

National Capital Region Transportation Planning Board

777 North Capitol Street, N.E., Suite 300, Washington, D.C. 20002-4290 (202) 962-3310 Fax: (202) 962-3202

MEMORANDUM

October 7, 2011

To: Transportation Planning Board

**From: Jane Posey
Senior Transportation Engineer**

Subject: Air Quality Conformity Assessment for the 2011 Update of the Constrained Long Range Plan (CLRP)

INTRODUCTION

This memo documents summary results of the air quality conformity assessment of the 2011 CLRP with respect to the following pollutants:

- **Ozone Season Volatile Organic Compounds (VOC) and Nitrogen Oxides (NO_x).** Ozone season pollutants must not exceed EPA approved totals from the Metropolitan Washington Air Quality Committee's (MWAQC's) Motor Vehicle Emissions Budgets (MVEBs) from the 8-hour Ozone State Implementation Plan (SIP). MWAQC adopted the 8-hour ozone SIP in May, 2007, and on September 4, 2009, EPA found adequate the 2008 Reasonable Further Progress (RFP) budgets, and stated that the Metropolitan Washington region must use these budgets for future conformity determinations for the 8-hour ozone standard. The RFP budget for VOC is 70.8 tons/day, and for NO_x is 159.8 tons/day. Ozone season pollutants will no longer be assessed against 1-hour ozone budgets.
- **Fine Particles (PM_{2.5}).** In the absence of approved budgets EPA, allows for an assessment that shows emissions in "action" scenarios are no greater than those in a 2002 base. This criterion was established and applied, with the concurrence of MWAQC, in prior PM_{2.5} conformity assessments.
- **Wintertime Carbon Monoxide (CO).** The region is in maintenance for mobile source wintertime CO, and is required to show that pollutants do not exceed the approved budget of 1671.5 tons/day.

The analysis shows that mobile emissions are well within the mobile budgets for ozone season VOC and NO_x, as well as wintertime CO, and are well below the 2002 base year levels for the PM_{2.5} pollutants.

The results, based upon analyses contained in the technical report, [Air Quality Conformity Determination Of The 2011 Constrained Long Range Plan For The Washington Metropolitan](#)

Region, were released for public comment and interagency consultation on October 13, 2011. The public comment period is scheduled to end on November 12, 2011.

BACKGROUND

The Transportation Planning Board (TPB) approved the scope of work and the project submissions for the 2011 CLRP air quality conformity analysis on March 16, 2011.

Key technical inputs to the analysis include:

- Round 8.0a Cooperative Land Activity Forecasts
- The Version 2.3 Travel Demand Model including a 3722 Transportation Analysis Zones (TAZ) area system and updated transit service
- New Project Submissions
- 2008 Vehicle Registration Data
- EPA's Mobile6.2 Emissions Factor Model.

WORK ACTIVITIES

Staff prepared inventories for each pollutant for five forecast years (2002, 2016, 2020, 2030 and 2040). Ozone season pollutants (VOC and NO_x) and wintertime CO are inventoried for average weekday conditions, and precursor NO_x and direct PM_{2.5} are inventoried to reflect emissions on a yearly total basis. Staff applied seasonal adjustment factors to convert daily travel (annual average weekday traffic or AAWDT) to annual values.

These inventories address a primary conformity assessment criterion to demonstrate that emissions associated with the plan do not exceed the approved budgets. In anticipation of possible emissions increases associated with implementation of the plan, staff (in conjunction with the TPB Technical Committee and its Travel Management Subcommittee) conducted parallel analyses of committed and potential new transportation emissions reduction measures (TERM)s, and documented emissions benefits for each analysis year.

Plan Amendments

Attachment A lists the major changes to the conformity project inputs since the 2010 CLRP.

Land Activity Forecasts

The COG Board approved Round 8.0 Cooperative Forecasts in November, 2010. The forecasts reflect both the small area land use distributions throughout the Washington region, and also the latest planning assumptions for areas that are outside the Washington region. When the Baltimore Metropolitan Council recently updated its land use data, COG included those data in a new round of cooperative forecasts, Round 8.0a. The new data were used for the conformity analysis of the 2011 CLRP. Attachment B shows a summary of the Round 8.0a data.

Travel Modeling Process

The new Version 2.3 travel demand model was used for the first time in an air quality conformity analysis. The model includes a finer-grain zone system (3722 instead of 2191 TAZs) and a more detailed street base than that of the Version 2.2 model. Staff completely re-calibrated and re-validated the new model using the 2007/2008 household survey, numerous on-board transit surveys, 2007 Highway Performance Monitoring System (HPMS) traffic count data, and INRIX highway speed data. The new model, reviewed extensively by the Travel Forecasting Subcommittee, contains numerous upgrades and additional technical parameters, enabling an improved analysis of travel in the region. For more information, review the December 2010 presentation to the TPB Technical Committee, or the Version 2.3 model documentation, both of which are located on the COG website.

In addition, in this air quality conformity assessment the definition of what constitutes a “regionally significant” project was changed. In the past, any project that changed any link in the regional highway or transit network was considered “regionally significant”. The new definition maintains the same threshold for “regional significant” as in the past, but accounts for the finer-grain zone system and more detailed street base. Attachment C contains a technical memo about regional significance.

Staff prepared travel demand forecasts for each of the analysis years using the Version 2.3 travel demand model. Exhibit 1 presents the geographic areas for travel modeling and for emissions reporting for each pollutant. Exhibit 2 presents the resulting average weekday transit trips, vehicle trips, and vehicle miles traveled (VMT) results through time for each conformity analysis year, for the full modeled area.

Emissions Factors

Staff developed emissions factors using EPA’s MOBILE6.2 emissions model. Emissions rates for each pollutant – shown illustratively for Fairfax County in Exhibits 3 and 4 -- were developed following execution of the model in one mph speed increments, by jurisdiction, for each analysis year. The chart shows significantly reduced rates through time, primarily due to the impacts of having cleaner fuel and vehicles in the fleet. Exhibit 5 presents direct PM_{2.5} emissions rates through time for each of the three seasons; data are arrayed in a bar chart since these emissions rates do not vary by vehicle speed.

Mobile Emissions Inventories

Ozone Season and Wintertime CO – Daily Emissions

The average annual weekday travel forecasts (AAWDT) generated by the travel demand model were adjusted, using a 1.03 ozone season factor or a 0.96 winter season factor, to develop seasonally appropriate VMT estimates. Staff then applied the appropriate Mobile6.2 emissions factors to the travel demand forecasts to prepare mobile source emissions inventories for each forecast year. These emissions results for ozone season pollutants are summarized in Exhibits 6 and 7 and indicate total VOC and NO_x emissions for each analysis year. The charts show dramatic reductions throughout the period. Historical emissions reductions from the Clean Air Act amendments 1990 base have been well documented in the past. 2040 VOC and NO_x emissions represent about 13 percent and less than 9 percent, respectively, of their 1990 levels. The results reflect the impact of the cleaner fuel / fleet and related programs.

PM_{2.5} – Yearly Emissions

To develop the yearly total PM_{2.5} emissions, travel and emissions were estimated by applying (three) seasonal factors to the primary travel data, followed by applying emissions rates for each of the seasons, and summarizing to obtain yearly totals. Direct PM_{2.5} and precursor NO_x emissions are shown in Exhibits 8 and 9. The emissions reductions through time are largely attributable to Tier II vehicle standards, cleaner fuels, and the heavy duty engine rule.

2011 CLRP Emissions Inventories vs. Budgets

Exhibits 6-9 display net emissions in comparison to emissions budgets for each forecast year. The charts show that emissions are within the mobile budgets (including budgets not yet approved by EPA) for each pollutant, for all forecast years. Wintertime CO emissions (contained in a full technical report but not summarized here) are also within the CO emissions budget.

