EL SEGUNDO FIRE DEPARTMENT

COMMUNITY RISK ASSESSMENT/ STANDARDS OF COVER

Facilitated by

CPSE Center for Public Safety Excellence

Introduction

The goal of the El Segundo Fire Department (ESFD) has always been to provide premier customer service to the residents and stakeholders within the community. ESFD is consistently working to achieve and/or maintain the highest level of professionalism and efficiency on behalf of those it serves. Thus, it contracted with the Center for Public Safety and Excellence (CPSE) to facilitate a method to document the department's path into the future.

To accomplish this, the organization analyzes how it provides service to the community.

This Community Risk Assessment/Standards of Cover (CRA/SOC) is a comprehensive study that analyzes the risks facing the City of El Segundo and the services provided by the ESFD concerning risk management. It is the responsibility of the ESFD to provide the community and policymakers with an educated assessment of the risk levels within the community and operational capabilities related to risk response, mitigation, and expected outcomes. It is ESFD's goal to utilize factual data to transparently document the effectiveness of its performance. This supportive data will serve as an informational aide to assist policymakers in making informed decisions about fire department services.

The CRA-SOC is one of three foundational documents required for International Accreditation through the Center for Public Safety Excellence (CPSE) and Commission on Fire Accreditation International (CFAI). The CRA/SOC is a living document that will be utilized in conjunction with the five-year ESFD Strategic Plan and the ESFD Self-Assessment Manual. These documents are a critical part of the department's continuous improvement process in today's "all-risk" fire service.

The City of El Segundo community has high demands regarding the services provided by its fire department. ESFD has utilized this CRA/SOC deployment analysis to demonstrate performance in meeting community expectations and, more importantly, identifying the gaps where improvement is needed.

The development of the CRA/SOC has identified areas to establish service-level goals. In developing those service goals, ESFD has utilized industry best practice standards, National Fire Protection Association (NFPA) 1710, CPSE and CFAI accreditation model, Insurance Services Office grading schedule, ESFD response time data, and community expectations.

El Segundo Fire Department

Fire Chief Deena Lee

Community Risk Assessment/Standards of Cover

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2022

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Introduction

The fire service has been ingrained for many decades in tradition but, due to technology moving faster and public opinion influencing government, the industry needs to pivot to be more community-minded and technology-driven. In response to the current climate, the City of El Segundo Fire Department, established in tradition, is embarking on the next phase within its history of the fire service, the accreditation process. According to the Commission on Fire Accreditation International (CFAI), accreditation is the process of agency self-assessment. The accreditation model has the department self-assess to align its services with its mission, goals and objectives, and procedural documents. This, in turn, will allow the department to evaluate and analyze its strengths, weaknesses, opportunities, and threats (SWOT) to create a strategic plan with key performance indicators so the department can be more data-driven and outcome-oriented. But more importantly, to serve as a process for continuous improvement for the fire department. With the evolution of public administration and the need to separate politics from administration, pursuing accreditation will also serve to hold the department in alignment with the pillars of public administration that include accountability, legitimacy, equity/fairness, representation, and efficiency/effectiveness.

The accreditation model that the department follows provides for these pillars through the various modules reviewed and documented in the process toward the goal of accreditation. According to the Center for Public Safety Excellence on accreditation, "Accredited agencies are often described as being community-focused, data-driven, outcome-focused, strategic-minded, well organized, properly equipped, and properly staffed and trained. Part of the reason for this is the holistic scope of the CFAI model. It includes 11 categories that cover the span of fire and emergency service operations:"

1. Governance and Administration
2. Assessment and Planning
3. Goals and Objectives
4. Financial Resources
5. Community Risk Reduction Programs
6. Physical Resources
7. Human Resources
8. Training and Competency
9. Essential Resources
10. External Systems Relationships
11. Health and Safety

Community and Agency Legal Basis

The City of El Segundo is a municipal corporation and general law city incorporated on January 20, 1917. On April 18, 1917, the City of El Segundo established through Resolution #3 the El Segundo Volunteer Fire Department, whose focus was to prevent and fight fires while protecting life and property. But, during a city council meeting on December 12, 1927, discussion ensued regarding a traffic accident that occurred on November 26, 1927, that required the transport of a patient to the General Hospital due to the injuries sustained in the accident. The city clerk and chief of police discussed and inquired with the council about their policy related to such circumstances. Council deferred to the city attorney for their input. The city attorney opined, "the city is justified in supplying such assistance as may appear necessary and proper in any emergency affecting the public peace, health, and safety." During this meeting, the council approved a resolution to provide "immediate surgical and/or medical attention and/or ambulance service, as in the discretion of said officials at said time, may seem reasonable and proper;" and authorized the purchase of an air mattress to equip a city vehicle as an emergency ambulance.

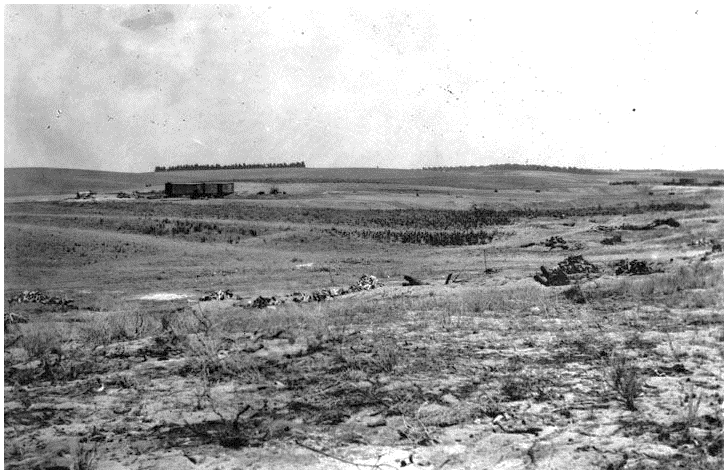
On November 12, 1930, the city council approved the repeal of Resolution #3. The volunteer fire department was disbanded to form an organized fire department under Resolution #239, and a fire chief was appointed for this new professional department. It was not until December 30, 1947 that fire department members were approved by council to apply for professional membership within the California State Firemen's Association, Inc., and for the fire chief to apply to the Pacific Coast Fire Chief's Association. Then on October 10, 1951, the fire prevention bureau was established when the council approved a fire engineer to attend a two-week fire prevention instruction class with the Culver City Fire Prevention Bureau while being paid for actual and necessary expenses in alignment with this schooling.

As public service evolved, the city moved toward a merit-based system in hiring and promoting public safety personnel. On April 16, 1962, council approved the creation and establishment of this merit-based system for all suppression staff, while the fire chief and clerical personnel fell under the personnel merit system. Resolution #586 outlined in their personnel policy, "(A). Employment in the City Government shall be based on merit and fitness, free of personal or political considerations," and employees will be subject to satisfactory performance in the performance of their duties.

As the department evolved, so did the emergency medical services division. Through a need to provide a higher level of service, the department was required to seek approval to implement a transport fee to sustain services. On July 7, 1987, Resolution #3477 was approved by council to charge non-resident patients transported by the department. Today the department continues to offer a residential program that allows the department to bill all transports while only requiring non-resident patients to pay the co-pay not covered by insurance.

History of the Community

El Segundo, now home to a population of more than 16,731 people and a number of Fortune 500 corporate offices, was once largely uninhabited land used for dry farming. The land was once part of the Sausal Redondo Rancho controlled by Daniel Freeman, the founder of Inglewood. In 1885, most of the rancho was sold to wealthy investors in one square mile sections. While the beach areas of the south attracted some residents, the El Segundo and airport land in late 1910 was vacant. Standard Oil Company, recognizing the need for a refinery in Southern California, sent a large party of executives from the east and California to scout for a site in November 1910.



The El Segundo area was an easy choice, being mostly vacant, with ocean access providing a water source for cooling and close to oil fields. Having constructed and managed Standard Oil's refinery at Point Richmond, William Rheem was instrumental in bringing Richard Hanna, Superintendent of a Franklin, Pennsylvania refinery, to build this second refinery at El Segundo. Richard Hanna's wife, Virginia, named this expanse 'El Segundo,' Spanish for "the second," and with Rheem's approval, it was done. In late May 1911, construction had begun on the refinery after a two-mile-long rail spur serving the site was completed. One of the first major tasks was dealing with the sand dunes. About 400 mules, mule-skinners, and Fresno scrapers were brought in to level sites for the refinery structures and storage tanks. In September 1911, Hanna invited Rheem down from San Francisco to "fire" the No. 1 battery of stills, starting the production of end products. Raw crude had been accumulating in storage tanks, having arrived by pipeline from the Whittier-Fullerton oil fields. By the end of the year, Standard Oil had reportedly spent over $1 million of the $3 million allotted to complete the refinery.

By the end of 1912, El Segundo had grown from a "tent city" to include 180 homes and 20 businesses, a school, a bank, churches, and five hotels. The El Segundo Land and Improvement Company offered Standard Oilers inducements to those wanting to build a home. This company managed the growth of El Segundo until the city was incorporated on January 18, 1917.

An early highlight in El Segundo occurred in 1914 when a Pacific Electric Rail line commenced operation in the heart of the town, providing service without scaling the dunes to catch the service along the beach. The city grew along with the growth of the refinery. There were other short-lived smaller ventures, such as a tractor assembly plant that later became a tile manufacturing plant.

Next door to the north Mines Field, a landing strip used by early aviators was chosen for the Los Angeles Municipal Airport site. Expansion and the official opening of the airport in 1930 ushered in numerous aviation companies. Douglas Aircraft, Hughes Aircraft, Northrop Corporation, Interstate, and North American Aviation are all located in El Segundo.

After a high point of activity during World War II (WWII), many of these companies eventually transitioned into the aerospace/defense industry. In the 1960s, the addition of The Aerospace Corporation and Los Angeles Air Force Base gave El Segundo claim to the title of "The Aerospace Capital of the World." Today the city's population has leveled off at around 16,731, which has enabled the community to preserve its small-town intimacy and charm.

As published in the City of El Segundo Annual Comprehensive Financial Report for 2021, El Segundo has twice been named the "Most Business-Friendly City in Los Angeles County" and is proud to be the home of the Los Angeles Lakers, the L.A. Kings, and Los Angeles Chargers.

Community Financial Basis

The city has operated under the council-manager form of government since 1917. Policy-making and legislative authority are vested in the city council (governing body), consisting of the mayor and four council members, all elected on a non-partisan basis. The council appoints the government's city manager, who serves as the organization's chief executive officer (CEO) and, in turn, appoints the heads of the departments. Council members serve four-year terms and are elected at large. The election schedule alternates with two seats open during one election cycle, and three seats open the next election cycle. The mayor is selected by the seated city council every two years.

The city council approves each year's budget submitted by the city manager before the start of the new fiscal year. Public hearings are conducted before its adoption by the city council. Budgets and adopted supplemental appropriations, where required during the period, are also approved by the city council. Intradepartmental budget changes are approved by the city manager. The legal level of control, defined as the level at which city council approval is required for changes, is at the department level for the general fund and the functional level for all other funds. During the year, several supplementary appropriations are necessary. All operating budget appropriations lapse at year-end.

The city council is required to adopt a final budget by no later than the close of the previous fiscal year. This annual budget serves as the foundation for the city's financial planning and control. The budget is prepared by fund, function (e.g., public safety), and department (e.g., police). Department heads may transfer resources within a department. Transfers between departments, however, must be approved by the city manager. Any transfers between funds must be approved by the city council.

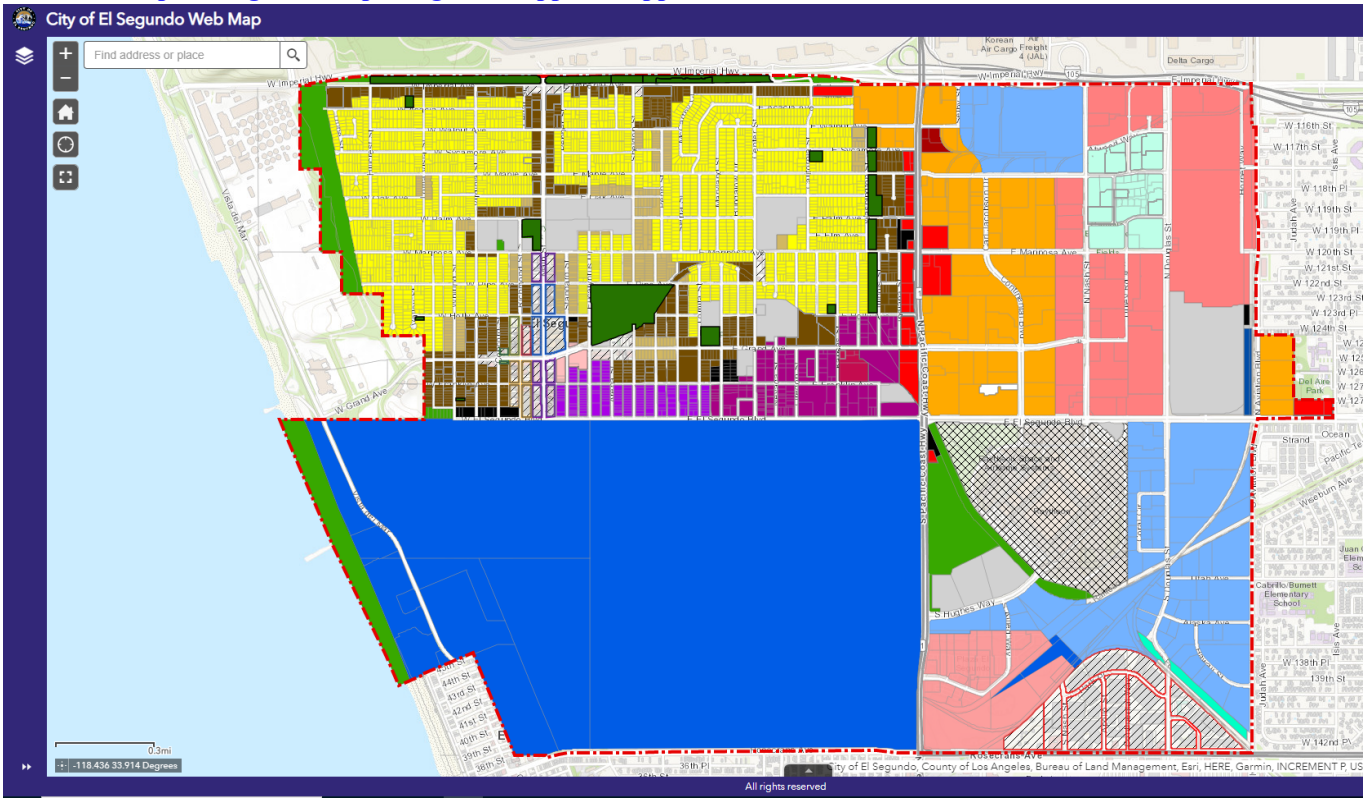
Budgets are adopted on a basis consistent with accounting principles generally accepted in the United States of America and are used as a management control device. Annual budgets are adopted for the general fund, special revenue funds, debt service funds, and capital projects funds except for the following special revenue funds: Metro Transit Authority Grant, Certified Access Specialist Program, Los Angeles World Airports, and Special Revenues/Donations.

Community Boundaries

The City of El Segundo is in the South Bay Area of Los Angeles County. The northern boundary is along Imperial Highway and adjoins the City of Los Angeles. The eastern boundary is along Aviation Boulevard to Rosecrans Avenue and adjoins Unincorporated Los Angeles County and the City of Hawthorne. An eastern projection from the 100 and 200 blocks of North Aviation Boulevard adjoining the Los Angeles County Del Air Park to Isis Avenue, ending at El Segundo Boulevard. The southern border adjoins the City of Manhattan Beach and is along Rosecrans Avenue from Aviation Boulevard to approximately 14 miles from Highland Avenue in the City of Manhattan Beach, and turns northwest along the Chevron Refinery property line, to the north of the City of Manhattan Beach, El Porto – North Manhattan Beach area to the Pacific Ocean. The western boundary starts at the Pacific Ocean at 45th Street and goes north to approximately Grand Avenue. At Grand Avenue, the border turns northeast along the Chevron Refinery property line to the east of the City of Los Angeles Scattergood Generating Station. The boundary follows the City of Los Angeles Scattergood Generating Station and Hyperion Sewage Treatment Plant to Imperial Highway.

Map 1: City of El Segundo

Source: https://elsegundo.maps.arcgis.com/apps/webappviewer/index.html?id=bf31cc23239f4504bf078ce36373fe2d



Community Planning Areas

The City of El Segundo has the following planning zones:

Residential Zones

- Single-Family Residential (R-1) Zone
- Two-Family Residential (R-2) Zone
- Multi-Family Residential (R-3) Zone

  The residential zones are in the city's northwest quadrant, between Imperial Highway to the north and Pacific Coast Highway (PCH) to the east. El Segundo Boulevard to the south and the city's boundary to the west. There are single-family, two-family, and multi-family buildings in the area, including hotels.

Commercial Zones

Downtown Commercial (C-RS) Zone

The downtown commercial zone encompasses the downtown El Segundo area, 100 and 200 blocks of Standard Street, 100 to 500 blocks of Main Street, 100 to 300 blocks of Richmond Street, and the 100 to 300 blocks of West and East Grand Avenue. The civic center is in the downtown specific plan area.

Neighborhood Commercial (C-2) Zone

The neighborhood commercial zone is those existing commercial businesses located within the residential zones.

General Commercial (C-3) Zone

The general commercial zone allows for allows retail and hotel uses. This area is located within different areas of the city. Hotels located off PCH include Aloft, Fairfield Inn, Travelodge, Hampton Inn, and Embassy Suites Hotel at 1440 E. Imperial Avenue. Additional hotels are on Mariposa Avenue, including Homestead Extended Stay Suites, Courtyard by Marriot, and Hilton Gardens Inn. Hotels off the Nash Street Corridor include the AC Hotel, Hyatt Place, and Residence Inn by Marriot, while the Hyatt House is located at 810 S. Douglas Street.

Corporate Office (CO) Zone

The corporate office zone comprises 21 high-rise and 18 mid-rise buildings in the city, all located on the east side of PCH.

Urban Mixed Use North (MU-N) Zone

The Urban Mixed Use North Zone comprises different planning zones in the city's northeast quadrant. It includes offices, hotels, retail, and light industrial uses.

Urban Mixed Use South (MU-S) Zone

The Urban Mixes Use South Zone comprises different planning zones in the city's southeast quadrant along Aviation Boulevard. It includes offices, hotels, and retail uses.

Commercial Center (C-4) Zone

The commercial center zone is co-located in other zones. This zone allows retail, restaurants, and other commercial uses in an integrated shopping center design. The Plaza El Segundo shopping center at 700 to 800 S. PCH and The Pointe shopping center at 820 to 860 S. PCH are included in these zones.

Industrial Zones

Light Industrial (M-1) Zone

Permits light manufacturing, warehousing, research and development, and office. Light manufacturing is defined as the assembly, packaging, fabrication, and processing of materials into finished products rather than the conversion or extraction of raw materials. This zone is primarily located in the city's northeast and southeast quadrants.

Heavy Industrial (M-2) Zone

Permits heavy manufacturing uses such as construction yards, factories, generating stations, extraction of raw materials, and refining. These facilities include the Northrop Grumman plant site at 590 N. Douglas Street, The Boeing Company plant site at 2060 E. Imperial Highway, and the Chevron Refinery at 324 W. El Segundo Boulevard.

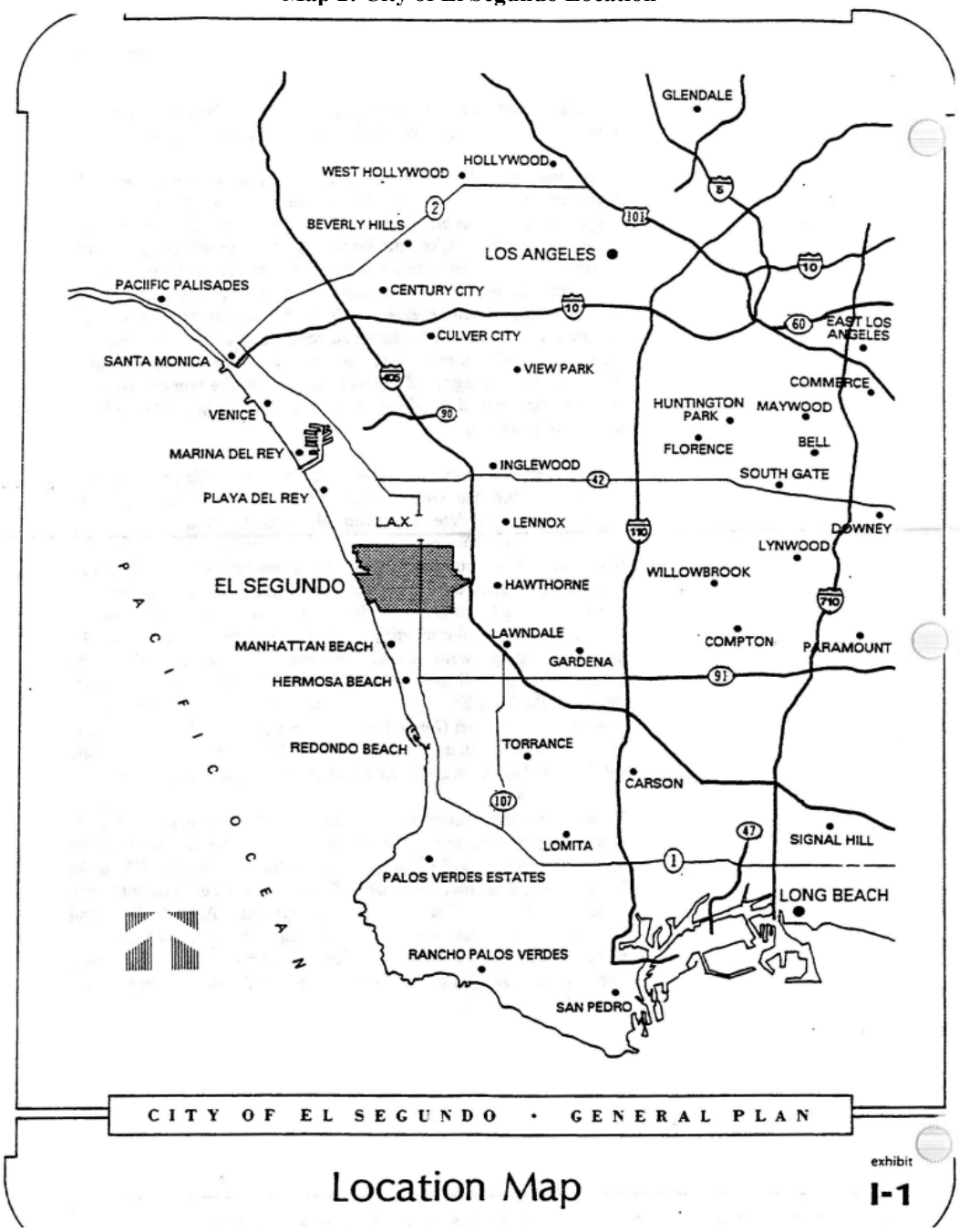
Smoky Hollow Specific Plan Area

The Smoky Hollo Specific Plan Area was developed to identify the mixed-use area in the quadrant approximate boundary by El Segundo Boulevard to the south, Standard Street to the west, Grand Avenue to the north, and PCH to the east. There are parcels north and south of Grand Avenue that are either in or out of the Smoky Hollow Specific Plan Area. The planning issues with this area, the first developed commercial area in the city, include post-WWII manufacturing, plating operations next to residential occupancies, and buildings on property lines. There are no or very limited property setbacks.

Community Transportation Systems

The City of El Segundo is in one of the nation's fastest developing urban centers. The proximity to Los Angeles International Airport (LAX), active railroad lines (Union Pacific, and Burlington Northern and Santa Fe [BNSF]), and a major street and freeway network, dictates the need for a close interface between transportation modes and systems other than the automobile.

Map 2: City of El Segundo Location



Los Angeles International Airport (LAX)

LAX is adjacent to the city on the north. This includes the West Imperial Terminal and Imperial Cargo Complex on Imperial Highway.

LAX encompasses a total of almost 3,500 acres. Approximately 1,257 acres of the property are utilized for landing, takeoff, and ground maneuvering. The remaining acreage is used for the terminal complex, automobile parking facilities, airline maintenance facilities, fuel storage systems, industrial purposes, air cargo complex, and related facilities. Some land has not yet been devoted to specific airport uses, including those acquired because of noise impact.

Circulation within and around LAX is by automobile, bus, and parking lot trams. For the general public, surface traffic circulation between major facilities is on public streets.

A Central Terminal Area (CTA) serves scheduled airline operations, while the West Imperial Terminal, located along the southern boundary of the airport, services charter flights, and other nonscheduled operations. The CTA is situated at the hub of the runways, with passenger boarding facilities located in satellite buildings around its periphery. The respective ticketing buildings are inward from the satellites and linked by underground passageways. These front on World Way, the main inner loop street serving all terminals. Within the loop itself is central parking, the airport administration, the control tower building, the airport theme building with an elevated restaurant, and other facilities.

Air freight operations are presently concentrated east of the CTA. This area is served by both Century and Aviation Boulevards.

Extensive parking facilities are provided for the public, employees, and car rental firms. About half of the passenger parking spaces are located within the loop formed by World Way. The balance is located on the perimeter of the airport. The outlying spaces are lower priced and served by free buses to the CTA. Total parking spaces number approximately 24,000.

Ground access to LAX is predominantly via motor vehicles using the street and highway system. The I-405 freeway provides north-south access from the east side of the airport. The I-105 freeway provides east-west access to LAX. A significant access route from the freeway to LAX is Century Boulevard, a major east-west thoroughfare. Alternative access routes are Imperial Highway and Lincoln Boulevard. In a north-south direction, PCH leads directly to LAX via an interchange at Century Boulevard. Aviation Boulevard leads to the existing cargo facilities and the Imperial Cargo Complex located just north of Imperial Highway. The airport's west end is served

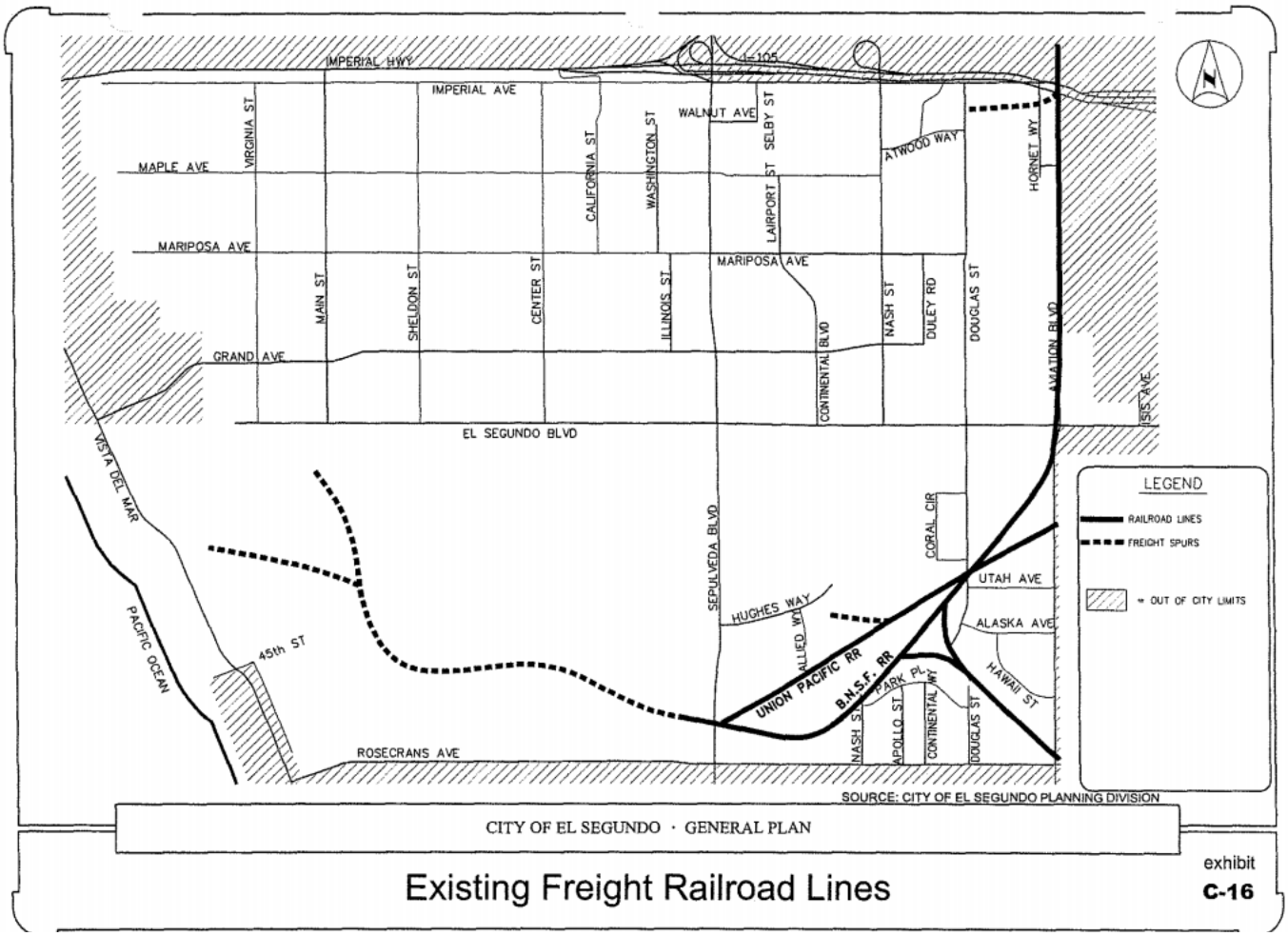
via City of Los Angeles streets, Vista Del Mar, and Pershing Drive. Pershing Drive terminates at Imperial Highway on the south and allows east-west flow into and out of the area. Vista Del Mar continues north into the Marina Del Rey/Westchester area. To the south, it serves the Manhattan and Hermosa Beach communities.

Annual passenger demand at LAX has risen steadily from 22 million in 1972 to 26 million in 1976, 32.7 million in 1981, 49.8 million in 1990, and 67.3 million in 2000. The proposed LAX Master Plan will include an additional projected passenger growth to approximately 100 million annual passengers by 2040.LAX is undergoing a master planning process that may result in extensive modifications, including an extension of the Metro Green Line from the I-105 to the CTA, relocations of cargo and rental car facilities, and potential construction of a new passenger terminal east of the CTA. These changes could significantly alter the current transportation patterns to and from LAX and impact traffic patterns in El Segundo. The city must monitor future plans and development at the airport because of the interrelationship of the city's economy and circulation system to the activity at LAX. Some of Los Angeles World Airports Modernization Highlights include work on an automated people mover (APM) train guideway, Metro station connections, new construction/ modernization of airport terminals, and expansion of the runways. As progress continues, the city must also ensure that airport plans and development are incorporated into all aspects of the city's planning process.

Railroad Freight Considerations

The city has several railroad lines that are actively used for freight transport and are shown on the following map. Most prominently located in the southeast portion of the city are the BNSF and the Union Pacific railroads. These rail lines do not provide public transportation services.

Map 3: Existing Freight Railroad Lines



There are 21 at-grade crossings of railroad lines with arterial roadways within the City of El Segundo. The crossing of freight trains disrupts vehicular traffic on the city's streets considerably, contributing to delays and congestion.

Two major grade separations of the BNSF railroad span El Segundo Boulevard and Rosecrans Avenue. The former crossing occurs immediately west of Aviation Boulevard, while the latter separation diagonally crosses the intersection of Aviation/Rosecrans.

The El Segundo/Aviation railroad crossing has a middle support due to the long span across the west leg of the intersection. While the grade separation eliminated railroad/auto conflicts, its position over the road and its supports preclude roadway widening unless a considerable cost is incurred.

Likewise, the diagonal orientation of the separation across Rosecrans Avenue at Aviation Boulevard precludes the widening of either street. The proximity of the railroad approach embankment necessitates railroad relocation or an extremely long span if significant widening were to occur.

The grade separation of the highway and rail facilities allows both to operate more safely and efficiently. Grade separation at additional rail crossings within the city should be analyzed and encouraged. However, the necessary structures should be configured to allow future alterations or expansions of the highway and rail link without necessitating reconstruction.

Ports

The city does not have a deep-water port or any small craft harbors along its jurisdictional boundary. Chevron has a marine terminal to moor offshore for loading and unloading its large oil tankers. It is located in Santa Monica Bay and consists of three berths of mooring buoys permanently anchored to the ocean floor. Each of the three berths has a transfer pipeline to the refinery shore facilities to discharge and load crude oil and refined products. Chevron currently has no plans to expand its operations nor to increase capacity through supertankers.

Small Craft Harbors

While the countywide demand for small craft harbors continues to grow, there are no plans for harbor facilities within the El Segundo jurisdiction. Marina Del Rey, the world's largest human-made harbor, lies north of El Segundo, while Kings Harbor in Redondo Beach provides berthing and mooring capacity to the south.

Truck Routes

The residents and businesses of El Segundo rely heavily on trucks for the efficient movement of goods in an economical and safe manner. For this reason, the truck route system within and through the city is an important aspect of the circulation element.

Current City Truck Routes

By resolution, the El Segundo Municipal Code officially authorizes the city council to designate truck routes on streets where vehicles over three tons may travel. Existing truck routes are provided with appropriate signposting to guide truck traffic through the city.

Truck route considerations selection of a truck routing system necessitates the determination of the impact of truck traffic on abutting land uses. There are land use categories that benefit from heavy truck access. Among these are industrial and commercial uses that require streets and alleys accessible to their development. Industry has to be served by trucks for deliveries of raw materials, the transfer of inventory, and the outflow of finished goods. Commercial land uses also require access to trucks primarily for the transfer of inventory.

Conversely, there is a need to protect those land uses that are adversely affected by heavy truck traffic. In El Segundo, these include the single-family, two-family, and multi-family residential uses in the northwestern portion of the city. Heavy truck traffic within residential neighborhoods produces annoying and often excessive noise, fumes, vibrations, and unsightliness. Areas in which schools, hospitals, churches, convalescent homes, and mortuaries are located must also be considered.

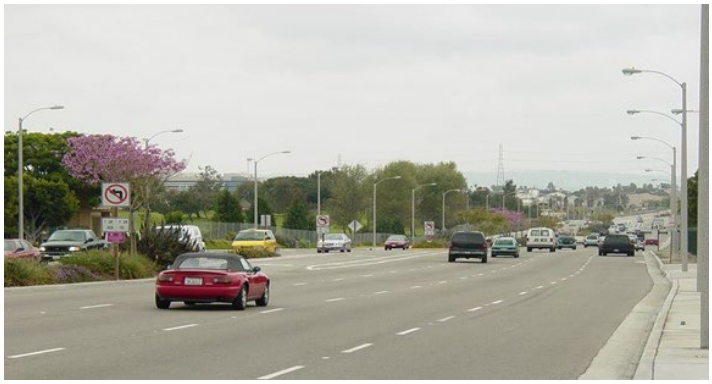
The establishment of a truck route system must follow the arterial street system. These routes must be located along those arterials designed to accommodate large vehicle traffic and must, at the same time, seek to avoid fully developed residential areas where there are close and reasonable alternatives. They should also concentrate on areas of need, such as the primary commercial and industrial areas in the southwest and easternmost portions of the city. The gross maximum weight restriction (6,000 pounds) in El Segundo is consistent with the weight limit imposed by most cities for non-truck route streets. The streets selected for the truck route system must be designed to support loads over this limitation.

Provisions must also be made for vehicles transporting hazardous materials into and through the city along the truck route system. Current municipal code sections in El Segundo adequately account for such provisions.

Master Plan Truck Route System

The recommended master plan truck route system incorporates the following roadways as recommended additions to the existing truck route system in El Segundo: Grand Avenue between PCH and Aviation Boulevard; Douglas Street between Imperial Avenue and Rosecrans Avenue; and Nash Street between Imperial Avenue and El Segundo Boulevard.

Pacific Coast Highway looking Northbound



Pacific Coast Highway looking Southbound

The recommended truck routes differ from those recommended in 1992 as follows: Nash Street from El Segundo Boulevard to Park Place is removed since that street extension has been deleted. Grand Avenue from Douglas Street to Aviation Boulevard is deleted since that street extension is deleted. Grand Avenue from Main Street to PCH is added. Grand Avenue from Main Street to PCH is retained since it has been implemented and is no longer recommended for deletion.

Truck Loading Zones

There are presently narrow streets and alleys within some of the industrial areas of the city that serve as impediments to truck operation on the present street system. Current land uses and future development require truck access in many of these areas. The city needs to work toward widening the streets and alleys, eliminating the impediments for truck operation from the city's street system. In addition, the city should work toward implementing the appropriate policies listed later in the circulation element to minimize the truck access impediments wherever street widening is not feasible.

