2010 METROBUS FLEET MANAGEMENT PLAN

Office of Long Range Planning
Department of Planning and Joint Development

Office of Bus Planning
Department of Bus Services

Washington Metropolitan Area Transit Authority
"The Best Ride in the Nation"

Final Report

July 22, 2010

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FIGURES

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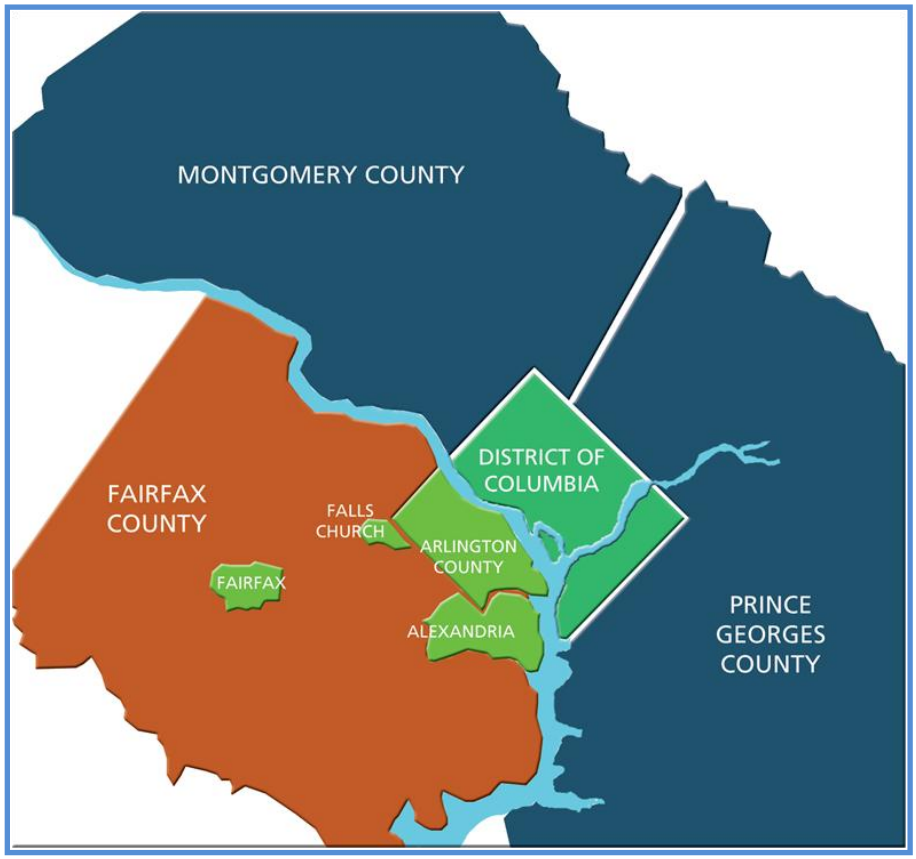
SECTION ONE: INTRODUCTION

The Metrobus system was created in 1973, when Metro consolidated service provided by four different private bus companies. Metrobus serves the District of Columbia, the suburban Maryland counties of Montgomery and Prince George's and the Northern Virginia counties of Arlington and Fairfax and the cities of Alexandria, Fairfax and Falls Church. Figure 1-1 shows the jurisdictions in which Metrobus operates.

The system currently operates 319 routes on 174 lines and serves a population of 3 million within the 1,500 square miles of Metrobus service area. At the end of FY2009, Metrobus had more than 1,500 buses and served over 12,000 bus stops. In FY 2009, Metrorail and Metrobus combined carried 357 million passenger trips, 134 million of which were on Metrobus. The average daily ridership reached 450,000 trips on weekdays, 230,000 trips on Saturdays and 145,000 trips on Sundays. All Metrobus vehicles are accessible to people with disabilities and provide bike racks.

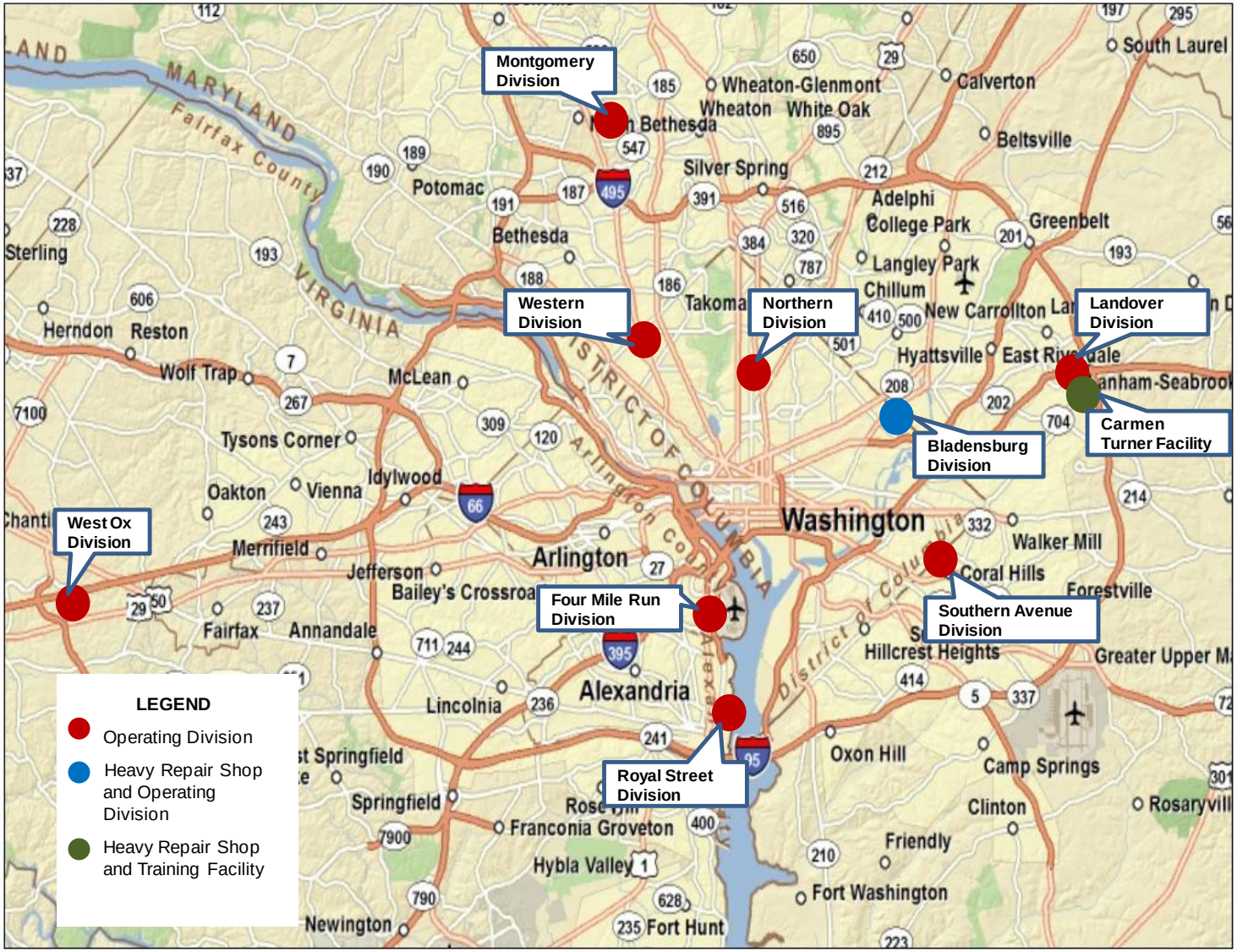
Figure 1-1. Metrobus Service Coverage Area



Metrobus is essential to the region's transportation system. The Metrobus network has a broad reach to each of the regional activity centers as well as to neighborhoods located in various parts of the region. Within the WMATA service area, more than 7% of residents ride a bus to work during the morning peak period, including Metrobus and local bus services. Not only does Metrobus provide lower-cost, flexible service, but it also transports large volume ridership in major urban corridors and complements the Metrorail system by connecting feeder bus service to stations.

Metrobus operates nine full-service operating divisions, as shown in Figure 1-2. Currently the operating facilities located in the District of Columbia accommodate 41% of the total fleet, with those in Maryland and Virginia at 34% and 25% respectively. In addition, Metro has two heavy repair shops, located at the Carmen E. Turner facility and the Bladensburg Operating Division. The Carmen E. Turner facility in Landover performs major corrective maintenance and the heavy repair shop at the Bladensburg Operating Division serves as the home of the Metro Heavy Maintenance Overhaul Program. The Heavy Overhaul program has been so successful at extending the useful life of a transit bus that the Metro Board of Directors raised the expected service life of a standard Metrobus from 12 years to 15 years and set the target average age of the Metrobus fleet at 7½ years.

Figure 1-2. Locations of Metrobus Facilities



1.1. Current Metrobus Fleet

As of June 2009, Metrobus active revenue fleet consisted of 1,482 vehicles, of which 75, or 5%, are articulated buses and 1,407 are mini, small, or standard size buses as shown in Table 1-1. The total fleet number includes 1,242 buses used for peak service, 214 buses under operating maintenance, 20 buses under heavy overhaul and 6 training buses.

Table 1-1. Metrobus Fleet and Division Assignment (June 2009)

Division	Mini Buses(1)	Small Buses(2)	Standard Buses(3)	Articulated Buses	Total
Bladensburg	0	19	247	34	300
Northern	0	0	144	27	171
Western	0	16	116	0	132
Landover	0	8	165	0	173
Montgomery	0	0	186	12	198
Southern	0	27	106	0	133
Four Mile Run	6	16	196	2	220
Royal Street	0	0	65	0	65
West Ox Road	0	0	90	0	90
TOTAL	**6**	**86**	**1315**	**75**	**1482**

Notes:

This table presented the number and composition of Metrobus fleet at the end of June 2009. Metro continues to receive new buses in FY 2010, funded by Metro Matters and ARRA.

Bus size definition:

Mini buses(1): vehicles with a length of 26 feet

Small buses(2): vehicles with a length of 30 feet – 35 feet

Standard buses(3): vehicles with a length of 35 feet – 42 feet

Articulated buses(4): vehicles with a length of 60 or more feet

1.2. Organization of Report

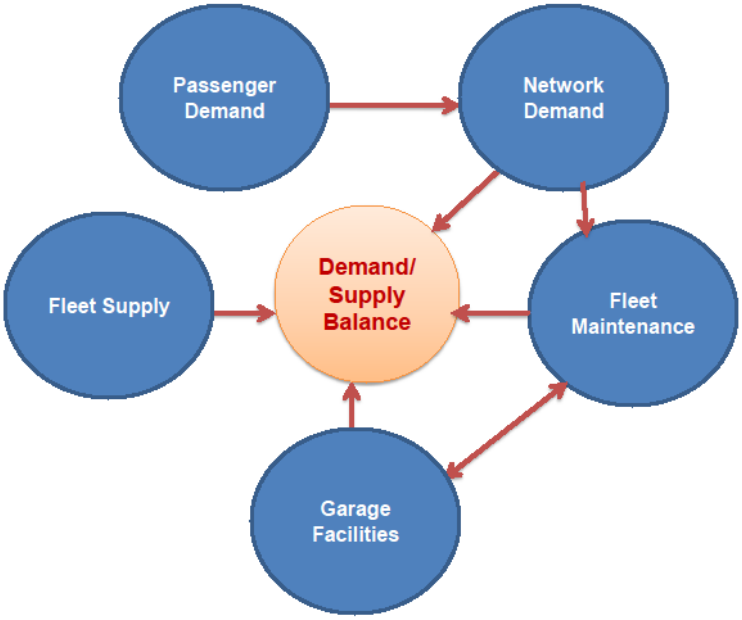
The 2010 bus fleet management plan documents the process and practice by which Metro establishes its current and projected Metrobus revenue vehicle fleet requirements. This report is developed consistent with quality assurance principles for document control. (For reference, see the Department of Rail's Quality Assurance Policy and Procedures Manual, referred to as Document QAAW-1).

The fleet plan is a planning document that provides a system-wide analysis for fleet growth from FY2010 through FY2020, taking into consideration current and future ridership demand, proposed service enhancements, supply of new buses based on the FY2011 - FY2020 Capital Needs Inventory and the FY2011 – FY2016 Capital Improvement Program, as well as capacities of the Metrobus maintenance programs and facilities. Projections of Metrobus operating costs are documented separately in Metro's annual operating budget and the financial plan component of the region's Constrained Long Range Plan.

Metro uses a ten-year horizon for the purpose of preparing its Capital Needs Inventory ("CNI") for system capital planning. Therefore, this fleet plan conforms to the same timeframe to link system service and capital recommendations. Projections beyond 2020 would not connect with any existing adopted documents and are built upon assumptions that are subject to change. At the time of this fleet plan update, there are no adopted major changes to Metrobus network and garage facilities beyond 2020. Additionally, ongoing transit system planning initiatives undertaken at local and state levels could come to fruition during the 2010 - 2025 timeframe, which may influence or impact Metrobus operations. However, for the time being, these investment initiatives and their transit operations plans are not finalized or fully funded. This document provides a system level projection for fleet growth for the period of 2020 and 2025, where applicable, with the understanding such projection is subject to many variables and uncertainties.

This fleet plan is structured by the sequence of the planning analysis and is divided into the sections as outlined below.

Figure 1-3. Sequence and Structure of the Fleet Plan



Section 2 – Passenger Demand for Fleet Growth: This section summarizes current ridership characteristics and projects potential ridership growth during the next ten years. It also analyzes Metrobus data in the 2008 Regional Bus Survey and provides an overview of the Metrobus survey results, including ridership distribution, trip purpose, mode of access, and socioeconomic characteristics of passengers.

Section 3 – Network Demand for Fleet Growth: This section identifies the demand for revenue vehicles and projects fleet growth based on Metrobus system expansion plans that are targeted for implementation over the next decade. This section also provides an overview of the performance and design measures Metro applies for network service evaluation and the current system performance and fleet requirements.

Section 4 – Metrobus Fleet Supply: This section addresses the supply of Metrobus revenue vehicles based on the results of the 2011 - 2020 Capital Needs Inventory and the draft FY2011 – FY2016 Capital Improvement Program. It accounts for total buses to be owned by fiscal year, authorized and anticipated procurement, and vehicles available for service. It also outlines the current fleet composition by size, age and fueling technology and summarizes the Metrobus replacement and expansion program including buses funded by Metro Matters between 2005 and 2010. This section also provides a discussion of replacement and expansion buses.

Section 5 – Fleet Maintenance: This section identifies maintenance requirements to support the projected fleet growth based on previous sections. It provides an overview of the fleet maintenance program and assesses the performance of the current Metrobus fleet.

Section 6 – Garage Facilities: This section focuses on system-wide garage capacities to accommodate and service the growing fleet over the next ten years. It discusses short-term garage development potentials including sites currently funded for construction and those in the stage of feasibility assessment.

Section 7 – Summary: This section identifies the gap between the projected demand for revenue vehicles and anticipated fleet supply from FY2010 through FY2025. It discusses strategies for future fleet mix, including alternative-fuel buses and articulated buses, timed with the development of new and replacement garage facilities, and outlines the framework for future plan review and update.

Appendices: This section presents the summary tables for the 2010 fleet plan update.

1.3. Definition of Terms

The following terms are used within this document:

- ARRA – The American Recovery and Reinvestment Act of 2009.
- Artic – Articulated bus, with length of 60 feet or longer.
- Artic conversion – Replacement of standard buses with articulated buses.
- AVL – Automatic Vehicle Location.
- Choice riders – Transit riders who have a vehicle available but "chose" to make the trip by bus instead.
- CIP –FY-2011 to FY-2016 Capital Improvement Program
- CLRP – Constrained Long-Range Plan
- CNG – Compressed Natural Gas
- CNI – FY-2011 to FY-2020 Capital Needs Inventory
- CTF – Carmen Turner Facility
- ERVs – Emergency Response Vehicles
- HOT lanes – High-Occupancy/Toll lanes
- HOV lanes – High-Occupancy Vehicle lanes
- MDBF – Mean distance between failures
- Metro Matters -- A joint effort between Metro and its jurisdictional partners to fund capital needs from FY2005 to FY2010.
- Mid-life rehab – Comprehensive rehabilitation of a vehicle performed when it has reached half of its useful life.
- NABI – North American Bus Industries
- PCN – The Metrobus Priority Corridor Network is a system of the of the highest ridership Metrobus corridors.
- TIGER – Transportation Improvements Generating Economic Recovery

SECTION TWO: RIDERSHIP DEMAND FOR FLEET GROWTH

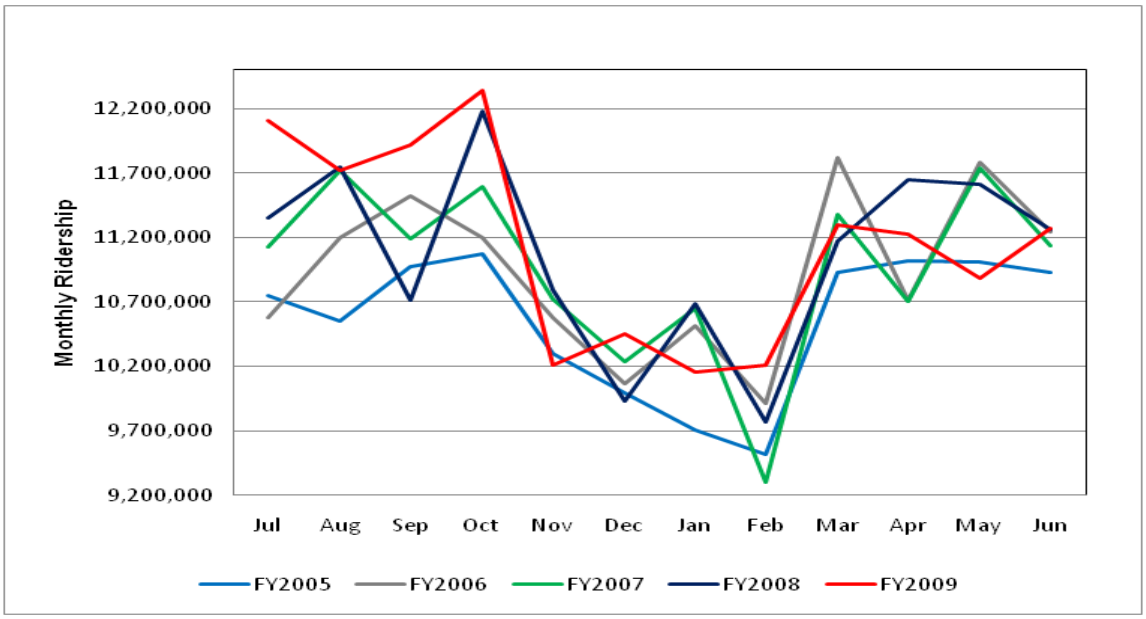
Metrobus has experienced strong ridership growth in the recent years, largely driven by regional economic development, a well-formed transit network inclusive of rail, bus and paratransit, and a solid base of transit riders across jurisdictions. The present and anticipated ridership increase requires Metro provide a high quality fleet to meet the passenger demand and to capture the growing transit market.

The process Metro uses to develop a fleet plan starts with an evaluation of current passenger demand and anticipated growth in the transit market over the next ten years. This section provides an overview of current and projected ridership growth and its impact on the Metrobus fleet.

2.1. Recent Ridership Growth

Metrobus ridership has shown steady growth over the past five years. The total ridership between FY2005 and FY2009 has grown by 5.5% at an average of 1.4% growth annually. During this period, the highest growth of 3.4% was achieved in FY2006. Figure 2-1 illustrates Metrobus monthly ridership trends from FY2005 to FY2009. The trend lines show the typical seasonal fluctuation of higher summer and lower winter ridership.

Figure 2-1. Metrobus Ridership Trend (FY2005-FY2009)



Weekday has the highest ridership level, averaging above 486,000 in September 2009. Between FY2005 and FY2009, weekday ridership has grown by 2.4% with an average annual growth of

0.6% (Figure 2-2). Figures 2-3 through 2-5 present annual ridership growth trends for weekdays, Saturdays, and Sundays.

Figure 2-2. Average Weekday Ridership Trend (FY2005-FY2009)

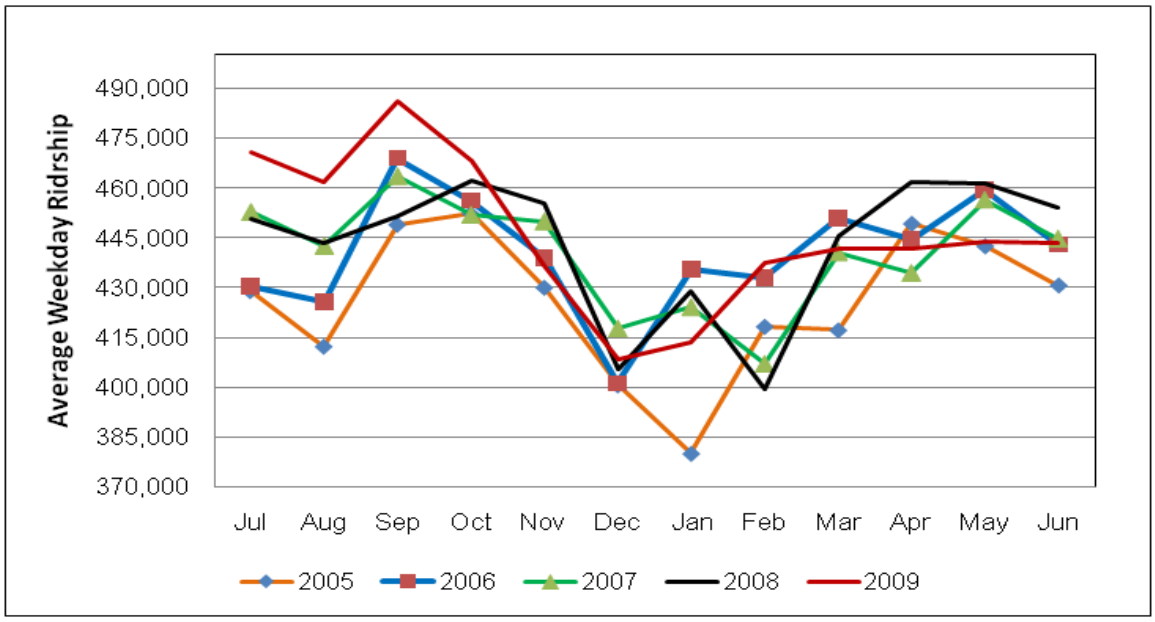


Figure 2-3. Annual Average Weekday Ridership (FY2005-FY2009)

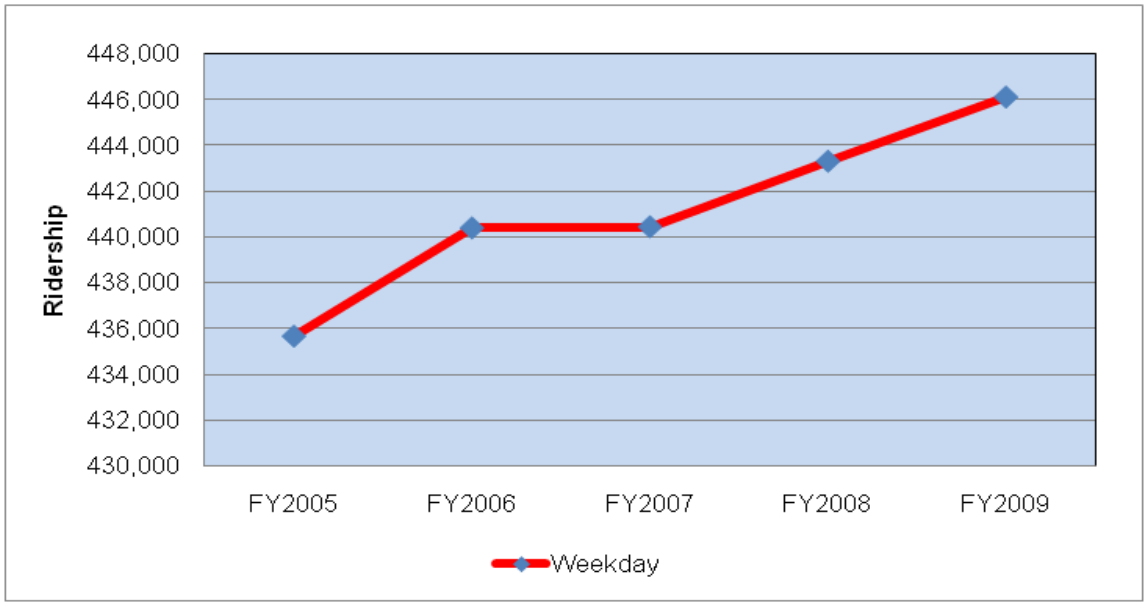


Figure 2-4. Annual Average Saturday Ridership (FY2005-FY2009)

