

Metrobus Service Evaluation Study

U and V Lines, Routes U2, U4, U5, U6, U8, V7, V8, and V9



Final Report

March 2015

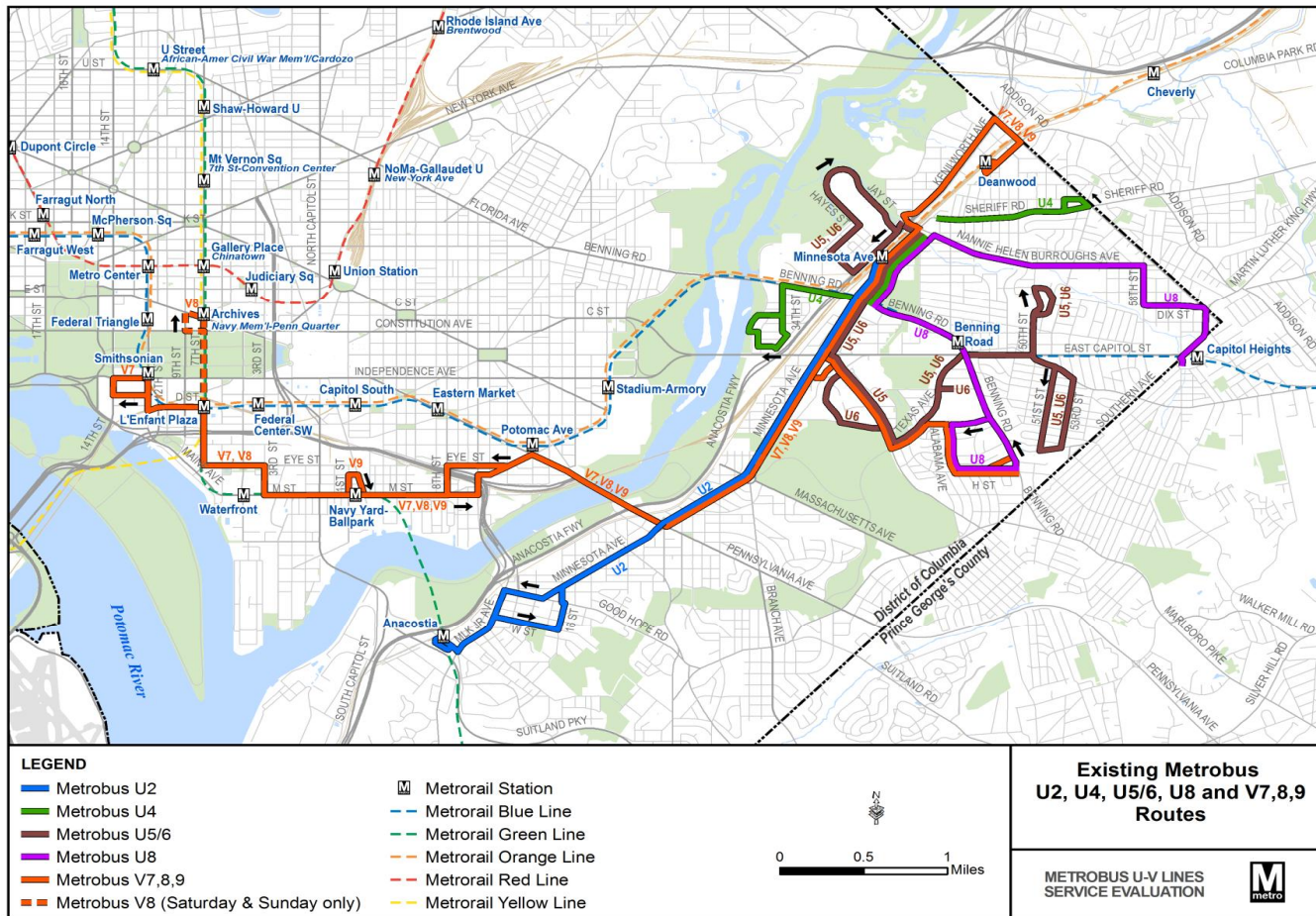


Metrobus Service Evaluation Study: U-V Lines U2, **U4, U5,6, U8, V7, V8, V9**

Study Purpose

The primary study purpose is to review capacity, productivity, and quality of service indicators, identify the need for customer facilities, and prepare recommendations to improve service delivery for the U and V Lines (Metrobus Routes U2, U4, U5, U6, U8, V7, V8, and V9).

