Appendix E
Comprehensive Analysis of Transportation Emissions Reduction Measures
### Index of Control Measures

#### State and Local Measures

<table>
<thead>
<tr>
<th>Measure</th>
<th>VOC (kg/day)</th>
<th>NOx (kg/day)</th>
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</thead>
<tbody>
<tr>
<td>Ride-matching/Commuter Connections</td>
<td>-0.33</td>
<td>-0.31</td>
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<tr>
<td>Park &amp; Ride Lots</td>
<td>-1.77</td>
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<tr>
<td>Hagerstown Telework Center</td>
<td>-0.19</td>
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<td>Telecommuting Outreach Program</td>
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<td>-3.12</td>
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<td>Ozone Action Days</td>
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<td>Clean Air Partners</td>
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<tr>
<td>Commuter Bus Service Hagerstown</td>
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<td>Turning Point Transit Services</td>
<td>-0.43</td>
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<td>E-government / E-commerce Enhancements</td>
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<td>-0.31</td>
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<td>New Job Tax Credit</td>
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<td>Growth Management Program</td>
<td>-13.24</td>
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<td>Signal System Enhancements</td>
<td>-10.22</td>
<td>-3.08</td>
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<td>Incident Management - Highway Advisory Radio</td>
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<td>Vehicle Acquisitions – Fleet Replacements</td>
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<tr>
<td>Vehicle Acquisitions – Bus Replacements</td>
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<td>Vehicle Acquisitions – Engine Rebuilds</td>
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<td>State Control Measures – VEIP</td>
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<td>OTC Programs – CP, AIM, PFC</td>
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<td>Low Emissions Paint</td>
<td>-26.28</td>
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<tr>
<td>Off-road vehicle replacements</td>
<td>---</td>
<td>---</td>
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<tr>
<td>RACT Controls</td>
<td>0.00</td>
<td>-1312.31</td>
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#### Federal Control Measures

<table>
<thead>
<tr>
<th>Measure</th>
<th>VOC (kg/day)</th>
<th>NOx (kg/day)</th>
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<tbody>
<tr>
<td>NLEV, TIER II, HDE Standard</td>
<td>-861.83</td>
<td>-3093.51</td>
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<tr>
<td>Phase I &amp; II Engine Standards</td>
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</tbody>
</table>
Engine Standards for diesel powered engines
Engine Standards for gasoline powered marine engines
Engine Standards for large gasoline-powered engines
Engine Standards for locomotive engines
NOx SIP Call

<table>
<thead>
<tr>
<th>Contingency Measures</th>
<th>VOC (kg/day)</th>
<th>NOx (kg/day)</th>
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<tbody>
<tr>
<td>Government Memo of Understanding</td>
<td>-4.57</td>
<td>-4.24</td>
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<tr>
<td>Fuel Programs</td>
<td>-208.65 to</td>
<td>-18.14 to</td>
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<tr>
<td></td>
<td>-444.52</td>
<td>-27.22</td>
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<tr>
<td>Diesel Vehicle Emission Controls</td>
<td>-3.24 to</td>
<td>-102.6 to</td>
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<td>-6.48</td>
<td>-205.20</td>
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<tr>
<td>Gas Can Replacement</td>
<td>-4.10</td>
<td>0.00</td>
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<tr>
<td>Lawnmower Replacement</td>
<td>-1.18</td>
<td>-0.03</td>
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<tr>
<td>Traffic Flow Improvements</td>
<td>-19.86</td>
<td>-8.97</td>
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<tr>
<td>Vehicle Acquisitions – Fleet Replacement</td>
<td>-0.08</td>
<td>-0.07</td>
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<tr>
<td>Vehicle Acquisitions – Bus Replacement</td>
<td>0.03</td>
<td>-21.67</td>
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References:

- Washington County Transportation Development Plan, MTA, July 16th 2003.
- MAQONE Version 3.2, Michael Baker Jr., Inc., Maryland Department of Transportation.
- Washington County Transportation Department – County Commuter Website: www.washco-md.net
- 2000 Journey to Work Commutation for Maryland, Maryland Department of Planning 2003.
- Baltimore Region Telecommuting Baseline Survey, 1999 BMC.
- Analyzing the travel behavior of home-based workers in 1991, CALTRANS Statewide Travel Survey, Mokhtarian P.L. and Henderson D.K.
- Telework America 2000 research results.
- Impact Analysis and Improvement Study for Hagerstown Telework Center, Marketing Solutions Inc. 2000.
- Work Program Book 2004, MDE
- Ozone Survey Report, 2002
- Comprehensive Plan for the County 2002, Washington County, Maryland
- Trip Generation, 6th Edition, Institute of Transportation Engineers (ITE).
- Maryland State Highway Administration, HPMS reports.
- Facts About - COMAR 26.11.32: Control of Volatile Organic Compounds from Consumer Products, MDE
- Facts About - Draft - COMAR 26.11.XX: Control of Volatile Organic Compounds from Architectural Coatings, MDE
- Facts About - New Regulations for Portable Gas Cans and Gas Can Spouts, MDE.
- Control of Air Pollution; Emission For New Nonroad Spark-ignition Engines at or Below 19 Kilowatts; Final Rule. 40 CFR Parts 9 and 90.
- Phase 2 Emission Standards for New Nonroad Spark-Ignition Non hand held Engines At or Below 19 Kilowatts; Final Rule. 40 CFR Part 90.
TERM: Rideshare

Description:
This measure refers to incentives and support for carpool and vanpool and promoting alternate transport methods.

Documentation:
- Maryland Department of Transportation

Assumptions:
- Carpool occupancy in Washington County = 2.6
- Daily work person trips per employee = 1.8
- Average carpool work trip length = 16.45 miles
- Total commuters ridesharing = 30

Calculations:
-Commuters using carpool for ridesharing = 30
-Total work trips made before = 30 * 1.8 = 54 trips
-Total carpools = 30 / 2.6 = 12
-Total carpool trips made after = 12 * 2 = 24 trips

-Total work trips reduced = 54 - 24 = 30 trips
-Total VMT reduced due to carpool = 30 * 16.45 = 494 miles

Summary of Results:

VT Benefit:  -30 trips
VMT Benefit: -494 miles

Emission Benefits:
VOC  -0.33 kg/day
NOx  -0.31 kg/day
Transportation and Emissions Impacts: Projects ordered by Project Type

<table>
<thead>
<tr>
<th>Cat. ID</th>
<th>County</th>
<th>Description</th>
<th>Yr. Compl.</th>
<th>VEHICLE</th>
<th>BUS</th>
<th>Vehicle Emissions kg/day</th>
</tr>
</thead>
<tbody>
<tr>
<td>EMO 12</td>
<td>Washington</td>
<td>Ridesharing</td>
<td>2003</td>
<td>VT -30</td>
<td>VMT -494</td>
<td>0</td>
</tr>
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</table>

Total impacts for all projects in this scenario: (kg/day) -30 -494 0 -0.33 -0.31 -4.19
(tons/day) 0.00 0.00 0.00

Cost Effectiveness represents the $ spent versus the Kg of emissions benefits (lower values represent higher levels of cost effectiveness; no benefit = N/A)
Emissions Only Analysis

Project ID: 12  County: Washington  Area Type: Urban  PPMS#:  
Option: Ridesharing  Implementation Year: 2003  

[Cost Benefit Analysis]

Capital Cost:  Service Life (in years):  
Annual Operating Cost:  

Enter base transportation impact data for emissions analysis:

Total Change in VMT: -454
Total Change in work related VT: -30
Total Change in non-work related VT: 0

Distributions by time period (must equal 100%)

Trip Distributions

<table>
<thead>
<tr>
<th></th>
<th>VMT</th>
<th>Work</th>
<th>Non-work</th>
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</thead>
<tbody>
<tr>
<td>AM</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Midday</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PM</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Night</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

100%  100%  100%
Washington County EAC Control Measures
Rideshare

Total Commuters Ridesharing = 30 (as per COG database)
Carpool Occupancy in Wash Co. = 2.6 (as per MAQONE def data)
Average Vanpool Occupancy = 9 (as per NJ rideshare data)
AVO in Wash Co. = 1.21 (as per MAQONE def data)

<table>
<thead>
<tr>
<th>Mode Split for Wash Co:</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>DA</td>
<td>76.00%</td>
</tr>
<tr>
<td>CP</td>
<td>13.60%</td>
</tr>
<tr>
<td>VP</td>
<td>0.20%</td>
</tr>
<tr>
<td>Transit</td>
<td>0.20%</td>
</tr>
<tr>
<td>Bike</td>
<td>4.60%</td>
</tr>
<tr>
<td>Other</td>
<td>5.40%</td>
</tr>
<tr>
<td>100%</td>
<td></td>
</tr>
</tbody>
</table>

Commuters using Carpool for rideshare = 30
Commuters using Vanpool for rideshare = 0

Daily Work Person Trips per employee = 1.8 (as per MAQONE def data)

Avg. Carpool work trip length (miles) = 16.45 (as per MAQONE def data)
Avg. Vanpool work trip length (miles) = 40 (as per NJ rideshare data)
Avg. SOV work trip length (miles) = 12.76 (as per MAQONE def data)

Total Work Trips made before = 54
Total Carpools = 12
Total Carpool Trips made after = 24

Total Work Trips reduced = 30
Total VMT reduced due to carpool (miles) = 494
TERM: Park and Ride

Description: Eight park and ride lots in Washington County.

Documentation:
- 2000 Journey to Work Commutation for Maryland, Maryland Department of Planning 2003.
- Maryland State Highway Administration.

Assumptions:
- Distance from home to lot is 5 miles.
- Market share for work trips are represented by Frederick County, Montgomery County, Baltimore City, and Washington D.C.
- We consider only the benefits along 20 miles traveled within Washington County.
- From historical data it is estimated 16% increase in Park and Ride lot occupancy from 2003 to 2007.

Calculations:
Transportation and emission benefits are calculated using MAQONE.

Summary of Results:

VT Benefit: -206 trips
VMT Benefit: -2,861 miles

Emission Benefits:
VOC -1.77 kg/day
NOx -1.80 kg/day
Transportation and Emissions Impacts: Projects ordered by Project Type

<table>
<thead>
<tr>
<th>Cat. ID</th>
<th>County</th>
<th>Description</th>
<th>Yr. Compl</th>
<th>VEHICLE</th>
<th>BUS</th>
<th>Vehicle Emissions kg/day</th>
</tr>
</thead>
<tbody>
<tr>
<td>PR1 1</td>
<td>Washington</td>
<td>US 40 Alternate @ MD 67</td>
<td>2007</td>
<td>-14</td>
<td>-123</td>
<td>0</td>
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<tr>
<td>PR1 2</td>
<td>Washington</td>
<td>I-70 @ US 40</td>
<td>2007</td>
<td>-15</td>
<td>-129</td>
<td>0</td>
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<tr>
<td>PR1 3</td>
<td>Washington</td>
<td>I-70 @ MD 65 (SHA lot)</td>
<td>2007</td>
<td>-30</td>
<td>-256</td>
<td>0</td>
</tr>
<tr>
<td>PR1 4</td>
<td>Washington</td>
<td>I-70 @ MD 65 (MVA lot)</td>
<td>2007</td>
<td>-51</td>
<td>-1,534</td>
<td>0</td>
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<tr>
<td>PR1 5</td>
<td>Washington</td>
<td>I-70 @ MD 66</td>
<td>2007</td>
<td>-57</td>
<td>-490</td>
<td>0</td>
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<tr>
<td>PR1 6</td>
<td>Washington</td>
<td>I-70 @ MD 632</td>
<td>2007</td>
<td>-10</td>
<td>-86</td>
<td>0</td>
</tr>
<tr>
<td>PR1 7</td>
<td>Washington</td>
<td>MD 144 @ Center Street (Hancock)</td>
<td>2007</td>
<td>-21</td>
<td>-176</td>
<td>0</td>
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<tr>
<td>PR1 8</td>
<td>Washington</td>
<td>I-81 @ MD 58</td>
<td>2007</td>
<td>-8</td>
<td>-67</td>
<td>0</td>
</tr>
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</table>

Total impacts for all projects in this scenario: (kg/day)

-206 -2,861 0 -1.77 -1.80 -24.77

Cost Effectiveness represents the $ spent versus the Kg of emissions benefits (lower values represent higher levels of cost effectiveness; no benefit = N/A)
Park and Ride (Carpool, Transit, Fixed Guideway)

Project ID: 1  
County: Washington  
Area Type: Rural  
Completion Year: 2007

Cost Benefit Analysis
Capital Cost:  
Service Life (in years):  
Annual Operating Cost:  

Without Transit Service, Carpool Only

100% Carpool
90% Carpool
80% Carpool
70% Carpool
60% Carpool
50% Carpool
45% Carpool
30% Carpool
20% Carpool
10% Carpool
Park and Ride (Carpool, Transit, Fixed Guideway)

Project ID: 2  County: Washington  Area Type: Rural
Location: I-70 @ US 40  Completion Year: 2007

**Cost Benefit Analysis**

<table>
<thead>
<tr>
<th>Capital Cost</th>
<th>Service Life (in years)</th>
<th>Annual Operating Cost</th>
</tr>
</thead>
</table>

**Without Transit Service, Carpool Only**

<table>
<thead>
<tr>
<th>Description</th>
<th>Cost</th>
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<tr>
<td>Without Carpool, Transit</td>
<td>$55,000</td>
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<tr>
<td>Without Transit, Carpool</td>
<td>$48,000</td>
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<table>
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<td>1</td>
<td>$100,000</td>
</tr>
<tr>
<td>2</td>
<td>$50,000</td>
</tr>
<tr>
<td>3</td>
<td>$25,000</td>
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</table>

**Total Cost:** $225,000
**Park and Ride (Carpool, Transit, Fixed Guideway)**

<table>
<thead>
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<th>PPMS#</th>
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<td>3</td>
<td>Washington</td>
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**Location**

I-70 @ MD 65 (SHA lot)

Completion Year: 2007

<table>
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<tr>
<th>Cost Benefit Analysis</th>
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<tbody>
<tr>
<td>Capital Cost:</td>
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<tr>
<td>Service Life (in years):</td>
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<tr>
<td>Annual Operating Cost:</td>
</tr>
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</table>

**Without Transit Service, Carpool Only**

- Without Transit Service, Carpool Only: 82
- Without Transit Service, Carpool Only: 79%
- Without Transit Service, Carpool Only: 5
## Park and Ride (Carpool, Transit, Fixed Guideway)

**Project ID**: 6  
**County**: Washington  
**Area Type**: Rural  
**Completion Year**: 2007

### Cost Benefit Analysis
- **Capital Cost**:  
- **Service Life (in years)**:  
- **Annual Operating Cost**:

| Without Transit Service, Carpool Only |  
|--------------------------------------|---|
| Operations Support Costs            | 20%
| Operations Support Costs            |  30%
| Operations Support Costs            |  70%
| Operations Support Costs            | 100%
| Operations Support Costs            | 110%
| Operations Support Costs            | 120%
| Operations Support Costs            | 130%
| Operations Support Costs            | 140%
| Operations Support Costs            | 150%
| Operations Support Costs            | 160%
| Operations Support Costs            | 170%
| Operations Support Costs            | 180%
| Operations Support Costs            | 190%
| Operations Support Costs            | 200%
| Operations Support Costs            | 210%
| Operations Support Costs            | 220%
| Operations Support Costs            | 230%
| Operations Support Costs            | 240%
| Operations Support Costs            | 250%
| Operations Support Costs            | 260%
| Operations Support Costs            | 270%
| Operations Support Costs            | 280%
| Operations Support Costs            | 290%
| Operations Support Costs            | 300%
| Operations Support Costs            | 310%
| Operations Support Costs            | 320%
| Operations Support Costs            | 330%
| Operations Support Costs            | 340%
| Operations Support Costs            | 350%
| Operations Support Costs            | 360%
| Operations Support Costs            | 370%
| Operations Support Costs            | 380%
| Operations Support Costs            | 390%
| Operations Support Costs            | 400%
| Operations Support Costs            | 410%
| Operations Support Costs            | 420%
| Operations Support Costs            | 430%
| Operations Support Costs            | 440%
| Operations Support Costs            | 450%
| Operations Support Costs            | 460%
| Operations Support Costs            | 470%
| Operations Support Costs            | 480%
| Operations Support Costs            | 490%
| Operations Support Costs            | 500%
| Operations Support Costs            | 510%
| Operations Support Costs            | 520%
| Operations Support Costs            | 530%
| Operations Support Costs            | 540%
| Operations Support Costs            | 550%
| Operations Support Costs            | 560%
| Operations Support Costs            | 570%
| Operations Support Costs            | 580%
| Operations Support Costs            | 590%
| Operations Support Costs            | 600%
| Operations Support Costs            | 610%
| Operations Support Costs            | 620%
| Operations Support Costs            | 630%
| Operations Support Costs            | 640%
| Operations Support Costs            | 650%
| Operations Support Costs            | 660%
| Operations Support Costs            | 670%
| Operations Support Costs            | 680%
| Operations Support Costs            | 690%
| Operations Support Costs            | 700%
| Operations Support Costs            | 710%
| Operations Support Costs            | 720%
| Operations Support Costs            | 730%
| Operations Support Costs            | 740%
| Operations Support Costs            | 750%
| Operations Support Costs            | 760%
| Operations Support Costs            | 770%
| Operations Support Costs            | 780%
| Operations Support Costs            | 790%
| Operations Support Costs            | 800%
| Operations Support Costs            | 810%
| Operations Support Costs            | 820%
| Operations Support Costs            | 830%
| Operations Support Costs            | 840%
| Operations Support Costs            | 850%
| Operations Support Costs            | 860%
| Operations Support Costs            | 870%
| Operations Support Costs            | 880%
| Operations Support Costs            | 890%
| Operations Support Costs            | 900%
| Operations Support Costs            | 910%
| Operations Support Costs            | 920%
| Operations Support Costs            | 930%
| Operations Support Costs            | 940%
| Operations Support Costs            | 950%
| Operations Support Costs            | 960%
| Operations Support Costs            | 970%
| Operations Support Costs            | 980%
| Operations Support Costs            | 990%
| Operations Support Costs            | 1000%

