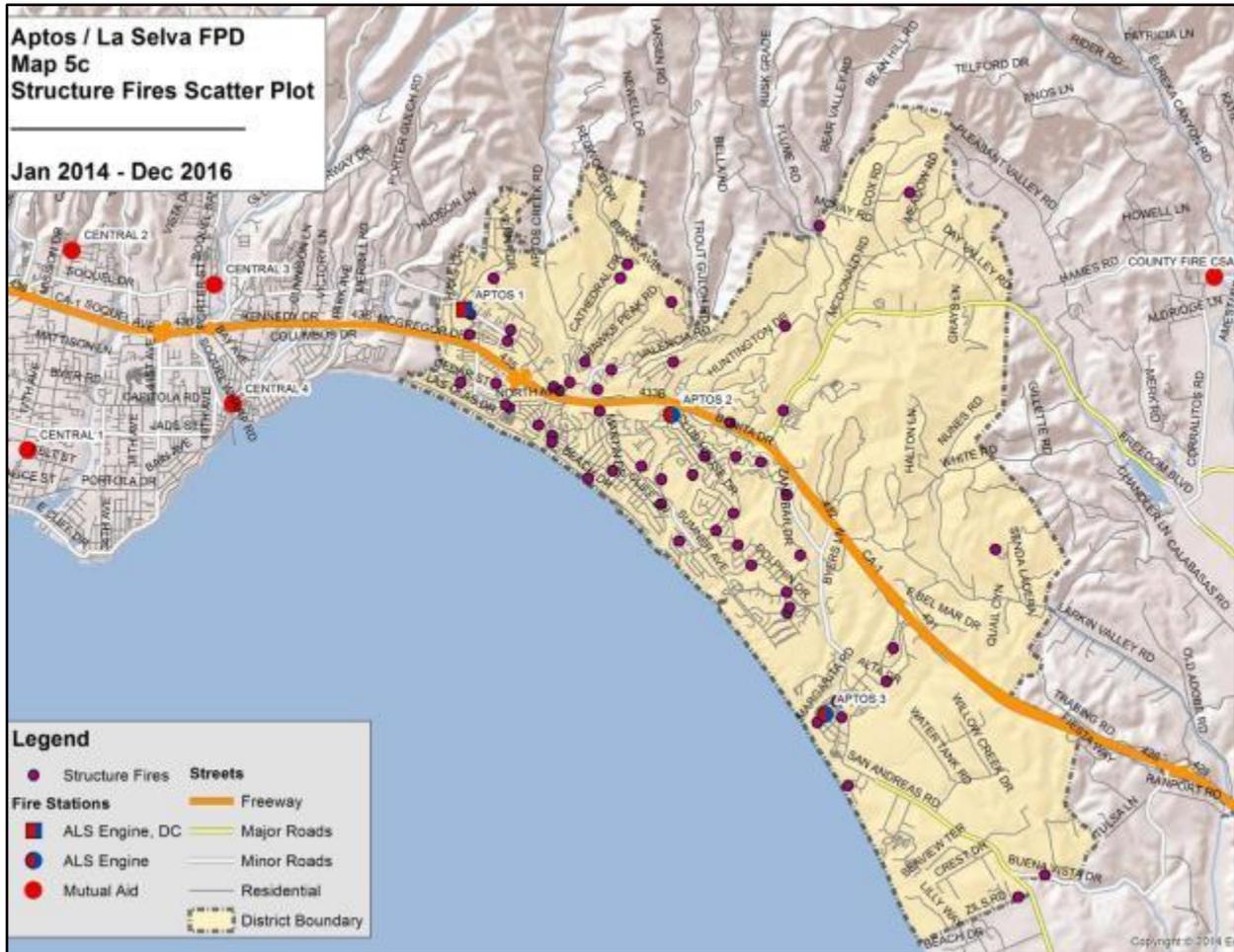
**Table 46—Building Fire Service Demand**

Hazard	Year	Planning Zone			Total	Percent of Total Service Demand
		Station 1	Station 2	Station 3		
<b>Building Fire</b>	<b>2014</b>	6	3	6	<b>15</b>	0.68%
	<b>2015</b>	9	6	3	<b>18</b>	0.78%
	<b>2016</b>	9	10	5	<b>24</b>	0.99%
<b>Total</b>		<b>24</b>	<b>19</b>	<b>14</b>	<b>57</b>	<b>0.82%</b>
<b>Percent of Total Service Demand</b>		0.85%	0.78%	0.82%	0.82%	

Source: Aptos/La Selva FPD incident records

As Table 46 shows, building fire service demand has increased slightly each year over the three-year study period, with the highest volume of incidents occurring at Station 1 and the lowest at Station 3. Overall, the District’s building fire service demand is very low, comprising less than one percent of all calls for service, which is typical of other California fire districts of similar size and demographics.

**Figure 27—Building Fire Locations**



**Probability of Building Fire Occurrence**

Table 47 scores the District’s building fire probability by planning zone based on building fire service demand history from Table 46.

**Table 47—Building Fire Probability Score**

Building Fire	Planning Zone					
	Station 1		Station 2		Station 3	
	Suburban	Rural	Suburban	Rural	Suburban	Rural
Probability Score	4	3	4	3	4	3

***Building Fire Impact Severity***

Table 48 scores the District’s probable building fire impact severity by planning zone.

**Table 48—Building Fire Impact Severity Score**

Building Fire	Planning Zone					
	Station 1		Station 2		Station 3	
	Suburban	Rural	Suburban	Rural	Suburban	Rural
Impact Severity Score	3	3	3	3	3	3

***Overall Building Fire Risk Rating***

Table 49 identifies the District’s overall building fire risk score and rating by planning zone.

**Table 49—Overall Building Fire Risk Rating**

Building Fire	Planning Zone					
	Station 1		Station 2		Station 3	
	Suburban	Rural	Suburban	Rural	Suburban	Rural
Overall Risk Score	12	9	12	9	12	9
Risk Rating	<i>HIGH</i>	<i>MODERATE</i>	<i>HIGH</i>	<i>MODERATE</i>	<i>HIGH</i>	<i>MODERATE</i>

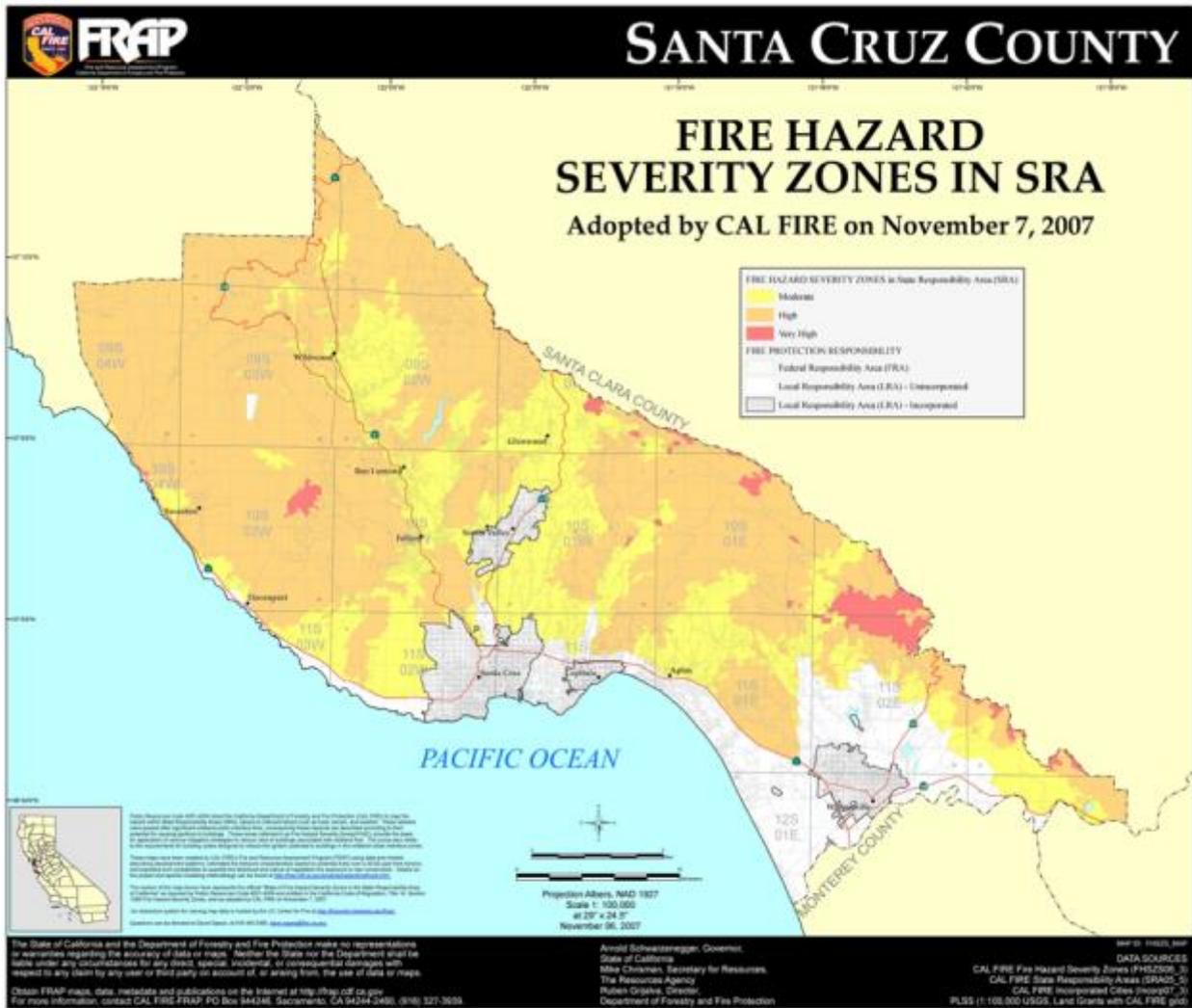
**A.1.12 Wildland Fire Risk**

Most of Santa Cruz County is vulnerable to a wildland fire; however, the highest risk is in the wildland-urban interface (WUI) areas where human population and related development exist within a predominantly wildland vegetation fuel environment.

***Wildland Fire Hazard Severity Zones***

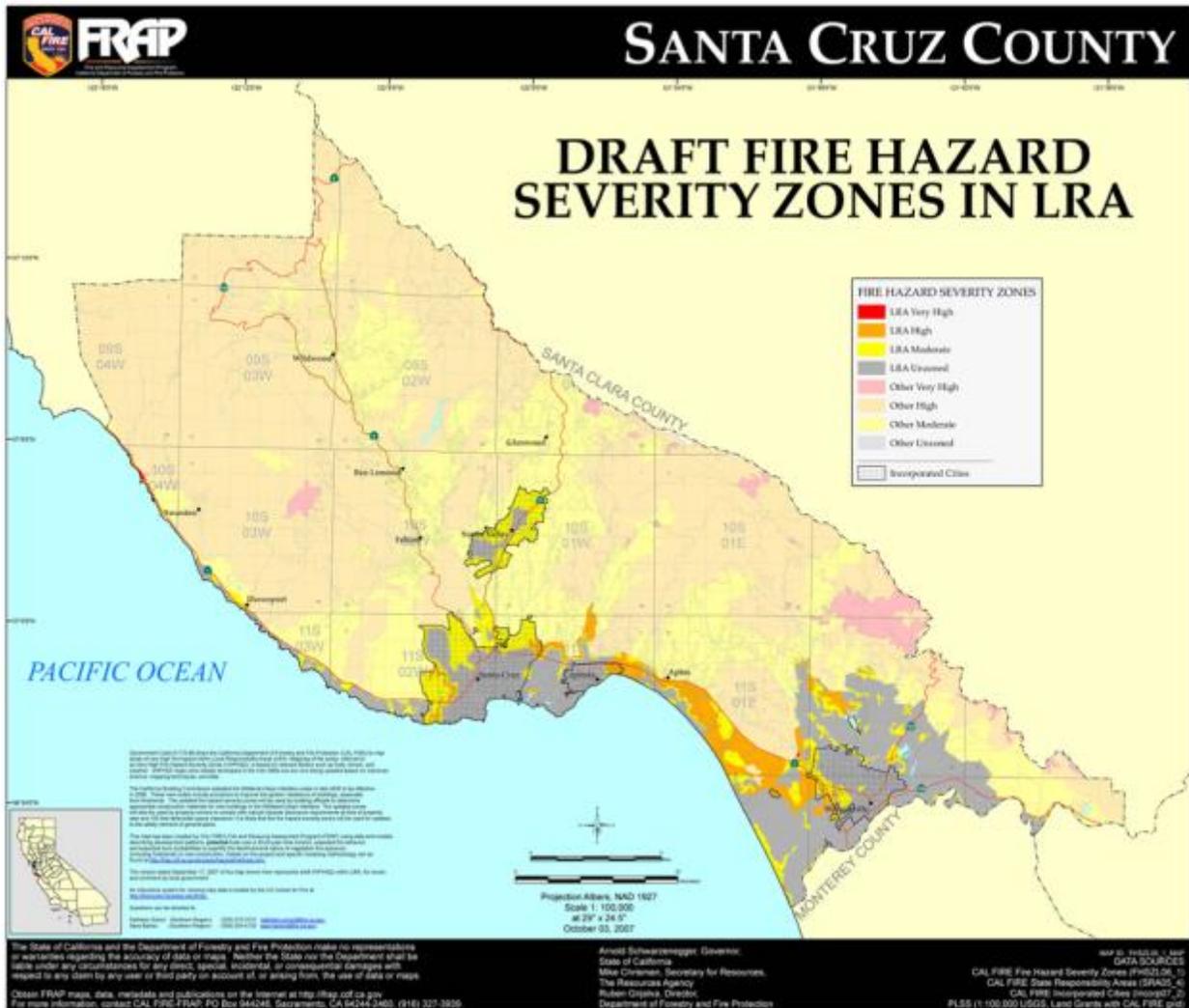
The California Department of Forestry and Fire Protection (CAL FIRE) designates wildland Fire Hazard Severity Zones (FHSZ) throughout the state based on analysis of multiple wildland fire hazard factors and modeling of potential wildland fire behavior. For State Responsibility Areas (SRAs) where CAL FIRE has fiscal responsibility for wildland fire protection, CAL FIRE designates Moderate, High, and Very High FHSZs by county, as shown in Figure 28.

Figure 28—SRA Wildland Fire Hazard Severity Zones



CAL FIRE also identifies recommended FHSZs for Local Responsibility Areas (LRAs), where a local jurisdiction bears the fiscal responsibility for wildland fire protection, including the Aptos/La Selva FPD, as shown in Figure 29.

Figure 29—LRA Wildland Fire Hazard Severity Zones



As Figure 28 and Figure 29 show, most of the District’s service area east of Highway 1 lies within a **Moderate** or **High** SRA FHSZ, and much of the District’s service area west of Highway 1 lies within a recommended **Moderate** or **High** LRA FHSZ.

### **Wildland Fuels**

Wildland fuel factors influencing fire intensity and spread include fuel type (vegetation species), height, arrangement, density, and moisture. Wildland fuels within the District consist of a mix of annual grasses and weeds, manzanita/knob cone, chaparral, deciduous, eucalyptus, and mixed conifer trees. Once ignited, wildland fires can burn intensely and contribute to rapid fire spread under the right fuel, weather, and topographic conditions.

### ***Weather***

Weather elements such as temperature, relative humidity, wind, and lightning also affect wildland fire potential and behavior. High temperatures and low relative humidity dry out wildland fuels, creating a situation where fuels will more readily ignite and burn more intensely. Wind is the most significant weather factor influencing wildland fire behavior; higher wind speeds increase fire spread and intensity. The annual wildland fire season in Santa Cruz County, when wildland fires are most likely to occur due to fuel and weather conditions, is from mid to late May through late October / early November. While normal weather conditions in the Santa Cruz Mountains can be categorized as cold and damp with extensive marine influence (fog), weather conditions occasionally result in fuel moisture levels below 5 percent, with temperatures above 90° Fahrenheit and winds exceeding 45 MPH. Wildland fire risk during drought weather conditions or offshore wind events is even greater.

### ***Topography***

The District's varied topography, ranging from sea level to approximately 1,000 feet, is predominantly flat west of Highway 1 transitioning to gentle to moderate slope east of Highway 1, with multiple drainages running generally northeast to southwest toward Monterey Bay. This topography influences wildland fire behavior and spread as fires tend to burn more intensely and spread faster when burning uphill and up-canyon, except for a wind-driven downhill or down-canyon fire.

### ***Wildland Fire History<sup>25</sup>***

Santa Cruz County has a long history of large damaging wildland fires, as summarized in Table 50 and Figure 30.

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<sup>25</sup> Reference: Santa Cruz County 2015–2020 Local Hazard Mitigation Plan, Section 5.3.2

**Aptos/La Selva Fire Protection District**  
*Emergency Services Master Plan*

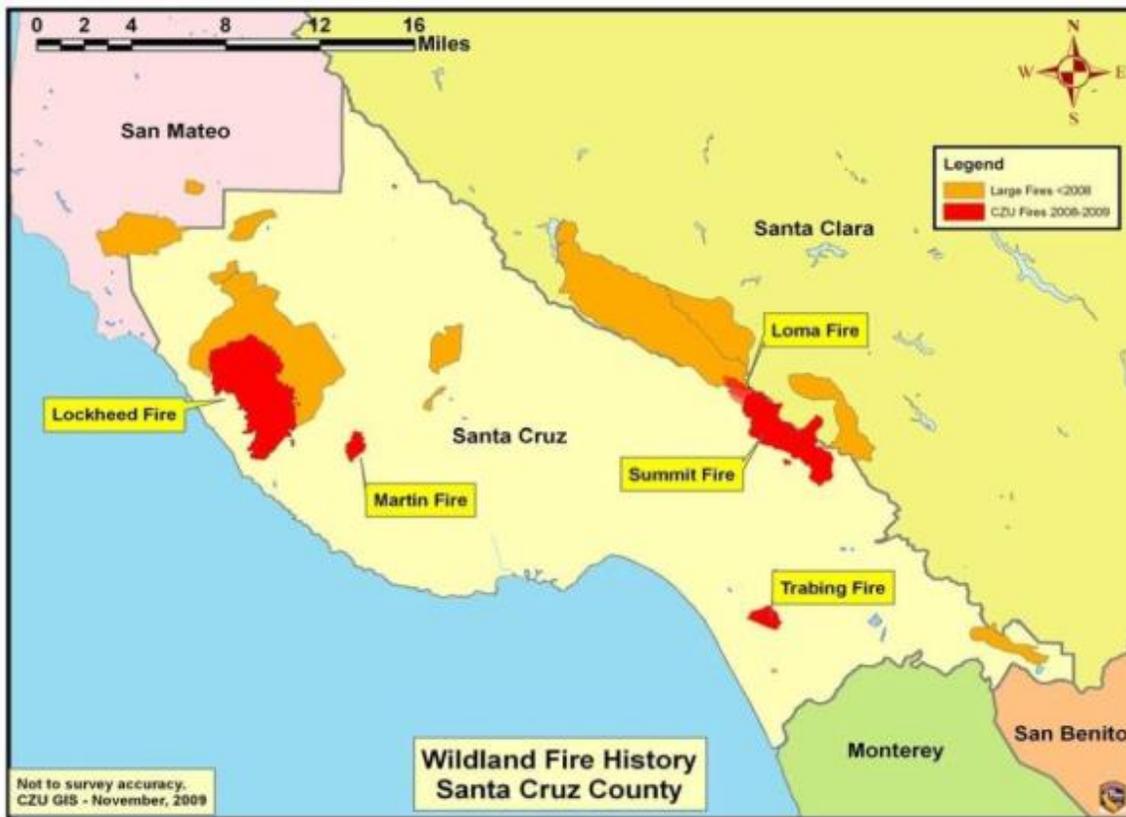
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**Table 50—Large Santa Cruz County Wildland Fires**

<b>Fire Name</b>	<b>Year</b>	<b>Acres Burned</b>
Pine Mountain	1948	15,893
Newell Creek	1954	166
Newell Creek #2	1959	1,326
Austrian Gulch	1961	9,067
Lincoln Hill	1962	3,234
Big Basin #7	1980	378
Big Basin	1982	300
Rocha #2	1984	1,239
Lexington	1985	13,122
Croy	2002	3,006
Summit	2008	4,270
Martin	2008	520
Trabing	2008	630
Lockheed	2009	7,819
Loma	2009	485

Source: 2015–2020 Santa Cruz County LHMP, Table 5-1

**Figure 30—Significant Santa Cruz County Wildland Fires**



### **Water Supply**

Another significant wildland impact severity factor is water supply immediately available for wildland fire suppression in high / very high fire hazard severity zones. According to District staff, available fire flow is excellent within the suburban demand zone with fire hydrants. It is, however, insufficient or not available in the non-hydrant zones as shown in Figure 26. This deficiency is partially mitigated with the automatic dispatch of a water tender to all wildland fires within these zones.

### **Wildland Fire Hazard Mitigation**

Hazard mitigation refers to specific actions or measures taken to prevent a hazard from occurring and/or to minimize the severity of impacts resulting from a hazard occurrence. While none of the hazards subject to this study can be entirely prevented, measures *can* be taken to minimize the consequences or impacts when those hazards do occur.

The 2015–2020 Santa Cruz County LHMP identifies two wildland fire mitigation goals:

1. Avoid or reduce the potential for injury; loss of life; and property, economic, and environmental damage to Santa Cruz County from wildfire

**Aptos/La Selva Fire Protection District**  
*Emergency Services Master Plan*

2. Collaborate with other local fire districts and departments in mutual aid fire protection efforts.

In addition, the LHMP identifies 10 strategies to achieve these goals, as summarized in Table 51.

