Alternative Response Vehicle

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CERTIFICATION STATEMENT

I hereby certify that this paper constitutes my own work product, that where the language of others is set forth, quotation marks indicate, and that appropriate credit is given where I have used the language, ideas, expressions, or writings of others.

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Abstract

As the fire service moves forward in today's economic climate, more questions are being asked, by the public to which we serve, as to the intricacies of how we conduct our daily operations. One area that has garnered specific attention from the citizens of the City of Overland Park is as to why the Overland Park Fire Department responds to emergency medical incidents with such large fire apparatus when the amount of equipment needed to mitigate the incident is relatively small in comparison. The purpose of this Applied Research Project is to identify response alternatives to replace Rescue 44 at Station #44 as the primary emergency medical incident response apparatus for the Overland Park Fire Department. The evaluative research method was utilized to guide the following three research questions: (a) What vehicle alternatives are utilized in the private sector amongst delivery service organizations? (b) What response alternatives are utilized by other fire departments within the United States? (c) How would the response alternatives identified financially impact the Overland Park Fire Department? A literature review was conducted to identify viable alternatives to reduce the operating costs associated with utilizing a traditional heavy rescue fire apparatus in response to emergency medical incidents. The results showed that the use of smaller sport utility type vehicles offered a considerably reduced operating cost over the traditionally larger fire apparatus. The research further identified alternative fuel vehicles as an area of significant interest to further reduce the operating cost over that of a standard sport utility type vehicle. Alternative fuel vehicles should be one area that is considered when future vehicle purchases are made by the Overland Park Fire Department. The recommendation proposed to the Overland Park Fire Department was to implement an alternative response vehicle, identified as an existing 2011 Ford F-350 quad cab pick-up, which will be used to respond in place of Rescue 44 on emergency medical incidents.

One stipulation to this recommendation is to continually evaluate the effectiveness of the alternative response vehicle program as more data is collected and analyzed by the Overland Park Fire Department in conjunction with the City of Overland Park Public Works Department fleet analyst.

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The private business sector has long been the breeding ground for efficiency and innovation. The highly influential and overwhelming motivation for this is economics. For a business to maintain financial sustainability it must produce enough revenue to offset the expenditures incurred. It is for this reason that organizations within the private business sector are constantly re-evaluating themselves in an effort to operate more efficiently. The examples set forth in the private business sector of our economy coupled with economic instability in the federal government have influenced citizen's relationships with their respective governing municipalities. One example of this can be witnessed in the questioning of fire department operations by the citizens to whom they serve.

Citizens across the United States have become more vigilant and aggressive in their probing into the expenditures of departments within their governing municipalities. Fire departments are not exempt from having to answer questions in reference to daily operations and the expenditures incurred for providing emergency services. A spotlight was placed on fire departments across the United States when a *National Public Radio* broadcast titled "*How Much Is a Firefighter Worth?"* aired in December of 2012. The piece centered on the Contra Costra County Fire Department in California (Kenny & Montagne, 2012). Although the main focus of the broadcast focuses on the pensions received by fire department employees and the lack of willingness to restructure previously negotiated labor contracts in the face of the county's financial crisis, many other issues related to the fire service are relayed to the listening audience. One of the topics covered in the broadcast is the use of large traditional fire apparatus to respond to emergency medical incidents and the lack of efficiency associated with this practice. The broadcast also statistically identifies the decrease in structure fires on an annual basis at a national level due to modern building codes (Kenny & Montagne, 2012). Since this broadcast

has aired the Overland Park Fire Department has received several inquiries from its citizens as to how we operate. Many of these questions have surfaced through elected officials that make up the City of Overland Park City Council. Although the Overland Park Fire Department has always been progressive when it comes to service delivery, we as an organization have challenged ourselves to look critically at our operation and target specific areas that can be improved upon.

In an article published by *Marginal Revolution* it was stated that "it costs $3,500 every time a fire truck pulls out of a fire station in Washington, DC" (Tabarrok, 2012, p. 2). One area that has garnered much attention nationally is the use of large traditional style fire apparatus to respond to emergency medical incidents. According to the National Fire Protection Association (NFPA) Fire Analysis and Research Division, sixty-six percent of emergency responses in 2011 were medical in nature (Levesque, 2013, p. 15). The maintenance and fuel costs associated with the use of traditional fire apparatus to respond to emergency medical incidents is neither efficient nor cost effective.

The purpose of this research paper is to identify response alternatives to replace Rescue 44 as the primary emergency medical incident response apparatus for the Overland Park Fire Department at Station #44. Evaluative research was used to evaluate and answer the following questions: (a) What vehicle alternatives are utilized in the private sector amongst delivery organizations? (b) What response alternatives are utilized by other fire departments within the United States? (c) How would the response alternatives identified financially impact the Overland Park Fire Department?

