ITEM 7 - Action
October 15, 2008

Approval of the Final Call for Projects Document for the 2009 Financially Constrained Long-Range Transportation Plan (CLRP) and FY 2010-2015 Transportation Improvement Program (TIP)

Staff Recommendation: Approve the final call for projects document for the 2009 CLRP and FY 2010-2015 TIP for distribution to state, regional, and local agencies.

Issues: None

Background: At the September 17 meeting, the Board was briefed on the draft call for projects document and the schedule for the air quality conformity assessment for the 2009 CLRP and FY 2010-2015 TIP. The TPB Technical Committee reviewed the document on September 5 and October 3. The proposed schedule for the 2009 CLRP, the FY 2010-2015 TIP, and the air quality conformity determination, is on page 9.

NATIONAL CAPITAL REGION TRANSPORTATION PLANNING BOARD (TPB)

Call for Projects

For the 2009 Financially Constrained Long Range Transportation Plan (CLRP) and Fiscal Year 2010 – 2015 Transportation Improvement Program (TIP)

DRAFT

October 15, 2008

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INTRODUCTION

The National Capital Region Transportation Planning Board (TPB), the designated Metropolitan Planning Organization (MPO) for the Washington region, has responsibilities for both long-term transportation planning covering the next two to three decades (the Financially Constrained Long Range Transportation Plan or CLRP) and short-term programming of projects covering the next six years (the Transportation Improvement Program or TIP). The planning horizon for the plan is from 2009 to 2030. The plan identifies transportation projects, programs and strategies that can be implemented by 2030, within financial resources "reasonably expected to be available."

Purpose of Document

This document is a broad solicitation for projects and programs to be included in the 2009 Plan and the FY 2010-2015 TIP. Individual counties, municipalities and state and federal agencies with the fiscal authority to fund transportation projects are invited to submit projects in response to the solicitation. The purpose of this document is to:

1) Describe the policy framework and priorities that should guide project selections;
2) Review federal regulations related to the Plan and TIP; and
3) Explain the project submission process for the Plan and the TIP.

Overview of the Policy Framework and Federal Requirements

The Plan and TIP must address the policy framework, the TPB Vision, and federal requirements, which together comprise the key criteria for the development of the Plan and TIP, summarized in Figure 1 below. The eight policy goals in the TPB Vision can be found on page 14.

The Plan and TIP must meet federal requirements involving financial constraint, air quality conformity, public participation, Title VI and environmental justice, and other requirements including a Congestion Management Process (CMP). A financial plan must show how the updated long-range plan can be implemented with expected revenues. The plan and TIP need to demonstrate conformity with national air quality standards.

Final Planning Regulations

The U.S Department of Transportation issued final regulations for Metropolitan Transportation Planning on February 14, 2007[1]. All plans adopted after July 1, 2007 must comply with these planning regulations and some of the new requirements include:

- The Plan and TIP must be updated every 4 years instead of 3 and 2 respectively. This means that the TPB's next major Plan update with a new financial plan will occur in 2010 (instead of 2009).

[1] Part II. Department of Transportation. Federal Highway Administration, 23 CFR Parts 450 and 500, Federal Transit Administration, 49 CFR Part 613, Statewide Transportation Planning; Metropolitan Transportation Planning; Final Rule. Federal Register, February 14, 2007.

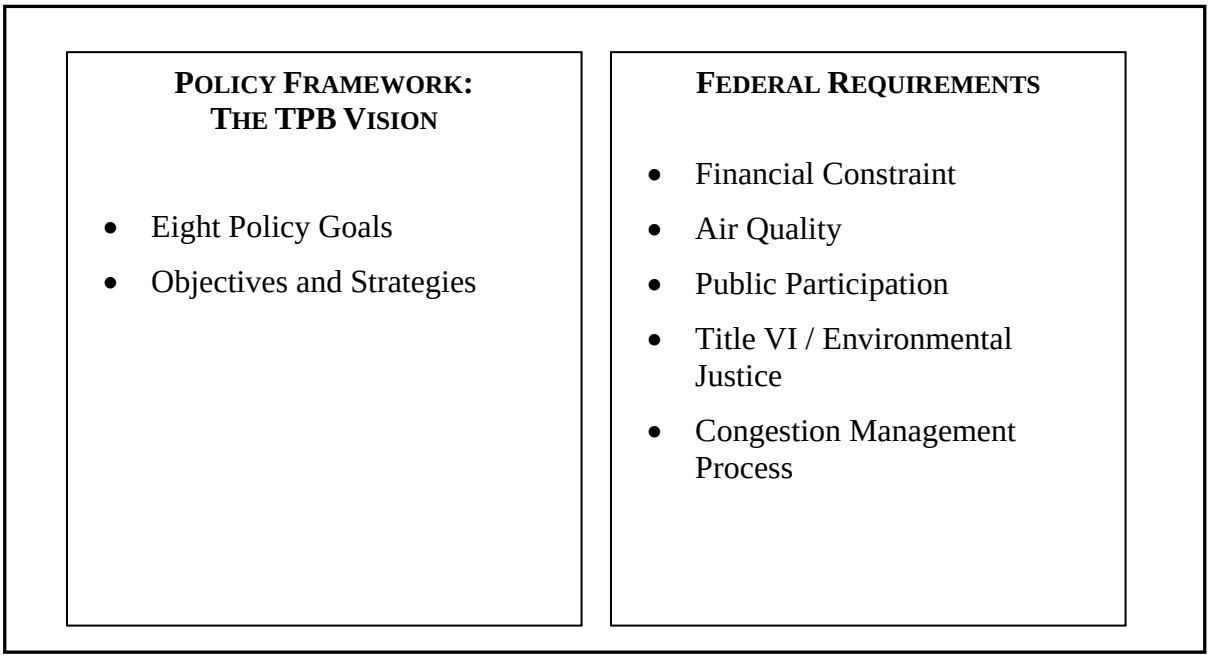
- A Congestion Management Process (CMP) is now required, instead of a Congestion Management System. The Congestion Management Process is a systematic set of actions to provide information on transportation system performance, and to consider alternative strategies to alleviate congestion, enhancing the mobility of persons and goods.

- Eight planning factors to consider during Plan and TIP development (instead of seven). The TPB Vision incorporates the eight planning factors; security is addressed implicitly. The new factors are:
    - Safety;
    - Security; and
    - Consistency between transportation improvements and state and local planned growth and economic development patterns.

- During the development of the long-range plan, the TPB and state implementing agencies will have to consult with agencies responsible for land use management, natural resources, environmental protection, conservation, historic preservation, airport operations and freight movements on projects in the Plan. The Plan must include a discussion of potential environmental mitigation activities along with potential sites to carry out the activities to be included.

- A participation plan has to be developed in consultation with interested parties that provides reasonable opportunities for all parties to comment.

Figure 1:
Key Criteria for Developing the Plan and Transportation Improvement Program (TIP)



Relationship between the Plan and TIP

Every year the TPB prepares a program for implementing the plan using federal, state, and local funds. This document, known as the TIP, provides detailed information showing what projects are eligible for funding and implementation over a six-year period. Like the Plan, the TIP needs to address the TPB Vision and federal requirements. The TIP includes portions, or phases, of projects selected for implementation from the Plan. While the entire project is described in the Plan, in many instances only a portion of the project is included in the six-year TIP. The Plan is reviewed every year and under federal requirements must be updated at least every four years. The TIP must be updated every four years as well.

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Schedule for the 2009 Financially Constrained Long-Range Plan (CLRP) and FY 2010 – 2015 Transportation Improvement Program (TIP)

September 11, 2008	TPB Citizen Advisory Committee Hosts a Public Meeting on the TIP and CLRP Development Process
*September 17, 2008	TPB is Briefed on Draft Call for Projects
*October 15, 2008	TPB Releases Final Call for Projects - Transportation Agencies Begin Submitting Project Information through On-Line Database
December 5, 2008	**DEADLINE:** Transportation Agencies Complete Submission of Draft On-Line Project Inputs. Technical Committee Reviews Draft Plan and TIP Project Submissions and Draft Scope of Work for the Air Quality Conformity Assessment
January 9, 2009	Tech Committee Reviews Plan and TIP Project Submissions and Draft Scope of Work
January 15, 2009	Plan and TIP Project Submissions and Draft Scope of Work Released for Public Comment
*January 21, 2009	TPB is Briefed on Project Submissions and Draft Scope of Work
February 14, 2009	Public Comment Period Ends
*February 18, 2009	TPB Reviews Public Comments and is asked to Approve Project Submissions and Draft Scope of Work
April 24, 2009	DEADLINE: Transportation Agencies Complete TIP Project Submissions and Finalize Congestion Management Documentation Forms (where needed) and CLRP Forms[2]. (Submissions must not impact conformity inputs; note that the deadline for conformity inputs was December 5, 2008).
*May 20, 2009	TPB Receives Status Report on the Draft Plan, TIP and Conformity Assessment
June 11, 2009	Draft Plan, TIP and Conformity Assessment Released for Public Comment at Citizens Advisory Committee (CAC) and the TPB Citizen Advisory Committee Hosts a Public Meeting on the Draft TIP.
*June 17, 2009	TPB Briefed on the Draft Plan, TIP and Conformity Assessment
July 11, 2009	Public Comment Period Ends
*July 15, 2009	TPB Reviews Public Comments and Responses to Comments, and is Presented the Draft Plan, TIP and Conformity Assessment for Adoption

*TPB Meeting

[2] By this date, the CLRP forms must include information on the Planning Factors, Environmental Mitigation, Congestion Management Information, and Intelligent Transportation Systems; separate Congestion Management Documentation Forms (where needed) must also be finalized.

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SECTION 1: POLICY FRAMEWORK

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THE TPB VISION

To guide the planning and implementation of transportation strategies, actions, and projects for the National Capital Region the TPB adopted a Vision in October 1998 that is a comprehensive set of policy goals, objectives, and strategies. The TPB Vision incorporates the eight planning factors specified in SAFETEA-LU; security is addressed implicitly. The eight planning factors are provided in Section 2.

The TPB Vision will be used to review and assess the strategies and projects under consideration for inclusion in the Plan and TIP. **In developing proposed projects and strategies in the Plan or TIP, each agency must consider their contributions to meeting the eight planning factors.** In this way, the TPB will be able to ensure and document that consideration of the required planning factors has taken place. Consideration of regional goals and objectives may also prove useful to agencies in selecting among proposed projects or actions when the desired level of investment exceeds the projected available revenues. Especially important are projects and strategies that contribute to meeting the required emission reductions and achieving air quality conformity.

The Vision policy goals, objectives, and strategies are provided in the following pages.

Vision Statement

In the 21st Century, the Washington metropolitan region remains a vibrant world capital, with a transportation system that provides efficient movement of people and goods. This system promotes the region's economy and environmental quality, and operates in an attractive and safe setting—it is a system that serves everyone. The system is fiscally sustainable, promotes areas of concentrated growth, manages both demand and capacity, employs the best technology, and joins rail, roadway, bus, air, water, pedestrian and bicycle facilities into a fully interconnected network.

The Vision Goals

1. The Washington metropolitan region's transportation system will provide **reasonable access at reasonable cost** to everyone in the region.

2. The Washington metropolitan region will develop, implement, and maintain an interconnected transportation system that enhances quality of life and promotes a strong and growing economy throughout the entire region, including a **healthy regional core and dynamic regional activity centers** with a mix of jobs, housing and services in a walkable environment.

3. The Washington metropolitan region's transportation system will **give priority to management, performance, maintenance, and safety** of all modes and facilities.

4. The Washington metropolitan region will use the **best available technology** to maximize system effectiveness.

5. The Washington metropolitan region will plan and develop a transportation system that enhances and **protects the region's natural environmental quality, cultural and historic resources**, and communities.

6. The Washington metropolitan region will achieve better **inter-jurisdictional coordination of transportation and land use** planning.

7. The Washington metropolitan region will achieve an **enhanced funding mechanism(s) for regional and local transportation system priorities** that cannot be implemented with current and forecasted federal, state, and local funding.

8. The Washington metropolitan region will **support options for international and interregional travel** and commerce.

SECTION 2: FEDERAL REQUIREMENTS

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AIR QUALITY CONFORMITY REQUIREMENTS

The Clean Air Act Amendments (CAAA) of 1990 require that the transportation actions and projects in the CLRP and TIP support the attainment of the federal health standards. The Washington area is currently in a nonattainment status for the 8-hour ozone standard and for fine particles standards (PM2.5, or particulate matter less than or equal to 2.5 micrometers in diameter). The CLRP and TIP must meet air quality conformity regulations: (1) as originally published by the Environmental Protection Agency (EPA) in the November 24, 1993 Federal Register, and (2) as subsequently amended, most recently on January 24, 2008, and (3) as detailed in periodic FHWA / FTA and EPA guidance.

Background

Ozone

Since EPA designated the Washington area as nonattainment for the 1-hour ozone standard in the 1990 CAAA, the Metropolitan Washington Air Quality Committee (MWAQC) and the state air management agencies have developed state air quality implementation plans (SIP)s to achieve EPA's emissions reduction requirements and demonstrate attainment. These work efforts included the development and submittal to EPA of a final 'severe' area ozone attainment SIP in 2004, which, following EPA's approval in May 2005, established revised mobile source emissions budgets for volatile organic compounds (VOC) and nitrogen oxides (NOx). On April 15, 2004 EPA designated the Washington, DC – MD – VA (1-hour ozone area less Stafford County) area as 'moderate' nonattainment for the 8-hour ozone standard, which supplemented the 1-hour ozone standard.

Following regional efforts to prepare an attainment plan to address 8-hour ozone requirements, the state air management agencies submitted the SIP to EPA in June 2007. Once approved by EPA for use in conformity, VOC and NOx mobile source emissions budgets contained in that SIP will be applicable for the TPB's use in assessing conformity.

Fine Particles Standards (PM2.5)

On December 17, 2004 EPA designated the DC – MD – VA area (consisting of the 8-hour ozone area excluding Calvert County) as nonattainment for PM2.5. As published in the January 5, 2005 Federal Register, these PM2.5 nonattainment designations became effective on April 5, 2005. Areas were given a 1 year grace period starting April 5, 2005 in which to demonstrate conformity of transportation plans and programs to the new standards. The primary conformity assessment criterion for PM2.5 in the Washington area, in the interim period until emissions budgets are approved by EPA, is to show that forecast year emissions are no greater than base year 2002 emissions. TPB staff conducted a conformity assessment for $PM_{2.5}$ in the Fall of 2005, which was adopted by the TPB on December 21, 2005. The assessment received federal approval prior to the April, 2006 deadline. Subsequent conformity assessments have met the same criterion.

By April 5, 2008 nonattainment areas were required to submit to EPA a SIP to define the expected methods for reducing to acceptable levels the fine particulate matter level in the air and emissions of $PM_{2.5}$ precursors. MWAQC adopted the Plan on March 7, 2008 and the DC-MD-VA air agencies submitted it to EPA prior to the April 5, 2008 deadline. As with other SIPs,

MWAQC developed motor vehicle emissions budgets to be used as benchmarks as part of the conformity determination of the CLRP and TIP. Following EPA's adequacy review, the mobile emissions budgets (for direct PM2.5 and for precursor NOx emissions) contained within the SIP should be available for use in this upcoming conformity assessment of the 2009 CLRP and FY2009 – 14 TIP.

Current Status

As part of the conformity assessment of the 2009 CLRP and FY2010-2015 TIP, projected emissions for the actions and projects expected to be completed in the 2009, 2010, 2020 and 2030 analysis years will need to be estimated. If the analysis of mobile source emissions for any of these years shows an increase in pollutants above what is allowed, it will be necessary for the TPB to define and program transportation emission reduction measures (TERMs) to mitigate the excess emissions, as has been done in the past. The TPB Technical Committee's Travel Management Subcommittee is developing a schedule for submittal and analysis of candidate TERM proposals for potential inclusion in the 2009 CLRP and FY 2010-2015 TIP for the purpose of NOx, VOC, or PM2.5 emissions mitigation. Should emissions analysis for any forecast year indicate excess emissions which cannot be mitigated, TPB's programming actions would become limited to those projects which are exempt from conformity.

FINANCIAL CONSTRAINT

Updating the Plan

The following financial requirements for the Plan are based upon the recent federal planning regulations[3] that became effective July 1, 2007.

> The long-range Plan must include a financial plan that demonstrates the consistency between reasonably available and projected sources of Federal, State, local, and private revenues and the cost of implementing proposed transportation system improvements. The plan must compare the estimated revenue from existing and proposed funding sources that can reasonably be expected to be available for transportation use, and the estimated costs of constructing, maintaining and operating the total (existing plus planned) transportation system over the period of the plan.
>
> The estimated revenue by existing revenue source (Federal, State, local and private) available for transportation projects must be determined and any shortfalls shall be identified. Proposed new revenue and/or revenue sources to cover shortfalls must be identified, including strategies for ensuring their availability for proposed investments. Existing and proposed revenues shall cover all forecasted capital, operating, and maintenance costs. All revenue and cost estimates must use an inflation rate(s) to reflect "year of expenditure dollars" based upon reasonable financial principles and information developed cooperatively by the MPO, States and public transportation operators.

The 2006 financial plan for the Plan and TIP was adopted by the TPB in October 2006. This financial analysis produced the same financial "big picture" as in the 2003 analysis; the majority of currently anticipated future transportation revenues will continue to be devoted to the maintenance and operation of the current transit and highway systems. In December 2007 this financial plan was updated to include summary tables with revenue and cost estimates in year of expenditure dollars. More information about the current financial plan is available at http://clrp.mwcog.org. The analysis of financial resources for the 2010 CLRP will begin in late 2008 and is scheduled to be complete by mid 2009.

Agencies should review the timing, costs and funding for the actions and projects in the Plan, ensuring that they are consistent with the "already available and projected sources of revenues." Significant changes to the projects or actions in the current plan should be identified. New projects and strategies, specifically addressing regional air quality conformity needs also should be identified. If new funding sources are to be utilized for a project or action, agencies should describe the strategies for ensuring that the funding will be available.

If new funding sources are to be utilized for a project or action, agencies should describe the strategies for ensuring that the funding will be available. Other projects or actions above and beyond those for which funds are available or committed may be submitted to the Plan under illustrative status. A change in project status from illustrative to full status would require a Plan amendment. Illustrative projects will not be assumed in the air quality conformity determination of the Plan.

[3] "Part III Department of Transportation, Federal Highway Administration 23 CFR Parts 450 and 500. Federal Transit Administration 49 CFR Part 613. "Statewide Transportation Planning; Metropolitan Transportation Planning; Final Rule" Federal Register, February 14, 2007.

Developing Inputs for the TIP

The following financial requirements for the TIP are based upon the recent federal planning regulations that became effective July 1, 2007.

> The TIP must be financially constrained by year and include a financial plan that demonstrates which projects can be implemented using current revenue sources and which projects are to be implemented using proposed revenue sources (while the existing transportation system is being adequately operated and maintained).
>
> In developing the TIP, the MPO, the States and the public transportation operators must cooperatively develop estimates of funds that are reasonably expected to be available to support TIP implementation. The TIP shall include a project, or a phase of a project only if full funding can reasonably be anticipated to be available for the project within the time period contemplated for completion of the project.
>
> Only projects for which construction and operating funds can reasonably be expected to be available may be included under full status in the plan. In the case of new funding sources, strategies for ensuring their availability shall be identified. In developing the financial analysis, the MPO shall take into account all projects and strategies funded under Title 23, USC and the Federal Transit Act, other Federal funds, local sources, state assistance, and private participation. All revenue and cost estimates must use an inflation rate(s) to reflect "year of expenditure dollars" based upon reasonable financial principles and information developed cooperatively by the MPO, States and public transportation operators.
>
> In non-attainment areas, projects included for the first two years of the current TIP shall be limited to those for which funds are available or committed.

To develop a financially constrained TIP, agencies should begin with the projects and actions committed in the previous TIP After reviewing the estimates of available state and federal funds for the period, agencies can identify the actions and projects as inputs for the TIP, ensuring that projects for the first two years are "limited to those for which funds are available or committed."

TITLE VI AND ENVIRONMENTAL JUSTICE

Executive Order 12898, Federal Actions to Address Environmental Justice in Minority Populations, dated February 11, 1994, requires Federal agencies to identify and address disproportionately high and adverse human health and environmental effects, including interrelated social and economic effects of their programs, policies, and activities on minority and low-income populations.

In December of 1998 the US Department of Transportation/Federal Highway Administration released Order 6640.23 "FHWA Actions to Address Environmental Justice In Minority and Low-Income Populations." Order 6640.23 "establishes policies and procedures for the Federal Highway Administration (FHWA) to use in complying with Executive Order 12898". The document states that Executive Order 12898 is "primarily a reaffirmation of the principles of Title VI of the Civil Rights Act of 1964 (Title VI) and related statutes, the National Environmental Policy Act (NEPA), 23 U.S.C. 109(h), and other Federal environmental laws, emphasizing the incorporation of those provisions with the environmental and transportation decision-making processes."

Furthermore, "these requirements will be administered to identify the risk of discrimination, early in the development of FHWA's programs, policies, and activities so that positive corrective action can be taken. In implementing these requirements, the following information should be obtained where relevant, appropriate, and practical:

(1) population served and/or affected by race, or national origin, and income level;
(2) proposed steps to guard against disproportionately high and adverse effects on persons on the basis of race, or national origin; and,
(3) present and proposed membership by race, or national origin, in any planning or advisory body that is part of the program."

The TPB addresses these requirements in several ways. First, to ensure on-going input from transportation disadvantaged population groups, the TPB established the Access for All Advisory Committee to advise on issues, projects and programs important to low-income communities, minority communities and persons with disabilities. Second, each time the Plan is updated, the AFA committee reviews maps of proposed major projects and locations of transportation disadvantaged populations from the Census. Third, an analysis of travel characteristics and accessibility to jobs is conducted to ensure that disadvantaged groups are not disproportionately impacted by the long-range plan. The latest analysis and AFA report can be found at the TPB website: http://www.mwcog.org/transportation/.

CONGESTION MANAGEMENT DOCUMENTATION

The Congestion Management Process (CMP) is a systematic set of actions to provide information on transportation system performance, and to consider alternative strategies to alleviate congestion, enhancing the mobility of persons and goods. The CMP impacts many aspects of the CLRP, including problem identification, analysis of possible actions, project prioritization and selection, and post-implementation monitoring. With the CMP, TPB aims to use existing and future transportation facilities efficiently and effectively, reducing the need for highway capacity increases for single-occupant vehicles (SOVs).

In accordance with federal law and regulations, the regional CMP must look at a number of separate components of congestion. The CMP must identify the location, extent, and severity of congestion in the region. Within the TPB work program, the CMP considers information and trend analysis on overall regional transportation system conditions, and undertakes a number of associated travel monitoring and analysis activities. A data collection and analysis program compiles transportation systems usage information, incorporates that information in its travel forecasting computer models, and publishes the information in reports. TPB's periodic aerial surveys[4] of the region's freeways show the most congested locations and associated planning or project activities occurring at that location. Since there is no similar source of information at the regional level for non-freeway arterials, agencies or jurisdictions should use their own data sources to characterize congestion on those facilities.

The following additional CMP components should be addressed through this Call for Projects as follows.

1. The CMP must consider congestion and congestion management strategies directly associated with Plan projects. Requested in this Call for Projects is documentation of any project-specific information available on congestion that necessitates or impacts the proposed project. Submitting agencies are asked to cite whether congested conditions necessitate the proposed project, and if so, whether the congestion is recurring or non-recurring.

2. **For any project providing a significant increase to SOV capacity, it must be documented that the implementing agency considered all appropriate systems and demand management alternatives to the SOV capacity**. This requirement and its associated questions are substantially unchanged from what has been requested in recent years. A special set of SOV congestion management documentation questions must be answered for any project to be included in the Plan or TIP that significantly increases the single occupant vehicle carrying capacity of a highway. A copy of the Congestion Management Documentation Form is included in this Call for Projects document for reference. Note that this form is not required to be filled out for all projects, only for projects meeting certain criteria. Non-highway projects do not need a form.

[4] See "Traffic Quality on the Metropolitan Washington Area Freeway System". 2/15/2006. Publication Number: 20066337. http://www.mwcog.org/store/item.asp?PUBLICATION_ID=337

Certain highway projects may also be exempt from needing a form. The detailed instructions later in this Call for Projects document provide further instructions and exemption criteria. It is recommended to complete a form in association with all submitted, non-exempt projects to ensure compliance with federal regulations and with regional goals.

OTHER FEDERAL REQUIREMENTS

The Final Planning Rule adds several other federal requirements in addition to air quality conformity and financial constraint which are described briefly here.

Planning Factors

The Final Rule specified eight planning factors to consider while developing the Plan and TIP, listed below, and **emphasizes safety, security and consistency between transportation and economic development.** The TPB vision incorporates all of the planning factors specified in SAFETEA-LU, except for explicitly addressing security. However, the TPB and the region have been very active in addressing security since 9/11 and have incorporated security and safety into the TPB's planning framework through a series of on-going planning activities. Implementing agencies will be asked to identify how each project addresses the eight planning factors in the project submission forms.

(1) Support the economic vitality of the metropolitan area, especially by enabling global competitiveness, productivity, and efficiency;

(2) Increase the safety of the transportation system for all motorized and non-motorized users;

(3) Increase the ability of the transportation system to support homeland security and to safeguard the personal security of all motorized and non-motorized users;

(4) Increase accessibility and mobility of people and freight;

(5) Protect and enhance the environment, promote energy conservation, improve the quality of life, and promote consistency between transportation improvements and State and local planned growth and economic development patterns;

(6) Enhance the integration and connectivity of the transportation system, across and between modes, for people and freight;

(7) Promote efficient system management and operation; and

(8) Emphasize the preservation of the existing transportation system.

