Transportation and Mobility Plan

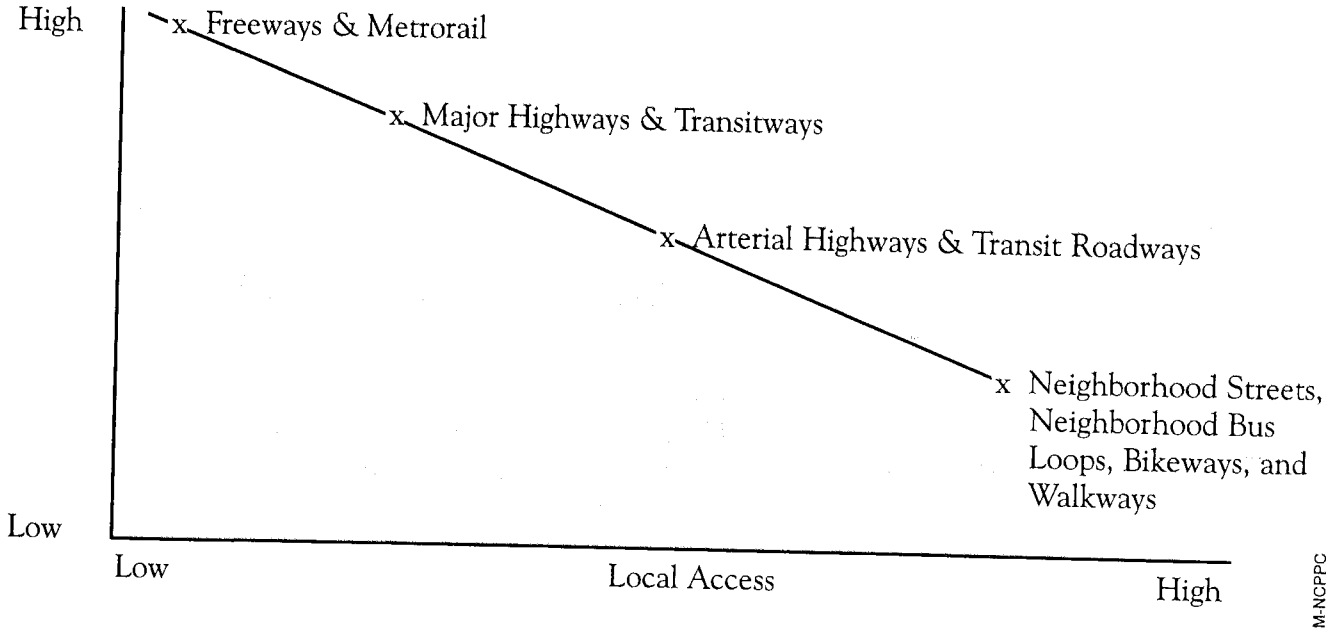
The developing Shady Grove Study Area will become a workplace and residential community of significant size in the future. Mobility will be a critical factor in assuring the viability and vitality of the area to attract the high caliber of employment and residential development envisioned. Therefore, the mobility needs of area residents and workers must be anticipated and planned to provide a variety of facilities serving trips to and from the area, connecting to regional Metrorail and conveniently linking activities within the area. The Plan includes a system of highways, access roadways, transit routes, and bikeway/ pathways to form an integrated network of access throughout the area. While this is a balanced approach, major emphasis is placed on exclusive transit rights-of-way through the area. These would limit congestion-related delays and make transit a travel mode of choice into and through the area. The land use plan has been designed around this particular transportation aspect to provide a high level of access to future stations from area development.

The mobility plan identifies the public facility improvements which will need to be implemented to provide for the future transportation needs of people in the area, assuming its end-state development. The need for these facilities, whether they be roadways, bikeways, or transitways, is highly dependent upon the rate and location of development, both in the Study Area and in surrounding areas.

The transportation system functions to serve both access for local traffic (to and from area development) and passage for through traffic moving between areas of the larger region. Most parts of the transportation system serve both of these functions. However, there is a general range of service differentiation which can be conceptualized, as shown in Table 7.1. Quite simply, freeways and Metrorail are intended to serve the movement of longer-distance through traffic while local neighborhood streets and neighborhood bus loops, bikeways, and walkways tend to only provide access to the residential and business areas through which they pass. Major highways, transitways, arterial highways, and transit roadways fall between these extremes, serving a combination of through movement and local access.

Transportation Facility Function for Local Access and Through Traffic

Table 7.1



Objectives

- Develop a highway network in coordination with the existing regional network.
- Develop quality public transportation systems on exclusive rights-of-way to reduce dependence upon single-occupancy automobile commuting.
- Encourage development of a public/private partnership for implementation of the exclusive transitway facilities serving the planning area.
- Consider/encourage the founding and operation of a transit management organization in the Study Area to assist in monitoring and managing traffic conditions.
- Encourage adequate residential and employment densities to support efficient public transit and carpool/vanpool programs.
- Encourage the provision of bikeways for commuter, as well as recreational, uses.
- Encourage the development of public and private pathways for pedestrian movement in concert with road design and construction.
- Recognize the different mobility needs of people, depending on whether they are traveling through, to, from, or just within the Study Area. Table 7.2 suggests particular strategies to be followed in meeting the needs of different types of travelers.
- Identify two potential sites for heliports which should be evaluated as part of a region-wide heliport study.

Identification of Master Plan Strategies for Improved Transportation in the Study Area

Table 7.2

Trip Oreintation	Components of Travel Through, To, From, and Within the Study Area					End of the Trip
	Start of the Trip	Predominant Means of Travel for the Trip				
		Auto/Highway	Transit	Biking	Walking	
Through	• Locate more housing closer to accessible transit that comes through the area	• Separate through traffic from locally oriented traffic through grade separations and interchange. • Regional ride-sharing programs	• Fare policy changes • Upstream Park-and-Ride lots • Corridor Cities Transitway			
To	• Locate more housing closer to transit routes that come to the area	• Moderate highway capacity improvements • Intersection improvements • Grade separations • Interchanges	• Corridor City Transitway • Park-and-Ride lots with express bus service to the area • Fare policy changes	• More bike routes in main travel corridors and within the area; priority implementation • Bike paths to area employment centers		• Parking availability and rates • Share-a-Ride programs for each employment center • Bike storage for workers at employment centers
From	• Provide a Share-a-Ride program for area residents • Improve sidewalks and access to transit routes	• Intersection improvements • Moderate highway capacity improvements • Grade separations • Interchanges	• Increase frequency of feeder bus routes to Metro • Corridor Cities Transitway • Increased transit route coverage and direction • Park-and-Ride lots	• Improved bike storage at transit stations		
Within	• Locate housing in the area closer to employment centers to facilitate walking and biking • Improve sidewalks and access to transit routes	• Intersection improvements • More local streets for circulation • Reduce conflicts with through traffic	• Improved route density and frequency of Ride-On routes	• Improve bike paths to employment centers and community facilities • Improve bike storage at employment centers	• Improve pathway and sidewalk system between residential areas and employment centers and community facilities	• Reduce conflicts with vehicles; more signalized crosswalks • Improved street lighting and amenities

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Transit Plan

The transit recommendations in this Plan establish a complete transit accessibility pattern for the Study Area. Based on these recommendations, most of the area development will be within one-quarter mile or less, walking distance, of a transit route.

Existing Service

The provision of transit services currently relies upon use of buses on existing roadways. Some of these circulate through the area while others access the Shady Grove Metro station, which is adjacent to the Study Area. Existing bus routes (Ride-On and Metrobus) are tabulated in the Appendix.

Transit Plan Recommendations

The Transit Plan recommendations include three major components:

1. designated exclusive transitways;
2. illustrative high-priority regional bus routes to link the Study Area to other parts of the County; and
3. illustrative neighborhood bus loops, including the "education shuttle," which provide internal circulation as well as access to the larger regional transit network.

The Transit Plan is shown in Figure 7.1, page 87.

