

Hydrant Maintenance: In-House or Out-Sourced?

Milton (GA) Fire Department

Robert E. Edgar

Milton Fire Department

Milton, Georgia

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Abstract

The Milton Fire Department spent four months in 2011 conducting bi-annual hydrant maintenance that had an impact on the department's budget as it related to fuel costs, added wear and tear to the department's front line fire apparatus and time spent on the hydrant maintenance detail by fire personnel. The purpose of the research was to determine the cost associated with hydrant maintenance being performed by Milton Fire Department personnel versus out-sourcing hydrant maintenance to a private contractor. Furthermore, this project was intended to determine if hydrant maintenance added additional wear and tear to fire apparatus beyond what is normal and expected of fire apparatus, if the hydrant maintenance detail had an impact on response times, and if the Milton Fire Department followed established standards for hydrant maintenance. The methods included a detailed analysis of Firehouse records, financial data, and repair and maintenance records. The results of the evaluative research indicated that the Milton Fire Department adhered to recognized standards for hydrant maintenance. The statistical data indicated that repair costs and fuel costs increased during or immediately following hydrant maintenance cycles. However, response times improved when Milton Fire Department personnel were in territory performing hydrant maintenance. The research indicated that outsourcing fire hydrant maintenance to a private contractor would be financially beneficial to the Milton Fire Department.

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Introduction

It has been a long tradition of the fire service that fire fighters perform fire hydrant maintenance. Fire department personnel, on a bi-annual basis venture out into their territories mapping, flushing, painting and recording fire hydrants. In order to receive full credit from the Insurance Services Office (ISO), the city/county must inspect and perform hydrant maintenance bi-annually (Hickey 2002). Hydrant maintenance is a daunting task that may have a negative impact on the efficiency of the Milton Fire Department. The problem was this program requires too much time to complete and adds to the wear and tear on fire apparatus.

The purpose of this research was to determine if the Milton Fire Department should continue to perform bi-annual hydrant maintenance or out-source this service to a fire hydrant maintenance contractor. Evaluative research was used to answer the following questions: (a) what are the local and national standards for hydrant maintenance; (b) what additional wear-and-tear does fire hydrant maintenance have on fire apparatus; (c) how much time is being dedicated by Milton Fire Department personnel to complete bi-annual fire hydrant maintenance; (d) does performing hydrant maintenance have an effect on response times; and (e) what is the cost of fire hydrant maintenance to the department versus out-sourcing? The research included the collection of financial records, response data, and repair and fuel costs. A systematic approach was used to collect and analyze the information to answer the previously stated questions.

Background and Significance

City of Milton

Incorporated on December 1, 2006, Milton, Georgia is a city with 38.52 square miles of mixed rural and suburban areas, and over 32,000 residents located 30 miles north of Atlanta. The City has over 12,000 housing units, with a median home value of \$466,400. In December 2011, the City of Milton was recognized as having the highest quality of life in the State of Georgia and the ninth best City in the Southern United States by the On Numbers study conducted by Atlanta Business Chronicle. “It is a distinctive community that embraces small-town life and heritage while preserving and enhancing the city's rural character” (Thomas, 2011). Milton’s rural areas are made up of large horse farms, mainly family owned with large homes and barns.

Milton Fire Department

Prior to the incorporation of the City of Milton, fire protection was provided by the Fulton County Fire Department. With the incorporation of the City of Milton on December 1, 2006, the Milton Fire Department formed a career fire department comprised of four fire stations, one of which is shared with our automatic aid partner, Alpharetta Emergency Services. Three advanced life support (ALS) engine companies and one Truck Company are staffed with three fire rescue personnel. One Battalion Chief, assigned to a 24 hour shift, manages the daily operations. There are 55 fire fighter EMT/paramedics, 51 of those are assigned to operations, 17 per shift and four are assigned to administrative duties. Fire administration is comprised of the Fire Chief, Deputy Fire Chief, Fire Marshal / Emergency Manager, Training Chief and Administrative Aid. Dispatch is provided by our automatic aid partner, Alpharetta Emergency

Services Department, which borders Milton on the south. The Milton Fire Department is a member of the Georgia Mutual Aid Group (GMAG), which manages statewide resources. The Georgia Mutual Aid Group provides for the systematic organization, mobilization, and operation of Fire-Rescue and Public Safety resources throughout the State of Georgia.

With the large horse population, the Milton Fire Department has organized the only Technical Large Animal Emergency Rescue (TLAER) team operated by a fire department in the State of Georgia. Furthermore, the department is very active in the community with its fire clown program, Public Safety Fairs, Boot Drives and Emergency Preparedness programs, in addition to EMS and fire training programs.

Hydrant Maintenance Program

The City of Milton does not have its own water department. Water and sewer services are provided by the Fulton County Water Authority. Prior to the establishment of the Milton Fire Department, Fulton County Fire Department conducted hydrant maintenance in what is today the City of Milton. Not having the hydrant maintenance records from the Fulton County Fire Department or the Fulton County Water Authority, the Milton Fire Department was forced to locate and map every fire hydrant in the City in order to continue the hydrant maintenance program previously conducted by the Fulton County Fire Department. The city's hydrant system is made up of 2662 county owned and privately owned hydrants, which are serviced by the Fulton County Water Authority. Maintenance and repairs for privately hydrants located in sub-divisions are the responsibility of the sub-division's home owners association. Privately owned hydrants located in apartment complexes and private businesses are the responsibility of property management groups or property owners. The Milton Fire Department relies on private

fire hydrants as much as fire hydrants owed by the Fulton County Water Authority and includes private hydrants as part of the bi-annual hydrant maintenance program. In the event a private hydrant requires repair or replacement, the property manager or owner is notified by written notification from a Milton Fire Department representative (Appendix A). Prior to the start of the hydrant maintenance program, the community is informed via the City's Web page (Appendix B) and Milton E-News (Appendix C) that fire fighters will be out flushing and painting hydrants. It is important to keep the community informed of the fire department's operations. If a home owner experiences dirty water coming from their faucet, they may remember the fire department is flushing hydrants and to contact the fire department for assistance.

Hydrant maintenance is performed during the months of March and April and then again in October and November, by on-duty fire department staff and in-service fire apparatus. A large hydrant maintenance kit is secured to the rear step of the fire apparatus. This large box contains hydrant paint, brush, blue street markers, hydrant tags, hydrant wrench, mineral oil and a static pressure gauge. Hydrants are painted in October and November every odd number year, unless the company officer determines that the hydrant requires a new coat of paint. The hydrant maintenance checklist includes: confirming the location of the hydrant, if the hydrant is operational, recording the static pressure, ensuring that all caps operate freely, checking that the hydrant is accessible, ensuring it conforms to the GPS coordinates and hydrant number in the Firehouse records management system, and determining if it will need to be painted (Appendix D). Each hydrant is flushed and the gallons of water flushed are recorded by a meter provided by Fulton County Water Authority. At the end of each fire hydrant maintenance cycle, the total gallons of water flushed are forwarded to the Fulton County Water Authority so they may

account for the water. Using this process, servicing one hydrant takes a crew of three approximately 15 minutes to complete.

Prior to the incorporation of the City Of Milton, the Insurance Service Offices (ISO) split Fulton County into two areas, north and south. The north Fulton County area, where the City of Milton is today, had a split Public Protection Classification (PPC) rating of “4/9.” The last ISO review was over ten years ago. In 2009, the City of Milton requested an ISO review in order to obtain its own rating for a new city. Since ISO required at least three years of water supply data, the Milton Fire Department put in place a comprehensive hydrant maintenance program. During that three year period, the fire department completed six cycles of hydrant maintenance. This included recording static water pressure measurements, flowing water, greasing caps, painting, adding reflective road markers and recording GPS coordinates on 2662 fire hydrants within the city limits of Milton. Through this effort and many others, the City of Milton earned their own PPC single rating of a “4” for the entire jurisdiction. In the Atlanta Journal Constitution, Fox (2010) reported, “that the owner of a \$250,000 home in the area that held the class “9” rating would see a 40% savings in their homeowner’s insurance premiums as a result of the new PPC rating.”

While this program has been successful, the concern is that this hydrant program requires too much time to complete and adds to the wear and tear on fire apparatus. The time and personnel dedicated to hydrant maintenance during the past four years could have been better spent by performing other fire department functions, i.e., training, public education programs and other community activities. The additional use and rising cost of fuel, along with the additional wear and tear on fire apparatus adds to the problem. The one positive aspect of on-duty fire personnel performing hydrant maintenance is that fire personnel will set their eyes on every fire

hydrant in the city, which may prove beneficial in the event of a fire. When fire fighters are familiar with the locations of fire hydrants in their territory, this may save valuable time searching for a hydrant or provide for a hydrant closer to the incident than what is indicated on a map. The author believes the research will indicate that the negatives may outweigh the positives of on-duty fire fighters performing hydrant maintenance.

Hydrant maintenance has traditionally been a function of the fire department. This research project looked at the technical problem of hydrant maintenance but also the adaptive problem of changes in beliefs and behaviors, which are defined in the “Executive Development” curriculum:

Every change effort should start with the identification of a problem or condition requiring modification. Change must have a purpose, and people must understand what the purpose is. If the purpose is not understood, change can be perceived as being done for no reason, or else for less-than-respectable reasons, rather than to respond to real organizational needs. (FEMA, 2011).

Over the years, the Milton Fire Department has spent a large amount of time and resources maintaining fire hydrants. With the decline in revenues and municipalities looking for ways to reduce costs but maintain services, it is time to reevaluate the process and determine if the Milton Fire Department is utilizing staff, resources and tax dollars in the most efficient manner. There is an association between the Executive Development curriculum of change management and the evaluative research of the efficiency of hydrant maintenance, especially whether it is handled in-house or out-sourced.

One of the five strategic initiatives established by the United States Fire Administration (USFA) is “Lead the Nation’s Fire and Emergency Services by Establishing and Sustaining USFA as a Dynamic Organization” (USFA, 2010-2014). An efficient hydrant maintenance program clearly meets the objective of “maintaining a positive work environment to ensure the organizations well-being and productivity” and “improving our business systems and processes” (USFA, 2010-2014).

