WMATA SERVICE EVALUATION STUDY

Final Report

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Contents

GLOSSARY OF ACRONYMS AND TERMS

Accessibility – the ability of transit service to provide access to a destination.

Alighting(s) – instances of passengers getting off of a transit vehicle.

Alignment – the on-street route that a bus line takes in a neighborhood or corridor.

Average Daily Traffic – average number of vehicles passing through a road segment or intersection in a 24-hour period.

Boarding(s) – instances of passengers getting onto a transit vehicle.

Bus – rubber-tired vehicles operating on fixed routes and schedules on roadways. Buses are powered by diesel, gasoline, battery or alternative fuel engines contained within the vehicle, or by overhead wires.

Bus Priority Lane - lanes from the general roadway that have been dedicated to bus traffic only.

Capital costs – the expense of procuring new equipment, land or physical improvements necessary to implement a new service.

Choke point – an intersection that experiences excessive delay, which results in an inefficient flow of traffic to and from the intersection.

Connectivity – the ability of transit to provide connections to multiple origins or destinations.

Corridor – a narrow band of land, usually surrounding a roadway or other transportation alignment, and linking key origin and destinations.

Cost Recovery Ratio – the portion of a transit route's operating costs that are recouped through farebox collections on the same route.

Cross-town Bus Route – a bus route that connects suburbs or urban neighborhoods but does not pass through the central employment area of the region it serves.

DDOT – acronym used for the District of Columbia Department of Transportation.

Headway – the planned period of time between consecutive vehicles on a transit route (also Service Frequency).

Land Use — refers to the manner in which portions of land or the structures on them are used, i.e., commercial, residential, retail, industrial, etc.

Level of Service (LOS) – a quantitative measurement of the operational conditions of an intersection measured in seconds of delay. LOS A is free-flow, while LOS F, the worst condition, denotes stop-and-go conditions.

Metrobus – bus service operated by the Washington Metropolitan Area Transit Authority.

Metrorail – rail service operated by the Washington Metropolitan Area Transit Authority.

Mixed-traffic – automobiles and transit vehicles sharing the same roadway.

Mixed-use – a type of development where residences, retail and/or office space are located in the same buildings or area.

Mobility – the ability of transit service to move people rapidly and with minimal transfers or delays. .

Mode – form of transportation, such as automobile, transit, bicycle and walking; a form of transit, such as fixed-route bus, heavy rail or commuter rail.

MWCOG – acronym used for the Metropolitan Washington Council of Governments.

On-Time Performance – see Reliability

Operating Costs – the expense of operating a transit service once it is implemented. Sometimes also referred to as operating and maintenance (O&M) costs.

Peak Load Point – the point on a route at which (typically) the largest number of passengers are present on a transit vehicle.

Radial bus route – a bus route that connects one or more suburban or urban neighborhoods to the region's central employment district.

Reliability – the degree to which transit customers can depend on a route to arrive on time and get them to their destination on schedule, especially in the case of a timed transfer to another route (also On-Time Performance).

Service Frequency – see Headway

Shuttle Bus Route – a bus route that connects multiple locations within a relatively small area, often arrayed in a loop configuration and anchored on a transfer point to longer-distance transit services.

Signal Prioritization - a technology that connects the traffic signal system to a sensor system on each bus, affording buses the opportunity to pass through intersections on their routes with less overall waiting time.

Subsidy – funding provided by WMATA's funding jurisdictions to provide for those costs not covered by operating revenues.

Traffic Operations Analysis - in the context of this report, an analysis to determine which places along each route are suffering from delays due to traffic congestion and what mitigation (if necessary) could be implemented to allow the route to operate more efficiently.

Transit – public transportation, such as buses or trains.

Transit Network – the pattern and connections made by buses and trains.

Transit Service Assessment – in the context of this report, a thorough evaluation of the operating characteristics, performance, and efficiency of one of the transit routes covered in the study.

Transit Modal Share – the percentage of trips made using transit within a certain period of time or between a certain set of origins and destinations.

Transit Travel Speed – the average speed over the duration of trips taken on transit between a particular origin and destination. Transit travel speed is often expressed as an **average** for a set of many different trips.

Transit Travel Times – the amount of time it takes to travel between a particular origin and destination using transit. The measure includes walk access time, waiting time, and the in-vehicle travel time. Transit travel times are often expressed as **averages** for a set of many different trips.

Valid Comment – in the context of this report, any non-blank comments that were relevant to bus lines included in the study.

Vehicle Capacities – standards set by WMATA as to what number of passengers constitutes a full bus. These are set by vehicle type and typically include all seats filled and a certain number of standing passengers. Capacities are set higher during peak periods to recognize that passengers will expect the bus to be full at those times.

Volume-to-Capacity (V/C) Ratio – a ratio of the traffic volume to capacity of a roadway. A v/c ratio approaching or over 1.0 indicates that the demand for use of a roadway exceed the available capacity of that roadway. This results in traffic congestion.

WMATA – acronym for the Washington Metropolitan Area Transit Authority.

EXECUTIVE SUMMARY

Project Purpose

The Washington Metropolitan Area Transit Authority's (WMATA) 2003 Regional Bus Study[1] identified continuous improvements to quality of service and enhanced reliability as priorities for advancing the Washington region's bus network and ensuring it continues to be attractive to riders. To that end, WMATA periodically reviews the performance of its bus routes to ensure that they are providing transit users with the best possible combination of services. In this study, WMATA has reviewed in detail the operations of the following bus routes:

- The Washington Boulevard Line (2A, 2B, 2C, 2G)
- The D1-8 Route, which is comprised of these lines:
  - Sibley Hospital – Stadium Armory Line (D1, D3, D6)
  - Glover Park – Dupont Circle Line (D2)
  - Ivy City – Union Station Line (D4)
  - MacArthur Blvd – Georgetown Line (D5)
  - Hospital Center Line (D8)
- The F8 Route (Prince George's – Langley Park Line)
- The P12 Route (Eastover – Addison Road Line)

The purpose of this study is to review the productivity, travel time and reliability, crowding, frequency and quality of service indicators, as outlined in the Metrobus Network Evaluation and Future Fleet Needs study[2], for each of the routes listed above and recommend service improvements that are essential to address their strategic needs.

Project Process

Analysis of Existing Conditions

The study team first collected the necessary background information for understanding and evaluating the current operating conditions of the route. The current performance indicators of each route were evaluated, as were the specific traffic conditions under which each route operates.

<u>Transit Service Assessment</u>

The Transit Service Assessment focused on existing operating parameters as collected during the Spring and Summer of 2008, as well as information gathered from WMATA bus operations staff, Supervisors and Service Planners. All information relevant to route performance was compiled, including span and frequency of service, vehicle requirements, on-time performance, boardings and alightings, accident rates and route miles. The team also looked at the history of each route and changes that had been made in the past. Data gathered was then converted into factors such as passenger loads (compared to capacity)

[1] WMATA Regional Bus Study, 2003, http://wmata.com/pdfs/planning/RegBusStudy.pdf

[2] Metrobus Network Evaluation and Future Fleet Needs, WMATA, 2007, http://wmata.com/pdfs/planning/Metrobus_Network_Eval_ExecSummary%20final%20April%2018.pdf

and productivity (in terms of revenue hours to platform hours and boardings per revenue hour). Subsidies for each route were evaluated in terms of subsidy per boarding and farebox recovery rates.

Traffic Operations Assessment

Traffic conditions were evaluated for each of the four routes in order to determine locations along each route that are suffering from delays due to traffic congestion. Conditions were assessed first by field observation by the study team and then using a variety of traffic data, including average daily traffic (ADT) volumes, roadway congestion information (in the form of volume to capacity ratio), and intersection volumes and delay. Due to the many jurisdictions involved and because there is not a standard way to keep information, not all of the desired traffic information was available in all areas for analysis. Where necessary, mitigation recommendations were created for specific intersections. Such recommendations will help the routes covered in this study to operate more efficiently.

Public Involvement

Public involvement activities included distribution of two newsletters, a project website, a dedicated hotline, and a minimum of two public meetings for each route family to gather inputs from bus users. In addition to comments gathered at the public meetings, over 100 comments and survey responses were received on the website.

The D routes generated the most interest due in part to the involvement of local civic organizations. The most common complaints for all routes were lack of reliability of the bus routes, and a request for increased frequencies. A summary of public input is provided in the route-by-route sections below.

Recommendations

The Metrobus Service Evaluation Study formulated recommendations that can be grouped into four major categories: traffic operations, customer communications, service planning, and stops and facilities.

Service Planning

The following recommendations detail the proposed changes to routing, frequency, span of service, and other aspects of the day-to-day operations of the routes.

Washington Boulevard Line

Short-term Recommendations

- Add additional buses throughout the day on the 2B and 2C routes.
- Add a limited number of 2B buses on Sundays.
- Convert six eastbound 2B runs in the AM peak and six westbound 2B runs in the PM peak to 2G runs in order to better serve the Arrowhead area.
- Add recovery time at terminal stops and at key points such as East Falls Church Metrorail Station, Dunn Loring Metrorail Station (2C), and the Vienna / Fairfax / GMU Metrorail station (2B, 2G).

Long-term Recommendations

- Consider breaking the lengthy 2B and 2G routes into east and west segments, possibly at Dunn Loring Metrorail Station.

D1-8 Routes

Short-term Recommendations

- Add an additional bus to the D6 from 6:00AM to 8:00PM to increase available operating time.
- Extend the D4 west to McPherson Square.
- Eliminate the middle segment (Dupont Circle to Union Station) of one-third of all D6 trips to reduce the number of trips that get caught in downtown traffic.
- Shorten the D6 routing in the area of Union Station, utilizing E Street NE instead of North Capitol Street and Massachusetts Avenue NE.

Long-term Recommendations

- Add additional 5 percent to the one-way running time of all routes that cross through the downtown core (D1,D3,D6 and eventually D4), plus an additional 15 percent of one-way running time for layover. Add mid-route layover points to the same routes to accommodate this change.
- Extend the D4 west from McPherson Square to Sibley Hospital.
- Implement the K Street Busway concept, revisiting operations of the D routes through downtown when this improvement is constructed.

F8 Route

Short-term Recommendations

- Add additional buses to the afternoon service to bring headways to 30 minutes.
- Add recovery time at terminal stops and at key points such as Cheverly Metrorail Station, Prince George’s Hospital, West Hyattsville, and Prince George’s Plaza.
- Consider extending service to 11:00 PM.

Long-term Recommendations

- Consider extending the F8 route to the Largo Town Center Metrorail station.

P12 Route

Short-term Recommendations

- Add recovery time at terminal stops and at key points such as Eastover Shopping Center, United Medical Center, Southern Avenue, Iverson Mall, Suitland, and Addison Road.
- More thorough cleaning of buses at night to address passengers’ concerns about graffiti.
- Reroute to avoid the United Medical Center entrance keeping the route on Southern Avenue.

- Stay on Southern Avenue between Southview Drive and Eastover Shopping Center, avoiding the traffic calming devices in the area along Iverson Street, Kennebec Street, Deal Drive and Audrey Lane that slow the buses near the apartment complexes.

Another need that was identified as a constant between all routes is the need for additional street supervisors. More or improved supervision might be a lower cost option to improve on-time performance, schedule adherence and to ensure buses arrive and depart major time points as close as possible to the given schedule.

Traffic Operations

Traffic operations recommendations include techniques to aid buses in getting through traffic more quickly, therefore improving the reliability of the routes. The recommendations included in this report focus on two primary improvements: bus priority lanes and signal prioritization. Due to the capital investment inherent is such improvements as well as the need for coordination with local jurisdictions, these recommendations should all be considered long-term improvements.

Bus priority lanes are lanes from the general roadway that have been dedicated to bus traffic only. They can be separated physically from the remaining lanes by barriers or marked by distinctive pavement coloring and markings. Bus priority lanes can be in effect at all times, or they can be limited to certain times of day, such as the peak travel periods. By providing a lane that is clear of general traffic, bus priority lanes can dramatically improve the travel times of bus transit. In some cases, they can improve general traffic either by removing the impediment of buses stopping to board and alight passengers or attracting motorists to ride speedier transit service.

Transit traffic signal prioritization is a technology that connects the traffic signal system to a sensor system on each bus. When buses are approaching a prioritized signal, the green phase will be extended for the approaching bus, or a red phase will be shortened. The end result is that buses are afforded the opportunity to pass through intersections on their routes with less overall waiting time.

Where both techniques are employed, queue-jump lanes can be created. The queue-jump principle is based on re-calibrating an intersection’s signals to give a green light to one lane before all others, allowing buses to pass through the intersection and get up to speed. Often the prioritized lane will be the furthest lane to the right, where buses will generally be if they have stops to make before or after the intersection.

The long-term traffic operations recommendations on a line-by-line basis are summarized below.

Washington Boulevard Line

- Bus priority lanes and signal prioritization at 35 intersections.
- Signal prioritization only at five intersections on Lee Highway in the City of Falls Church.
- Signal prioritization at 29 intersections on Lee Highway.

D1-8 Routes

- Implement traffic signal prioritization at three intersections on C Street NE.
- Implement traffic signal prioritization at three intersections on Reservoir Road NW.
- Implement traffic signal prioritization at nine intersections on H and K Streets NE between Union Station and Ivy City.

- Implement traffic signal prioritization at eleven intersections served by the D8 on 4th Street NE, 9th Street NE, Brentwood Road NE, and Rhode Island Avenue NE.
- Implement bus priority lanes on K Street NW in accordance with the K Street Busway Study[3].

F8 Route

- Bus priority lanes and signal prioritization at 15 intersections.

P12 Route

- Bus priority lanes and signal prioritization at three intersections.

Customer Communications

The recommendations to improve customer communications are similar for all routes covered in this study. Due to level of expense and effort, they can be categorized into short-term and medium to long-term recommendations.

Short-term recommendations to improve communications include:

- Improve availability of schedules in buses and at Metrorail stations along route.
- Update schedules posted at stops to reflect new services, highlighting the key information used by riders in an easy-to-read and visible format.
- Increase provision of information in Spanish for all routes, and in Vietnamese for the Washington Boulevard Line.
- Establish the practice of on-board announcements by drivers to announce upcoming transfer points to rail transit, major destinations, and major bus routes.
- Provide and promote capabilities to access real-time next bus information via phone and internet, including hand-held wireless devices.
- Where ridership is sufficient to justify the installation, provide real-time next bus displays that indicate when the next vehicle will arrive and the route it is serving.

Medium- and long-term recommendations include:

- Provide signs in Spanish and English (also Vietnamese for the Washington Boulevard Line).
- Install onboard automated annunciators to communicate stop locations, transfer opportunities, service delays and other information to the transit user. Include enhanced sound quality for easier comprehension and Spanish stop announcements where needed.
- Replace damaged or missing information cases at stops. Alter displays so that information faces towards sidewalks and shelters, rather than towards the street.

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[3] DDOT, *K Street Busway Study*, 2004, http://ddot.dc.gov/ddot/frames.asp?doc=/ddot/lib/ddot/information/studies/dc_congestion_taskforce/pdf/k_street_final_report_executive_summary.pdf

Stops and Facilities

In several portions of the routes studied, stops are very closely spaced and have low passenger volumes. These areas are candidates to have stops consolidated. By route, the areas where stop consolidation should be considered are:

Washington Boulevard Line

- Along North and South Washington Boulevard between I-66 and Annandale Road.
- Along Lee Highway from Graham Road to Gallows Road.
- Along Blake Lane from Lee Highway to Jermantown Road.

D1-8 Routes

- Stop consolidation not required.

F8 Route

- Along Merrimac Drive / 14th Avenue / Kanawha Street near the apartment complexes at the north end near Langley Park.
- Along Adelphi Road from the University of Maryland to Toledo Road.
- From Prince George's Hospital to the Cheverly Metrorail Station.

P12 Route

- Along Central Avenue from the Addison Road station to Shady Glen Drive.
- Along Shady Glen Drive / Walker Mill Road / County Road to Marlboro Pike.

In addition to areas identified for stop consolidation, several areas where additional amenities, such as benches, shelters, improved signage or trash cans, were required. This study recommends additional stop amenities on a basis of total ridership, as well as special considerations that have the potential to improve the overall functioning of the routes. By route, these recommendations are:

Washington Boulevard Line

- Additional stop amenities at three locations: Fair Oaks Mall, Washington Street at Broad Street, and Lee Highway at Gallows Road.
- Operators-only restrooms at Tysons Corner and Fair Oaks Mall.
- Study the prospects for a transit center in the vicinity of Gallows Road and Lee Highway.

D1-8 Routes

- New shelters at 14 locations.
- New benches at 13 locations.
- Minor amenity improvements, such as trash cans and schedule information, at 9 locations.

F8 Route

- Include operators-only restrooms in the design for the proposed transit center at Takoma-Langley Park.

P12 Route

- New shelters at three locations and shelter improvements at three locations.

INTRODUCTION

Project Purpose

The Washington Metropolitan Area Transit Authority's (WMATA) 2003 Regional Bus Study[4] identified continuous improvements to quality of service and enhanced reliability as priorities for advancing the Washington region's bus network and ensuring it continues to be attractive to riders. To that end, WMATA periodically reviews the performance of its bus routes to ensure that they are providing riders with the best possible combination of services. In this study, WMATA has reviewed in detail the operations of the following bus routes:

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- The P12 Route (Eastover – Addison Road Line)

The purpose of this study is to review the productivity, travel time and reliability, crowding, frequency and quality of service indicators, as outlined in the Metrobus Network Evaluation and Future Fleet Needs study[5], for each of the routes listed above. This study recommends changes, including additional service, routing changes, intersection improvements, stop and facility improvements, and steps to improve customer communications, that are essential to address the strategic needs of each route.

Project Process

Analysis of Existing Conditions

The study team first collected the necessary background information for understanding and evaluating the current operating conditions. The current performance indicators of each route were evaluated, as were the specific traffic conditions under which each route operates.

<u>Transit Service Assessment</u>

The Transit Service Assessment focused on existing operating parameters collected during the Spring and Summer of 2008, as well as information gathered from WMATA bus operations staff, Supervisors and Service Planners. All information relevant to route performance was compiled, including span and frequency of service, vehicle requirements, on-time performance, boardings and alightings, accident rates and route miles. The team also looked at the history of each route and changes that had been made in the past. The data that was gathered was then converted into factors such as passenger loads

[4] WMATA Regional Bus Study, 2003, http://wmata.com/pdfs/planning/RegBusStudy.pdf

[5] Metrobus Network Evaluation and Future Fleet Needs, WMATA, 2007, http://wmata.com/pdfs/planning/Metrobus_Network_Eval_ExecSummary%20final%20April%2018.pdf

(compared to capacity) and productivity (in terms of revenue hours to platform hours and boardings per revenue hour). The subsidy contribution of each route was evaluated in terms of subsidy per boarding and cost recovery ratio.

Traffic Operations Analysis

Traffic conditions were evaluated for each of the four route families in this study: the D1-8, the The Washington Boulevard Line, the P12, and the F8 routes. The goal in evaluating traffic conditions is to determine which places along each route are suffering from delays due to traffic congestion and what mitigation (if necessary) could be implemented to allow the route to operate more efficiently. Conditions were assessed first by field observation by the study team and then by using a variety of traffic information, including average daily traffic (ADT) volumes, and roadway congestion in the form of volume to capacity ratio. Due to the many jurisdictions involved and because there is not a standard way to keep information, intersection volumes were not available in most locations. As a result, traffic conditions were assessed using broad data like corridor traffic congestion and not specific intersection information.

A large portion of the analysis relies on calculated roadway network link congestion. Link congestion was evaluated by using volume to capacity (v/c) ratio information which is part of the Metropolitan Washington Council of Governments (MWCOG) regional trip model. In order to calculate this ratio traffic volumes were taken from the most recent volume measurements on a stretch of roadway while roadway capacity was calculated by functional classification and number of travel lanes as provided by the Highway Capacity Manual. The result is a ratio that illustrates the amount of traffic congestion a particular stretch of roadway is experiencing. A v/c ratio below 0.8 is considered not congested, while a v/c ratio above 1.0 means the roadway experiences congestion. A v/c ratio between 0.8 and 1.0 is a gray area, and is considered to be “somewhat to moderately” congested. While a v/c ratio of 0.8 – 1.0 means traffic volumes are technically less than the capacity of the roadway, it is at this point that saturation of travel lanes begins to occur, and a driver’s perception is that of slight congestion.

The result of using the v/c ratio is that it can show which roadways along each route is experiencing congestion and whether that congestion is contributing to the overall delay of the bus route. For this study, traffic congestion was assessed using weekday AM and PM peak period traffic.

Intersection volumes and congestion were also evaluated for select signalized intersections along each of the routes, although this information was not available for intersections in all areas. Intersection congestion is typically measured as the amount of delay experienced by motorists as they make their way through the intersection. Formulas found in the Highway Capacity Manual (HCM) calculate delay by taking into account intersection configuration, traffic volumes, and signal timing. HCM also provides a level of service rating that provides a letter grade based on the seconds of delay. With respect to bus route service evaluation, congested intersections were evaluated for the movement that the bus makes through the intersection, typically a through movement.

Evaluation of congestion then allowed the study team to make recommendations on how to mitigate traffic congestion delays for portions of each of the routes. Recommendations took into account not only the amount of delay experienced by the bus, but also what is considered normal congestion for an area, major cross streets, and the surrounding built environment. Since the routes assessed in this study vary in geography, recommendations are not the same in all areas. What may be the best solution for suburban Northern Virginia may make little sense in downtown Washington, or vice versa.

Recommendations to alleviate traffic congestion delays come in many forms. The lowest cost to implement would be a traffic signal priority system that allows green time for the bus to pass through the intersection. This makes the most sense where a single corridor is the dominant movement for traffic and changing cycles to accommodate buses would not disrupt crossing traffic. Of course, this is not always practical, especially in areas where several arterials moving in all directions are important to regional movement.

A more costly solution would be to implement bus priority lanes at congested intersections. Intersections typically are where buses (and all vehicles) are delayed. Bus lanes would allow the bus to skip past queued traffic, which makes for a quicker and efficient bus ride especially when combined with traffic signal priority.

Both of these stop short of putting a bus route on exclusive right of way, which typically occurs on bus rapid transit (BRT) systems. BRT encompasses more than just signal priority for buses, and usually reflects a larger policy direction for the transit agency. The intent of these recommendations is not a BRT system, but instead to help the route operate more efficiently. Thus, recommendations found here are strictly intersection improvements in order to help the route operate in a timely and efficient manner.

Public Involvement

Public involvement activities, which began in September 2008, included a newsletter, a website (www.MetrobusServiceEvaluation.com), a comment hotline (202-370-2915), and two rounds of public involvement meetings. Comments from the meetings, website, hotline, and from correspondence sent directly to WMATA project staff are summarized by route later in this report.

The intent of the first round (September/October 2008) of public meetings was to gather customer complaints, suggestions and other comments related to the existing routes. This information was essential to understanding how the route is used, identifying problems, and developing strategies for each of the routes. The newsletter and other printed materials describing the study (attached in Appendix 1) were distributed to public officials and other interested parties to announce the meeting dates and times for each line. These materials encouraged the submission of comments at the meeting, on the website, or through the hotline. Flyers were placed in buses and at some station areas for the same purpose.

The second round of public involvement activities (January/February 2009) was held primarily to gain feedback on the proposed strategies before finalization. Flyers were again posted in buses to publicize the dates and times of the meetings. Newsletters and other materials were distributed to participants from the first-round meetings, as well as public officials and other interested parties. All promotional materials for the second round meetings encouraged the submission of comments at the meetings, on the project website, or through the hotline. Second round newsletters and bus flyers were printed with Spanish text in response to comments made during the first round meetings.

Project Website

A project website, www.MetrobusServiceEvaluation.com, was set up and advertised in mid-September to provide information on the project, meeting locations, and to accept comments from the public. The website accepted individual comments, and viewers could also fill out a brief questionnaire on their use and opinion of their routes. After the first round of public involvement was completed, the questionnaire was removed from the website. For the second-round public meetings, only a comment space was provided. Overall, 94 valid questionnaires, and over 125 valid comments were received. Questionaires and comments that were blank or which referred to routes not covered in the study were discarded.

THE WASHINGTON BOULEVARD LINE (2A, 2B, 2C, 2G)

Transit Service Assessment

Service Performance

The Washington Boulevard Line operates between Ballston Metrorail station and Fair Oaks Mall. The Washington Boulevard Line has over 1,500 revenue miles each weekday, over 1,000 revenue miles on Saturdays, and roughly 350 revenue miles on Sundays. Service frequency is highlighted in Table 1.

Table 1: Metrobus Service Frequency for the Washington Boulevard Line

Route 2A		Headways (Minutes)				
Day	**Route**	**Early AM**	**AM Peak**	**Mid Day**	**PM PK**	**Late Eve**
MF	Dunn Loring Merrifield – Ballston MU	30	-	-	-	30
Sat	Dunn Loring Merrifield – Ballston MU	60	-	-	-	30
Sun	Dunn Loring Merrifield – Ballston MU	60	-	-	-	60

Route 2B		Headways (Minutes)				
Day	**Route**	**Early AM**	**AM Peak**	**Mid Day**	**PM PK**	**Eve**
MF	Fair Oaks Mall – Ballston MU	30	30	60	30	60
Sat	Fair Oaks Mall – Ballston MU	60	60	60	60	60

Route 2C		Headways (Minutes)				
Day	**Route**	**Early AM**	**AM Peak**	**Mid Day**	**PM PK**	**Eve**
MF	Tysons Corner Center – Ballston MU	30	30	60	30	60
Sat	Tysons Corner Center – Ballston MU	60	60	60	60	60
Sun	Tysons Corner Center – Ballston MU	-	60	60	60	-

Route 2G*		Headways (Minutes)				
Day	**Route**	**Early AM**	**AM Peak**	**Mid Day**	**PM PK**	**Eve**
MF	Fair Oaks Mall – Ballston MU	30	30	-	30/60	-

***Route 2G operates in one direction only: Ballston MU – Fair Oak Mall (AM) and Fair Oak Mall – Ballston MU (PM)**

Weekday running times are provided in Table 2. For the 2A, average one-way running times are 28 minutes eastbound and 25 minutes westbound on Saturdays and Sundays. The 2B averages 58 minutes eastbound and 54 minutes westbound on Saturdays. The 2C averages 43 minutes eastbound and 39 minutes westbound on Saturdays and 41 minutes in both directions on Sundays. Running time allocation, including the amount of time spent in transit, loading, and sitting at signalized intersections was not available for inclusion into this report.

Table 2: Metrobus Weekday Running Times for the Washington Boulevard Line

Route		Weekday Early AM	Weekday AM Peak	Weekday Midday	Weekday PM Peak	Weekday Evening
2A	Dunn Loring Merrifield – Ballston MU	EB: 28 min	-	-	-	EB: 23 min WB: 26 min
2B	Fair Oaks Mall – Ballston MU	-	EB: 66 min WB: 56 min	EB: 65 min WB: 62 min	EB: 69 min WB: 70 min	EB: 52 min WB: 52 min
2C	Tysons Corner Center – Ballston MU	-	EB: 45 min WB: 46 min	EB: 44 min WB: 45 min	EB: 47 min WB: 47 min	EB: 37 min WB: 40 min
2G	Fair Oaks Mall – Ballston MU	-	EB: 66 min	-	WB: 70 min	-

Table 3 shows the estimated operating costs and subsidies for the Washington Boulevard Line. Farebox revenue on weekdays averages $665,000, or 21 percent of daily costs. Farebox revenue averages $77,000 on Saturdays and $30,000 on Sundays, which is approximately 19 percent and 21 percent of daily costs, respectively.

Table 3: Metrobus Route Cost Data for the Washington Boulevard Line

	MF	Sat	Sun
Daily Operating Costs:	$12,143	$7,804	$2,778
Daily Revenue:	$2,543	$1,456	$586
Costs Per Rev Hour:	$133	$139	$140
Operating Costs / Trip:	$116	$108	$82
Annual Operating Costs:	$3,169,258	$405,789	$144,476
Subsidy / Boarding:	$2.72	$3.14	$2.69
Subsidy / Rev. Hour:	$105.34	$113.45	$110.28
Subsidy / Trip:	$91.43	$88.16	$64.48
Cost Recovery Ratio:	21%	19%	21%

Source: WMATA – June 2008 Time and Miles Calculations

Fare payment data from May 2008 revealed that the majority of passengers paid with cash. Table 4 shows fare payment methods for the Washington Boulevard Line:

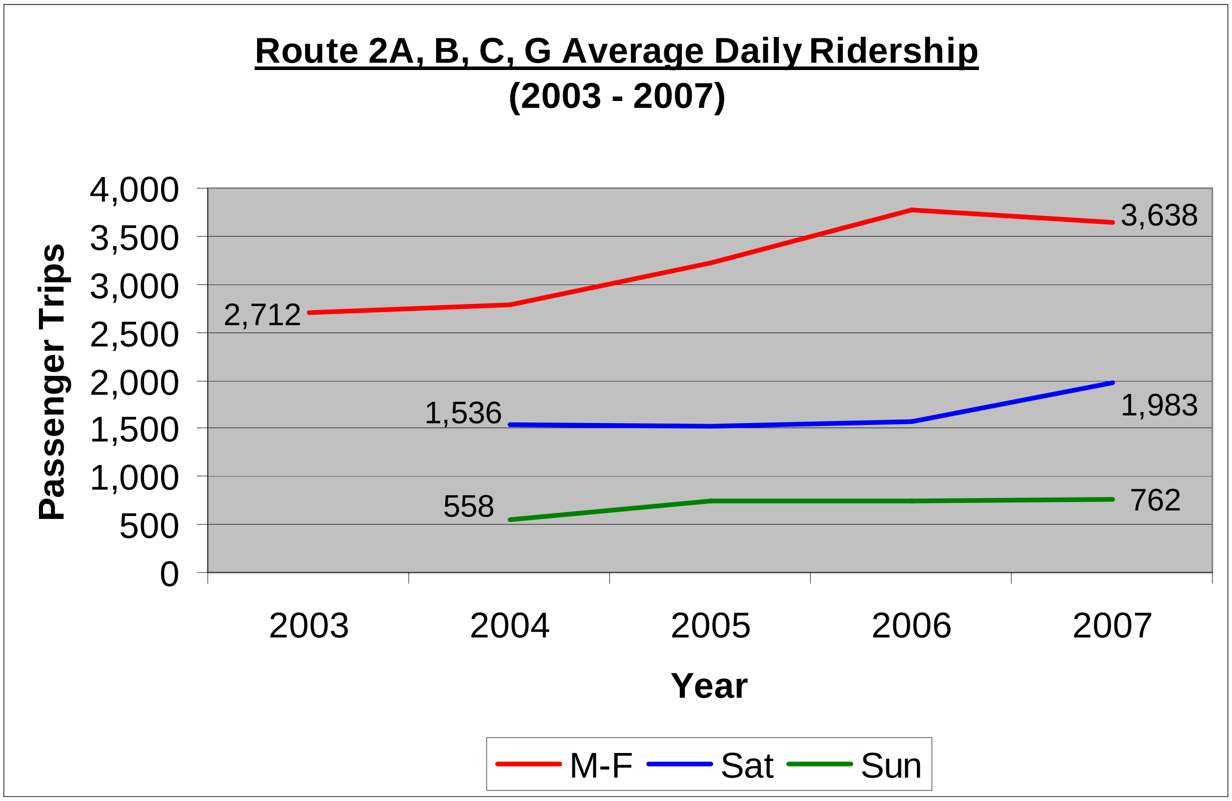
Table 4: Metrobus Fare Payment Method for the Washington Boulevard Line

	Percent (%)
Cash	51.3
Bus Transfer	25.9
Flash Pass	10.7
Rail Transfer	9.1
Elderly & Disabled	2.8
Student	0.1
Other	0.2

Ridership

As of July 2008, daily passenger trips for the Washington Boulevard Line combined averaged 3,532 trips on weekdays, 2,022 trips on Saturdays, and 814 trips on Sundays. Figure 1 shows average daily passenger volume between 2003 and 2007 for the combined Washington Boulevard Lines. Over the last few years there has been an increase in total ridership from 729,163 in 2003 to 1,157,258 in 2006. However, in 2007 there was a slight decline in ridership to 1,154,916.

Figure 1: Metrobus Average Daily Ridership for the Washington Boulevard Line



Note: All figures shown are calendar year averages. Saturday/Sunday service started in July, 2004.

Figures 2 and 3 show eastbound and westbound boardings and alightings for the Washington Boulevard Line. The figures illustrate that in both the eastbound and westbound direction, the most activity occurs on Lee Highway between Gallows Road and Graham Road. Metrorail stations are also among the highest boarding and alighting locations.

For eastbound trips, the busiest boarding stops include Lee Highway/Gallows Road (172), Fair Oaks Mall (141), and Vienna station (81). Stops with the highest number of alightings include Ballston-MU station (368), East Falls Church station (247), and Vienna station (110).

For westbound trips, the busiest boarding stops include East Falls Church station (229), Washington Street/Broad Street (169), and Vienna station (160). Stops with the highest number of alightings include Lee Highway/Gallows Road (159), Fair Oaks Mall (155), and Lee Highway/Hollywood Road (86).

Figure 2: Washington Boulevard Line Weekday Eastbound Boardings and Alightings

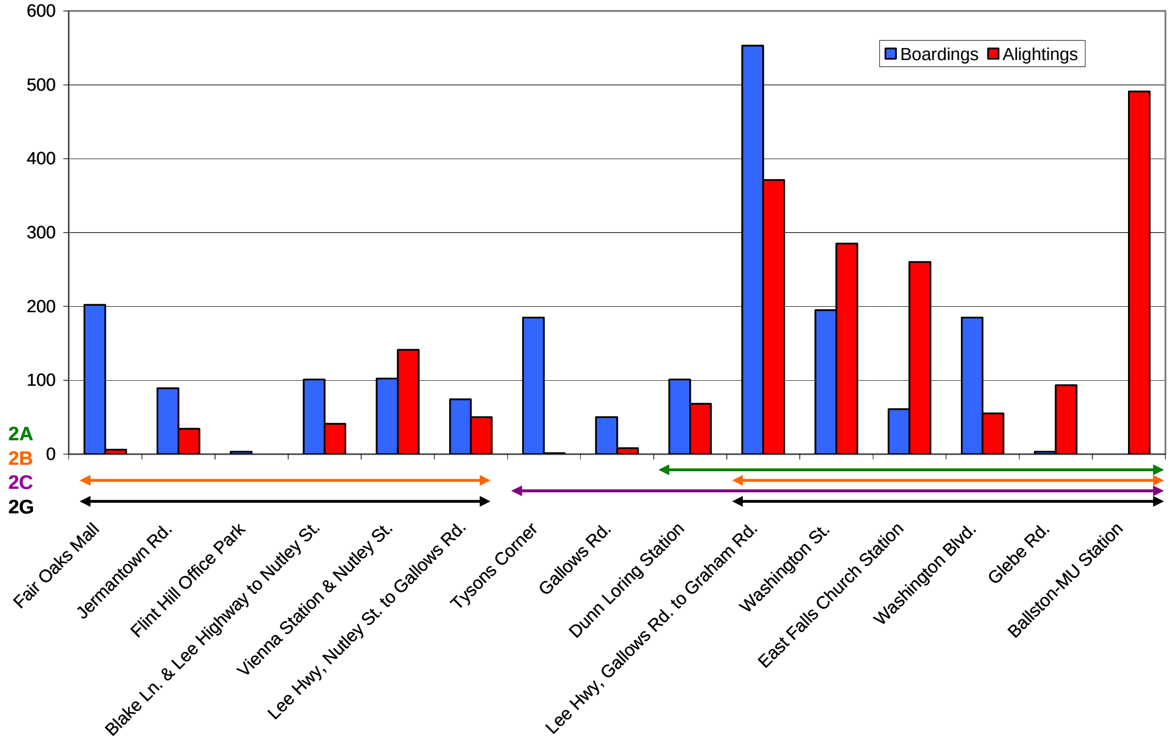
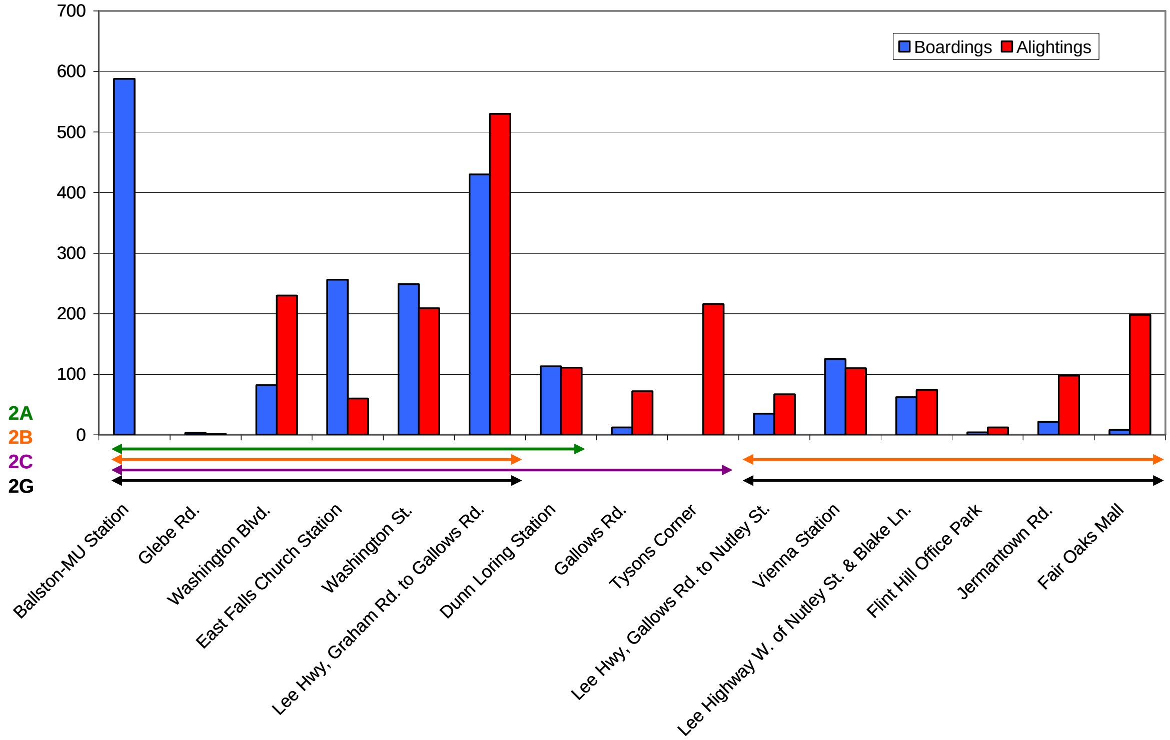


Figure 3: Washington Boulevard Line Weekday Westbound Boardings and Alightings



Peak load information was provided by the five standard weekday time periods, as shown in Table 5. The raw data gave overall counts of the numbers of passengers who boarded and alighted at each stop during these five time periods. Subtracting alightings from boardings gives a running total of the number of passengers aboard for each segment of the route, allowing the peak load point to be identified. The peak load for each time period was divided by the number of trips made during that period to determine the peak load for an average trip. These averaged peak loads were then compared to bus capacities (54 passengers during peak periods and 45 passengers during off peak and weekend periods) to determine the vehicle loading figures for each time period.

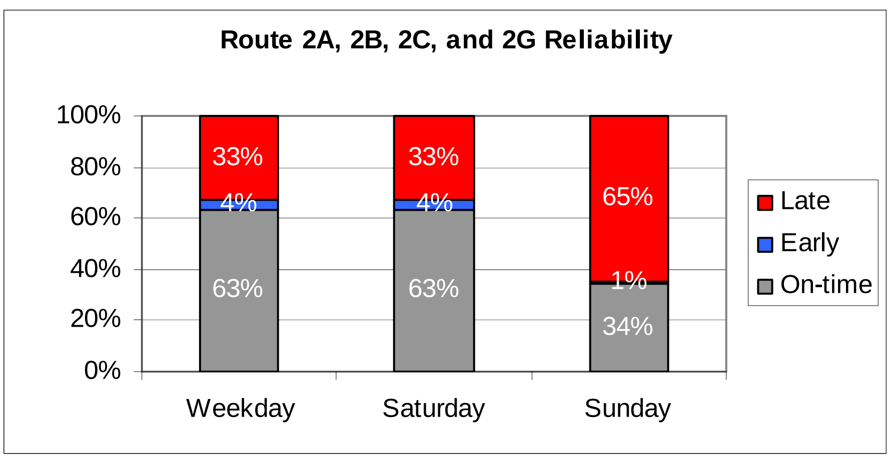
Table 5: Metrobus Vehicle Loading at Peak Load Points for the Washington Boulevard Line

	Early AM	AM Peak	Midday	PM Peak	Evening
2A	EB: 23%	-	-	-	WB: 14%
2B	-	EB: 41% WB: 23%	EB: 36% WB: 31%	EB: 29% WB: 29%	EB: 25% WB: 35%
2C	-	EB: 28% WB: 33%	EB: 32% WB: 26%	EB: 25% WB: 33%	EB: 17% WB: 26%
2G	-	WB: 11%	-	EB: 26%	-

On-time Performance

As shown in Figure 4, the Washington Boulevard Line was most reliable on weekdays and Saturday, with buses arriving on-time an average of 63 percent of the time. On-time performance significantly dropped on Sunday with about 34 percent of buses arriving on-time. Anecdotal evidence suggests that the line performs worse on Sundays because of the 60-minute headway and the more limited number of trips on Sundays. Once a bus gets off schedule and becomes late, that “lateness” is compounded after every subsequent run and there are fewer opportunities to make up the lost time. Additionally, the congestion levels at retail activity centers such as near Ballston and Fair Oaks Mall are still high, even on Sundays.

