Appendix D: Existing Conditions Speed and Density Maps
Existing Conditions: Speeds
AM Peak Period

Virginia Department of Transportation
I-395 Express Lanes
VDOT Project No. 0395-869-200, P101, UPC 108313

Average Speed (mph)

- < 25
- 25 - 35
- 35 - 45
- 45 - 55
- > 55

General Purpose Lanes
HOV/HOT Lanes

Southbound

Northbound
Existing Conditions: Speeds
AM Peak Period

Southbound

Northbound

AM Peak Hour
7:00 - 8:00 AM
8:00 - 9:00 AM
9:00 - 10:00 AM

All Analysis Hours
6:00 - 7:00 AM
7:00 - 8:00 AM
8:00 - 9:00 AM

Average Speed (mph)
< 25
25 - 35
35 - 45
45 - 55
> 55

General Purpose Lanes
HOV/HOT Lanes

Virginia Department of Transportation
I-395 Express Lanes
VDOT Project No. 0395-869-205, P161, UPCI 108313

Southbound

Northbound
Existing Conditions: Speeds

AM Peak Period

Page 3 of 5

Average Speed (mph)

General Purpose Lanes

HOV/HOT Lanes

< 25

25 - 35

35 - 45

45 - 55

> 55

Virginia Department of Transportation
I-395 Express Lanes
VDOT Project No. 0395-869-205, P181, UPC 108313

Southbound

Northbound
Existing Conditions: Speeds
AM Peak Period

Virginia Department of Transportation
I-395 Express Lanes
VDOT Project No. 0395-969-205, P181, UPC 108313

<table>
<thead>
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<td>Southbound</td>
<td>Northbound</td>
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<td>HOV/HOT Lanes</td>
<td>25 - 35</td>
<td>45 - 55</td>
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<tr>
<td>Average Speed (mph)</td>
<td>25 - 45</td>
<td>45 - 55</td>
<td>&lt; 25</td>
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</table>
Existing Conditions: Speeds
PM Peak Period

Southbound

Northbound

Average Speed (mph)
- < 25
- 25 - 35
- 35 - 45
- 45 - 55
- > 55

General Purpose Lanes
HOV/HOT Lanes
Existing Conditions: Speeds
PM Peak Period

Average Speed (mph)
- < 25
- 25 - 35
- 35 - 45
- 45 - 55
- > 55

Virginia Department of Transportation
I-395 Express Lanes
VDOT Project No. 0395-969-200, P101, UFC 108313

Southbound

Northbound
Existing Conditions: Speeds
PM Peak Period

Average Speed (mph)

<table>
<thead>
<tr>
<th>5:00 - 6:00 PM</th>
<th>6:00 - 7:00 PM</th>
<th>4:00 - 5:00 PM</th>
<th>3:00 - 4:00 PM</th>
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<tbody>
<tr>
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<td>All Analysis Hours</td>
<td>All Analysis Hours</td>
<td>All Analysis Hours</td>
</tr>
<tr>
<td>&lt; 25</td>
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<tr>
<td>35 - 45</td>
<td>50 - 55</td>
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Virginia Department of Transportation
I-395 Express Lanes
VDOT Project No. 0395-869-200, P161, UPC 108313
Existing Conditions: Speeds
PM Peak Period

<table>
<thead>
<tr>
<th>Average Speed (mph)</th>
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<th>HOV/HOT Lanes</th>
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<tr>
<td>45 - 55</td>
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<tr>
<td>&gt; 55</td>
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</tr>
</tbody>
</table>

PM Peak Period
5:00 - 6:00 PM
6:00 - 7:00 PM
5:00 - 6:00 PM
4:00 - 5:00 PM
3:00 - 4:00 PM

All Analysis Hours
6:00 - 7:00 PM
5:00 - 6:00 PM
4:00 - 5:00 PM
3:00 - 4:00 PM
Existing Conditions: Speeds
PM Peak Period
Page 5 of 5

Average Speed (mph)
- < 25
- 25 - 35
- 35 - 45
- 45 - 55
- > 55

General Purpose Lanes
HOV/HOT Lanes

Virginia Department of Transportation
I-395 Express Lanes
VDOT Project No. 0395-869-200, P161, UPCI 108313