Exhibits 8 and 9 show that both direct PM_{2.5} and precursor NO_x emissions are much lower than base year 2002 conditions and are within the proposed mobile budgets, for all forecast years, satisfying this additional conformity assessment criterion for PM_{2.5}.

Net Emissions Analysis

The emissions inventory data contained in Exhibits 6-9 reflect total mobile source network and off-network emissions. However, there are also emissions benefits associated with certain other transportation programs and projects. These benefits, estimated on an off-line basis, are also creditable in conformity analyses. Attachment D represents a summary table of these transportation emissions reduction measures, or TERMS, which have been previously planned or programmed by the TPB. They are arrayed in a ‘Tracking Sheet’ format to document the implementation status of each, with part A of the table documenting ozone season and part B documenting PM_{2.5} pollutants. The summary result of these measures, shown as the bottom line for each section of the table, amounts to additional reductions in each of the pollutants. Only those projects which have been affirmed by the implementing agency as having been completed, or are on a realistic schedule towards implementation, are being credited in this emissions analysis. Combining the emissions results in Exhibits 6-9 with the additional reductions from TERMS would further improve the emissions margins for each pollutant.

SUMMARY

The analytical results described in this air quality assessment provide a basis for a determination by the TPB of conformity of the 2011 CLRP.

Following: Exhibits 1-9
Attachments A - D

EXHIBIT 1

Washington, D.C.- Maryland - Virginia Planning Areas

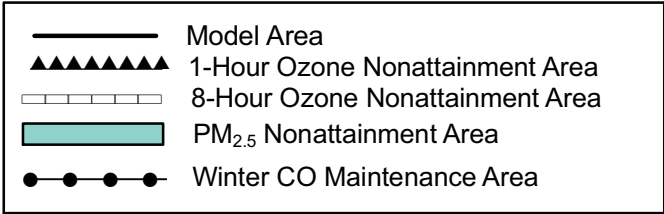
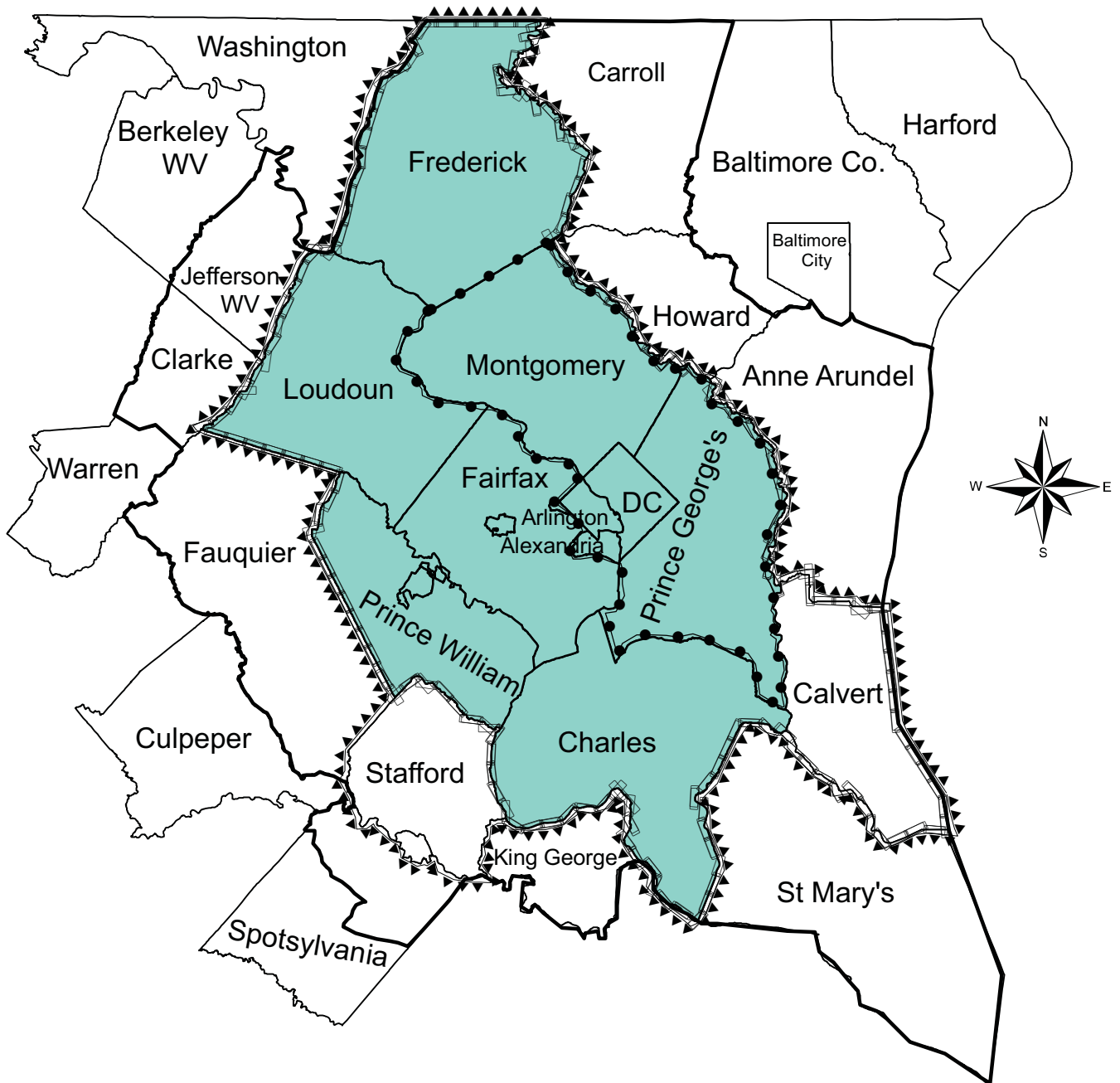


Exhibit 2
Travel Demand Summary
Modeled Area Trips and Vehicle Miles Traveled (000's)
Average Weekday Traffic (AWDT)

	<u>2002</u>	<u>2016</u>	<u>2020</u>	<u>2030</u>	<u>2040</u>
Transit Trips	1,093.2	1,308.1	1,418.3	1,538.8	1,634.6
Vehicle Trips	14,882.3	17,629.1	18,373.3	20,029.1	21,366.4
VMT	150,749.5	178,691.9	186,431.9	203,867.2	219,161.9

Adjustment Factors to Convert AAWDT to Appropriate Season:

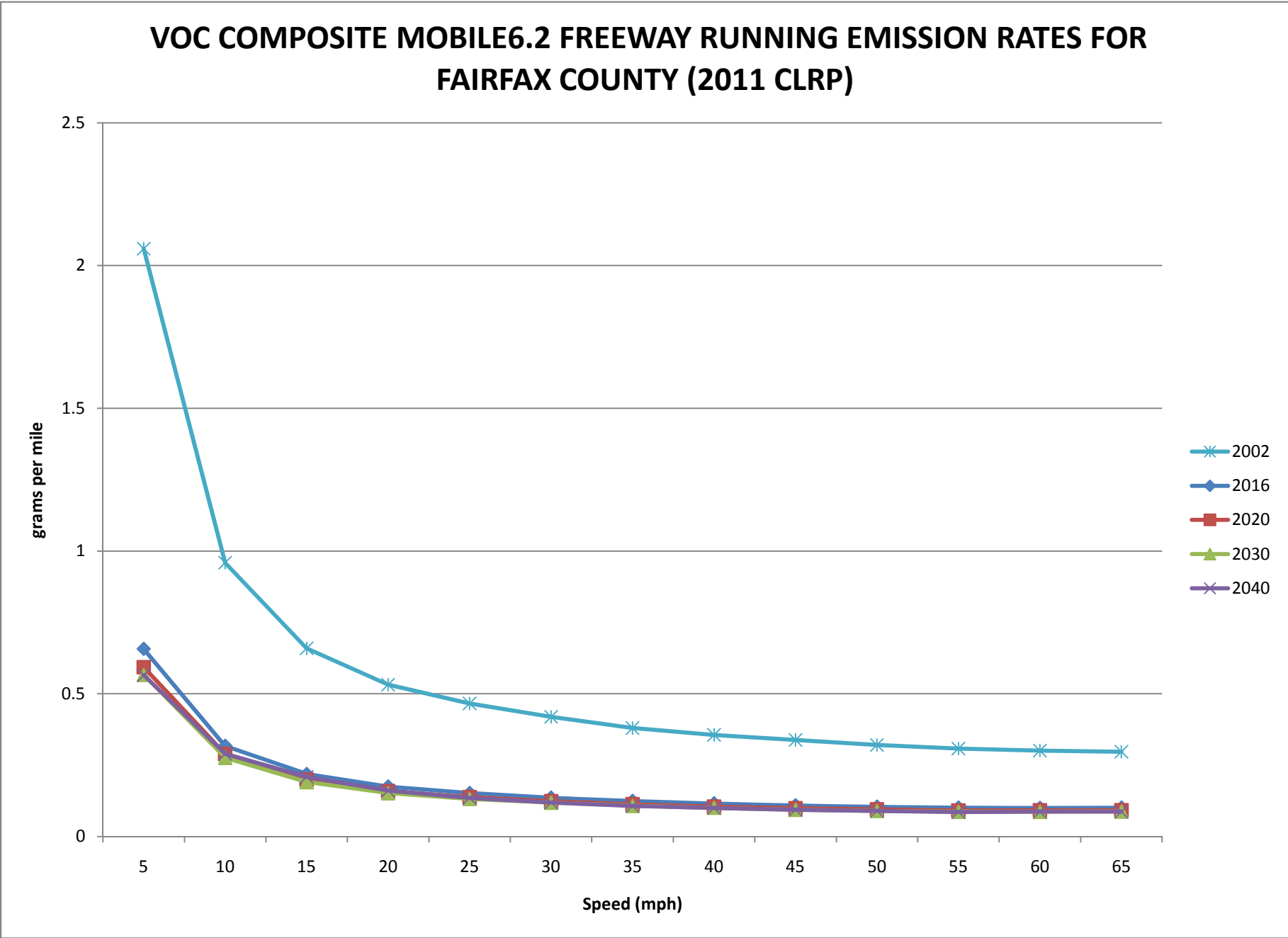
Ozone Season AWDT: 1.03

Winter Season AWDT: 0.96

PM2.5 Annual:

Season (ADT)	Factor
Season 1 (Jan- Apr)	0.9177
Season 2 (May- Sept)	0.9751
Season 3 (Oct- Dec)	0.9212

NOTE: AWDT reflects a five day average
ADT reflects a seven day average



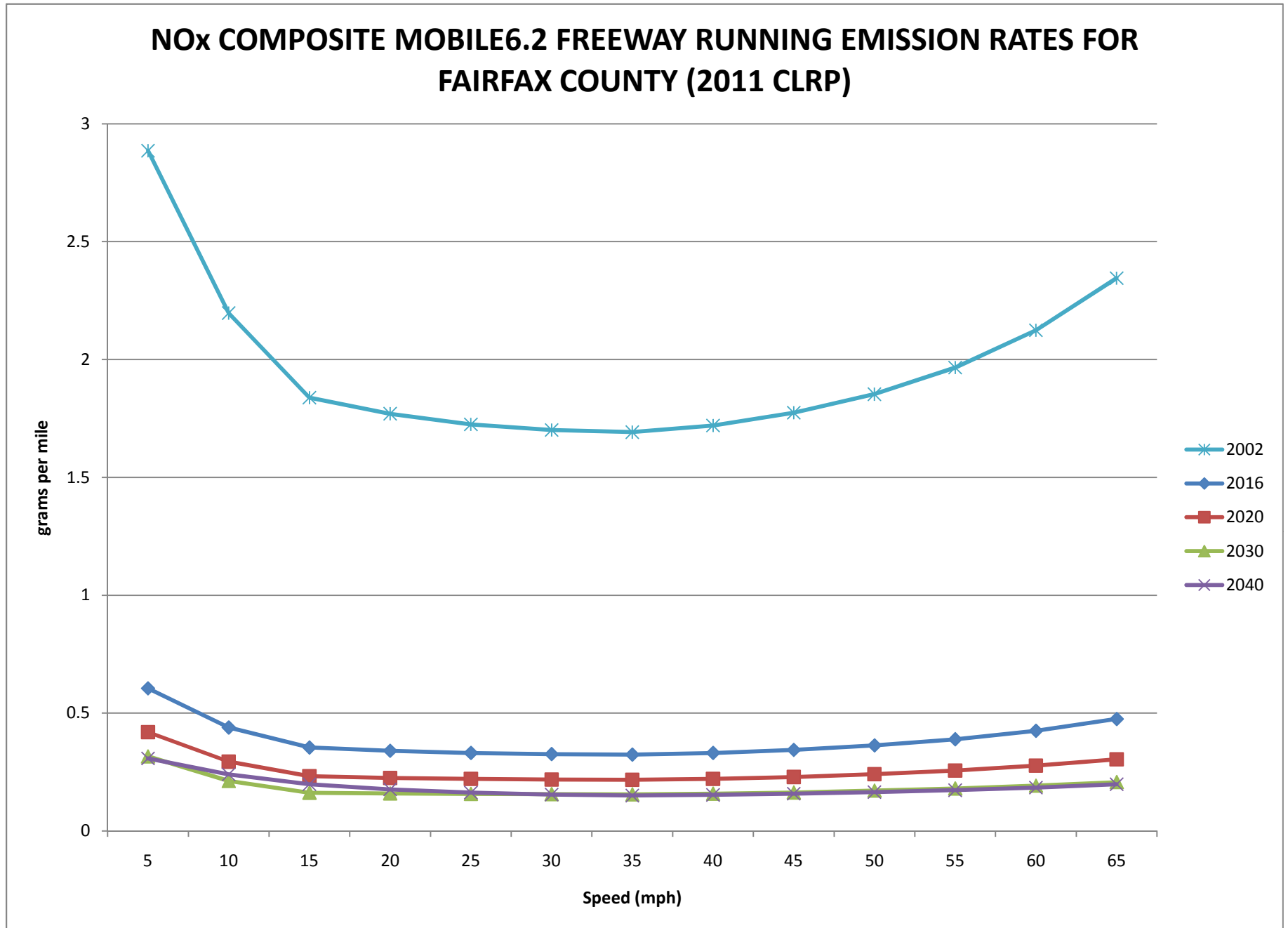


Exhibit 5 DIRECT PM_{2.5} EMISSION RATES FOR FAIRFAX COUNTY (MAJOR ROADS NETWORK)

