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EQUITY AND SOCIAL JUSTICE STATEMENT

Consistent with King County Ordinance 16948 TPF has strived to integrate equity and social justice foundational practices into our work and recommendations that follow. To that end we will selectively use ‘inequity’ only when it “means differences in well-being that disadvantage one individual or group in favor of another; and when these differences are systematic, patterned and unfair and can be changed because inequities are not random; they are caused by past and current decisions, systems of power and privilege, policies and the implementation of those policies.”1 If we refer to concepts of ‘social justice’ it will include “all aspects of justice, including legal, political and economic, and require the fair distribution of public goods, institutional resources and life opportunities for all people.”2

1 King County Ordinance 16948 Section G
2 King County Ordinance 16948 Section H
FREQUENTLY USED ACRONYMS

The Emergency Medical Services (EMS) field makes frequent use of acronyms that may not be familiar to many persons. To reduce confusion for the purposes of this report the following acronyms are defined as:

AEMT  Advanced Emergency Medical Technician, certified at the Intermediate level
ALS  Advanced Life Support (i.e. EMT-I/AEMT or paramedic level service)
BLS  Basic Life Support (i.e. EMT/EMR level service)
CAD  Computer Aided Dispatch software system
CON  Certificate of Need
E-9-1-1  Enhanced 9-1-1 System (provides number and location services)
EMD  Emergency Medical Dispatch (pre-arrival instructions for 9-1-1 incidents)
EMR  Emergency Medical [First] Responder
EMS  Emergency Medical Services
EMT  EMT certified by Washington Department of Health (BLS)
KCEMS  King County EMS includes regional EMS agencies
KCM1  King County Medic One is the paramedic agency operated by the EMS Division
MPD  Medical Program Director
Paramedic  Paramedic certified by Washington Department of Health
PIER  Public Information, Education, and Relations
PSAP  Public Safety Answering Point
PUM  Public utility model uses a governmental entity to manage EMS in a community
STEMI  ST Elevation Myocardial Infarction
TPF  The Paramedic Foundation
3rd Service  EMS delivered by a local government alongside other public safety departments (police and fire) and employs civilian EMS practitioners.
UGA  Urban Growth Area
UH  Unit Hour is one hour of time for a fully staffed, equipped, and ‘ready to respond’ medic unit
UHA  Unit Hour Activity is a measure of the fraction of total time that was spent on responses during a specified time period.
UHU  Unit Hour Utilization is a measure of productivity whose numerator is either the number of incidents responded to (UHU-R) or the number of transports (UHU-T) and denominator of the number of unit hours provided.
EXECUTIVE SUMMARY

The King County EMS (KCEMS) System has been a global leader in paramedic resuscitation science for more than 40 years. Valuable best practices have been compiled to develop the Resuscitation Academy; a joint effort of Seattle Medic One, the University of Washington, and King County Emergency Medical Services. These best practices are now shared with other EMS professionals contributing to improved resuscitation rates worldwide.

KCEMS is a tiered, integrated, and regional system with paramedics deployed from five fire departments and one county operated service. All paramedics in King County are trained through a 3,000-hour University of Washington training program codified in County Ordinance that got its start in the 1970s and is largely modeled after physician emergency medicine training with an extensive mentorship and field training or practicum regimen.

The KCEMS system is funded primarily by taxpayers through a property tax known as the EMS Levy generating approximately $75 million revenue annually. The levy is on a six-year cycle that must be renewed by the super majority vote of citizens and is managed by the Public Health – Seattle & King County EMS Division.

The EMS Division evaluates the system to ensure it meets the needs of the changing county demographics on a continual basis. This includes but is not limited to determining whether the number of medic units and locations are adequate to meet the needs of the county.

The Paramedic Foundation (TPF), however was retained by the EMS Division to determine the optimal number of paramedic agencies in King County and how many medic units are appropriate for each to operate. Secondly, TPF was asked to develop a regional process for responding to any changes to the current ALS agency configuration and whether that configuration would meet the needs of the county for the next ten years.

In order to assess KCEMS and determine the answers to those questions we collected qualitative and quantitative data. We considered system efficiency through medic unit productivity, economies of scale through costs per capita, and medic unit response times to emergency incidents.

OPTIMAL NUMBER OF ALS AGENCIES AND MEDIC UNITS PER AGENCY

Based on our quantitative analysis of data from the previous ten years of paramedic-generated patient records and incident data, we found the paramedic agencies are meeting and in some cases exceeding their response time requirements throughout the county. By meeting the demands of the system the agencies demonstrate an adequate number of medic units and personnel are in place today.
We also found the current agency configuration with multiple, decentralized agency operations makes responding to changes in the configuration a slow and expensive process. A configuration change is currently necessary as Vashon Island Fire & Rescue has asked to relinquish its ALS agency.

We conducted interviews with an array of stakeholders including ALS providers, fire districts chiefs, medical directors, dispatch personnel, and elected officials. These individuals provided first-hand knowledge and insights about agency and unit configurations. Key informants were nearly unanimous in saying “the fewer providers the better” for greater economy of scale, but also generally said the ideal number of units per agency is the same number that their agency already has.

From an efficiency and financial perspective, the optimal number of ALS providers countywide is one. However, that change is not likely to be politically feasible in the near future. Fewer agencies benefit from greater economies of scale. Standardization, reduction of duplication, and portability of paramedics from one agency or area to another can improve the operations, finances and performance of the system as a whole. Rather than reducing the total number of agencies, partners may want to consider an intermediate approach based on these principles that achieve those benefits and may be acceptable in the short term, such as a move towards consolidating agencies operating in Zone 1.

### REGIONAL PROCESS FOR RESPONDING TO ALS RECONFIGURATION NEEDS

Stakeholders also provided advice during interviews about developing a regional process that can be used in the event changes in the ALS agency configuration are required in the future. Most informants trust the EMS Division to facilitate such a process. Stakeholders viewed both quantitative (e.g., call volume, response time) and qualitative (e.g., geography, a jurisdiction’s motivation, knowledge and availability of required resources and oversight if interested in providing an ALS unit) data as valuable in informing the change process and both should continue to be used in the future.

Several stakeholders noted the value of including elected officials as part of proceedings to build consensus, elevate the discussion beyond EMS operations, and to move the process forward. A process similar to that employed for levy deliberations was offered as a possible structure.

### PROCESS RECOMMENDATIONS

We recommend the EMS Division continue to periodically and proactively review the system’s medic units and capacity. Evaluation and realignment should be conducted as situations arise, such as any time a provider relinquishes oversight or a need for system realignment is identified by the EMS Division (e.g., failure to meet key performance measures, agency withdrawal, significant changes in incident volumes by zone, or by other factors).
Elements of evaluations should include but not be limited to:

- A clear determination of community need
- A consensus process
- Clear selection criteria for stakeholder inclusion in the consensus process
- Impartial facilitation; and,
- Expert consultation to identify barriers/facilitators for success

A Central Region EMS and Trauma Council policy adopted in 2012 requires requests for geographic expansion or contraction of ALS or BLS service and requests for new ALS or BLS service within King County be subject to the approval of the King County Medical Program Director (MPD) and must be authorized by the Central Region EMS & Trauma Care Council. The MPD and the Central Region Council should be fully informed through access to the business case.

Prior to initiating any formal changes to support a new ALS agency in taking over an existing ALS medic unit or coverage area, we strongly suggest the leadership of that agency communicate with and attempt to develop a proposal jointly with the existing provider. This will avoid the perception that a hostile takeover is being made and will allow the affected organizations to collaborate on a viable proposal for the EMS Division to consider.

