

# 2.0 Purpose and Need

**This chapter describes the need for additional transit improvements generated by continuing population and employment growth in the District as well as local economic and community development objectives. The assessment addresses the effects of increased travel time, crowding on the existing bus and rail systems and inadequate access to transit.**

## 2.1 Project Purpose

The purpose of the transit investments outlined in the system plan is to enhance mobility for city residents, accommodate continued growth in population and employment, improve access to jobs, connect neighborhoods and activity centers, and support sustainable economic growth for the District of Columbia. These results are based on the needs assessment conducted as part of the DC Alternatives Analysis completed in 2005 and updated in 2008 and 2010. The following section summarizes the needs assessment results.

## 2.2 Needs Assessment

The project needs assessment identified areas of the District of Columbia that require transit improvements to enhance access within and between neighborhoods, to key activity centers within the city, and to the regional Metrorail system. To identify these needed improvements, it measured five indicators of system performance:

1. Transit travel times to employment and other activity centers for District residents;
2. Overall travel and transit demand in different sections of the city;
3. Comparison of transit demand to transit capacity within key corridors in the city;
4. Development and redevelopment initiatives within the city that will require transit access; and
5. Public preferences for transit improvements.

Based on the analyses outlined above, a statement of transportation needs was developed for the District of Columbia. The needs statement provided the framework for the identification of corridors to receive detailed evaluation in subsequent steps of the system planning process. The key indicators of system performance from

the needs assessment were incorporated into some of the measures used to evaluate the transit improvement options. These measures included travel time savings to major trip destinations, ridership potential, change in transit capacity and vehicle loads, planning initiatives and development/redevelopment projects served, and community support. The evaluation of alternatives is summarized in Chapter 3.0 and Appendix B of this report.

The statement of needs addressed the following key issues:

- **Accommodate Population and Employment Growth** - The District has been actively engaged in community and economic development efforts to target areas that could be redeveloped to help accommodate 100,000 additional District residents. Over time, additional transit service will be required that offers more direct and higher-capacity access between areas with growing concentrations of population and employment within the city.
- **Provide Enhanced Mobility** - Current and future District residents need new transit services that extend to new activity centers within communities and for trip purposes that are currently underserved and require multiple transfers. There is a need for high-capacity transit service that can offer cross-town trip patterns and more direct connections across the Anacostia River without forcing a transfer. There is also a need to serve non-work trips made by neighborhood residents and visitors to destinations located in different parts of the City.
- **Support Continued Economic Development** - There are mutual benefits to be obtained by supporting community development initiatives with transit investments. The developing areas receive the advantage of convenient transportation to a variety of destinations. At the same time, the transit investment will benefit from the potential increased ridership base associated with the redevelopment areas.

- **Provide Metrorail Coverage and Core Capacity Relief** - The Metrorail system serves several parts of the City effectively, but there are still large gaps in service coverage within the District due to the regional nature of the service. In addition, both the Metrorail and Metrobus systems are approaching their maximum capacities.

### 2.3 Accommodate Population and Employment Growth

The transportation system within DC will have to accommodate continued growth in population and employment over the next 20 years not only within the city, but across the region. In 2000, 572,000 people lived within the city, with an average density of over 9,000 people per square mile. In 2003, District government set a goal of attracting 100,000 new residents to the District over the next ten years, which would represent an increase of almost 20 percent. Along with population growth, employment within the District is expected to grow by

approximately 22 percent by 2030. This section presents the results of population and employment growth forecasts in DC and identifies locations that will experience the greatest future transit demands and needs.

### Population

Figure 2-1 shows the projected population densities across the city for the year 2030, and Figure 2-2 shows the areas in the District of Columbia that are expected to experience the greatest population increases between 2000 and 2030. High growth areas include:

- Mount Vernon Square/North of Massachusetts Avenue (NoMa) area near downtown DC;
- Brentwood area in Northeast DC;
- Soldiers' and Airmen's Home/McMillan Reservoir area in Northeast DC;
- Walter Reed Army Hospital site and adjacent area in Northwest DC;

Figure 2-1: Forecast Population Density (2030)

