

Metrobus Service Evaluation Study

Pershing Drive-Arlington Boulevard Line, Routes 4A, 4B, 4E, 4H

Final Report

June 2013

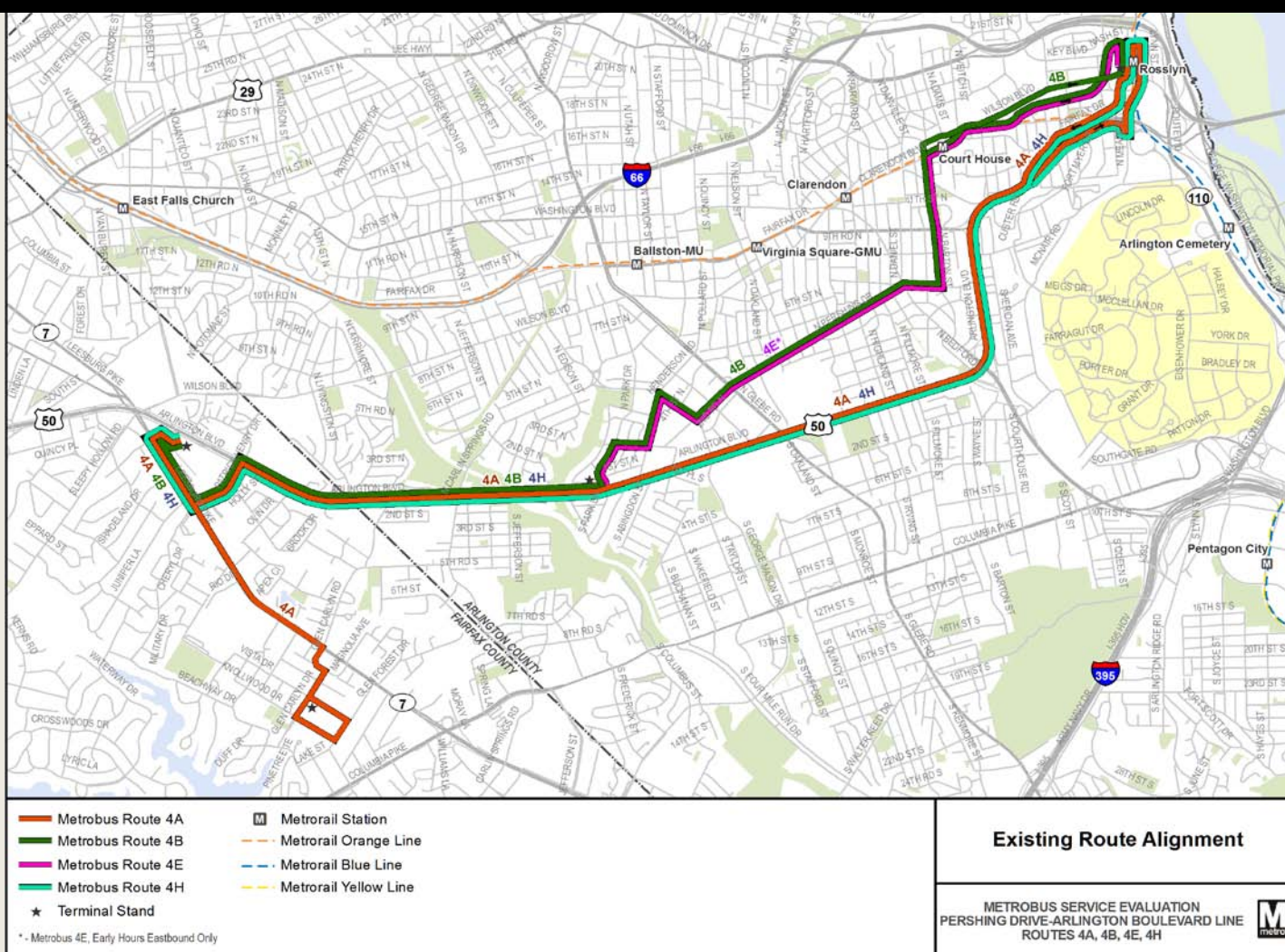


Study Purpose

The primary study purpose is to identify the strategic needs for programs and facilities for the Pershing Drive-Arlington Boulevard Line. The study includes a review of capacity, productivity, reliability, and quality of service indicators as well as recommended changes to improve service delivery.



