ITEM 12 - Information
July 20, 2005

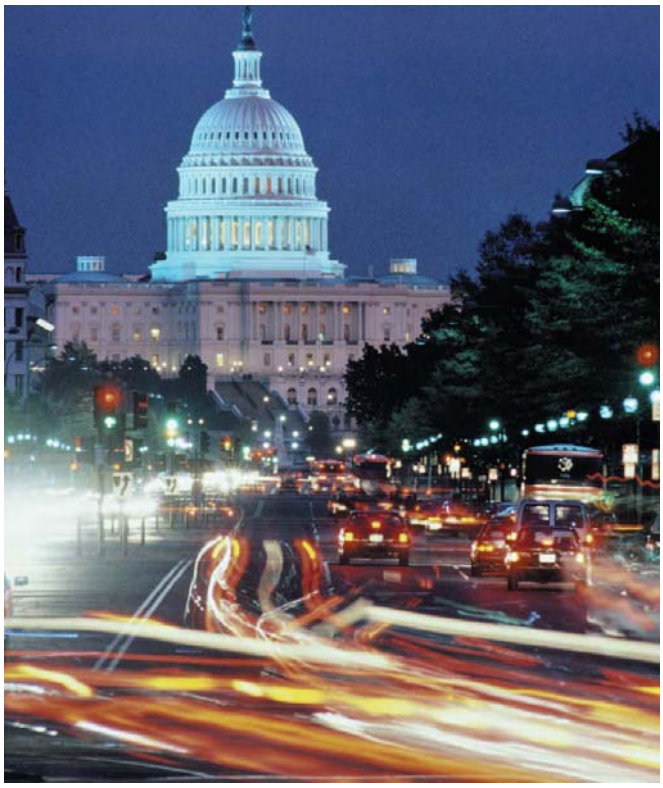
Briefing on the Report: Travel Characteristics and Accessibility Impacts of the 2004 Financially Constrained Long-Range Transportation Plan (CLRP) on Minority, Low-Income, and Disabled Populations in the Washington Region

Staff Recommendation: Receive briefing on the report that examines the performance of the 2004 CLRP in terms of accessibility to jobs, and the potential impact of the plan on minority, low-income, and disabled populations.

Issues: None

Background: This report utilizes 2000 Census data and the demographic and travel time data from the air quality conformity analysis of the 2004 CLRP to examine benefits and burdens of the plan in terms of access to jobs by automobile and by transit. The distribution of benefits and burdens is compared across the following population groups: African American, Hispanic/Latino, Asian, low-income, and persons with disabilities. The TPB Technical Committee was briefed on this report at it March 2005 meeting.

TRAVEL CHARACTERISTICS AND ACCESSIBILITY IMPACTS OF THE 2004 FINANCIALLY CONSTRAINED LONG-RANGE TRANSPORTATION PLAN ON MINORITY, LOW-INCOME AND DISABLED POPULATIONS



MARCH 2005

NATIONAL CAPITAL REGION TRANSPORTATION PLANNING BOARD
METROPOLITAN WASHINGTON COUNCIL OF GOVERNMENTS

ACKNOWLEDGEMENTS

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Allow 7 working days for preparation of the material.

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EXECUTIVE SUMMARY

This report examines the travel characteristics of disadvantaged population groups in the Washington region, and the potential impact of the 2004 Financially Constrained Long-Range Transportation Plan on these population groups. Benefits and burdens of the plan are measured in terms of accessibility to jobs by transit and by automobile. As a federally funded planning agency, the National Capital Region Transportation Planning Board is responsible for ensuring that its plans and programs do not have disproportionate, adverse impacts on minority, low-income, and disabled population groups.

Although the geographic locations of specific demographic groups vary, many minority, low-income, and disabled individuals are concentrated in the regional core and inner suburbs. The Asian population, which extends into the eastern outer suburbs, is a notable exception to this trend. Within the Washington region, minority, low-income, and disabled population groups suffer from higher poverty rates and unemployment rates, compared to the general population. Transit use and carpooling is more common among minority, low-income, and disabled workers, compared to the general population. These population groups are also more likely to live near transit and less likely to have access to vehicles, compared to the general population.

Between 2005 and 2030, some areas of the region are expected to experience a decline in the number of jobs accessible by automobile, due to congestion. Other parts of the region are expected to experience a gain in accessibility, due to steady employment growth. Across the whole region, the average number of jobs accessible by automobile is expected to increase slightly. In contrast, the average number of jobs accessible by transit is expected to increase significantly during the same time period, due to both employment growth and transit improvements. Accessibility to jobs by automobile, however, will remain higher than accessibility by transit. Changes in accessibility are not expected to have disproportionate, adverse impacts on minority, low-income, or disabled population groups.

Important limitations of this analysis, such the availability of high-quality data and the extent to which benefits and burdens of the plan can be measured, are described in the final section of the report.

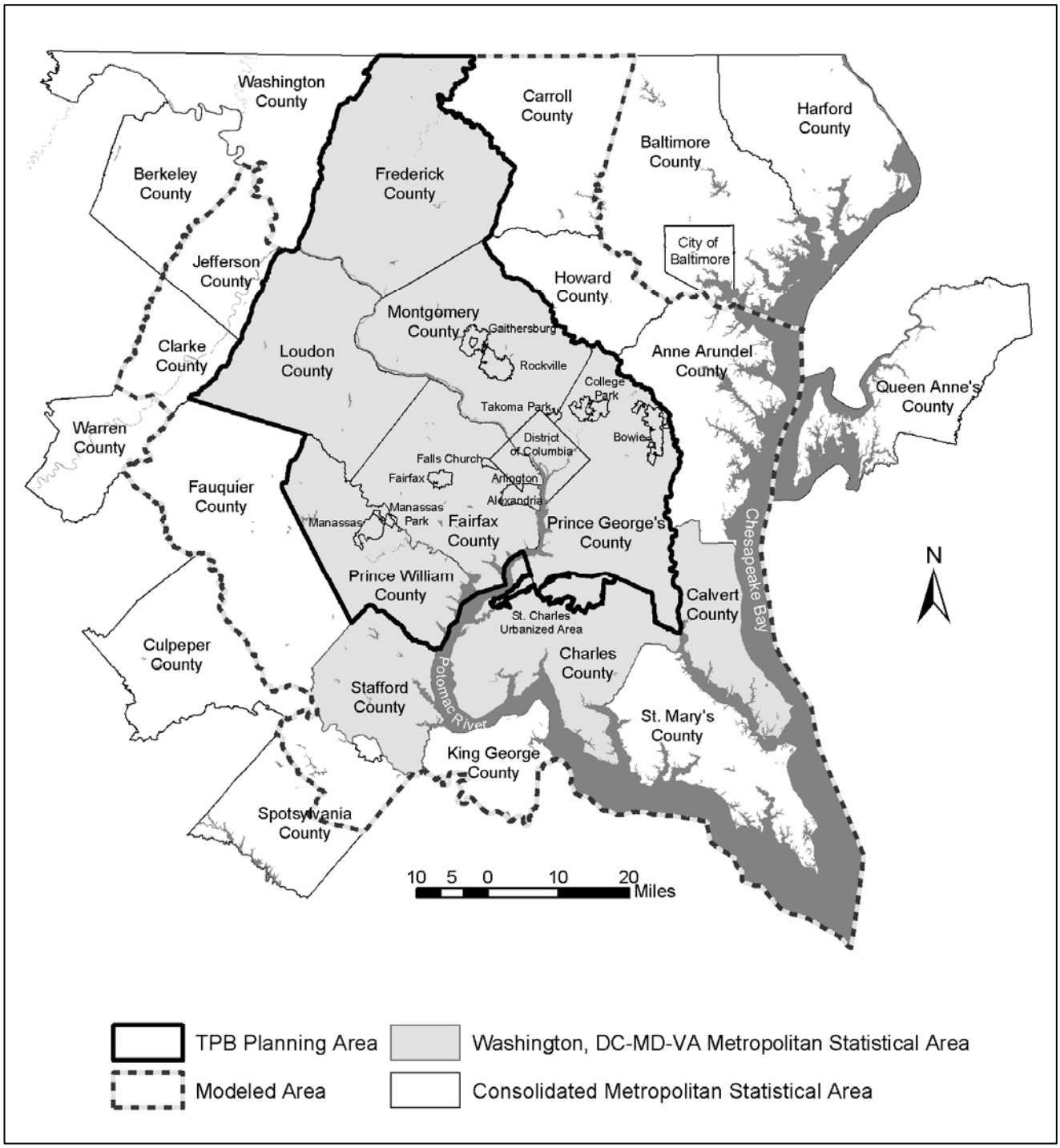
INTRODUCTION

PURPOSE AND ORGANIZATION OF REPORT

The purpose of this report is to describe the travel characteristics of minority, low-income, and disabled population groups in the metropolitan Washington region, and to assess the potential impact of the Financially Constrained Long-Range Transportation Plan (CLRP) on these population groups. The CLRP covers all of the jurisdictions that are members of the National Capital Region Transportation Planning Board (TPB), including the District of Columbia; Arlington, Fairfax, Loudoun, and Prince Williams Counties in Virginia; and Frederick, Montgomery, and Prince's George's Counties and St. Charles Urbanized Area in Maryland. Most of the data in this report refers to the Washington, DC-MD-VA Metropolitan Statistical Area (MSA), which was designated by the U.S. Census in the 1980s and includes all of the TPB member jurisdictions plus Stafford County in Virginia and Charles and Calvert Counties in Maryland. Figure 1 shows a map of the TPB planning area and the MSA.

The report is divided into six parts. The first section describes the major projects contained in the 2004 CLRP. The second section provides a demographic profile of the Washington region, and compares the geographic location of minority, low-income, and disabled population groups with the location of major transportation improvements from the 2004 CLRP. The third section reviews the travel characteristics of minority, low-income, and disabled populations, in terms of means of transportation to work, access to automobiles, and proximity to transit. The fourth section reviews forecast land-use trends over the next 25 years and the expected performance of the transportation system that will result, based on the 2004 CLRP. The fifth section introduces the concept of accessibility and discusses the results of a regional accessibility analysis, including the distribution of gains and losses in accessibility across minority, low-income, and disabled population groups. The sixth and final section summarizes the conclusions of the report and discusses important limitations of the data and methodology. An appendix follows the report and provides a more detailed description of the methodology.

Figure 1: The Metropolitan Washington Region



FEDERAL GUIDANCE AND REQUIREMENTS

An important reason for examining the travel characteristics of minority and low-income populations and the potential impact of the long-range plan on these demographic groups is that Federal guidelines and regulations call for such an analysis. In 1994, President Clinton signed Executive Order 12898, "Federal Actions to Address Environmental Justice in Minority Populations and Low Income Populations." The order 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." Similar Orders followed from the U.S. Department of Transportation in 1997 and the Federal Highway Administration in 1998.

Environmental justice is not a new requirement, but amplifies Title VI of the 1964 Civil Rights Act, which 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." As a government agency that receives federal funding, the TPB is responsible for implementing Title VI and conforming to federal environmental justice principles, policies, and regulations.

With these federal requirements in mind, the analysis described in this report was designed to address the following questions:

- How many minority, low-income, and disabled individuals live in the Washington region?
- Where are these individuals located within the region?
- How do minority, low-income, and disabled individuals get to work?
- Where do these individuals live relative to transit facilities?
- What are the benefits and burdens of the long-range transportation plan?
- How are the benefits and burdens distributed across minority, low-income, and disabled population groups?

Other issues involved with environmental justice and Title VI relate to the public involvement process.[1] To ensure ongoing participation from low-income and minority communities and persons with disabilities, in 2001 the TPB created the Access for All (AFA) Advisory Committee. The committee's mission is to identify concerns of low-income and minority populations and persons with disabilities, and to determine whether and how these issues might be addressed within the TPB process. A TPB member chairs the committee, which is composed of TPB-appointed community leaders from around the region. The committee also includes ex-officio representation from key transportation agencies that are active in the TPB process: the District, Maryland, and Virginia

[1] For more information on the TPB's public involvement process, see the TPB Citizen's Guide, available for download from www.mwcog.org.

Departments of Transportation, the Washington Metropolitan Area Transit Authority, the Federal Transit Administration, and the Federal Highway Administration.

The AFA committee made several recommendations to the TPB in its 2003 Report:

- Develop more effective communication of regional transit information.
- Prioritize regional and local transportation services for low-income populations.
- Improve transit services for people with disabilities.
- Promote more development around transit station areas, but take care of the community that is already there.

The full report may be downloaded from http://www.mwcog.org/transportation.

SECTION I: THE 2004 FINANCIALLY CONSTRAINED LONG-RANGE TRANSPORTATION PLAN FOR THE NATIONAL CAPITAL REGION

SUMMARY OF MAJOR IMPROVEMENTS INCLUDED IN THE PLAN

The Transportation Planning Board (TPB) adopted the current Financially Constrained Long-Range Transportation Plan (CLRP) in November 2004. The plan includes all regionally significant transportation projects and programs that are planned in the Washington metropolitan area between 2005 and 2030, and meets federal Air Quality Conformity and financial requirements.

Major highway improvements in the plan are shown in Figure 11. Over the next 25 years, approximately 2,000 freeway and arterial lane miles will be added to the highway system, a 13% increase. As Figure 11 shows, most of the CLRP highway improvements involve widening or upgrading, whereas new construction is limited. Some of the significant highway projects include the following:

- Intercounty Connecter – A new, east-west highway in Montgomery and Prince George's Counties in Maryland, between I-270 and I-95/Route 1.

- Springfield Interchange – Consists of building more than 50 bridges and widening a segment of I-95 to 24 lanes.

- Woodrow Wilson Bridge – Covers a 7.5-mile corridor, including four new interchanges and two new drawbridges.

Figure 12 depicts major transit and high-occupancy vehicle (HOV) improvements in the plan. Between 2005 and 2030, 160 HOV lane miles will be added to the highway system, an increase of 76%. During the same time period, 25 miles will be added to the Metrorail system, increase of 24%. Although the list of major transit improvements in shorter than the list of major highway improvements, transit accounts for 60% of the expenditures in the CLRP, approximately $56 billion out of $93 billion. Some of the significant transit projects include the following:

- Corridor Cities Transitway – A light-rail line roughly following the I-270 corridor north from Shady Grove.

- Rail to Dulles – A 23.1-mile extension of Metrorail to Dulles Airport and into Loudoun County.

- Anacostia Light Rail – Running 2.7 miles between Pennsylvania Avenue, SE, and Bolling Air Force Base.

Figure 2: Major Highway Improvements from the 2004 CLRP
2005 to 2030

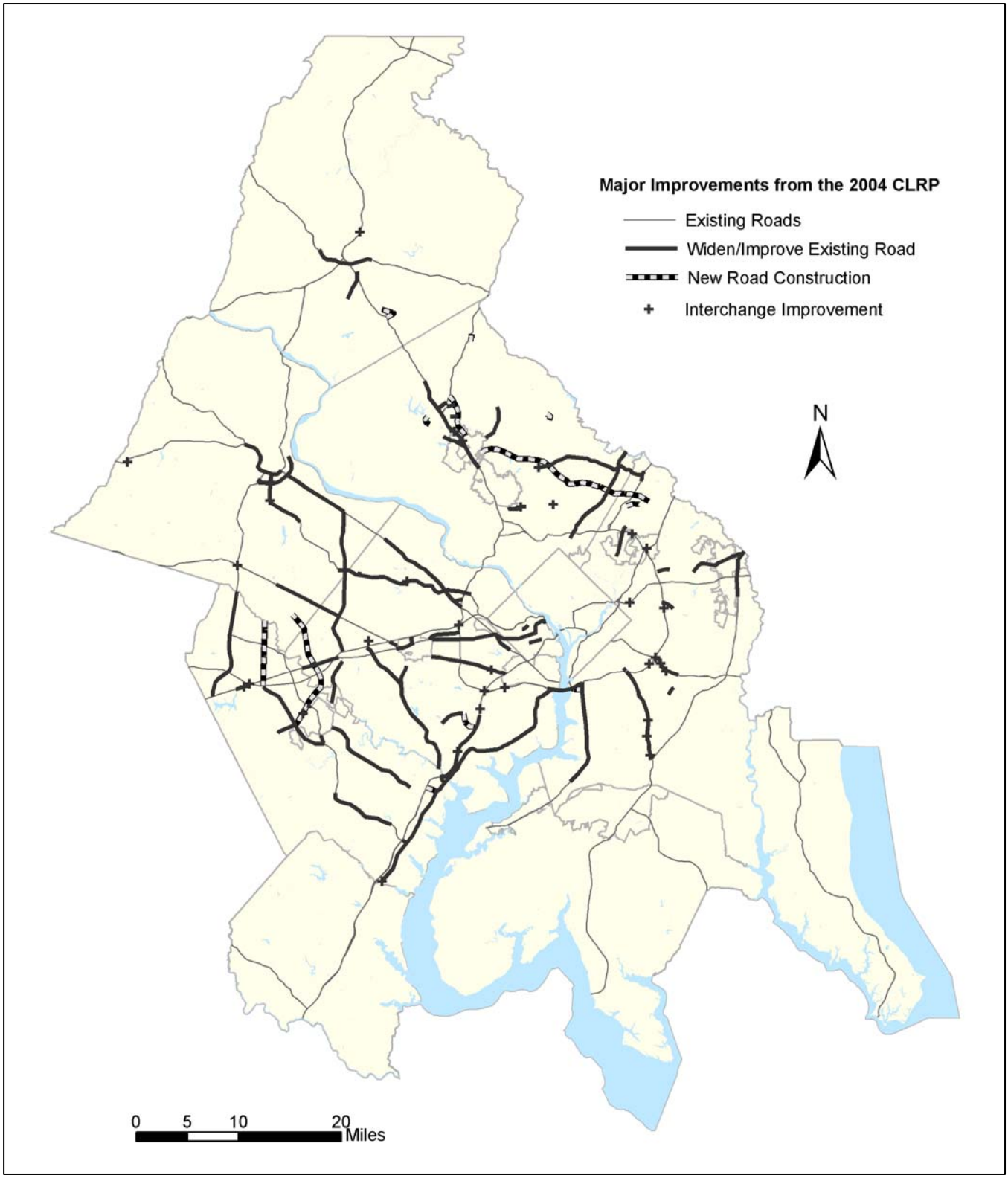
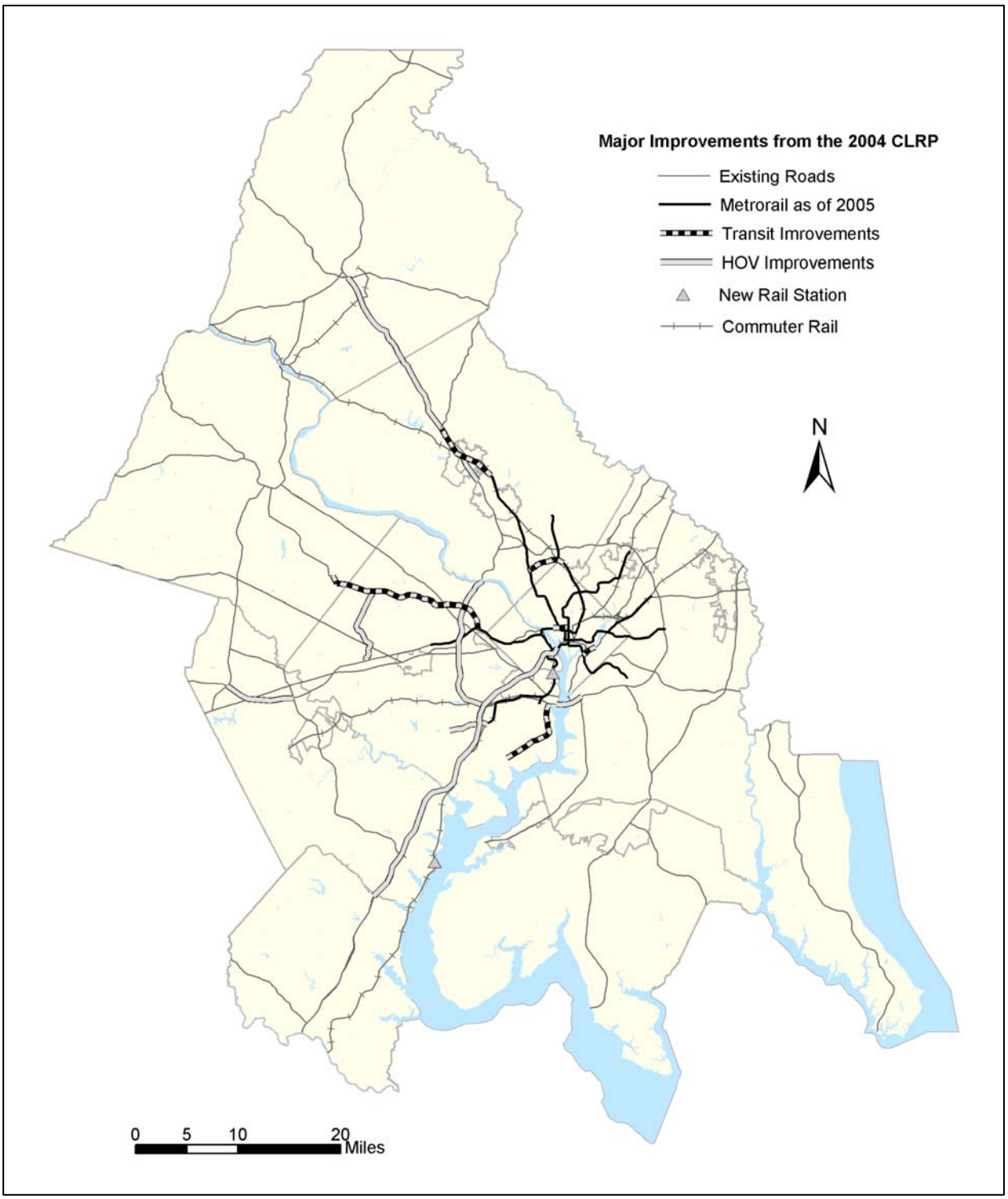


Figure 3: Major Transit and High-Occupancy Vehicle (HOV) Improvements from the 2004 CLRP 2005 to 2030



SECTION II: DEMOGRAPHIC PROFILE OF THE WASHINGTON REGION

PREVALENCE AND GEOGRAPHIC DISTRIBUTION OF MINORITY, LOW-INCOME, AND DISABLED POPULATION GROUPS

The analysis described in this report considered the following population groups[2]:

- African American – a person having origins in any of the black racial groups of Africa.
- Asian American – a person having origins in any of the original peoples of the Far East, Southeast Asia, or the Indian subcontinent.
- Hispanic/Latino – a person of Mexican, Puerto Rican, Cuban, Central or South American, or other Spanish culture or origin, regardless of race.
- Low-Income – a person whose household income is less than one-and-a-half times the federal government's official poverty threshold. The official poverty threshold depends on family size. For a family of four, the poverty threshold is an annual income of $17,000. In the current analysis, a family of four with an annual income of less than $25,500 is considered low income.
- Disabled – a person with any form of disability, including sensory, physical, mental, self-care, going outside the home, and employment disability.

Table 1 shows the number and regional percent for each population group in 1990 and 2000, based on U.S. Census data. The African American population is the largest minority group in the metropolitan Washington area, representing 27% of the region. The next largest demographic group is the disabled population, representing 14% of the region. As Figure 4 shows, all of the minority groups and the low-income population grew faster than the general population between 1990 and 2000. The Hispanic/Latino population experienced the most dramatic increase, nearly doubling in size over the 10-year period, while the general population increased by only 16%. The Asian population also experienced a large increase, of 61%.

[2] The American Indian and Alaskan Native population was not considered in the current analysis, because 2000 U.S. Census data shows that this population represents less than 1% of the Washington region.

Table 1: Regional Percent and Number of Minority, Low-Income, and Disabled Population Groups in the Washington Region

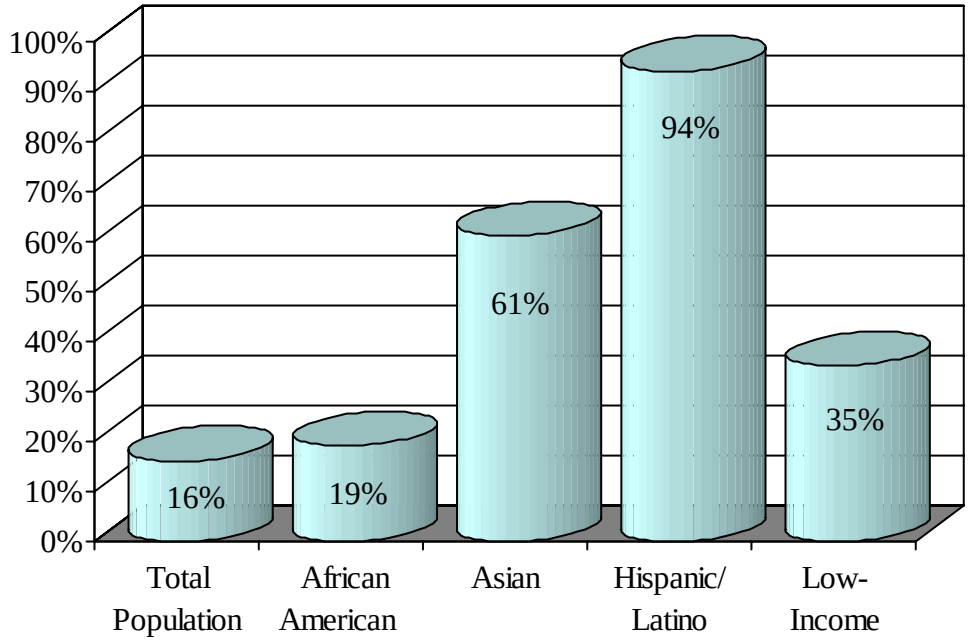
	African American	Asian	Hispanic/ Latino	Low-Income	Disabled*	Washington Region
1990	1,042,000 27%	200,000 5%	218,000 6%	397,000 10%		3,924,000 100%
2000	1,239,000 27%	321,000 7%	423,000 9%	536,000 12%	630,000 14%	4,545,000 100%

*For the first time in 2000, the U.S. Census included a general disability indicator. Comparable data is not available for 1990.

Note: Rows do not total to 100% because the demographic categories are not discrete.

Source: 1990 and 2000 U.S. Census SF3; numbers refer to the Washington, DC-MD-VA MSA

Figure 4: Percent Change in Minority and Low-Income Population Groups, 1990 to 2000



Source: 1990 and 2000 U.S. Census SF3; numbers refer to the Washington, DC-MD-VA MSA

Figures 5 through 14 show the geographic distributions of each population group, relative to major highway, HOV, and transit improvements from the 2004 CLRP. Map legends are based on the regional percent represented by each population group, and therefore vary across maps.

