The *Washoe County Master Plan* (2010) describes expected response performance in both the Public Services and Facilities Element and the Land Use and Transportation Element. Each section is reprinted below.

Washoe County Master Plan September 9, 2010

PUBLIC SERVICES AND FACILITIES ELEMENT Page 36

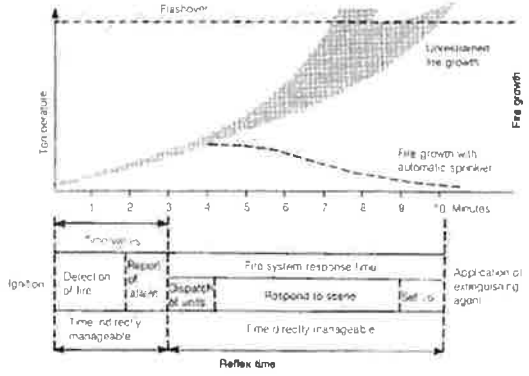
Fire Protection Response Criteria

The "Fire Suppression Rating Schedule" of 1980, published by the Insurance Services Office, represented a change from the previous specification oriented "Grading Schedule" to a performance based schedule. Some credit is available for water delivered to the fire scene regardless of the means of delivery. The new fire suppression rating schedule uses 1.5 mile response distances as a criteria for engine company response to fires. Appendix B lists the factors considered by the "Fire Suppression Rating Schedule". The 16th Edition of the National Fire Protection Handbook makes the following statements about response standards:

As already described, time is another critical factor in the evaluation of public fire protection. It is generally considered that the first arriving piece of apparatus should be at the emergency scene within five minutes of the sounding of the alarm, since additional minutes are needed to size up the situation, deploy hose lines, initiate search and rescue, etc. To be minimally effective in controlling a fire, the initial responding apparatus must reach the emergency scene within approximately 10 minutes of the sounding of the alarm. Figure 4 shows fire growth versus reflex time and illustrates this concept. Table 10 lists the minimum fire protection and emergency medical services response standards used for condition assessment and analysis in Washoe County.

Figure 4

Fire Growth Versus Reflex Time



Source: Managing Fire Services Second Edition (International City Management Association. 1988).

Table 10

Minimum Fire Protection and Emergency Medical Services Response Standards

Residential Land Use Designation	Response Time
Urban	5 minutes or less
Suburban	10 minutes or less
Rural	20 minutes or less

Source: Washoe County Department of Community Development.

Table 4: Planning Area Minimum Service Standards[1]

Service	Master Plan Designation			
	Urban, Industrial, and Commercial	Suburban	Rural Residential	Rural
Water	Connection w/community water system	Connection w/community water system; HDR – Individual well	Individual well	Individual well
Sewer	Connection w/community sewage disposal system	Connection w/community sewage disposal system[2]	Individual sewage disposal system	Individual sewage disposal system
Fire, EMS	5 minute or less response time[3]	10 minute or less response time	20 minute or less response time	20 minute or more response time
Police	10 minute response time[4]	10-15 minute response time	20-25 minute response time	25 minute or more response time
Schools:				
Elementary	Walk-in; 1 mile or less	15 minutes one-way	40 minutes one-way	90 minutes maximum
Middle	Walk-in; 2 miles or less	25 minutes one-way	55 minutes one-way	90 minutes maximum
High	Walk-in; 3 miles or less	35 minutes one-way	75 minutes one-way	90 minutes maximum
Libraries	5 miles or less	5 miles or less	40 minutes one-way	75 minutes one-way
Community Parks	7 acres per 1,000 population	7 acres per 1,000 population	7 acres per 1,000 population	7 acres per 1,000 population

Notes:
1 These standards are used for planning purposes and may be modified by the Washoe County Board of County Commissioners as deemed appropriate in response to budget constraints.
2 Exemptions for HDR, LDS and MDS connection to community sewage disposal system may occur in specific cases
3 Response time is measured from the time the initial call is received until the arrival of the first emergency vehicle
4 For a Class 1 Offense (a major incident or serious crime).
5 Service levels for Open Space Master Plan category are determined on a case-by-case basis.

Source: Washoe County Department of Community Development

In both sections, land designated as "Urban" should have a response time (received to arrival) of 5 minutes or less. Suburban designated land should have a response time of 10 minutes or less. In one section "Rural" designated lands should have a response time of 20 minutes or less. In another there are two categories of Rural, "Rural Residential" and "Rural". Each has a different response time standard.

The use of land use categories to establish response performance objectives is very appropriate. Land use categories and accompanying zoning and development criteria clearly define the intensity of development allowed in each category and expected population densities. It is also a very future looking approach since land use master plans, like the *Washoe County Master Plan*, describe how land is expected to develop in the future. This allows future fire service resource needs to be pre-planned based on planned development density rather than having to react to development as it occurs.

The Washoe County Commission, Truckee Meadows Fire Protection District Board of Directors, and the Sierra Fire Protection District Board of Directors adopted the following response performance zone definitions.

Suburban: Territory identified as the Master Plan category "Suburban Residential", and those areas that have been developed with lots comparable to those allowed by the Suburban Residential" category.

Rural: Territory identified as the Master Plan category "Rural Residential". In addition, territory identified as the Master Plan category as "Rural" except as identified as "Frontier".

Frontier: Territory identified as the Master Plan category "Open Space". In addition, territory north of the line commonly known as Township 22 unless designated as "Rural Residential" or "Suburban Residential".

"Urban Residential", "Commercial", and "Industrial" are identified Master Plan categories; however, they exist in disaggregated pockets. These areas should be treated as "target hazard" areas by the individual fire agencies and response protocols developed according to risk within each area.

ESCI evaluated several areas of the county that had been developed more intensely than would be expected in the rural category. Since "lots comparable to those allowed in the suburban category" means lots not more than one acre in size, only the Arrow Creek development

qualified as suburban level development within the rural category. It has been added to the suburban response performance zone.

The following series of maps illustrate response performance zones as defined by the Reno Standards of Cover plan and the definition above adopted by the Commission and Boards.