Literature Review

The purpose of a hydrant maintenance program is to maintain fire hydrants in a ready condition through flushing, inspection, lubricating, cleaning, recording static and residual pressures, and painting on a bi-annual basis. Water supply for fighting structure fires relies on an adequate and reliable water supply. Reliability in this sense is defined by Hickey (2002) as “the capability of a water supply system to deliver the water available 24 hours per day, 365 days per year” reinforcing the need for a quality hydrant maintenance program. Company officers are responsible for knowing the water system, hydrants and locations in their response area and are diligent in their hydrant maintenance efforts according to Rausch, Carter and Erwin (1989). The author looked beyond the fire service in the United States and researched how hydrant maintenance was performed internationally. The United Kingdom follows a national standard, which “indicates that the owner or occupier of the premises on which the fire hydrant lies is responsible for regular testing and maintenance of said hydrant” (British Standards 9990, 2006). Hydrant maintenance in the United Kingdom is performed by private contractors and not fire departments. The Essentials of Fire Fighting and Fire Department Operations states, “repairs and maintenance of fire hydrants are the responsibility of the water department, but many fire departments perform hydrant testing and inspections” (Goodson, & Murnane, 2008).

The Milton Fire Department performs hydrant maintenance twice a year within the city limits of the Milton (Appendix E). County owned and privately owned hydrants are maintained according to National Fire Protection Association (NFPA) recommends “flow testing recommended, opened fully for one minute, check drainage of dry barrel and wall hydrants after flow, lubricate” (NFPA 25, 2011). Property management/owners are responsible for maintaining and testing private hydrants. In early 2012, twenty five fire victims lost their homes and their belongings and the building was a total loss due to what was thought to be poor water supply and lack of maintenance on private hydrants (Brooks, 2012). The policy of the Milton Fire Department is to consider private hydrants the same as county owned hydrants and perform the same maintenance. The property owner is notified of any malfunctions or defects detected during the inspection (Appendix A). In addition to the recommended hydrant inspection items, Milton Fire Department verifies the hydrant number, the Global Position System (GPS) coordinates and street marker. Fire personnel will then enter each hydrant inspected into the Firehouse data base (Appendix F).

While gathering information and data for this project, the author found it difficult to locate literature to review for this topic, which makes this research so valuable. A majority of the literature review pertained to how to maintain fire hydrants opposed to costs associated with fire hydrant maintenance. A majority of the literature review was based on the gathering and analysis of the statistical data.

Risk

During hydrant maintenance cycles, each fire apparatus secures a large three by four foot wooden box is secured to the rear of the apparatus with tie down straps. The box contains

several gallons of paint, brushes, mineral spirits, rags, mineral oil, road markers, water department meter (calculates gallons of water flowed during flushing) and a weed-eater used to clear vegetation around hydrants. From a risk management perspective, this practice is a recipe for disaster. Conducting fire hydrant maintenance and responding to emergency calls while supplies and equipment are tied to the rear of the apparatus places the department and city at risk if this box or equipment falls from a vehicle, causing damage or injury to personnel and/or citizens. This is a risk associated with the hydrant maintenance program, Stephens, Gannon, and Clark (2008) state, “a risk that is taken unconsciously or inadvertently (or that cannot be measured) cannot be managed.” The risk of driving around the city four to five months out of the year with the possibility of equipment and/or supplies falling from the fire apparatus requires reevaluation. Milton Fire Department experienced one such event during the 2011 hydrant maintenance cycle when a weed eater fell off the back of the apparatus while responding to an alarm and was lost (Appendix G). This piece of equipment could have easily caused damage to other vehicles and/or injury and could be considered a “close call”.

Time

Each fire station is given a hydrant map that is prepared by the City’s GIS Department (Appendix H) with the hydrants to be completed by each station. The station officers divide the hydrants up evenly among the three shifts. The four fire apparatus travel across the city performing hydrant maintenance. In 2011, fire fighters spent 1331 hours performing fire hydrant maintenance. The Milton Fire Department completed hydrant maintenance on all 2662 hydrants twice in 2011 for a total of 5324 hydrants maintained. On average, it takes 15 minutes to perform maintenance on one hydrant or a total of 1331 hours for 2011 (Appendix I).

Each fire apparatus is staffed by a Captain, Driver Engineer and Fire Fighter with an average hourly rate of \$19.82, \$17.65, and \$14.93 respectfully. The total hourly cost per fire crew was \$52.40, this multiplied by the total hours spent (1331) completing hydrant maintenance in 2011 resulted in personnel cost for 2011's hydrant maintenance at \$69,739.65 (Appendix J). Personnel costs are constant, whether the fire fighters are performing hydrant maintenance or responding to emergency calls for service.

Call Volume

A possible contributing factor to increased fuel costs, maintenance and repair costs would be an increase in call volume. However, the Milton Fire Department responded to 2136 incidents in 2011 and 2481 incidents in 2010. This represented a 13.9% decrease in calls for service (Appendix K). With the decrease in call volume, apparatus repair costs and fuel costs did not appear to impact the overall costs associated with hydrant maintenance. One year of call volume data does not establish a trend. Gathering more statistical data will be necessary before a true correlation between call volume, hydrant maintenance, fuel costs and apparatus maintenance can be made.

Response Times

Responding to calls for service while performing fire hydrant maintenance was also researched to determine if response times increased because fire personnel were performing hydrant maintenance and possibly delayed. During fire hydrant maintenance cycles, fire personnel monitor their radios and are in close proximity to their apparatus while remaining in their first due response territory. The average response time during the 2011 spring hydrant tour for March was 6.30 minutes and 5.38 minutes in April, the fall hydrant tour response times;

October were 5.43 and 5.54 in November. The average response time for the Milton Fire Department in 2011 was 6.16 minutes. Hydrant maintenance did not appear to have an impact on response times (Appendix L). The Milton Fire department saw a slight improvement in response times during the 2011 hydrant maintenance cycle, which is being attributed to reflex time for personnel, which was less, and resulted in an overall improvement in response times.

Fuel Costs

Fuel costs are another consideration when fire apparatus are traveling from hydrant to hydrant, starting and stopping. Miles traveled and miles per gallon are traditional means of calculating fuel costs (<http://www.fueleconomy.gov>), unfortunately miles traveled during hydrant maintenance was not a statistic captured. The Milton Fire Department did calculate the miles per gallon for all fire apparatus with an average of 2.4 miles per gallon. However, distance traveled is just as important as the hours a vehicle spends idling. While performing hydrant maintenance fire personnel leave the apparatus idling between hydrants. Milton Fire Department operates a fleet of 2007 Pierce fire apparatus, 1500 gallon per minute (GPM) pumpers with Cummings ISL diesel engines. The author made contact with the Cummings engine representative, in an effort to determine fuel burned while the ISL diesel engine is idling, Cummings advised that calculation was not available and indicated that it would not be possible to calculate fuel usage while idling.

The Milton Fire Department did capture the hours each fire apparatus was running during the 2011 hydrant maintenance season in which 5324 hydrants were serviced. The total number of hours the Milton Fire Department fleet ran in 2011 was 3401, 39% of those hours or 1331 hours were spent performing hydrant maintenance. The average fuel cost per hour for all

apparatus is estimated at \$16.26 resulting in a diesel fuel cost for the 2011 calendar year in the amount of \$55,302.48. A comparison was completed using the number of hydrants serviced per month and the relationship with fuel used in 2011. The Milton Fire Department utilized 15,243 gallons of diesel fuel in 2011 at a cost of \$47,473. The average cost for fuel was \$3.11 per gallon, each apparatus gets approximately 2.4 miles per gallons. Milton Fire Department spent 1331 hours in 2011 on hydrant maintenance; the average fuel cost per hour estimated for all vehicles was \$16.26 (Appendix M). Hours spent on hydrant maintenance multiplied by fuel cost ($1331 \times \$16.26$) equaled \$21,642, spent on fuel during the 2011 hydrant maintenance program. Using the following calculation, the miles driven during the 2011 hydrant maintenance cycle was 16,702 miles; $\$21,642 / \$3.11 = 6,959$ gallons $\times 2.4$ mpg = 16,702 miles. The miles driven while performing hydrant maintenance results in fuel costs that is often overlooked when calculating the cost for a hydrant maintenance program. These calculations were used when factoring in the cost for the Milton Fire Department performing hydrant maintenance. This allowed the author to consider the problem of fuel consumption and apparatus wear and tear from two different perspectives: miles and hours.

Vehicle Maintenance and Repair Costs

The Milton Fire Department tracks vehicle maintenance and repairs on a monthly basis. Aside from a normal preventative maintenance schedule, the author looked for any relationship between hydrant maintenance and apparatus repairs. The first analysis was based on the number of repair events or break downs. The second was based on repair cost per apparatus. Hydrant maintenance is conducted during the months of March/April and October/November. The data indicated an increase in the number of repair events in March 2011 for Truck 1 and Engine 41 and again in November 2011 for Engine 42 and Truck 1. The data did reveal that

Truck 1 had more than double the number of repair events in August 2011 than any other apparatus. Historically, Truck 1 had the greatest number of repairs of all the MFD apparatus (Appendix N).

Repair costs for 2011 reached \$15,250; the average monthly repair cost was \$1,271. During the 2011 hydrant cycle, apparatus repair costs rose to \$1,800 in March and \$3,100 in November. There appears to be a direct link between hydrant maintenance and the increase in apparatus repairs. The repetitive starting and stopping between fire hydrants very likely indicates that utilizing fire apparatus for hydrant maintenance leads to extensive wear and tear on brake pads, calipers, rotors and tires. In fiscal year 2011, the Milton Fire Department's apparatus preventative maintenance budget was \$40,600 and the emergency repair budget was \$18,000. Because of the repair costs observed in fiscal year 2011, the Milton Fire Department's 2012 fiscal year budget for apparatus maintenance was increased to \$67,000 and the emergency repair budget was increased to \$30,000. This was an increase of \$26,400 for preventative maintenance and \$12,000 for emergency repairs, a total budget increase of 39.58% for apparatus maintenance and repairs (Appendix O).

Another consideration related to the hydrant maintenance program is aging apparatus and increased call volume. Milton Fire Department purchased the entire fleet of Pierce apparatus in 2007. This fleet is only five years old with an average mileage of 49,639, these vehicles are considered fairly new, with low mileage. Similar to one's personal vehicle, performing routine maintenance can extend the life of fire apparatus. However, the NFPA 1901 (2009) recommends, "fire departments should seriously consider the value (or risk) to fire fighters of keeping fire apparatus older than 15 years in first line service." With the aggressive apparatus maintenance program in place and a supportive vehicle maintenance budget, the Milton Fire

Department hydrant maintenance program must be considered a contributing factor in excessive wear and tear, resulting in a 39.58% increase in maintenance and repairs in 2012.

Taking into consideration the risk associated with fire apparatus traveling through the City with hydrant boxes strapped to the rear of the apparatus. The time spent away from other fire department activities, fuel consumed during hydrant maintenance periods and the related repair costs due to additional wear and tear on apparatus, the department considered the option of outsourcing.

