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NORTH BETHESDA TRANSITWAY FEASIBILITY STUDY. FINAL REPORT

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BETHESDA, MD

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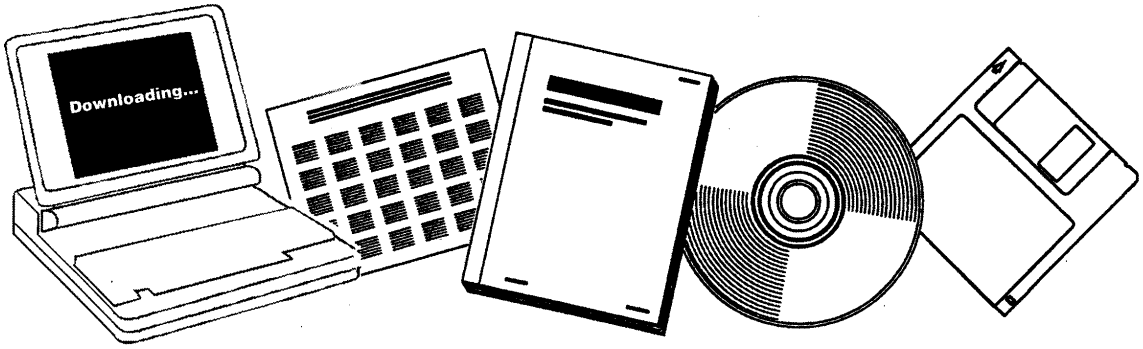

U.S. Department of Commerce
National Technical Information Service

NORTH BETHESDA TRANSITWAY

FEASIBILITY STUDY

FINAL REPORT

December • 1992

Prepared for:

Montgomery County Department of Transportation
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16. Abstract

The study focused on private sector financing of transit improvements between North Bethesda business and commercial areas and the Groscenor Metrorail Station. As part of this study, an investigation was made of the feasibility of using any of a number of advanced vehicle and guideway technologies commonly referred to as "People Movers" in this corridor. Recognizing the potential applicability of other transit technologies such as light rail or enhanced bus service, we have designated the potential alignment as a transitway to better refect the potential for a wide range of transit services. The body of the report refers to "People Mover" throughout and should be interpreted as referring to a transitway.

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EXECUTIVE SUMMARY

NORTH BETHESDA TRANSITWAY

STUDY

This study focused on private sector financing of transit improvements between North Bethesda business and commercial areas and the Grosvenor Metrorail Station. As part of this study, an investigation was made of the feasibility of using any of a number of advanced vehicle and guideway technologies commonly referred to as "People Movers". Recognizing the potential applicability of other transit technologies such as light rail or enhanced bus service, we have designated the potential alignment as a transitway to better reflect the potential for a wide range of transit services. The body of the report refers to "People Mover" throughout and should be interpreted as referring to a transitway.

Faced with roads choking with traffic, a burgeoning employment center at Rock Spring Park and an expanding regional retail center at Montgomery Mall, the Montgomery County Department of Transportation's Office of Planning and Project Development commissioned this study to explore the feasibility of implementing a transitway system to

connect Rock Spring Park and Montgomery Mall with the Grosvenor Metrorail Station. Together this major regional mall, with associated retail buildings totaling 1.5 million square feet in size and with 4,100 employees, and Rock Spring Corporate Park, with about 15,000 workers, have as many jobs and retail/commercial activity as downtown San Antonio, Texas. They have the economic attributes of a downtown, but they are not physically arrayed like a typical, concentrated, pedestrian-oriented central business district. In coming years, employment at Rock Spring is expected to increase to about 29,000 to 37,000 depending upon the land use plan selected for the North Bethesda-Garrett Park Master Plan now being developed. Montgomery Mall will add another 1,200 employees under current development plans.

Located 2 to 2.5 miles from the Grosvenor Metrorail Station, this part of North Bethesda is now served by Montgomery County Ride-On and Metrobus service, but bus commuters only account for a small percentage of those who travel to the area daily. For example, about three hundred daily riders now commute to Rock Spring Park by bus. The major goal of building a transitway or people mover is to provide an integrating force to create a more cohesive, transit-accessible, pedestrian-oriented suburban center which will convert automobile users to transit riders thus lessening traffic congestion and improving air quality.

