A CHESAPEAKE BAY FOUNDATION *REPORT*

Building Healthier Neighborhoods with Metrorail:

Rethinking Parking Policies

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The Chesapeake Bay Foundation (CBF) is a nonprofit environmental education and advocacy organization dedicated to the restoration and protection of the Chesapeake Bay. With a total of over 85,000 members, CBF has more than 70,000 members in Maryland, the District of Columbia, and Virginia. CBF works to educate the public and to protect the interest of the Chesapeake and its resources.

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EXECUTIVE SUMMARY

Ridership on the Washington, D.C., region's Metrorail system is booming – with an average of 627,630 weekday riders in May 2001. While most riders arrive at stations via walking, transit, bicycling, or drop off, others gain access by parking their cars at stations. The Washington Metropolitan Area Transit Authority (WMATA) provides 48,031 parking spaces at 41 of its 83 stations, 56 percent of which are located in surface lots. The agency, in official consultation with the Federal City Council (a private regional business association), is currently developing a new system access program that will likely call for the construction of tens of thousands of new spaces in addition to current planned expansions of parking capacity. The Federal City Council asked WMATA to adopt a resolution calling for 100,000 spaces to be built over 10 years as part of a $2.5 billion program, but WMATA staff has preliminarily recommended 30,000 additional spaces. To date, no decision has been made on how many automobile parking spaces will be built or how they will be paid for.

Will large numbers of parking spaces in huge garages and surface lots best serve WMATA's goal of doubling transit ridership by 2025? Will an automobile parking-based access strategy to rail stations best serve access needs for jobs and housing in the growing metropolitan region? Contrary to WMATA's and Federal City Council's priority of spending potentially billions on parking garages, a parking-based access strategy ultimately impedes rather than enhances access to stations. Expansive park-and-ride lots and garages make station areas less pedestrian and bicycle-friendly, reduce the economic development potential of station areas[1], weaken air quality benefits of transit, and – over the long term – diminish the ultimate ridership potential, and the role of the Metrorail system in supporting a livable, environmentally and economically sustainable region.

Numerous studies of land values around rail transit have demonstrated what local real estate agents call the "Metro premium." Land within walking distance of a Metrorail station (up to one-half mile), is substantially more valuable because people have easy, car-free access to a high speed regional rail transit system. The land values created by Metrorail and rail transit are strongly influenced by pedestrian access, rather than parking availability. Because land within one-half mile access of a transit station usually reflects increased value, surrounding stations with surface parking tends to yield an economically inefficient use of land. The presence of large surface lots also creates a poor environment for pedestrians and bicyclists, thereby limiting ridership and giving people few travel alternatives.

Comparing a number of Metrorail stations illustrates the influence their surrounding characteristics can have on ridership. For example, both the Takoma station in the District of Columbia and the West Hyattsville station in Prince George's County, Maryland, are surrounded by a comparable mixture of residential and neighborhood commercial activities within a half-mile radius of station portals. The Takoma station is easily accessible by pedestrians, while West Hyattsville lacks an extensive sidewalk network, is surrounded by surface parking lots, and is enclosed with a chain-link fence. These factors contribute to Takoma experiencing twice the daily ridership West Hyattsville does. If strong pedestrian links between more housing, offices, and shops surrounding Metrorail stations are provided,

[1] "Station area" refers to lands located within one-quarter to one-half mile of a transit station's portals.

more transit users will gain access to the system by means of non-vehicular modes and the number and duration of automobile trips will likely be reduced. Stronger pedestrian/bicycle links diminish the need for costly, expansive commuter park-and-ride facilities to achieve increased ridership.

Increasing access to Metrorail stations is essential not only to achieving WMATA's goal of doubling ridership by 2025, but also to sustaining an efficient, inter-modal transportation network that serves the region's growing population and employment. Because the presence of expansive commuter parking facilities at stations presents several barriers to achieving more efficient land use and long term increase in ridership, the promotion of non-automobile-originated trips should be undertaken as an priority strategy and policy objective for station area and access planning. Under current policies, WMATA and the jurisdictions it serves are wasting Metrorail's potential for transit-oriented development (TOD) that creates vibrant, walkable, mixed-use centers. Instead, large park-and-ride facilities and wide roads surround many stations making pedestrian and bicycle connections to adjacent communities hazardous and unappealing.

This parking-heavy approach reinforces the inefficient land uses and underutilized capacity of the system, and it negates air quality benefits of transit use. In constructing tens of thousands of new parking spaces for hundreds of millions, or billions, of dollars, the opportunity to create walkable transit villages, greater overall ridership, and off-peak transit trips will be lost. Several shortcomings in current parking policies undermine Metrorail's role in creating a network of livable communities:

1. *Many stations are exclusively automobile-oriented with extensive surface parking and experience little TOD investment.*
2. *Expanding the supply of commuter parking is a short-term access strategy and will not sufficiently address long-term accessibility for a larger number of people.*
3. *Inadequate bicycle parking facilities at stations further limits access by means other than the automobile.*
4. *WMATA requires developers to replace commuter parking spaces displaced by joint development, thereby raising costs and impeding the creation of transit-supportive communities and property tax revenues.*
5. *Many local zoning ordinances do not incorporate transit-supportive land use policies that permit reductions in the required amount of parking in areas near transit stations.*
6. *Many local jurisdictions have not drafted station area plans addressing transit-oriented development and non-vehicular access; WMATA does not assist jurisdictions in devising such plans.*

Although some parking is necessary for maintaining access to the Metrorail network, greater emphasis must be placed on other station access strategies. The adoption of prudent parking policies that support a vibrant walkable, mixed-use environment can foster greater access to jobs, diversity in housing choices, a safer environment for pedestrians and bicyclists, increased off-peak and reverse commute transit ridership, and an increased tax base near Metro stations. Upon the adoption of such policies, Metrorail can be used to enhance a network of livable communities, rather than simply serve nine-to-five commuters. A livable future, one that accommodates the region's growth while enhancing the quality of life, depends on relying less on automobiles and more on walkable communities and efficient transit.

Recommendations

To make the most of existing Metrorail stations' potential to support a large share of the region's growth, we recommend that WMATA and its member jurisdictions make the following changes:

1. ***Create a comprehensive station access policy that gives priority to pedestrian, bicycle, transit and shared ride modes and disallows commuter parking facilities from precluding or inhibiting the use of these modes.***

Commuter parking supply should be subordinate to actions to promote walking, bicycling, transit, and ridesharing so that land around stations can be used by more people for higher value transit-oriented uses, such as shops, housing, offices, and services. Over the long term, such uses will also generate more ridership and better manage future growth in travel demand by diverting many trips from automobiles to walking, bicycling, and transit. Such a strategy will also deliver significantly greater air quality benefits since park-and-ride transit users do little to reduce automobile emissions.

2. ***Economize WMATA lands and funds used for commuter parking facilities by replacing surface parking with transit-oriented development (with little or no commuter parking) or modest amounts of structured commuter parking.***

Additional parking facilities at both new and existing stations should be situated in locations that do not preclude redevelopment or inhibit pedestrian and bicycle access to the station. WMATA should locate parking garages on the periphery of its properties in order to maximize TOD potential. As land values increase, parking facilities should be converted to privately operated market-rate parking facilities. Net revenues from commuter parking should be used to fund non-parking access modes. This policy will ensure the efficient use of land and prevent the underutilization of prime developable land for large park-and-ride lots. It will also encourage the development of more housing and jobs close to Metrorail, thereby increasing the efficiency of pedestrian, bicycle, and bus access to stations.

3. ***WMATA and local jurisdictions should collaborate to comprehensively assess and plan to maximize pedestrian and bicycle access to stations.***

Presently, WMATA does not allocate funds for planning outside of its own property and has sometimes failed to coordinate its parking policy decisions with member jurisdictions. WMATA should reallocate joint development profits that are currently used to fund the construction of commuter parking facilities and instead provide assistance to jurisdictions in devising and implementing multi-modal access strategies to stations. In order to manage the supply of parking at stations, WMATA should also work with local governments to devise access strategies that reduce automobile dependence, saving money and boosting land values. WMATA should provide financial assistance and expertise to plan and implement favorable pedestrian and bicycle access to stations. Plans should create pedestrian and bicycle routes that provide direct and continuous sidewalks, trails, and on- and off-street bicycle lanes leading to the station that are safe, pleasant, and buffered from higher speed

motorized traffic. Measures to improve pedestrian and bicycle access include adding station entrances, narrowing road rights-of-way, widening sidewalks to at least five feet, minimizing intersection dimensions for pedestrian safety and comfort, permitting on-street parking, and redeveloping large surface parking lots near stations. Pedestrian paths should connect the station to adjacent neighborhoods where no street connects or environmental features separate the station from surrounding communities. Enhancing the safety of these connections through encouraging greater pedestrian activity along the route, along with appropriate lighting and design elements should also be a part of the planning. These measures are likely to be far more cost-effective than parking garages and more beneficial to surrounding communities, local tax revenues, and air quality.

4. WMATA and local jurisdictions should increase fixed- and flexible-route transit service to stations.

While pedestrian/bicycle connections to the community are likely to be most cost-effective, increasing bus and shuttle service is an important next step improving accessibility of stations and reducing the need for transit-users to drive to Metrorail. Added service to off-peak hours will also make transit a more attractive means for accessing stations. Increased service can be funded by revenues from joint development and increased parking fees.

5. WMATA should provide convenient, secure, and sheltered bicycle facilities at stations, such as attended bike rooms and racks inside stations.

In order to increase the number of transit-users accessing Metrorail stations via bicycle, WMATA should take measures to ensure customers that their bicycles will be safe and protected. Because there is significant overlap between automobile and bicycle service areas, potential exists for bicycles to substitute for automobiles in transit access. In many cases, 40 percent or more of automobile access trips to transit are shorter than typical median bicycle access distances. Providing sufficient bicycle parking facilities can help foster such a substitution. Bicycle racks are also relatively inexpensive, costing $250 per set, plus installation, or $1000 per locker plus installation, compared with a minimum of $13,000 for the construction of a single space in a parking garage. Rather than locating bike racks outside of stations, they should be placed in secure areas inside stations in order to prevent theft and vandalism. Video surveillance of facilities may be used if they must be placed outside of station portals. Bikestation Downtown Berkeley, which offers valet day and overnight parking for 77 bicycles in a 500 square foot cage on a subterranean level of the station, serves as an example of a safe bicycle parking facility with ample capacity and an ideal location. Given that many stations, especially above ground stations, have sufficient space for bicycle racks located within station portals, WMATA should revise its policy that disallows any bicycle parking inside station. Signs indicating the location of bicycle facilities and how transit users may rent them should be clearly posted.

6. Joint development replacement ratio of 1:1 for automobile parking spaces should be reduced or eliminated.

Because the presence of transit-oriented development in a station area reduces per capita automobile travel and demand for automobile parking by between 15 and 20 percent, it is

unnecessary to replace all parking spaces displaced by joint development. Thus, WMATA should adopt a policy similar to Tri-Met's policy for redevelopment in the Portland region, which does not require developers to replace any parking facilities. WMATA should allow developers to reduce the amount of commuter parking they provide when WMATA-operated spaces are displaced by joint development if the level of activity will replace parking-generated riders with pedestrian-, bicycle-, and transit-originated riders. If parking is to be replaced, the potential for shared parking should be maximized, and parking should be structured, preferably below ground or with retail on the ground floor, and situated on the periphery of the site. If development near stations generates enough pedestrian and bicycle activity, WMATA-operated commuter parking facilities may be eliminated altogether, as the market will provide parking in the area based on demand for competing land uses. A shift to market-based pricing will ensure that supply corresponds with demand without generating additional demand for parking. If Federal rules present a barrier in carrying out this reduced commuter parking requirement, WMATA should pursue special arrangements with the Federal Transit Administration to achieve these improved uses of land and investment.

7. ***Within one quarter mile of Metrorail stations, local governments should reduce or eliminate minimum parking requirements, institute maximum limits, and promote shared parking agreements and reduction of parking in favor of non-motorized access enhancements.***

Reduced parking ratios lower building costs and enable more efficient land uses. Local jurisdictions should modify their development regulations within the context of a transit district overlay zone implemented within one-quarter to one-half mile of Metrorail and other transit nodes. Reduced ratios can manage the parking supply and enhance the pedestrian environment. Reduced parking ratios should vary to based on urban form. The minimum and maximum ratios implemented in Oakland, California; Portland, Oregon; and Vancouver, Washington; exemplify effective parking ratios for stimulating transit-oriented development in both higher-density and moderate-density areas. Based on these jurisdictions' experience, we recommend the following parking minimum/maximums.

Recommended Minimum and Maximum Parking Ratios for One Quarter Mile from Station

Land Use	Minimum	Maximum
Single family residential	0.5 spaces / unit	1.25 spaces / unit
Office	none	3 spaces / 1000 GSF
Retail	none	3 spaces / 1000 GSF

Local jurisdictions should also promote shared parking and joint construction of new facilities when devising zoning provisions and master plans for station areas. The provisions set forth in Portland, Oregon's zoning ordinance and Montgomery County, Maryland's *Bethesda Central Business District Sector Plan* illustrate innovative means of encouraging shared parking.

8. WMATA and local jurisdictions should implement parking demand reduction strategies, including higher parking fees for all public and private facilities, transit vouchers, and car and bicycle sharing.