The Fire Department has explored another option for hydrant maintenance: hiring an employee to handle hydrant maintenance. This employee would be assigned to the fire department and be responsible for all hydrant maintenance in the city. Calculating the salary, benefits of a full time employee, vehicle maintenance and supplies, the estimated cost for a full time employee is over \$40,000 (Appendix P). The City of Milton has a philosophy of doing more with less and creating partnerships and outsourcing when possible. Adding an employee would not be received well by the city leadership. However, it must also be recognized that if the Milton Fire Department continues to operate under the status quo, fuel costs will continue to increase, apparatus maintenance and repairs will become more frequent and other fire department functions may decline.

Outsourcing

Outsourcing is one company or government contracting with another company or government to provide a service that may otherwise be performed by in-house employees. Financial reasons are usually the reason why outsourcing is used, mainly to save money. Companies that provide outsourcing can, more often than not, perform the job for less money

because they don't have to pay employee benefits and their overhead is much less. Outsourcing allows companies and governments to focus on other issues. Morrison (2009) recommends that fire departments consider five factors before deciding to outsource fire activities traditionally handled by fire fighters: "consideration would be the cost associated with providing the service, quality of service provided, effect on the organization's culture, a way to measure results and how do you manage the service provider." The National League of Cities conducted a study in 2005 and found that municipalities outsourcing services has declined almost 25% from 1999 to 2005 noting the "risks appear to outweigh rewards when it comes to outsourcing," (Gentile, 2006).

Some cities are concerned about the loss of control. By providing the service in-house, cities feel they provide better quality and easier recourse if the final product is not up to their standard. With the downturn in the economy since 2008, it appears more local governments are looking towards privatization and outsourcing. In 2010, the National League of Cities noted a change, "in a world of constrained resources, local governments of all sizes and metro types are exploring new ways to reduce costs and infuse innovation," (Rozsa, & Geary, 2010). Milton Fire Department considered outsourcing their hydrant maintenance program in an effort to reduce costs and utilize fire staff more efficiently and productively. Johns Creek, Sandy Springs and Forsyth County fire departments are in the metro Atlanta area and outsource their hydrant maintenance programs to private companies.

Milton Fire Department contacted the two local companies that provide hydrant maintenance services in the Metro Atlanta area. Both companies provided similar services and met the scope of work defined by the Milton Fire Department. The first company (Amflow) submitted a quote of \$10.48 per hydrant x 5324 (2662 hydrants bi-annually) for a total project

cost per year of \$55,795.52 (Appendix Q). The second company (Sample Preservation) submitted a quote of \$9.25 per hydrant x 5324 (2662 hydrants bi-annually) for a total project cost per year of \$49,247 (Appendix R). These costs compare favorably to the per hydrant cost Milton Fire Department is currently experiencing.

Procedures

This research project began at the National Fire Academy in Emmittsburg, Maryland in the Learning Resource Center (LRC) utilizing the electronic card catalog program, reviewing previously submitted applied research projects to determine if the Milton Fire Department was having the same issues with hydrant maintenance as other departments throughout the world. The LRC was also utilized for researching professional journals, texts books and the web to determine if a cost had been associated with hydrant maintenance, vehicle repairs, fuel costs, time and outsourcing.

The process then turned to reviewing the Milton Fire Department's procedures for hydrant maintenance by reviewing standard operating procedures and researching the risks associated with the fire department performing hydrant maintenance utilizing fire trucks. Department data was collected from the records management system Firehouse, calculating time spent on hydrant maintenance by staff and response times as well as reviewing damage reports. Time spent on hydrant maintenance by personnel was used to calculate a personnel cost for three fire fighters performing hydrant maintenance per apparatus. Damage reports were used to calculate the repair and/or replacement of damaged equipment (Appendix G). Response times were also an important factor in this process in order to determine if the hydrant maintenance program was causing a delay in responding to emergency calls for service (Appendix L).

Fuel costs were evaluated to determine if there was any relationship with higher fuel costs/usage during hydrant maintenance cycles (Appendix M). Apparatus maintenance costs were calculated along with the number of repairs in an effort to see any correlation between hydrant maintenance cycles and apparatus repairs. Wear and tear on fire apparatus could also be associated with increases in call volume; incident responses were evaluated to determine if there were any increases (Appendix K).

Response times are also a concern when fire apparatus and personnel are performing tasks in the field that requires equipment to be taken off the apparatus and personnel are engaged. Response time data was reviewed and examined to determine if there were any delays in responses to emergency calls for service while performing fire hydrant maintenance.

Results

The author provided historical information by first researching the local and national standards for hydrant maintenance. The only standards found for hydrant maintenance were by the NFPA and ISO recommendations, and recommendations from hydrant manufacturers. Additional standards are established by fire departments and local water authorities. The Milton Fire Department has an established standard operating procedure for fire hydrant maintenance, which covers fire hydrants owned by the Fulton County Water Authority and private hydrants. The recommendations include: inspection of caps and threads, grease as needed, flow hydrant until water becomes clear. The Milton Fire Department also includes: accessibility is clear around the hydrant, GPS coordinates are documented in Fire House software along with the hydrant number and static pressure (Appendix F). In order to receive full credit under the ISO guidelines, hydrants are inspected twice annually (Hickey, 2002).

Typically, fire apparatus go speeding towards an emergency where they stop and run at idle, potentially pumping water for hours on a fire scene. This type of activity for which these vehicles are designed, has an impact on all the working parts of the apparatus. Under these conditions fire apparatus have a life expectancy of 15 years before being placed in reserve status. This recommendation from NFPA will vary based on maintenance programs followed by departments: it is not unusual that departments will have front line fire apparatus in service for over 20 years. Milton Fire Department's initial deployment of fire apparatus were purchased in 2007, with an average mileage of 49,639 as of February 2012. The Milton Fire Department has a very aggressive preventative maintenance program with an annual budget of \$67,000, which includes oil changes, batteries, tires, brakes, etc. In 2012, the Milton Fire Department budgeted \$30,000 for emergency repairs, while in 2011 the Milton Fire Department budgeted only \$12,418 for emergency repairs, a 41% increase in one year. The research revealed that in 2010, Truck 1 experienced 12 repairs (\$5,255), five being emergency repairs (\$3334) or 63% of the total repair costs for 2010. In 2011, Truck 1 experienced 17 repairs (\$11,908), seven being emergency repairs (\$4785) or 40% of the total repair costs for 2011. In 2010, Engine 41 experienced 14 repairs (\$4853), three being emergency repairs (\$796) or 16%. In 2011, Engine 41 experienced 16 repairs (\$5931.12), one being an emergency repair (\$334) or .056% of the total repair costs for 2011. In 2010, Engine 42 experienced 12 repairs (\$6550), two being emergency repairs (\$1110) or 17%. In 2011, Engine 42 experienced eight repairs (\$1792), three being an emergency repair (\$748) or 4% of the total repair costs for 2011. In 2010, Engine 43 experienced 12 repairs (\$4560), one being emergency repairs (\$74) or .016%. In 2011, Engine 43 experienced five repairs (\$690), one being an emergency repair (\$160) or 23% of the total repair costs for 2011. The information indicates that Truck 1 saw a 56% increase in maintenance

costs from 2010 - 2011, Engine 41 saw a 73% increase, Engine 42 saw a 7.3% decrease in repairs and Engine 43 realized an 84% decrease in repairs (Appendix N). Truck 1 and Engine-41 had the largest increase in repairs, this would not lead one to believe that hydrant maintenance has a direct impact on repair costs since Engine 42 and Engine 43 performed maintenance on the same number of hydrants per year as Truck 1 and Engine 41. What the data did indicate was that repair costs were aligned with each hydrant cycle. During hydrant maintenance months of March/April and October/November the number of repair events increased. Hydrant maintenance had an impact on 50% of the Milton Fire Department's apparatus (Appendix S).

Milton Fire Department personnel operate under a 24/48 fire fighter schedule, with a total of 2808 scheduled work hours each year. An important consideration of this study is how much of the annual hours worked are spent on hydrant maintenance. During the 2011 fire hydrant maintenance program, Milton fire fighters documented in Firehouse software 1331 hours performing hydrant maintenance. These hours were distributed across three shifts (A, B, C). The hourly cost for a Fire Captain is \$19.82, Driver Engineer hourly rate is \$17.65, and the Fire Fighter's hourly rate of pay is \$14.93 resulting in a personnel cost for hydrant maintenance for 2011 at \$52.47 per hour (Appendix I). The Milton Fire Department spent 1331 hours performing hydrant maintenance in 2011, combined with the hourly rate (\$52.47) in a total personnel cost for hydrant maintenance at \$69,744.00 (Appendix T).

The average response time for the Milton Fire Department in 2011 was 6.16 minutes. During hydrant maintenance cycles, the average response time was 5.7 minutes (Appendix L). Does performing hydrant maintenance have an effect on response times? The department's response times actually improved during hydrant maintenance. A likely reason for this

improvement is related to the fact that the apparatus and personnel already being in territory, resulting in a decrease in reflex time and improving response times.

The most important consideration for this project is identifying what the cost of performing fire hydrant maintenance to the Milton Fire Department versus out sourcing? Hydrant maintenance costs are broken down into time, fuel and repairs compared to the cost of out sourcing the service to a private contractor. The time spent by fire personnel performing hydrant maintenance in 2011 added up to 1331 hours, this time multiplied by the hourly rates of a fire crew equaled \$69,744.00 (Appendix S). The Milton Fire Department's total fuel cost for 2011 was \$47,474. The average fuel cost per hour for all vehicles was \$16.26. Multiplying 1331 hours spent on hydrant maintenance by the average hourly fuel cost equals \$21,642.00 (Appendix M). The Milton Fire Department utilized 45% of its fuel budget performing hydrant maintenance in 2011. Apparatus wear and tear and emergency repairs in 2011 totaled \$18,418.11; this included the cost of tires, brakes, batteries, pump testing, DOT testing etc. All four fire apparatus operated for a total of 3401 hours in 2011, 1331 hours or 39% of that time fire apparatus were operating while performing hydrant maintenance. It was estimated that \$7,183.00 or 39% of 2011's repair cost may be linked to additional wear and tear associated with hydrant maintenance.

Milton Fire Department requested quotes from three vendors who were interested in performing hydrant maintenance on 2662 fire hydrants in the City of Milton bi-annually (totaling 5324 hydrants annually). The service included flushing the hydrant, greasing caps and threads, painting and GPS-locating each hydrant and submission of a bi-annual report. Only two vendors in the Metro Atlanta area submitted quotes, the first quote from American Flow Services, LLC for a bi-annual service of \$10.48 per hydrant, for a total of \$55,795.52. The second quote came

from Samples Preservation in the amount of \$9.25 per hydrant, for a total of \$49,247 for a bi-annual service. Based on time spent by Milton Fire Department personnel during hydrant maintenance, fuel used by apparatus during hydrant maintenance and repairs as they relate to the hydrant maintenance months (March, April and October, November), it cost the Milton Fire Department \$18.36 per hydrant, an annual cost of \$97,748.64 (Appendix T).

