

Metrobus Service Evaluation Study

East Capitol Street-Cardozo Line (Route 96/97)

Technical Memorandum #4

Recommendations

January 2013



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Introduction

Outlined in this document are proposed service and physical improvement modifications for the Metrobus East Capitol Street-Cardozo Line, Routes 96 and 97.

The sources of these recommendations include the Transit Service Assessment, the Traffic Operations Assessment, ridership data, the bus stop analysis, and driver and supervisor interviews. The recommendations included in this document are the result of an iterative process that included feedback from the public and the study's Project Management Team in order to finalize a set of preliminary recommendations developed during the study process.

Each recommendation contained in this document includes detailed backup analysis that helps identify the cost and ridership impacts associated with the recommendation's implementation as well as other data and graphics to support reader understanding of the recommendation.

1. Begin Saturday Morning Eastbound Service Earlier

WMATA'S Service Guidelines criteria used for this evaluation showed that, for Routes 96 and 97 (an urban crosstown line), hours of service are adequate for weekdays and Sundays. However, the guidelines state that on Saturdays, the first trip of day should arrive at its final destination terminal no later than 7:00 am.

Saturday eastbound service for Route 96 begins at McLean Gardens at 6:17 am and is scheduled to arrive at Capitol Heights Metro at 7:09 am – nine minutes past the time prescribed in the WMATA Guidelines.

Recommendation 1: Adjust the Route 96 Saturday schedule so that the first eastbound trip begins at McLean Gardens at 6:07 am, which would allow the first bus to arrive at Capitol Heights Metro before 7:00 am.

The first westbound, return trip would also be moved up 10 minutes.

To make this recommendation possible, a trip starting U & 13th Streets NW could begin at McLean Gardens instead.

This recommendation would not affect average headways; they would remain at 30 minutes in keeping with WMATA Guidelines for Saturday service.

2. Evaluate Need to Add Run Time to Schedule

The recommendation to evaluate the potential addition of run time to the Route 96-97 schedules is based on two sources of information. First, WMATA data on actual run times was compared to the current scheduled run times. Although there are trips that meet the scheduled run time, and in many cases the trips fall between WMATA's standard of -2 and +7 minutes to be considered "on-time", the data revealed a pattern: that the actual trip run times for Route 96 and 97 buses trend longer than the scheduled run times in both directions at most times of day. (This data is provided in detail in the project *Transit Service Assessment*.) The second source of data identifying run time issues were Route 96-97 operators at Northern Division. Bus drivers indicated during an interview that they always seem to be "pushing the bus" to meet the schedule, that the schedule is outdated and does not reflect recent increases in traffic, and that a minimum of five extra minutes is needed to ensure greater reliability on full-length Route 96 trips.

Recommendation 2: To address potential run time issues, request that the WMATA Schedules Department complete a detailed analysis of 96-97 actual run times relative to scheduled run times to determine whether the inadequate run time issues identified using available data and driver inputs are, in fact, present. If the patterns identified in this study are confirmed, schedules should be adjusted to ensure that they fully reflect actual conditions.

3. Dedicated Supervision

Because one of the most pressing issues with Routes 96 and 97 is reliability, dedicated supervision is recommended for certain times of day in the corridor to help buses adhere to the schedule and maintain adequate headway separation.

In previous Metrobus corridor studies and evaluations, one or two supervisors were assigned to a particular line. These supervisors monitor the on-time performance of buses, communicate with operators about delays and detours, and work proactively to address potential problems along the line before they happen.

For Routes 96 and 97, a supervisor would be assigned to a location to be determined. The weakest periods in terms of on-time performance are the mid-day, PM peak and early evening periods on weekdays and on weekends, as well as the late evening periods on weekends. A supervisor could cover these shifts seven days per week between approximately 9:00 AM and 9:00 PM. Running time re-calibration (described in Recommendation 2 above) would also likely address some of the on-time performance problems on the 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.

Recommendation 3: Assign two full-time equivalent (FTE) supervisors to monitor Routes 96 and 97. The estimated annual cost of two FTEs is \$160,000.

4. Overlap Route 96 Patterns

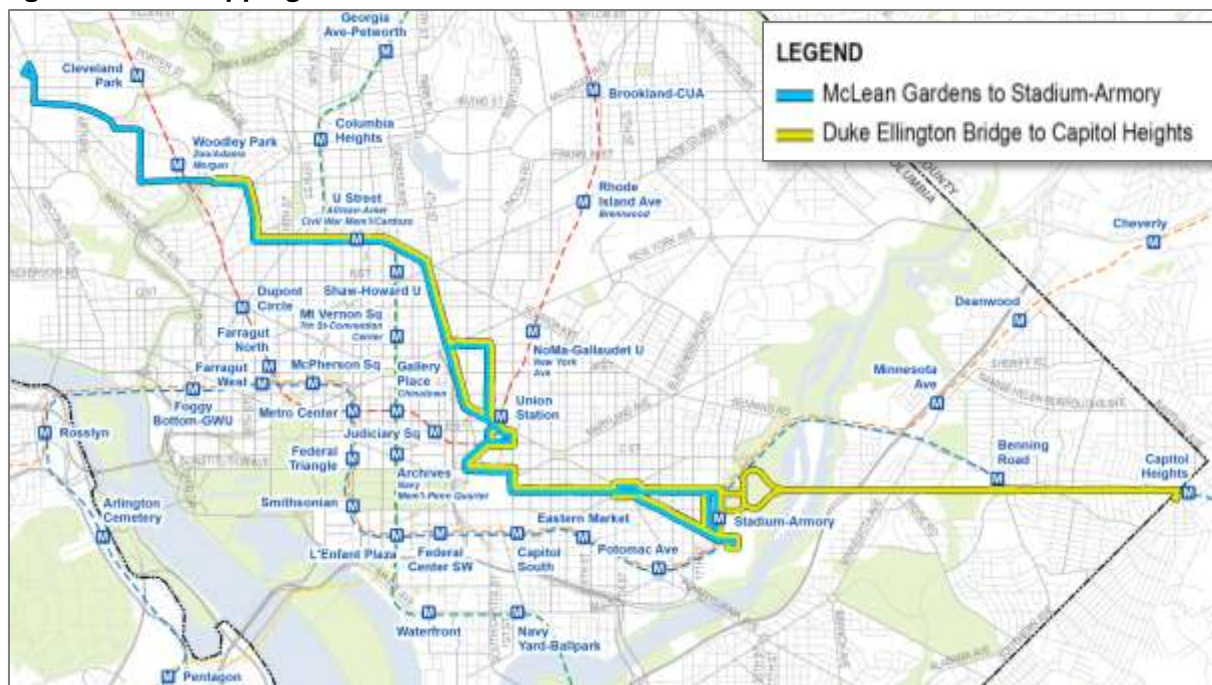
Input from the rider survey and the data regarding actual vs. scheduled run times suggest that reliability is a primary issue for riders of Route 96. Because Route 96 is a 14-mile long cross-town route that has on-time performance problems, splitting the route is a potential solution.