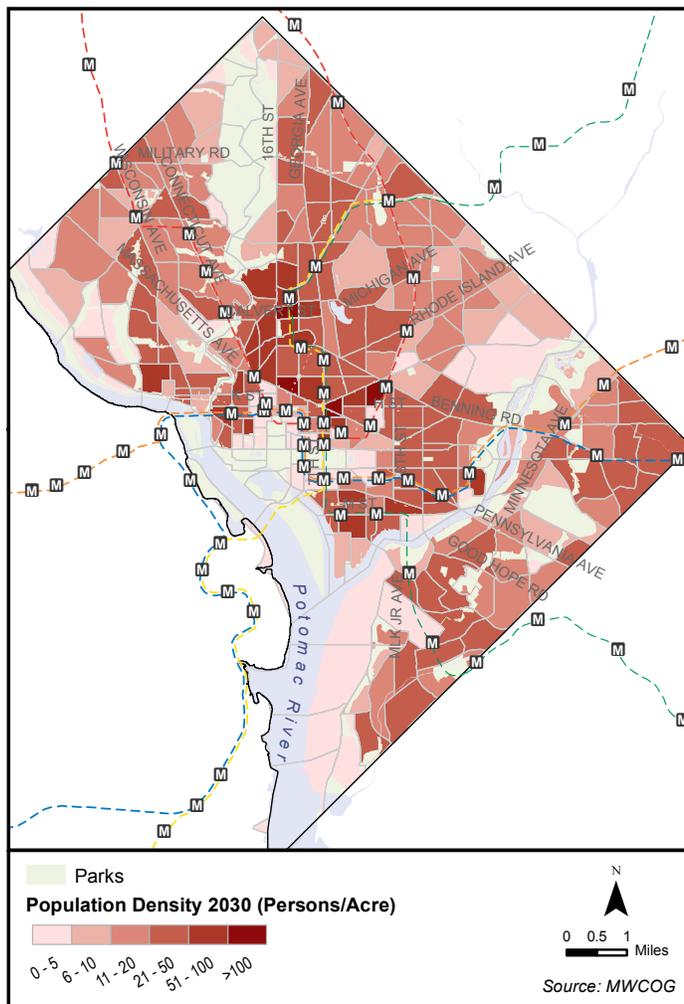
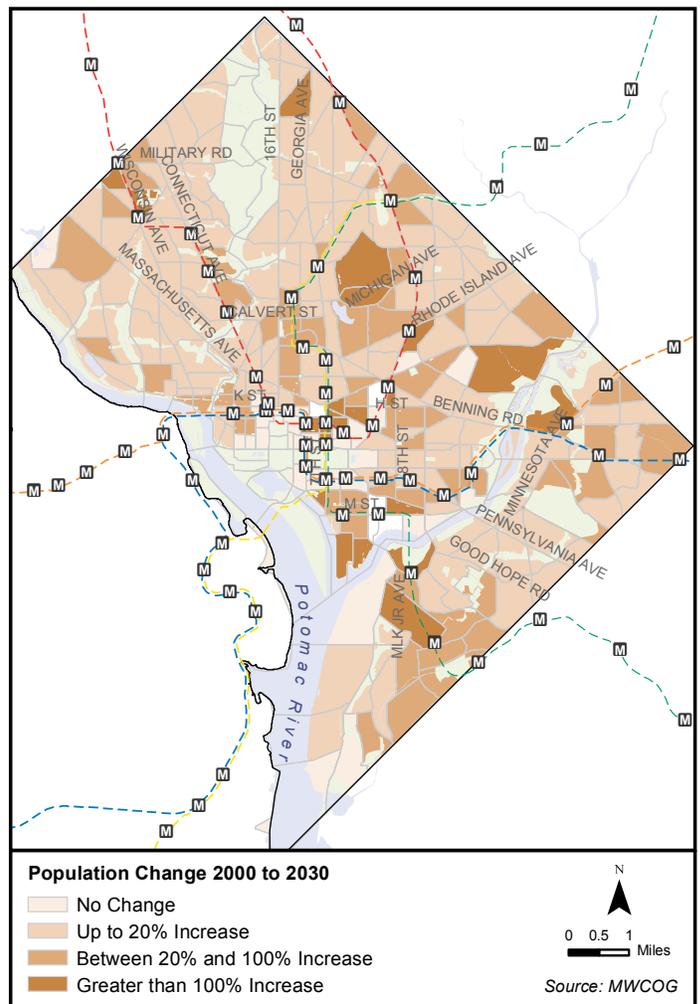


Figure 2-2: Population Change (2010-2030)



- East of New York Avenue NE and north of H Street NE/ Benning Road in the Trinidad and Carver/Langston neighborhoods in Northeast DC;
- Friendship Heights/Tenleytown area in Northwest DC; and
- Along the Anacostia River waterfront near the Navy Yard and Buzzard Point in Southeast DC.

### Employment

District employment is not uniform across the city, but rather is concentrated in a few locations. The majority of employment in the year 2030 is clustered in downtown Washington, the St. Elizabeth’s Hospital campus, and universities. Large employers currently almost exclusively concentrate in the downtown core, with even greater concentrations around K Street NW. Appendix A shows the locations of major employers within the District in the year 2007. Although the existing Metrorail and Metrobus systems provide high-quality access to some of these employment concentrations (especially downtown), there

continues to be a need to maximize District residents’ ability to access both local and regional employment opportunities, especially in areas immediately north and east of the downtown core.

Although the majority of recent employment growth in the metropolitan area has occurred in the Maryland and Virginia suburbs, significant future employment growth is expected in several areas within the District. Figure 2-3 presents the projected employment densities within the District in 2030, and Figure 2-4 presents the percent change in employment between 2000 and 2030. Areas expected to experience the greatest employment growth are generally located east of 14th Street NW. Areas with projected employment growth of more than 100 percent include:

- Capitol Riverfront area near the Navy Yard and Buzzard Point extending from Southwest to Southeast DC;
- Benning Road/East Capitol Street area in Northeast DC;

Figure 2-3: Forecast Employment Density (2030)