Public Participation

Metropolitan Planning Organizations (MPOs) are required to do the following based on the final planning regulations:

- Representatives of users of pedestrian walkways, bicycle transportation facilities, the disabled are specifically added as parties to be provided with the opportunity to participate in the planning process;
- The MPO is to develop a participation plan in consultation with interested parties that provides reasonable opportunities for all parties to comment; and

- To carry out the participation plan, public meetings are to be: conducted at convenient and accessible locations at convenient times; employ visualization techniques to describe plans; and make public information available in an electronically accessible format, such as on the Web.

The TPB adopted a Public Participation Plan on December 19, 2007. The Plan can be found online at http://www.mwcog.org/clrp/public/plan.asp.

Consultation

During the development of the long-range plan, the TPB and state implementing agencies will have to consult with agencies responsible for land use management, natural resources, environmental protection, conservation, historic preservation, airport operations and freight movements on projects in the Plan. Consultation may involve comparison of a map of transportation improvements to conservation plans or maps and natural or historic resources inventories. The TPB's efforts on this new requirement are described online at http://www.mwcog.org/clrp/elements/environment/.

Environmental Mitigation Discussion

The Plan must include a discussion of potential environmental mitigation activities along with potential sites to carry out the activities to be included. The discussion is to be developed in consultation with Federal, State, and tribal wildlife, land management, and regulatory agencies. Implementing agencies will be asked to identify on the project description forms "types of potential mitigation activities" for major projects. Implementing agencies will be asked to identify on the project description forms "types of potential mitigation activities" for major projects. The TPB's efforts on this new requirement are described online at http://www.mwcog.org/clrp/elements/environment/envmitigation.asp.

Freight Planning

The ability to move freight and goods is a critical element of the Washington region's economy. All businesses and residences rely on freight. The SAFETEA-LU legislation reaffirmed the federal emphasis on freight movement considerations in metropolitan transportation planning.

In 2007, a study was completed to examine the state of freight movement in the Washington region and identify ways to improve consideration of freight movement and stakeholders in the regional transportation planning process[5]. Among the key findings of this study were:

- The region lies at the crossroads of several important national freight corridors; while the region is not a large freight generator, its large population and vibrant economy demand a responsive freight system

[5] Enhancing Consideration of Freight in Regional Transportation Planning. Final Report. May 2007. Prepared for National Capital Transportation Planning Board of the Metropolitan. Washington Council of Governments. Prepared by Cambridge Systematics, Inc. http://www.mwcog.org/uploads/committee-documents/tFdXVl020070629142844.pdf

- Movement of goods is adversely affected by mounting congestion, not only on the region's highways, but also on the railroads
- Truck stops and parking facilities are in short supply
- Both local freight movement (approximately 30% by weight) and through movement (approximately 70%) are significant, and substantial growth is expected
- Air cargo is the fastest growing segment – airports and airport ground access will remain critical
- Approximately 222 million tons of goods worth over $200 billion are transportation to, from, or within the region annually, including construction materials (e.g., gravel), waste/scrap, coal products (top commodities by weight) and machinery and textiles (top commodities by value)
- It is also estimated that an additional 314 million tons of goods pass through the region annually (through traffic)
- Approximately three-quarters of the freight traveling to, from, or within the region is by truck, with specialized freight movement by other modes such as coal transportation by railroad or petroleum through pipelines.

TPB continues to work to enhance consideration of freight in the regional process, especially outreach to freight stakeholders for their input.

Questions 22 through 29 on the Financially Constrained Long-Range Transportation Plan Project Description Form address a number of SAFETEA-LU factors, including economic competitiveness, truck and freight safety, accessibility and mobility of people and freight, and integration and connectivity of the transportation system for people and freight. Strong consideration should be given to projects that support these goals for freight.

Annual Listing of Projects

Both TEA-21 and SAFETEA-LU require that the TPB must publish or otherwise make available an annual listing of projects, consistent with the categories in the TIP, for which federal funds have been obligated in the preceding year. With the assistance of and in cooperation with the transportation implementing agencies in the region, the TPB has prepared a listing of projects for which federal funds have been obligated each year since 2001.

SECTION 3: PROJECT SUBMISSION INSTRUCTIONS

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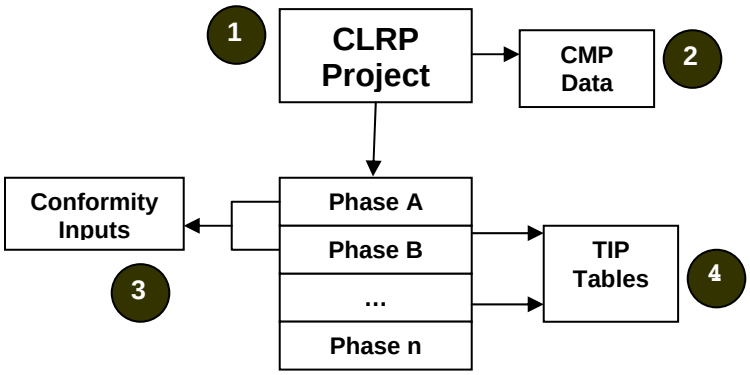
INTRODUCTION

This section describes the process to be used by transportation implementing agencies when updating project information for the CLRP as well as the Air Quality Conformity inputs, the Transportation Improvement Program and the Congestion Management Process. The project description forms are designed to elicit information to enable policy makers, citizens and other interested parties and segments of the community affected by projects in the plan to understand and review them. Description forms must be completed for all projects to be included in the Plan and the TIP. All regionally significant projects, *regardless of funding source*, must be included in the Plan for Air Quality Conformity information purposes. A Congestion Management Process Form must be completed for all projects meeting the requirements described on page 33 of these instructions. The relationship between the Plan, TIP, Conformity, and CMP is shown in Figure 2. The remainder of this section describes how to update Plan, TIP and Conformity project information using an online database application. TERM analysis and reporting procedures are not addressed here; see Section 4 for those instructions.

Figure 2: Relationship Between CLRP, TIP, CMP, and Conformity Information



1. CLRP projects are at the "parent" level. Each CLRP record may have one or more phases.
2. Some projects may require a CMP description form
3. Regionally significant project phases are compiled to create the Inputs for the Air Quality Conformity Analysis
4. Phases that are being funded for planning, ROW acquisition or construction between FY 2010 and FY 2015 are shown in the TIP.

The iTIP Online Database

An online database application is used to gather project information from each agency. Staff from implementing agencies will be assigned an account with a user name and password. There are two levels of access to the database; editors and reviewers. Each agency should decide which person on their staff should assume these roles. Once logged into the application users will have access to the most recent version of the Plan and TIP information that was approved by the TPB.

TPB staff will offer training sessions to assist staff with the application as needed. The remainder of this section will cover the purpose of, and line-by-line instructions for the forms.

CLRP Project Description Forms

Projects should be described in sufficient detail to facilitate review by the TPB and the public. Specific information is needed on the project location and physical characteristics, purpose, projected completion date, total estimated costs, proposed sources of revenues, and other characteristics. Submissions for studies should indicate those cases where the design concept and scope (mode and alignment) have not been fully determined and will require further analysis. TERM projects or actions should also be identified. Project Description Forms should be used to describe the full scope of a facility's improvements.

Basic Project Information

1. Submitting Agency.....The agency that is submitting the project information. Defined by the user's agency status.

2. Secondary Agency.....Any other agencies working in conjunction with primary agency

3. *Agency Project ID* .....Agencies can use this field to track projects with their own ID systems.

4. *Project Type* .....Identify the functional class or category on which projects will be grouped in reports. Options include: *Interstate, Primary, Secondary, Urban, Transit, Bike/Ped, Bridge, Enhancement, ITS, Maintenance, CMAQ, Other*.

5. *Project Category* .....Identify the nature of the project: *System Expansion* (adding capacity to a road or transit system), *System Preservation* (any work on the road or transit system that does not add capacity), *Management, Operations and Maintenance, Study, Other*.

6. *Project Name*.....A very brief, user-friendly description of the project; e.g. "East Market Street Widening" or "Downtown Circulator Bus System"

7. *Facility*.....These fields should be used to describe actual infrastructure or transit routes. Any of these fields may be left blank and there is no need for redundant entries. If a project can be described adequately in the *Project Title* field, it is not necessary to fill in these fields.
    a. *Prefix*.....Interstate or State abbreviation for route type, e.g. I, VA, MD, US. Combinations such as VA/US are acceptable, but discouraged.
    b. *Number*.....The route number that corresponds with the above prefix. Again, combinations are acceptable, but discouraged.
    c. *Name* .....Full name of facility; e.g. "Capital Beltway," "East Street" or "Red Line". To the extent possible, this field should be limited to actual street names or transit routes.

d. *Modifier*.....Any term that needs to be used to further describe a facility, such as “extended”, “relocated” or “interchange”.

8. *From (At)*.....The beginning project limit or location of a spot improvement. Use the *(At)* checkbox to indicate a spot or interchange improvement. Follow the conventions above for *Prefix, Number, Name* and *Modifier*.

9. *To*.....Terminal project limit. Follow conventions above for *Prefix, Number, Name* and *Modifier*.

10. *Description*.....Describe the project as clearly as possible. Use public-friendly phrasing and avoid technical jargon where possible.

11. *Projected Completion Year*.....Estimated year that the project will be open to traffic or implemented.

12. *Project Manager*.....Name of project manager or point-of-contact for information

13. *E-mail*.....E-mail address for project manager or point-of-contact for information

14. *Web Site*.....URL for further project information from implementing agency

15. *Total Mileage*.....If available, enter the total length of the project to the closest tenth of a mile.

16. *Map Image*.....If available, upload an image file to assist

17. *Documentation*.....If necessary, upload any extra documentation for the project. This could include financial plans or supplemental information materials.

18. *Bike/Ped Accommodations*.....Indicate using the pull-down menu whether the project is: a) *Primarily a bicycle/pedestrian project*, b) *Includes accommodations for bicycle/pedestrian users*, or c) *Does not include accommodations for bicycles and pedestrians*.

19. *Jurisdiction*.....Select the appropriate jurisdictions for the project. Multiple jurisdictions can be selected by pressing the **CTRL** key while clicking.

20. *Total Estimated Cost*.....If available, enter the cost of the project from start to finish

21. *Remaining Cost*.....Estimated cost remaining to be spent on project (not required).

22. *Sources*.....Indicate the sources of funds: Federal, State, Local, Private, Bonds, Other. Hold the **CTRL** key down to select multiple sources.

SAFETEA-LU Planning Factors

The following section is new. The questions here replace the memo/text field that asked how the project supported regional goals as outlined in the TPB's Vision. This new set of questions is intended to be easier to respond to and to show how the project is addressing the eight planning factors outlined in SAFETEA-LU. Particular attention should be paid to Question 28b as it pertains to safety.

23. *Please identify any and all planning factors that are addressed by this project:*

    Use the checkboxes to select all that apply:

    a. *Supports the economic vitality of the metropolitan area, especially by enabling global competitiveness, productivity, and efficiency.*

    b. *Increases the safety of the transportation system for all motorized and non-motorized users.*

        i. *Is this project being proposed specifically to address a safety issue?*

            It is presumed that all new projects being constructed include safety considerations. Select "Yes" only if the primary reason the project is being proposed is to address a safety issue.

        ii. *If so, please briefly describe (in quantifiable terms, where possible) the nature of the safety problem*:

    c. *Increases the ability of the transportation system to support homeland security and to safeguard the personal security of all motorized and non-motorized users.*

    d. *Increase accessibility and mobility of people and freight*

    e. *Protect and enhance the environment, promote energy conservation, improve the quality of life and promote consistency between transportation improvements and State and local planned growth and economic development patterns.*

    f. *Enhance the integration and connectivity of the transportation system, across and between modes, for people and freight.*

    g. *Promote efficient system management and operation.*

    h. *Emphasize the preservation of the existing transportation system.*

Environmental Mitigation

The following section is new. The questions here address a new emphasis in SAFETEA-LU on environmental impacts, both short and long term and strategies for mitigating those impacts.

24. *Have any potential mitigation activities been identified for this project? If so, identify the types of activities below.*

    Use the checkboxes to select "Yes" or "No" and to identify any mitigation activities being planned for this project.

    - *Air Quality,*
    - *Energy,*
    - *Floodplains,*
    - *Geology, Soils and Groundwater,*
    - *Hazardous and Contaminated Materials,*
    - *Noise,*
    - *Rare, Threatened and Endangered Species,*
    - *Socioeconomics,*
    - *Surface Water,*
    - *Vibrations,*
    - *Visual and Aesthetic Conditions,*
    - *Wetlands,*
    - *Wildlife and Habitat*

Congestion Management Process Documentation

The following addresses the SAFETEA-LU component called the Congestion Management Process. Please see the discussion on Congestion Management Documentation in Section 2 of this document for more information. Questions 25 and 26 should be answered for every project. In addition, a Congestion Management Documentation Form should be completed for each project or action proposing an increase in SOV capacity.

25. *Congested Conditions*

    a. *Do traffic congestion conditions on this or another facility necessitate the proposed project or program?*

       Check "Yes' if this project is being planned specifically to address congestion conditions.

    b. *If so, is the congestion recurring or incident-related non-recurring in nature?*

       Use the checkboxes to identify either option.

    c. *If the congestion is on a different facility, please identify it here:*

       Identify the name of the congested parallel or adjacent route that this project is intended to relieve.

26. *Capacity*

The federally-mandated Congestion Management Process requires that alternatives to major highway capacity increases be considered and, where reasonable, integrated into capacity-increasing projects. Except if projects fall under at least one of the exemption criteria listed under part (b), projects in the following categories require a Congestion Management Documentation Form:

- New limited access or other principal arterial roadways on new rights-of-way
- Additional through lanes on existing limited access or other principal arterial roadways
- Construction of grade-separated interchanges on limited access highways where previously there had not been an interchange.

a. *Is this a capacity-increasing project on a limited access highway or other principal arterial*?

Check "Yes" if the project will increase capacity on an SOV facility of functional class 1 (limited access highway), 2 (principal arterial) or 5 (grade-separated interchange on limited access highway).

b. *If the answer to Question 26.a was "yes," are any of the following exemption criteria true about the project? (Choose one, or indicate that none of the exemption criteria apply):*

- *None of the exemption criteria below apply to this project – a Congestion Management Documentation Form is required.*
- *The project will not use federal funds in any phase of development or construction (100% state, local, and/or private funding).*
- *The number of lane-miles added to the highway system by the project totals less than one lane-mile*
- *The project is an intersection reconstruction or other traffic engineering improvements, including replacement of an at-grade intersection with an interchange*
- *The project, such as a transit, bicycle or pedestrian facility, will not allow private single-occupant motor vehicles.*
- *The project consists of preliminary studies or engineering only, and is not funded for construction*
- *Any project whose construction cost is less than $10 million.*

Review the list of potential exemption criteria and determine if any of them are true, thus exempting the project from needing a separate Congestion Management Documentation Form. If more than one criterion is true, please select just one as the primary criterion. Use the pull-down menu to identify the exemption criterion.

c. If the project is not exempt and requires a Congestion Management Documentation Form, click on the link provided to open a blank Congestion Management Documentation Form.

Intelligent Transportation Systems

The questions here address a new emphasis in SAFETEA-LU on environmental impacts, both short and long term and strategies for mitigating those impacts.

27. *Is this an Intelligent Transportation Systems (ITS) project as defined in federal law and regulation, and therefore subject to federal Rule 940 requirements?*

    Use the checkboxes to select "Yes" or "No".

    a. *If yes, what is the status of the systems engineering analysis compliant with federal Rule 940 for the project?*

       Use the checkboxes to select: *Not Started; Ongoing, not complete;* or *Completed*

    b. *Under which Architecture: DC, Maryland,* or *Virginia State Architecture, WMATA Architecture, COG/TPB Regional ITS Architecture* or *Other; Please specify* _____

28. *Actual Completion Year* .....Use this field to indicate that the <u>full scope</u> of the project has been opened to traffic or implemented.

29. *Project Withdrawn* .....Use this checkbox to indicate that a project is being withdrawn from the Plan.

30. *Withdrawn Date* .....Provide an approximate date for the withdrawal of the project.

Record Tracking

This section is used to keep track of modifications to records. These fields are automated and are not editable.

31. Created by.....Identification of who created the record originally.
32. Created On.....Date record was originally created on (will not work for original imported data)
33. Last Updater .....Recorded ID of last person to make modifications to record
34. Last Updated On.....Recorded date and time of last modifications to record

35. Comments.....General notes for agency or TPB staff to use.

Project Phasing For TIP and Conformity Inputs

Each phase of the project (even if there is only one) should be described under the "Project Phases". The Air Quality Conformity Analysis is based on the information in these listings, so all regionally significant phases of all projects in the plan need to be included.

TIP funding information should be completed for each project intended for programming in the current TIP. The TIP should show all funds (federal and non-federal) that are expected to be obligated between FY 2008 and FY 2013. Previous fiscal years are shown for historical purposes only and have no bearing on the current fiscal years.

1. *Submitting Agency* .....Automatically displayed based on user's agency.

2. *Project Name* .....Automatically filled in based on parent project.

3. *Phase Name* .....A very brief, user-friendly description of the project phase; e.g. "East Market Street Widening" or "Downtown Circulator Bus." This can be the same as the project name.

4. *Facility* .....These fields should be used to describe actual infrastructure or transit routes. Any of these fields may be left blank and there is no need for redundant entries. If a project can be described adequately in the *Project Title* field, it is not necessary to fill in these fields.

a. *Prefix*.....Interstate or State abbreviation for route type, e.g. I, VA, MD, US. Combinations such as VA/US are acceptable, but discouraged.

b. *Number*.....The route number that corresponds with the above prefix. Again, combinations are acceptable, but discouraged.

c. *Name* .....Full name of facility; e.g. "Capital Beltway," "East Street" or "Red Line". To the extent possible, this field should be limited to actual street names or transit routes.

d. *Modifier*.....Any term that needs to be used to further describe a facility, such as "extended", "relocated" or "interchange".

5. *From (At)* .....The beginning project limit or location of a spot improvement. Use the *(At)* checkbox to indicate a spot or interchange improvement. Follow the conventions above for *Prefix, Number, Name* and *Modifier*.

6. *To* .....Terminal project limit. Follow conventions above for *Prefix, Number, Name* and *Modifier*.

7. *Description*.....Describe the project as clearly as possible. Use public-friendly phrasing and avoid technical jargon where possible.

8. *Agency Project ID*.....Agencies can use this field to track projects with their own ID systems.

9. *Environmental Review*.....Type of NEPA documentation required, if any

10. *Review Status*.....Current status of any required NEPA documentation

Questions 11 – 15 only need to be completed for projects that have conformity impacts.

11. *Improvement*.....Pulldown field to identify type of improvement being made to the facility (e.g. construct, widen, upgrade, etc.)
12. *Facility Type From/To*
    a. *Facility Type From* .....Functional class of facility before improvement
    b. *Facility Type To*.....Functional class of facility after improvement

13. *Lanes From/To*
    a. *Lanes From*.....Number of lanes on facility before improvement
    b. *Lanes To*.....Number of lanes on facility after improvement

14. *R.O.W. Acquired*.....Right-of-way has been acquired for the facility

15. *Under Construction?*.....Construction has begun on the facility

16. *Projected Completion Year* .....Estimated year that the project will be open to traffic or implemented.

17. *Completed*.....Date the project was completed (open to traffic) or implemented

18. *TIP Project Status* .....Project is delayed, reprogrammed, complete, withdrawn, or ongoing
19. *Capital Costs*
    a. *Amount*.....Funds shown in $1,000s
    b. *Phase*.....Funds obligated for: a) Planning and Engineering, b) R.O.W. acquisition, c) Construction, d) Studies and e) Other
    c. *Fiscal Year*.....Fiscal year in which funds are expected to be obligated
    d. *Source* .....Federally recognized source of funds
    e. *Fed/State/Local Share*.....Percentage distribution of federal, state and local funds

20. *Creator*.....Recorded ID of the user that created the record
21. *Created On*.....Date record was originally created on
22. *Last Updated On*.....Recorded date and time of last modifications to record
23. *Last Updater* .....Recorded ID of last person to make modifications to record

Congestion Management Documentation Form for SOV Projects

A Congestion Management Documentation Form should be completed for each project or action intended for the Plan that involves a significant increase in single-occupant vehicle (SOV) carrying capacity of a highway.

Brief and complete answers to all questions are recommended. A reference to an external document or an attachment without further explanation on the form itself is not recommended; findings of studies, Major Investment Studies, for example, should be summarized on the form itself. References to other documents can be made if desired *in addition to* the answer provided on the form.

As a rule of thumb, the scale and detail in the responses to the questions should be in proportion to the scale of the project. For example, a relatively minor project needs less information than a major, multi-lane-mile roadway construction project.

The form can summarize the results of EISs or other studies completed in association with the project, and can also summarize the impact or regional studies or programs. It allows the submitting agency to explain the context of the project in the region's already-adopted and implemented programs, such as the Commuter Connections program, and to go on to explain what new and additional strategies were considered for the project or corridor in question.

Sample Forms

The following pages are samples for the CLRP Project Description Form, TIP Project Description Form, and Congestion Management Documentation Form.

FINANCIALLY CONSTRAINED LONG-RANGE TRANSPORTATION PLAN FOR 2030
PROJECT DESCRIPTION FORM

BASIC PROJECT INFORMATION

1. Submitting Agency:
2. Secondary Agency:
3. Agency Project ID:
4. Project Type: _ Interstate _ Primary _ Secondary _ Urban _ Bridge _ Bike/Ped _ Transit _ CMAQ _ ITS _ Enhancement _ Other _ Federal Lands Highways Program _ Human Service Transportation Coordination _ TERMs
5. Category: _ System Expansion; _ System Maintenance; _ Operational Program; _ Study; _ Other

6. Project Name:

	Prefix	Route	Name	Modifier
7. Facility:				
8. From (_ at):				
9. To:				

10. Description:

11. Projected Completion Date:
12. Project Manager:
13. Project Manager E-Mail:
14. Project Information URL:
15. Total Miles:
16. Schematic:
17. Documentation:
18. Bicycle or Pedestrian Accommodations: _ Not Included; _ Included; _ Primarily a Bike/Ped Project; _ N/A
19. Jurisdictions:
20. Total cost (in Thousands):
21. Remaining cost (in Thousands):
22. Funding Sources: _ Federal; _ State; _ Local; _ Private; _ Bonds; _ Other

SAFETEA-LU PLANNING FACTORS

23. Please identify any and all planning factors that are addressed by this project:
    a. _ Support the **economic vitality** of the metropolitan area, especially by enabling global competitiveness, productivity, and efficiency.
    b. _ Increase the **safety** of the transportation system for all motorized and non-motorized users.
        i. Is this project being proposed specifically to address a safety issue? _ Yes; _ No
        ii. If yes, briefly describe (in quantifiable terms, where possible) the nature of the safety problem:

    c. _ Increase the ability of the transportation system to support **homeland security** and to safeguard the personal security of all motorized and non-motorized users.
    d. _ Increase **accessibility and mobility** of people and freight.
    e. _ Protect and enhance the **environment**, promote energy conservation, improve the quality of life, and promote consistency between transportation improvements and State and local planned growth and economic development patterns.
    f. _ Enhance the **integration and connectivity** of the transportation system, across and between modes, for people and freight.
    g. _ Promote efficient system **management and operation**.
    h. _ Emphasize the **preservation** of the existing transportation system.

ENVIRONMENTAL MITIGATION

24. Have any potential mitigation activities been identified for this project? _ Yes; _No
    a. If yes, what types of mitigation activities have been identified?
    _ Air Quality; _ Floodplains; _ Socioeconomics; _ Geology, Soils and Groundwater; Vibrations;
    _ Energy; _ Noise; _ Surface Water; _ Hazardous and Contaminated Materials; _ Wetlands

CONGESTION MANAGEMENT INFORMATION

25. Congested Conditions
    a. Do traffic congestion conditions necessitate the proposed project or program? _ Yes; _ No
    b. If so, is the congestion recurring or non-recurring? _ Recurring; _ Non-recurring
    c. If the congestion is on another facility, please identify it:
26. Capacity
    a. Is this a capacity-increasing project on a limited access highway or other principal arterial? _ Yes; _ No
    b. If the answer to Question 26.a was "yes", are any of the following exemption criteria true about the project? (Choose one, or indicate that none of the exemption criteria apply):

    _ None of the exemption criteria apply to this project – a Congestion Management Documentation Form is required
    _ The project will not use federal funds in any phase of development or construction (100% state, local, and/or private funding)
    _ The number of lane-miles added to the highway system by the project totals less than one lane-mile
    _ The project is an intersection reconstruction or other traffic engineering improvement, including replacement of an at-grade intersection with an interchange
    _ The project, such as a transit, bicycle or pedestrian facility, will not allow private single-occupant motor vehicles
    _ The project consists of preliminary studies or engineering only, and is not funded for construction
    _ The construction costs for the project are less than $10 million.

    c. If the project is not exempt and requires a Congestion Management Documentation Form, click here

to open a blank Congestion Management Documentation Form.

