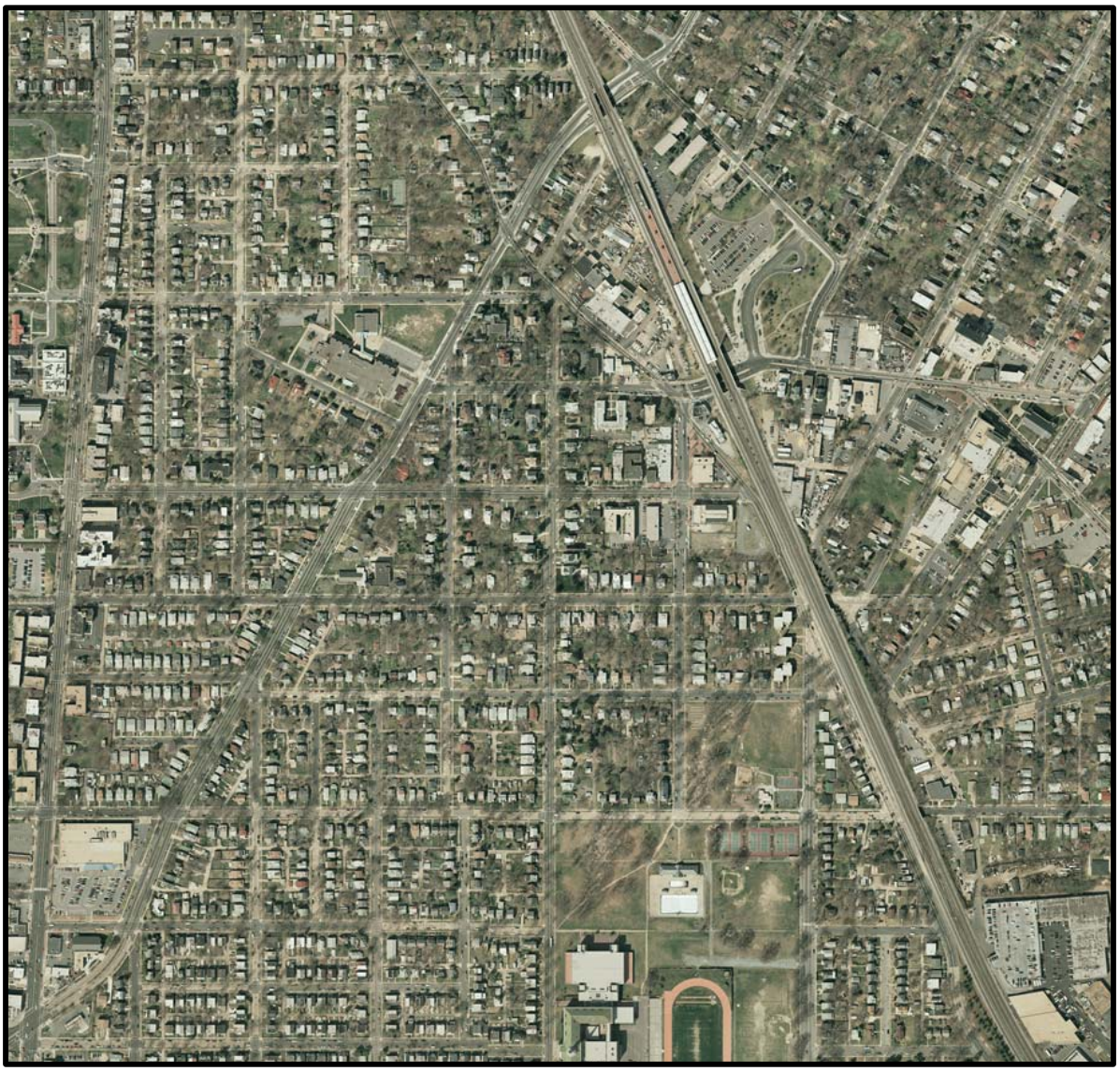
Takoma Transportation Study

Final Report



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For:
District of Columbia Department of Transportation
and
City of Takoma Park, Maryland
July 2003

EXECUTIVE SUMMARY

The District Department of Transportation (DDOT) and the City of Takoma Park conducted a study that evaluated transportation conditions in the Takoma area of Northwest Washington DC and adjacent Takoma Park, Maryland. This study was a continuation and an expansion of the transportation work conducted in conjunction with the development of the Takoma Central District Plan[1].

STUDY GOALS

The main goals of this study were to examine existing and future transportation conditions and determine short-term and long-term management and infrastructure improvements to reduce traffic congestion; improve traffic and pedestrian safety; protect surrounding residential streets from traffic impacts; enhance transit service; and improve bicycle and pedestrian transportation facilities in the study area. In addition, the study included an assessment of commercial parking needs in support of a municipal parking facility in Takoma Park.

STUDY PROCESS

The study was conducted with assistance from area residents. The Study Team (Consultant, DDOT representatives and Takoma Park staff) held several meetings with area residents to discuss existing transportation issues. Area residents provided additional input via e-mail, regular correspondence and meetings with DDOT, Takoma Park and Consultant representatives. The Study Team also held several meetings with representatives of key local agencies, including the Washington Metropolitan Area Transportation Authority (WMATA), Ride On, the District of Columbia Office of Planning, the City of Takoma Park and Maryland National Capital Park and Planning Commission (MNCPPC). Input from the residents and public agency representatives was helpful in the identification of key transportation issues and the identification of future levels of development in the study area.

GUIDING PRINCIPLES

The guiding principles of the Takoma Transportation Study are the following:

1. Promote a comprehensive transportation approach that improves the quality of life for all residents and supports Transit Oriented Development (TOD).
2. Listen to residents through an open community participation process.
3. Ensure that all suggestions promote transportation safety for all modes of travel.
4. Reduce commuter and cut-through traffic along local streets, as well as reduce traffic congestion.
5. Improve non-automotive transportation access for pedestrians, bicyclists and mass transit users.
6. “Right-Size” parking throughout the study area.
7. Improve visual aesthetics of rights-of-way throughout the study area.

[1] Completed in the year 2002.

The Study Team used these principles to develop recommendations to address existing and future transportation issues.

EXISTING CONDITIONS

The Study Team conducted an extensive data collection effort to gain an understanding of existing conditions in the study area. The Study Team identified a wide variety of existing transportation issues. Transit issues included lack of transit service to selected areas, inadequate pedestrian and bicycle access to the Metro station and inadequate location of taxi stands at the Metro station. Pedestrian issues included lack of sidewalks at critical locations, narrow sidewalks at selected locations, poor conditions of ADA access ramps, lack of pedestrian signals and sub-standard pedestrian signing near schools. Parking issues included insufficient parking for commercial needs at selected locations, lack of parking meters at key locations, inadequate striping for parking and lack of parking enforcement. Bicycle issues included lack of bicycle routes to the Metro station, lack of bicycle route signs for designated bicycle routes, conflicts between vehicles and bicycles, and the effects of the proposed Metropolitan Branch Trail alignments on traffic operations at major intersections. Traffic operations issues included congestion along major roadways and at critical intersections, speeding, cut-through traffic, lack of turn lanes at selected intersections, non-optimized signal timings and unsafe intersection geometry.

FUTURE CONDITIONS

In order to assess future conditions, the Consultant collected information on planned future developments in the study area. The main source of information for future levels of development was the Takoma Central District Plan. Additional information on future year development levels was gathered by the Consultant through meetings with several governmental institutions including the District of Columbia Office of Planning, the City of Takoma Park and the MNCPPC.

The Takoma District Plan identifies five priority redevelopment sites as well as the level of development associated with these sites. The Study Team assumed that these sites would be developed in the near future. Therefore, they were included in the 2012 future year scenario. Other sites that were included in the 2012 scenario were the development in Takoma Park at the site of the proposed Municipal Parking, and redevelopment at Montgomery College and at the Adventist Hospital.

The Study Team developed the 2022 levels of development based on data on long-term potential development levels noted in the Central District plan as well as assessment from the District planners on the most likely scenarios for future year developments. Most of the long-term development in the study area is expected to take place in the vicinity of the Takoma Metro station.

The Study Team found that the construction of the new developments expected to be in place by 2012 would result in detrimental effects on transportation operations in the study area. However, the projected 2022 levels of development are expected to have significant impacts on transportation operations in the study area.

TRANSPORTATION IMPROVEMENT RECOMMENDATIONS

The Study Team, with the assistance of the area residents, developed an extensive list of preliminary suggestions that could be implemented to address the identified transportation issues. The Study Team evaluated the suggested improvements and developed an extensive list of short-term and long-term recommendations to address the identified existing and future transportation issues. The recommended improvements are shown in Figures ES-1 through ES-4. Planning level cost estimates for the implementation of each the recommended improvements are provided in Appendix J.

CLICK TO VIEW:

- **FIGURE ES-1**
- **FIGURE ES-2**
- **FIGURE ES-3**
- **FIGURE ES-4**

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APPENDIX

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I. INTRODUCTION

The District Department of Transportation (DDOT) and the City of Takoma Park conducted a study that evaluated transportation conditions in the Takoma area of Northwest Washington DC and adjacent Takoma Park, Maryland. DDOT hired the consulting firm DMJM+HARRIS (Consultant) to conduct the technical analyses for this study. In this report work performed by either the Consultant or a combination of Consultant, DDOT staff and/or Takoma Park staff is referred to as work performed by the "Study Team." This study was a continuation and an expansion of the transportation work conducted in conjunction with the development of the Takoma Central District Plan[1].

STUDY GOALS

The main goals of this study were to examine existing and future transportation conditions and determine short-term and long-term management and infrastructure improvements to reduce traffic congestion, especially during peak morning and evening travel hours; improve traffic and pedestrian safety; protect surrounding residential streets from traffic impacts; enhance transit service; and improve bicycle and pedestrian transportation facilities in the study area. In addition, as described in the Scope of Work, included in Appendix A, the study included an assessment of the commercial parking needs in support of a municipal parking facility in Takoma Park.

STUDY PROCESS

As shown in Figure 1, the study area boundaries are the following streets:

- Georgia Avenue, NW[2] to the west,
- Peabody Street, NW to the south,
- Eastern Avenue, NW and Eastern Avenue NE to the east and
- Philadelphia Avenue and Blair Road to the north.

The study was conducted with assistance from the area residents. The Study Team held several meetings with area residents to discuss existing transportation issues. The area residents provided additional input via e-mail, regular correspondence and meetings with DDOT, Takoma Park and Consultant representatives. The Study Team also held several meetings with representatives of key local agencies, including the Washington Metropolitan Area Transportation Authority (WMATA), Ride On, the District of Columbia Office of Planning, the City of Takoma Park and Maryland National Capital Park and Planning Commission (MNCPPC). The input from the residents and the public agency representatives was helpful in the identification of key transportation issues and the identification of future levels of development in the study area.

[1] Completed in the year 2002.

[2] Most of the District of Columbia streets in the study area are located in the northwest quadrant of the District. Therefore, throughout this report where the NW designation is omitted, it should be understood that the street is located in the northwest quadrant of the District.

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Figure 1. Study Area

REPORT CONTENTS

This report summarizes the assessment of existing and future transportation conditions, identifies transportation issues, presents an evaluation of proposed improvements, and describes the improvements that are recommended for implementation in the study area. The existing conditions section of this report includes a description of the major roadways in the study area; information on traffic volumes at critical intersections; travel speeds throughout the study area, origin-destination patterns; accidents, queues, and level of service at critical intersections. It also describes the conditions of existing pedestrian facilities, parking facilities, public transportation and bicycle facilities.

The future transportation conditions section of this report includes an assessment of parking needs, future year travel forecasts and levels of service for the years 2012 and 2022. The following section describes the identified transportation issues and presents recommended improvements for the transit services, pedestrian and bicycle facilities, parking, and traffic operations. The last section of the report presents a summary of findings and recommendations.

GUIDING PRINCIPLES OF THE TAKOMA TRANSPORTATION STUDY

The guiding principles of the Takoma Transportation Study are the following:

1. Promote a comprehensive transportation approach that improves the quality of life for all residents and supports Transit Oriented Development (TOD).
2. Listen to residents through an open community participation process.
3. Ensure that all suggestions promote transportation safety for all modes of travel.
4. Reduce commuter and cut-through traffic along local streets, as well as reduce traffic congestion.
5. Improve non-automotive transportation access for pedestrians, bicyclists and mass transit users.
6. “Right-Size” parking throughout the study area.
7. Improve visual aesthetics of rights-of-way throughout the study area.

The Study Team used the guiding principles listed above to develop the recommendations to address existing and future transportation issues.

II. EXISTING CONDITIONS

This section summarizes the assessment of existing transportation conditions and describes the main transportation issues identified in the study area. The Study Team conducted an extensive data collection effort to gain an understanding of existing conditions in the study area. In addition to collecting data for the quantitative assessment of existing conditions, the Study Team conducted field evaluations throughout the study area during peak and off-peak hours to further assist in the assessment of existing conditions. The assessment of existing conditions phase of this study included the conduct of an origin-destination study. This section presents a summary of the findings of the origin-destination study.

MAJOR ROADWAYS IN THE STUDY AREA

The major roadways in the study area are located in Northwest Washington, DC and in Takoma Park, Maryland. This section of the report describes the characteristics of these major roadways.

Georgia Avenue

As shown in Figure 2, Georgia Avenue is a principal arterial[1] running north-south from the southern terminus of the study area at Peabody Street to the northern terminus of the study area at Blair Road. The posted speed limit is 30 miles per hour (mph). Between Peabody Street and Eastern Avenue, Georgia Avenue has two travel lanes in each direction with parking allowed on an additional curb lane on each side. North of Eastern Avenue, Georgia Avenue is three-lanes-wide. There are no exclusive turn lanes along Georgia Avenue. There are adequate sidewalks provided on both sides of Georgia Avenue throughout the study area.

As shown in Figure 3, the primary land use along Georgia Avenue is commercial, but there are residential uses. There are two schools, the Kima Public Charter School and the Sister Patricia Bennett School, located within the study area. Also within the study area, the Water Reed Army Medical Center is located on the west side of Georgia between Fern Street and Aspen Street. The major issue along Georgia Avenue is traffic congestion during the peak hours throughout the study area, largely due to the lack of exclusive turn lanes and large volumes of commuter traffic.

A critical location on Georgia Avenue is the intersection of Georgia Avenue and Elder Street. Congestion at the Elder Street entrance to the Walter Reed Army Medical Center during peak hours, caused by the inspections of vehicles entering the hospital, is a major issue for traffic operations on Georgia Avenue. Northbound left turns and southbound right turns attempting to enter the Medical Center block through traffic along Georgia Avenue. Detailed descriptions of all of the issues identified in the study area, including additional issues along Georgia Avenue, are provided in the Issues and Recommended Improvements section of this report.

[1] All roadway classifications for roads in the District of Columbia were taken from the District of Columbia Functional Classification Map, January 1, 2002.

Click to View:

Figure 2. Functional Classification of Roads

Click to View

Figure 3. Generalized Land Use Map

New Hampshire Avenue

Within the study area, New Hampshire Avenue is a two-way, four-lane principal arterial that traverses the study area in a northeast-southwest direction from the intersection of Peabody Street to Eastern Avenue. The posted speed limit is 30 mph. There are two lanes in each direction with an exclusive turn lane for the southwest left turn movement at the signalized intersection at Eastern Avenue. New Hampshire Avenue is surrounded by commercial areas, with a few residential areas. There are sidewalks provided on both sides of the roadway throughout the study area. Vehicles traversing the intersection of New Hampshire Avenue and Eastern Avenue experience significant delays during the peak periods.

Eastern Avenue

Within the study area, from Peabody Street to Carroll Street, Eastern Avenue is a two-lane minor arterial running northwest-southeast, however, there are two lanes in each direction between Peabody Street and Van Buren Street. Eastern Avenue is interrupted by the Washington Metro Rail Red Line east of Piney Branch Road and west of Blair Road. There is also a break in continuity between Carroll Street and Cedar Avenue. From Georgia Avenue to Blair Road and from Piney Branch Road to Cedar Avenue, Eastern Avenue is a two-way, two lane collector. Eastern Avenue has a posted speed limit of 25 mph throughout the study area. Between Laurel Street and Cedar Avenue, Eastern Avenue is predominantly commercial; however, the majority of Eastern Avenue is residential. The Regency School is located on Eastern Avenue between Laurel Street and Willow Street.

On-street parking or off-street residential parking is permitted at various locations along Eastern Avenue, but it is limited to the west side of the roadway between Sheridan Street and Walnut Street and between Cedar Avenue and Piney Branch Road. There is also a time restriction for parking on the east side of Eastern Avenue between Laurel Street and Walnut Street. The Takoma Metro Station parking lot is located adjacent to the intersection of Cedar Street and Eastern Avenue, in Washington, DC.

Between New Hampshire Avenue and Laurel Street, there is either no sidewalk or the sidewalks are narrow on the east side of Eastern Avenue as well as a short section on the west side of Eastern Avenue near Blair Street. Between Laurel Street and Walnut Street the sidewalk provided on both sides of the roadway is narrower than the recommended five foot width.

As shown in Figure 4, at Carroll Avenue and Willow Street, Eastern Avenue intersects these roadways in a unique geometric layout causing difficult turning maneuvers. Also at this intersection there is congestion during the peak hours. Detailed descriptions of all of the issues identified in the study area, including additional issues along Eastern Avenue, are provided in the Issues and Recommended Improvements section of this report.

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Figure 4. Geometry of Willow St., Carroll St. and Eastern Ave. NW

Piney Branch Road

Piney Branch Road is generally a two-way north-south minor arterial running from Georgia Avenue to Philadelphia Avenue through the study area. The posted speed is 30 mph. On street parking or residential parking is allowed on the majority of Piney Branch Road, but it is limited to the west side of the roadway from Butternut Street to Dahlia Street. Takoma Elementary School is located near the intersection of Piney Branch Road and Cedar Street. There are sidewalks provided along Piney Branch Road with the exception of a section on the southwest corner at the intersection with Blair Road.