African Americans are predominantly located in the eastern half of the District of Columbia and Prince George's County in Maryland. In contrast, the Asian population is located primarily in Montgomery County in Maryland and Fairfax County in Virginia. The Hispanic/Latino population is clustered along high-density transportation corridors, such as Route 1 and I-95 in Virginia, 16th Street in the District of Columbia, and I-270 and Rockville Pike in Maryland. The low-income population is concentrated in the central core of the region, particularly the eastern half, and is also clustered along transportation corridors similar to the Hispanic/Latino population. Finally, the disabled population is more widely dispersed throughout the region compared to the other population groups. Similar to African Americans and low-income individuals, however, individuals with disabilities are more heavily concentrated in the eastern portion of the region.

Figure 5: 2000 African American Population and Major Highway Improvements from the 2004 CLRP

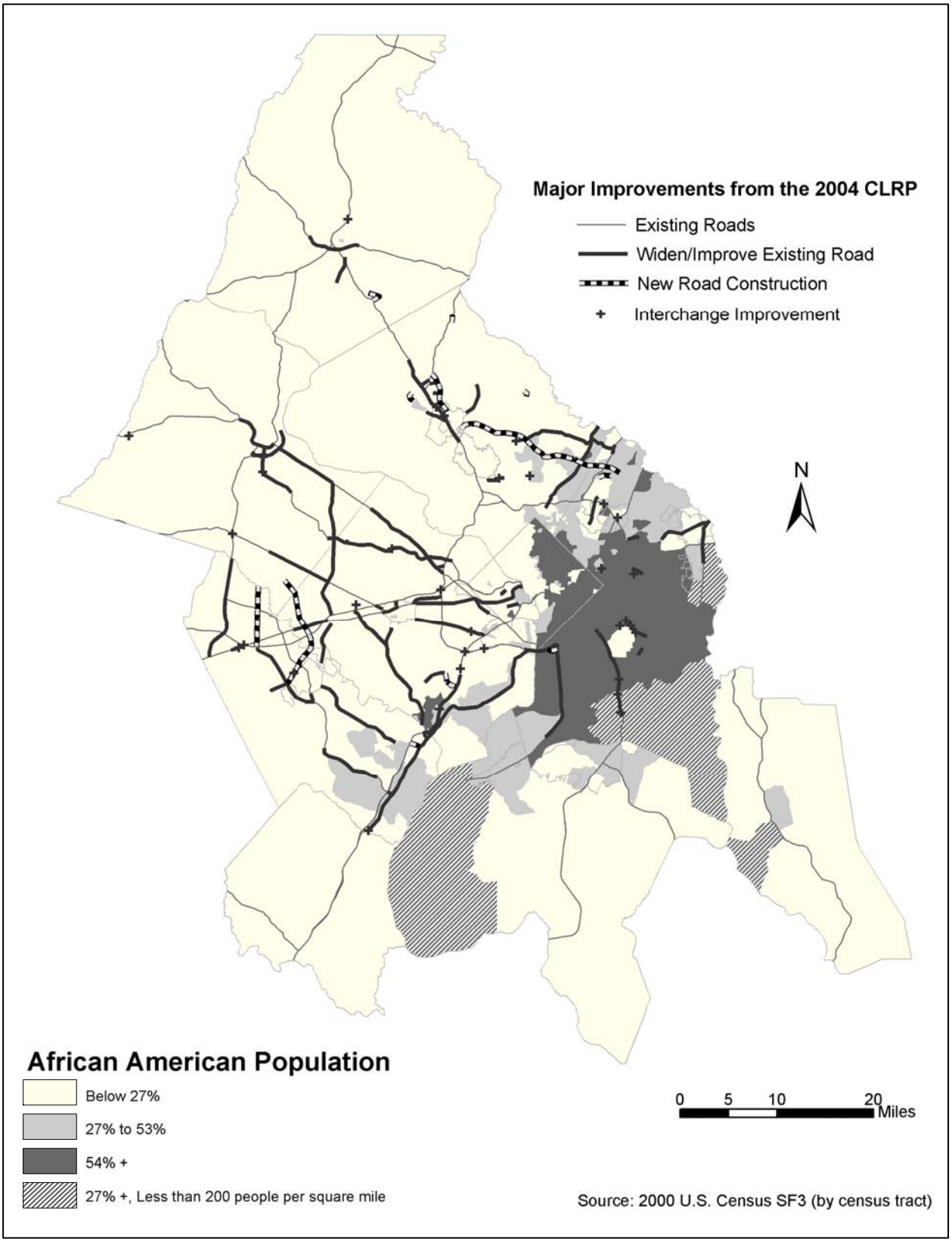


Figure 6: 2000 African American Population and Major High-Occupancy Vehicle (HOV) and Transit Improvements from the 2004 CLRP

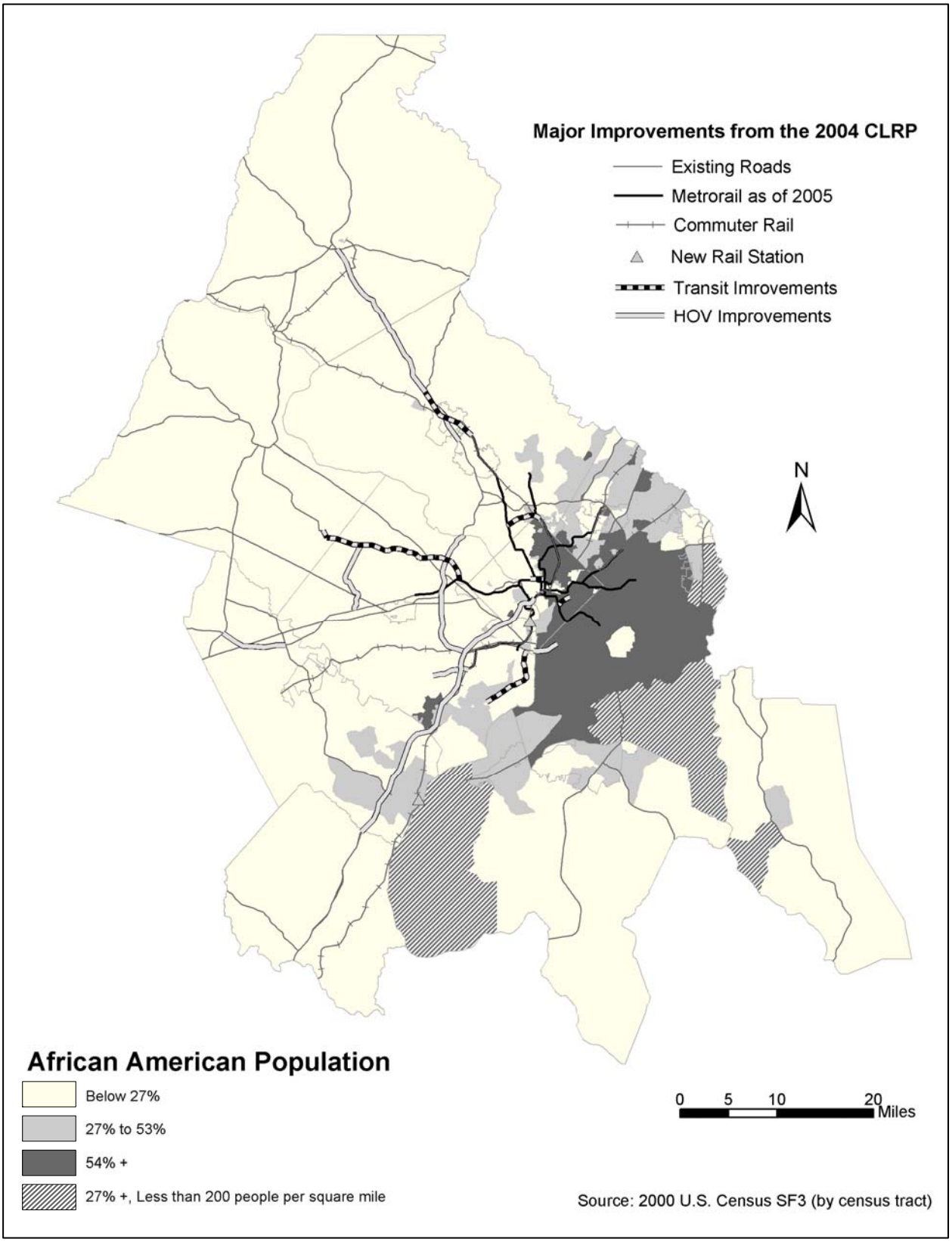


Figure 7: 2000 Asian Population and Major Highway Improvements from the 2004 CLRP

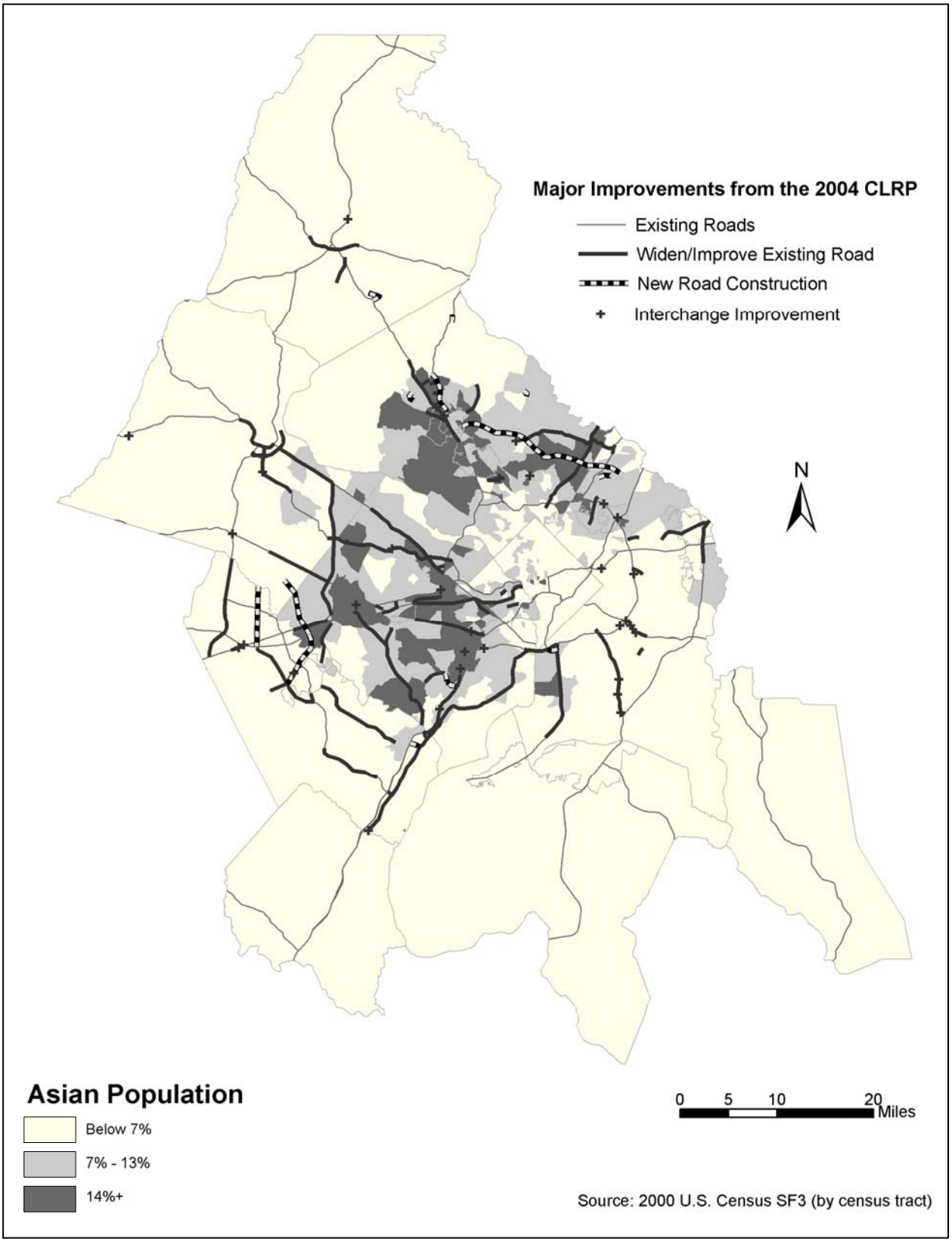


Figure 8: 2000 Asian Population and Major High-Occupancy Vehicle (HOV) and Transit Improvements from the 2004 CLRP

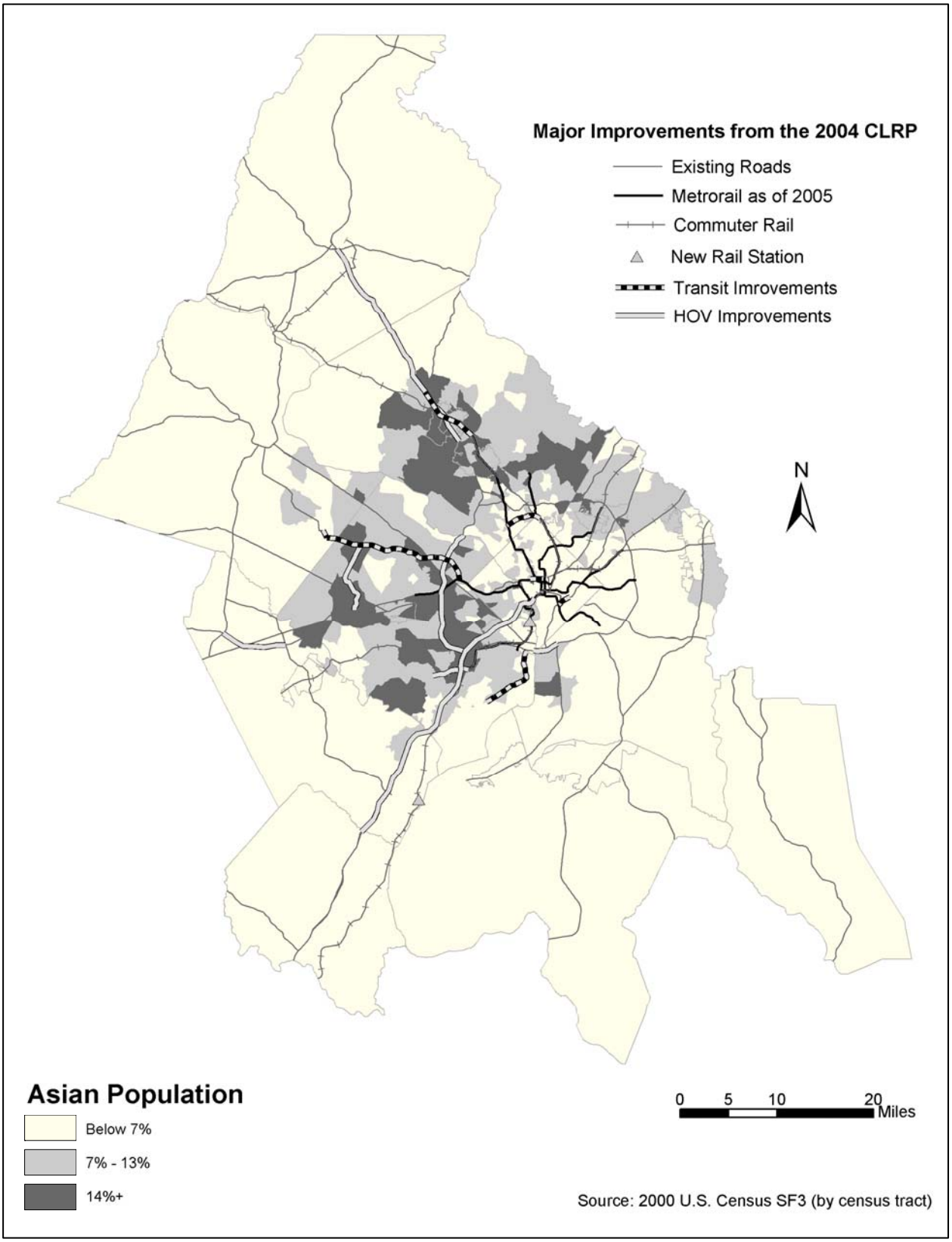


Figure 9: 2000 Hispanic/Latino Population and Major Highway Improvements from the 2004 CLRP

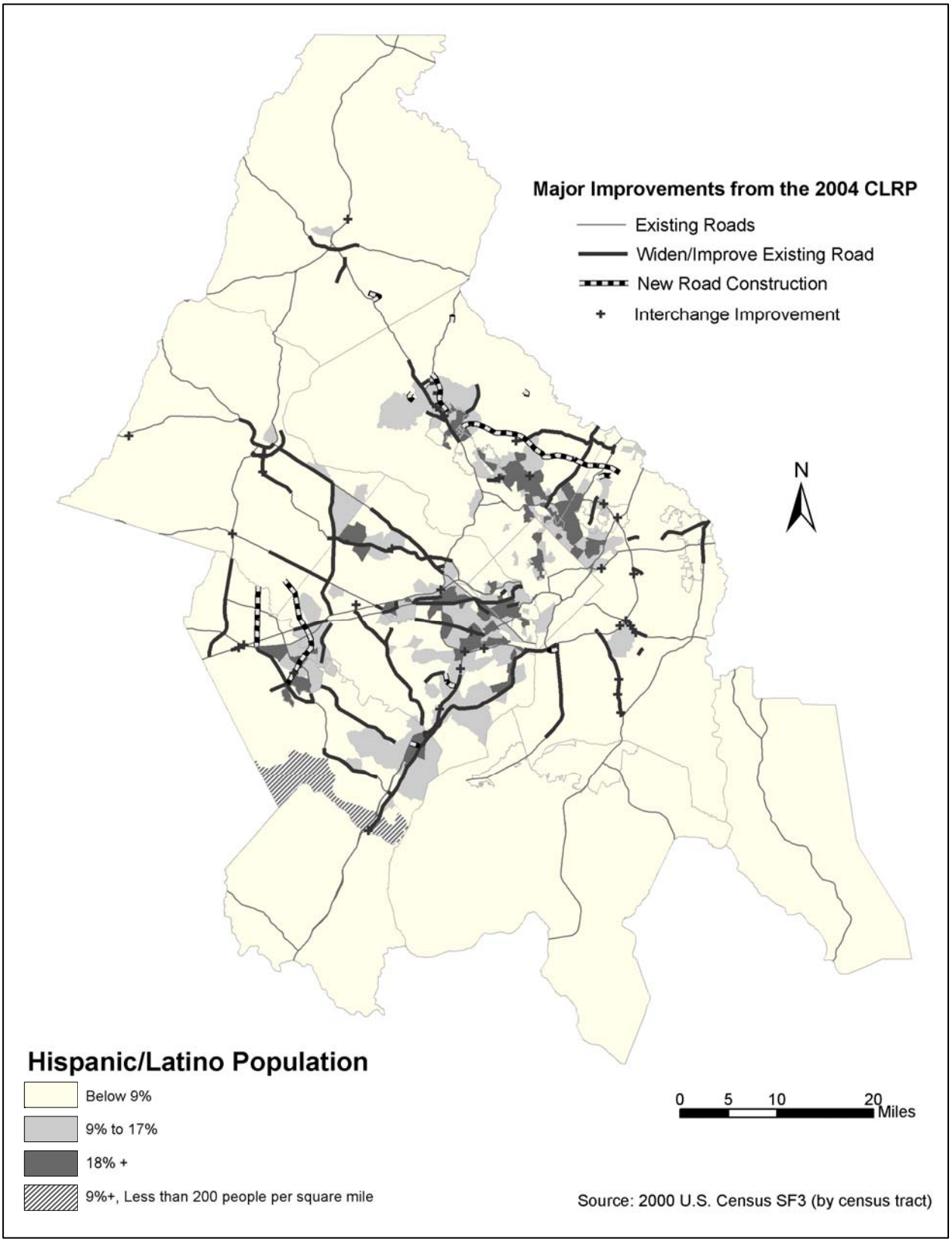


Figure 10: Hispanic/Latino Population and Major High-Occupancy Vehicle (HOV) and Transit Improvements from the 2004 CLRP

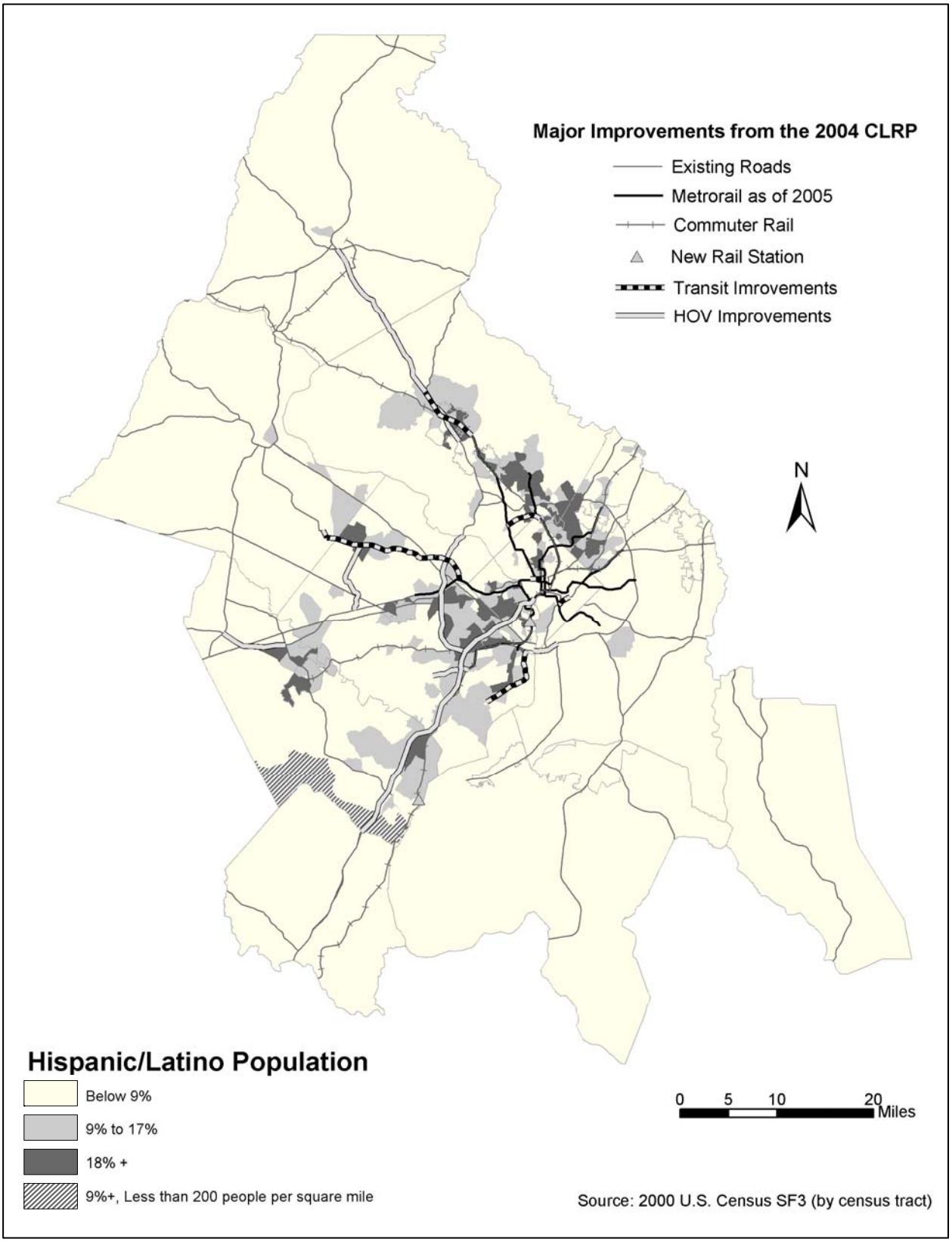


Figure 11: 2000 Low-Income Population and Major Highway Improvements from the 2004 CLRP

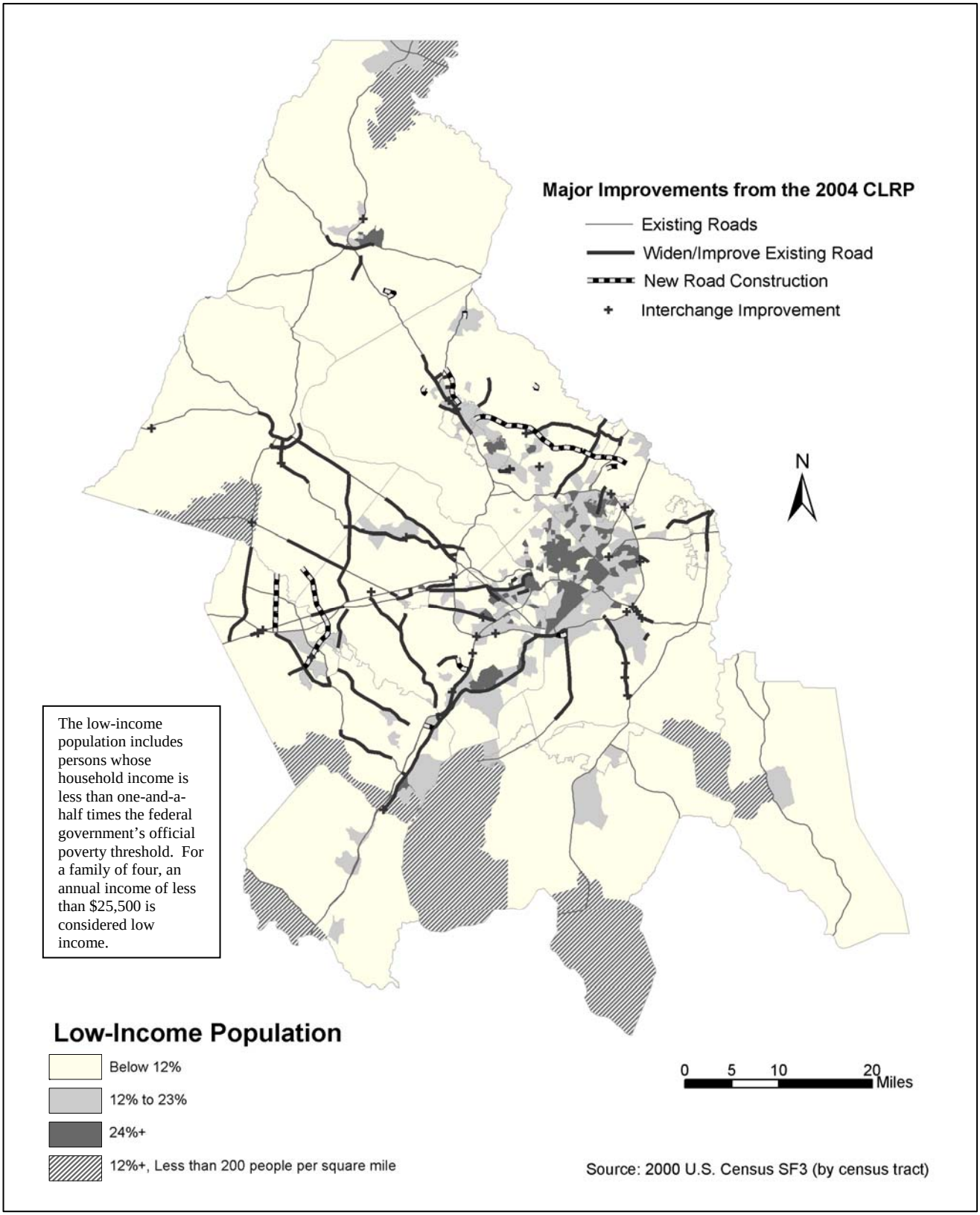


Figure 12: 2000 Low-Income Population and Major High-Occupancy Vehicle (HOV) and Transit Improvements from the 2004 CLRP

