



# NATIONAL CAPITAL REGION

---

## TRANSPORTATION PLANNING BOARD

### MEMORANDUM

September 26, 2014

**DRAFT**

**To: Transportation Planning Board**

**From: Jane Posey  
Senior Transportation Engineer**

**Subject: Air Quality Conformity Analysis for the 2014 Constrained Long Range Plan (CLRP) and the FY2015-2020 Transportation Improvement Program (TIP)**

### INTRODUCTION

This memo documents summary results of the air quality conformity analysis of the 2014 CLRP and FY2015-2020 TIP with respect to the following pollutants: (1) ground level ozone precursors- Volatile Organic Compounds (VOC) and Nitrogen Oxides (NO<sub>x</sub>), (2) fine particulate matter – PM<sub>2.5</sub> direct and PM<sub>2.5</sub> Precursor NO<sub>x</sub>, and (3) Wintertime Carbon Monoxide (CO). A summary description of the emissions threshold (budgets) for these pollutants is provided below.

- Ozone Season VOC and NO<sub>x</sub>.** On May 21, 2012 EPA designated the Metropolitan Washington, DC, (DC-MD-VA) region as ‘marginal’ nonattainment for the 2008 ozone National Ambient Air Quality Standards (NAAQS). Under a ‘marginal’ designation it is not necessary to develop updated mobile budgets; however, the region must still adhere to those currently approved by EPA under the old 1997 standard. The currently approved budgets for VOC and NO<sub>x</sub> were submitted to the EPA by the Metropolitan Washington Air Quality Committee (MWAQC) in 2007, as part of an 8-hour ozone SIP, responding to the 1997 Ozone Standard, under which the region was designated as ‘moderate’. On February 7, 2013 EPA found adequate the 2009 Attainment and 2010 Contingency budgets included in this SIP. The budgets are 66.5 tons/day of Volatile Organic Compounds (VOC) and 146.1 tons/day of Nitrogen Oxides (NO<sub>x</sub>) for the 2009 Attainment Plan and 144.3 tons/day of NO<sub>x</sub> for the 2010 Contingency Plan.
- Fine Particles (PM<sub>2.5</sub>).** On December 17, 2004 EPA designated the Metropolitan Washington, DC, (DC-MD-VA) region as nonattainment for the 1997 Fine Particles NAAQS. The region developed and submitted an Attainment SIP with motor vehicle emissions budgets for PM<sub>2.5</sub> direct and PM<sub>2.5</sub> Precursor NO<sub>x</sub>. On January 12, 2009, however the EPA determined that the region had attained the 1997 PM<sub>2.5</sub> NAAQS and issued a clean data determination for the area. The region subsequently withdrew the PM<sub>2.5</sub> Attainment SIP and decided to seek redesignation as a Maintenance Area for the 1997 PM<sub>2.5</sub> Fine Particles NAAQS. On May 22, 2013 MWAQC approved a PM<sub>2.5</sub> Redesignation Request and a Maintenance Plan for the Washington region. This Maintenance Plan includes forecast year mobile budgets for PM<sub>2.5</sub> direct and PM<sub>2.5</sub> Precursor NO<sub>x</sub> for 2017 and 2025. On April 28, 2014, EPA found these mobile budgets adequate for use in conformity analyses, with an effective date of May 13, 2014, so these budgets will be used for the first time officially in

777 North Capitol Street NE, Suite 300, Washington, DC 20002-4290

Web: [www.mwcog.org/tpb](http://www.mwcog.org/tpb) Phone: (202) 962-3315 Fax: (202) 962-3202

the conformity analysis of the 2014 CLRP. The Maintenance Plan includes two tiers of mobile budgets. Tier 1 budgets were based on mobile emission inventory projections for 2017 and 2025, and are applicable with EPA's adequacy finding. Tier 2 budgets were developed by adding a 20% buffer to the mobile emission inventory projections for 2017 and 2025. The Tier 2 mobile budgets will become effective if it is determined that technical uncertainties primarily due to model changes and to vehicle fleet turnover, which may affect future motor vehicle emissions inventories, lead to motor vehicle emissions estimates above the Tier 1 budgets. The determination to use the Tier 2 budgets will be made through the interagency consultation process. Tier 1 mobile budgets are 1,787 tons/year for 2017 PM<sub>2.5</sub> direct, 1,350 tons/year for 2025 PM<sub>2.5</sub> direct, 41,709 tons/year for 2017 PM<sub>2.5</sub> Precursor NO<sub>x</sub>, and 27,400 tons/year for 2025 PM<sub>2.5</sub> Precursor NO<sub>x</sub>. Tier 2 mobile budgets are 2,144 tons/year for 2017 PM<sub>2.5</sub> direct, 1,586 tons/year for 2025 PM<sub>2.5</sub> direct, 50,051 tons/year for 2017 PM<sub>2.5</sub> Precursor NO<sub>x</sub>, and 32,880 tons/year for 2025 PM<sub>2.5</sub> Precursor NO<sub>x</sub>.

- **Wintertime CO.** The region is designated as a Maintenance Area for mobile source wintertime CO, and is required to show that CO emissions from on-road mobile sources do not exceed the approved budget of 1671.5 tons/day.

**The regional air quality conformity analysis of the projects and programs in the 2014 CLRP and FY2015-2020 TIP shows that mobile emissions are within the mobile budgets for all analysis years for all pollutants.**

The results, based upon analyses contained in the full technical report, of the [Air Quality Conformity Analysis of the 2014 Constrained Long Range Plan and FY2015-2020 Transportation Improvement Program for the Washington Metropolitan Region](#), were released for public comment and interagency consultation on September 11, 2014. The public comment period ends on October 11, 2014.

## **BACKGROUND**

The Transportation Planning Board (TPB) approved the Scope of Work and project submissions for the 2014 CLRP and FY2015-2020 TIP air quality conformity analysis on April 16, 2014.

Key technical inputs and tools include:

- New Cooperative Land Activity Forecasts- Round 8.3
- New Project and Updates to Existing Project Submissions
- The Version 2.3.57 Travel Demand Model including a 3722 Transportation Analysis Zones (TAZ) area system
- 2011 Vehicle Registration Data with an updated vehicle population forecasting methodology
- EPA's MOVES 2010a Emissions Estimation Model
- Updated MOVES Inputs: fuel supply and formulation, Meteorology, and Inspection & Maintenance Program data

## **WORK ACTIVITIES**

Inventories were developed for each pollutant for five forecast years (2015, 2017, 2025, 2030 and 2040). Ozone season pollutants (VOC and NO<sub>x</sub>) and wintertime CO are inventoried for average weekday conditions, and PM<sub>2.5</sub> precursor NO<sub>x</sub> and PM<sub>2.5</sub> direct are inventoried to reflect

emissions on a yearly total basis. These inventories address a primary conformity assessment criterion to demonstrate that emissions associated with the plan do not exceed the SIP budgets approved or found adequate for use in regional air quality conformity analyses.

### **CLRP Projects**

Attachment A lists the major changes to the conformity project inputs since the 2013 CLRP. A complete list of highway and transit projects with updates as approved by the TPB included in the conformity analysis is shown in Appendix B of the full technical report.

### **Land Activity Forecasts**

The COG Board approved the draft Round 8.3 Cooperative Forecasts for use in the air quality conformity analysis of the 2014 CLRP and FY2015-2020 TIP in February, 2014. This update from Round 8.2 includes changes in the District, as well as Frederick, Fairfax, Loudoun, and Prince William counties. Generally Round 8.3, has slightly higher region-wide projections of households, population, and employment by 2040 when compared to Round 8.2. It also includes updates from the Baltimore region (BMC Round 8) for Anne Arundel, Howard, and Carroll counties. Attachment B shows a summary of the Round 8.3 data.

### **Travel Modeling Process**

Travel demand forecasts were developed for each of the analysis years using the Version 2.3.57 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 Travelled (VMT) results through time for each conformity analysis year, for the full modeled area.

### **MOVES**

MOVES (MOTOR Vehicle Emissions Simulator) is a software program developed by the US Environmental Protection Agency (EPA) to estimate air pollution emissions from on-road mobile sources. Officially released in 2010, the MOVES model version, MOVES2010, replaced the previous on-road emissions model, MOBILE6.2. MOVES2010a, a subsequent release of the program, was used in this conformity analysis, as it was for the conformity analysis of the 2013 CLRP.

### **MOVES Inputs**

Inputs to the MOVES model include both transportation and environmental data. Transportation data include travel information from the travel demand model, such as VMT and speed distributions. They also include vehicle population data, which is derived from Vehicle Identification Number (VIN) based registration records from the District, Maryland, and Virginia Departments of Motor Vehicles (DMV). Environmental data include fuel supply and formulation, meteorology data, and state Inspection and Maintenance (I/M) program information.

Outputs from the travel demand model served as inputs to the MOVES model after a post-model

processing phase in order to become MOVES-compatible. Average annual weekday VMT and trip data generated by the travel demand model are adjusted by a post processor to create annual county-level VMT estimates for the MOVES model. VMT are defined as Annual VMT and VMT by facility type. The annual VMT for MOVES input is based on 6 HPMS vehicle types. The VMT by facility type is stratified by MOVES vehicle type (13 categories) and road type (5 categories). Average vehicle speeds are stratified by vehicle type, road type, time of day, and type of day (i.e. weekday vs. weekend). Bus VMT and Auto Access to Transit VMT are added into the mix.