Background and Significance

The Overland Park (KS) Fire Department (OPFD) is a combination fire department. The Overland Park Fire Department is located in the Kansas City Metropolitan area. The Overland Park Fire Department is the 3rd largest fire department in the state of Kansas. The Overland Park Fire Department has 154.75 paid firefighters, emergency medical technicians, paramedics and support personnel staffed throughout fives stations and two nomadic peak-time service units. The Overland Park Fire Department services just over 75 square miles and over 176,000 residents. The population swells to just over 200,000 during the daytime hours due to the large number of retail shopping areas and corporate business parks. In the 2012 calendar year the Overland Park Fire Department responded to 18,847 emergency incidents (*Overland Park Fire Department Annual Report*, 2013). This is an increase of over 1000 emergency responses from the previous year (*Overland Park Fire Department Annual Report*, 2013). Emergency medical incidents account for over 80% of the Overland Park Fire Departments' annual call volume (*Overland Park Fire Department Annual Report*, 2013).

The City of Overland Park generates over 50% of its revenue from sales tax (www.opkansas.org). In past years established retail shopping and the accelerated development of future "unique" retail developments has provided ample revenue to keep the city's operating budget within acceptable limits. In the mid 2000's, the City of Overland Park began to experience a declining sales tax revenue that forever altered the way the city performs operationally. Departments within the City of Overland Park were required to reduce their respective operating budgets. Even though the City of Overland Park reduced its overall operating budget, the sales tax revenue that was being generated could not sustain the city's annual expenditures. The solution was for the city to either amend services provided to its

citizens or raise the mill levy. As a result of the declining sales tax revenue in 2012 the City of Overland Park decided to increases its mill levy rate from 8.876 mills to 12.814 mills (www.opkansas.org). Although the city's mill levy has been increased departments city wide have had their annual operating budgets "right sized" which has resulted in an overall decrease in the total operating budget for the city. The decrease in the operating budget of the Overland Park Fire Department has resulted in an effort to find more efficient and cost effective ways in delivering emergency services.

This research topic is significant to the Overland Park Fire Department for the following reasons. With an emergency response call volume that increases by an average of 1,000 incidents annually, more miles are being placed on an aging fleet of "heavy or traditional" fire apparatus. Increased mileage being placed on fire apparatus translates to increased maintenance costs and increased fuel consumption. This research will allow the Overland Park Fire Department to identify and explore the possibility and/or feasibility of instituting an alternative response vehicle (ARV). If an alternative response vehicle is utilized to respond to emergency medical incidents, in place of traditional fire apparatus, the result will be a decrease in miles driven by conventional fire apparatus. The decrease in overall fire apparatus fleet miles will result in a decrease in fuel consumption, a decrease in fleet maintenance costs and an increase in the life span of specific fire apparatus. For the purposes of this research paper the focus will be placed on Station 44 and the fire apparatus located there specifically Rescue 44. Rescue 44 is a 2004 E-One Cyclone-II full size rescue chassis that weighs 52,000 pounds. Station 44 houses a total of three fire companies that respond to emergency incidents on a variety of apparatus including a 100ft aerial/platform ladder truck, a conventional fire engine and a heavy rescue that

was previously described. Station 44 responds to more emergency incidents than any other fire station in the City of Overland Park.

This research relates to the United States Fire Administration's (USFA) goal No. 4 to improve the fire and emergency services' professional status ("Executive Development Student Manual," 2011). The fire service has long been regarded as an establishment steeped in tradition and reluctant to develop and advance. Fire departments across the United States are being questioned more than ever about the mechanics of daily operations. The citizens to whom the fire service serves are educating themselves on the cost effectiveness of various aspects of their fire departments daily operations. As fire service professionals we are obligated to serve the public in a manner that reflects the utmost stewardship. Fire service professionals need to explore new and innovative ideas that will allow more efficient delivery of emergency services to its citizens. With a comprehensive evaluation of both the private sector, specifically delivery services, and an operational review of the Overland Park Fire Department's current apparatus response matrix. The Overland Park Fire Department can make more efficient use of its resources. This will result in a reduction in the overall operating costs as it pertains to fleet maintenance. This alternative response vehicle model can be used as an example to the citizens of the City of Overland Park as to the willingness and commitment of the Overland Park Fire Department to improve the fire service.

This research also aligns with the Executive Fire Officer Program's Executive Development course ("Executive Development Student Manual," 2011) by critically evaluating the service delivery concept that is utilized by the majority of fire departments across the United States. Development of an organization is about striving for improvement and this is accomplished by constantly and critically evaluating the systems that make up that organization.