Figure 4: Metrobus On-Time Performance for the Washington Boulevard Line



Traffic Operations

The Washington Boulevard Line runs through Northern Virginia parallel to both I-66 and the Metrorail Orange Line. Explosive growth in this corridor for both jobs and people has led to extreme congestion along many arterials within the area. Field observation showed that Gallows Road, Lee Highway, and Washington Boulevard all have a distinctive traffic patterns during the AM and PM peaks towards and from major employment centers. The field check showed most congestion occurring along the route on Gallows Road and on Lee Highway between Broad Street in Falls Church and Blake Lane in Fairfax City.

Average Daily Traffic (ADT) measurements confirmed these observations. Figure 5 details ADT along the Washington Boulevard Line.

Congestion for the corridor was measured using volume to capacity ratio (v/c) during the AM and PM peaks. Figures 6 and 7 show AM and PM traffic, respectively. The maps confirm field observations. The heaviest congestion for the route occurs on Lee Highway (US 29) between Broad Street (SR 7) in Falls Church and the portion of Gallows Road from Oak Street south to Lee Highway. This congestion affects the 2B, 2C, and 2G routes during the AM and PM peaks. Congestion also appears to be a problem on Lee Jackson Memorial Highway near Fair Oaks Mall. However, since the 2B and 2G routes only run on this roadway for a small distance and exit to a ramp almost immediately, it is not considered to affect route operations.

Further analysis of the route was completed by assessing the operations of individual signalized intersections on Gallows Road and Lee Highway (US 29) in Fairfax County – the most congested portions of the entire route. Table 6 shows the level of service for different movements at these intersections in the AM and PM peaks. Only the movement used by the bus route is shown in the table.

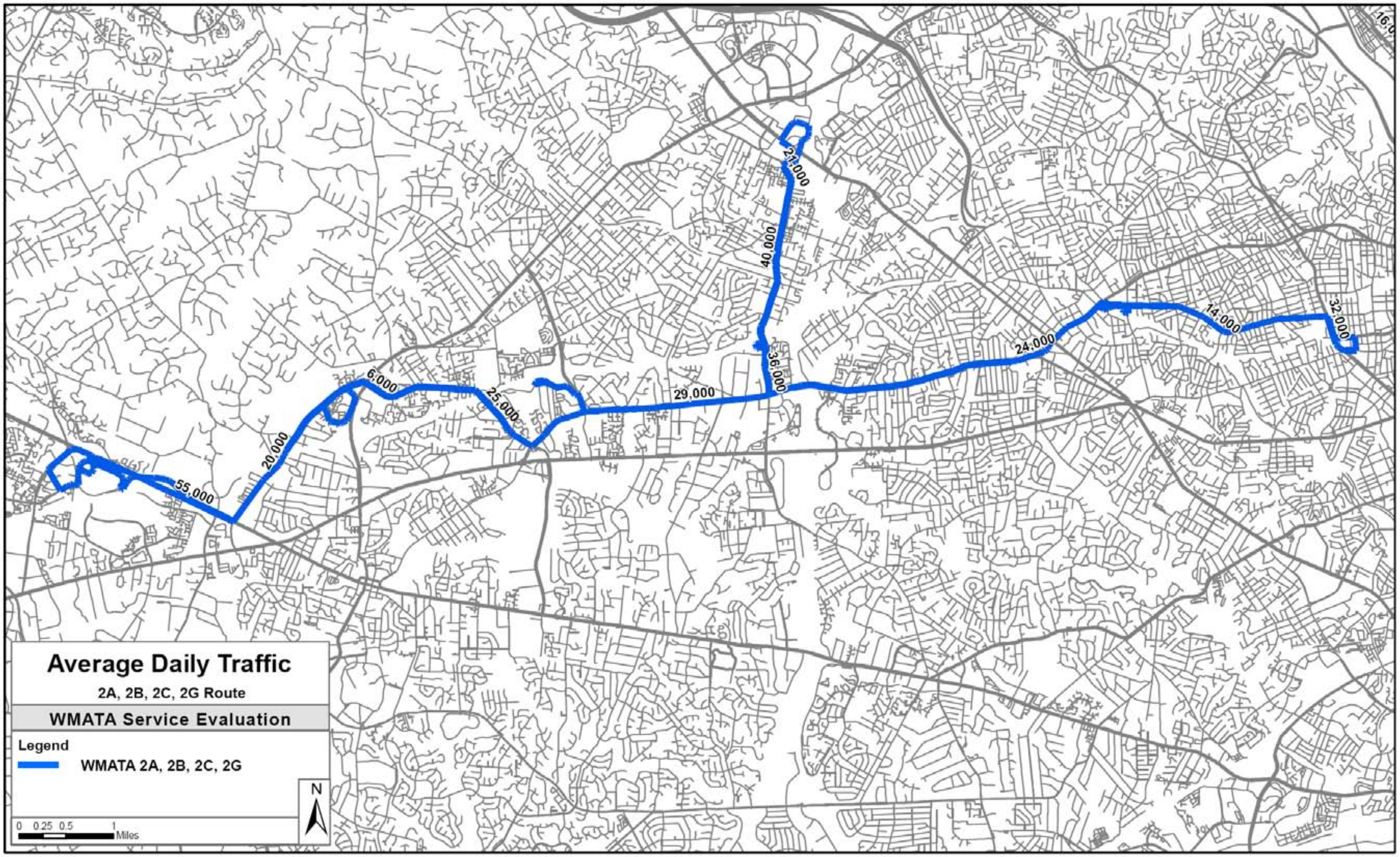
Table 6: Intersection Delay and LOS for Select Intersections on the Washington Boulevard Line

	AM Peak								PM Peak							
	EB LT	EB TH	WB TH	WB RT	NB TH	SB LT	SB TH	SB RT	EB LT	EB TH	WB TH	WB RT	NB TH	SB LT	SB TH	SB RT
Lee/Woodley		18.1/B	21.9/C							21.6/C	24.9/C					
Lee/West		25.3/C	17.7/B							30.1/C	23.8/C					
Lee/Cedar		33.0/C	38.3/D							16.2/B	51.6/D					
Lee/Nutley	63.6/E			31.8/C		66.8/E		26.5/C	191.3/F			15.2/B		55.5/E		26.0/C
Gallows/Oak					40.9/D		18.9/B						13.6/B		19.6/B	

Source: Virginia Department of Transportation (VDOT)

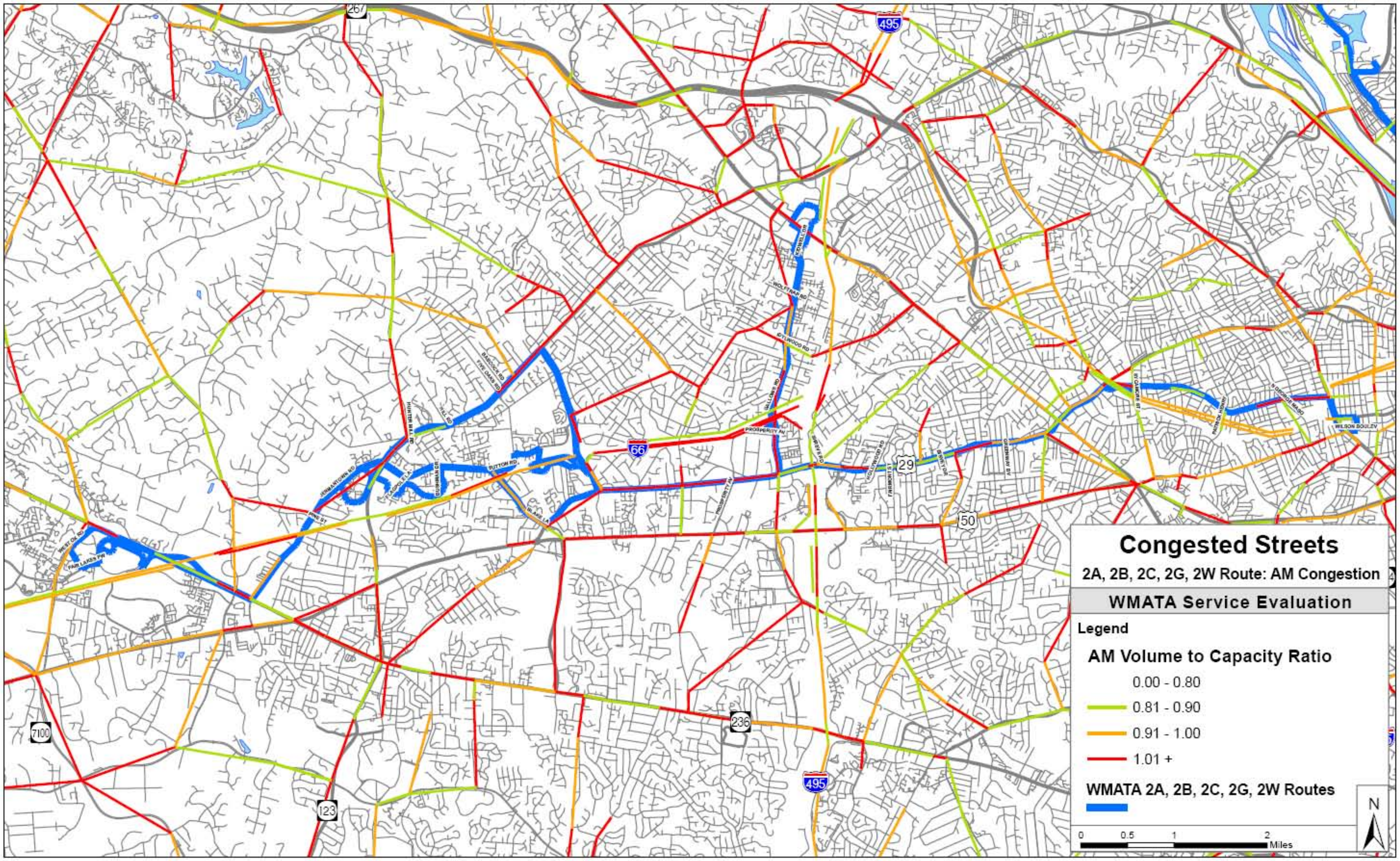
The selected movement for bus operations all operate at a LOS of D or better for both AM and PM peak, which is typically considered acceptable. The one exception to this is the intersection of Lee Highway (US 29) and Nutley Street (SR 243). At this intersection buses traveling eastbound turn left onto northbound Nutley Street to access the Vienna/Fairfax-GMU Metrorail Station. Buses experience a large amount of delay turning from southbound Nutley Street to eastbound Lee Highway.

Figure 5: Washington Boulevard Line Average Daily Traffic



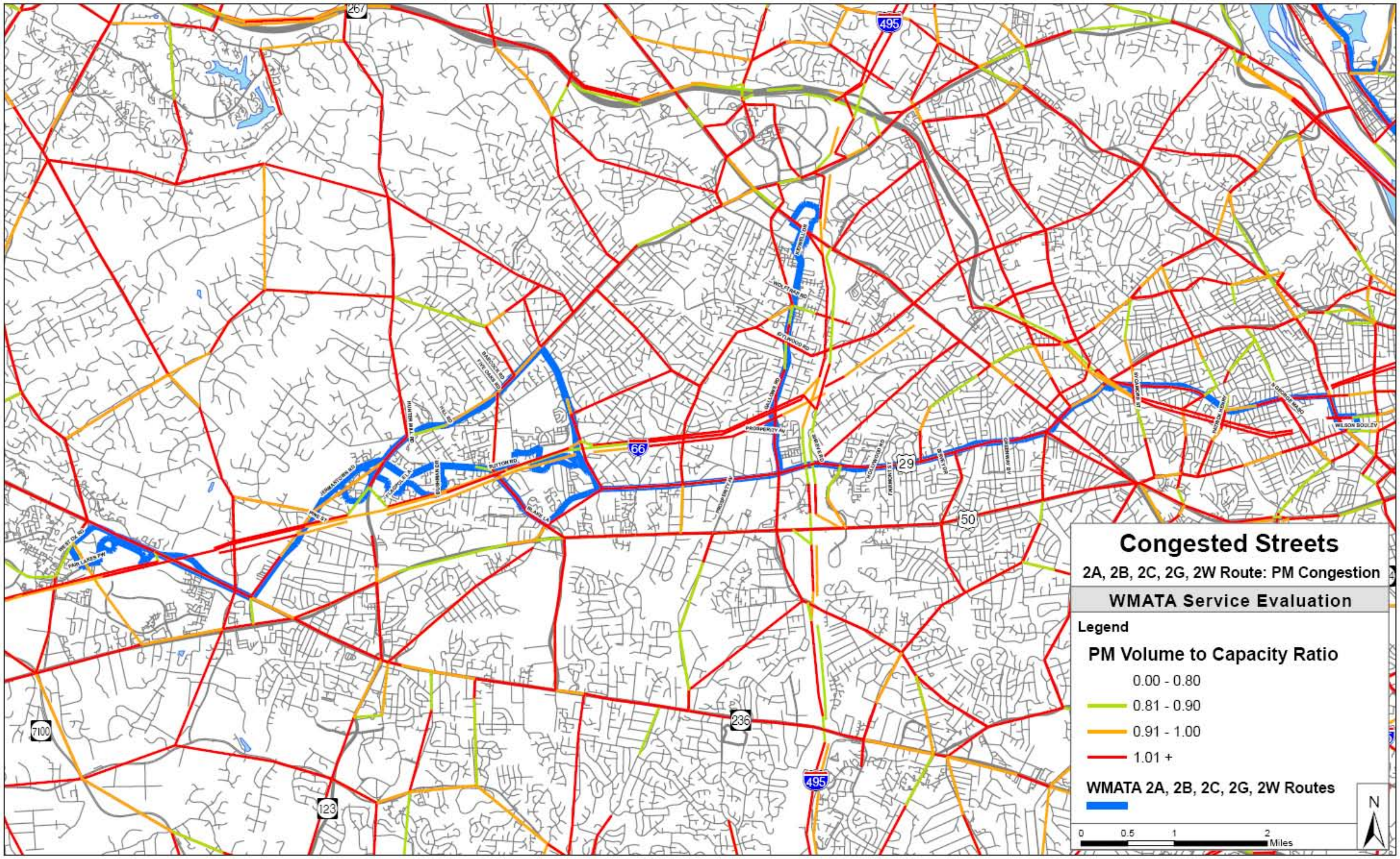
Data Source: Virginia Department of Transportation (VDOT)

Figure 6: Washington Boulevard Line AM Peak (7:00-8:00) Congestion Based on V/C Ratio



Data Source: MWCOG Regional Trip Model

Figure 7: Washington Boulevard Line PM Peak (5:00-6:00) Congestion Based on V/C Ratio



Data Source: MWCOG Regional Trip Model

Public Involvement Process

The first-round public meeting for the Washington Boulevard Line was held on September 30, 2008 in the Episcopal Church of the Holy Cross at 2455 Gallows Road in Dunn Loring, Virginia. The second-round meeting was held on February 4, 2009 at Mosby Woods Elementary School at 9819 Five Oaks Road in Fairfax, Virginia.

Comments from the meetings, website, hotline, and other correspondence are summarized below.

September 2008 Comments

Primary concerns included:

- Unreliable – buses arrive early or late too often.
- Consider breaking up the route.
- Need more frequent service
- Expand span of service, especially on weekend mornings.
- Too many stops – should consolidate
- Safety concerns related to traffic at some stops
- Buses are often not clean.

Other Comments:

- Consider a Y-Express bus to downtown DC to relieve crowding on the Orange Line.

February 2009 Comments

Primary concerns included:

1. Consolidating the stops has consequences for people who are less ambulatory. It will make their walks to stops longer
2. If the route is split, some passengers may miss the connections; need to give them ample time to make the transfer at the station. Also need to know how many through trips will be affected

Other Comments:

- The bench near Germantown Road and AT&T building needs to be replaced.
- Jermantown Road and US 123 is where the 2B and the 15M cross paths, though these routes do not share a bus stop for transfers. Due to the distance passengers must traverse on foot when transferring, as well as the tightness of the schedule, missed transfers are common. Additionally, this location needs more amenities.
- Signal synchronization in conjunction with bus priority is a good idea.
- Make SmarTrip more widely available and easier to recharge.

Recommendations

Service Planning

Various options for changing and/or improving the existing service on the route were developed. These proposed service changes and recommendations were developed as a direct result of the following:

- Field analysis and observations.
- Analysis of the existing operating conditions.
- Discussions with bus operators and supervisors.

- Discussions with riders at public meetings and comments from riders via the website and telephone.
- Discussions with WMATA planning and operations staff and jurisdictional partners.

<u>Service Frequency</u>

1. Overall, the Washington Boulevard Line has sufficient capacity to handle the passenger loads for most of the day on each line. However, there are some time periods when the passenger loads per bus are high enough to warrant additional service. To address crowding during these periods, additional buses/ trips should be added to the 2B and 2C on weekdays. These extra buses would help improve on-time performance and offer more opportunities for customers to transfer between lines, especially near the City of Falls Church and at Metrorail Stations. Extra buses would alleviate crowding, reduce dwell times at stops and provide a "cushion" in the schedule to maintain reliability along the heaviest-traveled portions of the line. The recommendation is for six to eight additional round trips for both the 2B and 2C (total of 12 to 18 extra one-way trips daily on weekdays), with four trips (total) provided in the peak period. The off-peak extra service could be spaced throughout the midday period. These additional buses could be added could be added for an initial evaluation period without modifying the published route schedules, and adjustments could be made before the changes are made permanent. Operating costs for the additional weekday service are shown on pages 6 and 7 of Appendix 2.
2. The 2B does not operate on Sundays, prompting complaints from some customers about a lack of access to Fair Oaks Mall. WMATA should consider running a few 2B buses on Sunday beginning mid morning, perhaps at 9:00 or 10:00 AM; and continuing hourly until approximately 6:00 PM. This would add approximately ten additional trips on Sunday to the existing schedule. This expanded Sunday service could be used by shoppers and workers destined for Fair Oaks. Operating costs for the additional Sunday service are shown on page 6 of Appendix 2.
3. Customers suggested operating route 2G in the peak direction during peak periods because the Arrowhead area, bounded by I-66, Jermantown Road, and Chain Bridge Road, has numerous residents and employees desiring direct, time-specific access to Metrorail stations and other destinations. Currently Route 2G serves Arrowhead Drive only in the off-peak direction. The service currently targets reverse commuters transferring from Metrorail destined for businesses on Arrowhead Drive. WMATA may want to increase the service to accommodate this request as an experiment to actually see if the ridership is present and sustainable before it commits to implementing the service on a permanent basis. Currently, there are four westbound trips in the AM peak and five PM eastbound trips in the PM peak. Running an equal service of eastbound and westbound trips in both the AM and PM peak periods would result in some more operating costs and can be easily and cost effectively accommodated by using some existing 2B runs from Fair Oaks Mall in the eastbound direction in the morning, and from Ballston in the westbound direction in the afternoon. For instance, the following 2B eastbound buses could become 2G buses with all of them starting at Fair Oaks Mall.
    - The 5:53 AM departure from Jermantown Road at the AT&T building
    - The 6:14 AM departure from Jermantown Road at the AT&T building
    - The 6:44 AM departure from Jermantown Road at the AT&T building
    - The 6:49 AM departure from Sears at Fair Oaks Mall

- The 7:19 AM departure from Sears at Fair Oaks Mall
- The 7:54 AM departure from Sears at Fair Oaks Mall

Likewise, in the PM peak direction westbound, the following runs would be converted to 2G buses and run along Arrowhead Drive / Arrowhead Circle:

- The 3:10 PM departure from Ballston
- The 3:45 PM departure from Ballston
- The 4:15 PM departure from Ballston
- The 4:45 PM departure from Ballston
- The 5:15 PM departure from Ballston
- The 5:45 PM departure from Ballston

<u>Service Route Changes</u>

1. Both operators and passengers have commented that service reliability is compromised because the routes are too long. This is especially true of the 2B and 2G which run almost 20 miles from Ballston to Fair Oaks Mall. The WMATA Regional Bus Study, as well as customers, operators, and service planners in Fairfax County have all suggested this route be split. This would, however, introduce a forced bus-to-bus transfer for passengers traveling through along the whole route A logical point to break the route would be at the Dunn Loring Metrorail Station, although additional study would be necessary to analyze traffic conditions and bus bay availability at any proposed split location.

<u>Other Recommendations</u>

1. In general, WMATA should consider extending the recovery time to ten minutes for all routes at their terminal bus stands so drivers can take breaks and leave the terminal stations on time. This would improve driver performance and improve schedule adherence and on-time performance.
2. WMATA should consider adding some time to the schedule at key time points such as:
    - East Falls Church Metrorail Station
    - Dunn Loring (2C)
    - Vienna Metrorail Station (2B, 2G)

   Each of these points could have a specific arrival and departure time in the schedule. If a bus is early, the operator would dwell a bit longer to match the departure time. If they are late, they could leave as soon as the passengers have boarded and alighted. In this manner, there are more opportunities to make up “lost” time and improve on-time performance and schedule adherence.
3. New service to employment and other destinations in the Fairfax area should be explored as well. Those destinations include the Social Security Administration Office and the Fairfax County Government Center. At this point it is difficult to estimate the costs of this new service because specific routing has not been determined.

4. More or improved supervision is needed and might be a lower cost option to improve on-time performance, schedule adherence and to ensure buses arrive and depart major time points as close as possible given the schedule.
5. The existing fleet mix seems adequate for the number of trips and volumes of passengers that are on the route. There are some complaints about the type of equipment and the various comfort features of the buses including the air-conditioning and the appearance and cleanliness of the buses. In interviews during public meetings, passengers complained about the air conditioning and the odors of the buses and said they appeared dirty. Some other passengers said the buses are not modern. WMATA needs to ensure that the buses in service on the Washington Boulevard Line are clean and free of graffiti and dirt and that the heating and cooling systems are in working order. This can be accomplished by supervising the bus cleaners, doing preventative maintenance on the HVAC systems, and performing spot checks by supervisors.

Traffic Operations

An overwhelming amount of traffic congestion is causing delays for the Washington Boulevard Line, most notably on Lee Highway and Gallows Road in Fairfax County. The following actions are recommended to improve reliability for the Washington Boulevard Line.

<u>Glebe Road/Washington Boulevard from Ballston Metrorail Station to East Falls Church Metrorail Station</u>

The congestion maps in Figures 6 and 7 show that the Washington Boulevard Line experiences congestion along a small portion of Glebe Road and also on portions of Washington Boulevard. Field observations showed delays for routes entering and exiting the Ballston Metrorail area.

To address the congestion problem, four intersections along Glebe Road are recommended for bus priority lanes and a traffic signal prioritization system, which will improve access to the Ballston area. These intersections are located at Washington Boulevard, 11th Street, Fairfax Drive, and Stuart Street. Bus priority lanes are not recommended elsewhere on Washington Boulevard given its residential nature.

<u>Lee Highway from East Falls Church Metrorail Station to Blake Lane</u>

The bulk of traffic congestion experienced on the Washington Boulevard Line occurs in the section of the route between the East Falls Church Metrorail Station and the Lee Highway/Blake Lane intersection in Fairfax City. Building setbacks along this roadway could provide ample room for bus priority lanes at intersections. Lee Highway through the City of Falls Church does not lend itself to bus priority lanes due to a lack of right of way, and therefore while this area would benefit from priority lanes, they not recommended.

Priority lanes and signal prioritization are recommended for several intersections on Lee Highway. The intersections are placed into high or low priority groups, reflecting intersections with regional arterials or local streets, respectively. Table 7 identifies these high- and low-priority intersections along Lee Highway.

Table 7: Lee Highway Prioritized Intersections

High-priority Intersections	Low-Priority Intersections
Sycamore Street	Maple Avenue
Washington Boulevard	Marshall Street
Graham Road	Hollywood Road
West Street	Fairview Park Drive
Gallows Road	Hartland Road
Prosperity Avenue	Merilee Road
Blake Lane	Hilltop Road
Cedar Lane	Cedarest road
Nutley Street	Mainstone Drive
Hunters Branch Road	Hunters Glen Way
Saintsbury Drive	Circle Woods Drive

<u>Jermantown/Lee Jackson Highway from Gallows Road to Fair Oaks Mall</u>

Data show that there are two stretches of roadway in this area that suffer from congestion-related delays: Blake Lane between Lee Highway and the I-66 overpass, and Lee Jackson Memorial Highway between Jermantown Road and Fair Oaks Mall.

Bus priority improvements are recommended for the following signalized intersections:

- Lee Jackson Memorial Highway/Waples Mill Road
- Lee Jackson Memorial Highway/Jermantown Road
- Blake Lane/Kingsbridge Drive

A portion of the 2B and 2G routes between Lee Jackson Memorial Highway and Fair Oaks Mall use I-66 flyover ramps and Fair Oaks Mall access ramps. Due to the large costs associated with modifying these roadways, intersection improvements in this area are unnecessary. Bus priority lanes are recommended between Waples Mill Road and Jermantown Road where there are large suburban setbacks.

<u>Gallows Road from Lee Highway to Tysons Corner</u>

Gallows Road between Lee Highway and Tysons Corner experiences congestion-related delay in the direction of predominate peak commuting flow to nearby employment centers. In order to address this problem, it is recommended to implement bus priority lanes and signal prioritization along Gallows Road at the intersections with Bellefores Drive, Idylwood Road, Oak Street, Merry Oaks Lane, and Old Courthouse Road. Improvements here will also help other WMATA routes that use Gallows Road.

Customer Communications

Input from customers who ride the Washington Boulevard Line highlighted several customer communication issues. In general, customers felt that more information was needed to explain the transfers available to numerous other routes, and asked that signage, schedules, and driver training be enhanced to accommodate this need. Another need mentioned often by customers was the need for information in languages other than English, particularly in Spanish.

For the short-term, it is recommended to:

- Improve availability of schedules in buses and at Metrorail stations along route.
- Update of all the schedules posted at stops to reflect new services, highlighting the key information used by riders in an easy-to-read and visible format.
- Based on the passenger boardings criteria from the 2003 Regional Bus Study, two additional stops (Washington Street at Broad Street westbound and Lee Highway at Gallows Road Eastbound) require schedule information.
- Increase provision of information in Spanish and Vietnamese.
- Establish on-board announcements by bus drivers or using automated annunciators for transfer points to rail transit, major destinations and other major bus routes, including Spanish and Vietnamese stop announcements where needed.
- Provide and promote capabilities to access real-time next bus information via phone and internet, including hand-held wireless devices.
- Install a NextBus dynamic display sign at the Ballston Metrorail Station stop to provide all passengers with real-time information.

Medium and long-term recommendations include:

- Provide additional signs in Spanish and Vietnamese
- Install onboard automated annunciators to communicate stop locations, transfer opportunities, service delays and other information to the customer, including enhanced sound quality for easier comprehension.
- Replace damaged or missing information cases at stops. Alter displays so that information faces towards sidewalks and shelters, rather than towards the street.
- Provide system maps that highlight the Washington Boulevard Line and connecting routes at shelter locations.
- Ridership at seven stops along the Washington Boulevard Line is high enough to justify real-time next bus displays that indicate when the next vehicle will arrive and what route the vehicle is serving. These displays should be installed when they become available on the WMATA system.

Stops and Facilities

1. The transit operations assessment and field surveys confirmed that the Washington Boulevard Line has many bus stops along the routes. There are over 80 stops in each direction in the Washington Boulevard Line service area. Some stops are very closely spaced, and, according to

the boarding / alighting volumes along the route, have low passenger volumes. These low volume bus stops are possible candidates for consolidation, including (see Figure 8):

- Along North and South Washington Boulevard between I-66 and Annandale Road.
- Along Lee Highway from Graham Road to Gallows Road.
- Along Blake Lane from Lee Highway to Jermantown Road.

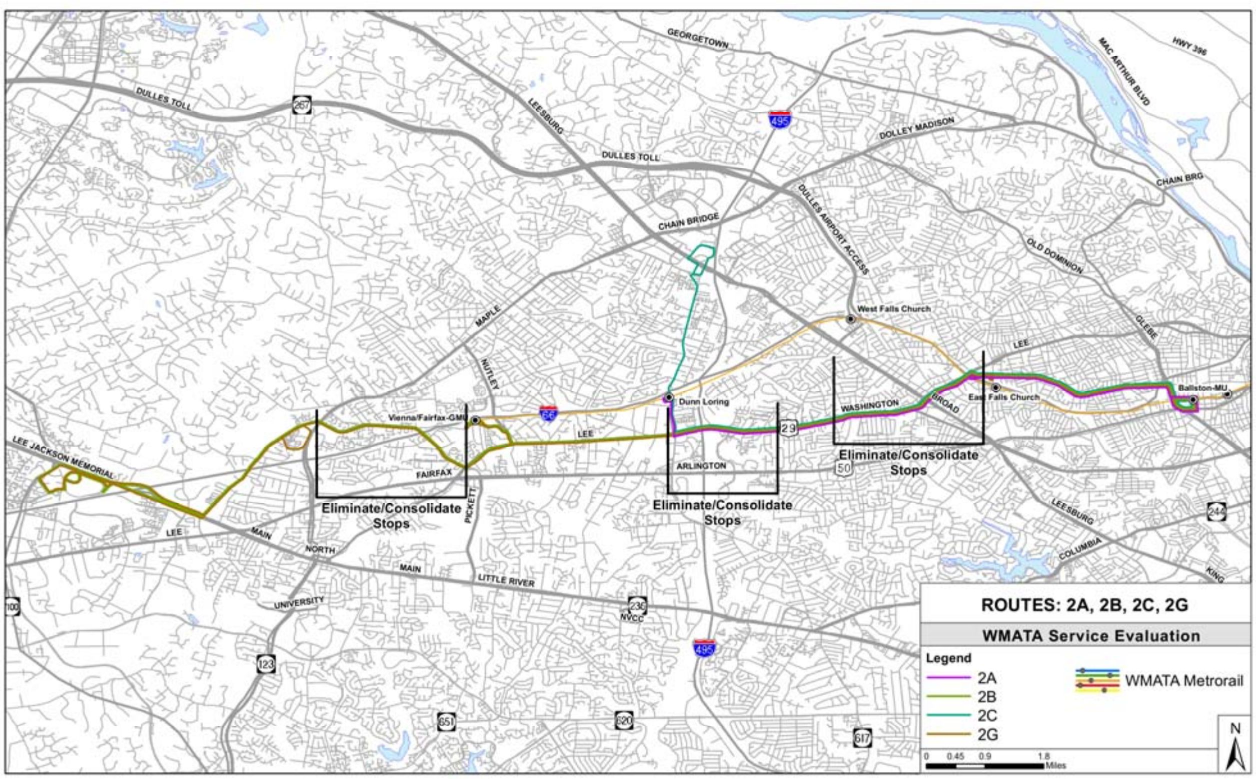
2. Likewise, there are a few places along the route where the passenger volumes are high enough to warrant needed additional amenities to include a shelter or additional shelters, new benches, improved lighting, trash cans, or improved schedule information to make the stops safer or more convenient and comfortable for passengers. Those areas include:

   - Fair Oaks Mall terminal stand near Sears – add a shelter, trash can, and bench to the existing concrete pad.
   - Washington Street at Broad Street – add a shelter, bench and bus schedule information.
   - Lee Highway at Gallows Road – add shelter(s), bench and bus schedule information.

3. Operators-only restrooms at Tysons Corner and Fair Oaks Mall would improve driver morale and may contribute to improved on-time performance and schedule adherence.

4. There is a growing need for a transit center located near the intersection of Gallows Road and Lee Highway. Approximately ten routes operated by either WMATA or Fairfax County serve this location. Currently, passengers in the area wait adjacent to a fast food restaurant without a shelter.

Figure 8: Potential Bus Stop Consolidation for the Washington Boulevard Line



ROUTES D1, D3, D4, D5, D6, D8 (D-ROUTES)

Transit Service Assessment

Service Frequency

All D routes operate seven days per week except for routes D1, 3 and 5, which only run during the morning and afternoon peak on weekdays. Buses originate from either the Bladensburg or Western bus divisions. As a whole, these routes run 3,648 revenue miles during the weekdays, 2,292 revenue miles on Saturdays, and 1,614 revenue miles on Sundays. Service frequency is shown in Table 8.

Early AM is defined as before 5:30 am, AM peak is between 5:30-9:30 am, Mid Day is defined as 9:30 am-3:00 pm, PM peak is between 3:00-7:00 pm, and evening is defined as after 7:00 pm.

Table 8: Metrobus Route D1-8 Service Frequency

Route D1		Headways (minutes)				
Day	Route	Early AM	AM Peak	Mid Day	PM Peak	Eve.
M-F	Glover Park – Ivy City		7-15		22-32	
Route D2		**Headways (minutes)**				
Day	**Route**	**Early AM**	**AM Peak**	**Mid Day**	**PM Peak**	**Eve.**
M-F	Glover Park – Dupont Circle	15-20	10	20	10	20
Sat	Glover Park – Dupont Circle	15	15	20	20	20
Sun	Glover Park – Dupont Circle	20	20	20	20	35
Route D3		**Headways (minutes)**				
Day	**Route**	**Early AM**	**AM Peak**	**Mid Day**	**PM Peak**	**Eve.**
M-F	Sibley Hospital – Ivy City		15-30		20-30	
Route D4		**Headways (minutes)**				
Day	**Route**	**Early AM**	**AM Peak**	**Mid Day**	**PM Peak**	**Eve.**
M-F	Ivy City – Union Station	20	15	25	15	20
Sat	Ivy City – Union Station	22	22	25	25	25
Sun	Ivy City – Union Station	35	35	35	35	40

Table 8 (continued): Metrobus Route D1-8 Service Frequency

Route D5		Headways (minutes)				
Day	**Route**	**Early AM**	**AM Peak**	**Mid Day**	**PM Peak**	**Eve.**
M-F	MacArthur Boulevard – Georgetown		15		20-30	

Route D6		Headways (minutes)				
Day	**Route**	**Early AM**	**AM Peak**	**Mid Day**	**PM Peak**	**Eve.**
M-F	Sibley Hospital – Stadium-Armory	20-30	7-15	20	10-20	30
Sat	Sibley Hospital – Stadium-Armory	30	26-30	30	30-35	31-39
Sun	Sibley Hospital – Stadium-Armory		40	35	40	31

Route D8		Headways (minutes)				
Day	**Route**	**Early AM**	**AM Peak**	**Mid Day**	**PM Peak**	**Eve.**
M-F	Hospital Center – Union Station	15	12	15	6-11	30
Sat	Hospital Center – Union Station		25	20	20	30
Sun	Hospital Center – Union Station		35	35	35	40

Running Times

Average weekday running times are shown in Table 9. When broken down by time period and direction, the results often show a slowdown of each route during peak periods. Running time allocation, including the amount of time spent in transit, loading, and sitting at signalized intersections was not available for inclusion into this report.

Table 9: Metrobus Route D1-8 Weekday Running Time

Route	Route	Early AM	AM Peak	Midday	PM Peak	Evening
D1	Glover Park – Ivy City	-	EB: 77 min	-	WB: 75 min	-
D2	Glover Park – Dupont Circle	-	42-48 min	37 min	44 min	34 min
D3	Sibley Hospital – Ivy City	-	WB: 60 min	-	EB: 82 min	-
D4	Ivy City – Union Station	-	42 min	39 min	47 min	39 min
D5	MacArthur Boulevard – Georgetown	-	EB: 40 min	-	WB: 40 min	-
D6	Sibley Hospital – Stadium-Armory	EB: 56 min WB: 47 min	EB: 71 min WB: 69 min	EB: 76 min WB: 71 min	EB: 83 min WB: 76 min	EB: 50 min WB: 55 min
D8	Hospital Center	-	52 min	49 min	52 min	SB: 36 min NB: 38 min

Cost and Subsidy

Tables 10-14 show the operating costs and subsidies for the D1 – 8 routes.

Table 10: Metrobus Route D1, D3, and D6 Cost Data

	M-F	Sat	Sun
Daily Operating Costs:	$23,455	$9,616	$7,358
Daily Revenue:	$4,584	$1,382	$1,028
Costs Per Rev Hour:	$130.98	$126.90	$133.66
Operating Costs / Trip:	$143.90	$120.20	$120.63
Annual Operating Costs:	$6,121,745	$500,048	$382,624
Subsidy / Boarding:	$2.96	$4.29	$4.43
Subsidy / Rev. Hour:	$105.38	$108.66	$114.99
Subsidy / Trip:	$115.77	$102.93	$103.77
Cost Recovery Ratio:	20%	14%	14%

Source: WMATA

Table 11: Metrobus Route D2 Cost Data

	M-F	Sat	Sun
Daily Operating Costs:	$5,384	$3,878	$3,272
Daily Revenue:	$1,257	$595	$526
Costs Per Rev Hour:	$129.13	$127.07	$122.64
Operating Costs / Trip:	$79.92	$65.73	$68.17
Annual Operating Costs:	$1,522,752	$201,670	$170,144
Subsidy / Boarding:	$2.62	$3.97	$3.76
Subsidy / Rev. Hour:	$101.31	$107.58	$102.94
Subsidy / Trip:	$62.70	$55.65	$57.22
Cost Recovery Ratio:	22%	15%	16%

Source: WMATA

Table 12: Metrobus Route D4 Cost Data

	M-F	Sat	Sun
Daily Operating Costs:	$5,118	$4,001	$2,827
Daily Revenue:	$1,015	$537	$693
Costs Per Rev Hour:	$133.75	$140.15	$154.45
Operating Costs / Trip:	$40.95	$41.68	$41.57
Annual Operating Costs:	$1,335,915	$208,060	$146,979
Subsidy / Boarding:	$2.91	$4.64	$2.22
Subsidy / Rev. Hour:	$107.22	$121.34	$116.61
Subsidy / Trip:	$32.83	$36.09	$31.38
Cost Recovery Ratio:	20%	13%	25%

Source: WMATA

Table 13: Metrobus Route D5 Cost Data

	M-F
Daily Operating Costs:	$1,505
Daily Revenue:	$194
Costs Per Rev Hour:	$171.66
Operating Costs / Trip:	$115.80
Annual Operating Costs:	$392,917
Subsidy / Boarding:	$4.86
Subsidy / Rev. Hour:	$149.49
Subsidy / Trip:	$100.85
Cost Recovery Ratio:	13%

Source: WMATA

Table 14: Metrobus Route D8 Cost Data

	M-F	Sat	Sun
Daily Operating Costs:	$14,539	$8,618	$4,570
Daily Revenue:	$3387	$1648	$765
Costs Per Rev Hour:	$128.89	$134.55	$125.99
Operating Costs / Trip:	$95.03	$82.86	$74.91
Annual Operating Costs:	$3,764,718	$448,126	$237,616
Subsidy / Boarding:	$2.37	$3.04	$3.58
Subsidy / Rev. Hour:	$98.87	$108.62	$104.90
Subsidy / Trip:	$72.89	$67.02	$62.38
Cost Recovery Ratio:	23%	19%	17%

Source: WMATA

Fare payment

Fare payment data from May 2008 revealed that cash is the most common fare payment for the D1,3,6, D2, and D5 routes. For routes D4 and D8, bus transfers have a slightly higher percentage than cash fares. Table 15 shows all fare payment methods for these lines. Note: SmarTrip usage is encompassed in the numbers for cash, rail transfers, and bus transfers.