The 2011 VIN vehicle population profile – consisting of age and vehicle type distributions -- served as the basis to develop future year vehicle population distributions. Trendlines, which were derived from actual vehicle population data from the period 1975-2011, served as the basis for developing total vehicle population projections – by jurisdiction -- for the analysis years. As a departure from previous conformity cycles, future year vehicle population projections are no longer derived using growth rates; instead, they are derived directly from the trendlines' equations. The updated methodology is documented in a separate brief technical memorandum, which is available for review.

Inputs related to fuel supply and formulation and Inspection/Maintenance programs are provided directly from the state air agencies in MOVES format through the MWCOG Department of Environmental Programs (DEP). Meteorology inputs are developed by the MWCOG/DEP staff and supplied as hourly records of temperature and relative humidity in MOVES format.

As part of the 2014 CLRP conformity analysis, meteorology data for the Fine Particles' analyses was updated – from what was used during the 2013 CLRP conformity analysis -- in order to be consistent with what was used in the PM<sub>2.5</sub> Maintenance Plan since the recently found adequate PM<sub>2.5</sub> mobile budgets now apply for conformity. In addition, the state air agencies provided updated Inspection/Maintenance and fuel inputs updates reflecting Tier III-related gasoline sulfur content reductions, a change to Reid Vapor Pressure (RVP) data for Maryland jurisdictions, and a technical correction in the data for the Maryland jurisdictions.

## **Mobile Emissions Inventories**

### **Ozone Season and Wintertime CO – Daily Emissions**

Ozone season emissions totals are illustrated in Exhibits 3 and 4. Wintertime CO emissions totals are shown in Exhibit 7. The emissions are shown in relation to the approved mobile budget for each pollutant. Ozone Season emissions reductions through time are attributed to cleaner vehicles and fuel standards, including Tier 2 federal standards, Tier 3 fuel formulation, and related emissions reductions/control programs. Tier 3 engine improvements are not included in this conformity analysis because MOVES2010a cannot account for those reductions. The Tier 3 engine improvements will be included once the region adopts MOVES2014 for used in conformity analyses.

### **PM<sub>2.5</sub> – Yearly Emissions**

PM<sub>2.5</sub> direct and PM<sub>2.5</sub> Precursor NO<sub>x</sub> emissions totals are illustrated in Exhibits 5 and 6. The PM<sub>2.5</sub> direct and PM<sub>2.5</sub> Precursor NO<sub>x</sub> emissions are shown in relation to the Tier 1 level mobile budgets contained in the region's PM<sub>2.5</sub> Maintenance SIP. The Tier 2 level mobile budgets for these pollutants are available for conformity on an as/if needed basis. Current analysis indicates

no such need and, as such, Tier 1 level budgets are in effect and are the only ones included on the graphs. The emissions reductions through time are attributed to cleaner vehicles and fuel standards, including Tier 2 federal standards, Tier 3 fuel formulation, and the heavy duty engine rule.

#### Emissions Inventories vs. Budgets

Exhibits 3-7 display net emissions for each forecast year. The charts show that the mobile emissions are within the mobile budgets for ozone season pollutants, fine particles pollutants, and Wintertime CO for all forecast years.

#### TERMs

Transportation Emission Reduction Measures (TERMs) are strategies or actions that the TPB and/or its member agencies can employ to offset increases in emissions from mobile sources. All TERMs are intended to reduce motor vehicle emissions by reducing either the number of vehicle trips (VT), vehicle miles traveled (VMT), or both. These strategies may include ridesharing and telecommuting programs, improved transit and bicycling facilities, clean fuel vehicle programs or other possible actions.

TERMs analyzed for the 2014 CLRP conformity analysis were grouped into four categories:

- TPB Commuter Connections Program
- Regional Incident Management Program
- Pedestrian Facilities Expansions & Enhancements
- Freeform Carpooling (Slug Lots)

Exhibit 7 lists the emission reduction potential of these TERMs, by pollutant, for each analysis year. The benefits of these projects are not included in the emissions totals in this report, but are available, if necessary, to ensure that regional emissions stay below the approved motor vehicle emissions budgets and also help offset future growth in mobile emissions.

#### **COMMENTS / RESPONSE TO COMMENTS**

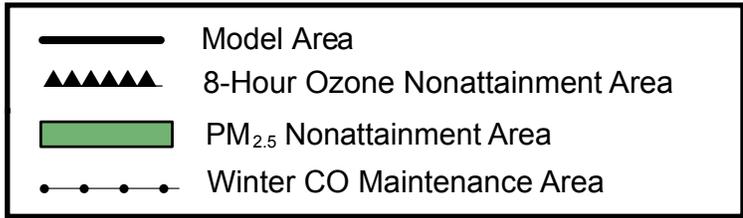
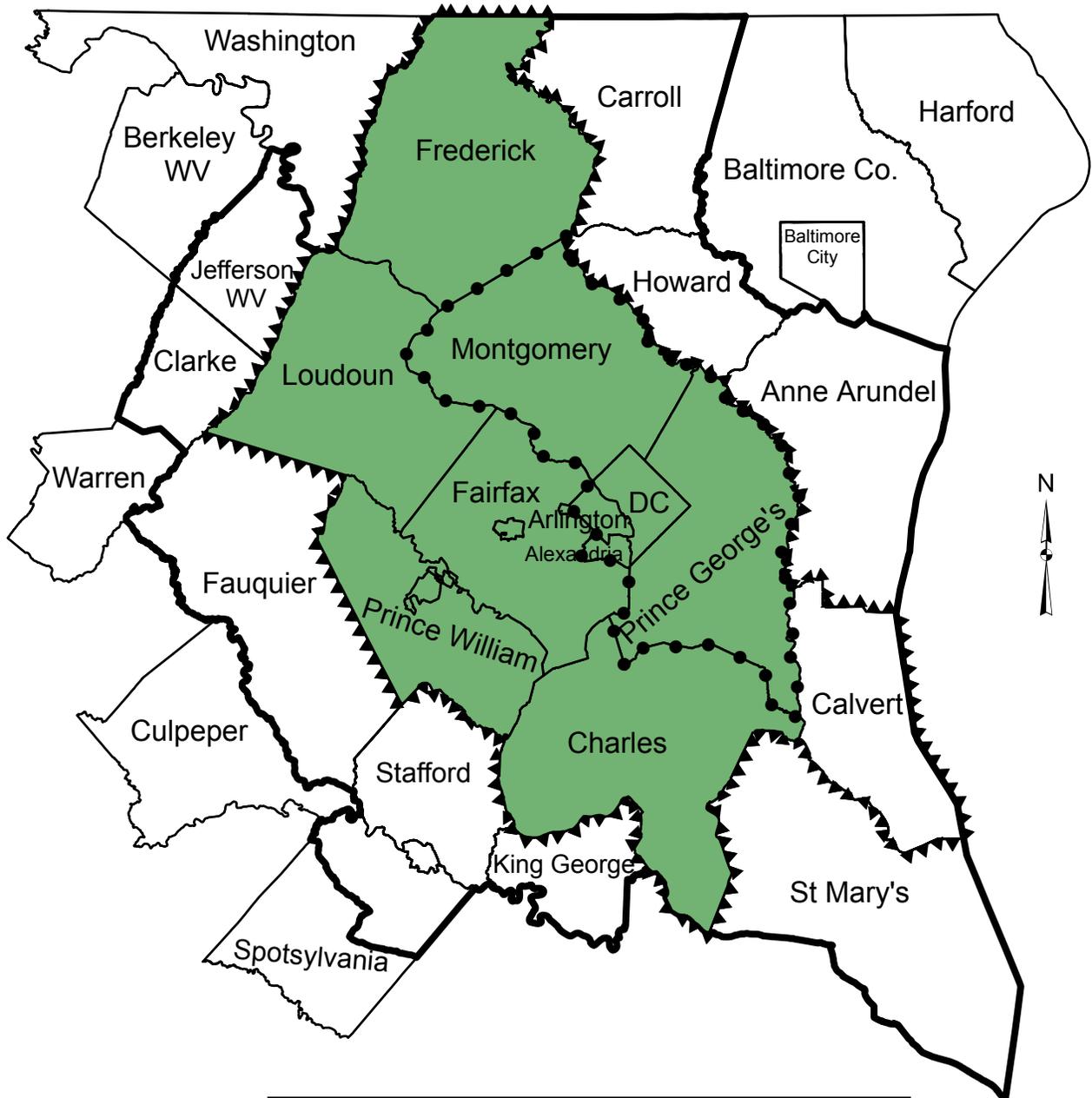
#### **SUMMARY**

The analytical results described in this air quality analysis provide a basis for a determination by the TPB of conformity of the 2014 CLRP and FY2015-2020 TIP.

Following: Exhibits 1- 8  
Attachments A - B

# EXHIBIT 1

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



**EXHIBIT 2**

**AIR QUALITY CONFORMITY  
Travel Demand Summary  
Modeled Area Trips and Vehicle Miles Traveled (000's)  
Average Weekday Traffic (AWDT)**

	<u>2015</u>	<u>2017</u>	<u>2025</u>	<u>2030</u>	<u>2040</u>
<b>Transit Trips</b>	1,175.1	1,235.9	1,399.9	1,450.1	1,548.0
<b>Vehicle Trips</b>	16,847.4	17,168.1	18,471.2	19,208.0	20,438.0
<b>VMT</b>	167,728.8	171,082.0	186,310.1	194,932.0	207,557.3

NOTE: The Mobile Budget shown was developed in 2007, as part of the 8-Hour Ozone SIP, in response to the 1997 Ozone Standard. This budget, as the most current approved by EPA, is required for use in any conformity analysis assessing ozone season pollutants.