Proposals for an agency to take over ALS geography from another ALS agency, or to become a new provider must include a business case. The business case must include a detailed description of the meetings and attempted resolution of issues with existing provider(s) and why they were not successful. It must also contain the costs for each levy cycle that include the balancing factors such as how it will impact adjoining agencies negatively, or positively. The agency must discuss what their value added proposition is and what any existing ALS agency would relinquish. The proposals should focus on how the change or addition makes the system better or fixes an existing problem.

If an entity submits a request for consideration as a new ALS provider, then balancing the metrics of the need and the impact on the existing providers should be heavily considered. An approach that mimics the Washington State Department of Health Certificate of Need (CON) process identified in Chapter 246-310 WAC should be used. Specifically, the determination of need described in WAC 246-310-210 can be adapted for KCEMS needs with little difficulty and it already incorporates the concepts of social justice and equity. Specifically, the hospital bed need methodology should be consulted for appropriateness of definitions and process modeling. The specifics could be determined jointly through an existing or a new EMS advisory committee to the EMS Division.

If an agency wants to withdraw then a pre-determined process must be activated to determine if the operation of the medic unit goes up for bid or the bordering agency is forced to take it
over, with clearly defined parameters of the minimum number of units that should be under an agency’s purview.

Future plans are built on forecasts that are greatly impacted by industry, the economy, housing prices, and migration patterns. The EMS Division’s levy planning cycle needs to consider scenarios far into the future that are not known today and may not be predictable. The same is true for redesigning the system, including medic unit placement, paramedic supply management in the context of retirements, and changes in educational technologies that could enhance the substantial training provided by the EMS Division to paramedics, EMTs, dispatchers, and others.

The ultimate decision in creating EMS system change will need to be made by the system stakeholders that have ownership in the outcomes: leaders and decision makers from throughout the region, the EMS Division, its many EMS partners, and the public. Many issues do not have easy or quick solutions and may require further analysis and consultation.

We appreciate the foresight of the EMS Division to investigate these topics in advance of the next levy using an independent third party. We provide an objective analysis of the issues and topics identified and have organized this report in a manner friendly for the layperson and public.

[Continued on the next page]
BACKGROUND

KING COUNTY ALS STUDY OBJECTIVES

The Paramedic Foundation (TPF) was retained by the EMS Division to conduct a study that examines the current Advanced Life Support (ALS) agency structure within the KCEMS regional tiered system in relationship to clinical outcomes and financial impacts. This ALS study has two primary deliverables:

1) Evaluate the ALS tier of service delivery and validate the optimal number (or range) of ALS agencies in the County, and the appropriate number (or range) of units operated per agency. The study also considers whether the current service model is designed to meet ALS system needs projected over the next decade (through 2025).

2) Develop a regional process for responding to any requests for changes to the current ALS agency configuration (e.g., if an ALS agency ceases operation).

TPF recognizes that the current EMS system provides excellent patient care, and our recommendations ensure that:
- The provision of medical care or patient outcomes does not deteriorate;
- The system remains a tiered, integrated, regional system;
- The delivery of patient care is derived from the highest standards of medical training based on scientific evidence with continued oversight by EMS physicians; and
- The system sustains its focus on operational and financial effectiveness and efficiencies.

METHODOLOGY

QUANTITATIVE DATA & METHODS

The project team requested and received the following data from the EMS division (for all agencies except Seattle) and Seattle Fire Department for our analysis:
- Financial summaries (2011-2016 for agencies except Seattle; 2011 through 2015 for Seattle)
- Available electronic Medical Incident Report Forms (eMIRF) from 2006 through mid-2016 for all agencies except Seattle
- Computer Aided Dispatch (CAD) system summary data for Seattle 2006 through 2015

Note:

Patient identifying information was removed prior to our response data analysis with incident locations identified by a simple grid number provided by the EMS Division.

Seattle is in the process of converting paper records into electronic records by scanning them into a software system. Seattle’s manual process is six to nine months behind and may be
incomplete, limiting our primary data analysis to only data available from the Computer Aided Dispatch (CAD) system. This did not include detailed data for 2015 and that limits our comparative analysis as noted where applicable in this report.

We also requested demographic data from the King County Demographer and sourced data from the US Census website and the National EMS Information System (NEMSIS) website.

In an effort to make meaningful distinctions between agencies, models and systems, several different ratios were examined. Since agency revenue is based on per unit reimbursement from the levy pool, only moderate differences can be found when evaluated on a per agency basis. However, as we will discuss through the report other measures were identified and used in our analysis. Several cost ratios were calculated:

- Cost per unit hour
- Salaries and benefits per unit hour
- Unit hour utilization
- Cost per transport
- Cost per response
- Cost per capita

**QUALITATIVE DATA & METHODS**

Between mid-September and early October 2016, TPF conducted interviews with 21 stakeholders, including fire chiefs from all three ALS zones, medical directors, dispatch directors, and elected officials. A TPF team of five or six conducted interviews in a semi-structured manner to address the two primary research questions and to elicit related ALS service issues.

Detailed handwritten notes were recorded, compiled, analyzed, and thematically coded using Atlas.ti qualitative software. This systematic data synthesis was employed to objectively capture the multitude of viewpoints expressed by various stakeholders.

This report does not contain all of the analysis we performed on information we collected as some of the key informant input validated a good practice or was otherwise helpful, but may not have addressed the primary study questions and as a result do not require specific mention in the report.

[Continued on the next page]
KING COUNTY DEMOGRAPHICS

Key to understanding how the history of KCEMS progressed into the mature system that exists today is awareness of the geographic challenges and urban growth over the past forty years.

Exhibit 1: King County incorporated areas

The Seattle-Tacoma-Bellevue, WA Metropolitan Statistical Area (MSA) is the country’s 14th most populous (Census 2012) with a 2010 total population of 3,439,809. King County is part of the MSA, is located in western Washington State, and includes 2,116 square miles. King County is bordered on the west by the Puget Sound and on the east by the Cascade Mountains and includes both Vashon and Maury Islands. In 2015 the population (2015 US Census Bureau estimates) was estimated to have increased 9.6% over 2010 reaching 2,117,125. At 1,000 persons per square mile, King County is the most densely populated county in the state.

The City of Seattle has been the seat of King County since January 1853. Seattle currently contains 32% of the county population with an estimated population of 684,451 (2015 Census estimate), a 12.5% increase over 2010 population levels. Seattle’s population is spread over 84 square miles, with a density of 8,148 persons per square mile.
The City of Bellevue contains 7% of the county population. Bellevue’s estimated population is 139,820 (2015 Census estimate), a 9.3% increase since 2010. Covering 32 square miles, Bellevue has a population density of 4,320 persons per square mile.

While the City of Seattle is the most densely populated municipality in the county, there are pockets of dense population north and south of the city. Most of the ALS medic unit station locations are within or nearby areas of higher population.

Exhibit 2: Medic unit locations with road networks

[Continued on the next page]
The ALS medic unit station locations are primarily on the west side of the county where the vast majority of the population and transportation infrastructure has been built.
The eastern two-thirds of King County are primarily rural in nature due in part to the Cascade mountain terrain and protected lands that are inland away from the seaport. These factors limit urban growth. The King County Comprehensive Plan designates an Urban Growth Area (UGA) that includes areas and densities sufficient to permit the urban growth that is projected to occur in the County for the succeeding 20-year period. Areas within the UGA boundaries are designated for higher density growth while areas outside are designated for low density growth. All but two ALS medic unit stations are within the UGA Boundary.