General reliance on automobiles should be reduced by means of providing better alternatives to driving. Although the federal government's $65-per-month employee transit pass program increased employee ridership by 11 percent between October 2000 and July 2001, much more potential exists for boosting employee ridership for both public- and private-sector workers. Additional programs and more aggressive promotion would foster transit usage, reduce vehicle miles traveled, and generate transit revenues.

Car-sharing and bicycle-sharing programs also reduce demand for parking. WMATA has taken positive steps to identify a car-sharing firm for a pilot program to provide cars at stations. In addition, the City of Alexandria and Arlington County are currently working with WMATA in order to implement a "SmartBike" program in which transit users can borrow bicycles located at Metrorail stations, commercial centers, tourist attractions, and office complexes. WMATA and jurisdictions should continue to support car sharing efforts, including assistance with parking shared vehicles, so that a sufficient supply of vehicles near stations and in walkable neighborhoods can facilitate car sharing as a substitute for ownership. WMATA and member jurisdictions should also expand bicycle-sharing programs as a mobility strategy coordinated with stations. These and other demand management strategies can make non-automobile travel more attractive, thereby reducing the need for additional parking.

Higher parking fees need to be coordinated with jurisdictions so that job centers and other driving destinations charge customers parking rates that discourage driving and encourage alternatives use of modes of access. Parking fees at Metrorail stations should also be raised. Revenues from parking fees should be used to enhance alterative modes of access to stations, and reduce costs of transit riders.

9. WMATA should convene a station access stakeholders task force that includes a cross section of interests in station access.

A task force representative of stakeholders would include to following: transit-oriented developers, pedestrian advocates, bicycle advocates, affordable housing organizations, transit advocates, small businesses, employers, organizations representing the interests of people with disabilities, civic associations (with high proportion of transit riders), architects/urban designers, environmental/smart growth advocates, organizations representing the interests of transit-dependent people. This broad diversity of transit rider interests will add significant understanding and fair representation of other interests to the current analysis being conducted by WMATA with only one outside group – the business association – the Federal City Council, which has suggested that constructing a 100,000 new parking spaces is the most important means of access to Metrorail stations.

I. CURRENT METRORAIL PARKING POLICIES

The Washington Metropolitan Area Transit Authority (WMATA) oversees the Washington, D.C., region's Metrobus and Metrorail systems. Metrorail, which began operation in 1976, is a heavy rail system currently comprised of 83 stations and 103 miles of track. The Metrorail system serves several jurisdictions, including the District of Columbia, Montgomery and Prince George's Counties in Maryland, Arlington and Fairfax Counties in Virginia, the Cities of Alexandria, Virginia, and Rockville, Maryland.

Because the presence of Metrorail stations enhances the accessibility of an area, it became evident to WMATA that substantial advantages could result from focusing more jobs, housing and services near stations (MWCOG). With this in mind, in 1976 WMATA formed a joint development division to encourage public/private partnerships that can capitalize on the valuable property surrounding stations and attract new transit users. Because some Metro stations are located underground with little or no station parking, WMATA's joint development efforts have helped to enhance urban character in several areas throughout the Washington metropolitan region. In particular, thriving residential and commercial transit-oriented districts surround the Ballston station in Arlington County and the Bethesda station in Montgomery County. Furthermore, some jurisdictions in the region, including Arlington County, Virginia, and Montgomery County, Maryland, have channeled a significant share of growth around Metrorail stations.

However, numerous shortcomings in the policies of WMATA and local jurisdictions prevent transit-oriented development from reaching its full potential in many station areas (lands located within a one-quarter to one-half mile radius of a station) (Chesapeake Bay Foundation). Several of these are attributable to WMATA's de facto parking policy.

As of July 2001, WMATA maintained 45,672 long-term parking spaces and 2,359 short-term spaces at 41 Metro stations (see Appendix A). Spaces located in surface lots comprise 56 percent of the agency's parking facilities; the other 44 percent of WMATA's parking spaces are located in structured facilities (Habegger). The agency's surface lots consume about 187 acres of land. Today, the development cost for a single parking space in a garage is, at minimum, $13,000 (Cardwell). The annual costs to the agency of a space in a WMATA-operated garage are estimated at about $400 (Habegger). WMATA funds these parking facilities through three different sources:

- the initial funds allocated by the Rail Construction Program;
- parking fees collected from users;
- some proceeds from the Joint Development Program (Habegger).

The large number of long-term spaces demonstrates the system's orientation toward automobile commuters. Although WMATA has never adopted a formal policy framework for park-and-ride facilities, the organization follows a few general guidelines in determining the amount of parking provided at a station. The desires of local jurisdictions were not always fully represented in determining the amount of parking to provide at stations when Metrorail began operation. For instance, during the system's initial stages of planning,

District of Columbia officials opposed the construction of park-and-ride lots at Metro stations, but many stations have parking. D.C. officials intended to encourage walking and bus ridership as the primary means of access to stations. Many suburban officials, however, supported the construction of large park-and-ride facilities at Metro stations. Some jurisdictions, including Montgomery County, have constructed county-operated parking facilities at stations.

WMATA has never utilized a precise model for determining the appropriate size of its parking facilities. Rather, the organization broadly defines the service area of a station, incorporating both the residential and employment sectors. WMATA furnishes more spaces at terminal stations and those located near the end of Metro lines, under the assumption that they serve a more automobile-oriented population. Some terminal stations and those near the end of the line are considered to have service areas of huge proportions – as much as 100 miles. When determining how much to expand parking facilities, WMATA looks at both short-term and long-term demand at each station. Short-term demand for parking is determined by the time of day a parking facility reaches capacity, while long-term demand is determined using growth patterns, projected land use changes, and long-range vehicular transportation plans (Habegger).

WMATA contends that a significant proportion of its customers require automobile parking at stations (McNeal). WMATA contends that these riders can only be served by parking at stations due to the great distances they are traveling and due to the difficulty in serving these customers by other means because they reside too far away or at too low a density to be served by transit links to the station (Cardwell). WMATA believes that it is part of its function is to intercept long distance drivers who would otherwise drive the additional few miles directly to job centers. As WMATA does not have direct influence over local jurisdictions' land use policies, or investments in transportation facilities, it anticipates automobile parking demand that relies on favorable automobile travel conditions to stations. It does not generally assume alternative means of better access such as bicycle or pedestrian access due to either increased development proximate to the station, or improved pedestrian/bicycle facilities and environment. Thus its access strategies, while officially recognizing the importance of transit-oriented development, pedestrian, bicycle, and transit access to stations, falls back on building more automobile parking since this access mode is most strongly and consistently facilitated by local government policies.

WMATA has set a goal to double Metrorail and Metrobus ridership by 2025 in order to enhance mobility, improve air quality, and support projected regional growth in population and employment. An increase in ridership also leads to a reduction in operating costs per passenger. Thus, WMATA has adopted a goal of funding $2.5 billion System Access Program (SAP) in order to maximize accessibility to its system. Increasing the parking supply at stations — possibly by tens of thousands of spaces over the next ten years — is part of the access plan. While WMATA has declared that it is "supportive of maximizing opportunities for pedestrian and bicycle access" and "maximizing transit oriented development," its close collaboration with the Federal City Council, which proposed 100,000 new parking spaces, casts uncertainty on the emergence of pedestrian/bicycle access and TOD as chief policy and investment priority.

Currently, thousands of new parking spaces are being constructed and planned. WMATA recently budgeted $75 million to add hundreds of new parking spaces at suburban stations during fiscal year 2002: 1,300 at Grosvenor, 1,000 at Franconia-Springfield, and 600 at either Dunn Loring or West Falls Church. Furthermore, Montgomery County is adding 1,530 spaces at Shady Grove by constructing a county-operated garage. The 1999 Transit System Expansion Plan recommended adding 23,000 new spaces to the system by 2025. Recent analyses identify a need for 33,000 spaces by 2025 (WMATA, Washington Regional Mobility Initiative Update).

Increasing access to Metrorail stations is essential not only to achieving WMATA's goal of doubling ridership by 2025, but also to sustaining an efficient, inter-modal transportation network that serves the region's growing residential and employment sectors. However, an automobile parking-based access strategy is extremely expensive when compared with other strategies, and ultimately constrains the potential for ridership growth at low levels and precludes the opportunity of creating vibrant, walkable, mixed-use station area communities. In addition, the short motor vehicle trip associated with park-and-ride access generates a baseline amount of pollution that negates much of the air quality benefit of transit use. The emissions resulting from short one- to two-mile automobile trips are nearly as great as the emissions from typical five- to ten-mile automobile commuter trips due to the large amount of emissions caused by simply turning an engine on and off (known as "cold start" and "hot soak"). One study showed that for a seven-mile trip, 90 percent of the emissions occur within the first mile of the trip (USDOT).

Surrounding a station with lots and garages for parked vehicles neglects the region's best opportunity to create land use patterns that enable more activities to be located in convenient, walkable proximity to one another. This causes the underutilization of land with low density, automobile-dependent uses that could otherwise have much higher values. Vast parking facilities and high capacity access roads discourage or preclude alternatives to driving because distances are great and the street environment is made for cars, not people. Thus, ridership growth is limited because a station area is dependent on how much land or expensive structures can be devoted to parked vehicles within walking distance of the station. Transit users have little choice but to drive to and from the station.

Because the presence of expansive commuter parking facilities at stations presents several barriers to achieving more efficient land use and increased ridership, the promotion of non-automobile-originated trips should be undertaken as a priority strategy and policy objective for station area planning and access planning. Under current policies, WMATA and the jurisdictions it serves are wasting Metrorail's potential to create vibrant, walkable, mixed-use centers, as well as increased off-peak and reverse commute system usage, by promoting massive park-and-ride lots and wide roads that are inhospitable to pedestrian and bicycle connections to surrounding communities. Several shortcomings in current parking policies inhibit the creation of transit-supportive communities.

1. Limited Ridership Growth

The presence of large surface parking lots at Metrorail stations impedes their accessibility by pedestrians and bicyclists. This limits ultimate ridership potential and often results in

minimal TOD investment. One study found that residential use of transit declines by 0.65 percent by every 100 feet in distance from a Metrorail station (Zykofsky). Thus, placing expansive parking facilities adjacent to stations separates the station from surrounding activities, decreasing the likelihood of a transit user walking to a nearby shop, office, or residence.

While ridership of a specific station is determined by multiple factors, comparisons of stations exhibiting positive and negative characteristics are instructive for assessing potential improvements for station access. Several stations in the Washington metropolitan region, including Prince George's Plaza and West Hyattsville in Prince George's County, are surrounded by a variety of office, residential, and retail land uses. However, because these stations maintain an automobile orientation with extensive surface parking, access by other modes of transportation is constrained. The poor pedestrian access to these sites is likely to be a significant factor in lower levels of ridership. Other neighborhood stations in the region, such as Brookland/CUA (Catholic University of America) and Takoma in the District of Columbia, have only small, short-term parking facilities and allow for easier pedestrian access. A variety of commercial and residential activities are accessible to pedestrians and bicyclists within 1,000 feet of station portals (Table 1). Ridership at these stations is significantly higher than at Prince George's Plaza and West Hyattsville.

Table 1: Approximate Distances via Sidewalk from Station Portals to Selected Land Uses

Station	Distance (feet) to Nearest Retail Establishment	Distance (feet) to Nearest Residence
Brookland	700	650
Suitland	900	1,100
Takoma	300	300
West Hyattsville	1,000	1,400

The neighborhood surrounding the Brookland/CUA station in the District of Columbia features many elements of a transit-supportive community. Moderate-density housing and neighborhood commercial establishments are located close to station entrances. The campus of Catholic University is located just to the west of the station. WMATA maintains 27 short-term parking spaces adjacent to the station and no long-term commuter parking facilities (WMATA, "Parking at Metro Stations"). Despite several adjacent empty lots and surface parking nearby, the station is situated close to streets and sidewalks in the neighborhood, providing access for pedestrians and bicyclists and connecting it to surrounding communities.

The neighborhood surrounding the Takoma station in the District of Columbia on the border with Maryland also provides many of the key elements of a transit-supportive community. Moderate-density single-family, multi-family dwellings, neighborhood commercial, office and institutional uses exist in the area. Several vacant buildings and lots and parking lots also exist. Despite the negative impact these empty spaces have on the pedestrian approaches to the station, their small scale mitigates their effect. WMATA

maintains a surface parking lot at the station, which contains 146 short-term parking spaces and no long-term spaces (WMATA, "Parking at Metro Stations"). Like Brookland, the station is situated close to streets and sidewalks in the neighborhood, providing easy access to pedestrians and bicyclists. The short-term surface parking facilities and wide bus bays at both Brookland and Takoma appear to present relatively minor barriers to pedestrian and bicycle access.

Despite the presence of many good pedestrian links at Brookland and Takoma, many station areas in the region do not offer such an environment. At stations that are surrounded by little development or lower density development, WMATA often constructs surface parking facilities in station areas, reinforcing a poor pedestrian environment and lower density, automobile-oriented land use patterns.

The Prince George's Plaza station in Prince George's County opened in late 1993. A number of large commercial and residential facilities exist within a one-half-mile radius of the station. Most prominently, the Prince George's Plaza Shopping Center, a 900,000 square foot regional mall, lies directly across Route 410, a six lane arterial, from the station. The Prince George's Metro Center, a 1,400,000 square foot office complex, is also located diagonally across an intersection from the station. About 3,500 people were employed at the complex in July 2001 (Taylor). As of July 2001, 198,275 square feet of office space in this complex was vacant (Prince George's Metro Center). Several commercial and light industrial establishments are located to the west of the station along Route 410 and several churches, a public library, and a neighborhood shopping center are located to the east. A neighborhood of single-family detached homes borders the WMATA property to the south and an cluster of apartment buildings lies to the north of the regional shopping mall (WMATA, *Joint Development Solicitation*). In 1998, an estimated 9,445 people resided within a one-half-mile radius of the station (Huang).

