2011-2020

Capital Needs Inventory

Washington Metropolitan
Area Transit Authority

Metro Capital Needs Inventory

Table of Contents

Introduction — Capital Needs Inventory

The Capital Needs Inventory (CNI) documents Metro's vehicle, infrastructure, facility, technology and system needs over the next ten years (FY 2011 – 2020).

Thanks to long-term investment by jurisdictional partners and the federal government, Metro fulfills a critical role in the region.

Metro's Role in the Region

In FY 2009,[1] close to 360 million trips were taken on Metro, with riders traveling to work, school, tourist sites and other destinations in the Washington, DC region. Thanks to long-term investment by jurisdictional partners and the federal government, Metro fulfills a critical role in the region. As Metro faces daunting capital needs over the next 10 years, the region is asked to continue its investment in order to support safety and reliability, preserve current levels of service, address growing ridership and improve the customers' experience. The reasons to invest in Metro are clear:

- Metro moves people
- Metro promotes and supports the region's economy
- Metro improves the environment
- Metro strengthens the national capital area's safety

Metro moves people

Metro is in the business of giving people a transportation choice. Metro directly benefits those who use the transit system, providing regional mobility and access for work, school and recreation. On an average weekday in FY 2009, Metro ridership totaled about 1.2 million (close to 750,000 trips on Metro's rail system, 440,000 on Metro's buses and 7,500 on Metro's paratransit service). Riders come from a 1,500 square mile area containing 3.5 million residents and hundreds of thousands of tourists. Metro is the 2nd largest rail transit system, the 6th largest bus network, and the 8th largest paratransit service provider in the United States.

Without Metro, people would not be able to get to and from work. The 2007/2008 household travel study conducted by the Metropolitan Washington Council of Governments found that 17% of the region's commuting trips are on transit. Nationally, only 5% of commuting trips are on public transportation (2000 Census). In the center core of Washington, DC and parts of Arlington County, 43% of workers use transit. About half of Metrorail stations serve federal facilities, and federal employees make up nearly half of Metro's peak period commuters. Public transit is also a vital link for citizens with disabilities who rely on MetroAccess, a paratransit service for people who cannot use fixed-route bus or rail systems. Operating in compliance with the Americans with Disabilities Act of 1990, MetroAccess meets the needs of thousands of people per day.

1 The Metro fiscal year runs from July 1 to June 30.

Looking to the future, the Washington, DC region is projected to experience significant growth. In a 2008 study, the Metropolitan Washington Council of Governments projected that from 2005 to 2030, employment in the region is expected to increase by nearly 40%, population by 32% and households by 35%. Given these growth patterns, Metro ridership will grow. From 2009 and 2020, average daily Metrorail ridership is expected to grow by about 20%. Over the same period, average daily Metrobus ridership is projected to grow by 10-15%. Of all its modal services, MetroAccess is expected to experience the fastest growing ridership at 112%.[2]

These projections mirror national data indicating more and more people are choosing transit. From 1995-2008, ridership on public transit went up 38%. This is faster than the growth in automobile use over this period (21%) or population growth (14%). In 2008, there were over 10.7 billion passenger trips on transit in the U.S., a 4% increase from 2007.

Metro wants to be the ride of choice for everyone in our region, including existing and future residents and visitors. The investments outlined in the CNI will enable Metro to continue to fill its role as a people mover.

Metro wants to be the ride of choice for everyone in our region, including existing and future residents and visitors. The investments outlined in this Capital Needs Inventory will enable Metro to continue to fill its role as a people mover.

Metro promotes and supports the region's economy

Besides getting people to and from work, public spending for transit is an investment in job creation. According to a 2009 study by the American Public Transportation Association (APTA), every $1 billion of investment in transit capital infrastructure supports 24,000 jobs. Metro creates direct jobs through its workforce of 10,000 employees which includes bus and rail operators, maintenance technicians, transit police officers, engineers, accountants and employees in many other fields. Metro also supports local job creation and the economy through the purchase of goods and services. Many of these transactions benefit small local businesses and disadvantaged business enterprises.

Over 16.6 million visitors came to DC in 2008, many of whom used Metro to see the sights. Metro's easy-to-use transit system makes the DC region an even more attractive place to visit. The importance of providing transportation to visitors was never more apparent than on Inauguration Day 2009. To accommodate record number of visitors, Metro operated trains for 22 consecutive hours, including 17 straight hours of rush hour service. This type of "stepped-up service" is also provided for the multitude of other special events that occur in the DC region.

Public transportation contributes to creating places where one wants to invest, live and work. This kind of development is referred to as transit-oriented development (TOD).

2 Regional growth projections from Metropolitan Washington Council of Governments Round 7.1 Cooperative Land Use Forecasts (2008). Metrobus and Metrorail ridership projections developed using Round 7.0 forecasts (2006). Paratransit ridership projections from HDR|HLB Decision Economics, Inc. study Paratransit Demand Statistical Analysis and Policy Scenario Analysis (2007) and MetroAccess Revenue Vehicle Fleet Management Plan (2009). All studies present projections of future growth and can be impacted by external factors.

Metro's Rosslyn-Ballston corridor in Arlington County is a nationally recognized example of how transit can help concentrate, sustain and attract development.

TODs are mixed-used communities within walking distance of transit that combines residential, retail, office, open space and public uses in a way that makes it convenient to travel on foot or by public transportation instead of a car. Like a business, transit adds value to land because of the improved accessibility it creates, but unlike a business, transit does not directly capture the value it creates. Instead, an increase in demand for TOD results in an increase in revenue for local communities and property owners. This in turn supports services provided by local government such as schools, public utilities, police and firefighting. APTA estimates that every dollar invested in public transportation projects generates six dollars in local economic returns. And every $10 million invested brings $30 million in new sales to businesses.

Metro's Rosslyn-Ballston corridor in Arlington County is a nationally recognized example of how transit can help concentrate, sustain and attract development. When the Ballston Metro station opened in 1979, the area was mostly used-car lots. The County encouraged denser residential development near the station, and with that came more retail. Today the area is filled with restaurants, shops and offices, bringing customers and workers to the area, and as a result, increasing tax revenues. The Urban Land Institute estimated that in Arlington County, development in two Metrorail corridors is concentrated on 6% of the land in the County but produces almost half of the County's tax revenues. The Wheaton Metro station area in Montgomery County, MD and the U St. and 14th St. corridors in DC have also benefited from their proximity to Metrorail. The DC Office of Planning has stated that the development value within 10-minute walk of Metro stations in DC is $37 billion.

Finally, Metro helps promote the economy by saving people money. Recent research by the American Public Transit Association (APTA) estimated that people using public transit save over $9,000 a year in avoided parking, gasoline, insurance, maintenance and repairs costs. Metro also benefits those residents who do not use transit. On a daily basis, Metro buses and trains take 500,000 cars off the road reducing congestion thus saving people time. Businesses benefit from Metro's transit services by spending less on fuel and not having to pay employees to sit in traffic. The Texas Transportation Institute reports that the congestion relief created through Metro services saves people in the region an estimated 26 million hours of travel time and an estimated $521 million each year.

Much of the anticipated new development in the region is expected in areas with transit access, supporting economic growth and providing benefits for local jurisdictions. The investments outlined in this CNI are investments in the region's economic future.

Metro improves the environment

Metro provides substantial environmental benefits to the region, eliminating more than 1 million tons of pollutants from the air each year. These reductions are a

result of removing cars from the road and operating an eco-friendly bus fleet. Metro's nearly 1,500 buses are fueled by a combination of compressed natural gas, advanced technology diesel, and diesel-electric hybrid buses. By using advanced engines, fuel and exhaust treatments, Metro greatly reduces fleet emissions and fuel consumption. Nationally public transportation saves the U.S. the equivalent of 34 supertankers of oil a year or 900,000 automobile fill-ups every day.

Public transportation offers an immediate alternative for individuals seeking to reduce their energy use and carbon footprint. The benefits gained by taking public transportation far exceeds the combined benefits of using energy-efficient light bulbs, adjusting thermostats, weatherizing one's home, and replacing a refrigerator. According to ATPA, switching to public transportation reduces individual carbon emissions by 20 pounds per day or 4,800 pounds per year.

Metro's CNI continues investment in vehicles and technology that protect the environment. In addition, all new and substantially renovated Metro facilities will meet new energy efficient standards such as the U.S. Green Building Council's Leadership in Energy and Environmental Design (LEED) Silver certification.

Metro provides substantial environmental benefits to the region, eliminating more than 1 million tons of pollutants from the air each year.

Metro strengthens the national capital area's security

Metro has the only tri-jurisdictional police force in the United States, operating in the District of Columbia, Virginia and Maryland. Metro's transit police department (MTPD) consists of 458 sworn officers, security special police and civilian personnel. The department provides protection for Metro riders, personnel, transit facilities and fare collection operations. MTPD officers have jurisdiction and arrest powers for crimes that occur in or against Metro facilities. Uniformed and plainclothes officers ride Metrobuses and patrol Metrorail trains, stations, and parking lots.

MTPD officers work proactively in the community to reduce crimes within the Metro system. Officers educate riders about how to travel safely and protect their personal belongings from theft. This is done in partnership with two dozen local, state and federal law enforcement agencies. Officers also work closely with public school administrators and teachers to address student behavior in the Metro system. This includes visits to area schools to talk with students and parents about MTPD efforts and expectations.

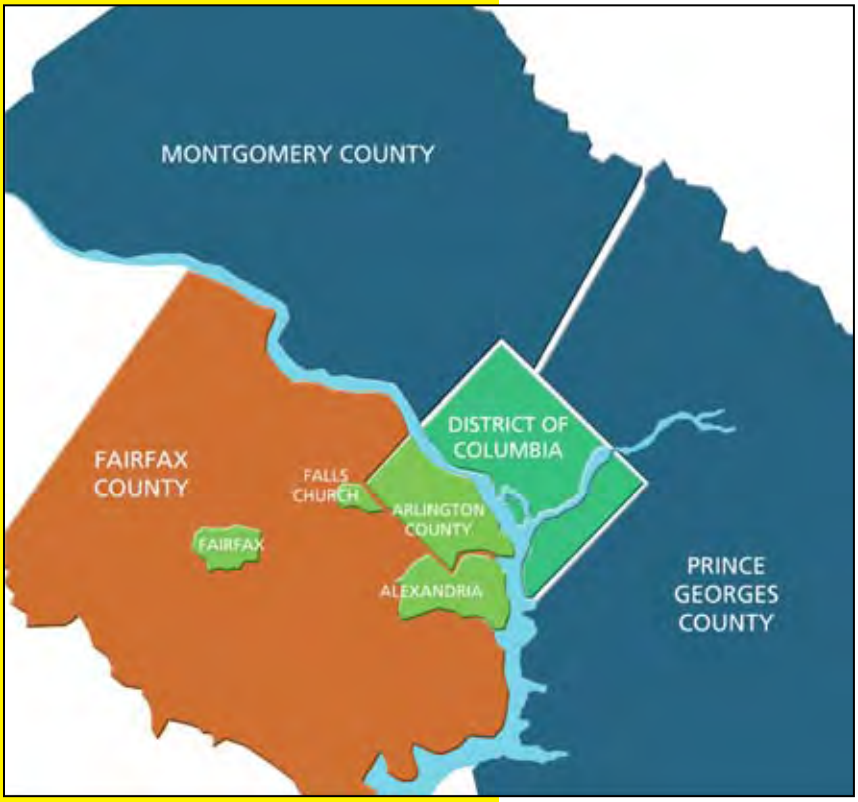
MTPD plays a significant role in our region's security, particularly in the prevention of threats to the transit system and providing emergency response when needed. Several of MTPD's prevention strategies are visible including uniformed patrols, cameras in stations and chemical and biological detection devices but many are non-visible activities. MTPD works with the FBI Local and National Joint Terrorism Task Force to ensure transit security information is shared in a timely and efficient manner. MTPD's special operations division includes explosive detection and

anti-terrorism teams, and provides security and crowd control at special events impacting Metro. In the case of a crisis or emergency, Metro serves as a critical evacuation mode for the region.

Statistically, mass transit is the safest mode of transportation. Historically, highway crashes are the leading cause of death among Americans 3 to 34 years old, and the third leading cause of death in the U.S. among all persons under the age of 70. In 2006, there were 31,326 occupant fatalities on U.S. roadways (includes passenger cars, vans, SUVS and light trucks). In the same year, less than 1% of all fatalities occurred on U.S. urban public transit systems. Of these, 94 resulted from bus incidents, 125 from rail incidents (light, heavy and commuter) and 8 from other public transit modes. Similarly, of the total transportation injuries in 2006, 99.9% were on U.S. roadways while .01% occurred on public transit systems.

The CNI will enable Metro to keep safety and security a priority.

Metro's Transit Zone



Note: Service to Loudoun County is anticipated to begin in FY 2017 with the extension of Metrorail to Dulles Airport.

Overview of Future Transit Demand

The Metropolitan Washington Council of Governments projects that from 2005 to 2030 employment in the region is expected to increase by nearly 40%. Population is expected to grow by 32% and households by 35%. Job growth in northern Virginia and the Maryland suburbs is expected to increase by 51% and 38%, respectively, and population growth in Loudoun County is expected to increase by a notable 89%. The District of Columbia is laying the foundation to increase its population by 24% by increasing its housing stock and expanding community-based retail. This phenomenal growth will translate into increased demand for Metrorail, Metrobus and MetroAccess services.

Regional Growth: 2005-2030

	Employment	Population
Metropolitan Total	38%	32%
Metro Service Area	33%	23%
Inside Beltway	23%	24%
Outside Beltway	41%	23%
Outer Suburbs	65%	61%

Source: MWCOG Round 7.1 Cooperative Land Use Forecasts, 2008

Metrorail

On an average weekday in FY 2009 there were about 750,000 trips on Metrorail. In FY 2009, there were a total of 223 million Metrorail trips. Looking to the future, the Station Access and Capacity Study (2008) estimated that ridership would grow at about 1.7% per year. The projected growth is primarily driven by system expansion—the Dulles Corridor Metrorail extension—and regional growth. Additional ridership growth could also occur as a result of increased gas prices or faster household/employment growth. Taking these causal effects into account, overall growth between 2009 and 2020 is estimated at about 20% to 910,000 average weekday trips. By 2030, Metrorail ridership is expected to be close to 1 million trips a day. Inauguration Day 2009 gave Metro a "sneak preview" of what ridership will be like in the future. To accommodate that record ridership (1.1 million trips on Metrorail), Metro operated trains for 22 consecutive hours, including 17 straight hours of rush hour service. Even with this unprecedented amount of service, customers experienced long lines, crowded platforms and packed trains.

By 2030, Metrorail ridership is expected to be close to 1 million trips a day.

The two figures below illustrate how Metro's rail system will become overcrowded in the future. Without fleet expansion, most rail lines will be congested by 2020, with the Orange/Dulles Line exceeding capacity (greater than 120 passengers per car). With expansion to 100% 8-car trains during peak periods, most rail lines will have adequate capacity through 2030, though the Orange/Dulles Line will exceed 120 passengers per car as 2030 approaches. Metrorail's expanding ridership will place significant demands on the fleet, system and station capacity.

Metrorail System Capacity: No Additional Fleet Expansion

Line	2005	2010	2015	2020	2025	2030
Red						
Blue (Rosslyn)						
Orange/ Dulles Rail						
Yellow/Blue (14th Bridge)						
Green						

Metrorail System Capacity: Expansion to 100% 8-Car Trains by 2020

Line	2005	2010	2015	2020	2025	2030
Red						
Blue (Rosslyn)						
Orange/ Dulles Rail						
Yellow/Blue (14th Bridge)						
Green						

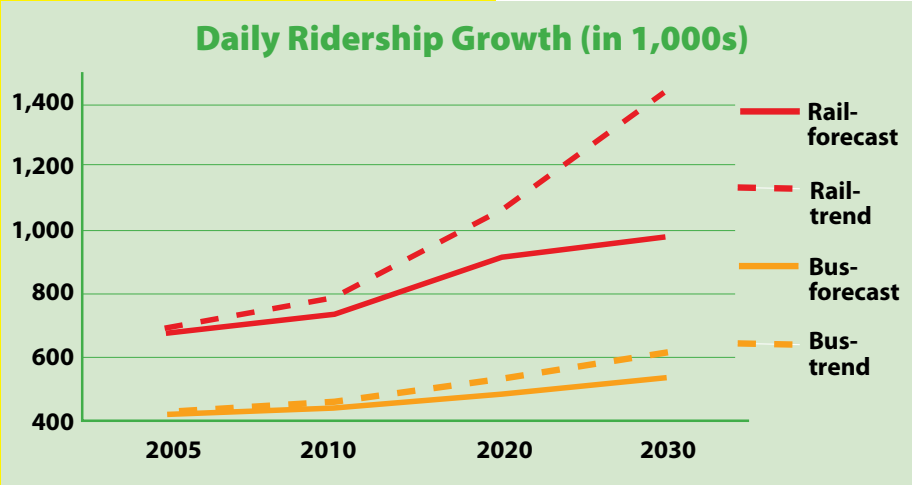
	Congested (<100 people per car)
	Highly Congested (100-120 people per car)
	Exceeds Capacity (>120 people per car)

Metrobus

Bus ridership is projected to expand to 510,000 average weekday trips by 2020, or about 1% a year.

Today, Metrobus ridership averages 440,000 weekday trips. In FY 2009, there were a total of 134 million trips on Metrobus. Bus ridership is projected to expand to 510,000 average weekday trips by 2020 (see figure), or about 1% a year. Additional buses and bus garages are needed to accommodate future ridership growth, avoid overcrowding and maintain the expanded fleet. Metro plans to focus the purchase of new buses on priority corridors that serve the greatest concentration of riders. These priority corridors include plans for running way improvements such as bus priority treatments along regional roadways (e.g., transit signal priority implementation), additional travel lanes at signalized intersections allowing buses to move to the front of traffic known as queue jumpers, bus bulbs that extend the sidewalk for a bus stop into the parking lane so the bus can remain in the traffic lane, corridor identity improvements and traffic management improvements. Priority corridor networks increase the average speed of buses by up to 30%, not only saving Metro capital and operating expenses but also improving passenger travel times. However, success of these priority corridors is dependent on partnerships with Maryland, the District of Columbia and Virginia. Through these partnerships, signal and road improvements need to be implemented to result in efficient and effective priority bus corridors.

Metrorail and Metrobus Ridership Trends



MetroAccess

Of all its services, Metro's paratransit service, MetroAccess, is expected to experience the fastest growing ridership over the next ten years. In FY 2009, 2.1 million passenger trips were taken on MetroAccess. By 2020, ridership on MetroAccess is anticipated to grow to 4.5 million trips (112% increase). Customer demand for accessible services continues to rise for four reasons: national and regional trends in the population of senior citizens and people with disabilities, many customers remain unable to use fixed-route bus and rail service due to the severity of their disabilities, lack of accessible pathways to reach bus and rail service, and other specialized transportation programs are being downsized or eliminated with the associated demand shifting to MetroAccess. Since 2004, the MetroAccess share of the regional paratransit market share has increased from 25% to 34% while human service transportation providers have reduced their market share from 50% to 25%.[3]

3 Market share estimates based on 2005 study by KFH Associates and additional Metro staff analysis in 2010.

Metro's Capital Needs Over the Next Ten Years

Over the next ten years (FY 2011 – 2020), Metro faces more than $11 billion in capital needs. These investments address Metro's physical assets, including vehicles, fleet maintenance facilities, operating systems, information technology, rail system track, passenger facilities, maintenance equipment and support facilities. Metro's capital needs are distinguished from the resources needed to operate the transit system. Operating needs that cover recurring annual costs for labor, supplies and services to operate Metrobus, Metrorail and MetroAccess are not addressed in this report.

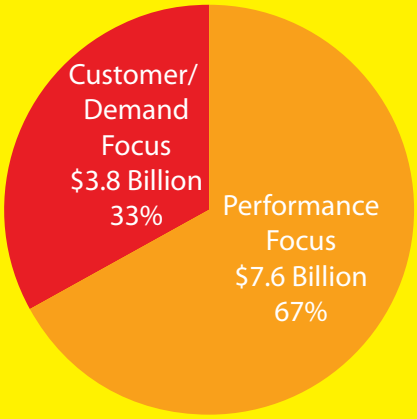
In September 2008 and October 2009, Metro staff presented to the Board of Directors the over $11 billion Capital Needs Inventory (CNI). The CNI includes two major categories of needs: Performance projects ($7.6 billion, 67% of total) and Customer/Demand projects ($3.8 billion, 33% of total).

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 for greater efficiency. Customer/Demand projects help meet growing ridership requirements and improve the rider`s experience on the system. Safety needs are included throughout the CNI.

The $11 billion in capital needs are driven by a number of factors, including the age and condition of Metro's assets. The 30-year old Metrorail system requires many life cycle replacement costs for the first time, including the replacement of nearly one-third of the rail car fleet. Similarly, Metrobuses need to be replaced and rehabilitated on a regular schedule. As Metro's vehicle fleet has changed over time, so have the maintenance facility and equipment requirements. Several of Metro's bus garages and rail yards used for storage and maintenance of Metro's vehicle fleet are in need of rehabilitation or replacement to accommodate the profile of new clean technology buses. For example, one of Metro's oldest bus garages was originally constructed to store trolley cars in the early 1900s. The CNI also includes Information Technology and MetroAccess capital costs that were previously included in Metro's operating budget or addressed through federal grants (e.g. Job Access Reverse Commute and American Recovery and Reinvestment Act). Finally, several infrastructure repair and replacement projects are necessary over the next ten years for system safety and reliability.

At the same time that Metro is investing in its existing assets to preserve current levels of service, Metro must add capacity to meet growing ridership. These capital needs include new vehicles (rail cars, buses and paratransit vans), expanded passenger facilities, additional fleet maintenance facilities, new support facilities and upgraded systems and technology necessary to support this growth.

FY 2011 – 2020 Capital Needs Inventory by Investment Category ($11.4 Billion)



Year-of-Expenditure (YOE) dollars

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."

Customer/Demand projects help meet growing ridership requirements and improve the rider`s experience on the system.

Metro's vision is to provide "the best ride in the nation." To reach that vision, Metro's General Manager and Executive Leadership Team (ELT) adopted five strategic goals in August 2007. These strategic goals were designed to guide decision-making at Metro.

The CNI also includes investments that improve the rider's experience on the transit system and respond to customer service requests. Not included in the CNI are system expansion projects (new entrances, stations or rail lines), transit projects entirely funded by jurisdictions, debt repayment costs, project administration and other needs identified in the future by federal oversight agencies.

Estimated capital need amounts included in the CNI were originally formulated in September 2008 and are for planning purposes only. As the Office of Management and Budget Services develops Metro's capital program, specific project budgets will vary from these estimates due to changing material and construction costs, project schedules, funding constraints and other reasons.

Strategic Framework

Metro's vision is to provide "the best ride in the nation." To reach that vision, Metro's General Manager and Executive Leadership Team (ELT) adopted five strategic goals in August 2007. These strategic goals were designed to guide decision-making at Metro. To further refine these goals, Metro developed strategic objectives for each goal by conducting a series of internal discussions and reaching out to external partners as well, such as the agency's Jurisdictional Coordinating Committee comprised of transportation officials from the cities and counties Metro serves, the Riders Advisory Council representing all riders, and the Accessibility Advisory Council representing seniors and passengers with disabilities. Metro asked each of these stakeholders to define the strategic goals from their perspective to better appreciate whether an overarching aim such as "deliver quality service" meant on-time performance, customer communication, or both. The result was twelve strategic objectives that would help drive progress on the five strategic goals (see Metro's Strategic Framework).

Together, the goals and objectives create a strategic framework that can guide decision-making at Metro. For example, this report documents Metro's capital needs over the next 10 years, totaling $11 billion. Given potential funding constraints, Metro may not be able to fund all of these needs in the FY 2011 – 2020 timeframe. The strategic framework has been used to recommend priority projects and identify those projects that may need to be deferred beyond FY 2020. This was done by identifying every capital project's linkage to each strategic goal and each objective. In addition, prioritization takes into account a project's relative priority to other projects, a project's budget, asset age and policy considerations.

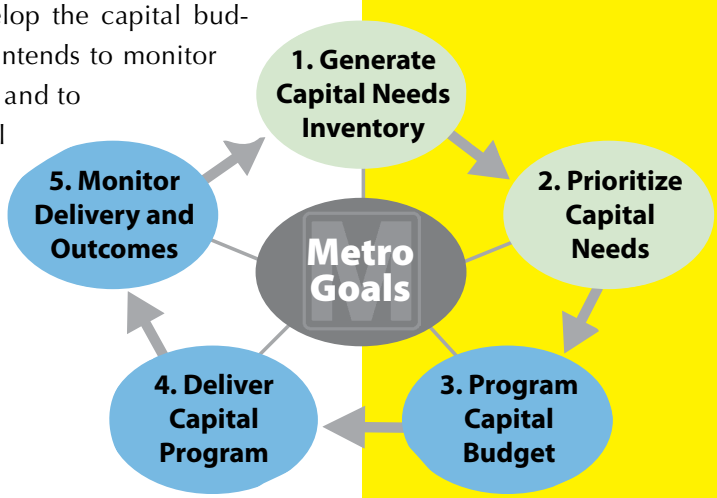
In October 2009, Metro staff recommended priority Performance projects to the Metro Board of Directors for FY 2011 – 2020, including rehabilitation of sections of the rail system that are more than 30 years old, replacement of older rail cars and buses, replacement/rehabilitation of Metro's oldest bus garages and information technology system upgrades. Key Customer/Demand projects recommended

as high priority include rail fleet expansion and power upgrades that would allow the full use of eight-car trains on all rail lines, safety and security enhancements, such as building a police training facility and expanding the Metrobus and MetroAccess fleet of vehicles.

Metro used its strategic goals and objectives to prioritize projects for American Recovery and Reinvestment Act (stimulus) funding. Metro's approach was highlighted as a best practice by the Metropolitan Policy Program at Brookings in its Implementing ARRA: Innovations in Design in Metro America report (July 2009).

The identification and prioritization of Metro's capital needs are the first two phases of the strategic capital planning process being developed at Metro. As the figure to the right illustrates, the core of the strategic process is Metro's agency goals which guide investment and implementation decision. Once capital priorities are established, Metro will develop the capital budget and deliver the capital program. Next, Metro intends to monitor how efficiently the capital program was delivered and to evaluate progress made towards agency goals. All of these steps contained in this strategic planning process have existed at Metro, but the connection between these steps and agency goals is being strengthened.

Metro used its strategic goals and objectives to prioritize projects for American Recovery and Reinvestment Act (stimulus) funding. Metro's approach was highlighted as a best practice by the Metropolitan Policy Program at Brookings in its *Implementing ARRA: Innovations in Design in Metro America* report (July 2009).



Strategic Capital Planning Process

Metro's Strategic Framework

GOAL: Create a Safer Organization

Objective	Definition
Improve customer and employee safety and security ("prevention")	Provision, maintenance, upgrade or replacement of assets to prevent breakdowns and malfunctions, to reduce incidents and to comply with federal environmental and safety regulations. Protection of assets from vandalism, fraud, crime, or terrorism. Implementation of employee safety and security programs, training and testing.
Strengthen Metro's safety and security response ("reaction")	Facility enhancements, new equipment and strategic partnerships that improve Metro's ability to respond to emergencies. Enhance incident response timing, planning, preparation and implementation.

GOAL: Deliver Quality Service

Objective	Definition
Improve reliability of service	Maintenance and replacement of capital assets to minimize disruptions and subsequent delays. Deliver transit service according to service and operating plans.
Increase service and capacity to relieve overcrowding and meet future demand	Targeted capacity expansion investments and service adjustments to relieve overcrowding and to promote regional ridership growth.
Maximize rider satisfaction through convenient and comfortable services and facilities that are in good condition and are easy to navigate	Investments that address our riders' day-to-day total experience on Metro. Provision of customer service for all aspects of their trip. Facility and vehicle improvements that ease the use of Metro services and improve asset condition and ride quality. "experience once on the system"
Enhance mobility by improving access to and linkages between transportation options	Provide regional leadership to increase the attractiveness of transit services through facility enhancements, improved accessibility, equipment upgrades, service adjustments, and seamless connectivity between travel modes, including other transportation systems and pedestrian/bicycle facilities. "getting riders onto the system"

GOAL: Use Every Resource Wisely

Objective	Definition
Manage resources efficiently	Business and technology infrastructure investments that improve efficiencies. Strategic investments that rehabilitate, reconstruct or replace assets based on life cycle data, conditions and usage. Assets include facilities, structures, vehicles, operational systems, equipment and technological infrastructure.
Target investments that reduce operating costs and / or generate revenue	Tactical investments that reduce operating costs through resource efficiencies, lower staffing requirements, or reduced maintenance needs. Investments that increase asset revenue generation.

GOAL: Retain, Attract and Reward the Best and the Brightest

Objective	Definition
Support diverse workforce development through management, training and provision of state of the art facilities, vehicles, systems and equipment	Investments in business processes, technology infrastructure and training. Innovative technologies and equipment that enhance employee skills and promote career development. Development of high quality leadership and management.

GOAL: Maintain and Enhance Metro's Image

Objective	Definition
Enhance communication with customers, employees, Union leadership, Board, media and other stakeholders	Convenient access to timely and accurate information on travel modes, schedules, facilities and service disruptions. Effectively communicate with Metro's wide range of stakeholders our role and performance results.
Promote the region's economy and livable communities	Investments that generate economic return for jurisdictional partners and enhance the economic competitiveness of the region.
Use natural resources efficiently and reduce environmental impacts	Technology, capital assets and business practices that reduce the consumption of natural resources and pollution.

