# Appendix H: Scenario Analysis



# **INTRODUCTION TO SCENARIOS**



#### SCENARIO ANALYSIS: DEALING WITH UNCERTAINTY

#### **Evolving Technology and Travel Preferences**

Scenario planning is a common approach among many peers and an approach familiar to the mid-Atlantic region. Scenario planning assesses possible futures or strategic choices by incorporating both the "knowns" of today as well as the unknowns (such as disruptive technologies) and considers multiple futures. Scenarios evaluated are often then combined into a single preferred program that incorporates the performance demonstrated across uncertain futures or in relation to tested priorities. The TransAction Update includes extensive scenario planning best practices to address both uncertain futures and potential strategies to deal with those futures.

Scenarios A and B are designed to vary future transportation characteristics, with improved vehicle performance and ITS/Corridor Management features on one hand (Scenario A), and more congested conditions and higher travel costs on the other hand (Scenario B), while Scenarios C and D address changes in land use.

#### Land Use

The TransAction planning process uses Round 9 of the MWCOG Cooperative Land Use Forecast for future population and employment. These forecasts are reviewed by jurisdiction staff and represent planned locations and specific levels of anticipated demographic growth.

Across the region there is a full range of existing and planned land use, from very urban in Arlington, Alexandria, and Fairfax County, to rural and agricultural in parts of Loudoun and Prince William Counties. Over the period to 2040, a high percentage of the expected growth is forecast to occur in the Regional Activity Centers, while many of the rural areas will be preserved as they are today. This tendency toward "Smart Growth" is a trend that is visible throughout the region. With increasing population and employment, many Northern Virginia jurisdictions are using their Comprehensive Plan documents to shape growth toward areas that are well-served through amenities and transit service.

The results also show some differences in jurisdictional land use totals, as shown in **Tables A-1** and **A-2**.



#### Table A-1: Changes in Land Use in Scenario C

|                            | F                  | Population    |        | E                  |               |        |
|----------------------------|--------------------|---------------|--------|--------------------|---------------|--------|
|                            | MWCOG<br>Round 9.0 | Scenario<br>C | Change | MWCOG<br>Round 9.0 | Scenario<br>C | Change |
| City of Alexandria         | 191,000            | 161,000       | -16%   | 143,000            | 119,000       | -17%   |
| Arlington County           | 278,000            | 250,000       | -10%   | 268,000            | 237,000       | -12%   |
| Fairfax County*            | 1,408,000          | 1,353,000     | -4%    | 908,000            | 874,000       | -4%    |
| Loudoun County             | 493,000            | 527,000       | 7%     | 274,000            | 284,000       | 4%     |
| Prince William<br>County** | 625,000            | 702,000       | 12%    | 281,000            | 360,000       | 28%    |

\* Includes the Cities of Falls Church and Fairfax

\*\* Includes the Cities of Manassas and Manassas Park

#### Table A-2: Changes in Land Use in Scenario D

|                            | I                  | Population    |        | E                  |               |        |
|----------------------------|--------------------|---------------|--------|--------------------|---------------|--------|
|                            | MWCOG<br>Round 9.0 | Scenario<br>D | Change | MWCOG<br>Round 9.0 | Scenario<br>D | Change |
| City of Alexandria         | 191,000            | 212,000       | 11%    | 143,000            | 155,000       | 8%     |
| Arlington County           | 278,000            | 314,000       | 13%    | 268,000            | 292,000       | 9%     |
| Fairfax County*            | 1,408,000          | 1,472,000     | 5%     | 908,000            | 941,000       | 4%     |
| Loudoun County             | 493,000            | 444,000       | -10%   | 274,000            | 258,000       | -6%    |
| Prince William<br>County** | 625,000            | 552,000       | -12%   | 281,000            | 227,000       | -19%   |

\* Includes the Cities of Falls Church and Fairfax

\*\* Includes the Cities of Manassas and Manassas Park

The following tables and maps in this appendix show detailed results for all four scenarios.