Potomac River
Washington DC
Existing Conditions: Density
AM Peak Period

AM Peak Hour
9:00 - 10:00 AM
8:00 - 9:00 AM
7:00 - 8:00 AM
6:00 - 7:00 AM

All Analysis Hours
9:00 - 10:00 AM
8:00 - 9:00 AM
7:00 - 8:00 AM
6:00 - 7:00 AM

Southbound
Van Dorn St

Northbound

Virginia Department of Transportation
I-395 Express Lanes
VDOT Project No. 0393-969-205, P101, UPC 108313

Average Density (veh/mi/ln)

- < 18
- 18 - 26
- 26 - 35
- 35 - 45
- > 45

General Purpose Lanes
HOV/HOT Lanes

MATCH LINE A
MATCH LINE B
Existing Conditions: Density
AM Peak Period
Page 3 of 5

Virginia Department of Transportation
I-395 Express Lanes
VDOT Project No. 0395-869-205, P181, UPC 1038313

Average Density (veh/mi/ln)

- < 18
- 18 - 26
- 26 - 35
- 35 - 45
- > 45

- General Purpose Lanes
- HOV/HOT Lanes

Southbound

Northbound
Existing Conditions: Density
AM Peak Period

AM Peak Hour
9:00 - 10:00 AM
8:00 - 9:00 AM
7:00 - 8:00 AM
6:00 - 7:00 AM

All Analysis Hours

Southbound

Northbound

Average Density (veh/mi/ln)

- < 18
- 18 - 26
- 26 - 35
- 35 - 45
- > 45

General Purpose Lanes
HOV/HOT Lanes
Existing Conditions: Density

AM Peak Period

Virginia Department of Transportation
I-395 Express Lanes
VDOT Project No. 0395-869-205, P181, UPC 108313

<table>
<thead>
<tr>
<th>Average Density (veh/mi/ln)</th>
<th>General Purpose Lanes</th>
<th>HOV/HOT Lanes</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 18</td>
<td>18 - 26</td>
<td>26 - 35</td>
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<tr>
<td>26 - 35</td>
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<td>35 - 45</td>
</tr>
<tr>
<td>&gt; 45</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Southbound

Northbound

All Analysis Hours

9:00 - 10:00 AM

6:00 - 7:00 AM

7:00 - 8:00 AM

8:00 - 9:00 AM

7:00 - 8:00 AM

Washington DC
Existing Conditions: Density
PM Peak Period

Virginia Department of Transportation
I-395 Express Lanes
VDOT Project No. 0395-869-205, P101, UPC 108313

Average Density (veh/mi/ln)
- < 18
- 18 - 26
- 26 - 35
- 35 - 45
- > 45

General Purpose Lanes
HOV/HOT Lanes
Existing Conditions: Density
PM Peak Period

<table>
<thead>
<tr>
<th>All Analysis Hours</th>
<th>PM Peak Hour</th>
<th>6:00 - 7:00 PM</th>
<th>5:00 - 6:00 PM</th>
<th>4:00 - 5:00 PM</th>
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</tr>
<tr>
<td>Northbound</td>
<td></td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

Average Density (veh/mi/ln)

- < 18
- 18 - 26
- 26 - 35
- 35 - 45
- > 45

General Purpose Lanes
HOV/HOT Lanes
Existing Conditions: Density
PM Peak Period

Average Density (veh/mi/ln)

- < 18
- 18 - 26
- 26 - 35
- 35 - 45
- > 45

General Purpose Lanes
HOV/HOT Lanes
Existing Conditions: Density
PM Peak Period
Page 4 of 5

Average Density (veh/mi/ln)
- < 18
- 18 - 26
- 26 - 35
- 35 - 45
- > 45

General Purpose Lanes
HOV/HOT Lanes
Existing Conditions: Density
PM Peak Period
Page 5 of 5

Virginia Department of Transportation
I-395 Express Lanes
VDOT Project No. 0395-969-205, P101, UPC 108313

