

4.4 Streetcar Fleet and Maintenance and Storage Facilities

The system proposed in the 2010 Update requires establishing streetcar maintenance and storage yard facilities to accommodate the fleet of vehicles that will operate the streetcar lines. This section describes the streetcar support facility analysis which estimated the needs for the proposed system.

As part of the streetcar support facility analysis, it was critical to project the size of the future streetcar fleet. In addition to providing the minimum number of vehicles to meet service standards, the necessary capacity to meet projected vehicle loads was also considered. Industry standards call for a 20% spare ratio of vehicles to account for breakdowns and service interruptions. Table 4-2 shows the estimated number of streetcar vehicles necessary to operate the service for the set of projects in each phase and for the total system.

The initial streetcar projects currently being constructed and the Phase 1 expansion will require 42 streetcars with 9 spares, for a total of 51 vehicles. Each subsequent phase adds a number of vehicles and spares to bring the total fleet size to 137 vehicles at full build out. Industry standards call for sufficient capacity to provide one storage space per streetcar vehicle and one maintenance and service bay per nine (9) vehicles. Based on the size of the proposed fleet, the space program of the storage and maintenance facilities can be calculated using a ratio of 1:1 for storage spaces, and 1:9 for maintenance bays. Additional spaces may be added to optimize the operations of the system and eliminate the need to run non-revenue “deadhead” vehicles long distances to remote storage facilities. Up to six service bays will be required immediately in Phase 1, ten bays will be required for Phase 2, and a total of 16 bays will be needed at full build out. These are minimum requirements; it is recommended that added service capacity be built into the system to optimize operations, avoid delays in maintenance service to the streetcar fleet and permit more frequent service if ridership exceeds projections.

Table 4-2: Streetcar Fleet Size By Phase

Project Phase	Base Number Vehicles	20% Spare ratio	Streetcar Vehicles Needed	Total Fleet Size
Phase 1	42	9	51	51
Phase 2	32	7	39	90
Phase 3	39	8	47	137
Total System	113	24	137	137

Facility Types

Two prototypes are proposed for the needed support facilities: a smaller end-of-line storage site (Type 1) and a larger centrally located facility that provides both fleet storage and maintenance services (Type 2).

Type 1: This type (end-of-line or mid-line storage only) would provide the following features:

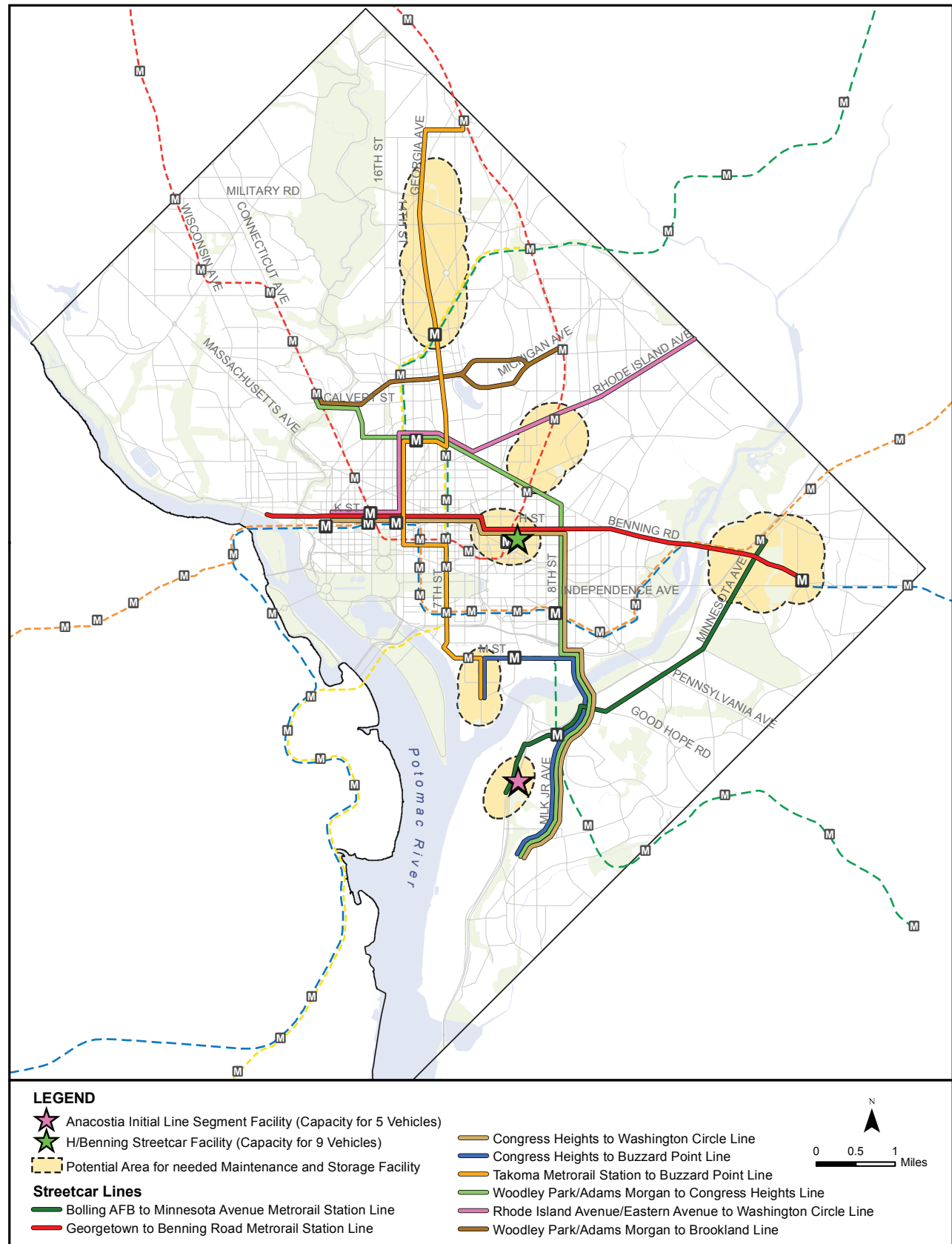
- Storage for up to 20 streetcars;
- Site security (fencing and lighting);
- Cleaning (interior and exterior);
- Inspections;
- Crew reporting;
- Employee service and welfare areas; and
- Employee parking.
- Building size of 100 feet by 44 feet (4,400 square feet), expandable to support added staff in future phases; and
- Total facility size of 47,600 square feet or approximately one acre for Phase 1, but expanding up to two acres for full build-out.

