APPENDIX G: SILVER SPRING/ TAKOMA PARK TRANSPORTATION AND CIRCULATION REPORT

SILVER SPRING / TAKOMA PARK

TRANSPORTATION AND CIRCULATION REPORT

Maryland - National Capital Park and Planning Commission,
Montgomery County Department of Park and Planning,
Transportation Planning

AUGUST 6, 1999

TABLE OF CONTENTS

LIST OF MAPS

LIST OF TABLES

EXECUTIVE SUMMARY

The Silver Spring/Takoma Park Transportation and Circulation Report is a complementary document to the four master plans in the Silver Spring/Takoma Park Policy Area which are being updated during 1999:

- Silver Spring CBD Sector Plan
- North and West Silver Spring Master Plan
- East Silver Spring Master Plan
- Takoma Park Master Plan

The transportation system recommendations in all four plans have therefore been developed in a coordinated fashion using the information in this analysis. This report serves as an explanatory guide for the transportation recommendations contained in the plans.

The analysis for this report was conducted to coordinate transportation elements within each of the master plan documents. The Silver Spring CBD is in the process of redevelopment, and the Sector Plan envisions a substantial increase in economic growth. The number of jobs and households are expected to increase by 32% and 53%, respectively, by the year 2020. The redevelopment of the CBD will have an effect on transportation conditions and needs in the adjacent master plan areas.

The analysis used a combination of policy area transportation review methods and local area transportation review methods to evaluate areawide needs and localized intersection needs. The report evaluates current and projected conditions for all elements of the transportation system.

The planned transportation system is generally in balance with the proposed 2020 land use in the study area. The areawide level of service is satisfactory; planned and programmed improvements for the transit, bikeway, and pedestrian systems are sufficient; parking supplies will be adequate; and aggressive transportation demand management programs will continue.

At several intersections, however, the local area transportation review indicates that providing enough capacity to achieve the current standards for intersection congestion would require improvements which might not be fiscally sound nor desirable in terms of community impacts. At these intersections, the report identifies the level of improvements which would achieve the congestion standards and recommends that subsequent intersection improvements be evaluated on a case-specific basis using this report as a guide.

I. INTRODUCTION

This document presents the results of a transportation and circulation study conducted for the Silver Spring/Takoma Park and Silver Spring CBD Policy Areas. The study was prepared to support the coordinated master planning activities in five Master Plan areas within the Policy Areas.

The purpose of the transportation and circulation study is threefold. The first purpose is to document the existing transportation conditions in the study area. The second is to review planned or programmed transportation system improvements. The third is to assess additional long-range needs and develop recommendations to address those needs. In each case, the material presented in this study provides background material for the relevant master plans. It is intended, however, to serve as an explanatory guide to both regulatory and advisory transportation recommendations in the relevant master plans.

This section of the Silver Spring/Takoma Park Transportation and Circulation Report (SSTPTCR) describes the study background and the organization of the remainder of the document.

Study Context

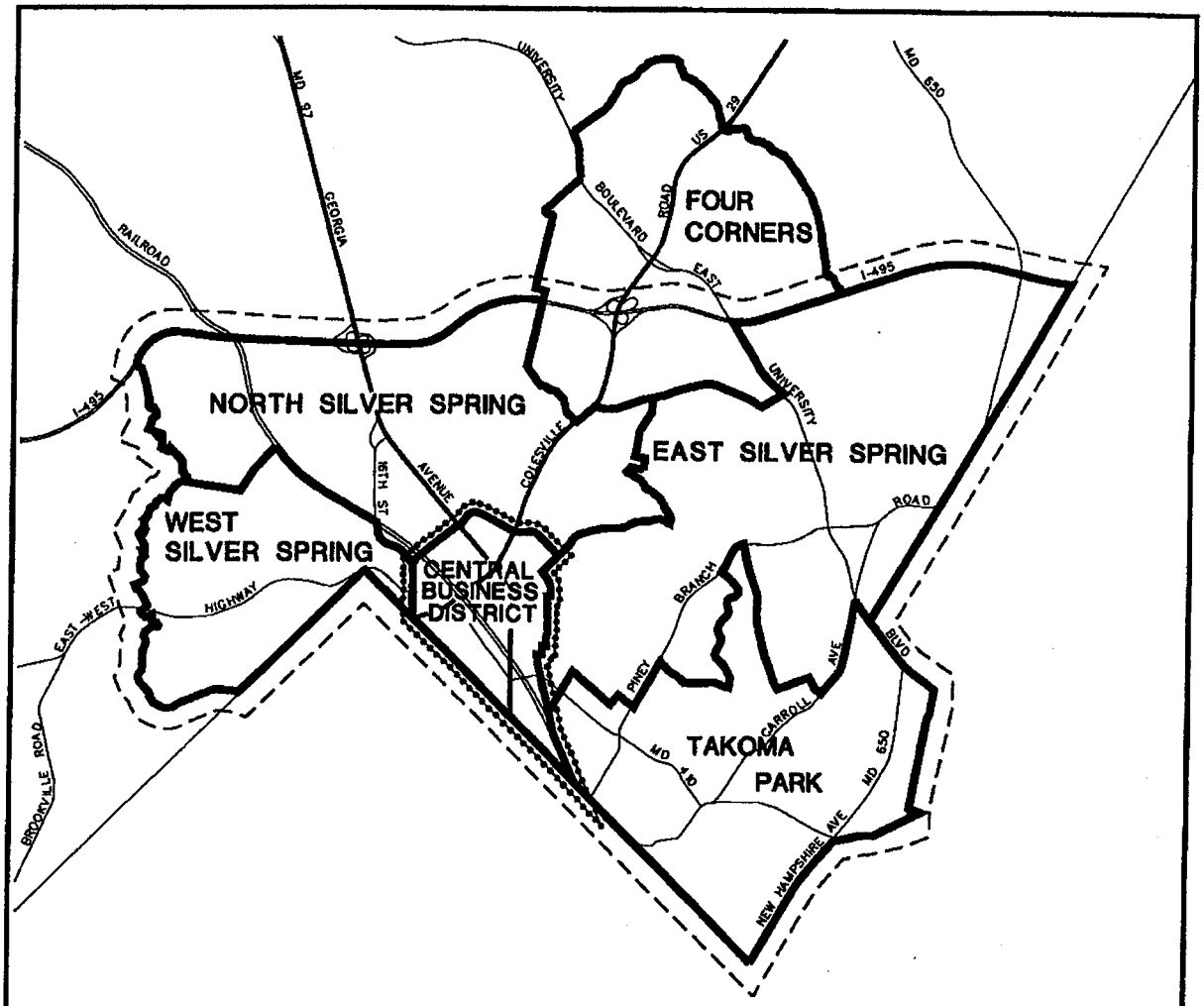
The Maryland-National Capital Park and Planning Commission (M-NCPPC) is currently preparing updates for four master plans in the Silver Spring/Takoma Park Policy Area:

- Silver Spring Central Business District Sector Plan, last updated in 1993
- North and West Silver Spring Master Plan, last updated in 1978
- East Silver Spring Master Plan, last updated in 1977
- City of Takoma Park Master Plan, last updated in 1982 (including the Sector Plan for the Transit Impact Area in Takoma Park, last updated in 1974; and affected portions of the Master Plan for Langley Park - College Park - Greenbelt in 1989)

The locations of these plan areas are shown in **Map 1**. The study area for this report is the Silver Spring/Takoma Park and Silver Spring CBD Policy Areas. The Silver Spring/Takoma Park Policy Area also includes a small portion of the Four Corners Planning Area. The Four Corners Master Plan was updated in 1996 and therefore is not explicitly addressed in this report.

This report is an update to the July 27, 1998 Silver Spring/Takoma Park Transportation and Circulation Report. The update was conducted for three reasons, each relating to intersection congestion. First, this report expands the discussion on the relationship between current intersection congestion standards and forecast intersection congestion levels. Second, the report reflects changes in master plan recommendations which have occurred during the past year. Finally, the report has revised the intersection congestion information to incorporate the updated lane-use factors approved by the Planning Board in April 1998.

STUDY AREA



SILVER SPRING / TAKOMA PARK POLICY AREA BOUNDARY

SILVER SPRING CBD POLICY AREA BOUNDARY

MASTER PLAN AREA BOUNDARIES

THE STUDY AREA INCLUDED THE SILVER SPRING/TAKOMA PARK AND SILVER SPRING CBD POLICY AREAS.

0 1000 2000 4000 FT.

\mplans\silvrspr\sstptcr\areamap.dwg (layer - title)

MNCPPC

Map 1

AUGUST 1999

Report Organization

The remainder of the report is organized functionally.

Sections II and III provide study background material. Section II provides an overview of the study area, and Section III describes the travel demand forecasting process and assumptions.

Sections IV through VII describe those existing and future elements of the transportation and circulation systems which are non-auto-oriented. The Silver Spring/Takoma Park Policy Area is one of the county's most urbanized locations. Therefore, both transit accessibility and transit utilization are relatively high compared to the remainder of the county. Planning for alternative travel modes is critical in the Silver Spring vicinity, both to provide needed access as well as to provide incentives for reducing reliance on single-occupancy vehicle (SOV) travel. Section IV describes travel demand management programs and services. Section V describes parking facilities and regulations. Parking is included in this report among the "non-auto-oriented" elements because the regulation of parking resources is viewed as a tool to manage travel demand. Section VI discusses transit services and Section VII describes the pedestrian and bicycle system.

Section VIII describes the street network. The emphasis of the circulation system plans contained in the draft master plans in the Silver Spring/Takoma Park policy area is on providing the auto user with alternative travel modes. The master plans generally discourage providing additional roadway capacity, since in most locations roadway widening would have undesirable community effects. The desire to accommodate redevelopment in the Silver Spring CBD while minimizing roadway system improvements results in a condition where consideration of adequate public facilities must be reviewed carefully. Numerical congestion standards exist for defining the adequacy of roadway facilities, but do not exist for transit, pedestrian, or bicycle facilities or services. Therefore, while the emphasis of the master plans is on transit, pedestrian, and bicycle circulation, this report is more heavily oriented toward roadway congestion.

Section IX summarizes the primary conclusions of the study.

II. STUDY AREA

The study area includes the Silver Spring/Takoma Park and Silver Spring CBD Policy Areas as shown in Map 1. The study area is located in the southeastern corner of Montgomery County. The southern and eastern boundaries of the study area are defined by the District of Columbia and Prince George's County, respectively. Rock Creek forms the study area's western boundary and the Capital Beltway (I-495) forms the northern boundary.

As of 1998, the study area contained 47,200 jobs and 32,400 households. Commercial development is concentrated in the Silver Spring CBD, which houses about three-fourths of the study area jobs, but only about one-sixth of the study area households.

The study area is served by a superior multimodal transportation system, resulting from the area's location within the Washington region and investments in regional and local transportation facilities. The study area lies at the northeast edge of the nation's capital city at the junction of regional radial and circumferential transportation routes.

The Silver Spring CBD was formed around the intersection of two radial commuter routes, Georgia Avenue and Colesville Road. The Metrorail Red Line includes Silver Spring and Takoma Park stations and the Silver Spring CBD is also served by a MARC commuter rail station. Other notable radial routes serving the study area include 16th Street, University Boulevard, and New Hampshire Avenue.

The Capital Beltway (I-495), the region's primary circumferential transportation facility, forms the northern boundary of the study area. The study area is also traversed by East-West Highway, a circumferential roadway connecting Silver Spring and Takoma Park to adjacent communities to the east and west.

The transportation system is constrained by both natural and manmade features. Several stream valleys flow across the study area, generally from northwest to southeast, including Rock Creek, Sligo Creek, Long Branch Creek, and Northwest Branch. These stream valleys and their linear parklands form the framework for the recreational trail system in the study area. Two manmade features, the CSX rail line and the Capital Beltway, also influence the transportation network. These linear features can serve as barriers to transportation network connectivity, forcing travel to occur at a limited number of crossing points.

III. FORECASTING PROCESS AND ASSUMPTIONS

The evaluation of transportation-related impacts of the proposed land use patterns in the study area included three levels of analysis. First, a regional travel demand model was used to evaluate areawide levels of service and forecast regional travel demand trends. Second, a local area model was used to assess localized travel demand changes generated by Silver Spring CBD redevelopment. Third, intersection analysis was performed to assess the localized impacts on intersection congestion and identify potential geometric and operational improvements. Each of these three steps are described in detail in the following paragraphs.

