Chapter 2, Part 1: Profile of City Fleet and Other Transportation

A Local Government Greenhouse Gas (GHG) Emissions Inventory

A collaborative partnership between

PALS

The City of Frederick Maryland

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EXECUTIVE SUMMARY

As Maryland's second largest city, it is imperative for the City of Frederick to begin thinking about and documenting how its local government activities contribute to the State's overall greenhouse gas emissions (GHGs). The effort to build a basic carbon profile for the City's transportation fleet and employee commutes will help inform and provide insight to decision makers on how Frederick can reduce its direct and indirect GHG emissions through incremental and feasible actions.

Table 1 shows the total emissions of metric tons of carbon dioxide equivalent ($MTCO_2e$) that the City's direct (municipal fleet) and indirect (employee commute) mobile sources produced in 2013. These transportation-related emissions come from both direct and indirect sources, yet both are tied to the City's municipal operation and should be considered collectively.

Table 1. 2013 Municipal Transportation GHG Emissions by Scope and Sector

Scope and Sector	$MTCO_2e$	% Transportation Sector
Scope 1: Vehicle Fleet	2,469	56.1%
Scope 3: Employee Commute	1,934	43.9%
TOTALS	**4,403**	**100.0%**

The vehicle fleet, or Scope 1, emissions were calculated using the Local Greenhouse Gas Inventory Tool (LGGIT). Analysis of the employee commute, or Scope 3, emissions used a part of the LGGIT model, but also used an equation with its own assumptions. Both datasets had limitations, yet the assumptions were made in the best effort to produce reasonable estimates of GHG emissions. Extended data collection and recordkeeping by the City will be needed to achieve greater accuracy of GHG emissions in the future. Details of the recommended actions to achieve the required data granularity are discussed in the report.

One key finding of the analyses is that the Police and Public Works Departments are the predominant departments in generating energy use, fuel consumption, and associated GHG emissions for both the fleet and employee commute sectors. This finding is a result of the fleet size, as well as the share of employees who use fleet vehicles within these two departments.

Another key finding suggests that 37 percent of City employees whose commutes were longer than the median (7.63 miles) account for nearly 82 percent of total CO_2e emissions from employee commutes. Steps taken to reduce the frequency, distance, or carbon intensity of this group of employees could have a measureable impact on CO_2e emissions. Secondly, Police Department employees have the highest per capita CO_2e emissions of any government department. If the City is committed to reducing GHG emissions in its municipal operations, this may be one place to start.

1.0 OBJECTIVE

The overall goal of this project is to develop a systematic and repeatable method for inventorying Frederick's vehicle fleet and employee commute (Scope 1 and 3) GHG emissions and to identify potential areas for improvement including data collection. Other relevant tasks/objectives have been incorporated, such as assessing the sources of the Scope 1 and 3 GHG emissions, evaluating the efficiency of the City's transportation related GHG emissions, identifying deficiencies or opportunities for improvement, and, finally, developing a set of recommendations and strategies to reduce the City's transportation related GHG emissions.

Although Frederick adopted its Sustainable Practice Action Plan in 2009 (SPAP), the document only broadly identifies reduction goals and the strategies to achieve the desired GHG reductions. Therefore, to be consistent with the State of Maryland GHG reduction goals, an appropriate goal for Frederick would be to reduce GHG emissions by 25 percent of 2000 levels by the Year 2020. Any strategies developed by the City as a result of this report are consistent with the transportation-related strategies and action items included in the SPAP, such as commuting policies for City staff and alternative transportation options (bicycle trails, trip reduction programs, carpooling, public transportation, etc.).

2.0 SCOPE 1 EMISSIONS: VEHICLE FLEET

2.1. Methodology

The Local Greenhouse Gas Inventory Tool (LGGIT) has been used to calculate vehicle fleet emissions. According to the description provided by the U.S. Environmental Protection Agency (EPA), "*The tool was developed to support municipal governments across the United States to evaluate the greenhouse gas emissions associated with their municipal operations. Understanding these emission levels provides a baseline for tracking emission trends, developing mitigation strategies and policies, and assessing progress towards meeting goals*."

LGGIT uses Microsoft® Excel 2007/2010 spreadsheets for data input, calculations, and presenting the results in table and graph formats. It is a useful tool for municipalities to understand their carbon emissions status and test the effectiveness of their GHG reduction strategies by changing the input in the LGGIT model. LGGIT is based on the Local Government Operations Protocol, and the GHG emissions are categorized into direct (Scope 1) and indirect (Scope 2 and 3) sources. The vehicle fleet analysis uses the "Scope 1 – Mobile Combustion of Fossil Fuels" section of LGGIT.

2.2. Data Sources

The following steps were taken to complete the project for the fleet vehicles:

1. *Data Gathering* – Data gathering was accomplished by obtaining the vehicle inventory from the City in a list that describes the vehicle type, model, year, fuel type, VIN, department, and fuel economy (where available). Each vehicle record was coded with its corresponding department as well as the vehicle type (i.e. light truck, passenger vehicle, construction equipment). Table 2 shows the data input parameters for the LGGIT model.

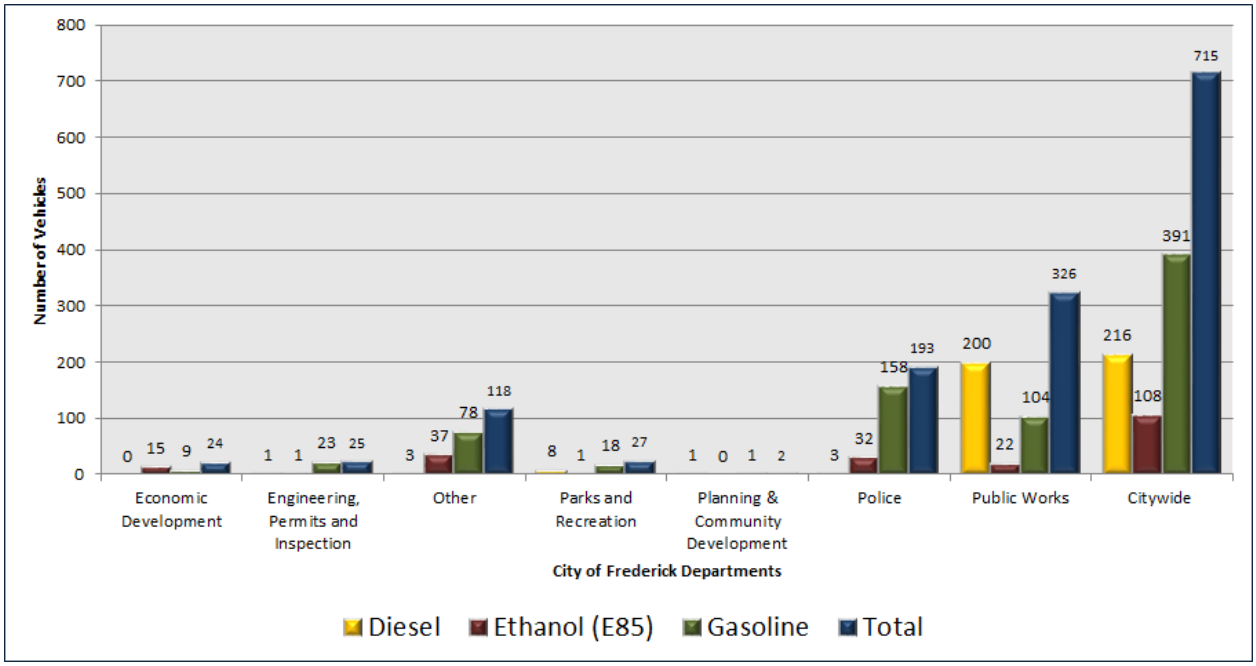
Table 2. Example of LGGIT Model Input Parameters

ID #	Vehicle Description	Department	Year	Type	Model	Fuel Type	Fuel Consumption (gal)	VMT (mi)	Fuel Economy (mpg)
1	Heavy-Duty	Economic Dev.	2006	LOADER	721C	Diesel	952	5000	5.25
2	Passenger	Engineering	2005	4X4PSR	CT10506	Diesel	500	5000	10.00
3	Passenger	Other	2008	4DRSED	IMPALA	Ethanol	214	3000	14.00
4	Light Truck	Parks & Rec.	2011	4X4PSR	RANGER	Gasoline	357	5000	14.00
5	Passenger	Police	2009	CRUISR	IMPALA	Gasoline	659	14500	22.00
6	Construction	Public Works	2000	ASPHLT	L7500	Diesel	190	1000	5.25
7	Heavy-Duty	Public Works	1985	TRACTR	84	Diesel	330	1900	5.75
8	Light Truck	Public Works	2011	DUMP	S 3500	Ethanol	850	8500	10.00
9	Heavy-Duty	Public Works	2006	MOWR	6215	Gasoline	211	2000	9.50
10	Passenger	Public Works	2008	4DRSED	PRIUS	Hybrid	177	8500	48.00

2. *Data Correction* – The data was reviewed for consistency and errors, corrected as necessary, and prepared for input into LGGIT model. The most common error was the duplicate entries of the police vehicles, which was corrected by matching the VINs and removing the duplicate numbers. In addition, some of the missing data for the vehicle type, fuel economy, and departmental categorization were also either interpolated using available information/data or created using professional judgment and external data sources such as industry-standards and U.S. Department of Transportation, Environmental Protection Agency, or Department of Energy. Details of such assumptions and their sources are documented in Appendixes B and C.
3. *Data Analysis* – The LGGIT model was used to calculate the Scope 1 GHG emissions. To ensure the consistency of the LGGIT with other industry standard analysis tools, a brief review of the algorithms used in the LGGIT model was conducted and were found to be consistent with other available tools.
4. *GHG Profile* – A GHG profile was created for Scope 1 emissions. The profile was further disaggregated to develop departmentalized GHG emissions and further develop department-specific GHG reduction strategies in the future.

In summary, Figure 1 shows the overall departmental distribution of the 715 vehicles in the municipal fleet by fuel type. (Due to limitations in the data, several departments were either consolidated or included in the "Other" category.)

Figure 1. Distribution of Vehicles by City Department and Fuel Type



2.3. Analyses and Results

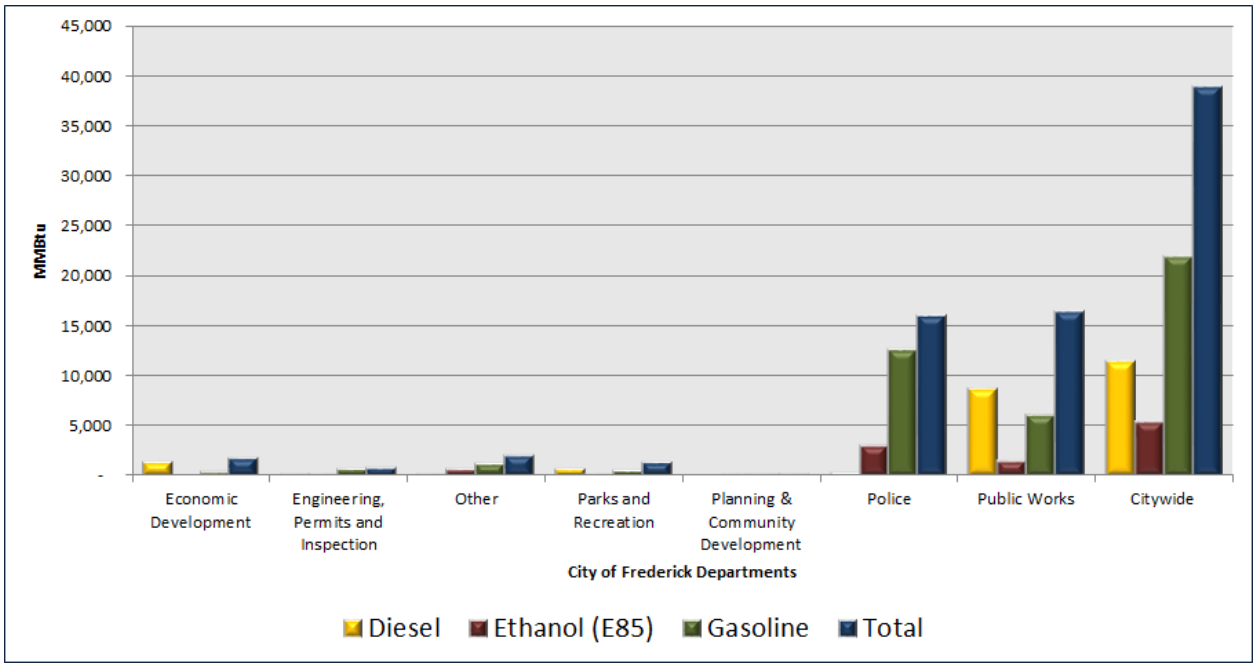
Even though the LGGIT model is designed to accept input of data in any granularity or scale such as citywide, by department, or by individual vehicles, meaningfuldata analyses for Scope 1 emissions requires fuel type and fuel consumption as two input variables on a vehicular level. If both the annual fuel consumption (i.e., gallons of fuel) and mileage for each vehicle in the municipal fleet is recorded throughout the year, the actual fuel economy can be calculated by dividing the annual mileage by the annual fuel consumption. This data would be useful in determining the efficiency of any vehicle in the fleet and could be used as a variable in the decision-making process for future fleet composition.

Current information for the municipal fleet, as provided by the City of Frederick, does not include vehicle disaggregated fuel consumption, annual mileage, or a complete set of fuel economy data. Therefore, a series of sources were consulted to develop assumptions for disaggregation, allowing the necessary calculations to produce reasonable results. Details of such assumptions and their sources are documented in Appendixes B and C**.** Figures 2 through 4, and Tables 3 and 4 were developed to visualize the key findings of this disaggregation process based on the data input and analysis results.

2.3.1. Annual Energy Use

The proportion of vehicles fueled by Ethanol 85 (E85) is presented in Figure 1 as 15 percent of the municipal fleet. Figure 2 shows the energy use of the City's vehicle fleet by department and fuel type, where the energy consumption is observed to be consistent with the fuel type composition of the fleet. Vehicles fueled by gasoline make up approximately 56 percent of the fleet and they also consume approximately 56 percent of the total energy used by the entire fleet. It is important to note that "E85 is a low-level fuel and one gallon of E85 has 73 to 83 percent of the energy of one gallon of gasoline (variation is due to ethanol content in E85)." The proportion of diesel vehicles in the fleet and their energy consumption are consistent at approximately 30 percent, because one gallon of low-sulfur diesel has approximately 113 percent of the energy of one gallon of gasoline[1].

Figure 2. Annual Energy Use by Department and Fuel Type (MMBtu)

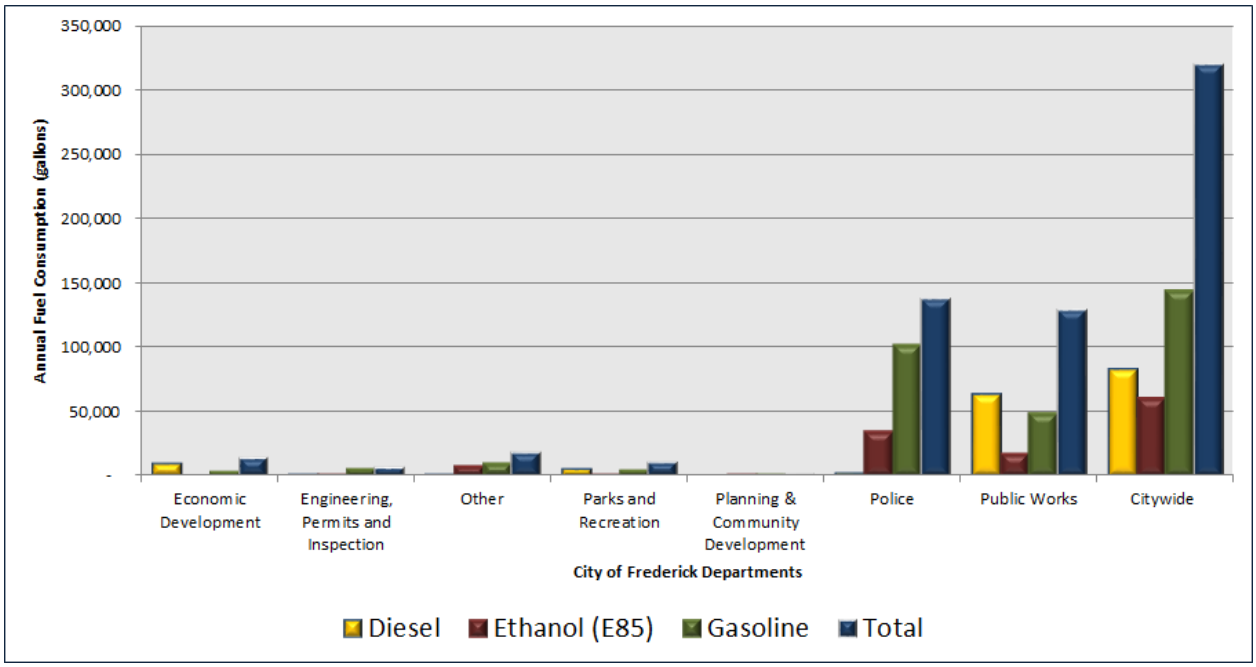


[1] Source: U.S. Department of Energy, Alternative Fuels Data Center – Fuel Properties Comparison, October 21, 2014 (http://www.afdc.energy.gov/fuels/fuel_comparison_chart.pdf)

2.3.2. Annual Fuel Consumption

Annual fuel consumption is a function of annual mileage as well as the types of vehicles in the fleet and their fuel economy. Breaking this information down by department and fuel type is useful in determining strategies to replace vehicles of certain type or age to gain fuel efficiency and reduced GHG emissions. Figure 3 summarizes the annual fuel consumption of the municipal fleet categorized by the department and fuel type.

Figure 3. Annual Fuel Consumption by Department and Fuel Type (gallons)



2.3.3. Carbon Profile

The City's carbon profile from Scope 1 direct emissions is determined by calculating the difference between the overall carbon emissions (Equation 1) and biogenic carbon emissions (Equation 2) by using the following Equation 3.

$$CO_2\ Emissions\ (MT) = Fuel\ use \times kg\ CO_2/unit\ of\ fuel \times MT/kg \quad \textbf{(Equation 1)}$$

$$Biogenic\ CO_2\ (MT) = Fuel\ use \times Biogenic\ kg\ CO_2/unit\ of\ fuel \times MT/kg \quad \textbf{(Equation 2)}$$

$$Net\ CO_2\ (MT) = CO_2\ Emissions - Biogenic\ CO_2\ (MT) \quad \textbf{(Equation 3)}$$

The only source for biogenic CO_2 is E85; based on the limited number of fleet vehicles fueled by E85, the net CO_2 profile is not significantly different than the gross CO_2e. It is particularly important to note that the low-energy qualities of E85 (as discussed in Section 2.4.1) are offset by its low GHG and carbon emission qualities. However, it is also important to note that research shows that use of corn-based ethanol could have higher GHG emissions when lifecycle analyses are performed, which require more complex data and effort than allowed in this

exercise[2]. Table 3 summarizes the CO_2e emissions based on the current municipal fleet vehicle composition.

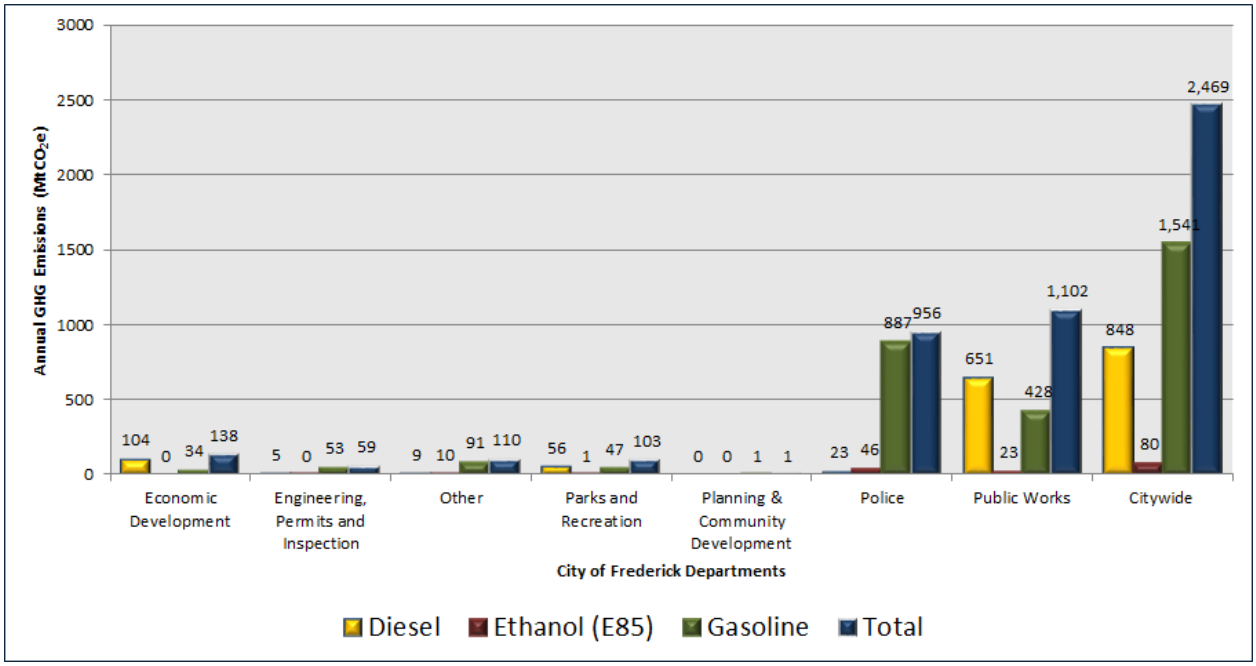
Table 3. Net and Detailed GHG Emissions by Selected City Department

Net Emissions by Department (CO_2e)			
Department	Gross CO_2	- Biogenic =	**Net CO_2**
Economic Development	138	--	**138**
Engineering, Permits, and Inspections	60	2	**58**
Other	149	39	**110**
Parks and Recreation	105	2	**103**
Planning and Community Development	3	1	**2**
Police	1,124	169	**985**
Public Works	1,186	84	**1,102**
Total Mobile CO_2 Emissions	2,766	297	**2,469**

2.3.4. Annual GHG Emissions

Annual GHG emissions were calculated based on the algorithms embedded in the LGGIT model and the results are shown in Figure 4. As expected from the findings in the previous sections, the GHG emissions associated with the vehicle fleets in the Police and Public Works Departments are the predominant GHG emissions mobile sources in the City of Frederick.

Figure 4. Citywide Transportation-related GHG Emissions ($MTCO_2e$)



[2] Using the fuel production assumptions, a user can compare their footprint of ethanol vehicles using either corn or cellulosic feedstocks. Source: *User Guide for GREET Fleet Footprint Calculator 2012, https://greet.es.anl.gov/fleet_footprint_calculator*

2.4. Key Findings

The key finding of the analyses is that the Police and Public Works Departments are the predominant departments in energy use, fuel consumption, and associated GHG emissions. This finding is a simple resultof the fleet size assigned to these two departments, as well as the annual mileage logged by the vehicles of these departments (i.e., maintenance, service, patrolling, etc.). The predominance of these two departments in consumption and emissions are comparable to other municipalities.

Knowing the departmental distribution of fuel consumption and GHG emissions allows department-specific measures to be implemented, including the following preliminary suggestions:

- efficient route planning strategies and practices using available technologies to reduce annual mileage;
- strategic planning for fleet composition to reduce fuel consumption;
- long-term planning for municipal vehicle fleet replacement based on age and lifespan thresholds; and
- policies for temporal routing of routine trips to avoid idling in congested traffic conditions.

3.0 SCOPE 3 EMISSIONS: EMPLOYEE COMMUTE

3.1. Methodology

Employee commute emissions measures emissions generated by employee travel to and from work. They were calculated based on round-trip commute distance, number of employee trips, and estimates of commute mode share (i.e. the proportion of employees driving, carpooling, biking, etc. to work). Though the LGGIT Model was used to some extent, employee commute emissions were calculated using an equation with its own set of assumptions. The calculation for the employee commute emissions per capita is shown in Equation 4.

$$\frac{CO_2\ emissions}{year \times person} = RT \times D \times \frac{1}{AVO} \times FC \times MEF \times \frac{MT}{kg} \qquad \textbf{(Equation 4)}$$

Where:

$RT = round\ trip\ mileage\ per\ year$

$D = round\ trip\ distance$

$AVO = average\ vehicle\ occupancy\ (i.e., person\ per\ vehicle)$

$FC = fuel\ consumption\ (i.e., gallons\ per\ mile)$

$MEF = mode\ emissions\ factor$

For detailed information on the reasoning and assumptions of the employee commute emissions and its equation, see Appendix D.

3.2. Data Sources

The City of Frederick provided employee data courtesy of the Department of Human Resources. Data collected consisted of the employee's department, the building address where the employee works, the zip code where the employee's commute originates, the employee's town of origin, the zip code where the employee's commute ends and the employee's status as either full-time or part time.

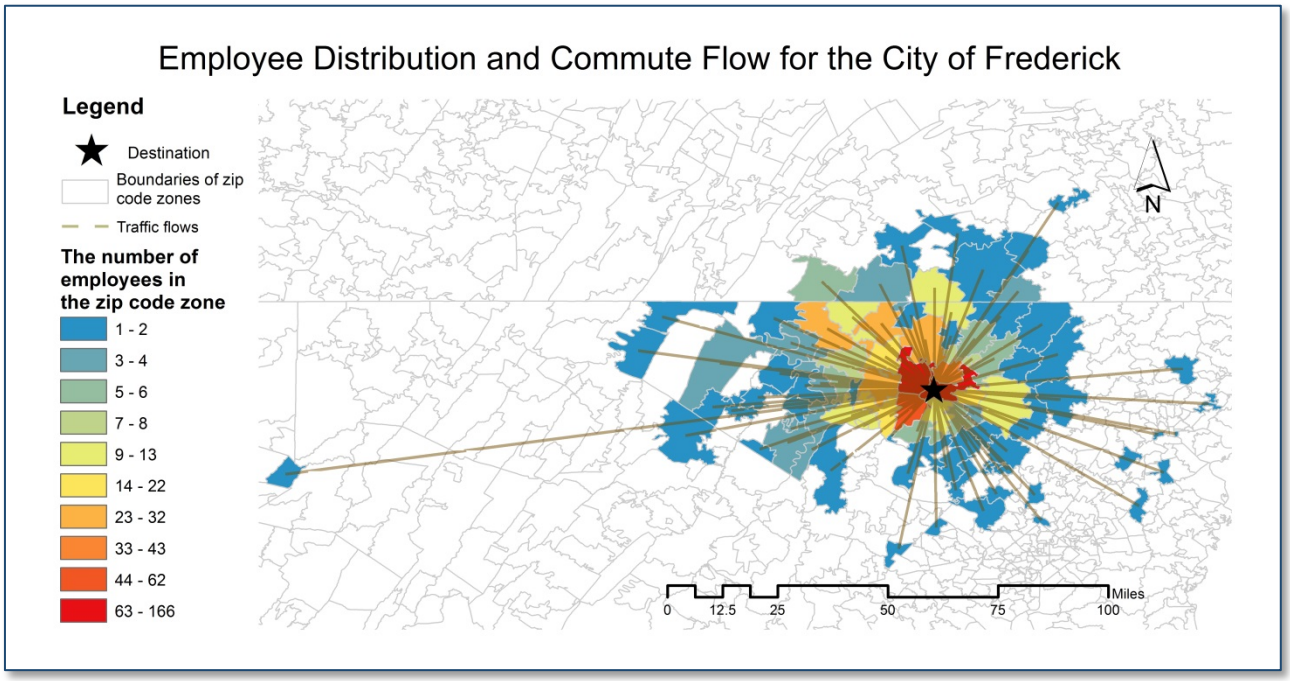
Due to data limitations, assumptions were made to input the necessary parts of the Employee Commute GHG Emissions equation per capita. Such assumptions included CO_2 emission factor, fuel efficiency, and mode share. For detailed information on the assumptions and limitations, see Appendix D.

3.3. Analyses and Results

3.3.1. Commute Distances and Patterns

The City of Frederick draws employees from 87 different zip codes surrounding the City. The mean employee commute for the City of Frederick is 13.6 miles. The median employee commute is 7.63 miles. Commute distances range from negligible (for the 166 employees who share the same origin/destination zip codes) to just under 155 miles round trip. Figure 5 maps these results as well as the concentration of employees in and near the City of Frederick.

Figure 5. Commute Distribution of the City Employees based on Zip Code



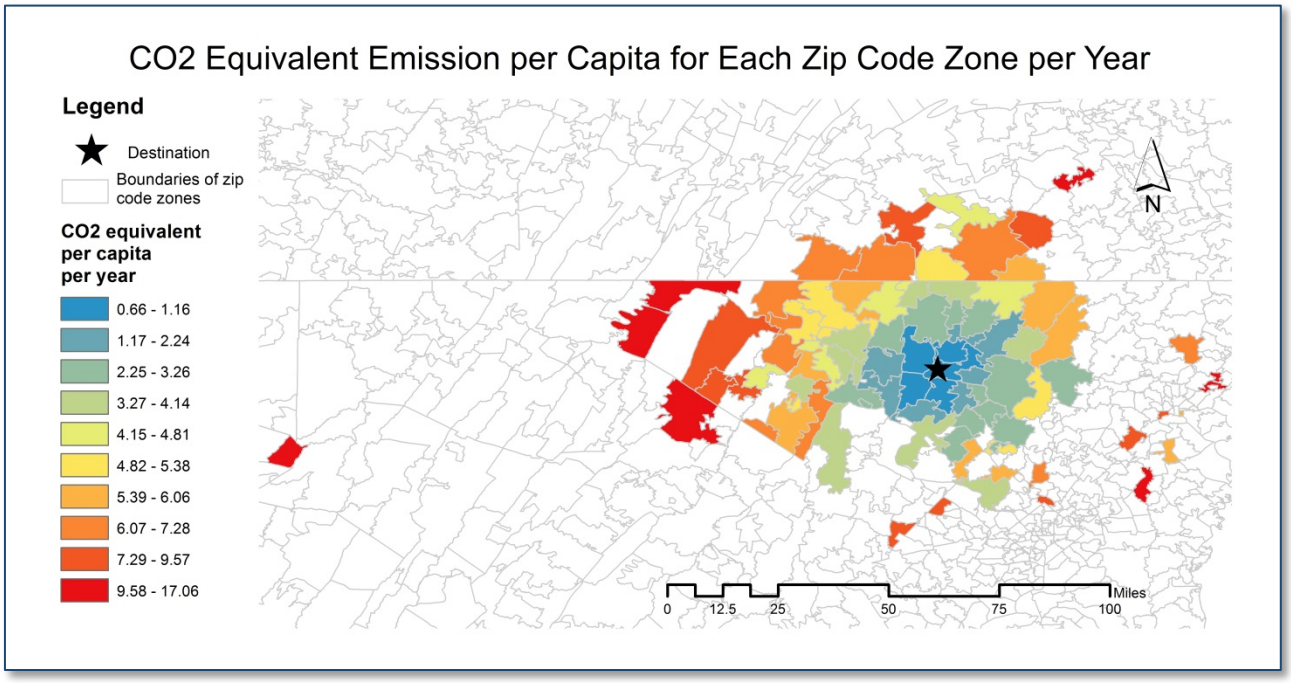
3.3.2. GHG Emissions from Employee Commutes

CO_2e emissions resulting from employee commutes totaled 1,934.1 $MTCO_2e$. Average CO_2 emissions per City employee in 2013 totaled 2.33 $MTCO_2e$.

Origin zip codes with the highest total levels of CO_2e emissions were 21783, 21740, and 21702. These three zip codes combined account for approximately 24.4 percent of employees and 21 percent of total CO_2e emissions. Appendix D - Figure D-1 shows the total CO_2e emissions per zip code per year.

Origin zip codes with the highest per capita CO_2 emissions were 26292, 25422, and 22603. These three zip codes account for 0.4 percent of City employees and 2.2 percent of total CO_2e emissions. Figure 6 maps per capita CO_2e emissions.

Figure 6. CO_2e Emissions per Capita for each Zip Code Zone per Year



3.3.3. CO_2 Emission Breakdown by Department

The Police Department has the highest total CO_2e emissions at 605.61 $MTCO_2e$, followed by Public Works Operations and Parks and Recreation at 504.36 and 315.45 $MTCO_2e$, respectively. On a per capita basis, the Police Department remains the highest source of CO_2e emissions, followed by Public Works Operations and Parks and Engineering, Permits, and Inspections. Figures 7 and 8 depict the department breakdowns as a total and as per capita CO_2e emissions.

Figure 7. Total CO_2e Emissions by Department

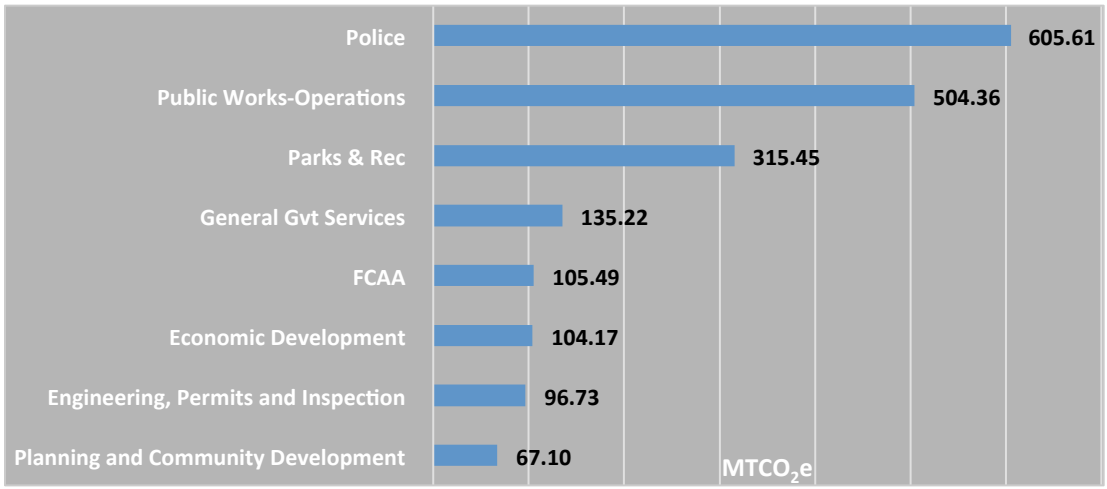
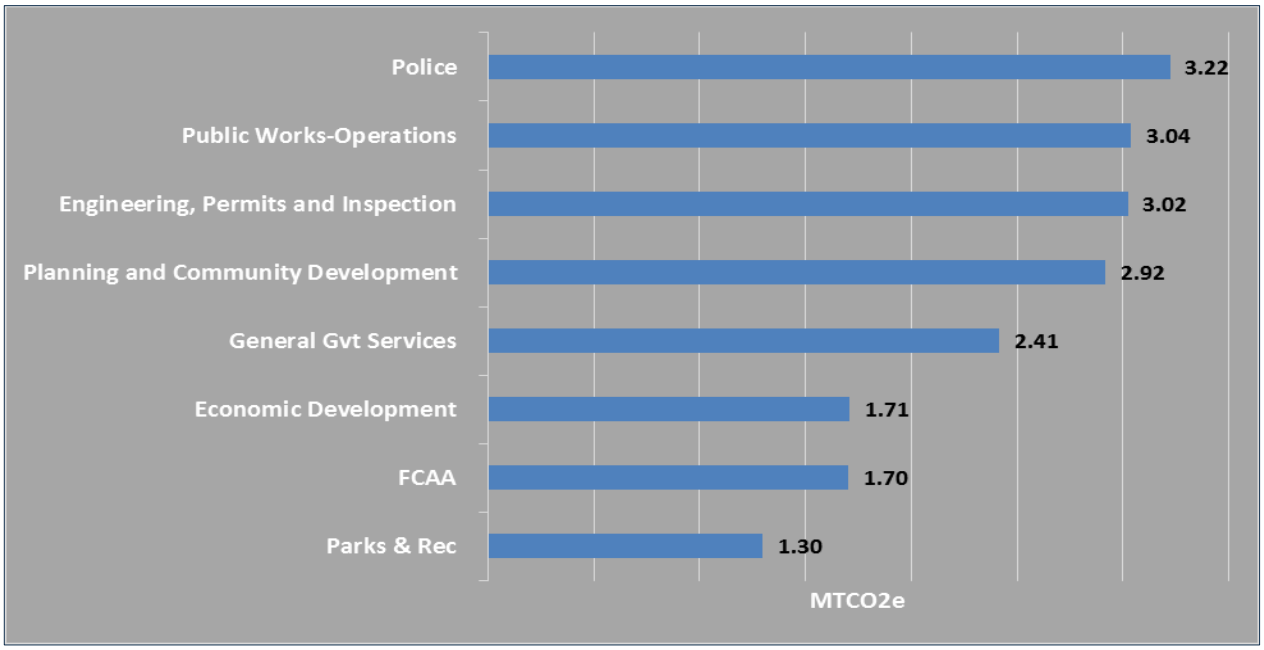


Figure 8. Per Capita CO_2e Emissions by Department



3.4. Key Findings

A key finding of employee commute emissions is simple: distance matters. While aggregate emission levels are generally higher in areas with larger numbers of employees, per capita emission figures are closely correlated to distance. A few employees with lengthy commute distances can have an outsized impact on overall levels of employee commute emissions. In the case of Frederick, the 36.5-percent of City employees whose commutes were longer than the mean (in terms of mileage) account for more than 72 percent of the total CO_2e emissions from employee commutes. This suggests that steps to reduce the frequency, distance, or carbon intensity of this group of employees could have a measureable impact on CO_2e emissions.