THE PEOPLE MOVER CORRIDOR

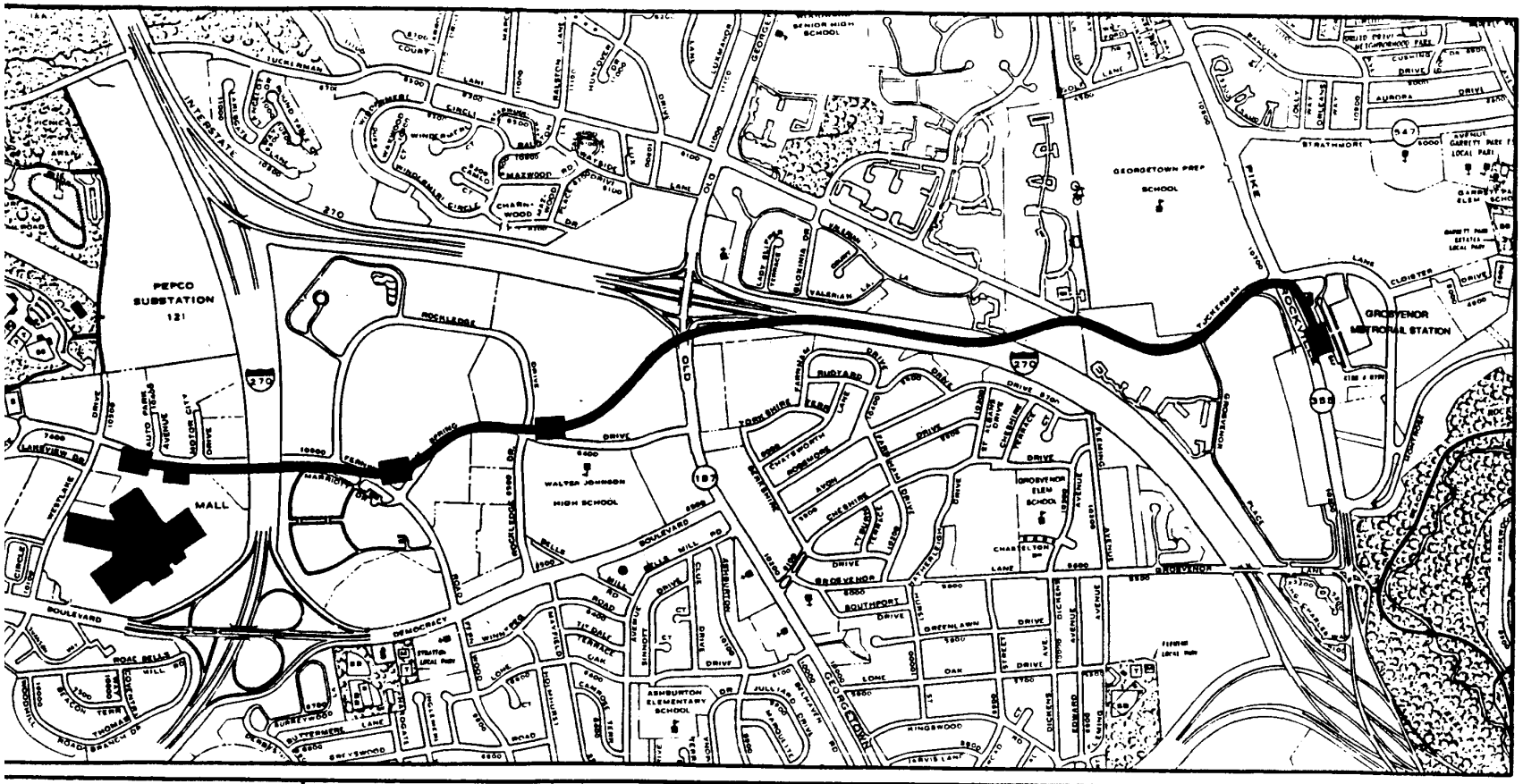
The three people mover alternatives studied with their associated alignments are shown in Figures 1, 2, and 3. One basic corridor emerged as we examined possible ways to place a people mover alignment between Grosvenor Metrorail Station and Rock Spring Park and Montgomery Mall. In locating alignments our objectives were to maximize use of existing public rights-of-way, minimize environmental and neighborhood impacts, keep potential capital costs in check, and maximize access to potential people mover patrons. The slight differences in alignments are almost entirely the result of the differing needs of the three modal technologies we selected.

Beginning at Montgomery Mall with a station on Westlake Terrace adjoining a commuter lot and the bus terminal, the alignment proceeds east to bridge the I-270 West Spur alongside the planned Fernwood Road Bridge. The alignment follows Fernwood Road to the IBM property where a station would be integrated into one of the planned IBM buildings. Leaving IBM property, the alignment follows Rock Spring Drive to enter the undeveloped Davis property which is proposed for development by the Davis/Camalier Family. Depending upon the zoning for this site which emerges from the North Bethesda-Garrett Park Master Plan, a people mover station would be integrated into a building on this property. The alignment leaves the Davis property, crosses Old Georgetown Road and follows the ramp down to the East Spur of I-270 where it is in the median, or alternatively to the side, of the roadway. It leaves the I-270 right-of-way to cross to Tuckerman Lane following a stream valley

between the Grosvenor Park townhouses and the Timberlawn Crescent II Apartments. It proceeds east to Grosvenor Metrorail Station in the right-of-way of Tuckerman Lane turning south after crossing Rockville Pike to a station parallel with the existing rail station.