Literature Review

Private industry, specifically delivery type service providers, offer examples of how to identify and target reductions in vehicle operating costs. Two organizations that have illustrated various strategies that aid in the reduction of these operating costs are the United States Postal Service and the United Parcel Service. Two specific areas that will be evaluated in this ARP are maintenance costs associated with fleet vehicles and fuel consumption. Maintenance costs include any preventive and/or emergency maintenance performed on a vehicle to retain its status as "ready" or in "operable" condition. These costs include parts and labor associated with repairs and preventative scheduled upkeep. Fuel consumption will be evaluated as the amount of fuel utilized by a given fleet vehicle. The standard analysis used by fleet maintenance programs is to associate the cost of a unit or vehicle per one gallon of fuel consumed. This figure incorporates both the cost of the fuel being consumed as well as the maintenance costs associated with that vehicle averaged out and calculated down to a per one gallon of fuel consumed unit.

The United States Postal Service (United States Postal Service) operates 220,000 vehicles making this collection of vehicles the single largest civilian fleet in the country (Calogera, 2009). With a vehicle fleet this large, and one that travels over 1.2 billion miles per year, the United States Postal Service is constantly looking for ways to reduce its operating costs. 1.2 billion miles of travel equates to a gasoline and diesel fuel consumption of over 155,023,538 gallons (United States Postal Service [United States Postal Service], 2012, p. 3). On average it costs the United States Postal Service $2,600 dollars in annual maintenance costs per vehicle (Aitoro, 2011). With the ever increasing price of fuel, efforts to combat consumption and increase fuel efficiency is a constant focus of the United States Postal Service. In an effort to

accomplish this the United States Postal Service has identified two specific areas for improvement. The United States Postal Service first addressed the fuel efficiency of the vehicles they utilize for delivery services. In an effort to increase fuel efficiency the United States Postal Service has purchased over 6,500 alternative fuel vehicles (Calogera, 2009). As a result the United States Postal Service has saved 17, 000 gallons of fuel per year per vehicle at a cost savings of over $50,000 dollars per vehicle. As a result of this cost saving initiative the United States Postal Service plans to purchase more alternative fuel vehicles in the future. The second area that the United States Postal Service focuses on is route efficiency. Route efficiency is the practice of optimizing vehicle travel by collecting and analyzing data points directly related to the variables associated with and/or between two or more geographical locations. These variables includes but are not limited to rates of travel, traffic flow, traffic congestion, terrain associated with specific travel routes and vehicle stops. Route efficiency experts analyzed and evaluated delivery routes in 40 major cities (Calogera, 2009). Upon completion of the route analysis, recommendations were made and initiated that resulted in a reduced vehicle mileage in those 40 cities by 850 miles per day (Calogera, 2009).

The United Parcel Service (United Parcel Service) operates a fleet of over 95,000 vehicles that provide parcel delivery on a global scale (Lovell, 2007). The United Parcel Service vehicles consume approximately 7 billion gallons of fuel per year (John, 2010). The average maintenance cost associated with United Parcel Service delivery vehicles is approximately $7,000 per vehicle per year (John, 2010). United Parcel Service is one of the most innovative delivery organizations in the world. In addition to initiatives like those of the United States Postal Service, United Parcel Service has introduced Telematics sensors to over 20,000 vehicles in its fleet. Telematics is a diagnostic software that monitors critical systems on a vehicle and

relays information to a central fleet server via 900 MHz radio communications. Over 200 sensors placed on a vehicle monitor critical vehicle systems. Data collected from various systems include transmission responsiveness, oil pressure, brake temperature, braking duration and idling time (Mika, 2010). The data received by the fleet maintenance division is compiled and reviewed. Specific recommendations on vehicle maintenance as well as driver corrective actions based on driver tendencies recorded by the sensors allow for continuous improvement. This new system of vehicle monitoring has restructured the way United Parcel Service performs preventive maintenance on the vehicles equipped with this technology. No longer does United Parcel Service schedule preventive maintenance based on mileage and/or time intervals for a specific vehicle. Vehicles equipped with the Telematics diagnostics system are removed from frontline status for preventive maintenance when specific preset limits are reached based upon the data collected for that given vehicle (Mika, 2010). Performing vehicle maintenance based upon use and performance rather than time has saved United Parcel Service millions of dollars in parts and labor. Telematics allows mechanics to replace parts on a vehicle when it is actually needed and not when a specific mileage and/or time interval has been reached (Mika, 2010). Adjustments made to driving tendencies have saved United Parcel Service 25 gallons per vehicle per day which has translated to an annual fuel consumption reduction of 1.4 million gallons (Mika, 2010). This technology lead United Parcel Service to the left turn elimination initiative which reduced the annual mileage placed on its fleet by 28.5 million miles (Lovell, 2007). The Telematics software identified idle time wasted at intersection lights as an area that could be improved upon. This finding lead United Parcel Service to re-evaluate route efficiency and eventually lead to the re-distribution of delivery routes eliminating the left hand turn.