Regional Travel Demand Model

The first step in evaluating transportation related impacts of the proposed land use patterns in the CBD Plan utilizes Transportation Planning staff's TRAVEL/2 four-step subregional transportation planning model. This regional model includes Montgomery County as well as all other jurisdictions in the metropolitan Washington region. The regional model was used to evaluate areawide levels of service within the Silver Spring/Takoma Park and Silver Spring CBD Policy Areas and identify changes in travel trends within these policy areas. The boundary of the study area, also the boundary of the Silver Spring/Takoma Park and Silver Spring CBD Policy Areas, is shown in **Map 2**. This boundary was considered a subregional cordon line for the purposes of model analyses as described below.

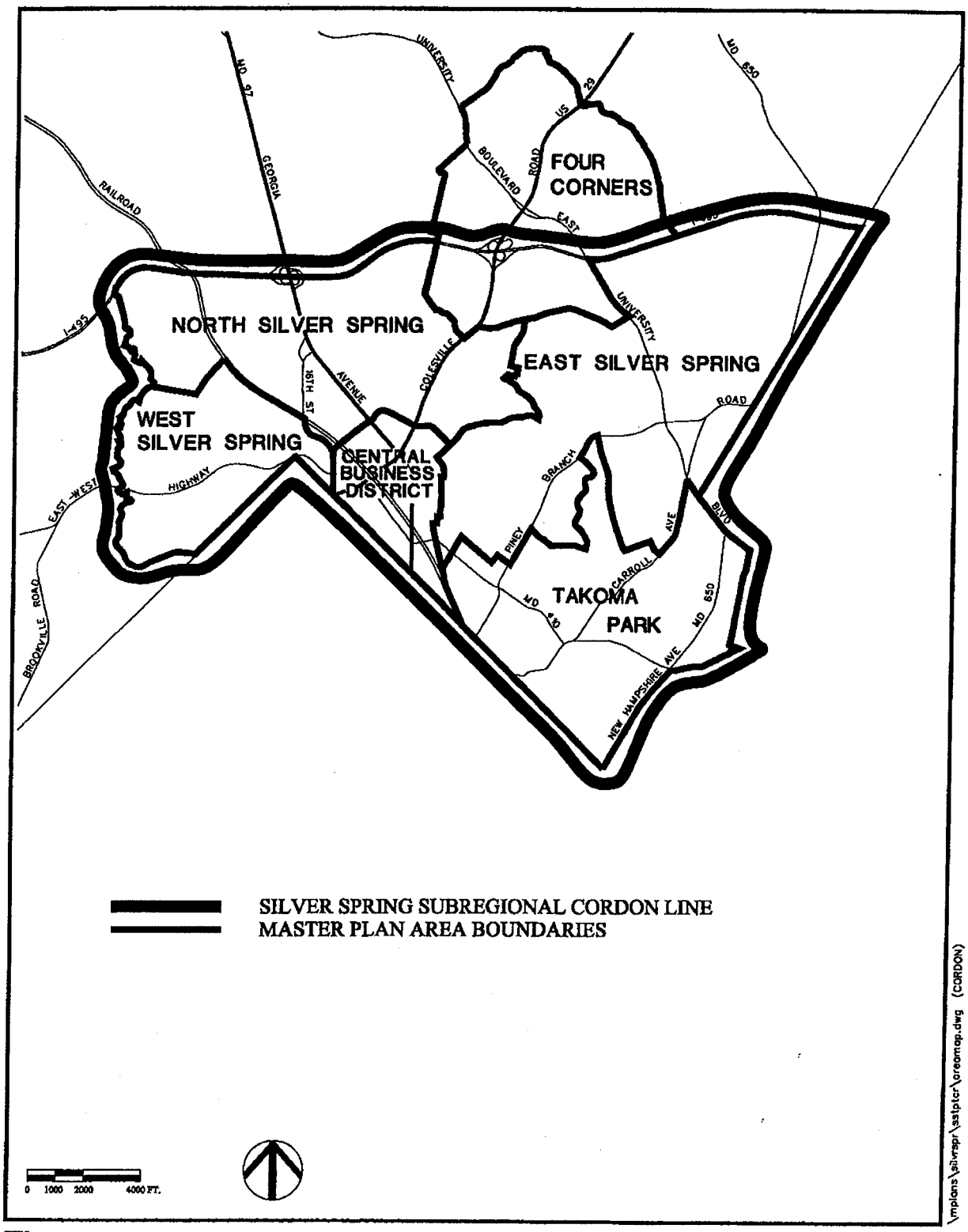
The TRAVEL/2 model forecasts travel demand during the PM peak hour. The subregional model, using EMME2 software, generates person trips (people in residences or in jobs), distributes these trips within and around the subregion, determines the mode used to make the trip (single-occupant vehicle (SOV), high-occupancy vehicles (HOV), transit vehicles (bus and rail), walk and bike) and then assigns these trips to the available transportation (highway and transit) network.

The model set used to evaluate this proposed land use within the CBD included the Metropolitan Washington Council of Governments (MWCOG) Round 5.4 Cooperative Forecasts. These demographic forecasts contain the land use activities (population and employment) for Montgomery County and the rest of the Washington region. These forecasts assume that the population of Montgomery County will grow from 750,000 in 1990 to over 1,000,000 by 2020, with a commensurate increase in the number of jobs. For the transportation network, the model includes all existing transportation facilities and those which have been identified with funding for construction or that are assumed by the MWCOG member jurisdictions and the state-level agencies in Maryland, Virginia and the District of Columbia to be funded for construction by the year 2020. For example this network includes the Georgetown Branch Light Rail Line, but does not include additional lanes on the Capital Beltway or the Intercounty Connector. It also assumes improved bus service with both reduced headways and additional routes.

The first purpose of the regional model is to determine the extent of traffic which will travel through the study area, reflecting changes in land use and travel demand associated with Round 5.4

Cooperative Forecast. These trips do not have origins or destinations within the study area but compete for the same capacity as those trips generated by the land uses of the proposed plan. The model also provides regional context for the evaluation of the proposed land use patterns and uses within the CBD. It also establishes the paths taken by trips traveling through the CBD and the immediate surrounding area.

SUBREGIONAL CORDON LINE



The regional model analysis indicated that the number of trips traveling through the study area would not change significantly, either by route or in total, through the year 2020. This is a result of two travel trends which generally offset each other. The first trend is an increase in areawide economic development, which would tend to increase through trips. The second trend is the forecast increase in Silver Spring CBD development, which, by generating new trips within a constrained roadway network would tend to divert through trips away from the CBD. In other words, if the Silver Spring CBD development increased while the rest of the region remained constant, the number of trips through the study area could be expected to decrease. Conversely, if no new development were to occur in the CBD, but the rest of the region continued to grow, some new through trips would be expected. The regional model indicates that the anticipated new development in Silver Spring is, in essence, keeping pace with the rest of the region, so that the number of through trips in the study area will essentially remain constant.

The second purpose of the regional travel demand model is the evaluation of areawide level of service. The model analysis demonstrated that the areawide level of service will remain acceptable. This analysis is similar to the Policy Area transportation review conducted as part of the Annual Growth Policy (AGP) test for the adequacy of transportation facilities. This test uses an "average congestion index" (ACI) to evaluate the average level of service across all transportation facilities in a policy area and compare that index to the AGP standard. With the proposed land use scenario for the CBD and the 2020 transportation network, the local road ACI standard and the calculated ACI were found to be the same.

Local Area Model

Within the subregional cordon line, a finer grain, more detailed analysis is conducted by a Local Area Model (LAM) which takes into account local land use (which disaggregates the population and employment forecast found in the TAZ into smaller zones), the intersection geometry and signal phasing, time of day turn prohibitions and lane use changes, the extent of through traffic, the logical paths taken by vehicle trips generated by the land use and the resulting level of service (LOS), based on critical lane volume (CLV). The trip generation rates used in the LAM are those which were used in the 1993 CBD Plan and reflect policies such as increased transit service, parking strategies, greater percentage of walk trips and other factors which occur in urbanized business districts. The LAM produces LOS information for both AM and PM peak hours.

The LAM analysis is based on the Local Area Transportation Review (LATR) procedures that evaluate roadway network impacts of individual development proposals. For the Silver Spring/Takoma Park Transportation and Circulation analysis, the typical LATR procedures were expanded to evaluate development throughout the study area. The assumed development characteristics for the study area are described in the following paragraphs.

Assumed Development Characteristics

The analysis of local area impacts assumed the following characteristics for development which would be expected to occur by the year 2020 as guided by the master planning process.

No change in the amount of peak period traffic generated by local land use was assumed in the North and West Silver Spring, the East Silver Spring, or the Takoma Park plan areas. This assumption reflects the master plan objectives for these areas that while redevelopment may be encouraged, it should be of a scope and nature consistent with the development it replaces. One exception to this general rule is at the Walter Reed Army Institute of Research (WRAIR), a 474,000 square foot building located on the Forest Glen Annex of the Walter Reed Army Medical Center in North Silver Spring. This development has been approved on the condition that the site generate no net increase in peak hour traffic volumes. No redevelopment of the National Park Seminary has been assumed.

The net increase in Silver Spring CBD development was assumed to include:

- 2.4 million square feet of office space
- 1.3 million square feet of retail space
- 1,800 dwelling units
- 600 hotel rooms

These figures reflect projected development over the next 20 years, not buildout of the full zoning envelope. This level of increased development would result in total CBD development levels similar to those endorsed by the 1993 Sector Plan, as shown in **Table 1**.

Table 1. Comparison of Projected CBD Development Levels

Land Use	Unit	1993 CBD Plan	1999 Study
Households	Dwellings	11,000	8,100
Office Employment	Jobs	33,000	35,600
Retail Employment	Jobs	7,000	6,400
Industrial Employment	Jobs	2,300	470
Other Employment	Jobs	1,400	3,260
Total Employment	Jobs	43,700	45,730

Note: As of 3/31/99, the CBD contained 34,665 jobs and 5,300 dwelling units.
An additional 4,446 jobs and 983 housing units were in the pipeline.

Trip generation rates for development were assumed that were consistent with those described in the Local Area Transportation Review Guidelines, as shown in **Table 2**.

Table 2. Trip Generation Rates

Land Use	Unit	Peak Hour Trip Generation Rate			
		AM		PM	
		Inbound	Outbound	Inbound	Outbound
Office	1,000 square feet	1.44	0.21	0.21	1.19
Retail	1,000 square feet	0.27	0.23	1.00	1.00
Residential	Dwelling unit	0.09	0.26	0.28	0.12
Hotel	Room	0.12	0.08	0.11	0.09

Trip distribution was developed based on the regional model. The percentage of CBD trips entering and leaving via each of the cordon points is listed in **Table 3**. These values are similar to those used in the 1993 plan.

Table 3. Trip Distribution

Cordon Point	Percent Office/Retail	Percent Residential/Hotel
Georgia Avenue/16th Street (north)	35%	27%
Colesville Road (north)	25%	10%
Wayne/Sligo Avenues	12%	8%
Philadelphia Avenue	7%	11%
Georgia Avenue (south)	6%	15%
16th Street (south)	8%	17%
East-West Highway	7%	12%

Travel Demand Management Trip Reduction

Prior analyses of Silver Spring CBD development plans have recognized the need to implement travel demand management (TDM) policies or services to reduce vehicle trips in the Georgia Avenue and Colesville Road corridors beyond the levels assumed in the CBD plan. The analyses presented in this report have included a reduction of 300 peak hour, peak direction vehicle trips on Georgia Avenue and a reduction of 200 peak hour, peak direction vehicle trips on Colesville

Road, consistent with assumptions made in prior planning efforts. This trip reduction is a corridor-specific assumption based on the fact that the high levels of congestion otherwise forecast cannot reasonably be assumed to occur. The peak hour trip reduction is assumed to reflect a combination of travel behavior changes in response to the high levels of congestion, including diversion of existing through traffic to other routes outside the study area, a modal shift toward ridesharing or transit use, or a temporal shift outside the peak hour.

IV. TRANSPORTATION DEMAND MANAGEMENT

Transportation Demand Management (TDM) strategies are intended to help reduce the percentage of peak hour (or peak period) travel by motorists driving alone. Localized strategies, such as ridesharing, reduced transportation costs (subsidies or reduced parking costs for carpools and vanpools), transit use subsidies, better transit accessibility (shelters, sidewalks, trails, bike racks at transit stations), and pedestrian-friendly design of buildings all contribute to meeting regional vehicle trip reduction goals.