PEOPLE MOVER MODES

The attributes of people movers which attract users are their speed, reliability--they run on their own guideway so aren't at the mercy of snarled road conditions--frequency of service, and small-scale, modern, sleek designs which lend themselves to integration with buildings. People movers are electrically-powered, usually driverless, with vehicles that resemble smaller versions of Metrorail cars. The systems run in a fixed guideway with the vehicles being supported by either steel wheels, rubber tires, magnetic levitation, or cushions of air. Propulsion can be provided by linear induction motors, cable drives or the more common electrically-powered wheels. The number of people mover systems in the world is growing rapidly with applications ranging from airports and amusement parks to downtowns including Miami, Detroit and Sydney, Australia. They serve as connectors, circulators and distributors for trips begun using some other mode. In Miami and Toronto, people mover systems connect with Metrorail-like rail rapid transit lines distributing trips from the rail rapid lines as is proposed in North Bethesda.


PEPCO SUBSTATION 121
MALL
WALTER JOHNSON HIGH SCHOOL
GEORGETOWN PREP SCHOOL
GROSVENOR METRORAIL STATION
GROSVENOR ELEM SCHOOL
ASHBURTON ELEMENTARY SCHOOL
INTERSTATE 270
OLD GEORGETOWN ROAD
ROCKVILLE PIKE
TUCKERMAN LANE
ROCKLEDGE DRIVE
BELLS MILL ROAD
DEMOCRACY BOULEVARD
WESTLAKE DRIVE
MARRIOTT DRIVE
GROSVENOR LANE
STRATHMORE
CLOISTER DRIVE
AURORA DRIVE
SOUTHPORT DRIVE
GREENLAWN DRIVE
KINGSWOOD DRIVE
BUTTERNUT LANE
SURREYWOOD
BEACON TERRACE
THOMAS
SERENITY DR
JULLIARD DRIVE
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ASHBURTON
SINNOTT
WINNEBAGO
LONE OAK
CARROLL TERRACE
TIC DALL TERRACE
MAYFIELD
MONTGOMERY
WOOD
DICKENS
EDWARD
CLEVELAND
CHARLESTON DR
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AVON
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ROSEWOOD
FARNHAM
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VALERIAN LANE
BLOOMINGTON DR
LADY BLACK TERRACE
MAXWELL RD
CHARNWOOD
WINDERMERE CIRCLE
WINTERGREEN
CUSHING DRIVE
ORLEANS
JOLLY
BANGLE
GARRETT PARK ESTATES LOCAL PARK
FISHER LOCAL PARK
STRATTON LOCAL PARK
AUTO PARK AVENUE
MOTOR CITY DRIVE
LAKEVIEW DR
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SPRING
COUPE
LUCKERMAN
HUNTOON
FRASETH LANE
MARC
LUXEMBOURG
GEORGETOWN
SENIOR HIGH SCHOOL
BRIDGE PRIVATE RESIDENCE PARK
BANGLE
ROCKVILLE
PLACE
WOODMONT
PARKWOOD
TOCKWOOD
FLEMING AVENUE
DUKE
BRIDGE
BRIGHTON
BRIGHTON DR
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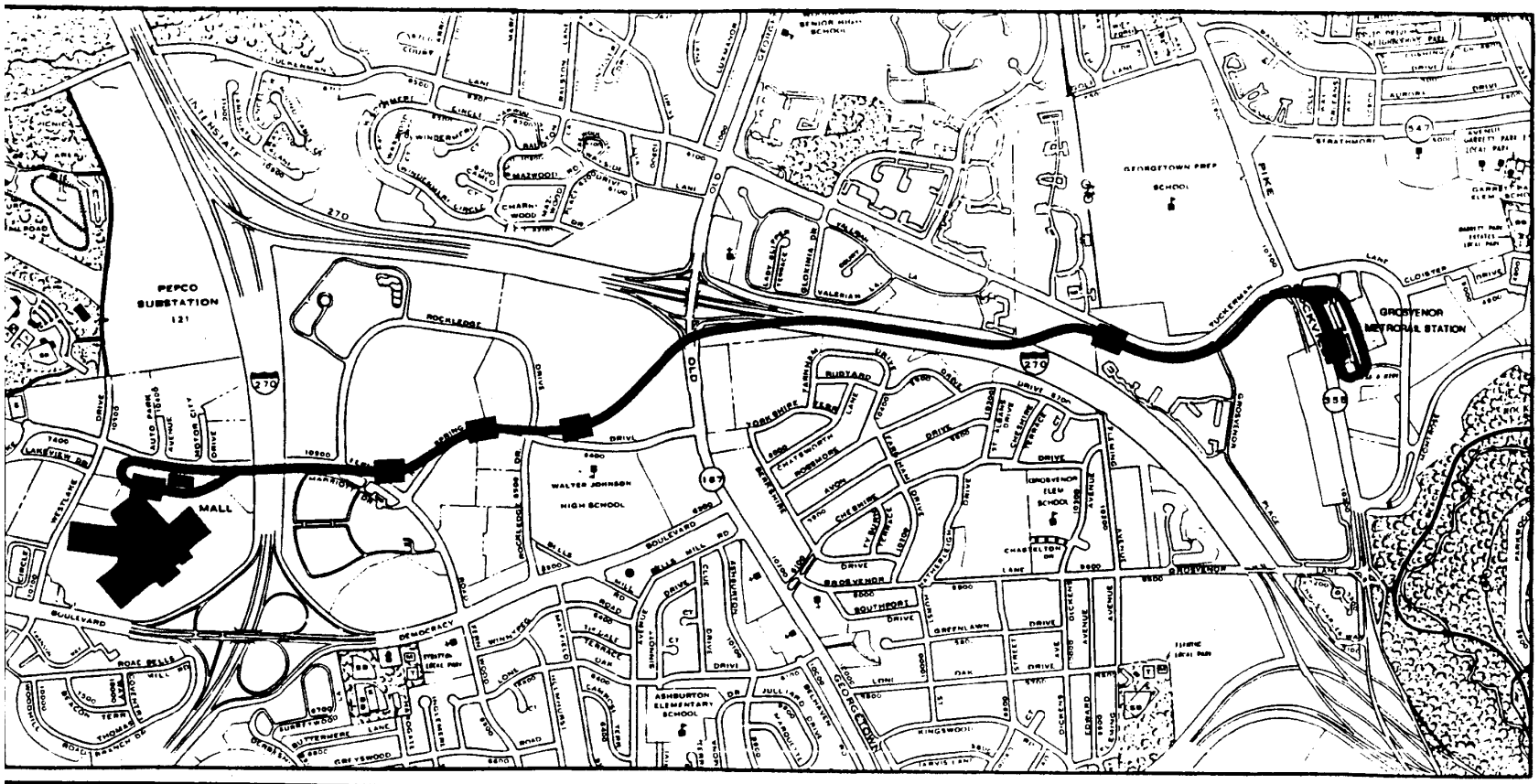

