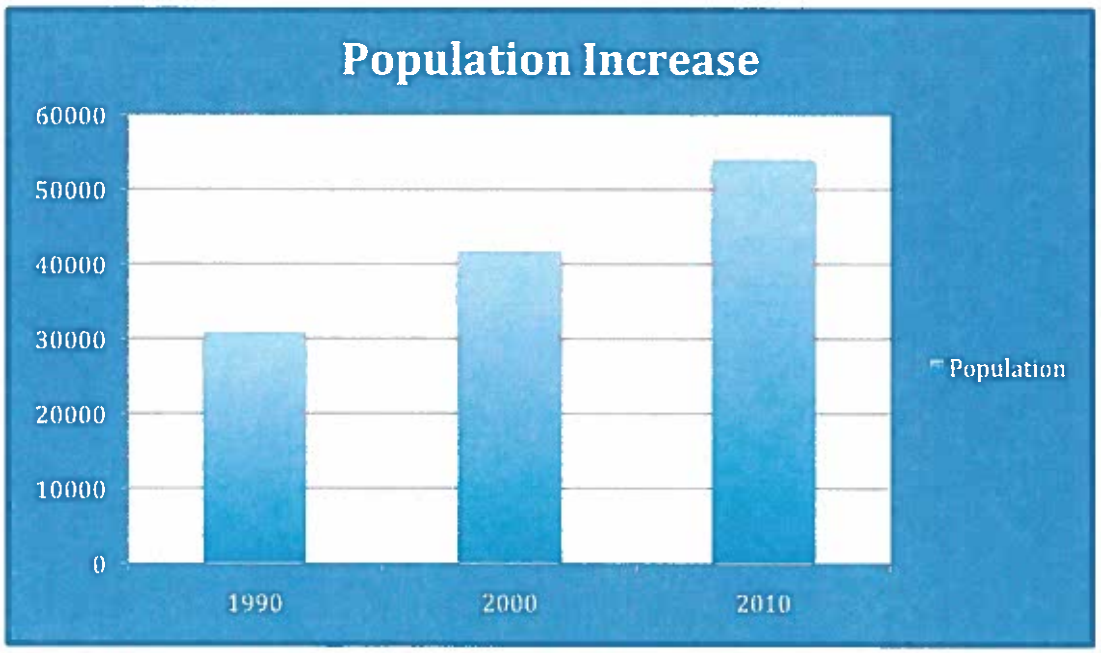
SECTION II: SYSTEM DEMAND PROJECTIONS

1. SYSTEM DEMAND PROJECTIONS

This chapter provides analysis and projections for workloads to be handled by the Hanford Fire Department.

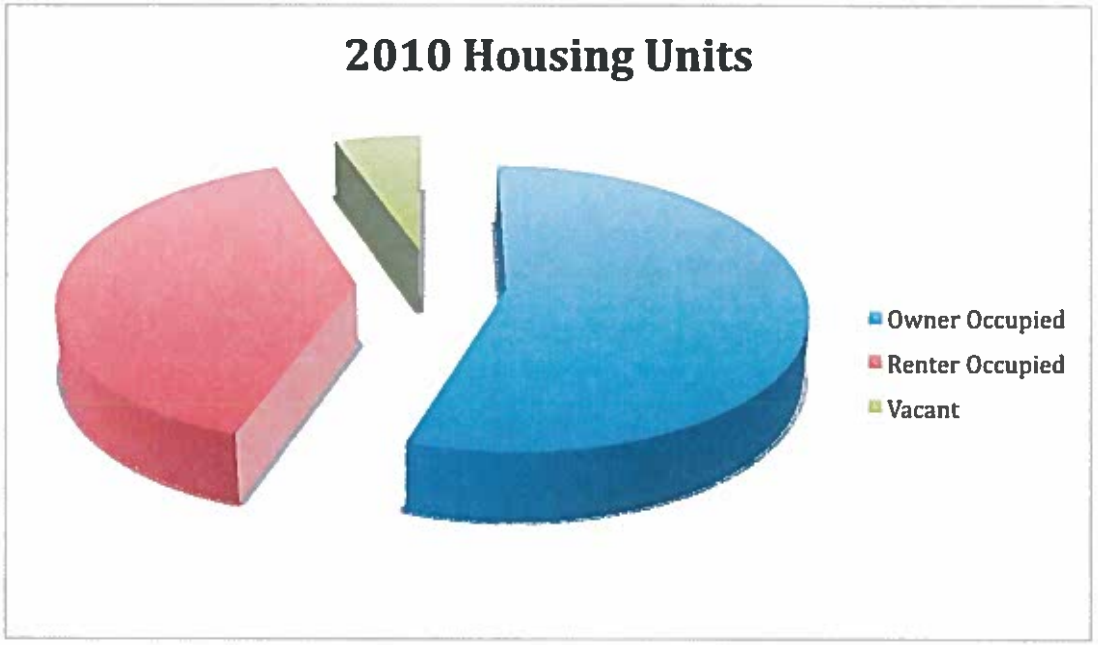
1. CURRENT POPULATION INFORMATION

According to the U.S. Census Bureau, the population of Hanford was 53,967 in 2010. This is a large increase from the 2000 Census, which recorded the population as 41,686 and 1990 with a population of 30,897. The historical growth for Hanford is shown below.



Hanford also enjoys a relatively young population with the largest population groups ranging from 5 years old to 44 years old. Two of the three smallest population

segments are those under 5 years of age and those over 65, which is positive for HFD as these two groups pose the highest historical risk for fire fatalities.



As shown Hanford has a majority of properties in the community occupied by owners (55%) as compared to 39% by renters and 5% vacant. The higher level of owner-occupied housing indicates a more stable economic environment than if more rental property existed.

2. POPULATION GROWTH PROJECTIONS

According the City of Hanford website, the City expects the population to continue to grow by 2-3% annually bringing the population to an estimated 70,177 by 2020. Since 2009 there has been a general slowdown in new construction, which will most likely cause the actual population to increase slower than current projections.