Information provided in other sections of this memorandum indicates the extent of the available transportation system capacity. The Silver Spring/Takoma Park area is a major transportation hub of the regional network. Several key intersections, which control the capacity of the urban network, are congested and operate at unacceptable levels of service. There remains additional development which is approved, but not yet built, and this development, along with growth in regional population and employment will contribute to even greater travel demand on the major roadways and bus and rail transit routes. As noted earlier in this memorandum, the highway network is virtually completed and its intersections offer little opportunity for significant capacity expansion. Therefore, an important investment in strategies to reduce the amount of vehicular travel (especially vehicle trips during peak periods) appears to be the most viable means of coping with potentially greater levels of congestion while preserving communities and natural features.

This approach of vehicle trip reduction strategies is characterized as transportation demand management or TDM. The purpose of TDM is to optimize the use of an ever-constrained transportation network by implementing strategies such as ridesharing, parking supply controls (such as pricing and availability), pedestrian friendly design, transit accessibility and affordability, and other practices which reduce the demand for automobile use, particularly during peak travel periods.

TDM strategies work best in an environment of cooperation between public and private entities where other transportation options are available and land use patterns promote other means of mobility beyond automobiles. The transit opportunities within the Silver Spring CBD which receives service from more than 40 bus routes, along with Metrorail and MARC commuter rail, greatly improve the chances of success of TDM strategies. The ideal climate for TDM success is where many workers converge on a few sites. Therefore, large concentrations of major employers, or a very large single employment site, tend to exhibit higher levels of success than do areas with large numbers of firms employing few people. In the other master plan areas surrounding the CBD, transit coverage and accessibility, sidewalks, bikeways, grid street patterns and land use patterns all promote other means of mobility without the use of automobiles. However, TDM strategies which are based on residential concentrations are normally not very successful, except for improvements in transit accessibility and regional ride-share matching. In areas which are predominately residential, TDM strategies must be employed on a *regional* basis, which means involvement by Virginia and its jurisdictions, the District of Columbia (including the Federal government agencies) and neighboring Maryland counties and cities. Since parking supply and mobility issues vary around the region, the compelling reason to impose such restrictions upon residents and employers also vary, making it very difficult to achieve much success on a regionwide basis.

The Silver Spring Transportation Management District (TMD) is a county-administered organization that disseminates information on alternative commuting modes, maintains match lists for potential ridesharing participants, and monitors travel patterns within the CBD. The TMD uses both field data and employee surveys to monitor performance measures described in the Annual Growth Policy (AGP).

The primary measure of TDM activities in the Silver Spring CBD is the extent to which office workers in the CBD use means of travel other than driving an automobile to commute. Within the CBD, the TDM goal is to limit automobile use so that during peak periods no more than 54 percent of employees in the CBD drive to or from work. During the past four years, the observed percentage of workers who drive to and from work has ranged from 60 percent to 66 percent, without a discernible trend either toward or away from the TDM goal. This performance suggests that more aggressive programs and policies may be needed to achieve the TDM goals.

V. PARKING

Parking within the Central Business District (CBD) of Silver Spring is monitored by the Transportation Management District (TMD). The Annual Growth Policy (AGP) recommends constraints on the amount of parking and that parking prices reflect a constrained market (higher costs for parking). As of 1998, parking rates for public facilities are set at $75 per month for single-occupant vehicles with a variable scale depending upon vehicle occupancy, down to $30 monthly for three-or-four-occupant vehicles. This relates to a public subsidy of $45 monthly for carpools. Privately operated parking garages and lots do not have a uniform pricing strategy.

In 1997 there were approximately 11,200 long term parking spaces available in public and private parking facilities within the CBD, a reduction of about 500 parking spaces since 1995. About two-thirds of these spaces are in public facilities, including 13 lots and eight garages. Approximately 6,700 long term parking spaces were observed to be used during midday in 1997, well below the AGP limit of 15,750. The AGP limit reflects a 90 percent cap on the total number of garage and surface lot spaces of approximately 17,500. This indicates that there is a substantial supply in available parking within the CBD, although much of this parking may not be convenient to activities within the CBD. In addition to the spaces noted in garages and surface parking lots, there are approximately 1,000 on-street spaces within the CBD. This indicates that there is sufficient parking capacity within the CBD to support development consistent with the plan. It also means that costs associated with providing parking usually borne by the site developer are not as significant since it is assumed that developers will provide some portion of required parking on-site.

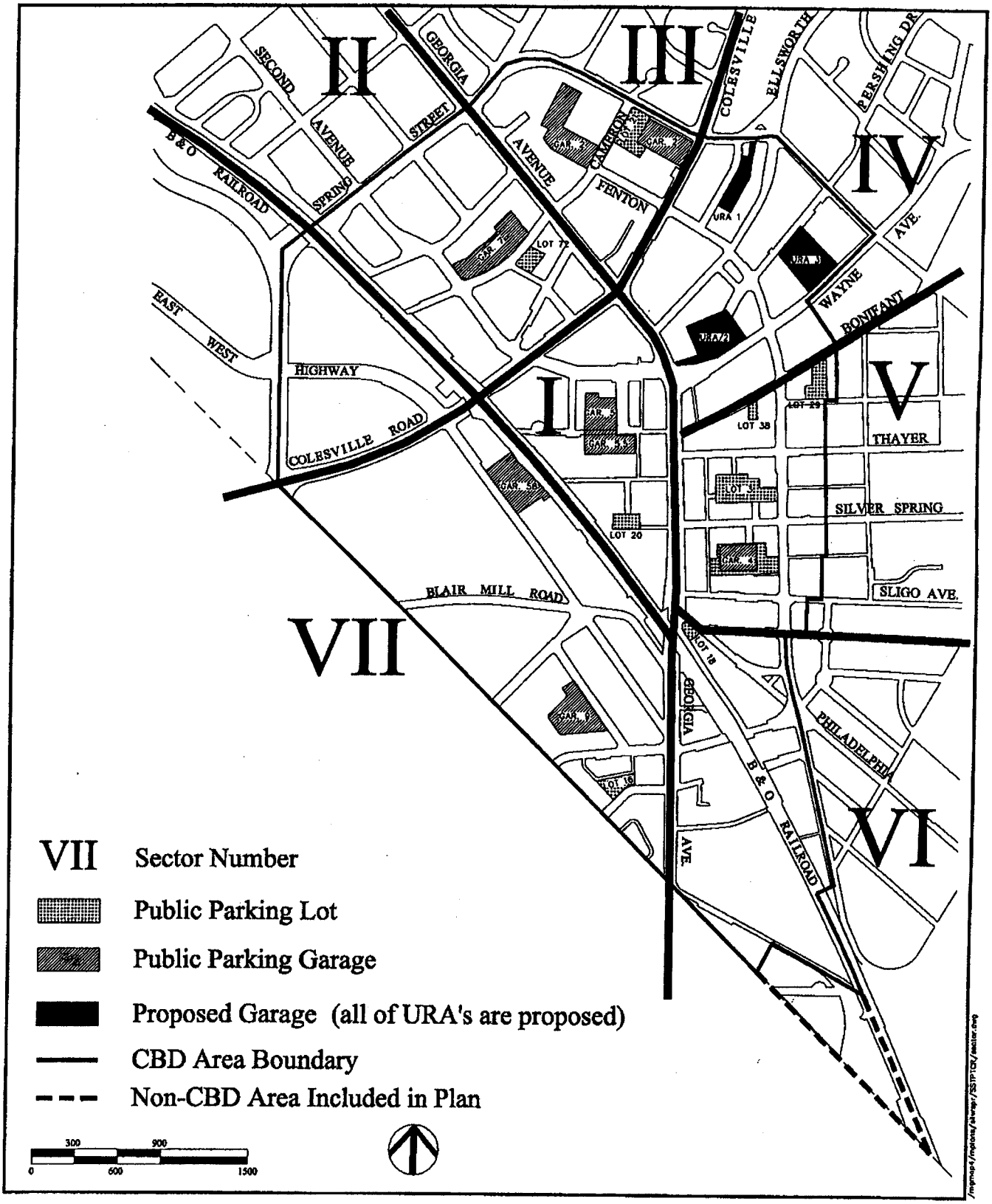
The public parking lots and garages are organized into seven sectors shown on **Map 3**. Based on surveys conducted in April 1997, the most highly used sector for long term public spaces is Sector II (70 percent) which is north of Colesville Road and west of Georgia Avenue. None of the other sectors had a greater than 50% utilization rate. The overall utilization rate for the CBD was 40%.

Preliminary estimates for 1998 indicate that the supply of public parking in Sectors II and VII has been reduced by approximately 1,000 spaces since 1997 as part of redevelopment projects. Sector II parking will be further reduced if the Tastee Diner is relocated to Lot 72. Current parking in Sector IV will be reconstructed as part of the urban renewal project.

Private parking is more utilized than public parking, with an overall utilization rate of 76% in1997. Private parking utilization is also more evenly distributed throughout the CBD, with the utilization rate in Sectors I through VII ranging from 66% to 86%.

In summary, the amount of long term parking is adequate to accommodate forecast needs. The difference between the current long term space utilization and the AGP cap is approximately 9,000 spaces. The amount of forecast CBD development includes an increase of approximately 11,100 jobs. Given the Sector Plan goal of a 54% auto-driver mode share for commuters to the CBD, only about 6,000 additional spaces will be needed.

Silver Spring CBD Parking Lot District Sectors



VI. TRANSIT SYSTEM

The county's Annual Growth Policy includes an assessment of the transit accessibility of each of the Policy Areas. This assessment is stated as a "regional transit accessibility," an index which measures how well the households in the policy area are connected by transit to the region's jobs and how well the households throughout the region are connected by transit to the jobs in the policy area. In this context, "transit" includes all non-auto modes of transportation, such as rail, bus, walking, and bicycling. The Silver Spring/Takoma Park and Silver Spring CBD Policy Areas are rated as having the county's best regional transit accessibility.

Existing transit service is very extensive in the Silver Spring/Takoma Park Policy Area and represents this area's close proximity to the District of Columbia and the other nearby densely populated urbanized centers located inside the Capital Beltway. Transit service in the study area includes MARC commuter rail (one station), Metrorail(two stations), and bus services (over 40 routes).

The study area is served by two Metrorail Red Line stations at Silver Spring and at Takoma Park. The latter station is located within the District of Columbia but is immediately adjacent to the City of Takoma Park. In addition to MARC commuter rail service, the Silver Spring Metrorail Station is served by 41 bus routes. The Takoma Park Metrorail Station is served by 14 bus routes operated by WMATA and Ride-On. There are additional bus routes which operate within the District of Columbia and connect with this station. The Forest Glen Metrorail Station, which is located immediately north of the Capital Beltway, also serves the Montgomery Hills neighborhood within the study area. The Capital Beltway forms a barrier to this station for residents and employees within North Silver Spring. Accessibility will be improved by a pedestrian bridge through the Capital Beltway/Georgia Avenue interchange which will allow pedestrians to walk along the western side of Georgia Avenue without crossing any of the interchange ramps at grade.

Generally, areas located within a quarter-mile of a bus stop are considered to be adequately served by bus transit. Based on the quarter-mile standard, transit coverage within the individual master plan areas of the study area appears to be adequate overall. There are very few areas located outside of this coverage zone. These areas can be generalized as located in the northern-most area of West Silver Spring around the U.S. Army Medical Center complex at Walter Reed, the southwestern area of West Silver Spring, the northeastern most area of North Silver Spring and areas immediately adjacent to the Northwest Branch in East Silver Spring. The quarter-mile coverage assumes transit patrons can use either sidewalks or low volume streets as a path to the closest bus stop.

By observation, there is more north-south bus route service than east-west service and very little service connecting Silver Spring with Prince George's County even though vehicular commuting patterns between the two areas are significant. The MTA, in conjunction with Transportation Planning staff and staff from the Counties, is evaluating east-west route improvements connecting both counties and major employment and population centers including Silver Spring.

State funding has been requested for several routes which connect Montgomery County destinations in the study area with locations within Prince George's County (Greenbelt, College Park,

Beltsville, Langley Park and New Carrollton). These routes are being evaluated for increases in service, new service starts and/or reduced headways. This service increase could reduce the disparities between north-south and east-west service and improve the connectivity between the two counties.

Transit services in the study area will be enhanced by the consolidation of local, regional, and intercity bus and rail services at the Silver Spring CBD Transit Center. The Transit Center, located at the existing Silver Spring Metrorail station, will be a downtown landmark, providing combined transit services that are directly linked to surrounding development.

The existing Silver Spring Metrorail station is the largest transit hub in Maryland serving over 57,000 bus and Metrorail boardings and alightings each weekday. Intercity bus and MARC commuter rail are located off-site and approximately one-half mile from this station.