### Exhibit 5: KCEMS service area descriptions

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<td>Seattle Medic One</td>
<td>7</td>
<td>73</td>
<td>Seattle</td>
<td>690,151</td>
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<td>King County Medic One</td>
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<td>71</td>
<td>Auburn, Black Diamond, Burien, Covington, Des Moines, Enumclaw, Federal Way, Kent, Maple Valley, Pacific, Renton, Seatac, Sea-Tac Airport, Skyway, Tukwila, White Center</td>
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<td>Shoreline Medic One</td>
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<td>Bothell, Kenmore, Lake Forest Park, Shoreline</td>
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<td>Bellevue Medic One</td>
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<td>Redmond Medic One</td>
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<td>Duvall, Kirkland, Redmond, Woodinville</td>
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<td>Vashon Medic One</td>
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<td><strong>2,125,652</strong></td>
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* 2014 Service Area Population is calculated by summing the 2014 census tract populations for each tract designated per agency. Density is then calculated by dividing that calculation with the summed square mileage of those census tracts.

Exhibit 5: KCEMS service area descriptions represent the service area population and population density by ALS agency (2014 census tract data).

The service areas represent the actual populations served by each agency’s primary area of response. Approximately 14% of King County’s population reside in unincorporated areas on the Eastern side of the county. KCM1, Bellevue Fire Department, and Redmond Fire Department have primary responsibility for the Eastern and unincorporated areas which are. This method objectively “assigns” the population to the agency with the closest medic unit station responsibility for response.

Exhibit 6: Responses per 1,000 population (2015)

Exhibit 6: Responses per 1,000 (2014 service area population) shows the variability in the number of responses per capita by ALS agency, which also represent geographical variances within the county.

DEMOGRAPHIC FORECASTING

The Puget Sound Regional Council has developed “forecast analysis zones” for purposes of forecasting future growth within the region (see Exhibit 7).

[Continued on the next page]
Exhibit 7: Forecast Analysis Zones (Source: Puget Sound Regional Council)

Exhibit 8: Projected King County population by Forecast Analysis Zone (Source: Puget Sound Regional Council, 9/2015 forecast)
Population changes and trends factor into the forecasting for planning purposes. In considering the Puget Sound Regional Council’s forecasts for the next ten years it is prudent to recognize that an increasing volume of incidents will occur in the Eastside King and Seattle areas; with more modest growth in the remaining areas. The growth patterns prior to 2010 are not the same as those forecasted for the next ten years. Noticeable growth in the Shoreline Area, Green River, SE King, SW King and King Other zones will be modest while the Eastside King and Seattle Area growth will be stronger (Exhibit 8).

The response volume forecast (simple linear trend based on forecasted population trends) shows an increase in total KCEMS system volume of 29% over the next decade (Exhibit 9).

**KING COUNTY EMS SYSTEM**

The KCEMS system is comprised of six pre-hospital regional ALS agencies operating 26 medic units throughout King County: one third-service agency (also known as King County Medic One or KCM1), three municipal fire departments (Seattle Fire Department, Bellevue Fire Department, and Redmond Fire Department), and two fire districts (Shoreline Fire Department, and Vashon Island Fire & Rescue). In addition, a contract with Snohomish County Fire District 26
brings ALS agencies to the Skykomish/King County Fire District 50 area, from Baring to Stevens Pass.

In many parts of the county private ambulance companies co-respond either automatically or upon request and complete a majority of the lower acuity transports.

There are twelve Public Safety Answering Points (PSAPs) in King County that each transfer medical related 9-1-1 incidents to one of five KCEMS dispatch centers in Seattle and throughout King County. Dispatchers determine the level of care necessary for immediate dispatch following medically approved emergency dispatch triage guidelines.

There are eighteen hospitals and three stand-alone emergency departments in the county. For specialty care, there is one level I trauma center, four level III trauma centers, three level IV trauma centers and one level V trauma center. Categorized Cardiac and Stroke Centers are also distributed in the heavily populated areas along I-5 and I-405 and I-90. There are twelve level 1 and four level 2 cardiac centers; and four level 1, seven level 2, and five level 3 stroke centers in the county. The State’s only Level I trauma center is located in Seattle and it serves patients from Washington, Wyoming, Alaska, Montana and Idaho.

The KCEMS system operates in a coordinated manner by numerous agencies that provide high quality pre-hospital medical care across King County. It is this unique integrated regional system of consistent, standardized, and collaborative medical care that allows the system to excel and achieve the best possible patient outcomes.

A “Tiered Response System” is defined by the EMS Division as an EMS response system that uses dispatch criteria to differentiate between BLS and ALS practitioner response levels to 9-1-1 incidents. The KCEMS tiered response system consists of primarily BLS and ALS agencies but there are also alternative response models for some lower acuity 9-1-1 incidents (Section 5.17 of Seattle & King County Public Health Policy PHL 9-2 DPH, 2012).

An “Integrated Regional System” is defined by the EMS Division as the coordination of EMS system components, including BLS and ALS agencies that respond in a seamless manner regardless of jurisdictional boundaries, in order to achieve the highest level of pre-hospital patient care (Section 5.10 of Seattle & King County Public Health Policy PHL 9-2 DPH, 2012).

The KCEMS tiered response system increases patient safety and care because it does not over-dispatch paramedics to incidents that do not need their level of care. By managing the system this way a smaller number of paramedics are used and each has the chance to perform low-volume high-risk procedures with greater frequency.

Systems that are all ALS dilute the ability of the paramedics to perform low-volume high-risk procedures because a significantly larger number of paramedics are required in the workforce,
and all of them respond to incidents where many of them will not have the opportunity to use any paramedic skills. In addition, as a practical matter, dual paramedic systems allow weaker-skilled providers to “hide” behind a stronger provider and the weaker provider is much harder to detect through quality improvement activities.

**EMS DIVISION REGIONAL SERVICES**

The EMS Division manages the core regional services and supports other key elements of the integrated regional system. The EMS Division is essential to enabling KCEMS agencies to provide the highest quality out-of-hospital emergency care available. Regional coordination ensures pre-hospital patient care is delivered at the same standards across the region; regional policies and practices that reflect the diversity of needs are maintained; and, local area service delivery is balanced with centralized interests in an efficient manner.

The EMS Division also manages innovative projects and operations known as Strategic Initiatives, which are designed to improve the quality of KCEMS agencies and manage the growth and costs of the system. Regional Strategic Initiatives have allowed the KCEMS system to maintain its role as a national leader in the field and have been key in the system’s ability to manage its costs.

Examples of Regional Services and Regional Strategic Initiatives include:

- Uniform education of more than 4,200 EMTs and dispatchers
- Regional medical control and quality improvement for over 30 EMS agencies
- Injury prevention public health programs
- Regional (centralized) data collection and analysis
- Regional planning for the KCEMS system
- Financial/administrative management
- More than 10,000 public school students per year are taught CPR
- BLS efficiencies with a stated objective to reduce unnecessary requests for paramedics by EMTs

[Continued on the next page]
KCEMS RESPONSE ZONES

Exhibit 10 shows King County emergency coordination zones. KCEMS Zone 1 is the North and East County areas and are served by Shoreline Fire Department, Redmond Fire Department, and Bellevue Fire Department. Zone 1 borders the Seattle Fire Department border at the north city limit and Renton Fire Department’s border at its northern limit. KCEMS Zone 1 includes the cities of: Bellevue, Bothell, Duvall, Issaquah, Kenmore, Kirkland, Lake Forest Park, Mercer Island, North Bend, Sammamish, Shoreline, Snoqualmie, Redmond, and Woodinville.

KCEMS Zone 3 is the South County area served by KCM1 and includes the cities of Auburn, Black Diamond, Burien, Covington, Des Moines, Enumclaw, Federal Way, Kent, Maple Valley, Pacific, Renton, Seatac, Sea-Tac Airport, Skyway, Tukwila, and White Center.

