This information is mailed. 12/3/96

November 27, 1996

Ms. Jerrily R. Kress
Chairperson
Zoning Commission of the
District of Columbia
Office of Zoning
441 4th Street, N.W., Suite 210
Washington, DC 20001

RE: Case No. 96-3/89-1 (Map Amendment & Overlay District for Buzzard Point-Capitol Gateway)

Dear Ms. Kress:

As you requested in the hearing on November 25, 1996 on the referenced case, I am sending you a copy of WMATA's Development-Related Ridership Survey which contains formulae for projecting transit ridership from various types of development. If you have any questions, please contact me at (202) 962-1240.

Sincerely,

Alvin R. McNeal

Alvin R. McNeal
Manager, Joint Development

'96 DEC -2 P2:33
OFFICE OF ZONING
DISTRICT OF COLUMBIA

Enclosure

Washington Metropolitan Area Transit Authority

600 Fifth Street, NW
Washington, D.C. 20001
202/962-1234

By Metrorail:
Judiciary Square-Red Line
Gallery Place-Chinatown
Red, Green and Yellow Lines

A District of Columbia, Maryland and Virginia Transit Partnership

ZONING COMMISSION
CASE No. 96-3/89-1
EXHIBIT No. 68

ZONING COMMISSION
District of Columbia
CASE NO.96-3
EXHIBIT NO.68

A

DEVELOPMENT-RELATED RIDERSHIP SURVEY

Final Report

prepared for

Washington Metropolitan Area Transit Authority

by

jhk & associates

MARCH 1987

FINAL REPORT
for the
DEVELOPMENT-RELATED RIDERSHIP SURVEY

prepared for the
Washington Metropolitan Area Transit Authority

prepared by
JHK & Associates

March 1987

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JHK & Associates and WMATA would like to acknowledge and thank the many individuals and organizations that contributed to this study. This especially includes the building owners and managers who assisted JHK in granting permission for and setting up the surveys. A listing of the sites studied can be found in the text of the report. Thanks are also expressed to other WMATA staff and to the staff at the Washington Metropolitan Council of Governments who reviewed the draft report materials.

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EXECUTIVE SUMMARY

This executive summary discusses the key findings and conclusions from the Development-Related Ridership Survey, a study sponsored by the Washington Metropolitan Area Transit Authority (WMATA). The purpose of the Ridership Survey was to study the travel behavior of persons traveling to and from residential and commercial developments around Metrorail stations and to establish relationships between travel characteristics and the nature of development at each site. The study consisted of surveys of persons travelling to and from office buildings, multi-family residential buildings, retail sites and hotels near Metrorail stations. A sample of 34 building sites were surveyed. The details of the procedures and results are discussed in the body of the report.

There has been a large volume of data generated in this project, requiring a substantial amount of time to assimilate and interpret. WMATA and other agencies will be able to draw their own conclusions directly from the data. However, a number of conclusions and observations have been derived from the analysis of data thus far. A summary of these observations is presented below, beginning first with general observations, followed by conclusions relating to each of the land use types.

General Observations

- There are many factors that influence choice of mode for trips to and from any type of land use. The most significant factors affecting the percent of trips by transit are 1) the location of the site within the urban area and on the Metrorail system: downtown sites have higher transit mode shares than suburban sites, and 2) the proximity of the building to a Metrorail station entrance. The higher transit ridership at downtown sites is a combined effect of a number of other factors, such as higher parking cost, limited parking availability and origin/destination patterns favoring transit ridership.

- Offices and residential uses have the highest transit mode shares of the four uses studied, particularly during the peak commuting periods. However, major downtown retail use also attracts a significant proportion of transit ridership.

- Retail uses and offices generate the highest number of daily transit trips, when comparing all four land uses on the basis of trips generated per 1000 square feet of floor area. The strength of the transit trip generation potential of major retail sites is the volume of trips generated - two to six times the number of person-trips as other land uses.

- Origin/destination pairs heavily influence the propensity to take transit. Poor transit accessibility at either end of the trip results in poor transit ridership between those pairs.

Observations on Office Development

- Transit mode shares for work trips to downtown office buildings located near Metrorail stations are in the range of 55 percent.

- Transit mode shares for work trips to office buildings near close-in suburban rail stations are in the range of 20 percent.

- For downtown office buildings, the percent of work trips by transit is fairly constant for commuters living in the District, Maryland and Virginia. For suburban office buildings, a low percent of work trips by transit occurs for trips originating in the same state (Virginia to Virginia or Maryland to Maryland). A much higher percentage of work trips by transit occurs where the trip crosses jurisdictional boundaries (e.g. to a site in Virginia from either the District or Maryland), probably due to greater transit accessibility at the origin end of the trip and to the distance of the trip itself.

- The distribution of residence locations for office employees indicates that transit commuters to any given office building are drawn from throughout the urban area. A higher-than-expected transit mode share at several of the office buildings could be traced to the attraction of transit riding employees from longer distances away. This also points to one of the additional benefits of locating offices near rail stations - the availability of a larger, more accessible labor market.

- Most mid-day trips by employees at office buildings near the Metro stations surveyed were walk trips. Of the non-walk trips, a significant percentage were made by transit: over half the trips to and from locations in the District, and 30 to 60 percent of the trips from the suburban station areas into the District. Trips from the District into Maryland or Virginia also had high transit percentages.

- The regression analysis of office sites indicates that the work trip transit mode share (rail and bus) decreases by approximately 0.75 percent for each 100 foot increase in distance of the site from a Metrorail station portal. Although this relationship was found to be valid for the sites studied, it is expected that the actual relationship is not completely linear. The percentage of mid-day non-walk trips captured by transit decreases by approximately 0.9 percent for each 100 foot increase in distance from the station.

- Although there is less data available for trips by visitors to office buildings, data indicate that 20 to 30 percent of visitor trips are by transit, with the higher percentages applying to the downtown sites.

Residential Buildings

- A high percentage of trips to and from multi-family residential buildings near Metro stations are via transit. The transit mode share is in the 40 percent range for most residential buildings, but ranges are as high as 63 percent and as low as 18 percent.

- Available data indicate that the percentage of trips by transit decreases by approximately 0.65 percent for each 100 foot increase in distance of a residential site from a Metrorail station portal. This suggests that residential sites are slightly less sensitive to distance from a Metro station than are office uses. This difference is most distinct for mid-day non-work trips.

Retail Uses

- The survey data suggest that between 30 and 40 percent of trips by shoppers to major retail facilities in the downtown area are made via transit. It is expected that this transit mode share applies only to major comparison-retail stores and may not be true of smaller stores or of convenience-retail establishments.

- At the non-downtown sites, between 10 and 20 percent of shoppers typically take transit.

Hotels

- Hotels had the smallest percentage of trips via transit of any of the land uses. Overnight guests rarely take Metro to the hotel. Most take the hotel-provided van or taxi.

- Meeting or conference attendees take Metro more often, depending on the hotel, nature of the conference, and origin of the conference attendees.

Implications of the Results

The results of this study have a number of significant implications on land use and transportation planning in the Washington metropolitan area. Metrorail has proved itself to be a major factor in transporting persons not only to and from the downtown but also to and from suburban sites. In some cases, it is the dominant choice of mode. It is also clear, however, that propensity to take transit is dependent on land use and origin/destination relationships. Several land use factors hold the keys to making the best possible use of the transit system. These include:

- In Metrorail station areas, promoting the types of land uses that tend to generate the most transit trips.

- Locating these land uses in close proximity to the station portals, and

- Providing high-density land development around Metro stations, including suburban stations.

The transit system is quite dependent on walk access, often at both ends of the trip. Because the convenience of walk access is highly dependent on distance from the station portal, it is important that a relatively dense, compact land use arrangement

occur within the station area. This development philosophy is good not only for the vitality of the transit system but for regional transportation overall. More convenient access to the Metrorail system (through locating sizeable land developments in close proximity to rail stations) increases use of the system and thereby reduces the amount of auto travel that would otherwise be made (if a similar development was located far away from a rail station). For example, a 200,000 square foot office building in the downtown will generate nearly 300,000 transit trips per year, valued at approximately $500,000 of transit revenue. A similar building near a close-in suburban station would generate over $200,000 in transit revenue annually. By locating this 200,000 square foot office building close to a suburban rail station rather than in a remote area not served by transit, an annual reduction of some 500,000 vehicle miles of travel would also be realized. Similar comparisons can also be made illustrating the economic and transportation benefits of increased density around rail stations.

Development of any type tends to be controversial. There are usually pros and cons that must be weighed. It is clear, however, that the limited supply of developable land and the fixed nature of the Metrorail system make development decisions around rail stations particularly critical. They must be lived with for many years to come and must therefore be made with a long-term view.

It is inevitable that the Washington metropolitan area will grow. Careful attention to how it grows, particularly in areas served by Metrorail, will reap major benefits in optimizing the use of the existing and future regional transportation system. The chapters that follow present the more detailed results of the study, which have led to the observations and conclusions discussed above.

1. INTRODUCTION

This is the Final Report for the Development-Related Ridership Survey, prepared for the Washington Metropolitan Area Transit Authority (WMATA). The purpose of the Ridership Survey was to study the travel behavior of persons traveling to and from residential and commercial developments around Metrorail stations and to establish relationships between travel characteristics and the nature of development at each site. This information will provide WMATA and other local agencies with better information on the accessibility benefits of locating buildings near Metrorail stations. One of the important elements of the study was an analysis of the effect of distance from a Metrorail station on mode of travel.

The purpose of this report is to present findings from the survey data, mathematical relationships developed between travel characteristics and site development factors, and trip generation characteristics derived from the studied sites.

STUDY APPROACH

The basic approach to the study involved the development of data on travel characteristics on a building-by-building basis. Each building was considered to constitute an "observation," with which a distinct set of travel characteristics could be associated. The travel characteristics were expected to vary among buildings, being dependent on a multitude of factors, such as the type of land use, location within the urban area, proximity to a Metrorail station, type of tenants within the building, cost and availability of parking, and other factors. By conducting an analysis of how these travel characteristics vary among buildings, relationships were established that would be useful for both land use planning and transportation planning around Metrorail stations.

Data on travel characteristics were collected through a series of questionnaires and interviews with individuals traveling to or from each of 34 building sites. The type of survey conducted depended primarily on the type of land use. The four land use types and associated survey approach and number of sites were as follows:

- Office buildings - self-administered questionnaires in the work place - 15 sites.

- Residential buildings - combination of self-administered mailback surveys and telephone interviews - eight sites.

- Retail establishments - personal interviews at the store entrances or within the facility - six sites.

- Hotels - personal interviews at the hotel entrances or within the facility - five sites.

