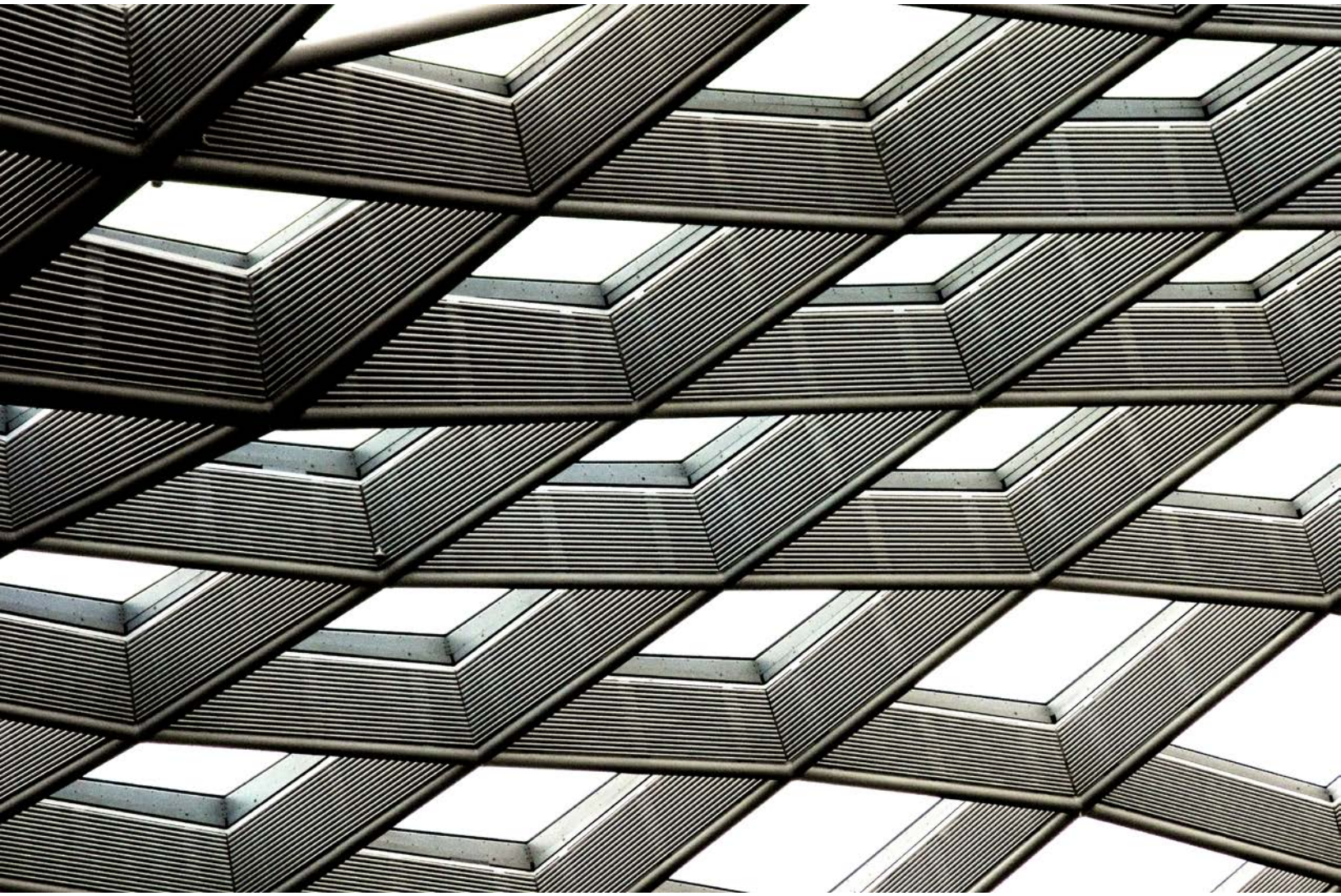
ENVIRONMENTAL JUSTICE AND TITLE VI ANALYSIS OF VISUALIZE 2045

Full Technical Report

December 2018



National Capital Region
Transportation Planning Board

ENVIRONMENTAL JUSTICE AND TITLE VI ANALYSIS OF VISUALIZE 2045
FULL TECHNICAL DOCUMENTATION

Prepared by TPB Staff
December 2018

ABOUT THE TPB

The National Capital Region Transportation Planning Board (TPB) is the federally designated metropolitan planning organization (MPO) for metropolitan Washington. It is responsible for developing and carrying out a continuing, cooperative, and comprehensive transportation planning process in the metropolitan area. Members of the TPB include representatives of the transportation agencies of the states of Maryland and Virginia and the District of Columbia, 23 local governments, the Washington Metropolitan Area Transit Authority, the Maryland and Virginia General Assemblies, and nonvoting members from the Metropolitan Washington Airports Authority and federal agencies. The TPB is staffed by the Department of Transportation Planning at the Metropolitan Washington Council of Governments (COG).

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INTRODUCTION

Background and Purpose

This report documents the results of an equity analysis of the constrained element of Visualize 2045, the National Capital Region's long-range transportation plan, including the federally-required Environmental Justice analysis. The purpose of this report is to demonstrate the Transportation Planning Board has complied with regional metropolitan transportation planning requirements for metropolitan planning organizations (MPOs) by conducting and documenting the results of the Environmental Justice and Title VI analysis of the region's long-range transportation plan. This report also provides analysis to decision makers, local elected officials, and the public with additional data, tools, and findings exploring transportation equity in the National Capital Region[1] (see Figure 1).

An Environmental Justice analysis seeks to identify and address disproportionately high and adverse impacts of a federal agency's programs and policies on minority and low-income populations. As the federally designated MPO for regional transportation planning in the National Capital Region, the TPB is required to prepare a long-range transportation plan, which is subject to Environmental Justice regulations. As a result, TPB conducted this Environmental Justice and Title VI analysis of Visualize 2045 to identify and consider high and adverse impacts that may disproportionately burden low-income and minority populations.

Visualize 2045 is the long-range metropolitan transportation plan for the National Capital Region and illustrates what the region "aspires" to do with more resources, "can do" with current funding levels, and "must do" to meet federal requirements. This report documents the equity analysis for the "can do" element, or the financially constrained element, which includes all transportation projects that are regionally significant, federally funded, or both, and are currently programmed to be built in the region between now and 2045. In all, the financially constrained element includes more than 600 projects ranging from multi-billion-dollar highway and transit projects, to local bridge replacements, to bicycle and pedestrian facilities.[2]

Federal Guidance and Policy Context

The contents of this full technical report are intended to satisfy several federal requirements as well as regional policy objectives outlined in this section. This section describes each set of requirements, summarizes the TPB's specific responsibilities, and highlights key policy guidance from the National Capital Region Transportation Planning Board (TPB).

FEDERAL GUIDANCE

Federal requirements regarding Title VI and environmental justice are related but distinct. Title VI provides legal protection from discrimination based on race, color, or national origin, while

[1] For a full map of the National Capital Region and the TPB member jurisdictions, see mwcog.org/transportation/about-tpb/jurisdictions/

[2] For an interactive listing of all projects in the financially constrained element, see mwcog.org/visualize2045/projects-map/

For additional information on Visualize 2045, see mwcog.org/visualize2045/

environmental justice requirements call upon Federal Agencies to ensure their programs and activities incorporate environmental justice principles and do not disproportionately burden low-income and minority populations.

Title VI of the 1964 Civil Rights Act, states that "no person in the United States shall, on the ground of race, color, or national origin, be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any program or activity receiving federal financial assistance."[3] Further, grant making Federal agencies are required to enforce regulations for compliance with this law. As an agent of government that receives federal funding, the TPB is responsible for implementing Title VI and conforming to federal Environmental Justice principles, policies, and regulations.

In 1994, President Clinton signed Executive Order 12898, "Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations," that further amplifies the requirements of Title VI and states that federal agencies must identify and address "disproportionately high and adverse human health and environmental effects, including social and economic effects, of their programs, policies, and activities on minority populations and low-income populations."[4] Similar Orders from the U.S. Department of Transportation (DOT) in 1997 and the Federal Highway Administration in 1998 called upon those agencies to consider Environmental Justice in their programs, policies, and procedures.[5]

In August 2011, a Memorandum of Understanding signed by 17 federal agencies reinforced and renewed the federal government's efforts in Environmental Justice.[6] As a result, DOT, FHWA, and FTA, communicated additional guidance reinforcing their programs and policies related to Environmental Justice and improved requirements for engaging low-income and minority populations.[7] The guidance defines three fundamental Environmental Justice principles that are consistent with the Executive and DOT Orders:

- To avoid, minimize, or mitigate disproportionately high and adverse human health and environmental effects, including social and economic effects, on minority populations and low-income populations.
- To ensure the full and fair participation by all potentially affected communities in the transportation decision-making process.
- To prevent the denial of, reduction in, or significant delay in the receipt of benefits by minority and low-income populations.

[3] Title VI, 42 U.S.C. § 2000d et seq.

[4] Executive Order 12898. February 11, 1994. "Federal Actions To Address Environmental Justice in Minority Populations and Low-Income Populations." Federal Register, Vol. 59, No. 32.

[5] U.S. Department of Transportation. April 1997. "Environmental Justice in Minority Populations and Low-Income Populations." Order 5610.2.

United States Federal Highway Administration. 1998. "FHWA Actions to Address Environmental Justice in Minority Populations and Low-Income Populations." Order 6640.23.

[6] United States Environmental Protection Agency. August 4, 2011. "Memorandum of Understanding on Environmental Justice and Executive Order 12898."

[7] U.S. Department of Transportation. May 2, 2012. "Department of Transportation Actions to Address Environmental Justice in Minority Populations and Low-Income Populations." Order 5610.2(a).

United States Federal Highway Administration. June 14, 2012. "FHWA Actions to Address Environmental Justice in Minority Populations and Low-Income Populations." Order 6640.23A.

United States Federal Transit Administration. August 12, 2012. "Environmental Justice Policy Guidance for Federal Transit Administration Recipients." FTA C 4703.1. Docket No. FTA-2011-0055.

The DOT Orders further defines "disproportionately high and adverse effect on minority and low-income populations" as an effect that:

1. Is predominately borne by a minority population and/or a low-income population, or
2. will be suffered by the minority population and/or low-income population and is appreciably more severe or greater in magnitude than the adverse effect that will be suffered by the non-minority population and/or non-low-income population.

For MPOs to meet EJ requirements, DOT guidelines suggest the following elements be included. This summary and the Full Technical Report complete elements #1 and #3 through #5. The TPB's Participation Plan identifies and describes the TPB's policies and procedures under element #2 to provide public access and involvement under a true collaborative planning process: [8]

1. A regional demographic profile of low-income populations and minority populations,
2. Documentation of public involvement activity as it relates to low-income and minority populations,
3. An analytical process and mapping,
4. Determination of any disproportionate and adverse impact on low-income and minority populations based on benefits and burdens identified in the analytical process, and
5. If present, a demonstration for how plans, programs, and projects can avoid or minimize disproportionately high and adverse effects.

Title VI Plan and Program

The Metropolitan Washington Council of Government (COG) and its Department of Transportation, as the administrative agent of the TPB (the region's MPO): must meet a variety of Title VI requirements. Through its Title VI Plan and Program, COG and the TPB outline the nondiscrimination assurances and policies for all its programs and activities. COG's Title VI Plan, which encompasses the TPB, provides necessary policies and practices to ensure non-discrimination and compliance with FHWA and FTA Title VI requirements. These are available at mwcog.org/TitleVI.

DOT's Federal Transit Administration (FTA) requires COG, as a Designated Recipient of the FTA Section 5310 Enhanced Mobility program, to submit a Title VI Program to "document compliance with DOT's Title VI regulations by submitting a Title VI Program to its FTA regional civil rights officer once every three years or as otherwise directed by FTA".[9] The Title VI Program is specific to the FTA requirements and includes general requirements for an MPO. These are available at mwcog.org/TitleVI.

[8] United States Federal Highway Administration. April 1, 2015. "Environmental Justice Reference Guide." Pg. 26.

[9] Title Vi Requirements And Guidelines For Federal Transit Administration Recipients. FTA C 4702.1B. October 1, 2012. Page III-1.

TPB POLICY CONTEXT

Public participation

Federal law requires MPOs to engage users of all transportation modes who reside, have an interest, or do business in an area affected by transportation decisions to ensure that the concerns and issues of everyone with a stake in transportation decisions are considered in the development of the policies, programs, and projects being proposed in their communities. The MPO must develop a participation plan that makes public information available in ways that are accessible and understandable by all participants and encourage the participation of traditionally underserved populations, such as, low-income or minority households and the elderly.

The TPB's Participation Plan identifies and describes the TPB's policies and procedures to provide public access and involvement under a true collaborative planning process in which the interests of all of the stakeholders - public and private - are reflected and considered. Accordingly, it is the TPB's intent to make both its policy and technical process inclusive of and accessible to all of its stakeholders. The Participation Plan was last updated in 2014 and will be updated again in 2019. The plan is available at mwcog.org/tpb-participation-plan/.

Two citizen committees regularly advise the TPB: The Citizens Advisory Committee (CAC) and the Access for All Advisory Committee (AFA). The CAC is a group of 15 people from throughout the Washington metropolitan region who represent diverse viewpoints on long-term transportation policy. The mission of the CAC is to promote public involvement in transportation planning for the region, and to provide independent, region-oriented citizen advice to the TPB on transportation plans and issues. The AFA is made up of community leaders from around the region and advises the TPB on issues and services that are important to low-income communities, minority communities, people with limited English skills, individuals with disabilities, and older adults.

Policy framework

The TPB policy framework is a culmination of a 20-year evolution that began with a visioning process in 1994. This framework includes comprehensive strategies that promote a strong regional economy and help improve quality of life for all residents. Within these goals, objectives, and strategies are multiple considerations and inclusion of equity.

The policy statements and documents that make up the framework encourage the region's transportation agencies to consider regional goals, priorities, and needs when developing and selecting projects to fund and implement. The policy framework consists of the TPB Vision, the Regional Transportation Priorities Plan, the Region Forward vision adopted by COG, and the seven aspirational initiatives recently endorsed by the TPB.

THE TPB VISION (1998)

The TPB Vision, adopted in 1998, provides a comprehensive set of policy goals, objectives, and strategies that guide transportation planning and investment decisions in the Washington region.[10] The Vision was developed by TPB members and technical staff from throughout the region through a

[10] The TPB Vision can be found at mwcog.org/transportation/plans/tpb-vision/

collaborative effort that involved consideration and inclusion of the transportation, land-use, environmental, and economic sectors.

The following TPB Vision goals apply to considerations of equity and inclusion:

1. The Washington metropolitan region's transportation system will provide reasonable access at reasonable cost to everyone in the region.
2. The Washington metropolitan region will develop, implement, and maintain an interconnected transportation system that enhances quality of life and promotes a strong and growing economy throughout the entire region, including a healthy regional core and dynamic regional activity centers with a mix of jobs, housing and services in a walkable environment
5. The Washington metropolitan region will plan and develop a transportation system that enhances and protects the region's natural environmental quality, cultural and historic resources, and communities.

REGION FORWARD (2010)

COG developed Region Forward in 2010 to guide local and regional decision making.[11] It spells out nine broad goal areas, one of which is transportation, and numerous objectives and targets for assessing progress toward achieving each of the goals.

The following Region Forward goals apply to considerations of equity and inclusion:

- We seek a broad range of public and private transportation choices for our region which maximizes accessibility and affordability to everyone and minimizes reliance upon single occupancy use of the automobile.
- We seek a transportation system that maximizes community connectivity and walkability and minimizes ecological harm to the region and world beyond.
- We seek to minimize economic disparities and enhance the prosperity of each jurisdiction and the region as a whole through balanced growth and access to high-quality jobs for everyone.

THE REGIONAL TRANSPORTATION PRIORITIES PLAN (2014)

The TPB adopted the Regional Transportation Priorities Plan (RTPP) in January 2014.[12] It focuses the region's attention on a handful of transportation priorities and strategies with the greatest potential to advance regional goals rooted in the TPB Vision. The strategies are meant to be "within reach" both financially and politically. The goals in the RTPP are frequently referenced in TPB planning activities. Pursuing the priorities outlined in this plan will lead to greater economic vitality and a higher quality of life for those that live in the metropolitan Washington region.

The following RTPP priority applies to considerations of equity and inclusion:

[11] Region Forward can be found at mwcog.org/regionforward/

[12] The RTPP can be found at mwcog.org/RTPP/

- Strengthen Public Confidence and Ensure Fairness: Efforts to increase accountability and address the needs of historically transportation-disadvantaged populations should be considered in all stages of project planning, design, and implementation.

The following RTPP goals apply to considerations of equity and inclusion:

1. Provide a comprehensive range of transportation options
2. Promote a strong regional economy, including a healthy regional core and dynamic Activity Centers
5. Enhance environmental quality, and protect natural and cultural resources

EQUITY EMPHASIS AREAS (2018)

TPB Equity Emphasis Areas are U.S. Census tracts in the National Capital Region with above average concentration of low-income, minority, or both, populations. The TPB adopted the methodology for Equity Emphasis Areas (EEAs) and the resulting map in March 2017 after a thorough consultation process with the TPB Technical Committee and COG's Planning Directors Technical Advisory Committee. This first step was to enhance the approach to analyze the long-range transportation plan for Title VI and Environmental Justice (EJ) considerations. In preparation for Visualize 2045, the Equity Emphasis Areas were updated with the most recent Census estimates, 5-year ACS data (2012-2016).

In addition to Environmental Justice analysis, the EEAs can be used for other planning and programming work where equity is a key consideration. For example, these EEAs will inform the sampling strategy for the regional Household Travel Survey to ensure that low-income and minority populations are fully represented in the survey. The Transportation and Land-Use Connections (TLC) grant program will encourage applications from local governments for projects related to the EEAs. EEAs can be used in scenario analysis and could also be used by local jurisdictions to assist with their community planning initiatives in areas such as housing, health care, education and parks or green space.

In the future, EEAs will be updated in conjunction with each major long-range transportation plan update using the latest-available Census or ACS data available at that time. Major plan updates, like Visualize 2045, occur at least once every four years in accordance with federal regulations.

Aspirational Initiatives (2018 and beyond)

In 2017 and 2018 the TPB identified seven initiatives that have potential to improve the performance of the region's transportation system compared to previously adopted long-range transportation plans.[13] The projects, policies, and programs that make up these initiatives were identified based on their ability to make more progress toward achieving the goals laid out in previously adopted TPB and COG governing policy documents.

In future plan updates, the TPB would like to see more projects, programs and policies included in the financially constrained element of the plan that help fulfill these initiatives. By advancing these initiatives, the region will continue to build upon a legacy of regional policies that bring the region closer to reaching its goals for an effective transportation system for all of its residents.

[13] More information on the inclusion of the aspirational initiatives in Visualize 2045 can be found at mwcog.org/visualize2045/aspirational-element/

METHODOLOGY

This section summarizes the two-phase approach TPB staff implemented to analyze the impact of long-range transportation plan on Environmental Justice, which includes identifying Equity Emphasis Areas and examining the constrained element of Visualize 2045 to determine if any disproportionate and adverse impact are experienced by low-income and minority populations.

In 2016, TPB staff undertook a review of the state of the practice in Title VI and Environmental Justice analysis methods used by other MPOs. The major finding from the scan was that while the TPB's previous approach was typical and compliant with the federal requirements, it could be enhanced. The review found that the Environmental Justice analyses of some MPOs first defined small geographic areas, sometimes called "Environmental Justice Areas," "EJ Areas," or "Communities of Concern," and then examined transportation performance in these smaller areas in comparison with the rest of their planning areas, herein referred to as the Rest of the Region. The review also found many MPOs use multiple transportation performance measures in their evaluation.

Based on this examination of methods and testing of alternative enhancements, TPB staff developed a revised Environmental Justice analysis methodology. The revised methodology reflects two key elements:

Phase 1: Identifying small geographic areas with higher than average concentrations of low-income populations, minority populations, or both. These were labelled as Equity Emphasis Areas (EEA) denoting an emphasis to place on these areas while making transportation investment decisions. The TPB approved this methodology in March 2017 and the EEAs for this analysis were identified using this methodology in June 2018.

Phase 2: Examining the constrained element of Visualize 2045 for changes in accessibility and mobility, using several different measures; determining if the changes were benefits or burdens; comparing benefits and burdens within EEAs relative to the Rest of the Region and determine if a disproportionately high and adverse impact on low-income and minority populations exists.