Furthermore, 43 percent of the City's employees travel less than three miles one-way to work (for a round trip of six miles or less). Based on our calculations, they account for 273.80 MT CO2e, or 14 percent of total employee commute emissions. This commute length is well within the range considered optimal for bicycle commuting. Lastly, the Police Department has the highest per capita CO_2e emissions of any government department. If the City is committed to addressing this issue, this may be one place to start.

Appendix A. Definitions and Acronyms/Abbreviations

DEFINITIONS

(from LGGIT Documentation)

Baseline – A measurement, calculation, or time used as a basis for comparison.

Baseline Year – The first full year (in this case, 2013) of emissions data. The baseline analysis is undertaken in order to provide a comparison for later years.

Biogenic Emissions – Biogenic emission sources are emissions that come from natural sources, and need to be accounted for in photochemical grid models, as most types are widespread and ubiquitous contributors to background air chemistry. Often only the emissions from vegetation and soils are included, but other relevant sources include volcanic emissions, lightning, and sea salt[3].

CO_2e – Carbon dioxide equivalent emissions. This is determined by multiplying the emissions of methane and nitrous oxide by their Global Warming Potential.

Emission Factor – The value for scaling emissions to activity data in terms of a standard rate of emissions per unit of activity (i.e. grams of carbon dioxide emitted per barrel of fossil fuel consumed).

Global Warming Potential – Conversion factor used to compare all GHG emissions to carbon dioxide equivalent units. The GWP represents the combined effect of the differing times these gases remain in the atmosphere and their relative effectiveness in absorbing outgoing thermal infrared radiation.

$MTCO_2e$ – Metric tons of carbon dioxide equivalent. This is the standard unit for measuring greenhouse gas emissions (GHGs).

PALS (Partnership for Action Learning in Sustainability) – A program administered by the University of Maryland, College Park (UMD). It is a campus-wide initiative that harnesses the expertise of UMD faculty and the energy and ingenuity of UMD students to help Maryland communities become more environmentally, economically, and socially sustainable. PALS is designed to provide innovative, low-cost assistance to local governments while creating real-world problem-solving experiences for UMD graduate and undergraduate students.

Scope 1 Emissions – Direct emissions from sources located within the boundary of a local government. One example is vehicle fleet fuel use.

Scope 3 Emissions – Indirect emissions from activities that occur as a result of activity within a local government's boundary. One example is employee commute.

[3] Source: U.S. Environmental Protection Agency (EPA), 2007, http://www.epa.gov/ttnchie1/emch/biogenic/

Appendix A – Definitions and Acronyms/Abbreviations

ACRONYMS AND ABBREVIATIONS

(from LGGIT Documentation)

%	percent
BAU	business-as-usual
BOD_5	Biological Oxygen Demand (the amount of oxygen consumed in five days by decomposing waste, used to measure the amount of waste input or output into a system)
CH_4	Methane
CO_2	Carbon dioxide
CO_2e	Carbon dioxide equivalent emissions
days/yr	days per year
eGRID	Emissions & Generation Resource Integrated Database
EPA	U.S. Environmental Protection Agency
ft^3	cubic feet
ft^3/yr	cubic feet per year
G.G.E.	gasoline gallon equivalent
kg	kilograms
kWh	kilowatt-hours
kg N/day	kilograms of Nitrogen per day
LFG	Landfill gas
LGOP	Local Government Operations Protocol
LGGIT	Local Greenhouse Gas Inventory Tool
mcf	thousand standard cubic feet
MMSCF	million standard cubic feet
MMSCF/yr	million standard cubic feet per year
MT	metric Tons
N_2O	Nitrous oxide
WARM	EPA's Waste Reduction Model

Appendix B. Assumptions and Estimations Methods for Fleet Annual Mileage and VMT

Annual mileage is one of the most critical variables in calculating per-vehicle GHG emissions. VMT per vehicle is also important information, yet the City's data did not provide that information. In order to develop a base model, research established a value for annual average mileage for the vehicles in the City's municipal fleet. The research focused on identifying municipalities similar in size and function to the City of Frederick and mining the available data.

The annual fuel consumption, as reported in the most recent City of Frederick Motor Fuel Tax Refund Claim, was also used as part of the method for verification of the annual VMT (i.e. annual fuel consumption divided by the average fuel economy for the entire fleet). However, it is important to note that the GHG emission calculations based on these assumptions and verification methods only provide an approximation of the annual GHG emissions of the municipal vehicle fleet and a detailed data collection method is recommended to achieve more accurate results.

To estimate the typical annual mileage for the individual vehicles in the City's fleet, external data sources were sought. However, while many of the reviewed documents on municipal fleet management, GHG emission inventories, and other relevant purposes, recommend collection of such data for accurate calculations and informed decision-making, they do not include vehicle-specific mileage information. A document prepared for the Town of Groton, CT was identified, where all of the municipal vehicles and their annual mileage, along with the actual fuel consumption were listed[4]. Although the analysts could not identify the document's date, it was used as the preliminary foundation to establish estimated annual mileage for the City of Frederick vehicle fleet. The following compare fleet characteristics of the Town of Groton and The City of Frederick as well as the average annual mileage data extracted from the Town and the estimated annual mileage for the City. To maintain consistency, calculations using the estimated annual mileage were also checked against the average fuel economy for the City of Frederick fleet and total annual fuel consumption. However, it should be noted that although mileage is available for individual vehicles in the Town of Groton database, the analysts applied the departmental averages of Groton to the corresponding departmental fleets of Frederick.

[4] http://www.groton-ct.gov/depts/plandev/docs/veh%20by%20dept%20incl%20fuel%20type%20w%20peg%20analysis.pdf

Appendix B. Assumptions and Estimations Methods for Fleet Annual Mileage and VMT

Table B-1. Comparison of Population, Geographic, and Fleet Data - Town of Groton vs. City of Frederick

Variable	City of Frederick, MD	Town of Groton, CT
City Area (sq. mi.)	23.13	45.3
Population (2010)	66,382	40,115
Density (sq. mi.)	2,966	890
Municipal Fleet Size	715	140
Municipal Vehicle per Capita	0.01077	0.00349
Number of Police Vehicles	151	42
Number of DPW Vehicles	326	64

Table B-2. Annual Mileage Data of Town of Groton and Estimations for City of Frederick Municipal Fleet

Vehicle Type	Annual Mileage		
	Town of Groton, CT		City of Frederick, MD
	Average	Range	Estimated
Economic Development	N/A	N/A	5,000
Engineering, Permits, and Inspections	4,430	1,001 – 9,220	5,000
Parks and Recreation	4,755	2,740 – 11,892	5,000
Planning & Community Development	2,784	2,784	3,000
Police*	13,264	716 – 33,595	14,500
Public Works (construction)	N/A	N/A	1,000
Public Works (heavy-duty)	1,892	330 – 6,321	1,900
Public Works (light trucks & passenger cars)	8,630	8,310– 9,519	8,500
Public Works (utility and recreational)	N/A	N/A	2,000
Other	N/A	N/A	2,500

* Police vehicles with model years older than 1999 were assigned minimal mileage (i.e. 500 per annum)

To establish an accurate model and GHG emission calculations, especially for the baseline, mileage records for each vehicle in the municipal fleet should be maintained and the end-of-year annual mileage used in the GHG emission calculations. This could be accomplished by recording the vehicle at the beginning and end of a calendar year. Recording the mileage during the vehicle's periodic maintenance should also be considered, because the interim records could resolve discrepancies between the beginning and end-of-year records.

Appendix C. Assumptions for Fleet Data Correction (Fuel Economy)

1. Calculations in the LGGIT model use the average fuel economy of fleet vehicles. Many of the vehicles listed in the City's database did not have the fuel economy associated with them. Therefore, fuel economy values for the majority of the passenger cars and SUV type vehicles in the City's fleet were obtained from the U.S. Environmental Protection Agency's database as published on the http://www.fueleconomy.gov/feg/findacar.shtml website. Typically, these fuel economy values are provided by the manufacturers and become somewhat unreliable after the vehicle has been in service for a while. The LGGIT model's calculations depend on fuel economy input by the user, thus reflecting the vehicle's fuel economy when it is new. Although not significant for new vehicles, the accuracy of the GHG emissions would be compromised as the the vehicles (and the entire fleet) ages. It would be desirable to keep records of the annual mileage and fuel consumption to develop vehicle-specific GHG emission profiles, which would be useful in the decision-making process to replace and/or retire vehicles, even if their expected life span is not reached.

2. Where the type of fuel is not indicated, analysis compared the vehicle's type to similar vehicles in the fleet to match the fuel economy values. In the future, keeping an accurate record of the vehicle fuel type during the purchase or recording it during the scheduled maintenance would be useful for accuracy of the analyses.

3. Data or fuel consumption/economy specifications for commercial lawn mowers are not available; however, an average of 5 mpg is used as an estimate (based on a brief literature review). Typically, fuel economy for tractors, farm equipment, and lawn mowers are listed in terms of horsepower-hour per gallon (hp-hr/gal), which is not suitable for the standard GHG emission calculations, because the number of hours of equipment operation is not practical to track.

4. Dump trucks and other heavy equipment where the fuel economy is not listed and not available through research for a specific make/model (i.e., manufacturer's information, U.S. EPA, internet search, etc.) was estimated based on the Transportation Research Board (TRB) publication *Technologies and Approaches to Reducing the Fuel Consumption of Medium- and Heavy-Duty Vehicles*[5]. These values were also checked against the default fuel economy values used in the Greenhouse Gases, Regulated Emissions, and

[5] Information for assumptions is found in the Vehicle Technologies Market Report (2013) prepared by Oak Ridge National Laboratories operated by Battelle (under UT-Battelle) for U.S. Department of Energy. The original source of data is extracted from The National Academies, Technologies and Approaches to Reducing the Fuel Consumption of Medium and Heavy-Duty Vehicles, 2010. http://www.nap.edu/catalog.php?record_id=12845.

Appendix C. Assumptions for Fleet Data Correction (Fuel Economy)

Energy Use in Transportation (GREET) model developed by the Argonne National Laboratory[6].

Table C-1. Typical Fuel Economy Range and Values used in LGGIT Model Input

Vehicle Type	Typical Fuel Economy Range (2007)	Default Values for Fuel Economy in GREET Model	Average Fuel Economy used in LGGIT Model
City Delivery, Parcel Delivery, Large Walk-In, Bucket, Landscaping, School Bus	5-12 mpg	9.50 mpg	9.50 mpg
City Bus, Furniture, Refrigerated, Refuse, Fuel Tanker, Dump, Tow, Concrete, Fire Engine, Tractor-Trailer	4-8 mpg	7.70 mpg	7.50 mpg
Straight Trucks, e.g., Dump, Refuse, Concrete, Furniture, City Bus, Tow, Fire Engine, (added Construction Equipment)	2.5-6 mpg	5.0 mpg	5.25 mpg
Combination Trucks, e.g., Tractor-Trailer: Van, Refrigerated, Bulk Tanker, Flat Bed	4–7.5 mpg	5.8-5.9 mpg	5.75 mpg

5. Where values for the highway and city fuel economy are listed, the least efficient value (city) is used for the vehicles in the police fleet, based on the assumption that those vehicles would be patrolling the City streets. However, for vehicles in other fleets such as administrative, DPW, etc., the average of the city and highway fuel economy values was used. If the City would like more conservative GHG emission estimates, the values can be changed to reflect the values provided for the city fuel economy.

6. Chevrolet Impala vehicles were manufactured in two types until 2006 as police vehicles and regular vehicles. The fuel economy for the regular Impala is listed as 18 mpg (used for DPW vehicles), whereas the police version is listed as 22 mpg.

7. Based on the recommendations of the LGGIT model, an average fuel economy of 20 mpg is used for passenger vehicles and light-duty trucks (regardless of the vehicle's age) where there is no data available.

[6] Argonne National Laboratory is managed and operated by University of Chicago for U.S. Department of Energy. More information about UChicago Argonne, LLC and GREET model can be found at http://www.uchicagoargonnellc.org/ and https://greet.es.anl.gov.

Appendix C. Assumptions for Fleet Data Correction (Fuel Economy)

8. Vehicles listed as "flexible fuel" have two fuel economies associated with them, where one value is used for gasoline and the other value (typically lower) is for Ethanol85 (E85). Since the percentage of time when these vehicles are using gasoline and ethanol are not specified, the analysis assumes that these vehicles are fueled by E85 100 percent of the time. To provide accurate GHG emission calculations, a record-keeping system should be developed for every refueling of these types of vehicles. This would ensure the percentage split between the gasoline and ethanol use.

Based on these assumptions and estimation methods, Table C-2 presents the values obtained from the City of Frederick, and the estimated input values used for the calculations in LGGIT as a representation of the actual values with close proximity.

Table C-2. Annual Fuel Consumption of On-road Vehicles– Actual Data from the City vs. Consumptions calculated based on Estimated Values

Fuel Type	Annual Consumption (Actual)	Annual Consumption (Estimated)	Difference [%]
Gasoline (gal)	175,078	175,569	+491 [+0.28%]
Diesel (gal)	74,271	74,233	-38 [-0.05%]
Ethanol (gal)	N/A	60,759	N/A

Appendix D. Assumptions for Calculating Employee Commute GHG Equation

CO_2 Emissions/(year × person) = Roundtrips per year × Trip Distance × 1/(# People in a vehicle) × Gallons/mile × Mode Emissions Factor × MT/kg

Where the following assumptions were made for each element of the equation:

- **Roundtrips per year (no unit)** were estimated based on an employee's status as full-time or part-time. The assumption is that full-time employees work for 48 weeks per year, five days per week, and one roundtrip (two trips) per day. Thus, their roundtrips per year are 480 (48*5*2=480). For half-time employees, a weighted average was used. According to information provided by City officials, the 315 part-time employees include 80 part-time regular and 235 part-time seasonal employees. Seasonal employees work an average of five months. Part-time regular staff works five days a week with shorter hours, while part-time seasonal schedules vary and can be only a few days, as needed. A weighted average was created using number of trips for each part-time employee and number of working days, equaling to 271 and represented by the following equation: (80*480+235*480*5/12)/315 = (38400+47000)/315=271.
- **Trip distance (miles)** is the distance from each employee's zip code of origin to zip code of destination, as calculated by ArcGIS. The City provided origin and destination zip codes for City employees.
- **1/(# people in a vehicle)** reflects the rate of carpooling. The emissions of employees that carpool are shared among all riders in the vehicle. If an employee rides to work alone, this factor is 1. Rates of employee carpooling were not included in the materials provided by the City. We have assumed that all employees commute via personal vehicle. Table D-1 shows the assumption in the calculator (Row 3).
- **Gallons/mile** reflect the rate of gasoline consumption. Our calculations used default average values included in the LGGIT calculator. The table below shows the value used by the calculator (Row 2). Specific gas consumption figures for employees' personal vehicles were not included in the information provided by the City.
- **The Mode Emissions Factor (kg CO_2/gallon)** converts energy consumption into CO_2 emission. We used default values included in the LGGIT calculator. The table below shows the value used by the calculator (Row 1).
- **MT/kg** is a simple unit conversion from kilograms to Metric Tons.

Appendix D. Assumptions for Calculating Employee Commute GHG Equation

Table D-1. Assumption Values for Employee Commute GHG Equation

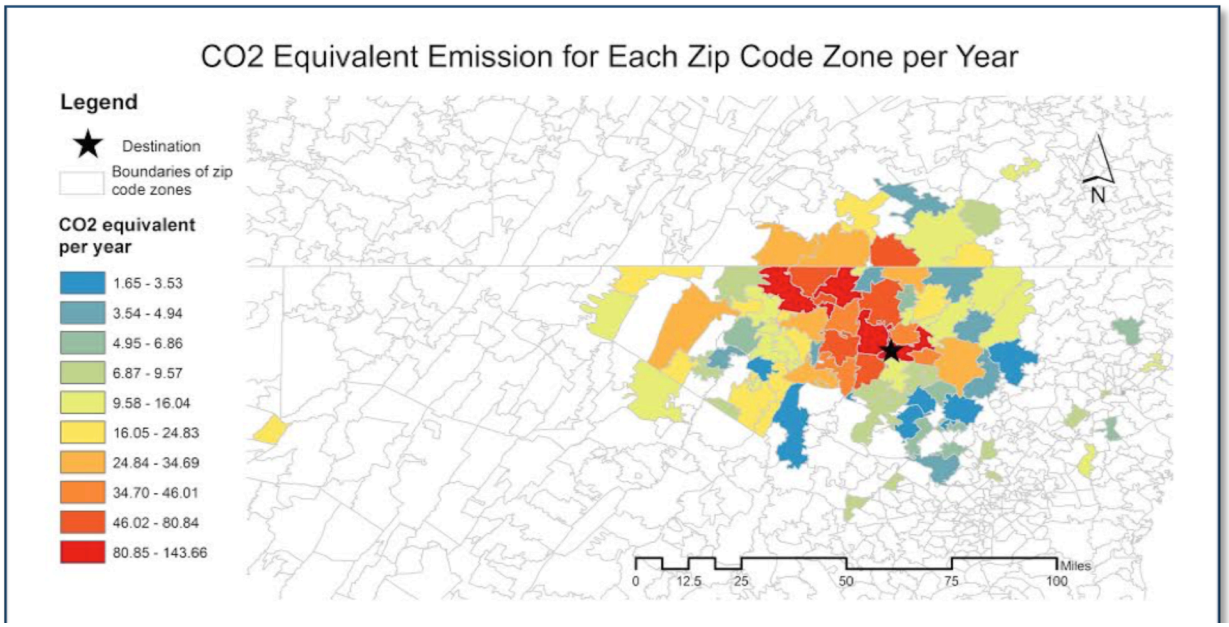
Mode Share	Personal Vehicle	Carpool	Motorcycle	Nonmotorized Transit (i.e. Bike)
CO_2 Emission Factor (kg/gal)	8.78	8.78	8.78	0
Gallons/mi	21.6	21.6	43.4	-
# of People in vehicle	1	2	1	0

Appendix D. Assumptions for Calculating Employee Commute GHG Equation

The accuracy of these calculations is influenced by several assumptions made due to data limitations. Substantial differences between assumptions and actual levels will result in either an increase or a decrease in overall emissions levels, depending on the nature and direction of the variation. These assumptions include:

- **Transit mode**: The analysis errs on the side of caution and assumes all employees travel to work via personal vehicle. This may not be the case, especially for those who carpool, walk, or ride bicycles to work. If more accurate transit mode for each employee were available, results would be more accurate.
- **VMT**: Calculations of round-trip travel distances are based on zip codes of origin and destination rather than actual street addresses. Figures are a rough estimate that assumes everyone lives in the geometric center of each zip code zone, so actual emissions figures may be higher than our calculations. The extent of this difference will depend on actual commute distances, mode share, and rates of gasoline consumption. Actual employee home addresses would return more precise results.
- **Idling**: The methodology used does not take idling into consideration. If the vehicles idle frequently during transit, our results would underestimate CO_2 emissions. A proper way to improve this is to 1) estimate the theoretical transiting time with VMT and average speed; 2) compare the theoretical value with the actual transiting time; 3) calculate the CO_2 emission from idling by **(Actual transiting time – Theoretical transiting time) x CO_2 emission from idling per time unit**
- **Fuel Efficiency and CO_2 Emission Factor**: Each vehicle was assumed to have the same fuel efficiency and emit the same emissions for each gallon of gasoline. Accurate vehicle information would improve these estimates.

Figure D-1. CO_2e Emissions of Employee Commuter by Zip Code Zone per Year



Appendix E. City of Frederick Municipal Vehicle Fleet Data used in the LGGIT Model

PLEASE REFER TO SPREADSHEETS BELOW

ID#	Vehicle or vehicle group description	Department	Vehicle Year	Vehicle Type	Vehicle Model	Fuel type	Fuel consumption (gal)	VMT (mi)	Fuel Economy (mpg)
1	Heavy-Duty Vehicle	Economic Development	1992	SWEEPR	SW-9XI ARMIDILLO	Diesel	526	5000	9.5
2	Heavy-Duty Vehicle	Economic Development	2006	LOADER	721C	Diesel	952	5000	5.25
3	Heavy-Duty Vehicle	Economic Development	2011	LOADER	721E	Diesel	952	5000	5.25
4	Heavy-Duty Vehicle	Economic Development	2013	BCKHOE	590SN	Diesel	952	5000	5.25
5	Heavy-Duty Vehicle	Economic Development	2013	MOWRLG	6115M	Diesel	526	5000	9.5
6	Heavy-Duty Vehicle	Economic Development	2013	N/A	3400GSTP	Diesel	526	5000	9.5
7	Heavy-Duty Vehicle	Economic Development	2013	TRAILR	TAD 1100	Diesel	870	5000	5.75
8	Heavy-Duty Vehicle	Economic Development	2014	DUMP	7600 SFA 4X2	Diesel	952	5000	5.25
9	Light Truck	Economic Development	2013	PUP4X4	3500 HD	Diesel	417	5000	12
10	Utility and Recreational Equipment	Economic Development	2004	TRAILR	LT58-13	Diesel	870	5000	5.75
11	Utility and Recreational Equipment	Economic Development	2008	N/A	MP-3D	Diesel	526	5000	9.5
12	Utility and Recreational Equipment	Economic Development	2008	N/A	RPR-16	Diesel	526	5000	9.5
13	Utility and Recreational Equipment	Economic Development	2008	N/A	RPR-16	Diesel	526	5000	9.5
14	Utility and Recreational Equipment	Economic Development	2009	GOLFCA	COMMANDER 2100E	Diesel	526	5000	9.5
15	Utility and Recreational Equipment	Economic Development	N/A	SNOWBL	N/A	Diesel	526	5000	9.5
16	Heavy-Duty Vehicle	Economic Development	2014	MOWRLG	6115M	Gasoline	526	5000	9.5
17	Light Truck	Economic Development	2007	4X4PSR	BLAZER	Gasoline	333	5000	15
18	Light Truck	Economic Development	2007	PUP	RANGER	Gasoline	333	5000	15
19	Light Truck	Economic Development	2007	PUP4X4	COLORADO	Gasoline	333	5000	15
20	Light Truck	Economic Development	2009	PUP4X4	COLORADO	Gasoline	294	5000	17
21	Utility and Recreational Equipment	Economic Development	2013	MOWRLG	9016	Gasoline	526	5000	9.5
22	Utility and Recreational Equipment	Economic Development	2013	MOWRLG	Z ZERO TURN	Gasoline	526	5000	9.5
23	Utility and Recreational Equipment	Economic Development	2014	MOWRLG	9016	Gasoline	526	5000	9.5
24	Utility and Recreational Equipment	Economic Development	2014	MOWRSM	ZERO TURN	Gasoline	526	5000	9.5
25	Passenger Car	Engineering, Permits and Insp	2005	4X4PSR	CT10506	Diesel	500	5000	10
26	Light Truck	Engineering, Permits and Insp	2014	4X4PSR	EQUINOX	Ethanol (E85)	357	5000	14
27	Light Truck	Engineering, Permits and Insp	2003	PUP	RANGER	Gasoline	294	5000	17
28	Light Truck	Engineering, Permits and Insp	2004	PUP	1500-SILVERADO	Gasoline	333	5000	15
29	Light Truck	Engineering, Permits and Insp	2004	PUP	COLORADO	Gasoline	263	5000	19
30	Light Truck	Engineering, Permits and Insp	2005	PUP4X4	SILVERADO 1500	Gasoline	333	5000	15
31	Light Truck	Engineering, Permits and Insp	2008	4X4PSR	TRAILBLAZER	Gasoline	333	5000	15
32	Light Truck	Engineering, Permits and Insp	2008	4X4PSR	TRILBLAZER	Gasoline	333	5000	15
33	Light Truck	Engineering, Permits and Insp	2008	N/A	TRAILBLAZER	Gasoline	333	5000	15
34	Light Truck	Engineering, Permits and Insp	2008	N/A	TRAILBLAZER	Gasoline	333	5000	15
35	Light Truck	Engineering, Permits and Insp	2013	4X4PSR	PATRIOT	Gasoline	238	5000	21
36	Light Truck	Engineering, Permits and Insp	2013	4X4PSR	PATRIOT	Gasoline	238	5000	21
37	Light Truck	Engineering, Permits and Insp	2013	4X4PSR	PATRIOT	Gasoline	238	5000	21
38	Light Truck	Engineering, Permits and Insp	2013	4X4PSR	PATROIT	Gasoline	238	5000	21
39	Light Truck	Engineering, Permits and Insp	2013	4X4PSR	PATROIT	Gasoline	238	5000	21

ID#	Vehicle or vehicle group description	Department	Vehicle Year	Vehicle Type	Vehicle Model	Fuel type	Fuel consumption (gal)	VMT (mi)	Fuel Economy (mpg)
40	Light Truck	Engineering, Permits and Insp	2013	4X4PSR	PATROIT	Gasoline	238	5000	21
41	Passenger Car	Engineering, Permits and Insp	2000	PSSNGR	LUMINA	Gasoline	238	5000	21
42	Passenger Car	Engineering, Permits and Insp	2001	4DRSED	ALERO	Gasoline	238	5000	21
43	Passenger Car	Engineering, Permits and Insp	2003	4DRSED	IMPALA	Gasoline	227	5000	22
44	Passenger Car	Engineering, Permits and Insp	2007	4DRSED	COBALT	Gasoline	208	5000	24
45	Passenger Car	Engineering, Permits and Insp	2007	4DRSED	CT15506	Gasoline	357	5000	14
46	Passenger Car	Engineering, Permits and Insp	2007	4DRSED	CT15506	Gasoline	357	5000	14
47	Passenger Car	Engineering, Permits and Insp	2007	4DRSED	MALIBU	Gasoline	208	5000	24
48	Passenger Car	Engineering, Permits and Insp	2009	4DRSED	PRIUS	GASOLINE	104	5000	48
49	Passenger Car	Engineering, Permits and Insp	2009	4DRSED	PRIUS	GASOLINE	104	5000	48
50	Heavy-Duty Vehicle	Other	1982	ARMOURED	PEACE KEEPER #2	Diesel	171	3000	17.5
51	Heavy-Duty Vehicle	Other	2006	TRAILR	N/A	Diesel	522	3000	5.75
52	Light Truck	Other	1997	PSSNGR	WINABEGO	Diesel	150	3000	20
53	Passenger Car	Other	2008	4DRSED	IMPALA	Ethanol (E85)	214	3000	14
54	Passenger Car	Other	2008	4DRSED	IMPALA	Ethanol (E85)	214	3000	14
55	Passenger Car	Other	2008	4DRSED	IMPALA	Ethanol (E85)	214	3000	14
56	Passenger Car	Other	2008	4DRSED	IMPALA	Ethanol (E85)	214	3000	14
57	Passenger Car	Other	2008	4DRSED	IMPALA	Ethanol (E85)	214	3000	14
58	Passenger Car	Other	2008	4DRSED	IMPALA	Ethanol (E85)	214	3000	14
59	Passenger Car	Other	2008	4DRSED	IMPALA	Ethanol (E85)	214	3000	14
60	Passenger Car	Other	2008	4DRSED	IMPALA	Ethanol (E85)	214	3000	14
61	Passenger Car	Other	2008	4DRSED	IMPALA	Ethanol (E85)	214	3000	14
62	Passenger Car	Other	2008	4DRSED	IMPALA	Ethanol (E85)	214	3000	14
63	Passenger Car	Other	2008	4DRSED	IMPALA	Ethanol (E85)	214	3000	14
64	Passenger Car	Other	2008	4DRSED	IMPALA	Ethanol (E85)	214	3000	14
65	Passenger Car	Other	2008	4DRSED	IMPALA	Ethanol (E85)	214	3000	14
66	Passenger Car	Other	2008	4DRSED	IMPALA	Ethanol (E85)	214	3000	14
67	Passenger Car	Other	2008	4DRSED	IMPALA	Ethanol (E85)	214	3000	14
68	Passenger Car	Other	2008	4DRSED	IMPALA	Ethanol (E85)	214	3000	14
69	Passenger Car	Other	2008	4DRSED	IMPALA	Ethanol (E85)	214	3000	14
70	Passenger Car	Other	2008	4DRSED	IMPALA	Ethanol (E85)	214	3000	14
71	Passenger Car	Other	2008	4DRSED	IMPALA	Ethanol (E85)	214	3000	14
72	Passenger Car	Other	2008	4DRSED	IMPALA	Ethanol (E85)	214	3000	14
73	Passenger Car	Other	2008	4DRSED	IMPALA	Ethanol (E85)	214	3000	14
74	Passenger Car	Other	2008	4DRSED	IMPALA	Ethanol (E85)	214	3000	14
75	Passenger Car	Other	2008	4DRSED	IMPALA	Ethanol (E85)	214	3000	14
76	Passenger Car	Other	2008	4DRSED	IMPALA	Ethanol (E85)	214	3000	14
77	Passenger Car	Other	2008	4DRSED	IMPALA	Ethanol (E85)	214	3000	14
78	Passenger Car	Other	2008	4DRSED	IMPALA	Ethanol (E85)	214	3000	14

ID#	Vehicle or vehicle group description	Department	Vehicle Year	Vehicle Type	Vehicle Model	Fuel type	Fuel consumption (gal)	VMT (mi)	Fuel Economy (mpg)
79	Passenger Car	Other	2008	4DRSED	IMPALA	Ethanol (E85)	214	3000	14
80	Passenger Car	Other	2008	4DRSED	IMPALA	Ethanol (E85)	214	3000	14
81	Passenger Car	Other	2008	4DRSED	IMPALA	Ethanol (E85)	214	3000	14
82	Passenger Car	Other	2008	4DRSED	IMPALA	Ethanol (E85)	214	3000	14
83	Passenger Car	Other	2008	4DRSED	IMPALA	Ethanol (E85)	214	3000	14
84	Passenger Car	Other	2008	4DRSED	IMPALA	Ethanol (E85)	214	3000	14
85	Passenger Car	Other	2008	4DRSED	IMPALA	Ethanol (E85)	214	3000	14
86	Passenger Car	Other	2008	4DRSED	IMPALA	Ethanol (E85)	214	3000	14
87	Passenger Car	Other	2008	4DRSED	IMPALA	Ethanol (E85)	214	3000	14
88	Passenger Car	Other	2008	4DRSED	IMPALA	Ethanol (E85)	214	3000	14
89	Passenger Car	Other	2008	4DRSED	IMPALA	Ethanol (E85)	214	3000	14
90	Heavy-Duty Vehicle	Other	1996	VNPSGR	WINDSTAR	Gasoline	139	2500	18
91	Light Truck	Other	1988	VNPSGR	G-20	Gasoline	104	2500	24
92	Light Truck	Other	1996	VNPSGR	E-350	Gasoline	167	2500	15
93	Light Truck	Other	1998	PUP	SONOMA	Gasoline	125	2500	20
94	Light Truck	Other	1999	VNPSGR	VAN	Gasoline	139	2500	18
95	Light Truck	Other	1999	VNPSGR	WINDSTAR	Gasoline	139	2500	18
96	Light Truck	Other	2001	VNUTIL	G - 10	Gasoline	139	2500	18
97	Light Truck	Other	2002	4X4PSR	TRAILBLAZER	Gasoline	143	2500	17.5
98	Light Truck	Other	2002	PUP	SILVARADO 1500	Gasoline	167	2500	15
99	Light Truck	Other	2002	VNPSGR	SONOMA	Gasoline	179	2500	14
100	Light Truck	Other	2003	N/A	YUKON DENALI	Gasoline	179	2500	14
101	Light Truck	Other	2007	4DRSED	MONTEGO	Gasoline	132	2500	19
102	Light Truck	Other	2007	PUP	N/A	Gasoline	192	2500	13
103	Light Truck	Other	2007	VNUTIL	G-1500	Gasoline	167	2500	15
104	Passenger Car	Other	1992	4DRSED	COROLLA	Gasoline	100	2500	25
105	Passenger Car	Other	2000	4DRSED	BONNEVILLE	Gasoline	114	2500	22
106	Passenger Car	Other	2000	4DRSED	IMPALA	Gasoline	114	2500	22
107	Passenger Car	Other	2001	4DRSED	IMPALA	Gasoline	114	2500	22
108	Passenger Car	Other	2001	4DRSED	IMPALA	Gasoline	114	2500	22
109	Passenger Car	Other	2001	4DRSED	IMPALA	Gasoline	114	2500	22
110	Passenger Car	Other	2001	CRUISR	IMPALA	Gasoline	147	2500	17
111	Passenger Car	Other	2001	CRUISR	IMPALA	Gasoline	147	2500	17
112	Passenger Car	Other	2002	4DRSED	CAMRY	Gasoline	104	2500	24
113	Passenger Car	Other	2002	4DRSED	IMPALA	Gasoline	114	2500	22
114	Passenger Car	Other	2002	4DRSED	MALIBU	Gasoline	119	2500	21
115	Passenger Car	Other	2002	4DRSED	MALIBU	Gasoline	119	2500	21
116	Passenger Car	Other	2003	CRUISR	IMPALA	Gasoline	147	2500	17
117	Passenger Car	Other	2003	CRUISR	IMPALA	Gasoline	147	2500	17