Increasing efficiency and attempting to cut costs is not a new phenomenon in the fire service. Fire departments across the country have identified and adopted various deployment systems in an effort to decrease the cost associated with vehicle maintenance and overall vehicle operations. As operating budgets continue to diminish and public concern of operational expenditures continues to increase, fire departments will have to be ever vigilant and innovative when it comes to service delivery and efficiency.

The City of Lincoln Fire & Rescue Department (LF&R) implemented a trial program in which a smaller sized Sport Utility Vehicle (SUV) was utilized to respond to emergency medical incidents in place of Truck 1. According to Lincoln Fire and Rescue Department the cost savings per mile traveled between Truck 1 and the sport utility vehicle was $6.12 per mile (Witte r, 2012). Truck 1 responded to 378 medical calls in 2011 which equated to 1223 miles roundtrip (*Corrective Action Plan* 2012, p. 3). The overall cost savings per 2011 calendar year will equate to approximately $7,484 (*Corrective Action Plan* 2012, p.3). The sport utility vehicle utilized to respond in place of Truck 1 is cross staffed with Truck 1's personnel. If Truck 1 is dispatched on an emergency medical incident Truck 1 is placed out of service and the sport utility vehicle responds with the entire crew of Truck 1. Once the emergency medical incident has been mitigated the sport utility vehicle returns to quarters and Truck 1 is returned to service. Fire Chief John Huff of the Lincoln Fire and Rescue Department stands behind the alternative response vehicle concept and its use in their response matrix.

In a personal conversation with Lincoln Fire and Rescue Department Fire Chief Huff, I asked a series of 6 interview style questions (see Appendix B). Chief Huff stated that the program was meeting the expectations that they had hoped for and that the Lincoln Fire and Rescue Department is looking to incorporate and/or expand the program as needed with the

future growth of the fire department (J. Huff, personal communication, June 7, 2013). Chief Huff stated that both the internal stake holders (shift personnel) and external stake holders (citizens) have been very receptive to the program (J. Huff, personal communication, June 7, 2013). Chief Huff stated that the initial reaction from shift personnel was mixed but once the cost analysis report associated to respond to emergency medical incidents in Truck 1 was distributed amongst the work force, personnel began to understand the vision of the program (J. Huff, personal communication, June 7, 2013). Chief Huff stated that the external stakeholder's response to the program has been very positive and he has received several phone calls from outside agencies inquiring about the program and its success (J. Huff, personal communication, June 7, 2013). Chief Huff stated that if he could change one thing he would have the program solidified in the form of a fire department policy (J. Huff, personal communication, June 7, 2013). Chief Huff stated that since the alternative response vehicle program started as a "trial", the program has evolved to varying degrees on the different battalions and that he envisions a need for consistency among all battalions in the future (J. Huff, personal communication, June 7, 2013).

The City of Memphis Fire Department (Tennessee) received approval to purchase eight sport utility type vehicles to respond to emergency medical incidents in place of larger fire apparatus. This sport utility style vehicle will save the City of Memphis Fire Department $17,000 per vehicle with an estimated total savings of $136,000 annually (Amos, 2011, p. 4). The Memphis Firefighters Union initially fought the utilization of the sport utility type vehicles for emergency medical response because the firefighters union feared that this would lead to a reduction in the total number of on-duty firefighters. The firefighters union believed that if the majority of emergency incidents were being handled by smaller crews, public officials would

eventually come to the conclusion that the overall work force for the Memphis Fire Department could be reduced resulting in a loss of jobs. Memphis City Officials and the Memphis Firefighters Union have reached a mutual understanding that the intention of the sport utility vehicle response proposal will not result in a reduction in the overall workforce of the fire department. The Memphis Firefighters Union has since reconsidered its position based upon cost savings and the current state of the city's financial outlook.

The City of Overland Park Public Works Department utilizes a proprietary software program called Ron Turley Associates (RTA) to perform fleet analysis on all vehicles maintained by the public works department. The City of Overland Park also maintains one Full Time Equivalent (FTE) position to perform fleet analysis. That individual is identified as John Alden. RTA gives the Overland Park Fire Department the ability to calculate vehicle maintenance costs on both a per mile basis as well as per one gallon of fuel consumed. RTA was utilized in analyzing Overland Park Fire Department's Station #44 fire apparatus for both cost per mile traveled as well as cost per one gallon of fuel consumed.