Although a variety of commercial and residential land uses exists near the station, and the county has adopted transit-supportive zoning, several barriers have kept the Prince George's Plaza station area from becoming the hub of a transit-oriented community. The station has an automobile commuter orientation with expansive park-and-ride lots. Of the 1,124 parking spaces WMATA operates at the station, 1,068 are long-term spaces (WMATA, "Parking at Metro Stations"). In addition, the regional shopping mall across the major arterial fronting the station provides 3,669 surface parking spaces and the adjacent office complex offers 20 acres of surface parking containing 3,346 spaces, further encouraging automobile travel and discouraging walking and bicycling in the area (Table 2) (WMATA, *Joint Development Solicitation*). The WMATA-operated parking garage at the station is located directly above the station platform. Because the station lies in the middle of a 24-acre parcel of land, it remains isolated from surrounding stores, offices, and homes (Huang). The width of the major arterial Route 410 (East-West Highway) and the speed of traffic create an unpleasant environment for both pedestrians and bicyclists, limiting access to the station (Huang). In addition, the station is deeply set back from public rights-of-way, making it difficult to gain access by non-vehicular modes of transportation. Although a pedestrian bridge exists between the station and the mall, pedestrian access continues to be constrained, as pedestrians must traverse large parking lots and walk long distances between destinations.

Current parking patterns at Prince George's Plaza Metrorail station hinders transit-oriented development and limits the station's service to existing homes, stores and offices in the area.

Recent plans and proposals may change Prince George's Plaza Metro station's automobile-oriented character and low ridership. At the Prince George's Plaza Metro Center office buildings, plans are moving forward to construct additional office buildings and redesign the streetscape between the surface parking lot and the buildings to become a pedestrian-oriented boulevard with retail shopping on the ground floor. Also, WMATA has awarded exclusive rights for the Metro station site to a developer to add 168,000 square feet of retail facing East-West Highway, a 300,000 square foot office building, 250 rental housing units and a public plaza at the station entrance. This proposal would add retail and commuter parking in an additional parking garage, but will likely improve the pedestrian environment by lining Route 410 and Belcrest Road with retail, office, and residential development. The station area and related development would remain separated from the residential neighborhood to the south, except for the existing pedestrian path.

Table 2: Parking Facilities Operated by WMATA at Selected Metrorail Stations, March 2001

Station	Number of All-Day Spaces	Cost per Day	Number of Short-Term Spaces	Average Weekday Occupancy
Brookland	—	—	27	—
Prince George's Plaza	1,068	$2.00	56	95%
Suitland	1,890	$1.00	175	86%
Takoma	—	—	146	—
West Hyattsville	453	$2.00	41	52%

Sources: WMATA, "Parking at Metro Stations;" WMATA, "Report on Park & Ride Facilities."

The West Hyattsville Station in Prince George's County, which opened in 1992, is situated primarily among suburban office, retail, and light industrial land uses. Apartment buildings exist north of the station and a neighborhood of single-family detached homes lie to the east (WMATA, *Joint Development Solicitation*). In 1998, an estimated 7,383 people resided within a one-half-mile radius of the station (Huang).

Like Prince George's Plaza, the West Hyattsville station maintains a car-commuter orientation. Of the 494 surface parking spaces WMATA maintains at the station, 453 are long-term spaces (WMATA, "Parking at Metro Stations"). The area surrounding the station has experienced little development or changes in land use since its opening. Suburban strip commercial development dominates the immediate station area. Similar to Prince George's Plaza, thoroughfares, vacant lots, and large parking lots surround the station, despite the presence of commercial and residential land uses nearby, and a pedestrian/bicycle trail. A lack of an extensive network of sidewalks also hinders access to the station. From many approaches, pedestrians must travel indirect routes that lengthen their walk to the station. Because it lies on a 26-acre parcel of land and is surrounded by a fence, the station remains isolated from surrounding development. Prince George's County adopted a Transit District Development Plan (TDDP) for the station area in 1992 and updated it in 1998 in order to stimulate transit-oriented development in the area. The TDDP restricts parking to existing levels and imposes fees on each parking added to the existing maximum. After years of

little development around the station, and modest ridership levels, encouraging signs for significant TOD have emerged. The National Town Builders Association, a national new urbanist developers trade group, has proposed a $300-400 million "new town" at the West Hyattsville station and adjacent properties. Using new urbanist design principles, this project would mix land uses and emphasize pedestrian environment and access to the transit station. The development proposal is for 60 acres of land and will construct 1000 housing units, 500,000 square feet of office space, 200,000 square feet of retail, 30,000 square feet community commons, 3,000 structured parking spaces and a 150-room hotel (NTBA).

The Suitland station in Prince George's County, which opened in January 2001, maintains a car-commuter orientation, despite the presence of a mixture of land uses within close proximity. The Suitland Federal Center, Smithsonian Support Center, and Paul E. Garber Facility, employ 10,000 federal employees, and are located just north of the station. However, access is limited due to the presence of a high fence and a WMATA parking garage between the government complex and the station. In May 2001, an average of 3,737 passengers boarded during the morning peak hours and an average of only 500 boarded during the afternoon peak hours. This indicates that very few employees of the office complex utilized Metrorail to commute to and from work. Furthermore, the parking garage is situated in a location that will impede joint development projects on the site unless it is removed. Of the 2,065 parking spaces WMATA maintains at the station, 1,890 are long-term spaces. Like Prince George's Plaza and West Hyattsville, the car commuter orientation of the Suitland station presents significant obstacles to becoming a transit-supportive community.

Table 3: Average Weekday Passenger Boardings at Selected Metrorail Stations, May 2001

Station	A.M. Peak	A.M. Off-Peak	P.M. Peak	P.M. Off-Peak	Total	% of Ridership In Peak Hours
Dupont Circle	4,145	5,240	8,928	4,310	22,625	58%
Friendship Heights	3,241	2,450	2,378	1,123	9,195	61%
Brookland	2,395	1,744	1,671	534	6,345	64%
Ballston	4,679	2,489	3,130	958	11,257	69%
Takoma	3,264	1,509	918	339	6,031	69%
Suitland	3,737	772	500	171	5,182	82%
Vienna	8,559	1,781	959	307	11,607	82%
Shady Grove	7,843	1,467	991	332	10,635	83%
Branch Avenue	4,122	464	191	81	4,860	89%

Source: WMATA, "Average Weekday Ridership Report for the Period of 05/01/2001 to 05/31/2001."

While ridership is influenced by many factors, by and large, stations with a pedestrian orientation and little surface parking experience higher and more evenly distributed time of day ridership (see Appendix A and B). This is likely attributable to a larger number of homes, jobs, and shops accessible from the station. In May 2001, an average of 6,345 passengers boarded at Brookland each weekday and an average of 6,031 boarded at Takoma (see Table 3). An average of just 3,150 passengers boarded at West Hyattsville and 3,889 at

Prince George's Plaza (WMATA, "Average Weekday Ridership Report for the Period of 05/01/2001 to 05/31/2001"). Although commercial and residential activities exist within close proximity to these stations, their automobile orientation inhibits access. TOD researcher Robert Cervero, tested what he calls the "3Ds – density, diversity, and design" core dimensions of pedestrian access, and provided evidence that these factors significantly influence pedestrian-originated rail transit riders. In analyzing the land use factors for trips to San Francisco Bay Area Rapid Transit (BART) and Metrorail stations in Montgomery County, he found that riders accessing rail by foot rather than a motorized mode were strongly effected by the proximity of the rider to the station (a correlate of density), the mixed use environments (diversity), and urban design. Egress trips from stations were longest where the streets were narrow, sidewalks continuous and complete, forming an interconnected network, with a high density of intersections – opportunities to cross the street (Cervero, "Walk-and-Ride Factors Influencing Pedestrian Access to Transit").

Stations that are primarily surrounded by large commuter parking facilities also experience less consistency in the number of passengers boarding throughout the day. For instance, at West Hyattsville, an average of 1,936 passengers boarded during the peak morning hours, while an average of only 697 passengers boarded during the off-peak morning hours in May 2001. Stations near the end of line, which tend to provide the most parking and greatest separation between land uses, have even greater disparities between peak and off peak ridership. While the Vienna station, which offers the most WMATA parking, experiences high ridership (11,607 daily average), 82% of this occurs during peak AM and PM hours, with a ratio of 2.2 riders to one long-term parking space. In contrast, Dupont Circle, which provides no parking and offers one of the most diverse and concentrated mixes of employment, housing, and retail, experiences twice the ridership of Vienna, has a daily average ridership of over 22,000 (5th highest), experiencing 58% of that during peak hours (see Table 3).

Because of inconsistent boarding patterns throughout the day at car commuter-oriented stations, trains become extremely congested for a few hours of the day and remain nearly empty at other times. Maintaining large commuter parking facilities at stations perpetuates transit usage exclusively during the morning and afternoon rush hours and underutilization of facilities during off-peak hours. Because a greater number of people can access the station by various modes of transportation, people will utilize rail transit for purposes other than commuting to work.

Constructing additional park-and-ride facilities may encourage more solo drivers and boost transit ridership in the short-term at a high cost of at minimum $13,000 per garage space. In the long term, however, ridership growth will be constrained to a significant degree by limits to the supply of land and funds that can be devoted to automobile storage. Due to high demand for commuter parking under WMATA's current pricing system, park-and-ride facilities tend to reach capacity shortly after they are constructed. For example, a 1,535-space parking garage at the Vienna station in Fairfax County reached capacity each day in March 2001 – only two months after it opened. Over half of WMATA's park-and-ride facilities reached full capacity nearly every day in March 2001 (WMATA, "Report on Park & Ride Facilities"). Many parking facilities, including the 5,178 spaces at Vienna, fill up earlier than eight o'clock every morning (Smith). Devoting large amounts of funds and land, and

forgoing pedestrian-oriented development opportunities in order to meet the demand for commuter parking constrains long-term access and ridership potential when compared with alternative access strategies (such as enhanced pedestrian/bicycle access) and land uses (such as TOD).

2. Inadequate Bicycle Parking Facilities

Inadequacies in the types of bicycle parking facilities provided at Metrorail stations also limit the potential demand for bicycle access to stations. On average, WMATA believes that bicyclists are willing to travel about two miles to access stations (Vogel). A 1988 study found that half of all park-and-ride rail users in the Chicago area lived less than two miles from the closest rail station with available automobile parking. Another Chicago area study indicated that many rail users who drive to stations would rather use a bicycle for access if proper bicycle facilities were provided (USDOT). WMATA has not conducted assessments of the distance automobile commuters drive to park at Metrorail stations, nor has it analyzed the potential to switch some drivers to bicycle riders.[2] Although WMATA maintains racks that can accommodate 1,600 bicycles at 60 stations, many are in disrepair or difficult to use, and are located outside of station portals, where bicycles are chronically subjected to vandalism and theft. WMATA does not utilize video surveillance to provide a measure of protection to parked bicycles. Although bicycle lockers are provided at many stations allowing storage of over 1,000 bicycles, WMATA provides little signage indicating how transit users can rent a bicycle locker or that they even exist. Currently, these lockers rent for $70 per year, and cannot be rented on a daily basis. While adequate bicycle routes to stations are also a major impediment, adequacy of facilities, and their ease of use and security for bicycle storage at stations continue to discourage potential cyclists.

3. Unnecessary Parking Replacement in Joint Development Projects

WMATA's joint development program was a pioneering initiative by a United States transit agency. Joint development, or selling or leasing WMATA land or access to transit facilities, has replaced many underutilized WMATA lands with high value uses. While WMATA's joint development efforts have many successes, many opportunities are missed by current approaches by the transit agency (Chesapeake Bay Foundation). WMATA requires that "WMATA facilities displaced by development must be replaced onsite" (WMATA, *Joint Development Solicitation*). Thus, if a joint development effort involves construction on parcels containing WMATA-operated parking facilities, developers must replace the lost spaces at a 1:1 ratio. Such a requirement allocates valuable land for arbitrary amounts of commuter parking and can present a barrier to optimal TOD investment. This requirement is based on Federal Transit Administration rules. Changing commuter parking requirements for federally-funded stations would require WMATA to propose special federal permission, and in the long-term, legislative change.

A substantial body of literature shows significant net increases in property values due to one-half mile or less accessibility to rail transit (Diaz), thus surrounding stations with surface

[2] The median distance is believed to be "well over 2 miles" (Harbegger), but WMATA has not conducted any definitive studies on the potential to substitute automobile parking with bicycle facilities.

parking tends to yield an economically inefficient use of land. While more up-to-date studies are available for other systems, an older study of land values for the Metrorail system demonstrated strong value increases associated with properties within a short walking distance of station entrances. The 1981 study conducted by House of Representatives Committee on Banking, Finance and Urban Affairs (see Rybeck) of Metrorail station's influence on land values found an increase of $2-per-square-foot within one block of a station entrance and $1 per square foot for "secondary" blocks between the first and second block from an entrance. Property values from three or more blocks away from the stations were disregarded. A "Metro premium" comparing two comparable townhouses in Arlington, Virginia, was put at $12,300 (in 1981 dollars). Based on this survey of land values around sixteen Metrorail stations, showing a $2 billion increase in value to Metro-accessible property, the study conservatively estimated that the Metrorail system of the then 41 functioning stations (of the total planned 86) had increased nearby property values by over $3.5 billion. Using the same methodology for extrapolating property values for one and two block access points to Metro station entrances, the original researcher of the 1981 study estimated that as of March 2001, between $10 and $15 billion in new land values have been generated by the completed 103 mile, 86 station system, exceeding its capital cost of $9.5 billion (Riley). This study essentially measured land values generated by pedestrian access to Metro stations. If more stations provided high quality pedestrian environments (including increased level of activity within walking distance), value added by access to the system would be much greater.

