Documentation of FHWA Review

Project Name: Value Pricing Pilot Program – I-66 Inside the Beltway

Based on preliminary information compiled by VDOT, FHWA approved this proposed action as a Categorical Exclusion on October 20, 2015. FHWA hereby approves the Categorical Exclusion documentation for public availability. FHWA's final approval of the proposed action meeting the criteria for a Categorical Exclusion is subject to the consideration of public comments.

John Simkins 3/25/16

TO: FHWA
FROM: John Muse
DATE: 03/24/2016

CATEGORICAL EXCLUSION (CE)

Date CE level document approved by VA FHWA Division: 10/20/2015
FHWA Contact: John Simkins
Route: 66
Route Type: Interstate
Project Type: Capital Outlay
State Project Number: 0066-96A-358, P101
Federal Project Number: N/A
UPC: 107371

From: Interstate 495
To: US Route 29
County/City: Fairfax and Arlington Counties
District / Residency: Northern Virginia

Project in STIP: Yes ☒
Project in Long Range Plan: Yes ☒ No ☐ N/A Project Outside of MPO Area ☐

Project Description: The purpose of the project is to manage congestion along Interstate 66 (I-66) inside the beltway. The project would manage congestion through the implementation of the Value Pricing Pilot Program (VPPP).

Tolling under the VPPP requires authorization from FHWA through the execution of a tolling agreement. This is a Federal action that triggers the requirement for a review under the National Environmental Policy Act (NEPA). Implementation of the VPPP would include the design, construction, operation, and maintenance of a dynamic tolling system along the I-66 corridor. Toll gantries would be located within the operational right of way of I-66 and regulatory signage would be installed along the arterials that would display pricing. Net toll revenues generated; after debt service, reasonable costs and expenses of tolling operation and tolling maintenance, including reserves for major maintenance of tolling operations of the Facility; would be used to fund multimodal improvements that benefit the toll-paying users of the Facility. The project has been included in the region's Constrained Long Range Plan (CLRP) as documented in Attachment H.

CE Category 23 CFR 771.117: (d)
Description of CE Category: Additional actions which meet the criteria for a CE in the CEQ regulations (40 CFR 1508.4) and paragraph (a) of this section may be designated as CEs only after Administration approval unless otherwise authorized under an executed agreement pursuant to paragraph (g) of this section. The applicant shall submit documentation which demonstrates that the specific conditions or criteria for these CEs are satisfied and that significant environmental effects will not result.

USGS Map Attached Yes ☒ (See Attachment B)

Logical Termini and Independent Utility:

Yes ☒ N/A☐ (For Non-highway construction only, explain in comments below)

Comments: Congestion management would be focused on the portion of Interstate 66 that is "inside the beltway". Therefore, signage, gantries, and supporting infrastructure would be installed along the interstate and associated ramps and arterial roads to support congestion management between I-495 and Route 29.

Typical Section: N/A

Structures: N/A

SOCIO-ECONOMIC	PRESENT YES	PRESENT NO	IMPACTS YES	IMPACTS NO
Minority/Low Income Populations	☒	☐	☒	☐
Disproportionate Impacts to Minority/Low Income Populations: Yes ☐ No ☒				
Existing or Planned Public Recreational Facilities	☐	☒	☐	☒
Source: CEDAR				
Community Services	☐	☒	☐	☒
Source: CEDAR				
Consistent with Local Land Use: Yes ☒ No ☐				
Source:				
Existing or Planned Bicycle/Pedestrian Facilities:	☒	☐	☐	☒
Source: CEDAR				

Comments: The minority population of the environmental justice (EJ) study area exceeds 50 percent in one census tract (461602-3). The percentage of minority population, however, is above the EJ evaluator factor in all tracts but 101000-4. Therefore, EJ populations are present in all but one of the census tracts identified above. Because all but one of the tracts are EJ populations and all tracts occur along an existing road facility, there would not be a disproportionate impact to EJ populations from anticipated diversion of vehicles from Interstate 66 during tolling periods. Current congestion on the interstate already results in traffic diverting through these areas. Traffic analysis done to support the CE indicates that future diversion would be limited and not concentrated in areas with EJ populations. The roll revenue generated by the project would be invested in transit, trails, and other multimodal improvements that would benefit EJ populations. The public would have the opportunity to participate in the decision-making process for where toll revenue would be spent. No comments were received from the public regarding EJ populations. Therefore, there would be no disproportionately high and adverse effects to environmental justice populations (See Attachment C for EJ analysis).

As the interstate and surrounding road network are existing facilities, there are no recreational facilities or community services that occur on these corridors. Also, the existing roads are included in local land use plans. There are existing sidewalks along some of the adjacent roads where tolling signage would be placed, but the signage would not impact these facilities.

SECTION 4(f) and SECTION 6(f)	YES	NO
Use of 4(f) Property: Acres of use:	☐	☒
Name of Resource:		
Type of Resource:		
Individually Eligible Historic Property:	☐	☐
Contributing Element to Historic District	☐	☐
Public Recreation Area:	☐	☐
Public Park:	☐	☐
Public Wildlife/Waterfowl Refuge:	☐	☐
Planned Public Park, Recreation Area, Wildlife or Waterfowl Refuge:	☐	☐
Source: CEDAR		
DeMinimis:	☐	☐
Type of Use:		
Permanent:	☐	☐
Temporary:	☐	☐
*Constructive:	☐	☐
*Temporary Non 4(f) Use	☐	☐
Section 4(f) Evaluation Attached:	☐	☐
Conversion of 6(f) Property: Acres of Conversion:	☐	☒
Source: CEDAR		
Comments: There are 14 parks/recreational lands/conservation lands within 0.25 miles of the project area. Five of these features are Section 6(f) resources. As the proposed project does not include the construction of any new roads or widening of existing facilities, these features would not be used by the construction of the toll gantries or associated signage.		

CULTURAL RESOURCES	COMPLETE	N/A
Source:		
"No Effect" Pursuant to 1999 DHR Agreement	☐	☐
Phase I Architecture Conducted	☐	☐
Phase II Architecture Conducted	☐	☐
Phase I Archaeology Conducted	☐	☐
Phase II Archaeology Conducted	☐	☐
Section 106 Effect Determination: No Effect		
DHR Concurrence on Effect: Yes ☒ Date: 11/6/2015		
MOA Attached: Yes ☐ N/A ☐ Execution Date: / /		
Name of Historic Property:		
Comments: The project has little to no potential to affect historic properties, either directly or indirectly (e.g., visual effects) as almost all infrastructure improvements would be located within the previously disturbed, existing highway right of way that is associated with an interstate highway located in a heavily urbanized setting. Installation of the wayfinding signs that may be located outside existing right of way will result in only minimal ground disturbance and the signs themselves should have no visual effect on any historic properties that may be located nearby in this already urbanized setting.		

NATURAL RESOURCES	PRESENT YES	PRESENT NO	IMPACTS YES	IMPACTS NO
Surface Water (Name: Holmes Run, Four Mile Run, Spout Run, Lubber Run)	☒	☐	N/A Linear ft.	
Source: CEDAR				
Federal Threatened or Endangered Species: Terrestrial: Northern long-eared Bat (*Myotis septentrionalis*) Aquatic: None None Plants: None None	☒ ☐ ☐	☐ ☒ ☒	☐ ☐ ☐	☒ ☒ ☒
Source: IPaC, CEDAR, Attachment D				
100 Year Floodplain: If "Yes" then identify the regulatory floodway zone: X	☒	☐	☐	☒
Source: CEDAR				
Tidal Waters/Wetlands:	☐	☒	N/A Acres Type	
Wetlands: If yes, there are no practicable alternatives to the construction in wetlands and the action will include all practicable measures to minimize harm to the impacted wetlands.	☐	☒	N/A Acres Type	
Source: CEDAR				
Permits Required:	☐	☒		
Source: CEDAR				

Comments: Wetlands and streams are located in close proximity to the study area. All improvements would be confined to existing right of way, which has been previously impacted and filled to support the road network. No changes would be made to existing culverts and/or drainages. While there would be changes in traffic patterns and volumes, this change would not be expected to measurably impact stormwater runoff. Therefore, there would be no impact to wetlands and streams. As the placement of signs, toll gantries, and other equipment would not result in tree clearing or impact the underside of any bridge structure, there would be no effect to the Northern long-eared bat. Portions of the study area pass through or are adjacent to the 500 year floodplain. As there would be no physical change or expansion of the transportation facility, there would be no impact to floodplains.

AGRICULTURAL/OPEN SPACE	PRESENT		IMPACTS	
	YES	NO	YES	NO
Open Space Easements: NVCT Easement, Beaver Pond Conservation Land	☒	☐	☐	☒
Source: CEDAR				
Agricultural/Forestal Districts	☐	☒	☐	☒
Source: CEDAR				
Comments: Several conservation easements exist adjacent to the road corridors. While easements would be required to implement the project, these open space easements would not be impacted by the action.				

FARMLAND	YES	NO
NRCS Form CPA-106 Attached: Rating:	☐	☒
Alternatives Analysis Required:	☐	☒
If Form CPA-106 is not attached check all that are applicable:		
Land already in Urban use:	☒	☐
Entire project in area *not* zoned agriculture:	☒	☐
NRCS responded within 45 days:	☒	☐
NRCS Determined no prime or unique farmland in the project area.	☒	☐
Source: CEDAR, NRCS response.		

Comments: NRCS stated the project area is committed to urban uses so no acres in the area would qualify as prime/unique/statewide or locally important farmland.

INVASIVE SPECIES	PRESENT		
	YES	NO	UNKNOWN
Invasive Species in the project area:	☐	☐	☒

VDCR indicated that the potential exists for some VDOT projects to further the establishment of invasive species. All seeds used will be tested in accordance with the Virginia Seed Law to ensure there are not prohibited Noxious Weed-Seeds in the seed mixes.

Comments:

AIR QUALITY

Carbon Monoxide (CO)	Yes	No
This project is located in a CO ☐ Attainment Area ☒ Maintenance Area		
CO Hotspot Analysis Required? (if "Yes", please attach analysis)	☒	☐

If "No", indicate which exemption it falls under:
- ☐ Exempt project under 40 CFR 93.126.
- ☐ Exempt project based on traffic volumes below thresholds in the current VDOT Project Level Air Quality Studies Agreement with FHWA/EPA.

Ozone

This project is located in an Ozone
- ☐ Attainment Area ☐ Maintenance Area
- ☒ Nonattainment Area ☐ Early Action Compact Area

Only projects located in ozone nonattainment or maintenance areas must complete this box
- ☐ Exempt from regional emissions requirements under 40 CFR 93.126 or 40 CFR 93.127.
- ☒ Properly programmed in the 2015 CLRP and FY 2015 - 20020 TIP.
- ☐ The project is not regionally significant and/or is not of a type that would normally be included in the regional transportation model.
- ☐ This project is regionally significant; however the project was not modeled, or the scope of the project is not consistent with what was modeled in the currently conforming CLRP and TIP.

Fine Particulate Matter (PM2.5)	Yes	No
This project is located in a $PM_{2.5}$	☐ Nonattainment Area ☒ Maintenance Area ☐ Attainment Area (if checked, do not fill out box below)	
$PM_{2.5}$ Hotspot Analysis Required? (If "Yes", Please Attach Analysis)	☐	☒

Check all that apply;
- ☐ A. Exempt project under 40 CFR 93.126, Table 2.
- ☒ B. Not a project of air quality concern under 40 CFR 93.123(b)(1)(i) thru (v).
- ☒ C. Properly programmed in the CLRP and FY - TIP.
- ☐ D. This project is regionally significant; however the project was not modeled, or its scope is not consistent with what was modeled, in the currently conforming CLRP and TIP.

If "B" is checked above, please indicate the following for highway projects; Design Year 2040, Peak AADT 155,800, Peak Diesel Truck % 0.7
Mobile Source Air Toxics (MSAT)
This project ☐ is exempt with no meaningful potential MSAT effects ☐ is one with low potential MSAT effects (attach qualitative MSAT analysis) ☒ is one with high potential MSAT effects (attach quantitative MSAT analysis)
Check all that apply; ☐ Exempt project under 40 CFR 93.126, or qualifies as a CE under 23 CFR 771.117(c). ☐ Project with no meaningful impact on traffic volumes or vehicle mix.
If a qualitative MSAT analysis is required, please indicate the following for highway projects; Design Year 2040, Peak AADT 155,800
Source: Transforming I-66 Inside the Beltway Air Quality Analysis
Comments: A project-level air quality analysis was completed for this project in compliance with all applicable federal and state regulations, and it is attached (Attachment F).

NOISE	YES	NO
Type I Project:	☐	☒
Source: VDOT Highway Traffic Noise Impact Analysis Guidance Manual		
Noise Analysis Attached:	☐	☒
Barriers Under Consideration:	☐	☒
Source:		
Comments: The project is not a Type I project and therefore does not require noise analysis for the Categorical Exclusion.		

RIGHT OF WAY AND RELOCATIONS	YES	NO
Residential Relocations: If "Yes", number:	☐	☒
Source: Attachment I		
Commercial Relocations: If "Yes", number:	☐	☒
Source: Attachment I		
Non-profit Relocations: If "Yes", number:	☐	☒
Source: Attachment I		
Right of Way required: If "Yes", acreage amount: 1.131 acres permanent toll road easement 0.879 acres temporary construction easement	☒	☐
Source: Attachment I		

	PRESENT		IMPACTS	
	YES	NO	YES	NO
Septic Systems, Wells, or Public Water Supplies:	☐	☒	☐	☒
Source: CEDAR				
Hazardous Materials:	☒	☐	☐	☒
Source: CEDAR				
Comments: No septic systems, wells, or public water supplies were identified within 0.25 miles of the road corridor. Within that area, 56 DEQ petroleum release sites, 8 RCRA sites, and 30 petroleum facilities were identified. All actions would be confined to existing operational right of way and would not impact these facilities.				

CUMULATIVE AND INDIRECT IMPACTS	PRESENT		
	YES	NO	N/A
Present or reasonably foreseeable future projects (highway and non-highway) in the area:	☒	☐	☐
Impact same resources as the proposed highway project (i.e. cumulative impacts):	☒	☐	☐
Indirect (Secondary) impacts:	☒	☐	☐
Source: See Attachment E			
Comments: See Attachment E			

PUBLIC INVOLVEMENT	YES	NO
Substantial Controversy on Environmental Grounds:	☐	☒
Source: Attached comments		
Public Hearing: If "Yes", type of hearing: Location/Design	☒	☐
Other Public Involvement Activities: If "Yes", type of Involvement: citizen information meetings	☒	☐
Comments: Numerous public meetings and briefings were held during the planning of the project. Design public hearings were held on March 7, 2016 at Washington-Lee High School, March 8, 2016 at Eagle Ridge Middle School, and March 9, 2016 at the VDOT Northern Virginia District Office. In addition, this CE is being made available for public review and comment.		

COORDINATION

The following agencies were contacted during development of this study:

- Arlington County
- Fairfax County
    - Fairfax County Economic Development Authority
    - Fairfax County Fire and Rescue
    - Fairfax County Health Department
    - Fairfax County Park Authority
    - Fairfax County Public Schools
- Faith Bible Presbyterian Church
- City of Falls Church
- Kingdom Hall Jehovah's Witness
- Northern Virginia Regional Park Authority
- Saint Ann Catholic Church
- U.S. Department of Agriculture, Natural Resources Conservation Service
- Virginia Department of Transportation
- Washington Metropolitan Area Transit Authority

Comments received as of December 11, 2015 are attached.

This project meets the criteria for a Categorical Exclusion pursuant to 40 CFR 1508.4 and 23 CFR 771.117 and will not result in significant impacts to the human or natural environment.

Attachment A: Absence of Unusual Circumstances

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This attachment documents the absence of unusual circumstances which, per 23 CFR 771.117(b):

1) Significant environmental impacts

   The CE illustrates that there are no measurable impacts to natural or cultural resources. The CE also documents that there are no disproportionately high and adverse effects to environmental justice populations. There are no significant environmental impacts.

2) Substantial controversy on environmental grounds

   There has been some controversy over the proposal to toll Interstate 66. However, the controversy has not been on environmental grounds. VDOT held three Design Public Hearings in March 2016 and made the Draft CE and attachments available for public review on the project web site for a month prior to the meetings. No substantive comments regarding environmental issues related to the proposed action were received during this period. In addition, many of the localities in the region have passed resolutions in support of the project.

3) Significant impact on properties protected by Section 4(f) of the DOT Act or section 106 of the National Historic Preservation Act

   As documented in the CE, there are several parks and conservation areas adjacent to the study area. There also are a number of historic properties in the vicinity. The physical impact related to the proposed action would be the installation of signs. There would be no use of properties protected by Section 4(f). In addition, pursuant to Section 106, the project would not affect historic properties.

4) Inconsistencies with any Federal, State, or local law, requirement or administrative determination relating to the environmental aspects of the action.

   The proposed action consists of implementing the Value Pricing Pilot Program (VPPP) and installing signage to manage the proposed tolling structure. The VPPP is well documented and regulated. The VPPP was established by the U.S. Congress as the Congestion Pricing Pilot Program in 1991. It was subsequently renamed the VPPP under Section 1216 (a) of TEA-21 in 1998, and continued through SAFETEA-LU, MAP-21, and the FAST Act. There are 12 State-led programs and 2 city-led programs participating in the VPPP: California, Connecticut, Florida, Illinois, Maryland, Minnesota, New Jersey, New York City, North Carolina, Oregon, Texas, Virginia, Washington State, and the District of Columbia. Many of these programs have multiple projects. Tolling I-66 inside the beltway also is consistent with state and local law. The concept of HOT lanes on interstate highways is not unusual in this region of the Commonwealth. HOT lanes have been implemented on the Beltway as well as I-95 in recent years. In addition, operational changes on I-66 inside the Beltway are not unusual, as the roadway has transitioned from HOV-4 to HOV-3 to HOV-2 over the years.

Attachment B: Mapping

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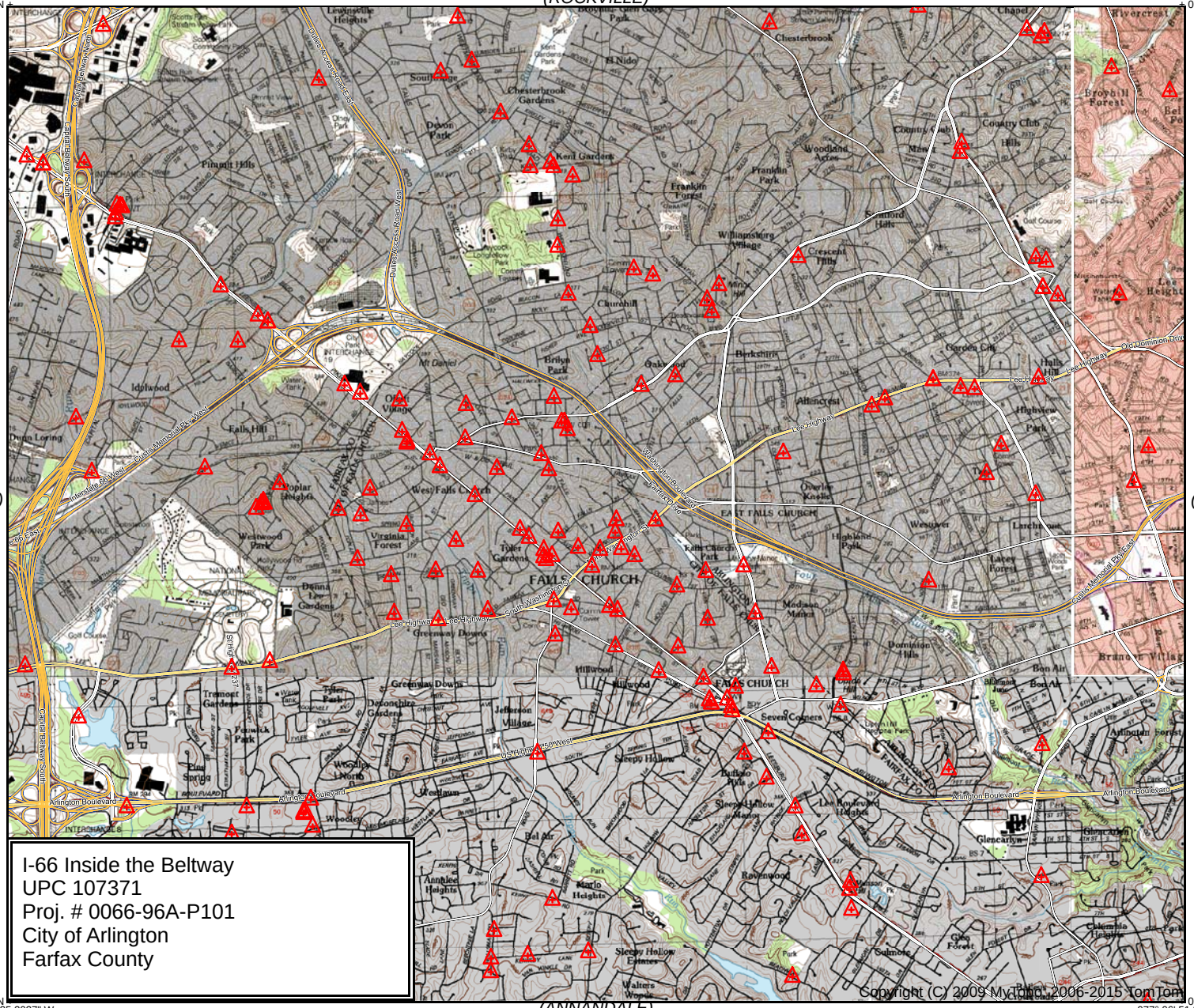
FALLS CHURCH QUADRANGLE
VIRGINIA
TOPOGRAPHIC SERIES

(SENECA) (Unavailable)

077° 13' 25.2027" W
038° 55' 24.2427" N

(ROCKVILLE)

077° 06' 51.8739" W
038° 55' 24.2427" N



(VIENNA) (WASHINGTON WEST)

I-66 Inside the Beltway
UPC 107371
Proj. # 0066-96A-P101
City of Arlington
Farfax County

038° 51' 5.2656" N
077° 13' 25.2027" W

(ANNANDALE)

038° 51' 5.2656" N
077° 06' 51.8739" W

(FAIRFAX) (ALEXANDRIA)

Declination

GN 1.36° W
MN 10.72° W

SCALE 1:48000

0 1 2
MILES

0 1000 2000 3000 4000
YARDS

0 1 2 3 4

CONTOUR INTERVAL 10 FEET
NATIONAL GEODETIC VERTICAL DATUM 1929

Produced by MyTopo Terrain Navigator
Topography based on USGS 1:24,000 Maps

North American 1983 Datum (NAD83)
Universal Transverse Mercator Projection

To place on the predicted North American 1927 move the projection lines 12M N and 26M E

FALLS CHURCH, VA
1994

Attachment C: Environmental Justice Analysis

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UPC 107371
Attachment C
Census Block Groups

STATEFP	COUNTYFP	TRACTCE	NAMELSAD	% Minority Population	Median Household Income ($)
51	013	101000	Block Group 4	8.6	142,181
51	013	100700	Block Group 2	9.7	197,266
51	013	100700	Block Group 4	10.2	180,833
51	013	101100	Block Group 5	11.3	159,896
51	013	101100	Block Group 3	11.5	138,438
51	013	100700	Block Group 3	11.8	174,196
51	013	101100	Block Group 2	12.6	170,077
51	013	101500	Block Group 4	12.8	160,313
51	013	100500	Block Group 1	13.3	143,750
51	013	101402	Block Group 1	13.7	130,873
51	013	101200	Block Group 3	14.8	177,768
51	013	100600	Block Group 2	14.8	154,931
51	013	100900	Block Group 3	14.9	83,125
51	059	470900	Block Group 5	15.1	116,625
51	059	471304	Block Group 1	15.7	179,103
51	013	101401	Block Group 1	15.9	110,417
51	013	101300	Block Group 1	15.9	157,781
51	013	101100	Block Group 4	16.9	128,438
51	013	100100	Block Group 1	17.9	172,928
51	013	101601	Block Group 1	18.8	162,917
51	013	101500	Block Group 1	18.9	88,203
51	013	100600	Block Group 3	19.8	100,972
51	059	471000	Block Group 1	23	143,438
51	013	100600	Block Group 1	23	170,375
51	013	101000	Block Group 3	26	53,856
51	013	101500	Block Group 6	26.6	72,054
51	013	100900	Block Group 4	29.2	67,228
51	059	461602	Block Group 3	56.9	110,227
EJ evaluator factor equals 1.1 x greater than lowest				9.46	
2013 Health and Human Services Poverty Guidelines					23,550

The minority population of the environmental justice (EJ) study area exceeds 50 percent in one census tract (461602-3). The percentage of minority population, however, is above the EJ evaluator factor in all tracts but 101000-4. Therefore, EJ populations are present in all but one of the census tracts identified above.
Current congestion on the interstate already results in traffic diverting through these areas. The traffic analysis done to support the CE indicates that future diversion would be limited and not concentrated in areas with EJ populations. The toll revenue generated by the Value Pricing Pilot Program would be invested in transit, trails, and other multimodal improvements that would benefit EJ populations, and EJ populations would have the opportunity to participate in the decision-making process to identify those improvements. No comments have been received from the public regarding EJ populations. There would be no disproportionately high and adverse effects to environmental justice populations.

Based on data, all Census Tracts exceed the 2013 Health and Human Services Guidelines ($23,550). 2015 guidelines state that a family of four is considered at poverty level if the median household income is $24,550 or below. As listed above all Census Tracts exceed that number therefore no-low income population is considered to be present.

Report Date: **10/26/2015**

Report Run by **S. Smizik**

Source: http://www.usa.com/virginia-state.htm

Attachment D: Threatened and Endangered Species Coordination

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Smizik, Scott (VDOT)

From: Hoskin, Sumalee <sumalee_hoskin@fws.gov>
Sent: Friday, October 30, 2015 10:15 AM
To: Smizik, Scott (VDOT)
Subject: Re: UPC 107371 - NLEB Coordination

Scott,
Thank you for your submission. We have all the information we need. In the future, please send your submissions to our general mailbox, virginiafieldoffice@fws.gov
Thanks,
Sumalee

On Fri, Oct 30, 2015 at 10:03 AM, Smizik, Scott (VDOT) <Scott.Smizik@vdot.virginia.gov> wrote:

Good morning Sumalee –

VDOT is preparing a Categorical Exclusion to implement a Value Pricing Pilot Program on Interstate 66 inside the beltway. The action would consist of installing new signage along existing, maintained right of way and co-locating new signs with existing signs mounted on bridges/overpasses. As there would be no impact beneath the bridging and the action would occur in highly urbanized areas along existing interstates with no tree removal proposed, we do not believe there would be any impact to the northern long-eared bat.

I have attached information to support this finding, but please let me know if you require additional information. We look forward to your response.

Scott Smizik

Location Studies Project Manager
Virginia Department of Transportation
Environmental Division
1401 East Broad Street
Richmond, Virginia 23219
Desk: (804) 371-4082

Cell: (804) 306-0920

Fax: (804) 786-7401

Scott.Smizik@VDOT.Virginia.gov

Smizik, Scott (VDOT)

From: Smizik, Scott (VDOT)
Sent: Friday, October 30, 2015 10:03 AM
To: 'Sumalee_hoskin@fws.gov'
Cc: Begg, Steven (VDOT)
Subject: UPC 107371 - NLEB Coordination
Attachments: UPC 107371 NLEB Coordination.pdf

Good morning Sumalee –

VDOT is preparing a Categorical Exclusion to implement a Value Pricing Pilot Program on Interstate 66 inside the beltway. The action would consist of installing new signage along existing, maintained right of way and co-locating new signs with existing signs mounted on bridges/overpasses. As there would be no impact beneath the bridging and the action would occur in highly urbanized areas along existing interstates with no tree removal proposed, we do not believe there would be any impact to the northern long-eared bat.

I have attached information to support this finding, but please let me know if you require additional information. We look forward to your response.

Scott Smizik
Location Studies Project Manager
Virginia Department of Transportation
Environmental Division
1401 East Broad Street
Richmond, Virginia 23219
Desk: (804) 371-4082
Cell: (804) 306-0920
Fax: (804) 786-7401
Scott.Smizik@VDOT.Virginia.gov

Federal Highway Administration (FHWA) and Federal Railroad Administration (FRA)
Range-wide Programmatic Informal Consultation for
Indiana Bat and Northern Long-eared Bat

Project Submittal Form for FHWA, FRA, and Transportation Agencies
Updated May 29, 2015

In order to use the programmatic informal consultation to fulfill Endangered Species Act consultation requirements, transportation agencies must use this form to submit project-level information for all may affect, not likely to adversely affect (NLAA) determinations to the appropriate U.S. Fish and Wildlife Service (Service) field office prior to project commencement. For more information, see the Standard Operating Procedure for Site Specific Project(s) Submission in the User's Guide.

In submitting this form, the transportation agency ensures that the proposed project(s) adhere to the criteria of the range-wide programmatic informal BA. Upon submittal of this form, the appropriate Service field office may review the site-specific information provided and request additional information. If the applying transportation agency is not notified within 14 calendar days of emailing the Project Submittal Form to the Service field office, it may proceed under the range-wide programmatic informal consultation.

Further instructions on completing the form can be found by hovering your cursor over each text box.

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1. Date: October 26, 2015

2. Lead Agency: Federal Highway Administration
This refers to the Federal governmental lead action agency initiating consultation; select FHWA or FRA as appropriate

3. Requesting Agency: Virginia Department of Transportation

    a. Name: Scott Smizik

    b. Title: Location Studies Project Manager

    c. Phone: 804-371-4082

    d. Email: scott.smizik@vdot.virginia.gov

4. Consultation Code[1]: 05E2VA00-2016-SLI-0120

5. Project Name(s): 66 ITB CE

6. Project Description:

    Install signage on existing bridges and right of way to implement Value Pricin

[1] Available through IPaC System Official Species List: https://ecos.fws.gov/ipac/

7. Other species from Official Species List:

   No effect – project(s) are inside the range, but no suitable habitat – see additional information attached

   May Affect – see additional information provided for those species (either attached or forthcoming)

8. For Ibat/NLEB, if Applicable, Explain Your No Effect Determination

   ✔ No effect – project(s) are outside the species' range (*form complete*)

   No effect – project(s) are inside the range, but no suitable summer habitat (*form complete*)

   No effect from maintenance, alteration, or demolition of bridge(s)/structure(s) – results of inspection surveys indicate no signs of bats. (*form complete*)

   Otherwise, please continue below.

9. Affected Resource/Habitat Type

   Trees

   Bridge

   Other Non-Tree Roosting Structure (e.g., building)

   Other (please explain):

10. For Tree Removal Projects:

    a. Please verify that no documented roosts or foraging habitat will be impacted and that project is within 100 feet of existing road surface:

    b. Please verify that all tree removal will occur during the inactive season[2]:

    c. Timing of clearing:

    d. Amount of clearing:

[2] Coordinate with local Service field office for appropriate dates.

11. For Bridge/Structure Work Projects:

    a. Proposed work:

    b. Timing of work:

    c. Evidence of bat activity on bridge/structure:

    d. If applicable, verify that superstructure work will not bother roosting bats in any way:

    e. If applicable, verify that bridge/structure work will occur only in the winter months:

12. Please confirm that:

- Proposed project(s) adhere to the criteria of the range-wide programmatic informal BA (see Section 2.0).
- All applicable AMMs will be implemented, including[3]:
- Tree Removal AMM 1:
- Tree Removal AMM 2:
- Tree Removal AMM 3:
- Tree Removal AMM 4:
- Bridge AMM 1:
- Bridge AMM 2:
- Bridge AMM 3:
- Bridge AMM 4:
- Structure AMM 1:
- Structure AMM 2:
- Structure AMM 3:

[3] See AMMs Fact Sheet (Appendix B) for more information on the following AMMs.

- Structure AMM 4:
- Lighting AMM 1:
- Lighting AMM 2:
- Dust Control AMM 1:
- Water Control AMM 1 (erosion control):
- Water Control AMM 2 (sediment control):
- Water Control AMM 3 (roadside drainage):
- Water Control AMM 4 (revegetation):
- Water Control AMM 5 (equipment service/maintenance):
- Water Control AMM 6 (spill plan):
- Wetland/Stream Protection AMM 1:
- Wetland/Stream Protection AMM 2:
- Wetland/Stream Protection AMM 3:
- Wetland/Stream Protection AMM 4:
- Wetland/Stream Protection AMM 5:
- Wetland/Stream Protection AMM 6:

Species Conclusions Table

Project Name: I-66 ITB CE

Date: October 8, 2015

Species / Resource Name	Conclusion	ESA Section 7 / Eagle Act Determination	Notes / Documentation
Northern long-eared Bat (*Myotis septentrionalis*)	Species present	No effect	USFWS has classified Arlington County as a dense urban area. As such, no effect is anticipated. As the physical impact of the action is confined to installing new signage along existing Right of Way, it is anticipated there would be no effect in Fairfax County or Falls Church.
critical habitat	no critical habitat present	No effect	
bald eagles	unlikely to disturb nesting bald eagles does not intersect with an eagle concentration area	No Eagle Act permit required	No nests within 660' and not within a concentration area

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Virginia Ecological Services Field Office
6669 SHORT LANE
GLOUCESTER, VA 23061
PHONE: (804)693-6694 FAX: (804)693-9032
URL: www.fws.gov/northeast/virginiafield/

Consultation Code: 05E2VA00-2016-SLI-0120 October 08, 2015
Event Code: 05E2VA00-2016-E-00139
Project Name: 66 ITB CE

Subject: List of threatened and endangered species that may occur in your proposed project location, and/or may be affected by your proposed project

To Whom It May Concern:

The enclosed species list identifies threatened, endangered, proposed and candidate species, as well as proposed and final designated critical habitat, that may occur within the boundary of your proposed project and/or may be affected by your proposed project. The species list fulfills the requirements of the U.S. Fish and Wildlife Service (Service) under section 7(c) of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 *et seq.*).

New information based on updated surveys, changes in the abundance and distribution of species, changed habitat conditions, or other factors could change this list. Please feel free to contact us if you need more current information or assistance regarding the potential impacts to federally proposed, listed, and candidate species and federally designated and proposed critical habitat. Please note that under 50 CFR 402.12(e) of the regulations implementing section 7 of the Act, the accuracy of this species list should be verified after 90 days. This verification can be completed formally or informally as desired. The Service recommends that verification be completed by visiting the ECOS-IPaC website at regular intervals during project planning and implementation for updates to species lists and information. An updated list may be requested through the ECOS-IPaC system by completing the same process used to receive the enclosed list.

The purpose of the Act is to provide a means whereby threatened and endangered species and the ecosystems upon which they depend may be conserved. Under sections 7(a)(1) and 7(a)(2) of the Act and its implementing regulations (50 CFR 402 *et seq.*), Federal agencies are required to utilize their authorities to carry out programs for the conservation of threatened and endangered species and to determine whether projects may affect threatened and endangered species and/or designated critical habitat.

A Biological Assessment is required for construction projects (or other undertakings having similar physical impacts) that are major Federal actions significantly affecting the quality of the human environment as defined in the National Environmental Policy Act (42 U.S.C. 4332(2)(c)). For projects other than major construction activities, the Service suggests that a biological evaluation similar to a Biological Assessment be prepared to determine whether the project may affect listed or proposed species and/or designated or proposed critical habitat. Recommended contents of a Biological Assessment are described at 50 CFR 402.12.

If a Federal agency determines, based on the Biological Assessment or biological evaluation, that listed species and/or designated critical habitat may be affected by the proposed project, the agency is required to consult with the Service pursuant to 50 CFR 402. In addition, the Service recommends that candidate species, proposed species and proposed critical habitat be addressed within the consultation. More information on the regulations and procedures for section 7 consultation, including the role of permit or license applicants, can be found in the "Endangered Species Consultation Handbook" at:

http://www.fws.gov/endangered/esa-library/pdf/TOC-GLOS.PDF

Please be aware that bald and golden eagles are protected under the Bald and Golden Eagle Protection Act (16 U.S.C. 668 *et seq.*), and projects affecting these species may require development of an eagle conservation plan (http://www.fws.gov/windenergy/eagle_guidance.html). Additionally, wind energy projects should follow the wind energy guidelines (http://www.fws.gov/windenergy/) for minimizing impacts to migratory birds and bats.

Guidance for minimizing impacts to migratory birds for projects including communications towers (e.g., cellular, digital television, radio, and emergency broadcast) can be found at: http://www.fws.gov/migratorybirds/CurrentBirdIssues/Hazards/towers/towers.htm; http://www.towerkill.com; and http://www.fws.gov/migratorybirds/CurrentBirdIssues/Hazards/towers/comtow.html.

We appreciate your concern for threatened and endangered species. The Service encourages Federal agencies to include conservation of threatened and endangered species into their project planning to further the purposes of the Act. Please include the Consultation Tracking Number in the header of this letter with any request for consultation or correspondence about your project that you submit to our office.

Attachment

United States Department of Interior
Fish and Wildlife Service

Project name: 66 ITB CE

Official Species List

Provided by:

Virginia Ecological Services Field Office
6669 SHORT LANE
GLOUCESTER, VA 23061
(804) 693-6694
http://www.fws.gov/northeast/virginiafield/

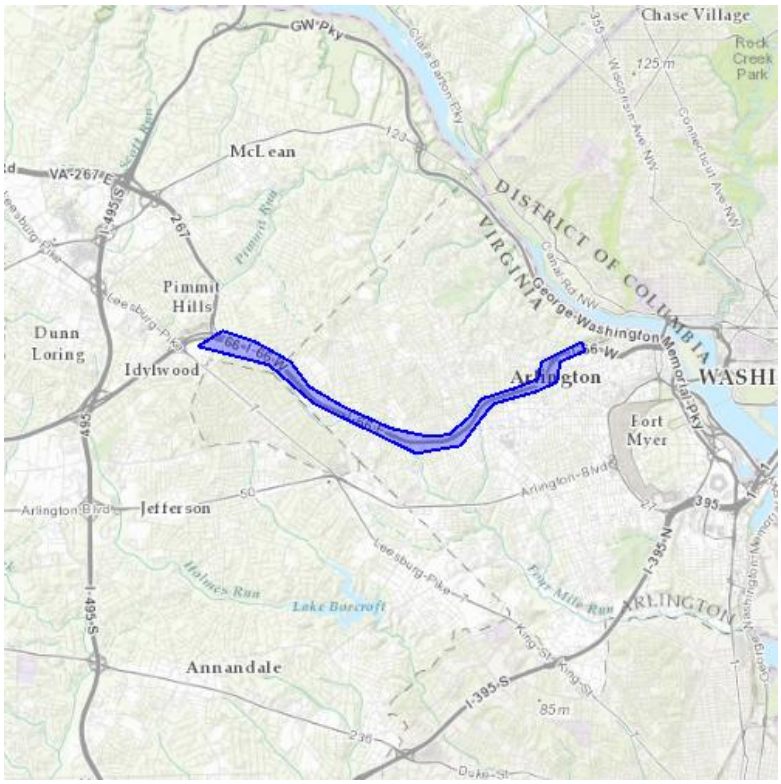
Consultation Code: 05E2VA00-2016-SLI-0120
Event Code: 05E2VA00-2016-E-00139

Project Type: TRANSPORTATION

Project Name: 66 ITB CE
Project Description: 66 ITB CE

Please Note: The FWS office may have modified the Project Name and/or Project Description, so it may be different from what was submitted in your previous request. If the Consultation Code matches, the FWS considers this to be the same project. Contact the office in the 'Provided by' section of your previous Official Species list if you have any questions or concerns.

Project Location Map:



Project Coordinates: MULTIPOLYGON (((-77.19200134277344 38.8985146573459, -77.1731185913086 38.894773840440934, -77.16161727905273 38.88689075977245, -77.135009765625 38.876868631634224, -77.12316513061523 38.878472267131286, -77.1181869506836 38.88368383257159, -77.11475372314453 38.88689075977245, -77.10342407226562 38.88942947447528, -77.09810256958006 38.89143365883688, -77.09741592407227 38.895441857911635, -77.09089279174805 38.89757947159315, -77.09157943725586 38.89958342598271, -77.0965576171875 38.89757947159315, -77.10205078124999 38.895441857911635, -77.10290908813477 38.89196809844948, -77.10891723632812 38.89009754221236, -77.11801528930664 38.888093320151775, -77.12110519409178 38.88408470638818, -77.12642669677734 38.88074402213866, -77.1320915222168 38.88047676061329, -77.14136123657227 38.88208031468691, -77.1540641784668 38.88635628195838, -77.16264724731445 38.89036476754788, -77.1676254272461 38.895441857911635, -77.17706680297852 38.89944983078282, -77.18530654907227 38.90172091499795, -77.19200134277344 38.8985146573459)))

Project Counties: Arlington, VA | Fairfax, VA

Endangered Species Act Species List

There are a total of 1 threatened or endangered species on your species list. Species on this list should be considered in an effects analysis for your project and could include species that exist in another geographic area. For example, certain fish may appear on the species list because a project could affect downstream species. Critical habitats listed under the **Has Critical Habitat** column may or may not lie within your project area. See the **Critical habitats within your project area** section further below for critical habitat that lies within your project. Please contact the designated FWS office if you have questions.

Mammals	Status	Has Critical Habitat	Condition(s)
Northern long-eared Bat *(Myotis septentrionalis)*	Threatened		

Critical habitats that lie within your project area

There are no critical habitats within your project area.

