16th Metrobus 16th Street Line Study

Final Summary Report

February 2009

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District Department of Transportation

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1.0 Introduction to the 16th Street Line Study

Between April and October 2008, the Washington Metropolitan Transit Authority (WMATA), in partnership with the District Department of Transportation (DDOT), studied ways of improving transit service along Metrobus routes S1, S2, and S4—collectively called the 16th Street Line. The existing routes are shown in **Figure 1-1**.

The current S2 and S4 service runs primarily on 16th Street NW between Silver Spring Metro Station in Maryland and Federal Triangle in downtown Washington, DC. The routes are the same with the exception of a small jog on the S2 that runs on Alaska Avenue and Eastern Avenue NW. The S1 is a shorter weekday/peak-period route that also runs primarily on 16th Street, but between Missouri Avenue and Foggy Bottom.

The 16th Street Line was chosen for study by WMATA and DDOT for several reasons. Its average weekday ridership of 16,000 makes it the third most heavily used line in the Metrobus system. The transit corridor is an important link to Silver Spring and Downtown for residents of Shepherd Park, Brightwood, Crestwood, Mount Pleasant, Columbia Heights, and other neighborhoods along 16th Street. However, because of the popularity of the routes and heavy traffic along the alignment, the line often suffers from overcrowding, bus bunching, and delays.

1.1 Project Purpose

The main purpose of the study was to conduct a comprehensive review of methods for improving the performance of transit service along the 16th Street Line, and to develop an improvement strategy that would include service, operations, and customer information enhancements. Among the challenges facing the 16th Street Line were:

- Improving the customer experience
- Updating services and operating plans to sustain good performance
- Improving reliability and travel times
- Establishing a strategy for implementing recommendations
- Planning for future demand and new services to accommodate District initiatives

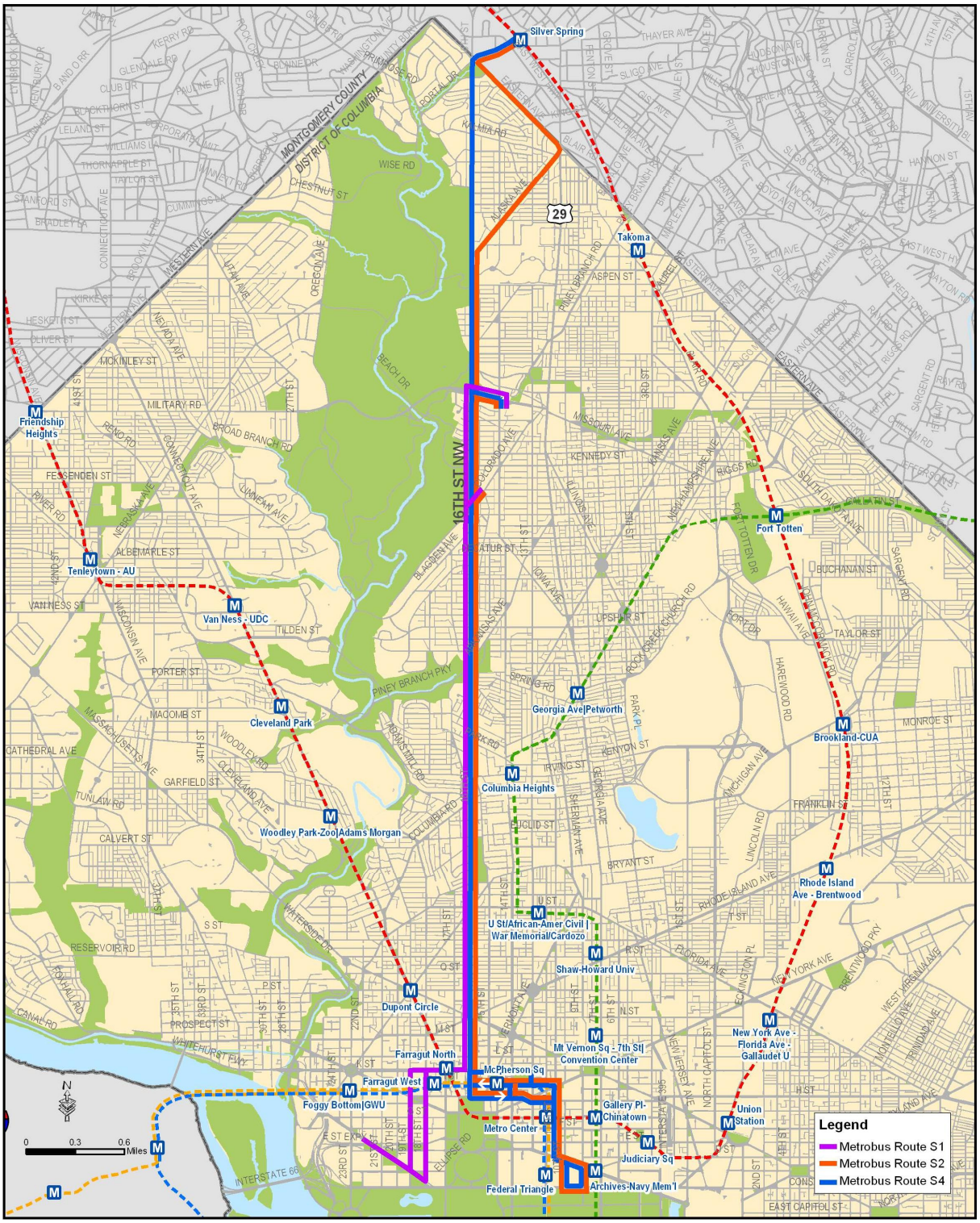
1.2 Planning Process

The 16th Street Line study included a coordinated planning effort to link implementation of the proposed service options with the development of community support. This work consisted of:

1) Reviewing the existing 16th Street Line services, operations, and customer information and conducting a rider survey to identify deficiencies to be addressed by the study.
2) Conducting two community workshops to develop public and agency support for enhancing 16th Street Line services.
3) Recommending an integrated set of service, operations, and customer information strategies to respond to consumer needs, minimize costs, and enhance effectiveness and performance of the 16th Street Line.

4) Identifying related enhancements, budgets, and funding needs for:
    - Service and supervision plan
    - Vehicle types and uses
    - Bus stop locations and design
    - Customer information
    - Traffic management strategies
5) Developing a coordinated implementation timetable and strategy with DDOT.
6) Requesting funding and WMATA Compact-required approvals.
7) Implementing the service and enhancements in coordinated phases to meet project and District transportation deadlines and requirements.

Figure 1-1: Existing 16th Street Line Routes



2.0 Public Outreach and Input

Public outreach was a significant part of the 16th Street Line study process. Opportunities for public participation included a rider survey, two public meetings, a project website, and other activities.

2.1 Rider Survey

The study began with an 18-question rider survey, which was administered on Wednesday, June 18, 2008. The surveys were bilingual—English on one side, Spanish on the other. Approximately 5,000 surveys were distributed between 6 am and 10 pm that day at high-ridership stops along the line. Over the course of the next seven weeks, 1,097 surveys were returned—nearly two-thirds via business reply mail. Six percent of the received surveys were in Spanish. In addition, an on-line version of the survey was available on the project website for eight weeks from mid-June to mid-August. Two hundred thirty responses were received on-line for a total of 1,327 responses overall.

The following are the most significant things the study team learned from the public about the 16th Street Line via the rider survey:

- The biggest problem facing the 16th Street Line is overcrowding. Although two-thirds of riders were able to find a seat on the day of the survey, buses are often at or over capacity during peak periods and sometimes at mid-day and in the evening.
- The frequency with which buses arrive, and more specifically the bunching of buses, is also a significant issue for 16th Street Line riders. A common complaint among survey respondents was that buses come three or four at a time, and then not at all for a long period.
- Tied into the frequency/bunching issue is schedule adherence. Even when respondents generally have a favorable view of the line, many believe that the schedules are unhelpful.
- Most respondents—almost 70 percent—were not concerned with safety or security either on the bus or at the stop where they boarded.
- Most riders rated their bus operator highly for safe operation of the bus, helpfulness, and knowledge of the system.
- Most respondents rated the condition, comfort, and cleanliness of buses and bus stops favorably. However, many felt that the bus stops should feature better or more shelters and benches.
- Almost two-thirds of riders did not transfer to or from the 16th Street Line. Many of those who did transfer tended to do so to or from the Red Line or other bus lines at Silver Spring Metro; although some did transfer to other rail and bus lines in Downtown.
- A large majority of riders indicated that they would use new transit services—such as express buses, limited-stop buses, and neighborhood connectors—if offered on the 16th Street Line.

For complete details about the rider survey, please see *Metrobus 16th Street Line Study: Final Results of Rider Survey, August 2008*.

2.2 First Public Meeting: Problem Identification

Two public meetings were conducted for the 16th Street Line study in 2008. Both were held at St. Stephen and the Incarnation Episcopal Church at 16th & Newton Streets NW. The location is at about the halfway point of the line, thus making it convenient for the greatest number of residents. The first meeting was on Tuesday, July 15, and the second was on Tuesday, September 23. Approximately 47 members of the public and the media attended the first public meeting, and about 37 participated in the second meeting.

Both meetings were held from 6:30 pm to 8:30 pm. The meetings began with a half-hour open house in which participants reviewed display materials and spoke individually with the study team. Following the open house was a 20-minute presentation, then an hour-long breakout session in which participants talked in small groups about their concerns with the 16th Street Line. In the final portion of the meetings, breakout group members reported their results to the other groups.

The purpose of the first public meeting was three-fold:

1) To engage 16th Street Line riders in dialogue about challenges facing the line;
2) To hear rider concerns, identify issues, and set priorities for the study; and
3) To reveal the preliminary results of the rider survey.

The project team gauged the issues that were of greatest importance to riders and used this information for setting standards for quantifiable service improvements, which were developed into draft recommendations and presented at the second public meeting in September. For a summary of activities and outreach for the first public meeting, see *Metrobus 16th Street Line Study: Summary of Public Meeting #1, July 2008*.