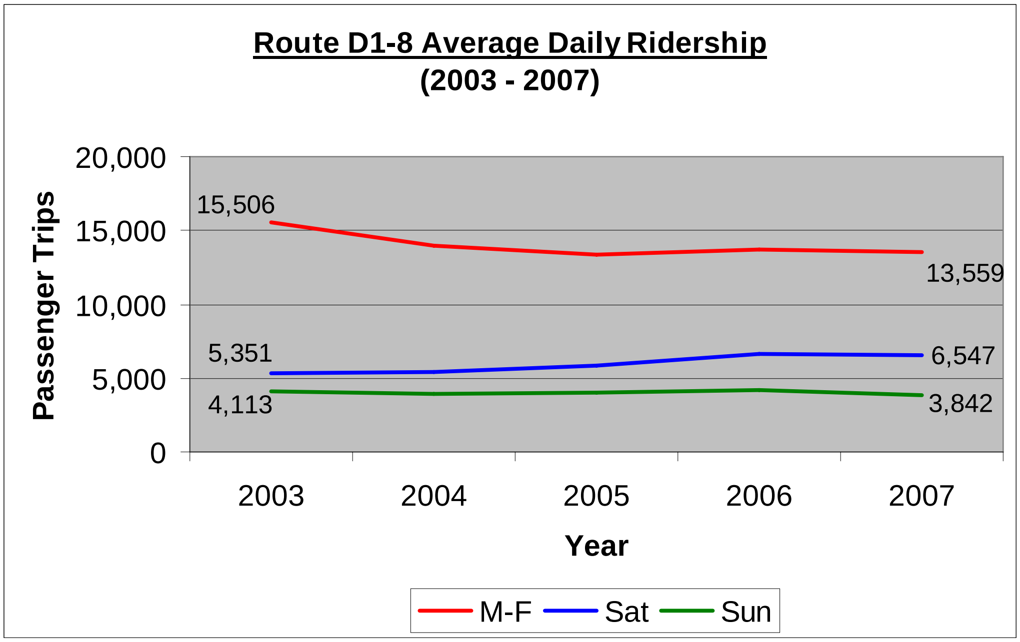
Table 15: Route D1-8 Percent Fare Payment Method

	D1,3,6	D2	D4	D5	D8
Cash	44.5%	49.9%	33.6%	73.3%	30.2%
Bus Transfer	25.7%	16.9%	34.7%	12.1%	37.5%
Flash Pass	18.8%	14.9%	19.6%	7.1%	18.5%
Rail Transfer	4.8%	13.8%	5.4%	3.4%	5.8%
Elderly & Disabled	4.9%	3.3%	4.9%	3.3%	5.5%
Student and Other	1.3%	1.2%	1.8%	0.8%	2.5%

Ridership

As of 2007, daily passenger trips for the combined D1-8 routes averaged 13,559 trips on weekdays, 6,547 passengers on Saturdays, and 3,842 passengers on Sundays. Figure 9 shows average daily passenger volume between 2003 and 2007 for these routes. The figure shows a 13 percent decline in weekday trips over the past five years. Average Saturday ridership has grown by 22 percent while average Sunday ridership has declined by nearly nine percent during the same time period.

Figure 9: Metrobus Route D1-8 Average Daily Ridership



Figures 10 through 18 show eastbound and westbound boardings and alightings by stop. As a whole, the maps show an expected trip pattern. For the D1,3,6 line, eastbound boardings are greatest in the northwest portion of the District and eastbound alightings are highest in downtown Washington. For westbound D1,3,6 the pattern is reversed, with boardings highest in the northeast portion of the District and alightings also highest in downtown Washington. For other routes the pattern is similar. Boardings are highest in the residential portions in the direction that serves destinations in downtown Washington, Georgetown, or Metrorail stations.

Peak load information was provided by the five standard weekday time periods, as shown in Table 16. The raw data gave overall counts of the numbers of passengers who boarded and alighted at each stop during these five time periods. Subtracting alightings from boardings gives a running total of the number of passengers aboard for each segment of the route, allowing the peak load point to be identified. The peak load for each time period was divided by the number of trips made during that period to determine the peak load for an average trip. These averaged peak loads were then compared to bus capacities (48 passengers during peak periods and 40 passengers during off peak and weekend periods) to determine the vehicle loading figures for each time period.

Table 16: D-Routes Vehicle Loading at Peak Load Points

Route	Early AM	AM Peak	Midday	PM Peak	Evening
D1, 3, 6	EB: 10% WB: 34%	EB: 61% WB: 57%	EB: 30% WB: 42%	EB: 61% WB: 37%	EB: 24% WB: 22%
D2	-	46.9%	25.1%	42.8%	37.4%
D4	-	EB: 12.8% WB: 47.6%	EB: 27.7% WB: 43.1%	EB: 41.7% WB: 21.8%	EB: 30.4% WB: 11.0%
D5	-	EB: 46.0%	-	WB: 38.6%	-
D8	-	NB: 65.4% SB: 47.1%	NB: 68.6% SB: 69.6%	NB: 54.3% SB: 59.8%	NB: 30.0% SB: 29.1%

Figure 10: D1, 3, 6 Weekday Eastbound Boardings and Alightings

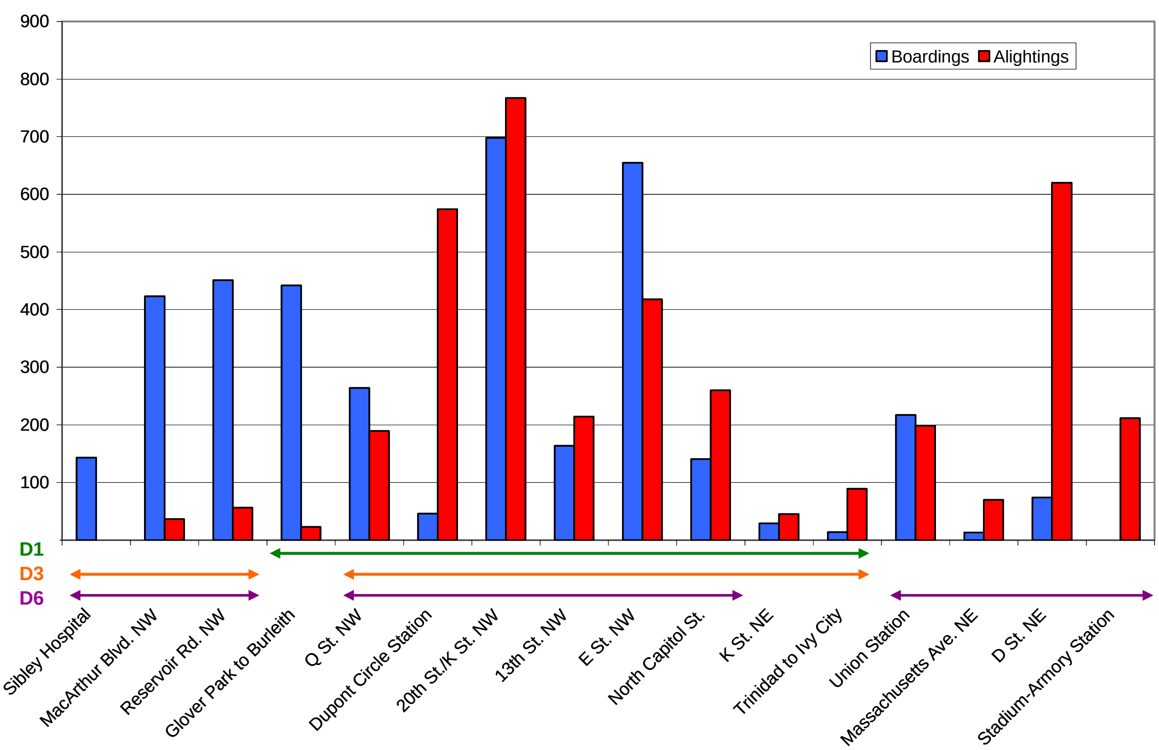


Figure 11: D1, 3, 6 Weekday Westbound Boardings and Alightings

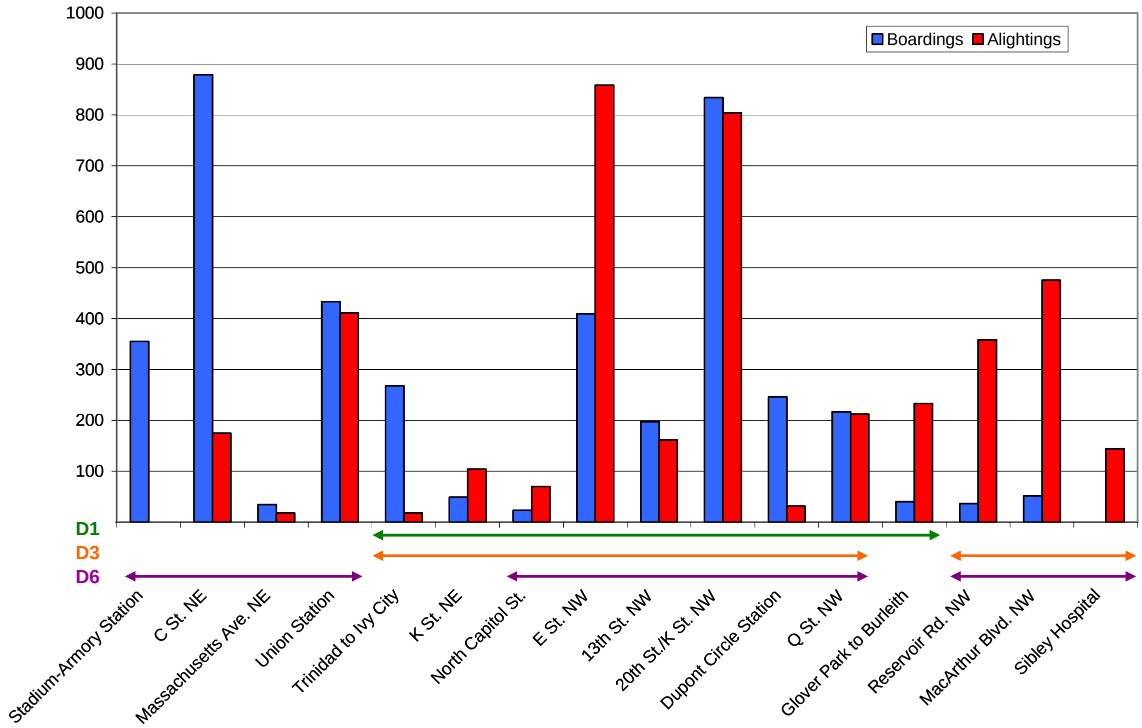


Figure 12: D2 Weekday Boardings and Alightings

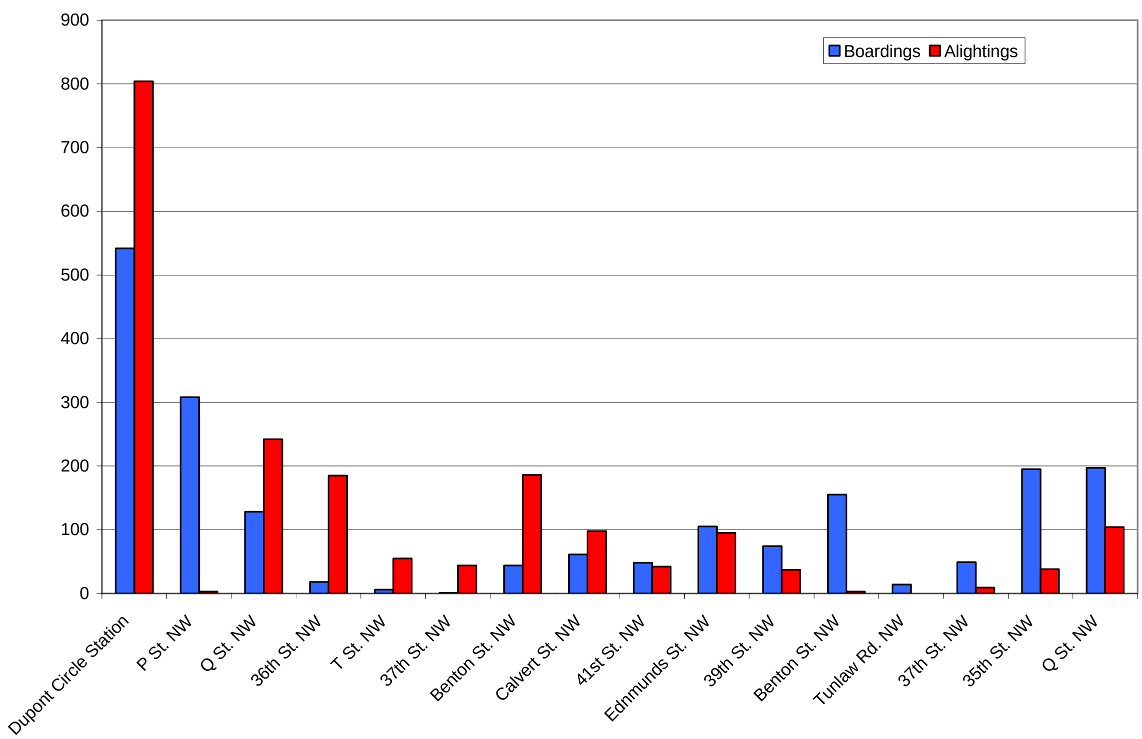


Figure 13: D4 Weekday Eastbound Boardings and Alightings

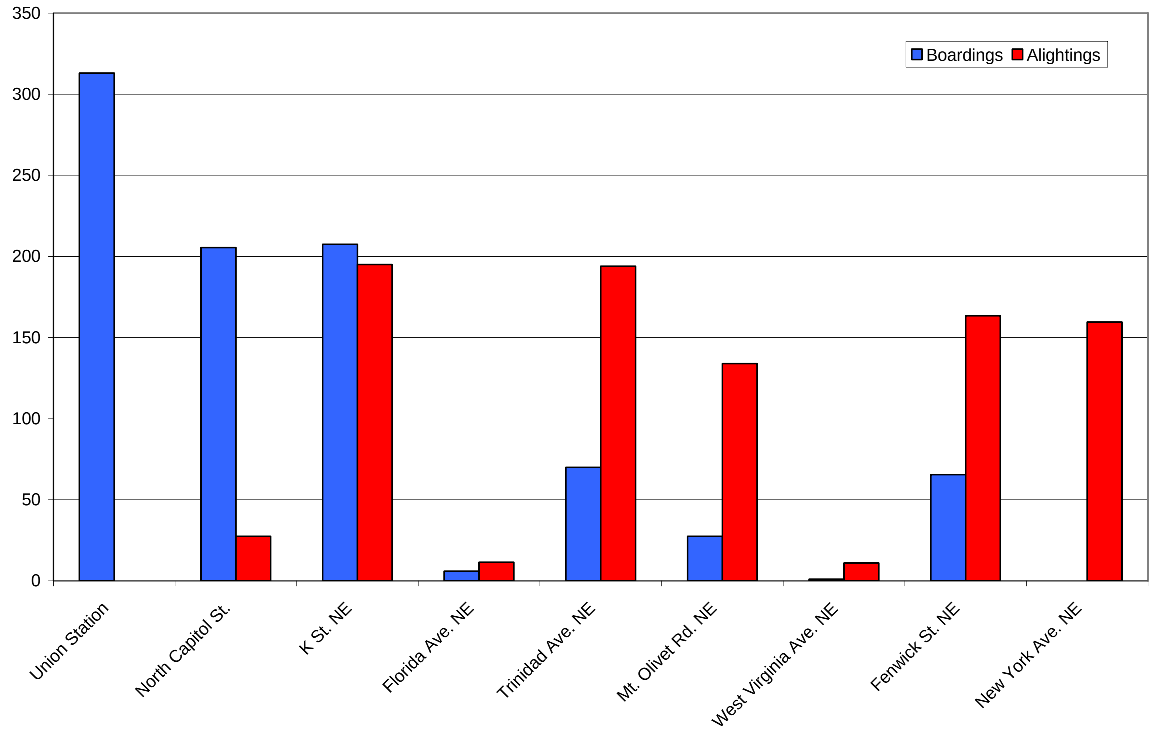


Figure 14: D4 Weekday Westbound Boardings and Alightings

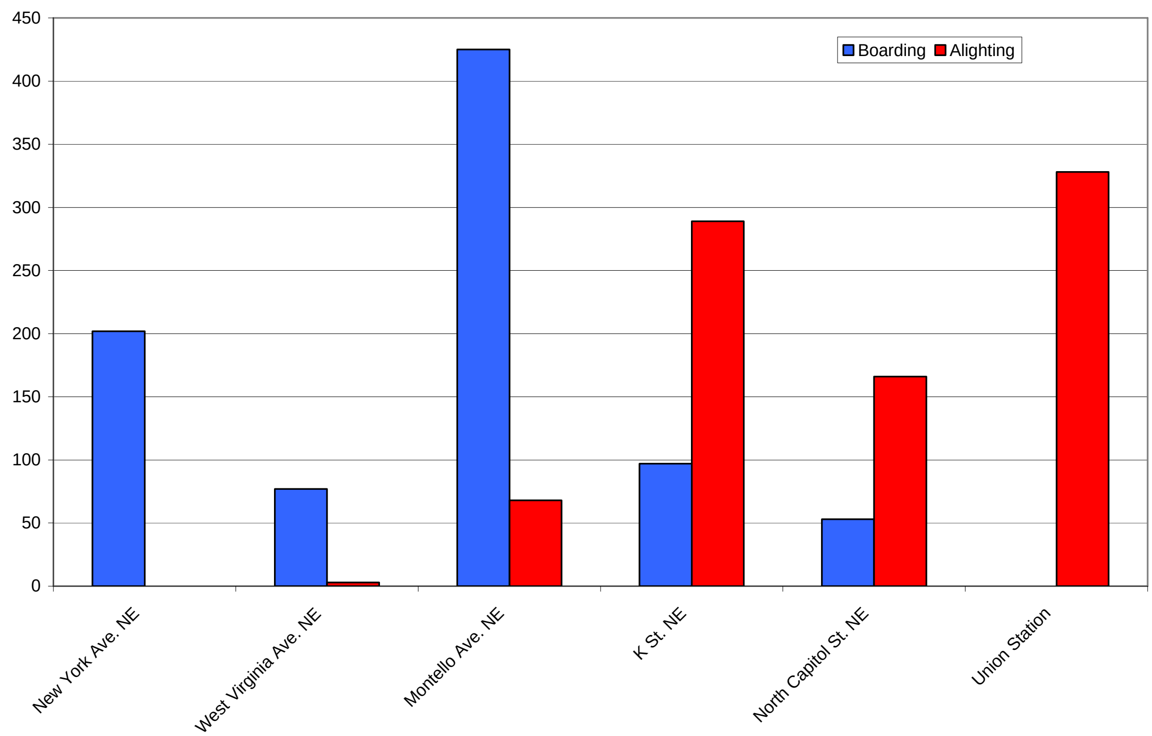


Figure 15: D5 Weekday Eastbound Boardings and Alightings

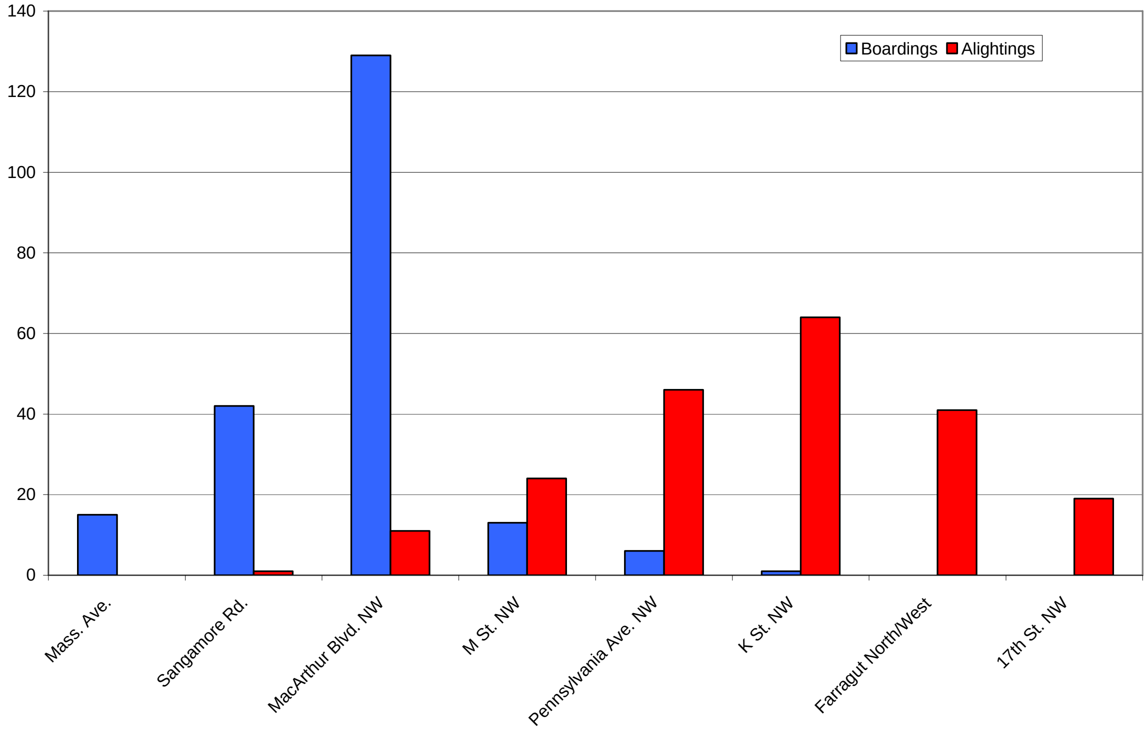


Figure 16: D5 Weekday Westbound Boardings and Alightings

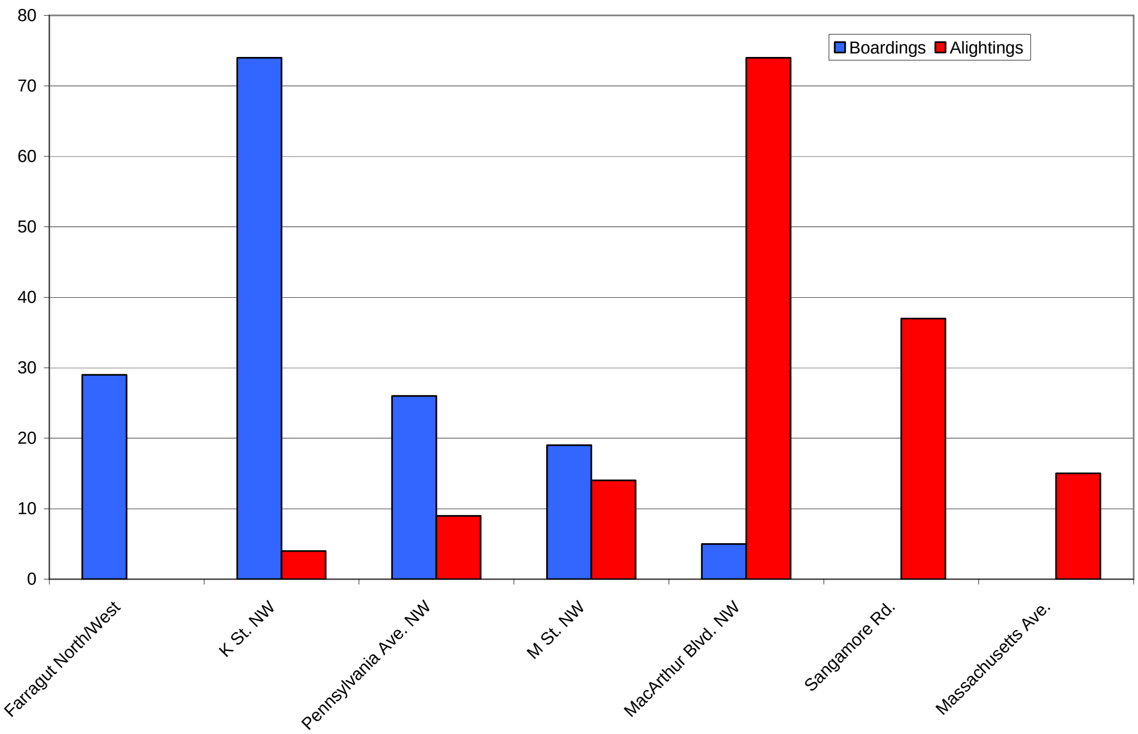


Figure 17: D8 Weekday Northbound Boardings and Alightings

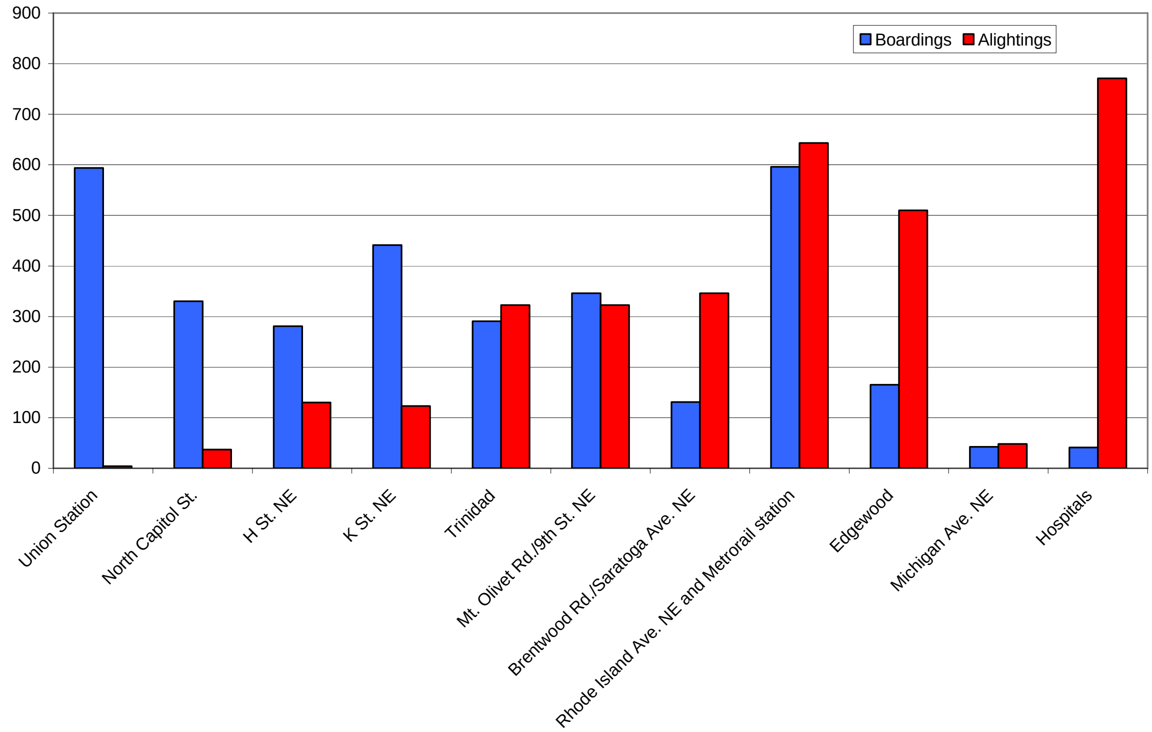
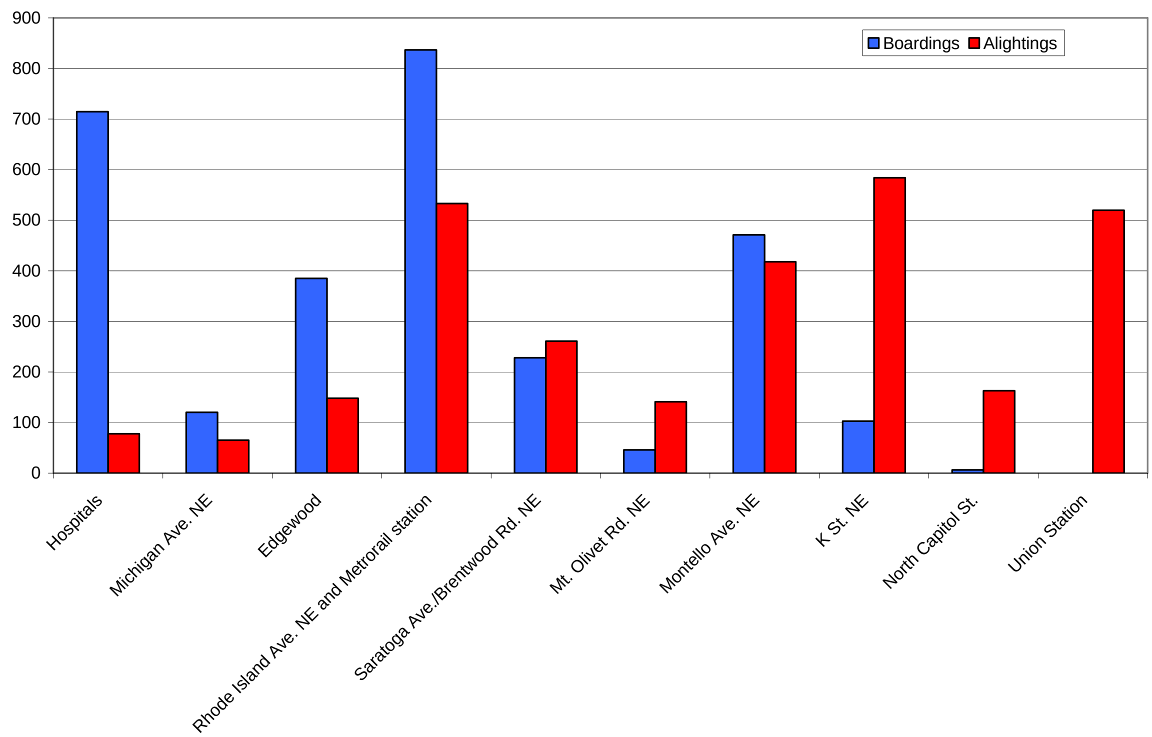


Figure 18: D8 Weekday Southbound Boardings and Alightings



On-time Performance

Data for On-time Performance is shown in Figures 19 through 23. Early trips are measured by WMATA as being more than two minutes early while late trips are those more than seven minutes late. Measurements for bus bunching and missed trips were not available for this analysis, but comments made during public meetings and via the internet have made it clear that reliability is an issue with these routes.

Figure 19: Metrobus Route D1, D3, and D6 On-Time Performance

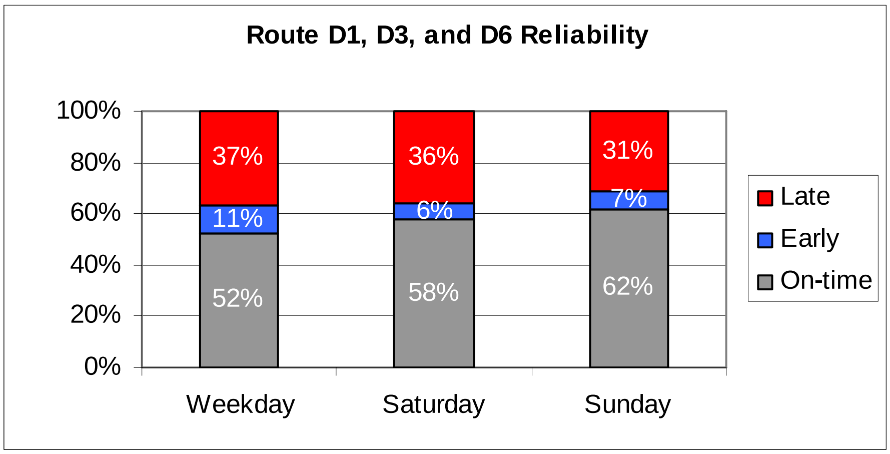


Figure 20: Metrobus Route D2 On-Time Performance

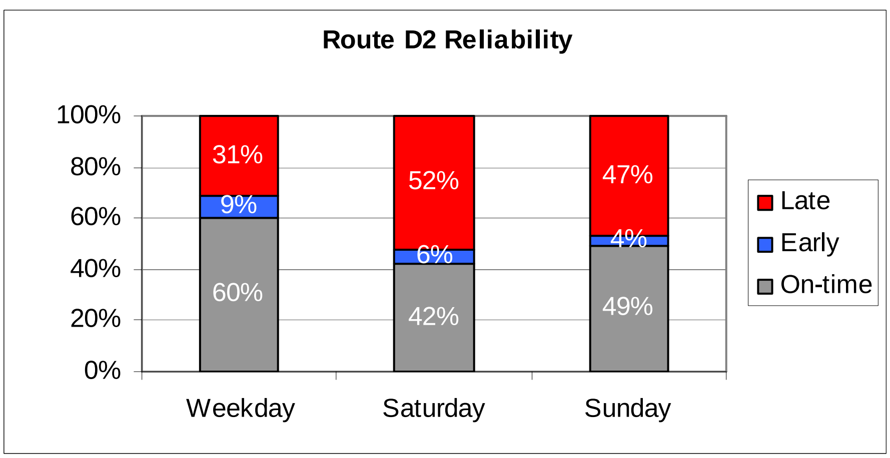


Figure 21: Metrobus Route D4 On-Time Performance

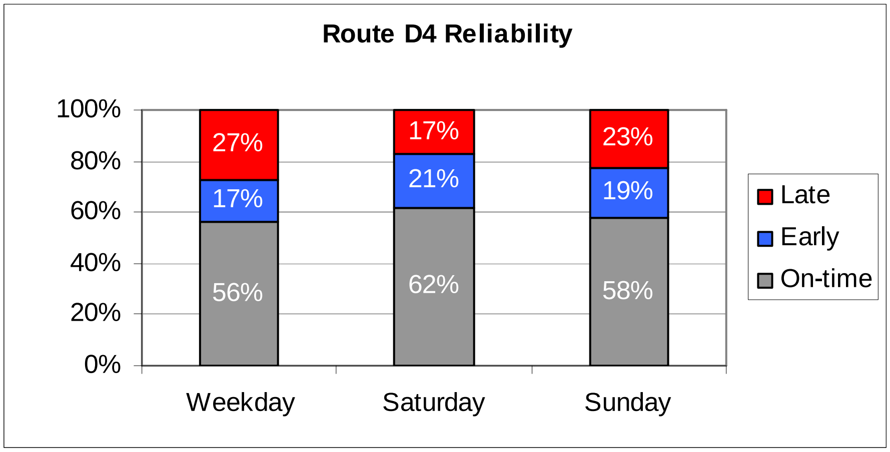


Figure 22: Metrobus Route D5 On-Time Performance

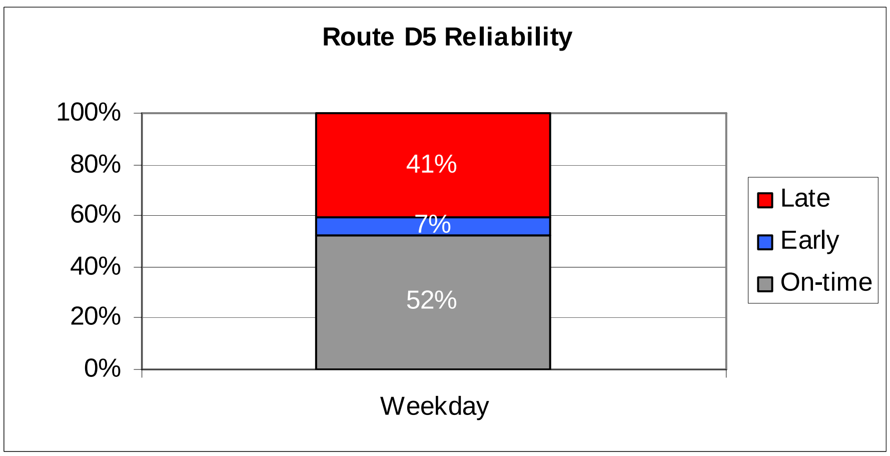
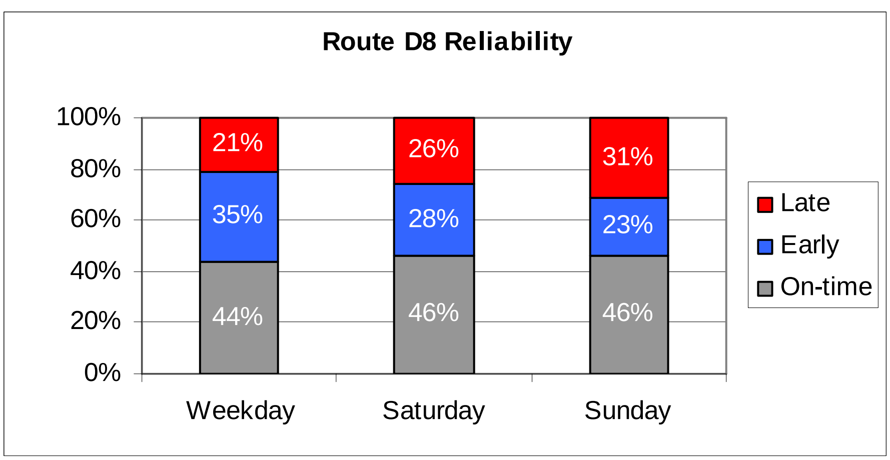


Figure 23: Metrobus Route D8 On-Time Performance



Traffic Operations

Traffic operations were assessed on the route to determine what recommendations, if any, could improve efficiency and operation of the route.

Field observations of the D routes showed the route serves different developed areas, including low-density suburban neighborhoods, high density city neighborhoods, the downtown district, industrial areas, and high-employment clusters. As a result, identifying types of traffic patterns that exist on the D route was difficult, and the route experiences more than one type of traffic pattern.

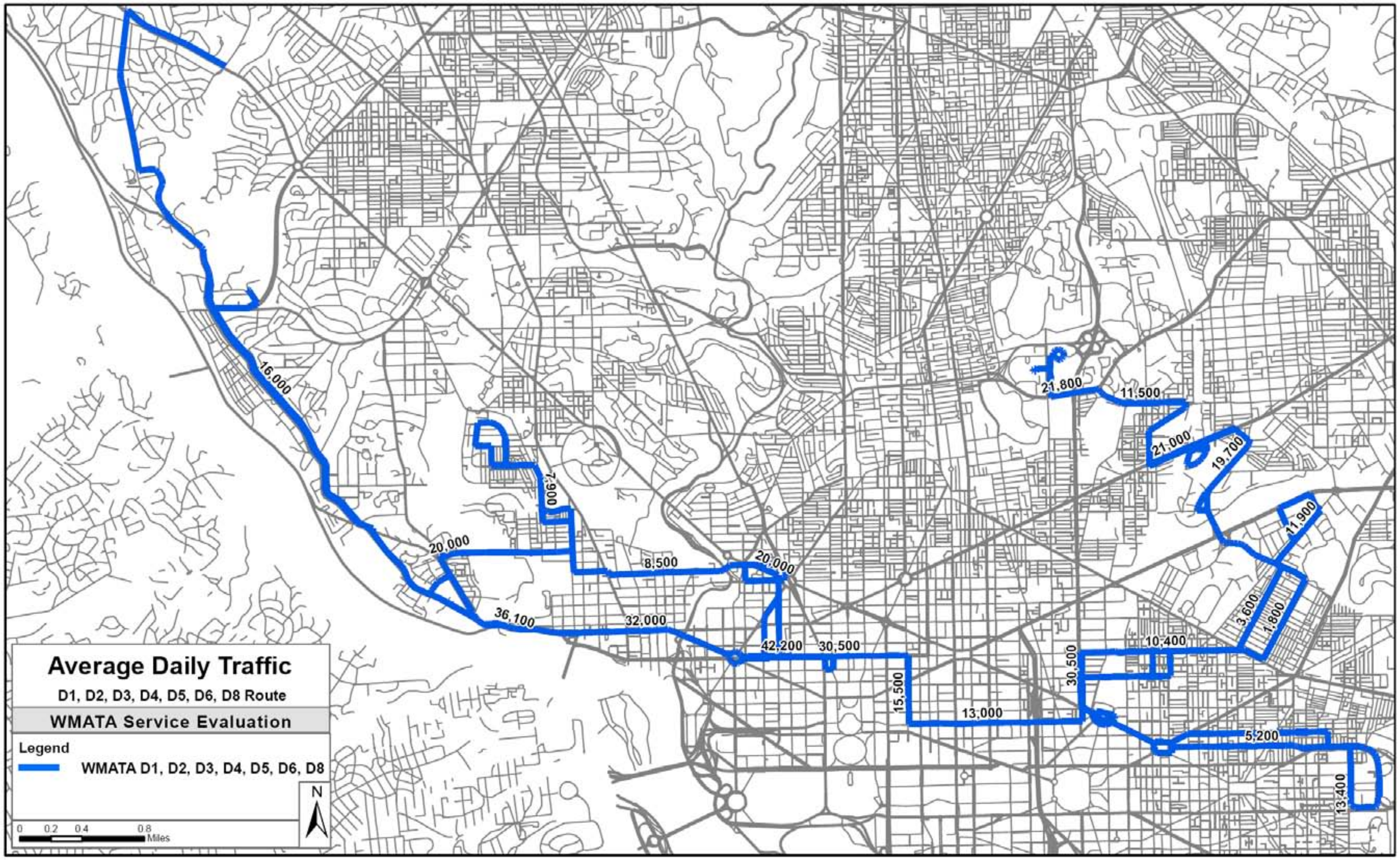
From the observations, traffic conditions appeared to be worst from Dupont Circle moving east and south along 20th Street NW, K Street NW, 13th Street NW, E Street NW, and North Capitol Street. Other places where extreme traffic congestion was observed were along Q Street NW, M Street NW in Georgetown, along K Street NE in the Capitol Hill neighborhood, and portions of New York Avenue and West Virginia Avenue in Ivy City.