VaFWIS Search Report Compiled on 10/8/2015, 2:16:14 PM

Help

Known or likely to occur within a **3 mile radius around point 38,52,27.6 -77,12,19.0** in **013 Arlington County, 059 Fairfax County, 610 Falls Church City, VA**

View Map of Site Location

749 Known or Likely Species ordered by Status Concern for Conservation (displaying first 38) (38 species with Status* or Tier I** or Tier II**)

BOVA Code	Status*	Tier**	Common Name	Scientific Name
010032	FESE	II	Sturgeon, Atlantic	Acipenser oxyrinchus
050022	FT		Bat, northern long-eared	Myotis septentrionalis
060006	SE	II	Floater, brook	Alasmidonta varicosa
030062	ST	I	Turtle, wood	Glyptemys insculpta
040096	ST	I	Falcon, peregrine	Falco peregrinus
040129	ST	I	Sandpiper, upland	Bartramia longicauda
040293	ST	I	Shrike, loggerhead	Lanius ludovicianus
040379	ST	I	Sparrow, Henslow's	Ammodramus henslowii
100155	FSST	I	Skipper, Appalachian grizzled	Pyrgus wyandot
040292	ST		Shrike, migrant loggerhead	Lanius ludovicianus migrans
070027	FS	I	Amphipod, Northern Virginia well	Stygobromus phreaticus
100248	FS	I	Fritillary, regal	Speyeria idalia idalia
040093	FS	II	Eagle, bald	Haliaeetus leucocephalus
100154	FS	II	Butterfly, Persius duskywing	Erynnis persius persius
100166	FS	II	Skipper, Dotted	Hesperia attalus slossonae
060029	FS	III	Lance, yellow	Elliptio lanceolata
100013	FS	III	Moth, leaf-mining	Tischeria perplexa
010038	FS	IV	Alewife	Alosa pseudoharengus
010045	FS		Herring, blueback	Alosa aestivalis
080340	FS		Caddisfly, Buffalo Springs	Ceratopsyche etnieri
030063	CC	III	Turtle, spotted	Clemmys guttata
030012	CC	IV	Rattlesnake, timber	Crotalus horridus
010077		I	Shiner, bridle	Notropis bifrenatus
040372		I	Crossbill, red	Loxia curvirostra
040225		I	Sapsucker, yellow-bellied	Sphyrapicus varius
040319		I	Warbler, black-throated green	Dendroica virens
040306		I	Warbler, golden-winged	Vermivora chrysoptera
040038		II	Bittern, American	Botaurus lentiginosus

040052		II	Duck, American black	Anas rubripes
040029		II	Heron, little blue	Egretta caerulea caerulea
040036		II	Night-heron, yellow-crowned	Nyctanassa violacea violacea
040213		II	Owl, northern saw-whet	Aegolius acadicus
040105		II	Rail, king	Rallus elegans
040186		II	Tern, least	Sterna antillarum
040320		II	Warbler, cerulean	Dendroica cerulea
040304		II	Warbler, Swainson's	Limnothlypis swainsonii
040266		II	Wren, winter	Troglodytes troglodytes
070020		II	Amphipod, Pizzini's	Stygobromus pizzinii

To view **All 749 species** View 749

* FE=Federal Endangered; FT=Federal Threatened; SE=State Endangered; ST=State Threatened; FC=Federal Candidate; FS=Federal Species of Concern; CC=Collection Concern

** I=VA Wildlife Action Plan - Tier I - Critical Conservation Need;
II=VA Wildlife Action Plan - Tier II - Very High Conservation Need;
III=VA Wildlife Action Plan - Tier III - High Conservation Need;
IV=VA Wildlife Action Plan - Tier IV - Moderate Conservation Need

Anadromous Fish Use Streams

N/A

Impediments to Fish Passage (1 records)

View Map of All Fish Impediments

ID	Name	River	View Map
1180	HOLMES RUN DAM #2A	HOLMES RUN	Yes

Threatened and Endangered Waters (1 Reach)

View Map of All Threatened and Endangered Waters

Stream Name	T&E Waters Species					View Map
	Highest TE*	BOVA Code, Status*, Tier**, Common & Scientific Name				
Pimmit Run (02070010)	ST	030062	ST	I	Turtle, wood	Glyptemys insculpta	Yes

Managed Trout Streams

N/A

Bald Eagle Concentration Areas and Roosts

N/A

Bald Eagle Nests

N/A

Habitat Predicted for Aquatic WAP Tier I & II Species (1 Reach)

View Map Combined Reaches from Below of Habitat Predicted for WAP Tier I & II Aquatic Species

Stream Name	Tier Species						View Map
	Highest TE*	BOVA Code, Status*, Tier**, Common & Scientific Name					
Pimmit Run (20700101)	ST	030062	ST	I	Turtle, wood	Glyptemys insculpta	Yes

Habitat Predicted for Terrestrial WAP Tier I & II Species

N/A

Virginia Breeding Bird Atlas Blocks (8 records)

View Map of All Query Results
Virginia Breeding Bird Atlas Blocks

BBA ID	Atlas Quadrangle Block Name	Breeding Bird Atlas Species			View Map
		Different Species	Highest TE*	Highest Tier**	
53193	Annandale, CW	72		II	Yes
53192	Annandale, NE	49		IV	Yes
53191	Annandale, NW	78		II	Yes
52192	Fairfax, NE	63		IV	Yes
53203	Falls Church, CW	56		IV	Yes
53206	Falls Church, SE	60		IV	Yes
53205	Falls Church, SW	66		II	Yes
52206	Vienna, SE	54		IV	Yes

Public Holdings:

N/A

Summary of BOVA Species Associated with Cities and Counties of the Commonwealth of Virginia:

FIPS Code	City and County Name	Different Species	Highest TE	Highest Tier
013	Arlington	458	FESE	I
059	Fairfax	559	FESE	I
610	Falls Church City	440	FTSE	I

USGS 7.5' Quadrangles:
Fairfax
Vienna
Annandale
Falls Church

USGS NRCS Watersheds in Virginia:

N/A

USGS National 6th Order Watersheds Summary of Wildlife Action Plan Tier I, II, III, and IV Species:

HU6 Code	USGS 6th Order Hydrologic Unit	Different Species	Highest TE	Highest Tier
PL22	Difficult Run	67	FSST	I
PL23	Potomac River-Nichols Run-Scott Run	69	FSST	I
PL24	Potomac River-Pimmit Run	68	FSST	I
PL25	Potomac River-Fourmile Run	67	FSST	I
PL26	Cameron Run	69	FSST	I
PL30	Accotink Creek	81	FSST	I

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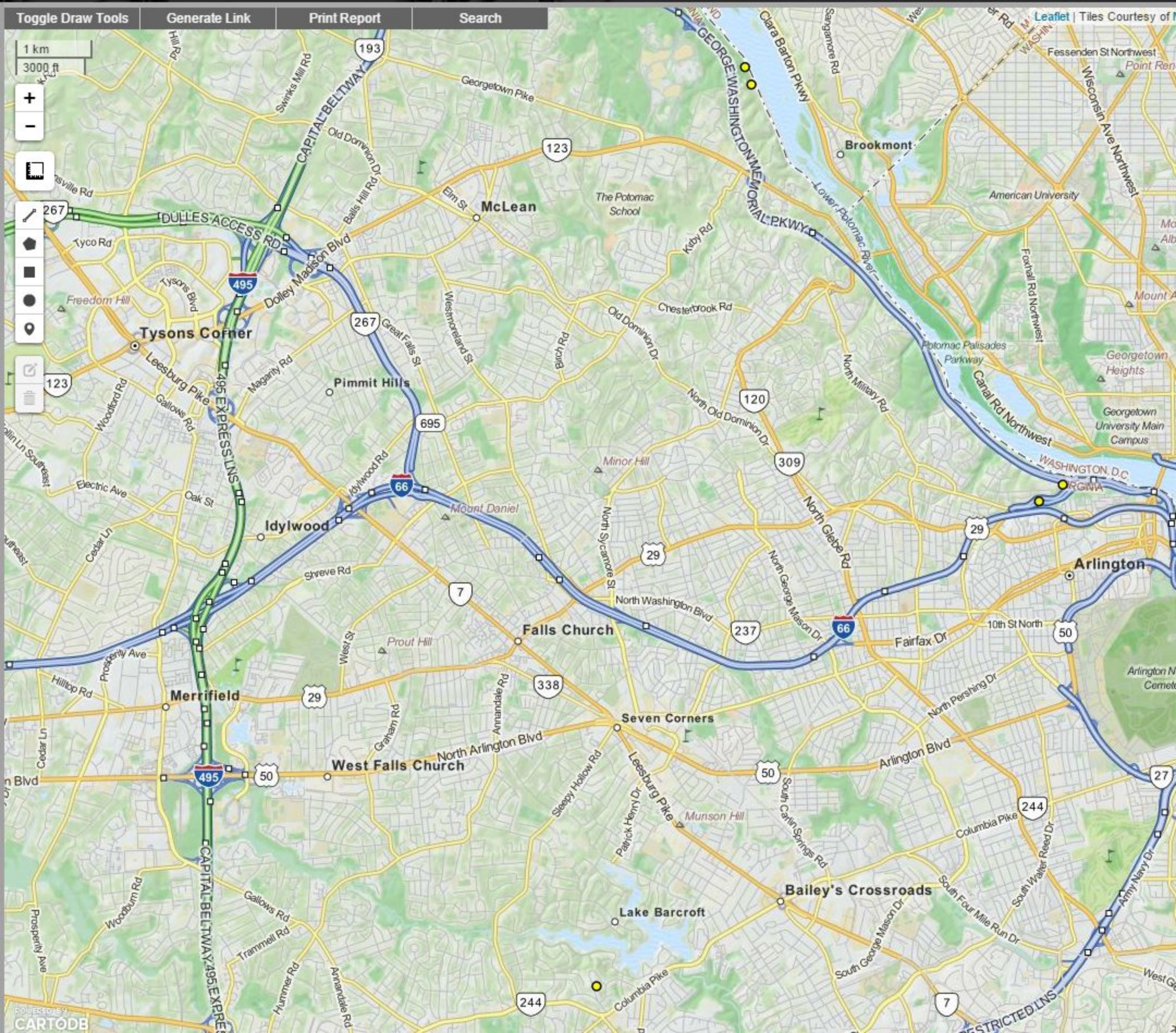

Attachment E: Indirect and Cumulative Effects Analysis

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Addendum

Following the availability of the Draft Categorical Exclusion (CE), Virginia lawmakers agreed to a plan that called for plans to accelerate the Eastbound I-66 Widening Inside the Beltway project. This widening project is now anticipated to commence by 2018 and would result in widening of I-66 in the eastbound direction from the Dulles Airport Access Road (Exit 67) to North George Mason Drive (Exit 71).

Notwithstanding, the proposed Federal action being evaluated in this CE (i.e., authorization from FHWA through the execution of a tolling agreement under Value Pricing Pilot Program (VPPP)) is independent from the widening project from the standpoint of FHWA's NEPA implementing regulations at 23 CFR 771. While both involve FHWA actions, the nature of the actions are very different. The VPPP is intended to demonstrate whether and to what extent roadway congestion may be reduced through application of **congestion pricing strategies**, and the magnitude of the impact of such strategies on driver behavior, traffic volumes, transit ridership, air quality and availability of funds for transportation programs. For I-66, VDOT is proposing to implement congestion pricing **in both directions**. The I-66 widening project, on the other hand, is addressing congestion in the **eastbound direction only** through **capacity improvements**. In addition, VDOT is not planning to utilize federal-aid highway funds for the implementation of congestion pricing, whereas VDOT does plan on utilizing federal-aid highway funds for the I-66 widening project.

While the tolling agreement under the VPPP is independent from the I-66 widening project, the I-66 widening project is considered in the cumulative effects portion of this Indirect and Cumulative Effects analysis.

When conducting cumulative effects analysis, FHWA and VDOT consider "Reasonably Foreseeable Future Actions" to be those actions that are fiscally constrained in the region's Long Range Transportation Plan (LRTP). At this time, efforts are underway to update the LRTP to properly include the proposed widening of I-66 inside the beltway. Therefore, it is appropriate to consider the contribution this project could have to cumulative effects.

The Eastbound I-66 Widening Inside the Beltway project is scheduled to be complete by 2020. The project could contribute to cumulative impacts related to socioeconomics and land use, natural resources, and cultural resources. Like many of the other foreseeable future actions, this project would be designed to further reduce congestion in the region. This project is different, however, in that it would address congestion along the same portion of I-66 as the proposed action addressed in the CE. It also would contribute to cumulative property impacts.

The proposed widening project also would contribute to cumulative impacts related to natural resources. The limited widening would contribute to adverse cumulative impacts related to other projects that widen or construct new transportation facilities.

The widening also could have the potential to contribute to adverse and beneficial cumulative effects related to cultural resources. Although the widening could contribute to adverse cumulative impacts to historic properties adjacent to I-66, the potential reduction in traffic diversion in the surrounding neighborhoods could contribute to beneficial impacts to these same resources. These impacts would be assessed as part of the Section 106 process for the future widening project.

Indirect Effects

This attachment has been prepared to further document the potential indirect and cumulative effects associated with the proposed project. The format and methodology are used by VDOT and FHWA on larger EA- and EIS- level studies. For the purposes of this CE, some of the sections have been condensed.

Methodology

This attachment presents an analysis of the potential indirect impacts related to the proposed action. For the purposes of this attachment and the associated CE, the methodology followed for analyzing indirect effects are prescribed in the Transportation Research Board's (TRB) National Cooperative Highway Research Program (NCHRP) Report 466, *Desk Reference for Estimating the Indirect Effects of Proposed Transportation Projects*.

In NCHRP Report 466, TRB states that indirect effects can occur in three broad categories:

1) Encroachment-Alteration Impacts – Alteration of the behavior and functioning of the affected environment caused by project encroachment (physical, biological, socioeconomics) on the environment;
2) Induced Growth Impacts – Project-influenced development effects (land use); and,
3) Impacts Related to Induced Growth – Effects related to project-influenced development effects (impacts of the change of land use on the human and natural environment).

It should be noted that induced growth is not anticipated because the proposed action occurs on an existing transportation facility, in a highly urbanized environment, and does not result in any new interchanges. Important characteristics for induced growth are described in North Carolina Department of Transportation's (NCDOT) *Guidance for Assessing Indirect and Cumulative Impacts of Transportation Projects in North Carolina, Vol. II: Practitioners Handbook*. These characteristics include existing land use conditions in the project area, increased accessibility that may result from new transportation improvements, local political and economic conditions, and the availability of other infrastructure and the rate of urbanization in the region. The NCDOT guidance illustrates the different stages of development and how a highway improvement project may influence development. Because the ICE study area is in an advanced land use progression, it is more likely that the proposed transportation improvements could result in infill development than urban/suburban sprawl. As a result, the improvements are not expected to be a catalyst for induced growth. Any growth that does occur is expected to occur along the existing corridor in existing or previously developed areas where the environment already has been impacted. Therefore, for the purposes of this analysis, the term "indirect effects" refers to encroachment-alteration impacts.

The stepwise process TRB recommends in NCHRP Report 466 for assessing indirect effects has been used as the structure for the analysis, and considers the following steps:

Step 1	Scoping
Step 2	Identify Study Area Direction and Goals
Step 3	Inventory Notable Features in the Study Area
Step 4	Identify Impact-Causing Activities
Step 5	Identify Indirect Effects for Analysis

Step 6 Analyze Indirect Effects and Evaluate Analysis Results
Step 7 Assess Consequences and Develop Mitigation

To complete these steps, the required analyses rely on planning judgment. The NCHRP 25-25 program, Task 22, *Forecasting Indirect Land Use Effects on Transportation Projects*, documents means of applying planning judgment to indirect and cumulative effects analyses (TRB, 2007). The direction provided in the TRB document is the basis for the indirect effects analyses presented in this technical report.

Step 1 - Scoping

To inform the CE, scoping letters were sent out to agencies and jurisdictions with purview over environmental and other areas in the study area. These agencies are listed on the CE form and responses are attached.

In addition to these letters, VDOT hosted numerous public meetings and briefings, as well as three design public hearings to inform the public of the proposed action and solicit input on the project. Input from the initial meetings and outreach has informed the analysis in this attachment as well as other elements of the CE.

Step 2 – Identify Study Area Direction and Goals

The second step in the indirect effects analysis focuses on assembling information regarding general trends and goals within the various resource ICE study areas. Before these trends and goals could be identified, specific resource studies areas were developed based on the information obtained during the first step of the process.

In considering indirect effects, the following study areas were considered:

- Socioeconomic and Land Use: Includes much of the metro area that could have travel patterns influenced by the proposed action.
- Natural Resources: Includes area within and immediately adjacent to existing right of way.
- Cultural Resources: Includes area within and immediately adjacent to existing right of way. (Independent of the Section 106 analysis documented on the CE.)

Scoping efforts identified well documented population growth in the region coupled with increasing traffic volumes. Congestion management and improved transportation options along the length of Interstate 66 have been discussed, studied, and documented for many years. Proposed improvements to the portion of the interstate outside the beltway were documented in a Tier I Environmental Impact Statement that was published in 2013. The recommendations made in this Tier I document are currently being refined through a Tier II study. Plans for congestion management and travel reliability improvements inside the beltway have culminated in the proposed action.

Step 3 – Inventory Notable Features in the Study Area

As documented in the CE, the developed nature of the road corridor limits the presence of notable natural or cultural resources. Within the socioeconomic study area, there are numerous residences, businesses, and community and recreational facilities.

Step 4 - Identify Impact-Causing Activities

The installation of tolling signage, gantries, and supporting equipment would require limited easements but would not have any measurable impact. Implementing the tolling would result in a change in traffic patterns on Interstate 66 and the surrounding road system. Traffic analysis is documented in Attachment G.

Step 5 – Identify Indirect Effects for Analysis

Given the lack of notable features and related impact causing activities, indirect effects to natural and cultural resources were not advanced for analysis (outside of the Section 106 process documented on the CE). Indirect effects to socioeconomic and land use resources are analyzed in the following sections. Though not specifically identified, this analysis includes indirect effects to environmental justice communities.

Step 6 – Analyze Indirect Effects and Evaluate Analysis Results

As documented in Attachment G, the proposed tolling structure would result in a change in traffic patterns on Interstate 66 and the surrounding road network. During tolling periods, it is anticipated that traffic would divert off of the interstate and onto local roads to avoid paying a toll. This type of diversion already is occurring at some level, as drivers avoid the congestion on the interstate and opt for the local road network. On the other hand, it is possible that some of the drivers who currently avoid the interstate may opt to pay the toll in exchange for a more reliable trip.

The diversion of vehicles from the interstate onto local roads during toll periods could lead to an increase in congestion and a decrease in travel reliability on local roads during the peak periods. Changes in traffic patterns on local roads could have beneficial impacts to businesses, such as fast food restaurants that rely on "drive-by" customers. Changes in travel patterns also could have adverse effects during tolling periods to properties, such as residencies or recreational facilities that derive value from their ease of access and lack of traffic congestion. This could result in some property owners leaving the area while attracting others to the region. In cases where traffic diverts onto the interstate to pay for a more reliable trip, these impacts would be reversed. These impacts also would be realized only during the hours when tolling is in effect.

VDOT plans to use fees collected through tolling to fund transit improvements. These improvements would have a beneficial indirect socioeconomic effect by providing additional travel options, improving travel reliability, and making travel more affordable for local workers.

Step 7 - Assess Consequences and Develop Mitigation

The analysis included in Step 6 identified indirect effects associated with the proposed project. Planning judgment allows for an identification of potential indirect effects; however, the consequences of these impacts cannot be fully assessed at the NEPA planning level. For example, while Attachment G illustrates the anticipated traffic diversion, it would be speculative to suggest how property owners may react to this diversion.

It is clear that traffic patterns would be altered as a result of the proposed action. This impact could be mitigated in two ways. First, through the use of dynamic pricing, the toll rates can be set to make the facility attractive to drivers to reduce the amount diversion and/or attract drivers that currently drive on local roads to avoid congestion during peak periods. As noted above, VDOT plans to use fees collected through tolling to fund transit improvements. These transit improvements could reduce the number of vehicles on the interstate and/or local roads, reducing the impacts discussed above.

Cumulative Effects

To document cumulative effects, the analysis followed the five-part evaluation process outlined in Fritiofson v. Alexander, 772 F.2d 1225 (5th Cir., 1985), as described in FHWA's *Guidance: Questions and Answers Regarding the Consideration of Indirect and Cumulative Impacts in the NEPA Process*:

1. What is the geographic area affected by the study?
2. What are the resources affected by the study?
3. What are the other past, present, and reasonably foreseeable actions that have impacted these resources?
4. What were those impacts?
5. What is the overall impact on these various resources from the accumulation of the actions?

The following sections document these steps.

What is the geographic area affected by the study?

The geographic area considered for cumulative effects is the same as the study areas described above for the indirect effects analysis. The timeframe considered for cumulative effects dates back to the construction of Interstate 66. The interstate was approved in 1977 and construction was completed in 1982.

What are the resources affected by the study?

During the indirect effects analysis, an inventory of notable features was performed. These resources were reviewed for potential cumulative effects. For the purposes of this analysis, the environmental baseline includes the current condition of these resources. A review of historic aerials indicates that, by the time the interstate was constructed, the area was already highly developed. Therefore, while the region has a history of environmental impacts associated with development, the interstate facility was constructed in an environment that had already been impacted. Since the construction of the interstate, the communities surrounding the transportation facility have increased in size and density.

Past Actions

Many of the past actions that have contributed to the baseline for this analysis occurred as part of the residential, commercial, and industrial development that occurred prior to the construction of the interstate. These actions date back to initial European settlement of the area, resulting in deforestation and manipulation of wetlands, streams, and wildlife habitat. As the area was transformed into the capital of our nation, these impacts intensified. Over time, as urban/suburban development extended from the capital, these impacts spread throughout the study area. This change resulted in in the fragmentation or loss of wildlife habitat and species, impacts to wetlands and streams, and increased levels of air and water pollution.

The increasing development also led to rapid population growth in the region. This growth resulted in residential and commercial developments further away from the major employment centers which were still located in the District of Columbia. This led to an increase in vehicle miles traveled and a greater demand for improvements to transportation facilities. The completion of Interstate 66 in 1982 represented

one of the greatest improvements to the regional transportation network to accommodate continued growth. Over the last 20 years, growth in the region has continued, placing greater demand on the interstate. The growing congestion on the interstate has resulted in traffic diversion described above, as well as impacted quality of life, employment trends, and real estate values.

Present and Reasonably Foreseeable Future Actions

The table below lists the projects listed in the Metropolitan Washington Council of Governments' (MWCOG) Constrained Long-Range Transportation Plan. Projects in these planning documents are treated as reasonably foreseeable actions because future construction funds have been set aside for them in the planning process.

Project Name	Description	Year Complete
DC Streetcar	Implement streetcar services at multiple locations	2014, 2015, 2016, and 2020
Purple Line	Construct a 16 mile light rail corridor from Bethesda to New Carrolton Metro Stations	2020
I-66 Express Lanes – outside the Beltway	Widen I-66 to 5 lanes (3 general purpose and 2 HOT), and provide frequent express bus service	2022
US Route 1 Bus Rapid Transit	Provide dedicated bus lane from Huntington Metro station to the Woodbridge VRE station	2030
Fairfax County Parkway HOV (VA-286)	Widen existing roadway to 6 lanes and restrict traffic in new lanes to HOV during peak travel times	2035
Metro Silver Line – Phase 2 (Dulles Corridor Metrorail Project)	Extend Metro's Silver Line from Wiehle-Reston East Metro station to Dulles Airport	2035
Corridor Cities Transitway	Construct bus rapid transit line from Shady Grove Metro station to the COMSAT facility, south of Clarksburg	2020
270/US Route 15 Corridor HOV	Widen highway between Shady Grove Metro station and Biggs Ford Road, add HOV lanes	2030

In addition to these projects, Arlington County, Fairfax County, and the City of Falls Church have independent transportation, stormwater, and facilities projects underway. These projects are documented The future toll revenue-funded multimodal projects that will be implemented have yet to be fully defined.

What were those impacts?

Cumulative impacts consist of the impacts of the proposed action and the impacts of the past, present, and reasonably foreseeable future actions. The table below illustrates the resources that could potentially be

impacted by these actions. These potential impacts are taken into consideration in the following discussions of cumulative impacts to different resources.

Project Name	Description	Anticipated Impacts
DC Streetcar	Implement streetcar services at multiple locations	Socioeconomic and land use
South Capitol Street Bridge Reconstruction	Convert South Capitol Street to a 6-lane urban boulevard and reconstruct the Frederick Douglass Memorial Bridge	Socioeconomic and land use, natural resources, cultural resources
Purple Line	Construct a 16 mile light rail corridor from Bethesda to New Carrolton Metro Stations	Socioeconomic and land use, natural resources, cultural resources
I-66 Express Lanes – outside the Beltway	Widen I-66 to 5 lanes (3 general purpose and 2 HOT), and provide frequent express bus service	Socioeconomic and land use, natural resources, cultural resources
US Route 1 Bus Rapid Transit	Provide dedicated bus lane from Huntington Metro station to the Woodbridge VRE station	Socioeconomic and land use
Fairfax County Parkway HOV (VA-286)	Widen existing roadway to 6 lanes and restrict traffic in new lanes to HOV during peak travel times	Socioeconomic and land use, natural resources, cultural resources
Metro Silver Line – Phase 2 (Dulles Corridor Metrorail Project)	Extend Metro's Silver Line from Wiehle-Reston East Metro station to Dulles Airport	Socioeconomic and land use, natural resources, cultural resources
Corridor Cities Transitway	Construct bus rapid transit line from Shady Grove Metro station to the COMSAT facility, south of Clarksburg	Socioeconomic and land use, natural resources, cultural resources
270/US Route 15 Corridor HOV	Widen highway between Shady Grove Metro station and Biggs Ford Road, add HOV lanes	Socioeconomic and land use, natural resources, cultural resources

Socioeconomics and Land Use

Past, present, and reasonably foreseeable future actions have impacted and would continue to impact socioeconomic and land use resources in the socioeconomic ICE study area. These actions have led to rapid residential, institutional, and commercial development. This growth and development has led to the land uses, population dynamics, and income levels that exist within the socioeconomic ICE study area today. The actions listed in above have facilitated this growth and/or improved the quality of life within the socioeconomic ICE study area. In some cases, these projects have or would result in property impacts along the given transportation corridors.

Lane management would be conducted through a dynamic tolling system that would seek to maintain desirable highway speeds on the interstate during peak hours. Impacts to traffic as a result of tolling are discussed in Attachment G. This management would reduce travel time and improve reliability with the study area during peak travel hours. In some cases, it could result in toll rates that were too high for some drivers to choose to pay. This could result in some drivers diverting from the highway to local roads in order to avoid the toll. This could result in greater vehicle volumes on local roads. As discussed earlier in

this document, increased volumes could have positive impacts to businesses that rely on “drive by” customers, while it could have adverse impacts on other properties and travelers along these roads. These impacts would be limited to peak hours, but could result in some property owners opting to leave while attracting others. Tolling also could attract some drivers from local roads to the interstate. These drivers would be willing to pay the toll for the improved use of the interstate system. These impacts would be short-term, only resulting in the impacts described above during tolling periods. As such, the proposed action would not significantly contribute to cumulative effects to socioeconomics and land use.

Natural Resources

Past, present, and reasonably foreseeable future actions have impacted and would continue to impact natural resources in the ICE study area. These actions have led to the filling and/or manipulation of wetlands and streams and the elimination and fragmentation of wildlife habitat. Some of the actions listed above have contributed additional impacts to natural resources. In other cases, transportation improvements and other projects are carried out in areas where no natural resources exist and where air and noise levels are already so impacted that any small change is immeasurable.

The direct impacts of the tolling infrastructure would be confined to areas immediately surrounding the existing transportation facility and would have no impact to natural resources. The change in traffic patterns during tolling periods could result in some minimal changes to air and noise levels. Potential air quality impacts are documented in the air quality analysis. These impacts would be limited in time and intensity. As such, tolling would not significantly contribute to adverse cumulative effects to natural resources.

Cultural Resources

Past, present, and reasonably foreseeable future actions have and would continue to impact cultural resources in the ICE study area. While the development described above has impacted cultural resources, many of the surrounding communities are of an age where they may be considered historic structures. In some neighborhoods, the historic setting and appearance of these structures has been retained. In other areas, however, the continued growth and development of the region threatens the integrity and context of the historic structures.

The project has little to no potential to affect historic properties, either directly or indirectly as almost all infrastructure improvements would be located within the previously disturbed, existing highway right of way that is associated with an interstate located in a heavily urbanized setting. Installation of the wayfinding signs that may be located outside existing right of way will result in only minimal ground disturbance and the signs themselves should have no visual effect on any historic properties that may be located nearby in this already urbanized setting. As such, tolling would not significantly contribute to adverse cumulative effects to cultural resources.

What is the overall impact on these various resources from the accumulation of the actions?

Given the extreme level of impacts that occurred prior to the construction of the interstate, the overall impact from the accumulation of actions listed above would be minor. On a local level, these impacts may be recognizable. On a regional level, however, they would not result in appreciable alterations to the existing environment.

Attachment F: Air Quality Analysis

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Transform I-66 Inside the Beltway
Investing in Multi-Modal Solutions
Project Level Air Quality Analysis in Support of a Categorical Exclusion
STATE PROJECT NO. : 0066-96A-358
UPC: 107371

PREPARED FOR:
VDOT ENVIRONMENTAL DIVISON

PREPARED BY:
MICHAEL BAKER INTERNATIONAL

IN ASSOCIATION WITH:
SC&A INC.

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Executive Summary

In 2012, VDOT and the Virginia Department of Rail and Public Transportation published the I-66 Multimodal Study, Inside the Beltway. This effort was conducted in cooperation with local jurisdictions, transit agencies, and other transportation stakeholders. In 2013, a Supplemental Report was published which further documented a recommended refined alternative to address documented transportation deficiencies in the I-66 corridor inside the Beltway.

In a December 9, 2014 letter to local jurisdictions, Virginia Secretary of Transportation Aubrey L. Layne, Jr. announced VDOT's decision to advance the recommendations from that 2012/2013 study effort. This was further reinforced in a March 12, 2015 briefing to local media and elected officials.

The cornerstone of the recommendations from the 2012/2013 study is the implementation of a variable toll condition along I-66 which will be owned and managed by VDOT, creating a revenue stream to help offset the cost of the multimodal elements in the 2012/2013 study. Conversion of I-66 inside the Beltway to dynamically priced toll lanes during the AM and PM peak periods in both directions will allow free travel for HOV qualified users and will allow VDOT to manage steady flow of traffic overall. The Multimodal improvements receiving funds from the project will be determined by the region through a cooperative process involving the Northern Virginia Transportation Commission.

This project is located within areas (Fairfax and Arlington Counties) that are part of a region currently designated non-attainment or maintenance for one or more of the national ambient air quality standards (NAAQS) established by the Environmental Protection Agency (EPA), as follows:

- DC-Maryland-Virginia marginal nonattainment area for the 2008 eight-hour ozone standard,
- DC-Maryland-Virginia maintenance area for the 1997 primary annual fine particulate matter ($PM_{2.5}$) NAAQS[1], and
- Arlington County-City of Alexandria maintenance area for the carbon monoxide (CO) NAAQS[2].

As such, federal transportation conformity rule (40 CFR Parts 51 and 93) requirements apply, including specifically requirements for inter-agency consultation for conformity (IACC) on the models, methods and assumptions to be applied in project-level air quality analyses (40 CFR 93.105(c)(1)) and the corresponding section of the Virginia Regulation for Transportation Conformity (9 VAC 5-151 Section 70). The IACC requirements were met in two ways:

1. In December 2015, IACC was conducted on all of the models, methods and assumptions specified or referenced in the VDOT Project-Level Air Quality Resource Document[3], which were applied in this analysis either directly or without substantive change. The Resource Document was created by VDOT to facilitate and streamline the preparation of project-level air quality analyses while maintaining high standards for quality. Appendix L of the VDOT Resource Document includes specific technical criteria for screening projects as ones potentially of air quality concern

[1] On March 23, 2015, EPA issued a proposed rule (80 FR 15340) on "*Fine Particulate Matter National Ambient Air Quality Standards: State Implementation Plan Requirements*" that stated, in part: *"… EPA is proposing to revoke the 1997 primary annual standard because the EPA revised the primary annual standard in 2012*". This is the $PM_{2.5}$ NAAQS for which the DC-Maryland-northern Virginia region is currently in maintenance. At the time of preparation of this report, EPA has not yet finalized that proposed revocation. If and when it does, then the associated project-level ("hot-spot") air quality analysis requirements as specified in the federal transportation conformity rule would no longer apply. See: https://www.gpo.gov/fdsys/pkg/FR-2015-03-23/pdf/2015-06138.pdf

[2] Until March 16, 2016, at which time the maintenance period (and associated conformity requirements) for CO ends. Note the CO maintenance area is comprised of Arlington County and the City of Alexandria only.

[3] To be made available on the VDOT website: http://www.virginiadot.org/programs/pr-environmental.asp

for $PM_{2.5}$, which were developed based on examples provided in EPA guidance. No adverse comments were received.

2. In addition, in the interests of full transparency and notwithstanding the IACC already completed on the Resource Document, IACC was conducted for this project via webinar on February 18th, 2016. No adverse comments were received, including specifically the proposed determination that the project was not one of potential air quality concern for $PM_{2.5}$.

$PM_{2.5}$ Analysis:
For $PM_{2.5}$, the screening criteria presented in Appendix L of the VDOT Resource Document, which were established based on EPA guidance and subjected to IACC as noted above, were applied to determine if this project represents one of local air quality concern. Traffic forecasts developed for this project showed that increases in average daily diesel truck traffic associated with the build scenario would not exceed 2,000 trucks per day[4], the criterion established in the VDOT Resource Document for highway capacity expansion. Additional factors that support the conclusion that this project is not one of local air quality concern for $PM_{2.5}$ include:

- Mainline capacity increases usable by trucks are not part of the proposed action.
- The area has already achieved the 1997, 2006 and 2012 $PM_{2.5}$ NAAQS
- Background concentrations are well below the 1997 NAAQS (8.8 – 9.4 ppb).
- EPA has proposed to revoke the 1997 $PM_{2.5}$ NAAQS in its implementation of the 2012 standard. This would change the status of the area from maintenance to attainment of the NAAQS, eliminating $PM_{2.5}$ conformity requirements entirely.

Based on the weight of evidence it was determined that the proposed improvements are not ones of air quality concern for $PM_{2.5}$ and therefore a detailed quantitative assessment of potential impacts was not required.

CO Analysis:
A quantitative CO hot spot worst-case screening analysis was performed for the project for purposes of both conformity and NEPA, using inputs and procedures specified in the VDOT Resource Document and consistent with applicable EPA and FHWA requirements and guidance. The analysis was conducted as follows:

- Modeling was completed for existing (2014), the project opening (2017) and design (2040) years.
- The modeling was conducted with EPA models for emissions (MOVES2014a) and dispersion (CAL3QHC and CALINE3), with the dispersion modeling facilitated in part with the FHWA CAL3i interface model (which invokes the EPA models).
- Modeling was conducted for three highly congested major intersections (VA 123 & Lewinsville Road, VA 123 & Kirby Road and VA 7 & Idylwood Rd) and the interchange between I-66 & I-495/The Capital Beltway.
- Modeling in all cases was conducted using worst-case assumptions for traffic and facility configurations. For example, at the interchange, worst-case traffic volumes were applied, traffic and emissions were concentrated into a single grade separation rather than modeled over broadly dispersed ramps, and receptors were located at twenty feet from the edge of the travelled roadways rather than outside the right of way limits that are outside the footprint of the interchange and therefore much further away from the modeled roadway.

[4] This represents 20% of the ten thousand diesel trucks per day criterion established in the VDOT Resource Document (based on the examples provided in EPA guidance) for new highway construction.

- The results for all of the analyses (intersection and interchange) show that CO concentrations for the Build scenarios are expected to remain well below the CO NAAQS for all locations modeled throughout the corridor for each year modeled.
- Based on the modeling results, implementation of the project is not expected to cause or contribute to a violation of the CO NAAQS.

Mobile Source Air Toxics (MSATs):
Based on FHWA guidance and the forecast total traffic volumes for I-66, this project is categorized as one with high potential effects for MSATs, which include the following: acrolein, benzene, 1,3 butadiene, diesel particulate matter, formaldehyde, naphthalene, and polycyclic organic matter. A detailed quantitative assessment (modeling) following FHWA guidance was therefore conducted for the project to assess the potential impacts for MSATs. The assessment shows that there would be no long-term adverse impacts associated with the Build scenario and that future MSAT emissions across the entire study corridor would be significantly below today's levels, even after accounting for projected VMT growth.

More specifically, the modeling results indicate that MSAT emissions are expected to decrease from the No-Build to the Build scenario in 2017, but increase slightly from the No-Build to the Build scenario in 2040, although these increases are not considered to be significant. However, when compared to existing conditions, emissions of all MSAT pollutants under the 2017 and 2040 Build scenarios are projected to be significantly lower than exist today. EPA's stringent vehicle emission and fuel regulations, combined with fleet turnover, are expected to significantly lower fleet-average emission rates for MSATs in the future relative to today.

Overall, best available information indicates that, nationwide, regional levels of MSATs are expected to decrease in the future due to fleet turnover and the continued implementation of more stringent emission and fuel quality regulations. Nevertheless, it is possible that some localized areas may show an increase in emissions and ambient levels of these pollutants due to locally increased traffic levels associated with the project.

Indirect Effects and Cumulative Impacts:
Effects of the project that would occur at a later date or are fairly distant from the project are referred to as indirect effects. Cumulative impacts are those effects that result from the incremental impact of the action when added to other past, present and reasonably foreseeable future actions. Cumulative impacts are inclusive of the indirect effects.

The potential for indirect effects or cumulative impacts to air quality that may be attributable to this project is not expected to be significant for a couple of reasons. First, regarding indirect effects, the quantitative assessments conducted for project-specific CO and MSAT impacts and the regional conformity analysis conducted for ozone can all be considered indirect effects analyses because they look at air quality impacts attributable to the project that occur at a later time in the future. These analyses demonstrated that in the future, 1) air quality impacts from CO will not cause or contribute to violations of the CO NAAQS; 2) MSAT emissions from the affected network will be significantly lower than they are today; and 3) ozone attributable to this and all other projects In the region will not exceed the mobile source emissions budgets established for the region.

Second, regarding the potential for cumulative impacts, the annual conformity analysis conducted by the Transportation Planning Board (MPO for the Washington, D.C. metropolitan nonattainment/ maintenance area) represents a cumulative impact assessment for purposes of regional air quality. Federal conformity requirements, including specifically 40 CFR 93.114 and 40 CFR 93.115, apply as the area in

which the project is located is designated as nonattainment for ozone and maintenance for fine particulate matter. Accordingly, there must be a currently conforming transportation plan and program at the time of project approval, and the project must come from a conforming plan and program (or otherwise meet criteria specified in 40 CFR 93.109(b)).

- The existing air quality designations for the region are based, in part, on the accumulated mobile source emissions from past and present actions, and these pollutants serve as a baseline for the current conformity analysis.
- The conformity analysis quantifies the amount of mobile source emissions for which the area is designated nonattainment/maintenance that will result from the implementation of all reasonably foreseeable (i.e. those proposed for construction funding over the life of the region's transportation plan) regionally significant transportation projects in the region.
- The most recent conformity analysis was completed in October 2015, with FHWA and FTA issuing a conformity finding on February 4, 2016 for the TIP and CLRP covered by that analysis. This analysis demonstrated that the incremental impact of the proposed project on mobile source emissions, when added to the emissions from other past, present, and reasonably foreseeable future actions, is in conformance with the SIP and will not cause or contribute to a new violation, increase the frequency or severity of any violation, or delay timely attainment of the NAAQS established by EPA.

Therefore, the indirect and cumulative effects of the project are not expected to be significant.

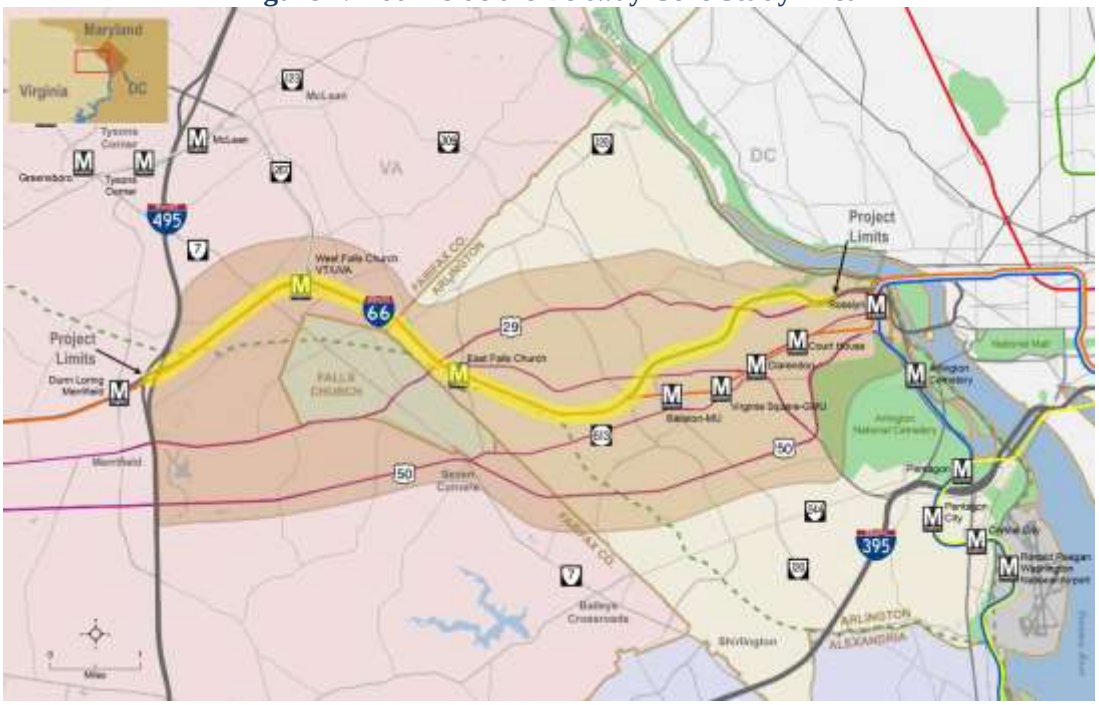
1.0 Introduction

In 2012, the Virginia Department of Transportation (VDOT) and the Virginia Department of Rail and Public Transportation (VDRPT) published the final report for the "I-66 Multimodal Study, Inside the Beltway."[5] This effort was conducted in cooperation with local jurisdictions, transit agencies, and other transportation stakeholders. A Supplemental Report to further develop alternatives for the I-66 Inside the Beltway corridor was published in 2013[6]. The core study area for this project is shown in **Figure 1**.

In a letter dated December 9, 2014, to local jurisdictions, Virginia Secretary of Transportation Aubrey L. Layne, Jr. announced VDOT's decision to advance the recommendations from the I-66 Multimodal Study. This was further reinforced in a briefing by VDOT to local media and elected officials on March 12, 2015.

The cornerstone of the recommendations from the I-66 Multimodal study is the implementation of dynamically priced tolling to be owned and managed by VDOT. The revenue stream from the tolling will offset the cost of the multimodal elements in the I-66 Multimodal study. Conversion of I-66 inside the Beltway to dynamically priced toll lanes during the AM and PM peak hours in the peak directions (Eastbound – AM, Westbound – PM) will allow free travel for HOV qualified users and will allow VDOT to manage the flow of traffic overall. The toll revenues will be set aside for funding of potential widening of I-66 inside the Beltway and for specific multimodal improvements within the Corridor. The Northern Virginia Transportation Commission (NVTC) will lead a cooperative process, with VDOT and stakeholder agencies and jurisdictions to identify, assess, and select those multimodal corridor improvements for funding from the toll revenues. Selected improvements will be addressed separately, where required, when they are developed.