**Table 51—Santa Cruz County Wildland Fire Mitigation Strategies**

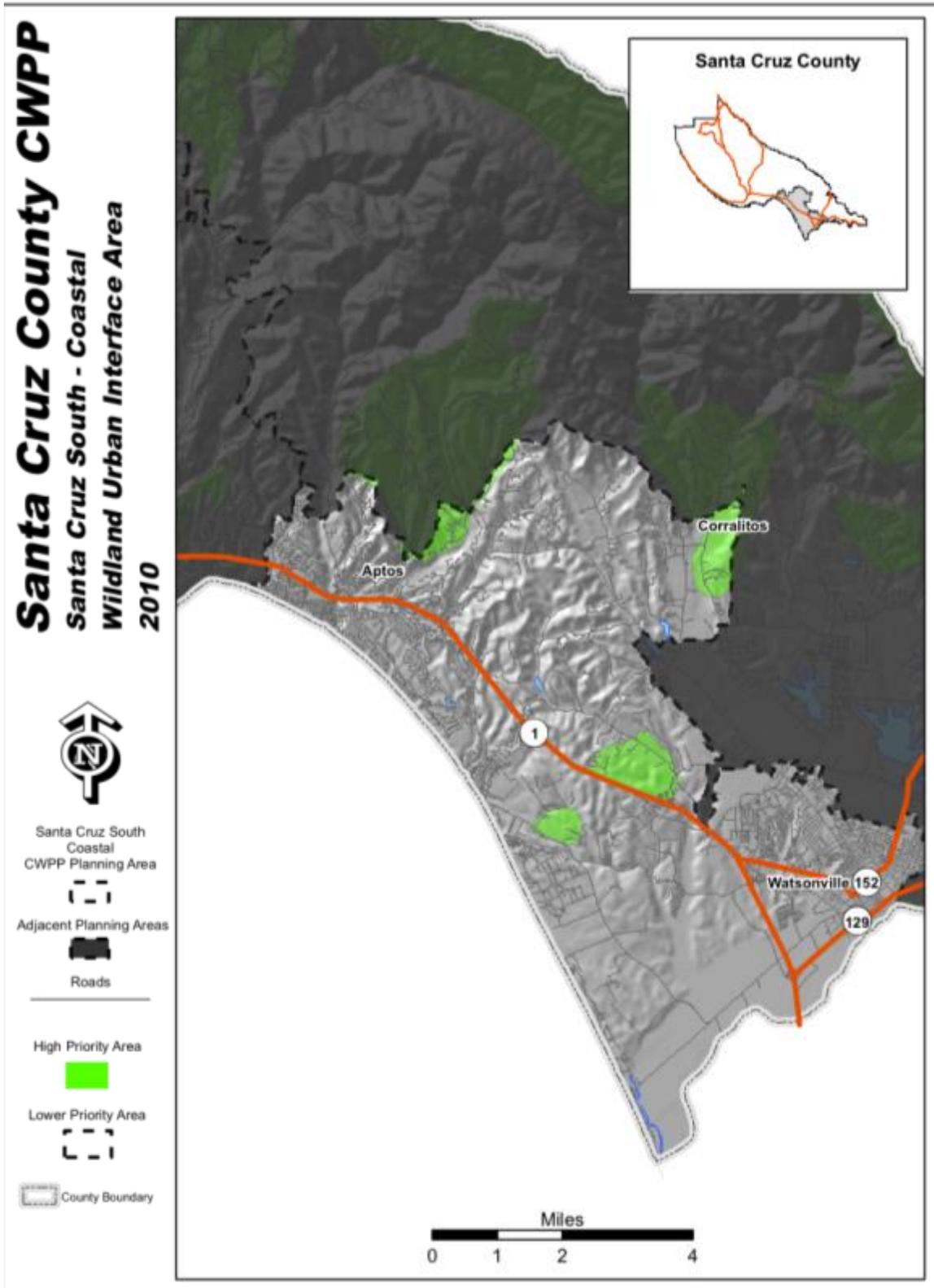
Strategy		Priority
1	Early notification/warning of residents by technology-based applications.	A-10
2	Establish and maintain cooperative fire protection and fire prevention agreements with other agencies.	A-12
3	Increased visibility and reduced response times with proper road and address markings.	A-13
4	Enhanced support for interoperability communications systems with local, state, and federal emergency services both inside and around the County.	A-14
5	Reduction of fire risk in urban-wildland interface (WUI) through improved building materials and appropriate code enforcement, including defensible space programs.	B-3
6	Maintain adequate Fire Suppression and Prevention staffing levels to meet the need of the County population and development trends.	B-4
7	Implement additional fire prevention programs in schools, institutions, and commercial buildings through inspections and education to promote fuel reduction and hazard abatement.	C-5
8	Promotion of built-in fire extinguishing systems and fire alarm system.	C-6
9	Land use planning to reduce incidence of human-caused wildfires, especially in very high fire hazard areas.	C-7
10	Appropriate road and secondary access improvement and creation program.	C-8

Source: Santa Cruz County 2015–2020 Local Hazard Mitigation Plan, Section 5.4.2

The 2010 San Mateo/Santa Cruz County Community Wildfire Protection Plan (CWPP) identifies 10 planning areas, including the Santa Cruz South – Coastal Planning Area, which includes the Aptos/La Selva Fire Protection District. High priority project areas are shown in Figure 31, including for the District:

- ◆ Roadside shaded fuel breaks, defensible space improvement, chipping for individual property owners, and improved emergency evacuation routes in the Redwood Drive Community
- ◆ Roadside fuel reduction in the Trabing Fire area.

**Figure 31—High Priority CWPP Project Areas**



Over the past two years, the District's Fire Prevention Division has, relative to wildland fire risk, focused on:

- ◆ Rebuilding the fire inspection and fire hydrant databases
- ◆ Reconfiguring the engine company inspection program
- ◆ Re-allocating Division workload subsequent to the termination of the Cooperative Prevention Project (CPP) with Central Fire Protection District
- ◆ Enhancing the District's wildland fire inspection program (LE-100)
- ◆ Assessing wildland fuel reduction project opportunities
- ◆ Expanding District pre-fire plans
- ◆ Reviewing/revising fire-prevention-related policies and procedures
- ◆ Maintaining building and development plan review and related inspections, code enforcement, and complaint services.

The District's Fire Prevention Division currently includes only the Division Chief / Fire Marshal due to the resignation of the part-time Fire Prevention Specialist in June 2016 and the retirement of the Deputy Fire Marshal in December 2016. According to District staff, 1,680 wildland fire safety inspections were completed over the past two years as part of a four-year cycle to inspect the approximately 3,200 parcels in the State Responsibility Area of the District east of Highway 1. In addition, the Division organized a fuel reduction project in Willow Canyon to improve fire road access to approximately 10 homes in the area.

**Finding #27:** Most of the District's service area east of Highway 1 is within a *Moderate* or *High* wildland Fire Hazard Severity Zone (FHSZ), as identified by the California Department of Forestry and Fire Protection (CAL FIRE).

**Finding #28:** Much of the District's service area west of Highway 1 lies within a *Moderate* or *High* wildland FHSZ, as recommended by the California Department of Forestry and Fire Protection (CAL FIRE).

**Finding #29:** The District has established a goal to inspect every parcel east of Highway 1 within the State Responsibility Area at least every four years to ensure that required defensible space is appropriately established and maintained.

**Finding #30:** The San Mateo / Santa Cruz County Community Wildfire Protection Plan identifies two high-priority wildland fire mitigation project areas within the District, including the Redwood Drive community and the area where the Trabling Fire burned in 2008.

***Wildland Fire Service Demand***

The District experienced 27 wildland fires from January 2014 through December 2016, comprising 0.39 percent of total service demand over the same time period, as summarized in Table 52.

**Table 52—Wildland Fire Service Demand History**

Hazard	Year	Planning Zone			Total	Percent of Total Service Demand
		Station 1	Station 2	Station 3		
Wildland Fire	2014	3	2	2	7	0.32%
	2015	1	2	8	11	0.47%
	2016	2	4	3	9	0.37%
<b>Total</b>		<b>6</b>	<b>8</b>	<b>13</b>	<b>27</b>	<b>0.39%</b>
<b>Percent of Total Service Demand</b>		<b>0.21%</b>	<b>0.33%</b>	<b>0.76%</b>	<b>0.39%</b>	

Source: Aptos/La Selva FPD incident records

As Table 52 shows, wildland fire service demand has been stable over the past three years, with the highest occurrence at Station 3 and the lowest occurrence at Station 1. Overall, the District’s wildland fire service demand is very low.

***Probability of Occurrence***

Table 53 scores the District’s wildland fire probability by planning zone based on wildland fire service demand history from Table 52.

**Table 53—Wildland Fire Probability Score**

Wildland Fire	Planning Zone					
	Station 1		Station 2		Station 3	
	Suburban	Rural	Suburban	Rural	Suburban	Rural
<b>Probability Score</b>	<b>3</b>	<b>4</b>	<b>3</b>	<b>4</b>	<b>3</b>	<b>4</b>

**Wildland Fire Impact Severity**

Table 54 scores the District’s probable wildland fire impact severity by planning zone.

**Table 54—Wildland Fire Impact Severity Score**

Wildland Fire	Planning Zone					
	Station 1		Station 2		Station 3	
	Suburban	Rural	Suburban	Rural	Suburban	Rural
<b>Impact Severity Score</b>	4	4	4	4	4	4

**Overall Wildland Fire Risk Rating**

Table 55 identifies the District’s overall wildland fire risk score and risk rating by planning zone.

**Table 55—Overall Wildland Fire Risk Rating**

Wildland Fire	Planning Zone					
	Station 1		Station 2		Station 3	
	Suburban	Rural	Suburban	Rural	Suburban	Rural
<b>Overall Risk Score</b>	12	16	12	16	12	16
<b>Risk Rating</b>	<b>HIGH</b>	<b>MAXIMUM</b>	<b>HIGH</b>	<b>MAXIMUM</b>	<b>HIGH</b>	<b>MAXIMUM</b>

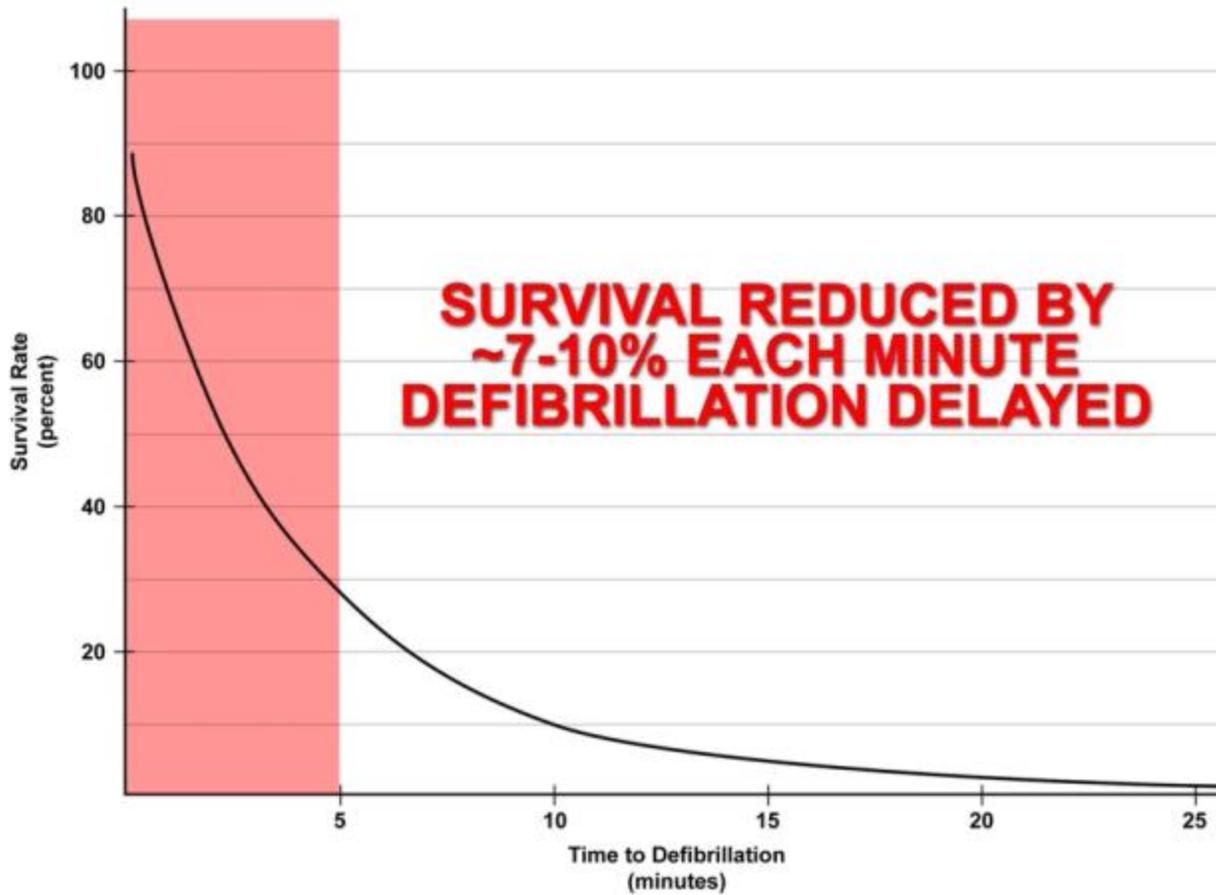
**A.1.13 Medical Emergency Risk**

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

Medical emergency risk can also be categorized as either a medical emergency resulting from a health-related condition or event, or a traumatic injury. One serious medical emergency is cardiac arrest or some other event where there is an interruption or blockage of oxygen to the brain.

Figure 32 illustrates the reduced survivability of a cardiac arrest victim as time to defibrillation increases. While early defibrillation is one factor in cardiac arrest survivability, other factors can influence survivability as well, such as early CPR and pre-hospital advanced life support interventions.

**Figure 32—Survival Rate versus Time of Defibrillation**



Source: [www.suddencardiacarrest.com](http://www.suddencardiacarrest.com)

### ***Population Density***

Because medical emergencies involve people, it seems logical that higher population densities generate higher medical emergency service demand than lower population densities. In Citygate’s experience, this is particularly true for urban population densities. As illustrated in Figure 24, the District’s population density ranges from less than 100 per square mile to more than 8,300 per square mile.

### ***Demography***

Medical emergency risk tends to be higher among older, poorer, less-educated, and uninsured populations. According to the U.S. Census Bureau, 16.45 percent of the District’s population is 65 and older; 8.5 percent of the population is at or below poverty level; nearly 24 percent of the

population over 24 years of age has less than a high school diploma or equivalent; and 6.5 percent of the population does not have health insurance coverage.<sup>26</sup>

### ***Violence***

As would be expected, medical emergency risk is also higher in communities or segments of communities with higher rates of violence. For 2014, the most recent year of available data, there were 737 violent crimes committed in unincorporated Santa Cruz County.<sup>27</sup> Given an estimated population of 155,000, this represents a violent crime rate of 0.4 percent, suggesting that violent crime minimally influences the County’s and District’s medical emergency risk.

### ***Vehicle Traffic***

Medical emergency risk tends to be higher in those areas of a community with high daily vehicle traffic volume, particularly those areas with high traffic volume travelling at high speeds. The District’s transportation network includes Highway 1, which carries an annual average daily traffic volume of over 84,000 vehicles, with a peak-hour load of more than 7,200 vehicles.<sup>28</sup>

### ***Medical Emergency Service Demand***

Medical emergency service demand over the previous three years includes 4,169 calls for service comprising 59.75 percent of total service demand over the same period, as summarized in Table 56.

**Table 56—Medical Emergency Service Demand History**

Hazard	Year	Planning Zone			Total	Percent of Total Service Demand
		Station 1	Station 2	Station 3		
Medical Emergency	2014	551	504	301	1,356	61.05%
	2015	556	490	342	1,388	59.83%
	2016	667	484	274	1,425	58.50%
<b>Total</b>		<b>1,774</b>	<b>1,478</b>	<b>917</b>	<b>4,169</b>	<b>59.75%</b>
<b>Percent of Total Service Demand</b>		<b>62.49%</b>	<b>60.90%</b>	<b>53.59%</b>	<b>59.75%</b>	

Source: Aptos/La Selva FPD incident records

As Table 56 shows, medical emergency service demand varies significantly by station and is trending upward an average approximately 2 percent annually over the past two years. Overall,

<sup>26</sup> Source: U.S. Census Bureau (2015)

<sup>27</sup> Source: Santa Cruz County Sheriff’s Office website

<sup>28</sup> Source: California Department of Transportation (2015)

the District’s medical emergency service demand is typical of other small districts with similar demographics.

***Probability of Occurrence***

Table 57 scores the District’s medical emergency probability by planning zone based on recent medical emergency service demand history from Table 56.

**Table 57—Probability of Medical Emergency Occurrence**

Medical Emergency	Planning Zone					
	Station 1		Station 2		Station 3	
	Suburban	Rural	Suburban	Rural	Suburban	Rural
<b>Probability Score</b>	4	4	4	4	4	4

***Medical Emergency Impact Severity***

Table 58 scores the District’s probable medical emergency impact severity by planning zone.

**Table 58—Medical Emergency Impact Severity**

Medical Emergency	Planning Zone					
	Station 1		Station 2		Station 3	
	Suburban	Rural	Suburban	Rural	Suburban	Rural
<b>Impact Severity Score</b>	3	3	3	3	3	3

***Overall Medical Emergency Risk***

Table 59 identifies the District’s overall medical emergency risk score and risk rating by planning zone.

**Table 59—Overall Medical Emergency Risk**

Medical Emergency	Planning Zone					
	Station 1		Station 2		Station 3	
	Suburban	Rural	Suburban	Rural	Suburban	Rural
<b>Overall Risk Score</b>	12	12	12	12	12	12
<b>Risk Rating</b>	<i>HIGH</i>	<i>HIGH</i>	<i>HIGH</i>	<i>HIGH</i>	<i>HIGH</i>	<i>HIGH</i>

### **A.1.14 Hazardous Material Risk**

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

The Santa Cruz County Environmental Health Services Department, serving as the designated Certified Unified Program Agency (CUPA) for the County, identified 19 facilities within the District’s service area requiring a State or County hazardous material operating permit or Hazardous Materials Business Plan (HMBP), as summarized in Table 60.

**Table 60—Hazardous Materials Sites**

Facility		Location
1	Aptos Chevron	7719 Soquel Drive
2	Aptos High School	100 Mariner Way
3	Aptos/La Selva Fire Station 1	6934 Soquel Drive
4	Aptos Landscape Supply	5035 Freedom Blvd.
5	Aptos Seascape Golf Course	610 Clubhouse Drive
6	Aptos Tire and Auto Care	8028 Soquel Drive
7	Aptos Village Garage	8026 Soquel Drive
8	Arco	795 Rio Del Mar Blvd.
9	AT&T	855 Polo Drive
10	Branciforte Auto Repair	10105 Soquel Drive
11	California Highway Patrol	10395 Soquel Drive
12	CVS Pharmacy	783 Rio Del Mar Blvd.
13	Rite Aid	80 Rancho Del Mar
14	Rio Esplanade Pump Station	103 Marina Avenue
15	Safeway	16 Rancho Del Mar
16	Safeway Fuel Center	18 Rancho Del Mar
17	Seacliff State Beach	201 State Park Drive
18	Seacliff 76	201 Sea Ridge Road
19	Soquel Creek Water District	2000 Bonita Drive

Source: Santa Cruz County Environmental Health Services Department

The District also has transportation-related hazardous material risk as a result of its road transportation network, including Highway 1 with heavy daily truck traffic volume, as summarized in Table 61.

**Table 61—Average Annual Daily Truck Traffic**

Highway	Crossing	AADT <sup>1</sup>	Truck AADT by Axles				% Truck AADT by Axles			
			2	3	4	5+	2	3	4	5+
1	Soquel Avenue	3,760	2,444	564	113	639	65.00%	15.00%	3.00%	17.00%

<sup>1</sup> AADT=Average Annual Daily Trips  
 Source: California Department of Transportation (2015)

***Population Density***

Because hazardous material emergencies have the potential to adversely impact human health, it is logical that the higher the population density, the greater the potential population exposed to a hazardous material release or spill. As previously illustrated in Figure 24, the District’s population density ranges from less than 100 per square mile to more than 8,300 per square mile.

***Vulnerable Populations***

Persons vulnerable to a hazardous material release/spill include those individuals or groups unable to self-evacuate, generally including children under the age of 10, the elderly, and persons confined to an institution or other setting where they either cannot or are unable to leave voluntarily. Nearly 26 percent of the District’s population is under age 10 or of the age of 65 and older.

***Emergency Evacuation Planning, Training, Implementation, and Effectiveness***

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

Although the District does not have its own emergency evacuation plan or mass emergency notification capability, Santa Cruz County has established emergency evacuation protocols, procedures, and resources as referenced in the County’s Emergency Operations Plan, which is

currently under review/revision as part of the County’s Local Hazard Mitigation Plan update process.

As needed during emergencies, the Santa Cruz County Sheriff’s Office utilizes these protocols to implement incident-specific evacuation procedures conforming to the Federal Emergency Management Agency (FEMA), Incident Command System, and incident action planning principles and guidelines. Evacuation needs and instructions are communicated to the public using CodeRED, a mass emergency telephone notification system administered by Santa Cruz Regional 9-1-1 (SCR911) Dispatch Center. Authorized local County public safety officials can directly request emergency notifications through the SCR911 dispatcher. This system is regularly utilized throughout the County, and both public safety personnel and SCR911 staff are well-versed with its use and procedures, particularly during the multiple serious storm events this past winter.

**Finding #31:** The County has established appropriate emergency evacuation protocols, procedures, and resources in its Emergency Operations Plan.

**Finding #32:** The County has established a mass emergency telephone notification system to effectively communicate emergency information to the public in a timely manner.

**Finding #33:** The County regularly utilizes, validates, and evaluates its emergency evacuation protocols, procedures, and resources to ensure ongoing emergency evacuation readiness and effectiveness.

***Hazardous Materials Service Demand***

The District experienced 80 hazardous material incidents over the past three years, comprising 1.15 percent of total service demand over the same period, as summarized in Table 62.

**Table 62—Hazardous Materials Service Demand History**

Hazard	Year	Planning Zone			Total	Percent of Total Service Demand
		Station 1	Station 2	Station 3		
Hazardous Materials	2014	13	13	4	30	1.35%
	2015	7	13	9	29	1.25%
	2016	7	9	5	21	0.86%
<b>Total</b>		<b>27</b>	<b>35</b>	<b>18</b>	<b>80</b>	<b>1.15%</b>
<b>Percent of Total Service Demand</b>		<b>0.95%</b>	<b>1.44%</b>	<b>1.05%</b>	<b>1.15%</b>	

Source: Aptos/La Selva FPD incident records

As Table 62 indicates, hazardous material service demand varies by station and is trending down, with the highest demand in Station 2’s response area. Overall, the District’s hazardous material service demand is low.

***Probability of Occurrence***

Table 63 scores the probability of a future hazardous material occurrence by planning zone over the next 12 months based on recent hazardous material service demand history from Table 62.

**Table 63—Probability of Hazardous Material Occurrence**

Hazardous Materials	Planning Zone					
	Station 1		Station 2		Station 3	
	Suburban	Rural	Suburban	Rural	Suburban	Rural
<b>Probability Score</b>	<b>3</b>	<b>2</b>	<b>3</b>	<b>2</b>	<b>3</b>	<b>2</b>

***Hazardous Materials Impact Severity***

Table 64 scores the District’s probable hazardous material impact severity by planning zone.

**Table 64—Hazardous Material Impact Severity**

Hazardous Materials	Planning Zone					
	Station 1		Station 2		Station 3	
	Suburban	Rural	Suburban	Rural	Suburban	Rural
Impact Severity Score	2	2	2	2	2	2

***Overall Hazardous Materials Risk***

Table 65 identifies the District’s overall hazardous material risk score and risk rating by planning zone.

**Table 65—Overall Hazardous Material Risk**

Hazardous Materials	Planning Zone					
	Station 1		Station 2		Station 3	
	Suburban	Rural	Suburban	Rural	Suburban	Rural
Overall Risk Score	6	4	6	4	6	4
Risk Rating	MODERATE	LOW	MODERATE	LOW	MODERATE	LOW

**A.1.15 Technical Rescue Risk**

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

***Construction Activity***

There is generally some construction activity occurring within the District, predominantly related to residential and/or light commercial activity.

***Confined Spaces***

There are some confined spaces within the District, including tanks, vaults, open trenches, etc.

### *Bodies of Water*

There are numerous bodies of water within the District, including the Monterey Bay coastline; Aptos, Trout, and Valencia Creeks; Mangels Gulch; and other smaller bodies of water.

### *Transportation Volume*

Another factor is transportation-related incidents requiring technical rescue. This risk factor is primarily a function of vehicle, railway, maritime, and aviation traffic. Vehicle traffic volume is the greatest of these factors within the District, with Highway 1 carrying more than 7,200 vehicles daily.

### *Earthquake Risk<sup>29</sup>*

All of Santa Cruz County is vulnerable to an earthquake. There are several active and potentially active faults, including the San Andreas, San Gregorio, Zayante, and Monterey Bay Fault zones, as well as numerous fault complexes and branches of these major faults, as shown in Figure 33.

**Figure 33—Earthquake Fault Zones**



Source: 2015–2020 Santa Cruz County Local Hazard Mitigation Plan, Figure 7

<sup>29</sup> Reference: 2015–2020 Santa Cruz County Local Hazard Mitigation Plan, Chapter 4

The most significant threat to the County is the San Andreas Fault zone, which passes through the Santa Cruz Mountains along the northern portion of the County. Based on records from the 1906 San Francisco earthquake, it is estimated that the maximum credible earthquake likely to occur along the San Andreas Fault would equal magnitude 8.3, which represents more than 30 times the energy released by the 1989 Loma Prieta earthquake, which caused significant damage in Santa Cruz County.

***Flood Risk<sup>30</sup>***

Numerous areas of Santa Cruz County are subject to flooding, including Aptos Creek, Trout Creek, and Valencia Creek within the District. Coastal flooding along the heavily developed Monterey Bay coastline may occur with the simultaneous occurrence of large waves and storm swells during the winter. Storm centers from the southwest produce the type of storm pattern most commonly responsible for the majority of severe coastline flooding. The strong winds combined with high tides that create storm surges are usually accompanied by heavy rains. When storms occur simultaneously with high tides, flood conditions, particularly flooding at the mouth of the Pajaro River and Aptos Creek, are exacerbated. This is especially true for the Rio Del Mar Beach tract, which experiences repetitive flooding during high tide / storm surge events. Figure 34 shows the location of flood hazards within Santa Cruz County as determined by FEMA.