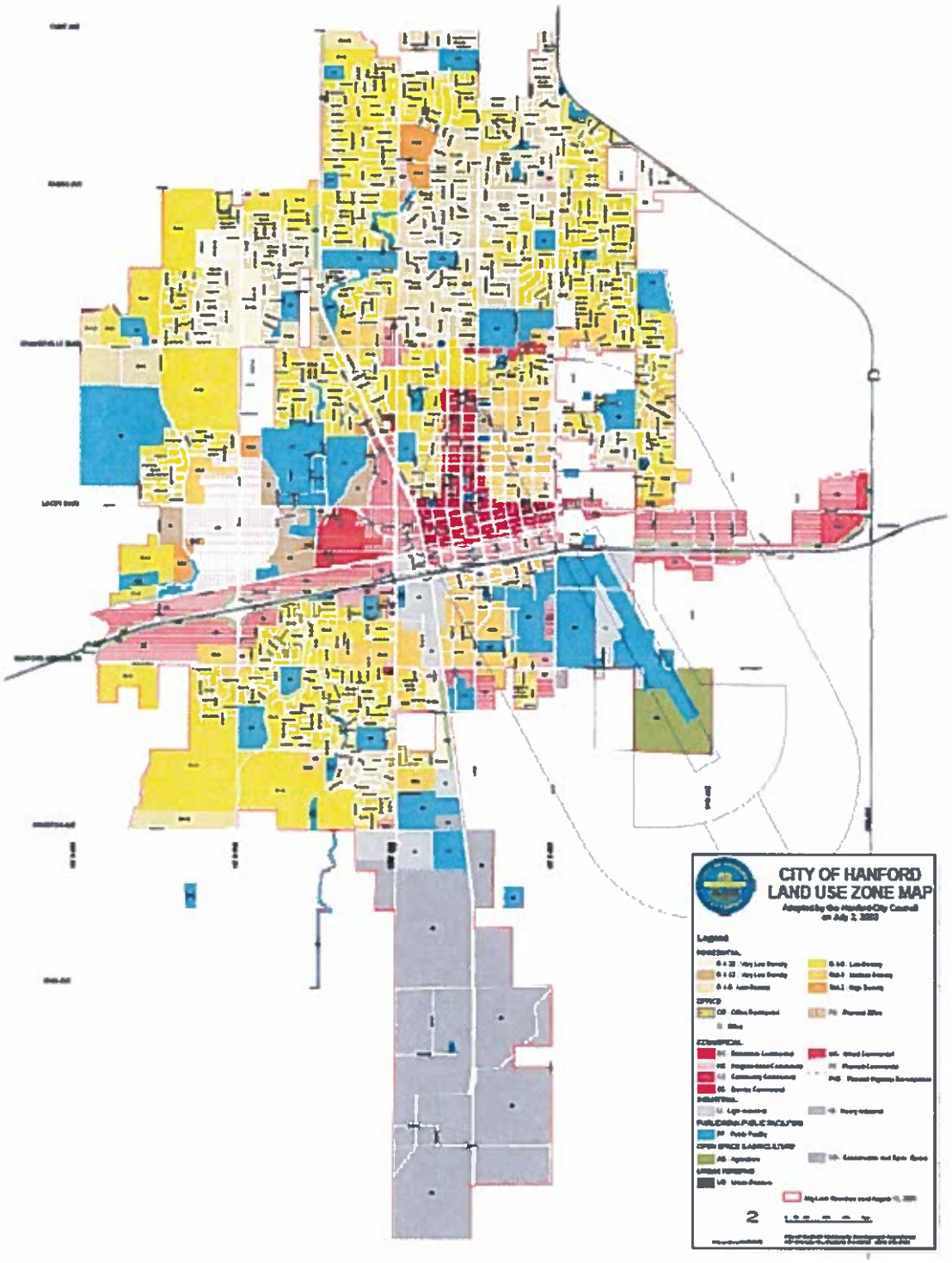
3. COMMUNITY RISK ANALYSIS

The assessment of the relative risk of properties is based on a number of factors. Properties with high fire and life safety risks require a greater number of personnel and apparatus to respond to effectively mitigate the emergency. Staffing and deployment decisions should be made with great consideration of the level of risk within different geographic sub-areas of the City.

A community risk assessment is developed based on land use within the community. These land uses are typically found in the City planning department and have specific zoning designations. Risk can then be translated to the land use maps based on the planned uses of land.

> **Low Risk** = Areas zoned and used for agricultural purposes, open spaces, low-density residential developments, and other low intensity uses.
>
> **Moderate Risk** = Areas zoned for medium-density single family properties, small commercial and office uses, low-intensity retail sales, and equivalently sized business activities.
>
> **High Risk** = Higher intensity business districts, mixed use areas, high-density residential, industrial, warehouses, and large mercantile centers.

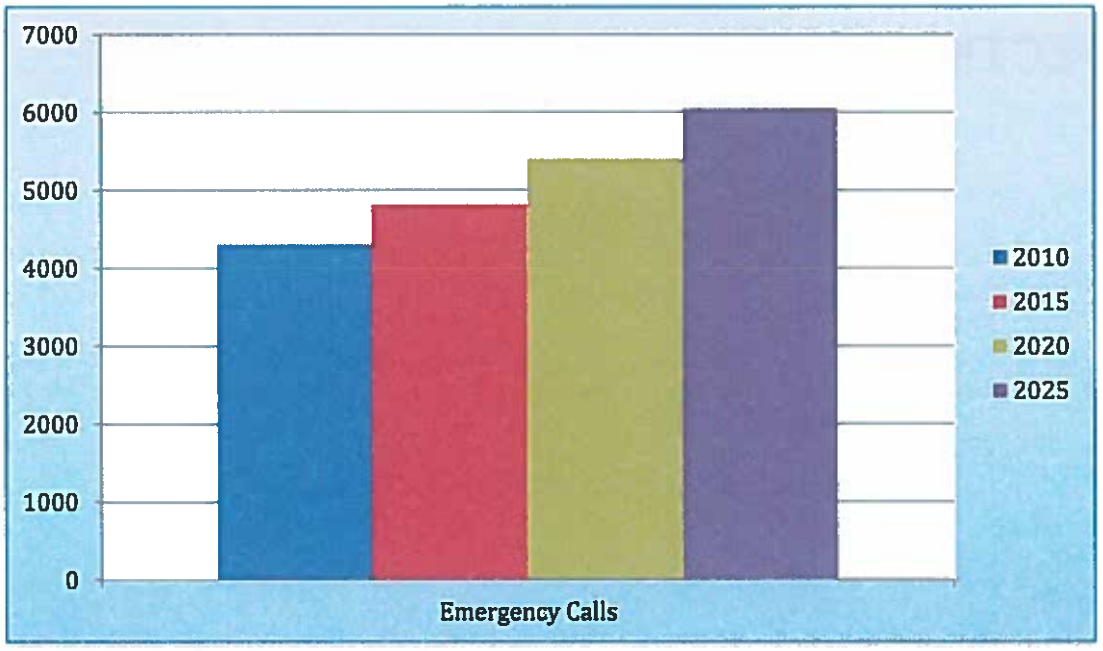
The current land-use map for the City of Hanford indicates that the majority of land is reserved for low and medium-density residential. The center of the City poses a higher fire risk with much of the commercial development occurring in this area. The extreme south portion of the City may pose the highest fire risk depending on how the industrial uses develop. The fire department must take an active role in this area as it develops to ensure fire and life safety concerns are addressed.


CITY OF HANFORD
LAND USE ZONE MAP
Legend

SECTION III: FUTURE SERVICE DELIVERY MODELS

4. SERVICE DEMAND PROJECTIONS

The prediction of increases in service demand projections is difficult to determine as great variations can occur depending on the type of occupancies constructed in the City. For the purposes of this study we will utilize population projections based on an annual growth rate of 2.3% as compared to historical incidents per capita to show how emergency service demands could increase with the population.