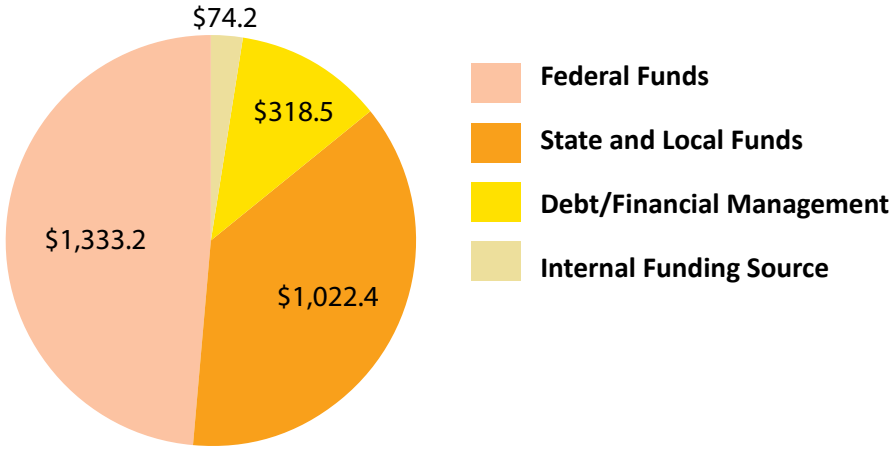
Funding the Capital Program

Metro's capital funding comes from several sources: the federal government, Maryland, the District of Columbia, Northern Virginia jurisdictions, debt/financial management and internal sources (e.g., interest). Federal funds are provided through annual appropriations and Federal Transit Administration grants. Most of these funds are matched by state and local funds, generally on an 80 – 20 basis. In other words, for every dollar of capital need, the federal government will fund $0.80 if the state/local governments fund $0.20. This is a typical funding arrangement in the transportation sector.

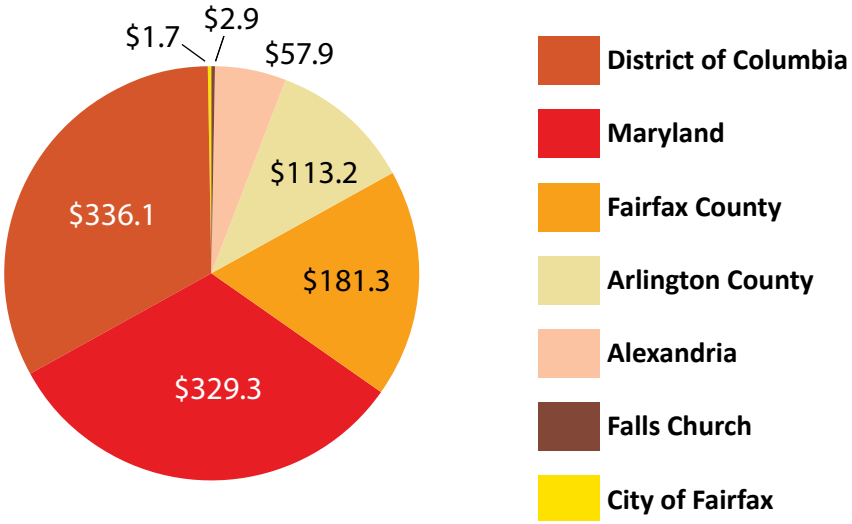
From FY 2005 – 2010, funding for Metro's capital program was governed by a funding agreement between Metro and its partners, known as "Metro Matters."

Under this agreement, Maryland, the District of Columbia and the Northern Virginia jurisdictions agreed to match federal funds and provide additional capital funding critical to the transit system. The two figures below illustrate Metro's capital funding sources for the FY 2005 – 2010 period.

Metro Capital Funding Sources FY 2005 - 2010 ($2.7 Billion)

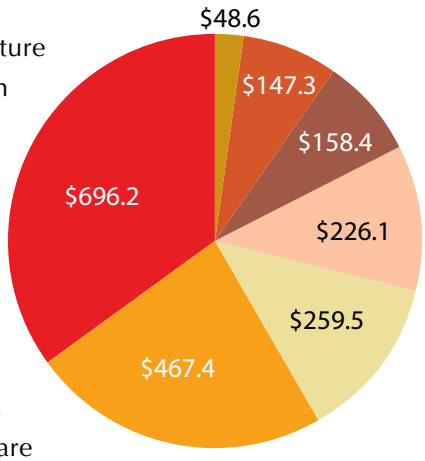


State and Local Capital Funding Details FY 2005 - 2010 ($1.02 Billion)



The Metro Matters agreement funded specific categories of capital improvements. The figure on page 15 shows Metro Matters expenditures for FY 2005 - 2010. Here, expenditures are shown by asset categories corresponding to those presented in this report, which include vehicles and vehicle parts, fleet maintenance facilities, systems and technology, track and structures, passenger facilities, maintenance equipment, and support facilities. Reimbursable projects (site-specific projects that are funded entirely by the jurisdictions) are not included in this capital funding discussion.

Metro Capital Budget Uses FY 2005 - 2010 ($2 Billion)



Metro reports its capital funding and future capital needs in two Washington metropolitan regional planning documents: the Transportation Improvement Program (TIP), a 6-year financial program that describes the schedule for obligating federal funds to state and local projects, and the Constrained Long Range Plan (CLRP) which includes all regionally significant transportation projects and programs that are planned over the next 30 years. Both of these planning documents are federally mandated.

Excludes $744.9 million for financing expenses, debt service and program management/support. The figure reflects actual expenditures for FY 2005 – 2008 and forecasts for FY 2009 – 2010.

In 2008, Congress passed legislation (HR 2095) that authorizes up to $1.5 billion in federal funds for Metro's capital program over 10 years if matched by Metro's funding partners. Prior to this legislation, Metro was the only major transit system without a source of dedicated funding. Although the new dedicated funding is notable progress, the funds are not guaranteed (subject to annual appropriation) and alone will not address Metro's daunting capital needs. Only through significant support from the federal government, Maryland, the District of Columbia and Northern Virginia will Metro be able to fulfill its critical role in the region.

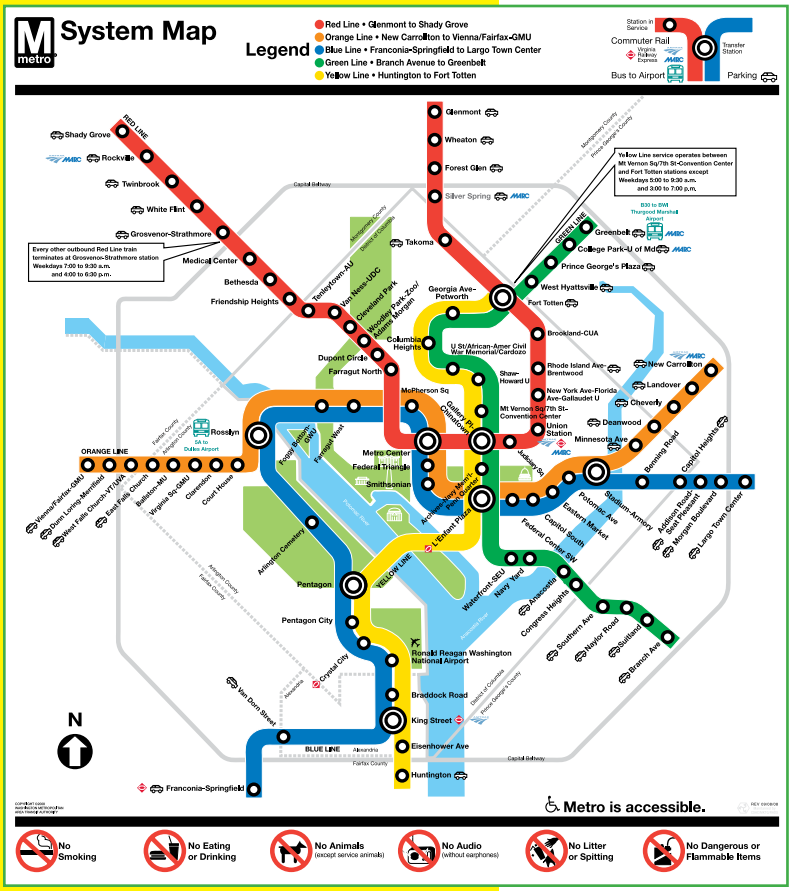
Metro System Overview

Plans for the Metrorail system were first developed in the 1960s with groundbreaking occurring in 1969 and service beginning in 1976. By 1980, 40 stations were open and by 1990, Metrorail served 63 stations. The most recent stations, Morgan Boulevard and Largo Town Center in Prince George's County, opened in 2004. Today Metrorail has over 1,100 trains serving 86 stations on 106 miles of track. Nearly 1,500 buses and over 500 MetroAccess vehicles move residents and employees to destinations throughout the region.

Today Metrorail has over 1,100 trains serving 86 stations on 106 miles of track. Nearly 1,500 buses and over 500 MetroAccess vehicles move residents and employees to destinations throughout the region.

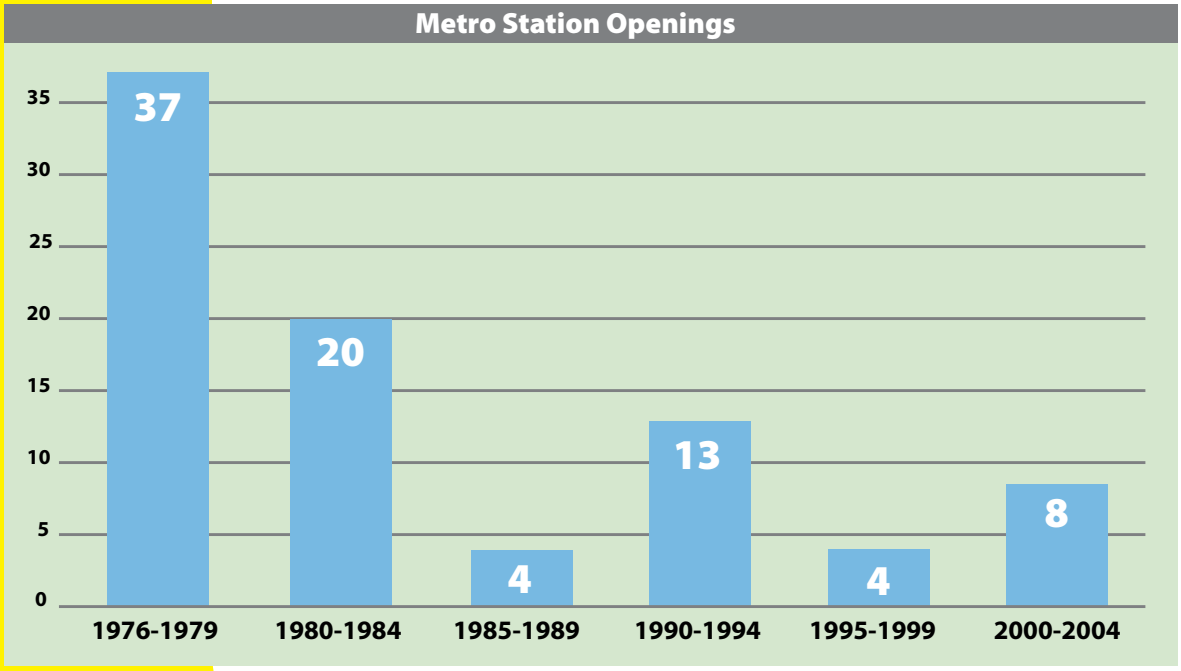
The Washington, DC metropolitan area benefits tremendously from this long-term investment in mass transit infrastructure. Seventeen percent (17%) of the region's commuting trips are on transit according to the 2007/2008 household travel study conducted by the Metropolitan Washington Council of Governments. In FY 2009, Metro provided close to 360 million passenger trips (223 million on Metrorail, 134 million on Metrobus and about 2 million on MetroAccess). Overall, 43 percent of those working in the center core – Washington and parts of Arlington County – use mass transit.

Added to the highly visible elements of Metro's infrastructure – trains, stations and buses - are the facilities, equipment and technology infrastructure providing critical support to transit operations. This section provides a brief overview of Metro's capital assets, including its vehicle fleet and fleet maintenance facilities for Metrorail, Metrobus and MetroAccess, Metro Transit Police Department assets, business support facilities and technology infrastructure.



MetroRail

Metro's first rail segment opened in March 1976. This first segment included 4 stations in downtown Washington, DC from Farragut North to Rhode Island Avenue. In 1977, service began in Virginia with the opening of stations on today's Blue, Yellow and Orange lines into DC. The youngest of Metro's rail lines, the Green line, made its debut in 1991. Today's Metrorail system has a total of 86 stations, 40 of which are in DC, 26 in Maryland and 20 in Virginia. On a typical weekday in FY 2009, Metrorail provided about 750,000 passenger trips. Metrorail provided a total of 223 million trips in FY 2009. With Metrorail's oldest segments now over 30 years old, Metro plans a systematic rehabilitation of the system, starting with rail segments, stations and rail yards constructed in the 1970s.



The Metrorail system includes 106 miles of track: 50.50 subway miles (below ground), 46.31 surface miles (above ground) and 9.22 aerial miles (bridges). The track extends from the District of Columbia (38.30 miles) into Virginia (29.47 miles) and Maryland (38.29 miles).

Metrorail Facilities by Political Jurisdiction

Jurisdiction	Miles*	Stations
District of Columbia	38.30	40
Maryland		
Montgomery County	18.43	11
Prince George's County	19.86	15
Total Maryland	38.29	26
Virginia		
Alexandria	6.11	3
Arlington	12.19	11
Fairfax County	11.17	6
Total Virginia	29.47	20

**The sum of miles does not equal the total because of rounding.*

The Metrorail system will grow in Virginia over the next 10 years with the extension to Dulles Airport through Tysons Corner, adding 23.1 miles and 11 new stations.

Metrorail's fleet consists of 1,130 75-ft. rail cars. The oldest of the fleet, 290 1000-Series cars, were purchased between 1974 and 1978. The newest cars are Metro's 6000-Series, purchased between 2006 and 2008. Over the next 10 years, Metro plans to replace its oldest cars (the 1000-Series) and begin the design work for the 2000- and 3000-Series replacements. Metro rehabilitates rail cars at their mid-life point (20 years) in order to maintain reliability, avoid high maintenance costs and realize the planned 40 year life-cycle. Metro will perform a comprehensive mid-life rehabilitation of the 4000-Series in the next 10 years and begin the rehabilitation of the 5000-Series. Furthermore, in order to respond to growing ridership trends, Metro plans to acquire new rail cars to expand the rail car fleet.

Metro Operating Rail Fleet by Rail Car Series

Series	Manufacturer	Years Purchased	Number of Cars in Service (July 2009)
1000	Rohr	1974-1978	290
2000/3000	BREDA	1983-1988	364
4000	BREDA	1992-1994	100
5000	CAF	2001-2004	192
6000	Alstom	2006-2008	184
TOTAL			1,130

Note: Does not include 4 1000-Series cars used for revenue collection, 6 1000-Series cars permanently out of service and 2 5000-Series cars permanently out of service.

Key Assets Supporting Metrorail Access

System-wide	No.
Escalators	588
Elevators	236
Bus stops (Metro-owned)	412
Parking Spots (Metro-owned)	58,000
Bike Racks (Metro-owned)	1,743
Bike Lockers	1,268

Metrorail Facilities

Location	Rail Facility	Age	Storage Yard	Service & Inspection	Heavy Repair	Overhaul	Running Repair
District of Columbia	Brentwood	37	√	√	√	√	√
Maryland	Branch Avenue	6	√	√			√
	Greenbelt	16	√	√	√	√	√
	Glenmont	11	√				
	New Carrollton	31	√	√			√
	Largo	5	√				
	Shady Grove	25	√	√			√
Virginia	Alexandria	26	√	√			√
	West Falls Church	23	√	√			√

Metro's rail cars are stored and maintained 9 rail yards located throughout the system. Maintenance facilities at Metro's rail yards include service and inspection shops and maintenance, operations and yard control buildings, totaling approximately 1.3 million square feet of floor area. Metro plans to implement a new maintenance program for its rail yards to extend each facility's useful life. In addition, as the fleet grows to accommodate all 8-car trains, Metro will need to build additional rail yard storage capacity.

MetroBus

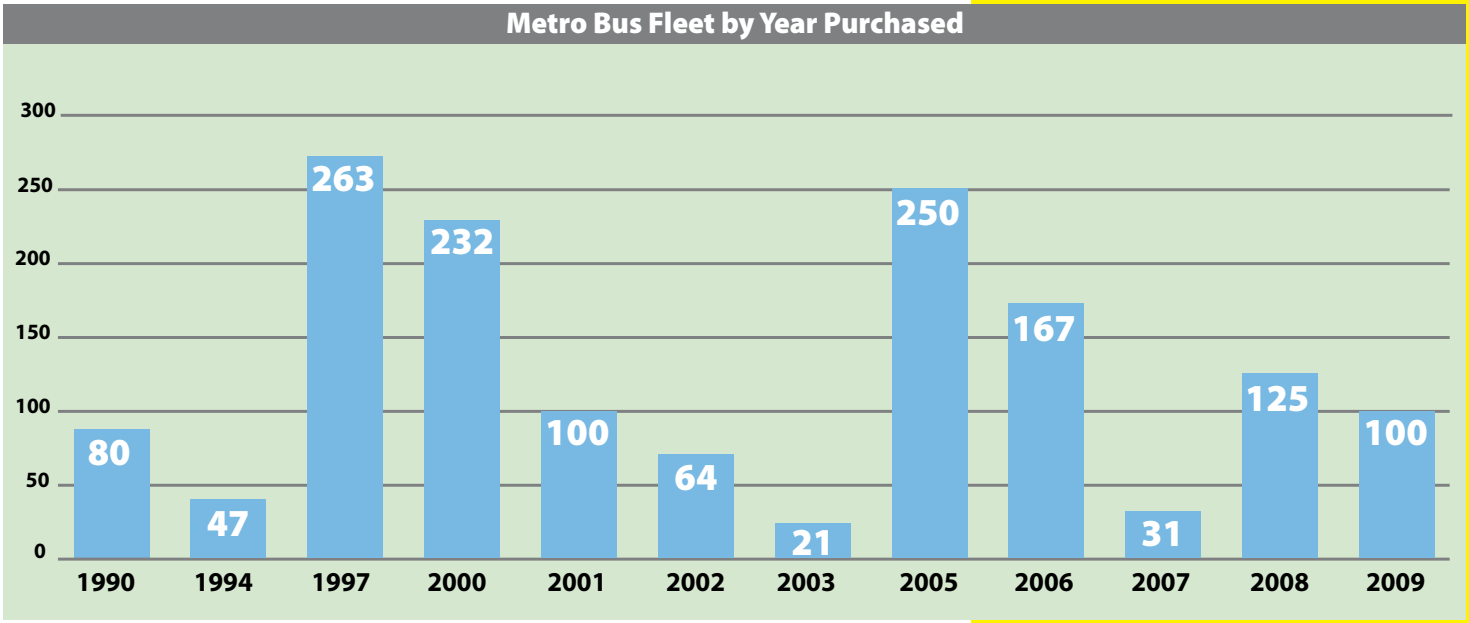
The Metrobus system was created in 1973, when Metro consolidated service provided by 4 different private bus companies. Metro operates bus service in the District of Columbia, Maryland and Virginia on over 300 routes within a 1,500 square mile area. Today's Metrobus fleet is comprised of nearly 1,500 buses serving over 12,000 bus stops. On a typical weekday in FY 2009, Metrobus provided over 440,000 trips. There were 134 million boardings on Metrobus in FY 2009.

On a typical weekday in FY 2009, Metrobus provided over 440,000 trips. There were 134 million boardings on Metrobus in FY 2009.

In June 2006, the Metro Board adopted an average bus age target of 7½ years. This means that Metro strives to replace 1/15th of its bus fleet each year, or approximately 100 buses a year. In addition, Metro routinely conducts mid-life overhauls on each bus at 7½ years to extend a bus' useful life to 15 years by replacing components at the end of their useful life. During the first 7½ years of life a Metrobus will accumulate approximately 300,000 miles. Metro's policy reflects the approach of many other large US transit agencies to improve service reliability (fewer bus breakdowns) and lower overall maintenance cost. The mid-life rehabilitation program reduces the replacement cycle and decreases Metro's bus replacement needs from approximately 120 buses a year to 100 buses a year.

Metro's 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. Metro plans to replace its oldest diesel buses with hybrid-electric and compressed natural gas buses. As a result of anticipated growth in Metrobus ridership, plans include the purchase of new buses to expand the fleet. The purchase and maintenance of additional buses will depend on available bus garage facilities.

Metro Bus Fleet by Year Purchased



As of August 1, 2009

Metro has 9 bus operating garages located throughout the region to store and maintain its buses. A tenth bus garage, the Southeastern Bus Garage, closed in 2008 when the Nationals Ballpark opened in Southeast Washington and is being relocated to the DC Village location. In addition, Metro operates two Heavy Overhaul support facilities located at Bladensburg in the District of Columbia and at the Carmen Turner Facility in Maryland. Metro also operates 3 service vehicle support facilities located at Bladensburg, Alexandria, and the Carmen Turner Facility, which support over 1,000 service vehicles. Metro's oldest bus garages originally served as trolley car barns, including Northern (102 years old) and Western (64 years old), both of which are located in the District of Columbia. Metro plans to rehabilitate/and or replace its oldest bus garages, and move all bus garages to a regular maintenance schedule in order to extend the useful life of each facility. In addition, Metro

plans to build additional bus garage capacity to accommodate new buses that will serve anticipated ridership growth.

MetroBus Facilities

	Operating Garage	Year Built	Age	Capacity	Current Bus Assignment	Equipped for CNG
District of Columbia	Bladensburg	1962	47	257	300	√
	Northern	1907	102	175	171	
	Western	1945	64	138	132	
Maryland	Landover	1989	20	210	173	
	Montgomery	1983	26	240	198	
	Southern	1922	87	103	133	
Virginia	Four Mile Run	1977	32	218	218	√
	Royal Street	1945	64	83	65	
	West Ox Road	2009	0	100	90	
Total	Nine Operating Garages			1,524	1,480	

***As of August 1, 2009**

In 1994, Metro began providing its paratransit service, called MetroAccess, for people with disabilities who cannot use the fixed-route bus or rail system.

MetroAccess

In 1994, Metro began providing its paratransit service, called MetroAccess, for people with disabilities who cannot use the fixed-route bus or rail system. On an average weekday, MetroAccess provides 7,500 trips. In FY 2009, the service provided a total of 2.1 million passenger trips. The current paratransit vehicle fleet includes over 500 vehicles. In the next 10 years, MetroAccess plans to replace paratransit vehicles (the goal is to retire vehicles 4 years old due to heavy usage) and purchase new vehicles to meet increased demand for paratransit service. A MetroAccess Fleet Management Plan has been reviewed and approved by the Metro Board and the Federal Transit Administration.

Business Support Facilities

Metro's support facilities house transit and public safety operations as well as business functions. The largest of these facilities is the Jackson Graham Building (JGB) located in downtown Washington, DC. JGB houses Metro's administrative offices, including transit operations (rail, bus and MetroAccess), MTPD administration, engineering, information technology, finance, planning, human resources and communications. The building also houses an Operations Control Center (OCC) that monitors the movement of Metro vehicles.

In addition to JGB, other Metro business support facilities include the Carmen Turner Facility (CTF) in Hyattsville, MD that in the near future will house the primary OCC,

Alexandria Yard Revenue Collection Facility and Systems Maintenance Facility in Alexandria, VA, Open Materials Storage Facility and Metro Supply Facility in Landover, MD, Stone Straw Building and Blair Road Support Shop in Washington, DC.

Over the next 10 years, Metro plans to perform basic maintenance and rehabilitation to JGB and the Revenue Collection Facility, and anticipates developing Metro-owned operating garages for MetroAccess. Metro also plans to conduct minor renovations to other support facilities.

Metro Transit Police Department

MTPD officers are responsible for providing law enforcement and public safety services on the Metrorail and Metrobus systems. The service area extends 1,500 square miles within three jurisdictions: Maryland, Virginia and the District of Columbia. MTPD has an authorized strength of 458 sworn police officers, 114 security special police and 4 armored vehicle guards. The Department is split into two patrol Districts, each covering one half of the system. A third district serves Metro's revenue collection operation.

Police capital assets include 98 emergency response vehicles and numerous facilities. MTPD vehicles include police sedans, utility vehicles, motorcycles, armored trucks and explosive ordnance vehicles. Facilities include administrative offices in the Jackson Graham building, two substations (District I substation near Fort Totten Metro station and District II near Huntington Metro station) and offices for the Department's Special Operations Division.

MTPD's capital needs include replacing emergency vehicles, portable radios, emergency management equipment and facility improvements. MTPD's facility needs also include replacement of the District II substation, construction of a permanent Special Operations Division and two new buildings – a training facility and new District IV substation.

MTPD has an authorized strength of 458 sworn police officers, 114 security special police and 4 armored vehicle guards.

Technology Infrastructure

Working behind the scenes is Metro's information technology infrastructure, providing critical support to transit operations. Some key examples include software for scheduling buses and trains and dispatch communication systems for Metro Transit Police. Metro also uses software to monitor the condition of its infrastructure and plan for maintenance and repairs. Other technology is designed to serve the customer, such as Next Bus which uses Global Positioning System (GPS) software and route schedules to predict bus arrival times and Metro's website, www.wmata.com. The website provides a wide array of customer information, including

route and schedule information through the Trip Planner, service updates, fare information and more. Metro's systems and technology capital needs also extend to the corporate and financial management of the agency. This includes software for treasury, budget, cash management and accounts payable.

Metro Asset Categories

Metro's capital needs are organized by investment category, asset category and project type (groupings of individual capital projects) in this report. The table below lists the 8 asset categories. A definition for each category is provided, along with an example project type.

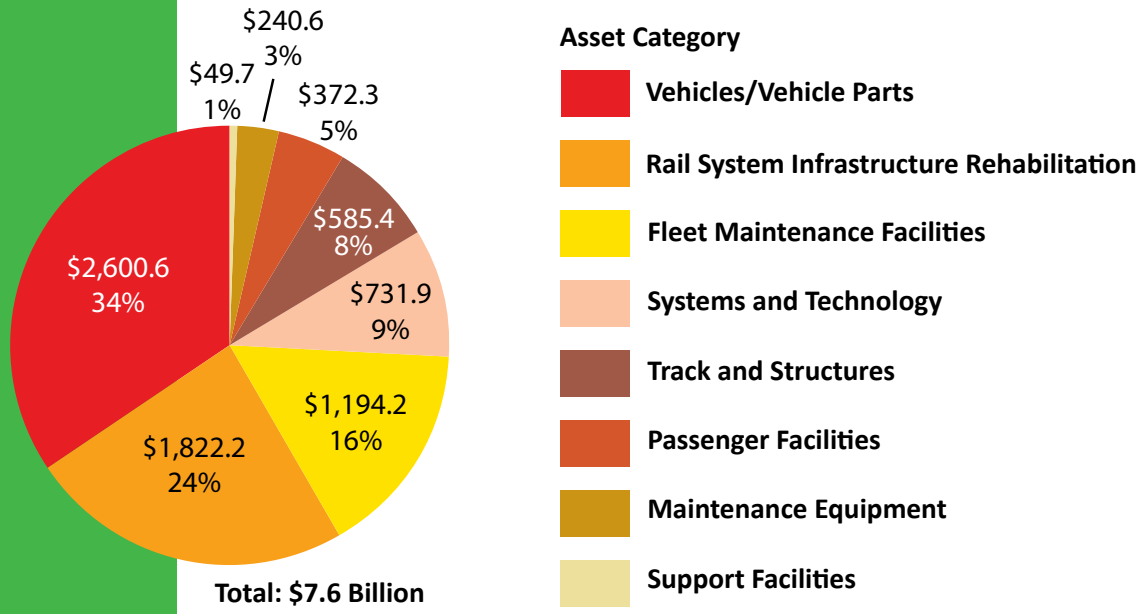
Asset Category	Definition	Project Type Example
Vehicles/ Vehicle Parts	Replacement or purchase of new rail cars, buses, paratransit vehicles and/ or service vehicles, rehabilitation of rail cars and buses and replacement parts to maintain the vehicle fleet.	Rehabilitation of Rail Cars
Rail System Infrastructure Rehabilitation	Multiple systems and equipment within the rail stations and tunnels that enable safe, reliable service. Several of these critical components are apparent to the transit rider (e.g., public address systems) but many are "behind the scenes" (e.g., uninterrupted power supply [UPS], that provides emergency power when utility power is not available).	Rail Line Segment Rehabilitation
Fleet Maintenance Facilities	Rehabilitation, maintenance, replacement and/or new bus garages and rail yards to support repairs to vehicle fleet.	Rehabilitation and Replacement of Bus Garages
Systems and Technology	Technology systems, software and equipment supporting transit operations and business functions.	Operations Support Software

Asset Category	Definition	Project Type Example
Track and Structures	Steel running rail that guides Metro's train cars, the cross ties and fasteners that hold the rail in place, the ballast bed that supports the cross ties and the third rail that provides power to the train. Structures include the retaining walls that protect the track bed and underground tunnels, the concrete pads that keep the track bed properly elevated and the bridges that span roads and bodies of water.	Track Rehabilitation
Passenger Facilities	Facilities at Metro's 86 Metro rail stations, including bus loops, bus stops, parking garages, surface lots, Kiss-and-Ride spaces, access roads and bus loops, bike racks and lockers.	Elevator / Escalator Facilities
Maintenance Equipment	Equipment to rehabilitate track and maintain the vehicle fleet (rail and bus).	Bus Repair Equipment
Support Facilities	Facilities that house administrative offices, training rooms, revenue processing activities, material storage, police work and a print shop.	Police Facilities

Investment Category: Performance

Investments to address Metro's Performance needs total $7.6 billion over the next ten years (FY 2011- 2020). 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. For example, diesel buses will be replaced with cleaner technology buses and inefficient fleet maintenance facilities will be replaced with environmentally friendly buildings. Key Performance needs include the replacement of older rail cars, buses and vehicles, rehabilitation of sections of the rail system that are more than 30 years old, track rehabilitation, MTPD equipment and facilities and information technology system upgrades.

FY2011 - 2020 Performance Needs by Asset Category ($7.6 Billion)



Total: $7.6 Billion
YOE, $ Millions

Metro's FY 2011 – 2020 Performance needs are driven by several factors. For the first time in the agency's history, Metro is faced with rehabilitating or replacing original capital assets. For example, sections of the rail system that opened for service in 1976 will soon reach the end of their life cycle and must be rehabilitated. Similarly, the 1000-Series rail cars that were purchased when the system was built need to be replaced and a program of regular rail car replacement must be instituted. In addition, according to Board policy adopted in June 2006, Metro's target is to achieve an average bus fleet age of 7½ years and a maximum age of 15 years. This means that Metro strives to replace 1/15th of its bus fleet each year, or approximately 100 buses each year. Metro's policy reflects the approach

of many other large US transit agencies to improve service reliability (fewer bus breakdowns) and lower overall maintenance cost.