INTELLIGENT TRANSPORTATION SYSTEMS

27. Is this an Intelligent Transportation Systems (ITS) project as defined in federal law and regulation, and therefore subject to Federal Rule 940 Requirements? _ Yes; _ No
    a. If yes, what is the status of the systems engineering analysis compliant with Federal Rule 940 for the project? _ Not Started; _ Ongoing, not complete; _ Complete
    b. Under which Architecture:
        _ DC, Maryland or Virginia State Architecture
        _ WMATA Architecture
        _ COG/TPB Regional ITS Architecture
        _ Other, please specify:

28. Completed Date:
29. _ Project is being withdrawn from the CLRP.
30. Withdrawn Date:
31. Record Creator:
32: Created On:
33. Last Updated by:
34. Last Updated On:
35. Comments

TRANSPORTATION IMPROVEMENT PROGRAM
FOR FY 2010-2015
PROJECT DESCRIPTION FORM

BASIC PROJECT INFORMATION

1. Submitting Agency:
2. Project Name (from CLRP Project):
3. Phase Name:

	Prefix	Route	Name	Modifier
4. Facility:				
5. From (_ at):				
6. To:				

7. Description:
8. Agency Phase ID:

Environmental Review

9. Type: _ PCE; _ CE; _ DEA; _ EA; _ FONSI; _ DEIS; _ FEIS; _ F4; _ N/A
10. Status: _ Proposed for preparation; _ Under preparation; _ Prepared for review; _ Under review; _ Approved

Conformity Information

11. Improvement: _ Construction; _ Widen; _ Upgrade; _ Relocate; _ Reconstruct; _ Rehabilitate; _ Study
12. Facility Type
    a. From:
    b. To:
13. Number of Lanes
    a. From:
    b. To:
14. R.O.W. Acquired?
15. Under Construction?
16. Projected Completion Year:
17. Completed:
18. Project Status:
    _ New Project
    _ In previous TIP, proceeding as scheduled
    _ In previous TIP, delayed or reprogrammed
    _ Project is ongoing, year refers to implementation
    _ Project is being withdrawn from TIP
19. Capital Costs

FISCAL YEAR	AMOUNT	PHASE	SOURCE	FED	STA	LOC

Congestion Management Documentation Form for Projects in the 2030 CLRP

BASIC PROJECT INFORMATION

1. Agency: Secondary Agency:

2. Project Title:

	Prefix	Route	Name	Modifier
4. Facility:				
5. From (_ at):				
6. To:				

7. Jurisdiction(s):

8. Indicate whether the proposed project's location is subject to or benefits significantly from any of the following in-place congestion management strategies:

_ Metropolitan Washington Commuter Connections program (ridesharing, telecommuting, guaranteed ride home, employer programs)

_ A Transportation Management Association is in the vicinity

_ Channelized or grade-separated intersection(s) or roundabouts

_ Reversible, turning, acceleration/deceleration, or bypass lanes

_ High occupancy vehicle facilities or systems

_ Transit stop (rail or bus) within a 1/2 mile radius of the project location

_ Park-and-ride lot within a one-mile radius of the project location

_ Real-time surveillance/traffic device controlled by a traffic operations center

_ Motorist assistance/hazard clearance patrols

_ Interconnected/coordinated traffic signal system

_ Other in-place congestion management strategy or strategies (briefly describe below:)

9. List and briefly describe how the following categories of (additional) strategies were considered as full or partial alternatives to single-occupant vehicle capacity expansion in the study or proposal for the project.

a. Transportation demand management measures, including growth management and congestion pricing

b. Traffic operational improvements

c. Public transportation improvements

d. Intelligent Transportation Systems technologies

e. Other congestion management strategies

f. Combinations of the above strategies

10. Could congestion management alternatives fully eliminate or partially offset the need for the proposed increase in single-occupant vehicle capacity? Explain why or why not.

11. Describe all congestion management strategies that are going to be incorporated into the proposed highway project.

12. Describe the proposed funding and implementation schedule for the congestion management strategies to be incorporated into the proposed highway project. Also describe how the effectiveness of strategies implemented will be monitored and assessed after implementation.

APPENDIX - A

TRANSPORTATION EMISSIONS REDUCTION MESURES (TERMs) ANALYSIS INSTRUCTIONS

Call for Projects

For the 2009 Financially Constrained Long Range Plan (CLRP) and Fiscal Year 2010-2015 Transportation Improvement Program (TIP)

TERM EMISSIONS REDUCTION CALCULATIONS

This section of the 'Call for Projects' document contains instructions for analyzing transportation emissions reduction measure (TERM) projects. Section I provides information to estimate VOC and NOx, and Section II provides the necessary information to estimate PM 2.5 emissions. Examples of analysis of commuting vehicle trip TERMs and their ozone precursors (VOC and NOx) and fine particulate matter (PM 2.5) emissions reduction are also included.

Section I

Table 1 provides an overview of the three emissions components, namely Start-up (Cold Start), Running, and Hot Soak. The methodology that will be used to analyze TERMs for the 2009 CLRP and FY 2010 - 2015 TIP utilizes the latest travel demand results from the Version 2.2 travel demand model and emissions rate data from the Mobile 6.2 emissions model.

The introduction of the Mobile 6 emissions model offered the potential for a more disaggregate emissions reduction analysis of TERMs. Instead of the 8 different vehicle classes used in the Mobile 5b model, the Mobile 6 model utilizes 28 vehicle classes (the current model version is Mobile 6.2). Four categories of TERMs have been developed utilizing the disaggregate nature of the vehicle classes. The four categories are:

- TERMs impacting the traffic stream (all vehicle types), such as the Signal Optimization TERM, will continue to be analyzed using a regional composite vehicle emissions factor. Tables 2, 3, 4, and 5 display emissions factors for analysis years 2009, 2010, 2020 and 2030. Weighted average of arterial and freeway emissions factors are shown in the tables; these factors are plotted in the exhibit 1 and 2.

- TERMs impacting commute trips, such as the Employer Outreach and Telework Resources Center TERM (item # 75 and # 90 on the TERM tracking sheet, page 1-2), will be analyzed using an average light duty vehicle emissions factor composed of emissions factors for several classes of light duty vehicles and for motorcycles. Tables 7, 6, 7, 8, and 9 display emissions factors for commuting vehicle trips for analysis years 2009, 2010, 2020 and 2030. Weighted average of arterial and freeway emissions factors are shown in the tables; these factors are plotted in the exhibit 3 and 4.

- TERMs impacting all types of heavy duty diesel vehicles, such as a Diesel Fuel Additive TERM, are considered as engine technology (heavy duty diesel vehicles) category.

- TERMs impacting an individual heavy duty vehicle type of a specific weight class, are categorized as a specific vehicle type, such as school buses, transit buses, tractor trailers. Emissions rates for specific weight classes can be generated as needed.

- TERMs impacting vehicle idling such as roundabouts in place of traffic signals can be analyzed using the individual vehicle type idling emissions factors or the traffic stream idling emissions factors for year 2010, 2020, and 2030 shown in Table 10.

Tables 2 through 9 show Cold Start, Running, Hot Soak emissions factors for VOC and NOx for the analysis years 2009, 2010, 2020 and 2030 to be used for analyzing "Traffic Stream" and "Commute" TERMs. Exhibits 1 through 4 show the plots of NOx and VOC running emissions factors for these years. Table 10 shows idling emissions factors for NOx and VOC for different vehicle types and PM2.5 factors for heavy duty vehicles for all three analysis year. Table 11 shows the 2005 regional average speeds generated by the post-processor, which are used to compute hourly speeds for emissions calculations. Since there is little variation through time, the 2005 speeds may be used for any of the analysis years; use specific speeds for each application, where available. Table 12 provides the Mobile 6 vehicle classifications. Tables 13, 14, and 15 show summary travel demand data such as person trips, transit trips, average occupancy and VMT

The cost effectiveness calculation methodology is explained following the emissions factors tables and is a primary criterion used to select TERMs. The final section provides an example of a commuting vehicle TERM analysis using the emissions factors included in the tables.

For purpose of determining emissions reductions, the start-up, running, and hot soak portions of each trip must be considered. Table 1 shows the procedure to use in the analysis.

Table 1: Mobile Source Emissions Overview

Emissions = Start up emissions + Running emissions + Soak emissions

Start-up emissions = Vehicle Trip Origin x Start up emissions rate (Cold start in Grams/Trip)

Running emissions =VMT x Running emissions rate (Grams/Mile)

Hot Soak emissions = Trip Destination x Hot Soak emission rate (Grams/Trip)

Emissions factors were obtained from the Mobile 6.2 model and are contained herein. NOx emissions do not occur in the hot soak portion of the trip, therefore only VOC factors are shown for this category. Diurnal and resting loss (VOC) emissions are vehicle-related, not trip-related, and are not estimated here.

It may be noted that the running emissions factors and cold start/hot soak emissions factors shown in the attached tables were generated using the Mobile 6.2 emissions model with the latest VMT and vehicle registration data as input to the model. These are the factors that were used in the conformity analysis of the 2007 CLRP and FY 2008-2013 TIP. Running emissions factors for speed ranges 1 to 65 mph are shown in the emissions factor tables. If the actual speed for a TERM is known use the appropriate emissions factors, otherwise use emissions factors for average travel speed.

Table 2: 2009 Running, Cold Start, and Hot Soak Average Emissions Factors for "Traffic Stream" TERMs (Mobile6.2)

Emission Type	Speed (mph)	Average 2009 Running Emission Factor (g/mi)					
		Arterial	Freeway	Weighted Factor VOC	Arterial	Freeway	Weighted Factor NOx
		VOC		Arterial - 60%, Freeway- 40%	NOx		Arterial - 60%, Freeway- 40%
Running (g/mi)	1	3.1310	3.1310	3.1310	1.5925	1.6508	1.6158
Running (g/mi)	2	3.1310	3.1310	3.1310	1.5925	1.6508	1.6158
Running (g/mi)	3	2.4518	2.4518	2.4518	1.5269	1.5852	1.5502
Running (g/mi)	4	1.6029	1.6028	1.6028	1.4450	1.5033	1.4683
Running (g/mi)	5	1.0934	1.0934	1.0934	1.3959	1.4539	1.4191
Running (g/mi)	6	0.9059	0.8971	0.9024	1.3074	1.3343	1.3182
Running (g/mi)	7	0.7722	0.7571	0.7662	1.2443	1.2488	1.2461
Running (g/mi)	8	0.6718	0.6520	0.6639	1.1971	1.1847	1.1921
Running (g/mi)	9	0.5937	0.5699	0.5842	1.1603	1.1348	1.1501
Running (g/mi)	10	0.5313	0.5049	0.5207	1.1309	1.0947	1.1164
Running (g/mi)	11	0.4894	0.4616	0.4783	1.0848	1.0427	1.0680
Running (g/mi)	12	0.4546	0.4253	0.4429	1.0464	0.9993	1.0276
Running (g/mi)	13	0.4253	0.3947	0.4131	1.0138	0.9626	0.9933
Running (g/mi)	14	0.4000	0.3686	0.3874	0.9862	0.9312	0.9642
Running (g/mi)	15	0.3781	0.3460	0.3652	0.9618	0.9038	0.9386
Running (g/mi)	16	0.3564	0.3285	0.3452	0.9378	0.8933	0.9200
Running (g/mi)	17	0.3374	0.3131	0.3277	0.9163	0.8843	0.9035
Running (g/mi)	18	0.3206	0.2996	0.3122	0.8974	0.8761	0.8889
Running (g/mi)	19	0.3055	0.2875	0.2983	0.8805	0.8688	0.8758
Running (g/mi)	20	0.2919	0.2765	0.2857	0.8651	0.8622	0.8639
Running (g/mi)	21	0.2806	0.2675	0.2754	0.8512	0.8559	0.8531
Running (g/mi)	22	0.2706	0.2596	0.2662	0.8382	0.8500	0.8429
Running (g/mi)	23	0.2612	0.2524	0.2576	0.8267	0.8446	0.8338
Running (g/mi)	24	0.2527	0.2455	0.2498	0.8159	0.8396	0.8254
Running (g/mi)	25	0.2449	0.2394	0.2427	0.8059	0.8353	0.8177
Running (g/mi)	26	0.2380	0.2336	0.2362	0.7980	0.8320	0.8116
Running (g/mi)	27	0.2314	0.2279	0.2300	0.7906	0.8291	0.8060
Running (g/mi)	28	0.2254	0.2229	0.2244	0.7835	0.8263	0.8006
Running (g/mi)	29	0.2199	0.2178	0.2190	0.7771	0.8238	0.7958
Running (g/mi)	30	0.2146	0.2136	0.2142	0.7710	0.8213	0.7911
Running (g/mi)	31	0.2098	0.2088	0.2094	0.7683	0.8203	0.7891
Running (g/mi)	32	0.2048	0.2043	0.2046	0.7655	0.8194	0.7871
Running (g/mi)	33	0.2004	0.2000	0.2002	0.7632	0.8185	0.7853
Running (g/mi)	34	0.1964	0.1961	0.1963	0.7610	0.8178	0.7837
Running (g/mi)	35	0.1923	0.1923	0.1923	0.7587	0.8170	0.7820
Running (g/mi)	36	0.1894	0.1894	0.1894	0.7624	0.8207	0.7857
Running (g/mi)	37	0.1867	0.1867	0.1867	0.7661	0.8245	0.7894
Running (g/mi)	38	0.1837	0.1837	0.1837	0.7693	0.8277	0.7926
Running (g/mi)	39	0.1813	0.1813	0.1813	0.7724	0.8308	0.7958
Running (g/mi)	40	0.1789	0.1789	0.1789	0.7755	0.8338	0.7988
Running (g/mi)	41	0.1763	0.1763	0.1763	0.7827	0.8409	0.8060
Running (g/mi)	42	0.1741	0.1741	0.1741	0.7893	0.8477	0.8126
Running (g/mi)	43	0.1720	0.1720	0.1720	0.7958	0.8541	0.8191
Running (g/mi)	44	0.1699	0.1699	0.1699	0.8021	0.8602	0.8253
Running (g/mi)	45	0.1678	0.1678	0.1678	0.8079	0.8663	0.8313
Running (g/mi)	46	0.1661	0.1661	0.1661	0.8183	0.8766	0.8416
Running (g/mi)	47	0.1637	0.1637	0.1637	0.8286	0.8868	0.8519
Running (g/mi)	48	0.1622	0.1622	0.1622	0.8383	0.8965	0.8616
Running (g/mi)	49	0.1606	0.1606	0.1606	0.8474	0.9057	0.8707
Running (g/mi)	50	0.1586	0.1586	0.1586	0.8564	0.9147	0.8797
Running (g/mi)	51	0.1570	0.1570	0.1570	0.8716	0.9298	0.8949
Running (g/mi)	52	0.1555	0.1555	0.1555	0.8858	0.9439	0.9090
Running (g/mi)	53	0.1540	0.1540	0.1540	0.8996	0.9579	0.9229
Running (g/mi)	54	0.1525	0.1525	0.1525	0.9129	0.9710	0.9362
Running (g/mi)	55	0.1513	0.1513	0.1513	0.9258	0.9838	0.9490
Running (g/mi)	56	0.1503	0.1503	0.1503	0.9463	1.0047	0.9697
Running (g/mi)	57	0.1493	0.1493	0.1493	0.9664	1.0248	0.9898
Running (g/mi)	58	0.1492	0.1492	0.1492	0.9858	1.0441	1.0091
Running (g/mi)	59	0.1482	0.1482	0.1482	1.0045	1.0628	1.0278
Running (g/mi)	60	0.1474	0.1474	0.1474	1.0225	1.0808	1.0458
Running (g/mi)	61	0.1471	0.1471	0.1471	1.0515	1.1099	1.0749
Running (g/mi)	62	0.1467	0.1467	0.1467	1.0798	1.1380	1.1031
Running (g/mi)	63	0.1464	0.1464	0.1464	1.1069	1.1653	1.1303
Running (g/mi)	64	0.1460	0.1460	0.1460	1.1333	1.1916	1.1566
Running (g/mi)	65	0.1452	0.1452	0.1452	1.1589	1.2172	1.1822

Emission Type	VOC	NOx
Cold Start (g/trip start, Light Duty Only)	1.0373	0.5761
Hot Soak Loss (g/trip end)	0.5929	-
Hot Start (g/trip start, Light Duty Only)	0.1789	0.1267

Table 3: 2010 Running, Cold Start, and Hot Soak Average Emissions Factors for "Traffic Stream" TERMs (Mobile6.2)

Emission Type	Speed (mph)	Average 2010 Running Emission Factor (g/mi)					
		Arterial	Freeway	Weighted Factor VOC	Arterial	Freeway	Weighted Factor NOx
		VOC		Arterial - 60%, Freeway- 40%	NOx		Arterial - 60%, Freeway- 40%
Running (g/mi)	1	2.8327	2.8327	2.8327	1.3837	1.4276	1.4012
Running (g/mi)	2	2.8327	2.8327	2.8327	1.3837	1.4276	1.4012
Running (g/mi)	3	2.2207	2.2207	2.2207	1.3262	1.3701	1.3437
Running (g/mi)	4	1.4556	1.4556	1.4556	1.2543	1.2984	1.2720
Running (g/mi)	5	0.9963	0.9963	0.9963	1.2113	1.2553	1.2289
Running (g/mi)	6	0.8264	0.8183	0.8232	1.1340	1.1498	1.1403
Running (g/mi)	7	0.7050	0.6912	0.6995	1.0788	1.0748	1.0772
Running (g/mi)	8	0.6139	0.5955	0.6066	1.0372	1.0183	1.0296
Running (g/mi)	9	0.5434	0.5216	0.5347	1.0049	0.9743	0.9927
Running (g/mi)	10	0.4867	0.4622	0.4769	0.9791	0.9392	0.9631
Running (g/mi)	11	0.4485	0.4224	0.4381	0.9386	0.8934	0.9205
Running (g/mi)	12	0.4167	0.3897	0.4059	0.9051	0.8555	0.8852
Running (g/mi)	13	0.3897	0.3616	0.3784	0.8766	0.8232	0.8552
Running (g/mi)	14	0.3669	0.3379	0.3553	0.8523	0.7956	0.8296
Running (g/mi)	15	0.3468	0.3171	0.3349	0.8311	0.7716	0.8073
Running (g/mi)	16	0.3271	0.3012	0.3167	0.8098	0.7627	0.7910
Running (g/mi)	17	0.3095	0.2870	0.3005	0.7911	0.7548	0.7765
Running (g/mi)	18	0.2940	0.2746	0.2862	0.7746	0.7477	0.7638
Running (g/mi)	19	0.2802	0.2633	0.2734	0.7598	0.7416	0.7525
Running (g/mi)	20	0.2677	0.2530	0.2618	0.7465	0.7359	0.7423
Running (g/mi)	21	0.2573	0.2453	0.2525	0.7340	0.7304	0.7326
Running (g/mi)	22	0.2482	0.2379	0.2441	0.7229	0.7253	0.7239
Running (g/mi)	23	0.2398	0.2314	0.2364	0.7126	0.7207	0.7158
Running (g/mi)	24	0.2320	0.2251	0.2292	0.7033	0.7168	0.7087
Running (g/mi)	25	0.2246	0.2194	0.2225	0.6948	0.7129	0.7020
Running (g/mi)	26	0.2184	0.2140	0.2166	0.6878	0.7101	0.6967
Running (g/mi)	27	0.2126	0.2089	0.2111	0.6810	0.7075	0.6916
Running (g/mi)	28	0.2069	0.2041	0.2058	0.6749	0.7052	0.6870
Running (g/mi)	29	0.2017	0.1997	0.2009	0.6692	0.7029	0.6827
Running (g/mi)	30	0.1970	0.1958	0.1965	0.6640	0.7010	0.6788
Running (g/mi)	31	0.1923	0.1913	0.1919	0.6615	0.7000	0.6769
Running (g/mi)	32	0.1880	0.1875	0.1878	0.6594	0.6994	0.6754
Running (g/mi)	33	0.1840	0.1836	0.1839	0.6571	0.6985	0.6736
Running (g/mi)	34	0.1802	0.1799	0.1801	0.6550	0.6977	0.6721
Running (g/mi)	35	0.1764	0.1764	0.1764	0.6531	0.6971	0.6707
Running (g/mi)	36	0.1740	0.1740	0.1740	0.6564	0.7004	0.6740
Running (g/mi)	37	0.1713	0.1713	0.1713	0.6594	0.7035	0.6771
Running (g/mi)	38	0.1689	0.1689	0.1689	0.6623	0.7061	0.6798
Running (g/mi)	39	0.1667	0.1667	0.1667	0.6651	0.7092	0.6827
Running (g/mi)	40	0.1644	0.1644	0.1644	0.6678	0.7117	0.6853
Running (g/mi)	41	0.1622	0.1622	0.1622	0.6742	0.7178	0.6916
Running (g/mi)	42	0.1602	0.1602	0.1602	0.6798	0.7238	0.6974
Running (g/mi)	43	0.1583	0.1583	0.1583	0.6855	0.7294	0.7031
Running (g/mi)	44	0.1562	0.1562	0.1562	0.6909	0.7348	0.7085
Running (g/mi)	45	0.1546	0.1546	0.1546	0.6958	0.7401	0.7135
Running (g/mi)	46	0.1529	0.1529	0.1529	0.7050	0.7490	0.7226
Running (g/mi)	47	0.1511	0.1511	0.1511	0.7138	0.7578	0.7314
Running (g/mi)	48	0.1493	0.1493	0.1493	0.7223	0.7663	0.7399
Running (g/mi)	49	0.1478	0.1478	0.1478	0.7303	0.7743	0.7479
Running (g/mi)	50	0.1464	0.1464	0.1464	0.7382	0.7820	0.7557
Running (g/mi)	51	0.1449	0.1449	0.1449	0.7509	0.7949	0.7685
Running (g/mi)	52	0.1437	0.1437	0.1437	0.7634	0.8073	0.7810
Running (g/mi)	53	0.1424	0.1424	0.1424	0.7754	0.8193	0.7930
Running (g/mi)	54	0.1411	0.1411	0.1411	0.7868	0.8308	0.8044
Running (g/mi)	55	0.1398	0.1398	0.1398	0.7979	0.8420	0.8156
Running (g/mi)	56	0.1391	0.1391	0.1391	0.8160	0.8600	0.8336
Running (g/mi)	57	0.1387	0.1387	0.1387	0.8333	0.8773	0.8509
Running (g/mi)	58	0.1381	0.1381	0.1381	0.8502	0.8940	0.8677
Running (g/mi)	59	0.1376	0.1376	0.1376	0.8662	0.9101	0.8837
Running (g/mi)	60	0.1370	0.1370	0.1370	0.8820	0.9258	0.8995
Running (g/mi)	61	0.1367	0.1367	0.1367	0.9071	0.9509	0.9246
Running (g/mi)	62	0.1364	0.1364	0.1364	0.9313	0.9754	0.9490
Running (g/mi)	63	0.1361	0.1361	0.1361	0.9549	0.9988	0.9725
Running (g/mi)	64	0.1357	0.1357	0.1357	0.9777	1.0217	0.9953
Running (g/mi)	65	0.1355	0.1355	0.1355	0.9998	1.0437	1.0173

Emission Type	VOC	NOx
Cold Start (g/trip start, Light Duty Only)	0.9434	0.5180
Hot Soak Loss (g/trip end)	0.5663	-
Hot Start (g/trip start, Light Duty Only)	0.1631	0.1150

Table 4: 2020 Running, Cold Start, and Hot Soak Average Emissions Factors for "Traffic Stream" TERMs (Mobile6.2)