Alternative Modes of Travel

Public Transportation

The automobile has traditionally been the primary method of transportation in the Southern California region. However, changing lifestyles, economic pressures, and greater social and environmental concerns have increased the need for alternatives to automobile travel. Public transportation is one of the alternative modes of travel that can reduce the region's and the city's dependence on the current auto-oriented transportation system.

For a transit system to attract users away from the automobile, it must be as convenient and affordable as possible. Compared to the convenience, flexibility, and privacy of travel by car, transit travel is perceived to be less appealing, especially for recreational purposes. Thus, for transit service to provide a viable alternative to the automobile in the

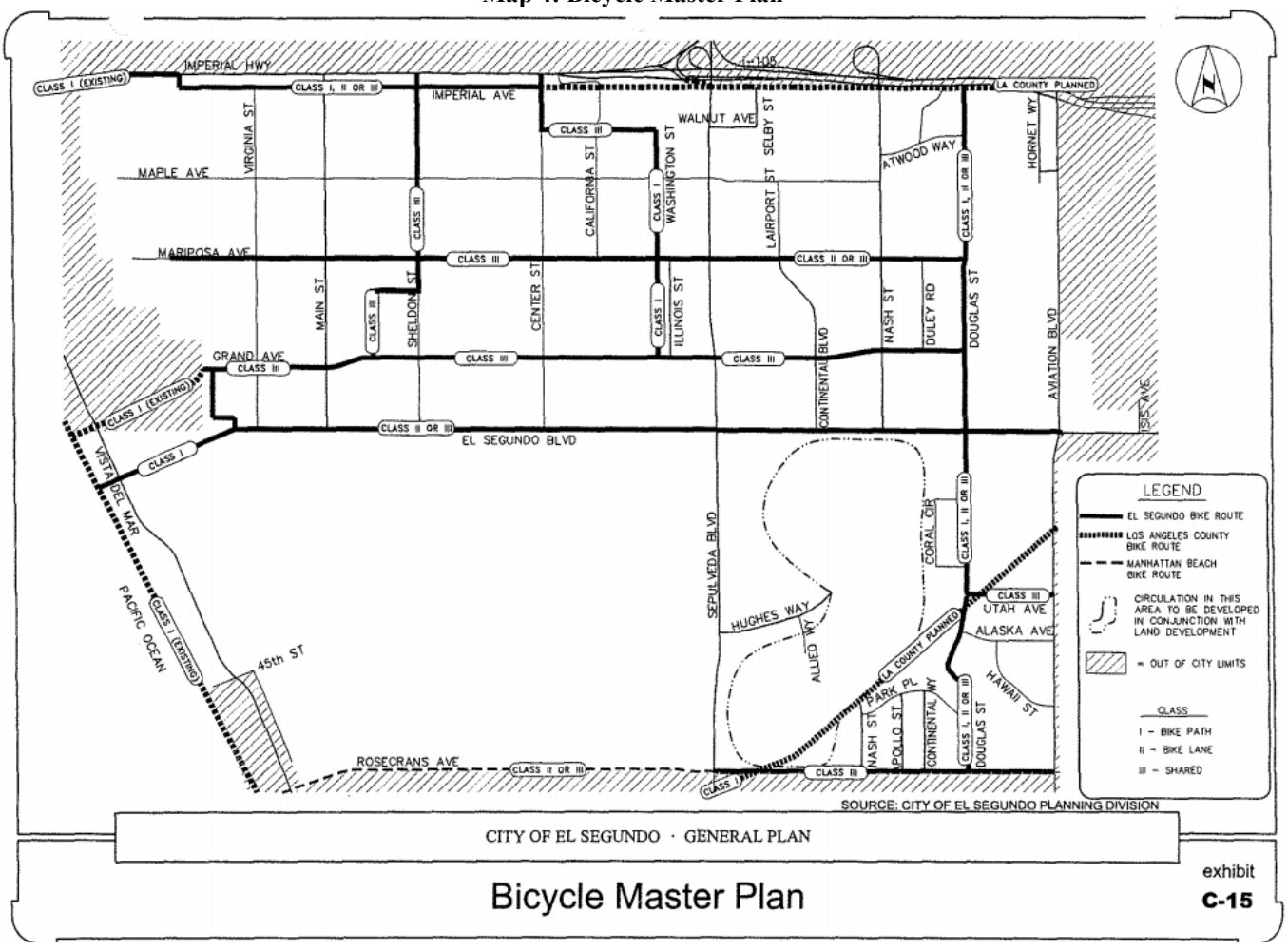
City of El Segundo, the city must take an active role in planning and supporting the provision of various transit opportunities.

Bicycle Facilities

The bicycle is increasing in popularity as a mode of transportation for commuter travel and recreation. This is due to the growing cost of motor vehicle operation, the significantly shorter portal-to-portal time when bikes are used on short trips, the increasing awareness and desire of travelers to utilize clean-air travel methods, and the acceptance of the bicycle for personal health, exercise, and increased mobility. There is a need to meet the growing demand for safe places to ride bicycles for recreation and commuter activities.

For many years, roadway facilities have been built exclusively to meet the needs of the motorized vehicle, resulting in street geometrics, lane widths, and intersections that have not been designed for bicyclist concerns. Bicycle safety is jeopardized due to bike/auto and bike/pedestrian confrontation on the street, and the lack of space for bicycle movement. Conflicts between bicycles and pedestrians at intersections and on sidewalks result in the need to separate these three modes, wherever possible, to provide a safer and more efficient operational environment for each.

Map 4: Bicycle Master Plan



Pedestrian Circulation

The pedestrian is an integral part of the circulation system and requires appropriate attention in the circulation element. The sidewalk is an area of refuge representing a convenient and safe route for pedestrian transport. The relatively high percentage of the elderly residential population in El Segundo, plus school children coupled with mid-day walkers for shopping trips and jogging, necessitate establishing a pedestrian circulation system that will support and encourage walking as a mode of transportation.

The El Segundo Municipal Code Section on "Street and Sidewalks" does not address the issue of sidewalk design nor the policies for sidewalk implementation. However, the city department of public works has prepared standard plans and specifications for the installation of sidewalks. The primary criteria is a minimum width of sidewalks on new installations, which is standard at four feet for residential streets. Sidewalks in commercial areas should be a minimum of eight feet wide. The only exception for commercial streets is the case where the distance from the face of the curb to the property line is five feet. The sidewalk minimum requirement then becomes four feet, six inches.

Installation of sidewalks is mandatory with all new improvements in the city. Existing locations that do not have sidewalks can only require implementation on an assessment district basis, i.e., a petition from the homeowners with city installation and cost of the sidewalk distributed to each homeowner on the basis of their street frontage.

Existing Public Transit

Bus options include LA Metro and Beach Cities Transit (BCT), and there are three LA Metro rail stations located in El Segundo. El Segundo is less than 30 minutes from downtown Los Angeles, Long Beach, Torrance, and Santa Monica.

LA Metro Green Line Stations

The Metro Green Line, also known as the C line, runs east and west from Norwalk to Redondo Beach. According to the City of Redondo Beach Recreation Department, the various metro lines run every 7 to 8 minutes during peak hours and 15 minutes during off-peak hours. All lines have parking except for El Segundo's Mariposa location.

El Segundo Green Line

Dial-A-Ride (DAR)

This service assists El Segundo residents (primarily seniors and disabled) by transporting them to and from their destination of choice. The boundaries of DAR are restricted to the residential area of El Segundo. This area includes west of PCH, north of El Segundo Boulevard, and south of Imperial Highway. DAR dispatch can schedule riders up to two weeks in advance.

Doctor Dial-A-Ride

This service transports resident seniors and disabled to and from their doctor appointments. Riders must have a valid El Segundo Recreation ID for the current year. From El Segundo, riders can go as far south as Torrance, east as Hawthorne, and north as Marina del Rey. Dispatch can schedule riders up to three months in advance from the current month. Space is limited.

Lunchtime Shuttle

This free service transports riders from the business side of El Segundo to Downtown El Segundo for lunch. The shuttle runs on a continuous loop to 17 corporate and downtown El Segundo locations.

Beach Shuttle

This shuttle operates during the El Segundo Unified School District's spring and summer breaks. Ridership is free with a valid Recreation ID for the current year; otherwise, it is $1.00 one-way. The shuttle runs on a continuous loop with stops in residential El Segundo and then takes riders to El Porto Beach.

Beach Shuttle pick-up locations include:

- Eucalyptus Drive & Holly Avenue
- Center Street & Mariposa Avenue
- Sheldon Street & Imperial Avenue
- Main Street & Imperial Avenue
- Richmond Street & Mariposa Avenue
- Virginia Street & Grand Avenue

Community Critical Infrastructure

The City of El Segundo has the following utilities and underground services:

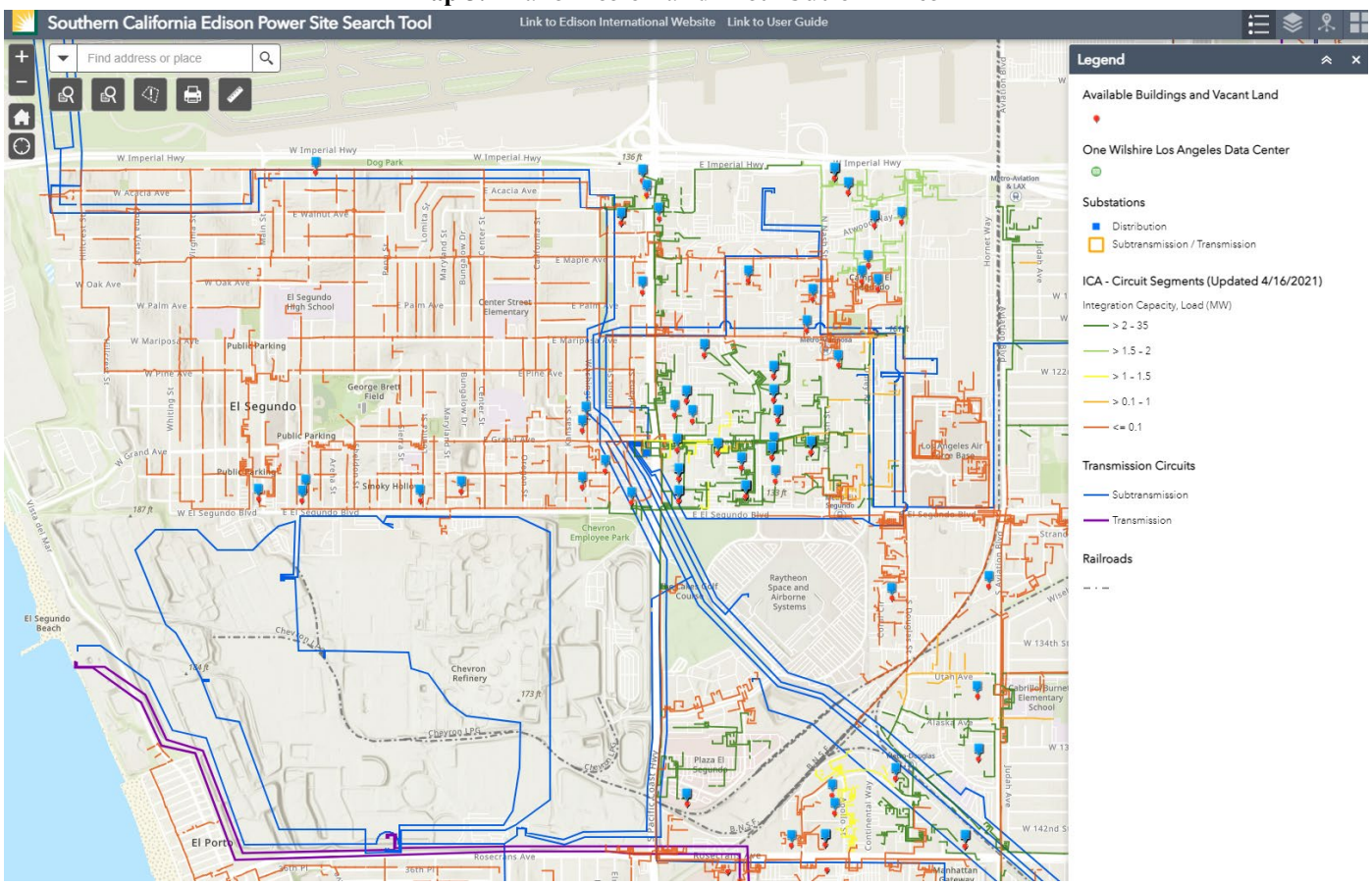
Water System

The city has its own water service, managed, and maintained by the public works water division. With a system supplied by the Metropolitan Water District, a 250,000-gallon elevated water tank, a three-million-gallon grade water tank, and a six-million-gallon underground water tank serve the west half of the city. The city's east side is fed directly from the Metropolitan Water District supplies, located on El Segundo Boulevard east of Aviation Boulevard and Redondo Avenue, south of Rosecrans Avenue, in the City of Manhattan Beach.

Electrical System

Electric service is provided by Southern California Edison, with transmission and distribution lines throughout the city.

Map 5: Transmission and Distribution Lines



Natural Gas

Natural gas service is provided by Southern California Gas Company. The main supply is from a large transmission pipeline along Aviation Boulevard, which goes west along El Segundo Boulevard to the Chevron Refinery. There are distribution lines throughout the city.

Petroleum Pipelines

There are several underground petroleum pipelines that transport crude oil and refined product in the following areas:

Railroad right of way in the southeast quadrant of the city, from Aviation Boulevard and Rosecrans Avenue to the Chevron Refinery.

Railroad right of way in the southeast quadrant of the city, northwest from Aviation Boulevard and Rosecrans Avenue to northeast along the easterly railroad right of way to Aviation Boulevard, along Aviation Boulevard to Imperial Highway. Westerly along Imperial Highway to the LAX fuels transition point, approximately one-quarter mile west of Main Street.

Along Virginia Street, from the Chevron Refinery at El Segundo Boulevard to Imperial Avenue. The pipeline heads east to the LAX Fuels transition point, approximately one-quarter mile west of Main Street.

Railroad right of way in the southeast quadrant of the city, from Aviation Boulevard and Rosecrans Avenue, continuing along the Southern California Edison right of way, northwest, crossing the intersection at El Segundo Boulevard and PCH. The pipeline continues along the Southern California Edison right of way to Walnut Street and turns west to the west side of The Boeing Company property at 1700 E. Imperial Highway. The pipeline heads north along The Boeing Company property line to Imperial Avenue and west to the LAX Fuels transition point, approximately one-quarter mile west of Main Street.

Storm Drain System

The city's storm drain system drains into the Los Angeles County Department of Public Works, Flood Division collection sumps at Arena Street and El Segundo Boulevard, Center Street and Grand Avenue, and Hughes Way. These storm drain collection sumps feed into the Los Angeles County storm drain system, which outfalls to the Pacific Ocean. There are two city-operated storm drain collection sumps, one at Recreation Park and the other at Imperial Avenue and California Street. The El Segundo system feeds into the Imperial Highway storm drain system, which outfalls into the Pacific Ocean.

Sanitary Sewer System

The city has two dedicated sanitary sewer systems with a separation at PCH. The west system and outfall from the Chevron Refinery go to the City of Los Angeles Hyperion Sewage Treatment Plant. The east system goes to the Los Angeles County Sanitation Districts Carson Sewage Treatment Plant. The city operates five sewer lift stations.

Community Land Use and Zoning

To classify, regulate, restrict, and segregate the uses of lands and buildings, to regulate and restrict the height and bulk of buildings, to regulate the area of yards and other open spaces about buildings, and to regulate the density of population, the city has adopted the following specific plan areas which function as the zoning code for specific areas:

1. Smoky Hollow Specific Plan: There are four classes of use zones intended to be used within the boundaries of the Smoky Hollow specific plan. These zones include:

SH-W - Smoky Hollow West Zoning District
SH-E - Smoky Hollow East Zoning District
P-F - Public Facilities Zoning District
P - Automobile Parking Zoning District

2. 124th Street Specific Plan: The one zone intended for use within the boundaries of the 124th Street specific plan is:

124th Street SP - 124th Street Specific Plan

3. Aviation Specific Plan: The one zone intended for use within the boundaries of the aviation-specific plan is:

ASP - Aviation Specific Plan Zone

4. Downtown Specific Plan: There are six classes of use districts intended to be used within the boundaries of the downtown specific plan. These districts include:

MSD - Main Street District
MSTD - Main Street Transitional District
NRSD - North Richmond Street District

RSD - Richmond Street District

GAD - Grand Avenue District

WGATD - West Grand Avenue Transitional District

5. Corporate Campus Specific Plan: The one zone intended for use within the boundaries of the corporate campus-specific plan is:

CCSP - Corporate Campus Specific Plan Zone

6. 199 North Continental Boulevard Specific Plan: The one zone intended for use within the boundaries of the 199 North Continental Boulevard specific plan is:

NCBSP - 199 North Continental Boulevard Specific Plan

7. 540 East Imperial Avenue Specific Plan: The one zone intended for use within the boundaries of the 540 East Imperial Avenue specific plan is:

EIASP - East Imperial Avenue Specific Plan

8. 222 Kansas Street Specific Plan: The one zone intended for use within the boundaries of the 222 Kansas Street specific plan is:

222 KSSP - 222 Kansas Street Specific Plan

9. 888 North PCH Specific Plan: The one zone intended for use within the boundaries of the 888 North PCH specific plan is:

888 NSBSP - 888 North PCH Specific Plan

10. El Segundo South Campus Specific Plan: The one zone intended for use within the boundaries of the El Segundo south campus-specific plan is:

ESSCSP - El Segundo South Campus Specific Plan

11. The Lakes Specific Plan: The one zone intended for use within the boundaries of the lakes specific plan is:

TLSP - The Lakes Specific Plan

Further, the lakes specific plan area is comprised of two subareas identified as PR/OS (Public Recreation/Open Space) and CR/OS (Commercial Recreation/Open Space).

Community Topography

The City of El Segundo is a coastal community within Los Angeles County. The city is a series of peaks and valleys with elevations ranging from 5 to 90 feet above sea level. According to the Guinness Book of World Records, the city is known for having the most roads with a hill or grade. The grade elevation changes are primarily on the west side of the city, west of PCH. The area east of PCH is primarily level ground.

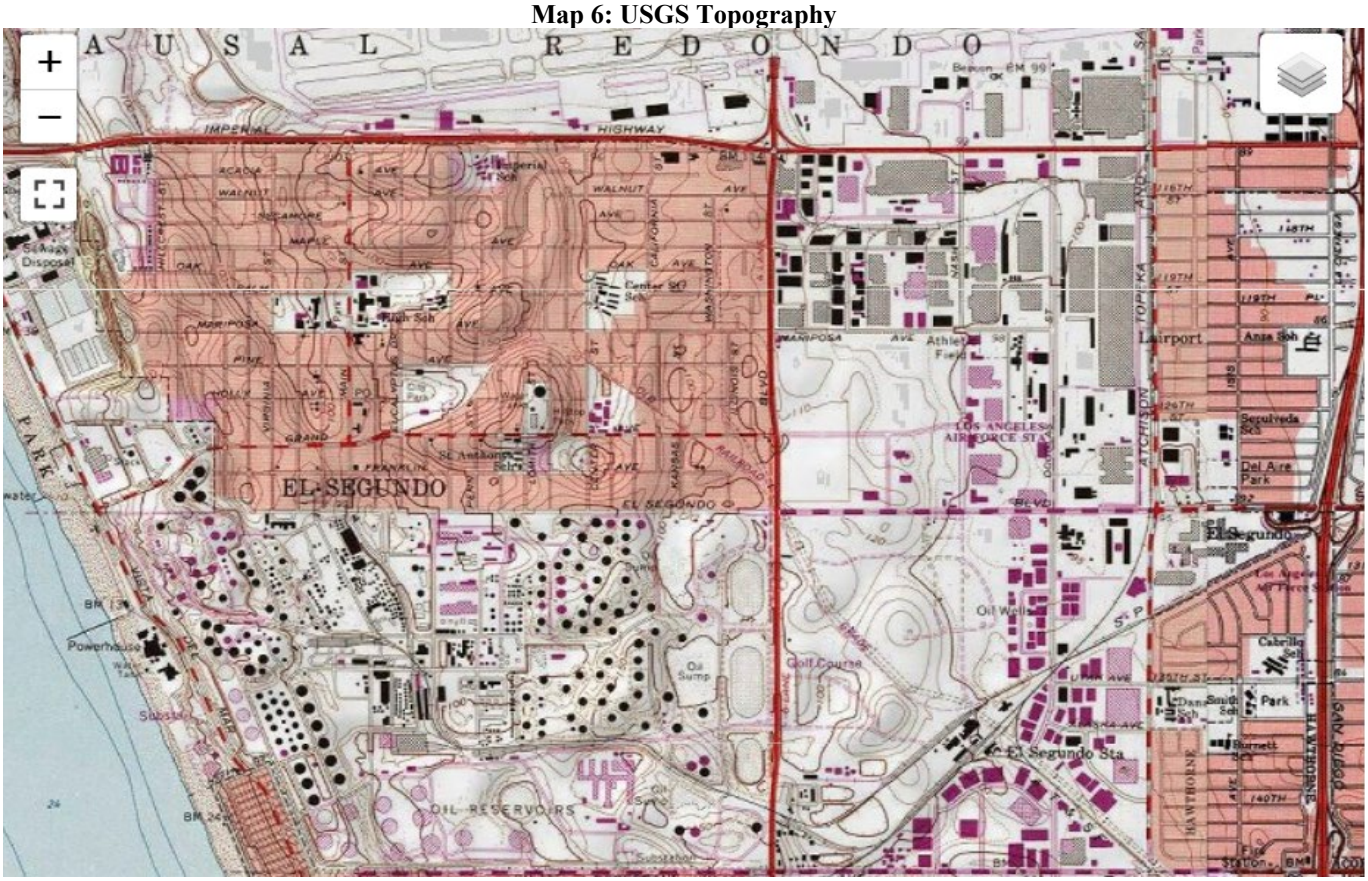
According to the City of El Segundo Multi-Hazard Mitigation Plan,

> "[t]he topography in the city is characterized by a series of northwest-trending rounded hills consisting of stabilized sand dunes rising above the main coastal plain. The elevation rises from sea level along the southwestern border to approximately 170 feet above mean sea level in the northern section of the city. Some of the northern area of the city retains the natural dune landscape. In the southern portion of the city more of the natural topography has been altered.
>
> A series of stabilized sand dunes referred to as the El Segundo Sand Dunes and Sand Hills cover the western part of the city. To the west of the city are steep coastal bluffs, exceeding 30 percent slope, descending to a coastal beach area. The eastern section is flat, almost at sea level; the surface represents the original erosion terrace of the Torrance Plain on which the coastal sand dunes were deposited. The Torrance Plain is underlain by marine and non-marine sediments of the Lakewood Formation."

The plan goes on to say, "[t]he Lakewood Formation consists of fine to medium grained sandstones, gravelly sandstones, and clays which weather into clays and silty clays. The western section of the city is underlain by dune sands in varying stages of consolidation. Current groundwater levels are at 20 feet below surface or deeper."

As outlined in the following United States Geological Survey (USGS) topographical map, the city is divided down the middle via State Route-1, also known as PCH. Additional transportation routes within the city include Imperial Highway to the north, El Segundo Boulevard, and Rosecrans Avenue to the south.

Map 6: USGS Topography



The business district resides east of PCH and consists of dense buildings, highlighted in dark gray and pink shading, while newer construction is in the white-shaded areas. The west side of PCH is primarily residential, with businesses flanking the downtown civic center. The southwestern side of the city is the Chevron Refinery which expands to the southernmost boundary of the city along Manhattan Beach and extends to the western coastline. The majority of the northwestern coastline falls under the jurisdiction of the City of Los Angeles and includes a sewage treatment plant, water, and power generating plant. The City of El Segundo also occupies a small portion of the coastal beach on its farthest western edge.

Community Geography

Location

The City of El Segundo is located on the western edge of Los Angeles County and resides in Southern California along the Santa Monica Bay. The city encompasses approximately five and a half square miles of residential, commercial, and industrial land. It is a coastal community bounded by the Pacific Ocean on the west, the LAX to the north, the City of Hawthorne to the east, and the City of Manhattan Beach to the south.

Land Use

The land use information included herein is primarily based on the city's latest general plan land use map. PCH and El Segundo Boulevard divide the city into four major quadrants. The northwest quadrant consists of the residential community and adjoining downtown business district. The Chevron Refinery is located in the southwest quadrant. The northeast and southeast quadrants are primarily industrial and commercial areas.

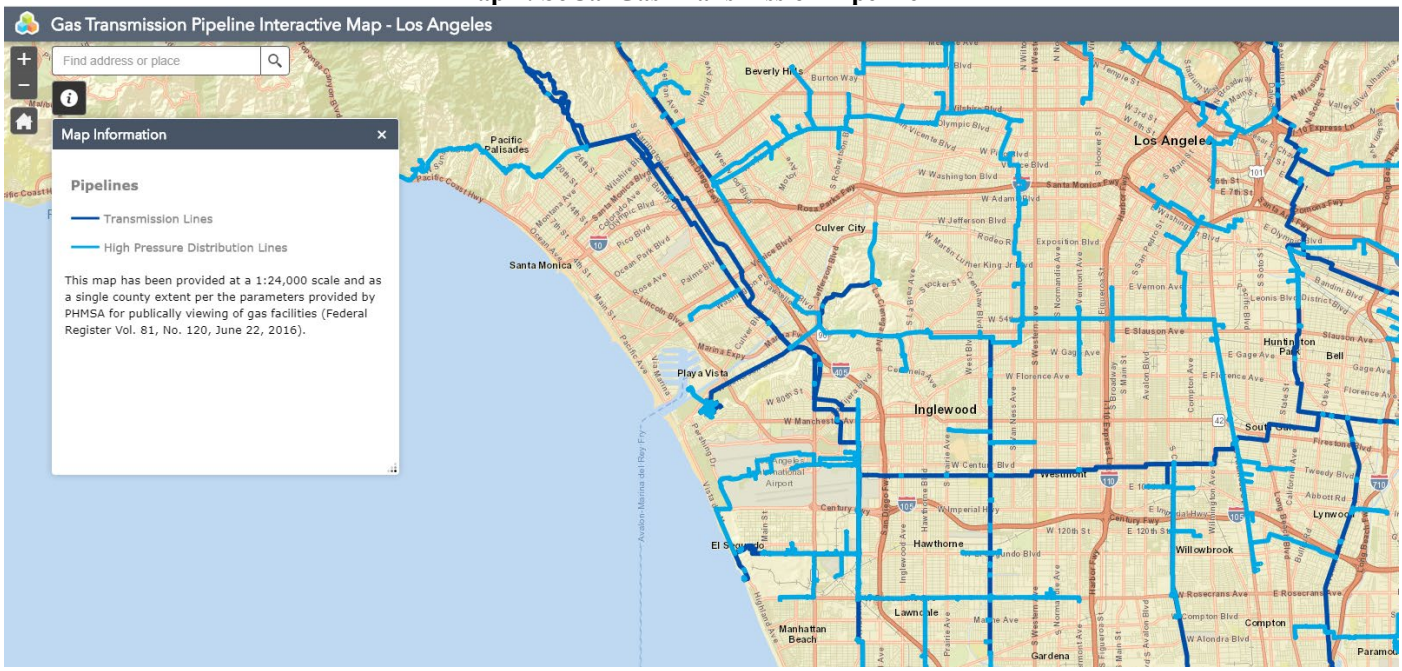
According to the City of El Segundo's Planning Department, of the city's 3,494 total acres, approximately 16 percent is residential (includes 540 E Imperial Avenue specific plan area); 9.4 percent is commercial/office; 13.2 percent is mixed use (includes specific plan areas); 39.5 percent is industrial; 5.0 percent is open space and parks; 3.8 percent is public and government facilities; and the remaining 12.9 percent are right-of-ways.

El Segundo has potential seismic hazards associated with earthquakes due to various active faulting and fault lines in Southern California. Liquefaction (soil weakening from saturated or partially saturated due to earthquake shaking) and seismically induced settlement potential (loosening of deposits of sand due to ground shaking) has been identified in the past at neighboring LAX.

While tsunamis carry a potential danger to coastal areas in California (and local fault-generated tsunamis are of specific concern in the Southern California area), historically, locally-generated tsunamis have not reached significant ('great tsunamis' or high amplitude) heights due to the area's basin-ridge bathymetry. This does not necessarily indicate future tsunami impact or hazards, however.

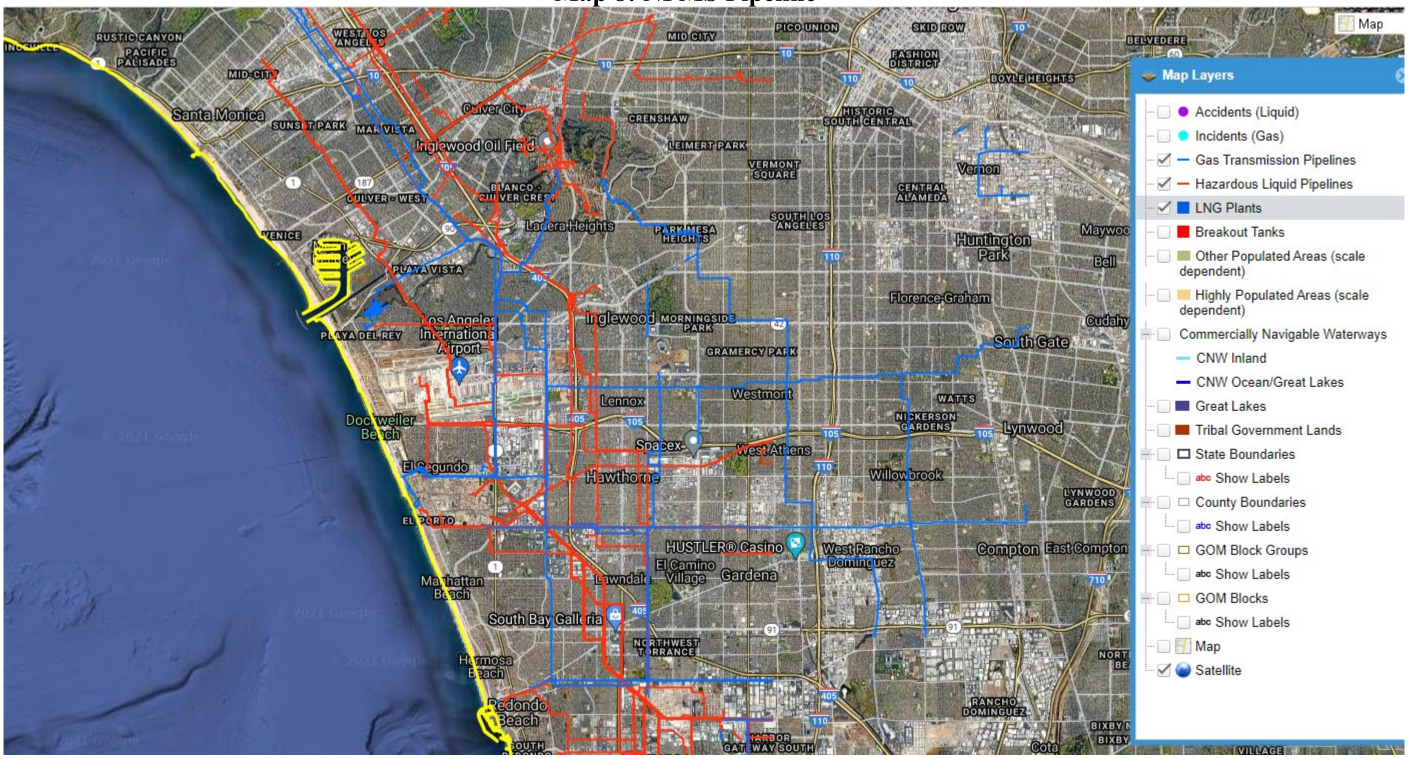
Hazardous liquid and natural gas pipelines traverse the City of El Segundo. According to the Southern California Gas transmission pipelines interactive map, the city has transmission lines (dark blue) versus high-pressure lines (aqua):

Map 7: SoCal Gas Transmission Pipeline



The National Pipeline Mapping System shows El Segundo has liquified natural gas (LNG) plants (blue), hazardous liquid pipelines (red), and gas transmission lines (blue) running throughout the city and towards its partnering cities.

Map 8: NPMS Pipeline



Community Geology

Minerals and Soils

El Segundo is underlain by the Pleistocene-age El Segundo San Dunes at the western edge of the Los Angeles Basin within the Transverse Ranges Geomorphic Province in Southern California. The El Segundo Sand Dunes consist predominantly of dense sands, with some local deposits of silts and clays within natural depressions, particularly in the eastern portion of the city. Rock is present at great depth beneath the city.

Community Physiography

There are no known faults with the potential for surface fault rupture within the City of El Segundo, but significant ground shaking can result from the rupture of a large number of nearby faults. The major faults that have the potential to affect the greater El Segundo region are the Newport-Inglewood Fault (east of the city) and the Palos Verdes Fault (offshore, west of the city).

Southern California has a history of powerful and relatively frequent earthquakes, dating back to the magnitude 8.0+ 1857 San Andreas Earthquake, which did substantial damage to the relatively few buildings that existed at the time. Paleo seismological research indicates that large magnitude (8.0+) earthquakes occur on the San Andreas Fault at intervals between 45 and 332 years, with an average interval of 140 years. Other lesser faults have also caused very damaging earthquakes since 1857. Notable earthquakes include the 1933 Long Beach Earthquake, the 1971 San

Fernando Earthquake, the 1987 Whittier Earthquake, and the 1994 Northridge Earthquake. In addition, many areas in Southern California have sandy soils that are subject to liquefaction. The City of El Segundo has no liquefaction zones except for an area of coastline on the west side of the city.

Earthquakes as a Threat to the City of El Segundo

The City of El Segundo was impacted by the 1933 Long Beach Earthquake though data is unavailable on the extent or values of the damages sustained by the city. It is known that the El Segundo High School and the elementary school, now known as Richmond Street School, suffered significant damages that resulted in the demolition and rebuilding of both campuses. The most recent significant earthquake affecting Southern California was the January 17, 1994 Northridge Earthquake. At 4:31 A.M. on Monday, a moderate but very damaging earthquake with a magnitude of 6.7 struck the San Fernando Valley. In the following days and weeks, thousands of aftershocks occurred, causing additional damage to affected structures. Fifty-seven people were killed, and more than 1,500 people were seriously injured. For days afterward, thousands of homes and businesses were without electricity, tens of thousands had no gas, and nearly 50,000 had little or no water. Approximately 15,000 structures were moderately to severely damaged, which left thousands of people temporarily homeless. While 66,500 buildings were inspected, nearly 4,000 were severely damaged, and over 11,000 were moderately damaged. Several collapsed bridges and overpasses created commuter havoc on the freeway system. Extensive damage was caused by ground shaking, but the earthquake triggered liquefaction, and dozens of fires also caused additional severe damage. This extremely strong ground motion in large portions of Los Angeles County resulted in record economic losses. Due to the earthquake occurring early on a holiday morning (Martin Luther King Jr. Day), potential loss was considerably reduced. Many collapsed buildings were unoccupied, and most businesses were not yet open. The direct and indirect economic losses ran into tens of billions of dollars.

Historical and geological records show that California has a long history of seismic events. Southern California is probably best known for the San Andreas Fault, a 400-mile-long fault running from the Mexican border to a point offshore, west of San Francisco.

San Andreas is only one of the dozens of known earthquake faults across Southern California. Some better-known faults include the Newport-Inglewood, Whittier, Chatsworth, Elsinore, Hollywood, Los Alamitos, Puente Hills, and Palos Verdes Faults. Beyond the known faults, a potentially large number of "blind" faults underlie the surface of Southern California. One such blind fault was involved in the October 1987 Whittier Narrows Earthquake.

Although the most famous of the faults, the San Andreas, is capable of producing an earthquake with a moment magnitude of greater than eight, some of the "lesser" faults have the potential to inflict greater damage on the urban core of Southern California. Seismologists believe that local faults such as the Newport-Inglewood Fault or the Palos Verdes Fault could potentially inflict greater damage on El Segundo than certain scenarios of ground rupture on the more distant San Andreas Fault.

For decades, partnerships have flourished between the USGS, Cal Tech, the California Geological Survey, and universities to share research and educational efforts with Californians. Tremendous earthquake mapping and mitigation efforts have been made in California in the past two decades, and public awareness has risen remarkably during this time. Major federal, state, and local government agencies and private organizations support earthquake

risk reduction and have made significant contributions to reducing the adverse impacts of earthquakes. Despite the progress, most California communities remain unprepared because there is a general lack of understanding regarding earthquake hazards among Californians.

To better understand the earthquake hazard, the scientific community has looked at historical records and accelerated research on those faults that are the sources of earthquakes in the Southern California region. Historical earthquake records can generally be divided into records of the pre-instrumental period and the instrumental period. In the absence of instrumentation, the detection of earthquakes is based on observations and felt reports and is dependent upon population density and distribution. Since California was sparsely populated in the 1800s, detecting pre-instrumental earthquakes is relatively difficult. However, the very large Fort Tejon earthquake in 1857 (magnitude 7.9) and the Owens Valley earthquake in 1872 (magnitude 7.6) are evidence of the tremendously destructive potential of earthquakes in Southern California. In more recent times, two 7.3 magnitude earthquakes struck Southern California in Kern County (1952) and Landers (1992). The damage from these four large earthquakes was limited because they occurred in areas that were sparsely populated at the time they happened. The seismic risk is much more severe today than in the past because the population at risk is in the millions rather than a few hundred or a few thousand persons.