This type of facility would be designed to fit on smaller land parcels (approximately one acre) but could be expanded to provide additional storage for up to 20 vehicles if sited on a two-acre footprint.

Type 2: The second type of facility (larger size, service and storage) would provide the following services:

- Storage for up to 50 streetcars;
- Site security (fencing and lighting);
- Cleaning (interior and exterior);
- Inspections;
- Running repairs;
- Heavy repairs and service;
- Parts storage;
- Crew reporting and dispatching;
- Employee service and welfare areas; and
- Employee parking.
- Building size of 7,000 square feet, but expanding to support additional services in future phases; and

Figure 4-10: Potential Areas for Maintenance and Storage Facilities



- Total facility footprint of four acres initially, but expanding up to six acres for full build out.

This type of facility would be designed to fit on a larger land parcel (approximately four acres) but could be expanded to provide additional storage of up to 50 vehicles if sited on a six-acre footprint.

Potential Locations of Support Facilities by Phase

Based on the phased streetcar fleet size, it is estimated that the system will require a total of five maintenance and storage facilities. This estimate includes three Type 1 facilities and two Type 2 facilities. Table 4-3 lists the estimated number of facilities needed by phase.

The number of facilities required includes the facilities for the Anacostia Streetcar Initial Line Segment and the H/Benning Streetcar. It is assumed that the Anacostia Streetcar Initial Line Segment facility is expanded from its initial size that serves five vehicles to serve up to 20 vehicles for the Phase 1 system. It also assumes that the facility to serve the H/Benning Project is constructed to serve 9 vehicles, which is the maximum size that can be accommodated at the proposed site adjacent to Union Station and the H Street Bridge over the rail yard. It remains this size through all three phases of streetcar development. The third Type 1 facility constructed in Phase 3 will accommodate up to 8 vehicles. The first Type 2 facility would be constructed to accommodate up to 22 vehicles in Phase 1 and then be expanded to accommodate up to 50 vehicles for Phase 2. The second Type 2 facility would be constructed to accommodate up to 11 vehicles in Phase 2 and expanded to accommodate 50 vehicles in Phase 3.

Figure 4-10 depicts areas suitable for potential facility sites based on the location of streetcar corridors and project phasing. The exact locations of the proposed sites will be determined in a future phase of the project.

The conventional method to siting transit support facilities is to identify a suitable vacant industrial site, purchase the property and build the required facility. In an urbanized location with little existing industrial property such as the District of Columbia, this standard approach may be a challenge. Many vacant properties have been developed during the real estate boom of the past decade, and many potential sites identified in the 2005 study are no longer available.

Other approaches should be considered if vacant industrial sites are not available, including joint development opportunities, building in non-traditional locations, or combining streetcar facilities with existing public facilities.

Table 4-3: Estimated Number of Facilities Needed

Project Phase	Type 1 Facilities	Type 2 Facilities	Total
Phase 1	2	1	3
Phase 2	2	2	4
Phase 3	3	2	5

- Joint development opportunities would include the options of working with a private land developer to place a transit facility on the ground floor of a suitable proposed facility such as a parking deck and offering financial incentives that offset their loss of floor space. Another option for joint development would be to arrange for the transit facility to be built by the developer during overall construction of their site and provide compensation for the construction.
- A second approach would be to find non-traditional locations for the facilities such as under existing transportation infrastructure (e.g., highway overpasses, ramps, or under existing bridges). Several locations in the District may be suitable. This approach could also explore the use of WMATA bus facilities as combined bus/streetcar maintenance garages. These options are only feasible if the locations allow suitable site access, the grades are suitable for streetcar operations, and the cost of construction is comparable to other optimal locations.
- Finally, a third approach would be to combine the streetcar functions with other types of public facilities. For example, siting a maintenance/storage facility below grade level adjacent to a public school and constructing athletic fields above the garage building could provide benefits to both the school and DDOT. Combining the facility with a new public parking garage would allow the placement of the streetcars on the ground floor and placement of public parking on the upper decks. Several locations in the District have sites and grading conducive to this type of facility.