Phase 1: Identifying Equity Emphasis Areas

The TPB methodology to identify EEAs, approved by the TPB at its March 2017 meeting, relies on the most recently available U.S. Census Bureau American Community Survey (ACS) data on income, race, and ethnicity to determine which Census tracts are considered Equity Emphasis Areas. For this analysis, tract-level data from the 2012-2016 5-year American Community Survey estimates for each of the following four population groups is used is used to identify areas that have above average concentrations of low-income populations, minority populations, or both, compared to the TPB planning area (see Figure 1).

- Low-Income: Individuals with household income less than one-and-a-half times the federal government's official poverty threshold, depending on household size. [14]
- Black or African American: A person having origins in any of the Black racial groups of Africa.

[14] For example, income less than $36,509 for a family of four would be considered low-income. For more info see: https://www.census.gov/data/tables/time-series/demo/income-poverty/historical-poverty-thresholds.html

- Asian: A person having origins in any of the original peoples of the Far East, Southeast Asia, or the Indian subcontinent.
- Hispanic or Latino: A person of Mexican, Puerto Rican, Cuban, South or Central American, or other Spanish culture or origin regardless of race.

Racial and ethnic minority populations identified by the U.S. Census includes American Indian and Alaska Native, Native Hawaiian and Pacific Islander, Some Other Race, and Two or More Races, that were not used for identifying Equity Emphasis Areas. Black or African American, Asian, and Hispanic or Latino were used as they represent the largest racial and ethnic minority populations in the study area.[15] Further, statistical margin of errors for tract-level population estimates of these other minority groups provided high levels of uncertainty for this regional analysis and were omitted for this reason, as well.

TPB staff established a system for scoring each Census tract that used clear ground rules. Tracts were identified as Equity Emphasis Areas if one of two criteria are met:

Criteria 1: Tracts must have a concentration of individuals identified as low-income more than one-and-a-half times the regional average (see Table 1)

Criteria 2: Tracts must have high concentrations of two or more minority population groups or high concentrations of at least one minority population group together with low-income concentrations at or above the regional average (see Table 2).

To identify tracts with above average concentrations of low-income or minority population groups, as well as to normalize and compare results across the four groups and the region, an Index Score was calculated for every tract in the region based on each group's regional concentration in each tract. Index Scores for each population group were aggregated to reach an uncapped Total Index Score for each tract. Areas with Total Index Scores greater than or equal to 4.00 are considered Equity Emphasis Areas.

Table 1: Scoring for Criteria 1 - Low-Income Population Concentration

RATIO OF CONCENTRATION (ROC or times the regional average)	INDEX SCORE Low-Income[16]
Between 1.5 and 3.0	4.5 to 9.0
Greater than 3.0	9.0
Index Score	4.5 to 9.0
☑ Equity Emphasis Area (Total Index ≥ 4.00) ☐ Not an Equity Emphasis Area (Total Index < 4.00)	

[15] Region is defined as the TPB Planning Area: http://www.mwcog.org/transportation/tpb/jurisdictions.asp.

[16] The ROC for low-income is multiplied by three to determine the index score but capped at 9.0.

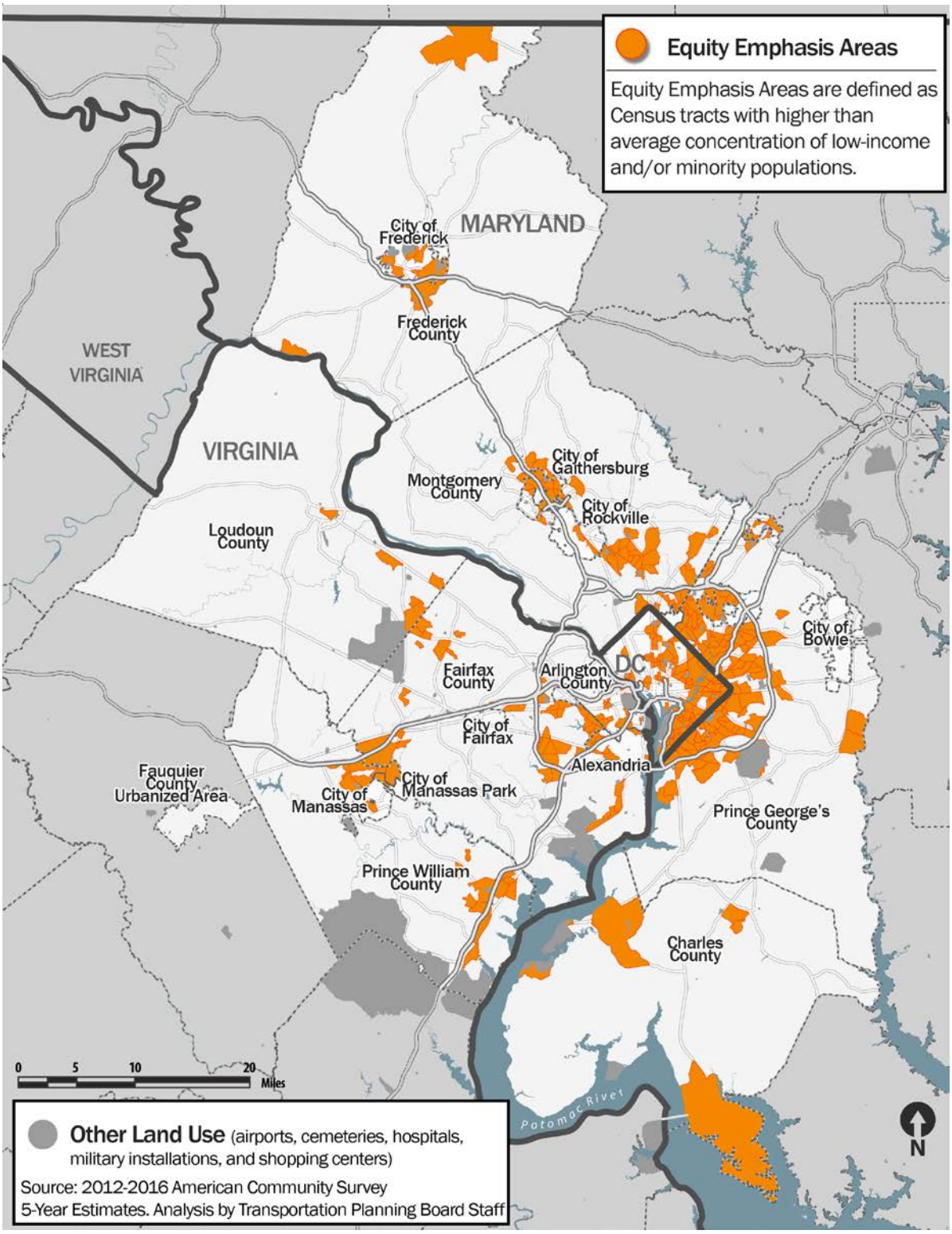
Table 2: Scoring for Criteria 2 - Minority Population Concentration and Secondary Low-Income Thresholds

RATIO OF CONCENTRATION (ROC or times the regional average)	INDEX SCORE			
	Low-Income[3]	African American	Asian	Hispanic or Latino
Less than 1.0	0	0	0	0
Between 1.0 and 1.49	1.0 to 1.49			
Between 1.5 and 3.0	See Criteria 1 (4.5 to 9.0)	1.5 to 3.0	1.5 to 3.0	1.5 to 3.0
Greater than 3.0	See Criteria 1 (9.0)	3.0	3.0	3.0
Total Index Score	Index scores are totaled			
☑ Equity Emphasis Area (EEA) (Total Index ≥ 4.00) ☐ Not an Equity Emphasis Areas (EEA) (Total Index < 4.00)				

The results of Phase 1 identified 351 of the 1,222 tracts analyzed in the region, or 28%, as Equity Emphasis Areas.[17] A map of the identified areas is presented in Figure 1. An online interactive map is available with detailed data information at https://gis.mwcog.org/webmaps/tpb/clrp/ej.

[17] The region includes 1,231 tracts. Nine tracts were excluded for having no to very little population.

Figure 1: Equity Emphasis Areas and the TPB Planning Area



CONSULTATION AND STAKEHOLDER INPUT

The TPB was briefed on the proposed methodology and mapping at several meetings. At the January 18, 2017 meeting, the TPB asked staff to re-examine and refine the methodology for the Equity Emphasis Areas map, specifically to address the concern that the approach to identifying Equity Emphasis Areas left out areas with high concentrations of a single minority population. Following the January 18 meeting, TPB staff reviewed the approaches of some peer organizations, tested alternative changes to the scoring system, and refined the methodology. The TPB adopted Phase 1: Equity Emphasis Areas methodology at its March 2017 meeting. The TPB was briefed in June 2018 on the update to the EEA map with the latest Census data and had no concerns or issues with the minor changes that resulted in the EEAs from using the latest data.

Consultation efforts during Phase 1 included briefings to COG's Planning Directors Technical Advisory Committee (PDTAC), a COG Committee of planning directors from every jurisdiction in the region, and staff level consultations in the District of Columbia, Montgomery County, MD, Prince George's County, MD, and Fairfax County, VA. These consultations concluded with the PDTAC endorsing the technical process used, which reflected the PDTAC's consensus recommendation of placing additional weight to the low-income factor in the methodology. PDTAC considered low-income as a determining factor for if an area is to be considered an Equity Emphasis Area, especially given the assumption that income is a stronger indicator of a person's ability to access transportation options than race or ethnicity.

The TPB Technical Committee, composed of local transportation planning representatives from the region, was also consulted and invited to provide comments on the enhancements to the Title VI and Environmental Justice analysis. During this time, only one written comment was received, underscoring the overall support for the proposed enhancements by the committee.

The CAC was briefed on the methodology and mapping. CAC members expressed enthusiasm for the proposed enhanced EJ analysis. The AFA was briefed and enthusiastically supported the work.

Phase 2: Examining the constrained element of Visualize 2045

This section describes the steps used to examine the constrained element of Visualize 2045 for changes in accessibility and mobility to jobs and hospitals by different modes of transportation. This section also identifies the benefits and burdens in Equity Emphasis Areas as-a-whole and in the Rest of the Region and describes the determination test used to identify if a disproportionately high and significantly adverse impact on low-income and minority populations exists.

Phase 2 of the Title VI and Environmental Justice analysis of the constrained element of Visualize 2045 uses output from the TPB's travel demand model, which forecasts where, when, and how people will travel around the region throughout the future years covered by the long-range transportation plan. To make its predictions, the model relies on the latest regional population, household and job growth forecasts prepared by COG, information on existing travel patterns from the TPB's 2007-2008 Regional Household Travel Survey, and the future transportation system laid out in the constrained element of Visualize 2045.[18]

This analysis primarily compares changes in transportation system performance from 2019 (Today) to a future, labelled "2045 Plan-Build" scenario, using a variety of accessibility and mobility measures. The changes in mobility and accessibility is attributable to the planned transportation projects included under the plan's financially constrained element and the forecasts change in population and employment. The analysis also includes "2045 No-Build" scenario data, which represents a future in which no new transportation projects would be constructed, but anticipated population and job growth would still occur. This additional scenario allows the analysis team to better understand if the changes in accessibility and mobility measures are due to the impact of the new transportation projects in the constrained element of Visualize 2045 or if they result from anticipated population and job growth.

Scenarios analyzed:

- **Today (2019)**: Today's household and jobs with projects already on the ground or expected to be completed by 2019.
- **2045 No-Build scenario**: *Grow but don't build.* Forecast growth for 2045 households and jobs but none of the transportation projects in the plan are built beyond those expected to be completed in 2019.
- **2045 Plan-Build scenario**: *Grow and build.* Forecast growth for 2045 households and jobs and all constrained element projects included in Visualize 2045 are completed by 2045.

The first step is to identify Transportation Analysis Zone-equivalencies for the U.S. Census tract-level Equity Emphasis Areas identified in Phase 1. Transportation Analysis Zone (TAZ) is the level of analysis used by the TPB for conducting the classic, "four-step" regional travel demand model.[19] Using a geographic information system, a TAZ is identified as an Equity Emphasis Area tract-level equivalent when its centroid is located within an Equity Emphasis Area tract. Additional staff review was completed to confirm these locations and make technical adjustments, when necessary.

[18] The results of this analysis use the following input data: MWCOG's Round 9.1 Cooperative Land-Use Forecasts and TPB's Version 2.3.75 Travel Demand Model. These findings are based on regional model estimates that come with a degree of uncertainty.

[19] Additional detail: https://www.mwcog.org/transportation/data-and-tools/modeling/model-documentation/

Next, the TPB Planning Area as-a-whole, the aggregated TAZ-level EEA equivalents, and the aggregated Rest of the Region are used as unique geographies to calculate average accessibility and average mobility measures for the three identified scenarios. For accessibility measures, the average for an origin zone is calculated by averaging the number of opportunities (e.g., jobs) for all destination zones weighted by the household population of each zone. This "weighted-average accessibility" approach is consistent with the methodology used in the performance analysis of the constrained element of Visualize 2045. Accessibility measures #1 through #4 were calculated using a 45-minute commute during AM Peak period.

ACCESSIBILITY MEASURES:

1. Average number of jobs accessible by auto
2. Average number of jobs accessible by transit [20]
3. Average number of jobs accessible by High Capacity Transit [21]
4. Average number of jobs accessible by bus [22]
5. Population with walkable access to High Capacity Transit [23]
6. Population with walkable access to bus service [24]

Mobility measures are the average model-estimated commute travel times for the residents of Equity Emphasis Areas and for the Rest of the Region. This measure is based on the mode choice output and evaluates travel times for the specific EEA-based and non-EEA-based (Rest of the Region) commute trip origins and destinations generated by the model. All residents of Equity Emphasis Areas are included in calculations regardless of their income and race and ethnicity since model-generated output cannot be disaggregated to that level.

MOBILITY MEASURES

7. Average commute time by auto [25]
8. Average commute time by transit [26]
9. Average travel time to closest hospital by auto [27]
10. Average travel time to closest hospital by transit

[20] This measure includes both walk and drive access to transit including walking to transit and driving to a transit station nearby (commuter lots, park and ride, etc.).

[21] This measure examines access by walking to transit and using High Capacity Transit (HCT) for any part of the trip (i.e., HCT-to-bus transfers are included). For this measure, HCT includes Metrorail, commuter rail, streetcar, or light rail but excludes Bus Rapid Transit (BRT). Exclusion of BRT has minimum impact on average accessibility.

[22] This measure examines accessibility for transit trips that begin with walking to bus, including BRT, with no transfer to HCT.

[23] High Capacity Transit includes Metrorail, commuter rail, streetcar, light rail, or BRT. All population and jobs in a TAZ were considered accessible to high capacity transit if its centroid is located within 1 mile of a rail station or within ½ mile of a BRT station.

[24] All population and jobs in a TAZ were considered accessible to bus service if its centroid was located within ½ mile of a bust stop. This measure does not include BRT.

[25] Average commute and travel times by auto includes travel time on roadways and "terminal" times (e.g., to park the vehicles, etc.).

[26] Average commute and travel times by transit includes time it takes to reach transit and destination, including walk access time, drive access time, transfer time, and wait time.

[27] Average travel time to closest hospital is calculated by averaging the access time to the nearest hospital for all origin EEA TAZs weighted by the household population of each zone. Hospital is defined as a facility that provides in-patient medical care, including 24-hour emergency care (including Children's Hospitals) for patients. This does not include stand-alone urgent care facilities, psychiatric hospitals, Veterans Administration hospitals, private hospitals exclusive to members, and hospitals with no emergency care.

The analysis developed quantitative estimates for the above measures for three geographic areas: (1) the entire TPB planning area, (2) the Equity Emphasis Areas as a whole and for (3) the Rest of the Region (excluding the EEAs). These estimates were then examined to identify benefits and burdens in all three areas. For the accessibility measures, a benefit is identified as an increase in average accessibility or an increase in the population with access to transit services between today and 2045. Conversely, a burden is identified when a decrease in average accessibility or a decrease in the population with access to transit services between today and 2045 is identified. For mobility measures, a benefit is identified when the average commute time or average travel time declines between today and 2045. Finally, a burden is identified when the average commute time or average travel time increases between today and 2045.

Using the results and established benefits and burdens, the final step is to determine if any of the estimated impacts, due to planned projects in the constrained element of Visualize 2045, results in a disproportionately high and significantly adverse impact on low-income and minority populations. The impact would be considered disproportionately high and significantly adverse when the adverse effect, or burden, is predominately borne by the Equity Emphasis Areas or will be suffered by the Equity Emphasis Areas and is appreciably more severe or greater in magnitude than the adverse effect that will be suffered by the Rest of the Region.

LIMITATIONS OF THE ANALYSIS

The methodology of this analysis is limited by available tools and data. When identifying tract-level areas with above average concentration of low-income populations, minority populations, or both, five-year U.S. Census American Community Survey is the most statistically significant. However, because data are aggregated of over a five-year period instead of reflecting the most recent year. Also, racial and ethnic groups tend to be undercounted in the survey relative to the general population. The number of individuals with disabilities may also be underestimated, because the Census relies on self-reports of disability status and some individuals may be reluctant to identify themselves as having a disability.

Further, the analysis assumes that the areas identified as Equity Emphasis Areas today will remain unchanged in 2045. However, the location of these areas will most likely change by 2045 as changes in land uses, housing prices, and migration patterns alter the demographic profile of the region over the next 27 years. Given the multiple variables and the difficulties in predicting how these variables will change in this region in the future, the current geographic distributions are assumed to remain constant through 2045.

Finally, the measures used in the analysis are limited. To measure benefits and burdens of the constrained element of Visualize 2045, the analysis considers quantifiable aspects of the regional transportation system, such as the location of major highways and transit routes. The analysis does not consider more qualitative aspects of the system that affect the accessibility of the transportation system to low-income and minority populations. These may include:

- Safety and comfort
- Reliability
- Availability of off-peak service
- Availability of information and ease of use
- Language barriers

In addition, the analysis focuses specifically on the impact of the transportation system and the forecasted impact of the constrained element of Visualize 2045 on various accessibility and mobility

measures. It does not consider non-transportation-related benefits and burdens, such as air, water, or noise pollution.

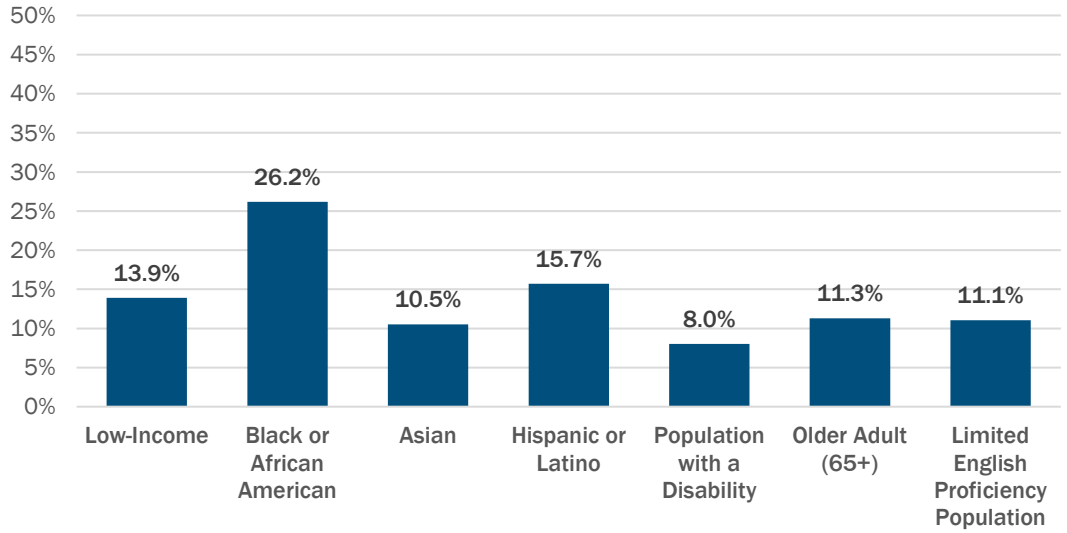
DEMOGRAPHIC PROFILE AND REGIONAL TRAVEL INDICATORS FOR THE NATIONAL CAPITAL REGION

This section provides the regional demographic profile of traditionally disadvantaged population groups in the National Capital Region.

Two important initial components in the Environmental Justice analysis include identifying the demographic makeup of the region and comparing the geographic location of traditionally disadvantaged population groups with the location of major transportation improvements from the constrained element of Visualize 2045. This approach allows a greater understanding of how the major transportation improvements over the next 27 years may affect traditionally disadvantaged population groups. Maps detailing the location of traditionally disadvantaged population groups with overlays of the major highway, major transit, and major managed High-Occupancy Toll (HOT), High-Occupancy Vehicle (HOV), and Toll Lane Projects from the constrained element of Visualize 2045 can be found in Appendix A.