Piney Branch Road intersects with several arterials including Georgia Avenue, Blair Road and Philadelphia Avenue and a collector, Eastern Avenue. At each of these intersections there are issues involving congestion at the intersections. Descriptions of all of the transportation issues identified in the study area, including additional issues along Piney Branch Road are provided in the Issues and Recommended Improvements section of this report.

Blair Road

Within the study area, Blair Road is a two-way north south minor arterial running from Peabody Street to Georgia Avenue. Blair Road runs west of the Metro Rail line. The posted speed limit between North Capitol Street and Van Buren Street is 30 mph; between Van Buren Street and Eastern Avenue is 25 mph; and between Eastern Avenue and Georgia Avenue is 30 mph. Blair Road is mostly residential with a few businesses near Cedar Street and 4th Street. As Figure 5 indicates, Blair Road intersects Cedar Street and 4th at a geometrically complicated intersection in the vicinity of the entrance to the Takoma Metro station. The geometric design complicates traffic flow and pedestrian movements through this intersection.

From Whittier Street to Peabody Street, on-street or off-street residential parking is provided on the west side of Blair Road only. There is no parking allowed on Blair Road from Whittier Street to Georgia Avenue.

From Eastern Avenue to Cedar Street, Blair Road has narrow sidewalks on the west side of the street. Detailed descriptions of all of the transportation issues identified in the study area, including additional issues along Blair Road are provided in the Issues and Recommended Improvements section of this report.

Carroll Street/Carroll Avenue

Within the study area, Carroll Street is a two-way east-west minor arterial running from Cedar Avenue to Laurel Avenue. Carroll Avenue runs directly through downtown Takoma Park, Maryland from Willow Avenue through Tulip Avenue with limited metered parking allowed. Parking is limited on Carroll Street. The posted speed limit is 25 mph with sidewalks along the corridor in most locations. There is congestion along Carroll Street/Carroll Avenue during the peak hours. Detailed descriptions of all of the transportation issues identified in the study area, including additional issues along Carroll Street/Carroll Avenue are provided in the Issues and Recommended Improvements section of this report.

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Figure 5. Geometry of Blair Rd., 4th St. and Cedar St. NW

Philadelphia Avenue

Within the study area, Philadelphia Avenue is a two-way east-west arterial running from Piney Branch Road to Carroll Avenue with a posted speed limit of 25 mph. Takoma Park Elementary School is located near the intersection of Philadelphia Avenue and Holly Avenue. Sidewalks are provided on both sides of Philadelphia Avenue between Maple Avenue and Carroll Avenue. However, the section between Holly Avenue and Piney Branch Road lacks adequate sidewalk on the south side of Philadelphia Avenue. There is no parking allowed on Philadelphia Avenue within the study area. Detailed descriptions of all of the transportation issues identified in the study area, including additional issues along Philadelphia Avenue are provided in the Issues and Recommended Improvements section of this report.

North Capitol Street

Within the study area, North Capitol Street is a two-way north-south minor arterial running from Kansas Avenue to Van Buren Street. North Capitol is mainly residential; however, there is commercial development at the south end close to Kansas Avenue. The Roots Activity Learning Center is located near Kansas Avenue. The posted speed limit is 25 mph and there are several all-way stops between Eastern Avenue and Kansas Avenue. There are several sections with inadequate sidewalks along North Capitol Street. Detailed descriptions of all of the transportation issues identified in the study area, including additional issues along North Capitol Street are provided in the Summary of Study Area Transportation Issues and Recommendations section of this report.

Kansas Avenue

Within the study area, Kansas Avenue is a two-way north-south minor arterial running from Peabody Street to Eastern Avenue. Kansas Avenue north of Chillum Place to Eastern Avenue is primarily low density residential. However, Kansas Avenue south of Chillum Place to Peabody Street is industrial. The posted speed limit is 25 mph. There are sidewalks on both sides of the street. Kansas Avenue is a fairly wide roadway and is conducive to speeding in the north section near Eastern Avenue. Detailed descriptions of all of the transportation issues identified in the study area, including additional issues along Kansas Avenue are provided in the Issues and Recommended Improvements section of this report.

Aspen Street

Within the study area, Aspen Street is a two-way east-west collector running from Georgia Avenue crossing under the Metro Rail line to Laurel Street. Aspen Street is generally narrow with residential developments on each side of the road. On-street parking is allowed on this street throughout the study area with the exception of the north side from 5th Street to 3rd Street. It has a posted speed limit of 25 mph with sidewalks on both sides. Commuter use of this street is an issue for the study area residents. Speeding on Aspen Street between Georgia Avenue and Piney Branch Road is a major concern for the residents of the area. Detailed descriptions of all of the transportation issues identified in the study area, including additional issues along Aspen Street are provided in the Issues and Recommended Improvements section of this report.

Butternut Street

Within the study area, Butternut Street is a two-way east-west collector running from Georgia Avenue to Blair Road. Butternut Street is a roadway with residential development on both sides of the street. On-Street parking is allowed on this street throughout the study area. It has a posted speed limit of 25 mph. Sidewalks are provided on both sides of the street. Commuter use of this street is an issue for the study area residents, as well. Descriptions of all of the transportation issues identified in the study area, including additional issues along Butternut Street are provided in the Issues and Recommended Improvements section of this report.

5th Street

Within the study area, 5th Street is a two-way north-south collector running from Peabody Avenue to Blair Road. 5th Street is a roadway that has residential land uses on both sides. On-Street parking is allowed only on the west side of the street. It has a posted speed limit of 25 mph. There are sidewalks on both sides of the street.

There are two District of Columbia public schools, Coolidge High School and Whittier Elementary School, located on 5th Street. Thus, the provision of adequate pedestrian facilities and the adequacy of school signing are major concerns around 5th Street. Detailed descriptions of all of the transportation issues identified in the study area, including additional issues along 5th Street are provided in the Issues and Recommended Improvements section of this report.

3rd Street

Within the study area, 3rd Street is a two-way north-south collector running from Peabody Avenue to Blair Road. The primary land use around 3rd Street is residential. There is on-street parking on both sides of the street. 3rd Street has a posted speed limit of 25 mph and there are sidewalks on both sides of the street. Due to the proximity to Coolidge High School and Whittier Elementary School, adequacy of pedestrian facilities and safety are also major concerns along 3rd Street. Detailed descriptions of all of the transportation issues identified in the study area, including additional issues along 3rd Street are provided in the Issues and Recommended Improvements section of this report.

TRAFFIC VOLUMES

The Study Team collected available data on existing turning movement counts in the study area. Additionally, the Study Team performed turning movement counts at critical intersections in the study area for which existing turning movement counts were not available. At each of the intersections where vehicular counts were taken, the Study Team also counted pedestrians crossing each of the street approaches[1]. The manual turning movement counts were taken during the morning peak period, 7:00 AM – 9:00 AM, and during the afternoon peak period, 4:00 PM – 6:00 PM, on a typical weekday (Tuesday, Wednesday or Thursday). The counts were taken from October 22, 2002 to November 7, 2002. The following are the 14 intersections where the Study Team conducted traffic counts:

[1] In this study, bicycles crossing a street approach were counted as a pedestrian crossing the approach.

1. Kalmia Road/Eastern Avenue/Georgia Avenue
2. Piney Branch Road and Eastern Avenue
3. Piney Branch Road and Blair Road
4. Blair Road and Van Buren Street
5. Carroll Street/Eastern Avenue/Willow Street
6. Piney Branch and Aspen Street
7. Butternut and Piney Branch Ave
8. Laurel Street and Eastern Avenue
9. Philadelphia Avenue and Piney Branch Road
10. Carroll Avenue and Laurel Avenue
11. Piney Branch Road and Georgia Avenue
12. Van Buren Street and Eastern Avenue
13. Kansas Avenue and Eastern Avenue
14. New Hampshire Avenue and Eastern Avenue

In addition, the following are the 14 intersections for which recent counts were available:

1. Eastern Avenue/Blair Road/Georgia Avenue
2. Georgia Avenue and Juniper Street
3. Georgia Avenue and Fern Street
4. Georgia Avenue and Fern Place
5. Georgia Avenue and Elder Street
6. Georgia Avenue and Dahlia Street
7. Georgia Avenue and Butternut Street
8. Georgia Avenue and Aspen Street
9. Georgia Avenue and Peabody Street
10. Blair Road and Dahlia Street
11. Blair Road/Cedar Street/Carroll Street
12. Blair Road and Aspen Street
13. Carroll Street and Maple Street
14. Carroll Street and Cedar Avenue

All of the intersections were not counted on the same day, thus, there were minor discrepancies in the overall balance of traffic volumes throughout the study area network. The discrepancies are due primarily to traffic variations that occur from day to day. To improve the modeling of existing traffic conditions, the Study Team applied standard traffic engineering techniques to adjust the turning movement counts at intersections where unjustified imbalances were found. The existing, 2002, balanced peak hour turning movement counts for the study area are presented in Figure 6. The raw volume counts for all of the 28 intersections are presented in Appendix B.

Click to View:

Figure 6. Existing (2002) AM and PM Peak Hour Volumes

In addition to turning movement counts, the Study Team collected daily traffic volumes using automatic traffic recorders (ATR's) over a two-week period. These counts were taken from November 12, 2002 to November 25, 2002 at the following two locations:

1. Georgia Avenue between Dahlia Street and Butternut Street.
2. Piney Branch Road between Blair Road and Cedar Street.

Georgia Avenue is the roadway in the study area with the largest daily volume. As Figure 7 indicates, during weekdays, Georgia Avenue carries approximately 26,000 daily vehicular trips. Georgia Avenue is heavily used by trucks. Along Georgia Avenue, the average weekday heavy vehicle percentage is 9.3 percent. Piney Branch Road carries approximately 13,500 daily vehicles during weekdays, which is a large daily volume for a two-lane road. Along Piney Branch Road, the average weekday heavy vehicle percentage is 3.4 percent.

As shown in Figure 8, traffic volumes fluctuate throughout the day. The PM peak period volumes on Georgia Avenue are greater than the AM peak period volumes. Contrastingly, as shown in Figure 9, on Piney Branch, the AM peak period volumes are slightly greater than the PM peak period volumes. For both of these major roadways, the PM peak period is longer than the AM peak period.

TRAVEL SPEEDS

Travel speed and travel time measurements were collected along the primary routes in the study area and at selected spot locations in order to evaluate the efficiency of the roadway system, to assess speeding and to gather information needed in the development of the traffic model.

Corridor Speeds

In order to assess corridor speeds, a test vehicle was driven along the study routes in accordance with the "floating-car" technique, which means that the driver keeps up with the prevailing traffic. Thus, the test car could travel at speeds above the speed limit at some sections of the study routes.

The test car was driven along eight study routes in each direction during the weekday AM and PM peak periods: 7:00 AM - 9:00 AM and 4:00 PM - 6:00 PM, as well as during Saturdays and Sundays from 10:00 AM to 2:00 PM during the month of November, 2002. The elapsed travel times at predetermined travel points and the distance between the selected travel points were recorded. This travel time includes delays because of congestion on roadways or traffic control devices, such as traffic signals or stop signs. Average travel speed was then calculated for each roadway segment as well as an overall average speed for the study route. Travel speeds on each study route are presented in Figures 10, 11, 12 and 13.

A comparison of Figures 10 and 11 indicates that generally vehicles travel at lower speeds during the PM peak hour than during the AM peak hour. A comparison of Figures 12 and 13 to Figures 10 and 11 indicates that travel speeds on Blair Road and Piney Branch Road are greater during the weekends.

Figure 7
Average Daily Traffic Volumes

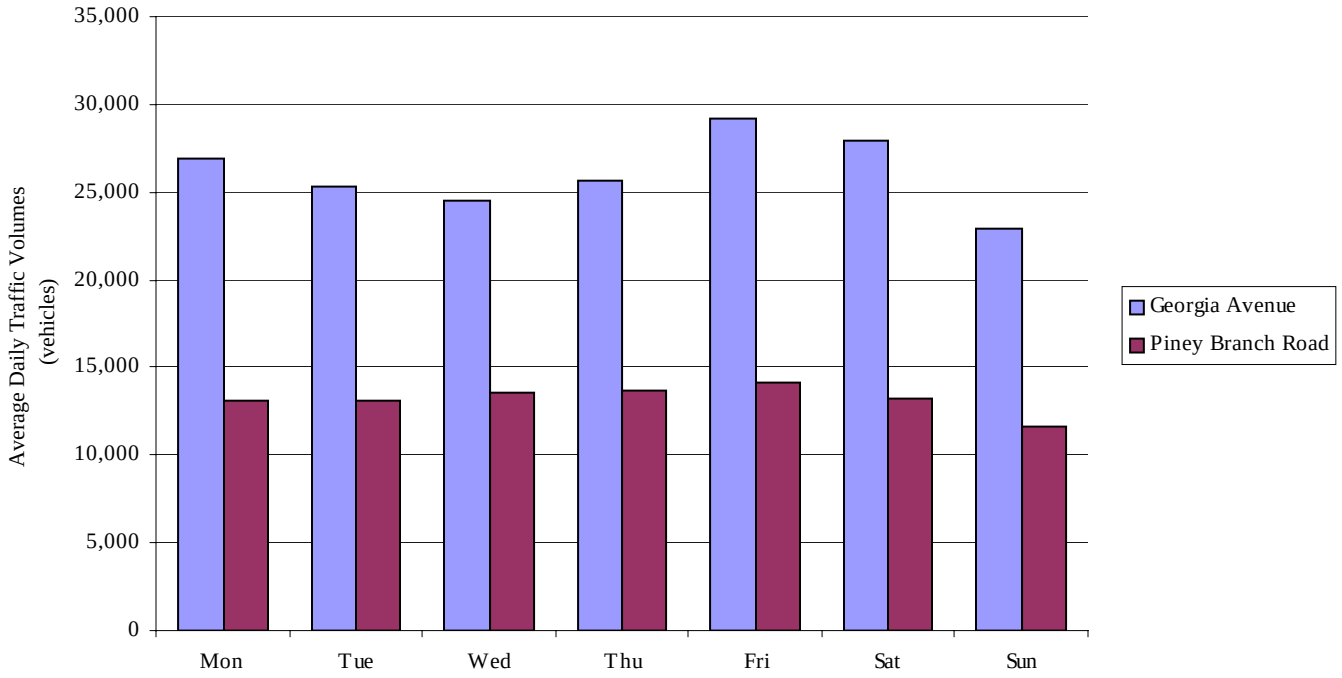


Figure 8
Hourly Traffic Volumes on Georgia Avenue

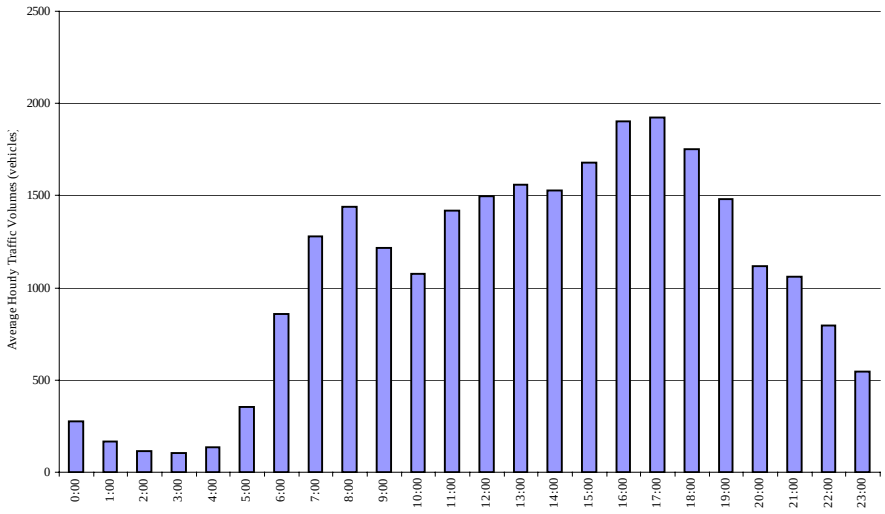
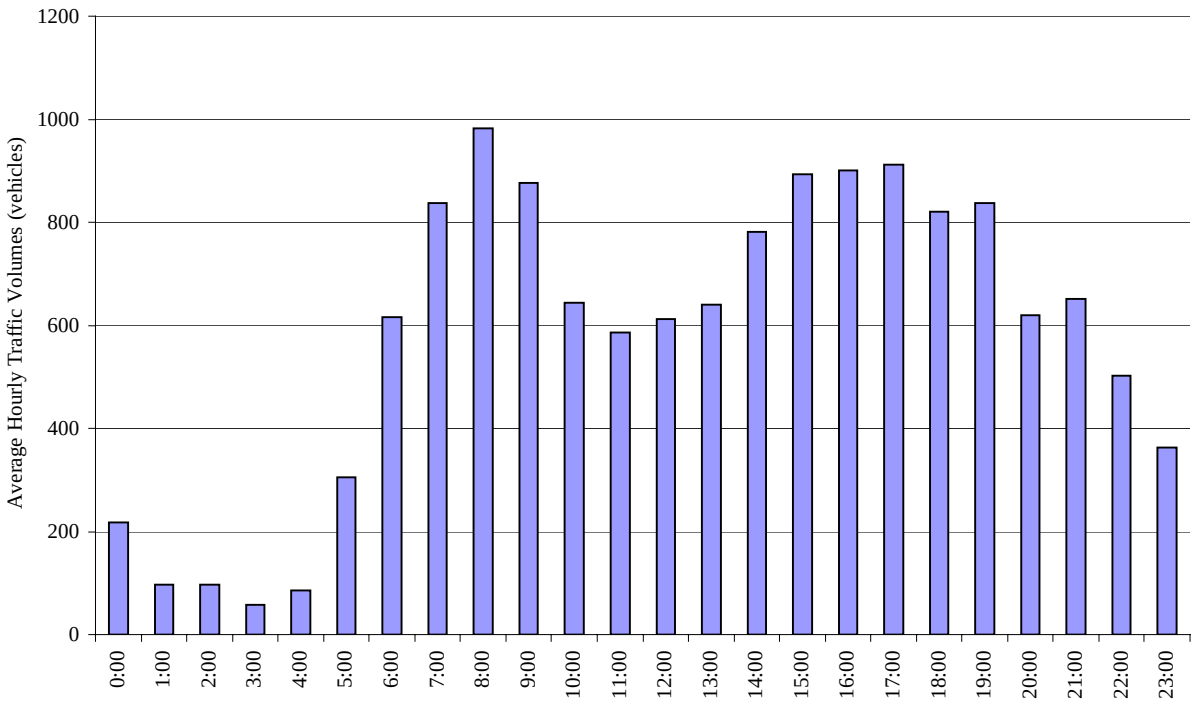


Figure 9
Hourly Traffic Volumes on Piney Branch Road



Click to View:

Figure 10. AM Peak Hour Speed Map

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Figure 11. PM Peak Hour Speed Map

Click to View:

Figure 12. Saturday Speed Map

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Figure 13. Sunday Speed Map

Average travel speeds on Piney Branch Road in the northbound direction and on Carroll Street in the eastbound direction were found to be below 10 mph during the PM peak hour. This is due to the high level of congestion on these roadways during the PM peak hour.