Figure 24 details ADT of the D1-8 routes. The portion of the route with the highest ADT is K Street near 20th Street NW, which has an ADT of 42,000 vehicles per day. Other portions of the route with high ADT include M Street NW, 35,100 vehicles per day, North Capitol Street, 30,500 vehicles per day, and Reservoir Road, 20,000 vehicles per day. Also of note is that the ADT is fairly low in many of the outlying areas, such as 1,800 vehicles per day on Trinidad Avenue. However, these areas could still experience traffic congestion delays due to the low capacity of the streets.

The AM and PM congestion maps, shown in Figures 25 and 26 respectively, confirm the field observations and some of the ADT data. Traffic congestion occurs almost continuously along portions of the route and there are few long stretches where congestion is not an issue. As shown in the figures, streets with traffic congestion during AM and/or PM include: MacArthur Boulevard, Reservoir Road, 35th Street NW, M Street NW, Q Street NW, New Hampshire Avenue, K Street NW, E Street NW, N. Capitol Street, Maryland Avenue NE, K Street NE, H Street NE, West Virginia Avenue, New York Avenue, Brentwood Road NE, and 4th Street NE.

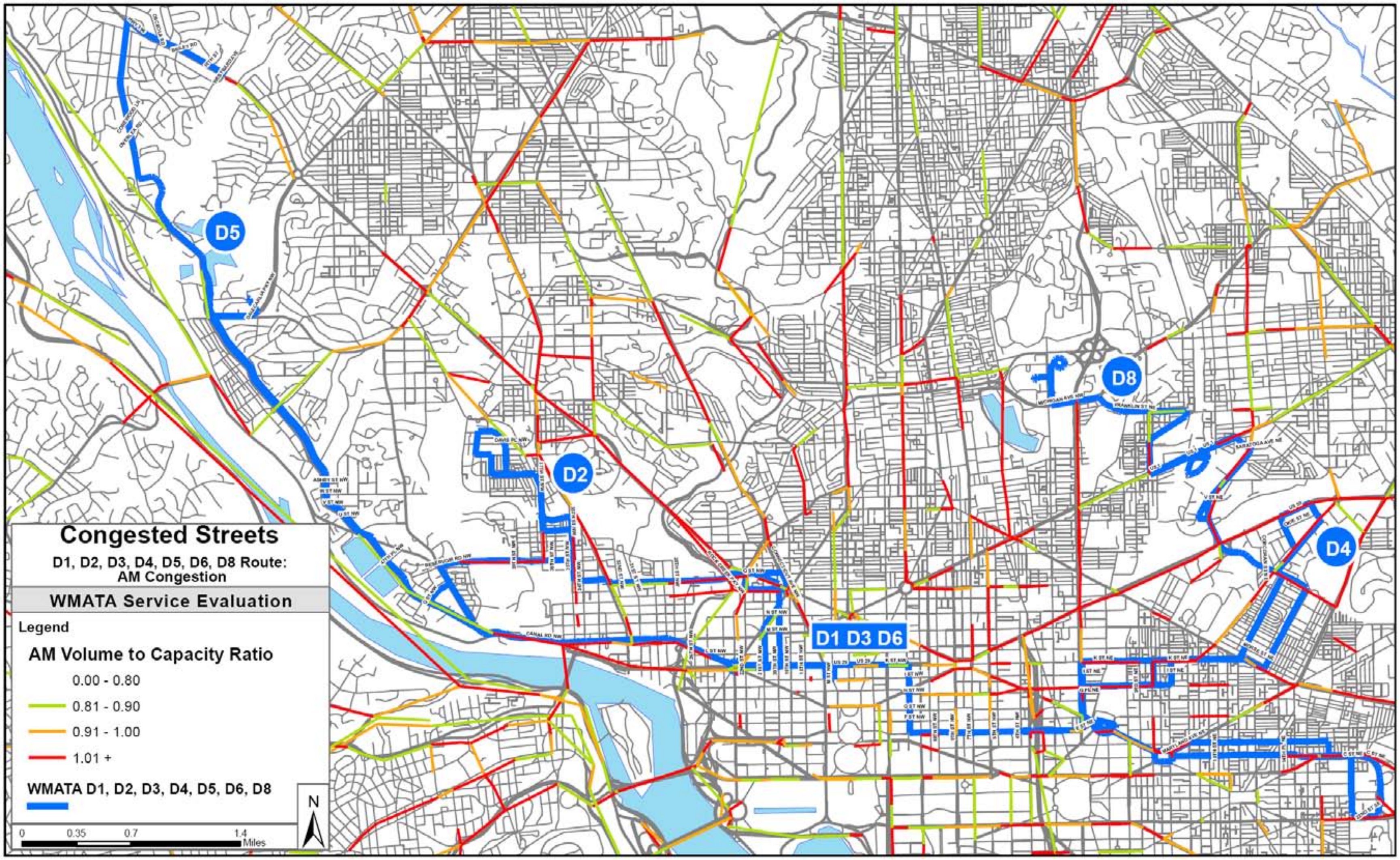
Equally important are the number of intersecting streets that also have traffic congestion. This is most obvious in the downtown portion of the route along K and E Streets. When two streets experiencing traffic congestion intersect, the resulting intersection typically operates with long delays in all directions. Individual intersection information, including volumes, cycle times, and operating level of service was not considered for use in this analysis. DDOT provided a list of the top 41 intersections in the District listed in descending order of ADT. Of those 41 intersections, ten of them are along some portion of the D1-8 routing. Table 17 details the intersection, the ADT, and the routes affected.

Figure 24: Route D1- 8 Average Daily Traffic



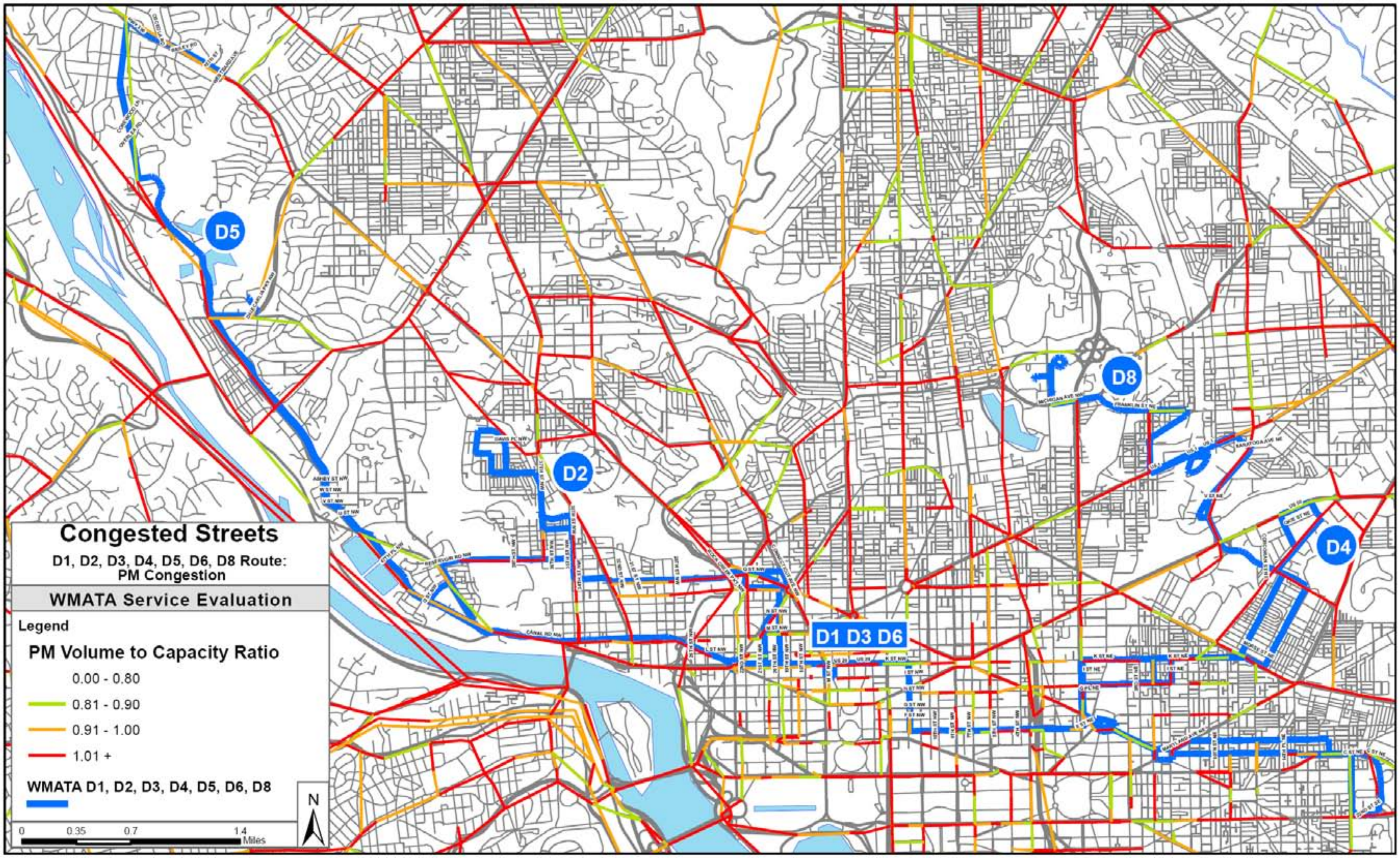
Data Source: District Department of Transportation (DDOT)

Figure 25: D1- 8 AM Peak (7:00-8:00) Congestion Based on V/C Ratio



Data Source: MWCOG Regional Trip Model

Figure 26: D1- 8 PM Peak (5:00-6:00) Congestion Based on V/C Ratio



Data Source: MWCOG Regional Trip Model

Table 17: Congested Intersections in District Along the D1-8 Route

Intersection	2006 ADT	Routes affected
Key Bridge/M Street NW	104,400	D5
N. Capitol/Michigan Ave	68,600	D8
Connecticut Ave/K Street NW	59,900	D1, D3, D5, D6
14th Street/K Street NW	59,800	D1, D3, D6
N. Capitol/H Street	52,000	D1, D3, D4, D8
17th Street/I Street NW	46,000	D5, D6
N. Capitol/Massachusetts Ave	45,200	D1, D3, D4, D8
16th Street/K Street NW	42,100	D1, D3, D6
18th Street/K Street NW	42,000	D1, D3, D5, D6
Wisconsin Ave/M Street NW	36,700	D5

Due to the high number of vehicles involved, these intersections are critical to the overall operations of the D1-8 route. While delays and level of service information were not available, it is probably safe to assume that delays are occurring at these intersections.

Analysis of the route is divided into segments for easier use and improved clarity. Those segments with recommendations are repeated in the recommendation section of this route.

Massachusetts Avenue/Ft. Sumner Drive to Sibley Hospital (D5)

This segment only experiences congestion over a small segment along MacArthur Boulevard near Loughboro Road during the PM peak. Low traffic volumes and few delays were confirmed during field observation. Also witnessed was a typical inbound/outbound commuting pattern in this area, with peak inbound volumes occurring along Massachusetts Ave, Sangamore Road, and MacArthur Boulevard during the morning, with corresponding outbound volumes along these roads in the afternoon.

Sibley Hospital to MacArthur Boulevard/Foxhall Road intersection (D3, D5, D6)

MacArthur Boulevard between Sibley Hospital and Foxhall Road displays a typical traffic pattern, with peak traffic traveling southeast towards downtown Washington in the AM and away from downtown Washington in the PM. This stretch suffers little traffic congestion in the AM. In the PM peak, two stretches appear to experience congestion – MacArthur between Loughboro and Arizona, and again between Reservoir and Elliot Place NW.

MacArthur Boulevard/Foxhall Road to K Street/20th Street NW (D5)

This stretch of the D5 route, which includes Canal Road NW, M Street NW, Pennsylvania Avenue, and a small portion of K Street, is extremely congested during all periods of day. The ADT for the routing is between 32,000 and 36,100 vehicles per day along M Street.

Congestion maps during the AM and PM peaks show almost continuous congestion from Foxhall Road to the intersection of K Street and 20th Street NW. The congestion was confirmed during field observations. Additionally, the routing goes through the second highest intersection by volume in the city, the intersection of M Street and the Key Bridge.

The reasons for the congestion are numerous. Much of the route is on narrow two-lane streets with on-street parking. There is no room to expand the roadway and parking maneuvers also cause delay. The route also follows roadways into two of the most desirable visitor and employment areas of the city: Georgetown and the western end of the K Street corridor. Additionally, the Key Bridge also dumps a large amount of commuters from Northern Virginia onto M Street in this vicinity.

<u>MacArthur Boulevard/Foxhall Road to 35th Street NW/Reservoir Road (D3, D6)</u>

This portion of the D3 and D6 routes runs primarily on Reservoir Road adjacent to Georgetown University. According to the congestion maps, Reservoir Road is congested during both the AM and PM peak periods. Average daily traffic is measured at 20,000 vehicles per day for the four lane street.

Field observations showed this area of the route to be a fairly dense city neighborhood. The route runs on tight, narrow streets (some with on-street parking) with little right-of-way available for bus priority lanes.

<u>35th Street NW/Reservoir Road to 41st Street NW/Edmunds Street (D1, D2)</u>

The D1 and D2 routes loop through the Burleith and Glover Park neighborhoods north of Georgetown University. The existing loop runs along several neighborhood streets in a residential district before looping back south and rejoining the main routing for the trip east towards downtown Washington.

The AM and PM congestion maps show that most of this routing does not suffer from traffic congestion except for a small portion of 35th Street NW just north of Reservoir Road. ADT in this section of the route is measured as 7,800 vehicles per day.

<u>35th Street NW/Reservoir Road to Dupont Circle (D1, D2, D3, D6)</u>

This portion of the route, running primarily on Q Street between Glover Park and Dupont Circle, has four routes running on it, the D1, D2, D3, and D6. As with most of the route running through Northwest Washington, the routing is on narrow streets with on-street parking through a primarily residential neighborhood.

The AM and PM peak congestion maps show that Q Street suffers from traffic congestion in both peak periods between 28th Street NW and Massachusetts Avenue. Also congested are Massachusetts Avenue and P Street in and around Dupont Circle.

Average Daily Traffic along this portion of the route is reported as 8,500 vehicles per day. The low ADT along Q Street suggests that traffic congestion occurs more from the aesthetic of the neighborhood (with a low capacity for motor vehicles) than from a high traffic volumes. The neighborhood, with buildings built right to the street, would not support traffic mitigation improvements in the form of bus priority lanes. Also of note, P Street, which parallels Q Street, also suffers from traffic congestion and would not be a good choice for a reroute of the D1, D2, D3, or D6 routes.

<u>Dupont Circle to Union Station via K Street, 13th Street NW, and E Street (D1, D3, D6)</u>

The routing of the D1, D3, and D6 routes through downtown Washington between Dupont Circle and Union Station is the core of the D route. It is in this section that routes face almost continuous congestion and delays, while also being the biggest destination for weekday riders.

The congestion maps show that the route is congested along portions of New Hampshire Avenue, K Street NW, and E Street NW. This section of the route is also where five of DC's top forty-one intersections are located (18th Street/K Street, Connecticut/K Street, 17th Street/I Street, 16th Street/K

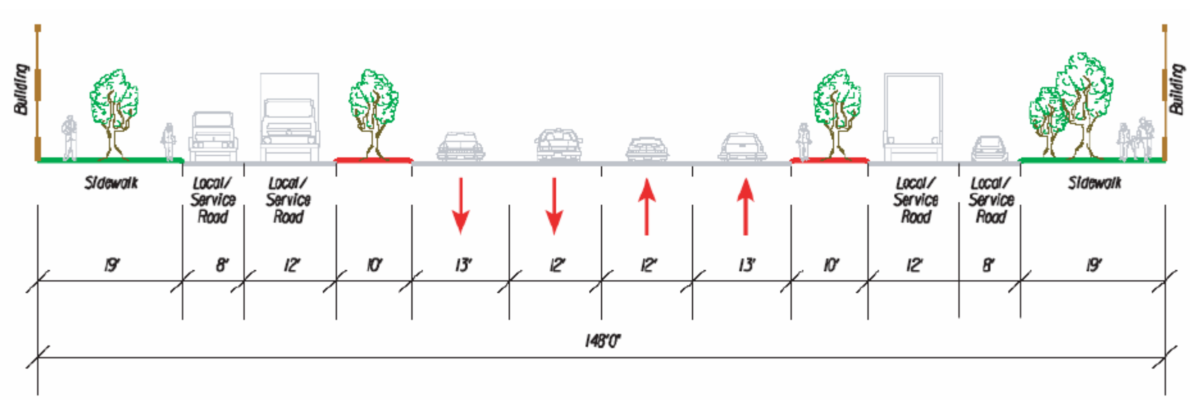
Street, and 14th Street/K Street). The ADT is very high along K Street – 30,000-40,000 vehicles per day, but is lower along E Street – only 13,000 vehicles per day.

At first glance it would appear that little can be done to reduce delay – congestion is very high. The K Street corridor is a special case. The configuration of K Street, shown in Figure 27, is such that it has two local lanes with parking in both directions, with four through lanes (two in each direction) running in the center of the street. In 2003, a study was conducted to determine what reconfiguration would be best for bus operations along the corridor. The study recommended, among other things, to reconfigure the street to force regular traffic to the outer lanes and creating center bus platforms lanes to facilitate the movement of buses through the corridor, demonstrated in Figure 28.

Such reconfiguration would benefit the operations of the D1, D3, and D6 routes tremendously by allowing buses to bypass traffic congestion through K Street. This configuration should occur as soon as possible to benefit D route operations on the K Street corridor.

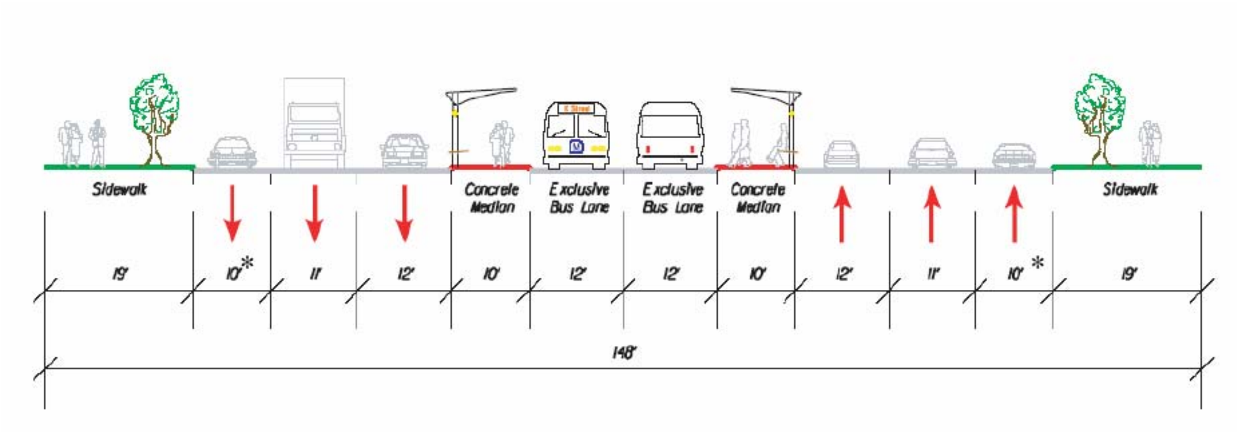
Another recommendation of the K Street Busway study was for traffic signal prioritization for buses to be implemented as part of the improvements. At minimum, a solution should be sought to improve the problematic right turn from K Street westbound to 20th Street northbound, which requires buses to enter the often congested service road. It is unknown whether a full traffic analysis was undertaken during the original K Street Busway study to model operations with a full signal prioritization system in place. It is the opinion of this study team that traffic signal priority for buses along K Street could be detrimental for bus operations on intersecting arterials and would need a sophisticated computer system to monitor traffic operations and allow buses green time . That is not to say that signal prioritization along K Street should not happen, just that it would need careful design in order to work efficiently and correctly within the context of traffic in downtown Washington.

Figure 27: Existing K Street Configuration



Source: K Street Busway Final Report, January 2004

Figure 28: Proposed K Street Configuration



Source: K Street Busway Final Report, January 2004

Union Station to Stadium-Armory Metrorail Station via C Street/D Street (D6)

At Union Station the D6 runs east-west through the Stanton Park and Lincoln Park neighborhoods and terminates at Stadium-Armory. This route runs primarily along Massachusetts Avenue, Maryland Avenue, and C Street/D Street as a one-way pair.

The congestion maps show a small amount of congestion occurs in the AM and PM peak periods along Maryland Avenue, C Street NE, and on 22nd Street NE as it loops in front of RFK Stadium. ADT in this area is 5,200 vehicles per day on C Street NE and 13,400 vehicles per day on 19th Street NE near the Stadium-Armory Metrorail Station.

The reason for traffic congestion along C Street and 22nd Street NE is because these streets are part of a network of roads that funnel traffic into one of the few crossings over the Anacostia River – the E. Capitol Street Bridge. Thus, portions of C Street include both a quiet residential neighborhood street and a city arterial that handles a large amount of traffic vehicles.

Union Station to Ivy City (D1, D3, D4, D8)

Four of the D routes run northeast from Union Station to the Ivy City neighborhood, primarily on K Street, H Street, the Trinidad/Montello one-way pair, and Mt. Olivet Road. Three of the routes then loop back through Ivy City to return back towards Union Station, while the D8 route continues north.

The congestion maps for this area show the same areas congested during the AM and PM peaks, including K Street, H Street, Mt. Olivet Road, West Virginia Avenue, and New York Avenue. The average daily traffic is 10,400 vehicles per day along K Street, between 1,800 and 3,600 vehicles per day on the Trinidad/Montello pair, and 11,900 vehicles per day on West Virginia Avenue. Field observation revealed that much of the traffic is due to commuters driving to/from downtown Washington, especially along major arterials like H Street, K Street, West Virginia Avenue, and New York Avenue (US 50).

Field observation also revealed that there are two different urban characters to this route. The routing along K Street NE and H Street NE runs through the Stanton Park and is adjacent to downtown. This area transitions from downtown fringe with some commercial buildings to residential neighborhood as it moves from west to east. North of Florida Avenue NE the neighborhood becomes quieter and completely residential – although there is still a fair amount of traffic on major arterials passing through the area.

West Virginia Avenue/Mt. Olivet Road Intersection to VA Hospital (D8)

At the intersection of West Virginia Avenue and Mt. Olivet Road in northeast DC the D8 route continues northward primarily on 9th Street NE, Brentwood Road, Rhode Island Avenue, 4th Street NE, Franklin Street, and Michigan Avenue before finally terminating at the Washington VA Hospital.

The AM and PM congestion maps show that this section of the routing suffers from congestion along short sections of Brentwood Road, Rhode Island Avenue, and 4th Street NE in both the AM and PM peaks. Average Daily Traffic for most of this routing is between 19,000 and 21,000 vehicles per day.

Congestion on 9th Street NE/Brentwood Road is expected, as this is one of the few routes in northeast DC that crosses railroad tracks to access New York Avenue (US 50). Fortunately for this routing 9th Street NE has an overpass over New York Avenue, which reduces the amount of delay in this area. The field observation also noted that Brentwood Road and Rhode Island Avenue in this area form the boundary of a large retail development adjacent to the Rhode Island-Brentwood Metrorail Station.

Public Involvement Process

The first-round public meeting for the D Routes was held on September 25, 2008 in the Palisades Branch Public Library at 4901 V Street NW in Washington, DC. A second meeting was held for the D routes in a location more accessible to areas along the eastern portion of the route. This meeting was held on October 9, 2008 at the Department of Housing and Community Development at 801 North Capitol Street in Washington, DC.

For the second round of public involvement, two meetings were scheduled for the D routes, one on January 29, 2009 at the Palisades Branch Public Library at 4901 V Street NW in Washington, DC, and another on February 5, 2009 at WMATA's headquarters, the Jackson Graham Building, at 600 Fifth Street NW in Washington, DC. Due to intense interest in the preliminary recommendations for the D2, an additional meeting was scheduled between WMATA and Advisory Neighborhood Commission (ANC) 3B, which covers the Glover Park area.

It should be noted that due to public input received at the January 29th meeting, a number of the preliminary recommendations (such as two-way service on Q Street) were removed from or revised for the February 5th meeting.

Comments from the meetings, website, hotline, and other correspondence are summarized below.

September 2008 Comments

Primary concerns included:

- Unreliable – buses often arrive early or very late/Need on-street supervision.
- Need more frequent service (weekdays and weekends).
- Crowding on some lines (D2, D5, D6).

Other Comments:

- Service is slow/Consolidate stops.
- Need bus stop improvements (updated schedules, benches, shelters, trash receptacles).
- Drivers not knowledgeable regarding connecting routes.
- Need to increase span of service on D4 and D5.
- D6 reliability was always poor, but recently has gotten worse.
- Need 24-hour service to hospitals (for employees).
- Need service to Tenleytown, especially on weekends.
- Combine with G routes.
- Have D6 run between Sibley and Dupont to avoid traveling through downtown.
- Bus cleanliness is a problem.

January 2009 Comments

Primary concerns included:

- Improve supervision on-street or using AVL/GPS.
- D5: run on weekends, extend span of service in AM and PM, and add more buses.
- Routing:
    - Do not implement proposed two-way service on Q Street – narrow, parking on both sides during school pickup-up/drop off hours in this area. Not safe for the children going to nearby recreation center & school. Cars ignore stop signs in this area.
    - Run service on Foxhall both ways.
    - Run D4 west on Reservoir Road.
    - Run D5 along Canal Road.
- Increase service frequencies, particularly of the D5.
- Residents liked the proposed recommendation of one-third of D6s running between Dupont and Sibley to avoid K street traffic. They pointed out that the D1/D6 usually empties at the Dupont Circle stop anyway. Residents suggested that the stop be at Farragut instead of not Dupont to allow for transfer to Blue Line as well as Red Line.
- D2 should remain a neighborhood collector (most riders transfer to rail, change would add delay to schedule).
- D4 should remain a neighborhood collector – going through downtown will create delays and bunching.
- Meeting participants liked the idea of extending D4 to Sibley and shortening trips through downtown.
- D1 and D2 are too slow - consolidate stops.
- Strong support for real-time information.

Other comments:

- Dislike idea of routing a third of D6s to turn at DuPont – too confusing/Any route change needs a new route number (e.g., D7) to reduce confusion. There are enough problems already with buses running with “out of service” headsigns, or wrong headsigns
- Consider streets parallel to K Street for bus lanes (esp. H, I, K).
- Look into combining the G and D lines to provide additional frequency at no additional cost.
- Need to give drivers permission to consolidate riders into one bus when there is bunching.
- Further study of bus stop consolidation/elimination is needed.
- Change D2 service to D6 service.
- Use smaller buses, operate more frequently.
- Reliability is a problem (on D5, D8, and also on buses going up to Sibley and never returning south).
- Need better access to Rosslyn and Tenleytown especially on weekends.
- Need a better system for handling complaints – improve tracking and response/post a report back to the community.
- Integrate D service with Circulator/Allow Ds to switch to skip-stop service, allowing the Circulator to fill in gaps/ Disapprove of increasing service along downtown segment (extending D4 & D2) Circulator should be able to handle service in this area.
- Add more time to schedule/add layover time if it improves reliability.
- Need ability to add value to SmarTrip cards on line.
- Revise published schedules to represent neighborhoods.
- Need more frequent trips between Georgetown and Dupont Circle.
- D1/3/6: If really late, supervisors give drivers permission to cancel trip…this is a problem.
- Need more D6 service/Do not cut D6 service to Sibley Hospital.
- D6: buses are overcrowded/increase frequency.
- D4: Run on weekends.
- D8: Always crowded in AM and evening/too many pass-bys.
- D8: Need larger buses or more buses.

Recommendations

Service Planning

Various options were developed for changing and improving the existing service on the route. These proposed service changes were based on:

- Field analysis and observations.
- Analysis of the existing operating conditions.
- Discussions with bus operators and supervisors.
- Discussions with riders at public meetings and comments from riders via the website and telephone.
- Discussions with WMATA planning and operations staff and jurisdictional partners.

Service Frequency

The D1-8 routes generally operate at a very high service frequency, and inadequate service frequency is not thought to be an issue.

One exception to service frequency is a slight modification of the D8 route. WMATA recently (December 2008) replaced the 30-foot buses on the D8 with 40-foot buses. The larger buses will allow the route to reduce frequency while also keeping existing capacity. Thus, a service frequency recommendation is to reduce one bus on the D8 for AM and PM peak.

Operations

1. Routes D1-D8 often operate late (or early) making it an unreliable route. A key finding of this study was the amount of traffic congestion in downtown Washington causes late trips for many of the D routes. Bus drivers noted that they sometimes run early in the outer portions of the route in order to make up for slow running in the downtown portions of the route. The result is that the D routes very frequently do not adhere to their schedule. Sometimes, whole trips run early, other times trips run early over part of the route and then run late after encountering congestion in the downtown area and in some other congested areas like Georgetown. Finally, some trips encounter such severe congestion that they run late throughout the route, or begin late due to a missed layover. The unreliability is a major concern on all of the D routes, documented by data and noted by bus drivers and members of the public.

   For the short-term extra time is recommended for only the D6 route and only during 14 daytime operating hours (approximately 6:00 am through 8:00 pm). Adding an extra bus during daytime hours would add additional time for operations, 12 minutes during the AM peak, 25 minutes during the midday, and 20 minutes during the PM peak. While all D-routes crossing downtown Washington experience congestion, the D6 is the most frequent of the D routes through downtown Washington and should receive priority. Furthermore, there are constraints with the 2009 WMATA budget which requires all short-term D-route recommendations to be “cost neutral.” As a result, the only action that is feasible in the short term is to add time to the D6 route. A further explanation of costs is detailed in the Implementation section and Appendix 2.

In the long term a more systematic approach is needed to add time to the routes. One recommendation is to add a mid-route “layover” point at a major transfer point along the route (such as Dupont Circle or Union Station, or at a Metrorail station in the downtown area). A second recommendation is to add more time to route schedules for running time on route links in the downtown area (between Dupont Circle and Union Station).

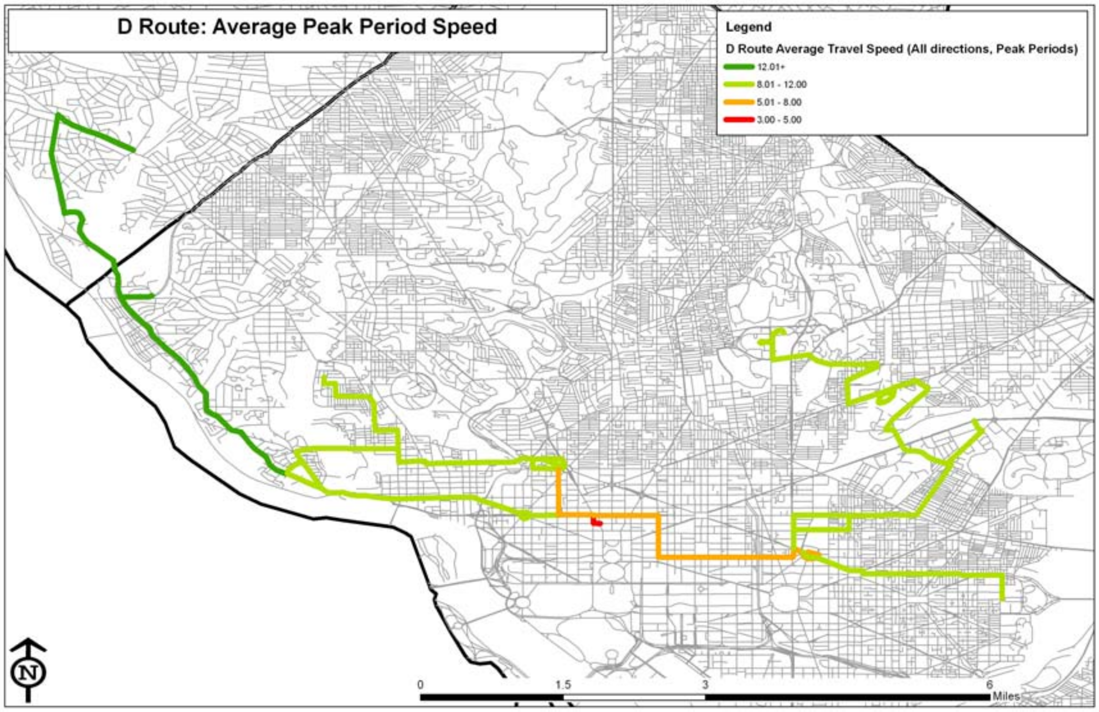
For the long term, the study recommends an extra 5 percent of time based on the overall running time of the route and an additional 15 percent layover time based on the time it takes to cross downtown Washington, where most congestion occurs.

Table 19: Added Time to Each Route for the Long-term Recommendation

	Current Running Time	Extra Running Time (5% of total route time)	Extra Layover Time (15% of downtown crossing time)
M-F AM	32 min	5 min	2 min
M-F PM	35 min	6 min	2 min
M-F Offpeak	35 min	6 min	2 min
Sat	25 min	4 min	2 min
Sun/Holiday	23 min	4 min	2 min

2. Supervision appears to be another factor for the unreliability of the D routes. A concern expressed by riders and drivers is the amount of bus bunching that occurs due to operation problems. Increased supervision (either using street supervisors or providing dispatchers with AVL data) is recommended to address locations where bunching tends to occur. Figure 29, below, shows average travel speed on segments of the D routes. The low average speed in the area between Union Station and Dupont Circle is a key factor in delay along the routes.

Figure 29: Average Travel Speed during AM and PM Peak Periods



Source: WMATA Public Time Tables

<u>Routing</u>

1. The D1-8 routes currently are arranged so that there is one route that runs through downtown all day (the D6), with several routes running short turns to the east and west that do not connect all the way through downtown. This routing means that the D6 provides excellent crosstown connectivity from Stadium-Armory in Lincoln Park to Georgetown and the Palisades area. However, the area between Union Station and Ivy City has crosstown connectivity only during peak periods with the D3. Extending the D4 into downtown Washington, as shown in Figure 30, would provide additional connectivity for Trinidad and Ivy City.

   This study recommends a short-term extension of route D4 along K Street from North Capital Street to McPherson Square (K Street NW and 14th Street NW). This extension will provide greater connectivity from the Ivy City and Trinidad area to downtown Washington and reduce the number of transfers for D4 riders. This routing will also connect neighborhood residents to the Safeway supermarket that has opened at 5th Street NW and New York Avenue.

   As part of this extension there will be some slight changes to the route. Service to Union Station on the D4 will be withdrawn. Additionally, headways on the D4 for Saturday and Sunday will be a uniform 30 minutes (a decrease from 25 minutes on Saturdays and an increase from 36 minutes on Sundays).

   In the long-term the study recommends extending the D4 to Sibley Hospital. An extension of the D4 route to this area would require additional operating funds, which is discussed in more detail in the Implementation section.

2. Every third trip 6:30 – 10:30 AM (six trips) and 3:30 – 7:30 PM (seven trips) on the D6 line is recommended to be a shortened turnback trip. Thus, every third D6 trip eastbound from Sibley Hospital will terminate at Dupont Circle on the west side and every third westbound trip from Stadium-Armory Metrorail Station will terminate at Union Station on the east side. This will maintain a high level of service on the D6 by reducing the number of trips that are slowed by downtown traffic. The volume of service through downtown will be maintained by the extended D4 route. Additionally, this recommendation will reduce the cost of the operating the D6.

3. A smaller routing change for the D6, displayed in Figure 31, is recommended at N. Capitol Street and Massachusetts Avenue. Currently buses from the west turn north on N. Capitol and then southeast onto Massachusetts Avenue to access Union Station. These movements in a congested area, particularly the left onto N. Capitol Street, add significant, unpredictable delay to the route. Instead of making this left and then right turn, it is recommended for buses to stay on E Street NE and access Columbus Circle directly. The reverse movement for buses from the east also should be changed to match the eastbound movement. This change would affect the D6. This change is contingent on identifying an appropriate bus stop along E Street or Columbus Circle, to allow the bus to stop at a convenient location for passengers going to or transferring at Union Station. During the study process, it was noted that a bus stop displacing the existing parking along E Street between North Capitol and Columbus Circle is unlikely to be permitted by the Architect of the Capitol, who has jurisdiction over parking issues in this area.

4. The service evaluation study recommends implementation of the K Street Busway. The proposed busway would improve operations of the D1, 3, 6 and D4 routes through downtown Washington. K Street in downtown is where much of the slowdown occurs for the D routes, and dedicated bus lanes would do much to improve travel times for these routes and others operating

along K Street. Some of the additional time that this study recommends adding to the schedule on these segments could be removed.

The timeline for implementation of the K Street busway has not been finalized. Therefore, it is recommended to revisit operations of the D routes through downtown when this improvement is constructed, and that improvements to service in the absence of the busway continue to move forward for implementation.

Figure 30: D4 Extension

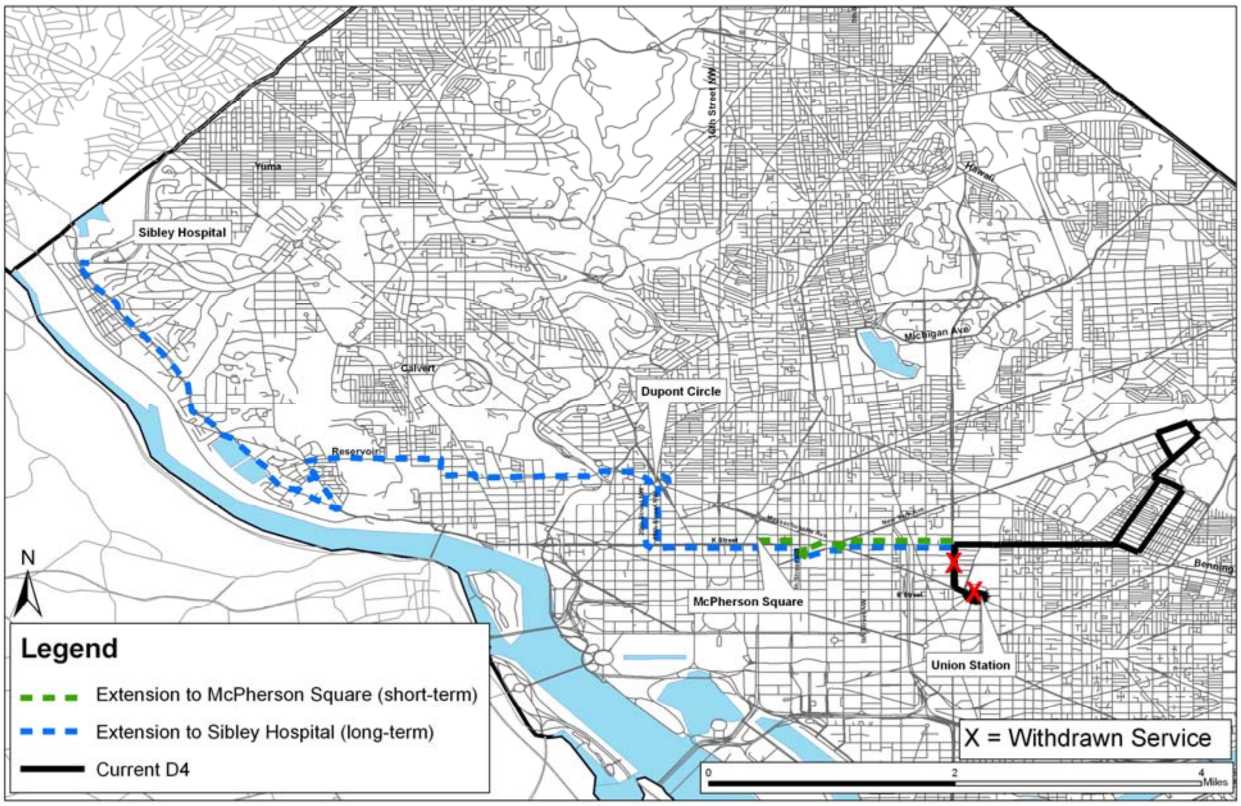
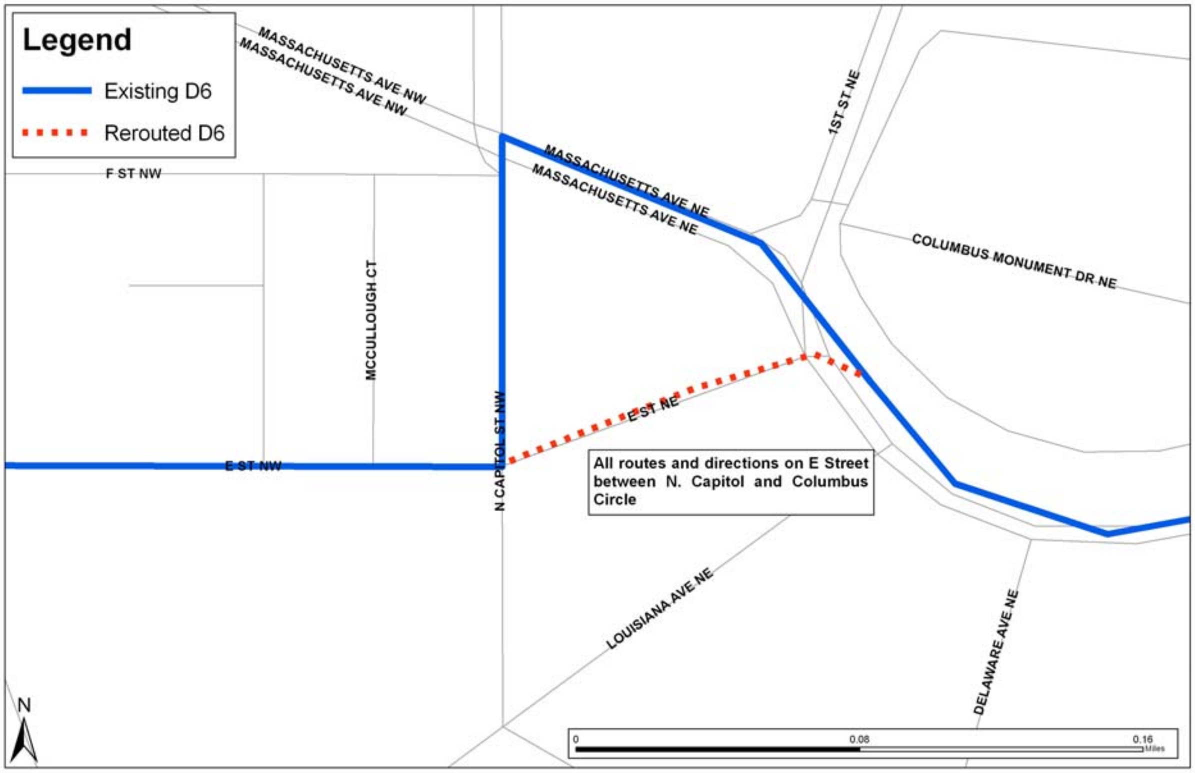


Figure 31: Reroute of D1, 3, 6, on E Street



Since the D1-8 route runs mostly through dense parts of the District (including downtown Washington) the route experiences significant traffic delays. There are no easy recommendations for traffic congestion mitigation. Typical solutions such as bus priority lanes or traffic signal prioritization may not be recommended in denser areas of the District, since they would be difficult to implement and could be detrimental to the surrounding neighborhood.

