Skagit County and
Skagit County EMS Commission
Washington

EMS System Evaluation and Management Plan

March 2013

25200 SW Parkway Ave. Suite 3 | Wilsonville | Oregon | 97070 | www.esci.us | 800-757-3724 | info@esci.us

Skagit County and

Skagit County EMS Commission

Washington

EMS System Evaluation and Management Plan

2012

Assembled by:

Kyle Gorman
Jack Krakeel
Mike Price

Emergency Services Consulting International

Table of Contents

Table of Figures

Executive Summary

Emergency Services Consulting International (ESCI) was retained by the Skagit County Board of Commissioners and Skagit County EMS Commission to conduct a comprehensive analysis of the County's Emergency Medical Services System. Specifically, the firm was tasked with examining the structures and functions within the EMS System to include the following:

- Current EMS Delivery Analysis
- Community Risk Analysis and Standard of Coverage
- Future System Demand
- Fiscal Analysis

The Skagit County Board of Commissioners engaged the firm upon the successful passage of the EMS Levy to assist the County in identifying opportunities for system improvement that could be implemented through a comprehensive management plan during the current levy cycle.

The process employed by the firm included multiple on-site interviews with system stakeholders, review of current research and literature, national standards, local ordinances, and system data; as well as a review of prior studies and system analysis.

ESCI consultants were impressed with the level of staff interaction with the consulting team. Our interaction with the various elected officials, county and city managers, administrative staff, finance personnel, fire chiefs and other stakeholders reflected a genuine interest in making sure the system is designed to meet the challenges of the future and ensure the continued delivery of high quality emergency medical services within Skagit County.

Our analysis has resulted in multiple recommendations that we believe creates the opportunity for the organization to:

- Restructure in a manner consistent with earlier visions of system stakeholders that establishes an integrated system of care and patient transport services;
- Expand the role of the first responder system, including both BLS and ALS providers;
- Implement a financial plan that is sustainable in light of declining reimbursement levels;
- Meet expected community growth, especially services required by the elderly;
- Position the organization to integrate with Public Health and the changing landscape of the healthcare industry; and
- Improve data collection, quality assurance, and analysis.

Conclusions

The conclusions listed here are not in order of importance, they merely represent a composite of findings and recommendations to improve the current system. Additional and supporting information and recommendations are provided by section in the balance of the document.

System Issues

- The system, which is comprised to a great extent of independent agencies, is managed by what we believe to be a committed management workforce willing and interested in making system improvements.
- The system includes a population of approximately 116,000 residents dispersed throughout urban, suburban, rural and wilderness areas. Recognized to some extent as a retirement community, an aging population will continue to challenge the system and its financial base with up to 70 percent of patient transports being paid for by capitated payers including Medicare and Medicaid.
- While referred to as an "EMS system", the county's emergency medical structure is in reality three distinct EMS systems—each with its own unique character, flavor and requirements.
- With the exception of Aero-Skagit, Anacortes and Central Valley Ambulance Authority (CVAA) rely on a staffing model consisting of two Paramedics. We believe that this approach limits flexibility and creates additional expense for the system without any scientific basis that demonstrates this model results in improved patient outcomes versus a one Paramedic, one EMT staffing configuration.

Planning

- The current system does not have a plan to anticipate the service delivery needs of a growing system demand. Over time, this demand will place burdens on the existing service delivery model.
- The current system plan is principally designed to meet the requirements of the annual contracts. While this is a laudable objective, it does not equate to proper system planning, nor does it allow for alternatives that could achieve lower operating costs or a balanced or equitable process for cost containment over time.
- Beginning no later than 2017, the system must begin planning for the next levy cycle.

Medical Quality and Data

- There are no substantive issues related to medical quality and none of the stakeholders interviewed demonstrated any issues with respect to patient care. We found no evidence that inadequate medical care was being provided by personnel working in the system.
- The current dispatch system is of little use to the EMS system providers for the purposes of a records management system. The data is difficult to obtain, it contains a number of inaccuracies, and requires significant data smoothing and evaluation to be useful. Reports created by the dispatch system are either not used by the participants or are believed to be of limited use.
- Data collected to help design the future of the EMS system does not exist. Transport providers utilize proprietary software primarily designed for financial billing. While the system has made efforts at collecting, analyzing, and reporting on data that is critical to analyzing system performance, in many cases the system was not capable of producing complete data for sound analysis. For example, ESCI attempted to evaluate response performance (one of the most basic indicators of quality) in the system. Performance data was difficult to discern from current information systems.
- The medical authority oversees the EMS System with a higher level of attention paid to transport agencies rather than first response agencies or other system participants.

Integration

- The system is ambulance centric. System participants could, and should, make use of first response resources to improve response performance, provide scalability, ensure resilience, and reduce fragmentation.
- There are too many ambulance resources on duty most of the time, though occasionally there are too few. The system must more carefully match system needs with resources or provide the flexibility to expand resources as needed. .

Governance

- While the governance hierarchy shows that the CVAA is subordinate to the Skagit County Emergency Medical Services Commission (SCEMSC), some have suggested that the CVAA and the SCEMSC are "co-equals". The future system structure must resolve this view.
- The system should reduce fragmentation by establishing a strong consortium of first response and ambulance deployment in the central valley and centralized services—including medical oversight, quality assurance, training, billing, and governance—throughout the system.
- The Public Health Department should oversee the contracts for services, leveraging its expertise in prevention, contracts management, community equity, and healthcare innovation.
- Other than response times, the existing contracts make use of very few performance requirements.

Finance

- Each agency maintains independent billing systems. While two of the agencies use the same vendor, there is no systematic process in place to allow system-wide financial review of the revenues generated by patient transports or how those revenues compare amongst the various provider agencies. Furthermore, in the absence of accurate financial reporting, the SCEMSC is limited in its ability to determine the appropriate distribution of levy and revenue for system improvements.
- The system does not have a provision for increasing user fees without requesting authorization for an increase from the Skagit County Board of Commissioners. This creates delays when market forces or other factors suggest that a rate increase may be warranted.
- The system does not have contractual requirements with transport providers for adherence to an established fee schedule or to limit the ability of the transport providers to enter into contractual billing arrangements resulting in discounted fees for service.
- Taxpayers throughout the system support the delivery of services through the EMS tax levy. In light of this financial support, cost for EMS services to individual citizens should be equitable throughout the service area.
- The participating providers are not engaged in providing scheduled non-emergency patient transports or BLS inter-facility transfers. The system should review the loss of potential revenue associated with these transports and the opportunities to improve total system revenue with existing transport resources.

ESCI extends its appreciation to all of the system stakeholders. Without their contribution and support this report would not have been possible. It is our hope that the recommendations contained within our report will be utilized to strengthen and enhance the timely delivery of quality EMS to all citizens served by the Skagit County EMS System.

Methods Used in Conducting the Assessment

In 1966, the National Academy of Sciences and the National Research Council published a landmark report on the state of emergency medical services in the United States. That report, *Accidental Death and Disability: The Neglected Disease of Modern Society*, provided the initial framework around which a number of Emergency Medical Services (EMS) systems were organized.[1] Importantly, the report provided the impetus for states and localities to begin to regulate EMS because, as the report noted, mortuaries operated more than half of the ambulance services in the United States.

Evidence from that report was so compelling that Congress passed the Highway Safety Act of 1966 that established the first organized EMS systems in the United States. Research compiled since that report makes it clear that EMS systems are much more than simply ambulance transport services and that problems continue to exist in EMS system design.[2]

EMS systems structured based on traditional paradigms are changing rapidly. Many people view EMS as ambulance transport or fire department response to medical events. However, those views are being challenged as regulators demand more accountability for ambulance transport and emergency care, fire departments seek better and more efficient use of resources, ambulance agencies struggle with increased system demand, and all system participants are faced with economic constraints.

EMS systems are important considerations for regulators, elected officials, and the citizens they are intended to serve. In most areas, a body of elected officials has overall responsibility for one or more components of the system, such as fire service first response or transport, or for regulating ambulance service contracts. In some cases, multiple local agencies exert some level of control over components.

Factors Considered in Reviewing the Skagit County EMS System

The evaluation process consisted of input from key members of the participating agencies, review of documents produced both inside and outside the system, review of statutes and ordinances in place in the state and in the area, and discussions with others who have a stakeholder interest in the EMS system.

In analyzing and developing the baseline assessment of the current EMS System, ESCI reviewed the following elements of contemporary EMS system design:

- EMS Governance and Administration
- System Planning
- Financing

[1] National Research Council. 1966. *Accidental Death and Disability: The Neglected Disease of Modern Society.* Washington: National Academy of Sciences.

[2] See also: Committee on Trauma Research, National Research Council and Institute of Medicine. 1985. *Injury in America: A Continuing Public Health Problem*. National Academy Press: Washington, D.C.

- Staffing and Personnel Management
- Facilities and Equipment
- Communications
- Medical Direction
- EMS System Delivery

Assessment Process and Method

Few local governments understand the complexity of comprehensive EMS structures because EMS systems are usually poorly defined. One widely accepted EMS definition is based on *NFPA 450*.[3] NFPA defines an EMS system as: "A comprehensive, coordinated arrangement of resources and functions which are organized to respond in a timely, staged manner to medical emergencies regardless of their cause."

At a minimum, EMS systems include public information and education, system access and dispatch components, first response, ambulance transport, and definitive hospital care. Though it is beyond the scope of this report to fully discuss the hospital component of the local EMS system, ESCI has evaluated the Skagit County EMS system based on a matrix that provides local EMS agencies with appropriate system considerations and with adequate measures of system quality.

The baseline EMS assessment conducted by ESCI strives to consider system structures and functions rather than simply any agency within the context of a single service. ESCI believes that EMS requires a number of interrelating components working together in order to maximize patient outcomes. As a result, this part of the report focuses on the structures and functions of effective EMS systems, the findings of published research (if any), and ESCI's experience. In each section that follows, ESCI describes the benchmarks that are applicable to the EMS system in Skagit County.

In reviewing the EMS system, ESCI used its proprietary matrix as a model for evaluation. The matrix is based not only on the expertise of analysts, but also on contemporary, professional literature regarding EMS and regulatory systems. This component list, derived from material provided by the National Highway Traffic Safety Administration (NHTSA), the American Society of Testing and Materials (ASTM), the Commission on Accreditation of Ambulance Services, and other sources, should be considered as the appropriate factors required for the operation of the Skagit County EMS System. These resources, as well as ESCI's expertise, provided the background information necessary to develop a component list of the items critical to the effective operation of this system.

[3] NFPA is now the name of what was previously known as the National Fire Protection Association. This association creates standards and guidelines for emergency services, prevention activities, and for emergency operations.

Strengths and Weaknesses

As with all EMS systems, the Skagit County EMS system[4] is subject to a number of strengths and weaknesses that enable or limit the potential for system changes. ESCI analyzed these elements within the context of how a merged organizational structure would eliminate system weaknesses and improve the strengths of the combined organizations to deliver emergency medical services.

Strengths - The strengths of the system currently include:

1. **Commitment of personnel**. The personnel participating in the system—from management personnel at the first response agencies to field personnel to medical authorities and elected officials—are interested in and committed to the system as well as their service to the public.
2. **Local officials willing to make improvements**. In our conversations with elected and administrative officials, it is readily apparent that they recognize opportunities are present to make significant improvements in the system. We believe that they are willing to make those improvements.
3. **A single medical protocol**. All emergency care providers in the system, both first responders and ambulance personnel, are required to operate under a unified set of medical and operational protocols.
4. **Committed management workforce**. All participants that were interviewed are interested in the system and willing to make organizational changes to improve the system for all residents in the service area. EMTs and managers appear to have the needs of the community first in their organizational goals.
5. **Shared facilities**. The organizations' emergency response units currently share or are co-located in some facilities.

Weaknesses - The weaknesses of the system tend to offset the strengths in certain areas. The most prominent of these are described below:

1. **Fragmented system**. Elements of the system are fragmented with multiple agencies operating essentially independent of each other. This fragmentation is evident through various aspects of the current system design, including lack of a formalized EMS System Plan at the county level, level-of-effort versus a performance-based approach to system design, lack of uniform system performance standards utilized by the responder agencies, and minimum quality assurance programs.
2. **Lack of system planning**. The system operates under a local EMS Commission that provides oversight of ambulance service but has no formal planning process for evaluating, designing, or modifying other system components.
3. **Insufficiency and irregularity of data**. During our evaluation, we considered the information provided by the system participants and evaluated that against other data sources including the dispatch data. It is clear from that assessment that there are significant flaws in the data, in some cases making it unreliable or unusable.

[4] The system that we refer to here is the system that is made up of the principal agencies that participate in the delivery of emergency medical services.

4. **Emergency dispatch and communications**. The emergency dispatch and communications system provides only limited priority dispatch guidelines and produces very limited data that lacks relevance in determining system performance. The dispatch system structure is not developed sufficiently to address system performance or the role of this integral system element within the delivery of patient care services.
5. **Inadequate quality measures**. There are limited performance requirements defined other than response time criteria described in state law. The current system participants are unable to provide contemporary, professional quality reporting methods on their collective roles within the context of the EMS system; subsequently, they have limited comprehensive reporting capabilities.
6. **Collective bargaining agreements**. EMS personnel are bound by collective bargaining agreements that at times may impede the ability to modify shift schedules and unit deployment, and the labor units may even have economic incentives to resist the merger of the agencies.

One of the disadvantages of describing strengths and weaknesses as part of a planning process is that the assessment does not necessarily provide direction about how to make improvements. The discussion on improving the system will be provided throughout this document.

Baseline Assessment

ESCI conducted a baseline assessment of the Skagit County emergency medical services system consisting of the Skagit County Emergency Medical Services Commission (SCEMSC), local ambulance providers—Central Valley Ambulance Authority, Anacortes Fire Department, and Aero-Skagit Emergency Service Association—as well as first response agencies and the associated EMS system components. In addition, we evaluated how the EMS system components work in concert to deliver out-of-hospital medical care.

The baseline assessment was conducted to establish a benchmark from which any options for future service delivery can be measured. The assessment was also designed to identify any critical issues that may have an impact on the operational integration of the organizations. The assessment consisted of the following elements:

1. Review of the organizational design of the System:
    - Organizational Structure
    - Governance
    - Operations
2. Review of the services supporting the operations of the agencies:
    - Planning
    - Financing
    - Staffing
    - Facilities
    - Medical Oversight
    - Communications

Skagit County and the Local EMS System

Skagit County encompasses approximately 1,735 square miles in Northwestern Washington between the Puget Sound and the foothills of the Cascade Mountain Range; the county has witnessed and will continue to see moderate growth in both residential and commercial development due to the popularity of the region as a vacation destination, diverse geography, and attractiveness as a retirement community. Since the last decennial census (2010), the county's population has increased to an estimated 119,300 residents in 2010,[5] reflecting a growth rate of approximately 15.85 percent since the last census in 2000. From the following figure, it becomes clear that not only has the county grown in population, but most of that population growth has occurred in the incorporated areas. In fact, approximately three-quarters of the growth in population has occurred in cities, although we recognize that some of that growth in city size could be the result of annexation. We also note that the recent recession has had a resulting effect on the population. The last few years have shown some degradation in the growth rate and in some cases has even caused population in the county to decline.

[5] Source: Washington Office of Financial Management (OFM), April 2012.

Figure 1: Population Growth, 2000 to 2012

Municipality	2000 (Census)	2002 (est)	2004 (est)	2006 (est)	2008 (est)	2010 (Census)	2012 (est)
Anacortes	14,557	14,910	15,470	16,170	16,640	16,800	15,960
Burlington	6,757	7,190	7,425	8,120	8,460	8,985	8,435
Concrete	790	790	785	840	845	710	715
Hamilton	309	340	340	330	325	300	300
La Conner	761	775	785	839	885	870	895
Lyman	409	415	440	450	445	445	440
Mount Vernon	26,232	26,670	27,720	28,710	30,150	31,020	32,250
Sedro-Woolley	8,658	8,805	9,380	9,755	10,030	10,040	10,610
Incorporated	**58,473**	**59,895**	**62,345**	**65,214**	**67,780**	**69,170**	**69,605**
Unincorporated	**44,506**	**45,205**	**46,455**	**47,886**	**49,720**	**50,130**	**48,345**
Skagit	**102,979**	**105,100**	**108,800**	**113,100**	**117,500**	**119,300**	**117,950**

Skagit County represents approximately 2 percent of the state's population; however, the county sits along a major travel route between Vancouver, Canada and Seattle, Washington and points south. Tourists travel through the I-5 corridor, connect to San Juan Island Ferries, travel to the Mount Baker recreation areas, and in summer months connect to Eastern Washington via the North Cascades Highway. Rail and highway infrastructure in and around the industrial marine waterfront connects shipping terminals with the rest of the continent. As such, the county's resident population does not reflect the entire population served by the EMS providers in the community—the transient population, while not captured in census data, is also a consideration for EMS.

As a popular area for visitors, the area spikes in population above community norms during seasonal periods, specifically during the spring tulip festivals and during the summer months. In the summer, visitors are attracted to the multiple activities in both the recreational areas of the mountains as well as the coastal areas.

The Washington State Office of Financial Management (OFM) is the responsible state agency to project and predict population growth in the state. Based on the current growth rate, the county is expected to increase its resident population by more than 45,000 people (or nearly 40 percent) by the year 2040.[6] After 2015, the growth rate is anticipated to be between 1 and 2 percent per year through 2040.

[6] Source: State of Washington, Office of Financial Management; County Growth Management Projections.

Figure 2: Total County Population Projections, 2010 to 2040

	2010	2015	2020	2025	2030	2035	2040
Total Population	116,901	121,624	128,249	136,410	144,953	155,632	162,738
Total Growth		4,723	6,625	8,161	8,543	10,679	7,106
Growth Percent		4.04%	5.45%	6.36%	6.26%	7.37%	4.57%
Cumulative Growth (%)			9.71%	16.69%	24.00%	33.13%	39.21%

According to the OFM, a significant portion of this growth will be reflected in the expansion of the residents age 60 and older. The following figure reflects the population projections established by Washington State OFM. The growth rate of elderly citizens in the county is expected to grow at a much faster pace than the growth of the general population—at times more than double or triple the county's overall growth rate. This disparity in growth rates will place a significant pressure on the pre-hospital providers.

Figure 3: Population Growth Projections by Age, 2010 to 2040

Age	2010	2015	2020	2025	2030	2035	2040
50 - 54	8,571	8,283	7,306	7,330	7,175	8,464	9,430
55 - 59	8,504	8,933	8,674	7,761	7,819	7,704	9,143
60 - 64	7,739	8,806	9,464	9,279	8,331	8,457	8,344
65 - 69	5,972	7,677	9,165	9,946	9,810	8,861	9,034
70 - 74	4,287	5,518	7,457	8,971	9,782	9,713	8,827
75 - 79	3,271	3,730	4,909	6,691	8,123	8,871	8,846
80 - 84	2,656	2,603	2,986	3,957	5,432	6,611	7,275
85 +	2,690	3,020	3,165	3,540	4,428	5,945	7,624
Age 60 and over	26,615	31,354	37,146	42,384	45,906	48,458	49,950
>=60 growth		4,739	5,792	5,238	3,522	2,552	1,492
>=60 growth %		17.81%	18.47%	14.10%	8.31%	5.56%	3.08%
Cumulative Growth (%)			39.57%	59.25%	72.48%	82.07%	87.68%

The table below describes the percent of the elderly population in Skagit County as a percent of total population. Analysis of this information shows that the ultimate share of the total population will continue to put pressure on emergency medical services. OFM data collected in the two tables above show that the Skagit Senior population (age 60 and over) will represent nearly a third of the county's population by 2030, up from less than a quarter of the population in 2010.

✓ **Observation**. The current system does not have a plan to anticipate the service delivery needs of a growing system demand. Over time, this demand will place burdens on the existing service delivery model.

Figure 4: Senior Population as a Share of the Total Population, 2010 to 2040

	2010	2015	2020	2025	2030	2035	2040
> = 60 as a % of total	22.77%	25.78%	28.96%	31.07%	31.67%	31.14%	30.69%

The EMS transport system in the county has primarily evolved into three separate EMS systems. In the central valley, the Central Valley Ambulance Authority provides ambulance service in the populated cities along the I-5 corridor. In Anacortes and the surrounding area the Anacortes Fire Department serves as both the first response agency as well as the advanced life support transport agency. In the rural and wilderness areas in the eastern portions of the county, Aero-Skagit—a non-profit ambulance service—provides ambulance service as well as BLS services in areas not served by first response agencies.

During the course of the research phase of the project, ESCI evaluated the distribution and allocation of current ALS resources in the county. It learned that three ambulance providers provide ALS resources throughout the area, each with an assigned response area.

1. The Anacortes Fire Department provides ambulance service within the City of Anacortes,[7] the balance of Fidalgo Island, and Guemes Island. Anacortes uses two 24-hour ambulances and one 12-hour ambulance to provide approximately 1,600 ambulance transports[8] per year.
2. Aero-Skagit Ambulance Service is based in Concrete and serves the rural areas to the east of the Central Valley Area. Aero-Skagit uses one ambulance staffed with one paramedic and two EMTs to provide ambulance service on a 24-hour basis. The service responds about 650 times and provides about 350 transports per year.
3. Central Valley Ambulance Authority (CVAA) serves the Central Valley, southwest to La Conner, south to the Snohomish county line, and north to the Whatcom county line. The service uses four 24-hour ambulances, each staffed with two paramedics. CVAA responds approximately 8,914 and transports 5,948 times per year. The service recently discontinued its use of one 40-hour per week ambulance to provide non-emergency and pre-arranged transports. During periods of unusually high demand, the EMTs from local first response agencies will pair up or "split" with paramedics from the 24-hour units. While ALS first responders assist when needed, that assistance is not well defined or formally coordinated as a component of the system.

The EMS system does not appear to be in the practice of regulating non-emergency transportation services; consequently, there is no prohibition against new start-up companies or other competition from out-of-county providers. Outside the system, unregulated providers frequently accept scheduled or unscheduled transports.

✓ **Observation**. The future of out-of-hospital service delivery is unclear. Hospital systems are seeking assistance in preventing readmissions, health insurers seek assistance in prevention activities, and healthcare exchanges are implementing out-of-hospital programs. Without a clear

[7] We recognize here that the boundaries of the ambulance service area for the City of Anacortes extend beyond the city boundaries to the east. That area cannot be reliably served from what is known as the Central Valley.
[8] We count ambulance transports as the number of times that an ambulance left for the hospital. When multiple patients are transported, the number of patients transported may be different.

understanding of private, non-emergency activities, the existing EMS system providers may be blocked from participating in future delivery systems.

The county grants the right or privilege to provide 9-1-1 ambulance services within Skagit County. Washington statutes authorize the county to provide for the provision of ambulance service in the county,[9] and restrict public provision of ambulance service to those areas where private ambulance service is not available. Anacortes, Burlington, Sedro Woolley, and Mt. Vernon have ambulance ordinances, ostensibly intended to regulate ambulance service within the boundaries of the cities. The combination of both county and city regulation of ambulance service presents far-reaching problems for the EMS system[10] and may now or in the future contribute to the system's fragmentation.

Further, the response demand is insufficient in any area to ensure long-term services without a system subsidy. As such, the Skagit County EMS Commission provides financial subsidies to providers based on the number of responding units that are deployed. A 13-member EMS Commission oversees services.

First-response services are provided by each of the three agencies, albeit with varying resource commitments and deployment methods. The Anacortes Fire Department and CVAA respond as either first or second responders, while Aero-Skagit responds as a first response agency that also provides transport. Anacortes often responds with two paramedics per ambulance, but also staffs with a paramedic and one EMT. CVAA respond with two paramedics per ambulance; Aero-Skagit, because it also serves as the first responder, responds with one paramedic per ambulance but with two additional EMTs. Local fire agencies also provide first response services and do not transport. Only limited first response is available from local fire districts or departments in Aero-Skagit's area.

Mount Vernon Fire Department (MVFD) responds to medical events with ALS personnel[11] and has the capability to deliver additional ambulance resources into the system on short notice. ALS personnel with MVFD are able to transport during periods of high demand on the system or they can split resources with CVAA crews. Currently, MVFD receives no funding from the Skagit County EMS Commission for ALS services.

Response times in the county for all of the providers are captured by Skagit's emergency 9-1-1 center, the emergency dispatch provider in the county. The service operates using a Spillman CAD system. Many of the providers expressed concern about the accuracy of the data produced by the CAD system,

[9] RCW 36.01.100.

[10] Multiple overlapping regulations may place ambulance services in impossible situations. If the county regulation, for example, required ambulance services to use lights and sirens for all emergency events but the city regulation prohibited the use of sirens under certain circumstances, the ambulance provider cannot possibly follow the law. Further, city regulations are limited to the geopolitical boundaries of the city while logical medical catchment areas frequently extend much farther. Ambulances serving the logical market areas are therefore unable to move freely throughout the market. Overlapping regulations should therefore be avoided whenever possible.

[11] Mount Vernon does not guarantee 24/7 ALS, but typically provides ALS services.

and as a result they are using their own data methods to capture and report status times and other information.

- ✓ **Observation**. The current dispatch system is of little use to the EMS system providers for the purposes of a records management system. The data is difficult to obtain, it contains a number of inaccuracies, and requires significant data smoothing and evaluation to be useful. Reports created by the dispatch system are either not used by the participants or are believed to be of limited use.

Governance and Regulation

Skagit County's EMS system has multiple layers of governance that includes the State of Washington, the Skagit County Commissioners, the Skagit County EMS Commission, and local cities, which have ambulance regulations. The state primarily regulates EMT training and certification, ambulance licensing, and medical program director criteria. The county oversees emergency ambulance services through the Skagit County EMS Commission whose members are appointed by the Skagit County Commissioners, and local cities regulate ambulance service and non-emergency ambulances through local ordinances. The county and the cities regulation appears to be consistent with the aforementioned National Academy of Sciences and the National Research Council report, Accidental Death and Disability, the Neglected Disease of Modern Society.[12] Importantly, the report authors stated:

> *Adequate ambulance services are as much a municipal responsibility as fire fighting and police services. If the community does not provide ambulance services directly, the quality of these services should be controlled by licensing procedures and by adequate surveillance of volunteer and commercial ambulance companies.*

State and Regional Oversight

EMS systems are comprised of a number of disparate components that must be carefully coordinated to ensure that patient outcomes are optimized. Coordination typically involves creating goals and objectives, establishing and implementing a system-wide plan, monitoring that plan, and making improvements. Most states have authorizing statutes allowing local regulation of EMS, although few local jurisdictions provide the necessary oversight to provide appropriate safeguards for citizens.

Washington state statutes specifically regulate the provision of pre-hospital life support services through its legislative authority codified in the Revised Code of Washington: Title 18 Chapter 18.71 Sections 200-215 and Chapter 18.73. The administrative authority is further defined in rule through the Washington Administrative Code, which has promulgated regulations for the following components of the EMS System:

1. Training and certification of EMS providers;
2. Licensure and inspection of ambulance services and aid services;
3. Verification of pre-hospital trauma services;

[12] National Research Council. 1966. *Accidental Death and Disability: The Neglected Disease of Modern Society.* Washington: National Academy of Sciences.

4. Development and operation of a statewide trauma registry;
5. The designation process and operating requirements for designated trauma care services;
6. A statewide emergency medical communication system;
7. Administration of the statewide EMS and Trauma Care system.

In addition to specific state requirements the local EMS System is also subject to rules and standards established by one of the eight regional EMS and Trauma Care Councils within the State of Washington. The North Region EMS and Trauma Care System exercises authority for specific aspects of the Skagit County EMS System including definitions, response time standards, operational guidelines and patient care procedures.

The North Region EMS and Trauma Care System has created the following timelines and definitions for trauma response performance. These standards have become the de facto performance standards for both medical and trauma performance.

Figure 5: Response Time Guidelines

North Region Response Time Guidelines[13]				
Response Zone	**ALS Transport (minutes)**	**BLS Response (minutes)**	**Reliability Measure**	**Definition**
Urban Areas	8	5	80%	Incorporated and > 30,000 people or 2,000 / sq. mile
Suburban Areas	10	5	80%	Incorporated or unincorporated, 10,000 to 29,999 or 1,000 to 2,000 per sq. mi.
Rural Areas	20	12	80%	Incorporated or unincorporated with < 10,000 people or < 1,000 per sq. mi.
Wilderness Areas	60	40	80%	Not readily accessible by the public.

✓ **Observation**. The current response time requirements are confusing and differ from other components of the North Region documents. The contracts with each of the providers should specify the response time and other performance requirements and should not link to an outside source with multiple options for response times.

[13] North Region EMS and Trauma Care System Plan, page-94, July 2009 – June 2012; Submitted by North Region & Trauma Care Council, August 10, 2011. We recognize that the response times are in conflict with the North Region Medical Protocols but we believe that as the System Plan is more recent, it takes primacy over the medical protocols. Providers report on neither, they use 90 percent fracti le reporting.

Local Regulatory Oversight.

The EMS delivery system in Skagit County is not atypical of the 1970's-era design of EMS systems found throughout the country. The genesis of the system can be traced to the implementation of a tax levy authorized under Washington statute and passed by the voters of the county in 1978. During this era, EMS in the United States was considered to be in its infancy. The EMS Act defined the essential elements of an EMS System. Unfortunately, it did not include first responder agencies as a critical component. Essentially EMS System design and regulation was primarily driven from the perspective of ambulance transport services. It appears that the progression of EMS in Skagit County has followed a similar path over the course of the last 25 years with the ambulance service providers being the primary focal point from an EMS service delivery perspective.[14]

During this same period, the role of fire agencies in the United States has dramatically changed. Today the fire service is recognized as the single largest provider of pre-hospital care in the country both in terms of its first-responder role but also from the perspective of providing patient transport services. Today, more than 90 percent of career and combination fire departments deliver emergency medical care services.[15]

In 1995, the National Highway Traffic Safety Administration published the *EMS Agenda for the Future*. At the time of its publication, the document was considered to be a visionary blueprint for EMS system development. One of its visions is that "EMS will be integrated with other health care providers and public health and public safety agencies." [16]

The Role of Skagit County.

Within Skagit County, the Board of Commissioners (BOC) has broad oversight for the provision of advanced life support ambulance services. In 2003, the BOC passed Ordinance O20030003, which established the Skagit County Emergency Medical Services Commission (SCEMSC), charging the Commission with carrying out the following functions:

1. Development of a Management Plan that shall:
   a. Define standards applicable to the provision of emergency medical services in Skagit County;
   b. Develop a financial plan, including the distribution of EMS levy revenues;
   c. Establish a capital replacement plan for facilities and equipment.
2. Establish the Skagit County EMS Commission (SCEMSC) to achieve the following goals:
   a. Create a centralized structure that coordinates the delivery of pre-hospital services through an efficient and effective program of patient care and transport.
   b. Identify the roles and responsibilities of system participants.
   c. Ensure that resources dedicated to provision of advanced life support services comply with established community standards.

[14] While we comment here that ambulance service is the primary focal point of the local system, we also note that the EMS Commission provides support to other system components.
[15] Report on EMS Field Experiments. (2010). *Firefighter Safety and Deployment Study.* Moore *et al.*
[16] NHTSA – *EMS Agenda for the Future*. 1995

d. Enable the system to meet both the anticipated and unanticipated changes that impact the delivery of EMS.
e. Institute an effective and efficient process for the replacement of capital infrastructure.
f. Ensure that the financial resources of the system are distributed equitable and appropriately to meet the emergency medical service needs of the community.

In 2009, the Skagit County Commissioners updated the EMS ordinance by passing an amendment (Ordinance # 020090003) vesting additional authority in the EMS Commission. The EMS Commission is now responsible to:

- Supervise the management of the EMS system in Skagit County and monitor the performance of contracts.
- Develop and approve an annual budget to include means of financing and allocation of tax levy funds for approval by the Skagit County Board of Commissioners.
- Approve an EMS management plan.
- Provide a quarterly financial report to the Skagit County Board of Commissioners.
- Identify qualified providers and execute performance contracts.
- Select and appoint EMS Commission personnel.
- Provide training for EMS personnel.
- Monitor the maintenance of equipment.
- Review provider performance.

✓ **Observation.** Other than response times, the SCEMSC has established very few performance requirements in the system contracts.

The Skagit County EMS Commission and the Central Valley Ambulance Authority

Skagit County participates in the EMS system primarily as an overseer of ambulance services. While a number of agencies provide first responder services with three agencies providing transport, there is no formal contract in place nor are significant funds exchanged for the services provided by first response agencies. Due to the lack of a formal service agreement, there exist different opinions in regard to critical components and functions such as scene management, cooperative deployment, quality assurance, funding, and regulatory oversight of the system within the geopolitical boundaries of the county.

The Skagit County Commissioners established a 13-member board for the EMS Commission that was appointed by the County Commissioners. Generally, the EMS Commission acts as an independent organization, although it is required to comply with laws regulating governments in the State of Washington. Prior to 2009, the EMS Commission directly operated the ambulance service, receiving EMS levy funding from the County and patient revenues from ambulance transports. The EMS Commission also contracted for ambulance service from the City of Anacortes and from Aero-Skagit.

The SCEMSC's 13 members represent county and municipal governments, consumers, hospitals, and a medical director, as well as fire service representatives. The Commission is supported by a staff consisting of:

- EMS Commission Manager
- Administrative Assistant
- Training Coordinator
- Special Projects Coordinator
- Accountant
- A number of part-time, on-call trainers.

The EMS Commission Manager reports to the EMS Commission and Public Health Director who serves as Chair of the Commission. From a systems perspective, the commission manager's authority is limited to coordinating system elements rather than exerting specific management or control over system components.

The SCEMSC periodically engages subject matter experts to develop the required management plan that is designed to serve as a guiding blueprint for system improvement and resource allocation. Moss Adams conducted the most recent management plan in January 2008. That report was more focused on the financial components rather than the operating components of the EMS system.[17]

The SCEMSC is not empowered to implement plans; it serves to develop policy recommendations for submission to the Skagit County Board of Commissioners. The SCEMSC derives its principal source of revenue from the EMS levy. The current levy of $0.375 cents per $1,000 taxable assessed value (TAV) was approved by the voters of Skagit County in 2012. The current levy has adequate funding to support the SCEMSC.

The SCEMSC has defined in its by-laws the establishment of standing committees to provide recommendations to the Commission on various aspects of the EMS System. It is unclear how active these committees are in providing recommendations to the SCEMSC. These committees whose chairs are designated commission members include the following:

- Medical Control
- Pre-Hospital
- Hospital and Trauma Facilities
- Quality Improvement
- Finance

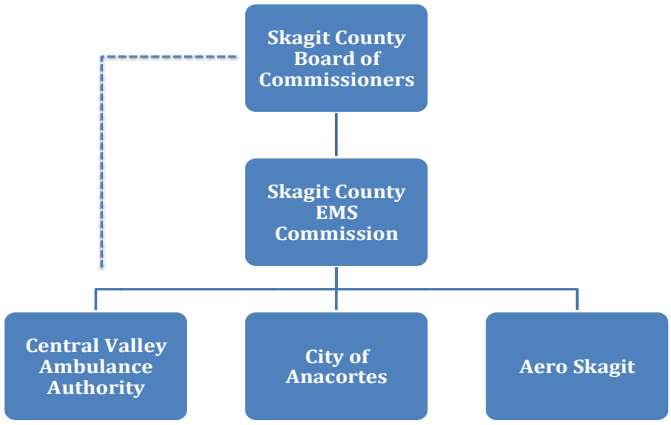
[17] Moss Adams LLP, Skagit County Financial Analysis Project, January 2008.

In 2009, due to concerns about the commission both providing and contracting for ambulance service, the County Commission elected to split off the service provision portion of the EMS system and established the Central Valley Ambulance Authority (CVAA)[18] to provide the ambulance service. Today, the Skagit County EMS Commission receives EMS levy and other funding from the County Commission and in turn distributes the majority of those funds to the three local ambulance providers.

CVAA was established in 2009 to, among other things, "provide emergency medical services in Central Skagit County in accordance with any applicable laws or regulations…" Like the EMS Commission, CVAA must prepare and submit an annual budget to the County Commission for approval. CVAA remains a quasi-public agency that provides ambulance services to the central valley area. Though the CVAA and the Skagit EMS Commission provide operating oversight of their respective agencies, the County Commission is ultimately responsible for the activities of both the EMS Commission as well as CVAA.[19] The following figure below describes the governance relationships within the County EMS system.

- ✓ **Observation**. While the governance hierarchy shows that the CVAA is subordinate to the SCEMSC, some have suggested that the CVAA and the SCEMSC are "co-equals" in the eyes of the law. The future system structure must resolve this view.

Figure 6: Governance Structure of the Local EMS System



City Oversight of EMS

Local policy makers often seek to implement regulatory oversight of at least some components of EMS. Though few systems have the all-inclusive oversight necessary to manage the interdependence of multiple, autonomous EMS organizations, many systems employ both county and city regulations to

[18] Skagit County Code, Chapter 252.

[19] Though the figure shows reporting relationships, both CVAA and SCEMSC are co-equals in the context of their respective relationships with the county. The County Commission approves budgets, bylaws, and generally establish policy for both bodies.

establish oversight over system components when regulation of the larger system is infeasible. Because the marketplace and historical precedence may not be successful, agencies often attempt to coordinate autonomous organizations and concurrently manage their independence. Such is the case in Skagit County with multiple cities attempting to manage the fragmented non-emergency component of the market.