Chapter 2 of this report discusses the specific approach and survey procedures for each land use type. One of the important considerations in the survey design for all land use types was the development of unbiased sampling techniques, designed to provide the best estimate of actual travel characteristics at each site. Although any survey is subject to sampling error, a careful design of the data collection approach can reduce the chances of inadvertently biasing the results. For example, no direct references were made to WMATA in the self-administered questionnaires, thereby reducing the chance of non-response bias (e.g., the chance of a higher proportion of transit riders responding to the survey, due to it being associated with the Transit Authority). The surveys were cast as general transportation surveys, thereby providing the best chance of obtaining unbiased estimates of mode choice. The total number of survey responses for all land uses studied exceeded 6,300, slightly over half of which resulted from the workplace surveys conducted at office buildings.

Chapter 3 presents a more detailed analysis of some of the survey results, focussing on quantitative relationships between travel characteristics at the buildings surveyed and the factors that influence travel behavior. This includes the development of regression equations that can be used to predict the transit mode share for a newly planned development. Although the equations will have constraints on how they may be applied, they should prove to be an excellent planning aid for developments being considered in close proximity to a rail station. Chapter 3 also contains an analysis of the transit trip generation potential of the four land use types under various development conditions.

SITE SELECTION

Site selection procedures considered both the selection of Metro station areas and building locations within each area. The surveyed sites were selected from an initial list of candidate Metro stations and sites by the following criteria:

- A range of stations with regard to proximity to the downtown core (downtown, urban fringe and suburban).

- Station areas had to have building developments that were constructed, rehabilitated or converted within more recent years. Although buildings were sought that had been occupied either shortly before or in the years following the opening and operation of the Metrorail station, this was not always possible, and older buildings sometimes had to be selected.

- The developments were to be of the following minimum sizes; office buildings - 100,000 square feet, residential buildings - 75 dwelling units, hotels - 200 rooms, retail - no minimum square footage or number of establishments.

- The buildings were to be selected to span a range of walking distances from the station entrance (ranging from zero to over 3,000 feet away).

- Two of the stations were to have data collected from all four of the studied land uses.

- Three of the remaining stations were to have data collected from office and one other land use.

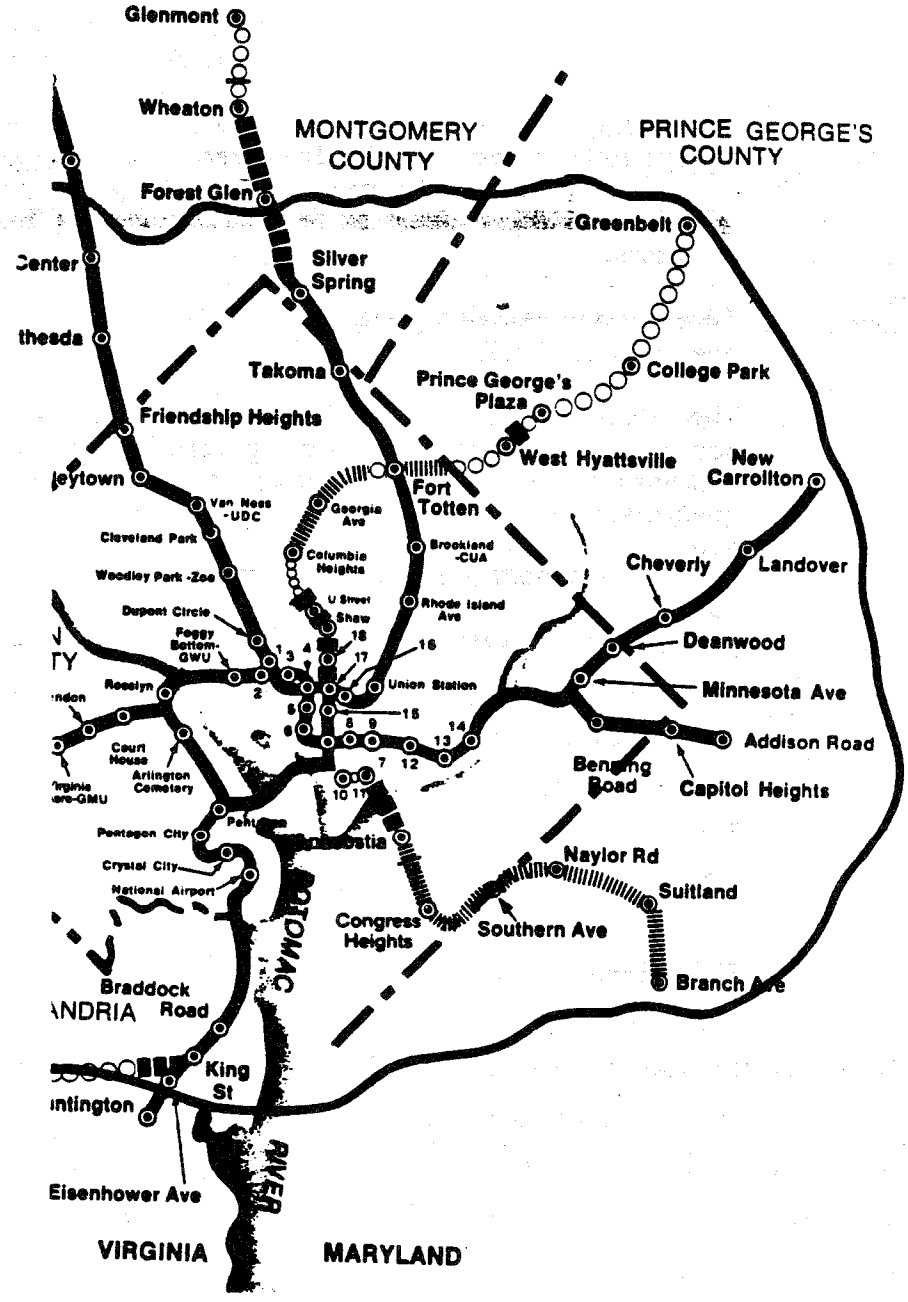
- The surveyed office buildings were to be largely non-governmentally occupied. Although there were government occupants within some of the buildings studied, it was necessary to control the sample to exclude large government buildings, since the very nature of a government office can affect travel characteristics (e.g. substantially more ridesharing occurs with most government employers). Having a mix of government and private buildings would have made it much more difficult to isolate the effect of other factors influencing transit use.

The following six stations were selected for study and are highlighted on the Metrorail system map on Figure 1:

- Metro Center
- Farragut West
- Rosslyn
- Crystal City
- Silver Spring
- Van Ness-UDC

Two of the stations, Rosslyn and Crystal City, had data collected from all four land uses. Three stations, Metro Center, Silver Spring and Van Ness-UDC, had data collected from office and an additional land use. Only Farragut West had data collected from only one land use, office. The location of the sites selected for study are shown on Figures 2 through 7.

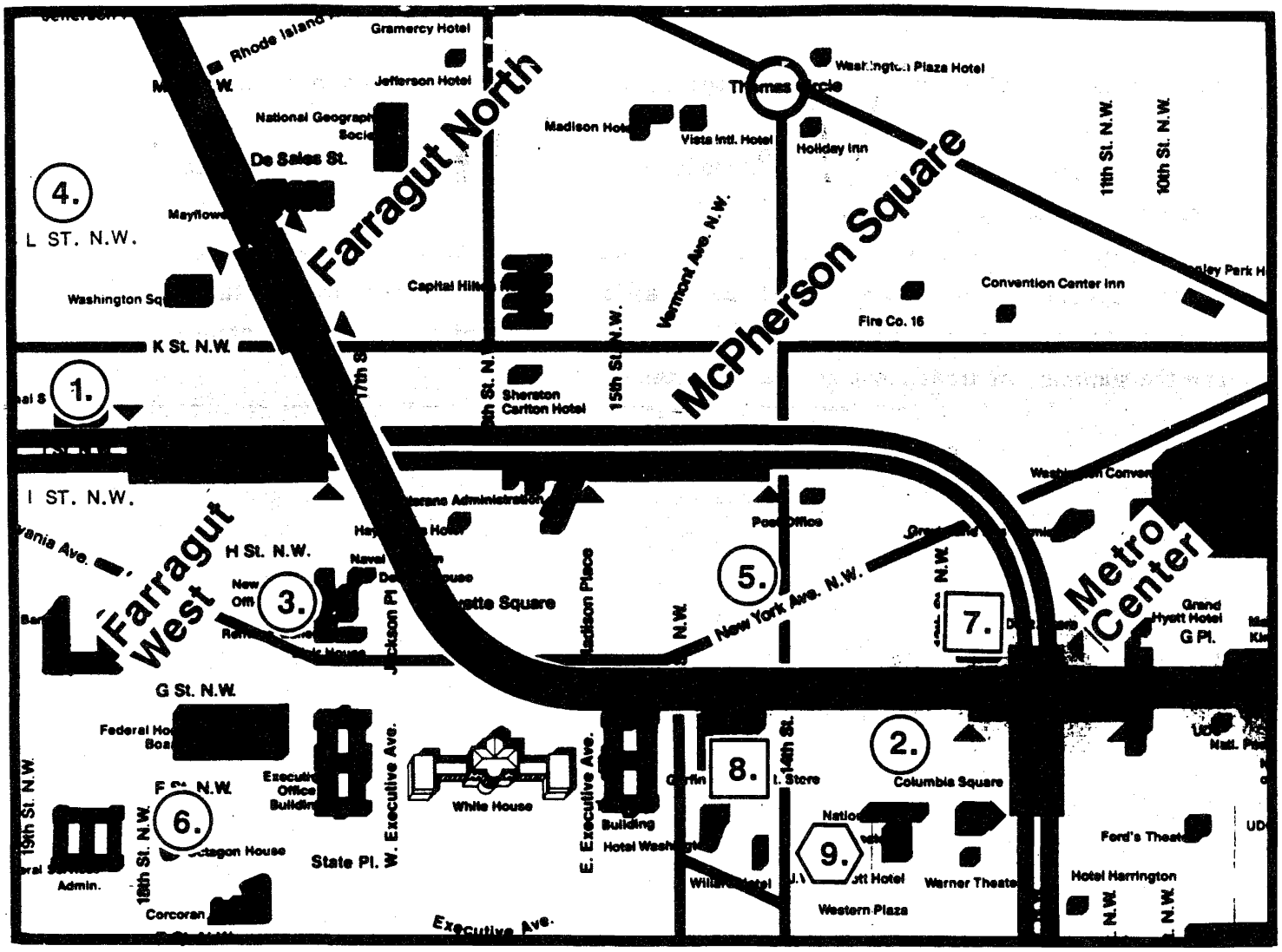
A slight modification to the above schedule occurred when an insufficient amount of data was collected at the retail shops located at the Van Ness Station. As a result, the retail mall, Ballston Common, was selected for study to complete the data collection requirements.