Data was assessed to determine the possible impacts to riders if Route 96 were split or overlapped. This data included the number of boardings and alightings and through riders by segment; segment boardings and alightings as a percentage of total boardings and alightings; through riders at potential split locations; and through riders at potential split locations as a percentage of the running total of boardings in previous segments.

Following this analysis, it was determined that the number of through-riders at each potential split point were high and that a significant percentage of Route 96 riders would be forced to transfer if the line were split at any location. If Route 96 were to be split at Union Station, for instance, 37 percent of eastbound through-riders and 14 percent of westbound through-riders would be forced to transfer.

However, overlapping two Route 96 segments may be a better option, as it would likely have a positive impact in terms of reliability without forcing transfers at a split point. It may, however, create longer wait times at stops for passengers traveling beyond the common portion of the line (e.g., passengers traveling east of Stadium-Armory would need to wait for Route 97, rather than board the first Route 96-97 bus to arrive). **Figure 4** shows one alternative for overlapping Route 96 patterns.

Figure 4 – Overlapping Route 96 Patterns



Recommendation 4: Continue to explore the feasibility and benefits of giving Route 96 two overlapping patterns. It should be noted that at the public meetings for this evaluation, reactions to this idea were mixed. Riders who live at either end of the current route were not in favor of the recommendation, while others said it would be acceptable if it produced better reliability.

5. Simplify Route Alignments

Conversations with Route 96-97 bus operators and members of the public revealed that the routing of buses between Union Station and the U.S. Capitol is convoluted. An analysis of alternate routings showed that Route 96 and 97 can potentially be realigned to save travel time and improve reliability. **Table 5.1** looks at two segments of the corridor and predicts the travel time savings by running buses on a different street pattern (in bold below).

Table 5.1: Travel Time Savings by Re-routing Route 96-97, by Segment

Direction	Routing	Distance	Average MPH ¹	Travel Time	Travel Time Savings
East Capitol & 2nd St to Union Station Segment					
Westbound	Original via 1 st St NE, Constitution Ave, Louisiana Ave, and D St	1.3 miles	10.5	~7 minutes	4 minutes
	Reroute via 2nd St and Mass Ave to reach Columbus Circle	0.7 miles	12.7	~3 minutes	
Eastbound	Original via E St, North Capitol St, Louisiana Ave, Constitution Ave, and 1 st St NE	1.2 miles	10.8	~7 minutes	4 minutes
	Reroute via Mass Ave and 2nd St	0.7 miles	15.5	~3 minutes	
Mass Ave & 11th St to Union Station Segment					
Westbound	Original via 11 th St, East Capitol St, 1 st St NE, Constitution Ave, Louisiana Ave, and D St	2.0 miles	12.1	~10 minutes	6 minutes
	Reroute via Mass Ave (including around Stanton Park)	1.1 miles	15	~4 minutes	
Eastbound	Original via E St, North Capitol St, Louisiana Ave, Constitution Ave, 1 st St NE, and East Capitol	1.9 miles	12.8	~9 minutes	5 minutes
	Reroute via Mass Ave (including around Stanton Park)	1.1 miles	14.2	~4 minutes	

¹ Average MPH for original routes came from traffic segments and reroutes were estimated from similar observed segments. Average MPH came from both AM and PM peak observations.

Two different routing alternatives were evaluated. The first would be to skip the area around the U.S. Capitol in order to improve reliability of the service (traffic and street closures around the Capitol result in significant traffic variability that significantly increases delays and negatively impacts reliability). The proposed routing is shown in **Figure 5**.

The idea of Skipping received overwhelming support by participants at the public meetings for this evaluation. The estimated 3 minute savings in running times resulting from this re-route would not result in a savings of a bus in service so the cost impacts of the re-routes are \$0. The focus of the recommendation is improved reliability and passenger convenience.

Ridership impacts at the stops that would be skipped as a result of this potential re-route are shown in **Tables 5.2** and **5.3** below.

Table 5.2: Ridership Impacts of U.S. Capitol Re-route, Westbound*

Time of Day / On-Off	Route 96	Route 97	Routes 96 and 97
Early Morning Boardings	0	0	0
AM Peak Boardings	1	4	5
Mid-Day Boardings	3	0	3
PM Peak Boardings	21	12	33
Evening Boardings	5	0	5
Total Boardings	30	16	46
Early Morning Alightings	6	0	6
AM Peak Alightings	15	62	77
Mid-Day Alightings	23	0	23
PM Peak Alightings	4	2	6
Evening Alightings	5	0	5
Total Alightings	53	64	117

*Stops included in analysis are 1st & Maryland, Delaware & Constitution, and Louisiana & D

The data above shows that 46 (1.8%) daily boardings and 117 (4.5%) daily alightings occur at the westbound stops that would be impacted by this potential re-route.