Figure 5: Response Performance Zones - South

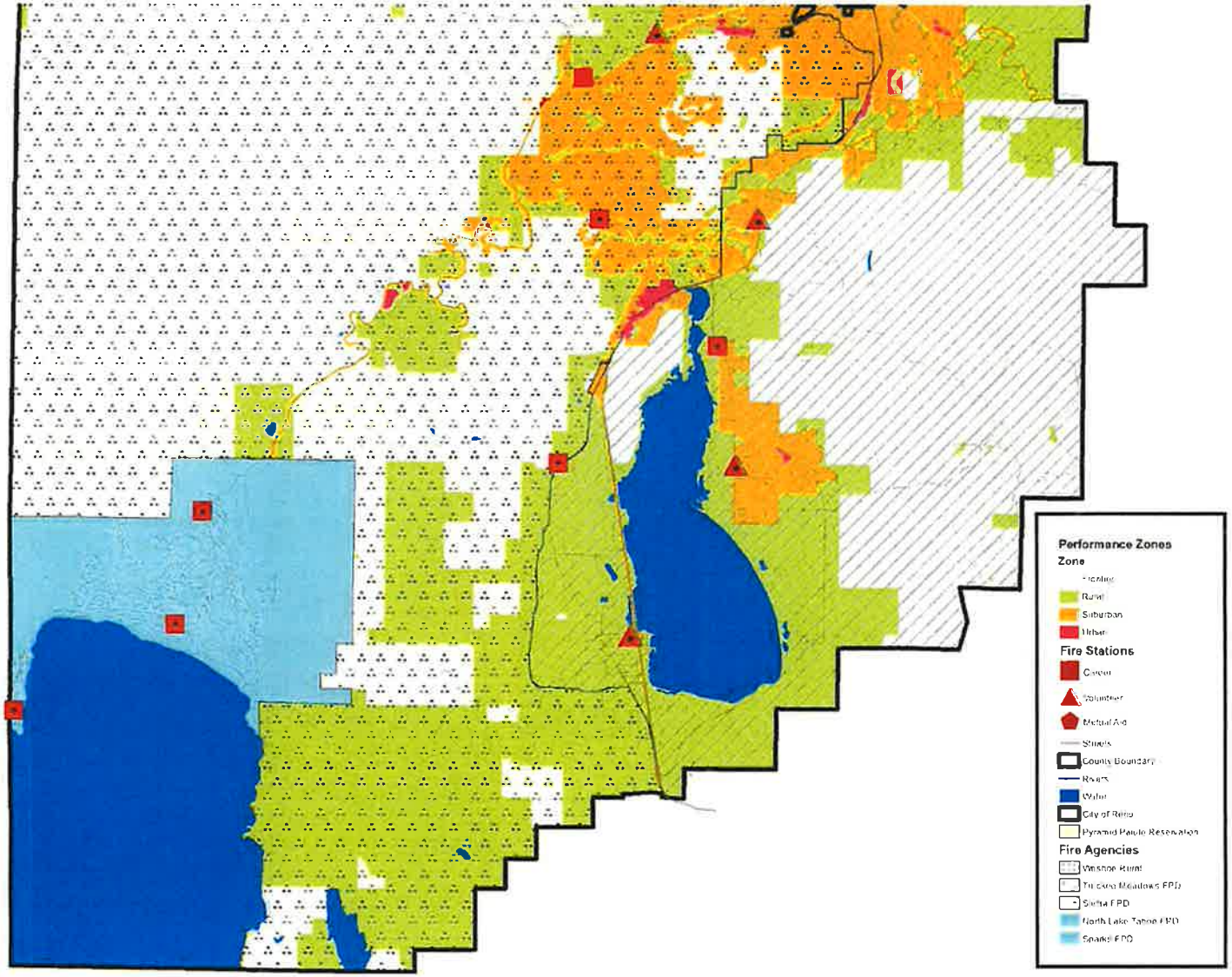


Figure 6: Response Performance Zones – Central

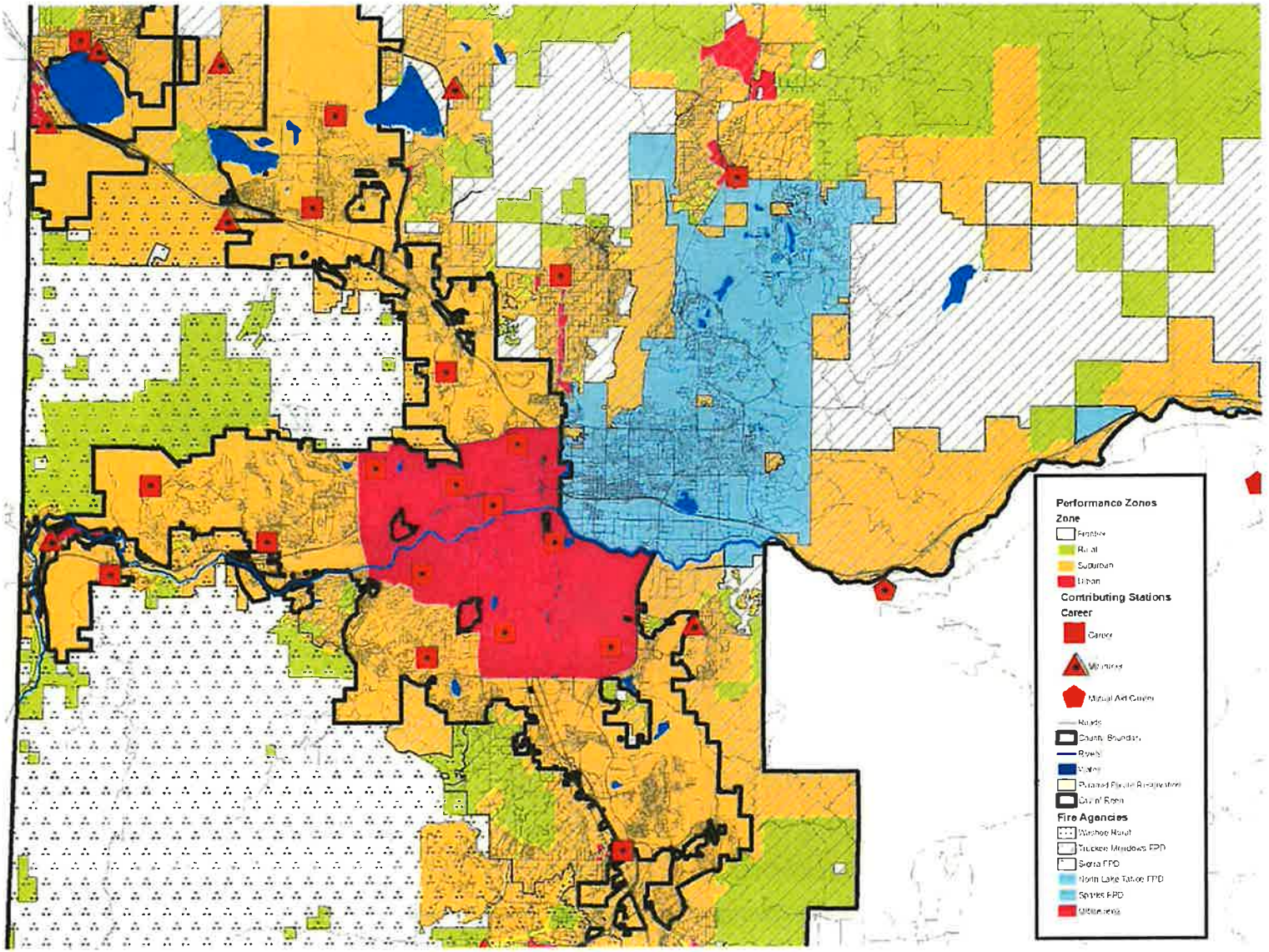


Figure 7: Response Performance Zones – East Central

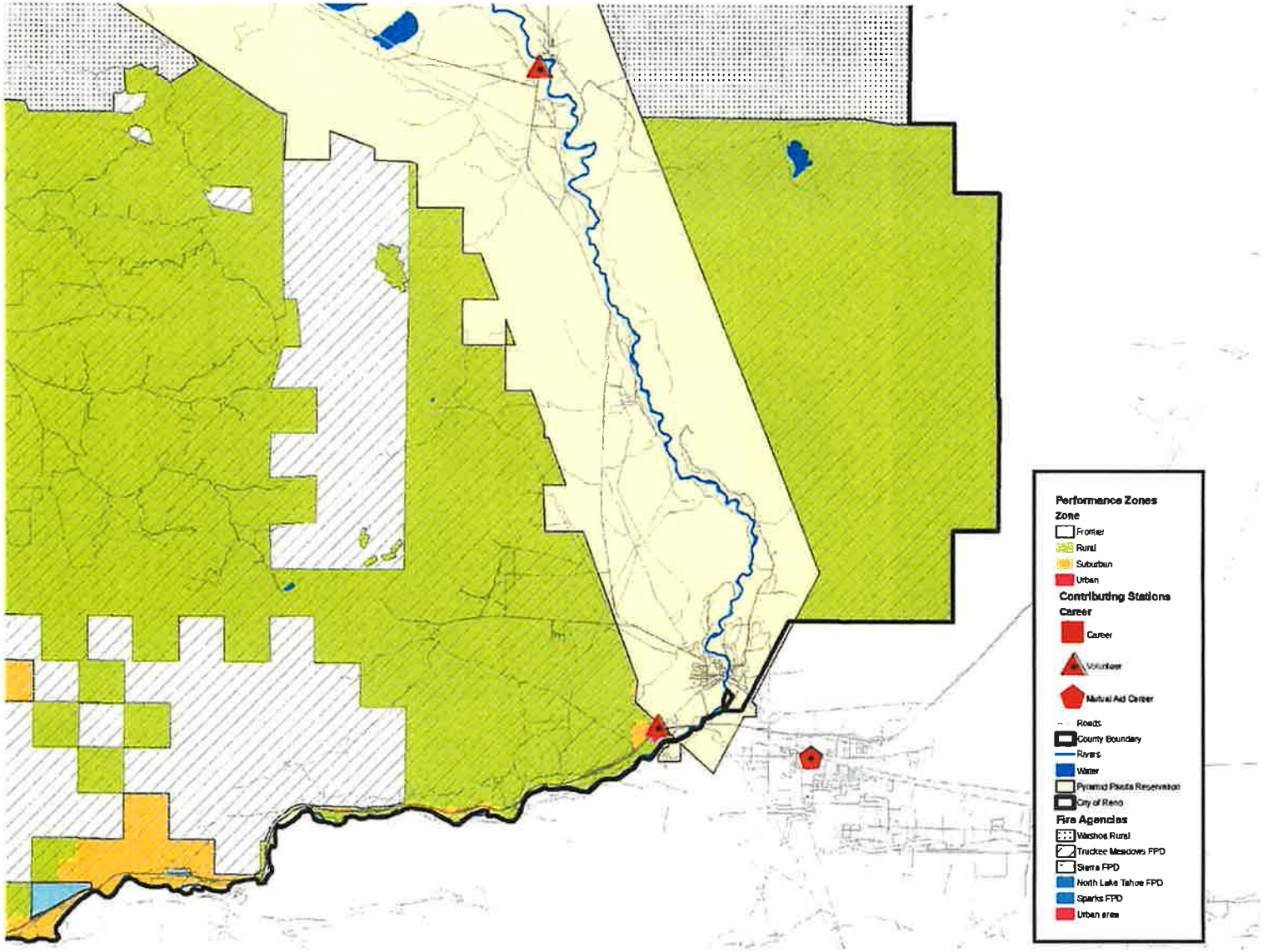


Figure 8: Response Performance Zones – North Central

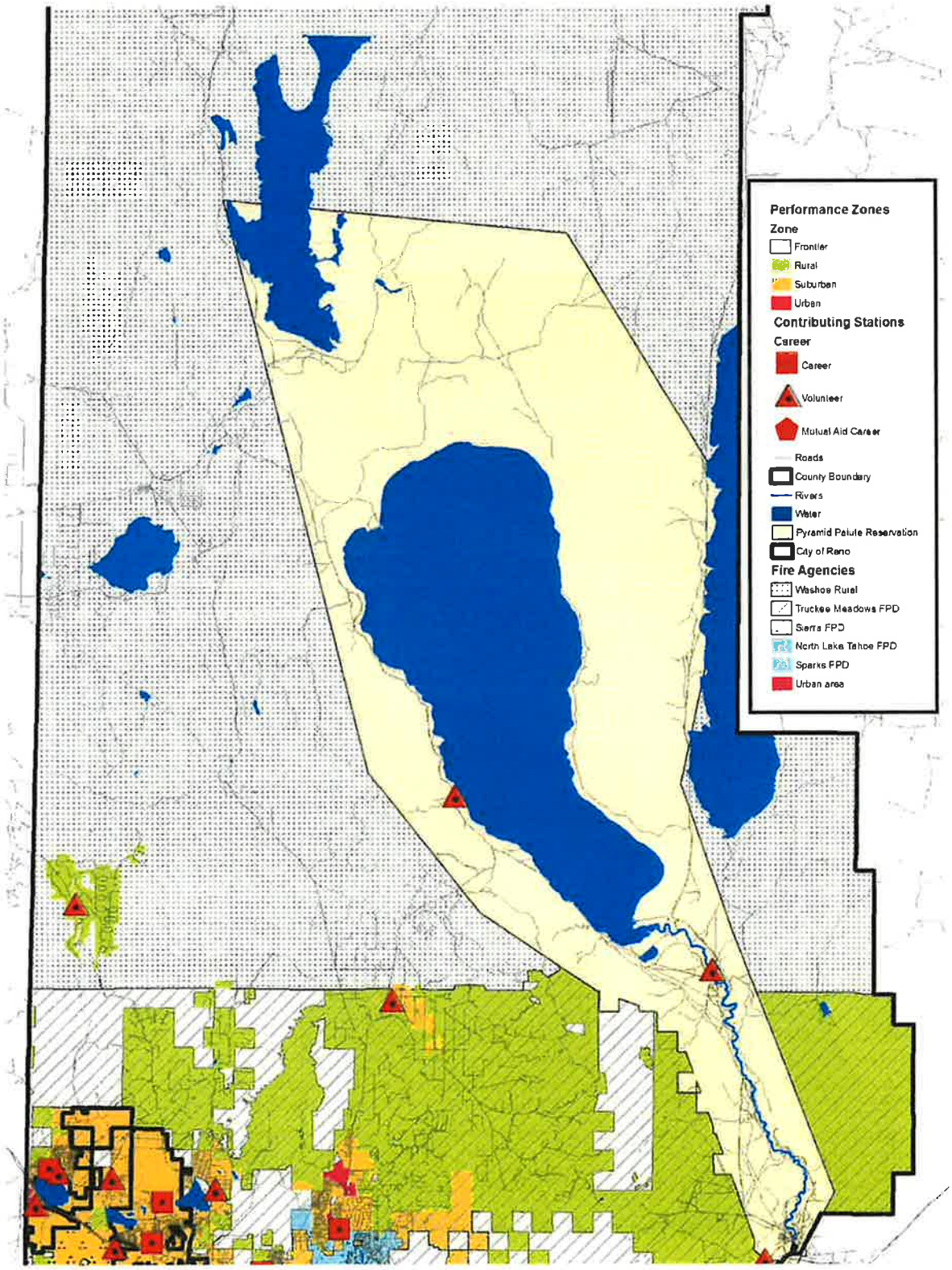
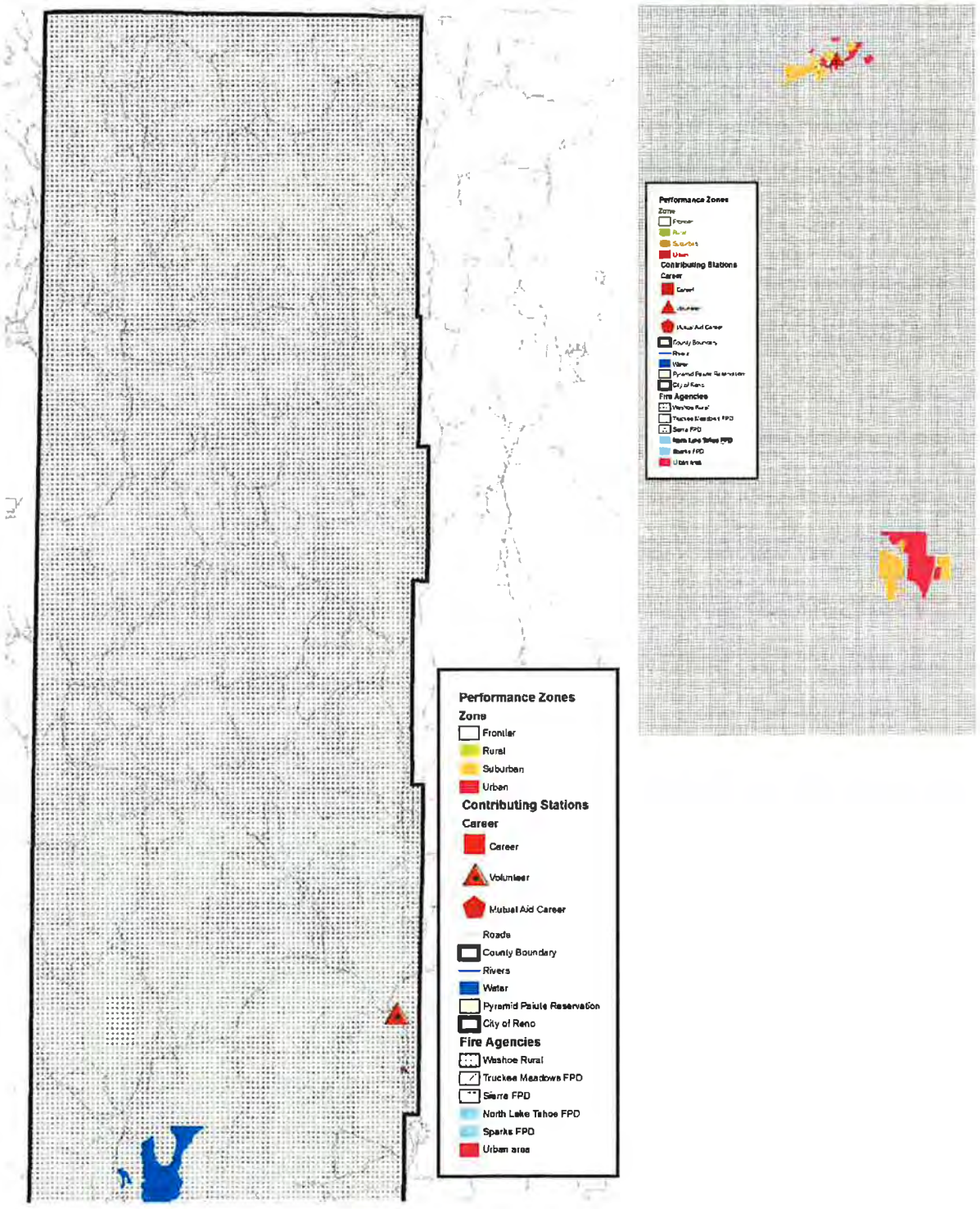


Figure 9: Response Performance Zones – North and Gerlach Area



Historic System Performance

ESCI completed an analysis of current response performance by region. This analysis used data gleaned from the Reno Emergency Communications Center (ECOMM) computer-aided dispatch database. ESCI assumed that the ECOMM data is accurate and did not independently verify the information. The data used was for the time period October 1, 2009, through September 30, 2010. This analysis evaluated performance only in areas outside the City of Sparks and the North Lake Tahoe Fire District.