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SCALE IN FEET

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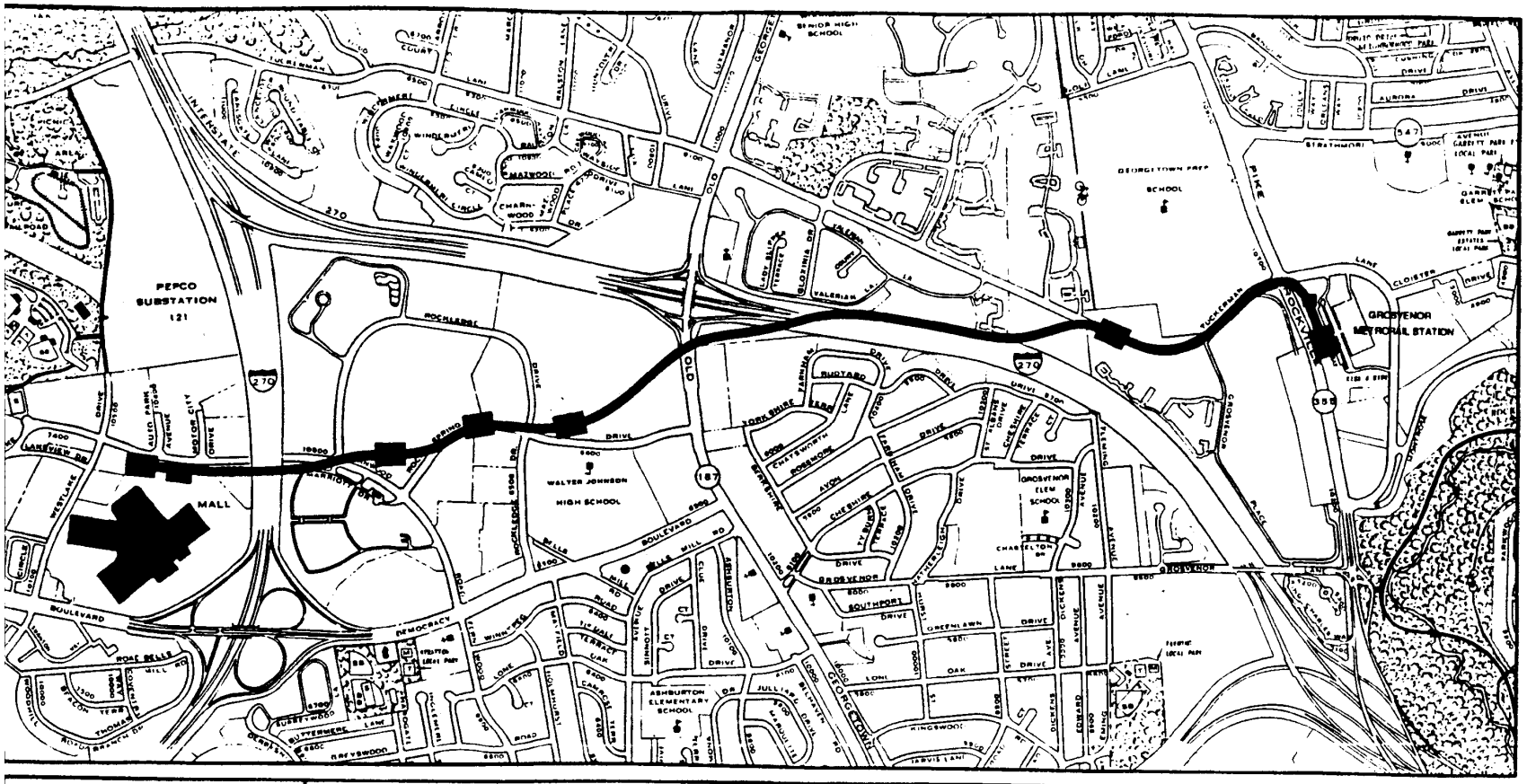
Alignment