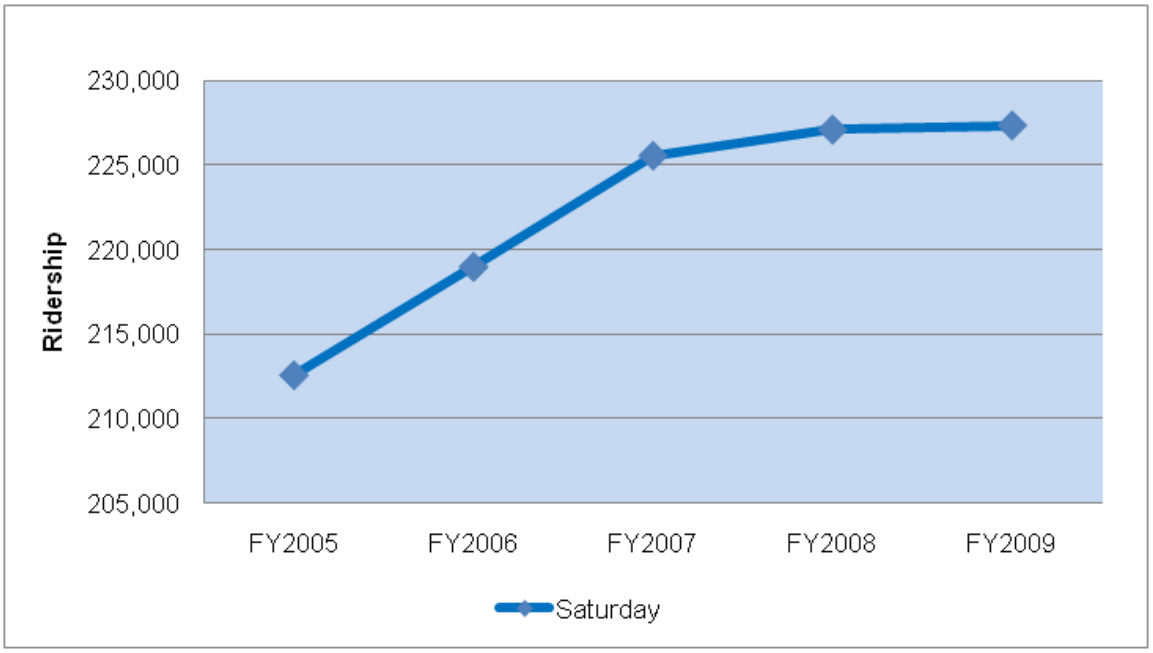
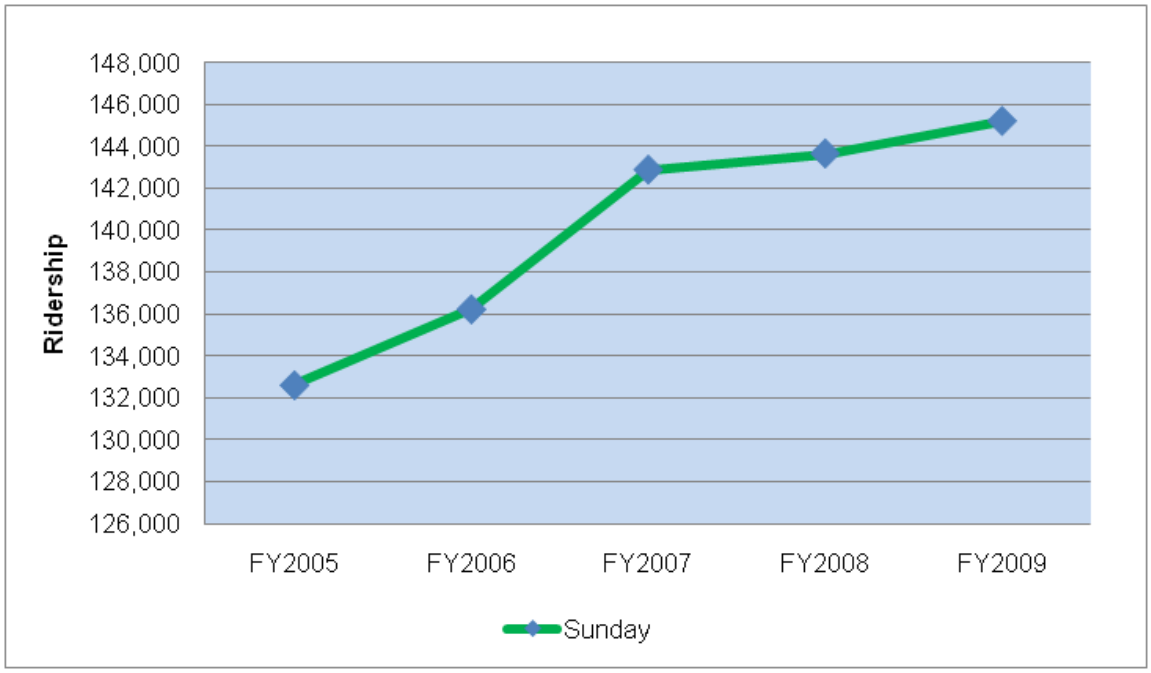


Figure 2-5. Annual Average Sunday Ridership (FY2005-FY2009)



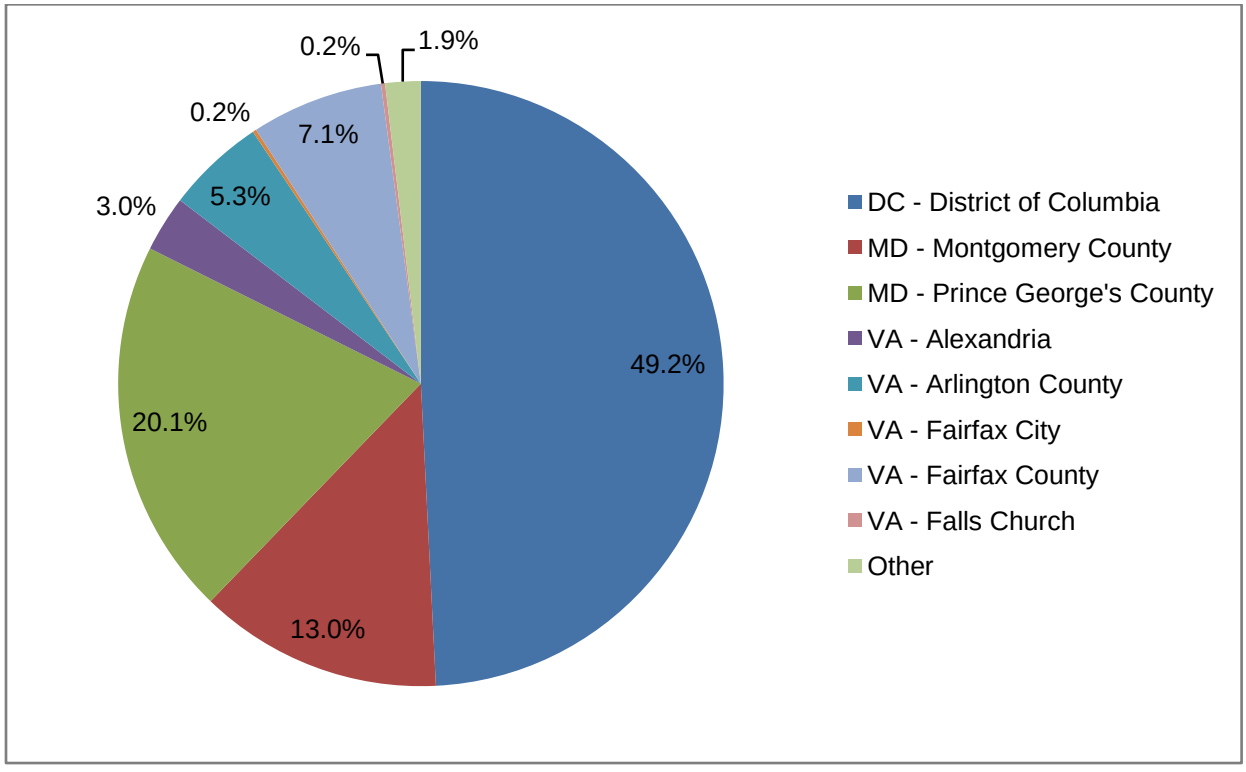
2.2. Current Ridership Characteristics

Within the WMATA service area, more than 7% of residents ride the bus to work during the morning peak period, including Metrobus and other local bus services. In areas of a quarter-mile walking distance to Metrobus lines, Metrobus commuting mode share reaches 9%. During the past decade, the mode share of commuters using all modes of transit increased from 15% in 1994 to 18% in 2008.

2.2.1. Distribution of Ridership by Area and Time

In 2008, the Metropolitan Washington Council of Governments surveyed all the bus systems in the region, and the Metrobus portion of the survey illuminated many characteristics of the current ridership. According to the survey responses, Metrobus boardings are highest in the District of Columbia, accounting for about 49.2% of system boardings. Maryland accounts for about 33.9% and Virginia the remaining 16.3% (Figure 2-6).

Figure 2-6. Ridership by Residency



Source: All figures and tables under Section 2.2 are tabulated based on the Metrobus portion of the 2008 Regional Bus Survey.

Metrobus weekday ridership can be more easily understood if divided into four sections by the time of day: AM peak, PM peak, mid-day, and evening. According to the responses to the 2008 Metrobus Survey, morning and afternoon peak periods account for almost two-thirds of total ridership (Table 2-1).

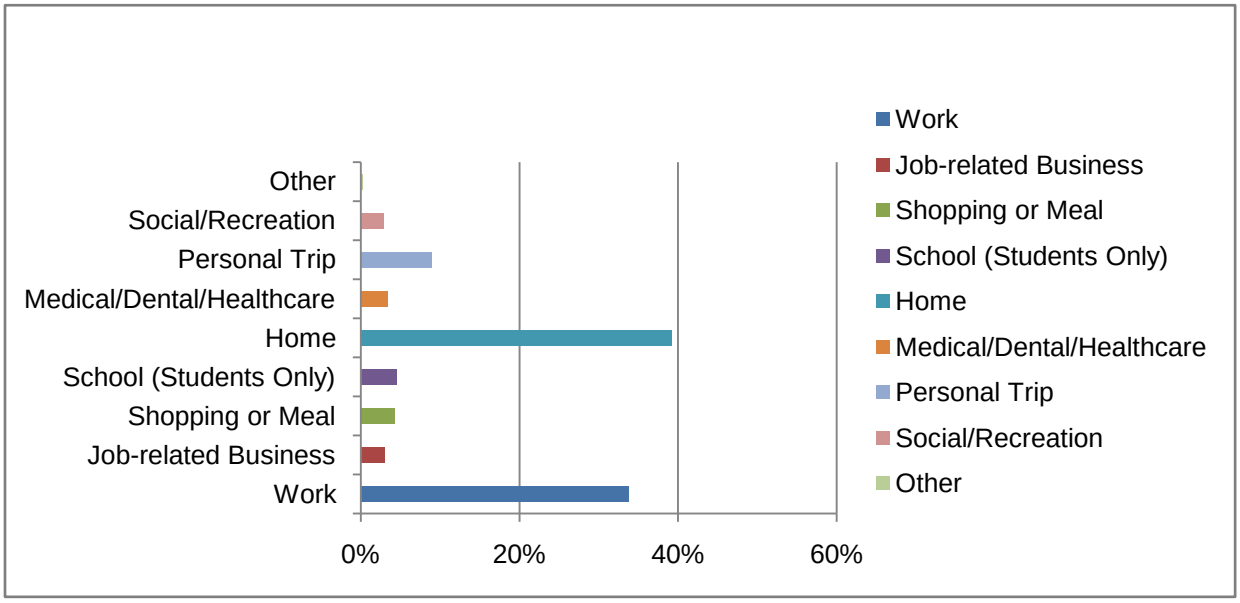
Table 2-1. Ridership by Time of Day

Time of Day	Ridership	Percent
AM Peak	143,052	31.4%
PM Peak	154,149	33.9%
Mid-Day	118,679	26.1%
Evening	39,017	8.6%
Survey Total	454,897	100%

2.2.2. Purpose of Metrobus Trips

Metrobus riders use the system for a variety of purposes, including traveling between work, home, school, healthcare, shopping, recreation, and personal trips. Although the majority of bus riders end their trips at work or home, more than one-quarter of all riders end their trips at other locations (Figure 2-7).

Figure 2-7. Trip Purpose by Destination



2.2.3. Socioeconomic Characteristics of Metrobus Passengers

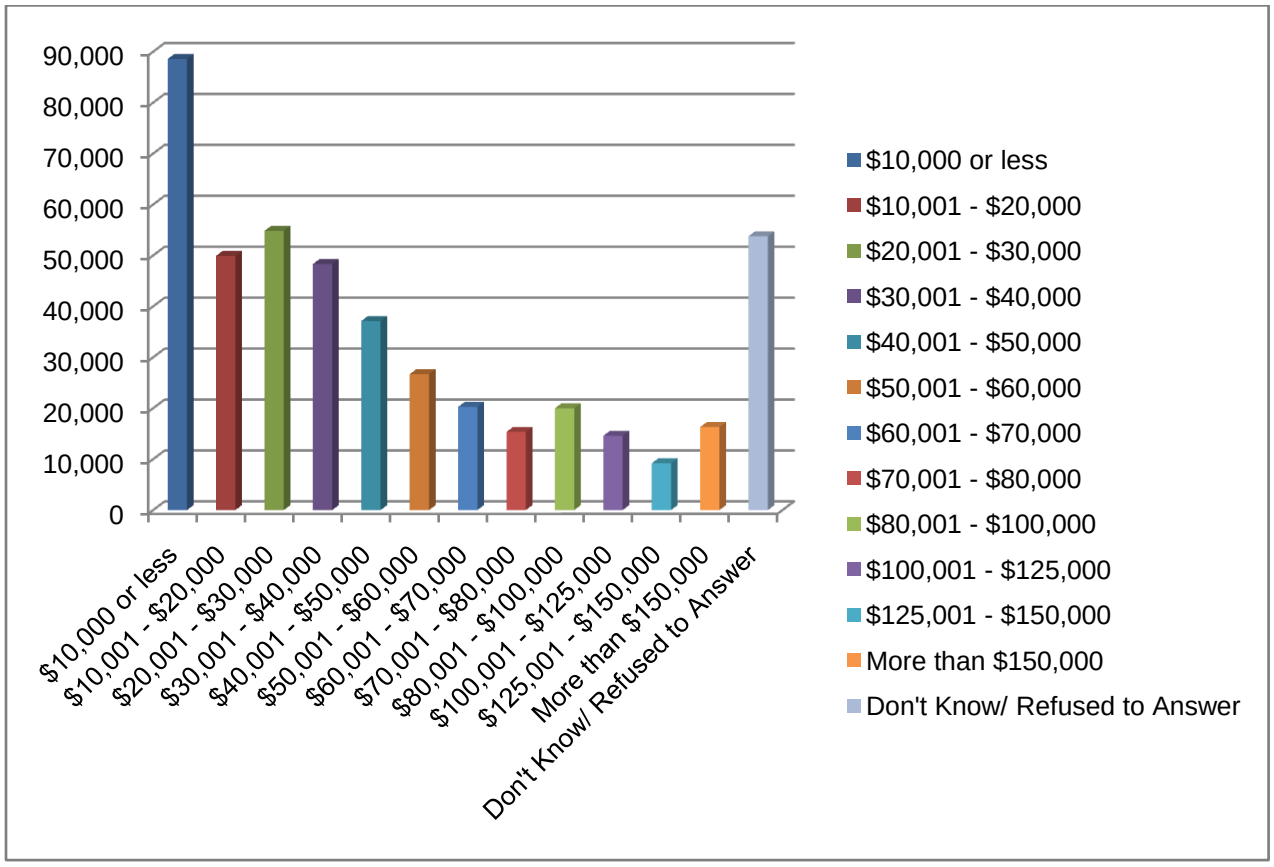
Ridership on the Metrobus system reflects the region's diversity - riders from all socioeconomic backgrounds and ethnicities use the system on a daily basis. About 60% of ridership are African American, 19% are white, 9% are Hispanic, 9% are multiple or other ethnicities, 4% are Asian, and about 1% are Native American (Table 2-2).

Table 2-2. Ridership by Ethnicity

Ethnicity	Ridership	Percentage
African American	269,587	59.3%
Asian	18,755	4.1%
Hispanic	39,026	8.6%
Multiple/Other	39,533	8.7%
Native American	3,631	0.8%
White	84,366	18.5%
Survey Total	**454,897**	**100%**

While Metro serves a high population of low-income riders, ridership spans a broad income spectrum. About 30% of ridership reported income of less than $20,000 per year, 31% between $20,000 and $50,000, 18% between $50,000 and $100,000 and 9% reported income greater than $100,000 (12% did not know or refused to answer) (Figure 2-8).

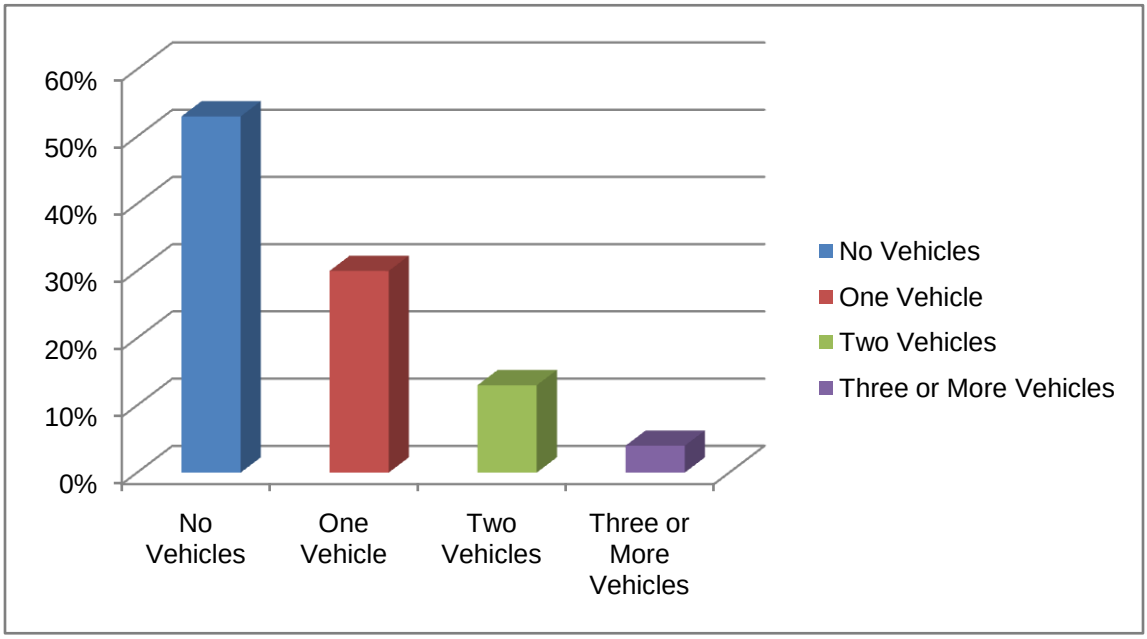
Figure 2-8. Ridership by Income Level



2.2.4. Vehicle Ownership

28% of Metrobus riders are “choice riders”. Choice riders are riders who have a vehicle available but “chose” to make the trip by bus instead. Vehicle ownership for Metrobus riders is outlined in Figure 2-9.

Figure 2-9. Vehicle Ownership



2.2.5. Mode of Access

Riders arrive at bus stops in many different ways: walking, bicycle, taxi, car and wheelchair. Of those who responded to the Metrobus survey, riders used more than 13 different modes to access the bus system. The majority of riders walked to access their bus, but more than a third of riders transferred from another bus or from the Metrorail system (Table 2-3).

Table 2-3. Access Mode

Access Mode	Number of Riders	Percent
Walked	265,397	58.3%
Drove and Parked	6,914	1.5%
Rode with Someone Who Parked	1,676	0.4%
Dropped Off by Someone	8,432	1.9%
Taxi	848	0.2%
Bicycle	996	0.2%
Transferred from Another Bus	82,885	18.2%
Wheelchair	1,034	0.2%
Transferred from Metrorail	76,901	16.9%
Transferred from MARC	1,165	0.3%
Transferred from VRE	910	0.2%
Transferred from Amtrak	454	0.1%
Other	982	0.2%
Don't Know/ Refused to Answer	6,303	1.4%
Survey Total	454,897	100%

2.3. Ridership Growth Projection

The projection of bus ridership growth between 2009 and 2020 takes into account past growth trends, regional transit trip forecasting, and potential Metrobus network enhancements.

Recently, Metrobus annual ridership has grown at a steady 1.4 percent annual rate, with the exception of FY2010. As a result of the current economic conditions, Metro is seeing a decline of transit ridership in the first six months of FY2010. However, Metro considers the observed decline a short-term impact and anticipates ridership to rebound and continue its growth trajectory once the economy recovers. Based on economic forecasts for the region, economic recovery is expected to be seen in early FY2011.

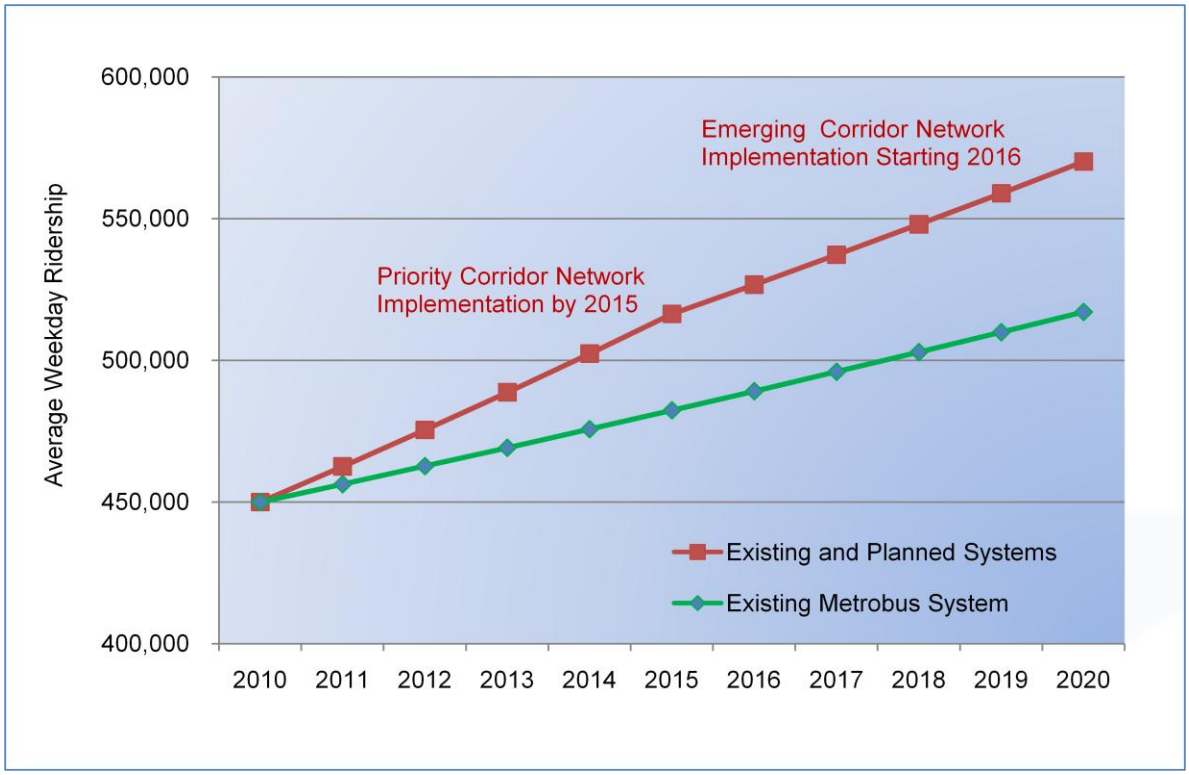
Over the long term, the regional travel demand forecasting model developed by the Metropolitan Washington Council of Governments anticipates a similar growth trend to 2030 for the regional transit market consisting of Metrobus and local services. Both estimates are consistent and serve as a conservative estimate of ridership market, resulting in a projected weekday ridership

of 480,000 by 2015 and 520,000 by 2020, a 15% increase over 10 years, or a 1.4% annual growth rate.

However, neither estimate reflects potential ridership impact from a new Metrobus enhancement initiative–the Metrobus Priority Corridor Network. The Metrobus Priority Corridor Network (PCN) refers to a network comprised of the twenty-four highest bus ridership corridors across the District of Columbia, Maryland and Virginia. To address the adverse impact of traffic congestion on urban arterials, Metro introduced the PCN program to deploy comprehensive service and infrastructure strategies for improving travel time, reliability and system productivity. The PCN implementation will result in an increase in daily average ridership of 34,000 on PCN routes by 2015. Metro is currently evaluating an emerging corridor network to foster transit growth on corridors with ridership growth potentials and to take advantage of the region's highway system, which could start to be implemented as early as 2016 following the planned completion of the PCN.