## **MODEL ASSUMPTIONS**



| Impact on the 2040 CLRP Model |                            | Scenario A                               | Scenario B                             | Scenario C                               | Scenario D  |
|-------------------------------|----------------------------|--|--|--|---|
| Model Cla                     | assification               | Technology<br>Improves Vehicle<br>Travel | People Change Their<br>Travel Patterns | More Sprawl with<br>Current Technologies | Concentrated Growth<br>with Current<br>Technologies |
|                               | Attribute                  | Change                                   | Change                                 | Change                                   | Change  |
| Freeways                      |                            |  |  |  |   |
|                               | Capacity                   | +50%                                     | N/A                                    | N/A                                      | N/A   |
|                               | Free Flow Speed            | max 60 mph                               | N/A                                    | N/A                                      | N/A   |
|                               | Volume-Delay Function      | V/C < 0.95 ~ FFSPD                       | N/A                                    | N/A                                      | N/A   |
| Expresswa                     | ys                         |  |  |  |   |
|                               | Capacity                   | +50%                                     | N/A                                    | N/A                                      | N/A   |
|                               | Free Flow Speed            | max 50 mph                               | N/A                                    | N/A                                      | N/A   |
|                               | Volume-Delay Function      | V/C < 0.95 ~ FFSPD                       | N/A                                    | N/A                                      | N/A   |
| Major Arte                    | rial                       |  |  |  |   |
|                               | Capacity                   | +15%                                     | N/A                                    | N/A                                      | N/A   |
|                               | Free Flow Speed            | +5%                                      | N/A                                    | N/A                                      | N/A   |
|                               | Volume-Delay Function      | V/C < 0.90 ~ FFSPD                       | N/A                                    | N/A                                      | N/A   |
| RAC and U                     | rban Area Arterials        |  |  |  |   |
|                               | Capacity                   | N/A                                      | -25%                                   | N/A                                      | N/A   |
|                               | Free Flow Speed            | -5 mph                                   | -5 mph                                 | N/A                                      | N/A   |
|                               | Volume-Delay Function      | N/A                                      | V/C < 0.75 ~ FFSPD                     | N/A                                      | N/A   |
|                               | Turn Penalty               | N/A                                      | +1 minute                              | N/A                                      | N/A   |
| Transit Acc                   | ess                        |  |  |  |   |
|                               | Max Walk to Rail           | 1.5 miles                                | 1.5 miles                              | N/A                                      | N/A   |
|                               | Max Walk to Express PNR    | 1.0 miles                                | N/A                                    | N/A                                      | N/A   |
|                               | Ped Environment Factor     | +25%                                     | +35% RAC/Urban                         | N/A                                      | N/A   |
|                               | Walk Speed                 | 5 mph                                    | 10 mph                                 | N/A                                      | N/A   |
|                               | KNR Distance               | +100%                                    | +100% Urban                            | N/A                                      | N/A   |
|                               | KNR Driver Factor          | 1.1                                      | 1.1                                    | N/A                                      | N/A   |
|                               | PNR Lot Capacity           | +50%                                     | N/A                                    | N/A                                      | N/A   |
|                               | PNR Lot Cost               | -50%                                     | N/A                                    | N/A                                      | N/A   |
|                               | Value of Drive Access Time | -50% PNR/KNR                             | -50% KNR                               | N/A                                      | N/A   |
|                               | Drive Wait Time            | +5 min PNR/KNR                           | +5 minutes KNR                         | N/A                                      | N/A   |
|                               | Walk Access Time           | +5 min > 0.5 miles                       | +5 min > 0.75 miles                    | N/A                                      | N/A   |
|                               | Drive Cost/Mile            | +50% PNR/KNR                             | +50% KNR                               | N/A                                      | N/A   |
|                               | Empty Drive Access Trips   | +50% PNR/KNR                             | +50% KNR                               | N/A                                      | N/A   |
|                               | Walk Access in Vehicles    | +Vehicle > 0.5 miles                     | +Vehicle > 0.75 miles                  | N/A                                      | N/A   |
| Number of                     | Trips                      |  |  |  |   |
|                               | Long Distance Trips        | Add 5%                                   | N/A                                    | N/A                                      | N/A   |
|                               | U.5-1.5 mile Urban Trips   | Add 25%                                  | N/A                                    | N/A                                      | N/A   |
|                               | Work Trips                 | N/A                                      | -25%                                   | N/A                                      | N/A   |
|                               | Relocated BAC Population   | N/A                                      | +10%                                   | -297 130                                 | +195.677  |
|                               | Relocated RAC Employment   | N/A                                      | N/A                                    | -305 012                                 | +115,077  |
| Peak Perio                    | d Travel                   |  |  | 505,012                                  | . 113,130   |
|                               | Peak Spreading             | -15 minutes                              | 25% +60 minutes                        | N/A                                      | N/A   |
| Trip Lengtł                   | ns                         |  |  |  | ,   |
|                               | Value of Drive Time        | -50%                                     | N/A                                    | N/A                                      | N/A   |
|                               | Urban Terminal Time        | -50%                                     | +100%                                  | N/A                                      | N/A   |
|                               | Trip Length Distribution   | N/A                                      | -25% RAC/Urban                         | N/A                                      | N/A   |
| Travel Cost                   | t                          |  |  |  |   |
|                               | Cost/Mile Driving          | 0%                                       | +100%                                  | N/A                                      | N/A   |
|                               | Parking Cost               | -50%                                     | +100% RAC/Urban                        | N/A                                      | N/A   |
| Mode Cho                      | ice                        |  |  |  |   |
|                               | Carpool Formation Time     | -50% or 5 minutes                        | 5 min RAC/Urban                        | N/A                                      | N/A   |
|                               | 0.5-3.0 mile Urban Trips   | -25% carpool imp                         | -25% carpool imp                       | N/A                                      | N/A   |
|                               | Transit Bias Factor        | N/A                                      | +25% RAC/Urban                         | N/A                                      | N/A   |