---
<table>
<thead>
<tr>
<th>Project ID</th>
<th>County</th>
<th>Area Type</th>
<th>Completion Year</th>
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<tbody>
<tr>
<td>7</td>
<td>Washington</td>
<td>Rural</td>
<td>2007</td>
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<table>
<thead>
<tr>
<th>Option</th>
<th>Capital Cost</th>
<th>Service Life (in years)</th>
<th>Annual Operating Cost</th>
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</thead>
<tbody>
<tr>
<td>MD 144 @ Center Street (Hancock)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

![Graph showing cost benefit analysis]

Without Transit Service, Carpool Only

- Without Transit Service, Carpool Only
- Service Life: 49 years
- Annual Operating Cost: $912

Click for more details.
Park and Ride (Carpool, Transit, Fixed Guideway)

Project ID: 8
County: Washington
Area Type: Rural
Location: I-81 @ MD 58
Completion Year: 2007

Cost Benefit Analysis
Capital Cost: 
Service Life (in years): 
Annual Operating Cost: 

Without Transit Service, Carpool Only
<table>
<thead>
<tr>
<th>SITE</th>
<th>COUNTY</th>
<th>SITE NAME/LOCATION</th>
<th>SPACES</th>
<th>SPRING</th>
<th>FALL</th>
<th>YEAR AVERAGE</th>
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<td></td>
<td></td>
<td></td>
<td></td>
<td>#</td>
<td>%</td>
<td>#</td>
</tr>
<tr>
<td>60</td>
<td>HO</td>
<td>I-70 @ MD 32</td>
<td>63</td>
<td>46</td>
<td>73%</td>
<td>0%</td>
</tr>
<tr>
<td>61</td>
<td>HO</td>
<td>I-70 @ MD 97 (MD 144)</td>
<td>22</td>
<td>19</td>
<td>86%</td>
<td>0%</td>
</tr>
<tr>
<td>62</td>
<td>HO</td>
<td>US 29 @ MD 108</td>
<td>99</td>
<td>10</td>
<td>10%</td>
<td>0%</td>
</tr>
<tr>
<td>63</td>
<td>HO</td>
<td>US 29 @ MD 216</td>
<td>421</td>
<td>117</td>
<td>28%</td>
<td>0%</td>
</tr>
<tr>
<td>64</td>
<td>HO</td>
<td>MD 32 @ Broken Land Parkway (east lot)</td>
<td>325</td>
<td>168</td>
<td>52%</td>
<td>0%</td>
</tr>
<tr>
<td>65</td>
<td>HO</td>
<td>MD 32 @ Broken Land Parkway (west lot)</td>
<td>318</td>
<td>346</td>
<td>109%</td>
<td>0%</td>
</tr>
<tr>
<td>66</td>
<td>HO</td>
<td>MD 100 @ Long Gate Parkway</td>
<td>302</td>
<td>56</td>
<td>19%</td>
<td>0%</td>
</tr>
<tr>
<td>67</td>
<td>HO</td>
<td>MD 175 @ Snowden River Parkway</td>
<td>210</td>
<td>130</td>
<td>62%</td>
<td>0%</td>
</tr>
<tr>
<td>68</td>
<td>K</td>
<td>US 301 @ MD 291</td>
<td>27</td>
<td>3</td>
<td>11%</td>
<td>4</td>
</tr>
<tr>
<td>69</td>
<td>M</td>
<td>MD 97 @ MD 28</td>
<td>248</td>
<td>24</td>
<td>10%</td>
<td>0%</td>
</tr>
<tr>
<td>70</td>
<td>M</td>
<td>I-270 @ MD 124</td>
<td>511</td>
<td>545</td>
<td>106%</td>
<td>0%</td>
</tr>
<tr>
<td>71</td>
<td>PG</td>
<td>I-95 @ I-495</td>
<td>147</td>
<td>108</td>
<td>73%</td>
<td>0%</td>
</tr>
<tr>
<td>72</td>
<td>PG</td>
<td>MD 193 @ BW Parkway (leased)</td>
<td>172</td>
<td>24</td>
<td>14%</td>
<td>0%</td>
</tr>
<tr>
<td>73</td>
<td>PG</td>
<td>MD 198 @ Van Dorn Road</td>
<td>60</td>
<td>27</td>
<td>45%</td>
<td>0%</td>
</tr>
<tr>
<td>74</td>
<td>PG</td>
<td>MD 210 @ MD 373</td>
<td>489</td>
<td>98</td>
<td>20%</td>
<td>0%</td>
</tr>
<tr>
<td>75</td>
<td>Q</td>
<td>US 50 @ MD 8</td>
<td>266</td>
<td>198</td>
<td>74%</td>
<td>173</td>
</tr>
<tr>
<td>76</td>
<td>Q</td>
<td>US 50 @ MD 404</td>
<td>37</td>
<td>26</td>
<td>70%</td>
<td>49</td>
</tr>
<tr>
<td>77</td>
<td>Q</td>
<td>US 50 @ Castle Marina Road</td>
<td>82</td>
<td>32</td>
<td>39%</td>
<td>34</td>
</tr>
<tr>
<td>78</td>
<td>Q</td>
<td>US 301 @ MD 304</td>
<td>13</td>
<td>6</td>
<td>46%</td>
<td>5</td>
</tr>
<tr>
<td>79</td>
<td>SM</td>
<td>MD 5 @ MD 235</td>
<td>24</td>
<td>7</td>
<td>29%</td>
<td>0%</td>
</tr>
<tr>
<td>80</td>
<td>SM</td>
<td>MD 234 @ MD 342</td>
<td>17</td>
<td>9</td>
<td>53%</td>
<td>0%</td>
</tr>
<tr>
<td>81</td>
<td>S</td>
<td>US 13 @ MD 562</td>
<td>19</td>
<td>10</td>
<td>53%</td>
<td>0%</td>
</tr>
<tr>
<td>82</td>
<td>S</td>
<td>US 13 @ MD 413</td>
<td>12</td>
<td>5</td>
<td>42%</td>
<td>0%</td>
</tr>
<tr>
<td>83</td>
<td>T</td>
<td>MD 33 @ MD 370</td>
<td>9</td>
<td>2</td>
<td>22%</td>
<td>0%</td>
</tr>
<tr>
<td>84</td>
<td>W</td>
<td>US 40 Alternate @ MD 67</td>
<td>66</td>
<td>27</td>
<td>39%</td>
<td>0%</td>
</tr>
<tr>
<td>85</td>
<td>W</td>
<td>I-70 @ US 40</td>
<td>68</td>
<td>28</td>
<td>41%</td>
<td>0%</td>
</tr>
<tr>
<td>86</td>
<td>W</td>
<td>I-70 @ MD 65 (SHA lot)</td>
<td>82</td>
<td>56</td>
<td>66%</td>
<td>0%</td>
</tr>
<tr>
<td>87</td>
<td>W</td>
<td>I-70 @ MD 65 (MDA lot) (leased)</td>
<td>168</td>
<td>93</td>
<td>57%</td>
<td>0%</td>
</tr>
<tr>
<td>88</td>
<td>W</td>
<td>I-70 @ MD 66</td>
<td>155</td>
<td>107</td>
<td>69%</td>
<td>0%</td>
</tr>
<tr>
<td>89</td>
<td>W</td>
<td>I-70 @ MD 632 (leased)</td>
<td>109</td>
<td>19</td>
<td>17%</td>
<td>0%</td>
</tr>
<tr>
<td>90</td>
<td>W</td>
<td>MD 144 @ Caster Street (Hancock) (leased)</td>
<td>49</td>
<td>38</td>
<td>78%</td>
<td>0%</td>
</tr>
<tr>
<td>91</td>
<td>W</td>
<td>I-81 @ MD 58</td>
<td>17</td>
<td>16</td>
<td>94%</td>
<td>0%</td>
</tr>
<tr>
<td>92</td>
<td>W</td>
<td>US 50 @ Phillip Morris Drive</td>
<td>16</td>
<td>1</td>
<td>6%</td>
<td>0%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>****</td>
<td>****</td>
<td><strong>10586</strong></td>
<td><strong>5934</strong></td>
<td><strong>56%</strong></td>
<td><strong>290</strong></td>
</tr>
<tr>
<td>Data Used</td>
<td>Percentage Occupancy Park and Ride Lots - Washington County</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>---------------------------</td>
<td>-------------------------------------------------------------</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1998</td>
<td>1999</td>
<td>2000</td>
<td>2001</td>
<td>2002</td>
<td>2003</td>
</tr>
<tr>
<td>Year average Wash County</td>
<td>49.8</td>
<td>47.8</td>
<td>53.4</td>
<td>53.3</td>
<td>55.8</td>
<td>57.9</td>
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<tr>
<td>Rate increase 2002 - 2007</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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</table>

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>US 40 Alternate @ MD 67</td>
<td>41</td>
<td>38</td>
<td>32</td>
<td>29</td>
<td>43</td>
<td>29</td>
<td>33</td>
<td>32</td>
<td>28</td>
<td>25</td>
</tr>
<tr>
<td>I-70 @ US 40</td>
<td>53</td>
<td>49</td>
<td>44</td>
<td>47</td>
<td>81</td>
<td>84</td>
<td>68</td>
<td>74</td>
<td>46</td>
<td>47</td>
</tr>
<tr>
<td>I-70 @ MD 65 (SHA lot)</td>
<td>58</td>
<td>53</td>
<td>54</td>
<td>47</td>
<td>70</td>
<td>70</td>
<td>60</td>
<td>66</td>
<td>66</td>
<td>68</td>
</tr>
<tr>
<td>I-70 @ MD 65 (MVA lot)</td>
<td>31</td>
<td>30</td>
<td>29</td>
<td>29</td>
<td>34</td>
<td>30</td>
<td>27</td>
<td>40</td>
<td>50</td>
<td>54</td>
</tr>
<tr>
<td>I-70 @ MD 66</td>
<td>60</td>
<td>48</td>
<td>49</td>
<td>62</td>
<td>65</td>
<td>64</td>
<td>59</td>
<td>66</td>
<td>65</td>
<td>67</td>
</tr>
<tr>
<td>I-70 @ MD 632</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>10</td>
<td>8</td>
<td>7</td>
<td>10</td>
<td>16</td>
<td>17</td>
</tr>
<tr>
<td>MD 144 @ Center Street</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>49</td>
<td>69</td>
<td>78</td>
<td>57</td>
<td>73</td>
<td>73</td>
</tr>
<tr>
<td>I-81 @ MD 58</td>
<td>71</td>
<td>65</td>
<td>53</td>
<td>76</td>
<td>88</td>
<td>53</td>
<td>82</td>
<td>76</td>
<td>100</td>
<td>94</td>
</tr>
<tr>
<td>Average (spring/fall)</td>
<td>52.3</td>
<td>47.2</td>
<td>44.3</td>
<td>51.3</td>
<td>58.6</td>
<td>48.1</td>
<td>51.9</td>
<td>54.6</td>
<td>55.5</td>
<td>56.1</td>
</tr>
<tr>
<td>Year average</td>
<td>49.8</td>
<td>47.8</td>
<td>53.4</td>
<td>53.3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Site Name/Location</th>
<th>2003 Spring</th>
<th>2007 Projection</th>
</tr>
</thead>
<tbody>
<tr>
<td>US 40 Alternate @ MD 67</td>
<td>39.0</td>
<td>45</td>
</tr>
<tr>
<td>I-70 @ US 40</td>
<td>41.0</td>
<td>48</td>
</tr>
<tr>
<td>I-70 @ MD 65 (SHA lot)</td>
<td>68.0</td>
<td>79</td>
</tr>
<tr>
<td>I-70 @ MD 65 (MVA lot)</td>
<td>57.0</td>
<td>66</td>
</tr>
<tr>
<td>I-70 @ MD 66</td>
<td>69.0</td>
<td>80</td>
</tr>
<tr>
<td>I-70 @ MD 632</td>
<td>17.0</td>
<td>20</td>
</tr>
<tr>
<td>MD 144 @ Center Street</td>
<td>78.0</td>
<td>91</td>
</tr>
<tr>
<td>I-81 @ MD 58</td>
<td>94.0</td>
<td>100</td>
</tr>
</tbody>
</table>

Historical_data.xls/Graphic data 11/17/2003
TERM: Hagerstown Telework Center

Description:
The Hagerstown Telework Center provides affordable office space and equipment, including computers and high speed internet access, to people who telecommute to work.

Documentation:
- Baltimore Region Telecommuting Baseline Study, 1999, BMC.
- Maryland Department of Transportation.
- Census Transportation Planning Package (CTPP 2000).
- Analyzing the Travel Behavior of Home-based workers in 1991 CALTRANS Statewide Travel Survey, Mokhtarian P.L. and Henderson D.K.
- Telework America 2000: Research Results.

Assumptions:
- The telework center provides 32 workspaces / day.
- The center is currently at 60% utilization = 32 * 0.60 = 19 workspaces / day.
- Assuming half of Hagerstown telework center are government employees and the other half private-sector clients.
- We will assume an average commute distance of 70 miles for government-sector commutes. (50+75+85)/3 = 70 miles daily. We consider 20 miles traveled within Washington County.
- Average work trip distance for private sector telecommuters is 28 miles (from BMC survey – Baltimore Region Telecommuting Baseline Study). We consider 20 miles traveled within Washington County.
- For telecenter-based telecommuters (non-home based), the average VMT reduction per trip was calculated as the non-telecommute day trip distance minus 10 miles, an average distance to a telecenter. (28 – 10) = 18 miles, for private sector; 70-10 = 60 miles, for government sector (Commuter Connections: Transportation Emission Reduction Measure Analysis Report by LDA Consulting, 1999). Only 10 miles are traveled within Washington County.

Calculations:
- Workspaces = 32 * 0.60 = 19 workspaces
- Private sector telecommuters = 19/2 = 9.5
- Government sector telecommuters = 19/2 = 9.5
Work trips:
Total work trips reduced = 0 trips
Total work VMT reduced = (9.5 * 2 * 10 + 9.5 * 2 * 10) = 380 miles

Summary of Results:

VT Benefit: 0 trips
VMT Benefit: -380 miles

Emission Benefits:
VOC -0.19 kg/day
NOx -0.22 kg/day
## Transportation and Emissions Impacts: Projects ordered by Project Type

<table>
<thead>
<tr>
<th>Cat.</th>
<th>ID</th>
<th>County</th>
<th>Description</th>
<th>Yr. Compl</th>
<th>VEHICLE</th>
<th>BUS</th>
</tr>
</thead>
<tbody>
<tr>
<td>EMO 4</td>
<td>1</td>
<td></td>
<td>Hagerstown Telework Center</td>
<td>2003</td>
<td>VT</td>
<td>VMT</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>-380</td>
<td>0</td>
</tr>
</tbody>
</table>

Total impacts for all projects in this scenario:

- (kg/day)
  - VT: 0
  - VMT: -380
  - Vehicle Emissions: -0.19
  - NOx: -0.22
  - CO: -2.63

- (tons/day)
  - VT: 0
  - VMT: -380
  - Vehicle Emissions: 0.00
  - NOx: 0.00
  - CO: 0.00

---

*Cost Effectiveness represents the $ spent versus the Kg of emissions benefits (lower values represent higher levels of cost effectiveness; no benefit = N/A)*

11/14/2007
Emissions Only Analysis

Project ID 4  County Washington  Area Type Urban  PMS#
Location Hagerstown Teelork Center  Completion Year 2003

☐ Cost Benefit Analysis
Capital Cost:  Service Life (in years):  Annual Operating Cost:

Enter base transportation impact data for analysis

Total Change in VMT -360

Total Change in work related VT 0

Total Change in non-work related VT 0

Distributions by time period [must equal 100%]

- Time period
  - Peak
  - Off-Peak
  - Daily

Trip Distributions

<table>
<thead>
<tr>
<th>Time Period</th>
<th>VMT</th>
<th>Work</th>
<th>Non-work</th>
</tr>
</thead>
<tbody>
<tr>
<td>AM</td>
<td></td>
<td>50%</td>
<td>50%</td>
</tr>
<tr>
<td>Midday</td>
<td></td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td>PM</td>
<td></td>
<td>50%</td>
<td>50%</td>
</tr>
<tr>
<td>Night</td>
<td></td>
<td>0%</td>
<td>0%</td>
</tr>
</tbody>
</table>

100% 100% 100%
TERM: Telecommuting Outreach Program

Description:
This TERM looks into actively encouraging employers (government/private sector) to establish telecommuting programs for their employees, and provide planning assistance and other technical expertise towards successful implementation of telecommuting programs. Telecommuting employees avoid making a trip to work on one or more days per week.

Documentation:
- Baltimore Region Telecommuting Baseline Study, 1999, BMC.
- Maryland Department of Transportation.
- Census Transportation Planning Package (CTPP 2000).
- Telework America 2000: Research Results.
- MAQONE Version 3.2, Telework Promotion methodology.

Assumptions:
- Assuming all telecommuters will be home base teleworkers.
- Telecommuters telecommute approximately 1.8 days a week. (Impact Analysis and Improvement Study for the Hagerstown Telework Center).
- The number of employers volunteering to offer a telecommuting option depends on the level of effort of the public agency promoting the program. It is assume low promotion level of effort.

Calculations:
Transportation and emission benefits are calculated using MAQONE’s Telework Promotion module.