History of Earthquake Events in Southern California

Since seismologists started recording and measuring earthquakes, there have been tens of thousands of recorded earthquakes in Southern California, most with a magnitude below three. No community in Southern California is beyond the reach of a damaging earthquake.

Measuring and Describing Earthquakes

An earthquake is a sudden motion or trembling caused by a release of strain accumulated within or along the edge of the earth's tectonic plates. The effects of an earthquake can be felt far beyond the site of its occurrence. They usually occur without warning and can cause massive damage and extensive casualties after just a few seconds. Common effects of earthquakes are ground motion and shaking, surface fault ruptures, and ground failure. Ground motion is the vibration or shaking of the ground during an earthquake. When a fault ruptures, seismic waves radiate, causing the ground to vibrate. The severity of the vibration increases with the amount of energy released and decreases with distance from the causative fault or epicenter. Soft soils can further amplify ground motions. The severity of these effects is dependent on the amount of energy released from the fault or epicenter.

One way to express an earthquake's severity is to compare its acceleration to the normal acceleration due to gravity. The acceleration due to gravity is often called "g." A ground motion with a peak ground acceleration of 100 percent g is very severe. Peak ground acceleration (PGA) is a measure of the strength of ground motion. PGA is used to project the risk of damage from future earthquakes by showing earthquake ground motions that have a specified probability (10, 5, or 2 percent) of being exceeded in 50 years. These ground motion values are used for reference in construction design for earthquake resistance. The ground motion values can also be used to assess relative hazards between sites when making economic and safety decisions.

Another tool used to describe earthquake intensity is the magnitude scale. The magnitude scale is sometimes referred to as the Richter scale. The two are similar but not the same. The magnitude scale was devised as a means of rating

earthquake strength and is an indirect measure of seismic energy released. The scale is logarithmic, with each one-point increase corresponding to a 10-fold increase in the amplitude of the seismic shock waves generated by the earthquake. In terms of actual energy released, however, each one-point increase on the Richter scale corresponds to about a 32-fold increase in energy released. Therefore, a magnitude 7 (M7) earthquake is 100 times (10 X 10) more powerful than an M5 earthquake and releases 1,024 times (32 X 32) the energy. An earthquake generates different types of seismic shock waves that travel outward from the focus or point of rupture on a fault. Seismic waves that travel through the earth's crust are called body waves and are divided into primary (P) and secondary (S) waves. Because P-waves move faster (1.7 times) than S-waves they arrive at the seismograph first. By measuring the time delay between the arrival of the P- and S-waves and knowing the distance to the epicenter, seismologists can compute the earthquake's magnitude.

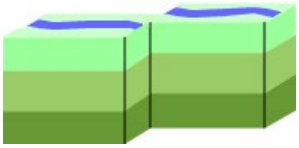
The modified Mercalli intensity (MMI) scale is another means for rating earthquakes, but one that attempts to quantify the intensity of ground shaking. Intensity under this scale is a function of distance from the epicenter (the closer to the epicenter, the greater the intensity), ground acceleration, duration of ground shaking, and degree of structural damage.

Earthquake Faults

A fault is a fracture between blocks of the earth's crust where either side moves relative to the other along a parallel plane to the fracture.

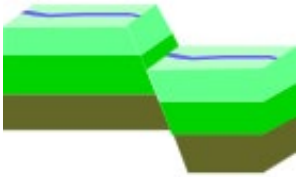
Strike-slip

Strike-slip faults are vertical or almost vertical rifts where the earth's plates move mostly horizontally. From the observer's perspective, if the opposite block looking across the fault moves to the right, the slip style is called a right lateral fault; if the block moves left, the shift is called a left lateral fault.



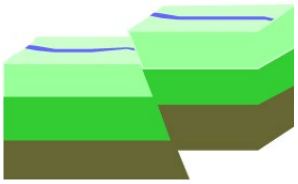
Dip-slip

Dip-slip faults are slanted fractures where the blocks mostly shift vertically. If the earth above an inclined fault moves down, the fault is called a normal fault, but when the rock above the fault moves up, the fault is called a reverse fault.



Thrust faults

Thrust faults have a reverse fault with a dip of 45 degrees or less.



Earthquake Related Hazards

Ground shaking, landslides, liquefaction, and amplification are the specific hazards associated with earthquakes. The severity of these hazards depends on several factors, including soil and slope conditions, proximity to the fault, earthquake magnitude, and the type of earthquake.

Ground Shaking

Ground shaking is the motion felt on the earth's surface caused by seismic waves generated by the earthquake. It is the primary cause of earthquake damage. The strength of ground shaking depends on the magnitude of the earthquake, the type of fault, and the distance from the epicenter (where the earthquake originates). Buildings on poorly consolidated and thick soils will typically see more damage than buildings on consolidated soils and bedrock.

Earthquake-Induced Landslides

Earthquake-induced landslides are secondary earthquake hazards that occur from ground shaking. They can destroy the roads, buildings, utilities, and other critical facilities necessary to respond to and recover from an earthquake. Many communities in Southern California have a high likelihood of encountering such risks, especially in areas with steep slopes.

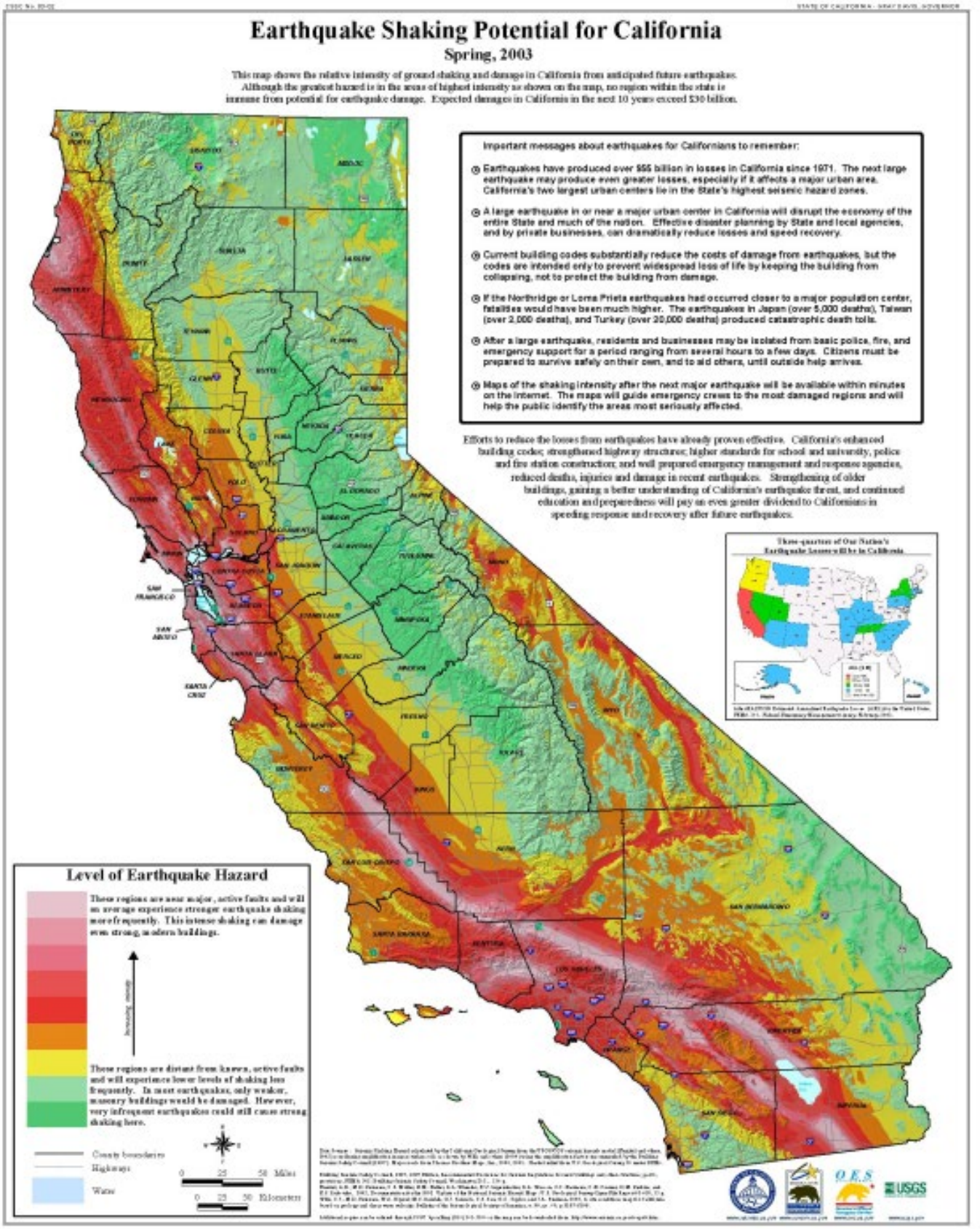
Liquefaction

Liquefaction occurs when ground shaking causes wet granular soils to change from a solid state to a liquid state. This results in the loss of soil strength and the soil's ability to support weight. Buildings and their occupants are at risk when the ground can no longer support these buildings and structures. Many communities in Southern California are built on ancient river bottoms and have sandy soil. In some cases, this ground may be subject to liquefaction, depending on the depth of the water table.

Amplification

Soils and soft sedimentary rocks near the earth's surface can modify ground shaking caused by earthquakes. One of these modifications is amplification. Amplification increases the magnitude of the seismic waves generated by the earthquake. The amount of amplification is influenced by the thickness of geologic materials and their physical properties. Buildings and structures built on soft and unconsolidated soils can face greater risk. Amplification can also occur in areas with deep sediment-filled basins and on ridge tops.

Map 9: Earthquake Shaking Potential for California
Source: www.seismic.ca.gov/pub/shaking_18x23.pdf



Earthquake Hazard Assessment

Hazard Identification

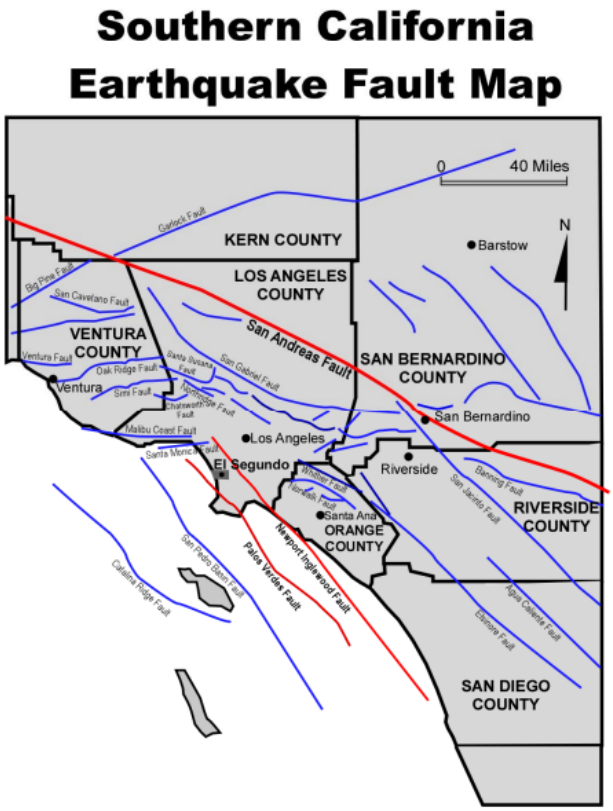
The following map plots the various major faults in Southern California. The Southern California Earthquake Data Center predicts that somewhere in Southern California will likely experience a magnitude 7.0 or greater earthquake about seven times each century. About half of these will probably be on the San Andreas "system" (San Andreas, San Jacinto, Imperial, and Elsinore Faults), and half will be on other faults. The equivalent probability in the next 30 years is 85 percent.

Many agencies in California are focused on seismic safety issues, including the State's Seismic Safety Commission, the Applied Technology Council, the Governor's Office of Emergency Services, the United States Geological Survey, Cal Tech, the California Geological Survey, and a number of universities and private foundations.

In partnership with other state and federal agencies, these organizations have undertaken a rigorous program in California to identify seismic hazards and risks, including active fault identification, bedrock shaking, tsunami inundation zones, ground motion amplification, liquefaction, and earthquake-induced landslides. Seismic hazard maps have been published and are available for many communities in the state through the California Division of Mines and Geology.

According to the City of El Segundo Multi-Hazard Mitigation Plan, several major active faults exist in Los Angeles County, including the San Andres, Newport Inglewood, Elsinore, San Jacinto, Whittier, and Norwalk. The Newport Inglewood Fault is considered to be the greatest potential threat to El Segundo, due to its proximity to the city.

Map 10: Southern California Earthquake Faults
Source: Southern California Earthquake Data Center



Vulnerability Assessment

The effects of earthquakes span a large area, and large earthquakes occurring in many parts of the Southern California region would probably be felt throughout the region. However, the degree to which the earthquakes are felt and the damages associated with them may vary. At risk from earthquake damage are large stocks of old buildings and bridges: many high-tech and hazardous materials facilities: extensive sewer, water, and natural gas pipelines; earth dams; petroleum pipelines; and other critical facilities and private property located in the county. The relative or secondary earthquake hazards, which are liquefaction, ground shaking, amplification, and earthquake-induced landslides, can be just as devastating as the earthquake.

The California Geological Survey has identified areas most vulnerable to liquefaction. Liquefaction occurs when ground shaking causes wet granular soils to change from a solid state to a liquid state. This results in the loss of soil strength and the soil's ability to support weight. Buildings and their occupants are at risk when the ground can no longer support these buildings and structures. The following map identifies areas in the vicinity that are subject to liquefaction and landslides associated with earthquake activities.

The City of El Segundo has facilities near liquefaction zones as shown on the following map. The liquefaction-prone areas are in the coastal locations in the city.

Map 11: Slide and Liquefication Hazards
Source: City of El Segundo Multi-Hazard Mitigation Plan

Community Climate

According to the City of El Segundo Multi-Hazard Mitigation Plan, the temperatures in the City of El Segundo range from 55 degrees Fahrenheit (F) in winter to 70 degrees F in summer. However, the temperatures can vary over a wide range, particularly when the Santa Ana winds blow, bringing higher temperatures, very low humidity, and strong winds. Rainfall in the region averages 12 inches of rain per year. But the term "average" means very little in this region as the annual rainfall has ranged from only 4.35 inches in 2001-2002 to 38.2 inches in 1883-1884 (Los Angeles). Furthermore, actual rainfall in the Southern California region tends to fall in large amounts during sporadic and often heavy storms rather than consistently over storms at somewhat regular intervals. In short, rainfall in Southern California might be characterized as feast or famine within a single year.

El Segundo is a coastline community that enjoys mild temperatures and plenty of sunshine throughout the year. The warmest months are typically August and September, with an average maximum temperature of 76.1 degrees F. The coolest months are typically December and January, with an average minimum temperature of 47.7 degrees F. The average annual rainfall of about 12.02 inches occurs primarily during the winter months, between November and March. (*Western Regional Climate Center*) Humidity is typically between 55 and 85 percent, depending on the time of year.

Community Population/Population Densities

El Segundo's population grew steadily from the town's inception but spiked dramatically after WWII. With limited available space to build housing, the town's residential population eventually leveled off at just over 16,731. That number will increase slightly with the construction of several large multi-unit condo and townhome complexes.

While many families descending from the town's original settlers have remained in El Segundo through multiple generations, the city has seen a large influx of new residents in recent years; many of them younger, educated professionals. They choose El Segundo not just because they work there but also because of the community's excellent schools, low crime, quiet neighborhoods, city services, and small-town charm. Meanwhile, El Segundo's daytime population peaks at approximately 80,000 people daily, thanks to the vast number of employees who work there.

Population

- Workforce population = 70,000+
- Total residential population = 16,731
- Families = 4,105
- Family income (median) = $109,577
- Households = 7,410.

Age

- 22.3% under the age of 18
- 6.7% from 18 to 24
- 31.1% from 25 to 44
- 29.8% from 45 to 64
- 10.1% who are 65 years of age or older
- Median age: 39.2
- For every 100 females, there are 108.3 males.

Educational Attainment (18 years and over)

- High school graduate or higher: 90.7%
- Bachelor's degree or higher: 46.4%.

Ethnicity

- African American = 337
- Asian = 1,458
- Caucasian = 12,997
- Latin/Hispanic = 2,609
- Native American = 68
- Pacific Islander = 38
- Other race = 799
- Two or more races = 957

The City of El Segundo is a unique city with distinct and identifiable areas. These distinct areas, along with the difference in population between the resident population of 16,731 and the daytime employment population of approximately 80,000, create unique opportunities for the city.

There is a very strong residential base, a mixture of single-family and multi-family residential. According to the 2010 Census, over one-half of the population lived in multi-family units.

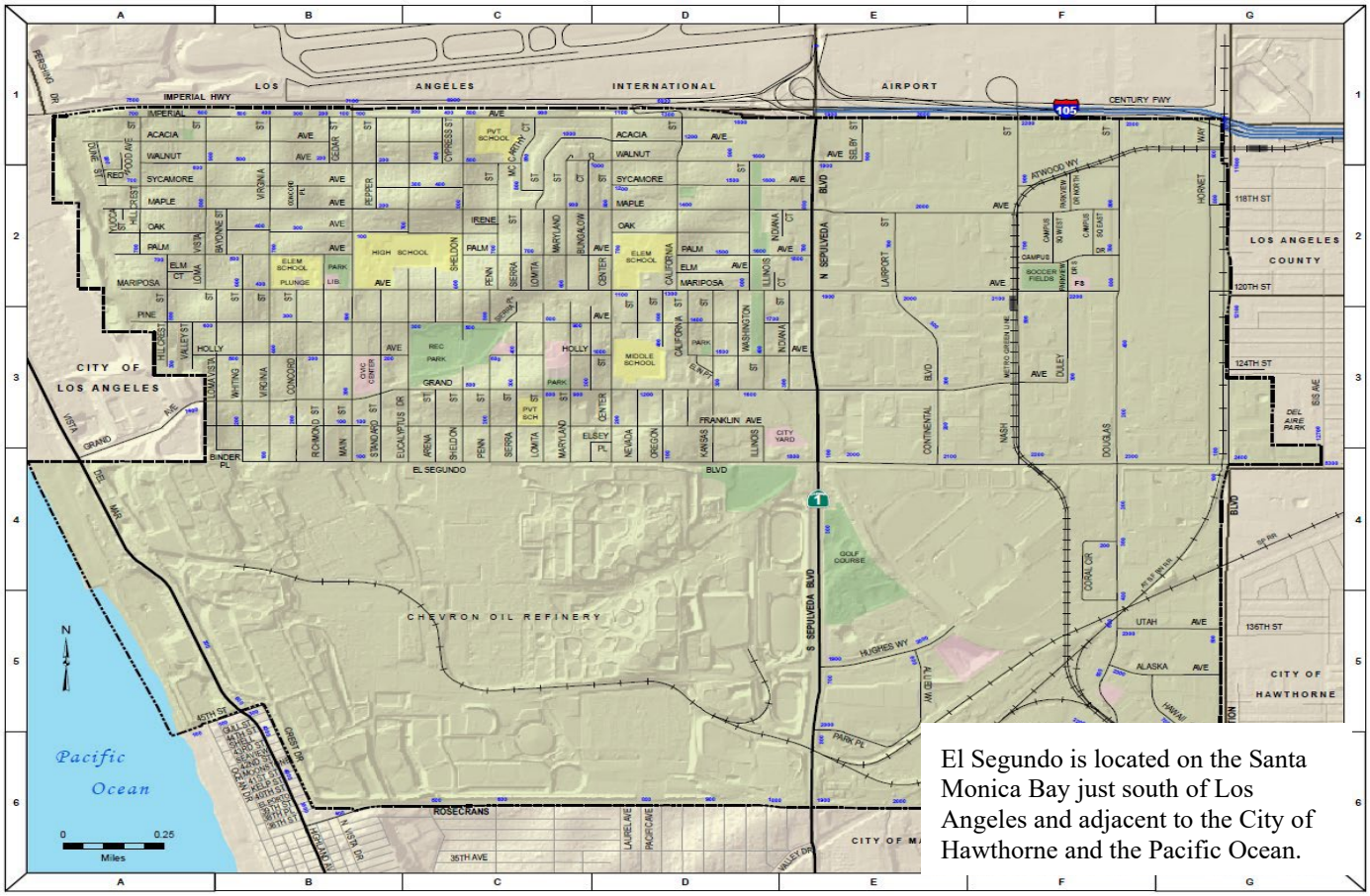
Near the residential area is downtown, which includes the civic center and provides a strong focal point for the city. Also in this general vicinity is an older industrial area called Smoky Hollow. This area contains mostly older industrial buildings of one or two stories.

The area of the city south of El Segundo Boulevard and west of PCH is taken up mostly by the Chevron Refinery. The refinery occupies approximately one-third of the city. The refinery also occupies a portion of the coastal zone, along with El Segundo Generating Station. The beach area is publicly owned and accessible.

The portion of the city east of PCH is a combination of industrial, office, and commercial uses. This area contains the U.S. Air Force Base and development with a mixture of office and research and development uses.

The City of El Segundo is subdivided into distinct residential, commercial, and industrial sections. The Chevron El Segundo Oil Refinery is in the southwestern part of the city.

Map 12: El Segundo Communities/Zoning



Population

Population Estimates, July 1, 2019 (V2019): (V2091): 16,731

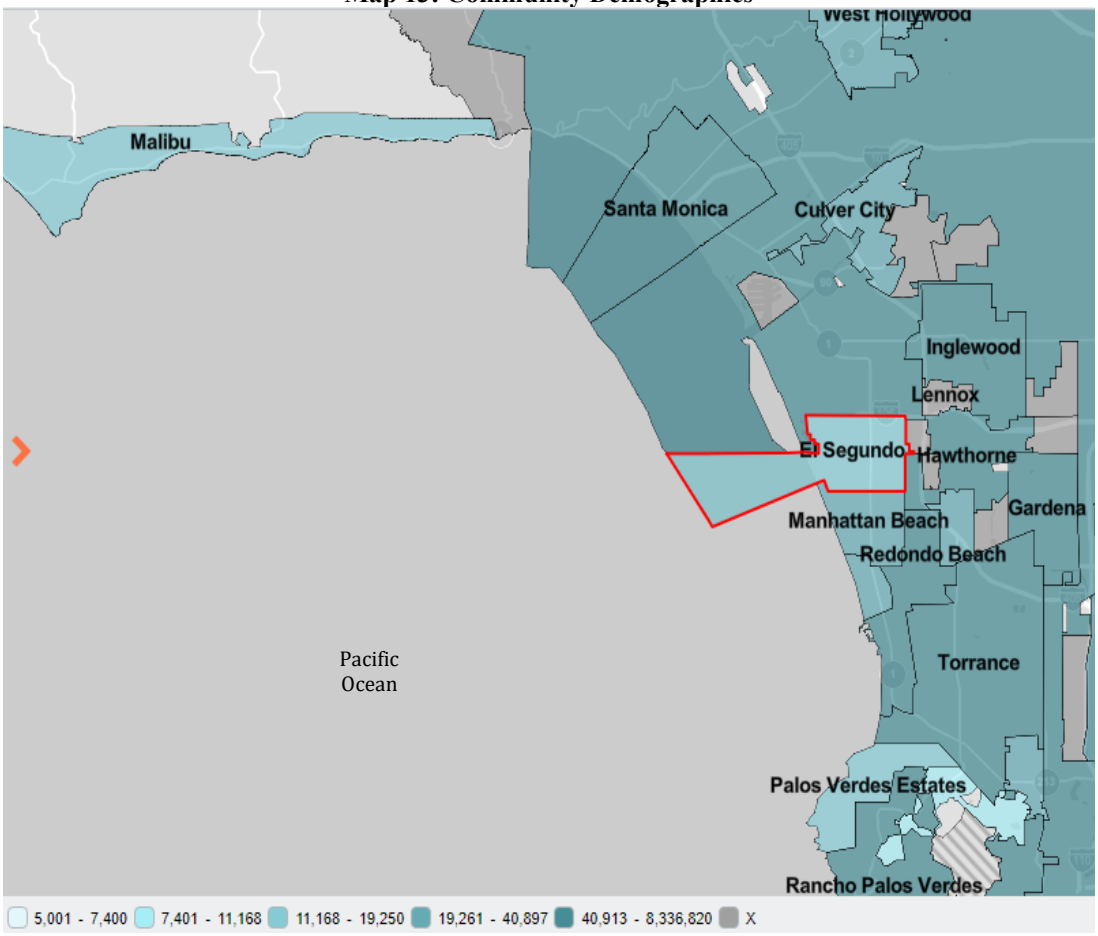
Population, Percent Change, April 1, 2010 (estimates base) to July 1, 2019 (V2019)

Population, Census, April 1, 2010: 16,654

Community Demographic Features

El Segundo is located on Santa Monica Bay just south of Los Angeles and adjacent to the City of Hawthorne and the Pacific Ocean. According to the U.S. Census Bureau's 2019 American Community Survey, the city has an approximate population of 16,731 or 3,048.5 per square mile. While the residential population is quite small, the city can experience an increase of up to 80,000 due to the number of employees working within the city and people passing through the city at any given time. This is partly due to the approximate 6,000 small businesses and Fortune 500 companies residing in the city.

Map 13: Community Demographics



The median household income is $109,577, with only 5.9 percent of persons in poverty. The higher median income may be attributed to 58.4 percent of the population over 25 having a bachelor's degree. The census bureau also reports more than 50.6 percent of the population is made up of women, with 24.2 percent of the population under the age of 18 years and only 10.5 percent over 65 years of age. It was also noted that only 4.2 percent of the population under 65 years of age are considered to have a disability. The ethnicity breakdown within this city is made up of the following:

Table 1: Race and Hispanic Origin

Race and Hispanic Origin	
White alone, percent	71.8%
Black or African American alone, percent (a)	3.7%
American Indian and Alaska Native alone, percent (a)	0.2%
Asian alone, percent (a)	10.2%
Native Hawaiian and Other Pacific Islander alone, percent (a)	0.1%
Two or More Races, percent	9.5%
Hispanic or Latino, percent (b)	**16.2%**
White alone, not Hispanic or Latino, percent	62.0%

The cost of housing in the South Bay is considered higher than in most communities due to its proximity to the ocean. El Segundo's median gross rent is $1,928 (2019), while 43 percent of the population are homeowners with an average mortgage of $3,727.

B. History of the Agency

Major Historical Milestones of the Department

The El Segundo Fire Department has been protecting the city for more than 100 years. Located just south of Los Angeles International Airport (LAX), the City of El Segundo is composed of 5.4 square miles overlooking the Pacific Ocean and has a residential population of approximately 17,000. The daytime population in the city can easily rise to over 80,000 people during business hours. This increase is due to the diverse business population at facilities such as Chevron, Mattel, AT&T, Xerox, Northrop-Grumman, Boeing, Raytheon Systems, Aerospace Corporation, and Los Angeles Air Force Base, along with hundreds of other small businesses. The Chevron Refinery, located in the southwestern portion of the city, is composed of over 1,000 acres and is one of the largest employers in the city. Chevron began its operations in 1911 as the Standard Oil refinery, and the town of El Segundo began to take shape near the entrance to Standard's second refinery (El Segundo - the second) on the west coast.

The history of fire protection in the City of El Segundo began when Standard Oil chose this small beach town next to the Pacific Ocean as their new site for a refinery. When the refinery and its apparent fire hazards came to the town, the needs for fire protection were apparent.

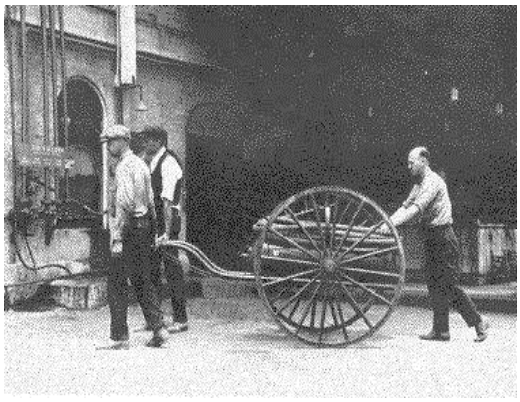
In 1898, Standard Oil had a small basic refinery in the growing town of Los Angeles. The firefighting practices were still developing, just like the refinery business. Fire engines were horse-drawn with steam-driven pumpers that generated the fire streams to extinguish fires. The lack of adequate equipment and training exposed the department and its inadequacies when a fire erupted due to the carelessness of a worker who was smoking while picking up a wagonload of petroleum products. A panicked, ill-prepared crew abandoned the operation, and the fire quickly spread. The Los Angeles Fire Department attempted to extinguish the fire but had little success. They quickly maneuvered into defensive tactics to save the surrounding businesses. With the loss of the whole refinery and the growing land costs, the Standard Oil Company started looking for a new home in Southern California. This second refinery for Standard Oil on the west coast was called El Segundo ('the second' in Spanish) and would become the largest refinery in the world. Fire protection was the oil company's first concern upon choosing a new site. Being next to the Pacific Ocean, there was a constant source of water that fit right into their plans to build a top-of-line saltwater distribution system. Hydrants were strategically placed every 300 feet with water pressure ranging from 125 pounds per square inch (psi) to 150 psi. The new water system was well suited for training with equipment and staffing.

1898 - The Standard Oil refinery had a small, basic refinery in the City of Los Angeles. Poor fire protection and training resulted in a fire that destroyed the plant, prompting a move to the unincorporated area of what is now the City of El Segundo.

1911 - A few concerns when relocating were fire protection and water supply. The area selected needed to be adjacent to the seashore for adequate water supply where tankers could unload oil. Standard Oil surveyors chose the undeveloped and unpopulated area of El Segundo as their new home.

1914 - One of the city's first big tests came when a fire started in the Richmond Street business district. The townspeople tried to fight the fire but were quickly overrun. The insufficient water pressure from the water system was apparent as workers from Standard Oil responded to save their town. They stretched a hose line on their hose carts from the north end of the refinery using a high-pressure water system, and they were able to extinguish the fire successfully.

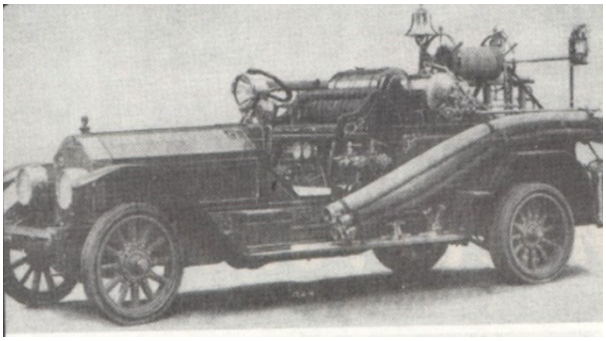
The town of El Segundo was a true boomtown during this era. The local marshal had his work cut out for him. Made up of entirely wood buildings and tents, the infrastructure was quickly built with no regard for safety. The local railroad had not come directly to town, and all firefighting equipment had to be freighted by wagon from the railroad. In November 1914, the first attempt by the local citizens to protect themselves from fires was made as they purchased two hand-drawn hose carts, shipped on the Pacific Electric Railway. They obtained 600 feet of hose from the refinery and used the town's limited hydrant water system. They would ring large steel triangles kept near the town's hose cart as an alerting system.



1915 - As the small town was growing in the early 1900s, the aspect of providing a more organized form of fire protection was of the highest priority. El Segundo could not rely on the inadequate water systems and a non-structured volunteer firefighter program. The El Segundo Chamber of Commerce Secretary, Mr. R.R. Davis, sent a petition to the Los Angeles County Board of Supervisors on June 14, 1915, requesting to establish a fire district in El Segundo. A law was enacted in 1909 authorizing the appointment of a fire commissioner by the board of supervisors upon filing a petition signed by fifty or more taxpayers and residents of any town or village. This law provided for fire protection, levying of taxes, etc.

1917 - On April 18, 1917, a resolution was adopted by the El Segundo Board of Trustees to establish a volunteer fire department. Eighteen citizens volunteered to assist with developing the city's first fire department. Most of these brave men were employees of Standard Oil. On December 19, 1917, the following personnel were approved for the offices of the volunteer fire department: G.W Draggo Fire Chief, L.A. Snyder, Assistant Chief, J.Mahla Second Assistant Chief, C.D. Mason, Captain, F.H. Staton, First Lieutenant, D.D. McKenzie, Second Lieutenant, M.Kock, Secretary.

1918 - On June 5, 1918, the office of a fire engineer was created. C.C. Beard was appointed to this position. The driver operator of a fire apparatus has specialized duties. With regard for the welfare of the public, department personnel and the limitation of equipment shall govern the operation of all apparatus (Ref: 1958 Rules and Regulations Ch.#1 pg. 15 / Ch. 10 Old History Document)



1924 - On September 12, 1923, the American La France Fire Engine Manufacturing Company submitted a proposal to furnish the City of El Segundo with an American La France Fire Engine Type 12, 105 horsepower, double 80-gallon, motor-driven chemical engine for the sum of $5,375.00. The company officer rang the engine's bell while responding to emergencies, warning other motorists and pedestrians to move aside and allowing the firefighters to reach their destination. That bell is still in service today, mounted on the Fire Station #1 apparatus floor, rung for "still alarms" and many different types of special services or events.

1928 - On September 15, 1928, the Standard Oil fire whistle blew when a fire broke at the refinery and spread out of control, killing four men trying to extinguish the blaze. Charles E. Lambert, Ralph Keller, Thomas J. Davis, and Fred J. Holden died in the line of duty. They were buried on September 21, 1928. As the City of El Segundo was organizing its fire department, neighbors to the south were experiencing heavy loss of life due to their lack of organized fire protection. Due to this incident, Standard Oil organized its fire department, using its employees and training them as reserve firefighters. At one point, the initial refinery fire department would be the same size as a small military battalion.

1941 - In September 1941, the city council awarded a contract for a new fire engine. A Maxim Fire Engine was delivered and put into service in June of that year. The American La France remained in service for 24 years.

1947 - On November 24, 1947, under the direction of Public Safety Commissioner W.B. Baker, Chief McConnell was able to usher in a new chapter in the El Segundo Fire Department history. The fire department hired six paid professional firefighters: F.L. Ingram, H.G. Chamberlain, C.W. Dinwiddie, J.A. Brennan, C.E. Kyler, and W.I.J. Coulter. After several weeks of intensive training under the supervision of Captain Walton of Huntington Park, the department's formation was complete. The transition from volunteer to professional was made easier by supplementing the workforce with volunteers that would now be called "call men." As the City of El Segundo continued to grow with new industry along with the expansion of residential homes, the demands for fire protection were quickly outgrowing the volunteers and Chief McConnell's efforts. The need for a full-time paid fire department was imminent.

Chief McConnell served many years as chief of the volunteers and was instrumental in transitioning from volunteers to a paid professional department. On December 16, 1947, the torch was passed to Chief Donald J. Farrar. Chief Farrar was Chief of the Fire Prevention Bureau at Alameda Naval Air Station before his appointment. One of Chief Farrar's first acts was to have his personnel undergo more intense training conducted by members of the California State Department of Education and Fire Training Division. On November 24, 1947, a professional fire department was established with six members. Donald Farrar was appointed as the first fire chief.

Chief McConnell

Chief Donald Farrar

On December 5, 1947, a line of duty death occurred. A fire erupted inside a storage tank at the refinery. Glen A. Todd was working nearby when an explosion and fire trapped employee James E. Morris behind a wall, in a place he could not self-extricate. As a member of the El Segundo Volunteer Fire Department and the Chevron Fire Department, Glen recognized that the employee was trapped and vaulted over a wall to rescue James without regard for his safety. After navigating through a raging inferno, he grabbed the man and moved him into a safe location. Sadly, 24-year-old James E. Morris succumbed to his injuries sustained in the explosion. Later that same afternoon, Firefighter Glen Todd suffered a massive heart attack and died as a result.

Firefighter Glen Todd

1948 - The El Segundo Fire Department initiated its first emergency medical system and started responding to life-threatening medical emergencies. During that same year, the Firemen's Association raised funds to purchase a new rescue truck, which remained in service until 1962.

In May 1948, the El Segundo Firemen's Association presented a stage show at the high school auditorium, appropriately named "Blaze." The local citizens and industry responded generously. The proceeds from the show allowed the Firemen's Association to purchase and donate a Chevrolet Rescue Truck to the City of El Segundo. The new rescue truck is shown in front of Old Fire Station #1 at 203 Richmond Street. The fire station had one bay door opening onto Franklin. At the time, the city hall, police station, and fire station were all in one building with the shared address of 203 Richmond Street.

In September 1948, the department needed to add another fire engine to meet the fire protection needs of the city. The city council awarded a contract for a new Maxim 1,250 gallon per minute (gpm) fire engine.