Emission Type	Speed (mph)	Average 2020 Running Emission Factor (g/mi)					
		Arterial	Freeway	Weighted Factor VOC	Arterial	Freeway	Weighted Factor NOx
		VOC		Arterial - 60%, Freeway- 40%	NOx		Arterial - 60%, Freeway- 40%
Running (g/mi)	1	1.5727	1.5727	1.5727	0.4705	0.4743	0.4720
Running (g/mi)	2	1.5727	1.5727	1.5727	0.4705	0.4743	0.4720
Running (g/mi)	3	1.2443	1.2443	1.2443	0.4495	0.4532	0.4509
Running (g/mi)	4	0.8338	0.8338	0.8338	0.4230	0.4265	0.4244
Running (g/mi)	5	0.5876	0.5876	0.5876	0.4068	0.4104	0.4082
Running (g/mi)	6	0.4918	0.4867	0.4897	0.3785	0.3695	0.3749
Running (g/mi)	7	0.4234	0.4146	0.4199	0.3585	0.3405	0.3513
Running (g/mi)	8	0.3723	0.3608	0.3677	0.3433	0.3186	0.3334
Running (g/mi)	9	0.3325	0.3186	0.3269	0.3315	0.3016	0.3195
Running (g/mi)	10	0.3005	0.2851	0.2943	0.3221	0.2881	0.3085
Running (g/mi)	11	0.2775	0.2610	0.2709	0.3076	0.2711	0.2930
Running (g/mi)	12	0.2582	0.2409	0.2512	0.2955	0.2570	0.2801
Running (g/mi)	13	0.2417	0.2239	0.2346	0.2854	0.2452	0.2693
Running (g/mi)	14	0.2279	0.2097	0.2206	0.2765	0.2349	0.2599
Running (g/mi)	15	0.2157	0.1967	0.2081	0.2691	0.2263	0.2520
Running (g/mi)	16	0.2028	0.1865	0.1963	0.2618	0.2244	0.2468
Running (g/mi)	17	0.1918	0.1773	0.1860	0.2554	0.2228	0.2423
Running (g/mi)	18	0.1817	0.1695	0.1768	0.2496	0.2212	0.2383
Running (g/mi)	19	0.1730	0.1619	0.1685	0.2446	0.2201	0.2348
Running (g/mi)	20	0.1649	0.1557	0.1612	0.2402	0.2190	0.2317
Running (g/mi)	21	0.1586	0.1507	0.1554	0.2358	0.2180	0.2287
Running (g/mi)	22	0.1530	0.1464	0.1504	0.2318	0.2171	0.2259
Running (g/mi)	23	0.1482	0.1423	0.1458	0.2285	0.2161	0.2235
Running (g/mi)	24	0.1436	0.1389	0.1417	0.2255	0.2150	0.2213
Running (g/mi)	25	0.1391	0.1357	0.1377	0.2225	0.2144	0.2192
Running (g/mi)	26	0.1354	0.1320	0.1340	0.2199	0.2137	0.2174
Running (g/mi)	27	0.1316	0.1289	0.1305	0.2175	0.2132	0.2158
Running (g/mi)	28	0.1280	0.1261	0.1272	0.2154	0.2125	0.2142
Running (g/mi)	29	0.1250	0.1234	0.1244	0.2134	0.2123	0.2129
Running (g/mi)	30	0.1217	0.1207	0.1213	0.2114	0.2118	0.2115
Running (g/mi)	31	0.1190	0.1183	0.1187	0.2104	0.2113	0.2107
Running (g/mi)	32	0.1164	0.1159	0.1162	0.2094	0.2113	0.2101
Running (g/mi)	33	0.1139	0.1134	0.1137	0.2084	0.2109	0.2094
Running (g/mi)	34	0.1115	0.1113	0.1114	0.2076	0.2106	0.2088
Running (g/mi)	35	0.1096	0.1096	0.1096	0.2067	0.2103	0.2081
Running (g/mi)	36	0.1077	0.1077	0.1077	0.2079	0.2114	0.2093
Running (g/mi)	37	0.1060	0.1060	0.1060	0.2089	0.2124	0.2103
Running (g/mi)	38	0.1045	0.1045	0.1045	0.2097	0.2134	0.2112
Running (g/mi)	39	0.1033	0.1033	0.1033	0.2105	0.2143	0.2120
Running (g/mi)	40	0.1020	0.1020	0.1020	0.2115	0.2151	0.2130
Running (g/mi)	41	0.1005	0.1005	0.1005	0.2133	0.2169	0.2147
Running (g/mi)	42	0.0992	0.0992	0.0992	0.2151	0.2189	0.2166
Running (g/mi)	43	0.0980	0.0980	0.0980	0.2167	0.2202	0.2181
Running (g/mi)	44	0.0968	0.0968	0.0968	0.2185	0.2219	0.2198
Running (g/mi)	45	0.0957	0.0957	0.0957	0.2199	0.2235	0.2214
Running (g/mi)	46	0.0948	0.0948	0.0948	0.2224	0.2261	0.2239
Running (g/mi)	47	0.0938	0.0938	0.0938	0.2251	0.2285	0.2265
Running (g/mi)	48	0.0929	0.0929	0.0929	0.2273	0.2307	0.2287
Running (g/mi)	49	0.0919	0.0919	0.0919	0.2295	0.2330	0.2309
Running (g/mi)	50	0.0911	0.0911	0.0911	0.2315	0.2351	0.2330
Running (g/mi)	51	0.0905	0.0905	0.0905	0.2351	0.2385	0.2365
Running (g/mi)	52	0.0898	0.0898	0.0898	0.2383	0.2420	0.2398
Running (g/mi)	53	0.0894	0.0894	0.0894	0.2414	0.2451	0.2429
Running (g/mi)	54	0.0889	0.0889	0.0889	0.2446	0.2480	0.2460
Running (g/mi)	55	0.0882	0.0882	0.0882	0.2477	0.2513	0.2491
Running (g/mi)	56	0.0883	0.0883	0.0883	0.2522	0.2558	0.2536
Running (g/mi)	57	0.0882	0.0882	0.0882	0.2566	0.2603	0.2581
Running (g/mi)	58	0.0882	0.0882	0.0882	0.2610	0.2647	0.2625
Running (g/mi)	59	0.0882	0.0882	0.0882	0.2653	0.2688	0.2667
Running (g/mi)	60	0.0881	0.0881	0.0881	0.2692	0.2728	0.2706
Running (g/mi)	61	0.0881	0.0881	0.0881	0.2754	0.2788	0.2767
Running (g/mi)	62	0.0883	0.0883	0.0883	0.2815	0.2848	0.2828
Running (g/mi)	63	0.0883	0.0883	0.0883	0.2874	0.2908	0.2887
Running (g/mi)	64	0.0885	0.0885	0.0885	0.2931	0.2966	0.2945
Running (g/mi)	65	0.0886	0.0886	0.0886	0.2985	0.3020	0.2999

Emission Type	VOC	NOx
Cold Start (g/trip start, Light Duty Only)	0.5272	0.2176
Hot Soak Loss (g/trip end)	0.2826	-
Hot Start (g/trip start, Light Duty Only)	0.0956	0.0509

Table 5: 2030 Running, Cold Start, and Hot Soak Average Emissions Factors for "Traffic Stream" TERMs (Mobile6.2)

Emission Type	Speed (mph)	Average 2030 Running Emission Factor (g/mi)					
		Arterial	Freeway	Weighted Factor VOC	Arterial	Freeway	Weighted Factor NOx
		VOC		Arterial - 60%, Freeway- 40%	NOx		Arterial - 60%, Freeway- 40%
Running (g/mi)	1	1.4783	1.4783	1.4783	0.3478	0.3477	0.3477
Running (g/mi)	2	1.4783	1.4783	1.4783	0.3478	0.3477	0.3477
Running (g/mi)	3	1.1696	1.1696	1.1696	0.3312	0.3312	0.3312
Running (g/mi)	4	0.7837	0.7837	0.7837	0.3102	0.3102	0.3102
Running (g/mi)	5	0.5520	0.5520	0.5520	0.2978	0.2978	0.2978
Running (g/mi)	6	0.4623	0.4575	0.4604	0.2760	0.2651	0.2716
Running (g/mi)	7	0.3980	0.3901	0.3949	0.2606	0.2418	0.2530
Running (g/mi)	8	0.3499	0.3392	0.3456	0.2490	0.2242	0.2391
Running (g/mi)	9	0.3122	0.2997	0.3072	0.2398	0.2106	0.2281
Running (g/mi)	10	0.2824	0.2683	0.2768	0.2325	0.1997	0.2194
Running (g/mi)	11	0.2607	0.2459	0.2548	0.2215	0.1865	0.2075
Running (g/mi)	12	0.2427	0.2271	0.2365	0.2122	0.1758	0.1976
Running (g/mi)	13	0.2275	0.2111	0.2209	0.2046	0.1666	0.1894
Running (g/mi)	14	0.2146	0.1976	0.2078	0.1979	0.1587	0.1822
Running (g/mi)	15	0.2031	0.1858	0.1962	0.1922	0.1519	0.1761
Running (g/mi)	16	0.1910	0.1760	0.1850	0.1865	0.1513	0.1724
Running (g/mi)	17	0.1807	0.1673	0.1753	0.1820	0.1506	0.1694
Running (g/mi)	18	0.1712	0.1597	0.1666	0.1778	0.1502	0.1667
Running (g/mi)	19	0.1626	0.1526	0.1586	0.1741	0.1498	0.1644
Running (g/mi)	20	0.1552	0.1465	0.1517	0.1708	0.1493	0.1622
Running (g/mi)	21	0.1495	0.1420	0.1465	0.1676	0.1489	0.1601
Running (g/mi)	22	0.1441	0.1379	0.1416	0.1648	0.1484	0.1582
Running (g/mi)	23	0.1395	0.1341	0.1373	0.1620	0.1483	0.1565
Running (g/mi)	24	0.1351	0.1308	0.1334	0.1598	0.1478	0.1550
Running (g/mi)	25	0.1311	0.1276	0.1297	0.1576	0.1475	0.1535
Running (g/mi)	26	0.1273	0.1243	0.1261	0.1556	0.1473	0.1522
Running (g/mi)	27	0.1239	0.1214	0.1229	0.1538	0.1470	0.1511
Running (g/mi)	28	0.1204	0.1185	0.1196	0.1523	0.1467	0.1501
Running (g/mi)	29	0.1175	0.1159	0.1169	0.1505	0.1465	0.1489
Running (g/mi)	30	0.1146	0.1136	0.1142	0.1493	0.1464	0.1481
Running (g/mi)	31	0.1118	0.1111	0.1115	0.1483	0.1461	0.1474
Running (g/mi)	32	0.1093	0.1090	0.1092	0.1475	0.1458	0.1468
Running (g/mi)	33	0.1070	0.1067	0.1069	0.1467	0.1456	0.1462
Running (g/mi)	34	0.1048	0.1046	0.1047	0.1458	0.1454	0.1457
Running (g/mi)	35	0.1030	0.1030	0.1030	0.1452	0.1452	0.1452
Running (g/mi)	36	0.1011	0.1011	0.1011	0.1458	0.1458	0.1458
Running (g/mi)	37	0.0996	0.0996	0.0996	0.1466	0.1466	0.1466
Running (g/mi)	38	0.0983	0.0983	0.0983	0.1472	0.1472	0.1472
Running (g/mi)	39	0.0970	0.0970	0.0970	0.1478	0.1478	0.1478
Running (g/mi)	40	0.0957	0.0957	0.0957	0.1484	0.1484	0.1484
Running (g/mi)	41	0.0944	0.0944	0.0944	0.1496	0.1496	0.1496
Running (g/mi)	42	0.0933	0.0933	0.0933	0.1507	0.1507	0.1507
Running (g/mi)	43	0.0919	0.0919	0.0919	0.1517	0.1517	0.1517
Running (g/mi)	44	0.0909	0.0909	0.0909	0.1527	0.1527	0.1527
Running (g/mi)	45	0.0899	0.0899	0.0899	0.1537	0.1537	0.1537
Running (g/mi)	46	0.0889	0.0889	0.0889	0.1553	0.1553	0.1553
Running (g/mi)	47	0.0880	0.0880	0.0880	0.1565	0.1565	0.1565
Running (g/mi)	48	0.0870	0.0870	0.0870	0.1579	0.1579	0.1579
Running (g/mi)	49	0.0863	0.0863	0.0863	0.1593	0.1593	0.1593
Running (g/mi)	50	0.0857	0.0857	0.0857	0.1603	0.1603	0.1603
Running (g/mi)	51	0.0850	0.0850	0.0850	0.1623	0.1623	0.1623
Running (g/mi)	52	0.0844	0.0844	0.0844	0.1643	0.1643	0.1643
Running (g/mi)	53	0.0839	0.0839	0.0839	0.1661	0.1661	0.1661
Running (g/mi)	54	0.0831	0.0831	0.0831	0.1677	0.1677	0.1677
Running (g/mi)	55	0.0827	0.0827	0.0827	0.1695	0.1695	0.1695
Running (g/mi)	56	0.0829	0.0829	0.0829	0.1719	0.1719	0.1719
Running (g/mi)	57	0.0827	0.0827	0.0827	0.1742	0.1742	0.1742
Running (g/mi)	58	0.0830	0.0830	0.0830	0.1765	0.1765	0.1765
Running (g/mi)	59	0.0827	0.0827	0.0827	0.1787	0.1787	0.1787
Running (g/mi)	60	0.0827	0.0827	0.0827	0.1811	0.1811	0.1811
Running (g/mi)	61	0.0828	0.0828	0.0828	0.1843	0.1843	0.1843
Running (g/mi)	62	0.0831	0.0831	0.0831	0.1873	0.1873	0.1873
Running (g/mi)	63	0.0831	0.0831	0.0831	0.1903	0.1903	0.1903
Running (g/mi)	64	0.0832	0.0832	0.0832	0.1932	0.1932	0.1932
Running (g/mi)	65	0.0832	0.0832	0.0832	0.1960	0.1960	0.1960

Emission Type	VOC	NOx
Cold Start (g/trip start, Light Duty Only)	0.4639	0.1565
Hot Soak Loss (g/trip end)	0.2078	-
Hot Start (g/trip start, Light Duty Only)	0.0854	0.0382

Exhibit - 1
VOC MOBILE6.2 RUNNING EMISSION RATES
TRAFFIC STREAM
FOR 2009, 2010, 2020 AND 2030
WEIGHTED AVEARGE of ARTERIAL & FREEWAY

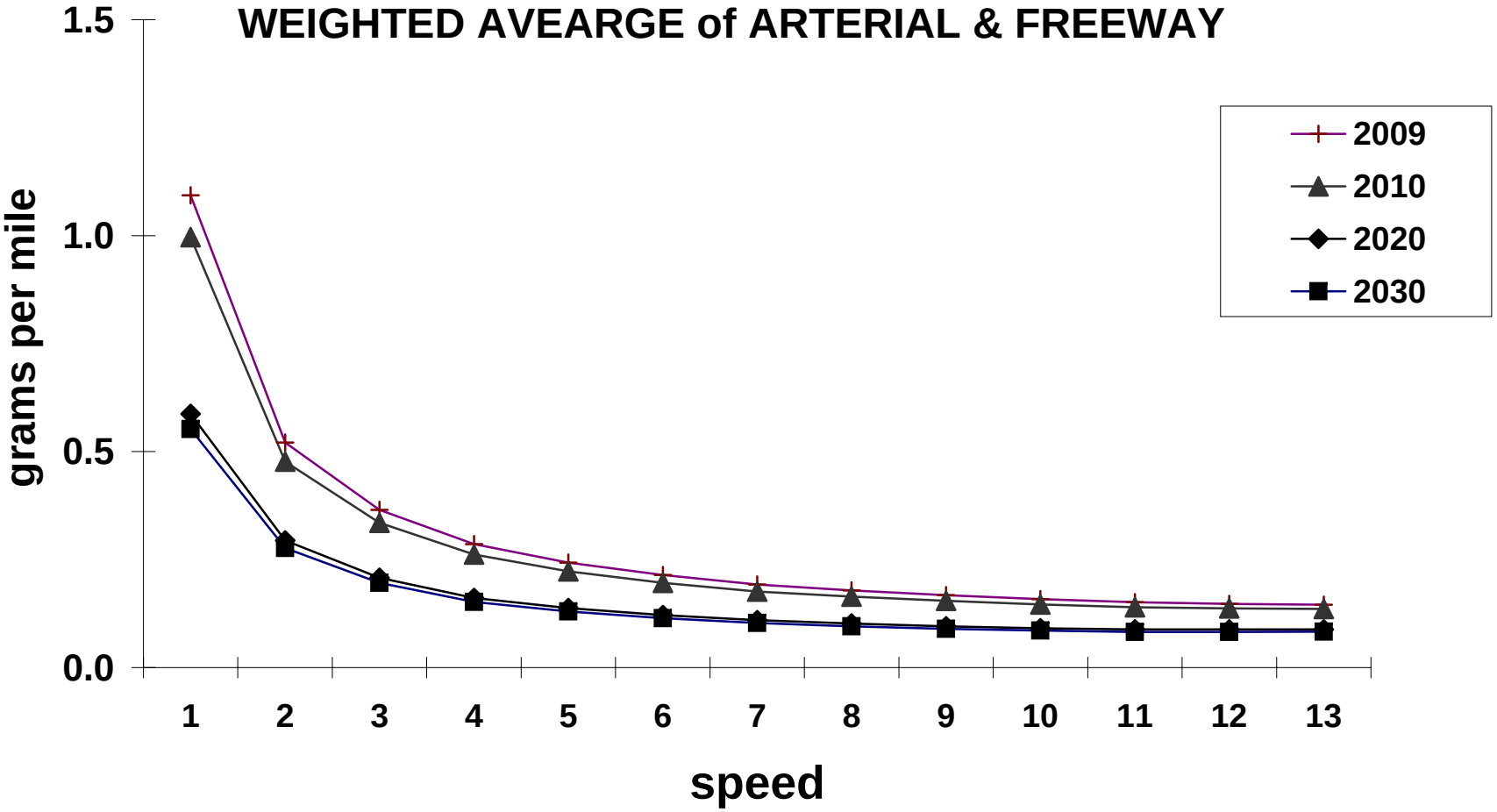


Exhibit - 2
NOx MOBILE6.2 RUNNING EMISSION RATES
TRAFFIC STREAM
FOR 2009, 2010, 2020 AND 2030
WEIGHTED AVEARGE of ARTERIAL & FREEWAY

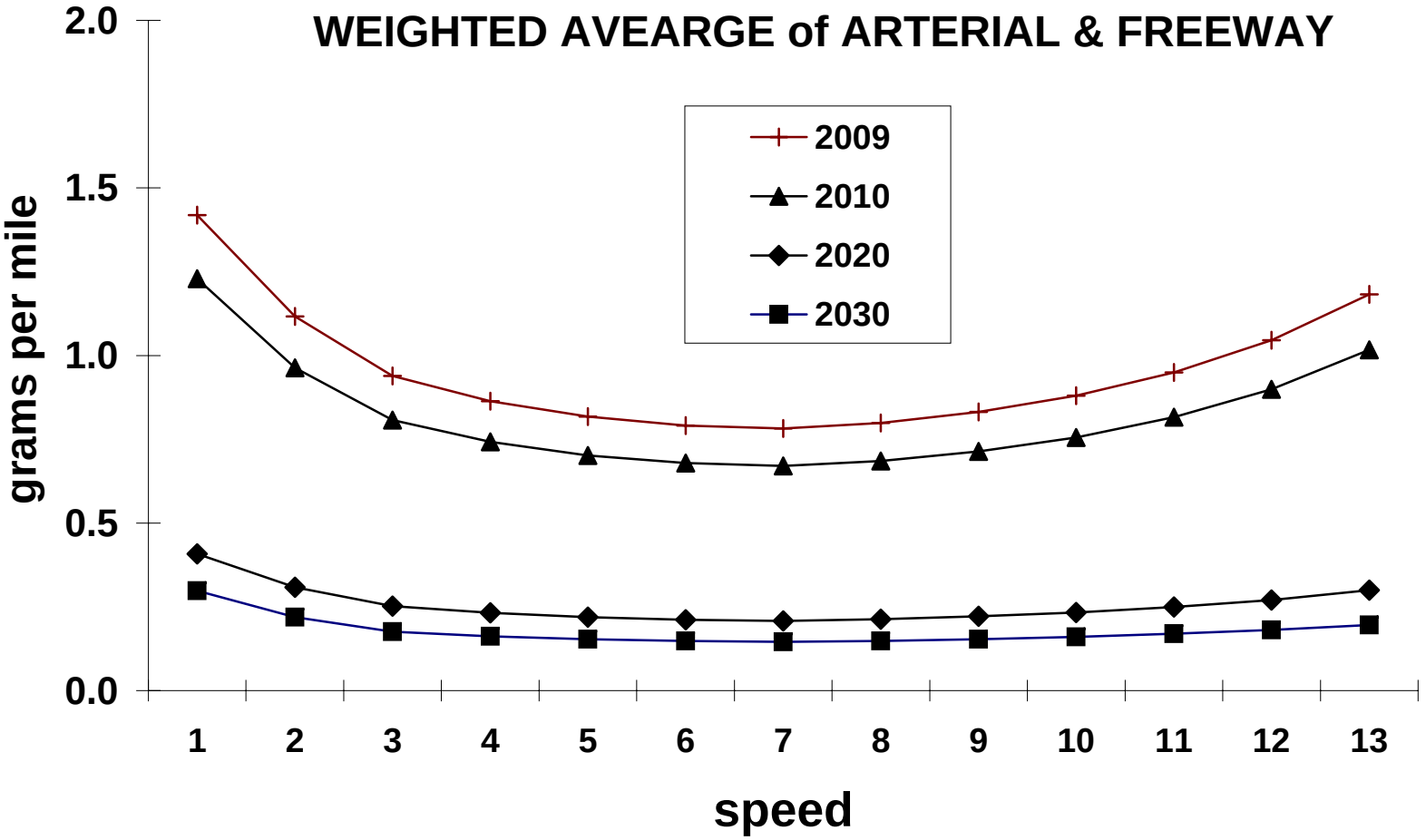


Table 6: 2009 Running, Cold Start, and Hot Soak Average Emissions Factors for "Commute" TERMs
(Mobile 6.2)

Emission Type	Speed (mph)	Average 2009 Running Emission Factor (g/mi)					
		Arterial	Freeway	Weighted Factor VOC	Arterial	Freeway	Weighted Factor NOx
		VOC		Arterial - 60%, Freeway- 40%	NOx		Arterial - 60%, Freeway- 40%
Running (g/mi)	1	3.2177	3.2177	3.2177	0.9303	0.9303	0.9303
Running (g/mi)	2	3.2177	3.2177	3.2177	0.9303	0.9303	0.9303
Running (g/mi)	3	2.5028	2.5028	2.5028	0.8834	0.8833	0.8834
Running (g/mi)	4	1.6094	1.6094	1.6094	0.8248	0.8248	0.8248
Running (g/mi)	5	1.0735	1.0734	1.0734	0.7895	0.7895	0.7895
Running (g/mi)	6	0.8815	0.8719	0.8776	0.7303	0.6959	0.7165
Running (g/mi)	7	0.7447	0.7281	0.7381	0.6879	0.6290	0.6644
Running (g/mi)	8	0.6420	0.6201	0.6332	0.6561	0.5789	0.6252
Running (g/mi)	9	0.5618	0.5362	0.5515	0.6314	0.5401	0.5949
Running (g/mi)	10	0.4982	0.4693	0.4866	0.6116	0.5088	0.5705
Running (g/mi)	11	0.4576	0.4273	0.4455	0.5820	0.4726	0.5382
Running (g/mi)	12	0.4242	0.3922	0.4114	0.5572	0.4423	0.5112
Running (g/mi)	13	0.3956	0.3626	0.3824	0.5363	0.4169	0.4885
Running (g/mi)	14	0.3713	0.3370	0.3576	0.5182	0.3949	0.4689
Running (g/mi)	15	0.3501	0.3150	0.3361	0.5028	0.3758	0.4520
Running (g/mi)	16	0.3298	0.2995	0.3177	0.4887	0.3768	0.4439
Running (g/mi)	17	0.3119	0.2854	0.3013	0.4765	0.3778	0.4370
Running (g/mi)	18	0.2962	0.2733	0.2870	0.4655	0.3788	0.4308
Running (g/mi)	19	0.2817	0.2622	0.2739	0.4558	0.3795	0.4253
Running (g/mi)	20	0.2690	0.2523	0.2623	0.4470	0.3802	0.4203
Running (g/mi)	21	0.2590	0.2447	0.2533	0.4390	0.3806	0.4156
Running (g/mi)	22	0.2499	0.2379	0.2451	0.4315	0.3807	0.4112
Running (g/mi)	23	0.2414	0.2317	0.2375	0.4247	0.3808	0.4071
Running (g/mi)	24	0.2336	0.2260	0.2306	0.4188	0.3812	0.4037
Running (g/mi)	25	0.2267	0.2209	0.2243	0.4129	0.3815	0.4004
Running (g/mi)	26	0.2207	0.2159	0.2188	0.4077	0.3813	0.3971
Running (g/mi)	27	0.2150	0.2111	0.2134	0.4028	0.3813	0.3942
Running (g/mi)	28	0.2096	0.2066	0.2084	0.3982	0.3813	0.3914
Running (g/mi)	29	0.2047	0.2027	0.2039	0.3938	0.3813	0.3888
Running (g/mi)	30	0.2000	0.1988	0.1995	0.3898	0.3813	0.3864
Running (g/mi)	31	0.1957	0.1947	0.1953	0.3871	0.3804	0.3844
Running (g/mi)	32	0.1915	0.1906	0.1911	0.3845	0.3797	0.3826
Running (g/mi)	33	0.1875	0.1870	0.1873	0.3822	0.3790	0.3809
Running (g/mi)	34	0.1839	0.1837	0.1838	0.3798	0.3785	0.3793
Running (g/mi)	35	0.1804	0.1804	0.1804	0.3778	0.3778	0.3778
Running (g/mi)	36	0.1779	0.1779	0.1779	0.3792	0.3792	0.3792
Running (g/mi)	37	0.1755	0.1755	0.1755	0.3805	0.3805	0.3805
Running (g/mi)	38	0.1732	0.1732	0.1732	0.3817	0.3817	0.3817
Running (g/mi)	39	0.1711	0.1711	0.1711	0.3830	0.3830	0.3830
Running (g/mi)	40	0.1691	0.1691	0.1691	0.3842	0.3842	0.3842
Running (g/mi)	41	0.1669	0.1669	0.1669	0.3861	0.3861	0.3861
Running (g/mi)	42	0.1650	0.1650	0.1650	0.3881	0.3881	0.3881
Running (g/mi)	43	0.1631	0.1631	0.1631	0.3899	0.3899	0.3899
Running (g/mi)	44	0.1614	0.1614	0.1614	0.3917	0.3917	0.3917
Running (g/mi)	45	0.1594	0.1594	0.1594	0.3932	0.3932	0.3932
Running (g/mi)	46	0.1577	0.1577	0.1577	0.3954	0.3954	0.3954
Running (g/mi)	47	0.1557	0.1557	0.1557	0.3974	0.3974	0.3974
Running (g/mi)	48	0.1541	0.1541	0.1541	0.3993	0.3993	0.3993
Running (g/mi)	49	0.1528	0.1528	0.1528	0.4010	0.4010	0.4010
Running (g/mi)	50	0.1512	0.1512	0.1512	0.4028	0.4028	0.4028
Running (g/mi)	51	0.1498	0.1498	0.1498	0.4048	0.4048	0.4048
Running (g/mi)	52	0.1483	0.1483	0.1483	0.4071	0.4071	0.4071
Running (g/mi)	53	0.1468	0.1468	0.1468	0.4093	0.4093	0.4093
Running (g/mi)	54	0.1455	0.1455	0.1455	0.4113	0.4113	0.4113
Running (g/mi)	55	0.1440	0.1440	0.1440	0.4131	0.4131	0.4131
Running (g/mi)	56	0.1433	0.1433	0.1433	0.4154	0.4154	0.4154
Running (g/mi)	57	0.1426	0.1426	0.1426	0.4177	0.4177	0.4177
Running (g/mi)	58	0.1419	0.1419	0.1419	0.4197	0.4197	0.4197
Running (g/mi)	59	0.1413	0.1413	0.1413	0.4217	0.4217	0.4217
Running (g/mi)	60	0.1407	0.1407	0.1407	0.4237	0.4237	0.4237
Running (g/mi)	61	0.1402	0.1402	0.1402	0.4260	0.4260	0.4260
Running (g/mi)	62	0.1397	0.1397	0.1397	0.4283	0.4283	0.4283
Running (g/mi)	63	0.1393	0.1393	0.1393	0.4304	0.4304	0.4304
Running (g/mi)	64	0.1390	0.1390	0.1390	0.4324	0.4324	0.4324
Running (g/mi)	65	0.1384	0.1384	0.1384	0.4343	0.4343	0.4343

Emission Type	VOC	NOx
Cold Start (g/trip start, Light Duty	1.0372	0.5761
Hot Soak Loss (g/trip end)	0.5837	-
Hot Start (g/trip start, Light Duty	0.1788	0.1266