Visual materials available to meeting participants included:

- Meeting agenda
- 16th Street Line fact sheet
- Two-page newsletter
- Display boards
- Table-sized maps
- Preliminary survey results
- Spanish-language materials were made available upon request

Problems with the 16th Street Line most frequently identified by meeting participants included:

- Bus crowding – the issue that was most on participants' minds. Crowding persists at all hours, and there was frustration about 'not in service' buses.
- Schedule adherence – many felt that buses are not reliable, and that they bunch up too easily and too often.
- Many riders indicated a preference for a new limited-stop and/or express service.
- Riders were also generally in favor of more frequent buses, or at least larger buses.

- There was a consensus that many of the problems with the line had less to do with the buses themselves and more to do with on-street parking, illegal parking, and congestion.
- Several participants thought that the southern end of the S1 should be realigned.
- Some participants felt that more shelters along the line would be beneficial.
- Others felt that bus drivers could be better trained to deal with issues such as managing crowded buses, skipping stops, and knowing the routes.
- On-board issues such as slow fare payment, exiting out the front door, and riders not moving toward the back of buses were mentioned as needing attention in the study.
- Safety and security was hardly, if at all, mentioned as a problem on the 16th Street buses or stops.

2.3 Second Public Meeting: Draft Recommendations

The format of and visual materials for the September 23 public meeting were the same as the first meeting. The major difference was that, during the hour-long breakout session, participants discussed the draft recommendations and evaluated whether they would be effective in solving the identified problems. For full results of the second public meeting, see *Metrobus 16th Street Line Study: Summary of Public Meeting #2, September 2008*.

The following were the most frequently heard comments from participants about the draft recommendations:

- There was substantial support for the limited-stop service; participants generally favored extending the proposed limited-stop service to non-peak periods and weekends. Several participants felt that it should go to Federal Triangle. Many felt that branding, as with the Metro Extra Route 79, was important.
- Of those who commented on the short-turn service, the consensus favored extending the northern terminal to Colorado Avenue, to serve those who live in Crestwood or park at the Carter Barron lot.
- Participants expressed approval for the idea of expanding the S1 hours, but felt that the service could be more reliable.
- Riders took the opportunity to again stress the need for more buses or greater capacity in the late pm hours.
- There was considerable apprehension among participants that the new 16th Street services would translate to a reduction of service or stops on the existing S2/S4.
- Several participants asked about the idea of a non-stop express bus between Silver Spring and downtown DC.
- There were a few requests for greater accommodations for disabled passengers.
- Several participants expressed support for greater parking restrictions and enforcement along 16th Street, especially during peak periods.
- Riders stressed the importance of better training for bus operators.

2.4 Other Outreach Activities

To maintain contact with those interested in the progress of the 16th Street Line study, a project website was created: www.metrobus-16th-dc.com. The website features an overview of the study, maps, links, contacts, and publications and reports related to the 16th Street Line study. The site also listed upcoming public meetings and featured an on-line version of the rider survey. A Spanish page is included on the site.

In addition, a hotline was established for those wishing to speak with someone about the study. Between July and November 2008, three persons called the hotline to talk about not-in-service buses, not removing any existing local service or stops, and being added to the project mailing list. The number, which remains active, is 703-682-5060.

3.0 Recommendations

This section describes the guiding principles of and recommended improvements for the 16th Street Line.

3.1 Guiding Principles

The 16th Street Line is part of a caring community of residential and commercial neighborhoods valuing: diversity; inclusiveness; and, connectivity with each other; that are important to the daily lives of many residents of the District of Columbia and the region. The 16th Street Line serves a community that:

- Is economically vibrant with expectations for continuing growth.
- Includes destinations of national, regional and local importance.
- Has a long tradition of transit service alignment, stops, and connections.
- Represents multiple travel markets inclusive of major activity centers, mixed use corridors and residential neighborhoods.
- Incorporates major District initiatives to accommodate future growth and enhance quality of life.
- Relies on bus and rail transit as a major component of day-to-day life style.

Based on the results of the review of the existing services, bus rider survey, and public comments, the following overarching principles were identified to guide the development of recommended improvements.

<u>Overarching Principles</u>

- First, do no harm. Disfranchisement of existing rider access or mobility is not an acceptable trade-off to achieve other project objectives.
- Ensure that the plan meets the diversity of travel needs in the 16th Street corridor.
- Avoid inequity; all areas along the 16th Street Line merit quality services.
- Consider the needs of seniors, the disabled, and those who do not drive in recommending service and operations strategies.
- Recommendations must be sustainable and take into account funding constraints.

- New services, facilities and staffing will take time to implement; changes/enhancements can be phased in gradually.
- Do something!

More specific principles were identified to guide the development of improvements to 16th Street Line service and operations.

Principles of Service

- There should be a basic level of service to anywhere in the corridor that transit service is provided.
- Retain a high-frequency "trunk" service along 16th Street NW.
- New service types should be in addition to retaining some all-stops local service.
- Match service type, frequency, and capacity to demand based on route segment; trip purposes, time of day; travel direction; day of week; and origins and destinations to preserve effectiveness and efficiency.

Principles of Operations

- Active service management and supervision is essential to success of service and technology should be used to improve ability to monitor and direct buses.
- Increased enforcement of parking regulations is essential to improving running times and bus stop access.
- Optimize route and schedule performance of "trunk" portion of 16th Street Line.
- Commit lanes of traffic and street operations to sustained transit-first principles to serve needs of buses in congested areas.
- Communication is important among bus drivers, supervisors and passengers, especially when there are detours or buses are being held to avoid bunching.
- Consider access needs of seniors and disabled in determining locations and number of bus stops.

3.2 Service

Service improvements to the 16th Street Line would include several changes from the existing service. One significant recommended change is the immediate addition of a new S9 Route, which would be limited-stop and which would feature specially branded vehicles in the same fashion as the 79 Route on Georgia Avenue. Another significant recommended change is the addition of a new S3 Route, which would be a short-turn service. The addition of larger vehicles is also recommended for late evening hours along the line. Improvements would take place in three phases: the immediate phase by March 29, 2009; the intermediate phase by late 2009 or early 2010; and the long-term phase after 2010. The following describes the recommended changes in 16th Street Line service.

S9: Limited-Stop Service

- *Purpose:* The limited-stop recommendation is in response to rider feedback about long travel times and the need for greater capacity during peak periods. The S9 would operate much like the Metro Extra Route 79 service on Georgia Avenue, which

is specially branded and which makes only 16 stops in each direction on its route, unlike the local routes in the corridor that stop at every block or two.

- *Route Description:* As shown in **Figure 3-1**, the alignment of the S9 route would be along 16th Street between downtown and the Maryland border, with a jog onto Alaska Avenue and Eastern Avenue. The S9 route would be similar to the S2 with two notable exceptions: the southern terminal would be near McPherson Square on I Street between 13th and 14th Streets (rather than continuing on to Federal Triangle); and the northern terminal would be across from Silver Spring Metro on Colesville Road, just west of East-West Highway.
- *Stops:* The S9 route limited stops are as follows:
    - Silver Spring Metro (Colesville Rd & East-West Highway)
    - Eastern Avenue
    - Kalmia Road
    - Sheridan Street (SB) and Somerset Place (NB)
    - Missouri Avenue
    - Colorado Avenue
    - Buchanan Street
    - 3636 16th Street (SB) and Spring Road (NB)
    - Park Road
    - Irving Street/Columbia Road
    - Euclid Street
    - U Street
    - P Street
    - M Street
    - K Street
    - McPherson Square (I Street between 13th and 14th)
- *Frequency:* Phase 1: 10 min/peak. Phase 2: 10 min/peak, 20 min/late evenings and middays.
- *Benefits:* By stopping every quarter mile or so, the S9 would offer a time-saving alternative to local routes for transit riders on 16th Street. The extra service would also add much needed capacity during peak periods.

S3: Short-Turn Service

- *Purpose:* The main problem identified by riders of the 16th Street Line in the rider survey and at public meetings was crowded buses. In addition to the greater capacity to the 16th Street Line offered by the S9, the S3 would add further capacity by providing peak-period service to the busiest part of the corridor.
- *Route Description:* As shown in **Figure 3-2**, the S3 would follow the same route as the S2 and S4 from Federal Triangle to about the mid-point of the corridor. At this time, it is unclear where the northern terminal of the S3 would be, though the northernmost point is expected to be Colorado Avenue.
- *Stops:* The S3 would stop at the same stops as the S2 and S4 local routes.
- *Frequency:* Phase 2: 10 min/peak, 15 min/non-peak. Phase 3: 5 min/peak, 10 min/non-peak.
- *Benefits:* By not traversing the entire length of the line, the new short-turn service would provide additional buses on 16th Street to alleviate crowding on existing routes.

Greater Use of Articulated Buses

All "full-length" S2 and S4 trips (i.e., those not operating any short-turn trips or other variations) would use articulated buses in the late-evening peak hours to address capacity and crowding issues that are currently experienced along portions of the line at these hours. This would require that more existing articulated vehicles in the Metrobus fleet be assigned to the S2 and S4 Routes when they are not in use or when they are not needed on other routes in the system. **Tables 3-1, 3-2, and 3-3** summarize the recommended service improvements for the 16th Street Line.