According to the U.S. Census, the National Capital Region is home to over 5.4 million residents. Traditionally disadvantaged population groups make up important shares of the region's population. Figure 1 presents the share of the region's population which identifies as low-income, members of as a racial or ethnic minority, persons with a disability, older adults, or persons with limited English proficiency.[28]

Figure 2: Demographic Profile of the National Capital Region (2017)



Source: U.S. Census, 2012-2016 American Community Survey 5-year estimate

[28] American Indian and Alaskan Native, Native Hawaiian and Pacific Islander, Other, or Two or More Races populations were not included in this analysis because data showed these populations representing less than 1% of the Washington region. Population with a Disability is a person with any form of disability, including sensory, physical, mental, self-care, going outside the home, and employment disability. Older Adult refers to a person over the age of 65. Limited English Proficiency is a person who speaks English less than "very well."

In 2019, Round 9.1 of the Cooperative Forecast expects the region's population to be over 5.6 million residents and 3.3 million jobs. By 2045, the region is expected to add 23% more residents and 26% more jobs, to 6.9 million and 4.3 million, respectively. Equity Emphasis Areas account for 29% of the region's population and 25% of jobs. Table 3 present summary demographic data for the region, Equity Emphasis Areas, and the Rest of the Region.

Table 3: Summary Demographic Data from COG Cooperative Forecast

	2019	2045	Change
Population			
EEAs	1,630,714	2,037,476	**+406,762 (24.9%)**
Rest of the Region	4,025,831	4,925,982	**+900,151 (22.4%)**
Region	5,656,545	6,963,458	**+1,306,913 (23.1%)**
Jobs			
EEAs	824,410	1,050,938	**+226,528 (27.5%)**
Rest of the Region	2,516,993	3,251,284	**+734,291 (29.2%)**
Region	3,341,403	4,302,222	**+960,819 (28.8%)**

Source: COG Round 9.1 Cooperative Forecast

Using the Equity Emphasis Area (EEAs) geographies, the analysis identifies important differences in how low-income and racial and ethnic minorities are expected to use the region's transportation network in 2045. The analysis looks at mode share for two groups of trips – all trips and work trips only.

For all types of trips taken in the region, people in EEAs will be more likely to take transit or use bicycle and pedestrian facilities than people in the Rest of the Region. In contrast, people in EEAs are less likely to drive alone (Single Auto) or drive with two or more people (HOV) than people in the Rest of the Region (see Figure 3).

When work trips are isolated for 2045, the patterns in mode share are similar between the two geographies, although the differences are sharper. People in EEAs are expected to be even more likely to take transit for work trips than for all trips. Similarly, driving alone for people in the Rest of the Region is expected to be much higher for work trips than for all trips (see Figure 4). For both groups, people will be much less likely to walk, bike, or use an HOV for work trips than they will for all trips.

Figure 4: Share of All Trips for EEAs and the Rest of the Region (2045)

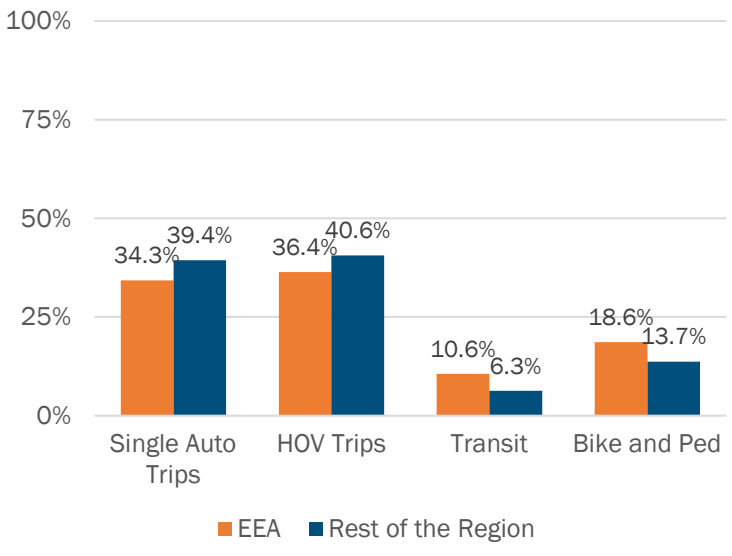
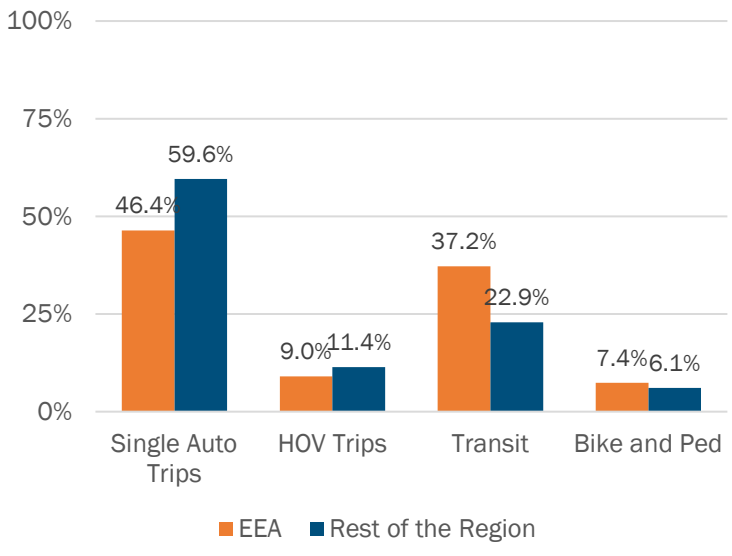


Figure 4: Share of Work Trips for EEAs and the Rest of the Region (2045)



ENVIRONMENTAL JUSTICE ANALYSIS RESULTS

This analysis finds that implementing the constrained element of Visualize 2045 would not have a disproportionate and adverse impact on low-income and minority populations. This determination is based on the findings from the analytical process identified in the Phase 2 methodology.

In no measure are Equity Emphasis Areas (EEAs) forecast to experience a burden while the Rest of the Region benefits. As such the planned projects of Visualize 2045 does not impose an adverse impact on minority and low-income populations of this region.

Equity Emphasis Areas (EEAs) and the Rest of the Region are forecast to experience similar benefits and burdens from the planned projects of Visualize 2045. As such, burdens would not be predominately borne nor be appreciably more severe or greater in magnitude in EEAs than the burdens experienced by the Rest of the Region.

With data comparing the Today scenario to the 2045-Build scenario, benefits and burdens are identified for the TPB Planning Area as-a-whole, Equity Emphasis Areas, and the Rest of the Region. For the accessibility measures, a benefit is identified as an increase in average accessibility or an increase in the population with access to transit between today and 2045. Conversely, a burden is identified when a decrease in average accessibility or a decrease in the population with access to transit between today and 2045 is identified. For mobility measures, a benefit is identified when the average commute time or average travel time declines between today and 2045. Finally, a burden is identified when the average commute time or average travel time increases between today and 2045.

Using the results and established benefits and burdens, the final step is to determine if any of the model output results, due to the impact of the constrained element of Visualize 2045, finds a disproportionately high and adverse impact on low-income and minority populations. The impact would be considered disproportionately high and adverse when the adverse effect, or burden, is predominately borne by the Equity Emphasis Areas or will be suffered by the Equity Emphasis Areas and is appreciably more severe or greater in magnitude than the adverse effect that will be suffered by the Rest of the Region.

An examination of individual performance measures finds EEAs and the Rest of the Region experience similar benefits or burdens across all measures with one measure disproportionately benefiting EEAs. For seven of the ten measures, benefits are identified for EEAs and the Rest of the Region. For two measures, burdens are identified for EEAs and the Rest of the Region. For one indicator, average commute time by transit, EEAs experience a benefit while the Rest of the Region experiences a burden.

For three of the six accessibility measures, the Rest of the Region's benefits were often greater and burdens less severe in percentage terms because the percentage changes will impact the smaller baseline figures in the Rest of the Region more acutely than the larger baseline accessibility figures in EEAs. Because EEAs today have better accessibility to jobs by auto and transit, it is more challenging to improve the EEA accessibility at the same rates in percentage terms as the Rest of the Region.

However, in no measure was a burden predominately borne by EEAs, or appreciably more severe, or greater in magnitude than the adverse effect suffered by the Rest of the Region and, as a result, this analysis demonstrates that the constrained element of Visualize 2045 does not have a disproportionately high and adverse impact on low-income and minority populations.

Reviewing the 2019 and 2045 Plan-Build transportation networks separately and not the change between scenarios, EEAs have the same or better transportation options than the Rest of the Region.

EEAs are likely to have greater access to jobs and will have larger share of their populations close to transit options compared to the Rest of the Region, both Today and in the 2045 Plan-Build. Commute times and travel times to hospitals were lower for the EEA residents in all but one measure.

The following table summarizes the overall results of the ten measures while the remainder of this section presents the results of each individual accessibility and mobility performance measure. Color blocking is used to identify burdens in **red** and benefits in **green**.

Table 4: Summary Findings of the Environmental Justice Analysis of Visualize 2045

		2019	2045 Plan-Build	Impact of Visualize 2045 Percent Change
1. Average number of jobs accessible by auto	EEAs	1,029	1,045	+1.6%
	Rest of the Region	799	853	+6.8%
2. Average number of jobs accessible by transit*	EEAs	540	738	+36.7%
	Rest of the Region	302	428	+42.0%
3. Average number of jobs accessible by High Capacity Transit**	EEAs	197	335	+70.2%
	Rest of the Region	125	203	+62.9%
4. Average number of jobs accessible by bus***	EEAs	99	145	+46.3%
	Rest of the Region	70	104	+49.4%
5. Population with walkable access to High Capacity Transit+	EEAs	648	1,119	+72.8%
	Rest of the Region	977	1,517	+55.2%
6. Population with walkable access to bus service‡	EEAs	1,492	1,872	+25.5%
	Rest of the Region	2,617	3,211	+22.7%
7. Average commute time by auto†	EEAs	42.3	47.0	+11.1%
	Rest of the Region	47.4	52.5	+10.8%
8. Average commute time by transit†	EEAs	54.1	52.9	-2.2%
	Rest of the Region	53.3	54.3	+1.9%
9. Average travel time to closest hospital by auto†	EEAs	15.3	16.7	+9.2%
	Rest of the Region	16.8	18.5	+10.1%
10. Average travel time to closest hospital by transit†	EEAs	33.9	33.6	-0.9%
	Rest of the Region	45.0	44.9	-0.2%

Notes:
Figures in thousands or minutes
* This measure includes both walk and drive access to transit, including walking to transit and driving to a transit station nearby (commuter lots, park and ride, etc.).
** This measure examines access by walking to transit and using HCT for any part of the trip (HCT-to-bus transfers are included). For this measure, HCT includes Metrorail, commuter rail, streetcar, or light rail but excludes BRT. Exclusion of BRT has a minimum impact on average accessibility.
*** This measure examines accessibility for transit trips that begin with walking to bus, including BRT, with no transfer to HCT.
+ High Capacity Transit includes Metrorail, commuter rail, streetcar, light rail, or BRT. All population and jobs in a TAZ were considered accessible to HCT if its centroid is located within 1 mile of a rail station or within ½ mile of a BRT station.
‡ All population and jobs in a TAZ were considered accessible to bus service if its centroid was located within ½ mile of a bust stop. This measure does not include BRT.
† In minutes. Average commute and travel times by auto includes travel time on roadways and "terminal" time (e.g., to park the vehicle, etc.). Average commute and travel times by transit includes time it takes to reach transit and destination, including walk access time, drive access time, transfer time, and/or wait time. Hospital is defined as a facility that provides in-patient medical care, including 24-hour emergency care (including Children's Hospitals) for patients. This does not include stand-alone urgent care facilities, psychiatric hospitals, Veterans Administration hospitals, private hospitals exclusive to members, and hospitals with no emergency care.

Individual Performance Measure Results

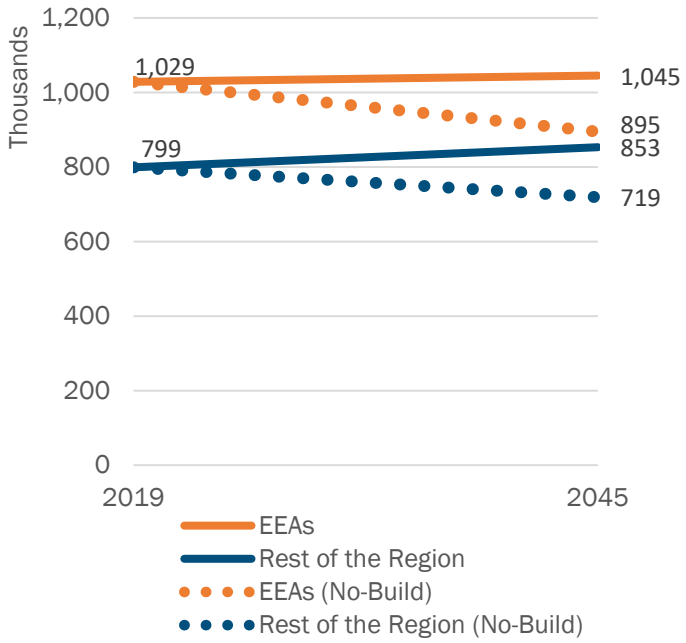
ACCESSIBILITY

Accessibility is a measure capturing both travel demand and land-use impacts. Accessibility measures the number of opportunities that can be reached in a specific amount of time from a given location by auto, transit, or other mode. By considering both travel demand and land use, an accessibility analysis recognizes that travel is not an end but rather a means for gaining access to opportunities and societal connections. The accessibility measures presented here were calculated using a 45-minute commute threshold during AM Peak period and are presented in thousands.

Measure 1: Average number of jobs accessible by auto

	2019	2045 Plan-Build	Percent Change 2019 to 2045 Plan-Build	2045 No-Build	Percent Change 2019 to 2045 No-Build
EEAs	1,029	1,045	+1.6%	895	-13.0%
Rest of the Region	799	853	+6.8%	719	-10.0%
TPB Region	864	909	+5.1%	770	-10.9%

Today, on average, EEAs can reach more than 1 million jobs within a 45-minute drive from home. For the Rest of the Region the average number of jobs accessible is 799,000. By 2045, with the addition of population, jobs, and transportation improvements, EEAs and the Rest of the Region will be able to access 17,000 and 54,000 more jobs each, a 1.6% and 6.8% increase in access to jobs by auto, respectively.



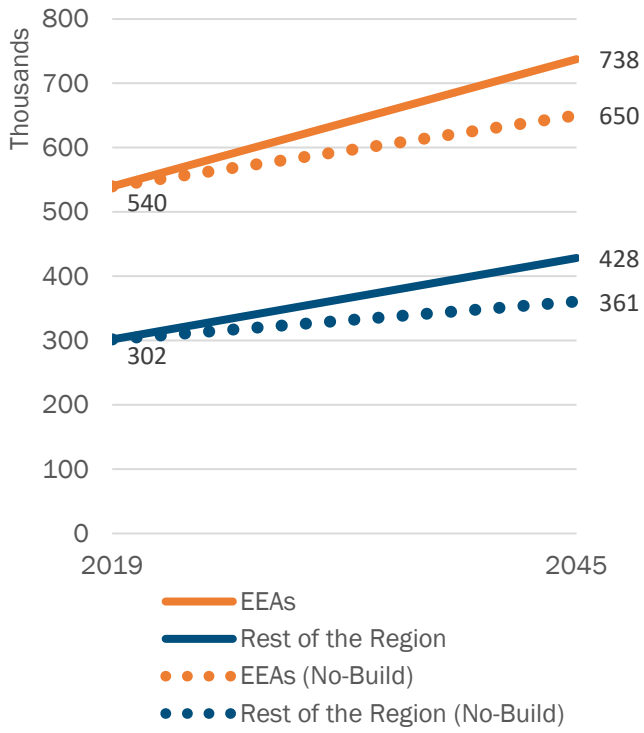
The impact of the constrained element of Visualize 2045 will benefit EEAs and the Rest of the Region with no burden identified. In the Rest of the Region, the percentage growth in access to jobs by auto is higher than EEAs. However, the EEAs have overall greater access to jobs due to their location near job centers and greater population density. These results identify no adverse impact from Visualize 2045.

Measure 2: Average number of jobs accessible by transit

	2019	2045 Plan-Build	Percent Change 2019 to 2045 Plan-Build	2045 No-Build	Percent Change 2019 to 2045 No-Build
EEAs	540	738	+36.7%	650	+20.5%
Rest of the Region	302	428	+42.0%	361	+19.5%
TPB Region	369	518	+40.2%	444	+20.3%

In 2019, average number of jobs accessible by all transit modes and types of access in 45 minutes is 540,000 for EEAs and 302,000 for the Rest of the Region. By 2045, with the addition of population, jobs, and transit improvements, EEAs and the Rest of the Region will be able to access 198,000 and 127,000 more jobs, a 36.7% and 42% increase, respectively. These figures represent a notable increase in job access by transit.

The impact of the constrained element of Visualize 2045 will benefit EEAs and the Rest of the Region with no burden identified. In addition, the location of EEAs in the region contributes to the significantly greater number of jobs accessible by transit. Today, when EEAs are compared to the Rest of the Region, they are 79% more accessible to jobs by transit. In 2045, EEAs will be 72% more accessible.

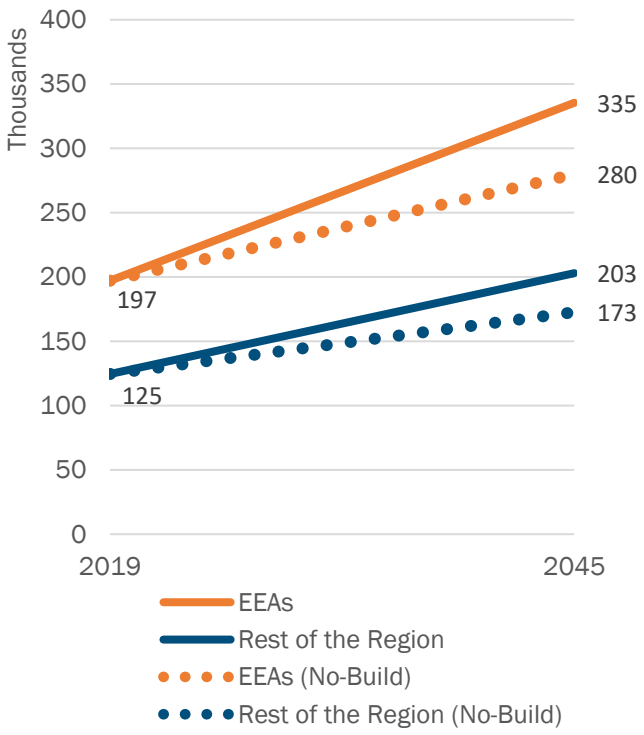


Measure 3: Average number of jobs accessible by High Capacity Transit (HCT) [29]

	2019	2045 Plan-Build	Percent Change 2019 to 2045 Plan-Build	2045 No-Build	Percent Change 2019 to 2045 No-Build
EEAs	197	335	+70.2%	280	+42.0%
Rest of the Region	125	203	+62.9%	173	+38.6%
TPB Region	145	241	+66.2%	204	+40.3%

Measures 3 and 4 estimate accessibility to jobs by different types of transit services accessed by walking. These measures isolate the impacts of the plan for the region's residents that are not able to commute by auto consistently (i.e., zero-vehicle households, prohibitively high parking cost, etc.).

Measure 3 approximates the average number of jobs accessible by walking to HCT. This measure isolates the impacts of high-quality transportation services that require significant infrastructure investment. Further, this measure focuses on HCT trips where the transit system is accessed by walking. By doing so, the analysis can better examine if EEAs are benefitting or being burdened by the increase in HCT service in the constrained element of Visualize 2045.



For 2019, the average number of jobs accessible is 197,000 for EEAs and 125,000 for the Rest of the Region. By 2045, with the addition of population, jobs, and additional HCT service, EEAs and the Rest of the Region will be able to access 138,000 and 78,000 more jobs, which represent increases of 70.2% and 62.9%, respectively.