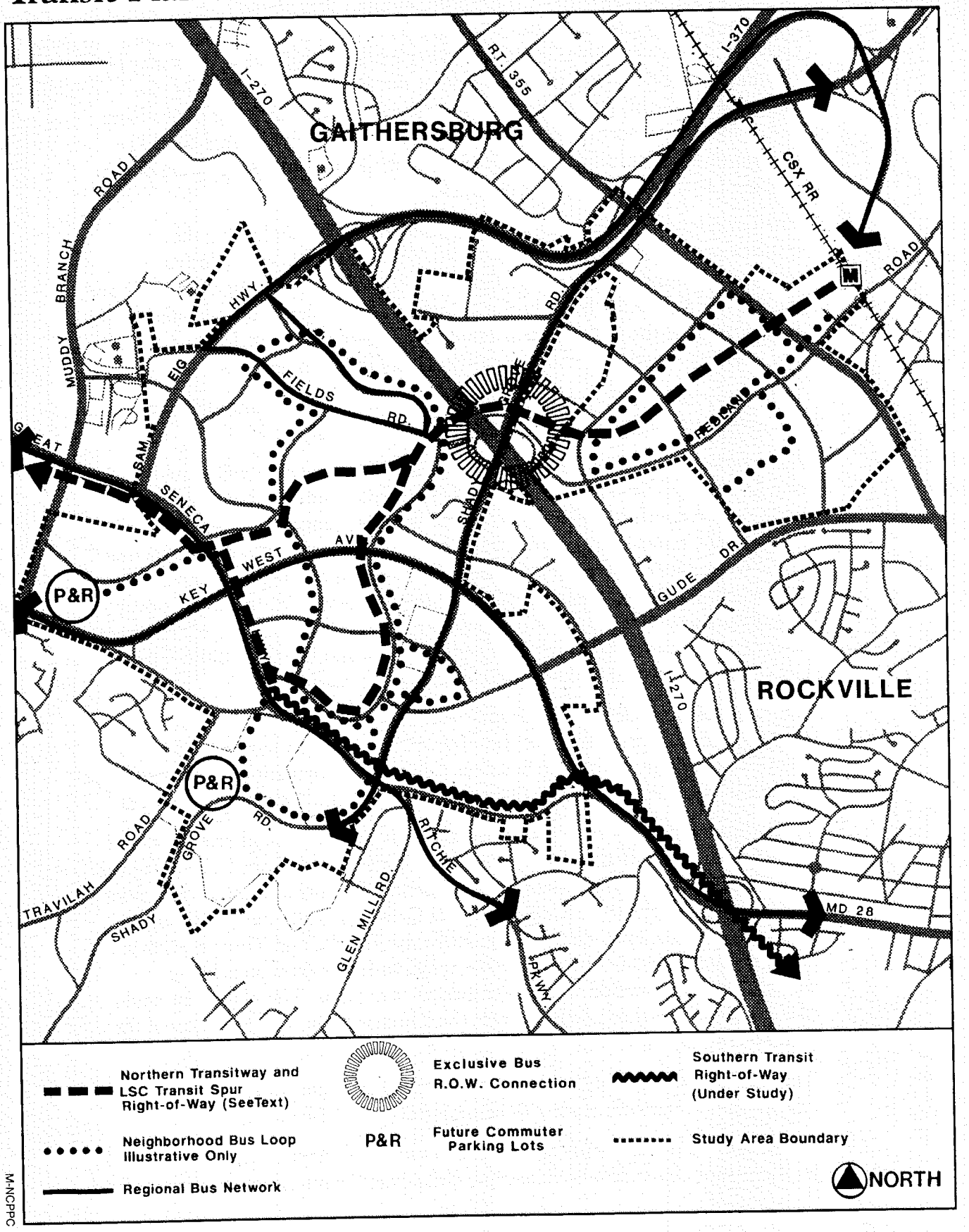
Exclusive Transitways

This Plan shows the proposed location of exclusive transitways through the Study Area. (See Figure 7.1, page 87.) These would be 70-foot rights-of-way if removed from roadways or 50-foot rights-of- way if developed adjoining roadways. In either case, the rights-of-way would provide space for the exclusive operation of transit vehicles. The precise location of this right-of-way will be determined by more detailed preliminary design and feasibility studies to be done by Montgomery County Department of Transportation (MCDOT) following adoption of this Plan. The transitways shown on this Plan are:

- A "northern transitway" extending from the Shady Grove Metro station to Great Seneca Highway, which will provide transit access to north and south of the Study Area. The alignment begins at the Shady Grove Metro station and proceeds west across the King Farm, which would be served by stops as indicated on the Land Use Plan. The alignment crosses I-270 to the north of the Shady Grove interchange and would be grade separated across both Shady Grove and I-270. West of I-270, the alignment continues across the southern end of the Washingtonian Center site and through the Crown Farm to

Transit Plan

Figure 7.1



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Decoverly Drive. The Crown and Washingtonian sites would also be served by stops, as identified on the Land Use Plan. The alignment proceeds along Decoverly Drive to Great Seneca Highway where a grade separation may be required to connect with the extension of the alignment north along the Highway. From this point, the alignment should extend into the Banks Farm before extending northward along Great Seneca Highway. A stop would be located on the Banks Farm, which may require some minor relocation of the proposed transitway alignment on the site.

The Corridor Cities Transit Easement Study recommends linking the transitway to the Metropolitan Grove MARC station via an exclusive transitway extending north from Great Seneca Highway through GEISCO and the Bureau of Standards. To keep this option viable, this Plan recommends the enlargement of the Great Seneca Highway right-of-way from 150 feet to 200 feet over the length of section from Decoverly Drive to GEISCO.

These options require further study by the Montgomery County Department of Transportation subsequent to the adoption of this Plan.

- A transitway along Omega Drive and Medical Center Drive will provide a transit "spur" to the Life Sciences area. This would connect from the Crown Farm station south to a point on Omega Drive and continue along the roadway to Medical Center Drive, then around to Great Seneca Highway, connecting north to Decoverly Drive. This forms a loop or spur through the Life Sciences area which could eventually be operated in conjunction with the transitway described above. Thus, transit could either interface with the other alignment at stops or operate around the Life Sciences area and through to the Shady Grove Metro station along a shared alignment across I-270.

  The Life Sciences Center transit spur should be studied further by the Montgomery County Department of Transportation and incorporated into a future amendment to the Life Sciences Center Development Plan. Transit stops along the alignment should be identified as part of the Amendment process.

- A southern alignment for a transitway through the area would provide access to and from North Bethesda and Rockville. This extends from I-270 along the north side of Darnestown Road to Great Seneca Highway, thence north along Great Seneca Highway to Medical Center Drive. This alignment provides transitway service immediately adjacent to the Traville and Thomas Farm sites. Stops should be located to serve these areas, with the exact sites being identified in conjunction with the respective site plans. The alignment could also be located further north through the Thomas Farm in the vicinity of the proposed retail center and higher density residential area.

  The southern alignment should be studied further as part of future transportation network studies to be undertaken by M-NCPPC.

All the Master Plan alignments are subject to further feasibility and engineering studies by the County Executive to determine their exact locations, cross-sections, and

modes of operation. All options for use of these alignments should be considered in the course of subsequent study, including above, below, and at-grade locations. All alignments should be considered for vertical integration with surrounding land use where appropriate. Future studies should also determine a feasible funding schedule for construction of these transitways and the expected sources of funding.

High-Priority Regional Bus Routes

This Plan recognizes the need for high priority designated regional bus routes. This Plan illustrates a network of potential regional transit routes which would serve the Study Area. (See Figure 7.3.) These designations are not intended to indicate exact routings, but to identify the key roadways where transit service may be implemented to provide improved regional access. They include:

- MD 355 (Rockville Pike)
- Shady Grove Road
- Gude Drive
- Key West Avenue
- Great Seneca Highway
- Sam Eig Highway

The Study Area is bisected by I-270. To strengthen transit connections across I-270, this Plan recommends an exclusive transit road link from Redland Road to Shady Grove Road in the Shady Grove interchange off I-270 northbound.

Neighborhood Bus Loops

Neighborhood bus loops should be considered in the King Farm area and in the R&D Village as expanded. Small buses (Ride-On, for example) would continually circulate along these loops. Possible routes are shown on Figure 7.1 to indicate a systems approach to those bus loops.

A "loop" system is also proposed to provide a high level of bus circulation among the Johns Hopkins University, the University of Maryland, and proposed conference areas. This emerging "University District" would have needs similar to major campuses where shuttle routes are used to connect buildings and parking areas. Other new primary roadways implemented in the development process throughout the area may prove to be more direct routes for buses and should be used accordingly.

Other Transit Recommendations

To enhance transit serviceability along all roadways in the Study Area (except for major roadways like Sam Eig Highway,) buildings should be clustered and located closer to sidewalks. This minimizes both walking distance and exposure between transit stops and building entrances.

To foster carpool formation and to provide "Park-and-Ride" services to Metro and down-County, this Plan identifies two Park-and-Ride lot locations. These lots should contain a minimum of 250 to 500 spaces and are proposed to be in the vicinity of Darnestown Road near Great Seneca Highway and Muddy Branch and Darnestown Road.

An interim transit plan may be developed and implemented to provide incremental improvements to area transit services in the period prior to the completion of proposed transitways. Such an interim transit plan is envisioned as a high level of bus service connection between the development areas such as Traville, the Life Sciences Center, and the Washingtonian, to the Shady Grove Metro Station via I-370. The goal would be to provide fast, direct, and convenient service to Metro using I-370 in advance of an exclusive transitway crossing of I-270. Once the transitway right-of-way is in place, these services could be redirected or replaced by another type of service. Such a service plan is only interim in that development which occurs directly along the transitway right-of-way would be designed to be best served by transit service thereon directly to Metro, without intervening traffic conflicts or constraints.

Relation of Corridor Cities Transit Easement Study to Plan Process

A transit easement extending north from the Shady Grove Metro station has been shown on the Master Plan of Highways and the Gaithersburg and Germantown Master Plans since the early 1970s. The original goal was to identify a right-of-way for the potential extension of Metro north to serve the Corridor Cities. A 70-foot-wide right-of-way is to be reserved and protected from development.