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<sup>30</sup> Reference: 2015–2020 Santa Cruz County Local Hazard Mitigation Plan, Chapter 6

**Figure 34—Santa Cruz County Flood Hazard Areas**

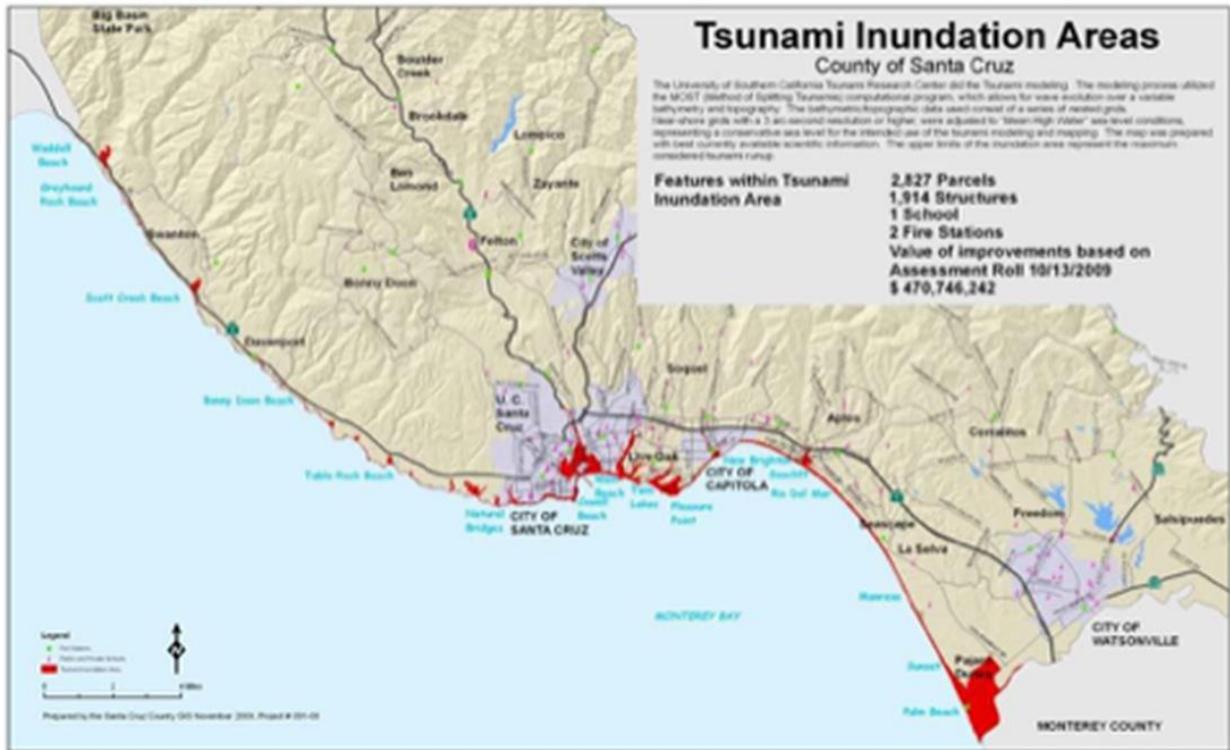


Source: 2015–2020 Santa Cruz County Local Hazard Mitigation Plan, Figure 18

An earthquake anywhere in the Pacific Ocean can cause tsunamis around the entire Pacific basin, including offshore of Santa Cruz County. Since the Pacific Rim is highly seismically active, tsunamis are not uncommon, but historically have been only a few meters in height. Significant damage occurred in the Santa Cruz Harbor as a result of a 9.0 earthquake in Japan. While the tsunami caused massive damage and casualties in Japan, the Santa Cruz Harbor suffered approximately \$20 million in damage. However, the historic record is short, and may not reflect the true tsunami hazard to the County. The potential outcome of a tsunami could be more significant damage and loss of life. Figure 35 illustrates the potential tsunami inundation areas of the County.

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**Figure 35—Tsunami Inundation Areas**



Source: 2015–2020 Santa Cruz County Local Hazard Mitigation Plan, Figure 24

***Technical Rescue Service Demand***

Over the most recent three years, there were 53 technical rescue incidents comprising 0.76 percent of total service demand for the same period, as summarized in Table 66.

**Table 66—Technical Rescue Service Demand**

Hazard	Year	Planning Zone			Total	Percent of Total Service Demand
		Station 1	Station 2	Station 3		
Technical Rescue	2014	3	4	7	14	0.63%
	2015	3	2	9	14	0.60%
	2016	4	3	18	25	1.03%
<b>Total</b>		<b>10</b>	<b>9</b>	<b>34</b>	<b>53</b>	<b>0.76%</b>
<b>Percent of Total Service Demand</b>		<b>0.35%</b>	<b>0.37%</b>	<b>1.99%</b>	<b>0.76%</b>	

Source: Aptos/La Selva FPD incident records

As Table 66 shows, technical rescue service demand is trending higher, with the greatest demand in Station 3’s response area.

***Probability of Occurrence***

Table 67 scores the probability of a future technical rescue occurrence by planning zone over the next 12 months based on recent service demand history from Table 66.

**Table 67—Probability of Technical Rescue Occurrence**

Technical Rescue	Planning Zone					
	Station 1		Station 2		Station 3	
	Suburban	Rural	Suburban	Rural	Suburban	Rural
<b>Probability Score</b>	2	2	2	2	2	2

***Technical Rescue Impact Severity***

Table 68 scores the District’s probable technical rescue impact severity by planning zone.

**Table 68—Technical Rescue Impact Severity**

Technical Rescue	Planning Zone					
	Station 1		Station 2		Station 3	
	Suburban	Rural	Suburban	Rural	Suburban	Rural
<b>Impact Severity Score</b>	3	3	3	3	3	3

***Overall Technical Rescue Risk***

Table 69 identifies the District’s overall technical rescue risk score and risk rating by planning zone.

**Table 69—Overall Technical Rescue Risk**

Technical Rescue	Planning Zone					
	Station 1		Station 2		Station 3	
	Suburban	Rural	Suburban	Rural	Suburban	Rural
<b>Overall Risk Score</b>	6	6	6	6	6	6
<b>Risk Rating</b>	<b>MODERATE</b>	<b>MODERATE</b>	<b>MODERATE</b>	<b>MODERATE</b>	<b>MODERATE</b>	<b>MODERATE</b>

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# **APPENDIX B**

# **INCIDENT STATISTICAL ANALYSIS**

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## APPENDIX B—INCIDENT STATISTICAL ANALYSIS

### B.1 STATISTICAL ANALYSIS

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#### B.1.1 Historical Effectiveness and Reliability of Response—What Statistics Say About Existing System Performance

**SOC ELEMENT 7 OF 8**  
**RELIABILITY & HISTORICAL  
RESPONSE EFFECTIVENESS  
STUDIES**

The map sets described in Section 2.6 show the ideal situation for response times and the response effectiveness given perfect conditions with no competing calls, traffic congestion, units out of place, or simultaneous calls for service. Examination of the actual response time data provides a picture of how response times are in the real world of simultaneous calls, rush hour traffic congestion, units out of position, and delayed travel time for events such as periods of severe weather.

#### B.1.2 Data Set Identification

The District furnished three years of National Fire Incident Reporting System (NFIRS 5) data and related apparatus response times that were merged into a single data file. The resulting database includes 7,625 incidents and 7,940 apparatus movement records.

Dataset strengths include:

- ◆ Long-term use of NFIRS 5 reporting system
- ◆ Use of seconds in time fields
- ◆ Standardized incident numbers in NFIRS 5 and apparatus response data
- ◆ Geospatial coordinates included later in 2016 (earlier data was geocoded with 93.07 percent accuracy)

#### B.1.3 Analysis Period

The data range for this statistical analysis is January 1, 2014, through December 31, 2016. This period incorporates 36 consecutive months over three calendar years.

#### B.1.4 Service Demand

For 2016, the District responded to 2,557 calls for service (incidents) for an average daily service demand of 7.01 incidents. Of those, 83 (3.25 percent) were fire incidents, 1,494 (58.43 percent) were EMS incidents, and 980 (38.32 percent) were other incidents (e.g., alarm activation with no fire, false alarm, no incident found, public assist, smoke scare, assist other agency, smoke or

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odor removal, electrical problem, water leak, rescue, hazardous material incident, animal problem, etc.).

Annual service demand is trending very slightly upward over the most recent three-year period, as shown in Table 70 and Figure 36.

**Table 70—Annual Service Demand**

Year	Incidents
2014	2,496
2015	2,572
2016	2,557
<b>Total</b>	<b>7,625</b>

Source: Aptos/La Selva FPD incident records

**Figure 36—Annual Service Demand by Year**

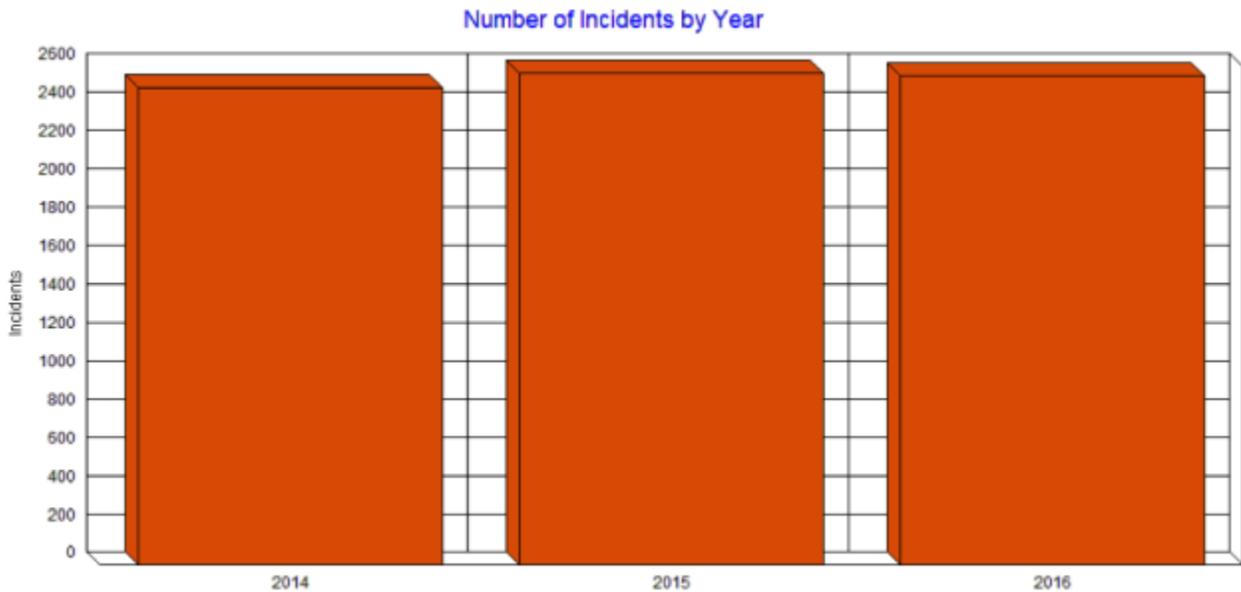
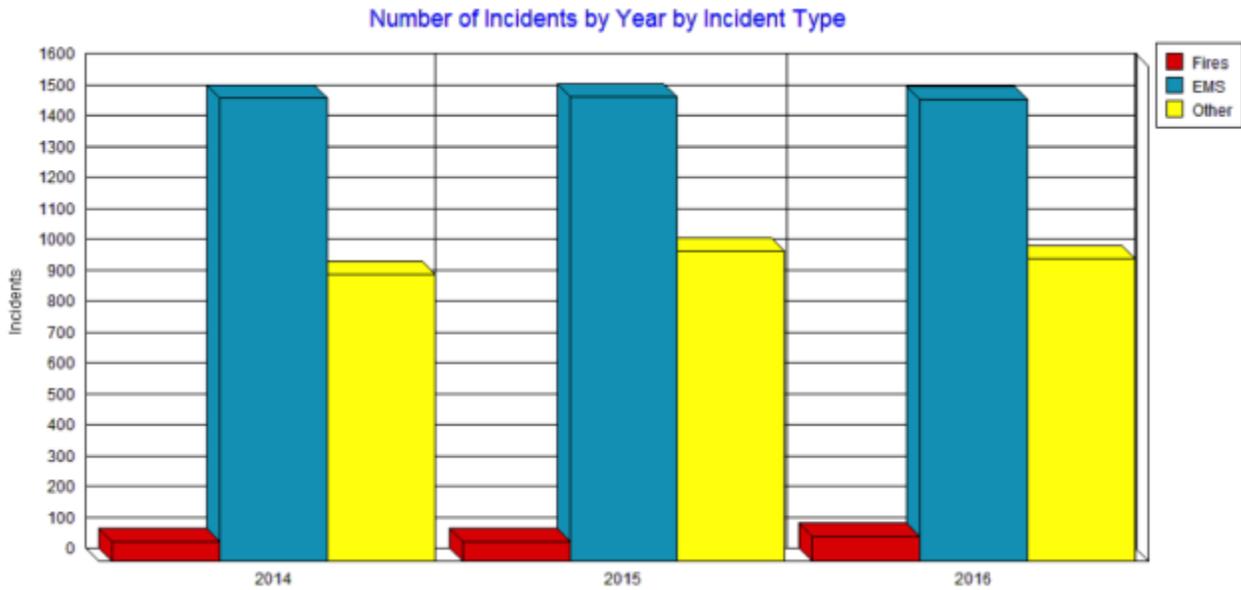


Figure 37 illustrates annual service demand by incident category.

**Figure 37—Annual Service Demand by Incident Type**



***Service Demand Over Time***

Figure 38 illustrates annual service demand by month. Note that monthly service demand is fairly consistent across all 12 months.

**Figure 38—Number of Incidents by Month by Year**



Figure 39 illustrates that service demand remains fairly consistent throughout the week with a slight increase at the end of the week.

**Figure 39—Number of Incidents by Day of Week by Year**

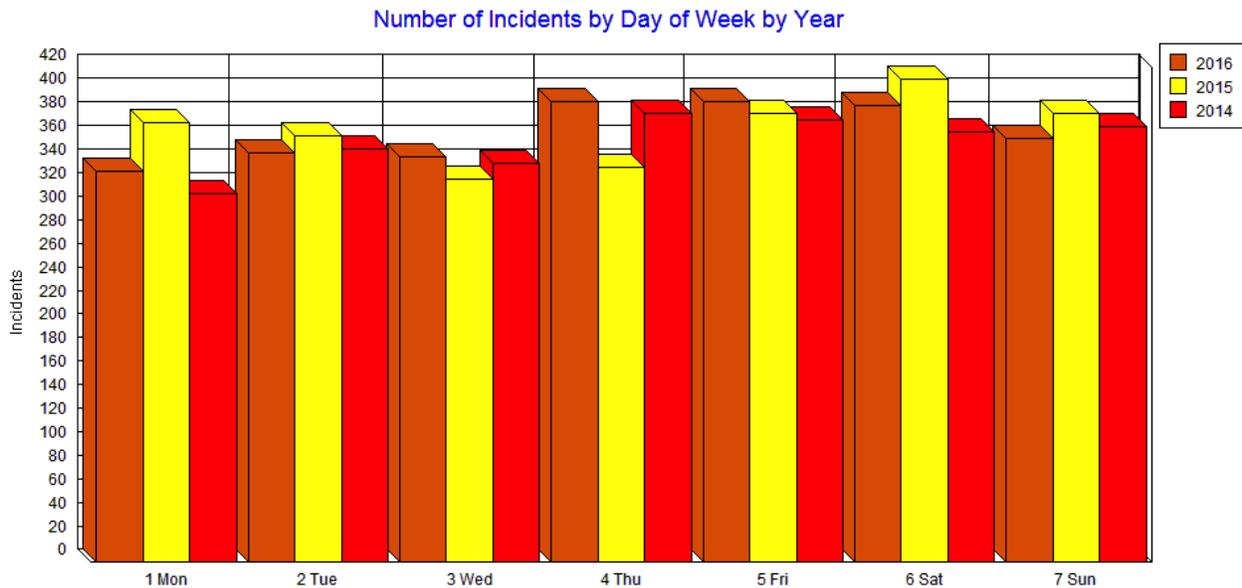
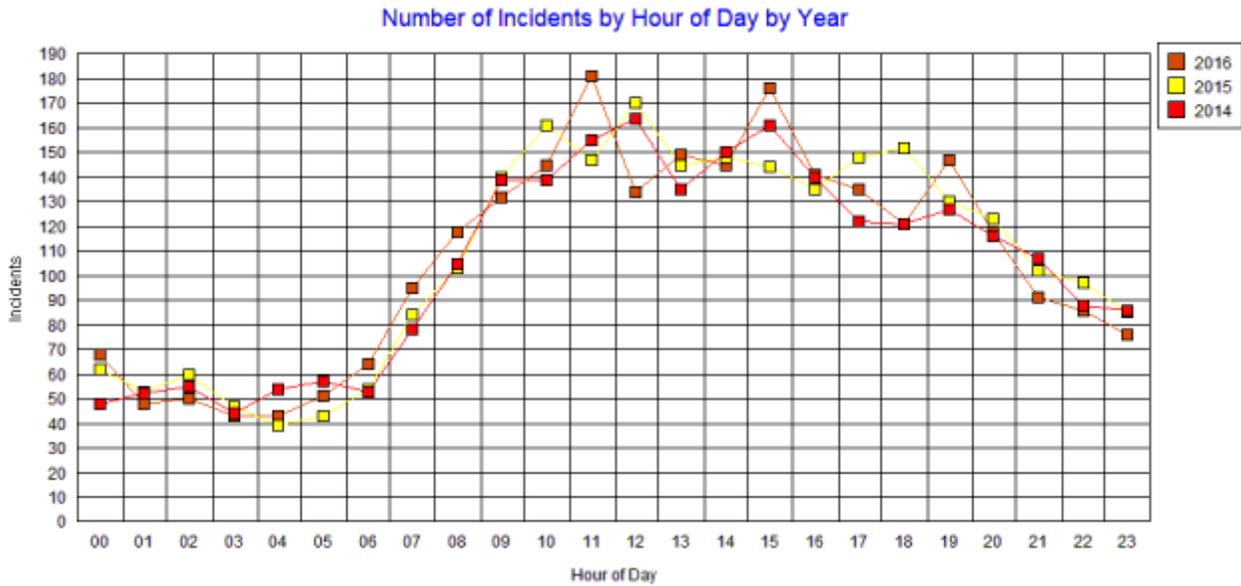


Figure 40 illustrates annual service demand by hour of day. Of note is the consistency of service demand during early morning hours, with larger variation from 11:00 am to 7:00 pm. This service demand curve is typical for urban/suburban departments, with increased service demand during typical business hours and peak demand period from approximately 10:00 am to 10:00 pm.

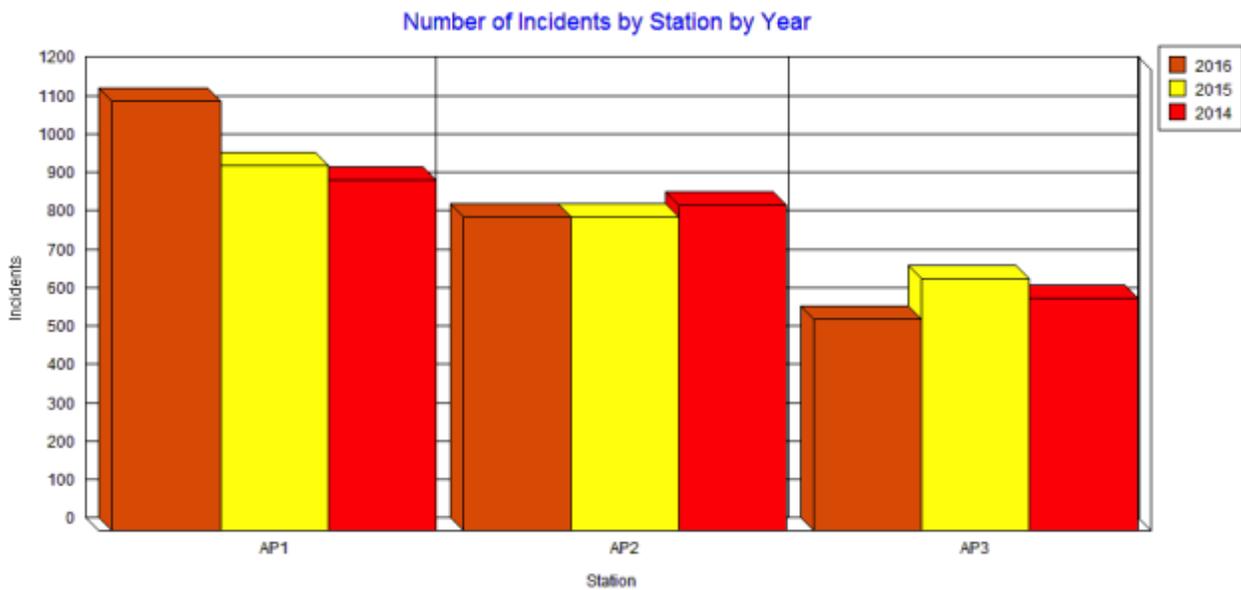
**Figure 40—Service Demand by Hour of Day and Year**



**Service Demand by Station**

Figure 41 illustrates annual service demand by station over the three-year study period. Of note is that service demand for Station 1 is trending upward, while Station 2 has been constant and Station 3 is trending slightly downward.

**Figure 41—Service Demand by Station by Year**



**Finding #34:** The District’s day-of-week and month-of-year service demand are fairly consistent, indicating the need for a consistent 24-hour-per-day, seven-days-per-week fire and EMS emergency response system.

***Service Demand by Incident Type***

Table 71 ranks service demand by NFIRS 5 incident type for the most recent reporting year. Of note is the strong ranking of EMS-related incidents, with cancelled prior to arrival also ranking high. Building fires ranked 11<sup>th</sup> by volume. Only incident categories with 20 or more incidents for 2016 are shown.

**Table 71—Service Demand by Incident Type**

NFIRS Incident Type	2016
321 EMS call, excluding vehicle accident with injury	1,314
611 Dispatched & canceled en-route	297
554 Assist invalid	87
622 No incident found on arrival	87
324 Motor vehicle accident; no injuries	64
700 False alarm or false call, other	58
322 Vehicle accident with injuries	55
743 Smoke detector activation; no fire	48
444 Power line down	41
733 Smoke detector activation due to malfunction	28
111 Building fire	25
553 Public service	25
745 Alarm system activation; no fire	23
364 Surf rescue	20

Another way to understand fire department service delivery is to review the types of properties at which incidents occur. Table 72 summarizes annual service demand by NFIRS property use categories, indicating that nearly 65 percent of the District’s annual service demand is generated by residential and roadway property uses. Only property types with greater than 100 occurrences over the three-year period of the dataset are shown.

**Table 72—Service Demand by Property Use by Year**

Property Use	2014	2015	2016	Total
Single or two-family dwelling	1,168	1,058	1,168	<b>3,394</b>
Residential, other	90	218	179	<b>487</b>
Highway or divided highway	119	139	164	<b>422</b>
Residential street	118	97	153	<b>368</b>
Street, other	76	93	107	<b>276</b>
Mercantile, business, other	68	116	43	<b>227</b>
24-hour care nursing home	82	67	46	<b>195</b>
Vehicle parking area	48	60	59	<b>167</b>
Hotel/motel, commercial	42	41	51	<b>134</b>
Beach	34	42	40	<b>116</b>

***Aid Provided and Received***

Table 73 summarizes automatic and mutual aid provided by the District to other agencies/jurisdictions, as well as automatic and mutual aid received from other agencies/jurisdictions. Aid provided to other agencies accounts for *7.96 percent* of all service demand over the three-year study period. Also of note is the significant reduction in aid provided for 2016.