Basis for Analysis

The response phase of an emergency is made up of several parts. These are:

1. Detection – That period of time during which it is recognized that an emergency exists.
2. Call processing – The time from the initial contact with the dispatch center (typically the 9-1-1 call) until emergency response personnel are notified of the emergency.
3. Turnout – The time between response personnel notification and the beginning of apparatus and personnel movement towards the incident location.
4. Travel – The time between initiation of response and arrival at the incident.

From the customer's standpoint, emergency services delivery time begins when the 9-1-1 call is placed to the dispatch center and ends when help arrives at the emergency location. Thus phases 2, 3, and 4 above combine to define "response time". Actual performance for each phase has been determined based on the data described above.

Call processing time and turnout time are particularly important for the evaluation of fire station location. Call processing time and turnout time must be subtracted from the target response time in order to determine the amount of travel time available for each fire station. The longer the first two phases, the less territory a fire station can cover within the target response time.

Time performance is described at the "85th percentile". This means that at 85 percent of all incidents had time performance equal to or less than the result.

Call Processing Time

The analysis determined that call processing time for incidents occurring during the study period was within 2 minutes 1 second, 85 percent of the time for City of Reno incidents and within 2 minutes 6 seconds in all other areas.

Turnout Time

Turnout time varies significantly from station to station. Those stations staffed with career personnel respond more quickly than those dependent on volunteer firefighters. This is to be expected since volunteers must travel to the station from home, work, or elsewhere before they can initiate a response.

Career station turnout times were within 2 minutes 25 seconds, 85 percent of the time. Individual station times were very consistent with each other, varying from a low of within 2 minutes 5 seconds, 85 percent of the time and a high of within 3 minutes 11 seconds, 85 percent of the time.

Volunteer fire department turnout times are shown in the following table. Times listed are at the 85th percentile for the first unit to respond from the station. A unit is defined as any unit whether it is a fire engine or an individual reporting their response by radio.

Figure 10: Volunteer Fire Departments' Response Times

Volunteer Fire Dept (Managing Department)	Turnout Time
Cold Springs Fire Department (Sierra FD)	9:58
Galena Fire Department (Sierra FD)	9:02
Peavine Fire Department (Sierra FD)	14:04
Verdi Fire Department (Sierra FD)	11:59
West Washoe Valley Fire Department (Sierra FD)	9:54
Cold Springs Fire Department (TMFPD)	8:05
Gerlach Fire Department[6]	12:17
Hidden Valley Auxiliary (TMFPD)	7:09
Lemon Valley Fire Department (TMFPD)	6:26
Palomino Valley Auxiliary (TMFPD)	10:50
Pleasant Valley Fire Department (TMFPD)	9:32
Red Rock Fire Department[6]	9:29
Silver Lake Fire Department (TMFPD)	11:02
Sutcliffe Fire Department (Pyramid Lk/Paiute Tribe)	7:04
Wadsworth Fire Department (TMFPD)	13:53

Out of Area Resources 'Received to Enroute' Time

There are several fire departments or districts with fire stations adjacent to the Sierra, Truckee Meadows, and Reno service areas. Their contribution to system performance is considered in this analysis.

[6] Gerlach and Red Rock stations are part of the county fire suppression program whose daily operations are overseen by Truckee Meadows Fire Protection District.

To determine the area these resources might serve in Washoe County it is first necessary to identify the time required for each to begin response. All are notified of emergencies by their own dispatch centers requiring that ECOMM notify the other dispatch centers of the incident location and resources requested. This call information transfer can be time consuming.

Based on data provided for this study the out of area resource times below have been determined. The times begin with the receipt of the call at ECOMM and end when response units report enroute to the incident.

- North Lake Tahoe Fire District – Within 7 minutes 45 seconds, 85 percent of the time
- Storey County Fire District – Within 8 minutes, 85 percent of the time
- North Lyon County Fire District – Within 7 minutes, 85 percent of the time

Travel Time

Travel time is exclusively the combination of the distance between the response unit and the incident location along with travel route impedance. Route impedance is a combination of factors such as traffic density, road speed, road grade, weather conditions, and others. Travel time varies considerably throughout the county based on all these factors.

Received to Arrival Time

Received to arrival time is the elapsed time from the initial call to the dispatch center until arrival of the first response unit. The following charts illustrate received to arrival time performance for the City of Reno and for the Sierra, Truckee Meadows, and County Fire Suppression Program areas.

Figure 11: Received to Arrival Time – City of Reno

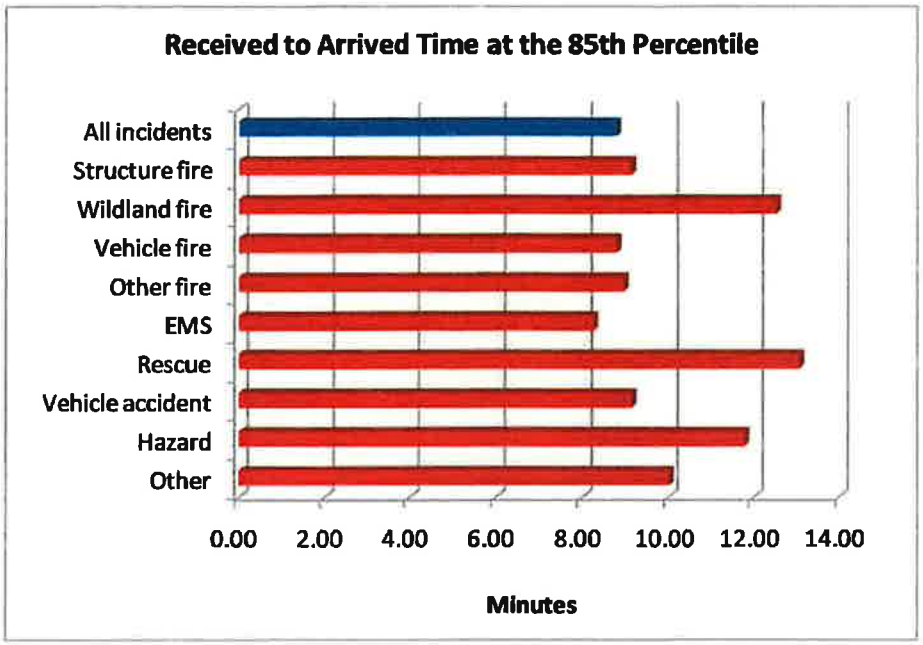
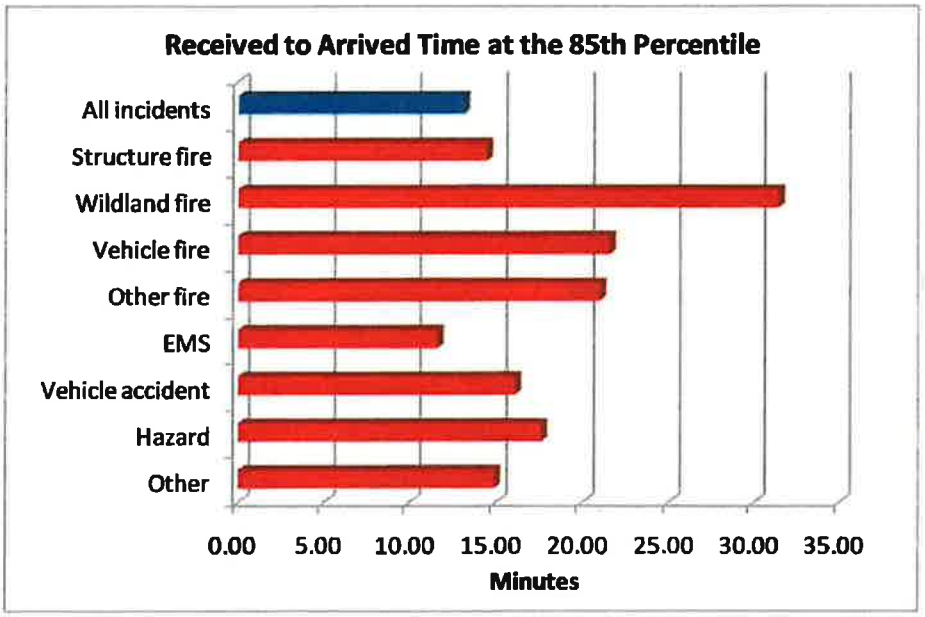


Figure 12: Received to Arrival Time – Sierra, Truckee Meadows, and County



The following maps show received to arrival time at the 85th percentile based on incidents occurring between October 1, 2009, and September 30, 2010. Approximately 87 percent of all incidents outside of the City of Reno and 89 percent of incidents in the City of Reno successfully plotted (geo-coded) to the map. No incidents geo-coded to the map for areas shown in white.