Discussion

The research completed for this project required the author to review the current situation, compliance with standards/recommendations and a maintenance program that includes flushing, visual inspection, lubrication, cleaning and recording water pressures on a semi-annual basis (NFPA 291, 2010). The purpose of this program was to ensure the “reliability is the capability of a water supply system to deliver the water available 24 hours per day, 365 days per year” (Hickey, 2002). Milton Fire Department has committed and performed a semi-annual hydrant maintenance program since 2008. The early years of hydrant maintenance were inconsistent and lacked accurate records. A change in leadership occurred in 2009, the development of a better program with accountability has become the norm. The current study is a result of better records and hydrant maintenance process.

Many fire departments across the United States perform in-house hydrant maintenance programs and some contract this service out to private contractors. This is also true in the United Kingdom where “the owner or occupier of the premises on which the fire hydrant lies is responsible for regular testing and maintenance of said hydrant” (British Standards 9990, 2006). The Milton Fire Department relies on private hydrants as much as county owned hydrants with the same expectation that they will function properly when needed. If a county hydrant requires

repair, the Milton Fire Department contacts a Fulton County Water Authority representative via email and the repair is scheduled and completed. Private hydrants require contacting the responsible party and advising that a repair is necessary and then a follow up by the Milton Fire Department (Appendix A).

There are risks associated with Milton Fire Department personnel performing hydrant maintenance utilizing in-service fire apparatus. Hydrant maintenance equipment is secured to the tailboard as the apparatus moves from hydrant to hydrant. Supplies and equipment have fallen from the vehicles causing damage and requiring replacement. Managing the risk of damage and/or personnel injury is necessary for a successful hydrant maintenance program, Stephens & Gannon & Clark (2009). With 2662 fire hydrants in the City of Milton, distributed equally between four apparatus and three shifts, it takes 1331 hours to complete the Milton Fire Department's hydrant maintenance program. This is based on 15 minutes per hydrant (Appendix I). At the end of each day, the crew returns to the station and enters the hydrant tag number; GPS coordinates and static pressure are entered into the Firehouse records management system. While performing hydrant maintenance, units are in service and subject to calls. The average response time in 2011 was 6.16 minutes. During hydrant maintenance months of March/April and October/November the average response time was 5.48 minutes (Appendix L). Response times during hydrant maintenance months indicated a slight improvement. It is believed that response times improved because the reflex time decreased when units and personnel are already in territory, resulting in a quicker response time.

The data showed Milton Fire Department spent \$47,463.51 on diesel fuel in 2011, or \$3.11 per gallon. Fire apparatus ran for 3401 hours at a cost of \$16.26 per hour multiplied by the

1331 hours spent on hydrant maintenance in 2011 resulted in \$21,642 spent on fuel for the 2011 hydrant maintenance program (Appendix M).

Taking into consideration that personnel costs were a constant, they were considered when calculating hydrant maintenance costs. The personnel cost for three fire fighters on one fire apparatus in the Milton Fire Department for one hour was \$52.40 (Appendix J). The hourly rate (\$52.40) multiplied by the hours spent on hydrant maintenance (1331) calculated out to an annual cost of \$69,744.40 for 2011 (Appendix S). The variable to the salary cost is that personnel are being paid regardless if they are performing hydrant maintenance or another task such as, training and public education activities.

The Milton Fire Department budgeted for repairs and maintenance, \$40,600 for preventative maintenance and \$18,000 budgeted for emergency repairs. The average maintenance and repair costs for 2011 was \$4.79 per hour, multiplied by 1331 hours spent on hydrant maintenance for a total of \$6,375 repair costs associated to hydrant maintenance (Appendix N). Maintenance and repairs of the apparatus, the age of the fleet was well within the parameters of a front line unit, less than “15 years in front line service” (NFPA 1901, 2009).

The cost per hydrant for the Milton Fire Department to perform hydrant maintenance in 2011 was \$18.36 per hydrant, this includes salary costs. If the salaries are removed from the equation and only consider the cost of fuel, maintenance and repairs, the cost per hydrant would be \$10.52 per hydrant (Appendix S). Based on this per hydrant cost, outsourcing this function to a private contractor would continue to be a consideration. Outsourcing a service traditionally performed by fire service personnel has some considerations: cost, quality, effect on the culture, results and managing the contractor (Morrison, 2009). The National League of Cities conducted

a study in 2005, noting a 25% decline in outsourcing. They noted that municipalities felt the “risks appear to outweigh rewards when it comes to outsourcing” (Gentile, 2006). Two companies in the Metro Atlanta area responded to a request for a quote to provide hydrant maintenance for the City of Milton. The service included flushing, greasing caps, GPS, paint and documentation for all hydrants; this did not include the cost for materials. Amflow Inc. submitted a quote for \$10.48 per hydrant and Sample Preservation submitted a quote for \$9.25 per hydrant. These quotes were less than the \$18.36 (salary included) Milton Fire Department calculates it costs to complete the hydrant maintenance program, competitive if the salaries are removed, \$10.52 per hydrant.

Recommendations

The research completed for this Applied Research Paper identified costs associated with the Milton Fire Department performing hydrant maintenance and confirmed that the department followed the recommendations from NFPA 291 on hydrant testing and the ISO requirements established in order to receive 100% credit for inspection of hydrants. A bi-annual hydrant maintenance program has been a function of the Milton Fire Department for several years and as shown in the research, proven to be beneficial for the City of Milton by improving the ISO rating and having a functional water system when the need arises. The first recommendation is to continue a bi-annual maintenance program.

Performing hydrant maintenance with front line, half-million dollar vehicles caused additional wear and tear on the fire apparatus, which was proven by statistical analysis by the number of events and costs associated with the repairs, an average of \$4.79 for every hour of operation. The analysis also showed a correlation between the months hydrant maintenance was

being performed and an increase in the number of repairs during those months. If continued, this practice may reduce the life of front-line fire apparatus. The second recommendation is to discontinue the use of fire apparatus for hydrant maintenance.

The research showed that it takes a crew of three Milton Fire Department personnel 15 minutes to properly complete the maintenance of one fire hydrant or four hydrants per hour. Three fire personnel earn \$52.40 per hour; it takes 1331 hours to complete annual hydrant maintenance for a total cost of \$69,739.65 for personnel during hydrant maintenance. Response times were evaluated and found that having fire personnel and apparatus in the field resulted in a decrease in response times. This proved to be a positive by-product of hydrant maintenance performed by Milton Fire Department. The research revealed that it costs the department \$18.36 per hydrant. Looking for alternatives to Milton Fire Department performing hydrant maintenance, two private contractors made proposals to the City of Milton. The first company (Amflow) quoted \$10.48 per hydrant and the second company (Sample Preservation) quoted \$9.25 per hydrant.

The research and data clearly indicated that the cost associated with the Milton Fire Department performing fire hydrant maintenance exceeded the cost of outsourcing hydrant maintenance by as much as 54%. The culture of the fire service has been that fire fighters perform hydrant maintenance. Performing hydrant maintenance provides for zone familiarization and good public relations. If Milton Fire Department personnel no longer performed hydrant maintenance they would have more time to train, conducting fire prevention activities, public education and community events. The research supports the idea of outsourcing fire hydrant maintenance from a cost perspective. The final recommendation is to outsource fire hydrant maintenance.

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United States Fire Administration (USFA) is “Lead the Nation’s Fire and Emergency Services by Establishing and Sustaining USFA as a Dynamic Organization” (USFA, 2010-2014)

Appendix A

Out of Service Hydrant at 13XXX Marywood Drive



City of Milton

13000 Deerfield Parkway Suite 107F Milton, GA 30004

To: Ike [redacted] and Julie [redacted]
From: Lieutenant Bruce Borders, City of Milton Fire-Rescue Department.
Re: Out of service hydrant at 13[redacted] Marywood Dr

To whom it may concern,

During the course of conducting our bi-annual fire hydrant inspections it has come to our attention that there is an out of service hydrant at the address of 13[redacted] Marywood Dr in the Regency @ Windward Square Subdivision. We have contacted the Fulton County Water Department regarding this hydrant and they have confirmed with us that it is a privately owned hydrant. For the safety of our citizens and fire suppression crews the Milton Fire Department requires that all privately owned hydrants are kept in a serviceable condition. We ask that you address this matter as soon as possible and have the hydrant repaired. We will send a crew out to re-inspect the hydrant in 30 days to ensure that the hydrant repairs have been performed.

Please feel free to contact me if you have any question regarding this notice. Thank you for your timely consideration of this matter.

Lieutenant Bruce Borders

Phone: 404-313-[redacted]

Appendix B

City of Milton Hydrant Maintenance Website Notification

Hydrant Maintenance - City of Milton, GA

Page 1 of 2

Search ☐ Full Site ☐ This Section [Search Tips](#)



City of Milton

Named best quality of life in Georgia
2011 Business Journals City of Milton

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For Residents
For Businesses
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Maps

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- City Manager
- Communications
- Community Development
- Finance
- Fire
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 - Contact and Fire Stations
 - Fire Marshal's Office
 - Home Fire Safety Tips
 - Life safety initiatives
- Operations
 - Deputy Fire Chief/Battalion Chiefs
 - Hydrant Maintenance
 - TLAER
- Organizational Chart
- General FAQs
- Human Resources
- Mayor and City Council
- Milton's Laws
- Municipal Court
- Parks and Recreation
- Police
- Public Works
- Staff directory

Milton City Hall
1,3000 Oserfield Parkway
Suite 107
Milton, GA 30064

Fire Hydrant Maintenance



Milton firefighters use hydrant water on a controlled training blaze

The Milton Fire Department is taking an active approach in ensuring the hydrants system provides a top-quality water supply for all of our fire calls. As such, any hydrants needing repair are serviced in a timely manner.

The fire department services hydrants twice a year, from March through April and September through October. This includes flushing, lubing, painting (as needed) and clearing overgrowth around the hydrant. If a city hydrant is found to be out of service or in disrepair, the Fulton County Water Authority is notified of the problem. They will schedule and repair the hydrant and inform us when it is repaired. In the case of a private hydrant, the owner will be notified of the problem. We will follow up with the hydrant owner to ensure proper fire coverage of the property.

During the time that a hydrant is out of service (O.O.S), an O.O.S tag is placed on it so fire personnel will know it is not available for use. We also notify fire personnel of all hydrants that are out of service in the city.

Capt. Andrew Kennedy coordinates the annual inspection of fire hydrants for the City of Milton. You can contact him through e-mail or call the Fire Marshal's Office at 678-242-2570 with any questions regarding the fire hydrant program.