Table 3-1: Summary of 16th Street Line Service Improvements, Phase 1 – March 2009

Route	Terminals	Weekday Peak Headways	Off-Peak Headways	Span of Service		
				Weekdays	Saturdays	Sundays
Local Routes, All Stops						
S1	Missouri Avenue to Foggy Bottom	5 minutes	N/A	5:50 am to 10:30 am and 3:58 pm to 8:00 pm	N/A	N/A
S2	Silver Spring to Federal Triangle (via Eastern and Alaska Avenues)	15 minutes	20 minutes	4:09 am to 3:45 am	4:17 am to 3:44 am	4:33 am to 2:16 am
S4	Silver Spring to Federal Triangle	15 minutes	20 minutes	4:26 am to 2:02 am	4:37 am to 2:13 am	4:51 am to 1:40 am
Limited-Stop Route						
S9	Silver Spring Metro to McPherson Square	10 minutes	N/A	6:30 am to 10:00 am; 3:00 pm to 7:00 pm	N/A	N/A

Table 3-2: Summary of 16th Street Line Service Improvements, Phase 2 – Early 2010

Route	Terminals	Weekday Peak Headways	Off-Peak Headways	Span of Service		
				Weekdays	Saturdays	Sundays
Local Routes, All Stops						
S1	Missouri Avenue to Foggy Bottom	5 minutes	N/A	5:50 am to 10:30 am and 3:58 pm to 8:00 pm	N/A	N/A
S2	Silver Spring to Federal Triangle (via Eastern Ave and Alaska Ave)	15 minutes	20 minutes	4:09 am to 3:45 am	4:17 am to 3:44 am	4:33 am to 2:16 am
S4	Silver Spring to Federal Triangle	15 minutes	20 minutes	4:26 am to 2:02 am	4:37 am to 2:13 am	4:51 am to 1:40 am
Limited-Stop Route						
S9	Silver Spring Metro to McPherson Square	10 minutes	20 minutes, mid-days and late evenings	6:00 am to 12:30 am	N/A	N/A
Short-Turn Service						
S3	Federal Triangle to mid-point of line (northern terminal T.B.D.)	10 minutes	15 minutes	6:00 am to 9:00 am and 3:30 pm to 6:30 pm	N/A	N/A

Table 3-3: Summary of 16th Street Line Service Improvements, Phase 3 – After 2010

Route	Terminals	Weekday Peak Headways	Off-Peak Headways	Span of Service		
				Weekdays	Saturdays	Sundays
Local Routes, All Stops						
S1	Missouri Avenue to Foggy Bottom	5 minutes	N/A	5:50 am to 10:30 am and 3:58 pm to 8:00 pm	N/A	N/A
S2	Silver Spring Metro to Federal Triangle (via Eastern Ave and Alaska Ave)	15 minutes	20 minutes	4:09 am to 3:45 am	4:17 am to 3:44 am	4:33 am to 2:16 am
S4	Silver Spring Metro to Federal Triangle	15 minutes	20 minutes	4:26 am to 2:02 am	4:37 am to 2:13 am	4:51 am to 1:40 am
Limited-Stop Route						
S9	Silver Spring Metro to McPherson Square	10 minutes	20 minutes, mid-day and late evening	6:00 am to 12:30 am	N/A	N/A
Short-Turn Service						
S3	Federal Triangle to mid-point of line (northern terminal T.B.D.)	5 minutes	10 minutes from 9 am to 3:30 pm; 15 minutes from 7:30 pm to 12:00	6:00 am to 12:00 am	N/A	N/A

Figure 3-1: S9 Limited-Stop Service

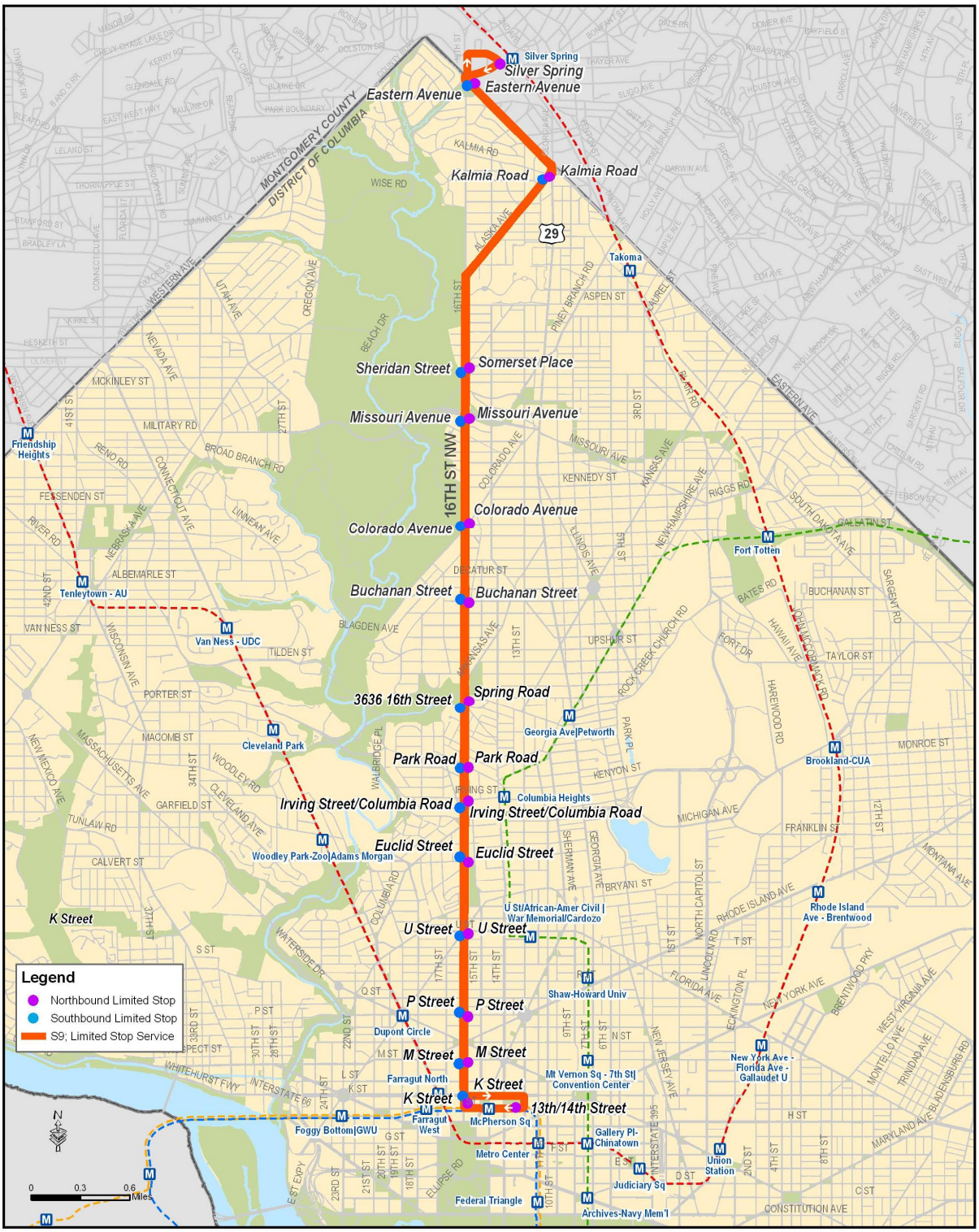
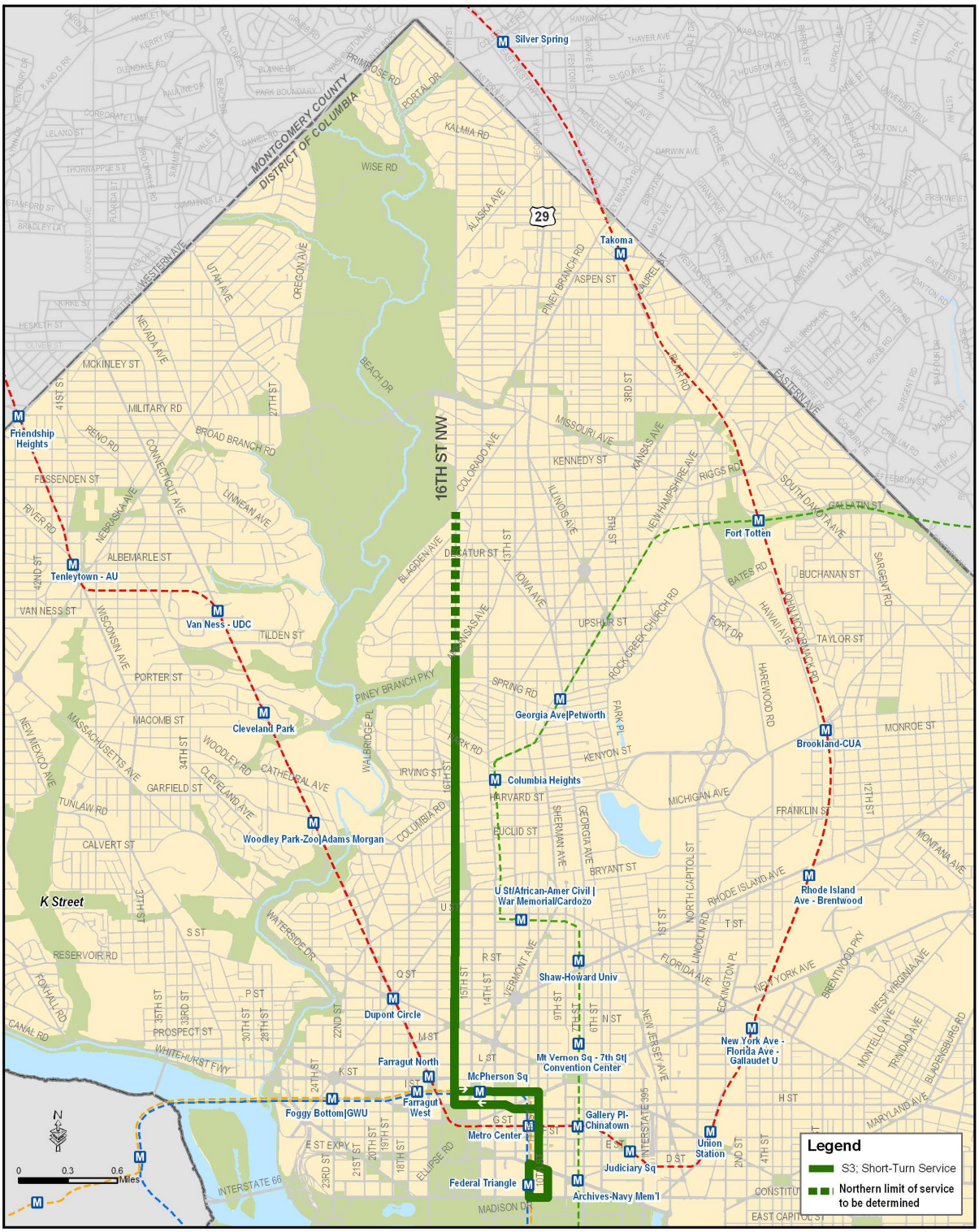


Figure 3-2: S3 Short-Turn Service



3.3 Operations

Operations recommendations to the 16th Street Line include the provision of enhanced service supervision at key points along the routes and specific training for drivers.