KCEMS Zone 5 is served by Seattle Fire Department and includes the entire city.

KING COUNTY GOVERNANCE

The King County EMS Division resides within King County’s Public Health Department. King County is governed by the Metropolitan King County Council (MKCC), a district elected legislative body consisting of nine members. The Council adopts laws, sets policy, and holds final approval over the budget. The council is free to pass all laws and ordinances it sees fit to further its operations, within the boundaries of the state and federal constitutions.

Currently KMCC has nine standing policy committees and three regional committees. Members of the Seattle City Council and representatives from suburban cities and local sewer districts are also members of the regional committees. In addition, all nine members of the Council meet as a Committee of the Whole to discuss broad-reaching legislation and issues.
The King County Executive is the highest elected official representing the government. The Executive is not a member of the County Council, and is a separately elected official who submits legislation to the County Council for consideration. Each year in October, the Executive submits a proposed budget to the County Council for the operation of County government for the coming year. The Executive also has veto power over ordinances passed by the County Council.

EMS SYSTEM OPERATIONAL EFFICIENCIES

EMS systems exist in a complicated regulatory and economic environment. They exist at the nexus of healthcare, public safety, and public health, and often use a combination of funding mechanisms from each. EMS systems are constrained by federal, state and local regulation in terms of system design, response reliability, certification, licensing and healthcare compliance. Each level of regulation adds cost to the system but also improves the quality, reliability, and responsiveness to local expectations as well.

EMS systems exist within the realm of public utility economics such that most of the cost is in establishing the network. As an essential public service that is locally regulated, EMS shares many economic attributes with public transportation, water, power and other utilities. As with the fire service, most of the cost of an EMS agency is associated with “readiness” (the ability to respond reliably to the next request for service).

EFFECTIVENESS MEASURES

Some public services may be uncomfortable with or unaccustomed to measures of productivity but one of the hallmarks of the KCEMS system is its interest in efficiency. While KCEMS agencies may not have many comparable peer groups outside of the county from which benchmarks can be set, the benchmarks within the county can and should be monitored and thus are able to be managed.

An objective measure of the effectiveness of productive effort is based on the deployment of ALS medic units throughout the county. Unit hour utilization (UHU) is a measure of productivity that is often used as a proxy for EMS system efficiency. UHU identifies the most efficient providers of an EMS service by their ability to produce a given level of output using the least number of inputs. This is a measure of medic unit productivity, not of individual paramedics and does not measure non-response related workloads.

UHU measures the productivity of the inputs (ALS medic unit hours) with the amount of time they are treating or transporting patients for productive activity. A unit hour (UH) is a fully staffed medic unit available for response to incidents for one hour. Thus the UHU is typically calculated by dividing the number of responses (UHU-R) or the number of transports (UHU-T) by the number of UHs consumed to cover those responses or transports.
A higher UHU indicates better productivity although at a certain point it can be so high that issues of practitioner fatigue or other concerns may become an issue. As a productivity measure in urban or suburban systems (rural areas provide geographic coverage and rarely have the ability to improve productivity). A UHU of 40% is generally considered a ceiling for 24 hour shifts.

<table>
<thead>
<tr>
<th>Common UHU Scale for Urban &amp; Suburban EMS</th>
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<tbody>
<tr>
<td>45% – 55%</td>
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<tr>
<td>35% - 45%</td>
</tr>
<tr>
<td>25% - 35%</td>
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<tr>
<td>15% - 25%</td>
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<td>1% - 15%</td>
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Workload expressed as Unit Hour Activity (UHA) more accurately measures the workload pressure put on the paramedics staffing a medic unit in their role as emergency medical responders. It also somewhat levels the playing field for differences in driving times between remote, rural, suburban, and urban agencies. This is an important consideration because research in the EMS, medicine, and transportation sectors supports that overworked staff make more mistakes and reduce the quality of patient care. UHA is calculated by using the total number of hours that units are engaged on calls by the total number of unit hours, or put more simply it is the fraction of the period that is spent engaged in responses to the total time on duty. It does not include time spent doing other work that may be assigned such as chart reviews, training, or restocking.

Hypothetically, if a medic unit were to never respond, it would always be available for a response. Conversely, if a medic unit were to go on every response, it would have limited availability for the next response and in some cases would not be able to respond (such as simultaneous dispatches to different incidents). Therefore, it is important for KCEMS to balance readiness to respond with the availability (factoring both UHU and 9-1-1 calls it was unavailable to be dispatched to) to respond, for a given medic unit. KCEMS could develop a composite measure that balances efficiency with capacity.

Other composite measures relying on UHU include subjective data such as crew fatigue and worker dissatisfaction with other objective points such as sick calls, worker compensation claims, etc., to give leaders a measure and “feel” for when new units are needed or when productivity starts to decrease or paramedics become bored. When measured over time these can be powerful indicators of system health.
Another distinction of KCEMS is an intense focus on minimizing the incidents that paramedics respond to and then minimizing the number of transports they perform. As such it is appropriate to measure the UHU for both responses and transports on an ongoing basis and to use these figures for discussing and managing the deployment of the system to ensure that the design of the system and trends in transportation decisions are appropriate to meet the needs of the patients requiring them.

For all current ALS medic units in KCEMS, the number of UHs per unit per year is 8,760 hours (24 * 7 * 365). That means a 24-hour ALS medic unit that runs eight incidents during a 24-hour shift would have a UHU-R of 0.33 or 33% (8/24). If it transports patients in 4 of those incidents, it would have a UHU-T of 0.17 or 17% (4/24). The UHA would determine that the four responses without a transport averaged 45 minutes (4 * 45 = 180 minutes) and the four transported averaged 75 minutes (4 * 75 = 300 minutes) for a total of 480 minutes of time spent on responses in 24-hours (1,440 minutes) for a fraction of 0.375 or 37.5%.

In many EMS systems, when a unit reaches a UHU-R of 40%-50% (9-12 responses per 24-hour shift), concerns are raised about the workload and its potential effect on the practitioners in terms of sleep time and fatigue on long shifts. Since KCEMS units fall below this level so fatigue is not likely to be a primary concern for KCEMS.

| 2014 KCEMS ALS Workload Comparison |
|-----------------|-------|-------|-------|
| Agency          | UHU-R | UHU-T | UHU-A |
| Vashon Island Fire & Rescue | 6%    | 2%    | 6%    |
| Redmond Fire Department | 14%   | 4%    | 10%   |
| Bellevue Fire Department | 15%   | 6%    | 10%   |
| Shoreline Fire Department | 17%   | 7%    | 13%   |
| KCM1            | 23%   | 6%    | 14%   |
| Seattle Fire Department | 31%   | 11%   | 17%   |

Exhibit 12: KCEMS ALS workload comparison

These UHU levels (Exhibit 12) demonstrate that Seattle Fire Department has the highest productivity metric; this is not surprising considering the entire urban geography served by the department. Among the more widespread urban-suburban mix of the other agencies, KCM1 stands out in productivity. This too is not surprising due to the single role nature of the KCM1 practitioners and the design of the response system in the South County area. The single unit Vashon system is a geographical coverage unit and thus will likely never significantly improve its UHU. Not shown is a recent trend in that KCM1 has become increasingly productive (an increasing UHU-R) over the last three years while the fire-based systems have remained unchanged.
MEDIC UNIT RESPONSE TIME
The public and elected officials focus on response times primarily because it is one of the few things that they both measure and understand. The public is unaware of adherence to protocols, drug dosages and other components of competent quality clinical care, but they know how quickly the system responds to their calls for help.