**Table 73—Aid Provided and Received by Year**

Aid Type	2014	2015	2016	Total
Mutual Aid Received	0	2	1	<b>3</b>
Automatic Aid Received	0	7	5	<b>12</b>
Mutual Aid Provided	12	23	16	<b>51</b>
Automatic Aid Provided	259	222	67	<b>548</b>
Other Aid Provided	0	2	6	<b>8</b>
<b>Total</b>	<b>271</b>	<b>256</b>	<b>95</b>	<b>622</b>

***Simultaneous Incident Activity***

Simultaneous incident activity measures the percentage of concurrent or overlapping incidents. Figure 42 shows simultaneous incident occurrence by year for the District. Of note is that simultaneous incident activity is trending down.

**Figure 42—Simultaneous Activity by Year**

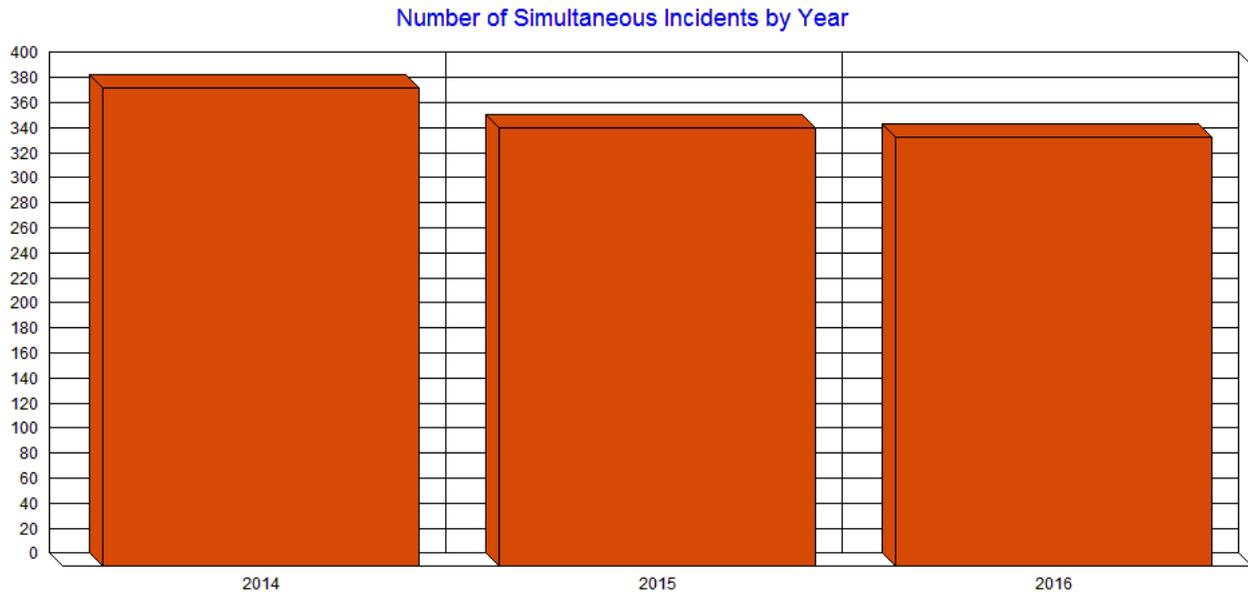


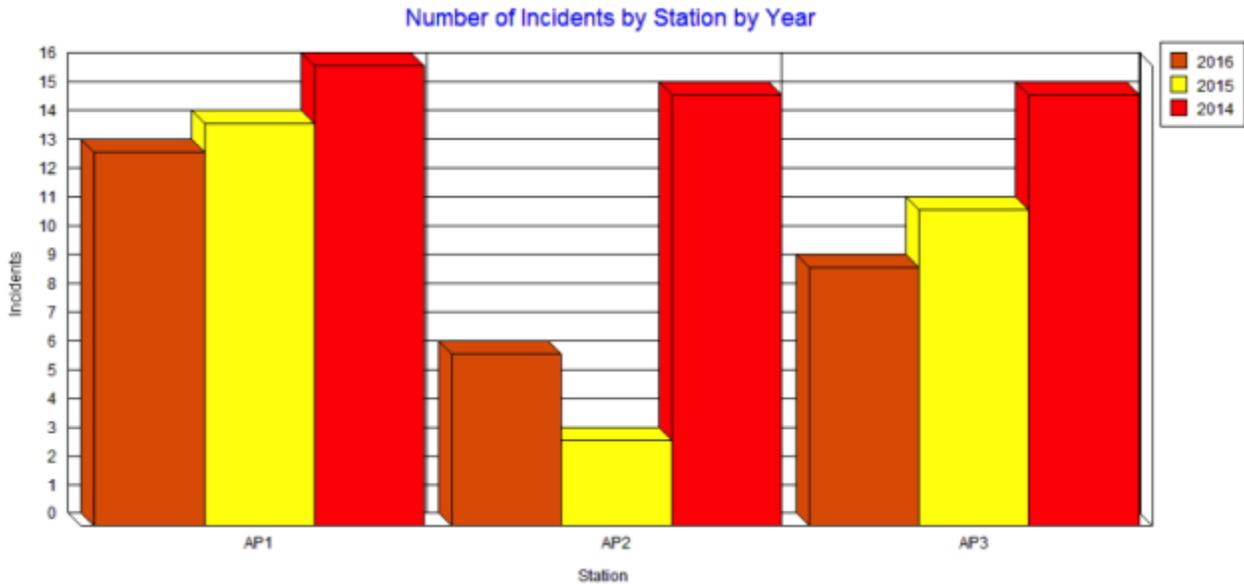
Table 74 shows the percentage of simultaneous incident activity for 2016.

**Table 74—Simultaneous Incident Activity**

Number of Simultaneous Incidents	Percentage of All Incidents
1 or more	<b>13.41%</b>
2 or more	<b>0.86%</b>

For multiple-station departments, simultaneous incident activity in different station areas may have very little operational impact. However, simultaneous incidents within a single station response area can result in significantly longer response times because the second or successive concurrent call must be handled by an engine/resource from a more distant station. Figure 43 shows simultaneous incident activity within the same station response area by station. With less than 16 single-station area simultaneous incidents in any given year, and the downward trend, simultaneous incident activity within a single station response area has very minimal impact on District first-due response times.

**Figure 43—Simultaneous Incident Activity within Same Station Response Area**



**Finding #35:** Out of all incident activity in 2016, 13.41 percent involved two or more simultaneous (concurrent) incidents.

**Finding #36:** Simultaneous incident activity *within the same station response area* minimally impacts District first-due response times, involving 1.1 percent of all calls for service in 2016.

**Station Demand Percentage and Unit-Hour Utilization**

Table 75 shows hourly service demand percentage by station for 2016, with the different colors illustrating variation in demand; the lowest rates of activity are green, progressing from yellow to red to indicate the highest quantity of incidents or rate of activity. The percentage shown is the probability of an incident occurring within the station area during that hour of the day. The percentage listed is the probability that a particular station is involved in an incident at any given hour. This percentage considers the number and duration of incidents over the three-year data set.

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**Table 75—Hourly Service Demand Percentage by Station**

Time of Day	Station 1	Station 2	Station 3
0:00	3.56%	2.78%	1.72%
1:00	2.92%	1.43%	3.09%
2:00	3.58%	1.53%	6.26%
3:00	3.45%	2.55%	1.57%
4:00	3.02%	1.45%	1.25%
5:00	2.11%	5.15%	1.37%
6:00	2.93%	3.08%	1.70%
7:00	5.41%	3.87%	1.98%
8:00	6.31%	5.92%	5.56%
9:00	8.64%	4.90%	3.08%
10:00	6.67%	5.48%	3.61%
11:00	8.69%	6.53%	7.80%
12:00	8.19%	6.44%	4.17%
13:00	8.63%	6.61%	3.19%
14:00	8.65%	6.31%	3.22%
15:00	9.50%	6.49%	4.89%
16:00	7.43%	6.83%	3.34%
17:00	6.46%	6.56%	4.37%
18:00	7.08%	4.06%	3.49%
19:00	7.60%	5.82%	4.36%
20:00	11.43%	4.78%	3.83%
21:00	5.61%	2.58%	3.97%
22:00	4.71%	3.35%	2.82%
23:00	3.59%	3.55%	2.90%

Table 75 shows that Station 1 is the busiest station, with peak service demand occurring from about 9:00 am to 9:00 pm. Overall hourly service demand is low, ranging from 1.25 percent to 11.43 percent.

Table 76 shows unit-hour utilization for 2016. The percentage shown is the probability that the apparatus is involved in an incident during that hour of the day.

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**Table 76—Unit-Hour Utilization Percentage**

Time of Day	E-3511	E-3512	E-3513	E-3510	B-3503
0:00	2.93%	2.81%	1.76%	0.59%	0.53%
1:00	1.46%	2.41%	4.16%	1.77%	1.11%
2:00	2.75%	1.66%	6.18%	0.90%	0.00%
3:00	3.56%	2.93%	0.62%	0.95%	0.78%
4:00	2.84%	1.63%	1.06%	0.33%	0.17%
5:00	2.07%	5.11%	1.28%	0.25%	0.00%
6:00	2.62%	3.42%	1.63%	0.51%	0.57%
7:00	4.79%	4.21%	1.61%	0.32%	0.20%
8:00	5.86%	8.25%	6.47%	0.88%	2.34%
9:00	8.44%	5.92%	3.14%	1.31%	1.19%
10:00	5.43%	4.83%	3.06%	1.60%	0.58%
11:00	7.47%	6.93%	8.08%	1.32%	0.97%
12:00	8.23%	6.71%	4.60%	0.48%	1.25%
13:00	7.47%	7.19%	2.88%	1.14%	0.47%
14:00	8.32%	7.14%	3.00%	1.02%	1.26%
15:00	8.37%	7.45%	4.18%	1.69%	0.94%
16:00	6.53%	7.29%	2.58%	1.66%	0.88%
17:00	5.76%	6.96%	4.87%	0.90%	1.32%
18:00	6.28%	3.99%	3.60%	0.89%	0.21%
19:00	6.47%	5.64%	4.55%	2.00%	0.68%
20:00	5.45%	4.88%	3.76%	0.76%	6.03%
21:00	4.83%	3.12%	3.85%	0.94%	0.39%
22:00	4.02%	3.65%	2.55%	0.76%	0.71%
23:00	3.08%	3.89%	2.90%	0.36%	0.36%
<b>Overall</b>	<b>5.21%</b>	<b>4.92%</b>	<b>3.43%</b>	<b>0.97%</b>	<b>0.96%</b>

What should be the maximum utilization percentage for a firefighting unit? For a nine-hour daytime work period, when crews on a 24-hour shift need to also pay attention to apparatus checkout, station duties, training, public education, and paperwork, plus required physical training and meal breaks, Citygate believes the maximum commitment UHU per hour *for an engine, ladder truck, or 24-hour ambulance unit* should not exceed 30 percent. Beyond that, the most important element likely to suffer will be training.

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As Table 76 shows, Engines 3511 and 3512 have the highest unit-hour utilization rates; however, overall unit-hour utilization percentages are low, ranging from 0 percent to 8.44 percent, which is far below the 30 percent saturation rate.

**Finding #37:** Overall District hourly station service demand and unit-hour utilization percentages are well below recommended maximum saturation rates.

***Medic 3566 Utilization Analysis***

The Prehospital Emergency Medical Services Agreement between the Emergency Medical Services Integration Authority (EMSIA) and American Medical Response, West (AMRW) includes a section addressing supplemental ALS patient transportation by a participating EMSIA fire agency, including when and how such supplemental transport ambulances are utilized and activated. Aptos/La Selva Fire District is the *only* current EMSIA agency with a supplemental transport ambulance (Medic 3566). According to District staff, this resource can be activated by SCR911 during a declared local emergency/disaster or by AMRW when the number of their available ALS transport ambulances falls below the minimum level established in their exclusive operating area contract with the Santa Cruz County Health Services Agency. The District cross-staffs Medic 3566 with Engine 3511 personnel, thus Engine 3511 is unstaffed and unavailable for response whenever Medic 3566 is activated.

Table 77 shows the number of calls and total hours that Medic 3566 was activated over the three-year study period.

**Table 77—Medic 3566 Utilization**

Response Area	2014	2015	2016	Total
In District	9	24	10	43
Out of District	1	2	31	34
<b>Total</b>	<b>10</b>	<b>26</b>	<b>41</b>	<b>77</b>
<b>Hours Committed</b>	5:50	8:01	24:58	<b>38:49</b>

Source: Aptos/La Selva FPD incident records; SCR911 CAD records

As Table 77 shows, Medic 3566 was activated for nearly 39 hours over the three-year study period, or an average of about 15 minutes per week. Of note is the sharp increase in utilization of Medic 3566 in 2016 over the previous two years (312 percent); however, this level of activation has minimal impact on Engine 3511’s availability for emergency response, averaging less than 30 minutes per week.

**Finding #38:** Whenever Medic 3566 is activated to provide surge capacity for the Santa Cruz County pre-hospital emergency medical system, Engine 3511 is unstaffed/unavailable for emergency response; to date, this has negligibly impacted the District’s overall emergency response capability.

**B.1.5 Operational Performance**

Once incident types are quantified, the analysis shifts to the time required to respond to those emergencies. Fractile analyses track the percentage (and count the number) of incidents meeting defined criteria, such as the first apparatus to reach the scene within progressive time segments. Based on national best practice recommendations and Citygate’s experience, this study’s response time test measurement is for the 90 percent call to arrival to be *7:30 minutes or less* for suburban planning (demand) zones. This is comprised of three component elements: call processing time, turnout time, and travel time.

***Call Processing Time***

*Call processing time* is the time it takes to answer the 9-1-1 call, determine the nature of the emergency, enter information into the computer-aided dispatch system, and dispatch the appropriate resource(s). Best practice<sup>31</sup> is for 90 percent of calls to be dispatched within 90 seconds. Where language barriers exist, or medical self-help instructions are needed, these calls should be dispatched within 120 seconds. Santa Cruz Regional 9-1-1, a Joint Powers Authority providing 9-1-1 and dispatch services for multiple public agencies in Santa Cruz and San Benito counties, including the District, serves as the primary Public Safety Answering Point (PSAP) for 9-1-1 calls. Table 78 shows 90<sup>th</sup> percentile call processing performance.

**Table 78—90<sup>th</sup> Percentile Call Processing Performance**

Incident Location	Overall	2014	2015	2016
<b>District-Wide</b>	<b>2:34</b>	<b>2:37</b>	<b>1:01</b>	<b>3:09</b>
<b>Station 1</b>	<b>2:37</b>	2:33	0:36	3:07
<b>Station 2</b>	<b>2:40</b>	2:43	1:29	3:12
<b>Station 3</b>	<b>2:21</b>	2:25	0:53	2:58

Source: Aptos/La Selva FPD incident records and SCR911 CAD data

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<sup>31</sup> NFPA Standard 1221 – Standard for the Installation, Maintenance, and Use of Emergency Services Communications Systems (2016)

As Table 78 shows, District-wide call processing performance is *71 percent lower* (1:04) than best practice standards over the three-year study period. Of additional note is the significant *increase* in call processing times for 2016 at *more than double* the 90-second goal. SCR911 General Manager Dennis Kidd advised Citygate that the dispatch center strives to conform to nationally recognized best practices while maintaining a balance between speed and accuracy. Although the District has no direct control over 9-1-1 call processing performance, it is a significant element of the District's overall response performance and associated customer service. Citygate suggests that the District collaborate with SCR911 staff and other SCR911 user agencies to identify ways to improve this performance to a level more in alignment with industry-recognized best practice standards.

**Finding #39:** Call processing times for 90 percent of the District's incidents fail to meet recommended best practices by a significant margin (99 seconds), and a significantly low percentage of dispatch records have a call processing time stamp within expected parameters.

**Recommendation #9:** Collaborate with Santa Cruz Regional 9-1-1 to improve call processing performance more in alignment with industry-recognized best practice standards while maintaining dispatch accuracy.

### ***Turnout Time***

Turnout time is the time it takes for the crew(s) to hear the dispatch message, confirm the response travel route, don appropriate safety clothing, and board the apparatus for response. While turnout time best practice standard is 60 to 80 seconds,<sup>32</sup> it has long been recognized as a standard rarely met in practical experience. Citygate has long recommended that, due to this and the floor plan design of some fire stations, most agencies should be able to reasonably achieve a 2:00-minute crew turnout time at 90 percent compliance. Table 79 shows the District's 90<sup>th</sup> percentile turnout time performance.

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<sup>32</sup> NFPA 1710 – Standard for the Organization and Deployment of Fire Suppression Operations, Emergency Medical Operations, and Special Operations to the Public by Career Fire Departments (2016)

**Table 79—90<sup>th</sup> Percentile Turnout Time Performance**

Incident Location	Overall	2014	2015	2016
District-Wide	2:41	2:39	2:43	2:43
Station 1	2:29	2:28	2:37	2:21
Station 2	2:48	2:46	2:49	2:49
Station 3	2:43	2:39	2:38	2:48

Source: Aptos/La Selva FPD incident records; SCR911 CAD records

As Table 79 shows, District-wide turnout time performance fails to meet a recommended 2:00-minute target by 41 seconds (34 percent) over the three-year study period. Also of note is that turnout time performance is consistent across all three years and stations.

**Finding #40:** Turnout time performance appears to consistently fail to meet a recommended target of 2:00 minutes or less by a significant margin.

**Recommendation #10:** Evaluate actual turnout time performance compared to study findings and, as appropriate, work to improve 90<sup>th</sup> percentile turnout time performance to meet a recommended target of 2:00 minutes or less.

### **Travel Time**

*Travel time* is defined as the time segment that begins with the start of apparatus movement and ends when that apparatus stops moving on arrival at the emergency. It is important to understand that this time segment *does not include* the time required to exit the apparatus and walk to an EMS patient or to deploy a hose line on a fire.

**First-Due Travel Time**

Best practice standards for first-due travel time is 4:00 minutes or less for urban demand zones,<sup>33</sup> and 8:00 minutes or less for rural demand zones.<sup>34</sup> Table 80 shows the District’s 90<sup>th</sup> percentile first-due travel time performance.

**Table 80—90<sup>th</sup> Percentile First-Due Travel Time Performance**

Incident Location	Overall	2014	2015	2016
<b>District-Wide</b>	<b>7:00</b>	<b>7:19</b>	<b>6:45</b>	<b>6:57</b>
<b>Station 1</b>	<b>6:38</b>	6:35	6:26	6:40
<b>Station 2</b>	<b>7:05</b>	7:39	6:50	6:58
<b>Station 3</b>	<b>7:24</b>	7:41	6:54	8:12

Source: Aptos/La Selva FPD incident records; SCR911 CAD records

As Table 80 shows, first-due travel time performance fails to meet the recommended 4:00-minute goal for urban areas by nearly 43 percent; however, there are several reasons for this, including large first-due response areas, topography, a predominantly curvilinear road network, and morning/afternoon traffic congestion on Highway 1 and surface streets.

**Effective Response Force Travel Time**

The District’s Effective Response Force (ERF or First Alarm) for building fires is five engines and one Chief Officer. Best practice standards for ERF travel time is 8:00 minutes or less for urban/suburban areas<sup>35</sup> and 12:00 minutes or less for rural areas.<sup>36</sup> Table 81 summarizes the District’s 90<sup>th</sup> percentile ERF travel time performance.

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<sup>33</sup> NFPA 1710 – Standard for the Organization and Deployment of Fire Suppression Operations, Emergency Medical Operations, and Special Operations to the Public by Career Fire Departments (2016)

<sup>34</sup> Citygate-recommended first-due travel time goal based on NFPA 1720 standard for rural areas: arrival of six or more personnel within 14:00 minutes of receipt of dispatch

<sup>35</sup> NFPA 1710 – Standard for the Organization and Deployment of Fire Suppression Operations, Emergency Medical Operations, and Special Operations to the Public by Career Fire Departments (2016)

<sup>36</sup> NFPA 1720 – Standard for the Organization and Deployment of Fire Suppression Operations, Emergency Medical Operations, and Special Operations to the Public by Volunteer Fire Departments (2014) 14:00 minutes or less response time standard from receipt of dispatch notification *minus* Citygate-recommended 2:00-minute turnout time goal

**Table 81—90<sup>th</sup> Percentile ERF Travel Time Performance**

Incident Location	2014	2015	2016
<b>District-Wide</b>	<b>N/A</b>	<b>14:25</b>	<b>16:46</b>
<b>Station 1</b>	N/A	9:20	16:46
<b>Station 2</b>	N/A	14:25	12:55
<b>Station 3</b>	N/A	N/A	N/A

Source: Aptos/La Selva incident records; SCR911 CAD records

As Table 81 shows, ERF travel time performance fails to meet the recommended 8:00-minute goal for suburban areas by 78 percent for 2015 and 106 percent for 2016; however, there are several reasons for this, including the District’s topography, a predominantly curvilinear road network, morning/afternoon traffic congestion, and the fourth and fifth ERF resources coming from a neighboring agency with longer travel distances/times. It is also important to note that there were only nine incidents where a full ERF arrived pursuant to simultaneous dispatch (i.e., not a supplemental resource request), comprising 1.9 percent of all fire incidents and 0.01 percent of all calls for service over the three-year data set. All of these incidents occurred in suburban planning zones, with four occurring in 2015 and five in 2016. This information should be considered with caution, as these sample sizes are very small and can readily change significantly from year-to-year depending on the exact locations of the fires, the various units’ availability to respond, and travel times.

**Finding #41:** Effective Response Force travel times in many areas of the District are significantly longer than the 8:00 minutes or less recommended for a positive outcome and to meet best practices for a suburban area.

***Dispatch to First Arrival Performance***

Citygate’s recommended dispatch to first arrival time for positive outcomes is 6:00 minutes or less in urban/suburban service demand zones and 10:00 minutes or less for rural service demand zones. Dispatch to arrival time includes crew turnout time and travel time. Table 82 summarizes the District’s dispatch to first arrival performance over the three-year study period.

**Table 82—90<sup>th</sup> Percentile Dispatch to First Arrival Performance**

Incident Location	Overall	2014	2015	2016
<b>District-Wide</b>	<b>9:00</b>	<b>9:11</b>	<b>8:40</b>	<b>9:11</b>
<b>Station 1</b>	<b>8:25</b>	8:27	8:12	8:28
<b>Station 2</b>	<b>9:06</b>	9:34	8:48	9:00
<b>Station 3</b>	<b>9:35</b>	9:35	8:59	10:31

Source: Aptos/La Selva FPD incident records; SCR911 CAD records

As Table 82 shows, dispatch to first arrival performance *fails to meet* the goal of 6:00 minutes or less recommended by best practices for positive outcome in suburban planning zones; however, this is not unexpected due to the longer crew turnout and travel times previously discussed.

***Call to First Arrival Performance***

A person needing help in an emergency measures the speed of the fire department response from the time assistance is first requested until the help arrives. This measure is referred to as “call to first arrival.” Table 83 summarizes call to first arrival performance by station by year.

**Table 83—90<sup>th</sup> Percentile Call to First Arrival Performance**

Incident Location	Overall	2014	2015	2016
<b>District-Wide</b>	<b>10:06</b>	<b>10:30</b>	<b>9:01</b>	<b>10:27</b>
<b>Station 1</b>	<b>9:26</b>	9:56	8:27	9:54
<b>Station 2</b>	<b>10:16</b>	10:52	9:19	10:27
<b>Station 3</b>	<b>10:53</b>	10:53	9:17	11:59

Source: Aptos/La Selva FPD incident records; SCR911 CAD records

As Table 83 indicates, District-wide call to arrival performance fails to meet the District’s current response performance policy for suburban demand zones by 4:06 minutes, or 67 percent. It also fails to meet the District’s current response performance goal for rural demand zones by 2:06 minutes, or 25 percent. While this response performance also fails to meet a goal of 7:30 minutes or less based on best practices to achieve a positive outcome for suburban areas, it is not unexpected due to the longer call processing, turnout, and travel times previously discussed.

**Finding #42:** Call to first arrival performance of 10:27 minutes *fails to meet* the District's current response performance policy of 6:00 minutes or less for suburban demand zones by 67 percent (4:06 minutes), as well as failing to meet its current 8:00 minutes or less response performance policy for rural demand zones by 25 percent (2:04 minutes). This response performance also fails to meet a best practice recommended response performance goal of 7:30 minutes or less for suburban areas due to large geographic station response areas, longer-than-expected dispatch center call processing and crew turnout time performance, and longer travel times due to the topography, road network, and daily traffic congestion within the District.