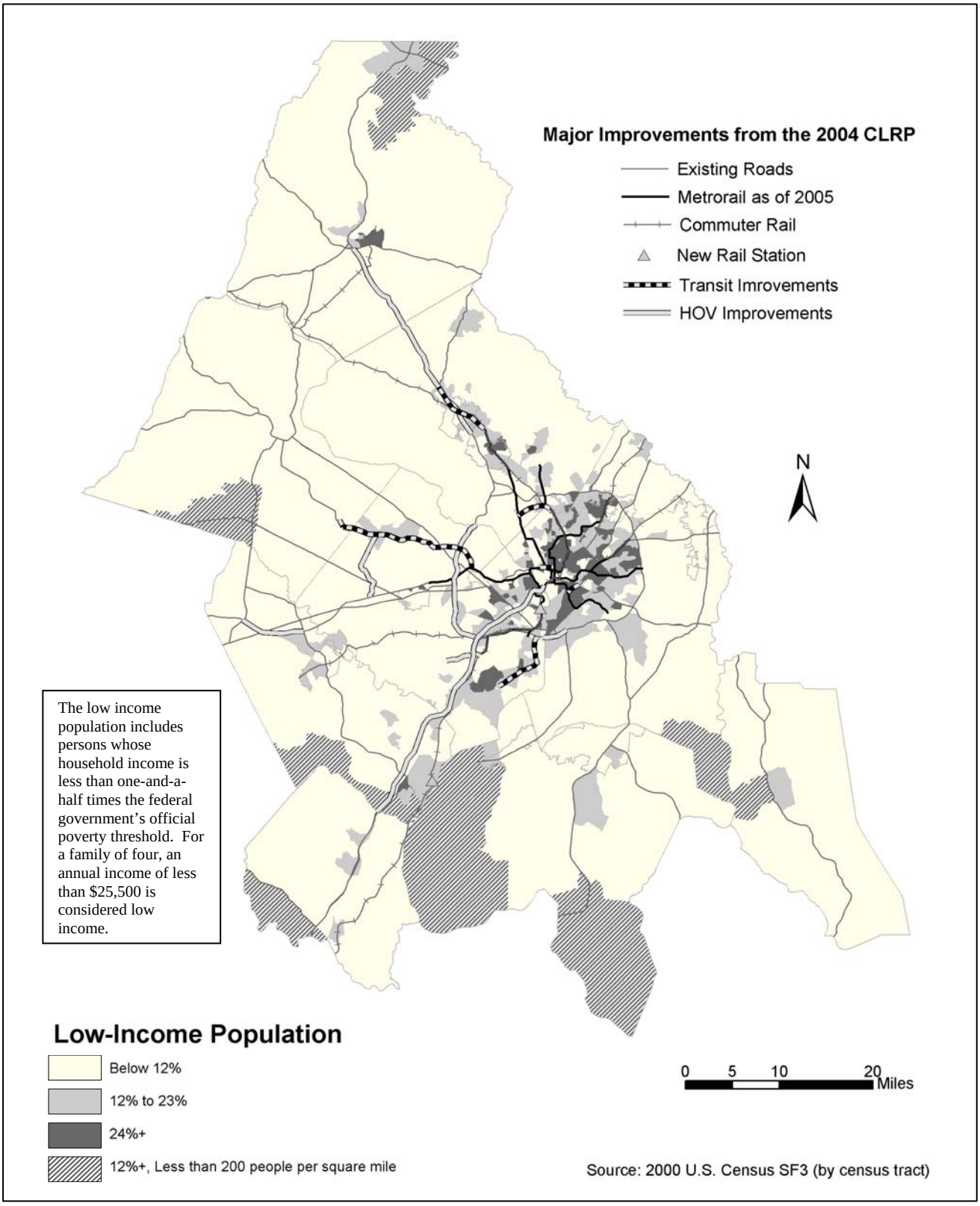


Figure 13: 2000 Disabled Population and Major Highway Improvements from the 2004 CLRP

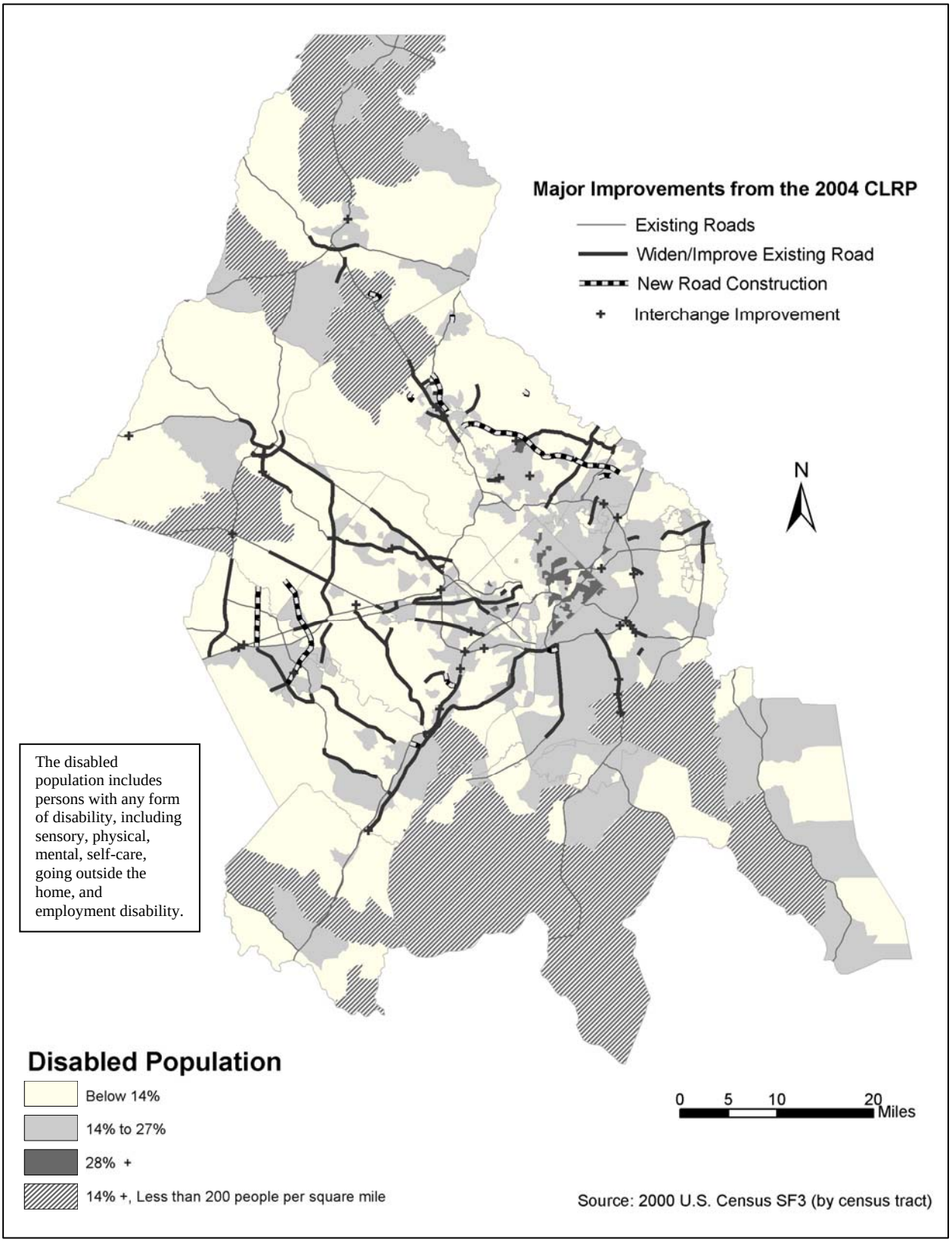
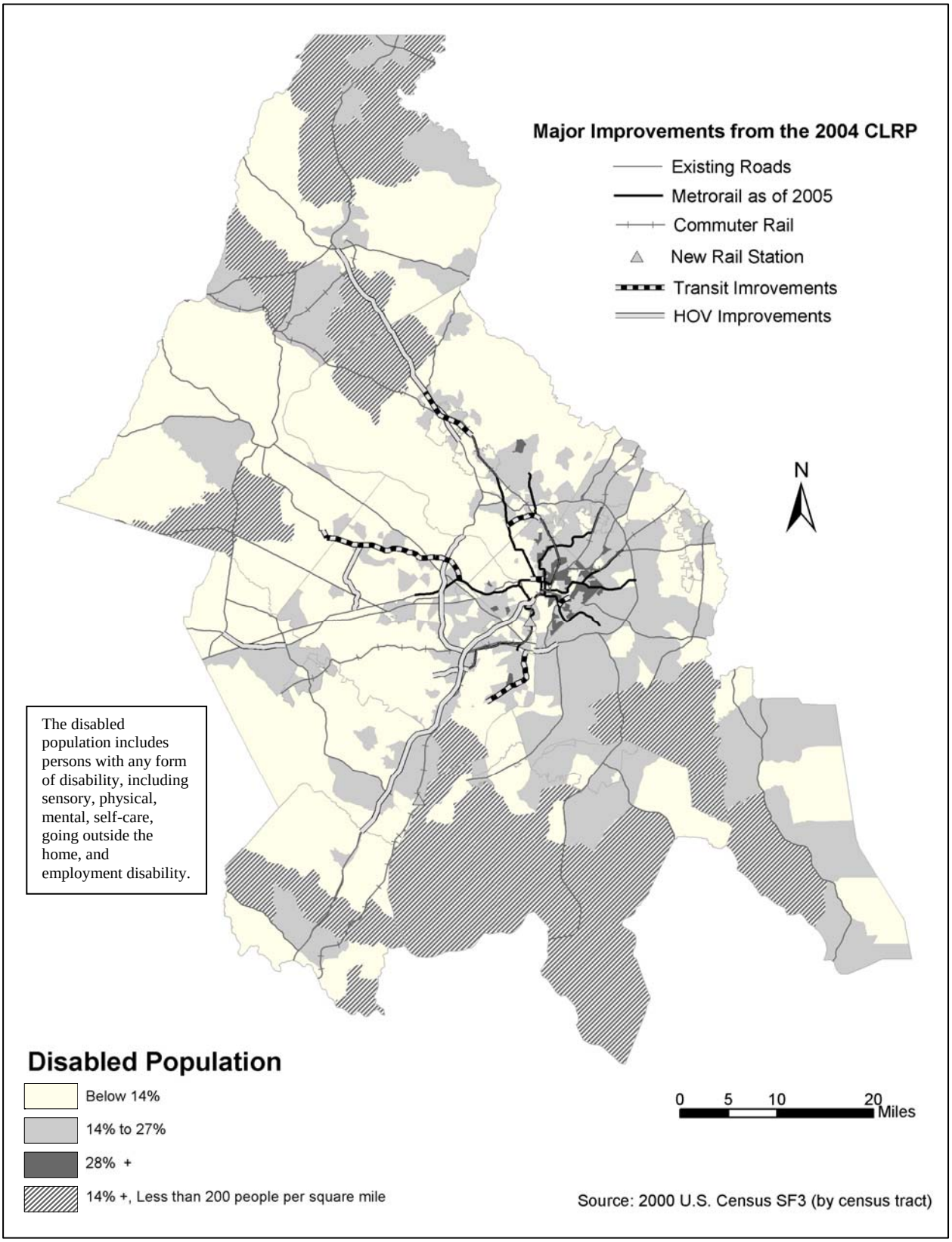


Figure 14: 2000 Disabled Population and Major High-Occupancy Vehicle (HOV) and Transit Improvements from the 2004 CLRP



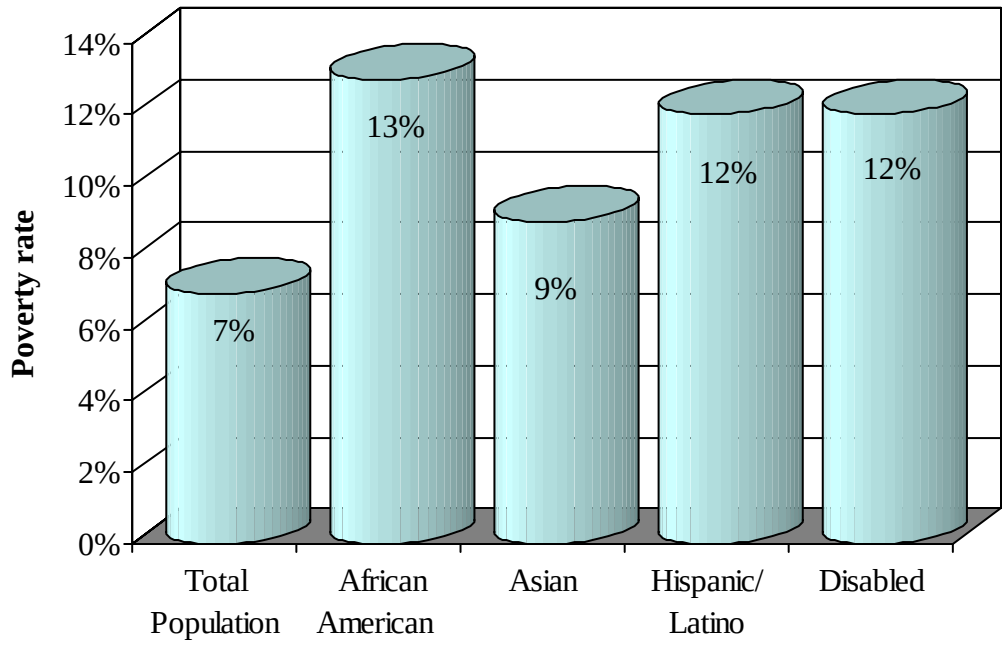
POVERTY AND UNEMPLOYMENT IN MINORITY, LOW-INCOME, AND DISABLED POPULATION GROUPS

The federal government's official poverty threshold is calculated based on assumptions regarding the dietary needs of families on austere budgets and the proportion of family income spent on food. Although poverty thresholds are revised annually to allow for changes in the cost of living as reflected in the Consumer Price Index, they are not adjusted for regional, state, or local variations in the cost of living.

The official poverty threshold depends on family size. For a single person, the 1999 poverty line was an income of $8,500 per year. For a family of four, the 1999 poverty line was an income of $17,000 per year. In comparison, the median household income for the Washington region was $68,656 in 1999.[3] According to the 2000 Census, 7% of the region's population lives below the poverty threshold. Figure 15 shows that poverty rates are higher for all of the minority population groups and for individuals with disabilities. The African American population has the highest poverty rate, at 13%.

Because the federal government's poverty threshold is so low relative to the Washington region's median income, the current analysis defines the low-income population as any person whose household income is less than one-and-a-half times the official poverty threshold. For example, a family of four with an income in 1999 of less than $25,500 is considered low income.

Figure 15: Poverty Rates for Minority and Disabled Population Groups

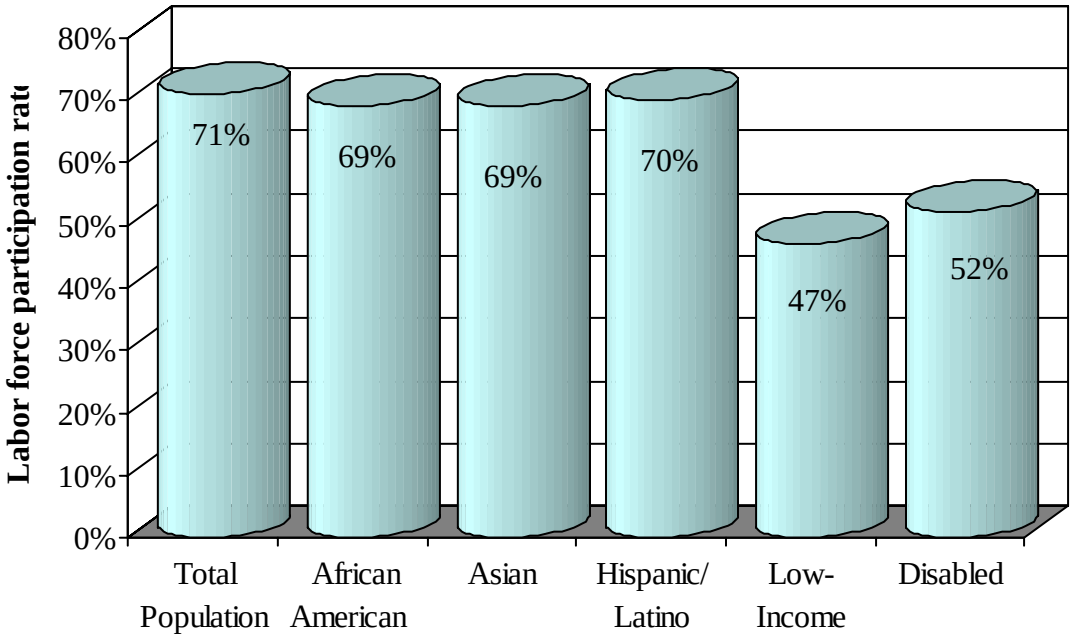


Source: 2000 U.S. Census PUMS; numbers refer to the Washington, DC-MD-VA MSA

[3] *Our Changing Region: Census 2000; Volume 1 Number 5*. Metropolitan Washington Council of Governments, October 1, 2003.

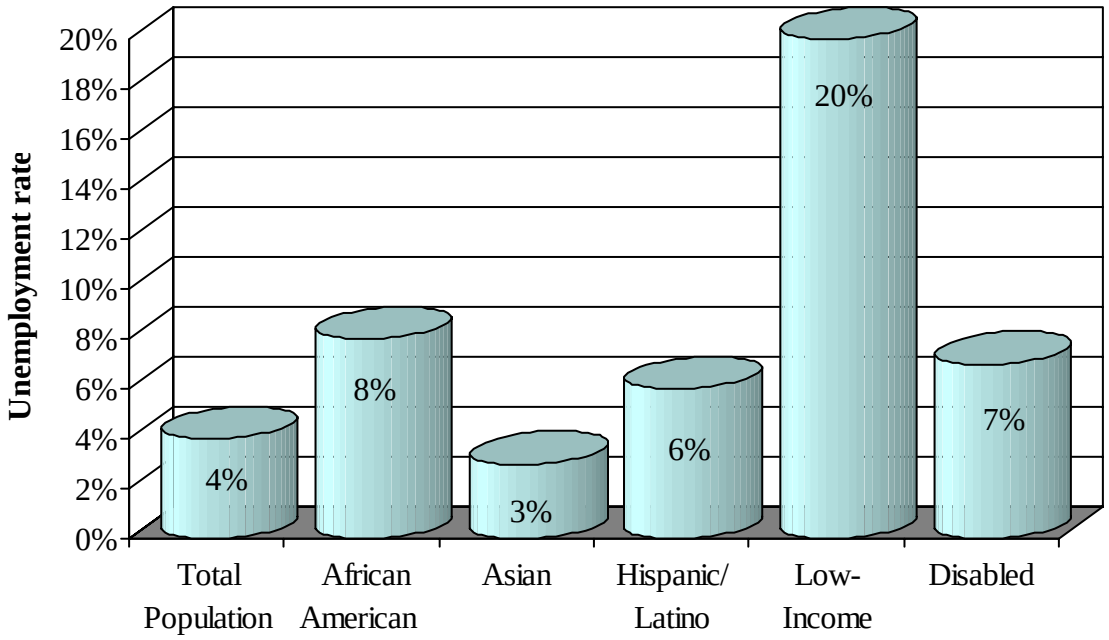
Minority, low-income, and disabled population groups also have higher unemployment rates and lower labor force participation rates, compared to the general population. According to the 2000 Census, 71% of the region's population age 16 and older participates in the labor force. Within the labor force, 96% is employed and 4% is unemployed but actively seeking employment. Figure 16 shows that the 2000 labor force participation rate is particularly low for the disabled population (52%) and the low-income population (47%). Figure 17 shows that the 2000 unemployment rate is highest for the low-income population (20%) and the African American population (8%).

Figure 16: Labor Force Participation Rates for Minority, Low-Income, and Disabled Population Groups



Source: 2000 U.S. Census PUMS; numbers refer to the Washington, DC-MD-VA MSA

Figure 17: Unemployment Rates for Minority, Low-Income, and Disabled Population Groups



Source: 2000 U.S. Census PUMS; numbers refer to the Washington, DC-MD-VA MSA

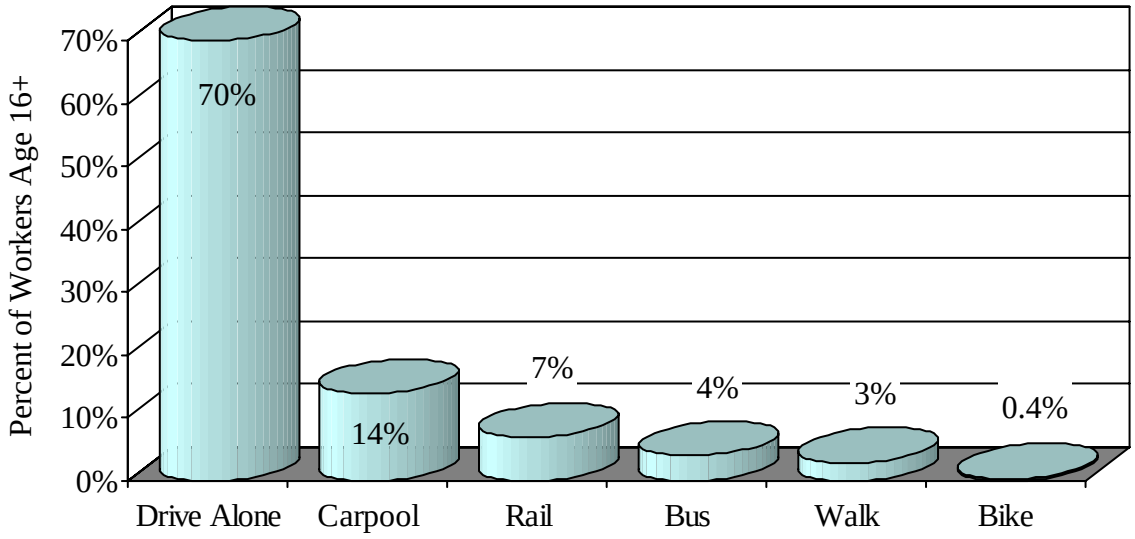
SECTION III: CURRENT TRAVEL CHARACTERISTICS OF MINORITY, LOW-INCOME, AND DISABLED POPULATION GROUPS

MEANS OF TRANSPORTATION TO WORK

In order to better understand the impact of the long-range transportation plan on minority, low-income, and disabled population groups, it is important to consider how these population groups use the current transportation system. Information on means of transportation to work is available from the U.S. Census. Numbers from the 2000 Census, shown in Figure 18, indicate that driving was the dominant means of transportation to work in the Washington region. Seventy percent of the region's workers drove alone to work, and 14% participated in carpools. Eleven percent of workers commuted by transit (rail and bus), and less than 5% used non-motorized modes (walking and biking).

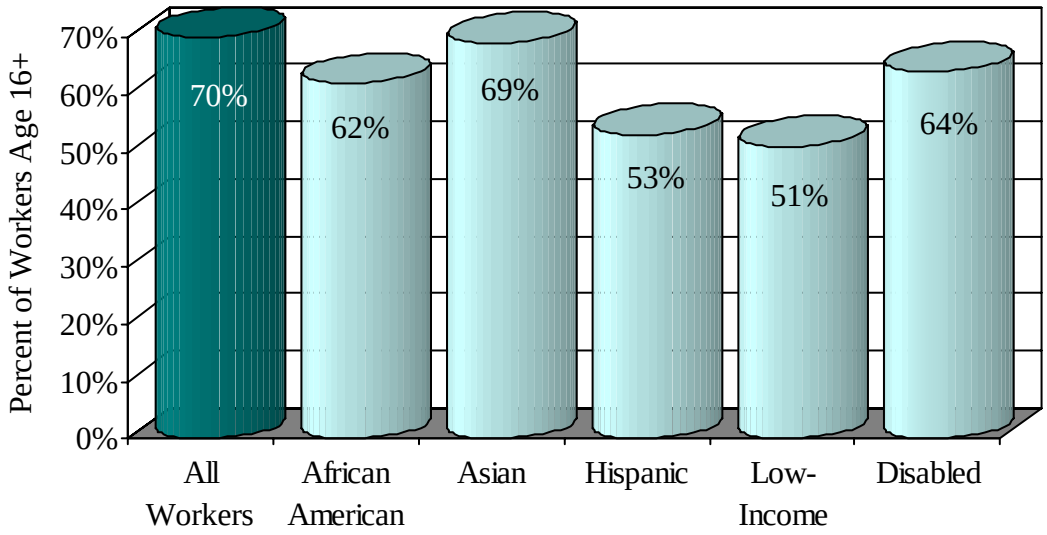
Figures 19 through 24 show the percent of minority, low-income, and disabled workers who commuted by different modes, according to the 2000 Census. Similar to the general population, driving was the dominant commuting mode for each of the demographic groups. All of the demographic groups were more likely to carpool, however, compared to the general population. The Hispanic/Latino population had the highest carpool rate, at 25%, compared to 14% of all workers. The percent of workers commuting by rail was fairly similar across the demographic groups, ranging from 5% of Asian workers to 9% of African American workers, compared to 7% of all workers. With the exception of the Asian population, all of the demographic groups were more likely to commute by bus, compared to the general population. Bus commuting was highest among low-income workers, at 14% compared to 4% of all workers. Low-income workers also had the highest rates of walking to work (7%) and biking to work (0.7%), nearly double those of the general population (3% walk, 0.4% bike).