As shown in Table 1, there are several segments where the average travel speed is significantly below the speed limit. These segments are on Blair Road, Georgia Avenue, Piney Branch Road and Eastern Avenue. Speeds on Blair Road northbound between Aspen Street and Carroll Street are consistently low, which is a reflection of the congested conditions at the intersection of Blair Road and Cedar Street. The average travel speed for all of the roadway segments for which data was collected is presented in Appendix C.

Table 1
Average Travel Speed at Selected Segments

Roadway and Direction	Segment	Speed Limit	AM Peak	PM Peak	Saturday	Sunday
Georgia Avenue Northbound	Missouri Avenue – Piney Branch Road	30	14.8	17.6	18.2	15.5
Georgia Avenue Southbound	13th Street – Blair Road	30	13.8	13.1	9.4	9.9
Piney Branch Road Northbound	Aspen Street – Blair Road	30	17.6	5.5	20.5	11.4
Piney Branch Road Southbound	Blair Road – Aspen Street	30	18.1	15.4	29.6	27.9
Cedar/Carroll Street Eastbound	Piney Branch Road – Blair Road	25	7.7	5.6	9.2	7.7
Cedar/Carroll Street Westbound	Laurel Street – Eastern Avenue	25	7.1	13.2	15.4	10.8
Blair Road Northbound	Aspen Street – Cedar/Carroll Street	25	4.9	5.0	5.5	6.9
Blair Road Southbound	Piney Branch Road – Cedar/Carroll Street	25	9.8	10.7	13.4	8.1
Eastern Avenue Northbound	Laurel Street – Carroll Street	25	5.5	9.2	16.7	6.6
Eastern Avenue Southbound	Carroll Street – Laurel Street	25	11.8	8.7	16.1	17.3

Note: Appendix C presents a list of the recorded speeds for all the studied segments in the Study Area.

Spot Location Speeds

In addition to the travel speed data collected by driving with traffic through the principal study corridors, the Study Team collected speed data using automatic traffic recorders (ATR's) over a two-week period from November 12, 2002 to November 25, 2002 at the following locations:

1. Georgia Avenue between Dahlia Street and Butternut Street.
2. Piney Branch Road between Blair Road and Cedar Street.

For a typical weekday, the average 85th percentile speed at the Georgia Avenue location was found to be 35.4 mph. The average 85th percentile weekday speed at the Piney Branch location was found to be 30.9 mph. This indicates that a significant number of vehicles travel at speeds significantly above the speed limit.

Furthermore, in order to assess issues related to speeding in residential areas, the Study Team collected spot speed data during off-peak periods at selected locations throughout the study area. These locations were selected based on citizen input with respect to speeding in residential areas. The locations where the speed data was collected are listed in Table 2. The speed data was collected for both directions of travel. As Table 2 indicates, at all of the segments evaluated, there were vehicles exceeding the speed limit. The fastest vehicles were observed on Kansas Street, Blair Road, Philadelphia Avenue, Eastern Avenue and Piney Branch Road. At Kansas Street near Sheridan Street, Blair Road between Eastern Avenue and Georgia Avenue,

Philadelphia Avenue between Holly Street and Cedar Street, Eastern Avenue between Georgia Avenue and Blair Road, and Piney Branch Road south of Blair Road the average speed exceeded by three or more miles per hour the posted speed limit.

Table 2
Off-Peak Spot Speeds at Selected Locations

	Location	Posted Speed Limit (mph	Minimum Speed (mph)	Average Speed (mph)	Maximum Speed (mph)
1	9th Street between Aspen Street and Butternut Street	25	21.2	22.3	27.6
2	8th Street between Aspen Street and Highland Street	25	18.2	22.7	26.6
3	Aspen Street between Georgia Avenue and Piney Branch Road	25	11.7	24.8	32.6
4	Blair Road between Butternut Street and Aspen Street	25	14.9	27.7	38.3
5	Aspen Street west of Blair Road	25	14.3	23.5	33.6
6	3rd Street north of Sheridan Street	25	14.8	20.0	27.6
7	N. Capitol Street near Underwood Place	25	15.3	25.2	32.2
8	Kansas Street near Sheridan Street	25	22.3	30.0	47.0
9	Blair Road between Eastern Avenue and Georgia Avenue	30	26.3	33.1	43.7
10	Philadelphia Avenue between Holly Street and Cedar St.	25	22.1	29.9	43.4
11	Eastern Avenue between Georgia Avenue and Blair Road	25	20.1	31.0	48.4
12	Piney Branch Road west of 6th Street	30	23.4	26.1	43.7
13	Piney Branch Road south of Blair Road	30	26.3	34.6	44.6

ORIGIN-DESTINATION PATTERNS IN THE STUDY AREA

In order to gain an understanding of existing traffic patterns in the study area, the Study Team conducted a comprehensive assessment of origins and destinations for vehicles entering and exiting the study area during the AM and PM peak period. The origin-destination survey helped identify the travel patterns of all vehicles entering the study area during the peak hours.

Data Collection for Origin-Destination Survey

The data collection effort for the origin-destination survey encompassed the following tasks:

1. Recording of license plates at all major entry and exit points of vehicles entering and exiting the study area: survey personnel (surveyors) recorded license plate data, state and number, onto tape recorders at the locations shown in Figure 14 on November 12, 2002.
2. Recording of missed vehicles: if a surveyor could not get the license plate of a vehicle, he/she was instructed to note the vehicle as a "missed" to have control totals that could be used for the expansion of the survey data.
3. Transcription of license plate records: surveyors entered the state and license plate data for each location onto a computerized database.

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Figure 14. License Plate Survey Locations for Origin-Destination Study

Data Processing for Origin-Destination Survey

Study Team staff used the license plate database to match entering and exiting vehicles. The Study Team made the following assumptions in the database matching process:

1. Unmatched exiting vehicles with District of Columbia and Maryland license plates were assumed to originate their trips in the study area.
2. Unmatched entering vehicles were assumed to terminate their trips in the study area.
3. 25 percent of the unmatched volumes at the entry and exit points were assumed to have entered or exited the study area via streets where license plate data was not collected.
4. The missed vehicles have the same travel patterns as the vehicles for which origin origin-destination matches were found.

In the first step of the license plate matching process, the Study Team developed a "raw" origin-destination trip matrix excluding unmatched vehicles and missed vehicles. In the second step, the Study Team used the assumptions listed above to determine a "total" origin-destination trip matrix for all vehicles entering and exiting the study area.

Trip Matrices and Findings of Origin-Destination Surveys

Tables 3 and 4 present the results of the vehicle matching for the study area during the AM peak period (6:45 AM – 9:15 AM). Tables 5 and 6 present the results of the vehicle matching for the study area during the PM peak period (3:00 PM – 5:30 PM). The matrices of origins and destinations shown in Tables 3 and 5 include the adjustments to account for unmatched and missed vehicles[1]. Figure 15 presents AM peak period license plate distribution. Figure 16 presents PM peak period license plate distribution. The main findings of the origin-destination survey results for the AM peak period are:

- Approximately 15 percent of the vehicles entering the study area are destined to locations within the study area, and approximately 13 percent of the vehicles exiting the study area originate their trips within the study area.
- The most used entry roadways are Georgia Avenue and New Hampshire Avenue.
- Over 300 vehicles that entered the study area via southbound Georgia Avenue left the study area at Blair Road. This indicates that a significant number of southbound commuters traverse the study area via Blair Road.
- The most used exit roadways are Georgia Avenue and Piney Branch Road.
- 27 percent of the vehicles destined to The Walter Reed Army Medical Center entered the study area traveling southbound on Georgia Avenue at Blair Road.
- Over 70 percent of the vehicles that exited the study area on Blair Road southbound at Peabody Street had Maryland license plates.
- Over 60 percent of the vehicles that exited the study area on Aspen Street westbound at Georgia Avenue had Maryland license plates.
- Over 70 percent of the vehicles that exited the study area on Piney Branch Road westbound at Georgia Avenue had Maryland license plates.

[1] The unadjusted "raw" origin-destination matrices are included in Appendix D.

Click to View:

Table 3. Origin-Destination Trips During the AM Peak Hours (6:45 AM – 9:15 AM)

Click to View:

Table 4: Origin-Destination Trips During the AM Peak Hours (6:45 AM – 9:15 AM) As Percentage of Exit Volumes

Click to View:

Table 5: Origin-Destination Trips During the PM Peak Hours (3:00 – 5:30 PM)

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Table 6: Origin-Destination Trips During the PM Peak Hours (3:00 – 5:30 PM) As Percentage of Exit Volumes

Click to View:

Figure 15. AM Peak Period (6:45 AM – 9:15 AM) License Plate Distribution

Click to View:

Figure 16. PM Peak Period (3:00 PM – 5:30 PM) License Plate Distribution

The main findings of the origin-destination survey results for the PM peak period are:

- Approximately 15 percent of the vehicles entering the study area are destined to locations within the study area, and approximately 10 percent of the vehicles exiting the study area originate their trips within the study area.
- The most used exit roadway is Georgia Avenue, and the most used entry roadways are Blair Road, New Hampshire Avenue and Georgia Avenue.
- Approximately 540 vehicles that entered the study area northbound on Blair Road at Peabody Street left the study area via northbound Georgia Avenue at Blair Road. This indicates that a significant number of regional commuters traverse the study area during the PM peak period.
- Over 60 percent of the vehicles that entered the study area on Blair Road northbound at Peabody Street had Maryland license plates.
- Over 45 percent of the vehicles that entered the study area on Aspen Street eastbound at Georgia Avenue had Maryland license plates.
- Over 70 percent of the vehicles that entered the study area on Piney Branch Road westbound at Georgia Avenue had Maryland license plates.

SAFETY

In order to assess safety conditions in the study area, the Study Team obtained accident data of critical intersections from the District Department of Transportation (DDOT) and Maryland Department of Transportation for the years 1999 through 2001[1]. As Table 7 indicates, the intersections in the study area with the largest number of accidents in the last three years are Georgia Avenue at Eastern Avenue, Georgia Avenue at Piney Branch Road, Piney Branch Road at Blair Road, and Eastern Avenue at New Hampshire Avenue.

As summarized in the table, the intersection of Eastern Avenue and New Hampshire Avenue had an average of 11 accidents per year. A large proportion of the accidents occurred during off-peak hours. Left turn, rear end, side-swipe, and right angle collisions are the major types of collisions at this intersection. Improvements in signal timing and road design, and speed enforcement measures may be needed to improve the safety record at this intersection.

The intersection of Georgia Avenue and Piney Branch Road experienced an average of 10 accidents per year from the year of 1999 to the year of 2001. A large proportion of the accidents occurred during off-peak hours. There were eight different types of collisions at this location. The majority of collisions are left turn and rear end collisions. Excessive speeds contribute to these types of collisions. Speed enforcement, geometric improvements and signal timing modifications may be needed to improve the safety record at this location.

[1] Year 2002 accident data was not available when the study was being conducted.

Table 7
Summary of Accident Data

Intersection	Total Number of Accidents (Injuries)			AM Peak Hour Percentage			PM Peak Hour Percentage			Off-Peak Percentage			Accident Type(s)
	1999	2000	2001	1999	2000	2001	1999	2000	2001	1999	2000	2001	1999-2001
Georgia Avenue and Blair Road	1 (5)	1 (0)	3 (2)	0	0	0	0	100	67	100	0	33	Left Turn – 2 Rear End – 2 Parked - 1
Georgia Avenue and Eastern Avenue	12 (8)	6 (6)	3 (3)	8	0	0	50	17	0	42	83	100	Right Angle – 6 Left Turn - 7 Rear End - 2 Side Swiped – 2 Pedestrian – 1 Other - 2
Georgia Avenue and Aspen Street	5 (3)	N/A	N/A	0	N/A	N/A	20	N/A	N/A	80	N/A	N/A	Rear End – 1 Side Swiped – 2 Head On – 1 Parked - 1
Georgia Avenue and Piney Branch Road	14 (10)	4 (1)	11 (9)	7	0	18	36	75	0	57	25	82	Right Angle – 3 Left Turn - 7 Rear End - 6 Side Swiped – 4 Head On - 2 Fixed Object – 3 Ran Off Road – 1 Pedestrian – 2 Other - 1
Piney Branch Road and Aspen Street	1 (1)	3 (1)	6 (5)	0	0	33	0	0	17	100	100	50	Right Angle - 4 Rear End - 3 Side Swiped - 1 Head On - 1 Parked - 1
Piney Branch Road and Philadelphia Avenue	1 (0)	5 (2)	3 (2)	0	0	0	100	40	0	0	60	100	Rear End - 4 Angle - 4 Fixed Object - 1

N/A: Not Available
Appendix D presents the complete accident data worksheets used to generate the summary presented in Table 7.

Table 7
Summary of Accident Data
(Continued)

Intersection	Total Number of Accidents (Injuries)			AM Peak Hour Percentage			PM Peak Hour Percentage			Off-Peak Percentage			Accident Type(s)
	1999	2000	2001	1999	2000	2001	1999	2000	2001	1999	2000	2001	1999-2001
Piney Branch Road and Butternut Street	3 (2)	1 (0)	1 (0)	0	0	0	33	100	0	67	0	100	Left Turn - 1 Rear End - 2 Head On - 1 Fixed Object - 1
Piney Branch Road and Blair Road	10 (13)	2 (0)	5 (13)	0	0	0	10	0	0	90	100	100	Right Angle - 2 Left Turn - 7 Rear End - 3 Head On - 2 Fixed Object - 1 Ran Off Road - 1 Pedestrian - 1
Piney Branch Road and Eastern Avenue	5 (4)	N/A	N/A	60	N/A	N/A	20	N/A	N/A	20	N/A	N/A	Left Turn - 2 Head On - 1 Parked - 1 Other - 1
Blair Road and Eastern Avenue	2 (0)	1 (1)	N/A	50	0	N/A	0	0	N/A	50	100	N/A	Left Turn - 1 Rear End - 1 Other - 1
Blair Road and Cedar Street and 4th Street	1 (0)	4 (8)	N/A	0	25	N/A	0	25	N/A	100	50	N/A	Rear End - 2 Side Swiped - 2 Other - 1
Blair Road and Van Buren Street	1 (0)	3 (3)	2 (3)	0	0	0	0	0	0	100	100	100	Right Angle - 1 Rear End - 3 Side Swiped - 2 Other - 1

N/A: Not Available
Appendix D presents the complete accident data worksheets used to generate the summary presented in Table 7.

Table 7
Summary of Accident Data
(Continued)

Intersection	Total Number of Accidents (Injuries)			AM Peak Hour Percentage			PM Peak Hour Percentage			Off-Peak Percentage			Accident Type(s)
	1999	2000	2001	1999	2000	2001	1999	2000	2001	1999	2000	2001	1999-2001
Blair Road and Aspen Street	3 (1)	4 (4)	3 (5)	33	25	33	0	0	0	67	75	67	Right Angle - 2 Left Turn - 2 Rear End - 2 Head On - 1 Parked - 3
Carroll Street and Cedar Street	3 (2)	1 (0)	N/A	0	0	N/A	33	0	N/A	67	100	N/A	Parked - 1 Pedestrian - 1 Other - 2
Carroll Street and Maple Street	N/A	1 (0)	3 (3)	N/A	0	0	N/A	0	33	N/A	100	67	Left Turn - 1 Rear End - 1 Parked - 1 Other - 1
Carroll Avenue and Laurel Avenue	1 (0)	N/A	N/A	100	N/A	N/A	0	N/A	N/A	0	N/A	N/A	Rear End - 1
Eastern Avenue and Carroll Street	N/A	N/A	1 (0)	N/A	N/A	0	N/A	N/A	100	N/A	N/A	0	Head On - 1
Eastern Avenue and Laurel Street	N/A	5 (5)	N/A	N/A	20	N/A	N/A	20	N/A	N/A	60	N/A	Side Swiped - 1 Head On - 2 Pedestrian - 1 Other - 1
Eastern Avenue and Kansas Avenue	2 (0)	2 (4)	2 (1)	0	0	0	50	0	0	50	100	100	Right Angle - 2 Rear End - 1 Side Swiped - 2 Fixed Object - 1
Eastern Avenue and New Hampshire Avenue	8 (7)	15 (4)	11 (5)	0	7	0	13	27	27	87	66	73	Right Angle - 6 Left Turn - 9 Rear End - 8 Side Swiped - 7 Head On - 3 Other - 1

N/A: Not Available
Appendix D presents the complete accident data worksheets used to generate the summary presented in Table 7.

The intersection of Georgia Avenue and Eastern Avenue experienced an average of seven accidents per year. However, the total number of accidents decreased from 12 accidents during the year 1999 to three accidents during the year 2001. Most accidents happened during off-peak hours. Right angle and left turn collisions are two major types of collisions at this intersection. Geometric and signal modifications may be needed to improve the safety record at this location.