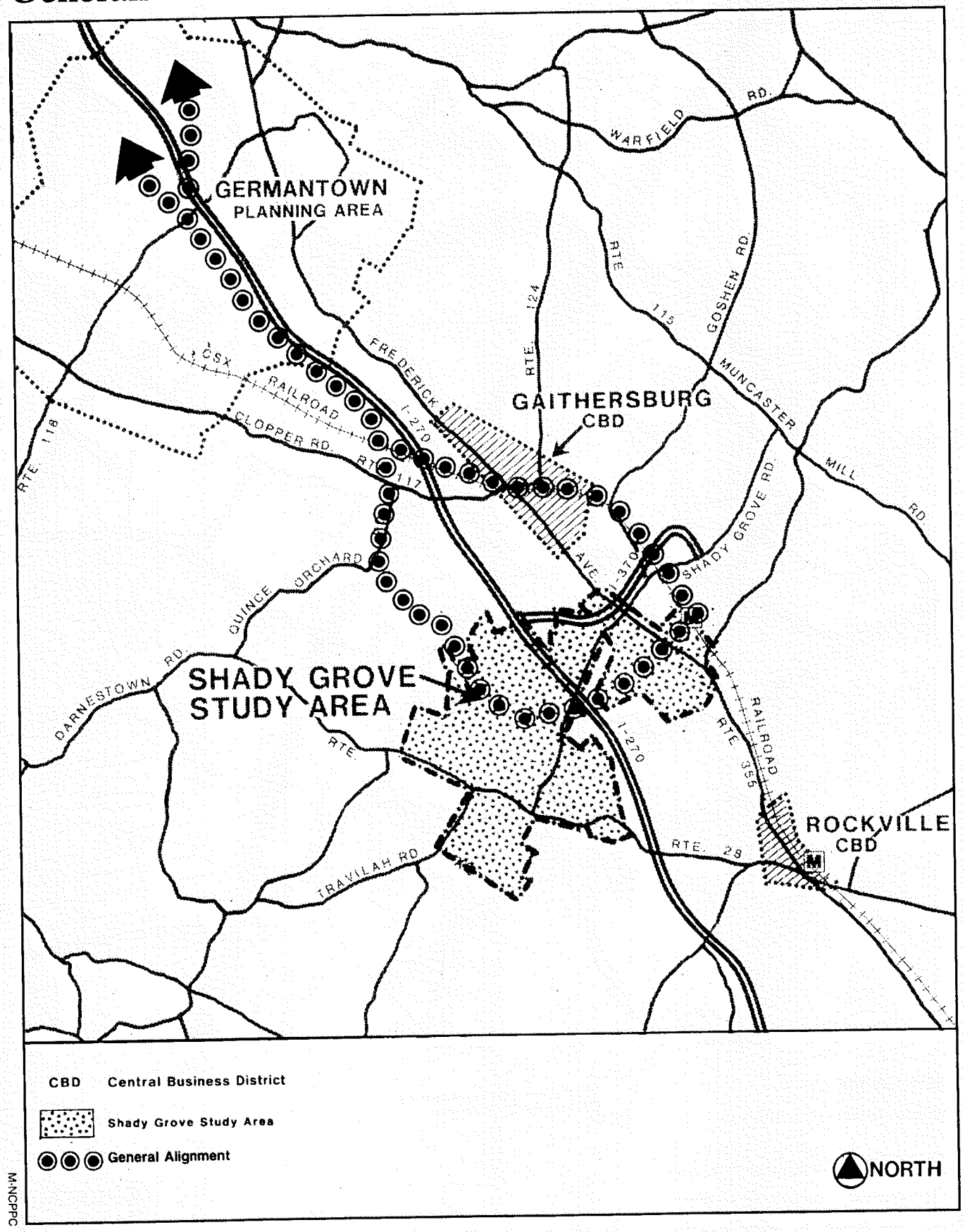
The location of the easement and its ultimate use have become more important as development has proceeded in the corridor over the past 15 years. Therefore, a two-part study has been initiated to study the alignment location and its use. The first study, The Corridor Cities Transit Easement Study (CCTES), recommended the best locations for the easement. (See Figure 7.2, page 91.) This is being followed with a study by the County Department of Transportation to determine the specific right-of-way to be preserved through the Shady Grove Study Area as well as through other critical sections of the alignment.

Street and Highway Plan

The comprehensive system of roadways proposed to serve the Master Plan vicinity is shown in Figure 7.3, page 92.

The highway plan consists of freeway, major highway, and arterial/industrial street classifications. The typical cross-sections for these classifications, as specified in the Master Plan of Highways, are shown in Figure 7.4, page 93. Additional roadways to primarily serve development access as it is planned in the future must be designed and

Generalized Location of Recommended Alignments *Figure 7.2*



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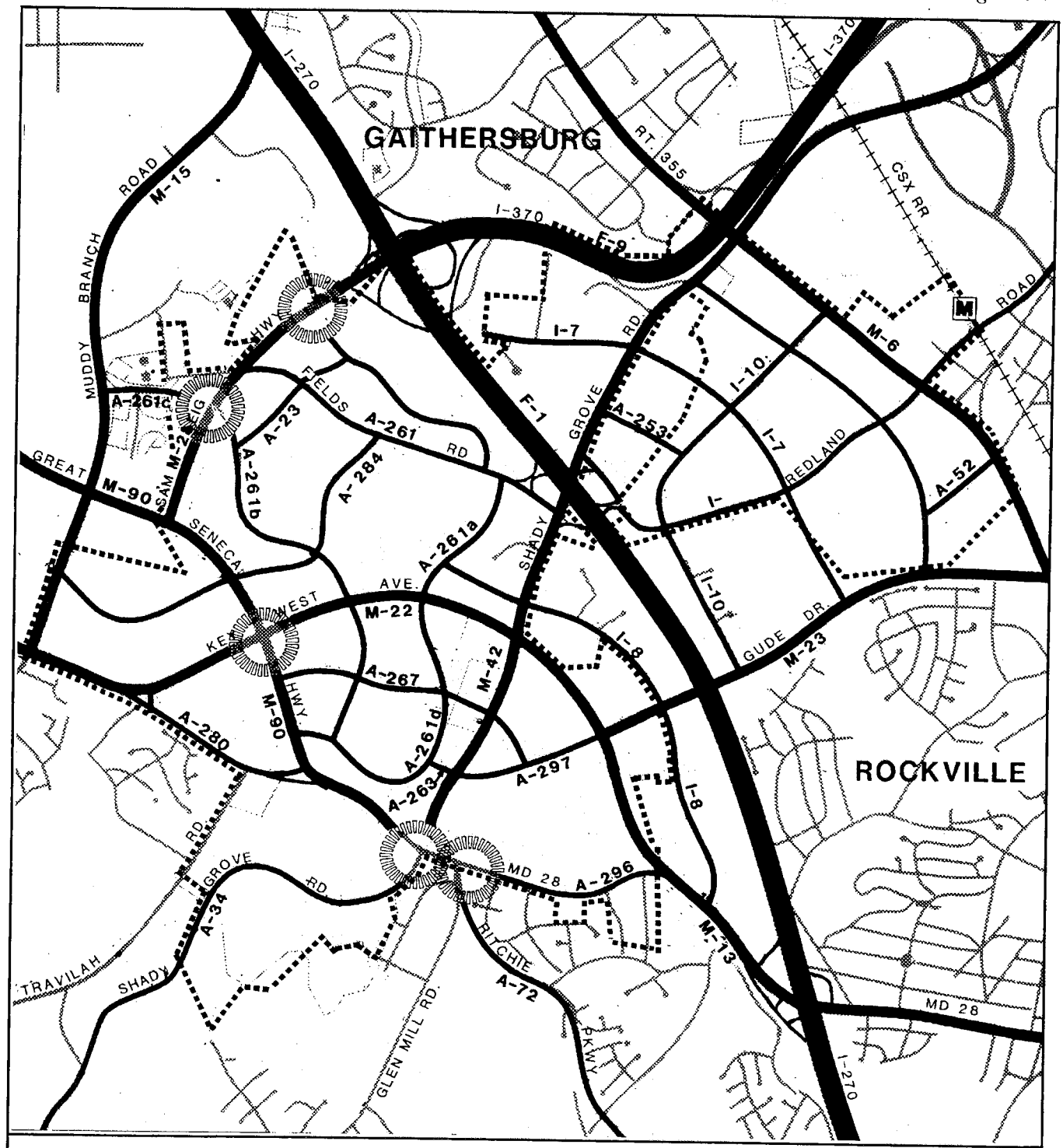
Highway Plan

Figure 7.3



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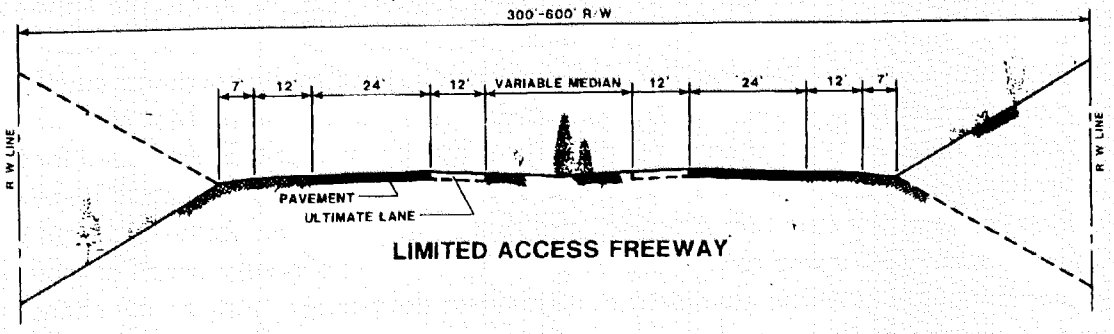
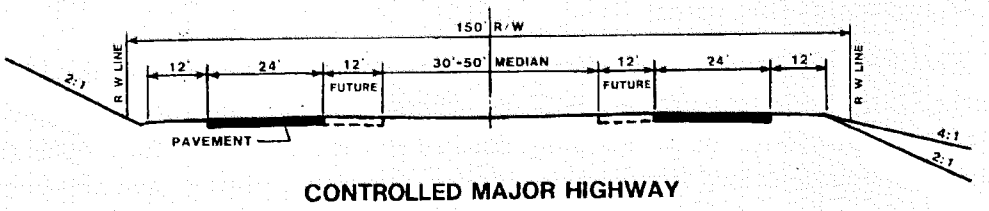
Typical Highway Cross Sections