1951 - A fire prevention bureau was established. The bureau was set up to augment the primary duties of fire department personnel by preventing fires and minimizing hazardous material events.

1955 - In April 1955, a new Triple Combination Van Pelt Fire Engine was delivered and put into service.

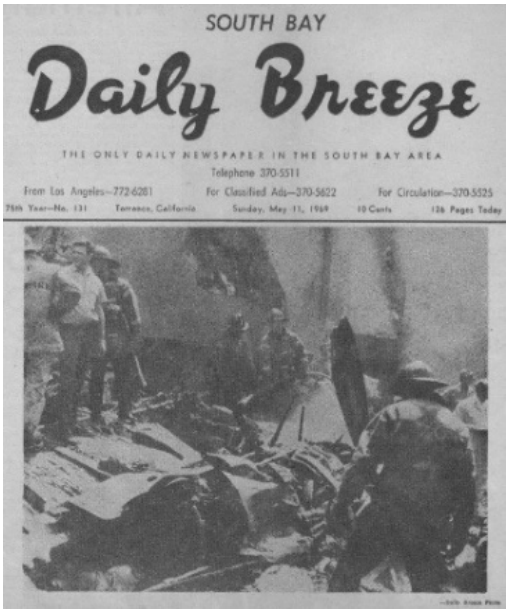
1957 - The city council agreed to build a second fire station east of Sepulveda.

1960 - The Rose Bowl, a popular bowling center and restaurant, caught fire. Today, the 99-cent store stands in its place.

1961 - El Segundo Fire Department joined the Hawthorne Fire Department to have a joint fire dispatch center. A mainstay of the dispatch center was ring-down telephones on telephone poles throughout El Segundo and Hawthorne, where the public could call in a fire emergency.

1965 - December 13, 1965 training at Fire Station #2 from the hose tower. At this point, the city had 40 firefighters.

1969 – In May 1969, a converted B-26 bomber crashed at 335 Eucalyptus Drive in El Segundo. The plane was taking off for its second flight of the day, testing equipment, when it crashed, killing six people.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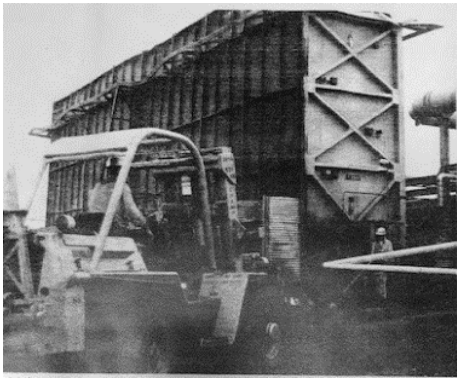
1974 - In March 1974, the El Segundo Fire Department established its first paramedic program, which enhanced its ability to provide community members advanced life support (ALS) services. Since the program's inception, countless numbers of lives have been saved. Throughout the past 45 years, 66 firefighter/paramedics have served the City of El Segundo. The paramedic program has continued to evolve and progress over the last four decades and serves as a critical component of the overall mission of the El Segundo Fire Department.

In February 1974, El Segundo Fire Department joined the South Bay Public Regional Communications Authority to form the first regional dispatch center in California, serving Palos Verdes Estates, Redondo Beach, Hermosa Beach, Manhattan Beach, Hawthorne, and Gardena.

1982 - In 1982, an arson investigation team consisting of fire and arson investigators from the South Bay were adopted to examine the physical attributes and evidence from a fire scene. Evidence collected is used to analyze to help determine if the cause of the fire was accidental or deliberate.



1989 - The urban search and rescue (US&R) program was established by the El Segundo Fire Department, led by Battalion Chief Rich Guyer and Firefighter/Paramedic Mark Simpson. This highly technical and advanced rescue program provides lifesaving services during a major disaster, such as a catastrophic earthquake or other natural or human-made disaster, anywhere in California. After its inception on May 8, 2003, the El Segundo Fire Department US&R program received a Single Resource Type-2 Medium Rescue typing issued by the California Governor's Office of Emergency Services (OES). On March 13, 2008, the US&R program received a coveted Type-1 Heavy rescue distinction. The original US&R 31 was a 1987 Ford C-8000 with a Hesse body. This apparatus, a former Corona beer truck, was donated to the department. A new paint scheme on the apparatus and miscellaneous equipment was donated by local companies. The apparatus is cross-staffed by a cadre of a dozen US&R instructors that form the California Governor's Office of Emergency Services (OES) medium-level rated team. Today's US&R 32 is a 2005 Spartan (Cab) Hackney (Trailer).

Fire guts building, toxic runoff affects park

1992 - Firefighters battle a blaze that destroyed five buildings occupied by Field Manufacturing Corporation on 122 Eucalyptus Drive. The building was used for plating materials.

1993 - A fire erupted in a vacant two-story building, with flames shooting 70 feet in the air. Approximately 75 firefighters from El Segundo and the surrounding cities were used to extinguish the fire.

1995 - The first annual, department-hosted CPR Saturday was launched for El Segundo residents to receive free cardiopulmonary resuscitation (CPR) training.

1997 - The first community emergency response team (CERT) class was taught. The course is designed to train volunteers in the community to assist their co-workers and neighbors during large-scale disasters and emergencies.

1999 - A fire broke out in Raytheon's research and development laboratory, sending thick plumes of smoke and the smell of burning plastic in the air. The fire started in the basement of E-1.

2007 - The special weapons and tactics (SWAT) medic program was launched. Firefighters and paramedics were immersed in a highly trained paramilitary team. Cross-trained with the El Segundo Police Department, this team can tackle any situation beyond the capability of conventional police forces. SWAT teams are called in when an incident presents a significant risk to law enforcement officers or the public.

2008 - A new Fire Station #2 was built to meet the demands of El Segundo's high technology pace and provide a new state-of-the-art facility. This station has been referred to as the "Farmhouse," given the station's original location off El Segundo Boulevard, neighboring a farm. Today, it is in a highly developed commercial and industrial area, neighboring the Los Angeles Lakers. Eight firefighters respond out of the station, staffing Engine 32, Truck 32, and Rescue 32. Most calls are to the high-rise buildings, large industrial complexes, and business centers.

2011 - A helicopter crashed into Raytheon building E-1 while doing heavy lifting. The building suffered heavy fire, water, and smoke damage. Approximately 70 firefighters responded to this incident from surrounding cities.

2014 - The city purchased its first tiller ladder truck.

2015 - Rapid extraction module support (REMS) was established by the fire department in accordance with the California Governor's OES. This program is a highly technical and advanced rescue team. REMS teams are pre-staged and assigned to a wildland fire incident to provide firefighters with a safe, effective, and efficient method of egressing off the fire line in the event of injury or illness during firefighting operations.

2017 - The El Segundo Fire Department celebrated its 100th year of service and tradition.

The Department Today

Currently, the El Segundo Fire Department is made up of 42 fire suppression personnel, including three battalion chiefs, nine captains, nine engineers, twelve firefighter/paramedics, and nine firefighters. There are 14 fire suppression personnel on duty each day, divided into three platoons (A, B, C). The department includes two fire engine companies, one tractor-drawn ladder truck, two paramedic rescue ambulances, and one battalion chief command vehicle. The US&R unit is crossed staffed by the ladder truck personnel and is always available to respond to any technical emergency. In addition to the fire suppression personnel, the fire prevention bureau is comprised of three personnel, including one fire marshal and two fire prevention inspectors. Environmental safety is comprised of three personnel, including one environmental safety manager, one environmental safety specialist, and one management analyst. The fire administration division, responsible for the overall administrative operations of the fire department, is comprised of one fire chief, one senior administration analyst, and one administrative specialist.

Fire Station #1 is located at 314 Main Street and serves the residential community, the Chevron refinery, El Segundo Beach, and light industrial and manufacturing businesses in the "Smoky Hollow" area. Station #1 was originally built in 1951 and, to keep up with the expanding community needs, was remodeled in 1986 and again in 2017. Engine 31, Rescue 31, and Battalion 31 are staffed and housed at Station #1.

Fire Station #2 is located at 2261 East Mariposa Avenue and serves the commercial and industrial businesses east of PCH. This area contains 21 high-rise office buildings, 37 low-rise buildings, and numerous hotels. The elevated Metropolitan Transit Authority (MTA) Green Line light rail travels through the district. Station #2 was built in 2009 and has received numerous environmental awards for its "green" design and functionality. Station #2 is home to Engine 32, Truck 32, Rescue 32, and US&R 32.

El Segundo Fire Department's emergency communications are provided by South Bay Regional Public Communications Authority (SBRPCA) from a state-of-the-art dispatch center with an enhanced 9-1-1 system. In 2018, the El Segundo Fire Department responded to 2,872 incidents, as illustrated in the following graphs:

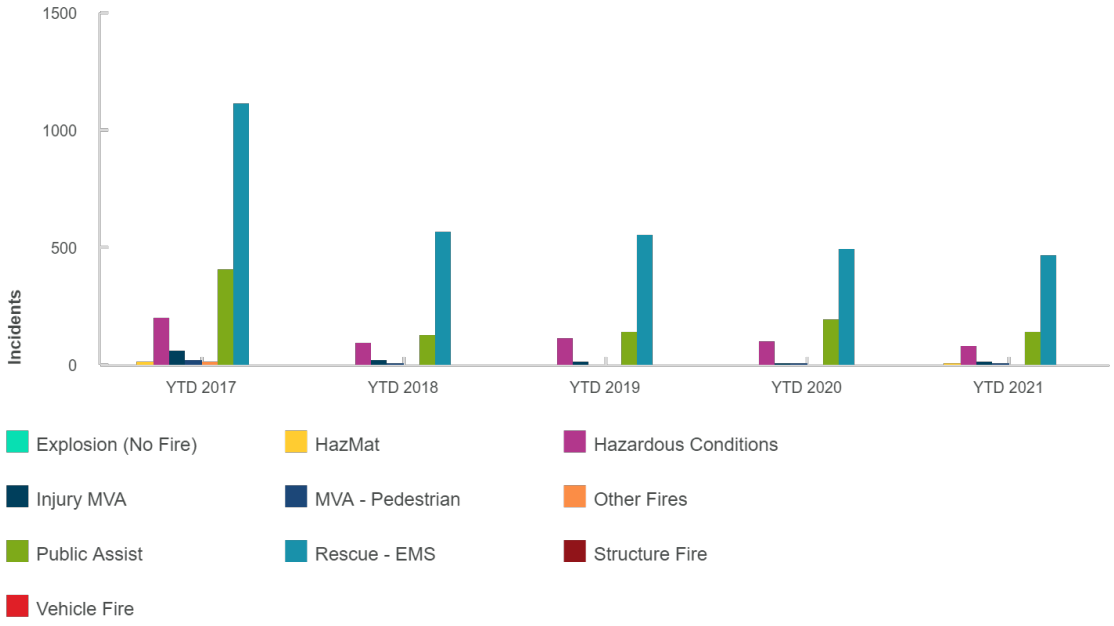


Figure 1: Total Incidents by Incident Category - YTD Comparison

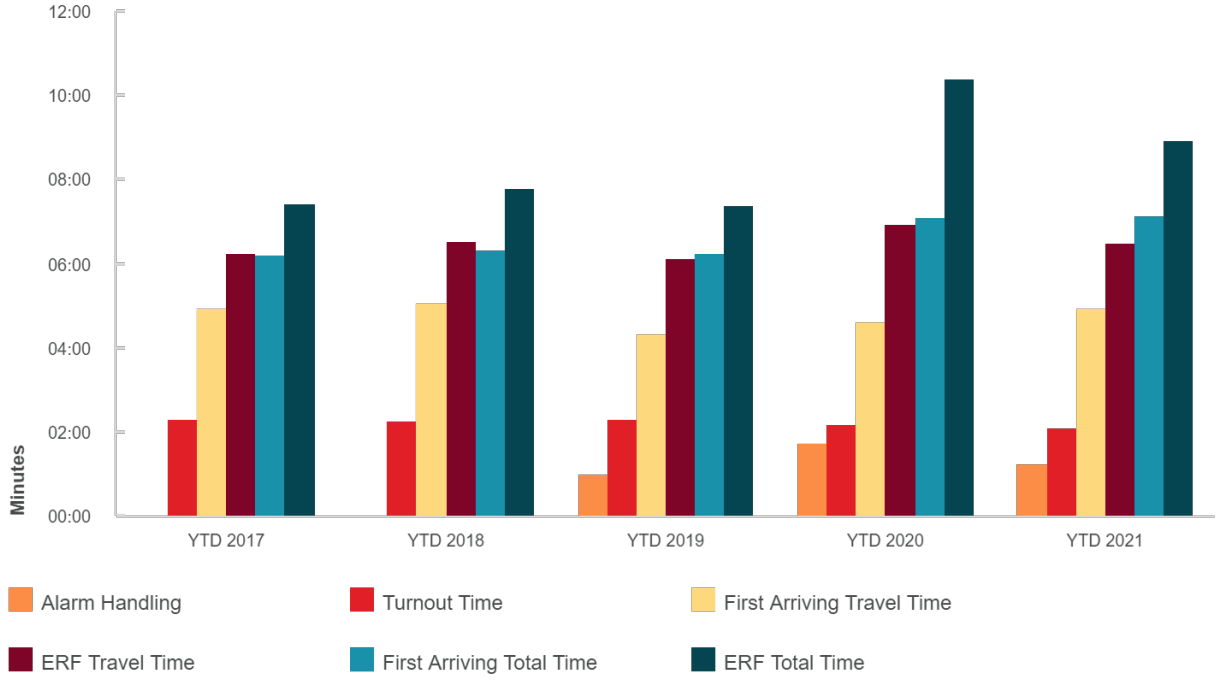


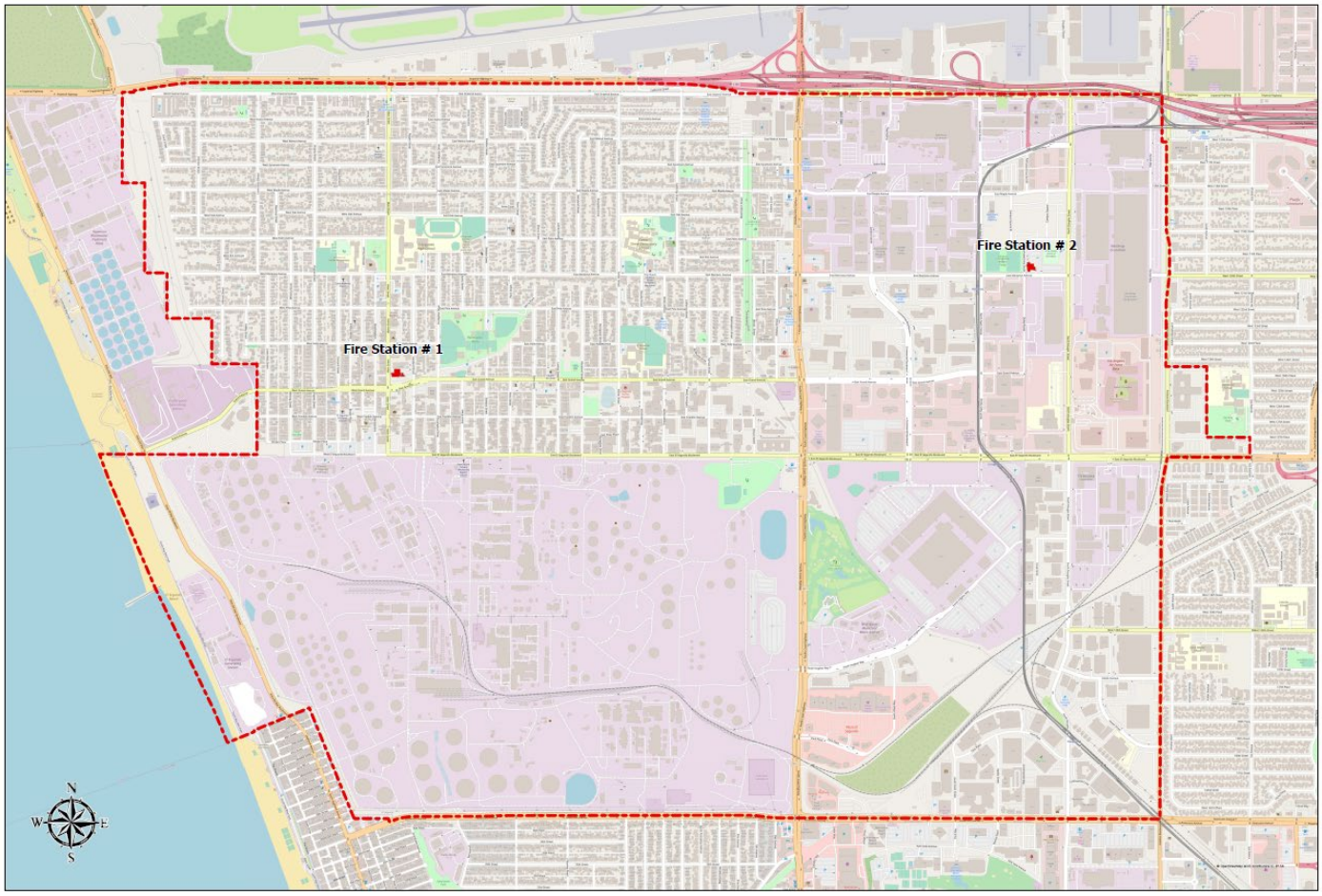
Figure 2: Response Time Categories - YTD Comparison

The El Segundo Fire Department enjoys a proud tradition of providing high-quality service to the community. The department has had 276 firefighters serve the City of El Segundo in the past 100 years. The department is committed to continuing the tradition of providing excellent service well into the future.

Current Legal Boundary of Service Area

El Segundo is located 14 miles southwest of downtown Los Angeles, adjacent to LAX. The city is bordered by the San Diego (405) and Century – Glen Anderson (105) Freeways. El Segundo is bound by LAX and Imperial Highway (north), Rosecrans Avenue (south), Aviation Boulevard (east), and the Pacific Ocean (west) – with just over three miles of public beaches: El Segundo Beach, Dockweiler State Beach, and the city and county of Los Angeles. Two major rail lines also traverse or pass near the city, and the MTA Green Line provides commuter access to the city from the South Bay and South-Central Los Angeles.

Map 14: Station Locations



Current Organization, Divisions, Programs, and Services

The main divisions within El Segundo Fire Department are:

Administration – The fire administration division is tasked with the overall effectiveness and efficiency of the fire department. The team includes the fire chief, senior management analyst, and administrative specialist. The team is responsible for the administrative management and coordination of all activities within the department, including budget coordination and management, personnel, and payroll administration, grant administration, contract management, billing, cashiering, revenue recovery, procurement, planning, and organizational development.

Fire Suppression and Rescue – The El Segundo Fire Department Suppression Division provides fire, emergency medical, and life safety services to the community.

Key services provided:

- Extinguishing fires
- Emergency medical treatment and transportation
- Responding to disasters (natural and human-made)
- Executing specialized technical rescue response
- Controlling hazardous materials incidents
- Providing public assistance.

The suppression division conducts regular outreach, education, and awareness programs to the community and assists the fire prevention bureau by conducting annual business inspections throughout the city. The division includes battalion chiefs, captains, engineers, and firefighters delivering service with the highest level of competency, safety, and customer service. The team is responsible for supplying and maintaining all fire suppression and emergency-related equipment. It administers and coordinates all suppression training needs to meet state and federal mandates. By working with other city departments and staff, the suppression division can efficiently and effectively supply, staff, and perform the duties and functions necessary for the fire department to protect and keep the community safe.

Emergency Medical Services (EMS) is a well-organized system that contains all aspects of medical care provided to patients in the pre-hospital or out-of-hospital environment. The El Segundo Fire Department, along with its paramedic transporting capabilities, serves as a critical component of the health system and a necessary link to improve the outcome of injuries and other time-sensitive illnesses. The EMS program is governed by the Los Angeles County Emergency Medical Services Agency and must adhere to all county protocols. The EMS program-required medical director is contracted by the city to provide medical advice and serve as the city's drug authorization physician for purchasing drugs, medical devices, and controlled substances for the department. The medical director also advises on and coordinates medical aspects of field care as defined by the Los Angeles

County EMS Agency. Additionally, the city contracts with the University of California, Los Angeles (UCLA) Center for pre-hospital care to provide continuing education in pre-hospital and emergency medicine for staff to maintain licensure.

Training – As an "all-risk" agency, the El Segundo Fire Department trains on the various specialties that may be encountered in the city. The department averages an annual 12,000 hours of training in multiple disciplines, from low frequency, high-risk, to high frequency, low-risk emergencies. Not only does the department train to safely extinguish all types of fires, including structure fires, industrial/flammable liquid fires, wildland fires, and vehicle fires, but training also includes preparation for hazardous materials incidents, urban search and rescue, auto extrication, multi-casualty incidents, active shooter, and radio communications procedures.

Prevention – The El Segundo Fire Department Fire Prevention Division, headed by the fire marshal, is responsible for enforcing fire/life safety and reducing the risks associated with loss of life and property. Through annual fire inspections of commercial and multi-residential buildings, technical plan reviews, and fire investigations, fire prevention can address community risk reduction issues and develop appropriate public education programs.

Public Education – Supervised by the fire marshal, this division provides life-saving campaigns and training programs devoted to protecting lives and property through prevention and public education. The fire prevention division educates the community about fire prevention and provides fire safety education services to the El Segundo business community, including:

- the use of fire extinguishers;
- evacuation training and drills;
- proactive emergency planning to deal with fires, medical emergencies, chemical releases, earthquakes, power outages, and bomb threats.

Community Awareness - The fire prevention division and the El Segundo Rotary Club sponsor an annual community awareness campaign and fire prevention poster contest. The contest is held annually in October to commemorate the "Great Chicago Fire" and raise awareness within the community about fire prevention. The contest engages all 3rd, 4th, and 5th-grade students in El Segundo schools. Poster contest winners are honored at an El Segundo Rotary Club Rotary meeting and the fire prevention week luncheon.

Environmental Safety Division works to continually meet or exceed the city's and public's expectations for environmental safety by promoting industry involvement, developing community awareness programs, and overseeing the management of hazardous materials through education and enforcement of federal and state requirements. The environmental safety division is comprised of an environmental safety manager, a principal environmental specialist, and a management analyst. The environmental safety division has oversight of El Segundo's Certified Unified Program Agency (CUPA) which authorizes the application of statewide standards to each facility within the jurisdiction.

Emergency Management Coordinator provides guidance and recommendations, and serves as the city's technical advisor for emergency preparedness plans, functions, and initiatives. Focused on all phases of emergency management, including mitigation, preparedness, response, and recovery, the emergency management coordinator ensures El Segundo's resiliency. The emergency management coordinator prepares and maintains the city's emergency readiness/preparedness plan in compliance with various local, state, and federal requirements; reviews and approves city departments' contingency plans; coordinates emergency response plans with neighboring cities, local agencies, and businesses; serves as the city's point of contact with external officials on emergency preparedness; maintains the city's emergency operations center and emergency supplies in a state of readiness; maintains and tests area communications systems for readiness effectiveness and efficiency.

Additionally, the emergency management coordinator develops and conducts ongoing updated emergency preparedness response and recovery training for all city employees, including the development and maintenance of the city's all-hazards incident management team; chairs emergency preparedness planning meetings and committees as assigned; makes presentations to city council, committees, the community and business groups; prepares and communicates evacuation and related emergency management plans for tenants of medium- and high-rise buildings within the city; conducts in-home resident meetings; functions as city liaison with media, amateur radio operators and school districts. The coordinator researches new emergency response and recovery legislation; reviews emergency plan against city resolutions and ordinances for accuracy and compliance with current legislation, codes, regulations, and ordinances; receives applications for disaster assistance for the state or federal governments; completes, submits, and tracks claims to Federal Emergency Management Agency (FEMA) and prepares other written and/or verbal reports, logs and statistics; researches and prepares grant applications for services, equipment, supplies, and programs related to emergency preparedness; and administers grants and maintains financial and related records.

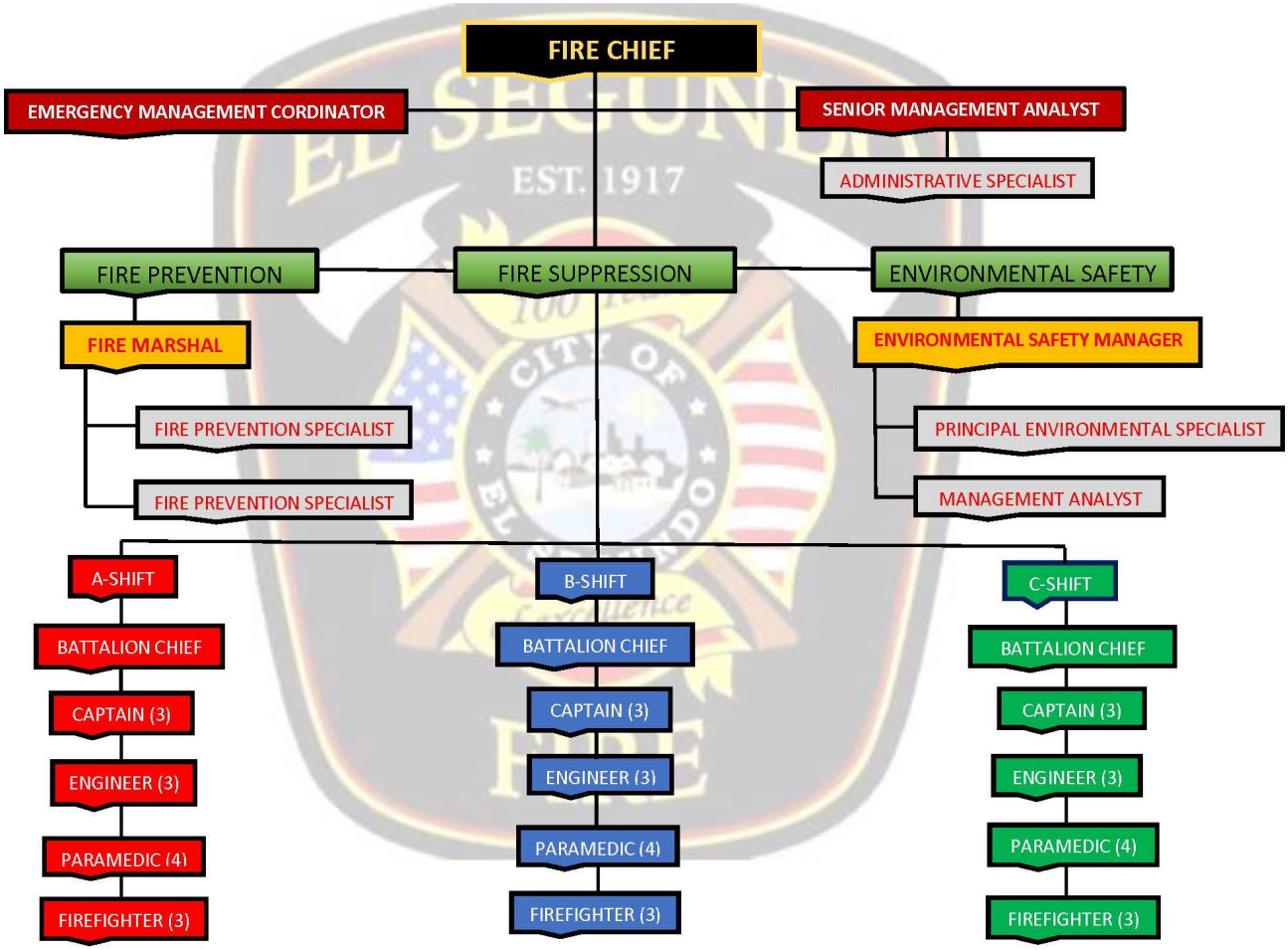


Figure 3: Organizational Chart

Fire Stations, Training Facilities, Apparatus, Equipment, and Staffing

Suppression Staffing and Coverage

The El Segundo Fire Department's suppression personnel work a 56-hour, 48/96 schedule, divided into three platoon shifts with one platoon commander. Personnel staff five "front line" apparatus, including two engines, one tiller ladder truck, and two paramedic rescues 24 hours a day, 365 days a year. The daily suppression staffing is 14 personnel.

El Segundo Fire Station #1
314 Main Street
El Segundo, CA 90245
310-524-2395

Fire Station #1 is "headquarters" housing six firefighters responding on Engine 31, Rescue 31, and Battalion 31. Additionally, fire administration, fire prevention, and environmental safety personnel work out of the station, making it an important facility for fire and medical response and a myriad of business services related to the fire department. Responding predominately to the 16,000 residents who call El Segundo home, the station is also first-due to an industrial area of Smoky Hollow, El Segundo Beach, and the Chevron Refinery.

Engine 31
2016 Pierce Arrow XT pumper
1500 GPM PUC pump
Staffed with three personnel

Battalion 31
2018 Chevy Suburban
Staffed by one battalion chief

Rescue 31
2019 Ford F-450 ALS rescue ambulance built by Braun
Staffed with two firefighter paramedics

Reserve Engine 33
1993 Pierce Lance pumper
1750 GPM pump

Station #1 is staffed with one captain, one engineer, and one firefighter assigned to Engine 31. A rescue is also staffed with two paramedic firefighters. A battalion chief staffs the battalion chief rig.

El Segundo Fire Station #2

2261 E. Mariposa Avenue

El Segundo, CA 90245

310-524-1990

Fire Station #2 has been referred to as the "Farmhouse," given the original location of the station off El Segundo Boulevard, neighboring a farm. Today, it is in a highly developed commercial and industrial area, neighboring the Los Angeles Lakers. Quite a move up in the neighborhood! Eight firefighters respond out of the station and staff Engine 32, Truck 32, and Rescue 32. Most calls are to the high-rise buildings, large industrial complexes, and busy business centers that cause the population to swell to over 65,000 additional people who work in the city.

Engine 32
2019 Pierce Arrow XT pumper
1500 GPM Pierce Ultimate Configuration (PUC) pump
Staffed with three personnel

Rescue 32
2019 Ford F-450 ALS rescue Ambulance built by Braun
Staffed with two firefighter paramedics

Truck 32
2014 Pierce 105' Arrow XT
1500 GPM PUC pump
Staffed with three personnel

REMS 32
2019 Ford F-250 4-wheel drive
Used as REMS-truck
Used to support US&R incidents with personnel and equipment transport

US&R 32
2005 Spartan/Hackney US&R
CA OES Type I Heavy status

Engine 34
2007 Pierce Quantum 1750 GPM pumper

Station #2 is staffed with one captain, one engineer, and one firefighter assigned to Engine 32. Truck 32 is staffed with the same complement, and a rescue is staffed with two paramedic firefighters. US&R 32 is cross-staffed with members of both the truck and engine companies.

C. Current Descriptions of Levels of Service with Delivery Programs

Fire Suppression

The fire suppression division consists of a fire chief, battalion chiefs, captains, engineers, paramedics, and firefighters. The service delivery model is committed to the highest level of competency, safety, and customer service. Suppression personnel protect life, property, and the environment through fire prevention and the provision of structural and wildland fire protection. There is a constant demand to maintain all fire suppression and emergency-related equipment while coordinating all training to meet the requirements of state and federal mandates. In addition, the suppression division has a strong working relationship with other city departments and staff to effectively supply, staff, and perform the duties and functions necessary for the fire department to protect and keep the community safe.

Emergency Medical Services

El Segundo paramedics provide complete EMS to the residents and business community of the City of El Segundo. The department serves the community with two paramedic rescue ambulances, each staffed with two firefighter/paramedics, two fire engines, and one tiller ladder truck. All El Segundo Fire Department heavy apparatus is designated paramedic assessment units staffed with at least one paramedic daily. The department has an additional paramedic rescue ambulance as a replacement unit that can be utilized anytime, as needed.

The firefighter/paramedics are licensed by the state and fully accredited by the County of Los Angeles. All firefighter/paramedics must complete a minimum of 48 hours of continuing education every two years and complete annual skills and educational updates.

Technical Rescue

In 1989, a US&R program was established in El Segundo. The highly technical and advanced rescue program can provide lifesaving services during major natural or human-made disasters anywhere in California. The El Segundo Fire Department's US&R program is proud to be classified as a Type-1 Heavy rescue by the California Governor's OES. A battalion chief administratively manages the program, and responsibilities for specialized programs are managed by company officers. A program advisor provides historical and technical advice, and three shift training officers develop and implement training. One fire engineer is responsible for the operation and maintenance of the program's vehicles. The US&R program provides technical rescue capabilities and lifesaving operations in dynamic environments, including confined space rescue, trench collapse stabilization and rescue, high and low angle rope rescue, structural collapse stabilization and rescue, and vehicle and machinery extrication and rescue. The department provides US&R support for the City of El Segundo, mutual aid to California Region 1, Area "G" cities, mutual aid to the State of California as a Type-1 Heavy US&R program, and as a member of California Regional Taskforce 2 (CA-RTF-2). The department has an established comprehensive training program, including weekly training that ensures personnel are familiar with the safety, operations, and troubleshooting of the equipment carried on the US&R vehicle.

Hazardous Materials

Managing hazardous materials incidents is legally a federal, state, county, city, and private industry partnership. The El Segundo Fire Department responds to hazardous materials incidents at the operations level. The primary responsibility centers on scene management, assessing the hazard, notification of the proper agencies, and providing the necessary interim measures to minimize the effects of a hazardous condition on people, the environment, and property. The first arriving company is responsible for providing initial size-up, initiating the incident command system, initiating strategic priorities, and requesting additional resources if needed. When dealing with hazardous materials incidents, the priorities of the El Segundo Fire Department are the protection of life, the protection of the environment, and the protection of property. Los Angeles County Fire Department provides technician and specialist level hazardous materials response upon request.

Wildland Fire Services

The El Segundo Fire Department maintains a continued state of readiness for wildland fire suppression. As an "all-risk" department, the department believes in aggressive wildland suppression, taking a proactive stance as opposed to a reactive posture. Through pre-existing mutual aid agreements with neighboring agencies, the department is routinely a part of the South Bay Strike Team, consisting of five of the same type of engine to provide structural protection (each engine comes from a different agency to minimize strain on resources). Staffed with four personnel, the Type-1 engine performs a range of firefighting tactics in suppressing wildfires.

When an engine is sent out, a reserve engine is placed in service in its place, and call-in personnel staff it. Strike teams can be deployed for up to two weeks. At that point, all vehicles return home, or the personnel are swapped out with a new crew if needed.

Specialized Services

Rapid Extrication Module Support

The El Segundo Fire Department REMS team is a highly technical and advanced rescue team that, once assigned, pre-stages at a wildfire to provide firefighters a safe, effective, and efficient method of egress off the fire line in the event of injury or illness during operations. Currently, the department provides two members and equipment to team up with the Torrance Fire Department's two members and equipment to form a complete REMS team.

Tactical Paramedic Program

The tactical paramedic program started in 2007 and provides a team of specially trained paramedics to assist the El Segundo Police Department SWAT team. Tactical paramedics are trained in tactical movement, the use of body armor and other specialized police equipment, and tactical medical care. Tactical paramedics may be used in situations involving warrants, hostages, bomb threats, and any other event where traditional paramedics should not enter. Tactical paramedics train monthly with the El Segundo SWAT team and attend other training as needed.

Arson Investigation

Department fire investigators, with the assistance of fire investigators from South Bay departments, examine the physical attributes of a fire scene and identify and collect physical evidence from the scene. The scene examination, observations, and evidence collected are then analyzed to determine the origin and cause.

Community Emergency Response Team (CERT)

CERT educates individuals about disaster preparedness for hazards that may impact their area, and trains them in basic disaster response skills, such as fire safety, light search and rescue, team organization, and disaster medical operations. Using the training learned in the classroom and during exercises, CERT volunteers can assist others in their community following a disaster when professional responders are not immediately available to help. CERT volunteers are encouraged to support emergency response agencies by actively participating in emergency preparedness projects. CERT is a volunteer organization of trained individuals from the community, school district, and business community who will help themselves and others during a major emergency when first responders are overwhelmed and cannot respond to all the calls for help. The El Segundo Fire Department currently has three specialized programs that include community (CERT), businesses (BERT), and the school district (SERT) to offer El Segundo a comprehensive training program.

Community Safety and Remediation Programs

Community safety and remediation programs exist to prevent and reduce the loss of life in the event of a natural disaster. The prevention division, headed by the fire marshal, is set up to enforce and manage fire and life safety codes through the review and installation of fire protection systems. Furthermore, the prevention division annually inspects properties for compliance with fire and life safety codes. In addition, the City of El Segundo employs an emergency manager responsible for developing and maintaining a city-wide emergency operations plan (EOP) and the emergency operations center (EOC). Lastly, the emergency manager manages the CERT. Public education aims to keep the public informed about the causes and prevention of fires, major medical emergencies, and overall awareness of what to do in the event of a disaster.