The intersection of Piney Branch Road and Blair Road experienced an average of six accidents per year. However, the total number of accidents decreased from 10 accidents during the year of 1999 to five accidents during the year of 2001. Most accidents happened during off-peak hours. Left turn collisions are the major type of collisions at this intersection. Speed enforcement and signal timing modifications would help improve the safety record at this intersection.

QUEUES AT CRITICAL INTERSECTIONS

Queuing observations were conducted at critical intersections to adequately develop a computerized model of existing traffic conditions. Maximum queue samples were taken at all approaches of critical intersections. The average of the maximum queues was then calculated. The average of the observed maximum queues for the critical intersections is summarized in Figure 17. As shown in the figure, the longest queues were observed on the southbound approach of New Hampshire Avenue at Eastern Avenue during the AM peak hour. Six lanes that narrow down to four lanes and construction on New Hampshire Avenue contributed to longer queues. Southbound Blair Road at Carroll Street was another approach where long queues were observed during the AM peak hour.

During the PM peak hour, the intersections where the longest queues were observed are: Blair Road northbound at Carroll Street/4th Street, Eastern Avenue eastbound at Kansas Avenue, Georgia Avenue southbound at Butternut Street, and Georgia Avenue northbound at Kalmia Road.

The queue information was used to validate the existing conditions traffic model. The results of the traffic simulations were compared to the observed queues. Where the Study Team found significant discrepancies between modeled conditions and observed conditions, the input data used to set up the model was thoroughly examined to eliminate the possibility of errors in the development of the model. After errors were ruled out, discrepancies were reconciled by making adjustments to the traffic model parameters to make the model replicate more accurately observed traffic conditions.

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Figure 17. Observed Maximum Queues at Critical Intersections

EXISTING LEVELS OF SERVICE

SYNCHRO, a traffic modeling/analysis program, was used to evaluate existing traffic conditions at critical intersections in the study area. The existing traffic volumes, lane configurations[1] and signal timings were entered into SYNCHRO to develop a base case, existing conditions model. SimTraffic, SYNCHRO's associated traffic simulation software, was used to assist in the development of a model that replicates accurately existing conditions.

SimTraffic outputs were used to determine the existing level of service (LOS) and the delay per vehicle for all the critical intersections in the study area. LOS is an indicator of the operating conditions which occur on a roadway under different volumes of traffic and is defined in the 2000 Highway Capacity Manual by six levels, "A" to "F". A number of operational factors can influence the LOS including geometry, travel speeds, delay, and the number of pedestrians crossing the intersections.

LOS "A" represents the best operating conditions and is an indicator of ideal travel conditions with vehicles operating at or above posted speed limits with little or no delays. Conversely, LOS "F" generally indicates forced flow conditions illustrated by long delays and vehicles queues. Level of Service "C" indicates a condition of stable flow and is generally considered satisfactory in rural areas. Under LOS "D" conditions, delays are considerably longer than under LOS "C", but are generally considered acceptable in urban areas. At LOS "E" the roadway begins to operate at unstable flow conditions as the facility is operating at or near its capacity. A detailed description of the different levels of service and their associated delays for both signalized and unsignalized intersections is included in Appendix F.

The existing LOS for the AM and PM peak hours for the study area intersections is presented in Figure 18. As shown in the figure, most of the intersections experience more congestion during the PM peak hour than during the AM peak hour.

As displayed in the figure, the intersections that operate at LOS F during both the AM and PM peak hours are Georgia Avenue at Blair Road, Blair Road at Piney Branch Road, Blair Road at Cedar Street and New Hampshire Avenue at Eastern Avenue. At the intersection of Blair Road Piney Branch Road, left turn vehicles blocking through traffic is one of the reasons for vehicular delays and poor level of service. At the intersection of Blair Road and Cedar Street/4th Street, the complicated geometry of the intersection and the large volumes of traffic traversing it during the peak hours are factors that make the intersection operate at LOS F.

Most of the intersections on Georgia Avenue operate at LOS F during the AM or PM peak hours. The intersection of Georgia Avenue at Elder Street operates at LOS F during the AM peak hours. The poor level of service is the result of blockages of Georgia Avenue traffic due to the vehicle inspections at the entrance to the Walter Reed Army Medical Center. Delays at the intersection of Piney Branch Road and Georgia Avenue are significant during the PM peak hour due in part to the complicated geometry and the large volumes traversing this location. The intersection of Carroll Street with Eastern Avenue and Willow Street operates at LOS F during the PM peak hour. Signal timing optimization may help improve the level of service at this intersection.

[1] The lane configurations for the study area intersections are summarized in Appendix E

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Figure 18. Existing Levels of Service

With regards to unsignalized intersections, those performing at the worst LOS include Eastern Avenue at Kansas Avenue (PM peak hour), Eastern Avenue at Laurel Street (AM peak hour), and Georgia Avenue at Fern Street (AM peak hour).

The Study Team used existing level of service information to identify locations where future improvements - such as signalization, changes in signal timing/phasing and/or turn lanes – could be implemented. Detailed descriptions of all of the transportation issues identified in the study area are provided in the Summary of Study Area Transportation Issues and Recommendations section of this report.

PEDESTRIAN CIRCULATION AND FACILITIES

The Study Team conducted a comprehensive survey of the existing pedestrian facilities. In the initial survey the Study Team determined the locations and widths of existing sidewalks in the study area. After meeting with citizens and hearing their concerns, the Study Team conducted more detailed field assessments of the pedestrian facilities in a one-half mile radius surrounding the Takoma Metro Station. The items reviewed included the conditions of the sidewalks, the sidewalk material, and the locations and widths of any buffer between the curb and sidewalk. This review also located disabled access ramps and assessed connectivity of ramps with respect to each other and the other pedestrian features.

Pedestrian Circulation

The majority of the study area is residential. There are a variety of significant pedestrian destinations which include: the Takoma Metro Station, primary and secondary schools, colleges, places of worship, post offices, libraries, theaters and community recreation centers. These locations are connected by a sidewalk network made up of different materials (i.e. brick and concrete pavers) in a range of conditions (between good and poor).

Some of the smaller and denser residential areas have no sidewalks on either side of the street, particularly in the neighborhoods to the west of the train tracks. Other sections have incomplete sidewalks with varying levels of continuity between them. Still others have fairly new sidewalks on both sides of the street with considerable care being given to upkeep, sidewalk width and disabled ramps.

Figure 19 identifies pedestrian destinations and sidewalk widths within the study area. Some general observations made regarding the sidewalk circulation in the area include:

- Sidewalks tend to be wider directly adjacent to the various major destinations, especially educational institutions.
- More highly utilized roadways, such as Blair Road and Eastern Avenue, do not have sidewalks along their entire length.
- Sidewalks tend to be wider in the residential areas of the Takoma section of DC than in residential areas of Takoma Park, Maryland.

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Figure 19. Existing Pedestrian Facilities

Pedestrian crossings are primarily regulated by properly placed crosswalks in conjunction with appropriate pedestrian signals throughout the study area. Most of the signalized intersections also contain pedestrian signals with the exception of the following locations:

- Georgia Avenue at Van Buren Street – missing NB/SB pedestrian signals
- Philadelphia Avenue at Piney Branch Road – missing NB/SB/EB pedestrian signals
- Georgia Avenue at Aspen Street – missing pedestrian signal head at WB sidewalk heading north
- Carroll Street at Cedar Street – missing SB/WB pedestrian signals
- Philadelphia Avenue at Maple Avenue – missing one pedestrian signal

Pedestrian Counts

The Study Team also conducted an assessment of the peak period pedestrian activity in the study area during which time individuals were stationed at intersections to count the number of pedestrians crossing the street. The intersections counted are indicated in Figure 20 along with the results of the counts. As expected, during the peak hours there were higher numbers of pedestrians crossing roadways in the area nearest the Metro Station. Since pedestrian activity has an effect on traffic operations, the pedestrian count information was used as an input in the development of the existing conditions AM and PM peak hour traffic model.

Sidewalk and Buffer Materials and Conditions

Notwithstanding other codes and standards, the Americans with Disabilities Act (ADA) set up guidelines for providing equal, or at the least, reasonable, access for individuals with disabilities to major public destinations. ADA regulations require that the flat area of disabled ramps have a minimum width of 3 feet – 4 inches; however, in the State of Maryland, new measures are being taken to upgrade pedestrian and disabled access along certain non-limited access roadways to a minimum 4’ flat ramp width during re-development efforts and for new designs. The wider ramps allow for easier maneuverability for individuals in wheelchairs or utilizing motorized scooters.

The Study Team conducted a field survey of the existing sidewalk materials and conditions and noted any buffer area between the curbside and the sidewalk. The condition of the sidewalk directly relates to the degree of accessibility for individuals with disabilities. The type and size of the buffer area is important for helping to explain the level of comfort individuals have when walking through that area.

The sidewalk buffers range between zero and 10 feet wide. Most of the buffer areas are composed of grassy strips and widely spaced trees of various sizes. Many of the denser residential areas in Takoma Park, Maryland have minimal sidewalk buffers, if at all, and thus tend to have no buffers between the curb line and the sidewalks.

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Figure 20. Existing (2002) Peak Hour Pedestrian Counts

Most of the sidewalks in the study area are composed of concrete and are in fair to good condition. There are a few locations where the concrete has begun to deteriorate significantly such that a disabled user would have problems maneuvering through the area. Brick sidewalks are primarily located in the commercial areas and tend to be in fair to good condition as well. One of the most notable problems arising with the brick sidewalks is the tendency for individual bricks to become loose, creating a hazardous pedestrian situation and warranting a lower rating by the Study Team. Another common cause for poor ratings of sidewalks was tree roots invading the sidewalk space, particularly in the District of Columbia.

The Study Team rated the sidewalks within one-half mile of the Takoma Metro Station in the following manner:

- Good – generally smooth surface with little to no uplifting or depressions, and no loose concrete or gravel. Newer looking sidewalks fell into this category.
- Fair – minor uplifting and minor depressions with some visible broken and loose gravel, and minor vegetation growth seeping through the seams.
- Poor – major uplifting and depressions, missing sections, broken and/or missing concrete or brick, with large tree roots and other vegetation coming through the seams.

As Table 8 indicates, most of the sidewalks in the vicinity of the Metro Station are in good condition. However, there are street sections with no sidewalk or sidewalks in poor conditions. The Summary of Study Area Transportation Issues and Recommendations section of this report includes recommendations to address these deficiencies.

Table 8
Sidewalk and Buffer Conditions within One-Half Mile of the Takoma Metro Station

Primary Roadway	Limits	Buffer Width	Sidewalk Material & Condition
Hemlock St	8th St to Eastern Ave	No Buffer	No Sidewalk
Geranium St	Georgia Ave to Blair Rd	No Buffer	No Sidewalk
Fern Pl	Georgia Ave to Blair Rd	2 ½ - 3’	Concrete, Fair Condition.
Elder St	Georgia Ave to 7th St	2½’ – 4’	Concrete, Good Condition.
Dogwood St	9th St to 8th St	2 ½’	Concrete, Good Condition.
Dahlia St	Georgia Ave to 9th St 8th St to 5th St	0 – 4 ½’ 0 – 5’	Concrete, Good Condition. Concrete, Fair Condition.
Highland Ave	9th St to Piney Branch Rd	No Buffer	Concrete, Good Condition.
Cedar St	Piney Branch Rd to Blair Rd	0 – 4 ½’	Concrete, Good Condition.
Butternut St	Georgia Ave to 5th St 5th St to 4th St. 4th St to Blair Rd	3 ½’ - 4 ½’ 3’ No Buffer	Concrete, Good Condition. Concrete, Fair Condition. Brick, Fair Condition.
Aspen St	Georgia Ave to Piney Branch Rd Piney Branch Rd to 4th St 4th St to Laurel St	3 ½’ – 4’ 3 ½’ – 4’ 2’ – 5½’	Concrete, Good Condition. Concrete, Fair Condition. Concrete, Good Condition.
Whittier St	Georgia Ave to Piney Branch Rd. Piney Branch Rd to Blair Rd Sandy Spring Rd to 2nd St 1st St to Harlan Pl	2 ½’ 3 ½’ - 5½’ 4½’ 3’ – 4½’	Concrete, Fair Condition. Concrete, Good Condition. Concrete, Fair Condition. Concrete, Fair Condition
Van Buren St	8th Street to 7th St and 6th to Blair Rd 7th to 6th St Railroad Tracks to Harlan Pl	3’ – 5’ 3 ½’ – 5 ½’ 3 – 4’	Concrete, Good Condition Concrete, Fair Condition. Concrete, Good Condition.
Carroll Ave	RR Tracks to Tulip Ave	No Buffer	Brick, Good Condition.
Walnut St	Laurel St to 2nd St 2nd St to Eastern Ave	3’ 3’	Concrete, Good Condition. Concrete, Poor Condition.

Table 8
Sidewalk and Buffer Conditions within One-Half Mile of the Takoma Metro Station (Continued)

Primary Roadway	Limits	Buffer Width	Sidewalk Material & Condition
Walnut Ave	Eastern Ave to Westmoreland Ave	2’	Concrete, Good Condition.
Maple St	Sandy Spring Rd to Carroll Ave	0 – 3’	Concrete, Fair Condition.
Willow St	Sandy Spring Rd to Eastern Ave	0 – 2’	Concrete, Good Condition.
Laurel St	Sandy Spring Rd to Eastern Ave Eastern Ave to Tulip Ave	2’ – 3’ No Buffer	Concrete, Good Condition Brick, Good Condition.
Sandy Spring Rd	Maple St to Van Buren St	No Buffer	No Sidewalk
2nd St	Laurel St to Walnut St Walnut St to Van Buren St	3’ 2’ – 4’	Concrete, Poor Condition. Concrete, Fair Condition.
Underwood Pl	Whittier Street to Van Buren St	3’	Concrete, Fair Condition.
Eastern Ave	Cedar Ave to Piney Branch Rd Carroll Ave to Whittier St	No Buffer 0 – 3’	Concrete, Fair–Good Condition Concrete, Good Condition.
Blair Rd	Eastern Ave to Cedar St Cedar St to Underwood St	0 – 7’ No Buffer	Brick, Good Condition Concrete, Good Condition
Georgia Ave	Fern Pl to Aspen St	0 – 4’	Concrete, Good Condition
9th St	Aspen St to Dogwood St Dogwood St to Elder St Geranium St to Hemlock St	2’ – 3’ 2 ½’ 4’	Concrete, Fair Condition Concrete, Good Condition Concrete, Fair Condition
8th St	Aspen St to Elder St Elder St to Hemlock St	3’ – 5’ 5’	Concrete, Good Condition Concrete, Fair Condition
7th St	Underwood St to Whittier St Dahlia St to Fern St	2 ½’ – 3 ½’	Concrete, Fair Condition
7th Pl	Van Buren St to Whittier St	0 – 2 ½’	Concrete, Good Condition
6th St	Underwood St to Aspen St Aspen St to Cedar St	2½’ – 5½’ 2’ – 4’	Concrete, Good Condition Concrete, Fair Condition
5th St	Underwood St to Cedar St Cedar St to Dahlia St	4’ 5’	Concrete, Good Condition Concrete, Fair Condition
4th St	Van Buren St to Aspen St Aspen St to Blair Rd	4’ – 5’ No Buffer	Concrete, Good Condition Brick, Good Condition
Piney Branch Rd	Philadelphia Ave to Tulip Ave	0 – 3’	Concrete, Fair Condition
Holly Ave	Eastern Ave to Dogwood St Dogwood St to Philadelphia Ave	0 – 4’ 0 – 1’	Concrete, Good Condition Concrete, Fair Condition
Birch Ave	Cedar Ave to Philadelphia Ave	0 – 2’	Concrete Good Condition
Cedar Ave	Carroll Ave to Tulip Ave Tulip Ave to Philadelphia Ave	3’ 0 – 3’	Concrete, Fair Condition Concrete, Good Condition
Maple Ave	Carroll Ave to Philadelphia Ave	0 – 2’	Concrete, Fair Condition
Willow Ave	Carroll St to Philadelphia Ave	4’ – 8’	Concrete, Fair Condition
Spruce Ave	Tulip Ave to Park Ave	0 – 6’	Concrete, Good Condition
Tulip Ave	Holly Ave to Cedar Ave Cedar Ave to Carroll Ave	0 – 2’ 2’ – 4’	Concrete, Good Condition Concrete, Fair Condition

Disabled Access

The Study Team conducted a detailed assessment of the existing disabled access facilities for the area within one-half mile of the Takoma Metro Station. The major items under review were: existing ramp locations, ramp connectivity, and ramp widths. Figure 21 depicts disabled ramp types within one-half mile of the Takoma Metro Station. Most corners were observed to have handicapped ramps of varying widths. The ramps were measured to determine if the flat widths were greater or less than the preferred minimum 4-feet width.

Notwithstanding other codes and standards, the Americans with Disabilities Act (ADA) set up guidelines for providing equal, or at the least, reasonable, access for individuals with disabilities to major public destinations. ADA regulations require that the flat area of disabled ramps have a

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Figure 21: Disabled Access Surrounding Metro Station Area

minimum width of 3 feet – 4 inches; however, in the State of Maryland, new measures are being taken to upgrade pedestrian and disabled access along certain non-limited access roadways to a minimum 4' flat ramp width during re-development efforts and for new designs. The wider ramps allow for easier maneuverability for individuals in wheelchairs or utilizing motorized scooters.

In both the District of Columbia and in Maryland, there is evidence of recent widening and upgrading of sidewalks and disabled access ramps, although there are more upgrades noted in the District. There are primarily two different ramp configurations observed in both jurisdictions. The double ramp configuration, shown in Figure 22, provides two perpendicular ramps on a single corner that allows the user to mount a ramp and then turn 90 degrees to wait for the opposing pedestrian signal to change. The single corner ramp configuration, shown in Figure 23, places a single, larger ramp directly at the corner of the intersection. The user can mount the ramp and turn to wait for the signal change without having to maneuver onto a second ramp. Both configurations are utilized in both jurisdictions with single corner ramps being used primarily at the "T" intersections.