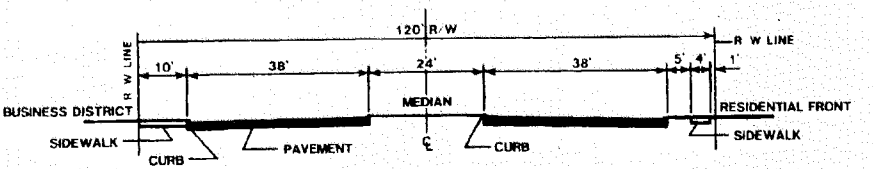
Figure 7.4



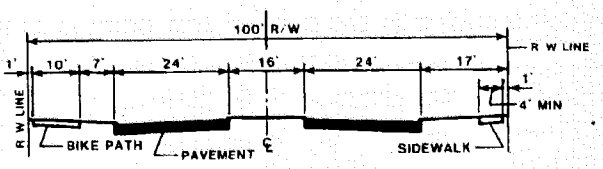
LIMITED ACCESS FREEWAY



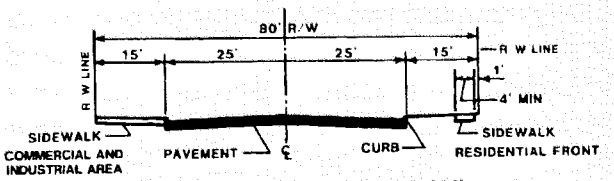
CONTROLLED MAJOR HIGHWAY



MAJOR HIGHWAY



DIVIDED ARTERIAL HIGHWAY



ARTERIAL HIGHWAY (URBAN)

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laid out within the framework of the highway system. Guidelines for the future location of these primary (local) roadways as a part of the development process are included below.

The Highway Plan Map shows the ultimate highway system, just as the Land Use Plan describes the ultimate development pattern. All highway segments in the Study Area and vicinity are tabulated in Table 7.3, which specifies the maximum number of recommended lanes and the minimum required right-of-way width. Master Plan roadway alignments are used to preserve the right-of-way that will be needed for future construction of roadways. This preservation process ensures that space will be available when roadway construction is needed and that development is located and sited with appropriate relationship to the future roads. A developer of a large parcel of land has some flexibility as to the alignment as it traverses the parcel so long as any changes made affect only that parcel.

This Plan proposes several changes to the road network shown in the 1985 Gaithersburg Vicinity Master Plan. These changes include several new roadway extensions and additions, which are described in the Appendix, and intersection improvements described later in this chapter. The rights-of-way have also been expanded for the major highway and arterial categories and on specific roadways which have been identified to include separate transitways.

Major highways have been increased from a master planned right-of-way of 120 feet to 150 feet with an increase from 80 feet to 100 feet for arterials. These increases are recommended to permit adequate space for continuous turn lanes, additional buffer/landscape space, and medians, as well as the typical street, sidewalk, and bikepath requirements. Attainment of the full recommended right-of-way in developed areas may not be feasible in all locations or cases.

This Plan recommends that the right-of-way of an arterial road or major highway be widened at intersections with arterial and/or major highways. This increased width will provide space for an additional left-turn lane and a right-turn lane on the approach side of the intersection, as well as an adjustment area on the departure side. The amount of additional right-of-way on the approach side is 24 feet wide for 500 feet from the intersection with a 400-foot taper. The departure side is 12 feet wide for 200 feet with a 180-foot taper. Both a divided arterial and a major highway with a 30-foot median can accommodate two left-turn lanes; only 12 feet of additional right-of-way is needed in those cases. An undivided arterial road needs an additional 8 feet of width to provide a median at the intersection for pedestrian and vehicular safety. In the case of transitway designation, the rights-of-way are increased 50 feet over that which would otherwise be required for the roadway right-of-way. The location or alignment of the additional 50 feet is on one side or the other of the existing right-of-way, or equivalently split off the center line. An example is the section of Great Seneca Highway from Decoverly Drive north. The location shown, to the west of the roadway, is subject to further review as part of the proposed feasibility study for preliminary engineering of the transitway. On Medical Drive through the Life Sciences Center, the extent of increased right-or-way, if any, will be examined in relation to possible future amendments to the Development Plan for the Life Sciences Center.

Highway and Transitway Plan Inventory in Shady Grove Study Area and Vicinity

Table 7.3

	Roadway	Limits	Number of Travel Lanes Maximum Recom.	Minimum ROW Width
FREEWAYS				
F-1	I-270	I-370/Sam Eig Hwy. to Darnestown Rd. (MD 28)	8-lane (with 2-lane CD Roads)	250'
F-9	I-370	I-270 to Shady Grove Metro Station	6-lane	300'
CONTROLLED MAJOR HIGHWAYS				
F-9	Intercounty Connector	I-370 East to Georgia Avenue and beyond	6-lane	300'
M-90	Great Seneca Hwy	Muddy Branch Road to Shady Grove Road	6-lane	150/200'*
MAJOR HIGHWAYS				
M-6	Frederick Avenue (MD 355)	I-370 to Gude Drive	6-lane	150'
M-13	Darnestown Road	Key West Avenue to I-270	7-lane	170'*
M-15	Muddy Branch Rd	Darnestown Road (MD 28) to I-270	6-lane	120'
M-22	Key West Avenue/ Darnestown Road	Muddy Branch Road to Great Seneca Highway	6-lane	150'
M-23	Gude Drive	Key West Avenue to Frederick Avenue (MD 355)	6-lane	150'
M-28	Sam Eig Highway	Great Seneca Highway to I-270	6-lane	150'
M-42	Shady Grove Road	Darnestown Road (MD 28) to Frederick Avenue (MD 355)	6-lane	150'
ARTERIAL/INDUSTRIAL HWYS.				
A-23	Louis Sullivan Drive	Fields Road to Diamondback Drive	4-lane	100'
A-34	Shady Grove Road	Great Seneca Highway to Piney Meetinghouse Road	4-lane	100'
A-52	Indianola Drive Extended	Frederick Avenue (MD 355) to Pleasant Road	4-lane	100'****
A-58	Pleasant Road Ext.	Shady Grove Road to Gude Drive	2-4 lane	100'***
A-253	Choke Cherry Road	Piccard Road Extended to Shady Grove Road	4-lane	100'
A-261	Fields Road	Sam Eig Highway to Omega Drive	6-lane	120'
A-261a	Omega Drive	Key West Avenue to Fields Road	4-lane	100'/150'*
A-261b	Diamondback Drive/ Broschart Road	Sam Eig Highway to Medical Center Drive	4-lane	100'/150'*
A-261c	Fields Road (Relocated)	Sam Eig Highway to Muddy Branch Road	4-lane	100'
A-261d	Medical Center Drive	Great Seneca Highway to Key West Avenue	4-lane	100'/150'*
A-263	Medical Center Way	Medical Center Drive to Shady Grove Road	4-lane	100'
A-267	Blackwell Road	Great Seneca Highway to Gude Drive	4-lane	100'
A-280	Darnestown Road (Existing MD 28)	Key West Avenue to Great Seneca Highway	4-lane	100'
A-284	Decoverly Drive	Muddy Branch Road to Fields Road	4-lane	100'/150'*
A-296	Darnestown Road (Existing MD 28)	Shady Grove Road to Key West Avenue	4-lane	150'*
A-297	Gude Drive	Shady Grove Road to Key West Avenue	4-lane	150'**
I-7	Gaither Road	West of Shady Grove Road to Gude Drive	4-lane	100'
I-8	Research Boulevard	Omega Drive to Darnestown Road (MD 28)	4-lane	100'
I-9	Redland Road	Frederick Avenue (MD 355) to Piccard Road	4-lane (plus service roads)	150'**
I-10	Piccard Road	Frederick Avenue (MD 355) to Gude Drive	4-lane	100'

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Highway and Transitway Plan Inventory in Shady Grove Study Area and Vicinity (cont.)

Table 7.3

Roadway	Limits	Number of Travel Lanes Maximum Recom.	Number of Travel Lanes Minimum ROW Width
INTERCHANGES			
Sam Eig Highway (M-28) and Fields Road (A-261)			
Sam Eig Highway (M-28) and Washingtonian Boulevard			
Key West Avenue (M-22) and Great Seneca Highway			
Shady Grove Road (M-42) and Darnestown Road (A-296)/Ritchie Parkway (A-72)			

* Fifty feet of the right-of-way is intended for provision of an exclusive transitway; where dual width is specified, the lower figure refers to non-transitway sections. On Medical Center Drive, the extent of ROW expansion, if any, will be examined in relation to possible future amendment(s) to the development plan of the Life Sciences Center.

** See Urban Design cross-section example in Chapter 4.

*** This arterial roadway is not intended to function as an alternative to MD 355 (Frederick Avenue), but to distribute local traffic movement through the neighborhood. The ultimate location of the road, the number of lanes and the ROW width will be determined as part of subdivision and site plan review.

**** The ultimate location of the road, the number of lanes and the ROW width will be determined as a part of subdivision and site plan review.