Besides replacing vehicles, Metro needs to rehabilitate assets to keep them working safely and reliably. The 2000- and 3000-Series rail cars were rehabilitated when they reached 20 years of age, and the 4000-Series rail cars will also be rehabilitated once they reach that age. Metro's regular bus rehabilitation program is necessary to achieve an average bus fleet age of 7½ years by extending the useful life of a bus to 15 years. The result of this rehabilitation work is like-new rail cars and buses with cutting edge technological upgrades, safety enhancements, and extended life cycles. This results in cost savings through reduced maintenance and increased reliability. Correspondingly, the oldest rail yards and bus facilities that are critical to storing and maintaining Metro's vehicle fleet are in need of rehabilitation.

Metro's FY 2011 – 2020 Performance needs also capture other assets that are being capitalized for the first time. Previously, many of the information technology investments and all of the capital investments for the MetroAccess program were addressed under the operating budget. Now, in order to capture cost savings through a regular program of replacement and upgrades, these programs are included in Metro's CNI.

Metro is not alone in facing large capital needs that are necessary to maintain its existing system. The Federal Transit Administration's Rail Modernization Study, an April 2009 report to Congress, found that more than one-third of the assets of the nation's seven largest transit agencies, including Metro, are near or have already exceeded their expected useful lives. The FTA study estimates that the backlog of capital needs of these seven agencies total roughly $50 billion.

The table below breaks down Metro's $7.6 billion in Performance needs by asset category and project type (grouping of individual capital projects). The following sections provide additional detail by asset category.

Performance Needs by Asset Category and Project Type

Asset Category	Project Type	Capital Needs, FY 2011 - 2020
Vehicles/ Vehicle Parts	Replacement of Rail Cars	$978
	Replacement of Buses	$749
	Rehabilitation of Rail Cars	$265
	Rehabilitation of Buses	$228
	Vehicle Replacement Components	$176
	Purchase of MetroAccess Vehicles	$141
	Replacement of Service Vehicles	$63
	Subtotal	$2,601

Metro is not alone in facing large capital needs that are necessary to maintain its existing system. FTA's Rail Modernization Study, an April 2009 report to Congress, found that more than one-third of the assets of the nation's seven largest transit agencies, including Metro, are near or have already exceeded their expected useful lives.

Asset Category	Project Type	Capital Needs, FY 2011 - 2020
Rail System Infrastructure Rehabilitation	Rail Line Segment Rehabilitation	$1,822
	Subtotal	$1,822
Fleet Maintenance Facilities	Rehabilitation and Replacement of Bus Garages	$489
	Maintenance of Bus Garages	$328
	Maintenance of Rail Yards	$281
	Rail Maintenance Facilities	$60
	Environmental Compliance Projects	$37
	Subtotal	$1,194
Systems and Technology	Operations Support Software	$426
	Business Support Software & Equipment	$256
	Power System Upgrades - Rail	$25
	Rail Fare Equipment	$24
	Subtotal	$732
Track and Structures	Track Rehabilitation	$539
	Station/Tunnel Rehabilitation	$46
	Subtotal	$585
Passenger Facilities	Elevator/Escalator Facilities	$234
	Maintenance of Rail Station Facilities	$134
	Bicycle & Pedestrian Facilities	$5
	Subtotal	$372
Maintenance Equipment	Rail Maintenance Equipment	$160
	Rail Car Repair Equipment	$44
	Bus Repair Equipment	$29
	Business Facilities Equipment	$8
	Subtotal	$241
Support Facilities	Business Support Facilities	$29
	Police Facilities	$21
	Subtotal	$50
	TOTAL	$7,597

Asset Category: Vehicles/Vehicle Parts

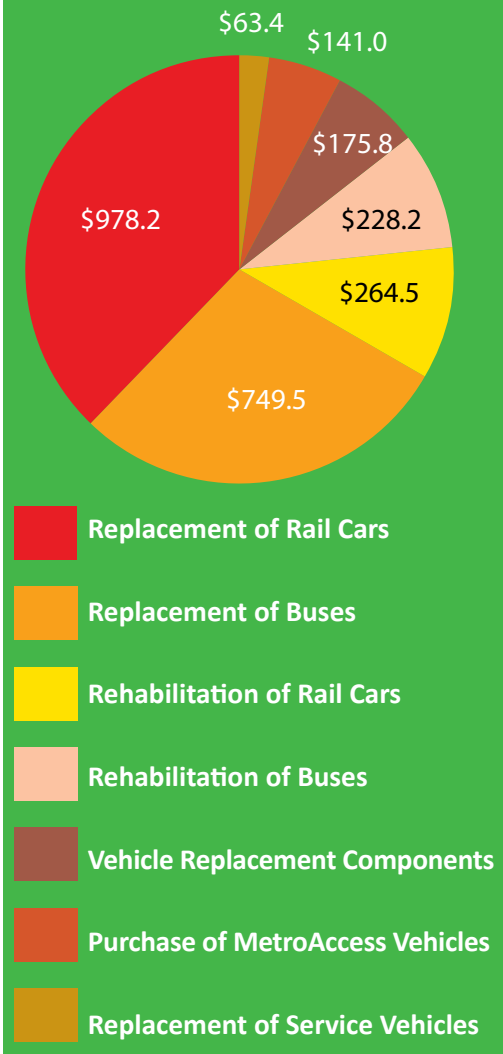
Metro runs the 2nd largest rail transit system, the 6th largest bus system and the 8th largest paratransit service in the United States. In FY 2009, ridership on the Metrorail system was over 220 million and ridership on the Metrobus system was over 130 million. Metro's revenue service fleet consists of more than 1,100 rail cars and approximately 1,500 buses. Rehabilitation and replacement of Metro's vehicle fleet are essential to delivering safe, reliable, and comfortable service to our customers. Prior investments in Metro's vehicle fleet have increased the average distance between breakdowns and increased the energy efficiency of the fleet. In order to maintain and build on these improvements, a sustained capital program is necessary.

Metro's program of comprehensive mid-life rehabilitations has kept its rail and bus fleet in a state of good performance and has extended the useful life of the fleet. With mid-life rehabs, the useful life of a Metrobus is 15 years, and the useful life of a Metrorail car is 40 years. The Metrobus fleet has been modernized through a program of normal replacement. Now, for the first time since the system began service in 1976, Metro must begin a replacement program for its rail cars. The oldest rail cars (the 1000-Series) were purchased between 1974 and 1978, and will need to be replaced. This normal replacement program will also introduce new technologies and improved customer features (e.g., lighting). Both bus and rail fleet plans (approved by the Metro Board and the Federal Transit Administration in 2007) are available on Metro's website, www.wmata.com.

Metro's vehicle fleet also includes service vehicles, such as patrol cars used by the MTPD or light-duty trucks used by maintenance personnel. These vehicles are necessary for the security of Metro's passengers and employees and for the transportation of materials and equipment to different locations throughout the Metro transit zone. Locations include rail stations, rail right-of-ways, service and inspection yards, maintenance facilities, revenue collection facilities, public parking facilities and Metrobus stops. Metro's transit zone consists of the District of Columbia, the suburban Maryland counties of Montgomery and Prince George's and the Northern Virginia counties of Arlington, Fairfax and Loudoun and the cities of Alexandria, Fairfax and Falls Church. With such a large transit zone, Metro's service vehicles need to be replaced on a regular cycle similar to that of the rail and bus fleet.

The figure breaks down Metro's Performance - Vehicles/ Vehicle Parts needs ($2.6 billion over the next ten years) by project type. A brief description of each project type follows.

Performance – Vehicles/ Vehicle Parts Needs by Project Type ($2.6 Billion)

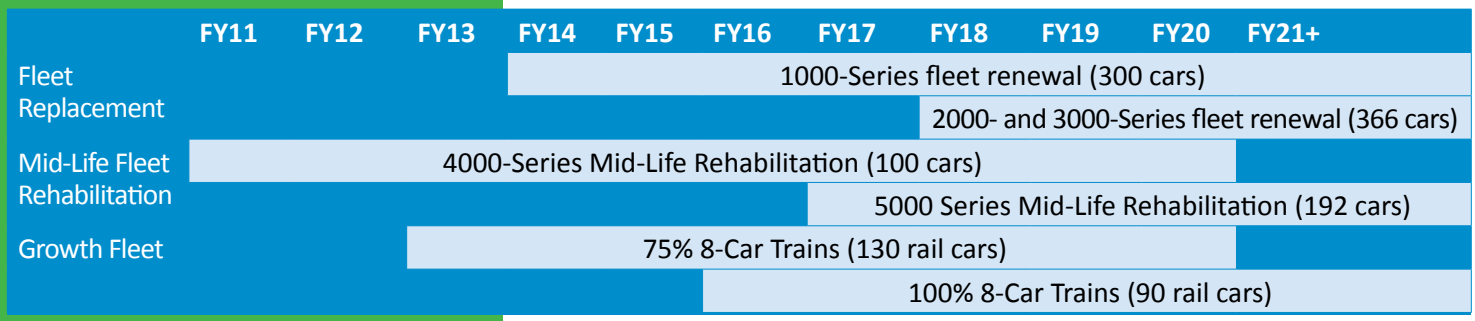


Replacement of Rail Cars ($978.2 Million)

Over the next ten years, Metro plans to begin a replacement program for its 1000-Series, 2000-Series and 3000-Series rail cars. The 1000-Series Rail Car Replacement project will replace all 300 of the 1000-Series rail cars with new 7000-Series rail cars. The 1000-Series rail cars were purchased between 1974 and 1978. These cars have a 40-year life and need replacement beginning in early FY 2015. The 40-year life anticipated in the original car design has proven to be accurate. This program is one component of a combined 7000-Series procurement strategy structured to avoid repetitive developmental costs associated with a new car design, development and delivery. The replacement of the 1000-Series cars with the 7000-Series cars will improve reliability, reduce maintenance and operating costs and incorporate technology and enhancements of newly designed rail cars. The total 1000-Series Rail Car Replacement program cost will be $841.2 million or $2.8 million per car. Of the total cost, $811 million is reflected in this 10-year Capital Needs Inventory and the $30.2 million balance will be incurred after FY 2020.

The 2000/3000-Series Rail Car Replacement project will begin in FY 2018, but most of the new rail cars will arrive after 2020. This project will replace all 366 of the 2000- and the 3000-Series rail cars with new 8000-Series rail cars. The 2000- and 3000-Series rail cars were purchased between 1983 and 1988 and underwent a comprehensive mid-life rehabilitation at their 20-year mark. As a result, they will need to be replaced beginning in FY 2023. The project calls for the design and procurement of a new 8000-Series car. Design will commence in FY 2018, leading to a contract award the following year, which will enable full scale car delivery to begin in FY 2023. The replacement of these cars is needed to maintain safety and reliability, avoid high maintenance costs and incorporate technology found on newer rail cars. Based on experience with the 1000-Series cars, a 40-year life is anticipated for the 2000/3000-Series. The total 2000/3000-Series Rail Car Replacement program cost will be $1.5 billion or $4.0 million per car (the higher per-car cost is due to inflation). Of the total cost, $167.2 million is reflected in the 10-year CNI and the $1.3 billion balance will be incurred after FY 2020.

Metro's 2007 Rail Fleet Plan



Replacement of Rail Cars includes the following CNI projects:

CNI Project	Total (YOE, $ Millions)
CNI 057: 1000-Series Rail Car Replacement	$811.0
CNI 059: 2000/3000-Series Rail Car Replacement	$167.2
Total	$978.2

Rehabilitation of Rail Cars ($264.5 Million)

Metro rehabilitates rail cars at their mid-life point in order to maintain reliability, avoid high maintenance costs and realize the planned 40 year life-cycle. The design process for rail car rehabilitation must begin four to five years before the cars will be delivered. Over the next ten years, Metro will complete the rehabilitation of the 2000- and 3000-Series and begin the rehabilitation of the 4000-Series (purchased between 1992 and 1994) and the 5000-Series (purchased between 2001 and 2004). The mid-life rehabilitation of the 100 4000-Series rail cars and the 192 5000-Series rail cars will be contracted as a component of the 7000-Series rail car procurement in order to gain economies of scale, incorporate enhancements from newer rail cars and ensure compatibility with the fleet. The total cost to rehabilitate the 4000- and 5000-Series is $564.6 million (about $1.6 million for each 4000-Series rail car and about $2.1 million, due to inflation, for each 5000-Series rail car). Of this total cost, $230.6 million is reflected in the 10-year CNI and the $334 million balance will be incurred after FY 2020. Metro's rehabilitation work over the next ten years will also complete required heating, ventilation and air conditioning (HVAC) work on the 1000-Series rail cars.

Metrorail's fleet currently consists of six rail car series purchased and rehabilitated at different times since 1976 and operates on rail tracks constructed over a thirty year period. To address compatibility issues across the fleet and interaction with the track, Metro performs engineering analysis, diagnosis, testing, and resolution implementation under the Rail Car Safety and Reliability Enhancement project. The sustained engineering capability under this program is necessary to maintain high reliability standards, fulfill regulatory requirements and meet Federal Transit Administration mandates. In addition, this capital project covers unforeseen issues that need to be addressed in a short time horizon (e.g., air compressor replacements).

Rehabilitation of Rail Cars includes the following CNI projects:

CNI Project	Total (YOE, $ Millions)
CNI 060: 4000-Series Rail Car Mid-Life Rehabilitation	$163.0
CNI 061: 5000-Series Rail Car Mid-Life Rehabilitation	$67.6
CNI 067: Rail Car Safety & Reliability Enhancements	$26.1
CNI 064: 1000-Series Rail Car HVAC Replacement	$5.2
CNI 058: 2000/3000-Series Rail Car Mid-Life Rehabilitation	$2.6
Total	$264.5

Metro rehabilitates rail cars at their mid-life point in order to maintain reliability, avoid high maintenance costs and realize the planned 40 year life-cycle.

Replacement of Buses ($749.5 Million)

Metro's fleet of approximately 1,500 buses, the 6th largest in the country, transported 134 million riders in FY 2009. Buses range in size from 26 feet to 62 feet, and are a mix of conventional and articulated buses (see table below for details). Of Metro's fleet, 714 (48%) are hybrid electric or compressed natural gas (CNG) fueled buses. In June 2006, the Metro Board adopted an average bus age target of 7½ years. This means that Metro strives to replace 1/15th of its bus fleet each year, or approximately 100 buses a year. Metro plans to continue to invest in buses that utilize clean fuel technologies to reduce emissions.

CNG-fueled buses decrease Metro's diesel fuel usage by over 4.5 million gallons annually and reduce more than 90 percent of carbon monoxide and particulate matter emissions and approximately 50 percent of nitrogen oxide emissions. The advanced technology diesel buses enable Metro to reduce more than 67 percent of nitrogen oxide emissions and 50 percent of particulate matter emissions. The diesel/electric hybrid buses decrease Metro's diesel fuel consumption by more than 50,000 gallons annually and reduce more than 90 percent of carbon monoxide, particulate matter and hydrocarbon emissions, and more than 67 percent of nitrogen oxide emissions.

Over the next ten years, Metro's bus replacement needs are $749.5 million, or approximately $570,000 per bus. Metro also plans to replace 22 of its 62-foot articulated buses costing approximately $900,000 per bus. (Estimated average costs are in 2008 dollars and do not reflect inflation).

In June 2006, the Metro Board adopted an average bus age target of 7½ years. This means that Metro strives to replace 1/15th of its bus fleet each year, or approximately 100 buses a year. Metro plans to continue to invest in buses that utilize clean fuel technologies to reduce emissions.

Metrobus Fleet Details*

Total	Manufacturer	Size	Seating	Capacity
189	New Flyer CNG	40 feet	40	75
21	Neoplan Articulated	60 feet	66	100
0	Ikarus Articulated	60 feet	65	100
111	ADB Flxible Metro with lift	40 feet	45	78
460	Orion	40 feet	38-46	57-77
51	Orion	30 feet	30	46
215	Orion CNG	40 feet	41	77
35	Orion CNG	30 feet	29	56
117	New Flyer	40 feet	39	59
6	Chevrolet	26 feet	20	26
22	NABI Articulated CNG	60 feet	61	100
20	New Flyer Hybrid	37 feet	39	63
211	New Flyer Hybrid	40-42 feet	39	63
22	New Flyer Hybrid	62 feet	39	63
1,480	Total			

CNG – Fueled by compressed natural gas

**As of August 1, 2009.*

Replacement of Buses includes the following CNI project:

CNI Project	Total (YOE, $ Millions)
CNI 006: Bus Replacement	$749.5
Total	$749.5

Rehabilitation of Buses ($228.2 Million)

During the first 7½ years of life, a Metrobus will accumulate approximately 300,000 miles. Metro routinely conducts mid-life overhauls on each bus at 7½ years to extend a bus' useful life to 15 years by replacing components at the end of their useful life. On average, Metro rehabilitates 100 buses per year.

Under this rehabilitation project, the bus engine, transmission and electronics are all rebuilt by Metro employees restoring the bus to an "as new" condition. Like many other large US transit agencies, Metro rebuilds a bus at mid-life due to better service reliability (fewer breakdowns) and lower overall maintenance cost. This program reduces the replacement cycle and decreases Metro's bus replacement needs from approximately 120 buses a year to 100 buses a year. Metro's bus rehabilitation needs over the next ten years totals $228.2 million.

Rehabilitation of Buses includes the following CNI project:

CNI Project	Total (YOE, $ Millions)
CNI 005: Bus Rehabilitation	$228.2
Total	$228.2

Vehicle Replacement Components ($175.8 Million)

Metro requires an inventory of replacement parts to maintain its fleet of vehicles in a state of good performance. Capital replacement components are needed once an item cannot be refurbished and re-used, to address fleet composition changes and to meet federal regulations (e.g., technology upgrades dictated by EPA). Bus rehabilitation components support Metro's mid-life rehabilitation program, destination sign replacement, hybrid/electric battery replacement and soot filter replacement programs. Examples of bus rehabilitation components include alternators, transmissions, engines, coolers, driver's seats, cylinder heads, fan motors, and radiator assemblies. Rail rehabilitation components are assemblies that can be removed from the rail cars and refurbished (e.g., traction motors, brake assemblies, heaters, electronic

signs, compressors and axle assemblies). A supply of rail replacement components are necessary to switch out items that are beyond economic repair. Metro's rehabilitation component needs over the next ten years total $175.8 million.

Vehicle Replacement Components includes the following CNI projects:

CNI Project	Total (YOE, $ Millions)
CNI 008: Bus Rehabilitation Components	$128.6
CNI 063: Rail Rehabilitation Components	$47.2
Total	$175.8

Purchase of MetroAccess Vehicles ($141.0 Million)

The current MetroAccess fleet consists of over 500 vehicles. After re-evaluation of capacity in terms of service quality and projected ridership, MetroAccess has adopted a four-year life cycle target for its rolling stock. Operating the paratransit fleet beyond the useful life reduces the reliability of the service through increased breakdowns, increases exposure to safety risks and increases the cost of expensive maintenance including new engines and transmissions. As of April 2009, 51% of the MetroAccess fleet exceeded the retirement age of 4 years. To meet the four-year average fleet age target, Metro plans to purchase a total of 2,631 MetroAccess vehicles from FY 2011 – 2020, for an average of 260 vehicles per year. Each vehicle costs an average of $55,000 bringing the total capital needs from FY 2011 – 2020 to $141.0 million. The number of MetroAccess vehicles that need to be replaced will increase over time as the passenger population expands (projected growth between FY 2011 – 2020 is 112% or 2.3 million).

Operating the paratransit fleet beyond the useful life reduces the reliability of the service through increased breakdowns, increases exposure to safety risks and increases the cost of expensive maintenance including new engines and transmissions.

This replacement project will shift the acquisition strategy for rolling stock from using a paratransit contractor as the purchasing agent to a capitally funded, Metro-owned program. MetroAccess estimates show that shifting to direct ownership of vehicles will result in significant savings. For example, in FY 2008, Metro procured 65 MetroAccess replacement vehicles directly rather than through a contractor, saving $600,000. These savings are realized through the tax savings, waived annual license fee (vehicles registered with exempt plates), and elimination of the 11% markup (over $4,500/vehicle) that private contractors charge. Combined, savings are approximately $9,200/vehicle when vehicles are purchased directly. In order to continue these savings during future vehicle procurements, Metro must establish a capital funding mechanism for these procurements. The MetroAccess Fleet Management Plan was adopted by the Metro Board and approved by the Federal Transit Administration.

Purchase of MetroAccess Vehicles includes the following CNI project:

CNI Project	Total (YOE, $ Millions)
CNI 015: MetroAccess Vehicles	$141.0
Total	$141.0

Replacement of Service Vehicles ($63.4 Million)

Metro developed a service vehicle replacement plan in May 2007 to eliminate the backlog of $23.5 million in deferred replacement vehicles and to meet future needs. This replacement strategy will enhance service, lower maintenance costs, and improve vehicle reliability and availability. The service vehicle fleet includes passenger vehicles, utility vehicles, specialized maintenance vehicles such as welding trucks and hi-rail vehicles, tow trucks, armored cars, and other specialized types. The plan recommends a weighted average replacement cycle of 7.1 years across all vehicle types. In 2007, 29% of the fleet was older than 10 years and 56% of the service vehicle fleet was over 6 years old.

The approximate number of vehicles to be replaced during FY 2011 – 2020 in each category is:

Passenger Cars: 214	Pickup/Utility Trucks: 506	SUVs: 346
Vans: 260	Heavy Trucks: 65	Tow Trucks: 11
Street Sweepers: 4	All others: 27	

Metro developed a service vehicle replacement plan in May 2007 to eliminate the backlog of $23.5 million in deferred replacement vehicles and to meet future needs.

The service vehicle category also include the Metro Transit Police Department (MTPD) fleet. The 98 MTPD vehicles are shared by officers on two or more shifts, increasing the wear and tear on these vehicles. With the exception of emergency management personnel, MTPD officers are not given "take-home" cars as condition of employment. MTPD relies on its emergency vehicles to transport police officers, K-9s, and special equipment to the site of reported crimes, public disturbances, and suspicious persons and packages throughout the 1,500 square mile Metro service area. MTPD also requires vehicles to respond to intrusions in rail right-of-ways, service and inspection yards, bus lots and garages, maintenance facilities, revenue collection facilities, public parking facilities and Metrobus stops. These vehicles must be replaced in order to maintain passenger and employee safety and security. Over the next ten years, MTPD plans to replace 1/3 of its emergency vehicles to ensure sedans are replaced every three years due to heavy usage. Armored trucks and heavy-duty bomb squad trucks are replaced every seven years.

Replacement of Service Vehicles includes the following CNI projects:

CNI Project	Total (YOE, $ Millions)
CNI 009: Service Vehicle Replacement	$52.0
CNI 104: Police Vehicle Replacement	$11.4
Total	$63.4

Asset Category: Rail System Infrastructure Rehabilitation

The Metrorail system is 106 miles long, including 51 miles of subway (below-ground), 9 aerial miles (above-ground), and 46 surface-level miles. This totals 212 miles of track, since the rail system has two tracks. The oldest sections of Metro's rail system were put into service in 1976, and the newest opened in 2004. These segments generally require rehabilitation every 40 years. The useful life of system components will vary greatly depending on their function and will deteriorate at different rates based on their location. For example, components in deep tunnels with water penetration will deteriorate at a faster rate than those in a dry, well-ventilated area of a station. Therefore, to keep the system in a state of good performance, Metro will begin a comprehensive rehabilitation of the rail infrastructure for the first time in its history.

Multiple systems and equipment are installed within the rail stations and tunnels to provide safe, reliable service. Several of these critical components are apparent to the transit rider (e.g., public address systems) but many are "behind the scenes" (e.g., uninterrupted power supply (UPS), that provides emergency power when utility power is not available). All of these rail infrastructure elements require periodic investment to maintain their structural integrity and functionality. The Rail System Infrastructure Rehabilitation however, does not address the steel running rail needs which are addressed under the asset category "Track and Structures."

The Metrorail system is a two-tracked system—one track heading in each direction. When Metro needs to perform major maintenance work on a section of the system, that segment must be taken out of service, thus altering service patterns. To minimize service disruptions, Metro conducts maintenance on weekends, in the evenings, when ridership is low, and

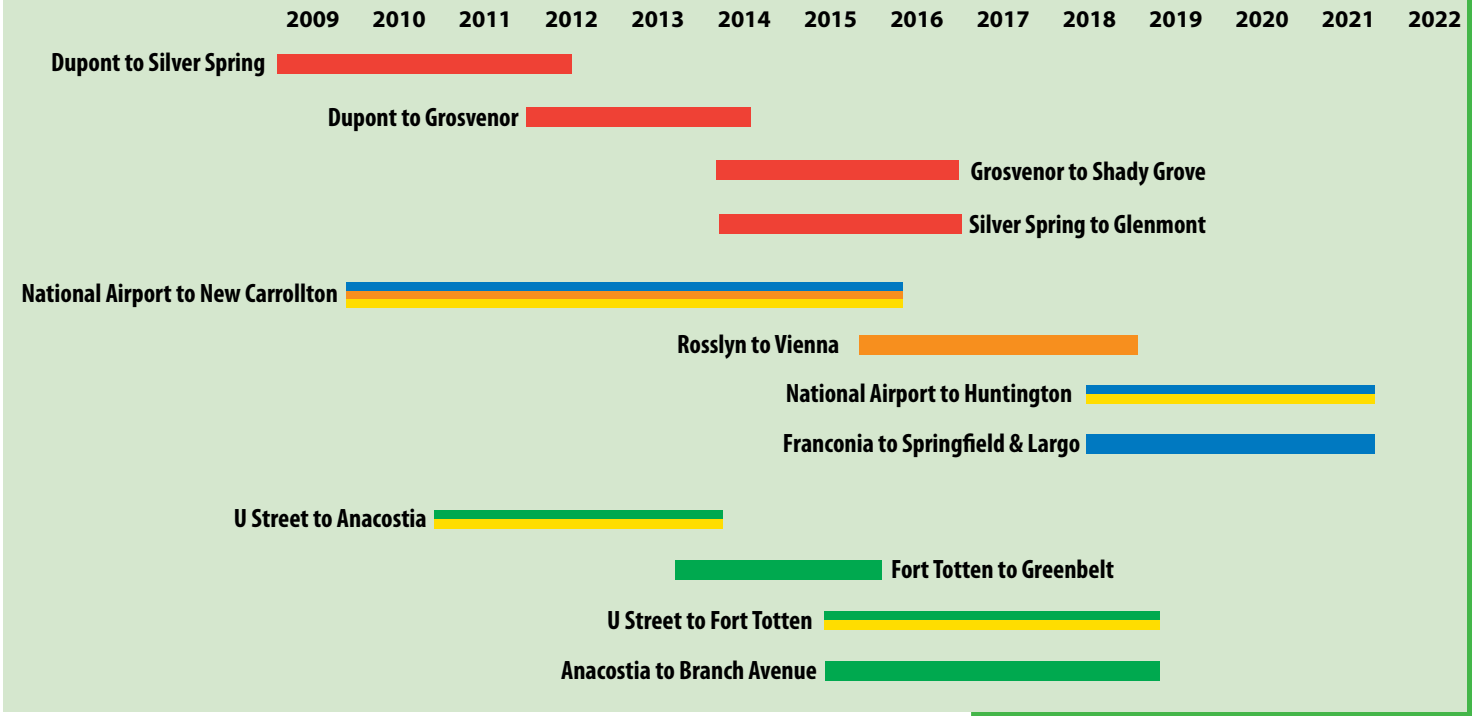
Sequence of Metrorail Openings

Line	Segment	Stations	Miles	Date
Red	Farragut North to Rhode Island Ave	5	4.6	3/29/1976
Red	Gallery Pl-Chinatown	1	none	12/15/1976
Red	To Dupont Circle	1	1.1	1/17/1977
Blue/Orange	National Airport to Stadium-Armory	17	11.8	7/1/1977
Red	To Silver Spring	4	5.7	2/6/1978
Orange	To New Carrollton	5	7.4	11/20/1978
Orange	To Ballston-MU	4	3	12/1/1979
Blue	To Addison Road	3	3.6	11/22/1980
Red	To Van Ness-UDC	3	2.1	12/5/1981
Yellow	Gallery Pl-Chinatown to Pentagon	1	3.3	4/30/1983
Blue	To Huntington	4	4.2	12/17/1983
Red	To Grosvenor	5	6.8	8/25/1984
Red	To Shady Grove	4	7	12/15/1984
Orange	To Vienna/Fairfax-GMU	4	9.1	6/7/1986
Red	To Wheaton	2	3.2	9/22/1990
Green	To U St/African-Amer Civil War Memorial/Cardozo	3	1.7	5/11/1991
Blue	To Van Dorn Street	1	3.9	6/15/1991
Green	To Anacostia	3	2.9	12/28/1991
Green	To Greenbelt	4	7	12/11/1993
Blue	To Franconia-Springfield	1	3.3	6/29/1997
Red	To Glenmont	1	1.4	7/25/1998
Green	Columbia Heights to Fort Totten	2	2.9	9/18/1999
Green	To Branch Ave	5	6.5	1/13/2001
Blue	To Largo Town Center	2	3.2	12/18/2004
Red	New York Avenue	1	none	11/20/2004

while the system is closed. When major maintenance work is needed, Metro can take one track out of service in each direction. Trains moving in both directions will then take turns sharing the section of track through the work zone. This is known as single-tracking. To the extent possible, Metro takes advantage of low rail ridership on three-day holiday weekends to save on late-night maintenance costs and reduce single-tracking. Although performing major work when the system is closed or on weekends has minimized customer impacts, Metro's future maintenance needs will exceed available track work hours.

The Rail System Infrastructure Rehabilitation Program is designed to streamline upgrades throughout the Metrorail system, expand available work hours by coordinating work at specific segments, increase productivity during those track work hours and minimize customer delays. The schedule by segment (as of July 2008) is shown in the Figure below. The basic concept is to accomplish all rehabilitation work at a specific segment using one contract. It takes several hours to secure a work area after closing and before opening the system for service. When this requirement is added to the time necessary to swap work crews between different contractors, the total track work hours is notably decreased. The new Rail System Infrastructure Rehabilitation Program will coordinate work at a segment thus enabling maintenance crews to spend more time performing the necessary work. Concentrating the work area versus spreading the work across the 106.3 mile system will also result in more efficient use of safety, escort and inspection personnel. The overall impact will be more work completed under a shorter timeframe at a lower cost.