The result is that delays due to traffic congestion may have to be accepted for portions of the route. The following segments of the route include traffic mitigation recommendations.

MacArthur Boulevard/Foxhall Road to 35th Street NW/Reservoir Road (D3, D6)

The analysis revealed traffic signal priority at signalized intersections would be beneficial to the overall efficiency of the routes running on Reservoir Road in this area.

The following intersections are recommended to be equipped with traffic signal priority equipment:

- Reservoir Road/39th Street NW
- Reservoir Road/37th Street NW
- Reservoir Road/35th Street NW

Dupont Circle to Union Station via K Street, 13th Street NW, and E Street (D1, D3, D6)

The analysis for this stretch of the route focused on the future K Street busway reconfiguration. Such reconfiguration would benefit the operations of the D1, D3, and D6 routes tremendously by allowing buses to bypass traffic congestion through K Street. This configuration should occur as soon as possible in order to benefit D route operations on the K Street corridor.

Another recommendation of the K Street Busway study was for traffic signal prioritization for buses to be implemented as part of the improvements. It is unknown whether a full traffic analysis was undertaken during the original K Street Busway study to model operations with a full signal prioritization system in place. It is the opinion of this study team that traffic signal priority for buses along K Street could be detrimental for bus operations on intersecting arterials and would need a sophisticated computer system to monitor traffic operations and allow buses green time . That is not to say that signal prioritization on K Street should not happen, just that it would need careful design in order to work efficiently and correctly within the context of traffic in downtown Washington.

K Street is a special case, and is the only street along the route that has sufficient space for reconfiguration to allow for exclusive bus lanes. Bus priority lanes are impractical for the rest of the routing because, in many locations, structures and fences are built adjacent to narrow sidewalks, leaving little room for bus priority lanes to be implemented without encroaching on buildings, landmarks, or parks.

Traffic signal priority would also be impractical since, as stated above, prioritization could take green time away from equally important intersecting streets. Therefore, beyond K Street there are no recommendations for this section.

Union Station to Stadium-Armory Metrorail Station via C Street/D Street (D6)

Analysis of this stretch of the route revealed there would not be enough right-of-way to implement bus priority lanes. Thus there are no recommendations for bus priority lanes at any of the congested intersections within this section.

Traffic signal priority, however, is a viable solution to alleviate some of the delays that D6 buses experience due to traffic congestion in this area. The following intersections are recommended for traffic signal prioritization:

- C Street/17th Street NE
- C Street/18th Street NE
- C Street/19th Street NE

Union Station to Ivy City (D1, D3, D4, D8)

The analysis revealed that tight urban development of this routing through both Stanton Park and Ivy City mean that bus priority lanes are not an option to alleviate traffic congestion delays for the bus route.

However, traffic signal prioritization should be implemented for the portions of K Street and H Street where these routes run. Additionally, the route has congestion along a short portion of West Virginia Avenue and Mt. Olivet Road. Delays are likely to be less of an issue on West Virginia Avenue and Mt. Olivet Road since this portion is short, at the end of the route, and in an industrial area. Therefore no recommendations for traffic congestion are recommended for this portion of the route.

The following intersections are recommended for traffic signal prioritization:

- K Street/1st Street NE
- K Street/2nd Street NE
- K Street/3rd Street NE
- K Street/4th Street NE
- K Street/5th Street NE
- K Street/6th Street NE
- H Street/3rd Street NE
- H Street/4th Street NE
- H Street/6th Street NE

West Virginia Avenue/Mt. Olivet Road Intersection to VA Hospital (D8)

The analysis showed that the dense built-up nature of the neighborhood where traffic congestion occurs means bus priority lanes are unfeasible and are not recommended. However, traffic signal prioritization for the D8 bus route may help alleviate some of the delays due to auto congestion in this area.

Not every congested intersection is a candidate for traffic signal priority. Since the routing does run along Rhode Island Avenue, a heavy arterial for commuter traffic into Washington, traffic signal priority may interfere with this commuting pattern. Any recommendations made here should be studied in further detail to determine how much delay would occur from traffic signal priority due to buses.

The following intersections are recommended for a traffic signal prioritization system:

- 9th Street NE/T Street
- 9th Street NE/Brentwood Road
- Brentwood Road/Home Depot Retail Entrance
- Brentwood Road/Saratoga Road
- Rhode Island Avenue/Saratoga Road
- Rhode Island Avenue/10th Street NE/Bryant Road
- Rhode Island Avenue/Rhode Island-Brentwood Metrorail Station
- Rhode Island Avenue/Retail Entrance
- Rhode Island Avenue/4th Street NE
- 4th Street NE/Bryant Road
- 4th Street NE/Edgewood Road

Customer Communications

Short-term strategies to improve communications include:

- Improve availability of schedules in buses and at Metrorail stations along each route.
- Update schedules posted at stops to reflect new services, highlighting the key information used by riders in an easy-to-read and visible format.
- Four additional bus stops require schedule information and three stops require a system map, based on standards for information at bus stops and on the volume of passenger boardings at the stops.
- Provide and promote capabilities to access real-time next bus information via phone and internet, including hand-held wireless devices.

Medium and long-term strategies include:

- Enhance sound quality of onboard automated annunciators for easier comprehension.
- Replace damaged or missing information cases at stops. Alter displays so that information faces towards sidewalks and shelters, rather than towards the street as some are oriented now.
- Provide system maps that highlight the D routes and connecting routes at shelter locations.
- Ridership at six stops along the D routes is high enough to justify real-time next bus displays that indicate when the next vehicle will arrive and what route the vehicle is serving. These displays should be installed when they become available on the WMATA system.

Stops and Facilities

All bus stops with more than 100 daily boardings were assessed to determine whether they have the amenities recommended in the WMATA Regional Bus Study. Unfortunately, some data on amenities was missing from the bus stop inventory for inclusion in this study.

While there are many bus stop needs, the findings of this study focus on whether a shelter and/or bench exist for those waiting at the stop. All other amenities (trash cans, schedule information) are deemed as a "minor amenity issue."

The findings include the following (see page 19 of Appendix 2 for details):

- On all the D routes there were 39 stops with more than 100 boardings.
- Of those 39, 38 of them had at least one issue related to availability of amenities.
- 13 of the bus stops are in need of a shelter and a bench, while one is in need of a shelter only and another is only in need of a bench.

At some of the stops, constraints prevent the installation of a bench and/or shelter. For instance, along the D2 route in the Glover Park neighborhood, the stop at Benton Street and 39th Street NW has sufficient boardings to recommend placement of a shelter. However, the neighborhood is urban in nature, with row houses built up to the sidewalk, and there is not enough room to place a shelter while allowing for adequate circulation on the sidewalk. Due to constraints such as these, the recommendations made here for placement of amenities, including shelters and benches, should be examined in detail on a location-by-location basis before implementation occurs.

Figure 32: Bus Stop Issues identified Along the D1-8 Route

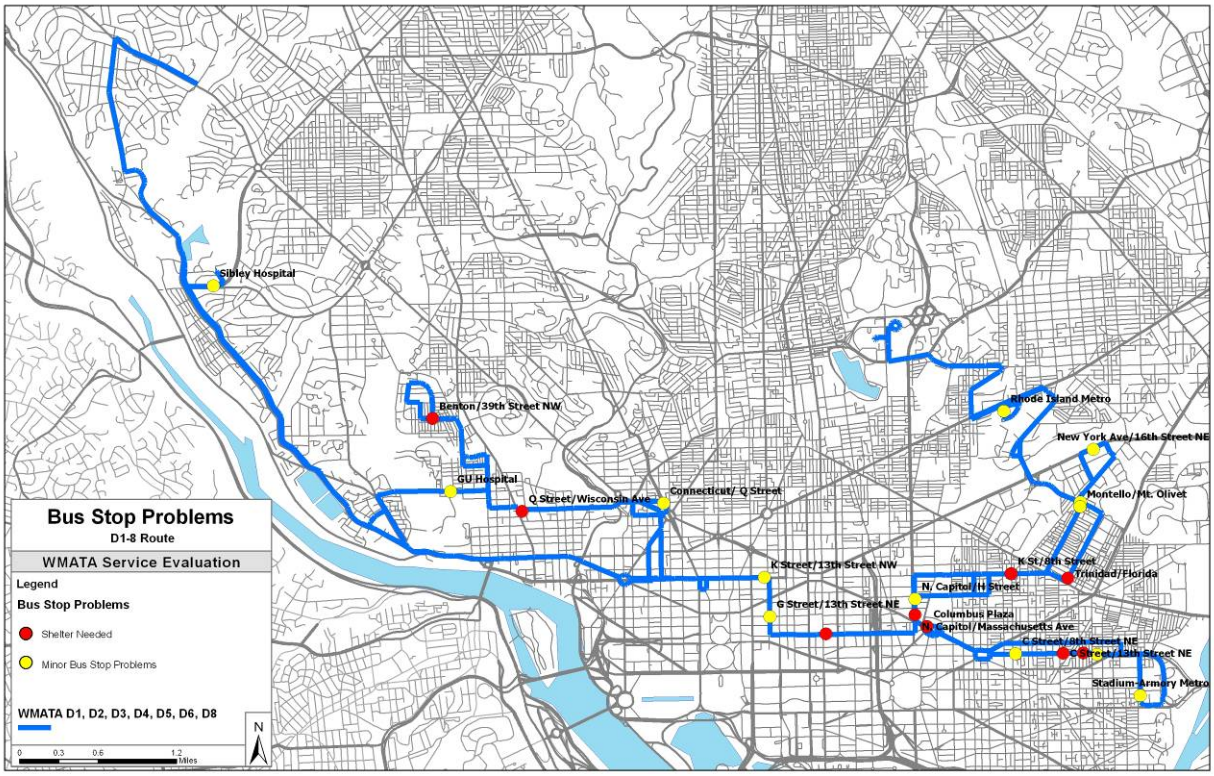


Table 20: Bus Stop Needs by Route

	Need Shelters	Need Benches	Minor Amenity Issues	No Amenity Information
D1,3,6	4	4	6	7
D2	2	3	0	1
D4	3	3	1	0
D5	N/A	N/A	N/A	N/A
D8	5	4	2	4

*Note: Stops may have more than one need and thus there is overlap for the numbers listed above

ROUTE F8

Transit Service Assessment

Service Performance

The F8 route currently operates seven days a week between Langley Park and the Cheverly Metrorail station. The route runs 558 revenue miles during the weekdays, 372 revenue miles on Saturdays, and 248 revenue miles on Sundays.

The F8 runs two buses per hour on weekdays and one bus per hour on weekends. Current public timetables show the average weekday running time for peak periods as 60 minutes, though actual running time is slightly longer at 63 minutes.

Daily operating costs are $5,910 on weekdays, $3,679 on Saturdays, and $3,272 on Sundays, which equates to a total annual operating cost of $1.9 million per year. Direct revenue from passenger fares account for just over $293,000 on the weekdays for a cost recovery ratio of approximately 19 percent. On Saturdays, passenger revenues account for 25 percent of operating expenses, or almost $48,000. On Sundays, passenger revenues account for 14 percent of operating expenses, which totals almost $24,000.

Fare payment data from May 2008 revealed that cash is the most common fare payment for the F8 route. Table 23 shows all fare payment methods for these lines. Note: SmarTrip usage is encompassed in the numbers for cash, rail transfers, and bus transfers.

Table 23: Metrobus Route F8 Fare Payment Method

	Percent (%)
Cash	47
Bus Transfer	34
Flash Pass	9
Rail Transfer	6
Elderly & Disabled	2
Student and Other	2

Ridership

For the F8 Route, on average 1,570 people board on a given weekday, with 1,285 average boardings on Saturdays and 642 average boarding on Sundays. Figure 33 details average daily passenger trips between 2003 and 2007. The trends show a decline in weekday passengers and an increase in weekend passengers.

Figures 34 and 35 detail eastbound and westbound boardings and alightings for the F8 route. The figures illustrates that for westbound trips, most of the boardings occur between the Prince George's

Plaza Metrorail Station and the Cheverly Metrorail Station, including Prince George's Hospital. The alightings mainly occur between the terminal stand at Langley Park and the West Hyattsville Metrorail Station. The busiest westbound boarding stops include Prince George's Hospital Center (110), Cheverly station (107), and West Hyattsville station (68). Westbound stops with the highest number of alightings include University Boulevard/Lebanon Street (61), West Hyattsville station (58), and University Boulevard/Merrimac Drive (55).

For eastbound trips, most boardings occur between the terminal stand at Langley Park and Baltimore Avenue (alt US Route 1) at Emerson Street before Bladensburg. Most alightings occur between the Mall at Prince George's Plaza and the Cheverly Metrorail Station. The busiest eastbound stops include Prince George's Plaza at Toledo Road (87), 15th Avenue/Kanawha Street (63), and University Boulevard/Merrimac Drive (60). Westbound stops with the highest number of alightings include Prince George's Plaza at Toledo Road (109), Cheverly station (96), and Prince George's Hospital Center (75).

Figure 33: Metrobus Route F8 Average Daily Ridership

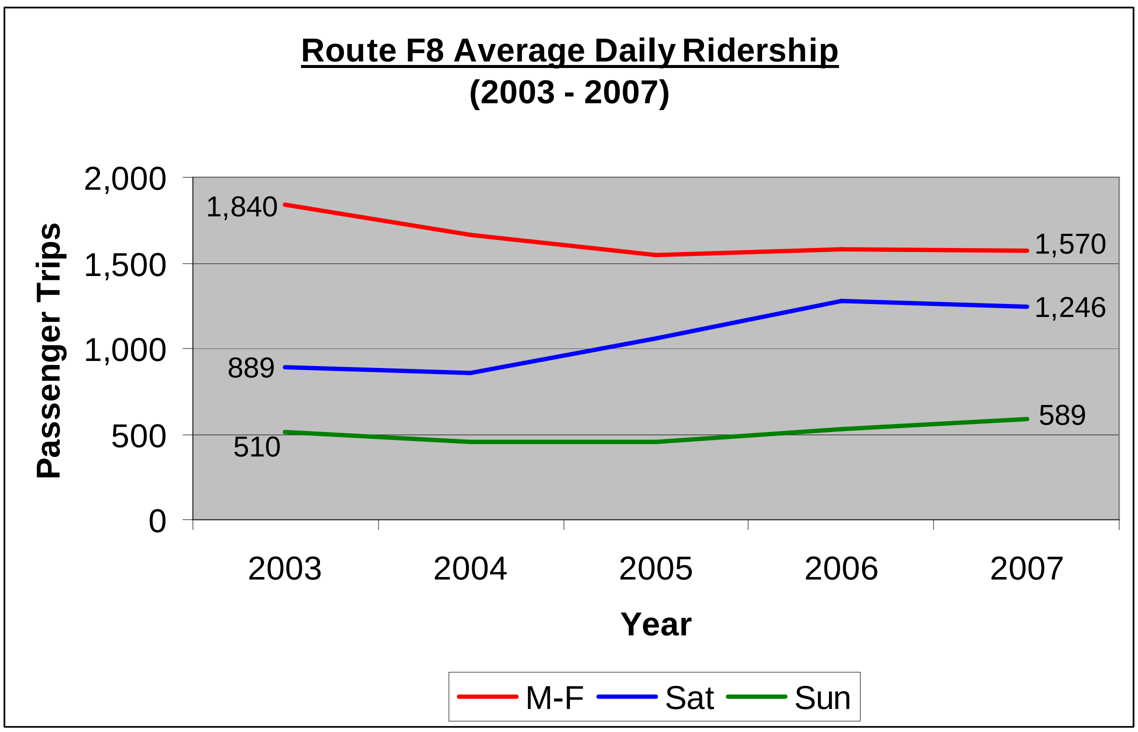


Figure 34: Route F8 Weekday Eastbound Boardings and Alightings

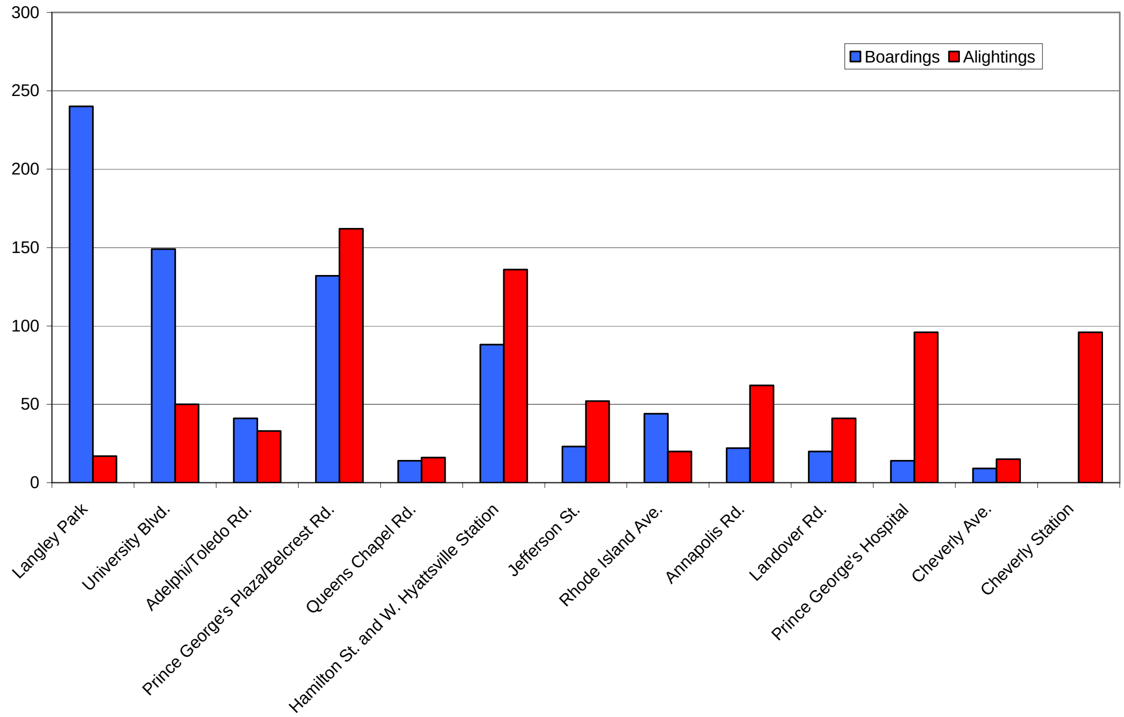
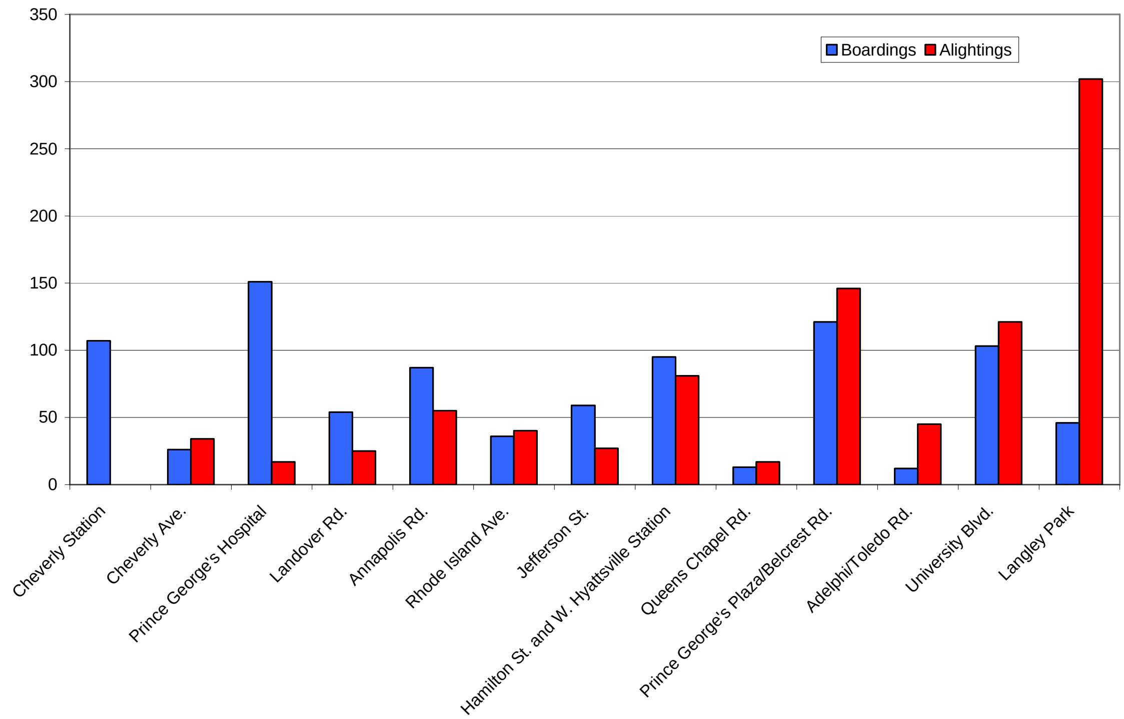


Figure 35: Route F8 Weekday Westbound Boardings and Alightings



Peak load information was provided by the five standard weekday time periods, as shown in Table 24. The raw data gave overall counts of the numbers of passengers who boarded and alighted at each stop during these five time periods. Subtracting alightings from boardings gives a running total of the number of passengers aboard for each segment of the route, allowing the peak load point to be identified. The peak load for each time period was divided by the number of trips made during that period to determine the peak load for an average trip. These averaged peak loads were then compared to bus capacities (54 passengers during peak periods and 45 passengers during off peak and weekend periods) to determine the vehicle loading figures for each time period.

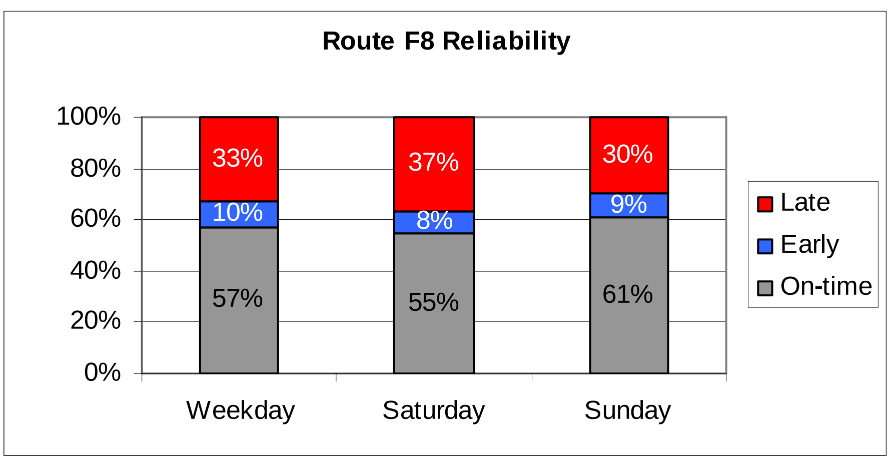
Table 24: Metrobus Route F8 Vehicle Loading

AM Peak	Midday	PM Peak	Evening
EB: 40.0% WB: 22.2%	EB: 33.0% WB: 50.2%	EB: 24.9% WB: 34.7%	EB: 24.4% WB: 13.3%

On-time Performance

As shown in Figure 36, the F8 route was most reliable on Sunday, with buses arriving on-time an average of 61 percent of the time. On-time performance slightly drops on weekdays and Saturday with about 57 percent and 55 percent of buses arriving on-time, respectively. Beyond an analysis of on-time performance, measurements for bus bunching and missed trips were not available. However, comments made during interviews with operators and at the initial public meetings indicate that reliability of buses is a key issue among passengers.

Figure 36: Metrobus Route F8 On-Time Performance



Traffic Operations

The F8 route, designated as a suburban circumferential bus route, runs in a north by northwest direction through northern Prince George's County. Main arterials used for the route include: Cheverly Avenue, Landover/Annapolis Road (SR 202), Baltimore Ave, Rhode Island Ave (US 1), Queens Chapel Road, Adelphi Road, and University Boulevard (SR 193).

Field observations of traffic conditions on this route during the AM and PM peaks revealed some traffic issues supported by quantitative data discussed later in this section. Annapolis Road (SR 202) near the ramps to Kenilworth Avenue (SR 201) was observed backing up with traffic during the AM peak period. The area around Prince George's Plaza Metrorail Station at Belcrest and Toledo Road, which also has a major retail development and offices, was observed to have some traffic issues. Additionally, stretches of Adelphi Road and University Boulevard near the University of Maryland College Park Campus was also observed to have some traffic congestion delays.

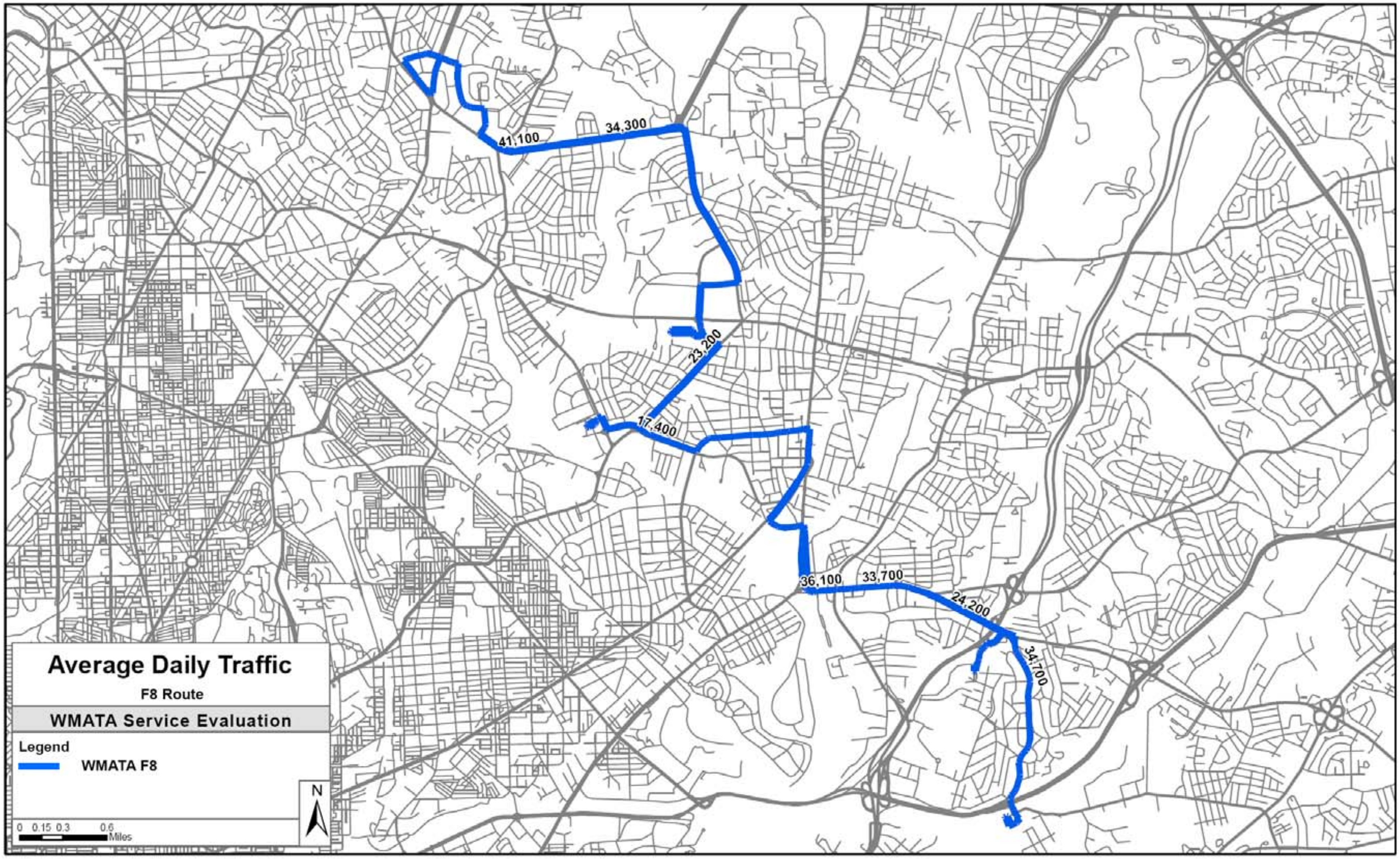
The ADT for the roadways of the F8 route showed the northern and southern portions of the route having higher ADT while the middle portion of the route (near Hyattsville) has lower daily traffic. The most traffic is along University Boulevard with an average of 41,119 vehicles per day, while the southern end of the route (southeast of US 1) averages between 33,000 and 36,000 vehicles per day. Figure 37 details ADT for the F8 route.

Daily peak period congestion in the form of volume to capacity maps can be found for the AM and PM peak periods in Figures 38 and 39. These maps confirm some of the field observations regarding traffic conditions. Traffic congestion, found in areas where traffic volume exceeds the free flow volume potential of the roadway, occurs during the AM and PM peak periods along Cheverly Road, Landover/Annapolis Road, Adelphi Road, and University Boulevard.

Similar to the analysis of the P12 route, because the F8 runs circumferentially around the downtown Washington core, it intersects several radial arterials that also experience major traffic congestion. Congested routes where the F8 intersects include East-West Highway and Riggs Road. Delays may occur a these intersections due to a majority of green time being given to the radial route.

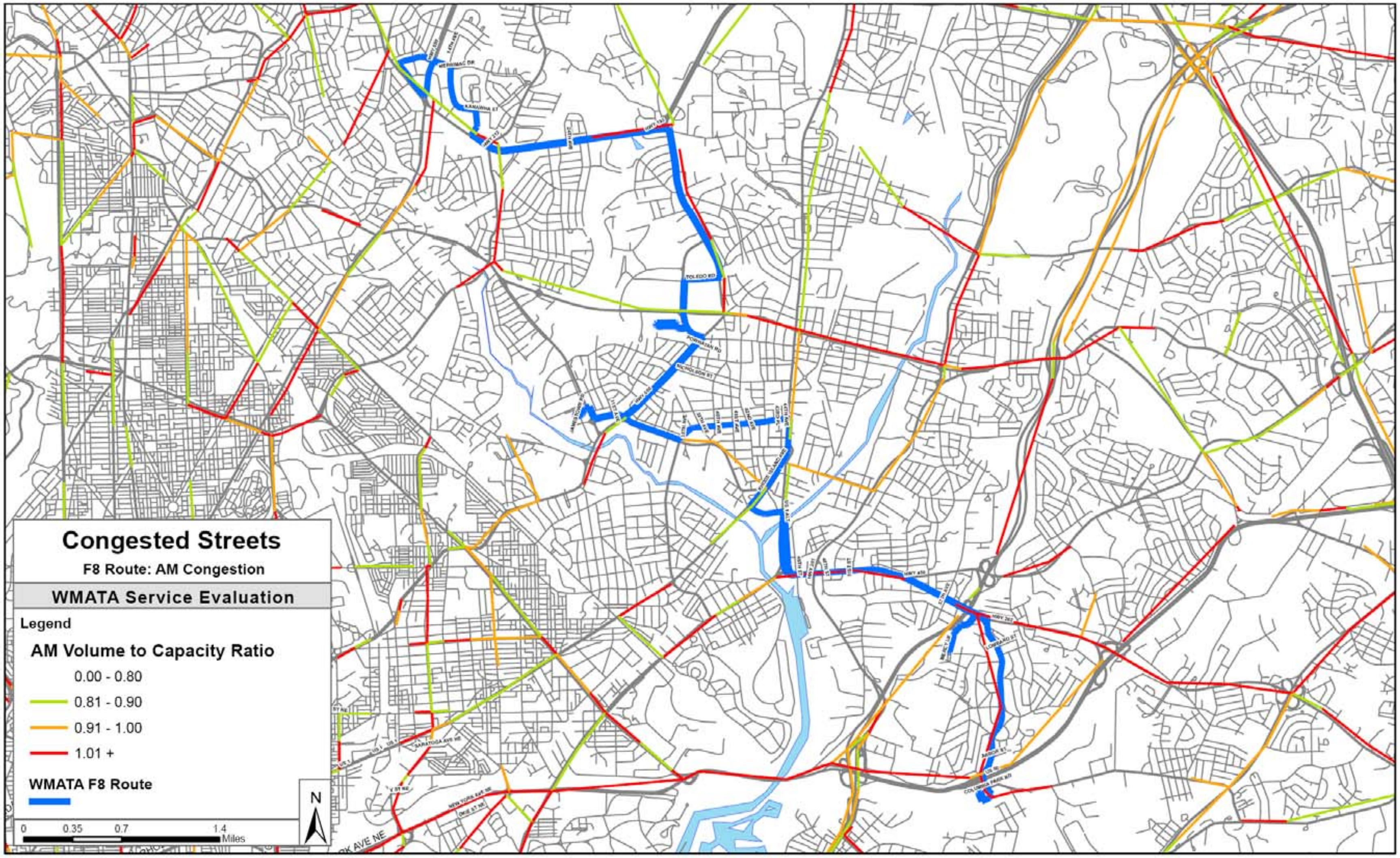
Intersection timing and volume information was requested for selected congested intersections along the route. However, this information was not available to be used in the traffic operations analysis.

Figure 37: Route F8 Average Daily Traffic



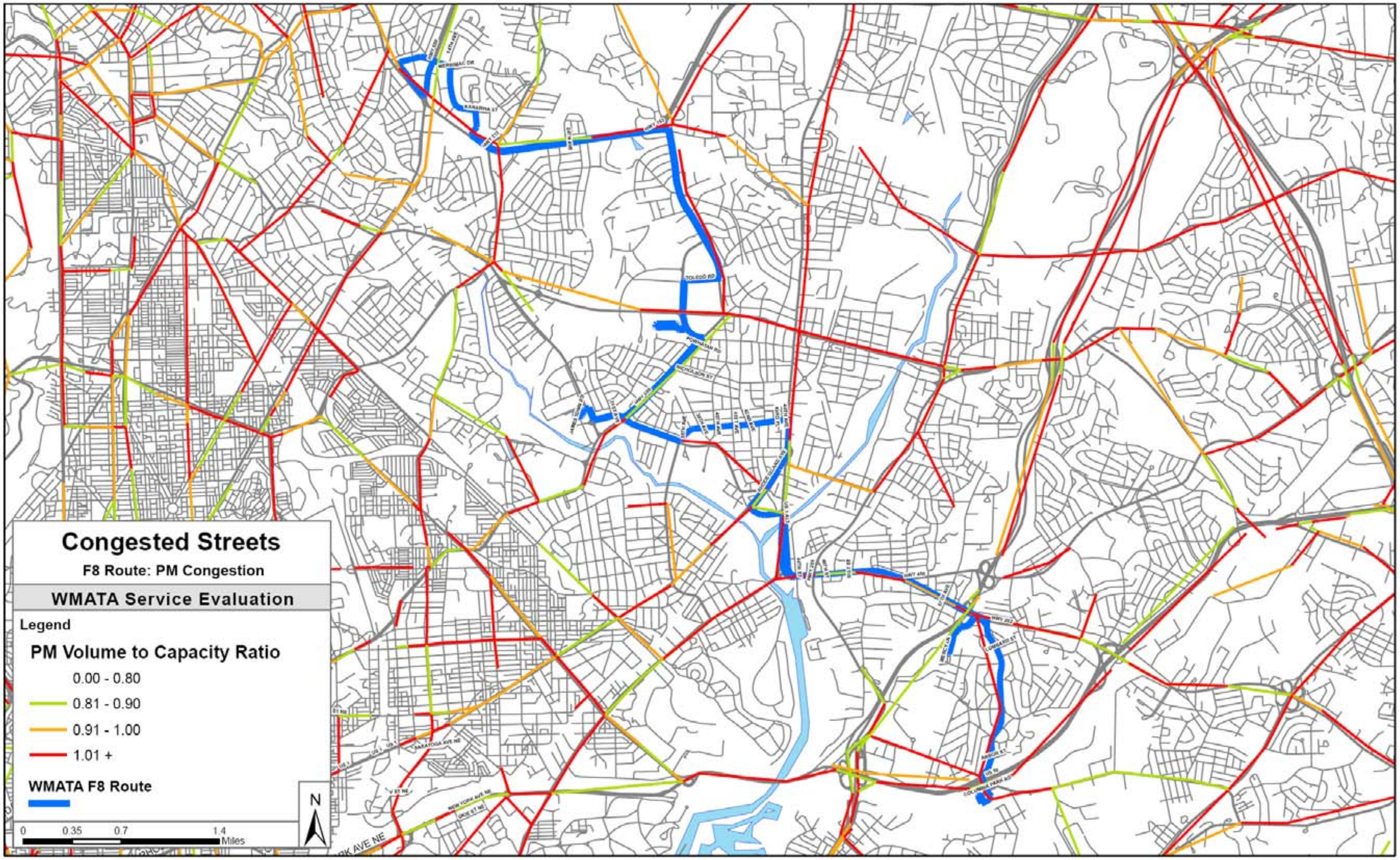
Data Source: Maryland State Highway Administration (MSHA)

Figure 38: F8 AM Peak (7:00-8:00) Congestion Based on V/C Ratio



Data Source: MWCOG Regional Trip Model

Figure 39: F8 PM Peak (5:00-6:00) Congestion Based on V/C Ratio



Data Source: MWCOG Regional Trip Model

Public Involvement Process

The first-round public meeting for Route F8 was held on October 1, 2008 at the Prince George's Plaza Community Center at 6600 Adelphi Road in Hyattsville, Maryland. The second-round meeting was held on February 10, 2009 at the same location.

Comments from the meetings, website, hotline, and other correspondence are summarized below.

October 2008 Comments

Primary concerns included:

- Unreliable – buses frequently arrive very late.
- Need to increase frequency.
- Need to increase span of service (run earlier and later, both weekdays and weekends).

Other Comments:

- Would be helpful if F8 and F1 buses ran on a staggered schedule during off-peak hours.

February 2009 Comments

Primary concerns included:

1. Rerouting away from the apartment complexes may not be a good idea.
2. Service needs to be added on Saturday and Sunday and it should run until 11 PM or midnight.
3. Increase frequencies.
4. Extra dwell time at Langley Park, PG Hospital and Cheverly Metrorail would be helpful.

Other comments

- Proposed rerouting ideas seem to be reasonable – particularly running F8 over the Hyattsville Bridge down US 41 Alt. to Decatur Street.
- Metrobus supervisors in attendance stated that the printing on the schedule boxes at bus stops is too small – when boxes are in place at all. This should be a near-term priority.
- Real time NextBus information is a good idea. It is needed at New Hampshire Avenue and Merrimac Drive.

Recommendations

Service Planning

Various options for changing and improving the existing service on the route were developed. These proposed service changes were developed as a direct result of many previous activities, including:

- Field analysis and observations.
- Analysis of the existing operating conditions.
- Discussions with bus operators and supervisors.