The existing configuration of the station is constrained by land area and necessary operational space, which limits the ability to add future bus capacity (for more non-automobile accessibility) and to accommodate taxi and passenger drop-off (kiss and ride) accessibility. Further, the station in its current configuration cannot accommodate the proposed east-west transitway connection to Bethesda, known as the Georgetown Branch, or planned hiker-biker trails. For these reasons, a Transit Center design concept has been prepared which would improve accessibility, increase modal inter-connectivity, and support future travel demand.

Planners from MTA, WMATA, and the County estimate that the demand at the station will increase from a current 57,000 boardings/alightings per day to approximately 97,000 by 2020, based on demographic and travel demand forecasts. To support this substantial increase in travel demand, the following design features are planned for the Transit Center.

- Relocating the MARC rail station and the intercity bus terminal location to the Transit Center
- Increasing the total on-site bus bays (WMATA, Ride-On, and MTA)
- Increasing the number of taxi stalls
- Increasing the number of kiss-and-ride spaces
- Improving pedestrian circulation and accessibility (to meet ADA requirements)

The first phase, which relocates the MARC platform to the station, is funded and will be underway soon. The second phase is predicated on funding for final design, detailed engineering, land acquisition and construction.

VII. NON-MOTORIZED TRANSPORTATION

Non-motorized transportation accounts for approximately five percent of peak period commuter travel in the Silver Spring CBD and is an important means of travel for other trip purposes throughout the study area. Non-motorized transportation is divided into two types of facilities: bicycle facilities such as bikeways and trails, and pedestrian facilities including sidewalks and bridges.

Bicycle Facilities

The Silver Spring/Takoma Park Planning Area includes a network of existing and planned bikeway facilities, including off-road bike paths (formerly referred to as Class I), on-road shoulders (formerly referred to as Class II), on-road paths (formerly referred to as Class II and III) and park trails (both paved and natural surface). Former master plans as well as the 1978 *Master Plan of Bikeways* recommended a network of bikeway facilities along most of the area's major roadways and within the major parks. While most of these facilities have never been built or signed, they have continued to be identified on master plans. **Table 4** shows the status of several major facilities within the study area.

Table 4. Status of Major Bikeway Facilities

Trail Route	Status of Completion
East West Highway	Completed
Second Avenue	Partially Completed
Rock Creek Park	Partially Completed
Sligo Creek	Partially Completed
Capital Crescent	Planned
Metropolitan Branch	Planned
Walter Reed Annex Facility	Planned
Silver Spring Green Trail	Planned
Sligo Avenue	Planned
Carroll Avenue	Planned
Fenton Street	Planned

The Silver Spring/Takoma Park Policy Area will be traversed by two new regional trail systems. These are the Capital Crescent and Metropolitan Branch Trails which will run north-south and meet at the Silver Spring Transit Center and the Sligo Creek Trail which follows Sligo Creek Parkway from north of the Planning Area into the District of Columbia. Currently, only segments of these trails have been completed. Completion of these trails is not fully funded within the FY 98-03 Capital Improvement Program.

In addition, the Capital Crescent/Metropolitan Branch Trail is one of seven corridors identified in the Staff Draft of the *Master Plan Update of Trails and Bikeways*. This draft update will revisit recommendations of the 1978 *Master Plan of Trails and Bikeways* and will analyze bikeway and trail needs at a "corridor-level." Corridor-level planning does not identify a specific route or alignment, but generally locates a desire line. The value of this information is that Silver Spring is a hub of this planning effort.

East-west bikeways are planned connecting the Rock Creek and Sligo Creek regional trails. The segment located within the CBD is known as the Silver Spring Green Trail. Funding is being sought for this segment of this connecting trail. Furthermore, there are two other "corridors" which intersect at the heart of the CBD, Georgia Avenue-Connecticut Avenue and Colesville Road - US 29 - Old Columbia Pike. The Draft *Master Plan of Trails and Bikeways* recommends bikeway facilities along these alignments connecting with the Capital Crescent/Metropolitan Branch Trail as well as other transportation systems.

Pedestrian Facilities

Sidewalks, along at least one side of a roadway, are provided virtually everywhere within the CBD. There are some exceptions along segments of Blair Mill Road and along the northwestern boundary in residential areas. In the residential areas surrounding the CBD, travel demand is low and the roadways are frequently retrofitted with speed reduction or "traffic calming" measures such as speed humps or frequently located stop signs. These strategies reduce the need for separate sidewalks.

While sidewalks are reasonably well provided for within the CBD and along major roadways within the adjoining master plan areas, pedestrian travel across major roadways is made difficult by the lack of medians or other refuge areas and high traffic volumes and speeds along those roadways. At intersections which are controlled by traffic signals, motorists are frequently permitted to make right turns on red or the pedestrian phase of the signal's cycle length is only long enough to permit safe crossing for those pedestrians waiting at the intersection prior to the beginning of that phase. Therefore, major roadways such as Georgia Avenue, Colesville Road, and East West Highway create barriers for pedestrian crossing.

In an effort to reduce the number of impediments which discourage pedestrians, the currently approved and adopted master plans have identified five pedestrian bridges to overcome railroad and highway barriers:

- The Montgomery College Bridge over the Metrorail/CSX tracks, which would replace the demolished Juniper Street Bridge
- Ripley Street Bridge over the Metrorail/CSX tracks
- Forest Glen/Montgomery Hills Bridge at the Capital Beltway, currently under design
- Sligo Creek Trail crossing of Colesville Road
- Georgia Avenue crossing at Columbia Boulevard/Seminary Road

VIII. STREET NETWORK

This section of the report describes the existing and forecast roadway network conditions. Existing daily traffic volumes are described, and the effect of Silver Spring CBD development on forecast peak hour volumes is summarized.

The focus of this section is on the extent of intersection congestion and the means for addressing the congestion. **Table 5** presents the existing intersection congestion levels, along with the forecast levels of congestion considering both a "No-Build" scenario for intersection improvements and an approach in which limited geometric improvements are implemented. **Tables 6A through 6D** describe those limited geometric improvements, generally considered consistent with the applicable master plans currently in the adoption process. **Tables 7A through 7D** describe the types of geometric improvements which would be required to attain current standards of adequacy. The final paragraphs in this section describe the policy implications of substandard intersection congestion.

Daily Traffic Volumes

Average daily traffic (ADT) information is gathered along roadways maintained by the State Highway Administration (SHA) on an annual basis. Although the Montgomery County Department of Public Works and Transportation (DPWT) collects ADT data as required for specific purposes, there is no longer a routine data collection effort along roadways maintained by the County. Therefore, the ADT counts shown below are expressed along state-maintained roadways only.

These numbers reflect a "point in time" and are not meant to be used for design purposes or to assess noise or air emissions impact. Their value is to provide a relative scale of travel demand (expressed in vehicles) along various segments of the highway network.

Map 4 shows the 1996 ADT counts collected by SHA for the study area. The Capital Beltway (I-495) is the most heavily used transportation facility in the policy area, carrying up to 250,000 vehicles per day along the northern boundary of the study area. Traffic volumes on other roadways in the study area tend to be highest in the vicinity of Capital Beltway interchanges. Georgia Avenue (MD 97) carries approximately 85,000 vehicles per day just south of the Capital Beltway, compared to about 46,000 vehicles per day at the northern edge of the Silver Spring CBD. Colesville Road (US 29) carries approximately 45,000 vehicles per day just south of the Capital Beltway, compared to about 31,000 vehicles per day at the northern edge of the Silver Spring CBD.

Peak Hour Traffic Volumes

The Annual Growth Policy (AGP) sets forth a series of performance objectives to measure the Silver Spring TMD's success in meeting its goals for the CBD. One of these goals addresses the maintenance of adequate traffic flow in the CBD by specifying a maximum level of local and through traffic exiting the CBD during the afternoon peak hour. The objective states that the outbound traffic must not exceed the practical cordon capacity of 18,000 vehicles.

Average Daily Traffic Volumes (1996)

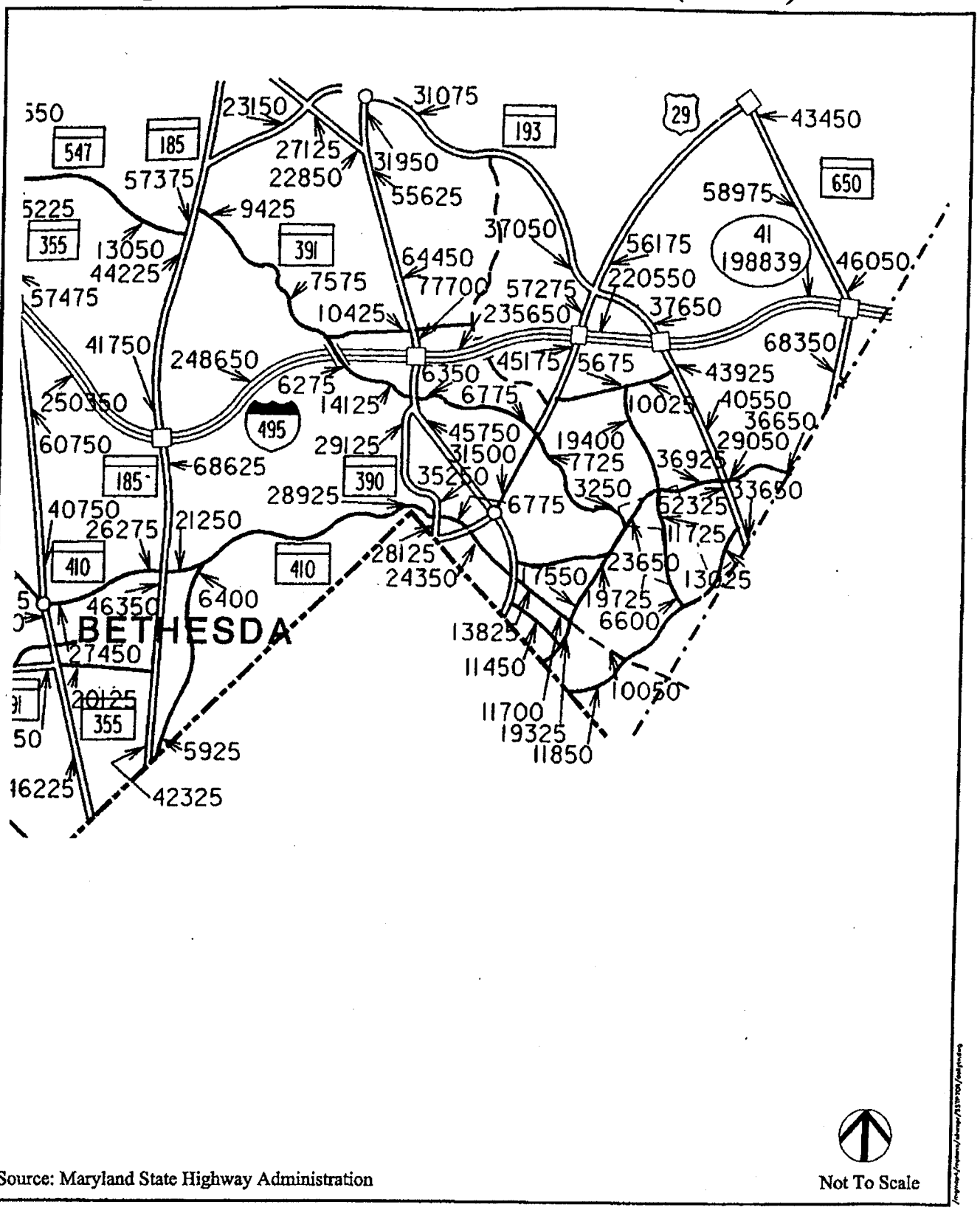


Table 5: Intersection Critical Lane Volumes

Intersection	Existing		2020 No-Build		2020 With Recommended Improvements	
	AM	PM	AM	PM	AM	PM
Silver Spring CBD						
16th Street @ Eastern Avenue	1190	1515	1276	1616	1276	1616
16th Street @ East-West Highway	1605	2151	1700	2307	1663	1752
16th Street @ Spring Street	700	963	727	1003	727	1003
Cedar Street @ Wayne Avenue	678	603	924	872	924	872
Colesville Road @ 16th Street	865	1284	1119	1526	1057	1462
Colesville Road @ East-West Highway	1340	1539	1841	1954	1537	1647
Colesville Road @ Fenton Street	952	1101	1492	2028	1432	1737
Colesville Road @ Spring Street	1197	1239	1501	1563	1441	1596
Colesville Road @ Wayne Avenue	1026	959	1596	1353	1522	1246
Fenton Street @ Philadelphia Avenue	988	1131	1154	1434	1354	1434
Fenton Street @ Wayne Avenue	868	942	1217	1416	1160	1349
Georgia Avenue @ Colesville Road	1451	1526	2080	2195	1769	1874
Georgia Avenue @ Eastern Avenue	965	994	1015	1076	904	965
Georgia Avenue @ East-West Highway	1687	1466	1799	1556	1614	1595
Georgia Avenue @ Sligo Avenue	904	941	1070	1147	885	1036
Georgia Avenue @ Spring Street	1230	1314	1805	1841	1536	1603
Georgia Avenue @ Wayne Avenue	1404	1282	2298	1997	1810	1495
Second Avenue @ Cameron Street	311	424	351	459	351	746
Spring Street @ Cameron Street	700	837	700	837	700	1089
Spring Street @ Second Avenue	320	721	431	847	431	847