D. Current Deployment and Coverage Areas

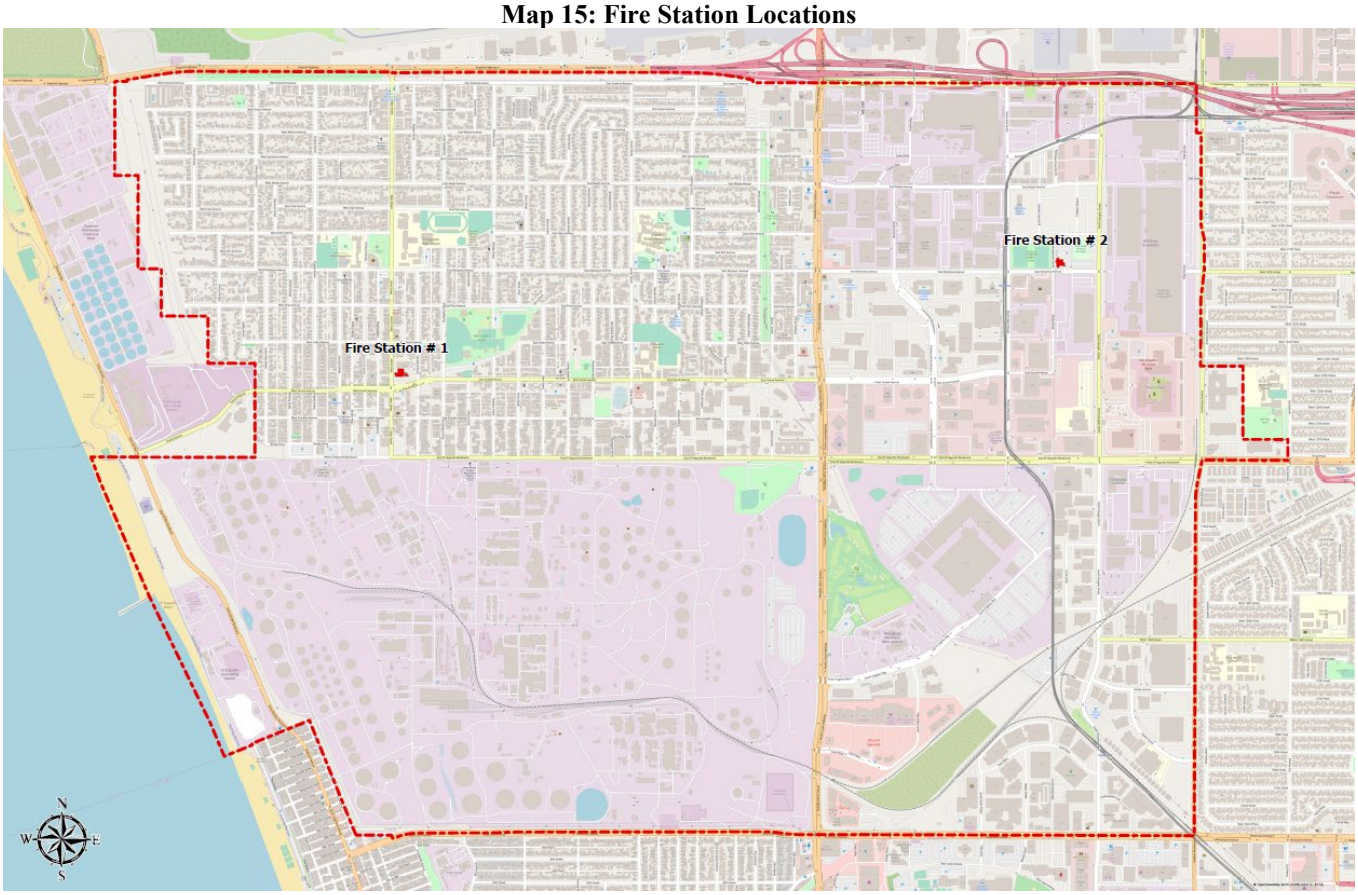
Points of Service Delivery

Currently, the El Segundo Fire Department is made up of 42 fire suppression personnel, including 3 battalion chiefs, 9 captains, 9 engineers, 12 firefighter/paramedics, and 9 firefighters. There are 14 fire suppression personnel on duty each day, divided into three platoons (A, B, C). The department includes two fire engine companies, one tractor-drawn ladder truck, two paramedic rescue ambulances, and one battalion chief command vehicle. The US&R unit is crossed staffed by the ladder truck personnel and is always available to respond to any technical emergency.

Fire Station #1 is located at 314 Main Street and serves the residential community, the Chevron Refinery, El Segundo Beach, and light industrial and manufacturing businesses in the "Smoky Hollow" area. Station #1 was originally built in 1951 and has expanded since then to keep up with the expanding communities' needs. The station was remodeled in 1986 and again in 2017. Engine 31, Rescue 31, and Battalion 31 are staffed and housed at Station #1.

Fire Station #2 is located at 2261 E. Mariposa Avenue and serves the commercial and industrial businesses east of PCH. This area contains 21 high-rise office buildings, 37 low-rise buildings, and numerous hotels. The elevated MTA Green Line light rail travels through the district. Station #2 was built in 2009 and has received numerous environmental awards for its "green" design and functionality. Station #2 is home to Engine 32, Truck 32, Rescue 32, and US&R 32.

Map 15: Fire Station Locations



Minimum Deployment Resources

The following table illustrates the units and personnel assigned at each station. There are always 14 personnel on duty. Station #1 has six members assigned to serve the community west of PCH, and Station #2 has eight members assigned to serve the areas east of PCH.

Table 2: Minimum Deployment Resources

Station	Staffing	Primary Apparatus	Apparatus Designator
1	6	Type 1	Engine 31
		Rescue	Rescue 31
		Command	Battalion 31
2	8	Type 1	Engine 32
		Rescue	Rescue 32
		Quint	Truck 32
		Technical Rescue	USAR 32

Mutual Aid System

A statewide mutual aid system, operating within the framework of the master mutual aid agreement, allows for the progressive mobilization of resources to and from emergency response agencies, local governments, operational areas, regions, and state with the intent to provide requesting agencies adequate resources.

The statewide mutual aid system includes several discipline-specific mutual aid systems, such as fire and rescue, law, medical, and public works. The adoption of the standardized emergency management system (SEMS) does not alter existing mutual aid systems. These systems work through local government, operational area, regional, and state levels consistent with SEMS.

Mutual aid may also be obtained from other states. Interstate mutual aid may be obtained through direct state-to-state contacts, pursuant to interstate agreements and compacts, or may be coordinated through federal agencies.

Local Mutual Aid

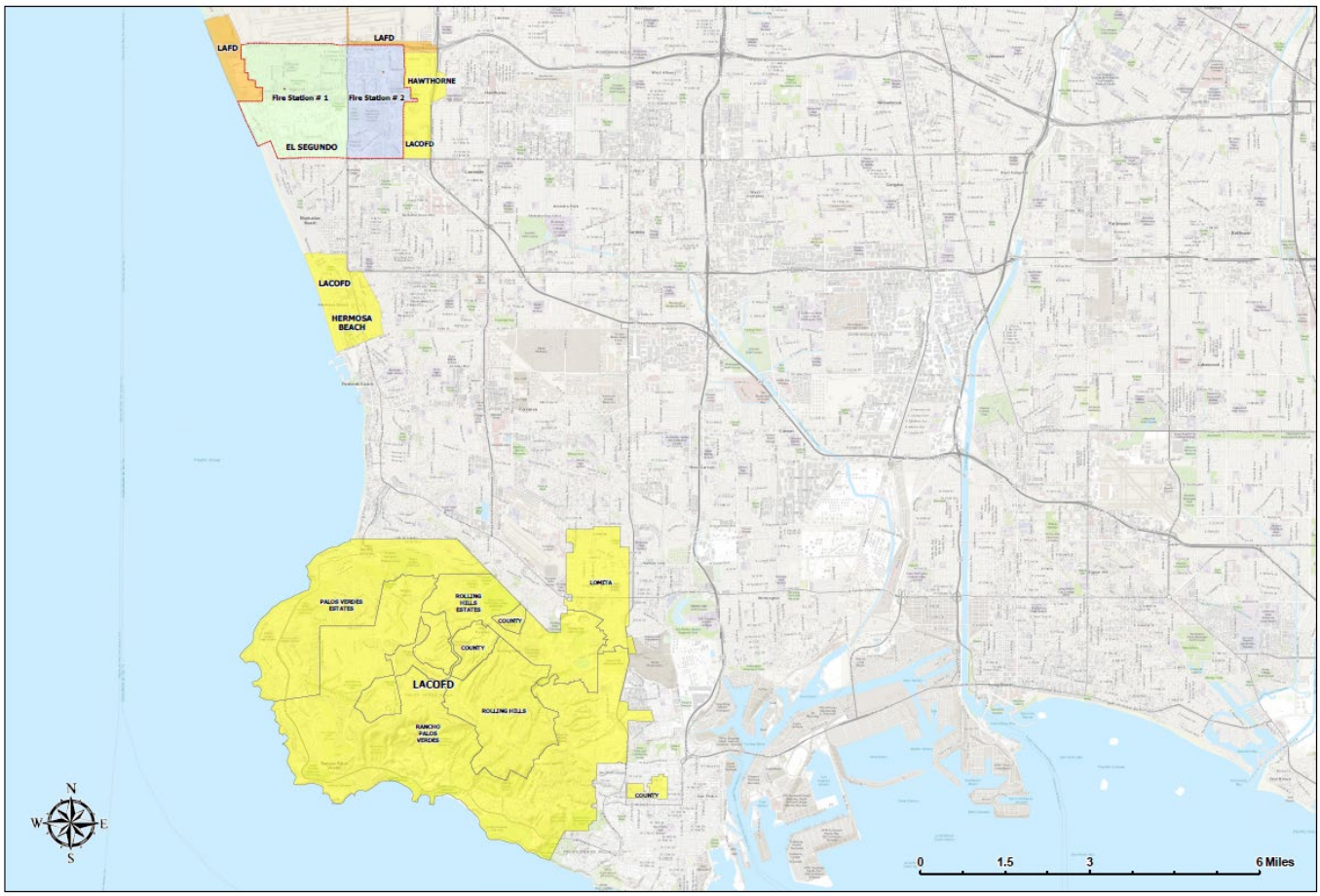
The El Segundo Fire Department has a mutual aid agreement under the State of California Office of Emergency Services Mutual Aid Plan. The department is in Region 1, Los Angeles County – Area G. Area G Fire Mutual Aid Coordination is among Area G cities, including El Segundo, Garden, Hawthorne, Hermosa Beach, Inglewood, Lawndale, Lomita, Manhattan Beach, Palos Verdes Estates, Rancho Palos Verdes, Redondo Beach, Rolling Hills, Rolling Hills Estates, and the City of Torrance.

When the City of El Segundo needs mutual aid, the first protocol is to initiate automatic aid using an "alarm" (formerly "plan") system. The "alarm" system is a three-tiered response system developed by the Area G Fire Chiefs' Association (1st, 2nd, 3rd alarm). When this automatic aid system is exhausted, the El Segundo Fire Department incident commander would contact the Area G Fire Coordinator and request formal mutual aid. If the Area G Fire Coordinator could not meet the resource request, the Area G Fire Coordinator would contact the Operational Area Fire Coordinator for additional resources. If unsuccessful, the Operational Area Fire Coordinator would contact the

Region 1 fire mutual aid coordinator, who would contact the other operational areas in Region 1 until the resources were acquired. The City of El Segundo has contracts with the following agencies:

- Los Angeles County Fire Department
- Los Angeles City Fire Department
- Manhattan Beach Fire Department
- Redondo Beach Fire Department
- Torrance Fire Department

Map 16: Local Mutual Aid Agencies Map



Mutual Aid Regions

Mutual aid regions are established under the Emergency Services Act by the governor. Six mutual aid regions numbered I-VI have been established within California. The City of El Segundo is located within Region 1. Each mutual aid consists of designated counties. Region I is in the OES Southern Administrative Region.

E. Summary of Community Response History

Response Areas

Station #1 – El Segundo Fire Station #1 is located on Main Street, just east of the Pacific Ocean. The response area covers everything west of PCH and includes the entire residential population of 17,000. It is considered headquarters, and all administrative staff have office space within the station.

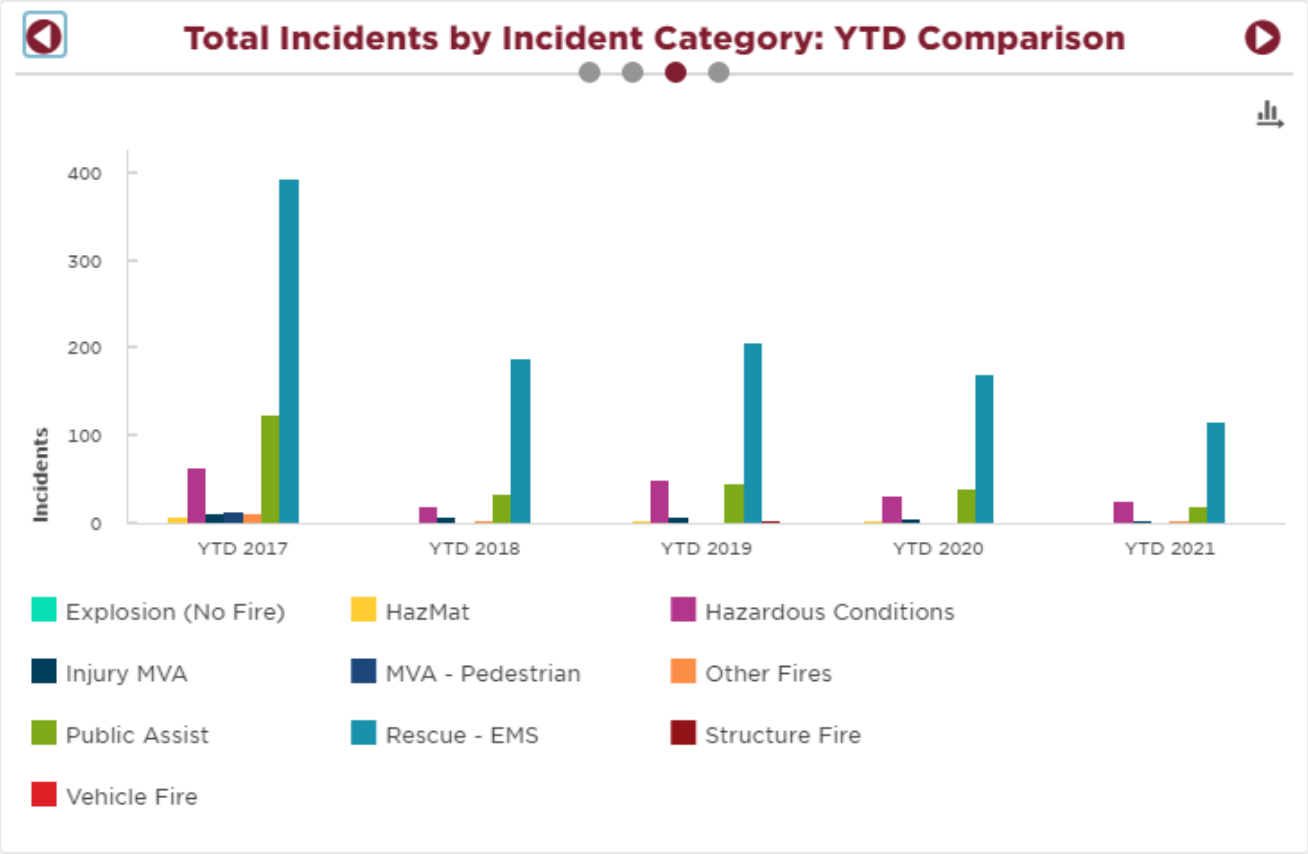


Figure 4: Total Incidents by Incident Category

Station #2 – All of the industrial areas east of PCH are covered by Station #2. The daytime population ranges between 80,000-100,000, depending on the time of day. All the units within Station #2 are also designated for mutual aid response on an as-needed basis.

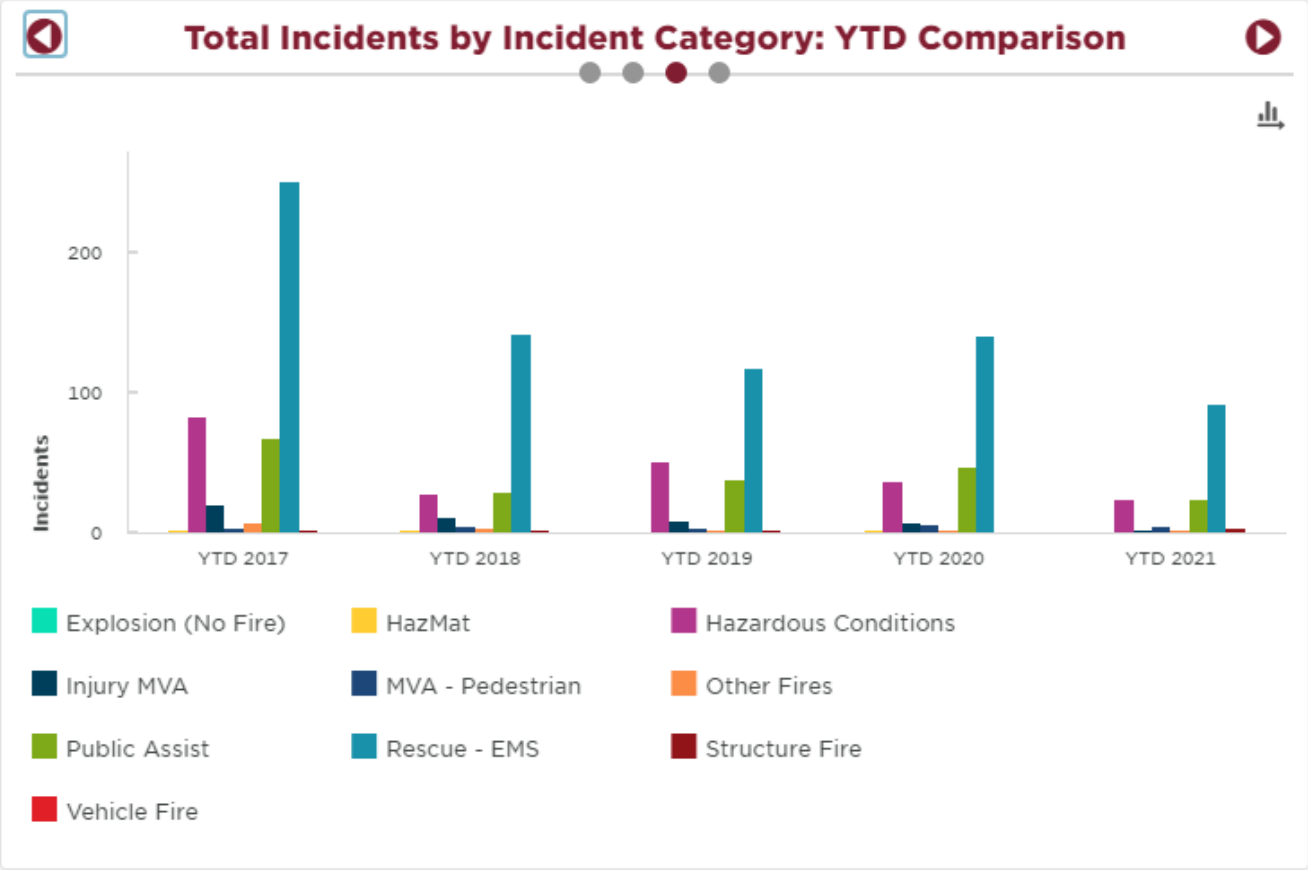


Figure 5: Total Incidents by Incident Category

F. Community Priorities, Expectations, and Performance Goals

Mission Statement

In February 2017, during a two-day gathering of ideas, philosophies, and traditions, the department developed a new mission statement. What members came up with represents the department of the future and also aligns with the history and expectations of the community served.

The purpose of the mission is to answer the questions:

- Who are we?
- Why do we exist?
- What do we do?
- Why do we do it?
- For whom?

A workgroup met to revisit the existing mission and, after ensuring it answered the questions, the following mission statement was created, discussed, and accepted by the entire group.

Committed to Protecting Our Community Against All Risks

Ethos

The ethos embraced by all department members are extremely important, as they recognize the features that make up the personality and culture of the organization. A workgroup met to revisit the existing ethos and determined that the current ethos fully captures those actions that are critical to switch by the women and men.

- Integrity
- Compassion
- Dedication
- Teamwork
- Professionalism

The mission and ethos are the foundation of this organization. Thus, every effort will be made to keep these current and meaningful so that the individuals who make up the El Segundo Fire Department are guided by them in accomplishing the goals, objectives, and day-to-day tasks.

Community Service Priorities

To best dedicate time, energy, and resources to services most desired by its community, the department needs to understand what the customers consider to be their priorities. With that, the community stakeholders were asked to prioritize the programs offered by the department through a process of direct comparison. The results were as follows:

1. Emergency Medical Services
2. Fire Suppression
3. Technical Rescue
4. Emergency Management
5. Hazardous Materials Mitigation
6. Fire Prevention
7. Fire Investigation
8. Public Education
9. Environmental Safety

Community Service Expectations

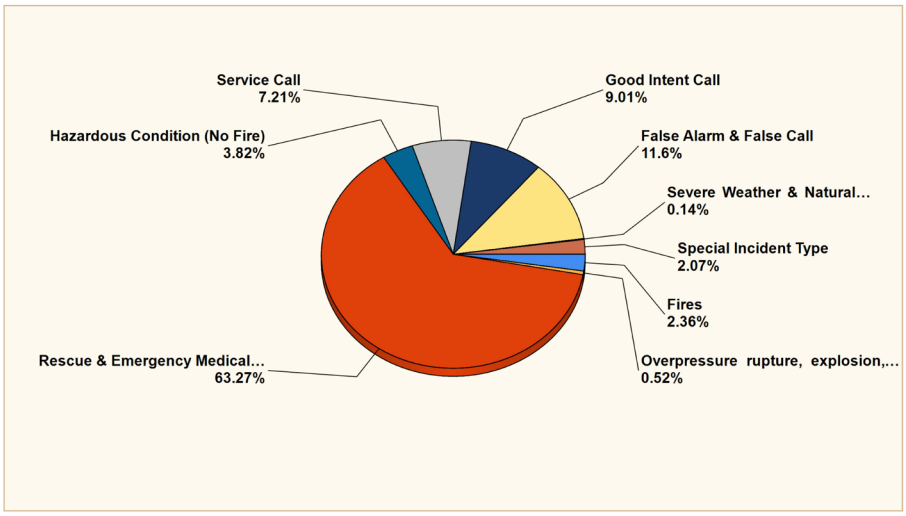
The following themes were identified as priorities during the 2020 strategic planning process:

- Fast Response Times
- Highly Trained Personnel
- Ability to Evolve/Adapt
- Positive Community Interactions
- Professionalism & Confidence
- Excellent Customer Service
- Fiscally Responsible

Goals and Objectives

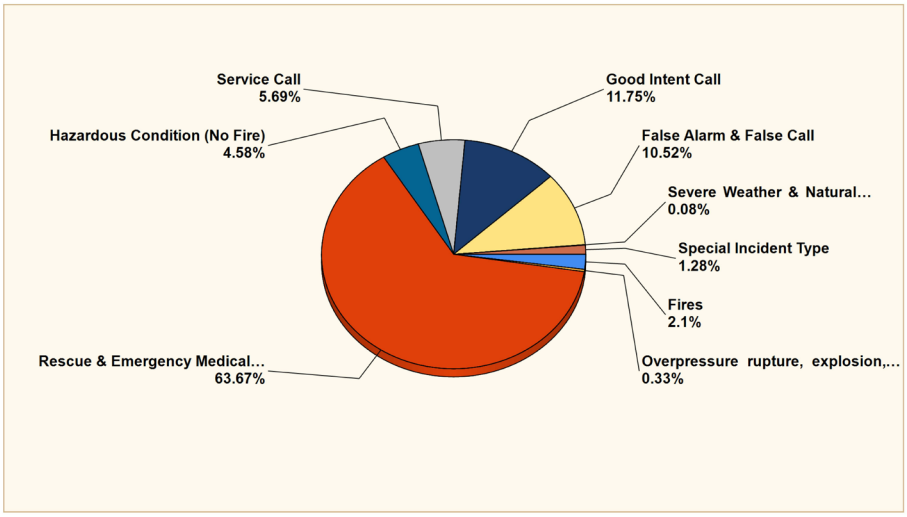
To continuously achieve the mission of the El Segundo Fire Department, realistic goals and objectives with timelines for completion have been established. These will serve to enhance strengths, address identified weaknesses, provide a clear direction, and address the concerns of the community. These are the focus of the department's efforts, as they will direct the organization to its desired future while reducing the obstacles and distractions along the way. Leadership-established workgroups will meet and manage progress toward accomplishing these goals and objectives and adjust timelines as needs and the environment change. Regular reports of progress and changes are shared with the El Segundo Fire Department's leadership.

Historical Performance Goals



MAJOR INCIDENT TYPE	# INCIDENTS	% of TOTAL
Fires	50	2.36%
Overpressure rupture, explosion, overheat - no fire	11	0.52%
Rescue & Emergency Medical Service	1342	63.27%
Hazardous Condition (No Fire)	81	3.82%
Service Call	153	7.21%
Good Intent Call	191	9.01%
False Alarm & False Call	246	11.6%
Severe Weather & Natural Disaster	3	0.14%
Special Incident Type	44	2.07%
TOTAL	2121	100%

Figure 6: Historical Performance (2019)



MAJOR INCIDENT TYPE	# INCIDENTS	% of TOTAL
Fires	51	2.1%
Overpressure rupture, explosion, overheat - no fire	8	0.33%
Rescue & Emergency Medical Service	1544	63.67%
Hazardous Condition (No Fire)	111	4.58%
Service Call	138	5.69%
Good Intent Call	285	11.75%
False Alarm & False Call	255	10.52%
Severe Weather & Natural Disaster	2	0.08%
Special Incident Type	31	1.28%
TOTAL	2425	100%

Figure 7: Historical Performance (2020)

G. Community Risk Assessment and Risk Levels

Risk Assessment Methodology

The first step in assessing the hazards involves placing the city into planning zones (smaller subdivisions of fire station response areas). This helps the department to focus on manageable areas from a risk perspective, and to paint a much clearer picture of the overall community risk. Both fire and non-fire risks are assessed within these zones.

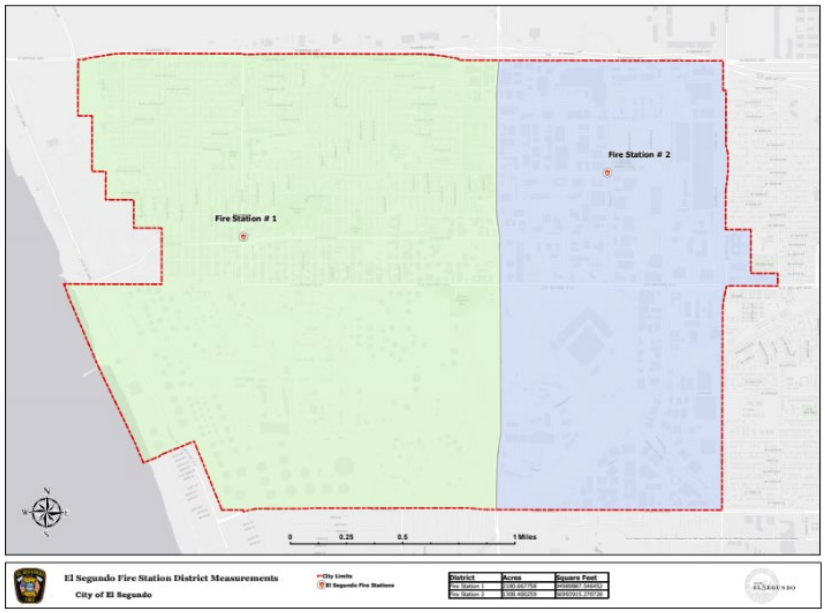
Planning Areas/Zones

The City of El Segundo is divided into two geographical planning zones known as fire districts. Each fire district is served by a fire station and defines the response area for each station. Each station is located to ensure the effective distribution of resources and limit undue risk from extended responses. In developing specific fire districts, the city is divided into response coverage areas for each fire station, called primary response areas. Using fire station primary response areas helps allow for a more consistent year-to-year comparison of distribution and concentration of resources.

Fire district one includes downtown El Segundo and the residential portion of the city. This district also encompasses the Chevron Refinery and ends at the Pacific Ocean. By geographic size, the Chevron Refinery is located in the largest planning area consisting of 2,181 acres.

Fire district two is east of Pacific Coast Highway (PCH) and encompasses most of the industrial and commercial workspace in the city. It is bordered along its eastern boundary by the 405 Freeway and the 105 Freeway to the north. The planning area is approximately 1,308 acres in size.

Map 17: Fire Districts



Risk Analysis Methodology

To establish an assessment of risk for the community, a process for managing the assessment must first be identified. This is commonly known as the risk assessment methodology or risk assessment model.

The overall goal of the risk assessment model is to allow the department's leadership to categorize the community's risk in a way that the appropriate El Segundo fire resources can be dispatched. With the risk assessment model, properties and events are placed in a rating system. This rating is based on the impact of an event at a location or event. A higher rating indicates a greater frequency of alarms or demands for service, or an infrequent event, on the other hand, could result in a high impact on the emergency service system.

There is always a probability of an event occurring. The frequency of that probability ranges from low to high. Each combination of probability and consequence creates a different risk level and different requirements in the community for a commitment of resources. A risk with a large potential loss and a low probability of occurrence is frequently treated differently from one with a lower consequence but a higher likelihood of occurrence.

There are three primary components of assessing risk: probability, consequence, and impact on the city. Probability is the likelihood that an event will occur in each given period. For example, an incident that occurs daily is considered a high probability incident, while an incident that occurs once every ten years is considered low probability. Consequence, the second component of risk assessment, measures the outcome of an event. Firefighter safety, life safety, environmental, and economic loss are the four measurable consequences. Lastly, the impact on the city is evaluated by the number and type of resources required to mitigate an incident and the resources needed to complete the tasks. Furthermore, hazards are categorized as either low, moderate, high, or maximum risk.

The consideration of maximum risk is important because it has inherent issues which often cause extreme conditions or disastrous potential. The reason for this potential is they occur infrequently but have high or extremely high consequences.

Training for these events tends to be more theoretical or simulated rather than occurring with actual incidents. Examples of this type of risk include airports, power plants, oil refineries, etc. They may involve hazardous materials or mass transit systems like the Metropolitan Transit Authority (MTA) Green Line system. Each quadrant of the chart creates different requirements in the community of El Segundo for the commitment of resources for the service being provided.

Resources are concentrated and distributed according to call volume, risk, apparatus availability, and response times. Impacts are consequently derived from each type of risk and the resources available to send to satisfy maximum coverage capabilities. As resources are depleted, the city is vulnerable to sustaining an increased threat of injury and,

in the worst-case scenario, loss. Service demands are changing continually, and the El Segundo Fire Department is adept at adjusting the distribution and concentration of resources to accommodate the city's needs.

Three-axis Methodology

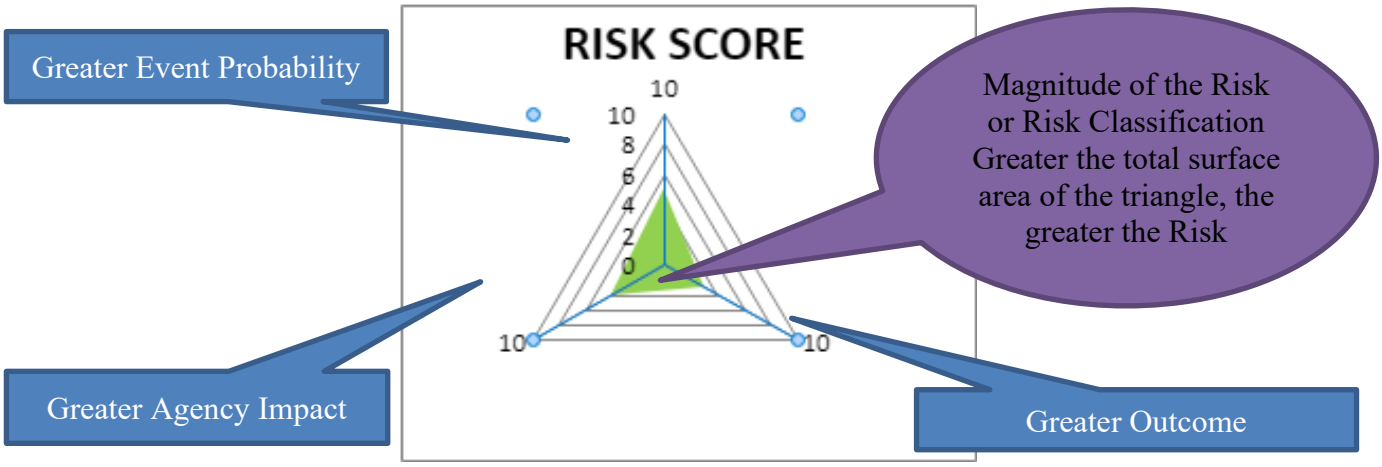
The Center for Public Safety Excellence (CPSE) provided the El Segundo Fire Department with many ways to measure risk in the community. The department elected the three-axis categorization process to measure the magnitude of risk. The three-axis chart measures the threat probability (Y-axis), consequence to the community (X-axis), and the impact on the agency (Z-axis). A point on the Y-axis indicates the relative threat (probability) that a particular type of incident will occur. A second point on the X-axis indicates the relative loss consequence a particular emergency might have on the community. A third point on the Z-axis indicates the effective response force (ERF) impact on the department should a particular event occur.

The three points form an inclusive triangle. A numerical value should be assigned by severity to each axis length. By employing a modification to Heron's formula, an objective mathematical calculation of the triangle surface area creates a risk category score based upon pre-qualified jurisdictional parameters set for risk category ranges. The visual area represented by the size and dimensions of the triangle becomes the qualitative illustration of the mathematically calculated risk score. Using this model, the department can demonstrate, with historical data, a full analysis of the city with each emergency risk category. The department collected data from the computer-aided dispatch (CAD), National Fire Incident Reporting System (NFIRS) and processed that information through *Emergency Reporting* software to develop an all-inclusive review of the unique hazards and call types present in the City of El Segundo. In this report, the department primarily focused the analysis on the three-year period of 2018-2020.

El Segundo Fire Department has attached numerical scores to the three areas of the risk analysis described above (probability, consequence, and impact). These scores range from 2-10, using even numbers only; a 2 is low probability, and a 10 is high probability. This valuation is consistent with the risk hazard and value evaluation process recommended by the Commission on Fire Accreditation International (CFAI).

Three Axis Risk Categorization

The three-axis risk categorization process measures the magnitude of the risk. The greater the total surface area of the triangle, the greater the risk category score. The further the score is from the origin point, the greater the threat probability (Y-axis), the greater the consequences to the community (X-Axis), or the greater the impact on the department (Z-axis).



The probability of the event occurring, or the likelihood of the incident based on historical data documented in the past three years.

Table 3: Probability Scores

Score	Probability
2	One to two times a year (rare)
4	Quarterly (unlikely)
6	Monthly (possible)
8	Weekly (likely)
10	Daily (almost certain)

The consequence to the community is based on the loss of life or debilitating injury, financial loss to the community, and the effect on community infrastructure. Most emergency medical service (EMS) events are tragic and serious in nature; however, the effect is usually on the patient and their family alone and not any other part of the community. This resulted in most of the scoring consequences being low or moderate.

Table 4: Consequence Scores

	Consequence		
Score	**Financial**	**Life Loss**	**Emotional/Historical/Social/Environmental**
2	No loss	No loss	No impact
4	Minor loss	Potential/loss of single life	Low impact
6	Moderate loss	Loss of a single life with potential for multiple	Moderate impact
8	Significant/substantial loss	Potential for multiple life loss	Significant/Substantial impact
10	Extraordinary loss	High probability of multiple life loss	Extraordinary impact

The impact chart represents the operational forces of the department based on the critical tasks associated with the incident. The larger the incident, the more resources that are needed.

Table 5: Impact Scores

Score	Impact (Number of Resources)
2	1-2 units
4	3-4 units
6	5-6 units
8	7-10 units
10	11 or more units

Risk Assessment

To understand the process and components of a community risk analysis, it is useful to present a discussion of the two key terms.

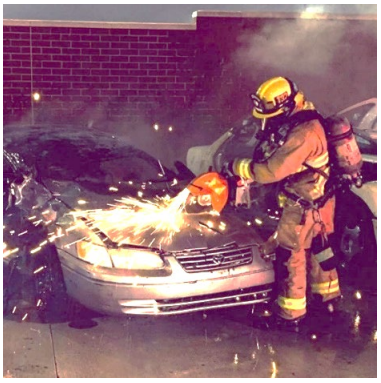
Hazard – a source of danger that can create an emergency event for which mitigation and management are required to prevent or reduce the losses to people or property. Some examples of hazards are fire, explosion, hazardous chemicals, and adverse weather. More specifically, a hazard may be a structure that presents a greater than normal likelihood of fire due to its use, occupancy, age, size, or condition. A hazard could be the 105 freeway or railway with a traffic volume or nature presents a hazard. Earthquakes are another hazard the community faces, not generally particular to other regions in the country.