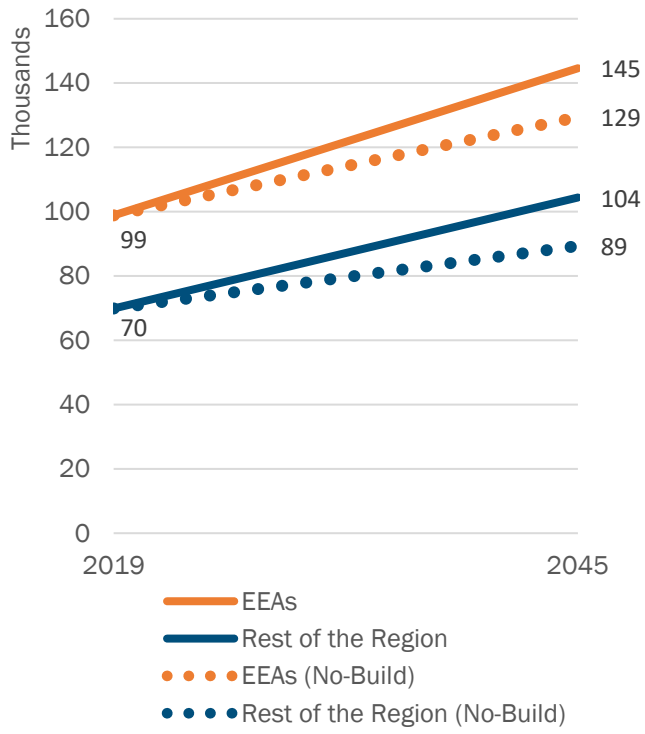
The impact of the constrained element of Visualize 2045 will benefit EEAs and the Rest of the Region with no burden identified. Further, EEAs' greater accessibility in 2019 expands by 2045 as additional HCT miles are constructed and transit service headways are improved.

[29] This measure examines access by walking to transit and using HCT for any part of the trip (HCT-to-bus transfers are included). For this measure, HCT includes Metrorail, commuter rail, streetcar, or light rail but excludes BRT. Exclusion of BRT has a minimum impact on average accessibility.

Measure 4: Average number of jobs accessible by bus [30]

	2019	2045 Plan-Build	Percent Change 2019 to 2045 Plan-Build	2045 No-Build	Percent Change 2019 to 2045 No-Build
EEAs	99	145	+46.3%	129	+30.9%
Rest of the Region	70	104	+49.4%	89	+27.8%
TPB Region	78	116	+48.5%	101	+29.2%

Measure 4 approximates the average number of jobs accessible by walking to bus. This measure isolates for the impact of the region's low-cost bus network and its significant geographic reach. By doing so, the analysis can identify if EEAs are benefitting or being burdened by the region's bus service and what impact it has on accessing jobs now and in 2045.



For 2019, the average number of jobs accessible is 99,000 for EEAs and 70,000 for the Rest of the Region. By 2045, with the addition of population, jobs, and additional bus service, EEAs and the Rest of the Region will be able to access 46,000 and 34,000 more jobs, which represent increases of 46.3% and 49.4%, respectively.

The region's bus service, limited to itself with no transfer to HCT, is more restricted in job access within a 45-minute threshold than all forms of transit trips (Measure 2) and HCT trips (Measure 3). However, the impact of the constrained element of Visualize 2045 will benefit EEAs and the Rest of the Region with no burden identified.

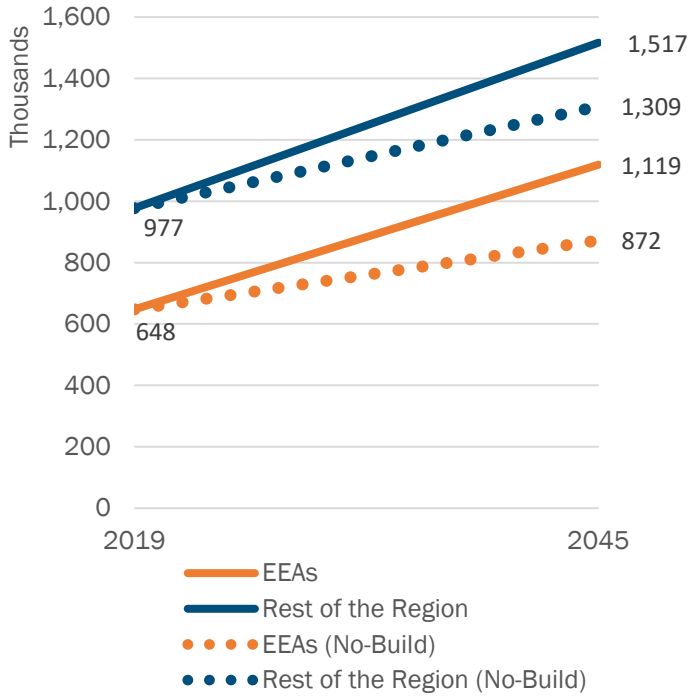
[30] This measure examines accessibility for transit trips that begin with walking to bus, including BRT, with no transfer to HCT.

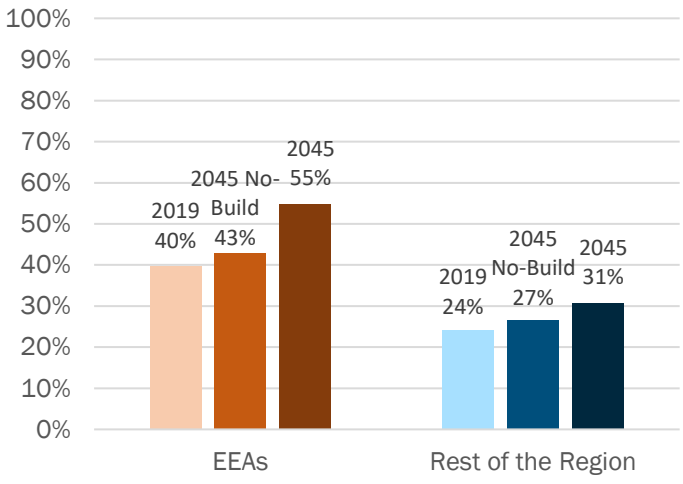
Measure 5: Population with walkable access to High Capacity Transit (in thousands) [31]

	2019	2045 Plan-Build	Percent Change 2019 to 2045 Plan-Build	2045 No-Build	Percent Change 2019 to 2045 No-Build
EEAs	648	1,119	+72.8%	872	+34.7%
Rest of the Region	977	1,517	+55.2%	1,309	+33.9%
TPB Region	1,625	2,636	+62.2%	2,181	+34.2%

Today, 648,000 residents of EEAs have walkable access to HCT compared to 977,000 residents in the Rest of the Region. These absolute figures could suggest the Rest of the Region is better served by HCT, however, when reviewing the share of the population for each area, nearly 40% of EEA population has access to HCT compared to 24% for the Rest of the Region.

The impact of Visualize 2045 on access to HCT is significant. By 2045, EEAs and the Rest of the Region will see growth in walkable access to HCT. The Rest of the Region will add 540,000 people with access to HCT while EEAs will add 471,000, which represent increases of 55% and 73%, respectively. As a percent share of the population, by 2045, 55% of the total population in EEAs will have walkable access to HCT as will 31% of the Rest of the Region.



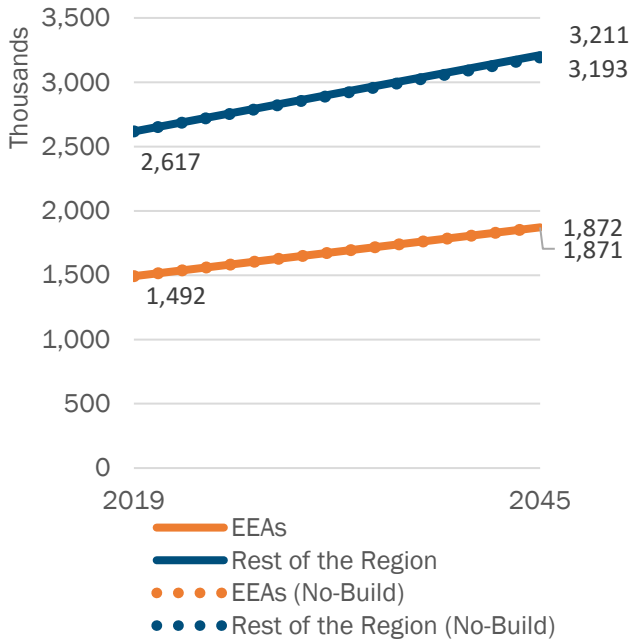


[31] High Capacity Transit includes Metrorail, commuter rail, streetcar, light rail, or BRT. All population and jobs in a TAZ were considered accessible to HCT if its centroid is located within 1 mile of a rail station or within ½ mile of a BRT station.

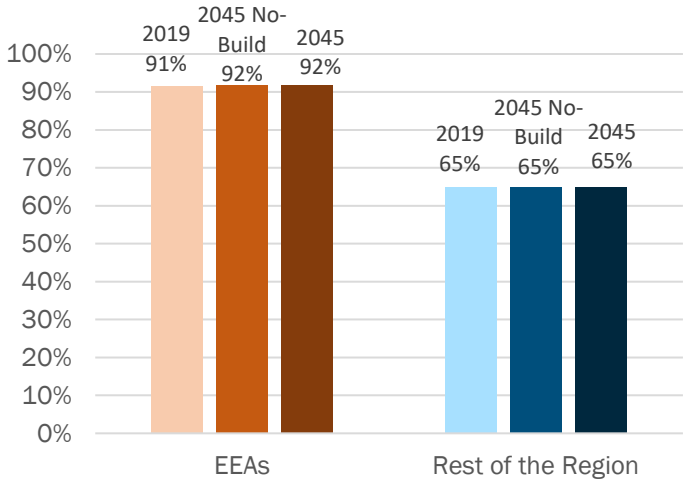
Measure 6: Population with walkable access to bus service (in thousands) [32]

	2019	2045 Plan-Build	Percent Change 2019 to 2045 Plan-Build	2045 No-Build	Percent Change 2019 to 2045 No-Build
EEAs	1,492	1,872	+25.5%	1,871	+25.4%
Rest of the Region	2,617	3,211	+22.7%	3,193	+22.0%
TPB Region	4,109	5,082	+23.7%	5,064	+23.2%

Today, 1.5 million people in EEAs have walkable access to traditional bus service compared to 2.6 million people in the Rest of the Region. These absolute figures could suggest the Rest of the Region is better served by buses, however, when reviewing the share of the population, nearly all residents of EEAs have access to bus service, 91%, compared to 65% for the Rest of the Region.



The impact of Visualize 2045 on walkable bus access is minimal. By 2045, EEAs and the Rest of the region will add 380,000 and 594,000 people with access, which represent increases of 26% and 23%, respectively. However, these increases do not significantly shift the share of the population with access to bus. Further, these percent increases are similar to increases identified in the 2045 No-Build Scenario, suggesting that the growth figures are more likely due to land use changes and less likely due to the impact of the projects in the constrained element of Visualize 2045.



[32] All population and jobs in a TAZ were considered accessible to bus service if its centroid was located within ½ mile of a bust stop. This measure does not include BRT.

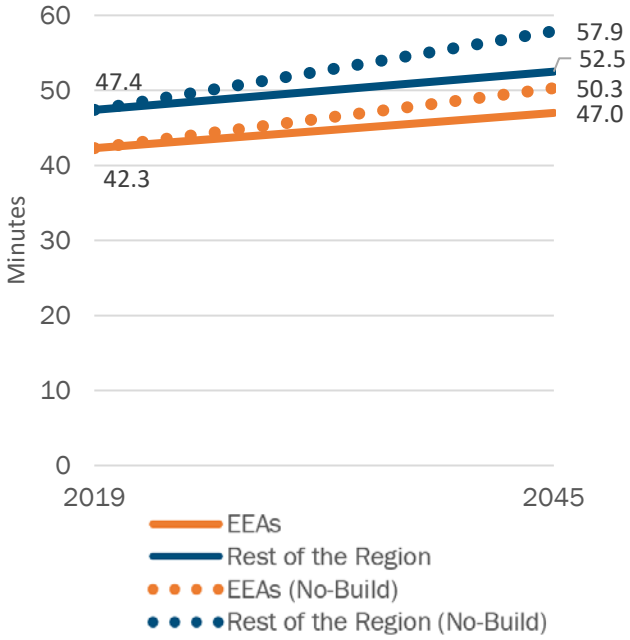
MOBILITY

For this Environmental Justice analysis, mobility measures the average trip time for different purposes. It considers the time and costs associated with the travel. Mobility is improved when the time, costs, and or combinations of the two are lowered, as such changes indicate a higher level of mobility within the transportation network. The measures presented here represents the AM Peak period and are in presented in minutes.

Measure 7: Average commute times by auto [33]

	2019	2045 Plan-Build	Percent Change 2019 to 2045 Plan-Build	2045 No-Build	Percent Change 2019 to 2045 No-Build
EEAs	42.3	47.0	**+11.1%**	50.3	**+18.9%**
Rest of the Region	47.4	52.5	**+10.8%**	57.9	**+22.2%**
TPB Region	46.2	51.2	**+10.8%**	56.2	**+21.6%**

Between 2019 and 2045, the average commute time for trips originating in both EEAs and the Rest of the Region will increase. The EEA commute time will increase 4.7 minutes and the Rest of the Region will increase 5.1 minutes, an 11% increase for both geographies. These increases can be linked to the general worsening of congestion as a result of increased demand on the transportation network during the AM peak period.



These increases in average commute time are considered burdens caused by the impact of the constrained element of Visualize 2045. As both geographies experience a negative impact, the burden is not predominately borne by EEAs or appreciably more severe or greater in magnitude than the adverse effect suffered by the Rest of the Region and, as a result, this measure does not meet the threshold of having a disproportionately high and adverse impact on low-income and minority populations.

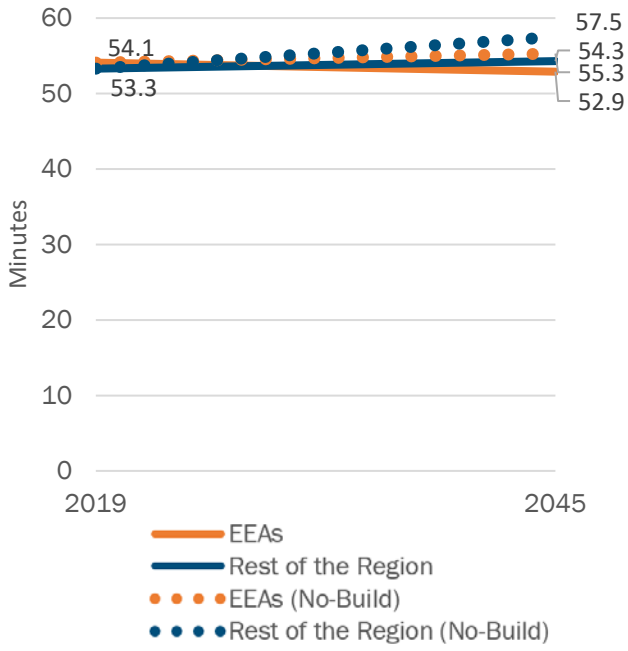
[33] Average commute and travel times by auto includes travel time on roadways and "terminal" time (e.g., to park the vehicle, etc.).

Measure 8: Average commute times by transit [34]

	2019	2045 Plan-Build	Percent Change 2019 to 2045 Plan-Build	2045 No-Build	Percent Change 2019 to 2045 No-Build
EEAs	54.1	52.9	**-2.2%**	55.3	**+2.2%**
Rest of the Region	53.3	54.3	**+1.9%**	57.5	**+7.9%**
TPB Region	53.6	53.8	**+0.4%**	56.7	**+5.8%**

Average commute time by transit is the only indicator to identify a disproportionate impact due to the constrained element of Visualize 2045. With the addition of population, jobs, and transportation projects between 2019 and 2045, average transit commute time for EEAs will decline from 54.1 to 52.9 minutes, a 2.2% decline and an identifiable benefit for EEAs. The Rest of the Region will experience a burden, with the average transit commute time increasing 1.9%, from 53.3 minutes to 54.3 minutes.

The identified burden is not predominately borne by EEAs or appreciably more severe or greater in magnitude than the adverse effect suffered by the Rest of the Region and, as a result, this measure does not meet the threshold of having a disproportionately high and adverse impact on low-income and minority populations.

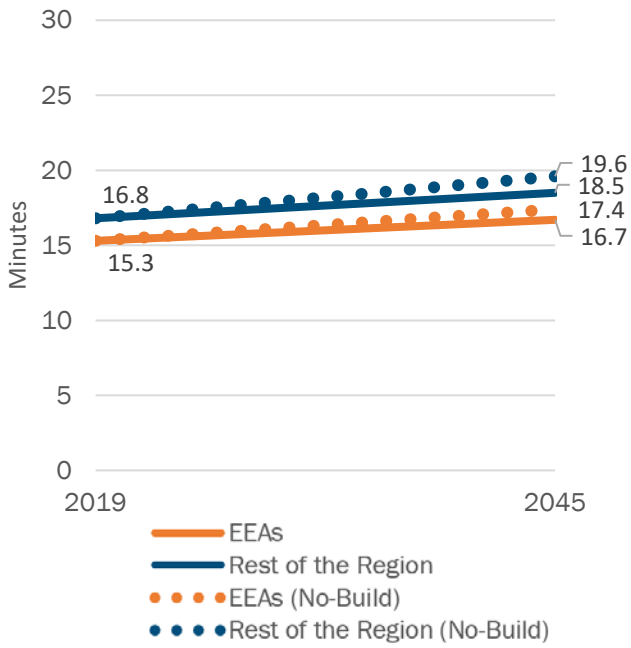


[34] Average commute and travel times by transit includes time it takes to reach transit and destination, including walk access time, drive access time, transfer time, and/or wait time.

Measure 9: Average travel time to closest hospital by auto [35]

	2019	2045 Plan-Build	Percent Change 2019 to 2045 Plan-Build	2045 No-Build	Percent Change 2019 to 2045 No-Build
EEAs	15.3	16.7	**+9.2%**	17.4	**+13.7%**
Rest of the Region	16.8	18.5	**+10.1%**	19.6	**+16.7%**
TPB Region	16.4	18.0	**+9.8%**	19.0	**+15.9%**

Measure 9 and 10 focus on the ability of the region's transportation system to provide access to in-patient medical care facilities that include 24-hour emergency service. Between 2019 and 2045, average travel time by auto to the closest hospital will increase 1.4 minutes for EEAs and 1.7 minutes for the Rest of the Region, representing increases of 9% and 10%, respectively. These increases can be linked to the impact of congestion as a result of increase demand placed on roadways during the AM peak period.



These increases are considered burdens caused by the impact of the constrained element of Visualize 2045. As both geographies experience a negative impact and EEAs have shorter trips relative to the Rest of the Region in both 2019 and 2045, the burden is not predominately borne by EEAs or appreciably more severe or greater in magnitude than the adverse effect suffered by the Rest of the Region. This measure does not meet the threshold of having a disproportionately high and adverse impact on low-income and minority populations.

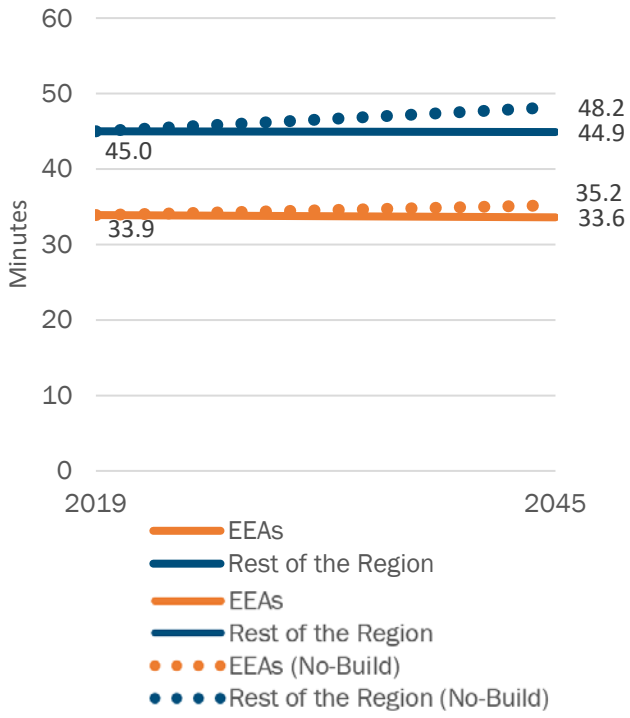
[35] Hospital is defined as a facility that provides in-patient medical care, including 24-hour emergency care (including Children's Hospitals), for patients. This does not include stand-alone urgent care facilities, psychiatric hospitals, Veterans Administration hospitals, private hospitals exclusive to members, and hospitals with no emergency care.

