A Cost Benefit Analysis: Exploring Alternative Transportation Initiatives with Parking Services

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4/20/2016

ENVS4100: Appropriate Technology and Sustainability – Ecological Design:

The Campus as a Living, Learning Laboratory

Dr. Harold Glasser
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is also contained in the back sleeve on the binder.
III. Executive Summary

Western Michigan University has had a long track record of sustainable practices on campus. Currently, Western has adopted a Climate Action Plan that states that Western will put research efforts into actions that attempt to reduce the universities carbon footprint to achieve the overall goal of being carbon neutral by 2065. Specifically, the Climate Action Plan aims to achieve carbon neutral methods of transportation on campus by the year 2040. Because of this long term commitment to sustainability it was surprising to learn that some aspects of transportation practices on campus are less than sustainable.

For the purpose of this project the authors have chosen to analyze Parking Service’s Parking Enforcement division. Research efforts were put into gathering data regarding GHG (greenhouse gas) emissions and maintenance cost of the six vehicles used by the five Parking Enforcement employees. Furthermore, a cost benefit analysis of the data collected was conducted and the authors were able to derive specific calculations about fuel costs, maintenance costs, GHG emissions, and CO2 emissions.

In light of these calculations the authors propose a pilot study be conducted to further understand the potential monetary and GHG reductions associated with using the Yuba bikes in place of traditional transportation practices, as well as exploring the potential paradigm shift in the Parking Enforcement employees to lean towards more sustainable transportation practices.

Finally, the authors believe that there is a large opportunity for future work conducting analysis of other departments of the university that endorse the use non-sustainable transportation practices by university faculty and staff, such as electric utility carts for Landscape Services or campus buses converting to straight vegetable oil (SVO) as an alternative fuel.
IV. Introduction

January 1, 2008, President John Dunn signed the Talloires Declaration cementing WMU’s commitment to sustainability as an institution of higher learning. It states that WMU will be a leader in developing, creating, supporting, and maintaining sustainability. Furthermore, July 17, 2009, President John Dunn signed the ACUPCC (American College and University Presidents’ Climate Commitment). This commitment has led to WMU completing a greenhouse gas emissions inventory, creating a plan for future climate neutrality, immediately taking actions to reduced GHG emissions, and integrating sustainability into the curriculum.

The goal of this project is to continue with the commitments made in the above documents. The authors believe that a vast amount of monetary resources and GHG emissions are being consumed and produced respectively by the Parking Enforcement division of Parking Services. In an attempt to prove this a Freedom of Information Act (FOIA) request was submitted to Facilities Management at WMU. The information requested was given to us as a compilation of vehicle maintenance cost forms and packets; these were thoroughly analyzed and considered. The following calculations were derived from the packets. The total GHG and CO2 emissions produced from the fleet of Parking Enforcement vehicles between 2011 and 2016 was 271,185.63 lbs. of GHG emissions and 188,651.55 lbs. of CO2 emissions, which is an average of 54,237.13 lbs. of GHG and 37,730.31 lbs. of CO2 per year. The total maintenance costs of the Parking Services enforcement vehicles between 2011 and 2016 was $62,477, which is $12,495 a year on average.

Parking Enforcement employees only work a five day work week, which is 261 days a year. If 13.5% (35 days out of the year, weather permitting) of the total time Parking Enforcement employees typically in a vehicle was done with an alternative transportation method such as using a Yuba Bike, it could potentially provide enough monetary savings from maintenance costs to purchase a Yuba Bike every year. Our estimates show that 13.5 percent of 12,495 is $1,686 which is roughly $680 more than the cost of an electric assisted BODA BODA V2. The estimates were generated generously to include a wide margin of error and possibilities. Furthermore, if 13.5% of the total time Parking Enforcement employees are working with vehicles was done with alternative transportation method such as using a Yuba Bike, GHG emissions would decrease by a total of 7,322.01 lbs. of GHG and 5,093.59 lbs. of CO2 per year.