With the strong fire code in place in the City of Hanford it is fair to factor the actual increase in fire incidents will be at a lower rate than other types of emergency calls. One risk to take into account is the mostly unprotected, historic downtown and whether automatic detection and suppression systems are installed as the area re-develops. Implementing these systems would further enhance the fire safety of the community.

1. FUTURE DEPLOYMENT RECOMMENDATIONS

The City of Hanford continues to project that the majority of growth will occur in the western portions of the community. This portion of the Master Plan is intended to provide strategic direction toward meeting the emergency service needs of the community as this growth occurs.

As stated earlier, HFD has acquired property in the western portion of the City for two additional fire stations. Based on the projected growth the locations for these stations are being re-evaluated to determine which station should be constructed first and how the City can determine the appropriate time to construct the station.

2. STANDARDS OF RESPONSE COVERAGE

1. FIRE STATION LOCATIONS

The use of geographic information systems (GIS) allows for scientific modeling of response times using the existing road network in a community. This process allows the evaluation of current deployment and future strategies with accuracy and detail. All scenarios use the existing stations and then add one additional station to the equation to determine which location should be constructed first according to current demand loads. For the purposes of creating the response time, we utilized a four-minute and five-minute/twelve second aggregate to allow HFD to evaluate their ability to meet best practices benchmark and baseline performance standards with the current and future station locations.

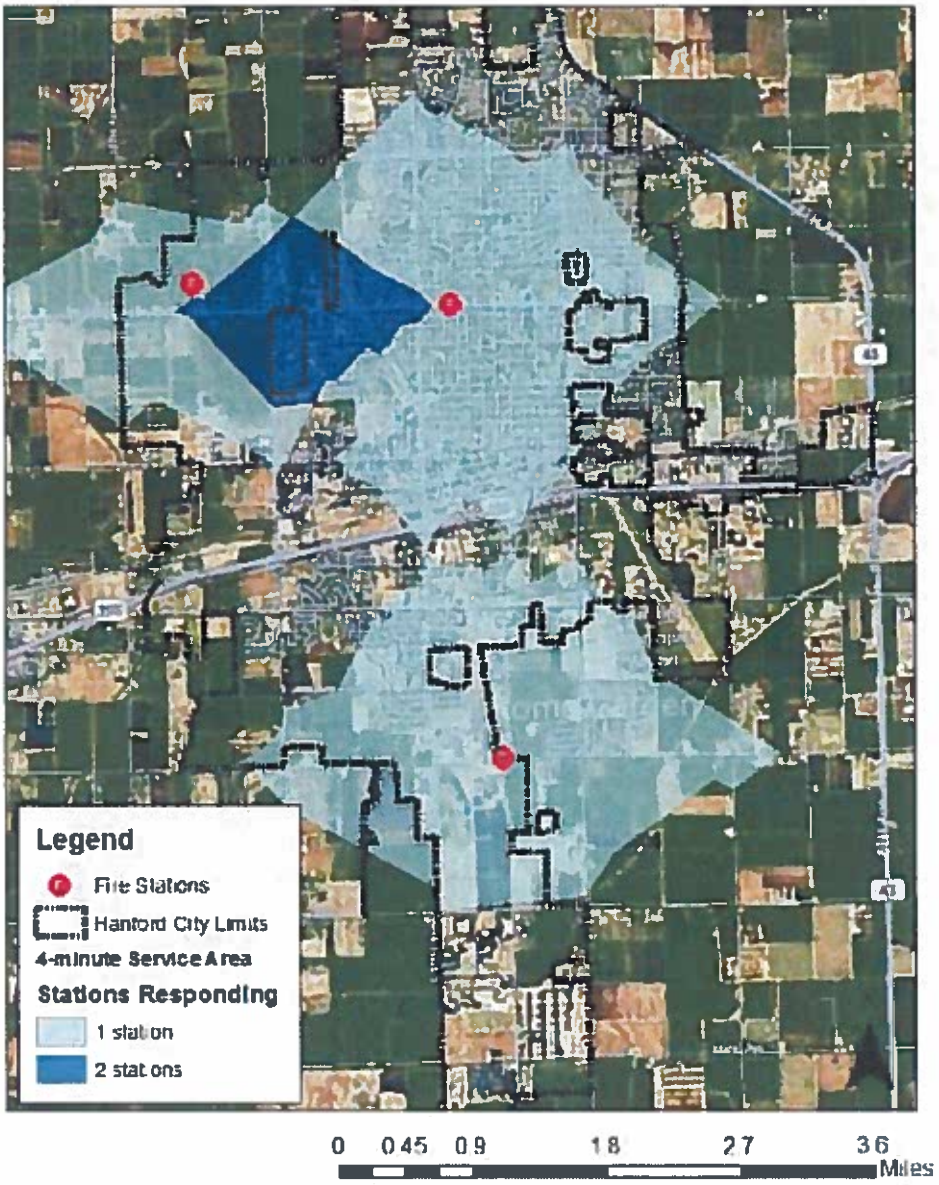
Staffing the stations can be achieved in several ways: fully paid, partial paid supplemented by on-call personnel, or partially paid supplemented by on-duty volunteer personnel. It is critical that whichever staffing pattern is chosen by the City of Hanford, a full crew should be available to respond at all times regardless of the method of compensation. Waiting on volunteers to respond and support paid staff will only delay the execution of critical tasks discussed earlier.

The major issue facing Hanford is the lack of immediately available mutual aid from neighboring jurisdictions. Travel time from Lemoore is projected at 14 minutes, Visalia at 25 minutes, Corcoran at 27 minutes, and Tulare at 29 minutes. The most immediate aid available is from Kings County Fire Department, but their local staffing levels will do little to impact the effective response force.