As part of the Plan process, the Master Plan recommendations for the connection of Great Seneca Highway to Ritchie Parkway were re-examined. One of the study objectives was to determine if recent roadway improvements along MD 28 could be incorporated into the connection. As a result of this re-examination this Plan recommends that the alignment of Great Seneca Highway be modified to follow the alignment of Darnestown Road to its point of intersection with Ritchie Parkway. The primary impetus for this modification is the desirability of maintaining the existing roadway (Darnestown Road), which is to be further improved through subdivision-related requirements. However, this alignment modification is proposed in conjunction with a recommendation that grade separation improvements be designated at Shady Grove Road and Ritchie Parkway. The combination of these modifications is intended to be designed such that traffic could circulate with equivalent ease from Great Seneca Highway to either Ritchie Parkway or Darnestown Road to the south.

Local Streets and the Neighborhood Concept

As development and site planning progresses in the future, networks of local streets will be designed to provide local access to area residences and businesses. A key plan objective for implementing the neighborhood concept and transit-serviceable site design is providing continuous, interconnected local streets that form the major organizing element. Local streets are important for traffic capacity and circulation, but the total right-of-way is used for purposes in addition to the movement of vehicles. In this respect, local streets are equally important in terms of pedestrian activity and building orientation. The relationship between site design and road network planning becomes critical in creating pedestrian-oriented and transit- serviceable developments.

To provide the flexibility for the layout of the local road network to be determined in relation to a major development plan, and to assure interconnected pedestrian- and transit- oriented design, the following guidelines for subdivision and site plan applications are provided:

Hierarchy of Residential Streets

A hierarchy of residential streets should be created to establish neighborhood character and differentiate the functions between streets. In addition to the minimum right-of-way for each street shown in the Road Code and Subdivision Regulations, the hierarchy of residential streets should include the following:

- Primary and Secondary Divided Residential Streets—The use of primary and secondary divided residential streets which include wide medians will be encouraged to create variety and establish neighborhood scale.
- Primary Residential Streets—The primary street should be used in areas with over 200 dwelling units on one street. Frontage of houses and businesses onto the street is preferred.
- Secondary Residential Streets—The secondary residential street is the preferred street within residential neighborhoods. This street provides adequate

space for public sidewalks and street trees along both sides of the street without conflicts with the storm drainage system.

- Tertiary Residential Streets—The use of tertiary streets with a right-of-way of 50 feet should be limited to minor streets with sidewalks and street trees on both sides. Tertiary streets with a right-of-way of less than 50 feet are discouraged because of the lack of space within the public right-of-way for sidewalks.
- Alley—The use of alleys will be encouraged in all residential neighborhoods to allow buildings to front on the streets.

Street Design Elements and Neighborhood Character

The specific design elements included in each neighborhood street are important features that establish the character of a neighborhood. The following elements are included to create pedestrian-oriented neighborhoods.

- Variable Right-of-Way—The right-of-way shown in the Design Standards for Montgomery County should be considered the minimum required. Additional right-of-way to provide adequate sidewalk space or create a unique character of streetscape is encouraged. This includes additional right-of-way for trails, bikeways, and parking as well as medians and linear parks.
- On-Street Parking—Parallel, on-street parking as well as angle parking will be encouraged along neighborhood streets to provide for street-oriented uses and to reduce the size of all off-street parking facilities.
- Eliminate Cul-de-Sacs—The use of cul-de-sacs should be discouraged to create a system of interconnected streets.
- Closed Section—All neighborhood streets should have a closed section with curb, gutter, and enclosed storm drainage systems to allow for sidewalks on both sides of streets within the public right-of-way.
- Sidewalks—Sidewalks within the public right-of-way along both sides of all neighborhood streets will be provided. The use of internal pedestrian pathways does not substitute for sidewalks along each street.
- Streetscape—A streetscape plan for all neighborhoods that emphasizes and delineates street lighting, trees, sidewalk paving, and sign locations should be required during the review of development plans and site plans.

High Occupancy Vehicle (HOV)

High Occupancy Vehicle (HOV) lanes are for exclusive use by buses, van pools, and car pools. Generally, these lanes would be additions to existing roadways or provided on new HOV-exclusive roadways.

This Plan designates two highways for future consideration as HOV facilities: Great Seneca Highway and Sam Eig Highway. (See Figure 7.5, page 100.)

Great Seneca Highway is an important link between Germantown and Shady Grove. Sam Eig Highway provides direct access to Shady Grove Metro from both Great Seneca Highway and the Study Area.

Grade Separations

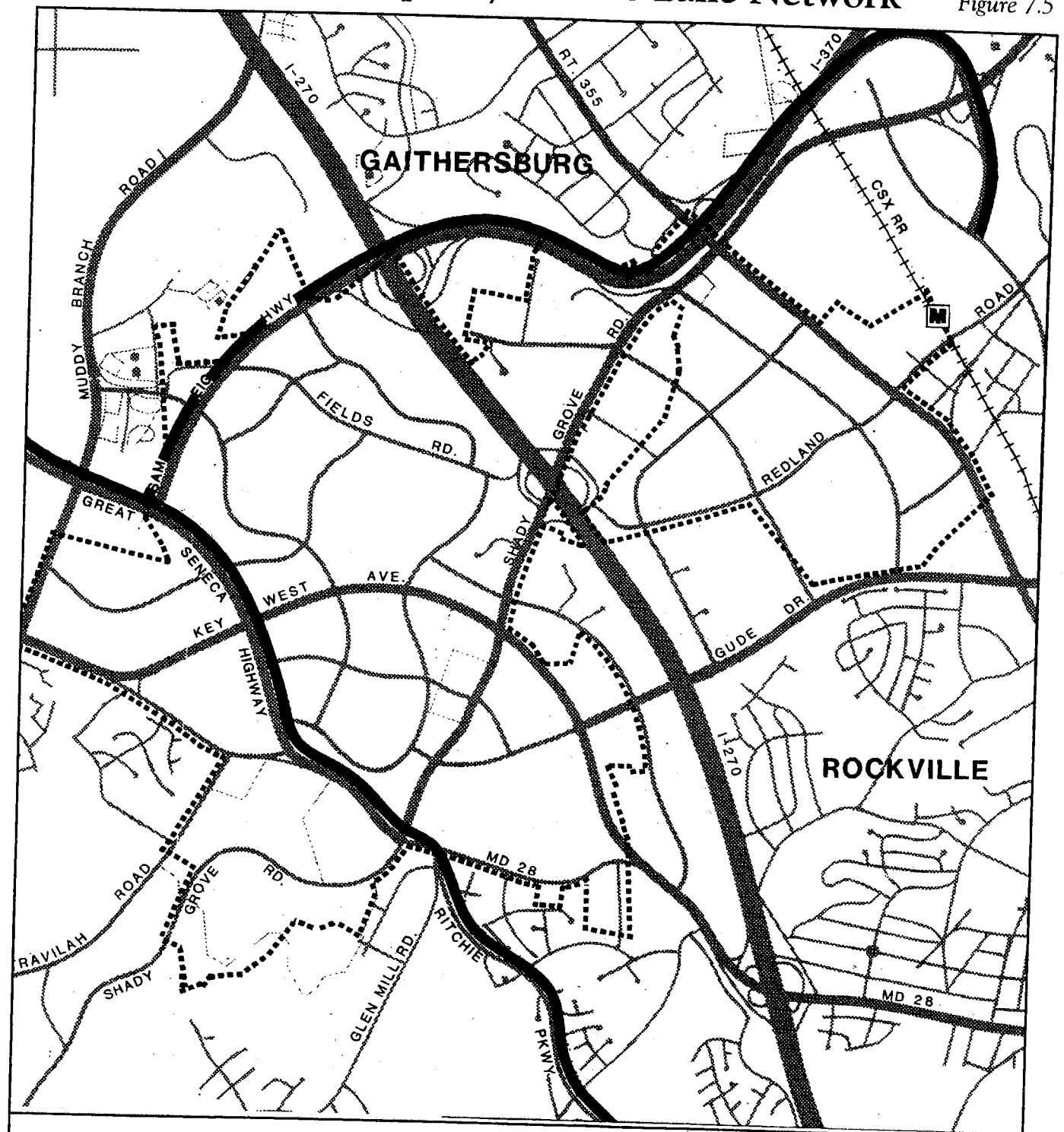
An analysis of intersection conditions was prepared from the results of the areawide transportation analysis described in Appendix B. The result of the transportation analysis projects an areawide Level of Service (LOS) of D for the Gaithersburg East and West policy areas at buildout. The limitations of this analysis are discussed in the Appendix. However, the pattern of congestion resulting from the planned land use indicates that about eight of the intersections in the Study Area may operate at local levels of service more congested than the standard of mid-LOS E used in Local Area Transportation Review. Figure 7.6 shows the most congested intersections, based on traffic projections resulting from the master planned land use and transportation network. A list of the intersections analyzed is provided in Table 7.4. At buildout, levels of congestion at some locations were projected to be significant enough to warrant treatment by grade separation, interchange design, or equivalent at-grade treatment. It should be noted that the intersections which are projected to exhibit the most congested conditions share a common feature: they are primarily located at the periphery of the Study Area. This peripheral congestion is due in large measure to regional through traffic using I-270 and major arterials such as MD 28, the Great Seneca Highway, and MD 355. The latter intersections within the Study Area are already operating at LOS F. See Appendix A for further discussion of these intersections.

The indication of future intersection congestion is a condition that will need to be monitored and reviewed several times over the course of the Master Plan buildout. Although the degree of accuracy for such long-range forecasting is limited, these estimates have been made because they are the best order-of-magnitude determination that can be made now of where problem areas are likely to occur or will continue to occur in the future.