Measure 10: Average travel time to closest hospital by transit [36]

	2019	2045 Plan-Build	Percent Change 2019 to 2045 Plan-Build	2045 No-Build	Percent Change 2019 to 2045 No-Build
EEAs	33.9	33.6	-0.9%	35.2	+3.8%
Rest of the Region	45.0	44.9	-0.2%	48.2	+7.1%
TPB Region	41.8	41.6	-0.5%	44.4	+6.2%

For 2019 and 2045, the average travel time to the closest hospital by transit is about 33% longer for people in the Rest of the Region than for those living in EEAs. The implementation of Visualize 2045 (the change between 2019 and 2045) results in minimal benefits for EEAs and the Rest of the Region, with travel times effectively remaining constant. It is also worth noting that the average travel time to the closest hospital by transit is more than twice as long as those by auto.

These modest benefits caused by the impact of the constrained element of Visualize 2045 ensure that this measure does not have a disproportionately high and adverse impact on low-income and minority populations.



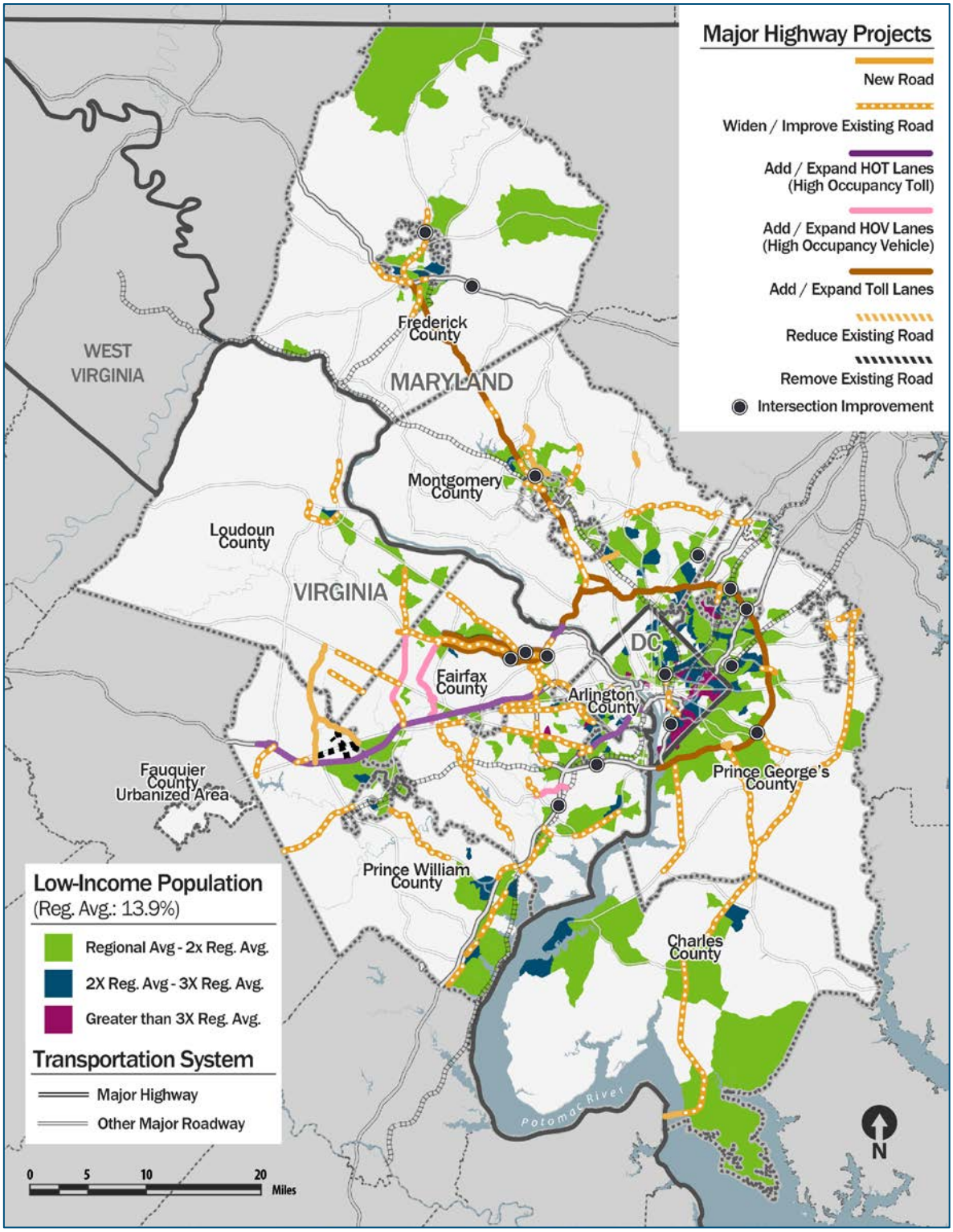
[36] Hospital is defined as a facility that provides in-patient medical care, including 24-hour emergency care (including Children's Hospitals), for patients. This does not include stand-alone urgent care facilities, psychiatric hospitals, Veterans Administration hospitals, private hospitals exclusive to members, and hospitals with no emergency care.

NEXT STEPS

While this Environmental Justice analysis was conducted to meet federal requirements on transportation equity for low-income and minority populations, it can also contribute to important and ongoing transportation policy discussions for promoting the fair and equitable treatment of all individuals, including low-income population, racial and ethnic minorities, people with disabilities, and older adults. Equity Emphasis Areas will most likely change by 2045 as land-use, housing prices, and migration patterns alter the demographic profile of the region. As it is difficult to predict where changes will occur, the current geographic distributions are assumed to remain constant through 2045. As a result, it will be important for policy makers and future analysis to monitor how accessibility and mobility measures shift based on these assumptions.

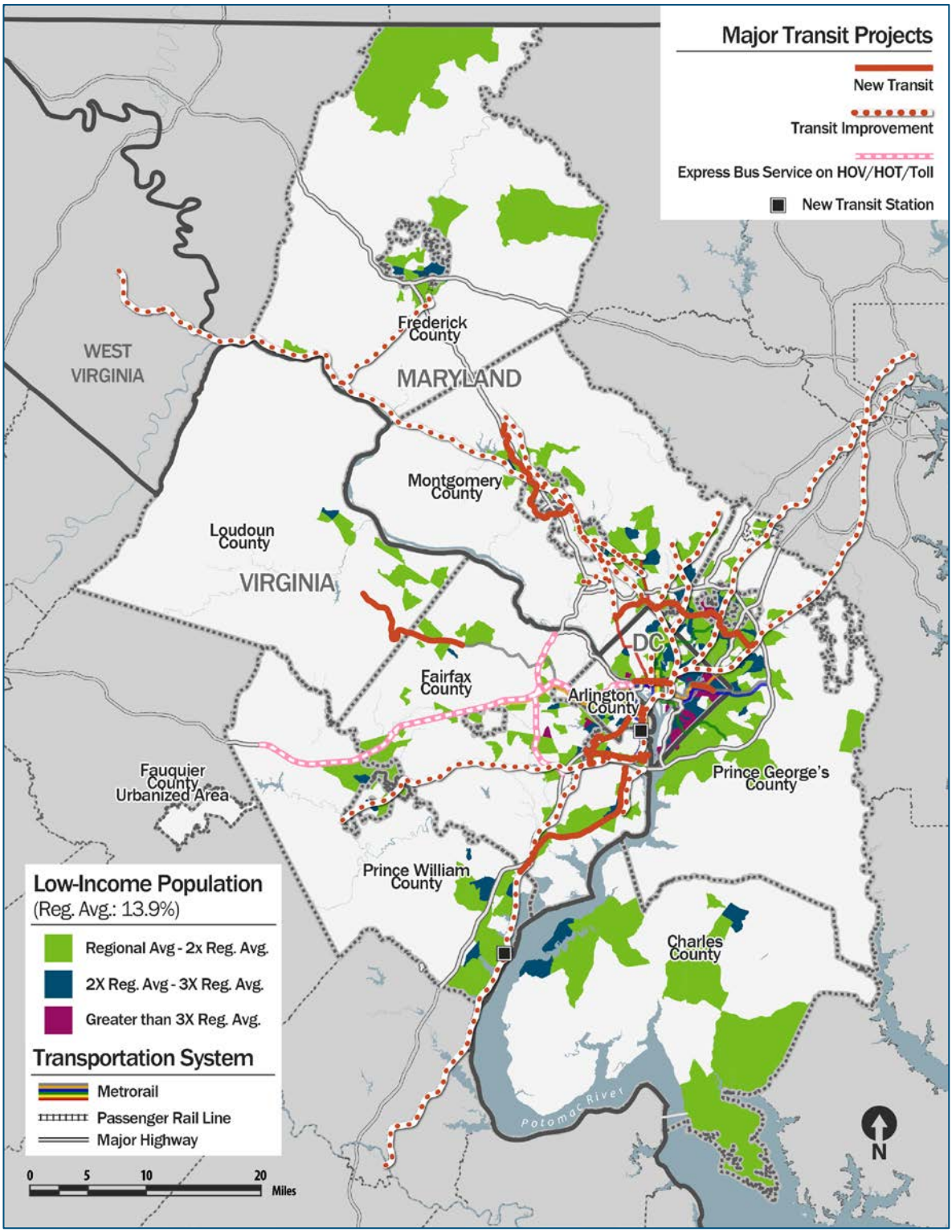
APPENDIX A – VISUALIZE 2045 AND TRADITIONALLY DISADVANTAGE POPULATION GROUPS

Figure 5: Low-Income Population and Major Highway Projects



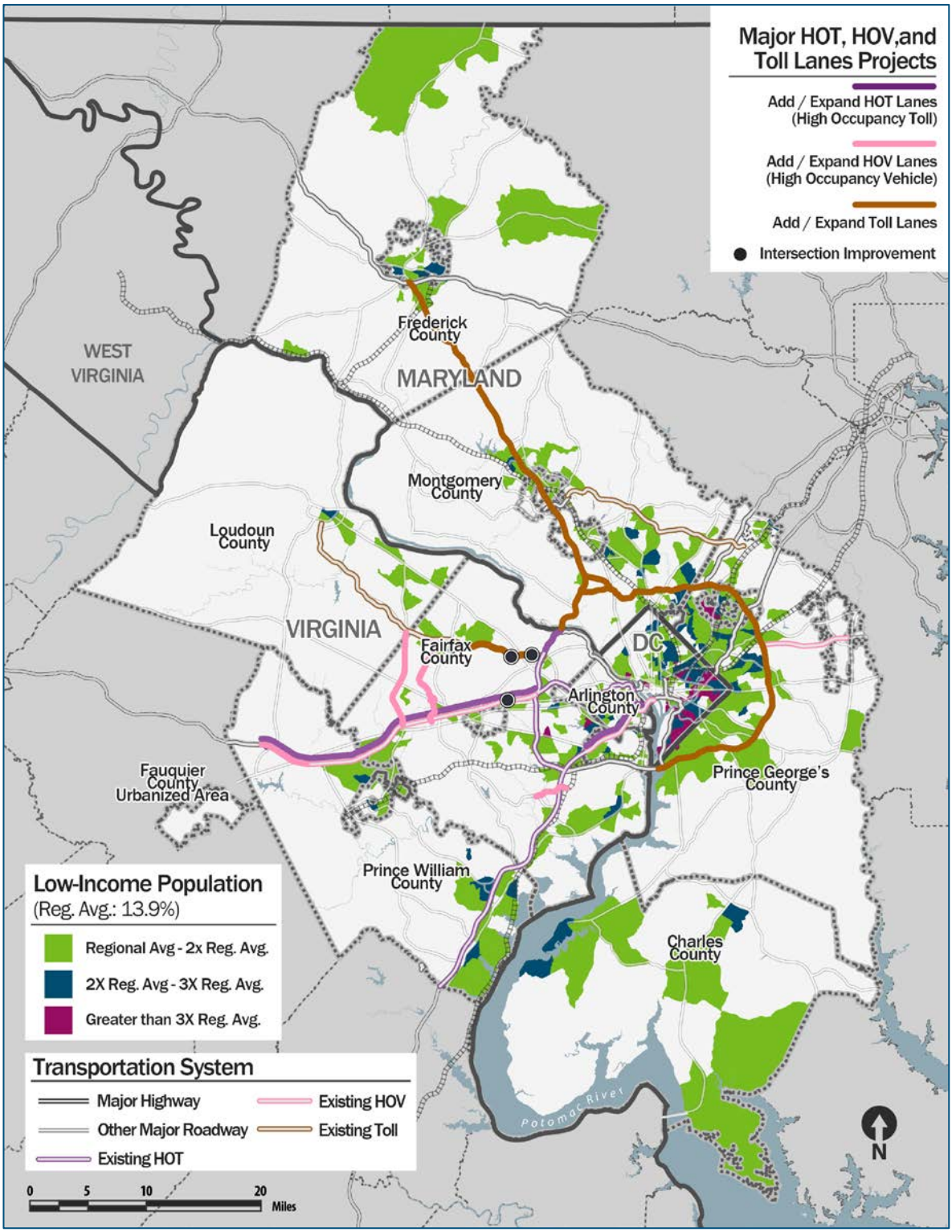
Source: Visualize 2045 and 2012-2016 American Community Survey

Figure 6: Low-Income Population and Major Transit Projects



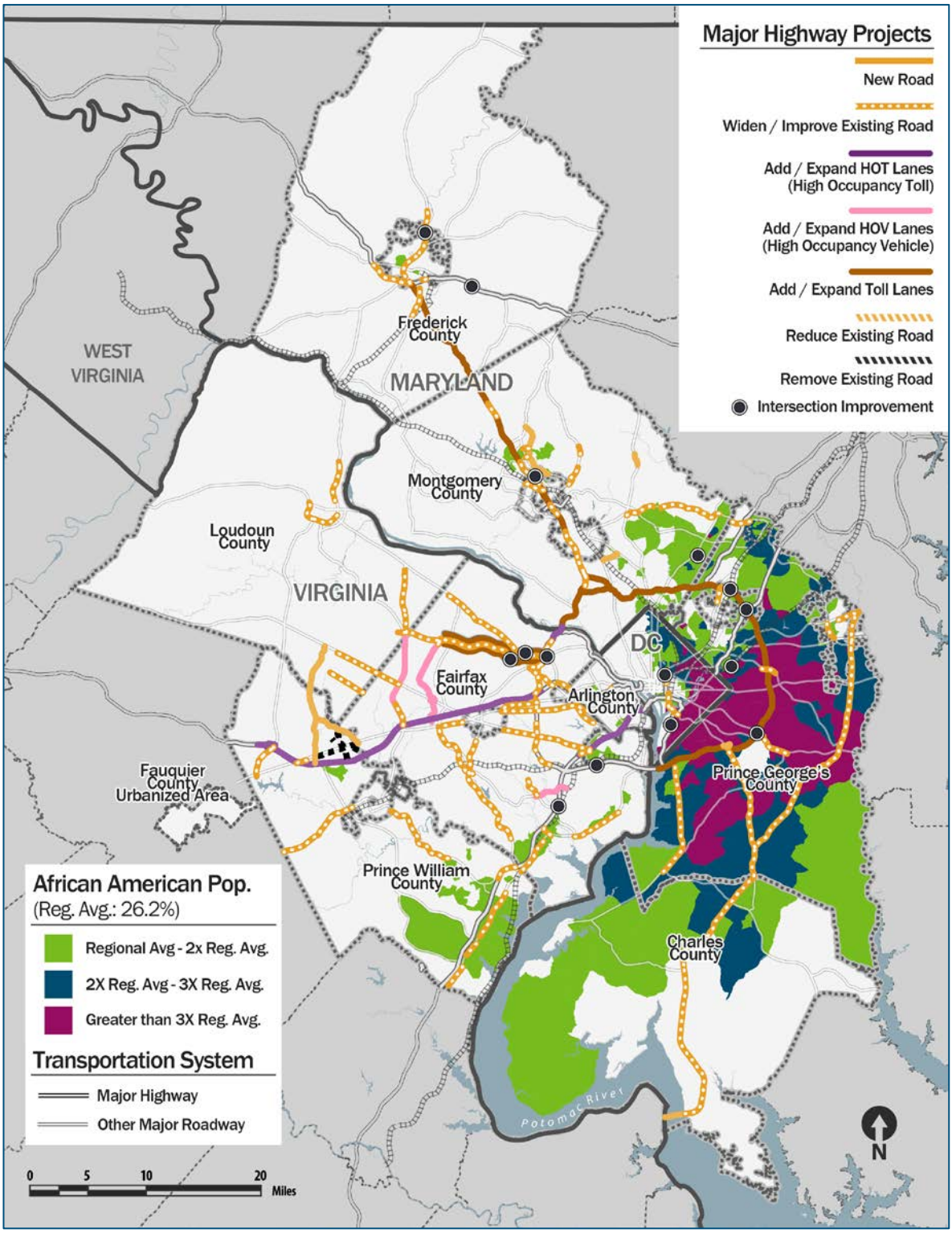
Source: Visualize 2045 and 2012-2016 American Community Survey

Figure 7: Low-Income Population and Major Managed Lanes Projects



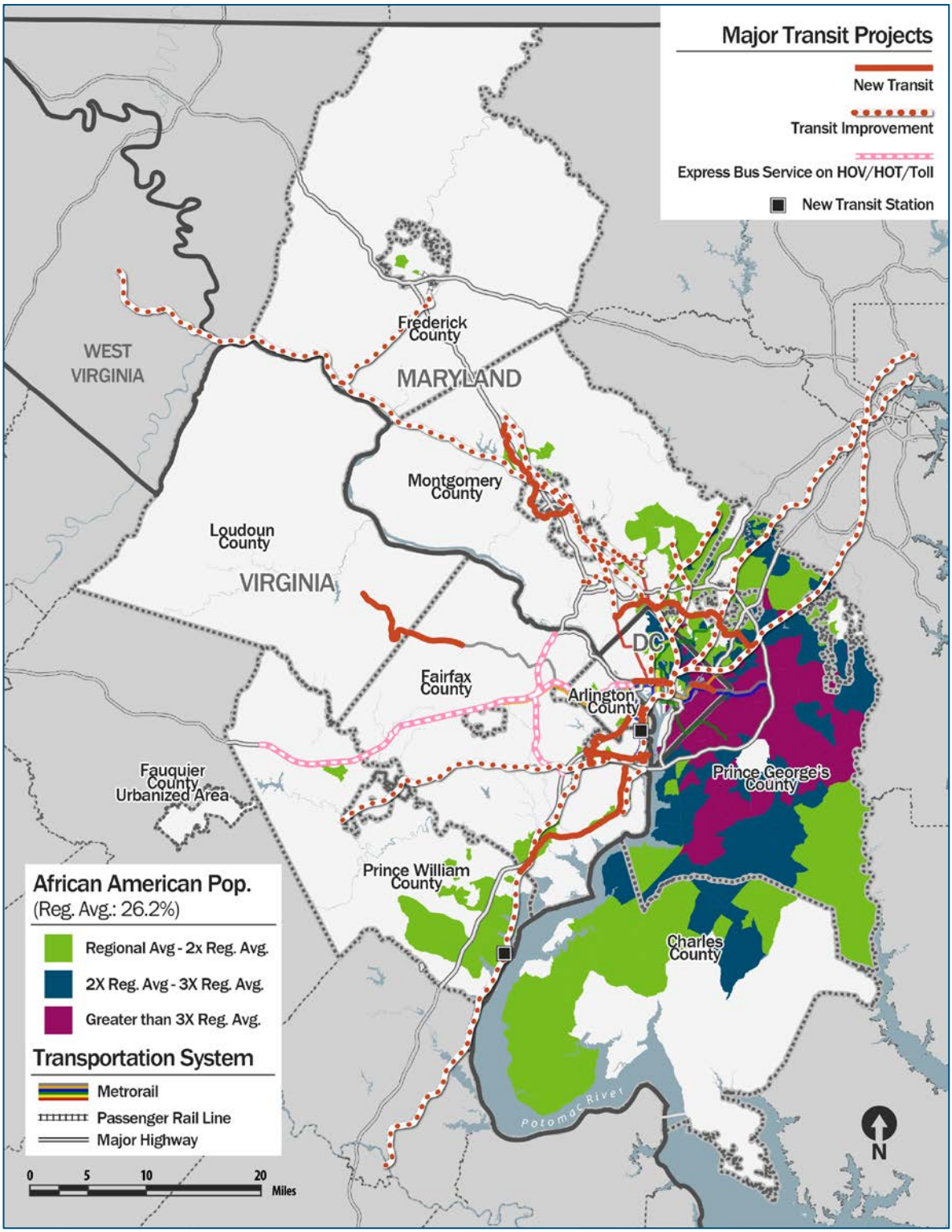
Source: Visualize 2045 and 2012-2016 American Community Survey