## **SCENARIO RESULTS**

## Scenario A Results (with TransAction Plan)

| Each pe<br>-", indica<br>condition<br>segment | formance measure is scored on a 0-100% scale, where 0%, or "-<br>ates no benefit along a corridor segment over the baseline<br>n and 100% indicates maximum regional benefit for a corridor<br>t. | Derson A | erson , | Conge  | Conge        | Tran             | Actil               | Bicy ch    | e and  | , Trail | Site Sp. | Venic.  | Syste | Emiss; |       |       |             |
|---|---|----------|---------|--------|--------------|------------------|---------------------|------------|--------|---------|----------|---------|-------|--------|-------|-------|-------------|
| A negati                                      | ve score indicates a reduction in a performance measure   | 10       | Cels,   | "Stion | <b>Stion</b> | <sup>Sir</sup> C | <sup>SIB</sup> III, | CITAC      | Nege 1 | Sales   | 'ation   | , veo   | EN P  | 10ns   |       |       |             |
| associat<br>score in                          | dicates an improvement in the condition of the transportation   | ng.      | -in -   | in y " | Ser 1        |                  | (P.) 2              | <i>t</i> 6 |        |         |          |         |       |        | dy    |       |             |
| system,                                       | such as improving regional accessibility.   | ng )     | ALIFO   | ans.   | Crity )      | ation            | se /                | Jobs )     | I CE   |         |          | IRCERIA | ner   | ne     | CHON  |       |             |
| A perfor<br>each pe                           | mance rating is calculated by multiplying the absolute score for rformance measure by its associated measure weight.  |          |         | ~~~    |              |                  |                     |            | - Tity |         | 3        | - Tig   |       |        |       |       |             |
|   | Measure   | 1.1.1    | 1.1.2   | 1.1.3  | 1.1.4        | 1.2.1            | 1.2.2               | 1.3.1      | 1.3.2  | 1.4.1   | 1.4.2    | 2.1.1   | 2.2.1 | 2.3.1  | 2.4.1 | 3.1.1 | Performance |
|   | Corridor Segment Measure Weight   | 10%      | 5%      | 5%     | 5%           | 5%               | 10%                 | 5%         | 5%     | 5%      | 5%       | 5%      | 10%   | 10%    | 5%    | 10%   | Rating      |
| 1-1   | Rt. 7/Rt. 9 — West Virginia State Line to Town of Leesburg  | -5%      |         | -7%    | -2%          | -40%             |                     |            | 32%    | -100%   | 20%      | 100%    |       |        | -13%  |       | 16.2        |
| 1-2   | Rt. 7/Dulles Greenway — Town of Leesburg to Rt. 28  |          |         |        | -1%          |                  | -28%                | 33%        | 58%    | -48%    | 51%      | 28%     | 51%   |        | -28%  |       | 20.3        |
| 1-3   | Rt. 7/Dulles Toll Road/Silver Line — Rt. 28 to Tysons   | -21%     |         | -28%   | -15%         | -18%             | -40%                | 13%        | 85%    | -24%    | 61%      | 19%     | 62%   | 0%     | -42%  |       | 27.6        |
| 1-4   | Rt. 7/Dulles Toll Road/Silver Line — Tysons to US 1   | -53%     | -100%   | -62%   |              | -28%             | -97%                | 33%        | 39%    | -22%    | 76%      | 13%     | 78%   | 20%    | -100% | -45%  | 52.9        |
| 2-1   | Loudoun County Parkway/Belmont Ridge Road — Rt. 7 to US 50  | -36%     |         | -47%   | -7%          | -43%             | -22%                |            | 62%    | -52%    | 71%      | 7%      | 62%   |        | -10%  | -100% | 36.9        |
| 2-2   | North-South Corridor/Bi-County Parkway — US 50 to I-66  |          | 0%      | 0%     | 0%           | -2%              | 0%                  |            | 68%    | -36%    | 41%      |         |       |        |       |       | 7.4         |
| 2-3   | Rt. 234 — I-66 to I-95  | -12%     | -1%     | -6%    | -3%          | -10%             | -2%                 |            | 79%    | -50%    | 31%      |         | 18%   |        | -6%   |       | 12.4        |
| 3-1   | Rt. 28 — Rt. 7 to I-66  |          | -21%    |        | -19%         |                  | -39%                | 47%        | 88%    | -37%    | 71%      | 3%      | 53%   |        | -41%  | -32%  | 28.7        |
| 3-2   | Rt. 28 — I-66 to Fauquier County Line   | -16%     | -2%     | -18%   | -8%          | -17%             | -4%                 | 100%       | 89%    | -47%    | 43%      |         | 29%   |        | -16%  | -20%  | 23.9        |
| 4-1   | Prince William Parkway — I-66 to I-95   | -19%     | -8%     | -23%   | -12%         | -12%             | -31%                | 33%        | 95%    | -49%    | 29%      |         | 20%   | 12%    | -29%  | -2%   | 23.0        |
| 5-1   | Fairfax County Parkway — Rt. 7 to US 50   | -11%     | -12%    | -15%   | -11%         | -16%             | -20%                |            | 90%    | -19%    | 51%      | 10%     | 56%   | 1%     | -28%  | -4%   | 21.9        |
| 5-2   | Fairfax County Parkway — US 50 to Rolling Road  | -14%     | -5%     | -15%   | -13%         | -17%             | -8%                 | 33%        | 81%    | -28%    | 49%      | 0%      | 29%   | 10%    | -19%  | -8%   | 19.9        |
| 5-3   | Fairfax County Parkway — Rolling Road to US 1   | -10%     | -11%    | -13%   | -3%          | -23%             |                     | 93%        | 75%    | -39%    | 65%      |         | 20%   | 1%     |       | -3%   | 19.4        |
| 6-1   | I-66/US 29/VRE Manassas — Prince William County Line to Rt. 28  | -37%     | -8%     | -39%   | -26%         | -16%             | -34%                | 80%        | 93%    | -48%    | 39%      | 79%     | 27%   |        | -60%  |       | 34.2        |
| 6-2   | I-66/US 29/US 50/Orange-Silver Line — Rt. 28 to I-495   | -29%     | -24%    | -36%   | -22%         | -15%             | -50%                | 60%        | 69%    | -27%    | 92%      | 11%     | 78%   | 56%    | -23%  |       | 40.2        |
| 6-3   | I-66/US 29/US 50/Orange-Silver Line — I-495 to Potomac River  | -33%     | -79%    | -42%   | -100%        | -18%             | -52%                | 27%        | 31%    | -24%    | 100%     | 15%     | 100%  | 19%    | -52%  | -44%  | 49.1        |
| 7-1   | I-495 — American Legion Bridge to I-66  | -31%     | -25%    | -45%   |              | -37%             | -40%                | 40%        | 35%    | -16%    | 51%      | 0%      | 64%   |        | -57%  | -40%  | 32.8        |
| 7-2   | I-495 — I-66 to I-395   | -14%     | -29%    | -21%   | -6%          | -21%             | -21%                | 47%        | 62%    | -25%    | 82%      | 2%      | 64%   |        | -59%  |       | 27.5        |
| 7-3   | I-495 — I-95 to Woodrow Wilson Bridge   | -78%     | -40%    | -100%  |              | -100%            | -40%                | 33%        | 51%    | -23%    | 65%      | 4%      | 65%   | 100%   | -82%  | -51%  | 58.4        |
| 8-1   | I-95/US 1/VRE Fredericksburg — Stafford County Line to Fairfax County Line  | -17%     | -11%    | -18%   | -22%         | -6%              | -23%                | 40%        | 100%   | -44%    | 39%      |         | 22%   | 4%     |       |       | 20.6        |
| 8-2   | I-95/US 1/VRE Fredericksburg — Prince William County Line to I-495  | -47%     | -48%    | -60%   | -53%         | -33%             | -26%                | 67%        | 68%    | -36%    | 69%      | 0%      | 27%   | 24%    | -8%   | -6%   | 35.2        |
| 8-3   | I-395/US 1/VRE Fredericksburg/Blue-Yellow Line — I-495 to Potomac River   | -100%    | -89%    | -100%  |              | -53%             | -100%               | 20%        | 42%    | -24%    | 59%      | 15%     | 64%   | 75%    | -79%  | -24%  | 60.3        |
| 9-1   | US 15 — Potomac River to Rt. 7  | -5%      |         | -5%    |              | -50%             | -2%                 |            | 43%    | -48%    | 20%      | 14%     |       |        | -19%  | -11%  | 11.7        |
| 9-2   | US 15 — Rt. 7 to I-66   | -5%      |         | -7%    | -1%          | -29%             | -6%                 |            | 48%    | -42%    | 20%      | 15%     |       |        | -8%   | -14%  | 11.0        |
| 9-3   | US 15 — US 50 to US 29  | -4%      | -1%     | -3%    | 0%           | -12%             | -2%                 |            | 58%    |         |          | 4%      |       | 6%     | -13%  |       | 5.8         |
| 10-1  | Braddock Road/VRE Manassas — Rt. 28 to I-495  | -51%     | -35%    | -64%   | -47%         | -56%             | -17%                | 67%        | 79%    | -28%    | 73%      | 7%      | 27%   |        | -71%  | -12%  | 37.1        |
| 10-2  | Columbia Pike/Braddock Road — I-495 to Pentagon   | -15%     | -58%    | -19%   | -75%         | -15%             | -29%                | 7%         | 43%    | -25%    | 82%      | 8%      | 85%   | 88%    | -22%  | -19%  | 41.2        |
| 11-1  | US 50 — Fauquier County Line to City of Fairfax   | -33%     | -19%    | -43%   | -6%          | -28%             | -23%                | 27%        | 76%    | -46%    | 86%      | 7%      | 65%   | 10%    | -44%  | -64%  | 38.7        |