Table 5.3: Ridership Impacts of U.S. Capitol Re-route, Eastbound*

Time of Day / On-Off	Route 96	Route 97	Routes 96 and 97
Early Morning Boardings	1	0	1
AM Peak Boardings	1	2	3
Mid-Day Boardings	10	0	10
PM Peak Boardings	9	28	37
Evening Boardings	1	0	1
Total Boardings	22	30	52
Early Morning Alightings	10	0	10
AM Peak Alightings	34	11	45
Mid-Day Alightings	6	0	6
PM Peak Alightings	5	1	6
Evening Alightings	3	0	3
Total Alightings	58	12	70

*Stops included in analysis are Louisiana & D, 1st & Constitution, and 1st & East Capitol

The data above shows that 52 (1.9%) daily boardings and 70 (2.5%) daily alightings occur at the eastbound stops that would be impacted by this potential re-route.

The second re-routing option to be evaluated would be to run Route 96 via Massachusetts Avenue between Lincoln Park and Union Station in order to save time on this very long route. **Tables 5.4** and **5.5** show the ridership at stops that would be impacted by this re-route.

Table 5.4: Ridership Impacts of East Capitol Street Re-route, Westbound*

Time of Day / On-Off	Route 96	Route 97	Routes 96 and 97
Early Morning Boardings	3	0	3
AM Peak Boardings	10	30	40
Mid-Day Boardings	25	0	25
PM Peak Boardings	9	8	17
Evening Boardings	12	0	12
Total Boardings	59	38	97
Early Morning Alightings	5	0	5
AM Peak Alightings	5	61	66
Mid-Day Alightings	37	0	37
PM Peak Alightings	6	21	27
Evening Alightings	7	0	7
Total Alightings	60	82	142

*Stops included in analysis are: East Capitol & 8th, East Capitol & 6th, East Capitol & 4th, and East Capitol & 3rd

The data shows that there are 59 (2.2%) daily boardings westbound on Route 96 at the stops impacted by the potential re-route and 60 (2.3%) daily alightings during the day. Added to the stops that would be skipped at the U.S. Capitol, the total westbound boardings impacted are 89 (3.4%) and alightings impacted are 113 (4.3%). Eastbound data for the same segment is shown in **Table 5.5**.

Table 5.5: Ridership Impacts of East Capitol Street Re-route, Eastbound*

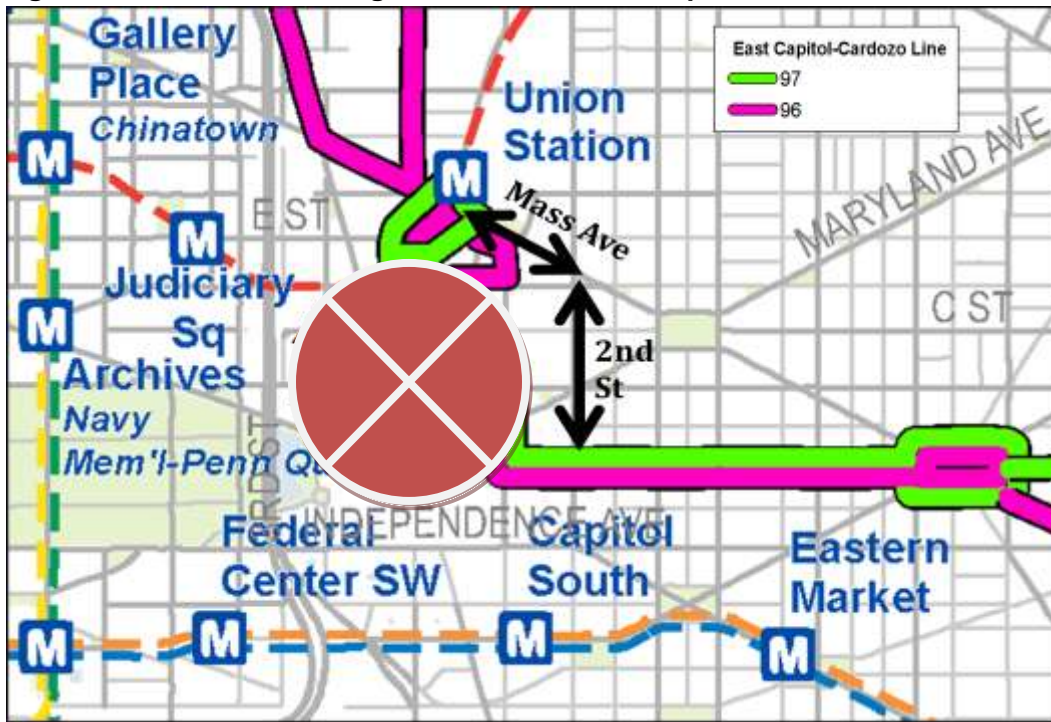
Time of Day / On-Off	Route 96	Route 97	Routes 96 and 97
Early Morning Boardings	1	0	1
AM Peak Boardings	6	11	17
Mid-Day Boardings	40	0	40
PM Peak Boardings	9	26	35
Evening Boardings	0	0	0
Total Boardings	56	37	93
Early Morning Alightings	2	0	2
AM Peak Alightings	16	10	26
Mid-Day Alightings	25	0	25
PM Peak Alightings	11	10	21
Evening Alightings	6	0	6
Total Alightings	60	20	80

* Stops included in analysis are: East Capitol & 8th, East Capitol & 6th, East Capitol & 4th, and East Capitol & 3rd

The data above shows that there are 56 (2.0%) daily boardings and 60 (2.2%) daily alightings at the stops that would be skipped. Added to the stops skipped around the Capitol, total eastbound impacts would be 78 (2.8%) boardings and 118 (4.3%) alightings.