Figure 1: I-66 Inside the Beltway Core Study Area



Source: VDOT I-66 Inside the Beltway Draft Traffic Technical Report

[5] See VDOT project website: http://inside.transform66.org/learn_more/documents.asp
[6] See VDOT project website: http://inside.transform66.org/learn_more/documents.asp

Air quality became a national concern in the 1960s, leading to the passage of the Clean Air Act of 1963. This was followed by the Air Quality Act of 1967, the Clean Air Act of 1970, the Clean Air Act Amendments of 1977, and the Clean Air Act Amendments of 1990. With the passage of each piece of legislation, requirements for addressing and controlling air pollution became more stringent. Following the passage of the Federal Clean Air Act Amendments of 1990, states were mandated to implement additional steps to reduce airborne pollutants and improve local and regional conditions. Motor vehicle emissions have been identified as a critical element in attaining federal air quality standards for carbon monoxide (CO), course and fine particulate matter (PM_{10} and $PM_{2.5}$), and ozone (O_3).

For this project compliance is required with both the National Environmental Policy Act (NEPA) and the Clean Air Act (CAA). Highway agencies are required to consider the impacts of transportation improvement projects at both the local and regional level. Regional air quality in non-attainment and maintenance areas is assessed by ensuring that region-wide mobile source emissions fall below the applicable motor vehicle emission budgets identified by the State Implementation Plan (SIP). Where applicable, this assessment is performed by the Virginia Department of Transportation (VDOT) and/or Metropolitan Planning Organizations (MPOs) and documented in a transportation conformity analysis of the region's Transportation Improvement Program (TIP) and Long Range Transportation Plan (LRTP). This project lies within an area designated as non-attainment for the 8-hour ozone standard and maintenance for the 1997 annual fine particulate matter ($PM_{2.5}$) and the carbon monoxide (CO) standards therefore; the project is subject to applicable transportation conformity requirements.

Compliance with the CAA will account for air quality impacts at both the regional and local level. NEPA, which generally requires that the impacts of an action on the environment be considered before any final decisions are made, serves as the basis for assessing air quality impacts at the project level. Accordingly, a micro-scale analysis evaluating peak CO concentrations at the project level has been performed. CO is a colorless, odorless, poisonous gas considered to be a serious threat to those who suffer from cardiovascular disease. High concentrations of CO tend to occur in areas of high traffic volumes or areas adjacent to a stationary source of the pollutant. CO emissions are associated with the incomplete combustion of fossil fuels in motor vehicles and are considered to be a good indicator of vehicle-induced air pollution.

In addition to CO, EPA also regulates air toxics, which are pollutants known or suspected to cause cancer or other serious health effects. Mobile source air toxics (MSATs) are compounds emitted from highway vehicles and non-road equipment. Although there are no ambient air quality standards or transportation conformity requirements for MSATs, MSATs are within the broader purview of NEPA because they have been shown to contribute to health risks, especially for populations in proximity to major roadways. EPA has identified the following MSATs as having the greatest impact on health: benzene, acrolein, formaldehyde, 1,3-butadiene, diesel exhaust, naphthalene, and polycyclic organic matter. FHWA has issued guidance for considering the impact of MSATs from transportation projects during the NEPA process.

This report provides documentation of the air quality assessments that have been performed to determine whether this project meets all NEPA and CAA requirements.

2.0 Project Need

Improvements in the I-66 corridor inside the Capital Beltway are needed to address:

- **Existing and Future Capacity Deficiencies:** The I-66 corridor inside the Beltway experiences congestion in the peak commuting direction which is eastbound in the AM peak hours and westbound during the PM peak hours. Travel demand is expected to continue to increase in major employment centers such as Arlington, Washington DC, Tysons, and Dulles. This increase will result in heavy traffic extending further into the off-peak periods than what is experienced today. Additionally, the Metrorail Orange Line also experiences peak hour demand that exceeds capacity.
- **Congestion:** There are several localized constraints or chokepoints that affect both cars and bus transit operations on a daily basis. Efforts have been made through the spot improvements and shoulder-use bus programs to minimize these congestion points, but congestion still exists after the completion of the recommended improvements between Fairfax Drive and North Sycamore Street.
- **Highly Variable Travel Conditions:** Travelers experience highly unreliable travel times on I-66, particularly during peak periods. Recurrent and non-recurrent congestion, incidents, crashes, disabled vehicles and other events, and adverse weather conditions all contribute to substantial differences in travel time.
- **Vehicular Traffic Demand in the Corridor:** There are significant numbers of buses and high occupancy vehicles (HOVs) that use I-66 in the peak direction during the peak commuting hours, making I-66 inside the Beltway a heavily used multimodal corridor. There are also many single occupancy vehicles (SOVs) who are currently restricted from using I-66 in the peak directions that must travel on other parallel routes.

In response to these needs, the goals for improvements along the I-66 corridor inside the Beltway are as follows:

- Reduce congestion on I-66 by better managing traffic demand and increased enforcement.
- Provide new and more reliable travel choices.
- Increase the number of people that can travel through the I-66 corridor as a result of more efficient traffic management, and increased use of transit, rail, bus and other alternate travel modes.

3.0 Existing Conditions

The proposed project is located in northern Virginia in Fairfax and Arlington Counties. The area is best categorized as a humid subtropical climate that averages approximately 43 inches of precipitation per year. The average daily high temperature in July is 90 degrees Fahrenheit while the average daily low temperature in January is 22 degrees Fahrenheit.

4.0 Regulatory Requirements and Guidance

This section provides an overview of regulations and guidance applicable to the project-level air quality analysis to support the environmental review of the project.

4.1 National Environmental Policy Act of 1969 (NEPA)

Under NEPA, federal agencies must consider the effects of their decisions on the environment before making any decisions that commit resources to the implementation of those decisions. Changes in air quality, and the effects of such changes on human health and welfare, are among the effects to be considered. A project-level air quality analysis has been performed to assess the air quality impacts of the project, document the findings of the analysis, and make the findings available for review by the public and decision-makers.

4.2 Clean Air Act

As implemented by the Clean Air Act, the US Environmental Protection Agency (EPA) is required to set the National Ambient Air Quality Standards (NAAQS) for pollutants considered harmful to public health and welfare. As shown in **Table 1**, there are currently two types of standards: Primary Standards that are intended to protect public health (including protecting the health of "sensitive" populations such as asthmatics, children and the elderly), and Secondary Standards that are intended to protect the public welfare (e.g., to protect against damage to crops, vegetation, buildings, and animals). Federal actions must not cause or contribute to any new violation of any standard, increase the frequency or severity of any existing violation, or delay timely attainment of any standard or required interim milestone.

Geographic regions that do not meet the NAAQS for one or more criteria pollutants are designated by EPA as "non-attainment areas." Areas previously designated as non-attainment, but subsequently re-designated to attainment because they no longer violate the NAAQS, are reclassified as "maintenance areas" subject to maintenance plans to be developed and included in a state's SIP. This project is located in Arlington and Fairfax Counties, which are currently designated as marginal non-attainment for the 2008 8-hour ozone and maintenance for the 1997 annual $PM_{2.5}$ standards. As a result of these designations, the project is subject to transportation conformity requirements under the CAA pertaining to ozone, CO and $PM_{2.5}$.

The federal transportation conformity rule (40 CFR Parts 51 and 93) requires air quality conformity determinations for transportation plans, programs, and projects in "non-attainment or maintenance areas for transportation-related criteria pollutants for which the area is designated non-attainment or has a maintenance plan" (40 CFR 93.102(b)). Transportation-related criteria pollutants, as specified in the conformity rule, include ozone (O_3), CO, nitrogen dioxide (NO_2), PM_{10} and $PM_{2.5}$. Regional conformity analysis requirements apply for plans and programs; hot-spot analysis requirements of 40 CFR 93.116 and 93.123 apply for projects.

On March 10, 2006, EPA released a rulemaking titled $PM_{2.5}$ and PM_{10} Hot-Spot Analyses in Project-Level Transportation Conformity Determinations for the $PM_{2.5}$ and PM_{10} National Ambient Air Quality Standards (40 CFR Part 93). This rulemaking established the criteria for determining which projects will be required to further analyze particulate emissions. In addition, the rule established the criteria for demonstrating conformity for $PM_{2.5}$ standards, and updated the existing criteria for determining conformity for PM_{10} areas. EPA also provided the document *Transportation Conformity Guidance for Quantitative Hot-spot Analyses in $PM_{2.5}$ and PM_{10} Nonattainment and Maintenance Areas*, the current version published November, 2015.[7] Additionally, the Metropolitan Washington Council of

[7] PM and CO hot-spot guidance documents are available on the EPA website: http://www3.epa.gov/otaq/stateresources/transconf/projectlevel-hotspot.htm

Governments published an update of the region's conformity determination (inclusive of this project) October 21st, 2015.[8]

Table 1: National Ambient Air Quality Standards

Pollutant [final rule cite]		Primary/ Secondary	Averaging Time	Level	Form
Carbon Monoxide [76 FR 54294, Aug 31, 2011]		primary	8-hour	9 ppm	Not to be exceeded more than once per year
			1-hour	35 ppm	
Lead [73 FR 66964, Nov 12, 2008]		primary and secondary	Rolling 3-month average	0.15 µg/m^3 (1)	Not to be exceeded
Nitrogen Dioxide [75 FR 6474, Feb 9, 2010] [61 FR 52852, Oct 8, 1996]		primary	1-hour	100 ppb	98th percentile of 1-hour daily maximum concentrations, averaged over 3 years
		primary and secondary	Annual	53 ppb (2)	Annual Mean
Ozone [80 FR 65292, Oct 26, 2015]		primary and secondary	8-hour	0.070 ppm (3)	Annual fourth-highest daily maximum 8-hr concentration, averaged over 3 years
Particle Pollution Jan 15, 2013	$PM_{2.5}$	primary	Annual	12 µg/m^3	Annual mean, averaged over 3 years
		secondary	Annual	15 µg/m^3	annual mean, averaged over 3 years
		primary and secondary	24-hour	35 µg/m^3	98th percentile, averaged over 3 years
	PM_{10}	primary and secondary	24-hour	150 µg/m^3	Not to be exceeded more than once per year on average over 3 years
Sulfur Dioxide [75 FR 35520, Jun 22, 2010] [38 FR 25678, Sept 14, 1973]		primary	1-hour	75 ppb (4)	99th percentile of 1-hour daily maximum concentrations, averaged over 3 years
		secondary	3-hour	0.5 ppm	Not to be exceeded more than once per year

(1) Final rule signed October 15, 2008. The 1978 lead standard (1.5 µg/m3 as a quarterly average) remains in effect until one year after an area is designated for the 2008 standard, except that in areas designated nonattainment for the 1978, the 1978 standard remains in effect until implementation plans to attain or maintain the 2008 standard are approved.

(2) The official level of the annual NO2 standard is 0.053 ppm, equal to 53 ppb, which is shown here for the purpose of clearer comparison to the 1-hour standard.

(3) Final rule signed October 1, 2015, and effective December 28, 2015. The previous (2008) O3 standards additionally remain in effect in some areas. Revocation of the previous (2008) O3 standards and transitioning to the current (2015) standards will be addressed in the implementation rule for the current standards.

(4) Final rule signed June 2, 2010. The 1971 annual and 24-hour SO2 standards were revoked in that same rulemaking. However, these standards remain in effect until one year after an area is designated for the 2010 standard, except in areas designated nonattainment for the 1971 standards, where the 1971 standards remain in effect until implementation plans to attain or maintain the 2010 standard are approved.

Source: Table and footnotes above are excerpted (5/5/2015) from US Environmental Protection Agency website: http://www.epa.gov/air/criteria.html

4.3 Mobile Source Air Toxics (MSATs)

On December 6, 2012, FHWA issued updated guidance titled Interim Guidance Update on Mobile Source Air Toxic Analysis in NEPA. The purpose of the memorandum was to update the September 2009 interim guidance that advised FHWA Division offices on when and how to analyze MSAT under the NEPA

[8] http://www.mwcog.org/transportation/activities/quality/Conformity/2015/ConformityReport-Complete.pdf

review process for highway projects. Based on FHWA's analysis using MOVES2010b, diesel particulate matter (diesel PM) has become the primary MSAT of concern. Additionally, the updated guidance reflects recent regulatory changes, projects national MSAT emission trends out to 2050 using EPA's MOVES2010b model, and summarizes recent research efforts; however, it did not change any project analysis thresholds, recommendations, or guidelines.

The MSAT guidance includes specific criteria for determining which projects are to be considered exempt from MSAT analysis requirements and which may require a qualitative or quantitative analysis. In accordance with the guidance, the FHWA developed a tiered approach with three categories for analyzing MSAT in NEPA documents, depending on specific project circumstances. Those categories are listed below:

- No analysis for projects with no potential for meaningful impacts;
- Qualitative analysis for projects with low potential MSAT effects; or
- Quantitative analysis to differentiate alternatives for projects with higher potential MSAT effects.

Projects considered exempt under section 40 CFR 93.126 of the federal conformity rule are also specifically designated as exempt from MSAT analysis requirements.

4.4 MOVES2014/2014a

On October 7, 2014, the EPA published a Federal Register Notice of Availability that approved the Motor Vehicle Emissions Simulator (MOVES2014) as the latest EPA tool for estimating emissions of volatile organic compounds (VOCs), nitrogen oxide (NO_X), CO, PM_{10}, $PM_{2.5}$ and other pollutants from motor vehicles. With this release, EPA started a 2-year grace period to phase in the requirement of using MOVES2014 for transportation conformity analyses. In July 2014, EPA issued guidance on the use of MOVES2014 for State Implementation Plan Development, Transportation Conformity, and Other Purposes. This guidance specifies that the same grace period be applied to project-level emissions analyses. At the end of the grace period, i.e., beginning October 7, 2016, project sponsors are required to use MOVES2014 to conduct emissions analysis for both transportation conformity and NEPA purposes. In March 2015, EPA published a new EPA guidance document titled *Using MOVES2014 in Project-Level Carbon Monoxide Analyses*[9] for completing project-level carbon monoxide analyses using MOVES2014.

In November 2015 EPA released MOVES2014a to allow MOVES users to benefit from several improvements to the model. MOVES2014a does not significantly change the criteria pollutant emissions results of MOVES2014 and therefore is not considered a new model for SIP and transportation conformity purposes. MOVES2014a incorporates significant improvements in calculating nonroad equipment emissions, and also incorporates additional reporting capabilities for these sources of emissions. For onroad emissions, MOVES2014a adds new options requested by users for the input of local vehicle miles traveled (VMT), includes minor updates to the default fuel tables, and corrects an error in MOVES2014 brake wear emissions. The change in brake wear emissions results in small decreases in PM emissions, while emissions for other criteria pollutants remain essentially the same as MOVES2014. MOVES2014a also corrects an error in the way hydrocarbon emissions are apportioned into the inputs needed by air quality models such as CMAQ and CAMx.[10]

[9] See: *http://www.epa.gov/otaq/stateresources/transconf/documents/420b15028.pdf*

[10] Description of MOVE 2014a adapted from USEPA *MOVES 2014a Questions and Answers*, November 2015. http://www3.epa.gov/otaq/models/moves/documents/420f15046.pdf

4.5 VDOT Project-Level Air Quality Resource Document

As the project is located in an area subject to the federal transportation conformity rule (40 CFR Parts 51 and 93), inter-agency consultation was required by the federal rule (40 CFR 93.105(c)(1)) and the corresponding section of the Virginia Regulation for Transportation Conformity (9 VAC 5-151 Section 70). This consultation was conducted on the models, methods and assumptions specified in the VDOT Project-Level Air Quality Resource Document (see: http://www.virginiadot.org/programs/pr-environmental.asp), which were applied in this analysis either directly or without substantive change[11]. The Resource Document was created by VDOT to facilitate and streamline the preparation of project-level air quality analyses while maintaining high standards for quality.

Inter-agency consultation for conformity purposes was conducted on the VDOT Resource Document on December 14th, 2015. Federal, state and local agencies, including the following, were invited to participate as required by the federal and Virginia conformity regulations:

- FHWA Virginia Division and Resource Center;
- Virginia Department of Environmental Quality;
- Virginia Department of Transportation;
- Virginia Department of Rail and Public Transit;
- Metropolitan Washington Council of Governments;
- EPA Region 3;
- Local agencies

All comments received on the VDOT Resource Document in the consultation process were considered as appropriate before the models, methods and assumptions (including data and data sources) and the definition of substantive change as provided in the VDOT Resource Document were finalized. No adverse comments were received. A summary of the consultation process, including a list of all individuals and agencies invited to participate, can be found in Appendix A of the VDOT Resource Document.

Due to the high-level of interest from public and stakeholders regarding the I-66 Inside the Beltway project, an interagency consultation meeting/webinar for the project was conducted on February 18th, 2016. An overview was provided of the project improvements, traffic data and modeling, and Resource Document screening criteria. The meeting provided an opportunity for stakeholder review and comment.

All comments received in this additional inter-agency consultation were considered as appropriate before the models, methods and assumptions (including data and data sources) for the project analysis were finalized. A summary of the additional or project-specific consultation and results is also provided in **Appendix A** of this analysis.

[11] Note the following definition of "substantive change" was included in the Resource Document and made the subject of inter-agency consultation: "For project-level air quality analyses conducted to meet conformity requirements and/or for purposes of NEPA, a substantive change is defined here as one that would reasonably be expected to affect the modeling results and/or the analysis to the degree that it would change a finding, determination or conclusion that all applicable requirements for the air quality analysis for the project would be met and the project cleared. For analyses involving project-specific dispersion modeling for any pollutant(s) for conformity purposes, this includes whether the project would pass the applicable conformity test(s)."

5.0 Carbon Monoxide Analysis

Carbon monoxide (CO) is a stable gas that disperses in predictable ways in the environment surrounding a project. Computer modeling can be used to assess both existing and expected future concentrations of CO at selected receptor sites in the vicinity of a project.

In order to better screen projects for CO, a programmatic agreement for project-level air quality (CO) analyses (Programmatic Agreement) was executed between the FHWA Virginia Division Office and VDOT on February 27, 2009. It uses worst-case modeling (defined below) to identify the conditions for which a proposed project or action would require either a quantitative or qualitative CO hot-spot analysis to meet requirements under NEPA. Based on the agreement and applicable federal requirements, the I-66 Inside the Beltway project requires a quantitative CO hot-spot analysis for purposes of both NEPA and conformity for the following reasons:

- The project is partially located in a CO maintenance area (Arlington County), so conformity requirements for CO project-level analyses currently apply.
- The project exceeds the technical criteria (i.e., average daily traffic or ADT thresholds) specified in the FHWA-VDOT Programmatic Agreement, which applies for both NEPA and conformity purposes per the protocols established in the VDOT Resource Document which completed inter-agency consultation for conformity in December 2015.

CO hot-spot analyses can be completed as either screening analyses or refined analyses. Screening analyses are performed using worst-case modeling assumptions for traffic, meteorological conditions and other inputs to generate estimates of the maximum concentrations that may be expected within the project corridor. If under these worst-case assumptions the applicable NAAQS are still met for the project, then it may be reasonably concluded that the actual proposed action will not result in an exceedance of the applicable NAAQS. All worst-case modeling assumptions for this project were taken as specified in or consistent with the VDOT Resource Document, consistent with EPA and FHWA requirements and guidance, and include (but are not limited to):

- Worst-case traffic volumes that are significantly higher than expected or forecast volumes, which significantly increases the estimated emissions and therefore the expected maximum concentrations in the vicinity of the project.
- Worst-case receptor locations (points for which ambient concentrations are estimated) selected as locations at which CO concentrations were likely to be highest.
    - For intersections, receptors were located on the edge of the roadway right of way.
    - For the interchange, receptors were also located along the edge of the roadway mixing zone, i.e., well inside the roadway right of way.
- Worst-case roadway configuration for the interchange
    - A grade separation was applied to represent the interchange, effectively concentrating all of the traffic and emissions in the smallest possible area and resulting in estimates for worst-case concentrations that would be well in excess of those actually expected for the project.

The modeling inputs and procedures were developed in accordance with FHWA and EPA guidance, including the *Guideline for Modeling Carbon Monoxide from Roadway Intersections, Using MOVES2014 in Project-Level Carbon Monoxide Analyses* and the VDOT Project-Level Air Quality Resource Document.

5.1 Overview of Screening Analysis

A worst-case screening analysis was applied using the EPA MOVES2014a emission model and CAL3QHC dispersion model. For the latter, which does not have a graphical user interface, the FHWA CAL3i interface was applied to facilitate the analyses. CAL3i[12] provides a convenient and user friendly means of generating input files and executing CAL3QHC, effectively streamlining the dispersion modeling process. CAL3i is an update to CAL3interface[13,14] which was originally released by the FHWA in December 2006. Following standard procedure for the screening analysis, CAL3i was run first to estimate project contributions to ambient CO concentrations, without including background concentrations; background CO levels were then added to the modeling results to estimate worst-case CO concentrations at each receptor location.

5.2 Traffic Summary Information

The traffic analysis for this project was completed under a separate effort and the results applied for the purposes of this air quality analysis. Traffic forecasts were developed for existing, 2014 baseline conditions, as well as both no-build and build scenarios for the Interim/Opening Year (2017) and the Design Year (2040). The resulting traffic volume forecasts were then used in selecting the intersections to be analyzed.

A detailed effort was undertaken as part of the traffic analysis to identify all intersections that were likely significantly impacted by the project. A total of 59 intersections were identified by the traffic team and are shown in **Figure 2**. These selected intersections served as the starting point for selecting the top three worst-case intersections. The traffic analysis team completed an operations analysis of each intersection using traffic forecasts developed on an intersection by intersection basis and the Synchro simulation package. The delay, level of service and traffic volume for every intersection identified was completed, and the results placed in an Excel table in order to rank the intersections. The ranking processed used for this study process is as specified in EPA guidance[15]:

1. Rank the top 20 intersections by traffic volumes;
2. Calculate the Level-of-Service (LOS) for the top 20 intersections based on traffic volumes;
3. Rank these intersections by LOS;
4. Model the top 3 intersections based on the worst LOS; and
5. Model the top 3 intersections based on the highest traffic volumes.

Since many of the worst-case intersections had the same LOS, delay was also incorporated into the ranking.[16] It is assumed that if the selected worst-case intersections do not show an exceedance of the NAAQS, none of the ranked intersections will. This is based on the assumption that these intersections will have the highest CO impacts and that intersections with lower traffic volumes and less congestion will have lower ambient air impacts. Thus, if no exceedances of the CO NAAQS occur for the opening and design years when the results of the intersection modeling are added to the urban area-wide component of the CO concentration at the intersection, then the CO attainment demonstration is complete.

[12] CAL3i can be obtained by contacting the FHWA Resource Center: http://www.fhwa.dot.gov/resourcecenter/teams/airquality/

[13] M.Claggett (FHWA), "*CAL3Interface – A Graphical User Interface for the CALINE3 and CAL3QHC Highway Air Quality Models*", ca 2006.

[14] M.Claggett (FHWA), "*Update of FHWA's CAL3Interface – A Graphical User Interface for the CALINE3 and CAL3QHC Highway Air Quality Models*", ca 2008

[15] *"1992 Guideline for Modeling Carbon Monoxide from Roadway Intersections,"* (EPA-454/R-92-005, November 1992); available online at: www.epa.gov/scram001/guidance/guide/coguide.pdf.

[16] Ibid.

Figure 2: Intersections Selected for Detailed Operations Analysis

The top ten of the 59 intersections as ranked (using the 2040 build scenario results) are shown in **Table 2** with the top three worst-case intersections identified as:

- VA 123 & Lewinsville Road
- VA 123 & Kirby Road
- VA 7 & Idylwood Rd

Given the traffic volumes through the congested interchange at I-495/I-66, an additional CO screening analysis was conducted for this location.

Worst case traffic volumes selected for the screening analysis were consistent with the values in the VDOT Resource Document. Typically the assumed federal worst-case traffic volumes tend to be significantly higher than the modeled volumes. **Table 3** below summarizes the refined traffic estimates developed by the project team on I-66, showing the per lane volume to be substantively lower in each scenario. The map presented in **Figure 3** showing the physical locations of the locations identified for the CO screening analyses.

Figure 3: Intersections Selected for CO Screening Evaluation

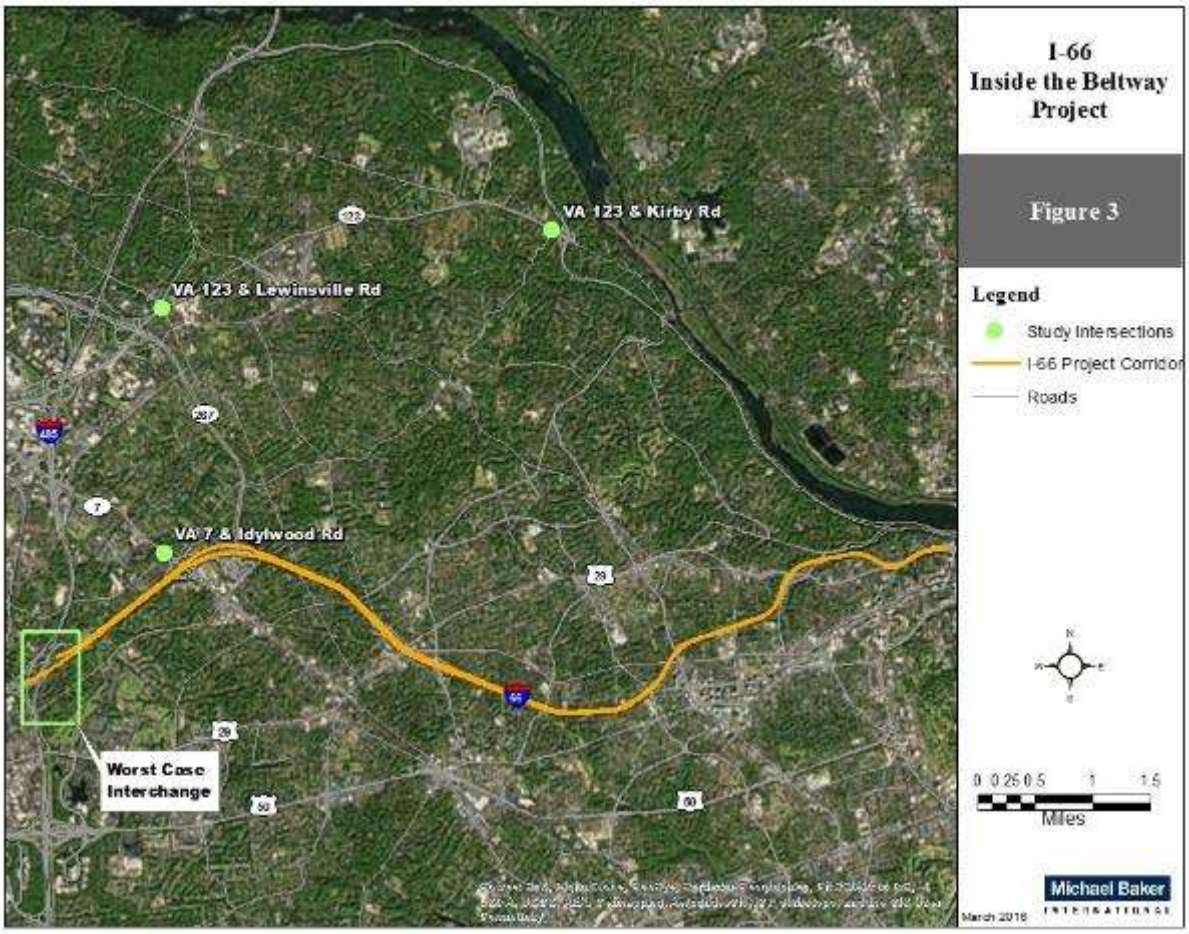


Table 2: PM Peak Hour Volumes, Delay and LOS at Intersections

Intersection	2014 Existing			2017 No-Build			2017 Build			2040 No-Build			2040 Build		
	Delay (Sec/Veh.)	LOS	Total Entering Volume	Delay (Sec/Veh.)	LOS	Total Entering Volume	Delay (Sec/Veh.)	LOS	Total Entering Volume	Delay (Sec/Veh.)	LOS	Total Entering Volume	Delay (Sec/Veh.)	LOS	Total Entering Volume
VA 123 & Lewinsville Road	105.5	F	7,976	108.7	F	8,210	80.5	F	7,430	122.1	F	8,410	119.4	F	8,360
VA 123 & Kirby Road	72.4	E	5,220	48.3	D	5390	50.6	D	5,230	216.5	F	6,600	215.7	F	6,470
VA 7 & Idylwood Road	53.1	D	4,795	57.1	E	4,950	48.8	D	4,610	67.4	E	5,940	122	F	6,530
US 50 & Graham Road	72.3	E	5,900	85.5	F	6,030	86.3	F	5,830	129.4	F	6,650	119.3	F	6,690
VA 7 & Sleepy Hollow Road/Wilson Boulevard/ US 50 Off-Ramp	65.1	E	4,432	72.7	E	4,500	73.3	E	4,500	144.3	F	5,720	134	F	5,560
US 50 & Annandale Road	55	D	5,556	55	D	5,540	49.5	D	5,368	105.6	F	6,610	106.5	F	6,590
VA 123 & Georgetown Pike	60.6	E	5,876	78.2	E	6,030	75.5	E	5,860	95.6	F	6,670	99.7	F	6,550
Fairfax Drive & N Glebe Road	68.8	E	4,035	72.8	E	4,390	70.2	E	4,320	105.5	F	4,890	88.9	F	5,390
US 29 & Glebe Road	74.4	E	3,159	122.7	F	3770	93	F	3,510	161.3	F	4,170	169.3	F	4,300
US 29 & N Harrison Street	28.3	C	3,086	33.2	C	3,260	29.2	C	3,190	54.9	D	4,230	67.1	E	4,470

Table 3: Comparison of Forecasted Peak Hour Traffic Volumes and Worst-Case Volumes Assumed for CO Screening Analysis

Location	Direction	2014	2017	2040	CO Screening Values			
					Volume	% Difference		
						2014	2017	2040
VA 7 & Idylwood Rd	NB	1,786	1,690	2,360	4,920	175%	191%	108%
	SB	2,053	2,010	3,240	4,920	140%	145%	52%
	EB	400	390	390	2,460	515%	531%	531%
	WB	496	380	420	2,460	396%	547%	486%
VA 123 & Lewinsville Rd	NB	2,932	2,790	3,470	6,150	110%	120%	77%
	SB	2,548	2,210	2,460	6,150	141%	178%	150%
	EB	1,092	900	940	3,690	238%	310%	293%
	WB	1,404	1,530	1,490	3,690	163%	141%	148%
VA 123 & Kirby Rd	NB	232	190	500	2,460	960%	1195%	392%
	EB	2,664	2,850	3,410	3,690	39%	29%	8%
	WB	2,324	2,190	2,560	3,690	59%	68%	44%
I-66/I-495	NB	8,599	12,500	13,114	14,400-19,200	67%	54%	46%
	SB	10,790	11,413	13,944	14,400-19,200	33%	68%	38%
	EB	5,325	5,446	10,792	14,400-16,800	170%	209%	56%
	WB	5,822	6,120	11,573	14,400-16,800	147%	175%	45%

5.3 CO Receptor Locations

Receptor locations (points for which the model generates estimates for ambient concentrations) were selected following FHWA worst-case modeling assumptions and EPA guidance as outlined in the VDOT Resource Document for screening analyses for CO. The selected receptor locations are used to quantify both existing and future maximum CO concentrations throughout the project area. If the peak CO concentrations at the locations selected in the analysis are below the NAAQS for CO, it is assumed that all other locations in the corridor will also remain below the NAAQS.

For the worst-case analysis for CO, receptors were automatically placed at the edge of right of way, regardless of whether the public even has access to these locations, which generate the highest possible estimates for concentrations. The receptors are placed 3m from the traveled roadway for intersections and 20 feet from the traveled roadway for freeways[17]. For a freeway to freeway interchange, this means that receptors are placed well within the right of way, resulting in significantly higher modeled estimates for peak concentrations than would be obtained in a refined analysis (i.e. not following worst case methodology). A refined analysis of the interchange would be more spread out over a wider geography, with traffic more dispersed over ramps and various lane configurations, distributing and defusing

[17] M.Claggett (FHWA), "*Update of FHWA's CAL3Interface – A Graphical User Interface for the CALINE3 and CAL3QHC Highway Air Quality Models*", ca 2008

emissions over a wider area. The worst-case assumption of modeling the interchange as a grade separation effectively assumes all traffic and emissions sources are tightly confined to lanes directly crossing each other, with receptors only 20 feet from the travelled roadway edge instead of outside the actual right of way (i.e., in areas with public access). While these receptor locations are close to the on-road emission sources, they are unlikely to be locations accessible to the public and therefore represent a worst-case assumption significantly in excess of what would be required by EPA or FHWA guidance. Because these assumptions are so conservative and by design intended to yield the highest possible estimates for concentrations, if the worst-case screening analysis still does not show an exceedance of the CO NAAQS despite these assumptions, it can be said with confidence that the actual interchange would not exceed the NAAQS as well.

5.4 Modeling Inputs

Key assumptions for CO modeling are consistent with the recommendations found in the VDOT Project-Level Air Quality Resource Document. This information, along with data and assumptions specific to this project, are detailed below:

- Emission Modeling:
  - MOVES2014a was applied.
  - Inputs into MOVES2014a were consistent with the latest draft version of VDOT Project-Level Air Quality Resource Document.
  - Modeling was done for roadway links in an urban area type.
  - The link inputs to MOVES2014a that affect the calculation of CO emission rates included the road type, speed, and road grade.
    - For this analysis, links on I-495 and I-66 were classified as MOVES road type "urban restricted" while links on all other roads were classified as "urban unrestricted".
    - For the intersections, link grades were developed based on elevation data from GIS files and the National Elevation Dataset provided by USGS.
    - For the interchange only, grades were assumed to be 6% on all approach lanes, the maximum uphill grade present at the interchange. For the departure lanes, a -1% grade was used, the most gradual downhill grade observed. Combined these represent the worst case for emissions modeling and are consistent with prior air quality evaluations at this location.[18]
    - The link source type hour fraction data were developed based on the source hours operating for each source type, using the MWCOG conformity analysis runs provided for Fairfax County.
- Posted speeds were assumed for all freeway links (55 mph) and the intersection analyses as an approximation for congested speeds.
- Dispersion Modeling:
  - CAL3QHC was applied using the CAL3i interface.
  - CO background concentration values were those developed by VDEQ based on recent monitoring data. Documentation for local background concentrations and associated persistence factors is included in the VDOT Resource Document.
  - All other defaults were based on the latest version of the VDOT Resource Document.
  - Worst-case traffic volumes of 2,400 vehicles per hour per lane (vphpl) were applied, far exceeding the theoretical capacity on any one approach. 2017 Traffic volumes in the

[18] US Department of Transportation and Virginia Department of Transportation. *1-66 Corridor Improvements – Tier 2 Revised Environmental Assessment.* January 5, 2016

screening analysis were from 29% to over 10 times higher than those currently forecasted for the project.

- Receptors were located on the edge of the roadway right-of-way, following federal guidance for worst-case analyses.
- All other worst case assumptions were consistent with recommendations included in the VDOT Project-Level Air Quality Resource Document including:
  - 3 foot median width for freeways
  - No median width for intersections
  - 20 foot right of way for freeways
  - 10 foot right of way for intersections
  - 2,400 vphpl for each travel lane for freeways
  - 1,230 vphpl for each travel lane for intersections
  - Average red cycle length of 68 seconds
  - Saturation flow rate of 1,900 vphpl

An example MOVES input data file applied in the CO analysis is provided in **Appendix B**.

CAL3QHC via the CAL3i interface was used for modeling the CO concentrations at the selected locations. Emission factors derived from MOVES2014a, calculated as discussed above, were included as inputs to the CAL3i model. Worst-case traffic operations and atmospheric conditions were incorporated to predict worst-case CO concentrations. The surface roughness coefficient used in the analysis was based on land use in the project area. In addition, a persistence factor of 0.78 was applied to the 1-hour CO concentrations to project the 8-hour CO concentrations as stipulated in EPA guidance. An example CAL3QHC input and output file are provided in **Appendix C**, and a complete set of modeling files can be made available upon request.

5.5 No-Build Scenarios

Modeling of No-Build scenarios for the project-level air quality analysis for CO is not required for this analysis in keeping with the FHWA-VDOT 2009 Agreement for No-Build Analyses. Per that Agreement, modeling of a No-Build scenario is not required for projects that qualify for an Environmental Assessment (EA).

A base year analysis was completed using 2014 emission rates, the number of lanes indicative of the No-Build scenario, and the same assumptions as indicated for the build scenario below.

5.6 Results of CO Screening Analysis – Build Scenarios

For the base year (2014), the worst-case CO concentrations at the I-66/I-495 interchange of 10.1 ppm (1-hour) and 8.0 (8-hour) are observed at receptor 13. For the project-opening year (2017), the worst-case CO concentrations of 9.8 ppm (1-hour) and 7.8 ppm (8-hour) are observed at receptor 13. For the design year (2040), the worst-case CO concentrations of 4.2 ppm (1-hour) and 3.4 ppm (8-hour) are observed at receptor 13. All of these maximum potential CO concentrations are below the CO NAAQS. Thus, these results demonstrate that, under worst-case conditions, the Build scenario will not cause or contribute to a violation of the CO NAAQS at the worst case interchanges adjacent to the project corridor. The configurations used in the CO analysis can be seen in **Appendix D**, and all input and output data for the analysis can be made available upon request. As shown in **Table 4** the highest CO concentrations are predicted at the interchange. The maximum observed CO concentrations (in ppm) are shown for the existing and Build condition for each year. The summary table also shows the CO NAAQS for the corresponding averaging period.

Table 4: Maximum Potential CO Concentrations (ppm)

Location	Averaging Period	2014 Existing	2017 Build	2040 Build	NAAQS
VA 7 & Idylwood Rd	1-hour CO	4.6	4.0	2.2	35
	8-hour CO	3.7	3.2	1.9	9
VA 123 & Lewinsville Rd	1-hour CO	5.6	4.8	2.4	35
	8-hour CO	4.5	3.9	2.0	9
VA 123 & Kirby Rd	1-hour CO	4.2	3.5	2.1	35
	8-hour CO	3.5	2.9	1.8	9
I-495 & I-66	1-hour CO	10.1	9.8	4.2	35
	8-hour CO	8.0	7.8	3.4	9

Notes: 1-hour and 8-hour concentrations are shown in parts per million (ppm). 1-hour concentrations were predicted using a background concentration of 1.6 ppm. 8-hour concentrations were calculated by applying a persistence factor of 0.78 to the 1-Hour concentration, and assume a background concentration of 1.4 ppm.

For the base year (2014), the maximum potential (worst-case) CO concentrations at an intersection are observed at the VA 123 & Lewinsville Road intersection with a 1-hour CO concentration of 5.6 ppm and an 8-hour CO concentration of 4.5 ppm. This peak occurs at receptor 13. For the project opening year (2017), the worst-case CO concentration at the signalized intersections is observed at the VA 123 & Lewinsville Road intersection with a 1-hour CO concentration of 4.8 ppm and an 8-hour CO concentration of 3.9 ppm. This peak occurs at receptor 13. For the design year (2040), the estimated worst-case CO concentrations are below the base and opening year worst-case concentrations.

The analysis of the interchange of I-495 and I-66 represents a much exaggerated screening analysis. While the interchange is spread over a wide area, the screening analysis reduces it to a compact roadway crossing with vehicle emissions similarly constrained and concentrated. Traffic volumes are assumed to be at the roadway capacity, and receptors are located adjacent to the roadway at locations that are actually inaccessible to the public. Despite these extreme assumptions, the screening analysis still shows no exceedance of the CO NAAQS. Given that the actual interchange has lower volumes, is far more spread out and the areas to which the public has access more removed from the roadway edges, it can be confidently stated that, based on this screening analysis, the interchange will not result in a CO exceedance of the NAAQS.

5.7 CO Conclusions

Based on a worst-case analysis following EPA and FHWA requirements and guidance, and using modeling inputs from or consistent with the VDOT Resource Document, which completed inter-agency consultation for conformity purposes in December 2015, the maximum CO concentrations modeled for this project are below the CO NAAQS. These results demonstrate that, under worst-case conditions, the Build scenario would not cause or contribute to a violation of the CO NAAQS.

6.0 Particulate Matter

The I-66 Inside the Beltway project is located in Arlington and Fairfax Counties, areas designated as maintenance for the 1997 annual $PM_{2.5}$ NAAQS, and as such requires a project-level conformity determination. The VDOT Project-Level Air Quality Resource Document, for which inter-agency consultation for conformity purposes was completed in December 2015, provides guidance and criteria to assist in determining whether a project warrants consideration as a possible project of local air quality concern for $PM_{2.5}$. This criteria is detailed in Appendix L of the Resource Document. For more background on inter-agency consultation for conformity conducted for this project, see sections 4.5 and 6.2.

6.1 PM Regulations & Overview

Quantitative $PM_{2.5}$ considerations are a requirement under the Transportation Conformity Requirements of the Clean Air Act (CAA). CAA section 176(c)(1) is the statutory requirement that must be met by all projects in nonattainment and maintenance areas that are subject to transportation conformity. Section 176(c)(1)(B) states that federally-supported transportation projects must not "cause or contribute to any new violation of any standard [NAAQS] in any area; increase the frequency or severity of any existing violation of any standard in any area; or delay timely attainment of any standard or any required interim emission reductions or other milestones in any area." Section 93.123(b)(1) of the conformity rule defines the projects that require a $PM_{2.5}$ or PM_{10} hot-spot analysis as:

> (i) New highway projects that have a significant number of diesel vehicles, and expanded highway projects that have a significant increase in the number of diesel vehicles;
> (ii) Projects affecting intersections that are at Level-of-Service D, E, or F with a significant number of diesel vehicles, or those that will change to Level-of Service D, E, or F because of increased traffic volumes from a significant number of diesel vehicles related to the project;
> (iii) New bus and rail terminals and transfer points that have a significant number of diesel vehicles congregating at a single location;
> (iv) Expanded bus and rail terminals and transfer points that significantly increase the number of diesel vehicles congregating at a single location; and
> (v) Projects in or affecting locations, areas, or categories of sites which are identified in the $PM_{2.5}$ or PM_{10} applicable implementation plan or implementation plan submission, as appropriate, as sites of violation or possible violation.

Some examples of projects of local air quality concern that would be covered by 40 CFR 93.123(b)(1)(i) and (ii) are:

- A project on a new highway or expressway that serves a significant volume of diesel truck traffic, such as facilities with greater than 125,000 annual average daily traffic (AADT) and 8% or more of such AADT is diesel truck traffic;
- New exit ramps and other highway facility improvements to connect a highway or expressway to a major freight, bus, or intermodal terminal;
- Expansion of an existing highway or other facility that affects a congested intersection (operated at Level-of-Service D, E, or F) that has a significant increase in the number of diesel trucks; and,
- Similar highway projects that involve a significant increase in the number of diesel transit busses and/or diesel trucks.