ID#	Vehicle or vehicle group description	Department	Vehicle Year	Vehicle Type	Vehicle Model	Fuel type	Fuel consumption (gal)	VMT (mi)	Fuel Economy (mpg)
118	Passenger Car	Other	2004	4DRSED	BONNEVILLE	Gasoline	119	2500	21
119	Passenger Car	Other	2004	4DRSED	GRAND PRIX	Gasoline	114	2500	22
120	Passenger Car	Other	2004	4DRSED	IMPALA	Gasoline	125	2500	20
121	Passenger Car	Other	2004	4DRSED	IMPALA	Gasoline	125	2500	20
122	Passenger Car	Other	2004	4DRSED	IMPALA	Gasoline	125	2500	20
123	Passenger Car	Other	2004	4DRSED	IMPALA	Gasoline	125	2500	20
124	Passenger Car	Other	2004	4DRSED	MALIBU	Gasoline	100	2500	25
125	Passenger Car	Other	2004	4DRSED	MAXIMA	Gasoline	119	2500	21
126	Passenger Car	Other	2005	4DRSED	500	Gasoline	125	2500	20
127	Passenger Car	Other	2005	4DRSED	ALTIMA SE 3.5	Gasoline	125	2500	20
128	Passenger Car	Other	2005	4DRSED	IMPALA	Gasoline	114	2500	22
129	Passenger Car	Other	2005	4DRSED	LACROSS	Gasoline	125	2500	20
130	Passenger Car	Other	2005	CRUISR	IMPALA	Gasoline	147	2500	17
131	Passenger Car	Other	2005	CRUISR	IMPALA	Gasoline	147	2500	17
132	Passenger Car	Other	2005	CRUISR	IMPALA	Gasoline	147	2500	17
133	Passenger Car	Other	2005	CRUISR	IMPALA	Gasoline	147	2500	17
134	Passenger Car	Other	2006	4DRSED	6S	Gasoline	104	2500	24
135	Passenger Car	Other	2006	4DRSED	IMPALA	Gasoline	147	2500	17
136	Passenger Car	Other	2006	4DRSED	IMPALA	Gasoline	147	2500	17
137	Passenger Car	Other	2006	4DRSED	IMPALA	Gasoline	147	2500	17
138	Passenger Car	Other	2006	4DRSED	IMPALA	Gasoline	147	2500	17
139	Passenger Car	Other	2006	4DRSED	IMPALA	Gasoline	147	2500	17
140	Passenger Car	Other	2006	4DRSED	IMPALA	Gasoline	147	2500	17
141	Passenger Car	Other	2006	4DRSED	IMPALA	Gasoline	147	2500	17
142	Passenger Car	Other	2006	4DRSED	IMPALA	Gasoline	147	2500	17
143	Passenger Car	Other	2006	4DRSED	IMPALA	Gasoline	147	2500	17
144	Passenger Car	Other	2006	4DRSED	IMPALA	Gasoline	147	2500	17
145	Passenger Car	Other	2006	4DRSED	IMPALA	Gasoline	147	2500	17
146	Passenger Car	Other	2006	4DRSED	IMPALA	Gasoline	147	2500	17
147	Passenger Car	Other	2006	4DRSED	IMPALA	Gasoline	147	2500	17
148	Passenger Car	Other	2006	4X4PSR	COLORADO	Gasoline	143	2500	17.5
149	Passenger Car	Other	2007	4DRSED	HHR	Gasoline	114	2500	22
150	Passenger Car	Other	2007	4DRSED	IMPALA	Gasoline	139	2500	18
151	Passenger Car	Other	2007	4DRSED	IMPALA	Gasoline	139	2500	18
152	Passenger Car	Other	2007	4DRSED	IMPALA	Gasoline	139	2500	18
153	Passenger Car	Other	2007	4DRSED	IMPALA	Gasoline	139	2500	18
154	Passenger Car	Other	2007	4DRSED	LACROSS	Gasoline	125	2500	20
155	Passenger Car	Other	2007	CRUISR	IMPALA	Gasoline	139	2500	18
156	Passenger Car	Other	2007	CRUISR	IMPALA	Gasoline	139	2500	18

ID#	Vehicle or vehicle group description	Department	Vehicle Year	Vehicle Type	Vehicle Model	Fuel type	Fuel consumption (gal)	VMT (mi)	Fuel Economy (mpg)
157	Passenger Car	Other	2007	CRUISR	IMPALA	Gasoline	139	2500	18
158	Passenger Car	Other	2007	CRUISR	IMPALA	Gasoline	139	2500	18
159	Passenger Car	Other	2007	CRUISR	IMPALA	Gasoline	139	2500	18
160	Passenger Car	Other	2007	CRUISR	IMPALA	Gasoline	139	2500	18
161	Passenger Car	Other	2007	CRUISR	IMPALA	Gasoline	139	2500	18
162	Passenger Car	Other	2007	CRUISR	IMPALA	Gasoline	139	2500	18
163	Passenger Car	Other	2007	CRUISR	IMPALA	Gasoline	139	2500	18
164	Passenger Car	Other	2007	CRUISR	IMPALA	Gasoline	139	2500	18
165	Passenger Car	Other	2008	4DRSED	PRIUS	GASOLINE	52	2500	48
166	Passenger Car	Other	2008	4DRSED	PRIUS	GASOLINE	52	2500	48
167	Passenger Car	Other	2008	4DRSED	PRIUS	GASOLINE	52	2500	48
168	Construction Equipment	Parks and Recreation	2009	N/A	ERP030THN36TE082	Diesel	952	5000	5.25
169	Heavy-Duty Vehicle	Parks and Recreation	1991	DUMP	4700	Diesel	952	5000	5.25
170	Heavy-Duty Vehicle	Parks and Recreation	2001	N/A	AMERICAN TRANS. CORP	Diesel	952	5000	5.25
171	Light Truck	Parks and Recreation	2003	VNPSGR	CARAVAN	Diesel	526	5000	9.5
172	Light Truck	Parks and Recreation	2003	VNPSGR	CARAVAN	Diesel	526	5000	9.5
173	Light Truck	Parks and Recreation	2003	VNPSGR	N/A	Diesel	526	5000	9.5
174	Light Truck	Parks and Recreation	2003	VNPSGR	N/A	Diesel	526	5000	9.5
175	Light Truck	Parks and Recreation	2005	VNPSGR	CARAVAN	Diesel	526	5000	9.5
176	Light Truck	Parks and Recreation	2008	4X4PSR	UPLANDER	Ethanol (E85)	417	5000	12
177	Light Truck	Parks and Recreation	1998	4X4PSR	CHEROKEE	Gasoline	333	5000	15
178	Light Truck	Parks and Recreation	2000	VNPSGR	WINDSTAR	Gasoline	278	5000	18
179	Light Truck	Parks and Recreation	2000	VNUTIL	ASTRO	Gasoline	286	5000	17.5
180	Light Truck	Parks and Recreation	2001	PUP4X4	F-250	Gasoline	333	5000	15
181	Light Truck	Parks and Recreation	2002	VNUTIL	G-20	Gasoline	278	5000	18
182	Light Truck	Parks and Recreation	2003	VNUTIL	E-250	Gasoline	385	5000	13
183	Light Truck	Parks and Recreation	2003	VNUTIL	F-250	Gasoline	385	5000	13
184	Light Truck	Parks and Recreation	2003	VNUTIL	G-30 VAN	Gasoline	278	5000	18
185	Light Truck	Parks and Recreation	2007	VNUTIL	C5500	Gasoline	278	5000	18
186	Light Truck	Parks and Recreation	2008	VNPSGR	E-150	Gasoline	357	5000	14
187	Light Truck	Parks and Recreation	2009	PUPCRW	SILVERADO 25	Gasoline	357	5000	14
188	Light Truck	Parks and Recreation	2010	PUP4X4	SUPERCAB	Gasoline	357	5000	14
189	Light Truck	Parks and Recreation	2010	VNUTIL	TRANSIT CONN XLT	Gasoline	263	5000	19
190	Light Truck	Parks and Recreation	2011	4X4PSR	RANGER	Gasoline	357	5000	14
191	Passenger Car	Parks and Recreation	2003	4DRSED	CAVALIER	Gasoline	200	5000	25
192	Passenger Car	Parks and Recreation	2003	4DRSED	CAVALIER	Gasoline	200	5000	25
193	Passenger Car	Parks and Recreation	2003	4DRSED	CAVALIER	Gasoline	200	5000	25
194	Passenger Car	Parks and Recreation	2003	4DRSED	CAVALIER	Gasoline	200	5000	25
195	Light Truck	Planning and Community Dev	2014	PUPCRW	SILVERADO 2500 HD	Ethanol (E85)	250	3000	12

ID#	Vehicle or vehicle group description	Department	Vehicle Year	Vehicle Type	Vehicle Model	Fuel type	Fuel consumption (gal)	VMT (mi)	Fuel Economy (mpg)
196	Light Truck	Planning and Community Dev	2000	VNPSGR	WINDSTAR	Gasoline	167	3000	18
197	Heavy-Duty Vehicle	Police	1982	ARMOURED	PEACE KEEPER #2	Diesel	29	500	17.5
198	Light Truck	Police	2004	VNPSGR	MONTREL	Diesel	1526	14500	9.5
199	Light Truck	Police	2006	TRAILR	N/A	Diesel	659	14500	22
200	Light Truck	Police	2006	4X4PSR	TAHOE	Ethanol (E85)	1115	14500	13
201	Light Truck	Police	2012	VNPSGR	GRAND CRAVAN	Ethanol (E85)	1000	12000	12
202	Passenger Car	Police	2008	4DRSED	IMPALA	Ethanol (E85)	1036	14500	14
203	Passenger Car	Police	2008	4DRSED	IMPALA	Ethanol (E85)	1036	14500	14
204	Passenger Car	Police	2009	CRUISR	IMPALA	Ethanol (E85)	853	14500	17
205	Passenger Car	Police	2009	CRUISR	IMPALA	Ethanol (E85)	853	14500	17
206	Passenger Car	Police	2011	CRUISR	IMPALA	Ethanol (E85)	1115	14500	13
207	Passenger Car	Police	2011	CRUISR	IMPALA	Ethanol (E85)	1115	14500	13
208	Passenger Car	Police	2011	CRUISR	IMPALA	Ethanol (E85)	1115	14500	13
209	Passenger Car	Police	2011	CRUISR	IMPALA	Ethanol (E85)	1115	14500	13
210	Passenger Car	Police	2012	CRUISR	IMPALA	Ethanol (E85)	1115	14500	13
211	Passenger Car	Police	2012	CRUISR	IMPALA	Ethanol (E85)	1115	14500	13
212	Passenger Car	Police	2012	CRUISR	IMPALA	Ethanol (E85)	1115	14500	13
213	Passenger Car	Police	2012	CRUISR	IMPALA	Ethanol (E85)	1115	14500	13
214	Passenger Car	Police	2012	CRUISR	IMPALA	Ethanol (E85)	1115	14500	13
215	Passenger Car	Police	2012	CRUISR	IMPALA	Ethanol (E85)	1115	14500	13
216	Passenger Car	Police	2012	CRUISR	IMPALA	Ethanol (E85)	1115	14500	13
217	Passenger Car	Police	2012	CRUISR	IMPALA	Ethanol (E85)	1115	14500	13
218	Passenger Car	Police	2012	CRUISR	IMPALA	Ethanol (E85)	1115	14500	13
219	Passenger Car	Police	2012	CRUISR	IMPALA	Ethanol (E85)	1115	14500	13
220	Passenger Car	Police	2014	4DRSED	IMPALA	Ethanol (E85)	1036	14500	14
221	Passenger Car	Police	2014	4DRSED	IMPALA	Ethanol (E85)	1036	14500	14
222	Passenger Car	Police	2014	4DRSED	IMPALA	Ethanol (E85)	1036	14500	14
223	Passenger Car	Police	2014	4DRSED	IMPALA	Ethanol (E85)	1036	14500	14
224	Passenger Car	Police	2014	CRUISR	IMPALA	Ethanol (E85)	1115	14500	13
225	Passenger Car	Police	2014	CRUISR	IMPALA	Ethanol (E85)	1115	14500	13
226	Passenger Car	Police	2014	CRUISR	IMPALA	Ethanol (E85)	1115	14500	13
227	Passenger Car	Police	2014	CRUISR	IMPALA	Ethanol (E85)	1115	14500	13
228	Passenger Car	Police	2014	CRUISR	IMPALA	Ethanol (E85)	1115	14500	13
229	Passenger Car	Police	2014	CRUISR	IMPALA	Ethanol (E85)	1115	14500	13
230	Passenger Car	Police	2014	CRUISR	IMPALA	Ethanol (E85)	1115	14500	13
231	Passenger Car	Police	2014	CRUISR	IMPALA	Ethanol (E85)	1115	14500	13
232	Light Truck	Police	1986	N/A	N/A	Gasoline	38	500	13
233	Light Truck	Police	1988	VNPSGR	G-20	Gasoline	21	500	24
234	Light Truck	Police	1990	PUP	F-250	Gasoline	23	500	22

ID#	Vehicle or vehicle group description	Department	Vehicle Year	Vehicle Type	Vehicle Model	Fuel type	Fuel consumption (gal)	VMT (mi)	Fuel Economy (mpg)
235	Light Truck	Police	1996	4X4PSR	TAHOE	Gasoline	38	500	13
236	Light Truck	Police	1996	VNPSGR	F-350	Gasoline	24	500	21
237	Light Truck	Police	1996	VNPSGR	WINDSTAR	Gasoline	28	500	18
238	Light Truck	Police	1998	PUP	SONOMA	Gasoline	24	500	21
239	Light Truck	Police	1999	PUP	RANGER	Gasoline	29	500	17.5
240	Light Truck	Police	1999	VNPSGR	VAN	Gasoline	24	500	21
241	Light Truck	Police	1999	VNPSGR	WINDSTAR	Gasoline	24	500	21
242	Light Truck	Police	2001	VNUTIL	G - 10	Gasoline	659	14500	22
243	Light Truck	Police	2002	4X4PSR	TRAILBLAZER	Gasoline	690	14500	21
244	Light Truck	Police	2002	PUP	SILVARADO 1500	Gasoline	690	14500	21
245	Light Truck	Police	2002	VNPSGR	SONOMA	Gasoline	1036	14500	14
246	Light Truck	Police	2003	4X4PSR	YUKON DENALI	Gasoline	659	14500	22
247	Light Truck	Police	2006	4X4PSR	COLORADO	Gasoline	725	14500	20
248	Light Truck	Police	2007	PUP	N/A	Gasoline	725	14500	20
249	Light Truck	Police	2007	VNUTIL	G-1500	Gasoline	659	14500	22
250	Light Truck	Police	2009	N/A	CUTAWAY	Gasoline	725	14500	20
251	Motorcycle	Police	1999	MTRCYC	N/A	Gasoline	53	500	9.5
252	Passenger Car	Police	1992	4DRSED	COROLLA	Gasoline	20	500	25
253	Passenger Car	Police	1994	4DRSED	STATION WGON	Gasoline	28	500	18
254	Passenger Car	Police	1997	PSSNGR	WINABEGO	Gasoline	26	500	19
255	Passenger Car	Police	1998	4DRSED	MALIBU	Gasoline	29	500	17
256	Passenger Car	Police	1999	4DRSED	GRAND PRIX	Gasoline	24	500	21
257	Passenger Car	Police	2000	4DRSED	BONNEVILLE	Gasoline	659	14500	22
258	Passenger Car	Police	2000	4DRSED	IMPALA	Gasoline	690	14500	21
259	Passenger Car	Police	2000	4DRSED	MALIBU	Gasoline	659	14500	22
260	Passenger Car	Police	2000	PSSNGR	LUMINA	Gasoline	630	14500	23
261	Passenger Car	Police	2001	4DRSED	IMPALA	Gasoline	967	14500	15
262	Passenger Car	Police	2001	4DRSED	IMPALA	Gasoline	659	14500	22
263	Passenger Car	Police	2001	4DRSED	IMPALA	Gasoline	659	14500	22
264	Passenger Car	Police	2001	4DRSED	IMPALA	Gasoline	659	14500	22
265	Passenger Car	Police	2001	4DRSED	IMPALA	Gasoline	659	14500	22
266	Passenger Car	Police	2001	CRUISR	IMPALA	Gasoline	659	14500	22
267	Passenger Car	Police	2001	CRUISR	IMPALA	Gasoline	659	14500	22
268	Passenger Car	Police	2001	CRUISR	IMPALA	Gasoline	659	14500	22
269	Passenger Car	Police	2001	CRUISR	IMPALA	Gasoline	659	14500	22
270	Passenger Car	Police	2001	CRUISR	IMPALA	Gasoline	659	14500	22
271	Passenger Car	Police	2001	CRUISR	IMPALA	Gasoline	690	14500	21
272	Passenger Car	Police	2001	CRUISR	IMPALA	Gasoline	690	14500	21
273	Passenger Car	Police	2002	4DRSED	CAMRY	Gasoline	604	14500	24

ID#	Vehicle or vehicle group description	Department	Vehicle Year	Vehicle Type	Vehicle Model	Fuel type	Fuel consumption (gal)	VMT (mi)	Fuel Economy (mpg)
274	Passenger Car	Police	2002	4DRSED	IMPALA	Gasoline	690	14500	21
275	Passenger Car	Police	2002	4DRSED	MALIBU	Gasoline	806	14500	18
276	Passenger Car	Police	2002	4DRSED	MALIBU	Gasoline	806	14500	18
277	Passenger Car	Police	2002	4DRSED	MALIBU	Gasoline	806	14500	18
278	Passenger Car	Police	2002	4DRSED	MALIBU	Gasoline	806	14500	18
279	Passenger Car	Police	2002	4DRSED	MAXIMA	Gasoline	806	14500	18
280	Passenger Car	Police	2003	4DRSED	ALTIMA	Gasoline	659	14500	22
281	Passenger Car	Police	2003	4DRSED	GRAND PRIX	Gasoline	659	14500	22
282	Passenger Car	Police	2003	4DRSED	IMPALA	Gasoline	659	14500	22
283	Passenger Car	Police	2003	4DRSED	MALIBU	Gasoline	806	14500	18
284	Passenger Car	Police	2003	4X4PSR	GRAN PRIX	Gasoline	630	14500	23
285	Passenger Car	Police	2003	CRUISR	IMPALA	Gasoline	659	14500	22
286	Passenger Car	Police	2003	CRUISR	IMPALA	Gasoline	690	14500	21
287	Passenger Car	Police	2003	CRUISR	IMPALA	Gasoline	690	14500	21
288	Passenger Car	Police	2004	4DRSED	BONNEVILLE	Gasoline	690	14500	21
289	Passenger Car	Police	2004	4DRSED	GRAND PRIX	Gasoline	659	14500	22
290	Passenger Car	Police	2004	4DRSED	IMPALA	Gasoline	659	14500	22
291	Passenger Car	Police	2004	4DRSED	IMPALA	Gasoline	659	14500	22
292	Passenger Car	Police	2004	4DRSED	IMPALA	Gasoline	659	14500	22
293	Passenger Car	Police	2004	4DRSED	IMPALA	Gasoline	690	14500	21
294	Passenger Car	Police	2004	4DRSED	IMPALA	Gasoline	690	14500	21
295	Passenger Car	Police	2004	4DRSED	MALIBU	Gasoline	806	14500	18
296	Passenger Car	Police	2004	4DRSED	MAXIMA	Gasoline	806	14500	18
297	Passenger Car	Police	2005	4DRSED	500	Gasoline	725	14500	20
298	Passenger Car	Police	2005	4DRSED	ALTIMA SE 3.5	Gasoline	725	14500	20
299	Passenger Car	Police	2005	4DRSED	IMPALA	Gasoline	659	14500	22
300	Passenger Car	Police	2005	4DRSED	LACROSS	Gasoline	725	14500	20
301	Passenger Car	Police	2005	CRUISR	IMPALA	Gasoline	659	14500	22
302	Passenger Car	Police	2005	CRUISR	IMPALA	Gasoline	659	14500	22
303	Passenger Car	Police	2005	CRUISR	IMPALA	Gasoline	659	14500	22
304	Passenger Car	Police	2005	CRUISR	IMPALA	Gasoline	725	14500	20
305	Passenger Car	Police	2005	CRUISR	IMPALA	Gasoline	725	14500	20
306	Passenger Car	Police	2006	4DRSED	IMPALA	Gasoline	725	14500	20
307	Passenger Car	Police	2006	4DRSED	IMPALA	Gasoline	725	14500	20
308	Passenger Car	Police	2006	4DRSED	IMPALA	Gasoline	725	14500	20
309	Passenger Car	Police	2006	4DRSED	IMPALA	Gasoline	725	14500	20
310	Passenger Car	Police	2006	4DRSED	IMPALA	Gasoline	725	14500	20
311	Passenger Car	Police	2006	4DRSED	IMPALA	Gasoline	725	14500	20
312	Passenger Car	Police	2006	4DRSED	IMPALA	Gasoline	725	14500	20

ID#	Vehicle or vehicle group description	Department	Vehicle Year	Vehicle Type	Vehicle Model	Fuel type	Fuel consumption (gal)	VMT (mi)	Fuel Economy (mpg)
313	Passenger Car	Police	2006	4DRSED	IMPALA	Gasoline	725	14500	20
314	Passenger Car	Police	2006	4DRSED	IMPALA	Gasoline	725	14500	20
315	Passenger Car	Police	2006	4DRSED	IMPALA	Gasoline	725	14500	20
316	Passenger Car	Police	2006	4DRSED	IMPALA	Gasoline	725	14500	20
317	Passenger Car	Police	2006	4DRSED	IMPALA	Gasoline	725	14500	20
318	Passenger Car	Police	2006	4DRSED	IMPALA	Gasoline	725	14500	20
319	Passenger Car	Police	2006	4DRSED	IMPALA	Gasoline	725	14500	20
320	Passenger Car	Police	2007	4DRSED	HHR	Gasoline	659	14500	22
321	Passenger Car	Police	2007	4DRSED	IMPALA	Gasoline	659	14500	22
322	Passenger Car	Police	2007	4DRSED	IMPALA	Gasoline	659	14500	22
323	Passenger Car	Police	2007	4DRSED	IMPALA	Gasoline	659	14500	22
324	Passenger Car	Police	2007	4DRSED	IMPALA	Gasoline	763	14500	19
325	Passenger Car	Police	2007	4DRSED	LACROSS	Gasoline	690	14500	21
326	Passenger Car	Police	2007	4DRSED	MONTEGO	Gasoline	763	14500	19
327	Passenger Car	Police	2007	CRUISR	IMPALA	Gasoline	659	14500	22
328	Passenger Car	Police	2007	CRUISR	IMPALA	Gasoline	659	14500	22
329	Passenger Car	Police	2007	CRUISR	IMPALA	Gasoline	659	14500	22
330	Passenger Car	Police	2007	CRUISR	IMPALA	Gasoline	659	14500	22
331	Passenger Car	Police	2007	CRUISR	IMPALA	Gasoline	659	14500	22
332	Passenger Car	Police	2007	CRUISR	IMPALA	Gasoline	659	14500	22
333	Passenger Car	Police	2007	CRUISR	IMPALA	Gasoline	659	14500	22
334	Passenger Car	Police	2007	CRUISR	IMPALA	Gasoline	659	14500	22
335	Passenger Car	Police	2007	CRUISR	IMPALA	Gasoline	659	14500	22
336	Passenger Car	Police	2007	CRUISR	IMPALA	Gasoline	725	14500	20
337	Passenger Car	Police	2008	4DRSED	IMPALA	Gasoline	763	14500	19
338	Passenger Car	Police	2008	4DRSED	IMPALA	Gasoline	763	14500	19
339	Passenger Car	Police	2008	4DRSED	IMPALA	Gasoline	763	14500	19
340	Passenger Car	Police	2008	4DRSED	IMPALA	Gasoline	763	14500	19
341	Passenger Car	Police	2008	4DRSED	IMPALA	Gasoline	763	14500	19
342	Passenger Car	Police	2008	4DRSED	IMPALA	Gasoline	763	14500	19
343	Passenger Car	Police	2008	4DRSED	IMPALA	Gasoline	763	14500	19
344	Passenger Car	Police	2008	4DRSED	IMPALA	Gasoline	763	14500	19
345	Passenger Car	Police	2008	4DRSED	IMPALA	Gasoline	763	14500	19
346	Passenger Car	Police	2008	4DRSED	IMPALA	Gasoline	763	14500	19
347	Passenger Car	Police	2008	4DRSED	IMPALA	Gasoline	763	14500	19
348	Passenger Car	Police	2008	4DRSED	IMPALA	Gasoline	763	14500	19
349	Passenger Car	Police	2008	4DRSED	IMPALA	Gasoline	763	14500	19
350	Passenger Car	Police	2008	4DRSED	IMPALA	Gasoline	763	14500	19
351	Passenger Car	Police	2008	4DRSED	IMPALA	Gasoline	763	14500	19

ID#	Vehicle or vehicle group description	Department	Vehicle Year	Vehicle Type	Vehicle Model	Fuel type	Fuel consumption (gal)	VMT (mi)	Fuel Economy (mpg)
352	Passenger Car	Police	2008	4DRSED	IMPALA	Gasoline	763	14500	19
353	Passenger Car	Police	2008	4DRSED	IMPALA	Gasoline	763	14500	19
354	Passenger Car	Police	2008	4DRSED	IMPALA	Gasoline	763	14500	19
355	Passenger Car	Police	2008	4DRSED	IMPALA	Gasoline	763	14500	19
356	Passenger Car	Police	2008	4DRSED	IMPALA	Gasoline	763	14500	19
357	Passenger Car	Police	2008	4DRSED	IMPALA	Gasoline	763	14500	19
358	Passenger Car	Police	2008	4DRSED	IMPALA	Gasoline	763	14500	19
359	Passenger Car	Police	2008	4DRSED	IMPALA	Gasoline	763	14500	19
360	Passenger Car	Police	2008	4DRSED	IMPALA	Gasoline	763	14500	19
361	Passenger Car	Police	2008	4DRSED	IMPALA	Gasoline	763	14500	19
362	Passenger Car	Police	2008	4DRSED	IMPALA	Gasoline	763	14500	19
363	Passenger Car	Police	2008	4DRSED	IMPALA	Gasoline	763	14500	19
364	Passenger Car	Police	2008	4DRSED	IMPALA	Gasoline	763	14500	19
365	Passenger Car	Police	2008	4DRSED	IMPALA	Gasoline	763	14500	19
366	Passenger Car	Police	2008	4DRSED	IMPALA	Gasoline	763	14500	19
367	Passenger Car	Police	2008	4DRSED	IMPALA	Gasoline	763	14500	19
368	Passenger Car	Police	2008	4DRSED	IMPALA	Gasoline	763	14500	19
369	Passenger Car	Police	2008	4DRSED	IMPALA	Gasoline	763	14500	19
370	Passenger Car	Police	2008	4DRSED	IMPALA	Gasoline	763	14500	19
371	Passenger Car	Police	2008	4DRSED	IMPALA	Gasoline	763	14500	19
372	Passenger Car	Police	2008	4DRSED	IMPALA	Gasoline	763	14500	19
373	Passenger Car	Police	2008	4DRSED	IMPALA	Gasoline	763	14500	19
374	Passenger Car	Police	2008	4DRSED	IMPALA	Gasoline	763	14500	19
375	Passenger Car	Police	2008	4DRSED	IMPALA	Gasoline	763	14500	19
376	Passenger Car	Police	2008	4DRSED	IMPALA	Gasoline	763	14500	19
377	Passenger Car	Police	2008	4DRSED	IMPALA	Gasoline	763	14500	19
378	Passenger Car	Police	2008	4DRSED	PRIUS	Gasoline	305	14500	47.5
379	Passenger Car	Police	2008	4DRSED	PRIUS	Gasoline	305	14500	47.5
380	Passenger Car	Police	2008	4DRSED	PRIUS	Gasoline	305	14500	47.5
381	Passenger Car	Police	2009	4DRSED	ACCORD	Gasoline	763	14500	19
382	Passenger Car	Police	2009	CRUISR	IMPALA	Gasoline	659	14500	22
383	Passenger Car	Police	2009	CRUISR	IMPALA	Gasoline	659	14500	22
384	Passenger Car	Police	2010	CRUISR	CHANGES-LEASED	Gasoline	659	14500	22
385	Passenger Car	Police	2012	4DRSED	ACCORD	Gasoline	725	14500	20
386	Passenger Car	Police	2013	4DRSED	ACCORD	Gasoline	690	14500	21
387	Passenger Car	Police	2013	4DRSED	ALTIMA	Gasoline	659	14500	22
388	Passenger Car	Police	2014	4DRSED	CAMRY	Gasoline	518	14500	28
389	Passenger Car	Police	2014	4DRSED	CAMRY	Gasoline	518	14500	28
390	Construction Equipment	Public Works	1984	TRLCMP	P160WJD	Diesel	174	1000	5.75

ID#	Vehicle or vehicle group description	Department	Vehicle Year	Vehicle Type	Vehicle Model	Fuel type	Fuel consumption (gal)	VMT (mi)	Fuel Economy (mpg)
391	Construction Equipment	Public Works	1985	CMPRSR	P160 W & D-W/LO12A	Diesel	190	1000	5.25
392	Construction Equipment	Public Works	1987	CMPRSR	N/A	Diesel	190	1000	5.25
393	Construction Equipment	Public Works	1989	CMPRSR	P160WJD	Diesel	190	1000	5.25
394	Construction Equipment	Public Works	1994	STMPCT	RG1665	Diesel	190	1000	5.25
395	Construction Equipment	Public Works	1995	ROLLER	RD-880	Diesel	190	1000	5.25
396	Construction Equipment	Public Works	1999	N/A	M SERIES	Diesel	190	1000	5.25
397	Construction Equipment	Public Works	1999	ROLLER	W 255	Diesel	190	1000	5.25
398	Construction Equipment	Public Works	2000	ASPHLT	L7500	Diesel	190	1000	5.25
399	Construction Equipment	Public Works	2000	CHIPPR	12108/993510	Diesel	190	1000	5.25
400	Construction Equipment	Public Works	2002	TRNCHR	1030H	Diesel	174	1000	5.75
401	Construction Equipment	Public Works	2002	TRNCHR	V5750	Diesel	174	1000	5.75
402	Construction Equipment	Public Works	2003	CMPRSR	P185W1R	Diesel	190	1000	5.25
403	Construction Equipment	Public Works	2003	CMPRSR	P185W1R	Diesel	190	1000	5.25
404	Construction Equipment	Public Works	2003	N/A	FG-25	Diesel	190	1000	5.25
405	Construction Equipment	Public Works	2003	ROLLER	265	Diesel	190	1000	5.25
406	Construction Equipment	Public Works	2005	N/A	T6A605-F4L	Diesel	190	1000	5.25
407	Construction Equipment	Public Works	2005	N/A	T6A60S-40450-ESP STD	Diesel	190	1000	5.25
408	Construction Equipment	Public Works	2005	N/A	VIO-27	Diesel	190	1000	5.25
409	Construction Equipment	Public Works	2006	CHIPPR	TORNADO 15 BUSH	Diesel	190	1000	5.25
410	Construction Equipment	Public Works	2006	LEAF	SCL800TM30	Diesel	190	1000	5.25
411	Construction Equipment	Public Works	2006	N/A	L5000T	Diesel	190	1000	5.25
412	Construction Equipment	Public Works	2008	N/A	GLCO35VXNURV082	Diesel	190	1000	5.25
413	Construction Equipment	Public Works	2008	N/A	T6A605-4045D	Diesel	190	1000	5.25
414	Construction Equipment	Public Works	2008	STMPCT	RG70	Diesel	190	1000	5.25
415	Construction Equipment	Public Works	2009	N/A	4200VXD	Diesel	190	1000	5.25
416	Construction Equipment	Public Works	2009	ROLLER	DV202	Diesel	190	1000	5.25
417	Construction Equipment	Public Works	2010	N/A	TLR7-898	Diesel	174	1000	5.75
418	Construction Equipment	Public Works	2011	N/A	302EFI	Diesel	190	1000	5.25
419	Construction Equipment	Public Works	N/A	RODDER	HONDA GCAD1066418	Diesel	190	1000	5.25
420	Heavy-Duty Vehicle	Public Works	1985	CRANEL	R800	Diesel	362	1900	5.25
421	Heavy-Duty Vehicle	Public Works	1985	LOADER	4100	Diesel	362	1900	5.25
422	Heavy-Duty Vehicle	Public Works	1985	TRACTR	84	Diesel	330	1900	5.75
423	Heavy-Duty Vehicle	Public Works	1991	LOADER	445C-KD5PW2	Diesel	362	1900	5.25
424	Heavy-Duty Vehicle	Public Works	1991	LOADER	621	Diesel	362	1900	5.25
425	Heavy-Duty Vehicle	Public Works	1993	TRACTR	2355	Diesel	330	1900	5.75
426	Heavy-Duty Vehicle	Public Works	1994	BUCKET	33000	Diesel	200	1900	9.5
427	Heavy-Duty Vehicle	Public Works	1994	LOADER	621B	Diesel	362	1900	5.25
428	Heavy-Duty Vehicle	Public Works	1997	PACKER	2574 6X4 2RII	Diesel	362	1900	5.25
429	Heavy-Duty Vehicle	Public Works	1998	LOADER	621B	Diesel	362	1900	5.25

ID#	Vehicle or vehicle group description	Department	Vehicle Year	Vehicle Type	Vehicle Model	Fuel type	Fuel consumption (gal)	VMT (mi)	Fuel Economy (mpg)
430	Heavy-Duty Vehicle	Public Works	1999	BCKHOE	590 SL	Diesel	362	1900	5.25
431	Heavy-Duty Vehicle	Public Works	1999	LOADER	85XT	Diesel	362	1900	5.25
432	Heavy-Duty Vehicle	Public Works	2000	BUCKET	BUCKET TRUCK	Diesel	200	1900	9.5
433	Heavy-Duty Vehicle	Public Works	2000	BUCKET	C7500	Diesel	200	1900	9.5
434	Heavy-Duty Vehicle	Public Works	2000	DUMP	CC 7H042	Diesel	362	1900	5.25
435	Heavy-Duty Vehicle	Public Works	2000	PACKER	2674 6X4 2RII	Diesel	362	1900	5.25
436	Heavy-Duty Vehicle	Public Works	2001	PACKER	2674 6X4 2RII	Diesel	362	1900	5.25
437	Heavy-Duty Vehicle	Public Works	2002	DUMP	7400 DT466	Diesel	362	1900	5.25
438	Heavy-Duty Vehicle	Public Works	2002	DUMP	7400 DT466	Diesel	362	1900	5.25
439	Heavy-Duty Vehicle	Public Works	2002	DUMP	F550	Diesel	362	1900	5.25
440	Heavy-Duty Vehicle	Public Works	2002	PACKER	2674 6X4 2RII	Diesel	362	1900	5.25
441	Heavy-Duty Vehicle	Public Works	2003	BCKHOE	590 SM 4WD	Diesel	362	1900	5.25
442	Heavy-Duty Vehicle	Public Works	2003	BCKHOE	590 SM 4WD	Diesel	362	1900	5.25
443	Heavy-Duty Vehicle	Public Works	2003	DUMP	7400 SFA 4X2	Diesel	362	1900	5.25
444	Heavy-Duty Vehicle	Public Works	2003	PACKER	LEACH 2RIII	Diesel	362	1900	5.25
445	Heavy-Duty Vehicle	Public Works	2003	SWEEPR	SW/9XV - MINUTEMAN	Diesel	200	1900	9.5
446	Heavy-Duty Vehicle	Public Works	2004	DUMP	550	Diesel	362	1900	5.25
447	Heavy-Duty Vehicle	Public Works	2005	DUMP	7396 SFA 4X2	Diesel	362	1900	5.25
448	Heavy-Duty Vehicle	Public Works	2005	DUMP	7397 SFA 4X2	Diesel	362	1900	5.25
449	Heavy-Duty Vehicle	Public Works	2005	DUMP	7398 SFA 4X2	Diesel	362	1900	5.25
450	Heavy-Duty Vehicle	Public Works	2005	PACKER	DURAPACK PYTHON	Diesel	362	1900	5.25
451	Heavy-Duty Vehicle	Public Works	2005	PACKER	DURAPACK PYTHON	Diesel	362	1900	5.25
452	Heavy-Duty Vehicle	Public Works	2005	PACKER	DURAPACK PYTHON	Diesel	362	1900	5.25
453	Heavy-Duty Vehicle	Public Works	2006	LOADER	850K	Diesel	362	1900	5.25
454	Heavy-Duty Vehicle	Public Works	2006	LOADER	A300	Diesel	362	1900	5.25
455	Heavy-Duty Vehicle	Public Works	2006	SWEEPR	SW/9XR	Diesel	200	1900	9.5
456	Heavy-Duty Vehicle	Public Works	2007	BUCKET	4300 4X2 -MAO25	Diesel	200	1900	9.5
457	Heavy-Duty Vehicle	Public Works	2007	LOADER	621E	Diesel	362	1900	5.25
458	Heavy-Duty Vehicle	Public Works	2007	LOADER	N/A	Diesel	362	1900	5.25
459	Heavy-Duty Vehicle	Public Works	2007	LOADER	N/A	Diesel	362	1900	5.25
460	Heavy-Duty Vehicle	Public Works	2007	PACKER	XPEDITOR	Diesel	362	1900	5.25
461	Heavy-Duty Vehicle	Public Works	2007	PACKER	XPEDITOR	Diesel	362	1900	5.25
462	Heavy-Duty Vehicle	Public Works	2007	PACKER	XPEDITOR WX64 CHASSI	Diesel	362	1900	5.25
463	Heavy-Duty Vehicle	Public Works	2007	SWEEPR	A4000	Diesel	200	1900	9.5
464	Heavy-Duty Vehicle	Public Works	2007	SWEEPR	ISUZU DST-4	Diesel	200	1900	9.5
465	Heavy-Duty Vehicle	Public Works	2008	BUCKET	4300 SBA 4 X 2	Diesel	200	1900	9.5
466	Heavy-Duty Vehicle	Public Works	2008	DUMP	4700	Diesel	362	1900	5.25
467	Heavy-Duty Vehicle	Public Works	2008	DUMP	4700	Diesel	362	1900	5.25
468	Heavy-Duty Vehicle	Public Works	2008	DUMP	7400 SFA 4X2	Diesel	362	1900	5.25