Staff Contact

Capt. Andrew Kennedy	Hydrant Maintenance Coordinator	678.242.2570
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Have a question?
Need to report a problem?
Want to make a comment?
[Contact us online](#)

Calendar of Events

March 2012

S	M	T	W	Th	F	S
26	27	28	29	1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	31

[< Feb](#)
[Apr >](#)
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City Council Work Session

3/12/2012 6:00 PM

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[Employee E-mail](#)

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Phone: 678.242.2500
 Fax: 678.242.2499
 E-mail: info@cityofmiltonga.us

http://www.cityofmiltonga.us/index.asp?Type=B_BASIC&SEC={B5E623F9-B32C-4FA0... 3/12/2012

Appendix C

City of Milton E-News – Hydrant Maintenance

Milton E-Round Up for April

Page 2 of 18



In This Issue

More than ever before

Milton FD now conducting
hydrant maintenance

Verizon Recycling Rally April 5

Emergency Manager, Red
Cross host program 4/11

Autism Speaks advocate to
discuss work April 12

Legacy Lacrosse Cup 2012
April 13-14

Parks Master Plan unveiled
April 16

Earth Day Festival set for April
21

Green vendors needed for
Earth Day Festival

Rain barrels available at Earth
Day

MPD holds drug take back
April 28

Milton partners with YMCA for
sports/arts camps

Registration now open for
special needs camp

City hiring three counselors
for camp Joyful Soles

More than ever before

It's not like we had much of a winter this year, but there's no denying that spring has now sprung. It's just beautiful outside, which is great because we're offering more programs and events than ever here at the City of Milton for all of our residents.



Earth Day Festival

On April 21, Milton will hold the third annual Earth Day festival thanks to the work of Milton Grows Green. They really expanded the festival last year, and this year is shaping up to deliver an even better day out with the family.

So make sure to come out to Birmingham Park hungry (there's going to be free food from a number of local eateries) and ready to have a great time. There's going to be entertainment, inflatable hamster balls, a rock wall, environmentally themed arts and crafts, and a whole lot more.

It should be a great time, and I'll see you there. And don't forget that if you happen to own and/or operate a local "green" business, we'd love to have you as a vendor. More information is available in the newsletter.

[Read the entire message.](#)

Milton FD now conducting hydrant maintenance

Milton Fire Chief Robert Edgar would like to alert residents the department's semi-annual fire hydrant maintenance is now underway.

Edgar said the city-wide maintenance effort will last into mid-May. During testing, firefighters flow the water in the hydrants and check to make sure they are in working order.

Please note: depending on hydrant placement in the water main system, this may inadvertently cause sediment to be loosened in the lines. As a result residents may see temporary discoloration in water coming from their faucets, showers, washing machines or dishwashers, said Edgar.

If this happens, please call the City of Milton at 678-242-2570.

"We'll be happy to come out and flush the line," said Edgar.

Appendix D

Milton Fire Department Hydrant Maintenance Standard Operating Procedure

MILTON FIRE-RESCUE

S.O.P. 3-14

Operations – Hydrant Maintenance

REVISION DATE: March 2011

APPROVAL: Fire Chief Robert Edgar

I. Purpose

To insure that all public fire hydrants are checked on a bi-annual basis and maintained according to the standards set forth in this policy.

II. Scope

All fire hydrants within the city limits of Milton will be inspected, while private hydrants are the responsibility of private property owners. The City of Milton Fire-Rescue Department will check private hydrants for proper function and notify the private property owner of any malfunctions or defects detected during the inspection.

III. Policy

It is the policy of this department to inspect all hydrants within the city limits of Milton twice annually. These inspections are to insure that the hydrant has an adequate flow of water suitable for sustained fire fighting purposes, and that the fire department has the ability to obtain water from the hydrant.

IV. Procedures

A. Inspections

1. Hydrant inspections will be performed during the months of March and April in the spring season and October and November in the fall season.
2. Station personnel will refer to last hydrant season's data in the Firehouse Software hydrant tracking program to update data and insure that all pertinent information is accurate and concise.
3. Hydrants will be divided into zones with each station having 3 sub-zones. Each shift will be assigned one of their station's sub-zones and will be expected to complete the hydrant checklist for all hydrants, both public and private, within their assigned sub-zone. This includes both physically checking the hydrants and logging all pertinent data into Firehouse. The zones will be divided as follows:

The Brown zone will be assigned to Station 43.

The Blue zone will be assigned to Station 42.

The Green zone will be assigned to Station 41.

The Red zone will be assigned to Truck 1.

4. The zones assigned to each station will remain consistent from tour to tour. However, sub-zones will rotate from shift to shift every tour. Below is an example of how this rotation will occur.

A shift's sub-zone will go to B shift for the next tour.

B shift's sub-zone will go to C shift for the next tour.

C shift's sub-zone will go to A shift for the next tour.

5. Inspection Checklist:

- a) The hydrant is present.
- b) The hydrant has water.
- c) Static pressure is tested.
- d) All caps operate freely.
- e) Accessibility is clear around the hydrant and to all connections on the hydrant.
- f) Confirm that each hydrant has GPS coordinates listed in Fire House and the assigned ID number matches the number that is tagged to the hydrant.

6. When inspecting hydrants:

- a) Contact "The Fulton County Water Authority" of the area you will be servicing each day. This will enable them to deal with complaints from the area. This should be done each morning by calling 770-640-3040.
- b) Spot the apparatus pump even with the hydrant. Turn on the GPS unit located in the cab of the apparatus. Allow the unit to locate the longitude and latitude coordinates for the hydrant you are positioned at. Utilizing the apparatus laptop, access the Firehouse program and again, find the hydrant that you are located at via the address, lot #, etc... Confirm that you have located the correct hydrant by cross checking the GPS coordinates listed for that hydrant in Firehouse, with the Coordinates showing on the GPS unit in the apparatus. These coordinates may not match exactly. The last digit to the right of the decimal may be off by 1 or 2 numbers.
- c) Once you have confirmed that you have the right hydrant pulled up in Firehouse, you will attach a numbered tag to the hydrant by way of a safety pin fastener, to the eyelet located underneath the steamer cap. Do not attach the tag directly to the chain. Once you have attached a numbered tag to the eyelet of the hydrant, crimp the lock portion of the safety pin fastener with a pair of pliers and bend the tail of the fastener over. This will prevent the safety pin fastener from accidentally coming open and the tag being lost.
- d) In the Firehouse record, left click on the "hydrant number" to highlight it. Once it is highlighted, type in the **exact** number that is listed on the tag that was

attached to the hydrant. This will create a “new” hydrant ID for this hydrant. Before proceeding on, confirm that the number on the tag matches the number entered in to firehouse, then save your entry. It is not necessary for the hydrant numbers to be contiguous. Each hydrant will have a number that is unique to that hydrant, thus eliminating the possibility of duplicate numbers throughout the city.

e) If the hydrant is “Private”, the tag that is attached to the hydrant should have a “P” before the number. The “P” should also be included when making the entry into Firehouse so that the tag and the Firehouse entry are identical. This portion of data entry **must** be completed while at each hydrant.

f) A blue reflective hydrant locating road marker should be placed in the center of the lane adjacent to the hydrant between the yellow line and the White line. The marker should be applied in the lane of travel that is closest to the hydrant regardless of direction of travel

g) The markers are visible from either direction and their placement will indicate which side of the road the hydrant is located on. Example, if the hydrant marker is visible in the lane that you are traveling in, the hydrant is on the right side of the road. If the marker is visible but is located in the oncoming traffic’s lane of travel, the hydrant is on the left side of the road.

h) The hydrant markers should be applied so that the two opposing reflective sides of the marker are facing the oncoming traffic. The markers can only be applied when the surface of the road is clean and dry and the road surface is a minimum of 60 degrees.

i) To apply the marker, sweep any obvious dirt or debris out of the area where the marker is to be applied. Peel the paper backing from the pad side of the marker and place the marker down onto the road using the guidelines previously established. Slowly and carefully drive the apparatus in a straight line over the marker, avoiding turning the wheel while it is in contact with the marker.

j) Flow water from the hydrant until it becomes clear and in such a way that it will not dislodge sediment within the water line or cause damage to surrounding property.

k) After flowing water, test the static pressure on each hydrant by using the static pressure gauge and record it in Firehouse.

l) Lubrication will be done every odd numbered year or as needed. Remove all hydrant caps and check for gaskets. Lubricate threads with mineral oil.

m) Paint hydrants every odd numbered year or as needed. When painting the bonnet of the hydrant, Paint it the existing color and sprinkle the reflective glass beads onto the wet paint. If the water authority re-paints the bonnet’s the appropriate color for the size of the main and the glass beads are painted over, simply repaint the bonnet top with the new color and sprinkle more beads onto the wet paint.

n) If vegetation and/or obstructions impedes the fire department's use of the hydrant, these obstructions should be cleared away from the hydrant. If ornamental landscaping impedes the fire department's use of the hydrant, contact shall be made with the homeowner advising them of the situation and obtaining permission for the fire department to clear away enough material to gain functional access to the hydrant. If permission is not given, then the information should be forwarded to the hydrant coordinator and Fire Marshal via e-mail.

o) "Out of Service" hydrants should have a Milton Fire Department "Out Of Service" tray tag placed around the 2 ½ "outlet.

p) The hydrant coordinator shall be notified via email about all damaged or out of service hydrants upon completion of the inspections each day.

V. Data Entry

A. Hydrants inspected each day shall be entered in the Firehouse Database. All Data entries, other than tagging and hydrant renaming, can be done on the laptop in each apparatus as you complete each hydrant or when you return to the station.

B. If there is a new hydrant that needs to be added to Firehouse, assign the hydrant a number as it's ID, and attach a corresponding number via the tagging system to the hydrant.

C. Information gathered for new hydrants should include the subdivision name if applicable, the address, cross street, main size, make and model of the hydrant, GPS coordinates, and any other note worthy information about the hydrant.

D. If a hydrant is in need of repair, it should be noted in the Firehouse Database and the information shall be forwarded to the hydrant coordinator so he can report it to the Fulton County Water Authority.

VI. New Hydrants

A. Personnel shall be responsible for surveying all streets and complexes in their respective territory to detect new hydrants.