Some examples of projects of local air quality concern that would be covered by 40 CFR 93.123(b)(1)(iii) and (iv) are:

- A major new bus or intermodal terminal that is considered to be a "regionally significant project" under 40 CFR 93.1012; and,
- An existing bus or intermodal terminal that has a large vehicle fleet where the number of diesel buses increases by 50% or more, as measured by bus arrivals.

It should be noted that the region currently attains the 2006 and 2012 $PM_{2.5}$ NAAQS based on monitoring data.[19] With the implementation of the 2012 $PM_{2.5}$ NAAQS, USEPA has proposed that the 1997 primary annual standard be revoked, which would eliminate the associated conformity requirements.[20]

6.2 Interagency Consultation and Discussion of Findings

As noted previously, the I-66 Inside the Beltway project has garnered both media and public attention. All models, methods and assumptions applied for this assessment were taken from or consistent with those specified in the VDOT Resource Document for which the requisite inter-agency consultation was completed in December 2015 (see section 4.5). In addition, a webinar was held on February 18th, 2016 specifically for this project. Agencies invited to participate included:

- FHWA Virginia Division and Resource Center;
- Virginia Department of Environmental Quality;
- Virginia Department of Transportation;
- Virginia Department of Rail and Public Transit;
- Metropolitan Washington Council of Governments;
- EPA Region 3;
- FTA local and regional offices;
- Fairfax County; and
- Arlington County

Materials distributed to webinar participants and the minutes from the meeting are provided in **Appendix A.**

Traffic forecasts, particularly along I-66 itself, did not indicate a significant growth in truck or diesel bus traffic as a result of the project. Diagrams summarizing the daily traffic on I-66 and at the affected interchanges can be found in **Figures 4a and 4b**. The absence of significant growth in Average Annual Diesel Truck Traffic (AADTT) in the project area was expected given that I-66 itself is limited to vehicles with no more than 4 tires, making heavy duty diesel trucks effectively banned on the facility itself (outside of violators.) There are no new land uses anticipated that would include congregations of idling trucks or diesel vehicles as a result of the proposed action. There is no specific transit component to the project involving diesel buses either traveling through the corridor, for example a dedicated bus lane, or new congregations of idling buses, such as at a major bus-to-bus transfer facility or a new bus yard.

Appendix L of the VDOT Resource Document specifies criteria to determinate whether a proposed project or action is one of potential air quality concern for fine particulate matter ($PM_{2.5}$). For proposed improvements to existing highways, the applicable criterion is whether the proposed improvement is

[19] Attainment status for any region of the country for all NAAQS can be found on the USEPA Greenbook: http://www.epa.gov/airquality/greenbook/

[20] See EPA's March 23, 2015 Notice of Proposed Rulemaking (80 FR 15340-15474) http://www.gpo.gov/fdsys/pkg/FR-2015-03-23/pdf/2015-06138.pdf#page=2

likely to lead to an increase in AADTT greater than 2,000 vehicles/day. For this project, the forecast changes in traffic volume, even if buses are included in the truck totals, do not attain this 2,000 vehicle/day criterion. This observation holds true in both the opening year of the project (2017) and the design year (2040), years for which traffic forecasts were made available. It can therefore be concluded that this is not a project of local air quality concern for $PM_{2.5}$. In summary for the determination that the proposed improvements do not constitute ones of potential air quality concern for fine particulate matter:

- Mainline capacity increases usable by trucks are not part of the proposed action.
- Traffic analysis/traffic modeling performed for this project shows no significant (>2,000 VPD) increase in truck traffic on any of the freeway or arterial roadways in the study corridor that are indirectly impacted by the project, and as such the project does not meet the technical criteria specified in the VDOT Resource Document to be specified to be one of air quality concern for fine particulate matter.[21]

Finally, additional factors described in the VDOT Air Quality Resource Document also help to support this determination:

- The area has already achieved the 1997, 2006 and 2012 $PM_{2.5}$ NAAQS
- Background concentrations are well below the 1997 NAAQS (8.8 – 9.4 ppb).[22]
- EPA has proposed to revoke the 1997 $PM_{2.5}$ NAAQS in its implementation of the 2012 standard. This would change the status of the area from Maintenance to Attainment of the standard, eliminating $PM_{2.5}$ conformity requirements entirely.

6.3 PM Conclusions

Overall the weight of evidence shows that the I-66 Inside the Beltway project is not a project of local air quality concern for $PM_{2.5}$. No comments to the contrary were received in inter-agency consultation for conformity purposes for this project.

[21] VDOT I-66 Inside the Beltway: Traffic Technical Report – Draft January 8, 2016 (Under Review)
[22] Monitored data provided by VDEQ

Figure 4a: Traffic Forecasts for I-66 Inside the Beltway – 1 of 2

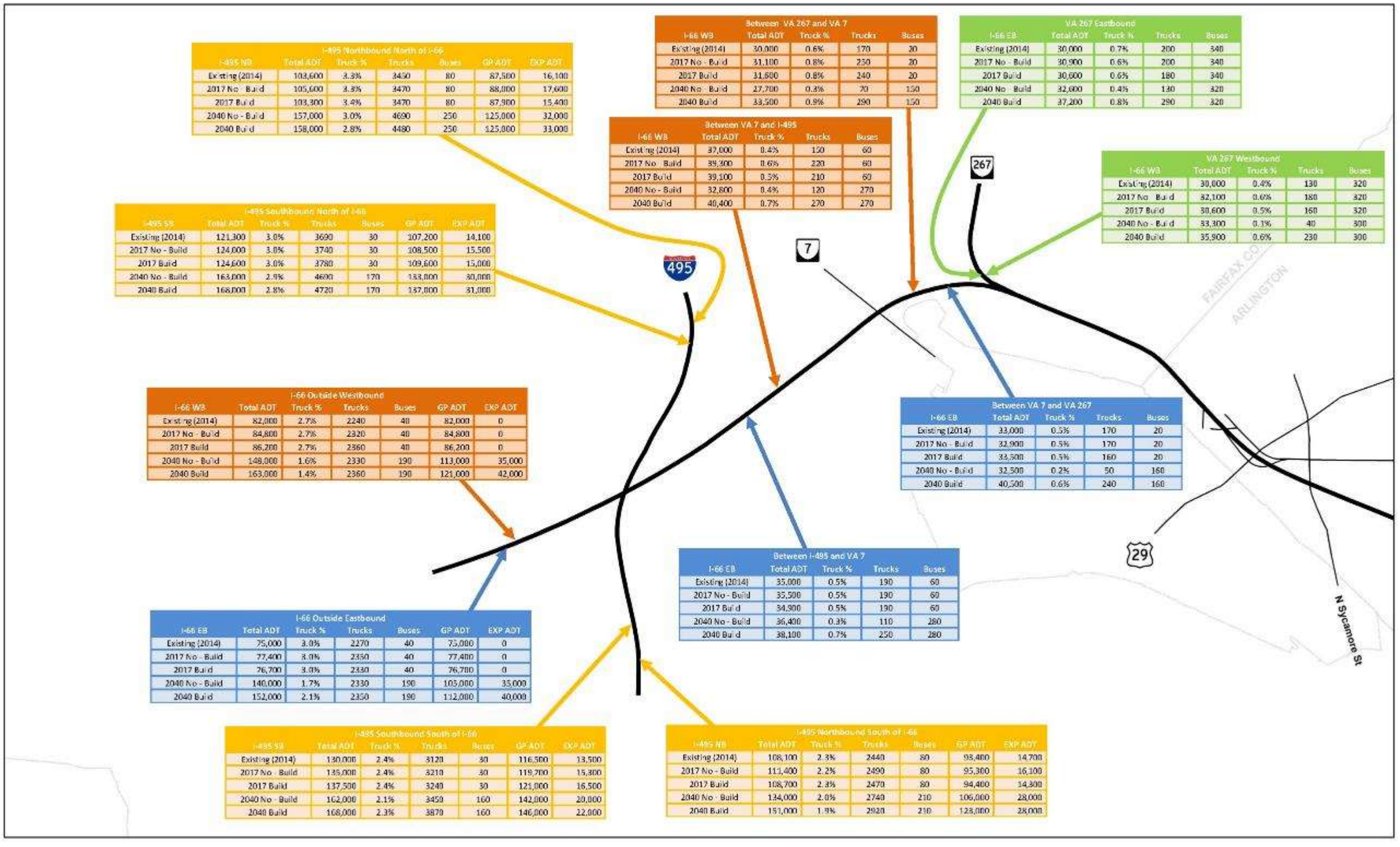
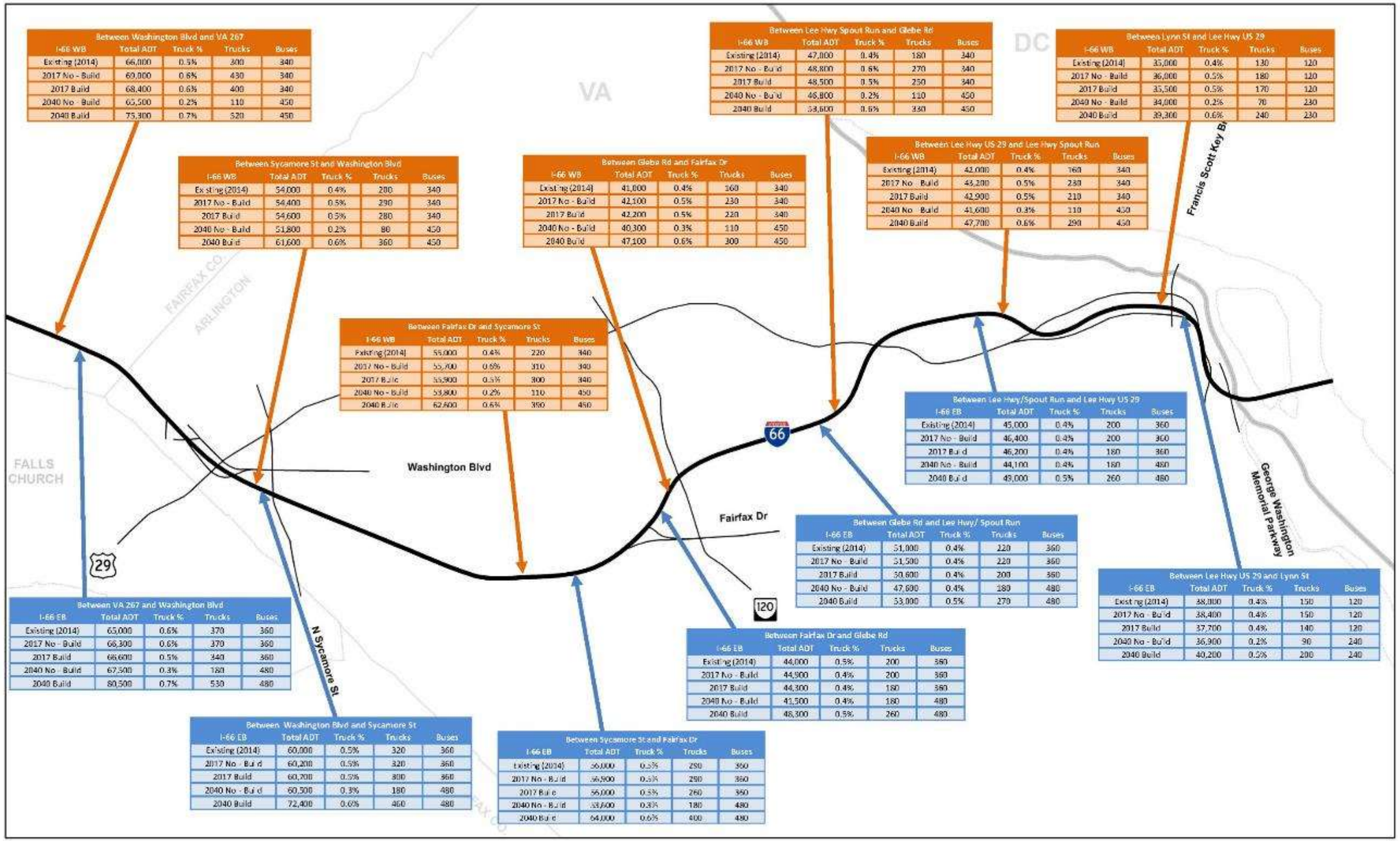


Figure 4b: Traffic Forecasts for I-66 Inside the Beltway – 2 of 2



7.0 Mobile Source Air Toxics Analysis

In December of 2012, the FHWA issued an interim guidance update regarding the evaluation of MSAT in NEPA analyses and included projections utilizing the EPA MOVES emission model and updated research on air toxic emissions from mobile sources. The guidance includes three categories and criteria for analyzing MSATs in a NEPA documents:

1. No meaningful MSAT effects,
2. Low potential MSAT effects, and
3. High potential MSAT effects.

A qualitative analysis is required for projects which meet the low potential MSAT effects criteria while a quantitative analysis is required for projects meeting the high potential MSAT effects criteria.

Projects with Low Potential MSAT Effects are described as:

- *Those that serve to improve operations of highway, transit, freight without adding substantial new capacity or without creating a facility that is likely to significantly increase emissions. This category covers a broad range of project types including minor widening projects and new interchanges, such as those that replace a signalized intersection on a surface street or where design year traffic is not projected to meet the 140,000 to 150,000 AADT criteria.*

Projects with High Potential MSAT Effects must:

- *Create or significantly alter a major intermodal freight facility that has the potential to concentrate high levels of diesel particulate matter in a single location;*
- *Create new or add significant capacity to urban highways such as interstates, urban arterials, or urban collector-distributor routes with traffic volumes where the AADT is projected to be in the range of 140,000 to 150,000 or greater by the design year; and*
- *Proposed to be located in proximity to populated areas.*

In accordance with the MSAT guidance, the study area is best characterized as a project with "higher potential MSAT effects" since projected design year traffic is expected to exceed the 140,000 to 150,000 AADT thresholds. Specifically, the 2040 Build scenario is expected to have AADT volumes on I-66 reach 155,300 AADT just west of the interchange with Route 29, and this traffic is also in proximity to populated areas. Traffic volumes on the Capital Beltway near the interchange with I-66 and on I-66 just west of the Beltway are projected to be even higher with daily volumes as great as 326,000 by 2040 in the Build scenario. The quantitative assessment of MSATs is discussed **Section 7.4**.

7.1 MSAT Background

Controlling air toxic emissions became a national priority with the passage of the Clean Air Act Amendments (CAAA) of 1990, when Congress mandated that the EPA regulate 188 air toxics, also known as hazardous air pollutants (HAPs). The EPA assessed this expansive list in their 2007 rule on the Control of Hazardous Air Pollutants from Mobile Sources and identified a group of 93 compounds emitted from mobile sources that are listed in their Integrated Risk Information System (IRIS). In addition, EPA identified seven compounds with significant contributions from mobile sources that are among the national and regional-scale cancer risk drivers from their 1999 National Air Toxics Assessment (NATA). The seven compounds identified were:

1. acrolein;
2. benzene;
3. 1,3 butadiene;

4. diesel particulate matter;
5. formaldehyde;
6. naphthalene; and
7. polycyclic organic matter.

While FHWA considers these the priority mobile source air toxics, the list is subject to change and may be adjusted in consideration of future EPA rules. The 2007 EPA rule mentioned above requires controls that will dramatically decrease MSAT emissions through cleaner fuels and cleaner engines.

7.2 Motor Vehicle Emissions Simulator (MOVES)

According to EPA, MOVES improves upon the previous MOBILE model in several key aspects. MOVES is based on a vast amount of in-use vehicle data collected and analyzed since the latest release of MOBILE, including millions of emissions measurements from light-duty vehicles. Analysis of this data enhanced EPA's understanding of how mobile sources contribute to emission inventories and the relative effectiveness of various control strategies. In addition, MOVES accounts for the significant effects that vehicle speed and temperature have on PM emission estimates, whereas MOBILE did not. MOVES2010b includes all air toxic pollutants in NATA that are emitted by mobile sources. EPA has incorporated more recent data into MOVES2010b to update and enhance the quality of MSAT emission estimates. These data reflect advanced emission control technology and modern fuels, plus additional data for older technology vehicles.

Based on an FHWA analysis using EPA's MOVES2010b model, even if vehicle-miles traveled (VMT) increases by 102 percent as assumed from 2010 to 2050, a combined reduction of 83 percent in the total annual emissions for the priority MSAT is projected for the same time period (see **Exhibit A**). It should be noted that MOVES2010b does not reflect the impacts of some of the more recent heavy duty vehicle fuel economy standards or fuel standards intended to further reduce emissions. Because of this, application of MOVE2014 (which does include these impacts) would forecast even more dramatic declines.

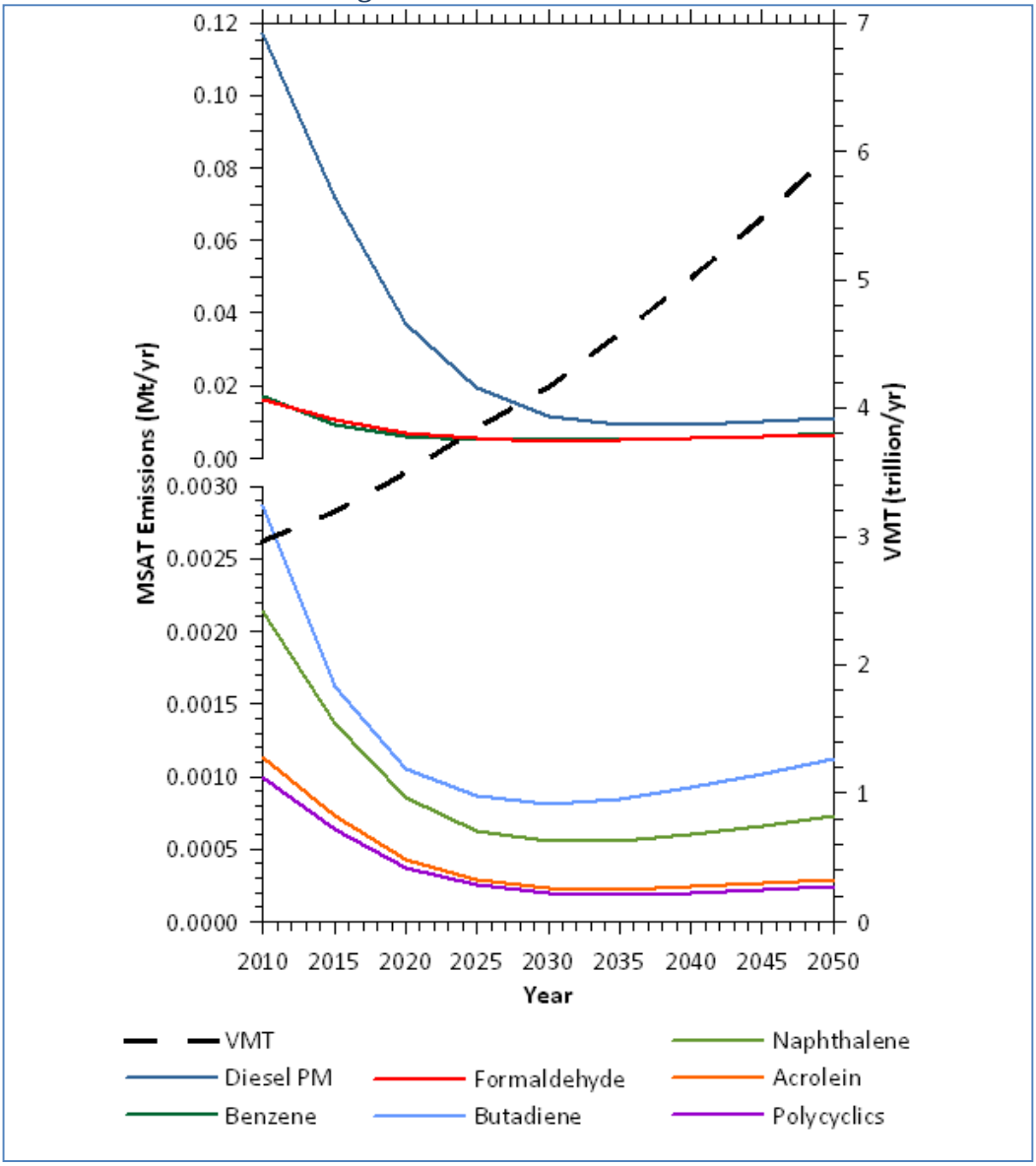
The implications of MOVES on MSAT emissions estimates compared to MOBILE are lower estimates of total MSAT emissions, significantly lower benzene emissions, and significantly higher diesel PM emissions, especially for lower speeds. This reflects the combined impact of more recent vehicle fuel economy standards, vehicle emission standards and fuel formulation not taken into account in MOBILE but fully integrated into MOVES. As a result, diesel PM is projected to be the dominant component of the emissions total.

7.3 MSAT Research

Air toxics analysis is a continuing area of research. While much work has been done to assess the overall health risk of air toxics, many questions remain unanswered. In particular, the tools and techniques for assessing project-specific health outcomes as a result of lifetime MSAT exposure remain limited. These limitations impede the ability to evaluate how potential public health risks posed by MSAT exposure should be factored into project-level decision-making within the context of NEPA.

Nonetheless, air toxics concerns continue to be raised on highway projects during the NEPA process. Even as the science emerges, we are duly expected by the public and other agencies to address MSAT impacts in our environmental documents. The FHWA, EPA, the Health Effects Institute, and others have funded and conducted research studies to try to more clearly define potential risks from MSAT emissions associated with highway projects. The FHWA continues to monitor the developing research in this field.

Exhibit A.: National MSAT Emission Trends 2010-2050 for Vehicles Operating on Roadways Using EPA's MOVES 2010b Model



Source: EPA MOVES2010b model runs conducted during May-June 2012 by FHWA.
Note: Trends for specific locations may be different, depending on locally derived information representing vehicle-miles travelled, vehicle speeds, vehicle mix, fuels, emission control programs, meteorology, and other factors.

7.4 Project Quantitative MSAT Analysis

A quantitative MSAT analysis was conducted consistent with the latest guidance developed by FHWA. These include the Interim Guidance Update mentioned earlier, and the FHWA guidance for addressing a quantitative MSAT analysis using MOVES titled "Conducting Quantitative MSAT Analysis for FHWA NEPA Documents—Frequently Asked Questions," from September 2015. The models, methods and assumptions applied in the analysis are also consistent with those specified in the VDOT Resource Document.

Based on traffic projections for the analysis years, the segments directly associated with the project and those roadways in the affected network where the Annual Average Daily Traffic (AADT) is expected to change +/- 5% and greater than 50 vehicles for the Build alternative compared to the No-Build alternative were identified. In addition, the roadway segments where the travel time is expected to change +/- 10% for the Build alternative compared to the No-Build alternative were also included. These links were the full affected network which includes the links affected by both the volume and travel time changes can be seen in **Figure 5.**

The following describes the approach and methodology used for conducting the quantitative MSAT analysis:

- AADT volumes, peak hour volumes and diurnal traffic distribution for I-66 and other roadways in the affected network along with the estimated network speeds for congested periods and for free-flow conditions were obtained from the travel network data files.
- Speed distributions were based on the congested speeds provided in the Travel Demand Model (TDM) output. Eight time periods were provided with the AM and PM peak traffic each broken into three periods, plus midday and nighttime. The AM peak periods include 5:30 am to 6:30 am, 6:30 am to 9 am, and 9 am to 10 am. The PM peak periods include 3 pm to 4 pm, 4 pm to 6:30 pm, and 6:30 pm to 7:30 pm. The midday period covers 10 am to 3 pm, and the nighttime period covers 7:30 pm to 5:30 am. The developed speed distributions are specific to each evaluation year, scenario, road type, and county. The fractions of vehicle hours of travel within each speed bin were estimated from the vehicle hours of travel and vehicle speeds contained in the traffic demand model output for each link included in the affected network and were apportioned using the MOVES AvgSpeedBin table of bins (i.e., 1 through 16) for each road type and county. The calculated speed distribution representing each time period was then applied to each hour in the time period. For the hours that include two time periods, a weighted average speed distribution was created from the two applicable speed distributions.
- The road type distributions were based on the functional class of the roadways. Interstates were assigned to MOVES road type category 4 (urban restricted access roadways), while other roads were assigned to MOVES road type category 5 (urban unrestricted access roadways). Road type distributions for each county were developed using the MWCOG distribution of VMT by sourcetype for road types 4 and 5 as well as the total VMT by road type from the TDM network output.
- The MOVES2014a model was run with local parameters for the four quarters of each analysis year (using January, April, July, and October meteorological and fuel data as surrogates for each quarter). Annual MSAT emissions were then calculated by multiplying the seasonal day emissions by the number of days in the season and summing the resulting emissions from the four seasons. The resulting, existing, interim, and design year emissions for the no-build and build conditions were compared.

- All inputs for MOVES were consistent with those specified in the VDOT Resource Document**.**
- The analysis reflects only running exhaust, crankcase running exhaust, evaporative permeation, and evaporative fuel leaks, in accordance with FHWA guidance. Diesel PM exhaust consists of exhaust PM10 emissions from diesel vehicles only. The polycyclic organic matter (POM) was summarized consistent with the pollutants listed in the FHWA guidance for POM.

The results of the quantitative MSAT analysis are presented in **Table 5. Table 6** shows the change in emissions between the Build and No-Build scenarios and between the Build and Existing scenarios. These tables show that all of the MSAT emissions are expected to increase slightly for the 2040 Build scenario conditions when compared to the corresponding No-Build conditions, but to decrease slightly from the No-Build to Build conditions in 2017. However, when compared to the 2014 Existing conditions, emissions of all pollutants in the Build scenarios for both years show significant decreases. These reductions occur despite projected increases in VMT from 2014 to the 2017 and 2040 Build scenarios of 2 and 20 percent, respectively. In 2040, the increased emissions from the No-Build to the Build scenario are generally consistent with the 6% increase in VMT from the No-Build to the Build scenario. In 2017, the Build scenario shows small reductions in all pollutants as well as VMT from the 2017 No-Build scenario, with all of these reductions around 1%.

In all cases, the magnitude of the MSAT emissions is small in the projection years and significantly lower than exists today. Over the 3-year time frame from 2014 to 2017, MSAT emissions are reduced by 37 to 54%, with 1,3-butadiene showing the greatest reduction of 0.18 tpy from the 2014 Existing scenario. By 2040, emissions of all pollutants are further reduced from 2014 levels, and all are under 1 tpy, except diesel PM, with emissions of 1.9 tpy in the 2040 Build scenario. Again in 2040, emissions of 1,3-butadiene show the greatest percentage decrease from 2014 levels, with a 99% reduction to 0.003 tpy in the 2040 Build scenario. After diesel PM, emissions of formaldehyde and benzene are the greatest in the 2040 Build scenario, at 0.9 and 0.5 tpy, respectively. Due to the small magnitude of projected MSAT emissions, the increases observed in 2040 from the No-Build to the Build scenario are not considered significant, especially when considering that emissions from all MSAT are expected to be significantly lower in future years than exist today.

Overall, the results of the MSAT analysis are consistent with the national MSAT emission trends predicted by MOVES and indicate that no meaningful increases in MSATs have been identified and are not expected to cause an adverse effect on human health as a result of the I-66 Build scenario in future years, and may even be reduced in the short term (i.e., 2017).

Figure 5: 2040 Affected Roadway Network

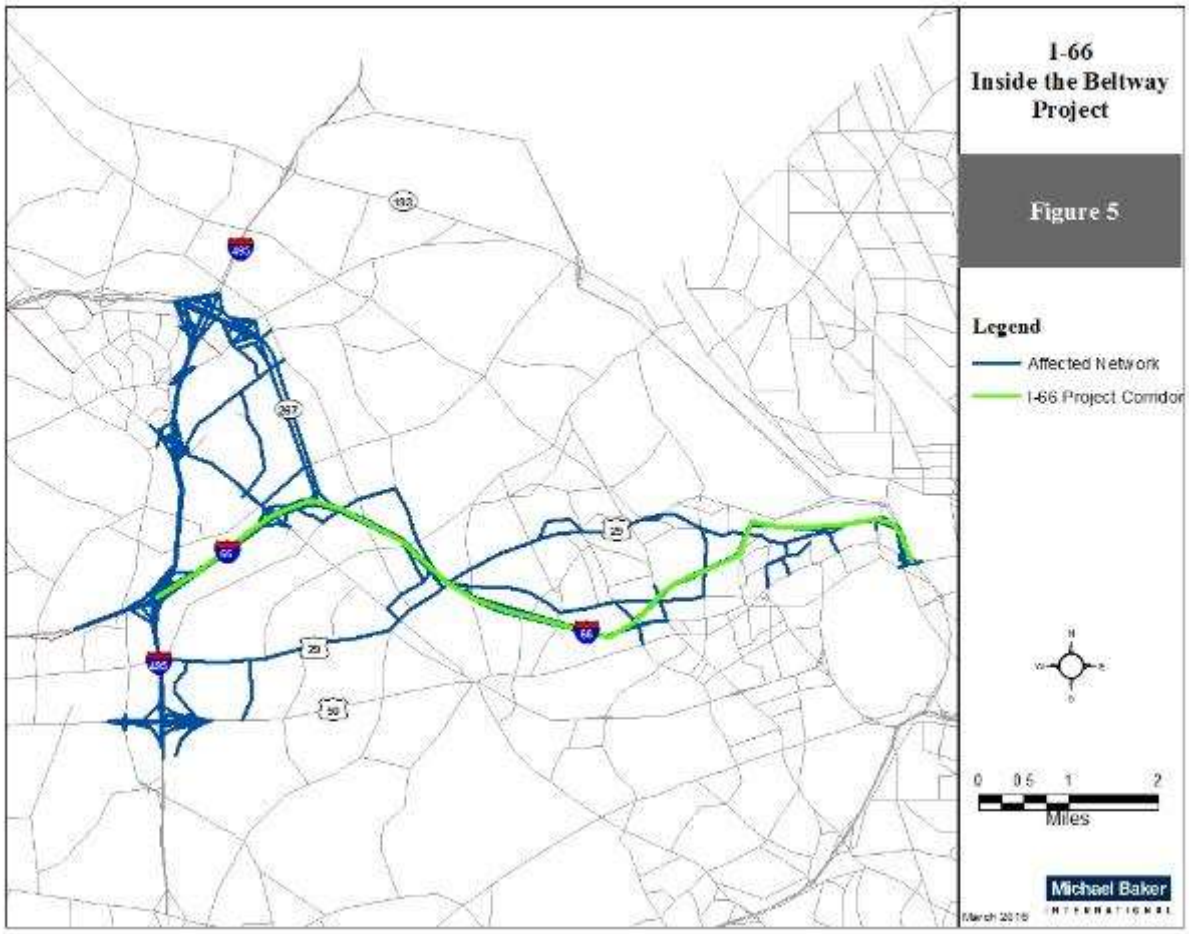


Table 5: Annual MSAT Emissions by Year, Scenario and Pollutant

Pollutant	2014 (tpy)	2017 (tpy)		2040 (tpy)	
	Existing	No-Build	Build	No Build	Build
1,3 Butadiene	0.39	0.180	0.178	0.003	0.003
Acrolein	0.27	0.164	0.161	0.039	0.041
Benzene	3.62	1.964	1.942	0.500	0.530
Diesel PM	22.86	13.741	13.560	1.787	1.877
Formaldehyde	3.99	2.540	2.502	0.859	0.903
Naphthalene	0.46	0.279	0.275	0.071	0.075
Polycyclic Organic Matter	0.23	0.143	0.142	0.029	0.030
VMT (million annual vehicle-miles)	1,232	1,269	1,262	1,391	1,477

Table 6: Change in Annual MSAT Emissions by Year, Scenario and Pollutant from No-Build and from Existing Emissions

Pollutant	Change from No-Build				Change from Existing			
	2017 Build		2040 Build		2017 Build		2040 Build	
	TPY	%	TPY	%	TPY	%	TPY	%
1,3 Butadiene	-0.002	-1.1%	0.000	0.0%	-0.211	-54.1%	-0.386	-99%
Acrolein	-0.003	-1.8%	0.002	4.9%	-0.107	-39.6%	-0.228	-84%
Benzene	-0.022	-1.1%	0.030	5.7%	-1.683	-46.5%	-3.095	-85%
Diesel PM	-0.181	-1.3%	0.090	4.8%	-9.297	-40.7%	-20.981	-92%
Formaldehyde	-0.037	-1.5%	0.044	4.9%	-1.485	-37.2%	-3.084	-77%
Naphthalene	-0.004	-1.4%	0.004	5.3%	-0.190	-41.3%	-0.390	-85%
Polycyclic Organic Matter	-0.002	-1.4%	0.002	6.7%	-0.090	-39.1%	-0.201	-87%
VMT (million annual vehicle-miles)	-7.17	-0.6%	86.21	5.8%	29.34	2.4%	245.24	20%

7.5: Incomplete or Unavailable Information for Project-Specific MSAT Health Impacts Analysis

In FHWA's view, information is incomplete or unavailable to credibly predict the project-specific health impacts due to changes in MSAT emissions associated with a proposed set of highway alternatives. The outcome of such an assessment, adverse or not, would be influenced more by the uncertainty introduced into the process through assumption and speculation rather than any genuine insight into the actual health impacts directly attributable to MSAT exposure associated with a proposed action.

The EPA is responsible for protecting the public health and welfare from any known or anticipated effect of an air pollutant. They are the lead authority for administering the CAA and its amendments and have specific statutory obligations with respect to hazardous air pollutants and MSAT. The EPA is in the continual process of assessing human health effects, exposures, and risks posed by air pollutants. They maintain the Integrated Risk Information System (IRIS), which is "a compilation of electronic reports on specific substances found in the environment and their potential to cause human health effects" (EPA, http://www.epa.gov/iris/). Each report contains assessments of non-cancerous and cancerous effects for individual compounds and quantitative estimates of risk levels from lifetime oral and inhalation exposures with uncertainty spanning perhaps an order of magnitude.

Other organizations are also active in the research and analyses of the human health effects of MSAT, including the Health Effects Institute (HEI). Two HEI studies are summarized in Appendix D of FHWA's Interim Guidance Update on Mobile Source Air Toxic Analysis in NEPA Documents. Among the adverse health effects linked to MSAT compounds at high exposures are cancer in humans in occupational settings, cancer in animals, and irritation to the respiratory tract, including the exacerbation of asthma. Less obvious is the adverse human health effects of MSAT compounds at current environmental concentrations (HEI, http://pubs.healtheffects.org/view.php?id=282) or in the future as vehicle emissions substantially decrease (HEI, http://pubs.healtheffects.org/view.php?id=306).

The methodologies for forecasting health impacts include emissions modeling, dispersion modeling, exposure modeling, and then final determination of health impacts, with each step in the process building on the model predictions obtained in the previous step. All are encumbered by technical shortcomings or

uncertain science that prevents a more complete differentiation of the MSAT health impacts among a set of project alternatives. These difficulties are magnified for lifetime (i.e. 70 year) assessments, particularly because unsupportable assumptions would have to be made regarding changes in travel patterns and vehicle technology (which affects emissions rates) over that time frame, since such information is unavailable.

It is particularly difficult to reliably forecast 70-year lifetime MSAT concentrations and exposure near roadways to (1) determine the portion of time that people are actually exposed at a specific location; and (2) establish the extent attributable to a proposed action especially given that some of the information needed is unavailable.

There are considerable uncertainties associated with the existing estimates of toxicity of the various MSAT, because of factors such as low-dose extrapolation and translation of occupational exposure data to the general population, a concern expressed by HEI (http://pubs.healtheffects.org/view.php?id=282). As a result, there is no national consensus on air dose-response values assumed to protect the public health and welfare for MSAT compounds, and in particular for diesel PM. The EPA (http://www.epa.gov/risk/basicinformation.htm#g) and the HEI (http://pubs.healtheffects.org/getfile.php?u=395) have not established a basis for quantitative risk assessment of diesel PM in ambient settings.

There is also the lack of a national consensus on an acceptable level of risk. The current context is the process used by the EPA as provided by the CAA to determine whether more stringent controls are required in order to provide an ample margin of safety to protect public health or to prevent an adverse environmental effect for industrial sources subject to the maximum achievable control technology standards, such as benzene emissions from refineries. The decision framework is a two-step process. The first step requires EPA to determine an "acceptable" level of risk due to emissions from a source, which is generally no greater than approximately 100 in a million. Additional factors are considered in the second step, the goal of which is to maximize the number of people with risks less than 1 in a million due to emissions from a source. The results of this statutory two-step process do not guarantee that cancer risks from exposure to air toxics are less than 1 in a million; in some cases, the residual risk determination could result in maximum individual cancer risks that are as high as approximately 100 in a million. In a June 2008 decision, the U.S. Court of Appeals for the District of Columbia Circuit upheld EPA's approach to addressing risk in its two step decision framework. Information is incomplete or unavailable to establish that even the largest of highway projects would result in levels of risk greater than deemed acceptable.

Because of the limitations in the methodologies for forecasting health impacts described, any predicted difference in health impacts between alternatives is likely to be much smaller than the uncertainties associated with predicting the impacts. Consequently, the results of such assessments would not be useful to decision makers, who would need to weigh this information against project benefits, such as reducing traffic congestion, accident rates, and fatalities, in addition to improved access for emergency response, that are better suited for a quantitative analysis.

7.6 MSAT Conclusions

The understanding of mobile source air toxics is an area of continued study. Information is currently incomplete or unavailable to credibly predict the project-specific health impacts due to changes in MSAT emissions associated with each of the project scenarios. Emissions of all MSAT pollutants were projected to decrease from the No-Build to the Build scenario in 2017, but increase slightly from the No-Build to the Build scenario in 2040, although these increases are not considered to be significant. However, when

compared to existing conditions, emissions of all MSAT pollutants under the 2017 and 2040 Build scenarios are projected to be significantly lower than exist today.

EPA's vehicle and fuel regulations are expected to result in significantly lower MSAT levels in the future than exist today due to cleaner engine standards coupled with fleet turnover. The magnitude of the EPA-projected reductions is so great (even after accounting for VMT growth) that MSAT emissions in the study area will be significantly lower in the future than they are today, regardless of the scenario chosen.

8.0 Construction Emission Analysis

The temporary air quality impacts from construction are not expected to be significant. Emissions will be produced during the construction of this project by heavy equipment and vehicle travel to and from the site. Earthmoving and ground-disturbing operations will generate airborne dust. Construction emissions are short term or temporary in nature. In order to mitigate these emissions, all construction activities are to be performed in accordance with VDOT's current *Road and Bridge Specifications*. These Specifications require compliance with all applicable local, state, and federal regulations.

This project is located within a Marginal 8-hour Ozone Nonattainment area, a $PM_{2.5}$ Maintenance area, a CO Maintenance Area, and a volatile organic compounds (VOC) and nitrogen oxides (NO_X) Emissions Control Area. As such, all reasonable precautions should be taken to limit the emissions of VOC, NOx, and particulate matter. In addition, the following VDEQ air pollution regulations must be adhered to during the construction of this project: 9 VAC 5-130, Open Burning restrictions; 9 VAC 5-45, Article 7, Cutback Asphalt restrictions; and 9 VAC 5-50, Article 1, Fugitive Dust precautions.

9.0 Regional Conformity Status of the Project

This project has already been evaluated in relation to regional air quality concerns. The Clean Air Act Amendments (CAAA) of 1990 mandate improvements to the nation's air quality. The final conformity regulations promulgated by the US EPA in 1997, as part of 40 CFR Part 93, require transportation plans and programs conform to the SIP. The final conformity rule requires that transportation plans in ozone nonattainment areas be consistent with the most recent estimates of mobile source emissions; provide for the expeditious implementation of transportation control measures in the applicable implementation plan; and contribute to annual emission reductions in ozone and carbon monoxide nonattainment areas.

The project is located in the Arlington and Fairfax Counties. Based on the CAA and most recent EPA classifications, this area has been designated as an attainment/maintenance area for the 1997 annual $PM_{2.5}$ NAAQS. This area is also subject to regional conformity requirements due to marginal nonattainment of the 2008 8-hour ozone NAAQS. The Metropolitan Washington Council of Governments *Amended 2015 Transportation Plan for the National Capital Region of the 2015 Constrained Long Range Plan Amendment and Fiscal Year 2015-2020 Transportation Improvement Plan, Air Quality Conformity Analysis*[23] was released on October 21, 2015 and includes the transportation impact of the proposed action. As such the project-level regional conformity requirements have already been demonstrated for this project.

[23] http://www.mwcog.org/transportation/activities/quality/Conformity/2015/ConformityReport-Complete.pdf

10.0 Indirect and Cumulative Effects

Effects of the project that would occur at a later date or are fairly distant from the project are referred to as indirect effects. Cumulative impacts are those effects that result from the incremental impact of the action when added to other past, present and reasonably foreseeable future actions. Cumulative impacts are inclusive of the indirect effects.

The potential for indirect effects or cumulative impacts to air quality that may be attributable to this project is not expected to be significant for a couple of reasons. First, regarding indirect effects, the quantitative assessments conducted for project-specific CO and MSAT impacts and the regional conformity analysis conducted for ozone can all be considered indirect effects analyses because they look at air quality impacts attributable to the project that occur at a later time in the future. These analyses demonstrated that in the future, 1) air quality impacts from CO will not cause or contribute to violations of the CO NAAQS; 2) MSAT emissions from the affected network will be significantly lower than they are today; and 3) ozone attributable to this and all other projects In the region will not exceed the mobile source emissions budgets established for the region.

Second, regarding the potential for cumulative impacts, the annual conformity analysis conducted by the Transportation Planning Board (MPO for the Washington, D.C. metropolitan nonattainment/maintenance area) represents a cumulative impact assessment for purposes of regional air quality. Federal conformity requirements, including specifically 40 CFR 93.114 and 40 CFR 93.115, apply as the area in which the project is located is designated as nonattainment for ozone and maintenance for fine particulate matter. Accordingly, there must be a currently conforming transportation plan and program at the time of project approval, and the project must come from a conforming plan and program (or otherwise meet criteria specified in 40 CFR 93.109(b)).

- The existing air quality designations for the region are based, in part, on the accumulated mobile source emissions from past and present actions, and these pollutants serve as a baseline for the current conformity analysis.
- The conformity analysis quantifies the amount of mobile source emissions for which the area is designated nonattainment/maintenance that will result from the implementation of all reasonably foreseeable (i.e. those proposed for construction funding over the life of the region's transportation plan) regionally significant transportation projects in the region.
- The most recent conformity analysis was completed in October 2015, with FHWA and FTA issuing a conformity finding on February 4, 2016 for the TIP and CLRP covered by that analysis. This analysis demonstrated that the incremental impact of the proposed project on mobile source emissions, when added to the emissions from other past, present, and reasonably foreseeable future actions, is in conformance with the SIP and will not cause or contribute to a new violation, increase the frequency or severity of any violation, or delay timely attainment of the NAAQS established by EPA.