If the District could save 99 seconds in dispatch and 43 seconds in crew turnout time, the resultant 2:22 minutes, when subtracted from the actual call to arrival time of 10:27 minutes, lowers call to arrival to 8:05 minutes, substantially closer to best practices, *without additional fire stations*.

EMERGENCY SERVICES  
MASTER PLAN  
VOLUME 2 OF 2: MAP ATLAS

APTOS/LA SELVA  
FIRE PROTECTION DISTRICT

OCTOBER 11, 2017



# Aptos / La Selva FPD Map 1a General Geography & Station Locations



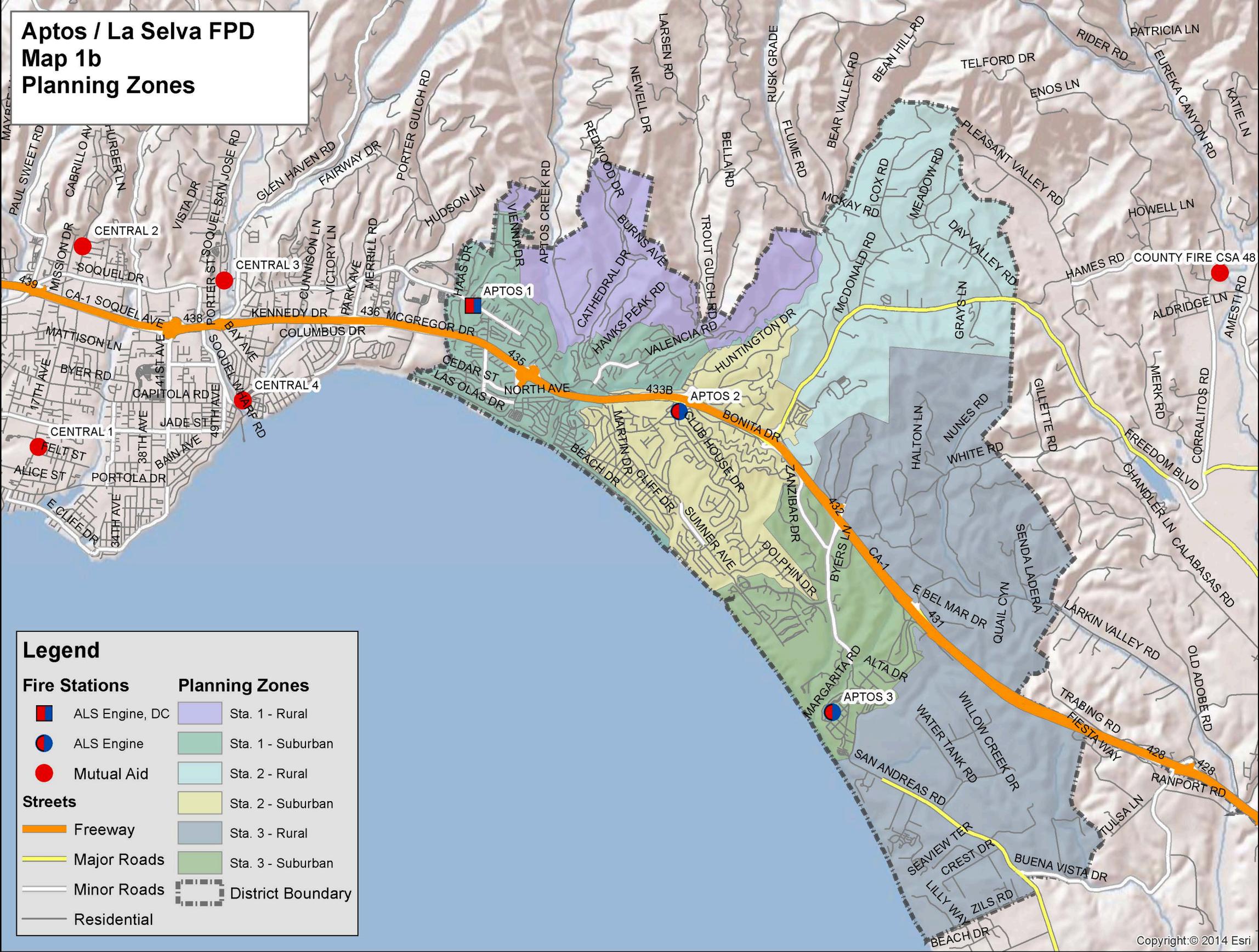
## Legend

- | Fire Stations  | Streets           |
|----------------|-------------------|
| ALS Engine, DC | Freeway           |
| ALS Engine     | Major Roads       |
| Mutual Aid     | Minor Roads       |
|                | Residential       |
|                | District Boundary |

# Aptos / La Selva FPD

## Map 1b

### Planning Zones



### Legend

#### Fire Stations

- ALS Engine, DC
- ALS Engine
- Mutual Aid

#### Streets

- Freeway
- Major Roads
- Minor Roads
- Residential

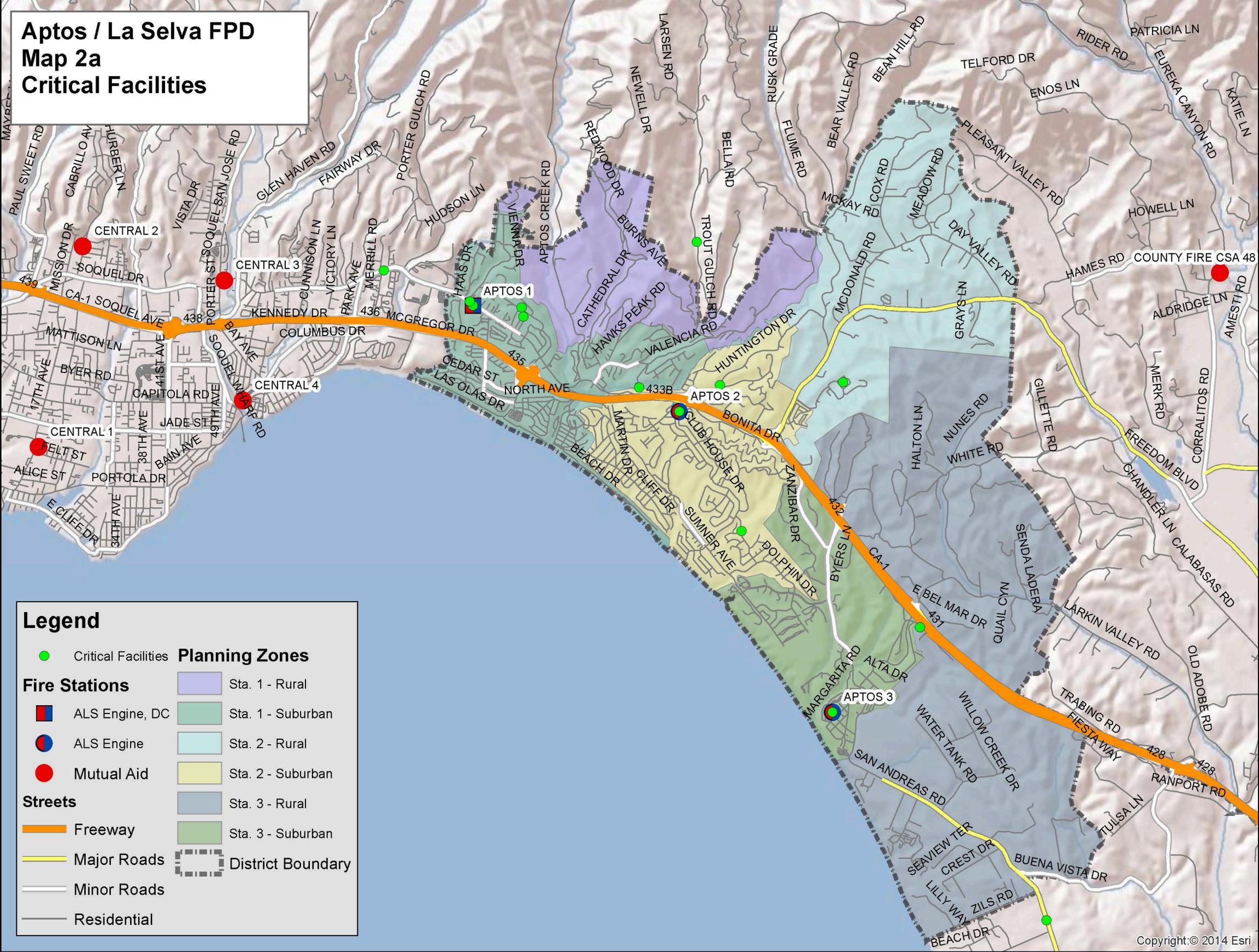
#### Planning Zones

- Sta. 1 - Rural
- Sta. 1 - Suburban
- Sta. 2 - Rural
- Sta. 2 - Suburban
- Sta. 3 - Rural
- Sta. 3 - Suburban
- District Boundary

# Aptos / La Selva FPD

## Map 2a

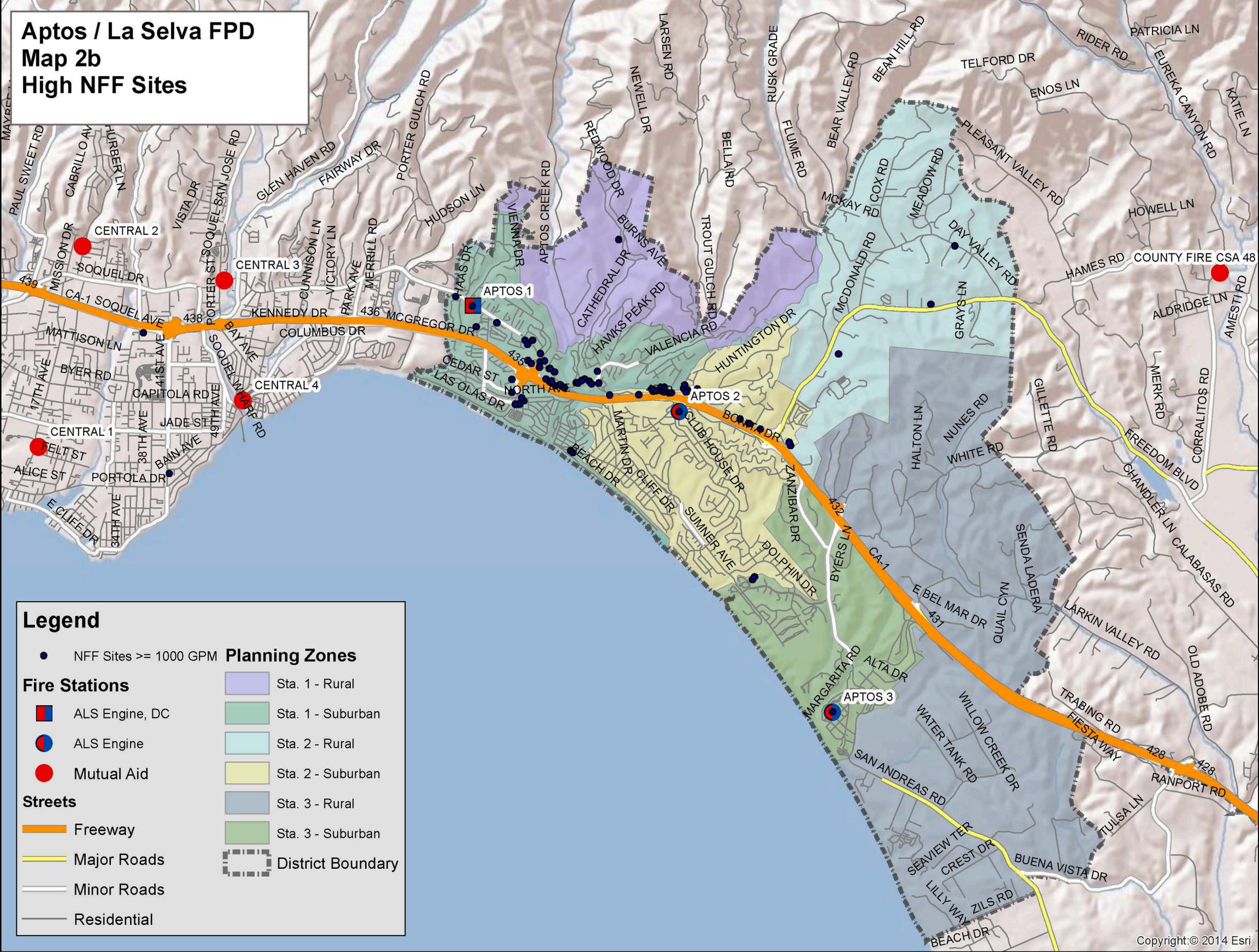
### Critical Facilities



# Aptos / La Selva FPD

## Map 2b

### High NFF Sites



### Legend

- NFF Sites  $\geq$  1000 GPM
- ALS Engine, DC
- ALS Engine
- Mutual Aid
- Freeway
- Major Roads
- Minor Roads
- Residential

### Planning Zones

- Sta. 1 - Rural
- Sta. 1 - Suburban
- Sta. 2 - Rural
- Sta. 2 - Suburban
- Sta. 3 - Rural
- Sta. 3 - Suburban
- District Boundary

# Aptos / La Selva FPD Map 2c Population Density

## Block Groups

## Legend

### Population Density

TOTPOP\_CY / SQMILES

90.92 - 500

501 - 1000

1001 - 2500

2501 - 5000

5001 - 8388

### Streets

Freeway

Major Roads

Minor Roads

Residential

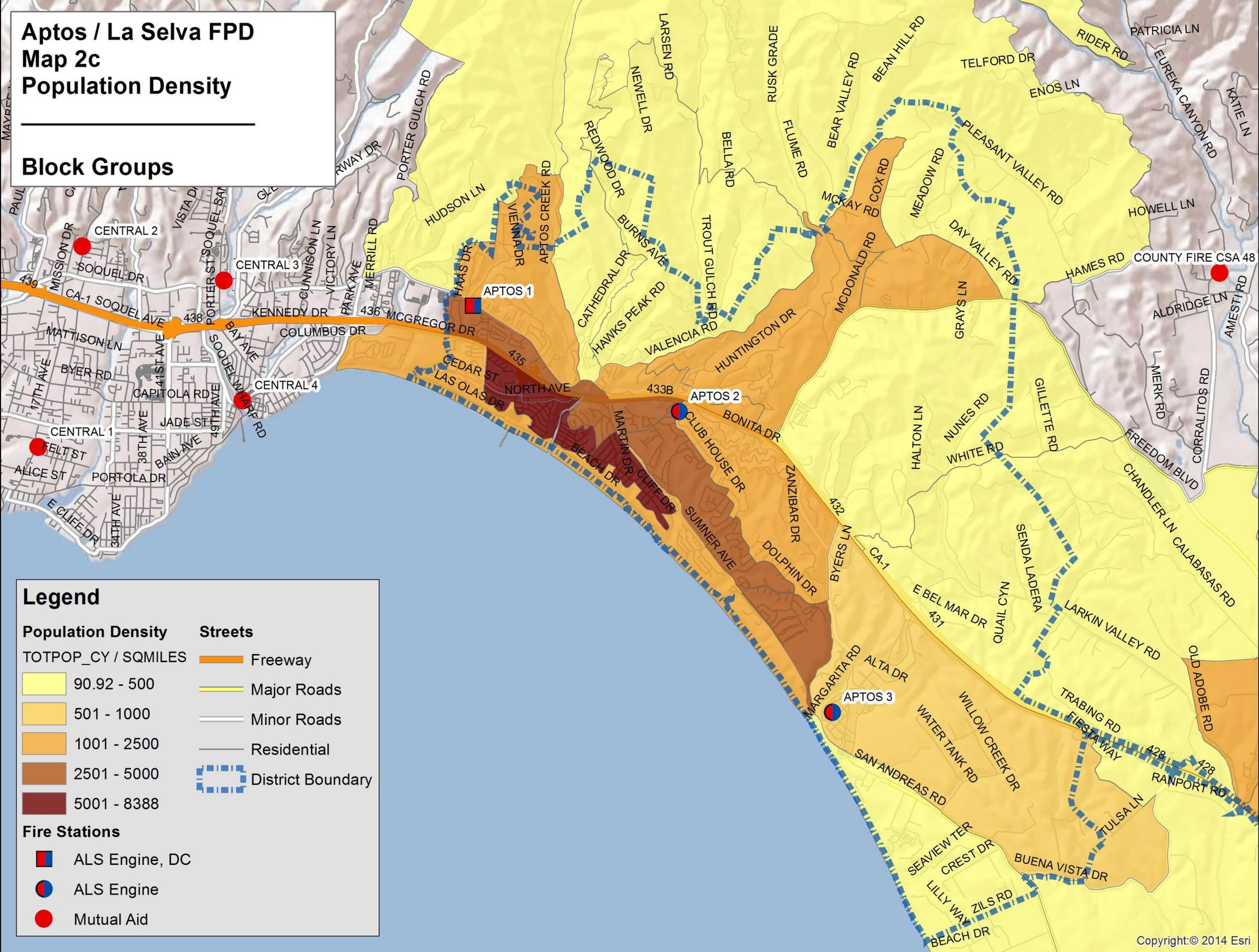
District Boundary

### Fire Stations

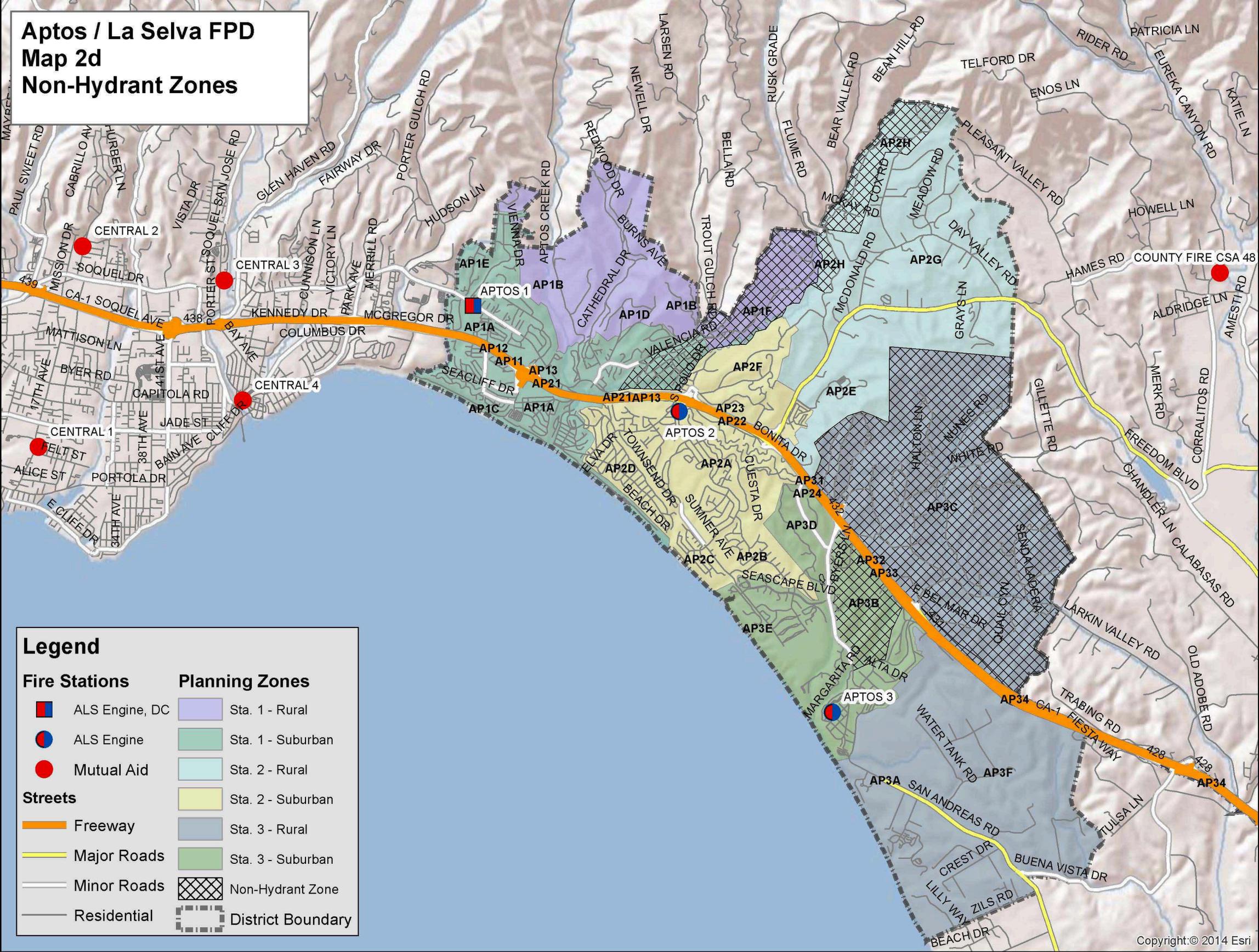
ALS Engine, DC

ALS Engine

Mutual Aid



# Aptos / La Selva FPD Map 2d Non-Hydrant Zones



## Legend

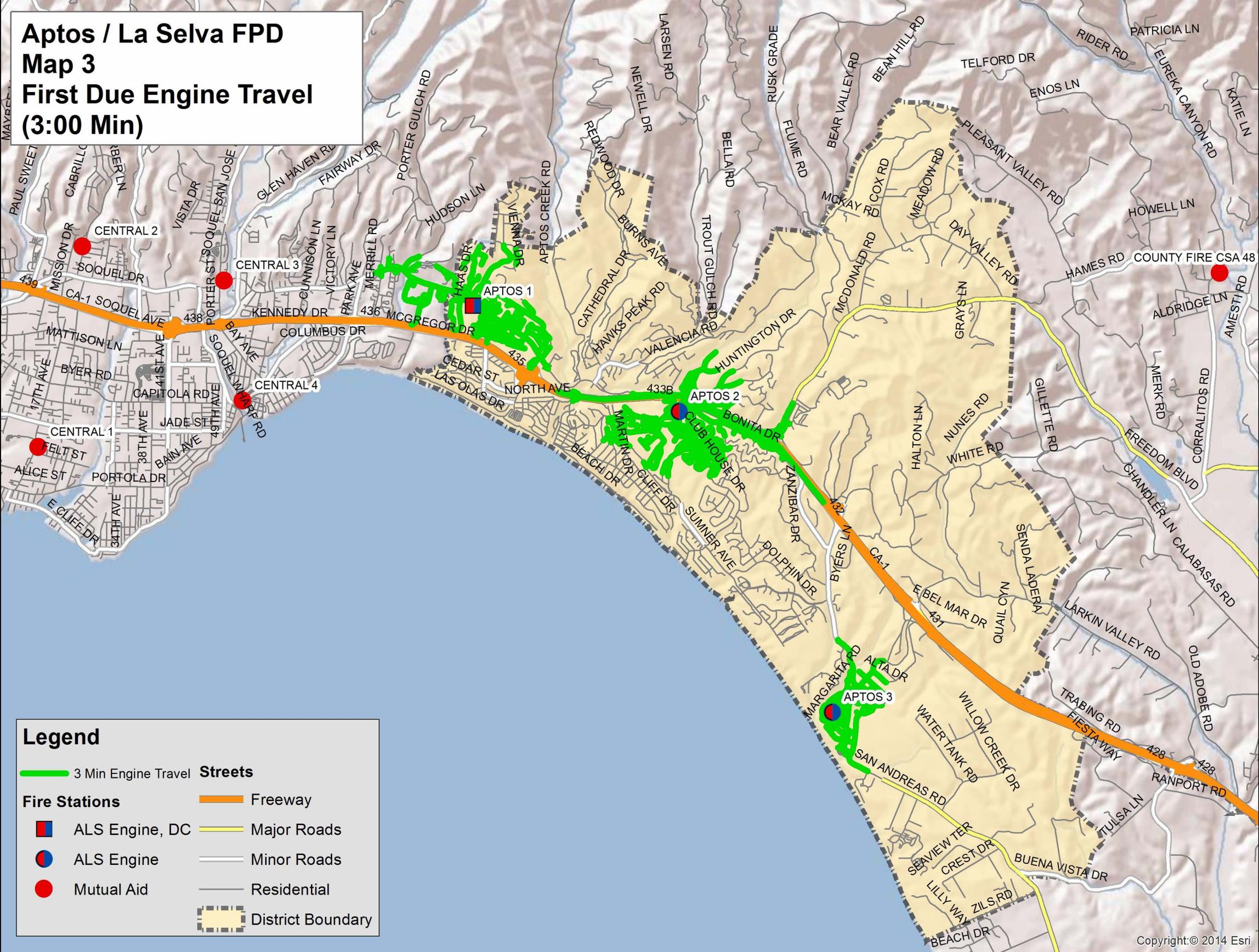
Fire Stations	Planning Zones
ALS Engine, DC	Sta. 1 - Rural
ALS Engine	Sta. 1 - Suburban
Mutual Aid	Sta. 2 - Rural
<b>Streets</b>	Sta. 2 - Suburban
Freeway	Sta. 3 - Rural
Major Roads	Sta. 3 - Suburban
Minor Roads	Non-Hydrant Zone
Residential	District Boundary