Exhibit 13: 2014 incident density with medic unit locations

Exhibit 13 shows the resulting number of incidents within each grid box when the incident data was joined to the geographic grid. This map demonstrates that heavier volumes of activity mostly exist nearby the ALS medic unit stations and coincide with population and infrastructure.

Travel time is impacted not only by driving speed but also distance from the station, weather, construction, traffic congestion, and physical and manmade barriers that will delay the units from reaching the scene. Once on scene, the patient could be several stories up within a building, on the far end of an industrial or commercial facility, or within a maze of hallways within a residential facility leading to an extended patient contact time.

While travel time is somewhat variable, we conducted a geographic analysis using station locations and the actual average street network speeds to create a model of expected response times.
Exhibit 14’s geographic analysis model shows the coverage for up to a 10-minute drive time from each ALS medic unit station. This depicts the “average” coverage for the required response times. The 2016 EMS Division’s Annual Report reports that ALS Agencies (not including Seattle Fire Department) reached nearly 80% of incidents in less than the 10-minute standard (averaging 8 minutes), and 94% of incidents in less than 14 minutes. Thus the ALS agencies are meeting their response time requirements for the current level of demand with the current number of ALS medic units.

[Continued on the next page]
Exhibit 15 shows that the current number of ALS medic units (26) are capable of achieving the goals of the EMS Division. This analysis should be monitored into the future as any variance of the result compared to the goal may require station moves, unit standby at other locations, or additional units within existing stations.

**Key Findings**

- The level of utilization among KCEMS ALS agencies is low compared to industry standard benchmarks.
- Seattle Fire Department stands out as a productive urban system while KCM1 is a productive suburban system.
- KCEMS ALS agencies are meeting their response time requirements with the current number of ALS medic units.
EMS ECONOMICS

The next criteria for determining the optimal number or range of ALS agencies are the economics. For the public benefit in King County we chose to evaluate the economy of scale and economy of scope; and to consider alternative models.

An economy of scale for EMS occurs when the cost per UH decreases while the number of responses increases. This occurs where there are high fixed costs and constant marginal costs, or when there are low fixed costs and declining marginal costs. The inputs are unit hours and the outputs are responses.

Closely related to the question of economies of scale is the issue of economies of scope. Whereas economies of scale relate primarily to the efficiencies associated with the level of production of a single product type, economies of scope relate to efficiencies that accrue from combining processes or activities in the production of multiple outputs (Abbott, Malcolm, and Bruce Cohen. "Productivity and efficiency in the water industry." Utilities Policy 17.3 (2009): 233-244). This speaks directly to the regional services provided by the EMS Division.

KCEMS ECONOMY OF SCALE

As described above, an economy of scale for EMS occurs when the cost per UH decreases while the number of responses increases. Although six agencies are too few to determine statistical significant correlations, the data show that the cost per capita decreases $18.05 (p= 0.22), the cost per response decreases $353.42 (p-value 0.05), and the cost per transport decreases $1,055.73 (p= 0.14) for each additional medic unit operated by an agency - even though the cost per unit hour may increase slightly at $3.15 (p= 0.2) per unit hour for each additional unit operated.

<table>
<thead>
<tr>
<th>For every medic unit operated by an agency the:</th>
<th>p-value</th>
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<tr>
<td>Cost per capita decreases</td>
<td>$18.05</td>
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<tr>
<td>Cost per response decreases</td>
<td>$353.42</td>
</tr>
<tr>
<td>Cost per transport decreases</td>
<td>$1,055.73</td>
</tr>
<tr>
<td>Cost per unit hour increases</td>
<td>$3.15</td>
</tr>
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Exhibit 16: Economy of scale cost changes

[Continued on the next page]
The single largest contributor to the ALS agency budgets is personnel salary and benefits. All ALS agencies are in a negotiated salary environment; thus there is little variation both in total salaries and in ratios of salary per unit hour. Salaries and benefits comprise 80-90% of ALS agency costs and would also vary by number of ALS medic units. KCM1 salary and benefit costs per medic unit are significantly lower when compared with the other ALS agencies.

This demonstrates an appreciable economy of scale. It was not within the scope of this study to complete a detailed ALS agency costing study, but such a study could uncover why there are cost per capita differences between Shoreline and the other agencies.
To maximize economic efficiency a manager seeks the greatest UHU from the lowest cost per UH. In rural areas, there may be no opportunity to improve productivity. In rural areas management of the UH cost is the most important issue for economic efficiency. Although labor is the largest cost of all ALS agencies at 80-90% of expenses, even small improvements in decreasing costs for supplies, capital items and medications, may make a noticeable difference in the UH cost.

In urban areas higher volume and productivity are even more powerful than UH cost in reducing the cost per incident and cost per transport. For this reason, many systems buy more expensive and reliable equipment and pay their paramedics higher wages to work in a more productive environment, often using variable staffing and fluid deployment.

Exhibit 19: Economy of scale comparison data

Exhibit 19 VIFR 1 = Vashon Island Fire & Rescue, SFD 3 = Shoreline Fire Department, RFD 3 = Redmond Fire Department, BFD 4 = Bellevue Fire Department, SFD 7 = Seattle Fire Department, KCM1 8 = King County Medic One.

A large factor in calculating the cost per unit hour is the cost data itself and how the ALS agencies determine their costs. Because the ALS agency funding allocation is fixed and reimbursement-based, all ALS agencies receive the same allocation, except for KCM1 which receives complete cost recovery rather than an allocation. KCM1 has the lowest per capita cost, while Vashon has the highest due to the economies of scale of 8 units versus one.

Exhibits 18-22 demonstrate the relationship that the number of ALS medic units has on the costs of operating the system when looking at a number of factors.

[Continued on the next page]
Exhibit 20: 2015 Cost per response by number of ALS medic units

Exhibit 20: 2015 Cost per response by number of ALS medic units shows the decreasing cost per response by increasing the number of ALS medic units.

Exhibit 21: 2015 Cost per transport by number of ALS medic units

Exhibit 21: 2015 Cost per transport by number of ALS medic units shows the decreasing cost per transport by number of ALS medic units.

[Continued on the next page]
Exhibit 22: 2015 Cost per unit hour by number of ALS medic units
Exhibit 22: 2015 Cost per unit hour by number of ALS medic units shows the slightly increasing cost per unit hour for additional ALS medic units.

Exhibit 23: 2015 Cost per capita by number of ALS medic units
Exhibit 23: 2015 Cost per capita by number of ALS medic units shows the decreasing cost per capita by increasing the number of ALS medic units per ALS agency.
Exhibit 24: 2015 Cost of salaries & benefits per unit hour by number of medic units (not including Seattle Fire Department)

Exhibit 24: 2015 Cost of salaries & benefits per unit hour by number of medic units (not including Seattle Fire Department) shows the decreasing costs for salaries and benefits for additional ALS medic units.

These findings are consistent with key informant perceptions, most of whom thought single unit ALS agencies as both economically and operationally inefficient. Vashon Island Fire and Rescue was frequently brought up to illustrate this point. Like several rural areas of King County, Vashon procured an ALS medic unit based on response time needs, rather than call volume. According to respondents, however, high costs and staffing difficulties have proved insurmountable obstacles for continued program feasibility. Vashon is in the process of transferring ALS medic units to another ALS agency. The optimal ALS medic unit volume suggested by informants often matched the current number in their own jurisdiction. Several cautioned, however, that too many ALS medic units could weaken interpersonal bonds between BLS and ALS practitioners, which are seen as important in providing congruent care.