Risk – is the level of exposure to a hazard. The level of risk is the probability of loss due to exposure to a hazard. People and things are both at risk. The National Fire Protection Association (NFPA) 551: *Guide for the Evaluation of Fire Risk Assessments* advises that risk is a combination of both probability and consequences, and could even be stated as a statistical value. There are also non-fire risks that are very valuable to the community.

Community Risk Hazards and Factors

Hazards impact residents, property, the environment, and the economy of the City of El Segundo. Earthquakes, floods, windstorms, tsunamis, and technological and human-caused hazards have exposed the City of El Segundo to the financial and emotional costs of recovering after natural, human-caused, and technological disasters. The risk associated with hazards increases as more people move to areas affected by hazards.

Even in communities that are built-out (i.e., have little or no vacant land remaining for development), population density continues to increase when low-density housing is replaced with medium and high-density development projects. The inevitability of hazards, and the growing population and activity within the city create an urgent need to develop strategies, coordinate resources, and increase public awareness to reduce risk and prevent loss from future hazard events. Identifying the risks posed by hazards and developing strategies to reduce the impact of a hazard event can assist in protecting life and property of citizens and communities. Residents and businesses can work together with the city to create a mitigation plan that addresses the potential impacts of hazard events.



Fire Suppression

The El Segundo Fire Department evaluates all these risks and determines the level of hazard based on several factors. Square footage, construction type, building usage, hazardous materials, etc. are areas critically examined to determine the hazards involved. All these factors combined will ultimately determine the probability, consequence, and impact of an event. The assessment of each commercial facility and residential structure is conducted by fire personnel. Once compiled, each element is assigned a value within a range and then applied to a formula that produces a value.

The department has attached numerical scores to the three areas of the risk analysis described above (probability, consequence, and impact). These scores range from 2-10, using even numbers only. A "2" is low, and a "10" is high. This valuation is consistent with the risk hazard and value evaluation process recommended by the CFAI.

Probability

To calculate the risks associated with fire suppression activities, the El Segundo Fire Department analyzed the hazards and dangers within the city limits. Target hazards such as schools, high-rise buildings, refineries, railways, freeways, the airport, and large commercial industrial complexes that potentially threaten life, property, and the environment if an incident occurs. An incident's frequency can increase during business hours as the city of El Segundo's population dramatically increases during the daytime.

Consequence

The consequence of fire suppression events can have various outcomes depending upon the size of the incident and the danger it poses to the community. Although the toil of fire has declined steadily over the past two decades, fire continues to cause major losses of life, infrastructure, and current or future revenues to all those affected within the community. These events often have short- and long-term effects on stakeholders in the city.

Impact

The impact of fire is often described in terms of lives threatened, structures and homes lost, suppression costs, and damage to the natural resource base on which the community relies. The economic impact goes beyond the primary indicators of suppression costs and homes lost. The impacts range from small-scale, low risk incidents to maximum risk incidents requiring multiple resources from outside the city.

Bringing in outside resources to assist during maximum risk incidents limits the city's coverage for other emergencies if one should happen and increases response times. A community's threat of injury or loss increases as fire and emergency resources become depleted and are less available for emergency incident mitigation.

Mitigating Factors Associated with Fire

The department protects the safety of the residents and the business community by doing its part to limit the damage from varied fire-related disasters. Below are preventative measures the department takes to manage the risks.

- Consider the hazards
- Ensure buildings are up to code
- Regularly inspect buildings and equipment
- Develop awareness and training programs
- Report fire hazards, incidents, and near misses
- Take appropriate cautions based upon identified hazards
- Formalize fire prevention strategies
- Automatic and mutual aid agreements reduce the risks of high and maximum risks incidents
- Regular equipment maintenance and replacement of aging equipment can decrease out-of-service times
- Ensuring that the El Segundo Fire Department firefighters are trained and equipped to handle all types of fire suppression activities, therefore, reducing the impact on the community
- The city's fire prevention and continued community risk reduction and education efforts help make the community fire safe.

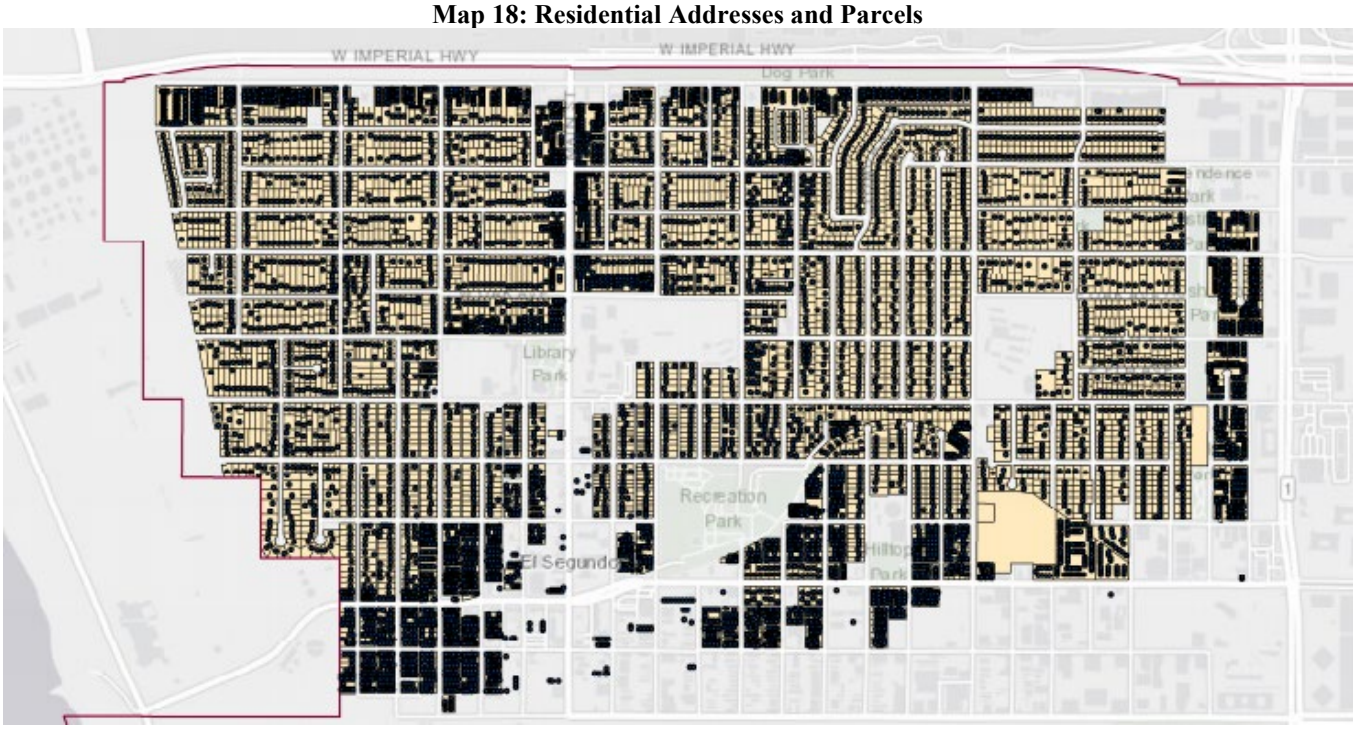
City of El Segundo Hazard Levels

The following hazard levels have been established for fire risk assessment:

Low Risk: Detached small structures are considered low hazard occupancies. Storage sheds, small outbuildings, and similar-sized buildings that pose a relatively low risk of harm to life, environment, or property damaged by fire. In addition, this category includes vehicle, dumpster, and rubbish fires.

Moderate Risk: Typical hazards are included in the moderate risk category. One- and two-family dwellings, detached garages, sprinklered buildings less than 10,000 square feet without a high hazard fire load, sprinklered storage facilities where environment or property damage is limited to a single building.

Map 18: Residential Addresses and Parcels

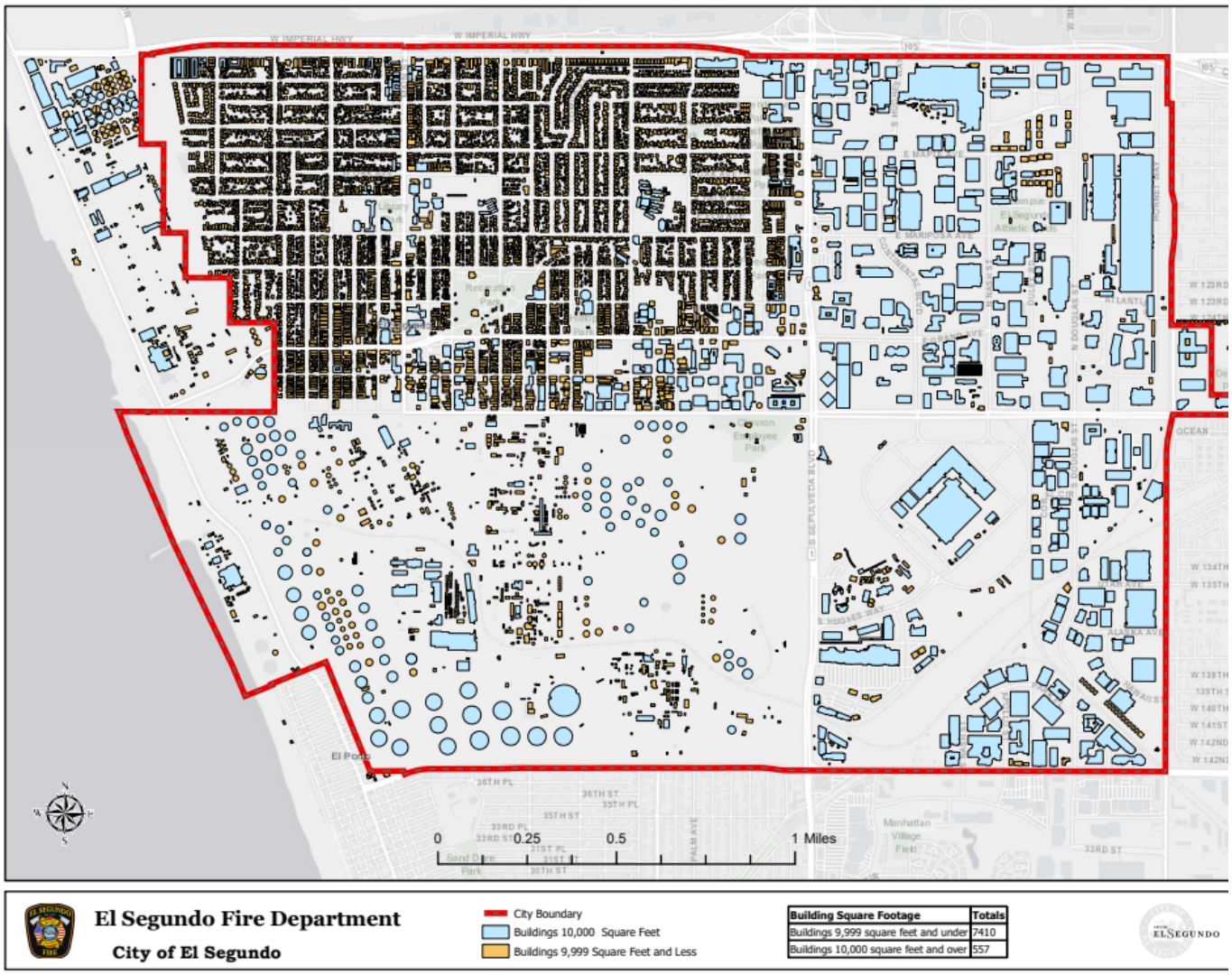


The address counts are based on the parcel data from the City of El Segundo's Geographic Information System (GIS) Department. Each one is filtered out to show those which meet the criteria of "res" or "residential." The counts have multiple addresses and accessory dwelling units (ADUs) that can be contained within one parcel. There are a total of **4,293** (color beige on map image) that fall in the categories of moderate to high risk.

High Risk: Large buildings that may result in a large loss of life are considered high risk. Schools, office buildings, churches, senior housing, hotels, apartments, and large commercial buildings over 10,000 square feet fall into this category. In addition, buildings that have a high hazard fire load, or have the potential for the substantial loss of life, environment, or property can also be categorized as high risk. This includes:

- 15 schools
- 15 hotels/motels
- 18 mid-rise buildings.

Map 19: Buildings <9,999 and >10,000 Square Feet



Provided by GIS, this map shows the number of buildings within the city under 9,999 square feet and those over 10,000 square feet. Within the city limits, there are 7,410 buildings of 9,999 square feet or less and 557 buildings of 10,000 square feet or more.

Maximum Risk: Buildings or facilities of unusually high risk that require significant resources and personnel, where a large loss of life, environment, or property is likely in the event of a large fire. High-rise buildings, movie theaters, shopping centers, and large hazardous materials storage areas pose a maximum risk. Within the City of El Segundo, this includes:

- 22 high-rise buildings
- Aircraft manufacturing buildings
- Satellite manufacturing buildings
- Oil refinery (Chevron)
- Multi-story senior residential building
- Movie theatre
- Large shopping centers
- Hazardous materials businesses
- 23 underground storage tank sites, totaling 58 underground storage tanks
- 33 storage tank sites, totaling 500 above-the-ground tanks.

Critical Task Analysis

Among the leading factors for determining needed resources in response mitigation is the number of personnel needed to conduct the critical tasks necessary to contain the event. To effectively respond to any identified risk or level of risk, it is necessary to understand what equipment and numbers of properly trained personnel are needed to mitigate each risk category for each service provided. This is accomplished through a critical task analysis process.

To identify critical tasks, there are specific tasks that must be in place and used by firefighters at structure fires, vehicle accidents, and medical incidents. To create standard levels for response in the mitigation process, an assessment must be made of department resources to determine the capabilities of the first arriving unit and individual responders to achieve these critical tasks. When identifying critical tasks, first-responder safety is a priority. NFPA 1710 outlines critical tasks that must be completed by an initial response to a structure fire. NPFA has developed a standard after assembling members from several fire and government organizations with technical expertise in this area. Levels of service, deployment capabilities, and staffing levels were all discussed and prioritized. Furthermore, response times and resource capabilities were clearly defined using a template for developing a plan regarding fires, emergencies, and other critical incidents.

Another aspect of the critical task analysis is identifying an effective response force. An ERF is the number of personnel necessary to complete all the identified tasks within the prescribed timeframe. The ERF level of resources demonstrates the ability to set up the equipment and simultaneously handle the tasks of fire attack, search and rescue, ventilation, backup lines, pump operation, water supply, and command, all within a few minutes because time equals lives. If fewer firefighters and equipment are available or if they have longer travel distances to cover, then the

department may not be able to meet an objective such as confining the fire to the room of origin. The El Segundo Fire Department has conducted a critical task analysis of each class and category of risk to determine the first arriving unit's response areas and ERF abilities. The El Segundo Fire Department endorses and recommends its critical tasking model by swotting actual incidents through after-action reviews and through actual training area simulations and testing. The department has also identified and categorized the following tasks on fire incidents that must be performed based on the level of risk. From these risk categories, standard operating guidelines (SOGs) are developed. These SOGs are built on industry standards, laws and regulations, and available resources.

Fire Suppression

The following are the four stages of fire growth within a structure: ignition, growth, fully developed, and decay.

- **Ignition:** Fuel, oxygen, and heat join in a sustained chemical reaction. At this stage, a fire extinguisher can control the fire.
- **Growth**: With the initial flame as a heat source, additional fuel ignites. Convection and radiation ignite more surfaces. The size of the fire increases, and the plume reaches the ceiling. Hot gases collecting at the ceiling transfer heat, allowing all fuels in a room to come closer to their ignition temperature at the same time.
- **Fully developed:** Fire has spread over much, if not all, the available fuel; temperatures reach their peak, resulting in heat damage. Oxygen is consumed rapidly.
- **Decay/Burnout:** The fire consumes available fuel, temperatures decrease, and the fire gets less intense.

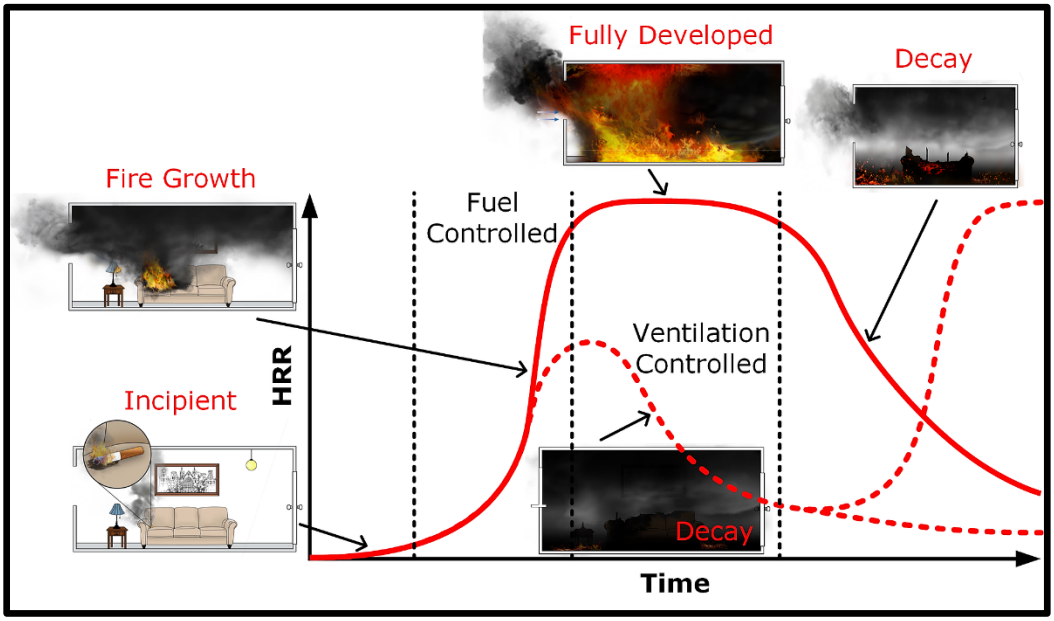


Figure 8: Growth Stages of Fire

Flashover is the sudden, simultaneous ignition of everything in a room**.** The incipient stage to flashover usually occurs between five and ten minutes. Therefore, the travel times for the department should occur before a flashover happens.

- Hot gases rise to the ceiling and spread out to the walls.
- Heat radiates downward and intensifies until all combustible items reach their ignition temperatures and burst into flames.
- Temperatures soar to as much as 1,000 degrees Fahrenheit in a few seconds. Even a firefighter in full protective gear is unlikely to survive a flashover.
- Firefighters are trained to recognize the signs that a flashover is about to occur: dense black smoke with tightly packed curls ("black fire"); dense, black smoke that pushes out of a doorway or window opening; smoke that has accumulated as low as a doorknob, with the fire seen below.

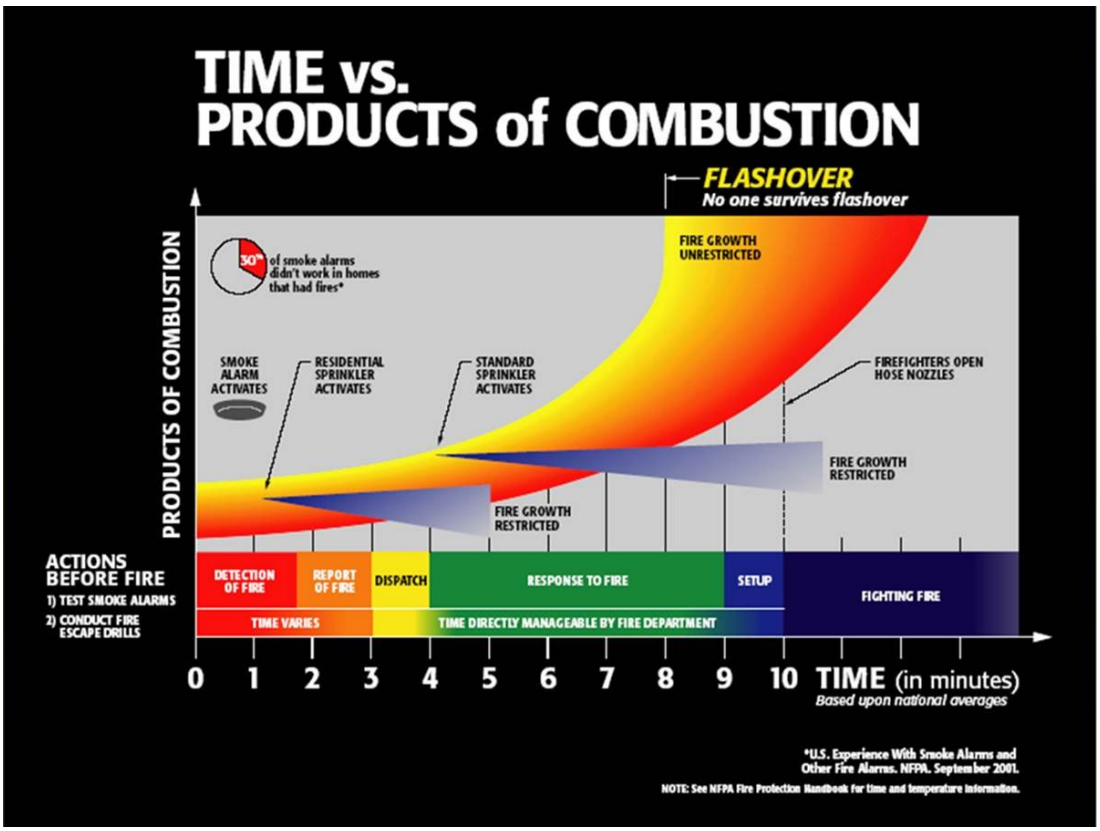


Figure 9: Time vs. Products of Combustion

Another important concept to understand is the physics of the flashover. Several factors will affect whether a room will flash over. The size of the room, the combustible contents, the air supply, and the room's insulation all combine to determine a room's flashover potential. Smaller rooms will flash over faster. A small room enhances the thermal radiation feedback faster because of the room's volume. In large rooms with high ceilings, it takes longer to heat the combustibles below. When radiated heat travels longer distances, it loses energy. The proximity of the contents in a small room increases the absorption of thermally radiated energy.

Taking all these factors into consideration, the survivability profile of the structure. The faster fire units can get on scene with the appropriate staffing, the faster the fire can be extinguished and lives can be saved.

Critical Tasks

Critical tasks are conducted in a coordinated effort by fire personnel to effectively manage and control an emergency incident. As outlined by NFPA 1710, critical tasks are conducted on an initial response to a structure fire. Ultimately, the goal is to prevent the fire from moving into the flashover stage. The following graphs describe the critical tasks ranging from low risk to maximum risk.

Fire Suppression Critical Tasking by Hazard Level

The following hazard categories have been established for fire risk assessment:

Table 6: Critical Tasking - Fire Suppression Low Risk

Fire Suppression Low Risk Isolated outside fires, rubbish fires, passenger vehicle.		
Task	**Personnel**	**Assignment**
Attack Line	**1**	**Engine Company Firefighter**
Pump Operator	**1**	**Engine Company Engineer**
Incident Command	**1**	**Engine Company Captain**
Total Personnel 3		

Table 7: Critical Tasking - Fire Suppression Moderate Risk

Fire Suppression Moderate Risk Single-family and two-family dwellings, detached garages, commercial/industrial buildings less than 10,000 square feet, and hazardous materials not meeting the 55 gallons, 500 pounds, or 200 cubic feet California Emergency Reporting System (CERS) threshold.		
Task	**Personnel**	**Assignment**
Attack Line	**2**	**1st Engine**
Pump Operator	**1**	**1st Engine**
Back-up Line	**2**	**2nd Engine**
Water Supply	**1**	**2nd Engine**
Ventilation	**3**	**Truck**
Search & Rescue	**3**	**3rd Engine Mutual Aid**
Rapid Intervention Crew	**3**	**4th Engine Mutual Aid**
Incident Command	**2**	**Battalion Chief (Mutual Aid)**
Medical	**2**	**Rescue**
Exposure Lines	**2**	**5th Engine Mutual Aid**
Salvage Team	**2**	**6th Engine Mutual Aid**
Utilities	**1**	**4th Engine Mutual Aid**
Total Personnel 24		

Table 8: Critical Tasking - Fire Suppression High Risk

Fire Suppression High Risk Mid-rise buildings, hotels, schools, garden apartments, large apartment or condominium complexes, large commercial/industrial buildings greater than 10,000 square feet, senior citizen housing, churches, strip malls, and hazardous materials businesses that meet the CERS threshold.		
Task	**Personnel**	**Assignment**
Attack Line/Division	**4**	**1st Engine 2nd Engine**
Pump Operator	**2**	**1st Engine 2nd Engine**
Back-up Line	**2**	**2nd Engine**
Water Supply/FDC	**1**	**2nd Engine**
Ventilation	**6**	**2 Trucks**
Search and Rescue	**6**	**4th Engine 9th Engine**
Rapid Intervention Crew	**5**	**5th Engine**
Incident Command	**2**	**Battalion Chief**
Exposure Lines	**2**	**6th Engine**
Salvage Team	**2**	**7th Engine**
Utilities	**2**	**5th Engine**
Medical	**5**	**8th Engine**
Total Personnel 36		

Table 9: Critical Tasking - Fire Suppression Maximum Risk

Fire Suppression Maximum Risk High-rise buildings, movie theater, refinery, power plant, Boeing, Northrop, and the air force base.		
Task	**Personnel**	**Assignment**
Attack Line/Division	**10**	**1st Engine**
Pump Operator	**3**	**1st Engine**
Back-up Line	**4**	**2nd Engine**
Water Supply/FDC	**2**	**2nd Engine**
Ventilation	**9**	**3 Trucks**
Search and Rescue	**8**	**4th Engine**
Rapid Intervention Crew	**6**	**5th Engine**
Incident Command	**4**	**Battalion Chief**
Exposure Lines	**4**	**6th Engine**
Salvage Team	**6**	**7th Engine**
Utilities	**2**	**8th Engine**
Medical	**4**	**9th Engine**
Total Personnel 62		

Critical Task Definitions

Incident Commander - The incident commander must be able to assess the incident priorities to determine the strategy and tactics that will be used. The incident priorities are simple and straightforward: life safety, incident stabilization, and property conservation. In addition, the incident commander is the decision maker during a major incident, delegating tasks and listening to input from subject matter experts to bring the incident to resolution. They become the highest-ranking individual on any major incident call, regardless of their day-to-day rank. Decisions made as commander are final.

Safety Officer - The safety officer immediately informs the incident commander of any actions taken to correct imminent hazards at an incident. Furthermore, the safety officer provides information and assistance to officers and firefighters so they will be able to identify and report safety and health hazards.

Attack Lines – Attack lines of hose are preconnected to the pump of a fire apparatus and ready for immediate use in attacking a fire. The standard size of an attack line is 1.75-inch, producing 150 gallons per minute (gpm). A 2.5-inch line, on the other hand, produces 250-300 gpm. The selection of attack lines depends on the type of structure, distance to fire, and gallons per minute needed to extinguish the fire.

Search and Rescue – Search and rescue consists of two distinct functions: Searching and rescuing. The search is the act of locating or finding the victim(s). Rescue is the separation of the victim(s) from the hazard. There are two basic types of searches: primary and secondary. The primary search is implemented before or during fire control by fire attack units. It is a quick and systematic search that is aimed at locating where the victims are likely to be located. The secondary search is implemented after fire control has been achieved and interior conditions are relatively improved. The secondary search is very thorough and efficient. Time and urgency are not priorities during a secondary search. It is usually assigned to a company other than one who performed a primary search to ensure that it is complete and thorough.

Water Supply - There are two sources from which to establish water supply: a pressurized source, such as a hydrant; and a static source, such as a pond or a portable tank of water. Either source will provide the needed water volume and pressures to hand lines. A large diameter hose, placed between the engine and the nearest hydrant, is used to supply the necessary water for the engine to pump to the attack lines.

Exposure Lines - The idea of exposure protection is to find a way to absorb heat. The primary method for protecting exposures is by putting water directly onto the threatened exposure with hose lines. First, when the radiated energy from the fire encounters the water, it can absorb some of that energy, which prevents it from being absorbed by the structure. Second, when given a porous surface, the water will soak into it, increasing both its moisture content and the amount of energy it takes to make that surface burn. One of the most versatile and effective methods of protecting exposures is the stretching and operation of 2 ½-inch hose lines.

Ventilation Team – Ventilation is the planned, methodical, and systematic removal of pressure, heat, smoke, toxic gases, and flame from an area through predetermined paths and replacing these products with cooler fresh air. Typically, ventilation tasks require a company with three or more firefighters for effective completion. It must be accomplished simultaneously with fire attack. The results depend on the size and type of occupancy, extent and location of fire, and whether the fire is in the free burning or smoldering stage.

Salvage Team - Salvage is the protection of buildings and their contents from unnecessary damage due to water, smoke, and other elements, both during and after a fire. Salvage considerations should be present during every stage of firefighting operations. The success or failure of salvage operations can be directly attributed to the degree to which firefighters have trained with salvage equipment and techniques. It is a combination of this familiarity mixed with thinking and ingenuity that will enable effective and timely salvage operations on the fireground.

Utilities Shut-off - The three types of utilities are electric, gas, and water. In terms of water and gas, the most difficult aspect of service termination is simply locating the connections. In residential structures, these can normally be found on the side of the home opposite the parking area or garage. However, this location can vary. The first-due officer should note this during the 360-degree size-up. The utility service location can also vary on commercial properties but can easily be found during building walk-throughs if marked properly on the plans.

Rapid Intervention Crew (RIC) - Rapid intervention crews serve as a stand-by rescue team for personnel and are available for the immediate search and rescue of any missing, trapped, injured, or unaccounted firefighters. This task involves staging firefighters in an area close to the incident, equipped with tools to perform a rescue, in the event something goes wrong. Occupational Safety and Health Administration (OSHA) requirements mandate placing a RIC team on all incidents immediately dangerous to life and health.

Backup Hose Lines - The backup line is a safety net for the crew on the initial attack line. This safety net has two main functions: to protect the initial fire attack crew and a move-up line that provides additional fire flow in a large fire. A 1.75-inch or 2.5-inch hose line are the standard sizes typically used as backup lines.

Pump Operator - The pump operator monitors water pressure and flow on fire attack hose lines. In addition to this responsibility, the pump operator also establishes hookups to the correct intakes and discharges, and establishes supply lines from fire hydrants. Supply lines are typically assigned to a firefighter; however, the pump operator is trained to complete the task if necessary.

Aerial Operator – The aerial operator positions the aerial ladder for rescues, roof access, and elevated master streams. Aerial ladders may be used to affect rescue, entry, search, and ventilation. They may also be used to stretch hose lines to upper floors or the roof; bridge a gap; operate hose lines for the ladder; ladder pipe operations; and as observation posts to assess conditions. When their need is evident upon arrival, they should be raised immediately. When their need is anticipated for later use, the ladders shall be positioned and set up as described in the standard operating procedure.

Medical Group – The medical group consists of firefighters and paramedics who are established to provide care for victims injured in any kind of incident. They are well trained and equipped to assist and transport anyone who needs basic or advanced life support care.

Fire Suppression Three-Axis Models by Risk Level

Graph results are based upon the calculations of data from three years (2018-2020) of fire-related incidents compiled from *Emergency Reporting*.

LOW RISK: VEHICLE FIRE

RISK
Probability of occurrence **4**
Consequence to community **4**
Impact on fire department **2**
SCORE **13.85640646**

MODERATE RISK: ONE AND TWO-FAMILY DWELLINGS

RISK
Probability of occurrence **4**
Consequence to community **6**
Impact on fire department **8**
SCORE **44.18144407**

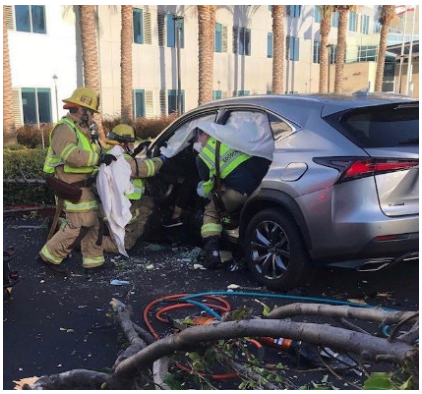
HIGH RISK: APARTMENTS / OFFICE BUILDINGS / HOTELS

RISK
Probability of occurrence **2**
Consequence to community **8**
Impact on fire department **10**
SCORE **59.39696962**

MAXIMUM RISK: HIGH RISE / OIL REFINERY

RISK
Probability of occurrence **2**
Consequence to community **10**
Impact on fire department **10**
SCORE **73.48469228**

Emergency Medical Calls



The El Segundo Fire Department responded to 4,817 emergency medical incidents from 2018 to 2020, requiring an average of five personnel, providing basic life support (BLS) or advanced life support (ALS) care under guidelines and protocols approved by the Los Angeles County Department of Health Services-Emergency Medical Services Agency (LACoDHS-EMSA). South Bay Regional Public Communications Authority (SBRPCA) dispatches the appropriate resources to the emergency when needed. EMS calls are the most common type of service provided by the El Segundo Fire department. There are many factors that can contribute to the volume and consequence of an Emergency medical incident. The hazards that determine the EMS risk assessment are attributed to demographics, lifestyle, acute and chronic medical conditions, natural disasters, violence in the community, transportation accidents, and socioeconomic factors. To establish EMS risk, certain staffing levels have been identified based on low, moderate, high, and maximum risk of incidents.

Emergency Medical Services Critical Tasking by Hazard Level

The following hazard levels have been established for EMS risk:

Table 10: Critical Tasking - EMS Low Risk

EMS Low Risk Injured and ill person, minor trauma, lift assist, and patient without airway and breathing or circulatory problems (single patient in stable condition).		
Task	**Personnel**	**Assignment**
Incident Command/Safety	**1**	**Engine Captain**
Patient Medical Care and Communications/Documentation	**2**	**Engineer/Firefighter**
Total Personnel 3		

Table 11: Critical Tasking - EMS Moderate Risk

EMS Moderate Risk Cardiac chest pain, shortness of breath, diabetic, seizure, and traumatic injuries (single patient in unstable condition).		
Task	**Personnel**	**Assignment**
Incident Command/ Safety	**1**	**Engine Captain**
Patient/Medical Care	**3**	**Engineer/Firefighter and Paramedic**
Communications/Documentation	**1**	
Total Personnel 5		

Table 12: Critical Tasking - EMS High Risk

EMS High Risk Cardiac arrest, stroke, severe trauma, and compound EMS incidents with a component of fire, rescue, or limited ability to enter the area (single patient with potentially fatal condition).		
Task	**Personnel**	**Assignment**
Incident Command/ Safety	**1**	**Engine Captain**
Patient/Medical Care	**3**	**Engineer/Firefighter and Paramedic**
Communications/Documentation	**1**	**Paramedic**
Total Personnel 5		

Table 13: Critical Tasking - EMS Maximum Risk

EMS Maximum Risk Multi-victim incidents with five or more patients, such as an active threat, terrorism, hazardous materials release, infectious disease outbreak, or large-scale transportation incident (multiple patients with various conditions).		
Task	**Personnel**	**Assignment**
Triage	**3**	**1st Engine**
Treatment	**6**	**2nd/3rd Engine or Truck**
Transport	**4**	**Rescues**
Staging	**10**	**Rescues**
Command	**1**	**Battalion Chief**
Total Personnel 24		

Emergency Medical Services Three-Axis Models for Each Risk Level

Graph results are based upon the calculations of data from three years (2018-2020) of EMS-related incidents compiled from *Emergency Reporting*.

LOW RISK:

RISK
Probability of occurrence 8
Consequence to community 2
Impact on fire department 2
SCORE 16.24

MODERATE RISK:

RISK
Probability of occurrence 6
Consequence to community 2
Impact on fire department 4
SCORE 8.48

HIGH RISK:

RISK
Probability of occurrence 10
Consequence to community 4
Impact on fire department 4
SCORE 41.56

MAXIMUM RISK:

RISK
Probability of occurrence **2**
Consequence to community **10**
Impact on fire department **10**
SCORE **73.48**

Critical Task Definitions

Incident Commander –The incident commander develops, implements, monitors, and modifies the incident action plan based upon the established goals and objectives for the incident.

Safety - Observes the evolving situation and orients the situation based on personal experience, training, and options. Decides on the best option for an intended outcome. Takes decisive action.

Medical Care – Trained to give emergency medical care to people who are injured or ill, typically in a setting outside of a hospital. Scope of practice for a paramedic as defined by LACoDHS EMSA reference 803 describes ALS procedures initiated before base hospital contact and directions to be continued after receiving medical directives. Per LACoDHS EMSA reference 802, EMTs can assist paramedics with appropriate ALS care.

Medical Communications – Base hospital contact made for patient assessment and patient evaluation for ALS procedures made before contact. The paramedic communicates directly with the medical alert center with any incident that has more than ten patients. Hospital availability is determined for patient destination and shortest transport times.