2. PROJECTED PERFORMANCE

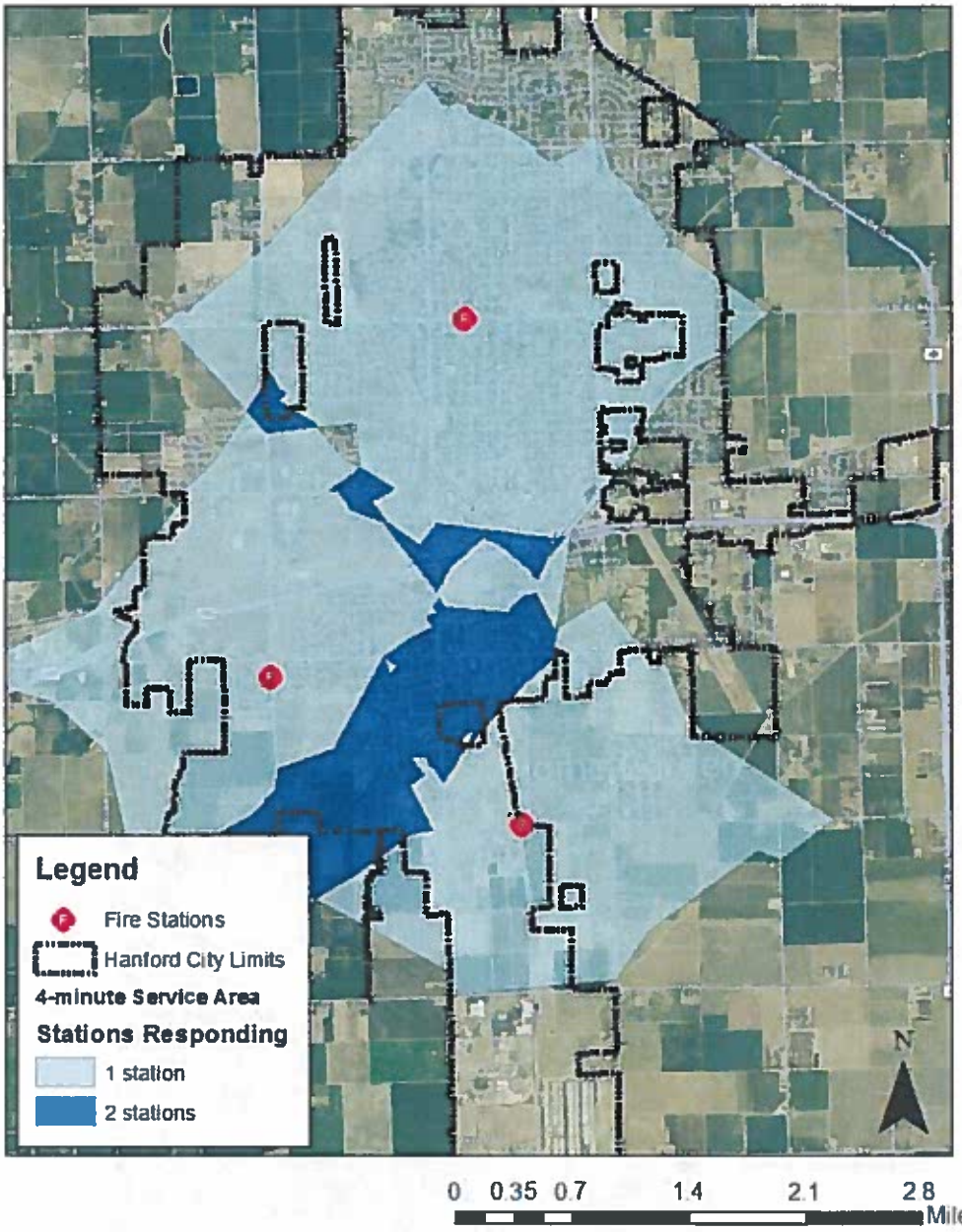
The following maps illustrate the coverage expected at four minutes travel time given various station options.

City of Hanford, CA
4-minute Service Area
Existing Stations & Station at corner of Centennial and W Berkshire

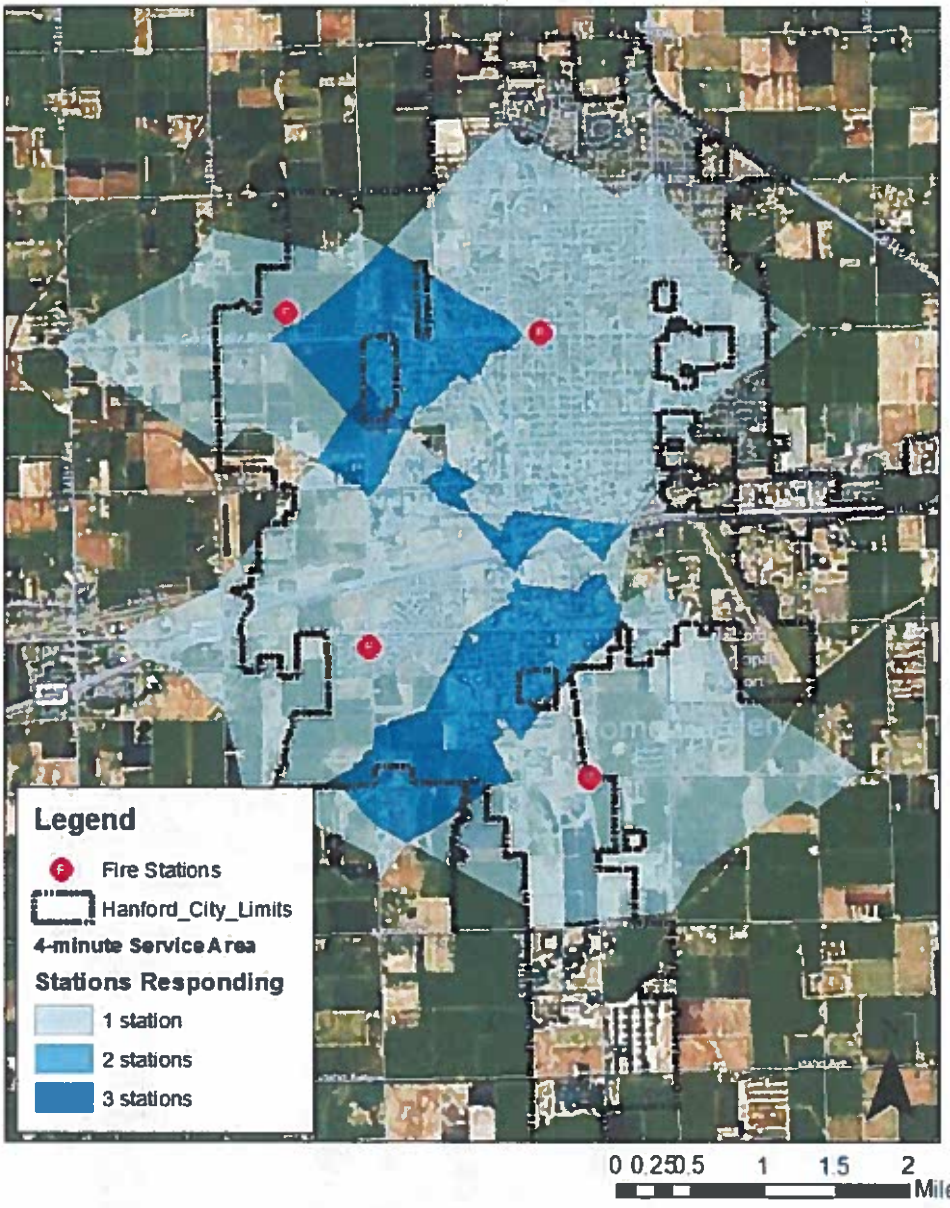


City of Hanford, CA
4-minute Service Area

Existing Stations & Station at corner of Woodland Dr. and 12th Ave



City of Hanford, CA
4-minute Service Area
Existing Stations and Proposed Stations