Therefore, the indirect and cumulative effects of the project are not expected to be significant.

11.0 Conclusions

In order to meet NEPA and conformity requirements[24], a quantitative CO hot-spot screening analysis was performed for the I-66 Inside the Beltway project. A CO screening analysis was performed using worst-case traffic and meteorological inputs to identify the resulting "worst-case" CO concentrations throughout the project corridor in order to determine if CO exceedances could occur as a result of the proposed improvements. The results of the analysis show that the worst-case CO concentrations for the Build scenarios are predicted to be well below the CO NAAQS in both the Interim/Opening Year Build (2017) and Design Year Build (2040) scenarios for each of the worst-case locations analyzed along the proposed project corridor. This screening analysis included the three worst-case signalized intersections and the worst-case interchange. Therefore, it is reasonably expected that all other locations within the project corridor will also remain well below the CO NAAQS and no mitigation measures are required.

Additionally, Arlington and Fairfax Counties have been designated as being non-attainment for the 8-hour ozone and attainment/maintenance for the annual $PM_{2.5}$ standards, and therefore transportation conformity requirements apply. Following EPA regulations and guidance, and using the technical criterion specified in the VDOT Resource Document for which inter-agency consultation for conformity was completed in December 2015, the project was determined to not be one of air quality concern for $PM_{2.5}$.

Notwithstanding that inter-agency consultation for conformity on the VDOT Resource Document, on which the models, methods and assumptions were based, was completed in December 2015, inter-agency was conducted for this project in February 2016. No adverse comments were received.

The study Build scenarios were also evaluated for MSAT impacts following the latest FHWA guidance. This project was identified as one with High Potential MSAT Effects; therefore, a quantitative MSAT analysis was conducted consistent with the guidance. Emissions of all MSAT pollutants were projected to decrease slightly from the No-Build to the Build scenarios in 2017 and increase slightly in 2040, although these changes are small and not considered to be significant. However, when compared to existing conditions, emissions of all MSAT pollutants under the 2017 and 2040 Build scenarios are projected to be significantly lower than exist today. EPA's vehicle and fuel regulations are expected to result in significantly lower MSAT levels in the future than exist today due to cleaner engine standards coupled with fleet turnover. The quantitative MSAT analysis demonstrated that there would be no long-term adverse impacts associated with the Build scenario, and that future MSAT emissions across the entire study corridor are expected to be significantly below today's levels, even after accounting for projected VMT growth.

[24] Which expire for CO effective March 16, 2016 with the conclusion of the maintenance status for Arlington County for CO.

Appendix A: Interagency Consultation Webinar Presentation and Meeting Minutes

Meeting Minutes
02/18/2016
(1:30– 2:30 PM)
Interagency Consultation for Air Quality Conformity
I-66 Inside the Beltway

Attendees*:

Name	Agency/Firm
Christopher Voigt	VDOT
Jim Ponticello	VDOT
Scott Smizik	VDOT
Norman Whitaker	VDOT
Dan Grinnell	VDOT
Paul Heishman	FHWA-Resource Center
Ed Sundra	FHWA-Virginia
Danielle McCray	Kimley-Horn & Associates (representing DRPT)
Ron Milone	MWCOG/DTP
Dusan Vuksan	MWCOG/DTP
Larry Marcus	Arlington County
Sonya Lewis-Cheatham	VDEQ
Warren Hughes	ATCS, p.l.c.
Nick Karsko	ATCS, p.l.c.
Maureen Mullen	SC&A, Inc.
Robert d'Abadie	Michael Baker International
Dan Szekeres	Michael Baker International
Robyn Hartz	Michael Baker International

* Representatives from EPA, FTA, DRPT, and Fairfax County were invited but did not participate in the webinar

Introduction and Roll Call (Jim Ponticello, VDOT)

- After a brief welcome and procedural overview by Robert d'Abadie, Jim Ponticello gave a brief introduction, and performed a roll call.

Presentation: Description of Project and Traffic Modeling Overview (Warren Hughes, ATCS)

- A brief overview of the project, the nature of the planned improvements and the current status was provided by Warren Hughes, PE (ATCS), lead for the traffic forecasting and analysis effort being undertaken for the project.
- During the overview a number of key aspects of the project were noted:
  - The project will convert I-66 inside the Beltway into the dynamically priced toll lanes during rush hours in the peak directions.

- This project is part of a Categorical Exclusion (CE) and does not include the widening of I-66 EB from the Dulles Connector to Ballston. The widening project will be addressed in an environmental assessment commencing later this year.
- During the peak periods there is significant variability in travel times and speeds.
- Travel times are currently highly variable and unpredictable.
- The project will reduce variability in peak period traffic conditions and increase travel time reliability, as well as reduce congestion on I-66 mainline and ramps.
- I-66 inside the beltway was originally HOV-3, however an agreement exists that currently allows HOV-2. In 2020, I-66 will revert back to HOV-3. Exemptions for clean fuels vehicles, off-duty law enforcement and travelers to/from Dulles airport will also no longer apply.
- Under the proposed action SOVs will be able to use I-66 by paying dynamically priced tolls during peak periods, which will help reduce congestion.
- Toll periods will be 4 hours long and only in the peak direction. Currently the HOV periods are only 2.5 hours.
- Operational analyses for 2017 No Build, 2017 Build, 2040 No Build and 2040 Build
  - 2017 (Build and No Build) does not have I-66 Outside the Beltway included in the modeling analysis, since it is not anticipated to be completed.
  - 2040 No Build and Build includes I-66 Outside the Beltway.

Questions and Answers on Traffic Presentation
(Q) Ron Milone (MWCOG) – Would there be any potential bottleneck or queue spillback at the Theodore Roosevelt Bridge? Also, what is the general sense for the costs for the commute?
(A) Warren Hughes – The analysis is underway to determine these issues. However, projected traffic flows are not much higher than existing values under the build scenarios. So, extensive queuing is not expected. The costs will vary to ensure pricing is currently being evaluated; however, the dynamically adjusted tolls will be based on rates that are comparable to the rates that are currently used for the Capital Beltway.

(Q) Dusan Vuksan (MWCOG) – What are the expected travel times on I-66 in the future?
(A) Warren Hughes – Existing travel time data has been compiled from INRIX. Estimates of future travel times for the AM and PM peak hours for the scenarios (i.e., 2017 No Build, 2017 Build, 2040 No Build and 2040 Build) have been derived from both the travel demand models and from highway capacity analysis using the post-processed traffic projections. More reliable and accurate estimates of the future travel times are being developed from the application of the VISSIM model and simulation analysis. This information will be included in the revised draft traffic technical report. The goal of the project is to maintain and guarantee a minimum 45 mph speed, consistent with managed lanes. Consequently, travel times for the eastbound direction in the AM peak period and for the westbound direction in the PM peak period will not be less than the travel time corresponding to traveling at 45 mph over the approximate 11 mile corridor length.

Air Quality Presentation (Rob d'Abadie, Michael Baker International)

- The air quality analysis will make use of the new VDOT Resource Document, which was developed to assist analysts in the selection of appropriate models, methods and assumptions/data for project-level air quality analyses. Interagency consultation for conformity (IACC) of the document was completed in December 2015. The list of consulted parties included FHWA, EPA and local agencies. As a result, IACC for this project need only refer to the Resource Document and its IACC,

unless substantive changes are planned in models, methods and/or assumptions (which are not proposed for this project). VDOT at its discretion has elected to still undertake IACC for this high-profile project, in the interest of transparency and to provide an opportunity for discussion.

- This project is located in counties of Arlington and Fairfax. Arlington County is currently a maintenance area for both CO and the 1997 annual $PM_{2.5}$ standard and in nonattainment for the 8 hour ozone standard. Fairfax County is currently a maintenance area for the 1997 annual $PM_{2.5}$ standard and in nonattainment for the 8 hour ozone standard.
- Northern Virginia is likely to be classified as attainment under the current PM and CO NAAQS.
    - Related conformity requirements would no longer apply.
- After consideration of the available traffic forecasts, data and in consultation with FHWA staff and other agencies, VDOT has concluded that this is not a project of local air quality concern for $PM_{2.5}$. The remainder of the presentation provided the reasoning behind this determination and included the following main points:
    - National Ambient Air Quality Standards (NAAQS)
        - This project falls within an area designated as maintenance of the 1997 annual $PM_{2.5}$ standard and therefore is subject to project level conformity, including interagency consultation requirements.
        - Based on verified monitoring data, the area is currently in attainment with the 1997, 2006, and 2012 NAAQS for $PM_{2.5}$.
        - The 1997 annual primary $PM_{2.5}$ NAAQS has been proposed to be revoked by EPA, which would end transportation conformity requirements including consultation for $PM_{2.5}$.
        - The project meets the technical criteria specified in the Resource Document to be considered one not of local air quality concern.
            - Specifically, it was noted that the change in average Annual Diesel Truck Traffic (AADTT) was less than 2,000 vehicles/day on both the freeway and arterial links.
            - The resource document criteria of less than a 2,000 change in AADTT applies to both arterials and freeways.
            - Even if buses are considered this criteria still applies.
            - This criteria alone was sufficient, and additional factors need not be considered.

            - Additiuonal Items noted
                - The project intent is to optimize person throughput.
                - The project will not provide any new capacity for trucks. In addition, trucks are currently not permitted on I-66, and this prohibition will continue.
                - Traffic analysis/modeling shows no significant changes in diesel traffic (truck or bus)
                    - Change in AADTT < 2,000
- A review of the trends in emission rates and expected traffic growth between 2017 and 2040 shows a significant decline in vehicle related emissions is inevitable in the corridor.

Overall it was noted that the weight of evidence indicated that this is not a project of local air quality concern for $PM_{2.5}$.

- CO Maintenance Period for Arlington County and the City of Alexandria expires on March 16, 2016, after which time project-level conformity requirements for CO will no longer apply in these jurisdictions.
    - CAL3QHC will be used for analysis, via the FHWA CAL3i interface model.
    - A worst-case analysis will be conducted following the VDOT Resource Document and FHWA and EPA methodology.
    - Intersections affected by the project were selected based on EPA guidance.
        - A worst case scenario was used
        - Starting point was the 59 intersections identified by the traffic team through consultation as the ones most impacted by the project
        - The existing Synchro analyses for these intersections was used as a source of data for ranking.
        - PM peak hour determined to be worst case
        - Ranked based on LOS, volume, and delay.
        - Intersections selected are VA 7 & Idylwood Rd, VA 123 & Lewinsville Rd, and VA 123 & Kirby Rd.
        - While two of the intersections are located some distance from the corridor on VA123, they were found to be the most affected and analyzing them represents a conservative approach.
    - I-495/I-66 interchange will also be evaluated
        - One of the highest volume interchanges in Northern Virginia.
        - This will also be analyzed using CAL3i tool using available default data both in the tool itself and the Resource guide, as appropriate.
        - Evaluated for I-66 Outside the Beltway, the screening analysis did not exceed NAAQS.
        - This updated interchange evaluation will build and improve on the prior work.

There were no questions on the Air Quality portion of the presentation, and no topics were brought up for discussion.

Next Steps

- The CO and $PM_{2.5}$ air quality analyses for this project will be completed.

Dabadie, Robert

From: Ed.Sundra@dot.gov
Sent: Tuesday, March 01, 2016 4:01 PM
To: Dabadie, Robert
Cc: paul.heishman@dot.gov; Robert.O'Loughlin@dot.gov
Subject: RE: Draft Minutes - Transform 66 Inside the Beltway Air Quality Interagency Webinar

FHWA is comfortable with what was presented and does not have anything to add to the minutes.

From: Dabadie, Robert [mailto:RDabadie@mbakerintl.com]
Sent: Tuesday, March 01, 2016 11:07 AM
To: Heishman, Paul (FHWA); Sundra, Ed (FHWA); Sonya.Lewis-Cheatham@deq.virginia.gov; Thomas.Ballou@deq.virginia.gov; ksrikanth@mwcog.org; rmilone@mwcog.org; Norman.Whitaker@vdot.virginia.gov; lmarcus@arlingtonva.us; Ponticello, James (VDOT) (Jim.Ponticello@VDOT.Virginia.gov); Voigt, Christopher G. (VDOT) (Christopher.Voigt@VDOT.Virginia.gov); Grinnell, Daniel T. (VDOT) (Daniel.Grinnell@VDOT.Virginia.gov); Warren Hughes; mmullen@scainc.com; Hartz, Robyn; Szekeres, Dan; Frazier, Jim; Nicholas Karsko; Smizik, Scott (VDOT); Danielle.McCray@kimley-horn.com; Nicholas Karsko; dvuksan@mwcog.org
Cc: Claggett, Michael (FHWA); Houk, Jeff (FHWA); McGill, Melissa (FTA); John.Muse@VDOT.Virginia.gov; Tim.Roseboom@drpt.virginia.gov; Malcolm.Watson@fairfaxcounty.gov; Frazier, Jim
Subject: RE: Draft Minutes - Transform 66 Inside the Beltway Air Quality Interagency Webinar

Everyone

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Sincerely;
Rob d'Abadie (on behalf of VDOT)

Robert Dabadie | Project Manager | Michael Baker International
Baltimore, MD | [O] 410-689-3452 | [F] 410-689-3401
rdabadie@mbakerintl.com | www.mbakerintl.com

From: Dabadie, Robert
Sent: Wednesday, February 24, 2016 2:42 PM
To: Subject: Draft Minutes - Transform 66 Inside the Beltway Air Quality Interagency Webinar

We would like to thank everyone for their participation on the Transform 66 - Inside the Beltway webinar held last Thursday to discuss the traffic and air quality analysis being undertaken for the study. Attached for review, please find a draft copy of the meeting minutes. If you have any clarifications or additions you would like addressed, please forward those to me no later than close of business this Friday, February 26th, 2016.

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rdabadie@mbakerintl.com | www.mbakerintl.com

Dabadie, Robert

From: Ronald Milone <rmilone@mwcog.org>
Sent: Wednesday, March 02, 2016 8:35 AM
To: Dabadie, Robert
Cc: Dusan Vuksan; Kanti Srikanth
Subject: RE: Draft Minutes - Transform 66 Inside the Beltway Air Quality Interagency Webinar

Robert,

I have reviewed the minutes and I have no suggested edits or comments.

Ron

Ronald Milone
Travel Forecasting Program Director
MWCOG / NCRTPB
777 North Capitol St., NE
Suite 300
Washington, DC 20002
202-962-3283
www.mwcog.org

From: Dabadie, Robert [mailto:RDabadie@mbakerintl.com]
Sent: Tuesday, March 01, 2016 11:07 AM
To: paul.heishman@dot.gov; Ed.Sundra@fhwa.dot.gov; Sonya.Lewis-Cheatham@deq.virginia.gov; Thomas.Ballou@deq.virginia.gov; Kanti Srikanth <ksrikanth@mwcog.org>; Ronald Milone <rmilone@mwcog.org>; Norman.Whitaker@vdot.virginia.gov; lmarcus@arlingtonva.us; Ponticello, James (VDOT) (Jim.Ponticello@VDOT.Virginia.gov) <Jim.Ponticello@VDOT.Virginia.gov>; Voigt, Christopher G. (VDOT) (Christopher.Voigt@VDOT.Virginia.gov) <Christopher.Voigt@VDOT.Virginia.gov>; Grinnell, Daniel T. (VDOT) (Daniel.Grinnell@VDOT.Virginia.gov) <Daniel.Grinnell@VDOT.Virginia.gov>; Warren Hughes <whughes@atcsplc.com>; mmullen@scainc.com; Hartz, Robyn <Robyn.Hartz@mbakerintl.com>; Szekeres, Dan <dszekeres@mbakerintl.com>; Frazier, Jim <JFrazier@mbakerintl.com>; Nicholas Karsko <nkarsko@atcsplc.com>; Smizik, Scott (VDOT) <Scott.Smizik@vdot.virginia.gov>; Danielle.McCray@kimley-horn.com; Nicholas Karsko <nkarsko@atcsplc.com>; Dusan Vuksan <dvuksan@mwcog.org>
Cc: Michael.Claggett@dot.gov; Jeff.Houk@dot.gov; melissa.barlow@dot.gov; John.Muse@VDOT.Virginia.gov; Tim.Roseboom@drpt.virginia.gov; Malcolm.Watson@fairfaxcounty.gov; Frazier, Jim <JFrazier@mbakerintl.com>
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rdabadie@mbakerintl.com | www.mbakerintl.com

Dabadie, Robert

From: Lewis-Cheatham, Sonya (DEQ) <Sonya.Lewis-Cheatham@deq.virginia.gov>
Sent: Wednesday, March 02, 2016 12:04 PM
To: Dabadie, Robert
Subject: RE: Draft Minutes - Transform 66 Inside the Beltway Air Quality Interagency Webinar

Hello,

I am comfortable with the recommended approach for project analysis as presented in the webinar held on February 16, 2016.

Thanks,

Sonya Lewis-Cheatham
Office of Air Data Analysis and Planning
Virginia Department of Environmental Quality
Sonya.Lewis-Cheatham@deq.virginia.gov
www.deq.virginia.gov

From: Dabadie, Robert [mailto:RDabadie@mbakerintl.com]
Sent: Tuesday, March 01, 2016 11:07 AM
To: paul.heishman@dot.gov; Sundra, Edward (Ed); Lewis-Cheatham, Sonya (DEQ); Ballou, Thomas (DEQ); Srikanth, Kanti; Milone, Ron; Whitaker, Norman (VDOT); lmarcus@arlingtonva.us; Ponticello, James (VDOT); Voigt, Christopher G. (VDOT); Grinnell, Daniel T. (VDOT); Warren Hughes; mmullen@scainc.com; Hartz, Robyn; Szekeres, Dan; Frazier, Jim; Nicholas Karsko; Smizik, Scott (VDOT); Danielle.McCray@kimley-horn.com; Nicholas Karsko; dvuksan@mwcog.org
Cc: Michael.Claggett@dot.gov; Jeff.Houk@dot.gov; melissa.barlow@dot.gov; Muse, John C. (VDOT); Roseboom, Tim (DRPT); Malcolm.Watson@fairfaxcounty.gov; Frazier, Jim
Subject: RE: Draft Minutes - Transform 66 Inside the Beltway Air Quality Interagency Webinar

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Robert Dabadie | Project Manager | Michael Baker International
Baltimore, MD | [O] 410-689-3452 | [F] 410-689-3401
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Hartz, Robyn

From: Khadr, Asrah <Khadr.Asrah@epa.gov>
Sent: Thursday, March 03, 2016 10:07 AM
To: Dabadie, Robert; Becoat, gregory
Cc: Ponticello, James (VDOT) (Jim.Ponticello@VDOT.Virginia.gov); Ed.Sundra@fhwa.dot.gov; Voigt, Christopher G. (VDOT) (Christopher.Voigt@VDOT.Virginia.gov); Hartz, Robyn; Frazier, Jim; Szekeres, Dan
Subject: RE: Draft Minutes - Transform 66 Inside the Beltway Air Quality Interagency Webinar

EPA concurs that this is not a project of local air quality concern.

Asrah Khadr, Environmental Engineer, EIT
U.S. Environmental Protection Agency, Region III
Air Protection Division
Office of Air Program Planning
1650 Arch Street
Philadelphia, PA 19103
Phone: 215-814-2071

From: Dabadie, Robert [mailto:RDabadie@mbakerintl.com]
Sent: Tuesday, March 01, 2016 10:55 AM
To: Becoat, gregory <becoat.gregory@epa.gov>; Khadr, Asrah <Khadr.Asrah@epa.gov>
Cc: Ponticello, James (VDOT) (Jim.Ponticello@VDOT.Virginia.gov) <Jim.Ponticello@VDOT.Virginia.gov>; Ed.Sundra@fhwa.dot.gov; Voigt, Christopher G. (VDOT) (Christopher.Voigt@VDOT.Virginia.gov) <Christopher.Voigt@VDOT.Virginia.gov>; Hartz, Robyn <Robyn.Hartz@mbakerintl.com>; Frazier, Jim <JFrazier@mbakerintl.com>; Szekeres, Dan <dszekeres@mbakerintl.com>
Subject: RE: Draft Minutes - Transform 66 Inside the Beltway Air Quality Interagency Webinar

Gregory/Asrah

I wanted to thank you in advance for your input on the air quality analysis we are undertaking for the I-66 inside the beltway project. It is unfortunate that EPA was unable to view our webinar, however we would appreciate any comments you have on the approach we are taking. Attached are the meeting minutes and the webinar presentation slides for your consideration. We sent these out in a group email earlier and apologize if you have not received them. If our approach is adequate from your perspective please let us know by replying to this email, and if you have any comments or concerns please do not hesitate to call or otherwise contact myself.

As you know, for political reasons, this project is on a highly compressed timeframe and we are aiming to have a final draft of the air quality study to VDOT by the end of this week. I am eager to ensure our approach is adequate from EPA's perspective, and look forward to your input/reply.

Sincerely,
Rob d'Abadie (on behalf of VDOT)

Robert Dabadie | Project Manager | Michael Baker International
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Investing in Multimodal Solutions

Virginia Air Quality Interagency Consultation Group Meeting

February 18, 2015

TRANSFORM 66 INSIDE the Beltway

VDOT | DRPT

Investing in Multimodal Solutions

AGENDA

- Project Background/Overview
- Traffic Analysis
- $PM_{2.5}$ Discussion
- CO Discussion
- Next Steps

TRANSFORM 66 INSIDE the Beltway

VDOT | DRPT

Investing in Multimodal Solutions

Project Background

- Study area includes the I-66 corridor between the Capital Beltway (I-495) and the Theodore Roosevelt Bridge
- Eastbound Lanes on I-66 inside the Capital Beltway are currently restricted to HOV-2 only during the AM peak period from 6:30 AM to 9:00 AM; Westbound Lanes on I-66 inside the Capital Beltway are currently restricted to HOV-2 only during the PM peak period from 4:00 PM to 6:30 PM
- Trucks (vehicles with > 4 tires) prohibited at all times
- SOVs (during HOV periods) and trucks traveling in an east-west direction are accommodated on parallel arterial highways, primarily U.S. Route 50 and U.S. Route 29

TRANSFORM 66 INSIDE the Beltway

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Investing in Multimodal Solutions

Project Background

Virginia General Assembly Bi-Partisan Agreement, February 10, 2016

- Moves forward on a plan to reduce congestion on I-66 inside the beltway.
  - Converts I-66 inside the beltway to Express Lanes during rush hours in the peak directions, widens I-66 eastbound from the Dulles Connector Road to Ballston and improves transit service throughout the corridor.
  - Lanes proposed to open to traffic in 2019
- The work to start widening of eastbound I-66 from the Dulles Connector Road to Ballston ***will commence this year with an environmental assessment***.
- Work on the categorical exclusion for conversion of I-66 Inside the beltway to express lanes is continuing in advance of the widening.
  - Focus of today's discussion

TRANSFORM 66 INSIDE the Beltway

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Investing in Multimodal Solutions

Project Map

TRANSFORM 66 INSIDE the Beltway

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Investing in Multimodal Solutions

Project Background

- Multimodal Elements
  - The WMATA Metro Orange line and Silver line runs above ground in the median of I-66 inside the Beltway for a portion of the 11 mile segment
  - Several local and express bus services run along I-66
  - The Washington & Old Dominion Trail and Custis Trail serve bicycles and pedestrians along I-66 corridor

TRANSFORM 66 INSIDE the Beltway

Investing in Multimodal Solutions

Project Background

- Proposed project is the outcome of the following studies on the I-66 Multimodal Transportation Facility:
  - I-66 Transit/TDM Study Final report (December, 2009)
  - I-66 Multimodal Study Inside the Beltway Final Report (June, 2012)
  - I-66 Multimodal Study Inside the Beltway Supplemental Report (Aug, 2013)

TRANSFORM 66 INSIDE the Beltway

VDOT | DRPT

Investing in Multimodal Solutions

Project Overview

Current Conditions

- Significant variability in travel times and speeds on I-66 inside the Beltway during peak periods
- Recurrent traffic congestion on eastbound and westbound I-66
- Congestion at several I-66 entry/exit ramps during the peak periods
- Slower bus service due to congestion
- Overcrowded Metrorail Orange Line

TRANSFORM 66 INSIDE the Beltway

VDOT | DRPT

Investing in Multimodal Solutions

Project Overview

Improvement Goals

- Reduce variability in peak period traffic conditions and increase travel time reliability
- Reduce congestion on I-66 mainline and ramps
- Provide more travel choices
- Improve transit service
- Enhance person throughput
- Provide revenue stream support to future investment on I-66 and multimodal improvements

TRANSFORM 66 INSIDE the Beltway

VDOT | DRPT

Investing in Multimodal Solutions

Project Overview

HOV Policy

- I-66 inside the beltway was originally HOV-3.
- Currently, there is an exemption for HOV-2.
- Will revert back to HOV-3 by 2020.
- Clean fuel vehicles will no longer be exempt.
- Law enforcement will no longer be exempt (except if on duty)

TRANSFORM 66 INSIDE the Beltway

Investing in Multimodal Solutions

Project Overview

Tolling in the Preferred Alternative

- Single Occupancy Vehicles (SOV) will be able to use I-66 by paying dynamically priced tolls during the AM peak period (5:30 AM – 9:30 AM) and PM peak period (3:00 PM – 7:00 PM).
- Current spike in traffic just before and just after the HOV-2 periods is due in part to SOVs rushing to avoid the restrictions - allowing paid SOV travel in restricted periods will reduce this source of congestion.
- All vehicles will be required to have EZPass or EZPass Flex transponders during peak periods.
- Law enforcement will not be exempted from tolls (unless on official duty.)
- Toll revenue will be allocated to multi-modal improvements in the corridor.
- VDOT will operate and maintain the facility.

TRANSFORM 66 INSIDE the Beltway

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Project Overview

- 40 year Agreement between the Commonwealth of Virginia and the Northern Virginia Transportation Commission (NVTC)
- Project will be jointly implemented by NVTC and VDOT
- VDOT will manage
  - Design
  - Construction
  - Maintenance
  - Operations
  - Future widening
- NVTC will manage
  - Multimodal improvements
  - Grants allocation
  - Coordination between and among agencies

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Traffic Analysis

- Operational analyses were performed for I-66 mainline, ramps and selected signal-controlled intersections for the AM and PM peak hours for the following scenarios:
  - 2017 No-Build
  - 2017 Build
  - 2040 No-Build
  - 2040 Build
- The projected traffic volumes for 2017 and 2040 were obtained from the travel demand models, and traffic assignments were post processed using NCHRP 255/765 methodology

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Traffic Analysis

- Highway capacity analysis performed for I-66 basic freeway segments, weaving areas, and merge/diverge areas.
- Synchro analyses completed for 59 selected intersections.
- VISSIM analyses or the I-66 mainline, ramps, and adjacent intersections (underway).

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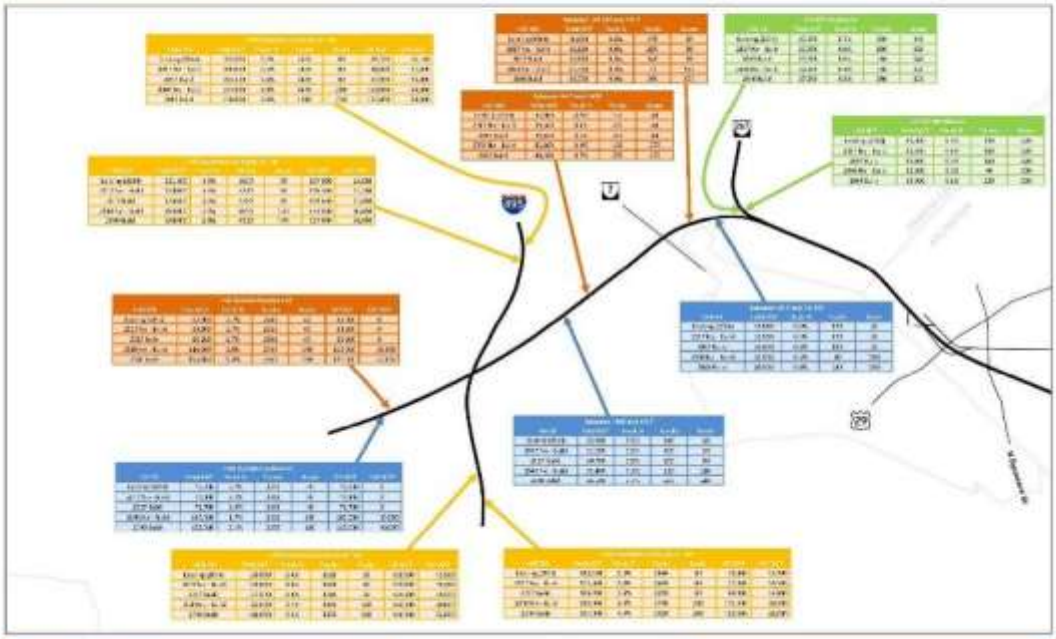
Average Daily Traffic Projections



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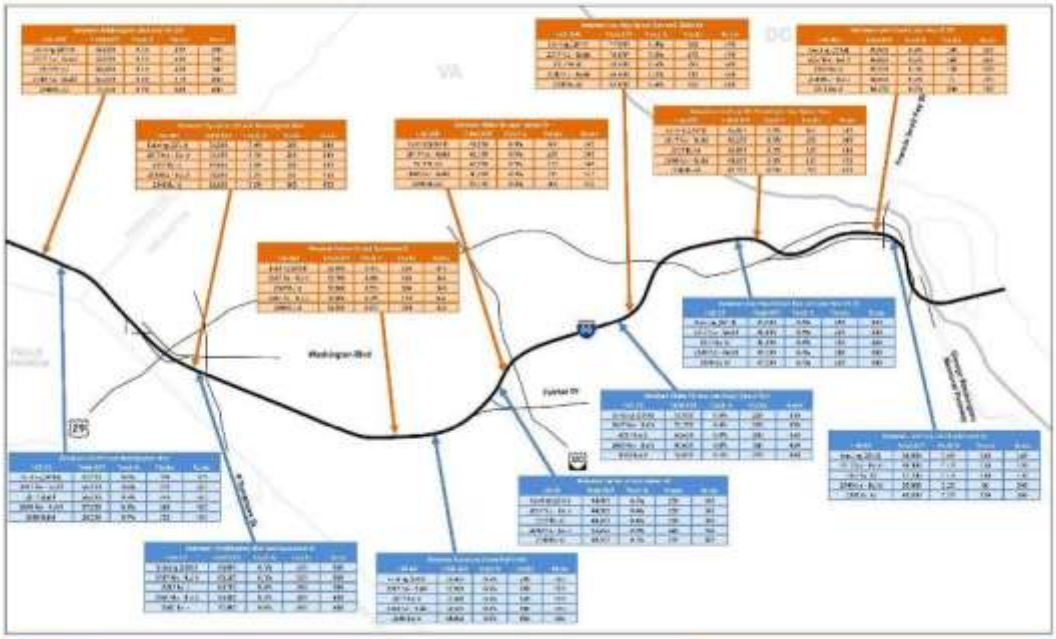
Average Daily Traffic Projections



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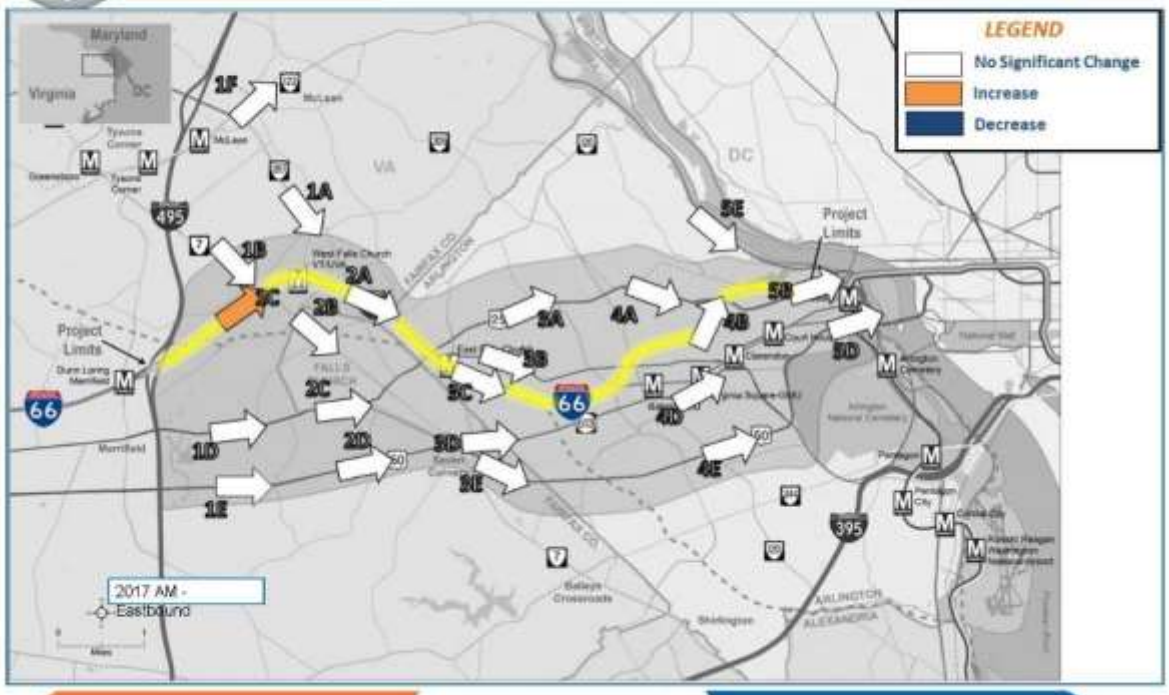
Traffic Volume Changes (>200 VPH)

No-Build vs Build Relative Change
(2017 – Eastbound AM Peak Hour)



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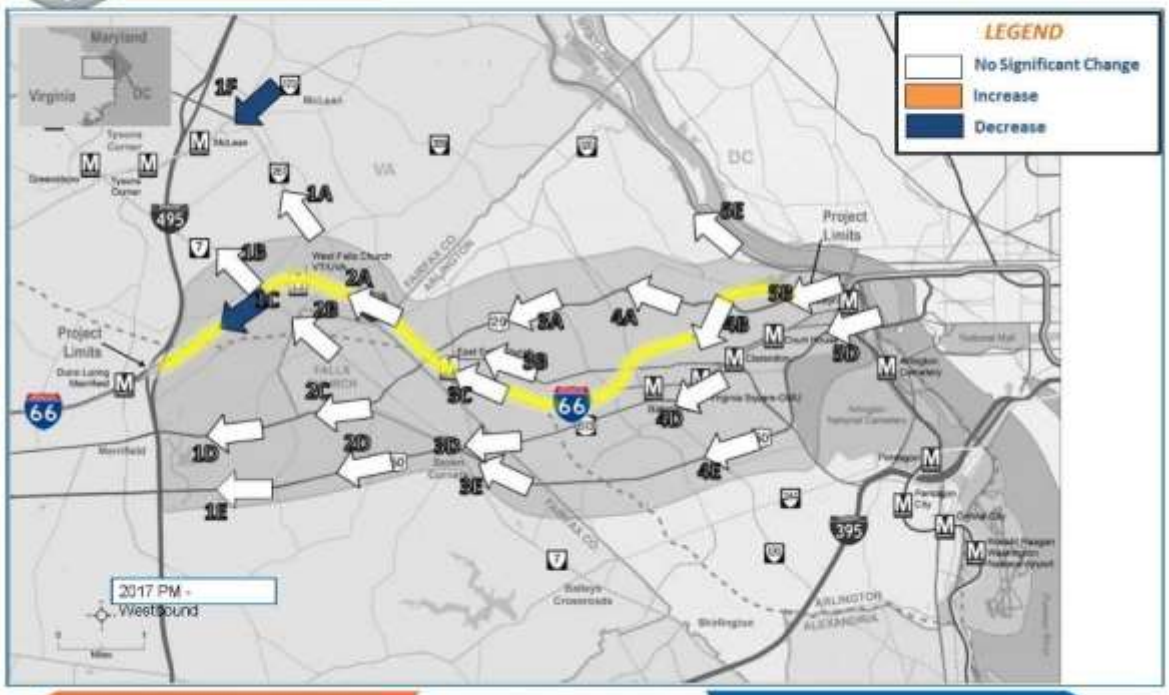
Traffic Volume Changes (> 200 VPH)

No-Build vs Build Relative Change
(2017 – Westbound PM Peak Hour)



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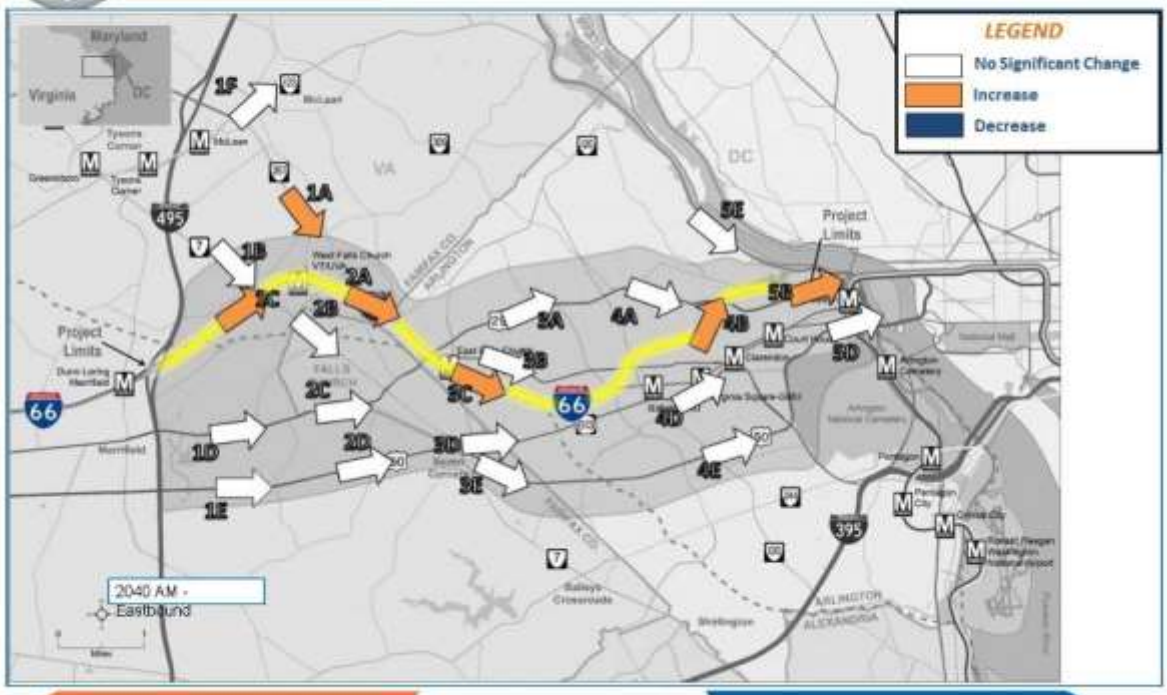
Traffic Volume Changes (> 200 VPH)

No-Build vs Build Relative Change
(2040 – Eastbound AM Peak Hour)



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Travel Time Comparisons

US 29 & US 50 (No-Build vs. Build)

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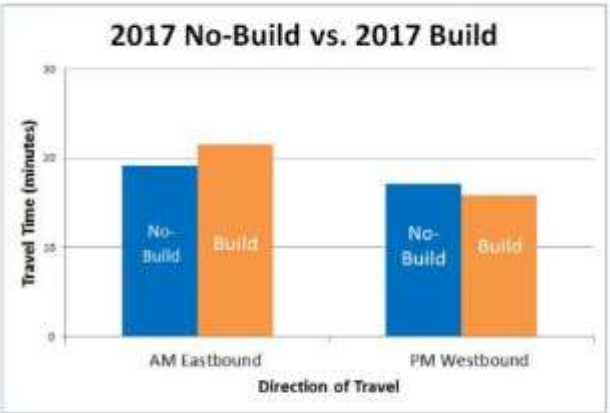
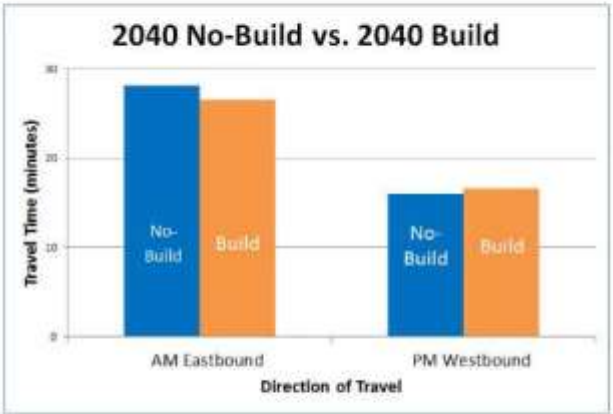
Minimal Impacts On Parallel Arterials

Travel Times
US 29 (No-Build vs. Build)
Between I-495 & North Glebe Road





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Minimal Impacts on Parallel Arterials

Travel Times
US 50 (No-Build vs. Build)
Between I-495 & Fillmore Street

Primary Findings

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- Decreased travel time variability and reduced recurring congestion on I-66 Eastbound AM and I-66 Westbound PM.
  - More consistent and reliable travel speeds during peak periods resulting from managed traffic
- 20-25% increase in total throughput through the corridor in 2040
  - No-Build scenario is HOV-3, with no lane additions.
  - Build Scenario includes Express tolling in peak direction and one additional lane in eastbound direction between the Dulles Connector and Fairfax Drive.
- Minimal impact on arterial network
  - Analysis at 59 signalized intersections shows limited number of intersections with significant changes
  - Modest changes in total travel time predicted for US 29 and US 50.