Station #44 has the highest call volume of the five fire stations located in the City of Overland Park. The chart listed under (Appendix A) outlines several items including cost per mile driven, fuel efficiency identified by miles per gallon per vehicle referenced, emergency medical responses handled per unit and total miles traveled by Station #44 apparatus to emergency medical incidents for the 2012 calendar year. Emergency medical incident miles traveled in 2012 were calculated by using the City of Overland Parks Geographical Information System (GIS). All emergency medical incident responses in 2012 were plotted based on the destination of the call and a starting point of Station #44. Based on the emergency response data collected from the 2012 calendar year and the annual operating costs associated with Rescue 44

(R44) it cost the Overland Park Fire Department $19,941.03 to respond to emergency medical incidents utilizing this traditional fire apparatus. Of the 11,358 miles placed on Rescue 44 in 2012, 8449.59 were the direct result of responding to emergency medical incidents.

Procedures

The procedures utilized for this applied research project were the evaluation of two private sector logistical delivery services and two fire departments that have explored the use of the alternative response vehicle concept. A personal communication with Chief John Huff was also completed via telephone. The third component and/or process was to review the cost associated with operating fire apparatus on an annual basis.

The United States Postal Service and United Parcel Service were chosen due to the significant size of their vehicle fleet, miles driven, fuel consumption and maintenance/operating costs associated. The literature review portion of this applied research project for these specific agencies consisted of government documents, newspaper articles and magazine articles. The purpose of this portion of the applied research project was to identify ways that these two organizations have cut costs as it applies to fleet operations, more specifically vehicles and their associated operating costs.

The City of Lincoln Fire and Rescue and Memphis Fire Departments were chosen as part of this applied research project due to the fact that both organizations have explored and implemented an alternative response vehicle program. The literature review portion of this applied research project for these specific organizations consisted of newspaper articles, magazine articles and a personal communication with Chief John Huff of the City of Lincoln Fire & Rescue. The interview with Chief Huff was guided by a semi-structured set of interview questions (See Appendix B). The purpose of this personal communication was to see if the

Lincoln Fire and Rescue Department was going to continue the alternative response vehicle program and to gain insight into how the program was received by both shift personnel and the public.

Fleet operating costs associated with fire department vehicles was also analyzed and evaluated, specifically those fire apparatus housed and utilized in emergency medical responses at Station #44. The precise apparatus of interest was Rescue 44 and its cost per response associated with emergency medical incidents.

Results

The first research question asked: What vehicle alternatives are utilized in the private sector amongst delivery service organizations? The private sector continues to look towards alternative fuel vehicles and decreased fuel consumption as its main focus of decreasing operating costs associated with fleet vehicles. Both the United States Postal Service and the United Parcel Service have begun the process of transitioning a portion of their fleet to alternative fuel vehicles. One other area that both the United States Postal Service and the United Parcel Service have targeted pertains to route efficiency. By increasing the efficiency of delivery/pick-up routes both organizations have been able to decrease the overall miles placed on their respective fleets. Route efficiency recommendations/implementation has decreased the amount of miles being placed on vehicles which as a result has decreased fuel consumption and maintenance costs. The United Parcel Service has initiated a program utilizing real-time vehicle diagnostics on 20,000 of its fleet vehicles (Mika, 2010). Telematic sensors placed on fleet vehicles that provide instantaneous vehicle diagnostics has changed the way that United Parcel Service performs its maintenance on vehicles equipped with these sensors. No longer does United Parcel Service replace parts based on mileage or time intervals. Parts and vehicle

maintenance is performed when the diagnostic software indicates maintenance needs to be performed. The Telematic sensors also record and relay driver tendencies including the amount of time a vehicle has been idling. Recommendations made on data analysis from Telematic sensors has resulted in several driver coaching programs including the reduction and/or elimination of idling time by 15 minutes per driver per day (Mika, 2010). This idle elimination program saved 1.4 million gallons of fuel annually for United Parcel Service (Mika, 2010).

The second research question asked: What response alternatives are utilized by other fire departments within the United States? With response to emergency medical incidents continuing to be the single greatest percentage of overall incident responses on a national basis, several fire departments are looking to address these incidents with smaller more fuel efficient type vehicles. The City of Lincoln Fire & Rescue Department and the Memphis Fire Department are two such organizations that have initiated an alternative response vehicle programs.