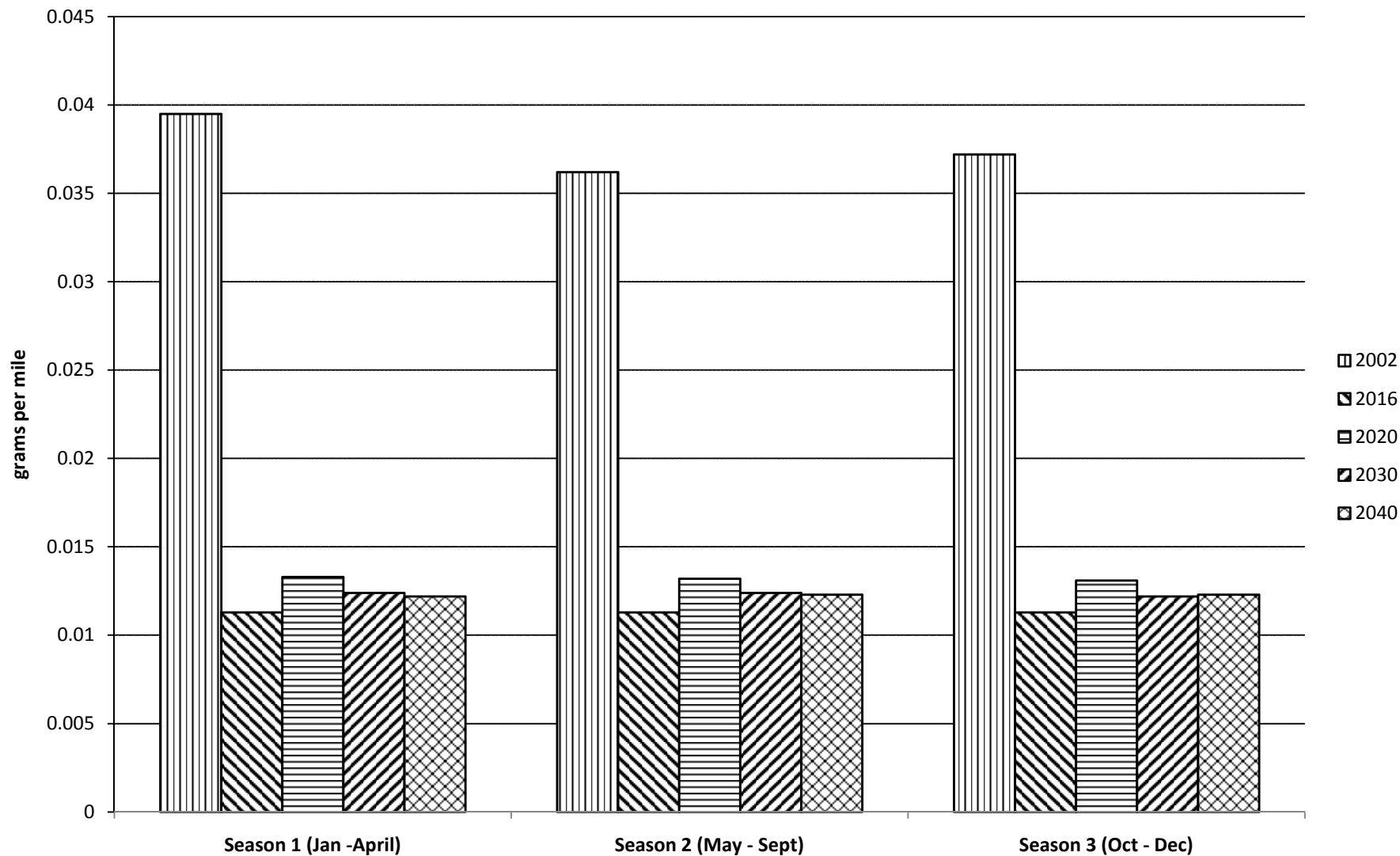


EXHIBIT 6

Mobile Source VOC Emissions for the 8-Hour Ozone Nonattainment Area 2011 CLRP

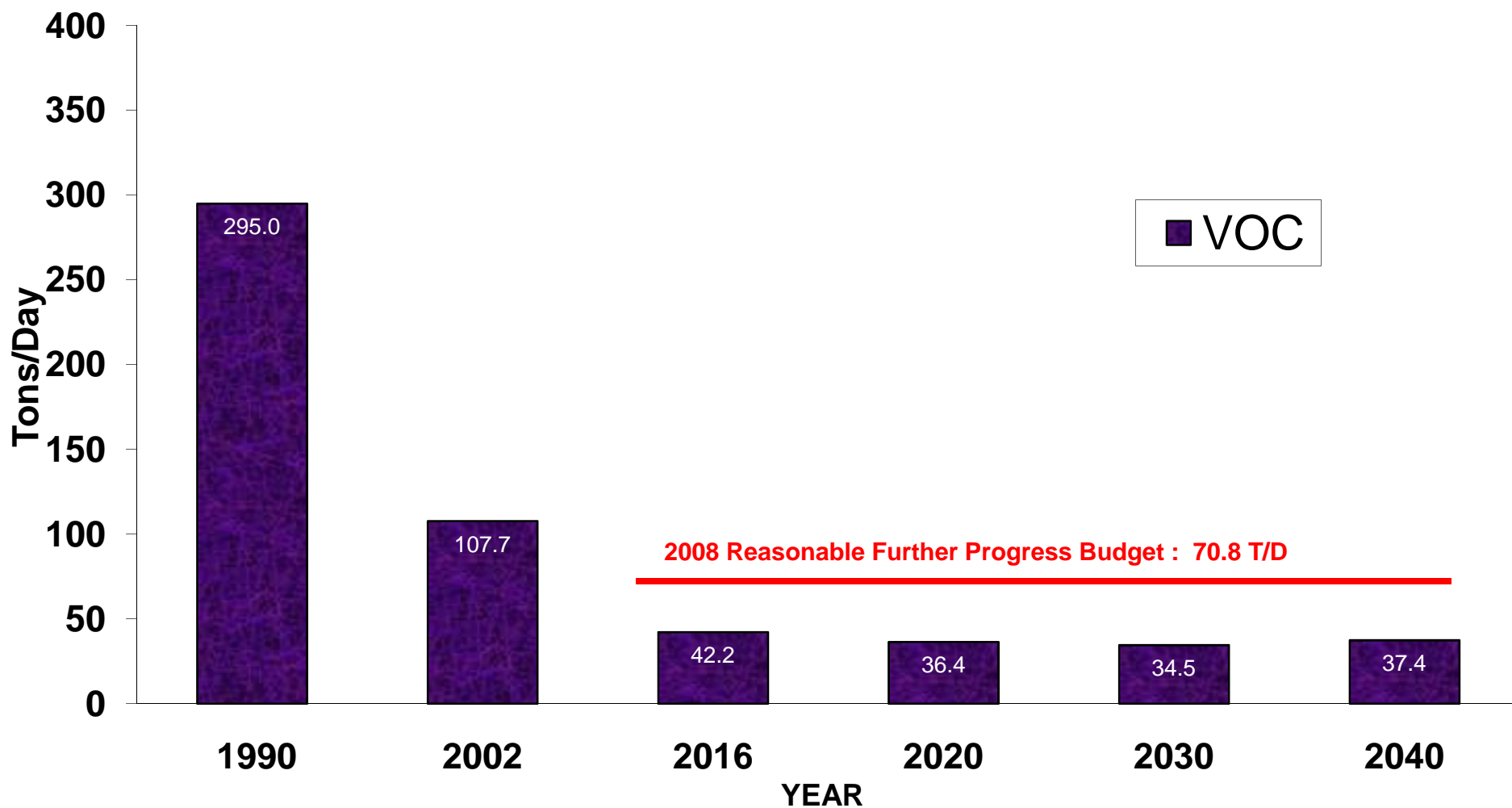


EXHIBIT 7

Mobile Source NOx Emissions for the 8-Hour Ozone Nonattainment Area 2011 CLRP



EXHIBIT 8

Mobile Source Emissions

2011 CLRP Precursor NOx

NOTE: The PM_{2.5} budgets have been submitted to EPA, but have not yet been deemed adequate for use in conformity. The region adheres to these budgets, even though it is not yet required.