Existing U and V Lines Route Map



Project Scope of Work

- *Transit Service Assessment*
 - Develop a detailed assessment and “snapshot” of the U and V Lines
 - 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 U and V Lines
 - 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, two public meetings, and bus stop “pop up” 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:

- Frequency
 - Reliability
 - Route structure
 - Bus stop distances and amenities
 - Traffic operations

U and V Lines Summary

- *Line Description*

- The U and V Lines are comprised of Metrobus Routes U2, U4, U5, U6, U8, V7, V8, and V9 operating primarily in the District of Columbia.
- The lines primarily connect the Minnesota Avenue Metrorail Station with nearby neighborhoods.
- The V Lines providing a connection into Downtown Washington.
- Route V9 is a weekday peak period, peak direction service
- Route V8 is a weekend only variation.

U and V Lines Summary

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

Route/Arrival or Departure Terminal	Direction	Weekday AM Arrival Time	Weekday PM Departure Time	Saturday AM Arrival Time	Saturday PM Departure Time	Sunday AM Arrival Time	Sunday PM Departure Time
U2 – Minnesota Avenue Metro-Anacostia	SB	6:18 AM	9:52 PM	6:35 AM	9:45 PM	n/a	n/a
U2 – Anacostia- Minnesota Avenue Metro	NB	6:21 AM	9:53 PM	7:05 AM	9:45 PM	n/a	n/a
U4 – Sheriff Road-River Terrace	Loop	5:26 AM	1:30 AM	6:25 AM	11:01 PM	6:55 AM	11:03 PM
U5 – Mayfair-Marshall Heights	Loop	6:02 AM	2:10 AM	6:33 AM	2:10 AM	7:32 AM	12:39 AM
U6 – Mayfair-Marshall Heights	Loop	5:40 AM	9:31 PM	7:01 AM	9:30 PM	7:03 AM	9:27 PM
U8 – Capitol Heights-Benning Heights	Loop	5:11 AM	3:20 AM	5:39 AM	3:20 AM	5:40 AM	1:00 AM
V7 – Deanwood Metro-C & 14 th Streets	WB	5:19 AM	12:07 AM	n/a	n/a	n/a	n/a
V8 – Deanwood Metro–Archives	WB	n/a	n/a	5:16 AM	11:55 PM	5:26 AM	11:59 PM
V9 – Benning Heights-Navy Yard-Ballpark Metro	WB	5:27 AM	n/a	n/a	n/a	n/a	n/a
V7 – C & 14 th Streets-Deanwood Metro	EB	6:14 AM	12:50 AM	n/a	n/a	n/a	n/a
V8 – Archives-Deanwood Metro	EB	n/a	n/a	5:56 AM	12:45 PM	6:10 AM	12:44 AM
V9 –Navy Yard-Ballpark Metro-Benning Heights	EB	n/a	3:04 PM	n/a	n/a	n/a	n/a



U and V Lines Summary

- *Service Characteristics – Service Frequency*
 - How often buses run

Line Segment	Route Number	Time Period	Weekday South and WB	Weekday North and EB	Saturday South and WB	Saturday North and EB	Sunday South and WB	Sunday North and EB
Sheriff Road – Nannie Helen Burroughs Avenue	U4	AM Peak	12	12	30	30	30	30
		Midday	30	30	30	30	30	30
		PM Peak	12	12	30	30	30	30
Mayfair – Nannie Helen Burroughs Avenue	U5, 6	AM Peak	20	20	20	20	30	30
		Midday	20	20	20	17	20	20
		PM Peak	15	15	15	17	20	20
Deanwood Metrorail Station – Nannie Helen Burroughs Avenue	V7, V8	AM Peak	20	20	30	30	30	30
		Midday	30	30	30	30	30	30
		PM Peak	20	20	30	30	30	30
Nannie Helen Burroughs Avenue – Minnesota Avenue Metrorail Station	U4, U5, U6, U8, V7, V8	AM Peak	3.5	3.2	6.7	6.7	7.5	10
		Midday	5	5	5.7	5.7	6	7.5
		PM Peak	3	3.3	5.7	5.7	6	7.5

U and V Lines Summary

- *Service Characteristics – Service Frequency (continued)*
 - How often buses run