In reviewing operations, we considered ALS medic unit productivity compared to number of responses, number of transports, population density, and the number of ALS medic units. We learned that:

1) Although KCEMS is medically homogenous, its operations and costs vary by agency. There is variation between the ALS agencies and ALS medic units that comprise KCEMS. The ALS agencies have the latitude and exercise discretion to design the agency according to their internal needs. This variation may erode efficiencies.
2) Response rate describes busy-ness. The number of responses a single ALS medic unit or single ALS agency experiences is the sole factor used to determine how busy that unit or agency is. Oversight to more accurately compare responses between agencies by adding filters for other related productivity measures would improve the measure.

3) The fewer the number of responses, the more likely the ALS medic unit is to transport. The higher the number of responses, the less likely the ALS medic unit is to transport. It was not within our scope to determine why these phenomena exist. They deserve further study.

4) The denser the population of an area, the busier the ALS medic units. Population density increases response requests. Various temporal, environmental, sociological and geographical affects are influenced by density.

5) The number of ALS medic units is not correlated to the number of responses. The service area for each ALS medic unit was established based on factors which were significant at the time. The changing factors of population density, traffic volume, and frequency of events drawing people to such an area during specific days or times may have changed.

6) A denser population does not result in a greater number of ALS medic units. The system does not deploy ALS medic units based on the population density.

The two most significant independent factors of economic efficiency of the KCEMS system are 1) the salaries and benefits costs and 2) the administrative and operational support necessary for each ALS agency to maintain. Reducing the number of ALS agencies while increasing the number of ALS medic units operated by each agency (total number of medic units remaining unchanged), will reduce redundant administration and operational support and will lead to the most effective means of increasing the economic efficiency of KCEMS.

**Key Findings**

- KCEMS system costs are greatly reduced by having fewer ALS agencies operating more units per ALS agency.
- Salaries and Benefits comprise the largest portion of the cost of the KCEMS system. Although controlled by labor agreements, there is significant variability between ALS agencies.
KING COUNTY STAKEHOLDER PERSPECTIVES

This section briefly outlines interview findings on the two primary research questions regarding: the optimal number of ALS agencies and units and a process for responding to changes in ALS configuration. Where appropriate, qualitative findings have also been provided throughout this report to further illustrate key points and provide context for the quantitative analysis.

OPTIMAL NUMBER OF AGENCIES

Overall, stakeholders expressed satisfaction with the existing number of ALS agencies in the county. This view was particularly strong among current ALS agencies. Responses among contract agencies included caveats about wanting more ownership in the system, such as local jurisdiction branding on medic units and decision-making about resource allocation (e.g., BLS training).

Though satisfaction with the current ALS agency configuration was high, representatives from both ALS agencies and contract organizations acknowledged that a reduction in agencies would increase system efficiency. Zone 1 was most frequently cited, with suggestions of up to an 40% efficiency benefit through consolidation. Decreasing redundancies in management (e.g., Medical Service Officer (MSO), Medical Service Administrator (MSA), chiefs) and administrative overhead were repeatedly mentioned as ways to produce savings.

Respondents suggested that ALS agency consolidation also offered benefits beyond economics, such as:

- More seamless service integration through a reduction of jurisdictional boundaries.
- Reduced barriers experienced by new paramedics from contract jurisdictions who currently lose their seniority and home department when required to become ALS agency employees.
- Increased range of environments through which paramedics could rotate with ALS personnel from rural jurisdictions gaining skills practice in busier urban areas, while rural settings offer recuperation time for others.
- More informal training and quality assurance opportunities provided by paramedics to contract department BLS staff, something that is more readily available to ALS agency EMTs.

Those suggesting consolidation were quick to point out, however, that merging ALS medic unit service areas would be extremely difficult. Politically, agencies were well established and invested in the current service configuration. Some fire-based agencies expressed that dual role paramedics provide benefits to the fire department in addition to their role as a paramedic.

Organizationally, different operational systems and labor representation would make integration challenging (e.g., departments on different work schedules). Several respondents warned that decreasing the number of ALS agencies could impede innovation as smaller departments were seen as more agile and responsive to change, as well as better able to tailor services around community needs. Overall, the challenges of service consolidation seemed
formidable to many. In fact, several respondents quipped that despite advantages, they don’t see mergers happening in their lifetime.

### OPTIMAL NUMBER OF ALS UNITS PER AGENCY

Most respondents were satisfied with current numbers of ALS medic units. Adequate response time was typically cited to support these views. Respondents reported that multiple ALS medic units (at least 3 to 6) allowed for adequate backfill of staff to cover absences related to vacation, training, and injury.

Still, key informants in all zones expressed divergent opinions about exceptions to acceptable ALS medic unit numbers. Most notably, Zone 5 (Seattle) reported potential benefit of a third ALS medic unit to service the downtown area. Seattle reportedly reaches Status 0, with no ALS medic units available, on a bi-weekly basis. This situation draws in the city’s north and south ALS medic units, leaving outlying areas with slower service. Rural jurisdictions in Zone 1 and 3 also reported challenges of long response time.

The needs of rural communities highlighted concerns regarding system equity. KCEMS applies an urban, rapid response EMS model to the county’s outlying regions. However, response times in those isolated areas tended to be longer and receive less EMS backup compared to urban centers. Respondents shared stories of BLS staff choosing to transport to the hospital over requesting ALS support because of delayed wait times and conversely paramedics first on scene, needing to wait for BLS before going back in service.

### REGIONAL PROCESS FOR RESPONDING TO CHANGES IN THE ALS CONFIGURATION

While not all stakeholders directly addressed the question of a change process during the interview, many expressed satisfaction with the current EMS Division role in overseeing ALS service levels and looked to the EMS Division as the lead agency in facilitating a change process moving forward. With regard to criteria for change, the use of county EMS data (e.g., call volume, response time, heat maps) provided by the EMS Division was highly valued. Respondents agreed that change should be based on science and system needs. Several stakeholders asserted, however, that statistics alone should not constitute the only evaluation criteria for system change. A jurisdiction’s motivation for staffing an ALS medic unit, their knowledge and availability of required resources and oversight, and the jurisdiction’s potential for success were additional factors offered for consideration.

How the change process should be structured was less articulated among respondents. One suggestion was to employ a similar process as was currently used for the King County EMS levy. The levy process invites input from ALS stakeholders and utilizes working groups. Opinions as to who should be at the table were split between current ALS agencies only or all interested stakeholders, with answers typically reflecting the stakeholder’s particular affiliation. Several respondents favored including elected officials, as done with levy proceedings, to help build
consensus, elevate discussion beyond EMS operations, and move the change process forward. Employing a facilitator was also mentioned. Transparency was seen as an important element of any change process.

**OPPORTUNITIES AND CHALLENGES FOR CHANGE**

Organizational change is a complex process requiring attention to the multiple factors of culture, politics, and the environment to ensure success. Stakeholders raised several important considerations in regard to pursuing change.

**KCEMS CULTURE, LOYALTY, & PRIDE**

Respondents in the various stakeholder groups hold the KCEMS system in high regard. Many cited excellent performance outcomes, especially cardiac survival rates, and its international reputation. KCEMS’ success was attributed to a variety of factors including strong EMS leadership, a common paramedic training platform, and tiered system of care. Allegiance to the KCEMS system was particularly strong among ALS agency personnel, many of whom ‘grew up’ in the system and expressed deep loyalty and pride. Many respondents expressed the sentiment that “commitment to Medic One as a system is without reproach”.