Figure 8: African American Population and Major Highway Projects



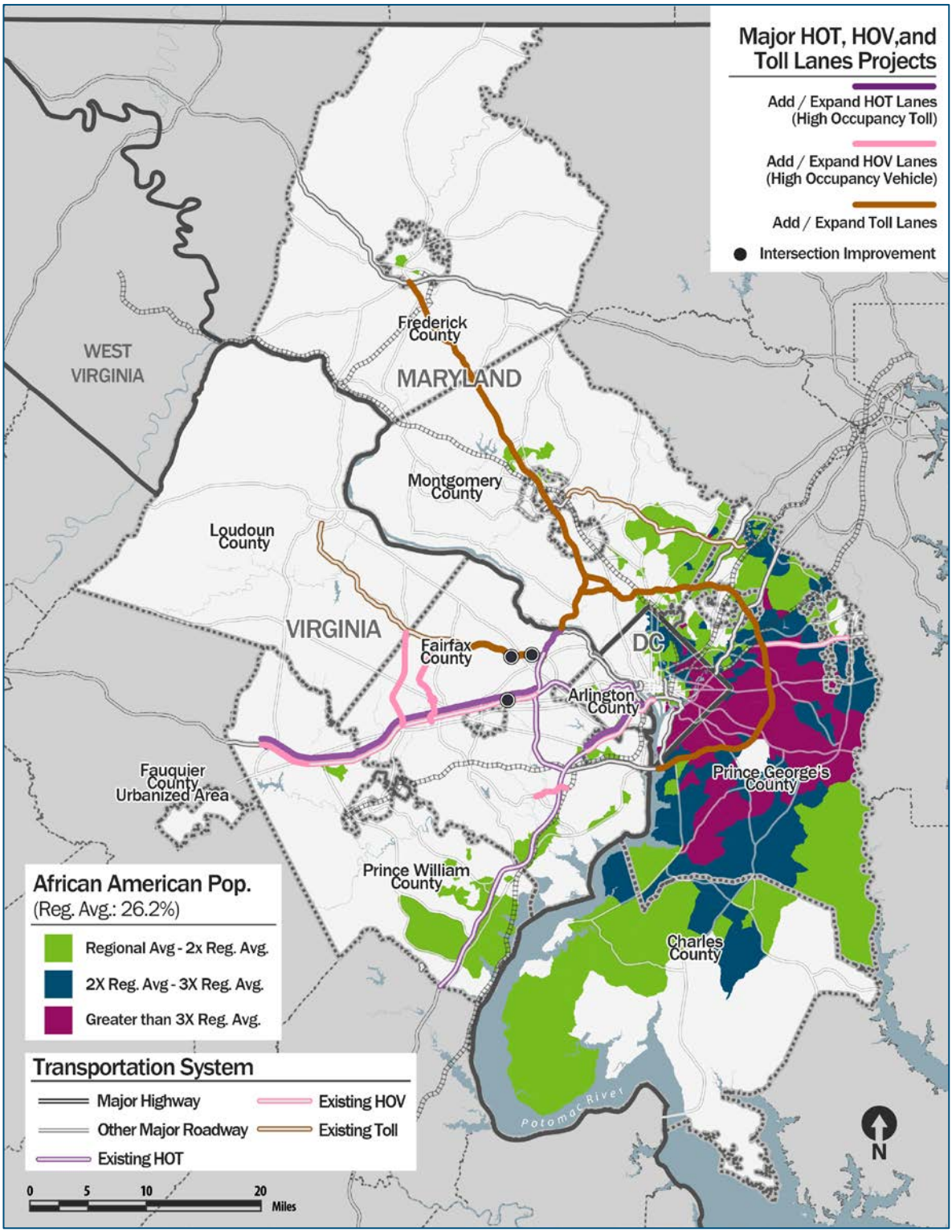
Source: Visualize 2045 and 2012-2016 American Community Survey

Figure 9: African American Population and Major Transit Projects



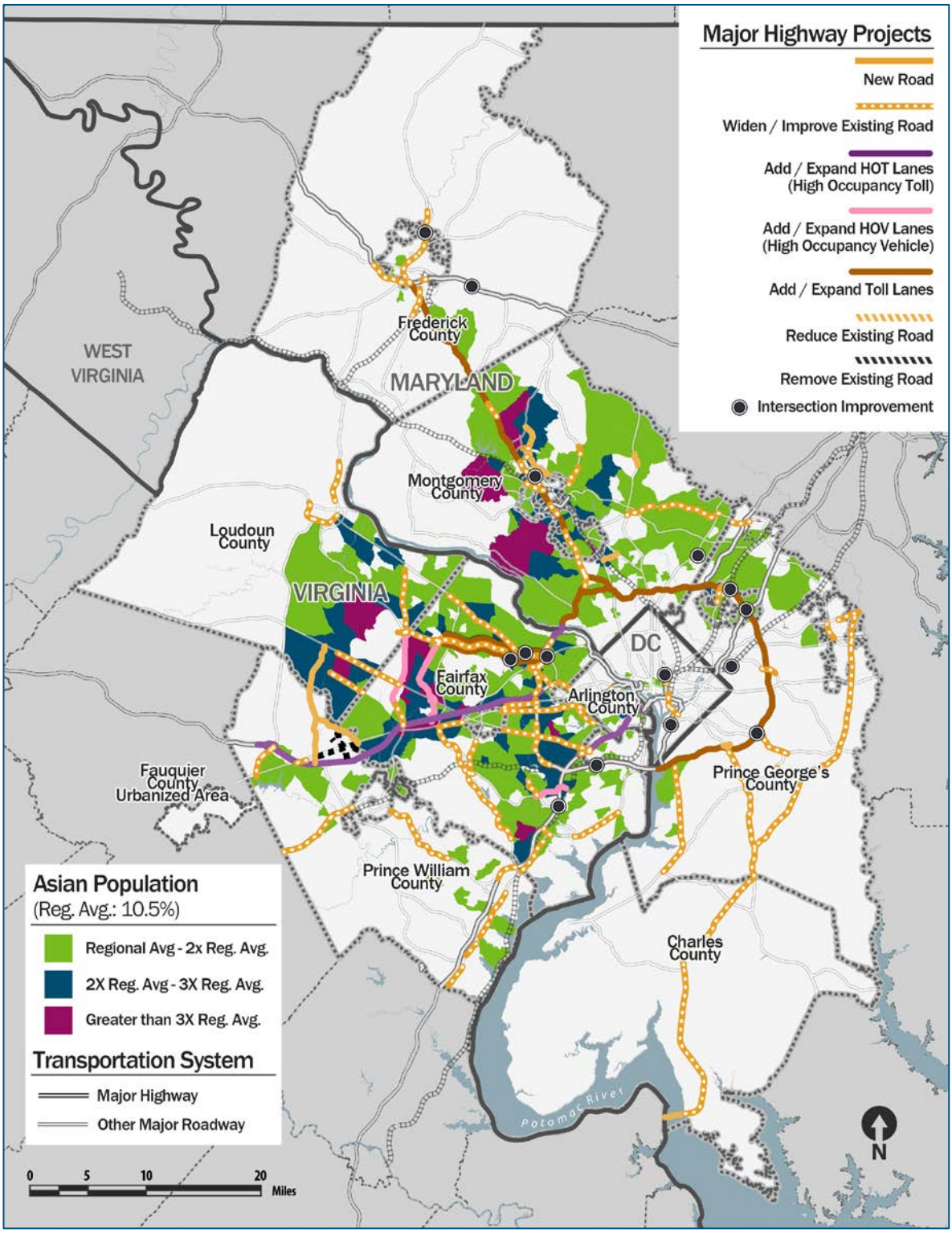
Source: Visualize 2045 and 2012-2016 American Community Survey

Figure 10: African American Population and Major Managed Lanes Projects



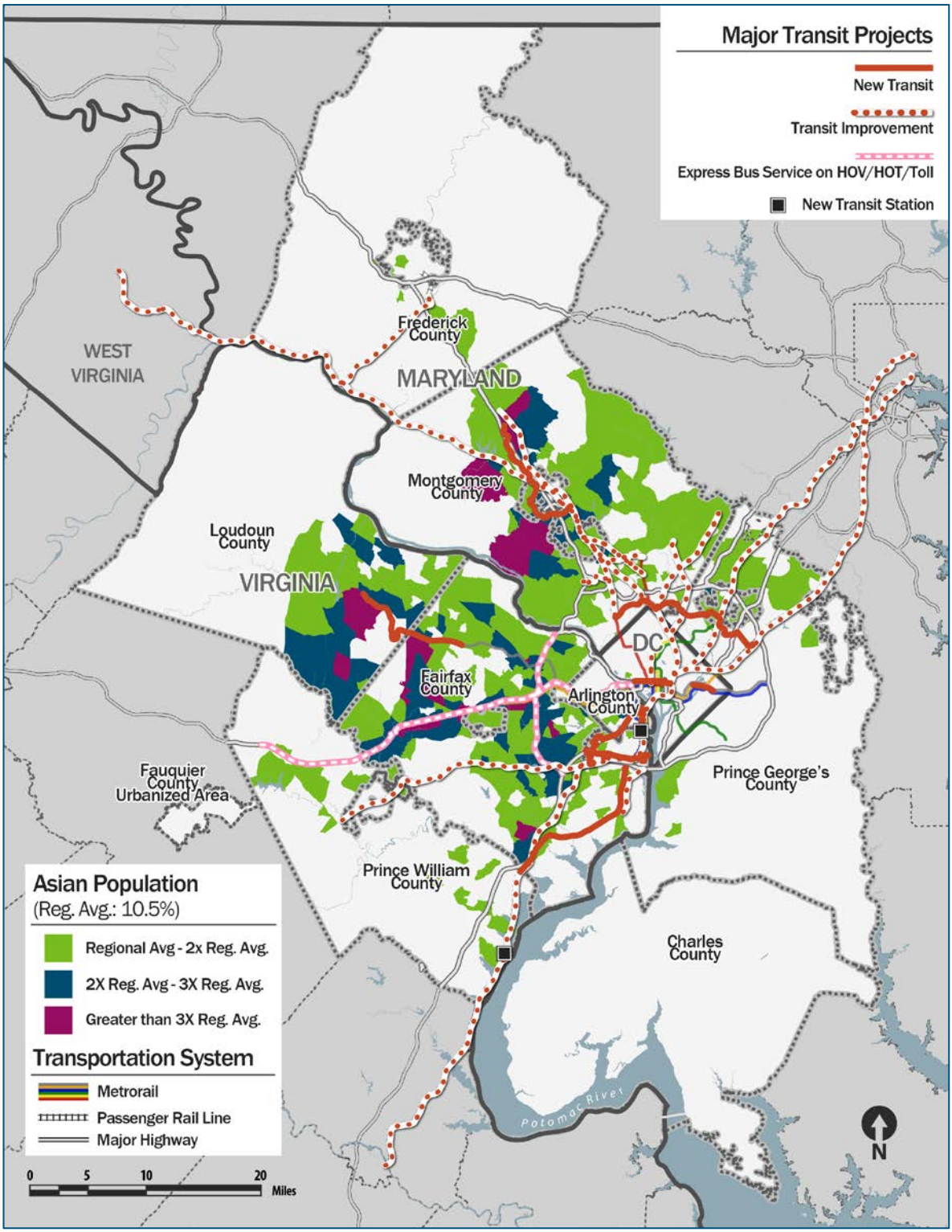
Source: Visualize 2045 and 2012-2016 American Community Survey

Figure 11: Asian Population and Major Highway Projects



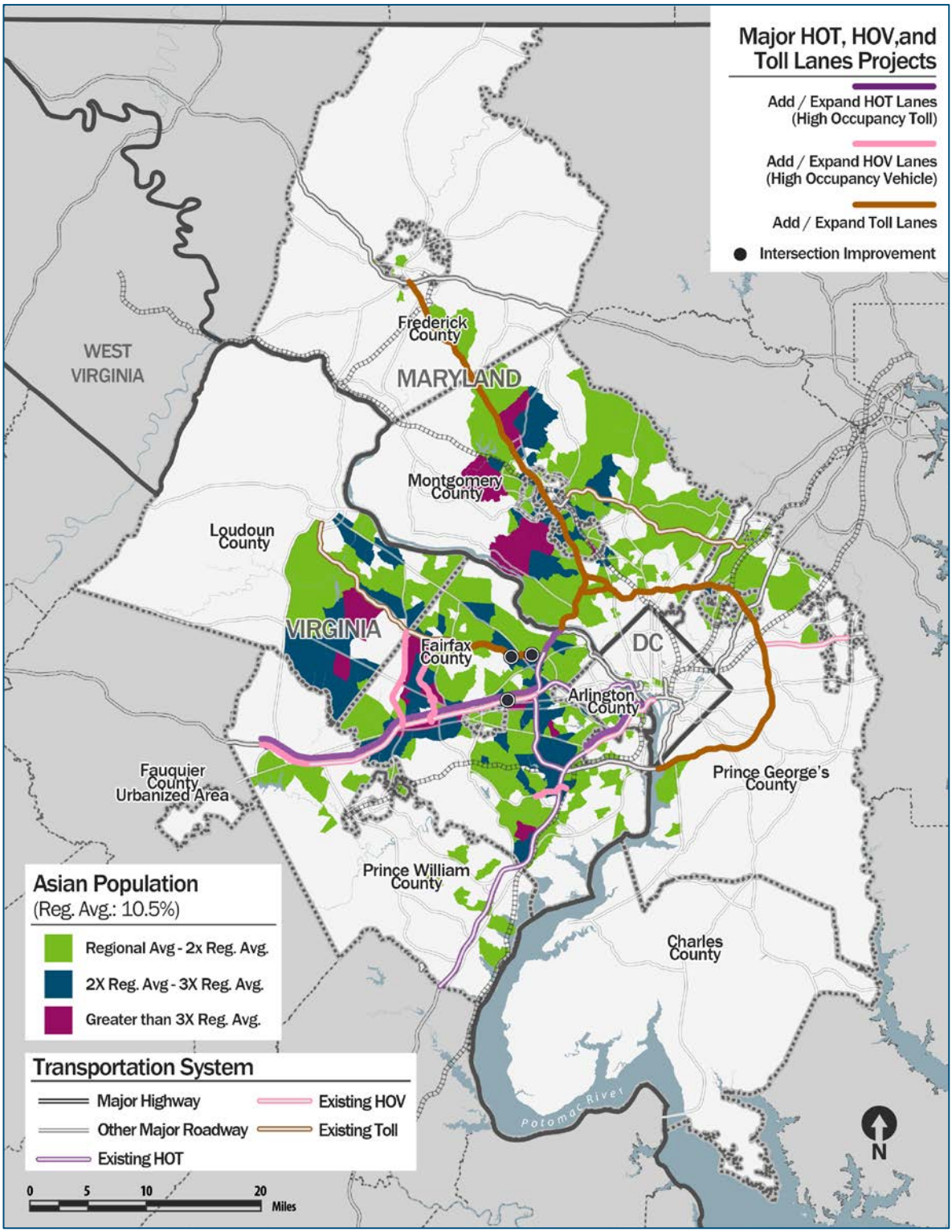
Source: Visualize 2045 and 2012-2016 American Community Survey

Figure 12: Asian Population and Major Transit Projects



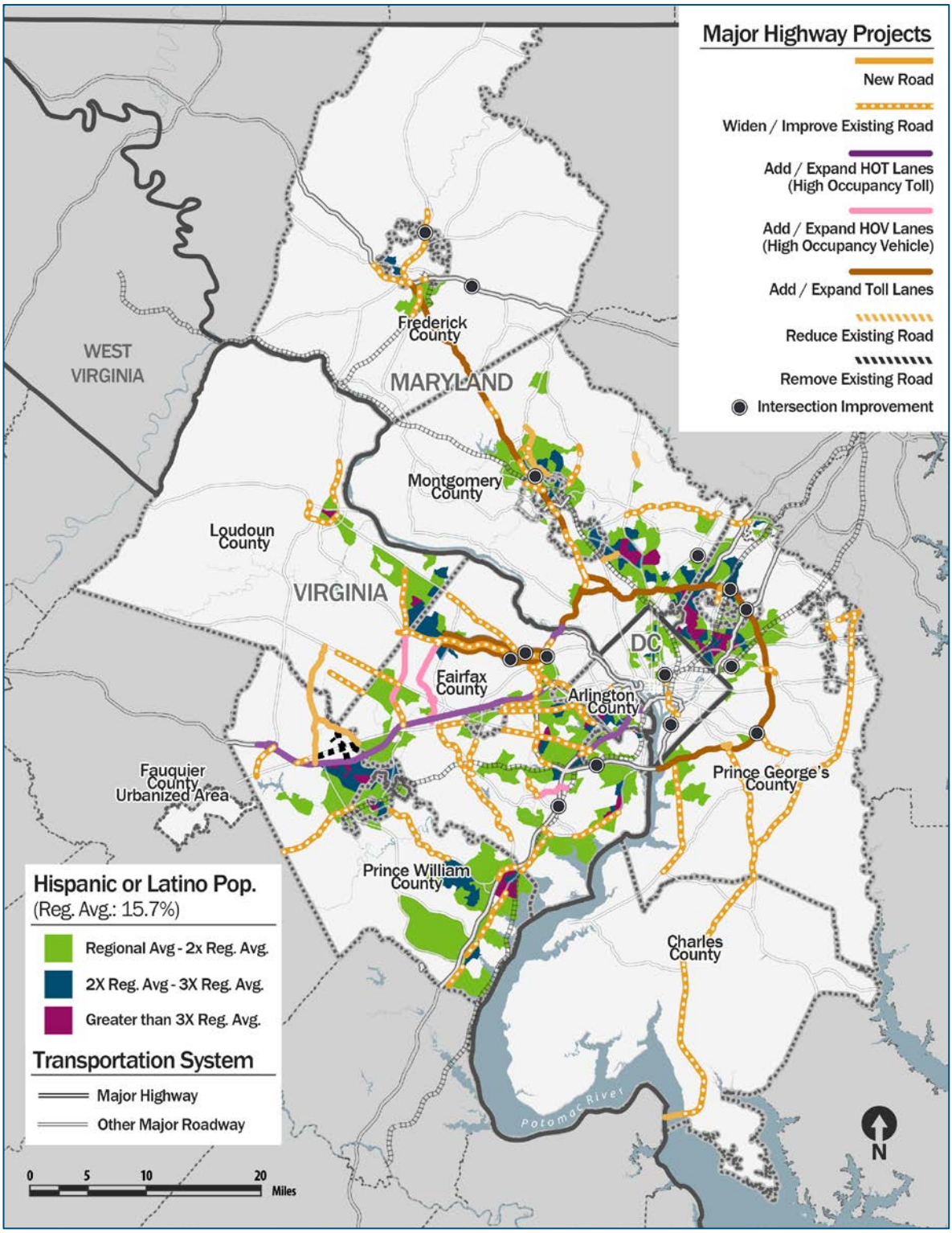
Source: Visualize 2045 and 2012-2016 American Community Survey