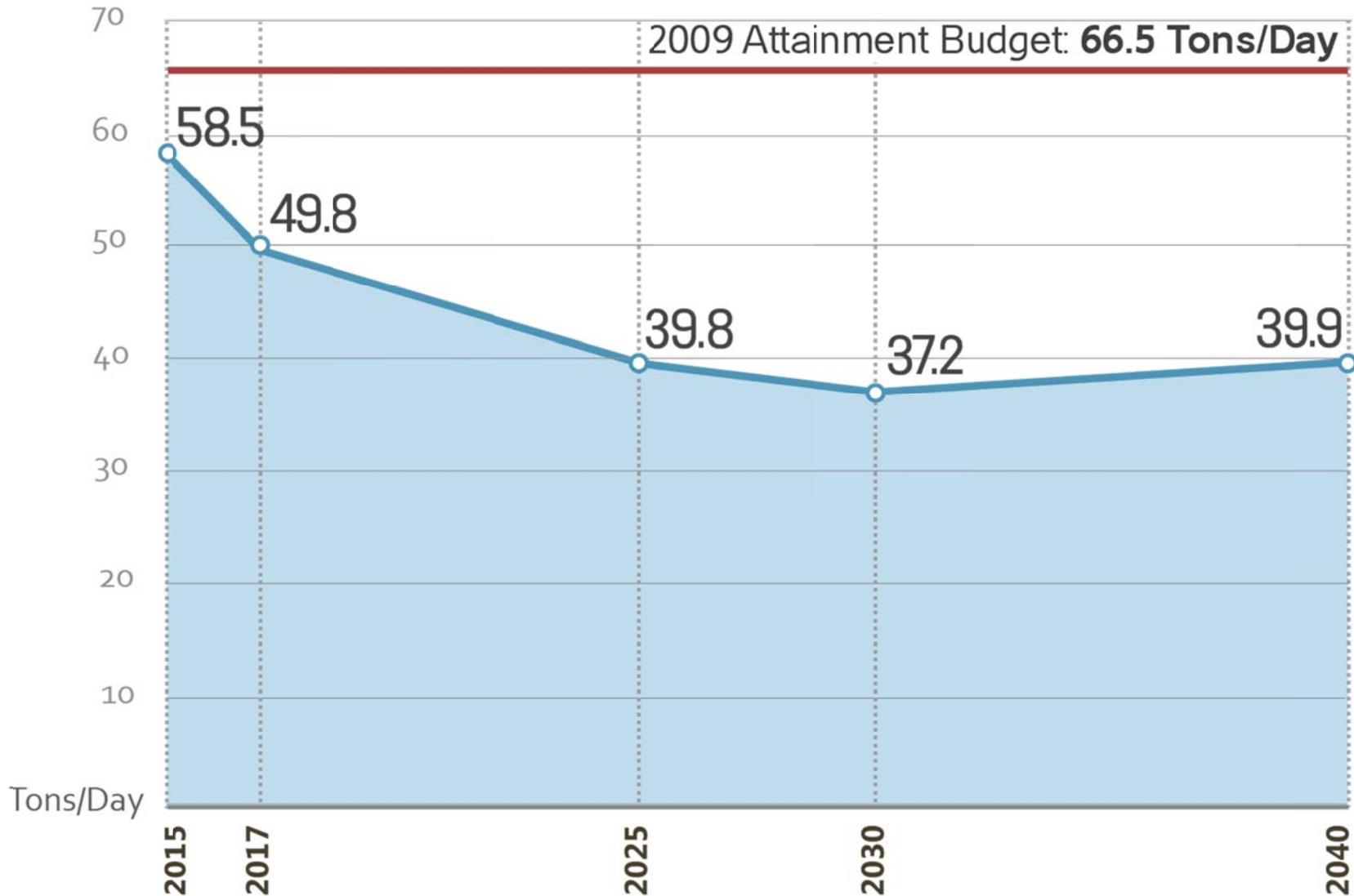
### EXHIBIT 3

## AIR QUALITY CONFORMITY

### 2014 CLRP & FY2015-2020 TIP

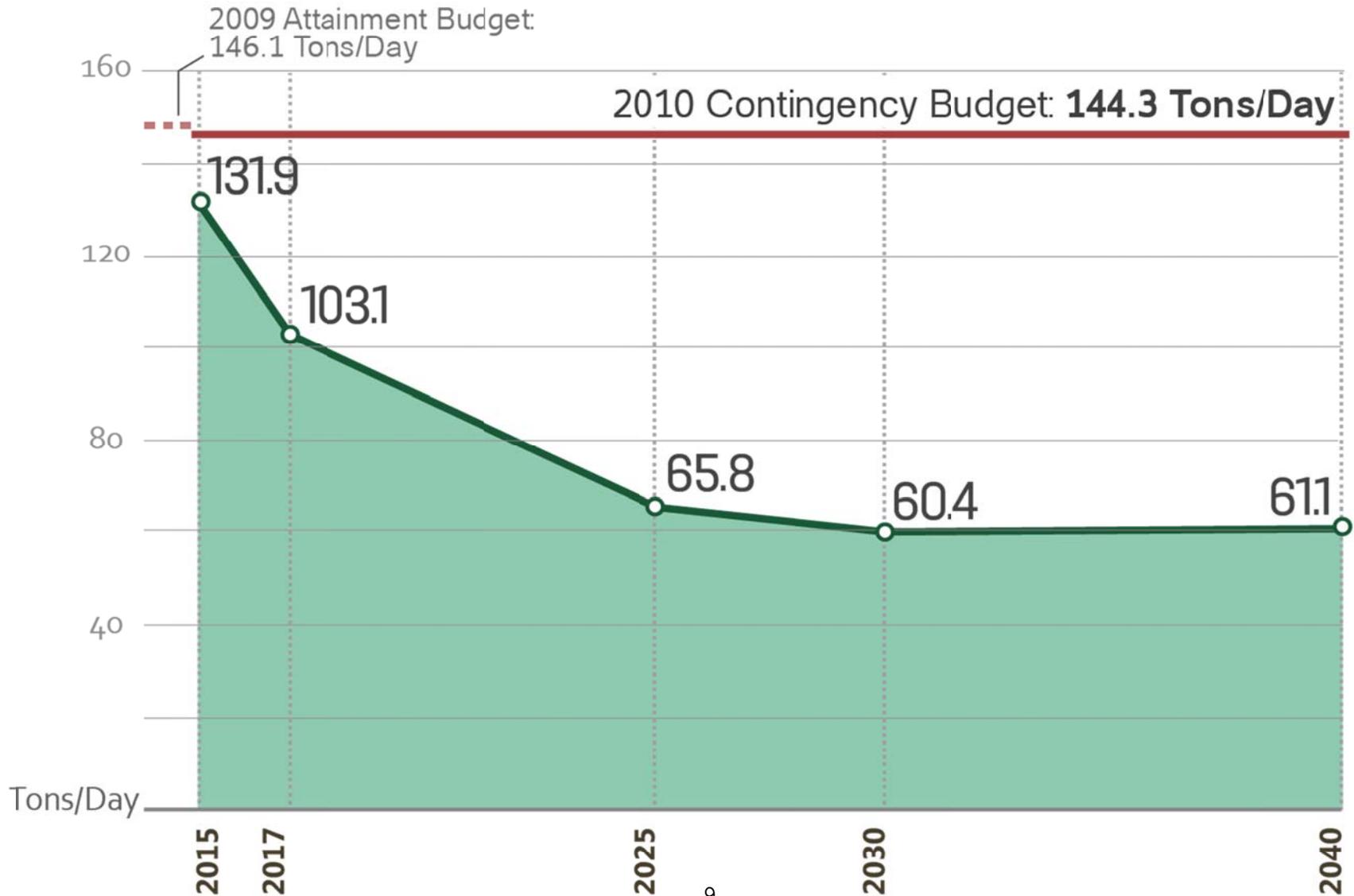
### Mobile Source Emissions

### Ozone Season VOC

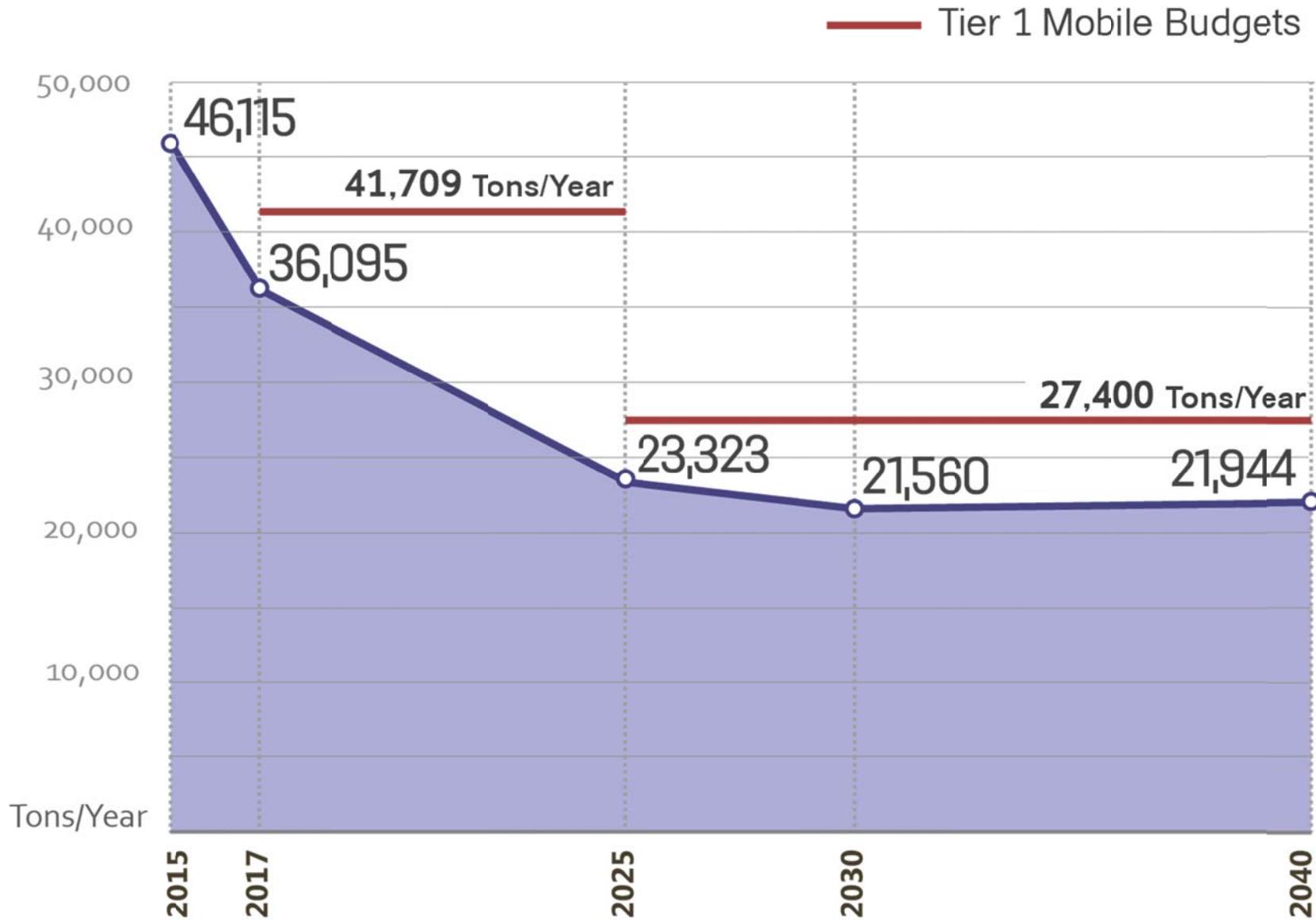


NOTE: The Mobile Budgets shown were developed in 2007, as part of the 8-Hour Ozone SIP, in response to the 1997 Ozone Standard. These budgets, as the most current approved by