System loyalty presents both challenges and opportunities for system change. Impassioned loyalties can foster resistance, as evidenced by the number of respondent comments about the system working and not needing to be fixed. Also organizational success can breed isolationism and elitism, closing minds to ideas about how the system could be improved. Similarly, we heard stories about past evaluations that, despite good evidence, failed to produce change. Recently, a regional fire authority study in the north end produced recommendations that were never implemented because elected official couldn’t decide on funding. South King County also was involved in a study earlier that failed to produce results. The consultant at that time was reported as saying that while the study questions were answered, the real issues were not.

Challenges also offer opportunities. KCEMS stakeholders have considerable investment in the EMS system and ensuring its ongoing excellence. Stakeholders also uphold the KCEMS mission of serving the public as “what we’re all about”. When managed well, these commitments can be mobilized in building continued system success.

**BALANCING DATA AND POLITICS**

As noted previously, stakeholders value a change process guided by data. The EMS Division has an established reputation for providing quality data to monitor system performance and anticipate upcoming needs. Having a well-respected data monitoring system in place provides the analytic foundation necessary for a well-orchestrated change process.

Data alone do not transform systems, however, people do. The politics associated with system change within KCEMS have been described as highly charged. “Elephants in the room”, “political football” and “holy grails” capture some of the sentiments describing the current
political climate. Attending to the various stakeholder perspectives will be essential to successfully moving any change process forward. Respondents looked for assistance from people outside the EMS system, including elected officials and facilitators, to help moderate a multi-stakeholder process.

**LEVY**

The King County EMS levy was one of the most commonly raised topics during interviews. Such attention is understandable given the levy’s role as the primary funding source for ALS agencies within the county. Every six years, voters in King County are asked to fund the Medic One system with the levy. However, prior to it even going to the people for a vote, the levy must be approved for the ballot first by each city council of city over 50,000 and second by the King County Council.

As the region has grown, new cities have gained populations large enough to participate in levy deliberations and their presence has shifted the balance of power in decision-making. For newcomers, this shift represents an opportunity to address needs of their communities. For longtime participants (e.g., Seattle, Bellevue, Redmond, Shoreline), the change poses a threat not only to the status quo, but potentially to the levy itself - a concern expressed by many regarding the recent deliberation process.

**Key Findings**

- KCEMS stakeholders are satisfied with the processes and trust the capabilities of the EMS Division staff to facilitate and manage the system as a regional, integrated, and tiered system.
- There are numerous benefits to agency consolidation in addition to the cost savings. Although difficult to quantify, they are felt to be important by most stakeholders.
- There was not unanimous consent as to the ideal number of medic units as long as it was greater than one.
- The ultimate decisions will need to be based on a multitude of factors and balanced with the needs of the entire system.
ANSWERING THE QUESTIONS

#1 IDEAL NUMBER OR RANGE OF ALS AGENCIES TO MEET THE REGION’S CURRENT AND FUTURE NEEDS

To determine the number of units needed to adequately serve the public need and demand for service requires a complex analysis of incident level of service, location of existing stations, geography and the ability to reach these priority incidents within a specific response time standard.

To consider the demand for and the capability of the ALS agencies to meet it, we considered the questions: 1) what are the performance requirements by which the need can be measured? And 2) are there enough agencies to meet those needs?

ALS agencies are meeting and in some cases exceeding their response time requirements throughout the county. By meeting the demands of the system, these ALS agencies are demonstrating an adequate number of ALS medic units and personnel are in place today.

Across the region, the ALS medic units are arriving on average in 8 minutes. When the incident processing and chute times are included this total response time averages 10 minutes and also meets the performance standards set by the EMS Division. From this we conclude the current system has enough ALS agencies and ALS medic units within each agency to meet the medical needs of the county.

We also found the current ALS agency configuration with multiple, decentralized agency operations makes responding to changes in the configuration a slow and expensive process. A configuration change is currently necessary as Vashon Island Fire & Rescue has asked to relinquish its ALS medic unit.

We also conducted interviews with an array of stakeholders including ALS providers, fire districts chiefs, medical directors, dispatch personnel, and elected officials. These individuals provided first-hand knowledge and insights about agency and unit configurations. Key informants were nearly unanimous in saying that “the fewer providers the better” for greater economy of scale, but also generally said the ideal number of units per agency is the same number that their agency already has.

What this does not consider is the economic impact. Considering the number of ALS medic units operated by an ALS agency, there are significant economic advantages to a single ALS agency. There are demonstrable economies of scale from a single ALS agency operating all of the ALS medic units in the county. In the future, should there continue to be more than one ALS agency operating ALS medic units, it is clear that more ALS medic units are more advantageous than fewer ALS medic units and that it is untenable to only operate a single ALS medic unit. It may be unrealistic for any ALS agency to operate fewer than three ALS medic units in order to
maintain the capacity to absorb and respond to logistical, staffing, equipment, and system demand issues.

From an efficiency and financial perspective, the optimal number of ALS providers countywide is one. However, that change is not likely to be politically feasible in the near future. Fewer agencies benefit from greater economies of scale. Standardization, reduction of duplication, and portability of paramedics from one agency or area to another can improve the operations, finances and performance of the system as a whole. Rather than reducing the total number of agencies, partners may want to consider an intermediate approach based on these principles that achieve those benefits and may be acceptable in the short term, such as a move towards consolidating agencies operating in Zone 1.

The answer: One ALS agency should operate the entire ALS system in King County, maintaining the current number of ALS medic units.

#2 A PROCESS FOR PROVIDING REGIONALIZED ALS AND MODELS FOR THE FUTURE

Stakeholders also provided advice during interviews about developing a regional process that can be used in the event changes in the ALS agency configuration are required in the future. Most informants trust the EMS Division to facilitate such a process. Stakeholders viewed both quantitative (e.g., call volume, response time) and qualitative (e.g., geography, a jurisdiction’s motivation, knowledge and availability of required resources and oversight if interested in providing an ALS unit) data as valuable in informing the change process and both should continue to be used in the future.

Several stakeholders noted the usefulness of elected officials as part of proceedings to build consensus, elevate the discussion beyond EMS operations, and to move the process forward. A process similar to that employed for levy deliberations was offered as a possible structure.

Future plans are built on forecasts that are greatly impacted by industry, the economy, housing prices, and migration patterns. The EMS Division’s levy planning cycle needs to consider scenarios far into the future that are not known today and may not be predictable. The same is true for designing the system, including ALS medic unit placement, paramedic supply management in the context of retirements, and changes in educational technologies that could enhance the substantial training provided in the county to paramedics, EMTs, dispatchers, and others.

PROCESS RECOMMENDATIONS

We recommend the EMS Division continue to periodically and proactively review the system’s medic units and capacity. Evaluation and realignment should be conducted as situations arise, such as any time a provider relinquishes oversight or a need for system realignment is identified by the EMS Division (e.g., failure to meet key performance measures, agency withdrawal, significant changes in incident volumes by zone, or by other factors).
Elements of evaluations should include but not be limited to:

- A clear determination of community need
- A consensus process
- Clear selection criteria for stakeholder inclusion in the consensus process
- Impartial facilitation; and,
- Expert consultation to identify barriers/facilitators for success

A Central Region EMS and Trauma Council policy adopted in 2012 requires requests for geographic expansion or contraction of ALS or BLS service and requests for new ALS or BLS service within King County be subject to the approval of the King County Medical Program Director (MPD) and must be authorized by the Central Region EMS & Trauma Care Council. The MPD and the Central Region Council should be fully informed through access to the business case.

Prior to initiating any formal changes to support a new ALS agency in taking over an existing ALS medic unit or coverage area, we strongly suggest the leadership of that agency communicate with and attempt to develop a proposal jointly with the existing provider. This will avoid the perception that a hostile takeover is being made and will allow the affected organizations to collaborate on a viable proposal for the EMS Division to consider.