Figure 5 shows what the realigned 96-97 Line would look like if it traveled on Massachusetts Avenue and 2nd Street NE/SE instead of on the current routing.

Figure 5: Potential Rerouting of Routes 96-97 to Skip Louisiana & Constitution Stop



Recommendation 5: To speed travel times, have Routes 96 and 97 run on Massachusetts Avenue NE and 2nd Street NE/SE instead of serving the intersection of Louisiana & Constitution.

6. Create Skip-Stop Service on Route 96 Between Duke Ellington Bridge and New Jersey Avenue

As one of the primary complaints among riders of Route 96 is the long travel times, this recommendation calls for skip-stop service between Duke Ellington Bridge and New Jersey Avenue NW. Instead of Route 96 stopping at 11 stops in this segment, buses would stop at only six. This would decrease travel time for through riders between upper Northwest DC and Union Station by more than a minute and a half in each direction. Participants at the public meetings said they would be unaffected by this recommendation.

Figure 6 shows the location of the Route 96 skip-stop service. Stops would include:

- 1) Duke Ellington Bridge (Calvert & 20th Streets NW)
- 2) 18th Street & Columbia Road NW (0.3 miles from Duke Ellington Bridge)
- 3) 16th & U Streets NW (0.7 miles from 18th & Columbia)
- 4) 14th & U Streets NW (0.2 miles from 16th & U)
- 5) 11th & U Streets NW (0.3 miles from 14th & U)
- 6) 7th Street & Florida Avenue NW (0.3 miles from 11th & U)

The stops that would be skipped and the ridership at these stops are shown in **Table 6.1**.

Table 6.1: Ridership Impacts of Route 96 Skip-Stop Service

Eastbound Stop	Boardings	Alightings	Westbound Stop	Boardings	Alightings
Florida & T	33	8	U & Vermont	24	22
17th & U	62	8	13th & U	54	29
15th & U	26	14	15th & U	28	17
13th & U	81	73	17th & U	8	24
Vermont & U	49	15	Florida & U	6	3
9th & U	7	11	Florida & 18th	8	54

Given that the number of stops would be decreasing from 11 to 6, and assuming a dwell time of 20 seconds per stop, approximately 100 seconds would be saved in run time per trip.

Impacts to existing riders would be minimal, as the segment is served by other routes (including the Metrobus X3, 90, 92, and 93) and the majority of boardings take place at the six stops that would be retained as part of this recommendation.

Recommendation 6: Create skip-stop service on the segment of Route 96 between Duke Ellington Bridge and New Jersey Avenue NW.

Figure 6 shows the location of stops that would remain as part of a skip-stop service, and **Table 6.2** shows the estimated cost savings of the skip-stop service.

Figure 6: Location of Skip-Stop Service on Route 96

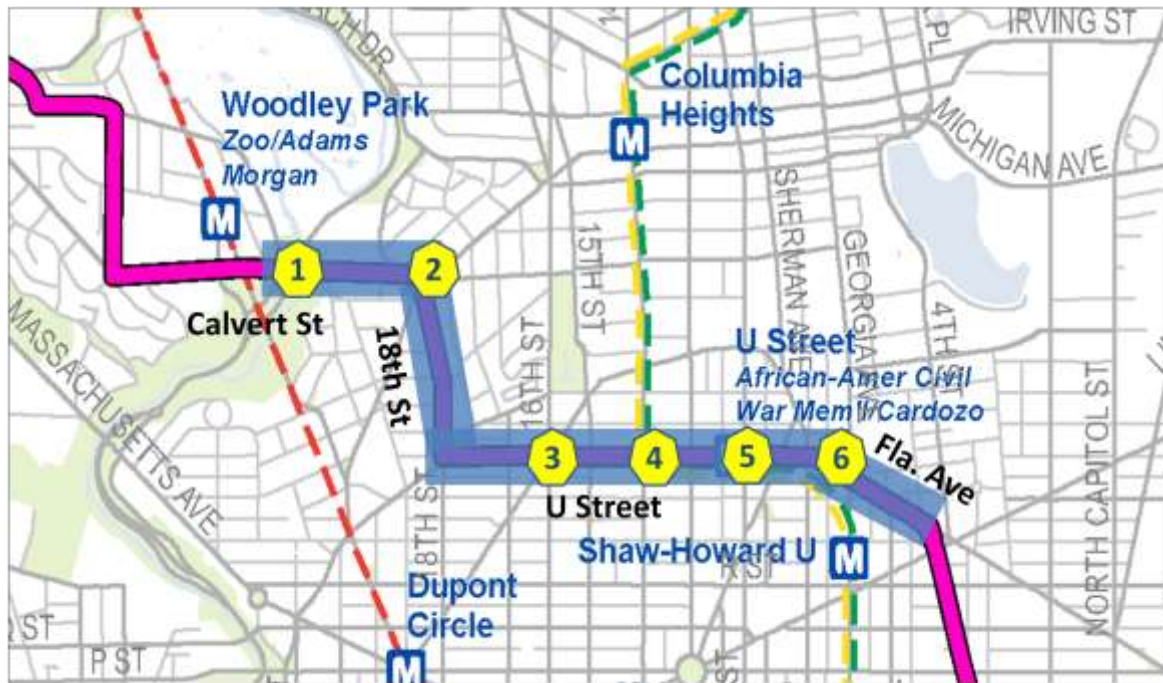


Table 6.2: Estimated Cost Savings, Skip-Stop Service on Route 96*

Route 96 Day of Week and Direction	Decrease in Run Time (Minutes)	Number of Trips	Decrease in Revenue Hours	Platform Hour Factor	Total Platform Hours	Daily Cost Savings	Total Annual Savings
Weekday WB (250)	-1.67	57	-1.59	1.12	-1.78	-\$195	-\$48,750
Weekday EB (250)	-1.67	56	-1.56	1.12	-1.75	-\$192	-\$48,000
Saturdays / Holidays WB (63)	-1.67	43	-1.20	1.12	-1.34	-\$147	-\$9,286
Saturdays / Holidays EB (63)	-1.67	44	-1.22	1.12	-1.37	-\$151	-\$9,513
Sundays WB (52)	-1.67	41	-1.14	1.12	-1.28	-\$141	-\$7,310
Sundays EB (52)	-1.67	41	-1.14	1.12	-1.28	-\$141	-\$7,310
Total							-\$130,169