Surprisingly, nothing is being done to change the status quo even though the previous documents mentioned above were signed and implemented by President John Dunn. The authors believe that not taking action with this issue is a direct contradiction to the commitments President Dunn made on behalf of WMU by signing those documents. Specifically, it contributes to slowing the progress of achieving carbon neutral methods of transportation on campus by the year 2040 as well as limiting opportunities to build a campus culture of sustainability. We suggest that a small one-week pilot program be conducted in which Parking Enforcement employees are able to participate in riding a Yuba Bike on campus while performing their designated work duties. The authors believe that this will provide sufficient evidence in GHG reductions, monetary savings, promoting a healthier lifestyle for universities employees, and supplementing any further information needed to justify the implementation of a successful and permanent program.
V. Methodology and data

The authors chose to approach the issue of non-sustainable transportation practices on campus in the following ways:

Submission of a FOIA request to Facilities Management for vehicle maintenance costs and general vehicle information. This provided the authors with the mileage and overall cost of maintaining the vehicles. Costs included labor, parts, and other. This information was used to derive calculations regarding GHG and more specifically CO2 emissions, and aided in conducting a cost benefit analysis of the current vehicles in relation to Yuba Bikes. Furthermore, information was gathered through internet research and interviews of various parties.

Mileage of Parking Service Enforcement Vehicles Between March 2011 and March 2016

<table>
<thead>
<tr>
<th></th>
<th>Beginning Mileage</th>
<th>End Mileage</th>
<th>Miles Driven</th>
<th>Estimated Average Miles per Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>2008 Chevy Colorado</td>
<td>25214</td>
<td>54052</td>
<td>28838</td>
<td>5767.6</td>
</tr>
<tr>
<td>2009 Chevy Colorado</td>
<td>15724</td>
<td>44560</td>
<td>28836</td>
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</tr>
<tr>
<td>2008 Chevy Colorado</td>
<td>19482</td>
<td>51625</td>
<td>25078</td>
<td>5015.6</td>
</tr>
<tr>
<td>2008 Chevy Colorado</td>
<td>21615</td>
<td>46069</td>
<td>24454</td>
<td>4890.8</td>
</tr>
<tr>
<td>*2016 Chevy Colorado</td>
<td>92</td>
<td>*2028</td>
<td>*1934</td>
<td>*386.8</td>
</tr>
<tr>
<td>2009 Chevy Impala</td>
<td>30356</td>
<td>87442</td>
<td>57086</td>
<td>11417.2</td>
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<tr>
<td>2016 Chevy Colorado</td>
<td>93</td>
<td>2027</td>
<td>1934</td>
<td>386.8</td>
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<tr>
<td>2009 Chevy Impala</td>
<td>33982</td>
<td>83809</td>
<td>49827</td>
<td>9965.4</td>
</tr>
<tr>
<td>*2016 Chevy Colorado</td>
<td>*0</td>
<td>1521</td>
<td>*1521</td>
<td>*304.2</td>
</tr>
<tr>
<td>Total Mileage</td>
<td></td>
<td></td>
<td>219508</td>
<td>43901.6</td>
</tr>
</tbody>
</table>

* Incomplete data set. Estimates were derived from the complete data set of the new Parking Services vehicle.

Mileage of Parking Enforcement vehicles was derived by the difference between start and end mileage provided from Vehicle Work Cost History that covered 5 years’ time. The estimated average miles per year was a measurement of miles driven divided by 5 years. Miles driven and estimated average miles per year is used to help calculate fuel costs and GHG/CO2 emissions.
### Maintenance Costs of Parking Enforcement Vehicles Between March 2011 and March 2016

<table>
<thead>
<tr>
<th></th>
<th>Maintenance Costs</th>
</tr>
</thead>
<tbody>
<tr>
<td>2008 Chevy Colorado</td>
<td>6523.03</td>
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<tr>
<td>2009 Chevy Colorado</td>
<td>5801.41</td>
</tr>
<tr>
<td>2008 Chevy Colorado</td>
<td>4931.5</td>
</tr>
<tr>
<td>2008 Chevy Colorado</td>
<td>5550.96</td>
</tr>
<tr>
<td>2016 Chevy Colorado</td>
<td>602.39</td>
</tr>
</tbody>
</table>

Maintenance costs were provided from the Vehicle Work Cost History as well. The units were a sum total of all maintenance costs from every time the vehicle was serviced over the past 5 years. The maintenance costs are used to show a monetary resource being underutilized.