Based upon the transportation analysis, a review was made of all major critical intersections to determine the feasibility and need for grade separation or equivalent at-grade treatment. The results of this review with regard to the designation of possible grade separations and those intersections not recommended for grade separation are discussed in Appendix A. The provision of grade separation removes and reduces the conflicts between opposing flows of traffic, resulting in improved operations through an intersection of roadways. However, such design treatments are expensive and take a considerably larger area of land than would otherwise be required at a typical at-grade intersection. Therefore, an advance determination of need must be made as part of the Master Plan process to preserve the needed interchange rights-of-way. Also, there may be at-grade treatments that would be equivalent in effect to grade separation, but may still require the same amount of land.

Potential High Occupancy Vehicle Lane Network

Figure 7.5



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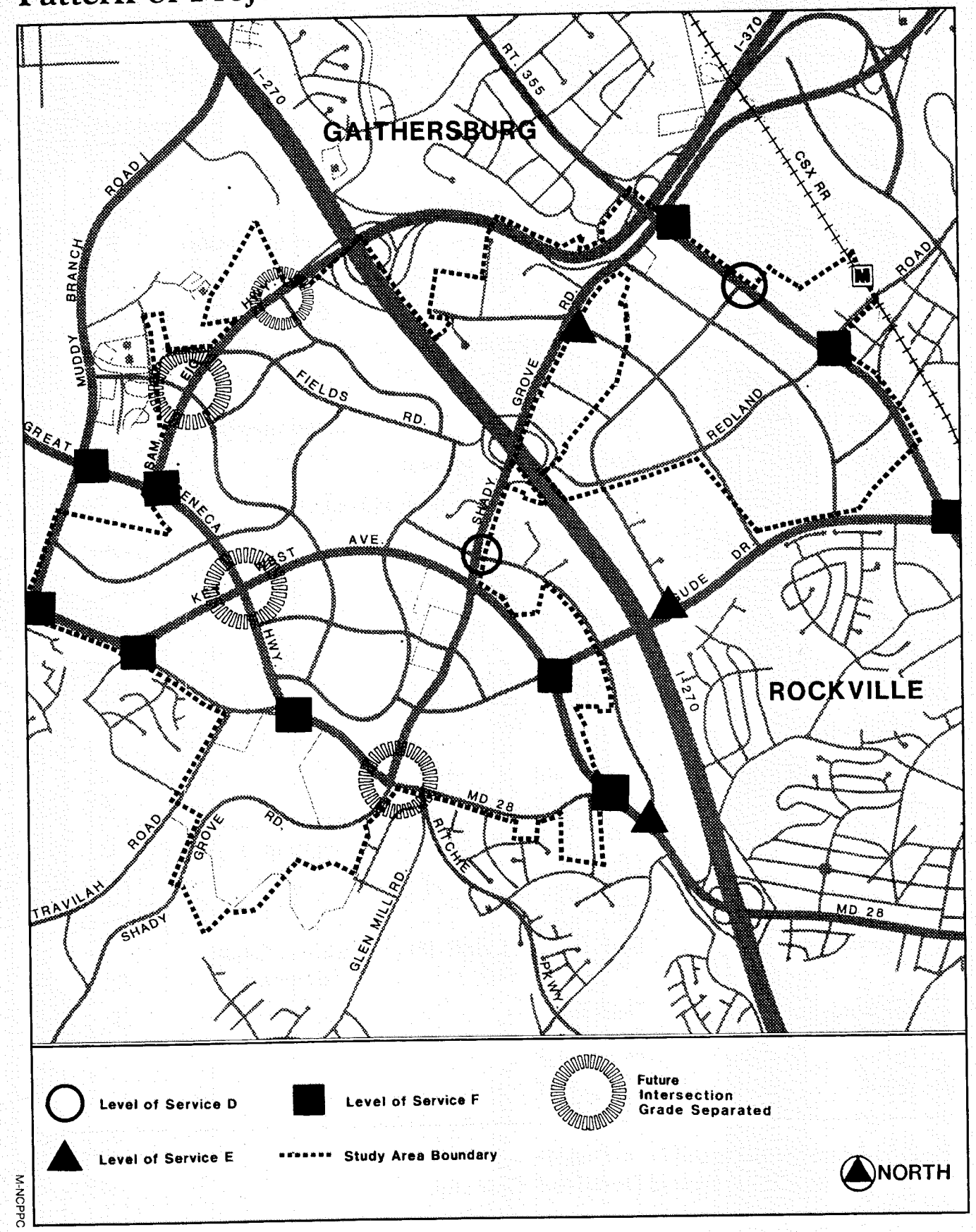
Pattern of Projected Intersection Congestion

Figure 7.6



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Samples of Likely Congested Intersections Assuming "End State" Roadway Network and Full Development Build-Out

Table 7.4

Samples of Likely Congested Intersections Roadway Approach Name		Intersection Level of Service At Full Build-Out	
N/S Approach	E/W Approach	of Plan	Existing (1988)
Frederick Ave. (MD 355)	Shady Grove Rd.	F	F
Muddy Branch Rd.	Great Seneca Hwy.	F	N.A.
Great Seneca Hwy.	Key West Ave.	F without Interchange	B
Great Seneca Hwy.	Sam Eig Hwy.	E/F with Partial Grade Separation	–
Sam Eig Hwy.	Fields Rd. (Relocated)	E/F without Interchange	
Frederick Ave. (MD 355)	Gude Dr.	F	F
Darnestown Rd. (MD 28)	Shady Grove Rd.	F without Interchange	C
Muddy Branch Rd.	Darnestown Rd. (MD 28)	F	E/F
Key West Ave.	Gude Dr.	F without Grade Separation	–
Research Blvd.	Darnestown Rd. (MD 28)	E	N.A.
Gaither Rd.	Shady Grove Rd.	E	B/C
Shady Grove Rd.	Key West Ave.	B	A
Piccard Dr.	Gude Dr.	A	N.A.
Research Blvd.	Shady Grove Rd.	C/D	E
Shady Grove Rd.	Gude Dr.	A/B	–
Frederick Ave. (MD 355)	Redland Rd.	F	F
Key West Ave.	MD 28 (& Thomas Farm)	F without Grade Separation	
Key West Ave.	MD 28 (& Banks Farm)	F	D
Omega Dr.	Fields Rd.	B	–
Great Seneca Hwy.	Darnestown Rd. (MD 28)	F without Grade Separation	A
I-270 Off-ramp	Fields Rd.	B	C
Piccard Dr. *	Redland Rd. **	A	–
Gaither Rd.	Redland Rd.	A	A

* Redland Rd. to Metro/Piccard Dr. to Gude Dr.
**Redland Rd. to MD 355/Piccard Dr. to Shady Grove Rd.

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In general, the factors considered in reviewing and recommending potential grade separation are:

- projected operational problems,
- impact on nearby land use,
- impact on local access, and
- spacing between intersections.

Concerns regarding the impact on local access and spacing between intersections have strongly influenced the Plan's recommendations for grade separations along Great Seneca Highway. Great Seneca Highway is a key roadway in the area for both local and through traffic. It connects Germantown to Rockville (via Darnestown Road) parallel to I-270, through the Study Area. Therefore, it carries traffic through the area as well as a significant amount of traffic into development in the area. It must serve both types of traffic and its intersections must provide for local access as well as accommodating significant through-flow. While grade separation/interchanges primarily reduce congestion for through traffic, they create limitations on local access (due to spacing requirements and land area taken up for ramp systems). Careful consideration was given to both the needs to reduce through-flow congestion and to preserving local, at-grade access in identifying potential grade separation locations and conceptual interchange design. While Great Seneca Highway may primarily be a throughway, it is not a freeway. Grade separations should be designed to balance both land use access and through traffic needs. The objective of this Plan is to reserve prudently sufficient rights-of-way to accommodate grade separations or equivalent at-grade solutions.

Based on an analysis of all the above factors, this Plan designated the following intersections for future grade separations or equivalent at-grade solutions:*

- Fields Road and Sam Eig Highway;
- Key West Avenue and Great Seneca Highway;
- Great Seneca Highway and Muddy Branch Road (transit only);
- Great Seneca Highway, Shady Grove Road, and Ritchie Parkway; and
- Great Seneca Highway and Decoverly Drive (bridge only).

Grade separations are not proposed for every intersection, which means some intersections are still anticipated to have future operational problems. This situation is not far outside the range of expectations for an area fully developed with the high level of quality transit service that is anticipated in Shady Grove.

This Plan recognizes that many events may occur in the future which could positively affect intersection levels of service.

* See Appendix A for discussion of possible designs for these intersections, and a discussion of those intersections not recommended for grade separation.

These include:

1. **Development**—Buildout may be less than maximum allowed by zone. Individual property owners may choose to not build the full density on their parcels, or local environmental conditions may require less intensity on the site. Thus, in the long-term, there may be less development locally as well as in the area beyond the Study Area which could result in less local intersection congestion.

2. **Regional Transportation Measures**—the impact of through traffic on local conditions could be mitigated by broader transportation measures taken by the County or region in the future. Such measures, for example, could make auto use less attractive or intercept higher proportions of through traffic at stations or Park-and-Ride facilities outside the Study Area.

3. **Local Transportation Measures**—actions taken in the Stidu Area pertaining to the implementation of facilities and programs will directly address the particular problems and needs that develop. Targeted intersection improvements, grade separations, and road widenings will directly impact local traffic circulation and locations of congestion. Consideration should also be given in the future to the creation of some form of Traffic Management Organization in the Study Area to assist the public sector in monitoring and managing traffic conditions.