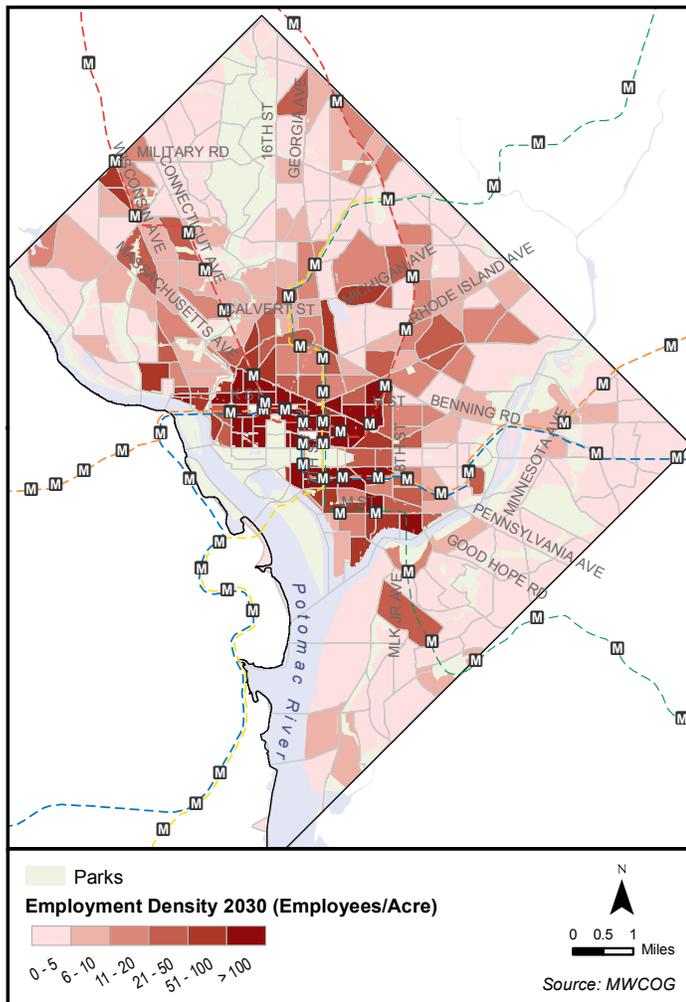
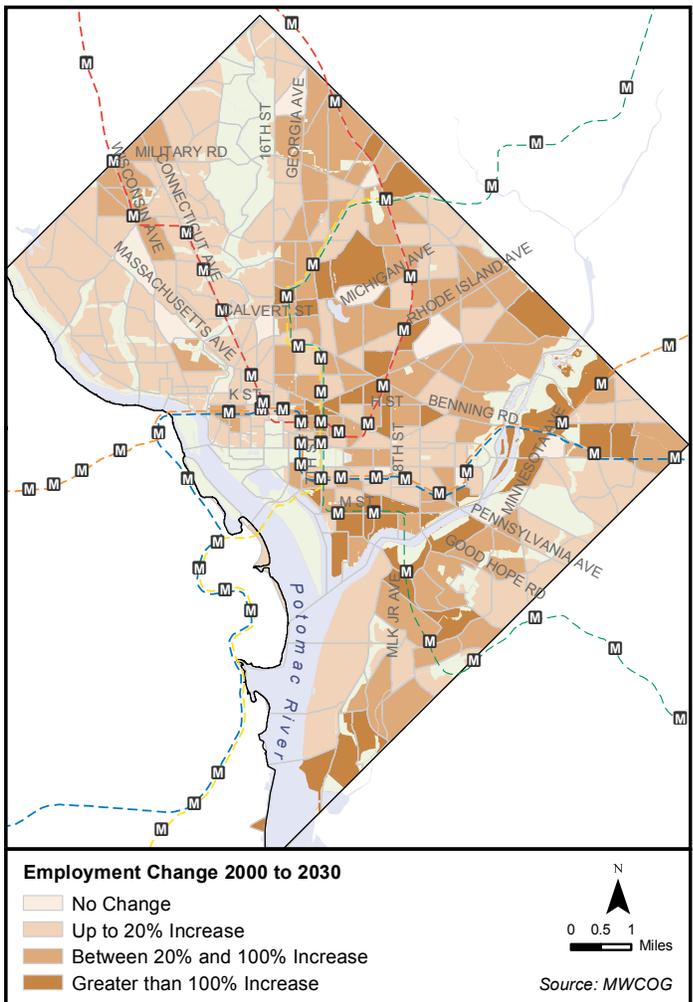


Figure 2-4: Employment Change (2010-2030)



- St Elizabeth’s Hospital campus in Southeast DC which is undergoing redevelopment as the new Homeland Security Administration headquarters;
- Southernmost portion of Southeast DC along South Capitol Street near National Harbor (which is located just over the border in Maryland);
- North of Massachusetts Avenue (NoMa) and Mount Vernon Square areas just north of downtown;
- Brentwood area along Rhode Island Avenue NE in Northeast DC;
- Columbia Heights area in Northwest DC;
- Soldiers’ and Airmen’s Home and Washington Hospital Center areas in Northeast and Northwest DC; and
- Fort Totten area in Northeast DC.

## 2.4 Provide Enhanced Mobility for District Residents

One of the primary purposes of the plan is to enhance mobility for DC residents. Mobility enhancements can benefit existing transit users through improved service and connections to new destinations. Enhanced transit mobility also benefits current non-users, by providing new travel options that are more competitive with the private automobile or other non-transit modes, thereby making it advantageous for them to use transit.