In addition to the authority vested with the Skagit County Board of Commissioners, several local jurisdictions including Mount Vernon,[20] Sedro-Woolley,[21] Burlington,[22] and Anacortes[23] have individually adopted ambulance ordinances that include licensure requirements for ambulance transport providers operating within their geo-political boundaries. These cities have ambulance ordinances, ostensibly intended to regulate ambulance service within the boundaries of the cities. The combination of both county and city regulation of ambulance service presents far-reaching problems for the EMS system[24] and may contribute to the system's fragmentation.

Local Services

Within the constraints established by city and county ordinances, each of the ambulance transport agencies is responsible to manage the factors of production necessary for the provision of ambulance service within their respective boundaries. The three agencies (Aero-Skagit, Central Valley Ambulance Authority, and the City of Anacortes) have remarkably different methods to provide services.

1. The Anacortes Fire Department provides ambulance service within the City of Anacortes,[25] the balance of Fidalgo Island, and Guemes Island. Anacortes uses two 24-hour ambulances to respond to 2,362 events and provide about 1,653 ambulance transports[26] per year, and supplements those primary ambulances with an additional half-time ambulance. Anacortes Fire Department is a department of the City of Anacortes and is responsible to the mayor and city council for budget and oversight. It provides ambulance services under contract with the SCEMSC but operates multiple business lines—specifically fire suppression, prevention, and various forms of rescue services.

[20] Ordinance No. 3198, Mount Vernon ordinance enacting Chapter 8.40 of the municipal code and establishing and regulating ambulance services in the city. 2004

[21] Chapter 8.40 of Sedro Woolley municipal code, establishing and regulating ambulance services in the city. 2011

[22] Chapter 8.24 of Burlington municipal code, relating to ambulance service.

[23] Ordinance No. 2877, City of Anacortes ordinance amending Chapter 13.54 of the municipal code and establishing and regulating ambulance services in the city. 2012

[24] Multiple overlapping regulations may place ambulance services in impossible situations. If the county regulation, for example, required ambulance services to use lights and sirens for all emergency events, but the city regulation prohibited the use of sirens under certain circumstances, the ambulance provider cannot possibly follow the law. Further, city regulations are limited to the geopolitical boundaries of the city while logical medical catchment areas frequently extend much farther. Ambulances serving the logical market areas are therefore unable to move freely throughout the market. Overlapping regulations should therefore be avoided whenever possible.

[25] We recognize here that the boundaries of the ambulance service area for the City of Anacortes extend beyond the city boundaries to the east. That area cannot be reliably served from what is known as the Central Valley.

[26] We count ambulance transports as the number of times that an ambulance left for the hospital. When multiple patients are transported, the number of patients transported may be different.

2. Aero-Skagit Ambulance Service is based in Concrete and serves the rural areas to the east of the Central Valley Area. Aero-Skagit uses two ambulances staffed with paid employees and scheduled volunteers to provide ambulance service on a 24-hour basis. The first-out ambulance is staffed with employees—one paramedic and two EMTs. The balance of responding units makes use of paid-on-call or volunteers to provide services. The service responds about 650 times and provides approximately 366 transports per year. Aero-Skagit is a not-for-profit organization providing emergency medical services and ambulance transportation in the rural and wilderness areas of the eastern part of the county. A seven-member board of directors oversees the organization. The agency provides only emergency medical services and ambulance transportation
3. The Central Valley Ambulance Authority (CVAA) serves the Central Valley southwest to La Conner, south to the Snohomish county line, and north to the Whatcom county line. The service uses four 24-hour ambulances, each staffed with two paramedics. The Central Valley Ambulance Authority is a public entity established under Chapter 2.52 of the Skagit County Code. The board of directors of CVAA is designed to be comprised of seven representative members—three city fire chiefs, three district fire chiefs, and one fire commissioner. The current (actual) makeup is one city fire chief, one rural chief, one rural assistant chief, one commissioner, one councilor and one member-at-large. There is one open position. CVAA is charged by the commissioners with providing emergency medical services including ambulance transport in the Central Valley area of Skagit County. CVAA responds to approximately 8,900 events and transports about 5,950 patients each year. The service previously provided non-emergency and prearranged ambulance transfers using one BLS unit—beginning in January 2012, that service was eliminated—except for ALS transports from United General and Skagit Valley Hospitals. The value of the BLS ambulance allowed the service to, during periods of unusually high demand, "split" paramedics from the 24-hour units and increase ambulance resources.

Planning for Emergency Medical Services

NFPA 450 Guide for Emergency Medical Services and System states, "Based on the comprehensive system analysis and the identified system priorities, the system should develop a plan for ongoing system design and improvements."[27]

In general, Washington statutes regulating ambulance services provide minimal requirements for system planning; however, EMS agencies participating in an EMS system should develop plans for creating ongoing improvements to the system to maintain service levels that are both effective and appropriate, to identify environmental changes, and to project future needs. The plan components work to ensure the system provides the appropriate balance between high quality patient care and system funding.

The planning process for EMS systems is a critical component to ensuring the ongoing success of those systems and to ensure that patient outcomes continually improve. While the mission and the vision statements of the authority overseeing EMS provide the strategic direction, the EMS plan provides the foundation by which the goals of the system can be achieved. Importantly, planners must be able to

[27] *NFPA 450 Guide for Emergency Medical Services*: 5.7 EMS System Planning.

look over the horizon in identifying environmental changes prior to those changes impacting the system. In doing so, planners should create written EMS plans, regularly review those plans, and report on the effectiveness of those plans. Plan components should, at a minimum, include needs and resource analyses, data collection processes, and a process by which data can be analyzed and evaluated to monitor the performance of the EMS system.

Planning for System Design

The system must be designed to ensure the highest possible levels of patient care given the funding, human resources, and ability of the organizations to provide services congruent with the constituents' demands.

The vast majority of EMS research regarding system design and planning has focused on resource deployment and meeting response times that would allow personnel to effectively treat cardiac arrest patients. In fact, various national organizations have adopted response time standards based on cardiac arrest studies including those found within *NFPA Standard 1710* which recommends that BLS units arrive at the scene within four minutes or less and ALS units arrive at the scene within eight minutes or less. The Commission on Accreditation of Ambulance Services (CAAS) has a required response time performance criterion of eight minutes 59 seconds (8:59) for ambulance services seeking accreditation.

Current System Planning

The Washington State Growth Management Act (36.70A RCW) requires counties to develop and maintain a Comprehensive Growth Management Plan. Consistent with the legislation, Skagit County is required to update its comprehensive plan every seven years. Skagit County recently obtained full compliance with 36.70A RCWGMA since the initial passage of the Growth Management Act in 1990.

Skagit County's GMP established policies and develops standards for managing growth in the county. The Plan accomplishes these objectives by establishing 13 distinct policy elements for managing growth and coordinating public facility and public services as growth occurs. Ambulance services are not specifically identified within the context of the plan unlike police and fire protection. The plan does identify a singular standard for emergency medical services response within the context of fire protection services under Policy 1 – Urban Growth:

> *Within 5 minutes of being dispatched, the Fire Department shall arrive and be able to deliver up to 200 gallons per minute fire flow in an offensive (interior) attack, with a minimum of 4 firefighters, for responses to: structural fires, vehicle fires, other outside fires, motor vehicle accidents, activated fire alarm systems, or other hazardous conditions. The Fire Department shall also be capable of delivering a minimum of Basic Life Support including defibrillation, with a minimum of one First Responder or Emergency Medical Technician, for medical responses.*

Based on the specific language, we assume that the ambulance deployment and services are not considered in the Comprehensive Plan unless the county intended it to be included under the broad

category of "health and public safety." However, the plan does provide for the development of specific and unique plans as subsets of the GMP.

As part of its initial charter under Skagit County Ordinance #O20030003, the SCEMSC is required to develop a management plan consisting of the following elements:

- Standards applicable to the provision of emergency medical services in Skagit County;
- A financial plan, including the allocation of EMS Levy Funds; and
- A capital equipment replacement and facilities plan.

Historically, SCEMSC has relied on outside expertise in the development of various planning documents. The most recent include:

EMS Levy Analysis – 2012. The Board of Commissioners engaged the services of Emergency Services Consulting International to assist the EMS Commission in projecting future system financial needs based upon the current service delivery model. Furthermore, ESCI was asked to provide an independent and transparent analysis that identifies the needed levy rate to present to the citizens of Skagit County for their vote.

Organizational Design and SCEMC Analysis – 2008. Mr. Timothy Kiehl, an independent consultant, was engaged to analyze the composition and function of the Skagit County EMS Commission. Included in the engagement was the development of an organizational design for the future of the EMS System. One of the principal recommendations from the study was to transition the current ambulance system to a fire-based model in which the City of Mt. Vernon Fire Department would take responsibility for areas within and adjacent to the City where CVAA is the principal provider of ALS transport services.

ALS Resource Needs Analysis – 2004. Emergency Services Consulting International (operating at the time as Emergency Services Consulting inc. (ESCi)) was retained by the Skagit County EMS Commission to review the emergency services deployment methods in the county. Specifically, ESCi was tasked with examining the structures and functions that would lead to improved arrival times on the scene, and the deployment of resources necessary to achieve optimal coverage considering geography, demand for services, and the potential for growth.

Moss Adams Management Plan – 2003. Moss-Adams, LLP was engaged by the County to assist the newly created EMS Commission and service providers in providing a comprehensive, efficient, effective and coordinated emergency medical services system countywide.

While these documents provide specific guidance on various aspects of the Skagit County EMS System (SCEMSS), there is no single comprehensive document that provides planning throughout the Skagit County service area. Planning for services has been primarily predicated on geographic coverage based on location of facilities of the various participating agencies and the annual allocation of levy revenues specifically through the financial request of system participants. The current planning process is driven primarily by the following elements:

1. Agency contracts with the participating providers
2. An annual financial plan that includes the operating and maintenance budget, scheduled capital investments and reimbursement methodology for system participants

3. Description of ambulance and first response services
4. Medical director contract
5. Treatment protocols
6. Communications

This planning process articulates the current structure of SCEMSS, but does not provide real long-term direction for the system. Past efforts with respect to planning have been predicated on historical experience.

- Deployment of resources based on fixed facilities designed for fire protection requirements
- Expansion of service areas as a result of urban growth areas
- Dependency on historical system design

The system must be designed to ensure the highest possible levels of patient care given the current financial structure, human resources, and ability of the organizations to provide services congruent with the constituents' demands. Though scientific EMS research and other literature is not completely clear on a number of system design factors, most system designers believe that responders (both ALS and BLS) arriving on the scene the earliest are more likely to achieve improved patient outcomes. One system design criterion, therefore, must ensure that the closest first responder and the closest ALS provider arrive on the scene as soon as possible after notification of an event.

EMS agencies must craft the policies and mitigating strategies that should be employed in relation to the goals and objectives of the SCEMSC. Planning for response to emergency situations must be done well in advance of an emergency. Once that pre-planning is accomplished, the system participants must continuously strive to improve the performance of the emergency system. The challenge is to unceasingly evaluate and improve as many system components as possible with a focus on improving the overall EMS system.

As previously identified, the comprehensive planning process should, at a minimum, include needs and resources analyses, data collection processes, and a process by which system data can be analyzed and evaluated to monitor the performance of the EMS system. Data collected to help design the future of the EMS system is minimal and consists primarily of provider agency submittal of response time data. Financial data critical to support system design and function is limited to the annual budget funded through the EMS levy. Transport provider agencies utilize proprietary software primarily designed for financial billing consistent with their internal needs and requirements. No comprehensive system wide efforts exist with respect to collecting, analyzing, and reporting on data that is critical to the analysis of system performance.

✓ **Observation**. The current system plan is principally designed to meet the requirements of the annual contracts. While this is a laudable objective, it does not equate to proper system planning nor does it allow for alternatives that could achieve lower operating costs or a balanced or equitable process for cost containment.

- ✓ **Observation**. The agencies in the service generally lack a formalized communication process to establish a strategy that provides objectives for meeting the EMS needs in the community beyond the monthly meetings of the SCEMSC.
- ✓ **Observation**. The system participants have not designed a plan for providing emergency medical services.
- ✓ **Observation**. Data collected to help design the future of the EMS system does not exist. Transport providers utilize proprietary software primarily designed for financial billing. While the system has made efforts at collecting, analyzing, and reporting on data that is critical to analyzing system performance, in many cases the system was not capable of producing complete data for sound analysis. For example, ESCI attempted to evaluate response performance (one of the most basic indicators of quality) in the system. Performance data was difficult to discern from current information systems.
- ✓ **Observation**. Response time reports are not evaluated system-wide. Duplication of responses by first responding agencies to parts of the service area complicates the accurate analysis of demand and resource requirements because of the way that dispatch records are kept.
- ✓ **Observation**. Customer service reports which will help design the future of the system are not readily available. When the data is available, it is reviewed on an agency basis rather than on a system-wide basis.

System Financing

Long-term survival of an EMS system requires that the system be adequately funded. A poorly funded system will result in lower capital investment, deferred maintenance, and ultimately lower service levels. Unfortunately, once service levels begin to degrade, it is both difficult and expensive to make the improvements necessary to make the system meet an appropriate standard.

There are three principal sources of revenue that support the delivery of advanced life support and treatment services for the citizens of Skagit County. These sources include local tax support through the EMS tax levy; revenue generated by the provider of ambulance transport services through user fees (ambulance transport fees); and support provided by local government agencies either directly or indirectly through the utilization of facilities and equipment, principally within the respective fire districts. In Anacortes, additional revenue is provided through general fund transfers, a share of the sales tax, and allocations of the property tax. Each of these component elements contributes to the financial support for the delivery of services and each of these funding mechanisms are subject to both internal and external influences in their ability to generate sufficient revenue to support operations.

Adequate EMS system funding is highly dependent on an effective and efficient billing system in order to maximize revenues generated by patient transport fees, controlling operational costs and the amount of revenue available in the form of tax subsidies. An in-depth analysis of the processes and procedures used in the billing and collection function was beyond the scope of this study. However, it is clear, based on our analysis of patient transport data, the current billing process appears to be effective in collecting patient revenues given the demographic composition of the community and the utilization of ambulance services within the community.

✓ **Observation**. Each agency maintains independent billing systems. While two of the agencies use the same vendor, there is no systematic process in place to allow system-wide financial review of the revenues generated by patient transports or how those revenues compare amongst the various provider agencies. Furthermore, in the absence of accurate financial reporting, the SCEMSC is limited in its ability to determine the appropriate distribution of levy and revenue for system improvements.

Analyzing transport system revenues typically involves identifying transport information, receiving payer source information, understanding the accounts receivable turnover rate (lag times between when the service was provided and when the payment was received) degree of contractual allowance (difference between the invoice and the payment from a capitated[28] payer source such as Medicare), and other financial/operational ratios.

✓ **Observation**. Due to the independence of the agencies in maintaining their own billing systems, there is limited data that reflects uniformity with respect to the billing process. It is unclear if the agencies have the authority or capability to negotiate special pricing or contracts with payors.

It is important that system participants understand the level to which subsidies exist in the system, the potential for cost shifting in the system, and the likelihood that system participants can fund long-term system goals. Ideally, an EMS system will identify its subsidies and take steps to ensure that a long-term plan exists so that changes in system financing will not degrade services provided to consumers.

✓ **Observation**. There does not appear to be a structured method for determining the cost of transport units that are subsidized by the EMS levy or the level of revenue needed to ensure a fair and equitable distribution to all system participants.

Service Levels

The following service level assumptions provide the background for the revenue projections that follow. Transport service level distribution is generally considered the percentage of revenues generated by the various service levels provided by the transport agency. The ability to accurately capture service levels is important recognizing that the Centers for Medicare Services requires all providers to submit charges based on level of service provided. These assumptions are derived from information provided by the participant agencies' billing systems to the extent the systems were able to generate the requested data. The table below describes how the annual emergency service requests are distributed among the three primary providers of ambulance service in Skagit County.

[28] Capitated – a term used in the industry to denote a cap that is placed on the amount that an entity will reimburse to a provider of services. Medicare is an example of a payment source that reimburses based on a pre-determined fee schedule irrespective of the total invoice amount.

Figure 7: EMS System Ambulance Call Volume, 2011

	CVAA	Anacortes FD	Aero-Skagit
Total Call Volume	9,044	2,362	663
Non-Transports	2,524	709	284
Transports by Type		1,653	
BLS Non-Emergency	1,080	0	0
BLS Emergency	1,362	319	113
ALS Non-Emergency	369	0	0
ALS 1	3,740	1,334	266
ALS 2	281	0	0
Critical Care	30	0	0
Mileage	58,333	13,214	4,417
Total Transports	**6,520**	**1,653**	**379**

The transport volume of approximately 8,552 patients per year is higher than what we would expect with a population base of 116,000 in the Skagit County EMS system.[29] We attribute this above average transport volume to both the high transient population, as well as the high utilization ratio of Medicare patient transports as reflected in annual billings.

Concentration Ratio for EMS Units

A significant cost factor in EMS systems is the total number of resources committed to providing the established service level. Unlike many production or service industries, EMS is unique in that it is impossible to predict with a high degree of accuracy when the next request for service will occur, at what time, or the amount of resources necessary to resolve the request. To accommodate for this level of uncertainty, additional capacity is required to create a constant state of readiness. However, too much excess capacity leads to higher system costs, while inadequate capacity may result in significant delays in service delivery.

Achieving the correct balance is one factor that dictates constant evaluation of system demands and resource utilization. While the total number of system transports can be fairly accurately predicted, the distribution of those transports is notable.

Figure 8: EMS System Ambulance Fleet

CVAA[30]	Anacortes Fire Department	Aero-Skagit
Ambulance (Med 1)	ALS Ambulance	ALS Ambulance
Ambulance (Med 2)	ALS Ambulance	ALS/BLS Ambulance

[29] A long-standing measure of EMS systems is approximately one transport per day for each 10,000 residents. This estimate is highly variable and is dependent on transportation routes, non-resident populations, income levels, insurance market penetration rates, employment, and other demographic factors. With a population of 110,000, we would expect slightly more than 4,000 transports per year. Washington DOT reports that approximately 40,000 vehicles travel into or through Skagit County each day.

[30] Not every ambulance is available to respond immediately as a "ready reserve" vehicle, especially CVAA vehicles.

Ambulance (Med 3)	ALS Ambulance	Reserve Ambulance
Ambulance (Med 4)	Reserve Ambulance	
Reserve Ambulance		
Reserve Ambulance		
Reserve Ambulance		
Reserve Ambulance		

In addition to the resources maintained by the transport provider agencies, the SCEMS also monitors a fleet of BLS ambulances known as Aid Vehicles throughout the system's service area.

Figure 9: Aid Vehicle Locations

Agency	Location
Hamilton Fire Department	Hamilton
LaConner Fire Department	LaConner
Mount Vernon Fire Department	Mount Vernon[31]
Sedro Woolley Fire Department	Sedro Woolley
Skagit County Fire District #1	Mount Vernon
Skagit County Fire District #2	McLean Rd.
Skagit County Fire District #3	Cedardale/Conway
Skagit County Fire District #4	Clear Lake
Skagit County Fire District #5	Edison/Allen/Samish
Skagit County Fire District #6	Burlington Surrounding City Limits
Skagit County Fire District #7	Lake Cavanaugh
Skagit County Fire District #8	North and East of City of Sedro Woolley
Skagit County Fire District #9	Big Lake
Skagit County Fire District #10	Grassmere/Birdsview
Skagit County Fire District #11	Mount Erie
Skagit County Fire District #12	Bayview
Skagit County Fire District #13	Summit Park/Hope Island
Skagit County Fire District #15	Lake McMurray
Skagit County Fire District #16	Day Creek
Skagit County Fire District #17	Guemes Island
Skagit County Fire District #19	Rockport/Marblemount

Ambulance Rates

Skagit County has established a fee schedule for patient transport services recognizing that individuals within the community contribute to the EMS System through the EMS Tax Levy. Contract transport

[31] The aid vehicles located in MVFD and SCFD1 stations were not the result of SCEMS contributions; rather they were purchased by and are maintained by the city.

agencies receiving levy support generally adhere to the transport fee schedule[32] to ensure equity throughout Skagit County in the pricing of the transport component.

Figure 10: Ambulance Fee Schedule – Skagit County EMS System

Service	Fee
BLS Non-Emergent	$425.00
BLS Emergency	$590.00
ALS 1 - Emergency	$770.00
ALS 2 - Emergency	$775.00
Specialty Care	$820.00
Mileage	$15.00 per mile

The City of Anacortes' fee schedule for ambulance transport services differs from the schedule established by the Skagit County Board of Commissioners. According to the Fire Department's 2011 Annual Report, "The rate for an ambulance charge is based on a regional comparison and agreed to by the Mayor in coordination with Island Community Hospital."[33] Aero-Skagit also uses a slightly different fee schedule that lists fees for multiple patient transports.

✓ **Observation**. The current pricing schedule appears to be consistent with regional rate schedules for EMS services.

Figure 11: Ambulance Fee Schedule - City of Anacortes

Service	Fee
BLS - Emergency	$535.00
ALS 1 - Emergency	$650.00
ALS 2 - Emergency	$828.00
Mileage	$15.00 per mile

Based on the current call volume of 1,653 patient transports in which 19 percent are BLS-Emergency and 81 percent consist of Advanced Life Support Level 1 transports, the City of Anacortes has lower gross billings of approximately $177,625.00 than other providers in the system would have with an equal volume of transport.

✓ **Observation**. The system does not have a provision for increasing user fees without requesting authorization for an increase from the Skagit County Board of Commissioners. This creates delays when market forces or other factors suggest that a rate increase may be warranted.

Transport Service Revenue

The EMS industry is subject to the same financial pressures faced by other healthcare providers, including a capitated payment structure by the Centers for Medicare Services (generally referred to as uncompensated care), bad debt which is generally associated with private payers, and contractual

[32] Anacortes uses a different fee schedule.
[33] Anacortes FD 2011 Annual Report.

allowances wherein ambulance services provide a discount to parties with whom they contract for transport services. The City of Anacortes Fire Department, through its billing arrangement, provides discounts to insurance companies for patient transports. According to Island Hospital billing personnel, the hospital provides ambulance contractual discounts to specified insurance carriers that can range from 15-35 percent of gross charges. Neither CVAA nor Aero-Skagit provides discounts to insurance firms.

Total revenue estimates from patient transports are constrained by certain assumptions. We assume that these transports represent all available emergency 911 transports in the market, and we also assume that ambulance transportation is the only product provided by the transport providers through which revenues are generated.

Figure 12: Gross Transport Billings, 2011

	CVAA	Anacortes FD	Aero-Skagit
BLS Non-Emergent	$459,000	$-	$-
BLS Emergency	$803,580	$212,395	$118,000
ALS Non-Emergent	$284,130	$-	$-
ALS 1	$2,879,800	$812,500	$123,200
ALS 2	$217,775	$25,668[34]	$-
Critical Care	$24,600	$-	$-
Mileage	$874,995	$198,210	$175,485
Other			$839
Gross Revenue	**$5,543,880**	**$1,248,773**	**$428,024**

Cumulatively, the three transport providers generated approximately $7,205,968 in annual gross billings in 2011.

[34] ESCI recognizes that the information included in Figure 7 shows no ALS 2 transports for Anacortes Fire. Anacortes reported no ALS 2 transports, however, ALS 2 revenue was reported by Island Hospital. We will reconcile this information as more complete data becomes available.

Figure 13: Net Transport Revenues, 2011

	CVAA	Anacortes FD	Aero-Skagit
BLS Non-Emergent	$226,389	$-	$-
BLS Emergency	$396,824	$112,868	$77,226
ALS Non-Emergent	$140,269	$-	$-
ALS 1	$1,430,929	$471,994	$100,185
ALS 2	$113,754	$10,706	$-
Critical Care	$12,589	$-	$-
Mileage	$435,305	$85,653	$31,308
Net Revenue	**$2,756,059**	**$681,221**	**$208,719**

Other factors that can dramatically influence net revenue include a community's demographic profile. For example, communities with a proportionately high number of retirees who are dependent upon Medicare as their principal payer for healthcare. In reviewing billing data from the three transport providers, Medicare and Medicaid reimbursement and billing account for a substantial portion of total revenue.

✓ **Observation**. The various billing systems utilized by the transport providers do not provide uniform financial data from which accurate financial support decisions can be made. One example is the ability to capture specific elements (payor source) of patient transportation distribution by level of service. This limitation impairs the ability of the SCEMSC system to project revenue, identify revenue trends, and conduct accurate analysis of revenues to support the EMS system. Furthermore, it is difficult to establish trend lines and revenue contribution ratios. This capability becomes more important when demographic changes within the community such as increases in the Medicare population (a capitated payor) can adversely affect revenue generation thereby making it difficult to project pricing and/or service level modifications from a fiscal perspective.

Figure 14: Payor Mix, 2011

Payor	CVAA	Anacortes FD	Aero-Skagit
Medicare	58.16%	61.31%	40.29%
Medicaid	15.21%	9.44%	29.11%
Insurance	20.40%	23.32%	21.43%
Private Pay	6.23%	5.93%	9.17%

Approximately 70 percent of all patient transport billings are to payors who have capped their payments. The overall payer mix between the three providers is fairly consistent. The net result of the system having to be dependent upon capitated payers to fund patient transport activities is a collection ratio below what one would normally expect to find in similarly sized systems.

✓ **Observation**. The system is not capable of generating valid, reliable call volume data nor does it have the ability to verify data for analysis efforts. Significant variations were found in individual agency data and system data. However, we note that during the course of this study, the EMS system participants are making strides in ensuring that these data can be verified.

✓ **Observation**. The inability of the system to verify call data with agency data creates the potential for transports not being entered into the system and subsequently not billed, resulting in loss of revenue.

It is readily evident that the Skagit County EMS system can anticipate a high dependence on revenues from capitated sources which will continue to be adversely affected by the baby boomer generation, "On January 1, 2011, the oldest baby boomers will turn age 65. Every day for the next 19 years, about 10,000 more will cross that threshold."[35]

Billing data and net revenues received from patient transport reflect a fairly homogenous demographic profile between the three ambulance providers. As previously indicated, the majority of transports in the system consist of Medicare and Medicaid patients. Approximately 53% of total net revenue received was reflective of Medicare reimbursements and an additional 27% of net revenues represented Medicaid reimbursement for patient transports. Collectively these two payor sources represent approximately 80% of the net transport revenue available to support the ESM transport system. The high degree of transport utilization and net revenue from Medicare and Medicaid results in significant dependence on the EMS levy to support the EMS transport system.

Island Hospital, the billing agency for the Anacortes Fire Department charges third party insurance on a contractual basis for patient transports unlike the other providers in the system that do not have contracts with insurance providers. It is not atypical for transport agencies to have contractual relationships in which the transport fee is negotiated by contract. However, these types of contracts are generally limited to the non-emergency transport market rather than providers who have 911 emergency call responsibilities. Discounts vary by contract and carrier and may range from 15-35 percent of the average bill.

Figure 15: Net Collection Ratio – All Payors, 2011

CVAA	Anacortes FD	Aero-Skagit
49.75%	55.00%	48.76%

Figure 16: Net Collection Ratio by Payor, 2011

Payor	CVAA	Anacortes FD	Aero-Skagit
Medicare	47.23%	59.97%	52.12%
Medicaid	24.37%	25.11%	31.87%
Insurance	83.60%	67.64%	64.14%
Private Pay	19.06%	4.87%	51.69%

Figure 17: Gross Billables by Payor, 2011

Payor	CVAA	Anacortes FD	Aero-Skagit
Medicare	$3,243,963	$756,614	$172,457
Medicaid	$848,599	$116,502	$124,586
Insurance	$1,137,912	$287,813	$91,730
Private Pay	$347,239	$73,144	$39,251
Gross Billings	**$5,577,713**	**$1,234,073**	**$428,024**

[35] Pew Research Center. *Survey Findings about America's Largest Generation*, D'Vera Cohn and Paul Taylor. December 2010.

Figure 18: Net Revenue by Payor, 2011

Payor	CVAA	Anacortes FD	Aero-Skagit
Medicare	$1,532,030	$453,735	$89,884
Medicaid	$206,770	$29,250	$39,711
Insurance	$951,277	$ 194,676	$58,835
Private Pay	$66,167	$3,560	$20,289
Net Revenue	**$2,756,244**	**$681,221**	**$208,719**

Total net revenue to help support the EMS transport system is approximately $3,646,184 reflecting a composite collection rate of 50 percent.

- ✓ **Observation.** The system does not have contractual requirements with transport providers for adherence to an established fee schedule or the ability of the providers to enter into contractual billing arrangements resulting in discounted fees for service.

- ✓ **Observation**. The lack of uniformity in financial reporting contributes to discrepancies between actual and reported transport revenues. Additionally, the inability to determine cash receipts by call type is problematic.

Not every call to which the agencies respond results in a transport. One measure of the function of the EMS system is the ratio of responses to transports. The transport ratio (percent of patients who are transported divided by the total number of responses) is approximately 63 percent, which is consistent with industry norms for emergency response transport providers. This value should be monitored regularly since a high transport ratio may mean that system resources are being used unnecessarily, while a low transport ratio may mean that providers are failing to transport patients when appropriate. Responses to a high number of traffic incidents will typically lower the transport ratio because calls are made to 9-1-1 after motor vehicle crashes, often without knowing the condition of the patient.

It should be noted that the call volume information was acquired through multiple sources. No single data set to reflect system-wide responses was available. Therefore, unlike patient transport data generated from the billing system, we can only rely on the information provided to represent the number of total EMS responses in the system.

Tax Levy

Within the State of Washington, counties are authorized under state statute RCW 84.52.069[36] to request from voters the authority to levy an additional property tax of up to $0.50 per $1,000 TAV to support emergency medical services programs. The levy presented to the voters can be imposed for six years, ten years, or permanently. Skagit County has traditionally relied on a six-year levy period with reauthorization of the levy through a voter referendum.

[36] RCW 84.52.069 – Emergency Medical Care and Service Levies.

Figure 19: EMS Tax Levy, 2007 - 2012

Year	Property Valuation	Levy Rate	Total Taxes
2007	$13,989,293,650	0.250	$3,497,323
2008	$16,148,479,615	0.229	$3,698,118
2009	$16,846,530,892	0.227	$3,829,366
2010	$15,969,744,068	0.246	$3,929,323
2011	$15,192,573,631	0.250	$3,798,245
2012	$14,476,397,872	0.250	$3,619,099

In 2012, Skagit County voters approved a levy increase to help support the EMS System and maintain historic service levels. The approved levy rate of $0.375 per $1,000 TAV was not designed to make substantial changes to the system or the manner in which it is principally financed. However, it is clear that the levy rate will continue to be a major source of revenue to support emergency medical services. It is anticipated that levy will provide the following revenue stream to support the EMS System:

Figure 20: EMS Levy Revenue Forecast, 2013 - 2017[37]

Year	Property Valuation	Total Taxes
2013	$14,042,105,396	$5,265,790
2014	$13,620,842,758	$5,107,816
2015	$14,029,468,041	$5,158,894
2016	$14,310,057,402	$5,210,483
2017	$14,596,258,550	$5,262,588
2018	$14,888,183,721	$5,315,214

✓ **Observation**. The system relies on a property tax levy to support the delivery of EMS. It appears that the reimbursement for system participants has historically been limited to patient transport providers.

The levy rate functions to provide for the following:

- Transport provider subsidy to maintain an effective EMS transport system.
- Capital investment needed to maintain a front-line fleet of ambulances.
- Replace outdated and technologically obsolete cardiac monitors.
- Assist first responder agencies with financial support to provide back-up capacity during periods of peak demand on the system.
- Provide administrative support in the management of the EMS System.
- Allow for essential technology that will improve data collection and response capability.

[37] ESCI's 2012 Levy Analysis Report reflects a declining property value through 2014 with increases expected from 2015 through 2018.

- Funding to assist the EMS System Medical Director to provide the services needed to meet the expected quality performance measures consistent with industry norms.

The following chart reflects the revenue contribution of the various municipalities and unincorporated Skagit County with respect to the special district levy.

Figure 21: Levy Revenue by Tax District, 2012

Tax District	Population	2012 Taxable Value	Revenue
City of Anacortes	15,860	$2,545,635,473	$636,408.87
City of Burlington	8,420	$1,182,072,646	$295,518.16
City of Concrete	710	$57,509,516	$14,377.38
City of Hamilton	300	$28,339,978	$7,084.99
City of LaConner	885	$139,264,787	$34,816.20
City of Lyman	440	$29,083,043	$7,270.76
City of Mount Vernon	31,940	$2,485,713,804	$621,428.45
City of Sedro Woolley	10,590	$724,366,210	$181,091.55
Unincorporated Skagit County	41,964	$7,284,412,415	$1,821,103.10
Total	**111,109**	**$14,476,397,872**	**$3,619,099.47**

Source: Skagit County Tax Assessor

✓ **Observation**. Property values have no direct relationship to the cost of EMS services, unlike fire services where type and value of development can be a significant factor in the cost of fire protection services. Property values as a measure for reimbursement can distort revenue distribution to areas that have significant commercial or industrial development.

✓ **Observation**. Reliance on property values to provide reimbursement to system participants negates the equity principle of services provided to citizens. Services provided by local governments, including EMS, recognize that revenues to support governmental services are distributed based on demand and community needs, not principally on the value of properties within the service area.

It should be noted that these values are 2012 projections, which reflect the previous levy rate of $0.250 per $1,000 TAV.

The EMS Commission utilizes other sources of revenue including grants and timber tax proceeds to support the EMS System. The transport provider subsidy is annually determined based upon request from the individual agencies and the capacity of the levy to fund subsidy requests. The subsidy level contractually agreed to by the individual agencies has been held constant for the past two years at the following levels:

Figure 22: Transport Provider Subsidy, 2012

CVAA	Anacortes FD	Aero-Skagit
$1,417,350	$715,478	$525,294

System Expenditures

The amount of resources dedicated to patient transport services is defined through contract between the SCEMSC and the transport provider agencies, including required staffing and certification levels of personnel assigned to ambulances. Contractually the provider agencies are committed to provide the following:

- Meet established response time standards
- Provide transport services 24/7
- Provide minimum staffing of 1 Paramedic and 1 Basic EMT as required under WAC 246-976
- Maintain liability insurance
- Complete SCEMSC approved patient care record
- Provide access to financial records and operational reports
- Respond to all incidents dispatched by the dispatch agency

✓ **Observation.** The lack of performance requirements other than merely response time is a concern. There are no quality requirements, no customer service requirements; no fatigue limitations, and no other beneficial outputs.

Figure 23: Provider Contracts - Required Ambulances

CVAA	Anacortes FD	Aero-Skagit
4	2	1

CVAA uses all ALS personnel in staffing its ambulances. Anacortes typically operates with all paramedics, but may also use one paramedic and one EMT to staff its ambulances. Aero-Skagit employs one Paramedic and two EMTs for its contracted ambulance.

✓ **Observation**. With the exception of Aero-Skagit, Anacortes and CVAA rely on a staffing model consisting of two Paramedics. We believe that this approach creates additional expense for the system without any scientific basis that demonstrates this model results in improved patient outcomes versus a one Paramedic, one EMT staffing configuration.

Because ambulance providers make use of emergency medical resources to provide other services, cost shifting can occur. Generally, this occurs when the tax revenue is utilized to cover costs not related to the direct provision of EMS services. It is inherently recognized that the fire department utilizes cross-trained personnel to deliver fire protection and emergency medical services and that at times ambulance personnel may be conducting fire suppression activities.

Currently, the EMS levy and patient transport revenues fund approximately 65 percent of Anacortes Fire Department expenditures. System participants believe that the majority of operational expenses are borne by the provision of EMS, yet the organization is not capable of responding to suppression incidents without negating their EMS response requirements.

In 2001, the Centers for Medicare Services contracted with Project Hope to conduct an analysis of average costs for EMS systems.[38] Based on their findings and other similar studies, the single variable that influences average costs the most is transport volume. This inverse relationship, increased volume = lower average costs, recognizes that with low transport volumes, average cost is higher since capacity is not fully utilized and the same fixed costs have to be borne by fewer transports. On the other hand, average costs decrease as transport volumes increase given that fixed costs are spread over higher volumes.

Concerns have been expressed that the in-kind support provided by the various non-transport fire agencies are not being appropriately compensated recognizing that the provision of ALS and BLS response capability by those agencies assist in reducing excess capacity requirements of the transport providers.

Agency Budgets

The EMS Commission expends $2,658,121 annually on provider contracts or approximately 64 percent of the EMS tax levy in direct support of agencies providing ambulance transport services. The balance of funding is dedicated to administrative support services, medical direction, training programs, capital equipment, communication services, and first responder support. Aero-Skagit receives a 30 percent increase over the rate provided to other agencies for support of its one contracted ambulance. The additional levy revenue reflects the fact that the agency is a low volume provider yet has the largest response area within Skagit County, encompassing approximately 1,000 square miles

Figure 24: SCEMS Commission Budget, 2010-2012

Line Item	2010	2011	2012
Training	$382,042	$405,964	$410,115
Administration	$3,819,892	$3,745,282	$3,403,039
Total Budget	**$4,201,934**	**$4,151,246**	**$3,813,154**

It should be noted that the 2012 budget included a four percent adjustment in provider reimbursement; however, that has not been implemented at this juncture. Aero-Skagit is incorporated as a 501(C)(3) business enterprise. Approximately 74 percent of its 2011 budget was supported by the EMS tax levy.