### Estimated GHG Emissions of Parking Enforcement Vehicles Between March 2011 and March 2016 based on DOE information

<table>
<thead>
<tr>
<th></th>
<th>Estimated GHG Emissions</th>
</tr>
</thead>
<tbody>
<tr>
<td>2009 Chevy Impala</td>
<td>21856.73</td>
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<tr>
<td>2016 Chevy Colorado</td>
<td>676.9</td>
</tr>
<tr>
<td>2009 Chevy Impala</td>
<td>16021.12</td>
</tr>
<tr>
<td>2016 Chevy Colorado</td>
<td>513.83</td>
</tr>
<tr>
<td>Total Maintenance Costs</td>
<td>62477.87</td>
</tr>
</tbody>
</table>
### Estimated CO2 Emissions of Parking Enforcement Vehicles Between March 2011 and March 2016

<table>
<thead>
<tr>
<th></th>
<th>Estimated GHG Emission Rate (in Grams per Mile)</th>
<th>Estimated GHG Emissions (in Grams)</th>
<th>Estimated GHG Emissions (in Pounds)</th>
<th>Yearly GHG Emissions (in Pounds)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>2008 Chevy Colorado</strong></td>
<td>627</td>
<td>18081426</td>
<td>39862.75331</td>
<td>7972.550662</td>
</tr>
<tr>
<td><strong>2009 Chevy Colorado</strong></td>
<td>627</td>
<td>18080172</td>
<td>39859.98871</td>
<td>7971.997742</td>
</tr>
<tr>
<td><strong>2008 Chevy Colorado</strong></td>
<td>627</td>
<td>20153661</td>
<td>44431.2532</td>
<td>8886.250639</td>
</tr>
<tr>
<td><strong>2008 Chevy Colorado</strong></td>
<td>627</td>
<td>15332658</td>
<td>33802.75225</td>
<td>6760.550451</td>
</tr>
<tr>
<td><strong>2008 Chevy Colorado</strong></td>
<td>627</td>
<td>*1084974</td>
<td>*2391</td>
<td>*478.2</td>
</tr>
<tr>
<td><strong>2009 Chevy Impala</strong></td>
<td>627</td>
<td>19033212</td>
<td>41961.08397</td>
<td>8392.216794</td>
</tr>
<tr>
<td><strong>2016 Chevy Colorado</strong></td>
<td>561</td>
<td>1084974</td>
<td>2391.960176</td>
<td>478.3920351</td>
</tr>
<tr>
<td><strong>2009 Chevy Impala</strong></td>
<td>627</td>
<td>31241529</td>
<td>68875.83776</td>
<td>13775.16755</td>
</tr>
<tr>
<td><strong>2016 Chevy Colorado</strong></td>
<td>561</td>
<td>*853281</td>
<td>*4085</td>
<td>*817</td>
</tr>
<tr>
<td><strong>Total Emissions</strong></td>
<td>5511</td>
<td>124945887</td>
<td>277661.6294</td>
<td>55532.32588</td>
</tr>
</tbody>
</table>

*Incomplete data set. Estimates were derived using the estimated total miles of the new Parking Services vehicle with complete data.

The GHG emission rates were taken through the U.S. Department of Energy’s fuel economy data. The estimated GHG emission rate was dependent on the vehicle being 100% city driven with 15,000 annual miles. Using mileage data and the estimated GHG emission rate calculations of the yearly GHG emissions were discovered. From there grams were converted to pounds to better understand the scale. Lastly, the estimated GHG emissions in pounds was divided by 5 to determine the yearly GHG emissions. This data was compiled to show the environmental benefits possible by switching to an alternative transportation source.
Information for CO2 emissions specifically was taken through data from the U.S. Energy Information Administration. Using miles driven divided by miles per gallon provided a number of gallons of fuel used per vehicle. Dividing that value by 5 provided the gallons of fuel used per year. From there the estimated CO2 emissions was calculated by multiplying the average gallons of fuel per year by 17.68. The value 17.68 is the amount of pounds of CO2 produced from the combustion of one gallon of E10 gasoline. This is additional information pertaining to potential environmental benefits obtained through using alternative transportation. The two charts pertaining to environmental effects of vehicles was made to compare CO2 vs. all GHG.