<table>
<thead>
<tr>
<th>Average Density (veh/ln)</th>
<th>General Purpose Lanes</th>
<th>HOV/HOT Lanes</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 18</td>
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<td>18 - 26</td>
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<td>26 - 35</td>
<td></td>
<td></td>
</tr>
<tr>
<td>35 - 45</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt; 45</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Existing Conditions: Density
PM Peak Period
Page 5 of 5
Appendix E: Crash Frequency Histograms
Crash Frequency by Crash Type
General Purpose Lanes
2012 - 2015
Sheet 2 of 5

Critical Crash Frequency Threshold = 44.2
Average Crash Frequency = 29.2

Critical Crash Frequency Threshold = 55.2
Average Crash Frequency = 32.6
Critical Crash Frequency Threshold = 5.0  
Average Crash Frequency = 3.3

Critical Crash Frequency Threshold = 10.0  
Average Crash Frequency = 6.4

Crash Frequency by Crash Type
HOV Lanes
2012 - 2015
Sheet 1 of 5
Crash Frequency by Time of Day
General Purpose Lanes
2012 - 2015
Sheet 1 of 5
Crash Frequency by Time of Day
General Purpose Lanes
2012 - 2015
Sheet 3 of 5

VDOT Virginia Department of Transportation
I-395 Express Lanes
VDOT Project No. 0395-969-206, P101, VEC 108313

Express Lanes

Time of Day

5AM TO 6AM
6AM TO 8AM
8AM TO 9AM
9AM TO 12PM
12PM TO 3PM
3PM TO 6PM
6PM TO 9PM
9PM TO 12AM

Mile Point

Southbound

Northbound
Crash Frequency by Time of Day
General Purpose Lanes
2012 - 2015
Sheet 5 of 5
Crash Frequency by Time of Day
HOV Lanes
2012 - 2015
Sheet 3 of 5
Crash Frequency by Time of Day
HOV Lanes
2012 - 2015
Sheet 5 of 5
Appendix F: Travel Demand Modeling Methodology and Assumptions

Memorandum
Introduction

The Virginia Department of Transportation (VDOT) in cooperation with the Federal Highway Administration (FHWA), has initiated a study for the Interstate 395 (I-395) Express Lanes Project (Northern High Occupancy Toll (HOT) Lanes) to extend the I-95 Express Lanes in the City of Alexandria, and Arlington and Fairfax Counties, Virginia. The proposed project will convert the two existing reversible High Occupancy Vehicle (HOV) lanes to High Occupancy Toll (HOT) lanes and construct an additional HOT lane.

The purpose of this memorandum is to provide an overview of the methodology for the travel demand forecasting tools being developed to support the I-395 Express Lanes project including the traffic analysis efforts for the Interchange Modification Report (IMR), Transportation Technical Report (TTR), and generation of environmental traffic data.

Forecasts are being developed for the following scenarios:

- Existing conditions (2015)
- 2020
  - No Build Conditions (including projects contained in the CLRP)
  - Build Conditions (reflecting the proposed conversion of the two HOV lanes to three HOT lanes and improvements to the Eads Street interchange)
- 2040
  - No Build Conditions (including projects contained in the CLRP)
  - Build Conditions (reflecting the proposed conversion of the two HOV lanes to three HOT lanes and improvements to the Eads Street interchange)

To provide the input to the IMR, TTR and development of the environmental traffic data, a set of tools are being developed that are based upon the use of the MWCOG regional travel demand model for development of the demand matrices and then further refined through a regional assignment tool that better aligns the traffic demand with I-395 HOV operations. The final step is the use of VISUM to develop the daily and peak period traffic forecasts for the IMR, TTR and environmental traffic data and VISSIM to evaluate traffic operations.

Figure 1 depicts the overall interaction of the tools being developed as described in this memorandum.
MWCOG Model

To provide consistency with the regional planning efforts, the MWCOG Travel Demand Forecasting Model, Version 2.3 Build 57a (adopted on October 21, 2015), also known as the Version 2.3.57a Travel Model will be used as the basis for the development traffic forecasts. Models exist for the following years: 2015, 2017, 2020, 2025, 2030, and 2040. The MWCOG Model utilizes a four step trip-based model framework with feedback between traffic assignment and distribution.