Metro Rail System Infrastructure Rehabilitation Schedule



Source: July 24, 2008 presentation to Planning, Development and Real Estate Committee

Under the Rail System Infrastructure Rehabilitation Program, all Metrorail segments are grouped into four "tiers" based on age. For example, Tier 1 includes the rail segment Red Line Dupont to Silver Spring which was completed between 1976 and 1978 making it the oldest section of the rail system. Metro plans to sequence the infrastructure rehabilitation work based on these four tiers. The Metro Board has already approved work under Tier One (Red Line between the Dupont Circle and Silver Spring and Blue and Orange lines between the Stadium-Armory and Ronald Reagan Washington National Airport). The Station Enhancement Program work (e.g., platform slab and tile replacement) will also be coordinated under the Rail System Infrastructure Rehabilitation Program to improve the effectiveness of both programs.

Typical infrastructure rehabilitation work includes drainage pumping rehabilitation, fire system rehabilitation, ceiling tile replacement, tunnel ventilation, station chiller rehabilitation, automatic train control rehabilitation, tunnel lighting replacement, mid-life power system rehabilitation, replacement of un-interruptible power supply systems and battery banks, replacement of traction power switchgear, and communications system rehabilitation. Metro's Rail System Infrastructure Rehabilitation Program needs over the next ten years total $1.8 billion.

Rail Line Segment Rehabilitation by CNI Projects ($1.8 Billion)*

Rehabilitation Tier	CNI Project	Opening Dates	Total (YOE, $ Millions)
Rail Tier 1	CNI 107: Red Line: Dupont to Silver Spring	1976-1978	$139.0
	CNI 110: Blue/Orange/Yellow Lines: National Airport to New Carrollton	1977-1978	$371.9
	CNI 108: Red Line: Dupont to Grosvenor	1981-1984	$234.1
	CNI 113: Green/Yellow Lines: U Street to Anacostia	1991	$98.4
Rail Tier 2	CNI 109: Red Line: Grosvenor to Shady Grove and Silver Spring to Glenmont	1984-1998	$185.7
	CNI 111: Blue/Orange/Yellow Lines: Rosslyn to Vienna	1979-1986	$232.9
	CNI 114: Green/Yellow Lines: U Street to Greenbelt	1993-1999	$159.9
Rail Tier 3	CNI 112: Blue/Orange/Yellow Lines: National Airport to Huntington and Franconia-Springfield and Largo Extension	1983-1991 1997-2004	$203.8
	CNI 115: Green/Yellow Lines: Anacostia to Branch Avenue	2001	$112.6
Rail Tier 4	CNI 122: Next Segment		$83.9
	Total		$1,822.2

**Cost estimates as of May 2009.*

Asset Category: Fleet Maintenance Facilities

Metro's fleet maintenance facilities include nine bus operating garages (a 10th bus division – Southeastern – is being relocated to the DC Village location) and nine rail yards. At these facilities, Metro employees complete regular repairs to the bus and rail fleet, conduct vehicle safety inspections and clean the vehicles for customer comfort. These facilities also provide secure storage of Metro's bus and rail fleet when these vehicles are not in use. Rehabilitation of Metro's maintenance facilities is required to upgrade safety, environmental, and maintenance systems, as well as to provide a better work environment for employees. The work at Metro's maintenance facilities is critical to keeping the Metrobus and Metrorail fleet safe and reliable.

Rail fleet maintenance work includes the following: automatic train controls, brakes, communication devices, doors, lighting, heating and cooling systems, power, propulsion, signs and signals. Bus maintenance work includes the vehicle power train (engine and transmission), brakes, electrical components, body/doors and heating and cooling system. In addition to regular maintenance, bus facilities are also used to rehabilitate vehicles halfway through their life cycle to extend the useful life of each vehicle. Rail car mid-life rehabilitation is conducted off-site by the rail car manufacturer.

As described in the Metro system overview, Metro's bus garages range in age from 20 years old to 102 years old, excluding the new West Ox facility that opened in 2009. The average age of Metro's bus garages (excluding West Ox) is 55.25 yrs. A peer review panel conducted by the American Public Transportation Association (APTA) in 2005 found that due to the age and condition of Metro's bus garages, working conditions impeded efficient operations. The panel recommended the development of a bus facilities plan to address deficiencies at the garages. As communicated to Metro's Board in November 2008, Metro aims to place all bus garages on a regular maintenance cycle so that the facilities can continue to serve Metro for many years into the future. These improvements are discussed under Maintenance of Bus Garages.

In June 2009, Metro presented to the Board its strategy for addressing bus garages that have outlived their useful lives. These old facilities present limitations due to the size and configuration of the garage and/or the amount of land area available for bus storage, so more significant investments are needed. These investments are addressed under Rehabilitation and Replacement of Bus Garages.

Metro's first rail yards were constructed at the opening of the Metrorail system in 1976. The youngest yard, Largo, was put into service in 2004. The Maintenance of Rail Yards program allows Metro to extend the useful lives of these facilities. Maintenance includes replacing equipment and building systems that have reached the end of their life cycles and repairs to worn walls, ceilings and floors. The first series of rail yard improvements was presented to the Metro Board in September 2009.

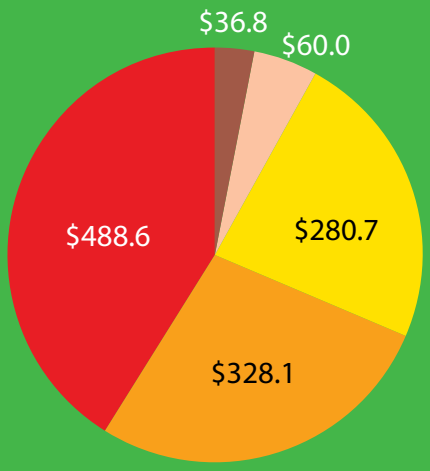
Testing and commissioning of new and rehabilitated rail cars is done on Metrorail track during the short 4-hour window when the rail system is closed. With the influx of over

Rehabilitation of Metro's maintenance facilities is required to upgrade safety, environmental, and maintenance systems, as well as to provide a better work environment for employees. The work at Metro's maintenance facilities is critical to keeping the Metrobus and Metrorail fleet safe and reliable.

1,100 new and rehabilitated rail cars in the next decade, a new rail car testing and commissioning facility is needed. This is discussed under Rail Maintenance Facilities.

As Metro's maintenance facilities age and technology changes, capital investment in these facilities increases in degree and necessity. In addition, Metro must continue to comply with increasingly stringent environmental regulations at all its facilities. The figure to the left shows Metro's Performance - Fleet Maintenance Facilities needs ($1.2 billion over 10 years) by project type.

Performance – Fleet Maintenance Facilities Needs by Project Type ($1.2 Billion)



YOE, $ Millions

- Rehabilitation and Replacement of Bus Garages
- Maintenance of Bus Garages
- Maintenance of Rail Yards
- Rail Maintenance Facilities
- Environmental Compliance Projects

Rehabilitation and Replacement of Bus Garages ($488.6 Million)

Many of Metro's oldest garages present operational challenges as the facilities were not designed for today's bus configurations. These garages, some of which were originally designed as trolley barns, are not adequate to meet today's bus maintenance and storage needs. To address this, Metro needs to replace and rehabilitate these garages with modern, energy efficient facilities and equipment at a cost of $488.6 million (see table below). These improvements respond to the 2005 APTA Peer Review of Metro's bus operations and facilities that recommended Metro develop a facilities plan for its bus garages. Metro's plans for bus garages that have outlived their useful lives were presented to the Metro Board in June 2009.

At Southern Avenue Bus Garage (built in 1928), the circulation aisle is too narrow to turn a bus into a repair bay in a single maneuver. Reconstruction of this garage will allow for more efficient bus movement within the facility, among many other improvements (CNI 084). At other facilities, replacement at alternate sites is more appropriate. These facilities present limitations due to the size and configuration of the garage and/or the amount of land area available for bus storage. Replacement of Bus Garages (CNI 085) provides Metro the opportunity to build new two facilities to replace the Royal Street Bus Garage in Alexandria and the Northern Bus Garage in DC at sites that allow for future expansion as needed. Metro also plans to replace the Southeastern Bus Garage that was sold to accommodate development near the Nationals baseball stadium with a new garage at DC Village (CNI 086).

Rehabilitation and Replacement of Bus Garages includes the following CNI projects:

CNI Project	Total (YOE, $ Millions)
CNI 085: Replacement of Additional Bus Garages	$328.6
CNI 084: Southern Avenue Bus Garage Replacement	$110.0
CNI 086: Southeastern Bus Garage Replacement*	$50.0
Total	$488.6

**Additional project funding to come from the sale of Southeastern Bus Garage ($60 million) and American Recovery and Reinvestment Act of 2009 funds ($30 million).*

Maintenance of Bus Garages ($328.1 Million)

Strategic investments can extend a bus garage's useful life so that the facility can continue to serve Metro for many years into the future. These investments allow Metro to move to a regular maintenance schedule for those bus garages not addressed in Rehabilitation and Replacement of Bus Garages. Many of Metro's bus garages have a long list of deferred capital needs, hampering the efficiency of bus repair programs and decreasing employee morale. Improvements to correct these deficiencies total $328.1 million. Similar to the Rail System Infrastructure Rehabilitation program, Metro will group bus garage maintenance work under three separate contracts to streamline procurement procedures, increase contractor productivity and minimize work interruptions at maintenance facilities. Metro's Board was informed of this initiative in November 2008.

Bus Garage Facility Repairs Tier 1 (CNI 119) includes maintenance at Metro's bus garages that are most in need of repair, including Western (64 years old), Northern (102 years old) and Landover (20 years old). Bus Facilities Tier 1 also includes maintenance at Metro support facilities: Revenue Collection Facility, Metro Supply Facility, Landover Open Storage, Blair Road Support Shop and the MTPD District 1 Substation. Although the substation is a new facility (built in 2007), minor repairs are anticipated near the end of the CNI time frame to keep the facility in good working condition. Bus Garage Facility Repairs Tier 2 (CNI 120) includes bus garages that have been in operation for 27 to 31 years. Bus Garage Facility Repairs Tier 3 (CNI 121) includes Metro bus garages that were recently renovated.

Many of Metro's bus garages have a long list of deferred capital needs, hampering the efficiency of bus repair programs and decreasing employee morale.

Specific bus garage improvements will vary depending on the age and condition of each facility, including replacement of bus maintenance equipment, installing additional in-ground bus lifts and automated bus cleaning systems, rehabilitating wear surfaces and rehabilitating employee areas. At Metro's Northern bus garage (Metro's oldest, constructed in 1907), plans include extending and upgrading 3 service bays to better accommodate articulated bus maintenance. An articulated bus uses a pivoting joint in the center to extend the bus length and passenger capacity, while still allowing it to turn on city streets. At 62-feet, articulated buses are considerably longer and require more maintenance and storage space than a standard Metrobus (37-feet or 42-feet). At Western bus garage, improvements will be made to bus service bays to improve maintenance capacity and electrical systems will be replaced, among many other improvements. At Landover bus garage, improvements include rehabilitation of the dispatch booth and bus maintenance equipment, along with replacement of the fire alarm system. Improvements address facility issues identified in the 2005 APTA Peer Review of Metro's bus operations and facilities.

Maintenance of Bus Garages includes the following CNI projects:

CNI Project	Total (YOE, $ Millions)
CNI 119: Bus Garage Facility Repairs Tier 1: Western, Northern and Landover	$135.9
CNI 120: Bus Garage Facility Repairs Tier 2: Montgomery and Four Mile Run	$113.9
CNI 121: Bus Garage Facility Repairs Tier 3: Bladensburg	$78.2
Total	$328.1

Maintenance of Rail Yards ($280.7 Million)

As with Maintenance of Bus Garages, the Maintenance of Rail Yards program allows Metro to extend the useful life of an existing facility, specifically, its rail yards. Facilities at Metro's rail yards include service and inspection shops, maintenance, operations and yard control buildings and traction power/tiebreaker substations. Improvements will begin with Metro's oldest rail yards that were built at the opening of the rail system. The scope of work will vary by facility depending on age and conditions, but may include: replacing shop/building equipment, rehabilitating wear surfaces, rehabilitating employee areas, upgrading security and public announcement systems, among other improvements.

Similar to the Rail System Infrastructure Rehabilitation program and Maintenance of Bus Garages, Metro will group rail yard maintenance work under three separate contracts to streamline procurement procedures, increase contractor productivity and minimize work interruptions at maintenance facilities. Rail Yard Facility Repairs Tier 1 (CNI 116) includes maintenance at Metro's oldest rail yards at Alexandria, Brentwood and New Carrollton, ranging from 26 to 33 years old. Rail Yard Facility Repairs Tier 2 (CNI 117) includes facilities that have been in operation for 16 to 23 years. Rail Yard Facility Repairs Tier 3 (CNI 118) includes Metro's newest rail maintenance facilities, ranging in age from 5 to 11 years old. Capital needs at Metro's rail yards total $280.7 million.

Rail yard maintenance work will vary by facility depending on age and conditions, but may include: replacing shop/building equipment, rehabilitating wear surfaces, rehabilitating employee areas, upgrading security and public announcement systems, among other improvements.

Maintenance of Rail Yards includes the following CNI projects:

CNI Project	Total (YOE, $ Millions)
CNI 116: Rail Yard Facility Repairs Tier 1: Alexandria, Brentwood and New Carrollton	$125.7
CNI 117: Rail Yard Facility Repairs Tier 2: West Falls Church, Greenbelt and Shady Grove	$123.9
CNI 118: Rail Yard Facility Repairs Tier 3: Branch Avenue, Glenmont and Largo	$31.1
Total	$280.7

Rail Maintenance Facilities ($60.0 Million)

Metro needs to replace rail cars for the first time in its 30+ year history. Over the next decade, Metro capital needs include over 1,100 new and rehabilitated rail cars. Metro conducts extensive testing on each train before putting it into service. The testing and commissioning period for a pair of rail cars is typically sixty days. All on-board systems are tested as well as how the cars work with the Automatic Train Control System. The tests are performed under a variety of operating conditions that examine performance both within the normal operating range and at the limits of that range and include tests on acceleration and braking, communications, heating and cooling systems, lighting, signage and door controls.

Metro does not have a dedicated facility to do this work. Currently, testing and commissioning of new trains is conducted at night during the short 4-hour window when the Metrorail system is closed. In the evenings, Metrorail track is shared with contractors, maintenance crews, and trains being moved for maintenance and staging for the next day's operations. Under these conditions, a maximum of 8-10 trains can be commissioned per month. This is not sufficient given the volume of trains that will be received through 2020. A new test track and commissioning facility will cost $60.0 million and will permit Metro to accept up to 20 cars per month. The facility will also be used for ongoing engineering analysis and enhancement to the rail fleet.

Currently, testing and commissioning of new trains is conducted at night during the short 4-hour window when the Metrorail system is closed. This is not sufficient given the volume of trains that will be commissioned over the next ten years.

Rail Maintenance Facilities includes the following CNI project:

CNI Project	Total (YOE, $ Millions)
CNI 071: Test Track and Commissioning Facility	$60.0
Total	$60.0

Environmental Compliance Projects ($36.8 Million)

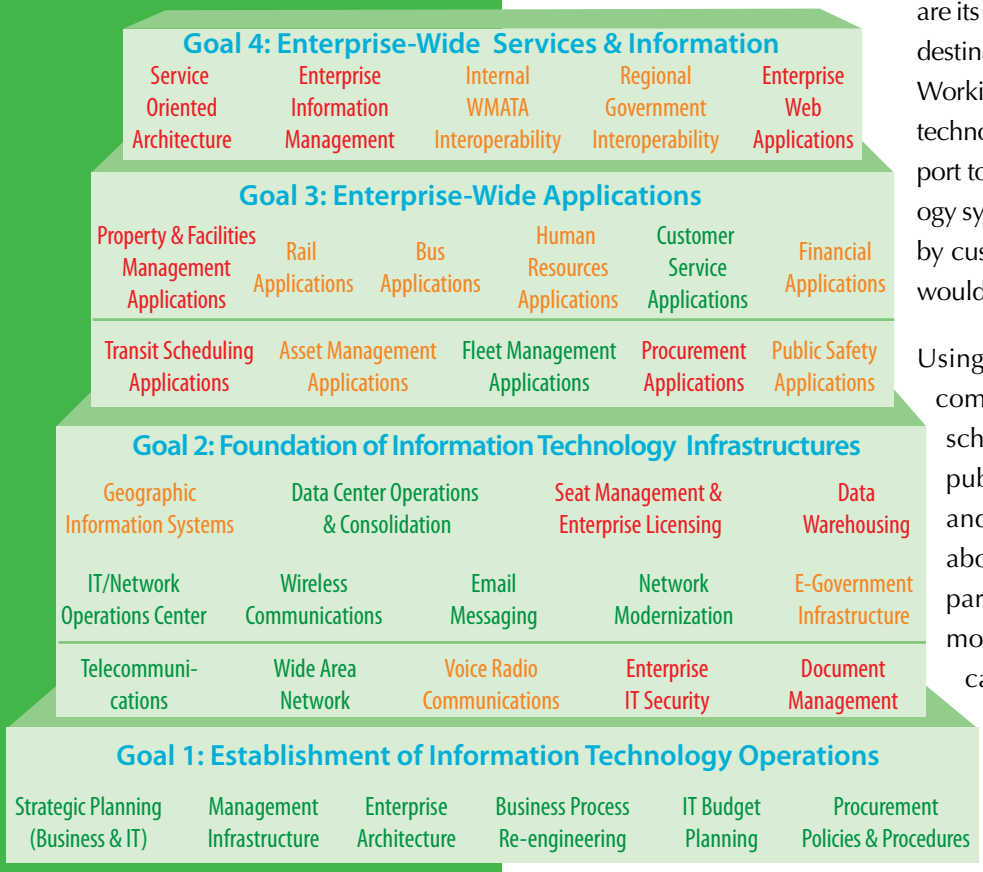
Metro's maintenance facilities house environmental systems that must operate properly to ensure compliance with increasingly stringent environmental regulations and to prevent expensive remediation programs and potential fines or shutdowns at maintenance facilities. These include vehicle fuel tanks and systems, storm water and wastewater pre-treatment systems, air emissions controls and other systems. This program includes the upgrade and replacement of existing systems within warranty periods and the installation of additional systems, totaling $36.8 million through 2020.

Environmental Compliance Projects include the following CNI projects:

CNI Project	Total (YOE, $ Millions)
CNI 011: Underground Storage Tank Replacement	$29.5
CNI 010: Environmental Compliance Projects	$7.3
Total	$36.8

Asset Category: Systems and Technology

Metro's Information Technology Capability Pyramid as of FY 2010

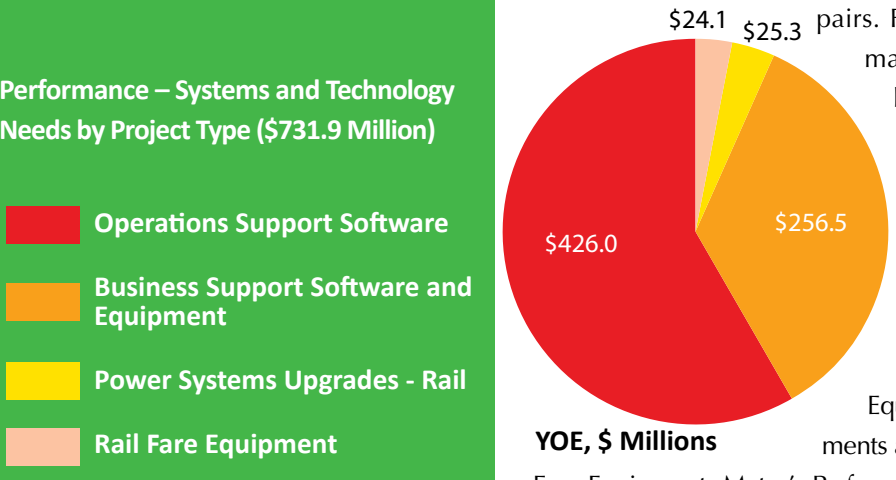


The above figure illustrates the status of information technology systems beginning in FY 2011, identifying those systems that still require investment.

The highly visible elements of Metro's infrastructure are its trains, buses and vans that move customers to destinations throughout the region 365 days a year. Working behind the scenes is Metro's business and technology infrastructure that provides critical support to transit operations. Some of Metro's technology systems, software and equipment go unnoticed by customers, but without them, transit operations would be severely hampered.

Using Metrobus as an example, software and communication equipment enable staff to schedule buses, distribute information to the public (printed timetables, web, telephone and smart phones), collect fares and data about the number of passengers traveling on particular lines, assign bus operators to routes, monitor performance, track new and/or relocated bus stops, store employee records, along with numerous other functions. An extensive technology infrastructure is also in place for Metrorail and MetroAccess. For example, as MetroAccess riders call into Metro's call center to request a ride, software is used to track eligibility, schedule trips and identify routes. Technology also helps Metro monitor the condition of its physical infrastructure and plan for maintenance and repairs. For example, Metrobus uses software to monitor maintenance for each of its approximately 1,500 buses and Metrorail's track inspectors use software to record and monitor the condition of the rail. Investment in these systems is discussed under Operations Support Software.

Performance – Systems and Technology Needs by Project Type ($731.9 Million)



Metro's systems and technology capital needs extend to the corporate and financial management of the agency (see Business Support Software and Equipment). Needed system and technology investments also include Power System Upgrades – Rail and Rail Fare Equipment. Metro's Performance - System and Technology needs fall into four main project types and total $731.9 million over the next 10 years (see figure at left). A brief description of each project type follows.

Operations Support Software ($426 Million)

These projects cover software upgrades and other technology improvements that are essential to transit operations. Metro's Operations Support Software program totals $426 million over the next 10 years including scheduling and dispatch software, on-board applications (for example, automatic bus fluid management), asset management systems, and the technology infrastructure needed to support these applications such as data centers and communication networks (see table below).

Rail operations support software includes upgrades to the Operations Control Center system that monitors train movement and expansion of the system to serve the new Dulles extension. Enhancements to Metrorail operating support software will improve the integration with other Metorail systems (for example, asset management and track work scheduling) and incorporate data from the new 7000-Series rail cars. Bus operations support software covers the deployment of centralized, field and on-board applications such as automatic vehicle maintenance, fluid management, computer aided dispatch and automatic vehicle location systems. Metrobus and Metrorail operations both utilize asset manage support software to track inventory and monitor the condition of assets. This software will be upgraded and new modules implemented in order to increase the efficiency of maintenance work. MTPD operations support software addresses the department's records management system which needs to be upgraded to support dispatch, crime and response tracking.

Operations Support Software projects include enhanced technology infrastructure to minimize service disruptions. For example, Metro's data centers will be upgraded to industry standards to improve reliability and avoid unnecessary failures. A network operations center will monitor system and network enterprise health. In addition, telephone and wireless communication systems will be upgraded to avoid outages impacting transit operations and customer service.

Operations Support Software includes the following CNI projects:

CNI Project	Total (YOE, $ Millions)
CNI 056: Rail Operations Support Software	$147.6
CNI 045: Data Centers and Infrastructures	$97.9
CNI 043: Bus Operations Support Software	$74.4
CNI 052: Network and Communications	$51.6
CNI 053: Network Operations Center (NOC)	$26.8
CNI 042: Bus & Rail Asset Management Software	$26.2
CNI 051: Police Dispatch and Records Management	$1.6
Total	$426.0

Operations Support Software projects include enhanced technology infrastructure to minimize service disruptions. For example, Metro's data centers will be upgraded to industry standards to improve reliability and avoid unnecessary failures.

Business Support Software and Equipment ($256.5 Million)

Business Support Software and Equipment projects include improvements to Metro's technology infrastructure to enhance the security of electronic information, replace outdated machines with newer, more technologically advanced equipment and upgrade software to support the corporate and financial management of the agency. Metro's Business Support Software and Equipment program totals $256.5 million over the next 10 years (see table below).

In order to secure Metro's technology infrastructure and reduce the risk of malicious attacks, cyber terrorism and fraud, Metro will put in place a comprehensive agency-wide security architecture. This includes additional security measures for credit card transactions made by Metro riders, including the purchase of farecards, loading value to SmarTrip cards and paying parking fees. IT security controls are required by Payment Card Industry (PCI) and financial system audits to protect electronic data and resources.

Metro will also replace key equipment necessary for transit operation support. New portable radios will enable transit police officers to quickly respond to incidents. Outdated currency processing machines, used by Metro employees for making fare box revenue deposits, will be replaced with newer machines that are more reliable and efficient.

Many of Metro's financial management software systems are at end-of-life and will no longer be supported by the vendor. This includes software for treasury, budget, cash management and accounts payable. Planned improvements will address out-of-date technology management techniques. In addition, the Metro IT OneStop and Office Automation program will provide for remote troubleshooting and electronic software distribution, increasing response time and productivity. Moving away from manual paper based processes to electronic records and forms through implementation of a document management system will produce significant employee productivity gains.

Business Support Software and Equipment includes the following CNI projects:

CNI Project	Total (YOE, $ Millions)
CNI 049: Management Support Software	$100.9
CNI 048: Sensitive Data Protection Technology	$69.3
CNI 050: Metro IT OneStop and Office Automation	$47.1
CNI 046: Document Management System	$33.1
CNI 103: Police Portable Radio Replacement	$3.9
CNI 030: Currency Processing Machines	$2.2
Total	$256.5

In order to secure Metro's technology infrastructure and reduce the risk of malicious attacks, cyber terrorism and fraud, Metro will put in place a comprehensive Agency-wide security architecture.

Power System Upgrades – Rail ($25.3 Million)

To meet increasing ridership demand and avoid overcrowding, Metro is moving from a combination of 6- and 8-car trains to 100% 8-car trains at peak periods. This requires additional investment in the electrical system that powers the trains. This project includes improvements to the traction-power system to support 8-car trains. This includes upgrades to traction power equipment and cables to reduce the risk of power outages and/or fire. Metro's Power System Upgrades – Rail program totals $25.3 million over the next 10 years.

To meet increasing ridership demand and avoid overcrowding, Metro is moving from a combination of 6- and 8-car trains to 100% 8-car trains at peak periods. This requires additional investment in the electrical system that powers the trains.

Power System Upgrades - Rail includes the following CNI project:

CNI Project	Total (YOE, $ Millions)
CNI 076: 8-Car Train Power Upgrades	$25.3
Total	$25.3

Rail Fare Equipment ($24.1 Million)

Metro is considering new technologies for fare collection, potentially moving to a bank card (credit/debit) fare payment system. Until then, Metro will continue to support its Automatic Fare Collection (AFC) system. This includes replacing and upgrading fare collection system parts and IT components at fare gates, express vendors and other machines as they age and/or become obsolete, as well as upgrades necessary to continue compliance with Payment Card Industry (PCI) standards. Metro's Rail Fare Equipment program totals $24.1 million over the next 10 years (see table below).

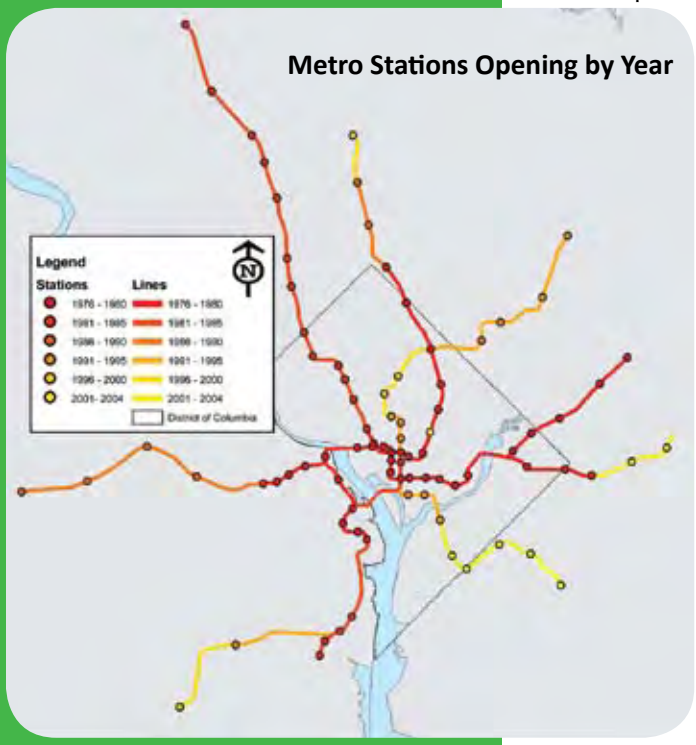
Rail Fare Equipment includes the following CNI projects:

CNI Project	Total (YOE, $ Millions)
CNI 095: Automatic Fare Collection Machine Repairs	$12.0
CNI 093: Maintaining NEXTFARE System	$6.4
CNI 031: Debit/Credit Processing Requirements	$4.1
CNI 032: Fare Media Encoders	$1.5
Total	$24.1

Asset Category: Track and Structures

Metro's track and structure assets include more than just the railroad track. Assets include the steel running rail that guides Metro's train cars, the cross ties and fasteners that hold the rail in place, the ballast bed that supports the cross ties and the third rail that provides power to the train. Structures also refer to the retaining walls that protect the track bed and underground tunnels, the concrete pads that keep the track bed properly elevated and the bridges that span roads and bodies of water. Together, track and structure assets comprise the 106 mile long Metrorail system: 51 subway miles (below ground), 46 surface miles (above ground) and 9 aerial miles (bridges). This totals 212 miles of track, since the rail system has two tracks.

Metro Stations Opening by Year



Metro's oldest rail segments date back to 1976, when the system opened, and require major track and structural rehabilitation (see graphic). The maintenance needs of these capital assets have accelerated due to increased train frequency, extended operating hours and longer trains (the 4-car trains used when the system opened have been replaced with 6- and 8-car trains). The region makes good use of this infrastructure. Compared with other large U.S. transit agencies, Metrorail moves more passengers per operating mile than the national average (excluding New York City transit).[4] Metro wears down its track faster than many heavy rail systems in the U.S. including BART (San Francisco), Chicago Transit Authority and MARTA (Atlanta). On an average weekday in FY 2009, there were about 750,000 passenger trips on Metrorail or 3,537 passenger trips per track mile per day. Projections show average weekday passenger trips increasing by about 20% to 910,000 trips by 2020 and to 970,000 trips by 2030. As Metrorail ridership grows, additional investment in track and structures will be critical to the system's safe and reliable operations.