Line Segment	Route Number	Time Period	Weekday South and WB	Weekday North and EB	Saturday South and WB	Saturday North and EB	Sunday South and WB	Sunday North and EB
Minnesota Avenue Metrorail Station – Benning Road	U2, U4, U5, U6, U8, V7, V8	AM Peak	3.2	2.9	5.5	5.5	7.5	10
		Midday	4.3	4.3	4.8	4.8	6	7.5
		PM Peak	2.7	3.0	4.8	4.8	6	7.5
Minnesota Avenue between Benning Road and East Capitol Street	U2, U5, U6, V7, V8	AM Peak	7.5	6	10	10	15	15
		Midday	8.6	8.6	8.6	8.6	12	12
		PM Peak	5.5	6.7	8.6	8.6	12	12
Benning Road – Benning Heights	U8	AM Peak	10	10	20	20	30	30
		Midday	12	12	17	17	20	20
		PM Peak	10	10	17	17	20	20
East Capitol Street – Pennsylvania Avenue	U2, V7, V8, V9	AM Peak	7.5	8.6	15	15	30	30
		Midday	16	15	15	15	30	30
		PM Peak	8.6	7.5	15	15	30	30

U and V Lines Summary

- *Service Characteristics – Service Frequency (continued)*
 - How often buses run

Line Segment	Route Number	Time Period	Weekday South and WB	Weekday North and EB	Saturday South and WB	Saturday North and EB	Sunday South and WB	Sunday North and EB
East Capitol Street – Pennsylvania Avenue	U2, V7, V8, V9	AM Peak	7.5	8.6	15	15	30	30
		Midday	16	15	15	15	30	30
		PM Peak	8.6	7.5	15	15	30	30
Pennsylvania Avenue – Anacostia Metrorail Station	U2	AM Peak	30	30	30	30	n/s	n/s
		Midday	30	30	30	30	n/s	n/s
		PM Peak	30	30	30	30	n/s	n/s
Pennsylvania Avenue – Navy Yard Metrorail Station	V7, V8, V9	AM Peak	10	12	30	30	30	30
		Midday	30	30	30	30	30	30
		PM Peak	12	10	30	30	30	30
Navy Yard Metrorail Station – C & 14 th Street SW (Archives Metrorail Station on weekends)	V7, V8	AM Peak	20	30	30	30	30	30
		Midday	30	30	30	30	30	30
		PM Peak	20	20	30	30	30	30

U and V Lines Summary

- Ridership and Boardings per Revenue Mile*

Route	Day of Week	Average Daily Ridership					Daily Ridership Standard (boardings/day)	Meets Standard	Boardings per Revenue Mile	Boardings per Revenue Mile Standard	Meets Standard
		2010	2011	2012	2013	2014					
U2	Weekday	2,058	2,192	2,389	2,198	2,226	>385	Yes	7.70	1.28	Yes
	Saturday			1,176	1,393	1,390	>296	Yes	6.60	1.18	Yes
U4	Weekday	1,072	1,141	1,171	956	1,157	>385	Yes	3.61	1.28	Yes
	Saturday	475	565	507	544	545	>296	Yes	3.50	1.18	Yes
	Sunday	314	391	411	424	447	>220	Yes	2.50	1.14	Yes
U5, 6	Weekday	2,960	1,673	3,325	3,273	3,126	>385	Yes	4.37	1.28	Yes
	Saturday	1,562	1,673	1,705	1,799	1,727	>296	Yes	3.20	1.18	Yes
	Sunday	1,156	1,264	1,406	1,396	1,398	>220	Yes	3.00	1.14	Yes
U8	Weekday	4,508	4,920	5,150	4,981	4,977	>385	Yes	5.62	1.28	Yes
	Saturday	2,589	2,918	2,838	2,919	2,886	>296	Yes	4.50	1.18	Yes
	Sunday	1,722	1,838	1,971	2,049	2,065	>220	Yes	4.00	1.14	Yes
V7, 8, 9	Weekday	3,418	3,726	4,134	4,002	4,086	>385	Yes	4.41	1.28	Yes
	Saturday	1,950	2,187	2,040	1,796	1,668	>296	Yes	2.70	1.18	Yes
	Sunday	1,267	1,450	1,617	1,536	1,577	>220	Yes	2.50	1.14	Yes