A 1999 study in the San Francisco Bay Area showed that apartments near BART stations were found to typically rent for 15-25% more than apartments more distant from BART (Sedway Group). In Santa Clara County, California, after controlling for other factors, properties within a half mile of light rail stations were found to realize 15% more in rent than those farther away during the study period, and the researcher predicted that further increases would be gained by properties in the future due to their proximity to rail transit (Weinberger). In Dallas, a 1999 study documented values of properties adjoining DART light rail stations growing by 25 percent more than similar properties not served by the rail system. (Weinstein).

Because studies consistently show that property values are only affected by rail transit access within one-half mile of station entrances (essentially the walking distance to a station), pedestrian accessibility is demonstrated to be a key determinant for increasing values (Diaz). Increasing pedestrian access to stations through increased density of streets and pedestrian paths, improving safety, lighting, and other pedestrian amenities, and providing additional station entrances to allow more direct access are recommended as strategies for increased property values (Diaz). Such pedestrian access improvements for a one-half mile radius area are likely to be more cost effective for increasing ridership and strengthening a jurisdiction's property values and tax revenues than the $13,000 per space basic cost of a garage parking space.

One to one replacement ratio requires developers to spend a considerable amount of money on building parking structures that lower development costs or be used for other attributes of their developments. Because the presence of transit-oriented development in a station area reduces per capita automobile travel and demand for automobile parking, it is

unnecessary to replace all parking spaces displaced by joint development (Litman, "Land Use Impacts on Transportation"). The presence of residential and commercial development near a Metro station generates greater ridership among people who gain access to the station by other means than driving, diminishing the need for parking in that area. According to the Victoria Transport Policy Institute, the presence of commercial, mixed-use, or residential development around transit stations significantly reduces per capita vehicle trip generation. This reduction is estimated at between 15 and 20 percent when compared with conventional development that lacks such features (Litman, "Land Use Impacts on Transportation").

Table 4: Vehicle Travel Impacts of Land Use Design Features

Design Feature	Reduced Vehicle Travel
Commercial development around transit centers	15%
Residential development around transit centers	15%
Commercial mixed-use development around transit centers	20%

Source: Litman, "Land Use Impacts on Transportation."

4. Unaccommodating Provisions in Local Zoning Ordinances

Local land use policies frequently deter mixed use development at densities that make walking convenient. Considerable development potential near Metrorail stations is forgone when zoning ordinances also require developers to provide a high minimum number of off-street parking spaces for various types of development. Minimum parking requirements, which tend to have a weak empirical basis, often require a substantial oversupply of parking spaces and violate a basic principle of economic efficiency by forcing consumers to pay for a good regardless of whether or not they want it. Such requirements tend to inflate demand for parking and consume valuable land that could be utilized for transit-oriented development. Most jurisdictions in the Washington metropolitan region permit some reduction in the required number of parking spaces if certain development projects are located near a Metrorail station. The reductions, are often insignificant, compared to the innovative practices of parking standards in other parts of the country. Only Prince George's has set a parking maximum for some of its station area zones and charges fees for each space provided above limits.

Although the zoning ordinances of all jurisdictions in the Washington metropolitan region address off-street parking, the amount of parking required for different types of development in the area varies by jurisdiction (see Tables 5, 6, and 7). Notably, the District of Columbia requires no parking spaces for very small retail development – below 300 square feet – anywhere in the city. Prince George's County has no parking minimum in the Prince George's Plaza, West Hyattsville, and College Park Transit District Overlay Zones, and Arlington County does not require new development to provide parking for certain commercial uses within 1,000 feet of a Metrorail station (M-NCPPC, Approved Transit District Development Plan for the Prince George's Plaza Transit District Overlay Zone, Arlington County Office of Zoning). Such policies encourage the development of transit-supportive communities, since excessive parking facilities will limit accessibility between transit stations and businesses. Although parking facilities exist in commercial districts near Metrorail stations in Arlington County, much of the parking is in garages and publicly

operated. This allows for shared parking opportunities and decreases the amount of land devoted in general to parking and to commuter parking in particular. Fairfax and Montgomery Counties, do not allow for such significant reductions.

Fairfax County allows for a reduction in the required minimum parking ratio if a developer demonstrates that "the spaces proposed to be eliminated are unnecessary based on the projected reduction in parking demand resulting from the proximity of the transit station or mass transit facility" (Fairfax County Department of Construction and Land Use). To date, the county has only reviewed a small number of applications for parking reduction and all of them have been large-scale developments (Hayes). Presently, the county is developing a more specific parking standard for development located near transit stations in order to promote transit-supportive development.

Table 5: Parking Requirements Prescribed by Washington, D.C., Region Zoning Ordinances: Single-Family Dwellings

Jurisdiction	Minimum Number of Spaces per Unit	Reduction Near Metro Stations?	Maximum Number of Parking Spaces per Unit?
City of Alexandria	2.0	Yes; 1.0 in King Street Transit Parking District	No
Arlington County	1.0	No	No
District of Columbia	1.0	No	No
Fairfax County	2.0	Yes; may be reduced on a case-by-case basis	No
Montgomery County	2.0	No	No
Prince George's County	2.0	Yes; no minimum requirement in Transit District Overlay Zone	Yes; preferred ratio of 1.33 for one bedroom units and 1.66 for units with two or more bedrooms in Transit District Overlay Zone (TDOZ); 1.0 for one bedroom units and 1.33 for units with two or more bedrooms in Mixed Use Zone within TDOZ

Sources: City of Alexandria Office of Zoning; Arlington County Office of Zoning; D.C. Office of Zoning; Fairfax County Department of Construction and Land Use; M-NCPPC, *Montgomery County Zoning Ordinance*; M-NCPPC, *Prince George's County Zoning Ordinance*.

According to University of California at Los Angeles researcher Donald Shoup, minimum parking requirements are routinely determined by arbitrary methods: "planners count the cars parked at existing land uses, identify the highest number counted as peak demand (without consideration of price), and then require developers to supply at least that many parking spaces (without consideration of cost)" (Shoup, "The High Cost of Free Parking," 4). In order to set these limits, most planners either look at the requirements of neighboring communities or consult the Institute of Transportation Engineers' (ITE) publication *Parking Generation*, the only major source of data pertaining to parking demand.

Table 6: Parking Requirements Prescribed by Washington, D.C., Region Zoning Ordinances: Retail Space

Jurisdiction	Minimum Number of Spaces per 1,000 Square Feet of Floor Space	Reduction Near Metro Stations?	Maximum Number of Parking Spaces per 1,000 Square Feet of Floor Space?
City of Alexandria	Varies by location between 5.0 and 5.2	Yes; 1.89 in King Street Transit Parking District	No
Arlington County	4.0	Yes; no spaces required for certain commercial uses within 1,000 feet of a Metro station	No
District of Columbia	No minimum below 300 GSF (Gross Square Feet), 3.33 per 1,000 GSF above 300 GSF (1.0 per 300 GSF)	Yes; 2.5 within 800 feet of a Metro station	No
Fairfax County	5.0 for first 1,000 GSF; 6.0 for each additional 1,000 GSF	Yes; may be reduced on a case-by-case basis	No
Montgomery County	5.0	No	No
Prince George's County	6.66 up to 3,000 GSF; 5.0 for each additional 1,000 GSF	Yes; no minimum requirement in Transit District Overlay Zone	Yes; preferred ratio of 4.35 in Transit District Overlay Zone

Sources: City of Alexandria Office of Zoning; Arlington County Office of Zoning; D.C. Office of Zoning; Fairfax County Department of Construction and Land Use; M-NCPPC, *Montgomery County Zoning Ordinance*; M-NCPPC, *Prince George's County Zoning Ordinance*.

Table 7: Parking Requirements Prescribed by Washington, D.C., Region Zoning Ordinances: Office Space

Jurisdiction	Minimum Number of Spaces per 1,000 Square Feet of Floor Space	Reduction Near Metro Stations?	Maximum Number of Parking Spaces per 1,000 Square Feet of Floor Space?
City of Alexandria	Varies by location between 5.0 and 5.2	Yes; 1.89 in King Street Transit Parking District	No
Arlington County	4.0 on 1st floor; 2.8 on additional floors	Yes; 1.89 in Commercial Office Building, Hotel and Multi-Family Dwelling Districts	No
District of Columbia	1.66	Yes; 1.24 within 800 feet of a Metro station	No
Fairfax County	Varies by size between 2.6 and 3.6	Yes; may be reduced on a case-by-case basis	No
Montgomery County	Varies by location between 2.4 and 3.0 more than 1,600 feet from a Metro station	Yes; varies by location between 1.9 and 2.6 less than 800 feet from a Metro station; varies by location between 2.1 and 2.7 between 800 and 1,600 feet from a Metro station	No
Prince George's County	4.0 up to 2,000 GSF; 2.5 beyond 2,000 GSF	Yes; no minimum requirement in Transit District Overlay Zone	Yes; preferred ratio of 2.5 in Transit District Overlay Zone

Sources: City of Alexandria Office of Zoning; Arlington County Office of Zoning; D.C. Office of Zoning; Fairfax County Department of Construction and Land Use; M-NCPPC, *Montgomery County Zoning Ordinance*; M-NCPPC, *Prince George's County Zoning Ordinance*.

A vast majority of data contained in the ITE manual were derived from suburban locations with little transit ridership and ubiquitous free parking (Shoup, "The High Cost of Free Parking," 4). The ITE's peak occupancy rates are also based on inconsistent, highly scattered data. For example, the highest peak occupancy rate in the demand studies for "General Office Building" was seven times the lowest rate (Litman, "Pavement Busters Guide," 7). In addition, the manual gives no consideration to off-peak parking or the time of day at which the peak occurred. This prevents any opportunities for "shared parking," in which adjacent land uses share parking spaces if they experience peak parking occupancy at different times during the day. For instance, under a shared parking scheme, an office building and a movie theater located adjacent to one another could share parking. Because an office building generates parking demand during the day and a movie theater generates peak parking demand in the evening, it is unnecessary for each use to separately provide parking spaces for its peak parking occupancy time.

The ITE's rates are not location-specific and therefore neglect adjustments for pricing, for non-drivers, or for locations that are more accessible by transit, bicycling, and walking. For example, a land use located near a transit station will generate less parking demand than one several miles away. Residents in one pedestrian-friendly community walked, bicycled, or rode transit for 49 percent of work trips and 15 percent of their non-work trips, 18 and 11-percentage points more than residents of a comparable automobile-oriented community (see Table 8) (Litman, "Land Use Impacts on Transportation"). A study in Austin, Texas found that about two-thirds of walking trips to stores replaced automobile trips in a pedestrian-friendly community (Litman, "Land Use Impacts on Transportation"). Because many jurisdictions rely on data such as the ITE's parking generation rates, rather than more recent location-specific empirical studies, the parking minimums prescribed by many zoning ordinances are often excessive.

Table 8: Percentage of Pedestrian, Bicycle, and Transit Trips in Pedestrian-Friendly and Automobile-Oriented Communities

	Pedestrian-Friendly Community	Automobile-Oriented Community
Work Trips	49%	31%
Non-Work Trips	15%	4%

Source: Litman, "Land Use Impacts on Transportation."

Minimum parking limits that require a greater number of spaces than necessary can also be expensive. Providing minimum parking requirements is estimated to cost an average of $31 or more per square foot of development in the United States. This figure is 4.4 times larger than all other impact fees, including water, sewer, schools, and roads, combined (Litman, "Pavement Busters Guide," 7). Parking costs also affect the affordability of a housing unit. Minimum parking requirements often disallow households from saving money by avoiding the costs of car ownership, or only owning one car (SPUR).

5. Minimal Station Area Planning by WMATA and Jurisdictions

A lack of station area planning efforts further perpetuates poor access and the predominance of many station areas with wide thoroughfares and immense park-and-ride lots. Although

detailed master plans have stimulated the creation of successful transit-supportive communities at a number of locations in the Washington metropolitan area, many station areas lack such intensive land use and access planning efforts. Presently, WMATA does not allocate funds for planning outside of its own property and has an uneven history of coordinating its parking policy decisions with member jurisdictions.

Montgomery County's master plan for the Bethesda Central Business District (CBD) and station area contains several measures that address parking policies and non-vehicular access. These include:

- Limit the supply of employee parking, providing some parking for Metro riders, as part of a balanced transportation system.
- Provide an adequate supply of short-term parking for use by retail, restaurant, and small business customers.
- Provide joint use of selected parking sites with other public uses, such as housing and parks (M-NCCPC, *Approved and Adopted Bethesda Central Business District Sector Plan*).