[38] Project Hope, an independent consulting firm specializing in medical economics, conducted a national study of EMS cost as a basis for the development of the National Ambulance Fee Schedule for the Centers for Medicare Services.

Figure 25: Aero-Skagit Budget, 2011

Income	
EMS Levy	$567,385
Transport Fees	$202,637
Total Income	$770,022
Expense	
Salaries and Benefits	$577,532
Operating Expense	$73,401
Repair and Maintenance	$33,432
Utility Expenses	$15,570
Other Expense	$2,724
Total Expenses	$702,659
Net Profit from Operations	**$67,363**

The City of Anacortes FD budget reflects that approximately 65 percent of the total fire department budget, including fire protection expenditures, is funded through the EMS Tax Levy, patient transport revenues, General Fund revenue support, standby fees and a State EMS Grant. The tax levy alone supports approximately 32 percent of the fire department's EMS budget.

Figure 26: Anacortes FD Ambulance Service Budget, 2011

Revenue	
EMS Levy	$715,498
Transport Fees	$682,348
Standby Fees	$16,800
Property Tax	$306,538
Sales Tax	$391,826
Grants	$1,738
General Fund	$145,000
Total Revenue	**$2,259,748**
Expense	
Salaries and Benefits	$2,063,364
Operating Expense	$187,465
Total Expenses	**$2,250,829**
Revenue over Expense	**$8,919**

Approximately 36 percent of the Central Valley Ambulance Authority budget consists of tax levy support. The budget does not reflect revenues or expenses from non-emergent operations which were discontinued at the end of 2011 due to budget constraints. In addition, the expense related to the position of Manager was not reflected in the expenditures due to the vacancy of the position.

Figure 27: Central Valley Ambulance Authority Budget, 2011

Income	
EMS Levy	$1,417,349
Transport Fees	$2,498,683
Total Income	**$3,916,032**
Expense	
Salaries and Benefits	$3,218,489
Operating Expense	$312,631
Supplies	$147,127
Taxes	$22,589
Total Expenses	**$3,700,836**
Net Income from Operations	**$215,196**

Various participants within the system have expressed concerns that the current distribution of tax levy revenue is not appropriately reimbursing the agencies that respond to EMS calls. The City of Anacortes is concerned that the City's General Fund has to support the EMS System within the City at an ever growing rate. The City of Sedro-Woolley expressed concern regarding the availability of units within the corporate limits as well as limited funding for the fire department's EMS response capability. Similarly, the City of Mount Vernon, which provides ALS response and surge capacity, is not being reimbursed for its role.

The current contracted reimbursement is predicated to some extent on the original levy, which stipulated that the revenues were designated to support the delivery of Advanced Life Support Services. The rate of reimbursement to transport provider agencies has steadily increased primarily due to a pre-set annual 4 percent increases.

CVAA and (usually) Anacortes FD staff their units with two Paramedics as opposed to what is generally the national norm—one Paramedic and one EMT. Contractually the transport providers are not required to staff their units with two Paramedics.

Figure 28: Performance Measures, 2011

Performance Measures	CVAA	Anacortes FD	Aero-Skagit
Operations			
Number of Transport Units (Front-line 24/7)	4	2[39]	1
Staffing Per Unit	2	2	2
Total Unit Hours Contracted Annually	34,944	17,472	8,736
Number of Daily Transports	17.86	4.53	1.04

[39] While we note that the city actually deploys 2.5 units; however, the city's decision to add additional capacity is not part of the contract and does not reflect the current staffing capability of the city. A staffed 24-hour unit requires 8.5 FTEs. The City has a total staff of 23 with one operational position not filled in 2011 due to budget concerns. According to the City's budget document it appears that the fire budget accounts for a minimum of 6 positions. That leaves 17 positions in the EMS budget consistent with the staffing requirements to staff 2 full-time units.

Performance Measures	CVAA	Anacortes FD	Aero-Skagit
Transports vs. Non-Transports	72%	70%	57%
Transport System Capacity Utilization (UHU)	19%	9%	9%
Average Miles per Transport	8.95	7.99	30.87
Financial			
Average Cost Per Transport Unit	$925,209	$1,125,415	$702,659
Gross Revenue Per Transport	$850	$747	$1,129
Net Revenue Per Transport	$423	$412	$551
Average Cost Per Transport	$568	$1,362	$1,854
Average Subsidy Per Transport	$145	$950	$ 1,306
Collection Rate	49%	55%	49%
Labor Cost Per Unit Hour	$92	$ 118	$66
Operating Cost Per Unit Hour	$14	$11	$14
Total Operating Cost Per Unit Hour	$106	$129	$80

✓ **Observation**. The transport volume from a system perspective is higher than industry standards. We attribute this difference to a higher than average Medicare population.

✓ **Observation**. The participating providers are not engaged in providing scheduled non-emergency patient transports or BLS inter-facility transfers. The system should review the loss of potential revenue associated with these transports and the opportunities to improve total system revenue with existing transport resources.

✓ **Observation**. Unit call volume distribution reflects what one would expect, recognizing the more densely populated cities of Mount Vernon and Anacortes having the highest response volume in the system, followed by the unincorporated areas of the county.

✓ **Observation**. The system has a sufficient number of transport capable units in the current system and for the foreseeable future given the size of the service area and geographic features. Unit hour utilization rates are significantly below national norms for the various provider profiles with the exception of Aero-Skagit given its low call volume and large response area.

✓ **Observation**. The average cost per patient transport reflects the low utilization rates of existing transport resources in both the Anacortes and Aero-Skagit service areas.

✓ **Observation**. Taxpayers throughout the system support the delivery of services through the EMS tax levy. In light of this financial support, cost for EMS services to individual citizens should be equitable throughout the service area.

✓ **Observation**. There does not appear to be an underlying basis for the 4 percent annual contract increases funded by the tax levy.

✓ **Observation**. The approach to providing support to transport providers utilizing tax levy revenues has historically served the system well. Concerns that each jurisdiction should receive financial support at least equal to the amount of tax levy revenues generated within the jurisdictions should not be a basis for providing financial support.

✓ **Observation**. Equitable distribution of tax revenues throughout the service area ensures that all citizens have access to the EMS system. Distribution equity is recognized through the service level being provided. Sparsely populated areas of the community that contribute less in property tax

revenues than suburban or urban areas will generally have lower performance expectations of the participants.

Staffing and Personnel Management

Regardless of how physical resources are deployed, without sufficient human resources to staff those field units, no system can function effectively. Nor is simply providing adequate numbers of personnel enough to ensure the system is functioning as intended. Other aspects of the human resources function are also important, such as ensuring minimum standards of qualification and credentialing, sufficient and relevant training and educational programs, and safety and wellness of personnel.

Adequacy of Personnel

Personnel adequacy to meet the needs of the system is independently determined by the provider agencies. Contract requirements stipulate the minimum level and certification of personnel to be provided by the transport agencies. No system is currently in place to determine the minimum or optimum number of personnel to provide for an effective and efficient response system, nor is any system in place to determine the optimum qualifications of personnel. The current system structure includes two paramedics assigned to each ambulance in the central valley, with no requirements for first response personnel. The Medical Director conducts periodic reviews of personnel within the system including direct observation with patient care encounters.

The EMS Commission has no standard to assess adequacy of commission personnel. Minimum standards have been defined for field personnel and are predicated upon Washington Administrative Code, more specifically:

- WAC 246-976-021 (Training Course Requirements)
- WAC 246-976-031 (EMS Instructor)
- WAC 246-976-041 (Applicant Requirements)
- WAC 246-976-141 (EMS Provider Certification)
- WAC 246-976-151 (Reciprocity)
- WAC 246-976-161 (EMS Continuing Education Requirements)
- WAC 246-976-171 (EMS Recertification Requirements)

System Training Programs

An EMS system should have a comprehensive training program in place to deliver relevant information to system personnel. Training programs should be such that varying levels of licensure and experience each receive information pertinent to their skill and knowledge level. In addition, training opportunities should be scheduled such that all personnel have an equal opportunity to attend those sessions without placing an undue burden on either the system or the individual.

The SCEMSC is charged with providing pre-hospital training to system participants and to the public. Training provided includes EMT-Basic, BCLS (Basic Cardiac Life Support - CPR), and Automatic External Defibrillator training. Specific Advanced Life Support courses such as ACLS (Advanced Cardiac Life Support) and Pediatric Advanced Life Support (PALS) are provided to paramedics operating in the system. In addition to SCEMSC training support, responder agencies have internal training programs for staff.

Training courses are provided at various times and locations to support shift and personnel schedules including volunteer agencies in the system. All training courses utilize criteria consistent with state WAC 246-976-021 (Training Course Requirements) and national standards.

Training instructors are required to meet state guidelines as defined in WAC 246-976-031 (EMS Instructor).

Individuals participating in training courses that fall within the scope of certification requirements must meet the standards identified in WAC 246-976-041 (Applicant Requirements).

Staffing Resources

Based on current needs there appear to be a sufficient number of personnel operating within the system at the various provider certification levels. Personnel operating in the system reflect both career (paid) as well as volunteers. The table below details the number and qualifications of personnel operating in the existing EMS system. From the table, there are 75 Paramedics within the system, along with 368 basic EMTs. Some of the paramedics and EMTs are firefighters and serve multiple roles while others are single duty EMS personnel.

Figure 29: EMS System Personnel

Agency	EMTs	Paramedics	FFs	Status
Skagit County Fire District 1	0	0	0	P
McLean Road Fire	11	0	24	V
Skagit County Fire District 3	16	0	37	V
Skagit County Fire District 4	6	0	21	V
Skagit County Fire District 5	14	0	25	V
Skagit County Fire District 6	14	0	1	V
Skagit County Fire District 7	6	0	14	V
Skagit County Fire District 8	26	0	14	PC/V
Skagit County Fire District 9	9	0	23	V
Skagit County Fire District 10	10	0	10	V
Skagit County Fire District 11	15	0	6	V
Skagit County Fire District 12	6	0	19	V
Skagit County Fire District 13	16	0	15	PC/V
Skagit County Fire District 14	8	0	17	V
Skagit County Fire District 15	6	0	14	V
Skagit County Fire District 16	7	0	10	V
Skagit County Fire District 17	10	0	5	V
Shell Refinery	26	0	0	P
Anacortes FD	7	20	0	P/V
Burlington FD	29	0	1	PC/V
Hamilton FD	2	0	15	V
LaConner FD	4	0	8	PC/V
Mt. Vernon FD	28	7	0	P
Sedro Woolley FD	28	0	8	PC/V
Aero-Skagit	13	19	0	P/V
Island Hospital	7	0	0	P
Skagit SAR	24	0	0	V
Central Skagit Medic One	0	34	0	P
Total	**348**	**80**	**287**	

P= Paid, PC= Paid Chief, V= Volunteer

Safety

Employee safety plans are the responsibility of the individual agencies that participate in the system. Periodically providers will make recommendations to the SCEMSC for specific types of equipment to improve patient and provider safety (i.e., bariatric units and electric/hydraulic gurneys). Individual agencies may at times request that the EMS Commission provide financial assistance to improve safety for crews and patients. The fire chiefs have in place a critical incident stress management (CISM) program that is available to all personnel in the system.

Collective Bargaining

Employees in the larger paid agencies in the EMS system are represented by labor agreements, each of which are associated with the International Association of Fire Fighters (IAFF). The following table describes the labor agreements that are currently in place.

Agency	Labor Unit	Term of Agreement	Expires
Anacortes Fire Department	IAFF Local 1537	Three Years	2014
Burlington Fire Department	IAFF Local 4111	Two Years	2012
Mount Vernon Fire Department	IAFF Local 1983	Two Years	2012
Central Valley Ambulance Authority	IAFF Local 3427	One Year	2012

During ESCI's initial evaluation, it was reported that there have been issues between some of the labor units, notably between CVAA and Mount Vernon. CVAA's labor unit is aggressively defending its right to be the sole provider of ALS ambulance service in the system,[40] apparently concerned about Mount Vernon's positioning to provide a more expansive scope of service in the system.

Facilities and Equipment

Analyzing an EMS system requires an evaluation of EMS equipment and facilities to ensure that they are appropriate and that they serve the function for which they are intended. Generally, the system components should work together so that when equipment is needed during an emergency, it functions appropriately and operates as it was designed. Personnel must be trained on the effective use of the equipment. Coordination of facility locations so as to minimize response times and maximize coverage levels is ideal.

ESCI conducted a limited evaluation of equipment and facilities that operate within the SCEMS system. That evaluation focused on the oversight provided in the area and by the system's ability to develop appropriate facility, equipment, and maintenance standards. Facilities and equipment were scrutinized only in general terms such that the agency's programs for facilities and equipment were evaluated, rather than a physical inspection of the facilities and equipment themselves.

Vehicles

The State of Washington has an established equipment and inventory requirement for all units licensed through the State Department of Health. However, there are no specific standards that have been promulgated for first response apparatus. Licensure and vehicle compliance requirements are stipulated in the contracts between SCEMSC and the transport providers. All agencies in the system are appropriately licensed through the State of Washington.

The three transport provider agencies maintain 15 transport-capable units (both frontline and reserve units that can be placed into service). There is no single standard in place to determine the appropriate number of reserve apparatus that should be maintained by the individual agencies. In addition to the

[40] Although we heard reports of this process, ESCI was not able to obtain documented evidence of this process.

transport providers, BLS aid vehicles (ambulances which have been taken out of service as reserves) are maintained by the various fire districts within the County.

Figure 30: Ambulance Fleet by Provider

	Unit	Model	Year	Mileage
Anacortes FD				
ALS Ambulance	Medic 14	International (4400)	2007	44,631
ALS Ambulance	Medic 2	International (4400)	2004	123,152
ALS Ambulance	Medic 16	International (4400)	2002	127,084
Reserve Ambulance	Medic 18	Ford E350	1995	109,997
Aero-Skagit				
ALS Ambulance	Med 7	Ford E450	2006	102,550
ALS/BLS Ambulance	Aid 10	Ford E450	2001	167,712
Reserve Ambulance	Aid 10	Ford E350	1996	122,273
CVAA				
Ambulance (Med 1)	21	E450	2011	28,722
Ambulance (Med 2)	18	E450	2008	124,287
Ambulance (Med 3)	17	E450	2008	59,166
Ambulance (Med 4)	20	E450	2009	28,255
Reserve Ambulance	16	F450	2006	111,719
Reserve Ambulance	12	E450	2005	211,508
Reserve Ambulance	11	F450	2005	126,209
Reserve Ambulance	2	E450	2003	149,084

There are no requirements contractually that stipulate certification levels and requirements for personnel maintaining the transport vehicles in the system although each transport provider is required to maintain $1 million in automobile liability insurance with "coverage for owned, non-owned, hired or leased vehicles. Coverage must be provided by an insurance company authorized to write insurance in the State of Washington and have an A- or better rating in the AM Best Rating Guide."[41]

Equipment

Emergency medical services systems improve patient outcomes by ensuring the smoothest transition between care providers. Sometimes a first responder will transition care to another – usually certified at a higher level – such as an EMT; at other times the care will be transferred to an ambulance EMT in the system. As these transitions take place, equipment used to provide care is often temporarily transferred along with the patient. In an EMS system, standardized equipment allows these transitions to take place smoothly and seamlessly. If responders spend time familiarizing themselves with the equipment during the incident, that time is withdrawn from the time available to care for the patient.

[41] SCEMSC Provider Contracts.

One system-wide plan for equipment benefits the system because:

- The system can create standardized patient care protocols that are based in part on the equipment in the system.
- System training on the equipment is easier when all providers are training on the same manufacturer's equipment.
- Specialized (and expert) equipment maintenance is more likely to be available when biomedical maintenance personnel can focus on a single product.
- Replacement parts are more likely to be available, which can be critical when lag times are long.
- When a failure occurs on a front-line piece of equipment, a spare is likely to be available in the area.
- Patient outcomes are likely to be improved as the patient transitions from one provider to another.

Despite the best maintenance standards, equipment will eventually fail and will need to be replaced. As such, EMS equipment, transport vehicles, and first response vehicles should have appropriate replacement plans in place. Generally, organizations will create capital improvement plans that establish long-term models for replacing critical equipment. These models assist agencies in ensuring that financing is available when essential equipment must be replaced.

✓ **Observation.** SCEMSC maintains minimum equipment standards for ambulance equipment (but not first response equipment).

✓ **Observation.** Portable EMS equipment should be standardized throughout the EMS system. In addition, plans should be established to inspect, maintain, and replace critical equipment. The State has established minimum inspection requirements for annual inspections to ensure that the capability of the personnel is maximized.

Each agency maintains its own program for the inspection and maintenance of vehicles and equipment in compliance with the self-inspection requirements stipulated in RCW 18.73.145. Annual maintenance and calibration of electronic equipment is provided through the SCEMSC. There does not appear to be a program that spot checks vehicles or equipment other than the noted program of electronic maintenance.

A replacement plan for vehicles and specialized equipment such as cardiac monitors has been established and is funded by the tax levy through the annual operating budget and Capital Improvement Plan (CIP). Threshold requirements for vehicle replacement are predicated upon mileage limits; however, the SCEMSC may modify these requirements at its discretion.

✓ **Observation.** The SCEMSC develops replacement plans and schedules. Generally, these plans are based on *soft* standards rather than clearly articulated criteria based on historical data.

Ambulance replacement consists of a standard model and any upgrade to standard equipment is the responsibility of the individual agency. In addition to the ambulance fleet, the SCEMSC also provides

financial support for specialized equipment such as cardiac monitors and (recently) CAD equipment for both ALS ambulances and supervisory vehicles.

Response Facilities

High performance EMS systems use analysis of system demand, including time-of-day and day-of-week analysis, coupled with the location of the demand to create a complex schedule by which to deploy resources. In busy urban centers, operating with excess capacity, these plans have been successful in matching the supply of ambulances with the demand for those ambulances. Fire agencies often use *NFPA 1710* or *1720*[42] standards to establish response facilities. The SCEMS system depends largely on the availability of a public safety infrastructure that is in place to serve additional community needs. That infrastructure relies on the availability of personnel for cases of fire-related demand that is less frequent and far more erratic in terms of both frequency and intensity.

The SCEMS system's response facilities reflects the diversity of the individual agencies within the system recognizing that there are currently 23 separate fire departments and 2 independent EMS agencies providing emergency services throughout Skagit County. That means that fire agencies place fire stations at locations that make sense for the agency's analysis of risk-hazard assessment whereas EMS locations should be based on ensuring appropriate response times to patients. These two needs are not necessarily exclusive because fire agency locations may be static, while ambulance facilities may be more dynamic. In fact, some busy urban centers in the country have no fixed posting locations for ambulances.

- ✓ **Observation.** Because reliable ambulance response time and demand data is not available, it is unclear whether the current locations are appropriate for locating EMS resources. It appears to ESCI that the static response locations are based upon internal operational needs and historical preference rather than analysis of demand or response times.

In addition to individual agency diversity there are vast geographical differences in service area. There is currently no singular comprehensive plan for the location of EMS resources. The current deployment of assets is predicated on space availability, individual agency needs, and proximity to system demand. Regardless, the system should be in a position to use geographical information to identify areas in which response times are inadequate and consider remedial efforts, including facility locations, alternate resources, or other factors to improve those response times. (Apparatus location throughout the system is noted in the Response Time section of this report.)

[42] While *NFPA 1710* and *1720* establish standards for fire and emergency medical response, these are consensus-based documents. In the EMS community, we have not been able to establish a link between improved patient outcomes and implementation of *NFPA 1700* series of documents. However, fire staffing components of those documents may reduce concurrency restrictions, and therefore, have an effect on response times. Not all fire agencies have adopted these documents to establish response performance standards.

Health Care Facilities

The functional capabilities of local health care facilities helps to identify those patients who can be treated locally and those that can be directed to specialty care centers. Though ESCI did not evaluate the capabilities of local hospitals, system participants report that some local medical centers are categorized by the state at various levels for trauma care. Three acute care facilities are located within Skagit County to which the majority of patients are transported:

- United General Hospital – Sedro-Woolley
- Island Hospital – Anacortes
- Skagit Valley Hospital – Mount Vernon

Transport guidelines exist for trauma patients as part of the trauma protocol and are based on distance, time, mechanism of injury, and physiologic criteria. Patient Care Procedures (PCPs) including standards for pre-hospital triage are utilized to determine the most appropriate facilities to which patients are transported and are specifically described as part of the Regional EMS and Trauma Care System Strategic Plans.[43] Regional PCPs are written operating guidelines adopted by regional EMS/TC councils in consultation with local EMS/TC Councils, emergency communication centers, and the MPD in accordance with statewide minimum standard. Major trauma patients are identified in the initial EMS field assessment using the current State of Washington Pre-hospital Trauma Triage Procedures as published by DOH-EMS and Trauma Section.

Tertiary care centers other than trauma centers, such a pediatric, stroke, and burn centers, have been identified and patients requiring tertiary services are generally transported to the appropriate and most capable facility. Emergency personnel are cognizant of the functional capabilities of the individual hospitals and tertiary care facilities. Field personnel exercise broad discretion in transport destination decisions.

✓ **Observation**. Appropriate distribution of patients is a concern for hospitals and the system should have a more formalized method to determine hospital capabilities. Working closely with local hospitals and the MPD would help in specifying destination criteria.

Medical Direction

NFPA 450 recommends that a single medical authority should be in place within every EMS System. The medical authority should provide oversight for the EMS system; however, in some cases the medical authority may be functionally the same as the medical director. ESCI notes that the term "medical authority" is distinct from medical director because a medical authority may be comprised of multiple physicians (or other medical personnel in some states) while medical director is typically one person.

[43] RCW 18.73.030 Definitions (12)

Role of the Medical Director

Like many states, Washington requires that personnel functioning within an EMS system do so under the direction (either verbal or written order) of a state-licensed physician.[44] Washington is somewhat unique, however, in that there is a single medical program director (MPD) for each county or group of counties. As such, the medical program director is responsible for first responders as well as ambulance providers.[45]

The role of the medical program director is established in State of Washington statute as well as through a contract with the SCEMSC. However, not every physician can be authorized as an MPD—they must be certified by the state. The State of Washington certifies MPDs through a structured process established in Washington Administrative Code.[46] As described in the code, the Secretary of the Department of Health, in conjunction with the State Emergency Medical Services and Trauma Care Committee, shall evaluate, certify, and terminate certification of medical program directors and prescribe minimum standards defining duties and responsibilities and performance of duties and responsibilities. The purpose of these rules is to implement RCW 18.71.200 through 18.71.215, and chapters 18.73 and 70.168 RCW; and those sections of chapter 70.24 RCW relating to EMS personnel and services.

The local medical program director, Dr. Don Slack, provides medical direction and oversight to personnel currently holding an EMS credential through the State of Washington. Dr. Slack is an emergency physician engaged through contract by the Skagit County EMS Commission to fulfill the role of medical program director. In addition to Dr. Slack, the system contracts with an additional part-time physician—Justin Curran, M.D.—an MPD delegate appointed by the State of Washington to assist the MPD.

The Medical Program Director has the responsibility to provide medical oversight to all of the personnel involved in patient care and transport in the pre-hospital emergency care system. WAC requirements of all MPDs in the state include:

- Provide medical control and direction of personnel—either by oral or written communication.
- Develop and adopt written pre-hospital patient care protocols within the scopes of practice of personnel.
- Establish policies for storing, dispensing, and administering controlled substances in accordance with state and federal regulations.
- Participate with local and regional EMS/TC councils to develop and revise regional patient care procedures and county operating procedures when applicable.
- Supervise training of all EMS certified personnel.
- Develop protocols for special training.
- Periodically audit the medical care performance of EMS certified personnel.

[44] State of Washington, Revised Codes of Washington, RCW 18.71.212 and RCW 18.71.205.
[45] Helicopter ambulance services have their own medical oversight.
[46] WAC 246-976-920.

- Recommend certification, recertification, or denial of certification or other disciplinary action.
- Recommend to the department individuals seeking recognition as senior EMS instructors.

The Skagit County EMS Commission has established a contract with Dr. Slack that provides responsibilities (not including direct patient care) that exceed those required by the state, including:

- Provide or oversee education to emergency physicians at local hospitals.
- Chair the EMS Commission's Medical Control Committee.
- Supervise training through auditing training hours.
- Oversee the ongoing training and evaluation program (OTEP).
- Periodically audit the skills of providers.
- Recommend certification, recertification or denial of certification.
- Work as a liaison to the medical staff of local hospitals.
- Attend various meetings and represent SCEMSC.
- Delegate responsibilities as appropriate.

The current contract does not specifically identify the role of the medical director with respect to establishing standards for or the purchasing of new equipment or supplies, nor are there contractual requirements for the MPD to conduct system research.

✓ **Observation:** The medical authority oversees the ambulance service with a much higher level of attention paid to transport agencies rather than first response agencies or other system participants.

The MPD as well as the MPD delegate have significant responsibilities in the system, in particular ensuring that the system is integrated. The MPD is tasked with consulting with local and regional EMS Trauma Care Councils, special committees, Emergency Department Medical Directors, and emergency communications centers to develop and approve patient care procedures and best practices. The MPD ensures that personnel work within the parameters of the approved regional patient care procedures. The MPD must periodically audit the performance of Skagit County Emergency Medical System (EMS) instructors, ensuring that providers maintain their skills and establishing practices to monitor the field performance of EMS certified personnel for quality assurance purposes. The MPD works closely with the EMS Commission to evaluate the performance of personnel in the system.

On-line medical control is available at each of the three primary receiving hospitals within Skagit County. The medical program director is responsible for ensuring that field personnel have access to qualified personnel for medical consultation. Though not all on-line physicians are board certified as emergency physicians, the MPD has specific contractual responsibility to oversee education of the emergency department physicians of Island Hospital, Skagit Valley Hospital, and United General Hospital. This education is intended to ensure quality medical control during related and respective transport events.

The current MD Contract expires at the end of 2012. As noted previously, the medical director is responsible for and participates in the quality assurance process. However, that process is aimed mainly at ALS ambulance responses and rarely includes the first response personnel.

- **Recommendation:** The single medical authority should also oversee and authorize a system-wide quality assurance program.

EMS Communications

EMS system communications are critical to ensuring that patients receive the timeliest application of appropriate medical care. The American Heart Association (AHA) considers critical components of communication system to include appropriate access by citizens as well as timely dispatch of responders.[47] According to the AHA, "Passage of time drives all aspects of emergency cardiac care and determines patient outcomes."

It is essential that patients are able to access that 9-1-1 system as quickly as possible and that responders are immediately dispatched to the scene with appropriate pre-arrival information.

Specific to fire agency call processing, which includes fire department response to emergency medical incidents, the Skagit County Comprehensive Plan[48] has an established standard with respect to Skagit 911 call processing. According to the policy statement,

> *Times are considered to be "Response Time," which shall be measured by the sum of turnout time (the time from dispatch until the first arriving unit is en-route to the incident), plus travel time. Dispatch time shall be allocated a maximum of 1 additional minute which is measured from the time the 9-1-1 call is received until the fire department is dispatched[49].*

The 9-1-1 system is a critical link in the chain of survival for emergency patients. The system must ensure that a single access number is available, that one lead agency is responsible for coordinating EMS communications, and that planning and monitoring structures are in place to promote ongoing improvements. In addition, the communication system must provide for appropriate communications between all responders, that computer aided dispatch systems provide appropriate reporting of incidents, and that online medical control is available to provide medical advice to EMTs and paramedics at the patient's side.

- ✓ **Observation.** The SCEMSC provides funding to support Skagit 911 predicated on a per call fee for ambulance dispatch services. In addition, fire agencies responding to the same EMS calls as first responders are also charged a per call fee.

In a contemporary EMS system, a single access number should be used as a gateway to reach emergency medical help. All areas in the Skagit County study area use 9-1-1 to access EMS. The current

[47] *Advanced Cardiac Life Support*, American Heart Association, 1997.
[48] Skagit County Comprehensive Plan – Countywide Planning Policies, 2000
[49] The dispatch center reports that it uses a new standard: 60 seconds 90 percent of the time and no more than 90 seconds 99 percent of the time. It reports that it does not meet this standard for a variety of reasons.

system uses enhanced 9-1-1 to receive calls for emergency services. In the study area, a single agency, the Skagit 911 Center, receives all 9-1-1 calls.

Skagit 911 is the lead agency with responsibility for countywide EMS communications. The agency is governed by the Skagit County Emergency Management Council whose membership consists primarily of elected officials representing the Skagit County Board of Commissioners and elected officials of the county's various municipalities. The agency utilizes various technical committees to provide policy recommendations to the Skagit 911 Communications Operations Advisory Board. The EMS Technical Committee meets on a monthly basis. Skagit County is responsible for developing a long-term plan for communications, and in ensuring that all agencies have the ability to communicate with each other.

✓ **Observation.** Currently, planning for communication needs appears to be accomplished at the individual agency level. No comprehensive planning process for the communications needs of the EMS system is evident.

Most EMS systems will have a method in place to ensure the quality of the dispatch system. That quality measurement can take a number of forms, so long as the system has a formalized method to record, analyze, and report on quality. To do so, the agencies must:

- Create standards for quality.
- Monitor that quality.
- Create quality responsibilities throughout the organization.
- Develop a quality assurance team that regularly meets and reports on dispatch quality.

Emergency Medical Dispatch

While a detailed evaluation of the dispatch center is beyond the scope of this report, the process of emergency medical dispatch (EMD) has a significant impact on patient outcomes, and therefore, is a matter of importance to the EMS system.

Emergency medical dispatch provides for two significant EMS system functions. First, it allows callers to receive pre-arrival instructions so that they can begin to deliver appropriate treatment before the arrival of the emergency responders. Second, it allows calls to be prioritized based on the seriousness of the event. Knowing whether an event is serious allows responders to respond without lights and siren, respond with fewer responders, or otherwise modify the response. Importantly, responding without lights and siren reduces risk to both the community and to the responder because emergency driving is inherently more risky to all motorists.

The Communications Center and staff rely on protocols for call triage and pre-arrival medical help instructions that are established and maintained by King County, Washington, for dispatch priority criteria.

We believe that dispatch quality degrades sharply after initial training; however, an appropriate medical quality program established as part of the dispatch process will ensure that quality remains at high levels. The National Academy of EMS Dispatch recommends that a minimum of 25 calls per week or 3 percent of the total medical dispatches, whichever is greater, must be reviewed.[50] It should be noted that Communication Center personnel have in the past participated in quarterly quality assurance meetings with emergency responders, the system medical director, and representatives of local hospitals. Those meetings have since been discontinued; however, each of the 30 or so dispatchers is reviewed on at least one random emergency medical event every month.

- ✓ **Observation.** The system has established EMD standards that are minimum requirements for the communications center employees. A comprehensive quality assurance process within the communications center may assist in identifying improvement opportunities that could be implemented through the use of a comprehensive training program. Those processes of identifying flaws should be directly linked to training programs so that opportunities for error are minimized.

- ✓ **Observation.** Currently, it appears that most if not all analysis regarding response intervals and other measures of quality are done at the agency level.

Dispatch Equipment

Another critical component of EMS communications involves ensuring that the equipment used in those communications is reliable and regularly maintained. Equipment should be evaluated regularly and tested to ensure that it works according to system standards. Because EMS standards change and technology regularly improves, EMS systems may find it appropriate to ensure that minimum standards for dispatchers are in place and followed. Dispatcher training and certification should be established as part of a system plan for communications. Primary Fire/EMS frequencies are VHF and vary between 154.265 and 159.015 Mhz. Tone NAC are in the 110 – 151 Mhz range. EMS only frequencies (MEDCOM) are UHF in the 463 and 468 Mhz range. While the system provides interoperability between responders, some limitations in communications exist between volunteer agencies and medical responders. Current plans include building out the existing infrastructure to provide appropriate radio coverage using existing radio systems.

- ✓ **Observation.** Communication reliability is critical to the EMS system. A communications program should involve evaluating the reliability of current radio units and investigating the potential to receive adequate funding for replacing those radios. As those radios and other communication components are replaced with new equipment, it is important that the system craft an equipment maintenance plan to ensure the long-term viability of the radio system.

Dispatch Equipment - CAD

Much of this report has focused on the needs of the system rather than any individual agency. As an element in the continuum of an EMS event, the dispatch function and electronic call processing equipment is critical in acquiring sentinel event data from which system design or redesign decisions can

[50] National Academy of EMS Dispatch, *Accreditation Guidelines*, 2002.

be made. The National Fire Protection Associations publication: *NFPA 450*: *Guide to EMS System Design* provides a template of critical event time stamps that every system should be able to capture. The current system utilizes the Spillman Computer Aided Dispatch (CAD) System version 4.6. Based on ESCI's review, the system may not be capable of producing accurate and critical EMS call event data.

- ✓ **Observation.** The system is unable to produce quality statistical driven data from which to adequately analyze call volume or call distribution for deployment analysis. The data that is available from the Spillman CAD is wholly inadequate to monitor the performance of the EMS system or of the responses of the respective agencies. One of the critical deficiencies in the current EMS system is that the SCEMSC administrative authority does not have essential call data necessary from which system improvements can be generated.

EMS System Operations

Ambulance Response Times

Response times are one of the most frequently used methods of measuring system performance. Policy makers and physicians require a gauge by which to measure the effectiveness of the system, and a method by which to make decisions. Unfortunately, very little medical research exists to support one response time over another. Further, because economic costs are highly sensitive to response times, a small change in response time requirements may cause a significant change in costs. Policymakers must therefore consider carefully the balance between the economic costs, medical costs and benefits, and social costs of response time requirements.

Medical studies on response times are not consistent nor do they suggest the optimal time. Several medical studies suggest that shorter response times lead to improved outcomes in cardiac arrest. A Scottish study[51] noted that reducing response times from 15 minutes to 8 minutes (with 90 percent reliability) would increase the predicted cardiac arrest survival from about 6 percent to 8 percent. Improving response times to five minutes would provide for expected survival rates in the range of 10 to 11 percent. Other studies are less optimistic. For example, Blackwell and Kaufman discovered that reducing response times to less than eight minutes had little effect unless those times were reduced to less than five minutes.[52]

While the studies are not consistent in their conclusions, one thing is consistent—the studies focus on the most critical 1 or 2 percent of the patients. They do not focus on the more common emergencies (i.e., chest pain, diabetic coma, stroke, and respiratory events) at which advanced personnel can have an impact on patient outcomes. Very little reliable scientific data is available to support any response time requirement in these cases. Yet despite the confusing nature of the studies, intuitively we believe that

[51] Effect of reducing ambulance response times on deaths from out of hospital cardiac arrest: cohort study. Pell JP, Sirel JM, Marsden AK, Ford I, Cobbe SM. BMJ. 2001 Jun 9;322(7299):1385-8.
[52] Response time effectiveness: comparison of response time and survival in an urban emergency medical services system. Blackwell TH, Kaufman JS., Acad Emerg Med. 2002 Apr, 9(4)320-1.

delivering faster emergency services will have an effect on patient satisfaction, it will improve 9-1-1 uses in emergency events, and it will improve economic outcomes.

Response Time Regulation

Response time reporting and response time requirements are only marginally regulated within the Skagit County EMS system. However, North Region EMS has established standards for response times for both first responders and for ambulance providers. Those standards provide guidance for response times in urban, suburban, rural, and wilderness areas.

The North Region response time standard does not compel compliance; rather it provides guidance to response agencies. Further, the standard fails to identify the point at which the "clock" starts and stops for the purposes of measuring response times. Finally, while the North Region standard for EMS provides a basis for determining response performance according to "area," the definition does not provide the method by which an agency determines the boundaries of an area. For that reason it is difficult to determine whether many parts of the Skagit County area are more appropriately considered urban, suburban, or rural.

The county has adopted the 2000 Census data as the basis for determining response zones; however, based on the demographics and geography of the area, many parts of the Skagit County System are difficult to define. The following table describes the response performance guidelines established by the North Region EMS system.

✓ **Observation.** Using Census data to define response times ignores those areas that have high call demand irrespective of the number of people that permanently in that area. For example, industrial areas, commercial areas (or other areas of high employment) place significant demands on EMS agencies yet are not included in Census-based response criteria.

Figure 31: North Region EMS Response Standards, 2010

Response Area	Definition	First Response Standard	Transport Standard
Urban	An incorporated area over 30,000 people; or an area of at least 10,000 people with a density of >2,000 people per square mile.	Less than or equal to 8 minutes with 80% reliability.	Less than or equal to 10 minutes with 80% reliability.
Suburban	An area with a population of 10,000 to 29,999 people with a density of 1,000 to 2,000 people per square mile.	Less than or equal to 15 minutes with 80% reliability.	Less than or equal to 20 minutes with 80% reliability.
Rural	An area with a population less than 10,000 people with a density of less than 1,000 people per square mile.	Less than or equal to 45 minutes with 80% reliability.	Less than or equal to 45 minutes with 80% reliability.
Wilderness	A rural area not accessible by public or private maintained road.	ASAP	ASAP

While there is some medical research that supports both the five and eight-minute response standards, there is limited or no data that supports 10, 15, or 20, or 45-minute responses. Further, the North Region process includes only guidance for major trauma events and seems to ignore major medical events. Regardless, we believe that the timelines should be considered the same for medical and for trauma events and that response time requirements and other performance measures should be predicated on recognized industry standards and designed to achieve an efficient system design that utilizes resources effectively.