Consideration of all of these alternative approaches will likely be needed to site and construct the required streetcar support facilities within the District of Columbia.

Vehicle Power Source

The District of Columbia currently has a ban on overhead wires used to power streetcars within some of the streetcar corridor areas that are included in the historic L'Enfant Plan. DDOT envisions operating vehicle electrically powered via overhead wires and across certain viewsheds using onboard batteries to operate wirelessly. A number of vehicle manufacturers are developing this technology.

4.5 Streetcar Costs and Funding

This section summarizes the capital and operating cost estimates and potential funding sources for the streetcar component of the 2010 Update. This section does not include costs and funding for the Metro Express limited-stop bus components of the plan. The Metro Express limited-stop bus components are estimated to cost an additional \$82 million in capital expenses and \$37 million in annual operating and maintenance expenses in 2009 dollars. Financial planning for the Metro Express limited-stop bus improvements are to be completed as part of the on-going individual corridor studies for each of the Metro Express bus corridors jointly with WMATA.

Project costs for the proposed streetcar system plan are divided into two categories:

- **Capital costs** – one-time costs for infrastructure and vehicles required to provide service; and
- **Operating and maintenance costs** – recurring costs for each year a service is operating.

All costs for the various components of the three-phased implementation plan are in 2009 dollars except where noted. They were developed using existing unit costs from similar systems whenever possible. The Anacostia Initial Line Segment, H/Benning Streetcar initial segment, and 11th Street Bridge streetcar projects are considered part of the baseline condition, because construction activities are already underway for them. Maintenance facilities that are under construction for the Anacostia and H/Benning segments are also considered part of the baseline condition. Capital costs for these initial streetcar segments and facilities in the baseline condition are not included in the cost estimates. However, the costs associated with expanding the maintenance and storage facility for the Anacostia Initial Line Segment to accommodate the Phase 1 system is included in the capital cost estimates.

Streetcar Capital Costs

Based on recent experience constructing modern streetcar systems in other cities, it is estimated that capital costs for streetcar systems are typically about \$40 million per mile for double track facilities in 2009 dollars (not including maintenance and storage facilities), although some systems can well exceed those estimates. Capital costs include the physical elements required to operate the proposed transit system, including:

- Streetcar vehicles;
- Utility relocation and street reconstruction;
- Tracks, overhead catenary and power systems;

- Limited bridge reconstruction;
- Stations, including amenities;
- Off-vehicle fare payment;
- Signal priority systems;
- Minor environmental mitigation;
- Contractor soft costs;
- Planning and design; and
- Planning level contingency.

In addition to these elements, the streetcar system will require the construction of supporting maintenance and storage facilities. The cost of supporting maintenance facilities can vary widely between \$4 to \$40 million per site based on the size, functions and the costs of land acquisition. The costs for these facilities are in addition to the \$40 million per mile costs for streetcar track facilities. Two types of maintenance and storage facilities have been identified for the system. As described in the previous section, a Type 1 facility is a smaller end-of-line storage yard, while the Type 2 service facility is a larger, centrally-located yard with a streetcar maintenance garage. Estimated capital costs are approximately \$13 million for each full size Type 1 base facility and \$0.37 million for each vehicle storage space, in 2009 dollars. Type 2 base facility is estimated to be approximately \$29.4 million, with \$0.37 million for each vehicle storage space, in 2009 dollars. These estimates include land acquisition costs, and the District could save substantial capital costs by utilizing District-owned property for storage and maintenance facilities.

Table 4-4 lists the capital costs over the entire 20-year life of the implementation plan. These costs are shown in inflated dollars reflecting a three-percent per year inflation factor. The schedule of the plan assumes that Phase 1 is from 2011 to 2015, Phase 2 is from 2016 to 2018, and Phase 3 is from 2019 to 2020.

Streetcar Operating and Maintenance Costs

Unlike capital costs, operating and maintenance costs recur every year once a transit service begins operating. As a result, for services that begin early in the implementation phasing, the cumulative operating and maintenance costs over the life of the plan can be substantial, even if the annual costs are relatively low. Table 4-5 presents the estimated unit operating and maintenance costs per revenue hour for costs associated with vehicle operators, maintenance staff, and administrative support staff. The table also shows the estimated costs per vehicle revenue mile relative to the costs for track and station

maintenance and electricity to power the system. The unit operating costs are based on information from the National Transit Database for operating streetcar systems. These are conservative estimates of costs and may be higher than actual costs of the system depending on the costs for the entity designated to operate the system.