In addition, the plan sets a goal of 37 percent for non-auto-driver travel during peak travel periods (MNCPPC, *Approved and Adopted Bethesda Central Business District Sector Plan*). It also addresses pedestrian and bicycle circulation in the area in order to ensure increased accessibility. It suggests various improvements to sidewalks, bikeways, and intersections in order to stimulate a hospitable environment for these modes. The current non-auto driver mode share is 27 percent (Montgomery County, *Draft 2001-2003 Annual Growth Plan Policy Element*).

Plans for Metrorail station areas often give inadequate attention to the full potential of effective pedestrian and bicycle access strategies. The *Access 2000* study prepared for the Maryland Department of Transportation attempted to perform an inventory of pedestrian and bicycle accessibility at all rail transit stations in the state. However, the study considered very few factors when conducting the inventory and performed only cursory analysis. Many questions about the accessibility of stations remain unanswered. For example, the inventory of the Shady Grove Metro station in Montgomery County simply stated that sidewalks are present along all routes within a 0.6-mile radius of the station and that all traffic signals offer at least partial pedestrian accommodation (Rummel, Klepper, and Kahl). The inventory neglected to assess the distances a person would have to walk between the station from various destinations throughout the study area. It is unknown how direct a route is provided for an individual to reach a destination or whether or not businesses, offices, and residences are located close enough to the station to make walking or bicycling to and from the station appealing or feasible. The mere existence of sidewalks does not necessarily indicate that pedestrian access to the station is sufficient. More analysis is necessary to determine the adequacy of pedestrian and bicycle connections to communities surrounding Metro stations.

II. MODEL PARKING POLICIES FOR STATION AREAS

A number of mass transit systems across the nation and the jurisdictions they serve maintain balanced parking policies that promote increased transit ridership and attractive, walkable transit-supportive communities through cost-effective means. Such innovative policies suggest a variety of successful practices for WMATA and jurisdictions in the Washington region.

1. Carefully Managed Parking at Stations

Various strategies that manage the amount of parking, particularly long-term commuter parking, at transit stations can foster the creation of transit-supportive communities. Careful parking management guidelines not only increase transit usage, but also promote the development of vibrant, walkable, mixed-use centers, where more trips are diverted from driving or transit to walking.

The Tri-County Metropolitan Transportation District of Oregon (Tri-Met) began operation of its Metropolitan Area Express (MAX) light rail system in 1986. The 33-mile system, which serves the City of Portland and several neighboring jurisdictions, continues to expand today. An additional 11.3 miles will open by 2004. Between 1990 and 1999, Tri-Met ridership, which includes MAX and a regional bus system, grew 51 percent. Ridership grew 24 percent faster than vehicle miles traveled and 59 percent faster than population growth (Tri-Met, "Tri-Met: MAX Light Rail System"). Some $2.4 billion worth of investment has occurred along the MAX line since the decision to construct the system.

The MAX system only offers a limited number of automobile parking spaces for commuters. Tri-Met maintains only three parking garages and 12 park-and-ride facilities at its 50 stations. Tri-Met and the Metropolitan Service District (an elected regional government body) utilized a demand model, based on the projected travelshed of each station and projected growth and land use changes, to determine the amount of parking at light rail stations. However, anticipating opportunities for shared parking and transit-oriented development, Tri-Met "purposely undersized" some of its park-and-ride facilities (Park). Furthermore, Tri-Met has implemented innovative shared parking strategies at many light rail stations. In its *Park & Ride Policy,* Tri-Met explicitly strives to identify low-cost strategies to provide parking supply, while limiting the amount of land devoted to parking facilities. Tri-Met policies include the following:

- Assign top priority to opportunities for shared use of existing parking lots in locations that serve this *Park & Ride Policy*, to contain costs and provide optimally efficient land use.
- Seek partnerships in which other land uses will share parking with Tri-Met.
- Seek partnerships for joint development and/or use of structured park-and-ride facilities (Tri-Met, *Park & Ride Policy*).

Although Tri-Met avoids annual operating costs in maintaining shared parking facilities, some landowners ask for financial compensation or special construction assistance. If a

landowner feels that compensation is necessary, Tri-Met prefers one-time capital construction or enhancements, such as installing landscaping and paving, rather than providing ongoing funding, such as maintenance.

Table 9: Maximum Cost per Space for Expanded or New Tri-Met Park & Ride Facilities, Year 2000 US$

	Expected Life of 5 Years or Less	*Expected Life of 5-10 Years*	*Expected Life of 10+ Years*
Shared Use or Joint Development			
Surface Lot			
One-time capital cost	$100	$150	$800
Ongoing annual cost	$60	$60	$100
Parking Structure			
One-time capital cost	$200	$350	$1,000
Ongoing annual cost	$100	$100	$150
Single Use			
Surface Lot			
One-time capital cost	do not pursue	do not pursue	$8,500*
Ongoing annual cost	do not pursue	do not pursue	$250
Parking Structure			
One-time capital cost	do not pursue	do not pursue	$11,000*
Ongoing annual cost	do not pursue	do not pursue	$350

***includes land acquisition costs (average $10 per square foot year 2000 US$)**
Source: Tri-Met, *Park & Ride Policy*

Tri-Met has implemented shared parking policies at many locations, operating 39 shared Park & Ride lots throughout the system. For instance, at the LaSalle Apartments at the Beaverton Creek Station, permitting overflow visitor parking in the Park & Ride lot allowed for the use of lower off-street parking ratios at the apartment complex. MAX users also utilize the parking lots of churches and movie theaters at many stations, with each group of users occupying the lots at different times. In addition, at the Hillsboro Parking Garage, MAX users share the facility with a regional justice center (City of Seattle, SAPT-SPO). This facility was developed jointly between Tri-Met and a local government. Such rigorous shared parking policies have helped to reduce the amount of land consumed by park-and-ride lots.

Tri-Met also manages the size of its parking facilities by not requiring developers to replace parking spaces displaced by joint development projects. A Park & Ride facility may be removed or built over if one or more of the following conditions apply:

- the facility's current capacity can be replaced at another location that offers access to comparable transit service and serves a similar travelshed, and movement of the facility serves some other long-term goal, such as reducing future operating costs or encouraging transit-oriented development
- market value of the land indicates that Park & Ride use is an economic underutilization – in this case, sale or ownership transfer of the land should be used to leverage some other benefit to the Tri-Met system

- the facility is replaced by new transit-oriented development of at least 30 units per acre (residential), at least 75 employees per acre (employment areas) and/or a development of Station Area, Town Center, or Regional Center density as defined by the Regional Framework Plan (Tri-Met, *Park & Ride Policy*).

These policies ensure that land that could be utilized for revenue-generating, pedestrian-friendly transit-oriented development is not consumed by oversized parking facilities.

2. Demand Management Strategies

Although managing the supply of parking is essential to the success of transit-supportive communities, a variety of demand reduction strategies, including pricing strategies, improved bus and shuttle service to stations, transit vouchers, parking cash-out programs, and car and bicycle sharing, further stimulate the development of convenient communities, where auto trips are reduced. The implementation of effective demand management strategies decreases reliance on the automobile as the chief mode to gain access to transit stations, as well as destinations in general, thereby reducing the amount of land needed for park-and-ride facilities and encouraging the predominance of walkable, transit-supportive communities.

Reduced Fees for Carpooling: Parking pricing strategies can manage the demand for parking at a particular location. The Victoria Transport Policy Institute suggests providing "discounted or free parking for rideshare (car and van pool) vehicles" (Litman, "Parking Solutions"). Tri-Met's *Park & Ride Policy* recommends the use of parking charges as a tool for allocating resources in an equitable manner. It suggests managing demand for parking at facilities where demand exceeds supply by "providing a higher charge for users who do not carpool" to the parking facility (Tri-Met, *Park & Ride Policy*). Charging single occupancy vehicles more encourages carpooling and can reduce demand for parking.

Bicycle Trip Substitution: Shifting some automobile trips to bicycle trips can also reduce demand for additional park-and-ride facilities. Unlike park-and-ride facilities, bicycle parking facilities can provide substantial quantities of bicycle storage on a small scale in residential areas without generating significant noise, increasing traffic congestion, or supplanting opportunities for transit-oriented development. Because there is often substantial overlap between automobile and bicycle service areas, unexploited potential exists for bicycle access to substitute for a portion of the automobile access to transit stations. Studies have documented that 40 percent or more of automobile access trips to transit are shorter than typical median bicycle access distances (USDOT). Both quality of access from trip origins and security of storage remain key deterrents to expanded bicycle access to transit. Providing sufficient bicycle parking facilities that prevent theft and vandalism, such as attended bike rooms and racks inside or at the entrances of stations, along with safe and direct routes to the station, can contribute greatly to fostering such a substitution. A 1988 study found that half of all park-and-ride rail users in the Chicago area lived less than two miles from the closest rail station with available parking. Another Chicago area study indicated that many rail users who drive to stations would rather use a bicycle for access if better bicycle facilities were provided (USDOT). Bay Area Rapid Transit's (BART) Berkeley station offers a good example of a secure bicycle storage facility. Owned by BART,

Bikestation Downtown Berkeley is a 500-square-foot steel cage located on the subterranean level of the Downtown Berkeley BART station. The facility has a high density of bicycle parking that can accommodate 77 bicycles within the cage. The Bikestation offers free valet bicycle parking during the day and overnight storage for a small fee (Bikestation Coalition). Funding for the station is provided by the Bay Area Air Quality Management District, BART, and City of Berkeley.

Through employer provided transit vouchers, parking demand at job sites can be further reduced. Studies across the nation demonstrate that commuter subsidy reform can cut the number of solo drivers by between 10 and 40 percent (ACAT). In October 2000, the federal government issued free $65-per-month transit passes to its employees in the Washington metropolitan region, causing 11 percent of those who were driving to work to switch to transit by July 2001. The use of vouchers also caused 12,500 additional motor vehicles to be taken off of regional roadways each workday morning (ACAT). In addition to the vouchers issued by the federal government, the State of Maryland offers of 50 percent corporate/non-profit tax credit for transit and van benefits. A 1995 survey of 239 employers in the San Francisco Bay Area that utilized vouchers issued by the Commuter Check Service Corporation found that 31 percent of the employees who received Commuter Checks increased their use of transit. The study estimated that 17 million vehicle miles were removed from Bay Area roads in 1994 and that 61 million tons of pollutants were avoided. An estimated $1.6 million in new transit revenues were generated in 1994 as a result of the program (CSCC).

Pay-per use car services such as car-sharing programs are a practical means to reducing private automobile ownership and the need for car storage and saving users money. Such shared-vehicle services have been active in Switzerland and Germany over the last ten years and have more recently been started up in Portland, Oregon, San Francisco, and other cities (SUPR). Short-term rental cars allow users who rely on transit, walking, and bicycling to make trips where transit service does not exist or suit the users' needs. Studies have shown that each shared vehicle replaces between four and eight privately owned automobiles (Zipcar). Two commercial car-sharing companies are initiating operations in the region, and WMATA has recently decided to award a contract to Flexcar to provide 22 Honda Civic 4-door sedans to be placed at or near 12 Metrorail stations throughout the region in 2001. In the subsequent year, more cars will be added to supplement the number of cars already in use. Cars will also be placed at or near nine additional stations for a total of 21 stations with the car sharing option available for customers. After the first 16 months of the program, 82 cars are proposed to be available and after 28 months, there would be 200 cars. According to WMATA, the 12 stations and neighborhood areas where the cars are set for initial placement are Anacostia, Ballston-MU, College Park, Columbia Heights, Court House, Grosvenor-Strathmore, King Street, L'Enfant Plaza, New Carrollton, Shady Grove, Vienna/Fairfax-GMU, and Woodley Park-Zoo/Adams Morgan.

Like car-sharing, bicycle-sharing programs also reduce demand for parking at stations and in general. The City of Alexandria and Arlington County are currently working with WMATA to implement a "SmartBike" program in which transit users can borrow bicycles located at Metrorail stations, commercial centers, tourist attractions, and office complexes.

3. Transit-Supportive Parking Standards in Local Zoning Ordinances

Although regional coordination is important for the creation of transit-supportive communities, local zoning and parking standards provide the fundamental policy framework for such communities. Changes to local zoning ordinances and the adoption of prudent parking standards by jurisdictions can promote the efficient use of land, foster transit usage, provide for pedestrian and bicycle access to transit stations, and promote walkable communities. Such provisions include low minimum and maximum off-street parking requirements near stations, shared parking, redevelopment of surface parking, and limited site coverage, especially frontage, devoted to parking.

Table 10: National Comparison of Parking Requirements Prescribed by Zoning Ordinances: Single-Family Dwellings

Jurisdiction	Minimum Number of Spaces per Unit	Reduction Near Transit Stations?	Maximum Number of Parking Spaces per Unit?
Arlington County, Virginia	1.0	No	No
City of Oakland, California	Varies by location between zero and 2.0	Yes; 0.5 in Transit-Oriented Development Zone	No
City of Portland, Oregon	1.0	Yes; 0.5 in Light Rail Transit Station Zone (within 500 feet of a light rail alignment)	Yes; 1.5 in Light Rail Transit Station Zone (within 500 feet of a light rail alignment)
City of Vancouver, Washington	1.0	Yes; 0.75 in Transit Overlay District	Yes; 1.25 in Transit Overlay District

Sources: Arlington County Office of Zoning; City of Oakland; City of Portland, *Code of the City of Portland, Oregon*; City of Vancouver.

Reducing or eliminating minimum parking requirements and instituting maximum parking limits are straightforward ways of managing the amount of parking in station areas. Such policies allow for a higher density mix of activities near stations and promote walkable communities, generating transit ridership. Reduced parking requirements also decrease the amount developers must spend on providing parking spaces, thereby decreasing housing and other building costs.