Table 7: 2010 Running, Cold Start, and Hot Soak Average Emissions Factors for "Commute" TERMs
(Mobile 6.2)

Emission Type	Speed (mph)	Average 2010 Running Emission Factor (g/mi)					
		Arterial	Freeway	Weighted Factor VOC	Arterial	Freeway	Weighted Factor NOx
		VOC		Arterial - 60%, Freeway- 40%	NOx		Arterial - 60%, Freeway- 40%
Running (g/mi)	1	2.9073	2.9073	2.9073	0.8218	0.8218	0.8218
Running (g/mi)	2	2.9073	2.9073	2.9073	0.8218	0.8218	0.8218
Running (g/mi)	3	2.2637	2.2637	2.2637	0.7804	0.7803	0.7804
Running (g/mi)	4	1.4592	1.4592	1.4592	0.7285	0.7285	0.7285
Running (g/mi)	5	0.9764	0.9764	0.9764	0.6974	0.6974	0.6974
Running (g/mi)	6	0.8027	0.7939	0.7992	0.6451	0.6147	0.6329
Running (g/mi)	7	0.6786	0.6635	0.6726	0.6077	0.5553	0.5867
Running (g/mi)	8	0.5857	0.5654	0.5776	0.5794	0.5109	0.5520
Running (g/mi)	9	0.5134	0.4895	0.5038	0.5577	0.4763	0.5251
Running (g/mi)	10	0.4556	0.4287	0.4448	0.5403	0.4488	0.5037
Running (g/mi)	11	0.4186	0.3904	0.4073	0.5140	0.4168	0.4751
Running (g/mi)	12	0.3880	0.3584	0.3762	0.4919	0.3899	0.4511
Running (g/mi)	13	0.3619	0.3313	0.3497	0.4734	0.3673	0.4310
Running (g/mi)	14	0.3396	0.3082	0.3270	0.4574	0.3478	0.4136
Running (g/mi)	15	0.3207	0.2882	0.3077	0.4438	0.3311	0.3987
Running (g/mi)	16	0.3021	0.2736	0.2907	0.4316	0.3321	0.3918
Running (g/mi)	17	0.2855	0.2607	0.2756	0.4206	0.3331	0.3856
Running (g/mi)	18	0.2709	0.2496	0.2623	0.4110	0.3338	0.3801
Running (g/mi)	19	0.2579	0.2395	0.2505	0.4023	0.3343	0.3751
Running (g/mi)	20	0.2460	0.2302	0.2397	0.3944	0.3351	0.3707
Running (g/mi)	21	0.2368	0.2236	0.2315	0.3873	0.3353	0.3665
Running (g/mi)	22	0.2286	0.2174	0.2241	0.3808	0.3357	0.3628
Running (g/mi)	23	0.2210	0.2119	0.2174	0.3749	0.3359	0.3593
Running (g/mi)	24	0.2140	0.2067	0.2111	0.3697	0.3361	0.3562
Running (g/mi)	25	0.2074	0.2018	0.2051	0.3643	0.3363	0.3531
Running (g/mi)	26	0.2018	0.1972	0.2000	0.3597	0.3364	0.3504
Running (g/mi)	27	0.1968	0.1929	0.1953	0.3554	0.3363	0.3478
Running (g/mi)	28	0.1919	0.1890	0.1907	0.3514	0.3363	0.3454
Running (g/mi)	29	0.1871	0.1851	0.1863	0.3476	0.3363	0.3431
Running (g/mi)	30	0.1832	0.1816	0.1826	0.3439	0.3363	0.3409
Running (g/mi)	31	0.1789	0.1779	0.1785	0.3417	0.3357	0.3393
Running (g/mi)	32	0.1752	0.1744	0.1749	0.3393	0.3350	0.3376
Running (g/mi)	33	0.1717	0.1711	0.1714	0.3373	0.3345	0.3362
Running (g/mi)	34	0.1683	0.1681	0.1682	0.3353	0.3338	0.3347
Running (g/mi)	35	0.1649	0.1649	0.1649	0.3334	0.3334	0.3334
Running (g/mi)	36	0.1629	0.1629	0.1629	0.3347	0.3347	0.3347
Running (g/mi)	37	0.1609	0.1609	0.1609	0.3358	0.3358	0.3358
Running (g/mi)	38	0.1586	0.1586	0.1586	0.3370	0.3370	0.3370
Running (g/mi)	39	0.1569	0.1569	0.1569	0.3382	0.3382	0.3382
Running (g/mi)	40	0.1550	0.1550	0.1550	0.3392	0.3392	0.3392
Running (g/mi)	41	0.1533	0.1533	0.1533	0.3409	0.3409	0.3409
Running (g/mi)	42	0.1513	0.1513	0.1513	0.3428	0.3428	0.3428
Running (g/mi)	43	0.1496	0.1496	0.1496	0.3442	0.3442	0.3442
Running (g/mi)	44	0.1482	0.1482	0.1482	0.3458	0.3458	0.3458
Running (g/mi)	45	0.1465	0.1465	0.1465	0.3474	0.3474	0.3474
Running (g/mi)	46	0.1448	0.1448	0.1448	0.3493	0.3493	0.3493
Running (g/mi)	47	0.1432	0.1432	0.1432	0.3510	0.3510	0.3510
Running (g/mi)	48	0.1418	0.1418	0.1418	0.3528	0.3528	0.3528
Running (g/mi)	49	0.1405	0.1405	0.1405	0.3543	0.3543	0.3543
Running (g/mi)	50	0.1392	0.1392	0.1392	0.3559	0.3559	0.3559
Running (g/mi)	51	0.1378	0.1378	0.1378	0.3579	0.3579	0.3579
Running (g/mi)	52	0.1365	0.1365	0.1365	0.3597	0.3597	0.3597
Running (g/mi)	53	0.1353	0.1353	0.1353	0.3615	0.3615	0.3615
Running (g/mi)	54	0.1342	0.1342	0.1342	0.3634	0.3634	0.3634
Running (g/mi)	55	0.1331	0.1331	0.1331	0.3650	0.3650	0.3650
Running (g/mi)	56	0.1323	0.1323	0.1323	0.3670	0.3670	0.3670
Running (g/mi)	57	0.1321	0.1321	0.1321	0.3690	0.3690	0.3690
Running (g/mi)	58	0.1314	0.1314	0.1314	0.3711	0.3711	0.3711
Running (g/mi)	59	0.1310	0.1310	0.1310	0.3728	0.3728	0.3728
Running (g/mi)	60	0.1306	0.1306	0.1306	0.3747	0.3747	0.3747
Running (g/mi)	61	0.1303	0.1303	0.1303	0.3767	0.3767	0.3767
Running (g/mi)	62	0.1298	0.1298	0.1298	0.3786	0.3786	0.3786
Running (g/mi)	63	0.1295	0.1295	0.1295	0.3805	0.3805	0.3805
Running (g/mi)	64	0.1292	0.1292	0.1292	0.3824	0.3824	0.3824
Running (g/mi)	65	0.1289	0.1289	0.1289	0.3843	0.3843	0.3843

Emission Type	VOC	NOx
Cold Start (g/trip start, Light Duty	0.9436	0.5180
Hot Soak Loss (g/trip end)	0.5579	-
Hot Start (g/trip start, Light Duty	0.1632	0.1151

Table 8: 2020 Running, Cold Start, and Hot Soak Average Emissions Factors for "Commute" TERMs (Mobile 6.2)

	Average 2020 Running Emission Factor (g/mi)						
Emission Type	Speed (mph)	Arterial	Freeway	Weighted Factor VOC	Arterial	Freeway	Weighted Factor NOx
		VOC		Arterial - 60%, Freeway- 40%	NOx		Arterial - 60%, Freeway- 40%
Running (g/mi)	1	1.6161	1.6161	1.6161	0.3613	0.3613	0.3613
Running (g/mi)	2	1.6161	1.6161	1.6161	0.3613	0.3613	0.3613
Running (g/mi)	3	1.2686	1.2686	1.2686	0.3429	0.3429	0.3429
Running (g/mi)	4	0.8345	0.8345	0.8345	0.3199	0.3199	0.3199
Running (g/mi)	5	0.5737	0.5737	0.5737	0.3059	0.3059	0.3059
Running (g/mi)	6	0.4757	0.4699	0.4734	0.2824	0.2687	0.2769
Running (g/mi)	7	0.4053	0.3959	0.4016	0.2657	0.2421	0.2563
Running (g/mi)	8	0.3532	0.3406	0.3482	0.2530	0.2219	0.2406
Running (g/mi)	9	0.3121	0.2972	0.3061	0.2431	0.2065	0.2284
Running (g/mi)	10	0.2794	0.2625	0.2726	0.2354	0.1939	0.2188
Running (g/mi)	11	0.2571	0.2392	0.2499	0.2235	0.1795	0.2059
Running (g/mi)	12	0.2385	0.2197	0.2310	0.2138	0.1675	0.1953
Running (g/mi)	13	0.2228	0.2032	0.2150	0.2055	0.1574	0.1862
Running (g/mi)	14	0.2093	0.1892	0.2013	0.1985	0.1488	0.1786
Running (g/mi)	15	0.1975	0.1768	0.1892	0.1921	0.1413	0.1718
Running (g/mi)	16	0.1855	0.1673	0.1782	0.1867	0.1418	0.1688
Running (g/mi)	17	0.1750	0.1591	0.1686	0.1820	0.1423	0.1661
Running (g/mi)	18	0.1657	0.1519	0.1601	0.1775	0.1427	0.1636
Running (g/mi)	19	0.1573	0.1452	0.1525	0.1736	0.1431	0.1614
Running (g/mi)	20	0.1499	0.1393	0.1457	0.1703	0.1434	0.1595
Running (g/mi)	21	0.1442	0.1354	0.1407	0.1671	0.1435	0.1577
Running (g/mi)	22	0.1394	0.1318	0.1364	0.1642	0.1439	0.1561
Running (g/mi)	23	0.1349	0.1287	0.1324	0.1615	0.1440	0.1545
Running (g/mi)	24	0.1307	0.1255	0.1286	0.1592	0.1441	0.1531
Running (g/mi)	25	0.1271	0.1229	0.1255	0.1570	0.1442	0.1519
Running (g/mi)	26	0.1233	0.1200	0.1220	0.1549	0.1442	0.1506
Running (g/mi)	27	0.1202	0.1174	0.1191	0.1531	0.1442	0.1495
Running (g/mi)	28	0.1172	0.1150	0.1163	0.1513	0.1443	0.1485
Running (g/mi)	29	0.1145	0.1127	0.1138	0.1495	0.1443	0.1474
Running (g/mi)	30	0.1117	0.1104	0.1112	0.1479	0.1443	0.1465
Running (g/mi)	31	0.1092	0.1083	0.1089	0.1469	0.1442	0.1458
Running (g/mi)	32	0.1070	0.1065	0.1068	0.1458	0.1439	0.1451
Running (g/mi)	33	0.1050	0.1045	0.1048	0.1449	0.1435	0.1443
Running (g/mi)	34	0.1027	0.1024	0.1026	0.1439	0.1433	0.1437
Running (g/mi)	35	0.1010	0.1010	0.1010	0.1431	0.1431	0.1431
Running (g/mi)	36	0.0995	0.0995	0.0995	0.1438	0.1438	0.1438
Running (g/mi)	37	0.0982	0.0982	0.0982	0.1443	0.1443	0.1443
Running (g/mi)	38	0.0971	0.0971	0.0971	0.1449	0.1449	0.1449
Running (g/mi)	39	0.0959	0.0959	0.0959	0.1455	0.1455	0.1455
Running (g/mi)	40	0.0950	0.0950	0.0950	0.1460	0.1460	0.1460
Running (g/mi)	41	0.0937	0.0937	0.0937	0.1468	0.1468	0.1468
Running (g/mi)	42	0.0925	0.0925	0.0925	0.1475	0.1475	0.1475
Running (g/mi)	43	0.0915	0.0915	0.0915	0.1484	0.1484	0.1484
Running (g/mi)	44	0.0905	0.0905	0.0905	0.1489	0.1489	0.1489
Running (g/mi)	45	0.0896	0.0896	0.0896	0.1498	0.1498	0.1498
Running (g/mi)	46	0.0889	0.0889	0.0889	0.1507	0.1507	0.1507
Running (g/mi)	47	0.0880	0.0880	0.0880	0.1516	0.1516	0.1516
Running (g/mi)	48	0.0872	0.0872	0.0872	0.1524	0.1524	0.1524
Running (g/mi)	49	0.0864	0.0864	0.0864	0.1532	0.1532	0.1532
Running (g/mi)	50	0.0857	0.0857	0.0857	0.1537	0.1537	0.1537
Running (g/mi)	51	0.0851	0.0851	0.0851	0.1547	0.1547	0.1547
Running (g/mi)	52	0.0846	0.0846	0.0846	0.1556	0.1556	0.1556
Running (g/mi)	53	0.0841	0.0841	0.0841	0.1566	0.1566	0.1566
Running (g/mi)	54	0.0838	0.0838	0.0838	0.1575	0.1575	0.1575
Running (g/mi)	55	0.0833	0.0833	0.0833	0.1585	0.1585	0.1585
Running (g/mi)	56	0.0833	0.0833	0.0833	0.1595	0.1595	0.1595
Running (g/mi)	57	0.0832	0.0832	0.0832	0.1602	0.1602	0.1602
Running (g/mi)	58	0.0834	0.0834	0.0834	0.1612	0.1612	0.1612
Running (g/mi)	59	0.0832	0.0832	0.0832	0.1620	0.1620	0.1620
Running (g/mi)	60	0.0835	0.0835	0.0835	0.1630	0.1630	0.1630
Running (g/mi)	61	0.0834	0.0834	0.0834	0.1639	0.1639	0.1639
Running (g/mi)	62	0.0837	0.0837	0.0837	0.1649	0.1649	0.1649
Running (g/mi)	63	0.0837	0.0837	0.0837	0.1657	0.1657	0.1657
Running (g/mi)	64	0.0839	0.0839	0.0839	0.1665	0.1665	0.1665
Running (g/mi)	65	0.0840	0.0840	0.0840	0.1675	0.1675	0.1675

Emission Type	VOC	NOx
Cold Start (g/trip start, Light Duty Only)	0.5273	0.2177
Hot Soak Loss (g/trip end)	0.2776	-
Hot Start (g/trip start, Light Duty Only)	0.0957	0.0509

Table 9: 2030 Running, Cold Start, and Hot Soak Average Emissons Factors for "Commute" TERMs (Mobile 6.2)

Average 2030 Emission Factors (gm/mi)							
Emission Type	Speed (mph)	Arterial	Freeway	Weighted Factor VOC	Arterial	Freeway	Weighted Factor NOx
		VOC		Arterial - 60% Freeway 40%	NOx		Arterial - 60% Freeway 40%
Running (g/mi)	1	1.529	1.529	1.5287	0.313	0.313	0.3133
Running (g/mi)	2	1.529	1.529	1.5287	0.313	0.313	0.3133
Running (g/mi)	3	1.199	1.199	1.1995	0.297	0.297	0.2972
Running (g/mi)	4	0.788	0.788	0.7884	0.277	0.277	0.2771
Running (g/mi)	5	0.541	0.541	0.5413	0.265	0.265	0.2653
Running (g/mi)	6	0.449	0.443	0.4466	0.244	0.232	0.2395
Running (g/mi)	7	0.383	0.374	0.3791	0.230	0.209	0.2212
Running (g/mi)	8	0.333	0.321	0.3282	0.219	0.191	0.2076
Running (g/mi)	9	0.294	0.281	0.2888	0.210	0.178	0.1971
Running (g/mi)	10	0.263	0.248	0.2572	0.203	0.167	0.1885
Running (g/mi)	11	0.243	0.226	0.2359	0.193	0.154	0.1774
Running (g/mi)	12	0.225	0.208	0.2181	0.184	0.144	0.1680
Running (g/mi)	13	0.210	0.192	0.2030	0.177	0.135	0.1600
Running (g/mi)	14	0.197	0.179	0.1900	0.171	0.127	0.1534
Running (g/mi)	15	0.187	0.167	0.1788	0.165	0.121	0.1475
Running (g/mi)	16	0.175	0.158	0.1683	0.161	0.121	0.1448
Running (g/mi)	17	0.165	0.150	0.1593	0.156	0.122	0.1424
Running (g/mi)	18	0.156	0.143	0.1512	0.153	0.122	0.1402
Running (g/mi)	19	0.148	0.137	0.1436	0.149	0.122	0.1385
Running (g/mi)	20	0.141	0.131	0.1372	0.146	0.123	0.1368
Running (g/mi)	21	0.136	0.128	0.1326	0.144	0.123	0.1352
Running (g/mi)	22	0.131	0.124	0.1285	0.141	0.123	0.1336
Running (g/mi)	23	0.127	0.121	0.1247	0.139	0.123	0.1323
Running (g/mi)	24	0.123	0.118	0.1211	0.136	0.123	0.1312
Running (g/mi)	25	0.120	0.116	0.1181	0.135	0.124	0.1301
Running (g/mi)	26	0.116	0.113	0.1150	0.133	0.124	0.1289
Running (g/mi)	27	0.113	0.111	0.1121	0.131	0.124	0.1280
Running (g/mi)	28	0.110	0.108	0.1093	0.129	0.124	0.1271
Running (g/mi)	29	0.107	0.106	0.1070	0.128	0.124	0.1262
Running (g/mi)	30	0.105	0.104	0.1047	0.127	0.124	0.1254
Running (g/mi)	31	0.103	0.102	0.1025	0.126	0.123	0.1247
Running (g/mi)	32	0.101	0.100	0.1005	0.125	0.123	0.1239
Running (g/mi)	33	0.099	0.098	0.0984	0.124	0.123	0.1234
Running (g/mi)	34	0.097	0.096	0.0965	0.123	0.123	0.1228
Running (g/mi)	35	0.095	0.095	0.0950	0.123	0.123	0.1225
Running (g/mi)	36	0.094	0.094	0.0935	0.123	0.123	0.1227
Running (g/mi)	37	0.092	0.092	0.0923	0.124	0.124	0.1236
Running (g/mi)	38	0.091	0.091	0.0912	0.124	0.124	0.1238
Running (g/mi)	39	0.090	0.090	0.0899	0.125	0.125	0.1246
Running (g/mi)	40	0.089	0.089	0.0889	0.125	0.125	0.1247
Running (g/mi)	41	0.088	0.088	0.0882	0.126	0.126	0.1257
Running (g/mi)	42	0.087	0.087	0.0870	0.126	0.126	0.1264
Running (g/mi)	43	0.086	0.086	0.0860	0.127	0.127	0.1268
Running (g/mi)	44	0.085	0.085	0.0851	0.128	0.128	0.1277
Running (g/mi)	45	0.084	0.084	0.0841	0.128	0.128	0.1283
Running (g/mi)	46	0.083	0.083	0.0833	0.129	0.129	0.1289
Running (g/mi)	47	0.082	0.082	0.0825	0.130	0.130	0.1297
Running (g/mi)	48	0.082	0.082	0.0819	0.130	0.130	0.1304
Running (g/mi)	49	0.081	0.081	0.0810	0.131	0.131	0.1313
Running (g/mi)	50	0.080	0.080	0.0803	0.132	0.132	0.1318
Running (g/mi)	51	0.080	0.080	0.0798	0.133	0.133	0.1325
Running (g/mi)	52	0.079	0.079	0.0794	0.133	0.133	0.1334
Running (g/mi)	53	0.079	0.079	0.0791	0.134	0.134	0.1343
Running (g/mi)	54	0.078	0.078	0.0784	0.135	0.135	0.1352
Running (g/mi)	55	0.078	0.078	0.0781	0.136	0.136	0.1358
Running (g/mi)	56	0.078	0.078	0.0782	0.137	0.137	0.1367
Running (g/mi)	57	0.078	0.078	0.0782	0.138	0.138	0.1375
Running (g/mi)	58	0.078	0.078	0.0782	0.138	0.138	0.1383
Running (g/mi)	59	0.078	0.078	0.0784	0.139	0.139	0.1392
Running (g/mi)	60	0.078	0.078	0.0782	0.140	0.140	0.1398
Running (g/mi)	61	0.079	0.079	0.0787	0.141	0.141	0.1408
Running (g/mi)	62	0.079	0.079	0.0788	0.142	0.142	0.1416
Running (g/mi)	63	0.079	0.079	0.0789	0.142	0.142	0.1423
Running (g/mi)	64	0.079	0.079	0.0790	0.143	0.143	0.1433
Running (g/mi)	65	0.079	0.079	0.0791	0.144	0.144	0.1439

Emission Type	VOC	NOx
Cold Start (g/trip start, Light Duty Only)	0.4640	0.1565
Hot Soak Loss (g/trip end)	0.2055	-
Hot Start (g/trip start, Light Duty Only)	0.0855	0.0383

Exhibit - 3
VOC MOBILE6.2 RUNNING EMISSION RATES
COMMUTE STREAM
FOR 2009, 2010, 2020 AND 2030
WEIGHTED AVEARGE of ARTERIAL & FREEWAY

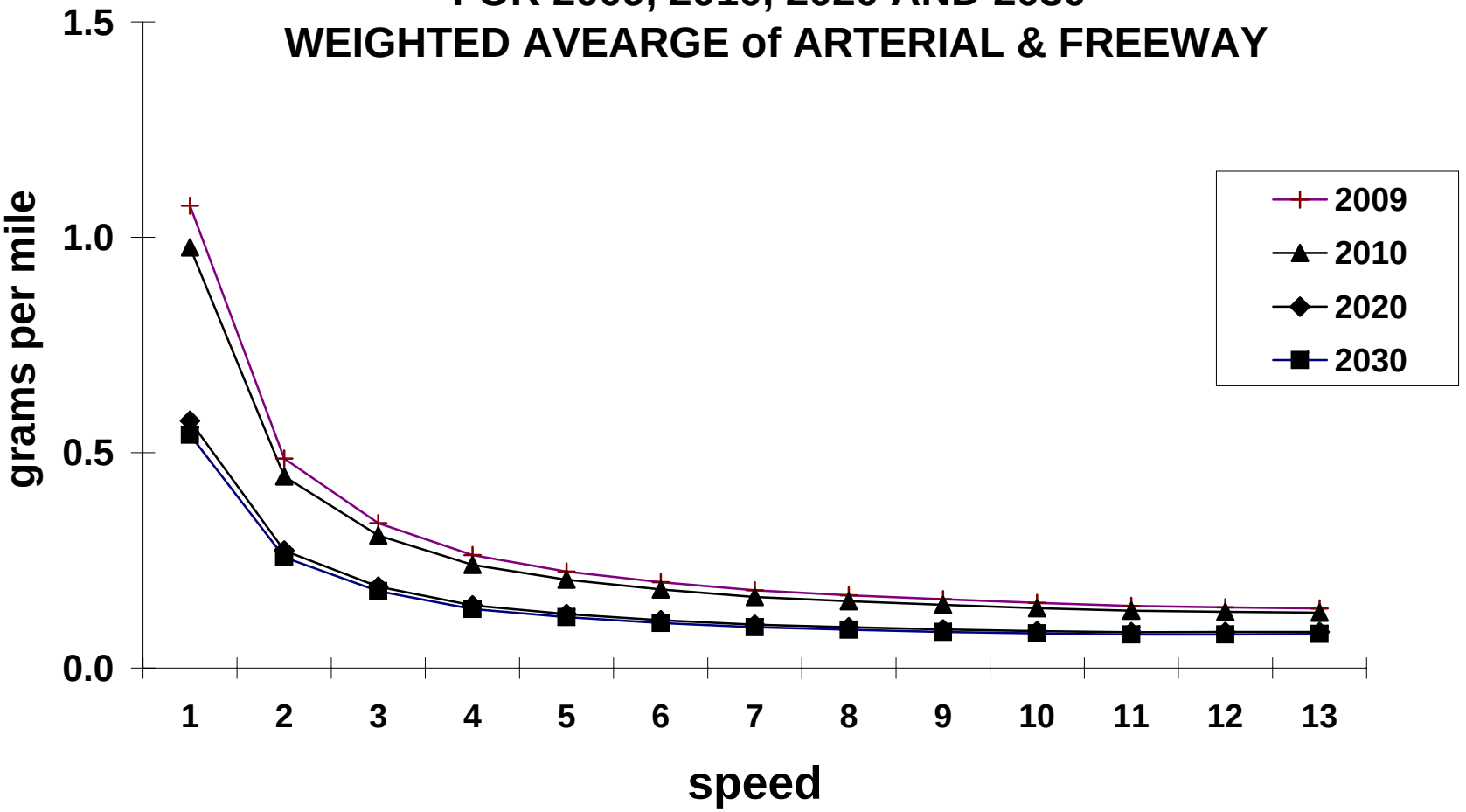


Exhibit - 4
NOx MOBILE6.2 RUNNING EMISSION RATES
COMMUTE STREAM
FOR 2009, 2010, 2020 AND 2030
WEIGHTED AVEARGE of ARTERIAL & FREEWAY