Mobility enhancements can address several key challenges facing the existing DC transit network, such as:

- Long travel times
- Transit service reliability
- Limited access to premium transit

### Long Travel Times

Metrorail lines provide relatively rapid trips due to their separation from surface roadways; however, many areas of the city have limited access to Metrorail. Metrobus lines must mix with traffic and face delays associated with congestion, construction, incident delays, and traffic signals. In addition, many Metrobus routes are indirect between origins and destinations, resulting from a history of adding branches and circuitous routings into the bus system. Finally, Metrobus routes are often slower than automobile travel on comparable routes, because buses must stop frequently for passenger pick-up and drop-off and cannot divert from their assigned routes to avoid incidents or congestion.

The consequence of relatively slower travel times for Metrobus, as opposed to Metrorail, is that different parts of the city and region have varying levels of access to employment, services, and recreational and cultural destinations, depending on the availability of Metrorail service. The following figures show the accessibility of employment as measured by travel times:

- **Regional Employment** – Figure 2-5 illustrates, by Traffic Analysis Zone (TAZ), the percentage of regional employment that is accessible within 60 minutes of travel time by transit from that zone.
- **DC Employment** – Figure 2-6 depicts, by TAZ, the percentage of District employment that is accessible within 40 minutes of travel time by transit from that zone.

These travel times include walk times and wait times at transit stops.

The data in these figures show that in many parts of the city the existing transit network does not provide quick and easy access to employment centers, which make these areas logical candidates for transit improvements. In addition, slow transit travel times are a major factor leading to the choice to drive to work rather than take transit. This mode choice can lead to significant traffic congestion in areas with limited transit service.

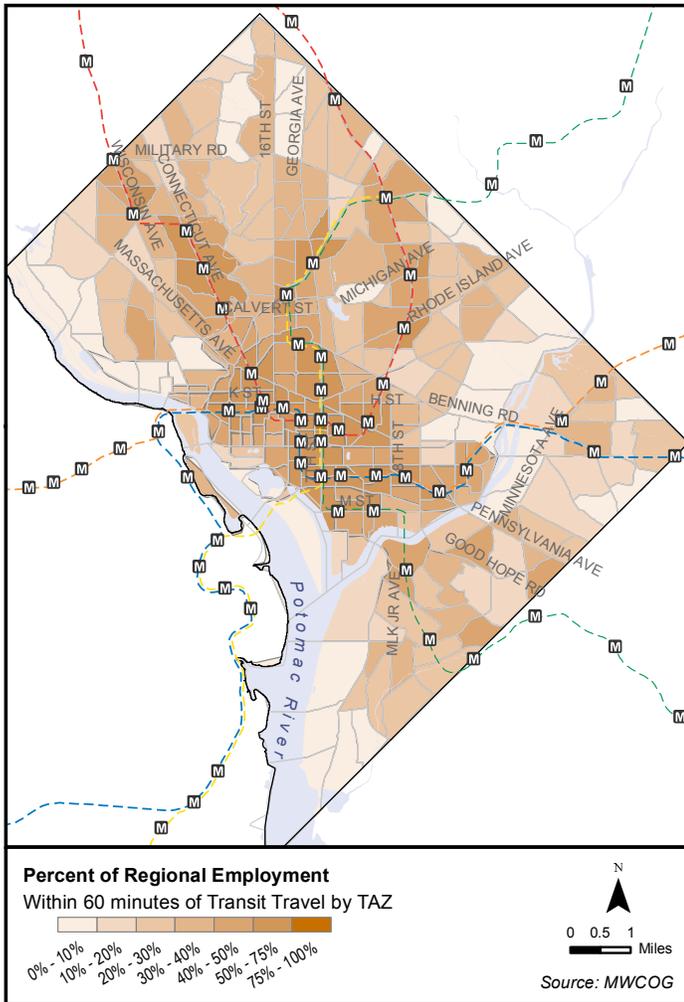
The figures also indicate that the central city and areas adjacent to Metrorail have the highest levels of transit service. Central city neighborhood locations have two advantages:

- They are adjacent to the largest job concentrations in the city; thus, transit trips to these jobs are short distances; and
- They have access to the greatest concentration of transit in the city; thus, their transit options are much greater.

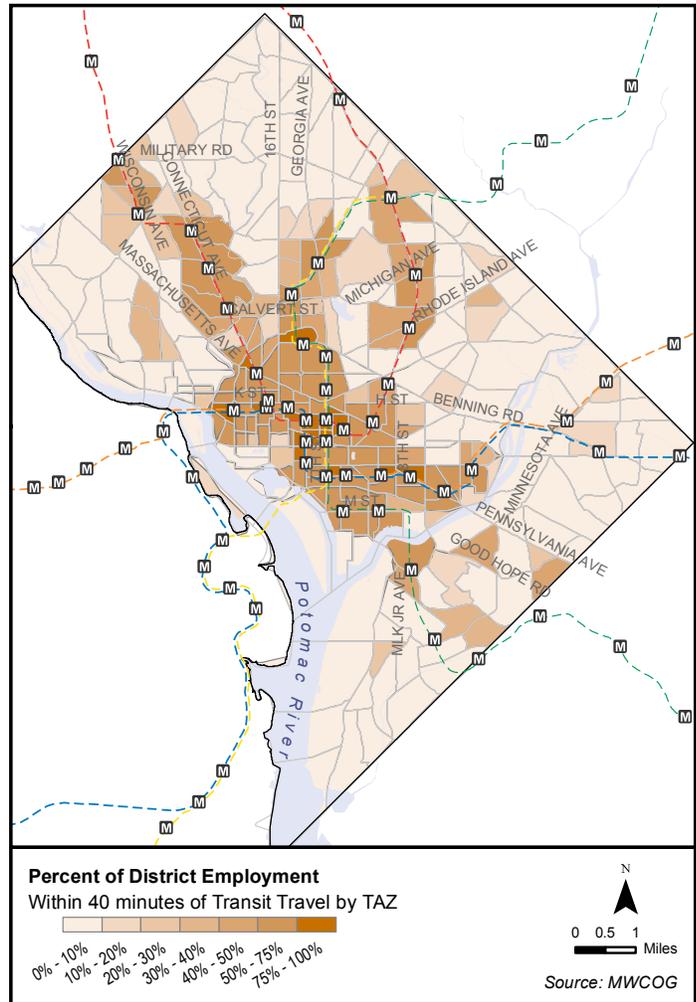
Locations along Metrorail lines have a similar advantage in their accessibility to employment centers. Metrorail lines run more frequently than other transit services and have shorter trip times because they do not run in mixed traffic.