The capital investments needed to maintain Metro's existing track and structures come to almost $600 million over the next ten years (FY 2011 – 2020) and fall into two project types: track rehabilitation and station/tunnel rehabilitation. A brief description of each project type follows.

Track Rehabilitation - $540M

Station/Tunnel Rehabilitation - $46M

4 Source: Federal Transit Administration National Transit Database, *2005 Annual National Transit Summaries and Trends*.

Track Rehabilitation ($539.3 Million)

As part of the track rehabilitation capital program, Metro rehabilitates major sections of the rail system (routine maintenance is addressed through the operating program). Track work occurs during off-peak hours (evenings and weekends) and when the system is closed. This rehabilitation work includes replacing turnouts that allow trains to switch from one track to another (30/year), running rail (52,800 feet/year, or 10 miles/year), direct fixation fasteners (16,000/year), cross ties (8,000/year) and third rail insulators (5,000/year). Metro replaces components when they become worn or unserviceable due to deterioration, excessive wear, or defects. In addition, track rehabilitation projects upgrade the performance of the track using new technologies, processes and equipment. For example, as the third rail is being replaced, a new aluminum and steel composite will be installed. The new third rail design will provide less resistance for 8-car trains and save energy. Metro uses a continuous welding process to rehabilitate track which reduces the number of open rail joints throughout the rail system, requires less maintenance than mechanical splices, improves the electrical conductivity of the rail, eliminates joint defects and eliminates cross tie fires. Metro continually strives to identify strategies that save capital and operating dollars.

Track rehabilitation projects also maintain the integrity of structures (e.g., aerial bridges and retaining walls) by repairing masonry, drainage systems, tensioning cables and expansion joints. Many of Metro's structures have been in service between 20 - 30 years and have been subjected to extreme environmental conditions. By rehabilitating structural components, Metro maintains the integrity of these dynamically loaded Right-of-Way structures and restores the structures to their designed load carrying capacity.

Concrete pads (or grout/plinth pads) located below the track are another key structural component addressed under track rehabilitation projects. Concrete pads provide elevation and support for the track and track fasteners. Other pads, called floating slab isolation pads, dissipate vibration energy and are replaced as needed to restore the track structure to the proper elevation. Improper elevation can result in damage to the car's third rail collector shoes and the vibrations can potentially lead to structural cracking in the surrounding buildings and structures. Metro's Track Rehabilitation projects total $540 million over the next 10 years.

Track Rehabilitation includes the following CNI projects:

CNI Project	Total (YOE, $ Millions)
CNI 024: Track Rehabilitation	$387.2
CNI 023: Third Rail Rehabilitation	$40.2

Many of Metro's structures have been in service between 20 - 30 years and have been subjected to extreme environmental conditions.

Water, moisture and humidity cause premature deterioration of Metro's infrastructure, track components, electrical, lighting and automatic train control equipment.

CNI 018: Track Welding Program	$31.7
CNI 021: Track Pad/Shock Absorber Rehabilitation	$29.5
CNI 022: Track Structural Rehabilitation	$22.4
CNI 019: Track Floating Slabs Rehabilitation	$16.3
CNI 089: Track Fasteners	$12.0
Total	$539.3

Station/Tunnel Leak Rehabilitation ($46 Million)

Water, moisture and humidity cause premature deterioration of Metro's infrastructure, track components, electrical, lighting and automatic train control equipment. Station/Tunnel Leak Mitigation work eliminates unsafe wet conditions for Metrorail passengers and prevents service delays resulting from water intrusion.The goal of this capital project is to maintain the structural integrity of the tunnel liners and prevent the corrosion of wayside systems and equipment. Repairing station/tunnel leaks over the next ten years requires $46.0 million to conduct engineering assessments, purchase specialized access equipment and provide additional training for employees.

Station/Tunnel Leak Rehabilitation includes the following CNI projects:

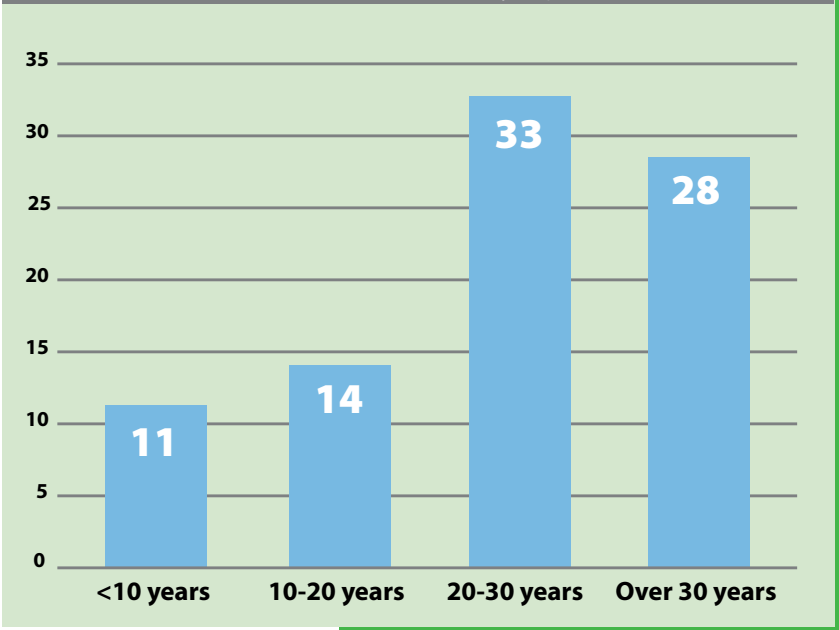
CNI Project	Total (YOE, $ Millions)
CNI 026: Station/Tunnel Leak Mitigation	$46.0
Total	$46.0

Asset Category: Passenger Facilities

Passenger facilities refer to the 86 rail stations used by over 220 million customers in FY 2009. Metro's rail stations are iconic in design and structure and provide for a pleasant and unique passenger experience. However, 38% (33 stations) are between 20 and 30 years old, and 32% (28 stations) are over 30 years old. These stations are in need of consistent investment to maintain their safe functionality.

Maintenance of the rail stations falls under Metro's Station Enhancement program, an in-house program that conducts a range of rehabilitation work to help restore the stations to its original character. Taking one architectural feature of the stations as an example, Metro maintains over 2.4 million square feet of paver tiles on mezzanines and platforms, which is equivalent to over 15 dual lane roadway miles. Regular cleaning and repair of the stations will preserve the value of these assets, improve customer perception of the system, and identify and address any potential safety concerns. Well maintained stations are a part of Metro's overall service delivery package.

Metrorail Stations by Age



Within Metro's rail stations, 236 elevators and 588 escalators provide vital transportation linkages to disabled and elderly passengers throughout the region. Metro is also responsible for maintaining 39 elevators at its support facilities. To keep elevator and escalator facilities available and reliable, Metro conducts regular maintenance throughout the system and upgrades the safety standards of existing equipment. Preventing outages reduces the need for shuttle bus service, which is an inconvenience to passengers and increases Metro's operating costs. When outages do occur, Metro communicates with customers through passenger information displays at stations, station announcements, email and text message alerts, website announcements and signs.

Metro's vehicle-related passenger facilities include 21 parking garages, 29 surface lots with approximately 58,000 park-and-ride and 3,500-metered Kiss-and-Ride spaces, 6 access roads and 51 bus loops. Metro's parking garages range in age from 3 years old to 40 years old. Metro parking garages are deteriorating due to exposure to the elements and to a lack of a capitally-funded preventive maintenance program. Currently, the parking garages do not have a preventive maintenance program, and undergo a minor rehabilitation every 7 years and a major rehabilitation every 15 years. A capital maintenance program would extend the life of parking garages and reduce rehabilitation costs by 30 to 50%. Bus loops and access roads have been used for more than 30 years as well. Metro needs to conduct preventive maintenance work to extend the useful life of vehicle-related assets and

Metro needs to conduct preventive maintenance work to extend the useful life of vehicle-related assets and prevent costly rehabilitation projects. The close proximity of these vehicle-related facilities to rail stations makes it important to prevent water, debris and other runoff from damaging the track bed.

prevent costly rehabilitation projects. The close proximity of these vehicle-related facilities to rail stations makes it important to prevent water, debris and other run-off from damaging the track bed.

Although the bulk of Metro's passenger facilities investment target rail stations, elevators, escalators and parking facilities, additional investments are required to maintain Metro's bicycle racks and lockers. Between 2002 and 2007, the number of people using bikes to access rail stations grew by 60%. Bicycling is one of the most cost-efficient modes of station access Metro can provide. For example, the space dedicated to a single vehicle in a parking garage could hold 10 – 12 bicycles. Metro has 1,743 bike racks and 1,268 key-operated lockers throughout the rail system. Due to increased population, denser development around stations and gas prices, it has become clear that Metro needs to provide and maintain bicycle storage facilities. Metro's Performance - Passenger Facility needs over the next ten years total $372.3 million and fall into three project types: Maintenance of Rail System Facilities, Elevators/Escalators Facilities, and Bicycle and Pedestrian Facilities (see table below). A brief description of each project type follows.

Performance Passenger Facility Needs by Project Type

Project Type	Capital Needs ($ YOE Millions)
Elevator/Escalator Facilities	$233.8
Maintenance of Rail Station Facilities	$133.9
Bicycle and Pedestrian Facilities	$4.6
Total	$372.3

Elevator / Escalator Facilities ($233.8 million)

Metro staff maintains 275 elevators (236 in Metrorail system and 39 in Metro support facilities) and 588 escalators in order to control costs and allow for greater scheduling flexibility. This program continually conducts preventive maintenance work throughout the system to keep the elevators and escalator facilities available and reliable. In addition, Metro refurbishes 15 elevators and 30 escalators a year. Elevators and escalators generally have a 40-50 year life with a midlife rehabilitation at about 20-25 years. Hydraulic elevators can be modernized for about $240,000 (2008 dollars) and traction elevators can be modernized for about $300,000 (2008 dollars) depending on the size and location of the elevator. The cost of rehabilitating an escalator is about $400,000 depending on the style, manufacturer, and length of the escalator. Metro estimates that the maintenance work extends the life of escalators by an additional 20 years.

A regular maintenance program enables Metro to lower operating and future repair costs. These capital investments ensure the longevity of Metro's escalators and

elevators. Metro also strives to improve the safety and reliability of elevators and escalators by installing upgrades to comb plates, hand rail systems, controllers and drives, amongst other features. To increase the safety of elevators and escalators, Metro upgrades equipment, enhances lighting around assets, and produces advertising campaigns (e.g., the advertisement comparing escalators to alligators; see right).

Elevator/Escalator Facilities includes the following CNI projects:

CNI Project	Total (YOE, $ Millions)
CNI 073: Escalator Rehabilitation	$177.8
CNI 072: Elevator Rehabilitation	$56.0
Total	$233.8

Maintenance of Rail Station Facilities ($133.9 Million)

The Station Enhancement Program was initiated in April 1991. The purpose of the Station Enhancement Program is to restore the appearance of stations. When the program started, the goal was to complete "major" enhancements at 10 stations per year which was subsequently increased to 12 stations per year. "Major" enhancement tasks include pressure washing coffered ceilings and walls and painting interior surfaces that are not easily reachable (e.g., track bed grates). In July 2000, the program was expanded to include 12 "mini" enhancements. "Mini" enhancement tasks include cleaning masonry surfaces (e.g., passageways, trackbed walls, and exterior canopies), painting interior surfaces (e.g., fare gates, mezzanine and passageway ceiling tiles), repairing metal components (e.g., platform shelter, station doors, and drainage grates), repairing interior masonry surfaces (e.g., granite edge stones and paver tiles); painting exterior surfaces (e.g., parking lot light poles, bike racks/lockers, and parking booths), replacing station signs (e.g., on kiosks and trash receptacles), refinishing bus and station platform shelter benches, and polishing bronze surfaces (e.g., on escalators). A "major" enhancement takes about 3 months while a "mini" enhancement takes about three weeks. By completing 12 "major" and 12 "mini" enhancements annually, the condition of each Metrorail station is restored every 3.75 years. The Station Enhancement Program work will be coordinated under the Rail System Infrastructure Rehabilitation Program.

The Parking Lot Preventive Maintenance Program provides for continuous rehabilitation of Metro's 21 parking garages and 29 surface lots. A program of regular sweeping and washdowns reduces the concentrations of corrosive road dirt and chemicals inside the structures. Under a preventive maintenance program, asphalt parking lots will be routinely crack-sealed and treated to extend the life of the surfaces. Every five years, a sealing treatment will be applied to concrete

pavement, concrete walkways, structural concrete slab surfaces and stairways to prevent water and chemical penetration, which cause premature deterioration of the parking facilities. Periodic maintenance of parking signs and post would also be performed under the preventive maintenance program.

Maintenance of Rail Station Facilities includes the following CNI projects:

CNI Project	Total (YOE, $ Millions)
CNI 087: Station Enhancement Program	$80.3
CNI 075: Parking Lot Preventive Maintenance	$53.6
Total	$133.9

Bicycle & Pedestrian Facilities ($4.6 Million)

Over the next ten years, Metro needs $4.6 million to replace remaining Rack III style bike racks (see photo) that are in poor condition, are difficult to maintain and provide limited bike storage capacity. Many of these racks were installed when the Metrorail system opened. The program will also replace other racks that are structurally damaged and implement a locker replacement plan. This program will replace up to 900 bike racks. It will also replace bike lockers, many of which also are showing their age or are damaged, with an effective replacement that provides the same features – secure, covered and guaranteed bike parking.

Replacement of bike racks and lockers on a regular basis will provide access to more people in the region, and effectively increases the "bike-shed," or the distance that people will travel to and from each rail station. More cyclists traveling to and from each station also results in a safer travel environment around the station, which results in a feedback loop that will generate additional cyclist use of each station. Bicycling to a Metro station is becoming a more attractive option due to the increasing number of bike trails linked to stations. For example, the Washington, Ohio and Dominion Trail and Mount Vernon trails provide riders access to many Orange and Blue line stations in Virginia. New and enhanced trails, such as the improvements underway to the Metropolitan Branch Trail (from Union Station in the District of Columbia to Silver Spring, MD), will provide enhanced access to many Metro stations.

Bicycles & Pedestrian Facilities includes the following CNI project:

CNI Project	Total (YOE, $ Millions)
CNI 036: Replacement of Bicycle Racks & Lockers	$4.6
Total	$4.6

Asset Category: Maintenance Equipment

Metro's rail system consists of 106 miles of track that was put into service between 1976 and 2004. Maintaining this network of track in a safe and reliable state requires an array of rail maintenance equipment. Rail maintenance equipment is essential for the efficient execution of track rehabilitation projects. Timely rehabilitation and replacement of track equipment will ensure equipment dependability, reduce the probability of delay due to equipment breakdown and allow for efficient use of track work hours. To keep the track work area safe, Metro also needs to replace old and illegible signage (e.g., "High Voltage"). Rail maintenance equipment needs also includes the rehabilitation of the track switch machines and the procurement of a geometry vehicle to analyze track conditions.

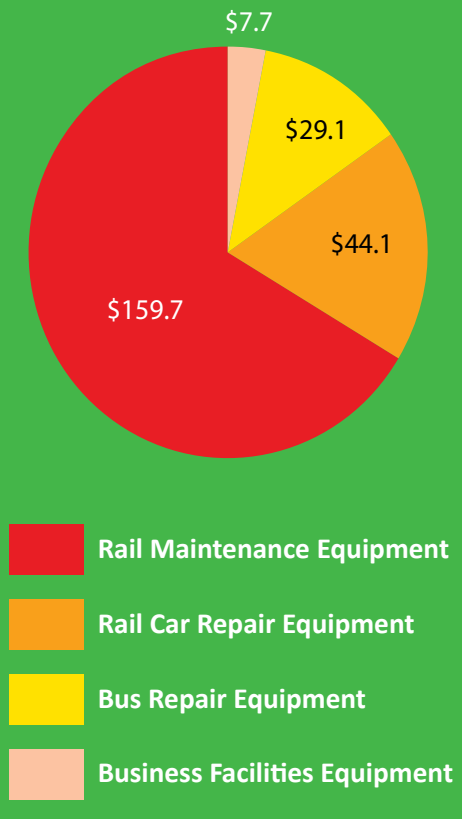
Timely rehabilitation and replacement of track equipment will ensure equipment dependability, reduce the probability of delay due to equipment breakdown and allow for efficient use of track work hours.

To maintain Metro's rail car and bus fleet, maintenance facilities use a variety of equipment. The rehabilitation and replacement of this fleet maintenance equipment on a life cycle basis is necessary to maintain equipment reliability and safety.

Metro stores the parts and materials necessary to deliver Metrobus, Metrorail and MetroAccess services at 23 storerooms. These storerooms are operated by the Office of Procurement and Materials (5), the Rail Department (7) and the Office of Bus Maintenance (11). The majority of storerooms are located at bus garages and rail yards. The Metro Supply Facility (MSF) is the agency's major storeroom and is operated by the Office of Procurement and Materials. To maintain safe and reliable storeroom operations, materials handling equipment (e.g., forklifts) must be replaced on a life cycle basis. In addition, the replacement of existing vertical storage units, shelving, and racking will improve the operational efficiency of Metro's storerooms.

Metro's Performance - Maintenance Equipment needs fall into four main project types and total $240.5 million over the next 10 years (see figure to the right). A brief description of each project type follows.

Performance—Maintenance Equipment Needs by Project Type ($240.5 Million)



Rail Maintenance Equipment ($159.7 Million)

Under the Track Maintenance Equipment project, Metro rehabilitates and replaces heavy-duty track equipment including locomotives, tunnel washers, deicers, flat cars, tampers, prime movers, grinders, and cranes. About two-thirds of this equipment is used to maintain the steel running rail that guides Metro's trains, the cross ties and fasteners that hold the rail in place, the ballast bed that supports the cross ties and the third rail that provides power to the train. The other equipment is used to maintain Metro's aerial structures and tunnels. Over the next ten years, Metro plans to replace 84 pieces of heavy-duty maintenance equipment according to equipment life cycles.

Metro's rail system contains thousands of graphic signs indicating locations and warnings to employees, emergency responders, and the general public. Examples

include: "High Voltage," "Fire Department," "No Trespassing," and "Danger." Rail track signage is essential for safe operations and emergency responses. Many signs throughout the rail system are approximately 30 years old and require replacement because they are damaged, deteriorated or obsolete. Under the Replacement of Rail Track Signage project, Metro plans to fabricate and install approximately 3,000 track markers and 500 fire and safety signs per year.

Track switch machines are the mechanical devices that move the steel rail so a train can move from one track to another. Metro's rail system currently has 306 main line track switch machines which move track ("throws") about 1,000 times per day. These devices will be regularly replaced under the Switch Machine Rehabilitation project thus improving the safety and reliability of the track interlocking infrastructure. This project will focus on maximizing the life of newly installed switch machines and the replacement of units based on years of number of "throws" and years in service.

Metro's maintenance equipment needs include the procurement of a track geometry vehicle used for track evaluation. A track geometry car passes over the steel rail measuring position, curvature, alignment of the track and smoothness. This special rail car uses various sensors and auxiliary wheels for this purpose. The geometry vehicle can prevent safety and reliability problems by detecting track misalignments and faults. Currently, Metro has contracts with outside firms to do track geometry inspections twice a year, track flaw detection and lateral load testing. Purchasing this vehicle would allow for more frequent track inspections throughout the year, as well as testing all track repairs as they are completed.

Under the Track Maintenance Equipment project, Metro rehabilitates and replaces heavy-duty track equipment including locomotives, tunnel washers, deicers, flat cars, tampers, prime movers, grinders, and cranes.

Rail Maintenance Equipment includes the following CNI projects:

CNI Project	Total (YOE, $ Millions)
CNI 025: Track Maintenance Equipment	$129.8
CNI 020: Replacement of Rail Track Signage	$12.5
CNI 027: Switch Machine Rehabilitation Project	$11.1
CNI 065: Geometry Vehicle	$6.3
Total	$159.7

Rail Car Repair Equipment ($44.1 Million)*

Metro's rail car maintenance shops use a variety of portable work equipment (e.g., generators and welding carts) and test equipment to maintain the rail car fleet. Metro's inventory of rail car repair equipment includes 125 units of maintenance equipment, 48 units of shop test equipment and 15 units of shop machine equipment. To keep this equipment safe and reliable, Metro plans to annually replace the equipment that has reached the end of its life cycle. The total cost of this equipment is $44.1 million.

Rail Car Repair Equipment includes the following CNI project:

CNI Project	Total (YOE, $ Millions)
CNI 066: Rail Car Repair Equipment*	$44.1
Total	$44.1

**Previously referred to as "Heavy-Duty Track Equipment."*

Bus Repair Equipment ($29.1 Million)

Metro uses a variety of bus repair equipment to maintain its bus fleet. This equipment includes jack stands, wheel dollies, pressure washers, parts cleaners, test equipment, storeroom shelving, paint booths, and battery chargers. Bus repair equipment needs to be replaced when it is beyond economical repair or when it hinders maintenance shop performance. Over the next ten years, new repair equipment will be necessary to address the changing configuration of the bus fleet. The total cost of this equipment is $29.1 million.

Bus Repair Equipment includes the following CNI project:

CNI Project	Total (YOE, $ Millions)
CNI 004: Bus Repair Equipment	$29.1
Total	$29.1

Business Facilities Equipment ($7.7 Million)

Metro's 23 warehouse storage facilities utilize heavy equipment in their day-to-day operations. These facilities store Metro's inventory of repair parts for the system. Equipment such as propane forklifts, electric stand up forklifts, electric man up order pickers, and electric swing-reach narrow-aisle forklifts require regular replacement at the end of their useful life. Replacement of materials handling equipment will also lower operating costs by reducing contracted maintenance on this equipment. Additionally, upgraded vertical storage units, shelving, and racking must be installed to use available space and labor more efficiently and safely. The improved technology will result in more accurate accounting of the material being stored. Over the next ten years, Metro's materials handling equipment and vertical storage units/shelving replacement needs at all 23 storerooms totals $7.7 million.

Business Facilities Equipment includes the following CNI projects:

CNI Project	Total (YOE, $ Millions)
CNI 029: Warehouse Vertical Storage Units/ Shelving	$6.2
CNI 028: Materials Handling Equipment	$1.5
Total	$7.7

Asset Category: Support Facilities

In addition to its 86 rail stations, 35 parking garages, 9 bus operating garages and 9 rail yards, Metro owns and maintains 12 additional support facilities. These buildings house administrative offices, training rooms, revenue processing activities, material storage, police work and a print shop (see list of support facilities below). The largest of these facilities is the Jackson Graham Building (JGB) located in downtown Washington, DC. JGB houses Metro's administrative offices, including transit operations (Metrorail, Metrobus and MetroAccess), Transit Police administration, engineering, information technology, finance, planning, human resources and communications. The building also houses an Operations Control Center that monitors the movement of Metro vehicles. After 35 year in operation, JGB is in need of renovation.

In addition to its 86 rail stations, 35 parking garages, 9 bus operating garages and 9 rail yards, Metro owns and maintains 12 additional support facilities.

Metro's Support Facilities

Facility	Use	Size (sq ft)
Jackson Graham Building 600 5th Street, NW, Washington, DC	Metro's headquarters, administrative offices, and an Operations Control Center	437,644
Carmen Turner Facility 3500 Pennsy Drive, Hyattsville, MD	Administrative offices, maintenance, and training facilities. The facility will house the primary Operations Control Center in the near future.	725,574
Alexandria Yard Revenue Collection Facility 3401 Eisenhower Avenue, Alexandria, VA	Revenue processing, fare media handling	50,000
Metro Supply Facility 8201 Ardwick-Ardmore Road, Landover, MD	Administrative offices and supply storage	142,912
Open Materials Storage Facility 3360 Pennsy Drive, Landover, MD	Surplus materials storage	58,000
Stone Straw Building 900 Franklin Street, NE, Washington, DC	Surplus materials storage, print shop and MTPD Cadet Training Facility	68,721
Salt Storage Facility 2310 Chillum Road, Hyattsville, MD	Centralized storage of salt for winter ice melting	28,204
MTPD District I Substation – Fort Totten 5315 1st Place, NE, Washington, DC	Police facility	18,500

Facility	Use	Size (sq ft)
MTPD District II Substation – Huntington 5801 N. King's Highway, Alexandria, VA	Police facility	7,500
Blair Road Support Shop 6211 Blair Road, NW, Washington, DC	Office of Plant Maintenance facility	6,600
Special Operations Division 4303 Auth Place, Camp Springs, MD	Police facility	2,500
Systems Maintenance on Telegraph Road 195 Telegraph Road, Alexandria, VA	Administrative offices, storage and training	57,740

At Metro's Alexandria revenue collection facility (RCF), employees process fares for deposit. New equipment and building repairs are needed at this facility to improve efficiency of fare collection processes. Metro's support facilities also provide necessary storage for a variety of materials. Over the next ten years, Metro plans to conduct minor renovation at Metro Supply Facility, Open Materials Storage, Salt Storage Facility, Blair Road Support Shop, and Systems Maintenance on Telegraph Road. Metro has proposed conducting renovations at the Metro Supply Facility, Open Materials Storage, and Blair Road Support Shop under the Bus Facilities Tier 1 project.

Three of Metro's support facilities specifically serve the Metro Transit Police Department (MTPD): District 1 Substation (Fort Totten), District 2 Substation (Huntington) and the Special Operations Division offices. These support facilities enable the MTPD to provide law enforcement and public safety services in 1,500 square miles within Maryland, Virginia and the District of Columbia. The District 2 Substation and Special Operation Division facilities are severely deficient in meeting the Department's needs and require replacement.

The Performance capital investments needed to maintain Metro's support facilities that are not covered under the Bus Facilities Tier 1 project total $50 million over the next ten years (FY 2011 – 2020). A brief description of each project type follows.

The District 2 Substation and Special Operation Division facilities are severely deficient in meeting the Department's needs and require replacement.

Business Support Facilities - $28.9M

Police Facilities - $21.1M

YOE, $ Millions

Business Support Facilities ($28.9 Million)

Improvements to Metro's business support facilities include renovation of the Jackson Graham building (JGB) and new equipment at the revenue collection facility. These investments total $28.9 million over the next 10 years (see table below).

JGB is Metro's headquarters. It was constructed in 1974 prior to the Metrorail system opening in 1976. The 440,000 sq. ft. building has not undergone complete renovation in its 35 years. An analysis conducted for Metro by Bolan Smart Associates indicated that the sale of the Jackson Graham Building and relocation of Metro headquarters would result in a net loss of between $5 and $50 million for Metro. As a result, Metro plans to renovate the facility. Original equipment will be replaced with more reliable and energy efficient systems (e.g., ventilation system). The program will also upgrade the building's mechanical and electrical systems, upgrade exterior walls and rehabilitate interior spaces.

Metro's 50,000 sq. ft. revenue collection facility is located at the Alexandria rail yard. At this facility, Metro employees process fare revenue in preparation for bank deposit. Existing office and facility equipment (e.g., loading dock levers) have exceeded or are at the end of their life cycles. Replacement and upgrades of this equipment and technologies are needed to improve efficiency of fare collection processes. Repairs to the revenue collection building (~$1.8 million) are included under the Bus Garage Facility Tier 1 project.

Business Support Facilities includes the following CNI projects:

CNI Project	Total (YOE, $ Millions)
CNI 080: Jackson Graham Building Renovation	$25.0
CNI 033: Replacement of Revenue Facility Equipment	$3.9
Total	$28.9

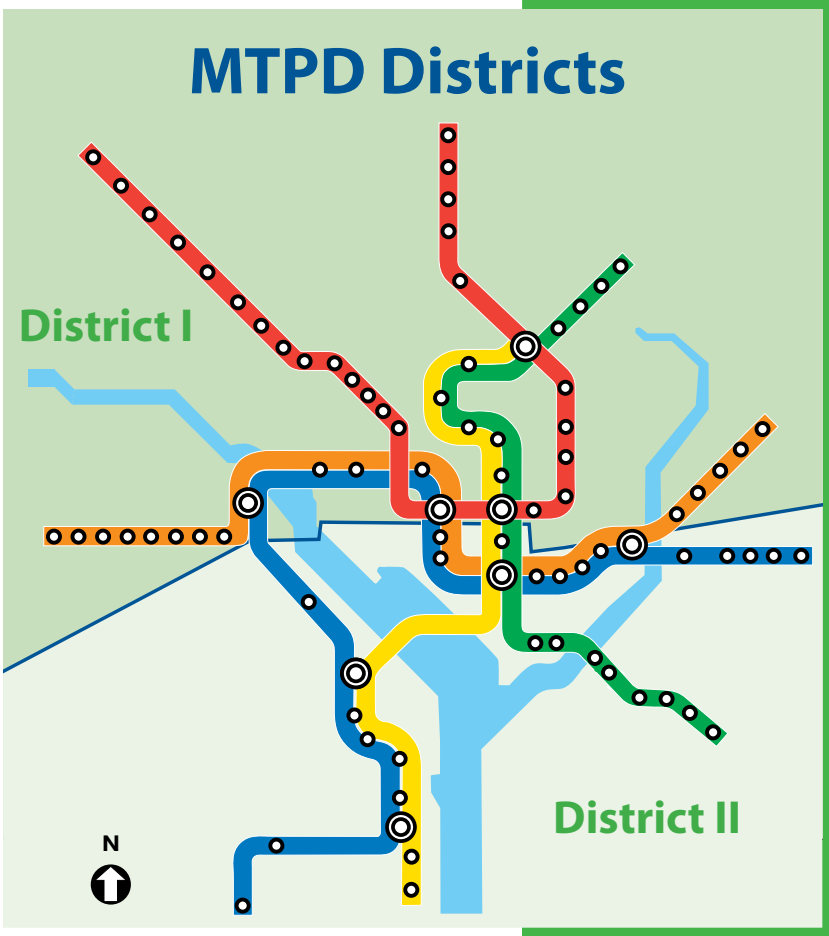
Police Facilities ($21.1 Million)

Two police facilities are in need of replacement over the next ten years: the District 2 Substation located at the Huntington Metro station and the Special Operations Division facility. The cost of replacing these facilities is $21.1 million (see table).