Glenmont
Wheaton
MONTGOMERY COUNTY
PRINCE GEORGE'S COUNTY
Forest Glen
Greenbelt
Silver Spring
Takoma
Prince George's Plaza
College Park
Friendship Heights
West Hyattsville
New Carrollton
Fort Totten
Van Ness -UDC
Georgia Ave
Cleveland Park
Columbia Heights
Brookland -CUA
Woodley Park -Zoo
U Street Shaw
Rhode Island Ave
Cheverly
Landover
Dupont Circle
Foggy Bottom-GWU
Deanwood
Rosslyn
Union Station
Minnesota Ave
Addison Road
Court House
Arlington Cemetery
Capitol Heights
Pentagon City
Crystal City
National Airport
Naylor Rd
Suitland
Congress Heights
Southern Ave
Branch Ave
Braddock Road
King St
Eisenhower Ave
POTOMAC RIVER
VIRGINIA
MARYLAND
LEGEND
1. Farragut North
2. Farragut West
3. McPherson Square
4. Metro Center
5. Federal Triangle
6. Smithsonian
7. L'Enfant Plaza
8. Federal Center SW
9. Capitol South
10. Waterfront
11. Navy Yard
12. Eastern Market
13. Potomac Ave
14. Stadium-Armory
15. Archives
16. Judiciary Square
17. Gallery Place
18. Mt Vernon Sq-UDC

stem Map

Chapter 2 documents additional details on the data collection and analysis methods and also presents the survey results for each land use type. The methods and results are presented together for each land use type, following the order of office, residential, retail and hotel.

Chapter 3 presents the results of further analysis of the survey data, with a view toward developing relationships that could assist in land use and transportation planning around Metrorail stations. This includes the results of the regression analysis and the summary of transit trip generation rates.



1. INTERNATIONAL SQUARE
1825 I Street, N.W.

2. NCPC BUILDING
1325 G Street, N.W.

3. OLMSTED BUILDING
1701 Penn. Avenue, N.W.

4. McKEE BUILDING
1828 L Street, N.W.

5. REALTORS BUILDING
777 14th Street, N.W.

6. AMERICAN INSTITUTE OF ARCHITECTS
1735 New York Avenue, N.W.

7. HECHTS - METRO CENTER
1201 G Street, N.W.

8. GARFINCKELS
1401 F Street, N.W.

9. J.W. MARRIOTT
1331 Penn. Avenue, N.W.

0' 600' 1200'
SCALE

LEGEND

Primary Use

Office Hotel Retail Residential

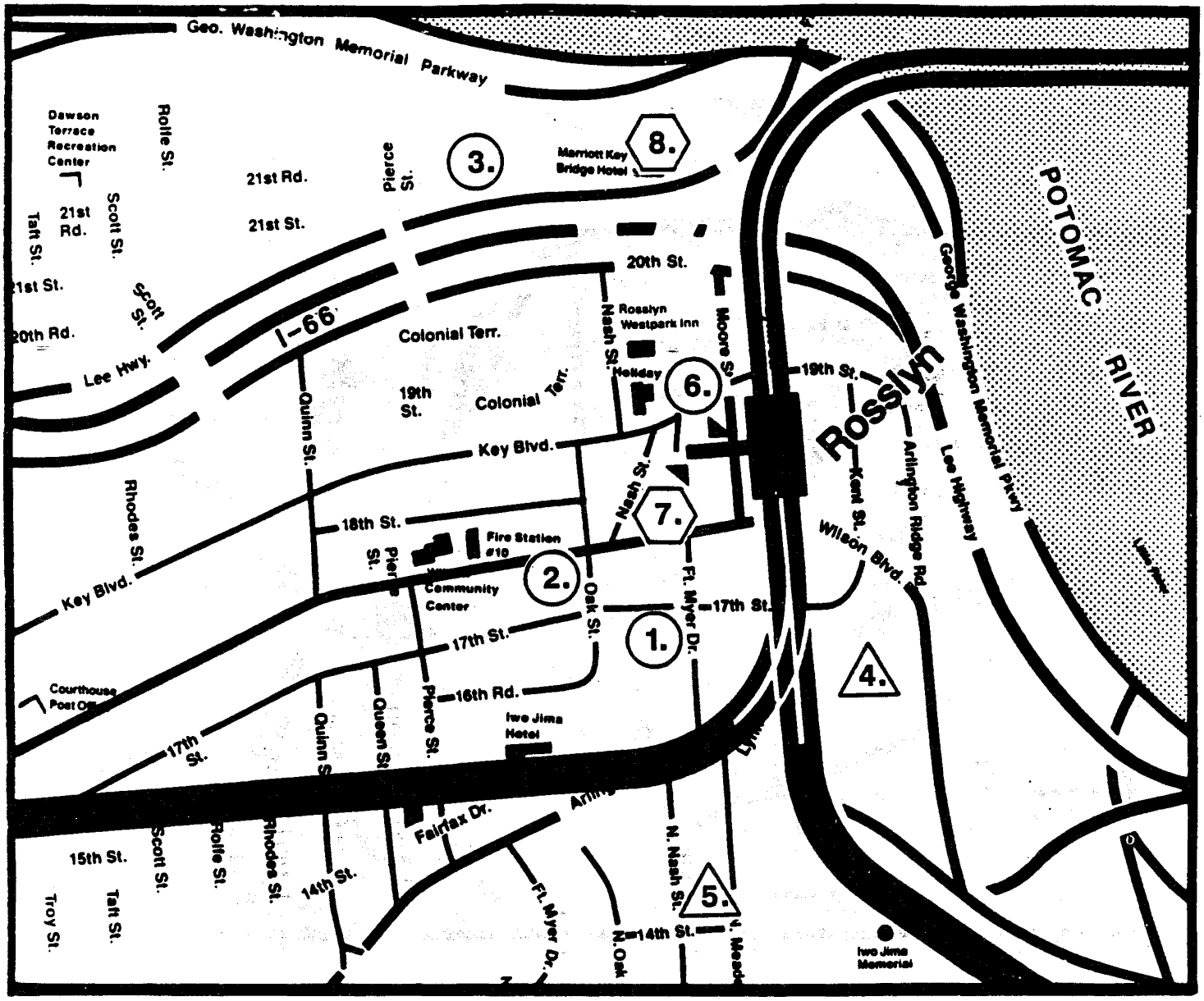
Metro Station

Station Entrance

N

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March 1987

Figure 2 Metro Center and Farragut West Site Selection



1. 1300 NORTH 17th STREET

2. AM BUILDING
1500 Wilson Boulevard

3. AIR FORCE ASSOC. BUILDING
1501 Lee Highway

4. RIVER PLACE NORTH
1121 Arlington Boulevard

5. PROSPECT HOUSE
1200 North Nash Street

6. ROSSLYN CENTER
1700 North Moore Street

7. HYATT ARLINTON
1325 No. Fort Meyer Drive

8. KEY BRIDGE MARRIOTT
1401 Lee Highway

0' 0' 600'

SCALE

LEGEND

Primary Use

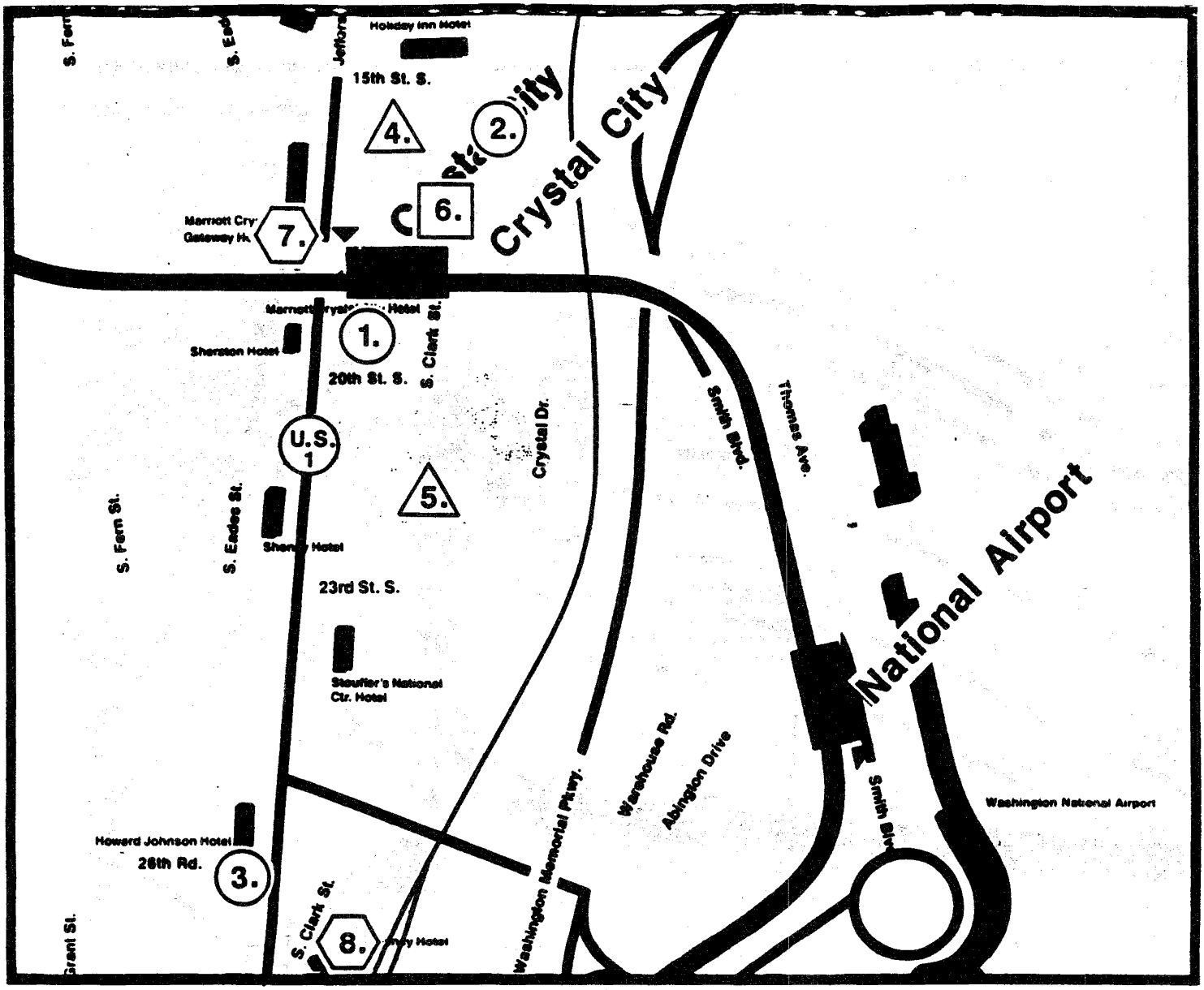
Office Hotel Retail Residential

Metro Station

Station Entrance

N

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WMATA Office of Planning
March 1987