If Metro and local jurisdictions could complete the PCN by 2015 and subsequently initiate the implementation of emerging corridors, daily ridership is likely to grow to 520,000 by 2015 and 570,000 by 2020, an increase of 25% over ten years, resulting from growth on the existing network, the PCN and the potential emerging corridor network (Figure 2-10).

Figure 2-10. Metrobus Ridership Growth Projection



2.4. Ridership Demand for Fleet Growth

2.4.1. Quality of Service

Quality of service is what ultimately determines the success of any transit system. Metro is committed to quality of service and has taken strong strides to improve the system's performance.

Quality of service is key to retaining and increasing ridership in Metro's service area, meeting customer demand and achieving Metro's vision of being the Best Ride in the Nation. Quality of service is a function of service characteristics, including safety, speed, cleanliness, courtesy, frequency, comfort and service reliability. The size and quality of the Metrobus fleet directly impact most service characteristics: cleanliness, comfort, safety, speed, and service reliability.

2.4.2. Passenger Load Standard

The Metrobus network is monitored on a regular basis to balance passenger demand and fleet supply, make adjustments for traffic congestion, and ensure passenger comfort. Metro uses peak hour load factor to measure passenger demand and to determine when more buses are needed. The peak load is calculated using point-checks to determine the number of passengers at the maximum load point during the peak hour divided by the number of seating

capacity. For example: 200 passengers divided by 5 trips, divided by 39 seats, yields a load factor of 1.0. A load factor of 1.0 means all seats are occupied and no passenger is forced to stand within the peak hour. The load factor for service and vehicle adjustments differs by route classification as follows.

Table 2-4. Peak Load Standard by Line Classification

Line Classification	Load Factor
Radial – operates over major arterials and corridors and is oriented toward major urban centers	1.2
Crosstown – provides service across corridors and generally does not serve urban centers	1.1
Express – operates over major travel corridors and includes significant non-stop segments oriented toward major activity	1
Off-peak – applies to all service types	1

Source: 2000 Metrobus Service Guidelines

2.4.3. Ridership Driven Vehicle Projection

At the beginning of FY2010, a total of 1,242 buses were put into service during the peak period. Simply in proportion to ridership growth, Metro would need to deploy more than 1,500 peak revenue buses to meet peak passenger demand and maintain the current load guidelines for passenger comfort.

SECTION THREE: NETWORK DEMAND FOR FLEET GROWTH

Fleet growth over the next decade is driven by ridership growth, passenger demand for service quality, as well as continuous service improvements and network expansion to the existing Metrobus system.

3.1. Network Characteristics

Traditionally, Metro classifies lines and routes in the Metrobus network into five categories based on geographical characteristics of individual service areas: radial line haul, other urban, other suburban, express and small bus (30 foot or less). Each of the five classes has different standards for peak and off-peak service.

The majority of Metrobus service is demand driven, which requires monitoring and matching of the fleet supply to the demand. During the peak periods, Metro maximizes fleet sizes and types to meet passenger demand and ensure passenger comfort. The rest of Metrobus service is policy driven, which is established by policy that a minimum level of service be provided even though the ridership does not justify the level of service provided. Policy driven services typically include night and weekend services with light ridership or new initiatives as demand develops.

The network today is facing both opportunities and challenges. Passenger demand has been increasing; however traffic congestion on urban arterials in the Washington DC region is also on the rise, directly impacting bus operations and passengers. The result has been increasing crowding, bus bunching and degrading on-time performance. Metro planners adjust service and corresponding fleet on a routine basis to cope with today's operations environment. Since 2003, Metro has gradually introduced a major network enhancement initiative that presents a fundamental structure and service improvements–the Metrobus Priority Corridor Network (PCN). Detailed description of PCN and its fleet requirements is provided in Section 3.5.

3.2. Performance and Fleet Requirements

For the existing network, Metro's operations planners regularly monitor its performance and make service adjustments to address system deficiencies and enhance efficiency. To accommodate increasing traffic congestion without compromising quality of service, many service adjustment measures require increasing the number of buses for lines and routes. The following section presents the performance and design measures Metro applies in network service evaluation and the resultant fleet requirements.

Productivity, reliability and level of crowding are the three key performance measures used by Metro. Productivity measures how effectively the resources devoted to route operations are used, typically by calculating the number of boardings per hour, per mile, or per trip. Lines that have high productivity, carrying a relatively large amount of boardings per unit of service, are candidates for service expansion, which would increase the number of peak vehicles required. Reliability is a critical service quality measure for customers, reflecting customers' expectation for on-time bus arrival and on-time completion of a bus trip. Bus lines with poor travel time reliability, particularly ones whose travel time is longer than the scheduled travel time, may require additional vehicles in service to meet the schedule. Level of crowding is another service quality measure from a customer's perspective. Lines that experience regular overcrowding require additional capacity, resulting in more buses.

3.2.1. Productivity

Metrobus uses five different thresholds to measure service productivity: Passenger Per Revenue Trip, Passenger Per Revenue Mile, Average Daily Passengers, Subsidy Per Passenger and Cost Recovery Ratio. Metrobus defines productivity failure as a line or route that fails one or more of the thresholds. Table 3-1 shows the productivity thresholds.

Table 3-1. Metrobus Productivity Thresholds

Threshold Types	Productivity Thresholds
Passenger Per Revenue Trip	<1/3 of System Average
Passenger Per Revenue Mile	<1/3 of System Average
Average Daily Passenger	<1/8 of System Average
Subsidy Per Passenger	> 2 Times System Average
Cost Recovery Ratio	< 50% of System Average

3.2.2. Reliability

Reliability of travel time is defined by the difference between actual travel time and scheduled travel time. For the purpose of this fleet plan update, service reliability is calculated by using data collected for the month of June 2009 from the Automatic Vehicle Location (AVL) system. Lines are considered to have poor reliability if they do not meet the standards for on-time service, departing from the timepoint more than two minutes early or seven minutes late after the scheduled departure time. Data collected for different time periods is used to assess if routes have adequate travel time. The criteria used to determine adequacy of travel time is based on the assumption that routes fail the reliability thresholds if, on average, 25% of the trips

are late by more than seven minutes. Metro's service planners use a number of operational strategies to improve reliability, including adding buses.

3.2.3. Level of Crowding

Passenger crowding is the component of service quality that receives the most attention from Metro planners. They continuously monitor passenger feedback on this issue and regularly review data to determine the degree of crowding throughout the system. When reductions are made to poorly performing routes, those resources are typically reallocated to lines that are experiencing crowded conditions.

Metro uses load factor as a performance measure to determine crowding on a particular bus line. The load factor is the number of people on the bus at the maximum load point divided by the number of seats. Metro's operations planning guidelines for load factors are 1.2 on peak-period radial routes, 1.1 on peak-period crosstown routes and 1.0 for peak-period express and all off-peak services. (See Section 2.4.2).

3.3. Design Measures

Design measures are comprised of service frequency, the primary measurer, as well as span of service and duplication of service. Service frequency is often expressed by headway, which is the interval between buses on a particular bus line. Other design measures, such as accessibility, number of stops, and location of stops along each route, are additional measures that have not been incorporated in this plan. Metro's recommended frequency thresholds are illustrated in Table 3-2.

Table 3-2. Service Frequency Thresholds

Headway	Peak Period (minutes)	Off-Peak/Weekend (minutes)
Urban/Radial	15	30
Suburban	30	60

Service frequency determines the number of buses needed for operations, thus having a direct impact on fleet size particularly during peak periods. For the demand-driven routes carrying high ridership, frequency is determined by the number of vehicles required to accommodate the demand. For policy driven routes with lower ridership, frequency is based on corresponding service policies.

3.4. Summary of Network Performance and Fleet Requirements

Overall, the total fleet required is a function of the performance measures outlined above. At the end of June, 2009, Metrobus had a total of 1,242 vehicles scheduled to operate during peak periods. Table 3-3 shows the maximum scheduled buses subdivided by AM and PM peak periods and the divisions they operate from.

Table 3-3. Maximum Scheduled Buses by Division (June 2009)

Division	AM Peak	PM Peak	Maximum Scheduled	Strategic Fleet	Total
Bladensburg	235	231	235	3	238
Northern	139	138	139	4	143
Western	113	105	113	1	114
Landover	128	139	139	3	142
Montgomery	162	164	164	4	168
Southern	110	111	111	4	115
Four Mile Run	183	185	185	4	189
Royal Street	55	52	55	0	55
West Ox Road	70	76	76	2	78
System Total	**1195**	**1201**	**1217**	**25**	**1242**

Table 3-4 provides a summary of how each of the Metrobus lines fares with respect to the service evaluation measures outlined above. A "Yes" indicates that the line meets the threshold for service, and a "No" indicates that a line does not meet the threshold. The last two columns show the number of buses required to operate the service during the AM and PM Peak periods.

Table 3-4. Summary of Evaluation Measures

Line	Line Name	Class	Meets Productivity Thresholds	Adequate Travel Time	Meets Policy Frequency	Absence of Overcrowding	Current Peak Buses	
							AM	PM
31,32,34-36	Pennsylvania Ave	Radial	Yes	No	Yes	Yes	40	40
37	Wisconsin Ave Ltd	Radial	Yes	No	Yes	Yes	5	6
39	Pennsylvania Ave Ltd	Radial	Yes	No	Yes	No	6	6
42, 43	Mt Pleasant	Radial	Yes	Yes	Yes	No	16	16
52-54	14th St	Radial	Yes	No	Yes	No	23	25
60,64	Fort Totten-Petworth	Radial	Yes	Yes	Yes	Yes	11	7
70,71	Georgia Ave-7th St	Radial	Yes	No	Yes	Yes	14	16
79	Georgia Avenue Limited	Radial	Yes	No	Yes	No	13	13
80	North Capitol St	Radial	Yes	No	Yes	Yes	14	15
81,82,83,86	College Park	Radial	Yes	Yes	Yes	Yes	11	13
96,97	East Capitol St-Cardozo	Radial	Yes	No	Yes	Yes	15	14
1A,B,E,F,Z	Wilson Blvd-Fairfax	Radial	Yes	No	Yes	Yes	10	14
3A,B,E	Lee Hwy	Radial	Yes	Yes	Yes	Yes	9	11
3Y	Lee Highway-Farragut Square	Radial	Yes	Yes	Yes	Yes	2	2
4A,B,E,H	Pershing Dr-Arlington Blvd	Radial	Yes	No	Yes	Yes	7	8
7A-F,H,P,W,X	Lincolnia-North Fairlington	Radial	Yes	Yes	Yes	Yes	23	18
9A,E	Huntington-Pentagon	Radial	Yes	Yes	No	Yes	7	9
15K,L	Chain Bridge Rd	Radial	Yes	No	No	Yes	3	3
16A,B,D-F,J,P	Columbia Pike	Radial	Yes	No	Yes	Yes	14	13
24P*	Ballston-Pentagon	Radial	Yes	Yes	No	Yes	3	3
38B	Ballston-Farragut Square	Radial	Yes	Yes	Yes	No	8	8
A9	South Capitol St	Radial	Yes	Yes	No	Yes	5	3
D1,3,6	Sibley Hospital-Stadium/Armory	Radial	Yes	No	Yes	Yes	28	19
D5	MacArthur Blvd-Georgetown	Radial	No	No	Yes	Yes	2	4
G8	Rhode Island Ave	Radial	Yes	Yes	Yes	Yes	11	10
H1	Brookland - Potomac Park	Radial	Yes	No	No	Yes	4	4
K6	New Hampshire Ave-Maryland	Radial	Yes	Yes	Yes	No	10	10
L1,2,4	Connecticut Ave	Radial	Yes	No	Yes	Yes	12	12
L8	Connecticut Ave-Maryland	Radial	Yes	No	Yes	Yes	6	8

Line	Line Name	Class	Meets Productivity Thresholds	Adequate Travel Time	Meets Policy Frequency	Absence of Overcrowding	Current Peak Buses	
							AM	PM
N2-4,6	Massachusetts Ave	Radial	Yes	Yes	Yes	Yes	15	13
P1,2,6	Anacostia-Eckington	Radial	Yes	No	Yes	Yes	11	11
Q2	Veirs Mill Rd	Radial	Yes	No	Yes	Yes	15	16
R1,2,5	Riggs Rd	Radial	Yes	Yes	No	Yes	10	9
R4	Queens Chapel Rd	Radial	Yes	Yes	No	Yes	3	4
S1	16th St-Potomac Park	Radial	Yes	Yes	Yes	Yes	14	5
S2,4	16th St	Radial	Yes	Yes	Yes	No	27	29
S9	16th Street Express	Radial	Yes	Yes	Yes	No	9	10
V5	Fairfax Village-L'Enfant Plaza	Radial	Yes	Yes	Yes	No	6	3
V7-9	Minnesota Ave-M St	Radial	Yes	No	Yes	Yes	14	14
X1,3	Benning Rd	Radial	Yes	Yes	Yes	Yes	9	7
X2	Benning Rd-H St	Radial	Yes	Yes	Yes	Yes	13	15
X8	Maryland Ave	Radial	Yes	Yes	No	Yes	3	2
Y5,7-9	Georgia Ave-Maryland	Radial	Yes	No	Yes	Yes	9	11
Z8	Fairland	Radial	Yes	No	Yes	Yes	10	8
62, 63	Takoma-Petworth	Urban	Yes	Yes	Yes	Yes	8	12
90,92,93	U St-Garfield	Urban	Yes	No	Yes	Yes	25	26
94	Stanton Rd	Urban	Yes	Yes	Yes	Yes	3	3
10A,E	Hunting Towers-Pentagon	Urban	Yes	Yes	No	Yes	6	7
10B	Hunting Towers-Ballston	Urban	Yes	Yes	No	Yes	4	6
13A,B,F,G	Nat'l Airport-Pentagon-Washington	Urban	Yes	No	Yes	Yes	5	5
16G,H,K,W	Columbia Hts West-Pentagon City	Urban	Yes	Yes	Yes	Yes	9	9
16L	Annandale-Skyline City-Pentagon	Urban	No	Yes	Yes	Yes	2	2
16Y	Columbia Pike-Farragut Square	Urban	Yes	Yes	Yes	Yes	7	7
22A	Barcroft-South Fairlington	Urban	Yes	Yes	No	Yes	4	5
23A,C	Mclean-Crystal City	Urban	Yes	No	Yes	Yes	10	12
25A,C,D	Ballston-Pentagon	Urban	Yes	Yes	No	Yes	8	8
25B	Landmark-Ballston	Urban	Yes	Yes	No	Yes	4	6
8S,W,X,Z	Foxchase-Seminary Valley	Urban	Yes	Yes	Yes	Yes	9	8
A11,12	M L King Jr Hwy	Urban	Yes	Yes	Yes	Yes	6	10
A2-48	Anacostia-Congress Heights	Urban	Yes	Yes	Yes	Yes	19	21

Line	Line Name	Class	Meets Productivity Thresholds	Adequate Travel Time	Meets Policy Frequency	Absence of Overcrowding	Current Peak Buses	
							AM	PM
A4,5	Anacostia-Fort Drum	Urban	Yes	Yes	Yes	Yes	6	6
B2	Bladensburg Rd-Anacostia	Urban	Yes	No	Yes	Yes	15	14
C12,14	Hillcrest Heights	Urban	Yes	Yes	Yes	Yes	3	3
C2,4	Greenbelt-Twinbrook	Urban	Yes	Yes	Yes	Yes	17	25
D12-14	Oxon Hill-Suitland	Urban	Yes	Yes	Yes	Yes	13	12
D8	Hospital Center	Urban	Yes	Yes	Yes	Yes	9	12
E2-4	Military Rd-Crosstown	Urban	Yes	No	Yes	Yes	14	11
F14	Sheriff Rd-Capitol Heights	Urban	Yes	Yes	Yes	Yes	5	5
F4,6	Prince George's-Silver Spring	Urban	Yes	No	Yes	No	16	17
F8	Prince George's-Langley Park	Urban	Yes	Yes	No	Yes	4	5
G2	P St-Ledroit Park	Urban	Yes	Yes	Yes	Yes	8	7
H11-13	Marlow Heights-Temple Hills	Urban	Yes	Yes	Yes	Yes	5	5
H2-4	Crosstown	Urban	Yes	Yes	Yes	Yes	16	12
H8,9	Park Rd-Brookland	Urban	Yes	Yes	Yes	Yes	7	8
J11-13	Marlboro Pike	Urban	Yes	Yes	Yes	Yes	3	4
J1-3	Bethesda-Silver Spring	Urban	Yes	No	Yes	Yes	14	14
J4	College Park-Bethesda	Urban	Yes	Yes	Yes	Yes	5	6
K1	Takoma-Walter Reed	Urban	Yes	Yes	No	Yes	2	2
K2	Takoma-Fort Totten	Urban	Yes	Yes	No	Yes	3	2
M6	Fairfax Village	Urban	Yes	Yes	Yes	Yes	3	3
P12	Eastover-Addison Rd	Urban	Yes	Yes	Yes	Yes	9	11
T18	Annapolis Rd	Urban	Yes	Yes	Yes	Yes	7	6
U2	Minnesota Ave-Anacostia	Urban	Yes	Yes	No	Yes	3	3
U5,6	Mayfair-Marshall Heights	Urban	Yes	Yes	Yes	Yes	5	5
U8	Capitol Heights-Benning Heights	Urban	Yes	Yes	Yes	No	7	8
V12	District Heights-Suitland	Urban	Yes	Yes	Yes	Yes	4	4
V14,15	District Heights-Seat Pleasant	Urban	Yes	Yes	Yes	Yes	5	7
W4	Deanwood-Alabama Ave	Urban	Yes	Yes	Yes	No	14	10
15M	George Mason - Tysons Corner	Subrban	No	No	Yes	Yes	3	3
24T	Mclean Hamlet-East Falls Church	Suburban	No	Yes	No	Yes	2	2
28A-B	Alexandria-Tyson's Corner	Suburban	Yes	No	Yes	Yes	8	10

Line	Line Name	Class	Meets Productivity Thresholds	Adequate Travel Time	Meets Policy Frequency	Absence of Overcrowding	Current Peak Buses	
							AM	PM
28T	Tyson's Corner-West Falls Church	Suburban	No	Yes	Yes	Yes	4	5
29K,N	Alexandria-Fairfax	Suburban	Yes	Yes	No	Yes	5	5
3T	Pimmit Hills	Suburban	No	Yes	Yes	Yes	5	5
89,89M	Laurel	Suburban	Yes	Yes	No	Yes	2	3
B21,22	Bowie State University	Suburban	Yes	Yes	No	Yes	2	3
B24,25	Bowie-Belair	Suburban	Yes	Yes	No	Yes	3	2
B27	Bowie-New Carrollton	Suburban	No	Yes	Yes	Yes	2	2
C11,13	Clinton	Suburban	Yes	Yes	Yes	Yes	3	3
C21,22,26,29	Central Avenue	Suburban	Yes	No	Yes	Yes	6	6
C8	College Park-White Flint	Suburban	Yes	Yes	Yes	Yes	6	6
F12	Ardwick Industrial Park Shuttle	Suburban	Yes	Yes	No	Yes	5	4
F13	Cheverly-Wash Business Park	Suburban	Yes	Yes	Yes	Yes	2	2
K11-13	Forestville	Suburban	Yes	Yes	Yes	Yes	5	6
R12	Kenilworth Ave-New Carrollton	Suburban	Yes	Yes	Yes	Yes	8	7
R3	Greenbelt-Fort Totten	Suburban	Yes	Yes	Yes	Yes	4	4
T16,17	Greenbelt	Suburban	Yes	Yes	Yes	Yes	5	6
T2	River Rd	Suburban	Yes	Yes	Yes	Yes	7	6
W15	Camp Springs-Indian Head Hwy	Suburban	No	Yes	Yes	Yes	3	3
Z2	Colesville-Ashton	Suburban	Yes	No	Yes	Yes	2	7
Z6	Tanglewood-Westfarm	Suburban	Yes	Yes	Yes	Yes	8	7
87,88	Laurel Express	Express	Yes	Yes	Yes	Yes	6	7
11Y	Mt Vernon Express	Express	Yes	Yes	Yes	Yes	6	5
17A,B,F,M	Kings Park	Express	No	No	Yes	Yes	4	7
17G,H,K,L	Kings Park Express	Express	No	Yes	Yes	Yes	14	14
18E,F	Springfield	Express	No	Yes	Yes	Yes	3	3
18G,H,J	Orange Hunt	Express	Yes	Yes	Yes	Yes	6	5
18P,R,S	Burke Centre	Express	No	Yes	Yes	Yes	8	11
21A	Landmark-Pentagon	Express	Yes	Yes	Yes	Yes	3	3
28F,G	Skyline City	Express	Yes	Yes	Yes	Yes	2	3
29C,E,G,H,X	Annandale	Express	No	No	Yes	Yes	13	12
5A	DC-Dulles Airport	Express	No	No	Yes	Yes	5	8

Line	Line Name	Class	Meets Productivity Thresholds	Adequate Travel Time	Meets Policy Frequency	Absence of Overcrowding	Current Peak Buses	
							AM	PM
B29,31	Crofton-New Carrollton	Express	No	Yes	No	Yes	2	2
B30	Greenbelt-Bwi Express	Express	No	Yes	No	Yes	3	3
C28	Pointer Ridge	Express	Yes	Yes	No	Yes	3	1
J5	Twinbrook-Silver Spring	Express	Yes	No	Yes	Yes	3	3
J7,9	I-270 Express	Express	Yes	Yes	Yes	No	5	6
NH1	National Harbor	Express	Yes	Yes	Yes	Yes	2	2
P17-19	Oxon Hill- Fort Washington	Express	Yes	Yes	Yes	Yes	12	14
REX (R99)	Richmond Highway Express	Express	Yes	Yes	Yes	Yes	9	8
W13,14	Bock Road	Express	Yes	Yes	Yes	Yes	8	8
W19	Indian Head Express	Express	No	Yes	Yes	No	6	7
Z11,13	Greencastle-Briggs Chaney Expres	Express	Yes	Yes	Yes	Yes	10	6
Z9,29	Burtonsville-Laurel Express	Express	Yes	No	No	Yes	8	5
84	RI Ave-New Carrollton	Small Bus	Yes	Yes	Yes	Yes	5	5
2A-C,G	Washington Blvd	Small Bus	Yes	No	Yes	Yes	10	6
2T	Tyson's Corner-Dunn Loring	Small Bus	Yes	Yes	Yes	Yes	3	6
B8,9	Fort Lincoln Shuttle	Small Bus	Yes	Yes	No	Yes	4	3
D2	Glover Park-Dupont Circle	Small Bus	Yes	Yes	Yes	Yes	5	5
D4	Ivy City-Union Station	Small Bus	Yes	Yes	Yes	Yes	3	3
E6	Chevy Chase	Small Bus	No	Yes	No	Yes	2	2
F1,2	Chillum Rd	Small Bus	Yes	Yes	Yes	Yes	5	6
H6	Brookland-Fort Lincoln Loop	Small Bus	Yes	Yes	Yes	Yes	4	5
M2	Fairfax Village-Naylor Road	Small Bus	No	Yes	No	Yes	1	1
M4	Nebraska Ave	Small Bus	Yes	Yes	Yes	Yes	5	3
M8,9	Congress Heights Shuttle	Small Bus	Yes	Yes	Yes	Yes	3	3
N8	Van Ness-Wesley Heights Loop	Small Bus	No	Yes	Yes	Yes	3	3
TAGS (S80,S91	Springfield Circulator	Small Bus	Yes	Yes	Yes	Yes	5	5
U4	Sheriff Rd-River Terrace	Small Bus	Yes	Yes	Yes	Yes	3	3
W2,3	S.E. Community Hospital-Anacostia	Small Bus	Yes	Yes	Yes	Yes	9	10
W6,8	Garfield-Anacostia Loop	Small Bus	Yes	Yes	Yes	Yes	8	7
School							13	0
Shuttle							4	4
Others							8	10
TOTAL							**1,195**	**1,201**

3.5. Priority Corridor Network and Fleet Requirements

The determination of fleet growth for the next decade has to consider network growth that can be realized within the same timeframe. Incremental scheduling adjustment is no longer sufficient to address operating challenges. The PCN targets the twenty-four highest ridership bus corridors and provides comprehensive strategies by investing in both bus service level and bus supportive infrastructure. At this time, the PCN is planned for full implementation by 2015.