Documentation – Legal record of the patient care delivered in the field. The report becomes part of the patient's hospital record**.**

Triage - Triage means "to sort." Triage in a mass casualty incident is the assignment of resources based on the initial patient assessment and consideration of available resources.

Treatment - Treatment of immediate life-threatening injuries (severe bleeding and airway) out in the field. This also includes guidelines that define the scope of pre-hospital intervention practiced by emergency care providers.

Transport - Expeditious transportation of victims from the incident to an appropriate medical facility.

Staging - Designated area where incident-assigned vehicles are directed and held until needed.

Technical Rescue

Technical rescue, in general, is a high risk and low frequency occurrence in the rescue industry. Many of these events are regulated by OSHA due to the elevated risks to the rescue workers. The El Segundo Fire Department's US&R program provides technical rescue capabilities in dynamic environments. Technical rescue incidents include vehicle extrication, confined space rescue, trench collapse, low/high angle rescue, and building collapse. The US&R program can provide lifesaving operations in various environments, including confined space rescue, trench collapse stabilization and rescue, high and low angle rope rescue, structural collapse stabilization and rescue, and vehicle and machinery extrication and rescue. The El Segundo Fire Department provides US&R support for the City of El Segundo, mutual aid to California Region 1, Area "G" cities, mutual aid to the State of California as a Type-1 Heavy US&R program, and as a member of the California Regional Task Force 2 (CA-RTF-2). Specialized technical rescue resources are available through the California Master Mutual Aid Plan.

Probability

There are many risks associated with technical rescue in relation to the hazards within the city. Human behavior, natural disasters, environmental conditions, electrical and mechanical failure, to name a few. Even though these types of incidents tend to be infrequent, the training required to maintain proper skill levels is mandatory and arduous.

Consequence

One of the most immediate and economically devastating concerns from these kinds of disasters is the damage to both public and private infrastructure. These events can cause thousands of dollars in damages, and not all local governments are equipped to fund the process of post-disaster cleanup and rebuilding. Natural disasters can have long-term negative consequences beyond the immediate loss of life and demolition of infrastructure. Often, an area impacted by a natural disaster will show scars of the event for years to come.

Impact

As a result of the personnel demands from a technical rescue, the City of El Segundo becomes vulnerable without the resources to handle another emergency event. Only low and moderate risk incidents can be effectively managed with 14 daily personnel. Even more importantly, the impact of a catastrophic event forces the El Segundo Fire Department to ask for mutual aid from the surrounding cities, rendering the cities that give aid to be left in a vulnerable state.

Mitigating Factors

Based on past historical responses, the fire department has recognized the need for the development and deployment of specialized personnel. As the incidents become increasingly more complex, they demand a greater degree of technical training, enhanced tactical capabilities, and expanded incident management. Mitigating factors require a heavier emphasis on efficiency and safety. Core classes on rope rescue, confined space, trench rescue, and vehicle extrication equip personnel to handle technical incidents with training and expertise.

Technical Rescue Critical Tasking by Hazard Level

Risks associated with technical rescue:

Table 14: Critical Tasking - Technical Rescue Low Risk

Technical Rescue Low Risk Low risk: Traffic accident with entrapment, lock-ins or out, elevator entrapment.		
Task	**Personnel**	**Assignment**
Command, Safety	**1**	**1st Engine/ Truck**
Extrication Group	**2**	**1st Engine/Truck**
Total Personnel 3		

Table 15: Critical Tasking - Technical Rescue Moderate Risk

Technical Rescue Moderate Risk Moderate risk: Vehicle into a structure, machinery extrication.		
Task	**Personnel**	**Assignment**
Command, Safety	**1**	**Battalion Chief**
Extrication Group	**3**	**Truck**
Medical Group	**3**	**1st Engine**
Total Personnel 7		

Table 16: Critical Tasking - Technical Rescue High Risk (Trench)

Technical Rescue High Risk High risk: Trench		
Task	**Personnel**	**Assignment**
Command, Safety	**1**	**Battalion Chief**
Rescue Group Supervisor	**1**	**1st Engine**
Rescue Team	**2**	**1st Engine**
Back Up Team	**2**	**2nd Engine**
Cut Team	**3**	**3rd Engine**
Extrication Team	**6**	**4th Engine & Truck**
Safety Officer	**1**	**2nd Engine**
Total Personnel 16		

Table 17: Critical Tasking - Technical Rescue High Risk (Confined Space)

Technical Rescue High Risk High risk: Confined space		
Task	**Personnel**	**Assignment**
Command, Safety	**1**	**Battalion Chief**
Entry Group Supervisor	**1**	**1st Engine**
Safety Officer	**1**	**2nd Battalion Chief**
Rescue Team	**2**	**1st Engine**
Support Group Supervisor	**1**	**3rd Engine**
Ventilation/ Atmospheric Monitoring	**2**	**2nd Engine**
Attendant Group Supervisor	**1**	**2nd Engine**
Back up Team	**2**	**3rd Engine**
Support Operation	**3**	**4th Engine**
Support Operation	**3**	**1st Truck**
Total Personnel 17		

Table 18: Critical Tasking - Technical Rescue High Risk (Low/High Angle)

Technical Rescue High Risk High risk: Low/high angle		
Task	**Personnel**	**Assignment**
Command, Safety	**1**	**Battalion Chief**
Rescue Group Supervisor	**1**	**1st Engine**
Rescue Team	**2**	**1st Engine**
Rigging Team	**3**	**2nd Engine**
Back up Team	**3**	**3rd Engine**
Safety Officer	**1**	**2nd Battalion Chief**
Support Operations	**3**	**4th Engine**
Support Operations	**3**	**Truck**
Total Personnel 17		

Table 19: Critical Tasking - Technical Rescue Maximum Risk

Technical Rescue Maximum Risk High risk: Structural collapse		
Task	**Personnel**	**Assignment**
Command, Safety	**1**	**Battalion Chief**
Rescue Group Supervisor	**1**	**1st Engine**
Rescue Team	**2**	**1st Engine**
Back Up Team	**2**	**2nd Engine**
Search Group Supervisor	**1**	**2nd Engine**
Search Team	**2**	**3rd Engine**
Safety Officer	**1**	**2nd Battalion Chief**
Shoring Group	**3**	**1st Truck**
Support Operations	**3**	**4th Engine**
Support Operations	**3**	**5th engine**
Total Personnel 19		

Technical Rescue Level Maximum Risk - Technical rescue responses are more dynamic events that will require additional resources to support the incident objectives. These incidents are very labor intensive and very dynamic. Incidents such as a rescue or an incident affecting the public require a higher sense of urgency and assistance from other qualified surrounding agencies. Surrounding mutual aid agreements allow the department to fill the critical support positions in the technical rescue response branches on an incident. The positions are filled in accordance with the State of California training and *FIRESCOPE*.

Technical Rescue Duties and Critical Task Definitions

Incident commander – Establishes personnel accountability, performs ongoing assessments, determines strategies, assigns critical tasks, and calls for additional resources.

Atmosphere monitoring – Continuously monitors and assesses the atmosphere in which the crew is working.

Vehicle extrication - Vehicle extrication is the process of removing a vehicle from around a person involved in a motor vehicle collision when conventional means of exit are impossible or inadvisable.

Cutting team - Responsible for all cutting and manufacturing systems containing wood.

Shoring team - Assembles and installs all shores and whalers required to make the protective system.

Support team - Assists any required tasks.

Rescue group supervisor - Responsible for the rescue group, which usually includes an attendant, ventilation, entry team, backup team, rigging team, decontamination, and medical group.

Search team - Responsible for the systematic coordination of search in an attempt to make a rescue.

Scene safety - Observes the evolving situation and orients to the situation based on personal experience, training, and options. Decide on the best option for an intended outcome. Take decisive action.

Entry group supervisor - The entry supervisor is responsible for determining whether acceptable entry conditions exist, authorizing the entry, overseeing entry operations, terminating the entry, and canceling the entry permit. The entry supervisor represents the employer and is accountable for entry operation safety.

Attendant - An individual stationed outside one or more permit spaces who monitors the authorized entrants and who performs all attendant duties assigned in the employer's permit space program.

Entrant – The person(s) ensuing work activities in a confined space and is considered as soon as any part of the entrant's body breaks the plane of an opening into the space to conduct a rescue.

Rigging/hauling team – Responsible for establishing the systems by which any person or object will be lifted and/or moved during the incident.

Ventilation control - The control of atmospheric hazards by introducing clean, breathable air into the confined space.

Technical Rescue Three-Axis Models for Each Risk Level

Graph results are based upon the calculations of data from three years (2018-2020) of technical rescue-related incidents compiled from *Emergency Reporting*.

LOW RISK: ELEVATOR ENTRAPMENT

RISK
Probability of occurrence **6**
Consequence to community **4**
Impact on fire department **2**
SCORE **19.79898987**

MODERATE RISK: VEHICLE INTO STRUCTURE

RISK
Probability of occurrence **2**
Consequence to community **6**
Impact on fire department **4**
SCORE **19.79898987**

HIGH RISK: STRUCTURAL COLLAPSE

RISK
Probability of occurrence **2**
Consequence to community **10**
Impact on fire department **8**
SCORE **59.39696962**

MAXIMUM RISK: CONFINED SPACE

RISK
Probability of occurrence **2**
Consequence to community **10**
Impact on fire department **8**
SCORE **59.39696962**

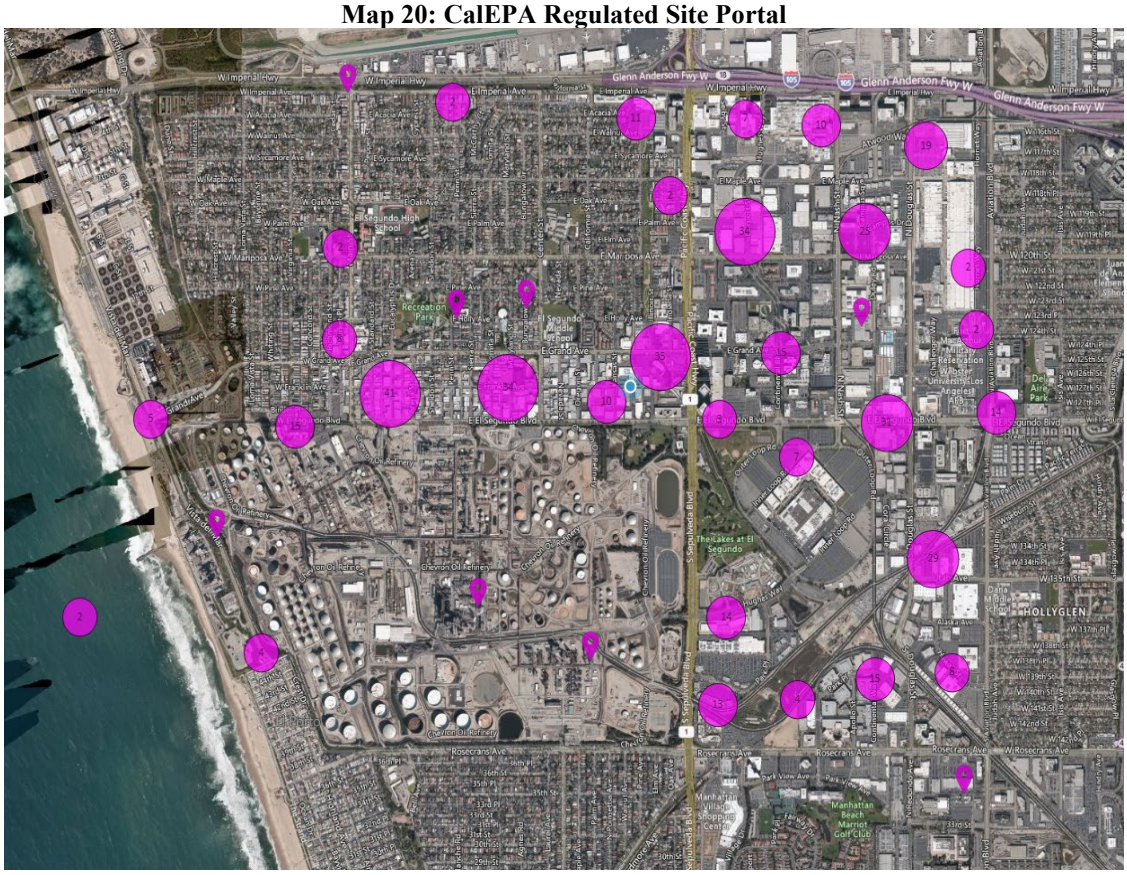
Hazardous Materials

Hazardous materials can potentially have the largest impact on the community. El Segundo Fire Department maintains hazardous materials first responder operations level of training. Hazardous materials incidents vary in complexity and hazard, from small spills of vehicle fluid, paint products, or other household consumer products to large releases of industrial chemicals that pose a major threat to life, property, and the environment. Responses to these incidents vary from one engine for a small fuel spill to a full hazardous materials assignment.

The department also responds to unknown chemicals that are abandoned, illegally dumped, or spilled, and intentional acts using hazardous materials as terrorist incidents to the public. A hazardous materials incident is very complex by nature of its threats to the public and environment. Successful mitigation requires a joint and cooperative effort between multiple agencies. These resources are available through the California Master Mutual Aid Plan and mutual aid agreements with Los Angeles County Fire Department and Area G.

El Segundo Fire Department is also an administrator of the local Certified Unified Program Agency (CUPA). The CUPA inspects businesses and or facilities that handle or store hazardous materials, generate and/or treat hazardous waste, own or operate underground storage tanks, store petroleum in aboveground tanks over state thresholds, or store federally-regulated hazardous materials over state thresholds. The inspections determine compliance with the California Health and Safety Code, California Code of Regulations, and the Code of Federal Regulations. The CUPA program achieves compliance through education, community and industry outreach, inspections, and enforcement. Once facilities were ranked, their information was geo-coded into the GIS system.

Map 20: CalEPA Regulated Site Portal



Each bubble in the map above indicates a CERS business site regulated by the City of El Segundo Fire Department within the environmental safety division. This information is from the [California Environmental Protection Agency Regulated Site Portal.]

Hazardous Materials as Threats to the City of El Segundo

The City of El Segundo maintains a safety element in the general plan, which provides an overview of the city's industrial locations and the potential involvement of hazardous materials incidents. Specific locations of hazardous materials are identified in the City of El Segundo Hazardous Materials Area Plan, maintained by the fire department's environmental safety division.

Hazardous materials are any substance or combination of substances that, because of quantity, concentration, or characteristics, may cause or significantly contribute to an increase in death or serious injury or pose substantial hazards to humans and/or the environment. Hazardous materials incidents differ from other emergency response situations because of the wide diversity of causative factors and the pervasiveness of the potential threat. Circumstances such as the prevailing wind and geographic features in the vicinity of emergency incidents are relevant factors that may greatly increase the hazardous chemical dangers. Incidents may occur at fixed facilities where, most likely, the occupants have filed site-specific emergency response contingency and evacuation plans. However, incidents may also occur at any place along any

land, water, or air transportation routes and (in event of vessel mishaps, aircraft accidents, misuse of agricultural chemicals, and illegal dumping) may occur in unpredictable areas, relatively inaccessible by ground transportation.

The increasing volume and variety of hazardous materials generated, stored, or transported within the city is a concern to public officials and the community. A major hazardous material accident and/or spill could endanger public health and safety within two miles of the accident scene. Several fixed-site industrial firms use potentially hazardous materials to operate their businesses. Other threats include commercial airliners, which routinely take off and land at LAX and significantly increase the overall potential disaster threat.

Specific Hazards that Threaten the City of El Segundo

The threat of a major hazardous material incident in El Segundo exists from seven different sources: (1) commercial transport vehicles, (2) air transportation; (3) rail car, (4) airborne industrial chemical release, (5) pipeline; (6) fixed facility; and (7) clandestine dumping.

Freeway/Transportation

El Segundo is traversed by two major freeways: the San Diego freeway (I-405) and the Glenn Anderson – Century freeway (I-105). These freeways are heavily traveled by trucks moving many types of materials produced by chemical manufacturing facilities within El Segundo, many of them hazardous. Commercial routes include El Segundo Boulevard, Grand Avenue, Imperial Highway, and Sepulveda Boulevard (SR-1). An accident on any major commercial route involving a vehicle carrying hazardous materials could impact thousands of residents depending on wind conditions and time of day.

Air Transportation

The City of El Segundo is near the flight pattern of arriving and departing commercial aircraft carriers at the Los Angeles International Airport and Hawthorne Municipal Airport. There is always a risk of an in-flight emergency and/or catastrophic aircraft failure over the city or the Pacific Ocean. Such an incident would significantly impact the city.

Pipelines

Pipelines owned and operated by various companies run beneath the city's streets. Some pipelines enter from the south and travel north along Sepulveda Boulevard and Aviation Street, and exit the city to the north beneath Imperial Highway to LAX. The pipes vary in size from 6 to 18 inches in diameter and are buried at different depths. A rupture of any of these pipelines could pose major hazards to persons, property, and the environment. Ruptures in these lines have occurred at various locations outside the city and will continue to pose a risk to the community.

Fixed Facility

A serious hazardous material threat exists from an accidental spill and/or incident at one of the facilities that manufacture, warehouse, and process toxic chemicals and/or generate hazardous waste materials within or next to city boundaries. Although there are numerous facilities involved with hazardous materials, they are less of a threat due to required plant contingency and evacuation plans.

Clandestine Dumping

Clandestine dumping is the criminal act of disposing toxic materials and hazardous waste on public or private property. As the costs and restrictions increase for legitimate hazardous waste disposal sites, it can be anticipated that the illegal dumping of hazardous materials will increase proportionately.

Probability

The potential for a hazardous materials release remains high within the City of El Segundo. This is because hazardous materials are transported on the streets, freeways, pipelines, and railways throughout El Segundo. There are 292 businesses in the city that use or store reportable quantities of hazardous materials, not to mention the manufacturing and refining of hazardous materials within the city's boundaries. Many aerospace companies use large amounts of hazardous materials to test and research government and commercial projects. Any release will and would threaten the surrounding community and environment with conceivably long-term and lasting effects. The location and storage of the reportable quantities exist within the city's populated areas. The possibility of a hazardous materials incident has been historically low, but the risk and hazard in mitigating the event are very high for the City of El Segundo and the fire department.

Consequence

Consequences depend on the category and scale of the incident. A small spill of motor oil or gas leak within a structure can have little to no long-term effects on the community, whereas a transportation incident near a residential neighborhood could have a potentially disastrous outcome. The release of massive amounts of hazardous materials in this kind of event conceivably will have long-term ongoing effects on the environment and surrounding areas. Furthermore, this type of incident will take an extended amount of time to mitigate, which can potentially delay surrounding businesses and industries that could also have a fiscal impact on multiple stakeholders.

Impact

The impact of a large hazardous materials incident would have a substantial number of resources assigned for an extended amount of time. This would reduce the available resources left in the city to mitigate other emergencies.

Additionally, this would bring Los Angeles County Fire Department HazMat and local Area G units to assist with the conclusion of the event.

Mitigating Factors

To meet the needs for a hazardous materials incident, all El Segundo Fire Department personnel are trained to the hazardous materials first responder operational level. The El Segundo Fire Department trains annually in varying scenarios and response types to prepare for such incidents. The City of El Segundo also uses mutual aid agreements with Los Angeles County Fire Department and surrounding agencies. In El Segundo, the vast majority of hazardous material incidents are handled before they become a major disaster. Nevertheless, the emergency organization needs to be flexible and evolutionary in responding to a developing incident. The Hazardous Materials Area Plan is designed to accommodate the large number of relatively routine minor spill incidents and the truly catastrophic hazardous material disaster.

Hazardous Materials Critical Tasking by Hazard Level

There are various critical tasks common for each hazardous materials incident based on the call type and risk assessment assigned. Each call type activates a pre-determined resource response based on the level of severity and critical tasks. Tasks are deemed critical to address, manage, and conclude the incident. The department operates within the hazardous materials first responder operations level.

The following hazard levels have been established for hazardous materials risk:

Table 20: Critical Tasking - Hazardous Materials Low Risk

Hazardous Materials Low Risk Passenger vehicle fuel leak, residential natural gas odor complaint, paint in the street, positively identified motor oil, etc. investigation		
Task	**Personnel**	**Assignment**
Command, Notifications, Identification	**1**	**1st Engine**
Isolate and Deny Entry	**1**	**1st Engine**
Containment and Control/Minor clean up	**1**	**1st Engine**
Total Personnel 3		

Table 21: Critical Tasking - Hazardous Materials Moderate Risk

Hazardous Materials Moderate Risk A broken gas main or natural gas release inside of a structure		
Task	**Personnel**	**Assignment**
Command, Notifications, Identification	**1**	**1st Engine**
Isolate and Deny Entry	**1**	**1st Engine**
Containment and Control	**1**	**1st Engine**
Command and Safety	**1**	**Battalion Chief**
Hazard Assessment, Action Planning	**1**	**2nd Engine**
Containment Control	**2**	**2nd Engine**
Total Personnel 7		

Table 22: Critical Tasking - Hazardous Materials High Risk

Hazardous Materials High Risk Bulk transportation release, distribution natural gas leaks		
Task	**Personnel**	**Assignment**
Command, Notifications, Identification	**1**	**1st Engine**
Isolate and Deny Entry	**1**	**1st Engine**
Containment	**1**	**1st Engine**
Command, Notifications	**1**	**Battalion Chief**
Hazard Assessment, Action Planning	**1**	**2nd Engine**
Medical Group Leader	**1**	**2nd Engine**
Medical Group	**2**	**3rd Engine**
Incident Safety Officer	**1**	**3rd Engine**
Emergency Decontamination	**3**	**4th Engine**
Total Personnel 12		

Note: These types of hazardous materials events require the hazardous materials team (from Los Angeles County) to make entry into the exclusion zone for containment, control, or sampling. El Segundo Fire Department does not have the required staffing or training by OSHA and California Specialized Training Institute (CSTI) to make an entry into an exclusion zone.

Table 23: Critical Tasking - Hazardous Materials Maximum Risk

Hazardous Materials Maximum Risk Radiological, biological, explosive materials, and any release with victims		
Task	**Personnel**	**Assignment**
Command, Notifications, Identification	**1**	**1st Engine**
Isolate and Deny Entry	**1**	**1st Engine**
Containment	**1**	**1st Engine**
Command, Notifications	**1**	**Battalion Chief**
Hazard Assessment, Action Planning	**1**	**2nd Engine**
Medical Group Leader	**1**	**2nd Engine**
Medical Group	**2**	**3rd Engine**
Incident Safety Officer	**1**	**3rd Engine**
Emergency Decontamination	**3**	**4th Engine**
Total Personnel 12		

Note: Hazardous Materials Level Maximum Risk responses are more dynamic events that will require additional resources to support the incident objectives. These incidents are very labor intensive and very dynamic. Incidents such as a rescue or an incident that is affecting the public require a higher sense of urgency and will require assistance from other qualified agencies such as Los Angeles County Fire Department or Chevron's Fire Department. Surrounding mutual aid agreements allow the department to fill the critical support positions in the hazardous materials response branch on an incident. The positions filled are in accordance with the State of California training and *FIRESCOPE*.

Critical Task Definitions

Incident Commander (IC) – The incident commander develops, implements, monitors, and modifies the incident action plan (IAP) based on the established goals and objectives for the incident. The incident commander is responsible for directing and/or controlling resources by virtue of explicit legal, agency, or delegated authority, as well as the overall management of the response.

Incident Safety Officer (ISO) –Working in conjunction with the IAP, the ISO shall develop measures identifying hazardous situations and the proper level of personal protective equipment personnel shall utilize. The ISO shall recognize potentially unsafe acts and implement corrective actions.

Isolate and Deny Entry – A minimum of one company will be required on a high risk incident to develop the initial hot, warm, and cold zones based upon wind direction, terrain, accessibility, and incident characteristics. These protective actions are those steps taken to preserve the health and safety of emergency responders and the public during an incident involving the release of dangerous goods. 'Isolate hazard area and deny entry' means to keep everyone away from the area if they are not directly involved in emergency response operations.

Medical Group – The medical group consists of a group of firefighters and paramedics who are established to provide care for victims injured in any kind of incident. They are well trained and equipped to assist and transport anyone who needs basic or advanced life support care.

Containment - Containment means restricting the material to its original container, while confinement refers to limiting the physical size of the area of release. First responders should have an assortment of products for spill mitigation of a spill for both types of controls

Rescue and Evacuation – Two firefighters or one company are required to safely rescue or evacuate victims of a hazardous materials incident. Personnel must develop and implement an action plan based on the number of people threatened, location to hazard, type of hazard, and time to safely evacuate with sheltering in place remaining a viable option.

Decontamination - A minimum of one company will be required on a high risk incident to develop and maintain the decontamination corridor for public safety personnel and victims being rescued. It is the process of removing or neutralizing contaminants accumulated on personnel and equipment, and is critical to health and safety at hazardous waste incidents.

Hazardous Materials Three-Axis Models for Each Risk Level

Graph results are based upon the calculations of data from three years (2018-2020) of hazardous materials-related incidents compiled from *Emergency Reporting*.

LOW RISK: PASSENGER VEHICLE LEAKING FUEL

RISK
Probability of occurrence 2
Consequence to community 4
Impact on fire department 2
SCORE 8.485281374

MODERATE RISK: BROKEN GAS MAIN

RISK
Probability of occurrence 4
Consequence to community 4
Impact on fire department 4
SCORE 19.59591794

HIGH RISK: BULK TRANSPORT RELEASE

RISK
Probability of occurrence 2
Consequence to community 8
Impact on fire department 6
SCORE 36.76955262

MAXIMUM RISK: RADIOLOGICAL / BIOLOGICAL / EXPLOSIVE MATERIAL

RISK
Probability of occurrence 2
Consequence to community 10
Impact on fire department 6
SCORE 45.51922671

Risk Classification and Categories

Fire Suppression Risk Classification Summary

Table 24: Risk Classification Summary - Fire Suppression

Fire	Probability	Consequence	Impact	Risk Score	Risk Assessment
Building Fire	6	8	6	54.33	High
Fires in Structure other than in a building	2	6	4	19.79	Moderate
Cooking Fire, confined to container	4	4	2	13.85	Moderate
Trash, or rubbish fire in a structure, no flame damage	2	2	2	4.89	Low
Vehicle Fire	4	2	2	8.48	Low
Brush, or brush and grass mixture fire	2	2	2	4.89	Low
Excessive heat, scorch burns with no ignition	4	2	2	8.48	Low
High-Rises/Oil Refinery	2	10	10	73.48	Maximum

Emergency Medical Risk Classification Summary

Table 25: Risk Classification Summary - EMS

EMS Rescue	Probability	Consequence	Impact	Risk Score	Risk Assessment
Traumatic Injury	10	4	4	41.56	High
Newborn	2	2	4	8.48	High
Cardiac Arrest	4	2	4	13.85	High
Seizure/Postictal	6	2	4	19.79	Moderate
Allergic Reaction	6	2	4	19.79	Moderate
Burns	2	2	4	8.48	Moderate
ETOH	6	2	2	12.32	Low
Psychiatric Crisis	8	2	2	16.24	Low
Cold/Flu Symptoms	6	2	2	12.32	Low
Multi-victim incidents with five or more patients, such as active threat, terrorism, hazardous materials release, infectious disease outbreak, or large-scale transportation incident (multiple patients with various conditions)	2	10	10	73.48	Maximum

Technical Rescue Risk Classification Summary

Table 26: Risk Classification Summary - Technical Rescue

Technical Rescue	Probability	Consequence	Impact	Risk Score	Risk Assessment
Confined Space	2	10	8	59.39	High
Vehicle into a structure, machinery extrication	2	6	4	19.70	Moderate
Traffic accident with entrapment,	2	4	4	16.97	Low
Swimming/Water Rescue	2	2	2	4.89	Low
Lock Ins/Out	4	4	4	13.85	Low
Elevator Entrapment	6	4	2	19.7	Low
Structural Collapse	2	10	8	59.39	Maximum

Hazardous Materials Risk Classification Summary

Table 27: Risk Classification Summary - Hazardous Materials

Hazardous Materials	Probability	Consequence	Impact	Risk Score	Risk Assessment
Bulk transportation release, distribution natural gas leaks	2	8	6	**36.76**	**High**
Biological Hazard	2	8	4	**23.70**	**Moderate**
Hazardous Condition	4	4	2	**13.85**	**Moderate**
Gas or Other Flammable Spill	4	4	4	**19.59**	**Moderate**
Chemical Spill	2	6	4	**19.70**	**Moderate**
Toxic Condition	2	4	2	**8.48**	**Low**
Radiological, biological, explosive materials, any release with victims	2	10	6	**45.51**	**Maximum**

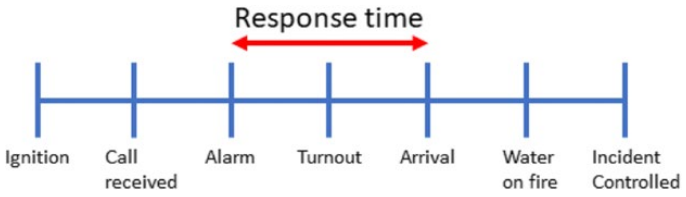
H. Historical Perspective and Summary of System Performance

The next step in the standards of cover process was to complete an in-depth measurement of overall department performance. Fire department performance is measured in various ways and categorized into four basic factors.

- Distribution - First assigned units.
- Concentration - Balance of effective response force (ERF).
- Reliability - Ability of units to respond to those incidents within their defined coverage areas.
- Comparability - A unit's performance when compared to an industry measurement/standard.

Fire Response – Critical Factor of Time

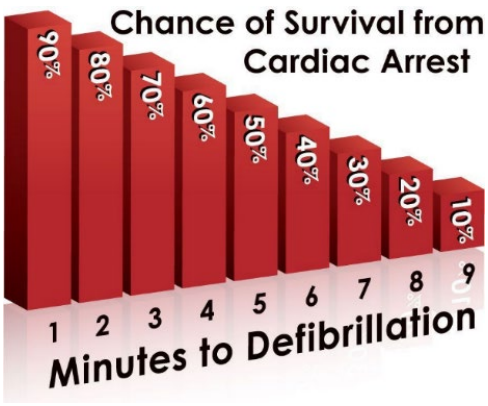
As stated earlier, early arrival and suppression efforts require efficient response times to minimize potential fire loss and save lives. To set proper time response measures, it is important to fully understand the critical factor of time when addressing fire and medical emergencies.



Emergency Medical Service (EMS) Response – Critical Factor of Time

The El Segundo Fire Department personnel respond quickly to many types of medical emergencies daily. Most medical emergencies require multiple fire department personnel to perform the various responsibilities related to patient care. The fire department's EMS model is to respond five personnel to a fire department EMS emergency to provide care.

A majority of emergency medical guidelines are based on studies demonstrating the relationship between resuscitation efforts and critical timeframes in which they are begun. Very similar to the fire flashover studies, the El Segundo Fire Department uses a critical time component of four to six minutes before brain death occurs in a cardiac arrest patient. Brain damage is usually irreversible after 10 minutes without oxygen. The term used in the fire department is "time equals brain." One of the methods of intervention is early defibrillation. When cardiac arrest occurs, the heart muscle twitches and beats chaotically. This, in turn, does not allow the body to circulate blood through the body and to the brain. For every minute without defibrillation, the odds of survival drop 7-10 percent. A sudden cardiac arrest patient who is not defibrillated within 10 minutes has a very slim to no chance of survival. The shortest possible response time creates the highest probability of resuscitation.



The fire department's total response time clock starts when someone calls dispatch (911) for help and stops when the first apparatus arrives on scene to mitigate the incident. The fire department measures time to assess its overall delivery system. El Segundo Fire Department uses measurable time data points to track the efficiency of response. These time points are alarm handling, turnout time, first arriving travel time, and ERF travel time.

Alarm Handling

The call processing time is the interval between a 911 call at the dispatch center and the time it takes the dispatcher to activate the station or engine company requested to respond. Several factors can influence the call processing time:

- Incidents reported with cell phones require the collected information to be manually entered into the computer-aided dispatch (CAD) system, unlike a landline that automatically populates in the CAD system.
- Multiple callers for the same incident compounding dispatcher workload.
- Multiple incidents at the same time, increasing workload and call time.
- Language barriers of non-English speaking customers may take more time.
- Dispatcher training levels.

The City of El Segundo Fire Department contracts its 911 dispatch with South Bay Regional Public Communications Authority, also referred to as Regional Communication Center (RCC). Dispatchers are trained and aware of the importance of a fast call processing time.

Turnout Time

The interval between the activation of a station and/or company alerting device is known as turnout time. This time also includes the time it takes for the responding crew to board the apparatus and begin responding to the incident location. Turnout time factors include:

- The location of apparatus at the time of dispatch. Many times throughout the day, department personnel are out of the station training, performing department-related details, returning from the hospital or from calls out of the city. Because of this, many of these activities may take a certain amount of extra time to return to their apparatus and respond.
- The nature of the incident may dictate the type of personnel protective equipment to wear to mitigate the incident. For example, responding to a fire incident requires structural turnout gear, which can take longer to don, while an emergency medical call may take latex gloves, mask, and gown.
- Station layout may also play an important part in responding to an incident. Station #1 is a lot smaller than Station #2. Travel time to and from the apparatus may be quicker, while at Station #2, the travel time may be longer because of the delay from walking downstairs to the apparatus.

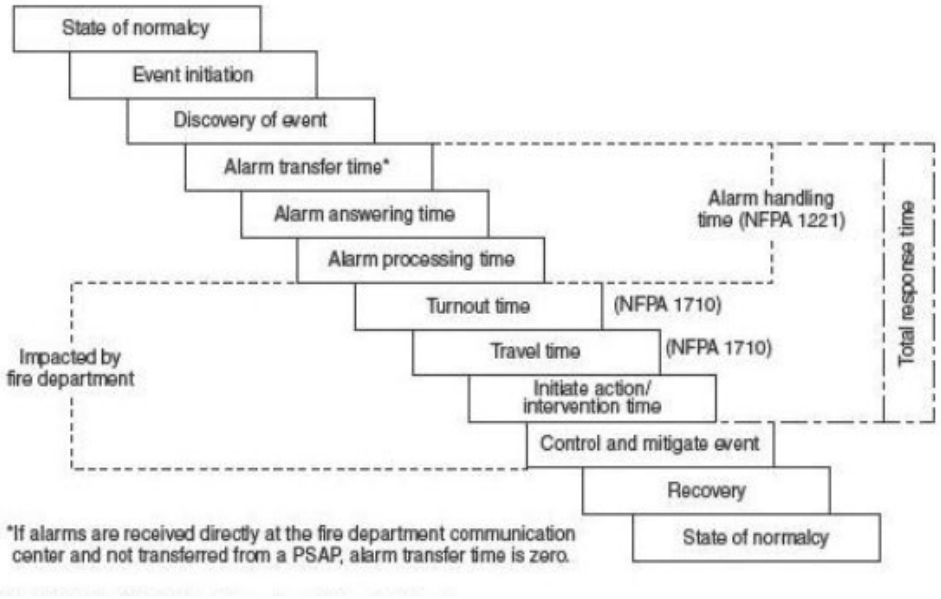
Fire department personnel are aware of and understand the importance of response times. To help decrease the response times, personnel routinely train in donning personnel protective equipment. Also, stop clocks and a pre-alerting system have been installed in both stations to help in speeding up the process of turnout time.

Travel Time

The next time interval the department collects data on is the travel time. The travel time is the time it takes the apparatus to drive from the station or the location at which personnel are when the alarm is received, to the reported incident address. Many factors can affect the speed of travel time, including:

- The number of vehicles on the road and at different times of days.
- Waiting for traffic to clear the road or pull to the right while traveling code 3 (lights and sirens) may cause a delay.
- Traffic and speed control devices such as signals, speed bumps, medians, and crosswalks may hamper the speed of response.
- Construction and large industrial complexes with large property to traverse, such as the refinery, may delay travel and arrival times.

NFPA Cascade of Events Chart



Distribution Factors

Distribution is defined as the geographic location of first-in resources for the initial mitigation of an incident. This is measured from fixed response points, such as fire stations, and expressed as a measure of time. Distribution is considered effective when resources are deployed to an emergency with the correct apparatus, equipment, and staffing to successfully assess the situation, establish a plan of action to mitigate the emergency, request appropriate resources, and stop or impede the escalation of the emergency. The City of El Segundo Fire Department measures distribution by reviewing its total response time that the first unit on scene arrives within the approved time frames for each service delivery program and risk classification defined earlier in the risk analysis. These classifications are fire suppression, emergency medical services, hazardous materials response, and technical rescue. To account for and define the distribution time clock, the department standard is to start the clock when the first unit is dispatched and ends when it arrives on scene. This is defined as the total response time.

The City of El Segundo is divided into two geographical planning zones known as fire districts. Each fire district is served by a fire station and defines the response area for each station. Each station is located to ensure effective distribution of resources and limit undue risk from extended responses. In developing specific fire districts, the city is divided into response coverage areas for each fire station, called primary response areas.