EPA, are required for use in any conformity analysis assessing ozone season pollutants.

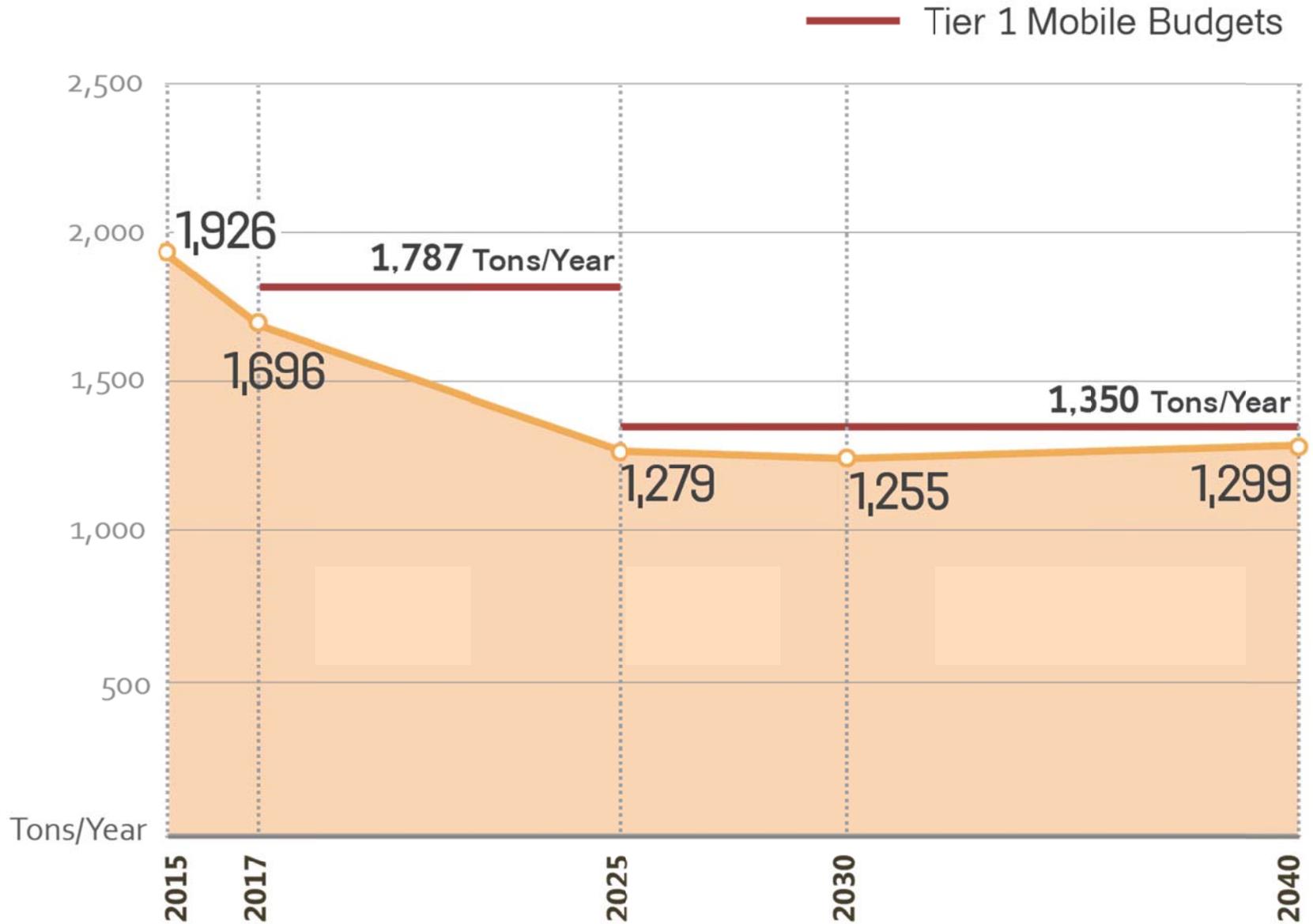
## EXHIBIT 4 AIR QUALITY CONFORMITY 2014 CLRP & FY2015-2020 TIP Mobile Source Emissions Ozone Season NOx



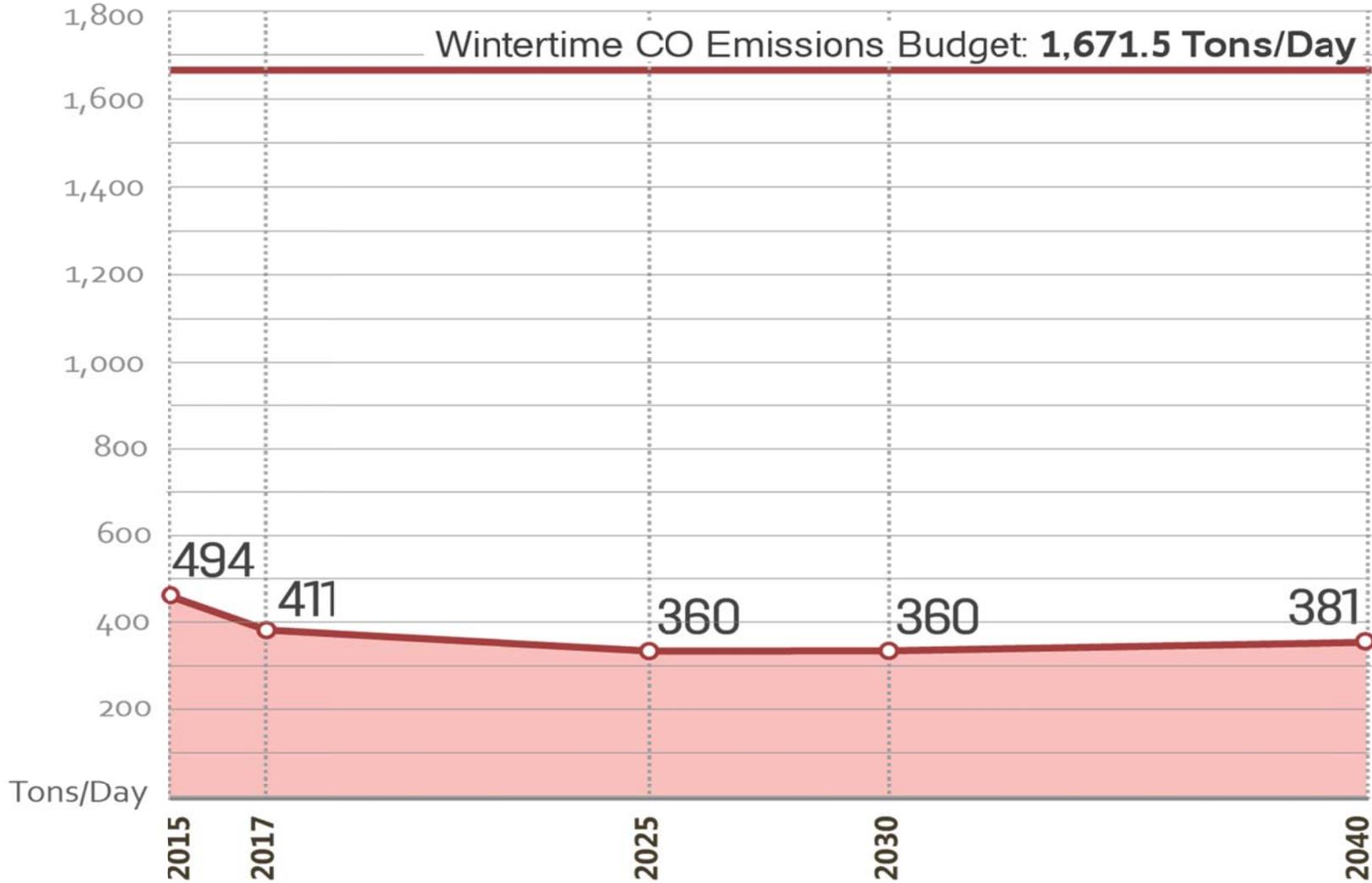
**EXHIBIT 5  
 AIR QUALITY CONFORMITY  
 2014 CLRP & FY2015-2020 TIP  
 Mobile Source Emissions  
 PM<sub>2.5</sub> Precursor NO<sub>x</sub>**