3.5.1. PCN Routes

The PCN covers a broad range of essential service and infrastructure elements including high level of service, limited stop route overlays, customer information, bus stop facilities and amenities, field operations and vehicle assignment strategy, exclusive bus lanes, transit signal priority and transit safety and security measures. The twenty-four Metrobus Lines operate in major urban arterials in the District of Columbia, Maryland and Virginia, carrying approximately half of the current system's ridership. Table 3-5 lists the PCN lines.

Table 3-5. List of Priority Corridor Network

Corridor	Line/Route	Status	Jurisdiction	Annual Ridership (In Million)
Columbia Pike (Pike Ride)	16ABDEFJ 16GHKW 16L 16Y	Implemented	VA	3.9
Richmond Highway Express (REX)	REX	Implemented	VA	1
Crystal City-Potomac Yard	9A 9E 9S	Implemented	VA	0.8
Georgia Ave./7th Street	70 71 79	Implemented	DC	5
Southern Ave. Metro/ National Harbor	NH-1	Implemented	MD	0.4
Wisconsin Ave./Pennsylvania Ave.	30 32 34 35 36	Implemented	DC	5.7
Sixteenth Street	S1 S2 S4 S9	Implemented	DC	4.6
Leesburg Pike	28AB 28FG 28T	Planned	VA	2
Veirs Mill Road	Q2	Planned	MD	3.8
University Blvd / East-West Highway	J1 J2 J3 J4	Planned	MD	2.3
New Hampshire Avenue	K6	Planned	MD	2.2
H Street / Benning Road	X2	Planned	DC	4.6
Georgia Ave. (MD)	Y5 Y7 Y8 Y9	Planned	MD	2.6
Greenbelt-Twinbrook	C2 C4	Planned	MD	4.5
East-West Highway (Prince Georges)	F4 F6	Planned	MD	2.3
Anacostia-Congress Heights	A2-8, A42-48	Planned	DC	3.5
Little River Turnpike/Duke Street	29KN 29CEGHX	Planned	VA	0.9
Rhode Island Ave. Metro to Laurel	81 82 83 86 87 88 89 89M	Planned	MD	1.6
Mass Ave/ U St./ Florida Ave./ 8th St./ MLK Ave.	90 92 93	Planned	DC	4.9
Rhode Island Avenue	G8	Planned	DC	1.2
Eastover - Addison Road	P12	Planned	MD	1.7
Colesville Rd./ Columbia Pike - MD US 29	Z2 Z6 Z8 Z9,29 Z11,13	Planned	MD	2.9
Fourteenth Street	52 53 54	Planned	DC	4.4
North Capitol Street	80	Planned	DC	2.5

3.5.2. Implementation

In 2004 the Metrobus 16 Line on Columbia Pike (VA) and the REX Line on Richmond Highway (VA) were the first two corridors to receive PCN service enhancements. The implementation involved limited stop service, enhanced frequency and span, transit signal priority at selected intersections and improved bus stop amenities. Since then, both corridors have experienced strong ridership growth, increasing 12% and 15% respectively per year. Service restructuring on other corridors, including Crystal City-Potomac Yard, Georgia Ave, National Harbor, Wisconsin Ave-Pennsylvania Ave, and Sixteenth St, have been completed in the past three years.

In FY2010, the 28 Line on Leesburg Pike and the Q2 on Veirs Mill Road received limited stop service. Metro will continue to implement PCN service enhancements on two to three corridors per year through FY2015. It is anticipated that approximately 60 new vehicles will be required to implement the proposed PCN service improvements. After 2015 it is assumed that PCN will be expanded to include other emerging corridors (Section 3.6). Table 3-6 shows the schedule of PCN implementation planned between FY2010 and FY2015.

Running way improvements are needed to support serve enhancements being implemented on the PCN corridors. In February 2010, the Metropolitan Washington Council of Governments (MWCOG) received a US DOT Transportation Investment Generating Economic Recovery (TIGER) Grant to fund regional bus priority treatments, including a bus transitway, bus-only lanes, transit signal priority, traffic signal management, real-time arrival technology and other enhancements. The grant includes over $25 million in bus running way improvements along nine of the PCN corridors.

Table 3-6. PCN Implementation Schedule

Corridor	Jurisdiction	Implem. Year
Leesburg Pike	VA	2010
Veirs Mill Road	MD	2010
H Street / Benning Road	DC	2011
New Hampshire Avenue	MD	2011
Georgia Ave. (MD)	MD	2012
University Blvd / East-West Highway	MD	2012
Mass Ave/ U St./ Florida Ave./ 8th St./ MLK Ave.	DC	2012
Greenbelt-Twinbrook	MD	2012
East-West Highway (Prince Georges)	MD	2013
Anacostia-Congress Heights	DC	2013
Little River Turnpike/Duke Street	VA	2013
Rhode Island Ave. Metro to Laurel	MD	2013
Fourteenth Street	DC	2014
North Capitol Street	DC	2014
Rhode Island Avenue	DC	2014
Eastover - Addison Road	MD	2014
Colesville Rd./ Columbia Pike - MD US 29	MD	2015

3.6. Emerging Corridors and Fleet Requirements

Metro, in collaboration with the Transportation Planning Board and with surrounding jurisdictions, is working on a concept of a regional express bus network. Additionally, Metro is evaluating a group of corridors that currently carry less ridership than the PCN but may have high growth potentials. These transit corridors are defined as emerging corridors in this report, with the intention to capitalize on existing or planned transit facilities in the regional highway network such as High-Occupancy-Vehicle (HOV) Lanes and High-Occupancy-Toll (HOT) Lanes, and to develop transit market in areas of high growth potentials. The first phase of implementation could begin in as early as FY2016, after the PCN is completed.

For planning purposes, this document assumes that about 15 peak buses a year will be required during the timeframe of FY2016 - FY2020 to gradually implement the emerging corridor network. This rate of fleet deployment is built upon Metro's experience in rolling out the PCN.

Overall implementation of the PCN and the emerging corridors between 2010 and 2020 will require an additional 135 buses, 123 of which will be expansion buses (Table 3-8).

3.7. Other Fleet Requirements

3.7.1. Service Adjustments

Service adjustment buses are those used for minor service adjustments, changes to improve crowding, and service reliability. From FY2010 to FY2020 it is assumed that each year close to 1% growth in the base fleet will be required to accommodate service adjustments.

3.7.2. Conversion of Standard Buses to Articulated Buses

During the FY2010 to FY2020 period, it is estimated that 114 new articulated buses will be bought as replacement buses, 70 of which will be used to replace standard buses that operate on lines with high ridership.

The concept of conversion came from the 2007 Metrobus Network Evaluation Study. The study proposed using articulated buses to replace standard buses on high ridership corridors. Generally, one articulated bus provides the ridership capacity of 1.4 standard buses. Therefore, this conversion to articulated buses will result in a smaller fleet serving the high ridership PCN corridors while meeting the same ridership demand. The routes most eligible for conversion would likely be local routes in the corridors initially, not the limited stop services, due to the observed longer dwell time of articulated buses at stops.

Based on the current estimate, conversion of these standard buses to articulated buses would initially result in a net reduction of the standard bus fleet by 20 buses as the replaced buses gradually retire from revenue service (Table 3-7).

Table 3-7. Conversion of Standard Buses to Articulated Buses

Jurisdiction	Artic Conversion		
	New Artic Bus	Standard Bus Converted to Artic	Net Change(1)
District of Columbia	48	61	(13)
Maryland	22	29	(7)
Virginia	0	0	0
Total	**70**	**90**	**(20)**

Note:
Net Change(1): all standard buses replaced by articulated buses will be retired from revenue service, resulting in a reduction of 20 buses for the entire fleet.

To make the conversion cost effective, these additional articulated buses will have to be hosted by the garage facilities located in the core transit market that need articulated buses, in particular the Northern and Western garages. However, neither of them has the excess capacity to accommodate any additional buses, nor is adequately equipped with routine maintenance facilities for additional articulated buses. Of these two facilities, only Northern has two designated maintenance bays for articulated buses at present. Moreover, the entire Metrobus system is short of maintenance capacity for articulated buses, with a total of eight designated maintenance bays spread across three divisions: Montgomery, Bladensburg and Northern. The planned new garages (refer to Section 6), while designed to accommodate articulated buses, are located farther away from the core transit market in need of articulated buses. Operating articulated buses from these distant new facilities would incur significant deadheading cost.

Therefore the deployment of articulated buses would have to be timed with the rehabilitation and/or replacement of garages in the core transit market to allow them to store, maintain and operate articulated buses in a cost effective manner. Metro has been aggressively pursuing opportunities for the replacement and expansion of the Northern and Western garages, recently submitting to the District of Columbia a proposal to relocate Northern, and potentially Western, to the Walter Reed Army Medical Center site in northwest DC, which will be redeveloped by the City.

Once the determination is made regarding a new garage at Walter Reed and the opening of DC Village, Metro will need to conduct a detailed analysis to identify the priority routes and timetable for the conversion of standard buses to articulated buses. In consideration of the circumstances aforementioned, this fleet plan assumes the conversion of articulated buses would occur at the completion of replacement/rehabilitation of Northern and Western garages.

3.7.3. Strategic Buses

Strategic buses are a type of reserve fleet Metro deploys to support the Metrobus network in the event of unexpected service disruption. Strategic buses are manned spare vehicles held at strategic locations during peak periods for quick replacement of breakdowns or for response to unusual circumstances, accidents, weather, or unannounced major detours. They help ensure reliable service to the public.

Also, when a Metrorail station elevator is out of service, there is the possibility that an elevator-dependent disabled patron will be forced to exit the system at a station other than his or her primary destination. Since Metro is required by FTA to respond within 30 minutes to a customer requesting service to a station with an elevator outage, strategic buses provide service back to the primary destination station. For long-term elevator outages, Metro operates "emergency response vehicles" (ERVs), however, they are sufficient to cover only a portion of the outages that occur. Currently Metro uses 25 strategic buses and the fleet update assumes the same number from FY2011 through FY2020.

3.7.4. Seat Loss

Due to change in technology and vehicle standards, the procurement of new standard buses is resulting in a reduction of the available seat capacity. The old standard buses had 45 seats while the new standard buses have only 39 seats. This resulted in a net reduction of the available capacity by 6 seats, or 13.3%. In order to compensate for that a seat loss factor is added to the fleet requirement as shown on Table 3-8.

3.7.5. Spare Buses

Spare buses are the portion of the fleet that are available for routine maintenance, and those that are unavailable for service each day due to unexpected mechanical problems. Bus reliability history and preventive maintenance practices determine the number of spare buses. Spare buses are usually expressed as a percentage of the scheduled fleet in excess of the daily in-service requirement. In 1997, the Metro Board established the policy of a 15.6% operating spare ratio as the system average; actual spare ratios vary by vehicle type and by operating division.

3.8. Projection of Network Driven Fleet Growth

Table 3-8 shows a summary of the network driven fleet growth between FY2010 and FY2020. Overall it is estimated that total fleet will increase by 312 vehicles, from 1,482 in the beginning of FY2010 to 1,794 by the end of FY2020. This projection, based on the network demand, requires Metro to procure 312 buses for the purpose of fleet expansion, in addition to the ongoing procurement for bus replacement. The projected 312 expansion buses will support the implementation of the PCN and emerging corridors from FY2010 to FY2020, provide additional buses for routine service adjustments to relieve crowding and adjust running time, increase

spare buses in proportion of fleet growth and other requirements outlined in Section 3.7 and Table 3-8.

During FY2010 and FY2011, to cope with the budget gaps in these two years, Metro is undertaking comprehensive strategies, two of which directly affect the requirement for expansion buses during these two years: retiring less fleet during the bus replacement program to retain old buses in service, and redeploying buses relieved from service reduction to PCN and other types of revenue service. The fleet plan anticipates that the combined strategies would allow Metro to shift more than 50 existing buses to support expansion during these two years, as shown in Table 3-8.

Table 3-8. Network Driven Fleet Demand Projection

Fiscal Year	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
PEAK VEHICLES IN SERVICE											
Peak Vehicles Scheduled for Service (Beginning of Year)	**1,242**	**1,242**	**1,242**	**1,276**	**1,310**	**1,340**	**1,379**	**1,418**	**1,449**	**1,480**	**1,513**
Additional Buses for Service (During the Year)	28	24	34	34	30	39	39	30	31	33	41
Priority Corridor Network(1)	8	4	12	12	9	15	15	15	15	15	15
Service Adjustment(2)	13	14	14	14	14	15	15	15	16	16	16
Artic Conversion Adjustment	0	0	0	0	0	0	0	(7)	(7)	(6)	0
Seat Loss	3	3	3	3	3	4	4	3	3	3	4
Additional Spares (3)	4	3	5	5	4	5	5	4	4	4	5
Buses Redeployed from Service Reduction (4)	(28)	(24)									
Peak Vehicles Scheduled for Service (End of Year)	**1,242**	**1,242**	**1,276**	**1,310**	**1,340**	**1,379**	**1,418**	**1,449**	**1,480**	**1,513**	**1,554**
SYSTEM VEHICLE REQUIREMENTS											
Total Fleet Demand (Beginning of Year)	1,482	1,482	1,482	1,516	1,550	1,580	1,619	1,659	1,689	1,720	1,753
Strategic Buses	25	25	25	25	25	25	25	25	25	25	25
Total Expansion Buses Required (5)	0	0	34	34	30	39	39	30	31	33	41
Total Fleet Demand (End of Year)	1,482	1,482	1,516	1,550	1,580	1,619	1,659	1,689	1,720	1,753	1,794

Notes:

Priority Corridor Network(1): Starting 2016, Metro plans to implement emerging corridors on a schedule of three corridors each year

Service Adjustment(2): Service Adjustment includes buses required for alleviating crowding and improving service reliability

Additional Spares(3): These additional spare buses are to support additional buses scheduled during the year. Metro uses 15.6% as operating spare ratio

Buses Redeployed From Service Reduction (4): These are buses redeployed from discontinued services in FY10 and FY11

Total New Buses Required (5) = Additional Buses Scheduled During the Year + Additional Supporting Spares

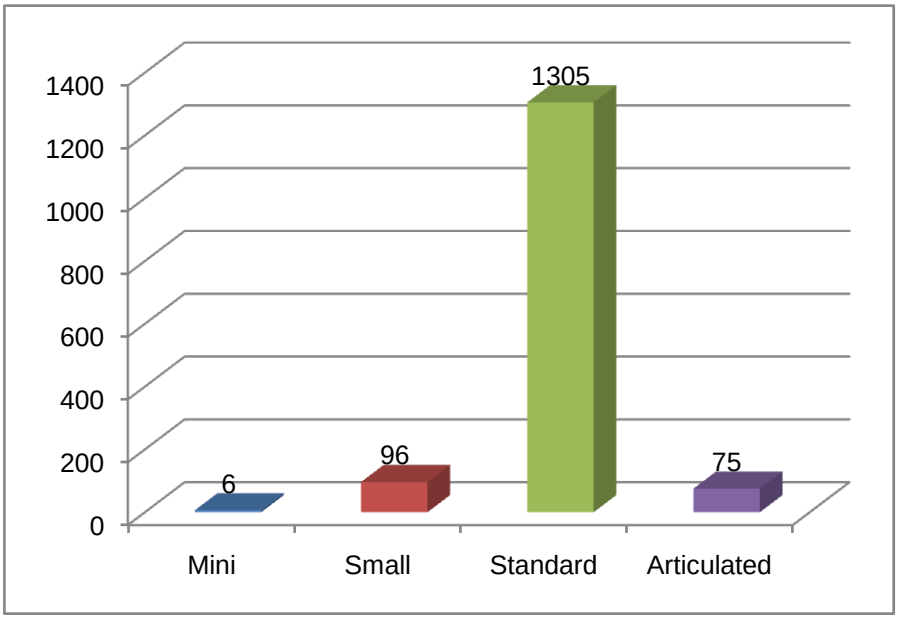
SECTION FOUR: METROBUS FLEET SUPPLY

Rehabilitation, replacement and expansion of Metro's existing vehicle fleet are essential to delivering safe, reliable, and comfortable service to our customers. The Metrobus fleet has been modernized through a program of replacement and expansion. "Replacement" buses refer to newly-procured buses that replace older buses without increasing the size of the bus fleet. "Expansion" buses refer to buses that do increase the total size of the bus fleet. Increasing passenger and network demand on the system require continuing investments in bus replacement and expansion.

4.1. Current Fleet Composition

As of June 2009, Metro has a total of 1,482 buses. The bus fleet ranges in size from 26 feet to 62 feet, and has a mix of mini, small, standard, and articulated buses. The June 2009 Metrobus fleet makeup is shown in Figure 4-1. A complete listing of the Metrobus fleet vehicle types is displayed in Table 4-1.

Figure 4-1. Current Metrobus Fleet by Size (June 2009)



Notes:
Mini buses: vehicles with a length of 26 feet
Small buses: vehicles with a length of 30 feet – 35 feet
Standard buses: vehicles with a length of 35 feet – 42 feet
Articulated buses: vehicles with a length of 60 or more feet.

Table 4-1. Composition of Metrobus Fleet (June 2009)

Make	Model	Year	Age	Fuel Type	Size	Seats	Access.	Count
Flxible	40102-6C	1990	19	Diesel	40'	43	Lift	73
Flxible	35102-6C	1990	19	Diesel	35'	35	Lift	10
Flxible	40102-6CE	1993	16	Diesel	40'	45	Lift	45
Flxible	40102-4D	1994	15	Diesel	40'	45	Lift	132
Ikarus	436-06	1995	14	Diesel	60'	64	Lift	33
Orion	5.501	1997	12	Diesel	40'	42	Lift	211
Orion	5.505	1997	12	Diesel	30'	30	Lift	51
Orion	5.501	2000	9	Diesel	40'	43	Lift	132
Orion	6.501	2000	9	Diesel	40'	38	Ramp	98
New Flyer	C40LF	2001	8	CNG	40'	40	Ramp	100
New Flyer	C40LF	2002	7	CNG	40'	40	Ramp	64
Neoplan	AN460	2003	6	Diesel	60'	66	Lift	21
Orion	7.501	2005	4	CNG	40'	41	Ramp	214
Orion	7.503	2005	4	CNG	30'	29	Ramp	35
New Flyer	DE40LF	2006	3	Hybrid	40'	39	Ramp	39
New Flyer	DE40LFR	2006	3	Hybrid	40'	39	Ramp	11
New Flyer	D40LFR	2006	3	Clean Diesel	40.9'	39	Ramp	104
New Flyer	D40LFR	2006	3	Clean Diesel	40.9'	38	Ramp	12
Chevrolet	C550	2007	2	Diesel	26'	20	Lift	6
New Flyer	C40LFR	2007	2	CNG	40'	40	Ramp	25
NABI	60BRT-08-01	2008	1	CNG	60'	61	Ramp	21
New Flyer	DE42LFA	2008	1	Hybrid	42'	39	Ramp	14
New Flyer	DE42LFA	2009	0	Hybrid	42'	39	Ramp	31
		Average:	8.7				Total	1482

4.1.1. Fleet Age

As of June 2009, the average Metrobus was 8.7 years old. More than 8% of the Metrobus fleet was greater than 15 years of age and 29% were between 11 and 15 years of age. The newest buses, New Flyer Hybrids, were purchased in 2009. The oldest buses – Metro Flxible – entered service in 1990, and at 19 years old, will be retired soon. Figures 4-2 through 4-4 detail fleet age by service year and size. By the end of FY 2010, 148 replacement buses will be delivered, which will lower the fleet age to below 7 years.

Figure 4-2. Current Metrobus Fleet by Age (June 2009)

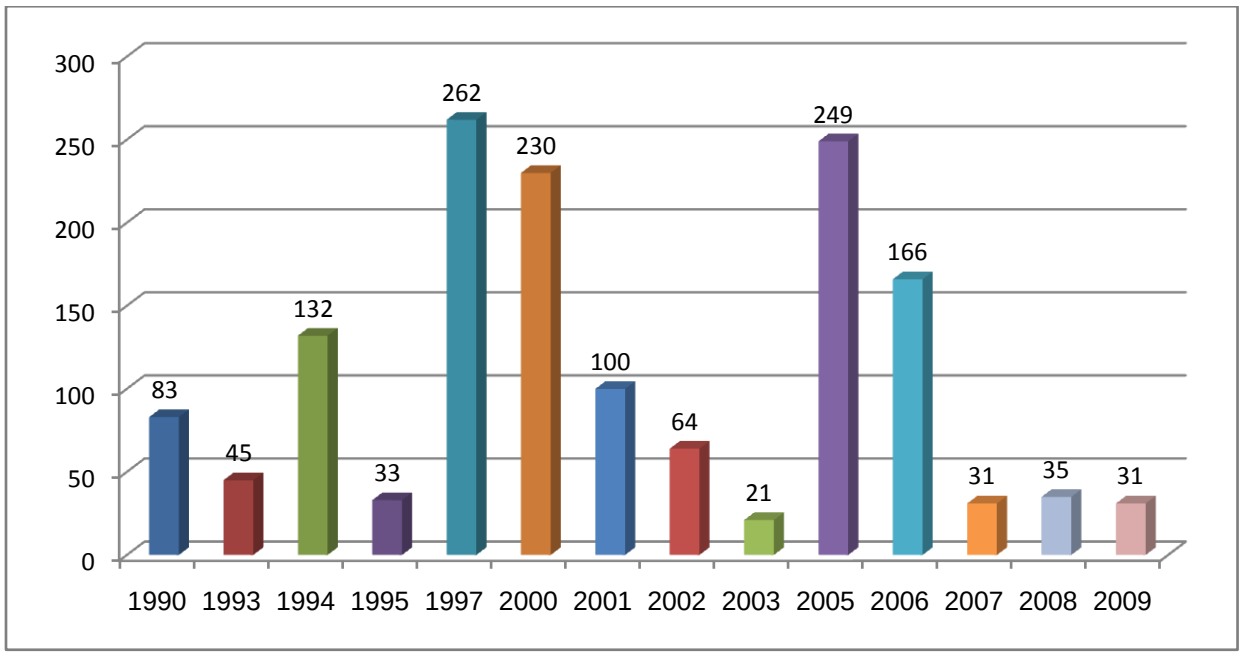


Figure 4-3. Composition of Fleet Age (June 2009)

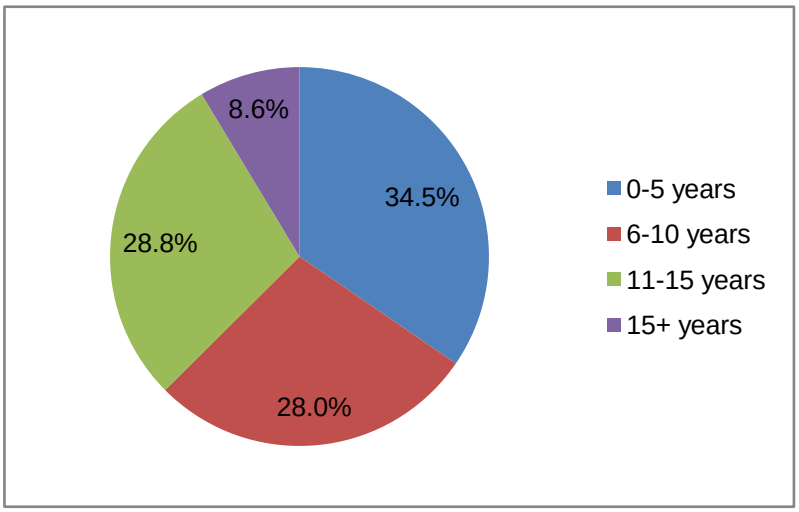
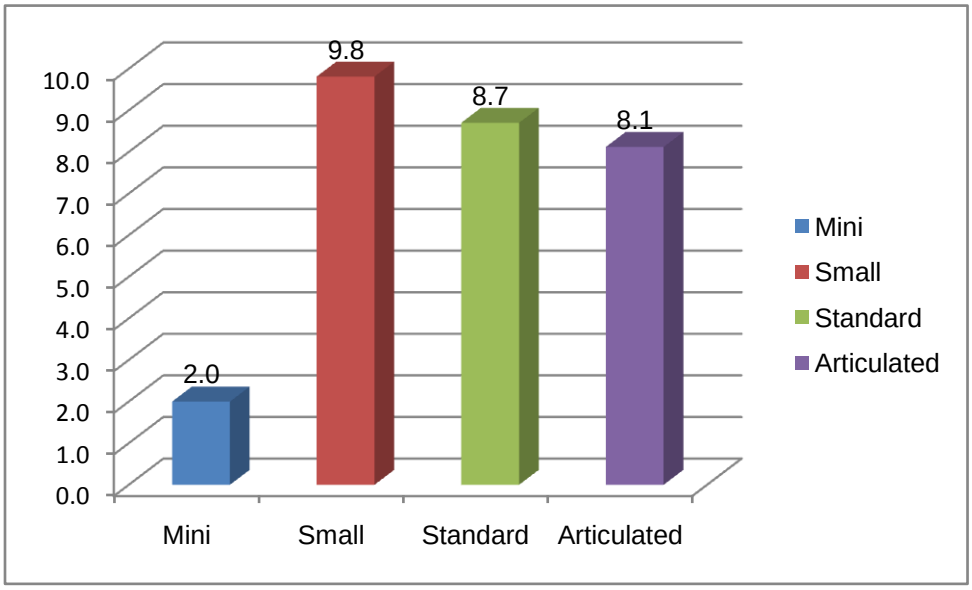


Figure 4-4. Average Age by Size (June 2009)



4.1.2. Fleet Fuel Technology

Of Metro's fleet, 95 are hybrid electric, 459 are fueled by compressed natural gas (CNG), and 116 are fueled by clean diesel. These clean technologies make up over 45% of the fleet (Figure 4-5). These clean fuel vehicles are the youngest generation in the Metrobus fleet (Figure 4-6).