Metro plans to replace MTPD's District 2 Substation with a new 18,500 sq. ft. facility modeled on the new District 1 Substation near the Fort Totten Metro station (constructed in 2007). More than 100 officers operate out of the current District 2 Substation, a 7,000 sq. ft. former private residence that was acquired when the Huntington Metro station was constructed. Not designed for police work, the

The replacement District 2 MTPD substation will accommodate officer training, administrative functions, crime scene search technicians, evidence storage, police interview rooms, locker rooms and restroom facilities.

facility is severely deficient in meeting the Department's needs. The replacement District 2 MTPD substation will accommodate officer training, administrative functions, crime scene search technicians, evidence storage, police interview rooms, locker rooms and restroom facilities.



Plans also call for replacing MTPD's Special Operations Division facility with a permanent 9,000 sq. ft. building. The Special Operations Division handles the many special events that impact Metro, responds to bomb threats and suspicious packages, addresses robberies on the bus and rail systems, among many other responsibilities. The following MTPD units are assigned to the Special Operations Division: the Special Response Team, the Transit Anti-Crime Team, the Auto Theft Unit, K-9 Teams, the Explosive Ordnance Disposal (EOD) Team, and the Motorcycle Unit. The original design of this facility was to provide office space for MTPD's canine unit which consisted of fourteen members. Now, over 67 members are assigned to the Special Operations Division and are forced to operate out of a trailer. The new Special Operations Division facility will provide the appropriate amount of space necessary for officers to carry out their work.

Police Facilities includes the following CNI projects:

CNI Project	Total (YOE, $ Millions)
CNI 101: Police Substation - New District 2	$12.1
CNI 106: Special Operations Division Facility	$9.0
Total	$21.1

Project Number	Project Name	Asset Category	Project Type	Capital Needs FY2011-2020
004	Bus Repair Equipment	Maintenance Equipment	Bus Repair Equipment	$ 29,087
005	Bus Rehabilitation	Vehicles/ Vehicle Parts	Rehabilitation of Buses	$ 228,219
006	Bus Replacement	Vehicles/ Vehicle Parts	Replacement of Buses	$ 749,483
008	Bus Rehabilitation Components	Vehicles/ Vehicle Parts	Vehicle Replacement Components	$ 128,599
009	Service Vehicle Replacement	Vehicles/ Vehicle Parts	Replacement of Service Vehicles	$ 52,032
010	Environmental Compliance Projects	Fleet Maintenance Facilities	Environmental Compliance Projects	$ 7,271
011	Underground Storage Tank Replacement	Fleet Maintenance Facilities	Environmental Compliance Projects	$ 29,483
015	MetroAccess Vehicles	Vehicles/ Vehicle Parts	Purchase of MetroAccess Vehicles	$ 140,975
018	Track Welding Program	Track and Structures	Track Rehabilitation	$ 31,798
019	Track Floating Slab Rehabilitation	Track and Structures	Track Rehabilitation	$ 16,254
020	Replacement of Rail Track Signage	Maintenance Equipment	Rail Maintenance Equipment	$ 12,513
021	Track Pad/Shock Absorber Rehabilitation	Track and Structures	Track Rehabilitation	$ 29,478
022	Track Structural Rehabilitation	Track and Structures	Track Rehabilitation	$ 22,430
023	Third Rail Rehabilitation	Track and Structures	Track Rehabilitation	$ 40,153
024	Track Rehabilitation	Track and Structures	Track Rehabilitation	$ 387,227
025	Track Maintenance Equipment	Maintenance Equipment	Rail Maintenance Equipment	$ 129,768
026	Station/Tunnel Leak Mitigation	Track and Structures	Station/Tunnel Rehabilitation	$ 46,033

Project Number	Project Name	Asset Category	Project Type	Capital Needs FY2011-2020
027	Switch Machine Rehabilitation Project	Maintenance Equipment	Rail Maintenance Equipment	$ 11,084
028	Materials Handling Equipment	Maintenance Equipment	Business Facilities Equipment	$ 1,543
029	Warehouse Vertical Storage Units/Shelving	Maintenance Equipment	Business Facilities Equipment	$ 6,167
030	Currency Processing Machines	Systems and Technology	Business Support Software & Equipment	$ 2,186
031	Debit/Credit Processing Requirements	Systems and Technology	Rail Fare Equipment	$ 4,100
032	Fare Media Encoders	Systems and Technology	Rail Fare Equipment	$ 1,548
033	Replacement of Revenue Facility Equipment	Support Facilities	Business Support Facilities	$ 3,934
036	Replacement of Bicycle Racks & Lockers	Passenger Facilities	Bicycle & Pedestrian Facilities	$ 4,571
042	Bus & Rail Asset Management Software	Systems and Technology	Operations Support Software	$ 26,151
043	Bus Operations Support Software	Systems and Technology	Operations Support Software	$ 74,398
045	Data Centers and Infrastructures	Systems and Technology	Operations Support Software	$ 97,866
046	Document Management System	Systems and Technology	Business Support Software & Equipment	$ 33,125
048	Sensitive Data Protection Technology	Systems and Technology	Business Support Software & Equipment	$ 69,312
049	Management Support Software	Systems and Technology	Business Support Software & Equipment	$ 100,882
050	Metro IT OneStop and Office Automation	Systems and Technology	Business Support Software & Equipment	$ 47,067

Project Number	Project Name	Asset Category	Project Type	Capital Needs FY2011-2020
051	Police Dispatch and Records Management	Systems and Technology	Operations Support Software	$ 1,647
052	Network and Communications	Systems and Technology	Operations Support Software	$ 51,566
053	Network Operations Center (NOC)	Systems and Technology	Operations Support Software	$ 26,781
056	Rail Operations Support Software	Systems and Technology	Operations Support Software	$ 147,633
057	1000-Series Rail Car Replacement	Vehicles/ Vehicle Parts	Replacement of Rail Cars	$ 811,011
058	2000/3000-Series Rail Car Mid-Life Rehabilitation	Vehicles/ Vehicle Parts	Rehabilitation of Rail Cars	$ 2,597
059	2000/3000-Series Rail Car Replacement	Vehicles/ Vehicle Parts	Replacement of Rail Cars	$ 167,171
060	4000-Series Rail Car Mid-Life Rehabilitation	Vehicles/ Vehicle Parts	Rehabilitation of Rail Cars	$ 163,042
061	5000-Series Rail Car Mid-Life Rehabilitation	Vehicles/ Vehicle Parts	Rehabilitation of Rail Cars	$ 67,609
063	Rail Rehabilitation Components	Vehicles/ Vehicle Parts	Vehicle Replacement Components	$ 47,191
064	1000-Series Rail Car HVAC Rehabilitation	Vehicles/ Vehicle Parts	Rehabilitation of Rail Cars	$ 5,202
065	Geometry Vehicle	Maintenance Equipment	Rail Maintenance Equipment	$ 6,300
066	Rail Car Repair Equipment	Maintenance Equipment	Rail Car Repair Equipment	$ 44,078
067	Rail Car Safety & Reliability Enhancements	Vehicles/ Vehicle Parts	Rehabilitation of Rail Cars	$ 26,053
071	Test Track & Commissioning Facility	Maintenance Facilities	Rail Maintenance Facilities	$ 60,000
072	Elevator Rehabilitation	Passenger Facilities	Elevator/Escalator Facilities	$ 56,035

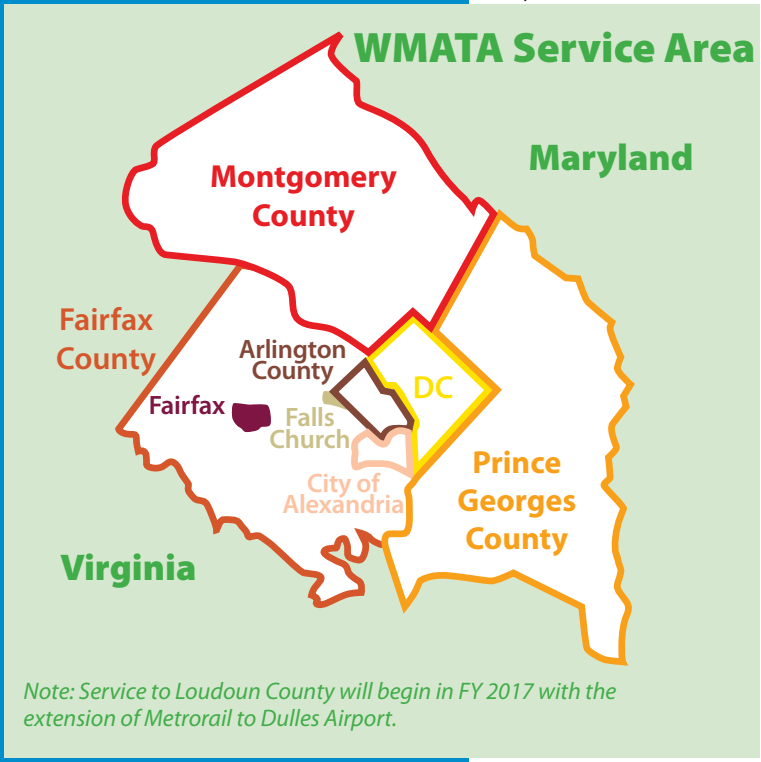
Project Number	Project Name	Asset Category	Project Type	Capital Needs FY2011-2020
073	Escalator Rehabilitation	Passenger Facilities	Elevator/Escalator Facilities	$ 177,815
075	Parking Lot Preventive Maintenance	Passenger Facilities	Maintenance of Rail Station Facilities	$ 53,593
076	8-Car Train Power Upgrades	Systems and Technology	Power System Upgrades - Rail	$ 25,291
080	Jackson Graham Building Renovation	Support Facilities	Business Support Facilities	$ 24,648
084	Southern Avenue Bus Garage Replacement	Fleet Maintenance Facilities	Rehabilitation and Replacement of Bus Garages	$ 110,000
085	Replacement of Additional Bus Garages	Fleet Maintenance Facilities	Rehabilitation and Replacement of Bus Garages	$ 328,640
086	Southeastern Bus Garage Replacement	Fleet Maintenance Facilities	Rehabilitation and Replacement of Bus Garages	$ 50,000
087	Station Enhancement Program	Passenger Facilities	Maintenance of Rail Station Facilities	$ 80,297
089	Track Fasteners	Track and Structures	Track Rehabilitation	$ 12,000
093	Maintaining NEXTFARE System	Systems and Technology	Rail Fare Equipment	$ 6,377
095	Automatic Fare Collection Machine Repairs	Systems and Technology	Rail Fare Equipment	$ 12,047
101	Police Substation - New District 2	Support Facilities	Police Facilities	$ 12,125
103	Police Portable Radio Replacement	Systems and Technology	Business Support Software & Equipment	$ 3,900
104	Police Vehicle Replacement	Vehicles/ Vehicle Parts	Replacement of Service Vehicles	$ 11,358
106	Special Operations Division Facility	Support Facilities	Police Facilities	$ 9,000
107	Rail Rehabilitation Tier 1: Dupont to Silver Spring	Rail System Infrastructure Rehabilitation	Rail Line Segment Rehabilitation	$ 139,013

Project Number	Project Name	Asset Category	Project Type	Capital Needs FY2011-2020
108	Rail Rehabilitation Tier 1: Dupont to Grosvenor	Rail System Infrastructure Rehabilitation	Rail Line Segment Rehabilitation	$ 234,050
109	Rail Rehabilitation Tier 2: Grosvenor to Shady Grove and Silver Spring to Glenmont	Rail System Infrastructure Rehabilitation	Rail Line Segment Rehabilitation	$ 185,692
110	Rail Rehabilitation Tier 1: National Airport to New Carrollton	Rail System Infrastructure Rehabilitation	Rail Line Segment Rehabilitation	$ 371,880
111	Rail Rehabilitation Tier 2: Rosslyn to Vienna	Rail System Infrastructure Rehabilitation	Rail Line Segment Rehabilitation	$ 232,898
112	Rail Rehabilitation Tier 3: National Airport to Huntington and Franconia Springfield plus the Largo Extension	Rail System Infrastructure Rehabilitation	Rail Line Segment Rehabilitation	$ 203,843
113	Rail Rehabilitation Tier 1: U Street to Anacostia	Rail System Infrastructure Rehabilitation	Rail Line Segment Rehabilitation	$ 98,371
114	Rail Rehabilitation Tier 2: U Street to Greenbelt	Rail System Infrastructure Rehabilitation	Rail Line Segment Rehabilitation	$ 159,949
115	Rail Rehabilitation Tier 3: Anacostia to Branch Avenue	Rail System Infrastructure Rehabilitation	Rail Line Segment Rehabilitation	$ 112,596
116	Rail Yard Facility Repairs Tier 1: Alexandria, Brentwood and New Carrollton	Fleet Maintenance Facilities	Maintenance of Rail Yards	$ 125,714
117	Rail Yard Facility Repairs Tier 2: West Falls Church, Greenbelt and Shady Grove	Fleet Maintenance Facilities	Maintenance of Rail Yards	$ 123,896

Project Number	Project Name	Asset Category	Project Type	Capital Needs FY2011-2020
118	Rail Yard Facility Repairs Tier 3: Branch Avenue, Glenmont and Largo	Fleet Maintenance Facilities	Maintenance of Rail Yards	$ 31,070
119	Bus Garage Facility Repairs Tier 1: Western, Northern and Landover	Fleet Maintenance Facilities	Maintenance of Bus Garages	$ 135,884
120	Bus Garage Facility Repairs Tier 2: Montgomery and Four Mile Run	Fleet Maintenance Facilities	Maintenance of Bus Garages	$ 113,948
121	Bus Garage Facility Repairs Tier 3: Bladensburg	Fleet Maintenance Facilities	Maintenance of Bus Garages	$ 78,245
122	Rail Rehabilitation Tier 4	Rail System Infrastructure Rehabilitation	Rail Line Segment Rehabilitation	$ 83,921

**Note: Some projects were consolidated with others during the prioritization process.*

Investment Category: Customer/Demand



Note: Service to Loudoun County will begin in FY 2017 with the extension of Metrorail to Dulles Airport.

The Metropolitan Washington Council of Governments projects that from 2005 to 2030, employment is expected to increase by nearly 40%, population by 32% and households by 35% in the Washington metropolitan region. Job growth in northern Virginia and the Maryland suburbs is expected to increase by 51% and 38% respectively and population growth in Loudoun County is expected to increase by a notable 89%. The District of Columbia is laying the foundation to increase its population by 24% by expanding its housing stock and community-based retail. This phenomenal growth in the region will translate into increased demand for Metrorail, Metrobus and MetroAccess services.

Regional Growth: 2005-2030

	Employment	Population
Metropolitan Total	38%	32%
Metro Service Area	33%	23%
Inside Beltway	23%	24%
Outside Beltway	41%	23%
Outer Suburbs	65%	61%

Source: MWCOG Round 7.1 Cooperative Land Use Forecasts, 2008

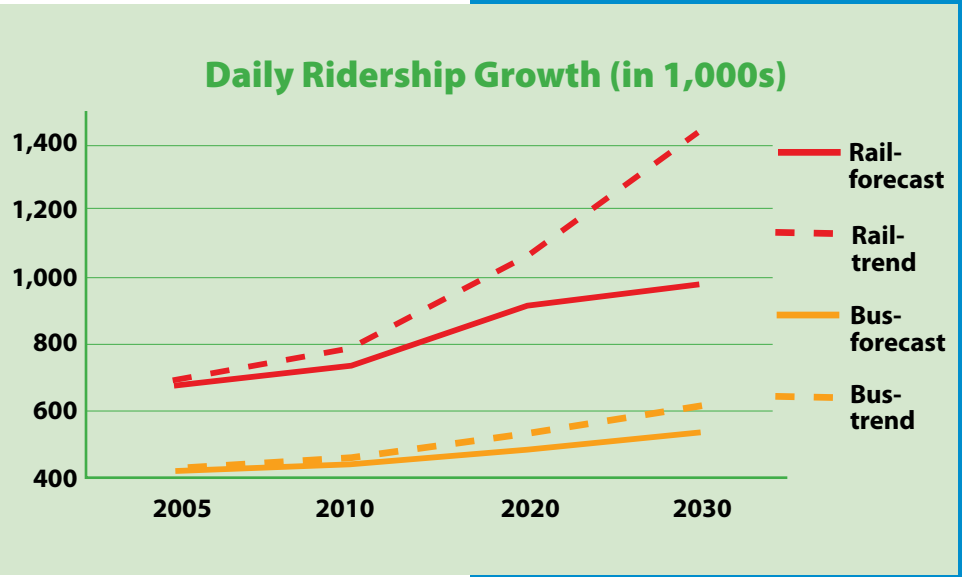
Between 2010 and 2020, average daily Metrorail ridership is expected to grow by about 20%. Over the same period, average daily Metrobus ridership is projected to grow by 10 - 15%. Of all its modal services, Metro's paratransit service, MetroAccess, is expected to experience Metro's fastest growing ridership at 112%. Customer/Demand capital needs includes investments that address Metro's growing ridership and improvements to the rider experience.

On an average weekday in FY 2009, there were about 750,000 trips on Metrorail. By 2030, Metrorail ridership is expected to be close to 1 million trips on an average weekday, approaching the ridership seen on Inauguration Day 2009 (1.1 million trips). To accommodate record ridership on Inauguration Day, Metro operated trains for 22 consecutive hours, including 17 straight hours of rush hour service. Even with this unprecedented amount of service, customers experienced long lines, crowded platforms and packed trains. In order to handle Inauguration Day ridership on a daily basis without severe overcrowding, Metro needs to invest in new rail cars and upgraded power systems to run 100% 8-car trains.

Projected growth in the Washington, DC region will translate into increased demand for Metrorail, Metrobus and MetroAccess services.

The two charts below comparing Metro's rail system capacity with and without fleet expansion clearly illustrate the need for additional rail cars. Without fleet expansion, most rail lines will be congested by 2020, with the Orange/Dulles Line exceeding capacity (greater than 120 passengers per car). With expansion to 100% 8-car trains during peak periods, most rail lines will have adequate capacity through 2030, though the Orange/Dulles Line will exceed 120 passengers per car as 2030 approaches. An expanded rail car fleet in turn will necessitate additional rail car storage, fleet maintenance facilities and a new test track and rail car commissioning facility. To accommodate the increased passenger flow across the rail system, capacity improvements at core stations and additional pedestrian connections are also needed.

Metrorail and Metrobus Ridership Trends



Metrorail System Capacity: No Additional Fleet Expansion

Line	2005	2010	2015	2020	2025	2030
Red						
Blue (Rosslyn)						
Orange/ Dulles Rail						
Yellow/Blue (14th Bridge)						
Green						

Metrorail System Capacity: Expansion to 100% 8-Car Trains by 2020

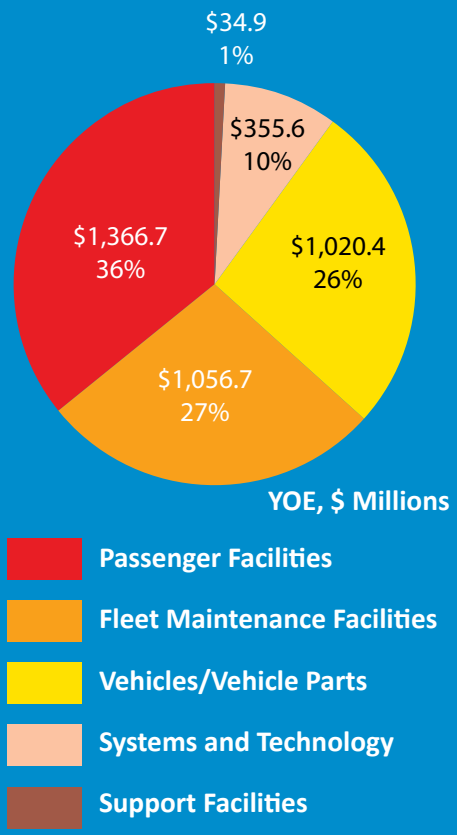
Line	2005	2010	2015	2020	2025	2030
Red						
Blue (Rosslyn)						
Orange/ Dulles Rail						
Yellow/Blue (14th Bridge)						
Green						

	Congested (<100 people per car)
	Highly Congested (100-120 people per car)
	Exceeds Capacity (>120 people per car)

An expanded rail car fleet in turn will necessitate additional rail car storage, fleet maintenance facilities and a new test track and rail car commissioning facility. To accommodate the increased passenger flow across the rail system, capacity improvements at core stations and additional pedestrian connections are also needed.

Additional buses and bus garages are needed to accommodate future ridership growth, avoid overcrowding and maintain the expanded fleet.

FY 2011 - 2020 Customer/Demand Needs by Asset Category ($3.8 Billion)



Demand for MetroAccess has recently grown significantly and is expected to continue over the next ten years.

In FY 2009, Metrobus ridership averaged 440,000 trips daily. Metrobus is projected to expand to 510,000 average daily trips by 2020. Additional buses and bus garages are needed to accommodate future ridership growth, avoid overcrowding and maintain the expanded fleet. Metro plans to focus the purchase of new buses on priority corridors that serve the greatest concentration of riders. Runningway improvements on priority corridors increase the average speed of buses up to 30% not only saving Metro capital and operating expenses, but also improving passenger travel times. However, success of these priority corridors is dependent on partnerships with Maryland, the District of Columbia and Virginia. Through these partnerships, signal and road improvements need to be implemented to result in efficient and effective priority corridors.

Demand for MetroAccess has recently grown significantly and is expected to continue over the next ten years. In FY 2009, 2.1 million passenger trips were taken on MetroAccess. By 2020, ridership is anticipated to grow to 4.5 million trips (112%) as the population ages and riders switch to MetroAccess from other providers. To accommodate growing ridership, additional MetroAccess vehicles and garages are needed. This will reduce leasing costs and ensure that garages are located so that deadheading costs are reduced.

Metro consistently works to improve the rider's experience on the transit system and respond to customer service requests. Over the next ten years, Metro plans to enhance its passenger facilities, vehicles and technologies to ease the use of Metro services and improve ride quality. Examples range from new farecard vending machines that distribute SmarTrip cards (permanent, rechargeable farecards that operate like credit cards) to Metrobus enhancements such as on-board cameras and automatic vehicle location equipment. Customer/Demand needs also includes investments that provide information to customers regarding various aspects of their trips. For example, Metro plans to upgrade the www.wmata.com website to encourage increased rider interaction and information sharing.

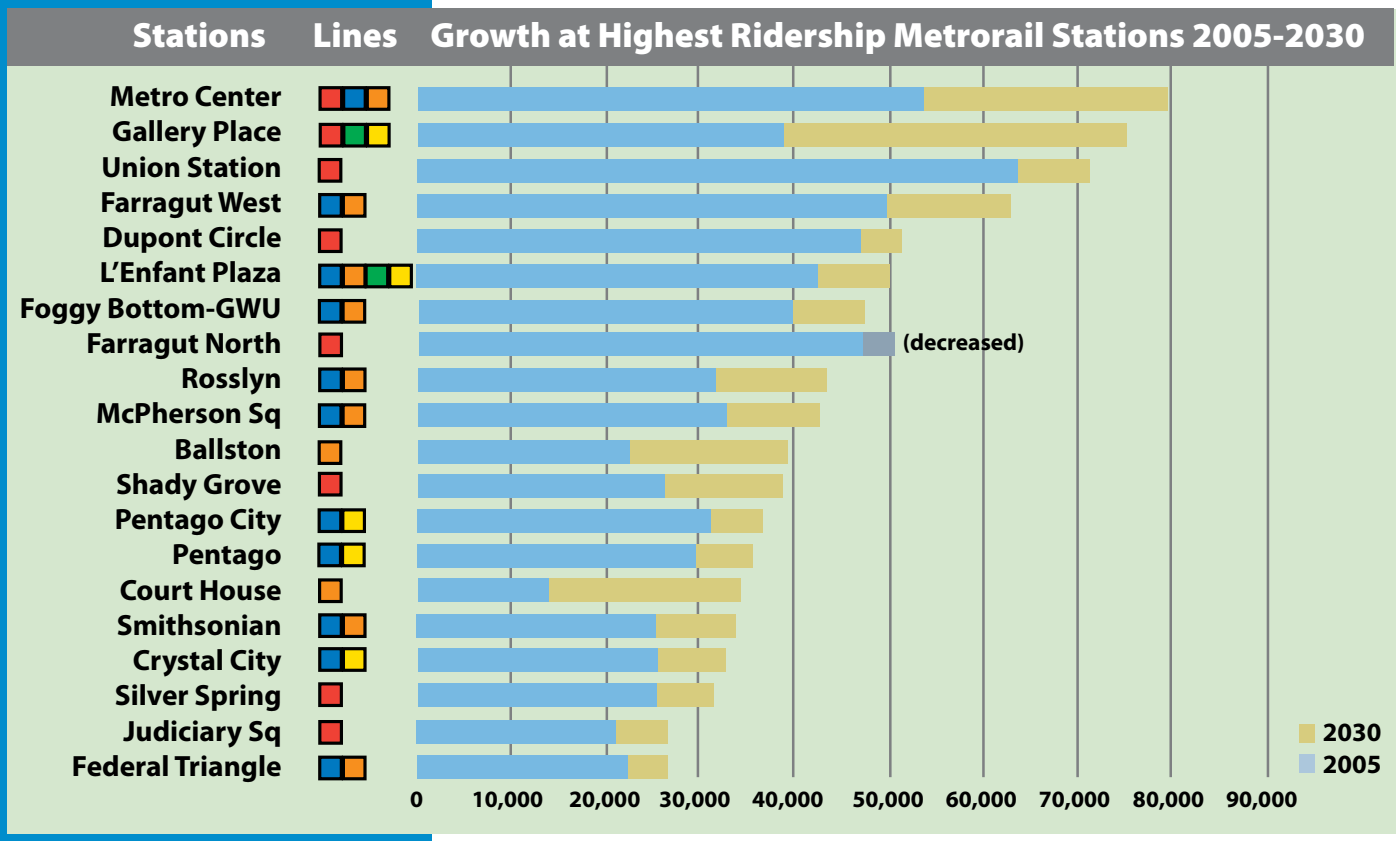
Investments to address Metro's Customer/Demand needs total $3.8 billion over the next ten years (FY 2011 – 2020) and fall into five asset categories: passenger facilities, fleet maintenance facilities, vehicles and vehicle parts, systems and technology and support facilities. The table below breaks down Metro's $3.8 billion in Customer/Demand needs by asset category and project type (grouping of individual capital projects). The following sections provide additional details by asset category.

Customer/Demand Needs by Asset Category and Project Type

Asset Category	Project Type	Capital Needs, FY 2011 – 2020
Passenger Facilities	Rail Station: Capacity/Enhancements	$ 1,184
	Bus Priority Corridor Improvements	$ 120
	Bicycle & Pedestrian Facilities	$ 40
	Rail Station Equipment	$ 22
	Subtotal	$ 1,367
Fleet Maintenance Facilities	Rail Maintenance Facilities	$ 596
	Expansion of Bus Garages	$ 445
	Expansion of MetroAccess Garages	$ 16
	Subtotal	$ 1,057
Vehicles/ Vehicle Parts	Rail Car Fleet Expansion	$ 605
	Bus Fleet Expansion	$ 255
	Bus Enhancements	$ 116
	MetroAccess Fleet Expansion	$ 44
	Subtotal	$ 1,020
Systems and Technology	Power System Upgrades - Rail	$ 150
	Operations Support Software	$ 134
	Business Support Software & Equipment	$ 40
	Rail Fare Equipment	$ 32
	Subtotal	$ 356
Support Facilities	Police Facilities	$ 23
	MetroAccess Operations Facility	$ 8
	Business Support Facilities	$ 4
	Subtotal	$ 35
TOTAL		$ 3,834

Asset Category: Passenger Facilities

Over 220 million passengers used Metro's 86 rail stations in FY 2009. A 2002 Core Capacity study evaluated available capacity at existing stations and concluded the following six stations have the highest ridership volume: Metro Center, Gallery Place/Chinatown, Union Station, Farragut West, L'Enfant Plaza, and Farragut North. When examining future ridership growth, these stations are also highlighted as among the busiest in the system (see chart below). With an approximately 20% ridership growth projected over the next ten years, Metro has identified rail station capacity expansion and enhancements projects that will reduce congestion, improve station maneuverability and save customers travel time. At stations with the highest activity, Metro plans to make capacity improvements to the platforms and mezzanines, and will create pedestrian tunnels between key stations to provide previously unavailable transfers. Rail station enhancements include the installation of station entrance and platform canopies designed to protect customers from inclement weather and prevent damage to escalators, stairs, and platforms.



Alleviating crowded conditions will also maintain the safety of Metrorail service. To further enhance safety, Metro plans to install bumpy dome tiles on the rail platform edge. This bumpy surface provides a tactile indicator of the edge of the platform to elderly and disabled customers traveling on the

system. Ensuring the Metrorail system is accessible to all customers is a top priority of Metro. Given that a single elevator outage can make an entire transfer station and all the lines it serves inaccessible, Metro has planned to build a second set of elevators at six key transfer stations. For Metro's riders that arrive by automobile, additional credit card readers are needed to ease the use of parking structures.

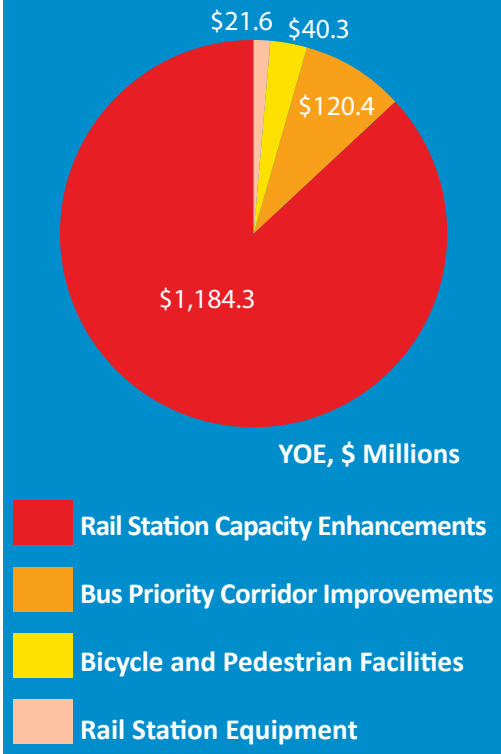
Metrorail passenger facilities are not the only part of the transit system facing increasing demand. Demand for bus service is also increasing. Metrobus ridership is expected to grow from about 440,000 trips daily in FY 2009 to about 510,000 in 2020, or 16%. Meanwhile, traffic congestion in the region remains among the worst in the nation, which slows down Metro's buses, especially on heavily traveled routes in the region's core. In order to speed up bus travel times and provide better service to our customers, Metro has identified a network of priority corridors that are targets for improvements such as transit signal priority, queue jumpers, bus bulbs, painted lanes, and left-turn enhancements. These investments will improve service, reliability, capacity, and system access.