The City of Oakland, California, permits a significant reduction in the number of required parking spaces for development in station areas. The city's zoning ordinance requires as many as two parking spaces per single-family dwelling unit in some residential zones, but only 0.5 spaces per dwelling unit in the Transit-Oriented Development Zone. In addition to fostering transit usage and enhancing urban form, a reduction in the required amount of off-street parking helps to reduce high housing costs in the San Francisco Bay Area (Albert). In addition, no parking spaces are required for any commercial or office use in the Transit-Oriented Development Zone, further encouraging greater diversity of activities in those areas (City of Oakland). Because the zoning ordinance requires different amounts of parking in different regions of the city, it acknowledges the fact that parking demand varies by location. Such variation is attributable to an area's accessibility by other modes of transportation and different patterns of automobile ownership.

Table 11: National Comparison of Parking Requirements Prescribed by Zoning Ordinances: Retail Space

Jurisdiction	Minimum Number of Spaces per 1,000 Square Feet of Floor Space	Reduction Near Transit Stations?	Maximum Number of Parking Spaces per 1,000 Square Feet of Floor Space?
Arlington County, Virginia	4.0	Yes; no spaces required for certain commercial uses within 1,000 feet of a Metro station	No
City of Oakland, California	Varies by location between 0.0 and 5.0	Yes; no spaces required in Transit-Oriented Development Zone	No
City of Portland, Oregon	2.0	Yes; 1.0 in Light Rail Transit Station Zone (within 500 feet of a light rail alignment)	Yes; 5.1; 3.0 in Light Rail Transit Station Zone (within 500 feet of a light rail alignment)
City of Vancouver, Washington	2.86 up to 1,500 GSF; 5.0 beyond 1,500 GSF	Yes; 2.14 up to 1,500 GSF; 3.75 beyond 1,500 GSF	Yes; 3.58 up to 1,500 GSF; 6.25 beyond 1,500 GSF in Transit Overlay District

Sources: Arlington County Office of Zoning; City of Oakland; City of Portland, *Code of the City of Portland, Oregon*; City of Vancouver.

Table 12: National Comparison of Parking Requirements Prescribed by Zoning Ordinances: Office Space

Jurisdiction	Minimum Number of Spaces per 1,000 Square Feet of Floor Space	Reduction Near Transit Stations?	Maximum Number of Parking Spaces per 1,000 Square Feet of Floor Space?
Arlington County, Virginia	4.0 on 1st floor; 2.8 on additional floors	Yes; 1.89 in Commercial Office Building, Hotel and Multi-Family Dwelling Districts	No
City of Oakland, California	Varies by location between zero and 1.66	Yes; no spaces required in Transit-Oriented Development Zone	No
City of Portland, Oregon	2.0	Yes; 1.0 in Light Rail Transit Station Zone (within 500 feet of a light rail alignment)	Yes; 3.4; 3.0 in Light Rail Transit Station Zone (within 500 feet of a light rail alignment)
City of Vancouver, Washington	2.5	Yes; 1.88	Yes; 3.13 in Transit Overlay District

Sources: Arlington County Office of Zoning; City of Oakland; City of Portland, *Code of the City of Portland, Oregon*; City of Vancouver.

The City of Portland, Oregon's zoning ordinance prescribes several innovative parking standards that promote transit-oriented development. Although Portland's general parking limits are only slightly more stringent than those of most jurisdictions in the country, the city has strict guidelines for off-street parking within 500 feet of transit stations. In the Light Rail Transit Station Zone, the minimum number of required parking spaces is 50 percent of the number required elsewhere in the city. In addition, the number of off-street parking spaces may not exceed 150 percent of the minimum number of required spaces. Thus, in station areas, the city requires only 0.5 spaces per dwelling unit and does not permit more

than 1.5 spaces per dwelling unit. Likewise, the city requires a minimum of one space per 1,000 square feet of floor area for offices and a maximum of three spaces. In Neighborhood Commercial Zones, the city reduces parking ratios even further. No spaces are required and the city limits the amount of parking to 0.4 spaces per 1,000 square feet of floor space.

In Portland's Central City Plan District, "surface parking is prohibited on the portion of a site within 100 feet of a light rail alignment" (City of Portland, *Code of the City of Portland, Oregon*). This provision ensures that land near transit stations is not underutilized as surface parking facilities.

Other innovative provisions in Portland's zoning ordinance for shared parking, bicycle parking, transit-supportive plazas, and carpool parking include the following:

- Joint use of required parking spaces may occur where two or more uses on the same or separate sites are able to share the same parking spaces because their parking demands occur at different times.
- Bicycle parking may substitute for up to 25 percent of required parking. For every five non-required bicycle parking spaces that meet the short or long-term bicycle parking standards, the motor vehicle parking requirement is reduced by one space. Existing parking may be converted to take advantage of this provision.
- Sites where at least 20 [off-street] parking spaces are required, and where at least one street lot line abuts a transit street may substitute transit-supportive plazas for required parking, as follows… (a) Transit-supportive plazas may be substituted for up to 10 percent of the required parking spaces on the site; (b) The plaza must be adjacent to the transit street. If there is a bus stop along the site's frontage, the plaza must be adjacent to the bus stop; (c) The plaza must be at least 300 square feet in area and be shaped so that a 10 x 10 foot square will fit entirely in the plaza; and (d) The plaza must contain the following elements: (1) A plaza open to the public; (2) A bench or other sitting area; (3) A shelter or other weather protection. The shelter must cover at least 20 square feet; and (4) Landscaping. At least 10 percent, but not more than 25 percent of the transit-supportive plaza must be landscaped…
- For office, industrial, and institutional uses where there are more than 20 parking spaces on the site… five spaces or five percent of the spaces, whichever is less, must be reserved for carpool use before 9:00 AM on weekdays. More spaces may be reserved, but they are not required (City of Portland, Code of the City of Portland, Oregon).

Effective parking provisions also address the redevelopment of parking spaces near transit stations. Surface parking facilities at stations should be targeted for redevelopment as transit-supportive office, residential, and retail centers (APA). The City of Vancouver, Washington allows a reduction in the number of required parking spaces if a building is expanded in the Transit Overlay District:

> The minimum number of parking spaces required… may be reduced by 10 percent to allow any structure existing on January 1, 1995, to be expanded (City of Vancouver).

Effective parking regulations not only address the amount of parking provided but also its location. Because structured and underground parking facilities consume less space than surface lots, they are more suitable for transit-oriented communities. With this in mind, the City of Minneapolis, Minnesota, promotes pedestrian activity and transit usage by discouraging large amounts of surface parking in the downtown area. Because parking lots cover over 50 percent of downtown Minneapolis, the city enacted a zoning provision limiting the number of parking spaces that can adjoin a property to 20. Additional spaces must go underground or, if they are included in a parking garage, developers must provide ground-floor retail space (City of Minneapolis). Such a provision prevents the use of valuable land for surface parking facilities and encourages transit-supportive, walkable places. These parking policies from other parts of the country demonstrate that innovative measures can successfully manage parking demand and add value to surrounding communities.

III. RECOMMENDATIONS

1. *Create a comprehensive station access policy that gives priority to pedestrian, bicycle, transit, and shared ride modes and disallows commuter parking facilities from precluding or inhibiting the use of these modes.*
2. *Economize on WMATA lands and funds used for commuter parking facilities by replacing surface parking with transit-oriented development (with little or no commuter parking) or modest amounts of structured commuter parking.*
3. *WMATA and local jurisdictions should collaborate to comprehensively assess and plan to maximize pedestrian and bicycle access to stations.*
4. *WMATA and local jurisdictions should increase fixed and flexible route transit service to stations and improve its quality.*
5. *WMATA should provide convenient, secure, and sheltered bicycle facilities at stations, such as attended bike rooms and racks* ***inside*** *stations.*
6. *Joint development requirements that stipulate a 1:1 replacement ratio for automobile parking spaces should be reduced or eliminated.*
7. *Local governments should reduce minimum parking requirements within one-half or one-quarter mile of transit stations and promote shared parking agreements and reduction of parking in favor of non-motorized access enhancements.*
8. *WMATA and local jurisdictions should implement parking demand reduction strategies, including higher parking fees for all public and private facilities, transit vouchers, and car and bicycle sharing.*
9. *WMATA should convene a station access stakeholders task force that includes a cross section of interests in station access including: transit-oriented developers, pedestrian advocates, bicycle advocates, affordable housing organizations, transit advocates, small businesses, employers, organizations representing the interests of people with disabilities, civic associations (with high proportion of transit riders), architects/urban designers, environmental/smart growth advocates, organizations representing the interests of transit-dependent people. This broad diversity of transit rider interests will add significant understanding and fair representation of other interests to the current analysis being conducted by WMATA with only one outside group – the business association – the Federal City Council.*

IV. CONCLUSION

Increasing access to Metrorail stations is essential not only to achieving WMATA's goal of doubling ridership by 2025, but also to sustaining an efficient, inter-modal transportation network that serves the region's growing travel needs. Because stations surrounded by expansive commuter parking facilities present several barriers to achieving more efficient land use and increased ridership, the promotion of non-automobile-originated trips should be undertaken as a priority and explicit policy objective for station area planning and access planning. Under current policies, WMATA and the jurisdictions it serves are wasting their potential to create vibrant, walkable, mixed-use centers by promoting massive park-and-ride lots, multi-million dollar garages, and wide roads that provide poor pedestrian and bicycle connections to surrounding communities. In seeking to establish thousands of new parking spaces instead of transit-oriented development, the opportunity to boost both off-peak and reverse commute transit trips will be lost – maintaining rather than reducing some of the rail system's current inefficiencies. WMATA and its member jurisdictions should look to the parking policies and access strategies of several comparable transit systems across the nation in order to shift away from the limitation of Metrorail as an automobile storage and commuter rail system. The adoption of prudent parking policies that support a vibrant, walkable, mixed-use environment can foster greater access to jobs and housing, a safer environment for pedestrians and bicyclists, increased off-peak and reverse commute transit ridership, and an increased tax base near Metro stations. By adopting more balanced access strategies, Metrorail can be used to enhance a network of livable communities, rather than simply serve nine-to-five automobile-dependent commuters.

V. REFERENCES

Albert, Peter, Station Area Planning Manager, Bay Area Rapid Transit (BART). Personal Communication. (25 May 2001).

Alliance for Clean Air and Transportation (ACAT). "National Commuter Choice Marketing Initiative: Opportunity for D.C. Region to Cut Traffic and Air Pollution." (July 2001).

American Planning Association (APA). *Creating Transit-Supportive Land-Use Regulations.* (December 1996).

Arlington County, Virginia. "Working Paper of the Parking Task Force." (July 2000).

Arlington County, Virginia, Department of Public Works. "Arlington County, Virginia, Department of Public Works Home Page." Available from: http://www.co.arlington.va.us/dpw/

Arlington County, Virginia, Office of Zoning. *Arlington County Zoning Ordinance.* Available from: http://www.municode.com/

Bay Area Rapid Transit (BART). "Policy Framework for Station Area Planning." (10 May 2001).

Bikestation Coalition. "Bikestation." Available from: http://www.bikestation.com/

Calthorpe, Peter. *The Next American Metropolis: Ecology, Community, and the American Dream.* (New York: Princeton Architectural Press, 1993).

Cardwell, George. Associate Director, Office of Business Planning and Development, Washington Metropolitan Area Transit Authority (WMATA). Personal Communication. (28 September 2001)

CarSharing Portland, Inc. Available from: http://www.carsharing-pdx.com/

Cervero, Robert. *Transit Villages in the 21st Century.* (New York: McGraw-Hill, 1997).

Cervero, Robert. "Walk-and-Ride: Factors Influencing Pedestrian Access to Transit." *Journal of Public Transportation* 3, 4 (July 2001): 1-23.

Chesapeake Bay Foundation. *Building Healthier Neighborhoods with Metro: Improving Joint Development Opportunities.* Annapolis, Maryland (2001). Available from http://www.cbf.org.

Chesapeake Bay Foundation. *Land and the Chesapeake Bay.* Annapolis, Maryland. (2000). Available from: http://www.cbf.org.

City of Alexandria, Virginia. *City of Alexandria Zoning Ordinance.* Available from http://www.municode.com/

City of Minneapolis. *Code of Ordinances.* Available from: http://www.municode.com/

City of Oakland, California. *Oakland Municipal Code.* Available from: http://www.oaklandnet.com/government/ceda/

City of Orlando, Florida. *Growth Management Plan, Transportation Element.* (26 January 1998).

City of Portland, Oregon. *Code of the City of Portland, Oregon.* Available from: http://ordlink.com/codes/portland/index.htm

City of Portland, Oregon, Office of Transportation. *Elements of Vitality: Results of the Downtown Plan.* (2001).

City of Seattle Station Area Planning Team, Strategic Planning Office (SAPT-SPO). *Strategic Planning Office Transit-Oriented Development (TOD) Case Studies.* Available from: http://www.ci.seattle.wa.us/planning/Todstudy/CS000Toc.htm

City of Vancouver, Washington. *Vancouver Municipal Code.* Available from: http://www.ci.vancouver.wa.us/

Commuter Check Services Corporation. "Commuter Check: The Tax-Free Transit Benefit." Available from: http://www/commutercheck.com/

Diaz, Roderick B. "Impacts of Rail Transit on Property Values." Booz, Allen & Hamilton, Inc. McClean Virginia. (May 1999). Available from: http://www.apta.com/info/briefings/diaz.pdf

District of Columbia Office of Zoning, *District of Columbia Municipal Regulations.* "Title 11, Zoning." (December 1999).