**EXHIBIT 6**  
**AIR QUALITY CONFORMITY**  
**2014 CLRP & FY2015-2020 TIP**  
**Mobile Source Emissions**  
**PM<sub>2.5</sub> Direct**



**EXHIBIT 7**  
**AIR QUALITY CONFORMITY**  
**2014 CLRP & FY2015-2020 TIP**  
**Mobile Source Emissions**  
**Wintertime CO**



**EXHIBIT 8**

**2014 CLRP**

**TRANSPORTATION EMISSIONS REDUCTION MEASURES**

**SUMMARY TABLE**

<b>REGIONAL EMISSIONS REDUCTIONS- ALL TERMS COMBINED</b>					
<b>Years/Pollutants</b>	<b>Ozone - VOC</b>	<b>Ozone - NOx</b>	<b>PM2.5 Direct</b>	<b>Precursor NOx</b>	<b>Winter CO</b>
	(tons/day)	(tons/day)	(tons/year)	(tons/year)	(tons/day)
<b>2015</b>	0.06	0.10	1.11	26.72	1.07
<b>2017</b>	0.07	0.10	1.42	27.53	1.30
<b>2025</b>	0.10	0.11	2.32	30.43	2.14
<b>2030</b>	0.12	0.13	2.99	34.63	2.74
<b>2040</b>	0.19	0.19	4.56	49.88	4.23

NOTE: Benefits from these TERMS are not included in the emissions totals in this conformity analysis.

# **ATTACHMENT A**

# Major Additions and Changes to the 2014 Update to the Financially Constrained Long-Range Transportation Plan



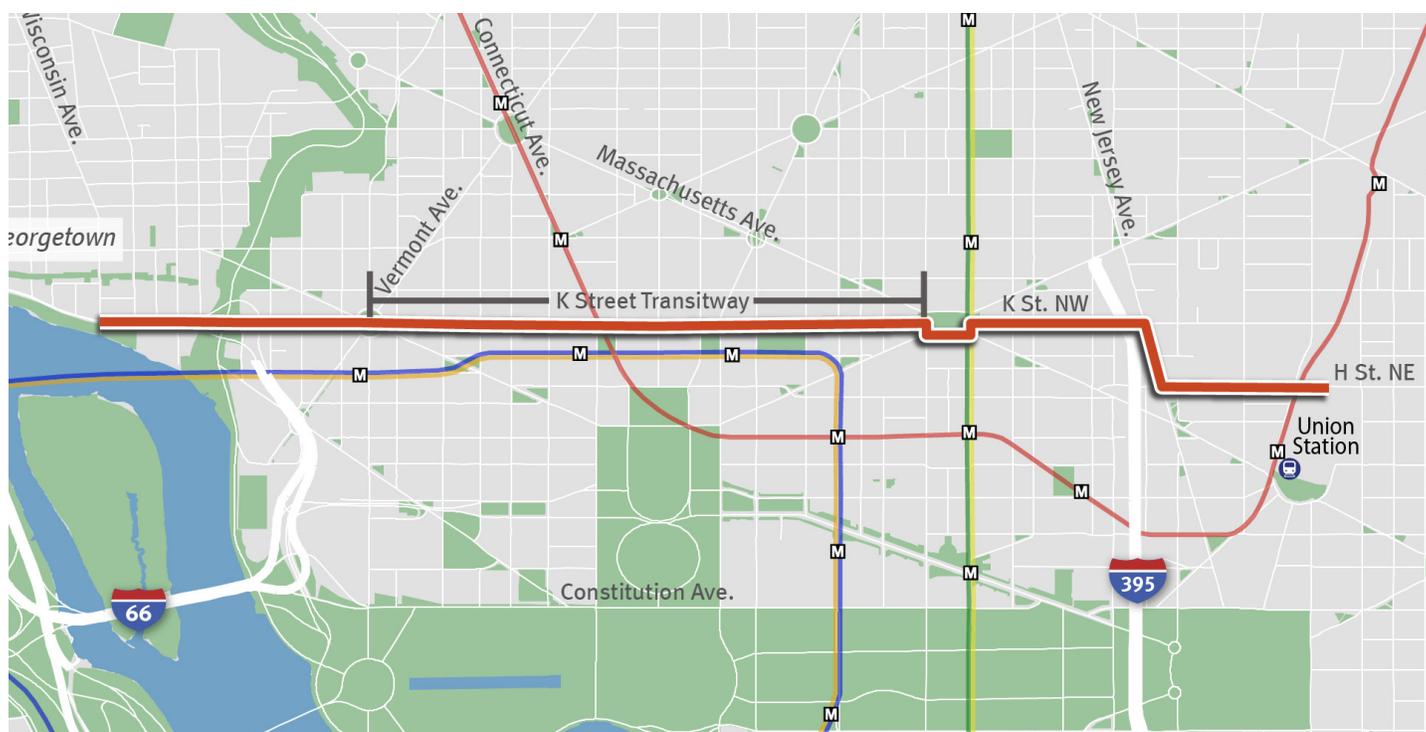
## District of Columbia

### 1. Union Station to Georgetown Streetcar Line from H Street NE to Wisconsin Avenue NW

Length: 3.4 miles

Complete: 2020

Cost: \$348 million



Construct a streetcar line from H Street NE near Union Station, running along H Street NW to New Jersey Avenue NW, and continuing on K Street NW into Georgetown, ending at Wisconsin Avenue NW. This line will connect to the H Street NE - Benning Road line, already under construction. The streetcars will travel in mixed traffic lanes through the eastern portion of the route, but will travel in dedicated transit lanes on K Street between Mount Vernon Square/9<sup>th</sup> Street NW and Washington Circle/23<sup>rd</sup> Street NW (a project previously approved in the CLRP called the "K Street Transitway").

See CLRP Project Description Form in Attachment A for more information.