1. CRYSTAL MALL 1
1911 Jeff-Davis Highway

2. CRYSTAL SQUARE 2
1725 Jeff-Davis Highway

3. 271 JEFF-DAVIS HIGHWAY

4. CRYSTAL SQUARE APARTMENTS
1515 Jeff-Davis Highway

5. CRYSTAL PLAZA APARTMENTS
2111 Richmond Highway

6. THE UNDERGROUND

7. MARRIOTT CRYSTAL GATEWAY
1700 Jeff-Davis Highway

8. CRYSTAL HYATT
2799 Jeff-Davis Highway

600' 0' 600'
SCALE

LEGEND

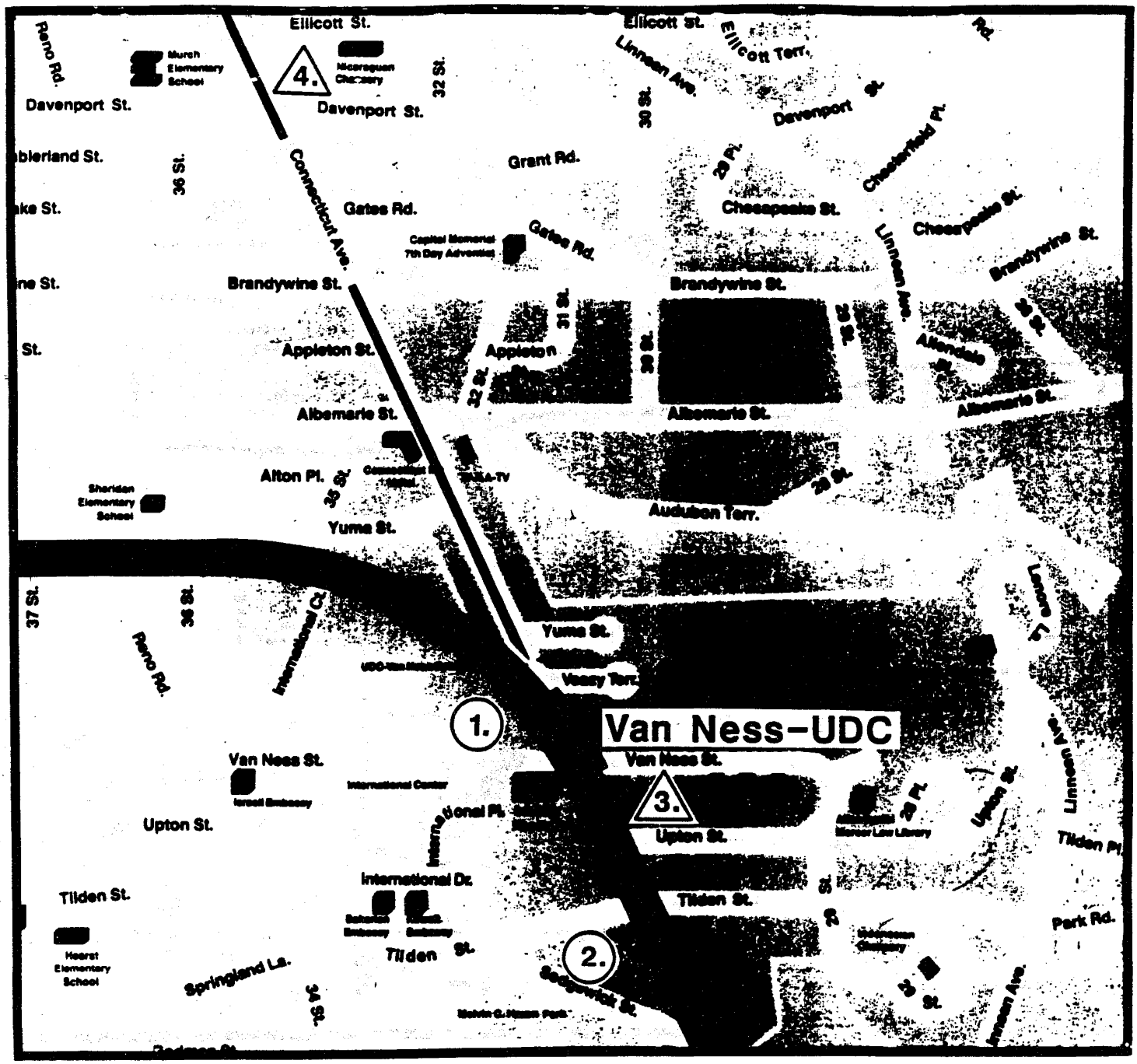
Primary Use
Office Hotel Retail Residential

Metro Station
Station Entrance

N

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WMATA Office of Plann
March 1987

Figure 1: Crystal City Site Selection



1. **VAN NESS STATION**
   4250 Connecticut Avenue, N.W.

2. **INTELSAT**

3. **THE CONSULATE**
   2950 Van Ness Street, N.W.

4. **CONNECTICUT HEIGHTS**
   4849 & 4850 Connecticut Ave., N.W.

00 0 600

SCALE

LEGEND

Primary Use

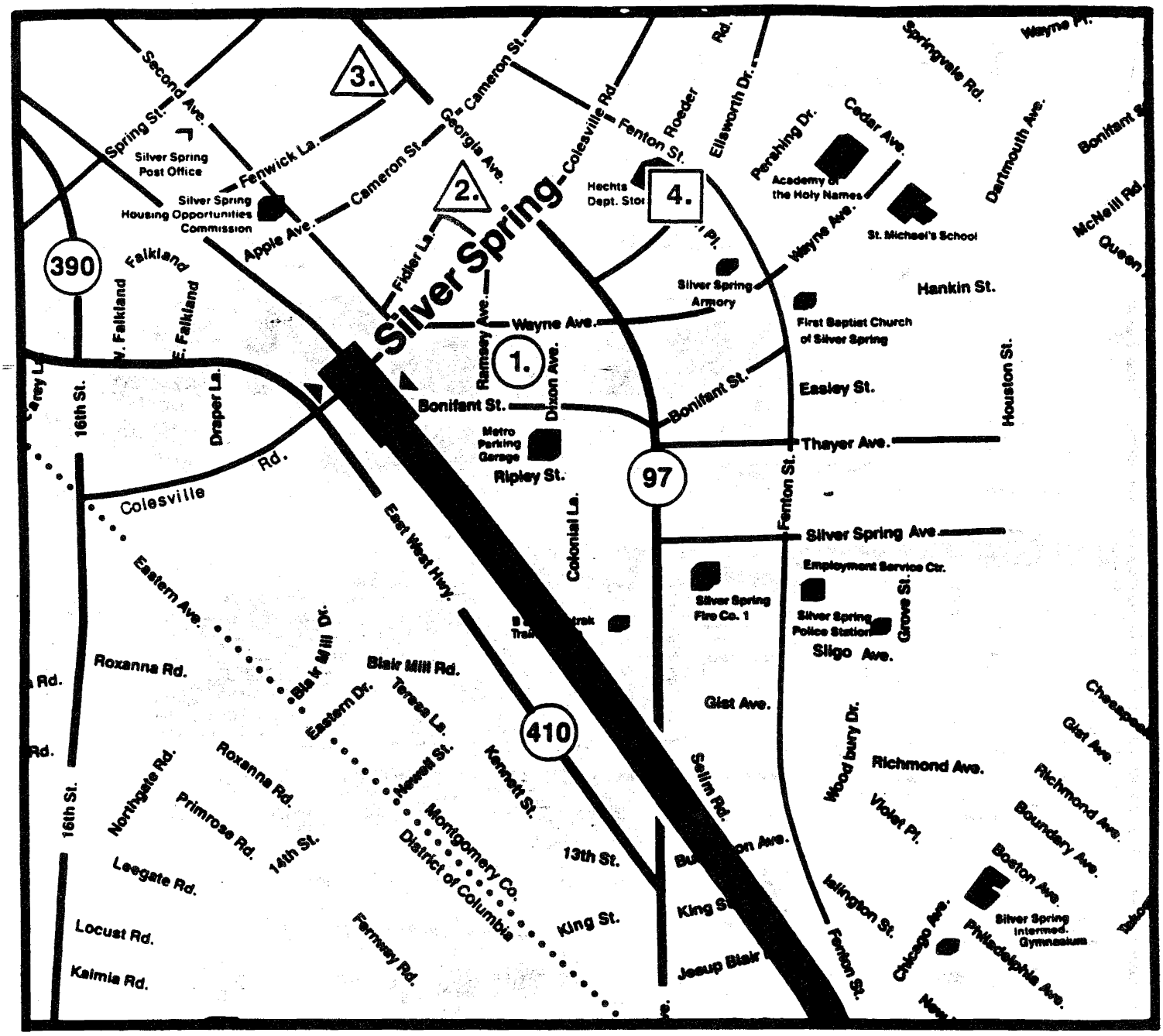
Office Hotel Retail Residential

Metro Station

Station Entrance

N

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1. 1100 WAYNE AVENUE

2. TWIN TOWERS
1110 Fidler Lane

3. GEORGIAN TOWERS
8750 Georgia Avenue

4. HECHTS, SILVER SPRING
901 Ellsworth Drive

LEGEND

600' 0' 600'