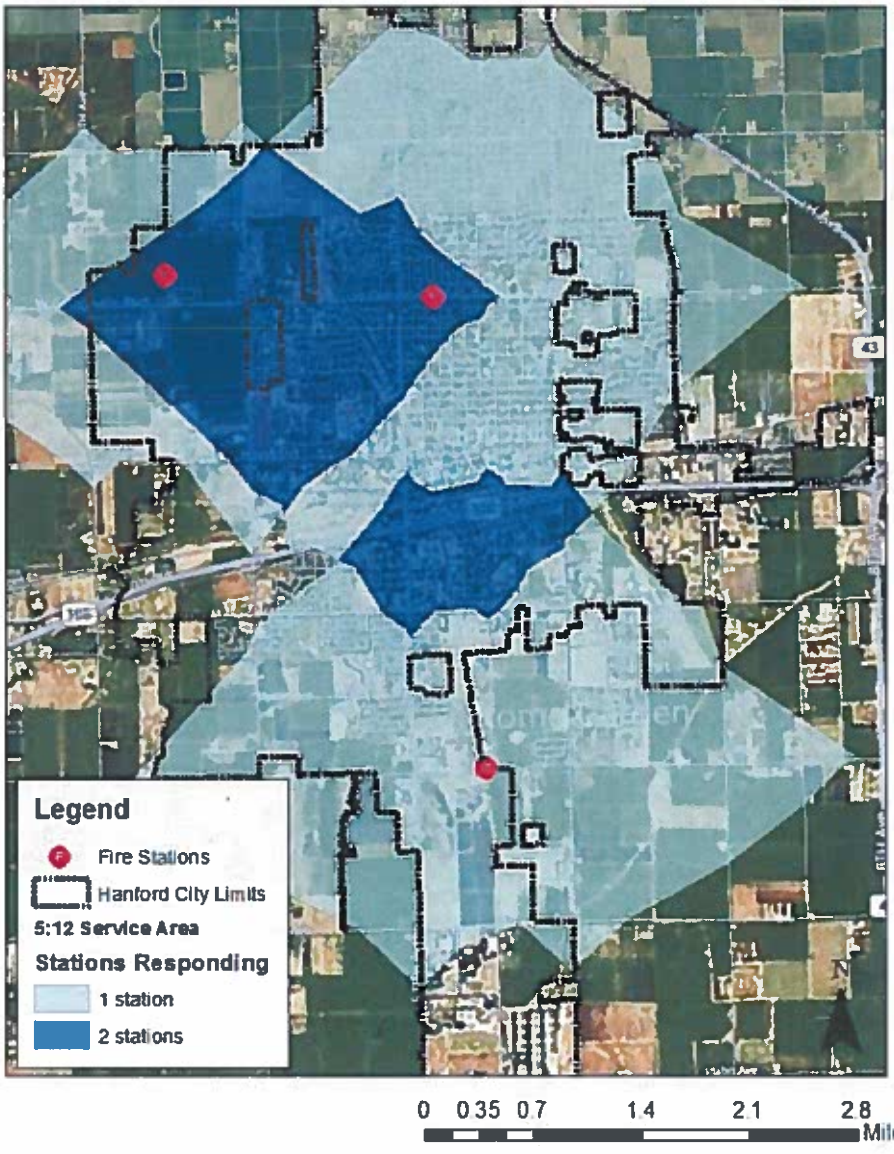
The proposed four-station plan provides coverage to the majority of Hanford within four minutes travel time. Areas in the extreme north, south, and east are not

adequately reached in four minutes. The addition of the station at Woodland Dr. and 12th Ave. provides the best three-station coverage.

The following maps illustrate the coverage expected at 5 minutes/12 seconds travel time given various station options.