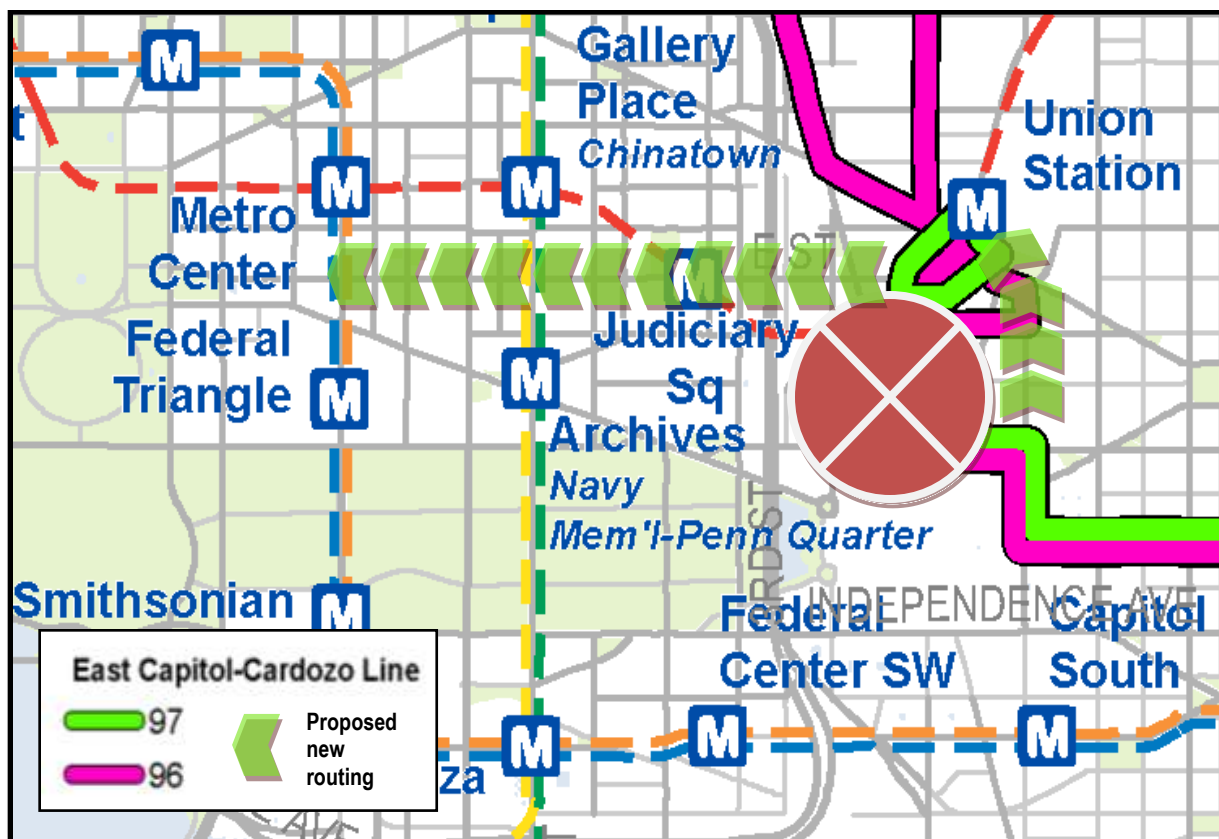
*Assumes Cost per Platform Hour of \$110

7. Extend Route 97 to Downtown DC

An idea that came out of the Project Team meeting in September is the possibility of extending Route 97 from East Capitol Street west into Downtown DC. As it stands, no Metrobus route offers a direct one-seat ride from the neighborhoods east of the Anacostia River to the core Downtown DC destinations. This section analyzes data obtained from Metropolitan Washington Council of Governments (MWCOCG) models and assesses whether a significant enough market exists to consider extending Route 97 to Downtown.

The map in **Figure 7.1** shows conceptually how a westward extension of Route 97 might look, with a likely routing to Metro Center *via E Street* to the Metro Center rail station. The terminal would become Metro Center instead of Union Station.

Figure 7.1: Possible Westward Extension of Route 97 into Downtown DC



To estimate a potential increase in ridership due to a realignment of Route 97 to terminate at Metro Center, assumptions were made regarding the increase in mode share for bus trips to the Downtown Core. The methodology for this analysis is as follows:

- 1) Based on regional model production and attraction data (**Figure 7.2**), bus trips from TAZs within 1/4 mile of the existing Metrobus Route 97 to the Downtown Core were calculated. These represent 10.3 percent of all trips from these TAZs.
- 2) To estimate the bus mode share after a realignment of Route 97, the bus mode share of those TAZs within 1/4 mile of the corridor to just TAZ 19 (the TAZ containing Metro Center) was calculated to be 13 percent.