## Scenario B Results (with TransAction Plan)

| Each performance measure is scored on a 0-100% scale, where 0%, or *-, indicates no benefit along a corridor segment over the baseline condition and 100% indicates maximum regional benefit for a corridor segment.<br>A negative score indicates a reduction in a performance measure associated with a negative impact, such as congestion, while a positive score indicates an improvement in the condition of the transportation system, such as improving regional accessibility.<br>A performance measure by its associated measure weight.<br>Measure 1111 112 113 114 114 |  |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |             |
|--|--|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------------|
|  | Measure  | 1.1.1 | 1.1.2 | 1.1.3 | 1.1.4 | 1.2.1 | 1.2.2 | 1.3.1 | 1.3.2 | 1.4.1 | 1.4.2 | 2.1.1 | 2.2.1 | 2.3.1 | 2.4.1 | 3.1.1 | Performance |
|  | Corridor Segment Measure Weight  | 10%   | 5%    | 5%    | 5%    | 5%    | 10%   | 5%    | 5%    | 5%    | 5%    | 5%    | 10%   | 10%   | 5%    | 10%   | Rating      |
| 1-1  | Rt. 7/Rt. 9 — West Virginia State Line to Town of Leesburg                 | -8%   | 0%    | -8%   | -2%   | -7%   |       |       | 48%   | -100% | 20%   | 83%   |       |       | -9%   | -7%   | 15.4        |
| 1-2  | Rt. 7/Dulles Greenway — Town of Leesburg to Rt. 28                         |       | -4%   |       | -9%   |       | -38%  | 40%   | 97%   | -47%  | 51%   | 40%   | 51%   |       | -11%  | -32%  | 27.1        |
| 1-3  | Rt. 7/Dulles Toll Road/Silver Line — Rt. 28 to Tysons                      | -25%  |       | -27%  | -18%  | -20%  | -45%  | 13%   | 76%   | -22%  | 61%   | 20%   | 62%   |       | -81%  | -47%  | 34.8        |
| 1-4  | Rt. 7/Dulles Toll Road/Silver Line — Tysons to US 1                        | -36%  | -100% | -41%  | -31%  | -9%   | -100% | 33%   | 45%   | -21%  | 76%   | 18%   | 78%   |       | -74%  | -68%  | 50.7        |
| 2-1  | Loudoun County Parkway/Belmont Ridge Road — Rt. 7 to US 50                 | -40%  |       | -43%  | -8%   | -23%  | -26%  |       | 100%  | -52%  | 71%   | 10%   | 62%   |       | -13%  | -100% | 38.8        |
| 2-2  | North-South Corridor/Bi-County Parkway — US 50 to I-66                     |       | 0%    | 0%    | 0%    |       | 0%    |       | 87%   | -43%  | 41%   |       |       |       | 0%    |       | 8.6         |
| 2-3  | Rt. 234 — I-66 to I-95   | -29%  | -2%   | -26%  | -11%  | -43%  | -11%  |       | 78%   | -53%  | 31%   |       | 18%   |       | -85%  | -24%  | 24.6        |
| 3-1  | Rt. 28 — Rt. 7 to I-66   | 0%    | -22%  | -7%   | -29%  | -5%   | -51%  | 47%   | 100%  | -37%  | 71%   | 3%    | 53%   |       | -27%  | -59%  | 33.8        |
| 3-2  | Rt. 28 — I-66 to Fauquier County Line                                      | -14%  | -9%   | -15%  | -9%   | -14%  | -8%   | 100%  | 97%   | -50%  | 43%   |       | 29%   |       | -18%  | -25%  | 25.4        |
| 4-1  | Prince William Parkway — I-66 to I-95                                      | -24%  | -22%  | -23%  | -22%  | -22%  | -39%  | 33%   | 86%   | -50%  | 29%   |       | 20%   | 8%    | -26%  | -40%  | 28.7        |
| 5-1  | Fairfax County Parkway — Rt. 7 to US 50                                    | -14%  | -14%  | -16%  | -14%  | -18%  | -24%  |       | 81%   | -16%  | 51%   | 11%   | 56%   |       | -32%  | -27%  | 24.7        |
| 5-2  | Fairfax County Parkway — US 50 to Rolling Road                             | -17%  | -6%   | -17%  | -13%  | -16%  | -17%  | 33%   | 95%   | -31%  | 49%   | 0%    | 29%   | 2%    | -24%  | -24%  | 23.1        |
| 5-3  | Fairfax County Parkway — Rolling Road to US 1                              | -11%  | -12%  | -13%  | -14%  | -26%  |       | 93%   | 100%  | -40%  | 65%   |       | 20%   |       | -26%  | -21%  | 24.8        |
| 6-1  | I-66/US 29/VRE Manassas — Prince William County Line to Rt. 28             | -35%  | -13%  | -32%  | -24%  | -15%  | -40%  | 80%   | 94%   | -52%  | 39%   | 100%  | 27%   |       | -52%  | -26%  | 38.0        |
| 6-2  | I-66/US 29/US 50/Orange-Silver Line — Rt. 28 to I-495                      | -34%  | -24%  | -36%  | -45%  | -19%  | -65%  | 60%   | 78%   | -29%  | 92%   | 14%   | 78%   | 34%   | -89%  | -50%  | 50.4        |
| 6-3  | I-66/US 29/US 50/Orange-Silver Line — I-495 to Potomac River               | -25%  | -87%  | -28%  | -100% | -5%   | -58%  | 27%   | 37%   | -24%  | 100%  | 19%   | 100%  |       | -55%  | -52%  | 47.7        |
| 7-1  | I-495 — American Legion Bridge to I-66                                     | -24%  | -29%  | -27%  | -9%   | -23%  | -39%  | 40%   | 49%   | -15%  | 51%   | 1%    | 64%   |       | -28%  | -46%  | 30.9        |
| 7-2  | I-495 — I-66 to I-395  | -7%   | -29%  | -11%  | -19%  | -16%  | -21%  | 47%   | 80%   | -24%  | 82%   | 3%    | 64%   |       | -53%  | -18%  | 29.1        |
| 7-3  | I-495 — I-95 to Woodrow Wilson Bridge                                      | -62%  | -25%  | -63%  |       | -54%  | -40%  | 33%   | 46%   | -23%  | 65%   | 5%    | 65%   | 100%  | -61%  | -65%  | 52.1        |
| 8-1  | I-95/US 1/VRE Fredericksburg — Stafford County Line to Fairfax County Line | -100% | -24%  | -100% | -75%  | -100% | -36%  | 40%   | 75%   | -51%  | 39%   |       | 22%   |       | -75%  | -89%  | 53.7        |
| 8-2  | I-95/US 1/VRE Fredericksburg — Prince William County Line to I-495         | -48%  | -43%  | -51%  | -79%  | -28%  | -31%  | 67%   | 82%   | -36%  | 69%   | 1%    | 27%   | 5%    | -97%  | -78%  | 46.6        |
| 8-3  | I-395/US 1/VRE Fredericksburg/Blue-Yellow Line — I-495 to Potomac River    | -68%  | -66%  | -67%  | -11%  | -26%  | -97%  | 20%   | 40%   | -24%  | 59%   | 20%   | 64%   | 47%   | -69%  | -71%  | 54.9        |
| 9-1  | US 15 — Potomac River to Rt. 7   | -6%   |       | -5%   | 0%    | -6%   | -2%   |       | 75%   | -47%  | 20%   | 22%   |       |       | -3%   | -7%   | 10.4        |
| 9-2  | US 15 — Rt. 7 to I-66  | -5%   | -3%   | -5%   | -1%   | -7%   | -3%   |       | 84%   | -42%  | 20%   | 23%   |       |       | -1%   | -6%   | 10.8        |
| 9-3  | US 15 — US 50 to US 29   | -4%   | -2%   | -3%   | 0%    | -5%   | -1%   |       | 57%   |       |       | 6%    |       | 22%   | -12%  | -2%   | 7.1         |
| 10-1   | Braddock Road/VRE Manassas — Rt. 28 to I-495                               | -43%  | -26%  | -45%  | -41%  | -25%  | -23%  | 67%   | 84%   | -31%  | 73%   | 9%    | 27%   |       | -100% | -54%  | 39.7        |
| 10-2   | Columbia Pike/Braddock Road — I-495 to Pentagon                            | -13%  | -60%  | -14%  | -56%  | -9%   | -27%  | 7%    | 48%   | -26%  | 82%   | 10%   | 85%   | 69%   | -26%  | -26%  | 39.0        |
| 11-1   | US 50 — Fauquier County Line to City of Fairfax                            | -36%  | -20%  | -39%  | -19%  | -18%  | -33%  | 27%   | 86%   | -48%  | 86%   | 10%   | 65%   |       | -68%  | -68%  | 41.2        |