Operating and maintenance cost estimates are based on the annual revenue hours of service and the annual revenue miles of service provided by each streetcar line in the plan. The operating and maintenance costs by each phase of the project are shown in Table 4-6. The unit costs are calculated using labor costs and operating costs and are described in the notes of the table. It is assumed that the streetcar lines will operate with 10-minute headways during peak and off-peak time periods. The estimates assume that the service operates:

- Monday through Thursday from 6 am to 12 am
- Friday from 6 am to 2 am
- Saturday from 8 am to 2 am
- Sunday from 8 am to 10 pm

The streetcar corridors will be interlined so that some segments of the system will accommodate multiple lines. Therefore the operating miles will be greater than the length of the proposed system assumed in the capital improvements table. The table also does not show the impacts of changes that may be made to the underlying local bus service network.

Total Annual Costs

Table 4-7 summarizes the total estimated annual capital expenditures and operating and maintenance expenditures to construct and operate the streetcar system between 2011 and 2020.

Potential Funding Sources

There are a broad range of funding and financing approaches available for surface transit alternatives in the District of Columbia. These possible funding sources include:

- Federal Grants
 - Section 5309 Federal Transit Capital Program
 - Section 5307 Urbanized Area Formula Program
- Joint Development and Benefit Capture
 - Leasing/selling development rights
 - Leasing/selling land or facilities
 - Special benefit assessment districts
 - Cost sharing
 - Concession leases
 - Density bonuses
 - Tax increment financing
 - Connector fees
- Taxes and User Charges
 - Motor fuel tax
 - Extension of State retail sales tax to motor fuels

Table 4-4: Estimated Streetcar System Capital Costs (in millions)

Item	Capital Cost (2009 \$)	Capital Cost (YOE \$)	Notes
Phase 1*			
Vehicles, Track & Infrastructure	\$498.0		Assumes 12.45 miles of track & infrastructure at \$40M per mile in 2009\$
Expand Type 1 Maintenance and Storage Facility (Anacostia Initial Line Segment Facility)	\$5.6		Expand storage capacity from 5 vehicles to 20 vehicles
New Type 2 Maintenance and Storage Facility	\$37.5		New Type 2 Facility with 22 spaces
Subtotal Phase 1	\$541.1	\$617.2	
Phase 2			
Vehicles, Track & Infrastructure	\$464.0		Assumes 11.6 miles of track & infrastructure at \$40M per mile in 2009\$
Expand Type 2 Maintenance and Storage Facility	\$10.4		Expand storage capacity from 22 vehicles to 50 vehicles
New Type 2 Maintenance and Storage Facility	\$33.5		New Type 2 Facility with 11 spaces
Subtotal Phase 2	\$507.9	\$640.1	
Phase 3			
Vehicles, Track & Infrastructure	\$420.0		Assumes 10.5 miles of track & infrastructure at \$40M per mile in 2009\$
Expand Type 2 Maintenance and Storage Facility	\$14.4		Expand storage capacity from 11 vehicles to 50 vehicles
New Type 1 Maintenance and Storage Facility	\$15.1		New Type 1 Facility with 8 spaces
Subtotal Phase 3	\$450.1	\$614.0	
Total	\$1,499.1	\$1,871.3	

*Assumes two Type 1 Maintenance and Storage Facilities are already constructed prior to Phase 1 as part of the Anacostia Initial Line Segment to accommodate 5 vehicles and H/Benning Streetcar Project to accommodate 9 vehicles.

Table 4-5: Streetcar Operating and Maintenance Unit Costs*

Item	Unit	Unit Cost (2009 \$)
Vehicle Operators, Vehicle Maintenance Staff, and Administrative Support		
Wages	Vehicle Revenue Hour	55.03
Fringe Benefits	Vehicle Revenue Hour	73.02
Services and Parts	Vehicle Revenue Hour	88.76
Total	Vehicle Revenue Hour	216.81
Track and Facility Maintenance Staff and System Power		
Wages	Vehicle Revenue Mile	1.67
Fringe Benefits	Vehicle Revenue Mile	1.24
Services and Parts	Vehicle Revenue Mile	1.18
Total	Vehicle Revenue Mile	5.23

*Unit costs for existing streetcar and light rail transit systems vary widely. These estimates are from the middle of typical cost ranges.