- 3) Taking the total of all trips from those TAZs within 1/4 mile of the corridor (~40,000 trips) minus those trips that are currently bus trips in the model (~4,100 trips) and applying the 13 percent mode share to the remainder gives a bus trips total of ~4,600.
- 4) Compared to the existing bus trip total of ~4,100 results in an increase of ~500 trips, which is estimated as the market potential for the realigned 97 route. (This amount, however, should be considered an extreme upper limit of the increase, as the increase in bus mode share allows for switches from Metro trips to bus trips, which may be unlikely.)

Recommendation 7: Extend Route 97 west along E Street from Union Station to Metro Center.

It should be noted that when the idea of extending Route 97 westward was presented to participants at the two public meetings for the evaluation, reactions were mixed. Some participants said they liked the idea and would use the revised service to travel to and from Downtown. Others said they prefer the terminal of Route 97 to remain where it is at Union Station.

An extension of Route 97 would also serve to decrease overcrowding on the D6 route, which also travels along E Street between Union Station and Metro Center.

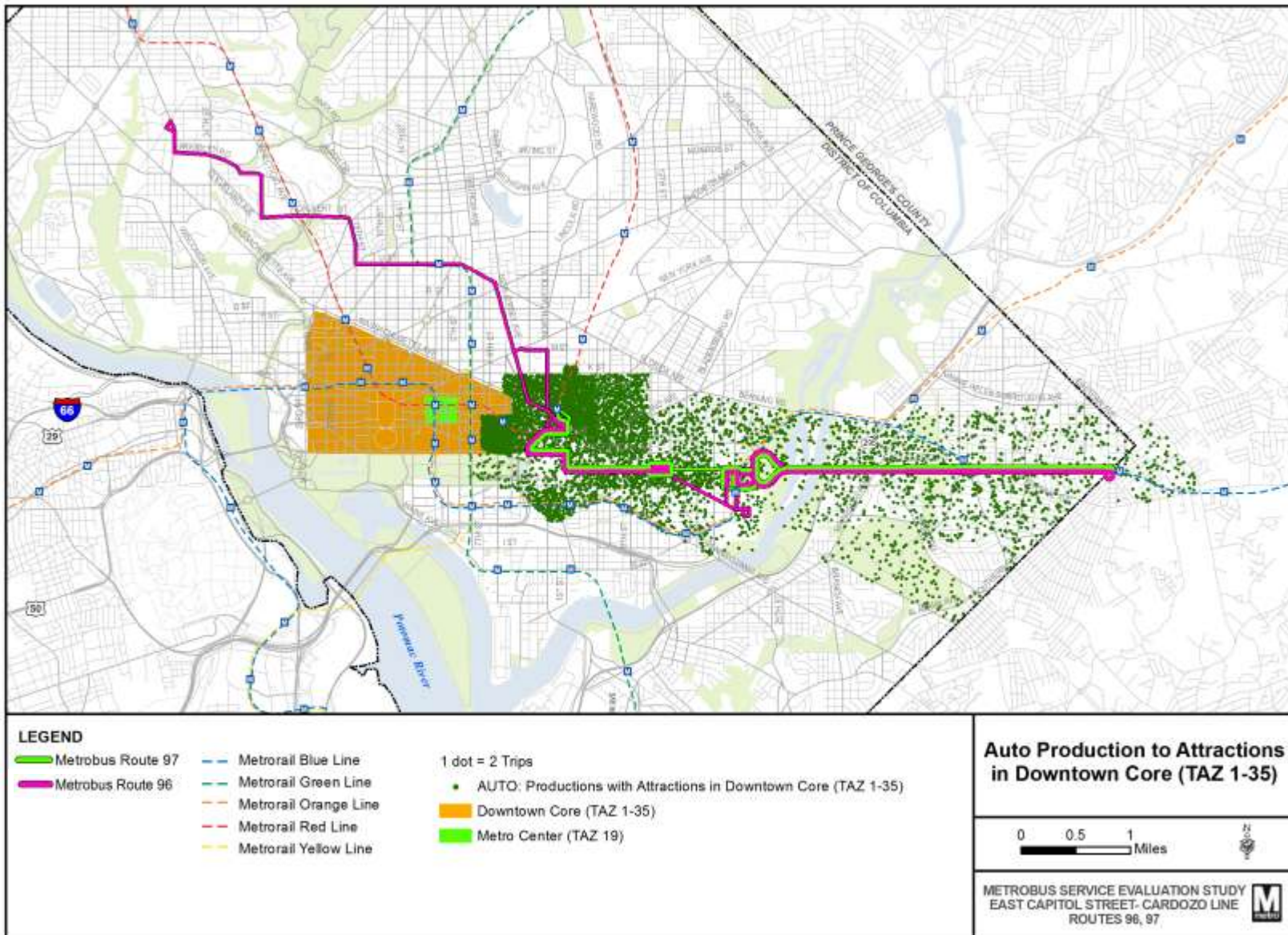
Future considerations for Route 97 may include converting the service to a limited-stop service that does not stop at every current stop in order to provide greater convenience for riders, especially riders east of the Anacostia River. Currently demand does not appear to warrant this change but demand may increase after the proposed Wal-Mart is constructed near East Capitol Street sometime during or after 2013. Ridechecks should be completed once the Wal-Mart is open. This new service could be configured so that all local stops are served east of the Anacostia River and then the service runs limited stop in the area where there is a common trunk with Route 96. The other alternative is to extend Route 96 east of the Anacostia River when the 97 runs in the peak period so that local stops east of the river are served.

Table 7 shows an estimated increase in annual costs to Route 97 if it were extended to Metro Center.