SCALE

Primary Use

Office Hotel Retail Residential

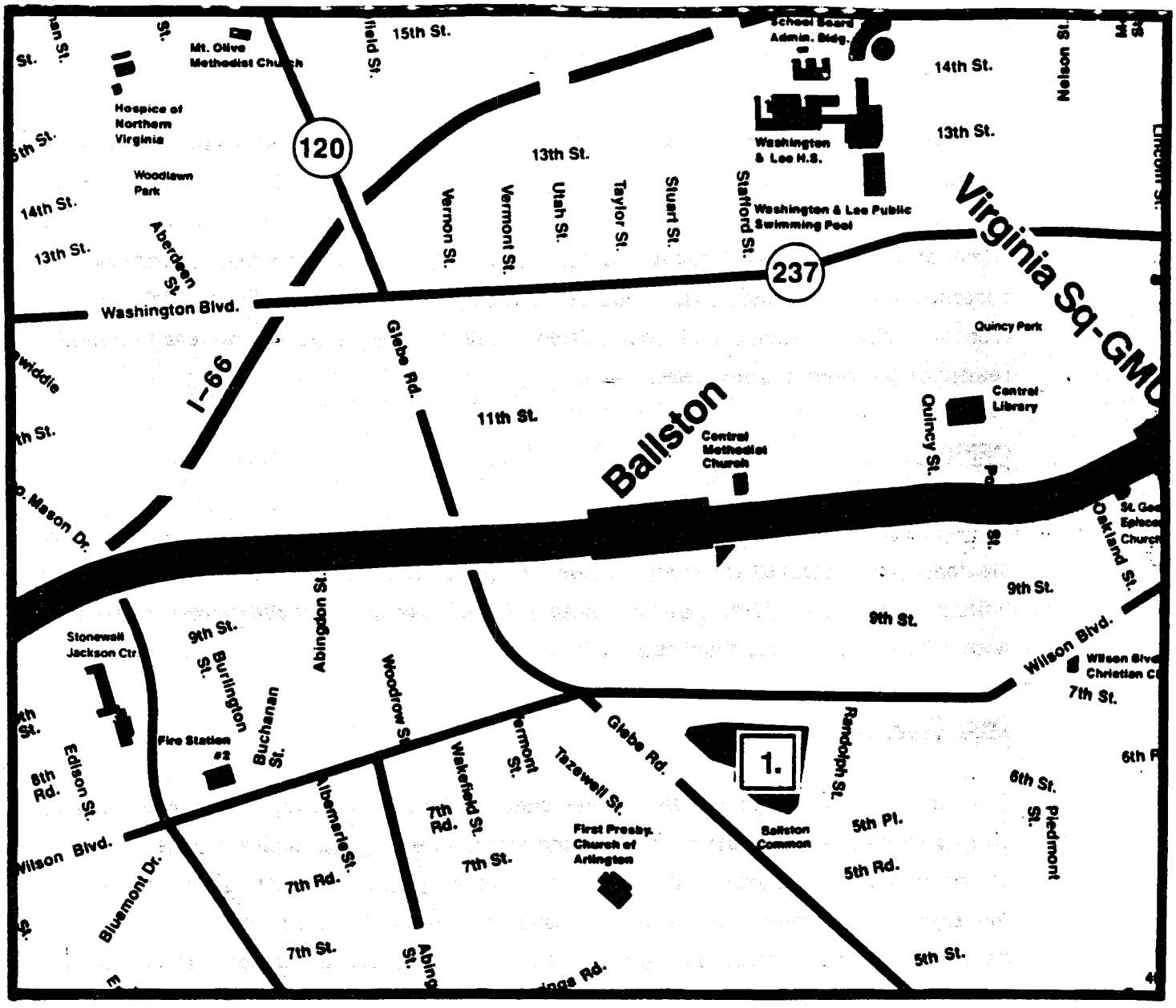
Metro Station

Station Entrance

N

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WMATA Office of Plann
March 1987

Figure 3 - Silver Spring Site Selection



1. **BALLSTON COMMON**
Glebe Road & Wilson Blvd.

0' 600' 1200'

SCALE

LEGEND

Primary Use

Office Hotel Retail Residential

Metro Station

Station Entrance

N

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March 1987

2. SURVEY PROCEDURES AND RESULTS

The survey procedures and results are described below for office, residential, retail, and hotel sites. For each land use, the survey procedures, including the data collection and analysis technique, and the survey results are presented in that order. Some of the results will require extensive study, as there are many numbers to be absorbed and evaluated. This discussion covers the most significant highlights and trends. Other findings and observations may become apparent to each individual reader as the report is reviewed.

OFFICE

Fifteen office buildings, varying from 100 to 2,800 feet from the various Metro stations, were selected for study. Table 1 provides site characteristics for each office building. At these offices, approximately 10,000 workplace surveys were distributed, with approximately one third responding.

Data Collection

In order to determine the travel characteristics of office employees, a survey form was developed for distribution in the workplace. The objective of this survey was to determine the mode split and other travel characteristics of office building employees. A sample workplace questionnaire is shown as Figure 8. Demographic data were acquired first, followed by information on the commute trip and then by data on mid-day trips.

The questionnaires were delivered to individual employment locations by project staff. The staff personally visited each office to explain the survey procedure and distribute enough forms for each employee to respond. Also, the letter from WMATA explaining the purpose of the survey was left with the employer's contact person. A copy of the letter is shown on Figure 9. In several cases, the building manager sent out a memo to inform the tenants that the survey was to be conducted. After the surveys were distributed, the employees were asked to return them to the employer's contact person within two days. On approximately the third day the completed questionnaires were picked up by a project staff member.

These surveys were distributed on Tuesdays, Wednesdays, and Thursdays to maximize the chances of receiving responses for the most typical travel days. The Surveys for all land use types, including office, were conducted in Fall, 1986.

Table 1. Site Characteristics of Office Buildings

Metrorail Station	Office Building	Distance[1] to Station (feet)	Gross Square Feet (1000)	Leasable Square Feet (1000)	Percent Occupied	Number of Employees	Number of Pkg. Spaces	Parking Cost/Month[4]	Year Constructed
Metro Center & Farragut West	International Sq.	200	1,105[2]	940	94	3,500[3]	750	$147	1982
	NCPC Building	500	300	290	90	1,000	370	$120	1959
	Olmsted Building	700	284	175	85	680	175	$120	1965
	McKee Building	900	365[2]	310	90	677	400	$125	1968
	Realtor's Building	1,200	139	125	97	550			
	American Institute of Architects	2,800	200	152	100	425	160	$110	1973
Rosslyn	1300 N. 17th Street	800	430[2]	365		1,500[3]			1980
	AM Building	1,000	250	239	100	910			1969
	Air Force Assoc. Building	2,200	75	70	84	168	400	$ 45	1984
Crystal City	Crystall Mall 1	200	210[2]	180	100	807	400	$40 - 70	1968
	Crystal Square 2	1,000	490[2]	414	98	1,550	550	$40 - 70	1980
	2711 Jeff Davis Highway	2,500	145	135	60	310			1982
Van Ness-UDC	Van Ness Station	100	190[2]	162	97	735			1982
	Intelsat	300	650	500	100	650	270 indoor 125 outdoor	$65 indoor $45 outdoor	1984
Silver Spring	1100 Wayne Avenue	200	190[2]	159	86	604[6]	150	$ 45	1981

1/ Distance to station is defined as the walking distance from the surveyed building to the nearest Metrorail station portal.

2/ Based on LSF = 0.85 x GSF.

3/ Based on 250 square feet/employee.

4/ Monthly parking cost refers to cost at garage.

WASHINGTON METROPOLITAN AREA WORK PLACE SURVEY

This survey is part of a continuing effort, approved by the Washington Metropolitan Area Council of Governments, to plan for the transportation needs of employees within the Washington Region. We would appreciate your help in this effort by filling out this questionnaire. The information obtained from this survey is completely confidential and will only be documented in summary form. Please complete this questionnaire and return it to the person who gave it to you as soon as you can.

THANK YOU FOR YOUR TIME AND COOPERATION.

Today's Date: ___/___/86

RESPONDENT INFORMATION

1. What is the name and address of the place where you report for work?

   _____ Name of Employer

   _____ Street Address

2. Where do you live?

   1. District of Columbia
   2. Fairfax County
   3. Arlington
   4. Alexandria
   5. Falls Church
   6. Fairfax City
   7. Elsewhere in Virginia
   8. Prince Georges County
   9. Montgomery County
   10. Elsewhere in Maryland
   11. Other (specify) _____

3. What is the zip code of your home address?

   _____ Zip Code

4. Was a privately owned vehicle available for your trip to work today? (Circle one)

   1. Yes
   2. No

5. Your sex? (Check one)

   1. Male
   2. Female

6. Your age on your last birthday? (Circle one)

   1. 18 years or under
   2. 19 to 24 years
   3. 25 to 34 years
   4. 35 to 44 years
   5. 45 to 54 years
   6. 55 to 64 years
   7. 65 years or over

7. What is your occupation? (Circle one)

   1. Professional/technical
   2. Manager/administrator
   3. Sales worker
   4. Clerical
   5. Craftsman (mechanic, etc.)
   6. Equipment operator/truck driver
   7. Laborer
   8. Service worker (cleaning, food prep, etc.)

PLEASE ANSWER THE FOLLOWING QUESTIONS ABOUT YOUR TRIP TO WORK TODAY

8. At what time did you first arrive at your work location today? (List time and circle A.M. or P.M.)

   ___:___ 1. A.M. 2. P.M.

9. How long did it take to travel from your home to your work location today? (Include walking to and from car or transit vehicle.)

   _____ Minutes

10. How long did it take you to walk from your parking space or last transit vehicle to your work location?

    _____ Minutes

(PLEASE TURN OVER AND COMPLETE OPPOSITE SIDE)

Figure 8. Sample Workplace Questionnaire

11. What means of travel did you use to get to work today? (Circle one response)

Privately Owned Vehicle	Public Transit	Other Means
1. Drove alone	4. Metrorail only	9. Walked all the way
2. Drove others (How many others, excluding yourself? ____)	5. Metrorail and bus	10. Taxi
	6. Metrorail and auto	11. Bicycle
3. Rode as passenger (How many total were in the vehicle? ____)	7. Metrorail and other combination (Please specify) _____	12. Other (Please specify)
	8. Bus only	

12. ANSWER THIS QUESTION ONLY IF YOU DROVE A CAR OR RODE TRANSIT TO WORK TODAY, OTHERWISE SKIP TO QUESTION 13.

A) **Auto Drivers** (Answer if you circled no. 1 or 2 in question 11).

How much does it cost you to park your car here? (Circle one/fill in amount)

1. Nothing - free parking
2. Nothing - company pays ($ ___.___ per month)
3. $ ___.___ per day
4. $ ___.___ per month

B) **Transit Riders** (Answer if you circled any of no. 4, 5, 6, 7, or 8 in question 11).

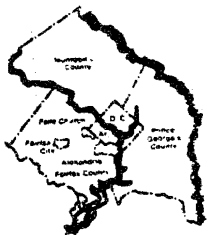
What is your estimated round trip cost to and from work? Please include all transit fares needed and parking charges, if any. (Fill in amount)

$ ___.___ per day

13. We would like to find out about all the trips you made (including walk trips) from this building during the course of an entire day. Please answer for trips you made yesterday or the last day you reported to work. Do not include your commute to and from work. Circle the numbers or fill in the blanks for each trip, as shown in the example. The example indicates a trip made by walking for the purpose of shopping in the District of Columbia. This trip was only 0.1 miles long.