Table 4-6: Operating and Maintenance Costs by Phase (in millions – 2009 dollars)

Streetcar Line (by phase)	Operating Length* (miles)	Revenue Miles	Unit Cost per Revenue Mile	Revenue Hours	Unit Cost per Revenue Hour	Cumulative Annual Operating Costs
Phase 1						
Georgetown to H/Benning	6.2	270,816	\$5.23	27,082	\$216.81	\$7.3
Georgia Avenue to Buzzard Point	3.8	165,984	\$5.23	16,598	\$216.81	\$4.5
Congress Heights to Downtown	6.7	292,656	\$5.23	29,266	\$216.81	\$7.9
Anacostia Streetcar to Nationals Park	3.4	148,512	\$5.23	14,851	\$216.81	\$4.0
PHASE 1 TOTAL	20.1	877,968		87,797		\$23.6
Phase 2						
Georgetown to H/Benning	7.0	305,760	\$5.23	30,576	\$216.81	\$8.2
Georgia Avenue to Buzzard Point	7.1	310,128	\$5.23	31,013	\$216.81	\$8.3
Congress Heights to Downtown	7.8	340,704	\$5.23	34,070	\$216.81	\$9.2
Woodley Park to Congress Heights	8.8	384,384	\$5.23	38,438	\$216.81	\$10.3
Anacostia Streetcar to Nationals Park	3.4	148,512	\$5.23	14,851	\$216.81	\$4.0
Rhode Island Avenue to Downtown	6.0	262,080	\$5.23	26,208	\$216.81	\$7.1
PHASE 2 TOTAL	31.3	1,367,184		136,718		\$47.1
Phase 3						
Georgetown to H/Benning	7.0	305,760	\$5.23	30,576	\$216.81	\$8.2
Georgia Avenue to Buzzard Point	9.4	410,592	\$5.23	41,059	\$216.81	\$11.0
Congress Heights to Downtown	7.8	340,704	\$5.23	34,070	\$216.81	\$9.2
Congress Heights to Nationals Park	4.5	196,560	\$5.23	19,656	\$216.81	\$5.3
Rhode Island Avenue to Downtown	6.0	262,080	\$5.23	26,208	\$216.81	\$7.1
Woodley Park to Congress Heights	8.8	384,384	\$5.23	38,438	\$216.81	\$10.3
Anacostia Streetcar to Minnesota Avenue	5.0	218,400	\$5.23	21,840	\$216.81	\$5.9
Woodley Park to Brookland "A Line" (follows Irving St between Warder St and 4 th St NE)	4.4	192,192	\$5.23	19,219	\$216.81	\$5.2
Woodley Park to Brookland "B Line" (follows Michigan Ave between Warder St and 4 th St NE)	4.5	196,560	\$5.23	19,656	\$216.81	\$5.3
PHASE 3 TOTAL	57.4	2,507,232		250,723		\$67.5

*Differs from track miles due to interlining

Table 4-7: Summary of Capital and Operating and Maintenance Costs by Year (in millions of Year of Expenditure \$)

	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	TOTAL
Capital Costs	\$79.6	\$120.2	\$135.1	\$139.1	\$143.3	\$202.9	\$215.4	\$221.8	\$295.7	\$318.4	\$1,871.4
Operating and Maintenance Costs	-	\$4.4	\$11.3	\$18.5	\$32.2	\$40.6	\$50.7	\$61.3	\$76.6	\$94.1	\$389.7
Total	\$79.6	\$124.6	\$146.3	\$157.7	\$175.5	\$243.5	\$266.0	\$283.1	\$372.3	\$412.5	\$2,261.1

- Motor vehicle license fee
- Motor vehicle emissions fee
- Alcohol and cigarette tax
- Corporate income tax
- Business, Professional, and Occupational License (BPOL) tax
- Local option sales tax
- Personal income tax
- Utility tax
- Recordation tax
- Lodging tax
- Local restaurant/food tax
- Local property tax
- Parking receipt tax
- Vehicle Leasing
- Debt Financing
 - General obligation funds
 - Revenue bonds

With the exception of Benefit Assessment Districts and Tax Increment Financing, most of these approaches provide only a modest amount of revenue relative to projected operating and maintenance costs and capital costs for any given project. There are also innovative funding and financing approaches, which include the following:

- Deferred Local Match – Federal grant funding from the New Starts or Small Starts program is provided up-front, allowing deferral of locally funded project capital costs. The total local funding match for the project through completion remains the fixed amount negotiated with FTA.
- Revolving Loan Fund – Current federal surface transportation legislation permits states and the District of Columbia to apply a portion of their Federal Aid Highway Funding to capitalize a state infrastructure bank (SIB). The SIB then provides loans to transportation projects in the jurisdiction. Funds repaid to the SIB are lent to new transportation projects. This approach requires the District of Columbia to activate a SIB by capitalizing it with federal highway funds.
- Joint Development – Transportation agencies work directly with private developers in planning and executing a specific project involving the development on, above, or adjacent to land owned by a transit agency for a negotiated payment by the developer. Developer payments may include an annual ground or air-rights lease payment for a specific period of time as well as the construction cost of transit-related facilities, such as portals to transit facilities, parking facilities, and station facility improvements.
- Use of Proceeds from Sale of Assets in Joint Development Projects – In lieu of lease payments for joint development parcels, a transportation agency may execute the outright sale of property for use by private developers. Often such arrangements involve the sale of construction staging areas or other surplus land no longer required following completion of a project.
- Transfer of Federal Ownership – Lands owned by the Federal government may be transferred to the District of Columbia for use in transportation projects. Lands may be transferred free of charge or in exchange for land owned by the District government elsewhere in the city.
- Incidental Non-Transit Use – Real estate acquired for projects that apply FTA funds must meet FTA requirements, including bona fide transportation use by the project for which the property is acquired. However, incidental non-transit use of property acquired for transportation projects is allowed. Such uses include joint development at station sites or the on-premise location of retail such as a coffee shop or newsstand. Incidental non-transit use may generate a small but stable revenue stream for a given project.
- Benefit Assessment District – The public sector owner/sponsor of a transit infrastructure project may partner with private sector property owners to create a sustainable funding source for transit improvements. Benefit Assessment Districts (BAD) assess properties within a defined distance of the fixed guideway and/or stations a higher property tax rate or special assessment commensurate with and in exchange for the benefits received from the property's enhanced accessibility due to the transit improvement.
- Tax Increment Financing – A portion of the property tax revenue collected on the incremental growth in the taxable value of real property within a defined boundary of the transportation project is dedicated to fund the transportation improvements. Thus, a portion of the increased taxable value of properties proximate to and benefiting from transportation improvements is applied to fund the cost of these improvements. Unlike BAD, the tax rate within the affected district remains unchanged. The portion of the tax revenue collected by the District of Columbia government within the defined district dedicated to the transportation project will not be available for other public uses.

Based on discussions regarding potential funding sources with DC government and the project participants, four major sources were identified for consideration. These included the following:

- Federal Grant Funding – The District of Columbia in coordination with WMATA may choose to pursue Section 5309 New Starts capital funding for portions of the streetcar system. However, these grants are discretionary and projects must compete for a limited pool of available funds.
- Local Government Contribution – DC general funds can also be used to fund a portion of the capital and operating and maintenance costs of the system.
- Value Capture – Interviews conducted with the development community as part of the system plan development revealed considerable enthusiasm for the corridor transit investments. This level of interest provided the basis for focusing funding and financing options on value-capture mechanisms, such as a BAD.
- User Fees – The two types of user fees considered were transit user fees and parking fees. Transit user fees are the fares that transit users will pay for the service. Parking fees could take many forms, but the most efficient are those associated with a parking tax. A parking fee generates substantial and stable revenue, is borne primarily by non-residents, and, arguably, may also be regarded as a Travel Demand Management (TDM) tool that mitigates congestion and contributes to improvement in air quality. Additionally, a parking tax has a logical nexus whereby revenue is raised from a transportation user charge and dedicated to transportation investment.

Streetcar System Funding

This section documents the recommended funding and financing options available to the District of Columbia to support the streetcar system plan. The funding strategy assumes that existing transit providers, primarily WMATA, will continue to receive funding for capital and operating costs of existing transit services in the District from existing revenue streams. This funding plan, therefore, addresses the incremental capital and operating costs and the marginal revenues required to provide premium streetcar services to the District. The funding plan does not include the capital costs for the Anacostia Initial Line Segment and the H /Benning Streetcar project, because these projects are already under construction.

Annualized Costs and Funding

From 2011 to 2030, capital expenses for the streetcar plan will total \$1,871 million in year-of-expenditure dollars, while operating expenses will total \$1,501 million. Funding for the system will come from the following sources:

- Federal Section 5309 Funding – assumes funding levels equal to 25% of the capital cost of the system;
- Local Government Contribution – assumes funding levels equal to 25% of the capital cost of the system, and 100% of the operating cost of the system, less fare revenues collected on the streetcar system;
- Value Capture Funding – based on property tax assessments within ¼ mile of streetcar lines, beginning in 2012 or five years prior to service in each segment (whichever is later), such as BAD dedicated taxes generated by an increase in property tax rates to fund transit capital improvements; and
- User Fee Funding – includes the revenue from the streetcar fare box and parking fees. Two types of annual per-parking space fees were evaluated, including rates for commercial and residential parking at medium- and high-density properties within ¼-mile of streetcar corridors as described below. This revenue source is assumed to begin in 2012 or five years prior to service in each segment (whichever is later).

The financial plan assumes a pay-as-you-go approach, funding the project on a cash basis, without debt financing. General Fund revenues are assumed to defray the non-federal share of project costs in FY11, with BAD and parking fee revenues covering a greater share of the project cost in subsequent years. Funds are structured to ensure that General Fund contributions cover no more than 25% of project capital costs by the conclusion of Phase 3 construction in 2020. BAD and parking fee revenue streams are assumed to sunset upon completion of Phase 3 of the program in 2020.

Table 4-8 shows the existing commercial and residential tax rates per \$100 of assessed value and can be used as a point of comparison to the additional amounts necessary to support the streetcar system construction.