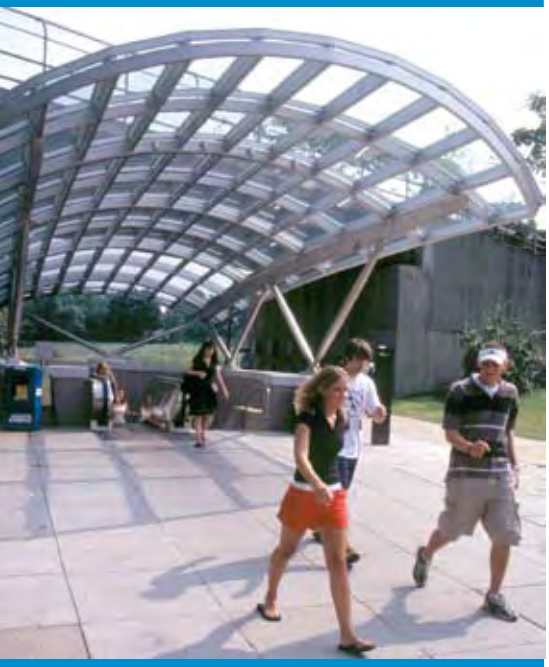
Changing land use patterns around some rail stations have increased the need for better access points. In response to factors such as increased population, denser development and new employment centers around rail stations, the demand for access to the rail system for cyclists and pedestrians is increasing every year. Metro staff routinely receives requests for more bicycle parking at suburban stations (e.g. Vienna, West Hyattsville) and at stations closer to the system core (e.g., Georgia Ave – Petworth). Field observations conducted in 2008 showed multiple stations with bicycles locked to any available fixed structure (e.g. sign posts, light poles, phone booths) which is illegal in some jurisdictions. Metro plans to respond to growing demand by constructing new bicycle facilities and improving pedestrian access to stations. Providing bicycle parking at stations is a highly cost-effective means of improving access to rail stations.

In light of the rail system's high profile within the nation's capital, Metro has taken many steps to secure the system from modern threats. The PROTECT system is Metro's Chemical, Biological, Radiological, Nuclear and Explosives (CBRNE) detection system installed in rail stations. Metro plans to expand the capabilities of this system and install additional evacuation and medical emergency equipment. These safety and security enhancements are included in Metro's rail station equipment needs.

The figure to the right shows a breakdown of Metro's Customer/Demand - Passenger Facilities needs by project type ($1.4 billion over 10 years). A brief description of each project type follows.

Customer/Demand – Passenger Facilities Needs by Project Type ($1.4 Billion)





Rail Station: Capacity/Enhancements ($1,184.3 Million)

As ridership grows over time, high volume stations will face overcrowded conditions making it difficult for customers to transfer and navigate the system. Improvements are needed to move passengers from the platform to the mezzanine area and to the street level in order to ensure platforms are clear before the next train arrives. Additionally, capacity improvements will address pedestrian bottlenecks and separate customers waiting on the platform from those leaving the station. At stations with the highest entry and exit demand (Metro Center, Gallery Place/ Chinatown, L'Enfant Plaza, Farragut North, Union Station, and Farragut West), Metro has identified needed capacity improvements including entrance escalators/stairs, passageways to mezzanine, fare collection equipment, mezzanine to platform escalators/stairs, platform widening, escalators/stairs between upper/lower platform, and lower level platform occupancy. Over the next ten years, Metro estimates that 16 new sets of stairs, 17 new escalators, 11 new elevators and more than 12 new fare gates are needed.

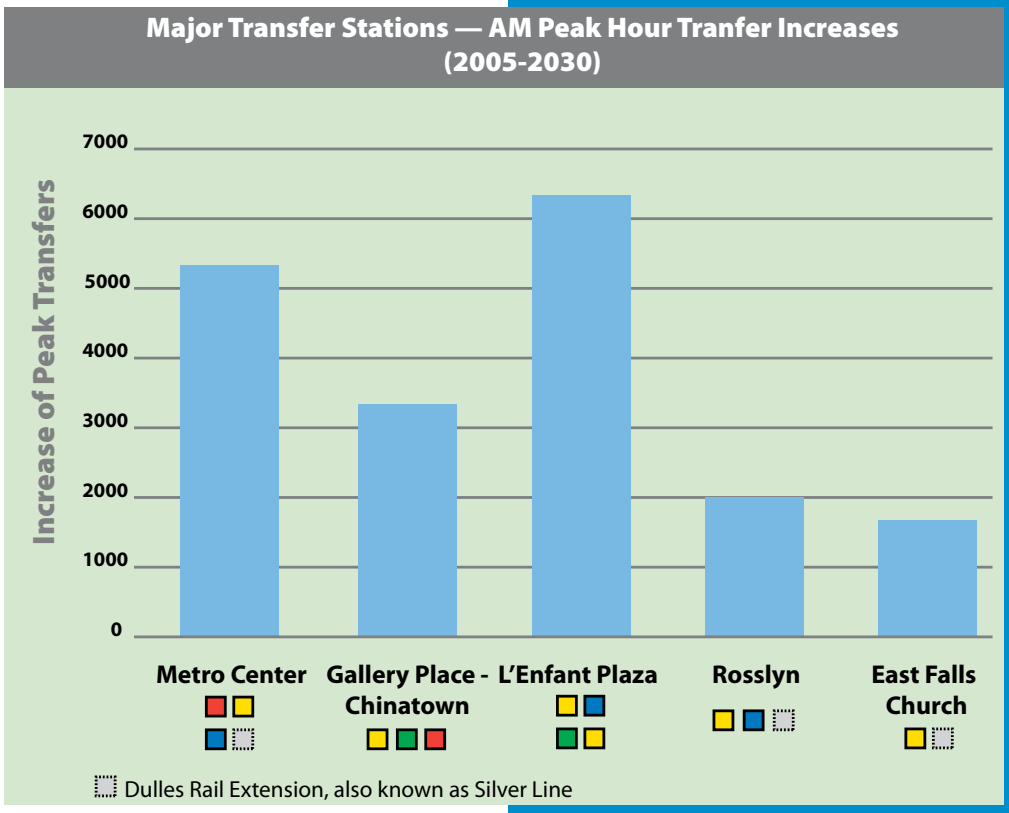
Core Station Capacity Enhancements

	New Entrances	Increase Fare Collection	Extend Mezzanines	Pedestrian Connection	Additional Vertical Circulation	Widening Platforms
Metro Center					●	●
Gallery Place		●			●	●
Metro Center-Gallery Place Interconnection			●	●		
Farragut West		●			●	●
Farragut North		●	●		●	
Farragut North-Farragut West Interconnection	●	●	●		●	
Union Station	●	●	●		●	
L'Enfant Plaza	●	●		●	●	●

2003-2006 2006-2014 2015-2020

Other capacity enhancements include a 400 foot long pedestrian tunnel between Farragut North and Farragut West stations. This pedestrian connection would shorten the travel time going from Virginia toward northwest Washington and vice versa by eliminating the need to go to Metro Center to transfer. On a weighted average basis across all markets, the pedestrian tunnel is expected to shorten each

user's travel time by 2 minutes. Tunnel users would collectively save about 900 hours per day or 260,000 hours per year in travel times based on 2003 ridership data. Besides saving customer time, the Farragut tunnel would free up space in Metro Center and reduce the transfer demand by up to 11 percent.



Metro has also identified a pedestrian tunnel between Gallery Place/Chinatown and Metro Center as an effective strategy to connect the system's two largest transfer points, relieving the most congested segment in the rail system. The pedestrian tunnel connects the east mezzanine at Metro Center to the west mezzanine at Gallery Place. The connection would be a level path supported on top of the existing track vaults. The length of the passageway is approximately 750 feet and the passageway area would be about 18,000 square feet. As part of this project a mezzanine to mezzanine bridge connection is proposed in Gallery Place Station to ease congestion on the Red Line Platforms for patrons walking from Gallery Place to Metro Center and vice-versa. When an event is taking place at Verizon Center, the Red Line Platforms become very crowded. The bridge over the platforms will prevent people pushing their way from one end of the station to the other to walk toward Metro Center. In addition, this connection would reduce the number of transfers at L'Enfant Plaza station. The pedestrian tunnel would allow patrons to transfer between the Blue, Orange, Red, Yellow and Green lines without taking a one stop ride on the Red Line. When the Dulles extension opens, the need for this pedestrian tunnel will increase.

Other station enhancements include the installation of station entrance canopies to protect customers from inclement weather and prevent damage to escalators and stairs. Metro has already installed entrance canopies at several stations but canopies are still needed at: Court House, Brookland East, Capital South, Foggy Bottom, Metro Center 12th&G, Potomac Avenue, Minnesota, Tenleytown, Smithsonian North and South, Judiciary Square North and South, Deanwood, Gallery Place West, U Street East, Bethesda, College Park East, Shady Grove, Huntington South, Dupont North, Arlington Cemetery North and South, and Archives. The average cost of a canopy is $1.5 million, but the unit cost will vary dramatically based on size, shape and location. For example, the National Law Enforcement Officers Memorial located at Judiciary Square puts severe constraints on the size and type of canopy that can be installed.

Platform canopies also protect customers from the elements and protect assets from additional wear and tear. As Metro transitions from 6-car trains to 8-cars trains, additional platform area at outdoor stations is exposed. Under this project, platform canopies would be extended to cover the full length of the platform at 20 Orange/Blue/Yellow line stations, 8 Red line stations and 7 Green/Yellow line stations. Covered platforms provide a dry environment, improve the walking surface, enhance safety and reduce customer complaints. In addition, canopies lower platform and tile maintenance costs.

Truncated domes or "bumpy tiles" have been installed at 60 of Metro's 86 stations. To increase passenger safety and accessibility, truncated domes are needed at the remaining 26 stations. This bumpy surface provides a warning to customers of the location of the platform edge. At a cost of $500,000 per station, Metro plans to schedule four installations per year.

To further improve the accessibility of the Metrorail system, Metro has plans to install a second set of elevators at the following six key transfer stations: Metro Center, L'Enfant Plaza, Gallery Place/Chinatown, Fort Totten, Pentagon and Stadium-Armory. Currently a single elevator outage can make an entire transfer station and all the lines it serves inaccessible to people with disabilities, travelers with luggage and customers with other devices such as strollers. The 2002 Core Capacity Study supports increasing access via entrances and passages at major key stations as a means of increased ability for all customers to enter and exit stations. The cost to build the dual access elevators may be borne by the local jurisdictions.

Providing adequate vehicle-related facilities is important to support passengers arriving by automobile. Currently, parking fees at several facilities can only be paid using a SmarTrip card. Infrequent users of the daily parking facilities find the cash-less SmarTrip-only payment requirement frustrating and confusing. Customers who arrive at a parking gate without a SmarTrip card must re-park and return to the station to purchase a SmarTrip card for the sole purpose of exiting the parking facility. Currently, Metro only has 14 credit card readers at six out of 35 stations with parking facilities. To make these facilities more convenient and accessible to all patrons, Metro plans to install at least one bank card/credit card reader at the remaining parking facilities.

Rail Station: Capacity/Enhancements includes the following CNI projects:

CNI Project	Total (YOE, $ Millions)
CNI 039: Core Station Capacity Enhancements	$612.1
CNI 079: Extend Platform Canopies	$317.0
CNI 041: Gallery Place/ Metro Center Pedestrian Connection	$100.0
CNI 040: Farragut North/ Farragut West Pedestrian Connection	$72.0
CNI 088: Station Entrance Canopies	$34.9
CNI 012: Dual Accessible Pathways – Core Elevator Project	$34.0
CNI 017: Platform Edge Bumpy Dome Installation	$11.0
CNI 074: Installation of Parking Lot Credit Card Readers	$3.3
Total	$1,184.3

Bus Priority Corridor Improvements ($120.4 Million)

The Bus Priority Corridor Plan, presented to the Metro Board in October 2008, outlined Metro's strategy for improving bus service travel times, reliability, capacity, productivity and system access through investments in bus stops, runningway enhancements, and street operations management. Twenty-four priority corridors covering 246 miles have been identified which represent 14% of Metro's bus lines and 50% of bus ridership. Metro will work with local governments and state Departments of Transportation to implement transit signal priorities, queue jumpers (additional travel lanes at signalized intersections allowing buses to move to the front of traffic), bus bulbs (extending the sidewalk for a bus stop into the parking lane so the bus can remain in the traffic lane), painted markings on lanes, and left-turn priorities. Enhancements are also planned for bus stops, transit centers and customer information displays. Together these improvements are estimated to increase the average speed of buses on these corridors by up to 30% which is equivalent to putting 100 additional buses on the road. This strategy improves service and expands capacity. In addition, this project is estimated to yield $50 million in capital cost savings and $40 - $50 million in avoided operating costs.

Bus Priority Corridor Improvements includes the following CNI project:

CNI Project	Total (YOE, $ Millions)
CNI 037: Bus Priority Corridor Network Enhancements	$120.4
Total	$120.4

Bicycle & Pedestrian Facilities ($40.3 Million)

The demand for access to the rail system for cyclists and pedestrians is increasing every year. Options to increase bicycle parking capacity at rail stations include free-standing bicycle parking structures with double-decked parking and key / swipe-card entry bicycle cages in existing garages. Current analysis suggests that Metro should expand bicycle capacity at rail stations by constructing 5 bike cages (150 bike capacity, swipe card access with canopy) and 2 bike stations (150 bike capacity, vendor-operated with services). Metro is currently conducting a Bicycle and Pedestrian facilities study to determine the best bike parking solutions and locations.

In a number of stations, the connection between the community and the station is lacking. Customers have brought specific pathways to Metro's attention that with improvements could provide more direct access for the surrounding communities. By improving this access, Metro may encourage customers to walk (or bike) to a

station rather than drive or ride the bus. Connections could include tunnels, bridges, at-grade sidewalk construction and safety improvements (e.g., lighting). Metro's current project includes pedestrian walkways at 5 – 10 stations.

Bicycle and Pedestrian Facilities includes the following CNI project:

CNI Project	Total (YOE, $ Millions)
CNI 035: Bicycle and Pedestrian Facilities: Capacity Improvements	$40.3
Total	$40.3

Rail Station Equipment ($21.6 Million)

In order to secure the rail system, Metro has installed safety equipment within each station. The PROTECT system is the Chemical, Biological, Radiological, Nuclear and Explosives (CBRNE) detection system installed within the track beds at select stations within the rail system. Metro will expand this system to include additional capabilities. Metro will also upgrade other safety equipment within rail stations, including Emergency Tunnel Evacuation Carts (ETECs) and Automatic External Defibrillators (AEDs). The ETECs allow emergency personnel to travel through tunnels to reach an emergency scene and to transport customers and employees to safety. The AEDs are used to automatically diagnose and treat life-threatening cardiac conditions, and are located in most Metro stations. The AEDs need to be replaced every 8 years, and the batteries need replacement every 5 years. This rail station equipment is critical to not only prevent incidents, but also respond to emergency situations.

Rail Station Equipment includes the following CNI projects:

CNI Project	Total (YOE, $ Millions)
CNI 105: Chemical Detector Enhancements	$20.4
CNI 099: Police Emergency Management Equipment	$1.2
Total	$21.6

Asset Category: Fleet Maintenance Facilities

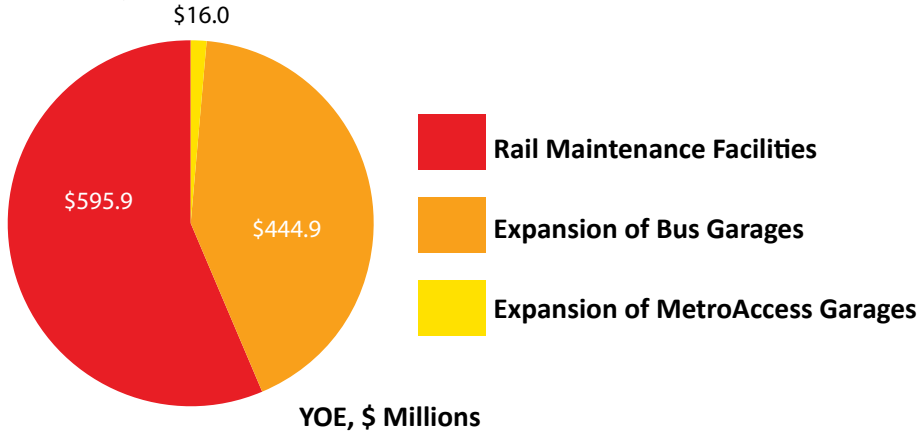
As Metro's vehicle fleet expands so will the need for additional fleet maintenance facilities. Over the next ten years, Metro plans to continue moving from a combination of 6- and 8-car trains to all 100% 8-car trains to accommodate projected ridership growth. In addition to replacing and rehabilitating older rail cars, Metro's fleet plan calls for the purchase of 220 new rail cars in order to deploy 100% 8-car trains. While Metro stations are designed to accommodate longer 8-car trains, additional capacity is needed at rail yards to maintain, store and rehabilitate the new rail cars.

Similar to Metro's rail yards, Metro's bus fleet maintenance facilities are at capacity, and some are so old that they cannot accommodate the profile of newer, cleaner technology vehicles. Therefore additional space is necessary for regular fleet maintenance/rehabilitation and adequate fleet storage facilities to serve Metro fleet expansion needs through 2020 and beyond.

MetroAccess vehicles are currently stored at six vendor owned facilities. Facing record ridership growth, Metro is evaluating the operating cost savings associated with moving the maintenance of these vehicles to existing Metro properties. The capital cost of this new maintenance strategy is included in this Capital Needs Inventory.

The figure below shows Metro's Customer/Demand - Fleet Maintenance Facilities needs ($1.05 billion over the next 10 years) by project type. A brief description of each project type follows.

Customer/Demand – Fleet Maintenance Facilities Needs by Project Type ($1.05 Billion)



Rail Maintenance Facilities ($595.9 Million)

Metro's 1,100+ trains are maintained and stored among 9 rail yards, all of which are at capacity. In light of anticipated ridership growth over the next decade, Metro plans to purchase 220 new rail cars (130 cars to reach 75% 8-car trains and

While Metro stations are designed to accommodate longer 8-car trains, additional capacity is needed at rail yards to maintain, store and rehabilitate the new rail cars.

Similar to Metro's rail yards, Metro's bus fleet maintenance facilities are at capacity, and some are so old that they cannot accommodate the profile of newer, cleaner technology vehicles.

90 additional cars to implement 100% 8-car trains). These new rail cars generate a demand for additional rail yard storage and maintenance capacity. Rail maintenance facilities include service and inspection shops and maintenance, operations and yard control buildings. In these facilities, Metro employees complete regular maintenance of the rail car fleet, conduct vehicle safety inspections clean the vehicles for customer comfort and store vehicles when not in use. Rail fleet maintenance covers the following: automatic train controls, brakes, communication devices, doors, lighting, heating and cooling systems, power, propulsion, signs and signals.

To accommodate 75% 8-cars trains, plans call for additional rail car storage at Metro's Shady Grove yard, twelve additional maintenance bays at Glenmont and additional rail car storage at New Carrollton yard. Implementing 100% 8-car trains will require storage for 90 – 110 rail cars and 15 – 20 maintenance bays. The 100% 8-car train maintenance facility project cost is high because a new yard is needed, including the purchase of land. The new yard would also include a service and inspection shop.

Rail Maintenance Facilities includes the following CNI projects:

CNI Project	Total (YOE, $ Millions)
CNI 083: 100% 8-Car Trains—Storage	$401.5
CNI 082: 75% 8-Car Trains—Storage	$194.4
Total	$595.9

To accommodate 75% 8-car trains, plans call for additional rail car storage at the Shady Grove yard, twelve additional maintenance bays at Glenmont and additional rail car storage at New Carrollton yard. Implementing 100% 8-car trains will require storage for 90 – 110 rail cars and 15 – 20 maintenance bays.

Expansion of Bus Garages ($444.9 Million)

Metro's approximately 1,500 buses are assigned to 9 bus operating garages located throughout the region. To meet the growing bus ridership demand, Metro plans to purchase up to 325 additional buses (a 21% increase in fleet size) by 2020. Currently, seven of Metro's bus garages are at, or near, their practical storage capacity. The garages with storage capacity are not located near demand centers, meaning that high operating costs associated with time "dead-heading" (the time a vehicle is "not in service" between the garage and the beginning or end of a route) would result if overflow buses were assigned to these garages. Additionally, many of the existing maintenance facilities are not designed to handle new articulated buses and other clean technology buses. Therefore the purchase of land and construction of two new bus garages with the capacity to store up to 250 buses each are needed to efficiently maintain, rehabilitate and store Metro's expanding bus fleet. An alternative approach under consideration is to add capacity when existing facilities are replaced, including the Royal Street, Southern Avenue and Western bus facilities.

Employees complete regular maintenance of the bus fleet at Metro garages, conduct vehicle safety inspections, clean the vehicles for customer comfort, and store buses that are not in service. Bus maintenance work includes the vehicle power train (engine and transmission), brakes, electrical components, body/doors and heating and cooling system. New bus garages will be located near demand centers in order to reduce deadhead time and will be designed to handle larger, clean technology articulated buses. An articulated bus uses a pivoting joint in the center to extend the bus length and passenger capacity, while still allowing it to turn on city streets. At 62-feet, articulated buses are considerably longer and require more maintenance and storage space than a standard Metrobus (37-feet or 42-feet).

The reconfiguration of space in the Bladensburg Bus Garage in the District of Columbia is also planned over the next ten years. Space at Bladensburg was freed when the Heavy Overhaul Shop relocated to the Carmen Turner facility in Hyattsville, MD. Once reconfigured, the Bladensburg bus garage will provide additional maintenance capacity for 15 buses and storage for 145 more buses.

Expansion of Bus Garages includes the following CNI projects:

CNI Project	Total (YOE, $ Millions)
CNI 038: Bus Garage Capacity Enhancements	$405.7
CNI 078: Bladensburg Shop Reconfiguration	$39.1
Total	$444.9

Expansion of MetroAccess Garages ($16.0 Million)

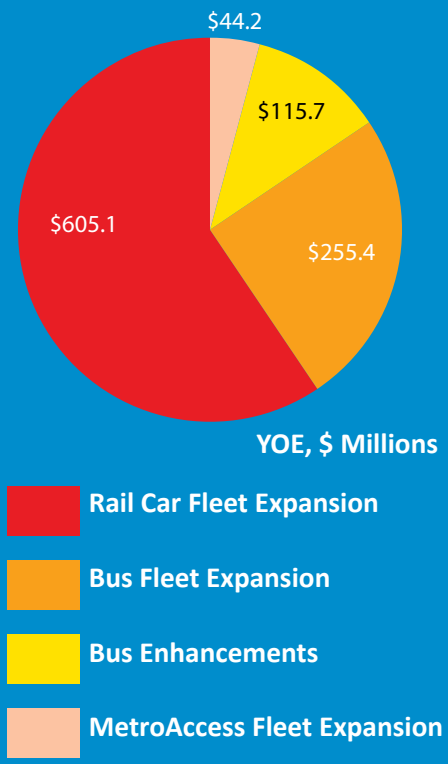
MetroAccess vehicles are currently stored at six vendor owned facilities. Current estimates show a need for approximately 900 MetroAccess vehicles by 2013 (up from about 500 today) and 1,300 vehicles by 2020. To cost-effectively fuel, maintain and store the existing and future vehicles, Metro is evaluating moving these vehicles to existing Metro properties. To do this, paving and facility improvements are needed at an estimated cost of $2 million per facility. MetroAccess anticipates the need for 8 operating garages for a total of $16 million.

Expansion of MetroAccess Garages includes the following CNI project:

CNI Project	Total (YOE, $ Millions)
CNI 016: MetroAccess Operating Garages	$16.0
Total	$16.0

Asset Category: Vehicles/Vehicle Parts

Customer/Demand – Vehicles/Vehicle Parts Needs by Project Type ($1.02 Billion)



As Metro's rail, bus and paratransit ridership grows, additional vehicles will be needed to address overcrowding and keep services safe, reliable and comfortable. In order to meet projected growth in rail ridership, Metro will need to move from running a combination of 6- and 8-car trains to running 100% 8-car trains at peak periods. Increasing the percentage of 8-car trains from 50% to 75% will require 130 new cars and expand the rail fleet capacity by 7%. Similarly, expanding service from 75% to 100% will require 90 new cars and will increase rail fleet capacity by another 7%. A higher number of cars is needed to reach 75% 8-car trains to account for the rehabilitation schedule of rail cars.

Without rail fleet expansion, most rail lines will be congested by 2020, with the Orange/Dulles Line exceeding capacity (120 passengers per car). With expansion to 100% 8-car trains during peak periods, most rail lines will have adequate capacity through 2030, though the Orange/Dulles Line will exceed 120 passengers per car as 2030 approaches. For more information, see the Overview of Future Demand section of this report.

Over the next ten years, Metro anticipates that the bus fleet will need to expand by 325 buses (from approximately 1,500 today) to address ridership growth, the backlog of expansion buses, provide service improvements along priority corridors and make up for the seating capacity lost due to conversion to low-floor buses (approximately seven seats are lost per bus conversion). Today's buses also employ a wealth of technology that improves service and the customer experience onboard. Metro plans a number of enhancements to the bus fleet, such as Automatic Vehicle Location equipment so that the Operations Control Center can see the location of each bus in real-time (the equipment has a life cycle of between seven to ten years, while a bus life cycle is 15 years). Other bus technology improvements will benefit the customer with faster travel time and better travel information.

The demand for MetroAccess service is increasing at a very high rate, and is projected to continue to do so as the regional population's average age increases and riders switch to MetroAccess from other providers. Demand for service is projected to increase from 2.1 million trips in 2009 to 4.5 million trips in 2020. In order to provide the same high level of service that paratransit customers currently receive, the MetroAccess fleet will need to expand by over 800 vehicles by 2020.

The figure to the left shows a breakdown of Metro's Customer/Demand - Vehicle and Vehicle Parts needs ($1.02 billion over 10 years) by project type. A brief description of each project type follows.

Rail Car Fleet Expansion ($605.1 Million)

The Metrorail fleet currently consists of more than 1,100 railcars that are run in a combination of 6-car trains and 8-car trains. When the system began operating in 1976, Metro ran 4- and 6-car trains. During the past five years, Metro has purchased the 184 new 6000-Series railcars to operate 50% of peak period trains as 8-car trains. $2.6 million is required from 2011 to 2014 to complete final acceptance of the 6000-Series rail car purchase.

In order to meet continued projected growth in rail ridership, Metro is planning to run 100% 8-car trains during the peak period. To get to 75% 8-car trains, Metro will need to purchase 130 new 7000-Series railcars, totaling $352.2 million, or $2.7 million per car. To move from 75% to 100% 8-car trains, 90 additional 7000-Series railcars will be required, totaling $261.2 million or $2.9 million per car. Of the total funding required to implement 100% 8-car trains, $10.8 million will be incurred after FY 2020. Metro will link options to purchase all the 220 rail cars necessary for 100% 8-car trains to the 7000-Series rail car procurement contract. By creating a single contract to purchase 520 rail cars (300 cars to replace the 1000-Series rail cars and 220 rail cars to reach 100% 8-car trains), Metro will realize nearly a half billion dollars in capital and operating cost savings through the elimination of a repetitive design, procurement, development and engineering costs, improved design and technology enhancements. The end result will be a new rail car fleet with increased capacity and lower maintenance and operating costs.

Metro officials envision the 7000-Series rail cars to have a brand new design and look. The rail car would have a stainless steel exterior. Gone would be the wide brown exterior paint stripes. Fiberglass seats would be replaced with stronger, yet thinner stainless steel for more leg room and carpet would be eliminated from the rail cars. All of these new features would substantially decrease maintenance costs. Passengers may also be provided with overhead, spring loaded grab handles. Other possible features include interactive linear maps, automated announcements stating the station names that the trains are servicing and security cameras.

Rail Car Fleet Expansion includes the following CNI projects:

CNI Project	Total (YOE, $ Millions)
CNI 069: 75% 8-Car Train – Rail Cars (7000 Series)	$352.2
CNI 068: 100% 8-Car Train – Rail Cars (7000 Series)	$250.4
CNI 062: 6000 Series Rail Car Procurement	$2.6
Total	$605.1

In order to meet continued projected growth in rail ridership, Metro is planning to run 100% 8-car trains during the peak period. To get to 75% 8-car trains, Metro will need to purchase 130 new 7000-Series railcars, totaling $352.2 million, or $2.7 million per car. To move from 75% to 100% 8-car trains, 90 additional 7000-Series railcars will be required, totaling $261.2 million or $2.9 million per car.

Bus Fleet Expansion ($255.4 Million)

Bus fleet expansion is needed for a number of reasons. Metro has developed a bus priority corridor network plan that will involve enhancement of service on specific corridors as well as possible extension of service lines, to help reduce demand on segments of the rail system that are approaching capacity constraints. Additional buses will be needed to provide these service enhancements. Regardless of service enhancements or additional market penetration, bus ridership is expected to grow 10-15% between 2010 and 2020. Consequently, additional buses will be required to meet these needs and deliver a similar quality of service experienced on existing routes. Metro also needs to make up for the seating capacity lost due to conversion to low-floor buses (approximately seven seats are lost per bus conversion). Finally, Metro also has deferred some of its previous expansion bus needs, so additional buses are needed to catch up with planned fleet expansion.

Metro plans to expand its current fleet by purchasing approximately 30 additional buses each year, for a total of 325 expansion buses by the year 2020. The total cost of these vehicles is $255.5 million.

Bus Fleet Expansion includes the following CNI project:

CNI Project	Total (YOE, $ Millions)
CNI 003: Bus Capacity Enhancements: Fleet Expansion	$255.4
Total	$255.4

Metro has developed a bus priority corridor network plan that will involve enhancement of service on specific corridors as well as possible extension of service lines, to help reduce demand on segments of the rail system that are approaching capacity constraints. Additional buses will be needed to provide these service enhancements.