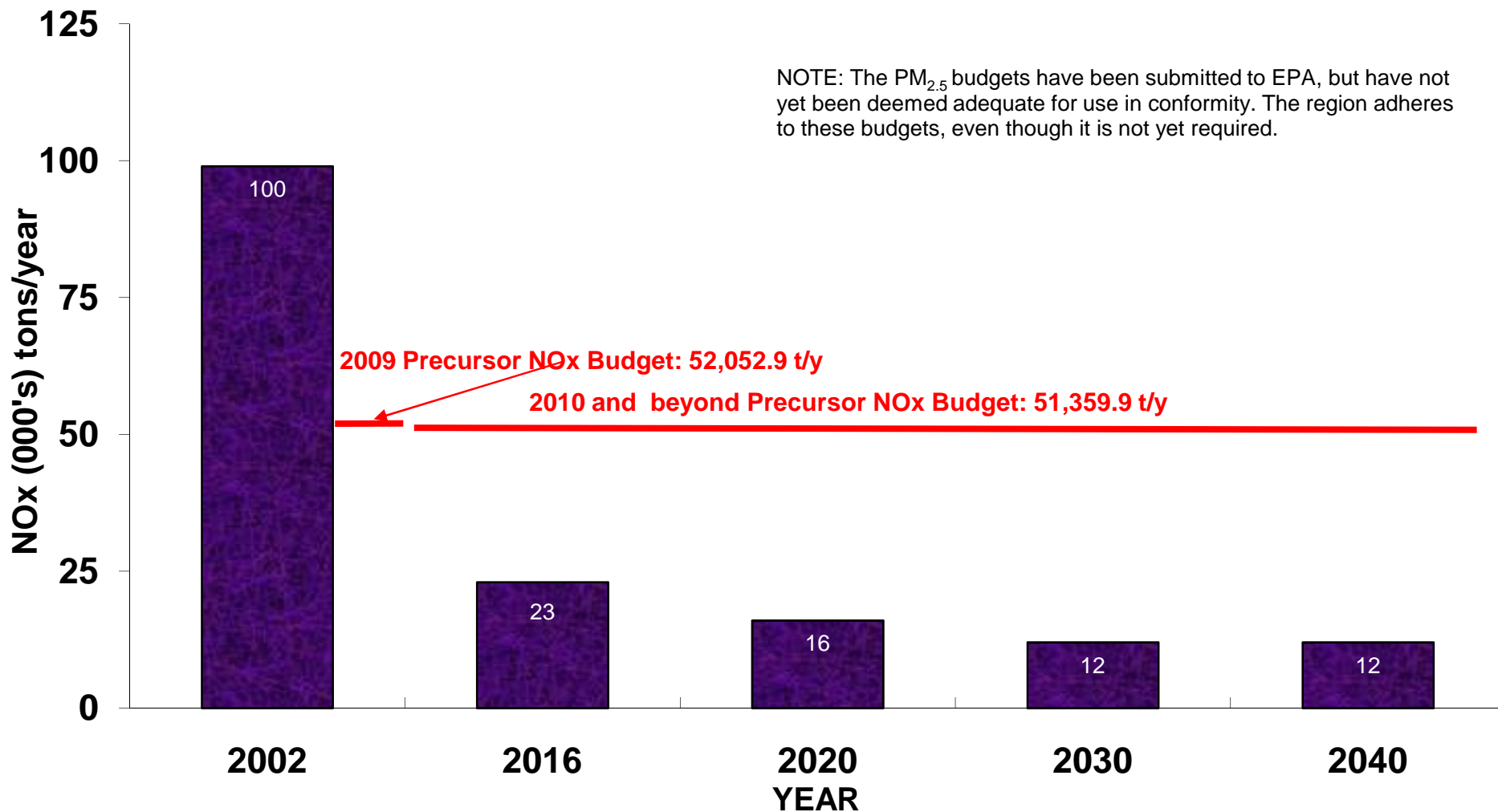
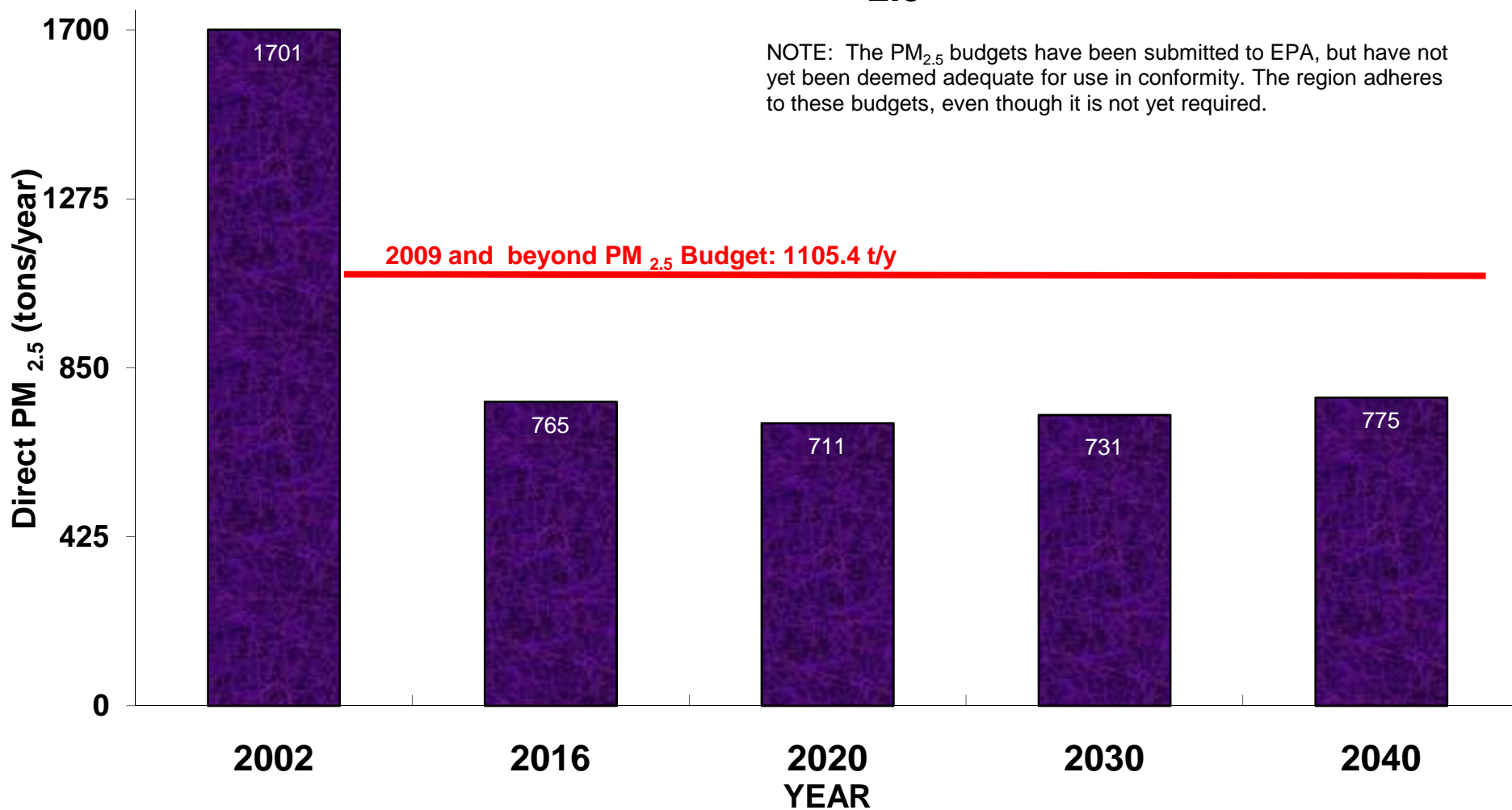