Table 4-9 presents the rates required for BAD and parking fees to cover the projected capital expenses not covered by the Federal and Local Government funding. These rates assume that 25% of the capital costs for the system are funded by Federal capital grants and another 25% of the capital costs are covered by local government contributions. Note that many assumptions in the finance model were based on pre-2008 real estate market conditions reflecting the time when the original analysis was completed. Also note that the rates of taxation required under the BAD scenarios are reported in cents, not dollars. For example, the additional commercial property tax required is 2.0 cents, or \$0.02, which amounts to two additional pennies per \$100 assessed value. The District of Columbia has statutory limits on the level of debt that it can issue. The use of debt financing would depend on the legal and financial capacity of the District to issue debt.

Tables 4-10 and 4-11 depict the project costs and the source of funds for pay-as-you-go financing over the 20-year period. Figures 4-15 and 4-16 show the uses and

sources of funds graphically. As shown in the tables, project funds are sufficient from these identified sources to cover capital costs and operating and maintenance (O&M) costs.

Table 4-8: Existing Property Tax Rates

Class	Tax Rate per \$100 of Assessed Value	Description
1	\$0.85	Residential real property, including multifamily
2	\$1.65	Commercial and industrial real property, including hotels and motels, for the first \$3 million of assessed value
2	\$1.85	Commercial and industrial real property, including hotels and motels, for assessed value more than \$3 million
3	\$10.00	Vacant real property

Table 4-9: Dedicated Funding: Benefit Assessment District Plus Parking Fees

Source	Rates Required for Pay-as-you-go Financing
Benefit Assessment Districts 2 Years Prior to Service (Additional property tax)	2 cents per \$100 Commercial and 1 cent per \$100 Residential From 2012 through 2020
Parking Fee (Annual Fee)	\$220/space Commercial and \$110/space Residential High- and Medium-Density From 2012 through 2020

* Assumes federal grants cover 25% of capital costs and local government contribution covers another 25% of capital costs

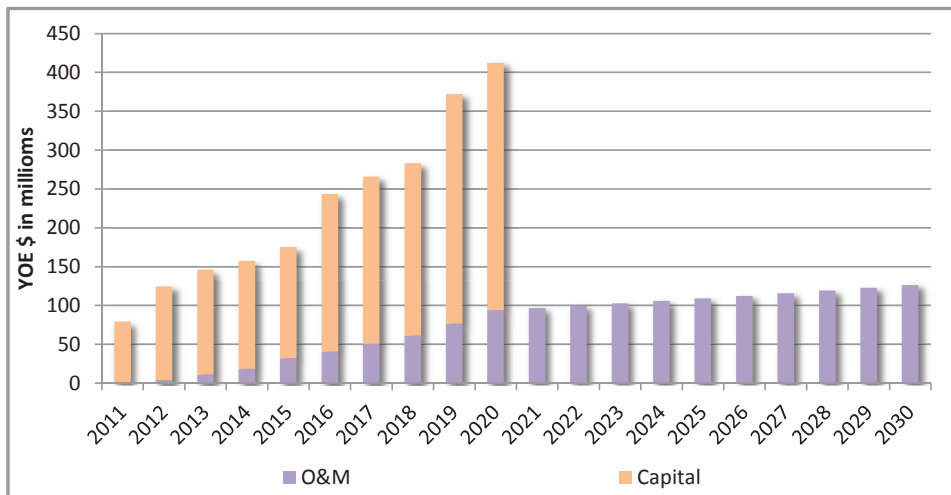
**Table 4-10: Pay-as-you-go Financing:
Annual Project Costs and Sources of Funds by Year 2011- 2020 (YOE \$ in millions)**

	Phase 1					Phase 2			Phase 3		TOTAL
	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	
Capital Uses of Funds:											
Capital Costs	\$79.6	\$120.2	\$135.1	\$139.1	\$143.3	\$202.9	\$215.4	\$221.8	\$295.7	\$318.4	\$1,871.4
Total Capital Uses (2011-2020)	\$79.6	\$120.2	\$135.1	\$139.1	\$143.3	\$202.9	\$215.4	\$221.8	\$295.7	\$318.4	\$1,871.4
Capital Sources of Funds:											
Local Funds (25% of Capital)	\$59.7	\$25.6	\$29.3	\$30.4	\$31.4	\$46.3	\$49.4	\$51.0	\$69.5	\$75.2	\$467.8
Federal Funds (25% of Capital)	\$19.9	\$30.0	\$33.8	\$34.8	\$35.8	\$50.7	\$53.8	\$55.5	\$73.9	\$79.6	\$467.8
Private Funds (Remainder of Capital)											
Value Capture (BAD)	\$-	\$24.6	\$25.5	\$37.5	\$38.8	\$40.2	\$41.6	\$43.1	\$44.6	\$46.2	\$341.9
Parking Fees	\$-	\$47.4	\$47.9	\$70.8	\$71.4	\$71.9	\$72.4	\$72.9	\$73.4	\$73.9	\$601.8
Total Capital Sources (2011-2020)	\$79.6	\$127.6	\$136.5	\$173.4	\$177.4	\$209.1	\$217.2	\$222.4	\$261.4	\$274.9	\$1,879.4
Net Capital Cash Flow	\$-	\$7.4	\$1.4	\$34.3	\$34.1	\$6.1	\$1.8	\$0.6	(\$34.3)	(\$43.5)	\$8.0
Operating Uses of Funds:											
Operating and Maintenance Costs	\$-	\$4.4	\$11.3	\$18.5	\$32.2	\$40.6	\$50.7	\$61.3	\$76.6	\$94.1	\$389.7
Total Operating Uses (2011-2020)	\$-	\$4.4	\$11.3	\$18.5	\$32.2	\$40.6	\$50.7	\$61.3	\$76.6	\$94.1	\$389.7
Operating Sources of Funds:											
Farebox Revenues	\$-	\$1.3	\$3.4	\$5.6	\$9.7	\$12.2	\$15.2	\$18.4	\$23.0	\$28.2	\$116.9
General Fund (100% of O&M less Fare Rev.)	\$-	\$3.1	\$7.9	\$13.0	\$22.6	\$28.4	\$35.5	\$42.9	\$53.6	\$65.9	\$272.8
Total Operating Sources (2011-2020)	\$-	\$4.4	\$11.3	\$18.5	\$32.2	\$40.6	\$50.7	\$61.3	\$76.6	\$94.1	\$389.7
Net Operating Cash Flow	\$-	\$-	\$-	\$-	\$-	\$-	\$-	\$-	\$-	\$-	\$-
Annual Surplus (Shortfall)	\$-	\$7.4	\$1.4	\$34.3	\$34.1	\$6.1	\$1.8	\$0.6	(\$34.3)	(\$43.5)	\$8.0