The Skagit County EMS system has adopted response times for ambulance services that are somewhat more aggressive than those established by the North Region.[53] Those system-approved ambulance response times are 8 minutes urban, 15 minutes suburban, 30 minutes rural, and 90 minutes wilderness as shown in the table below. All response requirements are based on the 90 percent fractile.

Figure 32: SCEMS Response Standards, 2011

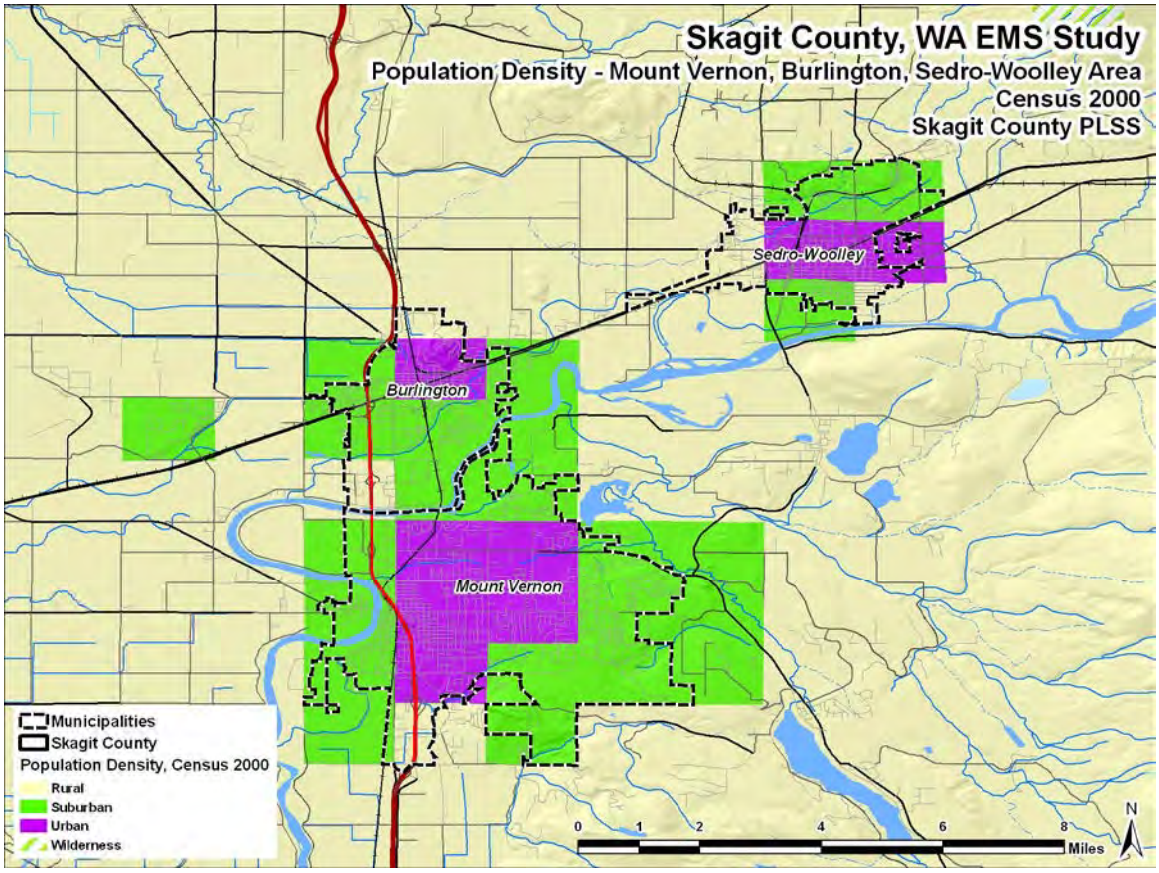
Response Area	Definition	Ambulance Standard
Urban	An incorporated area over 30,000 people; or an area of at least 10,000 people with a density of >2,000 people per square mile.	Less than or equal to 8 minutes with 90% reliability.
Suburban	An area with a population of 10,000 to 29,999 people with a density of 1,000 to 2,000 people per square mile.	Less than or equal to 15 minutes with 90% reliability.
Rural	An area with a population less than 10,000 people with a density of less than 1,000 people per square mile.	Less than or equal to 30 minutes with 90% reliability.
Wilderness	A rural area not accessible by public or private maintained road.	Less than or equal to 90 minutes with 90 percent reliability

Response Zones

Skagit County uses a definition of urban, suburban, rural and wilderness that is based on the population characteristics included in the 2000 U.S. Census. Based on these census numbers the county has prepared a map that describes the response zones. This map shows response zones primarily in the Central Valley area that are separated by urban, suburban, and rural based on population.

[53] Skagit County EMS.

Figure 33: Current Response Zones (2000 Census)[54]



These response zones are not automatically transferred by the dispatch data system, thereby requiring response personnel to enter the expected response zone into the electronic record upon completion of a call.[55] In CVAA electronic records, office personnel may examine the response zone for accuracy but that examination is not guaranteed and the records may exhibit a degree of inaccuracy.

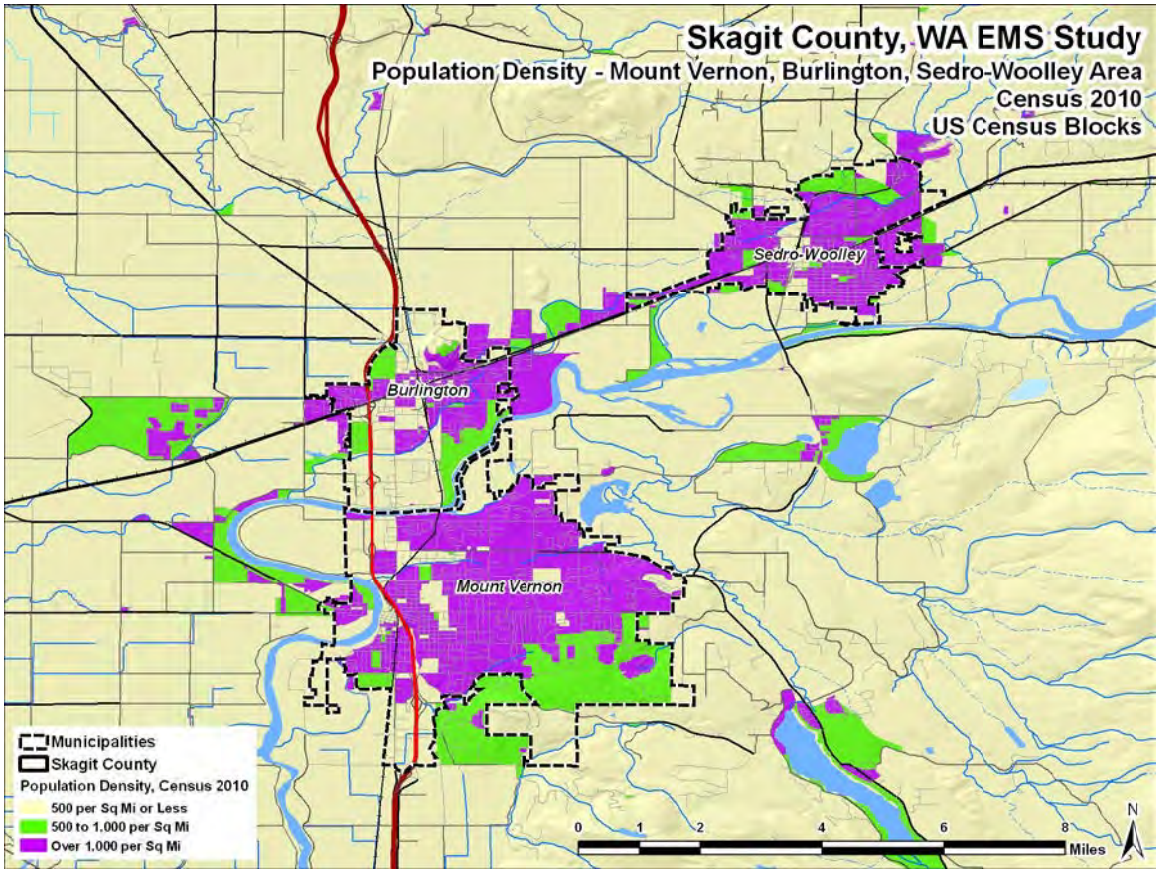
✓ **Observation.** Response zone boundaries should be automatically transferred into the electronic reporting system of each of the providers. The system should not rely on response personnel to determine response time boundaries.

Because of population changes since the 2000 Census, the response map has significantly changed. Density changes in the central valley have changed the response performance descriptions of the system. If Skagit County were to adopt the updated census characteristics, the response map would show a more robust distribution and concentration of population as is shown in the following map.

[54] A full-county version of this map is available in the Appendix.

[55] Dispatch personnel report that it is possible to translate dispatch data, however, that data field has not been included in the printouts and has not been transferred to EMS providers.

Figure 34: Potential Response Zones (2010 Census)[56]



The urban areas are much more significant than in the 2000 Census. However, adopting the Census 2010 map would increase in the size of the urban area and cannibalize the size of the suburban area. The rural area size has stayed basically the same.

✓ **Observation.** If the system were to pursue response time boundaries based solely on population, this map would provide an accurate depiction; however, it would be very difficult to code into the dispatch system and eliminates virtually all of the suburban areas in the central valley.

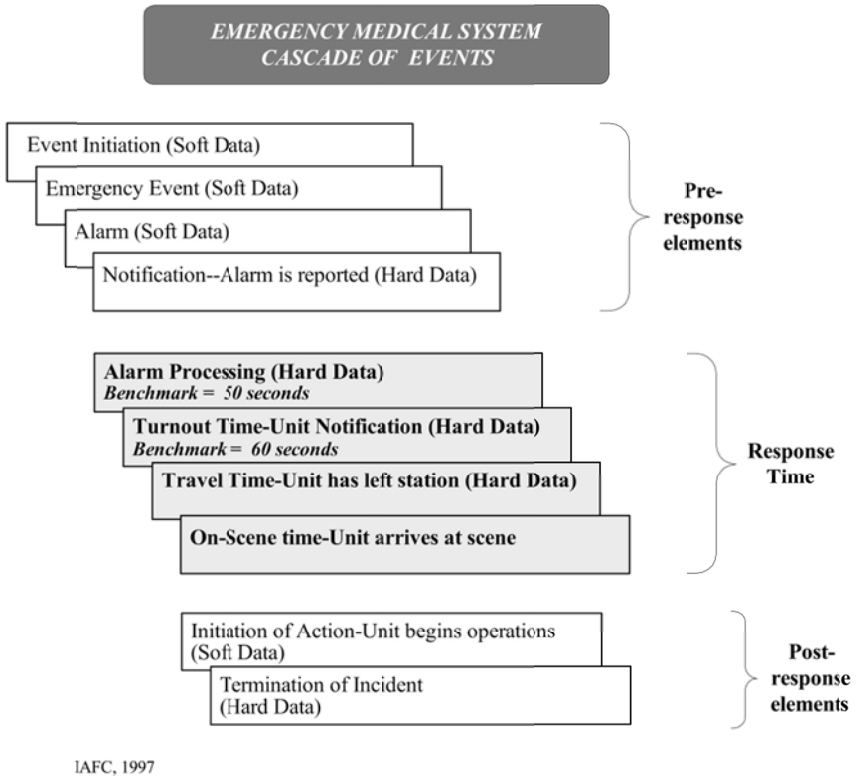
Response Components

The International Association of Fire Chiefs (IAFC) has different recommendations for response times and has established a "Cascade of Events" to assist responders in understanding response intervals in the EMS system. Irrespective of the method used, system regulators should establish an appropriate response time reporting method for their local communities. The IAFC method includes dispatch-processing time as a component of response time, though responders rarely have control over the dispatch center to the extent that they can influence those times. Regardless, the dispatch processing times should also be monitored by the system and standards for dispatch established. The Commission

[56] A full county version of this map is available in the Appendix.

on Fire Accreditation International has established performance measures for dispatch call processing times of no more than 60 seconds for communities similar in size and composition to Skagit County.

Figure 35: IAFC Cascade of Events



Response Time Reporting

Response time reports are based on data captured by electronic data management software by each of the ambulance providers. Skagit 911 collects its data on the Spillman Computer Aided Dispatch (CAD) system. The ambulances, fire agencies, and hospitals do not communicate through electronic data transfers. As such, there is no structured process to determine how long it takes for the first unit to arrive on the scene. The CAD system collects response time data in the following categories: call received, call posted, call assigned, unit enroute, unit arrived at scene, unit enroute to hospital, unit arrived at hospital, and call complete.[57] There is no structure to aggregate the databases to ensure that the system can adequately measure how long it takes to get the first unit to the scene, regardless of agency.

The following figure is a sample of a fractal response report that provides the number of responses in each category, and also provides the percent of calls that are answered in each time segment as well as

[57] In our analysis, we use assigned to at scene to describe "response interval", call received to assigned to describe "call processing interval", and call assigned to call complete to describe "service interval".

the cumulative performance. This type of report is fairly robust in the information that it provides and can be used to develop reports that describe 1) alarm processing time, 2) turnout time, 3) travel time and 4) response time based on the definitions described in WAC 246-976. Once those reports are provided, the agencies may determine weaknesses in the communication or response system so that changes can be made. Note that this report does not use average times to report performance.

Figure 36: Sample Fractal Response Time Report

Response Times	Number	Percent	Cumulative Percent
< =0m 59s	2	0.98%	0.98%
< =1m 59s	1	0.49%	1.46%
< =2m 59s	2	0.98%	2.44%
< =3m 59s	4	1.95%	4.39%
< =4m 59s	7	3.41%	7.80%
< =5m 59s	4	1.95%	9.76%
< =6m 59s	9	4.39%	14.15%
< =7m 59s	12	5.85%	20.00%
< =8m 59s	11	5.37%	25.37%
< =9m 59s	22	10.73%	36.10%
< =10m 59s	25	12.20%	48.29%
< =11m 59s	27	13.17%	61.46%
< =12m 59s	38	18.54%	80.00%
< =13m 59s	15	7.32%	87.32%
< =14m 59s	18	8.78%	96.10%
< =15m 59s	2	0.98%	97.07%
< =16m 59s	6	2.93%	100.00%
Total	**205**	**100.00%**	

As is shown in Figure 36, one can calculate the performance on the basis of reliability. For example, from the sample data in the table, 80 percent of the responses are achieved with a response time of 13 minutes or less. This is a valuable method of determining performance. A similar method can be used to determine dispatch processing times; and by "drilling down" into the data and breaking out turnout times and travel times, the agencies can determine which components of response time are responsible for overly long responses.

✓ **Observation.** Currently, agencies only report their performance at the 90% fractile. This fails to capture inordinately long response times.

The response performance in the system takes into consideration the fixed facilities used to provide emergency medical services in the area. Each of the ambulance providers and the first responders rely

on the locations of fixed (or static) facilities to deliver services.[58] The ambulances currently based in Anacortes and in the Central Valley are based very close to (or even in) fire agency facilities. Because the Anacortes Fire Department provides the ambulance service in Anacortes, the ambulances are predictably housed within the same facilities as first responders. Aero-Skagit operates an ambulance from a fixed facility in Concrete. The result is that the system has ambulance providers and first responders operating from virtually the same locations. This duplication of response means that EMS resources are concentrated in fixed locations in the area. Thus, the system loses the ability to respond to a larger area and loses the ability for the agencies to leverage EMT deployment to improve EMS (rather than ambulance) response performance.

✓ **Observation.** Because only the transport agencies report performance, the response performance of the system cannot be determined. In the central valley area (and in other areas where first response agencies provide ALS), it would be useful to know when the first paramedic arrived on the scene as opposed to the first ambulance.

EMS Operations and Response Performance

ESCI evaluated the response data for both ambulance and first response from July 1, 2011, through June 30, 2012. As part of that analysis, we examined both the geographic and temporal aspects of the demand in the system as well as the system's ability to generate supply to match that demand. Generally, EMS demand follows population.[59] As such, as populations shift within a response area, that shift tends to affect demand for services. By analyzing the demand, we can determine whether the EMS system can meet the needs of the service area.

Response Analysis Overview

The response analysis helps to determine whether the response times are appropriate for the EMS system, whether response performance can be affected by the nature of call demand on the system, and whether resources are sufficient to provide necessary services. For example, if multiple events occur at roughly the same location at the same time, the ambulance resource is immediately exhausted, and the response performance for the second ambulance will be inordinately longer. Demand analysis typically considers time-of-day and day-of-week to determine when the calls occur. In addition, it considers concurrency—the frequency at which events occur at the same time.

Expected Response

As part of the analysis, we examined the ability for ambulances in the Central Valley to respond to events from their fixed locations. To make this determination, we anticipated a turnout interval of

[58] However, in some of the rural areas, volunteers respond directly from their homes and as such are not responding from so-called fixed facilities.

[59] For example, during the workday, populations shift from residential areas to employment areas, and between areas of employment. During the week, employment has a significant impact on demand, and during the workday, movement of population impacts demand. On weekends, recreation creates shifts in demand.

approximately two minutes and used GIS network analysis to measure the expected performance at 6, 13, and 28-minute intervals. This provides the equivalent of 8, 15, and 30-minute response intervals (the sum of turnout and travel intervals). The following maps describe the expected response performance for each of the ambulance units. This measure is based on the ambulance units' base locations.

Figure 37: Medic 1 Expected Travel Performance

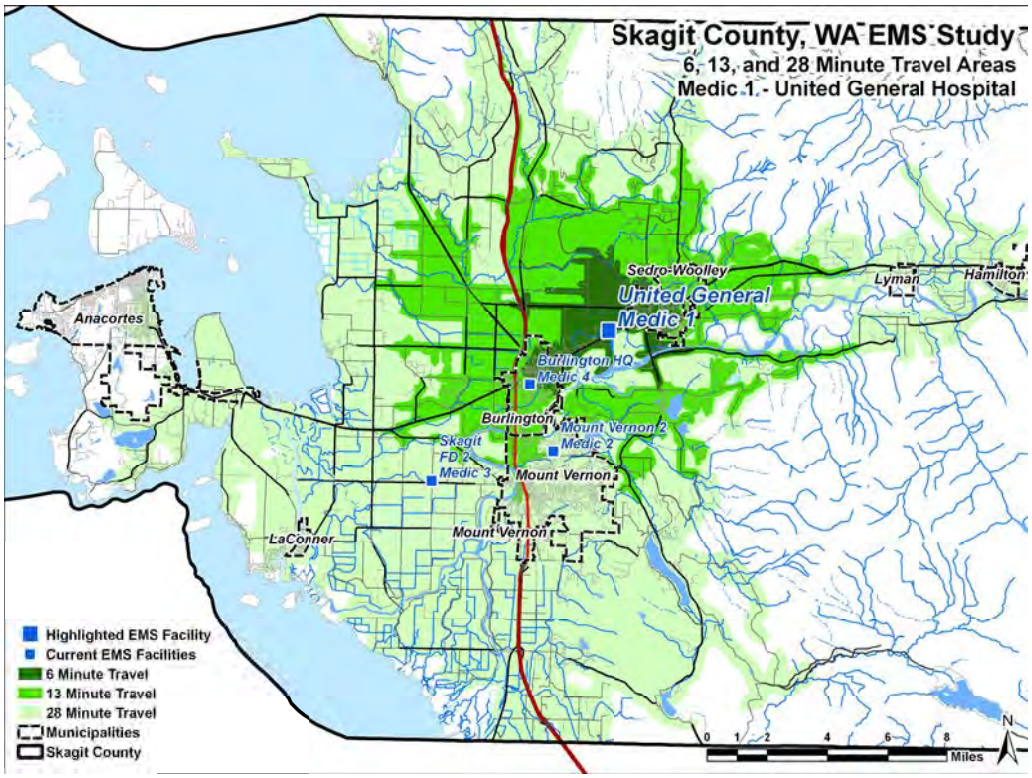


Figure 38: Medic 2 Expected Travel Performance

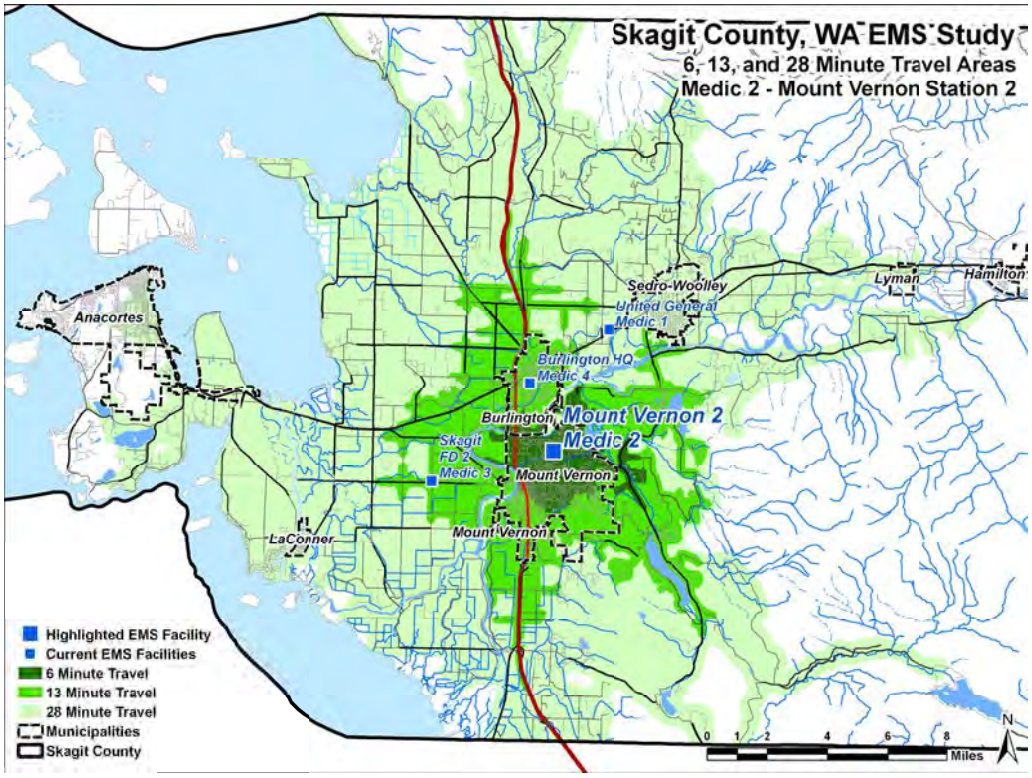


Figure 39: Medic 3 Expected Travel Performance

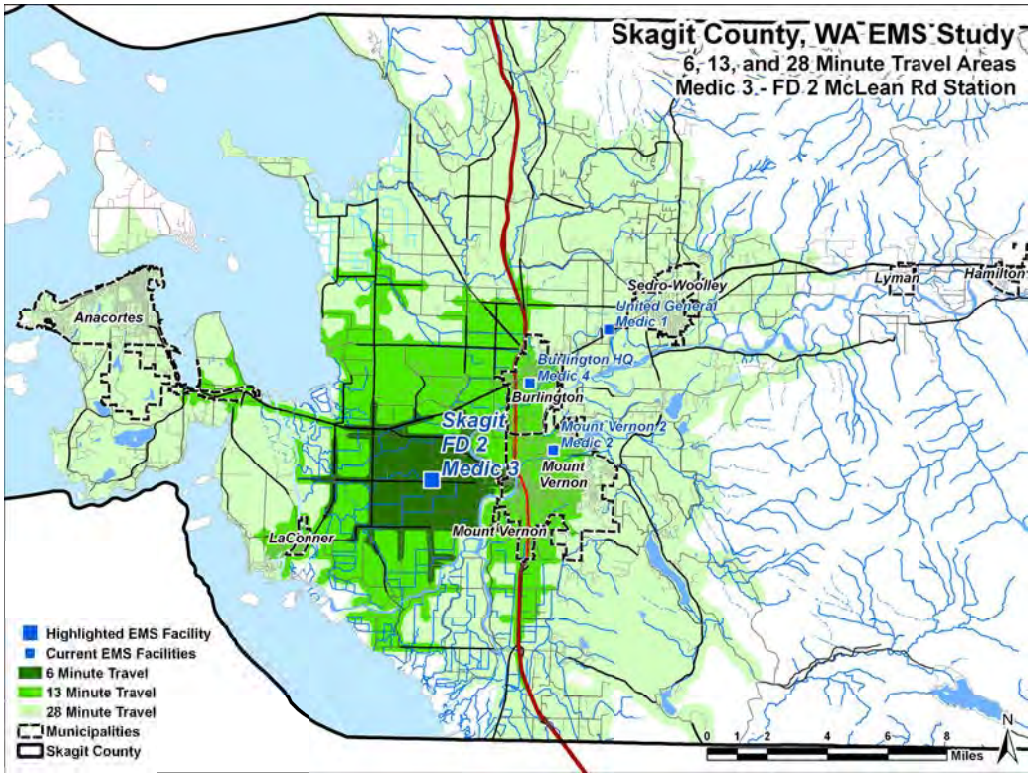
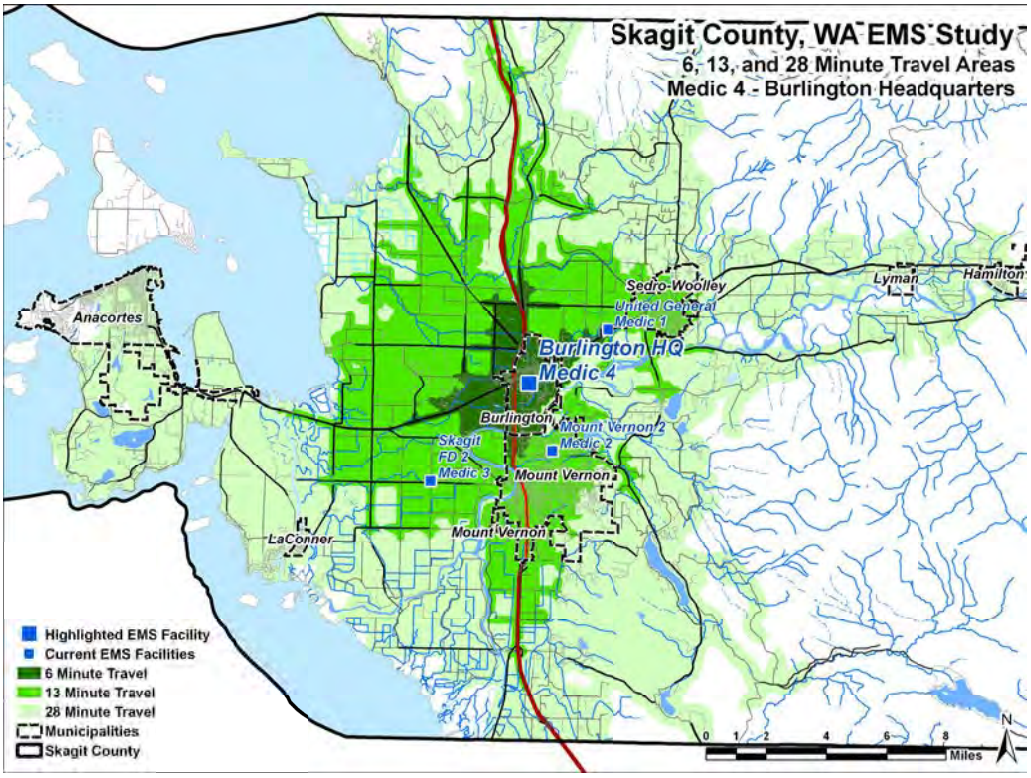


Figure 40: Medic 4 Expected Travel Performance



Ambulance Response Time Performance

ESCI evaluated response time performance for each of the ambulance providers from July 1, 2011, through June 30, 2012. We evaluated those response intervals based on the best information that was available from the dispatch center.[60] We measured response time from the time that the dispatch center reported the time as "assigned" until the unit reported that it had arrived on the scene. We then mapped the data on the 2000 response map and coded the data according to the appropriate response zone. We measured the response times according to the appropriate zone, filtered the response data according to emergency responses, and recorded the response performance in the fractile distribution report. The response time reported is the sum of the turn out time and the travel time.

CVAA Response Time Analysis

As shown in the following table, CVAA responded to urban emergency calls in just over 10 minutes with 90 percent reliability.

[60] We note that there are a number of problems with the response data. In some cases, data was simply missing from one field or another making the time intervals incalculable. In other cases the CAD system populated fields with incorrect data. We believe that we have cleaned the data as much as possible, however, the cleaning process removed some responses from the calculations. Further, there was no data available in the dispatch system that recorded the time of transport to the hospital. As such, we were unable to independently determine the accuracy of the agencies' reported number of transports.

Figure 41: CVAA Urban Response Time, 7/1/2011 - 6/30/2012

Urban, Priority 1 and 2, CVAA Fractile Response Times, 2000 Census			
Response Times	Number	Percent	Cumulative Percent
< = 1 min	18	0.63%	0.63%
< = 2 min	31	1.08%	1.70%
< = 3 min	141	4.90%	6.60%
< = 4 min	329	11.44%	18.04%
< = 5 min	623	21.65%	39.69%
< = 6 min	524	18.21%	57.91%
< = 7 min	361	12.55%	70.46%
< = 8 min	254	8.83%	79.28%
< = 9 min	176	6.12%	85.40%
< = 10 min	131	4.55%	89.95%
< = 11 min	76	2.64%	92.60%
< = 12 min	44	1.53%	94.13%
< = 13 min	31	1.08%	95.20%
< = 14 min	14	0.49%	95.69%
< = 15 min	6	0.21%	95.90%
< = 16 min	15	0.52%	96.42%
More	103	3.58%	100.00%
Total	**2,877**	**100%**	

In the suburban area, CVAA responded to emergency calls in just over 11 minutes with 90 percent reliability.

Figure 42: CVAA Suburban Response Time, 7/1/2011 - 6/30/2012

Suburban, Priority 1 and 2, CVAA Fractile Response Times, 2000 Census			
Response Times	Number	Percent	Cumulative Percent
< = 1 min	23	1.21%	1.21%
< = 2 min	11	0.58%	1.78%
< = 3 min	92	4.82%	6.60%
< = 4 min	189	9.91%	16.51%
< = 5 min	224	11.74%	28.25%
< = 6 min	263	13.78%	42.03%
< = 7 min	227	11.90%	53.93%
< = 8 min	225	11.79%	65.72%
< = 9 min	207	10.85%	76.57%
< = 10 min	138	7.23%	83.81%
< = 11 min	97	5.08%	88.89%
< = 12 min	63	3.30%	92.19%

Suburban, Priority 1 and 2, CVAA Fractile Response Times, 2000 Census			
Response Times	Number	Percent	Cumulative Percent
< = 13 min	40	2.10%	94.29%
< = 14 min	26	1.36%	95.65%
< = 15 min	16	0.84%	96.49%
< = 16 min	7	0.37%	96.86%
More	60	3.14%	100.00%
Total	**1,908**	**100%**	

In the rural areas, CVAA responded to emergency events in a time between 18 and 20 minutes with 90 percent reliability. Based on this analysis, it appears that CVAA is meeting its response performance requirements in the suburban and rural areas and failing to meet its response performance requirement in the urban area.

Figure 43: CVAA Rural Response Time, 7/1/2011 - 6/30/2012

Rural, Priority 1 and 2, CVAA Fractile Response Times, 2000 Census			
Response Times	Number	Percent	Cumulative Percent
< = 2 min	36	1.88%	1.88%
< = 4 min	145	7.56%	9.44%
< = 6 min	209	10.90%	20.33%
< = 8 min	231	12.04%	32.38%
< = 10 min	298	15.54%	47.91%
< = 12 min	292	15.22%	63.14%
< = 14 min	208	10.84%	73.98%
< = 16 min	165	8.60%	82.59%
< = 18 min	114	5.94%	88.53%
< = 20 min	75	3.91%	92.44%
< = 22 min	32	1.67%	94.11%
< = 24 min	20	1.04%	95.15%
< = 26 min	10	0.52%	95.67%
< = 28 min	9	0.47%	96.14%
< = 30 min	4	0.21%	96.35%
< = 32 min	10	0.52%	96.87%
More	60	3.13%	100.00%
Total	**1,918**	**100%**	

Anacortes Response Time Analysis

Anacortes Fire Department responds primarily in the urban and suburban zones. Because of the small number of rural responses, any consideration of performance based on these small numbers would not be reliable. As such, we evaluated only the urban and suburban responses for Anacortes.

Figure 44: Anacortes FD Urban Response Time, 7/1/2011 - 6/30/2012

Urban, Priority 1 and 2, Anacortes			
Fractile Response Times, 2000 Census			
Response Times	Number	Percent	Cumulative Percent
< = 1 min	16	1.14%	1.14%
< = 2 min	42	3.00%	4.15%
< = 3 min	129	9.23%	13.38%
< = 4 min	304	21.75%	35.12%
< = 5 min	259	18.53%	53.65%
< = 6 min	173	12.37%	66.02%
< = 7 min	131	9.37%	75.39%
< = 8 min	101	7.22%	82.62%
< = 9 min	67	4.79%	87.41%
< = 10 min	30	2.15%	89.56%
< = 11 min	28	2.00%	91.56%
< = 12 min	20	1.43%	92.99%
< = 13 min	13	0.93%	93.92%
< = 14 min	2	0.14%	94.06%
< = 15 min	1	0.07%	94.13%
< = 16 min	5	0.36%	94.49%
More	77	5.51%	100.00%
Total	**1,398**	**100%**	

Anacortes Fire responded to urban emergency events in more than 10 minutes with 90 percent reliability during the study period.

Figure 45: Anacortes FD Suburban Response Time, 7/1/2011 - 6/30/2012

Suburban, Priority 1 and 2, Anacortes Fractile Response Times, 2000 Census			
Response Times	Number	Percent	Cumulative Percent
< = 1 min	55	3.89%	3.89%
< = 2 min	39	2.76%	6.65%
< = 3 min	124	8.77%	15.42%
< = 4 min	301	21.29%	36.70%
< = 5 min	257	18.18%	54.88%
< = 6 min	172	12.16%	67.04%
< = 7 min	131	9.26%	76.31%
< = 8 min	101	7.14%	83.45%
< = 9 min	65	4.60%	88.05%
< = 10 min	30	2.12%	90.17%
< = 11 min	28	1.98%	92.15%
< = 12 min	20	1.41%	93.56%
< = 13 min	13	0.92%	94.48%
< = 14 min	2	0.14%	94.63%
< = 15 min	1	0.07%	94.70%
< = 16 min	5	0.35%	95.05%
More	70	4.95%	100.00%
Total	**1,414**	**100%**	

In the suburban area, Anacortes responded to emergency events in the study period in just 10 minutes with 90 percent reliability. We note that Anacortes Fire meets is response performance data in the suburban areas around the community, but fails to make its response performance in the urban area.

Aero-Skagit

The Aero-Skagit deployment is simpler than either Anacortes or CVAA. Aero responds from just one location and responds primarily to just one response zone—rural. While a few wilderness calls exist, the response performance is insufficient to attain reliable performance data.

Figure 46: Aero-Skagit Rural Response Time, 7/1/2011 - 6/30/2012

Rural, Priority 1 and 2, Aero-Skagit Fractile Response Times, 2000 Census			
Response Times	Number	Percent	Cumulative Percent
< = 2 min	10	2.64%	2.64%
< = 4 min	15	3.96%	6.60%
< = 6 min	10	2.64%	9.23%
< = 8 min	23	6.07%	15.30%
< = 10 min	27	7.12%	22.43%
< = 12 min	30	7.92%	30.34%
< = 14 min	46	12.14%	42.48%
< = 16 min	53	13.98%	56.46%
< = 18 min	53	13.98%	70.45%
< = 20 min	37	9.76%	80.21%
< = 22 min	22	5.80%	86.02%
< = 24 min	11	2.90%	88.92%
< = 26 min	4	1.06%	89.97%
< = 28 min	3	0.79%	90.77%
< = 30 min	3	0.79%	91.56%
< = 32 min	3	0.79%	92.35%
More	29	7.65%	100.00%
Total	**379**	**100%**	

In its responses for the study period, Aero-Skagit met its response performance standard of less than 30 minutes with 90 percent reliability.