Figure 13: Received to Arrival Performance by Dispatch Zone – South County

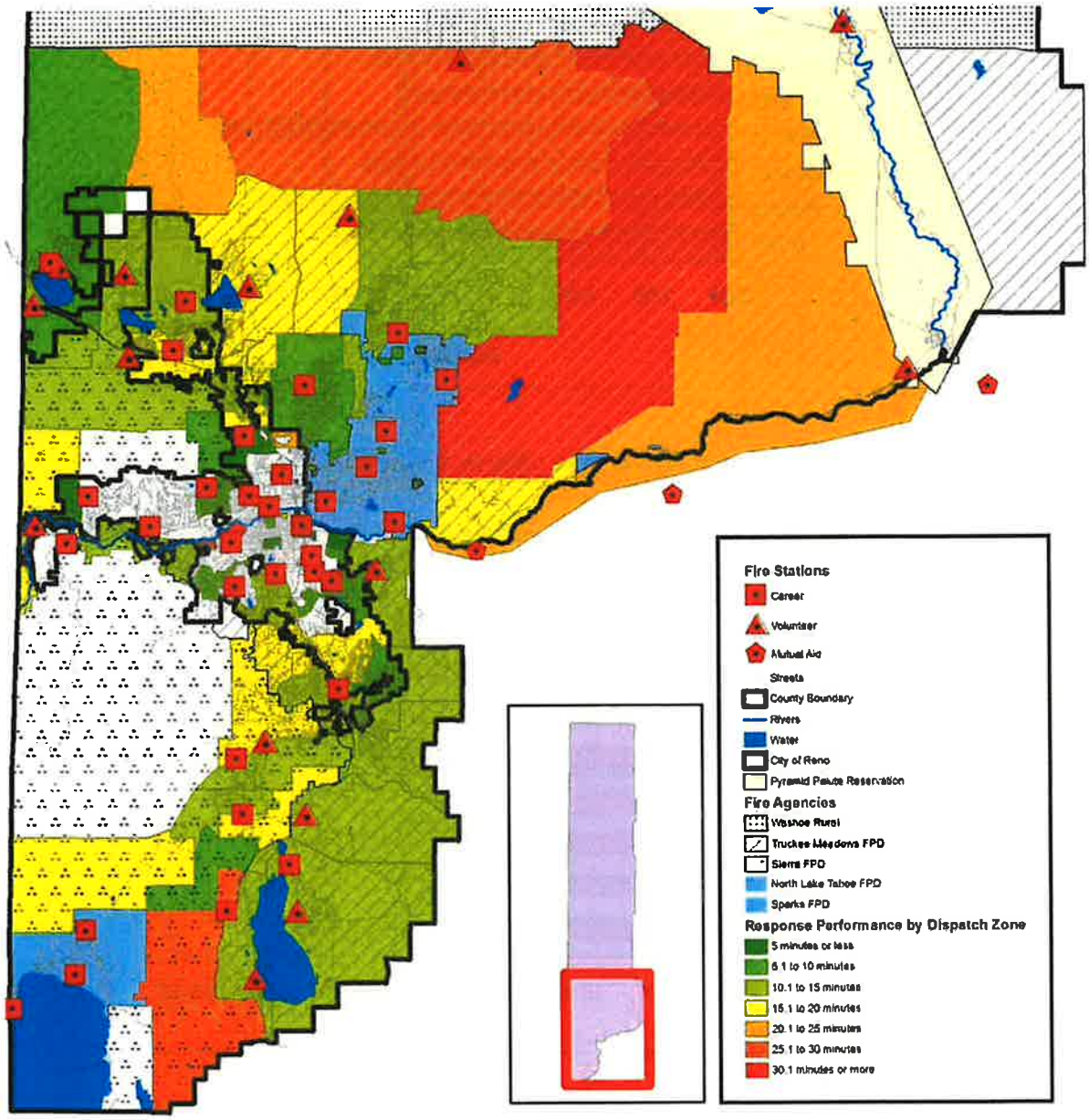
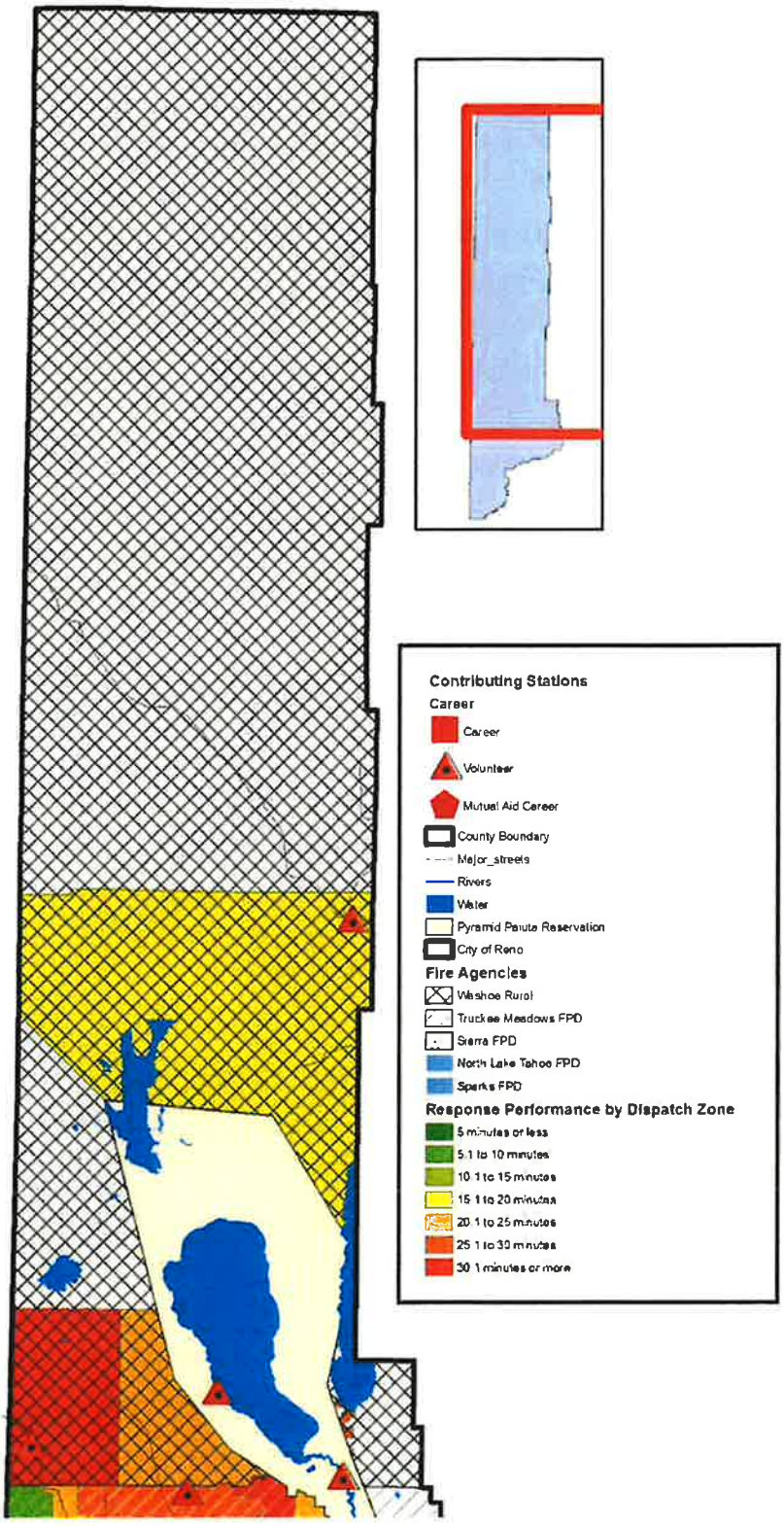