## Scenario C Results (with TransAction Plan)

| Each per<br>-", indica<br>condition<br>segment | formance measure is scored on a 0-100% scale, where 0% , or "-<br>tes no benefit along a corridor segment over the baseline<br>and 100% indicates maximum regional benefit for a corridor | Person Pa | erson | Conge   | Conge | Tran. | Acti                | Bicycl. | e and a   | , Traj | Sit SE                                | Venic,  | SUSKO      | Emissi |       |       |             |
|--|---|-----------|-------|---------|-------|-------|---------------------|---------|---|--------|---------------------------------------|---------|------------|--------|-------|-------|-------------|
| A negati                                       | ve score indicates a reduction in a performance measure   | 10ers     | Cela, | Stion . | S'HON | Site  | <sup>sib</sup> ilip | Enter.  |   | Sake.  | ation .                               |         | I'M Pa     | Ons s  |       |       |             |
| score inc                                      | licates an improvement in the condition of the transportation   | ndi,      | in    | in pa   | Ser C |       | Rena 14             |         | Cong  |        |                                       | ions ic | ID SA      |        | duc   |       |             |
| system,  | such as improving regional accessibility.   | ng )      | YURO  | ansia   | "ig   | tion  | So )                | ૅઝ્ડ    | CET.  |        |                                       | CETIN.  | <b>1</b> 2 | 12     | "lion |       |             |
| A perform<br>each per                          | nance rating is calculated by multiplying the absolute score for<br>formance measure by its associated measure weight.  |           |       |         |       |       |                     |         | The second se |        | e e e e e e e e e e e e e e e e e e e | , its   |            |        |       |       |             |
|  | Measure   | 1.1.1     | 1.1.2 | 1.1.3   | 1.1.4 | 1.2.1 | 1.2.2               | 1.3.1   | 1.3.2   | 1.4.1  | 1.4.2                                 | 2.1.1   | 2.2.1      | 2.3.1  | 2.4.1 | 3.1.1 | Performance |
|  | Corridor Segment Measure Weight   | 10%       | 5%    | 5%      | 5%    | 5%    | 10%                 | 5%      | 5%  | 5%     | 5%                                    | 5%      | 10%        | 10%    | 5%    | 10%   | Rating      |
| 1-1  | Rt. 7/Rt. 9 — West Virginia State Line to Town of Leesburg  | -3%       | 0%    | -2%     | -1%   | -11%  |                     |         | 25%   | -100%  | 20%                                   | 70%     |            |        |       |       | 11.8        |
| 1-2  | Rt. 7/Dulles Greenway — Town of Leesburg to Rt. 28  | -33%      | -3%   | -38%    | -12%  | -52%  | -41%                | 58%     | 62%   | -55%   | 50%                                   | 32%     | 51%        |        | -43%  | -63%  | 39.0        |
| 1-3  | Rt. 7/Dulles Toll Road/Silver Line — Rt. 28 to Tysons   | -40%      | -4%   | -42%    | -11%  | -59%  | -37%                | 63%     | 87%   | -25%   | 60%                                   | 19%     | 62%        |        | -57%  | -52%  | 40.5        |
| 1-4  | Rt. 7/Dulles Toll Road/Silver Line — Tysons to US 1   | -36%      | -85%  | -42%    | -52%  | -13%  | -100%               | 53%     | 54%   | -25%   | 74%                                   | 13%     | 78%        |        |       | -62%  | 48.2        |
| 2-1  | Loudoun County Parkway/Belmont Ridge Road — Rt. 7 to US 50  | -52%      | -1%   | -58%    | -8%   | -63%  | -33%                | 26%     | 68%   | -61%   | 70%                                   | 9%      | 62%        |        | -15%  | -100% | 43.6        |
| 2-2  | North-South Corridor/Bi-County Parkway — US 50 to I-66  |           | -1%   | 0%      | 0%    | -10%  | 0%                  |         | 60%   | -57%   | 40%                                   |         |            |        |       |       | 8.4         |
| 2-3  | Rt. 234 — I-66 to I-95  | -32%      | -1%   | -32%    | -6%   | -44%  | -10%                | 5%      | 24%   | -68%   | 30%                                   |         | 18%        |        | -10%  | -30%  | 20.0        |
| 3-1  | Rt. 28 — Rt. 7 to I-66  | -25%      | -7%   | -31%    | -10%  | -33%  | -35%                | 37%     | 84%   | -45%   | 70%                                   | 3%      | 53%        |        | -56%  | -68%  | 36.9        |
| 3-2  | Rt. 28 — I-66 to Fauquier County Line   | -15%      | -3%   | -16%    | -4%   | -23%  | -9%                 | 89%     | 66%   | -59%   | 42%                                   |         | 29%        |        | -20%  | -20%  | 23.4        |