4. **Transit Facilities**—the proposed transit system may well serve more riders than presently projected, and consequently automobile traffic would be less. The particular technology and character of service using the transit easement and the actual experience with its usage will play a key role in the ability of the overall transportation system to perform well. The actual amount and location of local congestion at the time of the future development will be affected by these implementation actions which are still to come. The Plan offers a wide range of possibilities in developing these services and facilities.

Bikeway/Pedestrian System

The emphasis and anticipation of the provision of a high level of transit facility development to serve the area's transportation needs dictates that pedestrian/bicycle circulation be an integral part of the transportation/land use development process.

To date, the bikeway system in the area has been provided only through the implementation of bikeways as part of County road projects. The County Road Code requires that these facilities be built in conjunction with new road construction, unless the particular bikeway is shown to be unwarranted or infeasible. Although the County Department of Transportation and the Department of Parks have independent budgets for bicycle and pedestrian facilities, their funds are limited and there are no independent projects programmed in the area. There are no major parks in the Study Area, although many are planned. Other independent bikeways and pathways may be

required in the subdivision review process as a condition of approval of development plans by the Planning Board. These are designed during the site plan development process and should be coordinated with road-related bikeways to enhance development of a continuous network. In this regard, special attention should be given to the site plans for the major parcels in the planning area to assure integration into the areawide trail network.

The County should also consider further development of the area bikeway system through the implementation of trails along the transitways as they are developed, similar to the proposal for the Georgetown Branch right-of-way. This has the additional benefit of providing a pedestrian access along the transitway tying directly from neighborhoods to the transit stops.

The bikeway recommendations of this Plan, shown in Figure 7.7, page 106, are based on those specified in the Gaithersburg Vicinity Master Plan, the Master Plan of Bikeways, and the County's Capital Improvements Program for roadways. Segments of the system are shown in Table 7.5, which is updated to reflect the currently approved FY 1989-1994 Capital Improvements Program. Standard bikeway classification cross sections are shown in Figure 7.8, page 107.

Bikeways should also be provided on a number of local streets and on neighborhood paths, particularly those providing access to transit, retail centers, and employment. These routes can be identified during the subdivision and site plan process.

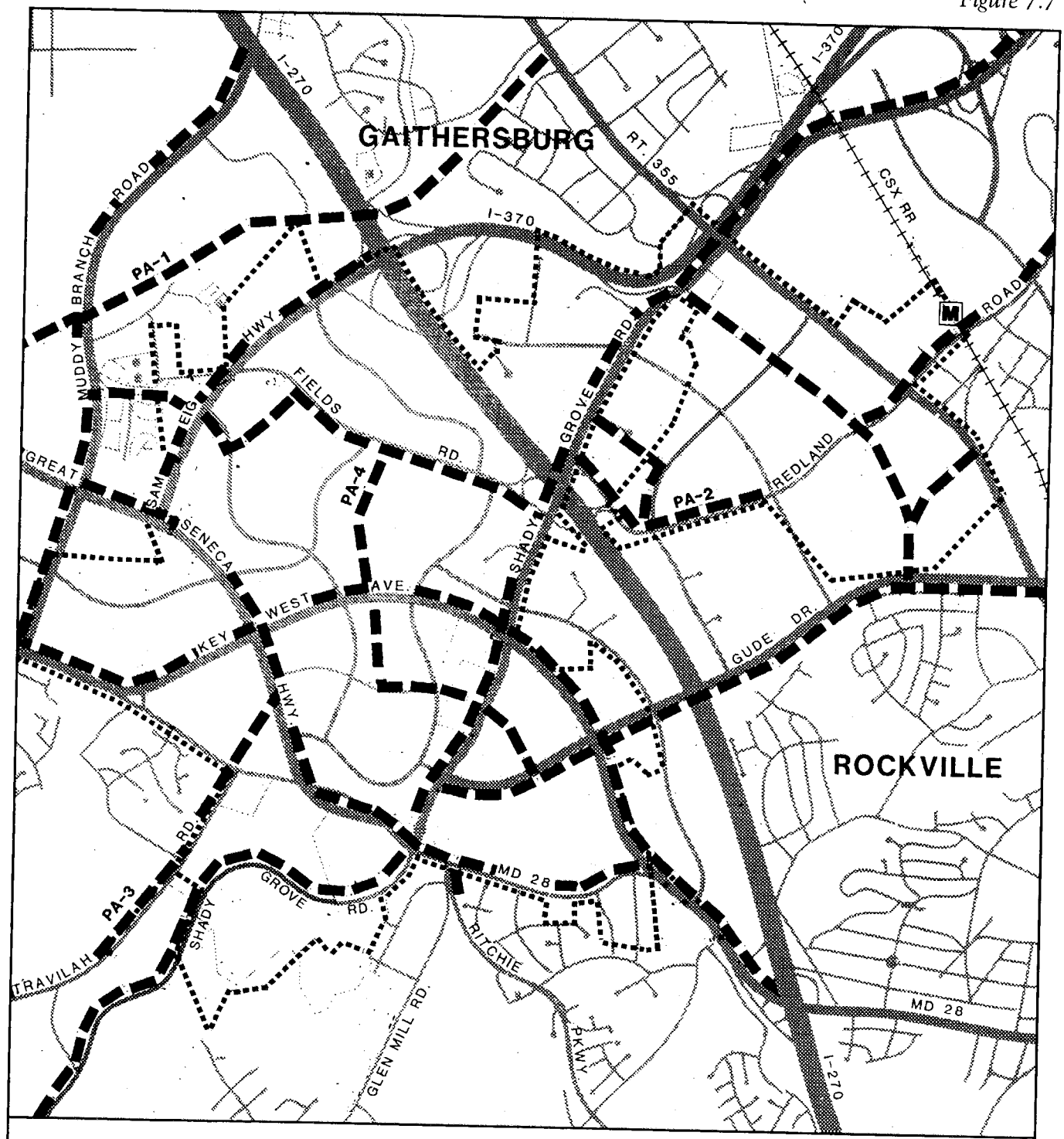
Heliport Recommendations

The need for a heliport facility in the southern portion of the I-270 Corridor has already been established in the *General Aviation Master Plan Report* prepared by Dynaplan, Inc. for the County Council. In addition, the Montgomery County *Comprehensive Growth Policy Study* presented a chapter regarding the Tiltrotor aircraft.* This Master Plan recommends that provision be made to site a public use heliport capable of serving both conventional and Tiltrotor craft within the Shady Grove Study Area. A heliport facility will be a positive contribution to the R&D Village concept by increasing accessibility to the Village.

* The military version of this new technology is currently under development. It is an aircraft that takes off and lands like a helicopter, then its rotor blades are tilted forward and it flies pretty much as a conventional propeller-driven airplane. Estimates are that a trip from the Washington area to a downtown New York heliport, for example, could be done in about 45 minutes. It is expected that the civilian versions of the Tiltrotor will be coming in use in the mid to late 1990s, pending continued budgetary support for its development.

Bikeway Plan

Figure 7.7



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Bikeways in the Study Area Vicinity

Table 7.5

Project	Location	Design Type*	Status
Great Seneca Hwy (M-28)	MD 28 to Middlebrook Rd.	Class I (north side)	MCDOT CIP–FY1989-90
Fields Rd. (A-261b & A-261)	Muddy Branch Rd. to Story Dr.	Class I (south side)	Existing
	Story Dr. to Sam Eig Hwy.	Class I (south side)	MCDOT CIP–FY1990
	Sam Eig Hwy. to Omega Dr.	Class I (south side)	MCDOT CIP–FY1990
	Omega Dr. to Shady Grove Rd.	Class I (south side)	Proposed
Key West Ave. (M-22)	MD 28 to I-270	Class I (north side)	MCDOT CIP–FY1990
Gude Dr. (M-23)	Shady Grove Rd. to Key West Ave.	Class I (south side)	Proposed
	Key West Ave. to Research Blvd.	Class I (south side)	MCDOT CIP–FY1990
	Research Blvd. to Piccard Dr.	Class I (south side)	Proposed
	Piccard Dr. to MD 355	Class I (south side)	Existing
Muddy Branch Rd (M-15)	MD 28 to MD 117	Class I (west side)	MCDOT CIP–FY1990
Sam Eig Hwy. (M-28)	Great Seneca Hwy. to I-270	Class I (north side)	MCDOT CIP–FY1991
Shady Grove Rd. (M-42)	MD 28 to Muncaster Mill Rd.	Class II	Proposed
Muddy Branch Park (PA-1)	Turkey Foot Rd. to . Frederick Ave	Class I	M-NCPPC Proposed Park Trail
Redland Rd. (PA-2)	Needwood Rd. to Shady Grove Rd.	Class I & II	Proposed
Dufief Mill Rd./Travilah Rd. (PA-3)	MD 28 to Great Seneca Hwy.	Class II	Proposed
Louis Sullivan Dr. (A-23)	Fields Rd. to Broschart Dr.	Class I	Proposed
Blackwell Rd. (A-267)	PA-4 to Gude Dr.	Class I	Proposed
Darnestown Rd. (A-296)	Shady Grove Rd. to Key West Ave.	Class I	Proposed
Choke Cherry Rd. (A-253)	Shady Grove Rd. to Redland Rd.	Class I	Proposed
Pleasant Rd. (A-58)	Shady Grove Rd. to Gude Dr.	Class I	Proposed
Indianola Dr. (A-52)	MD 355 to Pleasant Rd.	Class I	Proposed
Life Sciences Center (PA-4)	Life Sciences Center to Fields Rd.	Class I	Site-related Development

* See Figure 7.8 for definition of bikeway design types.