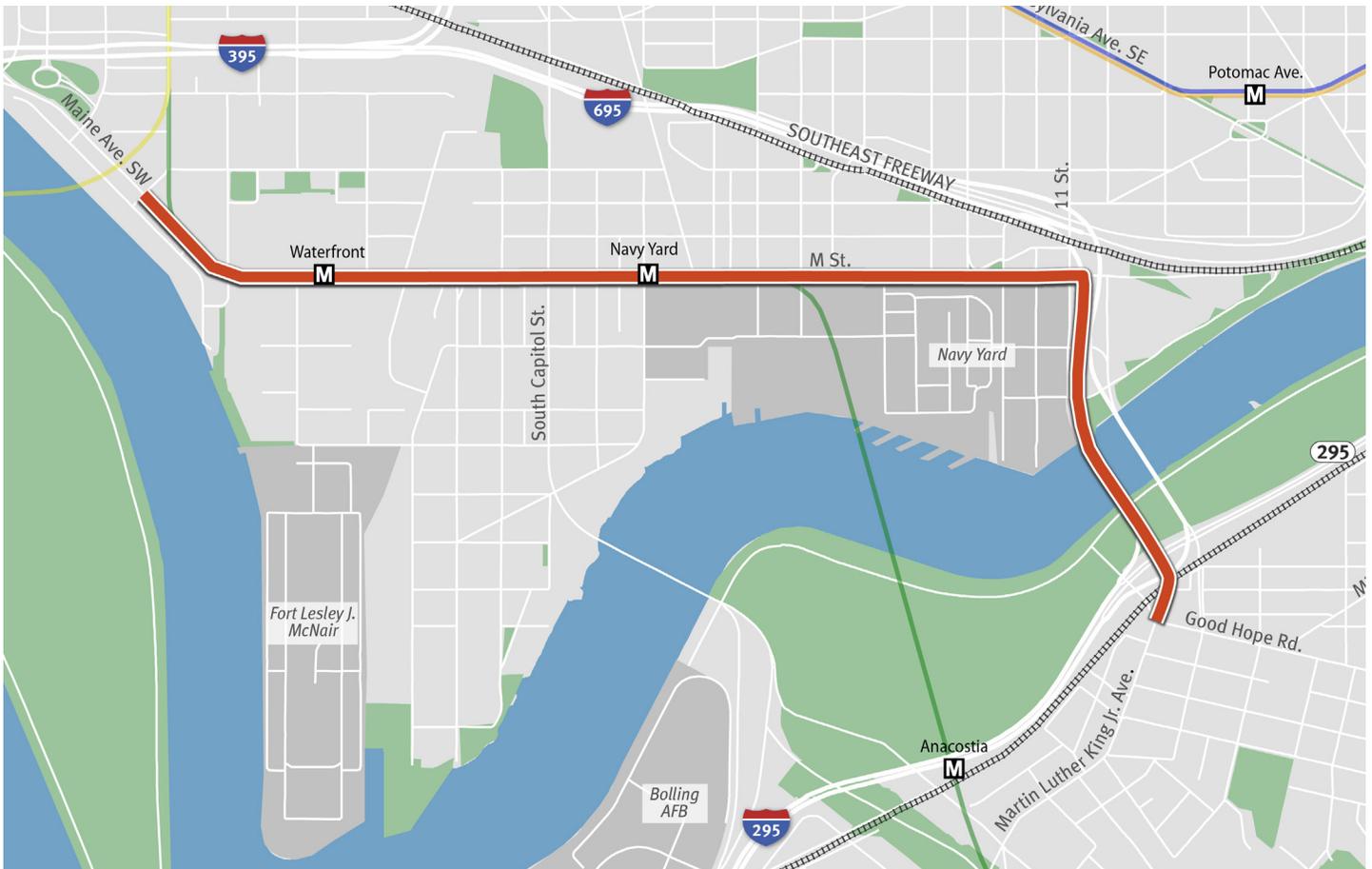
# Major Additions and Changes to the 2014 CLRP Update

## 2. M Street Southeast/Southwest Streetcar Line from Good Hope Road SE to Maine Avenue SW

Length: 3 miles

Complete: 2020

Cost: \$250 million



Construct a streetcar line running from Good Hope Road SE, across the 11<sup>th</sup> Street Bridge, to M Street SE/SW, ending at Maine Avenue SW. This line will connect to the planned Anacostia Initial Streetcar Line at Good Hope Road SE.

See CLRP Project Description Form in Attachment A for more information.



# Major Additions and Changes to the 2014 CLRP Update

### 3. Benning Road Streetcar Spur from Benning Road to Minnesota Avenue Metro Station

Length: < 1 mile

Complete: 2018

Cost: \$40 million



Construct a spur from the Benning Road Streetcar Line heading north along Minnesota Ave to the Minnesota Avenue Metro Station.

### 4. Removal of Proposed H and I Streets NW Peak Period Bus-Only Lanes

The approved CLRP contains two projects which proposed to implement bus-only lanes during peak periods. The H Street NW lane was planned between 17th Street NW and New York Avenue NW and the I Street NW lane was planned between 13th Street NW and Pennsylvania Avenue NW. These projects will be removed from the CLRP, pending further study.



# Major Additions and Changes to the 2014 CLRP Update

## 5. Studies: Managed Lanes on 14<sup>th</sup> Street/Rochambeau Bridge, I-395/I-695, and I-295

Length: ≈9 miles

Complete: 2015

Cost: \$5.9 million

### A. 14th Street/Rochambeau Bridge

The first study will look at converting the two northbound lanes on the 14th Street/ Rochambeau Bridge to High Occupancy Vehicle (HOV 3+) during the morning peak period on weekdays and the two southbound lanes on the same facility to HOV 3+ during the evening peak period on weekdays, to mirror existing HOV operations in Virginia. The existing four northbound lanes on the Arland Williams, Jr. Bridge and four southbound lanes on the George Mason Memorial Bridge would remain as general purpose lanes. The study will also consider a subsequent conversion of the HOV lanes into High Occupancy/Toll (HOT) lanes.

### B. I-395/I-695, Southeast-Southwest Freeway

The second study will look at implementing HOV lanes on the Southeast/Southwest Freeway (I-395/I-695) from the Case Bridge to the 11th Street Bridge, and subsequently converting those to HOT.

### C. I-295

The third study will consider implementing HOV and then HOT lanes on I-295 from the 11th Street Bridge to the DC/Maryland Line.

See CLRP Project Description Forms in Attachment A for more information.





# Major Additions and Changes to the 2014 CLRP Update

## Maryland

### 6. MARC Growth and Investment Plan

Complete: 2040

Cost: \$1.295 billion (Washington region)



MDOT is including \$1.06 billion of project improvements for MARC as identified in the MARC Growth and Investment Plan. The MARC Growth and Investment Plan is a multi-phased, multi-year plan to increase the capacity of MARC, Maryland’s commuter rail system. MARC is a key component of Maryland’s commuter network providing rail service for more than 30,000 commuters a day traveling between Washington’s Union Station and northern, central and western Maryland.

Primary objectives of the plan include providing better service for current riders and addressing existing problems with capacity, frequency and reliability. This package of projects will increase passenger-carrying capacity and increase share of trips by MARC during peak travel periods, among other benefits. The \$1.295 billion shown reflects the Washington region’s proposed contribution towards projects in the larger \$2.3 billion Growth and Investment Plan, which also includes the Baltimore area.

### 7. I-95/495 Interchange at Greenbelt Metro Station

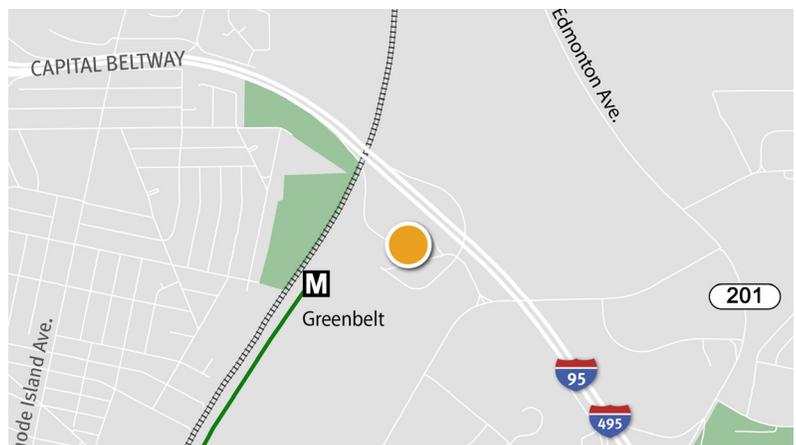
Length: <1 mile

Complete: 2020

Cost: \$78.21 million

Construct a full interchange along I-95/I-495 at the Greenbelt Metro Station. The existing partial interchange provides access from the inner loop of the Capital Beltway to the Greenbelt Metro Station. The project includes the addition of auxiliary lanes on I-95/I-495 between the Greenbelt metro and MD 201 interchanges.

See CLRP Project Description Form in Attachment A for more information.



## **Virginia**

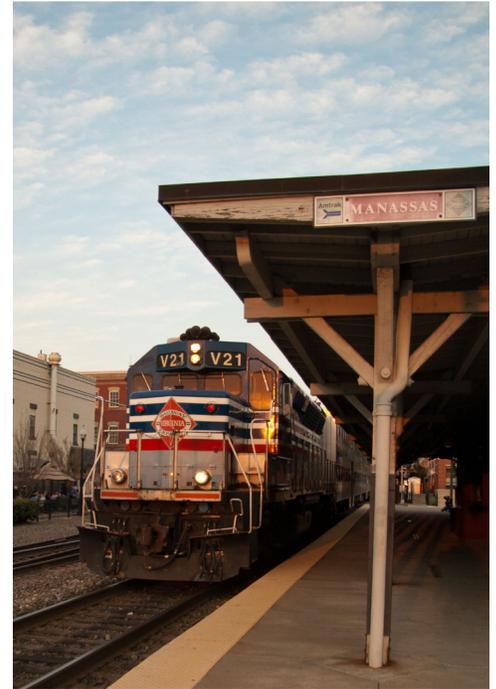
### **8. Virginia Railway Express System Plan**

Cost: 2040

Cost: \$977.4 million

The VRE System Plan provides a framework for VRE service expansion through 2040. The Plan includes system investments and expansion of peak service on the Fredericksburg and Manassas Lines, introduction of reverse-peak service, additional mid-day service, and service extension to the Gainesville-Haymarket area of Prince William County. Major railroad capacity projects focus on the relief of key capacity bottlenecks on the VRE system, including additional track capacity in the Long Bridge corridor and completion of a third main track on the Fredericksburg Line from Alexandria to Spotsylvania County.