# Aptos / La Selva FPD

## Map 3

### First Due Engine Travel

(3:00 Min)



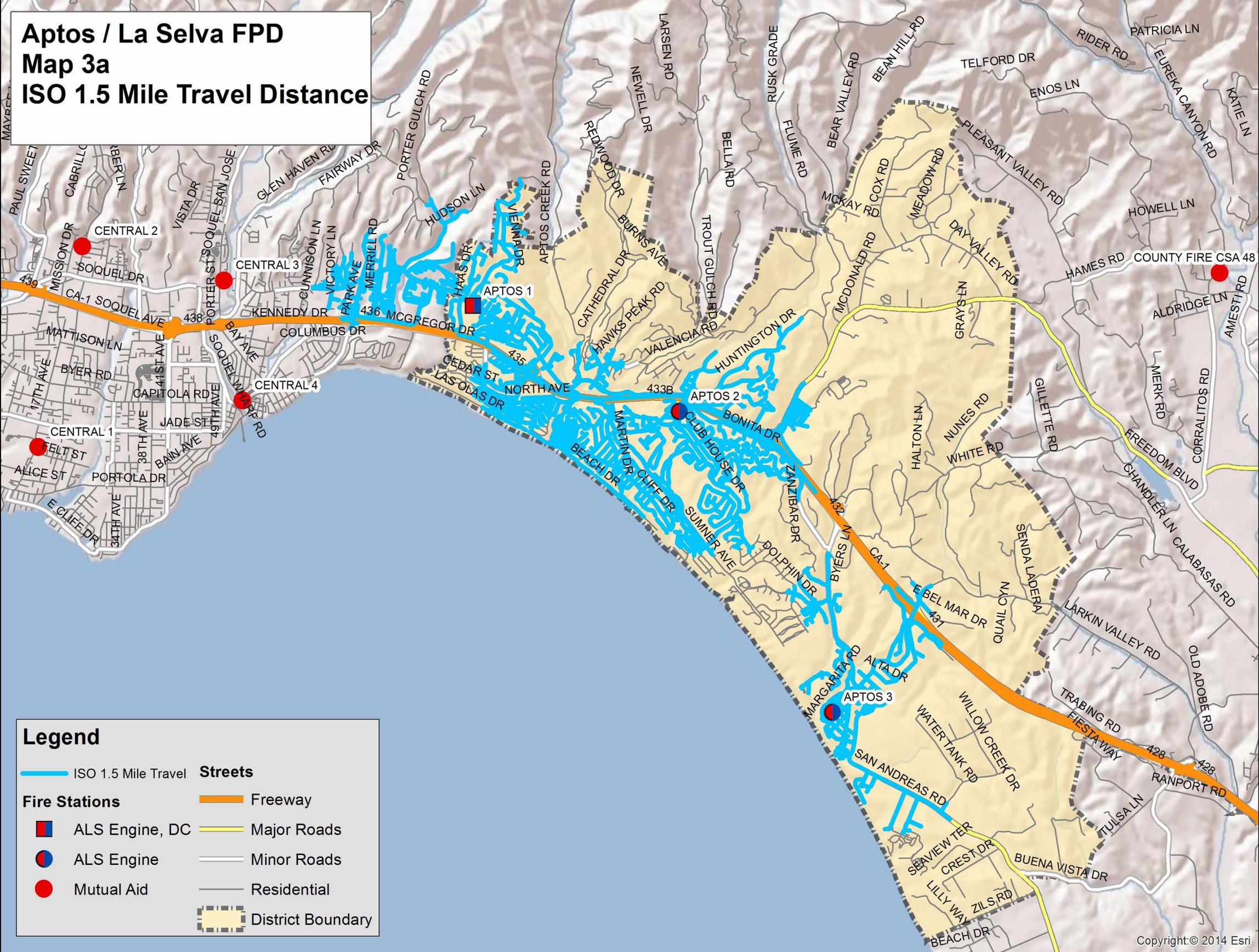
### Legend

	3 Min Engine Travel	<b>Streets</b>	
	ALS Engine, DC		Freeway
	ALS Engine		Major Roads
	Mutual Aid		Minor Roads
			Residential
			District Boundary

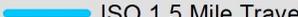
# Aptos / La Selva FPD

## Map 3a

### ISO 1.5 Mile Travel Distance

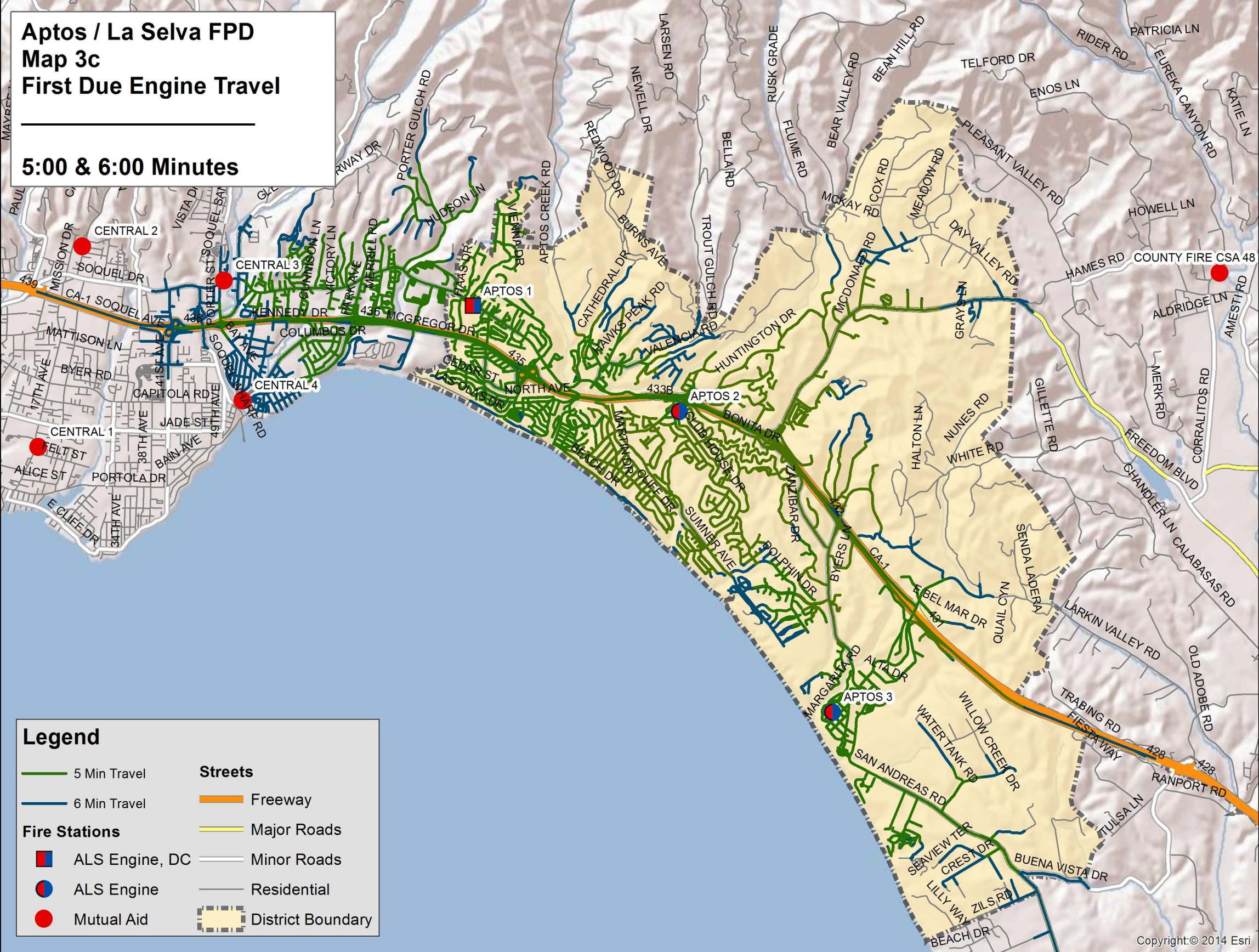


### Legend

	ISO 1.5 Mile Travel	<b>Streets</b>	
	ALS Engine, DC		Freeway
	ALS Engine		Major Roads
	Mutual Aid		Minor Roads
			Residential
			District Boundary

# Aptos / La Selva FPD Map 3c First Due Engine Travel

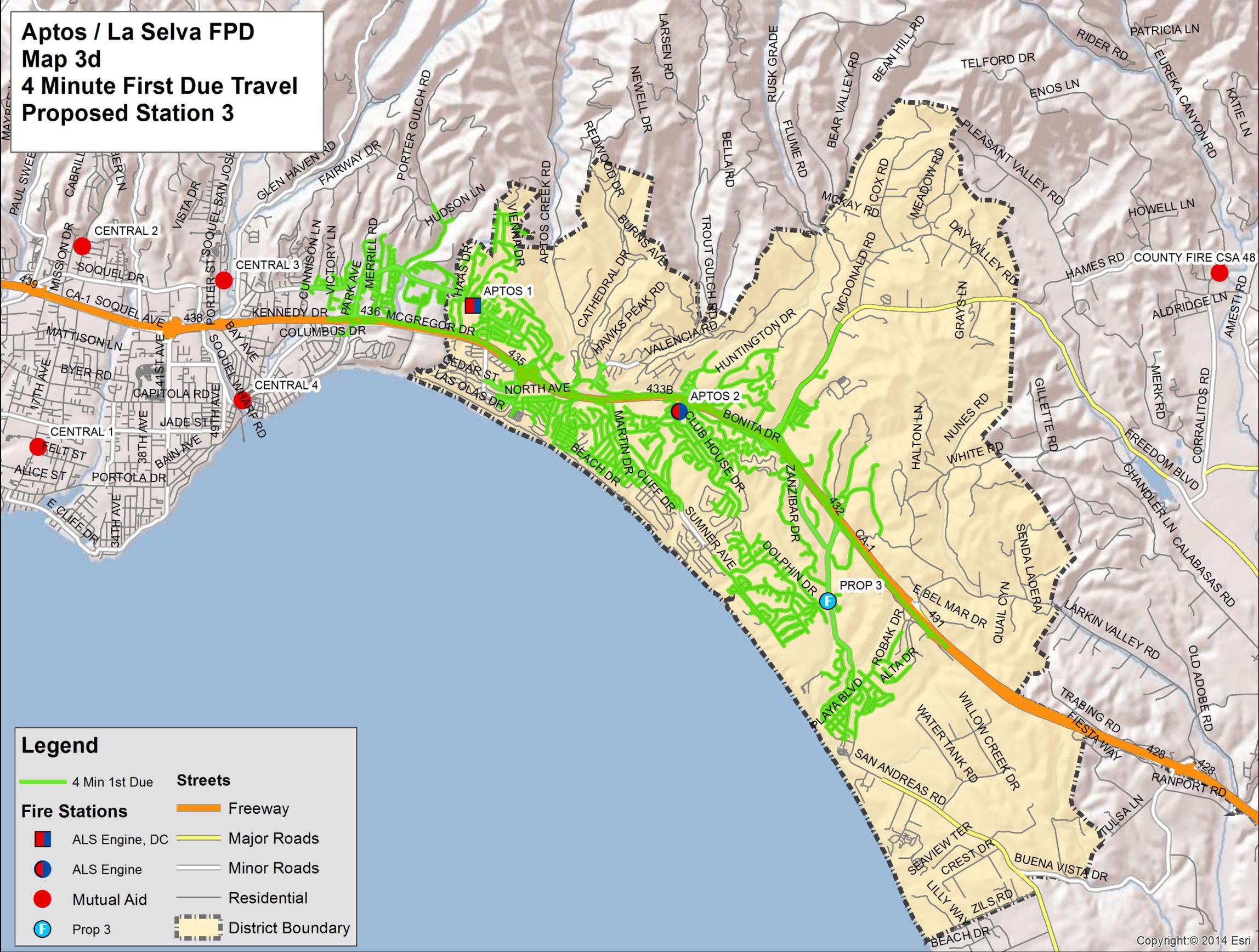
5:00 & 6:00 Minutes



**Legend**

	5 Min Travel	<b>Streets</b>		Freeway
	6 Min Travel		Major Roads	
<b>Fire Stations</b>			Minor Roads	
	ALS Engine, DC		Residential	
	ALS Engine		District Boundary	
	Mutual Aid			

**Aptos / La Selva FPD**  
**Map 3d**  
**4 Minute First Due Travel**  
**Proposed Station 3**

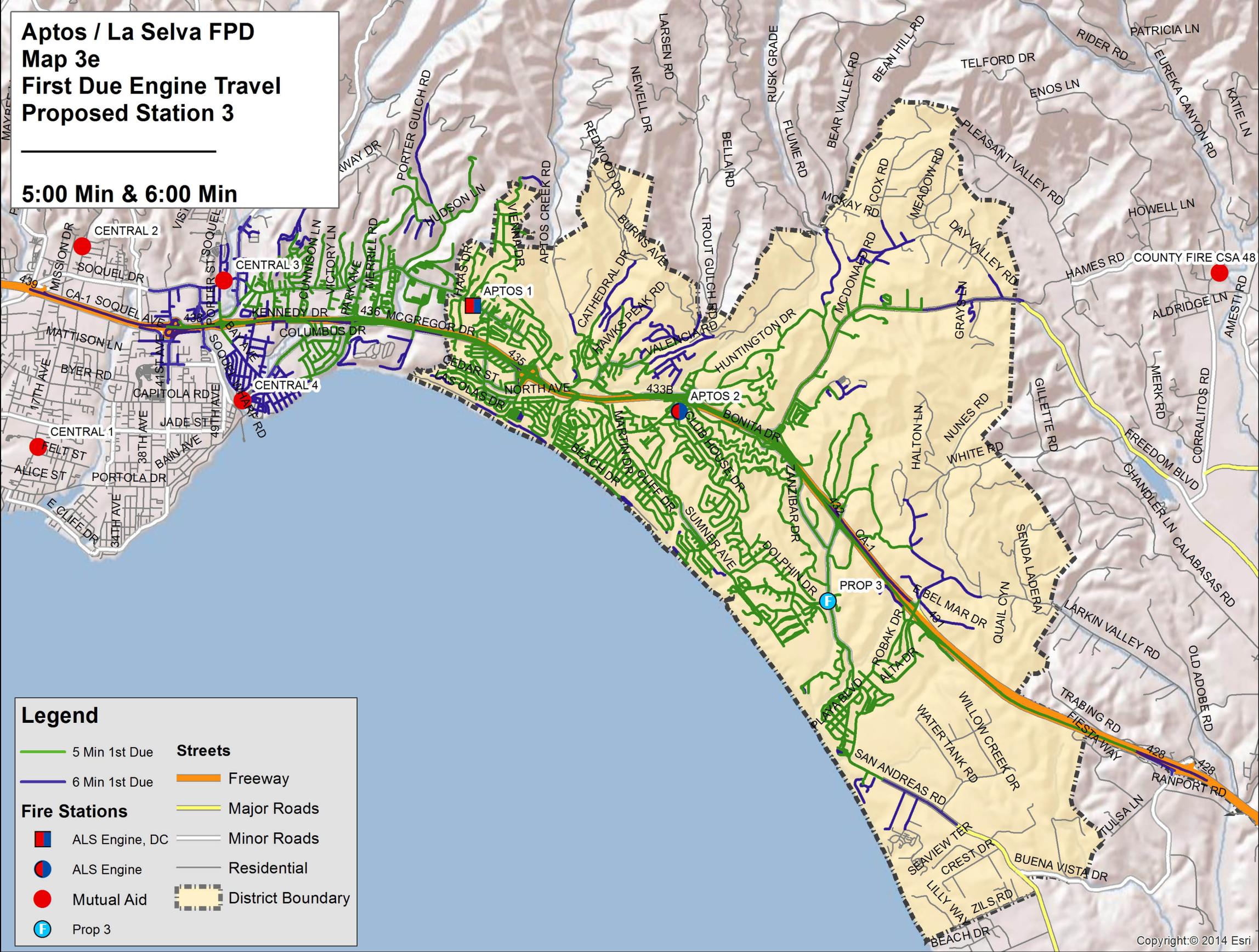


**Legend**

	4 Min 1st Due	<b>Streets</b>	
	ALS Engine, DC		Freeway
	ALS Engine		Major Roads
	Mutual Aid		Minor Roads
	Prop 3		Residential
			District Boundary

# Aptos / La Selva FPD Map 3e First Due Engine Travel Proposed Station 3

5:00 Min & 6:00 Min

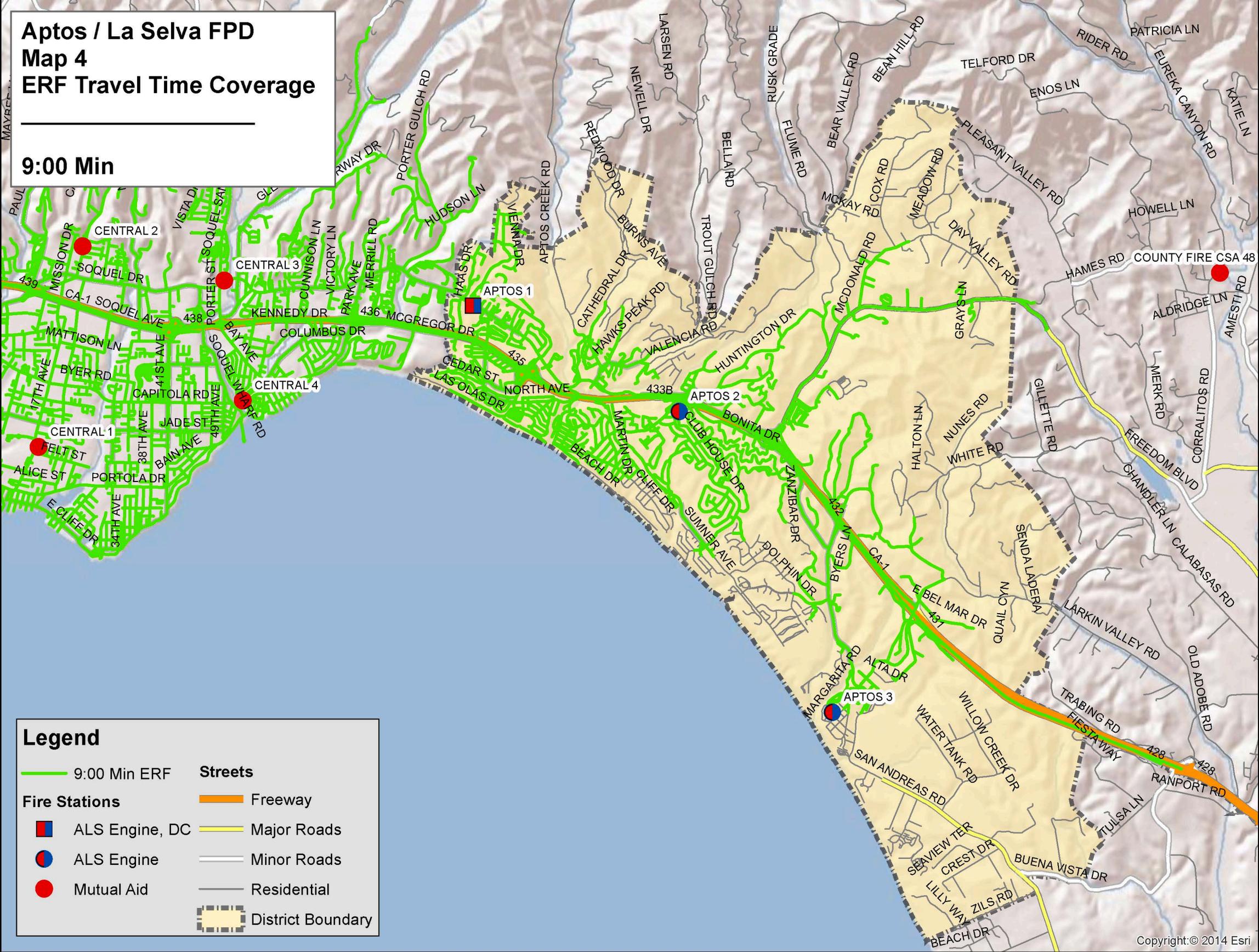


## Legend

- |  |                |                |                   |
|--|----------------|----------------|-------------------|
|  | 5 Min 1st Due  | <b>Streets</b> |                   |
|  | 6 Min 1st Due  |                | Freeway           |
|  | ALS Engine, DC |                | Major Roads       |
|  | ALS Engine     |                | Minor Roads       |
|  | Mutual Aid     |                | Residential       |
|  | Prop 3         |                | District Boundary |

# Aptos / La Selva FPD Map 4 ERF Travel Time Coverage

9:00 Min

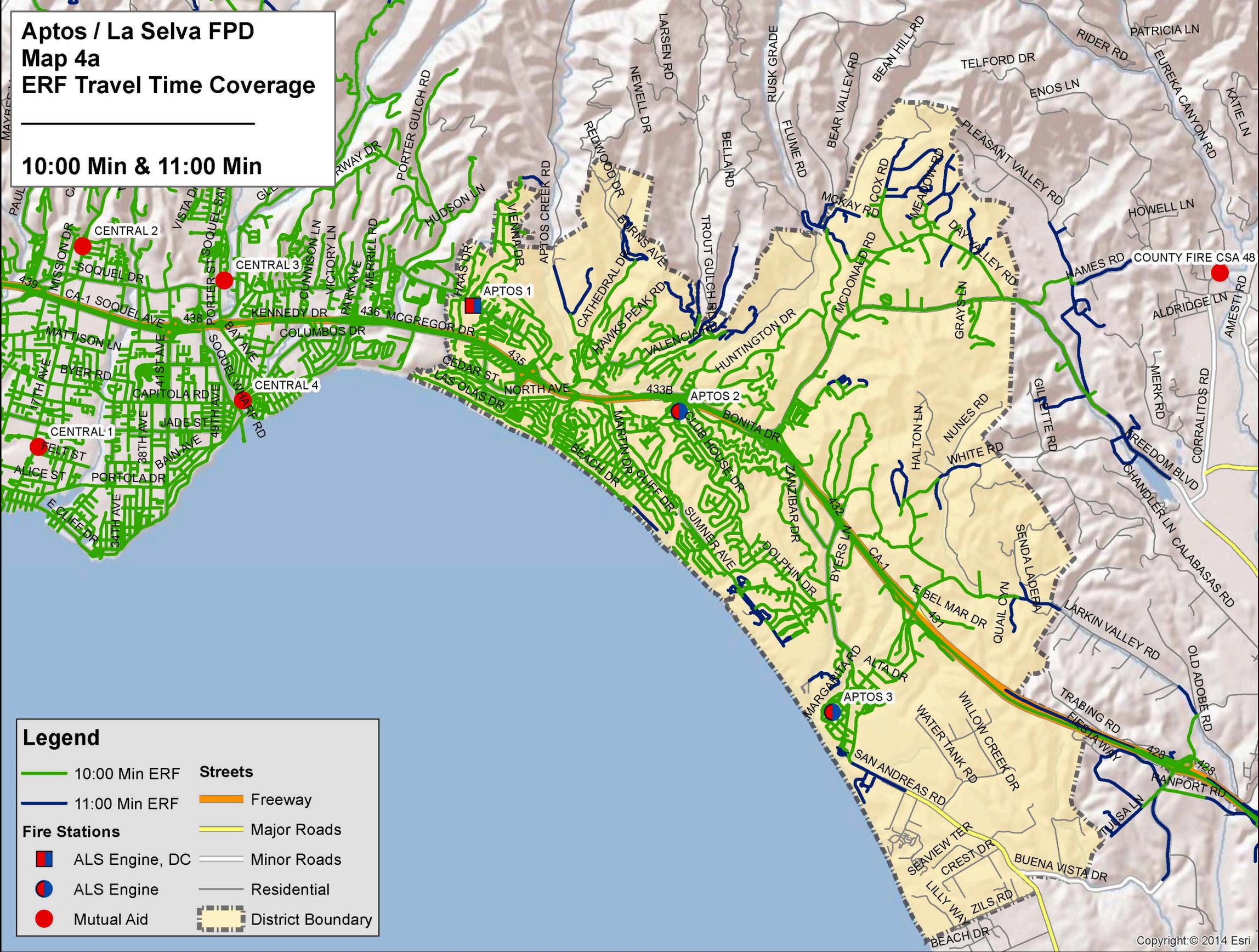


## Legend

- |   |   |
|---|---|
|  9:00 Min ERF   | <b>Streets</b>  |
|  ALS Engine, DC |  Freeway           |
|  ALS Engine     |  Major Roads       |
|  Mutual Aid     |  Minor Roads       |
|   |  Residential       |
|   |  District Boundary |