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Project Benefits

1. Reduces peak hour traffic flow on I-66
2. Increases efficiency of regional transportation network
3. Reduce variability of travel time on I-66
4. Enhance HOV travel during peak periods
5. Encourages more temporally balanced traffic demand on I-66 across the 4-hour peak periods
   - Eastbound AM / Westbound PM
6. Improves traffic operations and safety
7. Give commuters more travel options
8. Creates funding for multi-modal improvements

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Air Quality Overview

- Categorical Exclusion study underway (complete early March)
  - Proposed action under consideration is for tolling / associated infrastructure only

- The project falls within maintenance or non-attainment area(s) for Ozone, $PM_{2.5}$ and CO
  - Project is included in the most recent MWCOG regional conformity demonstration – Regional conformity requirements are met
  - CO and $PM_{2.5}$ conformity requirements currently apply

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Air Quality Overview

- NoVA is likely to be classified as attainment under the current PM and CO NAAQS
  - For the implementation of the 2012 $PM_{2.5}$ NAAQS, EPA proposed to revoke the 1997 $PM_{2.5}$ annual primary NAAQS
    - Related conformity requirements would no longer apply
  - CO maintenance plan is set to expire March 16, 2016
    - Related conformity requirements will no longer apply after that date (NEPA requirements remain)

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Air Quality Overview

VDOT Resource Document

- Developed to assist analyst in the selection of appropriate models, methods and assumptions/data for project-level air quality analyses
- Interagency Consultation for Conformity (IACC) of the document completed in December 2015
  - Consulted parties included FHWA, EPA and local agencies
  - As a result, IACC for this project need only refer to the Resource Document and its IACC, unless substantive changes are planned in models, methods and/or assumptions (which are not proposed for this project)
  - IACC still being undertaken for this project, in the interest of transparency/ an opportunity for discussion
- Resource Document (final version) posting on the VDOT website pending (imminent)
  - Draft previous circulated for IACC

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Air Quality Overview

- Draft Traffic Evaluation is complete (January, 2016)
- Analysis Years
  - Opening Year
    - 2017 (HOV-2 to Express Toll Lanes)
  - Design Year
    - 2040

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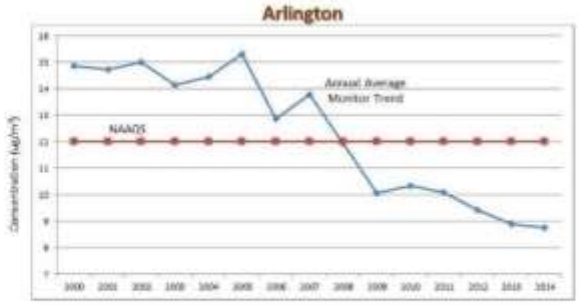
$PM_{2.5}$ Hot-Spot Overview

- Quantitative $PM_{2.5}$ considerations are a requirement under the Transportation Conformity Requirements of the Clean Air Act
- Project located in area that is in maintenance for 1997 Annual Primary $PM_{2.5}$ NAAQS (EPA proposal to revoke this NAAQS is pending finalization)
- Area already achieves the 1997, 2006 and 2012 $PM_{2.5}$ NAAQS



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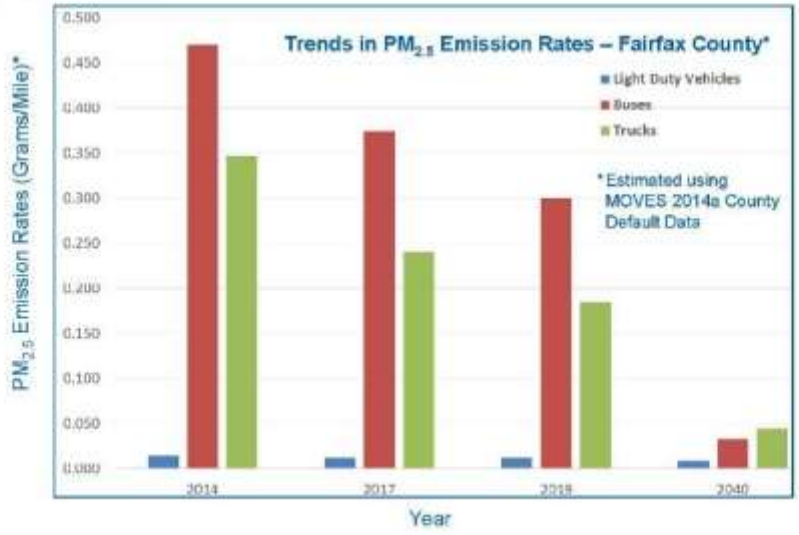
$PM_{2.5}$ Hot-Spot Overview

- While diesel trucks and buses have been a primary source of transportation-related $PM_{2.5}$, they are expected to be much cleaner in future years due to more stringent EPA vehicle exhaust and fuel quality standards



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Determining a Need for a Quantitative Analysis

- Consulting criteria in the VDOT Project-Level Air Quality Resource Document shows this not to be a project of "Air Quality Concern"

Assessment Level	Who Makes Decision?
LEVEL 1 Is the project exempt?	VDOT
LEVEL 2 Is the project clearly not of AQ concern?	VDOT (Using ICG-Reviewed Resource Document)
LEVEL 3 For projects that cannot be excluded in Level 1 or 2, is the project of AQ concern?	VDOT (Project-Specific Consultation)

Determination if Project is of "Air Quality Concern"

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Determining a Need for a Quantitative Analysis

- Project meets the criteria specified in the Resource Document to be considered one ***not*** of local air quality concern for $PM_{2.5}$
  - Existing Roadway with Diesel Truck Traffic Change (Build vs No-Build) <2,000 AADTT
  - Covers both arterials and freeways

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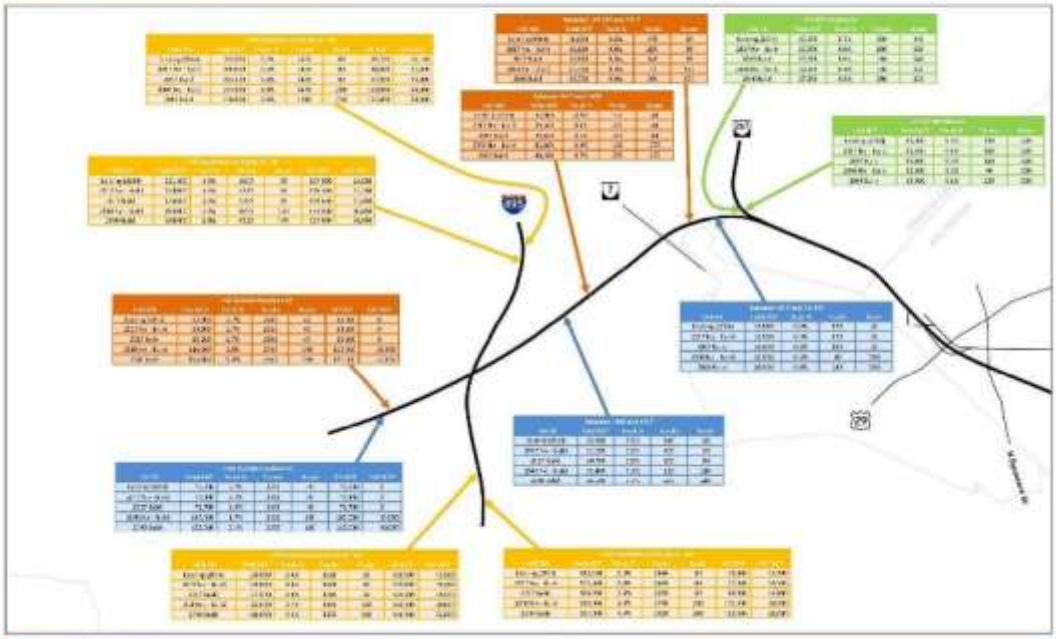
Average Daily Traffic Projections



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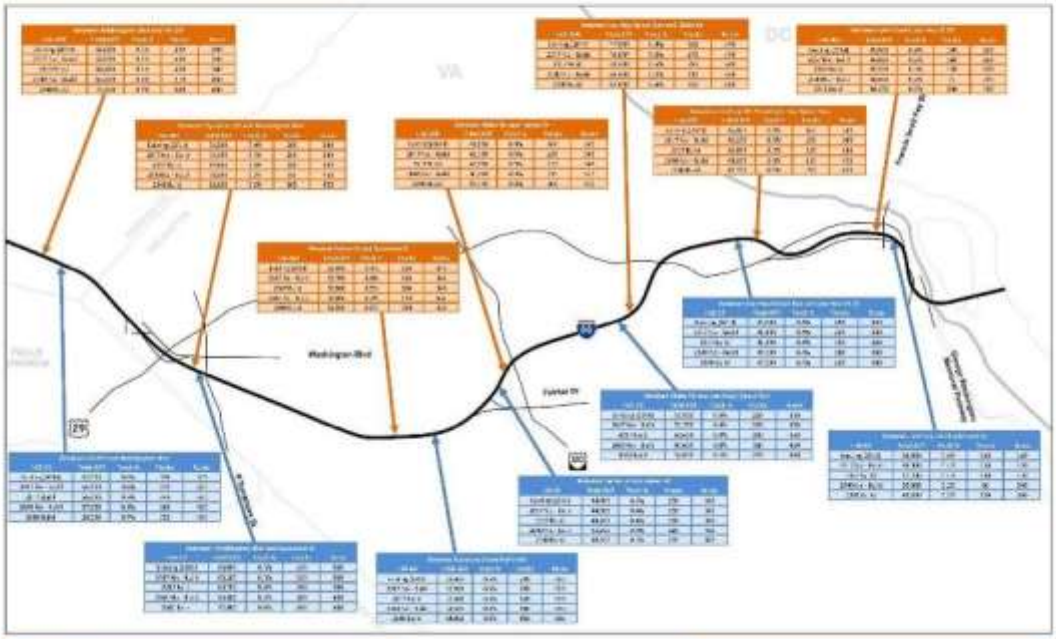
Average Daily Traffic Projections



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Determining a Need for a Quantitative Analysis

- Additional considerations:
  - I-66 is limited to 4-tire vehicles inside the Capital Beltway
  - Congestion limits traffic growth on parallel roads (including trucks)
    - Trucks avoid the area or shift travel times to avoid congestion
    - Network is at capacity – volume increases are constrained
  - Diesel Buses
    - No significant increase in buses due to the proposed action
      - » Additional Express service anticipated as part of the overall I-66 project
      - » Other transit projects would be subject to individual review
    - Proposed Action is limited to express tolls and related infrastructure

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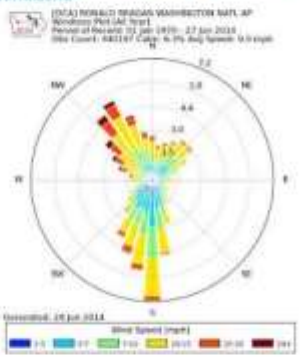
$PM_{2.5}$ Background Concentrations

-Monitors in DC and Maryland *not* representative of background concentrations in Virginia based on wind conditions



2011-2013 $PM_{2.5}$ Monitor Data				2011-2013 Three Year Average (µg/m³)
Site	Region	Site ID	County/City	Annual
2	NOVA	510130020	Arlington	9.4
7		510590030	Fairfax	8.8

Monitored data provided by VDEQ

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$PM_{2.5}$ Conclusions

- The project intent is to optimize throughput
- No new capacity for trucks.
- Trucks not permitted on I-66, prohibition will continue.
- Traffic Analysis/Modeling shows no significant changes in diesel traffic (truck or bus).
  - Both for freeway and arterial criteria
  - Existing facility, change in AADTT < 2,000
- Criteria provided in VDOT Project-Level Resource Document indicates this is ***not*** a project of air quality concern.
  - Both for freeway and arterial criteria

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$PM_{2.5}$ Conclusions

- Background $PM_{2.5}$ concentrations well below the NAAQS and decreasing.
- EPA has proposed to revoke the 1997 primary $PM_{2.5}$ NAAQS.
  - Conformity requirements would no longer apply

Weight of evidence shows this is not a project of local air quality concern for $PM_{2.5}$

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CO Evaluation

- Maintenance area for CO
  - Expires March 16th, 2016, after which project-level conformity requirements for CO no longer apply
- VDOT Project-Level Air Quality Resource Document
  - Inter-agency consultation for conformity completed December 2015
  - General approach for CO:
    - Screen with available FHWA Categorical Finding and Programmatic Agreement(s)
    - Otherwise model using FHWA/EPA worst-case analysis approach and specified modeling inputs
    - EPA conformity guidance approach for selecting intersections

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CO Evaluation

- Preliminary Assessment of Screening Options:
  - FHWA Categorical Finding - not applicable as criteria not met
  - FHWA-VDOT Programmatic Agreements
    - Intersections to be assessed against pending 2016 FHWA-VDOT Programmatic Agreement (if available in time)
- Worst-Case Screening (all locations)
- Inputs specified in the VDOT Resource Document
  - MOVES2014a
  - CAL3QHC Dispersion model (with files setup with FHWA CAL3i interface model)
  - NOVA-specific Background concentrations:
    - One hour: 1.6 ppm
    - Eight-hour: 1.4 ppm
  - NOVA-specific Persistence Factor:
    - 0.78

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CO Evaluation

- Intersections selected for CO analysis were based on EPA guidance*:
  - Started with the 59 intersections identified by the traffic team
  - PM peak hour used in selection process
  - Reviewed/ranked intersections using level of service, volume and total delay

*Guideline for Modeling Carbon Monoxide from Roadway Intersections (EPA-454/R-92-005)

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CO Evaluation

- I-495/I-66 interchange also being evaluated
  - One of highest volume interchanges in the Northern Virginia region
  - Affected by the project
  - Interchange was evaluated for I-66 Outside the Beltway

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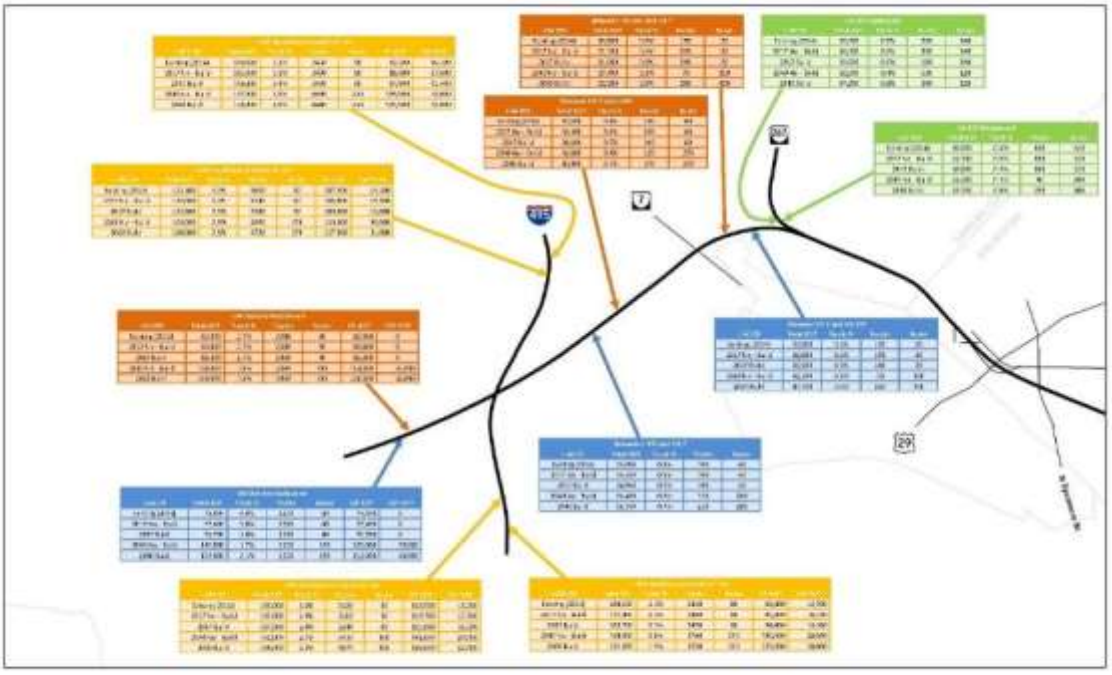
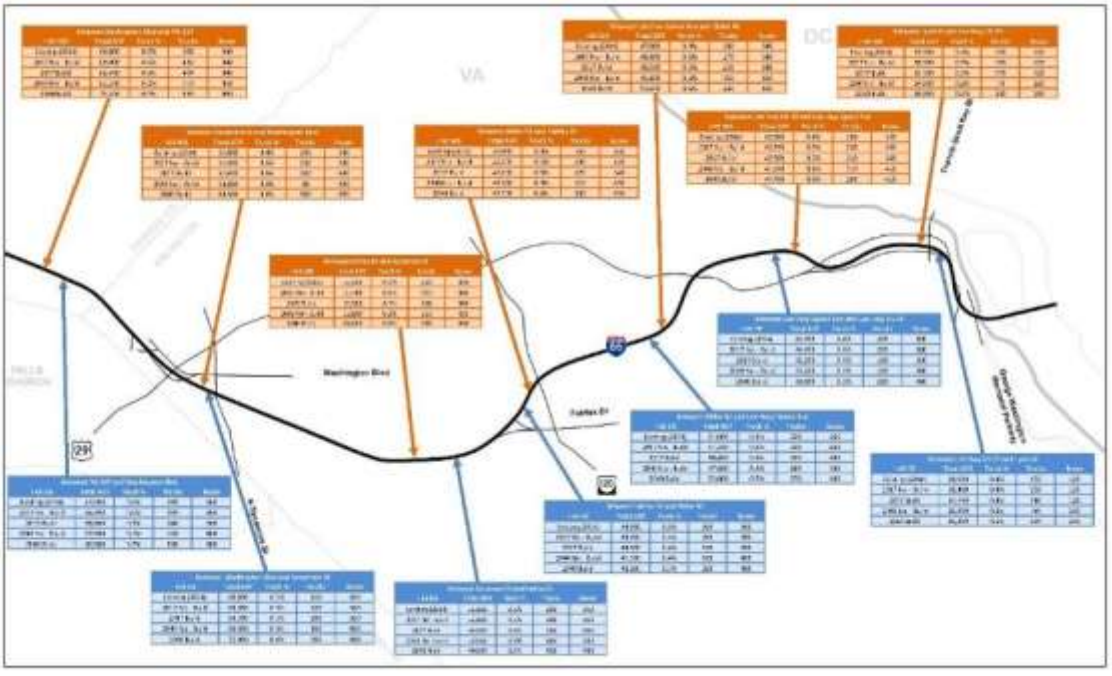
For More Information

Visit
Inside.Transform66.org





Appendix B: Memorandum on CO Background Concentration for Project-Level Air Quality Modeling

Michael Baker
INTERNATIONAL

MEMORANDUM

To: Jim Ponticello, Chris Voigt: VDOT Environmental Division

From: Dan Szekeres, Ying-Tzu Chung: Michael Baker Jr., Inc.

Date: February 8, 2016

Subject: CO and $PM_{2.5}$ Background Concentrations for Project-Level Air Quality Modeling
(For Jurisdictions Subject to Transportation Conformity Requirements in Northern Virginia)

Current background concentrations required for project-level air quality analyses for carbon monoxide (CO) and fine particulate matter ($PM_{2.5}$) are presented in this memorandum. Project-level analyses are conducted to meet the applicable requirements of the federal transportation conformity rule (40 CFR Parts 51 and 93) and apply for the following areas or jurisdictions in Virginia:

- Northern Virginia[1], i.e., the Virginia portion of the DC-MD-VA maintenance area for the 1997 annual $PM_{2.5}$ National Ambient Air Quality Standard (NAAQS).
- The City of Alexandria and the County of Arlington[2], which are in maintenance for the CO NAAQS.

Background concentrations as presented in this document are typically added to the modeled project contributions to generate estimates of the total concentration for each receptor location modeled. This memorandum and the data and default values it presents may be updated periodically by the Virginia Department of Transportation (VDOT) based on updated data and/or guidance as appropriate.

Role of Default Background Concentrations

In practice, background concentrations determined based on data from a limited number of ambient monitors apply for relatively broad geographical areas in which multiple transportation projects may be constructed or implemented over time. It is therefore more efficient and cost-effective to determine background concentrations that would apply for all projects located in the same general areas, and subject those "default" values to inter-agency consultation for conformity purposes as appropriate, rather than repeat the process separately for each individual project and area.

General Approach to Background Concentrations

The default values presented in this memorandum were determined following applicable federal and state requirements and guidance, and the analysis and results subjected to consultation with both VDOT and the

[1] The US EPA Green Book web page (http://www.epa.gov/airquality/greenbook/) currently lists the following jurisdictions in Virginia as part of the DC-MD-VA maintenance area for the 1997 annual $PM_{2.5}$ NAAQS: Alexandria, Arlington County, Fairfax, Fairfax County, Falls Church, Loudoun County, Manassas, Manassas Park, and Prince William County.

[2] The US EPA Green Book currently lists the following jurisdictions in Virginia as part of the DC-MD-VA maintenance area for the CO NAAQS: Alexandria, and Arlington County.

Virginia Department of Environmental Quality (DEQ). The results of the analysis as well as the methods and procedures are also addressed in the VDOT *Project-Level Air Quality Analysis Resource Document* as appropriate.

A design value is a statistic that describes the air quality status of a given location relative to the level of the NAAQS. Design values are defined to be consistent with the individual NAAQS and are typically used to designate and classify nonattainment areas, as well as to assess progress towards meeting the NAAQS. For the 1997 annual $PM_{2.5}$ NAAQS, design values are based on the 3-year average of annual mean mass concentrations for each eligible monitoring site. For the 1-hour and 8-hour CO NAAQS, design values are based on the 2nd maximum mass concentration for the most recent two years[3]. The design value formulations are used as a basis for determining background concentrations.

As an option to be applied at the discretion of the VDOT, alternative values for background concentrations may be determined on a project-specific basis following the general approach outlined in the *Resource Document*. Alternative values may also be determined following updates to EPA guidance and procedures (in consultation with DEQ) even if the updated data and procedures have not yet been incorporated into the Department *Resource Document*. Appropriate documentation of the underlying data and calculation would typically be provided with the analysis in those cases.

Monitor Locations and Design Values

This section summarizes the methodology for determining design values using the most recent three-years (2011-2013) of monitor data. DEQ is required by EPA to compile and submit summary information for each SLAMS (State and Local Air Monitoring Station) site that is operated in the state's ambient monitoring network. The Virginia Ambient Air Monitoring 2013 Data Report[4] contains the summary data compiled from monitoring stations and is the primary data source for the Virginia station design values provided in this memo. EPA's Air Data website is also a resource for monitor data to determine background concentrations. The data for CO and $PM_{2.5}$ can be downloaded from EPA's Air Data website (http://www.epa.gov/airdata/) and tabulated for areas in Virginia and nearby monitors in Washington D.C. and Maryland.

Figures 1 and 2 illustrate the monitor locations that have multiple years of monitor data available. These sites were used for the calculation of the background concentrations. **Tables 1a to 2b** summarize the monitor values for sites in Virginia, Washington D.C., and neighboring counties in Maryland. For CO, the highest second maximum values during the most recent two year period have been summarized in the tables. For $PM_{2.5}$, values are estimated by taking the 3-year average of the annual means, consistent with the design value.

All Virginia monitor design values were obtained from DEQ's Virginia Ambient Air Monitoring 2013 Data Report. Some discrepancies exist between DEQ's documented design values and those calculated from EPA's Air Data website as footnoted in the tables. These include differences due to rounding and locations that required a collocated monitor to address incomplete data. For the Arlington County $PM_{2.5}$ monitor site, incomplete data exists during 2011 due to extensive roof construction at the site. That site has a collocated $PM_{2.5}$ monitor that was used to replace the primary monitor data during the construction period.

[3] http://www.epa.gov/ttn/naaqs/aqmguide/collection/cp2/19900618_laxton_ozone_co_design_value_calcs.pdf
[4] The latest monitoring reports are available on DEQ's website: http://www.deq.virginia.gov/Programs/Air/AirMonitoring/Publications.aspx

Figure 1: Monitor Locations – Regional View

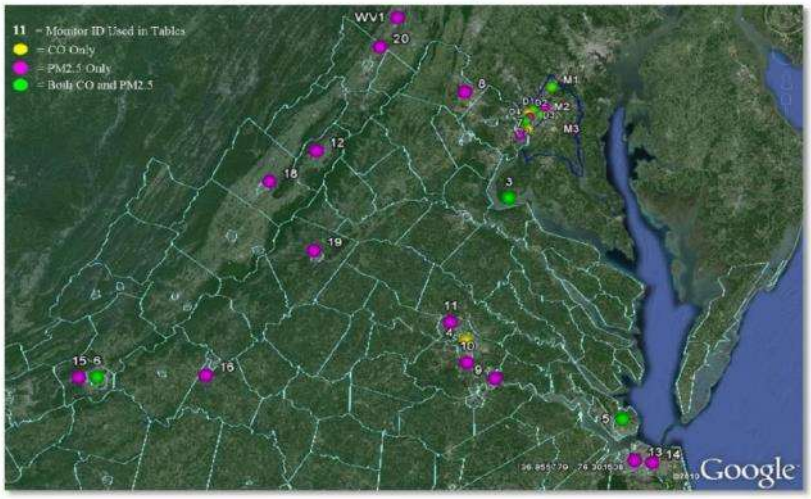


Figure 2: Monitor Locations – Northern Virginia

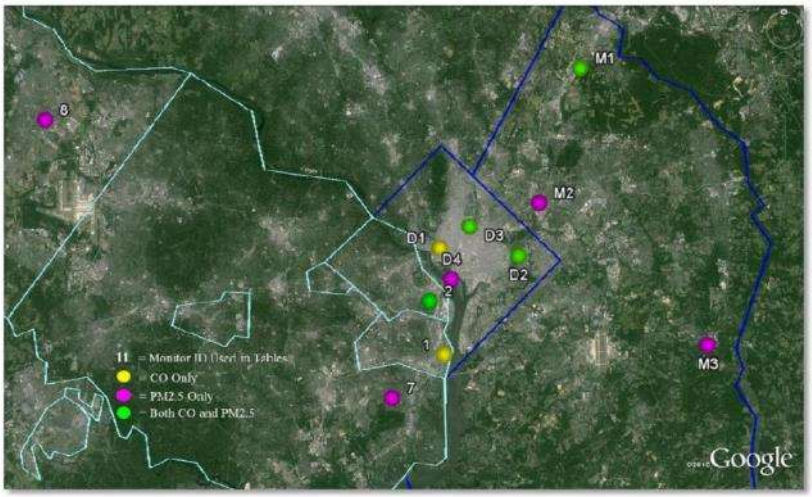


Table 1a: CO 2012-2013 Second Maximum Values for Virginia Monitors

2012-2013 CO Monitoring Data				2012-2013 Highest of Second Max (ppm)	
Site	Region	Site ID	County/City	1-Hour	8-Hour
1	NOVA	515100009* 515100021*	Alexandria City	1.4	1.0
2		510130020	Arlington	1.5	1.4
3	Richmond	510870014	Henrico	1.5	1.2
4		517600024** 517600025**	Richmond City	2.2	1.8
5	Hampton Roads	516500008	Hampton City	1.1	0.9
		517100024	Norfolk City	2.0	1.1
6	Roanoke	517700015	Roanoke City	1.5	1.2

* Site ID 515100009 (Alexandria City) was terminated in August 2012 and Site ID 515100021 was installed in August 2012 to serve as a special purpose monitor. Per DEQ email on November 22, 2013, this new site might not be representative of a background concentration due to its relative to the impact of the bus operations for DASH and the public schools. Thus, the 2012-2013 second max values from Site ID 515100021 were not used to determine 2012-2013 highest of second max for Alexandria City.

** Site ID 517600024 (Richmond City) was terminated in December 2012 and site ID 517600025 was installed in October 2013.

Table 1b: CO 2012-2013 Second Maximum Values for DC-MD Monitors

2012-2013 CO Monitoring Data				2012-2013 Highest of Second Max (ppm)	
Site	State	Site ID	County/City	1-Hour	8-Hour
D1	DC	110010023	District of Columbia	4.4	2.5
D2		110010041	District of Columbia	2.9	2.5
D3		110010043	District of Columbia	2.4	1.6
M1	MD	240330030	Prince George's	1.2	0.9

Table 2a: $PM_{2.5}$ Design Values for Virginia Monitors

2011-2013 PM2.5 Monitor Data				2011-2013 Three Year Average (µg/m3)
Site	Region	Site ID	County/City	Annual
2	NOVA	510130020	Arlington	9.4*
7		510590030	Fairfax	8.8**
8		511071005	Loudoun	8.9
9	Richmond	510360002	Charles	8.2
10		510410003	Chesterfield	8.0
3		510870014	Henrico	8.7
11		510870015	Henrico	8.3**
5	Hampton Roads	516500008	Hampton City	7.9**
13		517100024	Norfolk City	8.7**
14		518100008	Virginia Beach City	8.5
6	Roanoke	517700015	Roanoke City	9.2
15		517750011	Salem City	9.1
16	Other Areas	516000015	Lynchburg City	7.0
17		515200006	Bristol City	9.0
18		511650003	Rockingham	8.9
19		510030001	Albemarle	7.9**
20		510690010	Frederick	9.5
12		511390004	Page	8.1

** Collocated monitor site*

*** Rounding differences between DEQ Virginia Ambient Air Monitoring 2013 Data Report and EPA Air Data site*

Table 2b: $PM_{2.5}$ Design Values for DC-MD-WV Monitors

2011-2013 PM2.5 Monitor Data				2011-2013 Three Year Average (µg/m3)
Site	State	Site ID	County/City	Annual
D2	DC	110010041	District of Columbia	9.8
D4		110010042	District of Columbia	9.4
D3		110010043	District of Columbia	9.7
M2	MD	240330025	Prince George's	10.1
M1		240330030	Prince George's	8.3
M3		240338003	Prince George's	8.1
WV1	WV	540030003	Berkeley	10.7

Estimation of Default Background Concentrations

This section summarizes the default background concentrations for CO and $PM_{2.5}$ to be used for project-level conformity analyses in Northern Virginia. Per EPA's *Transportation Conformity Guidance for Quantitative Hot-Spot Analyses in $PM_{2.5}$ and PM_{10} Nonattainment and Maintenance Areas Transportation (EPA-420-B-13-053)*, the ambient monitoring data collected at nearby sites is appropriate for estimating background concentrations.

Carbon Monoxide (CO)

CO background concentrations for the City of Alexandria and the County of Arlington are needed to support project-level conformity analyses. The maximum design value in Northern Virginia over a two year period (shown in **Table 1a**) was selected to represent the background concentration for that region. **Table 3** summarizes the recommended default background concentrations.

Table 3: Default CO Background Concentrations for Northern Virginia

Region	Background Concentration (ppm)	
	2012-2013 Highest of Second Max	
	1-Hour	8-Hour
NOVA (Arlington County and Alexandria City)	1.6	1.4

According to EPA's technical guidance, monitors that are located in directions that are frequently upwind of a project are more likely to represent a project area's background concentration than monitors that are frequently downwind. Based on the 30-year average wind rose data obtained from the Automated Surface Observing System (ASOS), the annual average wind directions in Northern Virginia are primarily blowing from the south and northwest directions. Therefore, the D.C. and Maryland monitors, which are located north or northeast of Northern Virginia, are not considered to be representative of background concentrations in the region.

Fine Particulate Matter ($PM_{2.5}$)

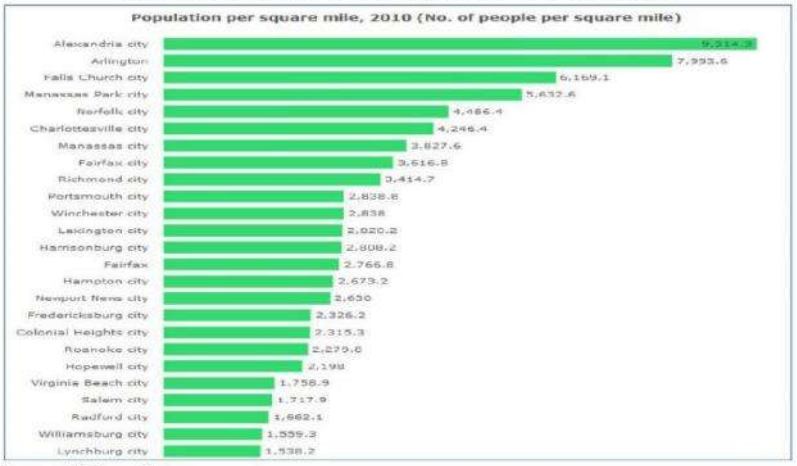
Background concentrations for $PM_{2.5}$ are needed to support project-level conformity analyses in Northern Virginia. **Table 4** summarizes the recommended default background concentrations for $PM_{2.5}$.

Table 4: Default $PM_{2.5}$ Background Concentrations for Northern Virginia

Region	Background Concentration (µg/m3)
	Annual
Arlington County & Alexandria City	9.4
Remaining Jurisdictions	8.9

A separate $PM_{2.5}$ background concentration is identified for the City of Alexandria and the County of Arlington due to the higher monitor reading at the Arlington site, higher land use density (as shown in **Figure 3**), and each county's proximity to Washington D.C. and its associated monitored values. The remaining counties in Northern Virginia use the Loudoun County monitor data, which is consistent with other monitor sites throughout the state.

Figure 3: 2010 Population Density– Top 25 Cities/Counties in Virginia



Source: U.S. Census Bureau
http://www.indexmundi.com/

According to EPA's technical guidance, monitors that are located in directions that are frequently upwind of a project are more likely to represent a project area's background concentration than monitors that are frequently downwind. Based on the 30-year average wind rose data obtained from the Automated Surface Observing System (ASOS), the annual average wind directions in Northern Virginia are primarily blowing from the south and northwest directions. Therefore, the D.C. and Maryland monitors, which are located north or northeast of Northern Virginia, are not considered to be representative of background concentrations in the region. As illustrated in **Figure 2**, the proximity of the Fairfax and Loudon County monitor locations are assumed to be representative of the region outside of Arlington and Alexandria City based on the primary wind directions.

Appendix C: Sample CAL3QHC Input/Output Files

INPUT - VA 123 & Lewinsville Rd - 2014

```
Q,EPA,,T,T,F,T
5,5,3,3,2200,2200,2200,2200,2200,2200,2200,2200,1230,1230,1230,1230,1230,1
230,1230,1230,12,12,12,12,10,10,10,10,0,0,-1200,1200,0,0,1200,-1200,-
1200,1200,0,0,1200,-
1200,0,0,0,0,0,0,0,0,0,0,2.6,7.1,4.3,5.1,16.7,16.7,16.7,16.7
120,120,120,120,68,68,68,68,2,2,2,2,1900,1900,1900,1900,1,1,1,1,3,3,3,3
'I-66 ITB 2014',60,108,0.0,0.0,28,0.3048,1,0
'N Leg, E Side-Corner',70.0,46.0,5.9
'N Leg, E Side - 25 m',70.0,118.0,5.9
'N Leg, E Side - 50 m',70.0,200.0,5.9
'N Leg, E Side-Midblk',70.0,636.0,5.9
'N Leg, W Side-Corner',-70.0,46.0,5.9
'N Leg, W Side - 25 m',-70.0,118.0,5.9
'N Leg, W Side - 50 m',-70.0,200.0,5.9
'N Leg, W Side-Midblk',-70.0,636.0,5.9
'S Leg, E Side-Corner',70.0,-46.0,5.9
'S Leg, E Side - 25 m',70.0,-118.0,5.9
'S Leg, E Side - 50 m',70.0,-200.0,5.9
'S Leg, E Side-Midblk',70.0,-636.0,5.9
'S Leg, W Side-Corner',-70.0,-46.0,5.9
'S Leg, W Side - 25 m',-70.0,-118.0,5.9
'S Leg, W Side - 50 m',-70.0,-200.0,5.9
'S Leg, W Side-Midblk',-70.0,-636.0,5.9
'E Leg, N Side - 25 m',142.0,46.0,5.9
'E Leg, N Side - 50 m',224.0,46.0,5.9
'E Leg, N Side-Midblk',660.0,46.0,5.9
'W Leg, N Side - 25 m',-142.0,46.0,5.9
'W Leg, N Side - 50 m',-224.0,46.0,5.9
'W Leg, N Side-Midblk',-660.0,46.0,5.9
'E Leg, S Side - 25 m',142.0,-46.0,5.9
'E Leg, S Side - 50 m',224.0,-46.0,5.9
'E Leg, S Side-Midblk',660.0,-46.0,5.9
'W Leg, S Side - 25 m',-142.0,-46.0,5.9
'W Leg, S Side - 50 m',-224.0,-46.0,5.9
'W Leg, S Side-Midblk',-660.0,-46.0,5.9
'Rte 123 & Lewinsville Road',12,1,0,'CO'
1
'N Leg App - FreeFlow','AG',-30,0,-30,1200,6150,7.1,0.0,79.7
2
'N Leg App - Queue','AG',-30,36,-30,1200,0.0,60.0,5
120,68,2,6150,16.7,1900,1,3
1
'N Leg Dep - FreeFlow','AG',30,0,30,1200,6150,2.6,0.0,79.7
1
'S Leg App - FreeFlow','AG',30,0,30,-1200,6150,2.6,0.0,79.7
2
'S Leg App - Queue','AG',30,-36,30,-1200,0.0,60.0,5
120,68,2,6150,16.7,1900,1,3
1
'S Leg Dep - FreeFlow','AG',-30,0,-30,-1200,6150,7.1,0.0,79.7
1
'E Leg App - FreeFlow','AG',0,18,1200,18,3690,5.1,0.0,55.7
```

```
2
'E Leg App - Queue','AG',60,18,1200,18,0.0,36.0,3
120,68,2,3690,16.7,1900,1,3
1
'E Leg Dep - FreeFlow','AG',0,-18,1200,-18,3690,4.3,0.0,55.7
1
'W Leg App - FreeFlow','AG',0,-18,-1200,-18,3690,4.3,0.0,55.7
2
'W Leg App - Queue','AG',-60,-18,-1200,-18,0.0,36.0,3
120,68,2,3690,16.7,1900,1,3
1
'W Leg Dep - FreeFlow','AG',0,18,-1200,18,3690,5.1,0.0,55.7
1.0,0,4,1000,0.0,'Y',10,1,36
```

OUTPUT - VA 123 & Lewinsville Rd - 2014

CAL3QHC: LINE SOURCE DISPERSION MODEL - VERSION 2.0 Dated 13045
PAGE 1

JOB: I-66 ITB 2014 RUN: Rte 123 & Lewinsville Road

DATE : 2/25/16
TIME : 16:54:16

The MODE flag has been set for calculating concentrations for POLLUTANT: CO

SITE & METEOROLOGICAL VARIABLES

VS = 0.0 CM/S VD = 0.0 CM/S Z0 = 108. CM
U = 1.0 M/S CLAS = 4 (D) ATIM = 60. MINUTES
MIXH = 1000. M AMB = 0.0 PPM

LINK VARIABLES

LINK DESCRIPTION	*	LINK COORDINATES (FT)				*	LENGTH	BRG	TYPE	VPH	EF	H	W	V/C	QUEUE
	*	X1	Y1	X2	Y2	*	(FT)	(DEG)		(G/MI)	(FT)	(FT)		(VEH)	
1. N Leg App - FreeFlow	*	-30.0	0.0	-30.0	1200.0	*	1200.	360.	AG	6150.	7.1	0.0	79.7		
2. N Leg App - Queue	*	-30.0	36.0	-30.0	5336.1	*	5300.	360.	AG	127.	100.0	0.0	60.0	1.62	269.2
3. N Leg Dep - FreeFlow	*	30.0	0.0	30.0	1200.0	*	1200.	360.	AG	6150.	2.6	0.0	79.7		
4. S Leg App - FreeFlow	*	30.0	0.0	30.0	-1200.0	*	1200.	180.	AG	6150.	2.6	0.0	79.7		
5. S Leg App - Queue	*	30.0	-36.0	30.0	-5336.1	*	5300.	180.	AG	127.	100.0	0.0	60.0	1.62	269.2
6. S Leg Dep - FreeFlow	*	-30.0	0.0	-30.0	-1200.0	*	1200.	180.	AG	6150.	7.1	0.0	79.7		
7. E Leg App - FreeFlow	*	0.0	18.0	1200.0	18.0	*	1200.	90.	AG	3690.	5.1	0.0	55.7		
8. E Leg App - Queue	*	60.0	18.0	5360.1	18.0	*	5300.	90.	AG	76.	100.0	0.0	36.0	1.62	269.2
9. E Leg Dep - FreeFlow	*	0.0	-18.0	1200.0	-18.0	*	1200.	90.	AG	3690.	4.3	0.0	55.7		
10. W Leg App - FreeFlow	*	0.0	-18.0	-1200.0	-18.0	*	1200.	270.	AG	3690.	4.3	0.0	55.7		
11. W Leg App - Queue	*	-60.0	-18.0	-5360.1	-18.0	*	5300.	270.	AG	76.	100.0	0.0	36.0	1.62	269.2
12. W Leg Dep - FreeFlow	*	0.0	18.0	-1200.0	18.0	*	1200.	270.	AG	3690.	5.1	0.0	55.7		

JOB: I-66 ITB 2014 RUN: Rte 123 & Lewinsville Road

DATE : 2/25/16
TIME : 16:54:16

ADDITIONAL QUEUE LINK PARAMETERS

LINK DESCRIPTION	*	CYCLE LENGTH (SEC)	RED TIME (SEC)	CLEARANCE LOST TIME (SEC)	APPROACH VOL (VPH)	SATURATION FLOW RATE (VPH)	IDLE EM FAC	SIGNAL TYPE	ARRIVAL RATE (gm/hr)
2. N Leg App - Queue	*	120	68	2.0	6150	1900	16.70	1	3
5. S Leg App - Queue	*	120	68	2.0	6150	1900	16.70	1	3
8. E Leg App - Queue	*	120	68	2.0	3690	1900	16.70	1	3
11. W Leg App - Queue	*	120	68	2.0	3690	1900	16.70	1	3

RECEPTOR LOCATIONS

RECEPTOR	*	COORDINATES (FT) X	Y	Z	*
1. N Leg, E Side-Corner	*	70.0	46.0	5.9	*
2. N Leg, E Side - 25 m	*	70.0	118.0	5.9	*
3. N Leg, E Side - 50 m	*	70.0	200.0	5.9	*
4. N Leg, E Side-Midblk	*	70.0	636.0	5.9	*
5. N Leg, W Side-Corner	*	-70.0	46.0	5.9	*
6. N Leg, W Side - 25 m	*	-70.0	118.0	5.9	*
7. N Leg, W Side - 50 m	*	-70.0	200.0	5.9	*
8. N Leg, W Side-Midblk	*	-70.0	636.0	5.9	*
9. S Leg, E Side-Corner	*	70.0	-46.0	5.9	*
10. S Leg, E Side - 25 m	*	70.0	-118.0	5.9	*
11. S Leg, E Side - 50 m	*	70.0	-200.0	5.9	*
12. S Leg, E Side-Midblk	*	70.0	-636.0	5.9	*
13. S Leg, W Side-Corner	*	-70.0	-46.0	5.9	*
14. S Leg, W Side - 25 m	*	-70.0	-118.0	5.9	*
15. S Leg, W Side - 50 m	*	-70.0	-200.0	5.9	*
16. S Leg, W Side-Midblk	*	-70.0	-636.0	5.9	*
17. E Leg, N Side - 25 m	*	142.0	46.0	5.9	*
18. E Leg, N Side - 50 m	*	224.0	46.0	5.9	*
19. E Leg, N Side-Midblk	*	660.0	46.0	5.9	*
20. W Leg, N Side - 25 m	*	-142.0	46.0	5.9	*
21. W Leg, N Side - 50 m	*	-224.0	46.0	5.9	*
22. W Leg, N Side-Midblk	*	-660.0	46.0	5.9	*

23. E Leg, S Side - 25 m *	142.0	-46.0	5.9	*
24. E Leg, S Side - 50 m *	224.0	-46.0	5.9	*
25. E Leg, S Side-Midblk *	660.0	-46.0	5.9	*
26. W Leg, S Side - 25 m *	-142.0	-46.0	5.9	*
27. W Leg, S Side - 50 m *	-224.0	-46.0	5.9	*
28. W Leg, S Side-Midblk *	-660.0	-46.0	5.9	*

JOB: I-66 ITB 2014 RUN: Rte 123 & Lewinsville Road

MODEL RESULTS

REMARKS : In search of the angle corresponding to the maximum concentration, only the first angle, of the angles with same maximum concentrations, is indicated as maximum.