DATE FOR WHICH YOU ARE REPORTING YOUR TRIPS / /86

	Example	Trip #1	Trip #2	Trip #3	Trip #4
Time you left the building	10:30	:	:	:	:
MEANS OF TRAVEL					
1. Drove a car	1	1	1	1	1
2. Rode in a car	2	2	2	2	2
3. Metrorail and walk	3	3	3	3	3
4. Metrorail and drive	4	4	4	4	4
5. Metrorail and bus	5	5	5	5	5
6. Bus only	6	6	6	6	6
7. Walk	(7)	7	7	7	7
8. Bicycle	8	8	8	8	8
9. Other (specify)	9_____	9_____	9_____	9_____	9_____
PURPOSE OF TRIP					
1. Job-related business	1	1	1	1	1
2. Personal business	2	2	2	2	2
3. Meal or snack	3	3	3	3	3
4. Shopping	(4)	4	4	4	4
5. Educational	5	5	5	5	5
6. Recreational	6	6	6	6	6
7. Other (specify)	7_____	7_____	7_____	7_____	7_____
DESTINATION					
1. District of Columbia	(1)	1	1	1	1
2. Fairfax County	2	2	2	2	2
3. Arlington	3	3	3	3	3
4. Alexandria	4	4	4	4	4
5. Falls Church	5	5	5	5	5
6. Fairfax City	6	6	6	6	6
7. Elsewhere in Virginia	7	7	7	7	7
8. Prince Georges County	8	8	8	8	8
9. Montgomery County	9	9	9	9	9
10. Elsewhere in Maryland	10	10	10	10	10
11. Other (specify)	11_____	11_____	11_____	11_____	11_____
LENGTH OF TRIP IN MILES (For short trips you may list no. of blocks and designate with "B")	0.1	_____	_____	_____	_____
Time you returned to this building	10:50	:	:	:	:



Washington Metropolitan Area Transit Authority

600 Fifth Street, N.W., Washington, D.C. 20001
(202) 962-1234

AUG 2 1 1986

Dear Washington Metropolitan Area Employer:

The Washington Metropolitan Area Transit Authority (WMATA) has enlisted the services of JHK & Associates, a transportation engineering consulting firm, to conduct a study of travel characteristics around several Metrorail stations in the Washington region. Essential to this study is development of a database of travel characteristics at existing offices, shopping areas, hotels and residential dwellings. This information will assist in providing better planning information for WMATA and for other local agencies.

The enclosed questionnaires request information from each employee in your office about their daily travel patterns. We are seeking your assistance in distributing the questionnaires to each of your employees and collecting them once they have been filled out completely. We realize that this may be a slight inconvenience to you, however, we believe that the investment of this short amount of time on your part (approximately four minutes per employee) will be worth the effort in our planning for better transportation in the Washington Metropolitan Area.

A representative from JHK & Associates will return to collect the surveys in approximately three days unless you have made other arrangements. We greatly appreciate your cooperation. If you have any questions concerning the survey you may contact Sandra Woods, of JHK & Associates at (703) 370-2411.

Very truly yours,

William I Herman
Director of Planning

Figure 9. Letter from WMATA to Office Managers

An approach was also developed to survey visitors to office buildings. However, due to the nature of the tenants of the buildings surveyed, the visitor surveys were not as successful. The method involved distributing a number of visitor surveys, accompanying instructions, and folders to each office. It required the receptionist to ask visitors to complete the form, a sample of which is shown in Figure 10. The number of survey responses from visitors was much smaller than had been hoped for. In some cases, there were relatively few visitors; in others, cooperation from the employers was lacking. However, an estimate of the number of visitors to each office was obtained from the receptionist. From this estimate and the number of completed surveys, it could be calculated that approximately 13 percent of the visitors were surveyed.

Analysis

The workplace survey form was designed to request information about the respondent, the commute trip, parking or transit costs, and mid-day trips. The completed survey forms were sent out for keypunching on microcomputer diskettes using a database program (dBase III Plus) with 100 percent verification. The microcomputer-based statistical software package, CRISP, was then used to compute frequencies and/or means for each variable and crosstabs of selected variables. Many frequencies and crosstabulations were created and are available as an appendix, contained in a separate volume.

The following summary tables were derived from the CRISP outputs for the each office building:

- Work trip mode shares
- Work trip mode share by resident location
- Mode share for mid-day trips by trip destination
- Mode share for non-walk, mid-day trips by destination
- Mode share for mid-day trips by trip purpose
- Mode share for visitors.

Part of the analysis involved testing the effect of weighting the survey responses by employer size. The tests indicated that there was little difference between the

WASHINGTON METROPOLITAN AREA TRANSPORTATION SURVEY
(VISITOR SURVEY)

This survey is part of a continuing effort approved by the Washington Metropolitan Council of Governments to plan for the transportation needs of the Washington Region. The purpose of this questionnaire is to find out what means of travel are used by visitors to this building. We would greatly appreciate your help by answering the following questions. After you complete the questionnaire return it to the same place at which you picked up the survey.

NOTE: If you came together in a group, please have only one member of the group complete the questionnaire. If you are making stops in several offices of this building, fill out this form for one stop only. Thank you for your assistance.

Today's Date: _____ Name of office visited: _____

1. Time you arrived at this building: (List time and circle AM or PM) ___:___ 1. AM 2. PM

2. How many people came in a group with you? Please include yourself. If you came by yourself, answer "1." _____

3. How did you get to this building? (Circle One)
   1. Auto
   2. Walk
   3. Metrorail
   4. Bus
   5. Company of government shuttle
   6. Taxi
   7. Other (Please Specify) _____

4. Will you return the same way? (Circle One)
   1. Yes
   2. No

5. If no, what mode of transportation will you use? (Circle One)
   1. Auto
   2. Walk
   3. Metrorail
   4. Bus
   5. Company or government shuttle
   6. Taxi
   7. Other (Please Specify) _____

ANSWER QUESTION 6, IF YOU DID NOT DRIVE TO THIS BUILDING. OTHERWISE, SKIP TO QUESTION 7.

6. Was a car available for your trip to this building? (Circle One)
   1. Yes
   2. No

7. Where did your trip originate? (Circle One)
   1. District of Columbia
   2. Fairfax County
   3. Rosslyn
   4. Crystal City
   5. Elsewhere in Arlington
   6. Alexandria
   7. Falls Church
   8. Fairfax City
   9. Silver Spring Business District
   10. Elsewhere in Montgomery County
   11. Prince Georges County
   12. Elsewhere (Please Specify) _____

8. What was the approximate length of your trip in miles? (Specify to nearest tenth if less than one mile) _____ miles

9. What time do you expect to leave this building? (List time and circle AM or PM) ___:___ 1. AM 2. PM

Figure 10. Sample Visitor Survey

weighted and unweighted results (usually less than two percentage points difference), and therefore, the unweighted responses were tabulated. Weighting the responses in this case also increases the risk of indicating a falsely high or low proportion, if employer weighting factors are large. Weighted responses also make it more difficult to evaluate the statistical confidence with which to view the results.

It is important to understand the statistical limitations of the data prior to discussing the results. Because the surveys represent only a sample of all trips to and from a building, there is a degree of error associated with the results. Assuming a distribution of the data and knowing the sample size, estimates of this error can be made. Appendix A explains the statistical aspects in more detail and provides a table indicating the 95 percent confidence limits that can be placed on various values and sample size combinations. The smaller the sample, the wider the confidence limits. Particular caution is needed in interpreting crosstabulated data as the number of responses represented by any one cell may be very small.

Results

Work Trip Characteristics

Table 2 illustrates the mode share (auto vs. transit) for the commute trip to each office building. These results illustrate a relatively high percentage of commute trips by transit for both the downtown sites and for those further out. As would be expected, however, the transit percents for the downtown sites were consistently higher. The downtown offices located within 1,000 feet of a Metrorail station realized a transit mode share of greater than 50 percent. The remaining downtown office, at 2,800 feet from the station, indicated approximately 37 percent transit ridership. In comparison, an office building located 2,500 feet from the Crystal City Metro station indicated only 7.7 percent of those surveyed rode transit.

When the variables transit percent vs. distance from the Metro station were represented graphically for the commute trip, two distinct trends could be identified, one for the downtown offices and another for the offices located outside the downtown area - these will be called suburban sites, but generally reflect those suburban sites that are closer in (see Figure 11). The data appears to support the hypothesis that offices located closer to the Metrorail station portals exhibit a higher percent of transit users than those located further away. This relationship is examined in more detail in Chapter 3.

Table 2. Mode Share for the Commute Trip to Office Buildings[1/]

Metrorail Station	Office Buildings	Distance to Station	Auto	Rail	Bus	Walk	Other	Sample Size	Summary % Auto	Summary % Transit
Metro Center and Farragut West	International Square	200	42.4	48.9	5.4	2.7	0.7	297	42.4	54.3
	NCPC Building	500	36.5	46.6	13.3	2.0	1.5	345	36.5	59.9
	Olmsted Building	700	45.4	43.5	6.6	2.8	2.0	106	45.4	50.1
	McKee Building	900	32.5	50.5	9.0	7.5	0.5	188	32.5	59.5
	Realtor's Building	1,200	28.3	45.6	15.2	8.7	2.2	46	28.3	60.8
	Am. Inst. of Architects	2,800	55.9	27.4	9.3	5.7	1.7	227	55.9	36.7
Rosslyn	1300 N. 17th Street	800	80.0	19.2	0.0	0.7	0.8	135	80.0	19.2
	AM Building	1,000	73.4	24.3	0.8	0.8	0.0	128	73.4	25.1
	Air Force Association	2,200	85.3	13.3	0.0	1.5	0.0	68	85.3	13.3
Crystal City	Crystal Mall 1	200	81.3	16.3	1.0	1.2	0.2	508	81.3	17.3
	Crystal Square 2	1,000	77.2	17.4	2.1	2.7	0.7	746	77.2	19.5
	2711 Jeff-Davis	2,500	90.2	5.4	2.3	0.8	1.9	132	90.2	7.7
Van Ness-UDC	Van Ness Station	100	72.8	21.1	3.8	1.4	1.0	209	72.8	24.9
	Intelsat	300	68.4	27.9	1.3	2.5	0.0	79	68.4	29.2
Silver Spring	1100 Wayne Avenue	200	75.8	19.5	4.2	0.5	0.0	190	75.8	23.7