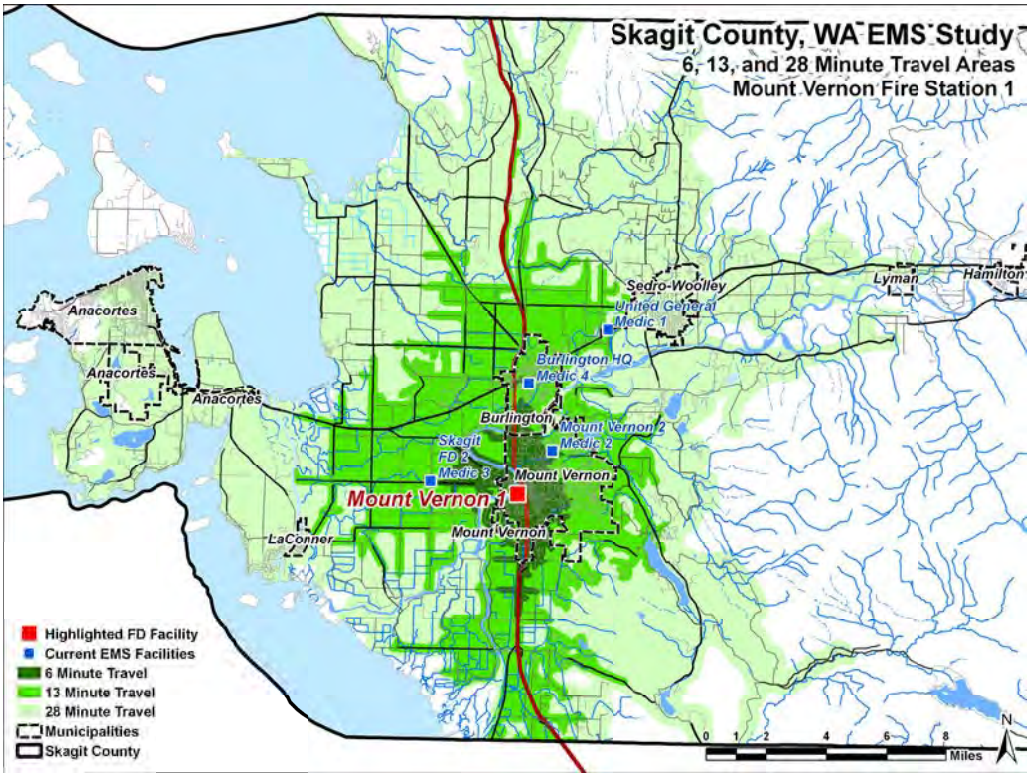
ALS Fire Performance in the Mount Vernon Area

Because Mount Vernon Fire Department provides paramedics in and around the city of Mount Vernon, the department has been used from time to time to augment the transport provider. There is concern among providers that performance in the urban areas of the central valley does not meet the requirements of the system.

ESCI evaluated the expected response performance for the ALS staffed units to determine whether a paramedic unit arriving on the scene could help to modify the response clock for the ambulance providers. To better understand the coverage capability of the fire department, we evaluated the response coverage from three fire stations in the city.

The following figure describes the expected performance for Mount Vernon Station 1 if that were to formalize its delivery of paramedic services in the system.

Figure 47: Expected Response Performance, Mount Vernon Fire Station 1



ESCI also evaluated the performance of Mount Vernon Stations 2 and 3. As shown in the following maps, Mount Vernon achieves significant coverage capabilities throughout the city and even to some areas outside the city.

Figure 48: Expected Response Performance, Mount Vernon Fire Station 2

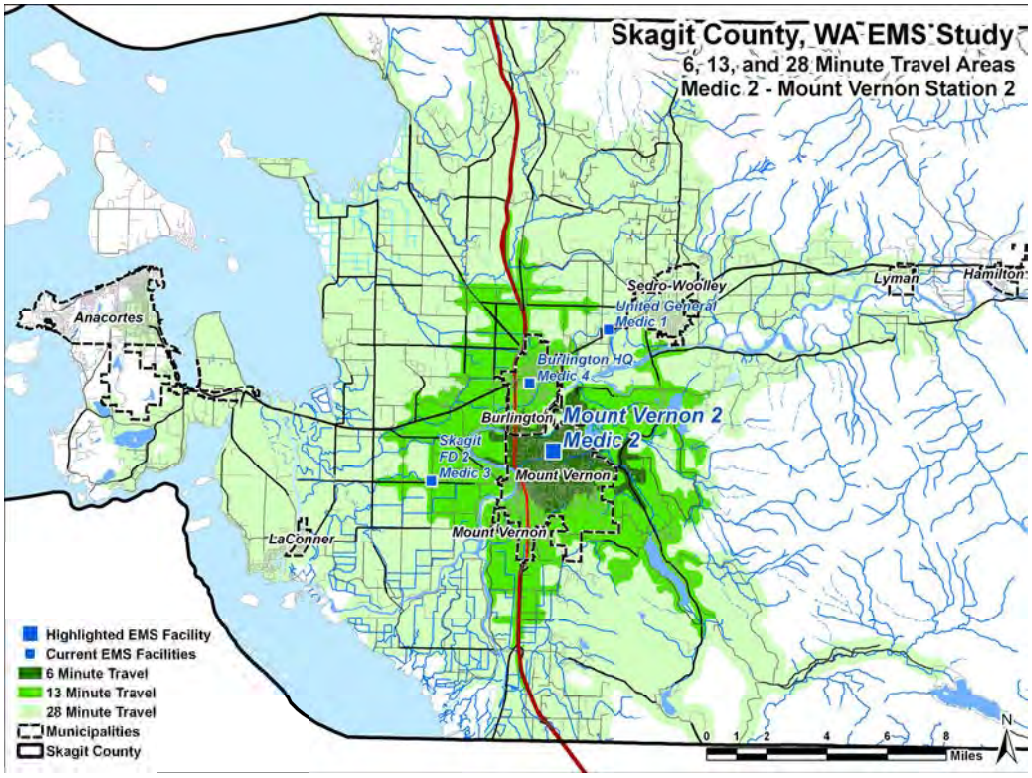
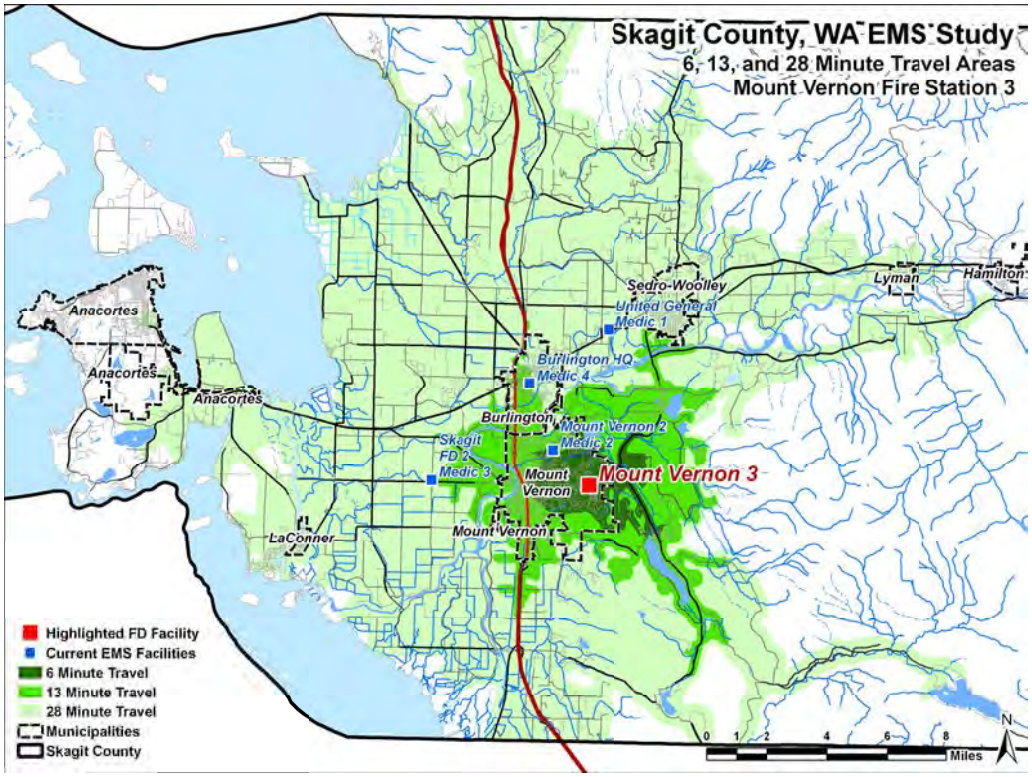


Figure 49: Expected Response Performance, Mount Vernon Fire Station 3



Agency-Reported Calls and Transports

Each of the ambulance providers submits documentation quarterly on their workload and performance for that quarter. The members of the EMS Commission review those reports. Each provider uses its patient care electronic reporting system to determine the data used to complete these reports.

One component of the quarterly reports is the number of times that each agency was dispatched. Dispatches for each agency define the number of times that each agency was asked to respond to an emergency event. The table below provides the dispatches for each agency (as reported by the agency) for each quarter for the last year. As shown in the table, the CVAA responded to approximately 73 percent of the total calls dispatched in the county. Anacortes responded to about 22 percent of the calls and Aero-Skagit responded to 5 percent.

Figure 50: Dispatches as Reported by Providers, 7/1/2011 - 6/30/2012

Agency	Q-2 2012	Q-1 2012	Q-4 2011	Q-3 2011	Total
Anacortes FD	573	651	683	757	2,664
CVAA	2,090	2,054	2,325	2,445	8,914
Aero-Skagit	145	139	139	226	649
Total	**2,808**	**2,844**	**3,147**	**3,428**	**12,227**

While a certain number of calls are dispatched, not every call results in a transport. Some patients refuse, some patients have either no or minor injuries, some are deceased, and some incidents have no patients at all. For example, after motor vehicle crashes the dispatch center may receive multiple calls through the cellular telephone system. When rescuers arrive they discover that there are no injuries and no transport is needed. As such, the number of transports will be lower than the number of dispatches. The following table shows the number of transports for each agency for the same one-year period.

Figure 51: Transports as Reported by Providers, 7/1/2011 - 6/30/2012

Agency	Q-2 2012	Q-1 2012	Q-4 2011	Q-3 2011	Total
Anacortes	398	398	421	402	1619
CVAA	1,496	1,305	1,339	1,808	5,948
Aero-Skagit	95	71	80	120	366
Total	**1,989**	**1,774**	**1,840**	**2,330**	**7,933**

✓ **Observation.** We note that in the dispatch data, the CAD system has not captured the time stamp on the transport time to the hospital. That time stamp has been missing from the data (or conversely missing from the canned report) for a number of years. This is the type of discontinuity that could be identified and fixed with a functioning quality assurance process.

The providers categorize each of the transports as either an ALS or BLS transport. ALS transports are categorized as such because they require advanced evaluation, significant medication administration, or invasive procedures such as ECG, intravenous administration, defibrillation, or some combination of these. BLS transports are the result of patients that require more basic medical services such as bandaging and splinting, backboard, or minor medical care. The difference is important because ALS transports are typically billed at a higher rate. The two tables below show the providers' reports related to ALS treatment and transport and BLS treatment and transport.

Figure 52: ALS Treatment/Transport as Reported by Providers, 7/1/2011 - 6/30/2012

Agency	Q-2 2012	Q-1 2012	Q-4 2011	Q-3 2011	Total
Anacortes	339	322	330	313	1,304
CVAA	1,155	1,047	1,207	1,121	4,530
Aero-Skagit	64	49	57	83	253
Total	**1,558**	**1,418**	**1,594**	**1,517**	**6,087**

Figure 53: BLS Treatment/Transport as Reported by Providers, 7/1/2011 - 6/30/2012

Agency	Q-2 2012	Q-1 2012	Q-4 2011	Q-3 2011	Total
Anacortes	59	75	63	94	291
CVAA	175	173	429	219	996
Aero-Skagit	25	22	23	37	107
Total	**259**	**270**	**515**	**350**	**1,394**

We note that the total numbers of ALS and BLS treatment/transport patients do not add up to the total number of transports. This may be because in some cases patients are treated but not transported, and in other cases multiple patients may be transported in the same ambulance.

Analysis of Dispatch Data.

ESCI evaluated the data available through the dispatch center to consider the best available information to determine the performance of the system from a perspective that is not reported by the providers. As part of that analysis we considered call-processing information, turnout information (to confirm our mapping analysis of expected performance), response intervals, and service intervals. While we focused on the information available in the Central Valley, we also examined Aero-Skagit and Anacortes data.

Day of Week

Responses in virtually all EMS systems vary, sometimes significantly according to the time of day. The following table describes the call frequency by day-of-week within Skagit County for emergency events. As shown in the table rankings, emergency events are more likely during the latter part of the week. Further analysis will help determine the extent to which those days receive inordinately higher calls.

Figure 54: Call Distribution by Day of Week, 7/1/2011 – 6/30-2012

Day of Week	CVAA	Anacortes	Aero-Skagit	Total
Sunday	1,367	278	103	1,748
Monday	1,440	250	81	1,771
Tuesday	1,313	269	95	1,677
Wednesday	1,374	249	95	1,718
Thursday	1,390	260	83	1,733
Friday	1,494	299	123	1,916
Saturday	1,479	283	96	1,858
Total	**9,857**	**1,888**	**676**	**12,421**

The data demonstrate higher than expected responses on weekends, while mid-week demand is somewhat lower than expected. The goal here is to determine whether the Skagit County system has sufficient resources available per day to manage the demand of the system.

✓ **Observation.** Though there is some daily variance here, the amount of variance is less than what we typically see in other systems. High variance levels might cause a provider to consider altering schedules based on the day of the week. That is not the case here.

Time of Day

Just as responses vary according to day of the week, the hour of the day affects demand. While intuition alone suggests that there will be more calls at 3 p.m. than at 3 a.m., a more rigorous analysis is required to determine if the variation is enough to warrant adding additional resources, realigning resources, or if the current resources are appropriately aligned with demand. The following table shows the frequency of emergency events for the one-year period from July 2011 through June 2012.

Figure 55: Responses by Hour of Day and Day of Week, 7/1/2011 – 6/30-2012

Hour	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Total
Midnight	75	36	45	36	52	38	54	336
1 a.m.	63	35	44	35	31	38	47	293
2 a.m.	53	40	31	28	29	30	48	259
3 a.m.	42	46	25	41	30	24	29	237
4 a.m.	46	28	28	30	29	30	33	224
5 a.m.	32	23	36	41	38	41	37	248
6 a.m.	34	48	56	42	36	33	38	287
7 a.m.	55	73	49	58	55	68	47	405
8 a.m.	56	88	73	57	64	71	68	477
9 a.m.	74	92	94	104	96	91	65	616
10 a.m.	95	99	99	111	110	117	94	725
11 a.m.	107	112	93	90	101	129	110	742
Noon	89	84	88	93	97	116	139	706
1 p.m.	95	94	87	93	102	135	121	727
2 p.m.	90	94	97	107	98	119	107	712
3 p.m.	107	107	105	106	96	116	118	755
4 p.m.	106	104	99	100	110	130	104	753
5 p.m.	85	106	79	100	83	111	82	646
6 p.m.	98	106	82	81	95	115	86	663
7 p.m.	76	102	104	92	92	79	91	636
8 p.m.	73	82	66	97	99	88	83	588
9 p.m.	88	53	79	71	83	69	91	534
10 p.m.	65	67	66	52	71	66	97	484
11 p.m.	44	52	52	53	36	62	69	368
Total	**1,748**	**1,771**	**1,677**	**1,718**	**1,733**	**1,916**	**1,858**	**12,421**

The majority of the events are clustered, not surprisingly, around the 12-hour period from about 9 a.m. to 9 p.m. In fact, about two thirds of all calls fall within this 12-hour period. ESCI also examined the individual agencies to evaluate if there are staffing options that would provide supply sufficient to meet the system demand.

Figure 56: Responses by Hour of Day and Day of Week - CVAA, 7/1/2011 – 6/30-2012

Hour	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Total
Midnight	57	34	40	24	47	25	44	271
1 a.m.	55	27	33	27	25	25	39	231
2 a.m.	45	35	26	21	26	19	43	215
3 a.m.	39	32	20	38	25	17	24	195
4 a.m.	35	21	22	26	19	24	22	169
5 a.m.	22	19	32	35	32	31	28	199
6 a.m.	26	37	42	29	30	23	24	211
7 a.m.	44	59	41	47	43	60	41	335
8 a.m.	45	73	50	42	51	51	50	362
9 a.m.	57	70	75	82	64	72	55	475
10 a.m.	67	82	80	92	86	84	72	563
11 a.m.	73	83	70	63	80	100	91	560
Noon	72	67	67	81	75	88	113	563
1 p.m.	72	82	74	70	87	107	97	589
2 p.m.	69	79	74	91	80	98	88	579
3 p.m.	81	90	81	77	89	91	95	604
4 p.m.	81	92	76	84	90	101	79	603
5 p.m.	63	90	60	87	64	89	66	519
6 p.m.	73	81	63	63	77	94	68	519
7 p.m.	61	78	82	71	64	65	66	487
8 p.m.	66	67	56	81	81	70	66	487
9 p.m.	72	43	57	57	68	53	69	419
10 p.m.	53	55	51	42	58	58	74	391
11 p.m.	39	44	41	44	29	49	65	311
Total	**1,367**	**1,440**	**1,313**	**1,374**	**1,390**	**1,494**	**1,479**	**9,857**

Figure 57: Responses by Hour of Day and Day of Week – Anacortes FD, 7/1/2011 – 6/30-2012

Hour	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Total
Midnight	11	1	4	8	5	8	10	47
1 a.m.	5	8	9	6	4	12	8	52
2 a.m.	7	5	4	6	2	6	5	35
3 a.m.	2	13	2	3	5	5	4	34
4 a.m.	6	5	6	3	7	5	3	35
5 a.m.	7	4	2	4	6	8	6	37
6 a.m.	7	10	10	10	5	8	11	61
7 a.m.	10	14	7	10	11	7	5	64
8 a.m.	9	13	18	11	8	16	16	91
9 a.m.	13	20	18	19	24	16	8	118
10 a.m.	14	14	17	17	18	29	20	129
11 a.m.	18	16	16	15	17	18	17	117
Noon	14	12	11	10	17	16	9	89
1 p.m.	21	9	7	23	14	14	16	104
2 p.m.	13	13	13	13	17	16	15	100
3 p.m.	24	11	20	16	6	21	13	111
4 p.m.	20	12	20	10	18	22	15	117
5 p.m.	17	12	15	10	11	17	11	93
6 p.m.	18	13	10	15	15	15	15	101
7 p.m.	7	12	20	13	17	9	22	100
8 p.m.	4	11	9	10	12	12	14	72
9 p.m.	14	8	15	7	10	7	20	81
10 p.m.	12	11	9	7	6	3	18	66
11 p.m.	5	3	7	3	5	9	2	34
Total	**278**	**250**	**269**	**249**	**260**	**299**	**283**	**1,888**

Figure 58: Responses by Hour of Day and Day of Week – Aero-Skagit, 7/1/2011 – 6/30-2012

Hour	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Total
Midnight	7	1	1	4		5		18
1 a.m.	3		2	2	2	1		10
2 a.m.	1		1	1	1	5		9
3 a.m.	1	1	3			2	1	8
4 a.m.	5	2		1	3	1	8	20
5 a.m.	3		2	2		2	3	12
6 a.m.	1	1	4	3	1	2	3	15
7 a.m.	1		1	1	1	1	1	6
8 a.m.	2	2	5	4	5	4	2	24
9 a.m.	4	2	1	3	8	3	2	23
10 a.m.	14	3	2	2	6	4	2	33
11 a.m.	16	13	7	12	4	11	2	65
Noon	3	5	10	2	5	12	17	54
1 p.m.	2	3	6		1	14	8	34
2 p.m.	8	2	10	3	1	5	4	33
3 p.m.	2	6	4	13	1	4	10	40
4 p.m.	5		3	6	2	7	10	33
5 p.m.	5	4	4	3	8	5	5	34
6 p.m.	7	12	9	3	3	6	3	43
7 p.m.	8	12	2	8	11	5	3	49
8 p.m.	3	4	1	6	6	6	3	29
9 p.m.	2	2	7	7	5	9	2	34
10 p.m.		1	6	3	7	5	5	27
11 p.m.		5	4	6	2	4	2	23
Total	**103**	**81**	**95**	**95**	**83**	**123**	**96**	**676**

We note that the total numbers for each of the agencies is somewhat different than the numbers reported by the agencies. The numbers reported by ESCI are taken directly from the dispatch information provided by Skagit County 9-1-1. The agencies do not report on the number of events that do not qualify as a "call", such as those dispatches that are cancelled before the unit reports its enroute time. Further, we note that in many cases the information reported by agencies is inconsistent with that reported by the CAD system in the dispatch center.

✓ **Observation.** There is significant hourly variance in the call demand for CVAA—some hours of the day have nearly three times the number of calls as other hours. Yet the staffing for CVAA does not vary despite this demand variance.

Call Concurrency

The time-of-day analysis shows the number of calls that occur during each hour of the day during the one-year period. While the data describes the busiest hour of the busiest day (Saturday) as having 139 events, this number of events is spread out over 52 Saturdays—more than 2.5 calls per day. If equally distributed, we would not consider that these demands are sufficient to require additional resources. However, on some days, multiple calls occur during the same hour and during other days no calls occur during that hour. The multiple calls create excess demands on the system and tend to confound the ability of the EMS system to adequately plan for responses. As such, combining the day-of-week and time of day analyses, and counting the number of "multiple hits" that occur during each day, allows the system to evaluate the requirements on the system.

Concurrency refers to the number of times that calls occur at the same time in the system. "Occurring at the same time" means that one or more calls are in process when another event happens[61]. ESCI evaluated the concurrency of calls in the Skagit County EMS system. Those data, for each of the agencies, are described in the following tables.

Figure 59: Call Concurrency – CVAA, 1/1/12 – 6/30/2012

Call Concurrency[62]	Number	Percent
Single Events	1,449	56.03%
Two Events	694	26.84%
Three Events	295	11.41%
Four Events	88	3.40%
Five Events	43	1.66%
Six Events	11	0.43%
Seven Events	3	0.12%
Eight Events	2	0.08%
Nine Events	1	0.04%
More than Nine	1	0.00%

We note that during the study period[63] the system responded about 44 percent of the time to calls occurring at the same time. Further, the data show that CVAA exhausted its ambulance resources[64] (four deployed ambulances) almost 150 times during the six-month study period—nearly once per day.

[61] We measure concurrency based on events. As such, if a single event requires more than one ambulance, it is still considered a single event. Therefore, the concurrency data tends to understate the actual demand on the system.

[62] The MyStateUSA data shows that the "last unit out" occurred approximately 80 times during the same 6-month period. This data is consistent with the potential for units to clear the hospital as resources get low and for dispatch errors when the last unit out page does not occur. Between the MyStateUSA and the dispatch data, we estimate that CVAA exhausts its resources once every one or two days.

[63] In this instance, we used a study period of 6 months: from January 1, 2012 through June 30, 2012, so as to avoid the consideration of the Aid Unit in the analysis. The Aid Unit ceased operations on December 31, 2011.

Figure 60: Call Concurrency – Anacortes FD, 7/1/11 – 6/30/2012

Call Concurrency	Number	Percent
Single Events	1,124	76.99%
Double Events	272	18.63%
Three Events	45	3.08%
Four Events	12	0.82%
Five Events	5	0.34%
Six Events	2	0.14%
Seven Events	0	0.00%
Eight Events	0	0.00%
Nine Events	0	0.00%
More than Nine	0	0.00%

Naturally, a lower number of calls in an area leads to a decreased likelihood of concurrent calls. In Anacortes, the call concurrency is much less than in the Central Valley. Similarly, the call concurrency for Aero-Skagit is even less than in Anacortes.

Figure 61: Call Concurrency – Aero-Skagit, 7/1/11 – 6/30/2012

Call Concurrency	Number	Percent
Single Events	393	86.18%
Double Events	26	5.70%
Three Events	30	6.58%
Four Events	4	0.88%
Five Events	3	0.66%
Six Events	0	0.00%
Seven Events	0	0.00%
Eight Events	0	0.00%
Nine Events	0	0.00%
More than Nine	0	0.00%

The system overseers must evaluate call concurrency not only in the context of the number of concurrent calls, but also in the context of the impact on the region when concurrent calls occur. The system must determine whether additional resources are needed in the system or if there are creative methods to meet the public service needs when concurrent calls occur.

[64] We consider that calls occurring during the same hour are concurrent because, as will be shown later, calls take about an hour to complete. Of course, some might argue that calls occurring in the same hour may not be concurrent if one call is complete before another begins. However, it is also true that calls occurring near the end of the previous hour may also be concurrent. As such, we believe that calls occurring in the same hour are a reliable, although not exact, estimate of concurrent calls.

Service Intervals

Analysis of the time it takes for CVAA to complete a call,[65] or the "service interval," reveals that an emergency ambulance call takes approximately 1 hour (with 90 percent reliability) to complete—regardless of whether a transport occurs. Ambulance agencies typically require a longer time than fire agencies to complete each call, but fire agencies often require more than one unit to serve an EMS event. As such, the level of effort required for fire agencies to provide services may be more significant.

The longer it takes to serve a customer, the less likely the provider will be available to respond to additional events. Most studies conducted across the United States show that the average time to complete a call is slightly less than one hour—usually between 45 and 56 minutes. If the service time is one hour, the responder can serve exactly one customer; in a 45-minute service time, the ambulance can service 1.33 customers.

Figure 62: CVAA Service Intervals

Service Intervals		Number	Percent	Cumulative Percent
< =	0:10:00	1,106	14.09%	14.09%
< =	0:14:00	436	5.55%	19.64%
< =	0:18:00	616	7.85%	27.48%
< =	0:22:00	865	11.02%	38.50%
< =	0:26:00	937	11.93%	50.43%
< =	0:30:00	874	11.13%	61.56%
< =	0:34:00	717	9.13%	70.70%
< =	0:38:00	565	7.20%	77.89%
< =	0:42:00	451	5.74%	83.63%
< =	0:46:00	311	3.96%	87.60%
< =	0:50:00	226	2.88%	90.47%
< =	0:54:00	150	1.91%	92.38%
< =	0:58:00	111	1.41%	93.80%
< =	1:02:00	75	0.96%	94.75%
< =	1:06:00	55	0.70%	95.45%
< =	1:10:00	39	0.50%	95.95%
< =	1:14:00	31	0.39%	96.34%
< =	1:18:00	27	0.34%	96.69%
< =	1:22:00	13	0.17%	96.85%
< =	1:26:00	16	0.20%	97.06%
< =	1:30:00	15	0.19%	97.25%
	More	216	2.75%	100.00%
	Total	**7,852**	**100%**	

[65] That is the time from when the response unit is first notified of the event until it is available to respond again.

Anacortes Fire completes calls in about the same time as CVAA. This has the effect of reducing the concurrency issue for Anacortes Fire and the Anacortes area, although there are some calls that take an inordinate amount of time. We expect that these calls are the result of transports to out-of-area hospitals.

Figure 63: Anacortes FD Service Intervals

Service Intervals	Number	Percent	Cumulative Percent
< = 0:10:00	183	11.58%	11.58%
< = 0:14:00	102	6.46%	18.04%
< = 0:18:00	156	9.87%	27.91%
< = 0:22:00	203	12.85%	40.76%
< = 0:26:00	210	13.29%	54.05%
< = 0:30:00	209	13.23%	67.28%
< = 0:34:00	150	9.49%	76.77%
< = 0:38:00	88	5.57%	82.34%
< = 0:42:00	68	4.30%	86.65%
< = 0:46:00	38	2.41%	89.05%
< = 0:50:00	27	1.71%	90.76%
< = 0:54:00	10	0.63%	91.39%
< = 0:58:00	9	0.57%	91.96%
< = 1:02:00	10	0.63%	92.59%
< = 1:06:00	7	0.44%	93.04%
< = 1:10:00	2	0.13%	93.16%
< = 1:14:00	2	0.13%	93.29%
< = 1:18:00	4	0.25%	93.54%
< = 1:22:00	3	0.19%	93.73%
< = 1:26:00	2	0.13%	93.86%
< = 1:30:00	3	0.19%	94.05%
More	94	5.95%	100.00%
Total	**1,580**	**100%**	

Aero-Skagit, on the other hand has significantly longer service times than either CVAA or Anacortes. With 90 percent reliability, Aero-Skagit takes roughly 90 minutes to complete a call.

Figure 64: Aero-Skagit Service Intervals

Service Intervals		Number	Percent	Cumulative Percent
< =	0:10:00	40	8.37%	8.37%
< =	0:14:00	12	2.51%	10.88%
< =	0:18:00	20	4.18%	15.06%
< =	0:22:00	21	4.39%	19.46%
< =	0:26:00	14	2.93%	22.38%
< =	0:30:00	18	3.77%	26.15%
< =	0:34:00	16	3.35%	29.50%
< =	0:38:00	22	4.60%	34.10%
< =	0:42:00	14	2.93%	37.03%
< =	0:46:00	15	3.14%	40.17%
< =	0:50:00	23	4.81%	44.98%
< =	0:54:00	22	4.60%	49.58%
< =	0:58:00	28	5.86%	55.44%
< =	1:02:00	29	6.07%	61.51%
< =	1:06:00	35	7.32%	68.83%
< =	1:10:00	31	6.49%	75.31%
< =	1:14:00	23	4.81%	80.13%
< =	1:18:00	20	4.18%	84.31%
< =	1:22:00	15	3.14%	87.45%
< =	1:26:00	11	2.30%	89.75%
< =	1:30:00	10	2.09%	91.84%
	More	39	8.16%	100.00%
	Total	**478**	**100%**	

Because of the long service intervals, the concurrency issues are exacerbated and could lead to coverage issues when units are out of service for long periods of time.

Critical Issues Related to the Skagit County EMS System

EMS in Skagit County is unique. Though there are three ambulance providers, the providers each represent a virtually isolated EMS system and each has its own structure for providing services. There is little opportunity for mutual aid because of the distances between the providers; yet the county provides some level of oversight and is in a position to ensure that services are provided and are appropriate to the respective communities. The county provides significant funding for the provision of ambulance service, which ensures some level of financial stability but limits the financial incentives for providers to maintain either fiscally or operationally responsible practices.

However, while the county ambulance system is unique, the delivery of the service is consistent with what can be found elsewhere—callers dial 9-1-1 for services, ambulances and first responders respond and deliver medical care, and patients are delivered to medical facilities at which they receive definitive care. With these differences and similarities, the system has the opportunity to make improvements in the context of the future plan for emergency medical services.

With the recent passage of the tax levy for EMS, the county is now poised to make improvements that will define the system for the next decade or more. However, if the providers expect to make substantive changes for the future, the system participants will have to address a number of critical issues related to the complexities of the existing system. Importantly, these changes should be able to show improved medical quality, to describe operational reliability in the context of response times and financial efficiencies. The following are critical issues that will have to be addressed to accomplish the future goals for the system.

System Fragmentation. The EMS system in Skagit County is fragmented. The system is designed around a historical ambulance model that doesn't consider other resources; in fact, the system can't even universally track when a first arriving responder arrives on the scene. Commonly applied quality assurance measures are not available throughout the system. A more integrated EMS system should be designed to resolve these issues.

A future plan creates opportunities for the agencies to make use of expertise contained within other participants in the county. For example, fire agencies in the central valley are recognized for their expertise in rescue, provider health and safety, rapid response, and managing large complex incidents. CVAA is recognized for its medical expertise. In a future system design, these synergies should be maximized within the participating departments to ensure the service delivery is enhanced.

Governance. The nature of the governance structure must be resolved as part of the future system design. Currently, the county has delegated part of its authority but none of its responsibility to the Skagit County EMS Commission to oversee EMS. The EMS Commission negotiates contracts and facilitates the commission meetings which provide some level of oversight. In ESCI's evaluation, it became clear that at times providers failed to meet their contractual requirements—thereby placing the

county at both legal and financial risk—and the EMS Commission did not take remedial action with the providers.

Further, the County is ultimately responsible for both the CVAA as well as the EMS Commission. Because both the County and the EMS Commission have the responsibility for overseeing the EMS system, there is potential to create some conflict in the long term. The management plan for ambulance service should include a recommendation for a governance structure that meets the management needs of the system.

Equitable Distribution of EMS Levy Revenues. The distribution of the EMS levy is predicated primarily on providing a subsidy for agencies engaged in the transport of patients. While some contributions to first responder agencies exist, the distribution of the levy is not reflective of system-wide support. There are no financial performance incentives within the current contracts to reward providers in lowering service delivery cost. Furthermore, there does not appear to be consistency in the billing processes or collection rates between the transport agencies, which can adversely impact total revenue available to support the system and greater reliance on the tax levy to support the providers.

Financial reporting to the EMS Commission in its current format limits the ability of the Commission to understand the financial strength of the provider agencies in their support of the overall system design. Subsequently, transport provider financial support through the levy is predicated on historical design, automatic annual increases in financial support, and individual agency requests for additional funding. Through the management plan, the EMS Commission has the opportunity to ensure that the distribution of the levy takes into consideration all agencies that have a functional role and participation in the system and thereby provide financial support for an integrated EMS system through a redesign of the current distribution methodology and inclusion of all revenue sources as a basis for determining appropriate levy support.

Data Insufficiency. The data in the system is highly flawed, insufficient, and may not be complete. During interviews with EMS system participants, we learned that system participants do not have confidence in the data provided by the dispatch system. Part of that is due to the dispatch computer system, which is not designed for the types of reporting and information collection required by the EMS system. System participants also commented that the data captured by the dispatch center, especially arrival and turnout times, may be flawed. The dispatch CAD system receives manual entry from dispatchers based on the status report by field units. That means when a unit reports that it has arrived on the scene, a dispatcher confirms that message by radio and enters the arrival manually into the computer. The radio message and the data entry are discontinuous—that is, if the radio message is not confirmed the data could still be entered, or if the message is confirmed the data may not be entered. A quality process must be in place to fix the existing issues and diligently support the long-term goals of having high-quality, accurate, and reliable data with which to make system improvements.

Contract Compliance. ESCI believes that the county contract for the ambulance service is a level-of-effort contract rather than a performance contract. The contract is level of effort in that it requires the number of ambulances to be deployed, the hours that they will be deployed, and the locations at which they will be deployed. While the contract also establishes performance requirements, it is difficult for the EMS Commission to hold an ambulance service responsible for performance when the provider has very little control over its resources. ESCI believes that a future contract should and could improve compliance by ensuring that the system can quickly deliver appropriate emergency medical resources. This may mean that paramedics arrive on the scene within appropriate timeframes irrespective of whether they arrive on an ambulance, a quick response vehicle, or a fire apparatus.

Further, the contracts are lacking in that they do not set penalties for non-performance and they do not establish methods to identify, define, or cure breach. Yet the wisdom behind the contract is reasonable. The contract should and does specify the number of personnel and their certifications per ambulance; response times for urban, suburban, and rural areas; a quality assurance process; and other appropriate performance measures.

Provider Selection. The current structure of the system has no provisions for provider selection or for replacing providers who are non-compliant with system requirements. The county may wish to retain the option of provider selection when ambulance agencies are unable, unwilling, or otherwise incapable of providing services under the financial and operational terms established by the county.

Integration and Opportunities to Engage First Responders in the System. Current call concurrency leaves large numbers of residents unprotected for substantial periods of time in the system. There are agencies that have the wherewithal and willingness to both respond and transport patients as needed. Further, there are a number of opportunities to engage BLS providers in many of the more rural fire districts. Engaging both BLS and ALS fire agencies means that the county must develop methods to establish requirements for participation in the EMS system and at the same time provide financial incentives for that participation.

Shift Structure and Staffing for CVAA (i.e., two paramedics and 24-hour shifts). IAFF members have served the community for decades and have substantial knowledge of EMS service delivery. Yet the IAFF local responsible for CVAA has multiple and significant economic incentives to maintain the status quo in the system. An integrated system will allow IAFF leaders, fire department leaders, ambulance leaders, and county leaders to consider changes to service delivery. Contract changes will be forced not by changes to the system but rather by challenging financial conditions, personnel shortages, and operational considerations. These changes will require participative negotiations with the IAFF leadership, beginning with the 2013 contract.

Quality Assurance and Continuity of Care. The existing quality assurance process is structured as a component of the ambulance service. However, there are opportunities to ensure that the quality model is deployed more effectively system wide. There is currently no contemporary, professional in-

house quality model that evaluates and improves the quality of the medical care throughout the continuum from dispatch through delivery of the patient at the hospital.

The continuity of care is not currently considered in the structure of the system. Because of the multiple handoffs between dispatch agencies, service providers, and others, opportunity exists for significant discontinuities in the medical care of patients. Does this degrade medical outcomes? No one is sure, because neither this nor many other aspects of EMS have been studied. ESCI believes that the more handoffs that are made in a system without a structured way to ensure continuity, the more risk for patients.

Management Plan Discussion

ESCI has been tasked with assisting Skagit County in developing a plan for the future of EMS in the county. In this process, we have identified the existing status of the system and have considered the financial, operational, legal and long-term issues facing the county and its emergency medical system structure.

Critically, the county must have a process in place to ensure patients have access to high-quality medical care, the system is resilient, and operating processes are scalable to account for variability in demand. All of these processes must consider that the financial structure is limited: the federal and state payers of ambulance service will not increase payments for ambulance service, the ability to generate additional revenue from the tax levy is constrained by both state law and economic growth, and other options for health care financing structures are largely unknown. Regardless, the participants in the existing EMS system are now faced with competing for more and more scarce dollars.

The management plan, therefore, is important to the future of the system. It must ensure that the critical issues previously identified are addressed, that the participants in the system move toward resolving the fragmented nature of the system, and that more system participants—including first responders and other health care providers—are engaged in achieving the outcome goals of the system.

System Plan Discussion

The Skagit County EMS Commission and the Skagit County Commissioners are now faced with the unique opportunity to establish a management plan that will make substantive improvements in the design of the emergency medical system. We have noted that there continues to be strong internal pressure by some system participants to maintain the status quo while others seek significant changes. The initial design of the options considered both possibilities. ESCI has made its recommendations based on a reasoned approach to evaluating EMS system design. We have evaluated the system based on contemporary professional standards and have considered the local operating, governance cultural, and political and financial environments as the basis for our recommendations.