B. Inspections shall follow the procedures in Section IV.

VII. Private Hydrants

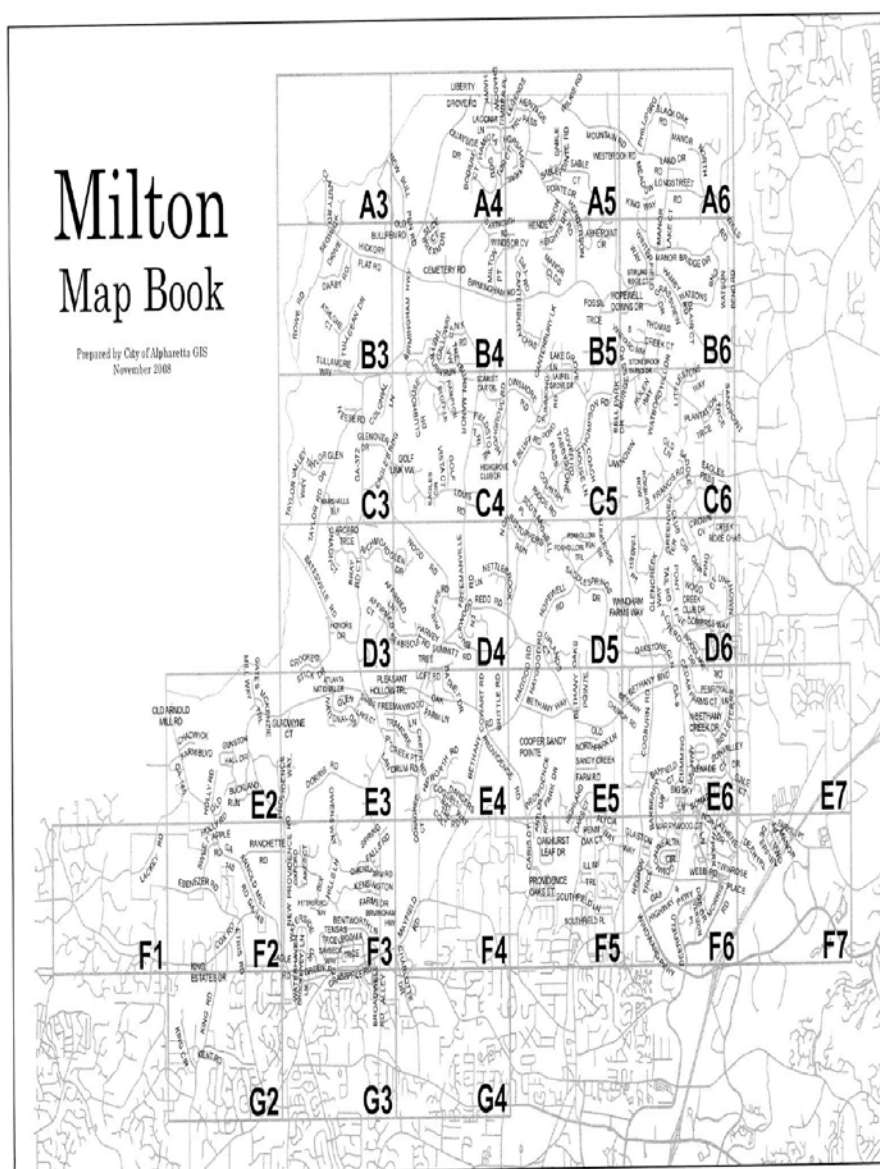
A. Follow all procedures in the other sections of this SOP except the following:

1. The property owner or designee shall be notified prior to inspecting hydrants on their property.
2. It is the responsibility of the property owner to paint and maintain/repair any hydrants on their property.

3. Notify the property owner or designee of any problems with their hydrants.
4. If a hydrant is in need of repair, it should be noted in the Firehouse Database and forwarded to hydrant coordinator via email. Provide enough information so we know how to contact the property owner.
5. Like all other hydrants, private hydrants will be identified by address, GPS coordinates, and by a hydrant tag. However, private hydrants will have tag that has a "P" followed by a number.

Appendix E

Map of the City of Milton



Appendix F

Firehouse Hydrant Maintenance Report (Sample)

Zone	Hydrant ID	Address	Station	District	Class	Description	Main ID	Main Size	Main Type	Description	Make	Model	Year
		16700											
1	BIRHW Y01	BIRMINGHAM HWY	43	43	U	Unkn own		0	DUC	Ductile Iron	AMERICA N DARLIN		2006
1	BIRHW Y02	BIRMINGHAM HWY	43	43	U	Unkn own		0	DUC	Ductile Iron	AMERICA N DARLIN		2006
1	BIRHW Y03	BIRMINGHAM HWY	43	43	U	Unkn own		0	DUC	Ductile Iron	AMERICA N DARLIN		2006
1	BIRHW Y04	BIRMINGHAM HWY	43	43	U	Unkn own		0	DUC	Ductile Iron	AMERICA N DARLIN		2006
		16455											
1	BIRHW Y05	BIRMINGHAM HWY	43	43	U	Unkn own		0	DUC	Ductile Iron	AMERICA N DARLIN		2006
1	BIRHW Y06	BIRMINGHAM HWY	43	43	U	Unkn own		0	DUC	Ductile Iron	AMERICA N DARLIN		2006
1	BIRHW Y07	BIRMINGHAM HWY	43	43	U	Unkn own		0	DUC	Ductile Iron	AMERICA N DARLIN		2006
1	BIRHW Y08	BIRMINGHAM HWY	43	43	U	Unkn own		0	DUC	Ductile Iron	AMERICA N DARLIN		2006
		16160											
1	BIRHW Y09	BIRMINGHAM HWY	43	43	U	Unkn own		0	DUC	Ductile Iron	MUELLER		2003
		16150											
1	BIRHW Y10	BIRMINGHAM HWY	43	43	U	Unkn own		0	DUC	Ductile Iron	MUELLER		2003

Appendix G

Milton Fire Department Hydrant Replacement of Lost or Damaged Equipment Form

CITY OF MILTON FIRE-RESCUE DEPARTMENT

REQUEST FOR REPLACEMENT OF LOST OR DAMAGED EQUIPMENT

Sta# and V#: E-41 SHIFT: B DATE: 4/9/11

STATION LOG: _____

ITEM (S): Weed Eater

EXPLANATION OF LOSS OR DAMAGE:
While doing hydrants the weed eater became lost most likely
while going on a call. It was stored in the hydrant box. It what
I thought was a safe position. We retraced our path immediately, with
no success in finding it. B-41 notified.

SIGNATURE: Don Patterson FAO (A) OIC.
NAME AND RANK

REPORTED TO: Bourne TIME: 12:32 PM DATE: 4/9/11

AVOIDABLE: XX UNAVOIDABLE: _____ REVIEWED BY: W.M. Bowry

RECOMMENDATION:
replacement of weed eater to
maintain station grounds and
assist in maintenance of hydrants.

Don Patterson
Company Officer

W.M. Bowry
Battalion Chief

Fire Chief

COMMENTS:
In the future, it is suggested that the weed eater be secured on
the apparatus in such a way that it will not be dislodged while the
apparatus is in motion, causing it to fall off. This was an unfortunate
incident, and with greater attention to detail, this type of incident
can be avoided in the future.

Appendix G (Supplemental)

Milton Fire Department Hydrant Replacement of Lost or Damaged Equipment Form

Weed Eater

Page 1 of 1

Weed Eater

Don Patterson

Sent: Saturday, April 09, 2011 6:18 PM

To: Bill Bourn

Chief,

Per our phone conversation this is a follow up letter to describe the events concerning the weed eater at Station 41 being lost.

E41's crew was out doing the Spring hydrant tour. We were at the intersection of Hwy. 140 and Ranchette Rd. when we were dispatched on a bicycle wreck at 13725 Providence Rd. Before leaving FF Turner and myself, quickly finished the hydrant and stowed and secured all the tools, and the hydrant went into the hydrant box as we have done during all hydrant tours in the city of Milton. The weed eater was placed with the engine inside the box and the trimmer head wedged against the rail at the top of the hose bed. We proceeded on to the call. Once we had finished the call we returned to doing hydrants. When I went to get the weed eater out of the box, it was gone.

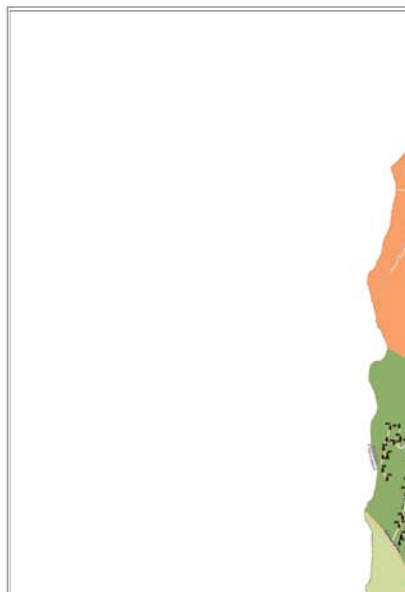
We immediately began retracing our route to see if we could find the weed eater. While doing this we contacted you to let you know what was going on. We were unable to locate the weed eater after an extensive search.

It was an unfortunate incident. I think in retrospect we could have physically tied/strapped the weed eater to the hydrant box to ensure it wouldn't come out. I assumed incorrectly that because it had never happened it couldn't or wouldn't happen. I was wrong. In the future I will physically tie/strap the weed eater to the hydrant box so it will not fall out/become lost.

 FAO

Appendix H

Milton Fire Department Hydrant Map



Appendix I

Hours Spent on Hydrant Maintenance

Hours Spent on Hydrant Maintenance

Hours spent on Hydrant Maintenance in 2011 (Per 15 minute assumption) - Conservative	1331
--	------

Milton FD Hydrant Activities in 2011

Per Firehouse

	Units		Staff Hours
Flow Tests	2161		1385.39
Inspections	3459		2849.33
Total	5620		4334.72