Table 5: Intersection Critical Lane Volumes (continued)						
Intersection	Existing		2020 No-Build		2020 With Recommended Improvements	
	AM	PM	AM	PM	AM	PM
North and West Silver Spring						
Colesville Road @ Dale Drive	1474	1637	1778	1961	1594	1707
Colesville Road @ Franklin Avenue	1278	1487	1629	1868	1555	1794
Colesville Road @ Sligo Creek Parkway	1648	1754	2014	2121	1927	1885
East-West Highway @ Grubb Road	1218	1241	1285	1356	1285	1356
East-West Highway @ Meadowbrook Lane	1209	877	1276	993	1276	993
Georgia Avenue @ 16th Street	1138	1447	1674	2005	1506	1946
Georgia Avenue @ Seminary Place	1436	1536	1871	1989	1781	1875
Georgia Avenue @ Seminary Road	1612	1588	2047	2041	1999	2044
Second Avenue @ 16th Street	815	724	873	761	873	761
Second Avenue @ Linden Lane	591	821	619	867	1101	1334

Table 5: Intersection Critical Lane Volumes (continued)						
Intersection	**Existing**		**2020 No-Build**		**2020 With Recommended Improvements**	
	AM	**PM**	**AM**	**PM**	**AM**	**PM**
East Silver Spring and Takoma Park						
Carroll Avenue @ Ethan Allen Avenue	1112	1109	1400	1292	1400	1292
Dale Drive @ Wayne Avenue	794	597	**1658**	1383	1526	1383
New Hampshire Avenue @ Adelphi Road	1860	2212	1984	2416	1401	**1798**
New Hampshire Avenue @ Northampton Drive	1126	1135	1279	1296	1279	1296
New Hampshire Avenue @ Oakview Drive	1563	2333	1684	2461	1541	**1776**
New Hampshire Avenue @ Piney Branch Road	980	1360	1038	1591	1038	1591
Philadelphia Avenue @ Carroll Avenue	1124	999	1229	1283	1229	1283
Philadelphia Avenue @ Maple Avenue	954	1479	1347	1946	1005	1266
Piney Branch Road @ Arliss Street	1151	1159	1419	1439	1419	1439
Piney Branch Road @ Barron Street	965	900	1233	1181	1233	1181
Piney Branch Road @ Carroll Avenue	805	950	995	1181	995	1181
Piney Branch Road @ Dale Drive	969	864	992	876	1525	1478
Piney Branch Road @ Flower Avenue	1281	1334	1502	1503	1502	1503
Piney Branch Road @ Greenwood Court	802	808	1070	1089	1070	1089
Piney Branch Road @ Philadelphia Avenue	1349	1622	1682	1952	**1682**	**1952**
Piney Branch Road @ Sligo Avenue	757	773	782	785	969	1151
Piney Branch Road @ Sligo Creek Parkway	1043	897	1066	908	1574	1406
University Boulevard @ Carroll Avenue	1025	1344	1060	1365	1060	1365
University Boulevard @ Franklin Avenue	1377	1254	1390	1310	1390	1310
University Boulevard @ New Hampshire Avenue	1512	1467	1547	1502	1547	1502
University Boulevard @ Piney Branch Road	1653	1991	1965	2330	**1949**	**2120**

Note: Intersection CLVs exceeding current congestion standard noted in bold text under "Recommended Improvements"

Table 6A. Recommended Improvements - Silver Spring CBD

Note: No improvements explicitly described in Silver Spring CBD Plan text.

Location	Recommended Improvements	Comments
Georgia Avenue/Spring Street	- Prohibit AM/PM peak period left turns from WB Spring Street - Remove E/W split phase	
Georgia Avenue/Wayne Avenue	- Add second left turn lane to EB Wayne (L,L,T,R) - Add right turn lane to WB Wayne (L,T,T,R) - Add right turn lane to SB Georgia (L,T,T,T,R)	
Colesville Road/East-West Highway	- Add right turn lane and convert leftmost thru lane on SB Colesville to left turn lane (L,L,T,T,R)	
Colesville Road/Fenton Street	- Prohibit PM peak period left turns from both Fenton Street approaches	
East-West Highway/16th Street	- Convert right turn lane to thru-right lane on EB East-West Highway (L,T,T,TR) - Convert left-thru lane to left turn lane on SB 16th Street (L,T,T,R) - Prohibit left turns from WB East-West Highway - Convert left turn lane to thru lane on WB East-West Highway - Remove NB/SB split phase	As described in North/West Plan
Fenton Street/Philadelphia Avenue	- Consolidate thru lane and right turn lane to shared thru-right lane on SB Fenton (L,TR)	To accommodate pocket park
Wayne Avenue/Fenton Street	- Add left turn lane to WB Wayne Avenue (L,T,TR) - Add right turn lane to NB Fenton Street (LT,T,R)	In current CIP, but not required to meet congestion standards

Table 6B. Recommended Improvements - North and West Silver Spring

Location	Recommended Improvements	Comments
Georgia Avenue/16th Street	- Reconfigure, develop using gateway treatment, improve pedestrian access, and maintain traffic capacity	
Georgia Avenue/Seminary Road/Columbia Boulevard	- Reconfigure per Plan text, with recommended lane uses: - NB Georgia (L,T,T,TR) - SB Georgia (LT,T,T,TR) - EB Seminary (LT,T,R) - WB Seminary (LT,T,R) - Prohibit AM peak period left turns from both Georgia Avenue approaches - Prohibit PM peak period left turns from SB Georgia Avenue and from EB Seminary Road	
Georgia Avenue/Seminary Place	Reconfigure per Plan text, including removal of alley	
Second Avenue/Linden Lane	Reconfigure per Plan text, all approaches two lanes (L,TR)	
Second Avenue/Seminary Road/Seminary Place	Reconfigure as "T" intersection per Plan text with recommended lane uses: - NB Second Avenue (L,R) - EB Seminary Road (T,R) - WB Seminary Place (L,T)	
Colesville Road/Dale Drive	- Add right turn lane to WB Dale Drive (L,TR,R)	Additional improvements in current CIP cited by TMD annual report
Colesville Road/Sligo Creek Parkway	- Add thru turn lane to WB Sligo Creek Parkway (L,T,TR)	

Table 6C. Recommended Improvements - East Silver Spring

Location	Recommended Improvements	Comments
Piney Branch Road/Sligo Avenue	- Current configuration or reconstruct Piney Branch Road as three-lane section with exclusive turn lanes at intersection (L,T,R)	
Piney Branch Road/Dale Drive	- Current configuration or reconstruct Piney Branch Road as three-lane section with exclusive turn lanes at intersection (L,T,R)	
Piney Branch Road/Sligo Creek Parkway	- Current configuration or reconstruct Piney Branch Road as three-lane section with exclusive turn lanes at intersection (L,T,R)	Intersection also in Takoma Park
Wayne Avenue/Dale Drive	- Restripe both Wayne Avenue approaches to remove thru traffic from left turn lane (L,TR) as part of reconstruction associated with Wayne Avenue Green Trail. Add right turn lane to westbound Wayne Avenue (L,T,R).	
University Boulevard/Piney Branch Road	- Add right turn lane to EB Piney Branch Road (L,T,T,R) - Add right turn lane to WB Piney Branch Road (L,T,T,R)	
New Hampshire Avenue/Adelphi Road/Dilston Road	- Add thru lane to NB New Hampshire Avenue (L,T,T,T,TR) - Add second left turn lane to SB New Hampshire Avenue (L,L,T,T,TR)	
New Hampshire Avenue/Oakview Drive	- Add thru lane to NB New Hampshire Avenue (L,T,T,T,TR) - Add left turn lane to EB Oakview Drive (L,TR) - Add left turn lane to WB Oakview Drive (L,T,R)	

Table 6D. Recommended Improvements - Takoma Park

Location	Recommended Improvements	Comments
Piney Branch Road/Sligo Creek Parkway	- Current configuration or reconstruct Piney Branch Road as three-lane section with exclusive turn lanes at intersection (L,T,R)	Intersection also in East Silver Spring
Philadelphia Avenue/Maple Avenue	- Add left turn lane to EB Philadelphia (L,TR) - Remove E/W split phase	

Table 7A. Potential Additional Improvements - Silver Spring CBD

Location	Improvements	Forecast Critical Lane Volume (AM/PM)
Georgia Avenue/Colesville Road	**Consistent with Master Plan** - Divert some WB left turns from Colesville onto Georgia via Fenton Street and Burlington Avenue	(1769/1874)
	Not Currently Recommended - Add second left turn lane to WB Colesville Road (L,L,T,TR in PM)	(1769/1764)
Georgia Avenue/Wayne Avenue	**Consistent with Master Plan** - Add second left turn lane to EB Wayne (L,L,T,R) - Add right turn lane to WB Wayne (L,T,T,R) - Add right turn lane to SB Georgia (L,T,T,T,R)	(1810/1495)
	Not Currently Recommended - Add second right turn lane to SB Georgia (L,T,T,T,R,R)	(1609/1495)

Table 7B. Potential Additional Improvements - North and West Silver Spring

Location	Improvements	Forecast Critical Lane Volume (AM/PM)
Georgia Avenue/16th Street	**Specifically Described in Master Plan** - Reconfigure, develop using gateway treatment, improve pedestrian access, and maintain traffic capacity	(1506/1946)
	Not Currently Recommended - Add fourth thru lane to NB Georgia (T,T,T,T)	(1455/1578)
Georgia Avenue/Seminary Road/Columbia Boulevard	**Specifically Described in Master Plan** - Reconfigure per Plan text, with recommended lane uses: - NB Georgia (L,T,T,TR) - SB Georgia (LT,T,T,TR) - EB Seminary (LT,T,R) - WB Seminary (LT,T,R) - Prohibit AM peak period left turns from both Georgia Avenue approaches - Prohibit PM peak period left turns from SB Georgia Avenue and from EB Seminary Road	(1999/2044)
	Not Currently Recommended In lieu of Master Plan recommendations: - Add second reversible lane to Georgia Avenue for eight-lane cross-section (T,T,T,T,TR in peak direction; T,T,TR in off-peak direction) - Add EB RT lane to Seminary Road (L,T,TR), add WB LT lane to Columbia Boulevard (L,T,T,R), and remove EB/WB split phase	(1718/1701) (1648/1587)
Georgia Avenue/Seminary Place	**Specifically Described in Master Plan** Reconfigure per Plan text, including removal of alley	(1781/1875)

Location	Improvements	Forecast Critical Lane Volume (AM/PM)
	Not Currently Recommended In lieu of Master Plan recommendations: - Add second reversible lane to Georgia Avenue for eight-lane cross-section	(1462/1546)
Colesville Road/Dale Drive	**Specifically Described in Master Plan** - Add right turn lane to WB Dale Drive (L,TR,R)	(1594/1707)
	Consistent With Master Plan - Add left turn lane to EB Dale Drive (L,L,TR)	(1584/1623)
Colesville Road/Sligo Creek Parkway	**Specifically Described in Master Plan** - Add thru turn lane to westbound Sligo Creek Parkway (L,T,TR)	(1927/1885)
	Not Currently Recommended In lieu of Master Plan recommendation: - Extend Colesville Road reversible lane through intersection (L,T,T,T,TR in peak direction; L,T,TR in off-peak direction)	(1625/1567)
Colesville Road/Franklin Avenue	**Master Plan** No recommended improvements	(1555/1794)
	Not Currently Recommended - Extend Colesville Road reversible lane through intersection (L,T,T,T,TR in peak direction; L,T,TR in off-peak direction)	(1295/1491)