Figure 22
Double Ramp Configuration

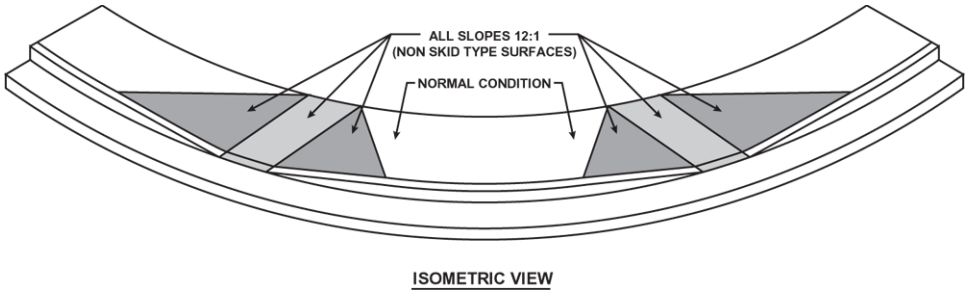
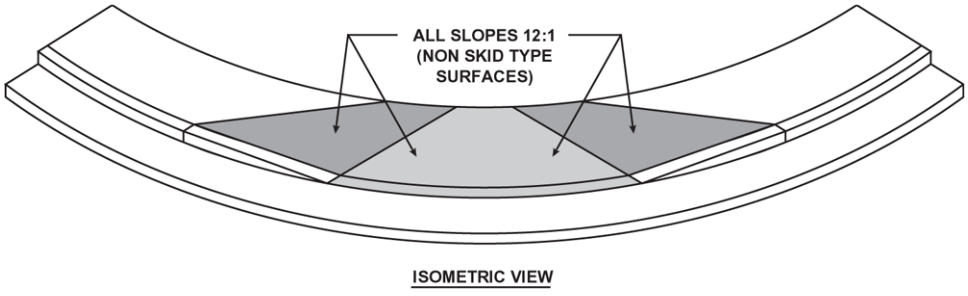


Figure 23
Single Corner Ramp Configuration



Most crosswalks are striped, although there are several locations where the striping does not properly coincide with the ramp locations. This unmatched striping was especially significant with the single corner ramp configuration where improper placement would guide the user into the middle of an intersection in order to access the ramp.

Several sidewalks within the study area are not disabled accessible. In the District of Columbia, 9th Street has the most consecutive inaccessible intersections: Highland Avenue, Dahlia Street,

Dogwood Avenue, and Elder Street have no handicapped ramp access at all. All of the other north-south roadways in the District portion of the study area have ramped access for their entire lengths.

There are locations where the user does not have continuous access to the same side of the street for the entire length of the roadway. In these locations, the user has to cross the roadway and use the ramps on the other side of the street to continue in the same direction. This scenario was usually observed in locations where remaining on a particular side of the street to cross would be seen as undesirable (i.e., locations where the user may not be visible to drivers if they stayed on that side of the street, or locations where there are several driveways or other obstructions to sight).

The lack of continuous access was observed at the following locations:

1. Van Buren Street at 4th Street
2. Highland Avenue at 8th Street
3. Elder Street at 7th Street
4. Geranium Street at Blair Road
5. Cedar Avenue at Dogwood Road
6. Maple Avenue at Valley View Avenue
7. Westmoreland Avenue at Carroll Avenue
8. Walnut Street at Eastern Avenue
9. Van Buren Street at Sandy Spring Road
10. Whittier Street at 2nd Street.

Directly adjacent to the Metro Station along Carroll Avenue, there is a section of sidewalk that is fairly new that has some more subtle difficulties than listed in the previous section. As shown in Figures 24 and 25, while the brick inlay in this section is in relatively good condition, the slope of the sidewalk is a major hindrance to an individual in a wheelchair or electric scooter. The ramps here are narrow which, combined with the improperly sloped sidewalk, makes maneuvering in this area virtually impossible.

This area along Carroll Street also has continuity problems for ADA access due to large numbers of driveways which access various businesses along the road. Many of these driveways are not being utilized by the businesses and have chains crossing them. This may be due to the increased difficulty in providing continuous access to the business since the driveway is located on such a congested roadway.

Figure 24
Poorly Sloped Sidewalk

Figure 25
Disabled Access Ramp

PARKING

Parking is regulated throughout most of the study area by the use of on-street residential parking restrictions and parking meters and is considered a critical issue by many area residents. On-street parking within the District of Columbia is regulated by signs that allow non-permit holders to park for a period of between one and three hours. There is also metered on-street parking, predominantly in the commercial districts and areas surrounding the Metro Station. In Takoma Park, MD, the zoning regulations are different in that they do not allow non-residents to park between 7:00 AM and 7:00 PM on weekdays.

On-Street/Metered Parking

Parking restrictions in the study area are summarized in Figure 26. Parking along Georgia Avenue is regulated by permit signage, except for the section between Alaska Avenue and Hemlock Street, and between Tuckerman Street and Quackenbos Street, where parking meters restrict parking on both sides of the street.

Parking is not permitted on Piney Branch Road between Georgia Avenue and 9th Street and between Butternut Street and Blair Road (on the west side of the roadway). There is an area near the Metro Station that is currently unsigned and is regularly occupied by long-term users. The balance of Piney Branch Road has permit parking regulations.

Along Blair Road no parking is permitted on either side of the roadway from Georgia Avenue to Peabody Street, except for the section along the west side of the street between Whittier and Peabody Streets.

Eastern Avenue, which is discontinuous throughout the study area, has no parking zones on the east side of the roadway between Piney Branch Road and Cedar Avenue as well as between Walnut Street and New Hampshire Avenue. The remaining sections of the road allow parking on the west side.

No parking is permitted along Philadelphia Avenue or along Carroll Avenue, between Philadelphia Avenue and Tulip Avenue.

Along Carroll Avenue/Carroll Street, parking is permitted with meter restrictions in the commercial district and with no restrictions on the north side of Carroll Street between Cedar Avenue and Willow Street, which is typically used by commuters for long-term parking.

Peabody Street has residential permit parking along most of its length, with the only exceptions being on the south side of Peabody between 9th and 8th Streets and between 2nd Street and Blair Road. No parking is permitted just west of Chillum Road and New Hampshire Avenue.

Click to View:

Figure 26. Existing Parking

Other areas of note regarding on-street parking are as follows:

- There is parking only on the west side of the roadway on the entire length of 5th Street and predominantly on the east side of Holly, Cedar, Willow, and Spruce Avenues.
- Several of the street segments throughout the study area have residential permit parking on one side of the street and no parking on the other, often due to narrow road widths in the residential areas.
- There is parking only on the south side of Hemlock and Geranium Streets between Georgia Avenue and 9th Streets and on Highland Avenue between 9th Street and Piney Branch Road.

Off-Street Parking

Within the Washington, D.C. portion of the study area, three private parking lots, as shown in Figures 27, 28, and 29, all within one-half mile of the Metrorail station, allow users to lease a space on a daily, weekly, or monthly basis. One lot is located between a church and an apartment building at the intersection of Butternut and 4th Streets, one is across the street from the Takoma Funeral Home along Carroll Street, and the last is behind the CVS store along Carroll Street between Maple and Willow Streets. The lot on Butternut Street has 20 parking spaces, the lot along Carroll Street has 59 parking spaces, and the lot along Willow Street has 76 parking spaces.

Figure 27
Off-Street Parking on Butternut Street

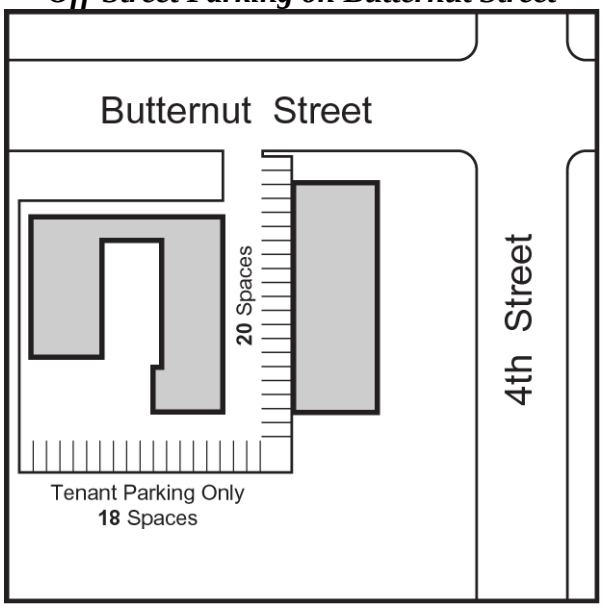


Figure 28
Off-Street Parking along Carroll Street

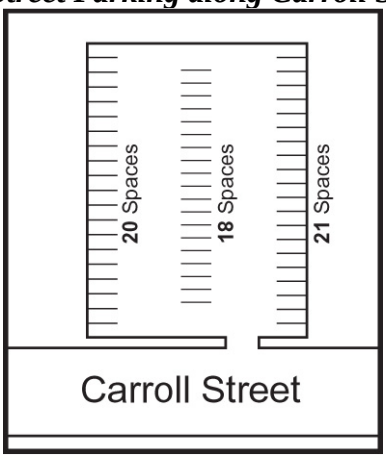
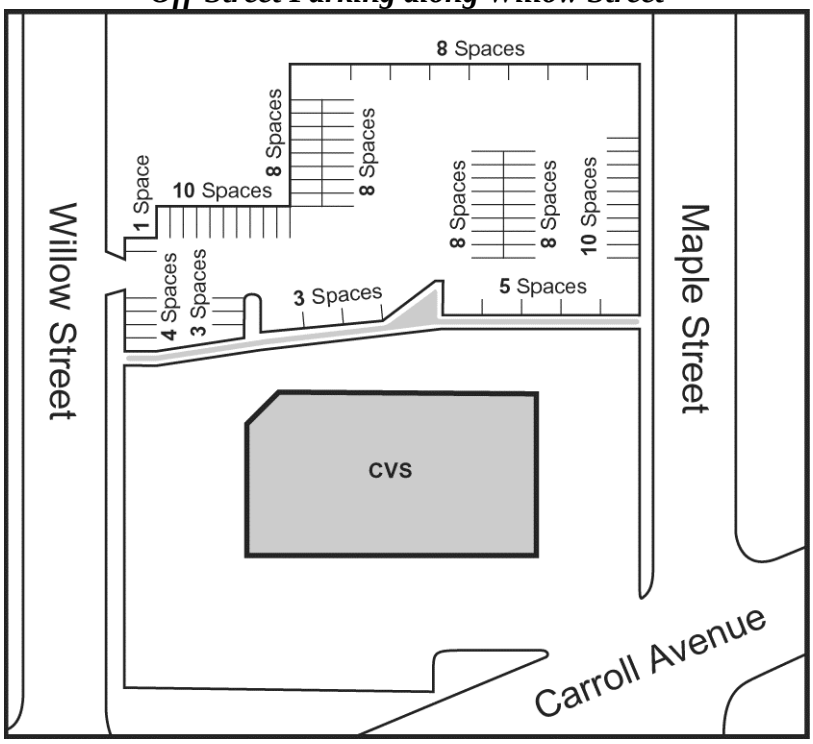


Figure 29
Off-Street Parking along Willow Street



Metro Station Parking

As Figure 30 indicates, the Takoma Metro Station parking facilities are located northwest of the station, and presently, parking is accessed via Eastern Avenue between Piney Branch Road and Cedar Avenue. Currently, there are restrictions against long-term commuter parking at the station.

The 152-space parking lot is divided into Sections A, B, and D, each with different parking restrictions. Section A is comprised of five 15-minute, Kiss-and-Ride, un-metered waiting spaces. Sections B and D are longer term parking areas, having 94 spaces and 58 spaces respectively with a maximum 7-hour daily parking limit. To further discourage all day commuter parking, the sections have offset time limit restrictions.

Section B parking is permitted between 8:30 AM and 3:30 PM with no parking permitted between 3:30 PM and 7:00 PM. Patrons may resume parking in Section B between 7:00 PM and 2:00 AM. Section D parking begins at 10:00 AM and ends at 2:00 AM, with no parking permitted between 2:00 AM and 10:00 AM on weekdays. Holiday and weekend parking is free all day in all sections. In addition to a large sign indicating parking restrictions in each section, shown in Figure 31, all parking meters have time limits posted in the viewing window of the meter.

The Study Team conducted observations of parking activities throughout a weekday. Over the 10.5-hour period of observation (8:30 AM – 7:00 PM), several patrons were observed parking in the lot outside of the posted time limits for each section. There is no clearly delineated sign indicating what hours require payment of the parking meters (i.e., when meter restrictions end). Two parking citations were issued in Section B between 8:30 AM and 7:00 PM on the observation day, both being given for expired parking meters.

Figure 31
Metro Station Section Parking Signs

Click to View:

Figure 30. Metro Parking and Station Access

On the observation day, 234 different vehicles parked at the station. As Table 9 illustrates, between 9:30 AM and 2:30 PM, more than 80 percent of the spaces in Section B were in use. Section D had greater than 80 percent utilization between 11:30 AM and 3:30 PM, and between 5:30 PM and 6:30 PM.

As indicated in Table 10, parking restrictions are often violated at the Takoma Metro station. The most severe periods of violation showed that 24 percent of Section D was utilized prior to 10:00 AM and 65 percent of the spaces in Section B were used after 3:30 PM. Of the 234 different cars that parked at the station, 47 vehicles (or approximately 20 percent) were observed in the parking lot beyond the 7-hour posted time limit, with more than half of those exceeding the time limit by more than an hour.

Table 9
Utilization of Takoma Metro Station Parking Facilities

Time	Section B		Section D		Total, %
	# of Cars	% of Section	# of Cars	% of Section	Both Sections of Lot
8:30 AM	0	0%	5	9%	3%
9:30 AM	77	82%	14	24%	60%
10:30 AM	79	84%	35	60%	75%
11:30 AM	77	82%	57	98%	88%
12:30 PM	75	80%	58	100%	88%
1:30 PM	80	85%	58	100%	91%
2:30 PM	80	85%	58	100%	91%
3:30 PM	63	67%	53	91%	76%
4:30 PM	49	52%	44	76%	61%
5:30 PM	50	53%	57	98%	70%
6:30 PM	50	53%	49	84%	65%
7:00 PM	46	49%	32	55%	51%
Total Spaces	**94**	**100%**	**58**	**100%**	**152**

Table 10
Utilization of Takoma Metro Station Parking Facilities

SECTION	Hours over Limit					# Cars in Day
	0	**1**	**2**	**3**	**4**	
B	113	8	0	0	14	135
D	74	14	4	4	3	99
Total	187	22	4	4	17	234
Percentage	80%	9%	2%	2%	7%	100%

Commercial Parking Deficiencies Near Old Town Takoma Park

Background

In 2001, Urciolo Properties released a market profile showing a shortage of short-term parking in Old Town Takoma Park and Takoma Junction. The market study contained detailed demographic data, descriptions of businesses, an inventory of existing parking and an analysis of parking requirements based on zoning ordinances. Related to the market profile is a proposal to expand a retail strip in Old Town Takoma Park to include a small movie theater, a restaurant and a parking garage. This expansion would complement the existing retail and business needs of Old Town, which consist of a mix of retail and office uses and off-street and on-street parking.

The findings of the market profile support Urciolo's development proposal. Of interest to the City of Takoma Park was how underserved commercial land uses are in Old Town and Takoma Junction. As described above, most of the on-street parking in the vicinity of the Takoma Park commercial district is zoned residential with restricted time limits. The City of Takoma Park is using this study to evaluate the potential viability of a parking garage in considering the possibility of sharing the construction cost of the garage with Urciolo Properties.

Methodology[1]

For this transportation study, the parking demand in the vicinity of the proposed parking garage was determined by applying the off-street parking requirements, based upon the zoning code for each jurisdiction, to the associated land uses. The proximity to the Metro Station results in reduced demand for parking. Since the zoning regulations for Montgomery County and for DC allow for the application of adjustments to the parking requirements to account for proximity to the Metro station, the calculation of parking requirements reflects adequately the demand for parking in the area. The City of Takoma Park follows the Montgomery County Zoning Ordinances, and the Takoma neighborhood of DC follows the District of Columbia's regulations.

[1] Detailed parking deficiency methodology is presented in Appendix G

Field visits of the area were conducted to help with the application of specific requirements which are not based solely upon the total square footage of the land use, such as for restaurants, schools and religious institutions. Existing parking was also inventoried for on-street locations (residentially zoned and metered areas) and off-street parking lots.

Parking deficiencies were calculated by subtracting the existing inventory from the required parking. Per the code regulations in both jurisdictions, reduction factors were applied to the determined parking requirements as credit for proximity to transit. Determining the short term parking demand within the vicinity of the proposed parking garage was the primary objective of this portion of the study.

Existing Parking Requirements for Takoma Park, Maryland

The study team made the following assumptions with respect to land uses involved in the development of the existing parking requirements for Takoma Park, Maryland:

- If the Retail/Service land use is specified, the parking requirement for Retail, or 5 parking spaces per 1000 square feet, was used as a conservative measure.
- If the property address contains various land uses, mixed use reductions were applied as specified in Section 59-E-3.1 of the Montgomery County Zoning Ordinances.[1]
- If the property address contains various land uses, each land use was assumed to have an equal split of the available square footage.
- A reduction of 25 percent is given for "office/service" land uses within 800 feet of a transit center.

Existing Parking Requirements for Takoma, D.C.

The study team made the following assumptions with respect to land uses involved in the development of the existing parking requirements for the District of Columbia:

- The Retail/Service land use category is comprised of the following uses: Public Service, Museum, Library, Gallery, Store, Commercial-Retail, Commercial-Restaurant, and Store-Restaurant.
- The "Other" land use category is comprised of the following uses: Gas Station, Commercial-Specific Purpose, and Special Purpose-Miscellaneous.
- Educational land uses are divided into Elementary/Junior High School, High School, and College/Trade School.
- A 25 percent reduction is given for all businesses located within 800 feet of a transit center.