The City of Lincoln Fire & Rescue Department introduced a smaller sport utility vehicle to capture emergency medical incidents that would have been answered by Truck 1. The costs savings associated with this alternative response vehicle program was equated to $6.12 per mile or $7,484 annually (*Corrective Action Plan* 2012, p. 3). The Memphis Fire Department instituted a similar alternative response vehicle program on a much larger scale. The Memphis Fire Department purchased eight sport utility vehicles to be utilized as response vehicles in place of specific traditional fire apparatus (Amos, 2011). The annual cost savings associated with this program was an estimated $137,000 annually (Amos, 2011).

The third research question asked: How would the response alternatives identified impact the Overland Park Fire Department? In 2012 Rescue 44 responded to 1484 emergency medical incidents at a cost of $2.36 per mile. Of the 11,358 total miles traveled in the 2012

calendar year by Rescue 44 8449.59 were the result of responding to emergency medical incidents. The result is an annual operating expense of $19,941.03 to have Rescue 44 respond to emergency medical incidents.

To completely and adequately answer the third research question, an alternative response vehicle would have to be identified so that operating costs associated with the alternative response vehicle could be calculated, and an accurate financial impact calculation could be made. For the purposes of this applied research paper Squad 41 (Sq41) has been identified as that alternative response vehicle. The reason that this vehicle was chosen is that it is already maintained in the Overland Park Fire Department fleet and that no new vehicles are approved for purchase for this project. Sq41 is a quad cab 2011 Ford F-350 pick-up with a custom storage bed that is utilized by the Overland Park Fire Department for peak time coverage during training days and for emergency medical stand-by events. Sq41's vehicle maintenance records are collected in the RTA fleet maintenance software program so a cost per mile data analysis was performed to give an accurate account of the costs associated with this specific vehicle. Sq41 costs $0.71 per mile to operate compared to Rescue 44's $2.36 per mile (See Appendix C for cost comparison between Rescue 44 and Sq41). If Sq41 responded to the 1484 emergency medical incidents in 2012 that were handled by Rescue 44 it would have cost $5,999.21 as opposed to the $19,941.03 it costs the Overland Park Fire Department to have Rescue 44 respond.

Discussion

The finding of this research does support the literature. In evaluating alternative response vehicles it is clear that there is an opportunity for the Overland Park Fire Department to improve upon its use of traditional fire apparatus in response to emergency medical incidents. Although

there will always be a need for traditional fire apparatus in response to emergency incidents based on their dedicated equipment and/or capabilities, there is room for improved response utilization of resources as it applies to emergency medical incidents.

The main focus of the private sector is to target vehicles with alternative fuel sources and/or decrease the fuel consumption of vehicles currently retained in the operating fleet. One significant example of the migration to alternative fuel vehicles can be found in the United States Postal Services initiative to purchase an additional 6,500 alternative fuel vehicles through Detroit General Motors (Calogera, 2009). Vehicles included in the United States Postal Service "green initiative" purchase include all electric vehicles, hybrid electric combination vehicles and E85 fuel alternative 4-cylinder vehicles (Calogera, 2009). Most efforts for decreasing fuel consumption in an existing fleet are concentrated on route efficiency and a decrease in the idle time of vehicles. The United Parcel Service eliminated left hand turns on delivery/pick-up routes to help decrease vehicle idling at stop lights and increase route efficiency. This small corrective action resulted in a 28.5 million mile reduction on fleet vehicles which resulted in 3 million gallons of fuel saved annually (Lovell, 2007). Route efficiency is not an area that the fire service can manipulate easily and/or at all. The Overland Park Fire Department utilizes Computer Aided Dispatch (CAD) routing which relays the quickest response route available based upon travel speed of given roadways as they relate to the intended geographical destination. The Computer Aided Dispatch routing software also takes into account road construction and applicable detours. Vehicle idle time is an area that could be explored permitting that the shutting off of an emergency vehicle does not compromise vehicle operations and the restarting of a fire apparatus at a given incident scene. The sophistication of modern fire apparatus and added electrical systems have made battery life of a given fire apparatus unpredictable and unreliable at times if

the vehicle is not left running or the vehicle is not plugged into an external power source like a shore-line charging system.

One area identified in the private sector specifically in the United Parcel Service is the use of Telematics for vehicle diagnostics (Mika, 2010). This is an area that may be of benefit to the Overland Park Fire Department. While Telematics is not the main focus of this applied research proposal it is an area that both fire equipment manufacturers as well as fire departments should explore for future decreases in vehicle maintenance operating costs.