1/ Source: Workplace Surveys

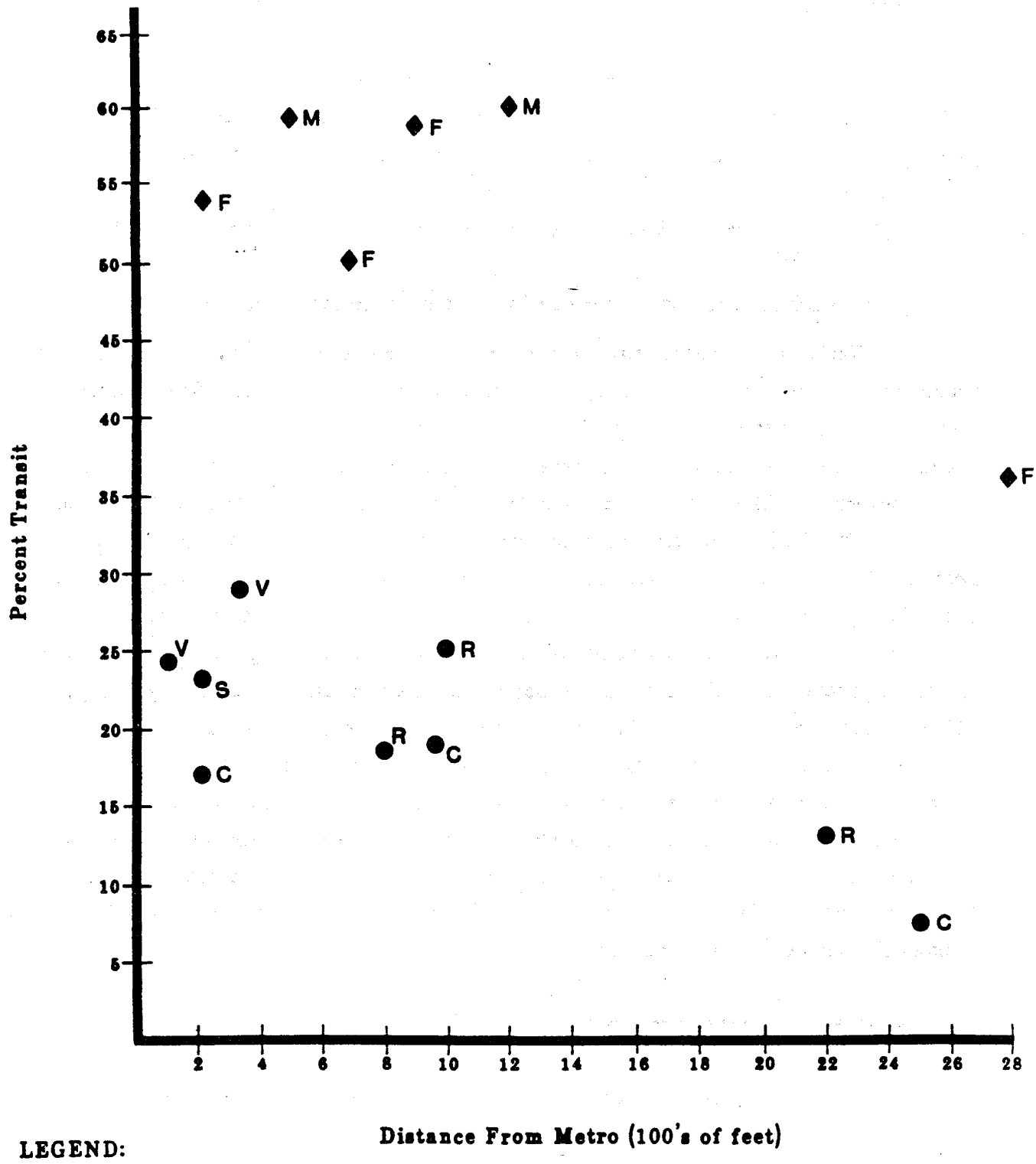


Figure 11. Distance - Transit Relationship for Office Buildings

Another factor that influences transit ridership is the cost of travel. Table 3 illustrates the cost of parking vs. the cost of transit use for each site. In all cases, the downtown office buildings experienced a higher parking cost than transit cost, while the reverse is true for all the offices located in the suburban sites. The monthly parking cost and the number of available parking spaces is included on Table 1.

Table 4 presents a summary of the following:

- For all office buildings, the percent of employees that reside in each jurisdiction
- For each location, the percent of transit vs. auto utilization

Study of Table 4 indicates that residence location substantially influences the propensity to take transit, especially for the non-downtown sites. The building in Silver Spring, for example, has a higher work trip transit percentage than was initially expected (nearly double the percentage from the 1978 survey for the Silver Spring Metro Before and After Study). Examination of the residence locations indicates that nearly one-third of the employees come from Virginia or the District and that a high percentage of these take Metrorail. The implication of this is that Metrorail accessibility opens up a substantial labor pool that might not otherwise be available.

To assist in the interpretation of Table 4, the data were aggregated into three residence location groups: District of Columbia, Virginia, and Maryland (including the offices located at Van Ness). The results were averaged and summarized further in Table 5. Findings from this table indicate that of those working downtown there is almost an equal draw from the District of Columbia, Virginia, and Maryland and that the transit/auto mode shares are fairly consistent. However, for the Virginia and Maryland buildings, the majority of employees live within the same state and exhibit the lowest transit ridership. Those traveling across the D.C., Maryland, or Virginia lines exhibit higher transit ridership.

Mid-day Trip Characteristics

Table 6 summarizes mid-day trips by trip purpose. Each cell of the table provides the following information:

- For each office building, the percent of the total mid-day trips for each purpose
- For each mid-day trip purpose the percent utilizing transit and auto, respectively

Table 3. Transit vs. Parking Costs for Office Employees[1/]

Metrorail Station	Office Buildings	Distance to Station	Transit Cost/Day[2/] Mean	Transit Cost/Day[2/] No.	Transit Cost/Day[2/] Percentage	Parking Cost/Day[3/] Mean	Parking Cost/Day[3/] No.	Parking Cost/Day[3/] Percentage	Free Parking[4/] Free	Free Parking[4/] Co. Pays	Free Parking[4/] % Free
Metro Center and Farragut West	International Square	200	3.71	147	62 0	4.93	38	16.0	5	47	22.0
	NCPC Building	500	3.14	179	70.2	5.92	59	23.1	5	12	6.7
	Olmsted Building	700	2.88	35	50.0	6.15	20	28.6	6	9	21.4
	McKee Building	900	3.82	82	60.7	5.83	26	19.3	2	25	20.0
	Realtor's Building	1,200	3.60	6	37.5	4.76	4	25.0	0	6	37.5
	Am. Inst. of Architects	2,800	2.94	72	41.4	5.26	52	29.9	11	39	28.7
Rosslyn	1300 N. 17th Street	800	3.40	24	19.4	3.20	3	2.4	17	80	78.2
	AM Building	1,000	3.82	30	26.1	3.59	29	25.2	11	45	48.7
	Air Force Association	2,200	3.76	4	6.7	1.12	5	8.3	21	30	85.0
Crystal City	Crystal Mall 1	200	3.57	77	17.9	1.08	275	63.8	7	72	18.3
	Crystal Square 2	1,000	3.83	132	20.4	2.27	218	33.7	35	262	45.9
	2711 Jeff-Davis Highway	2,500	3.67	7	5.9	2.18	31	26.0	16	65	68.1
Van-Ness-UDC	Van Ness Station	100	3.61	43	23.9	1.29	25	13.9	18	94	62.2
	Intelsat	300	3.66	20	29.4	2.65	27	39.7	4	17	30.9
Silver Spring	1100 Wayne Avenue	200	4.23	36	21.2	1.68	93	54.7	4	37	24.1

1/ Source: Workplace Surveys.

2/ Transit costs include fare plus parking cost, if any.

3/ For those that had a parking cost.

4/ Free parking includes those that find on-street free parking and those that have parking paid by their employer.

Table 4. Transit/Auto Mode Share by Employee's Residence for Work Trips to Office Locations[1/]

Metrorail Station	Office Building	Distance to Station	Location of Residence: District of Columbia	Fairfax County	Arlington	Alexandria	Elsewhere in VA	Pr. Georges County	Montgomery County	Elsewhere in MD	Sample Size
Metro Center & Farragut West	International Sq.	200	13.6[2/] 52.5/25.0	23.4 43.5/56.5	15.3 77.8/22.8	8.5 44.0/56.0	5.4 25.0/68.8	10.2 53.3/43.3	16.6 55.1/44.9	7.1 10.0/90.0	295
	NCPC Building	500	30.4 65.7/25.7	6.7 43.5/56.5	4.1 85.7/14.3	4.6 50.0/43.8	3.5 33.3/58.3	36.2 59.2/40.0	10.1 68.6/31.4	4.4 40.0/60.0	345
	Olmsted Building	700	26.4 53.6/28.6	22.6 37.5/62.5	8.5 44.4/55.6	12.3 38.5/61.5	1.9 0.0/100	6.6 42.9/57.1	18.9 80.0/20.0	2.3 33.3/66.7	106
	McKee Building	900	23.5 50.0/15.9	14.4 59.3/40.7	11.2 66.7/33.3	8.6 68.8/31.2	5.4 66.0/40.0	13.9 69.2/38.8	18.2 64.7/35.3	4.8 22.2/77.8	187
	Realtor's Building	1,200	32.6 60.0/6.7	15.2 71.4/28.6	4.4 50.0/50.0	4.4 0.0/100	2.2 0.0/100	6.5 100/0.0	30.4 71.4/28.6	4.3 0.0/100	46
	American Institute of Architects	2,800	33.2 44.0/33.3	16.4 13.5/86.5	10.6 33.3/66.7	4.9 27.3/72.7	3.1 28.6/71.4	11.5 34.6/65.4	14.6 54.6/45.4	5.8 38.5/61.5	226
Rosslyn	1300 N. 17th St.	800	7.4 80.0/20.0	39.3 5.7/94.3	12.6 11.8/82.4	8.2 27.3/72.7	4.4 0.0/100	6.7 33.3/66.7	15.6 28.6/71.4	5.9 12.5/87.5	135
	AM Building	1,000	5.5 71.4/28.6	33.6 16.3/81.4	14.1 22.2/72.2	10.9 21.4/78.6	6.3 12.5/87.5	7.0 55.6/44.4	15.6 20.0/80.0	7.0 33.3/66.7	128
	Air Force Assoc. Building	2,200	7.4 40.0/40.0	36.8 8.0/92.0	7.4 0.0/100	7.4 20.0/80.0	11.8 0.0/100	14.7 20.0/80.0	5.9 0.0/100	8.8 33.3/66.7	68
Crystal City	Crystal Mall 1	200	6.3 43.8/56.3	42.2 11.7/88.3	8.5 14.0/72.1	14.4 20.5/78.1	10.9 5.5/94.5	9.5 29.2/70.8	4.9 28.0/72.0	3.4 11.8/88.2	507
	Crystal Square 2	1,000	3.5 50.0/46.2	40.7 13.4/72.3	11.0 12.2/63.4	12.8 23.2/75.8	10.7 18.8/81.3	9.9 16.2/83.8	6.6 38.8/61.2	4.8 19.4/80.6	745
	2711 Jeff-Davis Highway	2,500	5.3 28.6/71.4	27.3 2.8/97.2	9.9 0.0/92.3	13.6 5.6/83.3	7.6 10.0/90.0	10.6 14.3/85.7	15.9 4.8/95.2	9.9 15.4/84.6	132
Van Ness-UDC	Van Ness Station	100	29.7 40.3/51.6	11.5 12.5/87.5	3.8 0.0/100	2.9 33.3/66.7	2.4 40.0/60.0	20.1 23.8/76.2	24.9 17.3/82.7	4.8 10.0/90.0	209
	Intelsat	300	10.1 50.0/25.0	22.8 11.1/88.9	8.9 28.6/71.4	7.6 16.7/83.3	1.3 0.0/100	6.3 0.0/100	38.0 43.3/53.3	5.1 0.0/100	79
Silver Spring	1100 Wayne Avenue	200	15.3 48.3/51.7	10.1 26.3/73.7	6.4 58.3/41.7	3.7 57.1/42.9	1.6 0.0/100	23.3 15.9/84.1	26.5 8.2/89.8	13.2 4.2/95.8	189