EXHIBIT 9

Mobile Source Emissions

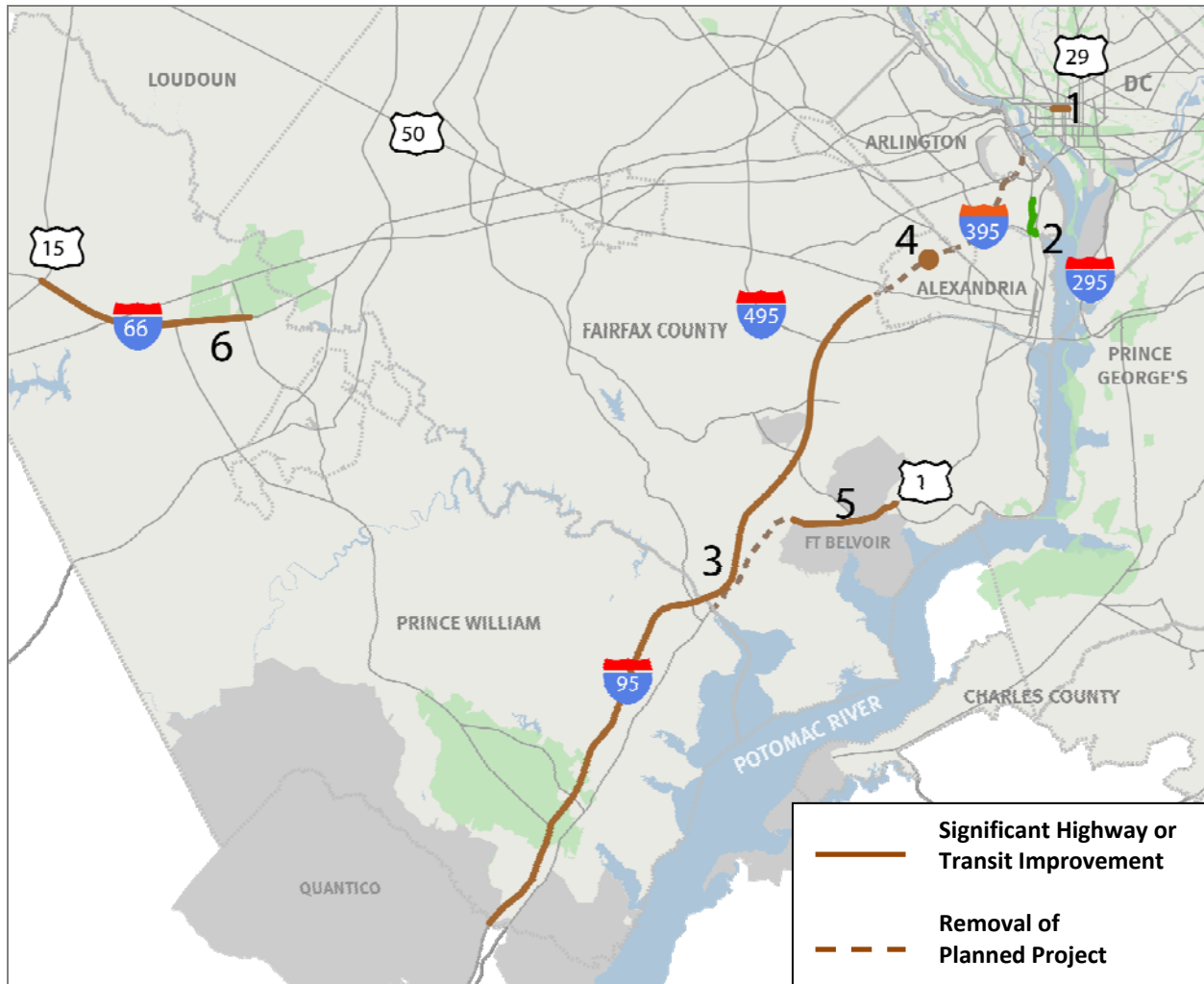
2011 CLRP

Direct PM_{2.5}



ATTACHMENT A

Significant Additions and Changes to The 2011 Update to the Financially Constrained Long-Range Transportation Plan



Significant Additions and Changes to the CLRP

1. H STREET, NW PEAK PERIOD BUS-ONLY LANE
2. CRYSTAL CITY – POTOMAC YARD STREETCAR
3. I-395/I-95 HOV AND HOT LANES PROJECT LIMIT CHANGES *
4. I-395 HOV LANES REVERSIBLE RAMP FROM/TO SEMINARY ROAD*
5. WIDENING OF US 1 PROJECT LIMIT CHANGE
6. WIDEN I-66 GENERAL PURPOSE AND HOV LANES*

* These projects were approved as amendments to the 2010 Update to the CLRP on July 18, 2011.

DISTRICT OF COLUMBIA

1. H Street, NW Peak Period Bus-Only Lane from 17th St. to New York Ave.

H Street NW is one-way, running eastbound between 17th Street and New York Avenue. Parking restrictions are in effect on both sides of the street during morning (7:00 – 9:30 a.m.) and evening (4:00 – 6:30 p.m.) peak periods, allowing for five lanes of traffic. This project proposes to use one of those five lanes as a bus-only lane during the peak periods.

Complete: 2012
Length: 0.5 mile
Cost: \$250,000
Funding: Local



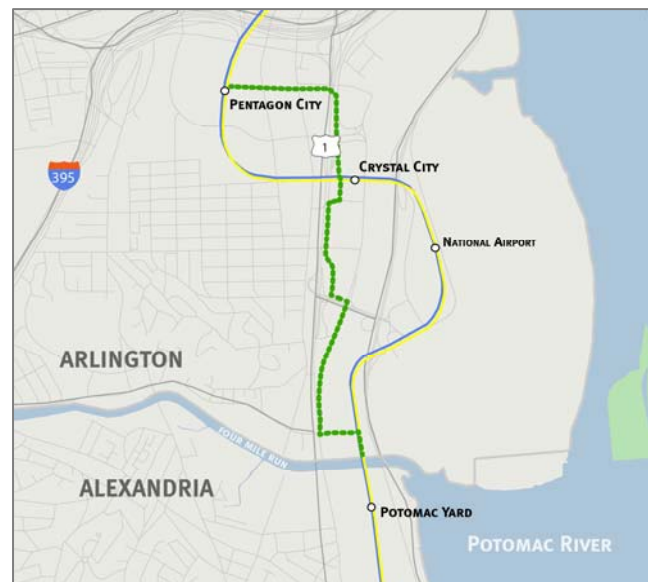
See the project description in Attachment A for more information.

VIRGINIA

2. Crystal City – Potomac Yard Streetcar in Arlington County

This project will construct and operate a streetcar system that runs parallel to US 1 (Jefferson Davis Highway) from the Pentagon City Metro station to Four Mile Run at the city limit of Alexandria. The CLRP currently includes an exclusive bus transitway project along most of the same route that is scheduled to open in 2013. The streetcar system will replace the bus service in 2018.

Complete: 2018
Length: 2.25 miles
Cost: \$160 million
Funding: Federal, state and local

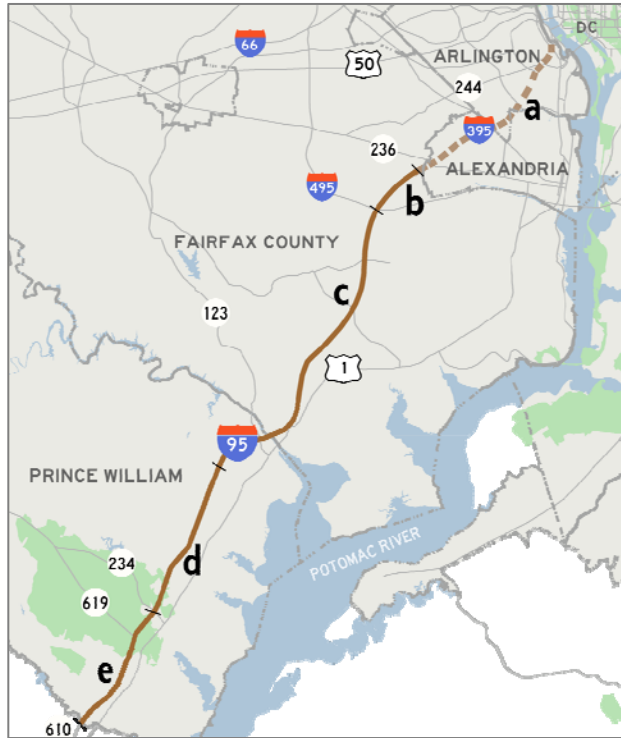


See the project description in Attachment A for more information.