Modeling a program similar to that of the City of Lincoln Fire & Rescue Department appears to be the most viable alternative for the Overland Park Fire Department. The Overland Park Fire Department could utilize the Lincoln Fire and Rescue Department template and incorporate this process into an alternative response vehicle program for Station #44 specifically targeted at replacing Rescue 44 on emergency medical responses. One issue identified by Chief Huff was that the lack of formalized fire department policy eventually resulted in inconsistency among the various battalions as to how the alternative response vehicle was to be utilized (J. Huff, personal communication, June 7, 2013). To avoid this same issue I recommend that the Overland Park Fire Department formalize this trial program into a structured policy that will be continually evaluated for a period of no less than one calendar year from the time of inception.

Recommendations

The purpose of this research project was to identify response alternatives to replace Rescue 44 as the primary emergency medical incident response apparatus for the Overland Park Fire Department at Station #44. The recommendations proposed, based on the research accomplished during this applied research project, has been broken down into three categories. The categories are immediate, short term and long term.

Immediate Recommendations –

Based upon the information collected, the recommendation for immediate application is to place Squad 41 at Station #44 and allow Station #44 personnel to use Squad 41 as the primary mode of transportation when responding to emergency medical incidents. In order to maintain a professional level of consistency among all three battalions a draft policy has been created (see Appendix D). Squad 41 will be re-numbered as Squad 44 and will be cross staffed with Recue 44 personnel. Squad 44 will carry a limited amount of equipment to handle a specific incident call type identified as emergency medical incidents (see Appendix E). When Rescue 44 is dispatched on an emergency medical incident the responding crew of two personnel will place Rescue 44 out of service and respond in Squad 44. The minimum number of personnel assigned to Rescue 44 is three personnel. The alternative response vehicle will respond with two personnel, one of which is required to be at a minimum acting officer qualified. The Fire Apparatus Operator (FAO) of Rescue 44 will remain in quarters with the unit while Squad 44 is deployed. The fire apparatus operator remaining at Station #44 allows for flexibility in the system in the case that Rescue 44 is needed for equipment purposes elsewhere in the system. If a special dispatch for Rescue 44 is received, the fire apparatus operator will respond to the desired location and Squad 44's crew will rendezvous with Rescue 44 once the emergency medical incident has been mitigated. Once the emergency medical incident has been mitigated Squad 44 will return to quarters and return Rescue 44 to service. Squad 44 will then be placed out of service. Squad 44 will be available to respond in place of Rescue 44 24 hours a day seven days a week. Data gathered from this alternative response vehicle trial will be reviewed and analyzed at

weekly senior staff meetings. Weekly review of the alternative response vehicle trial program will continue for a period of no less than one calendar year from the time of inception. The information gathered will focus on emergency medical incidents responded to and total miles traveled. Rescue 44 will be monitored for a decrease in overall mileage/usage. Station #44 Captains will be required to provide crew/personnel feedback to their respective battalion chief on a weekly basis.

Short Term Recommendations –

If the Overland Park Fire Department moves forward in the near future with the purchasing of alternative response vehicles, strong consideration should be given to exploring the options of alternative fuel vehicles and/or hybrid technology vehicles. The more fuel efficient vehicles that can be purchased to fill this particular need, the more cost effective the outcome will be.

Long Term Recommendations –

The Overland Park Fire Department, in a joint effort with the Public Works Department, should explore the option of utilizing Telematics on future fire apparatus. This recommendation will rely heavily on the expertise of the Public Works Department and the feasibility of this benefiting our current system. Additional work will have to be done with apparatus manufacturers like Pierce to see if this is a viable option for emergency vehicles. The benefits from this type of technology could change the way fleet maintenance is performed by the City of Overland Park.

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Appendix A

Station #44 Apparatus Cost Analysis -

Apparatus	Cost Per Mile	Cost Per 1 Gallon of Fuel	MPG	Medical Responses 2012	EMS Miles Traveled 2012
Rescue 44	$2.36	$7.27	3.09	1484	8,449.59
Engine 44	$2.43	$8.82	3.63	1124	6,399.83
Truck 44	$4.99	$10.32	2.07	173	985.02

Appendix B

Interview Questions –

1. Does the use of the alternative response vehicle for the City of Lincoln Fire & Rescue Department meet the desired expectations/target?
2. Is the Lincoln Fire and Rescue Department going to continue the program?
3. Is the Lincoln Fire and Rescue Department going to expand the alternative response vehicle program in the future?
4. Is there anything you would change about the alternative response vehicle program?
5. How has the public responded to the alternative response vehicle program?
6. How have shift personnel responded to the alternative response vehicle program?