In the first step of the analysis, the employment base for the affected region is estimated from area business patterns and local information that is available. The calculated employment base is then corrected for the level of public agency effort (high, medium, or low) to estimate the number of employees eligible for telecommuting. The estimated number of telecommuters is multiplied by a daily factor to account for the fact that telecommuting is not available on all days of the week. This value is divided by the average car occupancy in the region to estimate the number of trips removed due to the telecommuting program. This methodology also takes into account the increase in midday non-work trips the telecommuter makes.
Summary of Results:

VT Benefit: -82 trips
VMT Benefit: -5,276 miles

Emission Benefits:
VOC -2.87 kg/day
NOx -3.12 kg/day
### Transportation and Emissions Impacts: Projects ordered by Project Type

<table>
<thead>
<tr>
<th>Cat. ID</th>
<th>County</th>
<th>Description</th>
<th>Yr. Compl</th>
<th>VEHICLE</th>
<th>BUS</th>
<th>Vehicle Emissions kg/day</th>
</tr>
</thead>
<tbody>
<tr>
<td>TWK1</td>
<td>Washington</td>
<td>Telecommuting Outreach Program</td>
<td>2007</td>
<td>VT</td>
<td>VMT</td>
<td>VOC</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>-82</td>
<td>-5,276</td>
<td>-2.87</td>
</tr>
</tbody>
</table>

Total impacts for all projects in this scenario:

- **Vehicle**: kg/day -82 -5,276 0 -2.87 -3.12 -40.62
- **Vehicle**: tons/day 0.00 0.00 -0.04

Cost Effectiveness represents the $ spent versus the Kg of emissions benefits (lower values represent higher levels of cost effectiveness; no benefit = N/A)
**Washington County Early Action Compact**
*Review of Transportation Emissions Reduction Measures (TERMs)*
*HIGHWAY — VMT and Trip Reduction Measures*

**TERM:** Ozone Action Days

**Description:**
The Ozone Action Program currently in place in Baltimore and Washington DC will expand to Washington County. The Ozone Action Days program is a voluntary initiative by government, environmental groups, and business leaders working with the general public to take extra action to prevent air pollution when high ozone levels are predicted. Because ground level ozone forms under certain weather conditions, a regional team of meteorologists can predict days when ground-level ozone concentrations may exceed health standards. When the air quality is predicted to be poor in both the Baltimore and Washington areas, MDE will call for an Ozone Action Day.

In the event of an Ozone Action Day, MDE and the Metropolitan Washington Council Of Governments will fax an air quality message to media outlets, government agencies and Ozone Action Day participants. In addition, daily forecasts and Ozone Action Day messages will be available on MDE's Ozone Forecast page and on the Air Quality Hotline.

There are many simple actions that people and businesses can take to help reduce air pollution on Ozone Action Days. Example Air Quality CODE RED day volunteer programs include:
- Refuel cars after dusk and limit driving.
- Put off any painting until later.
- Don't use aerosol consumer products.
- Avoid mowing lawns with gasoline-powered mowers.
- Start charcoal with an electric or chimney-type fire starter instead of lighter fluid.
- Take public transportation.
- Try telecommuting

**Documentation:**
- Work Program Book 2004, MDE
- Ozone Survey Report, 2002

**Summary of Results:**
Voluntary Program — no credit taken.
Air Quality "CODE RED" Forecast for May 1, 2003
Air Quality Expected to be UNHEALTHY

2:54 PM, Baltimore, MD

Tomorrow's Forecast: An Air Quality CODE RED forecast has been issued for the Baltimore metropolitan region. Air quality is expected to be UNHEALTHY.

Today's Conditions: As of 3:00 p.m. today, today's air quality in the Baltimore metropolitan region was moderate.

Health Warning: Ground-level ozone can cause lung damage, breathing difficulties, coughing, and chest pain. Should air quality exceed the federal health standard, an Air Quality Code Red Health Advisory will be issued advising the following precautions:

- Children should reduce outdoor activities.
- Healthy individuals should limit strenuous outdoor work or exercise.
- Individuals with respiratory and heart ailments, emphysema, asthma, or chronic bronchitis should limit their outdoor activities. If breathing becomes difficult, move indoors.

Prevention Tips: About 60-70% of pollutants that cause ground-level ozone are created from vehicles, lawnmowers, other garden equipment, and common household products. In order to prevent high levels of ozone from forming, residents are strongly urged to:

- Limit driving and, when possible, combine errands.
- Use area bus and rail lines, or share a ride to work.
- Avoid mowing lawns with gasoline-powered mowers.
- Refuel vehicles after dusk.

Forecast Updates: MDE provides the daily air quality conditions and next-day forecast at 3:30 p.m. during the summer ozone season. For more information, call the Air Quality Hotline at (410) 537-3247 or visit http://www.mde.state.md.us/arma on the Internet.
Survey says....

By: Lizz Rogers, Northrop Grumman

This year, the Clean Air Partners piloted a new tool to use, the Ozone Action Day Employee Survey. The survey was designed by Northrop Grumman and hosted as a web page by Chesapeake Computer Technology. The purpose of the survey is to gather information from an employee's perspective on notification of a Code Red Ozone Action Day. The information could then be used by the employer to improve their Ozone Action Day plans. This information is also important to Clean Air Partners, as it provides a gauge in how our message is getting across.

The survey is e-mailed the day of a forecasted Code Red Ozone Action Day and this year it has been deployed 5 times. Nearly 1200 responses have been received and are currently being analyzed. From the first episode back of June 11th, 2002, the following statistics have been learned:

- 94.69% reporting knowing it was a “Code Red, Bad Air Alert, or OAD” day.
- 87.97% reporting hearing the “Code Red, Bad Air Alert, or OAD” phrase from their employer.
- 69.38% reported that they had been asked by their employer to reduce ozone by change in activities.
- 42.03% had altered their normal routine to reduce air pollution.
- Less than 10% use mass transit, carpool, or telecommute on a regular basis.
- The most significant reason for change was because of the air quality.

The survey can be found at: http://www.ccomt.com/OAD/oadsurvey.asp.
WASHINGTON COUNTY EARLY ACTION COMPACT

Review of Transportation Emissions Reduction Measures (TERMs)

HIGHWAY – VMT and Trip Reduction Measures

TERM: Clean Air Partners

Description:
Clean Air Partners is a volunteer, nonprofit, public-private partnership chartered by the Metropolitan Washington Council of Governments (MWCOG) and the Baltimore Metropolitan Council (BMC) and will be expanded to include Washington County. The Partnership seeks to improve health and the quality of life in the region by educating the public to take voluntary action to reduce ground-level ozone and to reduce exposure to ozone. It will build and broaden awareness of how individuals contribute to air pollution while informing them about the adverse effects of ground level ozone.

Transportation grants from the District of Columbia, MDOT, VDOT, and grants from private sector partners and MWCOG fund the operation. BMC, MDE and private sector partners contribute large amounts of in kind services.

Documentation:
• Work Program Book 2004, MDE

Summary of Results:
Voluntary Program – no credit taken.
Washington County Early Action Compact
Review of Transportation Emissions Reduction Measures (TERMs)
HIGHWAY – VMT and Trip Reduction Measures

TERM: Commuter Bus Service

Description:
Commuter Bus Service from Hagerstown to the Shady Grove Metro Station.

Documentation:
- Maryland Transit Administration (Bus Route No. 991).

Assumptions:
- We will assume an average ridership of 20 passengers per bus per route-trip. This assumption is consistent with data received.
- The distance between Hagerstown (MVA) and Shady Grove Metro Station is 51 miles. We are using 20 miles traveled within Washington County to calculate the transportation and emission benefits for Washington County only.
- Distance from home to Park and Ride Lot is 5 miles.
- For transit riders, the mode split for alternative mode from home to meeting place is as follows:
  
<table>
<thead>
<tr>
<th>Mode</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Walk</td>
<td>39.3%</td>
</tr>
<tr>
<td>Pick up at home</td>
<td>16.4%</td>
</tr>
<tr>
<td>Drive SOV to meeting point</td>
<td>23.6%</td>
</tr>
<tr>
<td>Bus / transit</td>
<td>10.6%</td>
</tr>
<tr>
<td>Vanpool driver</td>
<td>9.0%</td>
</tr>
<tr>
<td>Other</td>
<td>1.1%</td>
</tr>
</tbody>
</table>

  October 16, 2001, LDA Consulting.

- We are going to discount the transportation and emission benefits already calculated for MVA Park and Ride lot by considering only the walk access mode for total trips saved.

Calculations:

Total trips = 20 riders/bus/route-trip * 4 buses * 2 route-trips = 160 trips
Total trips saved = 160 * 0.393 = 63 trips

To calculate VMT:

\[ VMT_1 = 160 \times (0.393 + 0.164 + 0.106 + 0.011) \times 20 = 160 \times 0.674 \times 20 = 2157 \text{ miles} \]
\[ VMT_2 = 160 \times (0.236 + 0.09) \times (20-5) = 160 \times 0.326 \times 15 = 782 \text{ miles} \]
Total VMT saved = 2157 + 782 = 2,939 miles
Washington County Early Action Compact
Review of Transportation Emissions Reduction Measures (TERMs)
HIGHWAY – VMT and Trip Reduction Measures

Summary of Results:

VT Benefit: -63 trips
VMT Benefit: -2,939 miles

Emission Benefits:
VOC -1.65 kg/day
NOx -1.75 kg/day
## Transportation and Emissions Impacts: Projects ordered by Project Type

### Report ID Number
1

### Report Title
Washington County EAC

### Analysis Year
2,007

### Region
Hagerstown

### Mobile Version
Mobile 6

<table>
<thead>
<tr>
<th>Cat. ID</th>
<th>County</th>
<th>Description</th>
<th>Vr. Compl.</th>
<th>VEHICLE</th>
<th>BUS</th>
<th>Vehicle Emissions kg/day</th>
</tr>
</thead>
<tbody>
<tr>
<td>EMO 8</td>
<td>Washington</td>
<td>Commuter Bus Service</td>
<td>2003</td>
<td>-63</td>
<td>0</td>
<td>-1.65</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>-2,939</td>
<td>-1.75</td>
<td>-21.96</td>
</tr>
</tbody>
</table>

Total impacts for all projects in this scenario:

- (kg/day)
  - (tons/day)

Vehicle Emissions kg/day

- VMT
  - VT
  - VMT

Cost Effectiveness represents the $ spent versus the Kg of emissions benefits (lower values represent higher levels of cost effectiveness; no benefit = N/A)

11/14/2002
Emissions Only Analysis

Project ID  8  County Washington  Area Type Urban  Completion Year 2003

Description Commuter Bus Service

Cost Benefit Analysis
Capital Cost: Service Life (in years): Annual Operating Cost:

Enter base transportation impact data for emissions analysis

Total Change in VMT -2339
Total Change in work related VT -63
Total Change in non-work related VT 0

Distributions by time period (must equal 100%)

<table>
<thead>
<tr>
<th>Time period</th>
<th>VMT</th>
<th>Work</th>
<th>Non-work</th>
</tr>
</thead>
<tbody>
<tr>
<td>AM</td>
<td>21%</td>
<td>20%</td>
<td>19%</td>
</tr>
<tr>
<td>Midday</td>
<td>89%</td>
<td>79%</td>
<td>79%</td>
</tr>
<tr>
<td>PM</td>
<td>8%</td>
<td>8%</td>
<td>8%</td>
</tr>
<tr>
<td>Night</td>
<td>1%</td>
<td>1%</td>
<td>1%</td>
</tr>
</tbody>
</table>

100% 100% 100%
Washington County Early Action Compact
Review of Transportation Emissions Reduction Measures (TERMs)
HIGHWAY – VMT and Trip Reduction Measures

TERM: County Commuter.

Description:
County Commuter operates nine fixed routes. Service is provided along the major corridors in the Hagerstown and surrounding areas.

Documentation:
- Maryland Transit Administration.

Assumptions:
- Emissions are calculated using MAQONE.
- Analysis is made for each bus route separately.
- 80.6 % of the commuters are from SOV (CTPP 2000, Washington County)

Calculations:
See Attached spreadsheet.

Example: Valley Mall Route
VT= \(179 \times 0.806\) = 145 trips
VMT= \(145 \times 7 = 1,012\) miles

Summary of Results:

VT Benefit: -756 trips
VMT Benefit: -6,183 miles

Emission Benefits:
VOC -5.30 kg/day
NOx -4.19 kg/day
### Transportation and Emissions Impacts: Projects ordered by Project Type

<table>
<thead>
<tr>
<th>Cat. ID</th>
<th>County</th>
<th>Description</th>
<th>Yr. Compl</th>
<th>VEHICLE</th>
<th>BUS</th>
<th>Vehicle Emissions kg/day</th>
</tr>
</thead>
<tbody>
<tr>
<td>EMO 11</td>
<td>Washington</td>
<td>County Commuter</td>
<td>2003</td>
<td>-756</td>
<td>0</td>
<td>-5.30 -4.19 -62.30</td>
</tr>
</tbody>
</table>

Total impacts for all projects in this scenario:

- **(kg/day)**: -756 -6,183 0 -5.30 -4.19 -62.30
- **(tons/day)**: -0.01 0.00 -0.07

---

Cost Effectiveness represents the $ spent versus the Kg of emissions benefits (lower values represent higher levels of cost effectiveness; no benefit = N/A)
Emissions Only Analysis

Project ID: 11  County: Washington  Area Type: Urban  PPMS#:

Location: County Commuter  Completion Year: 2003

Cost Benefit Analysis
Capital Cost:  Service Life (In years):  Annual Operating Cost:

Enter base transportation impact data for emission analysis

Total Change in VMT: -6103
Total Change in work related VT: -756
Total Change in non-work related VT: 0

Distributions by time period (must equal 100%)
Time period: Peak  Off-Peak  Daily

Trip Distributions

<table>
<thead>
<tr>
<th>Time of Day</th>
<th>VMT</th>
<th>Work</th>
<th>Non-work</th>
</tr>
</thead>
<tbody>
<tr>
<td>AM</td>
<td>10%</td>
<td>20%</td>
<td>70%</td>
</tr>
<tr>
<td>Midday</td>
<td>10%</td>
<td>20%</td>
<td>70%</td>
</tr>
<tr>
<td>PM</td>
<td>10%</td>
<td>20%</td>
<td>70%</td>
</tr>
<tr>
<td>Night</td>
<td>10%</td>
<td>20%</td>
<td>70%</td>
</tr>
</tbody>
</table>

100% 100% 100%
<table>
<thead>
<tr>
<th>Service Name</th>
<th>Total Boarding</th>
<th>Vehicle Revenue Hours</th>
<th>Average Person/hour</th>
<th>No. Hours of Service</th>
<th>Average Trips/day</th>
<th>SOV Trips/day</th>
<th>Route Distance (miles)</th>
<th>VMT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Valley Mall</td>
<td>85,001</td>
<td>6,752</td>
<td>13</td>
<td>14.25</td>
<td>179</td>
<td>145</td>
<td>7</td>
<td>1,012</td>
</tr>
<tr>
<td>Long Meadow</td>
<td>35,334</td>
<td>3,479</td>
<td>10</td>
<td>15</td>
<td>152</td>
<td>123</td>
<td>8</td>
<td>962</td>
</tr>
<tr>
<td>Robinwood</td>
<td>31,367</td>
<td>3,060</td>
<td>10</td>
<td>12</td>
<td>123</td>
<td>99</td>
<td>8</td>
<td>793</td>
</tr>
<tr>
<td>Smithsburg</td>
<td>6,329</td>
<td>1,483</td>
<td>4</td>
<td>5</td>
<td>21</td>
<td>17</td>
<td>13</td>
<td>224</td>
</tr>
<tr>
<td>Funkstown</td>
<td>32,739</td>
<td>1,944</td>
<td>17</td>
<td>6.5</td>
<td>109</td>
<td>88</td>
<td>8</td>
<td>706</td>
</tr>
<tr>
<td>Salem Ave./West End</td>
<td>33,974</td>
<td>1,816</td>
<td>19</td>
<td>6</td>
<td>112</td>
<td>90</td>
<td>6</td>
<td>543</td>
</tr>
<tr>
<td>Williamsport</td>
<td>31,190</td>
<td>3,632</td>
<td>9</td>
<td>12</td>
<td>103</td>
<td>83</td>
<td>11</td>
<td>914</td>
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<tr>
<td>Maugansville</td>
<td>26,047</td>
<td>3,448</td>
<td>8</td>
<td>12.5</td>
<td>94</td>
<td>76</td>
<td>11</td>
<td>837</td>
</tr>
<tr>
<td>Prime Outlets</td>
<td>3,197</td>
<td>768</td>
<td>4</td>
<td>10.25</td>
<td>43</td>
<td>34</td>
<td>5</td>
<td>172</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>756</strong></td>
<td><strong>6,183</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
TERM: Turning Point

Description: Turning Point provides specialized curb to curb transportation for eligible persons with disabilities who are not able to access regular fixed route transit service.

Documentation:
- Washington County Transportation Department “County Commuter” web site.

Assumptions:
- When data is not available we are assuming a minimum of 4 riders/day/bus.
- By the nature of the service, one rider is making 1 trip.