Table 7C. Potential Additional Improvements - East Silver Spring

Location	Improvements	Forecast Critical Lane Volume (AM/PM)
University Boulevard/Piney Branch Road	**Specifically Described in Master Plan** - Add right turn lane to EB Piney Branch Road (L,T,T,R) - Add right turn lane to WB Piney Branch Road (L,T,T,R)	(1949/2120)
	Not Currently Recommended In lieu of Master Plan recommendations: - Add thru lane and right turn lane to EB Piney Branch Road (L,T,T,T,R) - Add thru lane to WB Piney Branch Road (L,T,T,TR) - Add left turn lane to NB University Boulevard (L,L,T,T,TR) These improvements are not currently recommended based on impacts to adjacent land uses. Should redevelopment occur during the Plan timeframe, these improvements should be reconsidered.	(1454/1538)
New Hampshire Avenue/Adelphi Road/Dilston Road	**Specifically Described in Master Plan** - Add thru lane to NB New Hampshire Avenue (L,T,T,T,TR) - Add second left turn lane to SB New Hampshire Avenue (L,L,T,T,TR)	(1401/1737)
	Consistent With Master Plan - Master Plan recommendation plus - Add left turn lane to WB Adelphi Road (L,T,R,R)	(1369/1651)
New Hampshire Avenue/Oakview Drive	**Specifically Described in Master Plan** - Add thru lane to NB New Hampshire Avenue (L,T,T,T,TR) - Add left turn lane to EB Oakview Drive (L,TR) - Add left turn lane to WB Oakview Drive (L,T,R)	(1541/1776)
	Consistent with Master Plan - Master Plan recommendation plus - Add second left turn lane to SB New Hampshire Avenue (L,L,T,T,TR)	(1541/1508)

Table 7D. Potential Additional Improvements - Takoma Park

Location	Improvements	Forecast Critical Lane Volume (AM/PM)
Philadelphia Avenue/Piney Branch Road	**Master Plan** No recommended improvements	(1682/1952)
	Not Currently Recommended - Add thru lane to NB and SB Piney Branch Road (L,T,TR)	(1363/1526)

Currently, 12,400 vehicles exit the CBD during a typical afternoon peak period. Redevelopment in the CBD is expected to increase the number of vehicles leaving the CBD during the peak hour by about 4,450 vehicles, for a forecast total of 16,850 peak hour vehicles by the year 2020. The forecast afternoon peak hour volumes crossing the cordon line are shown on **Map 5**.

Surveys performed for the 1993 plan indicated that about two-thirds of the cordon line traffic was generated by CBD activity. The regional travel demand model forecasts conducted for the current analysis indicated that the number of through trips would not change significantly by the year 2020, assuming CBD development occurs as planned. The percentage of through traffic, therefore, may be expected to drop slightly, from about one-third of the current cordon volume to about one-fourth of the cordon volume in the year 2020.

Neighborhood Protection

The Silver Spring/Takoma Park Policy Area is traversed by several major highways, including Georgia Avenue, Colesville Road, University Boulevard, East West Highway and New Hampshire Avenue. Because significant delay exists at many major intersections along these roads, motorists have a proclivity to seek other routes, especially during peak periods. The study area roadway network includes many interconnecting residential streets whose purpose is to provide neighborhood access. An increase in the use of these local streets by non-local traffic during peak demand period and speeding during non-peak periods have become important issues for these neighborhoods.

Through the Traffic Management Program, strategies have been implemented to discourage non-local traffic from using local residential streets. Such strategies include "soft changes" such as all-way stop-sign control, directional prohibition (one way streets), time-of-day turn prohibitions (limiting turns at intersections in peak periods), and "hard changes" such as speed humps, diverters, and collars. This program is being implemented on a county-wide basis. The City of Takoma Park which maintains most of its non-arterial roadway network has pursued a very aggressive program to reduce non-local travel demand with the City. As a result of the program non-local traffic is being discouraged from using local, residential streets and travel volumes are being reduced. Successful application of neighborhood protection strategies has forced more vehicles onto the arterial and major highway network. This rerouting of traffic has lead to greater travel demand along these roadways and more opportunities for congestion at major intersections along Georgia Avenue, Colesville Road, University Boulevard and New Hampshire Avenue.

Intersection Congestion

The level of congestion at intersections in Montgomery County is most commonly assessed using the Critical Lane Volume (CLV) method. The CLV summarizes peak hour travel conditions accounting for the number of thru and turning vehicles, the number of thru and turning lanes, and the intersection signal phasing. The Annual Growth Policy establishes acceptable levels of congestion for Policy Areas throughout the County. In the Silver Spring CBD, a CLV of 1,800 or less is considered acceptable. In the remainder of the Silver Spring/Takoma Park Policy Area, a CLV of 1,650 is considered acceptable.

Forecast Silver Spring CBD Cordon Line Volumes

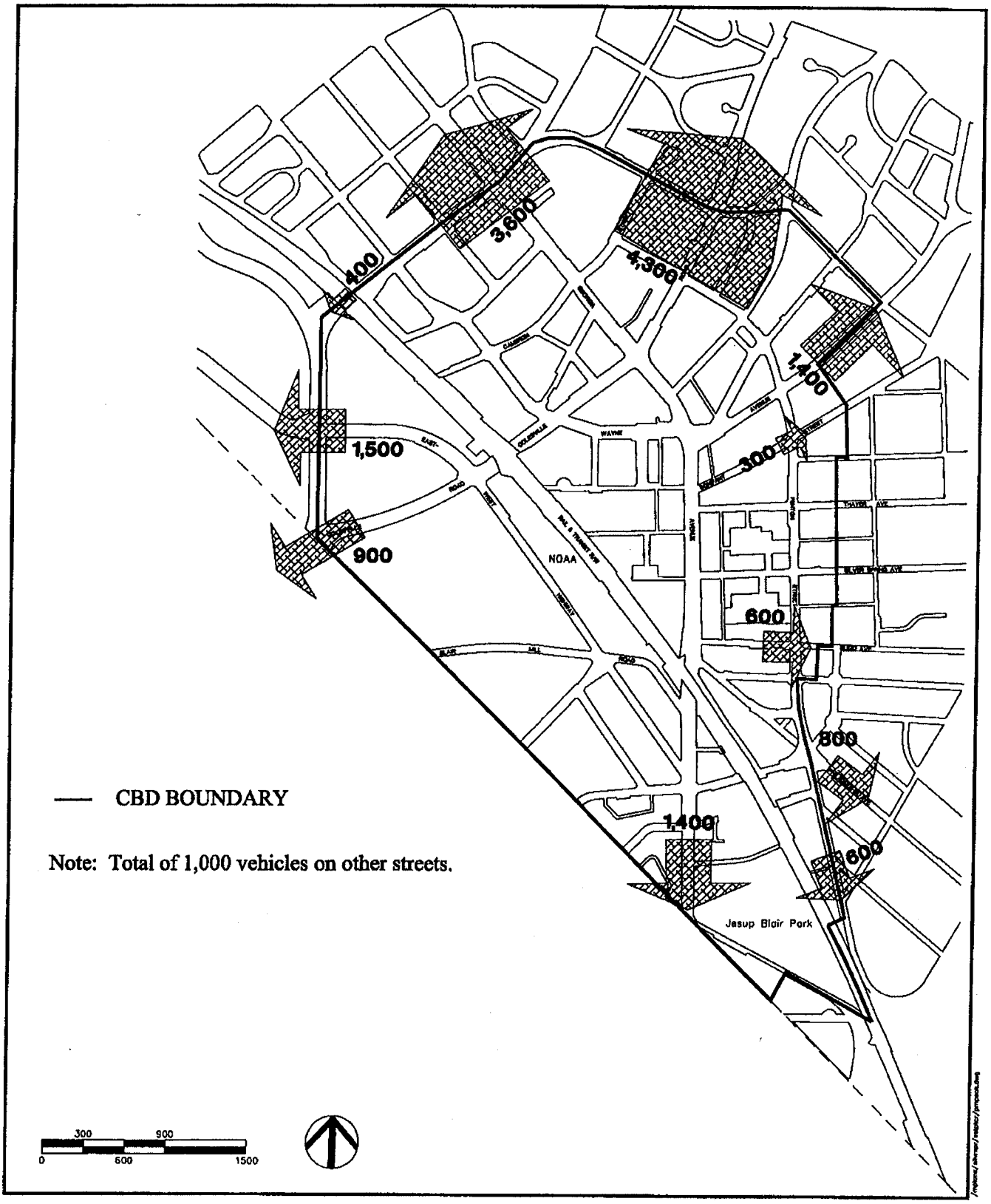


Table 5 presents existing and future CLV values for the intersections evaluated in this analysis. The leftmost columns show the existing CLV for the morning and evening peak hours, respectively. The middle columns show the forecast 2020 CLV for the morning and evening peak hours, assuming no changes ("No-Build") to intersection geometry or signal phasing. The rightmost columns show the forecast 2020 CLV for the morning and evening peak hours assuming recommended intersection improvements. For the purposes of this study, the term "recommended" includes those improvements specified in the relevant draft sector plan or master plan, if such detail is included in the draft plan. For other locations, the "recommended" improvement is one considered by staff to be consistent with the intent of the plans. Additional detail concerning already planned intersection improvements, recommended intersection improvements, and additional potential intersection improvements is provided in the following paragraphs.

Maps 6 through 9 present the forecast intersection congestion information graphically for the four master plans respectively. Study intersections which are forecast to operate within the applicable congestion standard with recommended improvements in place are shown with a circle. Study intersections which are forecast to operate at substandard levels of congestion, even with recommended improvements, are shown with a rectangle.

Currently Planned Roadway System Improvements

Previous sector plans, master plans, and development proposals within the study area have identified transportation improvements to enhance safety and support existing and future development. The study area has a well-established transportation network which serves mature land use patterns. Significant changes to the network are usually neither cost-effective nor desirable in terms of their community impacts. Most proposed improvements, therefore, are fairly modest in scope.

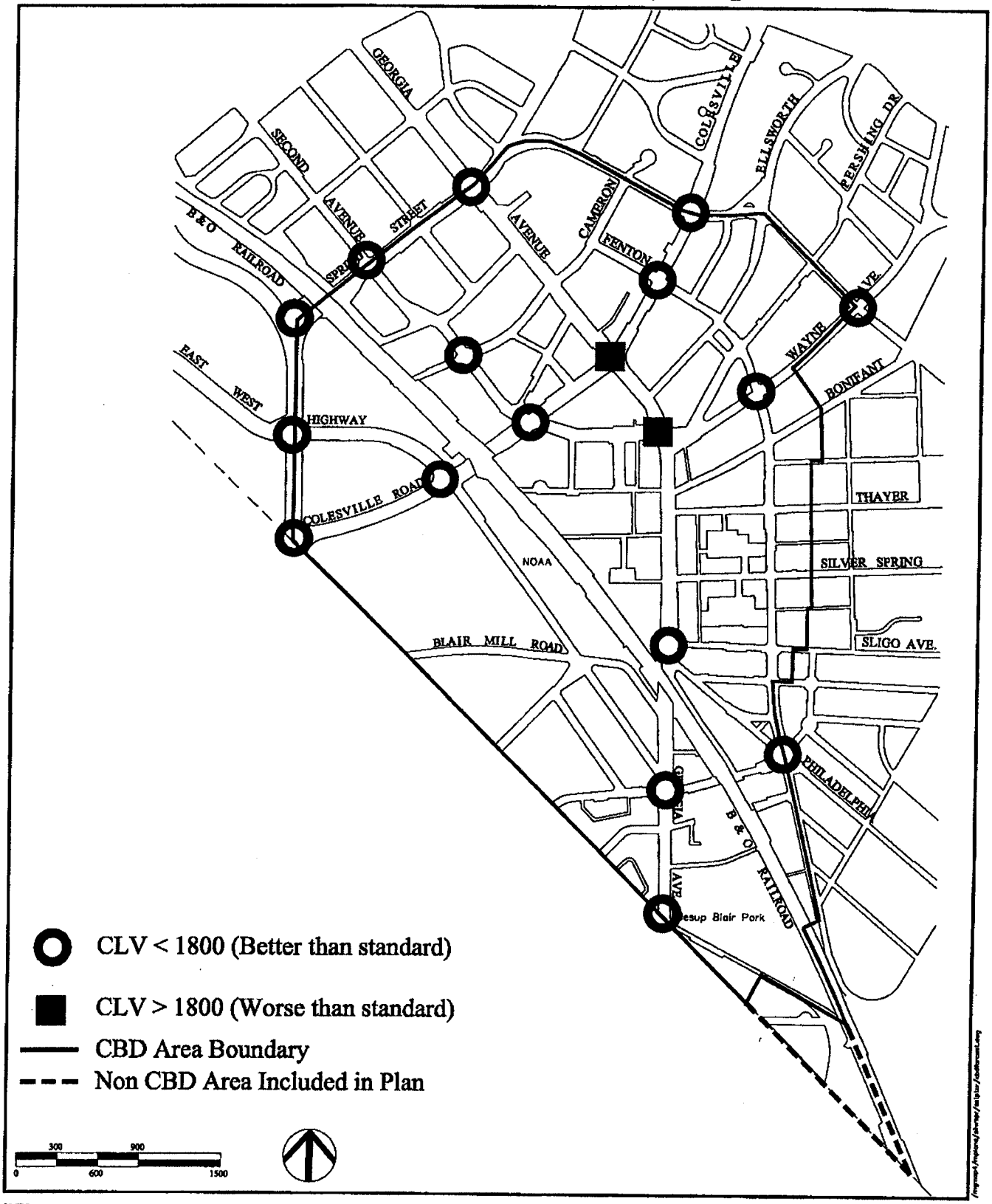
The following paragraphs summarize the study area improvements which are either in the county's Approved FY 99-04 Capital Improvements Program (CIP) or under current study by the Maryland Department of Transportation.