# Aptos / La Selva FPD Map 4a ERF Travel Time Coverage

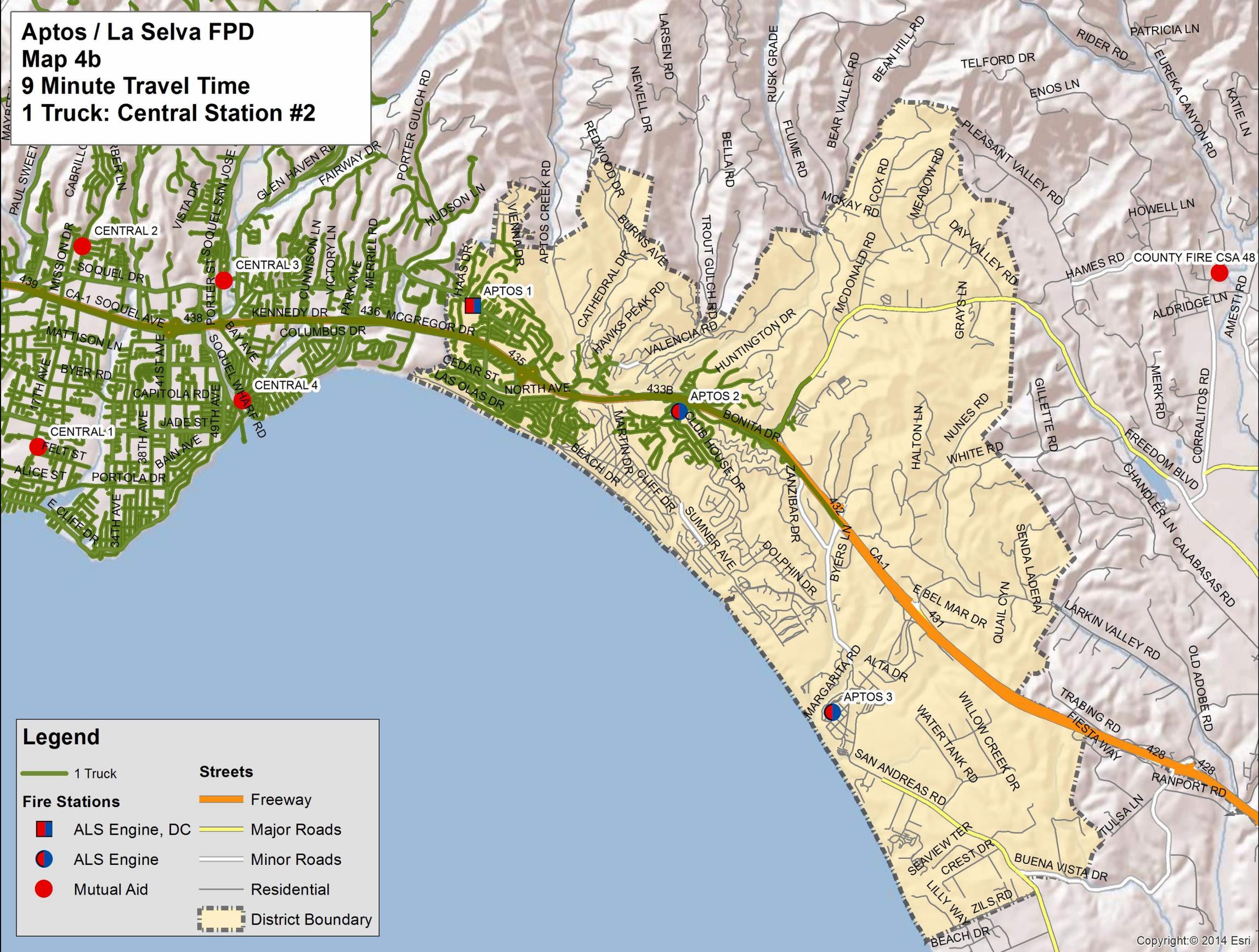
10:00 Min & 11:00 Min



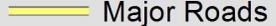
## Legend

- |                      |                |                |                   |
|----------------------|----------------|----------------|-------------------|
|                      | 10:00 Min ERF  | <b>Streets</b> |                   |
|                      | 11:00 Min ERF  |                | Freeway           |
| <b>Fire Stations</b> |                | Major Roads    |                   |
|                      | ALS Engine, DC |                | Minor Roads       |
|                      | ALS Engine     |                | Residential       |
|                      | Mutual Aid     |                | District Boundary |

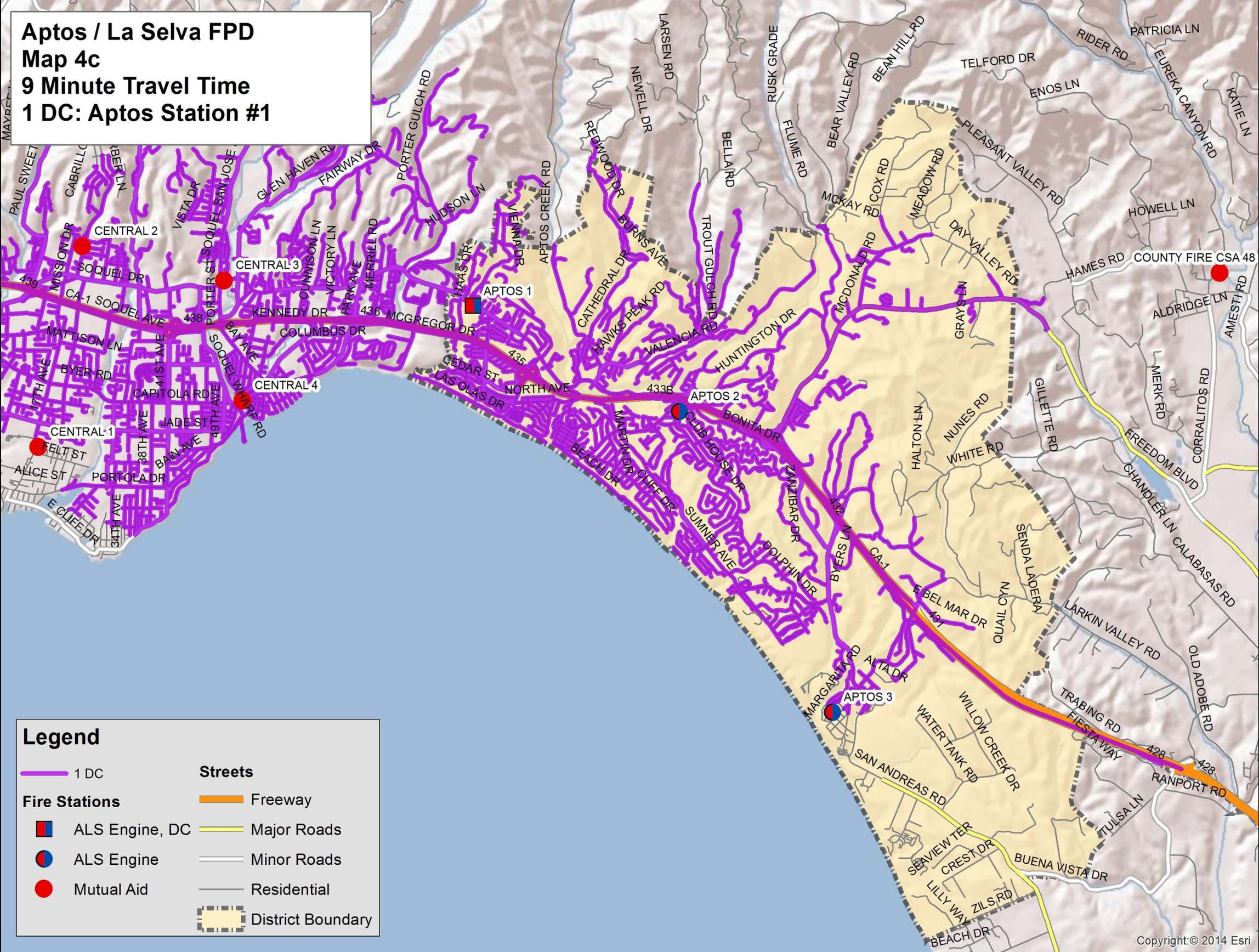
**Aptos / La Selva FPD**  
**Map 4b**  
**9 Minute Travel Time**  
**1 Truck: Central Station #2**



**Legend**

 1 Truck	<b>Streets</b>
 ALS Engine, DC	 Freeway
 ALS Engine	 Major Roads
 Mutual Aid	 Minor Roads
	 Residential
	 District Boundary

**Aptos / La Selva FPD**  
**Map 4c**  
**9 Minute Travel Time**  
**1 DC: Aptos Station #1**

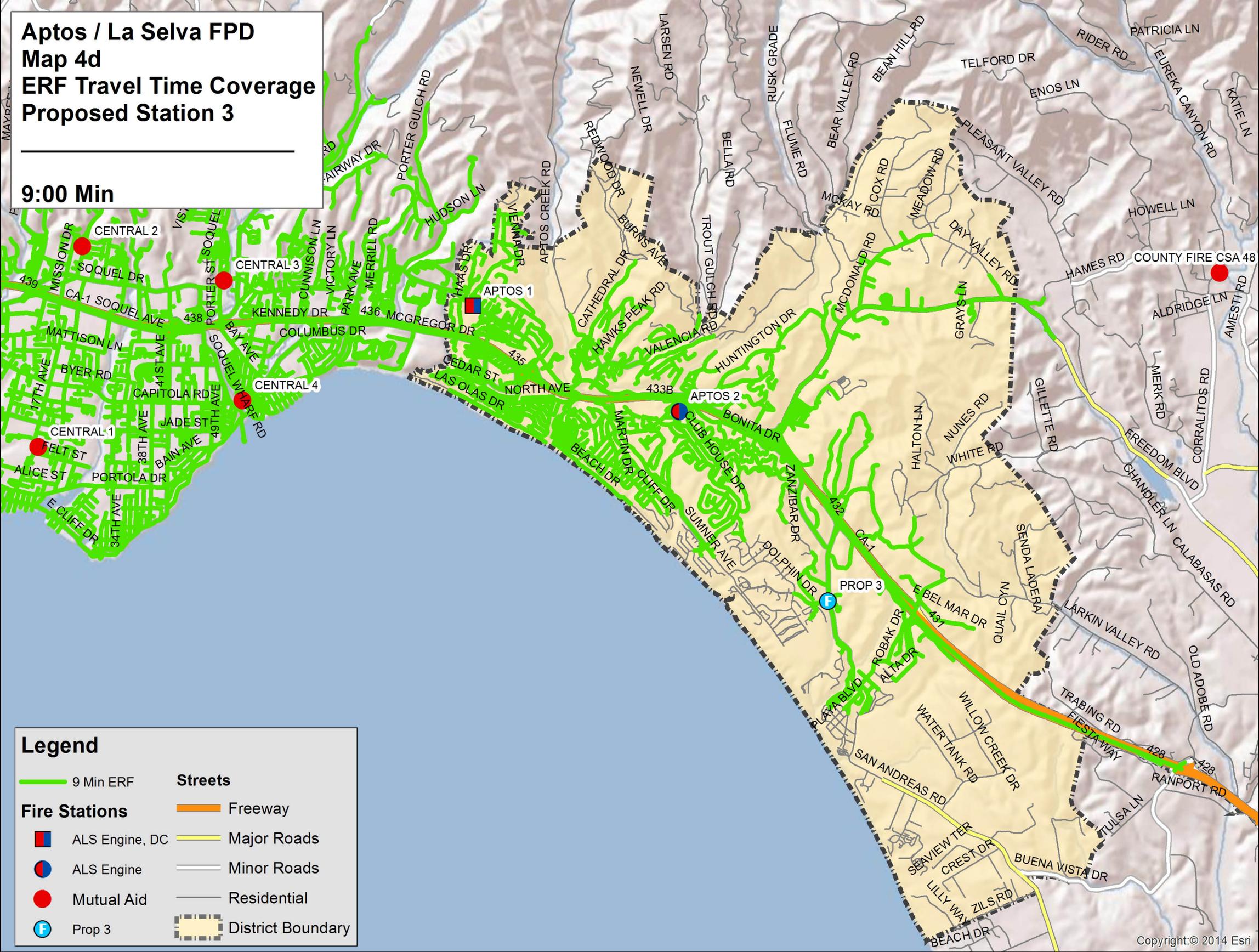


**Legend**

	1 DC	<b>Streets</b>		Freeway
	ALS Engine, DC		Major Roads	
	ALS Engine		Minor Roads	
	Mutual Aid		Residential	
			District Boundary	

**Aptos / La Selva FPD**  
**Map 4d**  
**ERF Travel Time Coverage**  
**Proposed Station 3**

**9:00 Min**



**Legend**

9 Min ERF

**Streets**

**Fire Stations**

Freeway

ALS Engine, DC

Major Roads

ALS Engine

Minor Roads

Mutual Aid

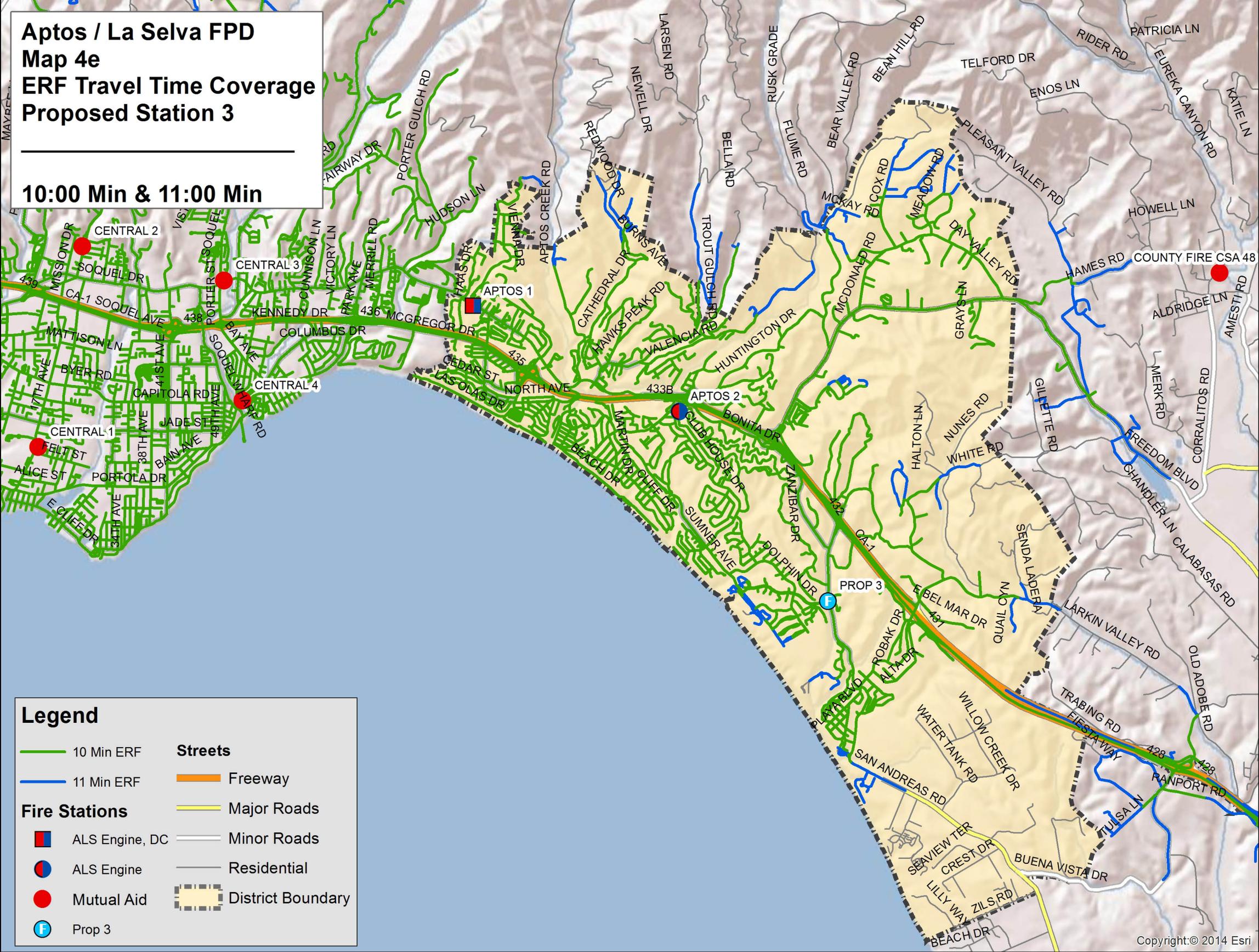
Residential

Prop 3

District Boundary

**Aptos / La Selva FPD**  
**Map 4e**  
**ERF Travel Time Coverage**  
**Proposed Station 3**

**10:00 Min & 11:00 Min**

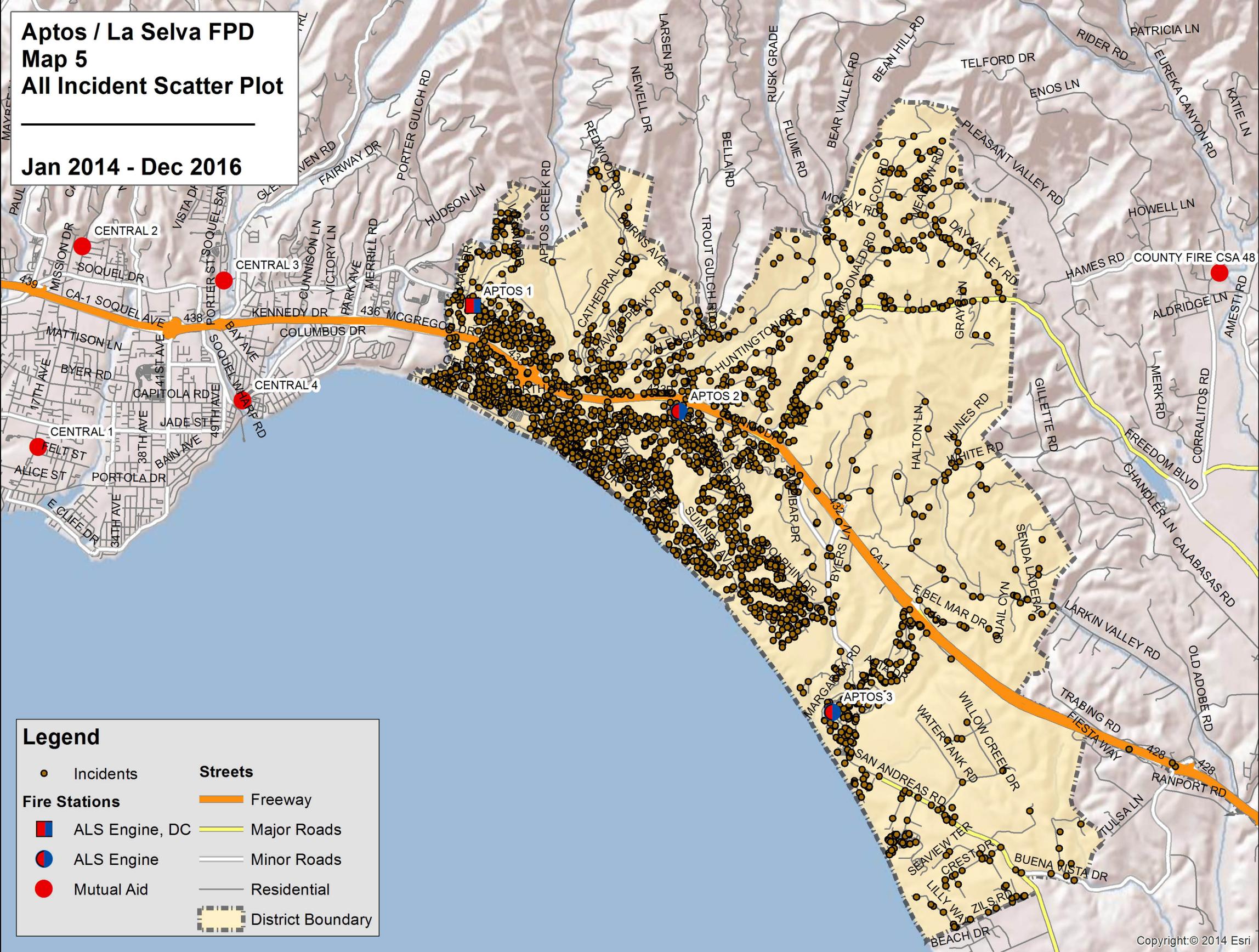


**Legend**

 10 Min ERF	<b>Streets</b>
 11 Min ERF	 Freeway
<b>Fire Stations</b>	 Major Roads
 ALS Engine, DC	 Minor Roads
 ALS Engine	 Residential
 Mutual Aid	 District Boundary
 Prop 3	