5324

1331

Appendix J

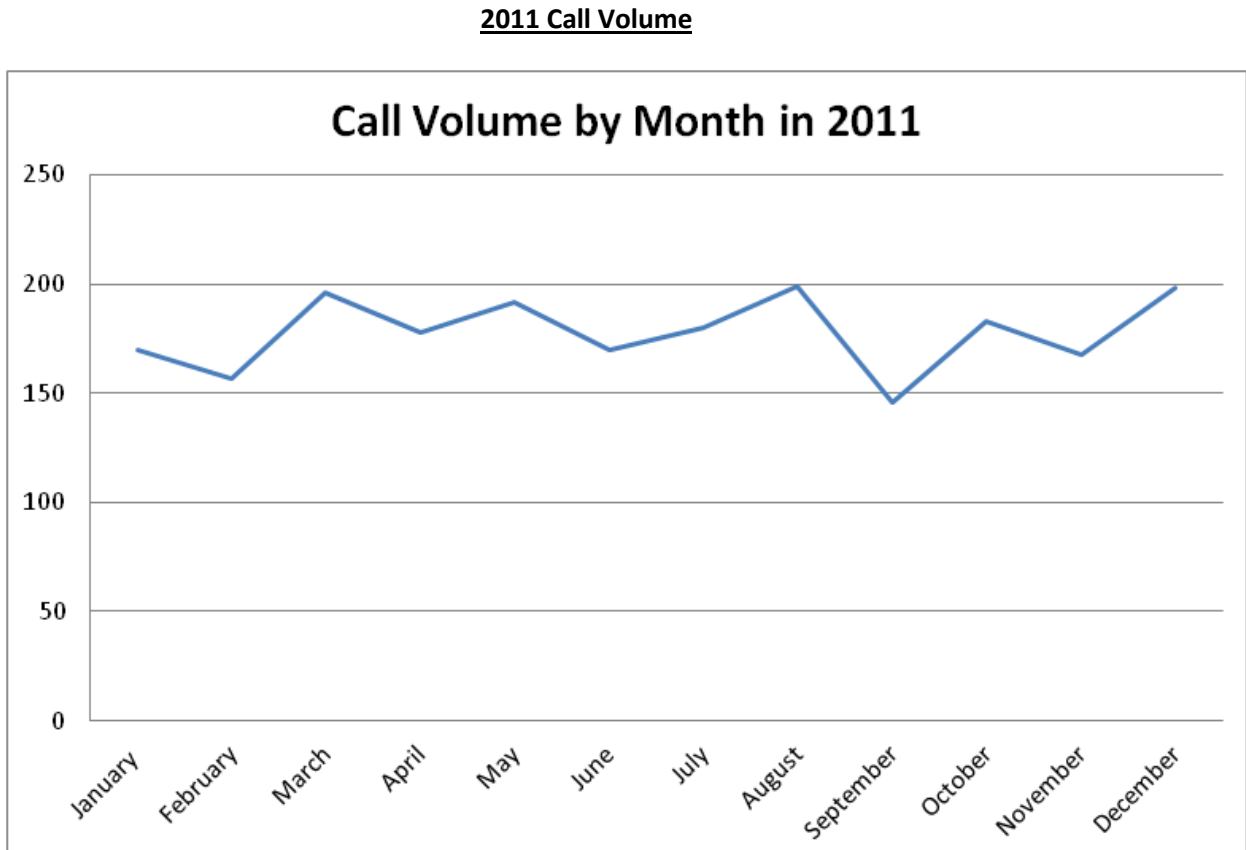
Average Salary Costs

Average Salary

Average Salary Costs		
Firefighter	\$14.93	
Driver	\$17.65	\$52.40
Captain	\$19.82	
Average Hourly Salary Cost for a Company:		\$17.47

Appendix K

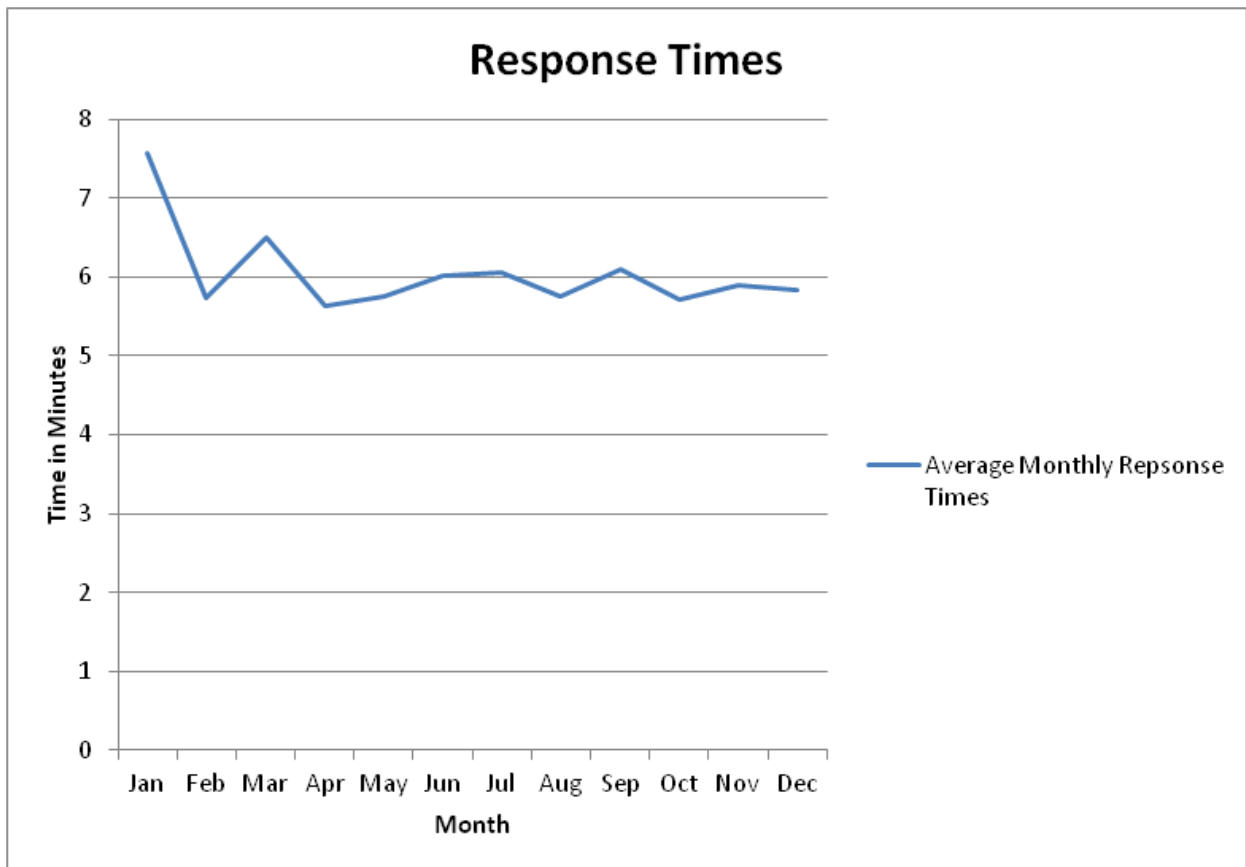
Call Volume by Month 2011



170	January
157	February
196	March
178	April
192	May
170	June
180	July
199	August
146	September
183	October
168	November
198	December

Appendix L

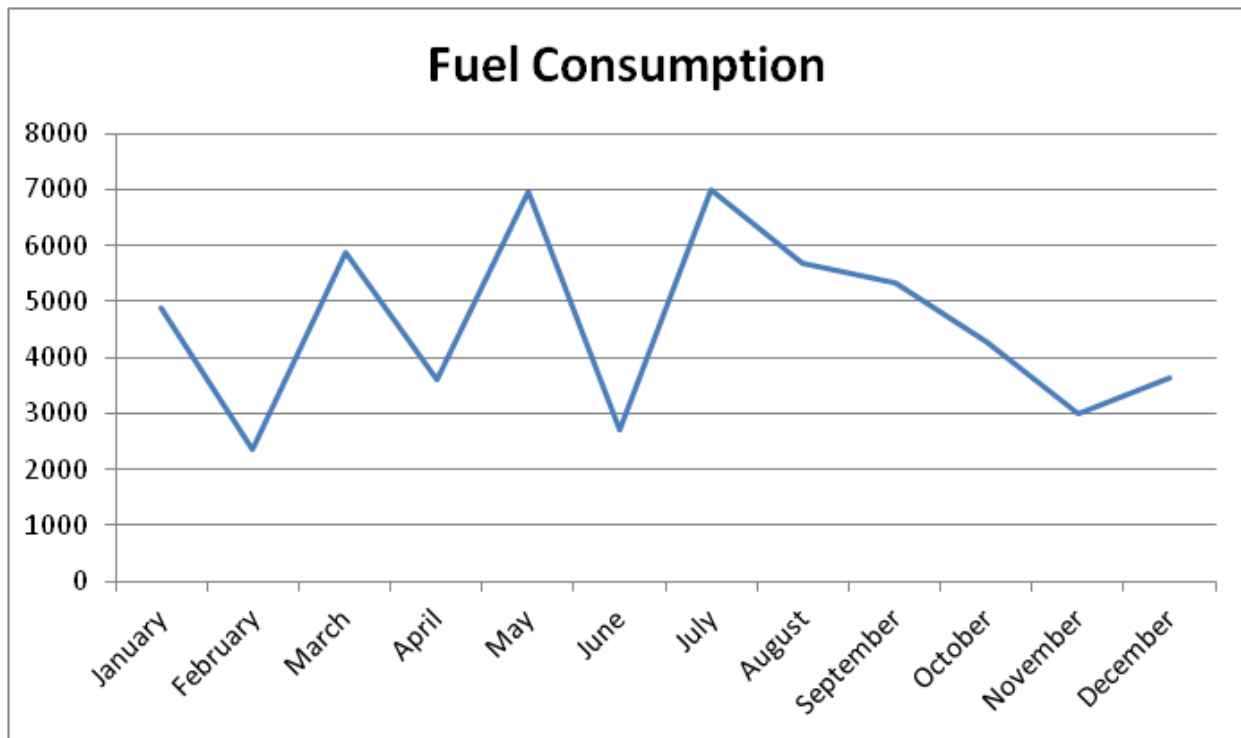
Average Response Times

Average Response Time

Jan	0:07:34	7.56
Feb	0:05:44	5.73
Mar	0:06:30	6.5
Apr	0:05:38	5.63
May	0:05:45	5.75
Jun	0:06:01	6.02
Jul	0:06:03	6.05
Aug	0:05:45	5.75
Sep	0:06:06	6.1
Oct	0:05:43	5.72
Nov	0:05:54	5.9
Dec	0:05:50	5.83