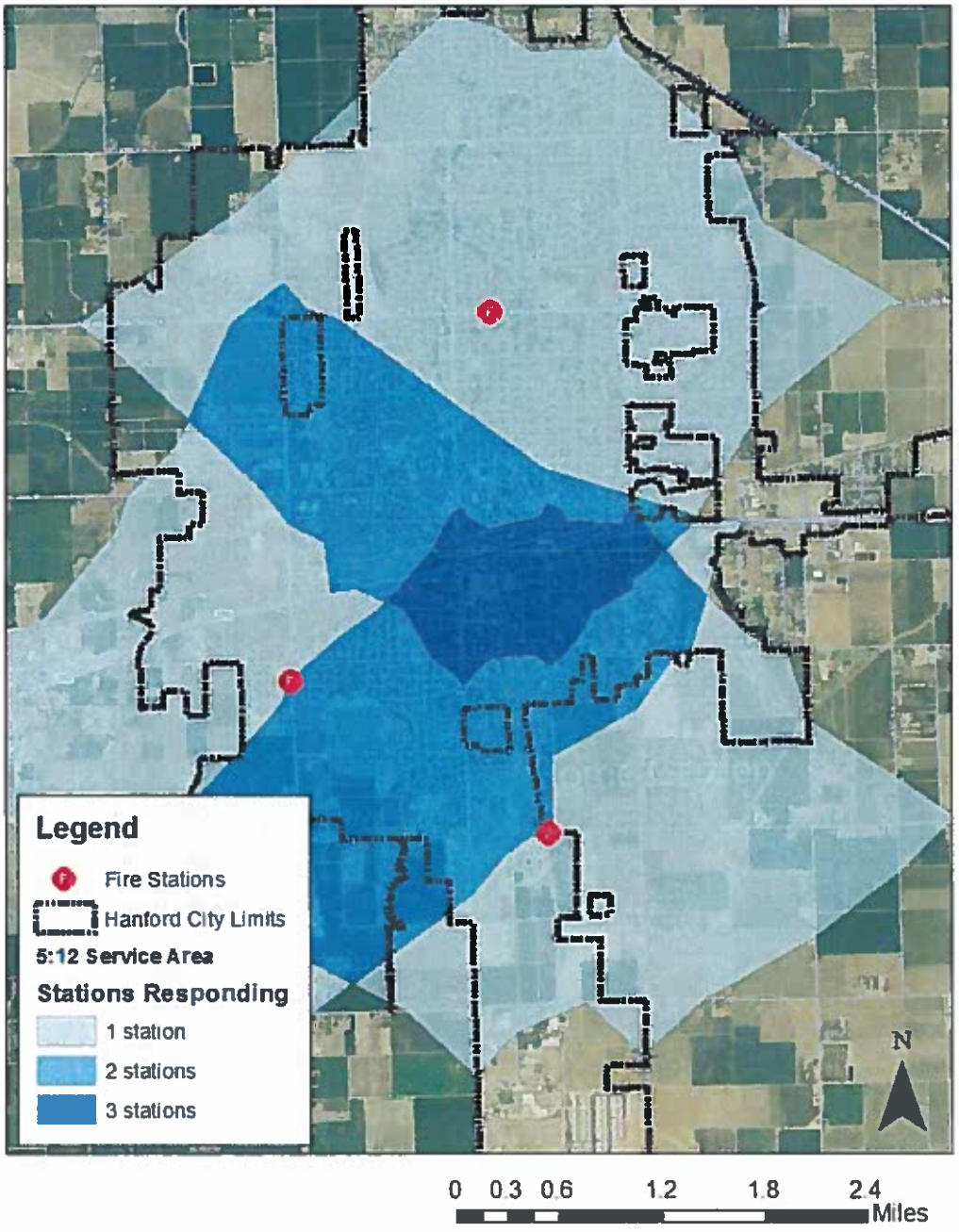
City of Hanford, CA
5:12 Service Area

Existing Stations & Station at corner of Centennial and W Berkshire

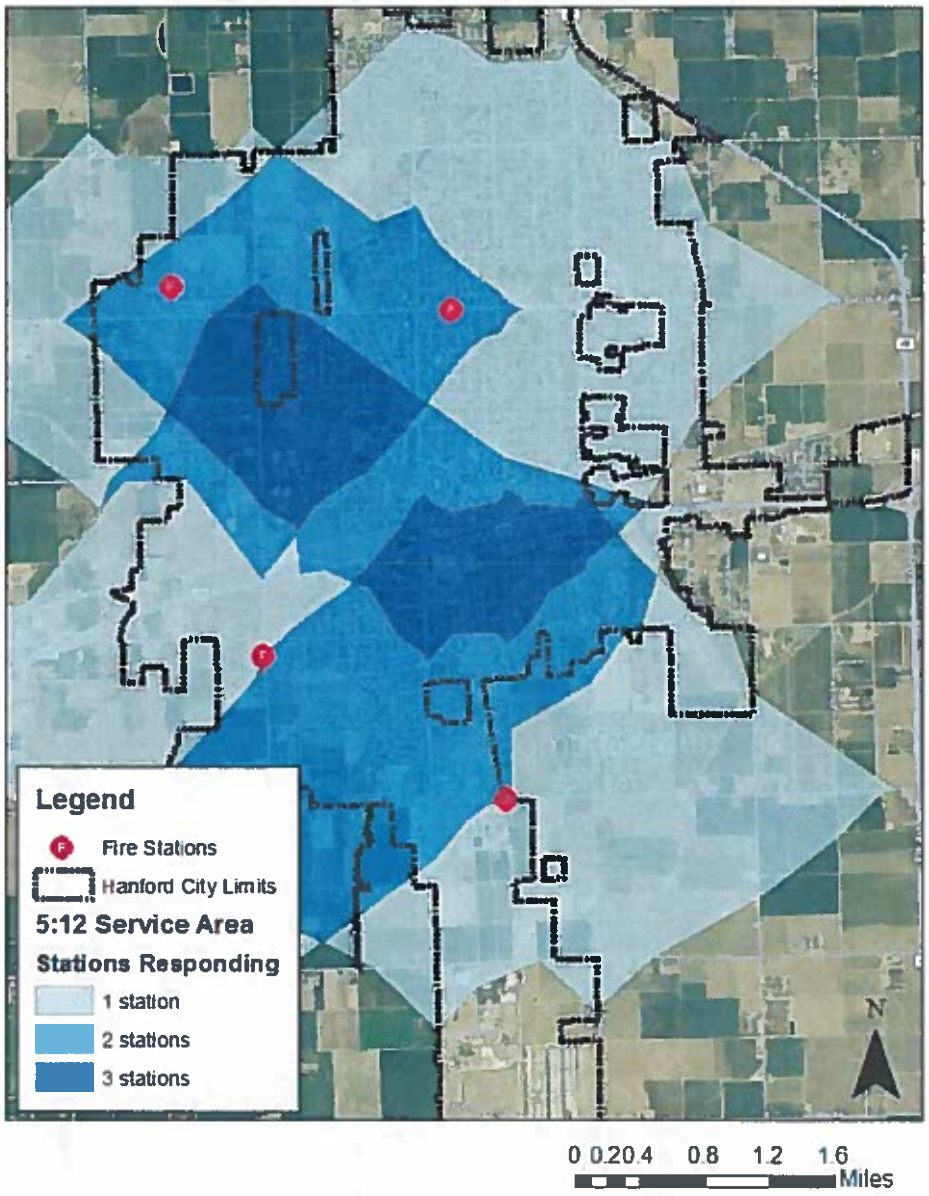


City of Hanford, CA
5:12 Service Area

Existing Stations & Station at corner of Woodland Dr. and 12th Ave



City of Hanford, CA
5:12 Service Area
Existing Stations and Proposed Stations



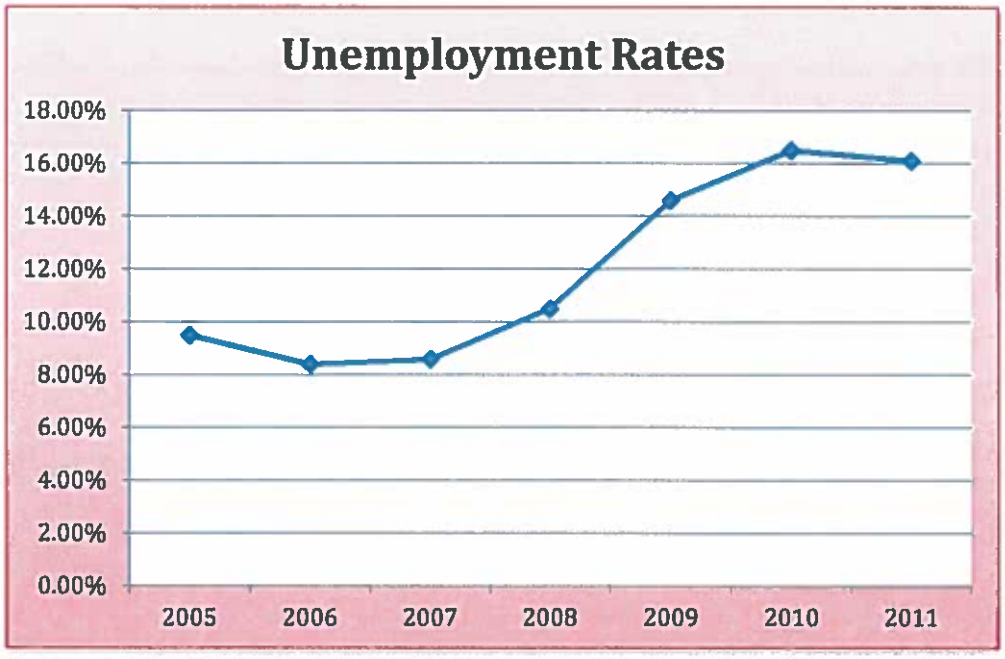
The proposed four-station plan provides coverage to the majority of Hanford within 5 minutes/12 seconds travel time. Areas in the extreme south, and east are not adequately reached in 5 minutes/12 seconds. The addition of the station at Woodland Dr. and 12th Ave. provides the best three-station coverage.

3. SYSTEM EXPANSION COSTS

1. ECONOMIC FACTORS

Many factor impact the various revenue sources, which fund the operations of the City of Hanford. The declining economy and ultimately declining income of the City leave fewer dollars available for expenditures. The City has increased the taxable property through annexation, but declining property values have resulted in a negative impact on property taxes. Unemployment and consumer uncertainty cause less spending and ultimately less sales tax revenue for the City.