Model Validation: Prior to using the model for further analysis, the 2015 model network will be reviewed for consistency with field conditions, including link coding and number of lanes. The model will be validated to ensure reasonable volumes across a set of cutlines and corridors defined to capture the movements in the region. Model runs will be performed for the base year 2015 and model volumes will be compared to actual counts to ensure a reasonable assignment within the study area using the Virginia Transportation Modeling (VTM) Policies and Procedures Manual as a guide. Once the cutlines are validated, the loadings on the individual links along the I-395 corridor will be compared to counts. The location of the cutlines being used for validation are shown in Figure 2. The model calibration and validation efforts will be documented in a technical memorandum.
Calibration Adjustments: The following are the types of adjustments that are being made as part of the calibration of the MWCOG Model in order to improve model validation. These adjustments will be documented in a model validation technical memorandum.

- Review and correct link coding (e.g., number of lanes)
- Modifying existing link speeds and capacities
- Modify the I-395 network north of the Pentagon and in the vicinity of the 14th Street Bridge to reflect the actual conditions
- Modify the values of the period-specific limit field ("amlimit / pmlimit / oplimit") to more accurately reflect access to the HOV links in the corridor
- Adjust centroid connection points to network to better reflect actual conditions
Time of Day Assignment Model (MWCOG Post Processor)

A review of the MWCOG Model periods and I-395 HOV lane operations showed an inconsistency that impacts the overall model calibration.

Alignment of Time of Day Periods: Table 1 below provides an overview of the access to the HOV facility along I-395 by time of day period in the MWCOG model. The table indicates two-way operation during the midday (MD) and nighttime (NT) periods.

Table 1: MWCOG I-395 HOV Access

<table>
<thead>
<tr>
<th>Mode</th>
<th>AM</th>
<th>MD</th>
<th>PM</th>
<th>NT</th>
</tr>
</thead>
<tbody>
<tr>
<td>SOV Single Occupant Vehicle</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>HOV2 2 Occupant Vehicles</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>HOV3 3+ Occupant Vehicles</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>COMM Commercial Vehicles</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>TRK Medium and Heavy Trucks</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>AIRPORT Airport Passenger Auto-Driver Trips/Vehicles</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
</tbody>
</table>

Further, the periods of operation for the HOV facility do not align well with the MWCOG Model Periods as illustrated in Table 2 nor do the policies for access by class used by the facility.
Table 2: Alignment of MWCOG Periods and HOV Operation

<table>
<thead>
<tr>
<th>Hour Beginning</th>
<th>MWCOG Period</th>
<th>HOV Operation</th>
</tr>
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<tbody>
<tr>
<td>0</td>
<td>NT</td>
<td>CLOSED</td>
</tr>
<tr>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
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</tr>
<tr>
<td>6</td>
<td></td>
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</tr>
<tr>
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<td>AM</td>
<td>NB (HOV3)</td>
</tr>
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</tr>
<tr>
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<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>MD</td>
<td>NB (SOV, HOV2, HOV3, COM, TRK, AIRPORT)</td>
</tr>
<tr>
<td>11</td>
<td></td>
<td>CLOSED</td>
</tr>
<tr>
<td>12</td>
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</tr>
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</tr>
<tr>
<td>14</td>
<td></td>
<td>SB (SOV, HOV2, HOV3, COM, TRK, AIRPORT)</td>
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<td>15</td>
<td>PM</td>
<td>SB (HOV3)</td>
</tr>
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<td>16</td>
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<td>19</td>
<td></td>
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</tr>
<tr>
<td>20</td>
<td>NT</td>
<td>SB (SOV, HOV2, HOV3, COM, TRK, AIRPORT)</td>
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<td>23</td>
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</tr>
</tbody>
</table>

1 The HOV/HOT lanes are closed to traffic nightly from 12:00 AM to 2:30 AM
2 The HOV 3+ restrictions are in place from 3:30 PM to 6:00 PM

Model Design: Based on the difference between the MWCOG Time of Day periods and the actual I-395 HOV operations, a post process to the MWCOG Model will be developed that further disaggregates the MWCOG trip tables to improve the alignment of periods between the model and actual operations as well as improving toll evaluations. The MWCOG Post Processor will have the sensitivity to accommodate both the policies of the HOV and HOT lanes as they differ in which vehicle classes will be permitted to use the facility.