Figure 14: Received to Arrival Performance by Dispatch Zone – North County



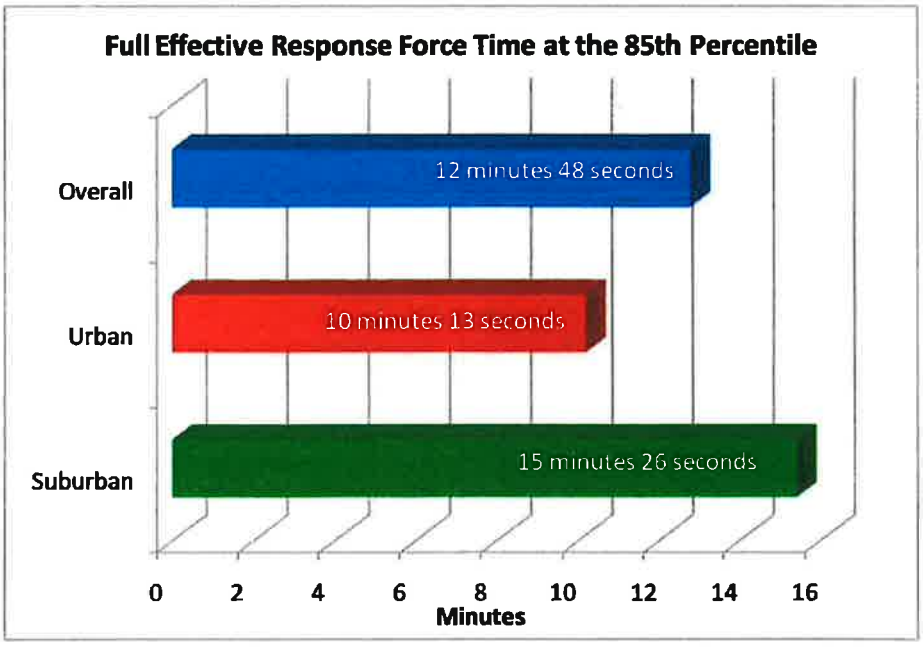
Current Effective Response Force Capability Analysis

Effective Response Force (ERF) is the number of personnel and apparatus required to be present on the scene of an emergency incident to perform the critical tasks in such a manner to effectively mitigate the incident without unnecessary loss of life and/or property. The ERF is specific to each individual type of incident, as are the critical tasks that must be performed.

Moderate risk structure fires are used as the primary risk category for this analysis. In the City of Reno, at least four response units (three fire engines and one ladder truck with 16 firefighters) must arrive on scene. In the county area the minimum force is three response units (three fire engines or two fire engines and one ladder truck with 13 firefighters).

In the city's urban area actual full effective response force performance was within 10 minutes 13 seconds, 85 percent of the time. In the suburban area actual full effective response force performance was within 15 minutes 26 seconds, 85 percent of the time.

Figure 15: City of Reno Full Effective Response Force Performance – 85th Percentile



Within the county area the full effective response force arrived within 29 minutes 21 seconds, 85 percent of the time within the suburban zone. No structure fires were identified that occurred outside the suburban zone.

The following maps shows each structure fire incident in the city and county areas with the marker color-coded by the amount of time it took for this minimum effective response force to arrive at the incident location from the time the call was received at the dispatch center.

Figure 16: City of Reno Structure Fires

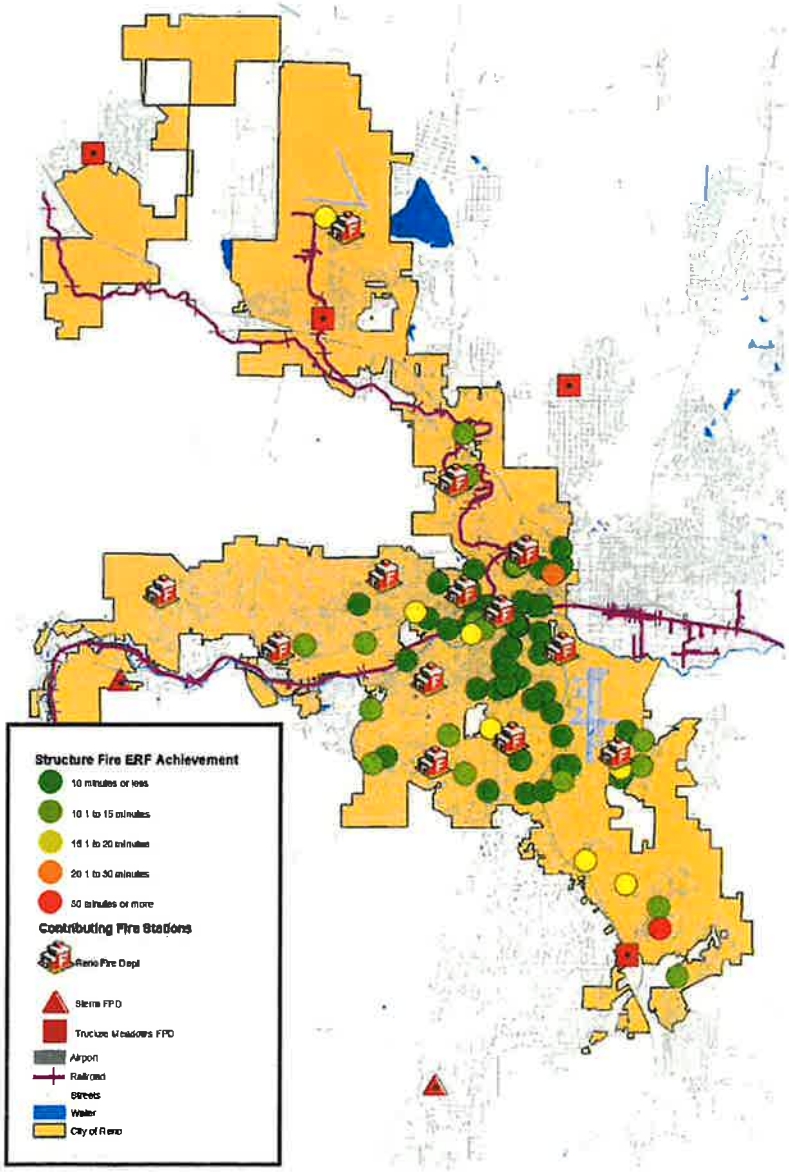
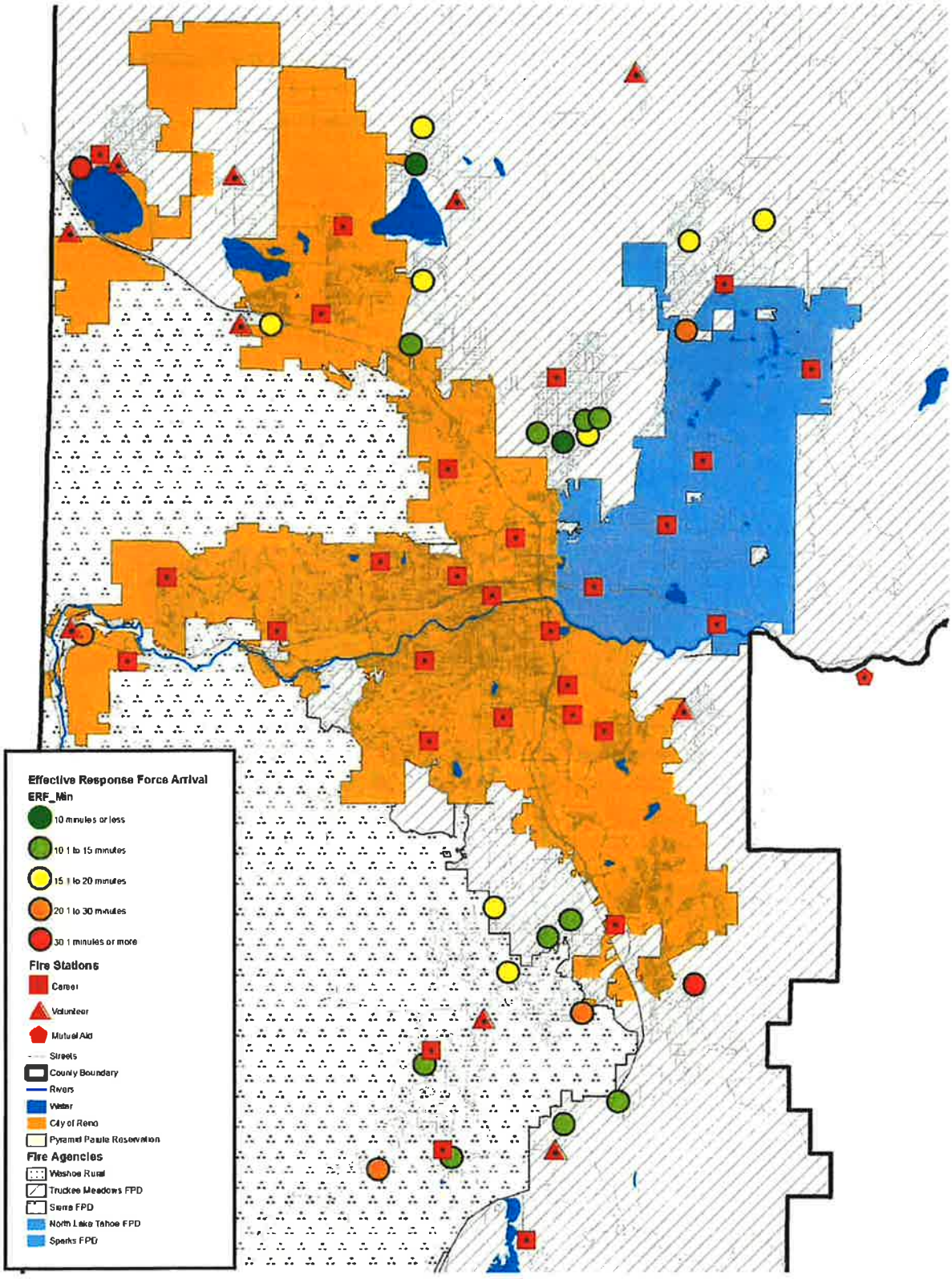