Enhanced Service Supervision

- *Purpose:* Enhanced service supervision is focused on improving bus operations to reduce bunching, improve the on-time performance of the service, and reduce crowding on buses.
- *Description:* The 16th Street Line would have supervisors that would be dedicated to monitoring and responding to service issues in their portion of the 16th Street Line. One would be stationed at McPherson Square, while the other would be roving in the central portion of the corridor. Two new supervisor full-time equivalents would be required for Phase 1 of the project implementation, with a third to be added in Phase 2. The 16th Street Line supervisors would have:
  - Ability to directly communicate with bus drivers along the route, central dispatch, line manager, line operations center, and each other.
  - Ability to track vehicles operating along the route via a laptop computer or other device.
  - A “play book” that describes actions to take when certain situations arise that impact on-time performance, vehicle spacing along the route, and vehicle crowding.
  - Access to a “strategic” bus and driver to add to the system when needed to maintain schedule, proper spacing of vehicles, and acceptable vehicle loads.
  - Ability to hold back and turn back buses when necessary to maintain schedule and vehicle spacing.
  - A supervisor vehicle to monitor operations in the portion of the 16th Street Line that has been assigned to them.

  A program to monitor and measure the performance of the system would be established to assess the impact of the recommended improvements. This would include the preparation of monthly reports that address on-time performance, travel times, bus bunching, crowding on buses, and ridership.
- *Benefits:* Enhanced supervision would provide improved on-time performance and a reduction in bus bunching, thereby reducing vehicle crowding.

Enhanced 16th Street Line Specific Training for Drivers

- *Purpose:* The purpose of additional 16th Street Line training is to better familiarize drivers with destinations along the route as well as connecting bus services and major destinations served by those routes. Training would also address the recommended changes to the route so that bus drivers can better respond to questions from riders about the changes.
- *Description:* This would include a special training session for drivers of the 16th Street Line that would include the following key information:
  - Major transit trip destinations along the route
  - Attractions and tourist destinations along the route

- Transfer points for connecting bus routes and major destinations served by those routes
- Recommended route structure for the 16th Street Line including route terminal points, headways, days of service, and span of service
- Improvement of customer service

- *Benefits:* Better informed bus drivers would be better able to answer riders' questions about how best to reach their destination and service changes to the 16th Street Line. They may also help to promote destinations and attractions located along the line. Increased training would also result in a more consistent performance.

3.4 Stops and Facilities

Planned improvements to stops and facilities are already underway. The improvements include new, improved shelters with benches and lighting. In the future, WMATA will resume the installation and activation of next-bus arrival displays. New shelters will be installed at most stops that currently have a shelter. During the phased implementation of the 16th Street Line recommendations, project staff would work to expedite the replacement of shelters along the corridor.

Provide New Shelters

- *Purpose:* The purpose of improved stops and facilities is to enhance the customer experience while waiting for buses and to provide weather protection and improved comfort and convenience.
- *Description:* Expedited continuation of the DC shelter replacement program, which will ultimately replace all of the existing bus shelters along the 16th Street Line with the new standard DC shelter. The new shelters will include weather protection, lighting, and advertising space. As a result of the 16th Street Line study, it is recommended that the shelters also include an updated system map and route information, and eventually a dynamic next-vehicle arrival display. The new shelters are to be cleaned and maintained as part of the DC government contract with the firm that will provide the shelters and collect the advertising revenues for the shelters. Shelters located at high-volume stops, major bus-to-bus transfer points, and rail-to-bus transfer points should also include additional maps and information regarding 16th Street Line services, information on connecting transit services, and should be sized appropriately for customer comfort and convenience.
- *Benefits:* Greater level of customer comfort and convenience and improved cleanliness and maintenance of shelters on the 16th Street Line.

3.5 Customer Information

Enhanced customer information includes updated and improved schedules at stops and, eventually, real-time next-bus arrival information at stops.

Updated Schedules and Future Next-Bus Information at Stops

- *Purpose:* The purpose of these improvements is to communicate information about each of the bus services and routes as clearly and concisely as possible so that transit riders can make informed choices regarding how they can best reach their destination, likely travel times, and when to expect vehicles to arrive at their stop. As

the recommended S9 service would be unfamiliar to some riders, new flags and other descriptive information would be installed at limited-stop locations to identify this specially branded service.

- *Description:* The recommended improvements include the following:
  - Replace damaged or missing information cases at stops;
  - Update all the schedules posted at stops to reflect new services, particularly the S9, and highlight the key information used by riders in an easy-to-read, visible format;
  - Provide system maps that highlight 16th Street Line and connecting routes at new shelters;
  - Provide real-time next-bus displays that indicate when the next vehicle will arrive and what route the vehicle is serving; and
  - Provide capabilities to access real time next bus information via telephone and internet.
- *Benefits:* Bus riders would be able to easily read the schedule, determine when the vehicle will arrive, and make informed decisions regarding what services and routes they should take to reach their destination in the quickest and easiest way possible.

Marketing Campaign for 16th Street Line Services

- *Purpose:* Make the public aware of the new services planned for the 16th Street Line and the benefits of these changes for the bus rider, and encourage transit use in the corridor.
- *Description:* Marketing would include a multimedia effort to inform the public about improvements to the 16th Street Line. Materials would:
  - Describe changes to existing 16th Street Line Services
  - Describe new services
  - Advertise potential benefits to the typical rider
  - Describe the schedule for improvements
  - Provide details on how to get more information

  The campaign would coordinate with potential project partners such as the various DC Business Improvement Districts (BIDs) located along the route. The secondary map frames (the frames on the left side of the new shelters) could potentially be used to market the service changes.
- *Benefits:* Regular bus riders would be fully informed about upcoming changes to their bus services including new routes, changes in service hours and schedules and how these changes will potentially improve the customer experience. The campaign would also encourage those who do not regularly use transit services or have stopped using the 16th Street Line in the past to try the new and improved system.

3.6 Safety and Security

The safety and security of riders would be improved by coordinating with police initiatives to reduce crime at stops and on buses.

Coordination with Police Initiatives

- *Purpose:* The recommended improvements focus on providing a greater sense of safety and security for passengers waiting at stops.
- *Description:* This includes working with both Metro Police and DC Police to support new initiatives that would provide a more visible police presence in areas around 16th Street bus stops located near crime hotspots, especially after dark. The improved lighting and visibility that comes with the bus shelter replacement program will also help create a more secure environment. Future bus stop consolidation should consider maximizing the visibility of stops and focus on areas with higher levels of pedestrian activity. Special security features may also be needed at stops located near key buildings such as the White House.
- *Benefits:* A more secure environment at stops would contribute to a more positive customer experience for 16th Street line riders.

3.7 Traffic Operations and Management

Improvements would include future transit-only lanes, enhanced intersection operations at key locations, adjustments to signal timing, and better enforcement of parking restrictions.

Future Transit-Only Lanes

- *Purpose:* Transit-only lanes provide a means for buses to travel more quickly on congested roadway segments and improve transit travel times and schedule adherence.
- A reversible lane is currently available along 16th Street between Spring Road and Irving Street that accommodates southbound traffic in the morning hours and northbound traffic in the evening hours. The District of Columbia Government is currently considering eliminating this travel lane and converting it to some other use such as a landscaped median. One option would be to retain this as a travel lane and convert the curbside lanes to a transit only lane during peak hours in the peak direction (southbound transit only in AM peak and northbound transit only in PM peak). This option is shown in **Figure 3-3**. This would require a study to determine its feasibility and a willingness by DC Government to consider changes to the current plans for abandoning the reversible lane in favor of a new median.
- *Benefits:* Reserved lanes have the potential for substantial improvements in travel times, schedule adherence, reliability, and reductions in bus bunching.