The VRE System Plan outlines capital investments totaling \$3.2 billion to implement plan recommendations. It builds upon prior VRE growth plans included in the CLRP financial analysis and transit-modeling assumptions proposed for implementation by 2020, for which funding has been identified. Funding for projected VRE station, yards and equipment needs through 2040 has also been identified and is reflected in the \$977 million CLRP project cost. Full funding for long-term system investments in railroad capacity, including the expansion of the Long Bridge and Fredericksburg Line third main track, and service enhancements such as reverse-peak service, additional mid-day trains or the future run-through of VRE and MARC trains has not been identified. Those recommendations are included for information purposes. As funding is identified for those initiatives they will be added to the CLRP and air quality conformity analysis.





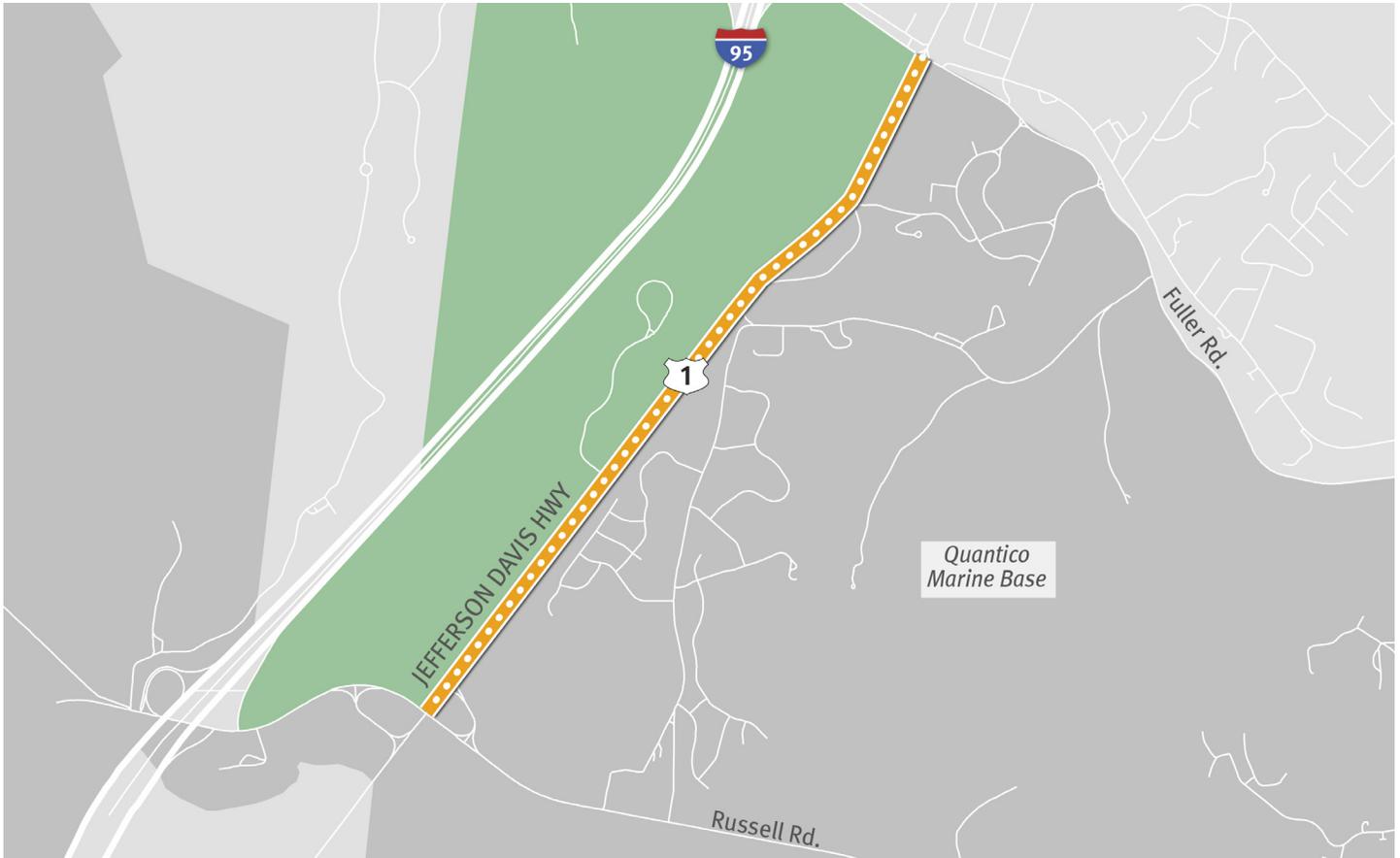
# Major Additions and Changes to the 2014 CLRP Update

## 9. Widen US 1 from Fuller Road to Russell Road Interchange

Length: 2.38 miles

Complete: 2025

Cost: \$76 million



Widen US 1 from Fuller Road to Russell Road from 4 to 6 lanes.

See CLRP Project Description Form in Attachment A for more information.

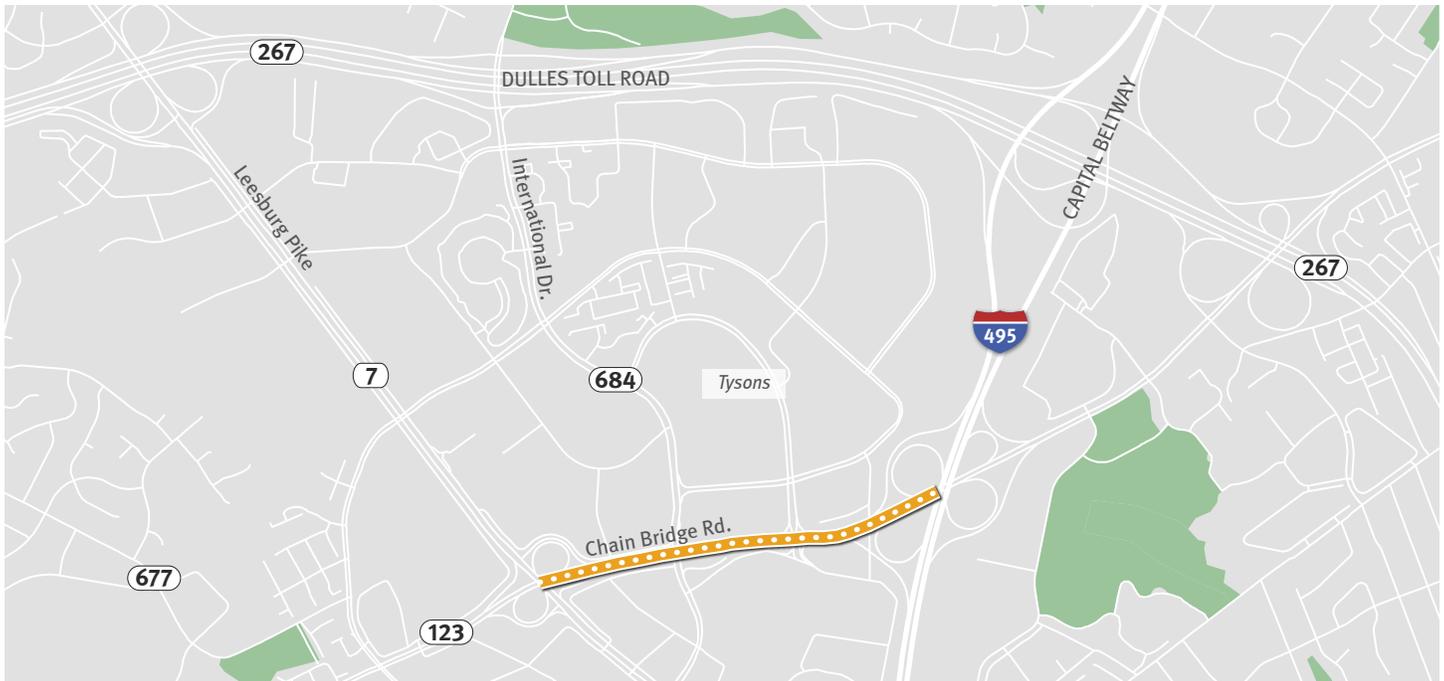
# Major Additions and Changes to the 2014 CLRP Update

## 10. Widen VA 123 from VA 7, Leesburg Pike to I-495, Capital Beltway

Length: <1 mile

Complete: 2021

Cost: \$22 million



Widen VA Route 123 from Leesburg Pike to the Capital Beltway from 6 to 8 lanes.

See CLRP Project Description Form in Attachment A for more information.