ID#	Vehicle or vehicle group description	Department	Vehicle Year	Vehicle Type	Vehicle Model	Fuel type	Fuel consumption (gal)	VMT (mi)	Fuel Economy (mpg)
469	Heavy-Duty Vehicle	Public Works	2008	DUMP	7400 SFA 4X2	Diesel	362	1900	5.25
470	Heavy-Duty Vehicle	Public Works	2008	SWEEPR	A7000	Diesel	200	1900	9.5
471	Heavy-Duty Vehicle	Public Works	2009	DUMP	7395 SFA 4X2	Diesel	362	1900	5.25
472	Heavy-Duty Vehicle	Public Works	2009	DUMP	7400 SFA 4X2	Diesel	362	1900	5.25
473	Heavy-Duty Vehicle	Public Works	2009	DUMP	7400 SFA 4X2	Diesel	362	1900	5.25
474	Heavy-Duty Vehicle	Public Works	2009	DUMP	7400 SFA 4X2	Diesel	362	1900	5.25
475	Heavy-Duty Vehicle	Public Works	2009	JETVAC	7400 SFA/VACCON V311	Diesel	253	1900	7.5
476	Heavy-Duty Vehicle	Public Works	2009	PACKER	7600 - 29YD2RIII	Diesel	362	1900	5.25
477	Heavy-Duty Vehicle	Public Works	2009	PACKER	7600-29YD2RIII	Diesel	362	1900	5.25
478	Heavy-Duty Vehicle	Public Works	2010	BUCKET	4300	Diesel	200	1900	9.5
479	Heavy-Duty Vehicle	Public Works	2010	SWEEPR	SW/9XR	Diesel	200	1900	9.5
480	Heavy-Duty Vehicle	Public Works	2011	BCKHOE	590SN	Diesel	362	1900	5.25
481	Heavy-Duty Vehicle	Public Works	2011	N/A	2P5000	Diesel	362	1900	5.25
482	Heavy-Duty Vehicle	Public Works	2012	PACKER	7600 SBA 6X4	Diesel	362	1900	5.25
483	Heavy-Duty Vehicle	Public Works	2013	DUMP	N/A	Diesel	362	1900	5.25
484	Heavy-Duty Vehicle	Public Works	2013	LOADER	621 F	Diesel	362	1900	5.25
485	Heavy-Duty Vehicle	Public Works	2013	LOADER	621E	Diesel	362	1900	5.25
486	Heavy-Duty Vehicle	Public Works	2014	DUMP	7399 SFA 4X2	Diesel	362	1900	5.25
487	Heavy-Duty Vehicle	Public Works	2014	DUMP	7400 SFA 4X2	Diesel	362	1900	5.25
488	Heavy-Duty Vehicle	Public Works	2014	DUMP	7400 SFA 4X2	Diesel	362	1900	5.25
489	Heavy-Duty Vehicle	Public Works	2014	DUMP	7400 SFA 4X2	Diesel	362	1900	5.25
490	Heavy-Duty Vehicle	Public Works	2014	DUMP	7400 SFA 4X2	Diesel	362	1900	5.25
491	Heavy-Duty Vehicle	Public Works	2014	DUMP	TERASTAR 4X4	Diesel	362	1900	5.25
492	Heavy-Duty Vehicle	Public Works	2014	DUMP	TERRASTAR SFA 4X4	Diesel	362	1900	5.25
493	Heavy-Duty Vehicle	Public Works	2015	BUCKET	4400 SBA	Diesel	200	1900	9.5
494	Heavy-Duty Vehicle	Public Works	N/A	SWEEPR	N/A	Diesel	200	1900	9.5
495	Light Truck	Public Works	2004	UTLTRK	SILVERADO 25/CK25903	Diesel	895	8500	9.5
496	Light Truck	Public Works	2006	4X4PSR	N/A	Diesel	654	8500	13
497	Light Truck	Public Works	2006	JEEP	WRANGLER	Diesel	500	8500	17
498	Light Truck	Public Works	2007	TVTRUK	CC5500	Diesel	654	8500	9.5
499	Light Truck	Public Works	2009	VNUTIL	CG33503	Diesel	895	8500	9.5
500	Light Truck	Public Works	2009	VNUTIL	F-550	Diesel	773	8500	11
501	Light Truck	Public Works	2010	PUPUTL	F-550	Diesel	773	8500	11
502	Light Truck	Public Works	2012	UTLTRK	SILVERADO 3500	Diesel	850	8500	10
503	Utility and Recreational Equipment	Public Works	1981	TRAILR	AP 8	Diesel	348	2000	5.75
504	Utility and Recreational Equipment	Public Works	1981	TRAILR	SW-8	Diesel	348	2000	5.75
505	Utility and Recreational Equipment	Public Works	1982	TRAILR	T-6	Diesel	348	2000	5.75
506	Utility and Recreational Equipment	Public Works	1983	N/A	206K6.25	Diesel	211	2000	9.5
507	Utility and Recreational Equipment	Public Works	1984	TRAILR	N/A	Diesel	348	2000	5.75

ID#	Vehicle or vehicle group description	Department	Vehicle Year	Vehicle Type	Vehicle Model	Fuel type	Fuel consumption (gal)	VMT (mi)	Fuel Economy (mpg)
508	Utility and Recreational Equipment	Public Works	1986	N/A	9CM W/8H.D HONDA MOT	Diesel	211	2000	9.5
509	Utility and Recreational Equipment	Public Works	1987	TRAILR	16" TRAILER	Diesel	348	2000	5.75
510	Utility and Recreational Equipment	Public Works	1988	SAWS	C-365-KET	Diesel	211	2000	9.5
511	Utility and Recreational Equipment	Public Works	1989	TRAILR	NW - 13224 KIT	Diesel	348	2000	5.75
512	Utility and Recreational Equipment	Public Works	1989	TRAILR	RC/3T/H	Diesel	348	2000	5.75
513	Utility and Recreational Equipment	Public Works	1989	TRAILR	U-16	Diesel	348	2000	5.75
514	Utility and Recreational Equipment	Public Works	1989	TRL16	U-16	Diesel	348	2000	5.75
515	Utility and Recreational Equipment	Public Works	1990	TRAILR	3 TON	Diesel	348	2000	5.75
516	Utility and Recreational Equipment	Public Works	1990	TRL10	TRILER	Diesel	348	2000	5.75
517	Utility and Recreational Equipment	Public Works	1992	ARRWBD	DLS 15-FA-SOL	Diesel	267	2000	7.5
518	Utility and Recreational Equipment	Public Works	1992	TRAILR	LT-616-70TASB	Diesel	348	2000	5.75
519	Utility and Recreational Equipment	Public Works	1993	TRLCMP	L8A-4MH	Diesel	348	2000	5.75
520	Utility and Recreational Equipment	Public Works	1994	TRL10	TL-10	Diesel	348	2000	5.75
521	Utility and Recreational Equipment	Public Works	1995	TRAILR	20T242CAS	Diesel	348	2000	5.75
522	Utility and Recreational Equipment	Public Works	1995	TRAILR	N/A	Diesel	348	2000	5.75
523	Utility and Recreational Equipment	Public Works	1996	CRKSLR	N/A	Diesel	381	2000	5.25
524	Utility and Recreational Equipment	Public Works	1997	TRAILR	HAUL-RITE	Diesel	348	2000	5.75
525	Utility and Recreational Equipment	Public Works	1998	TRL10	TRAILER	Diesel	348	2000	5.75
526	Utility and Recreational Equipment	Public Works	1998	TRL10	TRAILER	Diesel	348	2000	5.75
527	Utility and Recreational Equipment	Public Works	1998	TRL25	GOOSENECK	Diesel	348	2000	5.75
528	Utility and Recreational Equipment	Public Works	1999	TRAILR	6 TON TRAILER	Diesel	348	2000	5.75
529	Utility and Recreational Equipment	Public Works	1999	TRAILR	GATE-MAGT612	Diesel	348	2000	5.75
530	Utility and Recreational Equipment	Public Works	2000	SAWS	T5516	Diesel	211	2000	9.5
531	Utility and Recreational Equipment	Public Works	2001	SAWS	357 JET	Diesel	211	2000	9.5
532	Utility and Recreational Equipment	Public Works	2001	TRAILR	N/A	Diesel	348	2000	5.75
533	Utility and Recreational Equipment	Public Works	2002	PAINT	245	Diesel	211	2000	9.5
534	Utility and Recreational Equipment	Public Works	2002	TRAILR	LT101	Diesel	348	2000	5.75
535	Utility and Recreational Equipment	Public Works	2002	TRAILR	TRAILER	Diesel	348	2000	5.75
536	Utility and Recreational Equipment	Public Works	2002	TRL10	N/A	Diesel	348	2000	5.75
537	Utility and Recreational Equipment	Public Works	2004	N/A	DH1000	Diesel	211	2000	9.5
538	Utility and Recreational Equipment	Public Works	2004	TRAILR	SCL 800TM-30	Diesel	348	2000	5.75
539	Utility and Recreational Equipment	Public Works	2005	N/A	AL 4000 LIGHT TOWER	Diesel	381	2000	5.25
540	Utility and Recreational Equipment	Public Works	2005	TRAILR	N/A	Diesel	348	2000	5.75
541	Utility and Recreational Equipment	Public Works	2005	TRAILR	SL816TA2	Diesel	348	2000	5.75
542	Utility and Recreational Equipment	Public Works	2005	TRAILR	T6A60S	Diesel	348	2000	5.75
543	Utility and Recreational Equipment	Public Works	2005	TRAILR	UT616	Diesel	348	2000	5.75
544	Utility and Recreational Equipment	Public Works	2005	TRAILR	UT616	Diesel	348	2000	5.75
545	Utility and Recreational Equipment	Public Works	2006	N/A	2100	Diesel	211	2000	9.5
546	Utility and Recreational Equipment	Public Works	2006	N/A	5600 A	Diesel	211	2000	9.5

ID#	Vehicle or vehicle group description	Department	Vehicle Year	Vehicle Type	Vehicle Model	Fuel type	Fuel consumption (gal)	VMT (mi)	Fuel Economy (mpg)
547	Utility and Recreational Equipment	Public Works	2006	TRAILR	28T48V5	Diesel	348	2000	5.75
548	Utility and Recreational Equipment	Public Works	2006	TRAILR	N/A	Diesel	348	2000	5.75
549	Utility and Recreational Equipment	Public Works	2006	TRAILR	N/A	Diesel	348	2000	5.75
550	Utility and Recreational Equipment	Public Works	2006	TRL12	TRAILER	Diesel	348	2000	5.75
551	Utility and Recreational Equipment	Public Works	2007	ARRWBD	PCMS	Diesel	267	2000	7.5
552	Utility and Recreational Equipment	Public Works	2007	N/A	AFS 500	Diesel	211	2000	9.5
553	Utility and Recreational Equipment	Public Works	2007	N/A	EEMS300F12	Diesel	211	2000	9.5
554	Utility and Recreational Equipment	Public Works	2007	N/A	UT-200	Diesel	211	2000	9.5
555	Utility and Recreational Equipment	Public Works	2007	SNOWBL	STORM 9528	Diesel	211	2000	9.5
556	Utility and Recreational Equipment	Public Works	2007	SNOWBL	STORM 9528	Diesel	211	2000	9.5
557	Utility and Recreational Equipment	Public Works	2007	TRAILR	5X8SS2K	Diesel	348	2000	5.75
558	Utility and Recreational Equipment	Public Works	2007	TRAILR	PS-162	Diesel	348	2000	5.75
559	Utility and Recreational Equipment	Public Works	2008	PAINT	TT500DH	Diesel	211	2000	9.5
560	Utility and Recreational Equipment	Public Works	2008	TRAILR	LT142	Diesel	348	2000	5.75
561	Utility and Recreational Equipment	Public Works	2008	TRAILR	N/A	Diesel	348	2000	5.75
562	Utility and Recreational Equipment	Public Works	2008	TRAILR	PS-142	Diesel	348	2000	5.75
563	Utility and Recreational Equipment	Public Works	2008	TRAILR	TR66	Diesel	348	2000	5.75
564	Utility and Recreational Equipment	Public Works	2008	TRL12	N/A	Diesel	348	2000	5.75
565	Utility and Recreational Equipment	Public Works	2009	MOWRLG	9016	Diesel	211	2000	9.5
566	Utility and Recreational Equipment	Public Works	2009	TRAILR	5CAM16C	Diesel	348	2000	5.75
567	Utility and Recreational Equipment	Public Works	2009	TRAILR	8012T	Diesel	348	2000	5.75
568	Utility and Recreational Equipment	Public Works	2009	TRAILR	UTILITY	Diesel	348	2000	5.75
569	Utility and Recreational Equipment	Public Works	2009	TRAILR	UTILITY	Diesel	348	2000	5.75
570	Utility and Recreational Equipment	Public Works	2009	TRL12	PS122	Diesel	348	2000	5.75
571	Utility and Recreational Equipment	Public Works	2009	TRL16	LT162	Diesel	348	2000	5.75
572	Utility and Recreational Equipment	Public Works	2010	TRL12	PS121	Diesel	381	2000	5.25
573	Utility and Recreational Equipment	Public Works	2011	N/A	RAMMER BS50-2I	Diesel	381	2000	5.25
574	Utility and Recreational Equipment	Public Works	2012	ARRWBD	WTSP	Diesel	267	2000	7.5
575	Utility and Recreational Equipment	Public Works	2012	ARRWBD	WTSP	Diesel	267	2000	7.5
576	Utility and Recreational Equipment	Public Works	2012	ARRWBD	WTSP	Diesel	267	2000	7.5
577	Utility and Recreational Equipment	Public Works	2012	N/A	MSN09595	Diesel	348	2000	5.75
578	Utility and Recreational Equipment	Public Works	2012	TRAILR	LT142	Diesel	348	2000	5.75
579	Utility and Recreational Equipment	Public Works	2012	TRL12	LT121	Diesel	348	2000	5.75
580	Utility and Recreational Equipment	Public Works	2013	N/A	84068	Diesel	348	2000	5.75
581	Utility and Recreational Equipment	Public Works	2013	PAINT	3A1319B	Diesel	211	2000	9.5
582	Utility and Recreational Equipment	Public Works	2013	TRACTR	42-000F SUPERSTAR	Diesel	348	2000	5.75
583	Utility and Recreational Equipment	Public Works	2013	TRACTR	42-000F SUPERSTAR	Diesel	348	2000	5.75
584	Utility and Recreational Equipment	Public Works	2013	TRAILR	N/A	Diesel	348	2000	5.75
585	Utility and Recreational Equipment	Public Works	2013	TRAILR	SCL-TM30	Diesel	348	2000	5.75

ID#	Vehicle or vehicle group description	Department	Vehicle Year	Vehicle Type	Vehicle Model	Fuel type	Fuel consumption (gal)	VMT (mi)	Fuel Economy (mpg)
586	Utility and Recreational Equipment	Public Works	2014	TRL10	10CAM826TA	Diesel	348	2000	5.75
587	Utility and Recreational Equipment	Public Works	N/A	ARRWBD	ARROWBOARD	Diesel	267	2000	7.5
588	Utility and Recreational Equipment	Public Works	N/A	SAWS	C-305KBP	Diesel	211	2000	9.5
589	Utility and Recreational Equipment	Public Works	N/A	TRAILR	PRIMIER	Diesel	348	2000	5.75
590	Light Truck	Public Works	2003	PUP	LD 2500 - SILVERADO	Ethanol (E85)	850	8500	10
591	Light Truck	Public Works	2011	DUMP	SILVERADO 35	Ethanol (E85)	850	8500	10
592	Light Truck	Public Works	2011	PUP4X4	SILVERADO 2500	Ethanol (E85)	850	8500	10
593	Light Truck	Public Works	2012	N/A	2500 HD	Ethanol (E85)	654	8500	13
594	Light Truck	Public Works	2013	PUP4X4	SILVERADO	Ethanol (E85)	850	8500	10
595	Light Truck	Public Works	2013	PUP4X4	SILVERADO	Ethanol (E85)	850	8500	10
596	Light Truck	Public Works	2013	UTLTRK	SILVERADO 3500	Ethanol (E85)	850	8500	10
597	Light Truck	Public Works	2013	VNUTIL	EXPRESS	Ethanol (E85)	1063	8500	8
598	Light Truck	Public Works	2013	VNUTIL	EXPRESS	Ethanol (E85)	1063	8500	8
599	Light Truck	Public Works	2013	VNUTIL	EXPRESS	Ethanol (E85)	1063	8500	8
600	Light Truck	Public Works	2014	4DRSED	SILVERADO 3500HD	Ethanol (E85)	708	8500	12
601	Light Truck	Public Works	2014	4X4PSR	SILVERADO 3500 HD	Ethanol (E85)	708	8500	12
602	Light Truck	Public Works	2014	4X4PSR	SILVERADO 3500 HD	Ethanol (E85)	708	8500	12
603	Light Truck	Public Works	2014	4X4PSR	SILVERADO 3500HD	Ethanol (E85)	708	8500	12
604	Light Truck	Public Works	2014	JEEP	WRANGLER	Ethanol (E85)	500	8500	17
605	Light Truck	Public Works	2014	PUP4X4	SILVERADO	Ethanol (E85)	708	8500	12
606	Light Truck	Public Works	2014	PUP4X4	SILVERADO 3500HD	Ethanol (E85)	708	8500	12
607	Light Truck	Public Works	2014	PUPCRW	SIERRA 2500 HD	Ethanol (E85)	708	8500	12
608	Light Truck	Public Works	2014	PUPCRW	SILVERADO	Ethanol (E85)	708	8500	12
609	Light Truck	Public Works	2014	PUPCRW	SILVERADO	Ethanol (E85)	708	8500	12
610	Light Truck	Public Works	2014	PUPCRW	SILVERADO	Ethanol (E85)	708	8500	12
611	Light Truck	Public Works	2014	PUPUTL	SILVERADO 3500 HD	Ethanol (E85)	708	8500	12
612	Heavy-Duty Vehicle	Public Works	2005	MOWRLG	9016	Gasoline	211	2000	9.5
613	Heavy-Duty Vehicle	Public Works	2005	MOWRLG	HX15	Gasoline	211	2000	9.5
614	Heavy-Duty Vehicle	Public Works	2006	MOWRLG	6215	Gasoline	211	2000	9.5
615	Heavy-Duty Vehicle	Public Works	2006	MOWRLG	6215	Gasoline	211	2000	9.5
616	Light Truck	Public Works	1984	VNUTIL	VAN	Gasoline	472	8500	18
617	Light Truck	Public Works	1999	PUPUTL	2500	Gasoline	773	8500	11
618	Light Truck	Public Works	1999	PUPUTL	3500HD	Gasoline	773	8500	11
619	Light Truck	Public Works	1999	VNUTIL	VANDURA SPECIAL	Gasoline	472	8500	18
620	Light Truck	Public Works	2000	PUP	2WD EXT CAB	Gasoline	654	8500	13
621	Light Truck	Public Works	2000	PUP	CC 20953	Gasoline	567	8500	15
622	Light Truck	Public Works	2000	PUP4X4	F-350	Gasoline	567	8500	15
623	Light Truck	Public Works	2000	VNUTIL	G3500SWB	Gasoline	654	8500	13
624	Light Truck	Public Works	2001	PUPUTL	3500HD	Gasoline	773	8500	11

ID#	Vehicle or vehicle group description	Department	Vehicle Year	Vehicle Type	Vehicle Model	Fuel type	Fuel consumption (gal)	VMT (mi)	Fuel Economy (mpg)
625	Light Truck	Public Works	2002	4X4PSR	WRANGLER	Gasoline	500	8500	17
626	Light Truck	Public Works	2002	PUP	RANGER	Gasoline	500	8500	17
627	Light Truck	Public Works	2002	PUPUTL	CK25903	Gasoline	654	8500	13
628	Light Truck	Public Works	2002	VNUTIL	E-350	Gasoline	654	8500	13
629	Light Truck	Public Works	2002	VNUTIL	E-350	Gasoline	654	8500	13
630	Light Truck	Public Works	2003	BUCKET	3500 - VAN	Gasoline	708	8500	12
631	Light Truck	Public Works	2003	PUP	4 WD PU	Gasoline	850	8500	10
632	Light Truck	Public Works	2003	PUPCRW	F-350	Gasoline	567	8500	15
633	Light Truck	Public Works	2003	PUPUTL	LD 2500	Gasoline	850	8500	10
634	Light Truck	Public Works	2003	PUPUTL	LD2500	Gasoline	850	8500	10
635	Light Truck	Public Works	2003	VNUTIL	E-250	Gasoline	654	8500	13
636	Light Truck	Public Works	2004	CRANES	F-350	Gasoline	500	8500	17
637	Light Truck	Public Works	2004	PUP	2500HD	Gasoline	654	8500	13
638	Light Truck	Public Works	2004	VNUTIL	E-350	Gasoline	654	8500	13
639	Light Truck	Public Works	2004	VNUTIL	E-350 SD	Gasoline	654	8500	13
640	Light Truck	Public Works	2004	VNUTIL	N/A	Gasoline	654	8500	13
641	Light Truck	Public Works	2004	VNUTIL	N/A	Gasoline	654	8500	13
642	Light Truck	Public Works	2005	PUPUTL	X363	Gasoline	850	8500	10
643	Light Truck	Public Works	2006	PUP	F-350	Gasoline	567	8500	15
644	Light Truck	Public Works	2006	PUP	SILVERADO 25	Gasoline	654	8500	13
645	Light Truck	Public Works	2006	PUPCRW	CK35943	Gasoline	850	8500	10
646	Light Truck	Public Works	2006	VNUTIL	N/A	Gasoline	654	8500	13
647	Light Truck	Public Works	2007	4X4PSR	SILVERADO 2500	Gasoline	654	8500	13
648	Light Truck	Public Works	2007	PUP	CK25903	Gasoline	654	8500	13
649	Light Truck	Public Works	2007	PUP	CK25903	Gasoline	654	8500	13
650	Light Truck	Public Works	2007	PUP	RANGER	Gasoline	567	8500	15
651	Light Truck	Public Works	2007	PUP4X4	CK25903	Gasoline	773	8500	11
652	Light Truck	Public Works	2008	4X4PSR	CK20903	Gasoline	654	8500	13
653	Light Truck	Public Works	2008	4X4PSR	SILVERADO	Gasoline	654	8500	13
654	Light Truck	Public Works	2008	4X4PSR	SILVERADO	Gasoline	654	8500	13
655	Light Truck	Public Works	2008	4X4PSR	SILVERADO 25	Gasoline	654	8500	13
656	Light Truck	Public Works	2008	4X4PSR	SILVERADO 25	Gasoline	654	8500	13
657	Light Truck	Public Works	2008	4X4PSR	TRAILBLAZER	Gasoline	567	8500	15
658	Light Truck	Public Works	2008	PUP	CK30903	Gasoline	654	8500	13
659	Light Truck	Public Works	2008	PUP	COLORADO	Gasoline	654	8500	13
660	Light Truck	Public Works	2008	PUP4X4	SILVERADO 25	Gasoline	654	8500	13
661	Light Truck	Public Works	2008	VNUTIL	EXPRESS COM	Gasoline	773	8500	11
662	Light Truck	Public Works	2008	VNUTIL	EXPRESS COM	Gasoline	773	8500	11
663	Light Truck	Public Works	2009	JEEP	RUBICON	Gasoline	500	8500	17

ID#	Vehicle or vehicle group description	Department	Vehicle Year	Vehicle Type	Vehicle Model	Fuel type	Fuel consumption (gal)	VMT (mi)	Fuel Economy (mpg)
664	Light Truck	Public Works	2009	N/A	N/A	Gasoline	654	8500	13
665	Light Truck	Public Works	2009	PUP4X4	3500	Gasoline	708	8500	12
666	Light Truck	Public Works	2009	PUP4X4	SILVERADO 25	Gasoline	607	8500	14
667	Light Truck	Public Works	2009	PUP4X4	SILVERADO 35	Gasoline	607	8500	14
668	Light Truck	Public Works	2009	PUPCRW	2500HD	Gasoline	654	8500	13
669	Light Truck	Public Works	2009	VNUTIL	EXPRESS CARGO	Gasoline	654	8500	13
670	Light Truck	Public Works	2011	VNUTIL	TRANSIT	Gasoline	386	8500	22
671	Passenger Car	Public Works	1994	PSSNGR	CUSHMAN	Gasoline	425	8500	20
672	Passenger Car	Public Works	1996	PSSNGR	LUMINA	Gasoline	472	8500	18
673	Passenger Car	Public Works	2001	4DRSED	IMPALA	Gasoline	386	8500	22
674	Passenger Car	Public Works	2001	4DRSED	LUMINA	Gasoline	405	8500	21
675	Passenger Car	Public Works	2001	4DRSED	LUMINA	Gasoline	405	8500	21
676	Passenger Car	Public Works	2001	PSSNGR	LUMINA	Gasoline	405	8500	21
677	Passenger Car	Public Works	2002	4DRSED	MALIBU	Gasoline	405	8500	21
678	Passenger Car	Public Works	2002	4DRSED	MALIBU	Gasoline	405	8500	21
679	Passenger Car	Public Works	2003	4DRSED	IMPALA	Gasoline	386	8500	22
680	Passenger Car	Public Works	2003	4DRSED	MALIBU	Gasoline	405	8500	21
681	Passenger Car	Public Works	2007	4DRSED	COBALT	Gasoline	354	8500	24
682	Passenger Car	Public Works	2008	4DRSED	PRIUS	GASOLINE	177	8500	48
683	Utility and Recreational Equipment	Public Works	1998	MOWRLG	5111	Gasoline	211	2000	9.5
684	Utility and Recreational Equipment	Public Works	1999	MOWRLG	9016	Gasoline	211	2000	9.5
685	Utility and Recreational Equipment	Public Works	2003	MOWRLG	74235	Gasoline	211	2000	9.5
686	Utility and Recreational Equipment	Public Works	2004	MOWRLG	5111	Gasoline	211	2000	9.5
687	Utility and Recreational Equipment	Public Works	2004	MOWRLG	9016	Gasoline	211	2000	9.5
688	Utility and Recreational Equipment	Public Works	2004	MOWRSM	925651	Gasoline	211	2000	9.5
689	Utility and Recreational Equipment	Public Works	2005	MOWRSM	926998	Gasoline	211	2000	9.5
690	Utility and Recreational Equipment	Public Works	2006	MOWRLG	37AC466710	Gasoline	211	2000	9.5
691	Utility and Recreational Equipment	Public Works	2006	MOWRSM	37AC466710	Gasoline	211	2000	9.5
692	Utility and Recreational Equipment	Public Works	2006	MOWRSM	926980	Gasoline	211	2000	9.5
693	Utility and Recreational Equipment	Public Works	2008	MOWRLG	6415	Gasoline	211	2000	9.5
694	Utility and Recreational Equipment	Public Works	2008	MOWRLG	9016	Gasoline	211	2000	9.5
695	Utility and Recreational Equipment	Public Works	2008	MOWRLG	9116	Gasoline	211	2000	9.5
696	Utility and Recreational Equipment	Public Works	2008	MOWRLG	SSM38720	Gasoline	211	2000	9.5
697	Utility and Recreational Equipment	Public Works	2008	MOWRLG	SUPER Z	Gasoline	211	2000	9.5
698	Utility and Recreational Equipment	Public Works	2008	MOWRLG	SUPER Z	Gasoline	211	2000	9.5
699	Utility and Recreational Equipment	Public Works	2009	MOWRLG	HUSTLER SUPER Z	Gasoline	211	2000	9.5
700	Utility and Recreational Equipment	Public Works	2009	MOWRLG	HUSTLER SUPER Z	Gasoline	211	2000	9.5
701	Utility and Recreational Equipment	Public Works	2009	MOWRLG	HUSTLER SUPER Z	Gasoline	211	2000	9.5
702	Utility and Recreational Equipment	Public Works	2009	MOWRLG	HUSTLER SUPER Z	Gasoline	211	2000	9.5

ID#	Vehicle or vehicle group description	Department	Vehicle Year	Vehicle Type	Vehicle Model	Fuel type	Fuel consumption (gal)	VMT (mi)	Fuel Economy (mpg)
703	Utility and Recreational Equipment	Public Works	2013	MOWRLG	SUPER Z	Gasoline	211	2000	9.5
704	Utility and Recreational Equipment	Public Works	2013	MOWRLG	SUPER Z	Gasoline	211	2000	9.5
705	Utility and Recreational Equipment	Public Works	2013	MOWRLG	SUPER Z	Gasoline	211	2000	9.5
706	Utility and Recreational Equipment	Public Works	2013	MOWRLG	SUPER Z	Gasoline	211	2000	9.5
707	Utility and Recreational Equipment	Public Works	2013	MOWRLG	SUPER Z	Gasoline	211	2000	9.5
708	Utility and Recreational Equipment	Public Works	2013	MOWRLG	SUPER Z	Gasoline	211	2000	9.5
709	Utility and Recreational Equipment	Public Works	2013	MOWRLG	SUPER Z	Gasoline	211	2000	9.5
710	Utility and Recreational Equipment	Public Works	2013	MOWRLG	SUPER Z	Gasoline	211	2000	9.5
711	Utility and Recreational Equipment	Public Works	2013	MOWRLG	SUPER Z	Gasoline	211	2000	9.5
712	Utility and Recreational Equipment	Public Works	2014	MOWRLG	9016	Gasoline	211	2000	9.5
713	Utility and Recreational Equipment	Public Works	N/A	MOWRLG	HX15	Gasoline	211	2000	9.5
714	Utility and Recreational Equipment	Public Works	N/A	MOWRLG	N/A	Gasoline	211	2000	9.5
715	Van	Public Works	2009	N/A	CUTAWAY	Gasoline	654	8500	13

Chapter 2, Part 2: Smart Fleet Program for Reducing Costs and GHG Emissions

December 12, 2014

University of Maryland
School of Architecture, Planning and Preservation
URSP688R The Carbon and Energy Economy for Planners
Fall 2014

Tanya Allen, Paulo Couto, Pan He & Murat Omay

Sponsored by PALS—Partnership for Action Learning in Sustainability
A National Center for Smart Growth initiative
Gerrit Knapp, Executive Director
Uri Avin, PALS Director

CONTENTS

SMART FLEET PROGRAM: JUSTIFICATION

After careful analyses and consideration of the City fleet's composition and GHG emissions, a *Smart Fleet Program* was recommended to provide a long-term solution to diversifying the fleet with cleaner fuel technology. Case studies and best practices in the management of municipal vehicle fleets demonstrate that there are long-term economic, financial, and environmental benefits to be gained with a systematic approach to fleet "greening." Through the Smart Fleet Program, direct costs, such as fuel consumption and maintenance, and indirect costs of replacement are reduced or eliminated. The direct result of a more efficient fleet composition provides significant environmental benefits of reducing GHG emissions. The approach involves establishing a program that systemically evaluates the fleet operations, vehicle usage, and policies—developing a set of action items for program deployment.

This pre-feasibility study provides a work plan, cost structure framework, scenario cost and benefit analysis and funding sources to potentially fund this proposed Smart Fleet Program.

SMART FLEET PROGRAM: WORK PLAN

The following work plan highlights main tasks in the Smart Fleet Program. A detailed and comprehensive work plan, along with a cost template for development and deployment of this program, is provided in Appendix A.

YEAR 1

1.1. **Task Force –** Establish an interdepartmental "Smart Fleet" Task Force to lead the study and documentation efforts, as well as the policy-making process.

1.2. **Environmental Fleet Assessment: Phase 1 (Vehicle Inventory) –** Conduct a vehicle inventory by documenting essential information for each vehicle in the fleet, to include vehicle's identification number (VIN), department, function, fuel economy, mileage, etc.

1.3. **Fuel Efficient Vehicle Policy (or Green Vehicle Policy) –** Concurrent with the vehicle inventory, develop a policy that establishes the guidelines for minimum acceptable fuel economy, age, usage, applicability, exemptions, and alternative compliance criteria for new vehicle purchases in the City's municipal fleet.

1.4. **Policies for Smart Fleet Program and Funding ("Program") –** Establish the framework for a new Smart Fleet Program and funding (Smart Fleet Fund), as well as budgetary policies such as earmarking and/or obligating seed funding and its distribution among the fiscal cycles, appropriation of Citywide vehicle maintenance budgets as departmental budget items, and commitment for fiscal and environmental fiduciary to the GHG emission reductions. Establish policies for deploying fuel efficient and environmentally responsible technologies for mobile GHG sources, and for adaptating systematic vehicle recycling, retiring, replacing, and surplusing criteria and procedures.

YEAR 2

2.1. **Environmental Fleet Assessment: Phase 2 (Fleet Assessment Study) –** Conduct a Fleet Assessment Study (FAS) to document vehicle types, duty cycles, usage rates, and fuel consumption for each department, along with the scheduled routing information.

2.2. **Right-sizing –** Based on the FAS, determine if the fleet is the correct size for City operations, without compromising from safety and quality of service to citizens. Categorize vehicles as "eliminate," "retain," "replace," or "pool," depending on the FAS findings. Following the procedures of the Smart Fleet Program policies, deploy the plan components toward the set targets for the fiscal/horizon years.

2.3. **Supplemental Elements for the Smart Fleet Program –** In conjunction with the high-level Program components, begin deployment of the additional elements identified in Item 1.4 to supplement the Program for its success.

YEARS 3-5+

Performance Measurement – Assess fleet performance annually to determine if the following objectives are met, and adjust policies/procedures as necessary to decrease GHG emissions:

1. Fleet composition targets for the fiscal year are met
2. GHG emission reduction targets for the fiscal year are met
3. Financial obligations are on track for the fiscal and horizon years

SMART FLEET PROGRAM: BENEFIT/COST SCENARIO ANALYSIS

A benefit/cost analysis compared purchasing a new conventional versus hybrid vehicle over a lifecycle of 10 years. Holding vehicle price difference constant, the monetary benefit of hybrid vehicles comes primarily from its fuel economy, while also reducing less GHG emissions. The extent of such benefit depends on the Vehicle Miles Traveled (VMT)—the more frequent and longer a vehicle drives, the more savings on fuel spending. Therefore, there is a threshold beyond which hybrid vehicles would cost less. The threshold VMT is 1,925 miles per year. At the threshold VMT, a hybrid vehicle produces 2,881kg CO_2 less than a conventional vehicle. Beyond the threshold point, each mile of VMT would add to the competence of the hybrid vehicle. If all candidate vehicles were replaced with hybrid vehicles, $35,777 would be saved on fuel and with 104,709 kg CO_2 reduction. The benefit/cost ratio is 3.76. See Appendix D for more details.

SMART FLEET PROGRAM: POTENTIAL FUNDING SOURCES

Federal or State funding may be available to defray capital costs of upgrading to alternative fuel vehicles. The funding landscape changes each fiscal year. The most recent information regarding current laws and incentives for alternative energy vehicle conversion is available at the Department of Energy's Alternative Fuel Data Center at www.afdc.energy.gov. Additional information on funding sources can be found in Appendix E.

APPENDIX A: Detailed Smart Fleet Program Work Plan and Costs

YEAR 1

1.1. Task Force - With collaboration from the City of Frederick leadership and personnel from the departments of planning, vehicle maintenance and operations, procurement, public works, police and EMS, and finance, establish a "Smart Fleet" Task Force in order to lead the following study and documentation efforts, as well as the policy-making process.

1.2. Environmental Fleet Assessment – Phase 1 (*Vehicle Inventory)* - Conduct a vehicle inventory to document the vehicle model, type, year, function, fuel economy, annual mileage, and annual fuel consumption. Except the annual mileage and annual fuel consumption, the City has an inventory with the required information, which was also supplemented by UMD students based on research-based assumptions.

1.3. Fuel Efficient Vehicle Policy (or Green Vehicle Policy) - Concurrent with the vehicle inventory, develop a Policy, which would establish the guidelines for minimum acceptable fuel economy, age, usage, applicability, exemptions, and alternative compliance criterion for vehicles in the City's municipal fleet. The criteria would apply to ALL new purchases by integrating the requirements into the vehicle procurement process, as well as to the current vehicles to the extent possible. A sample policy from Massachusetts Department of Energy Resources is included in Appendix B.