Calculations: From Table 2-3 Human Service Agency Vehicle Utilization Table, Washington County Coordination Plan, the usual number of trips/day are:

\[ VT = 4+4+4+6+4+18+18 = 58 \text{ trips} \]

Multiplying trips by one-way trip length:

\[ VMT = 4*17+4*7+4*5+6*14+4*49+18*12+18*4 = 684 \text{ VMT} \]

Summary of Results:

- VT Benefit: -58 trips
- VMT Benefit: -684 miles

Emission Benefits:
- VOC: -0.43 kg/day
- NOx: -0.41 kg/day
Transportation and Emissions Impacts: Projects ordered by Project Type

<table>
<thead>
<tr>
<th>Cat. ID</th>
<th>County</th>
<th>Description</th>
<th>VEHICLE</th>
<th>BUS</th>
<th>Vehicle Emissions kg/day</th>
</tr>
</thead>
<tbody>
<tr>
<td>EMO 7</td>
<td>Washington</td>
<td>Turning Point - Transit</td>
<td>VT 2003</td>
<td>VMT</td>
<td>VMT</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>-58</td>
<td>-684</td>
<td>0</td>
</tr>
</tbody>
</table>

Total impacts for all projects in this scenario: (kg/day)

-58  -684  0  -0.43  -0.41  -4.92
(tons/day)

0.00  0.00  -0.01

Cost Effectiveness represents the $ spent versus the Kg of emissions benefits (lower values represent higher levels of cost effectiveness; no benefit = N/A)
Emissions Only Analysis

Project ID: 7
County: Washington
Area Type: Urban

Location: Turning Point - Transit
Completion Year: 2003

Cost Benefit Analysis
Capital Cost: __________________________
Service Life (in years): __________________________
Annual Operating Cost: __________________________

Enter base transportation impact data for emission analysis:

Total Change in VMT: -684
Total Change in work related VT: 0
Total Change in non-work related VT: -58

Distributions by time period (must equal 100%)

<table>
<thead>
<tr>
<th>Time period</th>
<th>Peak</th>
<th>Off-Peak</th>
<th>Daily</th>
</tr>
</thead>
<tbody>
<tr>
<td>VMT</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Work</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Non-work</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Trip Distributions:

<table>
<thead>
<tr>
<th>AM</th>
<th>Midday</th>
<th>PM</th>
<th>Night</th>
</tr>
</thead>
<tbody>
<tr>
<td>10%</td>
<td>10%</td>
<td>80%</td>
<td>10%</td>
</tr>
</tbody>
</table>

100% 100% 100%
<table>
<thead>
<tr>
<th>Agency</th>
<th>Usual Vehicle</th>
<th>Route Name or Number</th>
<th>Origin of Route</th>
<th>Geographic Areas Served</th>
<th>Destination of Route</th>
<th>Trip Purpose</th>
<th>Passenger/Client Group</th>
<th>One-Way Trip Length</th>
<th>Usual No. of Riders/Day</th>
<th>Days of Week</th>
<th>Hours of Day Operated</th>
</tr>
</thead>
<tbody>
<tr>
<td>WCDDA</td>
<td>03</td>
<td>Hancock</td>
<td>varies</td>
<td>Senior Ctr. Meals</td>
<td>nutrition</td>
<td>seniors</td>
<td>2</td>
<td>M-F</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>WCDDA</td>
<td>13</td>
<td>WilliamSPORT</td>
<td>varies</td>
<td>Senior Ctr. Meals</td>
<td>nutrition</td>
<td>seniors</td>
<td>5</td>
<td>M-F</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>WCDDA</td>
<td>14</td>
<td>Wash, Co.</td>
<td>varies</td>
<td>Senior Ctr. Meals</td>
<td>nutrition</td>
<td>seniors</td>
<td>0</td>
<td>M-F</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>WCDDA</td>
<td>15</td>
<td>Knoxville</td>
<td>Southwestern Co.</td>
<td>Senior Ctr. Meals</td>
<td>nutrition</td>
<td>seniors</td>
<td>7</td>
<td>M-F</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>WCDDA</td>
<td>16</td>
<td>Wash, Co.</td>
<td>varies</td>
<td>Doctor</td>
<td>medical</td>
<td>seniors</td>
<td>5</td>
<td>M-F</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>WCDDA</td>
<td>17</td>
<td>Smithsburg</td>
<td>varies</td>
<td>Senior Ctr. Meals</td>
<td>nutrition</td>
<td>seniors</td>
<td>5</td>
<td>M-F</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>WCDDA</td>
<td>18</td>
<td>Wash, Co.</td>
<td>varies</td>
<td>Shopping</td>
<td>nutrition</td>
<td>seniors</td>
<td>8</td>
<td>M-F</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>WCDDA</td>
<td>19</td>
<td>Alex, House</td>
<td>City County</td>
<td>Senior Ctr. Meals</td>
<td>nutrition</td>
<td>seniors</td>
<td>8</td>
<td>W-Th</td>
<td></td>
<td></td>
<td></td>
</tr>
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<td>WCDDA</td>
<td>20</td>
<td>Alex, House</td>
<td>City County</td>
<td>Senior Ctr. Meals</td>
<td>nutrition</td>
<td>seniors</td>
<td>8</td>
<td>M-Th</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>WCDDA</td>
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<td>County</td>
<td>Senior Ctr. Meals</td>
<td>nutrition</td>
<td>seniors</td>
<td>8</td>
<td>M-F</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>WCDDA</td>
<td>22</td>
<td>Alex, House</td>
<td>City County</td>
<td>Senior Ctr. Meals</td>
<td>nutrition</td>
<td>seniors</td>
<td>8</td>
<td>F-S</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>WCDDA</td>
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<td>Wash, Co.</td>
<td>varies</td>
<td>Medicare</td>
<td>medical</td>
<td>seniors</td>
<td>4</td>
<td>Tu-W</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>WCDDA</td>
<td>24</td>
<td>Alex, House</td>
<td>varies</td>
<td>Senior Ctr. Meals</td>
<td>nutrition</td>
<td>seniors</td>
<td>1</td>
<td>M-F</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Turning Point**

1. County & City: Hagerstown, Wash, Co. client residences, activity centers, job sites, client appointments, elderly & disabled (MD) 17 4 M-F
2. City: Hagerstown, Hagerstown, Hagerstown, community recreation, elderly & disabled (MD) 7 4 M-F
3. County & City: Hagerstown, Wash, Co. client residences, elderly & disabled (MD) 5 4 M-F
4. City: Hagerstown, Hagerstown, community recreation, elderly & disabled (MD) 10 6 M-F
5. County & City: Hagerstown, Wash, Co. client residences, elderly & disabled (MD) 49 4 M-F
6. City: Hagerstown, Hagerstown, community recreation, elderly & disabled (MD) 12 18 M-F

**Rester Seals**

1. East, East: Hagerstown, Hagerstown, Hagerstown, Hagerstown, adult day care 25 10 M-F
2. East, East: Hagerstown, Hagerstown, Hagerstown, Hagerstown, adult day care 25 10 M-F
3. East, East: Hagerstown, Hagerstown, Hagerstown, adult day care 17 7 M-F
4. East, East: Hagerstown, Hagerstown, Hagerstown, adult day care 20 3 M-F

**The W Houses**

1. Hagerstown, Hagerstown, Wash, Co. various, medical, employment 12 2 6 M-F
2. Hagerstown, Hagerstown, Wash, Co. local schools 15 5
3. Hagerstown, Hagerstown, Wash, Co. schools 15 5
4. Hagerstown, Hagerstown, Wash, Co. schools 15 5
5. Hagerstown, Hagerstown, Wash, Co. adult day care seniors 25 5
6. Hagerstown, Hagerstown, Wash, Co. adult day care seniors 25 5
7. Hagerstown, Hagerstown, Wash, Co. adult day care seniors 25 5
8. Hagerstown, Hagerstown, Wash, Co. adult day care seniors 25 5

**WCDDA**

1. Hancock, Hancock, Hancock, nutrition, seniors 2 5 M-F
2. WilliamSPORT, WilliamSPORT, WilliamSPORT, nutrition, seniors 5 5 M-F
3. Wash, Co., Wash, Co., Wash, Co., nutrition, seniors 0 5 M-F
4. Knoxville, Knoxville, Knoxville, nutrition, seniors 7 5 M-F
5. Wash, Co., Wash, Co., Wash, Co., nutrition, seniors 5 5 M-F
6. Smithsburg, Smithsburg, Smithsburg, nutrition, seniors 5 5 M-F
7. Wash, Co., Wash, Co., Wash, Co., nutrition, seniors 0 5 M-F
8. Alex, House, Alex, House, Alex, House, nutrition, seniors 8 5 M-F
9. Alex, House, Alex, House, Alex, House, nutrition, seniors 8 5 M-F
10. Alex, House, Alex, House, Alex, House, nutrition, seniors 8 5 M-F
11. Alex, House, Alex, House, Alex, House, nutrition, seniors 8 5 M-F
12. Alex, House, Alex, House, Alex, House, nutrition, seniors 8 5 M-F
13. Alex, House, Alex, House, Alex, House, nutrition, seniors 8 5 M-F
14. Alex, House, Alex, House, Alex, House, nutrition, seniors 8 5 M-F
15. Alex, House, Alex, House, Alex, House, nutrition, seniors 8 5 M-F
16. Alex, House, Alex, House, Alex, House, nutrition, seniors 8 5 M-F
17. Alex, House, Alex, House, Alex, House, nutrition, seniors 8 5 M-F
18. Alex, House, Alex, House, Alex, House, nutrition, seniors 8 5 M-F
19. Alex, House, Alex, House, Alex, House, nutrition, seniors 8 5 M-F
20. Alex, House, Alex, House, Alex, House, nutrition, seniors 8 5 M-F
21. Alex, House, Alex, House, Alex, House, nutrition, seniors 8 5 M-F
22. Alex, House, Alex, House, Alex, House, nutrition, seniors 8 5 M-F
23. Alex, House, Alex, House, Alex, House, nutrition, seniors 8 5 M-F
24. Alex, House, Alex, House, Alex, House, nutrition, seniors 8 5 M-F

**WCDDA**

1. Hancock, Hancock, Hancock, nutrition, seniors 2 5 M-F
2. WilliamSPORT, WilliamSPORT, WilliamSPORT, nutrition, seniors 5 5 M-F
3. Wash, Co., Wash, Co., Wash, Co., nutrition, seniors 0 5 M-F
4. Knoxville, Knoxville, Knoxville, nutrition, seniors 7 5 M-F
5. Wash, Co., Wash, Co., Wash, Co., nutrition, seniors 5 5 M-F
6. Smithsburg, Smithsburg, Smithsburg, nutrition, seniors 5 5 M-F
7. Wash, Co., Wash, Co., Wash, Co., nutrition, seniors 0 5 M-F
8. Alex, House, Alex, House, Alex, House, nutrition, seniors 8 5 M-F
9. Alex, House, Alex, House, Alex, House, nutrition, seniors 8 5 M-F
10. Alex, House, Alex, House, Alex, House, nutrition, seniors 8 5 M-F
11. Alex, House, Alex, House, Alex, House, nutrition, seniors 8 5 M-F
12. Alex, House, Alex, House, Alex, House, nutrition, seniors 8 5 M-F
13. Alex, House, Alex, House, Alex, House, nutrition, seniors 8 5 M-F
14. Alex, House, Alex, House, Alex, House, nutrition, seniors 8 5 M-F
15. Alex, House, Alex, House, Alex, House, nutrition, seniors 8 5 M-F
16. Alex, House, Alex, House, Alex, House, nutrition, seniors 8 5 M-F
17. Alex, House, Alex, House, Alex, House, nutrition, seniors 8 5 M-F
18. Alex, House, Alex, House, Alex, House, nutrition, seniors 8 5 M-F
19. Alex, House, Alex, House, Alex, House, nutrition, seniors 8 5 M-F
20. Alex, House, Alex, House, Alex, House, nutrition, seniors 8 5 M-F
21. Alex, House, Alex, House, Alex, House, nutrition, seniors 8 5 M-F
22. Alex, House, Alex, House, Alex, House, nutrition, seniors 8 5 M-F
23. Alex, House, Alex, House, Alex, House, nutrition, seniors 8 5 M-F
24. Alex, House, Alex, House, Alex, House, nutrition, seniors 8 5 M-F
TERM: E-government / E-commerce

Description:
Trips reduced or eliminated by using on-line services from MVA (Motor Vehicle Administration) website and Washington County's programs such as IVR (Interactive Voice Response) system and the proposed Permits Plus program which will allow the inspectors to work from their homes/trucks without the need for them to come into the office everyday.

Documentation:
- The MVA website offers a number of services online.
- Information received from Washington County's Information Technology Department.

Assumptions:
- The MVA website provides a number of services online such as registration renewal, VEIP extension, title replacements, driving records, change of address, etc. MVA has only one office location in Washington County. The website eliminates the need for trips to the MVA office and allows anyone with access to a computer to carry out these tasks from a computer.
- There is a web page for Washington County Government's On-line Services that includes real property data search, receive notification on job postings, subscribe to County E-mail lists, etc.
- Since December 1, 2003 the IVR system has been implemented to assist contractors/homeowners to schedule, cancel and check on status of inspections, check on the status of building permits and obtain information via fax from the County. This system will not only cut down on the number of phone calls made to the inquiry department but also will cut down many trips made for routine inquiries.
- Assuming average non-work trip length of 5 miles.

Calculations:

Without data available, we calculated benefits for 100 users/day by 2007.

For 100 users/day:
VT = 100 * 2 = 200 trips
VMT = 200 * 5 = 1,000 miles

Summary of Results:

VT Benefit: -200 trips
VMT Benefit: -1,000 miles
Washington County Early Action Compact
Review of Transportation Emissions Reduction Measures (TERMs)
HIGHWAY – VMT and Trip Reduction Measures

Emission Benefits:
VOC                   -1.59 kg/day
NOx                   -0.31 kg/day
Transportation and Emissions Impacts: Projects ordered by Project Type

<table>
<thead>
<tr>
<th>Cat. ID</th>
<th>County</th>
<th>Description / E-commerce</th>
<th>Vr. Compl.</th>
<th>VEHICLE</th>
<th>BUS</th>
<th>Vehicle Emissions kg/day</th>
</tr>
</thead>
<tbody>
<tr>
<td>EMO 13</td>
<td>Washington</td>
<td>E-government / E-commerce</td>
<td>2007</td>
<td>-1,000</td>
<td>0</td>
<td>-1.59 -0.31 -4.68</td>
</tr>
</tbody>
</table>

Total impacts for all projects in this scenario: (kg/day) (tons/day)

-1,000 -200 0 -1.59 -0.31 -4.68

Cost Effectiveness represents the $ spent versus the Kg of emissions benefits (lower values represent higher levels of cost effectiveness; no benefit = N/A)
### Emissions Only Analysis

<table>
<thead>
<tr>
<th>Project ID</th>
<th>13</th>
<th>County</th>
<th>Washington</th>
<th>Area Type</th>
<th>Urban</th>
<th>PPMS#</th>
</tr>
</thead>
<tbody>
<tr>
<td>Description</td>
<td>E-government / E-commerce</td>
<td>Completion Year</td>
<td>2007</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### Cost Benefit Analysis

- Capital Cost: [Blank]
- Service Life (in years): [Blank]
- Annual Operating Cost: [Blank]

**Enter base transportation impact data for emission analysis**

<table>
<thead>
<tr>
<th>Total Change</th>
<th>VMT</th>
<th>Work Related</th>
<th>Non-Work</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Change In VMT</td>
<td>-200</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Total Change In work related VT</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Total Change In non-work related VT</td>
<td>-1000</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

#### Distributions by time period (must equal 100%)

- **Time Period**
  - Peak
  - Off-Peak
  - Daily

**Trip Distributions**

<table>
<thead>
<tr>
<th>Time Period</th>
<th>VMT</th>
<th>Work</th>
<th>Non-Work</th>
</tr>
</thead>
<tbody>
<tr>
<td>AM</td>
<td>31%</td>
<td>59%</td>
<td>10%</td>
</tr>
<tr>
<td>Midday</td>
<td>16%</td>
<td>84%</td>
<td>0%</td>
</tr>
<tr>
<td>PM</td>
<td>19%</td>
<td>79%</td>
<td>0%</td>
</tr>
<tr>
<td>Night</td>
<td>10%</td>
<td>80%</td>
<td>10%</td>
</tr>
</tbody>
</table>

100% 100% 100%
Washington County Early Action Compact
Review of Transportation Emissions Reduction Measures (TERMs)
HIGHWAY – VMT and Trip Reduction Measures

TERM: New Jobs Tax Credit

Description:
The new jobs tax credit program provides eligible companies with a six-year tax credit against County real and personal property taxes. The business must either expand or relocate its operations within Washington County. Transportation and emission benefits will be calculated by the reductions in trip length to work by employees working in Washington County instead of other county.

Documentation:
- Washington County website.

Assumptions:
- Assuming ranges of 10%, 20% and 30% of new jobs will be generated by the new jobs tax credit.
- These 10%, 20%, and 30% of employees will reduced their work trip length by 10 miles due to new jobs created in Washington County.
- 1600 jobs will be created in Washington County in 2004.

Calculations:

10% new jobs:
VT = 1600 * 0.10 * 2 = 320 trips
VMT = 320 * 10 = 3,200 miles

20% new jobs:
VT = 1600 * 0.20 * 2 = 640 trips
VMT = 640 * 10 = 6,400 miles

30% new jobs:
VT = 1600 * 0.30 * 2 = 960 trips
VMT = 960 * 10 = 9,600 miles

Summary of Results:

Reduction in trip length in 10% new jobs:
VT Benefit: 0 trips
VMT Benefit: -3,200 miles

Emission Benefits:
VOC -1.59 kg/day
NOx -1.85 kg/day
Reduction in trip length in 20% new jobs:
VT Benefit: 0 trips
VMT Benefit: -6,400 miles

Emission Benefits:
VOC -3.18 kg/day
NOx -3.70 kg/day

Reduction in trip length in 30% new jobs:
VT Benefit: 0 trips
VMT Benefit: -9,600 miles

Emission Benefits:
VOC -4.77 kg/day
NOx -5.55 kg/day
### Transportation and Emissions Impacts: Projects ordered by Project Type

- **Report ID Number:** 1
- **Report Title:** Washington County EAC
- **Analysis Year:** 2007
- **Region:** Hagerstown
- **Mobile Version:** Mobile 6

<table>
<thead>
<tr>
<th>Cat. ID</th>
<th>County</th>
<th>Description</th>
<th>Yr. Compl</th>
<th>VEHICLE</th>
<th>BUS</th>
<th>Vehicle Emissions kg/day</th>
</tr>
</thead>
<tbody>
<tr>
<td>EMO 14</td>
<td>Washington</td>
<td>New jobs tax credit - 10%</td>
<td>2007</td>
<td>0</td>
<td>-3,200</td>
<td>-1.59</td>
</tr>
<tr>
<td>EMO 15</td>
<td>Washington</td>
<td>New jobs tax credit - 20%</td>
<td>2007</td>
<td>0</td>
<td>-6,400</td>
<td>-3.18</td>
</tr>
<tr>
<td>EMO 16</td>
<td>Washington</td>
<td>New jobs tax credit - 30%</td>
<td>2007</td>
<td>0</td>
<td>-9,600</td>
<td>-4.77</td>
</tr>
</tbody>
</table>

Total impacts for all projects in this scenario: (kg/day)

- VT: 0 -19,200
- VMT: 0

Cost Effectiveness represents the $ spent versus the Kg of emissions benefits (lower values represent higher levels of cost effectiveness; no benefit = N/A)
Emissions Only Analysis

Project ID: 14
County: Washington
Area Type: Urban
PPMS#:
Description: New jobs tax credit - 10%
Completion Year: 2007

Cost Benefit Analysis
Capital Cost: 
Service Life (in years): 
Annual Operating Cost: 

Enter base transportation impact data for emission analysis:
Total Change in VMT: -3200
Total Change in work related VT: 0
Total Change in non-work related VT: 0

Distributions by time period (must equal 100%)

<table>
<thead>
<tr>
<th>Time period</th>
<th>VMT</th>
<th>Work</th>
<th>Non-work</th>
</tr>
</thead>
<tbody>
<tr>
<td>AM</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Midday</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PM</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Night</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

100% 100% 100%
Emissions Only Analysis

Project ID: 16  County: Washington  Area Type: Urban  PPMS#:

Description: New jobs tax credit - 30%
Completion Year: 2007

Cost Benefit Analysis

<table>
<thead>
<tr>
<th>Capital Cost:</th>
<th>Service Life (in years):</th>
<th>Annual Operating Cost:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Enter base transportation impact data for emissions analysis:

Total Change in VMT: -9600
Total Change in work related VT: 0
Total Change in non-work related VT: 0

Distributions by time period (must equal 100%)

<table>
<thead>
<tr>
<th>Time period</th>
<th>VMT</th>
<th>Work</th>
<th>Non-work</th>
</tr>
</thead>
<tbody>
<tr>
<td>AM</td>
<td>20%</td>
<td>30%</td>
<td>50%</td>
</tr>
<tr>
<td>Midday</td>
<td>30%</td>
<td>40%</td>
<td>30%</td>
</tr>
<tr>
<td>PM</td>
<td>20%</td>
<td>30%</td>
<td>50%</td>
</tr>
<tr>
<td>Night</td>
<td>10%</td>
<td>10%</td>
<td>80%</td>
</tr>
</tbody>
</table>

100%  100%  100%
Washington County Early Action Compact
Review of Transportation Emissions Reduction Measures (TERM) Terms
HIGHWAY – VMT and Trip Reduction Measures

TERM: Growth Management Program – Hopewell Valley Promotion

Description:
Growth Management refers to policies that integrate transportation and land use decisions. Washington County has previously targeted investment to encourage economic development to occur in several primary areas within the Urban Growth Area, including Hopewell Valley, a moderate-heavy industrial area that has seen significant development, primarily low-tech in nature with emphasis on manufacturing, warehouse/distribution centers and freight transportation support facilities.