Appendix C

Cost Analysis of Squad 41 and Rescue 44 -

Apparatus	Cost Per Mile	Cost Per 1 Gallon of Fuel	MPG	Total Miles Traveled 2012
Rescue 44	$2.36	$7.27	3.09	11,358
Squad 41	$0.71	$4.74	6.66	7,045

Appendix D

Squad 44 Draft Policy –

Overland Park Fire Department

Number: 5013
Title: Alternative Response Vehicle Utilization
Date: May 2013
Revision: 0
Issued By: J. Bryan Dehner, Fire Chief

I. Scope

The Overland Park Fire Department (OPFD) will deploy a two-person Alternative Response Vehicle (ARV) to assist in meeting established service level and deployment objectives. The alternative response vehicle will also be implemented to meet standards of response coverage strategies. The alternative response vehicle will be staffed and equipped to provide a possible range of capabilities including advanced life support and basic life support.

II. Policy

The Overland Park Fire Department fire chief will assign an alternative response vehicle to a specific station when he/she feels it will improve efficiency when responding to medical incidents by reducing the associated fuel and maintenance costs of fire apparatus (engines, quints, trucks, and rescues). The deployment and response of the alternative response vehicle shall be at the discretion of the company officer, in alignment with the current accepted practices.

III. Procedure

A. The alternative response vehicle shall be identified as a Squad with the numeric nomenclature commensurate with the Emergency Communications Center (ECC). For example, an alternative response vehicle assigned to Station 44, would be Squad 44. The alternative response vehicle unit shall be maintained and repaired according to Preventative Maintenance Guideline 6002 –Department Vehicle Maintenance and Repair.

B. The alternative response vehicle should be deployed in place of a fire apparatus (engines, quints, trucks, and rescues) when responding to medical incidents (excluding motor vehicle accidents). When the alternative response vehicle is deployed, the fire apparatus it replaces shall be placed out of service.

    1. If the staffing matrix at a station in which an alternative response vehicle is assigned is such that a fire medic and/or paramedic is available to staff the alternative response vehicle , the alternative response vehicle may respond in place of any fire apparatus housed at that fire station.

C. The alternative response vehicle shall be staffed with a minimum of two Overland Park Fire Department personnel. The personnel shall consist of any combination of firefighter(s) and/or fire medic(s). At least one of the personnel shall be a company officer or acting officer.

    1. Staffing for the alternative response vehicle shall be documented on the FireHouse roster under the squad identifier assigned to that station (i.e. Squad 44). The remaining crew member(s) that are assigned to the fire apparatus that will be placed out of service shall be placed on the roster assigned to that fire apparatus.

D. The alternative response vehicle may be utilized to respond to lift assists, service calls, and other emergency and non-emergency incidents at the discretion of the company officer, in alignment with the current accepted practices.

E. Upon completion of their response, the alternative response vehicle shall be placed out of service and the fire apparatus it replaced shall be placed in service.

    1. Once an incident has been mitigated emphasis should be placed on reassembling the crew of the unit that was placed out of service.

    2. If the alternative response vehicle has cleared an incident and a working structure fire has been dispatched while the alternative response vehicle was committed to that incident, the alternative response vehicle may elect to respond to the working structure fire if the incident is in the first due response area of the station of which the alternative response vehicle is assigned.

    3. If a front line unit’s staffing is reduced to a crew of two and that units capabilities have been reduced to “medical only” incident call types an

alternative response vehicle should be utilized instead of the front line fire apparatus for personnel/equipment response where applicable.

4. The option of responding in an alternative response vehicle may be discontinued if the following situations arise. The examples listed are not all inclusive; severe weather, monthly training that would limit the number of apparatus available in the system, system overload. This decision should be communicated to the on duty battalion chief(s).

5. If the alternative response vehicle has been deployed in response to an incident the remaining crew member(s) may be used as additional personnel to supplement the remaining fire apparatus housed at that station. This should be handled on an incident by incident basis taking into consideration type of incident dispatched and the estimated time of arrival of the alternative response vehicle returning to the station. The remaining crew member(s) may also be used to transport equipment and/or the apparatus to an incident scene as deemed necessary by the designated station officer.

6. Company officers should refrain from using the alternative response vehicle and associated personnel to run errands.

IV. Standards Compliance

A. This guideline complies in full or in part with CFAI (8^{th} edition) performance indicators 2A.3, 2B.1, 2B.6, 3A.2, 5A.1 and 6C.1.

Appendix E

Squad 44 Inventory –

DOT Emergency Response Book

County Map Book

Nosh Pocket Guide

Cellular Phone

Clip Board

Hand Light x 2

Medical OB Kit

Medical Oxygen Kit

Medical Merit Bag

Medical Phillips MRX Monitor

Medical Spinal Kit

Medical Trauma Kit

Long Spine Board (Foldable)

Safety Vests x 2

Sampson Strap

Nitrile Gloves – S, M, L, XL, XXL

Portable Radio x 2

Gear Bag x 2

Flat Head Axe

30” Hooligan Bar