Silver Spring Traffic Improvements

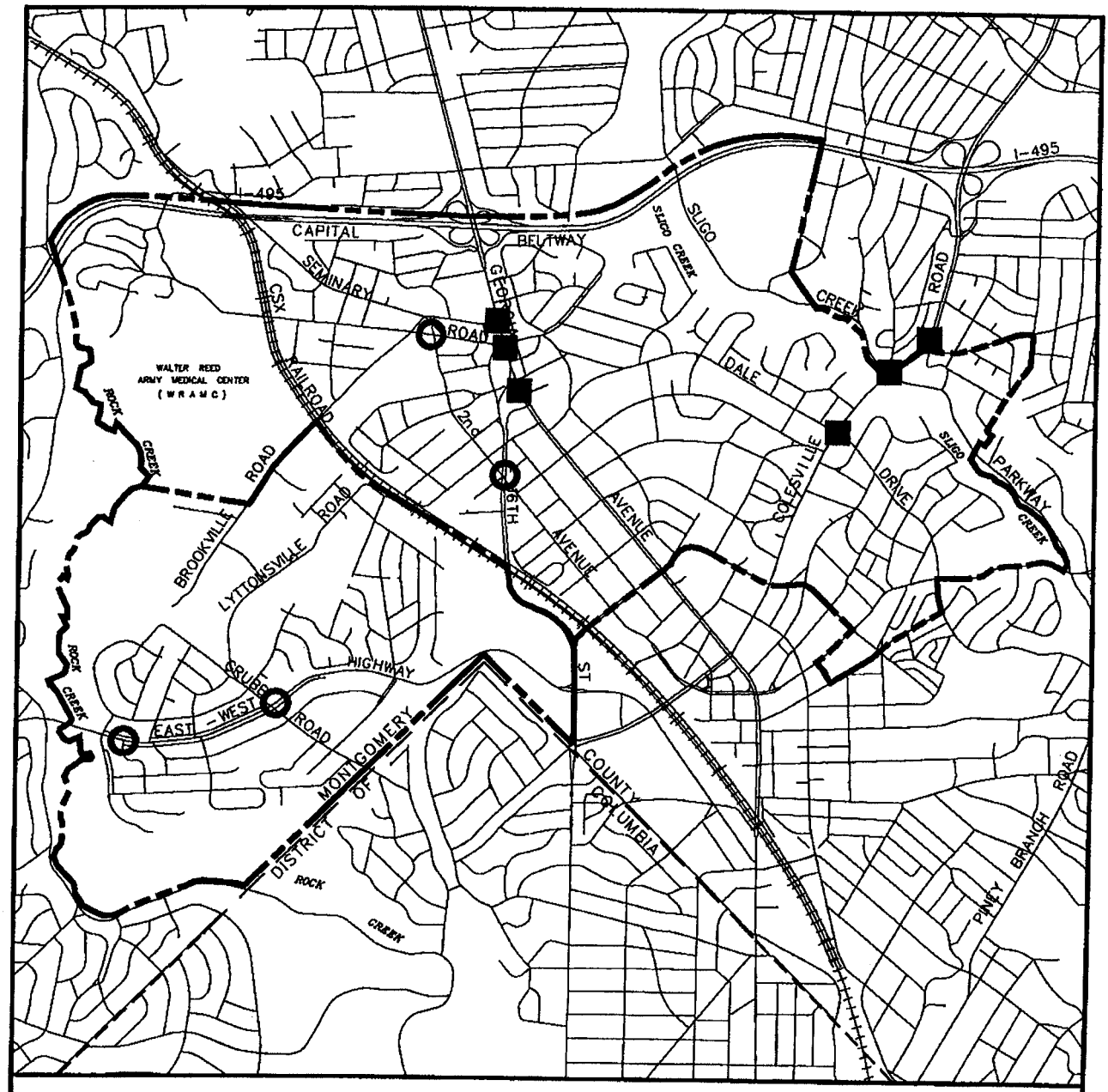
The CIP includes a project for Silver Spring Traffic Improvements to implement geometric changes at six intersections in the study area. Improvements at one of these intersections, Colesville Road and Spring Street, have been implemented. The remaining improvements are listed below, with the estimated fiscal year of construction and the conceptual design details summarized from the Silver Spring Transportation Management District FY 97 Annual Report.

- Colesville Road and Dale Drive (FY 00) - add left turn lane to eastbound Dale Drive, add right turn lane to westbound Dale Drive, and prohibit peak period turns from Colesville Road
- East-West Highway and 16th Street (FY 00) - add eastbound through lane to East-West Highway, add southbound left turn lane to 16th Street, and prohibit left turns from westbound East-West Highway
- Georgia Avenue and 16th Street (FY 01) - reconfigure, add through lane to northbound Georgia Avenue, and add through lane to northbound 16th Street

Forecast Congestion - Silver Spring CBD



Forecast Congestion - North and West Silver Spring

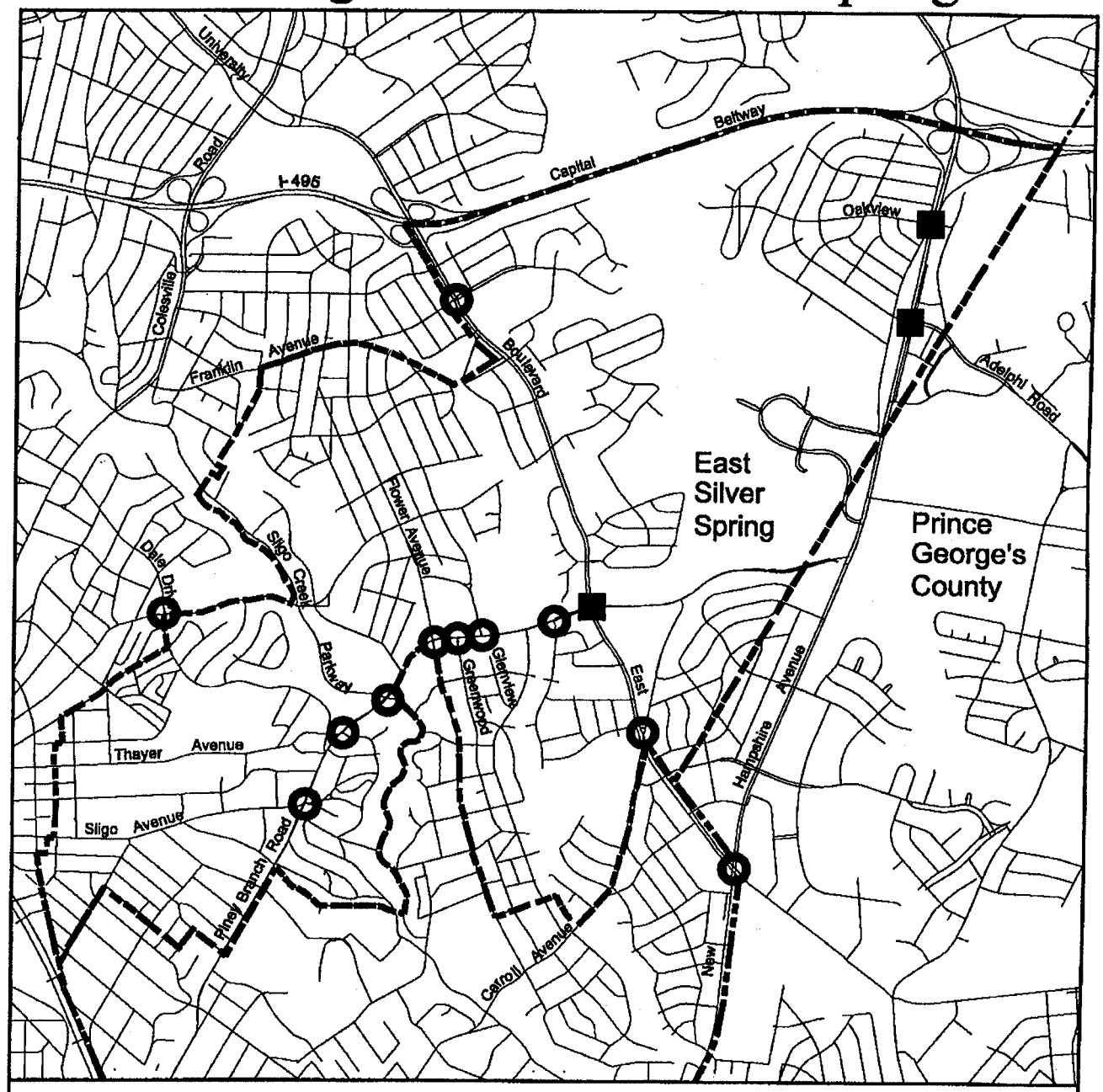


MNCPPC

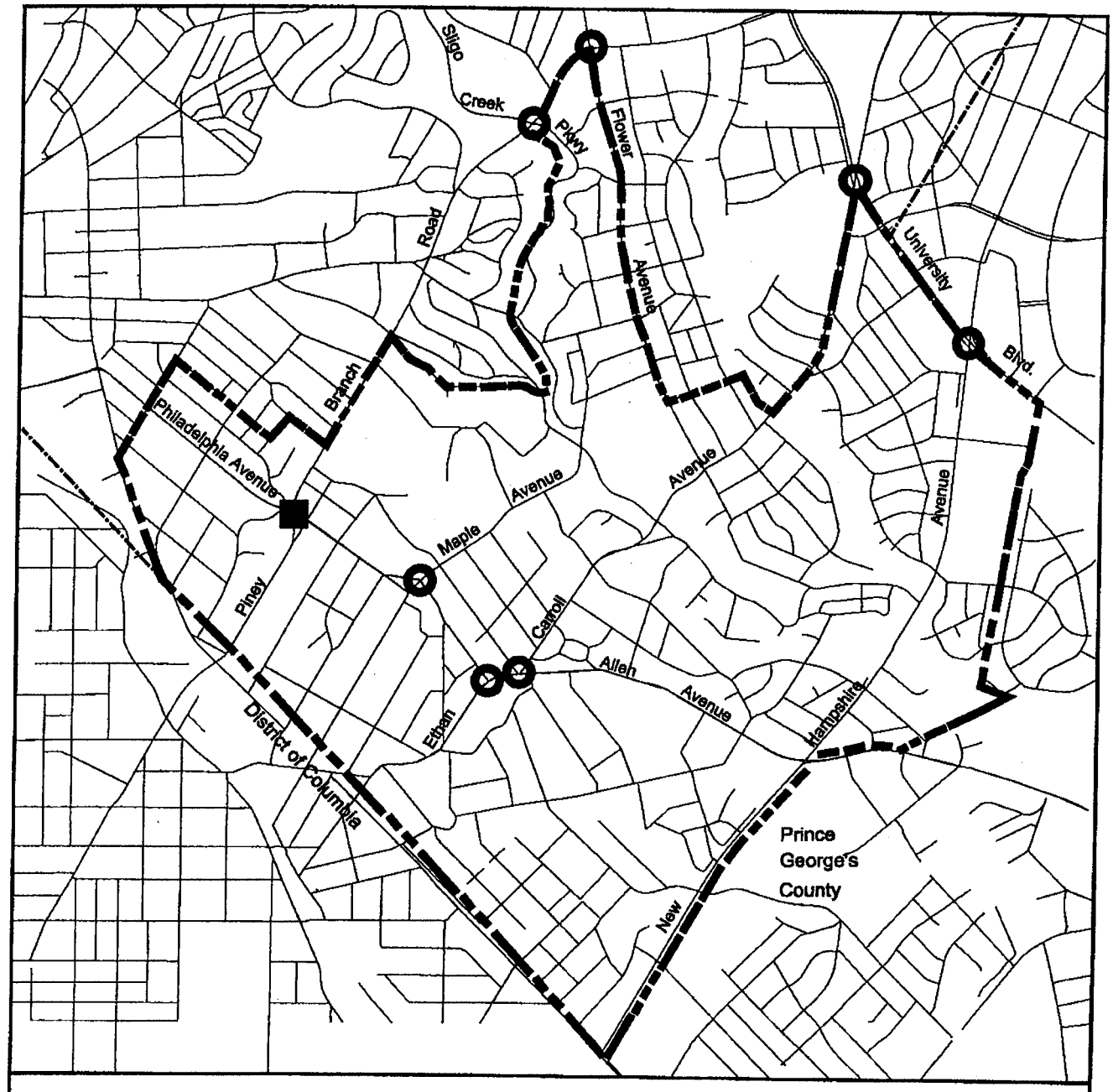
Map 7

AUGUST 1999

Forecast Congestion - East Silver Spring



Forecast Congestion - Takoma Park



LEGEND

County Line

Master Plan Boundary

CLV < 1650 (Better than standard)

CLV > 1650 (Worse than standard)

0 600 2400 Feet

- Piney Branch Road and University Boulevard (FY 01) - provide right turn lanes for southbound University Boulevard, eastbound Piney Branch Road, and westbound Piney Branch Road
- Wayne Avenue and Fenton Street (FY 01) - add left turn lane to westbound Wayne Avenue and add right turn lane to northbound Fenton Street.