Figure 18: Means of Transportation to Work in the Washington Region, 2000 Census Data



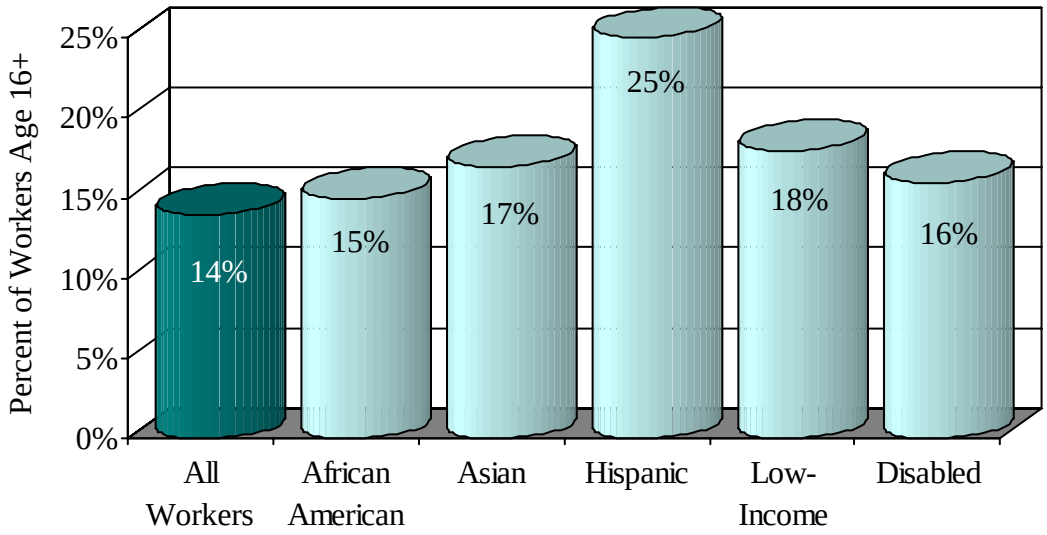
Source: 2000 U.S. Census PUMS; numbers refer to the Washington, DC-MD-VA MSA; excludes persons who worked from home

Figure 19: Percent of Minority, Low-Income, and Disabled Workers Who Drove Alone to Work, 2000 Census Data



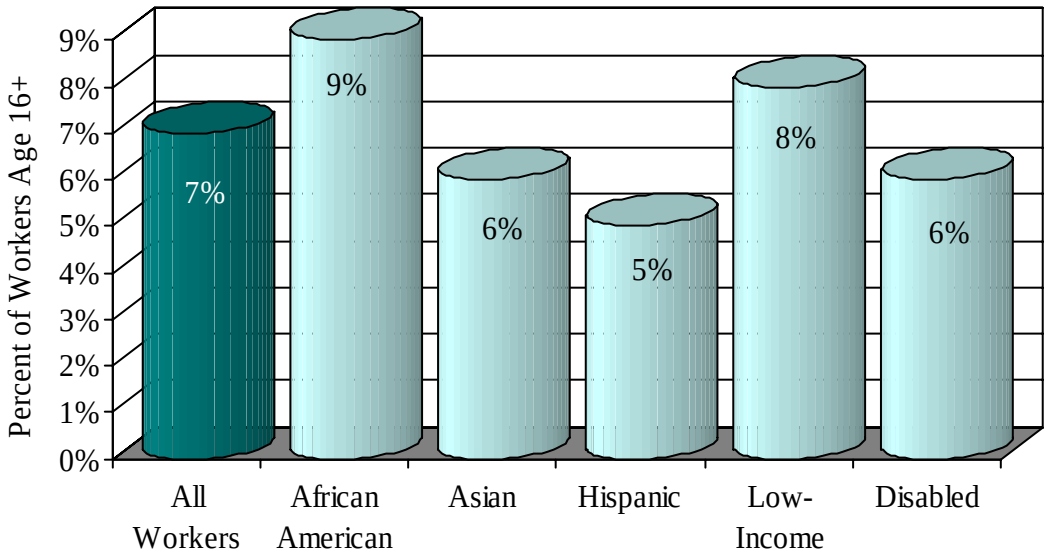
Source: 2000 U.S. Census PUMS; numbers refer to the Washington, DC-MD-VA MSA; excludes persons who worked from home

Figure 20: Percent of Minority, Low-Income, and Disabled Workers Who Carpooled to Work, 2000 Census Data



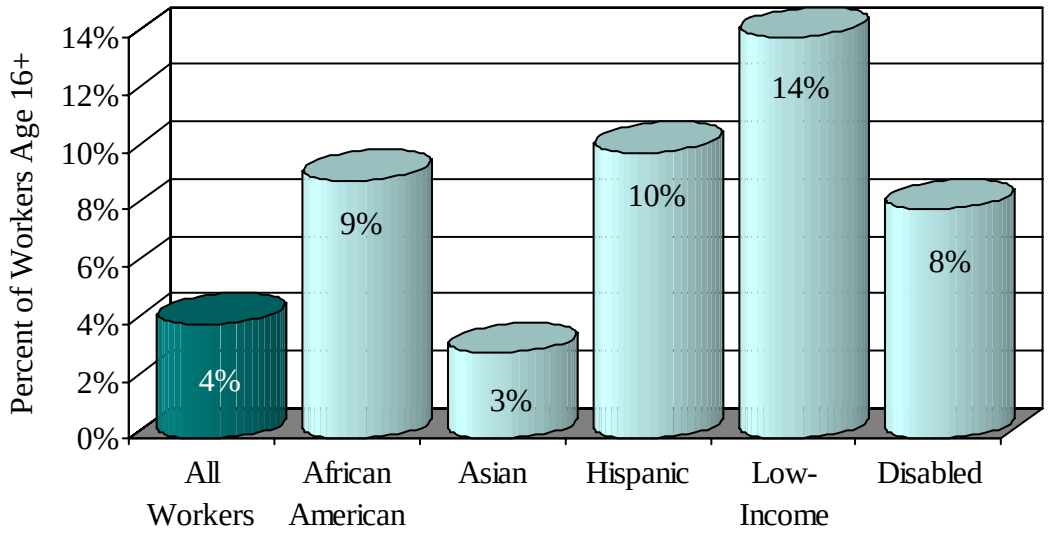
Source: 2000 U.S. Census PUMS; numbers refer to the Washington, DC-MD-VA MSA; excludes persons who worked from home

Figure 21: Percent of Minority, Low-Income, and Disabled Workers Who Commuted by Rail, 2000 Census Data



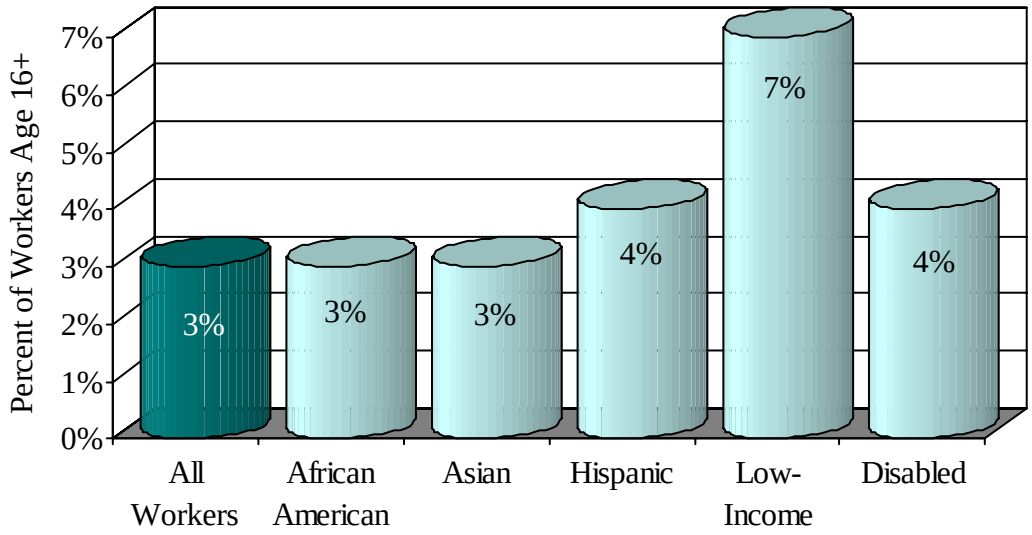
Source: 2000 U.S. Census PUMS; numbers refer to the Washington, DC-MD-VA MSA; excludes persons who worked from home

Figure 22: Percent of Minority, Low-Income, and Disabled Workers Who Commuted by Bus, 2000 Census Data



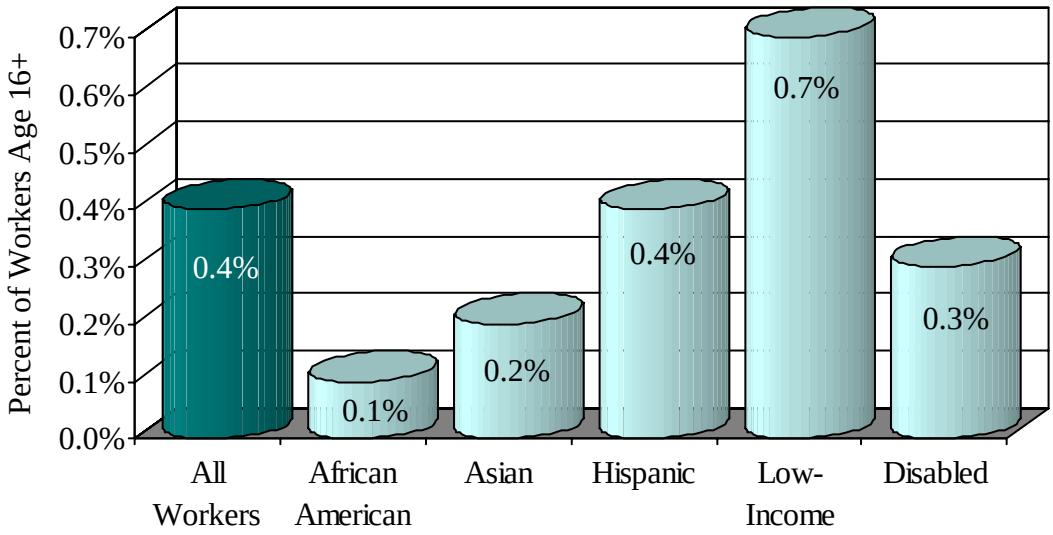
Source: 2000 U.S. Census PUMS; numbers refer to the Washington, DC-MD-VA MSA; excludes persons who worked from home

Figure 23: Percent of Minority, Low-Income, and Disabled Workers Who Walked to Work, 2000 Census Data



Source: 2000 U.S. Census PUMS; numbers refer to the Washington, DC-MD-VA MSA; excludes persons who worked from home

Figure 24: Percent of Minority, Low-Income, and Disabled Workers Who Bicycled to Work, 2000 Census Data

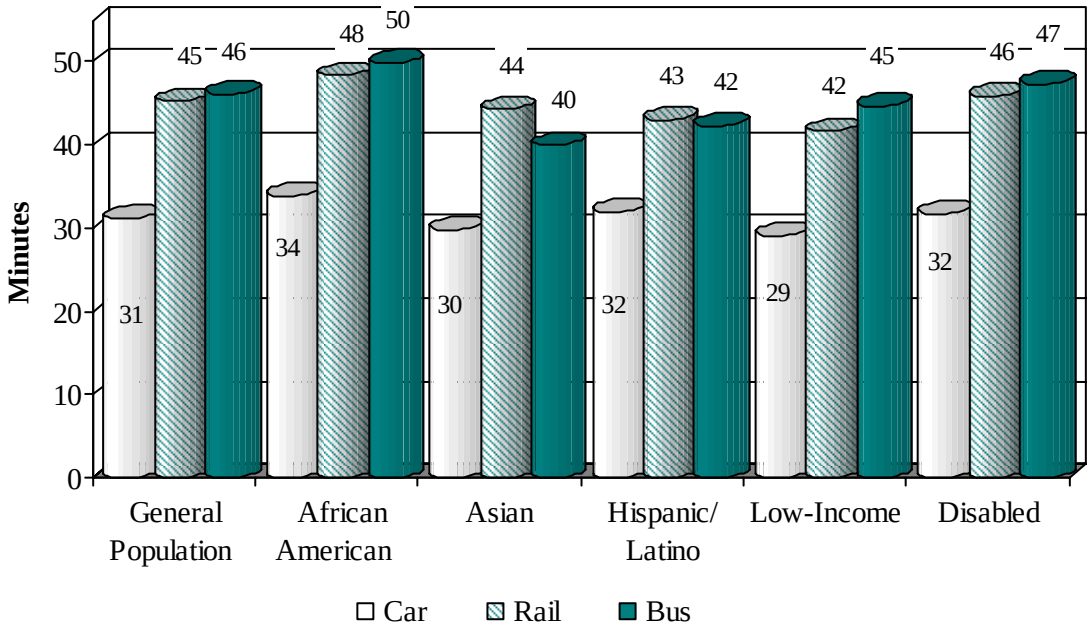


Source: 2000 U.S. Census PUMS; numbers refer to the Washington, DC-MD-VA MSA; excludes persons who worked from home

TRAVEL TIME TO WORK

According to the 2000 Census, in the Washington region the average car commute took less time than the average rail or bus commute. Figure 25 shows for workers in the general population, the average car commute was 31.2 minutes, whereas the average rail commute was 45.2 minutes, and the average bus commute was 46.1 minutes. These commute times were similar across all population groups.

Figure 25: Average Travel Time to Work by Transportation Mode and Population Group, 2000 Census Data



Source: 2000 U.S. Census PUMS; numbers refer to the Washington, DC-MD-VA MSA

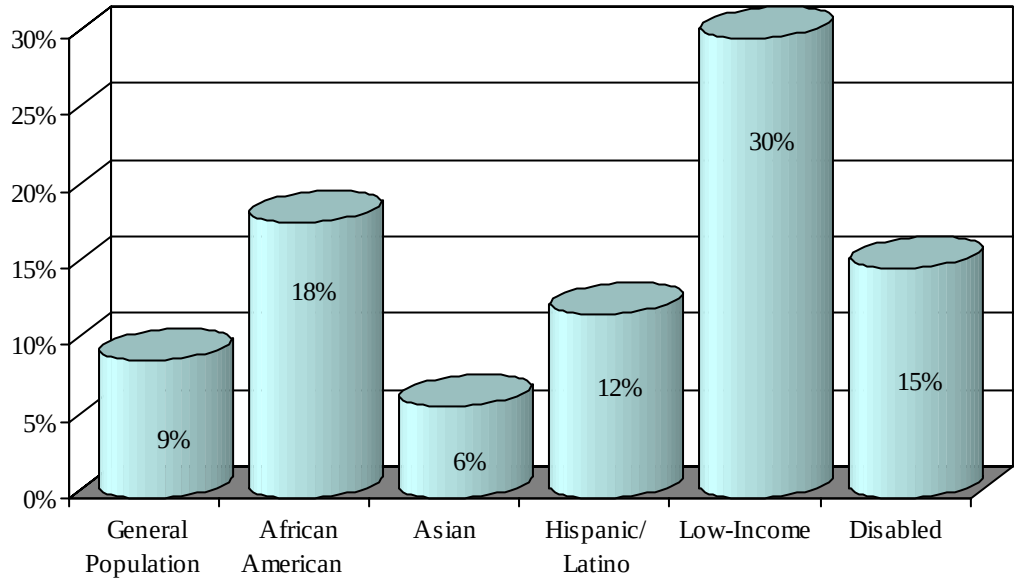
ACCESS TO AUTOMOBILES AND PROXIMITY TO TRANSIT

For many individuals in minority, low-income and disabled population groups, cars are not available. Figure 26 shows 2000 Census data on the percentage of individuals in each population group that lived in households with no vehicles available. Whereas 9% of the general population lived in households with no vehicles, 30% of low-income individuals lived in households with no vehicles.

The region's transit system includes 86 Metrorail stations and approximately 8,800 bus stops. Figure 27 shows the estimated percent of each population group that lives in close proximity to Metrorail stations and bus stops, based on the current (2005) transit network and 2000 Census data. The figure shows that an estimated 44% percent of the population lives within close proximity of a bus stop, whereas an estimated 10% of the population lives within close proximity of a Metrorail station. With the exception of the Asian

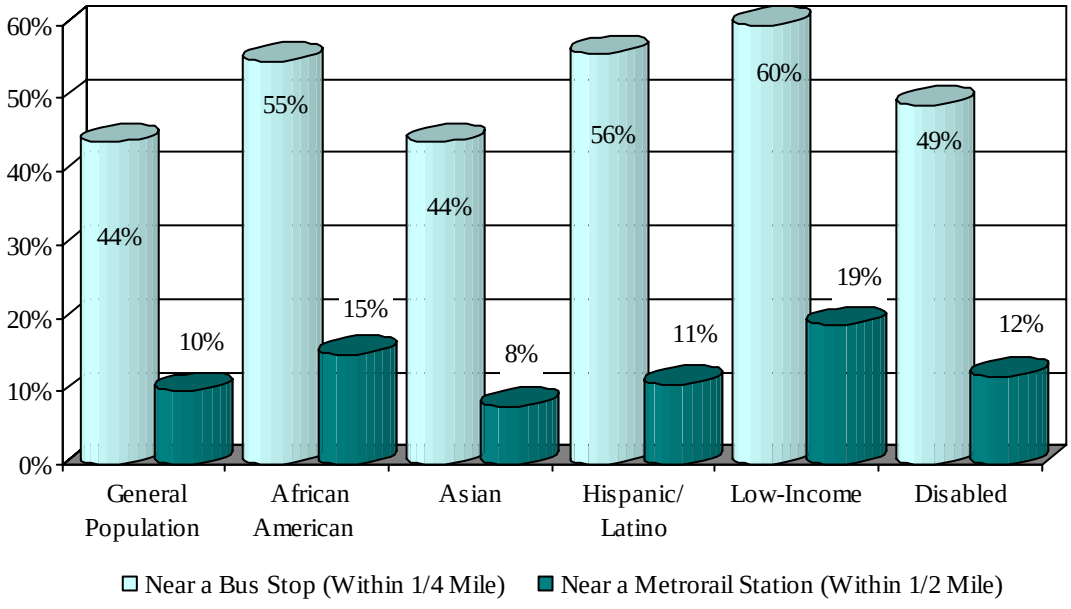
population, all minority, low-income, and disabled population groups are more likely to live within close proximity of bus stops and Metrorail stations, compared to the general population.

Figure 26: Percent of Minority, Low-Income, and Disabled Individuals Living in Households with No Vehicles Available, 2000 Census Data



Source: 2000 U.S. Census PUMS; numbers refer to the Washington, DC-MD-VA MSA

Figure 27: Percent of Minority, Low-Income, and Disabled Individuals Living Near Transit



Source: 2000 U.S. Census CTPP, 2005 bus and Metrorail networks from the 2004 CLRP; numbers refer to the DC-MD-VA MSA

SECTION IV: FORECAST TRENDS AND EXPECTED PERFORMANCE OF THE 2004 FINANCIALLY CONSTRAINED LONG-RANGE TRANSPORTATION PLAN

POPULATION AND EMPLOYMENT GROWTH

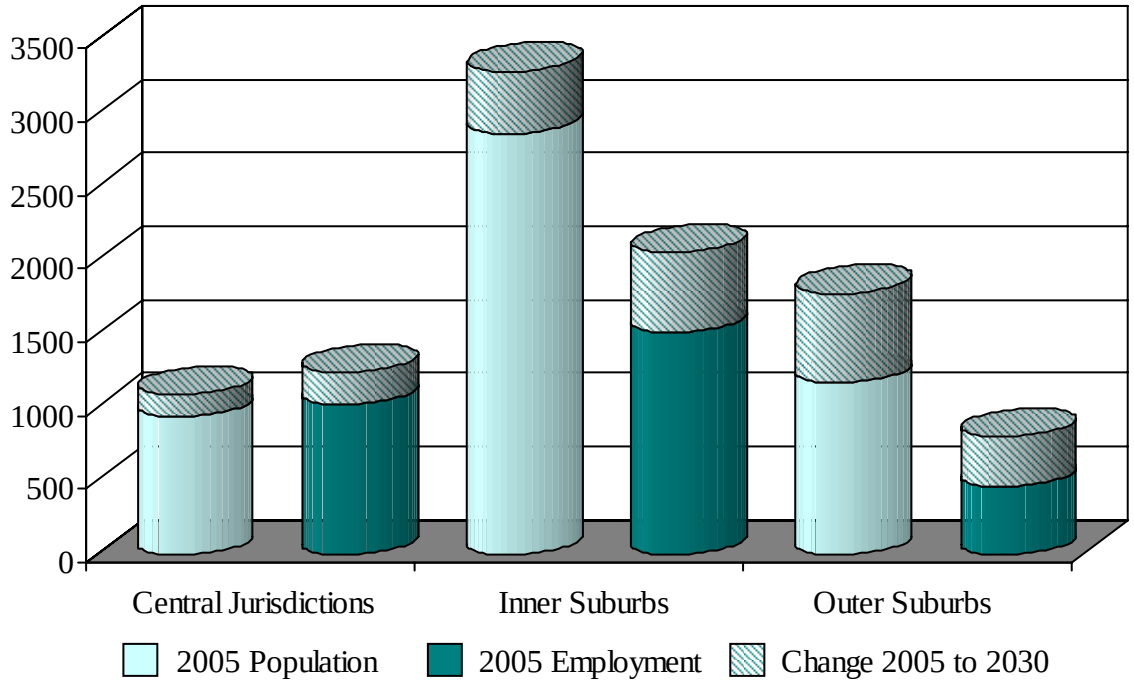
Economic prosperity in the Washington region is forecast to continue over the next 25 years. Population and employment is expected to increase between 2005 and 2030. The anticipated influx of people and jobs into the region will impact travel conditions, as shown on the following pages.

The Metropolitan Washington Council of Governments (COG) forecasts that approximately 1.2 million more people (a 24% increase) and 1.1 million more jobs (a 37% increase) will move into the Washington region between 2005 and 2030.[4] Figure 13 shows the change in population and employment for the central jurisdictions, inner, and outer suburbs. The most dramatic growth is forecast for the outer suburbs, which will capture 51% of the region's population growth and 30% of the region's employment growth. The inner suburbs, however, will continue to have the greatest number of people and jobs, with 3.3 million people and 2.1 million jobs in 2030.

Figure 14 shows the location of forecast population growth over the next 25 years. Growth is dispersed throughout the region, but significant increases are expected for eastern Loudon County and the I-95 corridor in Virginia, central Montgomery County and the I-270 corridor in Maryland, and the District of Columbia. Figure 15 shows the location of forecast employment growth during the same time period. Employment tends to be more clustered around transportation corridors, such as I-95 and the Dulles Corridor in Virginia, and I-270 and the blue and red lines in Maryland, as well as downtown D.C.

[4] Metropolitan Washington Council of Governments Cooperative Forecasts, Round 6.4a; numbers refer to the Washington, DC-MD-VA MSA.

Figure 28: Changes in Population and Employment 2005 to 2030



Source: Metropolitan Washington Council of Governments Round 6.4a Cooperative Forecasts. Central jurisdictions include the District of Columbia and Alexandria and Arlington County in Virginia; Inner suburbs include Montgomery and Prince George's Counties in Maryland and Fairfax County in Virginia; Outer suburbs include Calvert, Charles, and Frederick Counties in Maryland and Loudoun, Prince William, and Stafford Counties in Virginia.

Figure 29: Change in Population 2005 to 2030

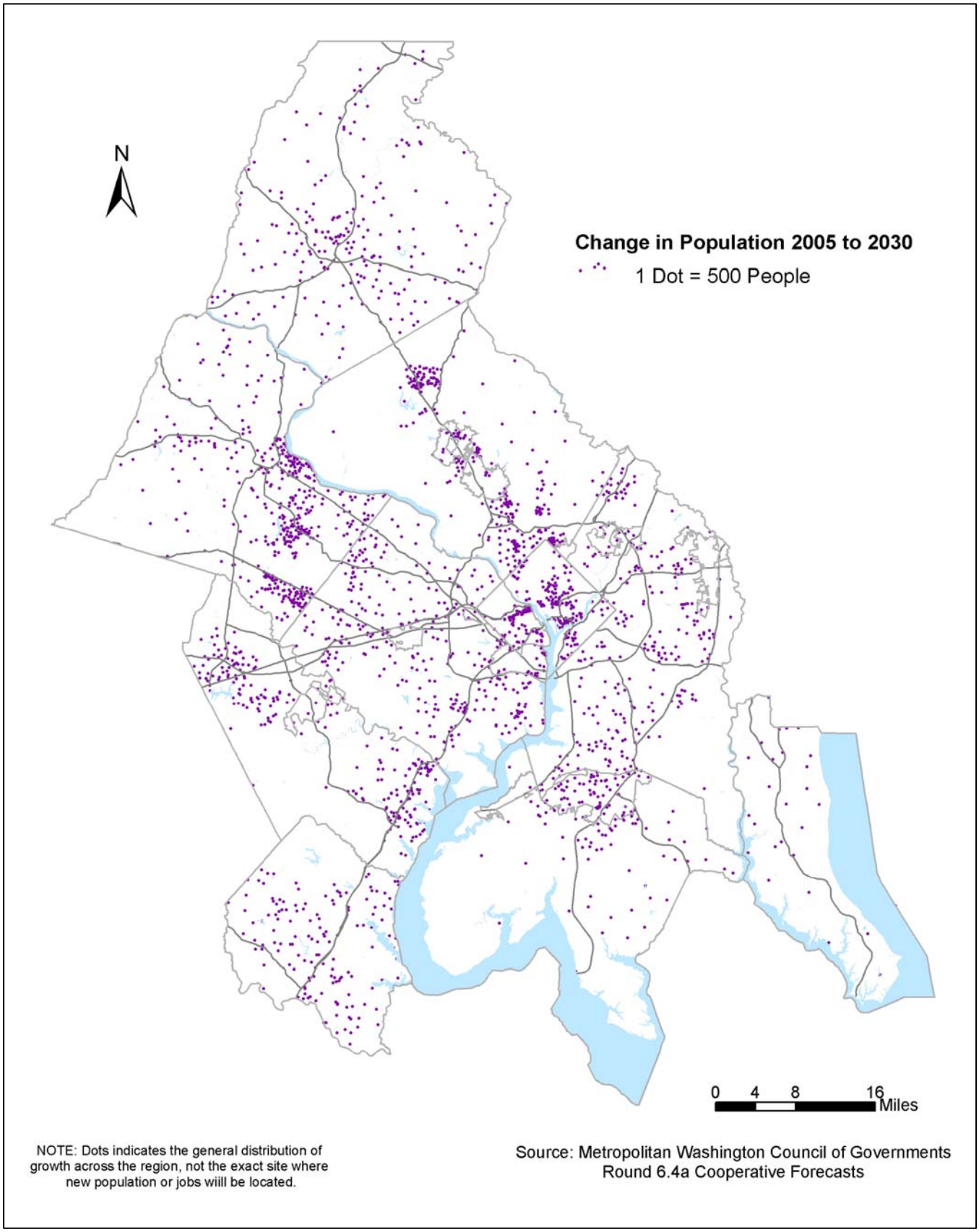
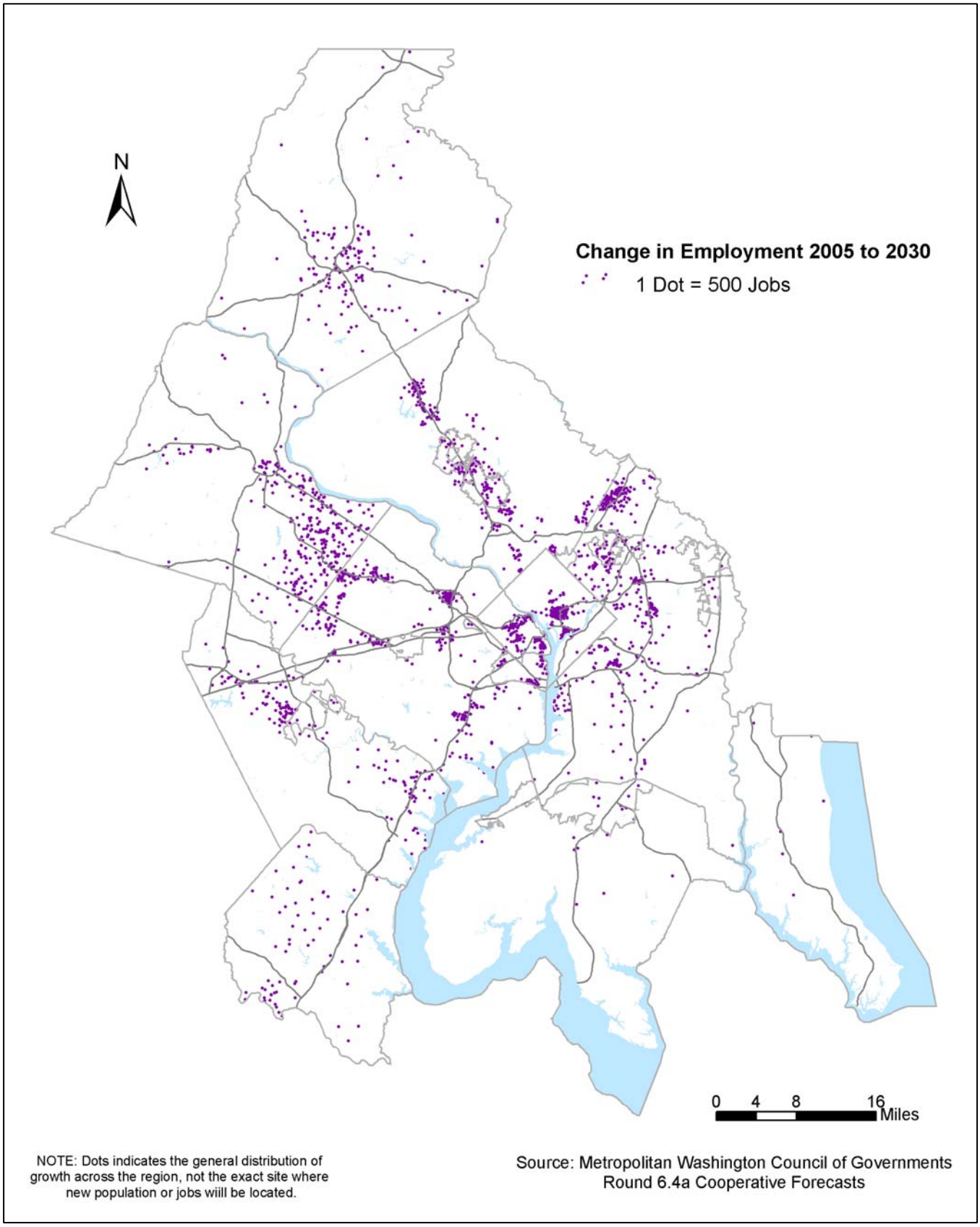