Figure 4-5. Metrobus Fleet by Fuel Type (June 2009)

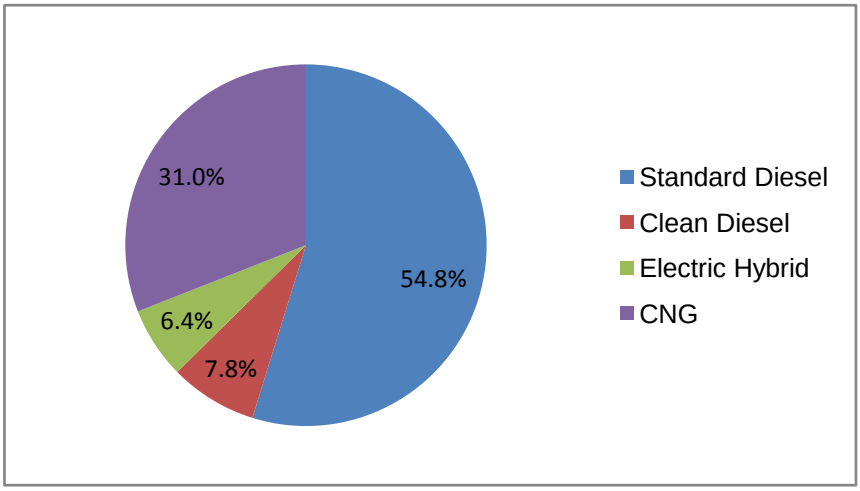
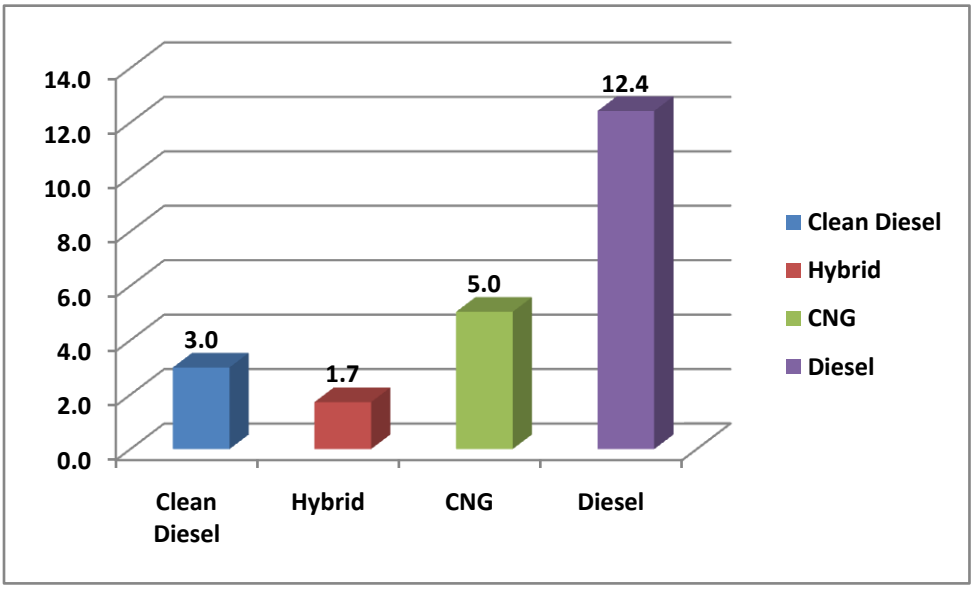


Figure 4-6. Average Age by Fuel Type (June 2009)



4.1.3. Fleet Operating Cost by Fuel Type

The Metrobus fleet consists of four fuel technologies: standard diesel, clean diesel, hybrid electric, and compressed natural gas (CNG). Each of these technologies have certain advantages and disadvantages (see Section 5 for discussion of maintenance requirements). Among the newer buses using alternative fuels, clean diesel buses had the best performance in FY2009, with more than an average of 12,000 MDBF (See Figure 5-4 for mean distance between failures by fuel type). Both electric-hybrid and CNG buses had nearly identical performance, with the interval between failures varying between 8,000 and 9,000 miles. Diesel vehicles performed poorly among the entire fleet because of their age. The average operating cost per mile for each technology is outlined in Table 4-2 below.

Table 4-2. Average Operating Cost by Fuel Technology (FY2009)

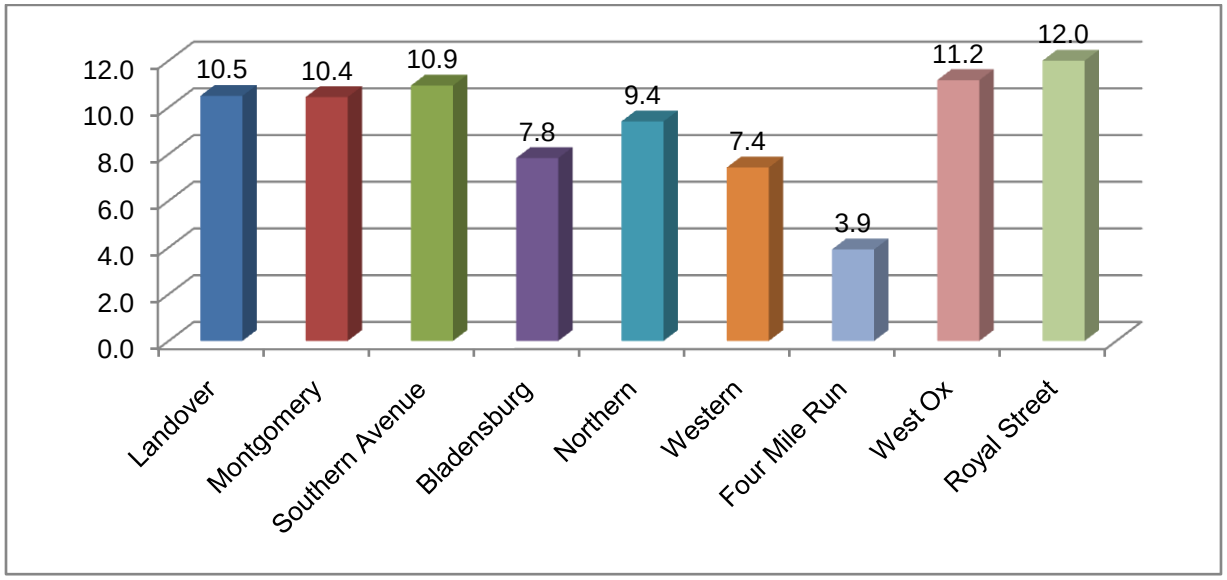
	CNG	Hybrid	Clean Diesel	Standard Diesel
Average Cost Per Mile	$1.17	$1.08	$1.04	$1.42

Accordingly, Metro will pursue alternative fuel technologies that provide the best combination of low operating cost, low maintenance, and low emissions. Metro is currently purchasing hybrid electric buses due to the lack of fueling capacity for CNG buses. Metro plans to purchase CNG replacement buses from FY2013 to FY2015 once CNG fueling capacity is expanded after the opening of replacement garages during FY2012 and FY2014 (see Section 6.3).

4.1.4. Fleet Operating Division

Nearly all operating divisions host fleet with an average age far exceeding 7.5 years, the average fleet age set by Metro Board policy (Figure 4-7). Since the newer fleet are clean fuel technology vehicles, these can only be refueled and maintained at certain garages with specific capabilities. For example, Four Mile Run and Bladensburg are the only garages that are currently CNG-equipped.

Figure 4-7. Average Age by Operating Division (June 2009)



4.2. Recent Fleet Procurement

The Metro Matters program is a joint effort between Metro and its jurisdictional partners to fund capital needs from FY2005 to FY2010. Under Metro Matters there have been five bus procurement contracts. The FY 2005-2010 budget for bus procurements under Metro Matters is $303 million. As of today, Metro Matters and other funding sources have funded 642 replacement buses and 25 expansion buses as follows:

1. In FY2006, Metro procured 250 compressed-natural gas (CNG) buses from Orion as replacement buses.
2. In FY2007, Metro procured 50 diesel-electric hybrid buses from New Flyer. All of these buses were replacement buses.
3. Also in FY2007, Metro procured 117 advanced-technology “clean diesel” buses from New Flyer. All of these buses were replacement buses.
4. In FY2008, Metro received 25 CNG expansion buses.

5. In FY2009, Metro received 22 60-foot articulated CNG buses from North American Bus Industries (NABI). These are all replacement buses, and are the ones with the new red-gray paint schemes. These buses were delivered in September 2008.
6. Also in FY2009, Metro has contracted with New Flyer for 203 diesel-electric hybrid buses. These buses include 20 37-foot buses, 161 42-foot buses, and 22 62-foot articulated buses. All of these buses are replacement buses.

The original bus procurement plan included in the Metro Matters Program provided for the purchase of up to 185 expansion buses and 455 replacement buses over six years (an average of 75 replacement buses per year). However after only 25 expansion buses were procured, the Board became concerned about the additional operating cost associated with expanding the Metrobus fleet. As a result of these concerns, the Board revised the Metro Matters bus procurement plan to defer expanding the Metrobus fleet to after FY 2010 and instead replace an average of 100 buses per year.

4.3. Planned Fleet Supply

In FY2010 Metro will exercise its option with New Flyer for up to 249 additional diesel-electric hybrid buses, with a portion of funding from the American Recovery and Reinvestment Act of 2009 (ARRA).

During 2008 and 2009, Metro staff conducted the Capital Needs Inventory (CNI), which outlined over $11 billion in needs over the next ten years (FY2011 to FY2020). The CNI established Metro's capital needs baseline from FY 2011 through FY2020. The CNI includes Performance ($7.6 billion, 67% of total) and Customer/Demand categories ($3.8 billion, 33% of total). Safety needs are reflected throughout the CNI.

Performance projects maintain and replace assets on a life cycle basis. They promote safety and reliability and preserve the current levels of service. These projects keep Metro in a "State of Good Performance" - assets are not simply replaced with an exact replica, but with assets that take advantage of the latest technology and materials. Replacing and rehabilitating the Metrobus fleet fall into the Performance category.

Customer/Demand projects help meet growing ridership requirements and improve riders' experience. Expansion buses fall into the Customer/Demand category.

4.3.1. Replacement of Buses

According to Metro Board policy, Metro's target is to achieve an average bus fleet age of 7.5 years and a maximum of 15 years. This means that Metro needs to replace 1/15th of its bus fleet annually on average, allowing flexibility in the procurement schedule.

This policy applies to standard buses but not articulated buses. While Metro has done rigorous maintenance and overhauls to articulated bus fleet, these large sized buses practically are not built to have the same life cycle as standard buses. In an urban environment, where road pavement conditions are not always desirable, these buses experience more mechanical malfunctions. Based on Metro's operating experience, the articulated buses have to be replaced at 12 years of age. In FY2015 and FY2020, Metro plans to replace 44 articulated buses, with the replacement of 22 2003 Neoplan buses in FY2015 and 22 2008 NABI buses in FY2020.

As shown in Table 4-4, Metro will replace 148 buses in FY2010 as a result of additional funding available from the American Recovery and Reinvestment Act. This increased procurement in FY 2010 relieves the replacement schedule for FY2011, when Metro will procure 52 replacement buses. From FY2012 through FY2016, Metro's capital program will fund the replacement of 429 standard buses and 22 articulated buses, slightly less than the required 1/15th replacement ratio as a result of further funding reductions in the FY2011-2016 Capital Improvement Program. After FY2016, this plan assumes that Metro will begin to replace 1/15th of its fleet, which equals slightly more than 100 buses each year.

4.3.2. Rehabilitation of Buses

During the first 7 ½ years of life a Metrobus will accumulate approximately 340,000 miles. To maintain the fleet in a good state of repair, Metro performs a comprehensive overhaul as they reach this age. The mid-life overhaul program rebuilds bus engine, transmission and electronics, replace chassis parts and seats and repaints the body, restoring the bus to an "as new" condition. On average, Metro rehabilitates 100 buses per year and the cost of the mid-life overhaul is approximately $110,000 per bus.

All major transit agencies operate a mid-life rehabilitation program which reduces maintenance and operating costs and results in fewer breakdowns and major repairs. Metro's mid-life rehabilitation program is a commitment to good maintenance and an effort to maximize capital investments, not intended to extend the life of the bus.

Metro's current maintenance capacity at its garages allows for the rehabilitation of 20 buses at any given time, which totals 100 buses per year. Metro's maintenance capacity will increase once the Bladensburg garage is renovated (refer to Section 5.3.3). As part of the 2011 - 2020 Capital Needs Inventory, Metro identified the need for a major renovation at Bladensburg to increase the current maintenance space. This proposed renovation will increase annual maintenance capacity by 16 additional buses and support the increased maintenance needs associated with a growing fleet size. This project is scheduled to be part of the FY2011 - FY2016 Capital Improvement Program.

4.3.3. Bus Fleet Expansion

Bus ridership averaged 450,000 daily weekday trips in FY 2009, and could potentially grow to 520,000 by 2015 and 570,000 by 2020 (see Figure 2-10). This projection results from growth on the existing network, the PCN, and the potential emerging corridor network. This fleet plan estimates that a total of 312 expansion new buses will be needed to support network expansion, address fleet reduction due to conversion from standard buses to articulated buses, compensate for seat loss on newer buses, and provide additional spare vehicles in support of expanded revenue fleet (refer to Section 3.7 and Table 3-8).

Metro plans to focus the purchase of new expansion buses on priority corridors that serve the greatest concentration of riders. These priority corridors include plans for runningway improvements, such as bus priority treatments, along regional roadways, and traffic management improvements. Priority corridor network would increase the average speed of buses by up to 30%, not only saving Metro capital and operating expenses but also improving passenger travel times. Success of these priority corridors is highly dependent on partnerships with Maryland, the District of Columbia and Virginia.

4.4. Projection of Fleet Supply

4.4.1. Summary

In order to meet the projected demand and implement the proposed Metrobus network expansion (as outlined in Section 3.8), Metro would need to expand its current fleet for a total of 312 expansion buses by the year 2020, for a total fleet of 1,794. However, based on projected funding scenarios, the total fleet size will increase by 135, less than half of the required expansion (Table 4-4). This is not enough to meet the growing demand over the 10 year timeframe.

Over the final quarter of calendar year 2009, Metro staff developed a six-year capital program (FY 2011 - FY 2016) based on the CNI prioritization results, committed project funding, preventive maintenance needs and other policy considerations. These results were presented to the Board as the General Manager's Proposed Budget in February 2010. The first year of the capital program represents Metro's FY 2011 Capital Budget.

However, due to the current economic conditions, funding is severely constrained in the very near-term. During FY2010 and FY2016, Metro does not expect to purchase any expansion buses from known funding sources. Beginning in FY 2017, it is assumed that funding will increase to a level that will allow for the purchase of the number of buses needed to address demand, ranging from 30 to 41 buses per year. Since the expansion supply projection for the next six years falls short of the needs identified in this plan, Metro will need to continue to explore new funding sources.

Metro engages in regional planning with the regional metropolitan planning organization, the Metropolitan Washington Council of Governments. As part of the planning process, Metro provides projections for the regional 2010-2040 Constrained Long Range Plan (CLRP). In this planning document, Metro projects its revenues and expenses for both capital and operating costs from FY2010 to FY2040. This plan will be available later in 2010.

4.4.2. Strategies for Fleet Mix

The 2006 Metrobus Technology Study concluded the diesel-electric hybrid technology would provide the best alternative for the standard replacement technology, albeit with a higher purchase cost per bus among the technologies evaluated at that time. CNG (compressed natural gas) technology is also being considered for replacement buses, and is being incorporated into future maintenance facilities. In fact in 2007, Metro purchased 22 CNG articulated buses by utilizing piggy-back options from the Los Angeles County Metropolitan Transportation Authority. With the assumed timetable for garage development (refer to Section 6.3), advancement in fuel technology and the resultant performance improvements of alternative fuel buses, Metro will resume the purchasing of CNG buses after the opening of DC Village and Cinder Bed Road garages in FY2012 and FY2013, both of which will be equipped with CNG fueling stations.

At this time, Metro is facing severe funding constraints in the proposed CIP bus replacement program and uncertainties associated with the Walter Reed proposal for Northern and/or Western replacement. To allow for the most cost effective use of articulated buses, this plan recommends Metro increase the purchase of additional articulated buses in the later years of the decade, when completion of the assumed timetable for the rehabilitation or replacement of Northern and Western garages is expected. This fleet plan also recommends a detailed operational analysis to prioritize the routes suitable for conversion to articulated buses, to enable Metro to seize any opportunities that might arise to replace Northern and Western garages.

As Metro moves forward with the planned new garage facilities proposed in the six-year CIP, the upcoming Metrobus purchase contract will consider CNG buses as proposed in the CIP. All new garages are designed to provide compressed natural gas (CNG) fueling, which will greatly expand the CNG bus fleet from the current two locations—Four Mile Run and Bladensburg Divisions. The final determination of bus types in fleet supply is subject to funding availability and timeline of new garages, which will occur after the completion of this fleet plan update. Metro should continue to assess the feasibility and timing for purchasing alternative fleet types, including CNG buses and articulated buses (Section 3-7), to prepare for the planned garage openings and seize opportunities for rehabilitation and/or replacement of old garages in the Metrobus core service areas. Once a clear timetable is determined for any of the proposed garage development, Metro should identify the number and type of buses to be purchased for

the new garage facilities ready for operations, as part of the bus purchase contract built on the 2010 fleet plan.

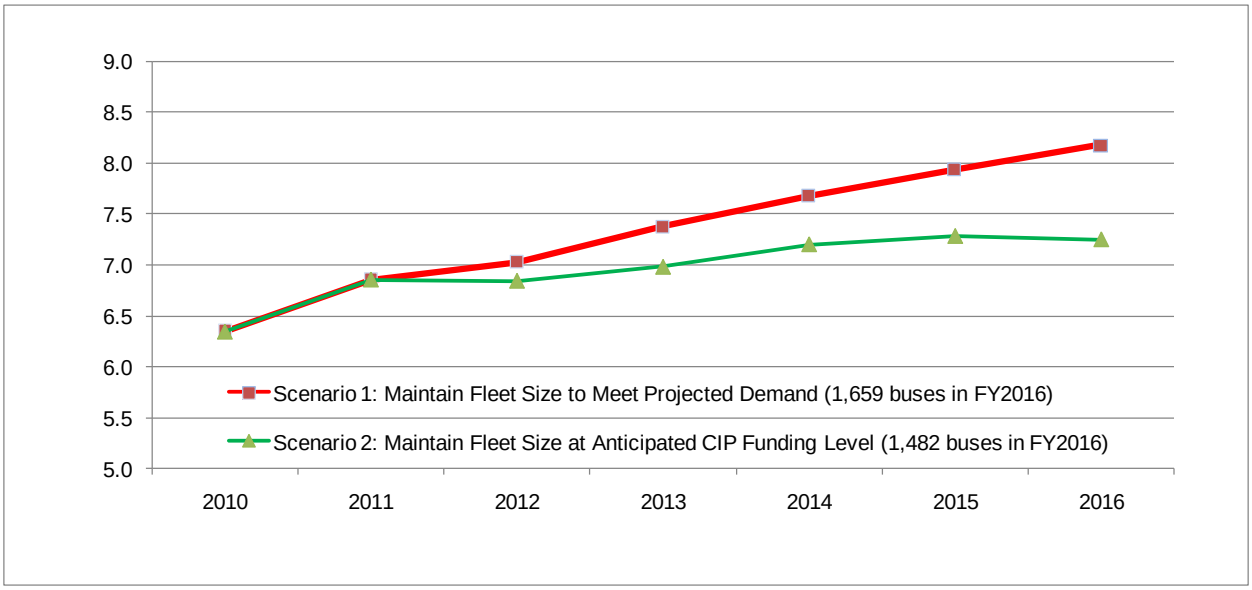
4.4.3. Projection of Fleet Age

The prediction for average fleet age is built on a key assumption for the outer years after the CIP– the potential for future funding to bridge the gap between the high demand for fleet growth demand and the low supply of bus purchase. Ideally, if Metro strictly follows the replacement of one old bus with one new bus and keeps a smaller fleet size regardless of demand requirements, the fleet age could go down to a desired level. What is most likely to happen in practice is that Metro may have to retain the old buses in revenue service to keep a larger sized fleet and meet the demand for the planned network expansion initiative and service adjustments, which will result in an increasing, rather than decreasing, average fleet age.

FY11-FY2016. During this time period, the proposed Capital Improvement Program would fund replacement buses at a level slightly lower than the 1/15th ratio on an annual basis, and would not fund any expansion buses. Therefore, by the end of FY2016, the average fleet age is anticipated to be at 7.3 if Metro adheres to the replacement policy of one new bus for each retiring bus. The average age of the fleet supply is shown in Figure 4-8 as the line labeled as Scenario 2.

The under-investment in fleet expansion during this period will result a 177-bus gap between fleet supply and demand for bus service. One way to meet this demand would be to keep older buses in service beyond their retirement age of 15 years. If this strategy is followed, by 2016, more than 270 buses will be in service beyond their retirement age of 15 years, and the average age of the fleet would be 8.2 years of age. The line labeled as Scenario 1 in Figure 4-8 illustrates the average age if Metro retains old buses to keep up with the fleet size required by demand.

Figure 4-8. Average Fleet Age 2010 - 2016



After FY2016, this fleet plan is built on the assumption of a robust expansion bus purchase plan at about 30 buses annually from FY2017 to FY2019 and about 40 buses annually from FY2020 to FY2025. This plan also assumes that Metro will return to a replacement ratio of 1/15th of the fleet size each year after FY2016.

Under these assumptions, the fleet size will expand to 1,597 buses by 2020 and buses will be replaced at the current rate of about 100 per year, or 1/15th of the fleet. This will result in the average age falling to 6.4 years by 2020. By FY2025, the fleet supply will total 1,807 buses, with an average age of 5.7 years. However, this supply will be short of the overall demand for bus service due to the under-investment in expansion buses from FY2011-2016. If the oldest buses are kept in service past their retirement age to meet this demand, more than 90 buses will be more than 15 years old by 2025, and the average fleet age will be 6.2 years.

Table 4-3. Fleet Age Projections for FY2020 and FY2025

	2020	2025
Scenario 1: Maintain Fleet Size to Meet Projected Demand		
Total Buses	1794	1997
Avg Age	7.3	6.2
Buses at 15+ Years of Age	172	94
Scenario 2: Maintain Fleet Size at Anticipated CIP Funding Level		
Total Buses	1597	1807
Avg Age	6.4	5.7
Buses at 15+ Years of Age	0	0

Table 4-4. Supply of Revenue Vehicles

Fiscal Year	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Fleet at the Beginning of Year	1,482	1,482	1,482	1482	1,482	1,482	1,482	1,482	1,505	1,530	1,556
Total Projected Fleet Purchase											
Total Projected Fleet Purchase	148	52	100	80	80	95	96	131	133	137	169
Projected Purchase for Fleet Expansion(1)								30	31	33	41
Projected Fleet Purchase for Fleet Replacement(2)	148	52	100	80	80	95	96	101	102	104	128
Projected Purchase for Mini/Small/Standard buses	148	52	100	80	80	73	96	78	79	80	106
Projected Purchase of Articulated Buses(3)						22		23	23	24	22
Total Projected Fleet Retirement											
Total Projected Fleet Retirement(4)	(148)	(52)	(100)	(80)	(80)	(95)	(96)	(108)	(109)	(110)	(128)
Standard/Mini Buses Retired from Replacement	(148)	(52)	(100)	(80)	(80)	(73)	(96)	(78)	(79)	(80)	(106)
Standard Buses Retired from Artic Bus Conversion								(30)	(30)	(30)	
Articulated Buses Retired						(22)					(22)
Total Fleet Supply at the End of Year	1,482	1,482	1,482	1,482	1,482	1,482	1,482	1,505	1,530	1,556	1,597

Notes:

Projected Purchase for Fleet Expansion(1): Due to the current economic conditions and fiscal constraint, Metro assumes significant reduction in the purchase of expansion fleet, consistent with the proposed six-year CIP. However, Metro anticipates that funding for expansion will be return to recommended levels starting in FY2017.