1.4. Policies for Smart Fleet Program and Funding ("Program") – Establish the framework for a new Smart Fleet Program and funding (Smart Fleet Fund), as well as budgetary policies such as earmarking and/or obligating seed funding and its distribution among the fiscal cycles, appropriation of Citywide vehicle maintenance budgets as departmental budget items, and commitment for fiscal and environmental fiduciary to the GHG emission reductions. Establish policies for deployment of fuel efficient and environmentally responsible technologies for mobile GHG sources, and adaptation of systematic vehicle recycling, retiring, replacing, and surplusing criteria and procedures.

Supplemental Policy Elements - Develop supplemental elements to support the Program such as procurement and deployment of route planning and associated technologies, preventive maintenance procedures for optimization of fleet efficiency, employee training on idling, driving habits, and vehicle and fuel performance.

Policy document should also include annual and horizon year targets for vehicle composition of the fleet, GHG reduction associated with fleet, and performance measurement methodologies.

YEAR 2

2.1. Environmental Fleet Assessment – Phase 2 *(Fleet Assessment Study)* - Conduct a Fleet Assessment Study (FAS) to document vehicle types, duty cycles, usage rates, and fuel consumption for each department, along with the scheduled routing information.

1. Analyze the mileage to document the usage profile of each vehicle in the fleet ("high," "medium," "low," and "no usage").
2. Analyze duty cycle and usage to categorize vehicles as "critical" or "non-critical."
3. Analyze scheduled routing and assess if the schedules can be changed to avoid congested routes during certain periods of the day. Assess if duties can be combined if the routing and schedules are adjusted.

Sample documents focusing on fleet assessment, management, and right-sizing (next item) from other municipalities are included in Appendix C.

2.2. Right-sizing - Based on the FAS, determine if the fleet is the correct size for the City of Frederick operations, without compromising from safety and quality of service to citizens. Categorize vehicles as "eliminate," "retain," "replace," or "pool," depending on the findings of the FAS. Following the procedures of the Smart Fleet Program policies, deploy the plan components towards the set targets for the fiscal/horizon years.

2.3. Supplemental Elements for the Smart Fleet Program – In conjunction with the high-level Program components, begin deployment of the additional elements identified in ***Item 1.4*** to supplement the Program for its success.

YEARS 3-5+

Performance Measurement – Assess the performance of the fleet annually to determine if the following objectives are met, and adjust policies/procedures as necessary to decrease GHG emissions:

4. Fleet composition targets for the fiscal year are met
5. GHG emission reduction targets for the fiscal year are met
6. Financial obligations are on track for the fiscal and horizon years

COST STRUCTURE TEMPLATE FOR DEVELOPMENT AND DEPLOYMENT OF SMART FLEET

ITEM	COST
Program Development and Management	
Environmental Fleet Assessment – Phase 1 (Vehicle Inventory)	
Fuel Efficient Vehicle Policy (or Green Vehicle Policy)	
Policies for Smart Fleet Program and Funding	
Environmental Fleet Assessment – Phase 2 (Fleet Assessment Study)	
Right-sizing	
Supplemental Elements for the Smart Fleet Program	
Performance Measurement	
Subtotal (Program Development and management)	
Program Deployment	
Vehicle Purchase	
Employee Training	
Technology Purchase (Route Planning Equipment)	
Technology Purchase (Anti-idling Equipment)	
Subtotal (Program Deployment)	
TOTAL	

APPENDIX B: Massachusetts Department Of Energy Resource Policy

PLEASE SEE FOLLOWING PAGES

August 2013

GREEN COMMUNITIES DESIGNATION and GRANT PROGRAM

GUIDANCE

Fuel efficient vehicles

Criterion 4

Massachusetts Department of Energy Resources

INTRODUCTION

Criterion Four of the Green Communities Program states that communities must purchase only fuel-efficient vehicles for municipal use whenever such vehicles are commercially available and practicable. The purpose behind this criterion is to reduce carbon dioxide emissions by municipal vehicles, which has a positive impact on the environment and saves municipalities money.

As background, the US Environmental Protection Agency's Green Vehicle Guide states that:

Vehicles with lower fuel economy create more carbon dioxide - the most prevalent greenhouse gas - than vehicles with higher fuel economy. Every gallon of gasoline your vehicle burns puts about 20 pounds of carbon dioxide into the atmosphere because air has weight and mass, and it takes a lot of it to burn a gallon of gasoline. One of the most important things you can do to reduce your contribution to global warming is to buy a vehicle with higher fuel economy. The difference between 25 miles per gallon and 20 miles per gallon can amount to the prevention of 10 tons of carbon dioxide over a vehicle's lifetime. Buying a more fuel efficient vehicle will also will help to reduce our nation's dependence on fossil fuels. And of course, you will save money by having to fuel up less often.

COMPLIANCE

To meet this criterion, municipalities need to adopt by action of the local official or body with authority to enact municipal policies a written Fuel Efficient Vehicle Policy that requires municipal departments and divisions to purchase only fuel efficient vehicles **(*See Appendix A, model policy*)**. Both general government and school districts are required to enact a fuel efficient vehicle policy for a municipality to meet this requirement, and letters documenting adoption must be provided and signed by the appropriate municipal authorities, as noted below. Letters from other municipal officials are not acceptable.

For letters from the general government and school district:

- **General Government** – The general government must provide a letter from the Chief Executive Officer of the city or town stating that it has adopted the Fuel Efficient Vehicle Policy.

The Chief Executive Officer is defined as the manager in any city having a manager and in any town having a city form of government, the Mayor in any other city, and the Board of Selectmen in any other town unless some other officer or body is designated to perform the functions of a Chief Executive Officer under the provisions of a local charter or laws having the force of a charter.

- **Public School Districts** - For a municipality to meet this requirement, its public school district must provide a letter from the School Superintendent stating that is has adopted the Fuel Efficient Vehicle Policy. Please note that even if the school only has vehicles that are exempt from the Policy, adoption of the Policy by the school must be provided since the school may acquire non-exempt vehicles in the future.

- **Regional School Districts** – Regional School Districts are not required to be part of a municipality's Green Communities designation application. However, for regional school districts that wish to be part of a municipality's Green Communities designation (with approval by the municipality), the regional school district must also adopt the Fuel Efficient Vehicle Policy and provide a letter from the Superintendent stating that it has adopted the Policy.

Sample adoption letters are provided in Appendices B and C.

In addition, the municipality is required to develop and maintain a vehicle inventory for all vehicles, both exempt and non-exempt. A plan for replacing non-exempt vehicles with vehicles that meet the fuel efficiency ratings below must also be developed and maintained. This inventory of all vehicles and replacement plan for non-exempt vehicles must include school vehicles. The fuel efficiency ratings are set to ensure that at least five or more automatic transmission models of mass production are available for sale in Massachusetts (all from affordable brands; no luxury brands). Based on 2010 EPA data, vehicles are to have a combined city and highway MPG no less than the following:

- 2 wheel drive car: 29 MPG
- 4 wheel drive car: 24 MPG
- 2 wheel drive minivan 20 MPG
- 4 wheel drive minivan 18 MPG
- 2 wheel drive pick-up truck: 17 MPG
- 4 wheel drive pick-up truck: 16 MPG
- 2 wheel drive sport utility vehicle: 21 MPG
- 4 wheel drive sport utility vehicle: 18 MPG

Hybrid or electric vehicles in these vehicle classes will meet these criteria.

To inform your purchasing decisions, information on makes and models of vehicles, including fuel economy comparisons, can be found at: http://www.fueleconomy.gov/ We encourage use of this valuable resource for informing decisions.

In addition, many vehicles that meet the above criteria can be found on statewide contract OVM10, "Purchase of Vehicles: Gasoline, Hybrid and Other Alternative Fuel Vehicles," located on www.comm-pass.com .

***NOTE:** The EPA maintains a database on vehicle fuel efficiency that is updated occasionally throughout the year, as new models are released. As increasing numbers of fuel efficient vehicle models are released, the minimum combined MPG requirements of Criterion 4 will be revised upwards. Thus, cities and towns must check the Criterion 4 Guidance for updates prior to ordering new vehicles.

In order to encourage efficient driving practices, municipalities should implement a monitoring system to record miles driven, fuel consumption, etc. for each vehicle in every department. A monitoring system will help facilitate the municipality's reduction in aggregate energy consumption. If a municipality provides fuel for fleet vehicles, it should consider using a universal fleet card that provides a monitoring system for tracking fuel use.

VEHICLE RECYCLING

Recycling of vehicles – i.e., moving a previously purchased and used vehicle from one municipal department to another municipal department in need of a vehicle - is only allowed if the vehicle being recycled to a new department meets the fuel efficient criteria listed above. Please be advised that a recycled Ford Crown Victoria does not meet the MPG rating and therefore would not meet fuel efficient vehicle requirements. When a city or town is ready to retire a Crown Victoria police vehicle, fleet disposal companies can provide an attractive option.

EXEMPTIONS

Vehicles that are exempt from the municipal Fuel Efficient Vehicle Policy include heavy-duty vehicles defined as having a manufacturer's gross vehicle weight rating (GVWR) of more than 8,500 pounds. Examples include fire engines, ambulances, and some public works vehicles. In addition, police cruisers, passenger vans, and cargo vans are exempt from this criterion, but, municipalities must commit to purchasing fuel efficient cruisers, passenger vans, and cargo vans when they become commercially available. Police and fire department administrative vehicles MUST meet fuel efficient requirements.

Emergency Response vehicles that are under 8,500 pounds and for which fuel efficient models are available are NOT exempt.

***PLEASE NOTE**: If a vehicle is found on www.fueleconomy.gov, then it has a GVWR of less than 8,500 pounds, is **NOT** a heavy-duty vehicle and is **NOT** exempt.*

ALTERNATIVE COMPLIANCE

If a municipality has a vehicle fleet composed of all exempt vehicles (e.g. heavy-duty vehicles and/or police cruisers), it must propose alternative means of reducing vehicle fuel consumption in order to comply with this criterion. Examples of Alternative Compliance include having in place policies and programs that reduce vehicle fuel consumption such as: carpooling incentives for municipal employees; preferred parking for employees with hybrid vehicles; bicycle racks at municipal buildings; incentives to encourage

employees to bike to work; or a bicycle sharing program for employees to travel within the municipality. Alternative compliance can also be provided through the Installation of electric vehicle charging stations, and/or use of alternative fuels such as biodiesel blends from B-5 to B-20 for heavy duty fleets. While DOER encourages policies such as these for all municipalities, cities and towns that do not have any vehicles in their fleet subject to the MPG criteria MUST provide some form of Alternative Compliance. In addition, a municipality must note that, should it acquire non-exempt vehicles in the future, it is committed to purchasing non-exempt vehicles that meet the most recent guidance for Criterion 4 published by the MA Department of Energy Resources' Green Communities Division. See Appendix D for a model Fuel Efficient Vehicle Policy for Alternative Compliance.

A vehicle inventory of exempt vehicles must be provided.

Please note: Even if a municipality has only one non-exempt vehicle, it must have a Fuel Efficient Vehicle Policy in place. Alternative Compliance for meeting Criterion 4 can only be used if ALL vehicles in the fleet are exempt.

APPLICABILITY

All communities seeking Green Communities designation must adopt a fuel efficient vehicle policy that reflects the most recent MPG criteria published in this Guidance. If a municipality has adopted a policy that reflects old MPG criteria, it must have done so within the six months immediately preceding issuance of revised Guidance in order to qualify for credit under this criterion when applying for designation.
All designated Green Communities must review their Fuel Efficient Vehicle Policy on an annual basis and ensure that their policies reflect DOER's most recently published MPG minimums. The Annual Reporting required of Green Communities will include this information.

Future Financial Considerations

Contingency language regarding potential future budgetary constraints in Fuel Efficient Vehicle Policies will not be accepted. DOER recognizes that predicting and committing future budgets is difficult and will work with municipalities on a case-by-case basis should they encounter difficulty complying with their Fuel Efficient Policy due to a budget issue in a particular year.

FOR MORE INFORMATION

Websites:

www.mass.gov/energy/greencommunities

www.fueleconomy.gov

Statewide contract ***OVM10, "***Purchase of Vehicles: Gasoline, Hybrid and Other Alternative Fuel Vehicles," located on www.comm-pass.com .

Contact your Regional Coordinator

APPENDIX A

This model policy was prepared to assist cities and towns in developing a fuel efficient vehicle policy. This model policy is intended for illustration purposes. Communities are free to utilize the format provided.

Municipality / School District **FUEL EFFICIENT VEHICLE POLICY**	
Effective Date	
Revisions	
Board of Selectman Approval Date	
School Superintendant Approval Date	

DEFINITIONS

Combined city and highway MPG (EPA Combined fuel economy): Combined Fuel Economy means the fuel economy from driving a combination of 43 percent city and 57 Percent highway miles and is calculated as follows:

=1/((0.43/City MPG)+(0.57/Ihighway MPG))

Drive System: The manner in which mechanical power is directly transmitted from the drive shaft to the wheels. The following codes are used in the drive field:

- AWD = All Wheel Drive: 4 -wheel drive automatically controlled by the vehicle power train system
- 4WD = 4-Wheel Drive: driver selectable 4-wheel drive with 2-wheel drive option
- 2WD = 2-Wheel Drive

Heavy-duty vehicle: A vehicle with a manufacturer's gross vehicle weight rating (GVWR) of more than 8,500 pound

POLICY STATEMENT

In an effort to reduce the (city/town/school district/other local entity)'s fuel consumption and energy costs the (policy making body) hereby adopts a policy to purchase only fuel efficient vehicles to meet this goal.

August 2013

PURPOSE

To establish a requirement that the (city/town/school district/other local entity) purchase only fuel efficient vehicles for municipal/school use whenever such vehicles are commercially available and practicable.

APPLICABILITY

This policy applies to all divisions and departments of the (city/town/school district/other local entity).

GUIDELINES

All departments/divisions shall purchase only fuel-efficient vehicles for municipal use whenever such vehicles are commercially available and practicable.

The (city/town/school district/other local entity) will maintain an annual vehicle inventory for ALL vehicles and a plan for replacing any non-exempt vehicles with vehicles that meet, at a minimum, the fuel efficiency ratings contained in the most recent guidance for Criterion 4 published by the MA Department of Energy Resources' Green Communities Division.

It is the responsibility of the (city/town/school district/other local entity) to check the Green Communities Division's Guidance for Criterion 4 for updates prior to ordering replacement vehicles.

Exemptions

- Heavy-duty vehicles: examples include fire-trucks, ambulances, and some public works trucks that meet the definition of heavy-duty vehicle

- Police cruisers, passenger vans and cargo vans are exempt from this criterion since fuel efficient models are not currently available. However, we commit to purchasing fuel efficient police cruisers, passenger vans and cargo vans when they become commercially available. Police and fire department administrative vehicles are NOT exempt and must meet fuel efficient requirements.

Inventory

The following information shall be included in a vehicle inventory list and said list shall be updated on an annual basis and provided to the Green Communities Division:

Model	Make	Model Year	Year/month Purchased	Drive System: 2 WD, 4WD or AWD	> 8500 pounds ? (Y or N)	Exempt or non-exempt	MPG Rating	Vehicle Function

NOTE: Departments/Divisions may use EPA combined MPG estimates or actual combined MPG.

FUEL EFFICIENT VEHICLE REPLACEMENT PLAN

All non-exempt vehicles shall be replaced with fuel-efficient vehicles that adhere to the most recent Green Communities Criterion 4 Guidance. Vehicles shall be replaced when they are no longer operable and will not be recycled from one municipal department to another unless the recycled replacement vehicle meets the fuel efficiency ratings outlined in the Policy. In addition, when replacing exempt vehicles, the function of the vehicle will be reviewed for potential replacement with a more fuel efficient vehicle, including a fuel efficient non-exempt vehicle.

(city/town/school district/other local entity) will review on an annual basis the Vehicle Inventory, along with the Green Communities Criterion 4 Guidance, to plan for new acquisitions as part of planning for the new fiscal year budget.

QUESTIONS / ENFORCEMENT

All other inquiries should be directed to the department/division responsible for fleet management and/or fleet procurement. This policy is enforced by the Chief Administrative Officer and/or his/her designee(s).

Appendix B

Sample town adoption letter

Letter must be on Town Letterhead

MA Department of Energy Resources
Green Communities Division
100 Cambridge Street – Suite 1040
Boston, MA 02114

{date of letter}

At a public Board of Selectmen meeting held on [DATE], the Board of Selectmen voted to adopt the attached Fuel Efficiency Vehicle Policy.

Thank you.

Signature and Typed Name of Chair

Appendix C

Sample School Adoption Letter

Letter must be on School letterhead

MA Department of Energy Resources
Green Communities Division
100 Cambridge Street – Suite 1040
Boston, MA 02114

{date of letter}

Please be advised that the Public Schools of [Town] hereby adopted the attached Fuel Efficiency Vehicle Policy.

Thank you.

Signature and Typed Name of Superintendent of Schools

Appendix D

This model policy was prepared to assist cities and towns in developing a fuel efficient vehicle policy. This model policy is intended for illustration purposes. Communities are free to utilize the format provided.

(city/town/school district/other local entity name) Alternative Compliance Fuel Efficient Vehicle Policy

FEVP Effective Date	
Date of Municipal Approval	
Date of Board of Selectmen Approval	
Date of School Superintendant Approval	

INTRODUCTION

Criterion Four of the Green Communities Program states that a Green Community must purchase fuel-efficient vehicles for municipal use, including schools, whenever such vehicles are commercially available and practicable. (city/town/school district/other local entity name) currently owns 10 vehicles for municipal use. All vehicles fall into the exempt status according to the Green Community's Criterion 4 guidance. (city/town/school district/other local entity name) has adopted this Fuel Efficient Vehicle Policy (FEVP) to purchase the most fuel-efficient vehicles for all departments/divisions whenever they become commercially available.

This policy is established to reduce the consumption of fossil fuels, which in turn will have a positive impact on the environment and save tax dollars. Under this policy (city/town/school district/other local entity name) hereby establishes a monitoring system to help facilitate the municipality's reduction in vehicle consumption. (city/town/school district/otherlocal entity name) Select Board will establish and oversee the monitoring system in conjunction with the town and school officials and staff. Additionally, (city/town/school district/other local entity name) has adopted an anti-idling policy for all municipally-owned vehicles.

ALTERNATIVE COMPLIANCE

(city/town/school district/other local entity name) has all exempt vehicles (see attachment A, vehicle inventory). Therefore, city/town/school district/other local entity is seeking Alternative Compliance for Criterion 4 based on the following three actions:

1) (city/town/school district/other local entity name) has developed an inventory of all registered vehicles for each department.

2) The annual miles driven (or hours used) and total fuel consumption will be determined starting in the municipal fiscal years of 2014, beginning on July 1, 2014. city/town/school district/other local entity will review this information in September of each year for potential ways to reduce consumption, including: reducing vehicle miles traveled, replacing exempt vehicles with fuel-efficient non-exempt vehicles, replacing exempt vehicles with more efficient exempt vehicles.
3) (city/town/school district/other local entity name) has adopted an anti-idling policy, in accordance with MGL chapter 90, Section 16A (see Attachment B) applicable to all municipal vehicles to reduce vehicle fuel consumption and emissions.
4) (city/town/school district/other local entity name) is a rural community with no access to public transportation, and, since employees travel to work from multiple directions, carpooling is unrealistic. However, two (2) priority parking place for employees traveling to work with hybrid and electric vehicles have been created closest to the main entrance of Town Hall.

POLICY STATEMENT

In an effort to reduce (city/town/school district/other local entity name)'s fuel consumption and energy costs, (city/town/school district/other local entity name)'s Board of Selectmen herby adopts this policy to purchase the most fuel–efficient vehicles to meet this goal.

APPLICABILITY

This policy applies to all divisions and departments of (city/town/school district/other local entity name).

GUIDELINES

All departments/divisions will purchase the most fuel-efficient vehicles for municipal use (including police, fire and highway) whenever such vehicles are commercially available and practicable.

(city/town/school district/other local entity name) will maintain an annual vehicle inventory for all vehicles and a plan for replacing any non-exempt vehicles that meet, at a minimum, the fuel efficiency ratings contained in the most recent guidance for Criterion 4 published by the MA Department of Energy Resources' Green Communities Division. The fuel efficiency ratings contained therein are based on the most recently published US Environmental Protection Agency combined city and highway MPG ratings for vehicles. The most recent Green Communities Guidance for Criterion 4 will be checked for updates prior to ordering replacement vehicles.

<u>Exemptions</u>

Heavy-duty vehicles such as fire trucks, ambulances, heavy-duty trucks and vans and public works trucks are exempt from this criterion. Police cruisers are also exempt from this criterion. However, (city/town/school district/other local entity name) commits to purchasing fuel-efficient cruisers when they become commercially available and practicable. Police Department administrative vehicles must meet fuel-efficient requirements unless they are also used as police cruisers.

Inventory

An inventory of all Town vehicles is contained in Attachment A and shall be updated on an annual basis.

FUEL EFFICIENT VEHICLE REPLACEMENT PLAN

All non-exempt vehicles shall be replaced with fuel-efficient vehicles that meet the fuel efficiency ratings outlined in the Policy. Vehicles shall be replaced when they are no longer operable and will not be recycled from one municipal department to another unless the recycled replacement vehicle meets the fuel efficiency ratings outlined in the Policy. In addition, when replacing exempt vehicles, the function of the vehicle will be reviewed for potential replacement with a more fuel efficient vehicle, including a fuel efficient non-exempt vehicle.

The Vehicle Inventory will be reviewed on an annual basis along with the Green Communities Criterion 4 Guidance to plan for new acquisitions as part of planning for the new fiscal year budget.

DEFINITIONS

Combined City and Highway MPG (EPA Combined fuel economy): Combined Fuel Economy means the fuel economy from driving a combination of 43 percent city and 57 percent highway miles and is calculated as follows:

Combined City and highway MPG = $\frac{1}{\left(\frac{0.43}{CityMPG}\right) + \left(\frac{0.57}{HighwayMPG}\right)}$

Drive System: The manner in which mechanical power is directly transmitted from the drive shaft to the wheels. The following codes are used in the drive field:

- AWD = All Wheel Drive: four-wheel drive automatically controlled by the vehicle power train system
- 4WD = 4 Wheel Drive: driver selectable four-wheel drive with 2-wheel drive option
- 2WD = 2-wheel Drive

Heavy-Duty Vehicle: A heavy-duty vehicle is defined as a vehicle with a manufacturer's gross vehicle weight rating (GVWR) of more than 8,500 pounds.

QUESTIONS AND ENFORCEMRNT

All inquires should be directed to the department/division responsible for fleet management and/or fleet procurement. This fuel Efficient Vehicle Replacement Plan is enforced by the Chief Administrative Officer and/or his/her designee(s).

ATTACHMENT A

(city/town/school district/other local entity name) MUNICIPAL VEHICLE INVENTORY

#	Department	Make	Model	Model Year	Drive System[1]	Date Purchased (month/yr)	Gross Vehicle Weight[2]	Exempt	Function
1	Ambulance	Ford		2004	4W	11/04	15,000	Yes	
2	DPW	Cat		1999	4W	6/04	11,100	Yes	
3	DPW	International		2007	2W	12/06	40,780	Yes	
4	DPW	John Deere		2008	4W	4/08	14,000	Yes	
5	Fire	Dodge		1951	4W	8/78	8,000	Yes	Brush Truck
6	Fire	International		1990	2W	12/89	35,000	Yes	Pumper
7	Fire	GMC	Yukon	1999	4W	12/10	8,500	Yes	
8	Fire	International	4400	2002	2W	8/02	35,000	Yes	Pumper
9	Highway	Cat	426B	1993	4W	4/08	16,000	Yes	Backhoe
10	Police	Ford	Crown Victoria	2006	4W	6/06	< 8,500	Yes	Cruiser

Notes: 1. Drive System: 2 WD, 4WD, or AWD

2. At minimum, a Town must indicate if the vehicle is <8,500 or >8,500 pounds

ATTACHMENT B

This sample policy was taken from the MA DEP's idling reduction toolkit, found at http://www.mass.gov/dep/air/community/depirkit.doc.

(city/town/school district/other local entity name)**ANTI-IDLING POLICY**

This policy applies to [Insert target audience: residents, municipal fleet, school] vehicles operated by or within the town/city of [name of municipality].

OBJECTIVES

1) To eliminate unnecessary idling of vehicles in order to reduce the community's exposure to exhaust from gasoline and diesel engines.
2) To educate and inform municipal employees and residents about the health and environmental effects of gasoline and diesel exhaust.

PURPOSE

Idling vehicles pollute the air and present several health and environmental hazards. Gasoline and diesel vehicles produce carbon monoxide, carbon dioxide, volatile organic compounds (VOCs) and oxides of nitrogen (NOx). Carbon monoxide causes respiratory distress and in high concentrations can be lethal; carbon dioxide is a primary contributor to global warming; and VOCs and NOx and form ozone, ground-level smog and impair lung function. In addition, diesel exhaust contains fine particulate matter, which the U.S. Environmental Protection Agency has designated as a likely carcinogen. The elderly, chronically ill and children are all particularly vulnerable to these health effects because their lung function is respectively decreased, impaired or still in development.

In addition, Massachusetts General Law (MGL Chapter 90, Section 16A) and the Massachusetts Department of Environmental Protection (DEP) idling reduction regulation (310 CMR 7.11(1)(b)) both prohibit unnecessary vehicle idling by stating that the engine must be shut down if the vehicle will be stopped for more than five minutes. Exemptions include: 1) the vehicle is being serviced and the idling is required to repair the vehicle; or 2) the vehicle is making deliveries and needs to keep its engine running (to power refrigerators, for example); and, 3) the vehicle's accessory equipment needs to be powered, such as a fork lift or a truck's rear dump bed, or a wheelchair lift in a bus or van. To provide additional protections for children, MGL Chapter 90, Section 16B further restricts unnecessary idling in school zones.

In order to reduce the health and environmental effects of vehicle exhaust, comply with the state's idling reduction regulation and law, and decrease our use of fuel by reducing unnecessary idling, the following actions shall be implemented to the maximum extent practicable:

[*Municipality would insert specific actions it will implement in its Idling Reduction Campaign such as: posting of signs in public areas, educating municipal employees and residents, establishing best management practices for municipal vehicle operations, etc.*]

This policy is hereby approved by the [Governing Body], this [date], to eliminate unnecessary idling.

Signature:_____

Authorized Official

APPENDIX C: Fleet Assessment, Management, and Right-Sizing Cases

PLEASE SEE FOLLOWING PAGES

Request For Proposals

EVALUATION & ANALYSIS OF FLEET OPERATIONS
REQUEST FOR PROPOSAL ("RFP")

1. BACKGROUND and PURPOSE

The City of Hyattsville is seeking proposals for the provision of a comprehensive analysis of the City's fleet management operations, programs, and practices. The resulting analysis, reports, recommendations, and action plans will identify opportunities to improve current processes and reduce costs.

The primary intent of this Request For Proposal (RFP) is to retain a consultant who is well qualified to conduct a thorough evaluation and analysis of the City's fleet management operations and recommend actions which will lead to improved effectiveness and efficiency in the utilization of equipment, infrastructure, personnel, and financial resources of four (4) separate and decentralized fleet management operations (Police Department, Code Enforcement/Administration, Recreation and Arts and Public Works). This study will result in specific recommendations to be considered by the City Administrator and City Council for implementation. Respondents are encouraged to be creative in their response to this RFP and in the development of the proposed study. The recommendations resulting from this study must be reliable and attainable. That is, the recommendations (a) must be justified and defensible as best practices for the industry and/or circumstances that are unique to the existing conditions; (b) must be supported by an implementation plan; (c) must be fiscally responsible; (d) must take full advantage of available industry technology, equipment, tools, and infrastructure; and (e) address the principles and goals of the City of Hyattsville's Environmental Sustainability Policy.

FLEET OPERATIONS

The City of Hyattsville maintains a diverse fleet of approximately 65 light, medium and heavy duty vehicles, rolling stock and associated fleet equipment that are representative of but not limited to refuse collection, street maintenance, parks and landscaping, managing recreation events, code enforcement, and police operations.

PROJECT OBJECTIVES

The evaluation and analysis of fleet operations must consist of organizational structure, policies, standard operating procedures, and performance activities; and include findings and provide recommendations relative to fleet management, maintenance, operations, environmental best practices, and information/data

management. The evaluation and analysis of fleet operations must at a minimum address the following topics:

a. Provide a replacement plan of the City's vehicle and equipment fleet for the next 5, 10, and 15 years using recently completed management and efficiency studies for growth projections.
b. Identify available options as to which components of the City's fleet management operations can be consolidated into centralized programs and which operations should remain decentralized and departmentalized.
c. Cost comparisons and analysis of providing certain fleet services in-house versus contracting to private vendors. Provide advantages and disadvantages for both service delivery options.
d. Assess and provide analysis for efficient staffing and funding levels.
e. Fleet rolling stock assessment (size, age, current condition, life expectancy, and replacement schedules).
f. Assess the current inventory of fleet management equipment, computer hardware/software, equipment and other tools dedicated to fleet maintenance operations and recommend the components necessary for managing and operating an efficient and effective fleet program and the associated costs.
g. Identify the necessary training, credentials and/or certifications for fleet maintenance staff including frequency, renewal period and budget.
h. Identify opportunities that would improve the efficiency and effectiveness of the City's fleet services as well as environmental improvements.
i. Identify policies and standard operating procedure changes that, if implemented, would promote efficient and effective fleet management operations, including management of hazardous or waste materials.
j. Evaluate the implementation of alternative fuel(s) including types, uses, costs and benefits.
k. Recommend policies and procedures for vehicle replacement or fleet rotation if appropriate.

2. SCHEDULE OF EVENTS

This request for proposal will be governed by the following schedule:

Release of RFP: September 22, 2010
Pre-bid Meeting: September 30, 2010, 10:00 a.m.
DPW Operations Yard
4633 Arundel Place, Hyattsville, MD. 20781
Deadline for Written Questions: October 8, 2010
Deadline for Response to Written Questions: October 13, 2010
Proposals are due: October 19, 2010

3. SCOPE OF WORK

The Scope of Work is to be used as a general guide and is not intended to be an all-inclusive list of the steps necessary for completing this study. The following are work tasks assumed to be necessary for preparing the analysis, reports, recommendations, and action plans described above.

The consultant shall perform the following tasks through review of reports, records and existing data, onsite tours and observations, meetings, discussions, department surveys and interviews, focus groups and other assessment tools:

1. Project Development Plan. Based on a thorough understanding of the purpose, objectives and scope; the consultant will submit the following for approval:

    a. Proposed work plan.
    b. Reporting methods, formatting standards for project reports and documentation, and frequency of reports.
    c. Proposed schedule for progress reports, final reports, and presentations.

2. Fleet Analysis. Anticipated tasks include but are not limited to the following:
    a. Analyze available data. The consultant will utilize existing data to identify and analyze all applicable fleet data, such as:
        i. Inventory by department, year, make, model, weight class, etc.
        ii. Mileage, vehicle maintenance, fuel data.
        iii. Maintenance and fuel costs and other historical data.
    b. Evaluate fleet the organizational structure:
        i. Confirm the City's fleet departments and areas of responsibilities.
        ii. Current departmental fleet managers, key staff members, and chain of command levels of training and certifications and decision making authority.
        iii. Interview and/or survey departmental managers and staff.
        iv. Determine fleet personnel's experience, levels of knowledge, skills, training and certifications and abilities.
    c. Perform onsite visits, observe and evaluate operations:
        i. Observe fleet operations, systems, and procedures.
        ii. Observe fleet maintenance processes and procedures.
        iii. Evaluate fueling locations and document conditions, equipment, security, safety, etc.
        iv. Evaluate fueling processes and procedures.
        v. management of parts and equipment used for maintenance operations including security.
        vi. Management and disposal of waste materials
    d. Analyze and evaluate existing fleet management programs, practices and standard operating procedures to identify areas where efficiencies

and cost savings can be achieved. Areas of focus include but are not limited to the following:

i. Vehicle acquisitions.
ii. Vehicle leasing and chargeback.
iii. Pool vehicles.
iv. Maintenance and repair facilities.
v. Preventive maintenance programs and compliance levels.
vi. Lifecycle cost and budget analysis.
vii. Mechanic staffing level, labor rate and productivity analysis.
viii. Contracted services/operations.
ix. Towing/roadside assistance.
x. Storeroom and parts services.
xi. Fueling services.
xii. Customer service.
xiii. Staff training.
xiv. Safety and security.
xv. Environmental best practices

e. Evaluate implementation of an enterprise fund/chargeback system:
   i. Chargeback rate structure.
   ii. Vehicle/equipment replacement planning process including budget forecasting.
   iii. Analyze implementation issues.
   iv. Recommend implementation plan and timeframe.

f. Assess the use and need of information systems and other technologies and make recommendations:
   i. Evaluate existing technical resources and infrastructure.
   ii. Evaluate the availability, use and application of technology.
   iii. Recommend improvements, provide cost estimates and implementation timeframe.

3. Analyze findings and benchmark against best practices:
   a. Review and analyze the fleet study results.
   b. Determine the City's cost of services and compare to industry benchmarks.
   c. Make recommendations that will improve operations, reduce costs and address the principles and goals of the City of Hyattsville's Environmental Sustainability Policy.
   d. Identify and assess possible barriers and constraints to recommendations.
   e. Recommend implementation plan and timeframe.

DELIVERABLES

The consultant, based on site visits, observations, interviews, surveys, research, analysis and findings shall present the following:

1. Present preliminary report for staff review detailing the City's fleet management program baselines, the consultant's analysis, findings, recommendations, possible barriers, implementation timeframe, and estimated costs/benefits:

a. Meet with City management staff and incorporate applicable comments.

Provide draft final report for review by the Executive Committee; upon review address comments and concerns leading to a presentation of a final report to City Council.

b. Submit final report with executive summary (20 bound copies, including PDF format on CD with each bound copy).

c. Prepare a formal presentation for the Mayor and City Council

2. Prepare a detailed proposal including itemized cost and timeframe estimates to implement consultant's recommendations.

SPECIAL CONDITIONS

1. The City of Hyattsville shall maintain all property rights of all material and deliverables produced from the execution of this contract.
2. Copyright of all documentation relating to this contract belongs to the City of Hyattsville. The successful bidder may not disclose any information, documentation or products to other clients without written approval from the City of Hyattsville.
3. In the event that the consultant(s) or any member of the project team would like to use information or data generated by this study, for academic or any other purpose, prior written approval must be obtained from the City of Hyattsville.
4. If required, As soon as it becomes known to the consultant that they will not be able to deliver the services within the delivery period and/or within the price as specified, the City of Hyattsville must be given immediate written notice to this effect. The City reserves the right to implement remedies as it deems appropriate.
5. Upon termination of this agreement, the consultant(s) and members of the project team shall hand over all documentation and electronic files provided as part of this study and all deliverables, etc., without the right of retention, to the City of Hyattsville.

REQUIRED SUBMITTALS FOR PROPOSAL

Letter of Transmittal

1. Explanation of Work to Be Performed

The letter should include a statement indicating your understanding of the work to be performed.

2. General Profile of Firm and Qualifications

The letter should include a statement of affirmation of the firm's and individual qualifications for professionally and expertly conducting the work as understood.

3. Contact Information

The letter should indicate the firm's contact person concerning the proposal, the firm's main and/or local addresses, and a telephone number where the contact person can be reached.

4. Schedule for Provision of Work

The letter should indicate the firm's anticipated availability for the project and an estimated performance schedule, if selected for the project.

Sealed Dollar Cost Bid / Basis for Compensation

1. General Information

The sealed dollar cost bid section of the proposal should contain all pricing information relative to providing the work as described in this request for proposals.

This section should include a statement of your firm's Basis for Compensation. For the basic services offered in this proposal, the respondent shall provide a lump sum, total all-inclusive maximum price. Please include a summary of the percentage of estimated professional costs, and the wage rate for analysts

The City of Hyattsville will not be responsible for expenses incurred in preparing and submitting the technical proposal or the sealed dollar cost bid. Such costs should not be included in the proposal.

2. Inclusions

The sealed dollar cost bid should also include the following information:

A. Name of firm.

B. Certification that the person signing the proposal is entitled to represent the firm, and empowered to submit the bid and authorized to sign a contract with the City of Hyattsville.