- Discussions with riders at public meetings and comments from riders via the website and telephone.
- Discussions with WMATA planning and operations staff and jurisdictional partners.

Frequency

1. More buses could be inserted into the schedule to accommodate 30-minute headways in the afternoon, perhaps beginning as early as 3:00 PM for the eastbound and for the westbound directions. This would mean an additional 4 trips per weekday and cost approximately $367 per day or $94,000 annually.
2. Some passengers have mentioned having a base headway of 30 minutes all day and peak service of 15 minutes for the weekdays. This would roughly double the amount of existing service and result in operating costs of $11,187 per day or $2,852,685annually just for the weekday service.

Operations

1. In general, WMATA should consider extending the recovery time for all the routes at the terminal bus stands and at major time points so drivers can take breaks and leave the terminal stations on time. This would improve driver performance and improve schedule adherence and on-time performance.
2. Also, WMATA should consider adding some time to the schedule at key time points such as:
   - Cheverly
   - Prince George’s Hospital (if there is layover area)
   - West Hyattsville
   - Prince George’s Plaza
3. If there is an improved layover area, Langley Park passengers expressed a desire for the consideration of adding more hours of service. Right now the routes terminate at 8:41 PM. Extending the service to 11:00 PM for instance would add 13 additional bus trips within the 30-minute headway scenario. This would result in an additional cost of $2,260 daily or $576,300 annually to operate.
4. More or improved supervision is needed and might be a lower cost option to improve on-time performance, schedule adherence and to ensure buses arrive and depart major time points as close as possible given their schedule. If the improved supervision can be done with the existing staff, the costs would be negligible.
5. Also, extending the recovery time from the current 10 to 12 – 14 minutes would add some “cushion” in the schedule to allow for late buses to be absorbed in the operations.

Routing Changes

1. The area where the route operates has much bus service, especially near the Cheverly Metrorail Station. Because of that, WMATA should explore rerouting the F8 to the Largo area and the Largo Town Center Metrorail Station via Landover Road. The F1 and F2 routes could still serve

the Cheverly area and provide equal if not improved service to what is there today. These two routes could also be optimized with the rerouting of the F8 as well.

This new change would:

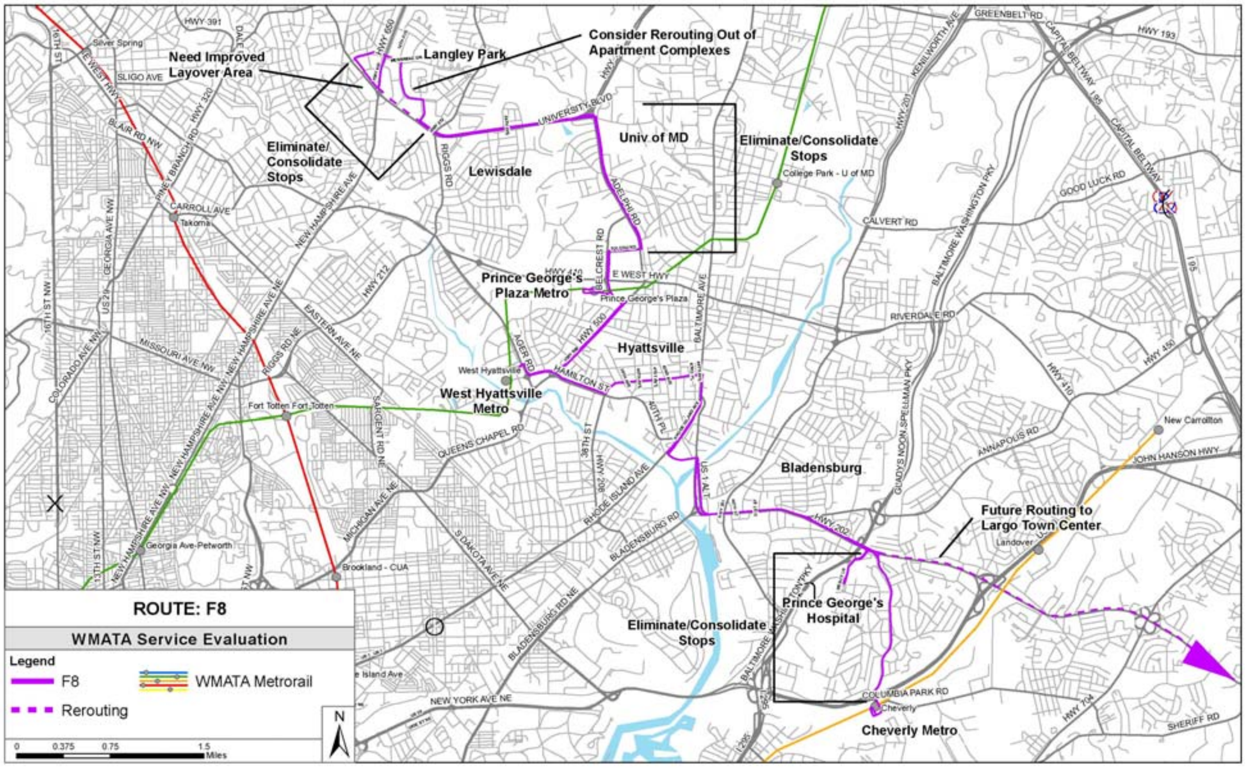
- Provide improved cross-county connections to/from Largo and Prince George's Community College.
- Provide improved access to the FedEx Field and the Boulevard at the Capital Centre.
- Provide improved access to the Prince George's Sports and Learning Complex.
- Reduce excess service on Cheverly Avenue.

2. Another possible rerouting is to take the bus off of Merrimac Drive / 14th Avenue / Kanawha Street / 15th Avenue and run it from University and New Hampshire Avenue straight down University Boulevard to Adelphi Road.

   The north end of the route has multiple apartment complexes and other destination that are served by the bus. However, the area has some narrow streets and cars often are parked illegally on the corners. This makes it difficult to maneuver the 40 foot transit buses along the current path. Also, the area the bus operates in makes it hard to find a layover area.

   When the Takoma / Langley Transit Center is built at University Boulevard and New Hampshire Avenue, in conjunction with the Purple Line, the current routing using local streets and the current on-street terminal loop in Langley Park north and west of University Boulevard near 15th Avenue can be eliminated. This will alleviate the problems associated with narrow streets, illegal parking, and the inability of the buses to layover in the immediate area. The Takoma/Langley Crossroads is the busiest non-Metrorail transit hub in the region, with 11 different bus routes passing through the area. Currently bus stops are located far apart, and riders transferring from one bus to another are required to walk almost a ¼-mile and across heavily traveled University Boulevard and New Hampshire Avenue. The transit center will be a much needed safety and operation improvement for the Crossroads community.

Figure 40: Potential F8 Route Changes and Bus Stop Consolidation



Traffic Operations

<u>Cheverly Metrorail Station to Baltimore Avenue/Armentrout Drive intersection</u>

The ADT and congestion maps show both Cheverly Avenue and Landover/Annapolis Road experiencing traffic congestion and delays in the AM and PM peaks.

Cheverly Avenue, while it does experience traffic congestion, is residential in nature. It is 30-40 feet wide and in some portions has on-street parking. It appears that the congestion experienced here is from a narrow residential street being used as a cut-through by commuters likely accessing US 50 to the south or I-295 to the north. Therefore, there is no recommendation for traffic congestion mitigation along Cheverly Avenue.

Landover Road (SR 202) and Annapolis Road (SR 450) also experience traffic congestion in both the AM and PM peak. This portion of the route, while it does have some residential parcels, is more of a typical suburban arterial. It has several signalized intersections where buses could be delayed and there is enough right-of-way due to suburban setbacks to consider a bus priority lane.

Additionally, the section of Baltimore Avenue between Annapolis Road and Armentrout Drive also experiences traffic congestion, and also has enough setback distance where bus priority lanes could be implemented.

Therefore, the following intersections are recommended for bus priority lane improvements:

- Landover Road/Cheverly Avenue
- Landover Road/I-295 ramps
- Landover Road/57^{th} Avenue*
- Landover Road/Annapolis Road
- Annapolis Road/Edmonston Road*
- Annapolis Road/ramps to Kenilworth Avenue
- Baltimore Avenue/Annapolis Road (SB lanes only)
- Baltimore Avenue/Armentrout Drive

* Denotes lower priority intersections

Improvements to these intersections, through bus priority lanes and a traffic signal priority system, will allow the F8 to operate more efficiently through this portion of the route.

Baltimore Ave/Armentrout Drive intersection to Prince George's Plaza Metrorail Station

This section of the route does not experience as much traffic congestion as the northern or southern portions of the F8 route, but there are some areas of this section that do suffer from traffic congestion, most notably the stretch of Rhode Island Avenue (US 1) between Farragut Street and Jefferson Street. However, this area is too short and too narrow to warrant any sort of bus lane improvements.

From Rhode Island Avenue the route runs west and north first to the West Hyattsville Metrorail Station and then along Queens Chapel Road to the Prince George's Plaza Metrorail Station. There are few traffic issues in this area. Also of note, the congested Queens Chapel/East-West Highway intersection is avoided due to the route diverging to access the Prince George's Plaza Metrorail Station, and thus does not need bus priority lanes.

The conclusion of the analysis is that there are no traffic mitigation needs for this section of the F8 route.

<u>Prince George's Plaza Metrorail Station to University Boulevard/Merrimac Drive intersection</u>

The northern section of the route experiences the most traffic congestion, as witnessed during field observations and also based on ADT measurements. There are several intersections within this section where the F8 bus route could benefit from bus priority lanes and traffic signal priority, including:

- Belcrest Road/East-West Highway (SR 410)**
- Adelphi Road/Toledo Road
- Adelphi Road/Belcrest Road
- Adelphi Road/Wells Parkway*
- Adelphi Road/University Boulevard/Campus Drive
- University Boulevard/Riggs Road**
- University Boulevard /New Hampshire Avenue*

*Denotes lower priority intersections

**Denotes intersection that should not receive traffic signal prioritization due to intersecting arterial needing more green time for commuters

Customer Communications

Short-term strategies to improve communications include:

- Improve availability of schedules in buses and at Metrorail stations along route.
- Update schedules posted at stops to reflect new services, highlighting the key information used by riders in an easy-to-read and visible format.
- Increase provision of information in Spanish.
- Establish on-board announcements by bus drivers to announce upcoming transfer points to rail transit, major destinations, and major bus routes, including Spanish stop announcements where needed.
- Provide and promote capabilities to access real-time next bus information via phone and internet, including hand-held wireless devices.

Medium and long-term strategies include:

- Provide signs in Spanish and English.
- Install onboard automated annunciators to communicate stop locations, transfer opportunities, service delays and other information to the consumer, including enhanced sound quality for easier comprehension.
- Replace damaged or missing information cases at stops. Alter displays so that information faces towards sidewalks and shelters, rather than towards the street.
- Provide system maps that highlight the F8 and connecting routes at shelter locations.

Stops and Facilities

The existing operations analysis as well as the field surveys confirmed that the F8 has many stops along the route. In total, there are 79 stops along the route in each direction. Some stops are very closely spaced, and according to the boarding / alighting volumes along the route, have low passenger volumes and are possible candidates to be consolidated. Those stops include (see Figure 40):

- Along Merrimac Drive / 14th Avenue / Kanawha Street near the apartment complexes at the north end near Langley Park.
- Along Adelphi Road from the University of Maryland to Toledo Road.
- From Prince George's Hospital to the Cheverly Metrorail Station.

The stops with the heaviest passenger volumes seem to be adequately served by the existing amenities. The proposed transit center at Takoma Langley Park would be a great improvement from the existing operations in the area. When it is built, it will consolidate some stops; provide a more convenient and comfortable area for passengers to wait and to transfer between buses, and provide a more convenient and reliable layover space for buses and drivers. A driver-only comfort area should be included as part of the transit center is design and budget permitting.

ROUTE P12

Transit Service Assessment

Service Performance

The P12 route currently operates seven days a week between Addison Road-Seat Pleasant Metrorail station and Eastover. The route runs 1,337 revenue miles during the weekdays, 1,015 revenue miles on Saturdays, and 493 revenue miles on Sundays.

On weekdays, the P12 runs three buses per hour in the AM and PM peaks, and two buses per hour in the midday and the evening periods. Saturday bus frequency is two buses per hour, while Sunday sees about 1.3 buses per hour.

Current public timetables show the average weekday peak running time of 72 minutes and off-peak running time of 74 minutes. Running time allocation, including the amount of time spent in transit, loading, and sitting at signalized intersections was not available for inclusion into this report.

Daily operating costs for the P12 route are $15,249 on weekdays, $10,115 on Saturdays, and $5,286 on Sundays. This equates to a total annual operating cost of $4.7 million per year. Direct annual revenue from passenger fares account for just over $1.1 million on the weekdays for a farebox recovery ratio of 28 percent. On Saturdays, passenger revenues account for 31 percent of operating expenses, or just over $163,000. On Sundays, passenger revenues account for 28 percent of operating expenses, which totals almost $77,000.

Fare payment data from May 2008 revealed that cash is the most common fare payment for the P12 route. Table 25 shows all fare payment methods for these lines. Note: SmarTrip usage is encompassed in the numbers for cash, rail transfers, and bus transfers.

Table 25: Metrobus Route P12 Fare Payment Method

	Percent (%)
Cash	47
Bus Transfer	29
Flash Pass	7
Rail Transfer	11
Elderly & Disabled	3
Student and Other	2
Other	1

Ridership

The P12 route has 5,947 average weekday boardings, 4,346 average Saturday boardings, and 2,062 average Sunday boardings. Figure 41 details average daily passenger trips between 2003 and 2007. The figure shows an increase in average ridership for weekdays, Saturdays, as well as Sundays. Ridership data was not provided by individual trip but by time period.

Figures 42 and 43 detail eastbound and westbound boardings and alightings by stop for the P12 route. The figures below illustrate that the most eastbound boarding and alighting activity occurs before Suitland station, though many alightings occur at Addison Road-Seat Pleasant station. The pattern is similar, but reversed, in the westbound direction.

Eastbound stops with the highest number of boardings include Southern Avenue station (462), Suitland station (387), and Iverson Mall (334). Stops with the highest number of alightings include Southern Avenue station (648), Addison Road-Seat Pleasant station (579), and Suitland station (353).

Westbound stops with the highest number of boardings include Addison Road-Seat Pleasant station (773), Southern Avenue station (532), and Suitland station (296). Stops with the highest number of alightings include Suitland station (385), Iverson Mall (289), and Southern Avenue station (288).

Figure 41: Metrobus Route P12 Average Daily Ridership

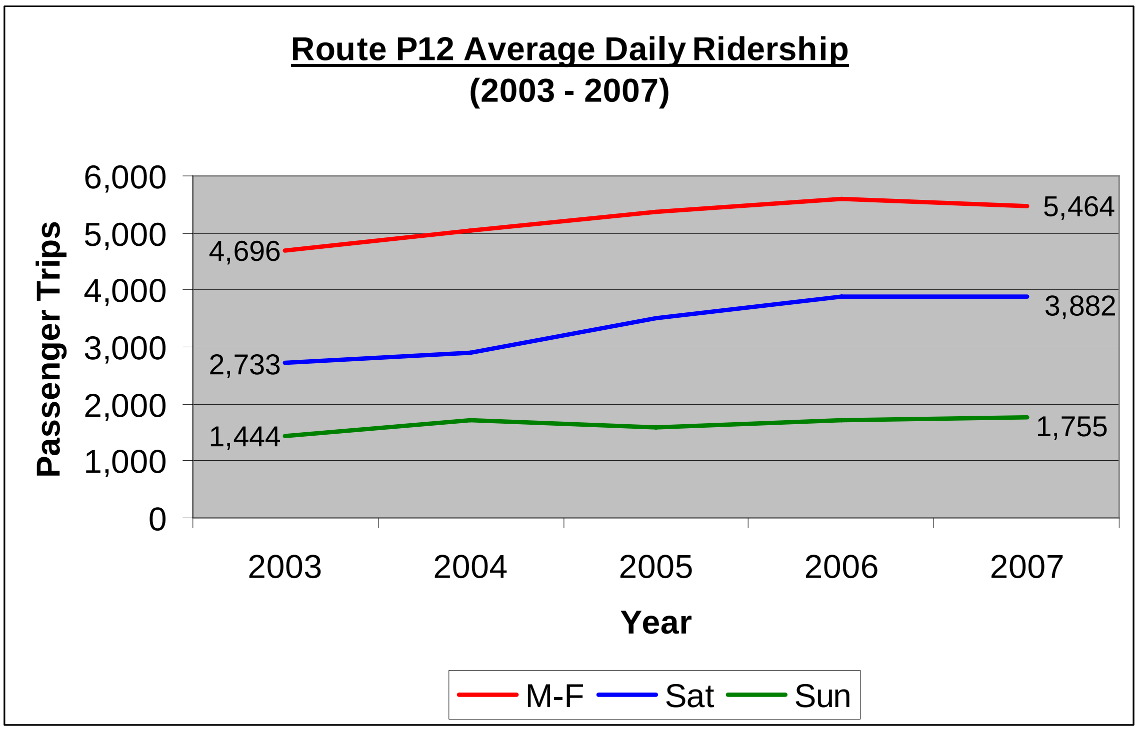


Figure 42: Route P12 Weekday Eastbound Boardings and Alightings

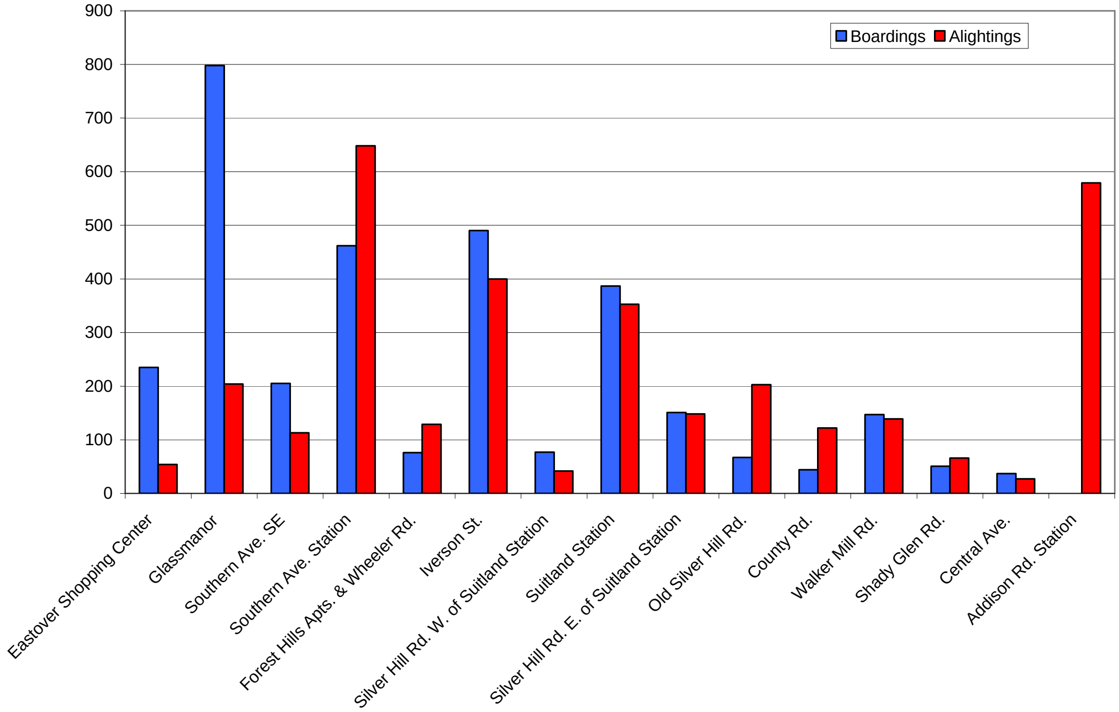
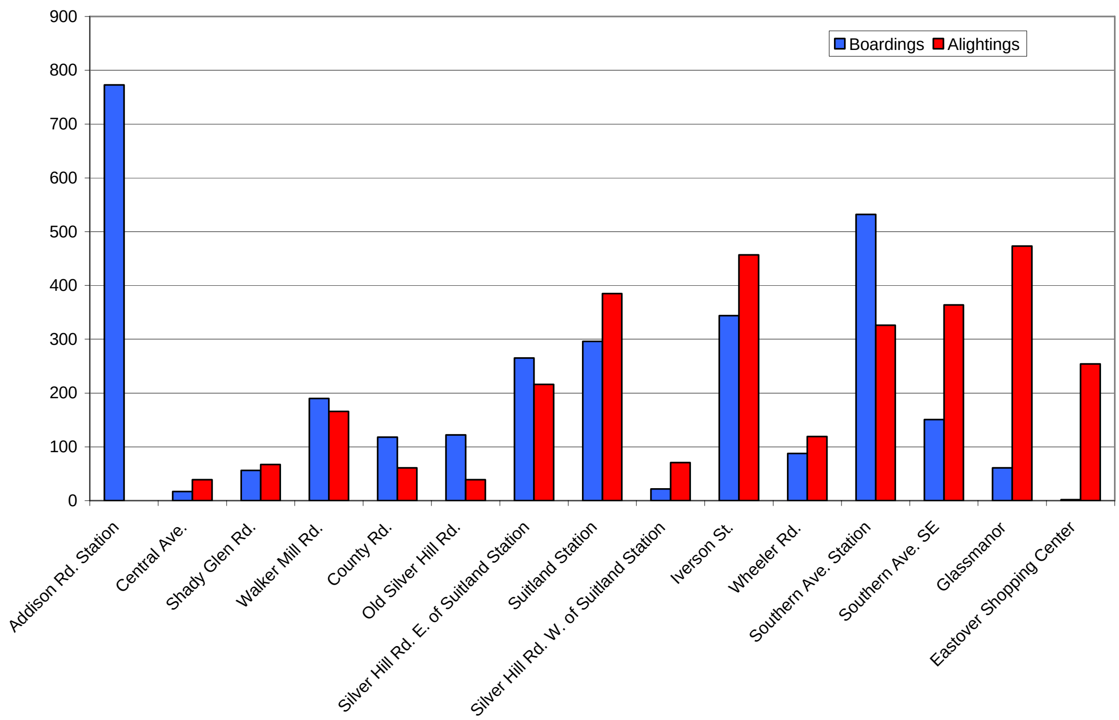


Figure 43: Route P12 Weekday Westbound Boardings and Alightings



Peak load information was provided by four standard weekday time periods, as shown in Table 26. The raw data gave overall counts of the numbers of passengers who boarded and alighted at each stop during these five time periods. Subtracting alightings from boardings gives a running total of the number of passengers aboard for each segment of the route, allowing the peak load point to be identified. The peak load for each time period was divided by the number of trips made during that period to determine the peak load for an average trip. These averaged peak loads were then compared to bus capacities (54 passengers during peak periods and 45 passengers during off peak and weekend periods) to determine the vehicle loading figures for each time period.

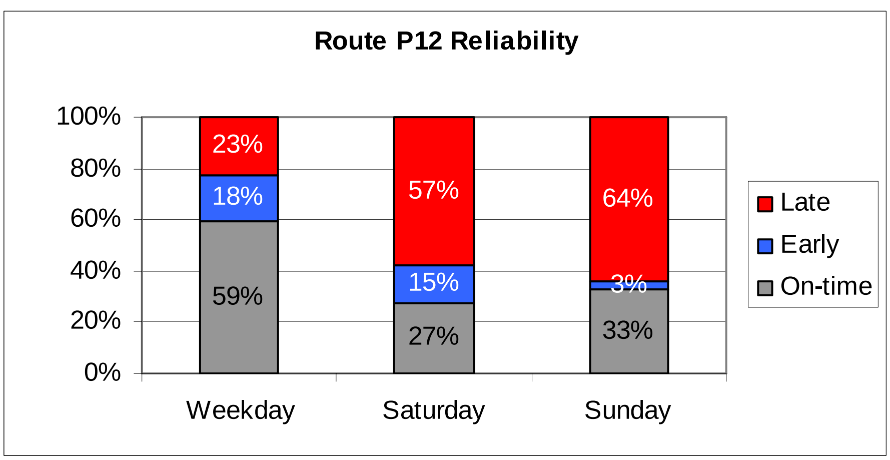
Table 26: Metrobus Route P12 Vehicle Loading

AM Peak	Midday	PM Peak	Evening
EB: 61.9% WB: 40.2%	EB: 61.8% WB: 64.1%	EB: 40.3% WB: 62.5%	EB: 38.8% WB: 43.2%

On-time Performance

As shown in Figure 44, the F8 route was most reliable on weekdays, with buses arriving on-time an average of 59 percent of the time. On-time performance significantly drops on Saturdays and Sundays with about 27 percent and 33 percent of buses arriving on-time, respectively. Beyond an analysis of on-time performance, measurements for bus bunching and missed trips were not available. However, comments made during interviews with operators and at the initial public meetings indicate that reliability of buses is a key issue among passengers.

Figure 44: Metrobus Route P12 On-Time Performance



Traffic Operations

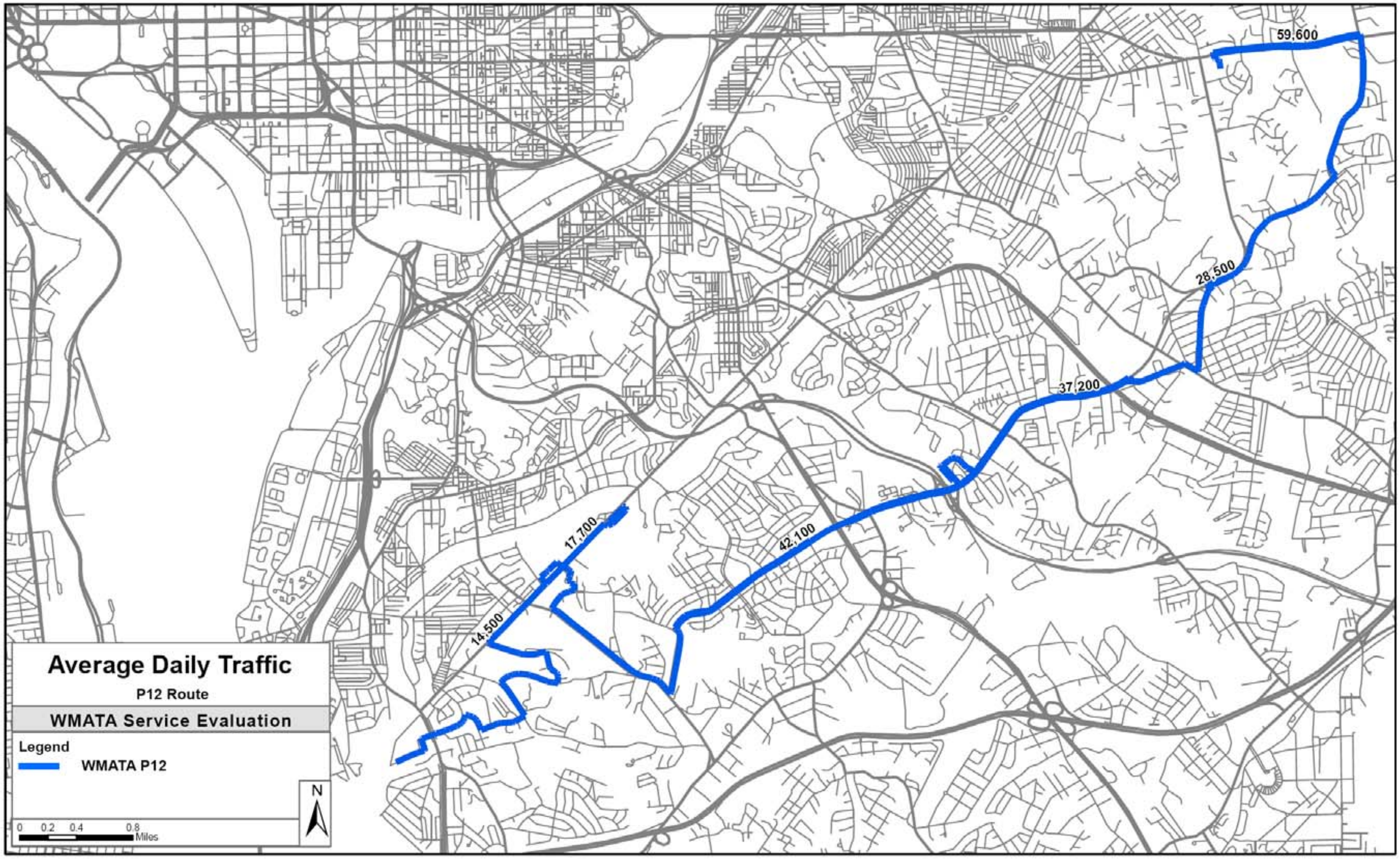
The P12 is a "suburban circumferential" route that runs through suburban Prince George's County, Maryland in a circumferential south and southwest direction in relation to downtown Washington, DC. The P12 is situated on arterials that serve a suburb to suburb commuting pattern in Prince George's County and links Eastover Mall with the Addison Road Metrorail Station. Field observations of traffic conditions during the AM and PM peak revealed few traffic congestion delays on the route with the exception of Silver Hill Road/Iverson Road between Pennsylvania Avenue and 23rd Parkway.

The average daily traffic (ADT) for the route, shown in Figure 45, reveals a couple of areas of extreme traffic. The section of Addison Road between the Addison Metrorail Station and Shady Glen Drive has an ADT of 59,600 vehicles per day, which is a tremendous amount for an arterial roadway. The section of Silver Hill Road near Suitland Parkway has a recorded ADT of 42,100 vehicles per day. The congestion maps correspond to findings from field observations and the ADT. The maps in Figures 46 and 47 show that the route is relatively free of congestion except for portions of Central Avenue, Silver Hill Road, and Wheeler Road.

Due to the circumferential orientation of the route, the P12 crosses over several radial arterials congested with traffic to/from downtown Washington, including Marlboro Pike, Pennsylvania Avenue, Suitland Road, Suitland Parkway, and Branch Avenue. Therefore delay on the P12 could occur not from traffic congestion but from having to wait at traffic signals for inbound/outbound traffic to pass. Since these inbound/outbound trips to the Washington core have regional precedence, it is unlikely traffic signals would be changed in order to give preferential treatment to the P12 route.

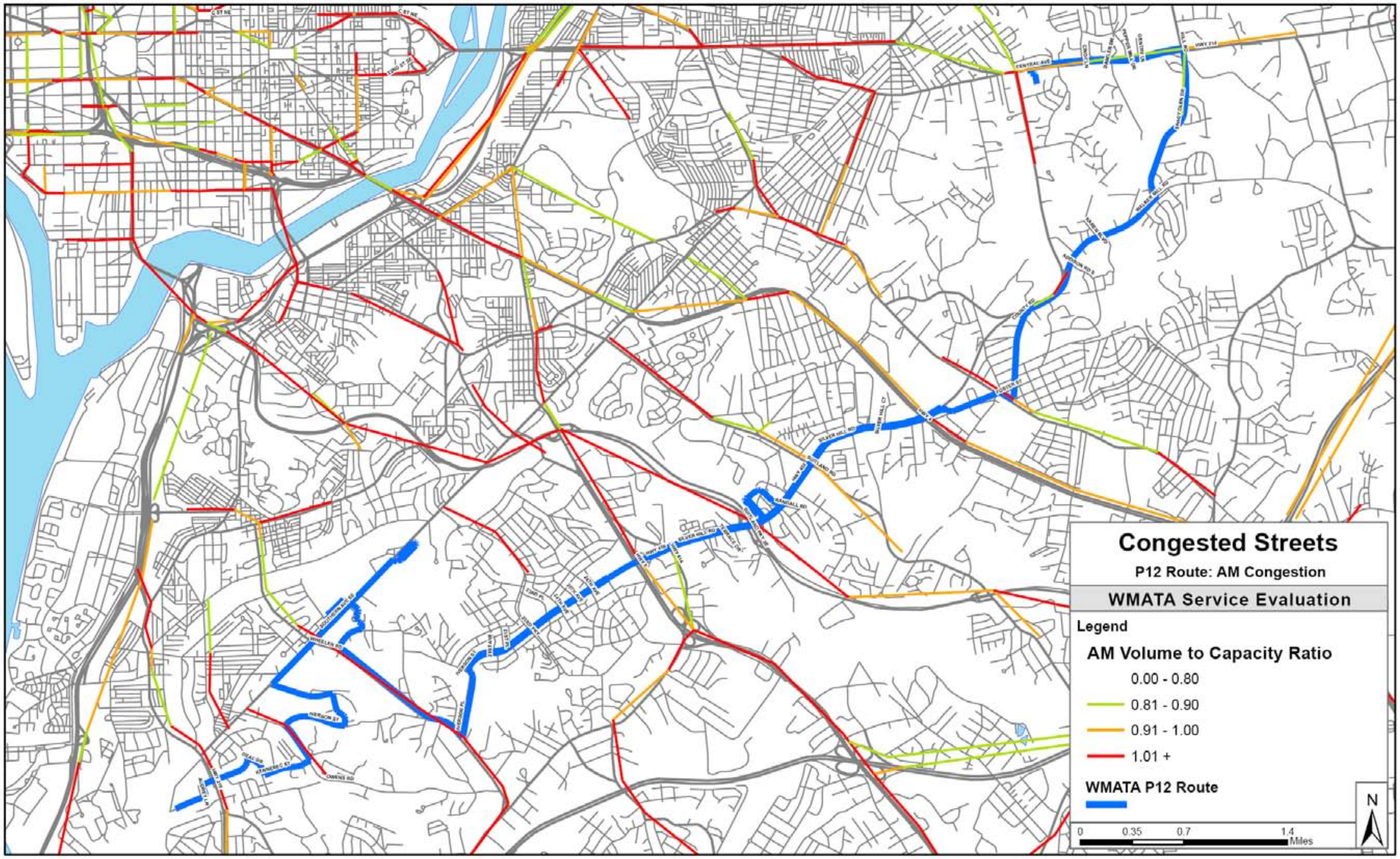
Information on signal timings and volumes for individual intersections along the P12 route were requested but were not available to be used in traffic analysis of the route.

Figure 45: Route P12 Average Daily Traffic



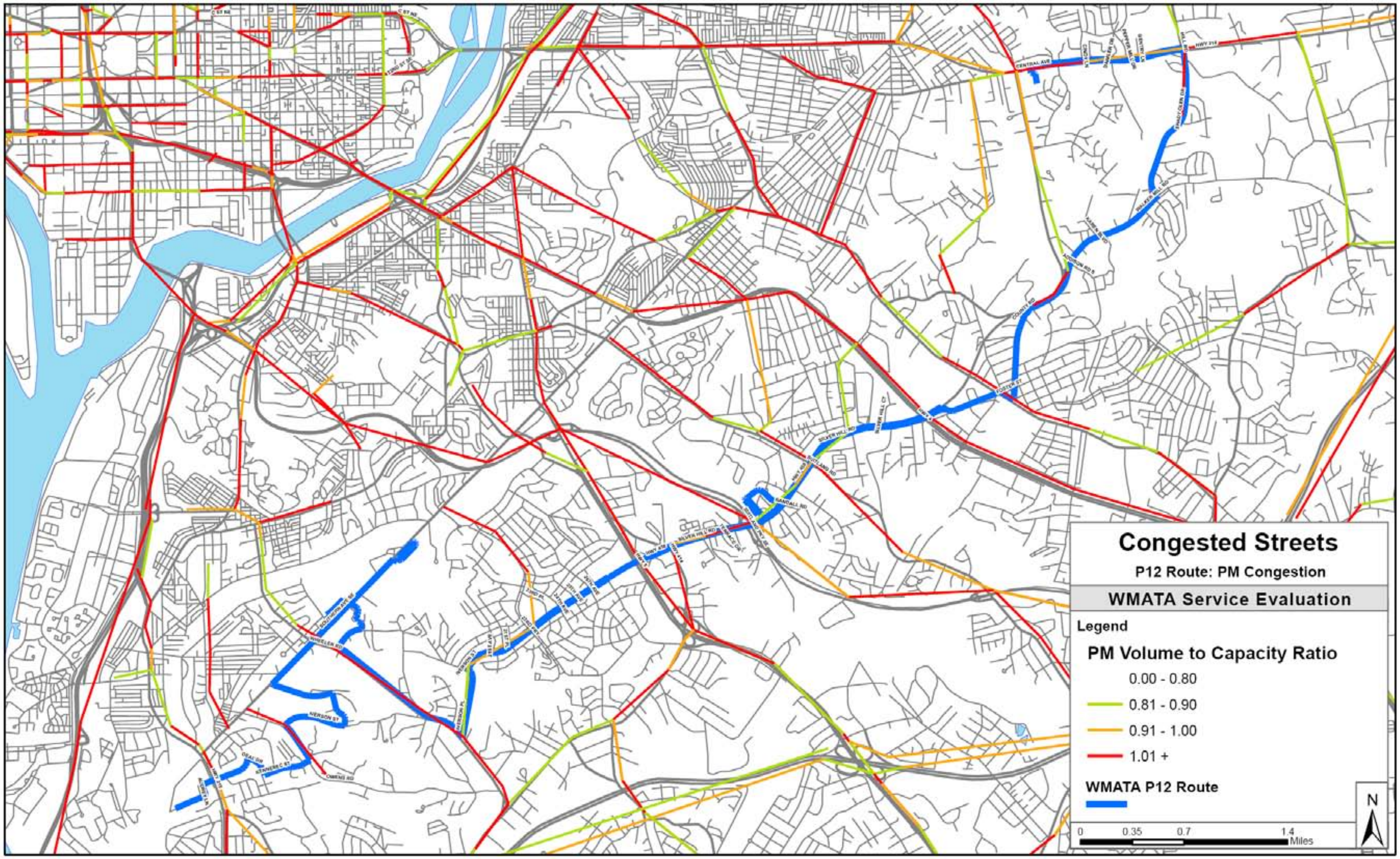
Data Source: Maryland State Highway Administration

Figure 46: P12 AM Peak (7:00-8:00) Congestion Based on V/C Ratio



Data Source: MWCOG Regional Trip Model

Figure 47: P12 PM Peak (5:00-6:00) Congestion Based on V/C Ratio



Data Source: MWCOG Regional Trip Model

Public Involvement Process

The first-round public meeting for Route P12 was held on September 24, 2008 at the Suitland Community Center at 5600 Regency Boulevard in Forestville, Maryland. Only officials from WMATA and Prince George's County attended this meeting, no riders attended. Public comments were received on the website from at least three F8 riders. The second-round meeting was held on February 3, 2009 at the Spaulding Branch Library at 5811 Old Silver Hill Road in District Heights, Maryland. Three F8 riders attended this meeting, in addition to WMATA staff.

Comments from the meetings and website, hotline, and other correspondence are summarized below.

September 2008 Comments

Primary concerns included:

- Buses are crowded/Use articulated buses or backup buses.
- Buses are frequently late.
- Need to increase frequency.
- Need to increase span of service (run earlier and later, both weekdays and weekends).

Other Comments:

- Young passengers are disrespectful.
- Break up the route.

February 2009 Comments

Primary concerns included:

- The proposed idea of adding trippers (extra or strategic buses) to the P12 is a good idea and is the number one priority.
- Consolidating stops is a good idea.
- Need to relieve crowding, especially between 6:00-7:00 AM and 5:30-6:30 PM.
- Consider a direct route down Pennsylvania Avenue.

Other Comments:

- Don't reroute at Southview Drive near apartments – consider removing traffic calming devices.
- Split route at Suitland Metrorail station/Route is too long.
- Run a bus from Southern Avenue Metrorail station to Eastover during rush hours.
- Reduce headways in the AM / PM peak from 20 to 15 minutes.
- Put more SmarTrip machines at the Metrorail stations – two is not enough.
- Please put schedules at all stops.
- Coordinate schedules with Metro and other bus routes/Interline P12 with other bus services, especially the K route.
- Some passengers are disrespectful.
- Improve lighting at bus stops.

Recommendations

Service Planning

Various options for changing and/or improving the existing service on the route were developed. These proposed service changes and recommendations were developed as a direct result of previous activities and analysis, including:

- Field analysis and observations.
- Analysis of the existing operating conditions.
- Discussions with bus operators and supervisors.
- Discussions with riders at public meetings and comments from riders via the website and telephone.
- Discussions with WMATA planning and operations staff and jurisdictional partners.

<u>Frequency</u>

1. The insertion of midday trippers on the route should be considered. Passengers have complained about the on-time performance and the frequency of the trips at midday. Four extra midday trips would cost $3,390 dollars per day, which amounts to an annual cost of $864,450.