WIND ANGLE RANGE: 10.-360.

WIND ANGLE (DEGR)	* CONCENTRATION (PPM) 1	2	3	4	5	6	7	8
9	10	11	12	13	14	15		
10.	* 0.5059	0.4957	0.4838	0.3936	3.1265	3.1061	3.0796	2.8292
1.4902	1.0957	0.9629	0.8568	4.0208	3.3913	3.1702		
20.	* 0.1618	0.1450	0.1430	0.1280	2.8706	2.8573	2.8497	2.7561
1.1130	0.6946	0.5384	0.3604	3.6226	3.0280	2.8217		
30.	* 0.1008	0.0643	0.0641	0.0631	2.5090	2.4852	2.4839	2.4652
1.0694	0.6288	0.4717	0.2520	3.2026	2.6683	2.5278		
40.	* 0.1045	0.0503	0.0503	0.0503	2.2551	2.2194	2.2193	2.2168
1.1211	0.6420	0.4659	0.2370	2.9813	2.4582	2.3632		
50.	* 0.1085	0.0438	0.0438	0.0438	2.0630	2.0077	2.0076	2.0076
1.2304	0.6783	0.4852	0.2220	2.8982	2.3512	2.2553		
60.	* 0.1229	0.0318	0.0315	0.0315	1.9420	1.8446	1.8443	1.8443
1.3668	0.7083	0.4941	0.1598	2.8895	2.3041	2.1505		
70.	* 0.2453	0.0251	0.0172	0.0156	1.9747	1.7553	1.7468	1.7450
1.5278	0.7232	0.4684	0.0833	3.0326	2.2994	2.0659		
80.	* 0.7042	0.0943	0.0280	0.0021	2.4396	1.8719	1.8018	1.7724
1.6259	0.6206	0.3345	0.0345	3.1867	2.2709	1.9901		
90.	* 1.4945	0.3670	0.1517	0.0114	3.2599	2.2897	2.0686	1.9125
1.2482	0.3314	0.1381	0.0101	2.9505	2.1005	1.9016		
100.	* 1.8967	0.6647	0.3531	0.0368	3.4288	2.4528	2.1455	1.8112
0.5618	0.0804	0.0238	0.0019	2.1955	1.7225	1.6621		
110.	* 1.7556	0.7623	0.4849	0.0857	3.1866	2.4639	2.2084	1.8306
0.1947	0.0231	0.0168	0.0156	1.8052	1.6222	1.6154		
120.	* 1.5520	0.7418	0.5075	0.1616	3.0171	2.5000	2.3167	1.9948
0.1067	0.0326	0.0324	0.0324	1.7796	1.6918	1.6916		
130.	* 1.3864	0.7048	0.4933	0.2194	3.0289	2.6207	2.4562	2.1920
0.1027	0.0487	0.0487	0.0487	1.8809	1.8297	1.8297		
140.	* 1.2594	0.6645	0.4708	0.2317	3.0906	2.8021	2.6168	2.4021
0.1030	0.0574	0.0574	0.0573	2.0551	2.0244	2.0243		
150.	* 1.1925	0.6514	0.4757	0.2431	3.2355	3.0411	2.8690	2.6675
0.1066	0.0758	0.0756	0.0746	2.2767	2.2585	2.2571		
160.	* 1.2503	0.7352	0.5444	0.3302	3.5395	3.3362	3.2186	3.0688
0.2017	0.1873	0.1854	0.1703	2.5871	2.5763	2.5687		

170.	*	1.7180	1.1863	0.9800	0.7568	3.8003	3.5132	3.4660	3.4174	0.6495	0.6394	0.6274	0.5370	2.7955	2.7752	2.7487
180.	*	2.6841	2.0377	1.8216	1.6391	3.2737	2.8410	2.7672	2.7627	1.5951	1.5698	1.5389	1.2976	2.1791	2.1518	2.1193
190.	*	3.1521	2.5190	2.2967	2.1845	2.0135	1.6012	1.4645	1.3603	2.2499	2.2271	2.1982	1.9279	0.9981	0.9858	0.9711
200.	*	2.9616	2.3368	2.1671	2.1041	1.3134	0.9047	0.7507	0.5714	2.2119	2.1942	2.1850	2.0658	0.3672	0.3523	0.3496
210.	*	2.6759	2.1182	2.0186	1.9204	1.1627	0.7395	0.5850	0.3624	1.9977	1.9712	1.9694	1.9426	0.2047	0.1739	0.1736
220.	*	2.5187	2.0347	1.9415	1.7791	1.1958	0.7356	0.5571	0.3245	1.8302	1.7935	1.7933	1.7891	0.1831	0.1374	0.1373
230.	*	2.4780	2.0301	1.9074	1.6428	1.3053	0.7638	0.5650	0.2988	1.6858	1.6381	1.6380	1.6378	0.1744	0.1197	0.1197
240.	*	2.5779	2.0526	1.8732	1.5523	1.4589	0.7737	0.5532	0.2156	1.6337	1.5562	1.5559	1.5559	0.1640	0.0863	0.0861
250.	*	2.7915	2.0606	1.8160	1.4428	1.6105	0.7629	0.5011	0.1110	1.6858	1.4998	1.4918	1.4900	0.2457	0.0516	0.0441
260.	*	2.9776	1.9929	1.7048	1.3861	1.7217	0.6368	0.3424	0.0365	2.0832	1.5807	1.5134	1.4848	0.6462	0.0927	0.0291
270.	*	2.6924	1.7551	1.5494	1.4023	1.3462	0.3419	0.1414	0.0101	2.8061	1.9231	1.7091	1.5566	1.3973	0.3565	0.1484
280.	*	1.9593	1.4386	1.3753	1.3493	0.6234	0.0857	0.0263	0.0037	3.0272	2.1460	1.8480	1.5234	1.8010	0.6521	0.3488
290.	*	1.5680	1.3677	1.3604	1.3589	0.2483	0.0506	0.0438	0.0426	2.7966	2.2008	1.9475	1.5747	1.6957	0.7765	0.5062
300.	*	1.4966	1.4035	1.4032	1.4032	0.1747	0.0872	0.0869	0.0869	2.5893	2.2283	2.0304	1.7053	1.5353	0.7855	0.5575
310.	*	1.5236	1.4601	1.4600	1.4599	0.1887	0.1245	0.1245	0.1245	2.5177	2.2807	2.1005	1.8215	1.3726	0.7709	0.5652
320.	*	1.6471	1.5985	1.5983	1.5942	0.1985	0.1444	0.1444	0.1444	2.5579	2.3602	2.1873	1.9757	1.2583	0.7426	0.5537
330.	*	1.7768	1.7444	1.7426	1.7158	0.2219	0.1854	0.1851	0.1830	2.6564	2.4721	2.3523	2.1545	1.2279	0.7452	0.5818
340.	*	1.9334	1.9132	1.9040	1.7847	0.4120	0.3946	0.3919	0.3679	2.8292	2.6254	2.5570	2.4135	1.4000	0.9256	0.7503
350.	*	1.9191	1.8962	1.8673	1.5968	1.1418	1.1295	1.1148	0.9934	2.8732	2.6241	2.5851	2.5503	2.1839	1.6743	1.4743
360.	*	1.3145	1.2890	1.2583	1.0170	2.4598	2.4327	2.3999	2.1330	2.3499	1.9638	1.8948	1.8916	3.5372	2.8982	2.6870
------	*	----------	----------	----------	----------	----------	----------	----------	----------	----------	----------	----------	----------	----------	----------	----------
MAX	*	3.1521	2.5190	2.2967	2.1845	3.8003	3.5132	3.4660	3.4174	3.0272	2.6254	2.5851	2.5503	4.0208	3.3913	3.1702
DEGR.	*	190	190	190	190	170	170	170	170	280	340	350	350	10	10	10

JOB: I-66 ITB 2014 RUN: Rte 123 & Lewinsville Road

MODEL RESULTS

REMARKS : In search of the angle corresponding to the maximum concentration, only the first angle, of the angles with same maximum concentrations, is indicated as maximum.

WIND ANGLE RANGE: 10.-360.

WIND ANGLE (DEGR)	* CONCENTRATION (PPM) 16	17	18	19	20	21	22	23	24	25	26	27	28
10.	* 3.0507	0.0912	0.0289	0.0018	1.1494	0.6150	0.0636	1.0845	1.0186	0.9887	2.2365	1.7060	1.1311
20.	* 2.7582	0.0232	0.0170	0.0156	1.3260	0.8474	0.1415	0.9954	0.9888	0.9873	2.3729	1.9108	1.2104
30.	* 2.4323	0.0366	0.0365	0.0364	1.2887	0.8872	0.2736	1.0312	1.0310	1.0310	2.3559	1.9752	1.3829
40.	* 2.2046	0.0542	0.0542	0.0542	1.2250	0.8630	0.3726	1.0997	1.0997	1.0995	2.3192	2.0027	1.5313
50.	* 2.0117	0.0647	0.0647	0.0647	1.1440	0.8316	0.3933	1.2127	1.2127	1.2118	2.2843	2.0751	1.6544
60.	* 1.8396	0.0913	0.0911	0.0899	1.1532	0.8191	0.4154	1.3445	1.3438	1.3347	2.3625	2.1690	1.8035
70.	* 1.6969	0.2283	0.2266	0.2117	1.2659	0.9008	0.5355	1.5182	1.5140	1.4627	2.5272	2.3066	2.0142
80.	* 1.6735	0.6960	0.6870	0.6107	1.6809	1.3619	0.9797	1.6144	1.5996	1.4566	2.6427	2.4393	2.1714
90.	* 1.7582	1.4811	1.4620	1.3012	2.3670	2.0625	1.7431	1.2342	1.2153	1.0559	2.2592	2.0400	1.7872
100.	* 1.6369	1.8853	1.8707	1.7295	2.6390	2.3587	2.0782	0.5538	0.5450	0.4710	1.5632	1.3034	0.9844
110.	* 1.6139	1.7460	1.7419	1.6922	2.4232	2.1816	1.9177	0.1778	0.1762	0.1620	1.1822	0.8609	0.5246
120.	* 1.6916	1.5298	1.5292	1.5205	2.2459	2.0571	1.7221	0.0742	0.0740	0.0729	1.0951	0.7848	0.4015
130.	* 1.8296	1.3695	1.3695	1.3687	2.1741	1.9812	1.5831	0.0541	0.0541	0.0540	1.0897	0.7972	0.3807
140.	* 2.0218	1.2393	1.2393	1.2390	2.2109	1.9156	1.4637	0.0456	0.0456	0.0456	1.1632	0.8305	0.3604
150.	* 2.2384	1.1509	1.1506	1.1506	2.2460	1.8862	1.3170	0.0310	0.0308	0.0307	1.2243	0.8552	0.2637
160.	* 2.4751	1.1035	1.0946	1.0923	2.2622	1.8280	1.1511	0.0239	0.0153	0.0132	1.2589	0.8159	0.1341

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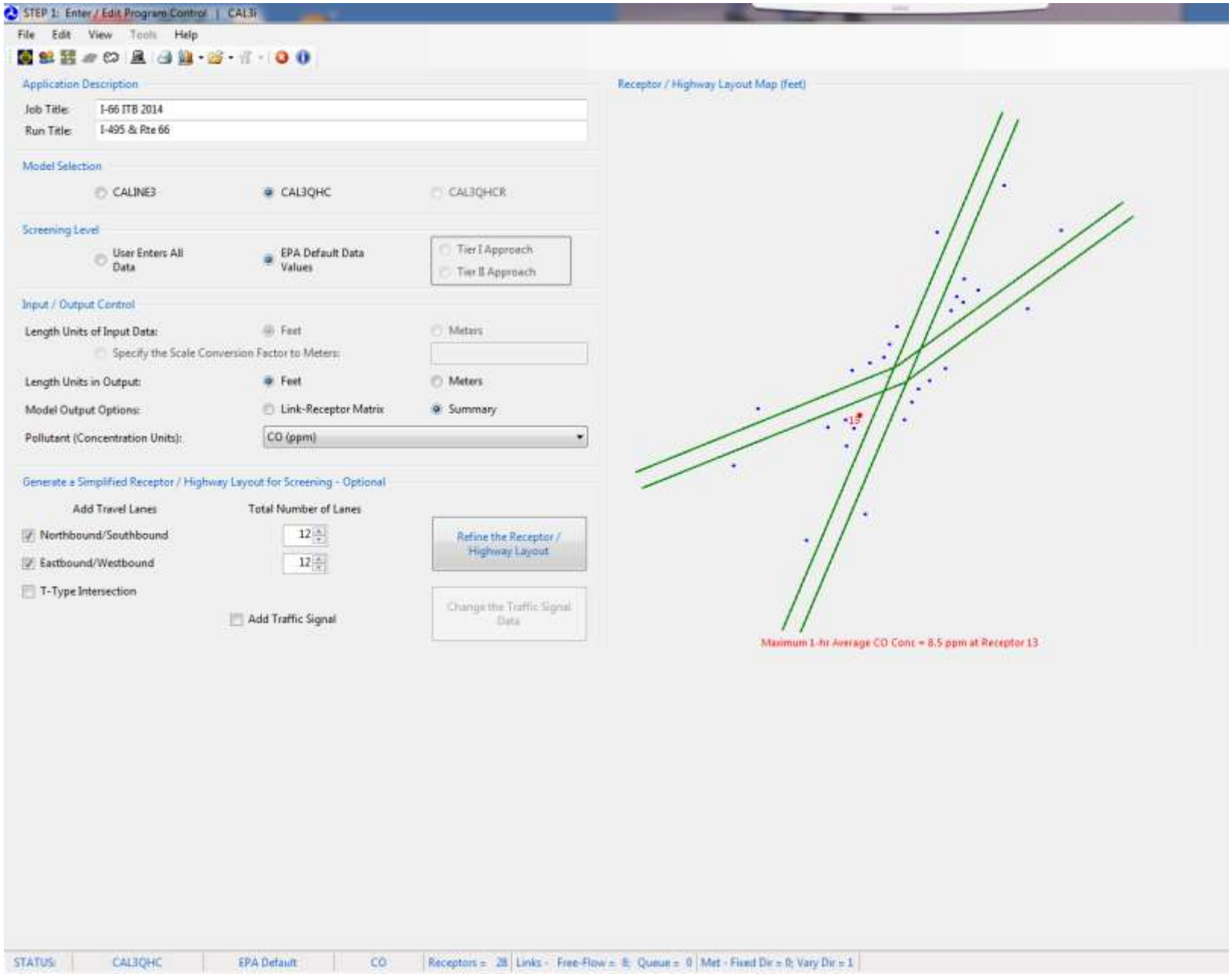
 170.  *  2.4981  1.2128  1.1321  1.0941  2.1163  1.6256  1.0775  0.1146
0.0374  0.0022  1.0768  0.5817  0.0573
 180.  *  1.8524  1.6656  1.3833  1.1709  1.6515  1.3175  1.0832  0.4914
0.2163  0.0194  0.5602  0.2324  0.0159
 190.  *  0.8499  2.0763  1.6483  1.1570  1.1546  1.0564  1.0175  0.9591
0.5287  0.0615  0.1308  0.0369  0.0017
 200.  *  0.3256  2.2295  1.8555  1.2229  1.0261  1.0147  1.0126  1.1552
0.7623  0.1281  0.0259  0.0151  0.0132
 210.  *  0.1715  2.2474  1.9396  1.3933  1.0603  1.0599  1.0599  1.1437
0.8160  0.2492  0.0311  0.0308  0.0307
 220.  *  0.1373  2.2437  1.9824  1.5564  1.1376  1.1376  1.1374  1.0910
0.7962  0.3500  0.0458  0.0458  0.0457
 230.  *  0.1197  2.2342  2.0653  1.6883  1.2571  1.2570  1.2562  1.0243
0.7664  0.3725  0.0546  0.0546  0.0546
 240.  *  0.0861  2.2984  2.1799  1.8499  1.3989  1.3983  1.3897  1.0133
0.7605  0.3940  0.0778  0.0777  0.0766
 250.  *  0.0426  2.4669  2.3246  2.0769  1.5895  1.5854  1.5358  1.1120
0.8195  0.5008  0.2018  0.2001  0.1860
 260.  *  0.0039  2.6251  2.4800  2.2589  1.7103  1.6956  1.5544  1.5137
1.2479  0.9117  0.6363  0.6275  0.5535
 270.  *  0.0114  2.2473  2.0872  1.8768  1.3315  1.3125  1.1518  2.1596
1.9144  1.6376  1.3838  1.3648  1.2054
 280.  *  0.0385  1.5164  1.3100  1.0376  0.6135  0.6045  0.5282  2.4295
2.2085  1.9758  1.7895  1.7746  1.6317
 290.  *  0.1119  1.0816  0.8325  0.5435  0.2043  0.2026  0.1878  2.2207
2.0577  1.8390  1.6747  1.6705  1.6192
 300.  *  0.2149  0.9821  0.7527  0.4070  0.0876  0.0875  0.0863  2.0732
1.9613  1.6597  1.4753  1.4747  1.4655
 310.  *  0.2943  0.9902  0.7520  0.3800  0.0641  0.0641  0.0641  2.0356
1.8837  1.5282  1.3252  1.3251  1.3242
 320.  *  0.3183  1.0461  0.7806  0.3548  0.0541  0.0541  0.0541  2.0632
1.8190  1.4130  1.2014  1.2014  1.2011
 330.  *  0.3523  1.0908  0.7954  0.2508  0.0369  0.0365  0.0364  2.0810
1.7925  1.2695  1.1222  1.1217  1.1217
 340.  *  0.5401  1.0931  0.7356  0.1256  0.0315  0.0183  0.0156  2.0680
1.7222  1.1130  1.0836  1.0699  1.0670
 350.  *  1.2593  0.8867  0.4956  0.0554  0.1544  0.0456  0.0023  1.8976
1.5100  1.0460  1.2254  1.1124  1.0653
 360.  *  2.5093  0.4305  0.1891  0.0159  0.6213  0.2600  0.0195  1.4837
1.2356  1.0469  1.7614  1.3934  1.1349
 ------*-------------------------------------------------------------------
-------------------------------------
 MAX   *  3.0507  2.6251  2.4800  2.2589  2.6390  2.3587  2.0782  2.4295
2.2085  1.9758  2.6427  2.4393  2.1714
 DEGR. *     10     260     260     260     100     100     100     280
280     280      80      80      80