Results

As shown in Table 11, there is currently a shortage of short term parking available in the commercial/institutional districts of the Takoma area equaling approximately 90 spaces (combining DC and MD).

Table 11
Commercial Parking Demand Uses

	Existing Parking (2002)	Existing Required Parking (2002)
WASHINGTON, DC		
Retail/Service Space	42	53
Office Spaces	0	8
Garage Spaces++	47	21
Warehouse Spaces	7	48
Religious	100	26
Educational	107	125
Other (includes Gas Stations & Recreational)	37	35
On-Street, 2-hr in Res. Zone*	67	
On-Street, Metered	38	
Off-Street Parking Lots	155	
SUBTOTAL^	**553**	**296**
TAKOMA PARK, MD		
Retail Spaces	28	238
Service Spaces	331	378
Restaurant Spaces	15	135
On-Street – Metered	30	
Off-Street Parking Lots	0	
SUBTOTAL	**404**	**751**
TOTAL	**957**	**1,047**

Additional Required Parking	**90**

*Assumed 50% of Residential Zone is available to General Short-Term Parking
++ Since parking is self contained and may not be shared by other land use patrons, the surplus value is removed from the calculation of parking deficits for repair garages.
^ Excludes parking for garage spaces (see note above)

PUBLIC TRANSPORTATION

Bus and rail service is provided by the Washington Metropolitan Area Transit Authority (WMATA, herein referred to as Metro). Additional bus service is also provi
ded by Montgomery County Ride On service (referred to throughout this document as Ride On).

Transit Service

Metrorail Service

The Takoma Metro Station is in the center of the study area on WMATA's Metrorail Red Line passenger train service. The Red Line extends both north and northwest from the central business district of Washington, DC. The Takoma Station is on the more northerly leg of the Red Line from Union Station to Glenmont in Montgomery County, MD. Immediately north of the Takoma Station is the Silver Spring Station with long-term parking and transfers to MARC

train service. Immediately south of the Takoma Station is the Fort Totten Station with transfers to the Metrorail Green Line.

Planning is underway for the Purple Line, proposed to extend from Bethesda to New Carrolton, MD, with a connection to the Red Line proposed at the Silver Spring Station. WMATA's System Expansion Plan (10 Year Capital Improvement Program, September 12, 2002) anticipates the supplemental draft environmental impact statement (SDEIS) for the section between Bethesda and Silver Spring to be completed in early 2003. The draft environmental impact statement (DEIS) for the section between Silver Spring and New Carrolton began last summer, with the selection of the locally preferred alternative (LPA) anticipated in 2004. Implementation of the Purple Line is anticipated to be complete by 2012.

Bus Service

There are multiple Metrobus routes that traverse both the District of Columbia and Montgomery County with some slightly overlapping service provided by the Ride On. As shown in Figure 32, sixteen bus routes service the Takoma Metro Station, and three additional routes cross the study area. As Table 12 indicates, for the buses that serve the Takoma Metro station Ride On uses smaller buses than Metro. Peak period headways range from six to 20 minutes and off-peak period headways range from 20 to 60 minutes. Bus service to the Takoma Metro station begins around 5:30 AM.

Metro buses which travel in the study area also service the Fort Totten, Columbia Heights, McPherson Square, Smithsonian, Archives-Navy Memorial, L'Enfant Plaza, Georgia Avenue-Petworth, Silver Spring, Gallery Place-Chinatown, Cheverly and West Hyattsville Metro Rail Stations. More detail regarding each bus route is provided below.

Metro Route 52, 53, 54 - 14th Street Line

These routes all serve the Takoma Metro Station, Walter Reed Army Medical Center, various locations along 14th Street, the Reeves Center, Columbia Heights and McPherson Square Metro Stations, with the 52 and 53 also accessing the Smithsonian Stations and Bureau of Engraving. The 53 also travels to The Portals Building. The 54 accesses the Metro Center, Archives-Navy Memorial and L'Enfant Plaza Metro Stations. These routes operate daily out of Takoma Metro Station between 5:37 AM and 12:36 AM with varying headways between 10 and 15 minutes in the peak and 30 minutes off-peak and weekends. Buses enter the study area via Aspen Street to Georgia Avenue to Butternut Street, 4th Street and Carroll Streets, terminating at Takoma Metro Station.

Metro Route 62 - Takoma-Petworth Line

This route serves the Takoma Metro Station, Coolidge High School, Manor Park and Georgia Avenue-Petworth Metro Station. Service operates out of Takoma Metro Station between 4:31 AM and 2:18 AM with varying headways ranging between 8 and 12 minutes in the peak and 20 – 30 minutes off-peak and weekends. Service enters the study area via 5th Street to Butternut to 4th to Carroll Street terminating at Takoma Metro Station.

Click to View:

Figure 32. Existing Transit Routes

Table 12
Metro Station Bus Statistics

	METROBUS					RIDE ON							
Bus Routes	**52, 53, 54**	**62**	**F1, F2**	**K2**	**Z19**	**3**	**12**	**13**	**14**	**16**	**18**	**24**	**25**
Bus Size	40'	40'	30'	26'		27 - 40 '	27 - 40 '	27 - 40 '	27 - 40 '	27 - 40 '	27 - 40 '	27 - 40 '	27 - 40 '
Service Period	5:37am - 12:36am	4:31am - 2:18 am	5:44am – 9:45 pm	6:31am - 6:35pm	Peak+ Only	Peak+ Only	5:26am - 12:57am	Peak+ Only	5:55am - 8:56pm	6:09am - 1:09am	5:31am - 10:12pm	5:45am - 8:51am	5:38am - 11:19am
# of Daily Scheduled Trips (Revenue Service ONLY)													
Weekday (AM/PM)	54/52	72/73	32/30	31/30		3/3	55/52	8/12	32/33	67/69	66/62	9/7	50/49
Saturday	39/39	54/56	15/14	--		--	39/39	--	16/18	55/50	41/41	--	30/30
Sunday	39/38	38/39	11/13	--		--	38/38	--	--	50/43	--	--	24/24
Frequency of Service (Minutes)													
Peak Periods	10 -15	8 - 12	20	20		23	12 - 24	20	15 - 30	12 - 15	6 - 14	15 - 20	14 - 17
Off-peak & Weekend	30	20 - 30	60	--		30 - 40	27 - 30	30 - 41	30	15 - 30	15 - 30	24 - 30	27 - 30
Passengers at Takoma Station (Boarding/Alighting)													
Weekday	470/305	706/338	314/335	134/114		8/2	437/343	98/58	175/120	236/246	209/309	94/107	281/272

* This table does not include information for routes not servicing Takoma Metro Station although these routes may service the study area.

+ Refers to one or two buses during the peak AM/PM periods only.

Metro Route F1, F2 - Chillum Road Line

These routes serve the Takoma Metro Station, Chillum Road, Avondale, West Hyattsville Station, Mt. Rainier, Prince George's Hospital, Cheverly and Cheverly Metro Station. Daily service is offered out of Takoma Metro Station between 5:44 AM and 9:45 PM with 20 minute headways during the peak period and 60 minutes off-peak. Buses enter the study area via Rittenhouse Street and Eastern Avenue to Carroll Street and the Takoma Metro Station.

Metro Route K2 - Takoma-Fort Totten Line

This route serves the Fort Totten and Takoma Metro Stations as well as Walter Reed Army Medical Center during peak periods every 20 minutes. No off-peak/weekend service is offered on this route. A short shuttle service is provided between Takoma Metro Station and the Medical Center. Additional service progresses from Takoma Metro Station to Eastern Avenue and exits the study area via North Capitol Street.

Metro Route Z19 - Calverton Express Line

This route serves the Calverton area and Silver Spring Metro Station via Four Corners, the Seventh Day Adventist Church headquarters, and Takoma Metro Station. Peak period service operates out of Takoma Station at 6:56 AM, 12:01 PM, 5:06 PM and 6:05 PM. Service enters the study area via Carroll Avenue to Carroll Street, accesses the Takoma Metro Station, and exits via Eastern Avenue, Piney Branch Road, and Philadelphia Avenue.

Metro Route 70, 71 - Brightwood-Petworth, Georgia Avenue-7th Street Line

These routes both serve the Silver Spring, Georgia Avenue-Petworth, Gallery Place-Chinatown, Archives-Navy Memorial, L'Enfant Plaza, Waterfront-SEU Metro Stations, Walter Reed Army Medical Center, Howard University, and Fort McNair, with the 71 also accessing Buzzard Point. Daily service is provided between 4:00 AM and 2:00 AM with headways ranging from 10 to 35 minutes. Service passes through the study area via Georgia Avenue but does not serve the Takoma Metro Station.

Ride On Route 3 - Takoma Metro Station to Silver Spring Metro Station

This route operates between the Takoma Metro Station, Piney Branch Road, Dale Drive, 16th Street, East-West Highway and Silver Spring Metro Station. Service is offered during AM and PM peak hours, Monday through Friday only, with a 23 minute headway during the peak and variable headway of 30 – 40 minutes off peak. The buses operate out of Takoma Metro Station between 7:05 AM 8:15 AM and 5:42 PM and 6:37 PM. Service enters the study area via Piney Branch Road to Eastern Avenue and terminates at Takoma Metro Station.

Ride On Route 12 - Takoma Metro Station to Silver Spring Metro Station

This route operates between the Takoma Metro Station, Carroll Avenue, Flower Avenue, Wayne Avenue and Silver Spring Metro Station daily. Service operates out of Takoma Metro Station between 4:34 AM and 12:57 AM, with 12 - 24 minute peak headways and 27 – 30 minute off peak headways. Service enters the study area via Carroll Avenue to Carroll Street and terminates at the Takoma Metro Station.

Ride On Route 13 - Takoma Metro Station to Silver Spring Metro Station

This route operates between the Takoma Metro Station, Carroll Avenue, Flower Avenue, Parkside Plaza-Three Oaks, Sligo Creek Parkway, Colesville Road, and Silver Spring Metro Station, Monday through Friday. Service operates out of Takoma Metro Station between 6:24am and 9:15am, with 23-minute peak headways and 4:47 PM to 6:59 PM with 20-minute peak headways and 30 – 41 minute off peak headways. Service enters the study area via Carroll Avenue to Carroll Street and terminates at the Takoma Metro Station.

Ride On Route 14 - Takoma Metro Station to Silver Spring Metro Station

This route operates daily between the Takoma Metro Station, Piney Branch Road, University Avenue, Franklin Avenue, Colesville Road, and Silver Spring Metro Station. Service operates out of Takoma Metro Station between 5:28 AM and 8:56 PM, with 15 – 30 minute peak headways. Service enters and exits the study area via Piney Branch Road and Eastern Avenue.

Ride On Route 16 - Takoma Metro Station to Silver Spring Metro Station

This route operates between the Takoma Metro Station, Carroll Avenue, Ethan Allen Avenue, New Hampshire Avenue, Langley Park, Quebec Terrace, Piney Branch Road, Sligo Avenue, Fenton Street-City Place, and Silver Spring Metro Station daily. Service operates out of Takoma Metro Station between 4:27 AM and 1:09 AM, with 12 – 15 minute peak headways and 30 minute off peak headways. Service enters the study area via Ethan Allen Avenue (MD 410) to Carroll Avenue and Carroll Street and terminates at Takoma Metro Station.

Ride On Route 17 - Silver Spring Metro Station to Langley Park

This route operates between Langley Park, (University Boulevard and New Hampshire Avenue), Merrimac Dr, Carroll Avenue, Philadelphia Avenue, Montgomery College-Takoma Park Campus, Fenton Street-City Place, and Silver Spring Station. Service passes through the study area along Maple Street and Philadelphia Avenues but does not utilize the Takoma Metro Station.

Ride On Route 18 - Langley Park to Silver Spring Metro Station

This route operates between Langley Park, (University Boulevard and New Hampshire Avenue), Merrimac Dr, Carroll Avenue, Takoma Metro Station, Montgomery College-Takoma Park Campus, Blair Mill Road, Second Avenue (Off Peak hours-Weekends), Colesville Road (Peak Hour), and Silver Spring Metro Station Monday through Friday. Service operates out of Takoma

Metro Station between 5:25 AM and 10:12 PM, with 6 - 14 minute peak headways and 15 – 30 minute off-peak headways. Service enters the study area via Carroll Avenue to the west or Takoma Avenue towards Montgomery College-Takoma Park campus.

Ride On Route 24 - Hillandale to Takoma Metro Station

This route operates between Hillandale-Powder Mill Road, New Hampshire Avenue, Northwest Park, Piney Branch Road, and Takoma Metro Station. Service operates out of Takoma Metro Station between 5:45 AM and 8:51 AM, with 15 - 20 minute peak headways and 4:17 PM and 6:55 PM with 15 - 20 minute peak headways and 24 – 30 minute off peak headways.

Ride On Route 25 - Maple Avenue to Takoma Metro Station

This route operates between the Takoma Metro Station, Maple Avenue, Maplewood Avenue, (Sunday) Houston & Roanoke Avenue (Weekdays-Saturday), Washington Adventist Hospital (Weekdays-Saturday), Maple Avenue, and Takoma Metro Station. Service operates out of Takoma Metro Station between 5:42 AM and 11:19 PM, with 14 – 17 minute peak headways and 27 – 30 minute off peak headways. Service enters the study area via Maple Avenue to Carroll Street, where it terminates at Takoma Metro Station.

Bus Coverage

The transit industry generally considers that bus users are willing to walk up to one-quarter mile of bus routes to use an existing bus route. The shaded areas of Figure 33 represent the areas within one-half mile of existing bus routes. As the figure indicates, most of the study area is within one-quarter mile of an existing bus route. This indicates adequate geographical coverage of the study area. However, because some of the routes do not operate all day, some of the areas are not covered by bus service during some periods of the day.

Transit Facilities

Utilizing transit is generally more desirable to users when other factors are considered, such as: adequate lighting for access to transit, bus shelters for protection from the elements, and frequent service (especially during the evening hours). The Study Team evaluated the adequacy of the transit facilities and has made recommendations to address the issues identified in the evaluations. These recommendations are presented in Section IV of this study.

Takoma Metrorail Station Access

Access to the station is provided from the northeast for automobiles, including Kiss-and-Ride, short-term parking, and taxi (as shown in Figure 30 in the parking section of this report). Pedestrians and cyclists are provided facilities to access the station from all directions although entrance into the rail service is only available on the northeast side through the main lobby or through the elevator/disabled entrance (located behind the taxi stand).

Click to View:

Figure 33. Transit Service Zones

Taxi Services

There is currently a taxicab stand located behind the Kiss and Ride area of the station parking lot, closest to the elevator access to the station. During the times when the Study Team conducted observations at the station, between 8:30 AM and 7:00 PM, no passengers were seen entering or exiting a taxicab at this location. Taxis were seen waiting in a convenience store parking lot and along Cedar Avenue, adjacent to the station. Boarding and alighting from taxicabs was observed beneath the underpass area along Cedar Street and at the entrance to the Metro Station. Several citizens noted during public meetings that they would like the taxicab stand to be relocated to a more convenient location. The recommendation for the location of the taxi stand is provided in the Issues and Recommended Improvements section of this report.

Bus Access

The Takoma Metro Station is serviced by the WMATA Metrorail, Metro buses and Montgomery County Ride On bus service. All of the Metro buses and most of the Ride On buses enter and exit the station via the Carroll Street entrance. The Ride On Routes 3, 14, 18 – Silver Spring, and 24 all exit the station on Eastern Avenue. Ride On Route 18 – Langley Park enters the Station from Eastern Avenue and exits via Carroll Street.

The station has nine bus bays for passengers boarding and alighting. The buses assigned to each bus bay are shown in Figure 30 (in the parking section of this report). The bus route which serves each bus bay is identified so that the user knows where to wait for the appropriate vehicle. Several bays have double bus shelters to accommodate larger numbers of waiting passengers. Eight of the nine bus bays are specifically assigned to particular Metro or Ride On routes, and the ninth is currently unassigned and used as a layover location when necessary.

Based upon the current frequency of buses using the station, there are enough bays to satisfy the needs of the station. These nine bays are able to accommodate the routes currently using the station as well additional (more frequent) service along the same routes. Using a minimum headway of ten minutes (allowing for six buses per hour at each bay), buses may continue to share bays and increase frequency at four of the existing locations (which currently accommodate WMATA routes and Ride On routes bay numbers 2, 3, 4, and 9).

Bus Shelters

Shelters from the elements are provided at various locations throughout the study area, primarily along commercial strips. The location of these shelters is shown in Figure 30. There are only 11 bus shelters in the entire study area. The Study Team has developed recommendations with respect to locations where new bus shelters should be installed. These recommendations were developed based on adequacy of sidewalk width, consideration for visual impact of large shelters placed in residential neighborhoods and bus ridership and are presented in Section Four of this study.

BICYCLE FACILITIES

There are a number of officially designated on-road bicycle routes and several unofficial bicycle routes in the study area. As shown in Figure 34, these bicycle routes are spread throughout the

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Figure 34. Bicycle Trails and Routes

study area. The officially designated on-road bicycle routes have no differentiating bicycle trail pavement markings and few to no signs designating the trail as an official bicycle route. In addition, there are no signs reminding motorists to share the roadway with cyclists.

The designated bicycle facilities do not connect to the Takoma Metro Station. As Figure 34 indicates, the designated bicycle route closest to the Takoma Metro Station is the one on Piney Branch Road. Thus, cyclists use unofficial bike routes biking to the Metro Station. Bicycle racks and lockers are provided at the Metro Station. These racks can accommodate up to 44 bicycles. Often, all the bicycle racks are used. The lockers at the station can accommodate up to 60 bicycles in double storage unit lockers. Approximately one-half of the lockers are rented. The lockers are rented on an annual basis for a fee of 70 dollars.