Estimated Fuel Costs of Parking Enforcement Vehicles Between March 2011 and March 2016

<table>
<thead>
<tr>
<th></th>
<th>Average Miles per Year</th>
<th>Estimated Yearly Cost of Fuel based on 15,000 miles</th>
<th>Estimated Yearly Fuel Costs</th>
</tr>
</thead>
<tbody>
<tr>
<td>2008 Chevy Colorado</td>
<td>5767.6</td>
<td>1750</td>
<td>672.8866667</td>
</tr>
<tr>
<td>2009 Chevy Colorado</td>
<td>5767.2</td>
<td>1750</td>
<td>672.84</td>
</tr>
<tr>
<td>2008 Chevy Colorado</td>
<td>5015.6</td>
<td>1750</td>
<td>585.153333</td>
</tr>
<tr>
<td>2008 Chevy Colorado</td>
<td>4890.8</td>
<td>1750</td>
<td>570.593333</td>
</tr>
<tr>
<td>*2016 Chevy Colorado</td>
<td>*386.8</td>
<td>1600</td>
<td>*41.2693333</td>
</tr>
<tr>
<td>2009 Chevy Impala</td>
<td>11417.2</td>
<td>1750</td>
<td>1332.006667</td>
</tr>
</tbody>
</table>
Information about fuel costs was taken from the U.S. Department of Energy’s fuel economy data. The estimated GHG emission rate was dependent on the vehicle being 100% city driven with 15,000 annual miles, and fuel cost was set at $2.00 a gallon. Given the average miles driven per year and the estimated yearly cost of fuel based on 15,000 miles, the estimated yearly fuel cost was calculated by taking a fraction of the average miles per year/15,000 and simply multiplying that value by the estimated yearly fuel cost based on 15,000 miles. Estimated yearly fuel costs were calculated to show another monetary resource that would be saved by switching to an alternative transportation.

Finally, all of this data was composed to show the monetary resources being underutilized and the impact the vehicles have on the environment. The data is meant to show that the vehicles are not cost-effective and the potential to clean-up the environment is possible by not using fossil fuel combustion engines.

VI. Examples of best practice on campus

Azure Dynamics

The University has taken strides to reach carbon neutrality of campus vehicles by 2040. The Universities electric vehicle infrastructure promotes alternative transportation initiatives. WMU utilizes five all-electric vehicles from Ford Motors and Azure Dynamics. In addition, there are electric charging stations on campus free to those with electric vehicles. Together, this infrastructure provides alternative transportation for employees, students, and guests with the absence of fossil fuel use and the promotion of electric vehicles through providing free charging stations. Despite the positive impacts, the electric vehicles require costly maintenance from trained professionals as Azure Dynamics has gone out of business.
**Bike Stable & Bronco Bikes**

Western Michigan University has many sustainable practices relating to shifting the paradigm away from fossil fuels to sustainable energy. In particular, the University has implemented a bicycle rental program and has their own Bike Stable. The bicycle rental program, Bronco Bikes, provides students with semester long bicycle rentals. The program provides helmets and locks for rentals as well. The Bike Stable at the Office for Sustainability helps to shift thinking towards bicycles through providing a workshop for students and the greater community to learn about upkeep of bicycles. The Bike Stable hosts Open Bike Shop on Friday 12-5p.m. where all tools for fixing a bike are provided and a trained mechanic will help attendees to fix their bike.

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**VII. Examples of best practices on other campuses**

To the authors’ knowledge there are no other Parking Service divisions operating with bicycles. For this reason, the authors have modeled police bicycle patrols as a best practice example.

**International Police Mountain Bike Association (IPMBA)**

Though the IPMBA is not a best practice campus, the IPMBA is present on almost all campuses that have bicycle patrols. The IPMBA is a non-profit organization dedicated to educating and training public safety cyclists. They provide numerous amounts of resources pertaining to bicycle patrol officers as well as providing plentiful amounts of articles including product reviews from fellow public safety bicyclists, case studies of different departments, and general information.
about bicycle patrols. Furthermore, the IPMBA provides training programs for bike patrols. Training includes teaching officers to maneuver bicycles better and safer in a manner that doesn’t affect their duties.

**Wayne State University**

Wayne State University initiated a bicycle patrol program in the winter of 1992 before its implementation the following May. Initially the program was created to address a cost effective and environmentally safe alternative to motorized transportation. Current capacity of Wayne States bicycle patrol is six officers. They operate over half of the year, April through October (weather permitting) and they have assisted other Universities and Police Departments in implementing their own bicycle patrols. Approachability of bicycle patrols, increased mobility and visibility, and an increase in stealth were all reasons given for the pros of using a bicycle patrol.