These improvements are currently conceptual in nature and subject to revision during the detailed design phase. At some locations, such as East-West Highway/16th Street and Colesville Road/Dale Drive, the improvements are slightly different than the recommendations in the master plans. In such cases, the detailed design phase should consider both alternatives.

Long-Range Planning Studies

The Maryland Department of Transportation (MDOT) is conducting a long-range study of the transportation and environmental impacts associated with improvements to the Capital Beltway (I-495) within Prince George's and Montgomery Counties. Improvements being considered include a rail option either located above-grade or subterranean. The state is also considering implementing high-occupancy vehicle (HOV) lanes along the Capital Beltway.

The Capital Beltway carries over 200,000 vehicles per day in the vicinity of the study area and travel demand forecasts of over 300,000 vehicles per day by the year 2020 have been forecast. The Capital Beltway is the single-most used transportation facility in Montgomery County and the interchanges themselves make the connecting roadways very heavily used. Significant capacity improvements on the Capital Beltway were not incorporated in this analysis, but could lead to greater travel demand along Georgia Avenue, Colesville Road, University Boulevard, and New Hampshire Avenue in the study area.

Recommended Intersection Improvements

Tables 6A through 6D identify intersection improvements which are either explicitly described in the relevant draft sector plan or master plan text or, at other locations, are considered by staff to be consistent with the intent of the plan. The tabulation of improvements is organized as follows:

- Table 6A contains Silver Spring CBD improvements
- Table 6B contains North and West Silver Spring improvements
- Table 6C contains East Silver Spring improvements
- Table 6D contains Takoma Park improvements

The CLV with these improvements in place is shown in the rightmost columns of **Table 5.**

Other Evaluated Intersection Improvements

At twelve locations, the recommended intersection improvements do not provide sufficient capacity to attain the current congestion standard (1,800 CLV in the Silver Spring CBD and 1,650 CLV elsewhere in the study area). These substandard locations are identified in Table 5 by bold text

in the rightmost columns. **Tables 7A through 7D** demonstrate the level of intersection improvements which could achieve the current applicable congestion standard. The tabulation of other evaluated intersection improvements is organized as follows:

- Table 7A contains Silver Spring CBD improvements
- Table 7B contains North and West Silver Spring improvements
- Table 7C contains East Silver Spring improvements
- Table 7D contains Takoma Park improvements

For each intersection, the recommended improvements from **Table 6A through 6D** are listed first with corresponding CLV value from Table 5. Below that, additional improvements are listed which would achieve the intersection congestion standard.

Three types of header captions are used to define the information in Tables 7A through 7D:

- **Specifically Described in Master Plan** - the draft master plan has language which specifies recommended intersection improvements at a level of detail to include turn lanes and signal phasing
- **Consistent With Master Plan** - the draft master plan does not specify particular intersection improvements, but staff considers the level of improvement consistent with the master plan
- **Not Currently Recommended** - the additional improvements required to achieve the congestion standard are not considered by staff to be consistent with the draft master plan. The improvements are not currently recommended.

Policy Implications

Transportation Planning staff's initial findings and analysis concludes that the land use scenario is generally balanced except in those locations noted. Generally, these locations where the level of service standard cannot be achieved are the result of the mixture of CBD Plan-generated and other, regional traffic. Some level of this congestion may be reasonable to expect in a long-term time frame such as 2020. The assumptions including land use and travel demand will require re-evaluation as the CBD Plan develops and the land use patterns in the region change. It will also serve to divert some of the traffic which is reflected in the CLV forecasts away from the busier locations and toward alternative routes or modes.

The local area model (LAM) used for the intersection analysis is not a dynamic modeling process but more a static evaluation. The LAM does not automatically divert traffic to another path or a different hour, or a different mode as typically happens when motorists have such options available to them. Nor does the LAM consider a motorist's decision to forgo the trip entirely. However, changes in travel behavior do occur as a result of substantial congestion. For instance, an evaluation of travel patterns at the National Institutes of Health campus have noted that the percentage of workers who travel during the peak hour has changed from 45 percent to 39 percent in recent years. Based on an employment total of 45,000 CBD workers and a 54% auto-driver mode share, a 6-percentage-point reduction in peak hour trips equals a reduction of about 1,460 vehicles.

Even with the locations which are forecast to be congested, the analysis indicates that the cordon line traffic volume total will not exceed the 18,000 total established in the 1993 CBD Plan. The current cordon line total, measured at the points indicated is approximately 12,400 today.

For these reasons, the Transportation Planning staff believes that the level of geometric improvements identified in the 1993 CBD Plan is still valid and that a monitoring program for intersections along major routes serving the CBD should be considered by the County and/or the State. It is more likely that increased travel demand congestion along major regional facilities such as the Capital Beltway, Georgia Avenue, Colesville Road, University Boulevard, and New Hampshire Avenue will lead to a lengthier peak period rather than a more congested peak hour.

As a result of greater amounts of development and urbanization within the study area, traffic will seek other routes, modes or times of travel. As the area's portal intersections (along Georgia Avenue, Colesville Road, University Boulevard, and East-West Highway) become more congested, the actual number of vehicle trips observed in the peak hour will not continue to increase. A monitoring program along these routes is essential to making the most efficient use of the road system and is an important strategy to implement. Through the advent of intelligent transportation systems (ITS) and the County's Advanced Transportation Management System (ATMS), these areas can be electronically monitored and information provided to travelers to assist them in making route, mode and time choices. Thus there is reason to assume that the levels of congestion shown in this circulation study will not be as dire as calculated.

As noted, the four plan areas currently being evaluated have two separate standards (1800 in the CBD and 1650 in the other areas). While the basis for the variation in CLV standard is rational considering the extent of transit service and accessibility to transit within the CBD, the sheer extent of vehicle trip generation which results from the CBD land uses will substantially impact travel demand outside the CBD in the other four plan areas. In virtually all locations, with identified geometric, lane use and signal phasing improvements, the intersections will operate at or better than their current level of service. This is based on the full development of the land use scenario for the CBD. Therefore, with the improvements, the intersections can operate better in the future which includes traffic generated by the CBD and development located throughout the region.

In some specific instances such as the Sligo Creek Parkway and Franklin Avenue intersections along Colesville Road, additional improvements to support the mainline or through traffic volume can be identified. However, such improvements (e.g., the continuation of the reversible lane concept on Colesville Road) have very undesirable neighborhood impacts which may overshadow the transportation benefit which would be provided by the additional capacity.

It is not necessary for all intersections within the planning area to be in balance by having CLV values less than the adopted AGP standard (1800 or 1650) for the overall network to be considered balanced. However, it is important to demonstrate that the street network has available capacity to support the recommended land use activity. The policy area network has been evaluated using the average congestion index (ACI) method. With the proposed land use scenario for the CBD and the 2020 transportation network, the ACI standard and the calculated ACI were found to be the same. So, on an areawide basis, the land use and transportation system are in balance.

As a further safeguard, the development activity assumed in the analysis will be evaluated in far greater detail at the time individual projects are submitted for subdivision (preliminary plan). At that time, the traffic impact generated by individual projects will be evaluated against existing and pipeline (from approved but not yet constructed projects) traffic using the Local Area Transportation Review (LATR) guidelines. This process provides the best opportunity to evaluate intersections, using more well defined traffic assumptions.

Finally, the land use and network assumptions in each of these master plans in the Silver Spring/Takoma Park Policy Area should be revisited prior to 2020. The purpose of this analysis is to provide guidance to decision makers and the general public about the relationship between local land use decisions and operations at local and regional intersections. This circulation study should be used as a guide in future capital improvement decisions in the Silver Spring/Takoma Park and Silver Spring CBD Policy Areas.

IX. CONCLUSIONS

The Silver Spring/Takoma Park Transportation and Circulation analysis reaffirmed many of the findings of prior studies, including the transportation analyses conducted for the 1993 Silver Spring CBD Sector Plan and those conducted for subsequent CBD development plans. These findings are presented below, organized in terms of development patterns, existing and forecast travel patterns, and recommendations for current master plans and future implementation plans.

The findings support the conclusion that the Silver Spring/Takoma Park Policy Area generally has a balance between land use and transportation, both for existing conditions and for proposed Silver Spring CBD redevelopment. The only element of the transportation system which merits further monitoring is the intersection congestion levels on major highways connecting study area activity centers to the Capital Beltway.

Development Patterns

1. By the year 2020, Silver Spring CBD development is expected to consist of a net increase of approximately 11,100 jobs and 2,800 households. These forecasts reflect a 32% increase in the number of jobs and 53% increase in the number of households.

2. The levels of forecast development in the CBD are similar to those in the approved and adopted 1993 Silver Spring CBD Sector Plan. The current development scenario includes approximately 2,000 more jobs but 3,000 fewer households than evaluated in the 1993 plan.

3. The amount of development in the non-CBD portions of the study area is expected to remain essentially constant for the foreseeable future.

Travel Patterns

1. The Silver Spring/Takoma Park Policy Area has better transit accessibility than any other policy area in the County.

2. As of 1998, about 60% of employees in the Silver Spring CBD drove an auto to work. The Sector Plan goal is 54%.

3. As of 1997, about 6,700 of the 11,200 long term parking spaces were being used. Sufficient capacity exists to accommodate forecast development within the AGP parking constraint of 15,750 vehicles.

4. Currently about 12,400 vehicles pass through the CBD cordon in an outbound direction during the evening peak hour. These vehicles include both trips which begin in the CBD and those which pass through the CBD. By the year 2020, the cordon line volume is expected to increase to 16,850 vehicles, less than the practical cordon capacity of 18,000 vehicles described in the AGP.

5. Currently about one-third of the traffic traveling outbound through the CBD cordon during the evening peak hour is through traffic, and two-thirds is generated by CBD activity. By the year 2020, the absolute volume of through traffic is expected to remain relatively constant, and so the percentage of through traffic will be slightly reduced.

6. With a few exceptions, the study area transportation network will be able to accommodate forecast travel demand within the current AGP standards. From a policy area review perspective, the planned roadway network is sufficient to accommodate forecast growth. From a local area review perspective, twelve intersections are forecast to experience substandard congestion for which there does not appear to be a fiscally-sound, community-compatible geometric solution. These intersections are generally located on high-volume roadways which link the study area's activity centers to the Capital Beltway.

Recommendations

1. Increased transit use, continued application of progressive parking charges, and other strategies to reduce reliance upon single-occupant vehicle trips are very important to support the implementation of the land use scenario evaluated in this analysis.

2. Greater reliance on walking and bicycling as means for home-to-work travel should be encouraged. Therefore, continued development of trail, sidewalk, and bikeway connections is emphasized in the study area master plans.

3. Neighborhood protection programs should be maintained to minimize the potential for non-local traffic diversion from the congested arterial roadway network.

4. Intersection improvements should be evaluated on a case-by-case basis. This report identifies both recommended improvements and potential additional improvements, some of which are not currently recommended. The report therefore serves as a guide to the range of improvements considered feasible at this time. The detailed nature of these recommendations should not imply that the improvements suggested are the only feasible solutions. Should other potential improvements be proposed, each improvement should be considered on its own merits, balancing fiscal and community costs associated with the provision of additional capacity against the adverse effects of failing to provide adequate facilities.