The completion date of the Potomac Yard Metro Station is also being advanced from 2030 to 2017.

3. I-395/I-95 HOV and HOT Lanes from 2 miles north of I-495 to VA 610

This project is currently included in the CLRP as a system of High-Occupancy Toll, or HOT lanes between Eads Street in Arlington County and VA 610 (Garrisonville Road) in Stafford County. HOT lanes will be available to HOV-3, transit and emergency response vehicles free of charge. Other vehicles may use the facility by paying an electronic toll. Tolls will vary based on time of day, day of week, and level of congestion in order to maintain free-flow conditions. VDOT is proposing to reconfigure the project, including the elimination of the implementation of HOT lanes on I-395 inside the Capital Beltway. The changes are summarized in the table below:



Map Index	Current CLRP Project Includes	VDOT Proposed Change to Current CLRP Project	Description of Proposed Configuration
a	3 HOT Lanes	2 HOV Lanes	Eliminate the implementation of HOT lanes on I-395 inside the Capital Beltway
b	3 HOT Lanes	3 HOT Lanes (no change)	Widen the existing HOV facility from 2 to 3 lanes on I-395 from I-495 (Capital Beltway) to approximately 2 miles north, in the vicinity of Turkeycock Run and convert to HOT lanes
c	3 HOT Lanes	3 HOT Lanes	Widen the existing HOV facility from 2 to 3 lanes on I-95 from I-495 to VA 3000, Prince William Parkway and convert to HOT lanes
d	3 HOT Lanes	2 HOT Lanes	Convert the existing 2-lane HOV facility from VA 3000, Prince William Parkway to VA 234 (Dumfries Road) into HOT lanes
e	2 HOT Lanes	2 HOT Lanes (no change)	Construct 2 new HOT lanes from VA 234 (Dumfries Rd.) to VA 610 (Garrisonville Rd.)
f	2 HOT Lanes	2 HOT Lanes (no change)	Two HOT lanes will continue 10 miles south to the VA 17/US 1 Massaponax exit in Spotsylvania County. This portion of the project is outside the TPB's planning area and will be coordinated with the Fredericksburg area MPO (FAMPO).

I-395/I-95 HOV and HOT Lanes (continued)

Transit Service Plan

At this time, VDOT is also proposing to remove the elements of the transit service plan that had previously been included in the CLRP as a part of the I-95/I-395 HOV/Bus/HOT Lanes project. VDOT is working with local jurisdictions and transit agencies to develop a revised set of transit and transportation demand management (TDM) improvements for the corridor. These transit and TDM measures will be proposed as a separate project for inclusion in the CLRP at a later date. Please see the table that follows the CLRP project description form in Attachment A for a full listing of the elements from transit service plan being removed.

Complete: 2015
Length: 27 miles (not including southern portion from VA 610 to VA17/US 1)
Cost: \$1.01 billion
Funding: Federal, state, local and private

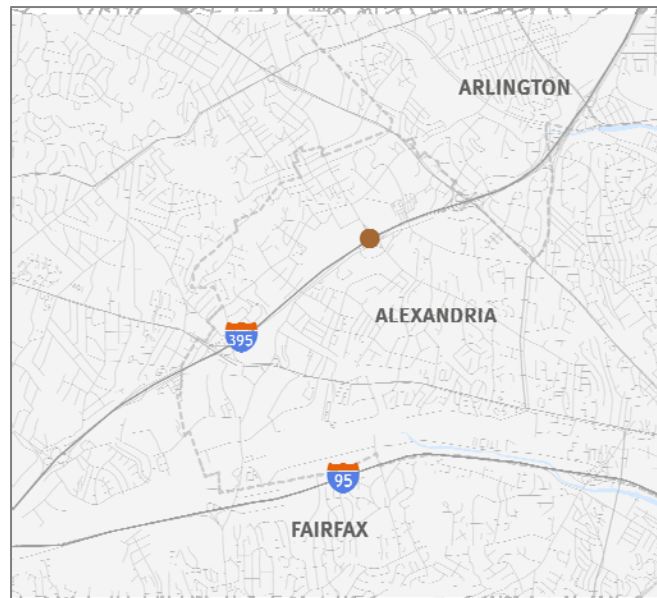
See the project description in Attachment A for more information.

Note: This project was included as an amendment to the CLRP on July 18, 2011.

4. I-395 HOV Lanes Reversible Ramp from/to Seminary Road

VDOT is proposing to construct a new reversible on/off ramp that connects Seminary Road and the I-395 HOV lanes to and from the south. This project adds HOV and transit access to accommodate the expected increase in travel generated by Department of Defense employees at the nearby Mark Center.

Complete: 2015
Cost: \$80 million
Funding: Federal and state



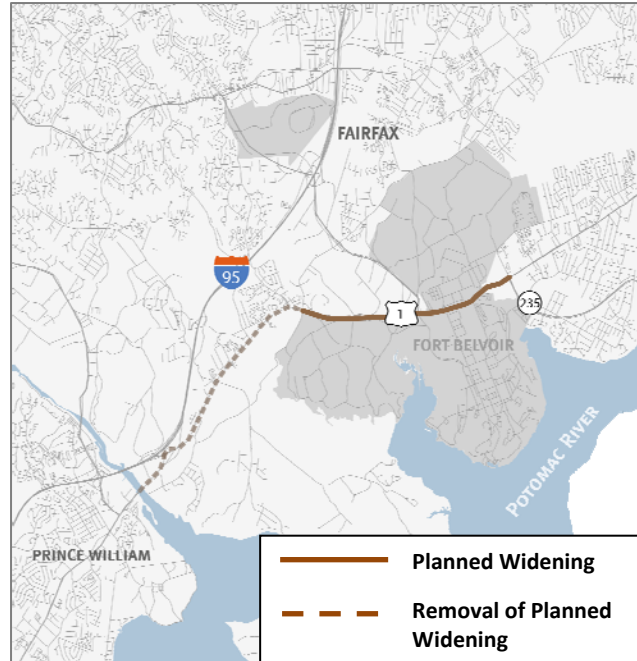
See the project description in Attachment A for more information.

Note: This project was included as an amendment to the CLRP on July 18, 2011.

5. Widening of US 1 – Project Limit Change from VA 235 South to VA 611

This project is currently included in the CLRP as a widening of US 1 (Richmond Highway) from 4 to 6 lanes from VA 235 South (Mt. Vernon Memorial Highway) to the Occoquan River/Prince William County Line. VDOT is proposing to remove approximately 4 miles of widening from the southern end of the project and change the southern limit to VA 611 (Telegraph Road).