Figure 13: Asian Population and Major Managed Lanes Projects



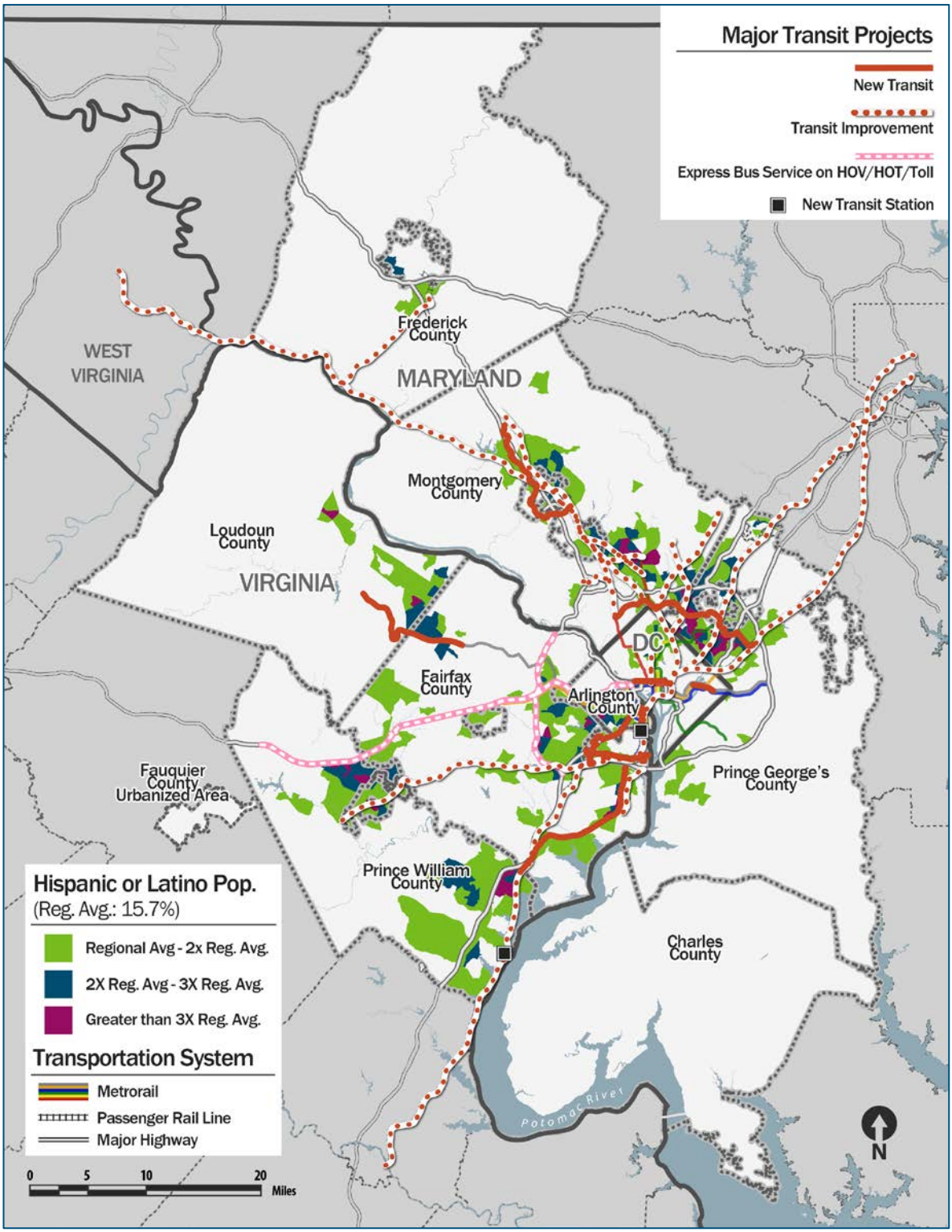
Source: Visualize 2045 and 2012-2016 American Community Survey

Figure 14: Hispanic or Latino Population and Major Highway Projects



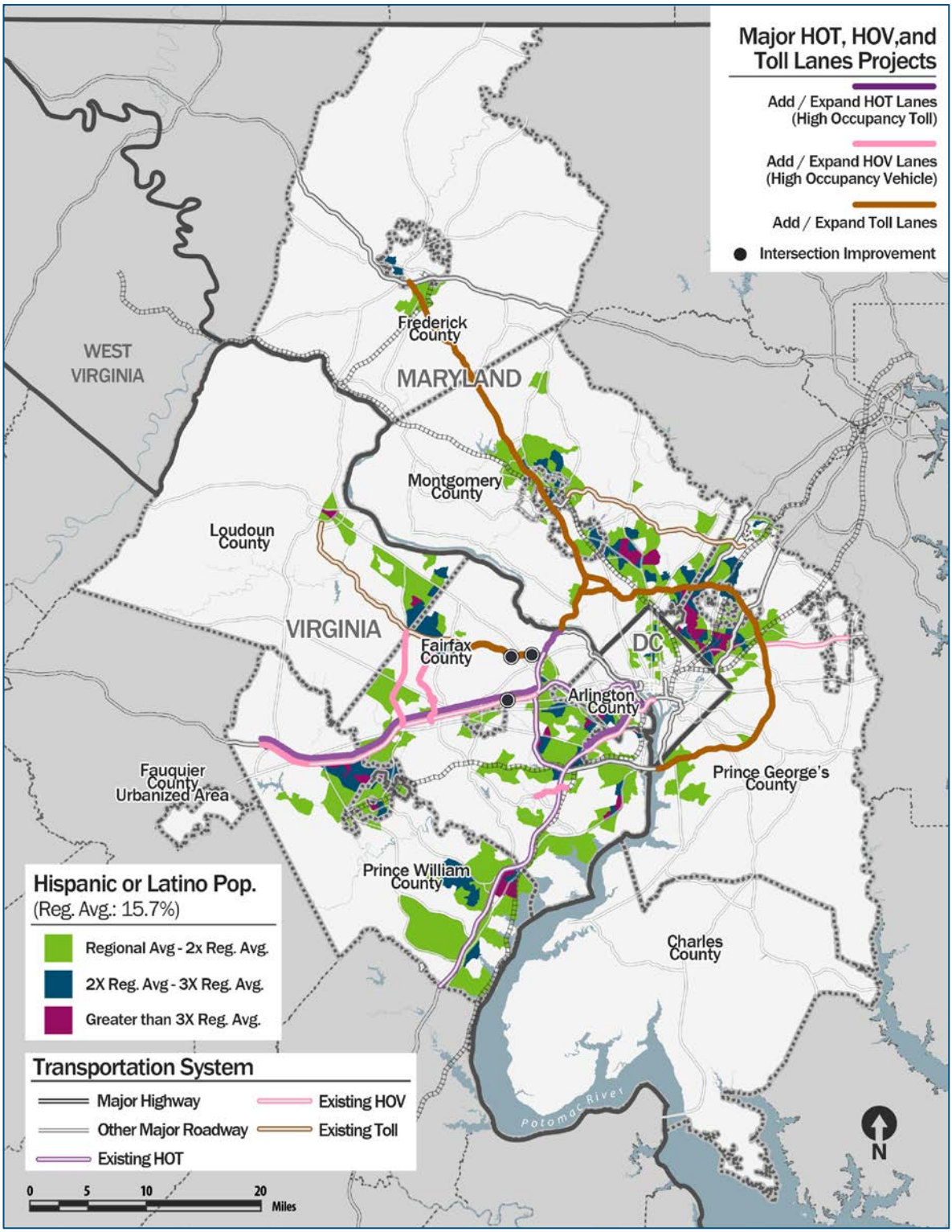
Source: Visualize 2045 and 2012-2016 American Community Survey

Figure 15: Hispanic or Latino Population and Major Transit Projects



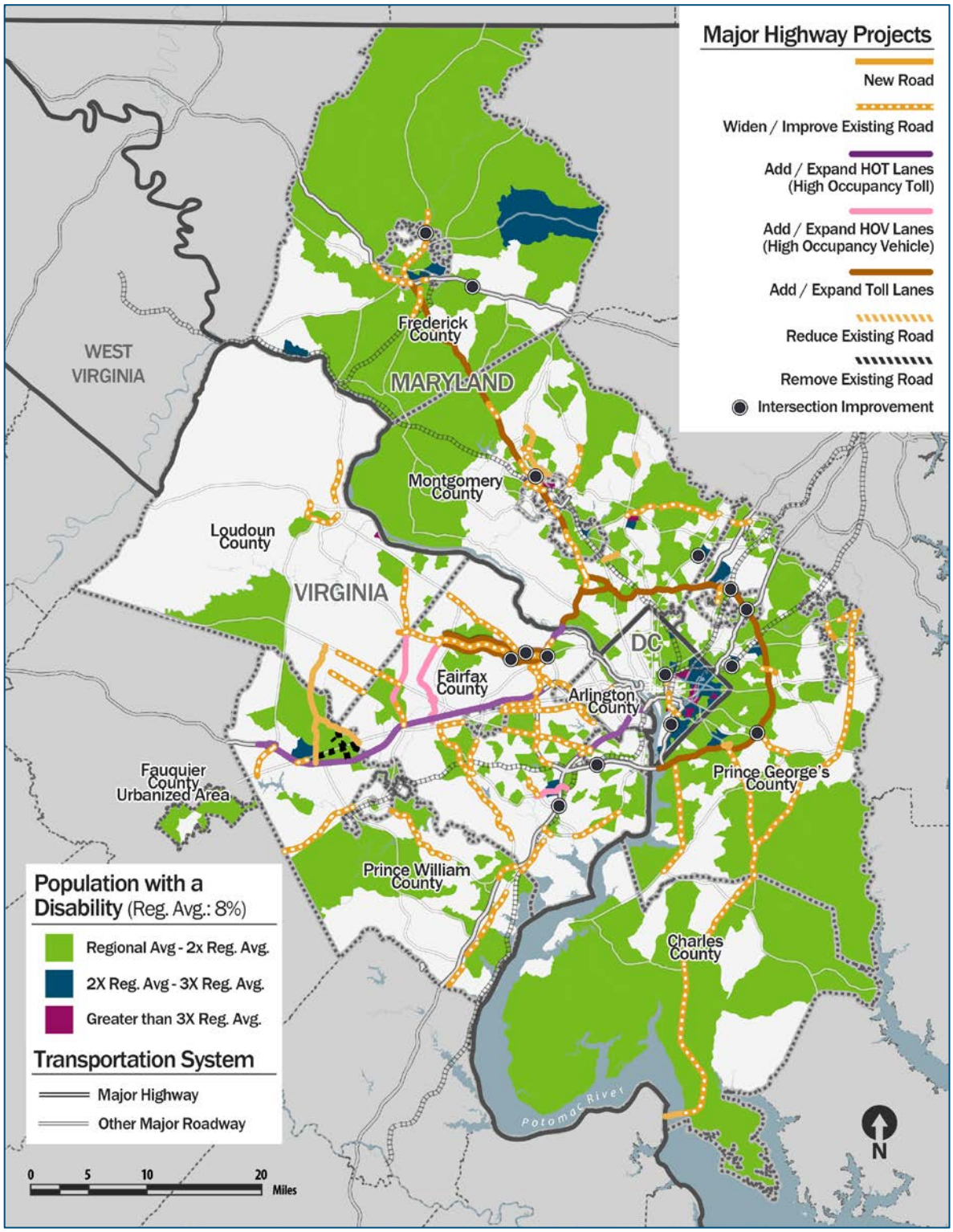
Source: Visualize 2045 and 2012-2016 American Community Survey

Figure 16: Hispanic or Latino Population and Major Managed Lanes Projects



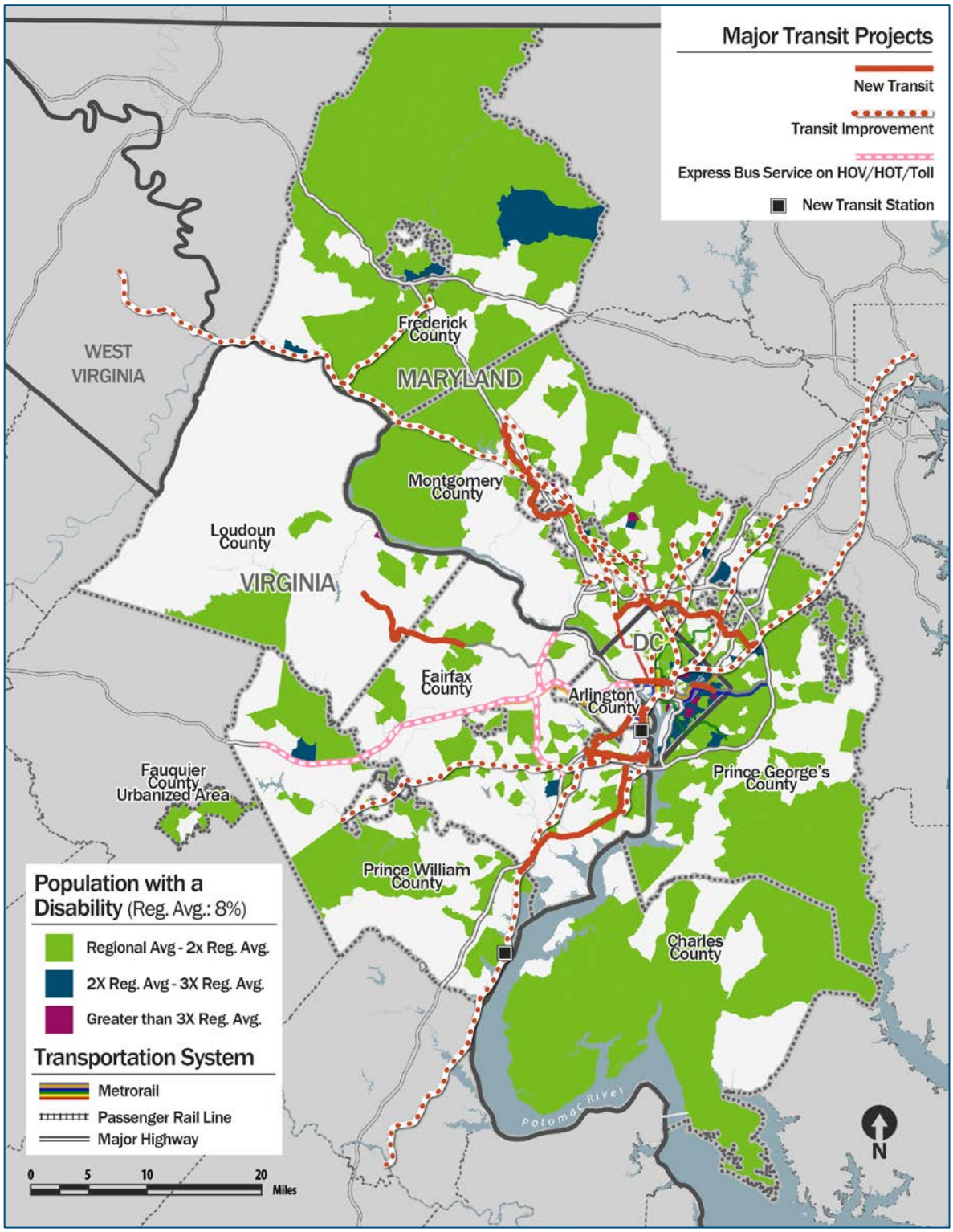
Source: Visualize 2045 and 2012-2016 American Community Survey

Figure 17: Population with a Disability and Major Highway Projects



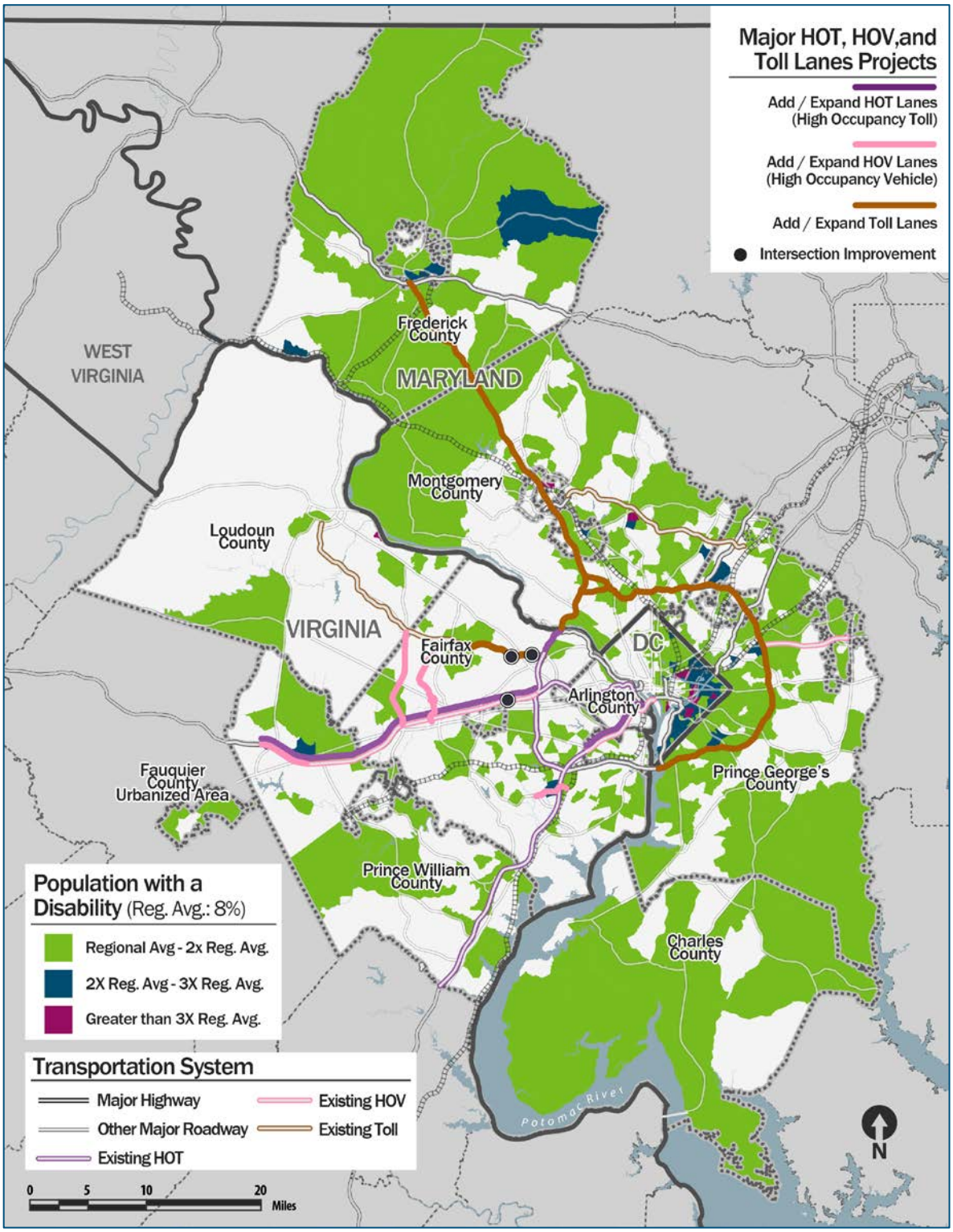
Source: Visualize 2045 and 2012-2016 American Community Survey

Figure 18: Population with a Disability and Major Transit Projects



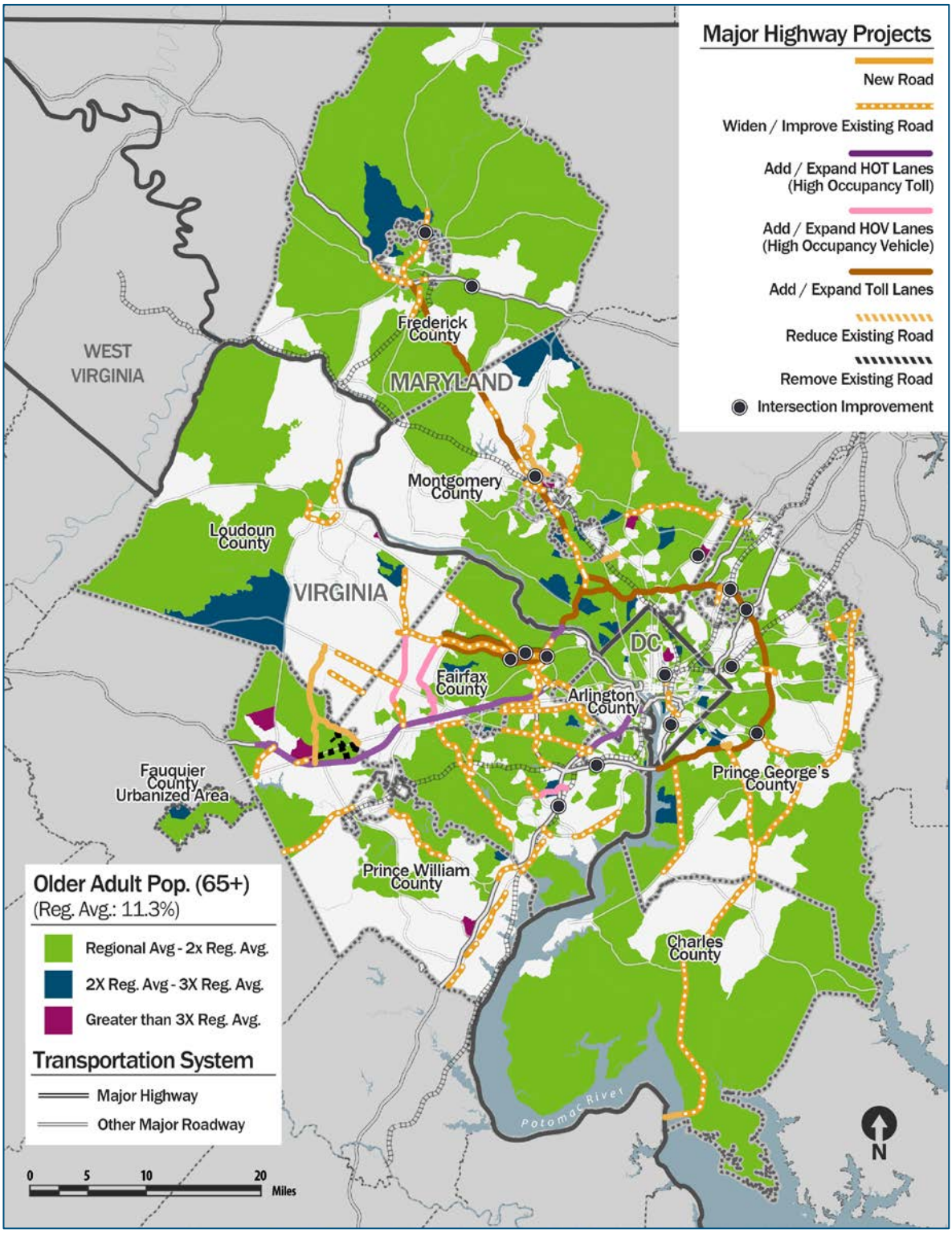
Source: Visualize 2045 and 2012-2016 American Community Survey