Documentation:
- Washington County website.
- Trip Generation, 6th edition. Institute of Transportation Engineers (ITE).

Assumptions:
- No data available.
- Trips length will be reduced by 10 miles due to growth management program.
- Ten percent of total trip generated/attracted by Hopewell Valley project will be considered to reduce trip length.
- Out of 912 acres of Hopewell Valley undeveloped land, 200 acres will be developed by 2007 using a growth management program.
- Weekday average vehicle trip ends is calculated using the weighted average trip generation rates from ITE. Number of Acres is the independent variable.
- A proposed scenario includes a mixed-used development consisting of 50 acres of offices, retail/commercial, 50 acres of housing, 50 acres of industrial park, 50 acres of general heavy Industrial.

Calculations:

\[ T = \text{average vehicle trip ends.} \]

\[ T \text{ offices, retail/commercial (business park)} = 149.79 \times 50 = 7,490 \]
\[ T \text{ housing (residential planned unit development)} = 46.78 \times 50 = 2,339 \]
\[ T \text{ industrial park} = 63.11 \times 50 = 3,156 \]
\[ T \text{ general heavy industrial} = 6.75 \times 50 = 338 \]

\[ T \text{ total} = 7490+2339+3156+338 = 13,323 \]

\[ VT = 13323 \times 2 = 26,646 \text{ trips} \]
\[ VT \text{ considered reducing trip length by growth management program} = 26646 \times 0.10 = 2,665 \]
\[ VMT = 2665 \times 10 = 26,650 \text{ miles} \]
Summary of Results:

VT Benefit: 0 trips
VMT Benefit: -26,650 miles

Emission Benefits:
VOC -13.24 kg/day
NOx -15.42 kg/day
Transportation and Emissions Impacts: Projects ordered by Project Type

Report ID Number: 1
Report Title: Washington County EAC
Analysis Year: 2,007
Region: Hagerstown
Mobile Version: Mobile 6

<table>
<thead>
<tr>
<th>Cat. ID</th>
<th>County</th>
<th>Description</th>
<th>Yr. Compl.</th>
<th>VEHICLE</th>
<th></th>
<th>BUS</th>
<th></th>
<th>Vehicle Emissions kg/day</th>
</tr>
</thead>
</table>

Total impacts for all projects in this scenario: (kg/day)

<table>
<thead>
<tr>
<th></th>
<th>0</th>
<th>-26,650</th>
<th>0</th>
<th>-13.24</th>
<th>-15.42</th>
<th>-184.41</th>
</tr>
</thead>
<tbody>
<tr>
<td>(tons/day)</td>
<td>-0.01</td>
<td>-0.02</td>
<td>-0.20</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Cost Effectiveness represents the $ spent versus the Kg of emissions benefits (lower values represent higher levels of cost effectiveness; no benefit = N/A)*
**TERM:** Signalization Improvements

**Description:**
This TERM includes computer-controlled system enhancement under construction and a signal re-optimization project.

**Documentation:**
- 2002 Highway Location Reference, Maryland State Highway Administration.

**Assumptions:**
- US 40 – Cleveland Av to Edgewood Dr computer controlled system, under construction, estimate completion 2003.

**Calculations:**
Emission benefits are calculated using MAQONE's Arterial Improvement methodology.

**Summary of Results:**

<table>
<thead>
<tr>
<th>Benefit</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>VT Benefit</td>
<td>0 trips</td>
</tr>
<tr>
<td>VMT Benefit</td>
<td>0 miles</td>
</tr>
</tbody>
</table>

**Emission Benefits:**
- VOC: $-10.22 \text{ kg/day}$
- NOx: $-3.08 \text{ kg/day}$
## Transportation and Emissions Impacts: Projects ordered by Project Type

<table>
<thead>
<tr>
<th>Cat ID</th>
<th>County</th>
<th>Description</th>
<th>Yr. Compl</th>
<th>VEHICLE</th>
<th>BUS</th>
<th>Vehicle Emissions kg/day</th>
</tr>
</thead>
<tbody>
<tr>
<td>H11 1</td>
<td>Washington</td>
<td>US 40 / Cleveland Ave to Edgewood Dr.</td>
<td>2007</td>
<td>0</td>
<td>0</td>
<td>-6.00</td>
</tr>
<tr>
<td>H11 2</td>
<td>Washington</td>
<td>MD 65 / Doub Way to Henry Douglas Dr.</td>
<td>2007</td>
<td>0</td>
<td>0</td>
<td>-4.22</td>
</tr>
</tbody>
</table>

Total impacts for all projects in this scenario: (kg/day)
(tons/day)

<table>
<thead>
<tr>
<th></th>
<th>VOC</th>
<th>NOx</th>
<th>CO</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>-10.22</td>
<td>-3.08</td>
<td>-33.37</td>
</tr>
<tr>
<td></td>
<td>-0.01</td>
<td>0.00</td>
<td>-0.04</td>
</tr>
</tbody>
</table>

Cost Effectiveness represents the $ spent versus the Kg of emissions benefits (lower values represent higher levels of cost effectiveness; no benefit = N/A)
Arterial Improvements

Project ID: 2
County: Washington
Area Type: Urban
PPMS#: 

Location: MD 65 / Doubt Way to Henry Douglas Dr.
Completion Year: 2007

Cost Benefit Analysis
Capital Cost: Service Life (in years):
Annual Operating Cost:

Favorable Progression
### Washington County EAC
### Signalization Improvements

<table>
<thead>
<tr>
<th>Data Used</th>
<th>AADT FOR ATR STATIONS: Station P0002</th>
</tr>
</thead>
<tbody>
<tr>
<td>Station\Year</td>
<td>1998</td>
</tr>
<tr>
<td>P0002</td>
<td>11284</td>
</tr>
<tr>
<td>US 40 / Cleveland Ave of Edgewood Dr</td>
<td>18125</td>
</tr>
<tr>
<td>MD 65 / Doub Way to Herry Douglas Dr.</td>
<td>10675</td>
</tr>
</tbody>
</table>

Historical_data.xls/Graphic data

11/14/2003
**TERM:** Incident Management / Intelligent Transportation Systems (ITS)  
[Highway Advisory Radio – 3 locations]

**Description:**  
From CHART ITS devices, only Highway Advisory Radio (HAR) is being used or will be used in Washington County before 2007.

**Documentation:**  
- 2002 Highway Location Reference, Maryland State Highway Administration  

**Assumptions:**  
- Locations with HAR are I-70 @ South Mountain Rest Area, US 522 @ I-70 (Hancock), and I-81 @ US 11 (Williamsport).  
- Average Incidents per day in both directions of the 44 mile expressway = 20 (for Atlantic City Expressway – DVRPC CMAQ Analysis). For 10 miles it is used 5 incidents/day.  
- Average accidents per day in both directions of the 44 mile expressway = 0.43 (for Atlantic City Expressway – DVRPC CMAQ Analysis). For 10 miles it is used 0.11 accidents/day.  
- 2002 AADT were projected to year 2007 based on historical data.

**Calculations:**

Emission benefits are calculated using MAQONE’s Incident Management methodology.

**Summary of Results:**

| VT Benefit: | 0 trips |
| VMT Benefit: | 231 miles |

**Emission Benefits:**

<p>| VOC | -17.59 kg/day |
| NOx | -7.99 kg/day |</p>
<table>
<thead>
<tr>
<th>Cat.</th>
<th>ID</th>
<th>County</th>
<th>Description</th>
<th>Yr.</th>
<th>VEHICLE</th>
<th>BUS</th>
<th>Vehicle Emissions kg/day</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>VT</td>
<td>VMT</td>
<td>VOC</td>
</tr>
<tr>
<td>ITS</td>
<td>1</td>
<td>Washington</td>
<td>Highway Advisory Radio (HAR) 1</td>
<td>2007</td>
<td>0</td>
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<td>-3.39</td>
</tr>
<tr>
<td>ITS</td>
<td>2</td>
<td>Washington</td>
<td>Highway Advisory Radio (HAR) 2</td>
<td>2007</td>
<td>0</td>
<td>52</td>
<td>-10.19</td>
</tr>
<tr>
<td>ITS</td>
<td>3</td>
<td>Washington</td>
<td>Highway Advisory Radio (HAR) 3</td>
<td>2007</td>
<td>0</td>
<td>81</td>
<td>-4.01</td>
</tr>
</tbody>
</table>

Total impacts for all projects in this scenario: (kg/day) (tons/day)

0 231 0 -17.59 -7.99 -61.24

-0.02 -0.01 -0.07

*Cost Effectiveness represents the $ spent versus the Kg of emissions benefits (lower values represent higher levels of cost effectiveness; no benefit = N/A)*
## Incident Management

**Project ID**: 1  
**County**: Washington  
**Area Type**: Rural  
**Completion Year**: 2007

### Cost Benefit Analysis

- **Capital Cost**:  
- **Service Life (in years)**:  
- **Annual Operating Cost**:  

### Project Information

<table>
<thead>
<tr>
<th>Location</th>
<th>Reason for Incident</th>
<th>Location Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>I-70 @ South Mountain Rest Are</td>
<td></td>
<td>35813</td>
</tr>
</tbody>
</table>

**Type of Project**: Freeway
### Incident Management

<table>
<thead>
<tr>
<th>Project ID</th>
<th>County</th>
<th>Area Type</th>
<th>PPMS#</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Washington</td>
<td>Rural</td>
<td></td>
</tr>
</tbody>
</table>

- **Highway Advisory Radio (HAR) 1**

- **Completion Year**: 2007

**Cost Benefit Analysis**

- **Capital Cost**: 
- **Service Life (in years)**: 
- **Annual Operating Cost**: 

**Road Design Information**

- **Width of Roadway**: 7/day
- **Number of Lanes**: 1 Lane

**Traffic Control Measures**

- **Low**
- **Low**
- **Low**

---

Additional information and diagrams related to incident management and traffic control measures.
Incident Management

<table>
<thead>
<tr>
<th>Project ID</th>
<th>County</th>
<th>Area Type</th>
<th>PPMS#</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Washington</td>
<td>Rural</td>
<td></td>
</tr>
</tbody>
</table>

Cost Benefit Analysis

- Capital Cost: 
- Service Life (in years): 
- Annual Operating Cost: 

- Data Gathering Improvement
- Data Analysis
- Incident Management Improvement

- Used Incident Management Improvement
  - Report
  - Analysis
  - Incident Analysis Report
  - Incident Handling Report
### Incident Management

<table>
<thead>
<tr>
<th>Project ID</th>
<th>County</th>
<th>Area Type</th>
<th>PPMS#</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>Washington</td>
<td>Rural</td>
<td></td>
</tr>
</tbody>
</table>

**Description:** Highway Advisory Radio (HAR) 2

**Completion Year:** 2007

**Cost Benefit Analysis**

- **Capital Cost:**
- **Service Life (in years):**
- **Annual Operating Cost:**

### Project Details

<table>
<thead>
<tr>
<th>Freeway</th>
<th>Annual Volume</th>
<th>Lane</th>
<th>Speed Limit</th>
<th>Shoulder Type</th>
<th>Roadway Treat</th>
<th>Capital Project</th>
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<tbody>
<tr>
<td>I-70 @ US 522</td>
<td>10</td>
<td>2</td>
<td>60</td>
<td>5</td>
<td>D</td>
<td>Freeway</td>
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</table>

**Traffic Counts:**

<table>
<thead>
<tr>
<th>Freeway</th>
<th>Traffic Counts</th>
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</table>

**Sanitary Condition:**

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<thead>
<tr>
<th>Freeway</th>
<th>Sanitary Condition</th>
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<tbody>
<tr>
<td></td>
<td></td>
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</table>
### Incident Management

<table>
<thead>
<tr>
<th>Project ID</th>
<th>County</th>
<th>Area Type</th>
<th>Completion Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>Washington</td>
<td>Rural</td>
<td>2007</td>
</tr>
</tbody>
</table>

**Highway Advisory Radio (HAR) 3**

- **Capital Cost:** 
- **Service Life (in years):** 
- **Annual Operating Cost:**

<table>
<thead>
<tr>
<th>Route Information</th>
<th>k Values</th>
<th>Traffic Counts</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>I-81 @ US 11 (Williamsport)</td>
<td>10</td>
<td>28164</td>
<td>2</td>
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</tbody>
</table>

- **Location:** Arterial
## AADT FOR ATR STATIONS: Station P0045

<table>
<thead>
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<th>Year 1998</th>
<th>Year 1999</th>
<th>Year 2000</th>
<th>Year 2001</th>
<th>Year 2002</th>
<th>Linear Trend 2007</th>
<th>R²</th>
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<tbody>
<tr>
<td>P0045</td>
<td>34669</td>
<td>35695</td>
<td>36603</td>
<td>37107</td>
<td>38646</td>
<td>43,000</td>
<td>0.9693</td>
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<tr>
<td>I-70 @ South Mountain Rest Area</td>
<td>32187</td>
<td>one way</td>
<td>35,813</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>I-70 @ US 522</td>
<td>18662</td>
<td>one way</td>
<td>20,765</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I-81 @ US 11</td>
<td>25312</td>
<td>one way</td>
<td>28,164</td>
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</tr>
</tbody>
</table>
VMT of Travel By Functional Classification

\[ y = 916.6x + 26501 \]

\[ R^2 = 0.9693 \]
TERM: On-Road Vehicle Replacements – Fleet Replacement (2 vehicles)

Description:
Purchase of 2 Pickups that are programmed and budgeted for Fiscal Years 2005.

Documentation:
• Maryland State Highway Administration.

Assumptions:
• New Low Emission Vehicles (LEV) will replace old ones.
• MAQONE is used to calculate emission benefits.

Calculations:
In 2005, SHA will replace two pickups (MY 1999,2000).

Summary of Results:

VT Benefit: -0 trips
VMT Benefit: -0 miles

Emission Benefits:
VOC - 0.01 kg/day
NOx - 0.01 kg/day
CO - 0.19 kg/day
<table>
<thead>
<tr>
<th>Cat</th>
<th>ID</th>
<th>County</th>
<th>Description</th>
<th>Yr. Compl</th>
<th>VEHICLE</th>
<th>BUS</th>
<th>Vehicle Emissions kg/day</th>
<th>Cost Effectiveness Ratio ($/kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ATV</td>
<td>1</td>
<td>Washington</td>
<td>Fleet Replacement 2005</td>
<td>2005</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>-0.01</td>
</tr>
</tbody>
</table>

Total impacts for all projects in this scenario: (kg/day) | 0 | 0 | 0 | -0.01 | -0.01 | -0.19
(tons/day) | 0.00 | 0.00 | 0.00

*Cost Effectiveness represents the $ spent versus the Kg of emissions benefits (lower values represent higher levels of cost effectiveness; no benefit = N/A)*
Advanced Technology Vehicles

Project ID: [ ]
County: Washington
Area Type: Urban
PPMS#: [ ]
Completion Year (Purchase Year): 2005

Cost Benefit Analysis
Capital Cost: [ ]
Service Life (in years): [ ]
Annual Operating Cost: [ ]

Retired Fleet Information:

<table>
<thead>
<tr>
<th>Age of Retired Veh</th>
<th># of Passenger Cars Retired</th>
<th># of Light Duty Trucks Retired</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>5</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>6</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>7</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>r</td>
<td>n</td>
<td>n</td>
</tr>
<tr>
<td>Total</td>
<td>0</td>
<td>2</td>
</tr>
</tbody>
</table>

Annualization Factor (days): 250
Annual Average Miles/Veh: 15000
Average Speed (mph): 36.34
Total Daily Current Fleet miles/day: 120

Replacement Fleet Information:

<table>
<thead>
<tr>
<th>Replacement Vehicle Type</th>
<th>Replaced # of Vehicles</th>
</tr>
</thead>
<tbody>
<tr>
<td>LEV Type Vehicles</td>
<td>2</td>
</tr>
</tbody>
</table>

Annualization Factor (days): 250
Annual Average Miles/Veh: 15000
Average Speed (mph): 36.34
Total Daily Future Fleet miles/day: 120

Add New | Delete | Copy to New | Defaults | Return to Main
WASHINGTON COUNTY EARLY ACTION COMPACT
Review of Transportation Emissions Reduction Measures (TERMs)
HIGHWAY – Vehicle Acquisitions

TERM: On-Road Vehicle Replacements – Bus Replacement (6 vehicles)

Description:
Purchase of 6 buses programmed and budgeted for Fiscal Years 2003 through 2005.