In evaluating the potential changes to the system, EMS participants should consider how each of the possible options will affect the current system and how those changes will affect outcomes—not just medical outcomes, but patient satisfaction outcomes, financial outcomes, and sustainability outcomes. Any changes to the system in the absence of establishing performance criteria will limit the ability of the system participants to make substantive improvements. In the absence of establishing performance criteria, selecting any option will have roughly the same impact on the community. Irrespective of the option selected, financial, response time, and medical performance must be carefully monitored. While each of the options we have provided has both advantages and disadvantages, there may be additional derivations of options and considerations other than those articulated in this report.

ESCI believes that in order for the status quo or any changes to be successful in the system, the commissioners must first determine the governance options that will be in place to guide the system

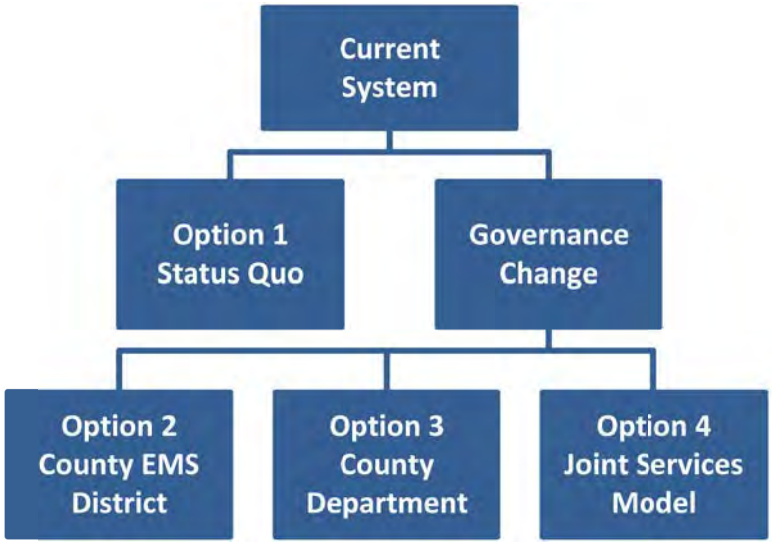
into the future. The governance selection is the key to establishing solutions to the other critical issues facing the county's EMS system.

Summary of System Governance Options

As we have previously noted, any changes to the system in the absence of establishing performance criteria will limit the ability of the system participants to improve performance. That is why we believe that financial, response time, and medical performance must be carefully monitored irrespective of which option is selected. While each of the options has both advantages and disadvantages, there may be additional options and considerations other than those articulated in the report. In fact, we believe that some components of each option could ultimately play a role in developing an appropriate system design for Skagit County.

The following figure describes the basic options available to the local EMS system. The system as it currently exists can opt to remain with the status quo or can make changes in any of three major ways. For the purposes of this report, the additional options will be described under the most common or likely scenarios, however, with each scenario, a number of potential permutations may impact either the operations or financing of the system.

Figure 65: System Governance Options



Option 1: Status Quo - Continue with current basic system, including the current transport model for ambulance service while making certain marginal improvements based on the recommendations in this report.

Option 2: County EMS District – Establish a county-wide EMS district in accordance with RCW 36.32.480. Negotiations will be required to establish a district that includes the boundaries of incorporated cities. Though governed by the county and local cities, the district is an independent entity with funding that could include six-year or ten-year levies or a permanent levy.

Option 3: County Department – The county commissioners could merge the current oversight provided by SCEMSC with a county department; the Public Health Department is the most likely candidate. Merging SCEMSC into a county department provides the opportunity to ensure that the county authority and responsibility is aligned with the selected governance structure.

Option 4: Joint Services Model – Provide oversight through a structure that establishes an independent oversight agency through joint powers agreements (JPAs) or intergovernmental agreements (IGAs). The oversight agreement will provide a governance structure that oversees financial as well as operational activities. Each of the participants in the IGA will support the system financially, as well as provide strategic oversight over system direction.

ESCI believes that each of the possible options will affect the current system and those changes will affect not only the ability to implement other options, but could also impact outcomes—patient outcomes, satisfaction, financial sustainability, as well as the ability to integrate with healthcare changes in the future. The basic options and their primary system impacts are described more fully below. Because each option may itself be comprised of a number of different nuances, not all of the potential ramifications are discussed.

Option 1: Status Quo. The "status quo" option assumes that SCEMSC will continue with the current transport system and operate it in essentially the same manner. However, "status quo" is probably a misnomer. System stakeholders most likely will demand improvements to the system and there will continually be funding equity issues that will ultimately be resolved by the Commissioners. ESCI has already articulated improvement opportunities necessary to make the system more functional in the preceding sections.

Continuing with the current system presupposes that the current number of EMTs and paramedics remains substantially the same. EMS training costs and advertising/marketing costs are stable, that the management structure remains, and that the system continues to respond to an equal number of EMS calls.

The status quo option will require additional resources be applied to the system so that response times and accountability can be improved. It will also require that certain adjustments occur in stakeholder subsidies to restore a sense of fairness among participating agencies.

This option would cause minimal EMS system impact and provide for a limited number of system improvements. It would also require buy-in from the current ambulance providers and would possibly

have the lowest cost. However, in the face of the existing perception of financial inequity, the EMS Commission will continue to be frustrated. The board will believe (and perhaps appropriately so) that Skagit County receives a lower level of service than it could achieve with other system improvements.

Option 2: County EMS District. A County EMS District can be established by the county commissioners in the unincorporated area of the county (36.32.480 RCW), and throughout the county with the participation of the cities. Covering the entire county will require an interlocal agreement with the cities, and the governance will be provided directly by the county commissioners or as described in the inter-local agreement.

A County EMS District provides a number of advantages. First, the district has the financial advantage of a six-year levy, a ten-year levy, or a permanent levy[66]. To that end a County EMS District could have the ability to stabilize or potentially improve financial considerations in the long term. Second, the County EMS District could diffuse the potential legal liability, which currently rests almost exclusively with the county. Because the governance structure will necessarily be made up of both cities and counties, we assume that the interlocal agreements establishing the district as well as the governance structure would necessarily dilute the county's share of the liability. Third, establishing a county EMS district does not require a countywide vote. A public hearing and an ordinance are required to establish a district.

This option would establish a different governance structure for the county EMS System. The county commissioners or a cadre of elected officials including the county commissioners and city councilors would oversee the EMS District, set policy, and establish methods to deliver services in the county. A functional joint process with City and County oversight could adopt the best of what is currently available in the system as well as develop additional improvements as described in this report. This option could solidify relationships between the cities and the county.

Option 3: County Oversees EMS through the Public Health Department. The existing EMS system governance structure would be transferred to the county public health department. Engaging a county department to oversee ambulance service and other components of EMS is a common governance model in the United States. Many counties charged with EMS oversight do so through county departments and a common selection is public health.

The public health department could establish methods to achieve stakeholder participation through the development of an EMS Council to provide advice to the public health director; it could establish a citizens' advisory committee to provide input on EMS or some combination of the two.

The county department governance model improves the liability risk to the county because the county transfers some of its authority but none of its responsibility through the existing model. In the department model, the county public health department would receive all funds from the EMS levy, allocate those funds through contracts with the department, and engage in contracts with providers.

[66] Municipal Research and Services Center of Washington, December 2012

Importantly, through this model the public health department would have the authority to both enter into contracts and enforce performance measures.

This model recognizes the role that the county provides to all aspects of ambulance service throughout the area and allows the "market" to help drive the system. Under this system structure, the county is free to establish its transport services presuming that the voters continue to fund the system through the EMS system levy. In this model, the county is free to establish methods to ensure that the system is fully integrated by overseeing the transport, first response, medical control, and response time criteria to make enhancements in the system.

Using this model, the Public Health Department would replace the EMS Commission with an advisory committee to provide insight into the operation of the EMS system. Operating independently, the Public Health Department can make improvements based on the medical need of the community. The department can prioritize how EMS healthcare dollars will be used to support out-of-hospital patients and can focus public health attention on activities such as training and prevention. Further, a county-based management structure can oversee both first response and ambulance transport, thereby achieving economies of scope in regulating the service.

Finally, the full cost of the public-health/county department model may not be easily identifiable. System overseers, regulators and the public may not know precisely what they are paying for emergency medical services, nor could they easily articulate the outcomes of that cost. As such the system could suffer from actual or perceived cost issues.

Option 4: Joint Services Model. The "joint services" option assumes that the agencies in the central valley[67] create a joint service delivery process that provides a functionally integrated EMS delivery system operating without regard for jurisdictional boundaries and instead for the best interest of the larger community.

In Option 4, Mount Vernon Fire, Burlington Fire, and potentially Sedro Woolley Fire would establish a model that provides for oversight participation by the agencies. The oversight structure would be organized through an intergovernmental agreement (IGA) with a governance structure and contribution structure established by the IGA. The fire agencies would coordinate levels of first response and extend those response levels to participate at some level with the transport component—contributing labor, capital, transport capability, and response performance in return for participating in the overall revenue structure of the system.

The agencies may establish an oversight body for emergency transport services that allows fully functional methods of aggregating data on response performance and financial performance of the system. In addition, providing a comprehensive oversight structure will allow agencies to participate in

[67] We note here that the central valley is the predominate focus of the joint services model, because we believe that the most significant integration improvements can arise in the central valley area. That is not to suggest that there could not be benefits in other areas of the county, only that they are most prominent in the central valley.

the response performance oversight as well as the obligation to contribute to the system. The structure could provide for the evaluation of the transport component by other public safety agencies and could ensure faster paramedic response times as well as the ability for the IGA to control broader ranges of service.

Finally, an IGA could re-evaluate and potentially redesign the costing structure of the service based on operational needs and determine if the taxpayers can or should subsidize the service to greater or lesser levels. Importantly, this structure could give agencies some additional level of control over the services while they provide commensurate contributions to the infrastructure costs of the systems.

An IGA overseeing the CVAA EMS system can often ensure that the patient receives coordinated services from first response to ambulance transport—medical care throughout the incident until arrival at the hospital. This continuity provides EMS systems with better tracking of quality assurance issues. In addition, the system can ensure that all scene responders are integrated into an appropriate incident command system and that the on-scene resources are centrally coordinated.

However, the IGA process alone does not ensure success in the system. All participating agencies—including their management teams and elected officials—must be fully committed to the goals established through the IGA process. A failure on any side to seek the success of the process could lead to a disintegration of the IGA and later degradation of EMS services. Further, the presence of an IGA in Skagit County may lead adjacent agencies to reconsider their system structures, thereby causing opportunities or friction in areas outside of the central valley but within the County.

Summary of Strategic Initiatives to Improve the EMS System

In the system analysis component of its report, ESCI identified a number of critical issues, which to be resolved must be addressed by a number of associated strategic initiatives. ESCI's recommendations, therefore, consider that for the system to be successful, these initiatives must be aligned with the critical issues. Though there are multiple critical issues, we categorize the strategic initiatives into four general categories: the financing plan; the fragmentation reduction plan; the data sufficiency, accuracy, and quality management plan; and the shift structure and deployment plan. The following describes each of the strategic initiatives in turn, and then the recommendations explain which of the potential options ESCI recommends to have the greatest likelihood of success in the system.

System Financing Options

There are three component elements of revenue that support the delivery of advanced life support and pre-hospital treatment for the citizens of Skagit County. These sources include local tax support through the EMS tax levy; revenue generated by the provider of ambulance transport services through user fees (ambulance transport fees); and support provided by local government agencies either directly or indirectly through the utilization of facilities and equipment, principally within the respective fire districts and additional financial support provided by the respective jurisdictions. Each of these component elements contributes to the financial support for the delivery of services and each of these

funding mechanisms are subject to both internal and external influences in their ability to generate sufficient revenue to support operations.

As significant as revenues are to ensuring a financially stable EMS system, the cost of operating the system are equally important. Determining the optimal method for distributing the EMS levy cannot be done in isolation and without considering the cost of providing essential services or other elements of financial support available to the system.

Various studies have been conducted to calculate the cost of providing ambulance service across the broad spectrum of providers and communities throughout the country. The source for the majority of these reports has been the federal government in their efforts to determine if Medicare, the principal federal payer for ambulance service transports, is reimbursing the industry for actual costs incurred in the provision of patient transport services. In addition, provider organizations such as the American Ambulance Association, the International Association of Fire Chiefs, and the International Association of Fire Fighters have conducted cost studies for the provision of ambulance transport services. Information generated from these cost studies have been highly variable, recognizing the substantial differences in the type of agency delivering the service, complexity of allocating actual service level cost with other public safety services, level of services provided, and geography being served. It is clear from our analysis that Skagit County is reflective of all of these differences, given the types of service agencies and the geographies of their service areas.

Determining how to finance the delivery of emergency medical services is further complicated by the diversity of the agencies providing patient transport services and the independent control exercised over patient transport revenues generated through this service delivery. Further, the allocation of public funds is compounded by the expectation that there should be an equitable return in service delivery based on the contributions made by the individual jurisdictions to the EMS levy. All of these factors make it imperative that the distribution of financial resources is equitable and supportive of all system participants.

Potential Funding Options

There are multiple options available to the Skagit County EMS System on how to effectively fund the delivery of advanced life support services to the citizens of the County. Because the system transport revenues reflect a disproportionate number of transports in which the reimbursement is capped at a pre-determined rate (Medicare), the method by which public funds (EMS Levy) are allocated will be critical to ensure effective financial support for the EMS System.

In light of the diversity of service delivery methods, the significant differences in patient transport volume, as well as geographic factors that influence cost, there are various options available for revenue distribution to the participating agencies within the Skagit County EMS System. Irrespective of the method selected for ensuring financial stability of the system, all component elements of revenue to support the system including transport revenues and other levels of local financial support should be taken into consideration for determining how levy revenues available to the system should be

distributed. Ultimately, system design will have a significant influence on how to allocate scarce public resources. There are three principal financing methodologies available to the Commission:

- Option 1: Status Quo - Maintain the status quo in which the transport providers receive the bulk of the EMS levy based on a historical per unit rate with an automatic annual increase and in some cases additional financial support predicated on individual agency requests. Maintaining the status quo does not prevent the system from making certain marginal improvements in the levy allocation.
- Option 2: Average Transport Cost - The second method would modify the current system which reimburses transport agencies on a per-unit basis to a regional average per unit cost for transport providers. This approach recognizes that transport resources are strategically positioned within the EMS system. This approach creates various incentives for developing efficiencies in service delivery within transport provider organizations.
- Option 3: Integrated System Cost Methodology – The third method would allocate resources in a manner that funds the necessary infrastructure to maintain system readiness, first response, and transport capability based upon the recommended governance model employed by the system.

The Skagit County Commissioners are limited in their ability to control the financial requirements of ensuring a stable EMS system recognizing that patient transport revenues are solely within the control of the transport providers. As such, providers who spend more than they are contracted to provide are incented to do so when levy revenues reward that overspending. However, with the EMS levy providing an estimated 50 percent of financial support for ambulance services, the Commissioners are positioned to ensure that services are being delivered cost effectively and efficiently. The capacity to control system cost should be an integral component of any decision to determine which funding model is the most appropriate methodology to ensure that citizens receive a high quality, effective and efficient emergency medical response system.

Option 1: Status Quo. The "status quo" option assumes that the SCEMSC will continue with the current transport system and operate it in the essentially the same manner. It should be recognized that some marginal improvements can be made to the current system of financial support including:

- Establishing a standard process for determining annual requests for increasing transport provider subsidy based on a regional or national economic metric such as the CPI.
- Establishing a process for increasing transport provider fees.
- Developing contract requirements consistent with service level being provided and expected.
- Ensuring conformance with contract specifications and requirements as a basis for levy support.

This option is easiest to implement because it does not significantly deviate from historical practice. It would continue to provide the majority of levy revenues to transport provider agencies while minimally addressing the EMS service levels being provided by other participant agencies. The methodology provides funding at the front end of the cost curve in anticipation of additional service demands over

time for which it is providing excess capacity to accommodate. This approach, however, would not insulate the EMS Commission from the argument that the levy should support the entire EMS system of which the transport agencies are but one component.

Option 2: Average Transport Cost Methodology. The average transport cost methodology relies on what the average cost of transporting a patient is for comparative providers in similar jurisdictions. The average cost methodology significantly reduces an agency's ability to influence subsidy support as a result of inefficient service delivery or higher operating costs than those of other similar provider profiles. Utilizing an average transport cost methodology to determine the financial support provided by the SCEMSS to the ambulance service providers should take into consideration the following factors:

- Excess capacity currently being funded and the ability to generate additional patient transport revenues to the transport provider should be accounted for annually in determining the level of financial support provided.
- The actual average cost of providing the service required by the contract should be an integral component of determining overall subsidy support as opposed to the actual cost of the transport provider that may not be consistent with contract requirements.

We note that the SCEMS system is comprised of multiple transport providers with varying degrees of service levels and fixed costs that provide services to significantly different geographical coverage areas. As a result, the average transport costs within the SCEMSS differ significantly with some of the divergence resulting from excess capacity, low volume, and geographical response coverage requirements. Employing an average transport cost approach has the potential to be viewed by the transport provider agencies as simply a method of lowering their financial support from historic norms.

All three providers have similar non-personnel operating costs indicating that the divergence in average cost is determined by the degree of excess capacity in the system and personnel cost. The average cost methodology utilized on an annual basis should reflect a declining requirement for levy support into the future recognizing the abundance of excess capacity to conduct patient transports in the system.

Option 3: Integrated System Cost Methodology. This option recognizes that the EMS system does not consist singularly of transport provider agencies and takes into consideration the role of first responder agencies and their ability to influence system cost by providing both initial response (reducing response times) as well as the capability to add surge capacity to the system when required. In financially supporting an ALS first response capability with existing fire department resources, the EMS system has the ability to modify the current cost structure more effectively and efficiently. For example, an integrated cost methodology can:

- Ensure that advanced life support services are delivered in a timely manner.
- Create the capacity for transport providers to engage in non-emergency service requests.
- Ensure that the system has surge capacity available throughout the system.
- Establish an integrated system of care from the initial call to transport destination.

- Financially recognize the contribution and participation of all providers, providing equity from a fiscal perspective.

Response time requirements are viewed as a critical element of any EMS system. Unfortunately, scientific research is limited with respect to equating fast response times with improved patient outcomes except perhaps in certain sentinel events such as cardiac arrest. However, response time is more than just medical outcomes. For example, the public's expectation is aligned with a rapid response to emergency medical needs. Currently, only the transport provider agencies have response time compliance requirements necessitating the appropriate level of transport infrastructure. Developing a system of integrated ALS and BLS first response along with ALS and BLS transport capability has the ability to lower overall system cost, improving response times, reducing excess capacity, and meeting service levels commensurate with citizen expectations.

Controlling Cost in the Skagit County EMS System

The United States Government Accountability Office (GAO) conducted an analysis of the cost of patient transports from 2004 thru 2007.[68] In its report, the GAO estimated costs of ambulance transports based on a nationally representative survey of 215 ambulance providers that did not share costs with non-ambulance services. Providers that shared costs with other institutions or services and could not report their costs for ambulance services separately (such as fire departments) were excluded because their reported costs appeared unreliable. GAO used its survey, Medicare claims, and other data for its analyses.

The analysis conducted by the GAO included all expenditures consisting not only of annual operating expenses but also capital costs. The provider mix in the GOA analysis primarily reflects private sector enterprises and third-service governmental providers. It should be noted that many private sector enterprises as well as third-service governmental agencies utilize their resources to conduct both emergency and non-emergency patient transports. Agencies that are restricted to 9-1-1 requests only, have a higher cost of readiness as excess capacity is maintained to provide for surge capacity and demand variations

In comparison to national averages that take geography and volume distribution into consideration, only the CVAA approximates national norms with respect to average transport cost.

[68] GAO-07-383 Cost and Expected Medicare Margins vary greatly. This analysis attempted to define the average cost of providing a patient transport.

Figure 66: Average Transport Costs, Local vs. National

COMPARISON OF ESTIMATED AVERAGE TRANSPORT COST BY PROVIDER AND SERVICE LEVEL								
Volume of Transports	CVAA	Anacortes	Aero-Skagit	National[69]	CPI Adjusted National [70]	CVAA	Anacortes	Aero-Skagit
2,000 or Less		X	X	$464	$534		$1,362	$1,854
6,000 or More	X			$330	$380	$568		
Transport Mix (ALS)	X	X	X	$476	$548	$568	$1,362	$1,854
Service Area								
Urban	X	X		$358	$412	$568	$1,362	
Rural			X	$420	$484			$1,854
Productivity								
0.12 UHU		X	X	$437	$503		$1,362	$1,854
0.64 UHU				$386	$445	$568		
Local Tax Support	X	X	X	$632	$728	$568	$1,362	$1,854

It is unrealistic to expect a low-volume provider such as Aero-Skagit and its geographic coverage requirements of approximately 1,000 square miles to be more cost effective or receive a lower level of subsidy than is currently being provided. It is appropriate to maintain a single-unit response capability to the area for which it has service responsibility.

UHU as a Performance Metric in the Skagit EMS System

The EMS Commission does not control one of the major financial elements of the EMS system—patient transport fees. Any decision regarding the level of subsidy provided to transport agencies should take into consideration the agencies' abilities to generate patient transport revenues. Infrastructure maintained by the transport providers has the capability to generate additional revenues to support their operating costs and reduce the cost to the EMS system. In determining the capacity to generate additional revenue, a measure of productivity commonly utilized in the EMS industry is the unit-hour utilization (UHU)[71] ratio. ESCI has calculated the following UHU ratios for transport providers in the SCEMSS:

[69] Sources: GAO analysis of 2005 GAO Survey of Ambulance Services and 2004 Medicare claims.
[70] Here we adjusted the National 2005 rate to 2011 equivalents using CPI-U total growth rate 15.18 percent. U.S Department of Labor, Bureau of Labor Statistics
[71] Unit Hour Utilization Ratio (UHU) – A performance ratio that describes the number of transports achieved in a given period of time with a fully staffed and capable transport unit.

Figure 67: Skagit County UHU Rates, 2011

Skagit County EMS System Unit Hour Utilization Rates	
Central Valley Ambulance Authority	0.19
Anacortes FD	0.09
Aero-Skagit	0.09

Essentially all three providers have excess capacity that can be utilized as revenue producing hours of production. For instance, in fire-based EMS systems it is not uncommon to have UHUs of 0.20 given the dual role responsibility of personnel and responsibilities associate with their fire suppression function.

A UHU of 0.20 reflects approximately five patient transports in a 24-hour period. On an annual basis the agency theoretically has the capability to transport 1,825 patients utilizing one transport unit. The current contract requires Anacortes to provide two staffed transport capable units recognizing that emergency calls for service are not linear and multiple requests may occur at the same time. However, with the level of excess capacity available, infrequency of multiple call events and financial support provided by the EMS levy the Anacortes FD can significantly increase transport revenue using existing resources.

CVAA as a single-role agency that does not have other response requirements is similarly situated with respect to its ability to generate additional transport revenues with existing resources or reduce costs by matching service delivery costs with actual demand. It is not uncommon for single service provider agencies such as CVAA to have a UHU of 0.30 reflecting approximately eight patient transports in a 24-hour period. With a current UHU of 0.19 the agency has additional resource capacity to handle increased call volumes and subsequent increases in revenue.

Similar to UHU, another method used to evaluate efficiency in the system is capacity utilization rate. In the UHU calculation, the number of transports is considered to be the numerator in the equation and each transport is considered to last approximately one hour. In Skagit County, the number of transports is slightly less than one hour; so another calculation might be useful. In this case, we consider capacity utilization. Capacity utilization considers the total time for all activities in which the unit is unable to respond to another event as the numerator and the total time that the units are on duty as the denominator. In the table that follows, we have calculated all of the time that the units for CVAA are on duty and have calculated all of the hours that the units were encumbered on calls. Importantly, these calculations include both cancellations and calls during which no patients were transported. In this case we find that the capacity utilization of all units equaled just less than 12 percent of the time. This means that more than 88 percent of the time on duty, the units are available for other (presumably emergency) work.

Figure 68: CVAA Capacity Utilization Rate, 2011

Unit	Calls	Hours on Duty	Hours of Work	Capacity Utilization
M1	1,977	8,760	932.7	10.65%
M2	3,192	8,760	1,208.3	13.79%
M3	1,483	8,760	1,114.8	12.73%
M4	2,224	8,760	885.5	10.11%
M5	37	0	5.3	N/A
Total	**8,913**	**35,040**	**4,146.5**	**11.83%**

Fragmentation Reduction Plan

ESCI has noted in its previous documentation that there are a number of components of the EMS system that are fragmented. We have stated that an EMS system should operate as a "system", with all of the components working together to further the county's desired outcomes. We believe that a system is more likely to improve patient outcomes, more likely to improve the patient experience, more likely to achieve lower costs and more likely to stimulate innovation and creativity in the system[72]. In some EMS systems, strict control by regulatory bodies or physicians offers the advantages of top-to-bottom quality control, data integration, and multi-jurisdictional oversight.

Although the county has the authority and the wherewithal to manage multiple, autonomous organizations (each with different missions), it has not fully exercised that ability. That is why significant components of the county's management plan must ensure that an integrated future design does not necessarily require that a single agency provide all of the services in the system, but rather that the system act as though it were a single agency. A fragmentation reduction plan is important.

First responder integration options

The existing EMS system is designed around the ambulance systems of the 1970s and 1980s—almost solely centered on the provision of transport service. For example, the quality assurance process, the financing structure, and the deployment plans are all ambulance centric. Yet in the last three decades first response agencies, medical research and operations research have all made advancements that consider transport as just one component of a more complex system.

Based on the existing structures in the system, there are a number of options to vertically integrate first response agencies to better deliver out-of-hospital services—especially in the central valley. Anacortes, using fire-based resources to deliver both first response and transport, is largely integrated already. Aero-Skagit, serving a large wilderness area without the availability of first response fire agencies,

[72] There is currently no medical (or other) evidence that has studied the nature of EMS system design. ESCI makes these observations based on a history of evaluating systems of multiple designs and noting the components that appear to ensure improvements.

largely acts as both first responder and transport provider. That is why we focus our integration options on the central valley area.

Engage the central valley fire agencies to deliver surge capacity and response performance.
Although the CVAA maintains excess capacity in the central valley area, that capacity is not aligned with either the demand or the coverage area. Because the CVAA does not move up resources to cover other areas when units go out of service (i.e., respond to events), large gaps may exist in coverage areas in the central valley. One or more of the central valley agencies—in particular Mount Vernon—are positioned now or could in the near future be positioned to provide backup capacity.

Engaging the central valley agencies provides significant steps toward integrating the EMS system. If the system were to engage the central valley first response agencies to deliver surge capacity, the agencies could provide scalable integration in a number of ways. First, central valley agencies could provide capacity by providing one or more "sprint" cars—rapid response vehicles staffed with one paramedic—to provide rapid paramedic response within or outside the central valley. Sprint cars can provide rapid response, are less expensive than ambulances, and can be easily deployed; but a sprint car needs to team up with an ambulance in order to transport patients.

Second, one or more central valley agencies could deploy paramedic-staffed ambulances on a limited-time, or call up basis. Using dual-role firefighter paramedics in the system provides resources at a significantly lower marginal cost. While Mount Vernon can currently deploy one paramedic-staffed ambulance, given time other agencies could follow suit. A dual-role ambulance correctly deployed could allow the ambulance provider to reduce its deployment commitment. Because a dual-role cost model is less expensive than a single-role ambulance on a unit-cost basis, a paramedic-staffed first-response ambulance could provide cost savings to the system. Further, if the system were to fully integrate dual-role services, the first response agencies can provide a level of scalability that the current system cannot provide.

Third, the central valley agencies could provide first response paramedic services to modify the response time clock for the ambulance service provider. A number of medical research studies consider response times and their effect on patient outcomes. However, those studies are ambulance centric in that they measure the time required to get ambulances rather than paramedics to the scenes of emergencies. Further, those studies evaluate medical outcomes in the most serious patients, not other outcomes and not any outcomes in less than critical patients. ESCI believes that delivering paramedics in first response vehicles and concomitantly reducing the response requirements by ambulances could improve service. We believe that ambulance response times could be reduced by two to four minutes without impacting outcomes. In fact, it's possible that outcomes could improve if first response agencies are able to guarantee response performance that exceeds the performance currently provided in the system.

Engage one or more central valley fire agencies to deliver ALS first response and transport throughout the central valley.

The EMS system regulators in Skagit County could accomplish system goals by engaging one or more agencies to deliver first response and transport services. A fire agency has an inherent advantage in that a first arriving paramedic can improve medical response times. A fire agency providing both ALS first response and transport can provide an integrated approach to service delivery.

There are difficulties with engaging a single agency to deliver services, the most significant of which is that the agency would be required to respond outside its geopolitical boundaries on a regular basis. Elected officials will ultimately have doubts as to whether taxpayers are subsidizing other areas or vice versa. If multiple agencies are engaged, the system must manage multiple autonomous agencies, which may defeat the goal of reducing fragmentation.

Establish a consortium of central valley fire agencies to oversee service.

The three city fire agencies in the county's EMS system could achieve the system goals by forming a consortium of the agencies. A consortium of fire agencies, with integrated deployment plans, advanced mutual aid integration, integrated EMS financial structures, and integrated management teams could improve service and resolve a number of the issues confronting the Skagit County EMS system.

A consortium of agencies is different from contracting with individual agencies. In the consortium model, the three agencies would establish a legal entity through an intergovernmental agreement. That entity would establish the contributions of the participants, the paramedic deployment configurations, the management structure, the governance, and other factors of production to provide for a structured EMS system in the central valley.

To establish a regulatory structure, the county would establish a contract with the consortium to provide services according to the requirements of the EMS system. That contract would create response time requirements, quality criteria, and oversight methods. A consortium structure would allow the EMS system to contract with a single agency (the consortium}, thereby reducing the fragmentation potential that might be the result of contracting with multiple agencies.

Finally, using a structure that gives the county the regulatory requirement rather than the service provision responsibility limits the liability for the county while maintaining the authority to oversee the system.

<u>Healthcare Integration</u>

Healthcare integration and innovation together have a number of different potential meanings and a number potential options and a very uncertain future.

A proposal to create changes could impact multiple aspects of the EMS system throughout Skagit County, however that integration would at least include the entire county (and perhaps the Northwest Region), including the 9-1-1 dispatch center, three ambulance providers, multiple cities and fire district

first responders, three hospitals, the public health department, Medicaid providers, out patient clinics and payors. Creating a large public-private partnership to better integrate emergency services into the healthcare delivery system is complex, because improved matching of patient needs to outpatient or other resources for a portion of low-acuity EMS patients is not generally a page in an EMS provider's playbook. Any project must be designed to reduce costs while increasing the quality, safety, health, and satisfaction of patients served by the 9-1-1 EMS system. At a minimum, the project goals should be:

1. Redirect a subset of low-acuity 9-1-1 calls to alternate care methods using a Dispatch Nurse Triage Line to support alternate care pathways (ACP). Currently, all 9-1-1 EMS callers receive a resource-intensive advanced life support response, regardless of acuity. An alternate care pathways plan could redirect the lowest acuity 9-1-1 calls to a Dispatch Nurse Triage Line (DNTL) using established algorithms. The system could contract for or hire a number of dispatch nurses for the DNTL who will determine if alternative care pathways are appropriate (e.g., redirect patients to medical clinics, hospital, or payer nurse advice line, ACO or CCO out-patient services, Community Health Program paramedic visit, or emergency department (ED)) by non-EMS transport versus standard EMS response.
2. Develop and implement an on-scene ACP program for a subset of low acuity 9-1-1 patients evaluated by EMS providers. Care pathways other than transport to the ED may also be appropriate for some 9-1-1 patients evaluated on-scene by EMS personnel. To make this program successful, the system must develop protocols to identify these patients and allow on-scene EMS providers flexibility in better matching resources with patient needs to avoid unnecessary ED visits and hospital admissions.
3. Train an EMS Community Health Program (CHP) workforce to provide home visits for high-risk patients to reduce unnecessary ED visits and hospital admissions. The project will train a number of paramedics as advanced practice paramedics to provide home visits for high-risk patients (e.g., chronic medical conditions, mental health problems) to prevent ED visits and hospital admissions. Referrals for this service could come from the ACP-dispatch and ACP-Scene programs, plus clinics, hospital providers and ACOs, as coordinated through the DNTL.
4. Train an EMS CHP workforce to provide home visits for high-risk patients to reduce readmissions to hospitals. Currently, the Medicare system disallows payment for patients who are readmitted after 30 days after being treated for pneumonia, congestive heart failure, and acute myocardial infarction. A CHP workforce, established through the EMS system, could lower medical costs by strategic home health visits and integrated programs with the local hospitals. In addition, a community health paramedic workforce can provide vital services for both public health and other healthcare providers to achieve the triple aim of the federal Medicare system: improving the experience of care, improving the health of populations, and reducing per capita costs of health care.

One significant goal of community healthcare integration is to reduce the total costs in the healthcare system by reducing hospital admissions and by reducing emergency room visits. A recent study by the Rand Corporation[73] found that roughly 17 percent of all emergency department visits could safely be treated at retail clinics or urgent care centers. This change could save as much as $4.4 billion in the

[73] Rand Corporation, Many Emergency Department Visits Could Be Managed at Urgent Care Centers and Retail Clinics, Health Affairs, Sept. 2010, p. 1630-1636.

United States every year. In addition, a recent study determined that frequent users of emergency departments account for only 4.5 to 8 percent of emergency patients, but account for up to 28 percent of visits.[74] Making use of expanded EMS functions could reduce unnecessary emergency room visits and more appropriately provide healthcare access to frequent users of emergency rooms. Some of the potential options for expanded EMS are noted in the table below.

Figure 69: Examples of Expanded EMS Functions

EMS Function	Examples
Assessment	Checking vital signs Blood pressure screening and monitoring Prescription drug compliance monitoring Assessing patient safety risks (e.g., risk for falling)
Treat/Intervene	Breathing treatments Providing wound care, changing dressings Patient education Intravenous monitoring
Refer	Mental health and substance abuse disorder referrals Social service referrals
Prevention and Public Health	Immunizations Well Baby Checks Asthma management Fluoride varnishing and oral health activities Disease investigation

While integration with EMS providers has the possibility of creating significant cost savings, the complexity of integrating EMS and healthcare has important considerations. The agencies must consider the medical community, the hospital community, and the nature of other competing interests that deliver services outside the hospital. That is why the consideration of implementing a healthcare integration project must be accomplished with caution.

Provider Selection

ESCI has not identified a pending change to the existing providers in the EMS system. However, there is a possibility that one or more of the existing providers could fail or could exit the ambulance market. That leads us to consider that the system should have options for provider selection processes so that the system can provide a seamless transition to a new provider if that should prove necessary.

Compare public versus private ambulance services.

Much has been written about the benefits of public EMS systems over private EMS systems75 and an equal amount of material has been developed that articulates the benefit of private systems over public

[74] LaCalle E, Rabin E, Frequent Users of Emergency Departments: The Myths, the Data, and the Policy Implications, Annals of Emergency Medicine, 2010.

[75] We refer to *public* EMS systems as those that use public resources - usually fire agencies - to provide ambulance transport, and *private* EMS systems as those that use private ambulance services to provide transport. In the context of our discussions on EMS as a *system*, neither Stout or Pepe use that definition in the article.

systems. As previously stated, both types of deployment systems have benefits and advantages. At least one noted EMS author, Jack Stout, concedes

> *Both of these deployment systems can offer certain advantages depending on local emergency medical services (EMS) system needs as well as the local philosophy of health care delivery. Applicability must therefore be considered in terms of local service demands and other factors that affect the EMS system, including catchment population, statutory and jurisdictional issues, available funding, accessibility of receiving facilities, and medical quality issues.*[76]

It is clear from the ongoing EMS system debate that not enough research has been done to determine whether the more appropriate ambulance provider in any EMS system should be a for-profit firm, a not-for-profit firm, or a public agency. Nevertheless, the table below provides estimates of the differences between public and private EMS agencies. Across the nation, each EMS system is managed according to a set of local and historical considerations that make rational EMS models difficult to quantify. Therefore, all EMS system measurements have some level of value assessment. ESCI's value-assessment of average public and private EMS systems is articulated in the table below.

Figure 70: Comparisons of Public and Private Ambulance Services

Comparison of Public vs. Private Ambulance Services		
System Considerations	**Public EMS System**	**Private EMS System**
Continuity of Care	Usually Continuous	Often Discontinuous
Barriers to Exit	High	High
Barriers to Entry (likelihood of market entry)	Medium	High
Market Protection	High	Medium
Average Cost	Medium to High	Medium to Low
Marginal Cost	Low	Average to Low
Supplier Power (union strength)	High	Medium to Low
Buyer Power (insurance and payer power)	Medium high	Medium High
Efficiency (Output/Input)	Varies: Medium to Low	Medium to High
Use of Incident Command Structure (ICS)	High	Medium to Low
Boundary Restrictions	Many	Few
Response Intervals	Short	Average
Interagency Cooperation & Coordination	High	Medium

Regardless of the selected design, the system must be aligned to ensure the highest possible levels of patient care given the funding, human resources, and ability of the organizations to provide services congruent with the constituents' demands. One system design criterion must ensure that the closest first responder and ALS provider arrive on-scene as soon as possible after notification of an event. Though scientific EMS research and other literature is not completely clear on a number of system

[76] Stout J, Pepe P., *Prehosp. Emerg Care*; *All Advanced Life Support versus Tiered Response Ambulance Systems*, Jan – March 2000.

design factors, one fact is undisputed—systems that ensure responders (both ALS and BLS) arrive on-scene the soonest are more likely to achieve improved patient outcomes.