<u>Operations</u>

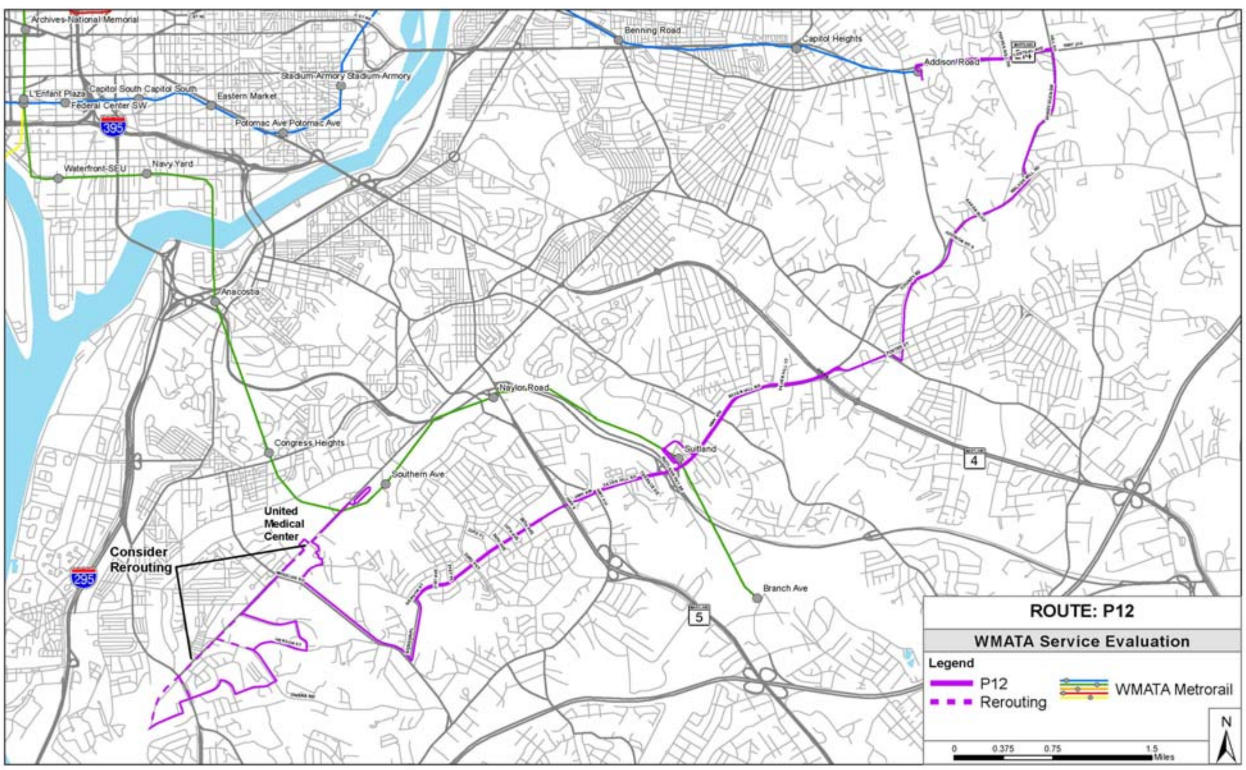
1. In general, WMATA should consider extending the recovery time for all the routes at the terminal bus stands and at major time points so drivers can take breaks and leave the terminal stations on time. Extending the recovery time from the current 10 to 12 – 14 minutes would add some "cushion" in the schedule to allow for late buses to be absorbed in the operations, improving schedule adherence and on-time performance.
2. Also, WMATA should consider adding some time to the schedule at key time points such as:
    - Eastover Shopping Center
    - United Medical Center (if there is layover area)
    - Southern Avenue
    - Iverson Mall (if there is a layover area)
    - Suitland
    - Addison Road
3. More or improved supervision is needed and might be a lower cost option to improve on-time performance, schedule adherence and to ensure buses arrive and depart major time points as close as possible given the schedule. If the improved supervision can be done with the existing staff, the costs would be negligible.
4. Expanding the hours of operation for the P12 is not recommended. WMATA begins service at 4:43 AM and 4:45 AM for eastbound and westbound service, respectively, and that extends to 12:10 AM and 11:00 PM for each direction. This is more than adequate for weekday service with the existing ridership.

5. More thorough and robust cleaning of the vehicles at night, including the removal of graffiti, may be needed to address rider complaints about the conditions of the buses. Also, installing security video cameras at the front of the vehicles and/or training drivers to spot and deal with disruptive behavior displayed by younger passengers is also needed based on comments and feedback from passengers. This is especially true with high school students.

<u>Route Changes</u>

1. The line could benefit from several slight reroutings. Those include:
   - Avoiding the United Medical Center entrance.
   - Rerouting in and around the Eastover Shopping Center area to improve circulation and flow of the buses and to find a short-term layover area.
   - Stay on Southern Avenue between Southview Drive and Owens Road to avoid the traffic calming devices in the area that slow the buses (this could be done in conjunction with consolidating stops).

Figure 48: Potential P12 Route Changes



Traffic Operations

Addison Metrorail Station to County Road/Silver Hill Road

The congestion maps show this area suffers from little congestion during the AM and PM peaks. The two exceptions to this are Central Avenue, which has the highest ADT of any segment along the P12, and the intersection of Walker Mill Road and Addison Road, which backs up in the southbound direction during the AM peak and conversely in the northbound direction during the PM peak.

The following recommendations for intersections for bus lane priority improvements include:

- Central Avenue/Cindy Lane
- Central Avenue/Shady Glen Drive
- Walker Mill Road/Addison Road

Silver Hill Road/County Road to Iverson Road/Wheeler Road

This segment suffers from some congestion in the PM peak from the area between Suitland Road and Iverson Mall. This roadway sees heavy traffic of 42,000 vehicles per day, but the field check showed that it did not experience long delays.

The P12 may also be seeing delays from long traffic signal timings where Silver Hill Road crosses radial arterials. Typically radial arterials are given preferential treatment through longer green times in order to serve the dominant commuting pattern – in this case inbound/outbound commutes to the Washington core.

No intersection improvements are recommended in this section due to the lack of congestion, both from v/c ratio and the observed field check, and the priority given to radial arterials crossing the route.

Wheeler Road/Southern Avenue/Owens Road from Iverson Road to Eastover Shopping Center

Both Wheeler Road and Owens Road function as radial arterials for commuters traveling between Prince George's County and the Washington core. As such, both roadways are congested during AM and PM peak periods..

A closer look at both roads reveals that where the P12 route runs neither have any signalized intersections that would be a candidate for bus priority lanes. In fact, traffic congestion and delays are occurring because there are simply too many vehicles for a narrow two-lane road to handle. At the same time, development and topography of the area mean that a reroute to a less congested parallel road is unavailable. There are no recommendations for traffic congestion mitigation along this portion of the P12 route.

Customer Communications

Short-term strategies to improve communications include:

- Improve availability of schedules in buses and at Metrorail stations along route.
- Update schedules posted at stops to reflect new services, highlighting the key information used by riders in an easy-to-read and visible format.

- Two additional stops require schedule information, based on the volumes of passenger boardings at these stops.
- Increase provision of information in Spanish.
- Establish on-board announcements by drivers to announce upcoming transfer points to rail transit, major destinations, and major bus routes, including Spanish stop announcements where needed.
- Provide and promote capabilities to access real-time next bus information via phone and internet, including hand-held wireless devices.

Medium and long-term strategies include:

- Provide signs in Spanish and English.
- Install onboard automated annunciators to communicate stop locations, transfer opportunities, service delays and other information to the consumer, including enhanced sound quality for easier comprehension.
- Replace damaged or missing information cases at stops. Alter displays so that information faces towards sidewalks and shelters, rather than towards the street.
- Provide system maps that highlight the P12 and connecting routes at shelter locations.
- Ridership at four stops along the P12 is high enough to justify real-time next bus displays that indicate when the next vehicle will arrive and what route the vehicle is serving. These displays should be installed when they become available on the WMATA system.

Stops and Facilities

The existing operations analysis as well as the field surveys confirmed that the P12 has many stops along the route. In fact, there are 98 stops along the route in each direction for the P12 as currently configured and this is the second highest bus route in terms of ridership in Prince George's County Some stops are very closely spaced, and according to the boarding / alighting volumes along the route, have low passenger volumes and are possible candidates to be consolidated. Those stops include:

- Along Central Avenue from the Addison Road station to Shady Glen Drive.
- Along Shady Glen Drive / Walker Mill Road / County Road to Marlboro Pike.

The stops with the heaviest passenger volumes seem to be adequately served by the existing amenities, although there are some improvements to be made. Those improvements include:

- Shelter / stop improvements at Southern Avenue Metrorail Station.
- Shelter / stop improvements at Suitland Metrorail Station.
- Shelter / stop improvements at Addison Road Metrorail Station.
- New shelter at Audrey Lane near Eastover Shopping Center.
- New shelter at Kennebec Street and Glassmanor Driver.
- New shelter at Iverson Mall.

WMATA SERVICE EVALUATION STUDY

Appendix 1:
Public Involvement Summary

June 2009

Prepared by:
P2D

INTRODUCTION

Two rounds of public involvement activities were held. The intent of the first round was to gather customer complaints, suggestions and other comments to assist in understanding how the route is used, identifying problems, and developing strategies for each of the routes. The second round of public involvement activities was held primarily to gain feedback on the proposed strategies before finalization.

First-round public involvement activities, which began in September 2008, included a newsletter, a website (www.MetrobusServiceEvaluation.com) and a hotline (202-370-2915). These newsletter, as well as additional printed materials describing the study, attached below, were distributed to public officials and other interested parties to announce the meeting being held for each line, and to encourage the submission of comments at the meeting, or on the website or hotline. Flyers were placed in buses and at some station areas for the same purpose.

Second-round public involvement activities, which began in January 2009, were the same. Flyers were posted in buses, and a newsletter and other materials were distributed to public officials and other interested parties – including participants in the first-round public involvement activities – to announce the meetings being held for each line, and to encourage the submission of comments at the meetings or on the project website or hotline.

FIRST-ROUND MEETINGS

WMATA conducted five public involvement meetings during September and October 2008 (see Table 1). Originally, one meeting for each route family was planned. However, due to intense interest, a second meeting was held for the D routes in a location more accessible to areas along the eastern portion of the route.

Meeting announcements were posted in buses, at a few bus stops, on the project website, and were included in WMATA's Metro Alerts. Newsletters were distributed to officials, community leaders, and other individuals via e-mail, fax and mail.

Each meeting informed attendees of the purpose of the study, the study project schedule; and ways in which citizens could get involved. The presentation and "open house" portion of the meetings also provided information on the routes, including ridership, boarding patterns, and on-time performance. After the presentation, attendees sat around one or more tables (depending on the number of participants) to discuss their responses to the meeting questionnaire (attached below).

Table 1 First-Round Public Meetings

Route	Date	Location
P12	Wednesday, September 24th 6:30-8:30PM	Suitland Community Center at 5600 Regency Boulevard in Forestville, MD
D1-8 (west)	Thursday, September 25th 6:30-8:30PM	Palisades Branch Public Library at 4901 V Street NW in Washington, DC
2A-G	Wednesday, September 30th 6:30-8:30PM	Episcopal Church of the Holy Cross at 2455 Gallows Road in Dunn Loring, VA
F8	Wednesday, October 1st 6:30-8:30PM	Prince George's Plaza Community Center at 6600 Adelphi Road in Hyattsville, MD
D1-8 (east)	Thursday, October 9th 6:30-8:30PM	Department of Housing and Community Development at 801 North Capitol Street in Washington, DC.

Public input from the first-round public involvement activities is summarized by route below.

A detailed listing of comments is available in WMATA Service Evaluation Study Technical Memorandum #4, Summary of First-Round Public Involvement, dated October 2008.

SECOND-ROUND MEETINGS

WMATA conducted five public involvement meetings during January and February 2009 (see Table 2). Meetings were delayed until the third week of January because bus flyers could not be posted until after the inauguration events were over. Flyer spaces on all buses in the system were reserved for inauguration transit announcements in early and mid-January 2009.

One meeting each for the F8, P12 and 2A-G were planned, along with two meetings for the D routes. Due to intense interest in the preliminary recommendations for the D2, a third meeting was scheduled between WMATA and Advisory Neighborhood Commission (ANC) 3B, which covers the Glover Park area.

Meeting announcements were posted in buses and distributed via e-mail, fax, and mail to officials, community leaders, individuals who had attended project meetings or posted comments on the project website, and other individuals.

The presentation at each meeting provided attendees with some background information from the first-round meetings, a summary of public comments received and a description of the preliminary recommendations. After the presentation, attendees were broken up into smaller groups (depending on the number of participants) to discuss their ideas and opinions on the recommendations.

Table 2 Second-Round Public Meetings

Route	Date	Location
D1-8	Thursday, January 29th 6:30-8:30PM	Palisades Branch Public Library at 4901 V Street NW in Washington, DC
P12	Tuesday, February 3rd 6:30-8:30PM	Spauldings Branch Library at 5811 Old Silver Hill Road in District Heights, MD.
2A-G	Wednesday, February 4th 6:30-8:30PM	Mosby Woods Elementary School at 9819 Five Oaks Road in Fairfax, VA.
D1-8	Thursday, February 5th 6:30-8:30PM	Jackson Graham Building at 600 Fifth Street NW in Washington, DC 20001
F8	Tuesday, February 10th (originally scheduled for January 27th, but delayed due to snow) 6:30-8:30PM	Prince George's Plaza Community Center at 6600 Adelphi Road in Hyattsville, MD

Public input from the second-round public involvement activities is summarized by route in the WMATA Service Evaluation Study Final Report.

A detailed listing of comments is available in the WMATA Service Evaluation Study Public Meeting Comments Technical Memorandum.

PROJECT WEBSITE

A project website, www.MetrobusServiceEvaluation.com, was set up and advertised in mid-September to provide information on the project, meeting locations, and to accept comments from the public.

The website accepted individual comments, and viewers could also fill out a brief questionnaire on their use and opinion of their routes. After the first round of public involvement was completed, the questionnaire was removed from the website. For the second-round public meetings, only a comment space was provided. Overall, nearly 100 valid questionnaires and over 125 valid comments were received.

Table 3 Website Comments as of February 17, 2009

Route	Number of Comments Received		Number of Questionnaires Received (First-Round Only)
	First-Round (2008)	Second-Round (2009)	
D Routes	56	30	73
2 Routes	12	13	16
F8 Route	4	7	2
P12 Route	3	1	3

Note: Respondents could leave more than one comment, and could fill out the questionnaires as well the separate comment field.

Comments from the website are summarized by route in the Final Report.

PROJECT HOTLINE AND OTHER COMMENT SOURCES

A dedicated project telephone line was set up and advertised beginning in September 2008.to record comments from individuals who did not have internet access, or who preferred to communicate by phone. Only a few valid comments were received from this line; a number of these calls provided comments on other Metrobus routes, or simply requested a call back.

Comments from the hotline, from the follow-up phone calls, as well as from correspondence sent directly to WMATA project staff, are summarized by route in the Final Report.

PUBLIC INVOLVEMENT MATERIALS

The remaining pages include the following attachments distributed as part of this study:

First-round:

- Bus Flyer
- Newsletter
- QuickFacts
- Sample Officials Letter
- Agenda
- Questionnaire
- Meeting evaluation form

Second-round:

- Bus Flyer
- Postponed notice for January 27th, 2009 F8 meeting
- Newsletter
- QuickFacts
- Sample Officials Letter
- Agenda
- Questionnaire
- Meeting evaluation form (English)
- Meeting evaluation form (Spanish)

WMATA SERVICE EVALUATION STUDY

Appendix 2:
Implementation Plan and Cost Estimates

June 2009

Prepared by:
P2D

WASHINGTON BOULEVARD LINE (2A, 2B, 2C, 2G) COST ESTIMATE

The implementation of the recommendations can be accomplished in two different phases. Phase I recommendations are those that can be easily implemented and relatively little in terms of additional operating and/or capital costs and require little preparation on the part of WMATA or little to no notice to passengers. Phase II recommendations require more work to get implemented in terms of changes to operations, capital costs / operating costs, effort on the part of WMATA and generally require longer lead times to make customers aware of the changes.

Phase I Recommendations

Increased supervision can happen almost immediately. The only extra costs for this recommendation would be if more supervisory personnel are needed. If the current personnel can handle more improved supervision of the 2 Routes, then the costs are virtually zero.

Likewise, the addition of time in the schedule could be easily accomplished. This would require updating the schedule to allow for increased recovery time and additional time at major time points. This would add some additional time to the schedule. However, it probably already exists in actual operation of the line so recognizing it in the schedule would improve customer expectations and schedule adherence of the buses. The costs of increasing the running times and having suitable recovery times at the intermediate and terminal points for each route is estimated to be approximately $400,000 annually.

The operation of the 2G in the peak direction for peak hour service is also something that can be accomplished relatively easily. One option involves changing / interlining some 2B runs over to 2G and letting the passengers of both routes know that the changes don't substantially cause negative affects. The incremental costs of this solution would be minimal, but careful scheduling and run cutting would need to take place. Also, any delays would cause problems for the 2B runs in the off-peak direction.

To forestall those potential problems, the 2G peak hour – peak direction service could be run with new 2G bus runs. This service option is estimated to cost about $1.5 M annually.

The rerouting of the 2C off International Drive near Tysons Corner can also be immediately accomplished as well. This would actually result is some very minor cost savings.

The consolidation and elimination of the stops could be a short-term recommendation. Proper notice to the riders at each stop and along the routes (on the buses) would be needed.

Encouraging passengers to have strollers folded and other parcels secured or out of the way while boarding is something that could be implemented in the short term.

The addition of the extra buses for the 2B and the 2C are also short-term recommendations. They would require more operating expenses daily and annually, respectively, to operate the service and may require added buses which would be a capital cost. The additional trippers for the 2B would require between $282,500 and $565,000 annually depending upon on the number of runs daily (either 6 or 8). Likewise, the additional trippers for the 2C would be $282,500 and $409,625 annually depending upon on the number of runs daily (either 6 or 8).

Additionally the new 2B Sunday service would also be a medium-term recommendation as it would have similar operating requirements. The costs to run this expanded Sunday service are estimate to be approximately $174,000 annually.

The increased promotion and changes to the existing SmarTrip card program are medium-term recommendations. Agreements with additional sales outlets and the study / feasibility of a reduced / no fee card and additional discounts beyond the existing 10¢ per trip would be needed. Eliminating the ability of passengers to add to the card at the farebox would also take some time to implement as well.

Additional shelters and passenger amenities at Fair Oaks Mall, Washington Street / Broad Street, and the Ballston Metro Station are estimated to cost approximately $27,000 for capital costs and minimal incremental costs for on-going maintenance and operations.

<u>Phase II Recommendations</u>

Splitting the 2B at the Vienna Station is a long-term recommendation. More study as to the number of through riders and the potential impacts to them as well as obtaining feedback from the riders on this proposal would be needed before the service change could be implemented.

Likewise the modifications to the various intersections and traffic signals also would be a long-term recommendation as each intersection would need to be studied in detail. Also, the benefits and costs of each potential improvement would need to be detailed and coordination with the various jurisdictions – Arlington County, City of Falls Church, Fairfax County, City of Fairfax, and Virginia Department of Transportation – would need to take place. At this time, there is not an estimate of capital or operating costs or savings for this option as it has not been more fully explored.

The driver-only comfort areas at Tysons and Fair Oaks are long-term recommendations as suitable places for the area must be located and built. At this time, there is not an estimate of capital or operating costs or savings for this option as it has not been more fully explored.

Build a transfer center at Lee Highway and Gallows Road is a long-term recommendation as a suitable location must be found; the site must be designed and ultimately built. This will require more capital cost than a typical shelter and probably acquisition of the land for the center or at least a memorandum or understanding (MOU) or other agreement since the current waiting area in on private property. The capital costs are estimated to be approximately $11,000; and the on-going operations and maintenance costs are expected to be minimal.

The following tables present the estimates for the above capital and operating costs in more detail.

Existing Route 2A

	Daily Hours	Annual Days	Annual Hours	Frequency	One Way Time with layover	Cycle Time	Vehicles Needed	Vehicle Revenue Hours	Platform Hours (+13%)	Cost per revenue hour	Annual Cost
M-F AM	0.0	255	0	30	28	56	1	0	0	$100.00	$0
M-F PM	0.0	255	0	30	28	56	1	0	0	$100.00	$0
M-F Offpeak	1.5	255	387	30	28	56	1	387	437	$100.00	$43,703
Sat	2.5	53	134	30	28	56	1	134	152	$100.00	$15,172
Sun/Holiday	17.0	57	969	60	28	56	1	969	1,095	$100.00	$109,497
								521	**589**		**$168,372**

Existing 2B

	Daily Hours	Annual Days	Annual Hours	Frequency	One Way Time with layover	Cycle Time	Vehicles Needed	Vehicle Revenue Hours	Platform Hours (+13%)	Cost per revenue hour	Annual Cost
M-F AM	3.0	255	765	20	63	126	7	5,355	6,051	$100.00	$605,115
M-F PM	3.0	255	765	30	63	126	5	3,825	4,322	$100.00	$432,225
M-F Offpeak	13.0	255	3,315	60	63	126	3	9,945	11,238	$100.00	$1,123,785
Sat	16.0	53	848	60	63	126	3	2,544	2,875	$100.00	$287,472
Sun/Holiday	0.0	57	0	60	63	126	3	0	0	$100.00	$0
								21,669	**24,486**		**$2,448,597**

Existing 2C

	Daily Hours	Annual Days	Annual Hours	Frequency	One Way Time with layover	Cycle Time	Vehicles Needed	Vehicle Revenue Hours	Platform Hours (+13%)	Cost per revenue hour	Annual Cost
M-F AM	3.0	255	765	20	45	90	5	3,825	4,322	$100.00	$432,225
M-F PM	3.0	255	765	40	45	90	3	2,295	2,593	$100.00	$259,335
M-F Offpeak	10.0	255	2,550	60	45	90	2	5,100	5,763	$100.00	$576,300
Sat	16.0	53	848	60	45	90	2	1,696	1,916	$100.00	$191,648
Sun/Holiday	10.0	57	570	60	45	90	2	1,140	1,288	$100.00	$128,820
									15,883		**$1,588,328**

Existing 2G

	Daily Hours	Annual Days	Annual Hours	Frequency	One Way Time with layover	Cycle Time	Vehicles Needed	Vehicle Revenue Hours	Platform Hours (+13%)	Cost per revenue hour	Annual Cost
M-F AM	3.0	255	765	30	72	144	5	3,825	4,322	$100.00	$432,225
M-F PM	3.0	255	765	40	72	144	4	3,060	3,458	$100.00	$345,780
M-F Offpeak	0.0	255	0	20	72	144	8	0	0	$100.00	$0
Sat	0.0	53	0	20	72	144	8	0	0	$100.00	$0
Sun/Holiday	0.0	57	0	20	72	144	8	0	0	$100.00	$0
									7,780		**$778,005**

Future 2A with Extra Time for Intermediate and Terminal Points and Recovery

	Daily Hours	Annual Days	Annual Hours	Frequency	One Way Time with layover	Cycle Time	Vehicles Needed	Vehicle Revenue Hours	Platform Hours (+13%)	Cost per revenue hour	Annual Cost
M-F AM	0.0	255	0	30	40	80	2	0	0	$100.00	$0
M-F PM	0.0	255	0	30	40	80	2	0	0	$100.00	$0
M-F Offpeak	1.5	255	387	30	40	80	2	774	874	$100.00	$87,406
Sat	2.5	53	134	30	40	80	2	269	303	$100.00	$30,344
Sun/Holiday	17.0	57	969	60	40	80	1	969	1,095	$100.00	$109,497
									2,272		**$227,247**

Future 2B with Extra Time for Intermediate and Terminal Points and Recovery

	Daily Hours	Annual Days	Annual Hours	Frequency	One Way Time with layover	Cycle Time	Vehicles Needed	Vehicle Revenue Hours	Platform Hours (+13%)	Cost per revenue hour	Annual Cost
M-F AM	3.0	255	765	20	75	150	8	6,120	6,916	$100.00	$691,560
M-F PM	3.0	255	765	30	75	150	5	3,825	4,322	$100.00	$432,225
M-F Offpeak	13.0	255	3,315	60	75	150	3	9,945	11,238	$100.00	$1,123,785
Sat	16.0	53	848	60	75	150	3	2,544	2,875	$100.00	$287,472
Sun/Holiday	0.0	57	0	60	75	150	3	0	0	$100.00	$0
									25,350		**$2,535,042**

Future 2C with Extra Time for Intermediate and Terminal Points and Recovery

	Daily Hours	Annual Days	Annual Hours	Frequency	One Way Time with layover	Cycle Time	Vehicles Needed	Vehicle Revenue Hours	Platform Hours (+13%)	Cost per revenue hour	Annual Cost
M-F AM	3.0	255	765	20	57	114	6	4,590	5,187	$100.00	$518,670
M-F PM	3.0	255	765	40	57	114	3	2,295	2,593	$100.00	$259,335
M-F Offpeak	10.0	255	2,550	60	57	114	2	5,100	5,763	$100.00	$576,300
Sat	16.0	53	848	60	57	114	2	1,696	1,916	$100.00	$191,648
Sun/Holiday	10.0	57	570	60	57	114	2	1,140	1,288	$100.00	$128,820
									16,748		**$1,674,773**

Future 2G with Extra Time for Intermediate and Terminal Points and Recovery

	Daily Hours	Annual Days	Annual Hours	Frequency	One Way Time with layover	Cycle Time	Vehicles Needed	Vehicle Revenue Hours	Platform Hours (+13%)	Cost per revenue hour	Annual Cost
M-F AM	3.0	255	765	30	84	168	6	4,590	5,187	$100.00	$518,670
M-F PM	3.0	255	765	40	84	168	5	3,825	4,322	$100.00	$432,225
M-F Offpeak	0.0	255	0	20	84	168	9	0	0	$100.00	$0
Sat	0.0	53	0	20	84	168	9	0	0	$100.00	$0
Sun/Holiday	0.0	57	0	20	84	168	9	0	0	$100.00	$0
									9,509		**$950,895**

2B Extra Trippers (6)

	Daily Hours	Annual Days	Annual Hours	Frequency	One Way Time with layover	Cycle Time	Vehicles Needed	Vehicle Revenue Hours	Platform Hours (+13%)	Cost per revenue hour	Annual Cost
M-F AM	1.0	250	250	20	75	150	3	750	848	$100.00	$84,750
M-F PM	1.0	250	250	20	75	150	3	750	848	$100.00	$84,750
M-F Offpeak	2.0	250	500	60	75	150	2	1,000	1,130	$100.00	$113,000
Sat	0.0	53	0	60	75	150	3	0	0	$100.00	$0
Sun/Holiday	0.0	57	0	60	75	150	3	0	0	$100.00	$0
									2,825		**$282,500**

2B Extra Trippers (8)

	Daily Hours	Annual Days	Annual Hours	Frequency	One Way Time with layover	Cycle Time	Vehicles Needed	Vehicle Revenue Hours	Platform Hours (+13%)	Cost per revenue hour	Annual Cost
M-F AM	1.0	250	250	20	75	150	3	750	848	$100.00	$84,750
M-F PM	1.0	250	250	20	75	150	3	750	848	$100.00	$84,750
M-F Offpeak	3.5	250	875	60	75	150	4	3,500	3,955	$100.00	$395,500
Sat	0.0	53	0	60	75	150	3	0	0	$100.00	$0
Sun/Holiday	0.0	57	0	60	75	150	3	0	0	$100.00	$0
									5,650		**$565,000**

2B Sunday Service

	Daily Hours	Annual Days	Annual Hours	Frequency	One Way Time with layover	Cycle Time	Vehicles Needed	Vehicle Revenue Hours	Platform Hours (+13%)	Cost per revenue hour	Annual Cost
M-F AM	0.0	250	0	20	75	150	8	0	0	$100.00	$0
M-F PM	0.0	250	0	20	75	150	8	0	0	$100.00	$0
M-F Offpeak	0.0	250	0	60	75	150	3	0	0	$100.00	$0
Sat	0.0	53	0	60	75	150	3	0	0	$100.00	$0
Sun/Holiday	9.0	57	513	60	75	150	3	1,539	1,739	$100.00	$173,907
									1,739		**$173,907**

2C Extra Trippers (6)

	Daily Hours	Annual Days	Annual Hours	Frequency	One Way Time with layover	Cycle Time	Vehicles Needed	Vehicle Revenue Hours	Platform Hours (+13%)	Cost per revenue hour	Annual Cost
M-F AM	1.0	250	250	30	57	114	2	500	565	$100.00	$56,500
M-F PM	1.0	250	250	30	57	114	2	500	565	$100.00	$56,500
M-F Offpeak	2.0	250	500	40	57	114	3	1,500	1,695	$100.00	$169,500
Sat	0.0	53	0	60	57	114	2	0	0	$100.00	$0
Sun/Holiday	0.0	57	0	60	57	114	2	0	0	$100.00	$0
									2,825		**$282,500**

2C Extra Trippers (8)

	Daily Hours	Annual Days	Annual Hours	Frequency	One Way Time with layover	Cycle Time	Vehicles Needed	Vehicle Revenue Hours	Platform Hours (+13%)	Cost per revenue hour	Annual Cost
M-F AM	1.0	250	250	30	57	114	2	500	565	$100.00	$56,500
M-F PM	1.0	250	250	30	57	114	2	500	565	$100.00	$56,500
M-F Offpeak	3.5	250	875	40	57	114	3	2,625	2,966	$100.00	$296,625
Sat	0.0	53	0	60	57	114	2	0	0	$100.00	$0
Sun/Holiday	0.0	57	0	60	57	114	2	0	0	$100.00	$0
									4,096		**$409,625**

Future 2G Peak Period Peak Direction Service

	Daily Hours	Annual Days	Annual Hours	Frequency	One Way Time with layover	Cycle Time	Vehicles Needed	Vehicle Revenue Hours	Platform Hours (+13%)	Cost per revenue hour	Annual Cost
M-F AM	3.0	250	750	20	84	168	9	6,750	7,628	$100.00	$762,750
M-F PM	3.0	250	750	20	84	168	9	6,750	7,628	$100.00	$762,750
M-F Offpeak	0.0	250	0	20	84	168	9	0	0	$100.00	$0
Sat	0.0	53	0	20	84	168	9	0	0	$100.00	$0
Sun/Holiday	0.0	57	0	20	84	168	9	0	0	$100.00	$0
									15,255		**$1,525,500**

Intersection and Trffic Signal Improvements

Equipment Improvements	Priority		Cost	Units	Spares	
In-bus transponders*	High		$4,000	9	2	$44,000
One time software upgrade	High		$1,000	1		$1,000

* based on number of peak buses on 2A-G

Intersection Improvements	Priorty	Improvement	Cost	Improvement	Cost	Total Cost
Glebe Road/Washington Boulevard	High	Queue Jump Lane	$250,000	Traffic Signal Equipment	$8,000	$258,000
Glebe Road/11th Street	High	Queue Jump Lane	$250,000	Traffic Signal Equipment	$8,000	$258,000
Glebe Road/Fairfax Drive	High	Queue Jump Lane	$250,000	Traffic Signal Equipment	$8,000	$258,000
Glebe Road/Stuart Street	High	Queue Jump Lane	$250,000	Traffic Signal Equipment	$8,000	$258,000
Washington Boulevard/Sycamore Street	High	Queue Jump Lane	$250,000	Traffic Signal Equipment	$8,000	$258,000
Lee Highway/Washington Boulevard	High	Queue Jump Lane	$250,000	Traffic Signal Equipment	$8,000	$258,000
Lee Highway/Graham Road	High	Queue Jump Lane	$250,000	Traffic Signal Equipment	$8,000	$258,000
Lee Highway/West Street	High	Queue Jump Lane	$250,000	Traffic Signal Equipment	$8,000	$258,000
Lee Highway/Gallows Road	High	Queue Jump Lane	$250,000	Traffic Signal Equipment	$8,000	$258,000
Lee Highway/Prosperity Avenue	High	Queue Jump Lane	$250,000	Traffic Signal Equipment	$8,000	$258,000
Lee Highway/Blake Lane	High	Queue Jump Lane	$250,000	Traffic Signal Equipment	$8,000	$258,000
Lee Highway/Cedar Lane	High	Queue Jump Lane	$250,000	Traffic Signal Equipment	$8,000	$258,000
Lee Highway/Nutley Street	High	Queue Jump Lane	$250,000	Traffic Signal Equipment	$8,000	$258,000
Nutley Street/Hunters Branch Road	High	Queue Jump Lane	$250,000	Traffic Signal Equipment	$8,000	$258,000
Nutley Street/Saintsbury Drive	High	Queue Jump Lane	$250,000	Traffic Signal Equipment	$8,000	$258,000
Lee Jackson Memorial Highway/Waples Mill Road	High	Queue Jump Lane	$250,000	Traffic Signal Equipment	$8,000	$258,000
Lee Jackson Memorial Highway/Jermantown Road	High	Queue Jump Lane	$250,000	Traffic Signal Equipment	$8,000	$258,000
Blake Lane/Kingsbridge Drive	High	Queue Jump Lane	$250,000	Traffic Signal Equipment	$8,000	$258,000
Gallows Road/Prosperity Avenue	High	Queue Jump Lane	$250,000	Traffic Signal Equipment	$8,000	$258,000
Gallows Road/Belleforest Drive	High	Queue Jump Lane	$250,000	Traffic Signal Equipment	$8,000	$258,000
Gallows Road/Idylwood Road	High	Queue Jump Lane	$250,000	Traffic Signal Equipment	$8,000	$258,000
Gallows Road/Oak Street	High	Queue Jump Lane	$250,000	Traffic Signal Equipment	$8,000	$258,000
Gallows Road/Merry Oaks Lane	High	Queue Jump Lane	$250,000	Traffic Signal Equipment	$8,000	$258,000
Gallows Road/Old Courthouse Road	High	Queue Jump Lane	$250,000	Traffic Signal Equipment	$8,000	$258,000
High Priority Total						**$6,192,000**
Lee Highway/Maple Avenue	Low	Queue Jump Lane	$250,000	Traffic Signal Equipment	$8,000	$258,000
Lee Highway/Marshall Street	Low	Queue Jump Lane	$250,000	Traffic Signal Equipment	$8,000	$258,000
Lee Highway/Hollywood Road	Low	Queue Jump Lane	$250,000	Traffic Signal Equipment	$8,000	$258,000
Lee Highway/Fairview Park Drive	Low	Queue Jump Lane	$250,000	Traffic Signal Equipment	$8,000	$258,000
Lee Highway/Hartland Road	Low	Queue Jump Lane	$250,000	Traffic Signal Equipment	$8,000	$258,000
Lee Highway/Merilee Road	Low	Queue Jump Lane	$250,000	Traffic Signal Equipment	$8,000	$258,000
Lee Highway/Hilltop Road	Low	Queue Jump Lane	$250,000	Traffic Signal Equipment	$8,000	$258,000
Lee Highway/Cedarest Road	Low	Queue Jump Lane	$250,000	Traffic Signal Equipment	$8,000	$258,000
Lee Highway/Mainstone Drive	Low	Queue Jump Lane	$250,000	Traffic Signal Equipment	$8,000	$258,000
Lee Highway/Hunters Glen Way	Low	Queue Jump Lane	$250,000	Traffic Signal Equipment	$8,000	$258,000
Lee Highway/Circle Woods Drive	Low	Queue Jump Lane	$250,000	Traffic Signal Equipment	$8,000	$258,000
Low Priority Total						**$2,838,000**
TOTALS FOR 2A-G						**$9,075,000**

Bus Stop Ammenity Costs

Route	StopID	Location	Total Boardings	Concrete Pad	Pad Cost	Lighting	Lighting Cost	Bus Signage	Signage Cost	Trash cans	Trash Cost	Shelter	Shelter Cost	Schedule info	Info Cost	Benches	Bench Cost	Real time travel info	NextBus cost	Total Cost
2B, 2G	10601	Fair Oaks Mall (terminal)	141	0	0	0	0	0	0	1	250	1	$ 10,000.00	0	$ -	1	$ 500.00	0	$ -	$ 10,750.00
2B, 2G	11808	Vienna Metrorail Station WB	160	0	0	0	0	0	0	0	0	0	$ -	0	$ -	0	$ -	0	$ -	$ -
2A-G	4552	Washington Street at Broad Street WB	169	0	0	0	0	0	0	0	0	1	$ 10,000.00	1	$ 500.00	1	$ 500.00	0	$ -	$ 11,000.00
2A-G	2376	Lee Hwy (US 29) at Gallows Road EB	172	0	0	0	0	0	0	0	0	1	$ 10,000.00	1	$ 500.00	1	$ 500.00	0	$ -	$ 11,000.00
2A-G	14082	E. Falls Church Metrorail Station WB	229	0	0	0	0	0	0	0	0	0	$ -	0	$ -	0	$ -	0	$ -	$ -
2A-G	14440	Ballston Metrorail Station WB	544	0	0	0	0	0	0	0	0	0	$ -	0	$ -	0	$ -	1	$ 5,000.00	$ 5,000.00
2C	5887	Tysons Corner Mall (terminal)	167																	

$ 37,750.00

ROUTES D1, D3, D4, D5, D6, D8 (D-ROUTES) COST ESTIMATE

The recommendations for improvements to the D routes include changes to route operations, traffic improvements and passenger amenities. The improvements can be implemented in two phases: Phase I improvements were designed to be implemented within a timeframe of one year and is intended to be "cost neutral" or implementable at no additional cost. As a result, any changes that result in cost increases were offset with savings from some efficiency improvements.

Implementation of Phase II improvements will require a large increase in capital and operating costs, or for other reasons would require more than one year to be implemented.

Phase I Recommendations

- Increased field supervision
- Minor reroute for D1,3,6 on E Street at North Capitol Street
- D4 Route Extension to McPherson Square
- D6 peak turnback trips
- D6 extra time for 14 daytime hours
- Slight decrease in peak frequency on D8

Increase field supervision

Depending on resources available, the recommendation to implement more field supervision on the D1-8 routes could occur almost immediately. This recommendation could require additional personnel and equipment such as vehicles, computers or communications equipment. Alternatively, these resources could be shifted from other routes or from other areas of the city

Minor reroute on E Street for D1,3,6 route

A minor reroute is recommended for the D1, 3, 6 route. The reroute would use E Street to access Union Station instead of the current pattern of North Capitol Street and Massachusetts Avenue. This reroute could be implemented relatively easily if policy changes regarding parking in this area are changed. The cost of such a change would be minimal.

Increase schedule time in D6 route

An increase in schedule time and extra time for layovers for the D6 route during AM Peak, Midday, and PM peak periods is recommended during Phase I. It is recommended that extra time be allowed in the schedule for operation through downtown Washington, to improve on-time performance and allow for longer layovers for schedule recovery. For the purposes of developing the operating cost estimate, it was assumed that an extra 15 percent of the original end-to-end running time would be added to the time it now takes to operate through downtown Washington. In addition, it was assumed that an additional 5 percent of the original end-to-end running time would be added to the entire route. The extra time added to the schedule would increase the number of vehicles required to operate the D6 by one bus, and would increase the operating cost of the route by approximately $410,550. Tables detailing this cost estimate are at the end of this section.

- Estimated annual cost of adding time to the D6 route: $410,550 dollars
- Estimated number of additional vehicles needed: 1

D4 Route Extension to McPherson Square

The extension of the D4 route to McPherson Square is recommended to continue west across K Street NW, with service to Union Station withdrawn on this route. The additional time required to operate to McPherson Square will require a slight decrease to headways during off peak (from every 23 to every 28 minutes), Saturday (from 25 to every 28 minutes), and Sunday (from every 36 to every 28 minutes) times in order to keep costs low. Monday through Friday peak service will maintain existing 16-minute headways. An additional vehicle will be required during peak periods in order to operate the route to McPherson Square, which would cost approximately $175,950 annually. The changes to headway during off-peak, Saturday and Sunday time periods would result in the same amount of vehicles required.

- Estimated cost of D4 extension to McPherson Square: $175,950 dollars
- Estimated number of additional vehicles needed: 1

D6 peak turnback trips

During AM and PM peak periods, every third eastbound trip will operate between Sibley Hospital and Dupont Circle, and not make the entire trip across downtown. Every third westbound trip will start at Stadium-Armory will end at Union Station. A total of 16 trips each day will operate in this short-turn pattern, which will save approximately 4,000 annual platform hours on this route.

- Estimated annual savings of D6 turnback trips: $400,000
- Estimated number of vehicles freed up for other uses: 1

D8 peak trip frequency adjustment

Peak trip frequency on the D8 was adjusted in order to reduce costs. These cost savings were then used to support other improvements in Phase I recommendations. Peak frequencies were adjusted from 12.5 minutes to 14 minutes during the AM peak and from 8.5 minutes to 10 minutes during the PM peak period. This slight adjustment will result in one fewer bus needed for the route, which will result in an overall annual savings of $191,250.

- Estimated annual savings of D8 frequency adjustment: $191,250
- Estimated number of vehicles freed up for other uses: 1

Overall, the improvements proposed in Phase I essentially are cost neutral, representing a slight decrease in operating costs.