Travel time data show that significant parts of the city outside of downtown are not well served by transit. For example, only 12 percent of District residents can reach Georgetown by transit in less than an hour using buses, rail or a combination of buses and rail. Similarly, over 95 percent of District residents must plan on spending more than an hour on transit to reach Walter Reed Hospital. By contrast, because it is located near a Metrorail station, over 60 percent of District residents can reach the Federal Center SW area near the National Mall in less than an hour of transit travel time.

**Figure 2-5: Access to Regional Employment within 60 Minutes**



**Figure 2-6: Access to District Employment within 40 Minutes**



## Reliability of Service

Poor reliability is a major challenge facing the District's transit services in general, and Metrobus service specifically. Even along Metrobus routes in which schedule adherence and reliability are high, the general perception may be that buses are not dependable. While Metrorail is generally able to maintain schedules and headways, except during mechanical problems, Metrobuses are much more likely to be impacted by heavy boardings, cycling wheelchair lifts, delays due to unexpected traffic congestion, and incidents such as accidents, special events, or road closings.

WMATA maintains on-time records for Metrobus routes that can serve as an indicator of service reliability. In general, a route with poor schedule adherence is one for which reliability may be a problem. Table 2-1 shows schedule adherence for selected high ridership bus routes that were evaluated as part of this study.

Almost 20 percent of trips on some of the busiest Metrobus routes are more than 5 minutes late; if trips between 2 and

5 minutes late are included, more than half of all trips are behind schedule. This statistic suggests a serious reliability problem with Metrobus service. Late buses or missed trips, especially for less-frequent routes, are serious disincentives to transit use, especially by choice riders.

## Access to Premium Transit

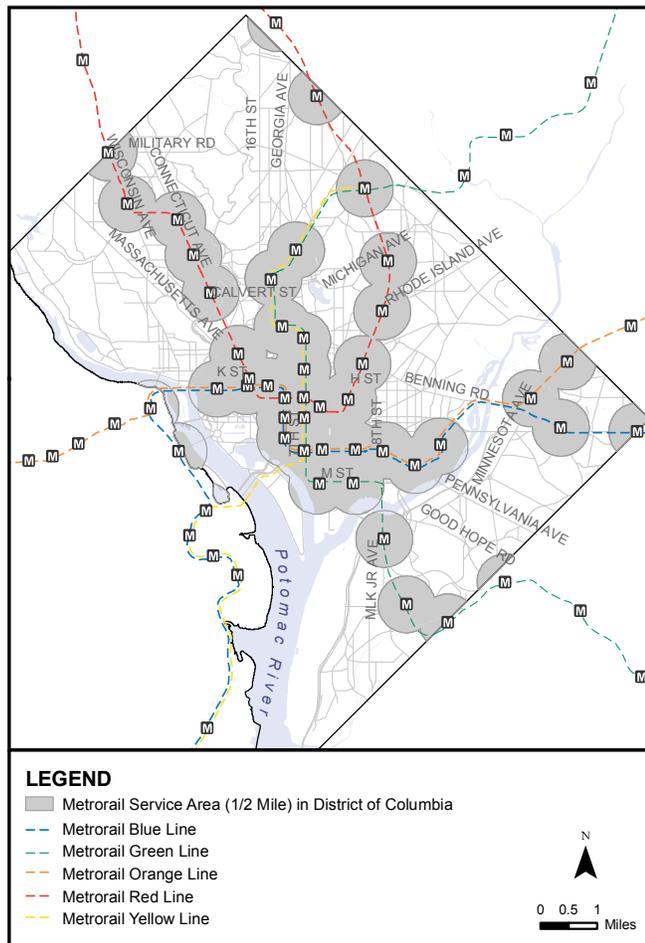
As noted in the section above, access to Metrorail service greatly expands the access to DC activity centers by transit in general. Figure 2-7 shows the areas within a half-mile radius of existing Metrorail stations. One-half mile is the approximate maximum distance that most transit patrons will walk to access a premium transit service. Premium transit service is defined as transit service that provides improved travel times, facilities and features compared to typical local bus service. Premium transit services would include limited-stop bus service, BRT, Streetcar, light rail and Metrorail services. The map shows that there are significant areas of the District that lack Metrorail access; these areas contain approximately 55 percent of District residents.