| 4-1  | Prince William Parkway — I-66 to I-95   | -34%      | -14%  | -37%    | -18%  | -43%  | -32%                | 32%     | 61%   | -63%   | 28%                                   |         | 20%        |        | -25%  | -43%  | 28.9        |
| 5-1  | Fairfax County Parkway — Rt. 7 to US 50   | -17%      | -4%   | -19%    | -6%   | -33%  | -19%                | 63%     | 86%   | -18%   | 50%                                   | 10%     | 55%        |        | -33%  | -27%  | 28.1        |
| 5-2  | Fairfax County Parkway — US 50 to Rolling Road  | -25%      | -2%   | -29%    | -8%   | -35%  | -20%                | 37%     | 98%   | -43%   | 48%                                   | 0%      | 29%        | 1%     | -43%  | -43%  | 28.9        |
| 5-3  | Fairfax County Parkway — Rolling Road to US 1   | -9%       | -7%   | -9%     | -5%   | -38%  |                     | 74%     | 96%   | -41%   | 64%                                   |         | 20%        |        | -16%  | -13%  | 21.7        |
| 6-1  | I-66/US 29/VRE Manassas — Prince William County Line to Rt. 28  | -42%      | -13%  | -40%    | -11%  | -28%  | -34%                | 74%     | 68%   | -64%   | 38%                                   | 100%    | 27%        |        | -63%  | -37%  | 38.9        |
| 6-2  | I-66/US 29/US 50/Orange-Silver Line — Rt. 28 to I-495   | -47%      | -29%  | -52%    | -59%  | -33%  | -56%                | 100%    | 97%   | -37%   | 90%                                   | 14%     | 78%        | 31%    | -82%  | -65%  | 57.3        |
| 6-3  | I-66/US 29/US 50/Orange-Silver Line — I-495 to Potomac River  | -26%      | -100% | -30%    | -100% | -8%   | -47%                | 58%     | 62%   | -30%   | 100%                                  | 14%     | 100%       | 24%    |       | -56%  | 50.4        |
| 7-1  | I-495 — American Legion Bridge to I-66  | -18%      | -19%  | -21%    | -9%   | -25%  | -48%                | 95%     | 90%   | -18%   | 50%                                   | 0%      | 64%        |        | -20%  | -40%  | 34.3        |
| 7-2  | I-495 — I-66 to I-395   | -10%      | -26%  | -11%    | -23%  | -21%  | -15%                | 89%     | 100%  | -29%   | 80%                                   | 3%      | 64%        |        | -17%  | -23%  | 31.1        |
| 7-3  | I-495 — I-95 to Woodrow Wilson Bridge   | -64%      | -33%  | -66%    | -25%  | -59%  | -40%                | 58%     | 40%   | -26%   | 64%                                   | 4%      | 65%        | 100%   | -63%  | -60%  | 54.7        |
| 8-1  | I-95/US 1/VRE Fredericksburg — Stafford County Line to Fairfax County Line  | -100%     | -10%  | -100%   | -40%  | -100% | -22%                | 42%     | 43%   | -49%   | 38%                                   |         | 22%        |        | -6%   | -63%  | 42.2        |
| 8-2  | I-95/US 1/VRE Fredericksburg — Prince William County Line to I-495  | -56%      | -32%  | -60%    | -52%  | -55%  | -31%                | 79%     | 72%   | -39%   | 68%                                   | 1%      | 27%        | 14%    | -100% | -75%  | 48.2        |
| 8-3  | I-395/US 1/VRE Fredericksburg/Blue-Yellow Line — I-495 to Potomac River   | -70%      | -60%  | -73%    | -43%  | -34%  | -84%                | 37%     | 33%   | -27%   | 58%                                   | 14%     | 64%        | 60%    | -39%  | -79%  | 56.6        |
| 9-1  | US 15 — Potomac River to Rt. 7  | -7%       | 0%    | -6%     | -1%   | -16%  | -1%                 |         | 36%   | -50%   | 20%                                   | 15%     |            |        | -1%   | -5%   | 8.6         |
| 9-2  | US 15 — Rt. 7 to I-66   | -9%       | -1%   | -10%    | -2%   | -25%  | -6%                 |         | 40%   | -45%   | 20%                                   | 15%     |            |        | -3%   | -11%  | 10.6        |
| 9-3  | US 15 — US 50 to US 29  | -6%       | -2%   | -5%     | 0%    | -14%  | -4%                 |         | 44%   |        |                                       | 5%      |            | 26%    | -3%   | -6%   | 7.8         |
| 10-1   | Braddock Road/VRE Manassas — Rt. 28 to I-495  | -52%      | -12%  | -56%    | -18%  | -42%  | -25%                | 47%     | 89%   | -38%   | 72%                                   | 8%      | 27%        |        | -88%  | -69%  | 40.9        |
| 10-2   | Columbia Pike/Braddock Road — I-495 to Pentagon   | -13%      | -35%  | -14%    | -30%  | -15%  | -16%                | 42%     | 51%   | -31%   | 80%                                   | 7%      | 85%        | 43%    |       | -24%  | 33.5        |
| 11-1   | US 50 — Fauquier County Line to City of Fairfax   | -42%      | -9%   | -45%    | -15%  | -34%  | -35%                | 42%     | 78%   | -56%   | 84%                                   | 11%     | 65%        |        | -30%  | -67%  | 41.1        |