Proposals for an agency to take over ALS geography from another ALS agency, or to become a new provider must include a business case. The business case must include a detailed description of the meetings and attempted resolution of issues with existing provider(s) and why they were not successful. It must also contain the costs for each levy cycle that include the balancing factors such as how it will impact adjoining agencies negatively, or positively. The agency must discuss what their value added proposition is and what any existing ALS agency would relinquish. The proposals should focus on how the change or addition makes the system better or fixes an existing problem.

If an entity submits a request for consideration as a new ALS provider, then balancing the metrics of the need and the impact on the existing providers should be heavily considered. An approach that mimics the Washington State Department of Health Certificate of Need (CON) process identified in Chapter 246-310 WAC should be used. Specifically, the determination of need described in WAC 246-310-210 can be adapted for KCEMS needs with little difficulty and it already incorporates the concepts of social justice and equity. Specifically, the hospital bed need methodology should be consulted for appropriateness of definitions and process modeling. The specifics could be determined jointly through an existing or a new EMS advisory committee to the EMS Division.

If an agency wants to withdraw then a pre-determined process must be activated to determine if the operation of the medic unit goes up for bid or the bordering agency is forced to take it.
over, with clearly defined parameters of the minimum number of units that that should be under an agency’s purview.

Future plans are built on forecasts that are greatly impacted by industry, the economy, housing prices, and migration patterns. The EMS Division’s levy planning cycle needs to consider scenarios far into the future that are not known today and may not be predictable. The same is true for redesigning the system, including medic unit placement, paramedic supply management in the context of retirements, and changes in educational technologies that could enhance the substantial training provided by the EMS Division to paramedics, EMTs, dispatchers, and others.

The ultimate decision in creating EMS system change will need to be made by the system stakeholders that have ownership in the outcomes: leaders and decision makers from throughout the region, the EMS Division, its many EMS partners, and the public. Many issues do not have easy or quick solutions and may require further analysis and consultation.

[Continued on the next page]
THE PARAMEDIC FOUNDATION

The Paramedic Foundation (TPF) is a Minnesota non-profit corporation and is tax-exempt under section 501(c)3 of the Internal Revenue Code as an IRS designated 170(b)(1)(A)(vi) public charity. It has no employees but is overseen by five volunteer directors. A Board of Advisors comprised of 14 professionals from across the country are also able to be contractually engaged as needed for specific projects. TPF headquarters are located in St Cloud, Minnesota, with an office and office staffing donated by a large non-profit Minnesota and Wisconsin based paramedic service.

TPF has formed the project team and assignments based on the requirements of this project. The project was led by Nikiah “Nick” Nudell, MS, NRP a paramedic and the Chief Data Officer for TPF.

TPF and its subsidiary (PrioriHealth Partners, LLC) have a long history of performing statewide EMS, critical access hospital and rural EMS evaluations and consultations for dozens of EMS systems across North and South America, Australia, and the Near-East. TPF also completed an ambulance rate rebasing analysis for the North Dakota Medicaid agency which resulted in the Governor including enhanced reimbursement in his budget the following year. TPF is the only EMS consulting firm that has ever completed a Medicaid ambulance rate rebasing study in any state.

TPF specializes in evaluating integrated medical communities and are unsurpassed in our experience working with communities that rely on levies for program support. We know that each program, community, and system require unique and thoughtful considerations that do not favor cookie-cutter solutions for obtaining superior medically oriented, patient centered, outcomes. In this manner, TPF’s sub-contractors are all seasoned EMS professionals averaging over 30 years’ experience in EMS.

Nick Nudell, MS, NRP grew up in King County and was first trained in CPR by Shoreline Fire Department in the 1980s. He recently completed a US Secretary of Transportation appointment to the National EMS Advisory Committee, where he served on the Affordable Care Act sub-committee. He has over 16 years’ experience as a paramedic, data analyst, project manager and nationally-recognized quality improvement expert with over 20 years of experience using quantitative data. In his doctoral studies he is developing deep learning algorithms to support mobile public services (police, fire, and EMS) in quality improvement and service delivery. Mr. Nudell has worked professionally with hundreds of local and state EMS agencies and the National Highway Traffic Safety Administration to analyze the data generated from out-of-hospital clinical encounters and has served as a subject matter expert on data collection, analysis, reporting, and use for many private and public organizations. He is the Project Manager for the EMS Compass Initiative, a US Department of Transportation cooperative agreement that he was the chief architect of, to design an evidence-based process for developing national EMS performance measures.
Davis G. Patterson, PhD, is a sociologist with more than two decades’ experience conducting quantitative and qualitative research in health and human services, with a focus on informing policy on improving patient access to healthcare. He is the Deputy Director of the WWAMI Rural Health Research Center, co-investigator in the Center for Health Workforce Studies, and a research assistant professor at the University of Washington, Seattle. Dr. Patterson has conducted numerous studies of prehospital EMS, including the rural component of the NHTSA-funded *EMS Workforce for the 21st Century: A National Assessment*, a CDC-funded study of EMS cardiac and stroke capabilities and practices, a HRSA-funded study of prehospital EMS personnel in rural areas, and a NHTSA-funded study, *Quality Review of Emergency Medical Service Performance Measure Data*.

Fred Morrison is recently retired as the CEO of Eagle County Paramedic Services (ECPS) located in Edwards, Colorado. After moving to Eagle County in 1986, he worked in the fire service and rose through the ranks at ECPS to become CEO in 2006. Mr. Morrison has a BS in Business Administration from Colorado State University with concentrations in both finance and management; paramedic training from Swedish Medical Center (Denver); and a certificate in Ambulance Service Management from the American Ambulance Association. Appointed by the Colorado Governor to the State Emergency Medical and Trauma Advisory Council, he is currently serving as Chair.

Paul Anderson, MS, NRP has invested his entire career in EMS, providing direct patient care and filling leadership roles. As a Chief Operating Officer he provided vision and direction for a paramedic service responding to 82,000 calls per year in multiple states. He worked extensively with governmental entities with a focus on developing and sustaining initiatives which strengthen paramedic services. He has been involved in a variety of projects with The Paramedic Foundation.

David Shrader has more than 40 years of experience in medical transportation services, including extensive executive management and various clinical, teaching, supervisory and management roles for private, public and voluntary ground and air agencies. He began his career as an EMT and subsequently filled roles as Paramedic Training Officer, Flight Medic, SWAT Medic (and law enforcement officer), Technical Rescue leader, Operations Manager, Director in a public service and then COO and CEO at various private companies. While working as the COO of a large medical transportation company, his responsibilities included operations in Seattle, Tacoma and Spokane. David also served as a firefighter and Deputy Chief of his local Fire Department.

Robert McNally, MS brings 20 years of public safety experience as a firefighter/paramedic, manager, and trainer. He has been recognized twice for his service to the community. He graduated magna cum laude with Bachelor’s Degree in Public Administration and has a Master’s degree in Urban and Regional Planning from the University of North Carolina at Charlotte. His focus was to apply Geographic Information Science (GIS) technology to public
safety and homeland security issues. Robert also worked as a research associate for a homeland security project grant funded by the Defense Intelligence Agency and the Special Warfare branch of the US Navy while attending the University. His thesis on critical infrastructure protection planning was recognized as exemplary research by a statewide geographic association.

Andrea Corage Baden, PhD, MPH is a medical sociologist specializing in qualitative methodologies, including individual and group interviews. Andrea has had a long career in the health field, first as a provider, including a Seattle EMT, and then as a researcher focusing on health disparities and equity. Currently Andrea works as a research consultant in the Center for Health Workforce Studies at the University of Washington.