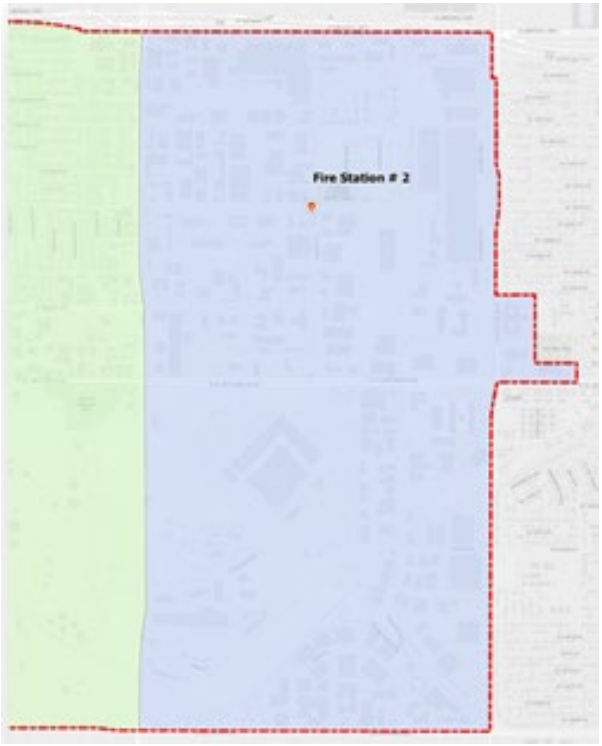
Station #1 Response Zone

Map 21: District One

Fire district one includes Downtown El Segundo, the Smoky Hollow District, and the residential portion of the city. This district also includes the Chevron Oil Refinery and ends to the west at the Pacific Ocean. The geographic response area of station one's district is 3.41 miles. The population density of Station #1's district is 16,731 residents and contains 4,293 residential structures that are single-family homes, residential apartments, accessory dwelling units, or condos. The Smokey Hollow portion of the district has unique planning issues and is considered to be the first developed commercial area in the city. There are post-WWII manufacturing and plating operations next to residential occupancies, and the buildings are located on property lines, with limited to zero setbacks. Furthermore, district one has 171 California Emergency Reporting System (CERS) reportable quantity businesses containing hazardous chemicals that fall under the 55 gallons, 500 pounds, or 200 cubic feet CERS threshold. The downtown area presents some unique hazards for the city as well. There is a historic building built before 1933 that was constructed with unreinforced masonry. Many other buildings have been retrofitted and continue to be modernized but present unique hazards in the event of an earthquake or extreme fire conditions. Many underground pipelines are located within this area, along with ten educational facilities, strip malls, and multiple hotels/motels.

Station #2 Response Zone

Map 22: District Two



Fire district two is east of Pacific Coast Highway and encompasses most of the industrial and commercial workspace in the city. It is bordered along its eastern boundary by the 405 Freeway and the 105 Freeway to the north. The planning area is approximately 2.04 square miles and provides the city with 80,000 private sector jobs. District two has 252 CERS reportable quantity businesses containing hazardous chemicals which fall under the 55 gallons, 500 pounds, or 200 cubic feet CERS threshold. Station #2's district has many facilities that have heavy manufacturing uses, such as construction yards, factories, and generating stations. These facilities include the Northrop Grumman plant site at 590 N. Douglas Street and The Boeing Company plant site at 2060 E. Imperial Highway. Portions of Station #2's area also contains light industrial areas that permit light manufacturing, warehousing, research and development, and office space for commercial use. This includes businesses such as Raytheon, Aerospace, and the United States Air Force Base. The city district also contains The Corporate Office zone, comprised of 21 high-rise and 18 mid-rise buildings in the city, all located on the east side of Pacific Coast Highway.

The Commercial Center zone is another portion that is co-located in other zones as well. These mixed zones allow retail, restaurants, and other commercial uses in an integrated shopping center design. The Plaza El Segundo shopping center at 700 to 800 S. Pacific Coast Highway and The Pointe shopping center at 820 to 860 S. Pacific Coast Highway. Station #2's area has many hotels/motels within its boundaries, such as Homestead Extended Stay Suites, Courtyard by Marriot, and Hilton Gardens Inn. Hotels located off the Nash Street Corridor hotels include the AC Hotel, Hyatt Place, and Residence Inn. The district has several railroad lines that are actively used for freight transport. Most prominently located in the southeast portion of the city are the Burlington Northern Santa Fe Railroad (BNSF) and the Union Pacific Railroad. These rail lines do not provide public transportation services.

The Metro Green Line, also known as the C line, runs east and west from Norwalk to Redondo Beach. According to the City of Redondo Beach Recreation Department, the frequency of the various metro lines is 7-8 minutes during peak hours and 15 minutes during off-peak hours.

Concentration Factors

The concentration of fixed and mobile resources based on the community's geography is designed by fire service leadership so that an ERF can arrive on scene in a timely manner. The on-scene ERF drives fire department objectives like fire station location, apparatus deployed, and staffing levels. The service level objectives drive response time performance by all responding resources and the assembly of an effective firefighting or EMS response force on scene. Both response time and assembly times subsequently drive resource distribution and concentration. Risk events are likely to be positive if response times and force assembly times are low, indicating that sufficient resources have been deployed. Conversely, risk events are more likely to be negative if high response times and force assembly times are indicative of insufficient resource deployment. A successful concentration of firefighters should be capable of providing safety for themselves and the community, providing incident management, completing all tasks in a timely manner, and preventing the emergency from escalating to critical levels. The El Segundo Fire Department uses total response time-ERF to measure concentration within each critical risk classification and adopted time frames. These classifications are fire suppression, emergency medical services, hazardous materials response, and technical rescue. Once the request to begin emergency services is received, total response time-ERF also begins. In other words, once South Bay Regional Public Communications Authority answers a 911 call, total response time-ERF begins and continues until the last emergency unit arrives on scene.

Reliability Factors

Reliability is the ability of an agency to perform and maintain its functions in routine and hostile or unexpected circumstances. In the case of emergency services, reliability looks at actual incident history data to measure historical performance in accordance with adopted performance measures. System reliability revolves around time and distance from the resources to the incident and the availability and capability of those resources. There are multiple reasons that one district is called to cover another: out-of-service units for training, mechanical issues, and multiple incidents occurring within the same district.

The following table illustrates the number of calls in both districts for the past five years and the percentage covered by the assigned station. A high percentage indicates that a district is adequately covered by its assigned apparatus. A low percentage may indicate that a district is understaffed and may need additional resources to better meet demands

Table 28: Reliability (2017-2021)

Year	2017		2018		2019		2020		2021	
Station	Incidents	Reliability	Incidents	Reliability	Incidents	Reliability	Incidents	Reliability	Incidents	Reliability
Station #1	1575	88.70%	1473	86.63%	1450	90.28%	1383	93.35%	1513	87.90%
Station #2	1273	91.99%	1362	95.52%	1322	94.40%	956	96.55%	1089	96.24%

Dataset Qualification

The El Segundo Fire Department analyzes the department's emergency response times using several key indicators to track and improve performance. Alarm handling, turnout time, and travel time are elements of the total response time. All of these contribute to the 90th percentile calculation, meaning total response time performance for 90 percent of the responses. While the department has varying levels of control over each of these elements, it is essential to track each to capture internal improvements and continue collaborating with the community in maintaining excellent service. Generally, both stations are positioned to cover 90 percent of the service area in each first-due district or zone, provide overlap for concentration, and allow redundancy to handle multiple calls for service, including equity of access for customer service.

To meet the needs of the community, the El Segundo Fire Department has established benchmark goals to build a system of continuous improvement. Consequently, five years of data have been collected to identify baseline trends and benchmark performance goals.

The El Segundo Fire Department has two three-person staffed engines, a three-person staffed truck, and two rescues staffed with two people on each. Most of the time, all heavy apparatus are staffed at the paramedic assessment level, meaning that at least one of the three people staffed on the unit are trained paramedics. The structure and deployment of resources are key factors when evaluating total response time baseline and benchmark performance.

Setting Thresholds

Not every value in the original dataset represents the department's typical performance. The establishment of thresholds for call processing, turnout, travel, response, committed, and on scene times (subject intervals) is a matter of deciding which data are to be included in an analysis and which are to be excluded. It is not an exact science but a statistical estimation that identifies round numbers that reasonably describe the department's historic performance boundaries for the period. The main point is to identify boundaries that include legitimate times on the high and low ends of the distribution, even if those times are unflattering to the department's performance, while excluding values with a very high probability of being operational anomalies or data errors.

A critical step in establishing thresholds is to isolate the data relevant to the department analysis. The following parameters and conventions were used to limit the data:

1. Outgoing mutual aid is excluded.
2. All units other than fire engines, ladder trucks, and ambulances were excluded.
3. All non-emergency runs were excluded.
4. Records for units arriving at scene first or second are aggregated and subjected to the same thresholds.

The upper threshold is the value under which the data is included and at and above which the data is excluded. The lower threshold is the value above which the data is included and at and below which the data is excluded.

Both the upper and lower thresholds are inherently conservative in that they are set based on a professional judgment about what on the high side is the worst case and what on the low side is the best reasonable case. This necessarily favors skewing the data high and is therefore deemed to be a conservative approach – one that does not by design show the department as faster than it might be.

The following table identifies the starting and ending thresholds for each interval. In every case, the ending thresholds represent the approximately 99.7th percentile of the starting distribution. The 99.7 percent is significant in that it represents the equivalent of three standard deviations from the mean in a normal distribution.

Table 29: Starting and Ending Thresholds

Duration Measure	Starting		Ending	
	Lower	Upper	Lower	Upper
Alarm Handling	0:00:10	0:06:00	0:00:15	0:05:00
Turnout Time	0:00:10	0:05:00	0:00:15	0:04:00
Travel Time	0:00:45	0:20:00	0:00:45	0:15:00
Total Response Time	0:00:00	4:00:00	0:00:00	2:30:00

When developing the benchmarks for the performance goals, the department looked at current capabilities, system demands, risk analysis, and community expectations to meet the end goal of NFPA 1710 total response time standards. Benchmark performance goals are set for each component of total response time: alarm handling, turnout time, travel time, and total response time. Baseline performance is separated by each risk level (low, moderate, high, maximum) and combines all risk levels for each service program (fire suppression, EMS, technical rescue, hazardous materials).

A **baseline** is a measurement of something (number of personnel, available trucks, available fire flow, etc.) used as a starting point when making comparisons or setting goals. It also refers to the "current" and historical performance of the agency. A **benchmark** is also a measurement by which something can be judged; however, it refers to future performance goals. Identifying industry standards will help define superior or benchmark (target) performance that an organization can strive to meet.

Baseline Performance Tables

Table 30: Baseline Performance - Fire Suppression Low Risk

Fire-LOW		2017-2021	2021	2020	2019	2018	2017
Alarm Handling	Pick-up to Dispatch 1st Unit	0:01:01	0:00:41	0:00:49	0:00:57	0:01:01	0:01:23
Turnout Time	Turnout Time 1st Unit	0:02:40	0:02:19	0:02:51	0:02:50	0:02:35	0:02:34
Travel Time	Travel Time 1st Unit **Distribution**	0:06:20	0:05:54	0:06:36	0:06:35	0:06:41	0:05:50
Total Response Time	Total Response Time 1st Unit on Scene	0:09:00	0:07:42	0:09:11	0:09:29	0:09:16	0:08:48
	Distribution	n=1,307	n=289	n=216	n=281	n=247	n=274

Table 31: Baseline Performance - Fire Suppression Moderate Risk

Fire-MODERATE		2017-2021	2021	2020	2019	2018	2017
Alarm Handling	Pick-up to Dispatch 1st Unit	0:00:37	0:00:31	0:00:23	0:00:45	0:00:36	0:00:50
Turnout Time	Turnout Time 1st Unit	0:02:39	0:02:24	0:02:48	0:02:30	0:02:41	0:02:38
Travel Time	Travel Time 1st Unit **Distribution**	0:04:47	0:04:05	0:03:46	0:05:57	0:03:57	0:04:40
	Travel Time ERF **Concentration**	0:10:03	0:10:21	0:8:30	0:08:28	0:11:18	0:10:38
Total Response Time	Total Response Time	0:07:10	0:06:18	0:06:01	0:07:59	0:06:10	0:07:24
	1st Unit on Scene **Distribution**	n=163	n=33	n=29	n=32	n=30	n=39
	Total Response Time	0:13:17	0:13:24	0:10:32	0:13:05	0:15:33	0:14:59
	ERF **Concentration**	n=160	n=33	n=28	n=32	n=29	n=38

Table 32: Baseline Performance - EMS All Risk

EMS-ALL		2017-2021	2021	2020	2019	2018	2017
Alarm Handling	Pick-up to Dispatch 1st Unit	0:00:46	0:00:28	0:00:30	0:00:39	0:00:47	0:01:15
Turnout Time	Turnout Time 1st Unit	0:02:16	0:01:59	0:02:06	0:02:16	0:02:21	0:02:23
Travel Time	Travel Time 1st Unit **Distribution**	0:04:49	0:04:47	0:04:48	0:04:24	0:04:19	0:05:27
Total Response Time	Total Response Time	0:06:40	0:06:21	0:06:28	0:06:21	0:06:19	0:07:24
	1st Unit on Scene **Distribution**	n=4,894	n=865	n=716	n=982	n=1,116	n=1,215

Table 33: Baseline Performance - Technical Rescue Low Risk

Rescue-LOW		2017-2021	2021	2020	2019	2018	2017
Alarm Handling	Pick-up to Dispatch 1st Unit	0:01:11	0:01:00	0:00:49	0:01:09	0:01:12	0:01:22
Turnout Time	Turnout Time 1st Unit	0:02:14	0:02:10	0:02:12	0:02:22	0:02:02	0:02:13
Travel Time	Travel Time 1st Unit **Distribution**	0:05:20	0:04:58	0:05:01	0:05:09	0:05:32	0:06:09
Total Response Time	Total Response Time 1st Unit on Scene	0:07:15	0:06:40	0:06:53	0:07:13	0:07:29	0:08:05
	Distribution	n=1,783	n=346	n=360	n=375	n=348	n=354

Table 34: Baseline Performance - Technical Rescue Moderate Risk

Rescue-MODERATE		2017-2021	2021	2020	2019	2018	2017
Alarm Handling	Pick-up to Dispatch 1st Unit	0:01:33	0:00:18	0:01:08	0:00:13	0:02:08	0:01:02
Turnout Time	Turnout Time 1st Unit	0:02:51	0:02:25	0:01:45	0:02:31	0:02:54	0:02:22
Travel Time	Travel Time 1st Unit **Distribution**	0:05:40	0:00:12	0:05:49	0:02:43	0:04:24	0:05:07
	Travel Time ERF **Concentration**	0:09:03	0:04:41	0:06:48	0:04:46	0:09:34	0:10:59
Total Response Time	Total Response Time 1st Unit on Scene	0:08:21	0:01:52	0:07:21	0:05:02	0:09:19	0:07:26
	Distribution	n=17	n=2	n=5	n=3	n=3	n=4
	Total Response Time	0:17:24	0:07:22	0:10:51	0:06:45	0:18:36	0:14:27
	ERF **Concentration**	n=16	n=2	n=5	n=3	n=3	n-3

Table 35: Baseline Performance - Hazardous Materials Low Risk

Hazardous Materials-LOW		Total	2021	2020	2019	2018	2017
Alarm Handling	Pick-up to Dispatch 1st Unit	0:01:09	0:01:10	0:00:54	0:00:44	0:01:12	0:01:37
Turnout Time	Turnout Time 1st Unit	0:02:21	0:01:57	0:02:14	0:02:22	0:02:26	0:02:23
Travel Time	Travel Time 1st Unit **Distribution**	0:08:54	0:08:02	0:08:38	0:08:49	0:07:55	0:09:29
Total Response Time	Total Response Time 1st Unit on Scene	0:11:08	0:10:31	0:10:33	0:11:26	0:10:38	0:12:00
	Distribution	n=1,019	n=188	n=188	n=228	n=209	n=206

I. Evaluation of Service Delivery

Performance Objectives – Benchmarks

Fire Suppression Services Program

For 90 percent of all low risk fires, the total response time for the arrival of the first-due unit, staffed with two firefighters and one officer, shall be: 6 minutes and 30 seconds in all areas. The first-due unit for all low risk fires shall be capable of providing 500 gallons of water and 1,500 gallons per minute (gpm) pumping capacity; initiating command; requesting additional resources, advancing an attack line, flowing a minimum of 150 gpm, establishing an uninterrupted water supply; containing the fire; and rescuing at-risk victims. These operations shall be done in accordance with departmental standard operating procedures while providing for the safety of responders and the public.

For 90 percent of all moderate risk fires, the total response time for the arrival of the effective response force (ERF), staffed with 24 firefighters and officers, shall be: 8 minutes in all areas. The ERF for moderate risk fires shall be capable of establishing command; appointing a site safety officer; providing an uninterrupted water supply; advancing an attack line and a backup line for fire control, complying with two-in and two-out; completing forcible entry; searching and rescuing at-risk victims; ventilating the structure; controlling utilities; and performing salvage and overhaul. The ERF for moderate risk fires shall be capable of placing the elevated streams into service from aerial ladders. These operations shall be done in accordance with departmental standard operating procedures while providing for the safety of responders and the public.

For 90 percent of all high-risk fires, the total response time for the arrival of the ERF, staffed with 36 firefighters and officers, shall be: 9 minutes in all areas. The ERF for high risk shall be capable of establishing command; appointing a site safety officer; providing an uninterrupted water supply; advancing an attack line and a backup line for fire control, complying with two-in and two-out; completing forcible entry; searching and rescuing at-risk victims; ventilating the structure; controlling utilities; and performing salvage and overhaul. The ERF for high and maximum risk fires shall be capable of placing the elevated streams into service from aerial ladders. These operations shall be done in accordance with departmental standard operating procedures while providing for the safety of responders and the public.

Emergency Medical Services Program

For 90 percent of all emergency medical services (EMS) responses, the total response time for the arrival of the first-due unit, staffed with two firefighter/paramedics or three emergency medical technicians (EMTs) shall be: 5 minutes and 30 seconds. The first-due unit shall be capable of: assessing scene safety and establishing command; sizing-up the situation; conducting an initial patient assessment; obtaining vitals and patient's medical history; initiating mitigation efforts within one minute of arrival; providing first responder medical aid, including automatic external defibrillation (AED); and assisting transport personnel with packaging the patient.

For 90 percent of all EMS response incidents, the total response time for the arrival of the ERF, staffed with five operations personnel, shall be: 8 minutes. The ERF shall be capable of providing incident command and producing related documentation; appointing a site safety officer; completing patient assessment; providing appropriate

treatment; performing AED; initiating cardiopulmonary resuscitation (CPR); and providing intravenous (IV) access-medication administration.

Technical Rescue Services Program

For 90 percent of all technical rescue incidents, the total response time for the arrival of the first-due unit, staffed with two firefighters and one officer, shall be: 6 minutes and 30 seconds. The first-due unit shall be capable of: establishing command; sizing up to determine if a technical rescue response is required; requesting additional resources; and providing basic life support to any victim without endangering response personnel.

For 90 percent of all technical rescue incidents, the total response time for the arrival of the ERF staffed with 14 personnel, including the technical response team, shall be 8 minutes. The ERF shall be capable of: appointing a site safety officer; establishing patient contact; staging and apparatus set up; providing technical expertise, knowledge, skills, and abilities during technical rescue incidents; and providing first responder medical support.

Hazardous Materials Services Program

For 90 percent of all hazardous materials response incidents, the total response time for the arrival of the first-due unit, staffed with two firefighters and one officer, shall be: 6 minutes and 30 seconds. The first-due unit shall be capable of: establishing command; sizing up and assessing the situation to determine the presence of a potential hazardous material or explosive device; determining the need for additional resources; estimating the potential harm without intervention; and beginning the establishment of a hot, warm, and cold zone.

For 90 percent of all hazardous materials response incidents, the total response time for the arrival of the ERF staffed with 14 personnel, shall be: 8 minutes. The ERF shall be trained to the first responder operational level. The tasks that shall be accomplished include locating personnel in a safe area, researching and gathering situational awareness related to the incident, identifying potential victims and opportunities for rescues, isolating and denying entry into the exclusion zone, building dams and dikes away from the hazard, evacuating and sheltering potential victims, coordinating with regulatory agencies, and providing any documentation necessary.

Performance Objectives – Baselines

Fire Suppression Services Program

The department's baseline statements reflect actual performance from 2017 to 2021. The department relies on the use of automatic aid or mutual aid from neighboring fire departments to provide its effective response force complement of personnel. These resources are immediately available as part of a seamless response system. The department's actual baseline service level performance is as follows:

For 90 percent of all low-risk fires, the total response time for the arrival of the first-due unit, staffed with two firefighters and one officer, is 9 minutes and 00 seconds in all areas. The first-due unit for all risk levels is capable of providing 500 gallons of water and 1,500 gpm pumping capacity; initiating command; requesting additional resources; advancing an attack line, flowing a minimum of 150 gpm; establishing an uninterrupted water supply; containing the fire; and rescuing at-risk victims, and performing salvage operations. These operations were done in accordance with departmental standard operating procedures while providing for the safety of responders and the public.

For 90 percent of all moderate risk fires**,** the total response time for the arrival of the ERF is: 13 minutes and 17 seconds in urban areas. The ERF for moderate risk is capable of: establishing command; providing an uninterrupted water supply; advancing an attack line and a backup line for fire control; complying with the Occupational Safety and Health Administration (OSHA) requirements of two in and two out; completing forcible entry; searching and rescuing at-risk victims; ventilating the structure; controlling utilities; and performing salvage and overhaul. The ERF for high and maximum risk fires is also capable of placing elevated streams into service from aerial ladders. These operations were done in accordance with departmental standard operating procedures while providing for the safety of responders and the public.

For the calendar years 2017-2021, the El Segundo Fire Department responded to two high or maximum risk fire suppression incidents rendering the 90th percentile analysis less than ideal for this sample size. Therefore, a baseline performance statement will not be included in the Standards of Cover.

Emergency Medical Services Program

The incident numbers were derived from the computer-aided dispatch (CAD) system. The City of El Segundo Fire Department sends the same number of resources, whether a basic life support (BLS) or advanced life support (ALS) call. The department does not differentiate between the two when responding units to an incident, as the call received may not be what is actually found on scene.

The department's baseline statements reflect actual performance from 2017 to 2021. The department does not rely on the use of automatic aid or mutual aid from neighboring fire departments to provide its effective response force complement of personnel. The department's actual baseline service level performance is as follows:

For 90 percent of all EMS responses, the total response time for the arrival of the first-due unit, staffed with two firefighter/paramedics or five personnel is: 6 minutes 40 seconds. The first-due unit is capable of: assessing scene safety and establishing command, sizing up the situation, conducting an initial patient assessment, obtaining vitals and patient's medical history, initiating mitigation efforts within one minute of arrival, providing first

responder medical aid, including AED, and assisting transport personnel with packaging the patient, initiating CPR, and providing IV access medication administration.

Technical Rescue Services Program

The department's baseline statements reflect actual performance from 2017 to 2021. The department relies on the use of automatic aid or mutual aid from neighboring fire departments to provide its effective response force complement of personnel. These resources are immediately available as part of a seamless response system. The department's actual baseline service level performance is as follows:

For 90 percent of low risk technical rescue incidents, the total response time for the arrival of the first-due unit, staffed with two firefighters and one officer, is: 7 minutes and 15 seconds. The first-due unit is capable of: establishing command; sizing up to determine if a technical rescue response is required; requesting additional resources; and providing basic life support to any victim without endangering response personnel.

For 90 percent of moderate risk technical rescue incidents, the total response time for the arrival of the 14 personnel, ERF, is 17 minutes and 24 seconds. The ERF is capable of: appointing a site safety officer; establishing patient contact; staging and apparatus set up; providing technical expertise, knowledge, skills, and abilities during technical rescue incidents; and providing first responder medical support.

For the calendar years 2017-2021, the El Segundo Fire Department did not have enough high or maximum risk technical rescue incidents rendering the 90th percentile analysis less than ideal for this sample size. Therefore, a baseline performance statement will not be included in the standards of cover.

Hazardous Materials Services Program

The department's baseline statements reflect actual performance from 2017 to 2021. The department relies on the use of automatic aid or mutual aid from neighboring fire departments to provide its effective response force complement of personnel. These resources are immediately available as part of a seamless response system. The department's actual baseline service level performance is as follows:

For 90 percent of low/moderate hazardous materials response incidents, the total response time for the arrival of the first-due unit, staffed with two firefighters and one officer, is: 11 minutes and 08 seconds. The first-due unit is capable of establishing command; sizing up and assessing the situation to determine the presence of a potential hazardous material or explosive device; determining the need for additional resources; estimating the potential harm without intervention; and begin establishing a hot, warm, and cold zone.

For the calendar years 2017-2021, the El Segundo Fire Department did not have enough high or maximum risk hazardous materials incidents rendering the 90th percentile analysis less than ideal for this sample size. Therefore, a baseline performance statement will not be included in the standards of cover.

The incident numbers were derived from the CAD call natures for odor complaints, hazardous materials, release/leak, unknown substance, and spills. Most of these responses are Code 2 (no lights and siren), indicating a decreased sense of urgency. Company officers are encouraged to reduce the number of Code 3 (lights and siren) responses for public and responder safety when the situation warrants.

Performance Gaps – Baseline to Benchmark Time Gap

Fire Suppression Services Program

Table 36: Baseline to Benchmark Time Gap - Fire Suppression Low Risk

2017-2021 Low Risk Fire Suppression Response Times				
1st/ERF	**Urban/Rural**	**Baseline**	**Benchmark**	**Gap**
1st Due	Urban	9:00	6:30	**02:30**
		n=1,307		

Table 37: Baseline to Benchmark Time Gap - Fire Suppression Moderate Risk

2017-2021 Moderate Risk Fire Suppression Response Times				
1st/ERF	**Urban/Rural**	**Baseline**	**Benchmark**	**Gap**
1st Due	Urban	7:10	6:30	**00:40**
		n=163		
ERF	Urban	13:17	8:00	**05:17**
		n=160		

Emergency Medical Services Program

Table 38: Baseline to Benchmark Time Gap - EMS All Risk

2017-2021 All Risk EMS Response Times				
1st/ERF	**Urban/Rural**	**Baseline**	**Benchmark**	**Gap**
1st Due	Urban	6:40	5:30	**01:10**
		n=4,894		

Technical Rescue Services Program

Table 39: Baseline to Benchmark Time Gap - Technical Rescue Low Risk

2017-2021 Low Risk Tech Rescue Response Times				
1st/ERF	**Urban/Rural**	**Baseline**	**Benchmark**	**Gap**
1st Due	Urban	7:15	6:30	**00:45**
		n=1,783		

Table 40: Baseline to Benchmark Time Gap - Technical Rescue Moderate Risk

2017-2021 Moderate Risk Tech Rescue Response Times				
1st/ERF	**Urban/Rural**	**Baseline**	**Benchmark**	**Gap**
1st Due	Urban	8:21	6:30	**01:51**
		n=17		
ERF	Urban	17:24	8:00	**09:24**
		n=16		

Hazardous Materials Services Program

Table 41: Baseline to Benchmark Time Gap - Hazardous Materials Low/Moderate Risk

2017-2021 Low/Moderate Risk Hazmat Response Times				
1st/ERF	**Urban/Rural**	**Baseline**	**Benchmark**	**Gap**
1st Due	Urban	11:08	6:30	**04:38**
		n=1,019		

Community Areas for Program Delivery and Coverage Improvement

The El Segundo Fire Department has developed a community risk assessment and standards of cover process, allowing the department to evaluate the community and response times in a thorough and comprehensive manner. It has been a valuable experience allowing the department to assess risks, set performance goals, and learn more about the community's needs. Consequently, the department has developed a series of recommendations that would effectively help the department become more efficient with the service provided.

The department is currently looking at all components of response times.

- Alarm Handling - With the department's partnership with the dispatch center, there is an opportunity for alarm handling improvements. The South Bay Regional Public Communications Authority has been positive and responsive to the department's wishes.
- Turnout Time - The department recently added the *First Alert* alerting system to both fire stations and has implemented turnout timers in the fire stations to encourage faster turnout times.

Improving data: There are several ways the department can improve data collection methods and data quality.

- The El Segundo Fire Department has recently updated the CAD and will now be able to record accurate data with the new system. This will change how the 911 dispatch center receives, processes, and routes the City of El Segundo's emergency calls. As the El Segundo Fire Department's emergency response units are dispatched to provide a service, the same information collected in the CAD system by a 911 dispatcher can be shared with dispatched units while responding. This real-time information sharing ensures that the fire department receives the most up-to-date information to make critical decisions. Once the incident is over, the fire department and records management system (RMS) can record and receive data automatically from the CAD system, with many populated fields for fire incident reporting. The National Fire Incident Reporting System (NFIRS) 5.0 is the standard by which the fire incident RMS collects and stores these data. With increased integration between the CAD and NFIRS-based systems, the data collected will become more accurate, and the quality of the data will be better. Two NFIRS data elements impacted by the integration of CAD and RMSs are incident times and incident remarks/narratives. It is the recommendation of the group to get together with South Bay Regional Public Communications Authority and the Technology Committee to update systems.
- The fire department has recently upgraded the EMS reporting with *Digital EMS*. The department's industry standard in records management has traditionally been emergency medical (paper) forms. The department has found that *Digital EMS* forms are the way of the future. To accomplish this, the department believes that *Digital EMS* can serve this purpose in a very practical and efficient way. *Digital EMS* can convert the department's existing rescue reports to an ePCR format for tablet use. They can provide the department with an intuitive user interface requiring little training to document patient information and vital signs. The EMS form will be designed with certain "hot zones" - when a firefighter touches a section, a pop-up window will appear, making the information easy to enter. The firefighter can simply enter the data with their fingertip and tap on the "save" button. Since this program uses digital EMS forms, the learning curve is significantly reduced, and personnel can easily adapt to the electronic patient care report.

- The department is currently transferring its records management software to *Emergency Reporting***.** Designed to facilitate inspections with the purchase of the prevention software, *Emergency Reporting* allows for accessing and editing the occupancy, structure, and hydrant data. Completing pre-fire planning forms and performing on-site inspections will be made easier and completed in real time. It enables the department to store photos, and send violation notices and emails from an iPad/tablet. Within the prevention software package, there is a wide range of features available that could help achieve the goal of developing the community risk reduction (CRR) plan within the city.
- *Emergency Reporting* provides the department with a single platform that allows for easy collection and organization of all data. Also, *Emergency Reporting* can provide the department with the tools needed to understand what data the department has and how to use it. Even more importantly, data can be easily reported to the state or federal government with the click of a button. A comprehensive Reports Module, for example, is a simple way to track and measure department goals. The Analytics Module is used to create custom response time benchmarks or see how the department measures up to the NFPA 1710/1720 standards of cover. In addition, from the research completed, there is a need for a better RMS to comply with NFIRS and National Emergency Medical Service Information System (NEMSIS) requirements. The department believes that this data can be used to effectively distribute resources, improve efficiency, and increase safety for first responders and the community.
- First responders are responsible for collecting and reporting critical information. The days of filing cabinets and notebooks with stacks of information that could improve first responder and community safety are long gone. The department believes that it is a valuable tool that can effectively be used to harness the data to make a difference and provide better service to the community served.
- Historically the fire department has done a good job recording fire loss data, but could improve the tracking of fire save data. To improve incident reporting consistency within the department, the department will be looking into further training with *Emergency Reporting* personnel.
- The department will be revisiting current automatic aid agreements to enhance efficiency and effectiveness. The department has already reached out to Los Angeles County Fire Department, Los Angeles City Fire Department, and Manhattan Beach Fire Department to discuss improving automatic aid agreements.

J. Performance Maintenance and Improvement Plans

Compliance Team / Responsibility

To ensure the department is meeting current service level objectives, continuous monitoring of service level baselines must be conducted on a regular basis. The compliance team consists of the Community Risk Analysis/Standards of Cover (CRA/SOC) Committee. Members include the fire chief, three battalion chiefs, the fire marshal, emergency medical service (EMS) coordinator, hazardous materials program coordinator, technical rescue program coordinator, management analyst (data analytics), and an El Segundo Firefighters Association (ESFA) representative.

The accreditation project manager heads the CRA/SOC Committee. The management analyst conducts data analysis, including weekly first-due analysis of fire and medical incidents and monthly reporting of all emergency service programs. The battalion chiefs provide quality control for individual incident reports completed by the captains on their respective shifts to ensure pertinent information is included and coding is correct. The fire marshal reports on pending developments and their potential impact on the City of El Segundo overall and on the status of community risk reduction activities, such as annual business inspections and public education. Below is a summary of the compliance team members and responsibilities.

Fire Chief:

- Liaison to the city manager and city council.
- Lead quarterly review of published baseline performance data with CRA/SOC Committee.

Accreditation Project Manager:

- Administration program appraisal.
- Review, interpret and publish all baseline performance data for each service program: fire suppression, EMS, technical rescue, and hazardous materials.

Fire Marshal:

- Monitor commercial and residential developments to analyze and report potential impacts for each planning zone.
- Provide updates on fire and life safety inspection programs.
- Subject matter expert of fire hazard reduction program.
- Subject matter expert of fire investigation program.

A-Shift Battalion Chief:

- A-Shift program appraisal and platoon activities.
- Quality control of A-Shift incident reports (assist with other shifts, as needed).

B-Shift Battalion Chief:

- B-Shift program appraisal and platoon activities.
- Quality control of B-Shift incident reports (assist with other shifts, as needed).

C-Shift Battalion Chief:

- C-Shift program appraisal and platoon activities.
- Quality control of C-Shift incident reports (assist with other shifts, as needed).

EMS Coordinator:

- Reports on patient outcomes, particularly related to ST-elevation myocardial infarction (STEMI) and cardiac arrest.
- Researches and recommends additional outcome measures.
- Subject matter expert of emergency medical services program.

Hazardous Materials Coordinator:

- Subject matter expert of hazardous materials program.

Technical Rescue Program:

- Subject matter expert of the technical rescue program.

Management Analyst:

- Analyze and report weekly, monthly, quarterly, and annual data in multiple reportable formats (e-mail, intranet, hard copy) for internal and external stakeholders.
- Publish quarterly and on-demand data.
- Maintain CRA/SOC performance tables.

ESFA Representative:

- Provide insight and perspective of first responders.
- Propose solutions to improve performance in all program areas.

Performance Evaluation and Compliance Strategy

The fire department's first-due fire and medical emergency response performance will be evaluated and reported weekly. This evaluation will include call processing, turnout, travel, and total response times measured at the 90th percentile.

All emergency service program areas will be evaluated monthly, including a 12-month analysis. Monthly reporting will include evaluation of first-due call processing, turnout, travel times, effective response force (ERF) travel, and total response times at the 90th percentile.

Summary of performance evaluation and compliance strategy:

1. Weekly reporting of first-due fire and medical emergency response performance (call processing, turnout, travel, and total response time).
2. Monthly reporting of fire suppression, emergency medical, hazardous materials, and technical rescue emergency response programs. Includes a 12- month review of each program.
3. Quarterly reporting of outcomes and response time performance of the fire suppression, emergency medical, hazardous materials, and technical rescue emergency response programs. These reports will be reviewed by the CRA/SOC Committee.
4. Annual reporting of outcomes and response time performance of the fire suppression, emergency medical, hazardous materials, and technical rescue emergency response programs. Annual reports will be reviewed by the CRA/SOC Committee, new benchmarks established, and a revised CRA/SOC document will be presented to city management and city council.

Compliance Verification Reporting

Weekly performance compliance will be reported weekly to El Segundo fire personnel, city management, councilmembers, and the public via a release in the city newsletter and on social media. Monthly performance compliance, including a 12-month overview of each program area, will be reported to El Segundo fire personnel and city management via e-mail and intranet; councilmembers will receive compliance reporting via e-mail; the public will receive compliance reporting through social media and website access (hard copies will be available upon request).

Continuous Improvement Strategy

To ensure the department is meeting current service level objectives, continuous monitoring of service level baselines must be conducted on a regular basis. The compliance team members include the fire chief, the three battalion chiefs, fire marshal, EMS coordinator, hazardous materials program coordinator, technical rescue program coordinator, management analyst (data analytics), and an El Segundo Firefighters Association (ESFA) representative, will review service level baselines on a weekly, monthly, quarterly, and annual basis. Included in the review shall be a summary of the results of the service level objectives, a comparison of current results to previous results and calculations of the difference in results between time periods.

In addition to the review of service level objectives, the CRA/SOC Committee will review the response demands within each response zone and the identified risks within. The committee will determine if there have been any changes within a planning zone, changes to service demands or changes in standards or operations that impact the service level objectives or the standards of cover document. These reviews will be conducted quarterly.

To aid in collecting and presenting this information, the compliance team will work as a group to assemble all required information and assist in the interpretation of data and considerations for improvement towards achieving target benchmarks. The final report will be presented to the city council by the fire chief.

Works Cited

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COMMUNITY RISK ASSESSMENT/ STANDARDS OF COVER