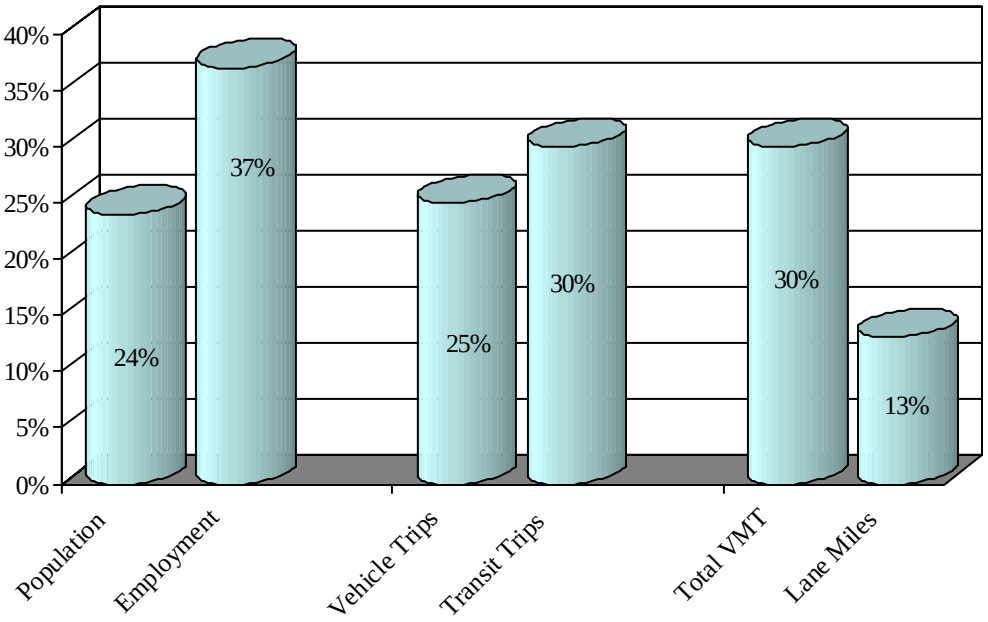
Figure 30: Change in Employment 2005 to 2030



TRAVEL DEMAND FORECASTS AND RESULTING CONDITIONS

A significant increase in population and jobs will lead to additional vehicles, trips, and congestion on the region's transportation system. Regional transportation demand projections for the 2004 CLRP, described in Section I, predict the amounts and types of travel by persons and vehicles and the resulting performance of the transportation system. Figure 31 presents a summary of the forecast change in regional demographics and transportation over the next 25 years. Transit trips are forecast to increase faster than population (30% versus 24%). Total vehicle miles of travel (VMT), a measure of how much people drive, is forecast to increase 30%, whereas arterial and freeway lane miles, a measure of roadway capacity, are planned to increase only 13%.

Figure 31: Percent Changes in Demographics and Travel 2005 to 2030



Source: Air Quality Conformity Determination of the 2004 Constrained Long-Range Plan and the FY2005-2010 Transportation Improvement Program for the Washington Metropolitan Region, National Capital Region Transportation Planning Board, November 17, 2004. Figures are for the Washington, DC-MD-VA MSA.

Table 1 provides the year 2005 and 2030 figures for demographics and regional daily travel that support Figure 16. Table 2 shows figures specifically for work trips. While work-related vehicle trips on HOV facilities are forecast to increase 10% over the next 25 years, average auto occupancy will remain steady at about 1.1 persons per vehicle. The transit share of work trips is expected to increase by one percentage point, from 16% in 2005 to 17% in 2030.[5] As a result of the projected growth in both commuting and daily travel for non-work purposes, congestion levels are expected to increase throughout the region.

[5] Transit trips are constrained to and from the core area after 2005 due to unmet funding needs required to accommodate future ridership growth.

Table 2: Summary of Regional Travel Forecasts 2005 to 2030 (in Thousands)

	2005	*2030*	*Absolute Change 2005-2030*	*Percent Change 2005-2030*
Demographics				
Population	5,000	6,200	1,200	24%
Employment	3,000	4,100	1,100	37%
Estimated Daily Travel				
Total Vehicle Trips	15,800	19,800	4,000	25%
Transit Trips	900	1,200	300	30%
Total Daily VMT	117,400	152,200	34,800	30%
Total Daily VMT Per Capita*	23	25	1	5%
Lane-Miles of Roadway	15.8	17.8	2	13%

*Figures are shown in total and are not thousands

Source: Air Quality Conformity Determination of the 2004 Constrained Long-Range Plan and the FY2005-2010 Transportation Improvement Program for the Washington Metropolitan Region, National Capital Region Transportation Planning Board, November 17, 2004. Figures are for the Washington DC-MD-VA MSA.

Table 3: Summary of Regional Work Travel Forecasts 2005 to 2030 (in Thousands)

	2005	*2030*	*Absolute Change 2005-2030*	*Percent Change 2005-2030*
All Person Work Trips	3,400	4,300	900	26%
Auto Driver Work Trips	2,600	3,200	600	24%
Work-Related Vehicle Trips on HOV Facilities	29	32	3	10%
Average Auto Occupancy*	1.12	1.13	0.01	1%
Transit Work Trips	550	715	165	30%
Transit Share of Work Trips	16%	17%	1	-

*Figures are shown in total and are not thousands

Source: Air Quality Conformity Determination of the 2004 Constrained Long-Range Plan and the FY2005-2010 Transportation Improvement Program for the Washington Metropolitan Region, National Capital Region Transportation Planning Board, November 17, 2004. Figures are for the Washington DC-MD-VA MSA.

SECTION V: REGIONAL ACCESSIBILITY AND DISTRIBUTION OF BENEFITS AND BURDENS OF THE LONG-RANGE TRANSPORTATION PLAN

Accessibility is a basic measure for evaluating the effectiveness of transportation plans, and it is useful for evaluating the impact of the plan on low-income, minority, and disabled populations. There are three main reasons for focusing on accessibility as an evaluation measure. First, access is a priority in the TPB Vision; the first policy goal in the Vision states that "*The Washington metropolitan region's transportation system will provide reasonable access at a reasonable cost to everyone in the region.*" Second, accessibility is a measure that captures both travel demand and land-use impacts. Traditional transportation measures, such as level-of-service and travel times, are considered together with employment and population change. By considering both travel demand and land use, an accessibility analysis recognizes that travel is not an end in itself, but rather a means for gaining access to opportunities such as employment. Third, accessibility measures are widely used by long-range planning agencies such as the TPB to evaluate the effect of transportation plans on low-income and minority populations.[6]

WHAT IS ACCESSIBILITY?

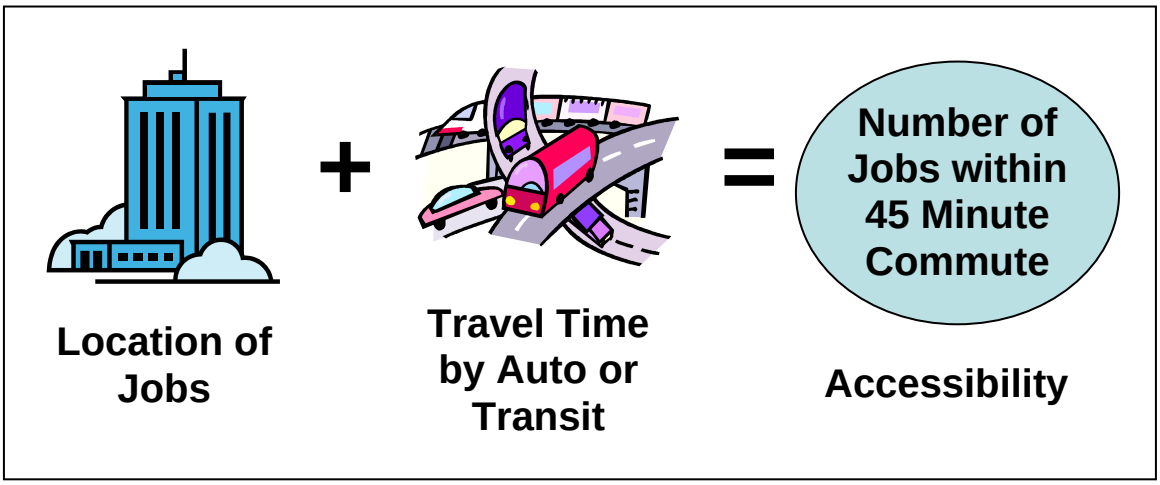
Accessibility measures the number of opportunities (jobs, households, etc.) that can be reached in a specific amount of time from a given location by automobile, transit, or some other mode of transportation. The accessibility of an area increases as the amount of activity (employment, housing development, etc.) in or around the area increases or the speed of travel to or from the area increases. Conversely, losses in accessibility occur when activity decreases or travel times increase due to higher congestion levels.

The current analysis focuses on accessibility to jobs, as opposed to other opportunities, for several reasons. First, forecast data on the locations of jobs and households in 2030 is readily available, whereas similar data for other opportunities such as schools or hospitals is not available. Second, accessibility to jobs is important from the perspective of workers, whereas accessibility to households is important from the perspective of employers who wish to know the availability of workers or customers. The worker's perspective is more germane to the current analysis. Third, because unemployment rates are higher for minority, low-income, and disabled population groups compared to the general population (see Section II), accessibility to jobs is of particular interest to these population groups.

[6] For more information see the U.S. Department of Transportation's website on environmental justice, at http://www.dotcr.ost.dot.gov/asp/ej.asp.

The remainder of Section V reviews an analysis of accessibility to jobs in the Washington region by auto and by transit within 45 minutes.[7] The two main factors that determine job accessibility are the location of jobs across the region and characteristics of the transportation system such as travel times, as shown in Figure 32. Accessibility to retail jobs was also examined, because these jobs are correlated with shopping opportunities and entry level employment, the latter of which may be of particular interest to the low-income population. The analyses of accessibility to all jobs and to retail jobs produced similar results, and therefore only limited data on accessibility to retail jobs is presented here (see Figure 49 on page 64).

Figure 32: Understanding Accessibility to Jobs



ACCESSIBILITY TO JOBS BY AUTO

Figures 18 and 19 show accessibility to jobs by auto in the years 2005 and 2030, respectively. The greatest accessibility to jobs occurs in the central area of the region, because that is where the greatest concentration of jobs is located. Figure 20 displays the change in accessibility to jobs by auto between 2005 and 2030. The legend categories are roughly based on 20% of the forecast job growth for the same time period (increments of 200,000 jobs). As the figure shows, some portions of the region are expected to experience a loss in auto accessibility. The greatest losses will occur near the Capital Beltway, where congestion levels are high, and in Prince George's County. Moderate gains in accessibility will occur in eastern Loudoun County and northern Fairfax County in Virginia, southern Montgomery County in Maryland, and central D.C.

[7] The analysis limited travel times to 45 minutes. A comparison of 30, 45, and 60-minute limits indicated that the clearest change in accessibility was seen with the 45-minute limit. Travel time information is based on the information from the 2004 Air Quality Conformity Determination of the 2004 Constrained Long-Range Plan and the FY 2005-2010 Transportation Improvement Program for the Washington Metropolitan Region, National Capital Region Transportation Planning Board, November 17, 2004.

Decreases in job accessibility can result from an increase in travel time or a loss in employment. An analysis of the forecast changes in travel times and employment indicates that most of the loss in auto accessibility expected for the Washington region results from increased traffic congestion. Between 2005 and 2030, vehicle miles of travel (VMT) are forecast to increase 30%, whereas capacity is planned to increase only 13%.[8] Increases in accessibility, such as seen in Northern Virginia, are due to primarily to employment growth. Between 2005 and 2030, employment is forecast to increase 37%.

[8] Capacity is defined here as the number of freeway and arterial lane miles.

Figure 33: Accessibility to Jobs by Auto Within 45 Minutes in the Year 2005 (2004 CLRP, Morning Rush Hour)

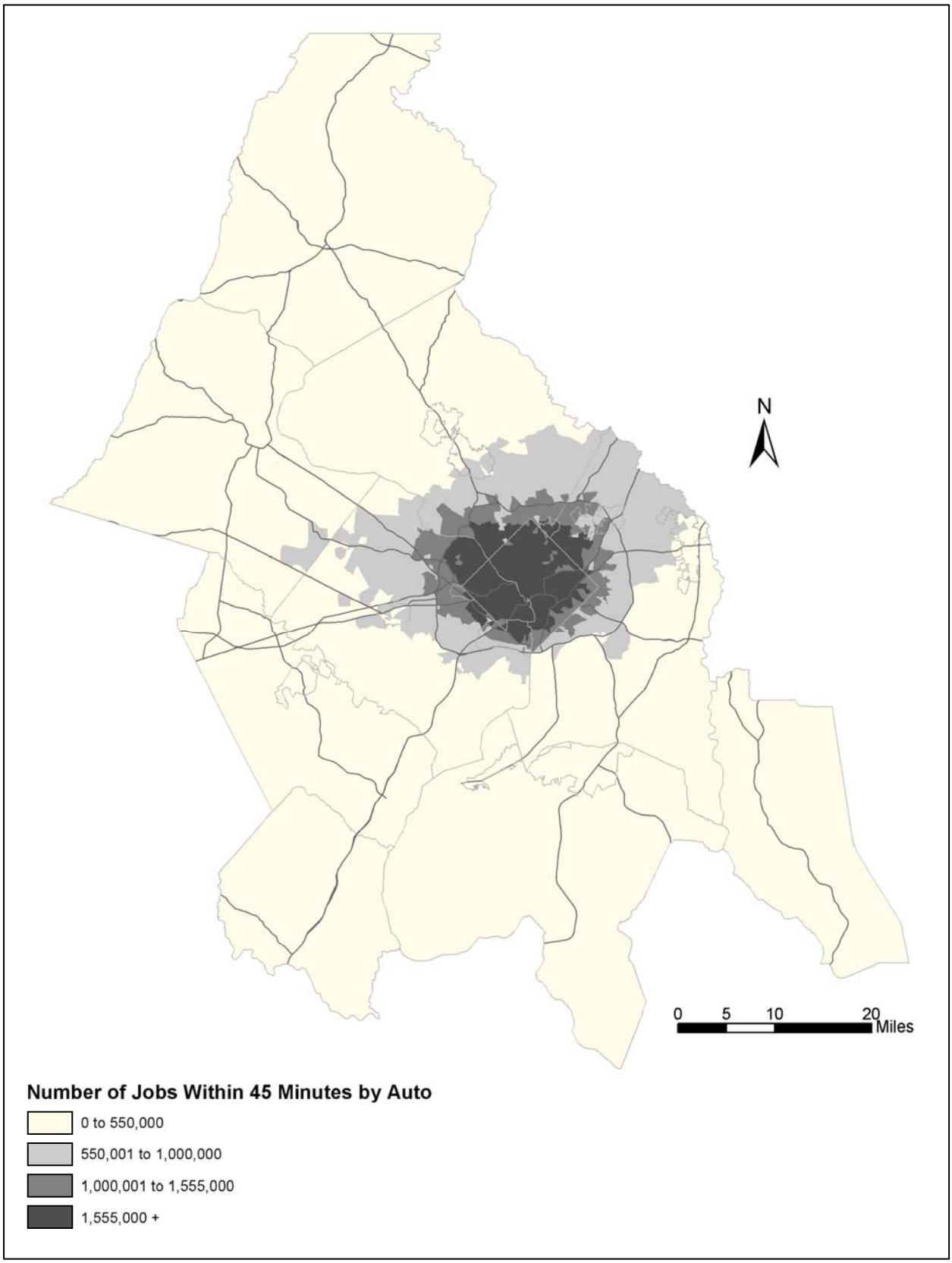


Figure 34: Accessibility to Jobs by Auto Within 45 Minutes in the Year 2030 (2004 CLRP, Morning Rush Hour)

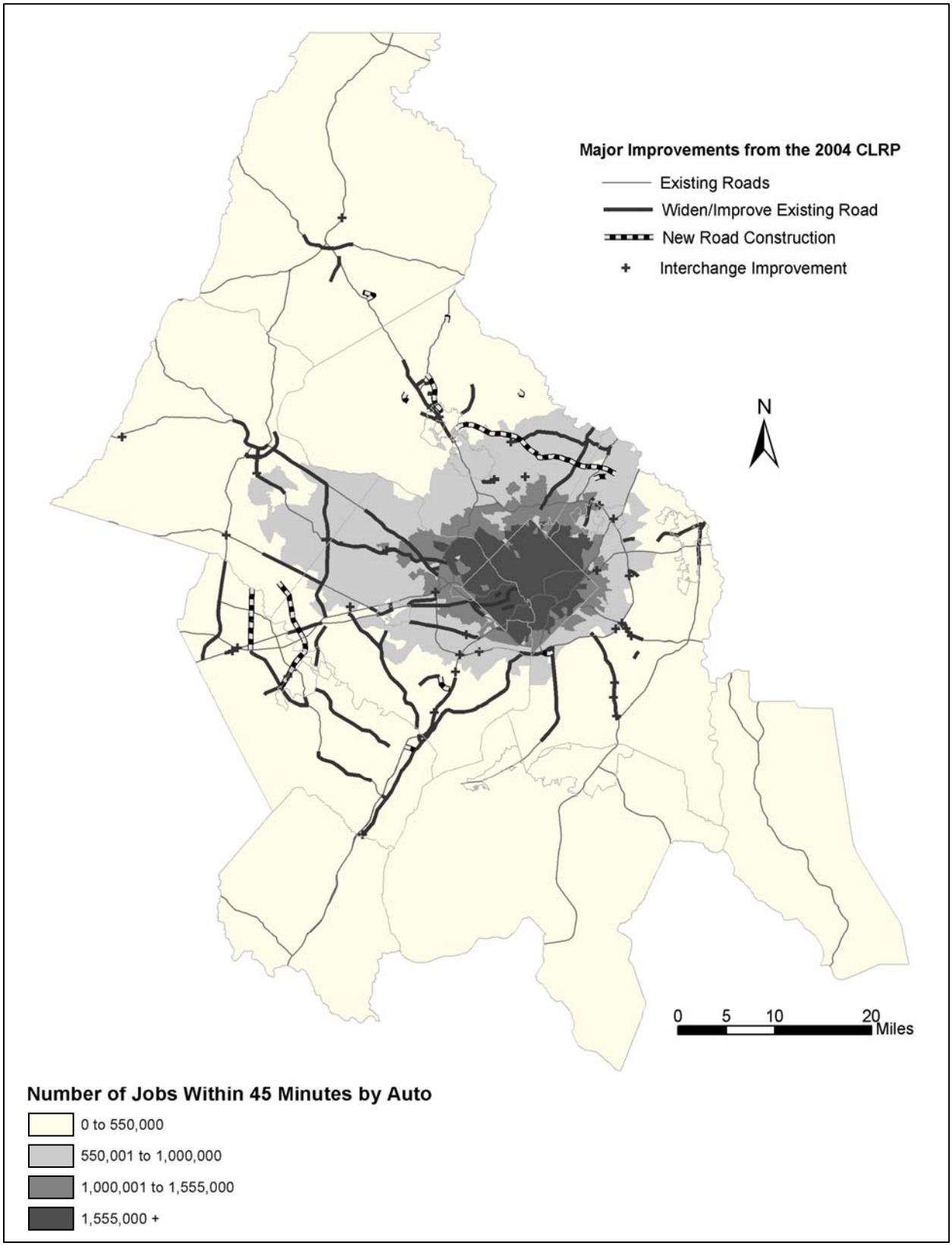
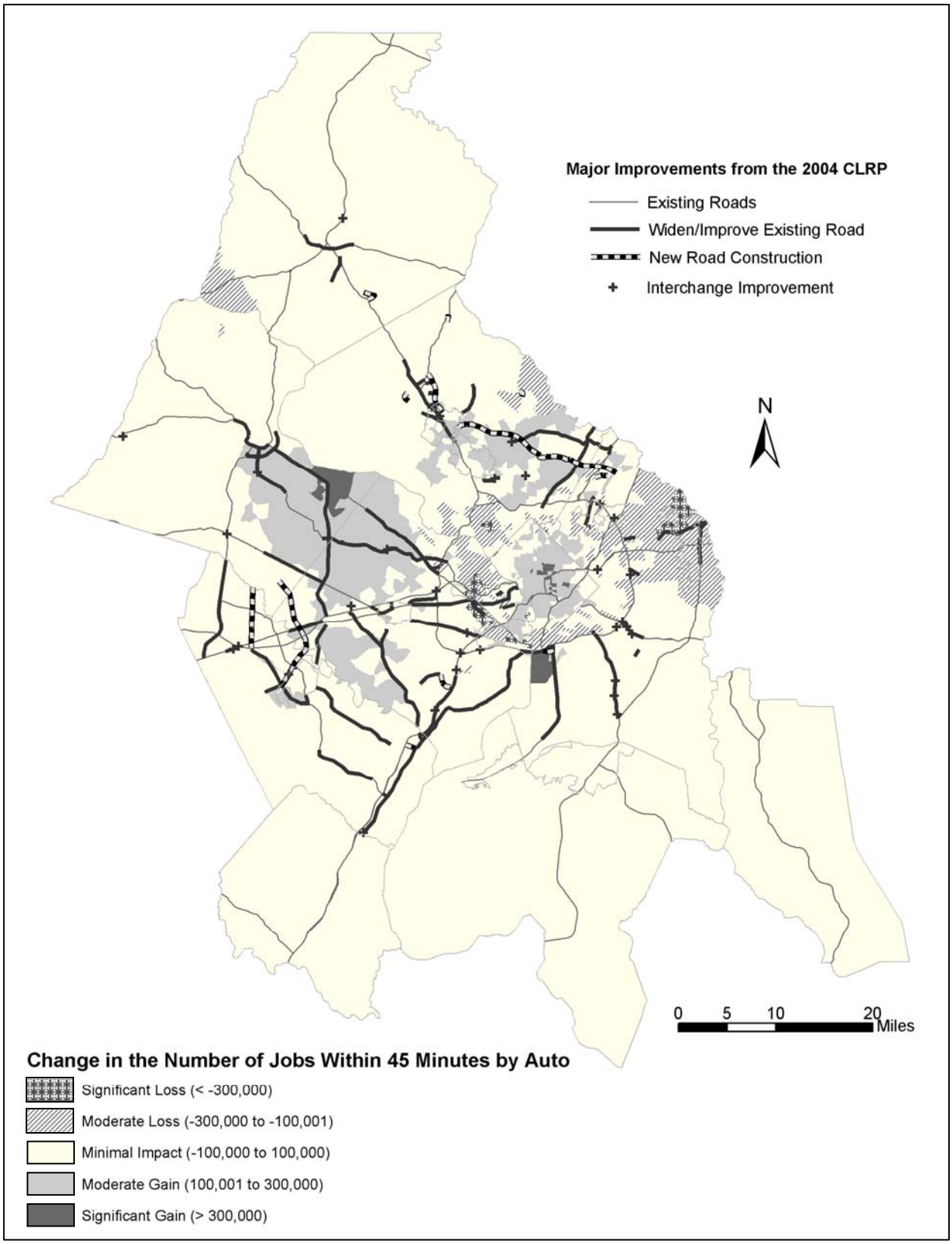


Figure 35: Change in Accessibility to Jobs by Auto Within 45 Minutes, 2005 to 2030 (2004 CLRP, Morning Rush Hour)



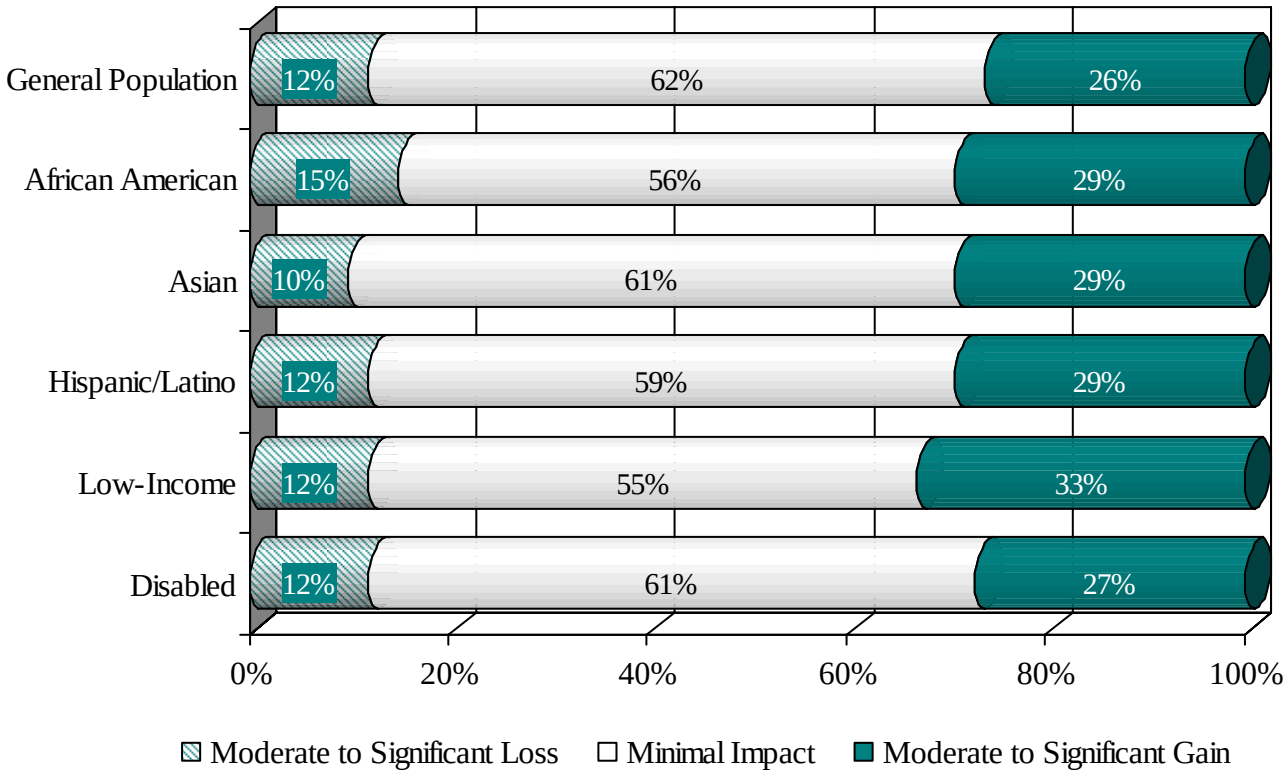
DISTRIBUTION OF CHANGES IN ACCESSIBILITY TO JOBS BY AUTO

An ***increase*** in the number of jobs accessible within 45 minutes is considered a benefit of the long-range transportation plan, whereas a ***decrease*** in the number of jobs accessible within 45 minutes is considered a burden of the plan. The impact of the long-range plan on minority, low-income, and disabled population groups can be evaluated by comparing the distribution of theses benefits and burdens across the different population groups. Figure 36 shows the percent of minority, low-income, and disabled individuals located in areas of the region forecast to experience a gain, loss, or minimal change in accessibility to jobs by auto over the next 25 years. Table 4 provides the data that support Figure 26. The data are based on the current geographic distribution of the population groups, according to the 2000 Census.