**Table 2-1: Metrobus Schedule Adherence – Percent of Trips More than 5 Minutes late**

Route	Northbound	Southbound	Eastbound	Westbound
A2-8, A42-48	11%	10%	-	-
A4-5	20%	4%	-	-
H1	71%	22%	-	-
70-71	16%	34%	-	-
79	16%	24%	-	-
90-92-93	16%	31%	-	-
H2-3-4	-	-	16%	8%
X1	-	-	48%	30%
X2	-	-	28%	24%
X3	-	-	68%	25%
32-36	-	-	70%	65%
34	-	-	66%	40%
37	-	-	44%	44%
39	-	-	67%	21%

Source: WMATA Metrobus Passenger and Time Reports through 2009, dates vary by line

**Figure 2-7: Areas Served by Metrorail**



## 2.5 Support Continued Economic Growth

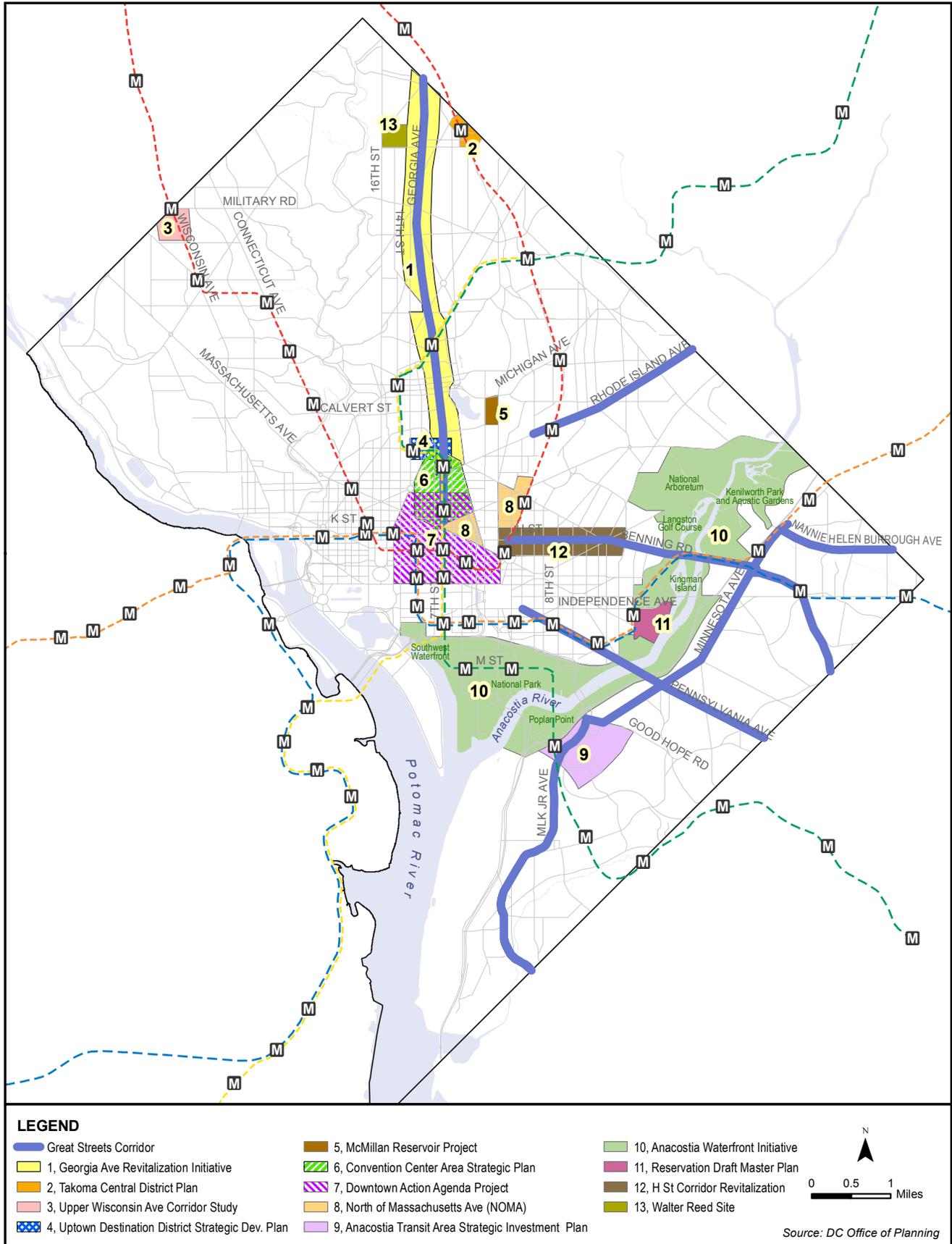
Major transit investments have the potential to support economic and community development initiatives by providing enhanced access, transportation capacity, and visibility to potential development and redevelopment sites located along the proposed new transit lines. The alternatives analysis and system plan development considered two factors in evaluating potential impacts of a transit investment on economic growth: service to city planning/economic initiatives and development potential along the route.

### DC Planning Initiatives

Several major initiatives of the District government are currently in planning or implementation. The following describes some of the different types of initiatives underway in the city.

- Great Streets Initiative** – The Great Streets Initiative is a program of the Office of the Deputy Mayor for Planning and Economic Development and DDOT. The initiative targets public investment in roadway and streetscape improvements along strategic corridors, with the goal of encouraging private investment and enhancement in these areas.
- Revitalization Initiatives** – The District’s Office of Planning has identified revitalization initiatives to leverage federal and private sector investment in targeted neighborhoods and corridors, provide new job opportunities, increase retail sales and services, enhance

Figure 2-8: DC Planning Initiatives



community image, and increase community pride. These strategies help existing businesses become more competitive and contribute to the growth of their neighborhoods.