Station

North Bethesda People Mover Feasibility Study • Montgomery County Department of Transportation

Figure 2

Monorail Loop Alternative



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Alignment

Station

North Bethesda People Mover Feasibility Study • Montgomery County Department of Transportation

Figure 3

Automated Light Rail Transit Alternative

For this application we considered the universe of people mover technologies available and selected three for detailed analysis. All three technologies are totally grade-separated on elevated guideway structures except for the light rail which is at grade along the East Spur of I-270 but on exclusive right-of-way. Travel times for each alternative are shown in Table 1.

Monorail Shuttle - uses high-speed monorail technology such as employed by TGI at Walt Disney World. Illustrated in Figure 4, this application would consist of two trains operated by drivers on two separate tracks which would shuttle back and forth between the terminal stations every 7 minutes. By using operators on this well-proven technology rather than an automatic train control system, capital costs are lower and the technology is simpler. The vehicles are capable of speeds of more than 50 mph. For our analysis we assumed that 5-car trains holding 312 passengers each would be used which would accommodate 2,640 passengers per hour per direction. Because trains shuttle back and forth, a time-consuming loop is not needed at terminal stations to turn monorail vehicles which are more difficult to switch than regular steel-wheel on steel-rail technologies. No yards or shops would be needed since only two trains are used, and they would stay on their tracks permanently. Servicing would be accomplished under the guideway as is done for the Seattle monorail.

Monorail Loop - employs medium speed monorail technology such as the system built by Von Roll in Sydney, Australia (see Figure 5). This two-track system reaches speeds of about 20 mph, and uses more, but smaller, cars than the Monorail Shuttle. We assumed that 10 4-car trains holding 105 persons would operate at 2.21-minute headways with an hourly capacity of 2,850 passengers per hour per direction. Rather than a shuttle configuration we assumed a loop at the terminal stations to allow vehicles to turn around. This system would employ an automated train control system, so no drivers would be needed on trains. Shops and yards would be needed, which could be located around Montgomery Mall, potentially on the ground floor of a parking garage to be built to serve park-and-ride patrons.