Source: WMATA Farebox Data



Metrobus Service Evaluation Study: U-V Lines U2, U4, U5,6, U8, V7, V8, V9

U and V Lines Summary

- Cost Recovery and Subsidy per Passenger*

Route	Day of Week	Cost Recovery	Minimum Cost Recovery Standard (from Fares)	Meets Standard	Subsidy per Passenger	Subsidy per Passenger Standard	Meets Standard
U2	Weekday	47.70%	16.25%	Yes	\$1.12	< \$4.40	Yes
	Saturday	42.41%	15.38%	Yes	\$1.39	< \$4.64	Yes
U4	Weekday	29.90%	16.25%	Yes	\$2.39	< \$4.40	Yes
	Saturday	32.43%	15.38%	Yes	\$2.26	< \$4.64	Yes
	Sunday	23.94%	15.59%	Yes	\$3.24	< \$4.67	Yes
U5, 6	Weekday	32.27%	16.25%	Yes	\$2.14	< \$4.40	Yes
	Saturday	28.78%	15.38%	Yes	\$2.52	< \$4.64	Yes
	Sunday	26.53%	15.59%	Yes	\$2.83	< \$4.67	Yes
U8	Weekday	44.75%	16.25%	Yes	\$1.26	< \$4.40	Yes
	Saturday	36.07%	15.38%	Yes	\$1.83	< \$4.64	Yes
	Sunday	33.91%	15.59%	Yes	\$1.99	< \$4.67	Yes
V7, 8, 9	Weekday	28.42%	16.25%	Yes	\$2.57	< \$4.40	Yes
	Saturday	19.03%	15.38%	Yes	\$4.34	< \$4.64	Yes
	Sunday	21.36%	15.59%	Yes	\$3.75	< \$4.67	Yes

Source: WMATA Productivity Report, September 2013

Study Findings

- Service Hours
 - Minimum service span is not met on the following routes: U2 and U6 on weekdays and Saturday, and the U6 on Sunday.
- Frequency
 - A number of individual route segments do not meet the frequency guidelines during AM and PM peak periods during weekdays.
- Supply/Demand Issues
 - Crowding identified on Routes U2 and U5/6.
 - Oversupply of service in Mayfair and River Terrace neighborhoods.
- Reliability
 - Running time and reliability are issues on select trips on the U and V Lines.
- Amenities
 - Multiple bus stops on the U and V Lines are too close together and lack basic amenities.
- Traffic
 - Long signal waits at some intersections.
 - On-street parking problems.
 - Traffic congestion problems cause slow travel times for buses.
 - Inadequate turning radii creates problems for buses to navigate safely.



Short Term Recommendations

Recommendation #1 –Running Time Calibration

- 26 weekday trips, 39 Saturday trips, and 15 Sunday trips on the U and V Lines were identified as having actual run times at least five minutes greater than scheduled run times.
- Recommendation is twofold:
 - WMATA Schedules Department to verify the potential run time issues identified in this study
 - Address verified run time issues through schedule adjustments

Estimated annual cost of adjusting schedule: \$66,987



Short Term Recommendations

Recommendation #2 – Increase Route U2 Service Frequency

- Increase peak period and midday frequency to every 20 minutes from every 24 minutes (during the peak periods) and every 30 minutes (during middays) to alleviate crowding on this route.

Estimated annual additional cost: \$454,338

Recommendation #3 – Increase U2 Service Span to Meet WMATA Service Guidelines

- Add one additional roundtrip to the U2 on weekday and Saturday evenings in order to meet WMATA service guidelines for service span.

Estimated annual additional cost for increased span: \$33,527

Recommendation #4 – Provide New Sunday Service on Route U2

- Sunday service would operate every 30 minutes from approximately 7:00AM to 10:00PM in order to meet WMATA guidelines.

Estimated annual additional cost for Sunday service: \$247,648



Short Term Recommendations

Recommendation #5 – Increase Route U5/6 Morning Peak Service Frequency

- AM peak headways should be improved from service every 20 minutes to service every 15 minutes to meet WMATA service guideline for frequency and address overcrowding.

Estimated annual additional cost for increased frequency: \$128,747



Short Term Recommendations

Recommendation #6: Improve Bus Stop Amenities

- The study identified the number of stops that are in need of repair or additional bus stop amenities based on WMATA's Bus Stop Guidelines.