Appendix M

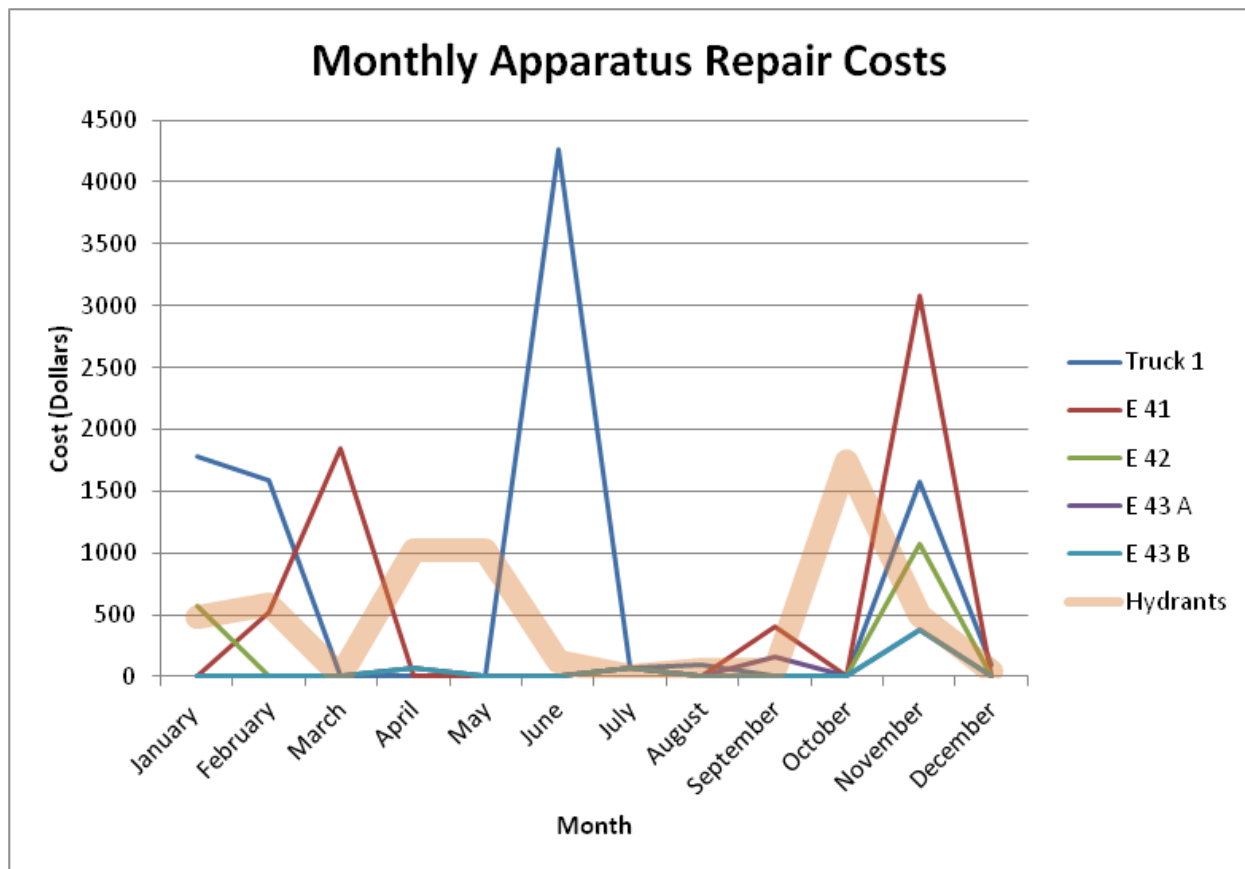
2011 Fuel Consumption



January	4879.6
February	2346.65
March	5860.32
April	3611.28
May	6975.83
June	2699.64
July	6991.12
August	5681.69
September	5338.19
October	4272.06
November	2994.92
December	3651.18

Appendix N

Monthly Apparatus Repair Costs

Monthly Apparatus Repair Costs

Vehicle Maintenance and Repair Costs for 2011	
Quint Maint/Repairs (Per Hour)	8.981175
E 41 Maint/Repairs (Per Hour)	8.237667
E 42 Maint/Repairs (Per Hour)	2.009249
E 43 (A) Maint/Repairs (Per Hour)	3.748098
E 43 (B) Maint/Repairs (Per Hour)	0.963545
Per Hour Cost of All Apparatus:	23.93973
Average Per Hour Cost for Apparatus	4.787947

Appendix O

Milton Fire Department Budget Worksheet 2012

EQUIPMENT REPAIR & MAINT		55,967	-	-	-		
STATION EQUIPMENT R & M	-	-	12,000	10,898	1,102	20,000	15,000
BREATHING APPARATUS							
TESTING/REPAIR	-	-	7,000	4,887	2,113	7,000	7,000
INSPECT/REPAIR HYD. RESCUE							
TOOLS	-	-	5,500	201	5,299	6,000	6,000
APPARATUS R&M INCLUDING							
PUMP TEST	919	-	60,600	32,600	28,000	67,000	67,000
APPARATUS EMERGENCY REPAIRS	3,939	-	18,000	5,602	12,398	40,000	30,000
GAS DETECTOR REPAIR	-	-	4,076	-	4,076	4,200	4,200
NOZZLES, VALVES, APPLIANCES,							
HOSE	-	-	1,500	298	1,202	8,432	5,432
ANNUAL HYDRANT							
MAINTENANCE	-	-	2,799	365	2,434	3,200	3,200
LADDER TESTING	2,310	-	1,200	-	1,200	1,300	1,300
THERMAL IMAGING CAMERA							
MAINTENANCE	-	-	-	-	-	3,000	3,000
<i>Total: Equipment Repair &</i>							
<i>Maintenance</i>	<i>7,168</i>	<i>55,967</i>	<i>112,675</i>	<i>54,851</i>	<i>57,824</i>	<i>160,132</i>	<i>142,132</i>

Milton Fire Department Budget Worksheet 2012

Appendix P

Cost for Hydrant Maintenance by a Full-Time Employee

Cost for Hydrant Service By a Full-Time Employee

Salary/Benefits	39,000				
Equipment R & M	-				
Vehicle R & M	1,000				
Education & Training	100				
General Supplies	200				
Uniforms	250				
TOTAL	\$ 40,550				
Impact on Budget	FY 2013	FY 2014	FY 2015	FY 2016	FY 2017
Increases Operating Costs	42,172	43,859	45,613	47,438	49,335
Decreases Operating Costs	-	-	-	-	-
Additional Revenues					
Vehicle Purchase	15,000	-	-	-	-
Total Operating Impact	\$ 57,172	\$ 43,859	\$ 45,613	\$ 47,438	\$ 49,335

Appendix Q American Flow Services (AMFLOW) Quote



4953 Austin Park Ave., Suite B
 Buford, GA 30518
 Phone: 678-730-0191
 Fax: 678-730-0192
 Cell: 678-357-9376
 Email: em@americanflowservices.com

PROPOSAL**DATE**

2/28/2012

CUSTOMER:

Bill to
 Address

City of Milton
 13000 Deerfield Pkwy, Suite 107A
 Milton Ga 30004

JOB SITE:**CONTACT:**

Phone:
 Fax:

Chief Robert Edgar
 404-387-6855

CONTACT:

Phone:
 Fax:

Same

SERVICE DESCRIPTION**ESTIMATE**

Perform Bi- Annual Testing and Maintenance on 3500 Hydrants

Includes:

*Static Testing will be performed twice annually.

*Weed eating around Hydrant within 3' radius

*Lubrication of Nozzles

*Painting of Hydrant (1 color)

*Painting of Valve Box Lids

*Applying Reflective Tape to Bonnets.

*Thoroughly Inspect full function ability of each hydrant.

*Out of Service Hydrants will be reported daily.

**All deficiencies found during test will be prioritized from Out of Service (Most crucial) to simple recommended maintenance and a cost to correct affixed to each Hydrant entered in the final deliverable database.

***Labor only Price. Grease, Tape, Tags and Paint to be supplied by City of Milton.

****Data Delivered will be in CD and Email formats.

ALL HYDRANTS WILL BE VISITED TWICE ANNUALLY.

**TOTAL PROJECT
 ESTIMATE**

\$73,360.00

Appendix R

Sample Preservation Quote

City of Johns Creek
Purchasing Section

NOTICE OF AWARD/AMENDMENT

Department:	FIRE	Date:	8/09/11
Vendor Name:	Samples Preservation	Vendor ID:	
Contract Number:		Original Award Date:	11/01/09
Contract Title:	Fire Hydrant Inspection	NIGP Code:	
Buyer:	John T. Henderson	Type of Contract:	Service

Performance Period

Effective Date:	11/01/09	Expiration Date:	9/30/10
-----------------	----------	------------------	---------

Department	Vendor
Address: 12000 Findley Rd. #400	Address: 136 Daffodil Dr.
City: Johns Creek State: GA	City: Dawsonville State: GA
Zip: 30097	Zip: 30534

Amendment

Amendment:	Yes: ☒ No: ☐	Amendment Number:	2
------------	---	-------------------	---

This amendment is part of the above reference contract and is accepted under the terms and conditions thereof, except as herein amended.

Follow-On Actions

Action			
Canceled:	Amended:	Renewed: ☒	Extended:
Effective Date:	10/01/11	Expiration Date:	9/30/12

Special Notes

Notes:
2nd renewal of original contract agreement for Fire Hydrant Inspection & Maintenance for the Fire Department for an additional term at the same prices, terms, and conditions.

Approved By

City Manager:	Contractor Name:
<i>John T. Henderson, Jr.</i>	Jeffrey N. Samples
Signature:	Signature:



EXHIBIT A
SCOPE OF SERVICES

- Grease all caps
- Paint hydrants/paint bonnet according to line size
- Turn on enough to hear water coming into the barrel
- Tag each hydrant with tags supplied
- Record each hydrant number
- Deliver violation letters
- Record out of service hydrants

Price per hydrant= \$9.25 each Estimated quantity- 3,343

Appendix S

Cost Estimate for Milton Fire Department Performing Hydrant Maintenance

Cost Estimate for Milton Fire Fighters Performing Hydrant Maintenance

2011 Hydrant Maintenance Cost Estimate for Personnel (Based on a Crew of 3 with 1 Capt, 1 Driver, and 1 Firefighter)	
	\$69,739.65
2011 Hydrant Maintenance Estimate for Vehicles	
	\$28,015.69
Total Annual Costs for Hydrant Detail in 2011	
	\$97,755.34
Cost Per Hour for 3 FF, 1 Apparatus (Fuel/Maint):	\$73.45
Cost per Hydrant (assuming 1/4 increments):	\$18.36

Appendix T

Milton Fire Department Hydrant Maintenance Break Down

Hours spent on Hydrant Maintenance in 2011 (Per 15 minute assumption) - Conservative	1331
--	------

Average Salary Costs		
Firefighter	\$14.93	
Driver	\$17.65	\$52.40
Captain	\$19.82	
Average Hourly Salary Cost for a Company:		\$17.47

Vehicle Maintenance and Repair Costs for 2011			
Quint Maint/Repairs (Per Hour)	8.981175	\$73.45	\$97,755.34
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Per Hour Cost of All Apparatus:	23.93973		
Average Per Hour Cost for Apparatus		4.787947	

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	\$69,739.65

2011 Hydrant Maintenance Estimate for Vehicles	
	\$28,015.69

Total Annual Costs for Hydrant Detail in 2011	
Cost Per Hour for 3 FF, 1 Apparatus (Fuel/Maint):	\$73.45
Cost per Hydrant (assuming 1/4 increments):	\$18.36

Diesel Fuel Costs for 2011	\$55,302.48
Total Hours for 2011	3401
Average Fuel Cost Per Hour Estimate for All Vehicles	
	\$16.26