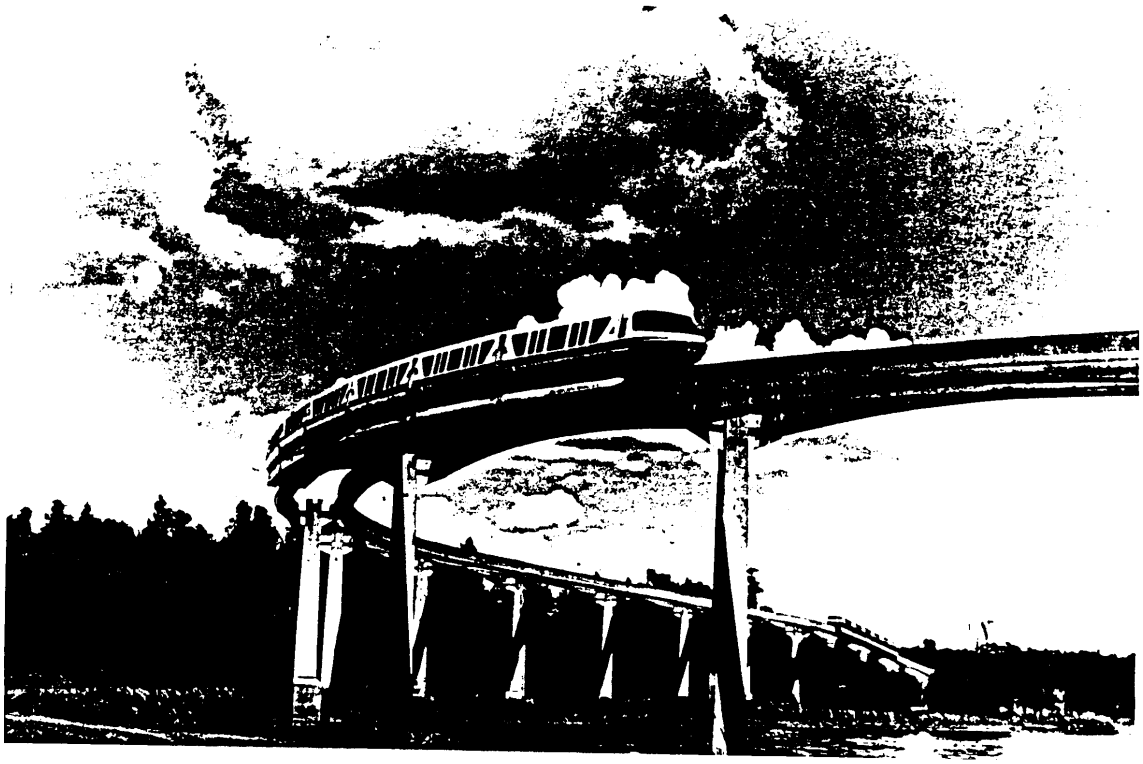

Figure 4 TGI (Disney) Monorail at Disney World

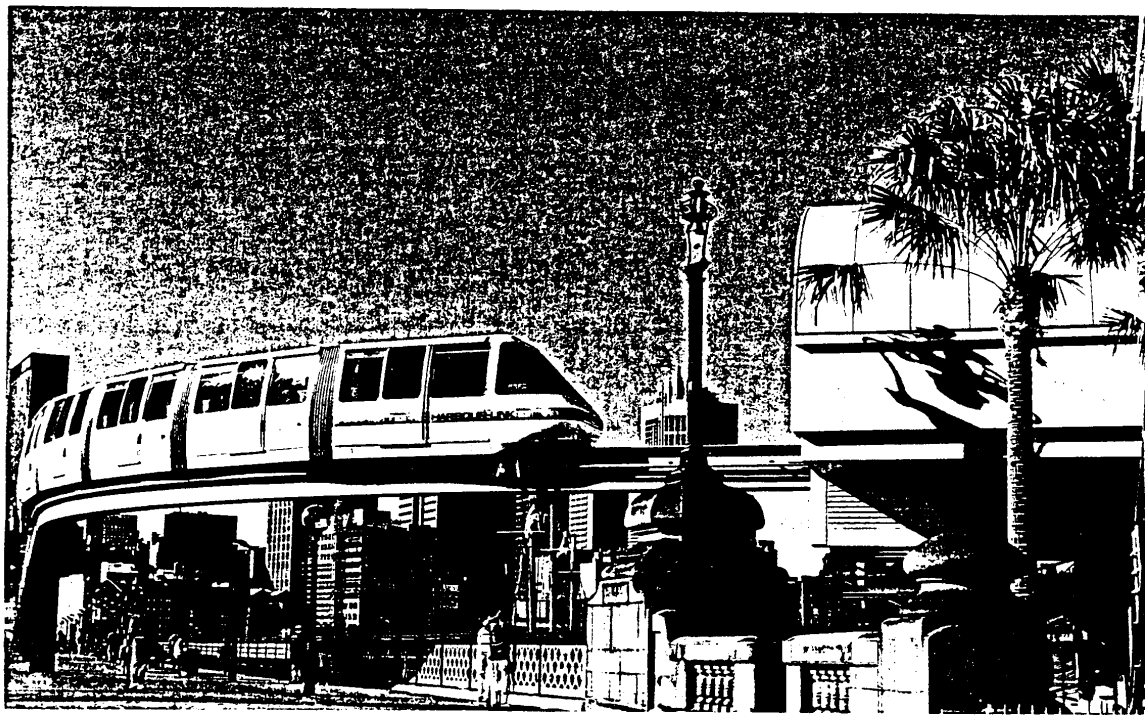

Figure 5 Von Roll Monorail in Sydney, Australia

Table 1
North Bethesda People Mover
Trip Times in Minutes

	Monorail Shuttle	Monorail Loop	Automated Light Rail Transit
From Grosvenor Metrorail Station To Walter Johnson High School	2.98	6.12	4.03
From Grosvenor To IBM	4.39	8.41	6.43
From Grosvenor To Montgomery Mall	5.88	10.56	8.37

Note: Monorail Loop and Automated Light Rail Transit have two more stations than the shuttle which add at least one minute to the trip.