Bus Enhancements ($115.7 Million)

Metro uses Automatic Vehicle Location (AVL) equipment to track the location of its bus fleet and enables the bus operations control center to monitor each bus's adherence to its schedule and to locate it in an emergency. AVL equipment is also necessary to run the NextBus application, which provides customers with real time predictions of bus arrival times. This equipment has a life cycle of between seven to ten years. AVL and communication equipment will cost $60.4 million over the next ten years.

To further enhance the safety of Metro's bus service, Metro also plans to install cameras fleet-wide. Newly purchased buses already have camera systems installed. These camera systems can protect customers by deterring crime, reducing vandalism and graffiti, reducing the frequency and detrimental impact of fraudulent injury claims, helping to effectively prosecute perpetrators when crimes are committed, and assisting with customer concerns or complaints. Metro plans to install camera systems on approximately 100 buses each year (approximately

$10,000 per bus). In addition, camera systems will be retrofitted on an 8-year cycle. The total cost to install, maintain and replace bus cameras over the next ten years is $31.4 million.

Advanced bus technologies such as Traffic Signal Priority (which provides conditional signal priority when a bus is behind schedule), Mesh Network (which enables the bus system to send customer information to technology enabled bus stops), and wireless internet access require antennas on bus roofs and a high level of security. The Antenna Reduction/Security Enhancements project will support these advanced technologies and will combine the wireless data from multiple on-board devices to manage wireless bus data transmissions via a single roof-mounted Wireless Local Area Network (WLAN) antenna. In addition to reducing the number of antennas, this program reduces the possibility of roof leaks and would result in lower maintenance costs. The benefits to the customer include faster travel time, better traveler information, and internet access on the bus. The cost of this project is $23.9 million.

Bus Enhancements includes the following CNI projects:

CNI Project	Total (YOE, $ Millions)
CNI 002: Automatic Vehicle Location Equipment	$60.4
CNI 007: Bus Camera Installation	$31.4
CNI 001: Antenna Reduction/ Security Enhancements	$23.9
Total	$115.7

MetroAccess Fleet Expansion ($44.2 Million)

Of all its modal services, MetroAccess is expected to experience Metro's fastest growing ridership at 112% over the next ten years. Demand for MetroAccess service is projected to increase from 2.1 million trips in FY 2009 to 4.5 million trips in 2020 as the regional population's average age increases, and riders switch to MetroAccess from other providers. In order to provide the same high level of service that paratransit customers currently receive, the MetroAccess fleet will need to expand by 803 vehicles by 2020. The total cost of these vehicles is $44.2 million.

MetroAccess Fleet Expansion includes the following CNI project:

CNI Project	Total (YOE, $ Millions)
CNI 014: MetroAccess Fleet Expansion	$44.2
Total	$44.2

Demand for MetroAccess service is projected to increase from 2.1 million trips in FY 2009 to 4.5 million trips in 2020 as the regional population's average age increases, and riders switch to MetroAccess from other providers.

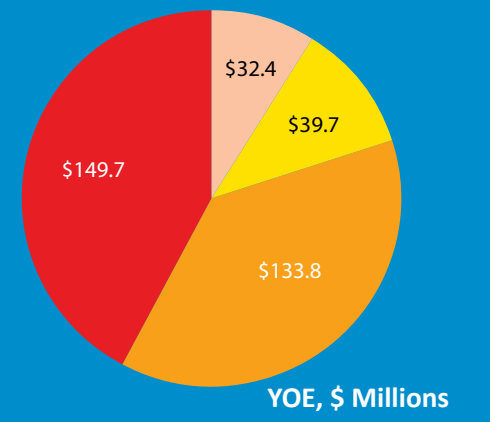
Asset Category: Systems and Technology

An extensive technology infrastructure works behind the scenes at Metro providing critical support to transit operations. Key examples include scheduling software for Metrobus, Metrorail and MetroAccess and Metro Police Transit Department's dispatch and records system. Other software is designed specifically to serve the customer, such as the Metrobus NextBus system which uses Global Positioning System (GPS) software and route schedules to predict bus arrival times. In addition, systems such as Metrorail's traction-power ensure that trains have the electricity needed to power Metro trains. This Customer/Demand investment category includes operating systems and information technology projects necessary to enhance performance, improve communication with customers and provide additional capacity to serve a growing ridership.

Over the next ten years, a significant operating system investment is needed to improve Metrorail's traction-power system to allow the deployment of up to 100% 8-car trains at peak periods (see Power System Upgrade – Rail). Operations Support Software projects will integrate and enhance Metro's existing operation software to better serve customers, including automated information sharing between Metrobus, Metrorail and MetroAccess. Building on recent improvements, Metro also plans to upgrade its website to encourage rider usage and information sharing (see Business Support Software and Equipment). To meet growing ridership, Metro has identified new automatic fare collection system upgrades and equipment needs (see Rail Fare Equipment).

The figure to the left shows Metro's Customer/Demand - Systems and Technology needs ($355.6 million over the next 10 years) by project type. A brief description of each project type follows.

Customer/Demand – Systems and Technology Needs by Project Type ($355.6 Million)



Power System Upgrades – Rail ($149.7 Million)

To meet increasing ridership demand and avoid overcrowding, Metro is moving from a combination of 6- and 8-car trains to 100% 8-car trains. This requires additional investment in the electrical system that powers the trains. 8-Car Trains Power Upgrades increases the power supply capacity of the traction-power system at a cost of $149.7 million. Under this project, additional transformers, rectifiers, breakers, track feeder cables and negative return cables will be installed in the Metrorail system. These upgrades are required to ensure that 8-car trains can operate without risk of an overload to the power system which could cause damage to the power equipment, cabling and/or trains.

Upgrades are required to ensure that 8-car trains can operate without risk of an overload to the power system which could cause damage to the power equipment, cabling and/or trains.

Power Systems Upgrades – Rail includes the following CNI project:

CNI Project	Total (YOE, $ Millions)
CNI 077: 100% 8-Car Trains—Power Upgrades	$149.7
Total	$149.7

Operations Support Software ($133.8 Million)

Metro's Operations Support Software investments will upgrade software and other technology infrastructure improvements to enhance transit operations and communications.

The Customer and Regional Integration project will automate information sharing between Metrobus, Metrorail and MetroAccess. This will enable Metro to integrate its customer, incident, response and performance information across the agency. For example, these improvements would enable MetroAccess customers faced with an elevator outage to take advantage of bus bridges (Metrobus service provided between two Metro stations due to elevator outages or service interruptions). In addition, this project will improve coordination and information sharing with regional partners.

The Enterprise Geographic Information System will create a single, agency-wide mapping function across departments to support more efficient and accurate asset maintenance and management, transit routing and trip planning, emergency response, long-range planning and information sharing with the public. Benefits would include an agency-wide bus stop inventory and an improved map of MTPD jurisdictional limits for dispatch and crime analysis.

Power Management Modernization will allow Metro to move toward a centralized power management infrastructure that monitors and controls power consumption. Research indicates that appropriate levels of power management automation can minimize power spikes, brownouts and other problems and help Metro increase its total passenger throughput on the rail lines. Private industry uses centralized power management to optimize use of electrical power and control power consumption costs.

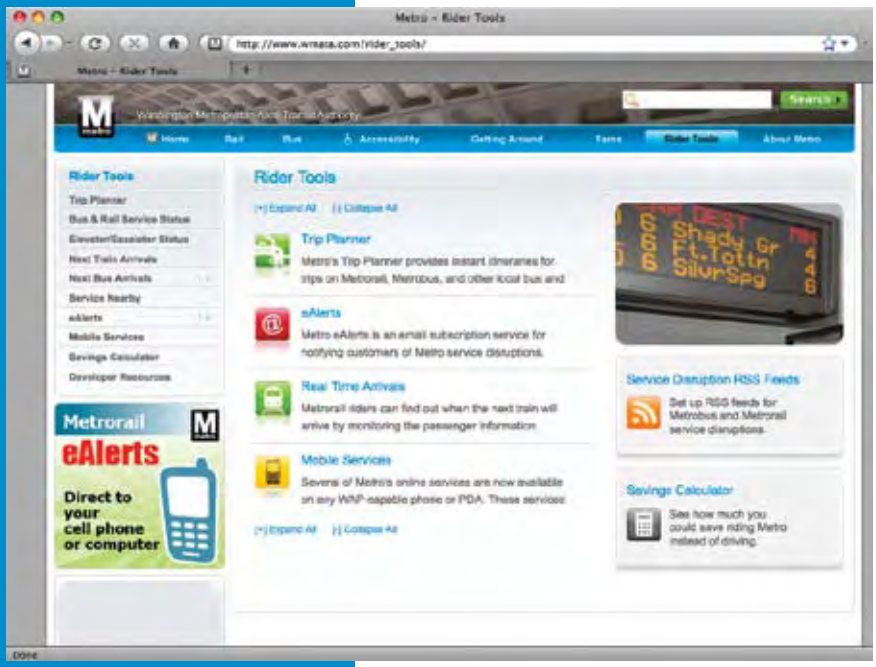
Metro's Operations Support Software investments will upgrade software and other technology infrastructure improvements to enhance transit operations and communications.

Operations Support Software includes the following CNI projects:

CNI Project	Total (YOE, $ Millions)
CNI 044: Customer and Regional Integration	$73.2
CNI 055: Power Management Modernization	$45.9
CNI 047: Enterprise Geographic Information System	$14.7
Total	$133.8

Business Support Software and Equipment ($39.7 Million)

Website Update – Customer Communication will encourage interaction and information sharing within www.wmata.com through appropriate social media tools. Upgraded hardware to support new website features will cost $39.7 million over the next 10 years.



Metro's website provides extensive information to riders, businesses and visitors about Metrorail, Metrobus and MetroAccess service. First launched in 1996, the web site is now the primary source of information for most Metro customers. Web site usage has grown from 1 million page views per month in 1999 to an average of 16 million page views per month in 2009. Metro plans improvements that will lay the groundwork for Web 2.0 collaborative technologies that could potentially create revenue-generating opportunities.

First launched in 1996, Metro's web site is now the primary source of information for most customers. Web site usage has grown from 1 million page views per month in 1999 to an average of 16 million page views per month in 2009.

Business Support Software and Equipment includes the following CNI project:

CNI Project	Total (YOE, $ Millions)
CNI 054: Website Update—Customer Communication	$39.7
Total	$39.7

Rail Fare Equipment ($32.4 Million)

Metro is considering new technologies for fare collection, potentially adding a bank card (credit/debit) fare payment option known as an "open system." The Metro Board approved solicitation of business proposals for an open fare payment system in May 2009. Metro estimates $10 million is needed for initial investments in such a system. An open fare payment system could mean lower fare collection costs if card companies would manage the collection system and customer inquiries. Revenue could also be raised by partnering with credit card companies or banks. The largest benefit would be to the customer who would have more payment choices increasing the convenience of using the

Metro system, particularly for tourists and occasional riders, who would no longer have to use the fare machines.

While the new open fare payment system is being evaluated, Metro will continue to support its existing Automatic Fare Collection (AFC) system. Currently, fare vending machines are located on each Metrorail mezzanine at all Metrorail stations and are of two types: standard vendors that only dispense limited-use paper fare cards and Express Vendors that also sell multiple farecards and passes, accept credit card payment, and allow reloading of SmarTrip cards (permanent, rechargeable farecards that operate like credit cards and are embedded with a special computer chip that tracks the value of each card). SmarTrip card dispensers are available only at stations with Metro-operated parking lots (but may also be purchased from Metro's web site, retail outlets and commuter stores). With ridership projected to grow, Metro also plans to purchase 50 additional fare gates and to replace 30 of its standard vendors that only dispense limited use paper fare cards with Express Vendors. The cost of this additional AFC equipment is $6.0 million.

To expand the availability of SmarTrip card purchasing, Metro also plans to convert 224 fare vending machines to "universal vendors" (two conversions at each rail mezzanine) at a cost of $12.9 million. These universal vendors will dispense plastic SmarTrip cards as well as limited use paper SmarTrip cards. Purchasing the conversion kits and upgrading current equipment provides a less expensive option than purchasing all new fare equipment.

Other planned improvements include wiring upgrades ($1.3 million), new coin vaults and new revenue transfer carts ($2.2 million). The carts are used by Metro employees to collect currency from fare vending machines in preparation for deposit. Together these investments in the Metro fare collection system will make fare payment faster and easier for daily riders and visitors.

Rail Fare Equipment includes the following CNI projects:

CNI Project	Total (YOE, $ Millions)
CNI 090: Conversion of Fare Machines to Universal Vendors	$12.9
CNI 097: Open Fare Payment System	$10.0
CNI 091: Automatic Fare Collection Machines	$6.0
CNI 094: Improvements to Coin Collection Machines	$2.2
CNI 092: Ethernet Wiring for Rail Fare Machines	$1.3
Total	$32.4

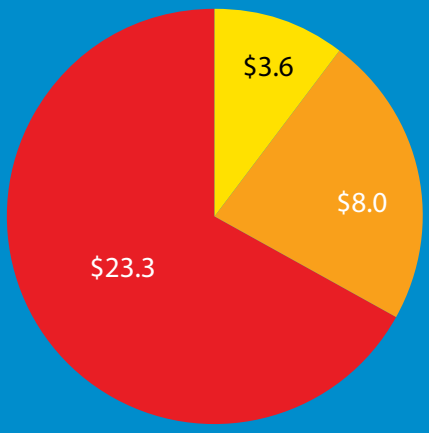
Investments in the Metro fare collection system will make fare payment faster and easier for daily riders and visitors.

Asset Category: Support Facilities

In addition to its rail stations, parking facilities, bus garages and rail yards, Metro owns and maintains support facilities that house administrative offices, training rooms, revenue processing activities, material storage, police work and print shops. While not highly visible to the public, Metro's support facilities are critical for delivering transit service. Several of these facilities are at capacity, so expanded and new facilities are planned to support growing service demands. Over the next ten years, support facility capital needs include a new Metro Transit Police Department (MTPD) substation to serve the western-most part of Metro's service area, including the Dulles Metrorail extension, and a police training facility. In order to transition from rented to permanent space, MetroAccess identified the need for a new command center. Business support facility capital needs include an expansion of Metro's revenue collection facility to serve new Dulles extension stations and improvements to the visitor management system at the Jackson Graham administration building.

The figure to the left shows Metro's Customer/Demand - Support Facilities needs ($34.9 million over the next 10 years) by project type. A brief description of each project type follows.

Customer/Demand – Support Facilities Needs by Project Type ($34.9 Million)



YOE, $ Millions

- **Police Facilities**
- **MetroAccess Operations Facility**
- **Business Support Facilities**

Police Facilities ($23.3 Million)

Metro Transit Police Department (MTPD) officers are responsible for providing law enforcement and public safety services on the Metrorail and Metrobus systems. The service area extends 1,500 square miles within Maryland, Virginia and the District of Columbia. MTPD has an authorized strength of 458 sworn police officers, 114 security special police and 4 armored vehicle guards. The Department is currently split into two patrol Districts, each covering one half of the system. A third district serves Metro's revenue collection operation. A fourth district will be established with the opening of the Dulles Metrorail extension.

MTPD's current facilities include administrative offices in the Jackson Graham building, two substations, and offices for the Department's Special Operations bureau. The District 1 Substation is the Department's newest facility (opened in 2007), and is located near the Fort Totten Metro station.

Metro plans to construct a new District 4 Substation to serve as a base for officers patrolling the new Dulles Metrorail extension and to cover increased Metrobus service in Arlington, Fairfax, Loudoun and Montgomery counties. The substation will accommodate officer training, administrative functions, crime scene search technicians, evidence storage, police interview rooms, locker rooms and restroom facilities.

While not highly visible to the public, Metro's support facilities are critical for delivering transit service. Several of these facilities are at capacity, so expanded and new facilities are planned to support growing service demands.

Each year MTPD's 458 sworn and commissioned members are required by state training mandates to qualify their firearms. Currently, MTPD officers qualify their firearms at ranges operated by local public safety agencies through cooperative agreement with these agencies. As the force of local police departments grows, available time at these facilities is becoming increasingly scarce. Consequently, MTPD officers are forced to qualify during off-hours, which can create overtime costs. Given that MTPD will also experience continued growth to match increasing ridership and regional expansion, a dedicated MTPD training facility is needed. A police training facility will provide MTPD officers with the resources needed to qualify their firearms semi-annually and to practice more frequently. The police training facility will include a firing range, classrooms, weapons cleaning and storage rooms.

Police Facilities includes the following CNI projects:

CNI Project	Total (YOE, $ Millions)
CNI 102: Police Substation - New District 4	$12.5
CNI 100: Police Training Facility	$10.8
Total	$23.3

MetroAccess Operations Facility ($8 Million)

The current MetroAccess command center operates in rented space (annual cost of about $850,000 per year) near the Prince George's Plaza Metro station. Use of rented space can require periodic relocation resulting in substantial costs for telephone transfers, backup power, heating/cooling systems and other requirements. To address growing ridership, provide operational stability and to realize long term cost reductions, Metro is considering constructing a permanent MetroAccess command center. The cost for the building space, equipment and communications is $8 million.

MetroAccess Operations Facility includes the following CNI project:

CNI Project	Total (YOE, $ Millions)
CNI 013: MetroAccess Command Center	$8.0
Total	$8.0

To address growing ridership, provide operational stability and to realize long term cost reductions, Metro is planning to construct a permanent MetroAccess command center.

Business Support Facilities ($3.6 Million)

Metro will need to expand the Alexandria revenue collection facility (RCF) in order to maintain efficient handling of fare collections and to accommodate future ridership growth. Metrorail customers purchase farecards using vending machines located on rail station mezzanines. The currency is then collected in revenue service carts by Metro employees. At Metro's RCF, employees process revenue carts in preparation for bank deposit. RCF has reached its maximum capacity to house personnel and equipment. In addition, the new Dulles Metrorail extension will place new demand on the facility with the addition of 20 additional mezzanines and 40 new revenue service carts. The cost to expand the RCF is $2.5 million.

Because Metro's Jackson Graham building in the District of Columbia houses not only administrative offices but also an Operations Control Center that monitors the movement of Metrovehicles, a high level of security is required. On a daily basis, Metro special police officers process hundreds of visitors. These visitors include participants in public meetings held at the building, MetroAccess' Transit Accessibility Center clients, Metro contractors, consultants and other guests. A secure and efficient visitor management system is needed at the Jackson Graham building in order to properly process and monitor visitors. The system will utilize the latest technology to screen visitors, create temporary photo identification cards and control access to the building. The cost of a Building Visitor Management System is $1.1 million.

A secure and efficient visitor management system is needed at the Jackson Graham building in order to properly process and monitor visitors. The new system will utilize the latest technology to screen visitors, create temporary photo identification cards and control access to the building.

Business Support Facilities includes the following CNI projects:

CNI Project	Total (YOE, $ Millions)
CNI 034: Revenue Collection Facility (RCF) Building Expansion	$2.5
CNI 098: Jackson Graham Building Visitor Management System	$1.1
Total	$3.6

Project Number	Project Name	Asset Category	Project Type	Budget
001	Antenna Reduction/ Security Enhancements	Vehicles/ Vehicle Parts	Bus Enhancements	$ 23,860
002	Automatic Vehicle Location Equipment	Vehicles/ Vehicle Parts	Bus Enhancements	$ 60,434
003	Bus Capacity Enhance-ments: Fleet Expansion	Vehicles/ Vehicle Parts	Bus Fleet Expansion	$ 255,450
007	Bus Camera Installation	Vehicles/ Vehicle Parts	Bus Enhancements	$ 31,400
012	Dual Accessible Pathways - Core Elevator Project	Passenger Facilities	Elevator/Escalator Facilities	$ 33,955
013	MetroAccess Command Center	Support Facilities	MetroAccess Command Center	$ 8,000
014	MetroAccess Fleet Expansion	Vehicles/ Vehicle Parts	MetroAccess Fleet Expansion	$ 44,165
016	MetroAccess Operating Garages	Maintenance Facilities	Expansion of MetroAccess Garages	$ 16,000
017	Platform Edge Bumpy Dome Installation	Passenger Facilities	Rail Station: Capacity/ Enhancements	$ 11,000
034	Revenue Collection Facility (RCF) Building Expansion	Support Facilities	Business Support Facilities	$ 2,522
035	Bicycle & Pedestrian Facilities: Capacity Improvements	Passenger Facilities	Bicycle & Pedestrian Facilities	$ 40,301
037	Bus Priority Corridor Network Enhancements	Passenger Facilities	Bus Priority Corridor Improvements	$ 120,449
038	Bus Garage Capacity Enhancements	Fleet Maintenance Facilities	Expansion of Bus Garages	$ 405,723
039	Core Stations Capacity Enhancements	Passenger Facilities	Rail Station: Capacity/ Enhancements	$ 612,112

Project Number	Project Name	Asset Category	Project Type	Budget
040	Farragut North/West Pedestrian Connection	Passenger Facilities	Rail Station: Capacity/ Enhancements	$ 72,035
041	Gallery Place/Metro Center Pedestrian Connection	Passenger Facilities	Rail Station: Capacity/ Enhancements	$ 100,001
044	Customer & Regional Integration	Systems and Technology	Operations Support Software	$ 73,161
047	Enterprise Geographic Information System	Systems and Technology	Operations Support Software	$ 14,713
054	Website Update — Customer Communication	Systems and Technology	Business Support Software & Equipment	$ 39,716
055	Power Management Modernization	Systems and Technology	Operations Support Software	$ 45,931
062	6000 Series Rail Car Procurement	Vehicles/ Vehicle Parts	Rail Car Fleet Expansion	$ 2,581
068	100% 8-Car Train — Rail Cars (7000-Series)	Vehicles/ Vehicle Parts	Rail Car Fleet Expansion	$ 250,377
069	75% 8-Car Train — Rail Cars (7000-Series)	Vehicles/ Vehicle Parts	Rail Car Fleet Expansion	$ 352,170
074	Installation of Parking Lot Credit Card Readers	Passenger Facilities	Rail Station: Capacity/ Enhancements	$ 3,278
077	100 % 8-Car Trains — Power Upgrades	Systems and Technology	Power System Upgrades - Rail	$ 149,735
078	Bladensburg Shop Reconfiguration	Fleet Maintenance Facilities	Expansion of Bus Garages	$ 39,129
079	Extend Platform Canopies	Passenger Facilities	Rail Station: Capacity/ Enhancements	$ 317,035

Project Number	Project Name	Asset Category	Project Type	Budget
082	75% 8-Car Train — Storage	Fleet Maintenance Facilities	Rail Maintenance Facilities	$ 194,415
083	100% 8-Car Train — Storage	Fleet Maintenance Facilities	Rail Maintenance Facilities	$ 401,465
088	Station Entrance Canopies	Passenger Facilities	Rail Station: Capacity/ Enhancements	$ 34,918
090	Conversion of Fare Machines to Universal Vendors	Systems and Technology	Rail Fare Equipment	$ 12,900
091	Automatic Fare Collection Machines	Systems and Technology	Rail Fare Equipment	$ 5,980
092	Ethernet Wiring for Rail Fare Machines	Systems and Technology	Rail Fare Equipment	$ 1,300
094	Improvements to Coin Collection Machines	Systems and Technology	Rail Fare Equipment	$ 2,208
097	Open Fare Payment System	Systems and Technology	Rail Fare Equipment	$ 10,000
098	Jackson Graham Building Visitor Management System	Support Facilities	Business Support Facilities	$ 1,100
099	Police Emergency Management Equipment	Passenger Facilities	Rail Station Equipment	$ 1,150
100	Police Training Facility	Support Facilities	Police Facilities	$ 10,818
102	Police Substation — New District 4	Support Facilities	Police Facilities	$ 12,500
105	Chemical Detector Enhancements	Passenger Facilities	Rail Station Equipment	$ 20,421

Project Number	Project Name	Page Number
001	Antenna Reduction/ Security Enhancements	83
002	Automatic Vehicle Location Equipment	83
003	Bus Capacity Enhancements: Fleet Expansion	82
004	Bus Repair Equipment	55
005	Bus Rehabilitation	31
006	Bus Replacement	31
007	Bus Camera Installation	83
008	Bus Rehabilitation Components	32
009	Service Vehicle Replacement	33
010	Environmental Compliance Projects	41
011	Underground Storage Tank Replacement	41
012	Dual Accessible Pathways - Core Elevator Project	74
013	MetroAccess Command Center	89
014	MetroAccess Fleet Expansion	83
015	MetroAccess Vehicles	33
016	MetroAccess Operating Garages	79
017	Platform Edge Bumpy Dome Installation	74
018	Track Welding Program	48
019	Track Floating Slab Rehabilitation	48
020	Replacement of Rail Track Signage	54
021	Track Pad/Shock Absorber Rehabilitation	48
022	Track Structural Rehabilitation	48
023	Third Rail Rehabilitation	47
024	Track Rehabilitation	47
025	Track Maintenance Equipment	54
026	Station/Tunnel Leak Mitigation	48
027	Switch Machine Rehabilitation Project	54
028	Materials Handling Equipment	55
029	Warehouse Vertical Storage Units/Shelving	55
030	Currency Processing Machines	44
031	Debit/Credit Processing Requirements	45
032	Fare Media Encoders	45
033	Replacement of Revenue Facility Equipment	58
034	Revenue Collection Facility (RCF) Building Expansion	90
035	Bicycle & Pedestrian Facilities: Capacity Improvements	76
036	Replacement of Bicycle Racks & Lockers	52
037	Bus Priority Corridor Network Enhancements	75
038	Bus Garage Capacity Enhancements	79
039	Core Stations Capacity Enhancements	74
040	Farragut North/Farragut West Pedestrian Connection	74

Project Number	Project Name	Page Number
041	Gallery Place/Metro Center Pedestrian Connection	74
042	Bus & Rail Asset Management Software	43
043	Bus Operations Support Software	43
044	Customer & Regional Integration	85
045	Data Centers and Infrastructures	43
046	Document Management System	44
047	Enterprise Geographic Information System	85
048	Sensitive Data Protection Technology	44
049	Management Support Software	44
050	Metro IT OneStop and Office Automation	44
051	Police Dispatch and Records Management	43
052	Network and Communications	43
053	Network Operations Center (NOC)	43
054	Website Update — Customer Communication	86
055	Power Management Modernization	85
056	Rail Operations Support Software	43
057	1000-Series Rail Car Replacement	28
058	2000/3000-Series Rail Car Mid-Life Rehabilitation	29
059	2000/3000-Series Rail Car Replacement	28
060	4000-Series Rail Car Mid-Life Rehabilitation	29
061	5000-Series Rail Car Mid-Life Rehabilitation	29
062	6000-Series Rail Car Procurement	81
063	Rail Rehabilitation Components	32
064	1000-Series Rail Car HVAC Rehabilitation	29
065	Geometry Vehicle	54
066	Rail Car Repair Equipment*	55
067	Rail Car Safety & Reliability Enhancements	29
068	100% 8-Car Train — Rail Cars (7000-Series)	81
069	75% 8-Car Train — Rail Cars (7000-Series)	81
071	Test Track & Commissioning Facility	41
072	Elevator Rehabilitation	51
073	Escalator Rehabilitation	51
074	Installation of Parking Lot Credit Card Readers	74
075	Parking Lot Preventive Maintenance	52
076	8-Car Train Power Upgrades	45
077	100 % 8-Car Trains — Power Upgrades	85
078	Bladensburg Shop Reconfiguration	79
079	Extend Platform Canopies	74
080	Jackson Graham Building Renovation	58
082	75% 8-Car Train — Storage	78

**CNI 066 was formerly known as "Heavy-Duty Track Equipment."*

Project Number	Project Name	Page Number
083	100% 8-Car Train —Storage	78
084	Southern Avenue Bus Garage Replacement	38
085	Replacement of Additional Bus Garages	38
086	Southeastern Bus Garage Replacement	38
087	Station Enhancement Program	52
088	Station Entrance Canopies	74
089	Track Fasteners	48
090	Conversion of Fare Machines to Universal Vendors	87
091	Automatic Fare Collection Machines	87
092	Ethernet Wiring for Rail Fare Machines	87
093	Maintaining NEXTFARE System	45
094	Improvements to Coin Collection Machines	87
095	Automatic Fare Collection Machine Repairs	45
097	Open Fare Payment System	87
098	Jackson Graham Building Visitor Management System	90
099	Police Emergency Management Equipment	76
100	Police Training Facility	89
101	Police Substation- New District 2	59
102	Police Substation — New District 4	89
103	Police Portable Radio Replacement	44
104	Police Vehicle Replacement	33
105	Chemical Detector Enhancements	76
106	Special Operations Division Facility	59
107	Rail Rehabilitation Tier 1: Dupont to Silver Spring	36
108	Rail Rehabilitation Tier 1: Dupont to Grosvenor	36
109	Rail Rehabilitation Tier 2: Grosvenor to Shady Grove and Silver Spring to Glenmont	36
110	Rail Rehabilitation Tier 1: National Airport to New Carrollton	36
111	Rail Rehabilitation Tier 2: Rosslyn to Vienna	36
112	Rail Rehabilitation Tier 3: National Airport to Huntington and Franconia Springfield plus the Largo Extension	36
113	Rail Rehabilitation Tier 1: U Street to Anacostia	36
114	Rail Rehabilitation Tier 2: U Street to Greenbelt	36
115	Rail Rehabilitation Tier 3: Anacostia to Branch Avenue	36
116	Rail Yard Facility Repairs Tier 1: Alexandria, Brentwood and New Carrollton	40
117	Rail Yard Facility Repairs Tier 2: West Falls Church, Greenbelt and Shady Grove	40
118	Rail Yard Facility Repairs Tier 3: Branch Avenue, Glenmont and Largo	40
119	Bus Garage Facility Repairs Tier 1: Western, Northern and Landover	40
120	Bus Garage Facility Repairs Tier 2: Montgomery and Four Mile Run	40
121	Bus Garage Facility Repairs Tier 3: Bladensburg	40
122	Rail Rehabilitation Tier 4	36

*** CNI projects 070, 081, and 096 were combined with other projects during the development of this report.*

Washington Metropolitan Area Transit Authority

600 Fifth Street, NW

Washington, DC 20001

Printed February 2010

Prepared by WMATA Department of Planning and Joint Development, Office of Long Range Planning

This report can be downloaded from WMATA's website at www.metroopensdoors.com