Table 3 provides the framework showing the information from the previous tables including the MWCOG Model and I-395 HOV operations along with the periods defined for the Post Processor.

The outputs of the Post Processor will then be used as the input demand matrices for the VISUM models and ultimately the VISSIM operational analysis. The relationship of the Post Processor to the VISUM and VISSIM periods are shown by color in Table 3.
The MWCOG Post Processor trip tables will be used by VISUM as the input to the trip table estimation (ODME) process, as indicated by shading in Table 3. By improving the resolution of the MWCOG trip tables to the periods required by VISUM and VISSIM and better alignment to the I-395 HOV operations, the calibration of the model-based flows will be improved.

The post processor will be developed in the Citilabs CUBE Software and follow the same structure and organization as the MWCOG Assignment routines. This includes the assignment of the SOV, HOV2, COM, TRK and Airport purposes first and then assignment of the HOV3 purpose. This process will be replicated for all periods defined in Table 3.

A refinement of the MWCOG Assignment Routines that will be made is further disaggregation of the assigned purposes to include the trip purpose. The purpose stratification is required for the toll diversion model that will be applied for the build scenarios discussed below.

**Output of MWCOG Post Processor:** The output of the MWCOG Post Processor will be a set of trip tables aggregated by toll and non-toll eligible and by vehicle type (Auto and Truck) for input into the VISUM models. A subarea trip table will be extracted from the MWCOG Post Processor based on the map in Figure 2.
Table 3: MWCOG Post Processor Period Disaggregation

<table>
<thead>
<tr>
<th>Hour Beginning</th>
<th>MWCOG Model</th>
<th>I-395 HOV Operations</th>
<th>MWCOG Post Processor</th>
<th>VISUM / VISSIM</th>
<th>Future I-395 HOT Lane Operations</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>NT ALL</td>
<td>CLOSED</td>
<td>NT 1</td>
<td></td>
<td>CLOSED</td>
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<tr>
<td>230</td>
<td>AM NB HOV3</td>
<td>NB HOV3</td>
<td>AM 1</td>
<td>AM 5-6</td>
<td>NB HOT</td>
</tr>
<tr>
<td>1</td>
<td>NB ALL</td>
<td>NT 2</td>
<td>AM 2</td>
<td>AM 9-10</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>SB ALL</td>
<td>PM 1</td>
<td>PM 2</td>
<td>PM 3-330</td>
<td>SB HOT</td>
</tr>
<tr>
<td>1530</td>
<td>SB HOV3</td>
<td>PM 2</td>
<td>PM 330-4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>NT ALL</td>
<td>SB ALL</td>
<td>NT 1</td>
<td>PM 6-7</td>
<td></td>
</tr>
</tbody>
</table>

1 The HOV/HOT lanes are closed to traffic nightly from 12:00 AM to 2:30 AM
2 The HOV 3+ restrictions are in place from 3:30 PM to 6:00 PM
Figure 3: Traffic Analysis Study Areas
Treatment of Unofficial Ridesharing at Pentagon

An important component of travel in the I-395 corridor is the unofficial ridesharing referred to as “slugging.” Slugging is a form of carpooling from designated pickup and drop off points in close proximity to the HOV facility. The incentive to the driver and the passenger is ability to the use the HOV facility. Because of the proximity of the Pentagon’s location to the I-395 corridor and the Pentagon Metro Station, it functions as a regional transit hub providing a linkage for commuters. The Pentagon provides designated pick-up locations for eight origin / destinations (Source: Pentagon Transportation Management Plan, 2.1.3 Informal Ridesharing):

- Burke / Springfield
- Horner Road / Potomac Mills
- Montclair / Route 234
- Rt. 17 Stafford
- Rt. 3 Fredericksburg Gordan Road
- Rt. 610 Mine Road
- Rt. 610 Stafford
- Tackett’s Mill / Lorton / VRE

As of 2010 when data was collected for the Pentagon Transportation Master Plan, approximately 2,500 riders were picked up during the PM Peak Period (3 – 6 PM) carried by 1,240 vehicles.