Unit	Unit Cost	Units	Capital Cost
Bus Stop Flag	\$100	5	\$500
Bus Stop Landing Pad	\$1,500	30	\$45,000
Stops Requiring Sidewalks	\$3,600	3	\$10,800
Information Case (Short Term)	\$207	29	\$6,003
Information Case (Long Term)	\$207	39	\$8,073
Trash Receptacle	\$1,000	45	\$45,000
Bus Stop Shelters	\$15,000	63	\$945,000
Bus Stop Bench	\$15,000	61	\$915,000
Total			\$1,975,376

Estimated capital cost for additional amenities: \$1,975,376

Short Term Recommendations

Recommendation #7: Short Term Restructuring

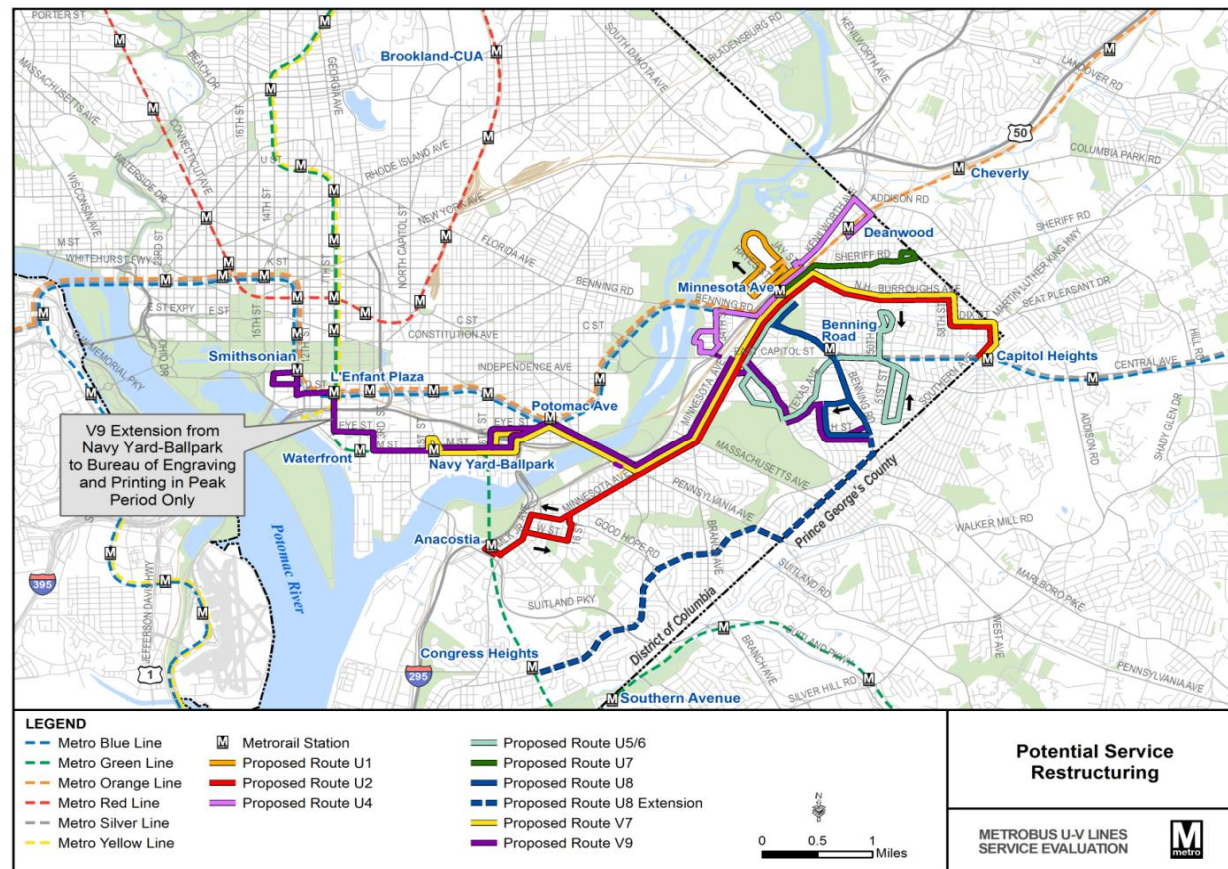
- An extension of Route U2 from Minnesota Avenue to Capitol Heights Metrorail Station via Nannie Helen Burroughs Avenue to replace Route U8 along this segment
- U2 service frequency increase and Sunday service
- Modified Route U4 to operate between River Terrace and Deanwood Metrorail Station to replace Route V7/8 service between Minnesota Avenue Metrorail Station and Deanwood Metrorail Station, service along Sheriff Road will be replaced with new Route U7
- Reduced service frequency on Route U4 to better match capacity to demand
- Routes U5/6 will no longer serve Mayfair, service to Mayfair replaced with new Route U1 service
- Route U8 will no longer operate between Minnesota Avenue Metrorail Station and Minnesota Avenue Metrorail Station, this segment will be replaced by extended Routes U2 and V7
- Select peak period U8 trips will be extended from Benning Heights to Congress Heights Metrorail Station