Unemployment is one gauge of economic health for a community, with statistics available for metropolitan areas. The following figure is a historical review of annual average unemployment for the Hanford–Corcoran Metropolitan Statistical Area (MSA) [10] from 2005 through current July 2011.



Unemployment has been rising steadily in the MSA since 2006. Current monthly figures show a slight decline from the high in 2010.

2. FINANCIAL ANALYSIS

As Hanford continues to grow, the ability to recruit, train, and retain a volunteer firefighting force will become more difficult. As training mandates and other requirements increase the commitment time required of volunteers, it becomes increasingly difficult to find qualified individuals with the required time to devote to volunteering. This reality makes it important for HFD to find viable ways to maintain an effective response force.

4. RECOMMENDED LONG TERM STRATEGY

Hanford was initially served by a single fire station located in the heart of the community. As the City continued to grow, largely through annexation, HFD was unable to meet community expectations for response times. The City ultimately closed the downtown station and opened two stations to better provide coverage to the community. This report has shown that HFD can still adequately respond to emergencies and protect the community from the existing two stations, but that staffing concerns should be addressed to ensure fire personnel can operate safety at fire scenes.

1. FIRE STATION LOCATIONS

The preferred method used today for determining fire station locations is through geographical information systems (GIS). This method can take into account road networks, impedance factors, turn impedance, and elevation impedance.

For many years the basic criterion for station placement was road mileage only. The standard came from the ISO based on 1.5-mile station separation. The thought was that a fire apparatus could respond on 1.5 miles of roadway within five minutes of an emergency call.

The concept of using actual travel time more accurately represents the level of service for an all-risk approach. This method is performance-based and when performance lags steps can be taken to correct the issue.

One point that needs to be re-stated is that response time criteria should only be applied to calls that are emergency calls. When incidents are analyzed, the data should be reviewed to ensure that nonemergency calls are not used when calculating

performance. Non-life threatening calls, which are routinely handled by HFD, should not be included in this analysis. To include these times in the analysis will skew the outcome, leading to false service indicators.

2. IMPROVING CALL PROCESSING

Improving the current call processing time will positively affect response times without the need to construct additional facilities. Options for improving call-processing time include:

- Update existing guidelines for call taking.
- Review current standards for dispatch processing time.
- Require a performance level of dispatchers.
- Recommend a standard call processing time of; less than 60 seconds, 90% of the time for high priority calls.
- Benchmark and monitor call processing time.

3. DETERMINING WHEN A STATION IS NEEDED

A question that must be addressed by the City of Hanford is when is the right time to construct the 3rd or 4th station. How will we know if a 5th station is eventually needed in the community? A quantifiable threshold must be developed to determine the point at which a station is needed. Ultimately the final answer will be made with a combination of financial measures and professional judgment from the leaders in the City.

The Commission on Fire Accreditation International (CFAI) has developed a Trigger Mechanism Decision Matrix to provide options available when faced with various factors [11]. The system approach would suggest a tiered application of solution

based on thresholds. In this system, first actions are to be analyzed when the performance indicators are within ten percent of the threshold values. At the point the threshold values are met, additional actions are indicated, and if the threshold are exceed, new resources may need to be employed within the first due area to increase performance.

THRESHOLD	POSSIBLE SOLUTIONS
Units within 90% of Threshold values: Unit/Station call loading • Above 3,150 calls per year – single unit • Above 7,900 calls per year – two units • Above 12,600 calls per year – three units First due unit availability less than 82% First due reliability under 82% Performance gap rate of 1 - 2%	• Change cover status/dynamic deployment • Decrease first-due area • Redeploy adjacent resources • Reconfigure station resources • Eliminate planned out of service time
Units at Threshold Values: Unit/Station call loading • 3,500 calls per year – single unit • 8,760 calls per year – two units • 14,000 calls per year – three units Unit availability under 80% First due reliability under 80% Performance gap rate of 3 – 5%	• Increase capacity of adjacent units • Increase/decrease mutual aid • Implement peak staffed units • Redeploy resources to problem areas • Relocate existing fire stations
Units over 110% of Threshold Values: Unit/Station call loading • Above 3,850 calls per year – single unit • Above 9,650 calls per year – two units • Above 15,400 calls per year – three units Unit availability under 78% First due reliability under 78% First due availability under 78% Performance gap rate over 5%	• Add new resources to station • Add new resources to adjacent stations • Add new station(s)

According to CFAI, trigger mechanism, when developed and employed with good science and data, can be a very valuable tool in compliance methodology [11].

Below is a table to quantify the trigger points for opening a new fire station in a developing community. Given the timeframe required to design and construct a new facility, it is important these decisions are properly anticipated with good planning for both the physical and financial needs of the community.

Action	Travel Distance	Response Time	Percent of Calls	Building/Risk Inventory
Maintain Status Quo	All risks within locally adopted distance	First due unit is within locally adopted standards	Enter % of current out of district calls	Enter local building/risk inventory
Temporary facilities and minimal staffing	Risks 1.5 to 3.0 miles from existing station	First due unit exceeds 5 minute travel time 10% of the time, but does not exceed 8 minutes	More than 10% of calls are out of district	New area has 25% of the same risk distribution as in initial area of coverage
Permanent Station Needed	Risk locations exceeding four miles from the station	First due company exceed 5 minute travel time 20 – 25% of the time. Some calls over 8 minutes	More than 20 – 25% of calls in outlying areas	New area has 35% of same risk distribution as in initial area of coverage
Permanent Station Essential	Outlying risk locations exceed five miles from station	First due unit exceeds 5 minute travel time 30% of the time. Some calls over 10 minutes	More than 30% of calls are in outlying area	New area has 50% of same risk distribution as in initial area

The City of Hanford Fire Department does not currently make use of service delivery zones. These are zones that have different response criteria based on population density, types of property uses, and anticipated levels of risk. If response zones are used they should be reviewed and (if applicable) adopted by the elected officials. This is appropriate since the decision will for the foundation for current and future deployment

of emergency services and the resulting of service anticipated by taxpayers. This may be a beneficial strategy as areas annexed in the future may be more rural in nature than the existing City.

4. RESPONSE ZONES

CFAI provides clear definitions for what constitutes the three response zones we will discuss [7].