<table>
<thead>
<tr>
<th>Location</th>
<th>Vehicles</th>
<th>Passengers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Burke / Springfield</td>
<td>130</td>
<td>275</td>
</tr>
<tr>
<td>Horner Road / Potomac Mills</td>
<td>315</td>
<td>600</td>
</tr>
<tr>
<td>Montclair / Route 234</td>
<td>245</td>
<td>480</td>
</tr>
<tr>
<td>Rt. 17 Stafford</td>
<td>165</td>
<td>320</td>
</tr>
<tr>
<td>Rt. 3 Fredericksburg Gordan Road</td>
<td>45</td>
<td>90</td>
</tr>
<tr>
<td>Rt. 610 Mine Road</td>
<td>130</td>
<td>250</td>
</tr>
<tr>
<td>Rt. 610 Stafford</td>
<td>165</td>
<td>320</td>
</tr>
<tr>
<td>Tackett’s Mill / Lorton / VRE</td>
<td>115</td>
<td>245</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>1,310</strong></td>
<td><strong>2,580</strong></td>
</tr>
</tbody>
</table>

Source: Pentagon Transportation Master Plan, Table 2-1

The MWCOG Post Processor will account for the transition of SOV to HOV3 trips in the corridor for drivers willing to pick up passengers. The process will focus on the vehicle side only and not the movement of the slugs or passengers. The original trip will be replaced to include three components: origin to slug pickup / slug pickup to slug drop off / slug drop off to destination. For the interim trip in the sequence, the mode will be defined as HOV3 allowing free access to the managed facility. For the first and third component of the trip, the original mode, SOV will be assumed. The three sub trips will then be assigned as part of the assignment process.
Treatment of Hybrid Vehicles

Under current policy, owners of hybrid vehicles with one or two occupants are able to use the HOV lanes when operating under occupancy restricted periods. It is expected that this policy will be phased out and that the under HOT operations, hybrids will not be exempt from tolls. The MWCOG HOV3 trip purpose is currently calibrated to account for the use of the HOV facilities by hybrid vehicles based on the validation to HOV facility counts. Under the policy change, the HOV3 trip tables in the 2020 and 2040 no build and build scenarios will be reduced based on data from the “Clean Fuel License Plate Study” conducted in December 2014. The hybrid vehicles that are reduced from HOV3 will be added to the SOV purpose and tolled consistent with the other SOV purposes.

Testing of Build Scenarios

The tools described in this memorandum will be used to develop the 2015 (existing conditions), 2020 (No Build and Build) and 2040 (No Build and Build) inputs to the operational analysis model as well as provide input to the environmental studies required for the I-395 Express Lanes Extension. The MWCOG Model will be used for each scenario to provide consistency with regional forecast. The output of the MWCOG Model will then be input to the MWCOG Post Processor to develop the toll and non-toll demand matrices used in the VISUM models.

MWCOG Two Tier Toll Rate Calibration: As described in the MWCOG Model documentation, the Two Tier Toll Rate Calibration process developed by MWCOG will be used for estimation of toll rates for the I-395 Express Lanes. The process developed by MWCOG to address the Northern Virginia HOV/HOT lane policy is described in the V2.3 Calibration Report (page 8-7):

The Version 2.2 travel model requires two model runs be performed for each scenario being modeled to address the stated policy of Virginia Department of Transportation (VDOT) that HOT facilities will not degrade the operations of HOV users. The “base run” captures the travel time for unimpeded flow of HOV traffic on HOT lanes, consistent with the stated operational policy. The “conformity run” or “final run” of the travel model substitutes the HOV skims obtained for the HOV skims that would otherwise be obtained by simply skimming the networks with HOT lanes in operation. Only the HOV skims are taken from the “base run.” Skims for all other modes are taken from the “conformity run.” Under this framework, the “base run” serves solely as a means for measuring times for HOV traffic on HOT facilities. This procedure, which is also called the “HOV 3+ skim substitution option,” is described on page 1-10 of the Version 2.2 documentation.