## Scenario D Results (with TransAction Plan)

| Each pe<br>-", indica<br>condition<br>segment | rformance measure is scored on a 0-100% scale, where 0%, or "-<br>ates no benefit along a corridor segment over the baseline<br>n and 100% indicates maximum regional benefit for a corridor<br>c. | actson by | erson | Cong   | Conge   | Tran     | Acti                | Bicy Cr  | e and a | <b>Traj</b> | nsit Ste | Venic, | Syste | Emissi |       |       |             |
|---|--|-----------|-------|--|---------|----------|---------------------|----------|---------|-------------|----------|--------|-------|--------|-------|-------|-------------|
| A negati                                      | ve score indicates a reduction in a performance measure  | 10ers     | Cela, | Stion .  | Stion . | , site C | <sup>SIB</sup> ilip | Enter.   | , rede  | Sales       | ation.   | ૾ૼ૰૦   | IN Pa | Ons s  |       |       |             |
| score in                                      | dicates an improvement in the condition of the transportation  | ng,       | in    | in the second se | Ser 1   | Jury 1   |                     | · 6, _ ( | Cons    |             | 2 \      | Cons C | ID3   |        | du    |       |             |
| system,                                       | such as improving regional accessibility.  | ng )      | YURO  | ansi,  | "ity    | Trion )  | ୍ତ୍ତ                | ૅઝ્ડ     | CHIN.   |             |          | CHIN.  | ng (  | ."Q    | "tion |       |             |
| A perfor<br>each pe                           | mance rating is calculated by multiplying the absolute score for for for formance measure by its associated measure weight.  |           |       | · ·  |         |          |                     |          | 112     |             | 8        | 15     |       |        |       |       |             |
|   | Measure  | 1.1.1     | 1.1.2 | 1.1.3  | 1.1.4   | 1.2.1    | 1.2.2               | 1.3.1    | 1.3.2   | 1.4.1       | 1.4.2    | 2.1.1  | 2.2.1 | 2.3.1  | 2.4.1 | 3.1.1 | Performance |
|   | Corridor Segment Measure Weight  | 10%       | 5%    | 5%   | 5%      | 5%       | 10%                 | 5%       | 5%      | 5%          | 5%       | 5%     | 10%   | 10%    | 5%    | 10%   | Rating      |
| 1-1   | Rt. 7/Rt. 9 — West Virginia State Line to Town of Leesburg   |           | -100% |  | -24%    |          |                     |          | 72%     | -40%        | 8%       | 10%    |       |        |       |       | 12.7        |
| 1-2   | Rt. 7/Dulles Greenway — Town of Leesburg to Rt. 28   | -24%      | -63%  | -30%   | -68%    | -9%      | -46%                | 40%      | 100%    | -26%        | 21%      | 5%     | 20%   |        | -67%  | -35%  | 33.9        |
| 1-3   | Rt. 7/Dulles Toll Road/Silver Line — Rt. 28 to Tysons  | -48%      | -21%  | -55%   | -55%    | -46%     | -36%                | 7%       | 51%     | -16%        | 25%      | 3%     | 24%   |        | -14%  | -41%  | 29.6        |
| 1-4   | Rt. 7/Dulles Toll Road/Silver Line — Tysons to US 1  | -29%      | -71%  | -34%   | -17%    | -23%     | -20%                | 4%       | 17%     | -16%        | 31%      | 2%     | 31%   | 1%     | -10%  | -28%  | 22.1        |
| 2-1   | Loudoun County Parkway/Belmont Ridge Road — Rt. 7 to US 50   | -78%      | -43%  | -89%   | -87%    | -45%     | -61%                |          | 100%    | -28%        | 29%      | 1%     | 24%   |        | -76%  | -80%  | 49.2        |
| 2-2   | North-South Corridor/Bi-County Parkway — US 50 to I-66   |           | -100% |  | -33%    |          |                     |          | 100%    | -23%        | 17%      |        |       |        | -6%   |       | 13.9        |
| 2-3   | Rt. 234 — I-66 to I-95   | -55%      |       | -60%   | -68%    | -53%     | -45%                |          | 100%    | -24%        | 13%      |        | 7%    |        | -14%  | -35%  | 30.8        |
| 3-1   | Rt. 28 — Rt. 7 to I-66   | -32%      | -72%  | -41%   | -76%    | -19%     | -38%                | 100%     | 61%     | -23%        | 29%      | 0%     | 21%   |        | -46%  | -52%  | 37.5        |
| 3-2   | Rt. 28 — I-66 to Fauquier County Line  | -38%      | -69%  | -54%   | -50%    | -14%     | -31%                | 100%     | 100%    | -25%        | 18%      |        | 11%   |        |       | -42%  | 33.6        |
| 4-1   | Prince William Parkway — I-66 to I-95  | -53%      | -69%  | -68%   | -73%    | -33%     | -55%                | 29%      | 100%    | -25%        | 12%      |        | 8%    | 0%     | -38%  | -43%  | 38.2        |