Existing 4 Line Route Map



Project Scope of Work

- *Transit Service Assessment*
 - Develop a detailed assessment and “snapshot” of the Pershing Drive-Arlington Boulevard Line
 - Overall service characteristics, ridership and productivity, boardings and alightings, passenger loads, bus stop spacing, on-time performance, driver and planner interviews
 - Results contained in Technical Memorandum #1
- *Traffic Operations Assessment*
 - Identify the full range of traffic issues on the Pershing Drive-Arlington Boulevard Line
 - Traffic signals and other traffic control devices
 - Lane widths and right-of-way
 - Turns and adequate turning radius
 - Results contained in Technical Memorandum #2



Project Scope of Work

- *Public Involvement*
 - Rider survey to gauge issues and needs
 - Focus group and two public meetings
 - Issues identification
 - Feedback on preliminary recommendations
 - Public input was a key factor in the study process and recommendations
 - Results contained in Technical Memorandum #3



Project Scope of Work

- *Recommendations*

- Two steps:

- Preliminary recommendations – relied on inputs from all previous steps
 - Final – incorporate project team comments

Recommendations are contained in Technical Memorandum #4

- Improvements covered by recommendations:

- Service hours
 - Frequency
 - Reliability
 - Additional service (limited-stop route)
 - Route simplicity
 - Bus stop distances and amenities
 - Traffic operations



4 Line Summary

- *Line Description*
 - Routes 4A-B-E-H operate in Arlington County and Fairfax County in northern Virginia.
 - The routes generally run east-west along Route 50 (Arlington Boulevard) and Pershing Drive between Seven Corners Transit Center and Rosslyn Metro Station.
 - Routes 4A and 4H share the pattern along Route 50 while Routes 4B and 4E share the pattern along Pershing Drive.
 - Route 4A extends south of Seven Corners down Leesburg Pike to serve the Culmore neighborhood.



4 Line Summary

- *Service Characteristics*
 - Days and hours of service (start of first trip to start of last trip)

	Route 4A	Route 4B	Route 4E Eastbound only	Route 4H
Weekdays	5:34 AM – 7:05 PM	6:10 AM – 12:25 AM	5:30 AM – 7:57 AM	6:24 AM – 11:56 AM
Saturday	No service	6:19 AM – 11:05 PM	No service	6:55 AM – 6:25 PM
Sunday	No service	6:19 AM – 9:45 PM	No service	No service



4 Line Summary

- Ridership*

Route	Day of Week	Average Daily Ridership	WMATA Daily Ridership Standard (boardings per day)	Meets Standard?
4A	Weekday	809	>385	Yes
4B	Weekday	675	>385	Yes
	Saturday	434	>296	Yes
	Sunday	438	>220	Yes
4E	Weekday	188	>385	No
4H	Weekday	329	>385	No
	Saturday	277	>296	No

- Boardings per Revenue Mile*

Route	Day of Week	Boardings per Revenue Mile	WMATA Boardings per Revenue Mile Standard	Meets Standard?
4A	Weekday	2.33	>1.02	Yes
4B	Weekday	2.14	>1.02	Yes
	Saturday	2.04	>1.02	Yes
	Sunday	2.12	>0.94	Yes
4E	Weekday	7.97	>1.02	Yes
4H	Weekday	2.48	>1.02	Yes
	Saturday	1.90	>1.02	Yes

Source: WMATA Productivity Report, November 2012



4 Line Summary

- Cost Recovery*

Route	Day of Week	Cost Recovery	WMATA Minimum Cost Recovery Standard from Fares	Meets Standard?
4A	Weekday	21.12%	>14.96%	Yes
4B	Weekday	18.02%	>14.96%	Yes
	Saturday	21.99%	>14.49%	Yes
	Sunday	24.89%	>13.40%	Yes
4E	Weekday	84.21%	>14.96%	Yes
4H	Weekday	22.12%	>14.96%	Yes
	Saturday	20.93%	>14.49%	Yes