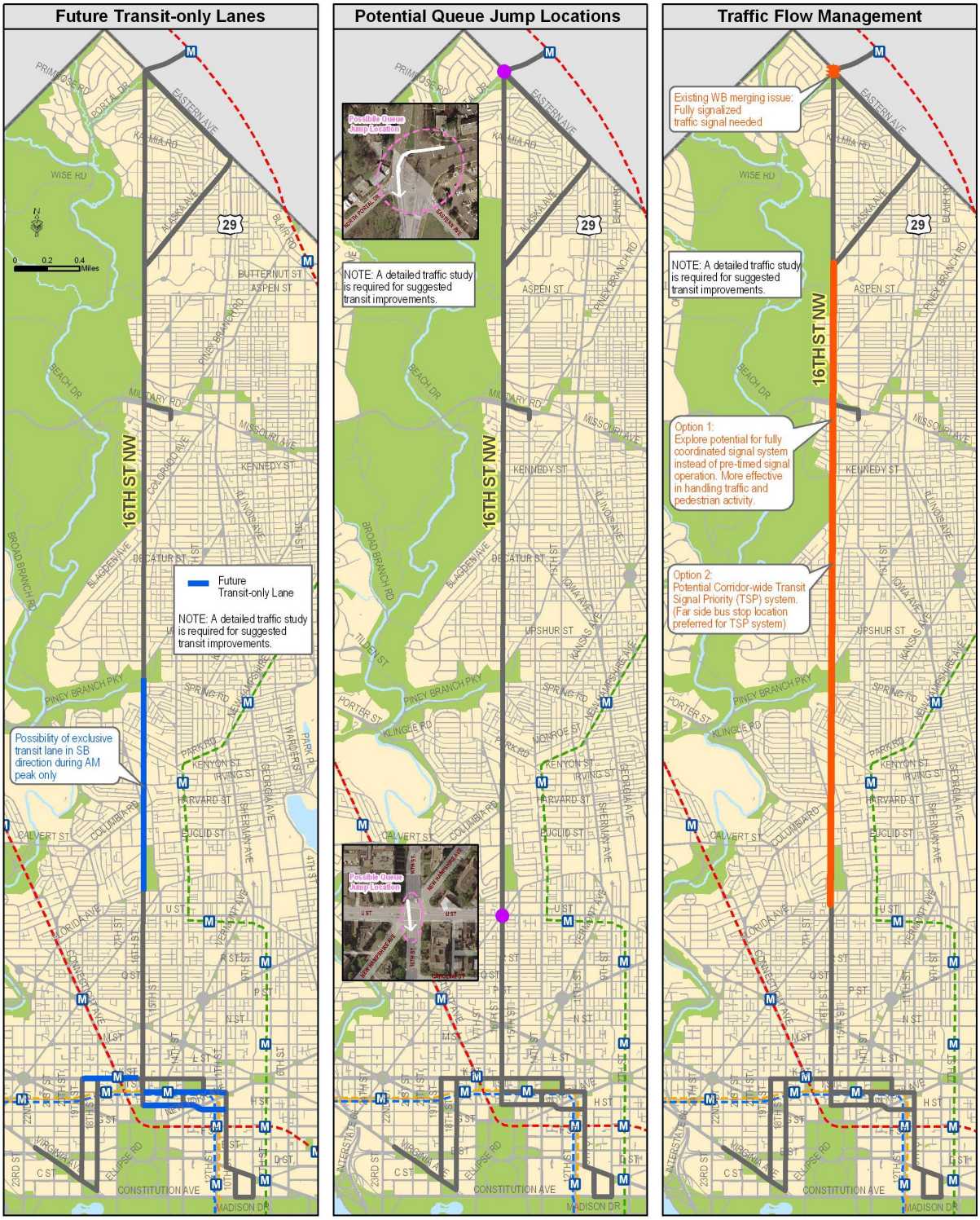
Improved Intersection Operations

- *Purpose:* Improving intersection operations through the use of queue jump lanes and traffic flow management techniques has the potential for improving travel times and reducing the potential for bus bunching along the 16th Street Line.
- *Description:* As shown in **Figure 3-3**, potential intersection improvements would include more green time for specific bus movements and the addition of DDOT traffic control officers during peak hours to facilitate bus movements for the 16th Street Line. This would include the intersections of Colesville Road and 16th Street, and at U and 16th Streets NW. In response to conversations with senior bus operators, it is recommended that the green time for left-turning vehicles at the intersection of K and 19th Streets NW be extended by 10 seconds. In the future, special traffic signal timing and queue jump lanes for transit could also be provided that would allow transit vehicles to bypass stopped traffic in these areas.
- *Benefits:* These intersection improvements have the potential for substantial reductions in travel times and bus bunching for 16th Street Line bus routes.

Better Enforcement of Parking Restrictions

- *Purpose:* The purpose of better enforcing parking restrictions is to reduce the potential for illegally parked vehicles to block not only bus stops, but also to block the curb lane when it is supposed to function as a travel lane.
- *Description:* This includes the possible elimination of spaces adjacent to stops to make it easier for buses to get into and out of stops; restrictions on delivery vehicle and tour bus parking near stops; and enhanced enforcement of parking restrictions around stops through better direct communication with Department of Public Works parking enforcement staff. In addition, peak period parking restrictions would be extended.
- *Benefits:* Better enforcement of parking restrictions and restrictions on tour bus parking would help to reduce travel times for passengers and improve on-time performance for transit vehicles.

Figure 3-3: Additional Recommendations



3.8 Vehicles and Vehicle Assignments

Specially branded vehicles would need to be acquired for the S9 limited-stop service. In addition, articulated buses used during the day for Routes 70 and 71 could be used in the late evening hours to increase capacity on the S2 and S4 routes. Apart from these two additions, it is assumed that the vehicles used for the recommended service structure would be standard 40-foot buses that accommodate about 37 seated passengers each. This would include both low- and high-floor vehicles. An estimated 10 peak vehicles would be needed for the new S9 Route, and eight for the S3.

Schedules for 16th Street Line Routes should be stocked on all 16th Street Line vehicles at all times. Over time, additional features should be introduced to 16th Street Line vehicles, including:

- Capability to remotely update automated announcements on the bus from a single location via the internet and WiFi equipped vehicles;
- Video screens on board to provide visual information to riders regarding next stops, detours, anticipated delays, connecting routes, attractions served by the route, and other items;
- Traffic Signal Priority (TSP) emitters that allow buses to automatically communicate with signal controllers to provide additional green time or special signal phasing to benefit buses approaching major intersections.

3.9 Fare Collection

Making the fare collection process more efficient has been identified as a factor that must be improved to speed boarding times and reduce overall travel times. The following improvements were suggested during the 16th Street Line study process to potentially speed up the fare collection process:

- Provide incentives for the use of SmarTrip cards for fare payment including waiving or reducing the initial fee for the cards.
- Make SmarTrip cards easier to obtain by allowing their purchase and replenishment at a wider variety of outlets that can be more easily accessed by 16th Street Line bus riders.
- Provide a SmarTrip reader at the rear door and allow boardings for card users via the back door. Encourage riders to exit from back door to decrease dwell times.
- Encourage the use of weekly flash passes for 16th Street Line bus routes. Strategies may include expanding the number of ways riders can easily obtain or renew flash passes.
- Inform riders of fare requirements; encourage riders to have money out and ready for payment.

These options should be further explored and developed as part of the implementation of 16th Street Line bus service and operations improvements.

3.10 Title VI Review

Regulatory Background

Title VI of the Civil Rights Act of 1964 prohibits discrimination on the basis of race, color, or national origin in programs or activities receiving federal financial assistance. The 16th Street Line project receives funding from WMATA and DDOT, which in turn receive financial assistance from the U.S. Department of Transportation. Further, the project must comply with 49 CFR Section 21.5 (b)(2) and (7), and Appendix C to 49 CFR Part 21, which state that federal funding recipients must "evaluate significant system-wide service and fare changes and proposed improvements at the planning and programmatic stages to determine whether those changes have a discriminatory impact." For service changes, the requirement applies to an agency's established guidelines of what it considers "major service changes".

WMATA Definition of Major Service Changes

WMATA defines major service changes in terms of increases and decreases to service. Major service increases are identified as:

- The improvement of peak period headways by more than 10 minutes; and
- The improvement of off-peak headways by more than 15 minutes.

Major service decreases are identified as:

- Revenue Miles: One or more reductions in a single year that represent a total reduction in that year of more than 20 percent of a line's scheduled revenue miles;
- Route Miles: One or more reductions in a single year that represent a total reduction in that year of more than 15 percent of a line's route miles;
- Span of Service: One or more reductions in a single year that represent a total reduction in that year of more than one hour in the hours of a service line; and
- Boardings: One or more eliminations of service in a year for more than 10 percent of a line's current riders.

Major service decreases require both WMATA Board approval and a public hearing. Major service increases, however, require only WMATA Board approval; a public hearing takes place only if requested by the WMATA Board or DDOT.

As the 16th Street Line would be receiving service increases, rather than decreases; and as no public hearing has been requested by DDOT or the WMATA Board as of November 2008, only a WMATA Board approval is required at this time. Thus, a full Title VI equity analysis is not required at this time to satisfy federal law.

However, because the 16th Street Line traverses a section of the District of Columbia with a large Latino population, WMATA undertook a program to reach out to and understand the transit needs of minority communities along the corridor. This program included 1) demographic research, and 2) enhanced public outreach with an emphasis on gaining feedback from Spanish-speaking transit riders.

Ridership Demographic Profile

According to 2000 U.S. Census data, the 16th Street line traverses predominantly minority communities. Based on data for Census Transportation Planning Package (CTPP) zones and census tracts through which the line passes, 72,618 (or 61.6 percent) of the 117,963 people who live within 1/4 mile of the 16th Street route alignments belong to a minority group. At the same time, 16.8 percent of residents along the 16th Street Line are considered low-income.

Because the recommended service improvements to the 16th Street Line are overlays to existing local service, and because no changes are proposed to the existing fare structure, no disparate impacts are expected for minority communities, and no alternatives are recommended for low-income populations. Additionally, as no adverse effects are expected, no mitigation is suggested to offset the changes.

Public Outreach Effort

WMATA also undertook an enhanced effort to reach out to Latino transit riders along the 16th Street corridor. Activities conducted as part of this effort included:

- A Spanish-language page on the project website: www.metrobus-16th-dc.com/espanol
- Spanish versions of project newsletters # 1 and # 2
- A Spanish translation on bus posters that announced the public meetings
- The distribution of a flyer in Spanish on the DC Office of Latino Affairs (OLA) listserv, which announced the September 23rd public meeting
- The preparation of Spanish-language factsheets and PowerPoint presentations, and a Spanish-speaking facilitator for the public meetings in July and September
- Assistance from OLA by providing the office with several hundred Spanish language rider surveys for distribution at Latino community events
- All-day presence at the OLA booth at Fiesta DC in Mt Pleasant on September 28, where the project team members passed out Spanish newsletters, fact sheets, and surveys
- A bilingual rider survey – English on one side, Spanish on the other

For the last item, six percent of the 1,097 rider surveys received were in Spanish. A separate set of results for Spanish surveys was prepared; it revealed that for issues related to the 16th Street Line, Latino riders had similar concerns as riders who submitted surveys in English. The only notable difference was on the topic of security; while only a third of English-version respondents felt unsafe on 16th Street Line buses and at stops, one half of Spanish-version respondents felt unsafe.

4.0 Future Issues

Looking ahead, the implementation of the 16th Street Line recommendations would need to be coordinated with three other transportation infrastructure projects in the planning stages, as well as with District land use plans.

4.1 Integration with Transportation Projects

Several planned transportation infrastructure projects have the potential to affect the 16th Street Line bus services in the future. These projects, and how they can impact the 16th Street Line recommendations, are described as follows.

Bridge Reconstruction at Military Road

The District of Columbia is securing a bond for an approximately $10 million project to rehabilitate the 16th Street bridge over Military Road. The rehabilitation of this bridge may cause temporary construction impacts to the 16th Street Line, creating delays and necessitating detours. The project also entails work on ramps A, B, C and D, and Military Road from Oregon Avenue to 14th Street.