- **Strategic Development Plans and Initiatives** – The Strategic Development Plans identified by the DC Office of Planning, provide clear policy direction for land use and development within their overall study areas and along major corridors. The plans designate future land uses and provide guidelines for development intensity and character.
- **District Plans** – District Plans define near- and mid-term strategies for revitalization and articulate broad development goals, urban design guidelines, and actions necessary to encourage and facilitate investment in the different areas of the city.
- **Area Master Plans** – Master plans address the locations of futures streets, blocks, and circulation patterns for major redevelopment sites. They also establish general land uses and address maximum build-out development intensities, building massing and heights, and public open space and parks.

Figure 2-8 shows the locations of these major planning initiatives relative to the corridors considered for major transit investments from previous studies (Chapter 3 describes these prior studies). As shown on the map most of these initiatives are located in the eastern portion of the city, generally east of 14th Street NW.

## 2.6 Provide Core Capacity Relief for Metrorail

Many DC Metrobus routes and all Metrorail lines face overcrowding during peak periods; in some cases, overcrowding continues into non-peak periods, including weekends. Overcrowding is a serious challenge facing Metro – it limits the number of potential patrons the system can serve, causes additional wear on transit infrastructure and vehicles, and reduces the quality of service.

### Metrorail Congestion

One of the most significant issues in the Metrorail system is excess demand relative to available capacity. Table 2-2 shows current and future forecasted passenger loads on the Metrorail system in the peak hour by line, assuming use of the existing rail vehicles and operating plan.

The *Metro Matters* plan addresses Metrorail congestion through system upgrades to accommodate longer (8-car) trains. However, even with *Metro Matters* improvements, the Metrorail system will still experience highly-congested conditions by 2015 and will be overcapacity as early as 2020, as shown in Figure 2-9.

### Metrobus Congestion

Many Metrobus lines in the District are also near or over capacity. Table 2-3 shows the load factors (the ratio of passenger volume to bus capacity) for crowded District bus lines. As the data show, a number of the primary bus corridors in the city have overcrowding, which in some cases is severe.

Another method of analyzing transit network capacity is to develop an estimate of transit demand for Metrobus trips from each sector of the city to each of the key activity centers and compare it to an estimate of transit capacity for direct trips (i.e., transit trips that do not require transfers) between the same origin/destination (O/D) pairs. This analysis takes into account the fact that there may be multiple methods of traveling between any two origins and destinations via direct transit trips. In transit corridors where overall trip demand outstrips service capacity, the result can be overcrowded transit vehicles or a shift of travel from transit to private automobile, which strains already congested roadways and parking capacity.

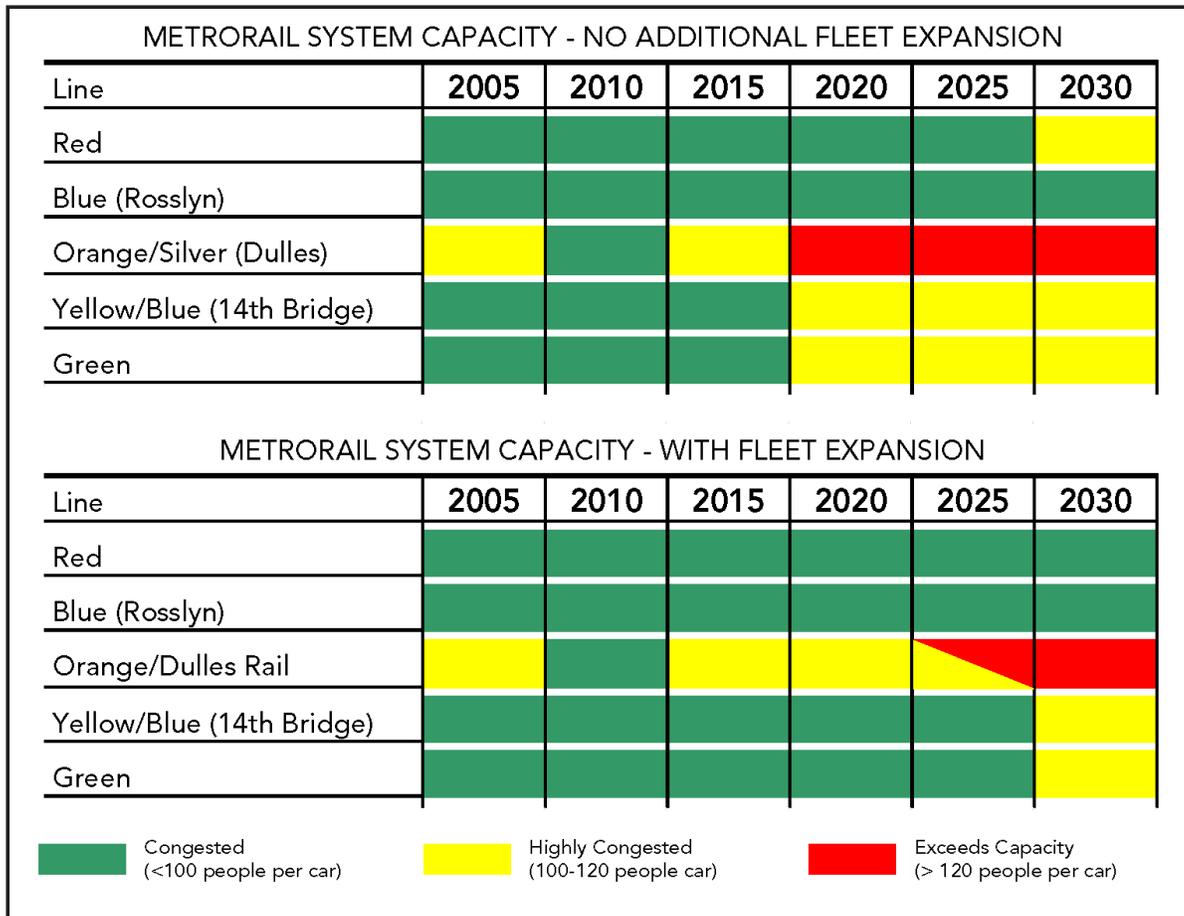
In this analysis, demand for transit trips to a number of the outlying activity centers exceeds service capacity, especially for crosstown trips that do not pass through downtown. These data do not necessarily imply high demand, as there may be extremely limited capacity for