The resulting toll rates developed using the above process will be used in the toll diversion model applied in the MWCOG Post Processor.
Implementation of Toll Diversion Curves: To support the VISSIM operational analysis, it is necessary to segment the demand in terms of toll and non-toll eligible trips. By applying the segmentation, the simulation models can restrict access to the I-395 Express Lanes in order to maintain acceptable operations. After reviewing similar and recent studies completed in the region including the ongoing I-66 Inside the Beltway and Outside the Beltway forecasting methodologies, for consistency, a toll diversion model was selected to estimate the toll and non-toll eligible trips for the SOV, HOV2, Commercial, and Airport purposes.

The I-66 Express Lanes Outside the Capital Beltway: Intermediate Traffic and Revenue Study prepared in September of 2015 was referenced to define a set of toll diversion curves that can be applied within the MWCOG Post Processor. It should be noted that a concurrent Traffic and Revenue study is currently being prepared by the Office of Transportation Public-Private Partnerships (OTP3) office for the I-395 Express Lanes project; however, toll diversion curves resulting from that study are not yet available.

The toll diversion process requires stratification of the trip tables used in the assignment to be by purpose in addition to mode (SOV, HOV2, HOV3). The assigned purposes that will be applied in the MWCOG Post Processor are shown in the Table 5. For no-build scenarios, access to the HOV facility will follow existing policy as outlined in Table 2.

Table 5: MWCOG Post Processor Assigned Purposes, Toll Diversion Purpose and Express Lane Access

<table>
<thead>
<tr>
<th>Purpose</th>
<th>Mode (Sub-Purpose)</th>
<th>Toll Diversion Purpose</th>
<th>HOT Lane Access</th>
<th>HOV Lane Access</th>
</tr>
</thead>
<tbody>
<tr>
<td>HBW</td>
<td>SOV</td>
<td>WORK</td>
<td>TOLL</td>
<td></td>
</tr>
<tr>
<td></td>
<td>HOV2</td>
<td></td>
<td></td>
<td>TOLL</td>
</tr>
<tr>
<td></td>
<td>HOV3</td>
<td></td>
<td></td>
<td>FREE</td>
</tr>
<tr>
<td>HBO (HBO + HBS)</td>
<td>SOV</td>
<td>OTHER</td>
<td>TOLL</td>
<td></td>
</tr>
<tr>
<td></td>
<td>HOV2</td>
<td></td>
<td>TOLL</td>
<td></td>
</tr>
<tr>
<td></td>
<td>HOV3</td>
<td></td>
<td>FREE</td>
<td></td>
</tr>
<tr>
<td>NHB (NHBO + NHBW)</td>
<td>SOV</td>
<td>NHB</td>
<td>TOLL</td>
<td></td>
</tr>
<tr>
<td></td>
<td>HOV2</td>
<td></td>
<td>TOLL</td>
<td></td>
</tr>
<tr>
<td></td>
<td>HOV3</td>
<td></td>
<td>FREE</td>
<td></td>
</tr>
<tr>
<td>MISC Purposes</td>
<td>SOV</td>
<td>OTHER</td>
<td>TOLL</td>
<td></td>
</tr>
<tr>
<td></td>
<td>HOV2</td>
<td></td>
<td>TOLL</td>
<td></td>
</tr>
<tr>
<td></td>
<td>HOV3</td>
<td></td>
<td>FREE</td>
<td></td>
</tr>
<tr>
<td>COMMERCIAL</td>
<td>TRUCK</td>
<td></td>
<td>TOLL</td>
<td></td>
</tr>
<tr>
<td>HEAVY TRUCK</td>
<td>TRUCK</td>
<td></td>
<td>EXCLUDED</td>
<td></td>
</tr>
<tr>
<td>AIRPORT</td>
<td>OTHER</td>
<td></td>
<td>TOLL</td>
<td></td>
</tr>
</tbody>
</table>

Notes:
- HBW: Home-based work
- HBO: Home-based other
- HBS: Home-based shopping
- NHB: Non home-based
- NHBO: Non home-based other
- NHBW: Non home-based work

Determined by existing HOV policy controlling direction of facility and entry by mode.