**University of Tennessee Chattanooga**

The University of Tennessee Chattanooga is another university utilizing bicycles as an alternative form of transportation for their law enforcement officers. Formed in 1996, the program currently has four officers certified by the IPMBA for bicycle patrol with many more officers training for certification. UTC sees bicycle patrols making a huge resurgence as a result of their effectiveness in navigating high populated areas like a college campus. The ability to move through congested areas with relative ease compared to vehicles is a pro for bike patrols recognized by UTC. Lastly, UTC also uses their bicycle patrols to promote bike safety and education through presentations and bike safety rodeos.

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**VIII. Discussions**

Holding true to the notion that WMU is committed to becoming a sustainable campus and a sustainable leader in the community, state, and nation the promotion of a pilot program of Yuba Bikes by Parking Enforcement employees is a natural next step in the stride towards a university wide transportation infrastructure that is carbon neutral. Examples of WMU’s commitment to sustainability are abundant.

- **President’s University wide Sustainability Committee’s (PUSC) Strategic Sustainability Initiatives Report, 2009:** WMU should “Explore the creation of campus
policies and programs to reduce motorized vehicles from the campus core and promote bicycle use…” (Strategic, 2009)

• **American College and University Presidents’ Climate Commitment**: Signed in 2009 and committed to being a climate neutral campus by 2065 (ACUPCC Reports, 2012).

• **President John Dunn**: “We're enormously proud of the campus environment we've built, but we recognize that we are only at the beginning of this journey of creating a culture of sustainability. There are always new issues to address and solutions to old problems that can be enhanced and extended.” (Dunn, n.d.)

• **Talloires Declaration**: Signed by President John Dunn in 2008, this is "the first official statement made by university administrators of a commitment to environmental sustainability in higher education." (Points of Pride, n.d.)

These statements, promises, and commitments are an optimistic first step in the progression toward a carbon neutral transportation infrastructure. In many respects, progress has been made to help bring truth to these words, however, the use of alternative transportation by Parking Enforcement employees has yet to be acknowledged as a feasible, cost effective, and carbon-neutral alternative. The time has come for WMU to make sustainable transportation for faculty and staff a priority and support efforts to push our commitments forward into tangible actions.
IX. Limitations of analysis and proposed future work

The intention of this proposal was not an outright switch to alternative transportation, but to move thought towards more sustainable transportation as laid out by the Climate Action Plan, the Talloires Declaration, and the American College and University Presidents’ Climate Commitment. As previously explained the intention is a shift in paradigm, to explore alternative transportation, and to encourage others to follow. New alternatives such as street-legal electric utility carts, electric golf carts, campus buses retrofitted for straight vegetable oil (SVO) fuel, and new all-electric vehicles could be researched for future alternative transportation proposals. Furthermore, more emphasis should’ve been placed on shifting the paradigm by physically going out and talking to students, faculty, and staff about the idea, their opinions, and their suggestions in an effort to get more buzz about alternative transportation.

The included analysis was done to the best of the authors abilities given time constraints and the road blocks faced. More conclusive safety information should’ve been obtained to produce peace of mind behind the whole idea of using bicycles compared to vehicles. Furthermore, liability and insurance should’ve been researched to adjust costs associated from liability contingencies and insurance incentives from employees being healthier. Another limitation of our analysis was our lack of research detailing external factors like costs and information associated with the bicycles. Information such as maintenance regularity and costs was undetailed from a lack of information from bike shops like Pedal Bicycles, Alfred E. Bike, and the Bike Stable on electric bicycles compared to conventional bicycles. Additional external factors not analyzed were the dependability of the Yuba bicycles. Beyond general information, battery life information wasn’t sufficient enough to make valid conclusions. Also, more information on routes for the bicycles should’ve been explored.

The greatest limitation on the project was likely the multiple setbacks attributed to political hierarchy. Time constraints from having to submit a FOIA request and obtaining survey permission from the HSIRB were some of the barriers faced. More crucial planning and a better initial start are crucial for success in a proposal developed for a semester project.