- Subsidy per Passenger*

Route	Day of Week	Subsidy per Passenger	WMATA Subsidy per Passenger Standard	Meets Standard?
4A	Weekday	\$4.49	<\$5.90	Yes
4B	Weekday	\$5.08	<\$5.90	Yes
	Saturday	\$4.08	<\$5.96	Yes
	Sunday	\$3.53	<\$6.44	Yes
4E	Weekday	\$0.26	<\$5.90	Yes
4H	Weekday	\$4.16	<\$5.90	Yes
	Saturday	\$4.42	<\$5.96	Yes

Source: WMATA Productivity Report, November 2012



Study Findings

- Service Hours
 - 4 Line weekend schedules do not meet WMATA criteria.
- Frequency
 - Combined frequencies on the 4 Line meet WMATA criteria only about half the time.
- Reliability
 - Run time added in June 2012 has helped 4 Line on-time performance, but delays still occur.
- Amenities
 - Multiple bus stops on the 4 Line are too close together and lack basic amenities as outlined in WMATA's Bus Stop Guidelines.



Service Recommendations

Recommendation #1 – Adjust the 4 Line’s weekend schedules to meet service guidelines.

Saturday

1. Change the departure time of the first 4B westbound trip from 7:25 am to 6:36 am, which will allow the bus to arrive at Seven Corners at 7:00 am.
2. Change the departure time of the first 4H (4A) westbound trip from 6:55 am to 6:42 am, which will allow the bus to arrive at Seven Corners at 7:00 am.
3. Change the departure time of the first 4H (4A) eastbound trip from 6:56 am to 6:41 am, which will allow the bus to arrive at Rosslyn at 7:00 am.
4. Change the departure time of the last 4H (4A) westbound trip from 6:25 pm to 10:00 pm.
5. Change the departure time of the last 4H (4A) eastbound trip from 5:25 pm to 10:00 pm.

Sunday

1. Change the departure time of the last 4B westbound trip from 9:45 pm to 10:00 pm.
2. Change the departure time of the last 4B eastbound trip from 9:05 pm to 10:00 pm.

Estimated annual cost of adjusting weekend schedule: \$59,793



Service Recommendations

Recommendation #2 – Add trips to reduce headways on the 4 Line to meet WMATA service guidelines.

Adding trips will have an extra benefit of improving on-time performance since additional trips will result in lower passenger-per-trip numbers and resulting in decreased bus stop dwell time. Adding the number of trips in the table below will allow 4 Line frequencies to improve from current headways to every 15 minutes in peak periods and 30 minutes all other times.

Variation	Direction	Weekday				Saturday	Sunday
		AM Peak	Midday	PM Peak	Late Evening		
4A	EB	6	6	6	0	0	0
4A	WB	6	6	3	0	0	0
4B	EB	6	6	9	5	15	13
4B	WB	6	6	7	4	15	13
4H	WB	0	0	0	3	11	0
Total		24	24	25	12	51	26

Estimated annual cost of reducing headways: \$1,935,622

Additional estimated annual cost of having weekend service meet frequency guidelines, if Recommendation #1 is implemented: \$166,780



Service Recommendations

Recommendation #3 – Re-evaluate need for further run time additions

WMATA added run time on weekdays in June 2012, and for Sundays in December 2012. The additional running time has greatly improved on-time performance on this line. However, on-time performance is still a concern along the 4 Line. The most notable time periods were:

	Route 4A	Route 4B	Route 4H
Weekdays	PM peak: Late 17% of the time	AM peak: Late 19% of the time PM peak: Late 15% of the time	-
Saturday	-	AM period: Late 14% of the time Mid-day: Late 24% of the time PM period: Late 20% of the time	AM period: Late 12% of the time Mid-day: Late 21% of the time PM period: Late 20% of the time
Sunday	-	Mid-day: Late 11% of the time PM period: Late 23% of the time	-

After construction is complete along Arlington Boulevard, and after enough time has elapsed to acquire new on-time performance data, WMATA should re-examine trip times to determine whether more minutes are needed to bring the 4 Line up to the authority's standards for reliability.