Figure 36 and Table 4 indicate that the majority of the general population, 63%, is located in areas that are expected to experience minimal change in auto accessibility between 2005 and 2030. Twelve percent of the general population is located in areas expected to lose accessibility, whereas 26% is located in areas expected to gain accessibility.

This pattern of gains and losses is roughly similar across all minority, low-income, and disabled population groups. The African American population has the largest percentage of individuals located in areas expected to lose accessibility between 2005 and 2030 (15%). The percentage of African Americans located in areas expected to gain accessibility, however, is also greater than that of the general population, at 29%. The low-income population has the largest percentage of individuals located in areas expected to gain accessibility (33%). These data suggest that changes in accessibility to jobs by auto do not have disproportionate, adverse impacts on minority, low-income, and disabled population groups.

Figure 36: Percent of Minority, Low-Income, and Disabled Populations Located in Areas Experiencing a Change in Accessibility to Jobs by Auto, 2005 to 2030



Sources: 2004 CLRP Air Quality Conformity Determination, Metropolitan Washington Council of Governments Round 6.4a Cooperative Forecasts, 2000 U.S. Census CTPP; Numbers refer to the Washington, DC-MD-VA MSA

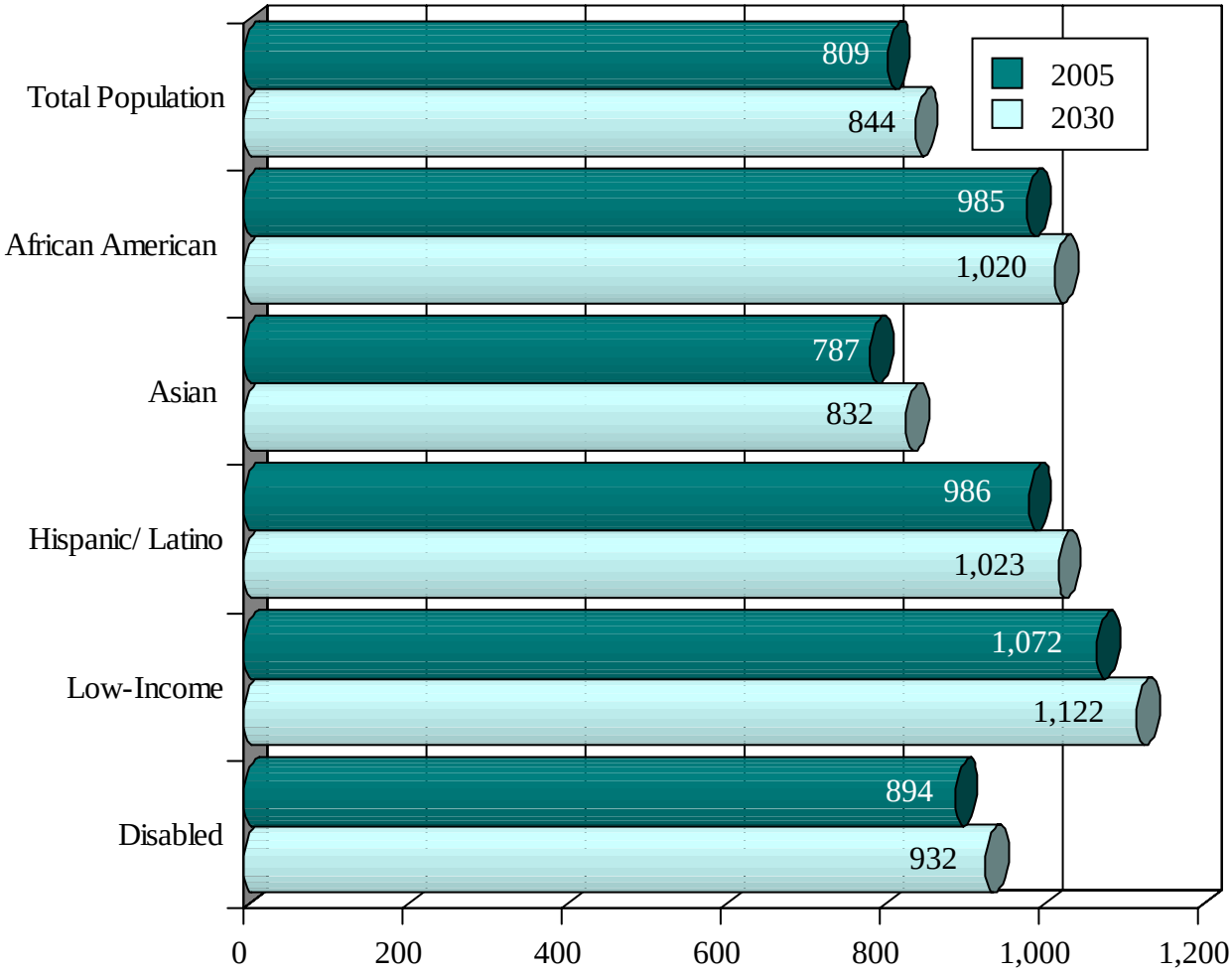
Table 4: Number and Percent of Minority, Low-Income, and Disabled Individuals Located in Areas Experiencing Change in Accessibility to Jobs by Auto, 2005 to 2030

Change in the number of jobs within 45 minutes by auto	*Moderate to Significant Loss (<-100,000)*	*Minimal Impact (-100,000 to 100,000)*	*Moderate to Significant Gain (>100,000)*
General Population	538,000 12%	2,842,000 62%	1,165,000 26%
African American	187,000 15%	698,000 56%	354,000 29%
Asian	33,000 10%	195,000 61%	92,000 29%
Hispanic/Latino	49,000 12%	250,000 59%	123,000 29%
Low-Income	58,000 12%	268,000 55%	160,000 33%
Disabled	77,000 12%	389,000 61%	174,000 27%

Sources: 2004 CLRP Air Quality Conformity Determination, Metropolitan Washington Council of Governments Round 6.4a Cooperative Forecasts, 2000 U.S. Census CTPP; Numbers refer to the Washington , DC-MD-VA MSA

Because some parts of the region are expected to gain and other parts of the region are expected to lose accessibility to jobs by auto between 2005 and 2030, across the whole region the average number of jobs accessible within 45 minutes changes only modestly during this time period. Figure 37 shows that in 2005, the average resident in the Washington region can reach approximately 809,000 jobs by auto, 26% of the total number of jobs in the region. By 2030, the average resident will be able to reach an additional 35,000 jobs by auto, an increase of 4%. Figure 37 also shows the average number of jobs accessible by auto in 2005 and 2030 for minority, low-income, and disabled population groups. These numbers are based on the current geographic distribution of the population groups, according to the 2000 Census. As Figure 37 shows, the increase in average accessibility is similar across all the population groups.

Figure 37: Average Number of Jobs Accessible Within 45 Minutes by Auto in 2005 and 2030, Weighted by Population Group



Source: 2004 CLRP Air Quality Conformity Determination, Metropolitan Washington Council of Governments Cooperative Forecasts Round 6.4a, 2000 U.S. Census CTPP; Numbers refer to the Washington, DC-MD-VA MSA.

ACCESSIBILITY TO JOBS BY TRANSIT

Figures 38 and 39 display accessibility to jobs by transit in 2005 and 2030, respectively. The figures include all trips by bus, Metrorail, and commuter rail, including those where the transit user drives or walks to the transit station. The areas around Metrorail lines show the greatest accessibility. Figure 40 displays the change in transit accessibility between 2005 and 2030. Here again, the legend categories are roughly based on 20% of the job growth during the same time period (increments of 200,000 jobs).

As Figure 40 shows, over the next 25 years many parts of the region are expected to experience an increase in accessibility to jobs by transit, due to both employment growth and transit improvements. Gains in accessibility are greatest in the regional core where employment increases are expected, and around major transit improvements such as the Bi-County Transitway in Maryland and Dulles Corridor Rail in Virginia. Nowhere in the region is expected to experience a loss in accessibility to jobs by transit between 2005 and 2030. It should be noted, however, that outer parts of the region that currently have minimal or no transit service have little accessibility to lose.

Figure 38: Accessibility to Jobs by Transit Within 45 Minutes in the Year 2005 (2004 CLRP, Morning Rush Hour)

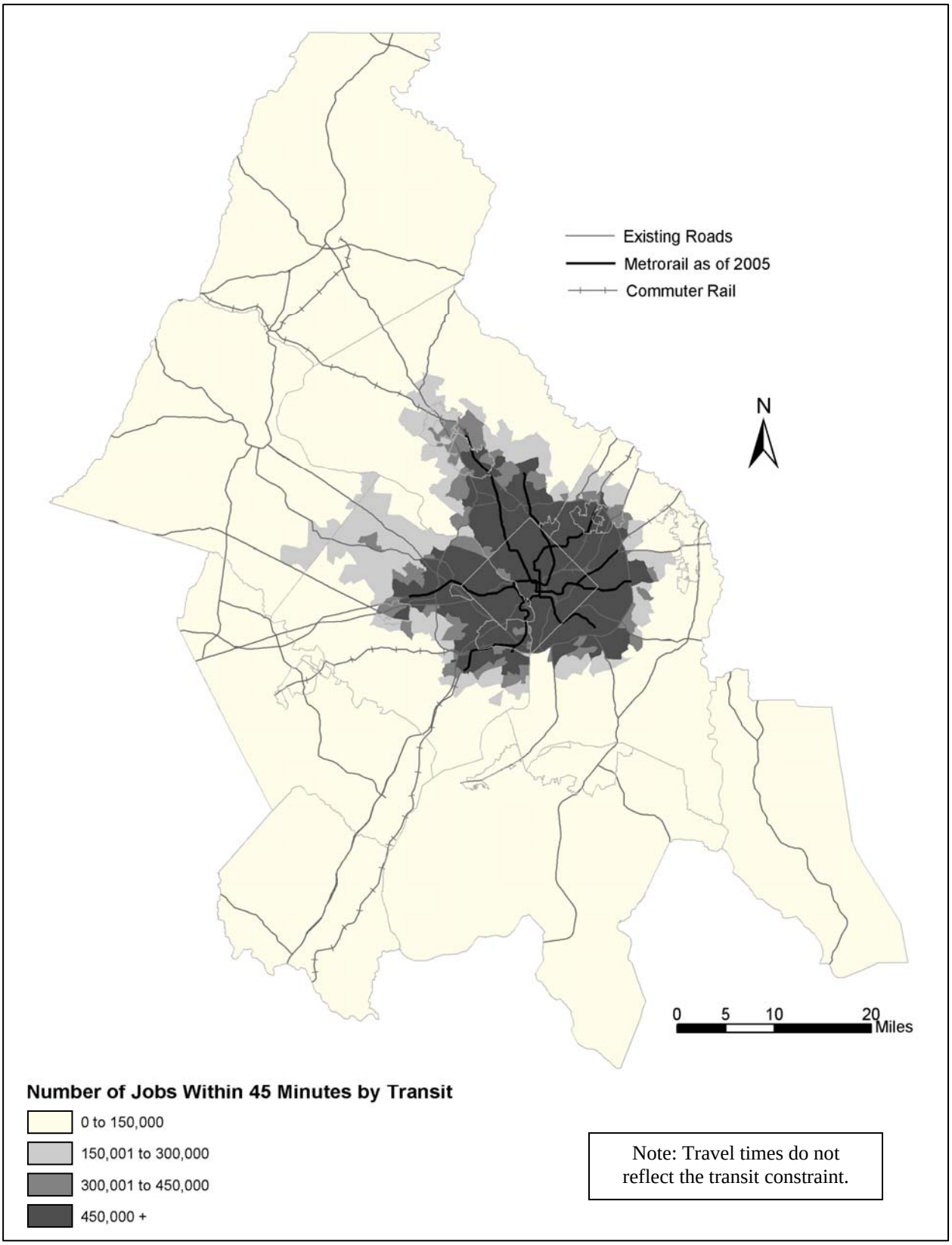


Figure 39: Accessibility to Jobs by Transit Within 45 Minutes in the Year 2030 (2004 CLRP, Morning Rush Hour)

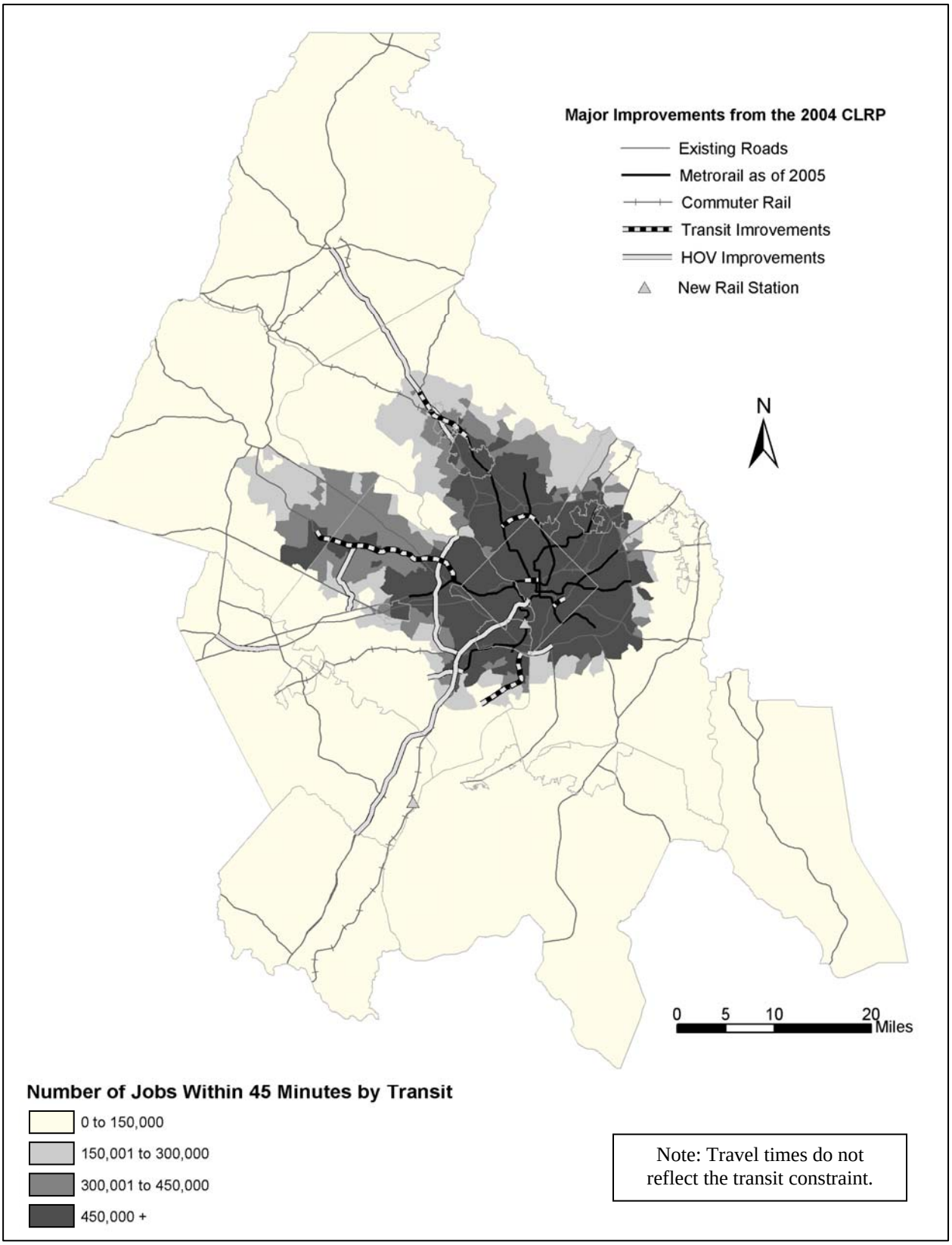
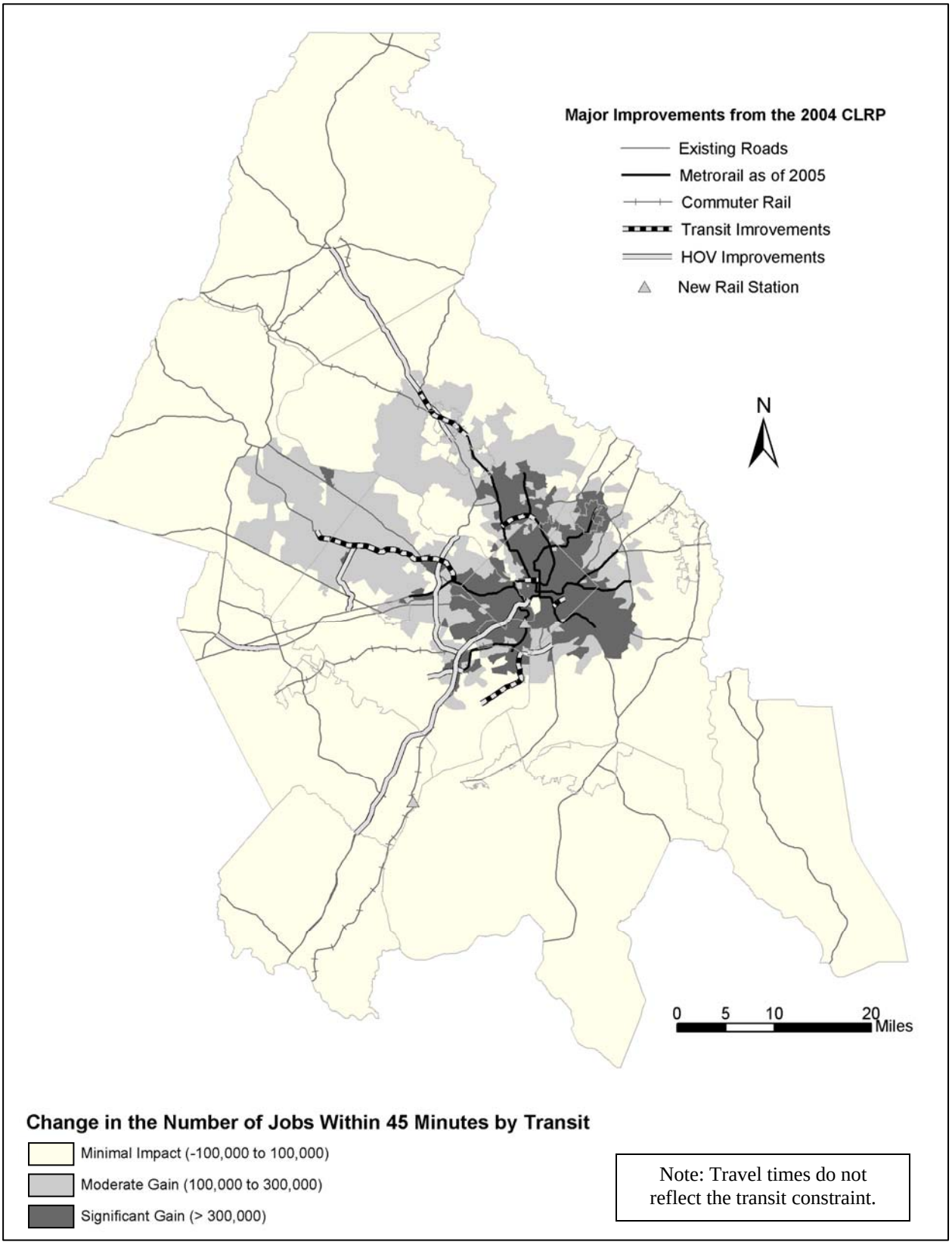


Figure 40: Change in Accessibility to Jobs by Transit Within 45 Minutes, 2005 to 2030 (20004 CLRP, Morning Rush Hour)

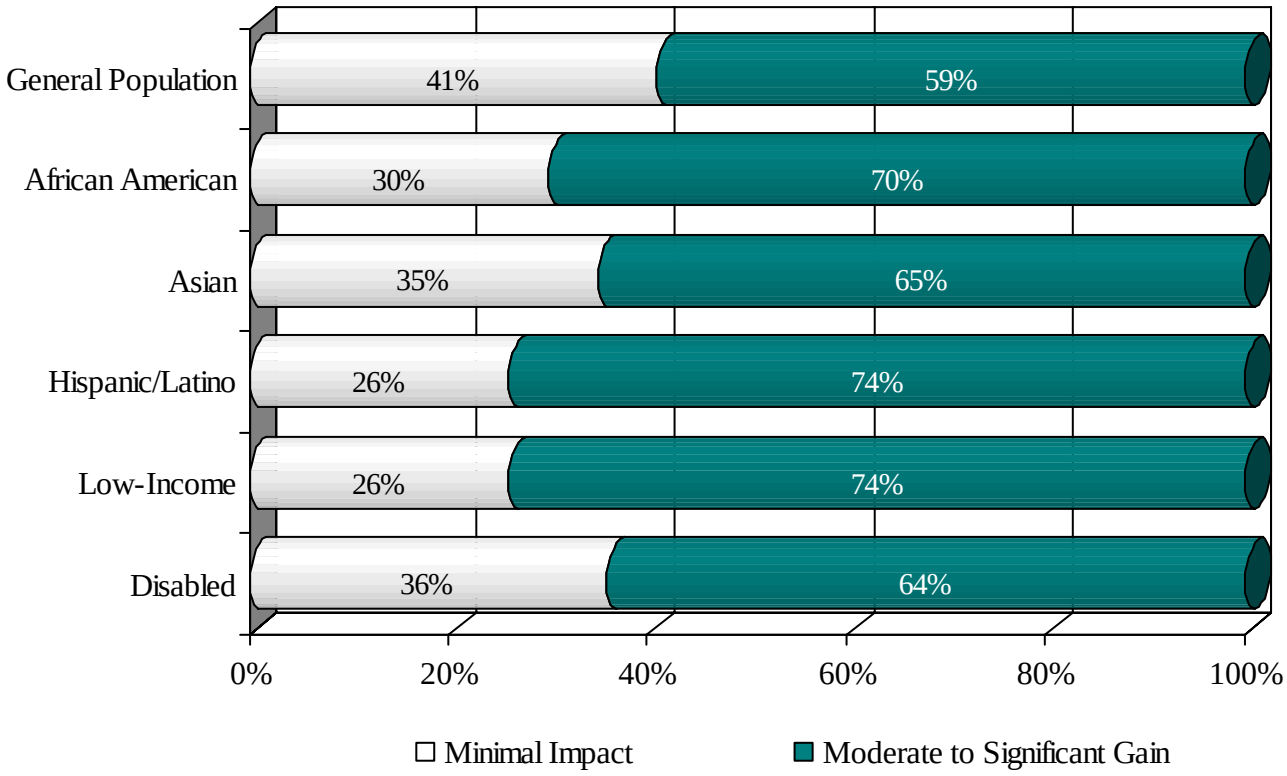


DISTRIBUTION OF CHANGES IN ACCESSIBILITY TO JOBS BY TRANSIT

Figure 41 shows the percent of minority, low-income, and disabled individuals located in areas of the region forecast to experience a gain, loss, or minimal change in accessibility to jobs by transit over the next 25 years. Table 5 provides the data that support Figure 41. The demographic data are based on the current geographic distribution of the population groups, according to the 2000 Census. Gains in accessibility are considered a benefit of the long-range transportation plan, whereas losses in accessibility are considered a burden of the plan.

Figure 41 and Table 5 indicate that the majority of the general population, 59%, is located in areas that are expected to experience a gain in transit accessibility. This number is higher for all minority, low-income, and disabled population groups. The Hispanic/Latino and low-income populations have the largest percentages of individuals located in areas expected to gain accessibility, at 74% each. Forty-one percent of the general population lives in areas expected to experience minimal change in the number of jobs accessible by transit. None of the population lives in areas expected to lose accessibility by transit. These data suggest that changes in accessibility to jobs by transit do not have disproportionate, adverse impacts on minority, low-income, and disabled population groups.