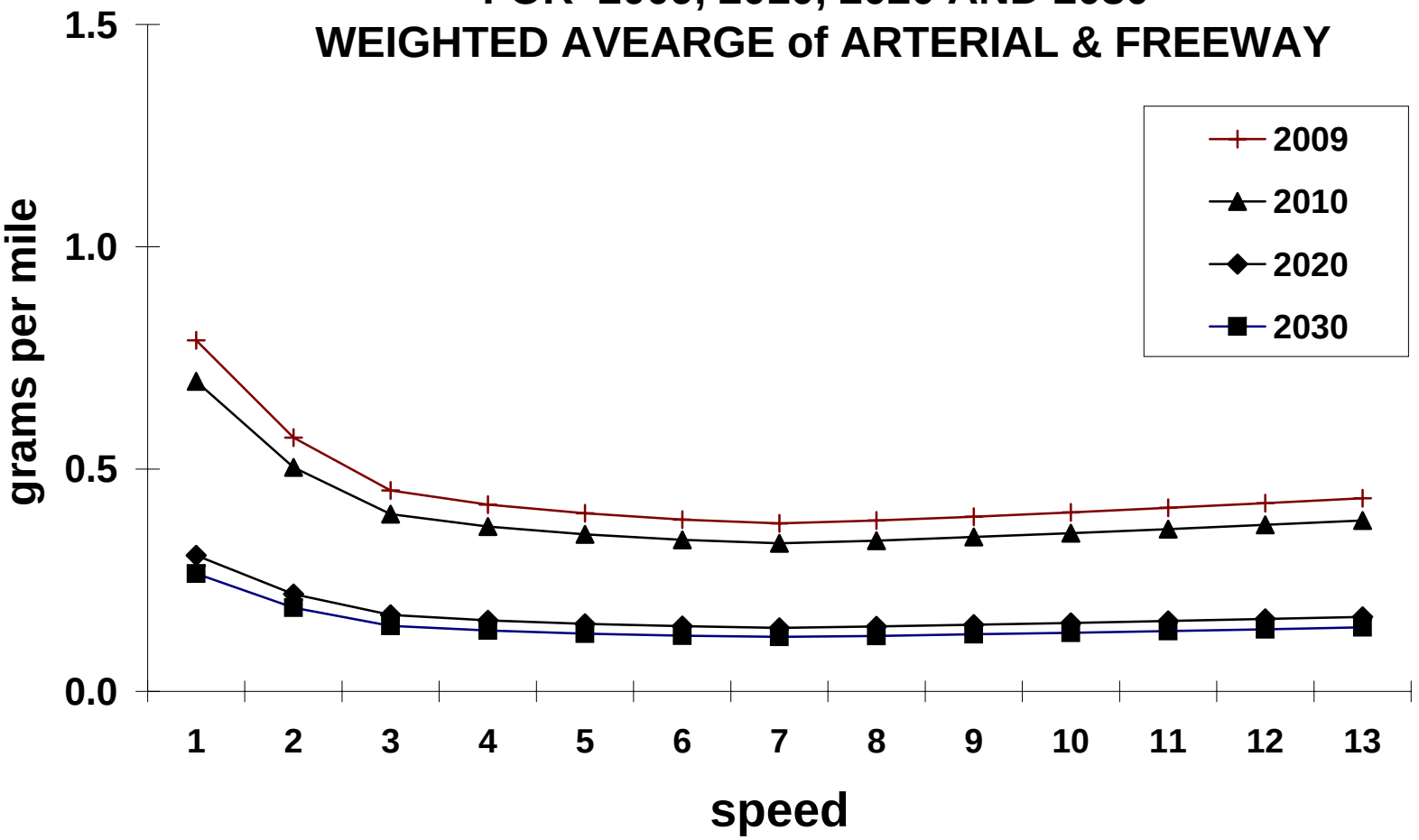


Table - 10 Idling Emissions Factors

(Mobile 6.2)

Vehicle Type	2010			2020			2030		
	VOC (g/hr)	NOx (g/hr)	PM2.5 (g/hr)	VOC (g/hr)	NOx (g/hr)	PM2.5 (g/hr)	VOC (g/hr)	NOx (g/hr)	PM2.5 (g/hr)
LDGV	1.1688	2.3925	-	0.5313	0.9000	-	0.4563	0.7300	-
LDGT12	1.2500	2.1900	-	0.7175	0.8813	-	0.6850	0.7863	-
LDGT34	1.9950	3.0913	-	0.9838	1.3038	-	0.8650	1.1038	-
HDGV	14.3938	4.5063	-	6.1063	1.1400	-	5.1125	0.3263	-
LDDV	0.6225	0.8638	-	0.2925	0.1625	-	0.2575	0.1113	-
LDDT	1.7250	2.0675	-	0.4288	0.3100	-	0.3775	0.2413	-
HDDV	3.1125	32.1350	0.9841	1.8663	6.5875	0.9237	1.6975	1.9863	0.9237
MC	20.2563	1.5825	-	20.2288	1.5825	-	20.2288	1.5825	-
Avg. for all vehicles	1.8401	4.2763	-	1.0011	1.3492	-	0.9213	0.9040	-

Notes:

1- NOx & VOC Average rates for all vehicles is weighted by the VMT percentages

2- EPA Mobile 6 guidance provides instructions for estimating PM2.5 idling rates only for heavy duty vehicles

3- PM average shown in the above table are based on the average of three jurisdictions. (District of Columbia, Fairfax County, Montgomery County)

Also for use in the emissions reduction calculations average weighted speed by time period are shown in Table 13 below. The 24 hour regional average weighted speed is 41 miles per hour and should be used for TERMs affecting the entire traffic stream, where site-specific speed data are not available. Please express reductions of VOC and NOx for all years in both kilograms per day and tons per day using a conversion factor of .0011 (# of kg reduced x .0011 = # of tons reduced).

Table 11: Average Weighted Speeds by Hour

Time	Speed (mph)
12-1	48
1-2	49
2-3	49
3-4	49
4-5	48
5-6	45
6-7	41
7-8	38
8-9	39
9-10	41
10-11	43
11-12	42
12-1 PM	40
1-2 PM	42
2-3 PM	42
3-4 PM	41
4-5 PM	40
5-6 PM	39
6-7 PM	40
7-8 PM	42
8-9 PM	43
9-10 PM	44
10-11 PM	45
11-12 MID	45
24 Hour Avg	41

Table 12: Mobile 6 Vehicle Classifications		
Number	***Abbreviation***	***Description***
1	LDGV	Light-Duty Gasoline Vehicles (Passenger Cars)
2	LDGT1	Light-Duty Gasoline Trucks 1 (0-6,000 lbs. GVWR, 0-3,750 lbs. LVW)
3	LDGT2	Light-Duty Gasoline Trucks 2 (0-6,000 lbs. GVWR, 3,751-5,750 lbs. LVW)
4	LDGT3	Light-Duty Gasoline Trucks 3 (6,001-8,500 lbs. GVWR, 0-5,750 lbs. ALVW)
5	LDGT4	Light-Duty Gasoline Trucks 4 (6,001-8,500 lbs. GVWR, 5,751 lbs. and greater ALVW)
6	HDGV2b	Class 2b Heavy-Duty Gasoline Vehicles (8,501-10,000 lbs. GVWR)
7	HDGV3	Class 3 Heavy-Duty Gasoline Vehicles (10,001-14,000 lbs. GVWR)
8	HDGV4	Class 4 Heavy-Duty Gasoline Vehicles (14,001-16,000 lbs. GVWR)
9	HDGV5	Class 5 Heavy-Duty Gasoline Vehicles (16,001-19,500 lbs. GVWR)
10	HDGV6	Class 6 Heavy-Duty Gasoline Vehicles (19,501-26,000 lbs. GVWR)
11	HDGV7	Class 7 Heavy-Duty Gasoline Vehicles (26,001-33,000 lbs. GVWR)
12	HDGV8a	Class 8a Heavy-Duty Gasoline Vehicles (33,001-60,000 lbs. GVWR)
13	HDGV8b	Class 8b Heavy-Duty Gasoline Vehicles (>60,000 lbs. GVWR)
14	LDDV	Light-Duty Diesel Vehicles (Passenger Cars)
15	LDDT12	Light-Duty Diesel Trucks 1and 2 (0-6,000 lbs. GVWR)
16	HDDV2b	Class 2b Heavy-Duty Diesel Vehicles (8,501-10,000 lbs. GVWR)
17	HDDV3	Class 3 Heavy-Duty Diesel Vehicles (10,001-14,000 lbs. GVWR)
18	HDDV4	Class 4 Heavy-Duty Diesel Vehicles (14,001-16,000 lbs. GVWR)
19	HDDV5	Class 5 Heavy-Duty Diesel Vehicles (16,001-19,500 lbs. GVWR)
20	HDDV6	Class 6 Heavy-Duty Diesel Vehicles (19,501-26,000 lbs. GVWR)
21	HDDV7	Class 7 Heavy-Duty Diesel Vehicles (26,001-33,000 lbs. GVWR)
22	HDDV8a	Class 8a Heavy-Duty Diesel Vehicles (33,001-60,000 lbs. GVWR)
23	HDDV8b	Class 8b Heavy-Duty Diesel Vehicles (>60,000 lbs. GVWR)
24	MC	Motorcycles (Gasoline)
25	HDGB	Gasoline Buses (School, Transit and Urban)
26	HDDBT	Diesel Transit and Urban Buses
27	HDDBS	Diesel School Buses
28	LDDT34	Light-Duty Diesel Trucks 3 and 4 (6,001-8,500 lbs. GVWR)

General Assumptions

The detailed assumptions for the each TERMs varies as per the nature of the TERM. However, some of the assumptions are common to the all the TERMs. Such assumptions included 2010 travel conditions, regional average emissions factors, regional average one way trip length of 15.5 miles etc.

Following tables shows regional data (VT & VMT by purpose, year) obtained from the travel demand model and some of the generic assumptions are the being used for the TERM analysis.

Table 13- Daily Regional Home Based Work Purpose Mode Analysis by Year

YEAR	HBW MOTORIZED PERSON	TOTAL HBW AUTO PSN	TOTAL HBW AUTO DRV	HBW CAROCC	HBW TRANSIT	HBW TRANSIT (%)
2002	4,206,415	3,615,426	3,216,654	1.120	590,989	14.00%
2009	4,772,858	4,124,520	3,670,545	1.120	648,338	13.60%
2010	4,851,013	4,203,391	3,709,888	1.130	647,622	13.40%
2020	5,520,205	4,753,117	4,158,222	1.140	767,088	13.90%
2030	5,996,319	5,155,786	4,508,419	1.140	840,533	14.00%

Table 14- Daily Regional Analysis by Year for all Trip Purposes

YEAR	TOTAL MOTORIZED PERSON	TOTAL AUTO PSN	TOTAL AUTO DRV	TOTAL CAROCC	TOTAL TRANSIT	TRANSIT (%)
2002	22,920,300	21,861,379	17,213,549	1.270	1,058,921	4.60%
2009	25,907,167	24,752,086	19,577,073	1.260	1,155,081	4.50%
2010	26,308,384	25,143,074	19,850,071	1.270	1,165,310	4.40%
2020	29,745,815	28,327,800	22,392,813	1.270	1,418,015	4.80%
2030	32,165,139	30,618,315	24,273,695	1.260	1,546,824	4.80%

**Note: Starting in 2010, all HOV facilities are HOV3+*

Table 15- Daily Regional Vehicle Trips by Purpose by Year

YEAR	WORK AND NON-WORK AUTO DRV	TRUCKS (Med + Hvy)	MISC + THRU TRIPS	TOTAL VEH. TRIPS	TOTAL VMT
2002	17,214,123	473,046	725,932	19,551,790	146,488,410
2009	19,577,642	533,716	828,730	22,213,151	161,839,018
2010	19,850,741	543,141	845,071	22,530,781	165,420,513
2020	22,393,442	621,888	972,961	25,447,683	187,484,318
2030	24,274,327	686,483	1,076,608	27,626,025	199,201,305

Source: 2007 CLRP / FY2008-2013 TIP CLRP air quality conformity document

Cost-Effectiveness Estimation Procedure

The staff has gathered cost information from the various agencies and cost figures are in today's dollars. The TERMs project cost is expressed in terms of TIP cost and cost per year. The total cost of project thus includes capital cost, operating cost and maintenance cost. The TIP cost consists of capital cost, and three year of operating cost and maintenance cost. For the cost-effectiveness annualized cost has been used. The annualized cost is total cost per year. The following formula shows the procedure.

Consistency between programming agencies in assumptions and methodology for effectiveness estimations is critical for meaningful comparison of different projects around the region. Therefore, please use the following guidelines when calculating the cost-effectiveness of your TERM projects. When determining the cost-effectiveness, capital costs, operating costs, and revenues should be considered. Projects should be expressed in dollars per ton of reduction for both VOC and NOx. Please use the following series of formulas to compute cost-effectiveness:

A. Total Project Cost = Capital Costs + Operating Costs - (Revenues + Resale Value, if relevant/significant)

B. Cost Per Day = $\frac{\text{Total Project Cost}}{\text{Benefit Days per Year X Lifespan}}$

C. Cost Per Ton = Cost Per Day / Tons VOC or NOx Reduced Per Day

Where:

Benefit Days per Year = 250 for projects mostly related to work travel (i.e., commuter lots, ridesharing)

365 for projects relating to all travel (e.g. roadway signal systems)

Lifespan[1] =
30 years for park and ride lot (construction)
100 years for park and ride lot land (right-of-way)
20 years for roadways
30 years for bridges
12 years for roadway signal systems
20 years for rail signalization
35 years for structures (i.e., garages)
12 years for buses
35 years for railcars
30 years for locomotives
10 years for sidewalks

Travel demand model assumptions:

[1] These lifespan values were provided by various transit and highway agencies and consultants. If lifespan values necessary for the cost/benefit calculation of any TERM projects are not provided, please contact Daivamani Sivasailam at (202) 962-3226.

Average one-way trip length for commute trips = 15.5 miles
Average HBW vehicle occupancy (2009) = 1.12

Section II

The EPA guidance on fine particulate matter (PM 2.5) emissions requires the region to estimate direct PM 2.5 and NOx emissions as a PM2.5 precursor. In addition these emissions estimations are required on an annual basis and not on a daily basis as in the case of ozone precursors. Direct PM2.5 emission rates are constant for all speeds and are expressed in grams/mile. Direct PM 2.5 has no start-up, soak or other evaporative emissions associated with them. However, PM2.5 NOx precursor is similar to ozone precursor NOx, and has start-up emissions in addition to running emissions.

The recommended methodology to estimate annual direct PM2.5 and NOx emissions as a PM2.5 precursor is to use an average of the three seasonal emission rates (Jan–April, May–September, & October-December) and apply these average rates to annual VT and VMT to estimate the annual direct PM2.5 and precursor NOx emissions. Direct PM2.5 emissions rates and average seasonal precursor NOx emissions rates for the analysis years 2010, 2020, & 2030 are shown in Tables 18, 19, 20, & 21

Examples of commuter TERM analysis with PM2.5 and NOx emissions as PM2.5 precursors are shown on the following pages.

Table-16

Direct PM2.5 Emissions Factors

Scenario	Season	Speed	Facility	Total PM
2010 PM25 - Auto Access	Jan-Apr	35.0	Arterial	0.0115
	May-Sep	35.0	Arterial	0.0115
	Oct-Dec	35.0	Arterial	0.0114
			Average	**0.0115**
2020 PM25 - Auto Access	Jan-Apr	35.0	Arterial	0.0113
	May-Sep	35.0	Arterial	0.0113
	Oct-Dec	35.0	Arterial	0.0113
			Average	**0.0113**
2030 PM25 - Auto Access	Jan-Apr	35.0	Arterial	0.0113
	May-Sep	35.0	Arterial	0.0113
	Oct-Dec	35.0	Arterial	0.0113
			Average	**0.0113**

Table 17: PM2.5 Precursor NOx - 2010 Running, Cold Start Average Emissions Factors for Commute TERMs (Mobile 6.2) (Seasonal Average)

Speed	Weighted Factor Jan-Apr NOx (grams/mile)	Weighted Factor May-Sep NOx (grams/mile)	Weighted Factor Oct-Dec NOx (grams/mile)	Average of Seasonal Factors (grams/mile)
1	0.9968	0.7555	0.8367	**0.8630**
2	0.9968	0.7555	0.8367	**0.8630**
3	0.9532	0.7201	0.8006	**0.8246**
4	0.8988	0.6757	0.7548	**0.7764**
5	0.8659	0.6492	0.7274	**0.7475**
6	0.7931	0.5914	0.6660	**0.6835**
7	0.7410	0.5501	0.6219	**0.6377**
8	0.7018	0.5189	0.5891	**0.6033**
9	0.6714	0.4949	0.5632	**0.5765**
10	0.6472	0.4755	0.5429	**0.5552**
11	0.6143	0.4495	0.5151	**0.5263**
12	0.5868	0.4280	0.4920	**0.5023**
13	0.5637	0.4097	0.4725	**0.4820**
14	0.5439	0.3940	0.4557	**0.4645**
15	0.5266	0.3805	0.4412	**0.4494**
16	0.5197	0.3746	0.4353	**0.4432**
17	0.5135	0.3694	0.4302	**0.4377**
18	0.5080	0.3648	0.4257	**0.4328**
19	0.5033	0.3606	0.4215	**0.4285**
20	0.4988	0.3568	0.4178	**0.4245**
21	0.4948	0.3535	0.4145	**0.4209**
22	0.4914	0.3504	0.4115	**0.4178**
23	0.4880	0.3475	0.4089	**0.4148**
24	0.4851	0.3448	0.4063	**0.4121**
25	0.4824	0.3426	0.4040	**0.4097**
26	0.4798	0.3402	0.4019	**0.4073**
27	0.4776	0.3382	0.4001	**0.4053**
28	0.4754	0.3361	0.3982	**0.4032**
29	0.4734	0.3343	0.3966	**0.4014**
30	0.4716	0.3327	0.3950	**0.3998**
31	0.4704	0.3314	0.3940	**0.3986**
32	0.4693	0.3302	0.3931	**0.3975**
33	0.4684	0.3291	0.3923	**0.3966**
34	0.4674	0.3280	0.3915	**0.3956**
35	0.4666	0.3272	0.3907	**0.3948**
36	0.4690	0.3286	0.3929	**0.3968**
37	0.4711	0.3302	0.3948	**0.3987**
38	0.4732	0.3313	0.3965	**0.4003**
39	0.4752	0.3330	0.3983	**0.4022**
40	0.4772	0.3342	0.4000	**0.4038**
41	0.4800	0.3362	0.4026	**0.4063**
42	0.4829	0.3382	0.4048	**0.4086**
43	0.4858	0.3401	0.4072	**0.4110**
44	0.4881	0.3415	0.4096	**0.4131**
45	0.4906	0.3434	0.4116	**0.4152**
46	0.4936	0.3455	0.4143	**0.4178**
47	0.4966	0.3474	0.4167	**0.4202**
48	0.4994	0.3494	0.4191	**0.4226**
49	0.5022	0.3512	0.4213	**0.4249**
50	0.5045	0.3530	0.4235	**0.4270**
51	0.5077	0.3551	0.4263	**0.4297**
52	0.5108	0.3573	0.4292	**0.4324**
53	0.5138	0.3594	0.4315	**0.4349**
54	0.5168	0.3614	0.4340	**0.4374**
55	0.5195	0.3634	0.4364	**0.4398**
56	0.5227	0.3656	0.4392	**0.4425**
57	0.5259	0.3677	0.4421	**0.4452**
58	0.5292	0.3698	0.4446	**0.4479**
59	0.5320	0.3718	0.4471	**0.4503**
60	0.5347	0.3738	0.4496	**0.4527**
61	0.5382	0.3761	0.4525	**0.4556**
62	0.5411	0.3784	0.4552	**0.4582**
63	0.5440	0.3804	0.4577	**0.4607**
64	0.5472	0.3821	0.4603	**0.4632**
65	0.5501	0.3842	0.4627	**0.4657**

	Jan-Apr	May-Sep	Oct-Dec	Average
Cold Start (g/trip start, Light Duty Only)	0.7816	0.5441	0.6700	**0.6652**

Table 18: PM2.5 Precursor NOx - 2020 Running, Cold Start Average Emissions Factors for Commute TERMs (Mobile 6.2) (Seasonal Average)

Speed	Weighted Factor Jan-Apr NOx (grams/mile)	Weighted Factor May-Sep NOx (grams/mile)	Weighted Factor Oct-Dec NOx (grams/mile)	Average of Seasonal Factors (grams/mile)
1	0.2483	0.2042	0.2288	**0.2271**
2	0.2483	0.2042	0.2288	**0.2271**
3	0.2377	0.1946	0.2191	**0.2171**
4	0.2243	0.1826	0.2068	**0.2046**
5	0.2163	0.1754	0.1996	**0.1971**
6	0.1979	0.1594	0.1823	**0.1799**
7	0.1846	0.1480	0.1703	**0.1676**
8	0.1747	0.1395	0.1611	**0.1584**
9	0.1671	0.1328	0.1539	**0.1513**
10	0.1610	0.1275	0.1483	**0.1456**
11	0.1526	0.1204	0.1405	**0.1378**
12	0.1456	0.1144	0.1341	**0.1314**
13	0.1398	0.1094	0.1287	**0.1260**
14	0.1348	0.1051	0.1240	**0.1213**
15	0.1305	0.1014	0.1199	**0.1173**
16	0.1288	0.0998	0.1185	**0.1157**
17	0.1273	0.0984	0.1170	**0.1143**
18	0.1260	0.0972	0.1158	**0.1130**
19	0.1248	0.0961	0.1147	**0.1119**
20	0.1236	0.0951	0.1137	**0.1108**
21	0.1227	0.0941	0.1129	**0.1099**
22	0.1219	0.0934	0.1121	**0.1091**
23	0.1211	0.0927	0.1113	**0.1083**
24	0.1203	0.0919	0.1107	**0.1077**
25	0.1198	0.0913	0.1099	**0.1070**
26	0.1191	0.0906	0.1095	**0.1064**
27	0.1186	0.0902	0.1090	**0.1059**
28	0.1181	0.0896	0.1086	**0.1054**
29	0.1177	0.0892	0.1081	**0.1050**
30	0.1172	0.0887	0.1077	**0.1045**
31	0.1169	0.0883	0.1074	**0.1042**
32	0.1167	0.0880	0.1073	**0.1040**
33	0.1164	0.0877	0.1070	**0.1037**
34	0.1162	0.0874	0.1068	**0.1035**
35	0.1160	0.0871	0.1066	**0.1032**
36	0.1167	0.0876	0.1072	**0.1038**
37	0.1173	0.0881	0.1078	**0.1044**
38	0.1179	0.0885	0.1084	**0.1049**
39	0.1185	0.0889	0.1089	**0.1054**
40	0.1189	0.0892	0.1094	**0.1058**
41	0.1198	0.0898	0.1102	**0.1066**
42	0.1206	0.0904	0.1109	**0.1073**
43	0.1214	0.0909	0.1117	**0.1080**
44	0.1220	0.0914	0.1124	**0.1086**
45	0.1227	0.0919	0.1130	**0.1092**
46	0.1235	0.0926	0.1137	**0.1099**
47	0.1244	0.0931	0.1145	**0.1107**
48	0.1252	0.0937	0.1153	**0.1114**
49	0.1260	0.0942	0.1159	**0.1120**
50	0.1267	0.0948	0.1166	**0.1127**
51	0.1276	0.0954	0.1176	**0.1135**
52	0.1286	0.0961	0.1184	**0.1143**
53	0.1294	0.0967	0.1192	**0.1151**
54	0.1302	0.0973	0.1199	**0.1158**
55	0.1310	0.0979	0.1208	**0.1166**
56	0.1319	0.0987	0.1216	**0.1174**
57	0.1329	0.0993	0.1224	**0.1182**
58	0.1338	0.1000	0.1234	**0.1191**
59	0.1345	0.1006	0.1241	**0.1198**
60	0.1354	0.1012	0.1249	**0.1205**
61	0.1364	0.1019	0.1259	**0.1214**
62	0.1373	0.1025	0.1268	**0.1222**
63	0.1382	0.1031	0.1275	**0.1229**
64	0.1391	0.1037	0.1283	**0.1237**
65	0.1398	0.1043	0.1291	**0.1244**

	Jan-Apr	May-Sep	Oct-Dec	Average
Cold Start (g/trip start, Light Duty Only)	0.1968	0.1414	0.1806	**0.1729**

Table 19: PM2.5 Precursor NOx - 2030 Running, Cold Start Average Emissions Factors for Commute TERMs (Mobile 6.2)
(Seasonal Average)

Speed	Weighted Factor Jan-Apr NOx (grams/mile)	Weighted Factor May-Sep NOx (grams/mile)	Weighted Factor Oct-Dec NOx (grams/mile)	Average of Seasonal Factors (grams/mile)
1	0.2093	0.1773	0.1994	**0.1953**
2	0.2093	0.1773	0.1994	**0.1953**
3	0.2003	0.1690	0.1909	**0.1867**
4	0.1893	0.1586	0.1803	**0.1760**
5	0.1826	0.1522	0.1740	**0.1696**
6	0.1668	0.1384	0.1590	**0.1547**
7	0.1556	0.1283	0.1483	**0.1441**
8	0.1473	0.1209	0.1403	**0.1362**
9	0.1408	0.1150	0.1340	**0.1299**
10	0.1355	0.1103	0.1290	**0.1249**
11	0.1284	0.1042	0.1223	**0.1183**
12	0.1225	0.0990	0.1166	**0.1127**
13	0.1175	0.0945	0.1118	**0.1079**
14	0.1132	0.0907	0.1077	**0.1039**
15	0.1096	0.0875	0.1042	**0.1004**
16	0.1081	0.0861	0.1028	**0.0990**
17	0.1068	0.0850	0.1015	**0.0978**
18	0.1057	0.0838	0.1006	**0.0967**
19	0.1047	0.0829	0.0996	**0.0958**
20	0.1038	0.0820	0.0987	**0.0948**
21	0.1032	0.0812	0.0980	**0.0941**
22	0.1023	0.0805	0.0974	**0.0934**
23	0.1017	0.0798	0.0967	**0.0927**
24	0.1011	0.0793	0.0961	**0.0921**
25	0.1006	0.0787	0.0956	**0.0916**
26	0.1002	0.0781	0.0952	**0.0911**
27	0.0997	0.0777	0.0947	**0.0907**
28	0.0992	0.0772	0.0943	**0.0903**
29	0.0988	0.0768	0.0939	**0.0898**
30	0.0985	0.0764	0.0936	**0.0895**
31	0.0982	0.0761	0.0934	**0.0892**
32	0.0980	0.0759	0.0932	**0.0890**
33	0.0978	0.0756	0.0930	**0.0888**
34	0.0976	0.0752	0.0927	**0.0885**
35	0.0974	0.0751	0.0925	**0.0884**
36	0.0981	0.0753	0.0931	**0.0888**
37	0.0986	0.0759	0.0937	**0.0894**
38	0.0991	0.0763	0.0942	**0.0898**
39	0.0996	0.0766	0.0947	**0.0903**
40	0.1000	0.0771	0.0952	**0.0908**
41	0.1008	0.0774	0.0959	**0.0914**
42	0.1015	0.0779	0.0966	**0.0920**
43	0.1021	0.0784	0.0972	**0.0926**
44	0.1028	0.0789	0.0978	**0.0932**
45	0.1034	0.0794	0.0984	**0.0937**
46	0.1041	0.0798	0.0991	**0.0944**
47	0.1049	0.0804	0.0998	**0.0950**
48	0.1056	0.0809	0.1004	**0.0956**
49	0.1063	0.0814	0.1011	**0.0963**
50	0.1070	0.0819	0.1018	**0.0969**
51	0.1078	0.0826	0.1026	**0.0976**
52	0.1085	0.0831	0.1034	**0.0984**
53	0.1093	0.0838	0.1041	**0.0991**
54	0.1101	0.0841	0.1049	**0.0997**
55	0.1108	0.0847	0.1055	**0.1003**
56	0.1116	0.0853	0.1063	**0.1010**
57	0.1124	0.0859	0.1071	**0.1018**
58	0.1133	0.0865	0.1079	**0.1025**
59	0.1141	0.0870	0.1086	**0.1032**
60	0.1148	0.0875	0.1093	**0.1039**
61	0.1155	0.0881	0.1100	**0.1045**
62	0.1163	0.0888	0.1108	**0.1053**
63	0.1173	0.0893	0.1116	**0.1061**
64	0.1180	0.0899	0.1124	**0.1068**
65	0.1186	0.0904	0.1131	**0.1074**

	Jan-Apr	May-Sep	Oct-Dec	Average
Cold Start (g/trip start, Light Duty Only)	0.1410	0.1042	0.1340	**0.1264**

EXAMPLES OF A COMMUTING VEHICLE TRIP TERM ANALYSIS

Example-1: Construction of 1300 additional Parking Spaces at a Metro Station

Description: 1,300 parking spaces will be constructed at a Metro station. The garages at Metrorail stations are currently experiencing full utilization of all existing parking capacity on a daily basis.