Figure 19: Population with a Disability and Major Managed Lanes Projects



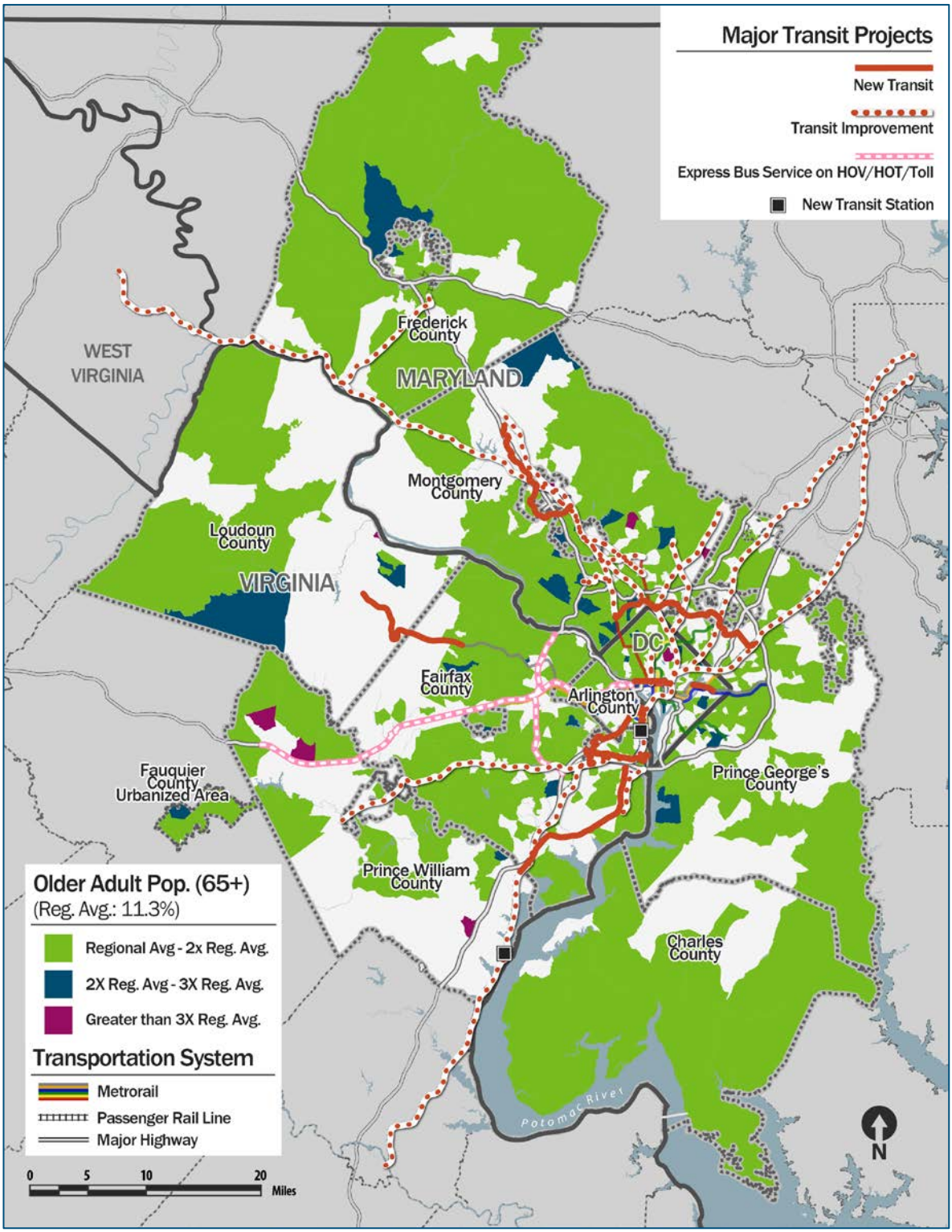
Source: Visualize 2045 and 2012-2016 American Community Survey

Figure 20: Older Adult (65+) Population and Major Highway Projects



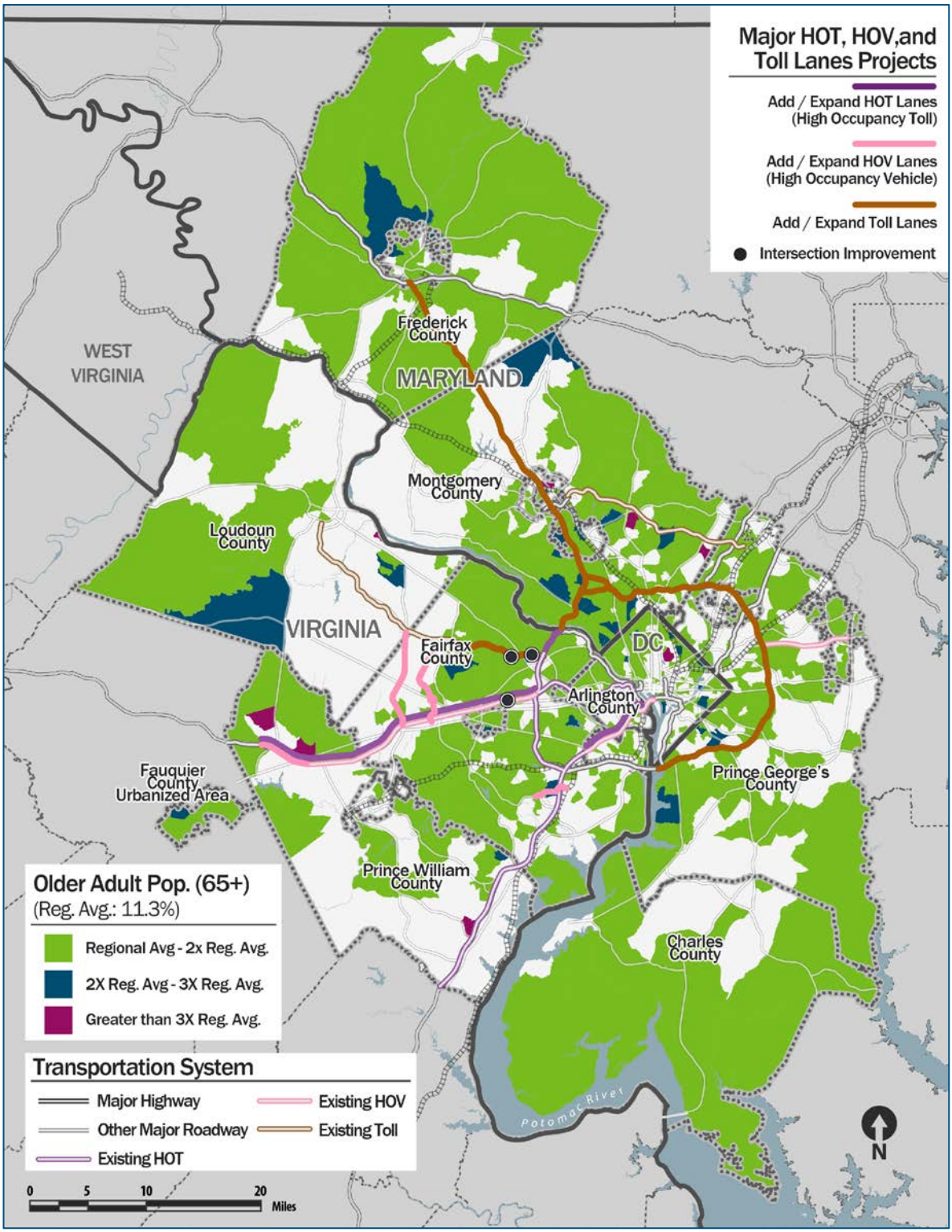
Source: Visualize 2045 and 2012-2016 American Community Survey

Figure 21: Older Adult (65+) Population and Major Transit Projects



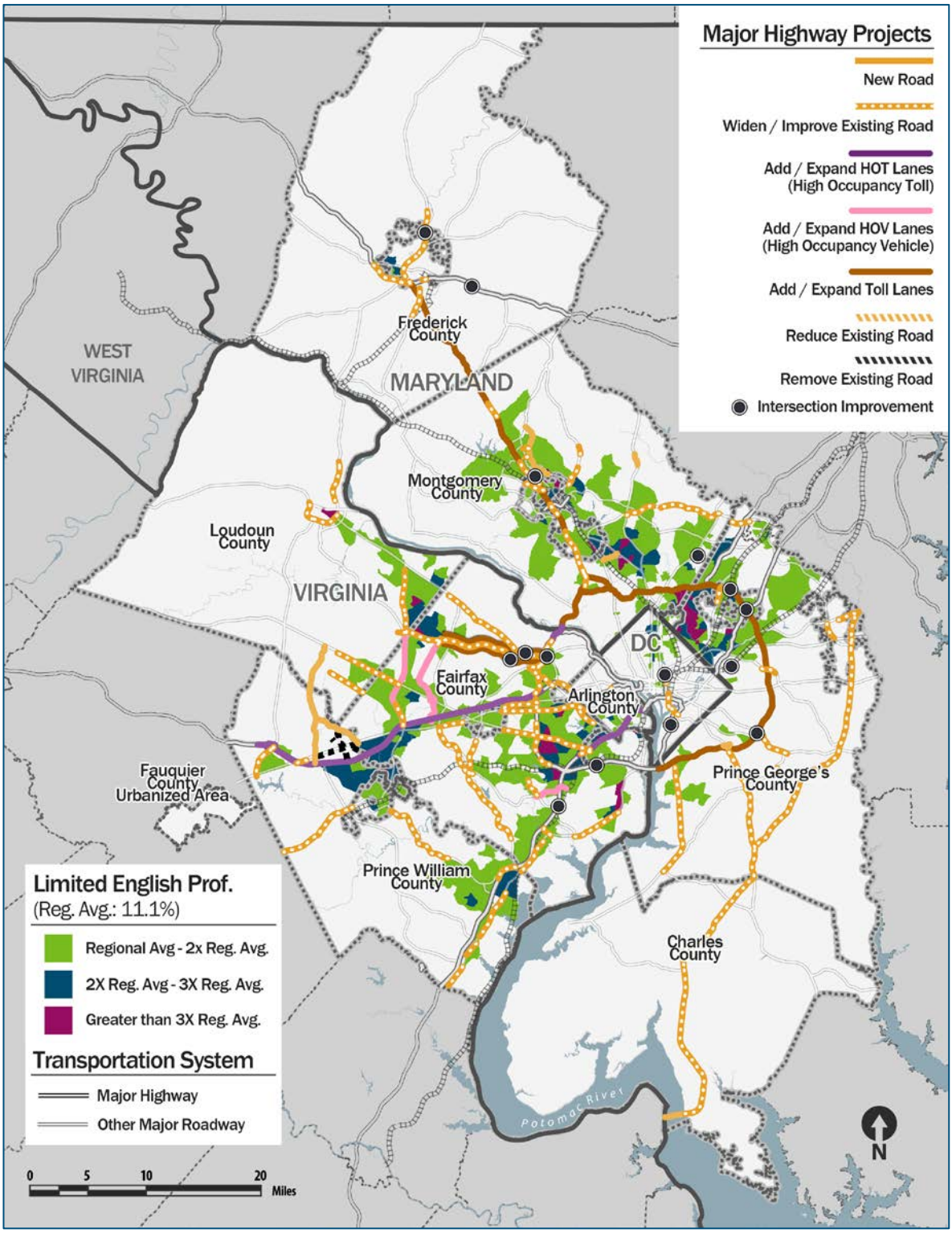
Source: Visualize 2045 and 2012-2016 American Community Survey

Figure 22: Older Adult (65+) Population and Major Managed Lanes Projects



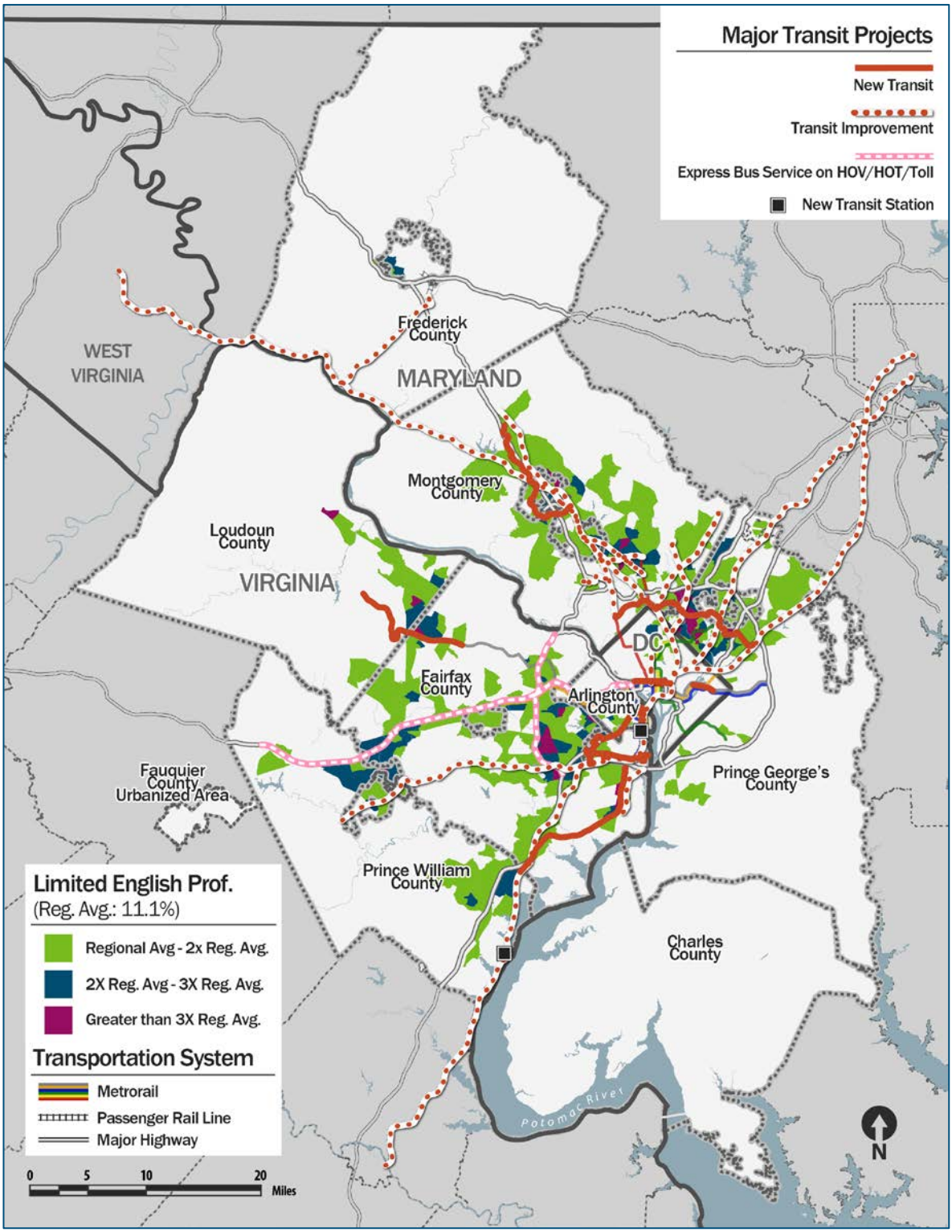
Source: Visualize 2045 and 2012-2016 American Community Survey

Figure 23: Limited English Proficiency Population and Major Highway Projects



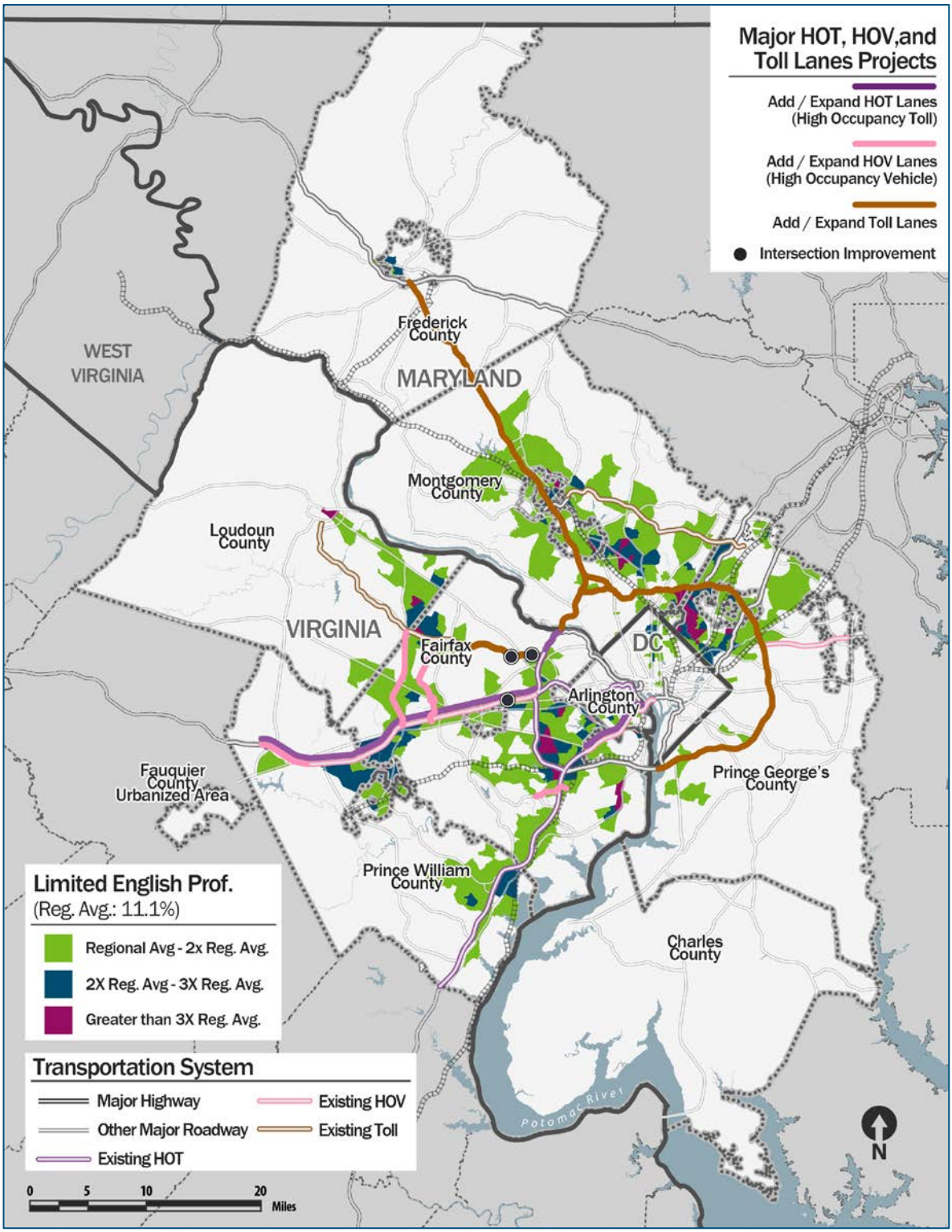
Source: Visualize 2045 and 2012-2016 American Community Survey

Figure 24: Limited English Proficiency Population and Major Transit Projects



Source: Visualize 2045 and 2012-2016 American Community Survey

Figure 25: Limited English Proficiency Population and Major Managed Lanes Projects



Source: Visualize 2045 and 2012-2016 American Community Survey