C. A "Total All-inclusive Maximum Price" for the work. The total all-inclusive maximum price is to contain all direct and indirect costs including all anticipated out-of-pocket expenses.

D. Rates for Additional Services: the City of Hyattsville may request additional services outside the scope of this proposal. The selected firm must be available to perform these additional services at the same rates detailed in the schedule of fees and expenses included in the sealed dollar cost bid.

GENERAL REQUIREMENTS AND INFORMATION

SUBMISSION OF PROPOSAL / BID

The RFP Transmittal Letter and the marked Sealed Dollar Cost Bid will be received by the City of Hyattsville, and are due by 3:30 p.m. on October 19, 2010 and to be mailed or messenger-ed to:

Douglas Barber, City Clerk
4310 Gallatin St
Hyattsville, Maryland 20781
Attn: FLEET STUDY PROPOSAL

Any questions concerning the RFP should be directed to Patrick J Ryan, Director of Public Works, City of Hyattsville at 301 985-5045.

EVALUATION OF PROPOSALS AND AWARD OF CONTRACT

The RFPs will be publicly opened and read on October 20, 2010 at 1:00 PM in the Prangley Room of the City of Hyattsville's Municipal Building, 4310 Gallatin Street, Hyattsville, Maryland.

The Transmittal Letter of the proposals submitted will be reviewed and evaluated first. The top-qualifying firms from this section will have their sealed dollar cost bid opened and evaluated. The firm best meeting the experience, approach and cost requirements will then be selected.

The City of Hyattsville reserves the right to reject any and all RFP submissions and further reserves the right to re-issue the RFP.

OTHER REQUIREMENTS AND INFORMATION

1. Stability of Proposed Prices

Any price offerings from respondents must be valid for a period of 90 days from the due date of the proposals.

2. Amendment or Cancellation of the RFP

The City of Hyattsville reserves the rights to cancel, amend, modify or otherwise change this RFP at any time if it deems it to be in the best interest of the City of Hyattsville to do so.

3. Proposal Modifications

No additions or changes to any proposal will be allowed after the proposal due date, unless such modification is specifically requested by the City of Hyattsville. The City of Hyattsville, at its option, may seek respondent retraction and/or clarification of any discrepancy or contradiction found during its review of proposals.

4. Presentation of Supporting Evidence

Respondents must be prepared to provide any evidence of experience, performance, ability, and/or financial sureties that the City of Hyattsville deems to be necessary or appropriate to fully establish the performance capabilities represented in their proposals.

5. Demonstration of Proposed Services

At the discretion of the City of Hyattsville, respondents must be able to confirm their ability to provide all proposed services. Any required confirmation must be provided at a site approved by the City of Hyattsville and without cost to the City of Hyattsville.

6. Erroneous Awards

The City of Hyattsville reserves the right to correct inaccurate awards. This may include, in extreme circumstances, revoking the awarding of a contract already made to a respondent and subsequently awarding the contract to another respondent. Such action on the part of the City of Hyattsville shall not constitute a breach of contract on the part of the City of Hyattsville.

7. Proposal Expenses

Respondents are responsible for all costs and expenses incurred in the preparation of proposals and for any subsequent work on the proposal that is required by the City of Hyattsville.

8. Ownership of Proposals

All proposals shall become the sole property of the City of Hyattsville and will not be returned.

9. Execution of Contract

This RFP is not a contract and, alone, shall not be interpreted as such. Rather, this RFP only serves as the instrument through which proposals are solicited. If, for some reason, the City of Hyattsville and the initial respondent fail to reach consensus on the issues relative to the contract, then the City of Hyattsville may commence contract negotiations with other respondents. The City of Hyattsville may decide at any time to start the RFP process again. The contract may include a liquidated damages clause at the discretion of the City of Hyattsville.

10. Oral Agreement or Arrangements

Any alleged oral agreements or arrangements made by respondents with the City of Hyattsville or employees of the City of Hyattsville will be disregarded in any proposal evaluation or associated award.

11. Subcontractors

The City of Hyattsville must approve any and all subcontractors utilized by the successful respondent prior to any such subcontractor commencing any work. Respondents acknowledge by the act of submitting a proposal that any work provided under the contract is work conducted on behalf of the City of Hyattsville and that the Public Works Director or his designee may communicate directly with any subcontractor as the City of Hyattsville deems to be necessary or appropriate. It is also understood that the successful respondent shall be responsible for all payment of fees charged by the subcontractor(s). The successful respondent shall provide a performance evaluation of any subcontractor promptly to the City of Hyattsville upon request. The successful respondent must provide the majority of services described in the Scope of Work.

12. Confidentiality and Care of Data

The successful respondent agrees to protect the confidentiality of any files, data or other material pertaining to this contract and to restrict their use solely for the purpose of performing this contract. The successful respondent shall take all steps necessary to safeguard data, files, reports or other information from loss, destruction or erasure. Any costs or expenses of replacing or damages resulting from the loss of such data

shall be borne by the contractor when such loss or damage occurred through its negligence.

2010 City Vehicle List

Police Department

Year	Make	Model
2005	Chevrolet	Implala
2006	Chevrolet	Implala
2005	Chevrolet	Implala
2004	Chevrolet	Implala
2003	Ford	Crown Victoria
2007	Dodge	Charger
2008	Chevrolet	Implala
2003	Ford	Crown Victoria
2000	Ford	Crown Victoria
2003	Ford	Crown Victoria
2008	Dodge	Magnum
2007	Dodge	Charger
2004	Chevrolet	Impala
2008	Chevrolet	Impala
2003	Ford	Crown Victoria
2004	Chevrolet	Impala
2006	Chevrolet	Impala
2007	Dodge	Charger
2001	Ford	Crown Victoria
2004	Chevrolet	Blazer
2005	Chevrolet	Blazer
2005	Chevrolet	Impala
2007	Dodge	Charger
2007	Dodge	Charger
2008	Dodge	Charger
2008	Dodge	Charger
2008	Dodge	Charger
2008	Dodge	Charger
2008	Dodge	Charger
2008	Dodge	Charger
2008	Dodge	Charger
2009	Chevrolet	Impala
2009	Chevrolet	Impala
2009	Chevrolet	Impala
2001	Chevrolet	Impala
2002	Chevrolet	Impala
2005	Homestead	
1996	Ford	Crown Victoria
2002	Chevrolet	Impala
2007	Dodge	Charger
2002	Chevrolet	Impala
2003	Ford	E350
2008	Dodge	Charger

2010 City Vehicle List

2008	Dodge	Charger
2008	Dodge	Charger
1999	Ford	Taurus
2000	Ford	Crown Victoria
2000	Ford	Crown Victoria
2009	Chevrolet	Impala
2009	Chevrolet	Impala
2009	Chevrolet	Impala
2009	Chevrolet	Impala
2000	Chevrolet	Impala

Public Works

Year	Make	Model
1994	ChevroletY	Blazer
1993	John Deere	AMT626
2004	Chevrolet	2500
2007	Ford	E-250
1995	Ford	F250
1998	Chevrolet	K-2500
1987	International	6x10
1988	Ford	2810/BS414C
1994	International	U-5X10
2010	Pace America	0B612SA
2010	John Deere	Gator TH6X4
2002	Chevrolet	2500
2001	Case	621CXT
2001	O.D.B.	SCL800TM14
2004	Spaulding	T2D
2005	O.D.B.	SCL800TM25
2008	Vermeer	1000XL
2008	O.D.B.	SCL800TM25
1995	Ingersoll Rand	P-175WJD
1996	John Deere	310-D Turbo 4 x 4
1996	O.D.B.	LCT600
1997	O.D.B.	LCT600
1999	Master Track	LCTGSE50-7616
2002	Chevrolet	C 8500
2002	Chevrolet	C 8500
2005	Ford	F-350
2006	Chevrolet	5500
2008	Ford	F-350
1991	International	4900
1995	International	4700
2006	Better Built	BH1621FB-E

2010 City Vehicle List

2002	International	7400
2005	International	7400
2008	Ford	F-350
2008	Ford	F-350
2009	FreightLiner	M2
2009	International	7400
1996	GMC	Top Kick
1998	GMC	C 8500

Code Enforcement

Year	Make	Model
2007	Chevrolet	Silverado
2007	Chevrolet	Silverado
1990	Chevrolet	S-10
2008	Honda	Fit

Recreation and the Arts

Year	Make	Model
2002	Chevrolet	C-2500HD
2004	Chevrolet	Shuttle Bus

Sustainable Community Essentials
Rapid Assessment
for Southwestern Pennsylvania
June 2011

Green Vehicle Fleet Programming: Within your reach!

Why is Green Vehicle Fleet Programming essential to your municipality?

1. Achieves cost savings
2. Decreases emissions
3. Improves efficiency

In response to aggregated data from the Sustainable Community Rapid Assessment, municipal vehicle fleets were identified as an area ripe for improvement. This two-page handout provides case studies from two local municipalities pursuing Green Vehicle Fleet programs, as well as a variety of resources and tips to help you begin saving money and reducing emissions. With tight budgets and rising gas prices, Green Vehicle Fleet programming offers an array of low-cost initiatives that can produce meaningful cost-savings for your community.

First Steps: Cost-free ways to green your fleet

- PLAN: Route-planning and departmental trip coordination can reduce mileage.
- SIZE RIGHT: Right-sizing and down-sizing vehicles appropriate to the task.
- TUNE-UP: Preventative maintenance and scheduling regular maintence per manufacturers' recommendations will ensure vehicles are performing optimally.
- DON'T IDLE: Reduce vehicle idling in accordance with the PA anti-idling law.
- EDUCATE: Employee training creates awareness and improves driving habits and vehicle performance.
- PROVIDE OPTIONS: Encourage walking, biking, and public transportation as an alternative to driving.
- BENCHMARK: Inventory your current vehicle fleet by recording make, model, year, use, years in service and MPG.

Next Steps: Investing in your green fleet

- FUELING UP: Consider the use of alternative fuels for vehicles in the fleet.
- PURCHASE SMART: When replacing vehicles in the fleet, consider flex-fuel, hyrbid, and electric vehicles.

Who should be involved?

1. Top municipal leadership
2. Municipal vehicle maintenance personnel
3. Purchasing Department
4. Public Works Department
5. Police and Fire Departments
6. Finance staff

Quick Resource Guide (click on the link to acces):

The resource sheet is just the beginning. To learn more on how you can begin a Green Vehicle program check out the following:

ICLEI's 8 Steps to Green Your Fleet:
www.morpc.org/pdf/Green_Your_Fleet.pdf

Sustainable Jersey Green Fleet Resource Sheets:
http://sustainablejersey.com/actiondesc.php?arr_num=109&id_num=12!11

Five-step Green Fleet Framework:
http://business.edf.org/projects/fleet-vehicles/five-step-green-fleet-framework

Alternative Fuel Programs for Municipal Fleets:
www.nlc.org/File%20Library/.../alternative-fuel-programs-cpb-fall08.pdf

Fuel Efficient Vehicles for a Municipal Fleet:
www.mass.gov/Eoeea/docs/doer/green.../efficient-vehicles-slides.pdf

Clean Cities 2011 Vehicle Buyer's Guide:
www.afdc.energy.gov/afdc/pdfs/49488.pdf

A Green Fleet is a Cost-Efficient Fleet:
www.fleetchallenge.ca/pdfnew/media/Green_Fleets_Article_rogersmith.pdf

Fleet Planning and Polices:
http://www.garfieldcleanenergy.org/trans-fleets-2010-workshop.html

SWPA and Green Fleet programs:

Monaca Borough

Monaca Borough is at the beginning stages of its Green Fleet vehicle program. Monaca has recently installed GPS tracking devices in its vehicle fleet. Having GPS systems in a vehicle can provide a great deal of helpful information, including being able to tell if a vehicle is idling. Incorporating technology systems like GPS can provide a wealth of information for the municipality and streamlines interdepartmental use. (Continued on next page)

One of the easiest ways to improve fleet efficiency is employee training. Monaca Borough reminds employees, "if you're not moving, shut off the car." Municipal manager, Mario Leone, points out how important it is to optimize vehicle use, "Do we [always] need a full size pick-up truck?" Vehicle right-sizing is another cost-free way to improve vehicle efficiency. While Leone is pleased to be reducing emissions and improving air quality in his community, the impetus for the Green Vehicle fleet is also driven by economic reasons and the cost savings for the municipality. Leone discussed that different fleets, like that of the police department, have different needs and uses for their cars. The Monaca police department already has bicycles, but they have started considering the purchase of a Segway for the municipal parking attendant. The borough now has access to good data on fuel costs for the police department vehicles, but Leone is hoping to begin recording more meticulously the performance of all the fleet cars so as to target deficiencies and improve strategies for emission reduction and cost-savings.

Leone pointed out there is always an opportunity for change and improvement. A vehicle commonly purchased by local governments, the Ford Crown Victoria, is no longer being manufactured. And since, "we have to make a change anyways", Monaca may consider flex-fuel vehicles, or electric cars on the market like the Chevy Volt. Leone is even looking into a new police car being manufactured by Carbon Motors, a dedicated police car model with fuel efficiency in mind. Next on Leone's agenda is to focus on preventative maintenance for his public works fleet. With employees from multiple departments utlitizing the public works fleet, it is difficult to keep track of wear and maintenance schedules. Leone is considering using the GPS systems to log information and provide municipal staff with alerts for scheduled maintenance on the fleet.

GPS Systems in Monaca Borough

SUSTAINABLE PITTSBURGH
Our Region. Our Resources. Our Future

SUSTAINABLE COMMUNITY DEVELOPMENT NETWORK
A Program of Sustainable Pittsburgh

environment healthy Cranberry TOWNSHIP economy equality

Cranberry Township, like Monaca Borough, sees a great duality in pursuing a Green Vehicle Fleet program: a commitment to sustainability and reducing energy costs. These goals are formally recognized in the township's comprehensive plan, specifically driven by its energy reduction action plan. The purchase of four hybrid vehicles by the municipality in 2010 was featured in a Post-Gazette article in which Jason Dailey, facilities manager, explained, "We believe that the technology of the hybrid vehicle has come a long way and that the price points now make achieving a greener fleet more sensible and truly responsible to the tax dollar."

While Cranberry Township is thrilled to have the addition of hybrid vehicles to the fleet, the township is also making great strides in other ways, that don't come with a big price tag.

- Monitoring fuel consumption reports, comparing mileage, fuel economy, vehicle usage, and work orders assigned.
- Educating employees on the new PA anti-idling law.
- A vehicle replacement policy that addresses minimum benchmarks for a vehicle to be considered for purchase.
- Evaluating alternative fuel technologies for medium duty vehicles.
- Retiring vehicles from the fleet that are no longer fuel efficient.
- Regularly monitor Preventative Maintenance schedules for all vehicles to ensure optimal parameters are being met.
- Train mechanics on current and upcoming technology.
- Equipment cost share between divisions.

Just as Monaca Borough is using GPS technology to improve its vehicle fleet efficiency, Cranberry Township operates a very impressive fueling system, tied to its asset management and work order system. Municipal employees are assigned a unique ID, along with the vehicle. The municipal employee enters the hours of use (or mileage) into the fueling system, which interfaces with the work order system. According to Dailey, "When a vehicle reaches the manufacturers' prescribed recommendation for the vehicle or piece of equipment (hours or miles) a service request gets generated and a work order is electronically prepared. The chance that an oil change or tire rotation would get missed is virtually eliminated with the automated system and therefore the operational efficiency is greatly enhanced."

Learn more about Sustainable Community Essentials at:
www.sustainablecommunityessentials.org

APPENDIX A

CITY OF SAN BERNARDINO

FLEET SERVICES ASSESSMENT AND UTILIZATION ANALYSIS

February 2007

MANAGEMENT PARTNERS
INCORPORATED

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EXECUTIVE SUMMARY

Management Partners was contracted by the City of San Bernardino to perform a Fleet Services checkup, as well as a fleet utilization study. The checkup, or assessment, was intended to conduct a limited review of San Bernardino's Fleet Services Division and program, and to identify opportunities for improvement. In addition we were asked to take a cursory look at the fleet operations of the San Bernardino Municipal Water Department and the City's Fire Department, and to explore opportunities for merging all or part of the three fleets.

The fleet utilization study's intent was to analyze each department's permanently assigned and temporary vehicle requirements, and to recommend how best to accomplish the City's business objectives.

Those two separate studies follow below.

Fleet Services Checkup Assessment

In our initial review of San Bernardino's fleet services program, we identified a number of best fleet-management practices that, if implemented, could improve functionality.

We feel it is important for San Bernardino to centralize its fleet functions and to develop a comprehensive policy to guide its fleet operation. This should include assigning all fleet functionality to the Fleet Services Division, and developing performance measures that effectively monitor and manage the function.

The chargeback system that recoups costs for Fleet Services needs to be re-engineered to encourage customers to minimize fleet size and to influence efficiency in the vehicle support system.

Fleet Services should continue with its plans to purchase a new fleet management information system to replace the current RTA system. That change should give Fleet Services the capability to track essential measures of performance and fleet costs.

In our brief review of the City's Water and Fire Department fleets, we identified a number of areas that could be improved upon. Of utmost importance is the need to relocate the Fire fleet operation because of Interstate 215 alterations that are close at hand.

Duplication of many fleet functions -- as well as management and supervision, facilities, shop equipment and personnel – is evident among the Water, Fire and Fleet Services fleets. This -- coupled with below-average productivity rates, non-competitive shop labor rates and the fact that critical "best fleet practices" are missing from each organization -- lead us to conclude that merging some aspects of these three fleets would be in the best interest of the City.

Centralizing fleet management by placing the some of the Fire and Water fleets under the direction of the City's Fleet Services Division, where a Fleet Manager and administrative support personnel are currently in place, would be a good place to begin.

Fleet Utilization Analysis

The City of San Bernardino has a major investment in its fleet of vehicles and equipment, estimated at between $45 and $50 million. The fleet is comprised of 728 units, including sedans, trucks, police vehicles, construction equipment, refuse trucks and miscellaneous equipment.

Management Partners spent two months in 2006 evaluating the utilization of the City's fleet. We examined fleet historical mileage and hour usage data, as well as maintenance and ownership costs. Additionally, we reviewed questionnaires pertaining to each unit's intended use and interviewed Fleet Services personnel about utilization issues.

We used a utilization methodology that first segregated vehicle and equipment classes into functional categories. We then calculated the average miles/hours for each category, to which we applied a formula to arrive at a high, medium and low use for each vehicle and piece of equipment in the fleet.

This enabled us to isolate underutilized units, which become potential candidates for reassignment or disposal. These units were further evaluated by reviewing questionnaires that we had asked all City departments to complete about how they utilized each vehicle and pieces of equipment.

Our analysis identified 45 units that we recommend should be reassigned or disposed of. This includes several units that we feel can be replaced with more efficient and economical electric vehicles. Of the 587 units of rolling stock, we identified 33 units that we recommend be disposed of and 10 units that should be reassigned to the shop loaner pool – or a newly established heavy equipment pool that we are endorsing. This represents more than 7% of all sedans, trucks and heavy equipment in the fleet. Of the 141 non-metered and small equipment units, we identified two units be surplused.

If adopted, the potential savings from surplusing the 35 units identified in this report would amount to about $65,000 in operational costs and $286,000 in cost avoidance (not having to replace vehicles and equipment) savings during the first year. Additionally, the City would realize about $65,000 in income as a result of surplusing some of these units.

Over a 10-year period, the City would realize more than $3.5 million in operational costs and cost avoidance savings.

A significant part of this study was devoted to identifying alternative means of transportation to permanently assigned vehicles and equipment. These included departmental pooling, citywide pooling, use of personal vehicles and utilizing rental vehicles.

As part of this study, we also examined how the City uses its central motor pool, standby and take home units, and personal use of vehicles to perform City business. As a result, we are recommending that the City eliminate its central motor pool and establish contracts with commercial rent-a-car agency(s) to supply vehicles upon demand. We also are encouraging the use of personally owned vehicles when appropriate, as it is far more economical than using a pool or assigned vehicle.

We also recommend developing a centralized heavy equipment pool, using various heavy equipment units that have been slated for reduction from the fleet. This can be accomplished without having to purchase any additional heavy equipment units.

There are a number of fleet management issues that have been identified in this study. As a result, we are strongly recommending that the City establish a Fleet Committee charged with developing policy and guidelines relating to vehicle assignment criteria, standby and take home usage and use of personal vehicles.

FLEET SERVICES CHECKUP ASSESSMENT

San Bernardino Fleet Services Division

This part of the report is divided into primary service delivery sections common to most public sector fleets. Each section identifies those areas where "best fleet management practices" are being used and identifies ways to achieve better results in those areas where they are not. We have provided specific recommendations for improvements to the fleet program. The information contained in this report is based on data the City provided, telephone conversations, and on-site assessment and interviews.

Fleet Organization, Structure and Policy

Fleet Services is a division of San Bernardino's Public Services Department. The City's fleet of 728 units includes 301 light-duty sedans, pickups, vans and SUVs; 106 pieces of medium, heavy duty and off-road equipment; 118 patrol units, 71 refuse trucks and 132 pieces of non-self-propelled small equipment (i.e., trailers, compressors).

Fleet Services does not maintain the City's Fire fleet (122 units) or the City's Municipal Water Department fleet (278 units), both of which service their own units. Fleet Services does assist the Fire Department in procuring its light-duty vehicles.

As is the case with many cities, in San Bernardino the fleet services program is part of the Public Services Department.

The City maintains a Fleet Policy and Procedures manual, but it falls short of addressing many key fleet management functions.

The most critical policy management functions for any successful fleet organization should include:

- Fleet policy and financial management
- Customer services management
- Fleet cost control and charge-back management
- Assignment and fleet size management
- Fleet replacement (cycling) management
- Fleet service delivery management

The creation of a Vehicle and Equipment Committee or Fleet Advisory Board is an ideal way in which to address many fleet-related issues. The committee/board should be comprised of fleet customers (managers), staffed by a fleet manager or designee, and presided over by the Finance Director or someone from the City Manager's Office.

This committee/board should be charged with developing policy and guidelines relating to vehicle assignment criteria, standby and take-home usage, and use of personal vehicles. Furthermore, the Committee/Board should act as a platform by which fleet management and its customers communicate ongoing fleet service-related issues. It also should act as a review board to evaluate all requests for additions to the fleet.

One of the key elements missing from San Bernardino's fleet program is written service level agreements. Service-level agreements should be developed between Fleet Management and each of its largest customers. These formal agreements should set out fleet services, charges, responsibilities of the parties and level of services, including priorities, policies and standards.

Recommendation 1: Form a Vehicle and Equipment Committee or Fleet Advisory Board.

Recommendation 2: Develop service level agreements between Fleet Services and each of its largest customers.

Staffing

The Fleet Services Division is part of the Public Services Department. The Division is comprised of a fleet manager, an equipment maintenance supervisor, three supervising equipment mechanics, 19 equipment mechanics, one fabricating welder, one fleet service worker, one tire repair worker, three extra relief heavy laborers, one senior parts specialist, one storekeeper, one administrative operations supervisor and two clerks.

A fleet operations coordinator also is part of the Fleet Division, but is budgeted in the Refuse Division. This position acts as a liaison between Fleet and Refuse, and is also responsible for training, DOT drug testing, DMV registration and licensing (commercial) city drivers.

Fleet Services is responsible for supervising two equipment repair workers who repair refuse bins. These positions are budgeted in the Refuse Division of Public Services.

Clerical, accounting, data entry and administrative support is accomplished by an administrative operations supervisor, an account clerk II and an administrative clerk II. The Administrative Operations Supervisor is also responsible for supervising a senior parts specialist and a storekeeper.

An equipment maintenance supervisor is responsible for supervising the three supervising equipment mechanics -- two on day shift and one on night shift. The three mechanics spend approximately one-third of their time wrenching.

It appears that Fleet Services is not adequately staffed with mechanics, based on an estimated productivity rate (wrenching hours) of 69%. By increasing productivity to 75%, and committing to replacing vehicles and equipment on a timely basis, the current staff should be able to support the existing workload.

The three extra relief heavy laborers are responsible for chasing parts, clean up, washing cars and various other non-mechanical duties.

Fleet Facility

All maintenance and repair work is performed at one location in the Public Works Corporation Yard. The shop has 13 heavy equipment repair bays, 10 light equipment repair bays and two

tire repair bays. There are two additional bays dedicated to repairing refuse bins and one bay that is used for welding tasks.

The parts inventory is centrically located within the shop, where mechanics can easily access parts. The shop offices upstairs house six administrative personnel.

The number of repair bays is sufficient to support the current complement of mechanics. However, transferring the bin repair operation to another location in the Corporation Yard would free up an additional three work bays. Shop equipment appears to be adequate.

There is no designated "ready line" or "customer service area" for vehicles that have been repaired, or for customers bringing their vehicles in for service. Consequently, customers must find a parking space among units that have already been repaired or park in front of the repair bays.

Recommendation 3: Designate a parking area for customers who bring their units in for service, and a separate area for vehicles that have been serviced and are ready to be picked up.

Performance Measures

Fleet Services does not have any performance measures in place at this time. Performance measures are an objective way of documenting fleet management performance, including the level of service to its customers. They provide a basis for internal trend analysis, and for comparison between fleets by tracking and monitoring resources (inputs) and workload statistics (outputs), and measuring the degree of efficiency and effectiveness of the operation.

The current fleet software system is primarily used to track vehicle and equipment assignments, costs, labor hours and service scheduling. Without key fleet performance measures data, it is impossible to measure the efficiency of the City's fleet operation. Examples of performance measures not being tracked include:

- Standards for measuring a mechanic's performance for preventive maintenance services or for various repair tasks
- Vehicle and equipment downtime
- Repeat repairs (comebacks)
- Vehicle hours (or days) lost waiting for parts
- Percentage of repairs delayed due to stock-outs/lack of parts

Recommendation 4: Establish and monitor performance standards, with the goal of measuring performance against industry and shop standards.

Preventive Maintenance Program

Fleet Services does all its preventive maintenance (PM) servicing during normal working hours (7 a.m. to 5:30 p.m.), Monday through Friday. But that is when most of its customers are utilizing their vehicles and equipment. The swing shift (2:30-11 p.m.) primarily is dedicated to servicing refuse trucks and some heavy duty units.

Except for Police patrol units, customers are not notified to bring their vehicles and equipment in for servicing. This responsibility is left up to customers, who must remember to check the sticker in the vehicle indicating when the next service is due. This process makes it extremely difficult for Fleet Services to plan its daily workload and is not considered a best fleet practice.

Several fleet customers have complained about the time that Fleet Services takes to complete preventative maintenance, stating that their vehicles are tied up for several days at a time. Additionally, Fleet Services has fallen behind in performing the state of California Biennial Inspection of Terminals (BIT) program, a legally mandated safety inspection. There are more than 100 heavy equipment units that are overdue for BIT Inspections.

There is no “fast lube” service in place for light-duty vehicles to accommodate customers who are in a hurry or need to travel great distances to the shop.

Fleet Services does not use a formal progressive multi-level (A, B, C) preventive maintenance (PM) program. One PM checklist is used for all light-duty units, and another PM checklist is used for medium and heavy-duty trucks. A preventive maintenance program must be designed around each vehicle and equipment classification to ensure proper maintenance occurs, and it must be specific for the conditions under which the units operate.

Fleet Services utilizes an oil sampling program to determine the optimum intervals to change oil in its heavy equipment. This is a best fleet management practice. Preventative maintenance is done on refuse trucks every 90 days or 300 gallons of fuel usage, whichever comes first. Vehicles and light duty trucks are PM’d every 6,000 miles or once per year.

> **Recommendation 5: Implement a multi-level preventative maintenance program that will be unique to each class in the fleet.**
>
> **Recommendation 6**: **Develop a pilot program that offers "fast lube" services (for "A" level preventative maintenance service) for customers who must travel significant distances to the shop facility.**
>
> **Recommendation 7**: **Consider performing most preventative maintenance work on a swing shift.**

These programs can provide greater flexibility for customers, while minimizing downtime and the number of loaner vehicles required. This is a key component for cutting excessive maintenance downtime.

> **Recommendation 8: Develop preventive maintenance performance measures.**

Parts Program

The parts room is centrally located in the shop, so mechanics can easily access parts needed. At the time of this review, the inventory was being converted over to a bar code system.

The Fleet Division's parts unit is understaffed. A benchmark ratio of parts personnel to mechanics is one parts worker for every seven to eight mechanics. Currently, the ratio of parts personnel to mechanics is 1:12.

One of the administrative operations supervisor's duties is to supervise the parts operation, which currently consists of two people. This responsibility would best be served by the equipment maintenance supervisor who overseas the maintenance and repair operation.

The total annual budget for parts is $1.1 million. This represents 16% of the total fleet budget. There are 1,737 items carried in inventory, valued at $216,161. Inventory level in relation to overall parts expenditures is approximately 1:5.

Parts are not marked up and there is no formula in place to calculate a markup by which you could benchmark against. Furthermore, there are no parts inventory performance measures in place such as:

- Downtime due to parts
- Percentage of repairs delayed due to stock-outs/lack of parts
- Percentage charge or markup on the price of parts; by light duty; by heavy duty
- Parts turnover ratio (total number of parts used during a specified period, divided by the average number of parts on hand at any given time)

Recommendation 9: Add one FTE storekeeper position.

Recommendation 10: Develop and use parts inventory performance measures.

Recommendation 11: Develop a parts markup system that reflects the true cost of providing this service.

Recommendation 12: Transfer all parts supervision duties from the administrative operations supervisor to the equipment maintenance supervisor.

Fuel Program

Fleet Services is responsible for fueling operations. City vehicle operators fuel their vehicles and equipment at one central fueling site, located at the Corporation Yard. There are four unleaded fuel pumps and four diesel pumps, supported by two, 20,000-gallon underground tanks. The fuel site is in compliance with state and federal regulations.

During the past 12 months, the City used 401,138 gallons of unleaded fuel, costing $1,057,335, at an average price of $2.64 per gallon. The City used 445,262 gallons of diesel fuel costing $1,302,937 at an average price of $2.93 per gallon

There are various above-ground fuel tanks throughout the City that support the Fire Department.

Vehicle operators are issued fuel cards by the Purchasing Department to purchase fuel at Chevron and Golden Gate Petroleum. Fleet Services marks its fuel up 10%.

The City has done an excellent job in utilizing alternative fuel vehicles in its fleet. Currently, there are 19 compressed natural gas (CNG) vehicles. The CNG vehicles are fueled at the San Bernardino County Yard. The City has a contract with City of Redlands L-CNG facility about 9 miles away for emergency backup, and it will utilize this facility once the new liquid natural gas (LNG) refuse trucks come on line.

A $750,000 L-CNG facility is scheduled to be constructed adjacent to the City's current fueling operation. It will have a 15,000-gallon LNG capacity and be able to produce CNG as well. It is being built in response to the CARB 1193 and 1196 regulations that require all refuse trucks and equipment over a certain GVW to utilize CNG or L-CNG fuels.

The facility will be open to the public and various other public agencies. The City has ordered 22 C-LNG trucks for delivery this year and will be converting its entire refuse fleet of 85 units to C-LNG over the next several years.

Under the City's current fuel program, vital fuel data is captured through the Trac system. Customers must utilize an employee key and a vehicle key to access fuel. The employee key also is used to access the Corporation Yard after hours. Consequently, Fleet Services is able to track such things as:

- Average fuel consumption (mpg) by vehicle and by class
- Fuel cost per mile
- Average total fuel cost by class

All of these are critical elements in measuring a vehicle's performance.

Customers are charged a $5 fee for each fuel key that is lost. We were informed that some customers, such as Police, will fill several vehicles from one key, which in most cases will cause the Trac system to become inoperative. This practice distorts fuel information that can affect many vehicle performance measures.

Recommendation 13: Levy a service charge on fuel transactions in which more than one vehicle is fueled from one key.

Vehicle Washing

Fleet Services operates a drive-through wash rack that is old and requires many repairs throughout the year. Adjacent to the wash rack are two new steam cleaners, which operators can use to clean their equipment. The City has a Fleet account with Miracle Mile Car Wash in which vehicle operators pay $2 for a full service wash (interior and exterior). One thousand dollars was budgeted last year for car washes.

Sublet Program

Fleet Services contracts out a reasonable amount of repair work. A total of $420,000 was budgeted this year for services such as towing, paint and body repairs, glass replacement, transmission repairs and some diagnostic work. This amounts to 6% of the total Fleet budget.

According to Fleet Services, a large amount of the parts budget is spent on tires.

Sublet work is not marked up and there is no formula in place to calculate a markup by which to benchmark against. Furthermore, there are no sublet performance measures in place.

Recommendation 14: Develop performance measures for sublet repair work.

Recommendation 15: Develop a markup system that reflects the true cost of utilizing sublet repair and auxiliary services.

Shop Labor Rates and Charge-Back Rate Development

Fleet Services recoups its operational costs by billing its customers directly for maintenance and repair services rendered. Costs are tabulated from shop work orders that contain labor hours, parts and sublet work. Fuel costs are captured from the Trac system and are marked up 10 percent. Parts and sublet work are not marked up.

Fleet Services uses a shop labor rate of $60 per hour to price shop work orders. There are no separate shop labor rates for maintaining light duty, heavy duty or miscellaneous equipment. This rate is based on taking Fleet Services operational cost and dividing it by the total number of annual billable hours (wrenching hours) of all mechanics who wrench.

Since Fleet Services does not track wrenching hours, the City has estimated that each mechanic wrenches an average of 6.5 hours per day. This represents an 81% productivity rate, which is much higher than what we commonly find in public agencies.

Based on discussions with Fleet Management staff, we estimated the mechanic's productivity rate at between 65-69%. California and national local government fleet surveys suggest that productive time for average- to well-managed public sector fleets range from 70% to 75%. Some government fleets achieve between 75% and 80%. In the private sector, this number is estimated to be 80% to 85%. A goal of Fleet Services should be to increase the wrenching productivity of its mechanics to 75%-77%.

This translates into a shop labor rate of $71.50 to $75.60 per hour.

Indirect costs for some City internal services (IT, facilities maintenance, insurance) are contained in the Fleet Services budget. However, a number of internal service allocations are not accounted for, such as legal, human resources, purchasing and finance. We estimated these costs to be approximately 4% of the Fleet Services budget, or about $91,000. When this figure is added to the current cost of Fleet Services, the shop labor rate increases to between $74.09 and $78.35 per hour.

According to Fleet Services, local private sector costs for general light-duty repairs range from $50 to $60 per hour. Heavy equipment repairs range from $65 to $85 per hour. Dealer costs range from $68 per hour for light-duty repairs to $95 per hour for heavy equipment repairs.

The City's chargeback rates may be fine for recovering fleet operational costs, but do little to

encourage fleet customers to minimize fleet size or influence efficiency in the vehicle support system.

When costs are identified and visible to the customer department, the customer tends to economize. And when customers are not held accountable, overall fleet costs rise, and customer responsibility and care for equipment tends to lessen.

Public agencies use various chargeback structures to recoup their Fleet costs. One structure we feel is useful in controlling fleet size, and which has proven successful for other fleet operations, is a three-tiered system that incorporates:

- A monthly flat fee that recoups the replacement costs over the life of the unit
- A standing or flat fee that captures the administrative overhead cost of the unit
- A direct charge or cost per mile rate that recovers the operational costs of the unit (costs associated with fuel, tires, maintenance and repair).

Shop labor rates (and markups), if developed properly, are an intricate tool used to compare the costs of internal fleet services with the costs of services offered by private contractors. Furthermore, they are useful when benchmarking against other public agencies.

This fleet checkup is designed to address only one of many fleet activity centers: The maintenance and repair function. Allocating all of the fleet labor and costs into the remaining activity cost centers (i.e. parts, fueling, contract services, administration) enables an organization to calculate standard measures of performance.

This will assist in determining the cost competitiveness of each service, to evaluate the efficiency of the services and for benchmarking purposes. This type of study also makes it possible to calculate the overall maintenance and repair productivity rate, and compare it to industry standards.

Recommendation 16: Develop a charge-back system that incorporates fleet replacement, overhead and all operational costs.

Recommendation 17: Perform an activity based costing analysis of the fleet operation.

Fleet Management Information System

Fleet Services currently uses RTA Fleet Management software as its information system.

This fleet management information system has limited capabilities. The division accesses few reports from the system that are vital to managing the fleet. Additionally, mechanics manually fill out work orders and do not have online access to fleet information that is vital to their trade. Furthermore, customers are not connected to Fleet Services to validate or update their fleet inventory, reserve a pool car or look up the status of a work order.