Urban Response Zones are areas with higher population density and greater community risk properties, corresponding with higher service demands. An Urban Zone is defined as an incorporated or unincorporated area with a population of over 30,000 people and/or a population density over 2,000 people per square mile. The benchmark and baseline performance standards for an Urban Zone are:

	1st Unit	2nd Unit	1st Alarm Assignment	Performance
Benchmark	4 minutes	8 minutes	8 minutes	90%
Baseline	5 minutes / 12 seconds	10 minutes / 24 seconds	10 minutes / 24 seconds	90%

Suburban Response Zones will extend from the urban zones, usually along major arterials, and are generally newly developed areas or have a high growth potential. The response objective of a Suburban Zone is slightly longer than an Urban Zone because of the more moderate call volume and reduced level of community risk. A Suburban Zone is defined as an area having a population of 10,000 – 29,999 and/or a population density of 1,000 to 2,000 people per square mile. The benchmark and baseline performance standards for a Suburban Zone are:

	1st Unit	2nd Unit	1st Alarm Assignment	Performance
Benchmark	5 minutes	8 minutes	10 minutes	90%
Baseline	6 minutes / 30 seconds	10 minutes / 24 seconds	13 minutes	90%

Rural Response Zones are areas with low population density and lower community risk properties, corresponding with low service demands. The population of this zone should be forecasted to stay low, like much of the agricultural land surrounding Hanford. Development in the Rural Response Zone should be expected to remain light. The Rural Zone is defined as an area having a population of less than 10,000 people and/or a population density of less than 1,000 people per square mile. The benchmark and baseline performance standards for a Rural Zone are:

	1st Unit	2nd Unit	1st Alarm Assignment	Performance
Benchmark	10 minutes	14 minutes	14 minutes	90%
Baseline	13 minutes	18 minutes / 12 seconds	18 minutes / 12 seconds	90%

Recommendation 42: Consider adopting modified tiered response time objectives for areas of Hanford not meeting the population density of the Urban Response Zone.

APPENDIX A – SUMMARY TABLE OF RECOMMENDATIONS

Recommendation 1: Develop an ISO improvement plan for Hanford Fire Department that focuses on maintaining the strengths of the agency while improving identified deficiencies.

Recommendation 2: Determine the effect that not having an in-service ladder company has on HFD's ISO rating.

Recommendation 3: Determine the effect that not utilizing the College of the Sequoias for regional training has on HFD's ISO rating.

Recommendation 4: Realign reporting responsibilities so all Suppression personnel report through the chain of command to the Deputy Chief.

Recommendation 5: Increase training of volunteer personnel to allow them to function fully as firefighters on emergency scenes.

Recommendation 6: Require volunteers to commit to a minimum number of hours of service monthly and assign them to apparatus to improve staffing.

Recommendation 7: Develop a Vision Statement for the Agency as part of the strategic planning process.

Recommendation 8: Conduct a strategic planning process, which involves both internal and external stakeholders.

Recommendation 9: Develop a policy related to how HFD will respond to mutual aid requests for the Hazardous Materials Unit. Specifically on who will staff the unit and when personnel callbacks will occur as these are often prolonged events.

Recommendation 10: Add a signature box to the header of each policy requiring the Chief's signature and date upon development and revisions to agency policies and procedure.

Recommendation 11: Strengthen the website presence of HFD to include regular news and community communication.

Recommendation 12: Develop and implement an external communication plan that includes community groups and public surveys.

Recommendation 13: Develop, validate, and implement a Candidate Physical Ability Test (CPAT) testing process to ensure candidates have the required fitness to engage in firefighting activities.

Recommendation 14: Utilize medical physical assessments that follow job related standards such as are found in NFPA 1582.

Recommendation 15: Train shift personnel from each shift according to the IAFC/IAFF Peer Fitness Standards to further guide the fitness and wellness program for the agency.

Recommendation 16: Allow flexibility to workout times to ensure calls for service do not preclude daily workouts.

Recommendation 17: Administer a stress test at the time of hire and periodically on incumbent employees based on age and risk factors.

Recommendation 18: Establish automatic aid agreements with neighboring agencies to assure an effective firefighting force is available to perform critical tasks for all risk levels in Hanford.

Recommendation 19: Develop a monthly training plan for volunteer staff to ensure they remain proficient in their assigned tasks.

Recommendation 20: Develop a process where an annual needs assessment is conducted to determine training needs and shift officers are part of the planning process.

Recommendation 21: Explore the opportunity for HFD personnel to train while utilizing the facilities at COS.

Recommendation 22: Explore the opportunity to conduct multi-company operational drills with nearby agencies to ensure standardized procedures are followed during incidents requiring outside aid.

Recommendation 23: Consider developing a mentoring program to prepare future company officers and command staff.

Recommendation 24: Review the current apparatus replacement schedule to ensure the current schedule is providing safe and reliable emergency response.

Recommendation 25: Include the cost of capital equipment when developing apparatus replacement projections.

Recommendation 26: Consider adding fire apparatus to the current City CIP planning process or develop a capital improvement plan for the Department.

Recommendation 27: Consider pursuing the acquisition of a commercial washer/extractor.

Recommendation 28: Begin tracking annual fire loss per capita and average 5-year trends to ensure your fire prevention efforts remain effective.

Recommendation 29: Consider adopting the 2009 International Fire Code, including the provisions for residential fire sprinklers.

Recommendation 30: Consider adopting the NFPA recommended inspection frequency standard.

Recommendation 31: Formalize and schedule company inspections on a regular basis.

Recommendation 32: Develop a risk classification for commercial occupancies and pre-fire plan occupancies based on risk.

Recommendation 33: Consider establishing a self-inspection program for small, B-type occupancies.

Recommendation 34: Evaluate opportunities for utilizing department volunteers in the fire prevention and public education efforts.

Recommendation 35: Revise the current press release policy to provide guidance on what information is not to be released and how media should be handled on emergency scenes.

Recommendation 36: Incorporate the use of prevention data and analysis into department operations and planning activities.

Recommendation 37: Publish an annual department report containing an overview of major events, significant changes, and analysis of performance trends.

Recommendation 38: Develop response plans that provide for emergency response coverage of concurrent calls.

Recommendation 39: Develop deployment strategies to achieve the desired level of service.

Recommendation 40: Develop a system to capture the time elements of emergency response and publicly report your performance.

Recommendation 41: Develop a deployment strategy that delivers a minimum of 13 firefighters to reported structure fires within 10 minutes/24 seconds 90% of the time.

Recommendation 42: Consider adopting modified tiered response time objectives for areas of Hanford not meeting the population density of the Urban Response Zone.

APPENDIX B – REFERENCES

1. Insurance Services Office, "ISO's PPC Program, Better Fire Protection – As Measured by the PPC Program", ISO's Public Protection Classification (PPC).

2. Insurance Services Office, "Fire Suppression Rating Schedule".

3. Insurance Services Office, "Draft Concept FSRS 2009", ISO, 2008.

4. Government Sourcebook, "State and Local Fire Protection Spending per Capita", 2006.

5. California State Comptroller, "Fire Net Expenditures Per Resident – California Cities Through FY 08-09", July, 2011.

6. National Fire Protection Association, "NFPA Report: U.S. Fire Department Profile Through 2009", October, 2010, by Karter, M. and Stein, P.

7. Commission on Fire Accreditation International (CFAI), "Fire & Emergency Service Self-Assessment Manual", 8th Edition, 2009.

8. National Fire Protection Association, NFPA 1901: Standard for Automotive Fire Apparatus, 2009 edition.

9. National Fire Protection Association, "Fire Loss in the United States During 2009", August 2010, by Karter, Michael.

10. CA.Gov, Employment Development Department, "LMI For Kings County California, August 2011.

11. Commission on Fire Accreditation International (CFAI), "Standards of Cover", 5th Edition, 2008.