Analysis Tool: Sketch Planning

Assumptions:

- To build 1,300 additional parking spaces at a Metro station to increase capacity at a station. Cost to construct the garage is assumed to be $2.117 million dollars. Life span: 30 years
- New trips generated due to additional parking spaces will be 2/3 of new spaces.
- Average one-way trip length reduced will be 15.5 miles.
- No cold start benefit, as autos will drive to station.
- NOx & VOC estimation using Mobile 6.2 Emissions factors.

Summary Impacts (2010):

Daily VT Reduction:	0	VT
Daily VMT Reduction:	26,846	VMT
Daily NOx Reductions:	0.0100	tons/day
Daily VOC Reductions:	0.0046	tons/day
Cost-Effectiveness (NOx)	28,917	$/ton
Cost-Effectiveness (VOC)	63,282	$/ton

Emission Impacts for (2010):

1,300 additional spaces

Trip length: 15.5 mile x 2 = 31 mi round trip

2/3 new trips: 2/3 x 1300 = 866 trips

866 x 31 miles = 26,846 VMT

Daily NOx & VOC emission reductions (2010):

NOx Estimation

Cold Start	0	x	0.518 grams / 1 trip	x	1 ton / 907,185 grams	=	0.0000	tons
Running	26,846	x	0.3392 grams / 1 mile	x	1 ton / 907185 grams	=	0.0108	tons
					Total		0.0100	tons

VOC Estimation

Cold Start + Hot soak	0	x	1.5015 grams / 1 trip	x	1 ton / 907,185 grams	=	0.0000	tons
Running	26,846	x	0.155 grams / 1 mile	x	1 ton / 907185 grams	=	0.0046	tons
					Total		0.0046	tons

Methodology for PM2.5 emissions estimation:

Direct PM2.5

Direct PM2.5 emissions factors are available for three seasons (Jan-April, May-Sept., Oct.-Dec). Estimation of direct PM2.5 emissions can be carried out on a seasonal or an annual basis. As PM2.5 seasonal emission factors do not vary significantly, the average of these four seasonal factors is used to estimate annual PM emissions. Please refer Table -14.

The travel demand model and postprocessor use average annual weekday traffic (AAWDT) for analysis. Hence for the analysis of TERMs which are effective 7-days a week, VT and VMT for such TERMs need to be adjusted to reflect average daily traffic (AADT). A factor of 0.95 is used to convert AAWDT volume to AADT volume. For the TERMs that affect only commuter traffic (effective only on weekdays) no adjustment is needed as the VT and VMT reflect average weekday traffic. The formulae for annual direct PM2.5 estimation for these TERMs are shown as below.

For the TERMs effective 365 days:

Direct PM2.5 Emissions = VMT x average of seasonal emissions factors x weekly VMT adjustment factor x days/year.

Running 26,846 x 0.0115 grams / 1 mi x 1 ton / 907,185 grams x 0.95 x 365 days = 0.1180 tons

For the TERMs effective only on weekdays:

Direct PM2.5 Emissions = VMT x average of seasonal emissions factors x days/year.

Running 26,846 x 0.0115 grams / 1 mi x 1 ton / 907,185 grams x 250 days = 0.0851 Tons

NOx Emissions as a PM 2.5 Precursor:

As conformity assessment criteria for the PM2.5 standards include NOx emissions as a PM 2.5 precursor, we are also required to estimate NOx emissions on seasonal/annual basis. For TERM analysis we follow the annual approach similar to the PM2.5 emission estimation as described above. Emission factors corresponding to 40 mph speed are used to estimate cold start and running NOx precursor emissions. Tables 15-17 show the average of the NOx seasonal emissions factors for years 2010, 2020 and 2030.

For the TERMs effective 365 days:

Cold Start	0	x	0.6652 grams / 1 trip	x	1 ton / 907,185 grams	x	0.95	x	365	=	0.0000	Tons
Running	26,846	x	0.4038 grams / 1 mi	x	1 ton / 907,185	x	0.95	x	365	=	4.1435	Tons
					Total						4.1435	Tons

For the TERMs effective only on weekdays:

Cold Start	0	x	0.6652 grams / 1 trip	x	1 ton / 907,185 grams	x	250	=	0.0000	Tons
Running	26,846	x	0.4038 grams / 1 mi	x	1 ton / 907,185	x	250	=	2.9874	Tons
					Total				2.9874	Tons

Cost-Effectiveness (2010):

Garage cost (assumed): $2.177 million

$$\text{NOx} = \frac{\$2.177 \text{ million}}{250 \text{ days} \times 30 \text{ yr} \times 0.010 \text{ t/d}} = \$28{,}910/\text{ ton}$$

$$\text{VOC} = \frac{\$2.177 \text{ million}}{250 \text{ days} \times 30 \text{ yr} \times 0.046 \text{ t/d}} = \$63{,}282/\text{ ton}$$

$$\text{PM2.5} = \frac{\$2.177 \text{ million}}{30 \text{ yr} \times 0.1180 \text{ t/yr}} = \$615{,}000/\text{ ton}$$

Example-2: Implement 10 Neighborhood Circulator Bus Service to Metrorail

Description:
The circulator bus service would operate over an expanded period from 5:30 am to 10:00 am and from 3:00 pm to 8:00 pm on weekdays.

Analysis Tool: Sketch Planning

Assumptions:

- Sketch planning is used as an analysis tool
- Two buses per neighborhood will be required at a cost of $150,000 per bus, with a useful life of 12 years.
- Anticipated ridership is 150 riders per day per circulator, for a total of 1500 additional transit riders per day.
- Average trip length = 15.5 miles
- The stations where circulator service could be implemented include:

  - ✓ Cheverly station
  - ✓ Deanwood station
  - ✓ Minnesota Ave. station
  - ✓ Vienna/Fairfax – GMU station
  - ✓ Dunn Loring – Merrifield station
  - ✓ Greenbel station
  - ✓ Van Dorn Street station
  - ✓ Addison Road station
  - ✓ Glenmont station
  - ✓ Rhode Island Ave. station
  - ✓ New Carrolton

Summary of Impacts (2010)

Daily VT Reduction:	3,000	VT
Daily VMT Reduction:	46,500	VMT
Daily NOx Reductions:	0.0191	tons/day
Daily VOC Reductions:	0.0129	tons/day
Cost-Effectiveness (NOx)	235,604	$/ton
Cost-Effectiveness (VOC)	348,560	$/ton

Emission Analyis (2010)

Anticipated ridership = 150 riders/day/circulator

150 * 10 = 1500 additional riders
1 rider = 2 trips
1,500 * 2 = 3000 VT

VMT: 3000 x 15.5 = 46500 VMT

Daily Emissions Reduction

NOx Estimation

Cold Start	3000	x	0.5181 grams / 1 trip	x	1 ton / 907,185 grams	=	0.0017	tons
Running	46,500	x	0.3392 grams / 1 mile	x	1 ton / 907185 grams	=	0.0174	tons
					Total		0.0191	tons

VOC Estimation

Cold Start + Hot soak	3000	x	1.5015 grams / 1 trip	x	1 ton / 907,185 grams	=	0.0050	tons
Running	46,500	x	0.1550 grams / 1 mile	x	1 ton / 907185 grams	=	0.0079	tons
					Total		0.0129	tons

Cost Analysis:

Annual Operating Costs ($100,000/bus): $1,000,000
Capital Costs: $150,000/bus x 10 = $ 1,500,000
Annualized cost: $1,000,000 + $1,500,000/12 = $1,125,000
TIP Cost (2006-2011): $1,000,000 x 5 + $1,500,000 = $6,500,000

Cost-Effectiveness (2010):

Cost-effectiveness NOx	$1,125,000 / (250 x 0.0191)	=	235,604	$/ton		
Cost-effectiveness VOC	$1,125,000 / (250 x 0.0129)	=	348,560	$/ton		

Direct PM2.5

For the TERMs effective 365 days:

Direct PM2.5 Emissions = VMT x average of seasonal emissions factors x weekly VMT adjustment factor x days/year.

Running 46,500 x 0.0115 grams / 1 mi x 1 ton / 907,185 grams x 0.95 x 365 days = 0.2044 tons

For the TERMs effective only on weekdays:

Direct PM2.5 Emissions = VMT x average of seasonal emissions factors x days/year.

Running	46,500	x	0.0115 grams / 1 mi	x	1 ton / 907,185 grams	x	250 days	=	0.1474	Tons

NOx Emissions as a PM 2.5 Precursor:

For the TERMs effective 365 days:

Cold Start	3000	x	0.6652 grams / 1 trip	x	1 ton / 907,185 grams	x	365	=	0.7628	Tons
Running	46,500	x	0.4038 grams / 1 mi	x	1 ton / 907,185	x	0.95 x 365	=	7.1769	Tons
					Total				7.9397	Tons

For the TERMs effective only on weekdays:

Cold Start	3000	x	0.6652 grams / 1 trip	x	1 ton / 907,185 grams	x	250	=	0.5499	Tons
Running	46,500	x	0.4038 grams / 1 mi	x	1 ton / 907,185	x	250	=	5.1477	Tons
					Total				5.7224	Tons

Cost-Effectiveness (2010):

$$\text{PM2.5} = \frac{\$1.125 \text{ million}}{30 \text{ yr} \times 0.2044 \text{ t/yr}} = \$5{,}504{,}000/\text{ton}$$

Example-3: Bus Information Displays with Maps at Bus Stops

Description:
This measure would provide more information at 2,000 Metrobus locations.
Note: WMATA is implementing this TERM

Assumptions

- Sketch planning is used as an analysis tool
- Decrease in waiting time: 2.5 minutes
- Average daily bus ridership: 500,000
- Average daily local bus ridership: 124,000
- Program would be launched in 2008 and continue through 2009
- Average trip length: 15.5 miles

Summary Impact

Daily VT Reduction:	2,210	VT
Daily VMT Reduction:	34,255	VMT
Daily NOx Reductions:	0.0141	tons/day
Daily VOC Reductions:	0.0095	tons/day
Cost-Effectiveness (NOx)	28,474	$/ton
Cost-Effectiveness (VOC)	42,126	$/ton

Emission Analysis

Local bus average daily Ridership 124,000

Average daily WMATA bus ridership 500,000

Average daily regional bus ridership 500,000 + 124,000 = 624,000

Total daily person trips 4,400,000 (conformity) x 0.25 (HBW) = 17,600,000

Regional bus mode share percentage = 624,000/17,600,000 = 3.55 %

Assumed benefit from the system = 2.5 minute decrease in wait time.

3.55 % → 4.07% = 0.52% increase in bus mode share due to decrease in wait time

(Source: William Allen, Mode Choice Model Sensitivity Analysis, April 1993)

WMATA Buses: 500,000 (0.52%) = 2600 new trips
VT reductions: 2600 x 0.85 SOV = 2210

VMT reductions: 2210 x 15.5 miles = 34255

Daily NOx Emission Reductions (2010)

Nox Estimation

Cold Start	2210	x	0.5181 grams / 1 trip	x	1 ton / 907,185 grams	=	0.00123	tons
Running	34,255	x	0.3392 grams / 1 mile	x	1 ton / 907185 grams	=	0.0128	tons
					Total		0.0141	tons

VOC Estimation

Cold Start + Hot Soak	2210	x	1.5015 grams / 1 trip	x	1 ton / 907,185 grams	=	0.0037	tons
Running	34,255	x	0.1550 grams / 1 mile	x	1 ton / 907185 grams	=	0.0059	tons
					Total		0.0095	tons

Cost Analysis

Cost per box = $120.00
Number of boxes = 2000
Cost for 2000 display boxes = $240,000
Capital cost per car – $30,000
Operating Cost for car to change schedule = $40,000
Life of car – 6 years
Annualized cost – $240,000 / 3 years + $30,000/6 years + $40,000 = $125,000
TIP Cost: $240,000 + $30,000 + $40,000 x 2 = $350,000

Cost-Effectiveness (2010)

Cost-effectiveness NOx	$125,000 / (312 x 0.0141)	=	28,470	$/ton
Cost-effectiveness VOC	$125,000 / (312 x 0.0095)	=	42,126	$/ton

Direct PM2.5

For the TERMs effective 365 days:

Direct PM2.5 Emissions = VMT x average of seasonal emissions factors x weekly VMT adjustment factor x days/year.

Running 34255 x $\frac{0.0115 \text{ grams}}{1 \text{ mi}}$ x $\frac{1 \text{ ton}}{907{,}185 \text{ grams}}$ x 0.95 x 365 days = 0.1506 tons

For the TERMs effective only on weekdays:

Direct PM2.5 Emissions = VMT x average of seasonal emissions factors x days/year.

Running 34255 x $\frac{0.0115 \text{ grams}}{1 \text{ mi}}$ x $\frac{1 \text{ ton}}{907{,}185 \text{ grams}}$ x 250 days = 0.1086 Tons

NOx Emissions as a PM 2.5 Precursor:

For the TERMs effective 365 days:

Cold Start	2210	x	$\frac{0.6652 \text{ grams}}{1 \text{ trip}}$	x	$\frac{1 \text{ ton}}{907{,}185 \text{ grams}}$	x 365	=	0.5619	Tons
Running	34255	x	$\frac{0.4038 \text{ grams}}{1 \text{ mi}}$	x	$\frac{1 \text{ ton}}{907{,}185}$	x 0.95 x 365	=	5.2870	Tons
					Total			5.8489	Tons

For the TERMs effective only on weekdays:

Cold Start	2210	x	$\frac{0.6652 \text{ grams}}{1 \text{ trip}}$	x	$\frac{1 \text{ ton}}{907{,}185 \text{ grams}}$	x 250	=	0.4051	Tons
Running	34255	x	$\frac{0.4038 \text{ grams}}{1 \text{ mi}}$	x	$\frac{1 \text{ ton}}{907{,}185}$	x 250	=	3.8118	Tons
					Total			4.2170	Tons

Cost-Effectiveness (2010):

PM2.5 = $\frac{\$125{,}000}{0.1506 \text{ t/yr}}$ = $830,010/ ton

APPENDIX - B

TERM REPORTING INSTRUCTIONS

TERM REPORTING

Federal regulations require the timely implementation of TERMs (CMAQ funded, non-CMAQ funded and NOx mitigation measures). If the implementation of programmed TERMs falls behind schedule the regulations state "that all State and local agencies with influence over approvals of funding for TERMs [should give] maximum priority to approval or funding of TERMs over other projects within their control". To address these requirements, please provide a brief statement describing the status of each TERM programmed in previous TIPs. This applies to those projects not yet fully implemented and reported in the 'TERM Tracking Sheet' developed as part of the CLRP and TIP. Please include any changes in the scheduling or implementation of these TERMs. Your submissions will be used to update the 'TERM Tracking Sheet' for analysis years 2009, 2010, 2020 and 2030. For information purposes the latest 'TERM Tracking Sheet' included in 2008 Constrained Long range Plan (CLRP) and FY 2009-FY2014 Transportation Improvement Program (TIP) is attached.

TERM TRACKING SHEET

TRANSPORTATION EMISSION REDUCTION MEASURES

Part A - Daily Ozone Precursor Emissions

***** Project Category: TR - Traffic Stream, C - Commute, H - Heavy Duty Vehicles (Engine Technology), SP- Specific Vehicle Type, TCM - Transportation Control Measures

NOs	CREDIT TAKEN	TIP CREDITED	AGENCY	PROJECT	IMPLEMENTATION STATUS				ORIGINAL COMPLETION DATE	ACTUAL COMPLETION DATE	2009		2010		2020		2030		Project Category *
					FULL	SCALED-BACK	UNDER-WAY	REM			VOC	NOX	VOC	NOX	VOC	NOX	VOC	NOX	
9	X	1994-99	MDOT	Park & Ride Lot - MD 210/ MD 373	X				2000	2003	0.0006	0.0014	0.0005	0.0013	0.0003	0.0005	0.0003	0.0005	C
19	X	1994-99	PRTC	VRE Woodbridge Parking Expansion (add 500 spaces)	X					2002-2003	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	-
20	X	1994-99	ALEX	King St. Metrorail access improvements	X					**2006**	0.0012	0.0014	0.0011	0.0013	0.0006	0.0005	0.0006	0.0005	C
38	X	1995-00	MDOT	Signal Systems - MD 85 Executive Way to MD 355	X				1996	Pre 2000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	TR
39	X	1995-00	MDOT	Signal Systems - MD 355 ,I-70 ramps to Grove Rd.	X				1996	n/a	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	TR
44	X	1995-00	MDOT	Signal Systems - MD 410, 62nd Ave. to Riverdale Rd.	X				1996	2002	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	TR
48	X	1995-00	MDOT	MARC Replacement Coaches	X				1999	2004	0.0006	0.0014	0.0005	0.0013	0.0003	0.0005	0.0003	0.0005	C (TCM)
49	X	1995-00	MDOT	MARC Expansion Coaches	X				1999	2004	0.0054	0.0133	0.0049	0.0118	0.0029	0.0050	0.0026	0.0043	C (TCM)
51	X	1995-00	VDOT	Alexandria Telecommuting Pilot Program	X					2000 & 2001	0.0000	0.0000	0.0000	0.0000			0.0000	0.0000	C
52	X	1995-00	VDOT	Fairfax County Bus Shelter (Fairfax Co. TDM program)			X		2000	2001	0.0000	0.0000	0.0000	0.0000			0.0000	0.0000	C
54	X	1995-00	VDOT	City of Fairfax Bus Shelters	X				1999	2004	0.0000	0.0005	0.0000	0.0004	0.0000	0.0002	0.0000	0.0002	C (TCM)
56	X	1995-00	VDOT	Cherry Hill VRE Access			X			Jul-08	0.0042	0.0114	0.0038	0.0101	0.0022	0.0043	0.0020	0.0036	C (TCM)
58	X	1995-00	WMATA	Bus Replacement (172 buses)	X				1998	1998	0.0690	0.2520	0.0690	0.2520					SP (TCM)
59	X	1995-00	MCG	Shady Grove West Park and Ride			X		2010		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	C
60	X	1995-00	MCG	White Oak Park and Ride			X		2010		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	C
61	X	1995-00	MCG	Bicycle Facilities			X		FY99		0.0018	0.0009	0.0016	0.0008	0.0010	0.0004	0.0009	0.0003	C
62	X	1995-00	MCG	Pedestrian Facilities to Metrorail			X				0.0030	0.0038	0.0027	0.0034	0.0016	0.0014	0.0014	0.0012	C
63	X	1995-00	MDOT	MARC Replacement Coaches	X				1999	2004	0.0024	0.0057	0.0022	0.0050	0.0013	0.0022	0.0012	0.0018	C
64	X	1995-00	MDOT	MARC Expansion Coaches	X				1999	2004	0.0191	0.0494	0.0176	0.0436	0.0103	0.0187	0.0092	0.0158	C (TCM)
66	X	1995-00	VDOT	Commuter Lots - District Wide	X				varies	1995, 2001	0.0066	0.0157	0.0060	0.0139	0.0035	0.0059	0.0032	0.0050	C
67	X	1995-00	VDOT	I-66 and Stringfellow Rd. Park and Ride	X				2000	2000 end	0.0060	0.0095	0.0055	0.0084	0.0032	0.0036	0.0029	0.0030	C
68	X	1995-00	VDOT	Lake Ridge Park and Ride (now called Tacketts Mill lot)	X					1999/2000	0.0000	0.0047	0.0000	0.0042	0.0000	0.0018	0.0000	0.0015	C
69	X	1995-00	VDOT	Bicycle Trails and Facilities (Arlington & Fairfax Co - 7 locations)			X		varies	2007	0.0012	0.0081	0.0011	0.0071	0.0006	0.0031	0.0006	0.0026	C
70	X	1995-00	VDOT	Improved Accesss to Metrorail Stations (VRE 2 Stn)			X		varies	2000-2012	0.0001	0.0002	0.0003	0.0004	0.0002	0.0002	0.0001	0.0002	C
71	X	1995-00	VDOT	I-66 HOV access at Monument Dr.	X					1997	0.0060	0.0095	0.0027	0.0042	0.0032	0.0036	0.0029	0.0030	C
72	X	1995-00	DC	Bicycle Facilities		X					0.0143	0.0095	0.0132	0.0084	0.0077	0.0036	0.0069	0.0030	C
73	X	1995-00	REGION	COG Regional Ridesharing Support	X					on-going	**0.0739**	**0.1322**	**0.0679**	**0.1169**	**0.0403**	**0.0502**	**0.0367**	**0.0426**	C
74	X	1995-00	REGION	M-47 Integrated Ridesharing	X					on-going	**0.0396**	**0.0698**	**0.0364**	**0.0617**	**0.0216**	**0.0265**	**0.0196**	**0.0224**	C
75	X	1995-00	REGION	M-92 Telecommuting Support	X					on-going	**0.0661**	**0.1097**	**0.0608**	**0.0969**	**0.0358**	**0.0417**	**0.0324**	**0.0352**	C
77		1996-01	VDOT	Duke Street Pedestrian Bridge	X				2005	2007			n/a	n/a	n/a	n/a	n/a	n/a	-
79	X	1996-01	VDOT	Fairfax County Bus Shelters (30 shelters with project #85)			X		1999	Summer 200	0.0012	0.0014	0.0011	0.0013	0.0006	0.0005	0.0006	0.0005	C
81	X	1996-01	VDOT	Arlington County Metrocheck Program	X				1997	1997 Onwards	0.0012	0.0014	0.0011	0.0013	0.0006	0.0005	0.0006	0.0005	C
82	X	1996-01	VDOT	Old Dominion Drive Bike Trail			X		2000	2008	0.0006	0.0005	0.0005	0.0004	0.0003	0.0002	0.0003	0.0002	C
83	X	1996-01	WMATA	Bus Replacement (see line 58, above)	X					1998	Credit taken in line 58, above								SP
85	X	1996-01	VDOT	Fairfax County Bus Shelters (30 shelters with project #79)	X				1999	2001	0.0006	0.0005	0.0005	0.0004	0.0003	0.0002	0.0003	0.0002	C

TERM TRACKING SHEET

TRANSPORTATION EMISSION REDUCTION MEASURES

Part A - Daily Ozone Precursor Emissions

***** Project Category: TR - Traffic Stream, C - Commute, H - Heavy Duty Vehicles (Engine Technology), SP- Specific Vehicle Type, TCM - Transportation Control Measures