Complete: 2020
Length: 3.5 miles
Funding: Federal and state

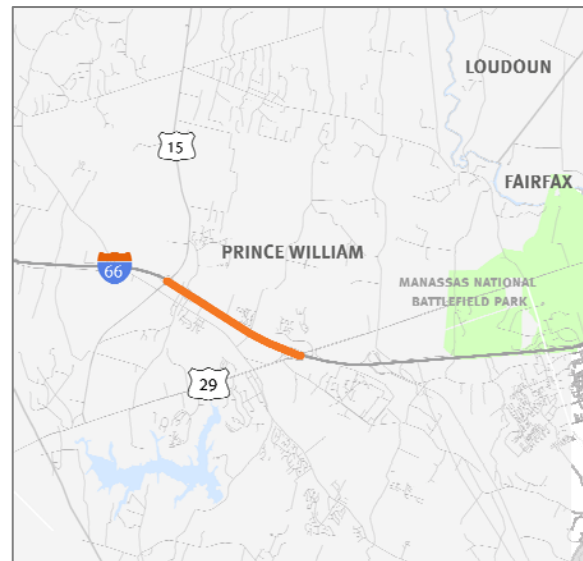


See the project description in Attachment A for more information.

6. Widen I-66 General Purpose and HOV Lanes from US 15 to US 29 (near Gainesville)

This project is currently included in the CLRP as a widening to construct HOV Lanes on I-66 between US 15 (James Madison Highway) and US 29 (Lee Highway) in Gainesville. VDOT is proposing to also add an additional general purpose lane in each direction to I-66 within the same limits. The completion date of the project is advancing from 2020 to 2018.

Length: 2.5 miles
Complete: 2018
Cost: \$131.9 million
Funding: Federal



See the project description in Attachment A for more information.

Note: This project was included as an amendment to the CLRP on July 18, 2011.

ATTACHMENT B

HOUSEHOLD DATA

MSA:	2002	2016	2020	2030	2040	2040/2002
D.C.	250368	289210	296765	317235	338980	1.35
MONTGOMERY	333721	381202	398000	438000	463000	1.39
PR.GEORGES	293125	321489	331066	348806	360110	1.23
ARLINGTON	89022	109350	114382	121341	124207	1.40
ALEXANDRIA	63658	69544	73678	82884	90555	1.42
FAIRFAX	373857	423440	442272	479839	502041	1.34
LOUDOUN	70936	115614	127409	150209	158299	2.23
PR. WILLIAM	120216	175818	188801	214454	231495	1.93
FREDERICK	73839	97562	104139	123125	147529	2.00
CHARLES	43963	58877	64299	75847	85901	1.95
STAFFORD	31991	53467	59037	72712	86205	2.69
CALVERT	27231	34648	36027	38348	40301	1.48
SUBTOTAL	1,771,927	2,130,221	2,235,875	2,462,800	2,628,623	1.48
ADDITIONAL COUNTIES:						
HOWARD	94669	119279	125600	135486	137773	1.46
ANNE ARUNDEL	184157	212270	217782	229371	234332	1.27
CARROLL	55264	66475	69614	76111	81464	1.47
FREDERICKSBURG (VA)	8372	11852	12462	13971	15469	1.85
JEFFERSON	17015	23743	25957	33075	41527	2.44
N. SPOTSYLVANIA	26738	44243	48536	58796	68631	2.57
FAUQUIER	21446	31932	35730	47502	63154	2.94
CLARKE	5162	6483	6722	7487	8308	1.61
K. GEORGE	6698	10358	11411	14030	16659	2.49
ST. MARY'S	32358	45406	49352	58143	66509	2.06
SUBTOTAL	451,879	572,041	603,166	673,972	733,826	1.62
TOTAL	2,223,806	2,702,262	2,839,041	3,136,772	3,362,449	1.51

SOURCE:

MWCOG Round 8.0a Cooperative Forecasts

BMC Round 7-C Cooperative Forecasts

GWRC/FAMPO Regional Demographic Control Forecasts for 2035 CLRP, June 2008

Tri-County Council for Southern Maryland data for Calvert, Charles and St. Mary's

EMPLOYMENT DATA

MSA:	2002	2016	2020	2030	2040	2040/2002
D.C.	746305	831978	868256	923988	977163	1.31
MONTGOMERY	483874	548995	585000	673000	723000	1.49
PR. GEORGES	342830	372836	383635	419635	474635	1.38
ARLINGTON	187611	223332	243835	268606	281120	1.50
ALEXANDRIA	95861	118958	124115	142257	160447	1.67
FAIRFAX	624887	738102	788508	863803	917484	1.47
LOUDOUN	104548	175340	206458	257195	285415	2.73
PR. WILLIAM	127700	171087	188769	232597	280697	2.20
FREDERICK	106624	152823	158278	167257	175109	1.64
CHARLES	48557	69099	71731	77537	83138	1.71
STAFFORD	32668	49828	54627	65101	74224	2.27
CALVERT	26637	41736	44457	47159	48955	1.84
SUBTOTAL	2,928,102	3,494,114	3,717,669	4,138,135	4,481,387	1.53
ADDITIONAL COUNTIES:						
HOWARD	140776	183911	194977	221168	231902	1.65
ANNE ARUNDEL	260720	313692	329042	358320	370904	1.42
CARROLL	57356	69854	70813	72456	74090	1.29
FREDERICKSBURG (VA)	23746	32013	34848	41034	46360	1.95
JEFFERSON	17010	24093	26115	30675	35780	2.10
N. SPOTSYLVANIA	29775	39756	43578	51966	59240	1.99
FAUQUIER	22308	31551	35762	43360	52578	2.36
CLARKE	6077	7328	7685	8550	9518	1.57
K. GEORGE	9345	11732	13150	16390	19339	2.07
ST. MARY'S	49613	64715	67268	71969	75862	1.53
SUBTOTAL	616,726	778,645	823,238	915,888	975,573	1.58
TOTAL	3,544,828	4,272,759	4,540,907	5,054,023	5,456,960	1.54

SOURCE:

MWCOG Round 8.0a Cooperative Forecasts
 BMC Round 7-C Cooperative Forecasts
 GWRC/FAMPO Regional Demographic Control Forecasts for 2035 CLRP, June 2008
 Tri-County Council for Southern Maryland data for Calvert, Charles and St. Mary's

NOTE: Includes Census Adjustment

ATTACHMENT C

National Capital Region Transportation Planning Board

777 North Capitol Street, N.E., Suite 300, Washington, D.C. 20002-4290 (202) 962-3310 Fax: (202) 962-3202

October 6, 2011

MEMORANDUM

TO: TPB Technical Committee

FROM: Jane A. Posey
Transportation Engineer

SUBJECT: Defining Regional Significance for Conformity

Transportation projects that are defined as “regionally significant” must be included in an air quality conformity analysis before they may be included in the Constrained Long Range Plan (CLRP) or Transportation Improvement Program (TIP). Currently, any project that changes a link in the regional highway or transit network is considered “regionally significant”. With the recent development of a finer-grain zone system, including a more detailed street base and splitting of links to add new connectors to zone centroids, it is necessary to redefine “regionally significant” in order to maintain the same threshold for “regionally significant” as in the past conformity procedures. The conformity regulations define regional significance as follows:

Regionally significant project means a transportation project (other than an exempt project) that is on a facility which serves regional transportation needs (such as access to and from the area outside of the region, major activity centers in the region, major planned developments such as new retail malls, sports complexes, etc., or transportation terminals as well as most terminals themselves) and would normally be included in the modeling of a metropolitan area’s transportation network, including at a minimum all principal arterial highways and all fixed-guideway transit facilities that offer an alternative to regional highway travel.

The following proposed new definition of a “regionally significant” project has been developed to meet the requirements of the conformity regulations while maintaining the same threshold for “regional significance” as in past conformity procedures:

- 1) Any project on a facility that is included in the coded regional network that adds or removes at least one continuous vehicular lane from one major road to the next, or adds a new access/egress location or capacity; or
- 2) Any transit project that adds or modifies fixed-guideway transit facilities (heavy rail, light rail, streetcar, bus rapid transit)

The new definition will be used for all future air quality conformity analysis, starting with the conformity analysis of the 2011 CLRP.

ATTACHMENT D

COMING SOON