Documentation:
• Maryland Transit Administration.

Assumptions:
• New diesel buses will replaced old ones.
• MAQONE will be used to calculate the emissions benefits.

Calculations:

Turning Point:
In 2003, Turning Point received one replacement vehicle.

County Commuter:
In 2004, two replacement vehicles; 2005 three replacements are scheduled.

Summary of Results:

VT Benefit: 0 trips  
VMT Benefit: 0 miles

Emission Benefits:
VOC 0.02 kg/day
NOx -13.6 kg/day (reduction)
CO 0.01 kg /day
## Transportation and Emissions Impacts: Projects ordered by Project Type

**Report ID Number**: 1  
**Report Title**: Washington County EAC - Bus Replacements  
**Analysis Year**: 2007  
**Region**: Hagerstown  
**Mobile Version**: Mobile 6.2

### Table: Emissions Impacts

<table>
<thead>
<tr>
<th>Cat</th>
<th>ID</th>
<th>County</th>
<th>Description</th>
<th>Yr. Compl</th>
<th>VEHICLE</th>
<th>BUS</th>
<th>Vehicle Emissions kg/day</th>
<th>Cost Effectiveness Ratio ($/kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>VT</td>
<td>VMT</td>
<td>VOC</td>
<td>NOx</td>
</tr>
<tr>
<td>TR7</td>
<td>1</td>
<td>Washington</td>
<td>Bus Replacement 2003</td>
<td>2003</td>
<td>0</td>
<td>0</td>
<td>0.00</td>
<td>-0.82</td>
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<tr>
<td>TR7</td>
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<td>Washington</td>
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<td>2004</td>
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<td>0</td>
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<td>-5.11</td>
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<tr>
<td>TR7</td>
<td>3</td>
<td>Washington</td>
<td>Bus Replacement 2005</td>
<td>2005</td>
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<td>0</td>
<td>0.01</td>
<td>-7.67</td>
</tr>
</tbody>
</table>

Total impacts for all projects in this scenario:  
- (kg/day)  
  - 0  
  - 0  
  - 0  
  - 0.02  
  - -13.60  
  - 0.01

- (tons/day)  
  - 0.00  
  - -0.01  
  - 0.00

---

*Cost Effectiveness represents the $ spent versus the Kg of emissions benefits (lower values represent higher levels of cost effectiveness: no benefit = N/A)*
### Bus Replacements

| Project ID | 1 |
| County | Washington |
| Area Type | Urban |
| Description | Bus Replacement 2003 |
| Completion Year (Purchase Year) | 2003 |

#### Cost Benefit Analysis
- Capital Cost: 
- Service Life (in years): 
- Annual Operating Cost: 
- Annualization Factor (days) = 250

#### Retired Buses
- Bus Model Year: 1998
- Number of Buses: 1
- Fuel Type: Assume Diesel
- Annual Vehicle Revenue Miles per Bus: 45911
- Average Bus Speed (mph): 14.8
- Deadhead Factor: 1.15

#### Replacement Buses
- Bus Model Year: 2003
- Number of Buses: 1
- Fuel Type: Diesel
- Annual Vehicle Revenue Miles per Bus: 45911
- Average Bus Speed (mph): 14.8
- Deadhead Factor: 1.15
### Bus Replacements

<table>
<thead>
<tr>
<th>Description</th>
<th>County</th>
<th>Area Type</th>
<th>PPMS#</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bus Replacement 2004</td>
<td>Washington</td>
<td>Urban</td>
<td></td>
</tr>
</tbody>
</table>

| Completion Year (Purchase Year) | 2004 |

#### Cost Benefit Analysis

<table>
<thead>
<tr>
<th>Capital Cost</th>
<th>Service Life (in years)</th>
<th>Annual Operating Cost</th>
</tr>
</thead>
</table>

#### Annualization Factor (days) = 250

### Retired Buses

<table>
<thead>
<tr>
<th>Bus Model Year</th>
<th>Number of Buses</th>
<th>Fuel Type</th>
<th>Annual Vehicle Revenue Miles per Bus</th>
<th>Average Bus Speed (mph)</th>
<th>Deadhead Factor</th>
</tr>
</thead>
<tbody>
<tr>
<td>1994</td>
<td>2</td>
<td>Diesel</td>
<td>45911</td>
<td>14.8</td>
<td>1.15</td>
</tr>
</tbody>
</table>

### Replacement Buses

<table>
<thead>
<tr>
<th>Bus Model Year</th>
<th>Number of Buses</th>
<th>Fuel Type</th>
<th>Annual Vehicle Revenue Miles per Bus</th>
<th>Average Bus Speed (mph)</th>
<th>Deadhead Factor</th>
</tr>
</thead>
<tbody>
<tr>
<td>2004</td>
<td>2</td>
<td>Diesel</td>
<td>45911</td>
<td>14.8</td>
<td>1.15</td>
</tr>
</tbody>
</table>
### Bus Replacements

**Project ID**: 3  
**County**: Washington  
**Area Type**: Urban  
**PPMS#**:  

**Description**: Bus Replacement 2005  
**Completion Year (Purchase Year)**: 2005  

- **Cost Benefit Analysis**
  - **Capital Cost**: [ ]
  - **Service Life (in years)**: [ ]
  - **Annual Operating Cost**: [ ]
  - **Annualization Factor (days)**: 250

#### Retired Buses

- **Bus Model Year**: 1994  
- **Number of Buses**: 3  
- **Fuel Type**: Assume Diesel

- **Annual Vehicle Revenue Miles per Bus**: 45911
- **Average Bus Speed (mph)**: 14.8
- **Deadhead Factor**: 1.15

#### Replacement Buses

- **Bus Model Year**: 2005  
- **Number of Buses**: 3  
- **Fuel Type**: Diesel

- **Annual Vehicle Revenue Miles per Bus**: 45911
- **Average Bus Speed (mph)**: 14.8
- **Deadhead Factor**: 1.15
WASHINGTON COUNTY EARLY ACTION COMPACT
Review of Transportation Emissions Reduction Measures (TERMs)
HIGHWAY - Vehicle Acquisitions

TERM: On-Road Vehicle Replacements - Installation of Emissions Reduction Devices on Engine Re-build Buses.

Description:
This project seeks to help fund the installation of emissions reduction devices on 6 engine re-build buses that are programmed and budgeted for Fiscal Years 2003 through 2005.

Documentation:
- Maryland Transit Administration.
- Environmental Protection Agency.

Assumptions:
- The EPA has certified the proposed Englehard DPX system to eliminate 60% of HC's and CO emissions, with no benefit to NOX emissions. Using MAQONE, the emissions of the buses without the system installed were calculated, and 60% of the VOC emissions recorded as the benefit.

Calculations:
In 2003, County Commuter had three engines re-built.
In 2004, County Commuter has three engines re-build scheduled.

Calculated emissions without the devices:
VOC=2.49 kg/day
NOx=26.93 kg/day

Benefits of installing the emission reduction devices:
VOC=2.49 * 0.60 = -1.49 kg/day
NOx= 26.93 * 0 = 0.00 kg/day

Summary of Results:
VT Benefit: 0 trips
VMT Benefit: 0 miles

Emission Benefits:
VOC -1.49 kg/day
NOx 0.00 kg/day
CO -13.98 kg/day
### Transportation and Emissions Impacts: Projects ordered by Project Type

<table>
<thead>
<tr>
<th>Cat.</th>
<th>ID</th>
<th>County</th>
<th>Description</th>
<th>Yr. Compl</th>
<th>VEHICLE</th>
<th>BUS</th>
<th>Vehicle Emissions kg/day</th>
</tr>
</thead>
</table>

Total impacts for all projects in this scenario:

- (kg/day)
- (tons/day)

---

*Cost Effectiveness represents the $ spent versus the Kg of emissions benefits (lower values represent higher levels of cost effectiveness; no benefit = N/A)*
## Bus Replacements

**Project ID:** 4  |  **County:** Washington  |  **Area Type:** Urban  |  **PPMS#:**

**Engine information:** Engine re-build 2003/2004  |  **Completion Year:** 2004

### Cost Benefit Analysis

- **Capital Cost:**
- **Service Life (in years):**
- **Annual Operating Cost:**

### Annualization Factor (days) =

<table>
<thead>
<tr>
<th>Retired Buses</th>
<th>Replacement Buses</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Bus Model Year</strong></td>
<td><strong>Bus Model Year</strong></td>
</tr>
<tr>
<td>1994</td>
<td>1994</td>
</tr>
<tr>
<td><strong>Number of Buses</strong></td>
<td><strong>Number of Buses</strong></td>
</tr>
<tr>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td><strong>Fuel Type – Assume Diesel</strong></td>
<td><strong>Fuel Type</strong></td>
</tr>
<tr>
<td>Diesel</td>
<td></td>
</tr>
<tr>
<td><strong>Annual Vehicle Revenue Miles per Bus</strong></td>
<td><strong>Annual Vehicle Revenue Miles per Bus</strong></td>
</tr>
<tr>
<td>45911</td>
<td>45911</td>
</tr>
<tr>
<td><strong>Average Bus Speed (mph)</strong></td>
<td><strong>Average Bus Speed (mph)</strong></td>
</tr>
<tr>
<td>12.8</td>
<td>14.2</td>
</tr>
<tr>
<td><strong>Deadhead Factor</strong></td>
<td><strong>Deadhead Factor</strong></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>
TERM: Vehicle Emissions Inspection Program (VEIP) [OBD, IM240]

Description:
This program requires inspection of vehicle emission systems every two years and repair of vehicles that fail to meet emissions standards.

Documentation:
- Maryland State Highway Administration, HPMS reports.

Assumptions:
- Highway Program Monitoring System data is used as input.

Calculations:
The emission benefits were calculated with MOBILE6 in tons/day (tpd).

I/M:
VOC = -0.53 tpd * 907.1858 = -480.81 kg/day
NOx = -0.62 tpd * 907.1858 = -562.46 kg/day

Summary of Results:

I/M Emission Benefits:
VOC -480.81 kg/day
NOx -562.46 kg/day
<table>
<thead>
<tr>
<th>2007</th>
<th>VMT</th>
<th>Speed mph</th>
<th>Voc tpd</th>
<th>Nox tpd</th>
<th>Emissions Benefits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Base</td>
<td>6,454,810</td>
<td>40.3</td>
<td>4.04</td>
<td>8.60</td>
<td>-0.74 -0.05</td>
</tr>
<tr>
<td>RFG</td>
<td>6,454,810</td>
<td>40.3</td>
<td>4.78</td>
<td>8.65</td>
<td></td>
</tr>
<tr>
<td>NLEV</td>
<td>6,454,810</td>
<td>40.3</td>
<td>4.13</td>
<td>8.71</td>
<td>-0.09 -0.11</td>
</tr>
<tr>
<td>Tier2</td>
<td>6,454,810</td>
<td>40.3</td>
<td>4.90</td>
<td>11.71</td>
<td>-0.86 -3.11</td>
</tr>
<tr>
<td>HDE std</td>
<td>6,454,810</td>
<td>40.3</td>
<td>4.04</td>
<td>8.79</td>
<td>0.00 -0.19</td>
</tr>
</tbody>
</table>
TERM: OTC Programs [CP, AIM & PFC]

Description:
Ozone Transport Commission programs to achieve emission reductions of VOC includes Consumer Products (CP), Architectural & Industrial Maintenance (AIM), and Portable Fuel Containers (PFC).

1. Consumer Products (CP): Beginning in January 2005, the rule will establish limits, expressed as percent VOC by weight, upon the concentration of VOCs contained in approximately 80 categories and subcategories of consumer products.
2. Architectural and Industrial Maintenance (AIM): The rule sets specific VOC content limits (in grams/liter) for 46 AIM coating categories. It requires compliance with the limits by January 1, 2005. In most cases, these limits are more stringent than existing Federal AIM rules.
3. Portable Fuel Containers (PFC): The regulation applies to new gas cans and spouts sold in Maryland starting January 1, 2003. The rule applies to any person or entity that sells, supplies, offers for sale, or manufactures for sale gas cans and/or spouts; and is intended to reduce VOC emissions from storage, transport, and refueling activities.

Documentation:
- Table IV-4: “County Assignments for Analyzing Emission Reduction Benefits from within 100 km of NAA” (p.45), Pechan.
- “Other OTC Counties Emission Reduction”, data spreadsheet from Pechan.
- “OTC_PFC”, data spreadsheet from Pechan.
- MDE, Facts About - Draft - COMAR 26.11.XX: Control of Volatile Organic Compounds from Architectural Coatings
- MDE, Facts About - New Regulations for Portable Gas Cans and Gas Can Spouts

Assumptions:
- Data received from Pechan & MDE.

Calculations:

CP:
VOC = -0.12 tpd * 907.1858 = -108.86 kg/day
NOx = 0.00
AIM:
VOC = -92.1793 kg/day
NOx = 0.00

PFC:
VOC = 0.06 tpd * 907.1858 = -54.43 kg/day
NOx = 0.00

Summary of Results:

CP Emission Benefits:
VOC = -108.86 kg/day
NOx = 0.00 kg/day

AIM Emission Benefits:
VOC = -92.18 kg/day
NOx = 0.00 kg/day

PFC Emission Benefits:
VOC = -54.43 kg/day
NOx = 0.00 kg/day
<table>
<thead>
<tr>
<th>County Name</th>
<th>State</th>
<th>County FIPS</th>
<th>SCC</th>
<th>SCC Description</th>
<th>2002 Emissions (tpd)</th>
<th>2002 Emissions (kg/day)</th>
<th>Reductions (kg/day)</th>
<th>% Control</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kent</td>
<td>24029</td>
<td>2401002000</td>
<td>A1M</td>
<td>(solvent based)</td>
<td>0.047887939</td>
<td>43.4423629</td>
<td>13.4672</td>
<td>31.00%</td>
</tr>
<tr>
<td>Queen Anne</td>
<td>24035</td>
<td>2401002000</td>
<td>A1M</td>
<td>(solvent based)</td>
<td>0.104565915</td>
<td>94.87874157</td>
<td>29.4124</td>
<td>31.00%</td>
</tr>
<tr>
<td>Washington</td>
<td>24043</td>
<td>2401002000</td>
<td>A1M</td>
<td>(solvent based)</td>
<td>0.327774957</td>
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<td>92.1733</td>
<td>31.00%</td>
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<tr>
<td>Kent</td>
<td>24029</td>
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<td>Commercial &amp; Consumer Products</td>
<td>0.189948889</td>
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<td>27.2152</td>
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<tr>
<td>Queen Anne</td>
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<td>2485000000</td>
<td></td>
<td>Commercial &amp; Consumer Products</td>
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<tr>
<td>Kent</td>
<td>24029</td>
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<td></td>
<td>0.020214603</td>
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<td></td>
<td></td>
</tr>
<tr>
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<td>2401008000</td>
<td>Traffic Markings</td>
<td></td>
<td>0.021910134</td>
<td>19.87653865</td>
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<tr>
<td>Washington</td>
<td>24043</td>
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<td>Traffic Markings</td>
<td></td>
<td>0.038021028</td>
<td>34.492099491</td>
<td>26.2800</td>
<td>76.19%</td>
</tr>
</tbody>
</table>

As received from MDE on 3/10/2004
TERM: Low Emissions Paint

Description:
Use of low emissions paint will reduce VOC emissions for all line-striping paint used in Washington County.

Assumptions:
- Line-striping paint used for Washington County on an average:
  - White Paint usage/year = 19,450 gallons
  - Yellow Paint usage/year = 13,225 gallons
- Emissions benefits per liter of pavement marking paint:
  - White Paint = 82 grams of VOC per liter
  - Yellow Paint = 71 grams of VOC per liter

Calculations:
VOC emissions reduced due to usage of low emissions white paint = 19,450 gallons * 3.785 liters * 82 grams = 6,036,697 grams of VOC reduced

VOC emissions reduced due to usage of low emissions yellow paint = 13,225 gallons * 3.785 liters * 71 grams = 3,554,020 grams of VOC reduced

Total annual VOC benefit = 9,590,717 gms/year
Total daily VOC benefit = 26,276 gms/day = 26.28 kg/day

Summary of Results:

Emission Benefits:
VOC - 26.28 kg/day
NOx - 0 kg/day
Washington County Early Action Compact
Review of Transportation Emissions Reduction Measures (TERMs)
OFF-ROAD SOURCES – Vehicle Acquisitions

TERM: Off-Road Vehicle Replacements - Landfill Vehicle Replacement

Description:
Two off-road heavy-duty vehicle replacements were replaced by Washington County in 2002 and one is scheduled to be replaced in 2004.

Documentation:
- A 1998 Dozer was replaced by a 2002 model year.
- A 1994 Compactor was replaced by a 2002 model year Compactor Series 2.
- A Tractor Mower is scheduled to be replaced in 2004. Replacement vehicle is not yet chosen.

Assumptions:
- The Dozer usage will be approximately 9235 hours/year and will cost $254,631.
- The Compactor usage will be approximately 9607 hours/year and will cost $447,685.
- The Tractor mower usage will be approximately 138 hours/year and will cost $35,272.

Calculations:
It is difficult to calculate the emissions difference between the old vehicle and the new vehicle. The benefits will be very low due to the small number of vehicles replaced and the low usage of the vehicles per day.