Fleet Services is currently evaluating other fleet management information systems that will better serve their purposes.

Recommendation 18: Include in the fleet management information system request for proposals the capability to track performance measures that monitor and manage the Fleet Management function, and the capacity to design reports that will capture information supporting those measures.

Vehicle Pooling, Utilization and Disposal

The City operates a central motor pool at City Hall consisting of five units. There are three Chevrolet Cavaliers, ranging in age from six to nine years old, and two nine-year-old Ford Crown Victorias.

Fleet Services maintains a shop loaner pool consisting of 10 older model vehicles, including a passenger van, a cargo van, a flat bed truck and seven sedans. There is no heavy equipment pool.

City Hall pool vehicles and shop loaner pool vehicles are charged out on a daily or per-mile basis. Vehicles checked out for less than one day are charged at a rate of $0.21/mile. Vehicles checked out for more than one day are charged a flat rate of $0.86 per hour (maximum of eight hours), plus $0.21/mile.

We are not sure if these charges cover the cost of operating this program. Additionally, Fleet Services was unable to tell us if they were retaining the correct number of units to satisfy the demand.

It is not a best fleet practice to use older cars as pool cars, especially in departmental or central pools where the goal is to “attract” city personnel to use pool cars in lieu of assigned vehicles that cost a city a great deal more to own and operate. The City does not regularly utilize rental car agencies to augment its pools.

The City uses the services of general auctioneers in Buena Park to auction approximately 70-80 units per year. General Auctioneers charges 1.5% of the selling price, which includes picking up the unit.

Fleet Replacement Funding

The City of San Bernardino used to maintain a vehicle and equipment replacement program. It collected money from user departments annually to offset the future cost of replacement. However, starting in FY05/06 this program was eliminated.

The City has a policy of replacing its sedans and light-duty trucks at 10 years or 100,000 miles, whichever comes first. These intervals are in line with other public fleets. Street sweepers are replaced every 13 to 16 years, or 60,000 miles, according to the City’s schedule. This interval exceeds the typical replacement schedule of seven years or 50,000 miles that we see in public agencies. Refuse trucks are replaced every seven years.
The City does not seem to have a rationale for its vehicle and equipment replacement schedules. There is no methodology or standards in place to support any of the replacement targets, such as downtime, salvage value, operational costs and ownership costs. Consequently, the City may be surplusing vehicles and equipment prior to or beyond their optimum economic life.

Keeping units in the fleet beyond their optimum economic life puts a burden on the customers who must now endure greater equipment downtime due to more extensive repairs, impacting their ability to accomplish their goals. It also drains Fleet Services, forcing it to expend more labor hours and parts to keep these units on the road. Surplusing units prematurely leads to higher costs associated with the purchase of replacement units.

While the City was operating its now-discontinued Vehicle Replacement Fund, two enterprise funds (Sewer and SBETA) did not contribute to it. Rather, those entities purchased or leased their vehicles and equipment on a year-to-year basis.

Two years ago, customers stopped paying into the fund. Instead, every year at budget time, funds are transferred from the General Fund into the Vehicle Replacement Fund to purchase replacement units. Over the past two years, the amount of funds set aside for replacement units has fallen short of the funds needed to replace vehicles and equipment, according to the replacement schedule.

Revenue from auction proceeds and fund interest earnings are not credited to this fund but, instead, are transferred into the General Fund -- except for vehicles and equipment that are part of enterprise funds such as Sewer and Refuse. If these revenue sources were credited to the Vehicle Replacement Fund, it would help stabilize the fund and reduce the monthly fees that customers are charged.

Furthermore, auction fees and make-ready costs are not figured into the monthly fees that customers pay.

Recommendation 19: Develop a methodology to support the replacement of vehicles and equipment based on the "optimum economic life point" of a unit.

Recommendation 20: Develop an accounting methodology that credits the Vehicle Replacement Fund with salvage revenues and interest earnings, and that incorporates auction fees and make-ready costs.

Recommendation 21: Reinstate the process of City departments setting aside funds on a regular basis for replacing their vehicles and equipment.

San Bernardino Municipal Water Department

Fleet Organization, Staffing and Facility

The Water Department's fleet consists of 178 rolling units and 100 pieces of miscellaneous equipment (i.e. generators, mowers, trailers). All units are maintained and repaired at the main yard located at 196 North "D" Street. The shop is open from 6 a.m. to 3:30 p.m., Monday thru Friday.

The repair shop consists of three light-equipment bays and one heavy equipment bay. The facility is barely adequate for this size fleet, and will need to be expanded if additional units are added to the fleet.

Water Department operators fuel at the main yard. There is one underground fuel tank that is divided in two, with 6,000 gallons of regular unleaded and 4,000 gallons of diesel. The fuel site is in compliance with state and federal regulations.

The "GasBoy" system is used to access fuel through four dispensers. The Water Department's alternative fuel vehicles fleet consists of 10 electric vehicles.

Water Fleet Services is adequately staffed for its number and size of units. Fleet staffing consists of one supervisor, one lead mechanic and two mechanics. All work a 9/80 shift. Mechanics open and close work orders and access their own parts from inventory or part runs.

The lead mechanic spends one hour each morning checking vehicles and equipment as they leave the yard in an effort to catch minor problems (i.e. lights, windshield wipers, low tires) prior to units getting into the field. But the responsibility for checking vehicles prior to going into the field should rest with operators, not the lead mechanic.

Maintenance and Repair

Preventive maintenance is performed every 5,000 miles or six months, whichever occurs first. A formal, progressive multi-level (A, B, C) preventive maintenance program is used, which is a best fleet management practice.

Fleet Services contracts for transmission work, paint and body work, upholstery work and air conditioning repairs. Smog work also is sublet at a cost of $50 per unit. We asked the Fleet Supervisor if his operation ever piggybacked with the City for contractual fleet services and was told no, that they could obtain better pricing because they pay their bills more readily and receive more favorable rates. But this is not accurate. For example, the Water Department is charged $88 per hour for work performed at Fairview Ford while the City pays only $75 per hour. Additionally, we learned that the Water Department pays $5 for a carwash (wash and vacuum) while the City pays only $2 for the same service.

> **Recommendation 22: Schedule a meeting between City of San Bernardino Fleet Services Division and Water Department Fleet Services to explore ways in which Water can piggyback with the City on commercial contract fleet services.**

Shop Labor Rate and Chargeback System

Water Department Fleet Services does not have a shop labor rate. According to the shop supervisor, customers are only billed for parts, fuel and sublet services. Shop labor and overhead costs are not charged out to divisions, except for Water Reclamation units, which are part of an enterprise fund.

With no shop labor rate in place, it is difficult to assess Water Fleet Services competitiveness in the marketplace. Furthermore, without a shop labor rate, it makes it difficult for the shop supervisor to determine if it is more economical to contract certain repair work out or perform the work in-house. Additionally, the situation impairs Fleet Services' ability to benchmark its costs with other public agencies. Based on limited data, we estimated the shop labor rate to be between $65 and $69 per hour.

It is unclear to us how Fleet Services chargeback system is able to recoup all its operational costs without a "loaded" shop labor rate and "markups" for parts, sublet repair and fueling services. Furthermore, it does little to encourage the behavior of fleet customers to minimize their fleet size or influence efficiency in the vehicle support system.

When costs are identified and visible to the customer department, the customer tends to economize. And when customers are not held accountable, overall fleet costs rise, and customer responsibility and care for equipment lessens.

For example, if individual divisions are charged directly for accidents, they are more likely to manage poor drivers by ensuring they attend driver training programs, and to document incidents of abuse, misuse and accidents in employee performance files.

One structure that is useful in controlling fleet size and has proven successful for other fleet operations is a three-tiered system that incorporates:

1. A monthly flat fee that recoups the replacement costs over the life the unit
2. A standing or flat fee that captures the administrative overhead cost of the unit
3. A direct charge or cost per mile rate that recovers the operational costs of the unit (costs associated with fuel, tires, maintenance and repair).

Recommendation 23: Develop a shop labor rate at Water Department Fleet Services, along with markups for parts, sublet repair and fueling services.

Recommendation 24: Develop a chargeback system at Water Department Fleet Services that incorporates fleet replacement, overhead and operational costs.

Performance Measures

Fleet Services does not have any performance measures in place at this time. Performance measures provide an objective way of documenting fleet management performance, including the level of service to its customers. They provide a basis for internal trend analysis and for comparison between fleets, by tracking and monitoring resources (inputs) and workload

statistics (outputs), and by measuring the degree of efficiency and effectiveness of the operation.

The current fleet software system (SunGard HTE Fleet Management) is primarily used to track vehicle and equipment assignments, costs, labor hours and service scheduling. The Shop Supervisor says that the current HTE system is difficult to work with and does not interface with the Water Department's accounting system.

Key fleet performance measures are not being tracked, making it impossible to measure the efficiency of the Water Department's fleet operation. Examples of performance measures not being tracked include:

- Standards for measuring a mechanic's performance for preventive maintenance services or for various repair tasks
- Vehicle and equipment downtime
- Repeat repairs (comebacks)
- Vehicle hours (or days) lost waiting for parts
- Percentage of repairs delayed due to stock outs/lack of parts

Recommendation 25: Establish and monitor performance standards in the Water Department Fleet Services area, with the goal of measuring performance against industry and shop standards.

Fleet Policy

Some aspects of fleet policy are contained in the Water Department's Policy and Procedures Manual, but they fall short of addressing many key fleet management functions. As stated above, in analysis of the City's Fleet Management operations, the most critical policy management functions for any successful fleet organization should include:

- Fleet policy and financial management
- Customer services management
- Fleet cost control and charge-back management
- Assignment and fleet size management
- Fleet replacement (cycling) management
- Fleet service delivery management

The creation of a Vehicle and Equipment Committee or Advisory Board is an ideal way in which to address many fleet-related issues. A committee/board should be comprised of fleet customers (managers), staffed by the Fleet Supervisor or designee, and presided over by the Finance Director or someone from the General Manager's Office.

This committee/board should be charged with developing policy and guidelines about vehicle assignment criteria, standby and take-home usage, and use of personal vehicles. Furthermore, the committee/board should be a platform through which fleet management and its customers communicate ongoing fleet service-related issues. And it should act as a review board to evaluate all requests for additions to the fleet.

One of the key elements missing from the Water Department's fleet program is written service level agreements. Service level agreements should be developed between Fleet Services and each of its largest customers. These formal agreements should set out fleet services, charges, responsibilities of the parties, and level of services, including priorities, policies and standards.

Recommendation 26: Develop a comprehensive and clearly defined fleet maintenance policy in the Water Department.

Recommendation 27: Form a Vehicle and Equipment Committee or Fleet Advisory Board for Water Department Fleet Services.

Recommendation 28: Develop service level agreements between Water Fleet Services and each of its largest customers.

Fleet Replacement Fund

The Water Department does not have a fleet replacement fund. Funding vehicles and equipment replacements is done on a year-to-year basis. Unfortunately, this process requires that requests for vehicles/equipment replacement funds have to "compete" with other Water Department programs and capital needs. This typically means that some units will not get replaced when they need to be.

Keeping units in the fleet beyond their optimum economic life puts a burden on the customer, who must endure greater equipment downtime due to more extensive repairs. This, in turn, impacts their ability to accomplish their goals. It also drains Fleet Services, forcing it to expend more labor hours and parts to keep these units on the road.

Recommendation 29: Establish a vehicle/equipment replacement fund for the Water Department in which customers contribute to the replacement cost of their units over time. This will guarantee that funds will always be available to replace units when they have reached the end of their useful life.

Fleet Utilization

In our discussions with Fleet Services personnel, no one seems to recollect when the last fleet utilization study was performed or when the last physical inventory of fleet units was done. Given this, it is highly probable that the Water Department's fleet may be "over-fleeted" and underutilized.

All fleet systems need to understand how their units are currently used and whether the transportation requirement currently assigned to a section can be satisfied by other means. We have found that in virtually all cases, a utilization study typically reduces the size of the fleet by at least 10 percent.

The objective of any utilization study is not only to identify underutilized units, but to offer alternative means of transportation, such as mileage reimbursement for using one's own vehicle, downsizing to less expensive and more economical units, centralized and departmental

pooling, sharing equipment with other public agencies, leasing equipment and the use of commercial rent-a-car firms.

We have found that in virtually all cases, a utilization study typically reduces the size of the fleet by at least 10 percent. The benefits to be derived from such a study are:

- A reduction in the size of the fleet
- One-time income generated from the sale of surplus vehicles and equipment
- Ongoing savings in the annual operating costs of those units that are surplused

Recommendation 30: Conduct a utilization study of the entire Water Department fleet in which divisions justify the need for each assignment.

San Bernardino Fire Department

Fleet Organization, Staffing and Facility

The City's Fire Department fleet consists of approximately 122 vehicles and pieces of equipment. This includes 32 pieces of fire apparatus (trucks, engines, brush trucks), 41 light-duty vehicles and 49 pieces of miscellaneous equipment (i.e. generators, compressors). This includes nine units from the San Manuel Fire Department that Equipment Maintenance services on a regular basis.

All units are maintained and repaired at the main shop facility located at 1208 North "H" Street. The shop is open from 6 a.m. to 3:30 p.m., Monday thru Friday.

The main repair shop was closed several years ago due to ceiling damage. It has not been repaired and is currently being used as a storage area. Consequently, all repair work is accomplished in a Quonset hut located behind the main shop. Some work is done outside as the current shop is not large enough to accommodate more than two large fire apparatus at one time. The shop is clean and well organized but very cramped.

The Equipment Maintenance Shop will need to be relocated as Cal Trans has plans to alter Interstate 215 and build an off-ramp through the area where the shop is located.

Equipment Maintenance is adequately staffed for its fleet size. Fleet staffing consists of one equipment maintenance supervisor and three equipment maintenance mechanics. All work a 9/80 shift. Mechanics open and close work orders, and can access their own parts from inventory or part runs. In discussions with Fire staff, they indicated the need for one additional apprentice mechanic, which would allow more work to be done in the field.

The Fire Department does most of its fueling from the City's fuel facility. Under the City's current fuel program, vital fuel data is captured through the Trac system. Additionally, there are three above-the-ground diesel fuel tanks situated at three Fire stations throughout the City.

Maintenance and Repair

Preventive maintenance is performed every 5,000 miles or six months, whichever occurs first. A formal, progressive multi-level (A, B, C) preventive maintenance program is used, which is a best fleet management practice.

Equipment Maintenance contracts for transmission work, some heavy equipment repairs, paint and body work, and upholstery work. Local vendors charge between $90-$95 per hour for transmission and heavy engine repairs.

> **Recommendation 31: Schedule a meeting between the Fire Department Equipment Maintenance staff and the City of San Bernardino Fleet Services Division to explore ways in which Fire can piggyback with the City on commercial contract fleet services.**

Shop Labor Rate and Chargeback System

Equipment Maintenance does not have a shop labor rate. Based on limited data, we calculated the shop labor rate to be between $67 and $71 per hour.

With no shop labor rate in place, it is difficult to assess Equipment Maintenance's competitiveness in the marketplace. Furthermore, without a shop labor rate, it makes it difficult for the shop supervisor to determine if it is more economical to contract certain repair work out or perform the work in-house. Additionally, the situation impairs Equipment Maintenance ability to benchmark its costs with other public agencies.

Recommendation 32: Develop a shop labor rate, along with markups for parts and sublet repair services, for Fire Department Equipment Maintenance.

Performance Measures

Equipment Maintenance does not have any performance measures in place. Performance measures provide an objective way of documenting fleet management performance, including the level of service to its customers. They provide a basis for internal trend analysis, and for comparison between fleets, by tracking and monitoring resources (inputs) and workload statistics (outputs), and by measuring the degree of efficiency and effectiveness of the operation.

Key fleet performance measures are not being tracked, making it impossible to measure the efficiency of the Fire Department's fleet operation. Examples include:

- Standards for measuring a mechanic's performance for preventive maintenance services or for various repair tasks
- Vehicle and equipment downtime
- Repeat repairs (comebacks)
- Vehicle-hours (or days) lost waiting for parts
- Percentage of repairs delayed due to stock outs/lack of parts

Equipment Maintenance does not operate a fleet management information system. Consequently, most paperwork is done manually, including shop work orders, posting of parts, sublet repair work and labor hours. Furthermore, the lack of a fleet software system makes it difficult to track and monitor performance measures.

Recommendation 33: Establish and monitor performance standards in the Fire Department Equipment Maintenance unit, with the goal of measuring performance against industry and shop standards.

Recommendation 34: Piggy back with the City of San Bernardino for a fleet software system that serves Fire Department Equipment Maintenance needs.

Fleet Policy

Equipment Maintenance has put together a fleet operations manual, but it falls short of addressing many key fleet management functions. The most critical policy management functions for any successful fleet organization should include:

- Fleet policy and financial management
- Customer services management
- Fleet cost control and charge-back management
- Assignment and fleet size management
- Fleet replacement (cycling) management
- Fleet service delivery management

The creation of a Vehicle and Equipment Committee or Advisory Board is an ideal way in which to address many fleet-related issues. A committee/board should be composed of fleet customers (managers), staffed by the fleet supervisor or designee, and presided over by the Finance Director or someone from the General Manager's Office.

This committee/board should be charged with developing policy and guidelines for vehicle assignment criteria, standby and take-home usage, and use of personal vehicles. Furthermore, the committee/board should act as a platform through which fleet management and its customers communicate ongoing fleet service-related issues. And it should be a review board to evaluate all requests for additions to the fleet.

One of the key elements missing from the Fire Department's fleet program is written service level agreements. Service level agreements should be developed between Equipment Maintenance and each of its largest customers. These formal agreements should set out fleet services, charges, responsibilities of the parties and level of services, including priorities, policies and standards.

Recommendation 35: Develop a comprehensive and clearly defined fleet maintenance policy for Fire Department Equipment Maintenance operations.

Recommendation 36: Form a Vehicle and Equipment Committee or Fleet Advisory Board.

Recommendation 37: Develop service level agreements between Fleet Maintenance and each large customer.

Fleet Replacement Fund

The Fire Department uses the City's fleet replacement fund for its light-duty vehicles and equipment. However, there is no replacement fund in place for heavy equipment such as trucks, engines and brush trucks. Funding for these units is done on a year-to-year basis.

Unfortunately, this process requires that requests for vehicles/equipment replacement funds have to "compete" with other Fire Department programs and capital needs. This typically means that some units will not get replaced when they need to be.

Keeping units in the fleet beyond their optimum economic life puts a burden on the customer, who must endure greater equipment downtime due to more extensive repairs. This, in turn, impacts customers' ability to accomplish their goals. It also drains Equipment Services, forcing it to expend more labor hours and parts to keep these units on the road.

Recommendation 38: Incorporate heavy equipment into the City's vehicle/equipment replacement fund.

Merging the Fleets

As part of this study, Management Partners was asked to identify opportunities for improvement in the fleet operations of the Municipal Water Department, the Fire Department and the City's Fleet Services Division, and to look at the concept of merging all or part of the three fleets.

Among our recommendations for improvement, we identified several areas common to all three fleets that we feel need to be addressed if they are to be successful. Of utmost importance is the need for a reliable and easy-to-use fleet management information system. Additionally, all three fleets need to establish:

- Performance standards, with the goal of measuring performance against industry and shop standards
- Al comprehensive and clearly defined fleet maintenance policy
- Service level agreements with each of its largest customers
- A shop labor rate, along with markups for parts, sublet repairs and fueling services

To help understand each fleet's organization, we put together an overview of each fleet, including number and types of units it services, staffing levels and a breakdown of budgeted costs. Additionally, the exhibit reflects an estimate of mechanic productivity (wrenching hours), as well as a burdened shop labor rate for each organization.

All three fleets have productivity rates ranging from 67%-69%, which are below average for well-run public fleets. A goal should be to increase the wrenching productivity of mechanics to 75% to 77%. The Fire and Water agencies do not have shop labor rates, but we estimate them to be $67 to $71 per hour and $65 to $69 per hour, respectively. The shop rate employed by the City's Fleet Services Division of $60 per hour is understated by $15 to $20 per hour, based on our calculation.

These rates are not competitive with commercial general repair shops in the area, where light-duty repairs range from $50 to $60 per hour. Dealer rates for light-duty repairs range from $68 to $70 per hour.

Small fleets (fewer than 300 units) generally have a hard time being competitive because there are not enough units to distribute the overhead costs among. The Fire and Water fleets are examples of this. For this reason, we typically encourage fleets to look for additional customers to add their fleets, such as school districts and other public agencies.

Another important element missing from both the Fire and Water fleets is a professional fleet manager -- a person with the skills for planning and analyzing fleet operations and future needs. These responsibilities are currently performed by the Fire and Water shop supervisors, and the managers they report to, who also are responsible for other, non-fleet related duties. As these fleets grow in size, the need for professional management will become more evident.

Duplication of many fleet functions, as well as management and supervision, facilities, shop equipment and personnel is evident among the Water, Fire and Fleet Services fleets. This -- coupled with below-average productivity rates, non-competitive shop labor rates and the fact that critical “best fleet practices” are missing from each organization – lead us to conclude that merging the three fleets would be in the best interest of the City.

Centralizing the fleet management function and implementing a customer-driven and market-driven approach has the potential to reduce fleet costs and improve fleet operations. The most apparent solution would be to place the Fire and Water fleets under the direction of the City’s Fleet Services Division, where a Fleet Manager and administrative support personnel are currently in place.

However, we believe that more analysis needs be done to address such issues as facility size and location, shop equipment, personnel, customer requirements, parking and access elements, fueling and the composition and duties of a Fleet Advisory Board. One of the first and critical issues to be dealt with is the Fire Department’s need to relocate its shop because of the re-routing of Interstate 215. This will require the City to purchase a site and construct a new repair shop in the near future. As a first step towards possible full merger we would recommend that the City Fleet services take over maintenance of all non-truck maintenance for the Fire Department.

We believe that these issues will need to be studied in greater detail to identify the options available to properly integrate the Fire, Water and City fleets. Management Partners is prepared to take on this task and would be happy to put together a proposal that would outline the scope of work required.

FLEET UTILIZATION ANALYSIS

Introduction

The focus of the fleet utilization study was to analyze each department's permanently assigned and temporary vehicle requirements. We were asked to recommend how best to accomplish the City of San Bernardino's business objectives using one of the following means of transportation:

- Permanently assigned city vehicle
- Departmental pooling
- City-wide pooling
- Use of personal vehicles
- Renting or leasing

Additionally, Management Partners evaluated the City's use of pool vehicles, daily take-home and standby units, personal mileage and monthly car allowances.

Study Methodology

Data Collection

Vehicle utilization, by most standards, is measured by miles driven on an annual basis. However, mileage is not always the best indicator of usage. This study will adopt "functional categories" that can be used in conjunction with mileage. It will categorize the City's vehicle and equipment fleet into seven functional categories to develop utilization criteria.

To accomplish the requirements of the scope of work, Management Partners took the following approach:

- We requested usage data on each piece of motorized and non-motorized vehicles and equipment in the fleet. This data included the units, City identification number, make, model, year, classification, department/division to which assigned, domiciled location, current odometer and/or hour meter reading (as of August 2006), total months in service and usage over the last 12 months. We used mileage and hour usage from the RTA Fleet Management Information System for FY05/06 in this study.
- We asked all City departments to fill out a questionnaire for each unit within their jurisdiction that Fleet Services maintains, including small, non-motorized equipment. The questionnaire was designed to determine each unit's intended use, equipment and loads transported, destinations and frequency of use. Many questionnaires were returned late and incomplete.

Management Partners discovered 73 pieces of shop equipment that were not included as part of the City's fleet inventory. Additionally, we became aware of 150 pieces of miscellaneous equipment that is not being serviced by Fleet Management (i.e. edgers, mowers, trimmers, welders, blowers).

Most of this equipment belongs to the Parks and Recreation Department and the Streets Division, and is either maintained by City personnel or contracted out to local vendors. These units were not analyzed.

To properly analyze the central administrative and shop loaner pools, we requested usage data and chargeback costs for pertaining to each vehicle. We also examined take-home and standby unit usage. Data on personal vehicle usage for City business was not available.

We also reviewed City policy and guidelines relating to vehicle assignments, daily take-home and standby vehicles, and personal vehicle usage reimbursement.

Analyzed Data

We reviewed usage data and assigned each unit into one of seven functional categories. We then calculated the average monthly usage (miles/hours) of each unit in the fleet and developed an overall average monthly usage for each class (or similar classes) within each functional category.

Usage factors (% of monthly usage) were applied to each of the overall average monthly usage figures to arrive at “low use”, “medium use” and “high use” ranges for each class grouping. These ranges become the basis for the justification range for all units having miles/hours as their utilization criteria.

This analysis enabled us to identify underutilized vehicles and equipment in the fleet, and then examine how they were being used, based on data contained in our survey questionnaires.

Breakeven Point Analysis

We performed a breakeven point analysis to determine the point at which the City can own, operate and maintain an assigned vehicle more economically than reimbursing City employees to drive personally owned vehicles or using a City pool unit. Additionally, we performed a breakeven point analysis to determine when it is more economical to use a City pool car versus a rental car.

Recommendations

We recommended fleet reductions, along with an estimate of their salvage value, estimated annual maintenance and repair cost savings, and replacement cost savings. Additionally, we recommended adjusting the makeup and number of pool units, and establishing a heavy equipment pool comprised of equipment we identified as underutilized and that would otherwise be surplused.

Measuring Fleet Utilization and Developing Utilization Criteria

Vehicle and Equipment Functional Categories

To measure utilization, the City's vehicle and equipment fleet was divided into seven functional categories under two broad classifications: general use" and "special use". Within the "general use" classification are three functional categories and under the "special use" classification are four functional categories.

GENERAL USE

1. General Use Vehicles and Equipment

These are vehicles without special equipment that are used for general transportation of personnel and material. They can be rotated between high and low mileage assignments.

Specific examples in the City fleet: **sedans, vans, SUV's and light trucks**.

2. Mobile Work Station Vehicles and Equipment

These are vehicles and equipment that transport craft workers, tools and equipment that perform specialized work and have special equipment installed. They normally have mileage criteria and may be rotated with other general-use vehicles by transfer of special equipment at a minimal cost.

Examples of equipment specific to these vehicles would be two-way radio(s), cross boxes, camper shells, utility bodies, equipment mounted inside vans, small cranes, hydraulic lift gates, racks, etc.

Specific examples in the city's fleet include**: vans, light and medium trucks, flatbed trucks.**

3. Project or short-term Fixed Duration Vehicles and Equipment

These are vehicles or equipment required for a specific project or activity for fixed, short time periods, which provides a mechanism for obtaining these vehicles in managed and cost effective manner. These units are normally rented or leased.

SPECIAL USE

The next four categories of vehicles and equipment are specially designed, outfitted or configured for a single activity, or they are used solely in support of a single activity. Some of these units have hour usage criteria.

4. Specially Designed/Modified Emergency Vehicles and Equipment

These are vehicles and equipment that are unique to the job -- emergency response – and are outfitted or configured with radios, light bars, computers, etc. These vehicles support activities required by law or policy to be on standby at all times to respond to emergencies or unusual events.

Examples include: **police patrol units, fire apparatus, ambulances, police motorcycles.**

5. Specially Designed/Modified Vehicles and Equipment

These are vehicles and equipment that are unique to the job requirement. They may be specially outfitted, configured for a single activity or one used solely in support of a single activity, and they have the following characteristics:

a. Permanently-installed features – cannot be economically used for any purpose other than the one for which it was designed; or

b. The transfer of equipment to permit rotation with other vehicles would require extensive modification of the unit and/or adversely impact safety.

Examples include: **utility trucks, digger derricks, boom trucks**.

6. Construction/Allied Equipment ("C" or "A")

These are mobile equipment or other construction equipment that are designed for a specific use and have unique design features. This category of equipment normally cannot be rotated for general use.

Examples include: **backhoes, loaders, tractors, graders, forklifts, sewer cleaners, rollers, gang mowers.**

Note: Most construction equipment is supplied with hour meters, not odometers, to track utilization. We were surprised to see that many of these units did not have hour meters, or they were inoperative.

7. Miscellaneous Equipment

These are hand-operated units such as **blowers, trimmers, edgers, push mowers.**

The City's fleet of 712 units was categorized into the seven functional categories as a basis for establishing utilization standards:

Functional Category	No. Units
General Use	
1. General Use Vehicles	71
2. Mobile Work Station Vehicles	108
3. Project or short-term Fixed Duration Vehicles	1
Special Use	
4. Specially Designed/Modified Emergency Vehicles	226
5. Specially Designed/Modified Vehicles	128
6. Construction/Allied Equipment (“C” or “A”)	120
7. Miscellaneous Equipment	58

Note: Sixteen (16) pool vehicles are not reflected in the Functional Category count.

Developing Utilization Criteria

The first step in establishing the utilization criteria was developing an average use per vehicle and equipment for each functional category. The second step was determining the minimum utilization standard required in justifying a unit’s existence in the fleet. The recommended utilization criteria are presented in this section for the various vehicle and equipment categories.

While we developed the new utilization criteria based on odometer readings, we had difficulty in developing usage averages for some vehicle and equipment classifications. For example, we noted that “like-year units” within the same functional category had odometer readings that varied considerably. This is due in part to the fact that many units are not salvaged when they are due for replacement. Rather, they remain in the fleet as spares, in pool units or they are reassigned to other departments. This makes it difficult to compute the actual miles/hours for which these units are intended to be used.

The formula for miles and hours of usage was constructed in a manner that allows the City to perform annual reviews and make adjustments as necessary. Elements of the formula, such as downtime, could vary with changes in fleet age and maintenance practices, as well as for vehicles and equipment that have been removed from service. We recommend doing an annual review of the calculations.

Actual miles/hours per month per class also should be tracked over the next year. The percentage formula, however, should remain the same, but adjustments to the annual miles/hours may be made based on the average for each vehicle and equipment classification.

Recommended Measurements for Miles Units

For this study, Fleet Services supplied mileage figures based on RTA’s Fleet Management Information System of tracking miles/hours. Exhibit I, entitled “Fleet Utilization Data-Mile Units”, contains data used as the basis for determining where to place each unit.

All units were assigned to one of seven functional categories. We then grouped similar classes together and computed their **life-to-date** average monthly usage, and their **last 12 months** average monthly usage. We compared both averages and decided to use the last 12 months averages. They seemed to be more representative of current usage than the life to date,

especially when you consider that many units are rotated among City departments during their lifetime.

Next, we added the average miles of each class from the last 12 months and divided this average by the number of units in each class to arrive at an overall monthly average miles figure for each class. We then applied the usage factors (see table below) to the average miles to arrive at "low use", "medium use" and "high use" ranges for class groupings. This average becomes the basis for the justification range for all units that have mileage as their utilization criteria.

Usage Factors

Three usage factors were developed for measuring utilization based on mileage:

High use – Usage exceeds 80% of annual average mileage
Medium use – Usage falls between 50-80% of annual average mileage
Low use – Usage averages less than 50% of annual average mileage

Example: General Use Vehicles and Equipment (Class-1322-Compact Sedan)
The annual average miles for all class 1322 compact sedans within the "General Use Vehicle & Equipment" category was computed at 457 miles per month. Applying the usage factors to this average, we developed the "high use" mileage range from 365 miles (80%) to 457 miles (100%); the "medium use" mileage range from 223 miles (50%) to 365 miles (80%); and the "low-use" mileage range from 0 miles to 228 miles (50%). This shows the range of utilization that is needed to justify the unit using miles as a criterion.

GENERAL USE

1. General Use Vehicles and Equipment

Class (Sedans, Vans, SUVs, Light-Duty Trucks)	Low Use	Medium Use	High Use
1322	0-228	223-365	365+
1332	0-249	249-388	388+
1342	0-259	259-415	415+
1418/1420/1421/1428	0-238	238-381	381+
1510/1521	0-170	170-272	272+
2413/2421	0-239	239-382	382+

2. Mobile Work Station Vehicles

Class (Vans, Light and Medium Duty Trucks, Flatbed Trucks)	Low Use	Medium Use	High Use
1342	0-264	264-422	422+
1421/1510/1511/1512/1521/1531	0-289	289-463	463+
1534/1634/2413/2421/2426/2511/2513/2514/2711/2712	0-193	193-309	309+

3. Project or short-term Fixed Duration Vehicles

Class (Classic Pickup Used in Parades)	Low Use	Medium Use	High Use
1521	NA	NA	NA

SPECIAL USE

4. Specially Designed/Modified Emergency Vehicles

Class (Patrol Units, Motorcycles)	Low Use	Medium Use	High Use
Patrol-1342/1348/1634/2413	0-652	652-1042	1042+
Motorcycle Patrol-1112	0-669	669-1071	1071+
Identification & Property 1348/1428/1531/1548/2540	0-325	325-520	520+
Investigations 1332/1348/1548/8796	0-497	497-796	796+
Met Division 1348/2421/2722	0-275	275-440	440+
Personnel & Training 1342/1348/2413/3413	0-498	498-796	796+
Police Administration 1348	0-333	333-534	534+
Traffic/Crossing Guards 0711/0741/1348/2548	0-605	605-969	969+
Vice & Narcotics 1322/1332/1348/1418/1421/1521/1612/1634/2421	0-512	512-819	819+
Facilities Management Parking District 1342/1348	0-57	57-92	92+

*The intent of developing utilization criteria for the above Police Department vehicles and equipment is to allow individual department management the opportunity to assess the assigned units within their respective organization. The criteria is unique to the Department's assigned units, and has been developed as a guideline for determining the best use of the vehicles and equipment. It is difficult to set parameters for emergency type units.

5. Specially Designed/Modified Vehicles

Class (Utility Trucks, Boom Trucks, Refuse Trucks)	Low Use	Medium Use	High Use
1211/1212	0-197	197-316	316+
2540	0-459	459-734	734+
3422/3711/3712/3740/5711/5741/5743/5765/6711/ 6712/6778/8767	0-289	289-463	463+
7712/7717/8712	0-119	119-191	191+
7743/8743	0-363	363-581	581+
9422	0-81	81-129	129+
1612	0-266	266-425	425+
8764	0-531	531-850	850+
8763/8767	0-419	419-670	670+

6. Construction/Allied Equipment ("C" or "A")

Class	Low Use	Medium Use	High Use
Construction Equipment			
7771 (Broom Sweepers)	0-124	124-198	198+
7775/8775/8776 (Sewer Trucks)	0-261	261-417	417+
9142/9143 (Backhoes, Loaders)	0-80	80-128	128+
9160 (Grader)	NA		
9310 (Forklifts)	0-270	270-432	432+
9443 (Rollers)	0-24	24-38	38+
8461/9621 (Trenchers, Tractors)	0-57	57-91	91+
Allied Equipment (Non-Metered)			
Trailers	NA		
Generators	NA		
Air Compressors	NA		
Mowers	NA		

7. Miscellaneous Equipment: Non-Metered

Class	Low-Use	Medium-Use	High-Use
Other	NA		

Summary of Distribution Miles

An inventory of all mile units can be found in Exhibit I "Miles Units-Utilization Data". Following is a summary of that distribution.

High Use	328
Medium Use	100
Low Use	129
N/A	5
Total Miles Units	**562**

Recommended Measurements for Hour Units

For this study, Fleet Services supplied mileage figures based on RTA's Fleet Management Information System of tracking miles/hours. Exhibit II, entitled "Fleet Utilization Data-Hour Units", contains data used as the basis for determining where to place each unit.

Eight units with hour meters were assigned to functional category six (Construction/Allied Equipment). We then grouped similar classes together and computed their life-to-date average monthly usage and their last 12 months average monthly usage. We compared both averages and decided to use averages from the last 12 months. They seemed to be more representative of current usage than the life to date, especially when you consider that many units are rotated among city departments during their lifetime.

Next, we added the average hours of each class from the last 12 months and divided this average by the number of units in each class to arrive at an overall monthly average hours figure for each class. We then applied the usage factors (see table below) to the average hours to arrive at "low use", "medium use" and "high use" ranges for class groupings. This average becomes the basis for the justification range for all units that have hours as their utilization criteria.