Estimated annual additional cost for restructured service: \$2,010 (approximately cost neutral), with an annual ridership increase of 21,712 boardings (0.42%)



Short Term Recommendations

Recommendation #7: Short Term Restructuring



Medium Term Recommendations

Recommendation #8: Begin the Bus Stop Consolidation Process

- Consolidating bus stops results in improved passenger convenience, shorter trip times and better service reliability.
- Recommendation – Begin bus stop consolidation process following WMATA procedures – potential consolidation candidates have been identified based on distance-between-stops guidelines.
- Estimated Capital Costs Associated with change cannot be calculated until specific stops to be consolidated are determined.
- A total of 42 bus stops are candidates for consolidation.

Medium Term Recommendations

Recommendation #9: Traffic Recommendations – Work with Local Agencies to Make Traffic-Related Improvements

1. Field visits and driver interviews identified locations where long signal cycles result in bus delays. The following locations are identified for additional intersection analysis to determine if more efficient signal cycles can improve bus run times.
 - Benning Road and Minnesota Avenue NE
 - Benning Road NE/SE and East Capitol Street
 - Minnesota Avenue and Pennsylvania Avenue SE
 - Kenilworth Avenue and Nannie Helen Burroughs Avenue NE
 2. Field visits and driver interviews identified locations where congestion has a significant impact on running times. The following locations are identified for additional analysis to determine if measures could be implemented to decrease congestion.
 - Along M Street SE/SW
 - Along Southern Avenue SE
 - Minnesota Avenue Metrorail Station
 - Deane Avenue and Kenilworth Terrace SE
- It is proposed to conduct additional intersection analysis, turning movement/pedestrian counts and optimize cycle length/splits based on traffic demand in order to potentially provide additional green for bus movements, if feasible.

Medium Term Recommendations

Recommendation #9: Traffic Recommendations – Work with Local Agencies to Make Traffic-Related Improvements

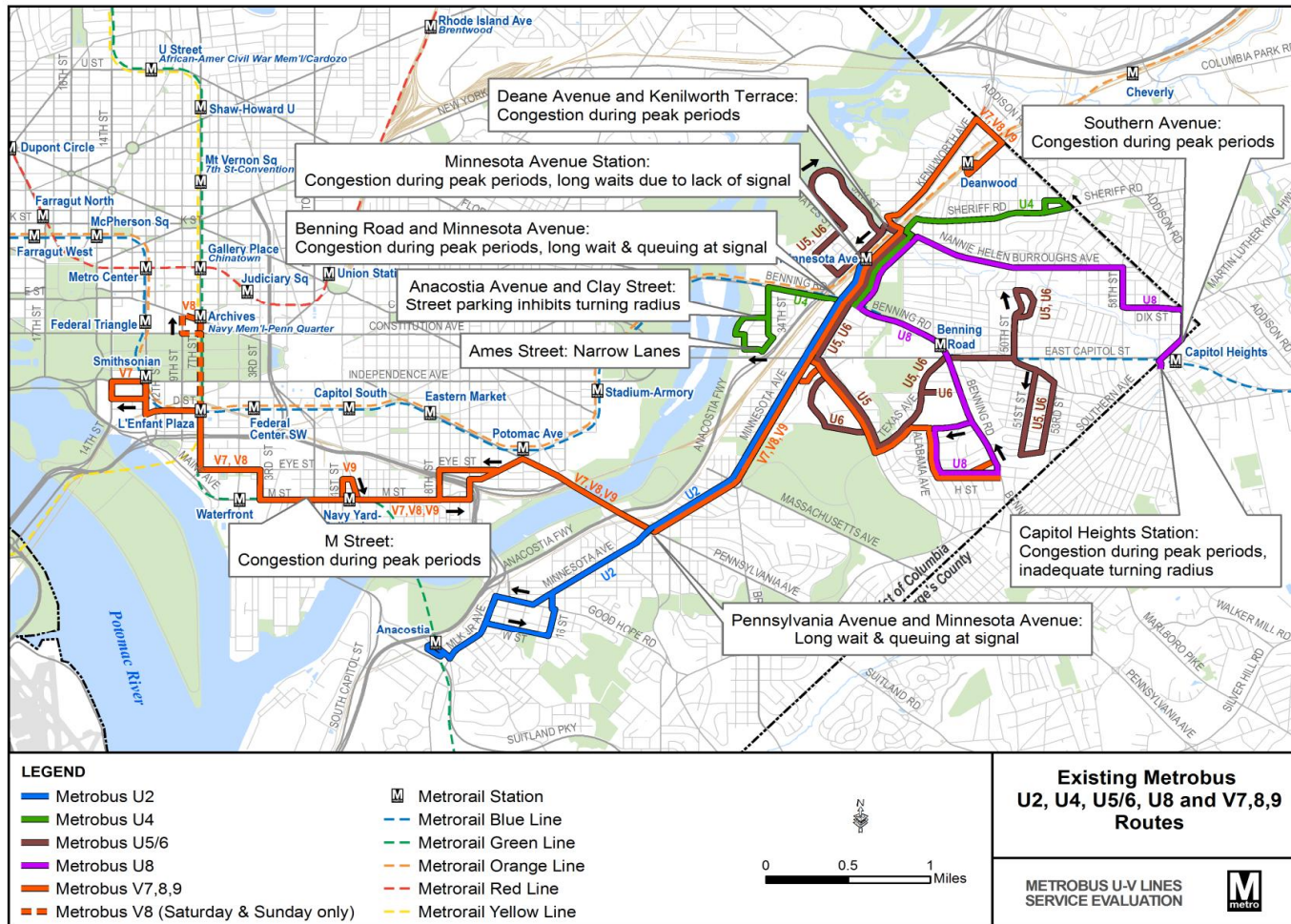
3. Address physical constraints that are problematic for bus operations