Table 2-2: AM Peak Hour Metrorail Line Loads in DC, 2005-2030

Line	Location		Passenger Load		Type of Train	
	From	To	2005	2030	2005	2030
Red	Gallery Pl-Chinatown	Metro Center	13,300	17,400	6 cars	8 cars
Yellow/ Blue	Pentagon	L'Enfant Plaza	4,800 (Yellow)	11,300	4-6 cars	8 cars
Green	Waterfront - SEU	L'Enfant Plaza	7,400	9,700	6 cars	8 cars

Source: WMATA, Station Access and Capacity Study, 2008

Figure 2-9: Projected Metrorail Congestion with and without Metro Matters Fleet Expansion



Source: WMATA, 2005

Table 2-3: Bus Load Factors in Major Corridors

Route Numbers	Corridor	Load Factor*
H1, H2, H3, H4	Michigan Avenue/Crosstown	1.45 (all day)
42	Mount Pleasant Line	1.41 (all day)
S2, S4	16 <sup>th</sup> Street Line	1.41 (peak)
X1, X2, X3	H Street, Benning Road	1.34 (peak)
52, 53, 54	14 <sup>th</sup> Street	1.30 (peak) 1.45 (all day)
A2, A3, A6, A7, A8	Anacostia/Congress Heights	1.26 (all day)
30, 32, 34, 35, 36	Wisconsin Avenue, Pennsylvania Avenue	1.20 (peak)
70, 71	Georgia Avenue/7 <sup>th</sup> Street	1.07 (Saturday) 1.39 (Sunday)
90, 92	U Street, Florida Avenue	1.06 (all day)
D1, D3, D6	Sibley Hospital/Stadium Armory	1.06 (all day) 1.35 (Saturday)

Source: Regional Bus Study Comprehensive Operations Analysis (WMATA, 2003)

\*Load factor over 1.2 in peak periods or over 1.0 in off-peak periods/weekends exceeds acceptable load standards.

direct trips between two outlying points in the city. Figure 2-10 provides a general overview of transit trip origins and bus trunk line capacities. Additional crosstown transit capacity is needed in the following corridors:

- For some destinations, such as Adams Morgan and the Washington Hospital Center, direct trip transit capacity is inadequate to meet the demand: there is nine times greater demand than capacity for transit trips to Adams Morgan and over five times greater demand than capacity for transit trips to the Hospital Center. By City sub-area, capacity is especially lacking for transit trips from the Northwest to Adams Morgan and from both the northwest and central sub-areas to the Hospital Center.
- In Northwest DC, there is significant transit demand for destinations within the Northwest sub-area (Northwest to Adams Morgan, Northwest to Georgetown, and Northwest to American University (AU)). However, most of the transit services available are oriented to serve the downtown core.
- In the Northern part of DC, there is a need for greater transit capacity to serve Walter Reed Medical Center, but, more significantly, there is a need for a crosstown service to connect Walter Reed to District residents living anywhere other than the Northern sub-area and the Central core.
- Similarly, although Northeast DC is served by portions of the Red and Green lines, it could benefit from additional transit capacity from the Northwest and Central sub-areas, as well as from the introduction of direct service from the North to the Central area. The areas served by the existing H8 and H9 routes show a critical exceedance of capacity.
- The existing service configuration forces transfers for most trips starting in Southeast DC with destinations outside the Central core, but there are also additional capacity needs within the Southeast and Central sub-areas.
- Even trips from outlying sub-areas to the Central core vary in terms of service availability and capacity:
- There are significant transit capacity needs for residents in the Northwest and Southeast traveling to Metro Center.
- For trips to L'Enfant Plaza from within the Central sub-area, trip demand is three times greater than capacity.
- Trips to Capitol Hill from any sub-area other than the Central and Northwest sub-areas require transfers.
- Finally, even from the Central Core, which has the greatest number of converging transit services, demand for trips to the Hospital Center and to Walter Reed Medical Center are 11 times higher and three times higher, respectively, than the transit capacity to accommodate them.

Figure 2-10: Ratio of Demand to Capacity for Major Bus Connections