Summary of Results:

Emission Benefits:

Credit not taken, as it is unquantifiable
## AIR QUALITY CONTROL REPORT

2003-2004

**WASH.CO.SOLID WASTE DEPT.**

CONTACT-RODNEY UNGER
PHONE-240-313-2799
CELL PHONE-240-675-1831

<table>
<thead>
<tr>
<th>YEAR</th>
<th>MAKE</th>
<th>MODEL</th>
<th>ENGINE</th>
<th>HRS.</th>
<th>REPLACED YEAR</th>
<th>MAKE</th>
<th>MODEL</th>
<th>ENGINE</th>
<th>PRICE</th>
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<tbody>
<tr>
<td>1998</td>
<td>JD.850</td>
<td>DOZER</td>
<td>9235</td>
<td></td>
<td>2002 JD.850</td>
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<tr>
<td>1994</td>
<td>CAT 826C</td>
<td>COMPACT</td>
<td>3406</td>
<td>9607</td>
<td>2002 CAT 826G</td>
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<td>SERIES 2</td>
<td>3406EATAAC</td>
<td>447,685.00</td>
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<td>301A-JD.</td>
<td>TRACTOR</td>
<td>MOWER</td>
<td>152 C IN</td>
<td>138</td>
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<td>TRACTOR</td>
<td>MOWER</td>
<td></td>
<td>35,272.00</td>
</tr>
</tbody>
</table>

250 HR. SERVICE ON ALL
OIL AND AIR FILTER

2004 REQUEST
CAT.TRACK LOADER
FORD MOWER TRACTOR
TERM: RACT Controls

Description:
Washington County sources subject to RACT:
  • R. Paul Smith/Allegheny Energy

Documentation:
• Data received from MDE.
• RACT credit can only be taken for post-1999 controls.

Calculations:
\[
\begin{align*}
\text{VOC Reduction kg/day} & \quad 0.00 \\
\text{NOx Reduction kg/day} & \quad = - \frac{528}{365} \times 907.185 \\
& \quad = -1312.31 \text{ kg/day}
\end{align*}
\]

Summary of Results:

Emission Benefits:
\[
\begin{align*}
\text{VOC} & \quad 0.00 \text{ kg/day} \\
\text{NOx} & \quad -1312.31 \text{ kg/day}
\end{align*}
\]
# WASHINGTON COUNTY SOURCE REDUCTIONS

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TERM: NLEV, Tier II, HDE Standard

Description:

- Under the National Low Emission Vehicle (NLEV) program auto manufacturers have agreed to comply with tailpipe standards that are more stringent than EPA can mandate prior to model year 2004. The NLEV program was instituted by the OTC states in 2001. Maryland opted into the program in 1999, two years prior to the OTC adoption.
- Tier II program includes more protective tailpipe emissions standards for all passenger vehicles, and lower standards for sulfur in gasoline. Tailpipe standards are set at an average standard of 0.07 grams per mile for NOx for all classes of passenger vehicles beginning in 2004. Vehicles weighing less than 6,000 pounds will be phased-in to this standard between 2004 and 2007. Beginning in 2004, the nation's refiners and importers of gasoline will have the flexibility to manufacture gasoline with a range of sulfur levels as long as all of their production is capped at 300 ppm. By 2006, refiners will meet a 30 ppm average sulfur level with a maximum cap of 80 ppm.
- Heavy-Duty Engine and Vehicle Standards (HDE) is a comprehensive national control program that will regulate the heavy-duty vehicle and its fuel as a single system. A PM emissions standard of 0.01 grams per brake-horsepower-hour for new heavy-duty engines is scheduled to take full effect in the 2007 model year. In addition, refiners will be required to start producing diesel fuel for use in highway vehicles with a sulfur content of no more than 15 ppm, beginning on June 1, 2006.

Documentation:
- Maryland State Highway Administration, HPMS reports.

Assumptions:
- Highway Program Monitoring System data is used as input.

Calculations:
The emission benefits were calculated with MOBILE6 in tons/day (tpd).
Washington County Early Action Compact
Review of Transportation Emissions Reduction Measures (TERMs)
HIGHWAY – Federal Control Measures

NLEV:
VOC = -0.09 tpd * 907.1858 = -81.65 kg/day
NOx = -0.11 tpd * 907.1858 = -99.79 kg/day

Tier II:
VOC = -0.86 tpd * 907.1858 = -780.18 kg/day
NOx = -3.11 tpd * 907.1858 = -2821.35 kg/day

HDE Standard:
VOC = 0.00 tpd * 907.1858 = 0.00 kg/day
NOx = -0.19 tpd * 907.1858 = -172.37 kg/day

Summary of Results:

NLEV Emission Benefits:
VOC = -81.65 kg/day
NOx = -99.79 kg/day

Tier II Emission Benefits:
VOC = -780.18 kg/day
NOx = -2,821.35 kg/day

HDE Standard Emission Benefits:
VOC = 0.00 kg/day
NOx = -172.37 kg/day
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## Millions of Annual Vehicle Miles

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### Seasonal Factor (%AADT)

| 2007 | Average July Summer Weekday | 858    | 32     | 206    | 195    | 98     | 126    | 1,514   | 301    | 0     | 231    | 169    | 60    | 80   | 840   | 2,355   |

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### Millions of Annual Vehicle Miles by Hour
#### 2007 Average July Summer Weekday

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<td>25</td>
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Total: 859  31  208  195  97  127  1,517  301  0  230  171  61  80  843  2,360
TERM: Phase I & II Engine Standards

Description:
Phase I emission standards for nonroad, handheld and nonhandheld engines operating at or below 19 kW took effect in model year 1997. Phase II standards for nonroad, nonhandheld Class I and II engines operating at or below 19 kW will be phased in beginning in model year 2002 and will be complete by 2007. A 30% reduction in VOC emissions is expected by 2005.

Documentation:
- Control of Air Pollution; Emission For New Nonroad Spark-Ignition Engines at or Below 19 Kilowatts; Final Rule. 40 CFR Parts 9 and 90.
- Phase 2 Emission Standards for New Nonroad Spark-Ignition Nonhandheld Engines At or Below 19 Kilowatts; Final Rule. 40 CFR Part 90.

Calculations:
Calculations were not performed, as benefits were difficult to quantify.

Summary of Results:
Emission Benefits:

Credit is not taken.
Washington County Early Action Compact
Review of Transportation Emissions Reduction Measures (TERMs)
OFF-ROAD SOURCES – ENGINE STANDARDS FOR DIESEL POWERED ENGINES

TERM: Engine Standards for Diesel Powered Engines

Description:
A three-tiered process, beginning in 1996 and continuing through 2008, will increase emissions standards for nonroad diesel powered engines used for a variety of purposes such as construction & agriculture. A 25% reduction in NOx emissions is expected by 2005.

Documentation:

Calculations:
Calculations were not performed, as benefits were difficult to quantify.

Summary of Results:
Emission Benefits:

Credit is not taken.
TERM: Engine Standards for Gasoline Powered Marine Engines

Description:
Outboard engine standards began in 1998 and will be phased in through 2006. Inboard standards were set in 2000. Auxiliary Marine engines that operate at less than 25hp were subject to emission standards beginning in 1997. A second phase of emission standards for these engines will be phased in between 2001 and 2005. Auxiliary engines that operate above 25hp will need to meet the requirements for the same size land-based nonroad spark-ignition engines. A 25% reduction in VOC emissions is expected by 2005.

Documentation:

Calculations:
Calculations were not performed, as benefits were difficult to quantify.

Summary of Results:
Emission Benefits:

Credit is not taken.
**TERM:** Engine Standards for Large Gasoline Powered Engines

**Description:**
A two-tiered standard with Tier 1 beginning in 2004 and Tier 2 beginning in 2007. These standards will regulate nonroad gasoline powered engines rated over 19kW. A 20% reduction in both VOC and NOx emissions is expected by 2005.

**Documentation:**

**Calculations:**
Calculations were not performed, as benefits were difficult to quantify.

**Summary of Results:**

**Emission Benefits:**

Credit is not taken.
Term: Engine Standards for Locomotive Engines

Description:
A three-tiered emission standard for new or remanufactured locomotive engines. A 30% reduction of both VOC and NOx emissions is expected by 2005.

Documentation:

Calculations:
Calculations were not performed, as benefits were difficult to quantify.

Summary of Results:

Emission Benefits:

Credit is not taken.
TERM: NOx SIP Call

Description:
This federal rule and state regulation will be implemented to further reduce NOx emissions from major NOx sources. In Maryland these regulations affect electric generators, paper mills, cement plants, and large internal combustion engines located at natural gas pumping stations. Under these regulations, the NOx control systems are to be installed by 2003 to meet a NOx emissions budget established by EPA by 2007. This phase III NOx reduction program is projected to reduce NOx emissions by 23 percent from 1995 levels.

Documentation:

Calculations:
Calculations were not performed, as benefits were difficult to quantify.

Summary of Results:
Emission Benefits:
Credit is not taken.
TERM: Government Memo of Understanding

Description:
A government Memo of Understanding (MOU) can be used to encourage flextime work schedules for employees in the county. Incentives can also be offered to employers who agree to voluntarily adjust work schedules in order to reduce peak travel.

Documentation:
- The compressed work week methodology in MAQONE Ver 3.5 was used to analyze the benefits from the project. MAQONE uses MOBILE6.2 to estimate the emission benefits.

Assumptions:
- A voluntary program to encourage alternate work schedules will be implemented throughout the county.
- Promoting agency level of efforts are assumed to be “low”.
- Default county employment, market share for work trips and time period distributions were used.
- 10% of employers are assumed to be able to offer Alternate work schedules to their employees.
- Daily work trips per employee = 1.8

Summary of Results:

<table>
<thead>
<tr>
<th>Reduced</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>VT</td>
<td>483 trips</td>
</tr>
<tr>
<td>VMT</td>
<td>6,757 miles</td>
</tr>
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</table>

Emission Benefits:

<table>
<thead>
<tr>
<th>Emission</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>VOC</td>
<td>-4.57 kg/day</td>
</tr>
<tr>
<td>NOx</td>
<td>-4.24 kg/day</td>
</tr>
</tbody>
</table>
Compressed Work Week - CWW

Project ID: 1  County: Washington
Area Type: Urban  PPMS#: 

Description: Flextime/Alt Work Schedule  Completion Year: 2007

Cost Benefit Analysis
Capital Cost:  Service Life (in years):  Annual Operating Cost:

Schedule Type: 4 days/40 hrs

- Voluntary Employer Participation
  Promoting agency level of effort: Low

- Only NEW employers REQUIRED to offer CWW
  Percent of all employers who are new:

- ALL employers REQUIRED to offer CWW
  Percent employers actually participating: 92%

Percent of all employers able to offer CWW: 10%
Regional employment base: 53662
Daily work trips per employee: 1.8

Time Period Distribution (must equal 100%)
- AM: 50%
- Midday: 0%
- PM: 50%
- Night: 0%
- Daily: 100%

Market Share for work trips
- Baltimore: 75.3 0%
- Washington, DC: 77.9 1%
- Other1: 13.29 99%
- Other2: 0%
- Other3: 0%

Must equal 100% 100%
### Transportation and Emissions Impacts: Projects ordered by Project Type

<table>
<thead>
<tr>
<th>Cat</th>
<th>ID</th>
<th>County</th>
<th>Description</th>
<th>Yr. Compl</th>
<th>VEHICLE</th>
<th>BUS</th>
<th>Vehicle Emissions kg/day</th>
<th>Cost Effectiveness Ratio ($/kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>CW</td>
<td>1</td>
<td>Washington</td>
<td>Flextime/Alt Work Schedule</td>
<td>2007</td>
<td>-483</td>
<td>0</td>
<td>-4.57 -4.24 -50.80</td>
<td>N/A N/A N/A</td>
</tr>
</tbody>
</table>

Total impacts for all projects in this scenario:
- (kg/day): -483 -6,757 0 -4.57 -4.24 -50.80
- (tons/day): -0.01 0.00 -0.06

*Cost Effectiveness represents the $ spent versus the Kg of emissions benefits (lower values represent higher levels of cost effectiveness: no benefit = N/A)*
TERM: Fuel Programs

Description:
Fuel program options include reformulated gasoline (RFG) or low Reid vapor pressure (RVP) programs. Currently, both Washington DC and Baltimore areas mandate federal RFG. A low RVP program would be state regulated and would mandate low RVP of 7.8psi or 7.2psi for the summer ozone season. Both fuel options have significant emissions benefits, VOC and NOx for RFG and VOC for low RVP. The state and county could only select one fuel program from the two options.

Documentation:
- Countywide emission calculation process for different values of RVP and for using reformulated gasoline in the county.

Assumptions:

Summary of Results:

Emission Benefits:
RVP 7.8
VOC - 208.65 kg/day
NOx - 18.14 kg/day

RVP 7.2
VOC - 444.52 kg/day
NOx - 27.22 kg/day

RFG
VOC - 743.89 kg/day
NOx - 36.29 kg/day

Benefits of implementing a low RVP program may range from 444.52 kg/day to 208.65 kg/day for VOC and may range between 27.22 kg/day to 18.14 kg/day for NOx.
TERM: Diesel Vehicle Emission Controls

Description:
Washington County will support state regulated diesel vehicle emissions controls. A large percentage of heavy-duty diesel trucks operate on the interstates and to local businesses in Washington County are not registered in the county or in Maryland. Therefore, any diesel controls will have to be regulated at the state or regional level. Possible diesel emission controls include:

- Vehicle idling policies/restrictions (Maryland currently has a 5 minute idling limit). There are 6 commercial truck stops with a total of 365 parking spaces and one rest area/welcome center in Washington county. Moreover, truck idling at warehouses, distribution centers, etc., during truck loading/unloading can also be targeted.
- Voluntary public outreach programs

Opacity Testing: Most of the recent activity is in the area of diesel emissions. Maryland has a diesel smoke inspection program that is conducted by the Maryland State Police. This random roadside smoke opacity test requires a failed vehicle to be repaired and retested within 30 days. The program is seeing about a 70% improvement in smoke levels on failed vehicles that have been retested.

Documentation:
- Guidance for quantifying and using long duration truck idling emissions reductions – US-EPA.
- Private source data on Travel Centers / Truck Stops

Assumptions:
- Trucks idle 8 hours/day on an average and using truck idling reduction technologies or other methods this can be reduced.
- Assume a 50% utilization of commercial truck stops parking spaces.
- Rest area truck parking spaces = 15

Calculations:
- Total Truck stops/Rest areas parking spaces = 380
- Average utilization = 50% - 25%
- Average hours of idling reduced per truck per day = 8
- Total Truck idling hours reduced per day = 380*8*0.5 = 1520
- Total Truck idling hours reduced per day = 380*8*0.25 = 760

Summary of Results:

Emission Benefits:
VOC: - 6.48 kg/day to - 3.24 kg/day
NOx: - 205.20 kg/day to - 102.60 kg/day
**Transportation and Emissions Impacts: Projects ordered by Project Type**

<table>
<thead>
<tr>
<th>Cat</th>
<th>ID</th>
<th>County</th>
<th>Description</th>
<th>Year</th>
<th>VEHICLE</th>
<th>BUS</th>
<th>Vehicle Emissions kg/day</th>
<th>Cost Effectiveness Ratio ($/kg)</th>
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<tr>
<td>TIR</td>
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<td>Washington</td>
<td>Washington EAC - Truck Idling Redn</td>
<td>2007</td>
<td>0</td>
<td>0</td>
<td>-3.24</td>
<td>N/A</td>
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<td>0</td>
<td>-102.60</td>
<td>-27.90</td>
<td>N/A</td>
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</table>

Total impacts for all projects in this scenario: (kg/day) 0 0 0 -3.24 -102.60 -27.90 (tons/day) 0.00 -0.11 -0.03

*Cost Effectiveness represents the $ spent versus the Kg of emissions benefits (lower values represent higher levels of cost effectiveness: no benefit = N/A)*
Truck Idling Reduction Analysis

Project ID 2 County Washington Area Type Urban PPMS# __________

Description Washington EAC - Truck Idling Redn Completion Year 2007

Cost Benefit Analysis
Capital Cost: __________ Service Life (in years): __________ Annual Operating Cost: __________

Total Parking Spaces at the Truck Stop 380
Total Truck Idling Hours Per Day 760

Utilization Factor (Default = 75%) 0.25
Average Truck Idling Time (Default = 8 hrs) 8

Add New Delete Copy to New Defaults Back to Main
### Transportation and Emissions Impacts: Projects ordered by Project Type

**Report ID Number**: 1  
**Report Title**: Washington County EAC - Bus Replacements  
**Analysis Year**: 2007  
**Region**: Hagerstown  
**Mobile Version**: Mobile 6.2

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<td>0</td>
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<td>-6.48</td>
<td>-205.20</td>
<td>-55.80</td>
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Total impacts for all projects in this scenario: (kg/day)  
|   |   |   | 0 | 0 | 0 | -6.48 | -205.20 | -55.80 | N/A | N/A | N/A |

Cost Effectiveness represents the $ spent versus the Kg of emissions benefits (lower values represent higher levels of cost effectiveness: no benefit = N/A)
Truck Idling Reduction Analysis

Project ID: 1
County: Washington
Area Type: Urban
PPMS#: 

Description: Washington EAC - Truck Idling Redn
Completion Year: 2007

Cost Benefit Analysis
Capital Cost: 
Service Life (in years): 
Annual Operating Cost: 

Total Parking Spaces at the Truck Stop: 380
Total Truck Idling Hours Per Day: 1520

Utilization Factor (Default = 75%): 0.5

Average Truck Idling Time (Default = 8 hrs): 

Add New | Delete | Copy to New | Defaults | Back to Main
## Truck Stops & Rest Areas in Washington County:

<table>
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<th>#</th>
<th>Truck Stop</th>
<th>City</th>
<th>Spaces</th>
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<tbody>
<tr>
<td>1</td>
<td>Big Pool AC&amp;T</td>
<td>Big Pool</td>
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<td>2</td>
<td>Sharpsburg Pike AC&amp;T</td>
<td>Hagerstown</td>
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<tr>
<td>3</td>
<td>Pilot Travel Center #150</td>
<td>Hagerstown</td>
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<td>AC&amp;T Fuel Center</td>
<td>Hagerstown</td>
<td>170</td>
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<tr>
<td>5</td>
<td>Little Sandy’s Hancock Truck Stop</td>
<td>Hancock</td>
<td>80</td>
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<tr>
<td>6</td>
<td>Williamsport Sunoco</td>
<td>Williamsport</td>
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</table>

Total Truck Stop Parking Spaces in Wash Co.: 365

## Rest Areas in Washington County:

<table>
<thead>
<tr>
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<th>City</th>
<th>Spaces</th>
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<tbody>
<tr>
<td>1</td>
<td>Sideling Hill Interpretive Center</td>
<td>Sideling Hill Cut</td>
<td>15</td>
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</tbody>
</table>

## Truck Loading/Unloading locations in Washington County:

Warehouses, distribution centers, and port terminals are key locations where truck idling related to loading and unloading occur on a regular basis.
TERM: Gas Can Replacement

Description:
650 Old gas cans will be exchanged for new CARB compliant cans that are designed to prevent spillage and decrease evaporative emissions. In addition to reducing VOC emissions, these exchange programs also create public awareness. In an unprecedented public outreach and emission reduction effort, the Maryland Department of Transportation, partnered with the Maryland Department of Environment, and the Home Depot, exchanged 4,392 cans at 12 Home Depot locations across the D.C. nonattainment area of Maryland. In addition, 1,823 cans were exchanged during county household hazardous waste collection events. Similar programs can be easily implemented in Washington County.