| 5-1   | Fairfax County Parkway — Rt. 7 to US 50  | -41%      | -69%  | -53%   | -51%    | -27%     | -38%                | 4%       | 57%     | -13%        | 21%      | 2%     | 22%   | 0%     | -13%  | -49%  | 30.5        |
| 5-2   | Fairfax County Parkway — US 50 to Rolling Road   | -57%      | -41%  | -80%   | -80%    | -29%     | -61%                | 63%      | 68%     | -24%        | 20%      | 0%     | 11%   | 0%     | -31%  | -69%  | 41.7        |
| 5-3   | Fairfax County Parkway — Rolling Road to US 1  | -41%      | -75%  | -49%   | -39%    | -33%     |                     |          | 72%     | -21%        | 27%      |        | 8%    |        | -9%   | -39%  | 25.1        |
| 6-1   | I-66/US 29/VRE Manassas — Prince William County Line to Rt. 28   | -48%      | -87%  | -60%   | -76%    | -12%     | -47%                | 100%     | 100%    | -25%        | 16%      | 19%    | 11%   |        | -26%  | -11%  | 37.7        |
| 6-2   | I-66/US 29/US 50/Orange-Silver Line — Rt. 28 to I-495  | -48%      | -94%  | -59%   | -64%    | -35%     | -42%                | 32%      | 50%     | -22%        | 38%      | 2%     | 31%   | 2%     | -15%  | -41%  | 36.9        |
| 6-3   | I-66/US 29/US 50/Orange-Silver Line — I-495 to Potomac River   | -25%      | -67%  | -29%   | -31%    | -13%     | -16%                | 4%       | 13%     | -18%        | 41%      | 2%     | 39%   | 2%     | -3%   | -31%  | 22.4        |
| 7-1   | I-495 — American Legion Bridge to I-66   | -35%      | -64%  | -40%   | -8%     | -32%     | -17%                | 4%       | 25%     | -13%        | 21%      | 0%     | 25%   | 1%     | -42%  | -34%  | 23.5        |
| 7-2   | I-495 — I-66 to I-395  | -26%      | -84%  | -30%   | -41%    | -18%     | -18%                | 31%      | 32%     | -18%        | 33%      | 0%     | 25%   |        | -17%  | -23%  | 24.3        |
| 7-3   | I-495 — I-95 to Woodrow Wilson Bridge  | -57%      | -90%  | -59%   | -22%    | -49%     | -22%                |          | 15%     | -15%        | 27%      | 1%     | 26%   | 3%     | -36%  | -41%  | 30.6        |
| 8-1   | I-95/US 1/VRE Fredericksburg — Stafford County Line to Fairfax County Line   | -54%      | -66%  | -57%   | -61%    | -59%     | -36%                | 63%      | 100%    | -24%        | 16%      |        | 9%    |        |       | -35%  | 35.6        |
| 8-2   | I-95/US 1/VRE Fredericksburg — Prince William County Line to I-495   | -50%      | -83%  | -57%   | -56%    | -38%     | -25%                | 23%      | 40%     | -19%        | 28%      | 0%     | 11%   | 1%     | -27%  | -44%  | 31.7        |
| 8-3   | I-395/US 1/VRE Fredericksburg/Blue-Yellow Line — I-495 to Potomac River  | -45%      | -68%  | -49%   | -19%    | -35%     | -24%                | 1%       | 11%     | -17%        | 24%      | 2%     | 25%   | 3%     | -18%  | -37%  | 25.5        |
| 9-1   | US 15 — Potomac River to Rt. 7   | -14%      | -100% | -10%   | -16%    |          | -8%                 |          | 100%    | -23%        | 8%       | 3%     |       |        | -7%   | -4%   | 16.0        |
| 9-2   | US 15 — Rt. 7 to I-66  | -40%      | -100% | -45%   | -35%    | -14%     | -27%                |          | 100%    | -21%        | 8%       | 3%     |       |        | -52%  | -26%  | 28.2        |
| 9-3   | US 15 — US 50 to US 29   | -29%      | -100% | -20%   | -56%    | -10%     | -26%                |          | 89%     |             |          | 1%     |       | 1%     | -34%  |       | 21.1        |
| 10-1  | Braddock Road/VRE Manassas — Rt. 28 to I-495   | -50%      | -75%  | -58%   | -60%    | -33%     | -24%                | 82%      | 57%     | -22%        | 30%      | 1%     | 11%   |        | -32%  | -44%  | 35.4        |
| 10-2  | Columbia Pike/Braddock Road — I-495 to Pentagon  | -30%      | -62%  | -34%   | -22%    | -19%     | -12%                |          | 13%     | -18%        | 33%      | 1%     | 34%   | 3%     |       | -30%  | 21.0        |
| 11-1  | US 50 — Fauquier County Line to City of Fairfax  | -58%      | -76%  | -72%   | -64%    | -35%     | -52%                | 27%      | 69%     | -27%        | 35%      | 2%     | 26%   |        | -3%   | -60%  | 40.1        |



#### WEIGHTED PERFORMANCE MEASURES

Figure 1: Scenario A Performance with TransAction Plan (compared to 2040 No Build Scenario A)







Figure 2: Scenario B Performance with TransAction Plan (compared to 2040 No Build Scenario B)











Figure 4: Scenario D Performance with TransAction Plan (compared to 2040 No Build Scenario D)