**Table 4-11: Pay-as-you-go Financing:
Annual Project Costs and Sources of Funds by Year 2021- 2030 (YOE \$ in millions)**

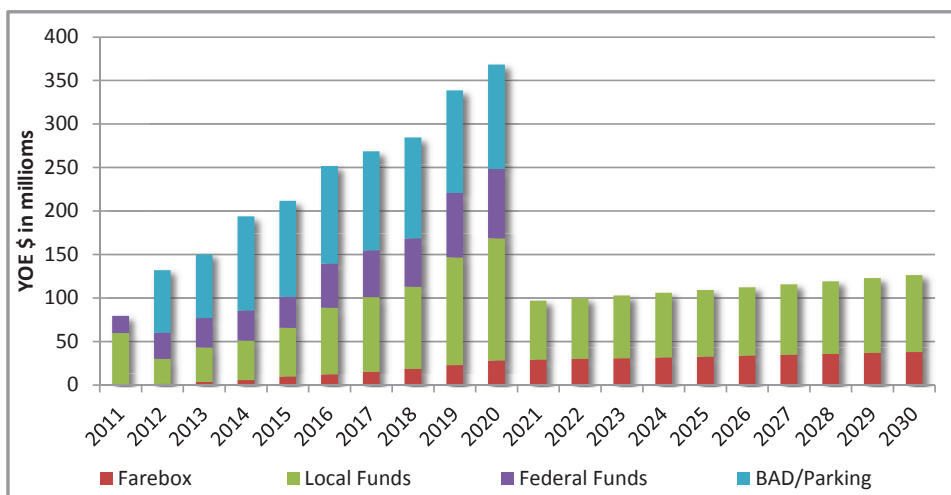
	Phase 3										TOTAL
	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	
Operating Uses of Funds											
Operating and Maintenance Costs	\$97.0	\$99.9	\$102.9	\$105.9	\$109.1	\$112.4	\$115.8	\$119.2	\$122.8	\$126.5	\$1,111.4
Total Operating Uses (2021-2030)	\$97.0	\$99.9	\$102.9	\$105.9	\$109.1	\$112.4	\$115.8	\$119.2	\$122.8	\$126.5	\$1,111.4
Operating Sources of Funds											
Farebox Revenues	\$29.1	\$30.0	\$30.9	\$31.8	\$32.7	\$33.7	\$34.7	\$35.8	\$36.8	\$38.0	\$333.4
General Fund (100% of O&M less Fare Rev.)	\$67.9	\$69.9	\$72.0	\$74.2	\$76.4	\$78.7	\$81.0	\$83.5	\$86.0	\$88.6	\$778.0
Total Operating Sources (2021-2030)	\$97.0	\$99.9	\$102.9	\$105.9	\$109.1	\$112.4	\$115.8	\$119.2	\$122.8	\$126.5	\$1,111.4
Net Operating Cash Flow	\$-	\$-	\$-	\$-	\$-	\$-	\$-	\$-	\$-	\$-	\$-
Annual Surplus (Shortfall)	\$-	\$-	\$-	\$-	\$-	\$-	\$-	\$-	\$-	\$-	\$-

Figure 4-15: Pay-as-you-go Financing: Uses of Funds (YOE \$ in millions)



Source: AECOM Technical Services, Inc.

Figure 4-16: Pay-as-you-go Financing: Sources of Funds (YOE \$ in millions)



Source: AECOM Technical Services, Inc.