- Cars do not observe the stop line at E Street and Benning Road SE
- On-street parking causes a tight turning radius at M Street and 11th Street SE
- On-street parking causes a tight turning radius at I Street and 8th Street SE
- On-street parking causes a tight turning radius at Anacostia Avenue and Clay Street NE – Buses traveling EB had difficulty turning onto Clay Street from Anacostia Avenue due to an inadequate turning radius due to on-street parking.
- On-street parking causes narrow lanes on Ames Street NE – Buses traveling WB on Ames Street regularly must navigate through narrow lanes caused by on-street parking.
- Inadequate turning radius at Capitol Heights Metrorail station entrance/exit – Buses traveling in both directions during the PM peak period were observed having difficulty turning in and out of the Capitol Heights Station due to congestion, a lack of signal, and an inadequate turning radius. Stopped on-coming vehicles often block entrance, leading to a narrow turning radius and passage. In addition, buses must use both lanes on Southern Avenue to make their right turn when exiting.

- It is recommended that Metro work with local jurisdictions to determine methods to address these issues. Possible solutions include removing, relocating or consolidating bus stops, removing parking to ensure buses have adequate space to enter and exit bus stops, or ensuring that existing bus stop zones are enforced.



Medium Term Recommendations



Medium Term Recommendations

Recommendation #10: Medium Term Restructuring

The medium term presents a service budget increase of approximately \$500,000 over current costs. The following service increases are proposed for the U and V Line to utilize the additional \$500,000:

- **Route U2** – Extend evening trips that are proposed to operate between the Anacostia and Minnesota Avenue Metrorail stations to the Capitol Heights Metrorail station to allow the route to have consistent terminals during all time periods of operation.
- **Route U8** – Extend weekday peak period trips to Congress Heights. Service will operate between the Benning Heights loop and the Congress Heights Metrorail station every 30 minutes. This will help reduce crowding on Route W4 at a lower cost than directly adding service to Route W4.

The above proposals are in addition to the “Short Term Restructuring” proposal listed above as Recommendation #7

Estimated annual additional cost for restructured service: \$491,657, with an annual ridership increase of 47,774 boardings compared to current boardings (0.94%)



Long Term Recommendations

Recommendation #11: Long Term Restructuring

Long term presents a service budget increase of approximately \$1,000,000 over current costs. The following service increases are proposed for the U and V Lines to utilize this additional funding:

- **Route U8** would now operate every 30 minutes between the Benning Heights loop and the Congress Heights Metrorail station between 5:30AM and 7:00PM. Once again, this will help reduce crowding on Route W4 at a lower cost than directly adding service to Route W4.