Phase I Operating and Capital Costs

Phase I Costs		
Improvement	**Annual Operating Cost**	**Capital Cost**
Increased field supervision	Depends on resources available	$0
Minor reroute for D1,3,6	$0	$0
D4 Extension to McPherson	$175,950	$550,000
D6 turnback trips	($400,000)	($550,000)
D6 extra time	$410,550	$550,000
D8 peak trip frequency decrease	($191,250)	($550,000)
Total	**-$4,750**	**$0**

<u>Phase II Recommendations</u>

- Increased time in schedule and longer layovers for drivers on D1, D3, D4, and D6 routes through downtown Washington
- Extension of D4 to Sibley Hospital
- Bus Stop Amenity Improvements
- Traffic Improvements

Tables tracing the development of these operating cost estimates are found at the end of this section.

<u>Increase schedule and layover time through downtown Washington for routes D1, D3, D4, and D6</u>

An increase in schedule and layover time is recommended for all routes that traverse downtown Washington, which includes the D1 and D3 during AM and PM peaks and the D4 and D6 during all time periods. The cost of Phase II implementation does not include adding additional time for the D6 during daytime hours since this was accounted for in Phase I improvements. The improvement proposes to add 15 percent to the running time in downtown Washington and a 5 percent increase in end-to-end running time, to improve on-time performance and provide adequate time for layovers and schedule recovery. These improvements are expected to result in a total cost of $615,826 in additional cost for the same improvements to the D6 route during daytime hours, which is accounted for in Phase I.

Estimated cost for additional time:

- D1: $73,313
- D3: $102,638
- D4: $175,950
- D6: $263,925 (in addition to Phase I improvements)

Estimated additional vehicle requirements:

- D1: 1
- D3: 1
- D4: 2
- D6: 0

D4 Route Extension to Sibley Hospital

An extension of the D4 route from McPherson Square (the Phase I extension) to Sibley Hospital would require additional schedule time, more hours of service and more buses. Assuming that the service frequencies on the route would be kept the same as those in Phase I, the annual operating cost of the route would be $3.06 million and would require 8,400 additional platform hours. This is $842,778 more than the cost of the Phase I service to McPherson Square.

- Estimated annual operating cost of extending the D4 route: $842,778 (in addition to Phase I improvements)
- Estimated number of additional vehicles needed: 1

Bus Stop Amenity Improvements

A number of desired bus stop amenities were identified for the D1-8 route. These include the installation of bus shelters and benches, passenger information, and deployment of WMATA's NextBus technology at selected high-volume bus stops. Overall, 38 stops were identified as having more than 100 boardings, but only 27 of these had amenity information. Additional amenities are recommended at each of these 27 sites.

Based on standard costs for these amenities, improvements to all of the routes would cost approximately $219,000 dollars.

- Bus stop improvements on D1,3,6 route: $65,000
- Bus stop improvements on D2 route: $31,000
- Bus stop improvements on D4 route: $36,000
- Bus stop improvements on D5 route: None
- Bus stop improvements on D8 route: $87,000

Tables outlining the methodology for developing these costs are found at the end of this section.

Traffic Improvements

Traffic signal priority or pre-emption improvements are recommended at 30 intersections located on various segments of the D1-8 routes. These improvements would allow buses, as they approach an intersection, to change the traffic signal to green, or extend the green time, so that the bus could reduce its wait time at the intersection. The cost for traffic signal improvements includes three elements: a software update that runs the signal, equipment installed at each of the intersections, and transponders on each of the buses. The costs include the software update and the transponders, but not the costs of installation or labor associated with implementation of this equipment.

The consultants are unaware whether the traffic signals at the intersections identified for implementation of signal priority treatments are operated in closed loops, or whether they are part of a larger signal system. Closed loop signals are the easier to implement for signal pre-emption or priority treatment, as i only the individual signal is affected. A larger system affecting more signals becomes more complicated, and thus may be much more costly to upgrade. However, a larger signal system may also be *easier* to upgrade, depending on the type of software used and whether such software can take into account buses with traffic signal preemption equipment.

A total estimated cost of $513,000 dollars to implement signal priority for the 30 intersections recommended for improvement, including all of the equipment upgrades listed above. Many of these intersections are used by multiple D-routes, so the estimates have not been presented on an individual route basis.

Tables depicting how these costs were developed for traffic signal improvements are found at the end of this section.

Overall, Phase II operating costs are approximately $1.46 million. Five additional buses would generate a capital cost of $2.75 million, with an additional $732,000 in capital costs attributable to stop and signal improvements.

Phase II Operating and Capital Costs

Phase II Costs		
Improvement	**Annual Operating Cost**	**Capital Cost**
Extra time for D1, D3, D4, D6	$615,825	$2,200,000
D4 Extension to Sibley	$842,778	$550,000
Bus Stop Amenity Improvements	N/A	$219,000
Traffic Improvements	N/A	$513,000
Total	**$1,458,603**	**$3,482,000**

D1-8 Phase I Tables

Existing D4

	Daily Hours	Annual Days	Annual Hours	Frequency	One Way Time with layover	Cycle Time	Vehicles Needed	Vehicle Revenue Hours	Platform Hours (+15%)	Cost per revenue hour	Annual Cost
M-F AM	3.0	255	765	16	24	48	3	2,295	2,639	$100.00	$263,925
M-F PM	3.0	255	765	16	24	48	3	2,295	2,639	$100.00	$263,925
M-F Offpeak	14.0	255	3,570	23	23	46	2	7,140	8,211	$100.00	$821,100
Sat	20.0	53	1,060	25	23	46	2	2,120	2,438	$100.00	$243,800
Sun/Holiday	20.5	57	1,169	36	21	42	2	2,337	2,688	$100.00	$268,755
								16,187	**18,615**		**$1,861,505**

Existing D6

	Daily Hours	Annual Days	Annual Hours	Frequency	One Way Time with layover	Cycle Time	Vehicles Needed	Vehicle Revenue Hours	Platform Hours (+15%)	Cost per revenue hour	Annual Cost
M-F AM	5.0	255	1,275	12	78	156	13	16,575	19,061	$100.00	$1,906,125
Midday	4.0	255	1,020	25	75	150	6	6,120	7,038	$100.00	$703,800
M-F PM	5.0	255	1,275	13	81	162	13	16,575	19,061	$100.00	$1,906,125
Evening	9.0	255	2,295	25	75	150	6	13,770	15,836	$100.00	$1,583,550
Sat	22.5	53	1,193	31	69	138	5	5,963	6,857	$100.00	$685,688
Sun/Holiday	20.0	57	1,140	37	60	120	4	4,560	5,244	$100.00	$524,400
											$7,309,688

Existing D8

	Daily Hours	Annual Days	Annual Hours	Frequency	One Way Time with layover	Cycle Time	Vehicles Needed	Vehicle Revenue Hours	Platform Hours (+15%)	Cost per revenue hour	Annual Cost
M-F AM Peak	3	255	765	13	44	97	8	5,967	6,862	$100.00	$596,700
M-F PM Peak	3	255	765	9	44	97	11	8,721	10,029	$100.00	$872,100
M-F Offpeak	13.5	255	3,443	15	51	112	8	25,819	29,692	$100.00	$2,581,875
Sat	20	53	1,060	20	39	86	4	4,558	5,242	$100.00	$455,800
Sun/Holiday	18	57	1,026	35	36	79	2	2,360	2,714	$100.00	$235,980
									51,824		**$4,506,475**

D4 extension to McPherson Square

	Daily Hours	Annual Days	Annual Hours	Frequency	One Way Time with layover	Cycle Time	Vehicles Needed	Vehicle Revenue Hours	Platform Hours (+15%)	Cost per revenue hour	Annual Cost
M-F AM	3.0	255	765	16	30	60	4	3,060	3,519	$100.00	$351,900
M-F PM	3.0	255	765	16	30	60	4	3,060	3,519	$100.00	$351,900
M-F Offpeak	14.0	255	3,570	28	28	56	2	7,140	8,211	$100.00	$821,100
Sat	20.0	53	1,060	28	28	56	2	2,120	2,438	$100.00	$243,800
Sun/Holiday	20.5	57	1,169	28	28	56	2	2,337	2,688	$100.00	$268,755
									20,375		**$2,037,455**

D6 with extra time, some peak turnback trips

	Daily Hours	Annual Days	Annual Hours	Frequency	One Way Time with layover	Cycle Time	Vehicles Needed	Vehicle Revenue Hours	Platform Hours (+15%)	Cost per revenue hour	Annual Cost
M-F AM	5.0	255	1,275	12	78	168	14	17,850	20,528	$100.00	$2,052,750
Midday	4.0	255	1,020	25	75	175	7	7,140	8,211	$100.00	$821,100
M-F PM	5.0	255	1,275	13	81	182	14	17,850	20,528	$100.00	$2,052,750
Evening	9.0	255	2,295	25	75	150	6	13,770	15,836	$100.00	$1,583,550
Sat	22.5	53	1,193	31	69	138	5	5,963	6,857	$100.00	$685,688
Sun/Holiday	20.0	57	1,140	37	60	120	4	4,560	5,244	$100.00	$524,400
									77,202		$7,720,238
					Hours saved due to peak period turnbacks				4,000		
									73,202	$100.00	**$7,320,238**

D8 with wider headways

	Daily Hours	Annual Days	Annual Hours	Frequency	One Way Time with layover	Cycle Time	Vehicles Needed	Vehicle Revenue Hours	Platform Hours (+15%)	Cost per revenue hour	Annual Cost
M-F AM Peak	3	255	765	14	44	97	7	5,355	6,158	$100.00	$535,500
M-F PM Peak	3	255	765	10	44	97	10	7,421	8,534	$100.00	$742,050
M-F Offpeak	13.5	255	3,443	15	51	112	8	25,819	29,692	$100.00	$2,581,875
Sat	20	53	1,060	20	39	86	4	4,558	5,242	$100.00	$455,800
Sun/Holiday	18	57	1,026	35	36	79	2	2,360	2,714	$100.00	$235,980
									49,625		**$4,315,225**

D1-8 Phase II Tables

Existing D1

	Daily Hours	Annual Days	Annual Hours	Frequency	One Way Time with layover	Cycle Time	Vehicles Needed	Vehicle Revenue Hours	Platform Hours (+15%)	Cost per revenue hour	Annual Cost
M-F AM	2.5	255	638	10	50	100	10	6,375	7,331	$100.00	$733,125
M-F PM	3.0	255	765	28	77	154	6	4,590	5,279	$100.00	$527,850
									12,610		**$1,260,975**

Existing D3

	Daily Hours	Annual Days	Annual Hours	Frequency	One Way Time with layover	Cycle Time	Vehicles Needed	Vehicle Revenue Hours	Platform Hours (+15%)	Cost per revenue hour	Annual Cost
M-F AM	4.0	255	1,020	20	63	126	7	7,140	8,211	$100.00	$821,100
M-F PM	3.5	255	893	28	56	112	4	3,570	4,106	$100.00	$410,550
									12,317		**$1,231,650**

D1 with extra time

	Daily Hours	Annual Days	Annual Hours	Frequency	One Way Time with layover	Cycle Time	Vehicles Needed	Vehicle Revenue Hours	Platform Hours (+15%)	Cost per revenue hour	Annual Cost
M-F AM	2.5	255	638	10	50	107	11	7,013	8,064	$100.00	$806,438
M-F PM	3.0	255	765	28	77	162	6	4,590	5,279	$100.00	$527,850
									13,343		**$1,334,288**

D3 with extra time

	Daily Hours	Annual Days	Annual Hours	Frequency	One Way Time with layover	Cycle Time	Vehicles Needed	Vehicle Revenue Hours	Platform Hours (+15%)	Cost per revenue hour	Annual Cost
M-F AM	4.0	255	1,020	20	63	133	7	7,140	8,211	$100.00	$821,100
M-F PM	3.5	255	893	28	56	120	5	4,463	5,132	$100.00	$513,188
									13,343		**$1,334,288**

D6 with extra time

	Daily Hours	Annual Days	Annual Hours	Frequency	One Way Time with layover	Cycle Time	Vehicles Needed	Vehicle Revenue Hours	Platform Hours (+15%)	Cost per revenue hour	Annual Cost
M-F AM	5.0	255	1,275	12	78	168	14	17,850	20,528	$100.00	$2,052,750
Midday	4.0	255	1,020	25	75	175	7	7,140	8,211	$100.00	$821,100
M-F PM	5.0	255	1,275	13	81	182	14	17,850	20,528	$100.00	$2,052,750
Evening	9.0	255	2,295	25	75	158	7	16,065	18,475	$100.00	$1,847,475
Sat	22.5	53	1,193	31	69	144	5	5,963	6,857	$100.00	$685,688
Sun/Holiday	20.0	57	1,140	37	60	126	4	4,560	5,244	$100.00	$524,400
									79,842		**$7,984,163**

D4 extension to Sibley and extra time

	Daily Hours	Annual Days	Annual Hours	Frequency	One Way Time with layover	Cycle Time	Vehicles Needed	Vehicle Revenue Hours	Platform Hours (+15%)	Cost per revenue hour	Annual Cost
M-F AM	3.0	255	765	16	63	90	6	4,590	5,279	$100.00	$527,850
M-F PM	3.0	255	765	16	67	90	6	4,590	5,279	$100.00	$527,850
M-F Offpeak	14.0	255	3,570	28	66	90	4	14,280	16,422	$100.00	$1,642,200
Sat	20.0	53	1,060	30	54	90	3	3,180	3,657	$100.00	$365,700
Sun/Holiday	20.5	57	1,169	30	50	90	3	3,506	4,031	$100.00	$403,133
									34,667		**$3,466,733**

Bus Stop Amenities

Route	StopID	Location	Total Boardings	Concrete Pad	Pad Cost $2,500	Lighting	Lighting Cost $2,000	Bus Signage	Signage Cost $200	Trash cans	Trash Cost $250	Shelter	Shelter Cost $10,000	Schedule info	Info Cost $500	Benches	Bench Cost $500	Real time travel info	NextBus cost $5,000	Total Cost
D1,3,6	5701	EB Massachusetts at 1st Street NW	100	0	$0	1	$2,000	0	$0	0	$0	1	$10,000	0	$0	0	$0	0	$0	**$12,000**
D1,3,6	5353	WB C Street at 15th Street NE	118	1	$2,500	1	$2,000	0	$0	1	$250	1	$10,000	0	$0	1	$500		$0	**$15,250**
D1,3,6	5354	WB C Street at 14th Street NE	124	0	$0	1	$2,000	0	$0	0	$0	1	$10,000	0	$0	1	$500		$0	**$12,500**
D1,3,6	5551	WB C Street at 8th Street NE	131	0	$0	0	$0	0	$0	1	$250	1	$10,000	1	$500	1	$500		$0	**$11,250**
D1,3,6	5362	WB C Street at 13th Street NE	120	0	$0	1	$2,000	0	$0	0	$0	0	$0	0	$0	1	$500		$0	**$2,500**
D1,3,6	5333	EB Loughboro at Sibley Hospital	120	0	$0	0	$0	0	$0	0	$0	0	$0	0	$0	0	$0		$0	**$0**
D1,3,6	6043	EB K Street at 17th Street NW	129	0	$0	1	$2,000	0	$0	1	$250	0	$0	0	$0	0	$0		$0	**$2,250**
D1,3,6	5706	EB N Capitol at Massachusetts	130	0	$0	1	$2,000	0	$0	0	$0	0	$0	0	$0	0	$0		$0	**$2,000**
D1,3,6	3726	EB Reservoir at GU Entrance	145	0	$0	0	$0	0	$0	0	$0	0	$0	0	$0	0	$0		$0	**$0**
D1,3,6	6653	WB P Street at 21st Street NW	175	0	$0	0	$0	0	$0	0	$0	0	$0	0	$0	0	$0		$0	**$0**
D1,3,6	13611	WB Stadium Armory Bus Bay E	355	0	$0	1	$2,000	0	$0	0	$0	0	$0	0	$0	0	$0	1	$5,000	**$7,000**
D2	6522	Q Street at Wisconsin Avenue NW	118	0	$0	0	$0	0	$0	0	$0	1	$10,000	0	$0	1	$500		$0	**$10,500**
D2	13541	Benton Street at 39th Street	126	1	$2,500	1	$2,000	0	$0	1	$250	1	$10,000	0	$0	1	$500		$0	**$15,250**
D2	6575	Connecticut Avenue at Q Street NW	542	0	$0	0	$0	0	$0	0	$0	0	$0	0	$0	1	$500	1	$5,000	**$5,500**
D4	6034	EB K Street at 8th Street NE	119	0	$0	1	$2,000	0	$0	0	$0	1	$10,000	1	$500	1	$500		$0	**$13,000**
D4	6505	WB Montello at Mt Olivet NE	193	0	$0	0	$0	0	$0	0	$0	1	$10,000	0	$0	1	$500		$0	**$10,500**
D4	5602	EB Columbus Plaza (Union Station)	228	0	$0	1	$2,000	0	$0	0	$0	1	$10,000	0	$0	1	$500		$0	**$12,500**
D4	6840	WB New York Ave btw Fenwick and 16th Street NE	202	0	$0	0	$0	0	$0	0	$0	0	$0	0	$0	0	$0		$0	**$0**
D8	5982	NB Trinidad Avenue at Florida Avenue	112	1	$2,500	1	$2,000	0	$0	1	$250	1	$10,000	0	$0	1	$500		$0	**$15,250**
D8	6505	SB Montello Avenue at Mt. Olivet Road	232	0	$0	0	$0	0	$0	0	$0	1	$10,000	0	$0	1	$500		$0	**$10,500**
D8	5602	NB Columbus Plaza	333	0	$0	1	$2,000	0	$0	0	$0	1	$10,000	0	$0	1	$500	1	$5,000	**$17,500**
D8	6034	NB K Street at 8th Street NE	347	0	$0	1	$2,000	0	$0	0	$0	1	$10,000	1	$500	1	$500	1	$5,000	**$18,000**
D8	K801	SB National Rehab Hospital	377	1	$2,500	0	$0	0	$0	1	$250	1	$10,000	0	$0	0	$0	1	$5,000	**$17,750**
D8	5823	NB N. Capitol at H Street	176	0	$0	0	$0	0	$0	0	$0	0	$0	1	$500	0	$0		$0	**$500**
D8	6524	NB Mt. Olivet Road at Montello Avenue	188	0	$0	1	$2,000	0	$0	0	$0	0	$0	0	$0	0	$0		$0	**$2,000**
D8	13444	SB Veterans Hospital Entrance	219	0	$0	0	$0	0	$0	0	$0	0	$0	0	$0	0	$0		$0	**$0**
D8	7070	NB/SB Rhode Island Avenue Metrorail Station	1067	0	$0	0	$0	0	$0	0	$0	0	$0	0	$0	0	$0	1	$5,000	**$5,000**
D1,3,6	6056	WB K Street at Connecticut	104	NO INFORMATION PROVIDED FOR THESE STOPS																
D1,3,6	6040	WB 13th Street at G Street NW	117																	
D8	7048	SB Rhode Island Ave at 5th Street NE	138																	
D1,3,6	6051	WB K Street at 13th Street NW	149																	
D8	7251	SB Edgewood Ave and 6th Street NE	150																	
D1,3,6	6054	WB K Street at 14th Street NW	166																	
D1,3,6	15057	EB E Street at 10th Street NW	169																	
D2	6468	P Street at 20th Street NW	209																	
D1,3,6	5607	EB E Street at 7th Street NW	219																	
D1,3,6	6469	WB K Street at 16th Street NW	246																	
D8	5604	NB Columbus Circle at First Street	261																	
D8	5896	NB 6th Street NE at H Street	267																	
Totals																				**$218,500**

Traffic Improvements

Equipment Improvements	Priority	Cost	Units	Spares	Cost
D1,6 In-bus transponders*	High	$4,000	25	5	$120,000
D3 In-bus transponders*	High	$4,000	7	1	$32,000
D2 In-bus transponders*	High	$4,000	5	1	$24,000
D4 In-bus transponders*	High	$4,000	6	1	$28,000
D5 In-bus transponders*	High	$4,000	4	1	$20,000
D8 In-bus transponders*	High	$4,000	10	2	$48,000
One time software upgrade	High	$1,000	1		$1,000

* based on number of peak buses for each route

Intersection Improvements	Routes Affected	Priorty	Improvement	Cost	Total Cost
MacArthur Boulevard/Loughboro Road	D3, D5, D6	High	Traffic Signal Equipment	$8,000	$8,000
MacArthur Boulevard/Cathedral Avenue	D3, D5, D6	High	Traffic Signal Equipment	$8,000	$8,000
MacArthur Boulevard/Arizona Avenue	D3, D5, D6	High	Traffic Signal Equipment	$8,000	$8,000
MacArthur Boulevard/Reservoir Road	D3, D5, D6	High	Traffic Signal Equipment	$8,000	$8,000
Reservoir Road/39th Street NW	D3,D6	High	Traffic Signal Equipment	$8,000	$8,000
Reservoir Road/37th Street NW	D3,D6	High	Traffic Signal Equipment	$8,000	$8,000
Reservoir Road/35th Street NW	D3,D6	High	Traffic Signal Equipment	$8,000	$8,000
C Street/17th Street NE	D6	High	Traffic Signal Equipment	$8,000	$8,000
C Street/18th Street NE	D6	High	Traffic Signal Equipment	$8,000	$8,000
C Street/19th Street NE	D6	High	Traffic Signal Equipment	$8,000	$8,000
K Street/1st Street NE	D1, D3, D4, D8	High	Traffic Signal Equipment	$8,000	$8,000
K Street/2nd Street NE	D1, D3, D4, D8	High	Traffic Signal Equipment	$8,000	$8,000
K Street/3rd Street NE	D1, D3, D4, D8	High	Traffic Signal Equipment	$8,000	$8,000
K Street/4th Street NE	D1, D3, D4, D8	High	Traffic Signal Equipment	$8,000	$8,000
K Street/5th Street NE	D1, D3, D4, D8	High	Traffic Signal Equipment	$8,000	$8,000
K Street/6th Street NE	D1, D3, D4, D8	High	Traffic Signal Equipment	$8,000	$8,000
H Street/3rd Street NE	D1, D3, D4, D8	High	Traffic Signal Equipment	$8,000	$8,000
H Street/4th Street NE	D1, D3, D4, D8	High	Traffic Signal Equipment	$8,000	$8,000
H Street/6th Street NE	D1, D3, D4, D8	High	Traffic Signal Equipment	$8,000	$8,000
9th Street NE/T Street	D8	High	Traffic Signal Equipment	$8,000	$8,000
9th Street NE/Brentwood Road	D8	High	Traffic Signal Equipment	$8,000	$8,000
Brentwood Road/Home Depot Retail Entrance	D8	High	Traffic Signal Equipment	$8,000	$8,000
Brentwood Road/Saratoga Road	D8	High	Traffic Signal Equipment	$8,000	$8,000
Rhode Island Avenue/Saratoga Road	D8	High	Traffic Signal Equipment	$8,000	$8,000
Rhode Island Avenue/10th Street NE/Bryant Road	D8	High	Traffic Signal Equipment	$8,000	$8,000
Rhode Island Avenue/Rhode Island-Brentwood Metro station	D8	High	Traffic Signal Equipment	$8,000	$8,000
Rhode Island Avenue/Retail Entrance	D8	High	Traffic Signal Equipment	$8,000	$8,000
Rhode Island Avenue/4th Street NE	D8	High	Traffic Signal Equipment	$8,000	$8,000
4th Street NE/Bryant Road	D8	High	Traffic Signal Equipment	$8,000	$8,000
4th Street NE/Edgewood Road	D8	High	Traffic Signal Equipment	$8,000	$8,000
					$240,000
TOTALS FOR D1-8					**$513,000**

F8 COST ESTIMATE

The implementation of the recommendations can be accomplished in two different phases. Phase I recommendations are those that can be easily implemented and relatively little in terms of additional operating and/or capital costs and require little preparation on the part of WMATA or little to no notice to passengers. Phase II recommendations require more work to get implemented in terms of changes to operations, capital costs / operating costs, effort on the part of WMATA and generally require longer lead times to make customers aware of the changes.

<u>Phase I Recommendations</u>

Increased supervision can happen almost immediately. The only extra costs for this recommendation would be if more supervisory personnel are needed. If the current personnel can handle more improved supervision of the routes, then the costs are virtually zero.

Likewise, the addition of time in the schedule could be easily accomplished. This would require updating the schedule to allow for increased recovery time and additional time at major time points. This would add some additional time to the schedule. However, it probably already exists in actual operation of the line so recognizing it in the schedule would improve customer expectations and schedule adherence of the buses. The incremental costs of updating the schedules and having increased running times due to the increased times at intermediate points and at the terminals would be approximately $600,000.

The addition of “extra” PM buses near the peak is also something that can be accomplished relatively easily. It would involve a few more bus runs to accomplish the service and can be rescheduled without needing extra peak buses. The costs for this new service is approximately $575,000.

Likewise the expanded service to 11:00 PM weekdays and the base 30-minute and 15-minute peak headway service are also something that can be immediately accomplished as well. The 30-minute base and 15-minute peak service would require much more funding, and because of this could be shifted to the medium- or long-term time frames due to funding constraints. The costs for this are estimated to be approximately $450,000 annually.

The consolidation and elimination of the stops could be a short-term recommendation. Proper notice to the riders at each stop and along the routes (on the buses) would be needed. The upgrades to the stops can happen quickly. This work is estimated to cost approximately $2,000 and would have minimal if any on-going operations and maintenance costs.

Encouraging passengers to have strollers folded and other parcels secured or out of the way while boarding is something that could be implemented in the short term.

Finding a better place to layover at the north end and rerouting away from University Gardens are also short-term recommendations. They would require operating adjustments that must be evaluated with regard to feasibility and feedback from the customers. Also, the coordination with the Takoma / Langley Transit Center construction is needed. At this time, there is not an estimate of capital or operating costs or savings for this option as it has not been more fully explored. (Note: The Takoma / Langley Transit Center may slip to a long Term Recommendation if the process is not complete within a 2 – 3 year time frame. WMATA is not responsible for this project.)

The increased promotion and changes to the existing SmarTrip card program are medium-term recommendations. Agreements with additional sales outlets and the study / feasibility of a reduced / no fee card and additional discounts beyond the existing 10¢ per trip would be needed. Eliminating the ability of passengers to add to the card at the farebox would also take some time to implement as well.

<u>Phase II Recommendations</u>

Rerouting the F8 from the Cheverly Station to Largo Town Center is a long-term recommendation. More study as to the number of through riders and the potential impacts to them as well as obtaining feedback from the riders on this proposal would be needed before the service change could be implemented. Likewise the modifications to the various intersections also would be a long-term recommendation as each intersection would need to be studied in detail. At this time, there is not an estimate of capital or operating costs or savings for this option as it has not been more fully explored.

The bus priority lanes and intersections improvements are long-term recommendations. Each location that is a potential candidate for an upgrade must be evaluated and thoroughly analyzed as to the benefits and costs of the recommendation. Likewise, coordination between WMATA and the local jurisdictions is also necessary. The costs for the signal and intersection upgrades is estimated to be approximately $3.9 million.

Existing F8

	Daily Hours	Annual Days	Annual Hours	Frequency	One Way Time with layover	Cycle Time	Vehicles Needed	Vehicle Revenue Hours	Platform Hours (+13%)	Cost per revenue hour	Annual Cost
M-F AM	3.0	255	765	20	57	114	6	4,590	5,187	$100.00	$518,670
M-F PM	3.0	255	765	20	57	114	6	4,590	5,187	$100.00	$518,670
M-F Offpeak	9.0	255	2,295	30	57	114	4	9,180	10,373	$100.00	$1,037,340
Sat	15.5	53	822	60	57	114	2	1,643	1,857	$100.00	$185,659
Sun/Holiday	11.0	57	627	60	57	114	2	1,254	1,417	$100.00	$141,702
									24,020		**$2,402,041**

Future F8 with Extra Time for Intermediate and Terminal Points and Recovery

	Daily Hours	Annual Days	Annual Hours	Frequency	One Way Time with layover	Cycle Time	Vehicles Needed	Vehicle Revenue Hours	Platform Hours (+13%)	Cost per revenue hour	Annual Cost
M-F AM	3.0	255	765	20	67	134	7	5,355	6,051	$100.00	$605,115
M-F PM	3.0	255	765	20	67	134	7	5,355	6,051	$100.00	$605,115
M-F Offpeak	9.0	255	2,295	30	67	134	5	11,475	12,967	$100.00	$1,296,675
Sat	15.5	53	822	60	67	134	3	2,465	2,785	$100.00	$278,489
Sun/Holiday	11.0	57	627	60	67	134	3	1,881	2,126	$100.00	$212,553
									29,979		**$2,997,947**

Extra PM F8 Buses

	Daily Hours	Annual Days	Annual Hours	Frequency	One Way Time with layover	Cycle Time	Vehicles Needed	Vehicle Revenue Hours	Platform Hours (+13%)	Cost per revenue hour	Annual Cost
M-F AM	0.0	255	0	20	67	134	7	0	0	$100.00	$0
M-F PM	0.0	255	0	20	67	134	7	0	0	$100.00	$0
M-F Offpeak	4.0	255	1,020	30	67	134	5	5,100	5,763	$100.00	$576,300
Sat	0.0	53	0	60	67	134	3	0	0	$100.00	$0
Sun/Holiday	0.0	57	0	60	67	134	3	0	0	$100.00	$0
									5,763		**$576,300**

F8 at 30 minute base and 15 min peak M-F

	Daily Hours	Annual Days	Annual Hours	Frequency	One Way Time with layover	Cycle Time	Vehicles Needed	Vehicle Revenue Hours	Platform Hours (+13%)	Cost per revenue hour	Annual Cost
M-F AM	3.0	255	765	15	67	134	9	6,885	7,780	$100.00	$778,005
M-F PM	3.0	255	765	15	67	134	9	6,885	7,780	$100.00	$778,005
M-F Offpeak	9.0	255	2,295	30	67	134	5	11,475	12,967	$100.00	$1,296,675
Sat	0.0	53	0	60	67	134	3	0	0	$100.00	$0
Sun/Holiday	0.0	57	0	60	67	134	3	0	0	$100.00	$0
									28,527		**$2,852,685**

Intersection and Trffic Signal Improvements

Equipment Improvements	Priority		Cost	Units	Spares	Cost
In-bus transponders*	High		$4,000	5	1	$24,000
One time software upgrade	High		$1,000	1		$1,000

* based on number of peak buses on F8

Intersection Improvements	Priorty	Improvement	Cost	Improvement	Cost	Total Cost
Landover Road/Cheverly Avenue	High	Queue Jump Lane	$250,000	Traffic Signal Equipment	$8,000	$258,000
Landover Road/I-295 ramps	High	Queue Jump Lane	$250,000	Traffic Signal Equipment	$8,000	$258,000
Landover Road/Annapolis Road	High	Queue Jump Lane	$250,000	Traffic Signal Equipment	$8,000	$258,000
Annapolis Road/ramps to Kenilworth Avenue	High	Queue Jump Lane	$250,000	Traffic Signal Equipment	$8,000	$258,000
Baltimore Avenue/Annapolis Road (SB lanes only)	High	Queue Jump Lane	$250,000	Traffic Signal Equipment	$8,000	$258,000
Baltimore Avenue/Armentrout Drive	High	Queue Jump Lane	$250,000	Traffic Signal Equipment	$8,000	$258,000
Adelphia Road/Toledo Road	High	Queue Jump Lane	$250,000	Traffic Signal Equipment	$8,000	$258,000
Adelphia Road/Belcrest Road	High	Queue Jump Lane	$250,000	Traffic Signal Equipment	$8,000	$258,000
Adelphia Road/University Boulevard/Campus Drive	High	Queue Jump Lane	$250,000	Traffic Signal Equipment	$8,000	$258,000
Belcrest Road/East-West Highway (SR 410)	High	Queue Jump Lane	$250,000	Traffic Signal Equipment	$8,000	$258,000
University Boulevard/Riggs Road	High	Queue Jump Lane	$250,000	Traffic Signal Equipment	$8,000	$258,000
University Boulevard /New Hampshire Avenue	High	Queue Jump Lane	$250,000	Traffic Signal Equipment	$8,000	$258,000
High Priority Total						**$3,096,000**

Landover Road/57th Avenue*	Low	Queue Jump Lane	$250,000	Traffic Signal Equipment	$8,000	$258,000
Annapolis Road/Edmonston Road*	Low	Queue Jump Lane	$250,000	Traffic Signal Equipment	$8,000	$258,000
Adelphia Road/Wells Parkway*	Low	Queue Jump Lane	$250,000	Traffic Signal Equipment	$8,000	$258,000
Low Priority Total						**$774,000**

TOTALS FOR F8	**$3,895,000**

Bus Stop Ammenity Costs

Route	StopID	Location	Total Boardings	Concrete Pad	Pad Cost	Lighting	Lighting Cost	Bus Signage	Signage Cost	Trash cans	Trash Cost	Shelter	Shelter Cost	Schedule info	Info Cost	Benches	Bench Cost	Real time travel info	NextBus cost	Total Cost
F8	7609	WB PG Hospital Main Entrance	110	0	0	1	$ 2,000.00	0	0	0	0	0	0	0	0	0	0	0	0	$ 2,000.00
F8	11980	Cheverly Metrorail Station	107	0	0	0	$ -	0	0	0	0	0	0	0	0	0	0	0	0	$ -

$ 2,000.00

P12 COST ESTIMATE

The implementation of the recommendations can be accomplished in two different phases. Phase I recommendations are those that can be easily implemented and relatively little in terms of additional operating and/or capital costs and require little preparation on the part of WMATA or little to no notice to passengers. Phase II recommendations require more work to get implemented in terms of changes to operations, capital costs / operating costs, effort on the part of WMATA and generally require longer lead times to make customers aware of the changes.

Phase I Recommendations

Increased supervision can happen almost immediately. The only extra costs for this recommendation would be if more supervisory personnel are needed. If the current personnel can handle more improved supervision of the P12 Routes, then the costs are virtually zero.

Likewise, the addition of time in the schedule could be easily accomplished. This would require updating the schedule to allow for increased recovery time and additional time at major time points. This would add some additional time to the schedule. However, it probably already exists in actual operation of the line so recognizing it in the schedule would improve customer expectations and schedule adherence of the buses. The operating costs for this option are approximately $720,000 annually.

The various reroutings proposed above can also be immediately accomplished as well.

The consolidation and elimination of the stops could be a short-term recommendation. Proper notice to the riders at each stop and along the routes (on the buses) would be needed.

Encouraging passengers to have strollers folded and other parcels secured or out of the way while boarding is something that could be implemented in the short term.

The addition of the extra buses for the midday trippers is also a short-term recommendation. This would require more operating expenses daily and annually respectively to operate the service and may require added buses which would be a capital cost. The operating costs are approximately $865,000 annually.

The increased promotion and changes to the existing SmarTrip card program are medium-term recommendations. Agreements with additional sales outlets and the study / feasibility of a reduced / no fee card and additional discounts beyond the existing 10¢ per trip would be needed. Eliminating the ability of passengers to add to the card at the farebox would also take some time to implement as well.

Additional shelters and improved passenger amenities at the locations identified above are medium-term recommendations because they may require some engineering and construction costs or entail agreements with private property owners. Bus stop amenities are estimated to be approximately $72,000.

Phase II Recommendations

Any option to split the route would be a long term recommendation.

The modifications to the various intersections also would be a long term recommendation as each intersection would need to be studied in detail. Also, the benefits and costs of each potential improvement would need to be detailed and coordination with Prince George's County. The intersection and signal upgrades are estimated to cost approximately $830,000.

Existing P12

	Daily Hours	Annual Days	Annual Hours	Frequency	One Way Time with layover	Cycle Time	Vehicles Needed	Vehicle Revenue Hours	Platform Hours (+13%)	Cost per revenue hour	Annual Cost
M-F AM	3.0	255	765	20	74	148	8	6,120	6,916	$100.00	$691,560
M-F PM	3.0	255	765	20	74	148	8	6,120	6,916	$100.00	$691,560
M-F Offpeak	15.3	255	3,889	30	74	148	5	19,444	21,971	$100.00	$2,197,144
Sat	18.0	53	954	30	74	148	5	4,770	5,390	$100.00	$539,010
Sun/Holiday	16.0	57	912	45	74	148	4	3,648	4,122	$100.00	$412,224
									45,315		**$4,531,498**

Future P12 with Extra Time for Intermediate and Terminal Points and Recovery

	Daily Hours	Annual Days	Annual Hours	Frequency	One Way Time with layover	Cycle Time	Vehicles Needed	Vehicle Revenue Hours	Platform Hours (+13%)	Cost per revenue hour	Annual Cost
M-F AM	3.0	255	765	20	84	168	9	6,885	7,780	$100.00	$778,005
M-F PM	3.0	255	765	20	84	168	9	6,885	7,780	$100.00	$778,005
M-F Offpeak	15.3	255	3,889	30	84	168	6	23,333	26,366	$100.00	$2,636,573
Sat	18.0	53	954	30	84	168	6	5,724	6,468	$100.00	$646,812
Sun/Holiday	16.0	57	912	45	84	168	4	3,648	4,122	$100.00	$412,224
									52,516		**$5,251,619**

P12 Extra Midday Trippers

	Daily Hours	Annual Days	Annual Hours	Frequency	One Way Time with layover	Cycle Time	Vehicles Needed	Vehicle Revenue Hours	Platform Hours (+13%)	Cost per revenue hour	Annual Cost
M-F AM	0.0	255	0	20	84	168	9	0	0	$100.00	$0
M-F PM	0.0	255	0	20	84	168	9	0	0	$100.00	$0
M-F Offpeak	5.0	255	1,275	30	84	168	6	7,650	8,645	$100.00	$864,450
Sat	0.0	53	0	30	84	168	6	0	0	$100.00	$0
Sun/Holiday	0.0	57	0	45	84	168	4	0	0	$100.00	$0
									8,645		**$864,450**

Intersection and Trffic Signal Improvements

Equipment Improvements	Priority		Cost	Units	Spares	Cost
In-bus transponders*	High		$4,000	11	2	$52,000
One time software upgrade	High		$1,000	1		$1,000

* based on number of peak buses on P12

Intersection Improvements	Priorty	Improvement	Cost	Improvement	Cost	Total Cost
Central Avenue/Cindy Lane	High	Queue Jump Lane	$250,000	Traffic Signal Equipment	$8,000	$258,000
Central Avenue/Shady Glen Drive	High	Queue Jump Lane	$250,000	Traffic Signal Equipment	$8,000	$258,000
Walker Mill Road/Addison Road	High	Queue Jump Lane	$250,000	Traffic Signal Equipment	$8,000	$258,000
Intersection totals						**$774,000**

TOTALS FOR P12	**$827,000**

Bus Stop Ammenity Costs

Route	StopID	Location	Total Boardings	Concrete Pad	Pad Cost	Lighting	Lighting Cost	Bus Signage	Signage Cost	Trash cans	Trash Cost	Shelter	Shelter Cost	Schedule info	Info Cost	Benches	Bench Cost	Real time travel info	NextBus cost	Total Cost
P12	1319	EB Audre0 at I1dia1 Head Hw0	117	0	0	1	$ 2,000.00	0	0	1	$ 250.00	1	$ 10,000.00	0	$ -	1	$ 500.00	0	$ -	$ 12,750.00
P12	1344	EB Ke11ebec at Glass Ma1or Dr	139	0	0	1	$ 2,000.00	0	0	1	$ 250.00	1	$ 10,000.00	1	$ 500.00	1	$ 500.00	0	$ -	$ 13,250.00
P12	13860	EB Audre0 at Eastover Ce1ter	210	0	0	1	$ 2,000.00	0	0	1	$ 250.00	1	$ 10,000.00	1	$ 500.00	1	$ 500.00	0	$ -	$ 13,250.00
P12	14611	WB Suitla1d Metrorail Statio1	296	0	0	0	$ -	0	0	0	$ -	0	$ -	0	$ -	0	$ -	0	$ -	$ -
P12	14632	EB Suitla1d Metrorail Statio1	387	0	0	0	$ -	0	0	0	$ -	0	$ -	0	$ -	0	$ -	1	$ 5,000.00	$ 5,000.00
P12	2235	EB/WB Iverso1 at Iverso1 Mall	515	0	0	1	$ 2,000.00	0	0	1	$ 250.00	1	$ 10,000.00	0	$ -	1	$ 500.00	1	$ 5,000.00	$ 17,750.00
P12	11962	WB Addiso1 Road Metrorail Statio1	773	0	0	0	$ -	0	0	1	$ 250.00	0	$ -	0	$ -	0	$ -	1	$ 5,000.00	$ 5,250.00
P12	14614	EB/WB Souther1 Ave Metrotail Statio1	994	0	0	0	$ -	0	0	0	$ -	0	$ -	0	$ -	0	$ -	1	$ 5,000.00	$ 5,000.00

$ 72,250.00