Projected Purchase for Fleet Replacement (2): Metro performs a mid-life rehabilitation on its buses at 7.5 years of age. This extends the lifespan of each bus to 15 years. Metro replaces about 100 buses a year based on CIP budget and schedule. Starting in 2016, Metro will begin to replace 1/15th of its fleet each year, with an additional 44 articulated buses in FY15 and FY20.

Project purchase of Articulated Buses(3): This plan assumes a total of 114 articulated buses purchased under the fleet replacement program. This includes 44 articulated buses in 2015 and 2020 to replace the 22 2003 Neoplans and the 22 2008 NABIs and another 70 articulated buses to replace standard buses in high ridership corridors based on the recommendations of the 2007 Metrobus Network Evaluation Study. The FY11-16 CIP only funds 22 Neoplans to be replaced on schedule in FY2015.

Projected Retirement (4): Metro retires buses on a 1 to 1 ratio as replacement buses of the same size are purchased. When Metro replaces standard buses with articulated buses, a higher number of standard buses can be retired as a result of the higher seating capacity from the replacement articulated buses.

SECTION FIVE: FLEET MAINTENANCE

Each Metrobus vehicle is a major capital investment that needs to be well maintained to maximize its service life and reduce capital and operating expenditures. Proper maintenance of the fleet is also essential to providing safe, reliable and attractive service.

Realistically, a portion of the fleet will be out of service due to unexpected failures as buses occasionally fail in service regardless of how well they are maintained. The ripple effect of a bus breakdown could cause passenger delay, increase travel time and overcrowd buses. The Metrobus fleet still has a large portion of older buses in active service which increases the possibility of breakdown even under a rigorous maintenance program.

Metro's maintenance needs and requirements will intensify over the next decade, due to the growing fleet and the mix of different vehicle technologies. A larger fleet requires more resources – equipment, facilities and personnel – to be devoted to maintenance. Recent development in alternative fuels, such as clean diesel, diesel-electric hybrid and compressed natural gas, helps the environment but complicates maintenance procedures, requiring specially trained mechanics and specific maintenance practices. Additionally, new technologies continue to evolve over time, demanding new equipments and practices.

5.1. Overview of Fleet Maintenance

For over 35 years, the Metrobus maintenance program has covered all revenue and non-revenue vehicles and performed almost all vehicle maintenance. Metro's in-house maintenance functions include the full scope of normal running maintenance, complete paint and body work, and full component overhaul. The stated mission of the Bus Maintenance division is "to provide safe, clean, and reliable buses for the riding public, and to ensure that WMATA's non revenue fleet of vehicles are maintained in a cost efficient manner. "

Metro's maintenance functions follow procedures set forth by manufacturers' maintenance manuals and Metrobus standard practice. Completed maintenance activities are documented on the pertinent reporting forms, reviewed and certified by a supervisor, and entered into the specified reporting system. Metro established an extensive support infrastructure and quality control process for the program, allowing crews to exercise control over the process which translates into better body work, mechanical component overhaul and bus rehabilitation.

Metro developed both automated and manual systems for record keeping. The automated system is an on-line Maximo system, which provides a complete maintenance history on each vehicle and makes it possible to perform a thorough equipment reliability analysis. Using Maximo, maintenance crews are able to track all preventive and corrective maintenance actions.

Metro also uses a manual record-keeping system. The combination of automated and manual systems assures the best possible vehicle maintenance at the lowest cost.

Additionally, the Maximo system, in conjunction with an inventory optimization program (Xtivity) and PeopleSoft ABC Flow (Purchasing Module), is used at the Metro Supply Facility to support inventory replenishment and control for more than 15,000 Bus Maintenance stock items at 11 sub-storerooms around the Metro area with average stock out rate of 2.40%. Metro's stock out goal is 5%.

Metro also stages tow trucks and service trucks throughout the system to respond quickly to vehicles that have failed while in service. Service trucks are equipped with fluids, air compressors, tool kits, jump start equipment and spare parts. If service truck personnel are unable to return a disabled bus to service, it is towed to its home division for more extensive repair, and a replacement bus is put into service.

5.2. Current Fleet Performance

5.2.1. In-Service Failures

Metro tracks bus failures daily, weekly, and monthly, and categorizes incidents into four categories which are:

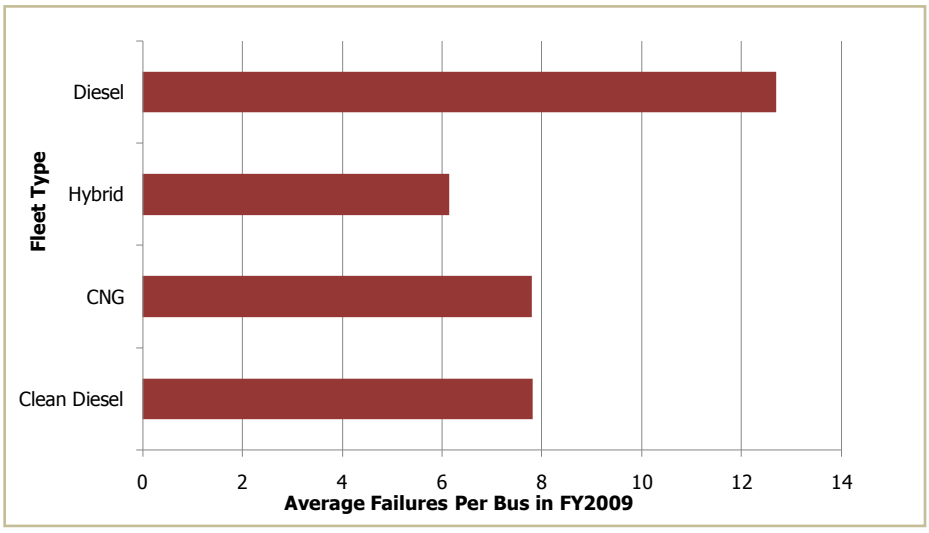
- **Change-Off With Passenger Impact:** Any bus replacement for an incident between layover points that causes passengers to transfer from the defective bus to a replacement bus with or without deviation from schedule.
- **Change-Off Without Passenger Impact:** Any bus replacement at layover points or while deadheading where there are no passengers transfers or delays.
- **Road-Call With Passenger Impact:** Any incident while in revenue service that requires the bus to be removed from service or responded to by an emergency vehicle with deviation from schedule.
- **Road-Call Without Passenger Impact:** Any breakdown during deadheading, or at layover points that requires the bus to be removed from service or responded to by a service truck with no deviation from schedule.

During FY2009, Metrobus experienced a total of 15,795 bus failures, averaging 44 change-offs and road-calls per day. The in-service failures displayed in Table 5-1 also vary among buses using different technologies, though primarily caused by the age of the fleet. As illustrated in Figure 5-1, diesel buses made up the oldest fleet, averaging 12 years of age. These experienced the most failures (13 per bus) in FY2009; newer buses using alternative fuels had lower failure rates (refer to Figure 4-6 on fleet age).

Table 5-1. Causes of In-Service Failures

Cause	Counts	%
Engine	3,678	23%
Air	1,434	9%
Warning Light	1,373	9%
Fare Box	1,310	8%
Door	1,229	8%
Wheelchair Lift	1,220	8%
Brakes	1,077	7%
Body	959	6%
Transmission	958	6%
Electrical	865	5%
Others	1,689	11%
Total FY2009	15,792	

Figure 5-1. In-Service Failures by Vehicle Technology



5.2.2. Mean Distance Between Failures

Mean Distance Between Failures (MDBF) is defined as the number of chargeable service interruptions during revenue service divided into scheduled miles. Metro has been able to limit the number of Metrobus failures by applying operating and maintenance strategies. The historical trend of annual MDBF illustrated in Figure 5-2 over the past twelve years appears to correlate with fleet age. MDBF had been gradually improving in the past few years as fleet age came down.

Metro has not met the 6,500-mile MDBF target set by the maintenance program, but the mean distance in FY2009 (5,670 miles) is better than that of FY2006 (5,240 miles) shown below in Figure 5-3. The best MDBF performance was in FY 2007 because the average age of the fleet was 7.7. Fleet age is likely the primary reason for the current MDBF performance.

Figure 5-2. Mean Distance Between Failures

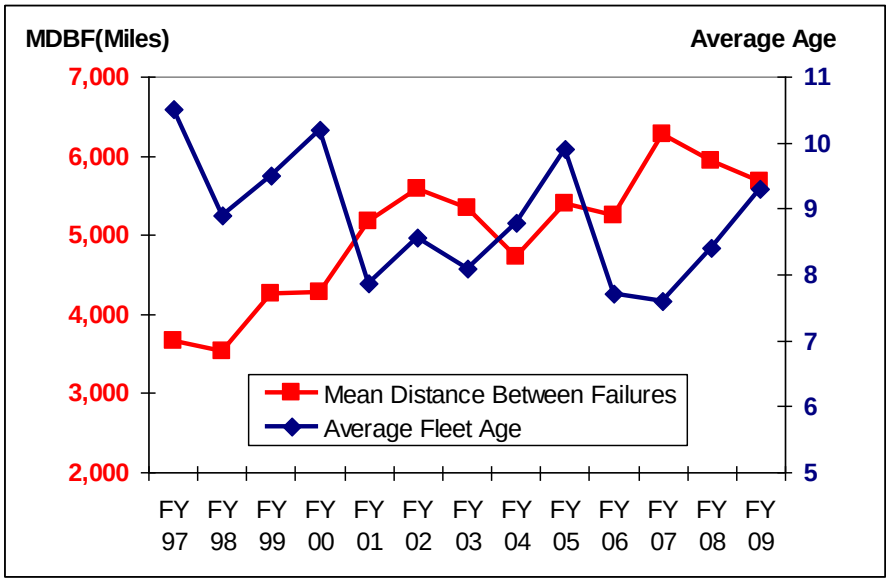
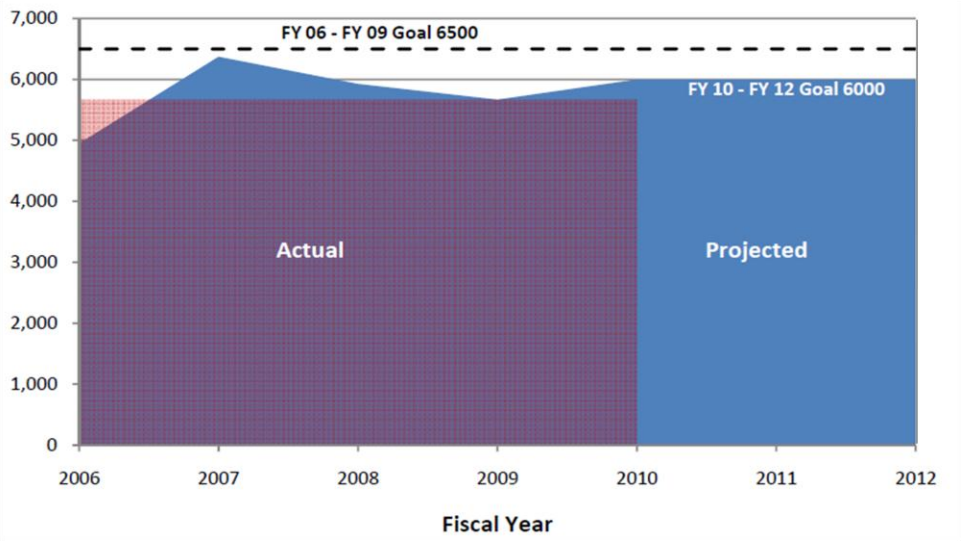


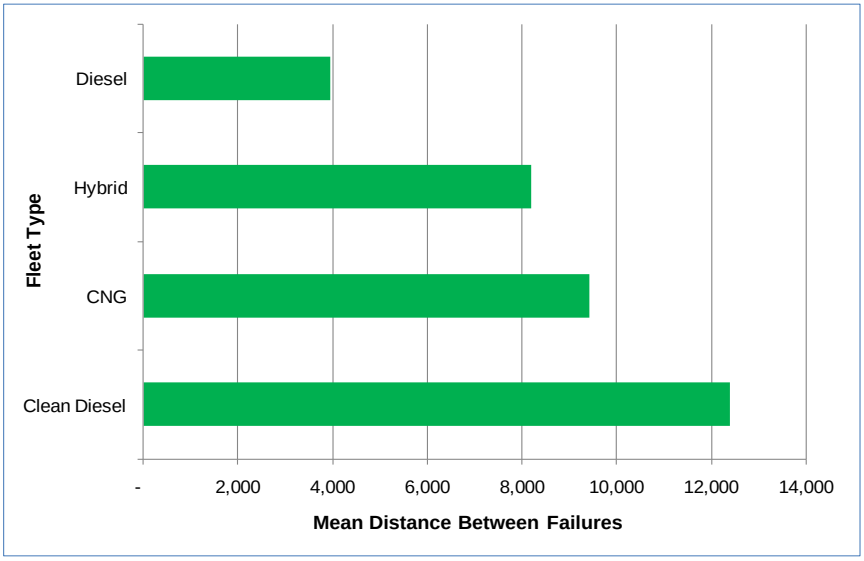
Figure 5-3. Actual and Projected MDBF



Among the newer buses using alternative fuels, clean diesel buses had the best performance in FY2009, with more than an average of 12,000 MDBF illustrated below in figure 5-4. Both

electric-hybrid and CNG buses had nearly identical performance, with the interval between failures varying between 8,000 and 9,000 miles. Diesel vehicles performed poorly among the entire fleet because of their age.

Figure 5-4. Mean Distance Between Failures by Vehicle Technology



5.3. Types of Maintenance

Two types of maintenance are performed on the Metrobus fleet: operating maintenance and mid-life heavy maintenance overhaul.

Operating maintenance consists of scheduled preventive maintenance and unscheduled corrective maintenance. Scheduled preventive maintenance is to keep equipment in good working order, prevent in-service failures, and meet certain vehicle regulatory requirements. Unscheduled corrective maintenance is to respond to unexpected vehicle malfunctions and breakdowns that occur outside schedule.

Mid-life bus overhaul is essential for Metro. While Metro Matters funded a substantial number of new buses, Metrobus replacement is still under-funded. The current fleet average age is 8.7 years, above Metro's goal of 7.5 years. As a result, a higher portion of the old fleet is used to maintain current service levels. If a vehicle is overhauled at 7.5 years, its expected life will be extended to 15 years from the designed expected life of 12 years. As a result, Metro established a mid-life bus overhaul program and the expected life has been officially extended to 15 years, one of the highest in the country.

5.3.1. Scheduled Preventive Maintenance

The Metrobus scheduled maintenance program sustains bus reliability by detecting and

correcting potential defects. Buses are withdrawn from service at regular mileage-based intervals for preventive maintenance actions including inspecting equipment and conducting routine service. Measures include lubrication, replacing filters, replenishing fluids and making adjustments, cleaning of exterior and interior surfaces, and scheduled replacement of electrical and mechanical equipment. Table 5-2 shows schedules for the preventive maintenance program.

Table 5-2. Preventive Maintenance Schedule

Inspection Type	Inspection Interval	Labor Hours	Buses per Day
ADA Equipment Maintenance	90 Days & Annual	3.21	44
A-Inspection	6,000 Miles	8	36
B-Inspection	Bi-Weekly	1	107
Bus Interior Cleaning	Daily / Weekly	4	1501
Bus Steam Cleaning	6,000 Miles	2.95	36
Camera Maintenance	Bi-Annual	4	12
Clever Devices	Annual	2	6
Coolant System Care	Bi-Annual	0.32	12
Engine Tune-up	Annual	5.1	6
Fire Suppression	Bi-Annual	2	12
Fluid Analysis	Various	0.52	36
GFI Farebox Maintenance	Varies	1.1	7
Heavy Maintenance Overhaul	7½ Years	-	20
HVAC Inspection	90 Days	4.32	24
Interior Cleaning	Monthly	2	69
Service Lane Activity	Daily	0.32	1501
Summer Preparation	Annual	2	Unspecified
Winter Preparation	Annual	2	Unspecified

A-inspection provides the primary Metrobus vehicle inspection and service, completed every 6,000 miles. It covers the entire vehicle including driver's equipment and controls, passenger interior, vehicle exterior, engine and engine compartment, transmission, battery, chassis, lubrication, and articulation equipment (if pertinent) and culminates with a complete road test.

Each bus goes through daily and bi-weekly regular inspections to ensure day-to-day operations. Service lane activity is a daily cursory inspection concurrent with the routine refueling and service of the vehicle. It includes checking the farebox, fluid levels, lights, doors and interlocks. The interior is also swept, and the exterior is washed. B-Inspection is done bi-weekly and follows a checklist of bus equipment condition and operation inspection which includes safety

and weather-related equipment, passenger seats, stop chimes, doors, floors, windows, wheelchair equipment, brakes, axles, tires, battery, fluid levels, wires and hoses.

5.3.2. Unscheduled Corrective Maintenance

With a substantial preventive maintenance program, Metro is able to optimize the corrective maintenance requirement and minimize the accompanying service quality degradation. However, unexpected breakdowns will occur even on new systems and components, and all corrective maintenance is required to be complete within 48 hours unless awaiting shop repair or deferred for parts.

5.3.3. Mid-Life Overhaul

Vehicle renovation is the third maintenance component of the fleet management plan. After 7.5 years of service, a standard Metrobus will have traveled about 340,000 miles. Many critical parts will wear out and basic overhauls will not be enough to maintain the expected performance. The mid-life overhaul allows Metro to consolidate the critical replacements and upgrades and keep the fleet in a good state of repair.

Initiated in 1994, the Heavy Maintenance Overhaul Program provides for the rehabilitation of bus mechanical and electrical systems, including overhaul of the engine, transmission, pneumatic equipment, doors, wheelchair lifts, destination signs, suspension, and other structural components. In addition, the interior and exterior of the bus are repainted and all upholstery and floor mats are replaced.

Heavy overhaul incorporates new technology and safety enhancements, keeps the fleet in compliance with air quality requirements, and permits standardization of configuration across bus fleets of varying ages. Presently, 20 buses are in overhaul process at any given time, and each week the program accepts two in-service buses and releases two buses completing rehabilitation, resulting in a total overhaul capacity of 100 buses per year. After 2013, when Bladensburg completes renovations and upgrades, the mid-life overhaul capacity will be increased to 116 buses a year.

Table 5-5 graphically represents the mid-life overhaul schedule, illustrating that due to “lumpy” procurement and limited overhaul facilities, overhauls must occasionally be spread across several years. Section 5.5 describes the increase of overhaul capacity from 2010 and beyond. Figure 5-6 illustrates the heavy overhaul production flow and basic scope of work.

Figure 5-5. Mid-Life Overhaul Schedule

Rehab Year		2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Maintenance Capacity		100	100	100	116	116	116	116	116	116	116	116	116	120	120	120	120
Bus Purchases																	
Year	**Quantity**																
2001	100	15															
2002	64	64															
2003	21	21	0														
2004	0	0	0	0													
2005	249		100	100	49												
2006	166			0	67	99											
2007	31				0	17	14										
2008	35					0	35	0									
2009	31						0	31	0								
2010	148							0	116	32							
2011	52								0	52	0						
2012	100									0	100	0					
2013	80										0	80	0				
2014	80											0	80	0			
2015	95												0	95	0		
2016	96													0	96	0	
2017	131														24	107	0
2018	133															13	120
2019	137																0
2020	169																
	Yearly Totals	100	100	100	116	116	49	31	116	84	100	80	80	95	120	120	120

Key	x	y	z
Rehab:	Early	On-Time	Late
Age:	6	7	8

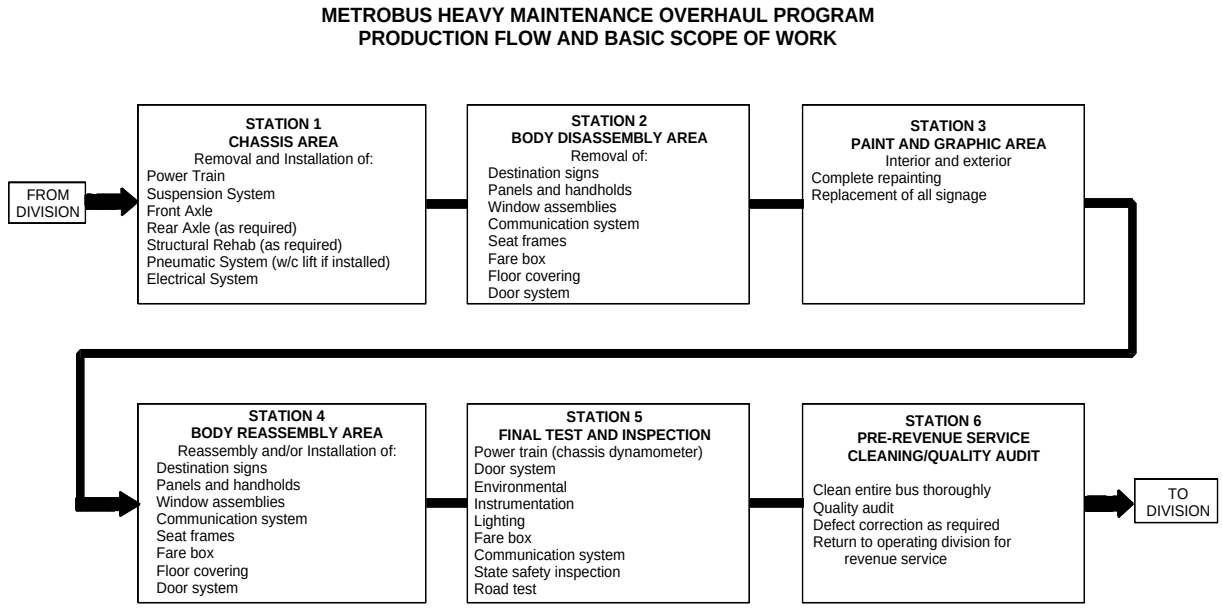


Figure 5-6. Mid-Life Overhaul Process

5.4. Maintenance Capacity for Fleet

There are four categories of maintenance at Metro as outlined below: warranty, shop, garage and retrofit. At present, the capacity of Metro's maintenance facilities and the level of staffing determine the maximum number of buses that can be under maintenance on any given day. The following paragraphs summarize each of the scheduled maintenance activities.

1. **Warranty Maintenance:** Service and repair of systems and equipment that are still under the manufacturer's warranty. This work is specified by the equipment manufacturer and is required to be accomplished in order to preserve the warranty on the product. Currently, about 16 buses are undergoing warranty maintenance daily which is equivalent of one percent of the total fleet.

2. **Shop Maintenance:** Heavy repair shop work involving activities such as accident repair, scheduled equipment overhaul and unscheduled corrective heavy maintenance (e.g. engine or transmission replacement). In FY 2009, an average of 42 buses per day underwent heavy repair work which is equivalent to 3 percent of the total fleet.

3. **Garage Maintenance:** The bulk of Metrobus preventive and corrective maintenance is accomplished at the individual garage level. On average, 130 buses are undergoing this level of maintenance daily which is equivalent to 9 percent of the total fleet.

4. **Retrofit Maintenance:** Activities at this level include manufacturer's recall repairs, and special item retrofits such as Nabi frame repairs, Orion V and VI frame retrofits, Niehoff alternator installations, sludge reducers, and soot filters. This level involves about seven buses daily which is slightly less than one percent of the total fleet.

In the four levels together, 14 percent of the fleet can undergo four levels of maintenance per day. For planning purpose, Metro uses an operating spare ratio of 15.6% in projecting the percentage of the fleet that will be out of service to go through various levels of maintenance.

5.5. Distribution of Maintenance Functions

All divisions carry out routine maintenance functions, outlined in Table 5-5 below. Among them, only Bladensburg and Carmen Turner Facility (CTF) have the capacity to host heavy repairs and overhauls.

In FY2009, Metro received funding from ARRA to redesign and expand the bus body shop at CTF, which allows for the construction of a second full body shop. The new CTF facility will accommodate heavy repair for CNG buses and allow Metro to consolidate and migrate many bus maintenance functions (painting and parts rehabilitation, for example) from Bladensburg to CTF, resulting in more centralized and cost-effective maintenance.

As a result of the migration of these bus maintenance functions from Bladensburg to CTF, scheduled for completion in 2012, the Bladensburg facility will also be upgraded. Metro identified this need for a major renovation at Bladensburg to increase the number of spaces for major maintenance as part of the 2011 - 2020 Capital Needs Inventory. This proposed renovation will add mid-life rehabilitation capacity for 16 more buses and support the increased maintenance needs associated with a growing fleet size. Once this upgrade is complete, the Bladensburg facility will be able to provide approximately 116 mid-life bus overhauls per year. This project is scheduled to be part of the FY2011 - FY2016 Capital Improvement Program. For the purposes of this plan, it is assumed that the overhaul capacity increase at the Bladensburg facility will take effect at the beginning of 2013.