Service Recommendations

Recommendation #4 – Place a supervisor at Seven Corners Transit Center

- The reasons for placing the supervisor at Seven Corners are that a supervisor is already located at Rosslyn Metro, and that a supervisor at Seven Corners would be able to monitor bus activity for Routes 28A and 28X and the 1 Line routes.
- Some of the weakest times of day for on-time performance on the 4 Line are on weekends. This is in contrast to most other Metrobus studies in which supervisors were recommended to monitor their line during the AM and PM peaks on weekdays – usually the time periods that lack schedule adherence the most. WMATA will need to determine whether a dedicated supervisor is warranted 7 days a week for the 4 Line.
- Supervisors would be asked to derive actions from a “playbook” of contingencies, to be determined, and report on a monthly basis the on-time performance of the line and actions taken to improve it.

Estimated annual cost of one full-time equivalent dedicated supervisor: \$80,000



Service Recommendations

Recommendation #5 – Change the western terminal of Route 4A from Culmore to Seven Corners Transit Center

- Terminating Route 4A at Seven Corners instead of Culmore would make the route more reliable because the route will be shorter and buses would not get stuck in traffic along Leesburg Pike.
- 4A riders west of Seven Corners would be negatively affected by this recommendation. Riders along Leesburg Pike would be forced to transfer from a 28A or 28X bus to 4 Line bus at Seven Corners. And residents of the Culmore neighborhood would no longer have a one seat ride to Rosslyn.
- Based on ridecheck information: 213 weekday riders, 76 Saturday riders, and 47 Sunday riders (or 10.65 percent of all 4 Line riders) board and alight between Culmore and Seven Corners. Of these, 157 weekday riders, 56 Saturday riders, and 34 Sunday riders (7.85 percent) are using the 4 Line only between Culmore and Seven Corners. Approximately 88 riders (2.8 percent of all 4 Line riders) would be required to transfer.
- To mitigate these impacts, Metro is working on new service plans to link the Culmore area to the surrounding destinations.
- Additional outreach would be done to obtain the input from 4A riders south of Seven Corners before this recommendation is implemented.

Estimated annual savings of terminating Route 4A at Seven Corners: \$189,640



Service Recommendations

Recommendation #6 – Implement New Limited-Stop Service

- New limited-stop service between Fairfax Inova or Dunn Loring Metro Station and Metro Center
- Five eastbound AM peak trips and five westbound PM peak trips, with service operating every 30 minutes
- The route would travel primarily along Arlington Boulevard and bypass Rosslyn
- It would offer a faster one-seat ride for passengers traveling to Downtown DC who otherwise would have to alight at Rosslyn and transfer to a Blue or Orange Line train
- It would provide more capacity on the 4A portion of the 4 Line, and narrow combined headways further for many current 4A riders
- It would add capacity and a one-seat ride for 1A-B-Z riders going to Downtown DC
- Limited-stop services improve travel time for passengers by 15 percent
- It would create a new link to downtown Washington, DC for riders from the Dunn Loring and Merrifield areas near Gallows Road