Table 7: Cost Estimate for Extending Route 97 to Downtown DC

Route	Daily Trips	Add'l Run Time	Additional Revenue Hours	Platform Hour Factor	Platform Hours	Cost per Platform Hour	Daily Cost	Annual Cost (250 weekdays)
97 WB	28	15 min.	7.00	1.12	7.84	\$110.00	\$862.40	\$215,600
97 EB	24	15 min.	6.00	1.12	6.72	\$110.00	\$739.20	\$184,800
Total								\$400,400

Figure 7.2: Projected Daily Auto Trips from Route 97 Corridor to Downtown Core



8. Consolidate Bus Stops

Routes 96 and 97 were analyzed using WMATA's guidelines for stop-to-stop distance: four to five stops per mile, or approximately 0.20 to 0.25 miles apart. The second step in this process was to determine whether the distance between stops would exceed the guideline of >0.25 miles if a stop identified in Step 1 were eliminated. And the third part of the analysis looked at the feasibility of removing stops in terms of usage; stops that serve Metrorail stations or which have more than 25 boardings or alightings per day were removed from consideration as candidates for consolidation.

Based on this process, 43 stops along Routes 96 and 97 were identified that could be considered for consolidation.

Table 8: Bus Stops to be Considered for Consolidation

Westbound Candidate Stops	Boardings/ Alightings	Eastbound Candidate Stops	Boardings/ Alightings
East Capitol & Division NE	10/7	Cathedral & Woodley NW	3/1
4250 East Capitol NE	0/11	2937 Cathedral NW	2/1
East Capitol & 14th NE	8/2	29th & Garfield NW	7/5
18th & C NE	1/8	2745 29th NW	3/2
Massachusetts & 19th NE	4/6	U & 9th NW	7/11
Massachusetts & 17th NE	8/2	Florida & 6th NW	5/10
Massachusetts & 16th NE	5/5	Florida & 5th NW	10/3
New Jersey & L NW	21/21	New Jersey & R NW	12/11
New Jersey & M NW	23/9	New Jersey & Q NW	16/11
New Jersey & N NW	19/14	New Jersey & P NW	15/18
New Jersey & O NW	6/22	New Jersey & O NW	19/14
New Jersey & P NW	16/15	New Jersey & N NW	18/9
New Jersey & Q NW	1/9	North Capitol & Pierce NW	23/15
New Jersey & R NW	16/10	East Capitol & 4th SE	18/11
New Jersey & Rhode Island NW	2/9	East Capitol & 15th SE	2/8
Florida & 6th NW	5/12	Massachusetts & 16th SE	18/11
Calvert & 29th NW	2/18	Massachusetts & 17th SE	0/11
2727 Calvert NW	1/3	Massachusetts & 18th SE	1/14
2937 Cathedral NW	1/1	Massachusetts & 19th SE	0/10
Woodley & 35th NW	0/5	East Capitol & Fort Chaplin Park	3/20
Woodley & 36th NW	0/6	East Capitol & 47th SE	3/8
		5901 East Capitol SE	3/12

Recommendation 8: To speed travel times along Routes 96 and 97, WMATA should consider the elimination or consolidation of bus stops that are under-used or too close to each other. Further analysis and coordination with DDOT is also recommended, to determine potential physical or political barriers to removing bus stops in the corridor. Cost estimates for the consolidation or elimination of stops should be developed when the affected stops are determined.

9. Add Shelters and Benches

WMATA guidelines mandate that stops with more than 50 boardings a day be candidates for the installation of a shelter and bench. A field visit confirmed that Routes 96 and 97 have eight stops currently without a shelter and bench that receive more than 50 boardings per day:

Table 9: Candidates for the Installation of a Shelter and Bench

Westbound Stops	Boardings	Eastbound Stops	Boardings
Massachusetts Ave between North Capitol St & 1st St NW	117	Massachusetts Ave & 1st St NE	427
East Capitol & 53rd St NE	105	U & 17th St NW	62
U & 14th St NW	85		
East Capitol & 55th St NE	78		
East Capitol & 57th Place NE	58		
U & 13th St NW	54		

Recommendation 9: WMATA should coordinate with DDOT and their vendor, Clear Channel, to determine whether the above stops are in the queue to receive a shelter and bench. If not, then these stops should be added to the queue. See Table 14 for the estimated cost.

10. Add Bus Stop Flags

WMATA requires that all bus stops have a flag indicating which routes serve the stop. A field visit verified that two stops along Routes 96-97 were missing flags:

Table 10: Stops Requiring a Bus Stop Flag

Westbound Stop	Boardings	Eastbound Stop	Boardings
New Jersey Ave & K St NW	55	East Capitol St & 52nd St	6

Recommendation 10: WMATA should schedule the immediate installation of bus stop flags at the stops listed above. See Table 14 for the estimated cost.

11. Add Information Cases

The tables below list bus stops along Routes 96-97 that require the installation of an information case. The field visit identified the location of all information cases along the line. 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. A total 36 out of 169 stops (21 percent) were missing bus information cases along the entire line, and 19 of those stops qualified for installation of an information case.

Table 11: Stops Requiring the Installation of an Information Case

Stop	Direction	Boardings	Stop	Direction	Boardings
Immediate Installation					
Massachusetts Ave between N. Capitol & 1st	WB	117	Massachusetts Ave & 1st St	EB	427
East Capitol St & Benning Rd	WB	113	U St & 14th St	EB	223
East Capitol & 53rd St	WB	105	18th & Columbia Rd	EB	107
East Capitol & 49th St	WB	80	U St & New Hampshire Ave	EB	87
East Capitol & 57th Pl	WB	58	U St & 13th St (Stop #1)	EB	81
U St & 13th St	WB	54	East Capitol & 8th St	EB	70
			U St & 17th St	EB	62
Future (Long-Term) Installation					
East Capitol & 50th St	WB	46	U St & 11th St	EB	29
U St & 11th St	WB	28			
U St & Vermont Ave	WB	24			
Massachusetts Ave & 18th St	WB	20			
Calvert St & Biltmore St	WB	20			

Recommendation 11: WMATA should prioritize and schedule the installation of information cases at the stops listed above. See Table 14 for the estimated cost.