Additional increases in mid-life bus overhauls, beyond 116 per year, could be made in the future to accommodate the increasing fleet size and the growing number of buses needing overhauls per year. An additional increase would not be needed until approximately 2024, when annual purchases of more than 116 buses per year starting in 2017 will result in rehab demand exceeding supply. Note, Figure 5-5 assumes an increase of rehab capacity to 120 buses per year to accommodate the increased demand.

Table 5-3. Maintenance Functions by Operating Divisions

Division	Location	Functions Performed
Bladensburg	District of Columbia	Heavy Repair, Overhaul, Storage Service and Inspection, Running Repair
Northern	District of Columbia	Storage, Service and Inspection, Running Repair
Western	District of Columbia	Storage, Service and Inspection, Running Repair
Montgomery	Montgomery County MD	Storage, Service and Inspection, Running Repair
Landover	Prince George's County MD	Storage, Service and Inspection, Running Repair
Southern Avenue	Prince George's County MD	Storage, Service and Inspection, Running Repair
Four Mile Run	Arlington County VA	Storage, Service and Inspection, Running Repair
West Ox	Fairfax County VA	Storage, Service and Inspection, Running Repair
Royal Street	City of Alexandria VA	Storage, Service and Inspection, Running Repair
Carmen Turner Facility	Prince George's County MD	Heavy Repair, Overhaul, Storage Service and Inspection, Running Repair

5.6. Projection of Maintenance Demand for Revenue Vehicles

The table below summarizes fleet maintenance needs from FY2010 to FY2020.

Table 5-4. Maintenance Demand for Revenue Vehicles

Fiscal Year	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
PEAK VEHICLES											
Peak Vehicle Scheduled - Beginning of Year	1,242	1,242	1,242	1,276	1,310	1,340	1,380	1,419	1,449	1,480	1,513
Net Increase in Expansion Buses	0	0	34	34	30	39	39	30	31	33	41
Peak Vehicles Scheduled - End of Year	**1,242**	**1,242**	**1,276**	**1,310**	**1,340**	**1,380**	**1,419**	**1,449**	**1,480**	**1,513**	**1,554**
DAILY MAINTENANCE REQUIREMENTS(1)											
Buses under Operating Maintenance	194	194	194	199	204	209	215	221	226	231	236
Buses under Mid-Life Overhaul(2)	20	20	20	20	23	23	23	23	23	23	23
Maintenance Total	**214**	**214**	**214**	**219**	**227**	**232**	**238**	**244**	**249**	**254**	**259**
Total Operating Fleet(3)	1,456	1,456	1,490	1,529	1,568	1,612	1,657	1,693	1,729	1,767	1,813

Notes:

Daily Maintenance Requirements(1): This summary captures an estimated number of buses required for maintenance on a daily basis, as buses rotate through various maintenance programs constantly.

Buses under Mid-Life Overhaul(2): The numbers here reflect the capacity Metro has for mid-life overhaul on any given day. Metro currently overhauls 100 buses annually and is expecting to increase the capacity to 116 buses annually by FY13.

Total Operating Fleet(3): It is an estimate of buses on scheduled service and going through maintenance on a daily basis. Because of the dynamic nature of fleet rotating through maintenance on a daily basis, this measure does not represent the actual total Metrobus fleet.

SECTION SIX: GARAGE FACILITIES

A growing bus fleet requires comparable garage facilities for bus fueling and storage as well as performing maintenance functions. Adequacy of garage capacity is another critical element of this bus fleet management plan as Metro projects the demand for 312 expansion buses, from 1,482 in the beginning of FY2010 to 1,794 by the end of FY2020 (Section 3.8). Metro will need a separate planning study to address specific elements of bus garages and to explore strategies for land acquisition.

This section of the bus fleet management plan intends to focus on the systemwide garage capacities and near-term potentials that are presently available or under discussions, therefore to provide an overall assessment of the ten-year garage growth in light of projected fleet growth.

6.1. Current Garage Capacity Constraints

There are nine garages serving the bus fleet in the District of Columbia, Maryland and Virginia as illustrated in Table 6-1. The garages have an average age of 49, with Northern being the oldest and West Ox being the newest facility.

Table 6-1. Garage Location and Capacity (June 2009)

Location	Garage	Year Built	Age	Capacity
District of Columbia	Bladensburg	1962	47	257
	Northern	1907	102	175
	Western	1945	64	138
Maryland	Landover	1989	20	210
	Montgomery	1983	26	240
	Southern	1922	87	103
Virginia	Four Mile Run	1977	32	218
	Royal Street	1945	64	83
	West Ox Road	2009	0	100
System	**Nine Garages**			**1,524**

Newer bus garages are designed for today's bus technology and maintenance practices, while older bus garages fall behind desired maintenance capabilities and demand intensive upkeep and investment in buildings, mechanical equipments and electrical systems.

As of June 2009, Metro's garages hosted 1,482 buses, including 1,456 buses for revenue service, 20 buses under overhaul and 6 buses reserved for training (Section 1.1). They have a combined storage capacity of 1,524 buses. As shown in Table 6-2, garages in the District of Columbia are over-capacity and those in Virginia are approaching capacity. Matching the bus garage capacity with bus service supply is a critical issue to Metro.

Table 6-2. Garage Capacity and Vehicle Assignments

Region	Scheduled Fleet	Strategic Bus	Spare Bus	Total Assignment(1)	Total Capacity	Net Capacity
DC Total	487	8	77	572	570	-2
Maryland Total	414	11	66	491	553	62
Virginia Total	316	6	50	372	401	29
System Total	1,217	25	194	1,436	1,524	88

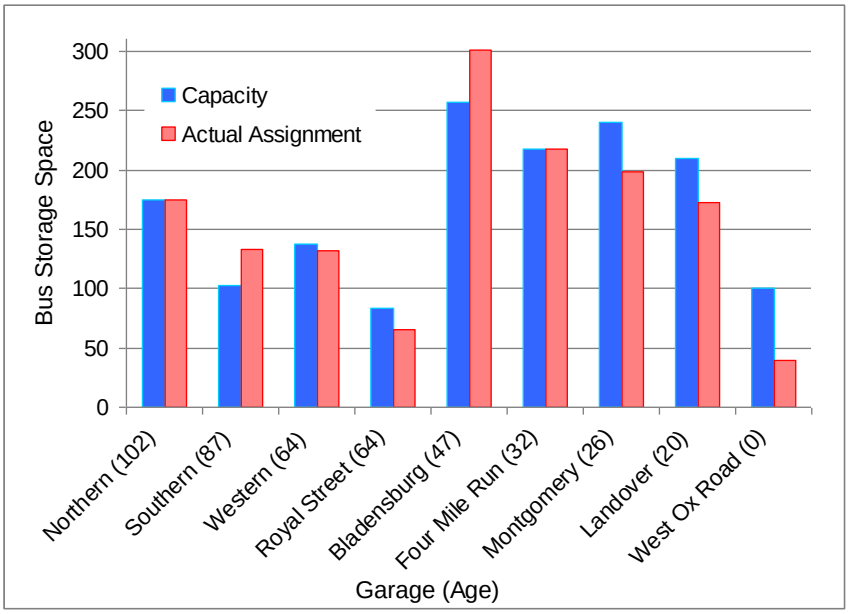
Notes:
This table is also referenced in Section 6 Table 6-2
Total Assignment(1): doesn't include 20 vehicles undergoing heavy overhaul on any given day.

Geographical distribution of bus assignments and capacity of individual garages differ significantly among the nine garages, affecting Metro's ability to provide buses to areas demanding high fleet growth. The majority of Metro's older garages, currently at or near capacity, are located in the District of Columbia and inner suburbs (see Figure 6-1), serving the core Metrobus market. The newer garages in outer suburbs, where less service is provided, have excess capacity, including Montgomery, Landover and West Ox garages located in Montgomery County, Prince George's County and Fairfax County respectively.

The present facilities also limit Metro's ability to purchase and deploy articulated buses and CNG buses. As transit demand continues to grow in the high ridership corridors in the Metrobus core market, conversion of standard buses to articulated buses would help to meet the ridership demand. Three operating divisions hosting articulated buses—Northern, Bladensburg and Montgomery—combined only provide eight maintenance bays for articulated buses. The lack of facility capacity constrains Metro from expanding articulated bus services in the core transit market in a cost effective manner. As for CNG buses, the majority of Metro's garages are not capable of providing CNG fueling nor can be feasibly modified to add CNG fueling. The only

two garages providing CNG fueling—Bladensburg and Four Mile Run—have been at or above CNG fueling capacity as well as total garage capacity. The Board made a decision to order hybrid buses only for the current bus purchase contract; however Metro has incorporated CNG fueling as a key requirement for the planned new or replacement garage facilities which will allow the use of CNG buses at the opening of DC Village (refer to Section 4.4.2 for Strategies for Fleet Mix).

Figure 6-1. Garage Capacity vs. Assignment



Advancements in vehicle technologies also present new challenges for bus garages. Older garages cannot be easily modified to provide fueling for compressed natural gas (CNG). Newer buses come with the placement of several components on the roof, making them taller and requiring changes in maintenance practices and equipment to reach these components. These modifications are not feasible at several facilities due to age and cost constraints.

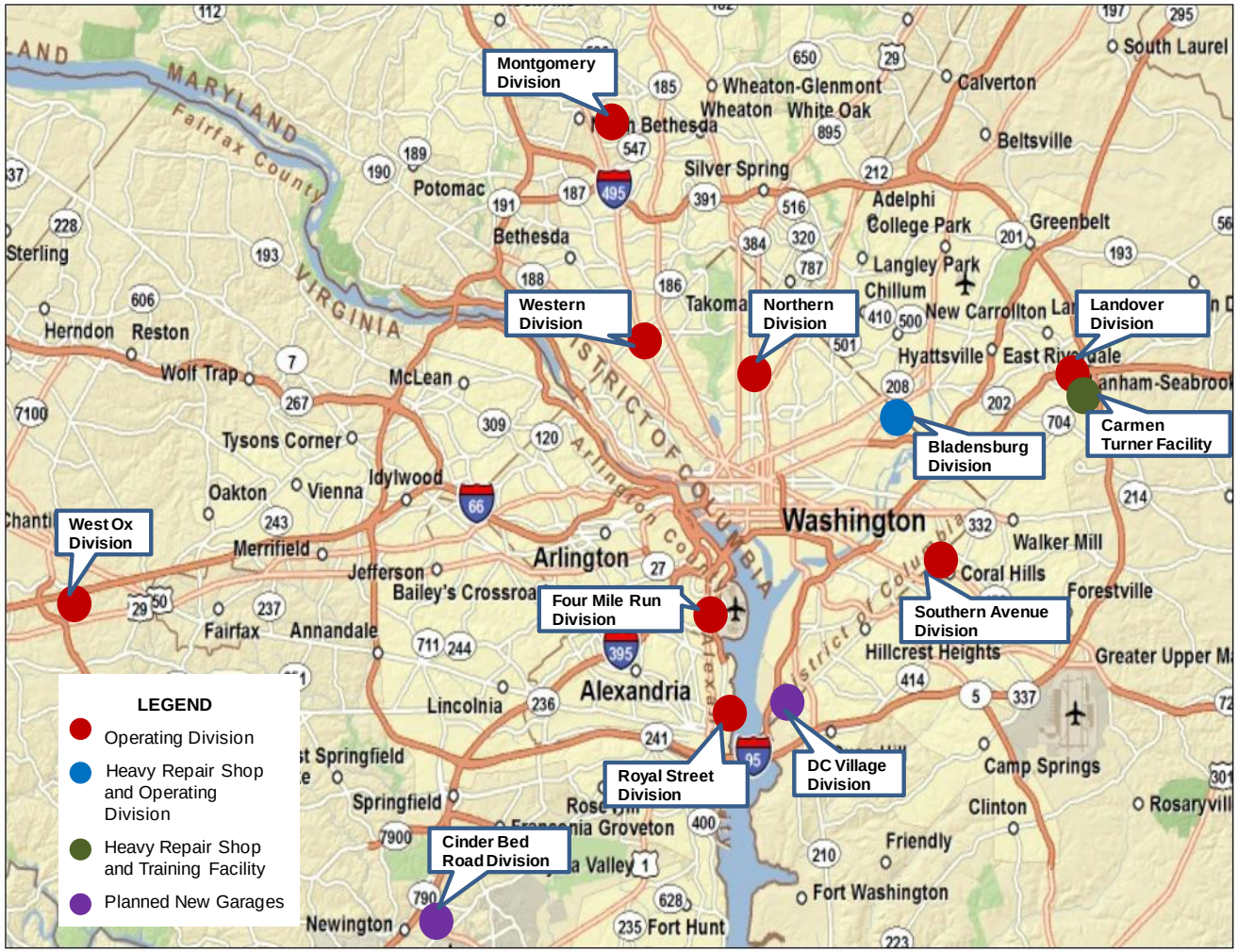
6.2. Garages under Development Consideration

Keenly aware of aging bus garage facilities, Metro has been exploring feasible bus garage development options across the region. The new West Ox garage is the result of a joint effort between Fairfax County and Metro to develop a county-owned site, where a Metrobus garage is co-located with a Fairfax Connector garage.

At present, two new garage proposals are advancing in their feasibility assessments: DC Village is in the final stages before construction will begin, and the proposed Cinder Bed Road garage could move into preliminary engineering once funding becomes available. The proposed six-

year CIP also included funding to construct a replacement garage for the Southern Avenue garage.

Figure 6-2. Location of Existing and Potential Facilities



6.2.1. DC Village Garage

DC Village is a new garage located in southwest Washington, D.C. to replace the capacity of the 70-year-old Metrobus Southeastern Garage. The Southeastern Garage was previously located near the new Nationals Baseball Stadium and the Navy Yard Metrorail station. It was closed in 2008 to accommodate developments associated with the stadium.

In July 2009, Metro purchased 16 acres at DC Village to build a new replacement garage. DC Village is approved as a 250 bus facility. It will have the fueling capability for both diesel and CNG buses. As of October 2009, the request for proposal (RFP) to design and build DC Village has been issued and award is anticipated in Spring 2010. Metro expects that DC Village will be open for service in late 2012.

Figure 6-3. Location of DC Village Garage

6.2.2. Cinder Bed Garage

Since 2008, Metro has been exploring a proposal to develop a new bus operations and maintenance facility on Cinder Bed Road in Fairfax County. Current operations at the Royal Street Garage will be relocated to the Cinder Bed site upon completion.

The proposed Cinder Bed Garage sites on 17 acres of land which provides far more expansion space than the Royal Street Garage. It is planned to house up to 160 buses, 77 more than the current capacity at Royal Street and have the fueling capability for CNG buses. Metro issued a RFP in November 2008 to call for the development and leasing of the facility to Metro. In April 2009, the Metro Board of Directors approved a non-binding partnership to express interest in the project.

Figure 6-4. Location of the Proposed Cinder Bed Garage

6.2.3. Other Garage Needs

The Northern, Southern Avenue and Western garage facilities are the three oldest in the Metrobus system, reaching the age of 102, 87 and 64 years respectively. Metro continues to maintain and improve the facilities to support bus operations and maintenance functions. However, these old garages are no longer considered cost effective for operations without complete rehabilitation for buildings and maintenance facilities.

All of them also face capacity constraints and need to be expanded to support ridership growth and network expansion. They are located in the areas where Metro operates a high level of service and are accommodating the fleet near or above the design capacity. The Southern Avenue garage currently hosts 133 buses, exceeding its capacity by 30 buses; the Northern garage is at capacity; and the Western is approaching capacity. According to APTA peer review

and industry standards, bus garage capacity should be in the range of 200 to 250 buses in order to achieve economies of scale for operations.

Metro is currently searching for candidate properties to replace the Southern Avenue garage and recently submitted a Notice-of-Interest to the District of Columbia proposing a replacement garage for Northern, potentially including Western, at the Walter Reed Army Medical Center site in northwest DC, which is under redevelopment planning by the City. The proposed replacement garage at Walter Reed is designed to accommodate a large number of articulated buses to serve the DC bus transit market.

6.3. Projection of Garage Capacity

At the opening of DC Village in FY2012, Metro will realize a significant increase in garage capacity from the current 1,524 buses to 1,774. If the Cinder Bed garage is completed on schedule, as shown in the January 14, 2010 Board presentation, the overall garage capacity will further expand to 1,851 by the end of FY2013. This includes the closing of the Royal Street garage and the opening of the Cinder Bed Road facility. The discussion below provides the projection and assumptions for garage capacity in the next ten years. Figure 6-6 illustrates the garage capacity projection along with the fleet size outlook.

This fleet plan assumes that DC Village, Cinder Bed Road and Southern Avenue replacement garages will be completed in FY2012, FY2013 and FY2014 respectively, as proposed in the FY2011-FY2016 CIP. However, the increase of capacity at the DC Village and Cinder Bed Road garages does not address capacity constraints and undesirable operating conditions at the older garages, including Northern and Western.

This plan further assumes that excess capacity that becomes available at the opening of DC Village and Cinder Bed Road garages can be used for bus staging, allowing Metro to rehabilitate Northern and Western garages during the subsequent years from FY2014 to FY2016, if not earlier. Rehabilitation or replacement of Northern and Western will enable Metro to implement service enhancements in the core transit market, including the PCN plan, conversion to articulated buses, and deployment of CNG buses. In the meantime, Metro should continue to seek opportunities to accelerate the rehabilitation or replacement of the Northern and Western garages.

Figure 6-5. Projection of Garage Capacity

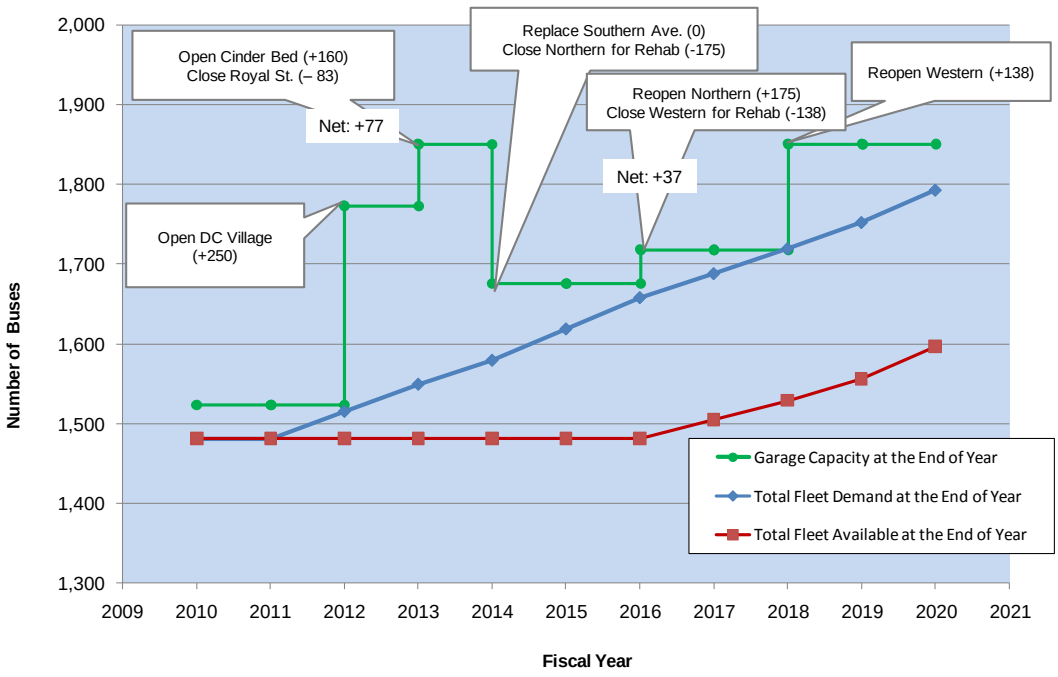
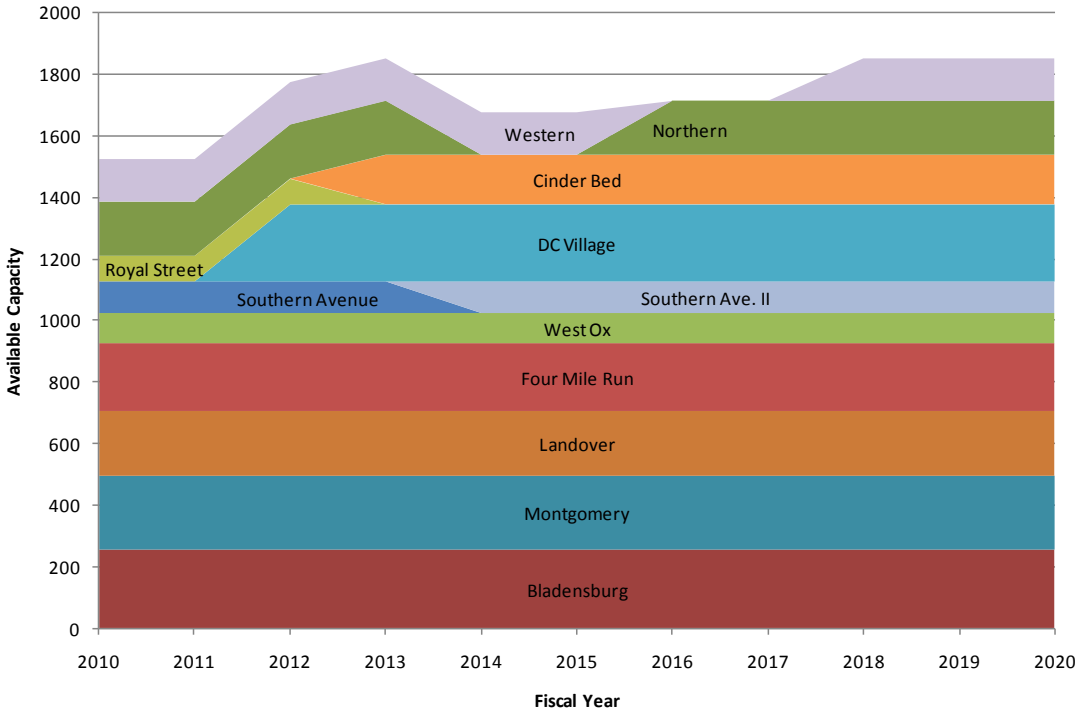


Figure 6-6. Illustration of Bus Maintenance Facility Capacities Over Time



SECTION SEVEN: SUMMARY

7.1. Fleet Demand and Supply Balance

Table 7-1 provides a summary showing the balance of demand for Metrobus vehicles and the supply of buses for the time period of this Metrobus fleet management plan. As discussed in the foregoing sections, this plan is a snapshot of an ongoing planning process. It takes into account the passenger demand for vehicles in revenue service and the demand that is placed on the fleet by system expansion and maintenance requirements. This section compares the network growth and maintenance needs to the supply of vehicles in both the present fleet and the anticipated new vehicle purchases.

Metro anticipates that network expansion and ridership growth will result in a need of 312 expansion buses over ten years, from 1,482 in the beginning of FY2010 to 1,794 by the end of FY2020. This expansion fleet is consistent with the recommendations of the ten-year Capital Needs Inventory (CNI), which clearly called for a procurement plan averaging 30 buses a year for system expansion, additional revenue services and supportive spare buses.

In the meantime, Metro continues to face funding challenges and cope with the shortage of buses for the ongoing network expansion. The current economic conditions further compound the funding shortage and, as a result, Metro has to reprioritize the limited funding in the FY2011 capital budget. To ensure funds for bus replacement and other urgent capital needs, the current capital budget and the fleet plan assume no expansion buses from FY2010 to FY2016, and between 30 and 40 buses thereafter.

The current funding challenges would result in a shortage of revenue buses starting FY2012. Even assuming funding will be back to the level recommended by CNI in FY2017, Metro would still face a shortage of nearly 200 buses by 2020. This shortage would hinder Metro's ability to provide high quality service to transit customers and affect the implementation of the priority corridor and emerging corridor networks. This shortage would also force Metro to retain its oldest buses in revenue service, instead of allowing for planned retirement, potentially worsening vehicle performance, increasing operating cost, and straining Metro's maintenance resources and capacity.

7.2. Outlook Beyond 2020

As discussed in Section 1, Metro conducts its capital planning on a ten-year basis and the fleet plan ties directly into the recommendations of the ten-year Capital Needs Inventory. Metro has no adopted policies or plans for bus fleet management beyond 2020. As such, it is only possible to present here a discussion of Metrobus fleet management beyond 2020 based on reasonable assumptions:

1. Growth of demand for Metrobus service will likely be lower, as local rail projects will assume a portion of the anticipated surface transit growth.
2. Metro will be able to acquire new buses at the same rate as 2020.
3. No additional garages or maintenance facilities will become available between 2020 and 2025.