Figure 41: Percent of Minority, Low-Income, and Disabled Populations Located in Areas Experiencing a Change in Accessibility to Jobs by Transit, 2005 to 2030



Sources: 2004 CLRP Air Quality Conformity Determination, Metropolitan Washington Council of Governments Round 6.4a Cooperative Forecasts, 2000 U.S. Census CTPP; Numbers refer to the Washington, DC-MD-VA MSA

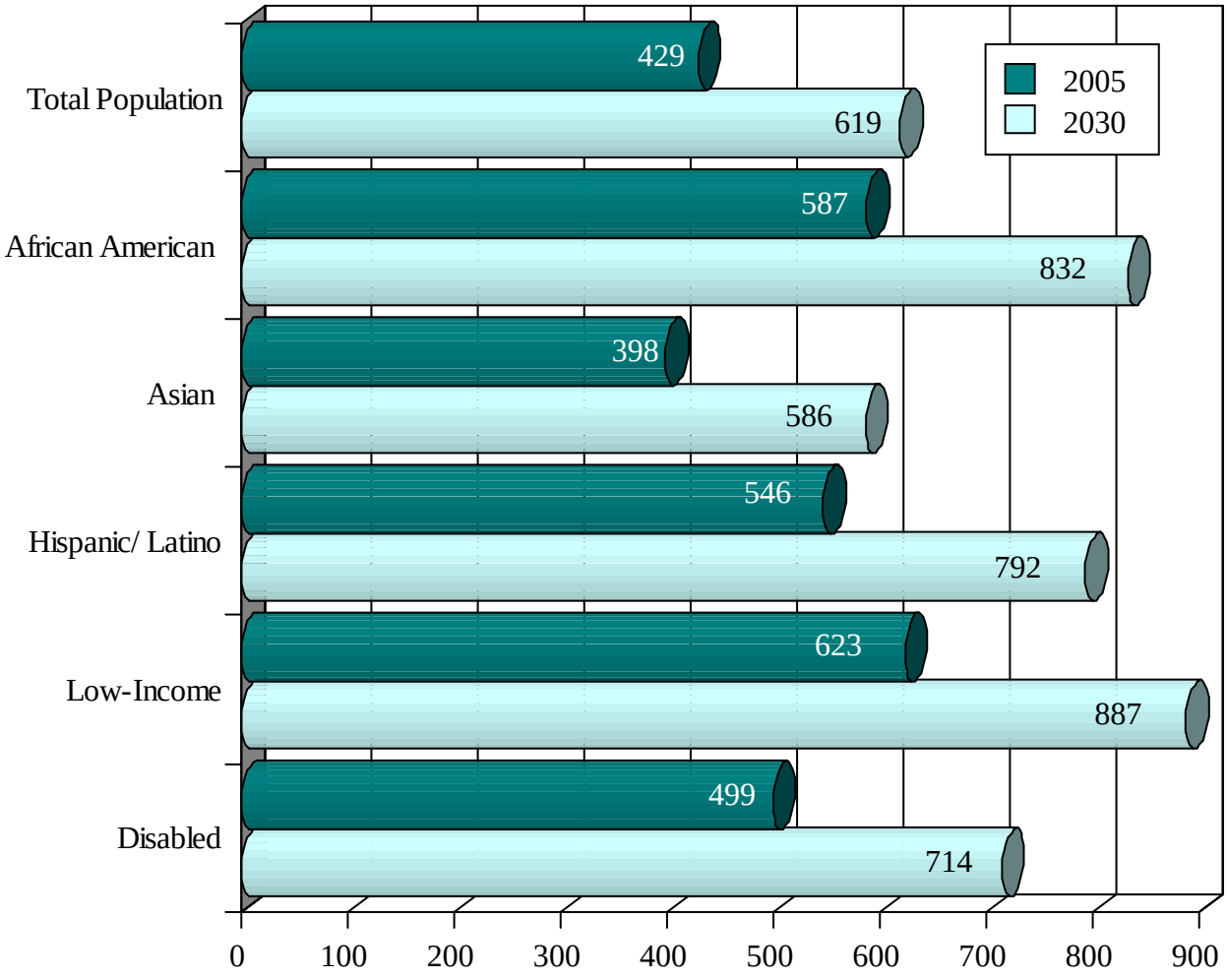
Table 5: Number and Percent of Minority, Low-Income, and Disabled Individuals Located in Areas Experiencing Change in Accessibility to Jobs by Transit, 2005 to 2030

Change in the number of jobs within 45 minutes by transit	*Moderate to Significant Loss (<-100,000)*	*Minimal Impact (-100,000 to 100,000)*	*Moderate to Significant Gain (>100,000)*
General Population	0 0%	1,862,000 41%	2,683,000 59%
African American	0 0%	376,000 30%	863,000 70%
Asian	0 0%	111,000 35%	209,000 65%
Hispanic/Latino	0 0%	109,000 26%	313,000 74%
Low-Income	0 0%	126,000 26%	360,000 74%
Disabled	0 0%	228,000 36%	413,000 64%

Sources: 2004 CLRP Air Quality Conformity Determination, Metropolitan Washington Council of Governments Round 6.4a Cooperative Forecasts, 2000 U.S. Census CTPP; Numbers refer to the Washington , DC-MD-VA MSA

Because large portions of the population are located in areas expected to gain accessibility to jobs by transit between 2005 and 2030, across the whole region the average number of jobs accessible within 45 minutes is forecast to increase significantly during that time period. Figure 42 shows that in 2005, the average resident in the Washington region can reach approximately 429,000 jobs by transit, 14% of the total number of jobs in the region. By 2030, the average resident will be able to reach an additional 190,000 jobs by transit, an increase of 44%. Figure 42 also shows the average number of jobs accessible by transit in 2005 and 2030 for minority, low-income, and disabled population groups. These numbers are based on the current geographic distribution of the population groups, according to the 2000 Census. As Figure 42 shows, all of the population groups are expected to experience a significant increase in the average number of jobs accessible by transit.

Figure 42: Average Number of Jobs Accessible Within 45 Minutes by Transit in 2005 and 2030, Weighted by Population Group



Source: 2004 CLRP Air Quality Conformity Determination, Metropolitan Washington Council of Governments Cooperative Forecasts Round 6.4a, 2000 U.S. Census CTPP; Numbers refer to the Washington, DC-MD-VA MSA.

ACCESSIBILITY TO JOBS BY WALK-ACCESS TRANSIT

Figures 43 and 44 display accessibility to jobs by walk-access transit in 2005 and 2030, respectively. The figures include only bus, Metrorail, and commuter rail where the transit user walks to the transit station; trips where the user drives to the transit station are excluded. Here again, the areas around Metrorail lines show the greatest accessibility. Figure 44 displays the change in walk-access transit accessibility between 2005 and 2030. As before, the legend categories are roughly based on 20% of the job growth during the same time period (increments of 200,000 jobs).

As Figure 44 shows, expected changes in accessibility to jobs by walk-access transit over the next 25 years are similar to those seen in the previous analysis of combined walk-access and drive-access transit. Gains in accessibility are greatest in the regional core where employment increases are expected, and around major transit improvements such as the Bi-County Transitway in Maryland and Dulles Corridor Rail in Virginia. Nowhere in the region is expected to experience a loss in accessibility to jobs by walk-access transit between 2005 and 2030. Once again, however, it should be noted that outer parts of the region that currently have minimal or no transit service have little accessibility to lose.

Figure 43: Accessibility to Jobs by Walk-Access Transit Within 45 Minutes in the Year 2005 (2004 CLRP, Morning Rush Hour)

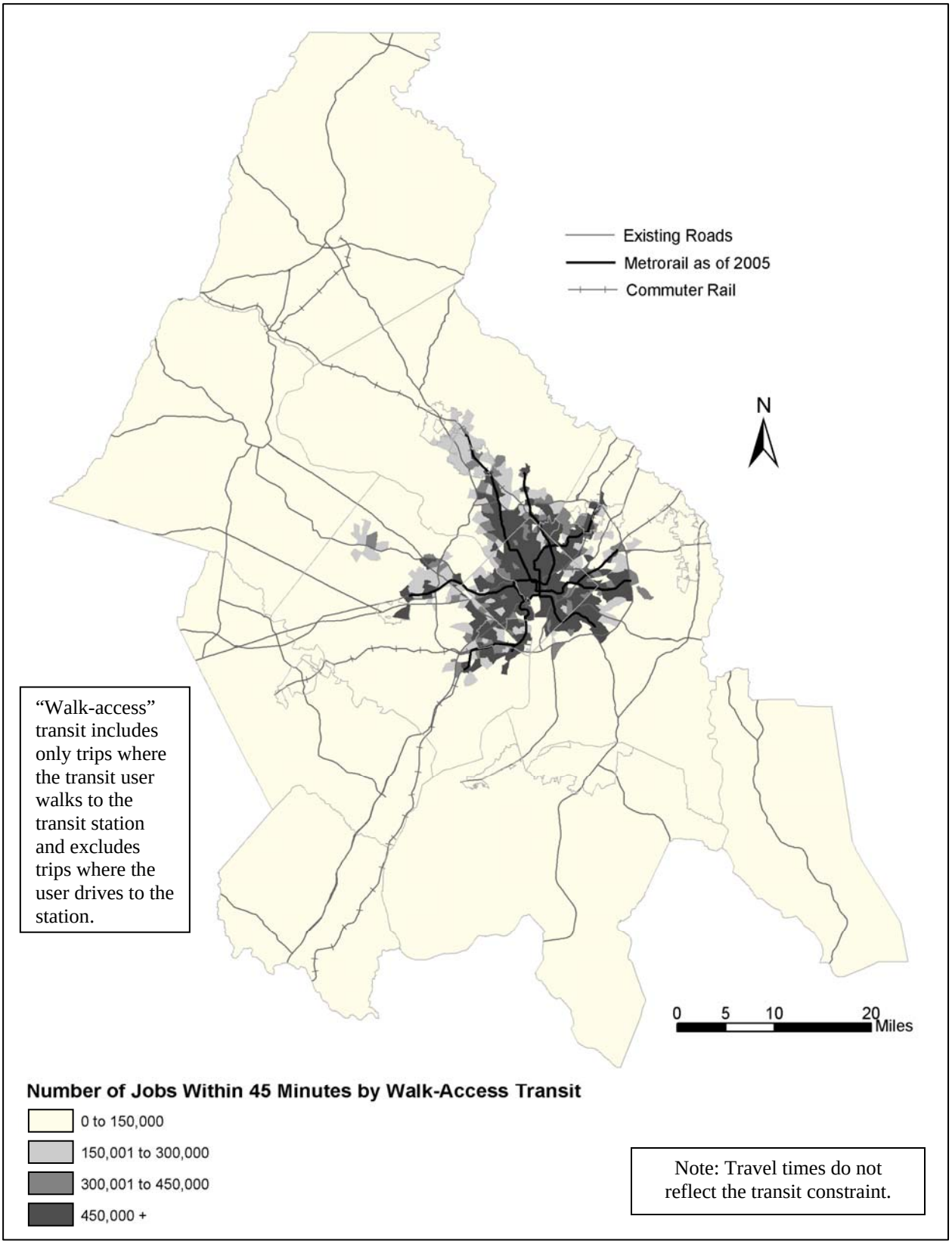


Figure 44: Accessibility to Jobs by Walk-Access Transit Within 45 Minutes in the Year 2030 (2004 CLRP, Morning Rush Hour)

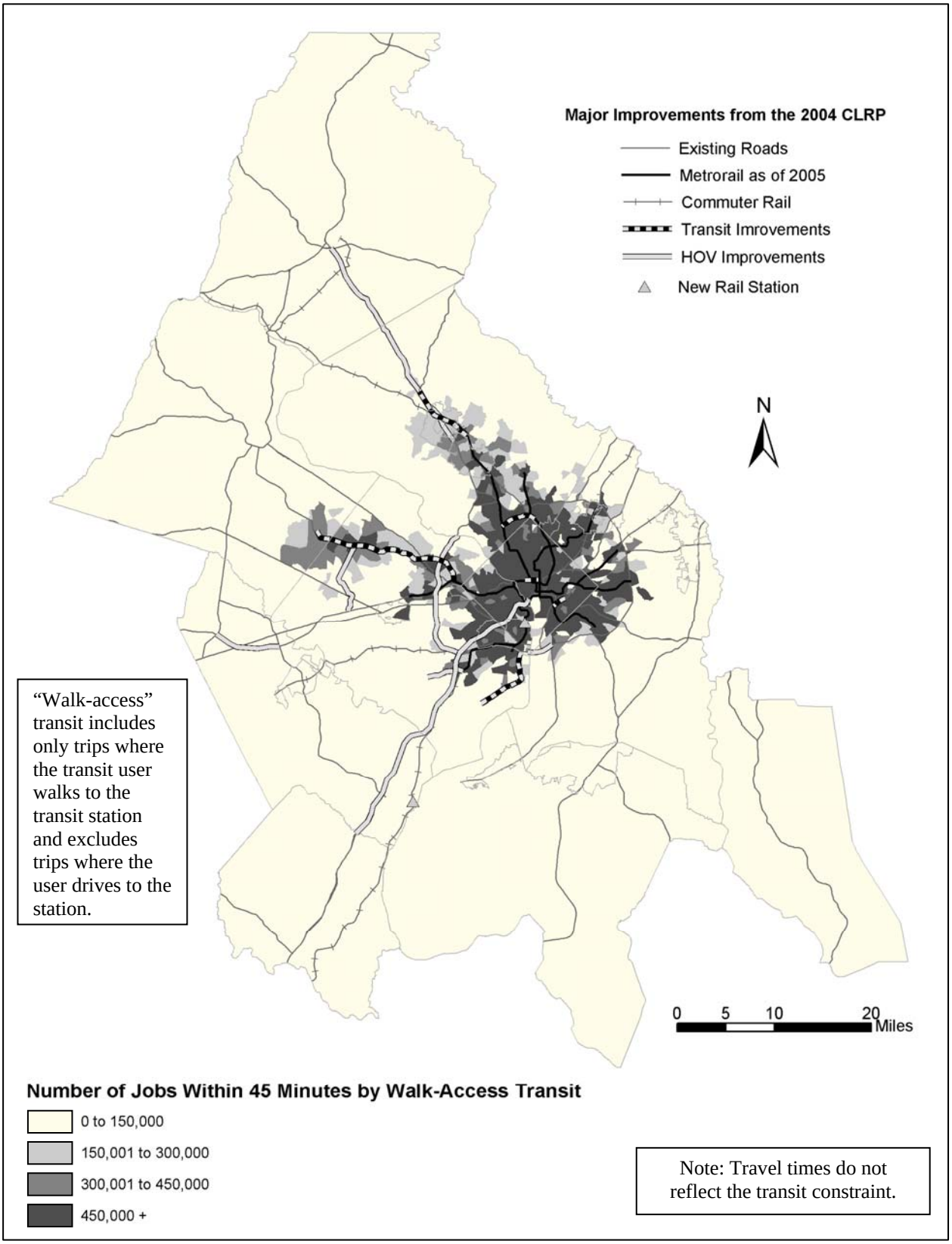
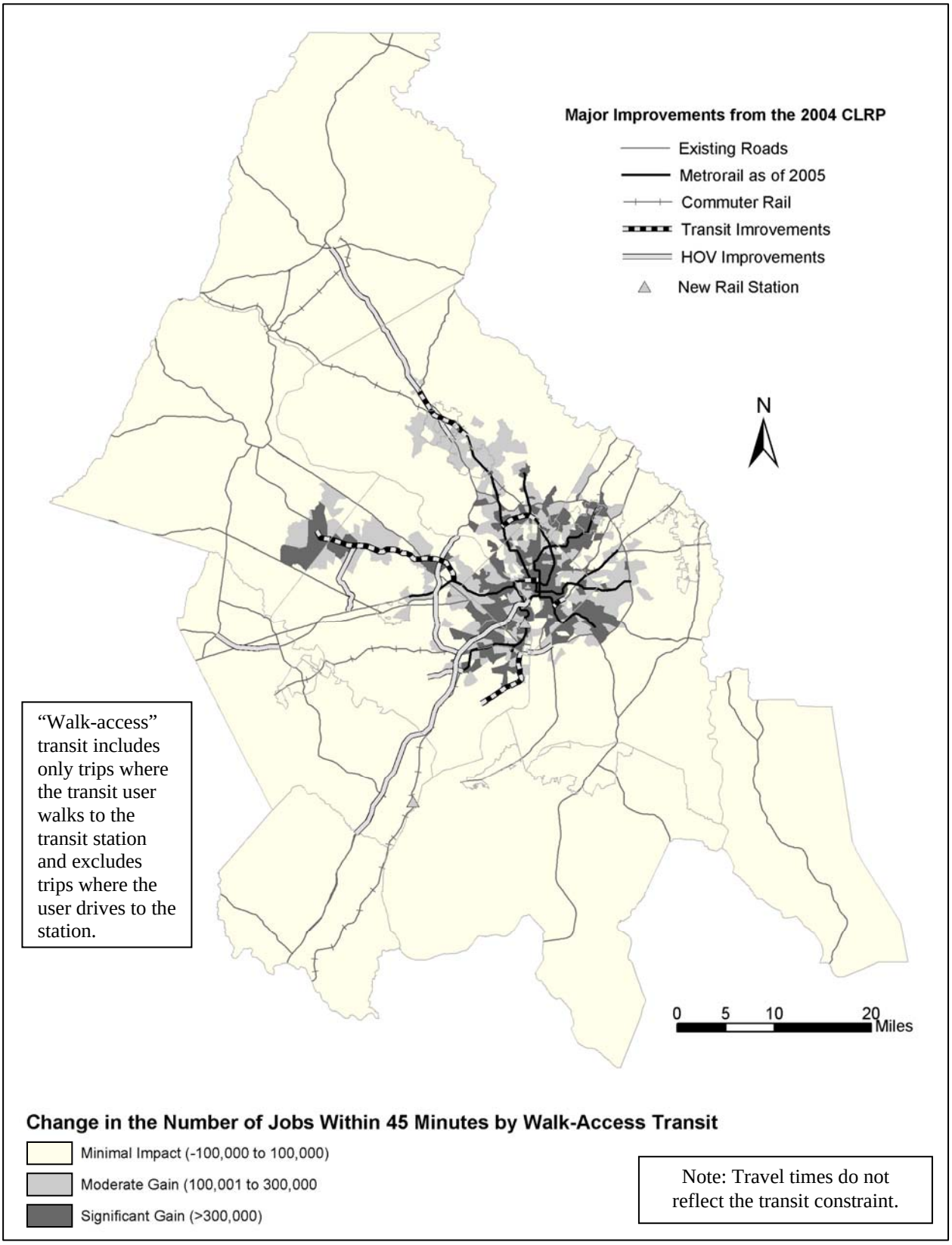


Figure 45: Change in Accessibility to Jobs by Walk-Access Transit Within 45 Minutes, 2005 to 2030 (2004 CLRP, AM Peak)

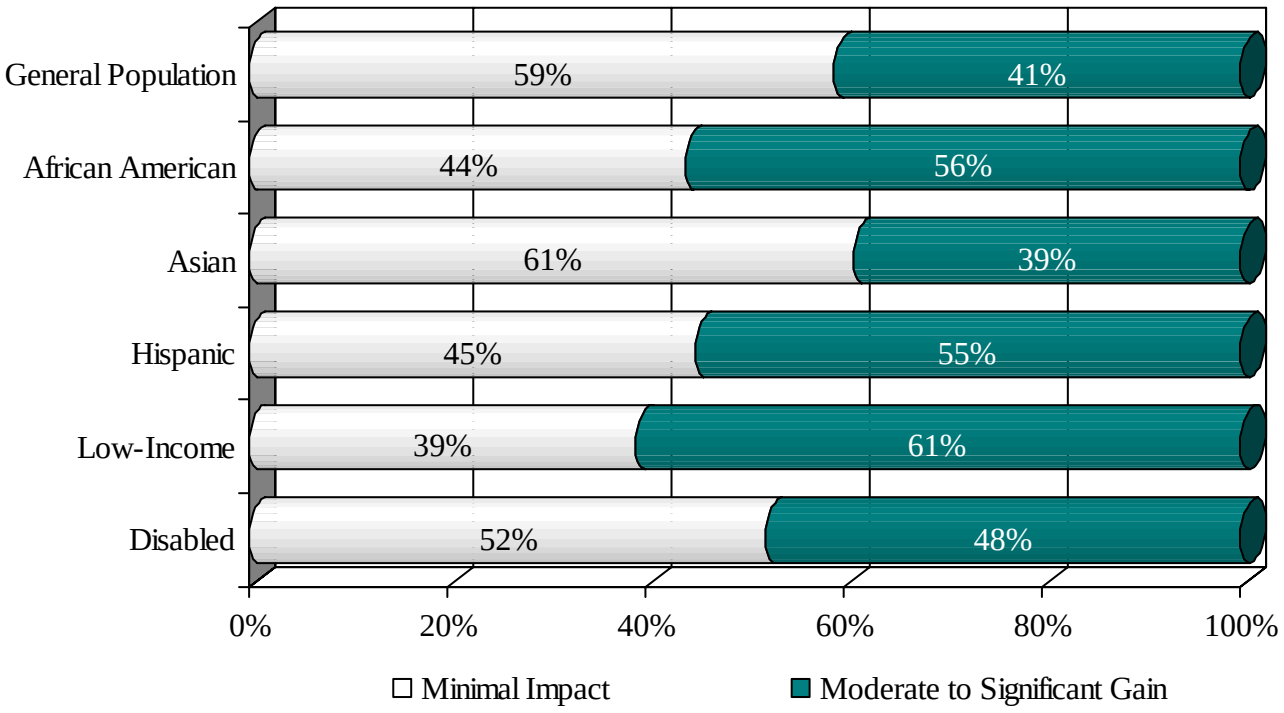


DISTRIBUTION OF CHANGES IN ACCESSIBILITY TO JOBS BY WALK-ACCESS TRANSIT

Figure 44 shows the percent of minority, low-income, and disabled individuals located in areas of the region forecast to experience a gain, loss, or minimal change in accessibility to jobs by walk-access transit over the next 25 years. Table 6 provides the data that support Figure 44. The data are based on the current geographic distribution of the population groups, according to the 2000 Census. Gains in accessibility are considered a benefit of the long-range transportation plan, whereas losses in accessibility are considered a burden of the plan.

Figure 44 and Table 6 indicate that, as was the case with auto accessibility, the majority of the general population (59%) is located in areas where changes in accessibility by walk-access transit are expected to be minimal. Forty-one percent of population is located in areas expected to experience an increase in walk-access transit accessibility. With the exception of the Asian population, this number is higher for all minority, low-income, and disabled population groups. The low-income population has the largest percentage of individuals located in areas expected to gain accessibility, at 61%. None of the population is located in areas expected to lose accessibility by walk-access transit. These data suggest that changes in accessibility to jobs by walk-access transit do not have disproportionate, adverse impacts on minority, low-income, and disabled populations.

Figure 46: Percent of Minority, Low-Income, and Disabled Populations Located in Areas Experiencing a Change in Accessibility to Jobs by Walk-Access Transit, 2005 to 2030



Sources: 2004 CLRP Air Quality Conformity Determination, Metropolitan Washington Council of Governments Round 6.4a Cooperative Forecasts, 2000 U.S. Census Data; Numbers refer to the Washington, DC-MD-VA MSA

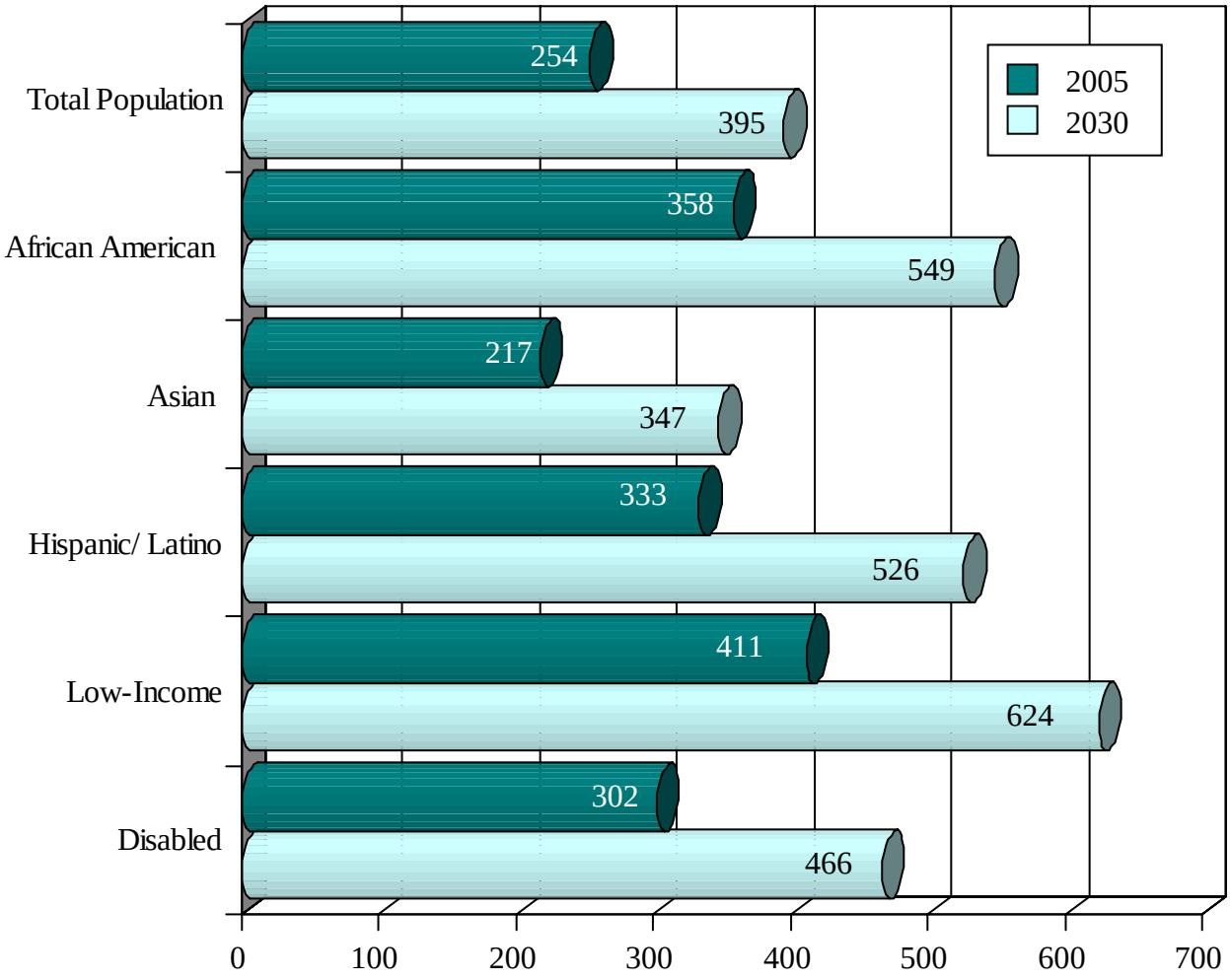
Table 6: Number and Percent of Minority, Low-Income, and Disabled Individuals Located in Areas Experiencing Change in Accessibility to Jobs by Walk-Access Transit, 2005 to 2030

Change in the number of jobs within 45 minutes by walk-access transit	*Moderate to Significant Loss (<-100,000)*	*Minimal Impact (-100,000 to 100,000)*	*Moderate to Significant Gain (>100,000)*
General Population	0 0%	2,675,000 59%	1,870,000 41%
African American	0 0%	549,000 44%	690,000 56%
Asian	0 0%	195,000 61%	126,000 39%
Hispanic/Latino	0 0%	189,000 45%	234,000 55%
Low-Income	0 0%	189,000 39%	297,000 61%
Disabled	0 0%	332,000 52%	309,000 48%

Sources: 2004 CLRP Air Quality Conformity Determination, Metropolitan Washington Council of Governments Round 6.4a Cooperative Forecasts, 2000 U.S. Census CTPP; Numbers refer to the Washington , DC-MD-VA MSA

Because large portions of the population are located in areas expected to gain accessibility to jobs by walk-access transit between 2005 and 2030, across the whole region the average number of jobs accessible within 45 minutes is forecast to increase significantly during that time period. Figure 47 shows that in 2005, the average resident in the Washington region can reach approximately 254,000 jobs by walk-access transit, 8% of the total number of jobs in the region. By 2030, the average resident will be able to reach an additional 141,000 jobs by walk-access transit, an increase of 56%. Figure 47 also shows the average number of jobs accessible by transit in 2005 and 2030 for minority, low-income, and disabled population groups. These numbers are based on the current geographic distribution of the population groups, according to the 2000 Census. As Figure 47 shows, all of the population groups are expected to experience a significant increase in the average number of jobs accessible by walk-access transit.