# **ATTACHMENT B**

## HOUSEHOLD DATA

TPB PLANNING AREA:	2015	2017	2020	2025	2030	2040
<b>D.C.</b>	287,112	294,489	305,550	323,191	340,307	370,758
<b>MONTGOMERY</b>	377,524	385,296	396,955	414,873	434,767	460,161
<b>PR.GEORGES</b>	323,364	328,465	336,107	348,307	359,878	379,020
<b>ARLINGTON</b>	105,692	108,296	112,211	117,332	121,383	128,605
<b>ALEXANDRIA</b>	72,306	74,175	76,978	81,352	84,717	94,890
<b>FAIRFAX</b>	412,183	419,165	429,673	455,610	478,867	523,521
<b>LOUDOUN</b>	122,644	129,391	139,505	151,558	158,142	164,297
<b>PR. WILLIAM</b>	166,083	172,975	183,321	197,890	210,450	229,944
<b>FREDERICK</b>	89,935	92,546	96,471	103,944	111,118	123,247
<b>CHARLES</b>	57,528	60,235	64,299	70,833	75,847	85,901
<b>SUBTOTAL</b>	<b>2,014,371</b>	<b>2,065,033</b>	<b>2,141,070</b>	<b>2,264,890</b>	<b>2,375,476</b>	<b>2,560,344</b>
<b>ADDITIONAL COUNTIES:</b>						
<b>HOWARD</b>	116,453	120,597	126,806	133,807	137,635	140,696
<b>ANNE ARUNDEL</b>	206,441	209,268	213,504	220,567	227,628	241,619
<b>CALVERT</b>	34,298	34,991	36,027	37,374	38,348	40,301
<b>CARROLL</b>	64,142	64,972	66,219	68,025	69,692	72,853
<b>FREDERICKSBURG (VA) &amp;N. SPOTSYLVANIA</b>	47,742	49,894	53,122	57,878	62,604	69,306
<b>CLARKE&amp;JEFFERSON</b>	29,378	30,455	32,064	34,783	37,347	42,371
<b>FAUQUIER</b>	25,337	25,981	26,954	28,616	30,272	33,801
<b>K. GEORGE</b>	9,808	10,379	11,237	12,808	14,366	17,142
<b>ST. MARY'S</b>	44,443	46,408	49,352	53,960	58,143	66,509
<b>STAFFORD</b>	49,673	52,815	57,533	65,473	73,367	87,670
<b>SUBTOTAL</b>	<b>627,715</b>	<b>645,760</b>	<b>672,818</b>	<b>713,291</b>	<b>749,402</b>	<b>812,268</b>
<b>TOTAL</b>	<b>2,642,086</b>	<b>2,710,793</b>	<b>2,813,888</b>	<b>2,978,181</b>	<b>3,124,878</b>	<b>3,372,612</b>

**SOURCE:**

- MWCOG Round 8.3 Cooperative Forecasts
- BMC Round 8 Cooperative Forecasts
- George Washington Regional Commission / Fredericksburg Area MPO February 2013  
TAZ Refinements of the January 2012 GWRC/FAMPO Long-Range Transportation Plan  
Update Control Estimates and Forecasts for City of Fredericksburg, King George, Spotsylvania and Stafford Counties
- Tri-County Council for Southern Maryland data for Calvert, Charles and St. Mary's
- COG/TPB Staff used Virginia Employment Commission Population Projections, February 2013 for Clark and Fauquier
- COG/TPB Staff used West Virginia University Population Projections, February 2013 for Jefferson County

## EMPLOYMENT DATA

TPB PLANNING AREA:	2015	2017	2020	2025	2030	2040
<b>D.C.</b>	814,957	833,701	861,814	905,846	944,096	1,001,814
<b>MONTGOMERY</b>	532,004	544,949	564,377	598,824	635,264	715,121
<b>PR.GEORGES</b>	356,958	365,324	377,879	403,134	427,514	497,652
<b>ARLINGTON</b>	247,460	258,989	276,281	292,078	303,044	308,830
<b>ALEXANDRIA</b>	110,248	112,872	116,812	131,152	149,552	167,598
<b>FAIRFAX</b>	693,803	719,557	758,260	814,740	866,739	930,665
<b>LOUDOUN</b>	163,850	177,217	197,265	224,249	248,803	278,216
<b>PR. WILLIAM</b>	163,423	172,538	186,215	207,340	230,047	278,151
<b>FREDERICK</b>	102,014	103,707	106,242	109,802	114,558	125,556
<b>CHARLES</b>	68,439	69,758	71,731	74,731	77,537	83,138
<b>SUBTOTAL</b>	<b>3,253,156</b>	<b>3,358,612</b>	<b>3,516,876</b>	<b>3,761,896</b>	<b>3,997,154</b>	<b>4,386,741</b>
<b>ADDITIONAL COUNTIES:</b>						
<b>HOWARD</b>	172,819	178,098	186,021	199,221	212,413	229,066
<b>ANNE ARUNDEL</b>	321,519	328,912	339,998	353,529	367,834	398,632
<b>CALVERT</b>	41,059	42,422	44,457	46,258	47,159	48,955
<b>CARROLL</b>	67,946	69,081	70,781	72,933	75,219	79,383
<b>FREDERICKSBURG (VA) &amp;N. SPOTSYLVANIA</b>	78,759	81,609	85,881	92,897	99,865	116,175
<b>CLARKE &amp; JEFFERSON</b>	27,533	28,329	29,530	31,348	33,052	36,300
<b>FAUQUIER</b>	29,270	30,016	31,135	33,071	34,996	39,086
<b>K. GEORGE</b>	17,804	18,433	19,377	20,947	22,490	25,747
<b>ST. MARY'S</b>	64,083	65,350	67,268	70,093	71,969	75,862
<b>STAFFORD</b>	52,681	54,970	58,399	64,304	70,170	84,159
<b>SUBTOTAL</b>	<b>873,473</b>	<b>897,220</b>	<b>932,847</b>	<b>984,601</b>	<b>1,035,167</b>	<b>1,133,365</b>
<b>TOTAL</b>	<b>4,126,629</b>	<b>4,255,832</b>	<b>4,449,723</b>	<b>4,746,497</b>	<b>5,032,321</b>	<b>5,520,106</b>

**SOURCE:**

- MWCOC Round 8.3 Cooperative Forecasts
- BMC Round 8 Cooperative Forecasts
- George Washington Regional Commission / Fredericksburg Area MPO February 2013  
TAZ Refinements of the January 2012 GWRC/FAMPO Long-Range Transportation Plan  
Update Control Estimates and Forecasts for City of Fredericksburg, King George, Spotsylvania and Stafford Counties
- Tri-County Council for Southern Maryland data for Calvert, Charles and St. Mary's
- COG/TPB Staff used West Virginia University population projections, February 2013 for Clark and Fauquier Counties
- COG/TPB Staff used West Virginia University population projections, February 2013 for Jefferson County

NOTE: Includes Census Adjustment

## POPULATION DATA

TPB PLANNING AREA:	2015	2017	2020	2025	2030	2040
<b>D.C.</b>	660,528	682,499	715,494	764,267	808,718	883,568
<b>MONTGOMERY</b>	1,020,036	1,038,835	1,067,030	1,109,953	1,153,912	1,202,769
<b>PR.GEORGES</b>	881,379	888,788	899,912	926,944	950,030	995,503
<b>ARLINGTON</b>	222,885	228,161	236,083	248,682	258,757	276,072
<b>ALEXANDRIA</b>	148,513	152,348	158,102	167,085	174,030	194,890
<b>FAIRFAX</b>	1,154,153	1,169,931	1,193,606	1,254,384	1,308,944	1,414,154
<b>LOUDOUN</b>	367,957	387,970	417,986	452,242	468,664	484,498
<b>PR. WILLIAM</b>	505,772	524,245	551,967	589,645	623,113	675,953
<b>FREDERICK</b>	241,616	248,507	258,849	278,654	297,708	329,955
<b>CHARLES</b>	160,098	166,434	175,953	191,475	202,552	224,871
<b>SUBTOTAL</b>	<b>5,362,937</b>	<b>5,487,718</b>	<b>5,674,982</b>	<b>5,983,331</b>	<b>6,246,428</b>	<b>6,682,233</b>
<b>ADDITIONAL COUNTIES:</b>						
<b>HOWARD</b>	302,206	309,870	321,370	334,991	343,327	350,116
<b>ANNE ARUNDEL</b>	555,159	562,478	573,462	585,521	597,135	615,624
<b>CALVERT</b>	96,500	98,081	100,450	103,253	105,099	108,882
<b>CARROLL</b>	170,549	172,687	175,901	179,437	183,258	189,574
<b>FREDERICKSBURG (VA) &amp;N. SPOTSYLVANIA</b>	133,403	138,651	146,515	158,276	169,994	189,052
<b>CLARKE&amp;JEFFERSON</b>	72,419	74,540	77,714	82,518	87,075	95,697
<b>FAUQUIER</b>	69,658	71,440	74,114	78,710	83,306	93,022
<b>K. GEORGE</b>	26,911	28,237	30,226	34,029	37,819	44,707
<b>ST. MARY'S</b>	118,184	122,945	130,098	141,135	151,403	173,832
<b>STAFFORD</b>	149,386	157,536	169,774	191,249	212,671	251,851
<b>SUBTOTAL</b>	<b>1,694,375</b>	<b>1,736,465</b>	<b>1,799,624</b>	<b>1,889,119</b>	<b>1,971,087</b>	<b>2,112,357</b>
<b>TOTAL</b>	<b>7,057,312</b>	<b>7,224,183</b>	<b>7,474,606</b>	<b>7,872,450</b>	<b>8,217,515</b>	<b>8,794,590</b>

**SOURCE:**

Includes Household and Group Quarters Population

MWCOG Round 8.3 Cooperative Forecasts

BMC Round 8 Cooperative Forecasts

George Washington Regional Commission / Fredericksburg Area MPO February 2013

TAZ Refinements of the January 2012 GWRC/FAMPO Long-Range Transportation Plan

Update Control Estimates and Forecasts for City of Fredericksburg, King George, Spotsylvania and Stafford Counties

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

COG/TPB Staff used Virginia Employment Commission Population Projections, February 2013 for Clark and Fauquier Cou

COG/TPB Staff used West Virginia University Population Projections, February 2013 for Jefferson County