The assumed projected fleet demand and supply, and garage capacity is illustrated in Figure 7-1.

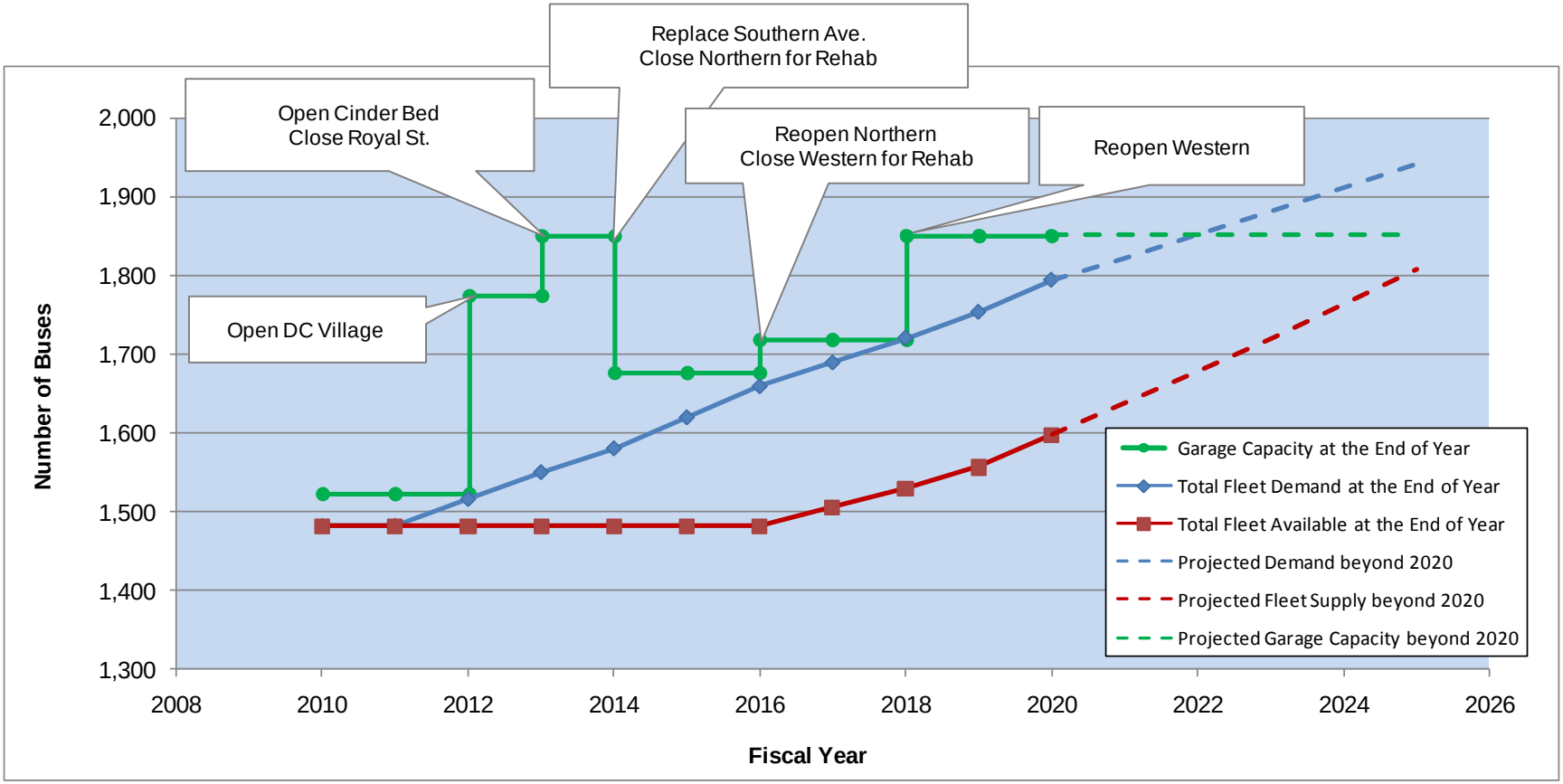
Growth of Fleet Demand. This plan assumes a constant rate of growth for surface transit. However, many local surface rail projects (including the DC Streetcar System, the Columbia Pike Streetcar [VA] and the Purple Line [MD]) are likely to come online in the 2020 to 2025 timeframe, if not earlier. These projects would have the ability to absorb much of the demand in a number of transit corridors, moderately reducing the overall growth rate of demand for Metrobus service.

Growth of Fleet Supply. It is assumed that Metro will continue to purchase new expansion buses between 2020 and 2025 at 40 buses a year, same as the assumed 2020 expansion purchase plan. Bus replacement will also continue at the 1/15th annual replacement ratio.

Garage and Maintenance Facilities. It is assumed that there will be no increases in storage or maintenance capacity between 2020 and 2025. According to Section 6 above, Metro will have garage capacity in 2020 for 1,851 buses. If the constant fleet size increase is anticipated beyond 2020 and Metro adheres to the replacement of one old bus with a new one, Metro would have enough garage space to accommodate the new vehicles in the foreseeable future.

In summary, the projection for the period of FY2020 through FY2025 assumes that the Metrobus system will continue to under-supply the region's network demand for bus transit. Even if the assumed rate of fleet purchase, the fleet size would likely approach garage storage capacity shortly after 2025. This would result in a lack of storage space to support fleet growth after 2025. If new funding sources are identified that can help fill the supply/demand gap, Metro could run out of bus storage capacity by 2022. Additionally, the fleet plan includes annual new bus purchases in excess of projected mid-life rehab capacity (Figure 5-5). For example, the 131 buses purchased in 2017 will require mid-life maintenance at about 120 buses annually in 2024 or 2025; however, the maintenance capacity of 116 vehicles per year is not projected to increase. In consideration of the fleet and garage capacity outlook beyond 2020, Metro should begin scoping potential sites located in growing transit markets to provide expansion for bus storage and maintenance capacity.

Figure 7-1. Projected Fleet Demand, Supply, and Garage Capacity



7.3. Strategies for Fleet Mix and Facility Development

With the assumed timetable for garage development (refer to Section 6.3), advancement in fuel technology and the resultant performance improvements of alternative fuel buses, Metro's CIP includes the purchase of CNG buses at the opening of DC Village, Cinder Bed Road and Southern Avenue replacement garages, all of which will be equipped with CNG fueling. To allow for the most cost effective use of articulated buses, this plan recommends Metro increase the purchase of additional articulated buses in the later years of the decade, when Metro completes the assumed timetable for the rehabilitation or replacement of Northern and Western garages.

It is urgent for Metro to invest in new garages and phase garage rehabilitation and replacement in the next few years, to allow Metro to operate its fleet and facilities cost effectively and achieve the economies of scale recommended by the industry. The assumed garage development timetable, capturing the current capital plans and development proposals, would allow Metro to achieve system garage overhaul at the end of the decade and provide excess storage, fueling and maintenance capacity for the system. However the plan recognizes the uncertainties associated with funding and timing for the planned garage development and recommends that once a clear timetable is determined on any proposed garages, Metro would need to finalize the purchase of types of buses that would best suit each new garage and the transit market it serves.

It is apparent that Metro needs to consider preparing for facility needs beyond 2020 to provide adequate capacity in support of future fleet and ridership growth.

7.4. Fleet Plan Review and Update

This fleet plan is a planning document that provides a fifteen-year outlook for fleet growth and garage development, consistent with other Metro capital programs—FY2011-FY2016 CIP and FY2011-FY2020 CNI—and garage development proposals. This plan should generally be updated every five years and reviewed on a frequent basis to reflect changes in regional transit system, fleet management, vehicle technology and facility expansion. At the time of this plan development, local jurisdictions have initiated plans for the expansion of local bus systems (such as DC Circulator, Fairfax Connector and others) and the construction of new surface streetcar and light rail systems, all of which could impact demand for Metrobus service in a number of corridors. However, for the time being, none of these service expansion projects, or the associated transit operations plans, are finalized or fully funded so the impacts are uncertain.

In conclusion, this fleet plan identifies the anticipated needs and gaps of the Metrobus fleet and facilities in the next 10 to 15 years. In anticipating economic recovery in the short term and transit ridership growth in the coming decade, Metro will need to seek additional funding

sources to put the bus expansion schedule back on track, support garage renovation and capacity expansion, and enhance operating maintenance and overhaul capabilities.

Table 7-1. Vehicle Demand and Supply Balance

Fiscal Year	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
SYSTEM FLEET DEMAND											
Peak Buses at the Beginning of Year	1,242	1,242	1,242	1,276	1,310	1,340	1,380	1,419	1,449	1,480	1,513
Expansion Requirements (Table 3-8)	-	-	34	34	30	39	39	30	31	33	41
Peak Vehicle at the End of Year	1,242	1,242	1,276	1,310	1,340	1,380	1,419	1,449	1,480	1,513	1,554
Fleet under Maintenance	214	214	214	219	227	232	238	244	249	254	259
Total Fleet Demand at the End of Year(1)	1,482	1,482	1,516	1,550	1,580	1,619	1,659	1,689	1,720	1,753	1,794
VEHICLE SUPPLY											
Fleet at the Beginning of Year	1,482	1,482	1,482	1,482	1,482	1,482	1,482	1,482	1,505	1,530	1,556
Projected Procurement for Growth								30	31	33	41
Projected Procurement for Replacement	148	52	100	80	80	95	96	101	102	104	128
Projected Retirement	(148)	(52)	(100)	(80)	(80)	(95)	(96)	(108)	(109)	(110)	(128)
Total Fleet Supply at the End of Year(2)	1,482	1,482	1,482	1,482	1,482	1,482	1,482	1,505	1,530	1,556	1,597
SUPPLY/DEMAND BALANCE											
Supply vs. Demand at the End of Year	0	0	(34)	(68)	(98)	(137)	(177)	(184)	(191)	(197)	(197)
Total Fleet Available at the End of Year	1,482	1,482	1,482	1,482	1,482	1,482	1,482	1,505	1,530	1,556	1,597
GARAGE CAPACITY											
Garage Capacity at the End of Year(3)	1,524	1,524	1,774	1,851	1,676	1,676	1,719	1,719	1,851	1,851	1,851

Notes:

Total Fleet Demand at the End of Year(1): Refer to fleet demand summary in Section Three Table 3-8

Total Fleet Supply at the End of Year(2): Refer to fleet supply summary in Section Four Table 4-2

Garage Capacity at the End of Year(3): Refer to garage development timetable in Section Six

APPENDICES

Appendix 1. Metrobus Fleet by Type (June 2009)

Division	Location	Mini Diesel(2)	Small CNG(3)	Small Diesel(3)	Standard Diesel(4)	Standard CNG(4)	Standard Hybrid(4)	Articulated Diesel	Articulated CNG	Total Assigned Fleet
Bladensburg	DC	0	19	0	40	207	0	15	19	300
Northern	DC	0	0	0	129	0	15	27	0	171
Western	DC	0	0	16	86	0	30	0	0	132
Sub Total	**DC**									**603**
Southern Avenue	MD	0	0	27	106	0	0	0	0	133
Landover	MD	0	0	18	130	0	25	0	0	173
Montgomery	MD	0	0	0	161	0	25	12	0	198
Sub total	**MD**									**504**
Four Mile Run	VA	6	16	0	0	196	0	0	2	220
West Ox	VA	0	0	0	90	0	0	0	0	90
Royal Street	VA	0	0	0	65	0	0	0	0	65
Sub-Total	**VA**									**375**
System Total (1)		6	35	61	807	403	95	54	21	1,482

Notes:

This table details the fleet type summarized in Section One Table 1-1. It reflects fleet numbers and sizes by the end of June 2009.

System Total(1): Includes buses under maintenance and heavy overhaul on a daily basis

Mini diesel buses(2): Vehicles with a length of 26 Feet

Small buses(3): Vehicles with a length of 30 - 35 Feet

Standard buses(4): Vehicles with a length of 35 - 42 Feet

Appendix 2. Peak Vehicle Requirement (June 2009)

Division	Location	Small Bus	Pullout Period	Standard Bus	Pullout Period	Articulated Bus	Pullout Period	Peak Requirement	Total Fleet Assignment
Bladensburg	DC	15	AM/PM	210	AM	13	PM	238	300
Northern	DC	2	AM/PM	127	AM	14	PM	143	171
Western	DC	15	AM/PM	99	AM			114	132
Sub-Total	**DC**							**495**	**603**
Southern Avenue	MD	21	AM/PM	94	PM			115	133
Landover	MD	11	PM	131	PM			142	173
Montgomery	MD			147	AM/PM	21	PM	168	198
Sub Total	**MD**							**425**	**504**
Four Mile Run	VA	5	AM/PM	184	PM			189	220
West Ox	VA	17	AM/PM	61	PM			78	90
Royal Street	VA			55	PM			55	65
Sub Total	**VA**							**322**	**375**
System Total(1)		86		1,108		48		1,242	1,482

Notes:

This table details the peak vehicle requirement summarized in Section Three Table 3-3

System Total (1): Includes buses under maintenance and heavy overhaul on a daily basis

Appendix 3. Allocation of Expansion Buses for Revenue Service

Net Change from Existing in 2020

Jurisdiction	Priority Corridor Network (PCN)	Service Adjustments		Conversion of Standard Bus to Articulated Bus(1)	Seat Loss	Spares to Support Additional Revenue Fleet	Total Additional Fleet Required
		Service Evaluation	Crowding Relief/Service Reliability				
District of Columbia	59	34	38	(13)	16	21	154
Maryland	40	16	17	(7)	9	12	87
Virginia	24	13	17	0	7	10	71
System Total	123	63	72	(20)	32	42	312

Notes:

This table details fleet expansion detailed in Section Three Table 3-8. The proposed conversion to articulated buses is based on the recommendations of the 2007 Metrobus Network Evaluation.

Conversion of Standard Bus to Articulated Bus(1): Number of standard buses reduced due to the conversion of service to articulated buses.

Appendix 4. Total Expansion Buses by Type

Net Change from Existing in 2020

Jurisdiction	Small Bus	Standard Bus	Artic Conversion			Net New Buses Required	Share
			New Artic Bus(1)	Standard Bus Converted to Artic	Net Change(2)		
District of Columbia	1	166	48	61	(13)	154	49%
Maryland	0	94	22	29	(7)	87	28%
Virginia	0	71	0	0	0	71	23%
Total	1	331	70	90	(20)	312	100%

Notes:

This table summarizes the net fleet demand detailed in Section Three Table 3-8

New Artic Bus (1): All articulated buses are procured for the purpose of fleet replacement, not for expansion

Net Change(2): All standard buses replaced by articulated buses will be retired from revenue service, resulting in a reduction of 19 buses for the entire fleet

Appendix 5. Network Driven Fleet Demand Projection

Fiscal Year	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
PEAK VEHICLES IN SERVICE											
Peak Vehicles Scheduled for Service (Beginning of Year)	**1,242**	**1,242**	**1,242**	**1,276**	**1,310**	**1,340**	**1,379**	**1,418**	**1,449**	**1,480**	**1,513**
Additional Buses for Service (During the Year)	28	24	34	34	30	39	39	30	31	33	41
Priority Corridor Network(1)	8	4	12	12	9	15	15	15	15	15	15
Service Adjustment(2)	13	14	14	14	14	15	15	15	16	16	16
Artic Conversion Adjustment	0	0	0	0	0	0	0	(7)	(7)	(6)	0
Seat Loss	3	3	3	3	3	4	4	3	3	3	4
Additional Spares (3)	4	3	5	5	4	5	5	4	4	4	5
Buses Redeployed from Service Reduction (4)	(28)	(24)									
Peak Vehicles Scheduled for Service (End of Year)	**1,242**	**1,242**	**1,276**	**1,310**	**1,340**	**1,379**	**1,418**	**1,449**	**1,480**	**1,513**	**1,554**
SYSTEM VEHICLE REQUIREMENTS											
Total Fleet Demand (Beginning of Year)	**1,482**	**1,482**	**1,482**	**1,516**	**1,550**	**1,580**	**1,619**	**1,659**	**1,689**	**1,720**	**1,753**
Strategic Buses	25	25	25	25	25	25	25	25	25	25	25
Total Expansion Buses Required (5)	0	0	34	34	30	39	39	30	31	33	41
Total Fleet Demand (End of Year)	**1,482**	**1,482**	**1,516**	**1,550**	**1,580**	**1,619**	**1,659**	**1,689**	**1,720**	**1,753**	**1,794**

Notes:

This table is referenced in Section Three Table 3-8

Priority Corridor Network(1): Starting 2016, Metro plans to implement emerging corridors on a schedule of three corridors each year

Service Adjustment(2): Service Adjustment includes buses required for alleviating crowding and improving service reliability

Additional Spares(3): These additional spare buses are to support additional buses scheduled during the year. Metro uses 15.6% as operating spare ratio

Buses Redeployed From Service Reduction (4): These are buses redeployed from discontinued services in FY10 and FY11

Total New Buses Required (5) = Additional Buses Scheduled During the Year + Additional Supporting Spares

Appendix 6. Supply of Revenue Vehicles

Fiscal Year	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Fleet at the Beginning of Year	1,482	1,482	1,482	1482	1,482	1,482	1,482	1,482	1,505	1,530	1,556
Total Projected Fleet Purchase											
Total Projected Fleet Purchase	**148**	**52**	**100**	**80**	**80**	**95**	**96**	**131**	**133**	**137**	**169**
Projected Purchase for Fleet Expansion(1)								30	31	33	41
Projected Fleet Purchase for Fleet Replacement(2)	148	52	100	80	80	95	96	101	102	104	128
Projected Purchase for Mini/Small/Standard buses	148	52	100	80	80	73	96	78	79	80	106
Projected Purchase of Articulated Buses(3)						22		23	23	24	22
Total Projected Fleet Retirement											
Total Projected Fleet Retirement(4)	**(148)**	**(52)**	**(100)**	**(80)**	**(80)**	**(95)**	**(96)**	**(108)**	**(109)**	**(110)**	**(128)**
Standard/Mini Buses Retired from Replacement	(148)	(52)	(100)	(80)	(80)	(73)	(96)	(78)	(79)	(80)	(106)
Standard Buses Retired from Artic Bus Conversion								(30)	(30)	(30)	
Articulated Buses Retired						(22)					(22)
Total Fleet Supply at the End of Year	**1,482**	**1,482**	**1,482**	**1,482**	**1,482**	**1,482**	**1,482**	**1,505**	**1,530**	**1,556**	**1,597**

Notes:

This table is referenced in Section Four Table 4-4

Projected Purchase for Fleet Expansion(1): Due to the current economic conditions and fiscal constraint, Metro assumes significant reduction in the purchase of expansion fleet, consistent with the proposed six-year CIP. However, Metro anticipates that funding for expansion will be return to recommended levels starting in FY2017.

Projected Purchase for Fleet Replacement (2): Metro performs a mid-life rehab on buses at 7.5 years. This extends the lifespan of each bus to 15 years. Metro replaces about 100 buses a year based on CIP budget and schedule. Starting in 2016, Metro will begin to replace 1/15th of its fleet each year, with an additional 44 articulated buses in FY15 and FY20.

Project purchase of Articulated Buses(3): This plan assumes a total of 114 artic buses purchased under the fleet replacement program. This includes 44 artic buses in 2015 and 2020 to replace the 2003 Neoplans and the 2008 NABIs and another 70 articulated buses to replace standard buses in high ridership corridors.

Projected Retirement (4): Metro retires buses on a 1 to 1 ratio as replacement buses of the same size are purchased. When Metro replaces standard buses with articulated buses, a higher number of standard buses can be retired as a result of the higher seating capacity from the replacement articulated buses.

Appendix 7. Metrobus Garage Capacity, June 2009

Division	Location	Capacity(1)	Functions Performed
Bladensburg	District of Columbia	257	Heavy Repair, Overhaul, Storage Service and Inspection, Running Repair
Northern	District of Columbia	175	Storage, Service and Inspection, Running Repair
Western	District of Columbia	138	Storage, Service and Inspection, Running Repair
Montgomery	Montgomery County, MD	240	Storage, Service and Inspection, Running Repair
Landover	Prince George's County, MD	210	Storage, Service and Inspection, Running Repair
Southern Avenue	Prince George's County, MD	103	Storage, Service and Inspection, Running Repair
Four Mile Run	Arlington County, VA	218	Storage, Service and Inspection, Running Repair
West Ox	Fairfax County, VA	100	Storage, Service and Inspection, Running Repair
Royal Street	City of Alexandria, VA	83	Storage, Service and Inspection, Running Repair
Total		**1,524**	

Notes:

This table is referenced in Section Six Table 6-1

Capacity(1): Does not include storage for contingency fleet which is stored non-operations facility

Appendix 8. Maintenance Demand for Revenue Vehicles

Fiscal Year	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
PEAK VEHICLES											
Peak Vehicle Scheduled - Beginning of Year	1,242	1,242	1,242	1,276	1,310	1,340	1,380	1,419	1,449	1,480	1,513
Net Increase in Expansion Buses	0	0	34	34	30	39	39	30	31	33	41
Peak Vehicles Scheduled - End of Year	**1,242**	**1,242**	**1,276**	**1,310**	**1,340**	**1,380**	**1,419**	**1,449**	**1,480**	**1,513**	**1,554**
DAILY MAINTENANCE REQUIREMENTS(1)											
Buses under Operating Maintenance	194	194	194	199	204	209	215	221	226	231	236
Buses under Mid-Life Overhaul(2)	20	20	20	20	23	23	23	23	23	23	23
Maintenance Total	**214**	**214**	**214**	**219**	**227**	**232**	**238**	**244**	**249**	**254**	**259**
Total Operating Fleet(3)	**1,456**	**1,456**	**1,490**	**1,529**	**1,568**	**1,612**	**1,657**	**1,693**	**1,729**	**1,767**	**1,813**

Notes:

This table is referenced in Section Five Table 5-4

Daily Maintenance Requirements(1): This summary captures an estimated number of buses required for maintenance on a daily basis, as buses rotate through various maintenance programs constantly.

Buses under Mid-Life Overhaul(2): The numbers here reflect the capacity Metro has for mid-life overhaul on any given day. Metro currently overhauls 100 buses annually and is expecting to increase the capacity to 116 buses annually by FY13.

Total Operating Fleet(3): It is an estimate of buses on scheduled service and going through maintenance on a daily basis. Because of the dynamic nature of fleet rotating through maintenance on a daily basis, this measure does not represent the actual total Metrobus fleet.

Appendix 9. Vehicle Demand and Supply Balance

Fiscal Year	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
SYSTEM FLEET DEMAND											
Peak Buses at the Beginning of Year	1,242	1,242	1,242	1,276	1,310	1,340	1,380	1,419	1,449	1,480	1,513
Expansion Requirements (Table 3-8)	-	-	34	34	30	39	39	30	31	33	41
Peak Vehicle at the End of Year	1,242	1,242	1,276	1,310	1,340	1,380	1,419	1,449	1,480	1,513	1,554
Fleet under Maintenance	214	214	214	219	227	232	238	244	249	254	259
Total Fleet Demand at the End of Year(1)	**1,482**	**1,482**	**1,516**	**1,550**	**1,580**	**1,619**	**1,659**	**1,689**	**1,720**	**1,753**	**1,794**
VEHICLE SUPPLY											
Fleet at the Beginning of Year	1,482	1,482	1,482	1,482	1,482	1,482	1,482	1,482	1,505	1,530	1,556
Projected Procurement for Growth								30	31	33	41
Projected Procurement for Replacement	148	52	100	80	80	95	96	101	102	104	128
Projected Retirement	(148)	(52)	(100)	(80)	(80)	(95)	(96)	(108)	(109)	(110)	(128)
Total Fleet Supply at the End of Year(2)	**1,482**	**1,482**	**1,482**	**1,482**	**1,482**	**1,482**	**1,482**	**1,505**	**1,530**	**1,556**	**1,597**
SUPPLY/DEMAND BALANCE											
Supply vs. Demand at the End of Year	0	0	(34)	(68)	(98)	(137)	(177)	(184)	(191)	(197)	(197)
Total Fleet Available at the End of Year	**1,482**	**1,482**	**1,482**	**1,482**	**1,482**	**1,482**	**1,482**	**1,505**	**1,530**	**1,556**	**1,597**
GARAGE CAPACITY											
Garage Capacity at the End of Year(3)	**1,524**	**1,524**	**1,774**	**1,851**	**1,676**	**1,676**	**1,719**	**1,719**	**1,851**	**1,851**	**1,851**

Notes:

This table is referenced in Section Seven Table 7-1

Total Fleet Demand at the End of Year(1): Refer to fleet demand summary in Section Three Table 3-8

Total Fleet Supply at the End of Year(2): Refer to fleet supply summary in Section Four Table 4-2

Garage Capacity at the End of Year(3): Refer to garage development timetable in Section Six