# Aptos / La Selva FPD Map 5 All Incident Scatter Plot

Jan 2014 - Dec 2016



**Legend**

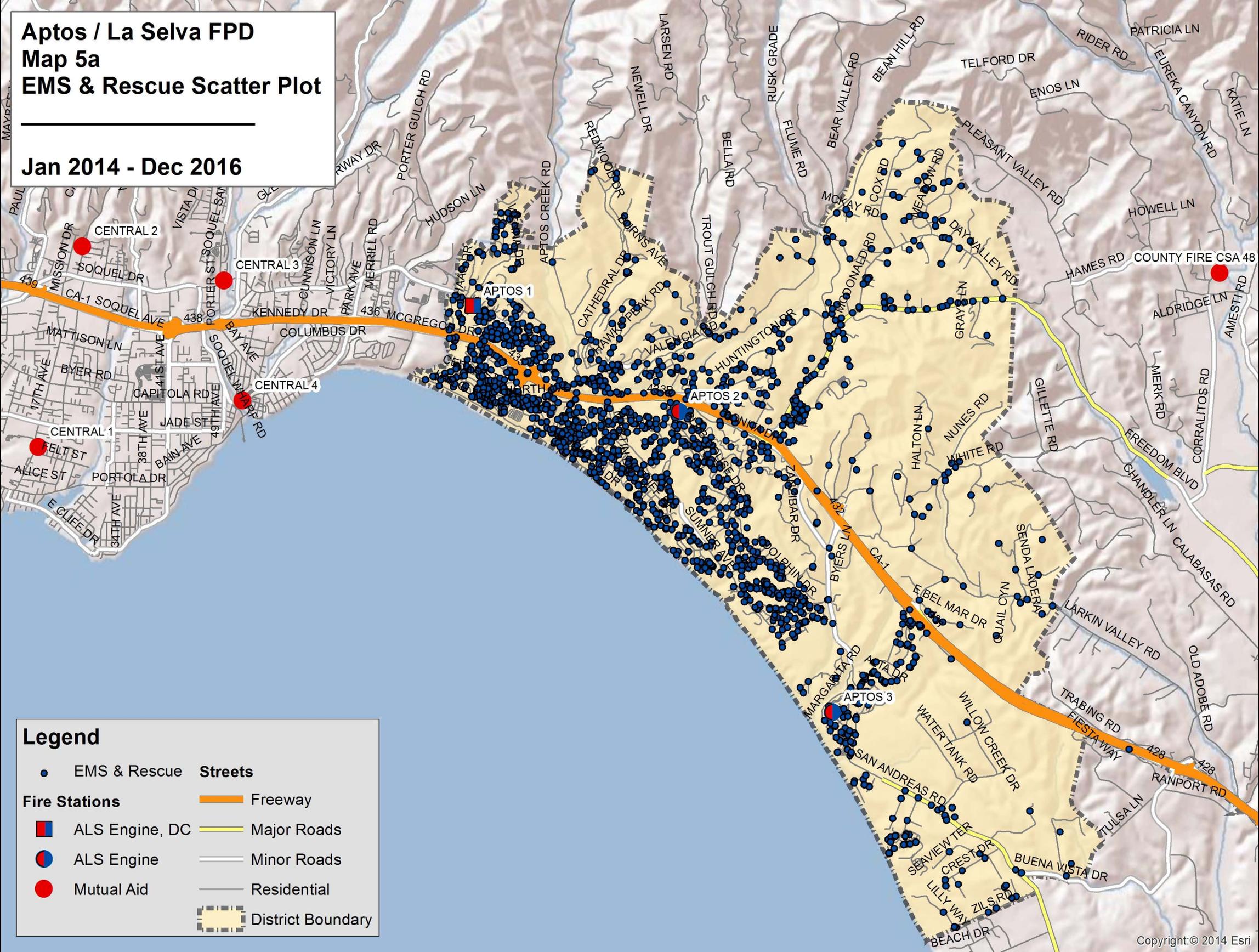
● Incidents	<b>Streets</b>
<b>Fire Stations</b>	— Freeway
■ ALS Engine, DC	— Major Roads
● ALS Engine	— Minor Roads
● Mutual Aid	— Residential
	⬡ District Boundary

# Aptos / La Selva FPD

## Map 5a

### EMS & Rescue Scatter Plot

Jan 2014 - Dec 2016

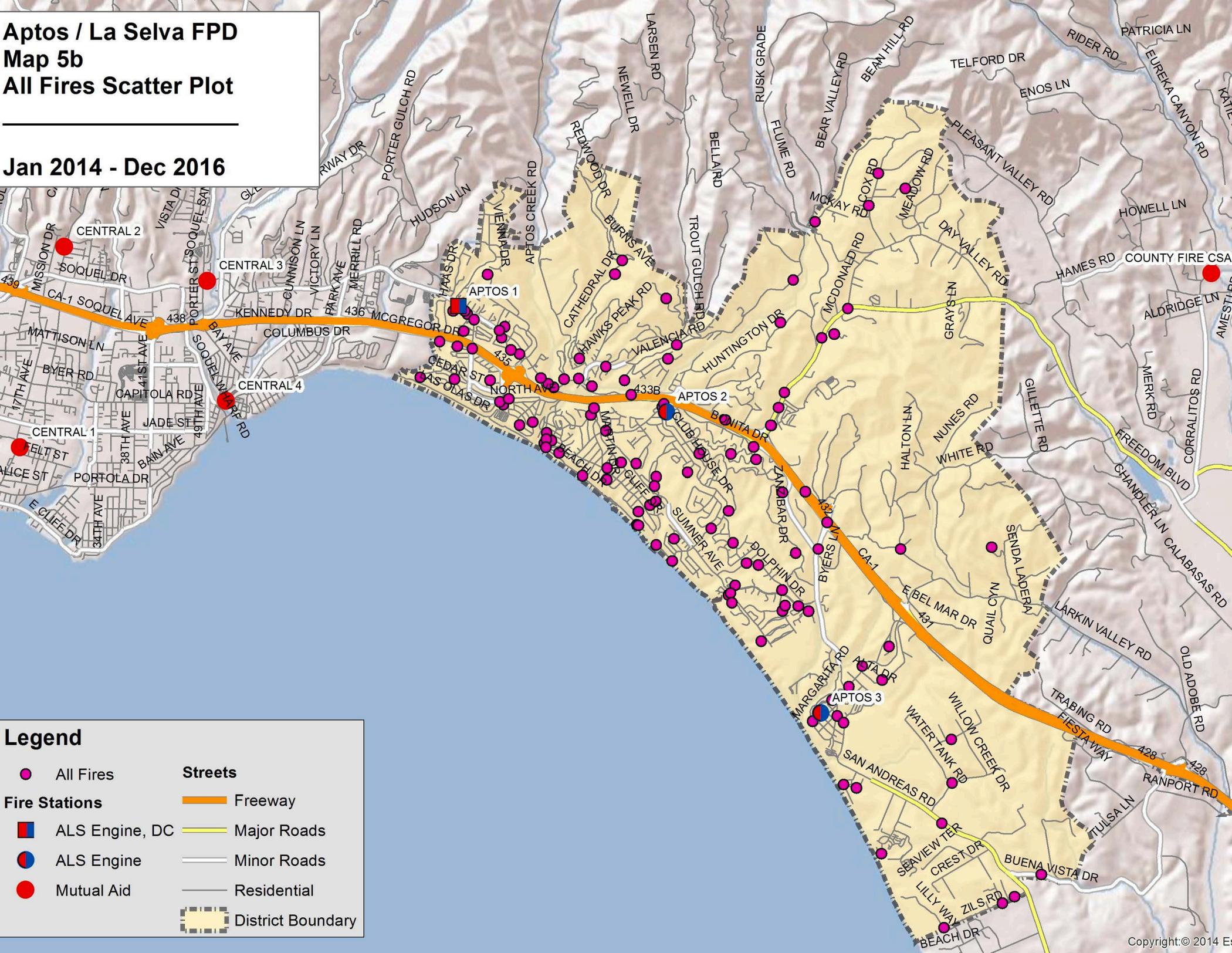


**Legend**

● EMS & Rescue	<b>Streets</b>
■ ALS Engine, DC	— Freeway
● ALS Engine	— Major Roads
● Mutual Aid	— Minor Roads
	— Residential
	⊞ District Boundary

# Aptos / La Selva FPD Map 5b All Fires Scatter Plot

Jan 2014 - Dec 2016

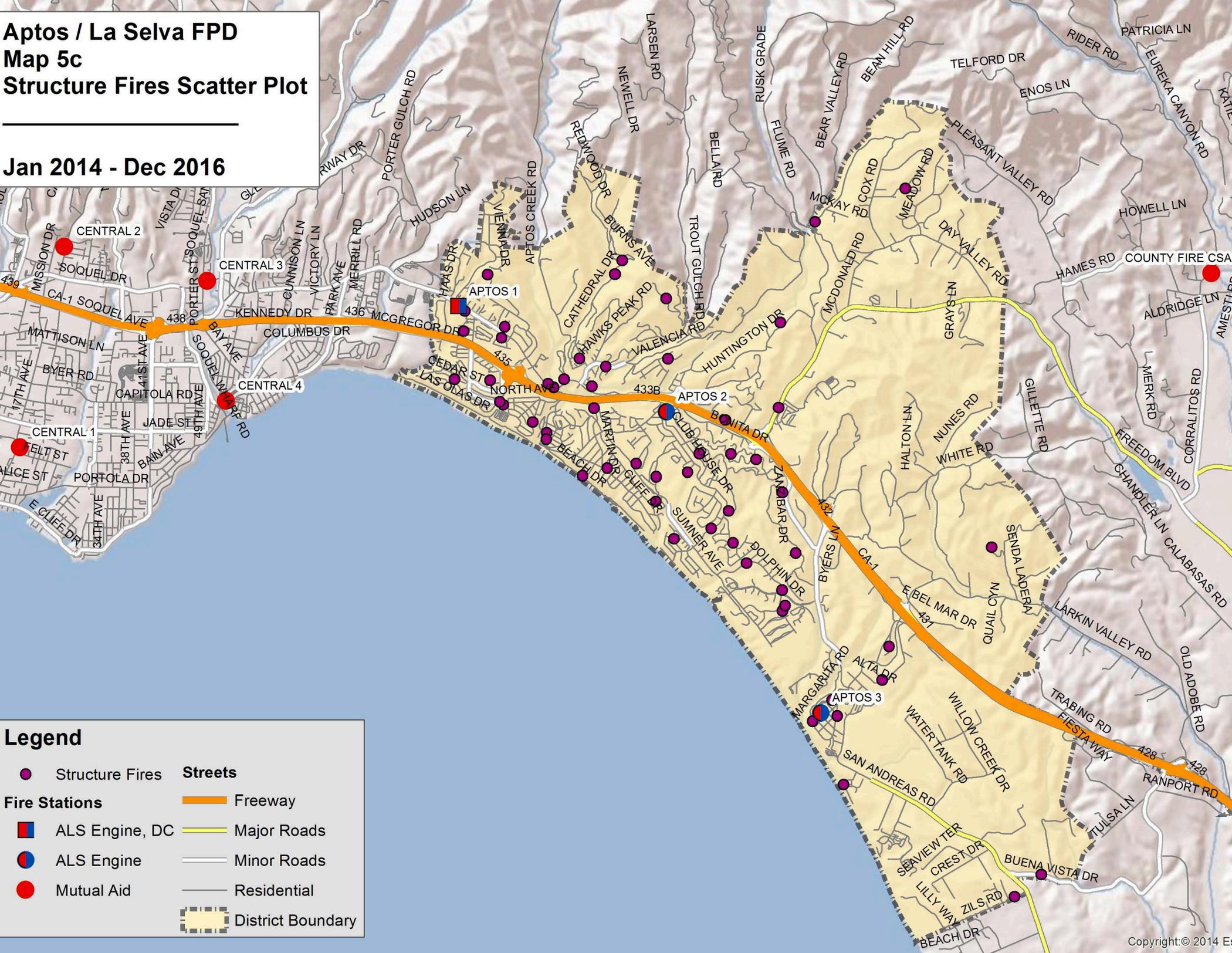


### Legend

<span style="color: pink;">●</span> All Fires	<b>Streets</b>
<span style="color: blue;">■</span> ALS Engine, DC	<span style="border-bottom: 2px solid orange; width: 20px; display: inline-block;"></span> Freeway
<span style="color: blue;">●</span> ALS Engine	<span style="border-bottom: 2px solid yellow; width: 20px; display: inline-block;"></span> Major Roads
<span style="color: red;">●</span> Mutual Aid	<span style="border-bottom: 1px solid gray; width: 20px; display: inline-block;"></span> Minor Roads
	<span style="border-bottom: 1px solid gray; width: 20px; display: inline-block;"></span> Residential
	<span style="border: 1px dashed gray; width: 20px; height: 10px; display: inline-block;"></span> District Boundary

# Aptos / La Selva FPD Map 5c Structure Fires Scatter Plot

Jan 2014 - Dec 2016

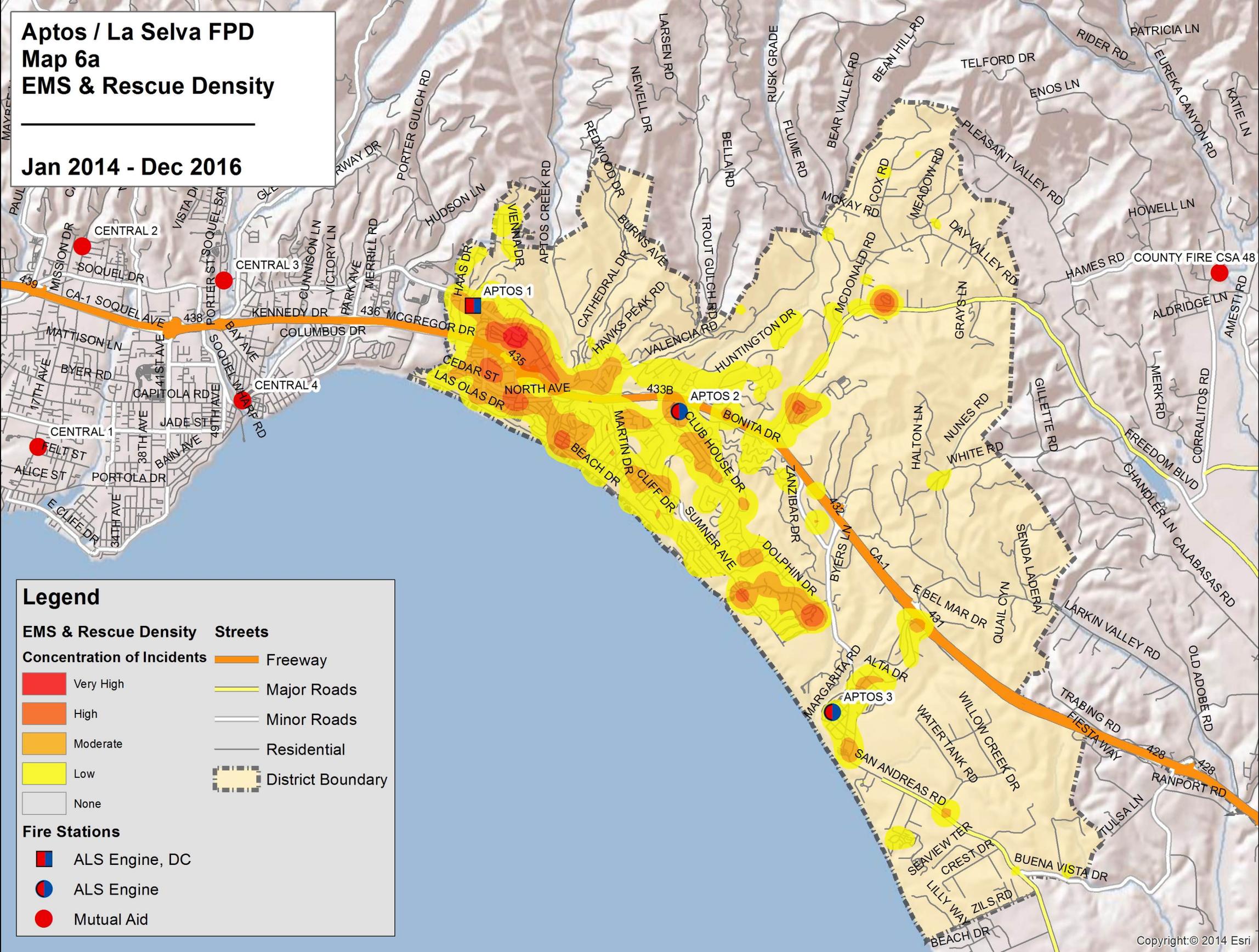


### Legend

Structure Fires	<b>Streets</b>
<b>Fire Stations</b>	Freeway
ALS Engine, DC	Major Roads
ALS Engine	Minor Roads
Mutual Aid	Residential
	District Boundary

# Aptos / La Selva FPD Map 6a EMS & Rescue Density

Jan 2014 - Dec 2016



## Legend

### EMS & Rescue Density

#### Concentration of Incidents

- Very High
- High
- Moderate
- Low
- None

### Streets

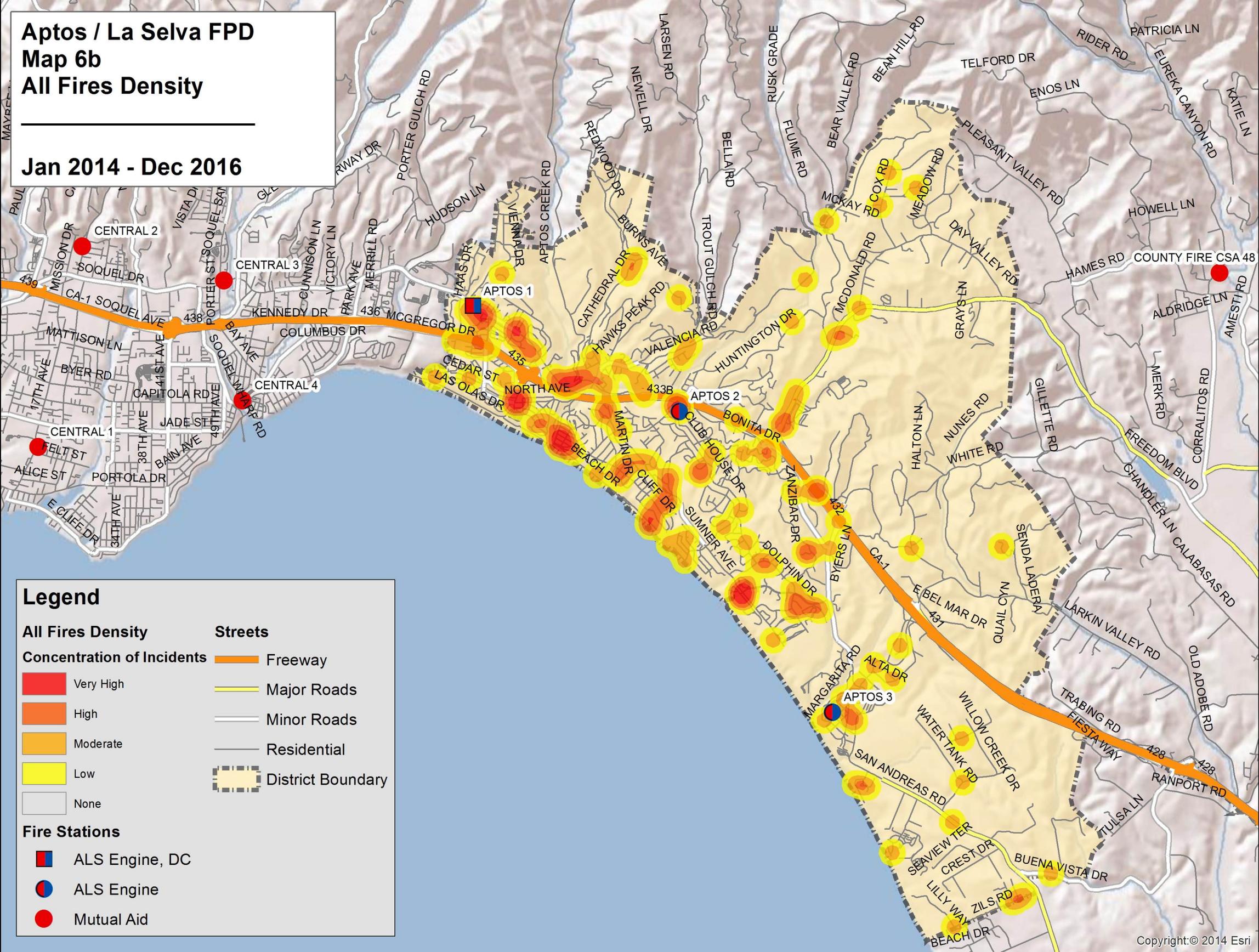
- Freeway
- Major Roads
- Minor Roads
- Residential
- District Boundary

### Fire Stations

- ALS Engine, DC
- ALS Engine
- Mutual Aid

# Aptos / La Selva FPD Map 6b All Fires Density

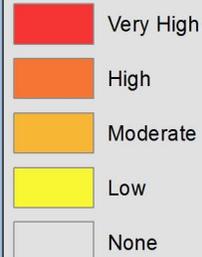
Jan 2014 - Dec 2016



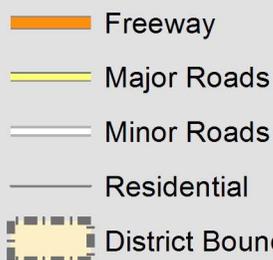
## Legend

### All Fires Density

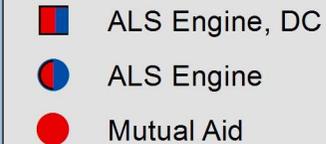
#### Concentration of Incidents



### Streets

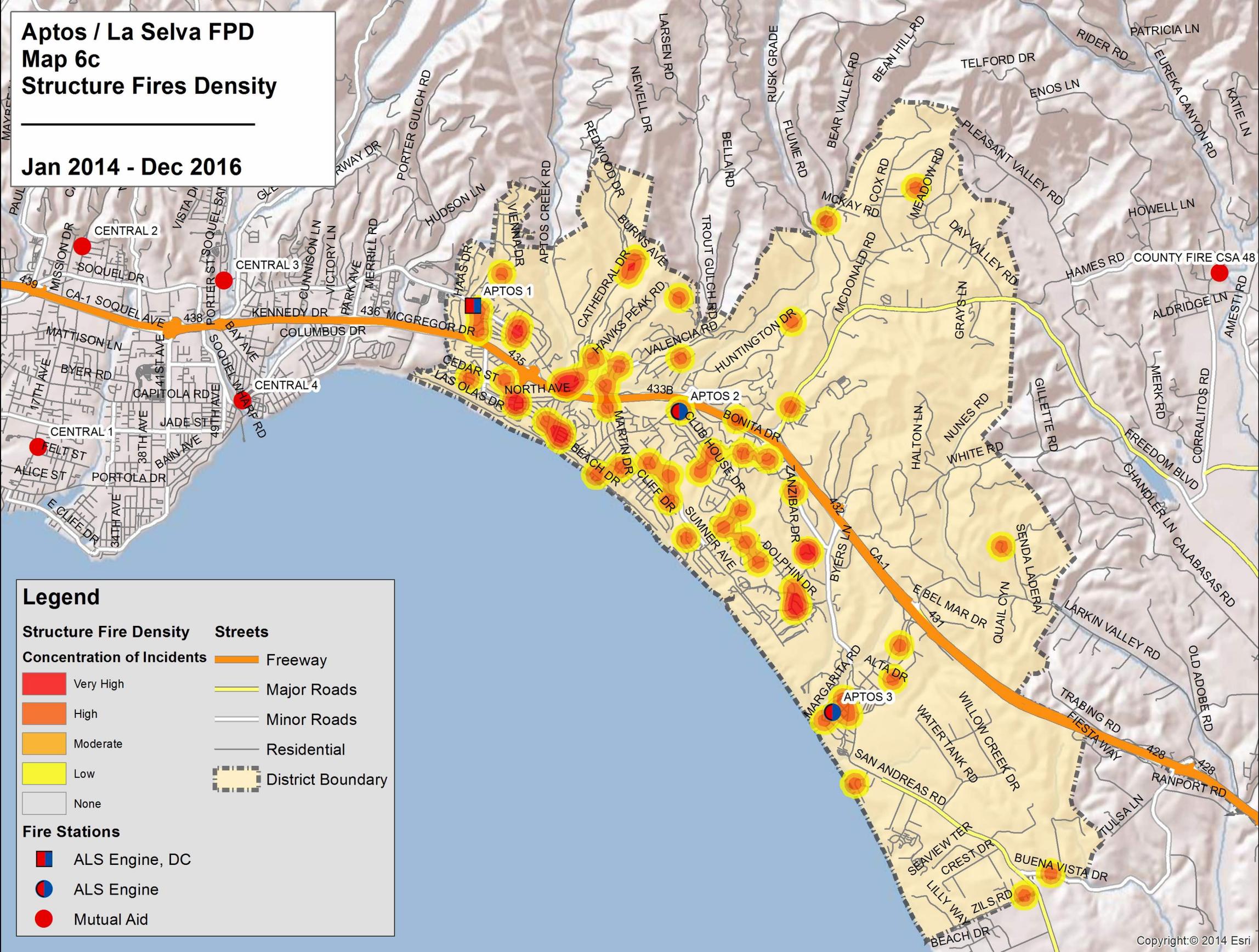


### Fire Stations



# Aptos / La Selva FPD Map 6c Structure Fires Density

Jan 2014 - Dec 2016



## Legend

### Structure Fire Density

#### Concentration of Incidents

- Very High
- High
- Moderate
- Low
- None

### Streets

- Freeway
- Major Roads
- Minor Roads
- Residential
- District Boundary

### Fire Stations

- ALS Engine, DC
- ALS Engine
- Mutual Aid