EMS agencies and regulators must determine the policies and mitigating strategies that should be employed in relation to the organization's goals and objectives. Planning for response to emergencies must be done well in advance of an emergency. Once that pre-planning is accomplished, the agency must do everything within its ability to continuously improve the performance of its emergency mission. The challenge is to unceasingly evaluate and improve as many system components as possible, with the result being a better customer experience, reduced suffering, and better patient outcomes.

Considerations for provider selection.

The provider selection process can be complicated or not-so-complicated given the circumstances under which the decision to select a new provider is created. Irrespective of the reasons for which a provider selection is needed, the following should be considerations by the EMS system if a new provider is required.

- Conduct an RFP to select a private provider to serve one or more areas of the county.
- Negotiate with a fire agency or a consortium of fire agencies to provide transport services throughout a given service area.
- Establish a new county department or branch that includes transport.
- Include considerations for incumbent workforce.
- Identify assistance and opportunities to make improvements if provider selection is necessary

Private ambulance option.

A private ambulance option involves engaging (or continuing with) a private ambulance operator to serve ambulance patients throughout the service area. An independent ambulance agency (an agency independent of both fire and hospital services) is free to establish its response criteria independent of fixed fire station locations and fixed hospital facilities. The ambulance agency can use analysis-of-demand and response time criteria to make system enhancements. Operating independently, the ambulance agency can also make improvements based on medical need. The ambulance agency may even prioritize how ambulance healthcare dollars will be used to support ambulance patients. Further, an independent management structure can specialize in one service. This leads to focus—the ability for the agency to do one thing and do it very well.

Systems using independent ambulance services may have higher system costs than other models because the system cannot take advantage of economies of scope. Vertical coordination with other agencies (first responders and hospital providers), while possible, requires more effort. The primary advantages of this model are that it obviates the dependency on other service providers, and instead focuses on the specific competency of the ambulance organization. In many systems, however, a hybrid structure is used to allow the for-profit ambulance provider to ensure transport, while the first response

agency provides medical care. In these cases, a fire paramedic may accompany the patient to the hospital; thereby ensuring the patient receives continuous medical care.

Though the total system cost may be higher, that cost is easily identifiable - for the patient it's simply the price charged for service.[77] System overseers, regulators, and the public know precisely what they are paying for ambulance service, and they can easily articulate the outcomes of that cost. Allowing EMTs in the system to focus solely on out-of-hospital medical care may also improve skills.

Yet, private EMS systems are not without controversy. Some argue that private ambulance services are profit-rather-than-service motivated, and as such, make decisions that may not be in the patient's best interest. Private ambulance services provide little career path for employees, often leading to disgruntled workers and high attrition. In a system that provides tiered response, private services create discontinuous medical care, as care must be transferred from first response to ambulance providers.

One concern about for-profit ambulance services is risk. While a local, for-profit ambulance service may appear to be functioning well, the revenue streams in the county may not, in the long run, support multiple infrastructures. Over time, the for-profit provider will find margins under pressure and may be forced to make choices about which programs to fund and how fully to fund those programs. This means that the local regulatory body may find itself in the ambulance business by default.

In the State of Washington, counties and cities are authorized by statute to ensure the provision of ambulance service. That authority includes establishing either a public service or a contract for service with a private provider. However, Washington statutes are specific in that establishing a public system cannot compete with an existing private ambulance system.[78] There are options for replacing a private provider if the service is insufficient; however, these provisions are cumbersome and could be litigious. As such, in the Skagit County area, once a private provider is established in the system, it may be difficult if not impossible to replace that provider later.

Select a fire agency or a consortium of fire service agencies.

The fire-ambulance option involves using firefighter paramedics to provide ambulance service from fire-owned ambulances. Like the private option, the public ambulance option has advantages as well as disadvantages. First, public ambulance providers typically are cross-trained, dual-role providers. This means that the personnel providing service can be used to provide rescue and fire-related activities in addition to their ambulance transport activities. This dual-role capability tends to reduce system costs

[77] There is a significant difference between *price* and *cost*. For a single service entity such as a private ambulance provider, the cost is somewhat less than the price charged for service. However, when private agencies use emergency resources to also provide non-emergency services, the cost for delivering the emergency portion of the service is somewhat blurred. We use this illustration here only to simplify the concept. The reader should understand that methods of cost allocation differ greatly between the public and private sector and between agencies that provide vertically-integrated services (such as fire-based ambulance services) and those that do not.

[78] See RCW 36.01.100 and 35.21.766

because the cost of labor can be shared between the ambulance transport role and the fire service role of personnel.

Further, dual role personnel have additional capabilities that ensure safer practices at particular incidents. At motor vehicle crashes, for example, firefighter paramedics typically have the personal protective equipment to enter a danger zone, while the same personal protection is usually not available to private ambulance personnel. Further, during periods when ambulance demand is at its lowest (usually very early hours of the morning), the likelihood of serious fires is higher. That means that firefighter paramedic crews can respond to those events and merge into an established fire attack crew and reduce risk for firefighters and for citizens.

Private ambulance services argue that fire-based transport systems are more expensive because the personnel are more expensive. Further, private ambulance services argue that public agencies often are less successful in collecting transport fees because they are less focused on reimbursement.

In addition, fire agencies may be policy bound to serve areas only within their geopolitical boundaries. The concern that fire agencies will limit their primary service area to the geopolitical boundaries of the agency can be mitigated if logical patient catchment areas are used to determine response areas rather than artificial governmental boundaries. Private ambulance agencies have no such restrictions.

Create a County-Department that includes transport.

A county department is a hybrid and one that could include some of the components of both the public and private models. Because of the county's funding authority with the EMS levy and its associated contracts, the county can assure an appropriately high continuity of care. Further, the county department model can operate within a reasonable marginal and average cost—at least as efficient or even more efficient that currently exists.

The county model would not change the supplier power or the buyer power, but it could establish an appropriate use of the existing incident command structure. In addition, with the county as the service provider it could ensure border-to-border ambulance service in the county or in any portion thereof. The county could also ensure appropriate response intervals as well as interagency cooperation and collaboration through its contracts for service.

However, the county maintains a certain liability risk by maintaining the service. That risk is no more that it experiences today with the presence of the EMS Commission and the CVAA. However, unlike the two existing agencies, the county would have direct control over the provision of service and therefore could reduce its risk of exposure.

The county model would also require some changes to the existing contract with CVAA. While the current contract is with the Skagit County EMS Commission, the labor unit for CVAA would have to negotiate a new contract with the county department.

Data sufficiency, accuracy, and quality assurance plan.

While previous sections of this report describe options for improving the system, the discussion of data sufficiency, accuracy and quality assurance is provided irrespective of the governance, financial, future system design, or provider type. ESCI believes that data improvements as quality assurance improvements can and should take place and those improvements can start immediately.

Data Improvements

We have previously acknowledged that the nature of the data is insufficient to ensure the long-term quality in the EMS system. The response data in the dispatch system is flawed, which is not terribly unusual. However, what was unusual was that the system did not have processes in place to detect the flaws and then take steps to make improvements. In fact, responders report that they are so distrustful of the dispatch data quality, that they ignore it and instead use their own data. This matters because, for example, the determination of whether a call takes place in an urban, suburban, or rural zone impacts response time requirements and therefore deployment. This information should be automatically determined through the dispatch data. The system therefore must constantly analyze, monitor, and improve the data collection and reporting from the dispatch center, and as part of the management plan, the county must take steps to ensure the accuracy of data at all levels in the system.

Response Time Improvements

Within Skagit County, there are no established system-wide performance standards nor are there definitions for what performance is appropriate to monitor and improve. CVAA, Aero Skagit, and Anacortes report response time "goals" of nine minutes or less with 90 percent reliability, and the fire departments have similar standards. Yet standards for performance go beyond simply creating standards for response time. Performance standards should also include standards for maintenance, breakdown rates, supplies and pharmaceuticals, vehicle design, training hours and delivery methods, employee turnover rates, patient satisfaction, and so on.

Yet even basic performance standards must have clearly structured definitions so that the measurement of performance against the standard is meaningful. For example, response time standards may at first seem straightforward, but definitions are complex. The system should define what starts and stops the clock, it should describe reasonable exceptions to response performance—such as weather, upgrades, downgrades, dispatch errors, staged calls, and inaccurate addresses—and it should describe response zones that receive urban, suburban, or rural levels of performance. Without these clear definitions, the reporting of response performance can be confusing or simply inaccurate. While Skagit County describes response zones, there are opportunities to more fully describe the details and expectations of what it means to respond.

In addition, the system has not defined the important questions regarding performance and patient outcomes. Despite each of the system responder's parochial response goal, there is no goal regarding how the "system" should perform. For example, the system should define how long it should take to deliver a paramedic to a patient's side rather than focusing on whether that paramedic arrives on an

ambulance, a motorcycle, a quick response vehicle, or fire apparatus. A critical issue for Skagit County and the EMS system is to describe and define appropriate performance standards and measures for the system.

Quality Assurance Improvements

For quality assurance issues, there are opportunities to make improvements to the quality assurance process. Dr. Slack has established a quality assurance process that evaluates sentinel indicators of quality in the system. However, those indicators are generally limited to the performance of the ambulance service. An integrated quality assurance process, would integrate dispatch quality data, first response quality data, and transport data. Then, using the data collected from this process, the medical overseers can identify discontinuities in the quality of the service provided in the system. To improve the system quality processes, we envision a multi-step method that would engage a number of people including dispatchers, paramedics, physicians, hospital personnel, and others. Without a system-wide engagement of personnel and the associated improvements[79] in quality, the system will not be prepared to make the improvements needed to develop the healthcare integration requirements that will be needed in the future.

Long-Term Shift Structure and Staffing Options

As we have previously described, ambulance personnel in the system work 24-hour shifts. The primary exception is the City of Anacortes that provides two standard 24-hour shifts as well as one 12-hour shift that includes a 24-hour crew devoting 12 hours of each day to ambulance service and 12 to fire protection. Aero-Skagit provides 24-hour shifts in the wilderness areas. In the Central Valley, CVAA provides 24-hour shifts with each of its ambulances.

In Anacortes and in Aero-Skagit, the shift schedules are probably appropriate and consistent with the combination of demand, but more importantly with the territory that must be covered by the services. However, CVAA produces unit hours without consideration of the demand that is present in the system.

ESCI has shown the 2011 demand by hour of day and by day of week in the system for CVAA. In addition to that analysis, we examined the maximum number of Priority 1 and 2 calls in each hour of the day and averaged those across the number of days throughout the year.[80] That analysis shows that the maximum average number of calls per day rises to just over two per hour at noon. The highest number of calls is therefore far below the four units that CVAA deploys in the system. This gap is more significant during the early morning hours.

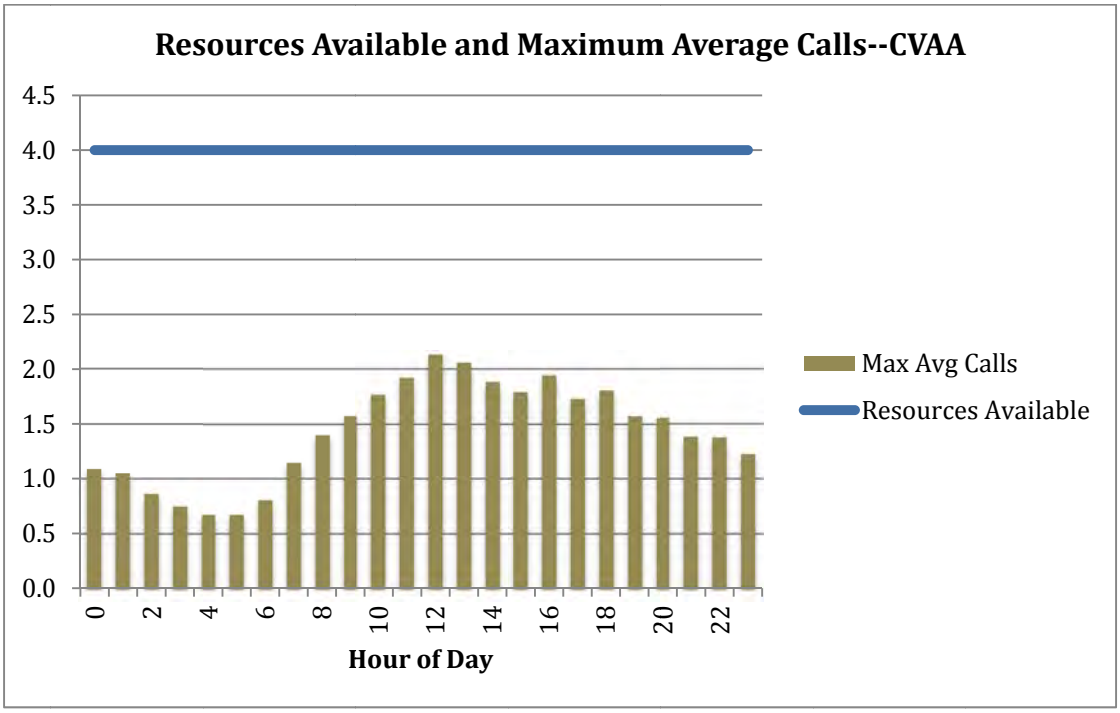
[79] We don't suggest here that quality is poor, rather that there are few quality measures that are reported on and measured on an on-going basis.

[80] We recognize that the data is not perfectly "clean" and that the number of calls is likely higher than reported by the dispatch system. We also understand that the averages don't explain the spikes in demand. Yet even though the spikes in demand require surge capacity, there are generally more ambulance resources than needed in the Central Valley.

There are options to minimize this supply-demand gap. CVAA can reduce the number of resources available during certain hours of the day, it can reduce resources available during all hours of the day, or it can increase demand by taking on more of the non-emergency work in the system, thereby increasing efficiencies. Of course reducing resources saves money, but places the system more at risk of call concurrency issues.

Resolving call concurrency issues provides scalability and surge capacity options to the system. The system can make use of first response resources for surge. Making use of fire agencies for surge capacity allows the system to integrate first response resources more fully into the EMS system thereby allowing the system to establish performance and quality assurance requirements on the first response agencies.

Figure 71: Supply of and Demand on Ambulance Resources in the Central Valley



In addition, the decision by CVAA to place two paramedics on each ambulance is concerning. First, because in our experience and in our research, it is unclear whether two paramedics deployed on ambulances provides a patient benefit. There are anecdotal discussions of the benefits of a two-paramedic model may suggest that two paramedics are beneficial. However, the system has not adopted that philosophy because the system ambulance provider contracts do not provide for two paramedics on an ambulance. As such, CVAA has elected to provide more services than required by the contract and the EMS Commission has paid additional contract fees over time to accommodate CVAA's decision.

We believe that it may be time to revisit the decision to staff each ambulance with two paramedics. There are options today that could improve outcomes, improve integration, and potentially improve

patient satisfaction and other measures of quality in the system. If the system were to distribute paramedics throughout the community, it's possible for them to arrive on the scene much faster, provide for the further integration of the EMS system, and provide the availability of surge capacity that is currently lacking in the system.

In addition, the Central Valley ambulances do not automatically move when other ambulance resources are encumbered. This could lead to inordinately long response times. In high-performance EMS systems, ambulances freely move throughout the system to be in position for the most likely requirements of demand. While Skagit County does not have the demand to justify a high-performance system, a structured method to move resources could reduce response times and improve service.

Recommendations

1.1 Governance Discussion

In making our recommendations, we have taken into account the critical issues related to the Skagit County EMS system and have analyzed the options based on those critical issues. The most significant decision for the community is the selection of the appropriate governance structure for the system, because the design of the governance structure drives all other considerations. The table below describes the likelihood of success for resolving each of the critical issues described above. A rating of "high" indicates that we believe that the likelihood of success is high. We have added another factor—ease of implementation—because we believe that the ability to actually resolve the critical issues is an important consideration.

Figure 72: Likelihood of Success in Resolving Critical Issues

Likelihood of Success in Resolving Critical Issues				
Critical Issues	**Option 1: Status Quo**	**Option 2: County EMS District**	**Option 3: County Department**	**Option 4: Joint Services Model**
System Fragmentation	Low	Med	High	High
Distribution of Revenues	Med	Med	High	Med
Data Insufficiency	Med	Med	High	Med
Contract Compliance	Med	Med	Med	Med
Provider Selection	Low	Low	Med	Med
Integration	Low	Med	Med	High
Shift Structure and Staffing	Med	Med	Med	High
Quality	Low	Low	Med	Med
Ease of Implementation	High	Low	Med	Low

1.1.1 Governance Recommendation

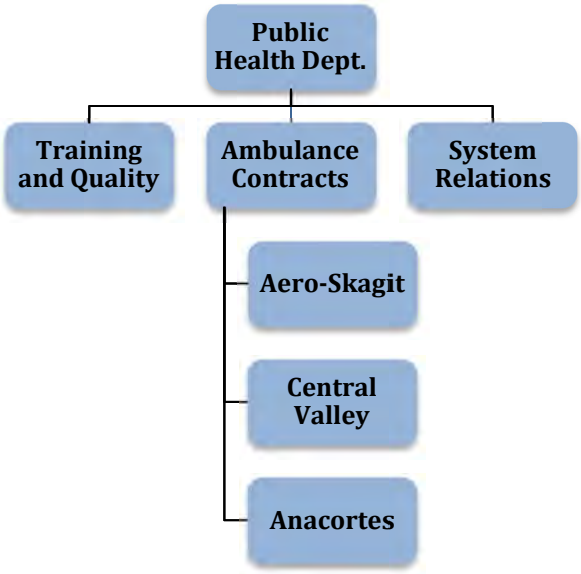
The system is in a position to make substantive changes. Based on the analysis and on ESCI's evaluation of the critical issues facing the Skagit County EMS system, we recommend that the system stake holders transition to a model that provides oversight from the county Public Health Department. Yet in the Central Valley we believe that the optimal structure for providing service is the joint services model. As such, we recommend a hybrid of the options that provides the best qualities of both and we anticipate that implementing this proposed structure—with appropriate execution—will provide improved services to the community.

We recommend this option based on our belief that certain fundamental components of the system can be improved and other high-quality components should remain. In fact we believe that the system should maintain those high quality components, while making improvements to the structure of the oversight process and financial processes. In this recommendation, we envision that the Public Health Department will be charged with oversight of the entire EMS system including contracts with transport

providers, first responder integration proposals, EMS system integration with the dispatch agency, oversight of the medical program director, quality improvement, and the data process.

We envision the system making use of the Public Health Department in its regulatory and oversight role. We recommend therefore that the Department directly provide training and system-wide quality assurance and provide system oversight—such as support for first response agencies and the EMS role in providing dispatch relations and coordination.

Figure 73: Public Health Proposed Role in the EMS System



1.1.1.1 Responsibilities of Public Health

The responsibilities of the Public Health Department change significantly in the proposed system redesign. The Department, most significantly, will manage and oversee the structure of the system from the strategic perspective.

ESCI recommends that the responsibilities of Public Health include at least the following:

- Develop and manage performance-based contracts with transport providers.
- Employ the medical program director.
- Monitor and provide training for entry-level EMS personnel (i.e. Basic EMT training), for the community (CPR, AED, and First Aid Training), and post-service training identified through the quality assurance process.
- Establish system structures and representation with outside agencies such as Skagit 9-1-1, including:
    - Assist with implementing a high-level criteria-based dispatch system
    - Establish a process for monitoring the medical quality of dispatch
- Evaluate ambulance and first response performance based on contractual requirements.
- Establish an advisory committee (much like the existing EMS Council) to provide strategic input to the Public Health Department for future plans and requirements.
- Assist with and provide recommendations to develop programs in response to healthcare reform changes.

The public health department model will improve the current system by establishing these structures and providing departmental management over the processes. Most importantly, it provides a clear and undeniable thread of authority from the county commission through the ambulance providers.

ESCI recognizes that implementing a consortium model with oversight by the Public Health Department is more complex than simply a model that provides services through Public Health. While conversations with staff and others have led us to believe that there is strong support for the consortium, it is possible that elected officials of the cities may not wish to pursue this model. If that occurs, we recommend that the county pursue a model in which oversight and operations occur through Public Health.

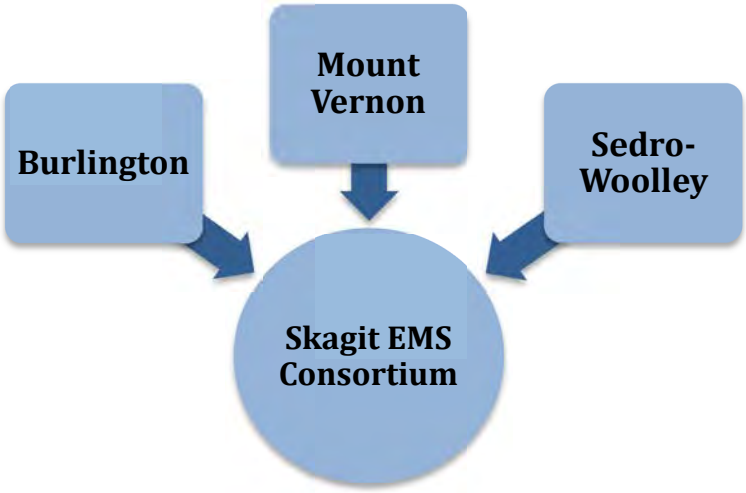
1.1.1.2 Responsibilities of Central Valley Consortium

A consortium of agencies in the Central Valley is a structure that can provide not only ambulance service, but also the EMS components that are needed in the Central Valley. A consortium provides flexibility. It can use multiple delivery models, multiple structures, and multiple deployment options to ensure that the needs of emergency patients are met. In addition, the consortium is a structure that can adapt to the needs of the healthcare system of the future.

The consortium model simply means that the three Central Valley cities establish a formal relationship to deliver services. The consortium is formed through a three-party intergovernmental agreement (IGA) that spells out the governance structure, financial contributions, operational model, and revenue sharing model for the system.

The Central Valley Consortium will be responsible to deliver the operational components of the EMS system as well as establish a structure to create the flexibility to provide additional out-of-hospital medicine in the future. ESCI believes that the cities can deliver the scale and scope economies to ensure that the system is efficiently managed, as well as structured to deliver a broader range of services.

Figure 74: Proposed Central Valley EMS Consortium



1.1.1.3 Status of EMS Commission after Recommendations

If these governance recommendations are adopted, we recommend that the Skagit County EMS Commission be dissolved. We do not recommend that the services provided by SCEMSC be discontinued. Rather, we recommend that the personnel and services provided by SCEMSC be transferred to the Public Health Department, along with the commensurate funding. After implementation, the training staff will continue to provide training and the administration staff will oversee contracts, quality assurance, and system relations.

If the recommendations are adopted, appointed commissioners would not be needed to oversee the SCEMSC. Instead, we recommend that the Public Health Department engage an advisory committee to provide input and advice regarding the EMS system. The advisory committee will be representative of a number of disciplines within the EMS community that could include some or many of the present commissioners.

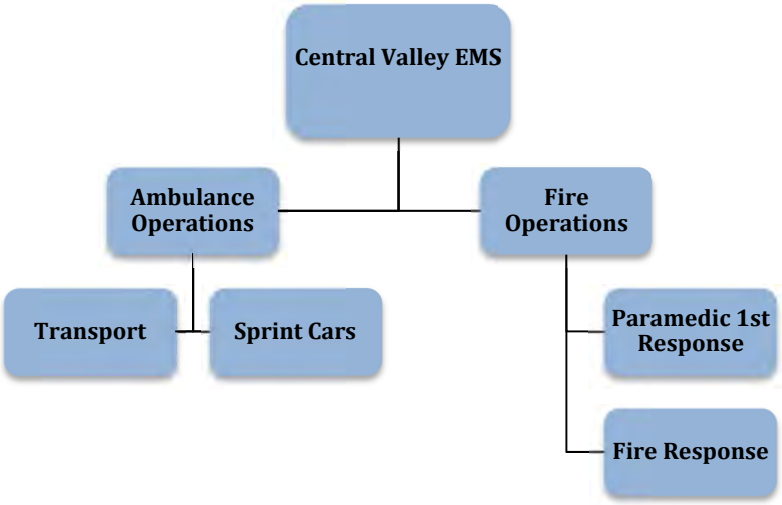
1.2 Operations Recommendations

The operations recommendations included herein are intended to improve performance in the system and to improve the reliability, scalability, and resilience of the system. The operating recommendations in the Anacortes response area, and in the Aero-Skagit area, remain relatively unchanged. However, the infrastructure in the Central Valley area will change significantly.

Our recommendations include changing the fundamental structure of the Central Valley ambulance process. In the Central Valley, the proposed structure will include three fire agencies overseeing, managing, and operating the transport component of the EMS system through a consolidated effort. Because roughly three quarters of all ambulance events in the Central Valley occur within the geopolitical boundaries of Mount Vernon, Burlington, or Sedro=Woolley, these are events to which the agencies already respond. A Skagit Ambulance Consortium will allow benefits to accrue to the system

through a reduction of fragmentation, the ability of the first response agencies to deploy paramedics through an integrated service delivery model, and the development of a quality assurance model that proceeds throughout the continuum of care.

Figure 75: Proposed Operating Structure--Central Valley EMS



Using this model allows the greatest amount of flexibility in the system because paramedics can be deployed with many more options than the status quo. Using a deployment model that considers the placement and staffing of first response apparatus as well as ambulance providers, this option offers the system a method to ensure that paramedics arrive on scene the soonest. In addition, the model provides the ability to use the fire service's incident command structure to manage the system in real time.

This model recognizes the benefit of ensuring that paramedics arrive on the scene quickly irrespective of whether they arrive on fire apparatus, quick response units, ambulances or other types of vehicles.

Operating recommendations in the Central Valley

- Establish opportunities for both civilian and fire/paramedics
- Employ alternate staffing, scheduling and deployment models consistent with demand and coverage to reduce paramedic response time
- Ensure and guarantee performance in areas outside the geopolitical boundaries of the cities

1.2.1 Response Zones and Performance

ESCI has previously commented on the outdated census information used to establish the response zones in the system. We believe that given the appropriate deployment methods and the distribution of ALS resources, the system can achieve urban-level response performance in each of the three Central Valley cities without degrading performance in other areas of the system.

As such, we recommend that the geopolitical boundaries of the three Central Valley cities be considered "urban" for the purpose of response time evaluation. Further, for the purposes of measuring response

times, the system should consider paramedic response times, rather than ambulance response times, and scale the resources in such a way so as to ensure coverage of both territory and demand. The areas immediately surrounding the urban areas could be considered suburban based on additional evaluation and consideration of the capabilities of the surrounding fire agencies.

Recommendations:

- Establish response zones more expansive than current—include urban, suburban, and rural.

1.2.2 Reducing Fragmentation

The proposed model establishes a number of ways to reduce fragmentation in the EMS system. That fragmentation occurs at all levels in the system and can be eliminated through a thoughtful, structured way.

Governance fragmentation. As we have previously said, the CVAA board is appointed by the Board of County Commissioners, as is the SCEMSC. That means in many ways that CVAA and SCEMSC are co-equals in the system. With SCEMSC structured to oversee the performance of CVAA and at the same time provide financial contributions through the EMS levy, the governance structure is somewhat problematic. The consortium model creates a single thread of authority from the county commissioners through the system and avoids complications related to governance.

Operating and deployment fragmentation. In the current Central Valley system, the ambulance service deploys its resources without regard to the location of any other resources in the valley. In addition, the fire agencies deploy resources without regard to where ambulance resources are deployed. Oddly, if the agencies considered the availability and deployment of other resources in the system, we believe that EMS could operate more efficiently and could deliver higher-quality services (i.e. quicker response times).

Quality assurance fragmentation. Currently, each of the agencies in the EMS system has different quality measures. The medical program director spends a significant share of his quality management time evaluating the medical performance of the transport component and a lesser share evaluating the performance of dispatch and first response activities. As we have previously discussed, these components may require additional focus to ensure that the overall quality of the system is improved. A system-wide quality assurance program process is made more possible during the consortium-based integration of the system.

Healthcare integration. No one knows for sure what health care integration will look like during the changes that will take place during the next four to six years. However, what is clear is that there will be changes and that the system must be prepared to accommodate those changes.

An integrated system, especially in the Central Valley, is positioned to ensure the relevance of the prehospital providers during the transitional period to an integrated healthcare system. Ultimately, we believe that this transformation of healthcare will not be about two paramedics on an ambulance

making additional healthcare visits to homes. Rather, the system will include a number of different providers, with integrated electronic systems and healthcare capabilities who are aligned to ensure that the health of the community is protected and improved, that the medicine delivered to patients is improved, and that the system delivers these things at lower cost.

Recommendations:

- Resolve the SCEMSC-CVAA discontinuities
- Integrate and formalize the first response ALS opportunities
- Engage first response ALS personnel in updating electronic documentation and establish QA processes over the entire continuum of care
- Establish a plan through Public Health to create healthcare integration opportunities

1.3 Financial Recommendation

As previously stated, there are three principal sources of revenue that support the delivery of emergency medical services to the citizens of Skagit County. These sources include direct tax support through the EMS tax levy; revenue generated by the provider of ambulance transport services through user fees (ambulance transport fees); and support provided by local government agencies either directly or indirectly, through the utilization of facilities and equipment, principally within the respective fire districts. In Anacortes, additional revenue is provided through general fund transfers, a share of the sales tax, and allocations of the property tax. Each of these component elements contributes to generating adequate financial support for the delivery of emergency medical services and each component element is subject to internal and external influences in their ability to generate sufficient revenue to support operations.

Equally as important as the revenue side of the equation to support these services is the ability of the county to control the cost of services being provided. Currently, there does not appear to be significant influence in the system's ability to control cost as the current transport service delivery model operates essentially independent from the various service providers; there is no competitive procurement process for ambulance service and levy support decisions are predicated on transport agency requests without consideration of their ability to generate revenue or control costs.

The long term financial viability of the Skagit County EMS System will be dependent on the system being able to influence both the ability of transport providers to increase transport revenues while at the same time controlling the costs associated with the response system. It should be noted that in light of the historical practice of providing an automatic increase in levy support to the transport provider agencies, any restructuring of the current level of financial support may be met with resistance. However, it does not appear that maintaining the status quo will ensure a financially viable method for ensuring long term fiscal stability of the system.

1.3.1 Revenues

1.3.1.1 Revenue Forecast

Revenue forecasting is as much art as it is science, however with appropriate annual analysis of community growth, the Commission should be able to establish trends that will indicate the degree to which revenue forecasts (especially revenue from the EMS tax levy) are within established targets, and the degree to which revenues are sufficient to sustain current operations. Combined with other revenue opportunities and expenditure control, ESCI believes that the current and projected fiscal environment is capable of maintaining as well as improving the Skagit County EMS System.

Figure 76: Projected Revenues

Projected EMS Revenues 2013-2018						
Sources	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**
EMS Levy	5,265,790	5,107,816	5,158,894	5,210,483	5,262,588	5,315,214
Fees			413,631	421,903	430,341	438,948
Other	275,000	275,000	275,000	275,000	275,000	275,000
Capital Fund	675,000	175,000		175,000	175,000	
Fund Balance		175,000				
Total Revenue	**6,215,790**	**5,732,816**	**5,847,525**	**6,082,386**	**6,142,929**	**6,029,162**

1.3.1.2 Fee Schedule

Currently the contractual relationship between the SCEMS and the transport providers does not require adherence to a single fee schedule. A regional comparison of fee schedules reflects that the SCEMS is below the patient transport schedules employed by other jurisdictions of similar size in the region.

Figure 77: Regional Fee Schedule Comparison

Skagit County EMS System Comparable System Fee Schedules				
Agencies	**Population**	**Service Levels**		
		BLS(Emergency)	**ALS1**	**Mileage**
Skagit County	**116,901**	**$590**	**$770**	**$15**
Cowlitz County FD 2	**102,410**	**$1,000**	**$1,000**	**$13**
Grant County	89,120	$950	$1,100	$15
Yakima County	243,231			
Sunnyside Fire Department*		$798	$865	$12
Whatcom County	201,140	$580	$1,044	$21

Similar to requesting a levy increase from citizens to ensure a financially viable system, periodic adjustments should be made to the transport fee schedule recognizing that transport revenues account for approximately 50% of total revenue to support the EMS System. The SCEMS should establish a process for increasing the fee schedule based upon an acceptable methodology that could include the following:

- Annual comparison of regional fee schedules
- Inflation adjusted rate increases
- Utilization of CPI
- Utilization of Health Care Index

The impact of a $100 adjustment to the fee schedule in terms of gross revenue that can be generated is accordingly:

Figure 78: Impact of $100 Rate Increase

Impact of $100 rate increase		
Gross Revenue	$	8,184,625
Current Gross	$	7,220,668
Total	**$**	**963,957**

Increasing the fees for patient transports will not generate as much revenue as one would anticipate, especially within Skagit County, due to the high utilization rate of services by Medicare beneficiaries. Approximately 70 percent of patient transports results in a bill to Medicare and Medicaid. Because reimbursement for these services is capped, no additional transport revenue will be generated from the capped payer source. However, additional revenue can be obtained from other third party insurance carriers and private pay. ESCI estimates that an additional $175,000 in net revenue can be generated based on a $100 increase in the base rate for ambulance transports.

At a minimum, the county should adopt a single fee schedule applicable throughout the service area and require that all transport providers receiving levy support utilize the fee schedule adopted by the county. The City of Anacortes has lower current gross billings of approximately $177,625.00 than other providers in the system would have with an equal volume of transport due to the utilization of a fee schedule that differs and is lower than the other transport providers in the system. Based on the current call volume of 1,653 patient transports in which 19 percent are BLS-Emergency and 81 percent consist of Advanced Life Support Level 1 transports within the Anacortes service area, the impact of requiring adherence to the adopted fee schedule would result in additional net transport revenue of approximately $62,000 for Anacortes.

Contractual requirements for transport providers should also limit the ability of these agencies to offer contractual discounts to payers such as third party insurance carriers for emergency service requests. Discounts can vary between the provider and the carriers and can range from 15 percent to 35 percent of the charges.

1.3.1.3 Excess Transport Capacity

ESCI has calculated the capability of the transport providers to conduct additional transports with existing resources both in terms of additional transports resulting from community growth, as well as existing transport opportunities. Generally the capacity to conduct additional transports is reflected through a measure known as the Unit Hour Utilization Rate which depicts the number of transports that

a staffed 24 hour unit should be able to handle. The measure takes into consideration other job duties and responsibilities that staff may have. The following UHU's were calculated for the various providers:

Figure 79: Skagit County Ambulance UHU Performance, 2011

Skagit County Emergency Medical Services System, 2011			
	CVAA	Anacortes	Aero-Skagit
Transport System Capacity Utilization Rate (UHU)	19%	9%	4%

These values reflect that each of the ambulance transport agencies has sufficient excess capacity to conduct additional patient transports without incurring significant additional expense to the system. As a single service provider, CVAA and Aero-Skagit have approximately 30 percent additional capacity based on national norms of a UHU of .30. Recognizing the dual role of the Anacortes FD, national norms for fire departments conducting EMS transports is approximately .20 resulting in an additional 50 percent transport capacity.

One additional factor regarding transport revenue needs to be recognized and that is community growth. As the population increases, the demand for patient transports will grow concurrently. With the end of the "Great Recession", community and population growth is returning to pre-recession levels and is expected to increase accordingly:

Figure 80: Total County Population Projections, 2010 to 2040

	2010	2015	2020	2025	2030	2035	2040
Total Population	116,901	121,624	128,249	136,410	144,953	155,632	162,738
Total Growth		4,723	6,625	8,161	8,543	10,679	7,106
Growth Percent		4.04%	5.45%	6.36%	6.26%	7.37%	4.57%
Cumulative Growth (%)			9.71%	16.69%	24.00%	33.13%	39.21%

As can be seen from the chart the expected population growth during the course of the current levy cycle is expected to be approximately 10 percent. Based on current and projected call volumes, the number of ambulances in the system should be able to adequately handle the expected increase in 9-1-1 emergency calls as a result of community growth without requiring additional transport units. ESCI recognizes that a majority of the population growth will occur from the population group representing senior citizens and has taken this into consideration in recognition of capped payments for Medicare beneficiaries.

Figure 81: Projected Unit Hour Utilization Rates--Current Levy Cycle

Skagit County EMS System 2011 - 2020 Patient Transport Volume	CVAA	Anacortes FD	Aero Skagit
Patient Transports	6,520	1,653	379
Community Growth @10%	652	165	38
Expected Patient Transports	7,172	1,818	417
Annual Contracted Unit Hours	34,944	17,472	8,736
Projected UHU	21%	10%	5%

In essence, the EMS System is paying for excess current capacity and therefore should not have to incur significant additional expense in terms of adding additional ambulances to the system. However, the population growth is not necessarily linear and one service provider may experience larger growth in service demands based on their particular geographic service area. Further, based on other recommendations including the addition of paramedic first response capability, the transport system should be capable of meeting the additional demand. Annual analysis of patient transport revenues should be an integral component of determining the level of financial support provided to the ambulance transport providers through the distribution of the EMS Tax Levy.