12. Add Bus Stop Landing Pad

WMATA also requires that bus stops have a sidewalk or landing pad for passengers to stand on while waiting for the bus. A field visit verified that five stops along Routes 96-97 were missing a sidewalk or pad:

Table 12: Stops Requiring a Landing Pad

Westbound Stop	Boardings	Eastbound Stop	Boardings
Louisiana Ave & D St	4	E. Capitol St & 3rd St	4
2727 29th St NW	1	E. Capitol St & Texas Ave	0
		2745 29th St NW	3

Recommendation 12: WMATA should schedule the installation of a bus stop landing pad at the stops listed above. See Table 14 for the estimated cost.

13. Install Trash Receptacles

WMATA's guidelines require that bus stops have a trash receptacle if the stop has more than 25 boardings per day. A field visit verified that out of 169 stops along Routes 96-97, six require a trash receptacle based on the boarding criterion.

Table 13: Stops Requiring a Trash Receptacle

Westbound Stop	Boardings	Eastbound Stop	Boardings
Massachusetts Ave between North Capitol & First St NW	117	Massachusetts Ave & First St NE	427
East Capitol St & 57th Place	58	U & 13th St NW (Stop #1)	81
		Newark St between Idaho & Wisconsin Aves NW	68
		M St & North Capitol St	36

Recommendation 13: WMATA should schedule the installation of a trash receptacle at the stops listed above. See Table 14 for the estimated cost.

Table 14: Estimated Cost of Proposed Bus Stop Amenities

Unit	Quantity	Cost per Unit	Total Cost
Bus Shelter and Bench	8	\$10,000	\$80,000*
Bus Stop Flag	2	\$100	\$200
Information Case (Immediate Installation)	13	\$200	\$2,600
Information Case (Future Installation)	6	\$200	\$1,200
Bus Stop Landing Pad	5	\$1,500	\$7,500
Trash Receptacle	6	\$1,000	\$6,000
Total			\$97,500

* Cost of shelters and benches may be defrayed via DDOT's shelter installation agreement with Clear Channel.

14. Recommendations from the Traffic Assessment

Based on the analysis performed for the Traffic Assessment, the following recommendations are made to improve traffic operations along the roadways in which Routes 96 and 97 operate. **Figure 14** shows where traffic problems were found to exist along the corridor. WMATA should coordinate with DDOT to determine the feasibility, estimated costs, and potential timetable for improvements to traffic operations.

1. Bus delays were observed at several locations including the signals at East Capitol Street & Benning Road, East Capitol Street & 11th Street, New Jersey Avenue & New York Avenue, New Jersey Avenue & Florida Avenue, Florida Avenue & 7th Street, U Street & 14th Street, and North Capitol Street. **Recommendation:** Turning movements and pedestrian counts should be conducted at these intersections and cycle lengths should be optimized for all traffic movements. In some cases, the possibility of increasing the green time should also be explored. (Note: DDOT plans for converting New Jersey Avenue to a two-way street should be reviewed to determine the location of new southbound bus stops for the placement of shelters, flags and landing pads.)
2. Some signals were observed to have phases for intersection legs with minimal traffic. These intersections include East Capitol Street & 1st Street NE, 1st Street NW & Louisiana Avenue, 1st Street NE & Constitution Avenue. **Recommendation:** Traffic counts should be conducted and these signals should be optimized accordingly. (Note: the stop at Louisiana Avenue may be eliminated from service on Routes 96 and 97 as part of the recommendations.)
3. Some near-side transit stops were difficult for the bus to access, including those along East Capitol Street between 1st and 13th Street, New Jersey Avenue, Florida Avenue, and U Street. **Recommendation:** These stops should become far-side stops, wherever possible.
4. Some turning movements were difficult for the bus to complete due to on-street parking being too close to the intersection. These include turns at Louisiana Avenue & D Street and New York Avenue & M Street. **Recommendation:** On-street parking should be removed in these locations so that buses can adequately make the turn.
5. Vehicles were observed blocking traffic lanes at several locations including Massachusetts Avenue and G Street, 18th Street & Belmont Street, and Calvert Street & Woodley Place. **Recommendation:** Regulations should be properly posted and enforced. If the observed traffic blocking can't be avoided, it is recommended that adequate curb space be provided.
6. Buses leaving Capitol Heights Metro Station onto Southern Avenue have to make tight turning movements to position the bus to turn left onto East Capitol Street. **Recommendation:** Buses should either use the station exit on Davey Street to access Southern Avenue, or a stop bar (with "stop here on red" signage) should be added on northbound Southern Avenue before the Metro station exit to provide adequate space for buses to exit.
7. Buses were observed laying over and blocking bus stops at Massachusetts Avenue & North Capitol Street and U Street & 13th Street. **Recommendation:** Adequate curb space should be provided for bus movements, including layovers and alighting.
8. East Capitol Street between Southern Avenue and Stoddert Place has inconsistent parking regulations, causing the buses to travel in and out of the curb lane. **Recommendation:** Consistent parking regulations should be implemented along the westbound curb lane in the AM peak and eastbound curb lane in the PM peak.
9. Several traffic and bus stop conflicts were noted along New Jersey Avenue. **Recommendation:** Bus stops and parking spaces should be adjusted to accommodate safe traffic movements.
10. At Wisconsin Avenue and Idaho Avenue, buses have to make an unprotected left turn against high volumes of traffic during the AM peak to reach the terminal station on Newark Street. **Recommendation:** Buses should make a left turn at the signalized intersection at Macomb Street, followed by a right turn onto Idaho Avenue, and a right onto Newark Street.

Figure 14: Traffic Operations Preliminary Findings