Fairfax County, Virginia, Department of Construction and Land Use. *Zoning Ordinance.* Available from: http://www.co.fairfax.va.us/gov/ocp/

Gallagher, Debbie, Permit Review Supervisor, Prince George's County, Maryland. Personal Communication. (4 June 2001).

Habegger, Ronald, Manager of Parking Operations, Washington Metropolitan Area Transit Authority (WMATA). Personal Communication. (30 May 2001, 2 July 2001, 18 September 2001).

Hayes, Rich, Department of Public Works and Environmental Services, Fairfax County, Virginia. Personal Communication. (29 June 2001).

Huang, Fang-Yu. "Metro Station Developable Land Inventory." Available from: http://www.rci.rutgers.edu/~fyhuang/METRO/metro.html

Litman, Todd. "Land Use Impacts on Transportation." (July 2001). Available from: http://www.vtpi.org/tdm/tdm20.htm

Litman, Todd. "Parking Requirement Impacts on Housing Affordability." Victoria, B.C.: Victoria Transport Policy Institute (November 1999). Available from: http://www.vtpi.org/0_land.htm

Litman, Todd. "Parking Solutions: A Comprehensive Menu of Solutions to Parking Problems." (July 2001). Available from: http://www.vtpi.org/tdm/tdm72.htm

Litman, Todd. "Pavement Busters Guide: Why and How to Reduce the Amount of Land Paved for Roads and Parking Facilities." Victoria, B.C.: Victoria Transport Policy Institute (January 2000). Available from: http://www.vtpi.org/0_land.htm

Litman, Todd. Personal Communication. (12 July 2001).

Maryland – National Capital Park and Planning Commission (M-NCPPC). *Approved and Adopted Bethesda Central Business District Sector Plan.* (July 1994).

Maryland – National Capital Park and Planning Commission (M-NCPPC). *Approved Transit District Development Plan for the College Park-Riverdale Transit District Overlay Zone.* (October 1997).

Maryland – National Capital Park and Planning Commission (M-NCPPC). *Approved Transit District Development Plan for the Prince George's Plaza Transit District Overlay Zone.* (June 1998).

Maryland – National Capital Park and Planning Commission (M-NCPPC). *Approved Transit District Development Plan for the West Hyattsville Transit District Overlay Zone.* (June 1998).

Maryland – National Capital Park and Planning Commission (M-NCPPC). *Development District Standards for the Addison Road Metro Town Center.* (October 2000).

Maryland – National Capital Park and Planning Commission (M-NCPPC). *Montgomery County Zoning Ordinance.* Available from: http://www.amlegal.com/montgomery_county_md/

Maryland – National Capital Park and Planning Commission (M-NCPPC). *Prince George's County Zoning Ordinance.*

McNeal, Alvin, Manager, Property Planning and Development, Office of Property Development and Management. Remarks at the 10th Annual Affordable Housing Conference of Montgomery County. (12 February 2001).

Menotti, Val Joseph, Senior Planner, Bay Area Rapid Transit (BART). Personal Communication. (12 June 2001).

Metropolitan Washington Council of Governments. *Metrorail Station Area Planning: A Metrorail Before-and-After Study Report.* (August 1983).

Montgomery County, Maryland. *Annual Growth Plan Policy Element, Staff Draft 2001-2003.* Department of Park & Planning, The Maryland-National Capital Park & Planning Commission, Silver Spring Maryland. Available at: http://www.mc-mncppc.org/planning/development/agp-policy.htm.

Montgomery County, Maryland, Department of Public Works and Transportation. "Montgomery County, Maryland Parking District Services Home Page." Available from: http://www.dpwt.com/parking/

NTBA – National Town Builders Association. HyattsvilleNET. See: http://www.ntba.net/netcollaborative/

Park, Young, Capital Improvements Manager, Tri-County Metropolitan Transportation District of Oregon (Tri-Met). Personal Communication. (12 June 2001).

Prince George's Metro Center. "PGMC." Available from: http://www.pgmc.com/

Riley, Don. *Taken For A Ride.* Centre for Land Policy Studies. London, UK. (2001).

Royle, Nick. Director, Business Development, Zipcar, Washington, D.C. Personal Communication. (19 September 2001).

Rummel, Klepper, and Kahl. *Access 2000: Pedestrian and Bicycle Access to Rail Transit Stations in Maryland.* Mass Transit Administration, Maryland Department of Transportation, Baltimore Maryalnd. (June 1997).

Russell, Terry, Office of Zoning, Arlington County, Virginia. Personal Communication. (31 May 2001).

Rybeck, Walter. "Transit-Induced Land Values." *Economic and Development Commentary.* (October 1981): 23-27.

Sedway Group. "Regional Impact Study." Bay Area Rapid Transit District. July, 1999. Cited in APTA Information Briefing, Number 1 – March 2001, at http://apta.com/info/briefings_index.htm.

Shoup, Donald C. "Evaluating the Effects of Cashing Out Employer-Paid Parking: Eight Case Studies." *Transport Policy* 4. (October 1997): 201-216.

Shoup, Donald C. "The High Cost of Free Parking." *Journal of Planning Education and Research* 18 (Summer 1999): 307-320.

Shoup, Donald C. "The Trouble with Minimum Parking Requirements." *Transportation Research Part A* 33 (August 1999): 549-574.

Smith, Leef. "Parking Spaces to Ease Crunch at Metro Station." *Washington Post* (18 January 2001).

SPUR (San Francisco Planning and Urban Research Association). "Reducing Housing Costs by Rethinking Parking." Available at: http://www.spur.org/spurhsgpkg.html

Taylor, Tim, Manager, Prince George's Metro Center. Personal Communication. (11 July 2001).

Tri-County Metropolitan Transportation District of Oregon (Tri-Met). *At Work in the Field of Dreams: Light Rail and Smart Growth in Portland.* (1998).

Tri-County Metropolitan Transportation District of Oregon (Tri-Met). *Community Building Sourcebook.* (September 1999).

Tri-County Metropolitan Transportation District of Oregon (Tri-Met). *Park & Ride Policy.* (15 January 2001).

Tri-County Metropolitan Transportation District of Oregon (Tri-Met). *Planning and Design for Transit Handbook.* (January 1996).

Tri-County Metropolitan Transportation District of Oregon (Tri-Met). "Tri-Met: MAX Light Rail System." Available from: http://www.tri-met.org/maxpage.htm

U.S. Department of Transportation (USDOT), Federal Highway Administration. "Linking Bicycle/Pedestrian Facilities with Transit." (October 1992). Available from: http://www.bikefed.org/

Vogel, Sharonlee, Manager, Customer Support, Washington Metropolitan Area Transit Authority. Personal Communication. (20 August 2001, 14 September 2001).

Washington Metropolitan Area Transit Authority (WMATA). "Average Weekday Ridership Report for the Period 05/01/2001 to 05/31/2001." (4 June 2001).

Washington Metropolitan Area Transit Authority (WMATA). *Joint Development Solicitation.* (July 2000).

Washington Metropolitan Area Transit Authority (WMATA). "Metrorail Passenger Surveys, Average Weekday Passenger Boardings." (June 2000).

Washington Metropolitan Area Transit Authority (WMATA). "Parking at Metro Stations." Available from: http://www.wmata.com/metrorail/parking.htm

Washington Metropolitan Area Transit Authority (WMATA). "Proposed Resolution of the Board of Directors." (19 April 2001).

Washington Metropolitan Area Transit Authority (WMATA). "Report on Park & Ride Facilities." (March 2001).

Washington Metropolitan Area Transit Authority (WMATA). "Washington Regional Mobility Initiative Update" Planning and Development Committee. (6 September 2001).

Washington Metropolitan Area Transit Authority (WMATA). "WMATA Facts." Available from: http://www.wmata.com/about/metrofacts.pdf

Weinberger, Rachel R. "Commercial Rents and Transportation Improvements: Case of Santa Clara County's Light Rail." Lincoln Institute of Land Policy Working Paper WP00RW2. (2000). Available from: http://www.lincolninst.edu/main.html

Weinstein, Bernard L; and Clower, Terry L. "The Initial Economic Impacts of the DART LRT System" Center for Economic Development and Research, University of North Texas. (July 1999). Available from: http://www.unt.edu/cedr/dart.pdf

Zipcar. "Zipacar." Available from: http://www.zipcar.com/

Zykofsky, Paul. "Why Build Near Transit? The Economic and Social Benefits of Transit-Oriented Development." *Transit California.* (December 1998/January 1999).

Appendix A: Parking Facilities at Metrorail Stations Ranked by Ridership

Station	Number of All-Day Spaces	Cost per Day	Number of Short-Term Spaces	Average Weekday Occupancy	Average Weekday Ridership, May 2001
Stations with No Parking Facilities Operated by WMATA					
Union Station	0	—	0	—	29,738
Metro Center	0	—	0	—	28,941
Farragut North	0	—	0	—	26,250
Farragut West	0	—	0	—	24,636
Dupont Circle	0	—	0	—	22,625
L' Enfant Plaza	0	—	0	—	20,115
Foggy Bottom	0	—	0	—	19,018
Pentagon	0	—	0	—	17,041
McPherson Square	0	—	0	—	16,411
Rosslyn	0	—	0	—	15,633
Crystal City	0	—	0	—	12,851
Gallery Place	0	—	0	—	12,494
Smithsonian	0	—	0	—	12,155
Pentagon City	0	—	0	—	11,751
Ballston	0	—	0	—	11,257
Judiciary Square	0	—	0	—	10,418
Federal Triangle	0	—	0	—	9,879
Friendship Heights	0	—	0	—	9,195
Bethesda	0	—	0	—	8,591
Archives	0	—	0	—	7,668
Capitol South	0	—	0	—	7,656
Woodley Park-Zoo	0	—	0	—	7,353
Court House	0	—	0	—	7,275
Van Ness	0	—	0		6,770
National Airport	0	—	0	—	5,506
Columbia Heights	0	—	0	—	4,771
Federal Center SW	0	—	0	—	4,657
Eastern Market	0	—	0	—	4,637
Waterfront	0	—	0	—	4,628
Cleveland Park	0	—	0	—	4,456
U Street-Cardozo	0	—	0	—	3,725
Georgia Avenue	0	—	0	—	3,440
Shaw-Howard U	0	—	0	—	3,320
Potomac Avenue	0	—	0	—	3,255
Stadium-Armory	0	—	0	—	3,174

Station	Number of All-Day Spaces	Cost per Day	Number of Short-Term Spaces	Average Weekday Occupancy	Average Weekday Ridership, May 2001
Benning Road	0	—	0	—	3,099
Clarendon	0	—	0	—	2,914
Virginia Square	0	—	0	—	2,607
Navy Yard	0	—	0	—	2,323
Arlington Cemetery	0	—	0	—	1,905
Mt. Vernon Square	0	—	0	—	1,818
Eisenhower Avenue	0	—	0	—	1,286
Subtotal	**—**	**—**	**—**	**—**	**417,242**

Stations with Only Short-Term Parking Facilities

Silver Spring	0	—	44	—	12,040
Brookland	0	—	27	—	6,345
Tenleytown	0	—	17	—	6,143
Takoma	0	—	146	—	6,031
King Street	0	—	30	—	5,678
Medical Center	0	—	14	—	4,438
Braddock Road	0	—	10	—	3,777
Congress Heights	0	—	66	—	1,702
Subtotal	**—**	**—**	**—**	**—**	**46,154**

Stations with Short-Term and All-Day Parking Facilities

Vienna	5,178	$2.25	71	100%	11,607
Shady Grove	2,951	$2.25	54	100%	10,635
New Carrollton	1,980	$2.00	97	100%	9,065
Huntington	3,090	$2.25	32	100%	8,372
Franconia-Springfield	3,856	$2.25	117	100%	8,194
West Falls Church	1,062	$2.25	53	100%	7,279
Anacostia	808	$2.00	15	77%	7,226
Greenbelt	3,364	$2.00	201	100%	6,482
Addison Road	1,268	$2.00	50	100%	6,022
Fort Totten	408	$2.00	37	43%	5,738
Suitland	1,890	$1.00	175	86%	5,182
Rhode Island Avenue	340	$2.00	40	100%	5,088
Glenmont	1,781	$2.25	69	84%	4,980
Branch Avenue	3,072	$1.00	150	89%	4,860
Dunn Loring	1,319	$2.25	36	100%	4,481
Wheaton	977	$1.50	35	100%	4,388

Station	Number of All-Day Spaces	Cost per Day	Number of Short-Term Spaces	Average Weekday Occupancy	Average Weekday Ridership, May 2001
White Flint	991	$2.25	16	90%	4,287
Twinbrook	1,098	$2.25	38	100%	4,266
Southern Avenue	1,980	$1.00	200	85%	4,258
East Falls Church	422	$2.25	20	97%	4,060
Rockville	524	$2.25	22	100%	3,915
Prince George's Plaza	1,068	$2.00	56	95%	3,889
Grosvenor	641	$2.25	57	78%	3,595
Van Dorn Street	361	$2.25	46	100%	3,539
Landover	1,866	$2.00	14	100%	3,462
West Hyattsville	453	$2.00	41	52%	3,150
College Park	530	$2.00	90	82%	3,085
Minnesota Avenue	333	$1.00	20	100%	2,890
Naylor Road	368	$1.00	63	84%	2,373
Capitol Heights	373	$2.00	14	100%	2,219
Forest Glen	596	$2.25	49	95%	1,930
Deanwood	194	$2.00	0	93%	1,854
Cheverly	530	$2.00	27	100%	1,503
Subtotal	**—**	**—**	**—**	**—**	**162,371**
System Total	**45,672**	**—**	**2,359**	**92%**	**627,630**

Sources: WMATA, "Parking at Metro Stations;" WMATA, "Report on Park & Ride Facilities," and WMATA "Average Weekday Ridership Report for the Period 05/01/2001 to 05/31/2001."