Utilizing a combination of periodic fee schedule adjustments, aligned with a mandatory use of the established fee schedule and elimination of contractual discounts, will generate additional revenue for patient transport providers placing less pressure on the system for annual levy support. Less dependency on the levy for the transport providers enables the system to financially support and implement other operational improvements.

The system, by implementing contractual requirements consistent with maximizing current transport resources, can expect to add the following additional revenue to support the individual transport providers:

Figure 82: Net Revenue Projections

Skagit County EMS System Net Transport Revenue Projections 2012 - 2018 Levy Cycle	CVAA	Anacortes FD	Aero-Skagit
Community Growth	$137,812	$34,061	$10,436
Uniform Fee Schedule		$61,394	
Fee Schedule Adjustment ($100)	$253,305	$48,102	$14,368
Additional Transport Revenues	$391,117	$143,557	$24,804

1.3.1.4 EMS Levy

Historically, a significant portion of the EMS levy has been distributed to the transport provider agencies with minimal support provided to other system participants. As a result of the economic downturn, resulting in a lower assessed value, the citizens of Skagit County approved an increase in the levy to ensure continued delivery of emergency medical services and ambulance transport capability. The levy has historically accounted for approximately 50 percent of the revenues of the transport agencies. The projected revenues from the new levy rate are accordingly:

Figure 83: EMS Levy Revenue Projections

Projected EMS Levy Revenues 2013-2017					
2013	2014	2015	2016	2017	2018
$14,042,105,396	$13,620,842,758	$14,029,468,041	$14,310,057,402	$14,596,258,550	$14,888,183,721
$5,265,790	$5,107,816	$5,158,894	$5,210,483	$5,262,588	$5,315,214

It is important to note that revenue from the levy is not expected to increase significantly during the course of the levy cycle. This is principally due to a slow growth forecast for the County and recapturing of some of the lost property values experienced during the recession through 2015. Recognizing the importance of the EMS levy as an essential component of the financial support to the EMS System will require annual monitoring of community growth and property values to ensure that the levy can support the annual budget including provider subsidy. Based on current projections, the levy will not be able to sustain automatic annual increases in financial support to transport provider agencies as has been the practice historically.

In addition to the EMS Levy, the system receives additional revenue from grants, interest income and proceeds from the timber tax. Collectively these sources are projected to provide additional revenue of approximately $178,000. On a positive note, 2012 timber tax revenues exceeded initial projections and yielded an additional $186,000 in revenue over budget forecast. The SCEMSC maintains a fund balance currently projected at $3,435,534 as of December 31, 2012. The fund balance is utilized for capital expenditures and cash flow for operational expenses incurred prior to the collection of taxes and other revenues. The 2013 SCEMSC budget projects utilizing $675,000 for capital expenditures including the replacement of ambulances and cardiac monitors.

Recommendations for billing integration:

- The system should adopt and require a standardized fee schedule
- Establish a process for implementing periodic fee schedule adjustments
- Establish new performance contracts between provider agencies and other system participants Elements for contractual consideration include at least:
  a. Compliance with fee schedule
  b. Prohibition of discounting fees to third party payers
  c. Require compliance with billing regulations for Federal and State payers
  d. Require submittal of a Medicare Compliance Manual

e. Require transport provider employee training on proper billing of services
f. Require response time compliance

- Establish process for indigent care write-off
- Consider implementing a single contract billing carrier for all transport providers
- Require transport provider agencies/billing carrier to submit consistent billing and collection data reports
- Develop a pro-forma Capital Expense Budget for the Levy Cycle
- Develop and update revenue forecasts for the Levy Cycle as part of annual budget cycle

1.3.2 Expenditures

The SCEMSC contracts for seven fully staffed transport units throughout Skagit County. Decisions regarding the operating costs of these units are within the purview of the provider agency. Of significance is that two of the three providers utilize two paramedics to staff their respective ambulances. The system should provide its financial support to the transport providers based on the contractual staffing requirement consisting of one Paramedic and one EMT[81]. Personnel costs represent the single largest expenditure in providing ambulance service. The average salary for a Paramedic with benefits employed by CVAA, which has the lowest operating costs structure in the system, is approximately $90,000. Salary differentials between Paramedics and EMTS are generally in the 15 percent to 20 percent range. Changing the staffing configuration from its current environment has the potential to result in annual savings in salary and benefits in the amount of approximately $220,000. ESCI recognizes the difficulty in modifying staffing configurations of the transport agencies but encourages the transition over time to lowering their operating expense and subsequent financial support. Thus, ESCI recommends that the system should provide its financial support to the transport providers based on the contractual staffing requirement consisting of one Paramedic and one EMT.

The current system relies on staffing seven units 24-hours per day without regard to demand for services. The system should determine the optimum number of units based upon call demand and geographic service. The addition of Paramedic first response capacity throughout the system may allow for different shift schedules that match call volume (i.e. demand) with resources such as staffed ambulances on duty. Preliminary analysis suggests there may be sufficient data to support the reduction of one 24 hour staffed ambulance to a 12 hour staffed ambulance. With the average cost of a fully staffed unit approaching $925,000 in the SCEMS System, savings of approximately $450,000 could be realized.

The SCEMS transport system is configured as an ALS system of transport providers. All ambulances in the system are staffed and configured to provide advanced life support services. An analysis of the level of medical intervention required by patients reflects that many patients do not require ALS transport.

[81] This is not to say that providers should not provide a second paramedic on an ambulance if it makes sense for that provider. Rather, the system levy should pay for only what it needs. If the provider wishes to provide additional resources then it should pay for those resources.

Utilizing an integrated approach to emergency service requests would allow the system to analyze the necessity of maintaining all transport units as Advanced Life Support units. The system may better served to have a combination of ALS and BLS transport units. ESCI estimates that the cost of a BLS transport unit, as opposed to an ALS unit, could save the system approximately $400,000 annually per unit.

Recommendation:

- The system should conduct a periodic analysis of call volume and service level required to determine the optimum number of ALS and BLS transport units

The system is financially supporting the various providers based on their expenditures. The current transport providers utilize different approaches to conduct patient billing activities. Two of the providers contract with different entities, and one provider conducts the billing program in house. Based upon a review of the cost of billing services, ESCI believes that efficiencies can be captured by having one billing contractor for the entire service area. Additional benefits could include standardized reports and specialty reports based upon the need of the system. In addition, equity would be created between the various providers in terms of the expense associated with the billing process. The contract could be rebid on a periodic basis to ensure that the system is receiving a competitive cost for this service.

Recommendation:

- The system should consider engaging a single firm for the patient billing and collection process

1.3.2.1 Operational Expense

Each of the transport agencies with the exception of Aero-Skagit have the capacity to reduce cost and increase revenue from additional patients transports which are not reflected in the recommended level of financial support. Decisions regarding level of financial support should therefore be predicated on the prior year financials including revenue and expenditure reports which reflect actual rather than projected revenues and expenditures. This practice will allow for more accurate financial decision making and provide sufficient lead time to review financial records including budgets, and provider billing and collection reports.

Figure 84: EMS Provider Subsidy

EMS Contracts Subsidy to Provider Agencies						
Transport Agencies	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**
Aero-Skagit	$580,000	$580,000	$580,000	$597,400	$615,322	$633,782
Fee Increase			$14,368	$14,368	$14,368	$14,368
Anacortes FD	$780,000	$780,000	$780,000	$803,400	$827,502	$852,327
Fee Increase			$48,102	$48,102	$48,102	$48,102
Central Valley	$1,836,937	$1,836,937	$1,836,937	$1,892,045	$1,948,806	$2,007,271
Fee Increase			$253,305	$253,305	$253,305	$253,305
Transport Subsidy	$3,196,937	$3,196,937	$3,196,937	$3,292,845	$3,391,630	$3,493,379
System Integration						
Mount Vernon	$225,000	$236,250	$248,063	$255,504	$263,170	$271,065
Sedro - Woolley					$260,000	$275,000
BLS Agencies	$98,800	$150,000	$157,500	$166,375	$173,644	$182,326
Total Subsidy	**$3,520,737**	**$3,583,187**	**$3,602,500**	**$3,714,724**	**$4,088,444**	**$4,221,770**

1.3.3 System Oversight Budget

ESCI has identified a number of financial opportunities both from a revenue perspective as well as expenditure control to assist the County in maintaining a viable emergency medical service system. In developing the pro-forma budget for the current levy cycle, ESCI has developed a capital budget predicated on known capital needs, revenue forecast as well as a projected operating budget reflecting recommendations that have a financial impact identified in the report. We recognize that some of the recommendations will take time to implement. However, the process for ensuring the system's fiscal stability should begin as soon as practical. Clearly, the most significant financial issue facing the system is the annual levy support provided to the ambulance transport agencies. Controlling annual increases in levy support requests and determining the appropriate level of support to the individual providers will be critical to maintaining the long term fiscal health of the system. ESCI recommends an integrated system's approach to determining how the levy proceeds should be allocated. A straightforward approach that treats all providers equally in terms of individual unit support does not appear to be appropriate given the diversity of the transport providers, geographic coverage requirements, and provider agency call volume. It is therefore recommended that the county use an annual financial review process consisting of reviewing actual versus projected revenues and expenditures from the prior year to determine the amount of levy support needed to sustain the transport provider agency. From a financial forecasting perspective, transport provider subsidies are not being recommended for reduction. However, future increases should be predicated on sound financial analysis of provider need and other revenue generating opportunities rather than sole reliance on continued levy dependency.

The system should begin to implement expenditure control measures that have been identified along with additional revenue generation opportunities as a condition for levy support. In taking this approach, the Commission can ensure that service levels can be maintained taking into consideration

the different operating environments encountered by the transport providers. In addition, this approach will provide additional revenue to help support an integrated system of patient care and transport including reimbursing other public agencies for their ALS and BLS response role. To assist the Commission, ESCI has developed a pro-forma budget for the balance of the levy cycle that reflects a sustainable fiscal approach to develop and maintain an integrated system of care.

Recommendations:

- The County should require submittal of prior year financials including budget actual from transport providers by June 1 to allow sufficient review time for determining the following year levy support
- The County should include financial reimbursement for selected ALS first response integration
- The SCEMS should fund the required Communications surcharge for EMS dispatch for all system providers including BLS 1st response agencies dispatched to EMS calls

1.3.4 Capital Budget

In addition to providing levy support for the transport provider agency's budgets, the Commission also takes financial responsibility for capital expenditures including rolling stock and certain equipment such as cardiac monitors. The current proposed capital budget includes replacement of seven ambulances over the course of the levy cycle. ESCI has reviewed the current fleet and recommends that five of the ambulances in front-line service be replaced during the current levy cycle. The principal driver for the current replacement program is accrued vehicle mileage. ESCI's recommendation only utilizes mileage as the single criterion in determining the projection for the number of ambulances to be replaced.

Figure 85: **Projected Ambulance Replacement Schedule 2013-2018**

Skagit County EMS System Ambulance Fleet						
Anacortes Fire Department	**Unit**	**Model**	**Year**	**Mileage**	**Average Annual**	**Projected Replacement Yrs.**
ALS Ambulance	Med 14	International (4400)	2007	44631	8,926	9.00
ALS Ambulance	Med 2	International (4400)	2004	123152	15,394	0.12
Aero Skagit						
ALS Ambulance	Med 7	Ford E350	2006	102,550	17,092	1.31
Central Valley Ambulance Authority						
Ambulance (Med 1)	Med 21	E450	2011	28,722	28,722	3.35
Ambulance (Med 2)	Med 18	E450	2008	124,287	31,072	0.02
Ambulance (Med 3)	Med 17	E450	2008	59,166	14,792	4.45
Ambulance (Med 4)	Med 20	E450	2009	28,255	9,418	10.27

Based on average mileage accrued, the system can anticipate the replacement of five ambulances during the current levy cycle. The replacement schedule is predicated on the unit attaining a maximum of 125,000 miles at which it is scheduled for replacement. Often with proper maintenance, units can exceed the mileage threshold and be safe for emergency operations. The SCEMSC should establish a replacement schedule identifying which ambulances will be replaced and the scheduled year for replacement. In addition, the Commission should establish a replacement policy that takes into consideration multiple factors for replacement including current mechanical condition, mileage, cost of annual repairs, certified inspection by qualified personnel, priority and financial capability to support capital budget.

Figure 86: SCEMSC Pro-Forma Capital Budget

Skagit County EMS Commission Pro-Forma Capital Budget (2013 -2018) Medic One						
CAPITAL ITEM	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**
Anacortes Med 2	175,000					
Central Valley Ambulance Med 18		175,000				
Aero-Skagit Med 7		175,000				
Central Valley Ambulance Med 21				175,000		
Central Valley Ambulance Med 17					175,000	
Cardiac Equipment Replacement	500,000					
Annual Cost	675,000	350,000	0	175,000	175,000	0

Recommendations:

- The County should establish a replacement schedule identifying which ambulances will be replaced and the scheduled year for replacement
- The Commission should establish a replacement policy that takes into consideration multiple factors for replacement of capital equipment

1.3.5 Operating Budget

The pro-forma operating budget has been formulated to reflect the various recommendations contained in the report. Major fiscal impacts of those recommendations include the integration of first responders into the overall EMS delivery system including reimbursement to cities for Paramedic first response and surge capacity including the cost of a response vehicle and equipment. Expansion of the BLS support system includes the absorption of the communications dispatch fee as well additional staffing to assist the Medical Director with quality assurance and administration with system data analysis. In addition, periodic adjustments are provided to the transport agencies. The operating budget and revenue forecast does not take into consideration potential cost savings that may be achieved through modification of the current deployment of transport units or staffing methodology.

Figure 87: EMS Administration Pro-forma Operating Budget

Skagit County EMS Commission Pro-Forma Operating Budget (2013-2018) Medic One						
Expenditures	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**
Training	$330,962	$347,510	$364,886	$383,130	$402,286	$422,401
Injury and Prevention	$170,255	$178,768	$187,706	$197,091	$206,946	$217,293
Administration	$665,000	$698,250	$733,163	$769,821	$808,312	$848,727
Transport Provider Subsidy	$3,196,937	$3,196,937	$3,196,937	$3,292,845	$3,391,630	$3,493,379
Additional Staffing - Quality Assurance/Analysis		$75,000	$78,750	$82,688	$86,822	$91,163
Medical Direction	$110,584	$116,113	$121,919	$128,015	$134,416	$141,136
BLS Agency Support	$98,800	$150,000	$157,500	$165,375	$173,644	$182,326
Capital Expenditures < $5000	$2,500	$2,500	$2,500	$2,500	$2,500	$2,500
Capital Expenditures > $5000	$675,000	$350,000		$175,000	$175,000	
Additional Projected Expenditures						
A. System Integration Cost	$225,000	$236,250	$248,063	$255,504	$523,170	$546,065
Budget Projections	**$5,475,038**	**$5,748,790**	**$5,091,423**	**$5,451,969**	**$5,904,725**	**$5,944,990**
Revenue Projections	**$6,215,790**	**$5,732,816**	**$5,847,525**	**$6,082,386**	**$6,142,929**	**$6,029,162**

1.4 Human Resources

Our recommendations are not made without considering the personnel currently serving the community in the Central Valley. Our concerns are related to the personnel currently working for CVAA. We believe that the cadre of personnel will have (and should have) positions in the redesigned system and the system should provide more opportunities for personnel. These opportunities may be different in the type of work being performed or in the reporting structure, however the likelihood that jobs will be lost as a result of this process is very low or nil.

First, there will continue to be opportunities for civilian personnel to operate ambulances in the system. We recommend that the Central Valley EMS Consortium establish and negotiate a process with the existing personnel that provides a pay structure roughly equivalent to the existing labor agreement between the IAFF and CVAA.

Second, those paramedics who desire to transfer their skills to one of the fire agencies should be given preference to do so. In this capacity, they will be given hiring preference to serve as firefighter/paramedics and service as either paramedics on first-response vehicles, be assigned to a fire-based ambulance, or provide medical services on a sprint car or other vehicle. In addition, they could be assigned simply as firefighters on fire apparatus. Based on our experience, we anticipate that approximately one third or more of the personnel will transfer to firefighter/paramedic roles.

Third, we recommend that there be no loss of jobs for the existing 40-hour personnel, specifically the CVAA 40-hour staff[82]. These personnel will be needed to guide the financial as well as the operational integration in the system, primarily because they know the history and have knowledge of the system that cannot be easily replaced.

Recommendations:

- Ensure opportunities to existing field personnel within the system
- Provide opportunities for civilian paramedics within the construct of the consortium
- Provide cross-training opportunities for existing paramedics
- Transfer 40-hour staff to manage business and back office functions in the consortium
- Make multiple roles available—i.e. sprint cars, ambulances, and ALS first response vehicles

Naturally, the existing personnel seeking employment in the system will have access to additional benefits that the current system cannot provide--specifically, access to individual growth and professional development opportunities that do not now exist. Firefighter/paramedics will have access to promotional opportunities, while civilian personnel will have access to transferability of skills and other competencies to a larger and more robust system and provider mix.

1.4.1 Shift Structure

One opportunity to make improvements through this EMS system model is to redesign, or at least reevaluate, the shift structure being used. Currently, the required 24-hour shift schedule is problematic for a number of reasons that have already been described. While the system is not a metropolitan area that can use alternate shift schedules of 8-, 10-, 12-, or even 14-hour shifts, it can certainly reevaluate the obligatory 24-hour requirements.

One benefit of a consortium structure is that the consortium model can make use of employees on something other than 24-hour shifts by rotating them to other functions during alternate hours of the day—much like Anacortes redeploys its 12-hour ambulance crew to fire responsibilities after the shift is over. In addition, the consortium could structure shifts in something other than the traditional 24-hour shift depending on other deployment options that are employed.

Further, with multiple options to deliver paramedics to the scene, the consortium model will maintain the flexibility to create shifts that are aligned with demand, while at the same time ensuring the flexibility and scalability of expanding resources, as real-time needs require.

[82] While we articulate a recommendation to hire CVAA personnel here, guarantees are more difficult. Some employees may choose not to work under a fire-based system, a few may not meet the minimum hiring standards, and others may simply retire. Regardless, we believe the opportunities for paramedics will be expanded rather than reduced.

1.5 Communications, Data and Quality

Throughout this report, ESCI has commented on the availability of adequate data by which to make appropriate system design changes. Although some methods to capture data are in place, there is no real method to evaluate that data or otherwise make use of it for the purposes of improving the system. Irrespective of the system design option selected, Skagit County system participants must develop a process that provides regular methods of capturing, analyzing, and reporting on system data.

The dispatch agency collects time-related data, but the agencies do not have enough confidence in that data to make use of it to improve the system. Further, data that could be provided by the dispatch agency is not captured by the agencies for the purposes of even analyzing response performance. For example, the dispatch agency can provide urban, suburban, and rural zone information, yet the agencies input zone information manually—a process that is prone to error. Finally, while ambulance providers use a standardized reporting system, that system is not universally adopted among all responders. For appropriate analysis to take place, the system must have an opportunity to evaluate all of the response data—either through the use of universally adopted reporting software, or through a standardized data base that can aggregate data into a single patient record.

Even if the data captured by the system were used for the purposes of quality improvement and system development, the agencies do not have access to patient outcome data, which could be used to improve the system. While we believe that this should be a long-term goal, it is complex but not impossible to adopt. We therefore recommend that the hospital, the dispatch agency, and the fire agencies establish methods to produce performance reports and examine both individual agency and system performance as part of a long term planning process.

Recommendations:

- Establish full-time quality assurance and data manager to oversee quality and data
- Create system-wide process to aggregate patient data into a single data record
- Engage hospitals to participate in the data analysis process to link out-of-hospital data with patient outcomes
- Establish process outcomes and QA outcomes for specific disorders and for the system

1.6 Summary of Structure and Future Design Recommendations

Governance Recommendations

- Establish Public Health Regulatory Structure
    - Create and appoint advisory board
    - Create performance-based contracts with providers
    - Established centralized, system-wide QA and data analysis
    - Engage hospitals in the QA and system improvements.
- Establish Central Valley consortium
    - Create multiple city agreements
    - Create deployment plans and structures
    - Enable performance based contracts

- Structure demand and surge capacity performance

Financial Recommendations

- Create BLS subsidy arrangements
- Standardize fee schedule and billing rules
- Provide dispatch subsidy arrangements for BLS providers
- Create and adopt capital plan
- Establish first response integration reimbursement
- Establish levy analysis before next levy cycle

Structural Recommendations

- Establish new boundaries for urban, suburban, and rural areas
- Appoint a single firm for EMS billing and potentially collections
- Create performance-based contracts with penalties
- Establish flexible, scalable first-response ALS program
- Consider alternative shift scheduling methods

1.7 Implementation Planning

Ease of Implementation. The best plan is of no consequence to the system if it cannot be implemented. ESCI believes that participants of Skagit County should appropriately consider ease of implementation when designing the system for the future.

The easiest plan to implement is clearly the Status Quo option. Participants in this option need to do nothing other than simply making marginal improvements. The Public Health model is the next easiest to implement. The Consortium Model, on the other hand, is more complex. Not only must three fire agencies create a new governance model in the Central Valley and enact human resources plans for hiring EMTs and paramedics, they must also bolster their data processes, manage bench strength, human resource processes and capital planning. Yet this model provides the best opportunity to make structural improvements in the system. Though there may be some costs required for implementation assistance, the consortium model with oversight by the public health department will, in our opinion, be the most likely to demonstrate the desired improvements.

1.8 Implementation

The system is currently poised to create an implementation plan that could be complete prior to the next budget cycle beginning in January 2014—if it moves quickly. ESCI proposes that the system overseers proceed immediately with a multi-phased process to establish the system improvements suggested by this document. We believe that the work will be able to proceed quickly if the system establishes an integration oversight committee to help guide the integration of the system. The primary goals of the integration process will be 1) incremental improvements in the current system, followed by 2) a selection of a method to assist the agencies developing a joint services agreement and

implement the strategic system plan for the Skagit County EMS system, and 3) establish methods to create and review performance measures and reporting. If the County and other system participants move forward with these recommendations, then ESCI recommends the following four-phase process for making those changes.

1.1.2 Create the Primary Governance Structures

1.1.2.1 Establish Consortium (Up to Four Months)

1. Conduct individual and joint agency meetings
2. Establish parameters for joint services agreement
3. Establish funding and governance structures for inclusion in the agreement
4. Create a valid Joint Services Agreement that meets the approval of all local agencies
5. Submit the Joint Services Agreement for adoption by local cities
6. Implement the agreement

1.1.2.2 Create a Public Health Structure (three months)

1. Establish rules and standards for financial structure
2. Create transport provider contracts
3. Create EMS Advisory Committee and committee makeup
4. Reevaluate existing county code and make recommendations
5. Create medical director contracts
6. Engage existing SCEMSC staff to implement systems

1.1.3 Implement Financial System Plan (Up to Six Months)

1. Create BLS subsidy arrangements
2. Standardize fee schedule and billing rules
3. Provide dispatch subsidy arrangements for BLS providers
4. Create and adopt capital plan
5. Establish first response integration reimbursement
6. Establish levy analysis before next levy cycle

1.1.4 Create Performance Measures (Three to Four Months)

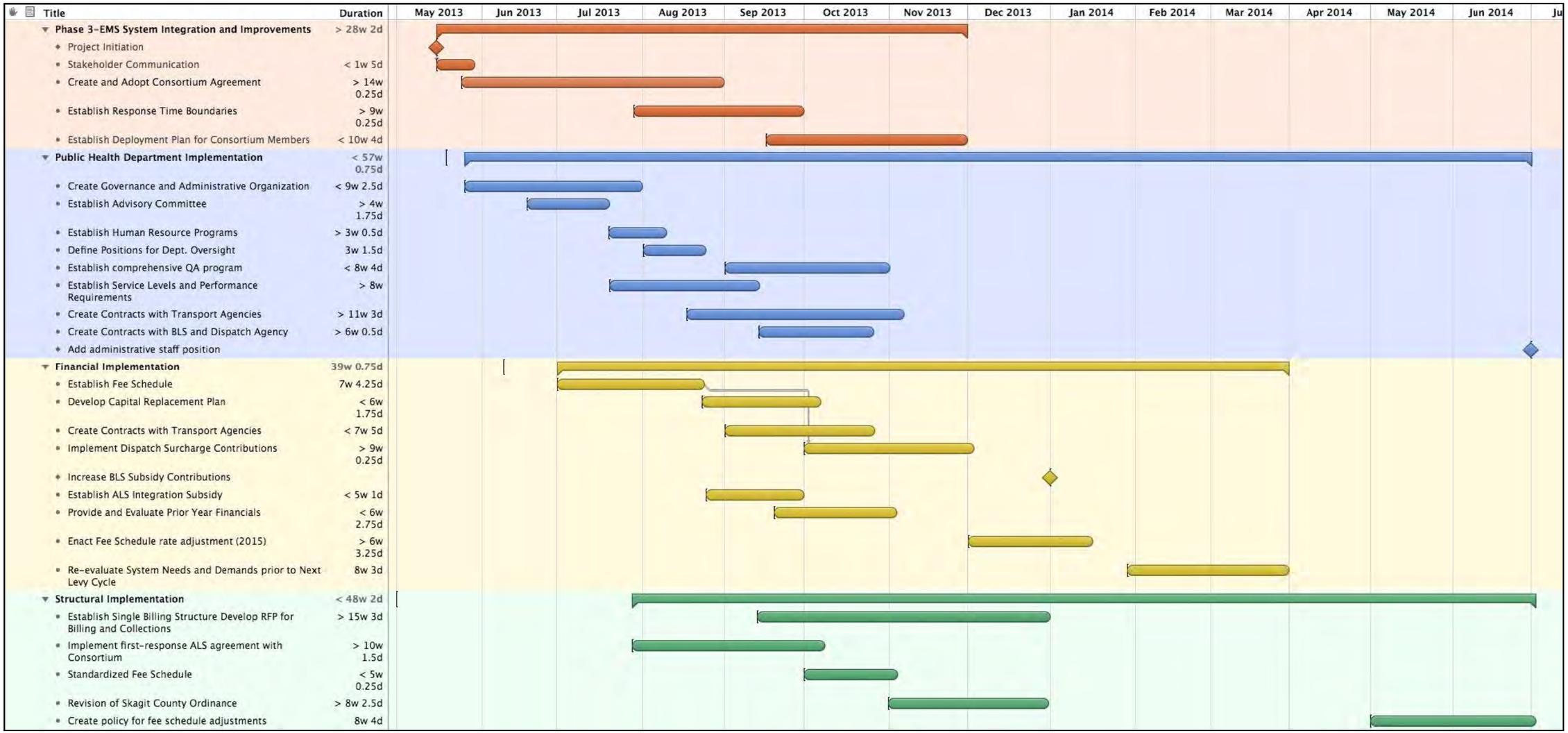
1. Establish response zone boundaries and performance measures for suburban and rural areas in Central Valley
2. Establish reliable, valid and feasible performance measures that include more than just response-time based
3. Investigate data integration options

1.1.4.1 Establish Reporting Process (Three to Four Months)

- Establish reporting parameters working with collective agencies
- Work with hospitals to evaluate data availability and transferability
- Work with fire district and Skagit 9-1-1 to evaluate data availability and transferability
- Provide reporting format and process

SKAGIT COUNTY EMS SYSTEM PLAN IMPLEMENTATION

Title	Duration
Phase 3–EMS System Integration and Improvements	> 28w 2d
Project Initiation	
Stakeholder Communication	< 1w 5d
Create and Adopt Consortium Agreement	> 14w 0.25d
Establish Response Time Boundaries	> 9w 0.25d
Establish Deployment Plan for Consortium Members	< 10w 4d
Public Health Department Implementation	< 57w 0.75d
Create Governance and Administrative Organization	< 9w 2.5d
Establish Advisory Committee	> 4w 1.75d
Establish Human Resource Programs	> 3w 0.5d
Define Positions for Dept. Oversight	3w 1.5d
Establish comprehensive QA program	< 8w 4d
Establish Service Levels and Performance Requirements	> 8w
Create Contracts with Transport Agencies	> 11w 3d
Create Contracts with BLS and Dispatch Agency	> 6w 0.5d
Add administrative staff position	
Financial Implementation	39w 0.75d
Establish Fee Schedule	7w 4.25d
Develop Capital Replacement Plan	< 6w 1.75d
Create Contracts with Transport Agencies	< 7w 5d
Implement Dispatch Surcharge Contributions	> 9w 0.25d
Increase BLS Subsidy Contributions	
Establish ALS Integration Subsidy	< 5w 1d
Provide and Evaluate Prior Year Financials	< 6w 2.75d
Enact Fee Schedule rate adjustment (2015)	> 6w 3.25d
Re-evaluate System Needs and Demands prior to Next Levy Cycle	8w 3d
Structural Implementation	< 48w 2d
Establish Single Billing Structure Develop RFP for Billing and Collections	> 15w 3d
Implement first-response ALS agreement with Consortium	> 10w 1.5d
Standardized Fee Schedule	< 5w 0.25d
Revision of Skagit County Ordinance	> 8w 2.5d
Create policy for fee schedule adjustments	8w 4d



Appendix

Figure 88: Current Response Zones (2000 Census) – Skagit County

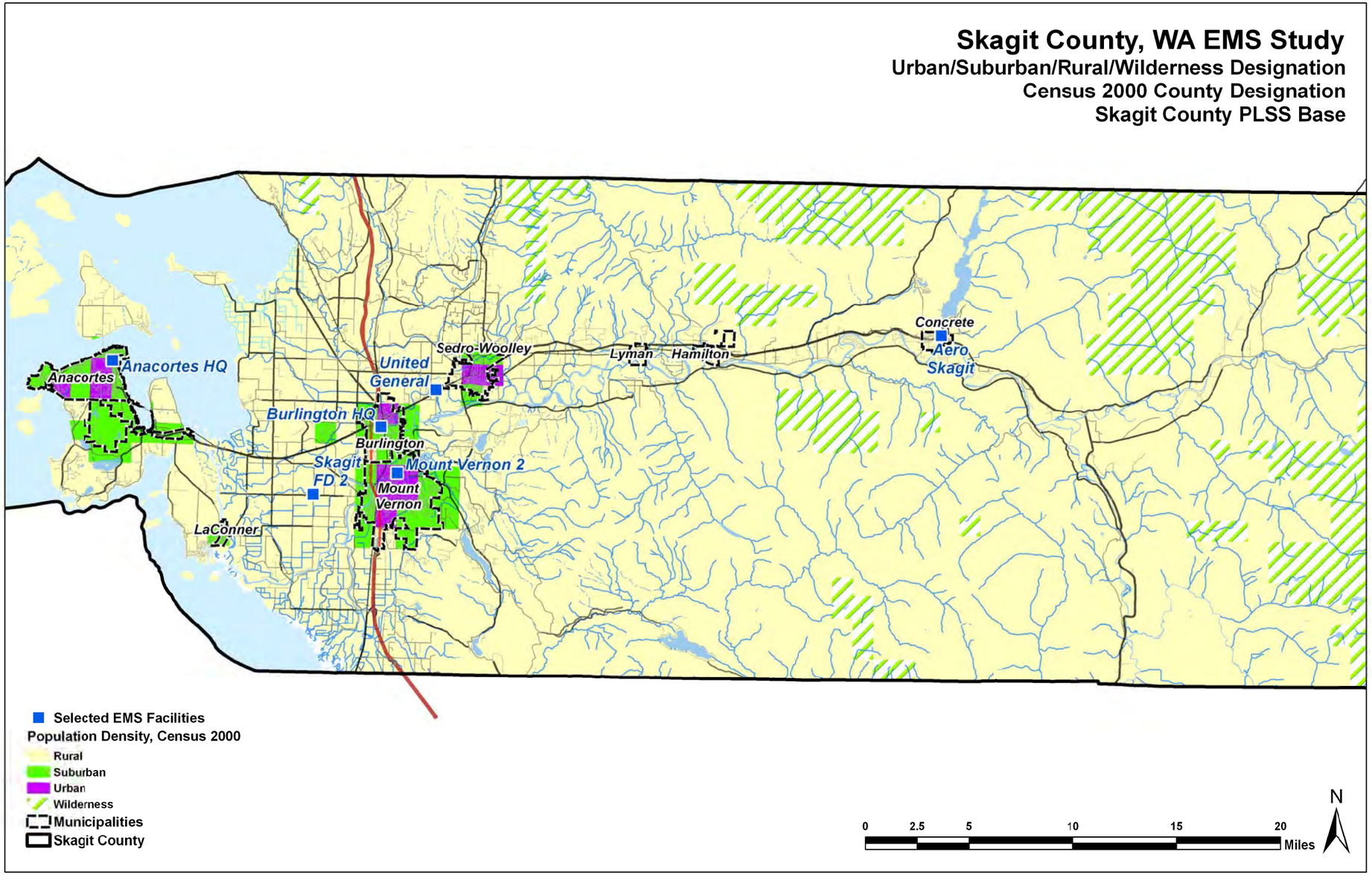
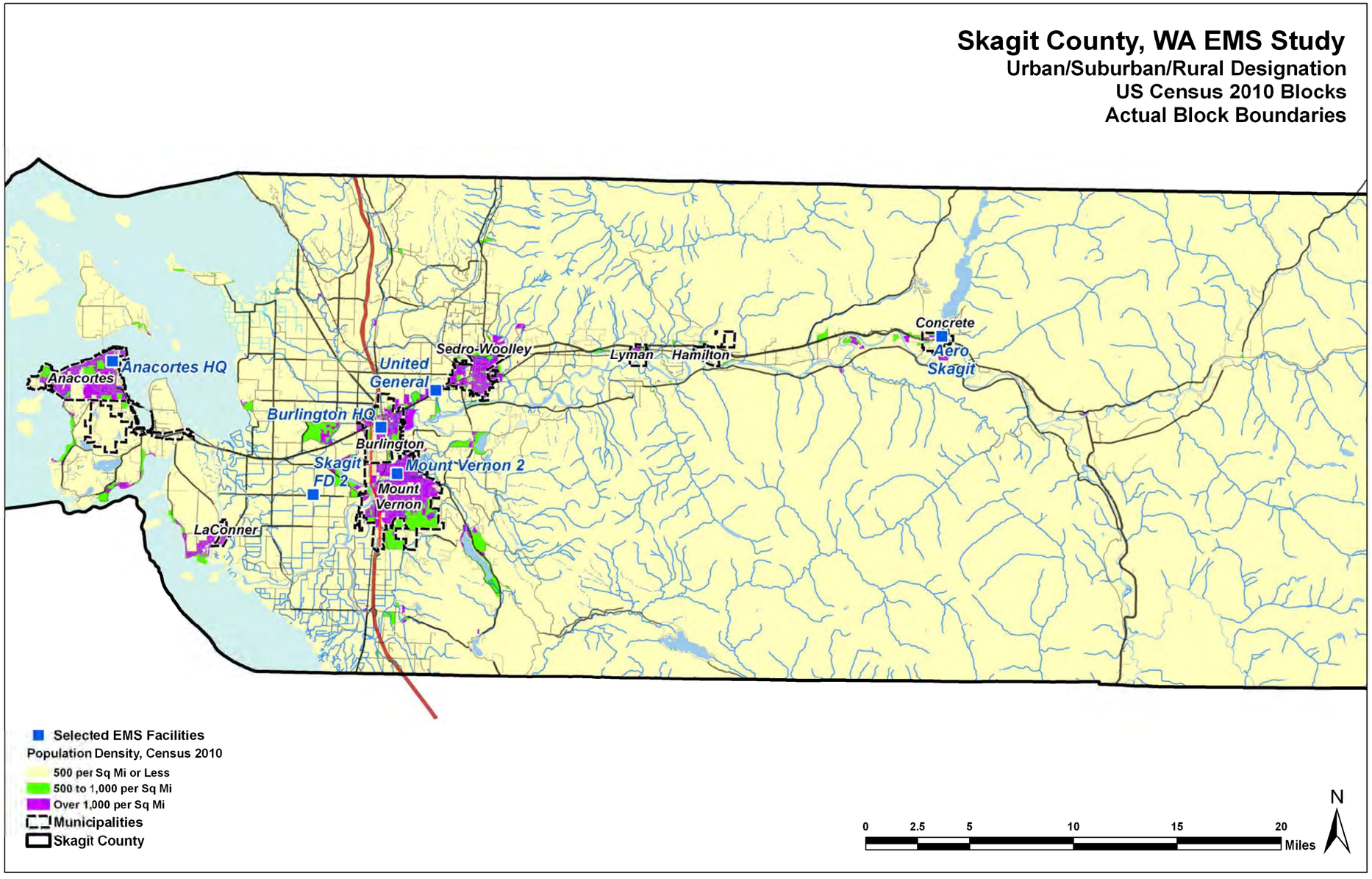


Figure 89: Current Potential Zones (2010 Census) – Skagit County



Corporate Offices
25200 SW Parkway Avenue, Suite 3
Wilsonville, Oregon 97070
800.757.3724

Eastern Region Office
111 Kilson Drive, Suite 208
Mooresville, North Carolina 28117
704.660.8027

National Capital Region Office
4025 Fair Ridge Drive
Fairfax, Virginia 22033
703.273.0911