Figure 17: County Area Structure Fires



Volunteer Fire Department Reliability

In many areas of the County quick response is dependent on the availability of volunteer firefighters. In Washoe County, as in many areas of the country, volunteer firefighters do not provide 100 percent response reliability. Personal commitments to family and work can prevent a volunteer firefighter from responding to an emergency. This results in a more distant station being the first emergency unit on scene of the incident, extending the time to deliver the needed assistance.

The following tables, using data from the ECOMM computer-aided dispatch system, lists each volunteer fire department, the number of incidents to which it was dispatched, the number of times each department responded, and the corresponding reliability percentage.

Figure 18: VFD Reliability Percentages

Volunteer Fire Dept (Managing Department)	Number of Times Dispatched	Number of Times Responded	Reliability Percentage
Cold Springs Fire Department (Sierra FD)	68	25	36.8%
Galena Fire Department (Sierra FD)	572	40	7.0%
Peavine Fire Department (Sierra FD)	78	19	24.4%
Verdi Fire Department (Sierra FD)	236	47	19.9%
West Washoe Valley Fire Department (Sierra FD)	67	3	4.4%
Cold Springs Fire Department (TMFPD)	382	61	16.0%
Gerlach Fire Department[7]	62	52	83.9%
Hidden Valley Auxiliary (TMFPD)	127	1	0.8%
Lemon Valley Fire Department (TMFPD)	390	58	14.9%
Palomino Valley Auxiliary (TMFPD)	90	3	3.3%
Pleasant Valley Fire Department (TMFPD)	683	110	16.1%
Red Rock Fire Department[2]	165	134	81.2%
Silver Lake Fire Department (TMFPD)	163	134	82.2%
Sutcliffe Fire Department (Pyramid Lk/Paiute Tribe)	242	180	74.4%
Wadsworth Fire Department (TMFPD)	510	286	56.1%

An audit of the Sierra Fire Protection District, prepared by the Washoe County Internal Audit Division and dated March 17, 2011, also identified volunteer firefighter response reliability as a concern. Additionally, compliance with medical screening and minimum training requirements were identified concerns.

At present, the volunteer fire departments, with the exception of Red Rock Fire Department, Gerlach Fire Department, and Silver Lake Fire Department, do not offer sufficient reliability to

[7] Gerlach and Red Rock stations are part of the county fire suppression program whose daily operations are overseen by Truckee Meadows Fire Protection District.

consider in an analysis of available response capability. Silverlake's turnout times and its location in a predominately suburban zone make it unlikely to provide first-due service within current suburban response time objectives.

Geographic Coverage From Existing Stations

The following maps illustrate territory that can be covered from each contributing fire station. All career staffed stations along with Gerlach Station 242 and Red Rock Station 240 are included. In addition, out of region fire resources from North Lyon Fire District, Storey Canyon Fire District, and North Lake Tahoe Fire District are also included.

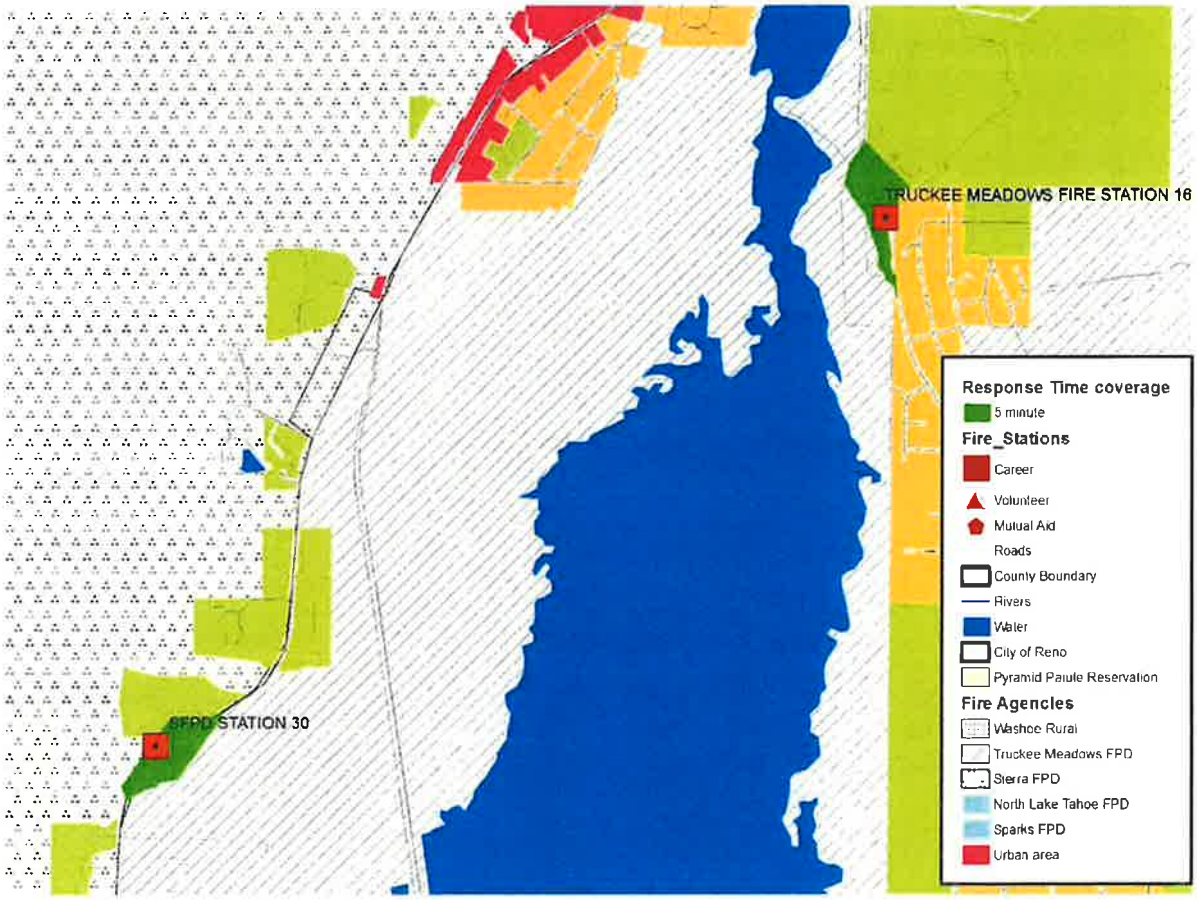
The following maps model coverage based on total response time from call receipt until arrival of the first response unit. The following assumptions are included in the analysis:

1. Dispatch call processing time for units dispatched by ECOMM is within 2 minutes, 85 percent of the time
2. Dispatch call processing and turnout time for out of region resources is within7 minutes 30 seconds, 85 percent of the time. This accommodates the need for ECOMM to call the out of region dispatch center to relay call information.
3. Career station turnout time is within 2 minutes 30 seconds, 85 percent of the time
4. Red Rock Fire Department and Gerlach Fire Department turnout time is within 10 minutes, 85 percent of the time.

Each station has been evaluated based on its ability to reach areas within 5 minutes, 10 minutes, 15 minutes, and 20 minutes from receipt of call at the dispatch center.