NOs	CREDIT TAKEN	TIP CREDITED	AGENCY	PROJECT	IMPLEMENTATION STATUS				ORIGINAL COMPLETION DATE	ACTUAL COMPLETION DATE	2009		2010		2020		2030		Project Category *
					FULL	SCALED-BACK	UNDER-WAY	REM			VOC	NOX	VOC	NOX	VOC	NOX	VOC	NOX	
90	X	1996-01	REGION	M-47c Employer Outreach / Guaranteed Ride Home	X					on-going	**0.5083**	**0.8164**	**0.4676**	**0.7218**	**0.2740**	**0.3101**	**0.2473**	**0.2616**	C
91	X	1996-01	REGION	M-70a Bicycle Parking			X		1999		0.0042	0.0033	0.0038	0.0029	0.0022	0.0013	0.0020	0.0011	C
92	X			M-92 Telecommuting Support [1]	Combined with item #75														C
95	X	1997-02	MCG	Germantown Transit Center	X				2005		0.0030	0.0090	0.0027	0.0080	0.0016	0.0034	0.0014	0.0029	C (TCM)
102	X	1997-02	PG	Prince George's County Bus Replacement	X				1998	1998	0.0030	0.0090	0.0030	0.0090					SP (TCM)
106	X	1997-02	VDOT	PRTC Employer Commuting Outreach Program	X					1977 on-going	0.0012	0.0002	0.0011	0.0002	0.0006	0.0001	0.0006	0.0001	C
107	X	1997-02	VDOT	PRTC Multimodal Strategic Marketing Implementation Plan	X					1977 on-going	0.0000	0.0002	0.0000	0.0002	0.0000	0.0001	0.0000	0.0001	C
108	X	1997-02	MDOT	M-103 Taxicab Replacement in Maryland [2]	X				2005	Stopped	0.0797	0.2675	0.0797	0.2675	~~0.1340~~	~~0.1827~~	~~0.3120~~	~~0.4810~~	SP
109	X	1997-02	REGION	M-70b Employer Outreach for Bicycles	X				1998	on going	**0.0013**	**0.0018**	**0.0012**	**0.0016**	**0.0007**	**0.0007**	**0.0006**	**0.0006**	C
110		1997-02	VDOT	M-77b Vanpool Incentive Programs in Virginia				x	1999	delayed	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	C
111	X	1998-03	WMATA	Bus Replacement (108 buses)	X				1999	1999	0.0450	0.1617	0.0450	0.1617					SP
112	X	1998-03	MCG	Montgomery County Bus Replacement	X					Ongoing	0.0080	0.0270	0.0080	0.0270					SP
113	X	1998-03	PG	Prince George's County Bus Replacement	X				1998	Ongoing	0.0010	0.0020	0.0010	0.0020					SP
114	X	1998-03	FDC	Frederick County Bus Replacement	X						0.0010	0.0000	0.0010	0.0000					SP
117	X	1998-03	VDOT	Arlington County Four Mile Run Bike Trail			X		1999	2009	-	-	0.0005	0.0004	0.0003	0.0002	0.0003	0.0002	C
118	X	1998-03	VDOT	Northern Virginia Turn Bays	X				2000	1998	0.0006	0.0009	0.0006	0.0008	0.0003	0.0003	0.0003	0.0002	TR
119	X	1998-03	VDOT	Fairfax City Bus Replacement	X				2001	2003	n/a	n/a	n/a	n/a					SP
121	X	1998-03	WMATA	WMATA Bus Replacement (252 buses)	X				2001	2001	0.1060	0.3860	0.1060	0.3860					SP
122	X	97 & 98 TIP	REGION	M-101a Mass Marketing Campagin (Consumer)			X			2005	**0.0402**	**0.0647**	**0.0370**	**0.0572**	**0.0217**	**0.0246**	**0.0196**	**0.0208**	C
123	X	1999-04	MDOT	Various Park and Ride Lots(I-270/MD124, 450 & I-170/MD-75, 54 spaces)		X			2001/1999	2001	0.0048	0.0171	0.0044	0.0151	0.0026	0.0065	0.0023	0.0055	C
124	X	1999-04	MDOT	Signal Systems (197/MD-198, MD-382 TO US-301,US301)	X				2000	2002	0.0074	-0.0019	0.0068	-0.0016	0.0040	-0.0005	0.0036	-0.0004	TR
125	X	1999-04	VDOT	Transit Center at 7 Corners	X				2002	2001	0.0006	0.0009	0.0005	0.0008	0.0003	0.0004	0.0003	0.0003	C
126	X	1999-04	VDOT	Falls Church Clean Diesel Bus Service	X				2000	2003	0.0040	0.0050	0.0040	0.0050					SP
127	X	1999-04	VDOT	VA 234 Bike Trail			X		2001	2008	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	C
128	X	1999-04	VDOT	PRTC Ridesharing	X				on-going	2000 ongoing	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	C
130	X	1996-01	VDOT	M-14: I-66 Feeder Bus Fare Buy Down	X					1998 onward	0.0149	0.0261	0.0137	0.0231	0.0080	0.0099	0.0072	0.0084	C
131	X	2000-05	MDOT	Various park and Ride Lots	x				2002	2003	0.0041	0.0154	0.0038	0.0136	0.0022	0.0059	0.0020	0.0049	C
132	X	2000-05	MDOT	Signal Systems	X				Varies	on-going	0.0018	0.0000	0.0017	0.0000	0.0015	0.0000	0.0009	0.0000	TR
133	X	2000-05	VDOT	250 Spaces at Gambrill/Hooes Rds. Park and Ride	X				2002	2004	0.0042	0.0085	0.0038	0.0076	0.0022	0.0032	0.0020	0.0027	C
134	X	2000-05	VDOT	300 Spaces at Backlick Rd	X				2003	2007	0.0030	0.0062	0.0027	0.0055	0.0016	0.0023	0.0014	0.0020	C
135	X	2000-05	VDOT	Accotink-Gateway Connector Trail	X				2002	2005	0.0042	0.0047	0.0038	0.0042	0.0022	0.0018	0.0020	0.0015	C
136	X	2000-05	VDOT	Columbia Pike Trail			X		2000	Summer 2009			0.0033	0.0034	0.0019	0.0014	0.0017	0.0012	C
137	X	2000-05	VDOT	Lee Highway trail			X		2000	2007	0.0018	0.0019	0.0016	0.0017	0.0010	0.0007	0.0009	0.0006	C
138	X	2000-05	VDOT	Arlington Bus Shelter Improvements	X				2005	2005	0.0006	0.0005	0.0005	0.0004	0.0003	0.0002	0.0003	0.0002	C
139	X	2000-05	VDOT	Pentagon Metrostation Improvements	X					2003	0.0048	0.0081	0.0044	0.0071	0.0026	0.0031	0.0023	0.0026	C

TERM TRACKING SHEET

TRANSPORTATION EMISSION REDUCTION MEASURES

Part A - Daily Ozone Precursor Emissions

***** Project Category: TR - Traffic Stream, C - Commute, H - Heavy Duty Vehicles (Engine Technology), SP- Specific Vehicle Type, TCM - Transportation Control Measures

NOs	CREDIT TAKEN	TIP CREDITED	AGENCY	PROJECT	IMPLEMENTATION STATUS				ORIGINAL COMPLETION DATE	ACTUAL COMPLETION DATE	2009		2010		2020		2030		Project Category *
					FULL	SCALED-BACK	UNDER-WAY	REM			VOC	NOX	VOC	NOX	VOC	NOX	VOC	NOX	
140	X	2000-05	MDOT	East/West Intersection Improvements			X		2005	2005	0.0245	0.0119	0.0225	0.0105	0.0132	0.0045	0.0118	0.0038	C
141	X	2001-06	Feds	Federal Transit/Ridesharing subsidy	X				on-going		0.0610	0.0907	0.0561	0.0802	0.0327	0.0344	0.0294	0.0290	C
142	X	2002-07	WMATA	100 CNG buses	X				2002		0.0000	0.1358	0.0000	0.1358					SP (TCM)
143	X	2002-07	WMATA	ULSD with CRT filters	X				2006	Jun-06	0.2100	0.0000	0.2100	0.0000	0.4300	0.0000	0.4300	0.0000	H (TCM)
144		2003-08	DC	Replace ~~23~~ 12 Taxicabs with CNG cabs				X	2005	2006	0.0089	0.0157	0.0089	0.0157					H
145	X	2003-08	DC	D.C.Incident Response & TrafficManagement System	X				2005	2004	0.0170	0.0468	0.0156	0.0403	0.0092	0.0127	0.0100	0.0168	TR
146	X	2003-08	DC	Bicycle Lane in D. C. (35 Mile)			X		2005	2008	0.0099	0.0085	0.0091	0.0075	0.0053	0.0032	0.0048	0.0027	C (TCM)
147	X	2003-08	DC	Bicycle Racks in D. C. (500)	X				2005	2004	0.0014	0.0010	0.0013	0.0008	0.0007	0.0004	0.0007	0.0003	C (TCM)
148	X	2003-08	DC	External Bicycle Racks on WMATA Buses in D. C. (600)	X				2005	2003	0.0020	0.0031	0.0019	0.0027	0.0011	0.0012	0.0010	0.0010	C (TCM)
149		2003-08	DC	CNG Rental Cars (18)				X	2005		0.0000	0.0002	0.0000	0.0002					SP
150	X	2003-08	DC	Sidewalks in D.C. ($ 5 million)	X				2005	2004	0.0374	0.0556	0.0344	0.0492	0.0201	0.0211	0.0180	0.0178	C
151	X	2003-08	DC	CNG Refuse Haulers (2)	X				2005	2004	0.0001	0.0020	0.0001	0.0020					H (TCM)
152	X	2003-08	DC	Circulator /Feeder Bus Routes	X				2005	2003	0.0136	0.0201	0.0125	0.0177	0.0073	0.0076	0.0066	0.0064	C
153	X	2003-08	MDOT	Commuter Tax Credit	X				2005	n/a	0.0816	0.1225	0.0751	0.1083	0.0438	0.0465	0.0394	0.0392	C
155		2003-08	MDOT	Employer Vanpool Program (WWB)				X	2005		0.0019	0.0041	0.0018	0.0037					C
156	X	2003-08	MDOT	Green Line Link			X		2005	n/a	0.0027	0.0047	0.0025	0.0041	0.0014	0.0018	0.0013	0.0015	C
157	X	2003-08	MDOT	Park & Ride Lots - Southern Maryland			X		2005	2005	0.0052	0.0109	0.0048	0.0096	0.0028	0.0041	0.0025	0.0035	C
158	X	2003-08	MDOT	Prince George's County- Bus Exp			X		2005	n/a	0.0374	0.0657	0.0344	0.0581	0.0201	0.0250	0.0181	0.0210	C
159	X	2003-08	MDOT	MTA - Bus Service Expansion			X		2005	n/a	0.0085	0.0157	0.0078	0.0139	0.0045	0.0060	0.0041	0.0050	C
160	X	2003-08	MDOT	Ride- On - Super Discount			X		2005	n/a	0.0010	0.0014	0.0009	0.0013	0.0005	0.0005	0.0005	0.0005	C
161	X	2003-08	Regional	Regional Traveler Information Systems			X		2005		0.1067	0.6106	0.0984	0.5250	0.0579	0.1656	0.0522	0.1156	TR
162	X	2003-08	MDOT	Universal Transportation Access (MD + WMATA)			X		2005	n/a	0.0168	0.0249	0.0154	0.0220	0.0090	0.0095	0.0081	0.0080	C
163	X	2003-08	MCG	Construction of 1300 additional Parking Spaces at Grosvenor Metro Garage	X				2004		0.0048	0.0105	0.0044	0.0092	0.0026	0.0040	0.0025	0.0036	C (TCM)
164	X	2003-08	MCG	Bethesda Shuttle Bus Services	X				2004		0.0032	0.0048	0.0030	0.0042	0.0017	0.0018	0.0016	0.0015	C
165	X	2003-08	MCG	External Bicycle Racks on Ride-On Buses in Montgomery County	X				2004		0.0006	0.0010	0.0006	0.0009	0.0003	0.0004	0.0003	0.0003	C
166	X	2003-08	MCG	New CNG Powered Light Duty Vehicle fleet in the County	X				2004		0.0000	0.0001	0.0000	0.0001					SP
167	X	2003-08	MCG	Free Bus Service on Selected Routes on I-270	X				2004		0.0011	0.0017	0.0010	0.0015	0.0006	0.0006	0.0005	0.0005	C
168	X	2003-08	MCG	Annual Sidewalk Program	X				2004		0.0178	0.0265	0.0164	0.0234	0.0096	0.0101	0.0086	0.0085	C
169		2003-08	MDOT	Bethesda Breeze/International Express Metrobus				X	2005	Removed	0.0039	0.0053	0.0036	0.0047	0.0021	0.0020	0.0019	0.0017	C
170		2003-08	MDOT	Bethesda-8, Silver Spring Downtown Dasher and Prince Georges Co. Shuttles at 3 PNR lot				X	2005	Removed	0.0092	0.0104	0.0085	0.0092	0.0049	0.0040	0.0044	0.0033	C
171		2003-08	MDOT	Proposed Transportation Management District in Montgomery County (Rockville and Gaithersburg)				X	2005	Removed	0.0060	0.0078	0.0055	0.0069	0.0032	0.0030	0.0029	0.0025	C
172	X	2003-08	MDOT	Sidewalks (Bikes/Pedestrian) at / near Rail Stations	X				2005	2002	0.0097	0.0147	0.0089	0.0130	0.0052	0.0056	0.0047	0.0047	C
173	X	2003-08	MDOT	Neighborhood Sidewalks Improvements (Bike/Pedestrian)	X				2005	2004	0.0034	0.0017	0.0031	0.0015	0.0018	0.0006	0.0016	0.0005	C
174	X	2003-08	MDOT	Neighborhood Conservation Program - Neighborhood Sidewalks Improvements (Bikes/Pedestrian)		X			2005	Ongoing	0.0030	0.0014	0.0027	0.0013	0.0016	0.0005	0.0014	0.0005	C
175	X	2003-08	MDOT	Maryland bus Transit Service Expansion	X				2005	2004	0.0147	0.0323	0.0135	0.0286	0.0079	0.0123	0.0071	0.0103	C

TERM TRACKING SHEET

TRANSPORTATION EMISSION REDUCTION MEASURES

Part A - Daily Ozone Precursor Emissions

***** Project Category: TR - Traffic Stream, C - Commute, H - Heavy Duty Vehicles (Engine Technology), SP- Specific Vehicle Type, TCM - Transportation Control Measures

NOs	CREDIT TAKEN	TIP CREDITED	AGENCY	PROJECT	IMPLEMENTATION STATUS				ORIGINAL COMPLETION DATE	ACTUAL COMPLETION DATE	2009		2010		2020		2030		Project Category *
					FULL	SCALED-BACK	UNDER-WAY	REM			VOC	NOX	VOC	NOX	VOC	NOX	VOC	NOX	
176	X	2003-08	VDOT	Universal Transportation Access Program	X				2005	2005-07	0.0012	0.0019	0.0011	0.0017	0.0007	0.0007	0.0006	0.0006	C
177	X	2003-08	VDOT	Interactive Rideshare & Kiosk Initiative			X		2008 onward		0.0004	0.0007	0.0004	0.0006	0.0002	0.0003	0.0002	0.0002	C
178	X	2003-08	VDOT	Mobile Commuter Stores	X				2005	2005	0.0022	0.0039	0.0021	0.0035	0.0012	0.0015	0.0011	0.0013	C
179	X	2003-08	VDOT	Telework Incentive Program (Telework VA)[1]	x				2005	Fall 2006	0.0008	0.0012	0.0007	0.0011	0.0004	0.0005	0.0004	0.0004	C
180	X	2003-08	VDOT	Commuter Choice	X				2005		0.0010	0.0014	0.0009	0.0012	0.0005	0.0005	0.0005	0.0004	C
181	X	2003-08	VDOT	Employer Shuttle Services				x	2005		0.0119	0.0166	0.0109	0.0147	0.0064	0.0063	0.0057	0.0053	C
184	X	2003-08	VDOT	Van Start / Van Save	X				2005	till 2006	0.0015	0.0026	0.0013	0.0023					C
185	X	2003-08	VDOT	Metro Shuttle Bus			X		2005	1999-2005	0.0012	0.0026	0.0011	0.0023	0.0007	0.0010	0.0006	0.0008	C
187	X	2003-08	VDOT	VRE Mid-Day Train Service	X				2005	2002	0.0016	0.0029	0.0015	0.0026	0.0009	0.0011	0.0008	0.0009	C
190	X	2003-08	VDOT	Employer Vanpool Program (Bridge deck)	X				2005	2004 - 2008	0.0010	0.0019							C
191	X	2003-08	VDOT	Town of Leesburg P&R Lot			X		2005	early 2009			0.0018	0.0035	0.0011	0.0015	0.0010	0.0013	C
192	X	2003-08	VDOT	District-wide P&R Lots	X				2005	2001-2005	0.0118	0.0224	0.0108	0.0198	0.0063	0.0085	0.0057	0.0072	C
193	X	2003-08	VDOT	Additional Parking at 4 Metro stations	X				2005	2005	0.0152	0.0334	0.0140	0.0295	0.0082	0.0127	0.0073	0.0107	C
196	X	2003-08	WMATA	64 CNG Buses (Purchased in 2001)	X				2005	2004	0.0021	0.0870	0.0021	0.0870					SP (TCM)
197	X	2003-08	WMATA	250 CNG Buses (175 buses by Dec. 2004; 75 buses by mid 2006)	X				2005	Jun-06	0.0083	0.3400	0.0083	0.3400					SP
198	X	2003-08	WMATA	60 Engine Replacement (MY 1992 & 1993 MY buses)	X				2004	2004	0.0138	0.0755	0.0138	0.0755					SP
199	X	2003-08	WMATA	Car Sharing Program	X				2005	2004	0.0008	0.0018	0.0008	0.0016	0.0004	0.0007	0.0004	0.0006	C
200	X	2003-08	WMATA	Bikes Racks on WMATA Buses in VA (372 Bike Racks)	X				2005	2004	0.0013	0.0019	0.0012	0.0017	0.0007	0.0007	0.0006	0.0007	C (TCM)
202		2003-08	MDOT	Fleet Replacement (state auto fleet, gas to hybrid, 250 vehicles)				X	2005		0.0055	0.0133	0.0055	0.0133	0.0055	0.0133			SP
203	X	2003-08	MDOT	Replace 55 Montgomery County 10 yr. old buses w/ new CNG buses			X		2005	Ongoing	0.0459	0.1628	0.0459	0.1628	0.0459	0.1628			SP
204		2003-08	MDOT	Neighborhood Bus Shuttle (5 circulator routes)				X	2005		0.0078	0.0122	0.0072	0.0108	0.0042	0.0046	0.0038	0.0039	C
205	X	2003-08	MDOT	New Surface Parking at Transit Centers (500 spaces)			X		2005	2005	0.0027	0.0060	0.0025	0.0053	0.0015	0.0023	0.0013	0.0019	C
206		2003-08	MDOT	Additional Bike Lockers at Metro-Stations				X	2005		0.0138	0.0209	0.0127	0.0185	0.0074	0.0079	0.0067	0.0067	C
207	X	2003-08	MDOT	Bike Facilities at PnR Lots or other similar location			X		2005	2005	0.0097	0.0166	0.0089	0.0147	0.0052	0.0063	0.0047	0.0053	C
208		2003-08	MDOT	CNG Fueling Stations				X	2005		0.1270	0.1170	0.1270	0.1170					SP
209		2003-08	MDOT	Gas cap replacements (ROP Credit)				X	2005		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	SP
210		2003-08	MDOT	Gas can turnover (ROP Credit)				X	2005		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	SP
211	X	2003-08	MDOT	External Bicycle Racks on WMATA Buses (486 MD buses)	X				2005	2002	0.0015	0.0022	0.0013	0.0020	0.0008	0.0008	0.0007	0.0007	C (TCM)
212	X	2003-08	MDOT	Bike \ Pedestrian Trail - Anacostia River Walk			X		2005	Ongoing	0.0006	0.0005	0.0006	0.0004	0.0003	0.0002	0.0003	0.0001	C
213		2003-08	MDOT	Transit Prioritization - Queue Jumps				X	2005		0.0032	0.0037	0.0030	0.0033	0.0017	0.0014	0.0016	0.0012	C
214	X	2003-08	MDOT	Commuter Choice Benefit/Tax Credit - Marketing Expansion	X				2005	Ongoing	0.0570	0.0860	0.0525	0.0761	0.0306	0.0327	0.0275	0.0275	C
215	X	2003-08	MDOT	Improvements to Pedestrian Access in TOD areas (4 locations)			X		2005	Ongoing	0.0062	0.0087	0.0057	0.0077	0.0033	0.0033	0.0030	0.0028	C
216	X	2003-08	MDOT	Telecommuting Expansion[1]	x				2005	Ongoing	0.0673	0.1210	0.0620	0.1070	0.0362	0.0460	0.0325	0.0387	C
217		2003-08	MDOT	Replace older Diesel Engine in Public Sector vehicles				X	2005		0.0237	0.1300	0.0237	0.1300					H
218	X	2003-08	VDOT	MV-92 Telecommuting Program - Expanded[1]	x				2005	2005	0.0719	0.1292	0.0662	0.1143	0.0386	0.0491	0.0347	0.0413	C

TERM TRACKING SHEET

TRANSPORTATION EMISSION REDUCTION MEASURES

Part A - Daily Ozone Precursor Emissions

***** Project Category: TR - Traffic Stream, C - Commute, H - Heavy Duty Vehicles (Engine Technology), SP- Specific Vehicle Type, TCM - Transportation Control Measures

NOs	CREDIT TAKEN	TIP CREDITED	AGENCY	PROJECT	IMPLEMENTATION STATUS				ORIGINAL COMPLETION DATE	ACTUAL COMPLETION DATE	2009		2010		2020		2030		Project Category *
					FULL	SCALED-BACK	UNDER-WAY	REM			VOC	NOX	VOC	NOX	VOC	NOX	VOC	NOX	
219	X	2003-08	VDOT	MV-123 Employer Outreach for Public Sector Employees [2]	X				2005	2003	0.0160	0.0237	0.0147	0.0210	0.0086	0.0090	0.0077	0.0076	C
220	X	2003-08	REGION	Signal System Optimization	X				2005	2005	0.4505	0.1707	0.4155	0.1468	0.2445	0.0463	0.2204	0.0323	TR
221		2007-12	MDOT	Two P & R Lots in Frederick County (70 spaces)	X				2007	2008	0.0006	0.0012	0.0006	0.0011	0.0003	0.0005	0.0003	0.0004	C
										Available Emissions Credits	**2.598**	**5.059**	**2.441**	**4.676**	**1.475**	**1.165**	**1.332**	**0.821**	

TRANSPORTATION EMISSION REDUCTION MEASURES (CLRP Projects Only)

Part A - Daily Ozone Precursor Emissions

Project Category: TR - Traffic Stream, C - Commute, H - Engine Technology (Heavy Dudy Vehicles), SP- Specific Vehicle Type

NOs	CREDIT TAKEN	TIP CREDITED	AGENCY	PROJECT	IMPLEMENTATION STATUS				PROJECTED COMPLETION DATE	ACTUAL COMPLETION DATE	TONS/DAY REDUCTION CREDITED						Project Category
					FULL	SCALED-BACK	UNDER-WAY	REM			2010		2020		2030		
											VOC	NOx	VOC	NOx	VOC	NOx	
221	X	1995-00 TIP	REGION	M-24 Speed Limit Adherence					2010		-0.0146	0.5364	-0.0042	0.2365	0.0010	0.0739	TR
222		1996-01 TIP	MGC	Rock Spring Park Pedestrian Amenities				X			0.0010	0.0040	0.0000	0.0000	0.0000	0.0000	-
223	X	1996-01 TIP	MGC	Olney Transit Center Park and Ride					2015		0.0020	0.0080	0.0009	0.0030	0.0003	0.0007	C
224	X	1996-01 TIP	MGC	Damascus Park and Ride						2003	0.0010	0.0040	0.0004	0.0015	0.0001	0.0003	C
225	X	1996-01 TIP	DC	M-103 Taxicab Replacement (DC)					2015		0.0000	0.0000	0.1745	0.3000	0.3490	0.6000	H
226	X	STADIUM ANALYSIS		M-103 Taxicab Replacement (MD)				X	2008		0.0000	0.0000	0.1560	0.2400	0.1560	0.2400	H
227	X	1997-02 TIP	MDOT	Shady Grove West Transit Center Park and Ride				X			0.0000	0.0100	0.0000	0.0038	0.0000	0.0009	C
228	X	1997-02 TIP	MGC	Olney Transit Center Park and Ride					2015		0.0000	0.0000	0.0004	0.0012	0.0003	0.0007	C
229	X	1997-02 TIP	MGC	White Oak Park and Ride					2008		0.0000	0.0200	0.0000	0.0076	0.0000	0.0017	C
230	X	1997-02 TIP	MGC	Damascus Park and Ride						2003	0.0000	0.0000	0.0002	0.0005	0.0001	0.0003	C
231	X	1997-02 TIP	MGC	Four Corners Transit Center					2015		0.0000	0.0010	0.0000	0.0004	0.0000	0.0001	C
232		1997-02 TIP	MGC	Burtonsville Transit Center				X			0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	-
233	X	1997-02 TIP	MGC	Silver Spring Transit Access							0.0000	0.0010	0.0000	0.0003	0.0000	0.0002	C
234	X	1997-02 TIP	MGC	Shady Grove Parking Construction						2003	0.0050	0.0190	0.0021	0.0072	0.0007	0.0017	C
PLAN TOTAL											-0.0066	0.5894	0.1743	0.5583	0.3516	0.6804	
GRAND TOTAL (Current Measures + CLRP plan)											2.435	5.265	1.649	1.723	1.683	1.501	

DEFINITIONS: Project Numbers implemented fully prior to 2000 were removed from the TERM Tracking Sheet

CREDIT TAKEN (X means emissions reduction credits taken):

TIP - Emissions credits are taken for projects being implemented, according to the progress reporting schedules provided by the implementing agencies (contained in Appendix J of Conformity Document). No credit has been taken for projects in which only some components of the measure have been implemented.

CLRP - Credit is taken for each of these elements of the CLRP according to the schedule provided by the implementing agency.

IMPLEMENTATION STATUS:

FULL = project is completed as planned at the time of analysis.

SCALED BACK = project is completed, but at a different level than assumed at the time of analysis (i.e., purchased 50 buses instead of 100)

UNDERWAY = project is not complete, but is close enough that credit may be taken (i.e., under construction, NOT just out for bid)

REMOVED = project no longer expected to be implemented or constructed

COMPLETION DATE:

PROJECTED = project completion date originally expected (i.e., at time of emissions analysis)

ACTUAL = actual year project was open for use, or expected to be open for use if under construction

REMOVED projects Emissions credits are not counted in toal available emissions credits

1 Line items 218, 216, 179, 92 are all credited as part of M-92 Regional Telecommute Support TERM, line item # 75

2 Line item 108 & 219 credits are taken only for year 2010