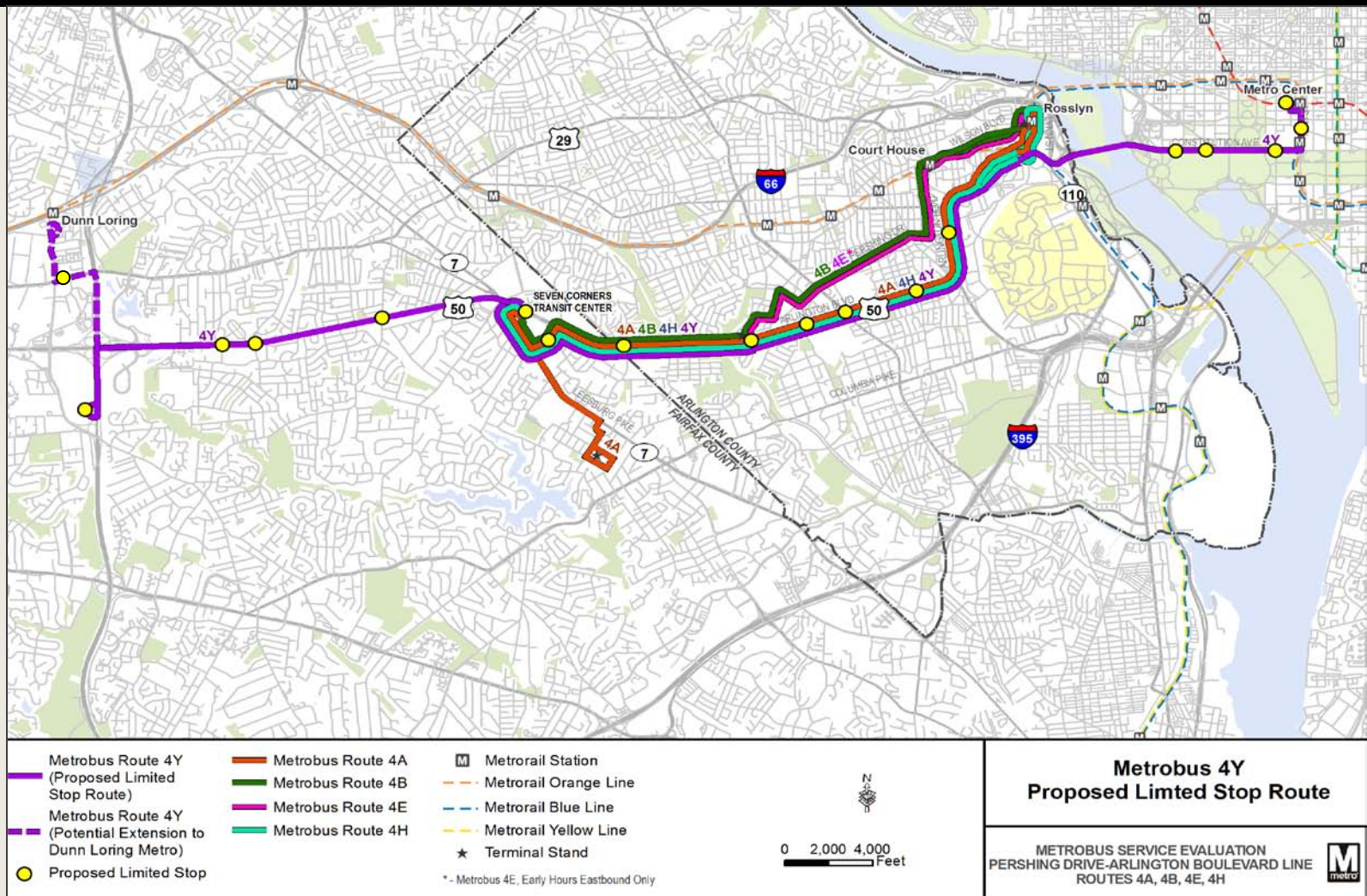
Estimated annual operating cost of Limited-Stop (Metro Extra Route 4Y) Service:

- a) Western terminal at Inova Fairfax Hospital: \$319,006
- b) Western terminal at Dunn Loring Metro: \$341,783
- c) Service to both Dunn Loring and Inova Fairfax Hospital: \$385,059

Estimated capital cost of Limited-Stop Service: \$2,419,976 (based on purchase of four vehicles)



Service Recommendations



Service Recommendations

Recommendation #7 – Improvements to Route Simplicity

- Rename all 4E trips 4B or 4B/
- Rename all 4H trips 4A or 4A/
- This will simplify the 4 Line and make the service easier for riders to understand.
- No service cuts are proposed as part of this recommendation.
- During implementation, WMATA should consider an outreach campaign to ensure that riders are aware of the change in service.
- Bus operator training should be conducted at Four Mile Division to ensure that drivers are aware of the changes and remember to adjust the destination signs accurately.
- Assumes that a 4A/ service operating only between Rosslyn and Seven Corners would be necessary if Recommendation #5 does not go forward.



Bus Stop Recommendations

Recommendation #8: Begin the Bus Stop Consolidation Process

Bus stops that are too close together can result in significant passenger inconvenience based on slower travel speeds and a “stop and start” rider experience as buses are slowing down to stop even before they have fully accelerated from the stop just served. Because of the negative impacts of stops too close together, WMATA has developed guidelines for distance between bus stops. These guidelines state that the ideal number of bus stops per mile should be four to five, meaning stops spaced approximately 0.2 to 0.25 miles apart.