 THE HIGHEST CONCENTRATION OF   4.0208 PPM OCCURRED AT RECEPTOR    13.
```

Appendix D: CO Modeling Layout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Run Title: I-495 & Rte 66
Model Selection
CALINE3 CAL3QHC CAL3QHCR
Screening Level
User Enters All Data
EPA Default Data Values
Tier I Approach
Tier II Approach
Input / Output Control
Length Units of Input Data: Feet Meters
Specify the Scale Conversion Factor to Meters:
Length Units in Output: Feet Meters
Model Output Options: Link-Receptor Matrix Summary
Pollutant (Concentration Units): CO (ppm)
Generate a Simplified Receptor / Highway Layout for Screening - Optional
Add Travel Lanes
Total Number of Lanes
Northbound/Southbound 12
Eastbound/Westbound 12
T-Type Intersection
Add Traffic Signal
Refine the Receptor / Highway Layout
Change the Traffic Signal Data
Receptor / Highway Layout Map (Feet)
Maximum 1-hr Average CO Conc = 8.5 ppm at Receptor 13
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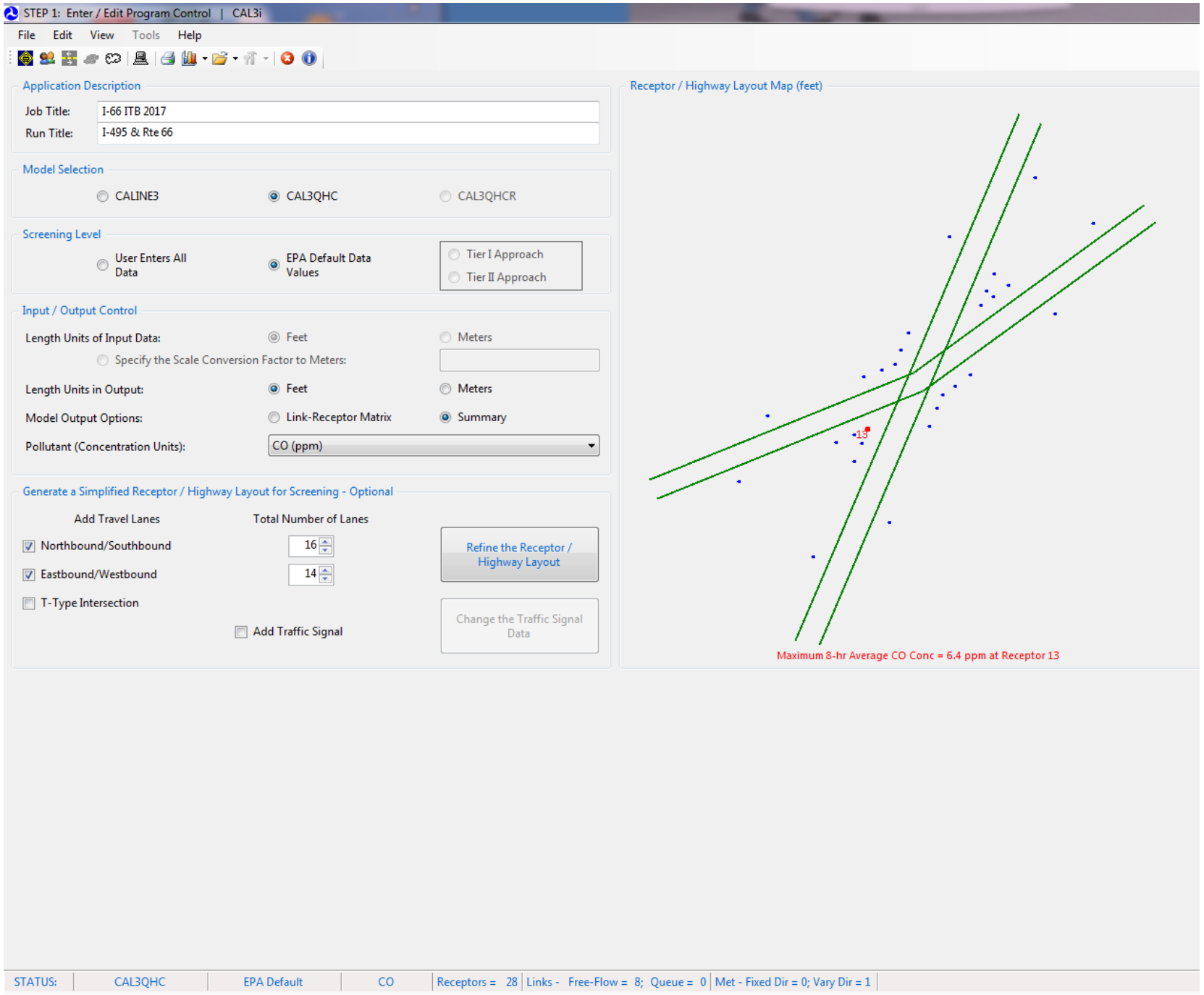
STEP 1: Enter / Edit Program Control | CAL3i
File Edit View Tools Help
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Run Title: I-495 & Rte 66
Model Selection
CALINE3 CAL3QHC CAL3QHCR
Screening Level
User Enters All Data
EPA Default Data Values
Tier I Approach
Tier II Approach
Input / Output Control
Length Units of Input Data: Feet Meters
Specify the Scale Conversion Factor to Meters:
Length Units in Output: Feet Meters
Model Output Options: Link-Receptor Matrix Summary
Pollutant (Concentration Units): CO (ppm)
Generate a Simplified Receptor / Highway Layout for Screening - Optional
Add Travel Lanes
Total Number of Lanes
Northbound/Southbound 16
Eastbound/Westbound 14
T-Type Intersection
Add Traffic Signal
Refine the Receptor / Highway Layout
Change the Traffic Signal Data
Receptor / Highway Layout Map (feet)
13
Maximum 8-hr Average CO Conc = 6.4 ppm at Receptor 13
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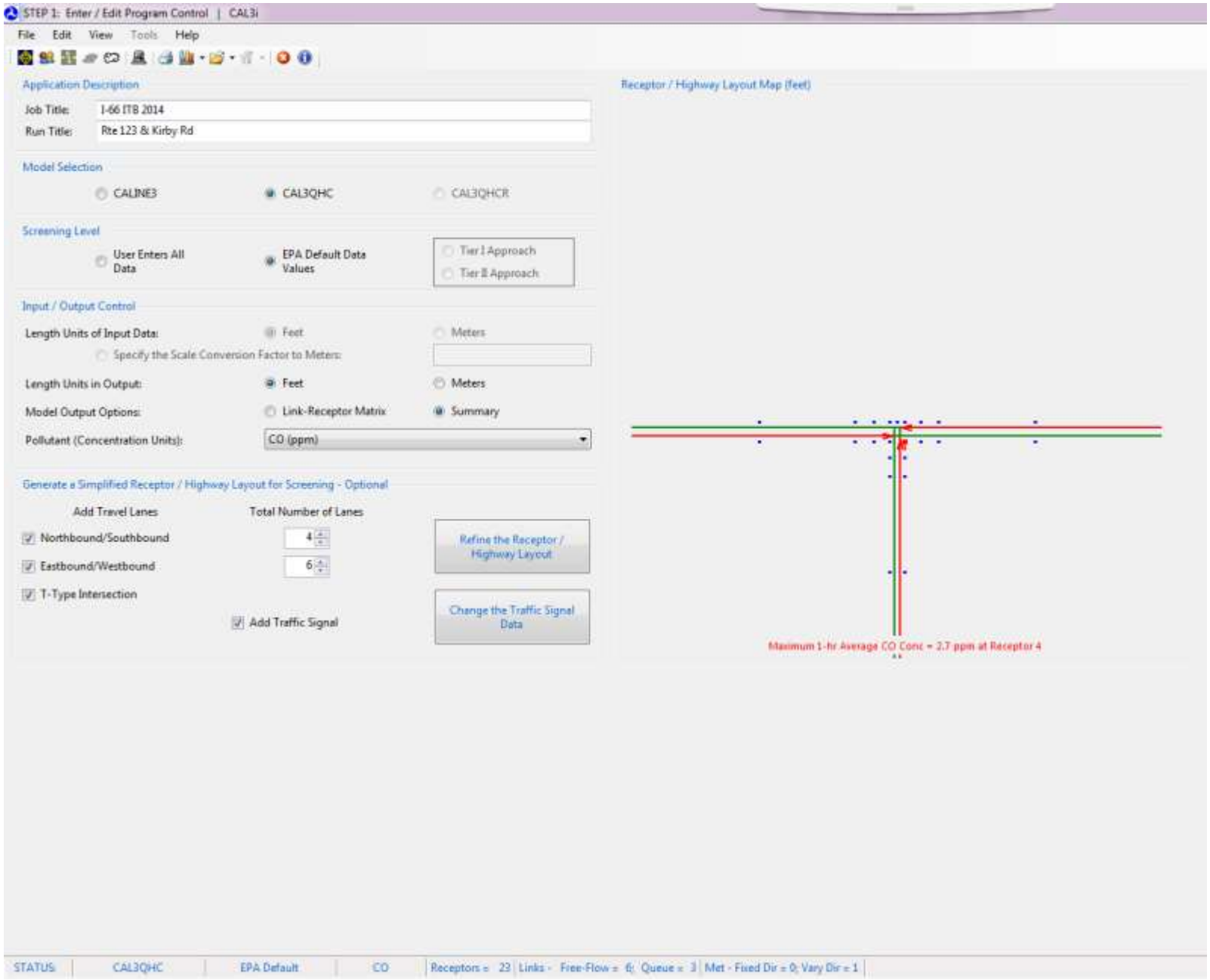

STEP 1: Enter / Edit Program Control | CAL3i
File Edit View Tools Help
Application Description
Job Title: I-66 ITB 2014
Run Title: Rte 123 & Kirby Rd
Model Selection
CALINE3
CAL3QHC
CAL3QHCR
Screening Level
User Enters All Data
EPA Default Data Values
Tier I Approach
Tier II Approach
Input / Output Control
Length Units of Input Data:
Feet
Meters
Specify the Scale Conversion Factor to Meters:
Length Units in Output:
Feet
Meters
Model Output Options:
Link-Receptor Matrix
Summary
Pollutant (Concentration Units):
CO (ppm)
Generate a Simplified Receptor / Highway Layout for Screening - Optional
Add Travel Lanes
Total Number of Lanes
Northbound/Southbound
4
Eastbound/Westbound
6
T-Type Intersection
Add Traffic Signal
Refine the Receptor / Highway Layout
Change the Traffic Signal Data
Receptor / Highway Layout Map (feet)
Maximum 1-hr Average CO Conc = 2.7 ppm at Receptor 4
STATUS
CAL3QHC
EPA Default
CO
Receptors = 23
Links - Free-Flow = 6; Queue = 3
Met - Fixed Dir = 0; Vary Dir = 1

STEP 1: Enter / Edit Program Control | CAL3i

File Edit View Tools Help

Application Description

Job Title: I-66 ITB 2014

Run Title: Rte 123 & Lewinsville Road

Model Selection

○ CALINE3 ◉ CAL3QHC ○ CAL3QHCR

Screening Level

○ User Enters All Data ◉ EPA Default Data Values

○ Tier I Approach ○ Tier II Approach

Input / Output Control

Length Units of Input Data: ◉ Feet ○ Meters

○ Specify the Scale Conversion Factor to Meters:

Length Units in Output: ◉ Feet ○ Meters

Model Output Options: ○ Link-Receptor Matrix ◉ Summary

Pollutant (Concentration Units): CO (ppm)

Generate a Simplified Receptor / Highway Layout for Screening - Optional

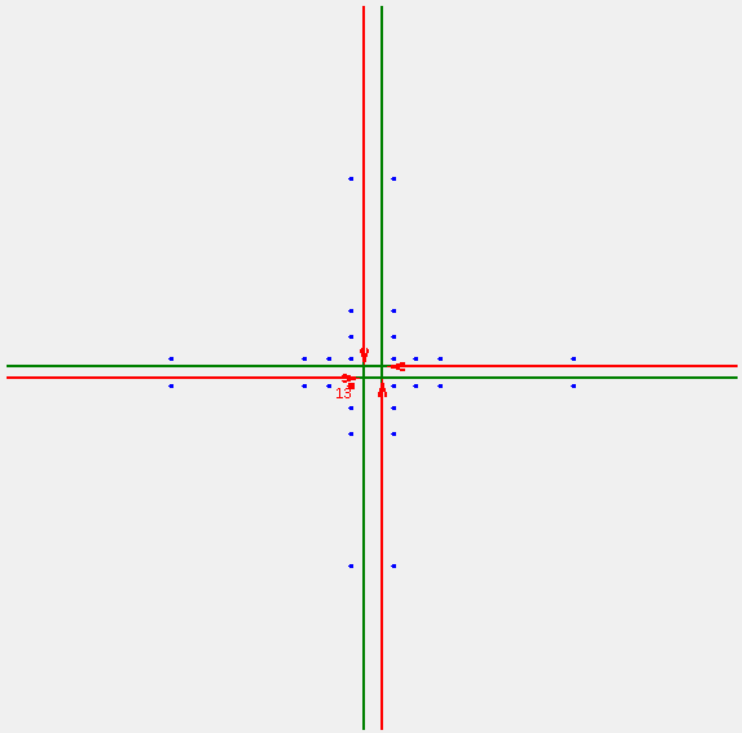
Add Travel Lanes	Total Number of Lanes
☑ Northbound/Southbound	10
☑ Eastbound/Westbound	6
☐ T-Type Intersection	

Refine the Receptor / Highway Layout

☑ Add Traffic Signal

Change the Traffic Signal Data

Receptor / Highway Layout Map (feet)



Maximum 1-hr Average CO Conc = 3.9 ppm at Receptor 13

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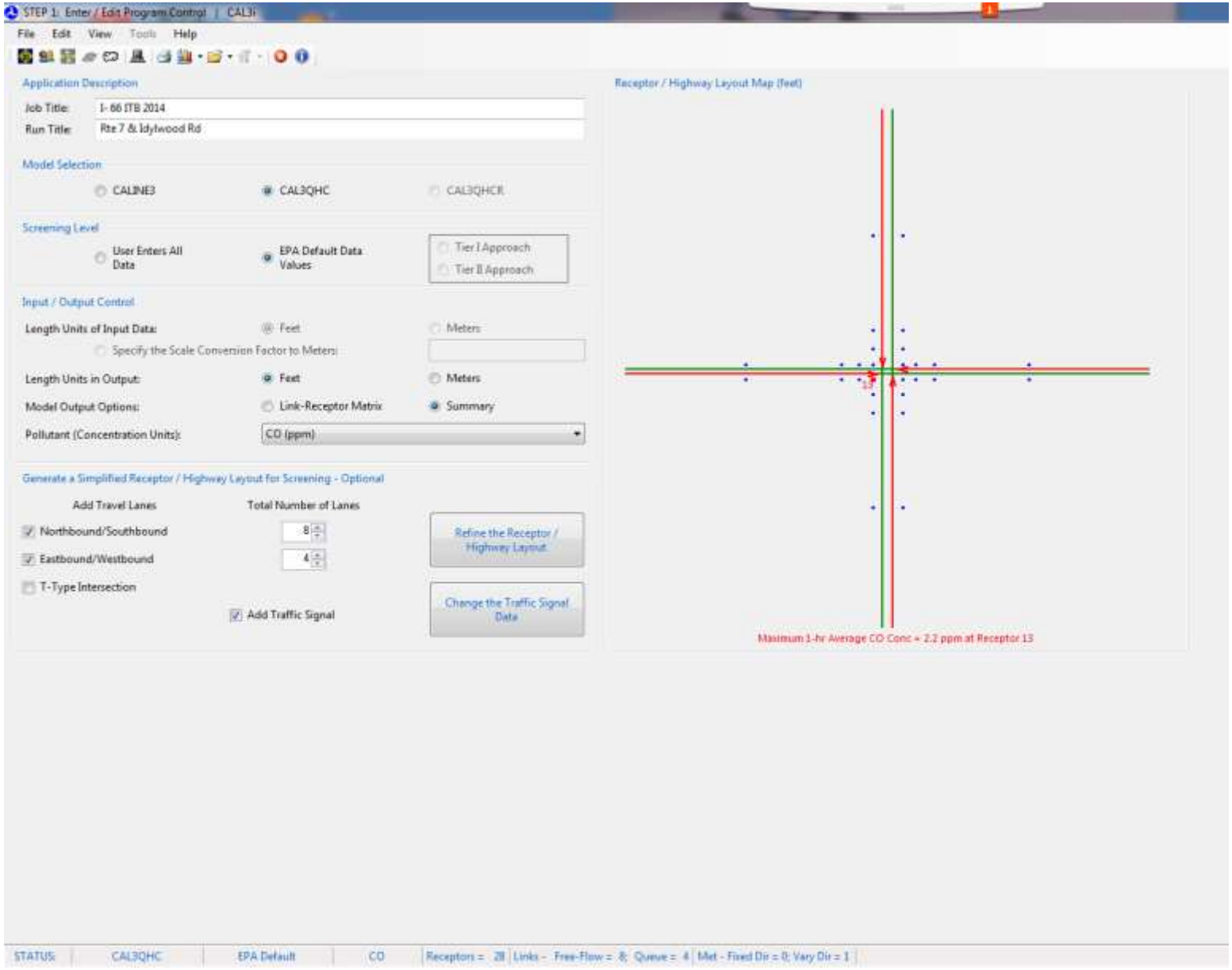
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File Edit View Tools Help
Application Description
Job Title: I- 66 ITB 2014
Run Title: Rte 7 & Idylwood Rd
Model Selection
CAL3NE3
CAL3QHC
CAL3QHCR
Screening Level
User Enters All Data
EPA Default Data Values
Tier I Approach
Tier II Approach
Input / Output Control
Length Units of Input Data:
Feet
Meters
Specify the Scale Conversion Factor to Meters:
Length Units in Output:
Feet
Meters
Model Output Options:
Link-Receptor Matrix
Summary
Pollutant (Concentration Units):
CO (ppm)
Generate a Simplified Receptor / Highway Layout for Screening - Optional
Add Travel Lanes
Total Number of Lanes
Northbound/Southbound
8
Eastbound/Westbound
4
T-Type Intersection
Add Traffic Signal
Refine the Receptor / Highway Layout
Change the Traffic Signal Data
Receptor / Highway Layout Map (feet)
Maximum 1-hr Average CO Conc = 2.2 ppm at Receptor 13
STATUS:
CAL3QHC
EPA Default
CO
Receptors = 28 Links - Free-Flow = 8; Queue = 4 Met - Fixed Dir = 0; Vary Dir = 1

Attachment G: Toll Diversion Analysis

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I-66 Multimodal Improvements

TRANSFORM 66 INSIDE the Beltway

VDOT | DRPT

Investing in Multimodal Solutions

Traffic Technical Report

DRAFT

January 8, 2016

Prepared for

VDOT

Prepared by

ATCS, P.L.C.

ENGINEERING • PLANNING • SURVEYING

I-66 Inside the Beltway: Traffic Technical Report

(Draft – January 8, 2016)

Prepared for:

Virginia Department of Transportation
4975 Alliance Drive
Fairfax, VA 22030

Prepared by:

ATCS, P.L.C.
2553 Dulles View Drive, Suite 300
Herndon, VA 20171

Table of Contents

Figures

Tables

CHAPTER 1 OVERVIEW AND METHODOLOGY

1.1 Project Background

In 2012, the Virginia Department of Transportation (VDOT) and the Virginia Department of Rail and Public Transportation (VDRPT) published the final report for the "I-66 Multimodal Study, Inside the Beltway." This effort was conducted in cooperation with local jurisdictions, transit agencies, and other transportation stakeholders. A Supplemental Report to further develop alternatives for the I-66 inside the Beltway corridor was published in 2013.

In a letter dated December 9, 2014, to local jurisdictions, Virginia Secretary of Transportation Aubrey L. Layne, Jr., announced VDOT's decision to advance the recommendations from the I-66 Multimodal Study. This was further reinforced in a briefing by VDOT to local media and elected officials on March 12, 2015.

The cornerstone of the recommendations from the I-66 Multimodal study is the implementation of dynamically priced tolling to be owned and managed by VDOT. The revenue stream from the tolling will offset the cost of the multimodal elements in the I-66 Multimodal study. Conversion of I-66 inside the Beltway to dynamically priced toll lanes during the AM and PM peak hours in the peak directions (Eastbound – AM, Westbound – PM) will allow free travel for HOV qualified users and will allow VDOT to manage the flow of traffic overall. The toll revenues will be set aside for funding of potential widening of I-66 inside the Beltway and for specific multimodal improvements with the Corridor. The Northern Virginia Transportation Commission (NVTC) will lead a cooperative process, with VDOT and stakeholder agencies and jurisdictions to identify, assess, and select those multimodal corridor improvements for funding from the toll revenues.

1.2 Project Need

Improvements in the I-66 corridor inside the Capital Beltway are needed to address:

- **Existing and Future Capacity Deficiencies.** The I-66 corridor inside the Beltway experiences congestion in the peak commuting direction which is eastbound in the AM peak hours and westbound during the PM peak hours. Travel demand is expected to continue to increase in major employment centers such as Arlington, Washington DC, Tysons, and Dulles. This increase will result in heavy traffic extending further into the off-peak periods than what is experienced today. Additionally, the Metrorail Orange Line also experiences peak hour demand that exceeds capacity.

- **Congestion.** There are several localized constraints or chokepoints that affect both cars and bus transit operations on a daily basis. Efforts have been made through the VDOT Spot Improvement and buses on shoulders programs to minimize these congestion points, but congestion still exists after the completion of the recommended improvements between Fairfax Drive and North Sycamore Street.

- **Highly Variable Travel Conditions.** Travelers experience highly unreliable travel times on I-66, particularly during peak periods. Recurrent and non-recurrent congestion, incidents, crashes, disabled vehicles and other events, and adverse weather conditions all contribute to substantial differences in travel time.

- **Vehicular Traffic Demand in the Corridor:** There are significant number of buses and high occupancy vehicles (HOVs) that use I-66 in the peak direction during the peak commuting hours, making I-66 inside the Beltway a heavily used multimodal corridor. There are also many single occupancy vehicles (SOVs) who are currently restricted from using I-66 in the peak directions that must travel on other parallel routes.

In response to these needs, the goals for improvements along the I-66 corridor inside the Beltway are as follows:

- Reduce congestion on I-66 by better managing traffic demand and increased enforcement.
- Provide new and more reliable travel choices.
- Increase the number of people that can travel through the I-66 corridor as a result of more efficient traffic management, increased use of transit, rail, bus and other alternate travel modes.

CHAPTER 2 EXISTING TRANSPORTATION NETWORK

The project study area extends approximately nine miles between I-495 (Capital Beltway) and just west of Rosslyn and includes I-66, US 29 and US 50. **Figure 2.1** presents an overview of the project limits for I-66 inside the Beltway, denoted by the yellow band, and the approximate corridor area for this study, denoted by the brown area. The character of the corridor is consistent throughout the project area and includes roadways of varying types, ranging from urban interstate to local roadways. The following sections describe the conditions of the primary roadways considered in the project analyses.

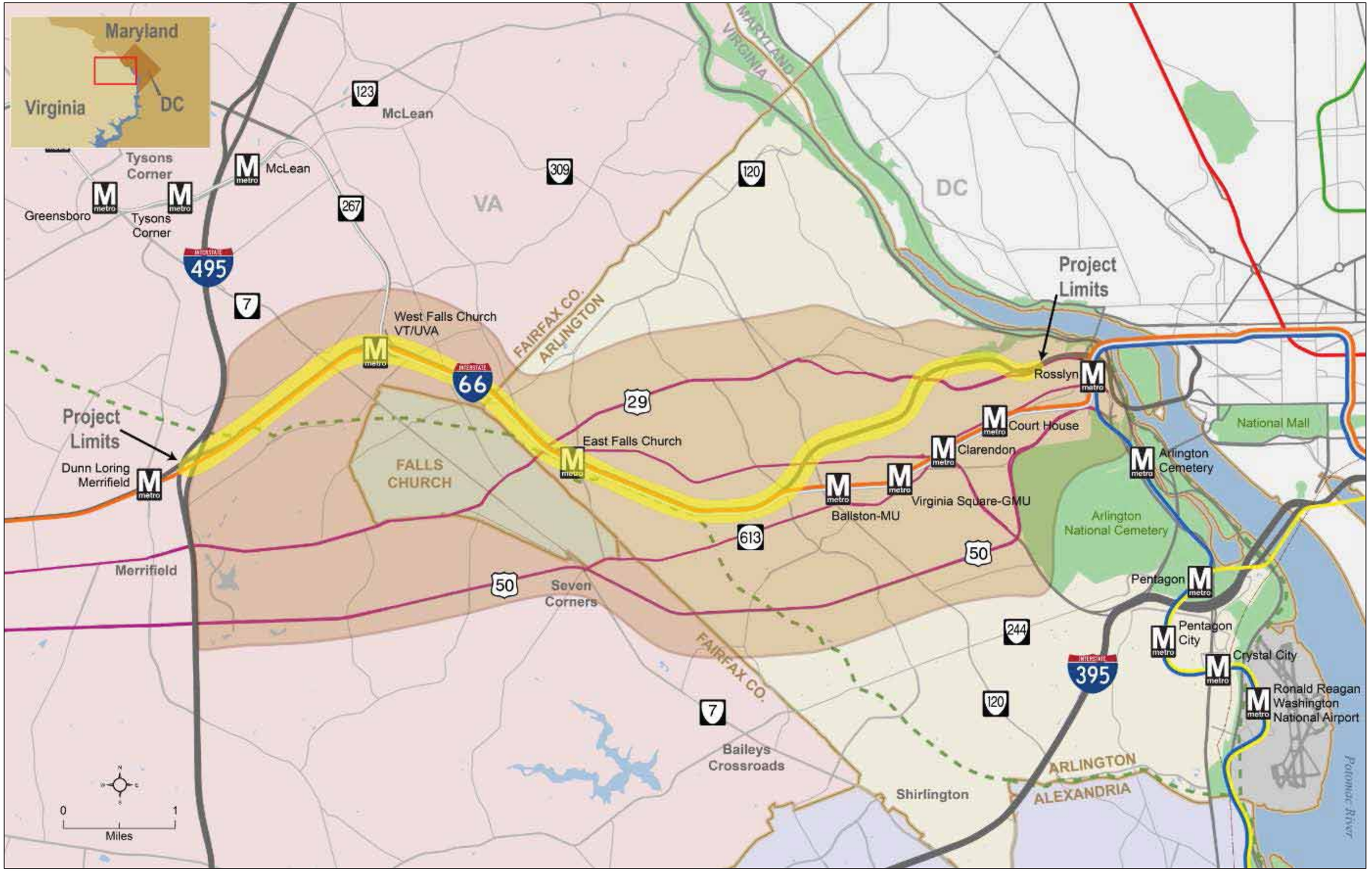

Figure 2.1 - I-66 Core Study Area

2.1 I-66

I-66 is classified as an urban interstate by FHWA. It serves as a major east-west corridor that provides direct connections between major destinations such as Arlington, Washington, DC, Tysons, and Dulles. The approximately 13-mile long segment of I-66 that was evaluated as part of this study travels through the counties of Fairfax and Arlington, as well as bordering the City of Falls Church. Through the entire length of the study area, I-66 is generally a four-lane, barrier separated roadway with the Metrorail Orange and Silver lines running down the median. Trucks with more than four wheels are prohibited from using I-66 inside the Beltway at all times. Below is a location-specific description of the I-66 corridor from west to east, identified by mile markers (MM). **Figure 2.2** presents an overview of the I-66 corridor inside the Beltway, including number of lanes, posted speed limit, and locations of Metrorail stations within the project area.

- **MM 65 - MM 67:** I-66 is generally a four-lane, divided highway with a barrier separated median for the Metrorail Orange Line throughout the length of this segment. However, in the eastbound direction, three eastbound lanes continue through the I-495/I-66 interchange with the third, outside lane terminating at approximately MM 66. In the eastbound direction, the outside shoulder varies in width between 4 feet and 12 feet wide, and the inside shoulder varies in width between 8 feet and 10 feet wide. In the westbound direction, the outside shoulder is 4 feet wide, and the inside shoulder varies in width between 8 feet and 9 feet wide. The posted speed limit along the entire length of this segment is 55 MPH. Within this segment, access is provided to/from Leesburg Pike (Route 7).

- **MM 67 - MM 69:** Within this segment, I-66 transitions to a six-lane divided highway with a barrier separated median for the Metrorail Orange and Silver Lines. The third eastbound lane originates from the Dulles Connector Road (Route 267) entry ramp and continues through this segment of I-66. The third westbound lane originates at the entry ramp from Washington Boulevard and terminates as an Exit Only lane onto the Dulles Connector Road (Route 267). Currently, there is an ongoing construction project, which is entitled “Spot Improvement #2”, to add a fourth westbound lane between Washington Boulevard and the Dulles Connector Road (Route 267). In the eastbound direction, the outside shoulder varies in width between 4 feet and 11 feet wide, and the inside shoulder varies in width between 9 feet and 10 feet wide. In the westbound direction, the outside shoulder varies in width between 6 feet and 10 feet wide, and the inside shoulder varies in width between 9 feet and 13 feet wide. The posted speed limit along the entire length of this segment is 55 MPH. Within this segment, access is provided to/from the Dulles Connector Road (Route 267), to North Westmoreland Street from eastbound I-66, and to/from Lee Highway (U.S. Route 29) /Washington Boulevard.

- **MM 69 - MM 71:** I-66 is generally a four-lane, divided highway with a barrier separated median for the Metrorail Orange and Silver Lines throughout the length of this segment. However, in the westbound direction, three lanes continue from the Fairfax Drive entry ramp to the North Sycamore Street exit ramp. In the eastbound direction, the outside shoulder varies in width between 7 feet and 8 feet wide, and the inside shoulder varies in width between 10 feet and 12 feet wide. In the westbound direction, the outside shoulder varies in width between 4 feet and 8 feet wide, and the inside shoulder is 9 feet wide. The posted speed limit along the entire length of this segment is 55 MPH. Within this segment, access is provided to/from North Sycamore Street.

- **MM 71 - MM 74:** I-66 is generally a four-lane, divided highway with a barrier separated median. In the eastbound direction, the outside shoulder varies in width between 6 feet and 8 feet wide, and the inside shoulder varies in width between 10 feet and 11 feet wide. In the westbound direction, the outside shoulder varies in width between 7 feet and 8 feet wide, and the inside shoulder varies in width between 9 feet and 11 feet wide. The posted speed limit along the entire length of this segment is 55 MPH. Within this segment, access is provided to/from Fairfax Drive, North Glebe Road (Route 120), Lee Highway (US 29), and North Scott Street.

  The so-called "Rosslyn Tunnel," which is located from approximately MM 74.4 to MM 74.6, decreases the posted speed limit on I-66 from 55 MPH to 45 MPH. In the eastbound direction approaching the tunnel, the outside shoulder is 9 feet wide with an inside shoulder width of 11 feet. In the westbound direction, the outside shoulder is 9 feet wide with an inside shoulder width of 12 feet. Through the tunnel, these shoulder widths are maintained in each direction.

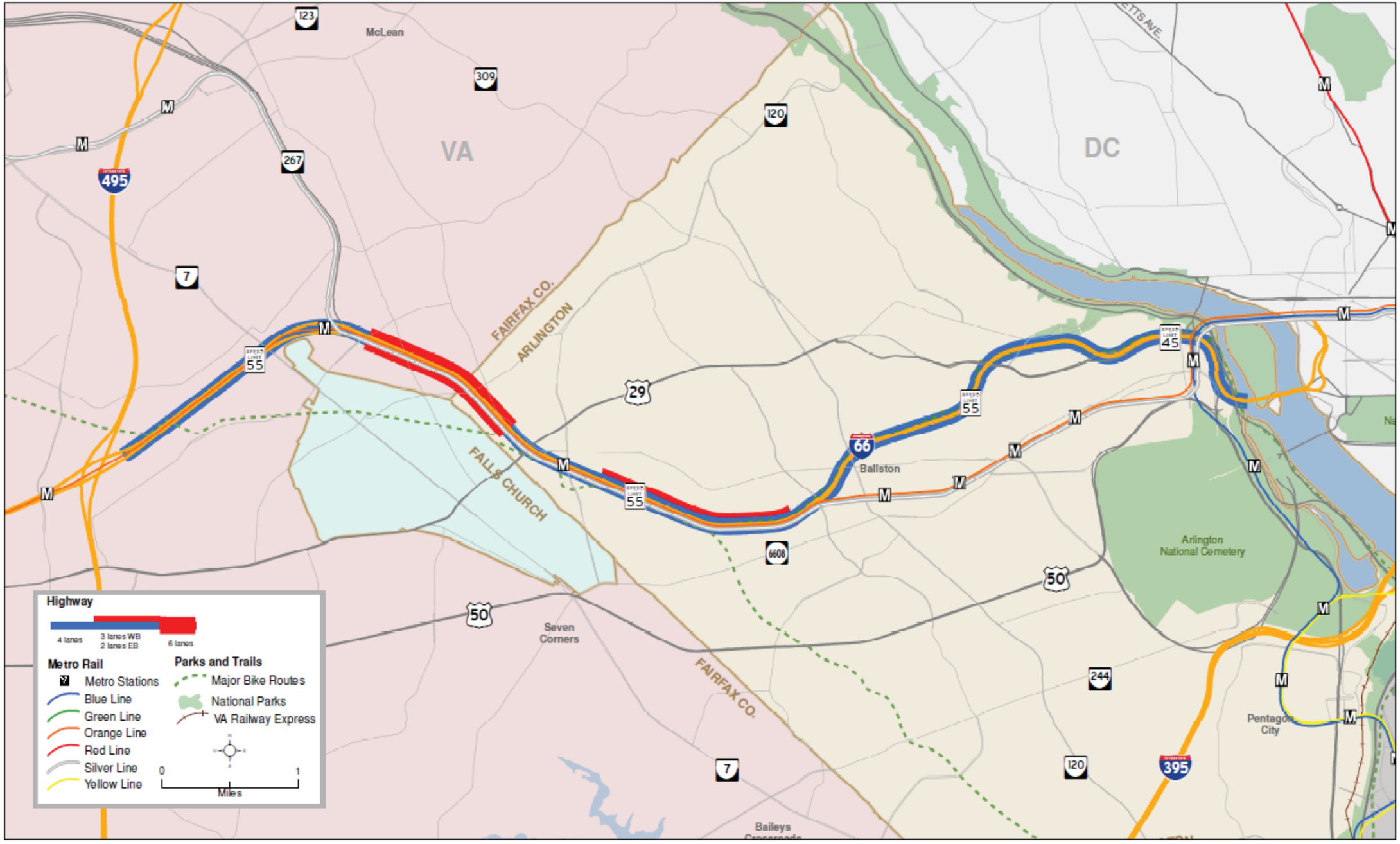

Figure 2.2 - I-66 Corridor Overview

Attachment I: CLRP Update

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National Capital Region
Transportation Planning Board

MEMORANDUM

TO: Transportation Planning Board
FROM: Kanti Srikanth, TPB Staff Director
SUBJECT: Briefing on the Draft 2015 CLRP Amendment
DATE: October 15, 2015

On September 10, the draft 2015 CLRP Amendment was released for public comment along with the draft Air Quality Conformity Analysis. At its meeting on September 16, the TPB was briefed on these items and was also given a presentation on the Performance Analysis of the CLRP. The public comment period closed at midnight on Saturday, October 10. Comments received may be reviewed online at mwcog.org/TPBcomment.

The capital improvement projects that have impacts on the capacity of the region's road and transit systems are listed in the "2015 CLRP and FY 2015-2020 TIP Air Quality Conformity Inputs" table, included in the Air Quality Conformity Analysis. That table includes more than 500 projects or project segments, and highlights almost 200 changes to limits and/or completion dates for previously approved projects or new projects. Included with this memo is a summary of the major new projects and changes to existing projects, summarized below.

SUMMARY OF MAJOR ADDITIONS AND CHANGES TO PROJECTS IN THE CLRP

In the **District of Columbia**, DDOT proposes to add ten dedicated bike lane projects to its existing bicycle network. These projects will remove one or more lanes for vehicular traffic on approximately 9 miles of streets throughout the city. Description forms for these projects are included in Attachment A.

DDOT also proposes to remove the Benning Road Streetcar Spur project.

No new major projects are proposed this year in **Maryland**.

In **Virginia**, VDOT proposes to add two new projects on I-66. The first project, I-66 Multimodal Improvements inside the Beltway, would convert I-66 to a managed Express Lanes facility, with dynamic, congestion-based tolling in both directions during the morning and evening peak periods. This project also includes enhanced bus services, expanded bicycle and pedestrian facilities, and a widening of I-66 from N. Fairfax Drive to I-495.

The second project would reconfigure I-66 outside the Beltway between I-495 and US Route 15 to have three general-purpose lanes and two managed Express lanes in each direction. This project will also include a new high-frequency bus service and additional or expanded commuter park-and-ride lots. Description forms for these projects are included in Attachment A.

On behalf of the Virginia Department of Rail and Public Transit, VDOT proposes to implement a Bus Rapid Transit (BRT) system that would run in a dedicated Transitway along US Route 1 between Huntington Metro Station and Woodbridge. This project was included in the Air Quality Conformity inputs that were released for public comment in January of this year, but this project had not been highlighted as a "major addition" at that time due to a lack of detailed information.

At the request of Arlington County, VDOT proposes to remove the Columbia Pike Streetcar and Crystal City Streetcar projects due to the recent withdrawal of funding support for these two projects by Arlington County.

No new major additional capacity projects are proposed by **WMATA** at this time.

Exhibit 1 on the following pages provides a further summary of the Major Additions and Changes including maps, costs and completion dates. A complete listing of proposed additions and changes to all projects in the CLRP can be found in the 2015 CLRP and the FY 2015-2020 TIP Air Quality Conformity Inputs table, included in Appendix B of the Air Quality Conformity Analysis report. These documents can be found online at mwcog.org/CLRP2015.

Exhibit 1: Summary of Major Additions and Changes for the 2015 CLRP Amendment

District of Columbia

Dedicated Bike Lanes, Citywide

Length: 9 miles

Complete: 2015

Cost: $470,000

The District Department of Transportation (DDOT) proposes to add a series of dedicated bike lane projects that will remove one or more lanes for vehicular traffic on 10 different roadways by reducing lanes as follows:

a. 4th St. SW, M St. to P St.
4 to 2 lanes

b. 6th St. NE, Florida Ave. to K St.
2 to 1 lane

c. 7th St. NW, New York Ave. to N St.
4 to 2 lanes

d. 12th St. NW, Pennsylvania Ave. to Massachusetts Ave.
4 to 3 lanes

e. 14th St. NW, Florida Ave. to Columbia Rd.
4 to 2 lanes

f. Brentwood Pkwy. NE, 6th St./Penn St. to 9th St.
4 to 2 lanes

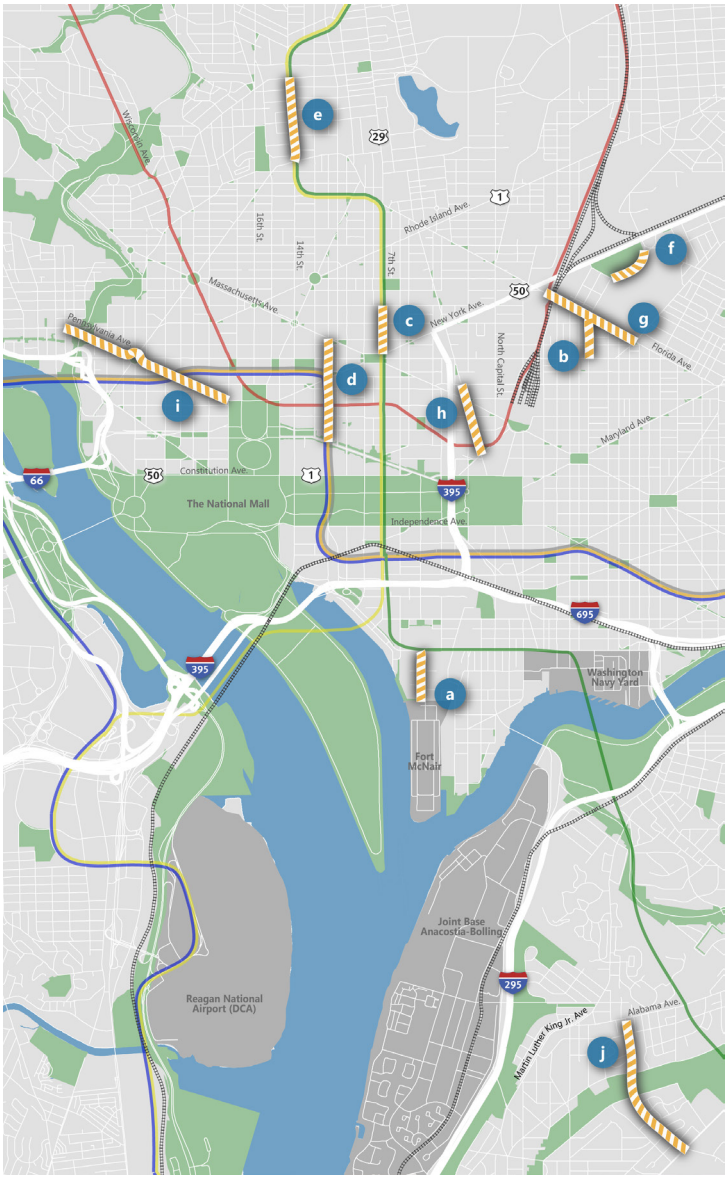
g. Florida Ave. NE, 2nd St. to West Virginia Ave.
6 to 4 or 5 lanes

h. New Jersey Ave. NW, H St. to Louisiana Ave.
4 to 2 lanes

i. Pennsylvania Ave. NW, 17th St. to 29th St.
4/6 to 2 or 4 lanes

j. Wheeler Rd. SE, Alabama Ave. to Southern Ave.
4 to 2 lanes

See description forms on pages A1-A11 of Attachment A for more information.



Remove: Benning Road Streetcar Spur

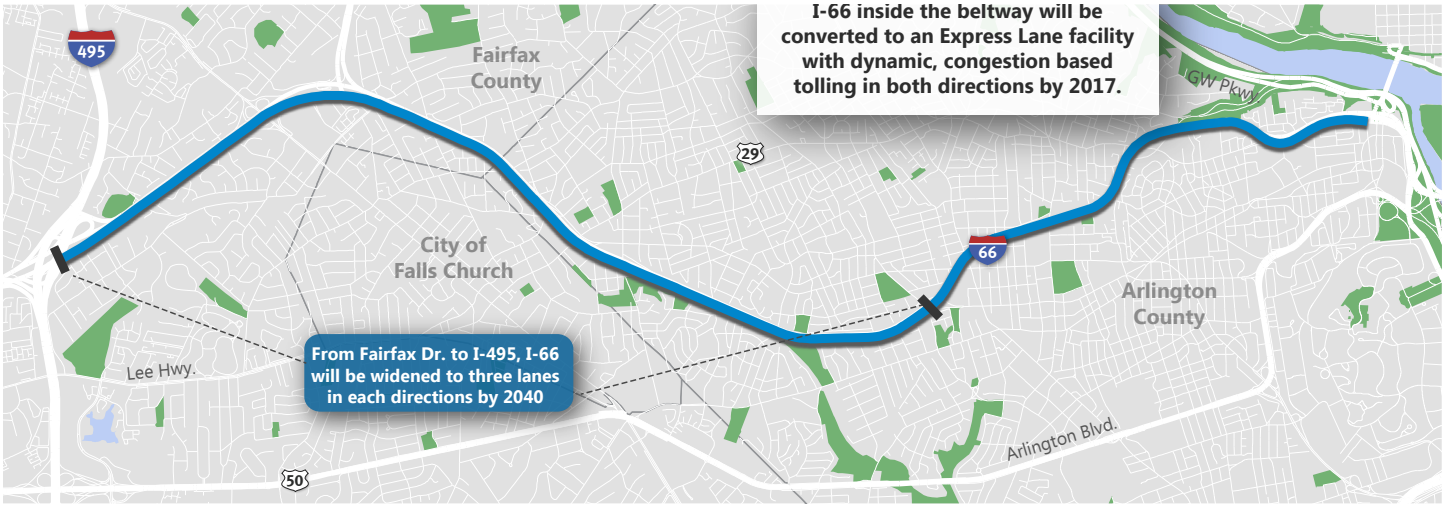
The 2014 Update to the CLRP included the addition of a streetcar spur line running from Benning Rd. along Minnesota Ave. to the Minnesota Ave. Metro Station. This project is being withdrawn from the CLRP.

Exhibit 1: Summary of Major Additions and Changes for the 2015 CLRP Amendment

VIRGINIA

I-66 Multimodal Improvement Project, Inside the Beltway US Route 29 in Rosslyn to I-495

Length: 10 miles
Complete: 2017, 2040
Cost: $350 million



The Virginia Department of Transportation (VDOT) proposes to convert I-66 inside the Capital Beltway into a managed express lanes facility with dynamic, congestion-based tolling for all vehicles with less than three occupants, in both directions during the morning and evening peak periods. VDOT plans to implement this conversion by 2017. VDOT also proposes widening I-66 to 3 lanes in both directions between Fairfax Dr. and I-495 (and from 3 to 4 lanes on eastbound I-66 from the Dulles Toll Road to Washington Blvd.) The widening is projected to be complete by 2040.

VDOT proposes to implement a number of multimodal improvements with this project, including enhanced bus service and completion of elements of the bicycle and pedestrian network around the corridor. Tolls from the managed express lanes will be used to fund further multimodal improvements.

The currently approved CLRP includes an assumption that the existing HOV requirement on I-66 inside the Beltway would increase from 2 to 3 occupants in 2020. This proposed project would advance that requirement to 2017 inside the Beltway. The CLRP also currently includes two spot improvement projects that provide additional lanes on westbound I-66 between Westmoreland Dr./Washington Blvd. and Haycock Rd./Dulless Access Highway (complete in 2015), and between Lee Highway/Spout Run and Glebe Rd. (complete in 2020).

See the CLRP Project Description Form and supplemental materials provided by VDOT on pages A13 - A24 in Attachment A for more information.

Attachment I: Proposed Easements

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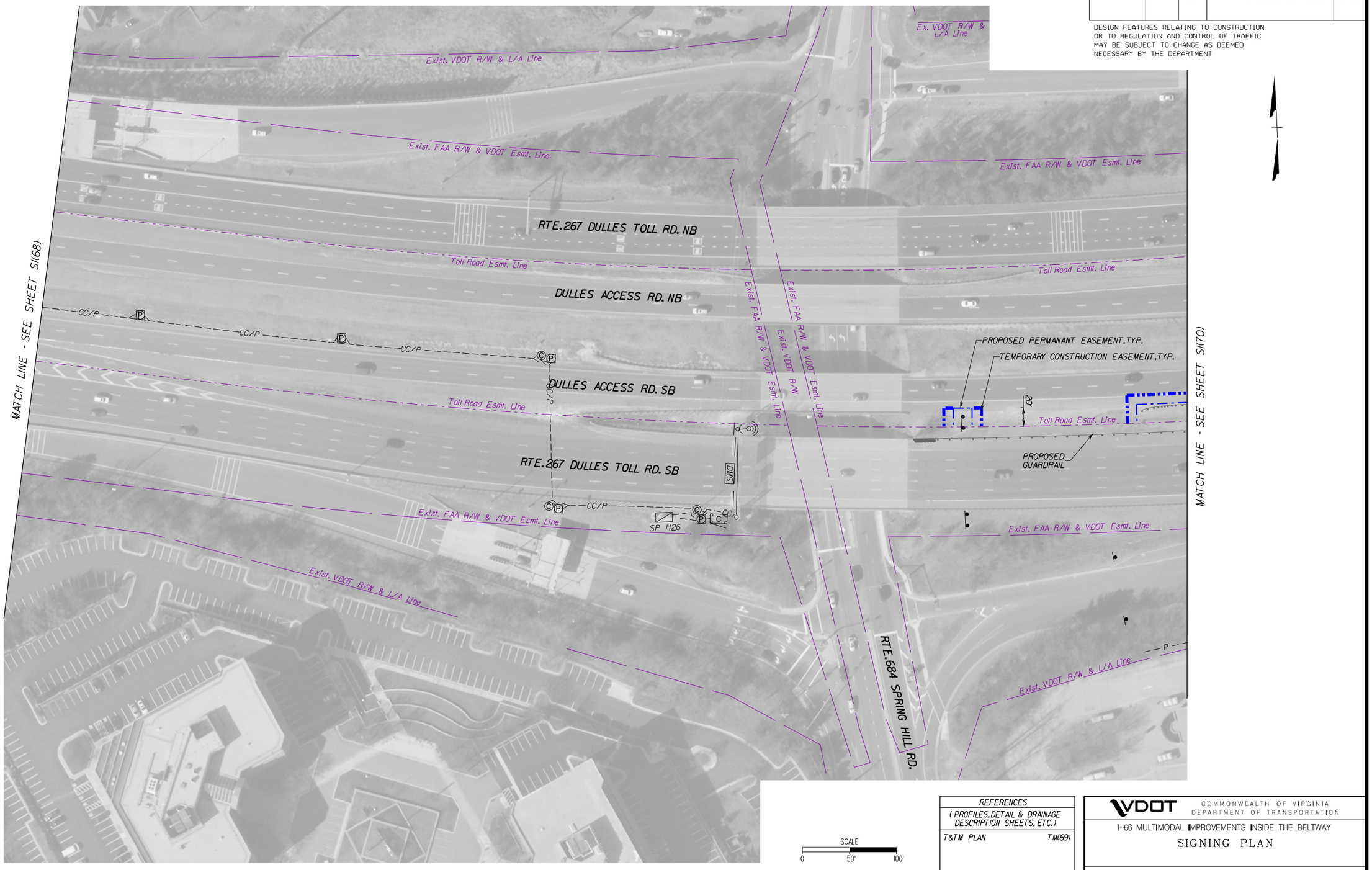
LIMITED ACCESS HIGHWAY — By Resolution of Commonwealth Transportation Board dated January 18, 2001

PROJECT MANAGER:	TIMOTHY HARTZELL, P.E. (703) 259-2749 (NOVA District)
SURVEYED BY, DATE:	PRECISION MEASUREMENTS, INC., 9/2015 (804) 340-5229
DESIGN BY:	HNTB CORPORATION (703) 824-5100
SUBSURFACE UTILITY BY, DATE	SO-DEEP, 9/2015 (703) 361-6005

REVISED	STATE	STATE ROUTE	STATE PROJECT	SHEET NO.
	VA.	66	(FO) 0066-96A-358, P101 (FO) 0066-96A-388	SI(69)

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT



SCALE 0 50' 100'

REFERENCES (PROFILES, DETAIL & DRAINAGE DESCRIPTION SHEETS, ETC.)	
T&TM PLAN	TM(69)

VDOT — COMMONWEALTH OF VIRGINIA, DEPARTMENT OF TRANSPORTATION

I-66 MULTIMODAL IMPROVEMENTS INSIDE THE BELTWAY

SIGNING PLAN

HNTB — HNTB CORPORATION, ARCHITECTS ENGINEERS & PLANNERS, ARLINGTON, VIRGINIA

SCALE	DATE	SHEET	OF
1" = 50'-0"	MARCH 2016		

PLAN NO.	PROJECT	FILE NO.	SHEET NO.
A	0066-96A-358 0066-96A-388		SI(69)

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LIMITED ACCESS HIGHWAY

By Resolution of Commonwealth Transportation Board dated January 18, 2001

PROJECT MANAGER:	TIMOTHY HARTZELL, P.E. (703) 259-2749 (NOVA District)
SURVEYED BY, DATE:	PRECISION MEASUREMENTS, INC., 9/2015 (804) 340-5229
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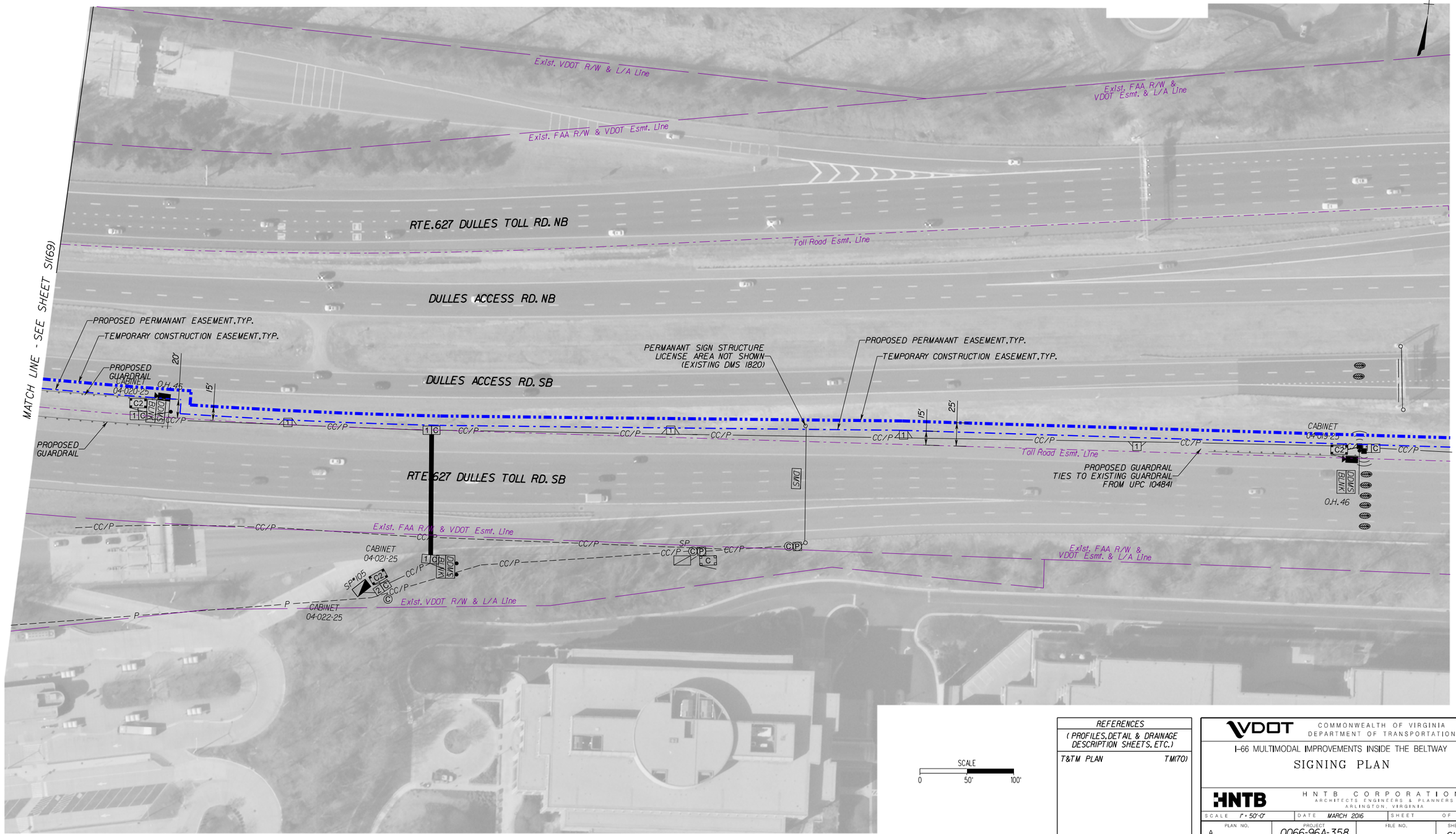
SUBSURFACE UTILITY BY, DATE	SO-DEEP, 9/2015 (703) 361-6005

REVISED	STATE	STATE ROUTE	STATE PROJECT	SHEET NO.
	VA.	66	(FO) 0066-96A-358, P101 (FO) 0066-96A-388	SI(70)

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT



SCALE
0 50' 100'

REFERENCES	
(PROFILES, DETAIL & DRAINAGE DESCRIPTION SHEETS, ETC.)	
T&TM PLAN	TM(70)

VDOT COMMONWEALTH OF VIRGINIA
DEPARTMENT OF TRANSPORTATION

I-66 MULTIMODAL IMPROVEMENTS INSIDE THE BELTWAY

SIGNING PLAN

HNTB HNTB CORPORATION
ARCHITECTS ENGINEERS & PLANNERS
ARLINGTON, VIRGINIA

SCALE 1" = 50'-0"	DATE MARCH 2016	SHEET	OF

PLAN NO.	PROJECT	FILE NO.	SHEET NO.
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SUBSURFACE UTILITY BY, DATE	SO-DEEP, 9/2015 (703) 361-6005

REVISED	STATE	STATE ROUTE	STATE PROJECT	SHEET NO.
	VA.	66	(FO) 0066-96A-358, P101 (FO) 0066-96A-388	SI(71)

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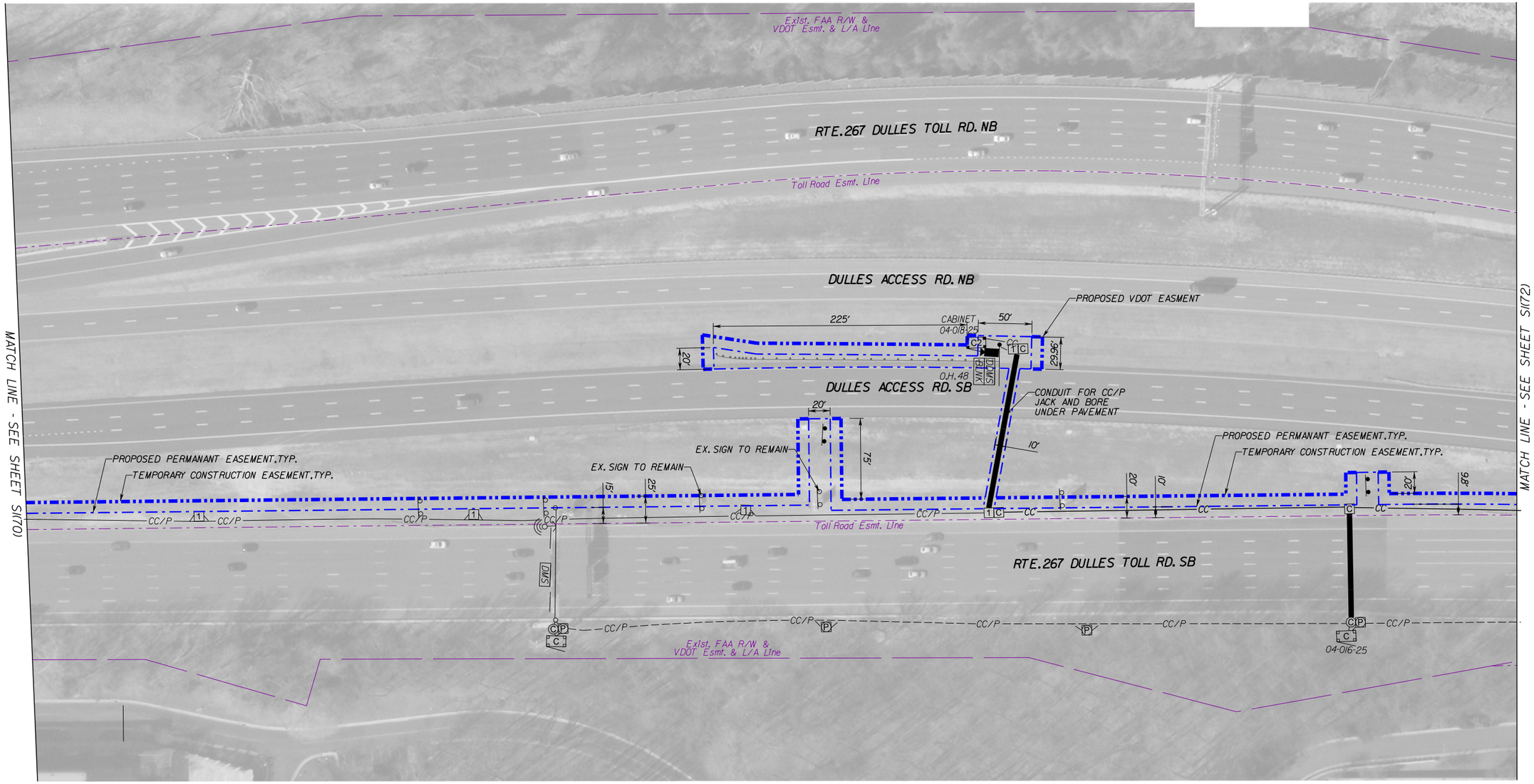

SCALE 0 50' 100'

REFERENCES (PROFILES, DETAIL & DRAINAGE DESCRIPTION SHEETS, ETC.)	
T&TM PLAN	TM(71)

VDOT COMMONWEALTH OF VIRGINIA DEPARTMENT OF TRANSPORTATION

I-66 MULTIMODAL IMPROVEMENTS INSIDE THE BELTWAY

SIGNING PLAN

HNTB HNTB CORPORATION ARCHITECTS ENGINEERS & PLANNERS ARLINGTON, VIRGINIA

SCALE 1" = 50'-0"	DATE MARCH 2016	SHEET	OF

PLAN NO.	PROJECT	FILE NO.	SHEET NO.
A	0066-96A-358 0066-96A-388		SI(71)

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LIMITED ACCESS HIGHWAY

By Resolution of Commonwealth Transportation Board dated January 18, 2001

REVISED	STATE	STATE ROUTE	STATE PROJECT	SHEET NO.
	VA.	66	(FO) 0066-96A-358, P101 (FO) 0066-96A-388	SI(72)

DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT

PROJECT MANAGER: TIMOTHY HARTZELL, P.E. (703) 259-2749 (NOVA District)
SURVEYED BY, DATE: PRECISION MEASUREMENTS, INC., 9/2015 (804) 340-5229
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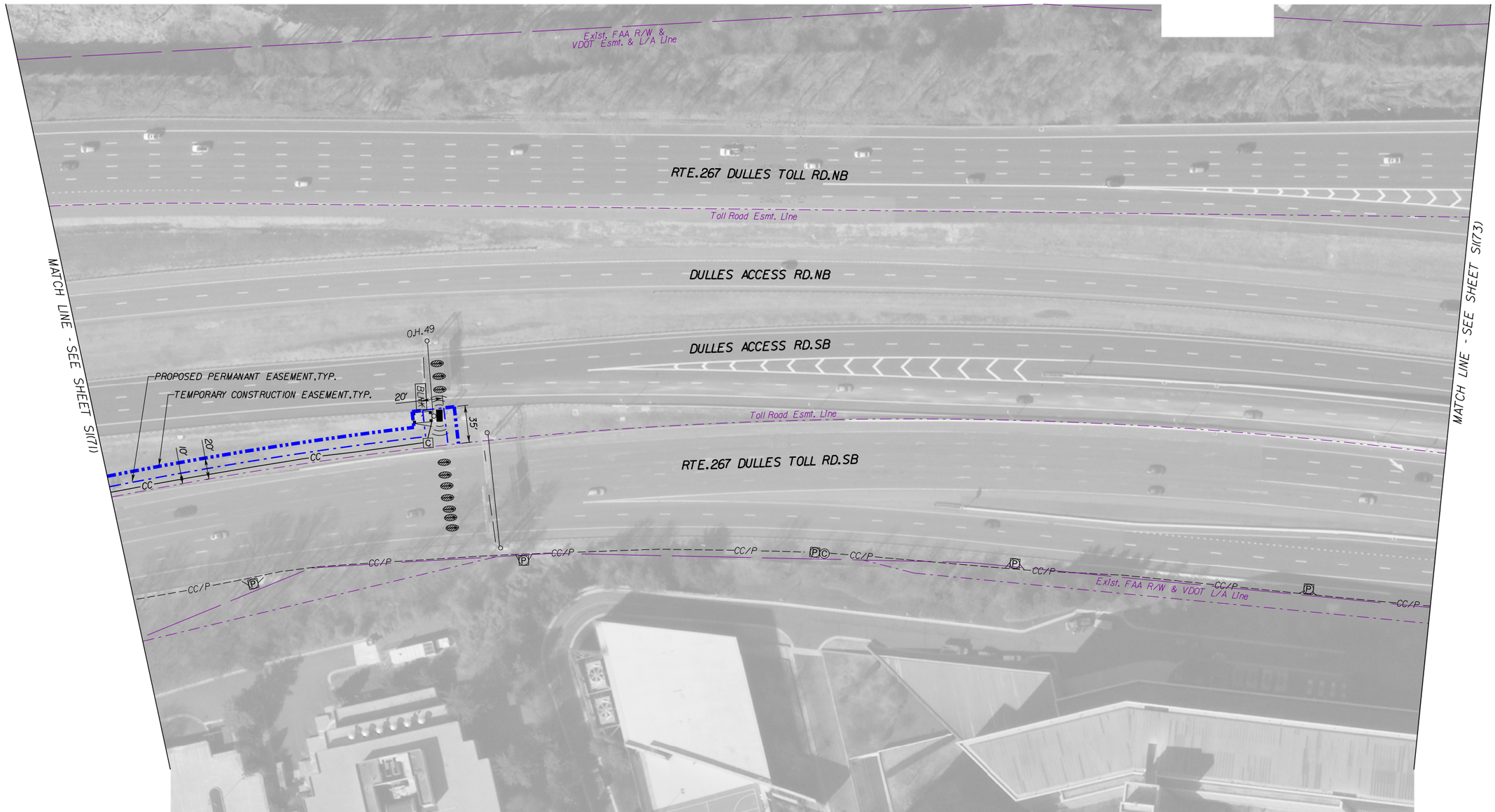
SUBSURFACE UTILITY BY, DATE SO-DEEP, 9/2015 (703) 361-6005



SCALE
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REFERENCES (PROFILES, DETAIL & DRAINAGE DESCRIPTION SHEETS, ETC.)	
T&TM PLAN	TM(72)

VDOT COMMONWEALTH OF VIRGINIA
DEPARTMENT OF TRANSPORTATION

I-66 MULTIMODAL IMPROVEMENTS INSIDE THE BELTWAY

SIGNING PLAN

HNTB HNTB CORPORATION
ARCHITECTS ENGINEERS & PLANNERS
ARLINGTON, VIRGINIA

SCALE	DATE	SHEET	OF
1" = 50'-0"	MARCH 2016		

PLAN NO.	PROJECT	FILE NO.	SHEET NO.
A	0066-96A-358 0066-96A-388		SI(72)

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