Automated Light Rail Transit - which is conventional light rail transit technology such as being designed for the Baltimore Central Corridor and the Bethesda-Silver Spring Trolley but with automated train control systems.

Figure 6 Docklands Automated Light Rail Transit System, London, England

We took as a prototype the Docklands light rail system now operating in London, England on totally exclusive right-of-way which uses a third rail rather than the traditional overhead catenary wires for power and which is automated and driverless (see Figure 6). To save capital costs we assumed a single-track system with passing sidings. We assumed that 4 single-car trains would operate at 4.8 minute headways with passings every 2.4 minutes carrying 2,625 passengers per hour per direction. Yards and shops could be located in the Montgomery Mall area; or alternatively, as the system uses a third-rail and if the line were designed with a track gage congruent with Metrorail, a track could be built to carry vehicles onto Metrorail tracks at Grosvenor to be serviced by WMATA at their yards and shops.

Enhanced Bus Service - Buses do not require a fixed guideway as do the other modes investigated for this study, so they are inherently less costly and faster to implement than rail modes. Conversely, if they operate in the streets, they are affected by traffic congestion and weather-related delays.

The feasibility of implementing a bus connector to connect Montgomery Mall to Grosvenor Metrorail Station is beyond question. The study team decided not to pursue analysis of this alternative further at the feasibility study level because it was less attractive in attracting riders and travel times were not much lower than those for the existing Ride-On bus route 47. We recommend studying it further in Alternatives Analysis as a transportation system management (TSM) option.

COSTS AND RIDERSHIP

The costs to build, operate and maintain the three people mover alternatives are shown in Table 2. Estimates are conservative based on the real costs to build and operate other systems. The net annualized cost is the sum of annual operating and maintenance (O and M) costs plus the annual cost of the capital expense spread over 30 years at 8 percent interest.

Ridership estimates are also shown in Table 2. In estimating ridership using the Maryland-National Capital Park and Planning Commission's models, people mover alternatives were tested assuming four different land use scenarios which are now being considered for the North Bethesda-Garrett Park Master Plan. The employment and housing assumptions in three of the land use scenarios are similar for the Rock Spring/Montgomery Mall area, so no differences in ridership emerged. But the fourth scenario, "Nodal A," assumes higher densities of jobs and residents around transit station nodes, and the ridership estimates based on this scenario are significantly higher.

People mover patrons will be drawn from three markets: (1) Employees commuting to businesses located in Rock Spring Park and Montgomery Mall. Their commuter trips will account for 41 percent of the total daily ridership. (2) Employee non-work trips for shopping, eating and business purposes during the day will account for an additional 40 percent of the ridership. (3) Residents of the North Bethesda/Potomac area who would drive, use a bus or walk to Montgomery Mall to use the people mover to reach Grosvenor Station will form the remaining 20 percent of the patrons.

Table 2
Comparison of North Bethesda
People Mover Alternatives

	Monorail Shuttle	Monorail Loop	Automated Light Rail
Capital Costs	$63,752,000	$80,861,000	$81,737,000
Total Annual O & M Cost	$ 1,737,000	$ 3,527,000	$ 1,707,000
Net Annual O & M Cost	$ 887,000	$ 2,629,500	$ 852,000
Net Annualized Cost (1990 Constant $)	$ 6,130,000	$ 9,280,000	$ 7,575,000
Total Daily Trips Under Land Use Scenario Which Intensifies Jobs and Housing at Transit Nodes (Nodal A Scenario)	13,086	13,845	13,982
Total Daily Trips Under Land Use Scenarios Which Retain Zoning in 1970 Master Plan Plus Amendments	10,777	11,400	11,581

IMPACTS OF BUILDING A PEOPLE MOVER

Taking Automobiles off the Road - Under land use scenario Nodal A, 4,600 persons a day would be diverted from automobiles to use the people mover and Metrorail with a net reduction of 4,200 vehicles. This would remove 45,000 vehicle miles of travel from area streets and roads a day or 11.4 million a year. The result of taking these automobiles off the road would be better local air quality and improvement in traffic conditions, particularly for intersections and I-270 ramps in the people mover corridor.

Reduction in Parking Spaces Needed at Rock Spring Park - 2,086 fewer parking spaces would be needed at Rock Spring Park, leaving more land in open space.

Neighborhood Impacts Low - Because it mainly follows existing rights-of-way, takes no buildings, and is relatively quiet in a very noisy corridor, the people mover's impact on the neighborhoods between Grosvenor and Rock Spring Park would be low.