Example-Class 0340 (Hydroblaster):
The annual average hours for class 0340 (Hydroblaster) within the Construction/Allied Equipment category was computed at 12 hours per month. Consequently, the "high-use" hours range from 10 hours (80%) to 12 hours (100%); the "medium use" hours range from 6 hours (50%) to 10 hours (80%); and the "low-use" hours range from 0 hours to 6 hours (50%). This shows the range of utilization needed to justify the unit using hours as a criterion.

Usage Factors

Three usage factors were developed for measuring utilization based on hours:

High use – Usage meets or exceeds 80% of the average monthly hours
Medium use – Usage falls between 50-80% of the average monthly hours
Low use – Usage falls below 50% of the average monthly hours

6. Construction/Allied Equipment ("C" or "A")

Class	Low use	Medium use	High use
Construction Equipment			
9133/9160/9143/9210/9432 (Loaders, Graders, Paver)	0-9	914	14+
Allied Equipment			
0340 (Hydroblaster)	0-6	6-10	10+
0640 (Stump Grinder)	NA		

Summary of Distribution Hours

An inventory of all hour units can be found in Exhibit II "Hour Units-Utilization Data". Following is a summary of that distribution.

High use	3
Medium use	3
Low use	1
N/A	1
Total Miles Units	**8**

Optional Criteria for Allied and Miscellaneous Equipment

Fleet Services does not measure utilization for the 142 units of "allied" and "miscellaneous equipment," as many of these units (trailers, signs/arrow boards, pumps, etc.) do not have odometers or hour meters. In light of this, we have developed utilization criteria based on hours (time away from the parking location) that the City should consider using.

The recommended utilization criterion for these types of units is 80% of the unit's available time. For example, units assigned to a crew for an eight-hour shift must be in the field a minimum of 6.4 hours per day. The time difference is allowed for non-field type of activities (vehicle downtime, fueling, administrative activities, sick leave, vacation, other non-productive work, etc.). This utilization criterion, if used, will require well-defined methods of collecting, recording and reporting usage data to make the process beneficial to all fleet users.

Taking the utilization criteria, "hours away from the parking location," the following ranges were developed for all miscellaneous equipment, based on a 21-day work month.

Low Use	Medium Use	High Use
0-53	53-101	101-134

Note: *The high use range gives a base of 5.1 to 6.4 hours usage per day, the medium use range gives a base of 3.2 to 5.0 hours usage per day, and the low use range gives a base of 0 to 3.2 hours usage per day. Furthermore, we recommend the City adjust these utilization criteria for seasonal use units.*

Example-Trailers
A trailer classified as an "allied equipment" must be used a minimum of 101 to 134 hours per month to fall into the "high use" category. There are 134 available hours per month (6.4 hours x 21 workdays), and the "high-use" range for this classification is 101 (80%) to 134 (100%) hours per month.

This process would require completing manual logs that indicated the hours the unit is away from its parking location. The logs would require date, time out, time in, operator signature, unit number, work location, project number and functions the unit performs. These logs should be submitted to Fleet Services once per quarter at a minimum.

Summary Distribution of Fleet

The new utilization criteria has been applied to the current fleet to establish an overview of which units fall into the "high use," "medium use" and "low use" categories (See Exhibit I-III). This application is based on the odometer or hour usage data supplied to us by the City of San Bernardino,

The results of the application indicate that a substantial number of vehicles and equipment in the fleet are underutilized, but only 45 units are being recommended for elimination or pooling. In addition, 38 Police units have been identified as "low usage" units and will need to be reviewed internally. The remainder of the "low usage" units appear to be justified, based on our review of information contained in the questionnaires. Several "high usage" units were identified that we felt were not justified based on their intended use.

The following is a compilation of the City's entire fleet by utilization category:

High use	331
Medium use	103
Low use	130
N/A	6
Non-metered	142
Total	**712**

Note: Sixteen pool vehicles are not reflected in the functional category count. A list of pool vehicles and their usage can be found in Exhibit III.

Recommended Fleet Reductions

Fleet Reductions

Listed below are 45 vehicles and equipment we identified as candidates for surplusing and/or pooling, based on our analysis. This represents a 6% reduction in the total number of the City fleet units that this study examined. We also have identified a few units that should be removed from service and replaced with more economical units (i.e. substituting electric scooters for some of the full-size police sedans in the Facilities Management Department).

City Attorney

Unit #	Type	Location	Disposition
575	Sedan-Crown Vic	City Hall	Surplus

City Clerk

Unit #	Type	Location	Disposition
588	Mini Cargo Van	City Hall	Transfer-Shop Loaner Pool

Development Services

Unit #	Type	Location	Disposition
252	Sedan-Compact	City Hall	Surplus
253	Sedan-Compact	City Hall	Surplus

Economic Development Agency

Unit #	Type	Location	Disposition
602	Sedan-Patrol Unit	Carousal Mall	Surplus
603	Sedan-Patrol Unit	Carousal Mall	Surplus

Facilities Management

Unit #	Type	Location	Disposition
0601	Sedan-Patrol Unit	Downtown Security	Surplus/Replace w/Elec. Cart
0609	Sedan-Patrol Unit	Downtown Security	Surplus/Replace w/Elec. Cart

Finance

Unit #	Type	Location	Disposition
363	Pickup-Compact	City Hall	Transfer-Shop Loaner Pool

Human Resources-Risk Management

Unit #	Type	Location	Disposition
1098	Sedan-Full Size	City Hall	Surplus
1099	Sedan-Full Size	City Hall	Surplus

Library

Unit #	Type	Location	Disposition
1200	Pickup-Compact	City Hall	Transfer-Shop Loaner Pool

Public Services-Refuse

Unit #	Type	Location	Disposition
478	Sweeper	Corp Yard	Surplus
226	Sedan-Compact	Corp Yard	Surplus

Public Services-Fleet Services

Unit #	Type	Location	Disposition
387	Sedan-Full Size	Corp Yard	Surplus
355-96	Sedan-Full Size	Corp Yard	Surplus
355	Sedan-Full Size	Corp Yard	Surplus
356	Sedan-Full Size	Corp Yard	Surplus
345C	Sedan-Compact	Corp Yard	Surplus
362	Forklift	Corp Yard	Transfer-Heavy Equip. Pool
393	Flat Bed Truck	Corp Yard	Transfer-Heavy Equip. Pool
1506	Sedan-Full Size	City Hall	Surplus
1507	Sedan-Full Size	City Hall	Surplus
1515	Sedan-Full Size	City Hall	Surplus
0621	Sedan-Medium Size	City Hall	Surplus
1505	Sedan-Compact	City Hall	Surplus
1508	Sedan-Compact	City Hall	Surplus

Public Services-Admin

400	Sedan-Full Size	City Hall	Surplus

Public Services-Sewer

435	Dump Truck	Corp Yard	Transfer-Heavy Equip. Pool
453	Backhoe	Corp Yard	Transfer-Heavy Equip. Pool

Public Services-Streets

436	Asphalt Roller	Corp Yard	Surplus
434	Small Roller	Corp Yard	Surplus
460	Loader	Corp Yard	Surplus
467	Asphalt Paver	Corp Yard	Surplus
462	Crack Sealer	Corp Yard	Surplus
445	Patch Truck	Corp Yard	Surplus
1542	Trailer	Corp Yard	Surplus

Public Services-Street Lighting

637	Crane Truck	Corp Yard	Transfer-Heavy Equip. Pool
479	Flat Bed Truck	Corp Yard	Transfer-Heavy Equip. Pool
644	Trencher	Corp Yard	Transfer-Heavy Equip. Pool

Park and Recreation:

Unit #	Type	Location	Disposition
700	Sedan-Compact	City Hall	Surplus
738	Dump Truck	Corp Yard	Surplus
717	Sedan-Compact	City Hall	Surplus
813	Scooter	Corp Yard	Surplus
711	Compact Pickup	Corp Yard	Surplus

Fleet Reduction Savings

The following savings benefits represent 35 vehicles and equipment that have been recommended to surplus out of the 45 units identified as potential candidates for reduction/pooling. The savings reflect an estimate of each unit's annual maintenance and repair costs, and estimated one-time disposal income, as well as the projected savings from not having to replace units.

Savings Benefits

	1st Year	Over 10 Years
Cost Avoidance		
Maintenance and repair	$65,652	$656,520
Replacement	$286,000	$2,860,000
Projected Disposal Income		
One-time income from disposal (surplus)	$65,000	NA
Total	416,652	3,516,520

We recommend that Fleet Services conduct follow-up discussions with all departments to review all units that were identified as "low use" and "medium use" units.

Management Partners also recommends, contingent on condition, that pooling and/or rotation of older units in the fleet with these units be considered before disposing of any units. Finally, if the disposal of any of these units is deferred, the Department should not replace these or other units, if they are scheduled for replacement, until the Department concludes its review of this report.

Vehicle Cost Analysis

Break-Even Point Analysis

Break-even point analysis is the study of profit volume relationships named in honor of the point at which an enterprise moves from a loss to a profit position. In fleet management, the break-even point is the point at which a fleet can own, operate and maintain a vehicle more economically rather than use alternative means of transportation. In this study we are comparing the cost of a typical City-assigned vehicle with reimbursing a City employee to drive a personally owned vehicle.

The overall cost of a typical **assigned** sedan in the City's fleet that is acquired, maintained and fueled by the City's Fleet Services Division ranges from $251 per month for a compact sedan to $360 per month for a full-size sedan, based on an average utilization of 476 miles per month.

We have developed tables in Exhibits IV, V and VI that compare the costs of an assigned vehicle with the costs of reimbursing City employees for using their personal vehicles, using various monthly mileage intervals. Breakeven points were calculated for each class to determine the mileage where it is more economical to provide a City vehicle, rather than reimburse a City employee to drive a personally-owned vehicle.

These figures are based on the City's historical operational and acquisition costs of three representative units: A compact Chevrolet Cavalier, a mid-size Buick Century and a full-size Ford Crown Victoria. Operational costs include fuel, labor, parts and repair work performed by outside vendors. Labor rates (adjusted to $73/hr.) and administrative overhead were computed based on information contained in a study currently being performed of the City's Fleet Services operation.

Assigned Compact Sedan vs. Direct Mileage Reimbursement

We calculated the breakeven point for a compact sedan at $281 per month based on a utilization factor of 632 miles per month. For those general-purpose compact sedans not reaching this threshold, it is more economical for the City to pay direct mileage reimbursement of $0.445 per mile.

For those general-purpose compact sedans exceeding 632 miles per month, it is more economical for the city to provide a vehicle.

Assigned Mid-Size Sedan vs. Direct Mileage Reimbursement

We calculated the breakeven point for a mid-size sedan at $348 per month based on a utilization factor of 783 miles per month. For those general-purpose mid-size sedans not reaching this threshold, it is more economical for the City to pay direct mileage reimbursement of $0.445 per mile.

For those general-purpose mid-size sedans exceeding 783 miles per month, it is more economical for the City to provide a vehicle.

Assigned Full Size Sedan vs. Direct Mileage Reimbursement

We calculated the breakeven point for a full-size sedan at $617 per month based on a utilization factor of 1,388 miles per month. For those general-purpose full-size sedans not reaching this threshold, it is more economical for the City to pay direct mileage reimbursement of $0.445 per mile.

For those general-purpose full size sedans exceeding 1,388 miles per month, it is more economical for the city to provide a vehicle.

With direct mileage reimbursement, the City only pays for transportation when a private vehicle is driven for City business, compared to the total costs associated with owning a vehicle that may not be utilized consistently. The same hold true for checking out a City pool vehicle, which is analyzed later in this report.

Personal Mileage and Rental Cars

There was no data available to evaluate the number of City employees that claim mileage to drive their own vehicles on City business. This would have been helpful in evaluating whether employees favor using their own vehicles versus checking out a pool car. We suspect the former is the case, based on the low utilization of the pool car fleet.

The City currently reimburses its employees $0.445 per mile for using their own vehicle in the course of performing City business. This is, by far, the least costly alternative to checking out a City pool car or utilizing a rental car.

Management Partners has put together three exhibits (Exhibits VII, VIII, IX) that compare the costs of reimbursing an employee for using his/her own vehicle versus using a rental car or a City pool vehicle. Each exhibit reflects the daily costs associated with various daily miles traveled, ranging from 10 to 100 miles. There are separate exhibits for each size of vehicle (compact, mid-size, full-size). Following are some examples of the costs related to a 23-mile trip (average traveled for all sedans in the City's fleet) for three classes of sedans.

Compact Sedan

The cost of paying an employee for using his/her own vehicle that travels 23 miles on a given day is $10.24, compared to renting a compact car at $25.46 per day or using a compact City pool vehicle at $33.50 per day. When a trip exceeds 66 total miles on a given day, it becomes more economical to rent a car.

Mid-Size Sedan

The cost of paying an employee for using his/her own vehicle that travels 23 miles on a given day is $10.24, compared to renting a mid-size car at $31.40 per day or using a mid-size City pool vehicle at $43.46 per day. When a trip exceeds 86 total miles on a given day, it becomes more economical to rent a car.

Full-size Sedan

The cost of paying an employee for using his/her own vehicle that travels 23 miles on a given day is $10.24, compared to renting a full-size car at $38.28 per day or using a full-size City pool vehicle at $51.27 per day. When a trip exceeds 112 total miles on a given day, it becomes more economical to rent a car.

These exhibits illustrate the cost savings from encouraging the use of personal vehicles whenever possible. This should be supplemented by rental cars in place of city pool cars that are more expensive to maintain, as reflected in the "Cost Comparison" exhibits

The use of rental car agencies to replace and/or supplement motor pools is becoming increasingly popular among public agencies. There are many advantages to renting vehicles, including:

- Broad choice of vehicle classes (compact, intermediate, standard, full-size, cargo vans, SUVs, 4x4 pickups, passenger vans)
- Delivery and pick up of vehicles
- Access to new, low mileage vehicles
- Vehicles that are always clean and that have been fueled
- 24-hour roadside service
- Choice of daily, weekly or monthly rates

Recommendation 39: Establish policies that encourage the use of personal vehicles for City business. Enforce private vehicle insurance requirements and check driver's licenses routinely for all City drivers using personally-owned vehicles on City business.

Recommendation 40: Develop employee guidelines and policy that support the most economic means of transportation. For example: Use personal vehicles for all local trips under XX miles (roundtrip). Use rental vehicles for all trips exceeding XX miles (roundtrip).

Recommendation 41: Eliminate all units from the Central Motor Pool and use rental cars instead. Negotiate rental agreements with local rental car agencies for vehicles to be used for local and out of town trips.

Monthly Car Allowances

The City has a formal policy about monthly car allowances. Twenty-nine City managers and five Council members receive monthly car allowances ranging from $250 to $500 per month. The Mayor has an assigned vehicle. There is no evidence of managers that drive a City vehicle in lieu of receiving a monthly allowance.

Daily Take-Home and Standby Units

In our review of take-home daily home units, we identified seven units that we felt were questionable based on the information contained in their questionnaires. These units are listed below:

Department	Division	Unit Number	Type of Vehicle	Operator
Parks & Recreation	Parks	802	Pickup	Larry Monk
Parks & Recreation	Parks	725	Pickup	Greg Wallace
Parks & Recreation	Parks	723	Pickup	Mike Gomez
Human Resources	Risk Mgt.	1099	Sedan	Ken Hernandez
Public Services	Risk Mgt.	1098	Sedan	Mark Andres
Public Services	Streets	539	Pickup	John VanHavermont
Crew	Streets	540	Pickup	Sewer Standby Crew

These units should be re-evaluated in terms of take-home use, unless specified as part of their employment contract. Part of this evaluation should include a survey of the number of times that each of these individuals was called out during the last 12 months. Additionally, alternatives to taking a City vehicle home – such as paying mileage to use one's own private vehicle, or driving to City Hall or the Corporation Yard to obtain the necessary vehicle and equipment required – should be explored.

In addition to the above units, we identified 27 Police units that are taken home on a regular basis but that exceed the City's round-trip limit of 26 miles. They represent nearly 300,000 annual miles and cost the City approximately $158,000 to maintain each year.

Recommendation 42: Verify the take-home mileage for each standby unit and number of callouts. Evaluate the need for taking vehicles home for standby purposes, versus reimbursing employees for using their own vehicles to respond directly to an emergency or to pick up a more appropriate City vehicle in which to respond.

Recommendation 43: Re-evaluate the use of daily take-home units, and develop policy and guidelines that reflect standards for take-home units.

Vehicle and Equipment Pools

Central Administrative Motor Pool

The City's central administrative motor pool currently consists of six vehicles: two compact sedans and four full-size sedans. These vehicles are available to City employees to use in the course of City business. The Public Services Department is responsible for checking out vehicles to City employees. The cost is $0.86/hour (for vehicles exceeding one-day usage) and $0.21 per mile.

Management Partners reviewed pool utilization data from logs dating from July 2005 to June 2006. They indicated that the pool was underutilized. In fact, during the 12-month period, there were only 72 instances where pool cars were checked out. This data clearly demonstrates that only a few of the six pool vehicles are being utilized to their fullest extent. On average, only one vehicle out of six is being used on a consistent basis. One of the reasons for this may be that personnel are reluctant to check out older vehicles. All units are between six and 13 years old. Of the six available units, three have mileage in excess of 86,000 miles.

Best fleet management practices suggest that it is customary to maximize the use of a central motor pool and minimize the number of individual assignments (low- and medium-use vehicles) whose need for transportation can be met through pooling or paying city employees to use their own vehicles. The reduction of sedans in various City departments will mean a greater dependency on alternative means of transportation.

Fleet Services Loaner Pool

Currently, Fleet Services operates a pool of 10 shop loaner vehicles: seven sedans, one passenger van, one cargo can and one flat bed truck. All units are between nine and 20 years old. Three units have mileage in excess of 111,000 miles and five units have mileage between 80,000-93,000 miles. These units are loaned out when vehicles are in for service or extended use due to accidents or major breakdowns.

It is unclear if the current shop loaner pool is adequate or economical to support the Fleet Services operation. For instance, there are no shop pickups to loan out. Furthermore, this pool, like the City's Central Pool, seems to be underutilized. A review of pool usage during FY05/06 (12 months) revealed that these 10 units were only utilized 73 times or about 6 times per month.

Best fleet management practices emphasize that the size and makeup of shop loaner pools have a direct correlation to the productivity and efficiency of a fleet's operation. For example, an excess number of pool vehicles might suggest that maintenance and repair work is not being accomplished in a timely manner. Consequently, the costs associated with keeping a large number of pool units on hand will ultimately add to the costs of the fleet operation and drive its overhead costs up.

Management Partners has recommended in it's Fleet Study that a swing shift operation be adopted by Fleet Services to service light duty units during hours when the units are not being used in the field. If adopted, the number of shop loaner vehicles required could certainly be reduced as well as spare and backup units that exist throughout the City.

Recommendation 44: Eliminate five sedans (Units 387, 355-96, 355, 356, 345C) from the Fleet Services loaner pool and replace with two compact pickups and one cargo van (Unit 1200 from Library, Unit 363 from Finance, Unit 588 from City Clerk). Transfer the flat bed truck (Unit 393) from the pool to a new heavy equipment pool.

Recommendation 45: Negotiate rental agreements with local rental car agencies for vehicles to augment the fleet management pool when units are out of service due to extensive repair work, or for peak needs.

Recommendation 46: Establish procedures to monitor the use of the shop loaner pool units during the next year to determine the best mix and number of units to offer.

Establishing a Central Heavy Equipment Pool

One of the conditions that fleet customers will require when giving up their low-usage heavy equipment units is to be able to access such equipment quickly when a need arises. To accommodate this, Management Partners is recommending the City establish a central heavy equipment pool at the Corporation Yard. This pool would be administered by Fleet Services and made available to all City departments.

To supplement this heavy equipment pool, we recommend that Fleet Management develop rental agreements with local vendors that supply similar equipment. Additionally, the use of this equipment should be closely monitored over the next year to determine which units should be retained or surplused.

Following is a list of equipment that we have recommended be removed from the City departments and transferred to the new heavy equipment pool at Corporation Yard:

Unit #	Type
362	Forklift
393	Flat-bed Truck
479	Flat-bed Truck
637	Crane Truck
435	Dump Truck
644	Trencher
453	Backhoe

Additionally, a 15-foot trailer should be added to the Heavy Equipment Pool.

Recommendation 47: Negotiate rental agreements with local heavy equipment rental agencies for equipment to augment the City's heavy equipment pool.

Recommendation 48: Establish procedures to monitor the use of central heavy equipment pool units during the next year to determine the type and number of units required.

Department Pools

There are no real sub-pools to be found within the City departments. Many department operators will share their vehicles among themselves if needed (i.e. Inspections). Heavy equipment is shared among departments, however, judging from the low use on various units, we are recommending that a central heavy equipment pool be developed at the Corporation Yard. We hope that these units will be used more frequently by more of the City departments.

Follow-Up Recommendations

Overhaul the City's Vehicle Assignment Policy

Policy relating to "Usage of City Vehicles" is contained in the City's Department Director Letters, which was last updated in May 1988. The policy addresses take-home vehicles, vehicle allowances and personal use of vehicles, but does not address vehicle assignments. Much of the language is vague, with little or no criteria by which to regulate the use of vehicles.

The City should establish a Vehicle and Equipment Committee to address a number of fleet issues. In terms of the utilization study, the committee should be charged with developing a vehicle assignment policy. Key facets of such a policy include:

- Delineating the types of transportation available to City departments, for individual assignments, for departmental pools, for central administrative/heavy pools, for personally owned vehicles and for rental cars
- Determining the criteria appropriate to the type of assignment that encourages the most economical transportation assignment without impeding the public service involved
- Developing a more modern and effective central pool and departmental sub-pools using commercial rental agencies
- Developing a central heavy equipment pool and inter-departmental heavy equipment pools to encourage sharing and minimizing the size of the City 's heavy equipment fleet
- Developing more specific guidelines regulating the use of daily take-home and standby vehicles, and personally owned vehicle reimbursement

Review Utilization Data

It is critical that the City start to track miles and hour utilization for all vehicles and equipment in the fleet by one of the means mentioned earlier in this chapter. After a year, San Bernardino should re-establish the utilization criteria for "low", "medium", and "high" usage units using the new mileage and hours data.

The same functional categories outlined in this report should be appropriate for all units unless their function has changed. We recommend units that fall into the "medium-use" category (and those "low-use" units not disposed of) be reviewed with new usage data and utilization criteria adjusted accordingly.

We also recommend that a semi-annual review be conducted during the next year with each department to critique units that are not meeting the established criteria. This process will allow City departments to adjust the assignment of their units before they might be removed from permanent assignment due to low utilization. City-wide fleet leveling should occur on an annual basis.

It should be noted that a number of vehicles and equipment in the fleet have unique functions that may affect usage criteria. For example, there may be units classified as "mobile work

stations" that should be in the "special use" category. Consequently, we recommend that the fleet be reviewed from time to time to ascertain whether a unit's functionality has changed.

Capturing Accurate Usage Data

Management Partners discovered some inconsistencies in some odometer and hour meter readings supplied for this study. We recommend that these readings be corrected as soon as possible to ensure the vehicles and equipment fall into the right utilization category. This should be accomplished by performing an independent physical audit of all City vehicles and equipment, and recording all odometer/hour meter readings.

Recording of odometer readings can be captured in a number of ways — when repair orders are opened, when fuel is issued or through manual collections. We recommend that odometer readings be captured through the automated systems. However, if that is insufficient for any reason, each department should submit the appropriate readings to Fleet Services at a minimum of once per quarter.

Vehicles and equipment that are designated as hours units should be required to post hour meter readings each time the units are repaired and/or fueled. Hour readings may not always occur on a monthly basis, and should be submitted to Fleet Services at a minimum of once per quarter.

APPENDIX D: Benefit/Cost Analysis

Data Sources for Example Analysis of Replacing Candidate Vehicles to Hybrids

To conduct an example analysis of replacing vehicles to hybrids, we initially sought a number of data sources. Mainly, the city provided a list of 14 candidate vehicles for consideration (see Appendix). These select vehicles ranged in their individual mileage, make, model and year. To assess the cost benefit of purchasing a hybrid or conventional vehicle in replacement of those candidate vehicles, we estimated vehicle price and their fuel economies using the Department of Energy's Fuel Economy website.[1] The LGGIT Model, used in our earlier profile of the City's vehicle carbon profile, was used to provide the GHG Emissions Factor to understand the amount of kg of CO_2 a gallon of gasoline emits. Finally, the Environmental Protection Agency's GHG Calculator tool[2] was used to illustrate fuel savings related to its equivalent in CO_2 emissions.

Assumptions for Example Analysis of Replacing Candidate Vehicles to Hybrids

Not having intimate knowledge of the current fleet management system, replacement criteria, and purchase plans the City employs for its vehicles, there were a number of assumptions that had to be made after pulling our data sources together. The original data set was provided with instructions that two vehicles were possibly being replaced with other vehicles in the fleet. These original candidate vehicles were removed from the final candidate list. Given the purchase history for hybrids and non-hybrid vehicles in the fleet, we assumed a 2014 Toyota Prius and Chevrolet Malibu as the two vehicles for consideration of replacing the candidate vehicles. The vehicle price was an average of the MSRP range, and fuel economy as combined city and highway economies. The price of gallon was rounded to $3 per gallon (in present value dollars) for the next 10 years. We also assumed a social cost of CO_2 is $153 per $MTCO_2e$/year (in present value dollars, provided from *Technical Update of the Social Cost of Carbon for Regulatory Impact Analysis Under EO 12866*). Given the vehicle model year of candidate vehicles were at a minimum of 2004, we assumed a lifecycle of the vehicles in the fleet of ten years. Assumptions did not take into consideration the salvage value of the candidate vehicles, nor the additional cost items for new vehicles in a ten-year lifecycle such as depreciation, taxes, insurance, maintenance and repairs. For more accurate information of estimating the cost and benefits of purchasing hybrids, the City will need to adjust these figures based on actual data that the City will continue to improve upon in their data management practices.

[1] www.fueleconomy.gov

[2] http://www.epa.gov/cleanenergy/energy-resources/calculator.html

Methodology

Cost difference = Price of the conventional vehicle - Price of the hybrid vehicle

Benefit difference (savings on fuel only) = Cost on fuel for the conventional vehicle - Cost on fuel for the hybrid vehicle = (price of gasoline/fuel economy of the conventional vehicle)*VMT-(price of gasoline/fuel economy of the hybrid vehicle)*VMT

At the threshold point, the cost equals to the benefit:
Price of the conventional vehicle - Price of the hybrid vehicle = (price of gasoline/fuel economy of the conventional vehicle)*VMT - (price of gasoline/fuel economy of the hybrid vehicle)*VMT

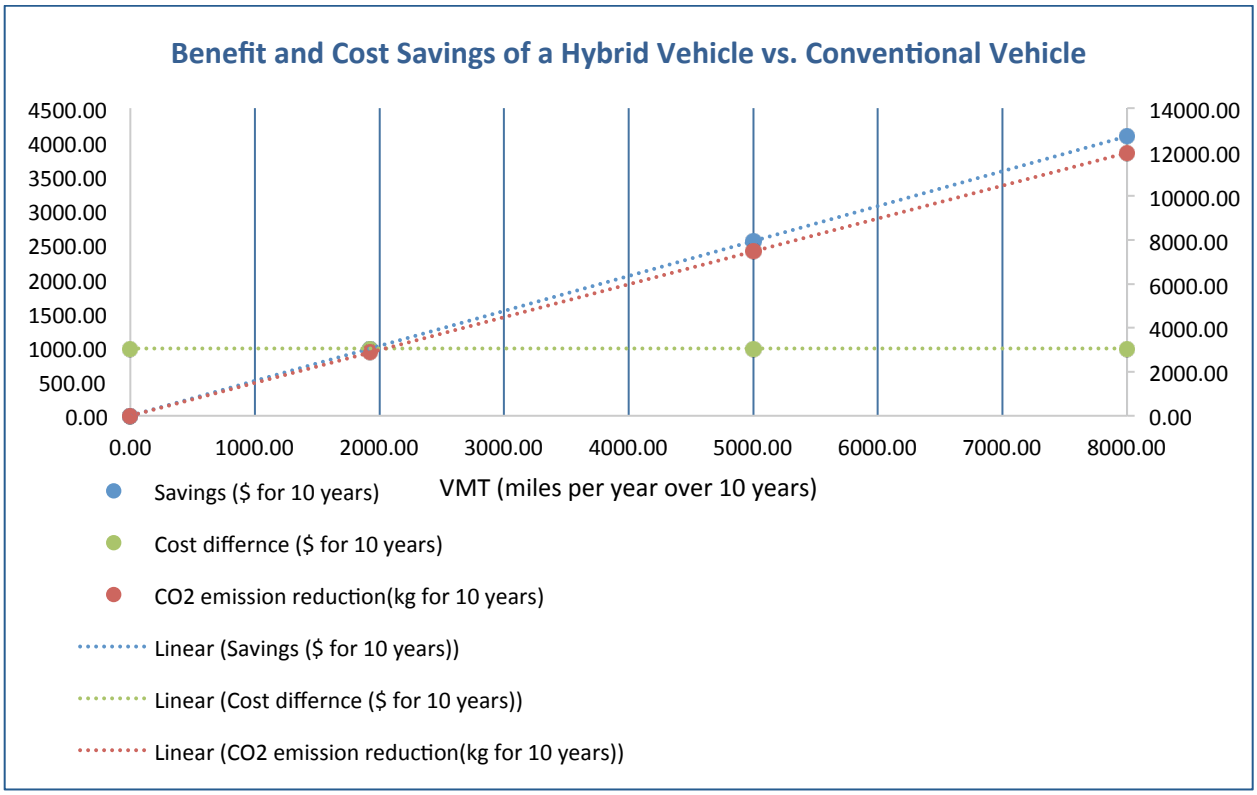
Thus, with the information of the price and fuel economy of the conventional/hybrid vehicle, as well as the price of gasoline, we can solve for the threshold VMT beyond which the hybrid vehicle is more beneficial.

The calculation of the threshold VMT

$PP_h - PP_c$ = \$27,000 - \$26,000 = \$1,000
PP_h = purchase price (hybrid vehicle) = \$27,000 (2014 Toyota Prius) [after incentives]
PP_c = purchase price (conventional vehicle) = \$26,000 (2014 Chevrolet Malibu LS)
Cost of 1 hybrid vehicle = \$1,000
Suppose that one is paying \$1000 with a certain amount in 10 years, in the 1^{st} year she pays Z, in the 2^{nd} year she pays $Z/(1+3\%)$, in the 3^{rd} year she pays $Z/(1+3\%)^2$…so $\$1000=Z+ Z/(1+3\%)+ Z/(1+3\%)^2+…+ Z/(1+3\%)^9$. Solve for Z, and time it by 10, it is the true amount she pays, which gives
Present value of Cost with the discount rate of 3% = $\$1000 * [1-(1+3\%)]/[1-(1+3\%)^9]*10=$ \$984.3
The benefit difference (savings on fuel only) = (price of gasoline/fuel economy of the conventional vehicle)*VMT- (price of gasoline/fuel economy of the hybrid vehicle)*VMT= (\$3/27-\$3/50)*VMT
Threshold VMT=\$984.3/(\$3/27-\$3/50)=1925.80 miles/year over 10 years

Results

As shown in the chart below, the threshold VMT is where the cost of the vehicle is equal to the benefit of fuel savings, at 1,925.80 miles per year for 10 years. At the threshold VMT, a hybrid vehicle produces 2,881kg CO_2 less than a conventional vehicle. Beyond the threshold point, each mile of VMT would add to the competence of the hybrid vehicle, saving five cents on fuel and a reduction of 0.15 kg CO_2 reduction. If all candidate vehicles were replaced with hybrid vehicles, \$35,777 would be saved on fuel and with 104,709 kg CO_2 reduction. The benefit/cost ratio is 3.76. Therefore, assuming 5,000 miles of VMT per year per vehicle over 10 years, if the 14 existing cars are all replaced with hybrid vehicles instead of conventional vehicles, there will be \$35,777 of savings on fuel and 104,709 kg reduction of CO_2. With a discount rate of 3% and the social cost of CO_2 to be \$153 per $MTCO_2e$/year, the total benefit and cost of replaced hybrid vehicles against conventional vehicles would be \$3,670 and \$984.30, respectively. This would bring about a net benefit of \$2,716 and a benefit/cost ratio of 3.76 over 10 years.



Benefit/Cost Analysis

Cost:

Present value of Cost with the discount rate of 3% = $984.3

Benefit:

With assumed 5000 miles per year VMT, for one vehicle

Benefit (total) = Benefit (fuel savings) + Benefit (CO_2 emissions)

In each year the present value of the cost savings on fuel would be different, as calculated below:

Benefit (fuel savings over 10 years) =$255.55*10=$2,555.5

Benefit (CO_2 emissions over 10 years) =0.748 $MTCO_2e$/*$153 per $MTCO_2e$/year *10 =$1,144.44

Benefit (total) =$2,555.55+ $1,144.44= $3,699.99

Cost & Benefit:

Net benefit = $3,699.99- $984.3= $2,715.69

10-yr Benefit/Cost Ratio = $3,699.99/$984.3 = **3.76**

APPENDIX E: Potential Funding Sources

Current programs that the City of Frederick may be able to utilize to upgrade its fleet include:

The Clean Cities Coalition funded by the US Department of Energy works with various stakeholders including municipalities to reduce petroleum use in transportation additional information about Clean Cities Coalitions can be found at http://energy.maryland.gov/Transportation/cleanCities.html.

Maryland Freedom Fleet Voucher Program
The Maryland Freedom Fleet Voucher (FFV) Program provides assistance vouchers for the purchase of new and converted alternative fueled vehicles registered in the state of Maryland. Vouchers will reduce the purchase price of a vehicle by up to $20,000 depending on Gross Vehicle Weight. Eligible vehicles include purchased or leased light-, medium-, and heavy-duty dedicated natural gas, propane, hybrid electric, plug-in electric, and hydraulic hybrid vehicles. Hybrid vehicles must weigh more than 8500 lbs to qualify. Additional information is available at http://energy.maryland.gov/Transportation/ffvp.

Congestion Mitigation and Air Quality (CMAQ) Improvement Program (Department of Transportation)
CMAQ was designed to help State and local governments finance transportation projects and programs to help meet the requirements of the Clean Air Act. Programs to convert public fleet vehicles to run on cleaner fuels are currently within the requirements. The Maryland DOT administers funds for this program. The Washington Metropolitan region has received $20-25 million annually in past years, but future funding is dependent on the Federal budget process. CMAQ funds have an 80/20-match requirement.

Maryland Smart Energy Communities Program
As an existing member of Maryland's Smart Energy Communities Program as of 2014, Frederick City may be eligible for additional funding under this program for transportation-related initiatives in future rounds.

In addition to the possibilities above, the City could also consider instituting municipal taxes or fees to help build or augment the "Smart Fleet Fund".

Appendix - City of Frederick Hybrid Replacement Vehicles, FY 16

Vehicle #	Year	Model	Assigned Department	Current Mileage	Yearly Average Mileage
190	1996	Lumina	Vehicle Maintenance	80930	4496.11
862	1998	Jeep	Recreation	87043	5440.19
800	2000	Lumina	Building Inspector	24115	1722.50
4	2001	Lumina	Gen. Administration	25075	1928.85
855	2001	Oldsmobile	Code Enforcement	123437	9495.15
195	2001	Impala	Vehicle Maintenance	150364	11566.46
900	2002	Malibu	Asset Mainagement	139000	11583.33
902	2002	Malibu	Asset Mainagement	57758	4813.17
834	2002	Malibu	Engineering	120086	10007.17
198	2003	Malibu	Vehicle Maintenance	96068	8733.45
196	2003	Impala	Vehicle Maintenance	108696	9881.45
897	2003	Cavalier	Comm. Action	44920	4083.64
893	2003	Cavalier	Comm. Action	66625	6056.82
898	2003	Cavalier	Comm. Action	43900	3990.91
899	2003	Cavalier	Comm. Action	45104	4100.36
851	2004	Impala	Code Enforcement	65239	6523.90
854	*2006*	*Cobalt*	Code Enforcement	*30382*	*3797.75*
904	*2007*	*Cobalt*	Asset Mainagement	*48610*	*6944.29*
850	*2007*	*Impala*	Code Enforcement	*30225*	*4317.86*
903	*2008*	*Prius*	Asset Mainagement	*33013*	*5502.17*
852	*2009*	*Prius*	Code Enforcement	*22234*	*4446.80*
853	*2009*	*Prius*	Code Enforcement	*21160*	*4232.00*