The first map shows an example of area that can be served within five minutes from receipt of the call. Virtually no area is served at this performance level. Since 4 minutes 30 second is used in call processing and turnout, only 30 seconds is left for travel to the incident. On average 30 seconds of travel time serves an area only within one-quarter mile (about two blocks) from each fire station.

Figure 19: Five-Minute Response Coverage



The following series of maps illustrate response service coverage at 10, 15, and 20-minute response time intervals. The service area from each career staffed station, on average is:

- 10-minute response time – 2.75-mile travel distance
- 15-minute response time – 5.25-mile travel distance
- 20-minute response time – 7.75-mile travel distance

Figure 20: 10, 15, and 20-Minute Response Coverage – South

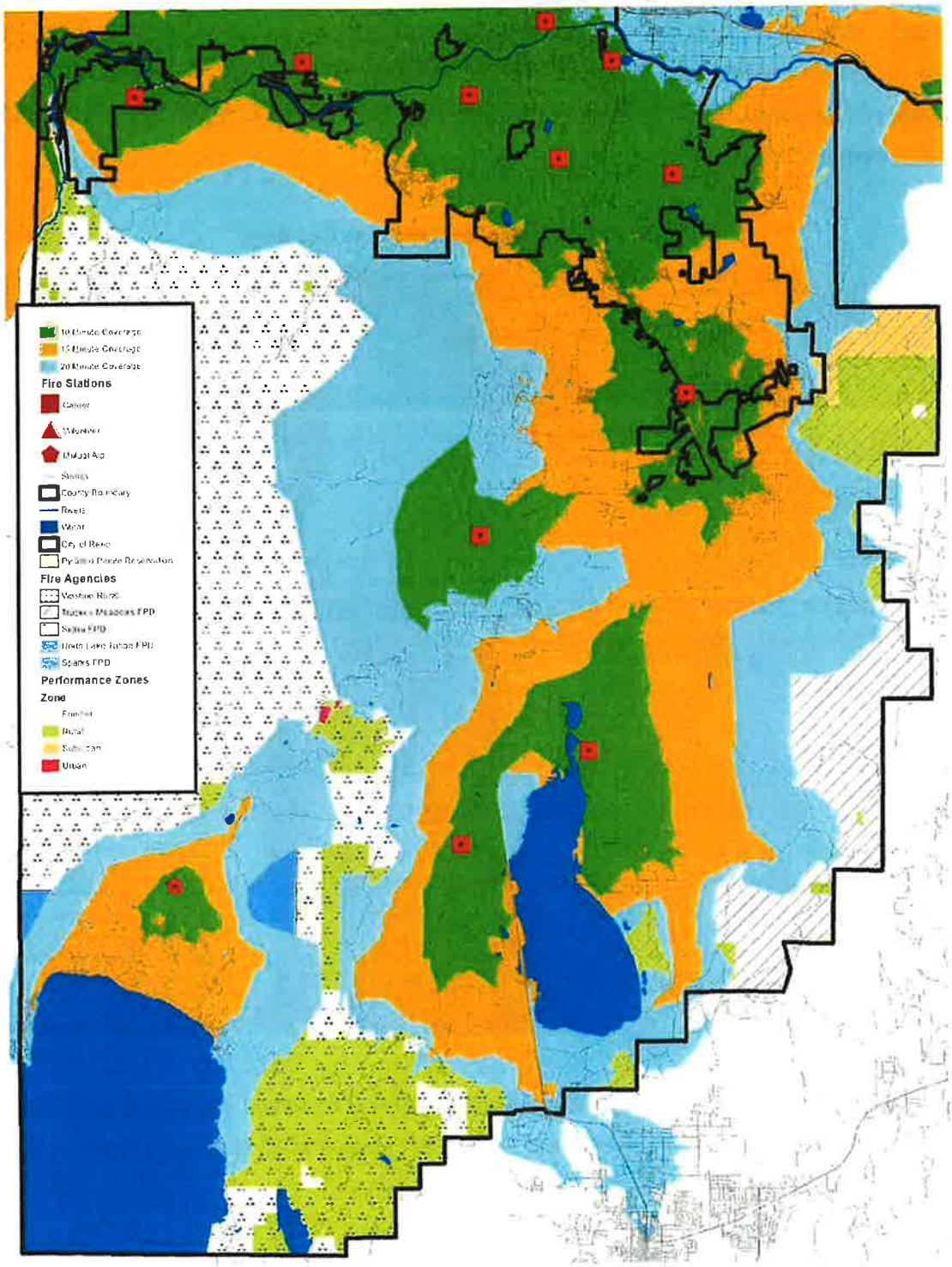


Figure 21: 10, 15, and 20-Minute Response Coverage – Central

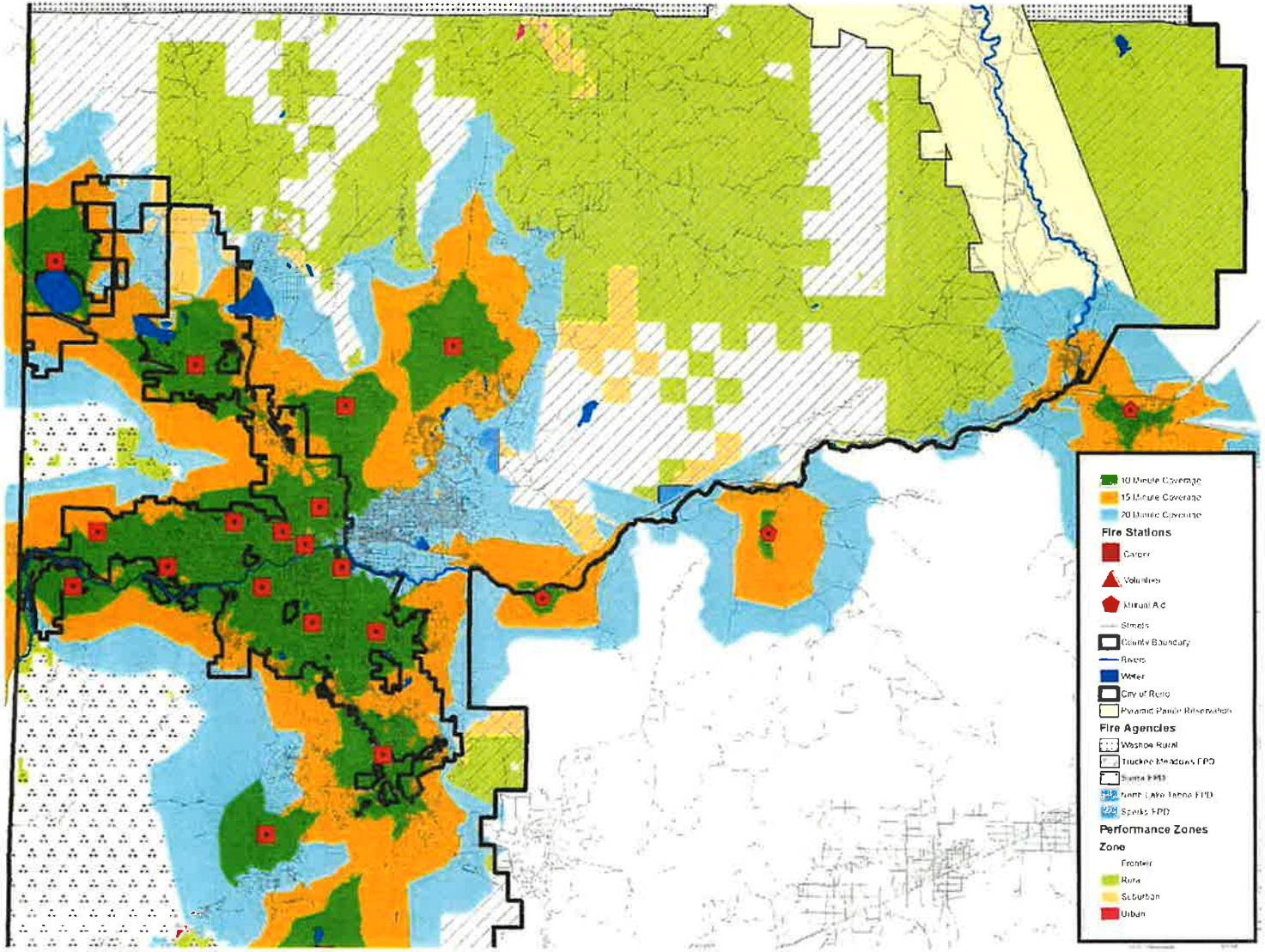


Figure 22: 10, 15, and 20-Minute Response Coverage – Red Rock Area