Figure 47: Average Number of Jobs Accessible Within 45 Minutes by Walk-Access Transit in 2005 and 2030, Weighted by Population Group



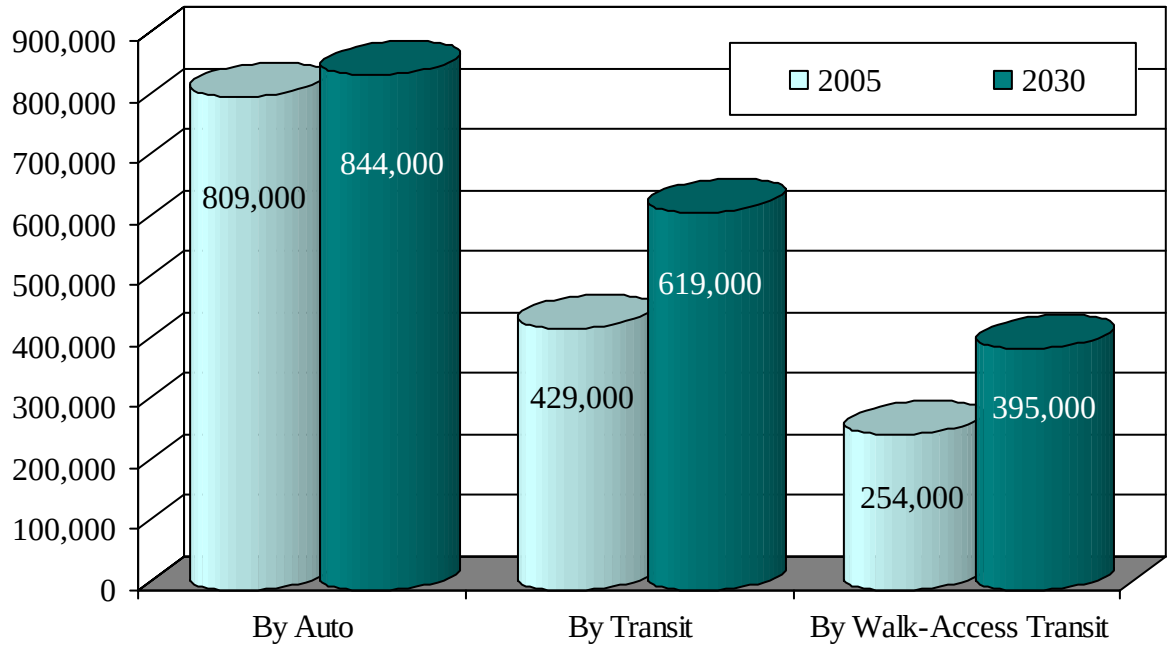
Source: 2004 CLRP Air Quality Conformity Determination, Metropolitan Washington Council of Governments Cooperative Forecasts Round 6.4a, 2000 U.S. Census CTPP; Numbers refer to the Washington, DC-MD-VA MSA.

A COMPARISON OF ACCESSIBILITY TO JOBS BY AUTO VERSUS TRANSIT

Although accessibility to jobs by transit is forecast to increase considerably between 2005 and 2030, accessibility to jobs by auto remains greater than by transit. Figure 46 shows that in both 2005 and 2030 the average number of jobs accessible by transit will be significantly less than the average number of jobs accessible by auto. The average number of jobs accessible by walk-access transit is even lower, less than half the average number of jobs accessible by auto.

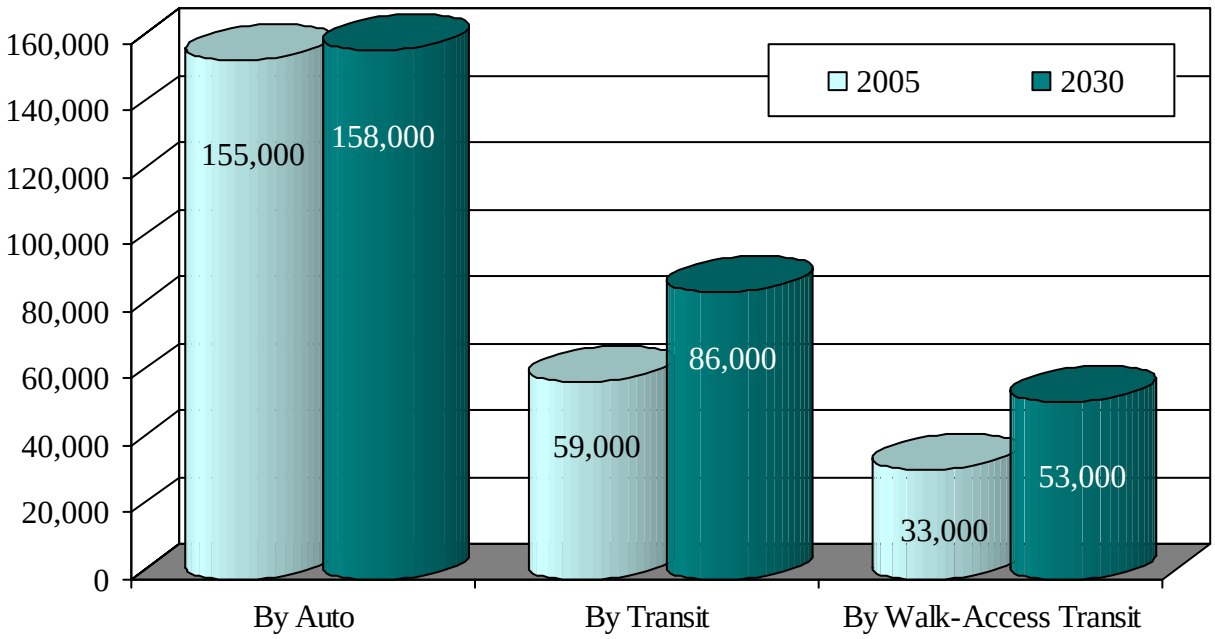
The discrepancy between auto and transit accessibility is magnified for retail jobs, as shown in Figure 47. In the year 2030, the average number of retail jobs accessible by transit will be one-half the average number of jobs accessible by auto. Again, the average number of jobs accessible by walk-access transit is even lower, one-third the average number of jobs accessible by auto. Accessibility to retail jobs is important to consider, because these jobs are correlated with shopping opportunities and entry-level employment, the latter of which may be of particular importance to the low-income community.

Figure 48: Average Number of Jobs Accessible Within 45 Minutes by Mode, 2005 and 2030



Sources: 2004 CLRP Air Quality Conformity Determination, Metropolitan Washington Council of Governments Round 6.4a Cooperative Forecasts, 2000 U.S. Census CTPP; Numbers refer to the Washington, DC-MD-VA MSA

Figure 49: Average Number of Retail Jobs Accessible Within 45 Minutes by Mode, 2005 and 2030



Sources: 2004 CLRP Air Quality Conformity Determination, Metropolitan Washington Council of Governments Round 6.4a Cooperative Forecasts, 2000 U.S. Census CTPP; Numbers refer to the Washington, DC-MD-VA MSA

SECTION VI: SUMMARY AND LIMITATIONS OF THE ANALYSIS

SUMMARY OF RESULTS

This report reviewed the demographic profile of the metropolitan Washington region and the travel characteristics of minority and low-income residents, as well as residents with disabilities. The report then reviewed the expected performance of the long-range transportation plan in terms of accessibility to jobs by auto and by transit. Finally, the report examined the distribution of benefits and burdens associated with the plan across different demographic groups. This section summarizes the findings of these analyses.

Demographic Profile of the Region

The region's largest minority group is the African American population, which represents 27% of the population and is located primarily in the eastern part of the region. Conversely, the Asian population is predominately located in the western part of the region. The Hispanic/Latino population is more clustered along major transportation corridors. The low-income and disabled populations are concentrated in the regional core. Minority individuals and individuals with disabilities are more likely to live below the federal government's official poverty threshold and less likely to participate in the labor force, compared to the general population. Unemployment rates are higher for minority, low-income, and disabled populations, relative to the general unemployment rate.

Travel Characteristics of Minority, Low-Income, and Disabled Populations

Driving alone is the dominant means of transportation to work for the general population and for each of the demographic groups; 70% of all workers use this mode. Compared to the general population, however, minority, low-income, and disabled workers are more likely to carpool and commute by bus. Although less than 5% of commuters use non-motorized forms of transport, low-income workers are twice as likely to walk to work, compared to the general population. Minority, low-income, and disabled individuals are more likely to live near bus stops and Metrorail stations and less likely to have access to vehicles, compared to the general population.

Accessibility to Jobs

This report measured the performance of the 2004 CLRP in terms of the number of jobs accessible within 45 minutes by auto or by transit. Some portions of the region are expected to experience a decrease in accessibility to jobs by auto between 2005 and 2030, due to increased congestion. Across the whole region, however, the average number of jobs accessible by auto within 45 minutes is forecast to increase modestly, by about 4% over the next 25 years. Steady employment growth is the main reason for this increase in accessibility. The average number of jobs accessible by transit is forecast to increase more substantially, by about 44% (56% for walk access transit), due to both transit improvements and employment growth.

Benefits and Burdens of the Long-Range Transportation Plan

An increase in job accessibility is considered a benefit of the plan, whereas a decrease in job accessibility is considered a burden of the plan. The impact of the plan on minority, low-income, and disabled population groups can be evaluated by comparing the distribution of these benefits and burdens across the different population groups. This comparison was accomplished by calculating the proportion of each population group that resides in parts of the region expected to gain or lose accessibility to jobs by auto or by transit. By this measure, changes in accessibility to jobs by auto and by transit do not appear to have disproportionate, adverse impacts on minority, low-income, or disabled population groups. The benefits and burdens of the plan appear to be fairly distributed.

It is important to note, however, that the number of jobs accessible by transit is considerably less than the number of jobs accessible by auto, in both 2005 and 2030. Minority, low-income, and disabled individuals are less likely to have access to a vehicle and more likely to commute to work by transit, compared to the general population. As a result of this transit dependency, even though individuals in these population groups may benefit from increases in accessibility to jobs by transit, they may still have less access to jobs compared to the general population.

LIMITATIONS OF THE ANALYSIS: SCOPE AND DATA

The methodology of the current analysis is limited by the available tools and data. The U.S. Census provides imperfect data on minorities and disability status. Minority racial groups tend to be undercounted, relative to the general population. This means that Census data may underestimate the relative size of minority groups in the Washington region. 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 disabled.

Furthermore, the prevalence and location of minority, low-income, and disabled population groups in the year 2030 is not known. It is likely that changes in land-use, housing prices, and migration patterns will alter the demographic profile of the region over the next 25 years.

To measure benefits and burdens of the long-range plan, the current analysis considered easily quantifiable aspects of regional transportation system, such as the location of major highways and transit routes. The analysis did not consider more qualitative aspects of the system. Qualitative features such as those listed below can make the transportation system more or less accessible to minority, low-income, and disabled individuals:

- Safety and comfort
- Reliability
- Availability of off-peak service
- Features that address the specific needs of the elderly and persons with disabilities
- Availability of information and ease of use

- Language barriers
- ADA accessibility of transit stops

Finally, the current analysis does not consider accessibility by non-motorized forms of transportation, such as walking and biking, and does not consider non-transportation-related benefits and burdens of the long-range plan, such as air, water, or noise pollution. These kinds of analyses would require data and analytical tools that are unavailable.

APPENDIX: TECHNICAL DOCUMENTATION

OVERVIEW OF METHODOLOGY

This analysis used data from the U.S. Census to determine the following:

- The number and of location of minority, low-income, and disabled individuals in the Washington region
- Poverty, labor force participation, and unemployment rates for minority, low-income, and disabled population groups
- The travel characteristics of minority, low-income, and disabled population groups

Census data was then combined with data from the Financially Constrained Long-Range Transportation Plan (CLRP) for the National Capital Region and the Metropolitan Washington Council of Governments (COG) Cooperative Forecasts to determine the following:

- The proximity of minority, low-income, and disabled population groups to bus stops and Metro rail stations
- The forecast number of jobs accessible within 45 minutes by auto and by transit from each TAZ in the Washington region in 2005 and 2030
- The impact of changes in accessibility on minority, low-income, and disabled population groups

GEOGRAPHIC SCOPE

The analysis included the following jurisdictions (see Figure 1 on page 3):

- District of Columbia
- Frederick County, Montgomery County, Prince George's County, Calvert County, and Charles County in Maryland
- Loudoun County, Fairfax County, Prince William County, and Stafford County in Virginia

DATA SOURCES

Table 7 describes the data sources used in the analysis.

Table 7: Data Sources

Data	Unit of analysis	Source
Major highway and transit improvements	N/A	2004 Update to the Financially Constrained Long-Range Transportation Plan for the National Capital Region (CLRP)
Forecast AM peak highway and transit travel times for 2005 and 2030	Transportation Analysis Zone (TAZ) origin-destination pairs	Air Quality Conformity Determination of the 2004 Constrained Long-Range Plan and the FY2005-2010 Transportation Improvement Program for the Washington Metropolitan Region
Forecast employment data for 2005 and 2030	TAZ	Metropolitan Washington Council of Government Cooperative Forecasts, Round 6.4a
Demographic data for 1990 and 200	Census tract	U.S. Census Summary File 3 (SF3)
Demographic data for 2000	TAZ, adjusted to account for differences between Census TAZ boundaries and COG TAZ boundaries	U.S. Census Transportation Planning Package (CTPP)
Journey to work and household vehicle availability for 2000	Public Use Microdata Area (PUMA)	Census Public-Use Microdata Samples (PUMS)
Spatial data	Census tracts, TAZs, jurisdictional boundaries, major roads, bodies of water, Metrorail lines, bus and metrorail stops	2004 COG Regional Transportation Data Clearinghouse

Notes on Use of PUMS Data:

PUMAs are large geographic areas that include a minimum of 100,000 people. Most of the counties included in the current analysis overlap directly with one or more PUMA. However, Calvert County, Stafford County, and Loudon County are each located within a PUMA that is larger than the individual county and that includes additional counties outside the scope of the current analysis. Data from these PUMAs were weighted to estimate figures for the counties of interest. The weighting factor used was [total population of interest for county]/[total population of interest for PUMA]. "Total populations of interest" were calculated from SF3 data and varied according to the analysis.

For example, for data concerning means of transportation to work, the population of interest was the total number of workers age 16 and over. To calculate the number of workers who commuted by bus in Calvert County, the following formula was used:

> [total number of workers who commuted by bus in PUMA 01500, which includes Calvert and Saint Mary's County] TIMES [total number of workers in Calvert County] DIVIDED BY [Total number of workers in PUMA 01500]

Microsoft Access was used to first filter the PUMS data to include only data from PUMAs of interest, and then to perform cross tabulations of specific variables (e.g., race X means of transportation to work). Cross tabulations were checked against SF3 data where possible (for African American, Asian, and Hispanic/Latino populations, as well as the general population).

Control totals for the populations listed below were compared across PUMS and SF3 data for each county, to verify the accuracy of the PUMS data. Except for the last category (population for whom disability status is determined), the difference between PUMS and SF3 totals was always less than 3%, and less than 1% in the majority of the cases. According to the Census data dictionary, the total population for whom disability status is determined should be the population age 5 years and over. For unclear reasons, this equivalency is true for the PUMS data, but not the SF3 data. As a result, the difference between the PUMS and SF3 total population for whom disability status is determined ranged from 1.8% for the District of Columbia to 35% for the city of Alexandria. For the entire study area, the difference was 2%.

Control Totals:

- Total population
- Workers age 16 and over
- Population for whom poverty status is determined
- Population for whom disability status is determined (5 years and over)

METHOD FOR DETERMINING THE NUMBER AND LOCATION OF MINORITY, LOW-INCOME, AND DISABLED INDIVIDUALS

1. Determined the total number and percent of individuals who fall within the population groups listed below. Numbers were calculated using SF3, CTPP, and PUMS data.

    a. African American – a person having origins in any of the black racial groups of Africa.
    b. Asian American – a person having origins in any of the original peoples of the Far East, Southeast Asia, or the Indian subcontinent.
    c. Hispanic/Latino – a person of Mexican, Puerto Rican, Cuban, Central or South American, or other Spanish culture or origin, regardless of race.
    d. Low-Income – a person whose household income is less than one-and-a-half times the federal government's official poverty threshold. The official poverty

threshold depends on family size. For a family of four, the poverty threshold is an annual income of $17,000. In the current analysis, a family of four with an annual income of less than $25,500 is considered low income.

e. Disabled – a person with any form of disability, including sensory disability, physical disability, mental disability, self-care disability, going outside the home disability, and employment disability.

2. Produced GIS maps illustrating the spatial distribution of each of the minority and disadvantaged populations groups listed above, using SF3 data. The following color coding scheme was used for each of the maps:

   a. Pale yellow – census tracts where the percent of the population that falls within the minority or disadvantaged group is less than the regional percentage.
   b. Medium color – census tracts where the percent of the population that falls within the minority or disadvantaged group is equal to or greater than the regional percentage
   c. Dark color – census tracts where the percent of the population that falls within the minority or disadvantaged group is equal to or greater than twice the regional percentage
   d. Striped – sparsely populated census tracts (less than 200 people per square mile) where the percent of the population that falls within the minority or disadvantaged group is equal to or greater than the regional percentage

METHOD FOR DETERMINING POVERTY, LABOR FORCE PARTICIPATION, AND UNEMPLOYMENT RATES

1. Calculated poverty rates for minority, low-income, and disabled population groups, as well as the general population, using PUMS data. The "total population of interest" used to weight the data to estimate poverty rates for Calvert, Loudon, and Stafford Counties was the "population for whom poverty status is determined."

2. Determined unemployment and labor force participation rates for minority, low-income, and disabled population groups, as well as the general population, using PUMS data. The "total population of interest" used to weight the data to estimate figures for Calvert, Loudon, and Stafford Counties was "population 16 years and over." The census codes four different categories of employment status:

   a. In labor force, in armed forces
   b. In labor force, civilian, employed
   c. In labor force, civilian, unemployed
   d. Not in labor force

   Unemployment rate was calculated as [c/(a+b)]. Labor force participation rate was calculated as [(a+b+c)/(Total population 16 years and over)].

METHOD FOR DETERMINING TRAVEL CHARACTERISTICS

1. Determined means of transportation to work for minority, low-income, and disabled population groups, as well as the general population, using PUMS data. The "total population of interest" used to weight the data to estimate figures for Calvert, Loudon and Stafford counties was "workers 16 years and over." The following modes of transport were considered:

    a. Drive alone
    b. Car/Van pool
    c. Subway (referred to as "rail" throughout this report)
    d. Bus
    e. Walk
    f. Bicycle

2. Determined average commute times by automobile and by transit for minority, low-income, and disabled population groups, as well as the general population, using PUMS data. The "total population of interest" used to weight the data to estimate figures for Calvert, Loudoun and Stafford counties was "workers 16 years and over."

3. Determined the number of individuals in households with no vehicles available for minority, low-income, and disabled population groups, as well as the general population, using PUMS data. Microsoft Access was used to link individual PUMS records with household PUMS records. The "total population of interest" used to weight data to estimate figures for Calvert, Loudoun, and Stafford counties was "total population."

4. Determined the percent of minority, low-income, and disabled population groups, as well as the general population, located near transit stops. Population data was obtained from the CTPP and transit network nodes from the 2004 CLRP were used to represent bus and Metrorail stops. "Near" was defined as within ¼ mile of bus stops and within ½ mile of Metrorail stops. GIS was used to perform the following steps:

    a. Created ½ mile buffer zones around the 86 Metrorail station located in the Washington region. Dissolved overlapping buffer zones into one larger buffer zone, so that the same area would not be counted twice.
    b. Multiplied the proportion of each TAZ contained within a buffer times the total population of the TAZ, to obtain an estimate of the number of persons located within ½ mile of a Metrorail station.
    c. Compared the total number of persons located within ½ mile of a Metro rail station to the total regional population, to determine the percent of the population with Metro rail access.

    The above three steps were repeated with the approximately 8,800 bus stops located in Washington region, using ¼ mile buffer zones.

METHOD FOR DETERMINING ACCESSIBILITY TO JOBS BY AUTO AND TRANSIT AND THE DISTRIBUTION OF CHANGES IN ACCESSIBILITY

The following steps were performed six times, using different combinations of travel modes and employment types, as displayed in Table 8. Drive-access transit refers to transit trips where the transit user drove to the transit station. Walk-access transit refers to transit trips where the transit user walked to the transit station.

Table 8: Combinations of Travel Modes and Employment Types Used to Analyze Job Accessibility for 2005 and 2030

Travel Mode	All Employment	Retail Employment
Auto	Number of jobs accessible by auto within 45 minutes	Number of retail jobs accessible by auto within 45 minutes
Transit (drive-access and walk-access)	Number of jobs accessible within 45 minutes by transit	Number of retail jobs accessible within 45 minutes by transit
Transit (walk-access only)	Number of jobs accessible within 45 minutes by walk-access transit	Number of retail jobs accessible within 45 minutes by walk-access transit

1. Determined the forecast number of jobs accessible within a 45-minute commute during the AM peak period from each TAZ in the Washington metropolitan region in the years 2005 and 2030. Forecast travel time data was obtained from the 2004 CLRP Air Quality Conformity Determination, which used the COG/TPB Travel Forecasting Model Version 2.1 D#50[9], land use inputs from the COG Round 6.4a Cooperative Forecasts, and highway and transit networks from the 2004 CLRP. TP+ scripts were used to calculate the number of jobs accessible within a 45-minute commute from each TAZ, based on the travel time data and employment data from the round 6.4a forecasts. Although transit trips are constrained to and from the core area after 2005 due to unmet funding needs, transit travel times do not reflect this restraint.

2. Produced GIS maps illustrating spatial variations in job accessibility across the Washington region, for both 2005 and 2030, using the data from step 1. The following color-coding scheme was used on each map to indicate the forecast number of jobs accessible within 45 minutes. The categories used for auto accessibility roughly correspond to 15% of the forecast total regional employment in 2005 (increments of approximately 500,000 jobs), whereas the categories used for transit roughly correspond to 5% of the forecast total regional employment in 2005 (increments of 150,000 jobs).

[9] The COG/TPB Travel Forecasting Model Version 2.1 D#50 User's Guide is available for download from www.mwcog.org.

a. White – 0 to 550,000 jobs (auto); 0 to 150,000 jobs (transit)
b. Light color – 550,001 to 1,000,000 jobs (auto); 150,001 to 300,000 jobs (transit)
c. Medium color – 1,000,001 to 1,550,000 jobs (auto); 300,001 to 450,000 jobs (transit)
d. Dark color – > 1,550,000 jobs (auto); > 450,000 jobs (transit)

3. Determined the change between 2005 and 2030 in the forecast number of jobs accessible within 45 minutes from each TAZ.

4. Produced a GIS map illustrating spatial variations in forecast changes in job accessibility, using that data from step 3. The following color-coding scheme was used to indicate the forecast change in the number of jobs accessible within 45 minutes. The change categories roughly correspond to 20% of the forecast employment growth between 2005 and 2030 (increments of 200,000 jobs).

   a. Star pattern – Significant Loss (< -300,000 jobs)
   b. Diagonal stripe – Moderate Loss (-300,000 to -100,001 jobs)
   c. White – Minimal Impact (-100,000 to 100,000 jobs)
   d. Light color – Moderate Gain (100,001 to 300,000 jobs
   e. Dark color – Significant Gain (> 300,000 jobs)

5. Identified the TAZs falling within each of the change categories listed in step 4 and used 2000 CTPP data to determine the total population associated with each change category (e.g., the total number of people living in "Significant Loss" TAZs, where the forecast number of jobs accessible within 45 minutes decreases by more than 300,000 between the years 2005 and 2030).

6. Divided the population associated with each change category by the total regional population, to determine the percent of the region's population associated with each change category (e.g., the percent of the population located in "Significant Loss" TAZs).

7. Repeated steps 5 and 6 using 2000 CTPP numbers for minority, low-income, and disabled population groups, to determine the percent of each population group associated with each change category (e.g., the percent of African Americans located in "Significant Loss" TAZs).

METHOD FOR DETERMINING THE AVERAGE NUMBER OF JOBS ACCESSIBLE BY AUTO AND BY TRANSIT

The following steps were performed six times, using the different combinations of travel modes and employment types displayed in Table 8 (above).

1. For both 2005 and 2030, determined the average number of forecast jobs accessible within 45 minutes across all TAZs in the Washington region, weighted by TAZ population, using the following formula. Population data for each of the 1,850 TAZs in the Washington region were obtained from the 2000 CTPP.

   Average # of jobs accessible w/in 45 minutes = X /(Total regional population)

   Where X =
   (# of jobs accessible from TAZ_1 within 45 minutes)*(Population of TAZ_1) +
   (# of jobs accessible from TAZ_2 within 45 minutes)*(Population of TAZ_2) +
   (# of jobs accessible from TAZ_3 within 45 minutes)*(Population of TAZ_3) +
   .
   .
   .
   (# of jobs accessible from TAZ_{1850} within 45 minutes)*(Population of TAZ_{1850})

2. Determined the average number of forecast jobs accessible within 45 minutes for minority, low-income, and disabled population groups, by repeating the previous step and replacing general population numbers with numbers for the relevant population group (obtained from the 2000 CTPP).