The current S1 route and the S2/short-turn service will not be able to use the westbound Military Road ramp to access 16th Street southbound as a result of the construction. In addition, the proposed use of Fort Stevens Drive as a detour may not be feasible, as the roadway appears to be too narrow and steep for buses. Also, because traffic on 16th Street across the bridge will be limited to one lane in each direction at all times, buses will not be able to turn left from the ramp into the one 11-foot southbound lane, owing to a short turning radius. Therefore, alternative streets must be considered, including Kennedy Street and Arkansas Avenue for S1 and S2/short turn services.

Work is scheduled to begin in early 2009, but the duration of the project is unknown at this time.

Silver Spring Transit Center

Montgomery County, Maryland, began building a multimodal transit facility at Silver Spring Metro station on September 28, 2008. Construction is expected to last about two years. Currently, all bus operations out of the station are conducted on adjacent streets at the intersection of Wayne, Dixon, and Bonifant Streets. At this time, operation of the 16th Street Line out of Silver Spring is running normally; however, there may be short-term delays or interruptions in service upon completion of the facility, as operations transition to the new location and system.

In the long term, transit rider safety will be enhanced, as the multimodal center has been designed with pedestrian and passenger safety in mind. Because the new facility will double the number of bus bays and is expected to enhance the transit experience for users, the 16th Street Line may experience an increase in ridership and improved operations upon the opening of the center.

Potential Changes to 16th Street Roadway Design

The District is currently reviewing a proposal to change the roadway design of 16th Street in Mt. Pleasant/Columbia Heights, including the possible removal of the reversible lane in favor

of a landscaped median. The concept came about in response to calls for traffic calming measures that would create greater pedestrian safety on 16th Street. In April 2008, the District completed a draft Pedestrian Master Plan, which identifies the segment between Spring Road and Massachusetts Avenue as a priority corridor. Because the plan considers the subtraction of a lane of traffic, it could add to travel times for transit vehicles and impact the potential for dedicated transit lanes. Developments on this concept will need to be coordinated with DDOT and monitored as the 16th Street Line project moves through implementation.

4.2 Integration with Land Use Projects

Center City Action Agenda

The DC Office of Planning and the Downtown Business Improvement District are leading a planning process, begun in 2006, to develop an "action agenda" for Washington's center city, which the 16th Street Line bisects from north to south. The purpose of this land use planning effort is to develop a list of key strategic initiatives to reach a set of goals for the continued improvement of DC's Center City. As the Action Agenda area encompasses part of the 16th Street Line, benefits to the line may result:

- *Emphasis on Residential and Retail Markets* – The *Action Agenda* seeks to build on the District's success in creating a "Living Downtown" in which residential and retail uses define the center city as much as the commercial and institutional uses it is traditionally known for. The addition of new residential buildings and retail stores in a mixed-use, compact pattern of development may create opportunities to attract new transit riders to the 16th Street Line in the future.
- *Transportation Options* – The *Action Agenda* stresses the importance of having adequate resident street parking and available on-street parking. This objective will need to be balanced with the results of the 16th Street Line study, in which many riders expressed their desire for fewer on-street parking spaces and increased enforcement of parking regulations around Metrobus stops.

5.0 Funding Requirements

Annualized weekday operating costs for the recommended 16th Street Line have been estimated based on the number of revenue hours for each of the recommended bus routes plus any peak period tripper routes necessary to maintain headways during the peak periods. For services operating throughout the service day, the estimated revenue hours were then increased by 10 percent to convert the figure to platform hours. However, for services operating only during a specific period of the service day, the estimated revenue hours were then increased by 30 percent to convert the figure to platform hours. These factors are consistent with the percentage of revenue hours experienced by WMATA on similar services. Operating cost estimates are in 2008 dollars and based on a standard operating cost of $102.00 per platform hour. It should be noted that these cost estimates include only the costs for weekday services; weekend services on the 16th Street line remain unmodified.

Table 5-1 shows the estimated annualized weekday operating costs for the recommended system and compares the total cost to the estimated existing costs for the 16th Street Line routes. The comparison shows that the recommended system requires an additional $10,029,221 per year to operate the recommended routes plus an additional $240,000 per

year for the enhanced supervision for total additional operating costs of $10,269,221 per year for the overall recommended system. Because there are no weekend changes proposed, these cost increases reflect the total annual cost increase as well. Note that these costs do not include the Metro Police and D.C. Metropolitan Police costs for increased police presence at bus stops, traffic control at intersections, or increased enforcement of parking restrictions.

Table 5-1: Estimated Annualized Weekday Operating Costs *

Route	Annual Weekday Operating Costs *
S1 (Potomac Park variation)	$1,055,000
S2 and S4	$9,181,000
S3 (Short-Turn variation)	$4,935,398
S9 (limited-stop service) **	$3,212,235
Subtotal Route Operations	**$18,383,633**
Additional Supervisors ***	**$240,000**
Total Recommended Weekday System	**$18,623,633**
Existing 16th Street Line Operating Cost	**$8,354,412**
Weekday Operating Cost Increase with Recommended Improvements	**+ $10,269,221**

** Estimated in Year 2008 Dollars. Does not include costs for enhanced police presence at stops or traffic control officers at intersections.*
*** Assumes all-day and evening service; Phase 1 is for peak hour-only service at a cost of $2.54 million*
**** Assumes annual base salary of $53,333 with additional 50 percent for benefits.*

One-time capital cost requirements for Phase 1 improvements have also been estimated for the recommended system and are shown in **Table 5-2** below. These include improvements that could be implemented as early as spring 2009. As shown in the table, capital costs are estimated to be about $730,331. These capital costs do not include Phase 2 or Phase 3 improvements.

Table 5-2: Estimated Capital Costs for Phase 1 Improvements*

Item	Units	Unit Cost	Capital Cost
New Information Cases at All S9 Stops	31	$189	$5,859
New Schedules at All S-Series Stops	164	$3	$492
System Maps at Existing Shelters	49	$20	$980
“Next Bus” Displays at Existing Shelters	49	$5,000	$245,000
New Bus Stop Shelters (Includes Maps)	17	$8,000	$136,000
“Next Bus” Displays At New Shelters	17	$5,000	$85,000
Supervisor Laptops (Including Spare)	2	$3,500	$7,000
Marketing Campaign and Materials	1	$250,000	$250,000
Total for Recommended System			**$730,331**

** Estimated in Year 2008 Dollars – Does not include Phase 2 or Phase 3 improvements. Table does not include capital costs for the S9 as funding for that service has been secured by the DC Council and Councilmember Jim Graham (Ward 1). DC Council funding for S9 service is for operating costs only.*

6.0 Cost-Neutral Proposal

Given the budget constraints currently facing Metro, a cost-neutral proposal has been developed in addition to the recommendations made in previous sections of the Final Report. This section identifies ways in which the first phase of the proposed Route S9 limited stop bus service could be operated without any of the funding from the District of Columbia Department of Transportation (DDOT).

The measures below represent a cost-neutral option that allows the S9 to be operated in an initial phase (albeit less frequently than initially proposed) with no additional operating costs. The improvements to the 16th Street Line include:

- Operation of the S9 limited stop route every 15 minutes in the weekday peak periods
- Use of articulated buses on weekday evenings as well as during the weekday peak periods on the S2 and S4
- Additional on-street supervision (i.e., two full-time equivalents)
- Four additional weekday evening trips on the S2
- Streamlined route nomenclature system

These improvements are funded primarily by eliminating:

- Three weekday peak period buses from the S2
- Three weekday peak period buses from the S4
- Five weekday AM peak period trips on the southbound S1
- Two weekday AM peak period trips on the southbound S2/
- Ten weekday PM peak period trips on the northbound S2/

Originally, a weekday peak-period service operating every ten minutes was proposed for the first phase of the S9. Given an estimated 90-minute cycle time, this required a commitment of nine buses to the new S9 service.

However, with no DDOT funding, it would be difficult to gather this level of resources (i.e., nine peak buses) from the rest of the 16th Street Line – thus remaining “cost neutral” – without unduly impacting the existing local service and its ridership. Therefore, this proposal outlines a manner in which the S9 could still be operated in the initial phase of the plan without either incurring additional costs to WMATA or placing an extreme undue burden on the existing ridership. Other cost neutral elements described in previous memoranda are also included in this proposal.

<u>Operate Route S9 Limited Stop Service Every 15 Minutes</u>

Description of Element

The primary element of this proposal is to operate the new S9 limited-stop bus route every 15 minutes during the weekday peak periods in the first phase of the plan. In latter phases, once DDOT funding is secured, the originally proposed operating plan could be adopted.

To operate every 15 minutes, the S9 would require six buses, assuming a 90-minute cycle time between Silver Spring and McPherson Square. These six buses would most logically

be cannibalized from the existing "full length" 16th Street Line bus routes – the S2 and the S4. This is because these bus routes provide service along the entire length of the corridor, thus essentially mirroring the proposed S9 and serving all of its bus stops. Since new funding is no longer an issue, the S9 would serve the Silver Spring terminal and not terminate at the District Line. In this way, the number of buses per hour serving Silver Spring is maintained. Additionally, the various short turn variations on the southern portion of the 16th Street Line are necessary to provide capacity in the more heavily utilized southern portion of the corridor and thus would continue to be operated, with some limited exceptions.

However, as part of this element, it is proposed that the remaining S2 and S4 runs during the weekday peak periods be assigned articulated buses in order to mitigate the impact of losing buses to the proposed S9 service.

In addition, because the operation of the S9 would require adequate supervision, the subsequently described savings in the short-turn variations (i.e., five AM peak trips on the S1, two AM peak trips on the S2/ and two PM peak trips on the S2/) would still be enacted to provide funding for the enhanced supervision.