Appendix B: Average Weekday Passenger Boardings at Metrorail Stations During Peak and Off-Peak Hours, May 2001

Station	A.M. Peak	A.M. Off-Peak	P.M. Peak	P.M. Off-Peak	Total	% of Ridership in Peak Hours
Addison Road	4,387	986	416	249	6,022	80%
Anacostia	4,015	1,730	1,022	456	7,226	70%
Archives	277	1,932	4,742	715	7,668	65%
Arlington Cemetery	23	988	755	138	1,905	41%
Ballston	4,679	2,489	3,130	958	11,257	69%
Benning Road	1,918	705	298	176	3,099	72%
Bethesda	2,722	1,880	2,856	1,131	8,591	65%
Braddock Road	2,103	676	792	204	3,777	77%
Branch Avenue	4,122	464	191	81	4,860	89%
Brookland	2,395	1,744	1,671	534	6,345	64%
Capitol Heights	1,569	382	160	107	2,219	78%
Capitol South	772	2,399	3,510	973	7,656	56%
Cheverly	1,113	210	132	47	1,503	83%
Clarendon	1,268	726	608	310	2,914	64%
Cleveland Park	2,216	1,119	605	515	4,456	63%
College Park	1,476	752	616	239	3,085	68%
Columbia Heights	2,098	1,180	998	495	4,771	65%
Congress Heights	952	416	218	114	1,702	69%
Court House	3,000	1,541	2,124	608	7,275	70%
Crystal City	3,052	3,271	5,561	965	12,851	67%
Deanwood	1,081	410	229	132	1,854	71%
Dunn Loring	2,641	780	846	213	4,481	78%
Dupont Circle	4,145	5,240	8,928	4,310	22,625	58%
East Falls Church	2,733	695	450	180	4,060	78%
Eastern Market	1,875	1,212	1,074	474	4,637	64%
Eisenhower Avenue	378	395	443	68	1,286	64%
Farragut North	940	5,647	15,858	3,800	26,250	64%
Farragut West	1,081	5,098	15,169	3,286	24,636	66%
Federal Center SW	350	1,154	2,843	308	4,657	69%
Federal Triangle	273	2,661	5,963	982	9,879	63%
Foggy Bottom	2,038	4,526	8,994	3,458	19,018	58%
Forest Glen	1,358	337	172	61	1,930	79%
Fort Totten	3,306	1,143	927	360	5,738	74%
Franconia-Springfield	6,038	1,290	598	266	8,194	81%
Friendship Heights	3,241	2,450	2,378	1,123	9,195	61%
Gallery Place	859	3,129	6,627	1,874	12,494	60%
Georgia Avenue	1,573	838	689	339	3,440	66%
Glenmont	3,639	762	398	179	4,980	81%
Greenbelt	4,671	1,022	564	224	6,482	81%
Grosvenor	2,391	630	434	139	3,595	79%
Huntington	6,326	1,239	587	216	8,372	83%

Station	A.M. Peak	A.M. Off-Peak	P.M. Peak	P.M. Off-Peak	Total	% of Ridership in Peak Hours
Judiciary Square	474	3,272	5,873	796	10,418	61%
King Street	2,288	1,372	1,414	602	5,678	65%
L' Enfant Plaza	2,174	4,878	11,688	1,372	20,115	69%
Landover	2,709	438	192	122	3,462	84%
McPherson Square	1,422	3,593	9,589	1,803	16,411	67%
Medical Center	1,257	1,009	1,723	447	4,438	67%
Metro Center	1,590	7,095	15,560	4,691	28,941	59%
Minnesota Avenue	1,605	649	444	191	2,890	71%
Mt. Vernon Square	758	506	382	172	1,818	63%
National Airport	849	1,986	1,441	1,228	5,506	42%
Navy Yard	456	722	943	199	2,323	60%
Naylor Road	1,659	383	197	132	2,373	78%
New Carrollton	6,362	1,465	917	320	9,065	80%
Pentagon	8,738	3,898	4,230	534	17,041	76%
Pentagon City	2,512	3,585	3,328	2,325	11,751	50%
Potomac Avenue	1,915	703	384	251	3,255	71%
Prince George's Plaza	1,930	888	715	355	3,889	68%
Rhode Island Avenue	2,650	1,187	782	467	5,088	67%
Rockville	2,134	836	716	228	3,915	73%
Rosslyn	4,102	4,142	5,939	1,449	15,633	64%
Shady Grove	7,843	1,467	991	332	10,635	83%
Shaw-Howard U	974	953	991	400	3,320	59%
Silver Spring	5,991	2,735	2,434	878	12,040	70%
Smithsonian	317	3,803	6,952	1,082	12,155	60%
Southern Avenue	3,217	667	243	129	4,258	81%
Stadium-Armory	1,288	904	557	422	3,174	58%
Suitland	3,737	772	500	171	5,182	82%
Takoma	3,264	1,509	918	339	6,031	69%
Tenleytown	1,790	1,637	1,894	820	6,143	60%
Twinbrook	2,309	870	853	233	4,266	74%
U Street-Cardozo	1,191	993	951	588	3,725	58%
Union Station	8,641	7,149	9,934	4,012	29,738	62%
Van Dorn Street	2,144	664	542	187	3,539	76%
Van Ness	2,555	1,934	1,601	680	6,770	61%
Vienna	8,559	1,781	959	307	11,607	82%
Virginia Square	1,301	580	553	171	2,607	71%
Waterfront	1,307	1,315	1,520	485	4,628	61%
West Falls Church	4,819	995	1,109	355	7,279	81%
West Hyattsville	1,936	697	328	188	3,150	72%
Wheaton	2,408	963	610	405	4,388	69%
White Flint	1,877	922	1,150	337	4,287	71%
Woodley Park-Zoo	2,296	2,400	1,750	906	7,353	55%
System Total	**212,442**	**144,547**	**208,373**	**62,118**	**627,630**	**67%**

Source: WMATA, "Average Weekday Ridership Report for the Period 05/01/2001 to 05/31/2001."

Appendix C: Average Weekday Passenger Boardings at Metrorail Stations, 1977-2001 (all counts were taken in May unless otherwise noted)

Station	Nov. 1977	1980	1985	1990	1995	2000	2001
Addison Road	—	—	3,723	5,703	5,238	6,682	6,022
Anacostia	—	—	—	—	8,182	10,131	7,226
Archives-Navy Memorial	—	—	3,364	3,871	6,164	6,846	7,668
Arlington Cemetery	140	362	1,099	1,102	1,480	1,759	1,905
Ballston	—	9,352	10,239	9,531	9,892	10,450	11,257
Benning Road	—	—	3,050	3,883	2,775	2,999	3,099
Bethesda	—	—	5,011	7,572	7,501	8,469	8,591
Braddock Road	—	—	2,124	3,054	3,270	2,481	3,777
Branch Avenue	—	—	—	—	—	—	4,860
Brookland	—	6,333	5,741	6,978	5,585	5,951	6,345
Captiol Heights	—	—	2,317	2,922	2,099	2,324	2,219
Capitol South	3,696	6,758	7,480	8,383	7,214	7,001	7,656
Cheverly	—	1,380	1,315	1,855	1,484	1,505	1,503
Clarendon	—	1,899	2,351	3,078	2,694	2,752	2,914
Cleveland Park	—	—	3,870	3,884	4,328	4,398	4,456
College Park	—	—	—	—	1,504	2,709	3,085
Columbia Heights	—	—	—	—	—	3,957	4,771
Congress Heights	—	—	—	—	—	—	1,702
Court House	—	2,825	3,673	5,310	6,018	7,079	7,275
Crystal City	3,912	8,204	10,602	13,349	12,067	12,108	12,851
Deanwood	—	2,638	1,909	1,903	1,708	1,802	1,854
Dunn Loring	—	—	—	4,546	3,921	4,216	4,481
Dupont Circle	7,784	15,643	16,767	21,631	20,586	21,425	22,625
East Falls Church	—	—	—	4,269	3,698	3,756	4,060
Eastern Market	2,506	4,545	5,074	5,816	4,220	4,452	4,637
Eisenhower Avenue	—	—	1,269	2,448	1,158	1,108	1,286
Farragut North	7,950	15,087	19,446	24,651	22,586	24,885	26,250
Farragut West	15,167	28,891	24,138	28,717	22,302	23,404	24,636
Federal Center SW	2,778	5,246	4,928	6,499	5,421	5,453	4,657
Federal Triangle	4,036	6,774	6,376	8,799	7,870	9,302	9,879
Foggy Bottom	6,144	13,528	14,928	19,674	17,296	18,200	19,018
Forest Glen	—	—	—	—	1,898	1,860	1,930
Fort Totten	—	5,294	4,363	5,825	4,670	5,121	5,738
Franconia-Springfield	—	—	—	—	—	7,131	8,194
Friendship Heights	—	—	5,674	8,268	8,343	9,089	9,195
Gallery Place	2,100	4,057	6,938	7,287	7,462	10,563	12,494
Georgia Avenue	—	—	—	—	—	2,909	3,440
Glenmont	—	—	—	—	—	4,619	4,980
Greenbelt	—	—	—	—	2,948	5,786	6,482
Grosvenor	—	—	2,618	3,794	3,438	3,551	3,595
Huntington	—	—	6,099	9,445	7,917	7,787	8,372
Judiciary Square	5,490	8,527	7,740	9,347	9,206	9,402	10,418
King Street	—	—	2,549	4,144	4,038	5,232	5,678
L' Enfant Plaza	6,154	12,929	16,514	20,979	17,320	18,712	20,115
Landover	—	2,815	2,940	3,856	3,192	3,477	3,462
McPherson Square	7,024	13,829	13,902	18,918	14,324	15,419	16,411
Medical Center	—	—	2,715	4,501	3,911	4,141	4,438
Metro Center	10,493	18,516	16,550	25,956	27,643	27,457	28,941
Minnesota Avenue	—	3,556	2,135	2,518	2,177	2,703	2,890

Station	Nov. 1977	1980	1985	1990	1995	2000	2001
Mt. Vernon Square	—	—	—	—	1,861	1,635	1,818
National Airport	2,479	5,605	4,497	5,657	4,094	5,039	5,506
Navy Yard	—	—	—	—	1,425	1,828	2,323
Naylor Road	—	—	—	—	—	—	2,373
New Carrollton	—	6,592	5,695	8,786	7,670	8,742	9,065
Pentagon	10,558	16,123	19,838	20,687	16,873	15,548	17,041
Pentagon City	1,312	3,586	2,821	6,650	9,587	11,058	11,751
Potomac Avenue	2,830	4,779	6,383	6,044	4,855	5,353	3,255
Prince George's Plaza	—	—	—	—	2,391	2,289	3,889
Rhode Island Avenue	5,665	4,989	4,891	6,328	4,451	4,858	5,088
Rockville	—	—	2,140	3,944	3,443	3,844	3,915
Rosslyn	11,167	12,752	13,856	13,565	13,831	14,672	15,633
Shady Grove	—	—	4,050	9,106	9,014	9,767	10,635
Shaw-Howard U	—	—	—	—	2,854	3,107	3,320
Silver Spring	—	16,414	13,445	14,857	11,311	11,492	12,040
Smithsonian	4,060	12,427	8,986	11,931	12,844	12,241	12,155
Southern Avenue	—	—	—	—	—	—	4,258
Stadium-Armory	3,956	4,094	3,226	3,942	3,586	3,319	3,174
Suitland	—	—	—	—	—	—	5,182
Takoma	—	4,809	5,195	6,227	5,204	5,595	6,031
Tenleytown	—	—	4,128	5,591	4,805	5,966	6,143
Twinbrook	—	—	2,364	4,515	3,778	3,883	4,266
U Street-Cardozo	—	—	—	—	3,127	3,497	3,725
Union Station	7,038	12,540	11,761	21,946	25,238	27,330	29,738
Van Dorn Street	—	—	—	—	3,190	3,285	3,539
Van Ness	—	—	6,650	8,747	6,701	6,458	6,770
Vienna	—	—	—	8,353	9,386	10,238	11,607
Virginia Square	—	1,728	2,757	2,312	2,348	2,334	2,607
Waterfront	—	—	—	—	4,112	4,466	4,628
West Falls Church	—	—	—	5,568	5,299	6,973	7,279
West Hyattsville	—	—	—	—	1,876	2,793	3,150
Wheaton	—	—	—	—	5,508	4,001	4,388
White Flint	—	—	2,199	4,333	3,605	4,050	4,287
Woodley Park-Zoo	—	—	6,461	6,352	6,609	6,643	7,353
System Total	**134,439**	**305,426**	**382,864**	**519,465**	**517,622**	**576,945**	**627,630**

Sources: WMATA, "Metrorail Passenger Surveys, Average Weekday Passenger Boardings;" WMATA, "Average Weekday Ridership Report for the Period 05/01/2001 to 05/31/2001."