WMATA has a detailed process to determine which of the potential candidate bus stops identified in the tables should be consolidated with other stops. In general, there are three steps that Metro follows when making bus stop consolidation and elimination. The first step is an evaluation of boarding and alighting activity at each candidate stop, the extent of improvements and passenger amenities at each candidate stop and the proximity of each candidate stop to unique facilities such as a medical facility, hospital, school or elderly housing. This recommendation is the first step in the process. The second step is a further detailed review of the proposed bus stops for consolidation/elimination using additional criteria and input in consultation with jurisdictional partners and other stakeholders. The third and final step is an extensive public outreach effort to present the recommended changes riders and get further input from users of the stop.

Westbound Candidate Stops	Boardings/ Alightings	Eastbound Candidate Stops	Boardings/ Alightings
Wilson + Pierce	12/4	W. Glen Carlyn + Argyle	2/0
Wilson + Quinn	2/1	Leesburg Pike + Glen Carlyn (N)	1/0
Wilson + Rhodes	4/1	Arlington Blvd + Highland	4/0
Wilson + Troy	0/1	Arlington Blvd + Garfield	1/0
Pershing + Washington Blvd	5/6	Arlington Blvd S/R + Queen	3/5
Pershing + Edgewood	3/2	Arlington Blvd S/R + Nash	1/3
Pershing + Oakland	1/0	Park + 1st	9/3
Pershing + Quebec	2/14	Park + 2nd	3/0
Pershing + Thomas	8/8	2nd + Henderson	10/1
George Mason + Pershing	6/14	Pershing + Piedmont	13/4
George Mason + Henderson	0/2	Pershing + Oakland	5/1
Henderson + George Mason	4/2	Pershing + Edgewood	2/2
Henderson + N 3rd	5/5	Pershing + Washington Blvd	5/5
N 2nd + Wakefield	0/6	Pershing + Danville	2/3
Arlington Blvd + Garfield	1/6	Barton + Clarendon Blvd	2/14
Arlington Blvd + Hudson	1/3	Clarendon Blvd + Courthouse	4/2
Arlington Blvd + Jackson	0/4	Clarendon Blvd + Pierce	1/11
Arlington Blvd + Columbia Gardens Cemetery	0/1		
Patrick Henry + Brook	5/13		
Leesburg Pike + Glen Carlyn	0/6		
Vista + Lake	0/3		



Bus Stop Recommendations

Recommendation #9: Install or Repair Bus Stop Amenities

Stops Requiring a Trash Receptacle

Stop	Direction	Boardings
Patrick Henry & Arlington Blvd	Eastbound	78
Glen Carlyn & Vista (Culmore)	EB / WB	64
Patrick Henry & Brook	Eastbound	39
Glen Carlyn & Belleview	Eastbound	29
Arlington Blvd & Park Drive	Eastbound	25

Stops Requiring an Information Case

Westbound Stop	Boardings	Eastbound Stop	Boardings
Immediate Installation			
Pershing & Glebe	56	Patrick Henry & Arlington Blvd	78
		Arlington Blvd & Manchester	50
Future/Long-Term Installation			
Wilson Blvd & Veitch	35	Pershing & George Mason	34
Barton & 10th	20	Arlington Blvd & Fillmore	28
		Pershing & Thomas	26
		Barton & Pershing	21

Stops Requiring a Bus Stop Flag

Westbound Stop	Boardings	Eastbound Stop	Boardings
Arlington + Courthouse	2	Arlington Blvd + Columbia Gdns	2
Arlington + Fairfax	6		
Arlington + Pershing	6		

Stops Requiring a Shelter/Bench

Stop	Direction	Boardings
Patrick Henry & Arlington Blvd	Eastbound	78

WMATA's Bus Stop Guidelines are based on a hierarchy in which every bus stop should have a basic set of passenger amenities. The next two slides make recommendations for the repair or addition of amenities based on data collection performed for the *Transit Assessment*.

All stops with more than 25 boardings per day that do not currently have a **trash receptacle** were identified as candidates for installation. Currently 41 of 149 bus stops (27.5 percent) have a trash receptacle.

All stops with more than 50 boardings per day that do not currently have an **information case** were identified as candidates for immediate installation. All stops with more than 20 boardings per day that do not currently have an information case were identified as candidates for future (long-term) installation. 105 out of 149 stops (70 percent) were missing bus information cases along the 4 Line, and nine of those stops qualified for installation of an information case.