Estimated Impacts

The six buses required for the S9 would be drawn from the S2 and the S4 (three from each). Because these resources are already being utilized, there are no operating cost impacts for WMATA. However, various capital costs associated with providing the S9 service (new buses, paint schemes, shelter and passenger information signage, etc.) as well as operating articulated buses on the remaining S2 and S4 weekday peak period runs would be incurred. In addition, other costs associated with reassigning articulated buses to the 16th Street Line (e.g., the loss of parking revenue for DDOT as fewer parking spaces would be available along 16th Street due to the longer bus stop length required by articulated vehicles, additional costs associated with modifying bus garages to handle articulated buses, etc.) would also be incurred.

Finally, given their 120-minute cycle time, going from eight to five buses during the peak periods means that the S2 and the S4 would each operate every 24 minutes instead of every 15 minutes during the peak periods. However, if articulated buses are utilized on the remaining S2 and S4 runs the impact of this frequency reduction is mitigated because the number of seats per hour on the S2 or the S4 would only decline by 12 percent (from 176 to 155), even though the number of trips per hour would decline by 38 percent (from 4 to 2.5). This assumes that standard buses seat about 44 passengers while articulated buses seat about 62 passengers.

Pros and Cons

Although this proposal does not provide the same level of service as the fully funded proposal does, it provides many of the benefits of limited-stop bus service. For passengers using bus stops at both ends of their journeys served by the limited-stop service, there would be no discernible difference in the frequency of service when compared with the existing service. In fact, if they utilize the S9, their journey times would improve.

However, for people at local bus stops, there would be a reduction in the frequency of service to provide for the resources necessary to operate the Route S9 limited-stop service.

Utilize Articulated Buses During Weekday Peak Periods and Weekday Late Evenings

Description of Element

All "full-length" S2 and S4 trips (those not operating any short turn trips or other variations) would utilize articulated buses in the weekday late-evening peak hours to address capacity and overcrowding issues that are currently experienced along portions of the line at these hours. In addition, as described in the previous element, all S2 and S4 trips during the weekday peak periods would also require the use of articulated buses. This would require more existing articulated vehicles in the Metrobus fleet to be assigned to Routes S2 and S4 when they are not in use or when they are not needed on other bus routes in the system.

Estimated Impacts

This element would not incur any additional operating costs to WMATA. Rather – should no articulated vehicles in the existing fleet be available – capital costs associated with the purchase of additional articulated buses would instead be incurred. In addition, as was previously mentioned, other costs associated with reassigning articulated buses to the 16th Street Line would also be incurred.

Pros and Cons

The larger buses increase the capacity of the line by making more seats available without increasing the service frequency (and therefore the operating cost) of the service. In addition, utilizing articulated buses during the weekday late evening period addresses the need for additional off-peak capacity along the 16th Street corridor. This element does not alter any of the existing route alignments of the Metrobus services along the corridor and therefore would be relatively straightforward for the existing ridership to comprehend.

However, as was previously mentioned, the use of articulated buses means that bus stops along the entire route will need to be lengthened in order to accommodate the vehicles, thus reducing the amount of on-street parking available.

Provide Additional On-Street Supervision

Description of Element

An important element of any public transportation system is to provide a sufficient level of on-street supervision so that the service provided is as effective and efficient as possible. The enhanced on-street supervision proposed for the 16th Street Line is focused on improving overall bus operations to reduce bunching, improve the on-time performance of the service, and reduce overcrowding on buses. As was previously mentioned, this is especially necessary should the S9 be implemented, even if it operates only every 15 minutes.

An initial level of improved on-street supervision would require two new supervisor full-time equivalents (FTE), as was proposed for Phase 1 of the improved 16th Street service. One supervisor would be stationed at McPherson Square and/or Federal Triangle, while the other would be "roving" in the central portion of the 16th Street corridor.

However, with no additional supplementary funding available, the following cost-neutral element was developed to illustrate a method for reducing current operating costs on the 16th Street Line by an amount sufficient to cover the proposed increase in supervisory costs.

The cost for the two FTE supervisors is $160,000 per year, based on $80,000 per year for each FTE. A possible cost reduction scenario on the existing 16th Street Line to provide funding for two FTE supervisors is as follows:

S1 Modification:

First, five trips on the S1 in the morning peak period could be eliminated. The S1 has an abundance of service in the AM peak period (much more so than during the PM peak period) and if five trips were eliminated selectively (eliminating the combination of trips that presently has the lowest total boardings) then some savings could be realized.

The S1 operates in the peak period and only in the peak direction; therefore, each one-way southbound trip in the AM peak period is shown to take 37 minutes, or 0.62 hours.

If five trips were eliminated, then 3.10 daily revenue hours of service would be eliminated. Using an assumed 30 percent increase as a revenue-hour-to-platform-hour ratio for peak period only services such as the S1 (which was previously supplied by WMATA) results in 4.03 daily hours of service being eliminated.

If 4.03 daily hours of service were multiplied over every weekday of the year, then 1,027.65 hours of service have been eliminated. Assuming a cost per hour of $102.00 (which was also previously supplied by WMATA) then an annual total of $104,820.30 has been saved.

S2/ Modification:

In a similar manner, four trips on the S2/ (i.e., the current peak period/peak direction short turn) could also be eliminated. Two trips in the morning peak period could be eliminated, and two in the afternoon peak period could also be eliminated. The S2/ has an abundance of service during the peak periods and if two trips in each peak period were eliminated selectively (i.e., eliminating the combination of trips that presently has the lowest total boardings) then some savings could be realized.

It should also be noted that although the S2/ is a peak period-only service, for the purposes of developing this cost-neutral scenario, we will assume that it is very well-integrated with the other S2 and S4 services and that its revenue-hour-to-platform-hour ratio requires a 10 percent increase. This is in line with the data supplied by WMATA for the entire S2 and S4 service. In addition, this makes for a more conservative estimate; cost savings may actually be higher.

The S2/ operates in the peak period and only in the peak direction; therefore, each one-way southbound (i.e., to McPherson Square) trip in the AM peak period is shown to take about 30 minutes, or 0.50 hours.

If two trips were eliminated, then 1.00 daily revenue hour of service would be eliminated. Using an assumed 10% increase as a revenue-hour-to-platform-hour ratio results in 1.10 daily hours of service being eliminated.

If 1.10 daily hours of service were multiplied over every weekday of the year, then 280.50 hours of service have been eliminated. Assuming a cost per hour of $102.00 (which was also previously supplied by WMATA) then an annual total of $28,611 has been saved.

Similarly, each one-way northbound (i.e., to Colorado Avenue and 16th Street NW) trip in the PM peak period is shown to take about 36 minutes, or 0.60 hours.

If two trips were eliminated, then 1.20 daily revenue hours of service would be eliminated. Using an assumed 10% increase as a revenue-hour-to-platform-hour ratio results in 1.32 daily hours of service being eliminated.

If 1.32 daily hours of service were multiplied over every weekday of the year, then 336.60 hours of service have been eliminated. Assuming a cost per hour of $102.00 (as was previously supplied by WMATA), then an annual total of $34,333.20 has been saved.

Estimated Impacts

If all the savings from these modifications are added - $104,820.30 from the S1, $28,611.00 from the morning S2/ and $34,333.20 from the afternoon S2/ - a total of $167,764.50 in cost savings can be realized. This slightly exceeds the $160,000 annual cost of two FTE supervisory positions.

Table 6-1: Savings-Providing Cost of 2 FTE Supervisors

Service Savings	Number of Trips	Annual Hours Saved	Annual Cost Saved
S1	5 AM Peak	1,027.65	$104,820.30
S2/	2 AM Peak	280.50	$28,611.00
S2/	2 PM Peak	336.60	$34,333.20
TOTAL SAVINGS			**$167,764.50**
Cost of 2 FTE Supervisors			***$160,000.00***

Pros and Cons

The chief advantage to this additional on-street supervision is that, as was previously mentioned, it will improve overall bus operations to reduce bunching, improve the on-time performance of the service, and reduce overcrowding on buses. This is important given the implementation of the overlying S9 limited stop service upon the existing service structure.

The chief disadvantage is that some capacity along the 16th Street Line would be sacrificed to provide the funding necessary for the additional on-street supervision.

<u>Additional Evening Trippers</u>

Description of Element

Half of the northbound S2/ trippers that are currently operated as far as 16th Street and Colorado Avenue during the weekday late-evening peak hours (i.e., the eight trips between 9:35PM and 11:28PM) can be extended to serve the northern terminus of the route at the Silver Spring Metrorail station, thus providing additional capacity along the entire length of the 16th Street corridor.

If four of these evening S2/ trips become full-length S2 trips, then four northbound S2/ trips earlier in the service day – most likely during the initial "shoulder" of the afternoon peak period – will be eliminated so that their resources could be utilized to provide the additional full-length S2 evening service. If four S2/ trips in the afternoon peak period's shoulder were eliminated selectively (i.e., eliminating the combination of trips that presently has the lowest total boardings) then the negative consequences of having fewer short turns in the southern portion of the bus route will be minimized.

It should be kept in mind that, with the prior reduction in northbound PM peak period S2/ service to provide resources for additional on-street supervision, the number of northbound S2/ trips is reduced from the current 30 trips to 20 trips. However, this is offset in part by the addition of four full-length S2 trips.

Finally, it should also be kept in mind that these new full-length S2 trips should utilize articulated vehicles, as was previously described.

Estimated Impacts

Given that the resources for these new full-length S2 trips are funded by reductions in the number of earlier S2/ trips, this element would not incur any additional operating costs to WMATA, thus remaining cost neutral. In addition, depending on how the schedule is developed (i.e., the "run cut"), any negative consequences from having fewer northbound short turns may be minimized.

Pros and Cons

The chief advantage of this element is that it increases capacity along the entire length of the 16th Street corridor by extending some current short turn trips northbound to Silver Spring during the weekday evenings.

Conversely, the main disadvantage of this element is that there are now fewer northbound short turn trips to exclusively serve the southern portion of the corridor. However, these impacts may be minimized depending upon which specific trips are eliminated and how the schedule is cut.