Lastly, the authors propose collaboration with similar proposals for future work. A carpool initiative has been proposed by Gerrit Anderson and Isaac Green, however, Parking Services stands to lose money though the proposed carpool program. We suggest collaboration to balance lost funds with monetary savings from this proposal. The collaboration would not only provide a monetary solution for the carpool program, it would also further the Universities commitment towards sustainability. Furthermore, collaboration with Keith Heatherly’s proposal would be beneficial to provide safe and secure routes throughout campus for Parking Service employees as well as furthering our transition towards carbon-neutral transportation through advertising the use of bicycles.
X. Conclusions and recommendations

Conclusions:
After reviewing the information obtained from the vehicle cost work history forms provided by the FOIA request the authors have concluded:

1. Total maintenance costs of the nine Parking Services enforcement vehicles between 2011 and 2016 was $62,477, which is $12,495 a year on average.
2. Considering that Parking Enforcement employees only work a five day work week that is 261 days a year. If 13.5% (35 days out of the year, weather permitting) of the total time Parking Enforcement employees are working with vehicles was done with alternative transportation method such as using a Yuba Bike it could potentially provide enough monetary savings from maintenance costs to purchase a Yuba Bike every year. Our estimates show that 13.5 percent of 12,495 is $1,686 which is roughly 680$ more than the cost of an electric assisted BODA BODA V2. The estimates were generated generously to include a wide margin of error.
3. Total GHG emissions produced from the fleet of Parking Enforcement vehicles between 2011 and 2016 was 271,185.63 lbs., which is an average of 54,237.13 lbs. per year. The CO2 emissions produced from the fleet of Parking Enforcement vehicles between 2011 and 2016 was 18,865.55 lbs., which is an average of 37,730.31 lbs. per year.
4. Furthermore, if 13.5% of the total time Parking Enforcement employees are working with vehicles was done with alternative transportation method such as using a Yuba Bike, GHG emissions would decrease by a total of 7,322 lbs. per year while CO2 emissions decrease by 5,093.59 lbs. per year.

Recommendations:
In order to improve WMU’s current transportation practices and meet the goal of the Climate Action Plan, the Talloires Declaration, and the American College and University Presidents’ Climate Commitment the authors would like to make the following recommendations:

1. **Short term**: The implementation of a pilot program as described below using the Office for Sustainability’s Yuba Bikes for Parking Enforcement employees. Specifically a BODA BODA V2, or the El Mundo models.
2. **Long term**: Pending the success of the pilot program, the authors recommend the purchase of Yuba Bikes for Parking Enforcement employees and the start of developing a university policy regarding the use of the Yuba bikes at least 13.5% of the time Parking Service enforcement employees are working. Using the Yuba Bikes 13.5% of the time would allow a 5-year payback for the University.
**Pilot description:** This pilot was designed with the assistance of Derek Kanwischer in the hopes of promoting sustainability and a healthier life style for university employees. The authors will also perform a test ride across campus and the routes that Parking enforcement employees take to ensure that battery life and fatigue will not be an issue.

1. The pilot will take place 1 month after the spring semester ends. Derek and the authors have discussed that this date is arbitrary and subject to change to suit the most conducive time period. It will take place for 1 week, and will interchangeably use the two Yuba Bikes (Boda Boda V2, and the El Mundo models) held at the Office for Sustainability.
2. Using the authority designated to Derek by WMU, the bikes will be checked in and out using the Bronco Bike check in and out procedure. It includes the waiver of liability and assures security. Derek also assured the authors that the Office for Sustainability will cover a deposit, maintenance for repairs, and or loss due to theft or damage of the Yuba Bikes for the purpose of this research.
3. Derek further elaborated that he or another employee of the Office for Sustainability would be willing to orchestrate a training program for Parking Enforcement employees at the Office for Sustainability.

**Evaluation:** The success of this pilot will be evaluated in the following ways:

1. A short 8 question survey will be sent out after the pilot’s completion to Parking Enforcement employees. The survey will help the authors analyze if there was an apparent paradigm shift in the employees willingness to participate in sustainable transportation use (survey is contained in the appendices). As well as the post-pilot survey, Parking Enforcement employees will be encouraged to take notes in a journal throughout the pilot program.
2. A cell phone application, TripLog - Mileage Log Tracker, would also be proposed to be used by Parking Enforcement employees during their experiences with the Yuba Bikes. The application will log the miles traveled during the work week of use, and give the authors the ability to use the metrics and calculations in the methodologies section of the report to calculate GHG and CO2 emissions reductions. Furthermore, the average cost spent on maintaining these vehicles per year was $12,495. If the pilot study was conducted and the bikes were used in place of gas powered motorized vehicles for the duration of the week the potential savings for vehicle cost during that week could be $240.
XI. References


XII. Appendix 1

Contact list:

**Office of Sustainability**
- Jeff Spoelstra
  - jeffrey.spoelstra@wmich.edu

**Facilities management**
- Jeff Alexander
  - jeff.alexander@wmich.edu

**FOIA Officer**
- Carrick D Craig
  - carrick.craig@wmich.edu
- Rose Roberts
  - rose.roberts@wmich.edu

**NMT Team**
- Derek Kanwischer
  - derek.kanwischer@wmich.edu

**Parking Services**
- Tim Unangst
  - timothy.unangst@wmich.edu

**University of Tennessee Chattanooga**
- Paul Soyster
  - (423)425-4357

**Contact Log:**

**Tim Unangst:** Ray met with Tim once during the semester and conversed through email for 2 weeks after first initial meeting. Joseph emailed Tim as well.
3/30/2016 at 1:00pm

**Derek Kanwischer:** Ray met with Derek several times throughout the semester, and Joseph was present 4/8/2016
4/1/2016 at 1:40pm
4/8/2016 at 1:40pm
4/19/2016 at 3pm

**Pedal Bicycles & Alfred E. Bike:** Joseph interviewed employees from both bike shops in an effort to better understand maintenance associated with electric bicycles.
4/18/2016 at 2pm

**Paul Soyster:** Joseph conducted a phone interview regarding UTC’s bicycle patrol program.
4/18/2016 at 12:30pm

Other contacts were contacted via email throughout the semester at multiple times.
XII. Appendix 2

Image Archives:
Survey:
Parking Services Post-Pilot Survey

1. Do you believe the bicycles affect your ability to do your job?

2. Do you see/feel any health benefits as a result of riding bicycles instead of driving vehicles?

3. What specifically did you enjoy about the pilot program? (Being outdoors, getting exercise, it was a change from the regular routine, did you not like it?)

4. Do you have any safety concerns regarding bicycles as transportation? Do you feel safe riding the bicycles around campus?

5. Did you face any safety issues during the pilot program?

6. Would you be willing to make a conversion to alternative transportation? If so, what are your ideas? If not, why?

7. Do you think the cost benefits of using bicycles outweighs any downsides to using bicycles? Please list any downsides to using bicycles as transportation.

8. Any other thoughts or comments about the bicycle pilot program?
Re: Freedom of Information Request

Dear Jeff Alexander,

I am writing this letter to request information under Michigan Act 442, the Freedom of Information Act.

I am requesting the following information about the Parking Services vehicles:

• Make, model, and year of the vehicles
• Miles per gallon of the vehicles
• Average mileage driven per day/week
• Number of vehicles used
• Maintenance costs
• Fuel costs
• Frequency of refueling and maintenance
• CO2 emissions of the vehicles
• Past fuel audits

If any of the information is not obtainable please provide a description of where it could be found or why it couldn’t be obtained.

I am willing to pay fees up to $20.00. Please inform me before completing the request if fees associated with my request surpass $20.00.

I request the information to better understand the duties of Parking Services and to research environmental impacts of the Parking Services vehicles.

Thank you for your consideration of this request.

Sincerely,

Joseph Birdsall
April 7, 2016

Mr. Joseph Birdsall
Via email only (joseph.m.birdsall@wmich.edu)

Re: Your Freedom of Information Act (FOIA) email request of March 16, 2016

Dear Mr. Birdsall:

The above referenced FOIA request is granted in part and denied in part. As to all extant, non-exempt records your request is granted. With regard to your second, the frequency of refueling component of your seventh, eighth, and ninth bulleted requests, those requests are denied as no such documents exist and this response will certify that those documents are not in the possession of the University by those names or other names reasonable associated with those documents. With regard to miles per gallon we would direct you to the manufacturer's disclosures for those vehicles.

With regard to your first, third, fourth, fifth, and the remaining portion of the seventh bulleted request, your requests are granted and the records are attached.

With regard to your sixth bulleted request that request is granted as well; however, the estimated fees to complete your request are $76.72 and are explained on the attached form. A deposit of $38.36 will be required if you wish us to proceed in responding to your request. Please make the check out to Western Michigan University and mail it to Carrick D. Craig, Freedom of Information Act Officer, 1903 W. Michigan Ave., Kalamazoo, MI 49008-5423.

You may submit to the president of the University a written appeal that specifically states the word "appeal" and identifies the reason or reasons for reversal of the disclosure denial. You may also seek judicial review of the denial under Section 10 of the Michigan FOIA, a copy of which is attached which further explains your appeal rights.

Our FOIA procedures and guidelines can be found at http://www.wmich.edu/legal/foia.

Very truly yours,

Carrick D Craig
Freedom of Information Act Officer