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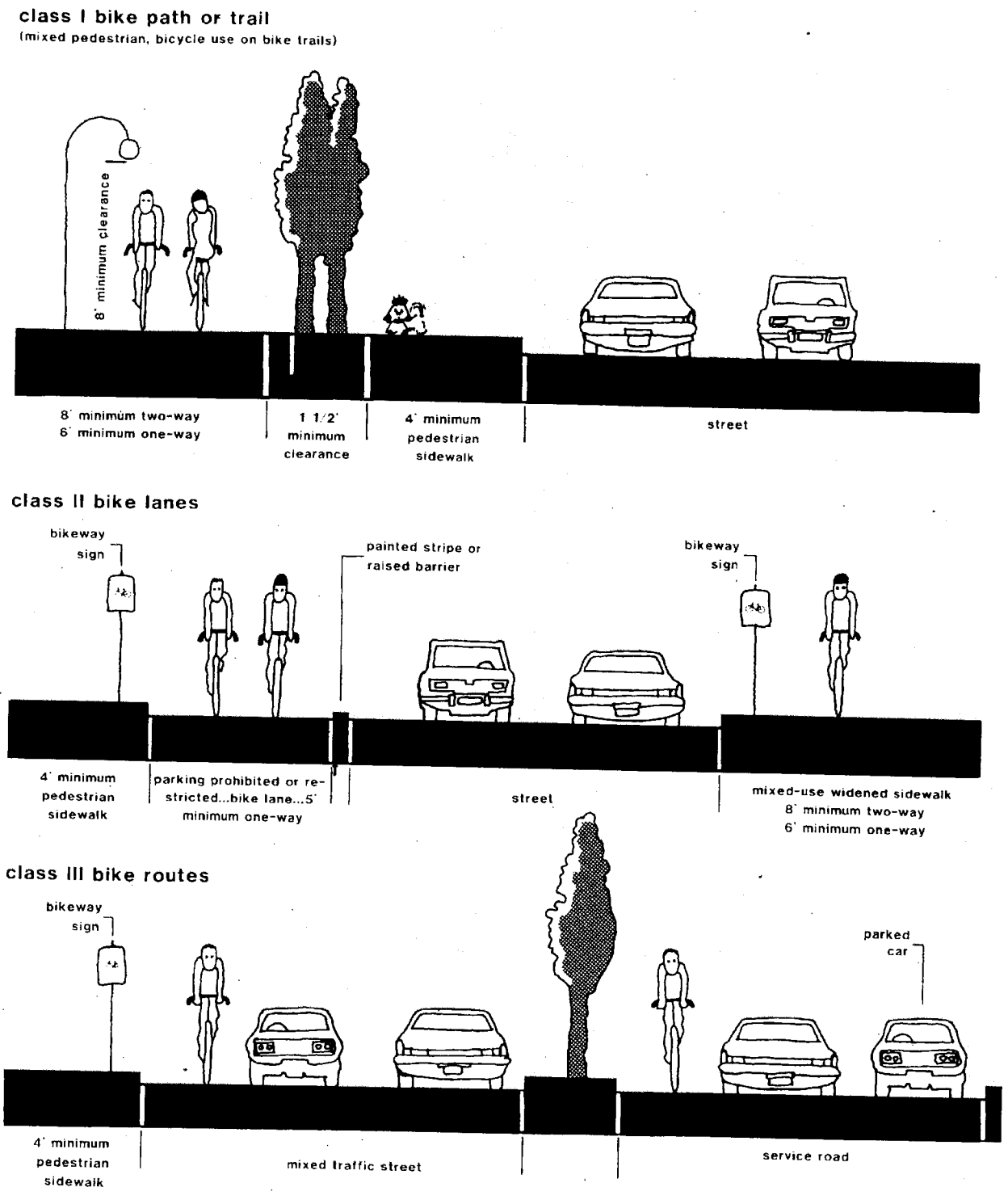
Typical Bikeway Cross Sections

Figure 7.8



Acreage Requirements

Prototypical sites for a heliport usage facility range from 7 to 25 acres depending upon the amount of support facilities and setting. A suburban heliport would require approximately 20 to 25 acres.

A heliport in a more urban setting could use ground level and decked facilities and could be accommodated on 7 to 10 acres.

Heliport Location Criteria

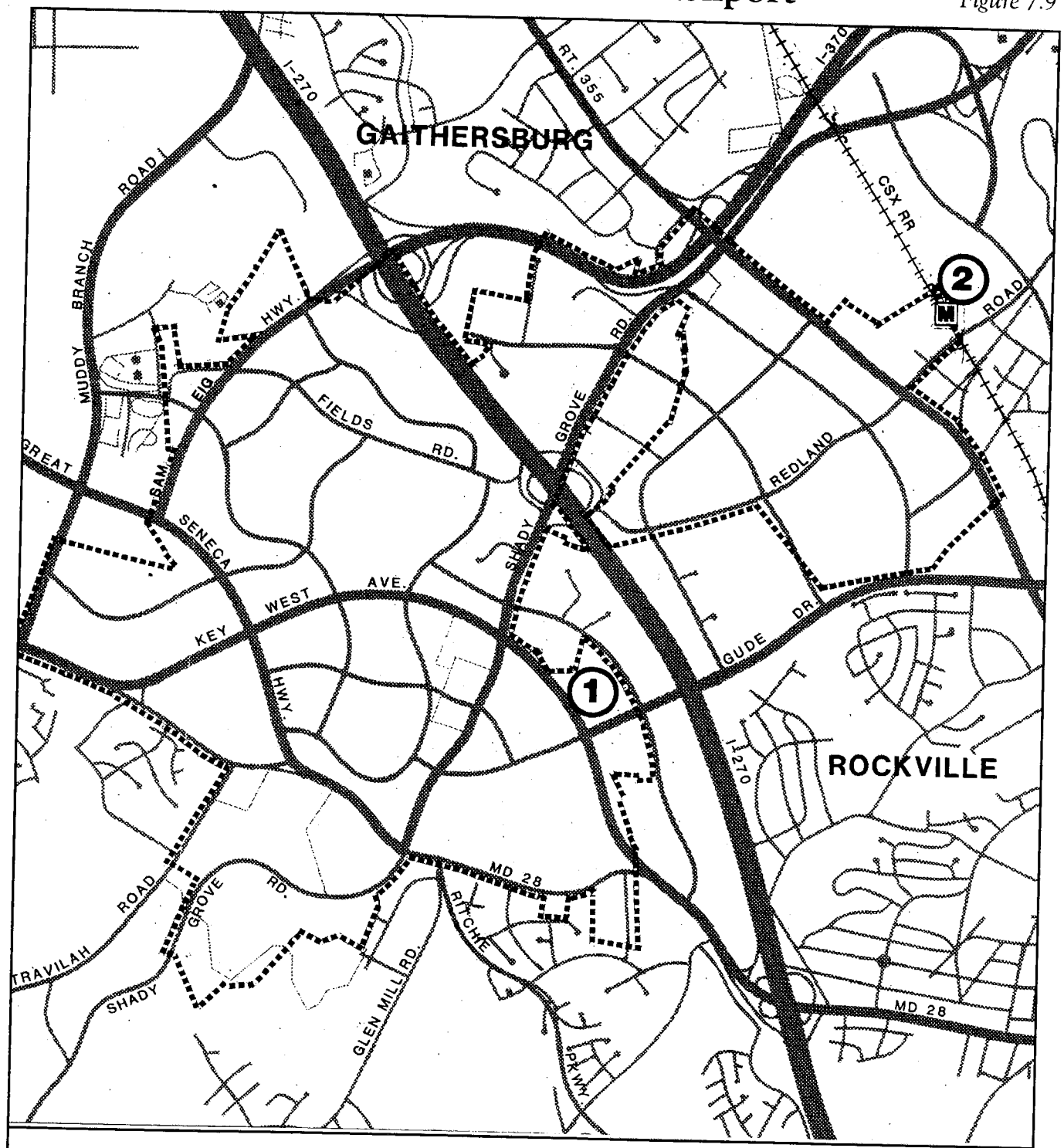
A detailed study should be undertaken by the County Executive to determine sites most appropriate for a heliport, based on criteria listed below. In addition, the scope of the study should include capital and operating cost alternatives, and what administrative structure would be most appropriate to manage and operate the facility.

- Site sizes should range from 10-25 acres.
- Sites should be within the employment area and should avoid residential land uses.
- Flight paths from I-270 (the logical regional flyway) should avoid residential overflights to the greatest extent possible.
- Sites should offer convenient access to the regiona highway and transit network.
- Sites should not be located near institutions such as hospitals that may be adversely impacted by resulting noise.
- The two sites listed below and shown on Figure 7.9 appear to meet most of the criteria and are potential sites that could be included in the study. They are:
  - a 25-acre parcel at Gude Drive and Key West Avenue, and
  - the Shady Grove Metro Area.

The draft of a preliminary study being done for the Federal Aviation and National Aeronautics and Space Administrations has indicated that there could be demand for 15 to 20 heliports serving Tiltrotor aircraft in the Washington to New York corridor.

Alternative Future Locations for a Heliport

Figure 7.9



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