<u>Streamline Route Nomenclature</u>

Description of Element

The current way of identifying trips on the 16th Street Line can be confusing, especially for occasional riders. One cost-neutral improvement that may be undertaken is to streamline the identification of the route and all its variations, as shown in the following table:

Table 6-2: Proposed Route Nomenclature System

Current Service Pattern	Proposed Route Nomenclature
Southbound	
S1 to Potomac Park from 14th & Missouri	S1 – Potomac Park/State Department
S2 to Federal Triangle from Silver Spring	S2 – Federal Triangle via Eastern Avenue
S2 to Federal Triangle from the District Line	S2 – Federal Triangle via Eastern Avenue
S2/ to 14th & Eye from the District Line	S3 – McPherson Square
S2/ to 14th & Eye from 14th & Missouri	S3 – McPherson Square
S2 "Short" to Federal Triangle from 14th & Missouri	S4 – Federal Triangle via 16th Street
S4 to Federal Triangle from Silver Spring	S4 – Federal Triangle via 16th Street
S4/ to 13th & Eye from 14th & Missouri	S5 – McPherson Square via K Street
--	S9 – McPherson Square *LIMITED*
Northbound	
S1 to 16th & Colorado from Potomac Park	S1 – 16th and Colorado
S2 to Silver Spring from Federal Triangle	S2 – Silver Spring via Eastern Avenue
S2/ to 16th & Colorado from Federal Triangle	S3 – 16th and Colorado
S4 to Silver Spring from Federal Triangle	S4 – Silver Spring via 16th Street
S4 "PM Peak" to Silver Spring from 13th & Eye	S4 – Silver Spring via 16th Street
--	S9 – Silver Spring *LIMITED*

This streamlining of the route nomenclature in the 16th Street corridor will make the service patterns easier for riders – especially occasional users of the Metrobus system – to comprehend. It also clearly separates the proposed S9 service.

Estimated Impacts

This element would not incur any additional operating costs to WMATA.

Rather, there are other relatively minor costs associated with implementing a new route nomenclature system. These include making changes on all public information materials (e.g., system maps, timetables, etc.) and updating bus stop signs. However, these could be accomplished as either part of the ongoing regular updates to public information materials or whenever bus shelters and bus stop signs are cleaned and repaired. In the aggregate, these costs are relatively minor.

Pros and Cons

The improved ease of comprehension of the variations in service in the 16th Street corridor will be beneficial; thus allowing passengers to more quickly determine which bus service pattern is being operated on any specific trip.

The drawbacks are mainly temporary in that passengers will need a short span of time to adjust to the new route nomenclature system.

7.0 Implementation Strategy

This section presents a phased implementation of the improvements described in Section 3 of this document. The work activities necessary to implement the improvements, the entity responsible for completing each of the activities, and a completion date are also presented.

7.1 Phased Implementation

The implementation of the recommended 16th Street Line improvements has been divided into three phases (see **Tables 7-1, 7-2, and 7-3**). Phase 1 includes all of the improvements that could potentially be implemented by spring 2009. Phase 2 includes all of the improvements that would likely be implemented by early 2010. And Phase 3 includes improvements that would likely be implemented after 2010. The three phases are as follows:

Phase 1 Improvements

- New Route S9: limited-stop service
- Expanded hours of Route S1 service
- Maintain local routes S2 and S4, use articulated buses and tripper service in late pm periods
- Updated schedules and information case repair or replacement
- Enhanced service supervision, including two additional supervisor positions
- Better enforcement of parking restrictions
- 16th Street Line-specific training for drivers

Phase 2 Improvements

- New Route S3: “short-turn” service
- Shelter replacement
- Next-bus arrival information and displays at shelters
- Improve intersection operations through traffic control officers and adjustments to signal phasing and timing
- S9 hours expanded to late-evening and midday periods
- Enhanced service supervision, with one additional supervisor position

Phase 3 Improvements

- Potential signal priority and queue jump lanes at key locations
- Potential dedicated peak-hour bus-only lanes

7.2 Work Activities, Responsibilities, and Schedule

For each of the 16th Street Line study recommendations, a series of work activities associated with each of the improvements has been identified. **Table 7-1** highlights each of the work activities for the Phase 1 improvements, the entity responsible for leading each activity, and a completion date for the activity. Entities that are responsible for selected work tasks include various departments of the Washington Metropolitan Area Transit Authority (WMATA) and the District Department of Transportation (DDOT) as well as Metropolitan Police Department.

Table 7-1: Responsibilities and Schedule for Phase 1 Implementation Activities

Activity	Responsibility	Complete By
Finalize Plans and Approvals		
Finalize recommendations	WMATA/DDOT	Oct 08
Community leader outreach	DDOT MTA	Jan 09
WMATA Board approval	WMATA Board	Feb 09
Service Changes		
Identify terminal stands and layover facilities	WMATA OPAS	Dec 08
Identify stops served by S9	WMATA OPAS/DDOT	Dec 08
Define and redesign schedule	WMATA OPAS/Marketing	Jan 08
Bus driver assignments	WMATA Bus Operations	End Mar 09
Initiate service	WMATA Bus Operations	**March 29, 09**
Customer Communications and Marketing		
Develop marketing plan for new service	WMATA Marketing	Jan 09
Develop updated maps for shelters	WMATA Marketing	Jan 09
Develop media plan for new services	WMATA Marketing	Jan 09
Initiate marketing campaign for new service	WMATA Marketing	Mar 09
Print and distribute printed materials for service change	WMATA Marketing	Mar 09
Announce/Advertise new routes to riders and public	WMATA Communications	Mar 09
Enhance Service Supervision		
Modify “supervisor playbook” for 16th Street Line	WMATA Bus Operations	Nov 08
Define supervisor equipment and information needs	WMATA Bus Operations	Nov 08
Develop 16th Street Line training for supervisors	WMATA Bus Operations	Dec 08
Obtain and install supervisor equipment	WMATA BMNT/BTSS	Mar 09
Fill additional supervisor positions	WMATA HR	Mar 09
Supervisor training	WMATA Bus Operations	Mar 09
Additional scout car	WMATA Bus Operations	Mar 09
16th Street Line Specific Training for Drivers		
Prepare 16th Street Line FAQ and responses	WMATA Planning	Jan 09
Modify 16th Street Line specific training module	WMATA Bus Operations	Jan 09
16th Street Line driver training session	WMATA Bus Operations	Mar 09
Stop Improvements		
Update signage (incl. designation of S9 stops)	WMATA Bus Operations	Feb 09
Replace damaged or missing information cases	WMATA Bus Operations	Feb 09
Place updated schedules at stops	WMATA Bus Operations	Mar 09
Place updated maps and information at shelters	DDOT	Mar 09
Expedite shelter replacement (part of the District’s ongoing shelter replacement program with Adshel)	WMATA	Mar 09
Additional Items		
Traffic Systems Management	WMATA/DDOT	Mar 09
Safety and security – new initiative	WMATA/MTPD	Mar 09

Table 7-2 highlights each of the work activities for the Phase 2 improvements, the entity responsible for leading each activity, and a completion date for the activity. This includes the completion of a service evaluation and review to be conducted in 2009 to assess how well the Phase 1 improvements have addressed the deficiencies and transit needs identified as part of the 16th Street Line Study.

Table 7-2: Responsibilities and Schedule for Phase 2 Activities

Activity	Responsibility	Complete By
Service Changes		
Identify S3 terminal stands and layover facilities	WMATA OPAS	2010
Identify stops served by S3 short-turn service	WMATA OPAS/DDOT	2010
Define and redesign schedule	WMATA OPAS/Marketing	2010
Bus driver assignments	WMATA Bus Operations	2010
Initiate service	WMATA Bus Operations	2010
Service Review and Evaluation		
Develop review process and criteria	WMATA OPAS	Feb 09
Conduct service review	WMATA OPAS	Early 2010
Coordinate with Police Initiatives		
Develop/implement a strategy for increased security for transit users	WMATA MTP/MPD	Early 2009
Better Enforcement of Parking Restrictions		
Develop/implement an improved parking enforcement strategy	DDOT/MPD/DPW	Early 2009

Table 7-3 highlights each of the work activities for the Phase 3 improvements, the entity responsible for leading each activity, and a completion date for the activity.

Table 7-3: Responsibilities and Schedule for Phase 3 Activities

Activity	Responsibility	Complete By
Future Transit Only Lanes		
Conduct traffic study for peak hour transit-only lanes on 16th Street	DDOT TOA	2009
Finalize locations and schedule for transit-only lanes	DDOT IPMA/TOA	2010
Prepare an enforcement strategy for transit-only lanes	MPD	2010
Construct transit-only lanes	DDOT/IPMA	2010
Improve Intersection Operations		
Study potential for recommended changes in signal phasing, protected movements, and timing to benefit bus movements	DDOT TOA	2009
Potential queue jump lane at 16th & U Streets	DDOT TOA	2011
Implement signal changes	DDOT TOA	2011

8.0 Contacts and Information Sources

Table 8-1 is a list of staff that has participated in the 16th Street Line Study and will serve as contacts and sources of information for the implementation of recommended improvements.

Table 8-1: Contacts and Information Sources for 16th Street Line Improvements

Name	Phone	E-mail
Office of DC Councilmember Jim Graham		
Jonathan Kass	202-724-8152	jkass@dccouncil.us
District Department of Transportation, Mass Transit Administration		
Eric Madison	202-673-1747	eric.madison@dc.gov
Catondra Noye	202-673-1737	catondra.noye@dc.gov
WMATA, Long Range Planning, Operations Planning and Administrative Support		
Douglas Stallworth	202-962-2761	dstallworth@wmata.com
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Gloria Harris	202-962-2487	gharris@wmata.com
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WMATA, Government Relations		
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WMATA, Civil Rights		
Deborah Coram	202-962-2328	dcoram@wmata.com
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WMATA, Bus Services		
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Marquezn Jones Jr.	202-269-8981	mjjones@wmata.com
Clairessa Washington	202-379-8792	cmwashington@wmata.com
Metro Transit Police		
Scott Whitfield	202-345-0815	swhitfield@wmata.com
Consultants		
Chris Bell, AECOM	410-637-1716	chris.bell@aecom.com
Mark Niles, AECOM	703-682-5024	mark.niles@aecom.com