Documentation:
- California Air Resources Board, “Public Meeting to Consider Approval of California’s Portable Gasoline-Container Emissions Inventory,” Mailout MSC 99-25. Mobile Source Control Division, September 1999.

Assumptions:
- Approximately 1,000 cans were exchanged in Charles County during a combination of County run events (at Household Hazardous Waste events) and events held at a Home Depot location within the County in 2004.
- Approximately 550 cans were exchanged in Frederick County during a combination of County run events and events held at a Home Depot Location within the County in 2004.
- Washington County’s population is comparable to that of Charles and Frederick County.

Calculations:
Emission benefits were calculated using methodologies obtained from California Air Resource Board’s documentation and EPA’s Draft NONROAD2002a Model.

Summary of Results:
Cans Exchanged: 650
VOC Benefit per Can: .0063 kg/day

Emission Benefits:
VOC -4.10 kg/day
TERM: Lawnmower Replacement

Description:
100 old gasoline powered lawnmowers will be exchanged for new electric mowers, resulting in VOC and NOx benefits. Lawnmower exchanges have been a very popular and successful tool for raising public awareness as well as offering both VOC and NOx reductions. High polluting, old gasoline powered mowers are exchanged for electric mowers which have zero emissions. The Maryland Department of Transportation, partnered with MDE, Black & Decker and Home Depot, held a lawnmower exchange event for the D.C. nonattainment area in June of 2004. 662 gasoline-powered lawnmowers were replaced with electric mowers. MDE and MDOT, having sponsored successful events in the past, can provide logistical support for implementation in Washington County.

Documentation:

Assumptions:
- Based on an exchange held in Prince George's County in 2004, it is assumed that 44% of the mowers exchanged will have 2-stroke engines.

Calculations:
Benefits were calculated using methodologies obtained from EPA documents listed above.

Summary of Results:
Emission Benefits:
- VOC: 1.18 kg/day
- NOx: 0.03 kg/day
TERM: Incident Management / Intelligent Transportation Systems [CCTV – 2 locations & Dynamic Message Signs – 1 location]

Description:
From CHART ITS list of proposed devices, CCTV Camera and Dynamic Message Sign (DMS) are considered in Washington County by 2007.

Documentation:
- 2002 Highway Location Reference, Maryland State Highway Administration

Assumptions:
- CCTV Camera Locations are I-70 @ I-81; and I-68 @ I-70.
- DMS location is I-70 (WB) @ I-68.
- Average Incidents per day in both directions of the 44 mile expressway = 20 (for Atlantic City Expressway – DVRPC CMAQ Analysis). For 10 miles it is used 5 incidents/day.
- Average accidents per day in both directions of the 44 mile expressway = 0.43 (for Atlantic City Expressway – DVRPC CMAQ Analysis). For 10 miles it is used 0.11 accidents/day.
- 2002 AADT were projected to year 2007 based on historical data.

Calculations:

Emission benefits are calculated using MAQONE’s Incident Management methodology.

Summary of Results:

VT Benefit: 0 trips
VMT Benefit: 155 miles

Emission Benefits:
VOC -19.86 kg/day
NOx -8.97 kg/day
## Transportation and Emissions Impacts: Projects ordered by Project Type

<table>
<thead>
<tr>
<th>Cat.</th>
<th>ID</th>
<th>County</th>
<th>Description</th>
<th>Yr. Compl</th>
<th>VEHICLE</th>
<th>BUS</th>
<th>Vehicle Emissions kg/day</th>
</tr>
</thead>
<tbody>
<tr>
<td>ITS</td>
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<td>Washington</td>
<td>CCTV Camera FY07 - 1/2</td>
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<td>0</td>
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<td>Washington</td>
<td>CCTV Camera FY07 - 2/2</td>
<td>2007</td>
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<td>0</td>
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<td>ITS</td>
<td>6</td>
<td>Washington</td>
<td>Dynamic Message Sign FY07 - 1/1</td>
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<td>155</td>
<td>-11.79 -5.78 -47.18</td>
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</tbody>
</table>

Total impacts for all projects in this scenario: (kg/day)

<table>
<thead>
<tr>
<th></th>
<th>VT</th>
<th>VMT</th>
<th></th>
<th>VOC</th>
<th>NOx</th>
<th>CO</th>
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<td>-19.86</td>
<td>-8.97</td>
<td>-74.57</td>
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</tbody>
</table>

*Cost Effectiveness represents the $ spent versus the Kg of emissions benefits (lower values represent higher levels of cost effectiveness; no benefit = N/A)*
Incident Management

Project ID: 4
County: Washington

Area Type: Rural

Completion Year: 2007

Cost Benefit Analysis
- Capital Cost:
- Service Life (in years):
- Annual Operating Cost:

<table>
<thead>
<tr>
<th>Location</th>
<th>Total Incident Experience</th>
<th>Incident Management Improvements</th>
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</thead>
<tbody>
<tr>
<td>I-70 @ I-81</td>
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</tr>
<tr>
<td>2</td>
<td>60</td>
<td></td>
</tr>
<tr>
<td>0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Freeway</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

[Diagram showing incident locations and numbers]
### Incident Management

**Project ID:** 4  
**County:** Washington  
**Area Type:** Rural  
**Completion Year:** 2007

**CCTV Camera FY07 - 1/2**

<table>
<thead>
<tr>
<th>Capital Cost</th>
<th>Service Life (in years)</th>
<th>Annual Operating Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Action</th>
<th>Number</th>
<th>Revenue</th>
<th>Annual Rent</th>
<th>Lane</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Lane</td>
<td>1</td>
<td>1</td>
<td>Low</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Type of WO</th>
<th>Total $</th>
<th>Annual $</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Action:**

- Address:
- Date:
- Signature:
- Review Date:
- Approval Date:
## Incident Management

| Project ID | 4 |
| County | Washington |
| Area Type | Rural |
| Completion Year | 2007 |
| Option | CCTV Camera FY07 - 1/2 |

### Cost Benefit Analysis
- Capital Cost: 
- Service Life (in years): 
- Annual Operating Cost: 

### Details

- [ ] Incident Reporting
- [ ] Law Enforcement
- [ ] Incident Information Center
- [ ] Incident Support

### Special Considerations

- [ ] Access
- [ ] Interface and participation
- [ ] Permanent access

---

ADDENDUM: Updates and Addenda
Incident Management

Project ID: 5  
County: Washington  
Area Type: Rural  
PPMS#:  

Completion Year: 2007

Cost Benefit Analysis

Capital Cost:  
Service Life (in years):  
Annual Operating Cost:  

Base Equations

<table>
<thead>
<tr>
<th>Equations</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>I-60 @ I-70</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td></td>
</tr>
<tr>
<td>1363</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td></td>
</tr>
<tr>
<td>35</td>
<td></td>
</tr>
<tr>
<td>D</td>
<td></td>
</tr>
</tbody>
</table>

Arterial  

Costs:  
Charges:  
Depreciation:  
Benefits:  
Demand:  
Location:  

ashington EAC.mdb  11/19/2003
### Incident Management

<table>
<thead>
<tr>
<th>Project ID</th>
<th>County</th>
<th>Area Type</th>
<th>Completion Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>Washington</td>
<td>Rural</td>
<td>2007</td>
</tr>
</tbody>
</table>

**Cost Benefit Analysis**
- **Capital Cost:**
- **Service Life (in years):**
- **Annual Operating Cost:**

#### Traffic Volume
- **1 Lane:**
  - **Day:** 5
  - **0.11**

#### Traffic Capacity
- **Low:**
  - SUP: 10
  - DUS: 10
  - LUS: 10

#### Flow
- **Low:**

---

*Additional information not shown in the image.*
### Incident Management

| Project ID | 6 |
| County | Washington |
| Area Type | Rural |
| Completion Year | 2007 |

**Dynamic Message Sign FY07 - 1/1**

#### Capital Cost: [ ]

#### Service Life (In years): [ ]

#### Annual Operating Cost: [ ]

### Installation

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-70 (WB) @ I-69</td>
<td>[ ]</td>
</tr>
<tr>
<td>10</td>
<td>[ ]</td>
</tr>
<tr>
<td>17371</td>
<td>[ ]</td>
</tr>
<tr>
<td>2</td>
<td>[ ]</td>
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<tr>
<td>60</td>
<td>[ ]</td>
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<td>D</td>
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<table>
<thead>
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<th>Category</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Freeway</td>
<td>[ ]</td>
</tr>
</tbody>
</table>
Incident Management

Project ID: 6  
County: Washington  
Area Type: Rural  
Completion Year: 2007  

Option: Dynamic Message Sign FY07 - 1/1

Cost Benefit Analysis
Capital Cost:  
Service Life (in years): 5  
Annual Operating Cost: 0.11  

Traffic Analysis:
1 Lane

Traffic Flow:
Low

Risk Assessment:
Low
## Incident Management

<table>
<thead>
<tr>
<th>Project ID</th>
<th>County</th>
<th>Area Type</th>
<th>PPMS#</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Washington</td>
<td>Rural</td>
<td></td>
</tr>
</tbody>
</table>

**Location:** Dynamic Message Sign FY07 - 1/1  
**Completion Year:** 2007

**Cost Benefit Analysis**

<table>
<thead>
<tr>
<th>Capital Cost</th>
<th>Service Life (in years)</th>
<th>Annual Operating Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Need Identification
- [ ] Reduce operational costs
- [ ] Improve traffic safety
- [ ] Meet regional demand
- [ ] Increase congestion
- [ ] Variable Message Sign

### Evaluation
- [ ] Noise
- [ ] Visibility
- [ ] Regulatory requirements
- [ ] Variable Message Sign

### Evaluation

<table>
<thead>
<tr>
<th>Category</th>
<th>Description</th>
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</thead>
<tbody>
<tr>
<td></td>
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</tr>
</tbody>
</table>

### Evaluation

<table>
<thead>
<tr>
<th>Category</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>
TERM: On-Road Vehicle Replacements – Fleet Replacement (5 vehicles)

Description:
Purchase of 4 Pickups and one SUV that are programmed and budgeted for Fiscal Year 2007.

Documentation:
- Maryland State Highway Administration.

Assumptions:
- New Low Emission Vehicles (LEV) will replace old ones.
- MAQONE is used to calculate emission benefits.

Calculations:

Summary of Results:

VT Benefit: -0 trips  
VMT Benefit: -0 miles

Emission Benefits:
VOC -0.08 kg/day  
NOx -0.07 kg/day  
CO -0.83 kg/day
**Transportation and Emissions Impacts: Projects ordered by Project Type**

<table>
<thead>
<tr>
<th>Cat</th>
<th>ID</th>
<th>County</th>
<th>Description</th>
<th>Yr. Compl</th>
<th>VEHICLE</th>
<th>BUS</th>
<th>Vehicle Emissions kg/day</th>
<th>Cost Effectiveness Ratio ($)/kg</th>
</tr>
</thead>
<tbody>
<tr>
<td>ATV</td>
<td>2</td>
<td>Washington</td>
<td>Fleet Replacement 2007</td>
<td>2007</td>
<td>0</td>
<td>0</td>
<td>-0.08</td>
<td>-0.08</td>
</tr>
</tbody>
</table>

Total impacts for all projects in this scenario:

- (kg/day)

- (tons/day)

Cost Effectiveness represents the $ spent versus the Kg of emissions benefits (lower values represent higher levels of cost effectiveness; no benefit = N/A)
Advanced Technology Vehicles

Project ID: 2  County: Washington  Area Type: Urban  PPMS#: 

Description: Fleet Replacement 2007  Completion Year (Purchase Year): 2007

Cost Benefit Analysis

Capital Cost:  Service Life (in years):  Annual Operating Cost: 

Retired Fleet Information:

<table>
<thead>
<tr>
<th>Age of Retired Veh</th>
<th># of Passenger Cars Retired</th>
<th># of Light Duty Trucks Retired</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>6</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>7</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>8</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>9</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Total =</td>
<td>1</td>
<td>4</td>
</tr>
</tbody>
</table>

Annualization Factor (days) 250
Annual Average Miles/Veh 15000
Average Speed (mph) 36.34
Total Daily Current Fleet miles/day 300

Replacement Fleet Information:

<table>
<thead>
<tr>
<th>Replacement Vehicle Type</th>
<th>Replaced # of Vehicles</th>
</tr>
</thead>
<tbody>
<tr>
<td>LEV Type Vehicles</td>
<td>5</td>
</tr>
</tbody>
</table>

Total = 5

Annualization Factor (days) 250
Annual Average Miles/Veh 15000
Average Speed (mph) 36.34
Total Daily Future Fleet miles/day 300
TERM: On-Road Vehicle Replacements – Bus Replacement (7 vehicles)

Description:
Purchase of 7 buses programmed and budgeted for Fiscal Years 2006 & 2007.

Documentation:
- Maryland Transit Administration.

Assumptions:
- New diesel buses will replaced old ones.
- MAQONE will be used to calculate the emissions benefits.

Calculations:

County Commuter:
Three bus replacements in 2006 and four in 2007 scheduled.

Summary of Results:

VT Benefit: 0 trips
VMT Benefit: 0 miles

Emission Benefits:
VOC 0.03 kg/day
NOx -21.67 kg/day
CO -4.32 kg /day
### Transportation and Emissions Impacts: Projects ordered by Project Type

<table>
<thead>
<tr>
<th>Cat</th>
<th>ID</th>
<th>County</th>
<th>Description</th>
<th>Yr. Compl</th>
<th>VEHICLE</th>
<th>BUS</th>
<th>Vehicle Emissions kg/day</th>
<th>Cost Effectiveness Ratio ($/kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>TR7</td>
<td>4</td>
<td>Washington</td>
<td>Bus Replacement 2006</td>
<td>2006</td>
<td>0</td>
<td>0</td>
<td>0.01 -7.67 0.01</td>
<td>N/A N/A N/A</td>
</tr>
<tr>
<td>TR7</td>
<td>5</td>
<td>Washington</td>
<td>Bus Replacement 2007</td>
<td>2007</td>
<td>0</td>
<td>0</td>
<td>0.02 -14.00 -4.33</td>
<td>N/A N/A N/A</td>
</tr>
</tbody>
</table>

Total impacts for all projects in this scenario:  
- (kg/day): 0 0 0; 0.03 -21.67 -4.32  
- (tons/day): 0.00 -0.02 0.00

**Cost Effectiveness** represents the $ spent versus the Kg of emissions benefits (lower values represent higher levels of cost effectiveness; no benefit = N/A)
## Bus Replacements

### Project Details
- **Project ID:** 4
- **County:** Washington
- **Area Type:** Urban
- **PPMS#:** 
- **Completion Year (Purchase Year):** 2006

### Cost Benefit Analysis
- **Capital Cost:** 
- **Service Life (in years):** 
- **Annual Operating Cost:** 

### Annualization Factor (days)
- **Annualization Factor (days):** 250

### Retired Buses
- **Bus Model Year:** 1994
- **Number of Buses:** 3
- **Fuel Type:** Assume Diesel
- **Annual Vehicle Revenue Miles per Bus:** 45911
- **Average Bus Speed (mph):** 14.8
- **Deadhead Factor:** 1.15

### Replacement Buses
- **Bus Model Year:** 2006
- **Number of Buses:** 3
- **Fuel Type:** Diesel
- **Annual Vehicle Revenue Miles per Bus:** 45911
- **Average Bus Speed (mph):** 14.8
- **Deadhead Factor:** 1.15

---

### Associated Transit Agency
- **Washington County TD**
# Bus Replacements

<table>
<thead>
<tr>
<th>Description</th>
<th>Completion Year (Purchase Year)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bus Replacement 2007</td>
<td>2007</td>
</tr>
</tbody>
</table>

## Cost Benefit Analysis

<table>
<thead>
<tr>
<th>Capital Cost:</th>
<th>Service Life (in years):</th>
<th>Annual Operating Cost:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

## Annualization Factor (days) = 250

### Retired Buses

<table>
<thead>
<tr>
<th>Bus Model Year</th>
<th>Number of Buses</th>
<th>Fuel Type</th>
<th>Annual Vehicle Revenue Miles per Bus</th>
<th>Average Bus Speed (mph)</th>
<th>Deadhead Factor</th>
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<tbody>
<tr>
<td>1994</td>
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<td>Diesel</td>
<td>45911</td>
<td>14.8</td>
<td>1.15</td>
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</table>

### Replacement Buses

<table>
<thead>
<tr>
<th>Bus Model Year</th>
<th>Number of Buses</th>
<th>Fuel Type</th>
<th>Annual Vehicle Revenue Miles per Bus</th>
<th>Average Bus Speed (mph)</th>
<th>Deadhead Factor</th>
</tr>
</thead>
<tbody>
<tr>
<td>2007</td>
<td>4</td>
<td>Diesel</td>
<td>45911</td>
<td>14.8</td>
<td>1.15</td>
</tr>
</tbody>
</table>