Natural Systems Impacts Limited to Stream Valley - Because the stream valley between Tuckerman Lane and the I-270 East Spur is the last undeveloped property between them, this became the people mover path after discussions with County environmental staff members concerning the impacts on the two small streams, floodplain, wetlands, and woods of this site. On elevated guideway, the people mover spans the 1000-foot area minimizing impacts on the streams and wetlands but requiring the removal of approximately a 30-foot corridor of trees. The placement of columns in the valley and an unpaved access road would create minor but manageable impacts.

Enhance Employment Opportunities and Accessibility to Retail Area - Building the people mover would enhance and expand employment opportunities at Rock Spring Park and Montgomery Mall for those not using automobiles who could transfer from Metrorail or buses at Grosvenor. Retail activity would also increase as additional sales are captured from improved accessibility to the Montgomery Mall area businesses. For some families this would eliminate the need to buy second cars.

Use of People Mover Efficient - Compared to many fixed-guideway transit facilities oriented to downtowns, this people mover would be used efficiently because in the same peak period riders would use the line in both directions. Commuters from East Potomac/North Bethesda coming to Montgomery Mall in the morning would proceed east on the people mover to connect with Metrorail at Grosvenor while commuters to Rock Spring Park and Montgomery Mall would be proceeding west. During the day a sizable number of people mover trips in both directions is anticipated because of the paucity of restaurants and services at Rock Spring and the ability of Rock Spring workers to use Metrorail to go to meetings.

Metrorail More Efficient - Metrorail revenues would increase through increased use by people mover riders by slightly over $4 million annually with no increase in operating costs. This would increase the efficiency of the public investment in Metrorail.

Rock Spring/Montgomery Mall Employers Receive Competitive Advantage - Because employers will be more accessible, employee recruitment and retainage will increase which will give employers near people mover stations a competitive advantage over those farther away. This in turn will increase the desirability of offices/stores near the people mover and their lease rates. This increased value can be tapped to help finance the people mover.

FINANCING A PEOPLE MOVER SYSTEM FOR NORTH BETHESDA

We analyzed an array of financing options for building and operating a people mover system and concluded that a public/private partnership with costs borne by both the public and private sectors was a good solution for this application. Consistent with the direction of the study, non-federal funding strategies were initially investigated. This investigation concluded that 73-80 percent of the funding may be derived from private sector Montgomery Count Government, and State of Maryland sources. The balance would be in the form of Federal funds derived from either the transfer of highway funds to transit as permitted under ISTEA or use of FTA Section 9 Formula Fundings. Given the use of FTA Section 3 Discretionary Funding for the completion of Metrorail System, it is unlikely that any of those funds would be available for a North Bethesda Project. If Federal funding is pursued, Federal project development requirements, including preparation of an environmental impact statement, must be met. We recommend that Montgomery County take the lead in implementing the system. Potential private sector funding could
come from (1) payments in lieu of parking for the 2000+ parking spaces at Rock Spring which would not be needed because of the people mover, and (2) benefit assessments from businesses near the people mover which would benefit from its presence through increased sales and rents. These two sources could supply all the funds needed to operate and maintain the system annually (the amount revenues won't cover) as well as about 35 to 42 percent of the funds needed to build the system. We suggest that a workable funding scheme for the public sector to build the system could be a potential 20 to 27 percent share of the costs from the Federal Transportation Administration, a potential 20 to 27 percent share from the State of Maryland, and a potential 10 to 20 percent share from Montgomery County.

RECOMMENDATIONS

The Study Team concluded that implementing a people mover in the North Bethesda corridor is feasible. A people mover would be an attractive transportation facility for reducing traffic congestion and lessening reliance on the automobile. We recommend that:

1. Montgomery County proceed with project planning by requesting federal planning funds to carry the project forward to the Alternatives Analysis/Draft Environmental Impact Statement planning stage.

2. Further planning should concentrate on an elevated fixed-guideway transit system, generally following the alignment identified in this study.

3. Exact station locations need to be examined in more detail. In particular, the stations in this study on Tuckerman Lane and midway through Rock Spring Park (the "Rock Spring" station) should be analyzed to weigh the costs to build them and their impact on system travel times versus the potential increase in riders. The connection at Grosvenor Metrorail Station should receive more detailed study. In this study we outlined one feasible connection, but more detailed engineering may suggest other desirable ways to link the people mover and metrorail stations.

4. Further studies should evaluate the relative cost of high speed monorail systems (such as our monorail shuttle alternative) versus lower speed monorail technology (such as our monorail loop alternative). Further study of manual versus automatic operation is also desirable. This study identified a manually-operated high speed monorail as more efficient than currently available mid-speed monorails and automated light rail transit systems. But this judgment can change as people mover technology and comparative costs continue to develop.