The Metropolitan Branch Trail (MBT) is a proposed bicycle and pedestrian trail that will extend from Union Station in Downtown Washington, DC to Silver Spring, MD. The MBT will be a hybrid trail with off-street and on-street bicycle lanes. Based on the latest information available from the Metropolitan Branch Trail Alignment Study, this trail will make its way through the study area through one of five proposed alignments shown in Figure 35. All alignments within the study area follow a southeast to northwest path, originating at the intersection of Blair Road and Peabody Street and ending at the intersection of Eastern Avenue and Baltimore Avenue. Along each proposed alignment of the trail there are crossings of existing roadways causing potential intersection traffic conflicts with cyclists and pedestrians. The potential conflict locations are the following:

1. Peabody Street and N. Capital Street
2. Blair Road and Van Buren Street
3. Cedar Street / 4th Street / Blair Road
4. Carroll Street and Maple Avenue
5. Carroll Street and Cedar Avenue
6. Eastern Avenue and Cedar Avenue
7. Eastern Avenue and Piney Branch Road

The Study Team has evaluated the potential effects on traffic operations at critical locations associated with the implementation of each of the potential alignment options. This evaluation and associated recommendations are presented in Section IV of this study.

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Figure 35: Overview of Possible Eastern and Western Alignments for Metropolitan Branch Trail

III. FUTURE CONDITIONS

The Study Team evaluated future conditions for different transportation modes. This section of the report presents the assessment of future parking needs, future bus bay requirements at the Metro station, needed expansion of bus service, forecast traffic volumes for 2012 and 2022 scenarios, and an assessment of traffic operations for the two future year scenarios.

FUTURE YEAR DEVELOPMENTS

In order to assess future conditions, the Consultant collected information on planned future developments in the study area. The main source of information for future levels of development was the Takoma Central District Plan. Additional information on future year development levels was gathered by the Consultant through meetings with several governmental institutions including the District of Columbia Office of Planning, the City of Takoma Park and the Maryland National Capital Park and Planning Commission (MNCPPC).

The Takoma District Plan identifies five priority redevelopment sites as well as the level of development associated with these sites. The Study Team assumed that these sites would be developed in the near future. Therefore, they were included in the 2012 future year scenario. As shown in Figure 36, other sites that were included in the 2012 scenario were the development in Takoma Park at the site of the proposed Municipal Parking, and redevelopment at Montgomery College and at the Adventist Hospital.

The Study Team developed the 2022 levels of development based on data on long-term potential development levels noted in the Central District plan as well as assessment from the District planners on the most likely scenarios for future year developments. The 2022 forecast levels of development are presented in Figure 36. As the figure shows, most of the long-term development in the study area is expected to take place in the vicinity of the Takoma Metro station.

TRAFFIC

The Study Team evaluated future traffic conditions taking into consideration growth in background traffic and traffic generated by forecast developments in the study area and assuming a ten-year and a twenty-year build out. The future traffic demand for the target-year is then estimated.

2012 Future Traffic Conditions

The Study Team evaluated future conditions taking into consideration growth in background traffic and traffic generated by new developments in the Study Area. Background traffic and new development traffic was added to existing traffic counts to determine future traffic volumes. The Study Team estimated traffic volumes and assessed future year traffic conditions for the years 2012 and 2022. The developments expected to be in place during these years are shown in Figure 36. This section summarizes the traffic forecasts and anticipated levels of service for the 2012 scenario.

Click to View:

Figure 36. Future Development Map – 2012 and 2022

Background Growth

Background traffic growth is considered the component of traffic that increases due to region-wide increases in population and employment. Based on historical counts, the growth rate used for background traffic was one percent per year. All balanced traffic volumes were grown by this percentage to determine background growth in traffic volumes for ten years in the future.

New Development Traffic

With the help of the information contained in the Central District Plan, the Study Team identified a number of sites as new planned developments within and outside the immediate study area. These developments are presented in Figure 37.

Trip Generation

The trips generated by new developments were estimated based on the land use information and applying trip generation rates from the Institute of Transportation Engineers (ITE) *Trip Generation Manual, 6th Edition* (1997). The adjustments to account for transit usage were developed based on information provided in "Development Related Ridership Survey," published by the Washington Metropolitan Area Transportation Authority. Table 13 summarizes the AM and PM peak hour traffic volume forecasts for all the developments expected to be in place by 2012.

As shown in the Tables, site 7 and site 8 generate more traffic than other sites, but these two sites have less traffic impact for the study area since these two locations are outside the study area. The new developments that are located in the study area are expected to generate 84 and 274 new trips during the AM and PM peak hours, respectively, by the year 2012.

Citizens of Takoma requested that the trip generation for site 1 be provided at different levels of development at this site. Table 14 presents a comparison of trip generation at different levels of residential development at site 1.

Trip Distribution and Trip Assignment

Trips were distributed on the basis of existing traffic patterns and information gathered from available traffic studies for selected sites. The projected year 2012 trip assignments at each of the study area intersections were estimated by combining the traffic assignments for the study area developments with the grown volumes (existing volumes grown by one percent per year for ten years). Figure 38 presents the projected peak hour trip assignments for the new developments for the design year of 2012. Figure 39 presents the total projected traffic volumes, which combine grown background traffic and site development traffic for the design year of 2012.

Click to View:

Figure 37. Future Development Map – 2012

Table 13
Summary of 2012 Trip Generation for Area Developments

Location*	Land Use	Trip Generation					
		AM Peak Hour Trips			PM Peak Hour Trips		
		Entering	Exiting	Total	Entering	Exiting	Total
1	95 DU 10,000 SF Retail	4	17	21	19	17	36
2	50 DU 10,000 SF Retail	2	9	11	17	15	32
3	50 DU 5,000 SF Retail	2	9	11	13	10	23
4	30 DU 10,000 SF Retail 10,000 SF Office	4	17	21	21	46	67
5	80 DU	4	16	20	16	8	24
6	8,500 SF Restaurant 7,500 SF Theater	0	0	0	61	31	92
7	980 New Students	130	12	142	116	57	173
8	124,800 SF Hospital Bldg. 134,546 SF Medical Office Bldg.	143	42	185	56	155	211
Total Area Development	**305 DU 35,000 SF Retail 10,000 SF Office 8,500 SF Restaurant 7,500 SF Theater 980 Students 124,800 SF Hospital 134,546 SF Medical Office Bldg.**	**289**	**122**	**411**	**319**	**339**	**658**

*See Figure 37 for location of proposed area developments
DU: Dwelling Units
SF: Square Feet

Table 14
2012 Trip Generation for Different Size of Residential Units at Site 1

Residential Unit Size	AM Peak Hour Trips			PM Peak Hour Trips		
	Entering	Exiting	Total	Entering	Exiting	Total
30 DU	3	11	14	6	4	10
60 DU	3	14	17	8	5	13
90 DU	4	16	20	11	7	18
95 DU	4	17	21	11	7	18

*See Figure 37 for location of proposed area developments
DU: Dwelling Units
SF: Square Feet

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Figure 38. Projected 2012 Peak Hour Site Trip Assignments

Click to View:

Figure 39. Projected 2012 AM and PM Peak Hour Volumes

Future Levels of Service

SYNCHRO and SimTraffic were used to model and simulate future traffic conditions and to calculate the future year levels of service. The existing and projected 2012 Levels of Service are summarized in Figure 40.

In general, due to the area development and background growth, traffic conditions in the study area degrade. However, as shown in the figure, the new developments and the background growth are expected to have an effect on traffic operations in the study area. Thirteen of the 24 intersections are expected to operate at the same LOS as the existing LOS. The LOS at 11 of the intersections is expected to deteriorate, generally by one letter grade, during the AM peak hour. The LOS at nine of the intersections is expected to deteriorate, generally by one letter grade, during the PM peak hour. The mitigation measures noted in Section IV of this report would help address the impacts of the proposed 2012 developments.

2022 Future Traffic Conditions

In addition to evaluating traffic conditions for 2012, the Study Team evaluated future traffic conditions for 2022. Background traffic and new development traffic was added to existing traffic counts to determine future traffic volumes. This section summarizes the traffic forecasts and anticipated levels of service for the 2022 scenario.

Background Growth

Background traffic growth is considered the component of traffic that increases due to region-wide increases in population and employment. Based on historical counts, the growth rate used for background traffic was one percent per year. All balanced traffic volumes were grown by this percentage to determine background growth in traffic volumes for ten years in the future.

New Development Traffic

With the help of the information contained in the Central District Plan, the Study Team identified a number of sites as new planned developments within and outside the immediate study area. These developments are presented in Figure 41.

Trip Generation

The trips generated by new developments were estimated based on the land use information and applying trip generation rates from the Institute of Transportation Engineers (ITE) *Trip Generation Manual, 6th Edition* (1997). The adjustments to account for transit usage were developed based on information provided in "Development Related Ridership Survey," published by the Washington Metropolitan Area Transportation Authority. Table 15 summarizes the AM and PM peak hour traffic volume forecasts for all the developments expected to be in place by 2022 under a most likely scenario.

Click to View:

Figure 40. Existing and 2012 Projected Levels of Service

Click to View:

Figure 41. Future Development Map – 2022

Table 15
Summary of Trip Generation
for 2022 Most Likely Area Developments Scenario

Location*	Land Use	Trip Generation					
		AM Peak Hour Trips			PM Peak Hour Trips		
		Entering	Exiting	Total	Entering	Exiting	Total
1	95 DU 10,000 SF Retail	4	17	21	19	17	36
2	50 DU 16,000 SF Retail	2	9	11	22	21	43
3	50 DU 11,000 SF Retail	2	9	11	17	16	33
4	30 DU 16,000 SF Retail 10,000 SF Office	4	17	21	26	52	78
5	80 DU	4	16	20	16	8	24
6	8,500 SF Restaurant 7,500 SF Theater	0	0	0	61	31	92
7	980 New Students	130	12	142	116	57	173
8	124,800 SF Hospital Bldg. 134,546 SF Medical Office Bldg.	143	42	185	56	155	211
9	65 DU 10,000 SF Retail	3	13	16	20	17	37
10	123 DU 20,000 SF Retail	5	21	26	37	32	69
11	82 DU 10,000 SF Retail	4	17	21	24	19	43
12	12,000 SF Retail	0	0	0	9	12	21
Total Area Development	**575 DU 105,000 SF Retail 10,000 SF Office 8,500 SF Restaurant 7,500 SF Theater 980 Students 124,800 SF Hospital 134,546 SF Medical Office Bldg.**	**301**	**173**	**474**	**423**	**437**	**860**

*See Figure 41 for location of proposed area developments
DU: Dwelling Units
SF: Square Feet

As shown in the Table, the new developments that are located in the study area (sites 1 through 6 and sites 9 through 12) are expected to generate 151 and 476 new trips during the AM and PM peak hours, respectively, by the year 2022. In order to gain an understanding of the potential ranges in trip generation under different allowable development levels, the Study Team performed estimated trips for two alternative scenarios. The first scenario is based on the maximum level of residential units and the second scenario is based on a mixture of commercial and residential units. The details of land use and trip generation for the 2022 most likely scenario, the 2022 max residential scenario, and the 2022 mixed use scenario are presented in Table 16. As shown in the Table, the maximum mixed land use scenario for the year of 2022 would generate 76 percent more trips during the PM peak hour than the most likely scenario. The maximum residential scenario would generate slightly more trips than the most likely scenario during the AM peak hour, and slightly less trips during the PM peak hour.

Trip Distribution and Trip Assignment

Trips were distributed on the basis of existing traffic patterns and information gathered from available traffic studies for selected sites. The projected year 2022 trip assignments at each of the study area intersections were estimated by combining the traffic assignments for the study area developments with the grown volumes (existing volumes grown by one percent per year for 20 years). Figure 42 presents the projected peak hour trip assignments for the new developments for the design year of 2022, based on the most likely scenario. Figure 43 presents the total projected traffic volumes, which combine grown background traffic and site development traffic for the design year of 2022.

Future Levels of Service

SYNCHRO and SimTraffic were used to model and simulate future traffic conditions and to calculate the future year levels of service. The existing and projected 2022 Levels of Service are summarized in Figure 44.

As shown in the figure, the 2022 “most likely” development level would have a significant impact on traffic operations in the study area. Many intersections are expected to operate at LOS F during the AM and PM peak hours. The LOS would degrade for most of the intersections during the AM and PM peak hours.

The proposed mitigation measures, described in Section IV of this report, would help reduce the impacts of the 2022 “most likely” developments, but are not sufficient to accommodate the high levels of development associated with the “maximum 2022 mixed-use” scenario. Additional mitigation measures would be needed to accommodate the maximum 2022 mixed-use scenario.

Table 16
Land Use and Trip Generation for 2022 Scenarios

Location*	Land Use Type	Most Likely Scenario			Max Residential Scenario			Mixed Use Scenario		
		Land Use Size (DU/SF)	Total AM Peak Hour Trips	Total PM Peak Hour Trips	Land Use Size (DU/SF)	Total AM Peak Hour Trips	Total PM Peak Hour Trips	Land Use Size (DU/SF)	Total AM Peak Hour Trips	Total PM Peak Hour Trips
1	Residential Units	95	21	36	358	49	51	130	25	378
	Retail	10,000			0			196,000		
2	Residential Units	50	11	43	76	17	20	30	8	90
	Retail	16,000			0			45,000		
3	Residential Units	50	11	33	87	18	22	35	9	104
	Retail	11,000			0			52,000		
4	Residential Units	30	21	78	76	18	22	30	31	99
	Retail	16,000			0			25,000		
	Office	10,000			0			20,000		
5	Residential Units	80	20	24	86	22	26	86	22	26
6	Restaurant	8,500	0	92	8,500	0	92	8,500	0	92
	Theater	7500			7500			7,500		
7	Classroom	91,000	142	173	91,000	142	173	91,000	142	173
	Clinnic	9,000			9,000			9,000		
	Cultural Arts Building	500			500			500		
8	Hospital Building	124,800	185	211	124,800	185	211	124,800	185	211
	Medical Office Building	134,546			134,546			134,546		
9	Residential Units	65	16	37	130	29	35	52	36	166
	Retail	10,000			0			58,544		
	Office	0			0			20,000		
10	Residential Units	123	26	69	326	60	77	130	67	371
	Retail	20,000			0			156,020		
	Office	0			0			40,000		
11	Residential Units	82	21	43	163	37	46	65	48	192
	Retail	10,000			0			68,010		
	Office	0			0			30,000		
12	Retail	12,000	0	21	20,000	13	75	30,000	0	54
	Office	0			10,000			0		
Total Area Development Traffic			474	860		535	812		551	1521

*See Figure 41 for location of proposed area developments
DU: Dwelling Units
SF: Square Feet

Click to View:

Figure 42. Projected 2022 Peak hour Site Trip Assignments

Click to View:

Figure 43. Projected 2022 AM and PM Peak hour Volumes

Click to View:

Figure 44. Existing and Projected 2012 and 2022 Levels of Service

TRANSIT

With the assistance of the service providers in the area, the Washington Metropolitan Area Transit Authority (WMATA) and the Montgomery County Ride On (Ride On), the study team assessed future bus transit needs in the study area. Key transit origination points have been identified in the future which will impact the need for additional bus transit service to the Takoma area in general and the Metro Station, specifically.

Future Bus Service

At this juncture, WMATA does not anticipate the need to provide additional bus routes to the Takoma station, since the coverage area by the current routes includes the major roadways in the Takoma area and the in the District of Columbia. Ride On anticipates the addition of two new routes in the short term which will layover at the Takoma Metro Station. One route will service the rapidly growing Montgomery College, Takoma Park Campus and the other will provide local circulator service within the Takoma Park area. Montgomery College's Takoma Park campus is currently in the process of expanding to meet the needs of the community which it serves. The close proximity of the College to the Metro Station may provide a significant ridership increase and ultimately the need for additional bus routes which service both.

The headway for the local Ride-On route will likely by 20 – 30 minutes and is likely to be an all day route, rather than peak service only. The route servicing the college will operate on 30 – 60 minute headways and will also likely be an all day route, considering the higher concentrations of working students utilizing a community college.

The transit industry considers ¼ - ½ mile a reasonable distance for a patron to walk to transit. Within the study area, each bus route was overlaid with a ½-mile wide corridor, centered about each route. The area south of the Metro station between Van Buren and Quackenbos Streets and 2nd and 3rd Streets is outside of the ¼-mile transit coverage zone. In the off-peak periods the uncovered area extends between 5th Street and Blair road, south of Van Buren Street (see Figure 33). Currently there is no bus that provides service within Walter Reed Army Medical Center. Based upon these gaps in service area, the Study Team developed recommendations for new routes. Details on the recommended transit improvements are provided in the Summary of the Study Area Transportation Issues and Recommendations section of this report.

Bus Bay Needs at the Takoma Metro Station

The *Takoma Central District Plan* includes a redeveloped layout for the Takoma Metro Station. The existing site, which currently contains a bus turnaround area, nine bus bays, and a surface parking lot, would be redeveloped with retail and residential uses, a revamped bus depot, and short-term garaged Metrorail Station parking.

Based on forecasted transit service at the station, it was determined that a total of 12 bus bays would be needed at the redeveloped Takoma Metro station[1]. Under a scenario with expanded bus service (two new Ride On routes, two additional routes recommended by this study, and increased frequencies for existing bus routes), 11 bus bays would be adequate to serve the needs of the Metro Station in the future, and one bus bay would be adequate for layovers. To assess the bus bay needs, several assumptions were made:

- There are three types of bus operations occurring at the Takoma Metro Station: "through" service, "turnaround" service" and peak period (unidirectional) service. These three types of service will be continued in the future.
- Peak periods of service are between 7:00AM – 8:30 AM and 5:00 PM – 6:30 PM.
- Bus bays serving buses operating with frequencies of six minutes or less would not be shared.