All bus stops should have **flags** that identify the location of the bus stop. Currently four out of 149 stops (3 percent) were missing bus stop flags.

WMATA's Guidelines indicate that any stop with more than 50 boardings is a candidate for a **shelter and bench**. Currently 47 of 149 bus stops (31.5 percent) have both a shelter and a bench, while an additional 4 bus stops (2.7 percent) only have seating. The total number of bus stops that have seating is 51 bus stops (34.2 percent). Only one 4 Line stop is currently a candidate for a shelter and bench.



Bus Stop Recommendations

Recommendation #9: Install or Repair Bus Stop Amenities

Stops Requiring a Sidewalk (S) or Landing Pad (P)

Westbound Stop	S	P	Board -ings	Eastbound Stop	S	P	Board -ings
Wilson Blvd + Court House		X	25	Pershing + George Mason		X	34
Patrick Henry + Arlington Blvd		X	23	Pershing + Thomas		X	26
6166 Leesburg Pike		X	22	Barton + 9th		X	14
Pershing + Thomas		X	8	Pershing + Irving		X	7
Henderson + 3rd		X	5	Arlington Blvd + Irving		X	7
Patrick Henry + Leesburg Pike		X	3	Pershing + Oakland		X	5
Arlington Blvd + Hudson		X	1	Arlington Blvd + Edison		X	4
Lake + Knollwood		X	1	Arlington Blvd + Highland		X	4
2nd St + Wakefield		X	0	Park + 2nd		X	3
Arlington Blvd + Jackson		X	0	Barton + Clarendon Blvd		X	2
Vista + Glen Carlyn		X	0	Arlington Blvd + Garfield		X	1
6017 Vista		X	0	Arlington Blvd + Meade		X	0
Vista + Lake		X	0	Arlington Blvd + Manchester	X	X	50
6026 Knollwood		X	0	Arlington Blvd + Park	X	X	25
2nd + Park	X		0	Arlington Blvd + Glebe	X	X	13
Arlington Blvd + Fairfax	X	X	6	Arlington Blvd + Henderson	X	X	12
Arlington Blvd + Montague	X	X	5	Park + 1st	X	X	9
Arlington Blvd + Courthouse	X	X	2	Leesburg Pike + Glenmore	X	X	6
Arlington Blvd + Pershing	X	X	1	Arlington Blvd + Columbus	X	X	3
Arlington Blvd + Garfield	X	X	1	Arlington Blvd + Washington	X	X	2
Arlington Blvd + Rdwy to Glebe	X	X	1	Arlington Blvd + Meeting	X	X	2
Leesburg + Munson Hills Apts	X	X	1	Wilson + Nash	X	X	54
Leesburg Pike + Glenmore	X	X	1	Clarendon + Oak	X	X	0
Arlington Blvd + Henderson	X	X	0	Castle Pl + Castle Rd	X	X	2
Arlington Blvd + Park	X	X	13	Arlington Blvd + Castle	X	X	12
Leesburg Pike + Rio	X	X	0	Arlington + Olin	X	X	6

WMATA requires that all bus stops have a sidewalk and landing pad for passengers to stand on while waiting for the bus. A field visit verified that 52 out of 149 stops on the 4 Line (35 percent) were missing a sidewalk, a bus stop pad, or both.

Estimated Cost of Installation/Repair of Bus Stop Amenities:

Unit	Quantity	Cost per Unit	Total Cost
Bus Shelter and Bench	1	\$10,000	\$10,000
Bus Stop Flag	4	\$100	\$400
Information Case (Immediate Installation)	3	\$200	\$600
Information Case (Future Installation)	6	\$200	\$1,200
Bus Stop Landing Pad	51	\$1,500	\$76,500
Trash Receptacle	5	\$1,000	\$5,000
Total			\$93,700



Traffic Improvement Recommendations

Recommendation #10: Work with Local Agencies to Make Traffic-related Improvements

1. The magazine stands at Wilson & Courthouse should be moved to a location that does not block the buses.
2. Consider moving the bus stop at Barton & Pershing onto Pershing Drive just west of Barton Street.
3. Contact Arlington County Police to ask for enhanced parking enforcement at Pershing & Nelson.