The above proposals are in addition to the “Short Term Restructuring” proposal listed above as Recommendation #7

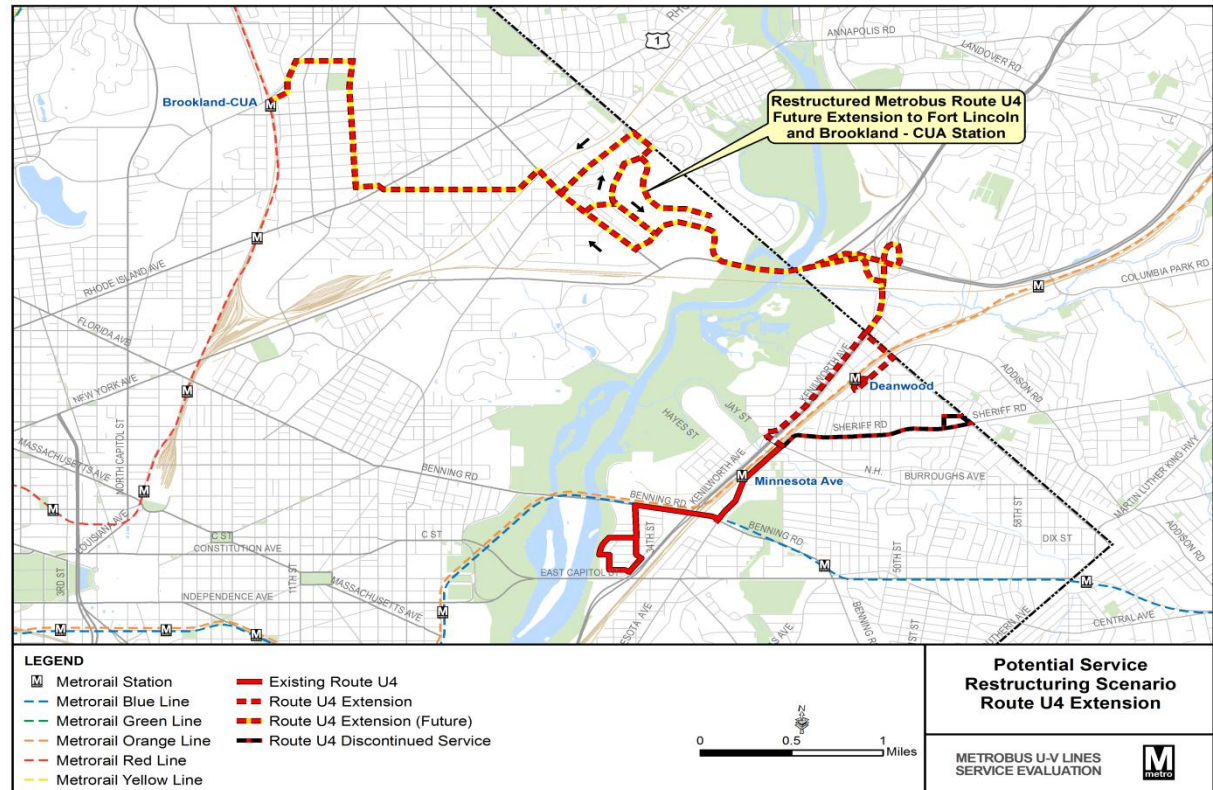
Estimated annual additional cost for restructured service: \$992,993, with an annual ridership increase of 86,729 boardings compared to current boardings (1.7%)



Long Term Recommendations

Recommendation #12: Extend Route U4 from Deanwood to Brookland via Ft. Lincoln

This alternative is to extend service from Deanwood to the Brookland Metrorail station via the Fort Lincoln area to serve the Costco. Service would operate via DC/MD Route 295, U.S. Route 50/New York Avenue, and Fort Lincoln Drive.



Estimated annual additional cost for restructured service: \$1,764,922



Metrobus Service Evaluation Study: U-V Lines U2, U4, U5,6, U8, V7, V8, V9

Capital Costs for Restructuring Proposals

Capital Expense Item	Unit Cost	Short Term		Medium Term	
		Units	Capital Cost	Units	Capital Cost
Additional Vehicles for Congress Heights Service	\$749,000	0	\$0	2	\$1,498,000
Bus Stop flags	\$100	120	\$12,000	79	\$7,900
Information cases (Short Term)	\$207	38	\$7,866	0	\$0
Information cases (Long Term)	\$207	22	\$4,554	0	\$0
Schedules	\$3.25	332	\$1,079	79	\$257
Feasibility studies for street improvements	\$200,000	0	\$0	4	\$800,000
Total			\$25,499		\$2,306,157