The addition of three bus bays (for a total of 12 bus bays) will be sufficient to accommodate more frequent transit service for the existing routes, the addition of two Ride On buses, and the addition of two WMATA bus routes recommended by this study.

PARKING NEEDS

The Study Team evaluated future parking needs for the commercial areas, new residential developments and for the Takoma Metro station. This subsection of the report describes the findings with respect to future parking needs.

Commercial Parking Needs for the Area around Old Town Takoma Park

The Study Team used the forecast future development levels to estimate future commercial parking needs for the year 2012. The future development levels are described in detail in the future development levels subsection above. Using these levels, the respective future parking need was determined for an area defined by the recommended maximum walking distance radius for short-term parking in an urban area, 800 feet[2] from the location of a proposed municipal parking facility to be located at the intersection of Eastern Avenue and Laurel Street. This approach follows what was used in determining the existing parking deficiency in this area described in section III of this report.

By using the respective jurisdiction's zoning ordinance, off-street parking *requirements* were used as the determinant for parking *demand*. Table 17 shows the base parking requirements for

[1] Bus bay calculations are presented in Appendix H

[2] 800 feet walking distance chosen per maximum guideline for short-term, per *Parking*, Robert A. Weant and Herbert S. Levinson, Eno Foundation for Transportation, 1990, p. 211.

Washington, D.C. and Montgomery County according to their zoning ordinances. This requirement reflects the minimum number of spaces needed per gross square footage of particular land use, except for theaters and classrooms, which are dependent on seating available. Future parking demand was determined by computing a build-out scenario based upon current zoning ordinances. The proximity to the Metro Station results in reduced demand for parking. Since the zoning regulations for Montgomery County and for DC allow for the application of adjustments to the parking requirements to account for proximity to the Metro station, the calculation of parking requirements reflects adequately the demand for parking in the area.

Takoma Park is located within Montgomery County's Commercial Revitalization Zone. Under this regulation, future developments may be granted additional reductions in parking requirements exceeding that which is included in the existing zoning ordinance. These reductions were not included in the calculations for future requirements shown here as these factors have not yet been determined.

Table 17
Base Parking Requirements

Zoning/Land Use	District of Columbia # of Spaces	Maryland # of Spaces
Educational		
College/High School	2 spaces for every 3 teachers *plus* 1 space for 10 auditorium seats	N/A
Elementary/J.H.S	2 spaces for every 3 teachers and staff	1 spaces for every teacher and staff
Office	Greater than 2000 ft^2, 1 space for each 600 ft^2	1.9, 2.1, or 2.4* spaces per 1000 ft^2
Restaurant	Fast Food – Greater than 1500 ft^2, 1 space for each 100 ft^2 Other – Greater than 3000 ft^2, 1 space for each 300 ft^2	25 spaces per 1000ft^2 **
Retail	Greater than 3000 ft^2, 1 space for each 300 ft^2	5 spaces per 1000ft^2
Service	Greater than 3000 ft^2, 1 space for each 300 ft^2	1.9, 2.1, or 2.4* spaces per 1000 ft^2
Special Purpose	1 space for each 600 ft^2	N/A
Theater		1 space per 4 seats in auditorium
Warehouse	1 space for each 3000 ft^2	N/A

* Office space requirements vary based upon the proximity of the business to a transit station. There are 1.9 spaces for business less than 800 feet from a station, 2.1 spaces for business between 800 and 1600 feet from a station, and 2.4 spaces for businesses greater than 1600 feet from a station.

** For restaurants, this requirement is applied to floor area devoted to patron use inside the establishment

Note: Both jurisdictions allow a 25 percent reduction in parking requirements within 800 feet of a transit center.

The result of the parking analysis was a parking assessment that detailed the existing inventory of parking and predicted future demand based on zoning. The parking assessment shows a summary of all types of businesses in Old Town Takoma Park and the required base parking requirement associated with each. The assessment confirms the analysis of the market profile that the existing off-street parking available in Old Town Takoma Park is insufficient for existing and future land uses. Table 18 shows the results of the parking evaluation. The Study Team estimated that the projected parking deficiency is 276 spaces.

Table 18
Future Parking Need within Walking Distance of Proposed Garage in Old Town Takoma Park

	Existing Parking (2002)	Existing Req'd Parking (2002)	Add'l Parking Required due to Future Dev.	Future Required Parking
DC				
Retail/Service Space	42	53	0	53
Office Spaces	0	8	0	8
Garage Spaces[++]	47	21	0	21
Warehouse Spaces	7	48	0	48
Religious	100	26	0	26
Educational	107	125	0	125
Other	37	35	0	35
On-Street, 2-hr in Res. Zone*	67			
On-Street, Metered**	38			
Off-Street Parking Lots	155			
SUBTOTAL^	**553**	**296**	**0**	**296**
MD				
Retail Spaces	28	238	0	238
Service Spaces	331	378	0	378
Restaurant Spaces	15	135	107	242
Classroom Spaces	0	0	60	60
Other (Theater) Spaces	0	0	19	19
On-Street – Metered**	30			
Off-Street Parking Lots	0			
SUBTOTAL	**404**	**751**	**186**	**937**
TOTAL	**957**	**1,047**		**1,232**
Additional Required Parking		**90**		**276**

*Assumed 50% of Residential Zone is available to General Short-Term Parking
[++] Since parking is self contained and may not be shared by other land use patrons, the surplus value is removed from the calculation of parking deficits for repair garages.
^ Excludes parking for garage spaces (see note above)
** The use of all available metered parking in the calculations of parking requirements for the businesses around the proposed parking garage is a conservative approach because some of the metered parking spaces are used by metro station users and may not be available to business patrons.

This analysis demonstrates that the land use parking requirements within the recommended maximum walking distance for short-term parking can support a garage of 200+ spaces at the future development site in Old Town Takoma Park.

Generalized Commercial Parking Needs in the Study Area

With the future development levels, the required off-street parking, as dictated by the current zoning ordinances, is significant. Table 19 illustrates the collective magnitude of parking required for each future development that has commercial land uses (*e.g.* retail or office).

Table 19
Maximum Required Commercial Off-Street Parking Spaces for Future Developments Outside of Old Town Takoma Park

Future Development Site	2012	2022 Likely Scenario	2022 Max Scenario 1	2022 Max Scenario 2
1	24	24	0	0
2	24	44	0	140
3	7	27	0	164
4	38	58	0	104
5	0	0	0	0
6	See Table 18 Above			
7	Outside of Takoma Transportation Study Area			
8				
9				
10	-	57	0	64
11	-	24	0	264
12	-	30	71	90

With most of the above uses within walking distance to both the Metro station and each other, reductions in parking requirements due to proximity of a Metro station may be applied, in addition to other reductions allowable in the jurisdiction.

Metro Station Parking Needs

With the redevelopment of the present Takoma Metrorail station site, the existing parking will need to be maintained. The Metro station parking is currently being utilized at levels close to capacity. While the high utilization levels indicate that additional capacity may be needed, the desire to maintain the character of the station as one serving residents primarily, instead of commuters, dictates that the number of parking spaces should not be increased. A 1:1 replacement ratio for the existing parking spaces at the Metro station should be implemented with redevelopment at the Takoma Metro site. Short-term parking only for Metrorail patrons should be provided on site and commuter (long-term) parking should continue to be prohibited on site. Off-street long-term parking options should be provided, likely as privately operated parking.

Residential Parking Needs

Most of the future developments have residential units. Both jurisdictions have very stringent requirements for parking for residential developments. Considering the proximity of these developments to the Metrorail station, parking reductions may be pursued by the developers. Table 20 illustrates the base residential parking requirement for each of the future development scenarios.

Table 20
Maximum Required Residential Off-Street Parking Spaces for Future Developments within Study Area

Future Development Site	2012	2022 Likely Scenario	2022 Max Scenario 1	2022 Max Scenario 2
1	95	95	358	130
2	50	50	76	30
3	50	50	87	35
4	30	30	76	30
5	80	80	86	86
6	--	--	--	--
7	Outside of Takoma Transportation Study Area			
8				
9	--	65	130	52
10	--	123	326	130
11	--	82	163	65
12	--	--	--	--

IV. ISSUES AND RECOMMENDED IMPROVEMENTS

Through field work, assessment of existing conditions data and meetings with area residents, the Study Team compiled a comprehensive list of transportation issues and suggested improvements for the entire study area. These issues represent the most pressing concerns and needs for improving safety and transportation operations in the Study Area.

This section of the reports presents each identified transportation issue, listed by roadway, and then by intersection. They are presented as follows:

- Issue – states the concern, problem or need for improvement.
- Preliminary Suggestion(s) – various solutions that could potentially address the issue. This section includes a description of all the short-term and long-term improvements considered in the evaluation. Based on the evaluation of alternatives, some of the preliminary suggestions were not recommended for implementation.
- Discussion – analysis and evaluation parameters.
- Recommendations – improvements to be implemented.

In order to facilitate the presentation of traffic operation issues, the Study Team divided the study area into the four geographic areas shown in Figure 45. The boundaries of these four areas are the following:

- Area east of Blair Road and north of Walnut Street/Walnut Avenue

1. Area east of Blair Road and south of Walnut Street/Walnut Avenue
2. Area west of Blair Road and south of Piney Branch Road
3. Area west of Blair Road and north of Piney Branch Road

These area issues are summarized in Table 21 through Table 24. Figure 46 through Figure 49 present the location of traffic operation issues for each geographic area. In addition to summarizing the identified transportation issues by geographic area, the Study Team prepared additional tables of transportation issues for the following four topic groups:

1. Transit issues
2. Pedestrian issues
3. Parking issues
4. Bicycle issues

The Study Team prepared separate recommendations by topics to address the transit, pedestrian, parking, and bicycle issues. The recommendations are summarized in Table 25 through Table 27 and Figure 50 through Figure 53.

Click to View:

Figure 45. Sub-Area Boundaries

Click to View:

Figure 46. Location of Traffic Issues – Area Map 1

Click to View:

Table 21. Area 1 Traffic Issues and Recommendations

Click to View:

Figure 46A. Recommended Improvements to Piney Branch and Blair Roads

Click to View:

21A. Blair Road at Cedar Street and 4th Street

Click to View:

46B. Recommended Improvements to 4th Street / Blair Road / Cedar Street

Click to View:

Figure 46C. Proposed Signing and Pavement Markings for Entrance to the Grand China and Liquor Store

Click to View:

Figure 46D. Proposed Geometry for Blair Rd at Dahlia St and 5th St NW

Click to View:

Figure 46E. Recommended Improvements to Carroll Street/Avenue

Click to View:

Figure 46F. Recommended Improvements to Carroll Avenue (Westmoreland Ave – Philadelphia Ave)

Click to View:

Figure 46G. Takoma Park Municipal Parking Garage

Click to View:

Figure 47. Location of Traffic Issues – Area Map 2

Click to View:

Table 22. Area 2 Traffic Issues and Recommendations

Click to View:

Figure 48. Location of Traffic Issues – Area Map 3

Click to View:

Table 23. Area 3 Traffic Issues and Recommendations

Click to View:

Figure 48A. Georgia Avenue and Piney Branch Road

Click to View:

Table 23A. Aspen Street

Click to View:

Figure 48B. Recommended Improvements to Aspen Street

Click to View:

Figure 48C. Recommended Improvements to Piney Branch Road and Underwood Street

Click to View:

Figure 48D. Recommended Improvements to Van Buren Street between 3rd and 7th Streets

Click to View:

Figure 49. Location of Traffic Issues – Area Map 4

Click to View:

Table 24. Area 4 Traffic Issues and Recommendations

Click to View:

Figure 49A. Recommended Improvements to Georgia Avenue and Elder Street

Click to View:

Table 25. Transit – Issues and Final Recommendations

Click to View:

Figure 50. Future Transit Recommendations

Click to View:

Figure 50A. New Transit Routes

Click to View:

Figure 51. Pedestrian Improvement Locations

Click to View:

Table 26. Pedestrian – Issues and Final Recommendations

Click to View:

Figure 51A. Recommended Pedestrian Improvements

Click to View:

Figure 51B. Recommended Signing and Pavement Markings at Piney Branch Road and Eastern Avenue

Click to View:

Figure 52. Parking Improvement Locations

Click to View:

Table 27. Parking – Issues and Final Recommendations

Click to View:

Figure 52A. Recommended Parking Meter Locations

Click to View:

Figure 53. Bicycle Issues and Recommendations

Click to View:

Figure 54. Transportation Recommendations for Area 1

Click to View:

Figure 55. Transportation Recommendations for Area 2

Click to View:

Figure 56. Transportation Recommendations for Area 3

Click to View:

Figure 57. Transportation Recommendations for Area 4

Click to View:

Figure 58. Existing and 2012 Projected Levels of Service

Click to View:

Figure 59. Existing and 2022 Projected Levels of Service

Click to View:

Table 28. Level of Service Comparison

V. SUMMARY OF FINDINGS AND RECOMMENDATIONS

The Study Team conducted an extensive evaluation of transportation conditions in the Study Area. This study was a continuation and an expansion of the transportation work conducted in conjunction with the development of the Takoma Central District Plan[1]. The main goals of this study were to examine existing and future transportation conditions and determine short-term and long-term improvements to reduce traffic congestion, especially during peak morning and evening travel hours; improve traffic and pedestrian safety; protect surrounding residential streets from traffic impacts; enhance transit service; and improve bicycle and pedestrian transportation facilities in the study area. In addition, the study included an assessment of the commercial parking needs in support of a municipal parking facility in Takoma Park.

The study was conducted with assistance from the area residents[2]. The Study Team (Consultant, DDOT representatives and Takoma Park staff) held several meetings with area residents to discuss existing transportation issues. The area residents provided additional input via e-mail, regular correspondence and meetings with DDOT, Takoma Park and Consultant representatives. The Study Team also held several meetings with representatives of key local agencies, including the Washington Metropolitan Area Transportation Authority (WMATA), Ride On, the District of Columbia Office of Planning, the City of Takoma Park and Maryland National Capital Park and Planning Commission (MNCPPC). The input from the residents and the public agency representatives was helpful in the identification of key transportation issues and the identification of future levels of development in the study area.

TRANSPORTATION ISSUES

The Study Team identified a wide variety of existing and forecast transportation issues. Transit issues included lack of transit service to selected areas, inadequate pedestrian and bicycle access to the Metro station and inadequate location of taxi stand at the Metro station. Pedestrian issues included lack of sidewalks at critical locations, narrow sidewalks at selected locations, poor conditions of ADA access ramps, lack of pedestrian signals and sub-standard pedestrian signing near schools. Parking issues included insufficient parking for commercial needs at selected locations, lack of parking meters at key locations, inadequate striping for parking and lack of parking enforcement. Bicycle issues included lack of bicycle route to the Metro station, lack of bicycle route signs for designated bicycle routes and conflicts between vehicles and bicycles. Traffic operations issues included congestion along major roadways and at critical intersections, speeding, cut-through traffic, lack of turn lanes at selected intersections, non-optimized signal timings and unsafe intersection geometry.

TRANSPORTATION IMPROVEMENT RECOMMENDATIONS

The Study Team, with the assistance of the area residents[3], developed an extensive list of preliminary suggestions that could be implemented to address the identified transportation issues. The Study Team evaluated the suggested improvements and developed an extensive list of short-

[1] Completed in the year 2002.
[2] Appendix H summarizes citizens' comments presented during public meetings.
[3] Appendix I provides a summary of comments made by residents during the public meetings.

term and long-term recommendations to address the identified transportation issues. The recommended improvements are shown in Figures 54 through 57. Planning level cost estimates for the implementation of each the recommended improvements are provided in Appendix J.

The implementation of these improvements would enhance transportation operations in the study area. An improvement that would enhance traffic operations significantly is the optimization of signal timings throughout the study area. As shown in Figure 58 for 2012, the optimization of signal timings[1] and implementation of other recommended improvements are expected to improve LOS by at least one letter grade at 11 of the 24 studied intersections during the AM peak hour. During the PM peak hour, LOS is expected to improve by at least one letter grade at ten of the 24 studied intersections. Seven intersections are expected to operate at the same LOS during the 2012 AM peak hour with improvements, while six intersections are expected to operate at the same LOS during the PM peak hour.

Examples of critical intersections where when compared to the unimproved scenarios, LOS with optimization and improvements remains the same but delay decreases are Georgia and Eastern Avenues; Blair Road/Cedar Street/4th Street; and Aspen Street and Georgia Avenue.

As shown in Figure 59 for 2022, the optimization of signal timings and implementation of other recommended improvements are expected to improve LOS by at least one letter grade at eight of the 24 studied intersections during the AM peak hour. During the PM peak hour, LOS is expected to improve by at least one letter grade at nine of the 24 studied intersections. Nine intersections are expected to operate at the same LOS during the 2012 AM peak hour with improvements, while 15 intersections are expected to operate at the same LOS during the PM peak hour.

Examples of critical intersections where when compared to the unimproved scenarios, LOS with optimization and improvements remains the same but delay decreases are Georgia and Eastern Avenues; Blair Road/Cedar Street/4th Street; and Aspen Street and Georgia Avenue.

In most cases where intersection delay increases, it is the result of improved traffic flows at upstream intersections reaching a bottleneck point in the corridor. An example of this is the intersection of Georgia Avenue and Piney Branch Road. While delay increases at this intersection during the AM peak hour, signal optimization is expected to reduce delay at four of the remaining five studied intersections on Piney Branch Road. The ability of traffic to flow more freely through these upstream intersections increases the number of vehicles at Georgia Avenue and Piney Branch Road, further congesting this intersection. Levels of service for all analyzed intersections, under a variety of scenarios including the implementation of all recommended improvements, are presented in Table 28.

[1] Appendix K provides optimized signal timings for the Study Area intersections.

Click to View:

54. All Issues and Recommendations Map – Area 1

55. All Issues and Recommendations Map – Area 2

56. All issues and Recommendations Map – Area 3

57. All Issues and Recommendations Map – Area 4

58. Existing and 2012 Projected Levels of Service

Click to View:

Figure 59. Existing and 2022 Projected Levels of Service