1/ Source: Workplace Surveys

2/ 13.6 Percent of trips by location of residence

Table 5. Summary Analysis of Transit/Auto Mode Share by Employee Residence Location for Worktrips[1/]

Office Location	Sample Size	Location of Residence: District of Columbia	Virginia Average	Maryland Average
Metro Center/ Farragut West	1,205	26.6[2/] 45.6/22.5	36.3 38.8/57.4	37.2 49.9/50.4
Rosslyn/Crystal City	1,715	5.9 52.3/43.7	67.1 10.7/84.6	27.1 23.0/77.0
Silver Spring/Van Ness	477	18.5 46.2/42.8	27.5 23.6/76.4	54.0 13.6/85.8

1/ Source: Workplace surveys

2/ 26.6 Percent of trips by location of residence
45.6/22.5 Percent transit/auto mode share for each location

Table 6. Transit/Auto Mode Share by Purpose of Mid-day Trip for Office Employees[1/]

Metrorail Station	Office Building	Distance to Station	Purpose of Mid-Day Trip: Job-related Business	Personal Business	Meal or Snack	Shopping	Educational	Recreational	Other	Sample Size
Metro Center and Farragut West	International Sq.	200	40.0[2/] 47.7/24.6	16.1 7.7/1.9	29.8 2.1/2.1	7.1 8.7/0.0	0.9 66.7/0.0	6.2 5.0/0.0		325
	NCPC Building	500	20.8 6.6/21.1	18.6 10.3/1.5	47.1 0.0/0.6	9.9 0.0/0.0	0.5 0.0/0.0	3.0 0.0/0.0		365
	Olmsted Building	700	36.0 8.3/44.4	17.0 0.0/0.0	36.0 5.5/0.0	7.0 14.3/0.0	2.0 50.0/0.0	2.0 0.0/0.0		100
	McKee Building	900	36.2 20.9/13.4	14.1 3.8/3.8	42.2 0.0/0.0	6.5 8.3/0.0		1.1 0.0/0.0		185
	Realtor's Building	1,200	34.0 17.6/23.5		66.0 0.0/0.0					50
	American Institute of Architects	2,800	21.0 11.1/37.8	14.5 9.7/9.7	48.6 0.0/0.0	10.3 4.5/0.0	1.4 0.0/33.3	4.2 0.0/22.2		214
Rosslyn	1300 N. 17th St.	800	36.8 9.5/71.4	18.4 4.8/38.1	39.5 4.4/8.9	2.6 0.0/66.7		2.6 0.0/33.3		114
	AM Building	1,000	50.0 33.3/49.0	6.9 28.6/28.6	37.3 2.6/5.2	3.9 0.0/25.0		2.0 0.0/50.0		102
	Air Force Assoc. Building	2,200	47.3 30.8/69.2	5.5 0.0/100.0	41.8 0.0/78.2	5.5 0.0/33.3				55
Crystal City	Crystal Mall 1	200	26.8 16.8/30.1	17.6 4.1/37.8	46.6 0.0/10.2	7.4 0.0/0.9	0.2 100/0.0	1.4 0.0/16.7		421
	Crystal Square 2	1,000	51.5 10.1/20.2	11.8 7.2/32.4	29.6 0.7/13.6	4.4 2.4/14.6	0.1 0.0/100	2.6 0.0/16.7		941
	2711 Jeff-Davis Highway	2,500	69.1 0.9/7.0	5.5 0.0/55.6	22.4 0.0/24.3	1.8 0.0/66.7	1.2 0.0/50.0			165
Van Ness-UDC	Van Ness Station	100	21.0 6.7/26.7	14.0 30.0/30.0	53.3 3.5/8.8	7.9 5.9/11.8	1.4 33.3/66.7	2.3 0.0/25.0		214
	Intelsat	300	2.5 0.0/100	30.0 0.0/25.0	37.5 6.7/6.7	20.0 0.0/12.5		7.5 0.0/0.0	2.5 0.0/0.0	40
Silver Spring	1100 Wayne Avenue	200	18.4 14.3/42.9	10.5 0.0/37.5	56.6 0.0/14.0	6.6 20.0/0.0		3.9 0.0/0.0	3.9 0.0/33.3	76

1/ Source: Workplace Surveys

From this table, approximately three fourths of the mid-day trips (76.4 percent) were made for job-related business or for a meal or snack. Job-related business accounted for approximately one third of the total mid-day trips.

Because the surveyed buildings were all located in higher density areas, a large fraction of mid-day trips by employees were walk trips. For the meal or snack category, both transit and auto ridership was very low (i.e., walk was high). Transit ridership varied from zero to 6.7 percent for this category. However, the percentage of auto use was very low except for a couple of office buildings located further than 2,000 feet from the station. Walking accounted for at least 75 percent of the trips that were made for a meal or snack.

When only the non-walk mid-day trips were analyzed (Table 7), the job-related business trip percentage increased sharply, while the percentage of trips for a meal decreased sharply. Generally, the transit ridership for the job-related business trip percentage was encouraging at the downtown offices, while the results from the suburban offices were inconsistent. As a word of caution, the sample sizes for the non-walk mid-day trips were very small in some cases and may not be representative or typical of what actually occurs.

The results of the crosstabulation of mid-day trip mode by destination of trip are contained in Table 8. This table contains information on:

- Percent of mid-day trips to each destination by office building
- Transit/auto mode split for each destination.

Because walking was the predominant mode of travel (75 percent for mid-day trips), Table 9 was calculated utilizing only non-walk mid-day trips. Eliminating these walk trips essentially removed the short localized trips. For example, a large proportion of the trips from the downtown offices within the District were walk trips. Removing the walk trips dramatically increased the percentage of trips made to Virginia or Maryland. Table 10 represents an aggregation of the destinations and sites into a simplified 3 x 4 matrix, allowing for easier interpretation. The Virginia and Maryland columns are statistically more reliable, although the data are not distinguished by distance from the station. The trips from the offices located outside the downtown area to areas in Virginia or Maryland exhibit a very small transit ridership percentage. However, the trips to or from the District, where Metrorail access is the greatest, exhibit a large transit ridership percentage. The implication of this is that a high percentage of mid-day office-to-office trips will take place by Metrorail as long as rail access is good at both ends of the trip. This fact should affect land use decisions

Table 7. Purpose of Non-walk Mid-day Trips for Office Buildings[1/]

Metrorail Station	Office Building	Distance to Station	Purpose of Mid-Day Trip: Job-related Business	Personal Business	Meal or Snack	Shopping	Educational	Recreational	Other	Sample Size
Metro Center and Farragut West	International Square	200	85.5[2/] 66.0/34.0	4.6 80.0/20.0	3.6 50.0/50.0	1.8 100/0.0	1.8 100/0.0	0.9 100/0.0	0.9 50.0/50.0	110
	NCPC Building	500	78.4 60.0/40.0	15.7 87.5/12.5	2.0 0.0/100				3.9 0.0/100	51
	Olmsted Building	700	82.6 15.8/84.2		8.7 100/0.0	4.4 100/0.0	4.3 100/0.0			23
	McKee Building	900	88.5 60.9/39.1	7.7 50.0/50.0		3.8 100/0.0				26
	Realtor's Building	1,200	100 42.9/57.1							7
	American Institute of Architects	2,800	65.5 26.3/73.7	20.7 50.0/50.0		3.5 100/0.0	3.5 0.0/100	6.9 0.0/100		29
Rosslyn	1300 N. 17th Street	800	65.4 11.8/88.2	17.3 11.1/88.9	11.5 33.3/66.7	3.9 0.0/100		1.9 0.0/100		52
	AM Building	1,000	82.4 40.5/59.5	7.8 50.0/50.0	5.9 33.3/66.7	2.0 0.0/100		2.0 0.0/100		51
	Air Force Assoc. Building	2,200	53.2 28.0/72.0	6.4 0.0/100	38.3 0.0/100	2.1 0.0/100				47
Crystal City	Crystal Mall 1	200	48.2 35.9/64.1	28.2 9.7/90.3	18.2 0.0/100	2.7 0.0/100	0.9 100/0.0	0.9 0.0/100	0.9 0.0/100	110
	Crystal Square 2	1,000	62.2 37.3/62.7	18.3 26.7/73.3	17.1 0.0/100			1.2 0.0/100	1.2 0.0/100	82
	2711 Jeff-Davis Highway	2,500	34.6 11.1/88.9	19.2 0.0/100	34.6 0.0/100	7.7 0.0/100	3.9 0.0/100			26
Van Ness-UDC	Van Ness Station	100	27.3 20.0/80.0	32.7 50.0/50.0	25.5 28.6/71.4	5.5 33.3/66.7	5.5 66.7/33.7	1.8 0.0/100	1.8 0.0/100	55
	Intelsat	300	14.3 0.0/100	42.9 0.0/100	28.6 50.0/50.0	14.3 0.0/100				7
Silver Spring	1100 Wayne Avenue	200	42.1 50.0/50.0	15.8 0.0/100	31.6 0.0/100	5.3 100/0.0			5.3 0.0/100	19

1/ Source: Workplace Surveys

2/ 85.5 Percent of Non-walk trips by purpose

Table 8. Transit/Auto Mode Share by Destination of Mid-day Trips for Office Employees[1/]

Metrorail Station	Office Building	Distance to Station	Destination of Mid-Day Trip: District of Columbia	Fairfax County	Arlington	Alexandria	Elsewhere in VA	Pr. Georges County	Montgomery County	Elsewhere in MD	Sample Size
Metro Center & Farragut West	International Square	200	89.2[2/] 17.4/7.1	0.6 100/0.0	5.7 72.2/16.7	2.2 49.2/49.2	0.9 66.7/33.3	1.3 75.0/25.0			315
	NCPC Building	500	97.2 7.2/5.2		0.6 100/0.0	0.3 0.0/100	0.3 100/0.0	0.6 100/0.0	0.6 50.0/50.0	0.6 50.0/0.0	358
	Olmsted Building	700	95.9 7.1/13.8	1.0 0.0/100	1.0 100/0.0				1.0 0.0/100	1.0 0.0/0.0	98
	McKee Building	900	97.5 14.3/11.2	1.0 0.0/100	1.0 50.0/50.0			0.5 100/0.0			202
	Realtors Building	1,200	94.1 6.3/2.1	1.0 0.0/100					5.9 0.0/100		51
	American Institute of Architects	2,800	95.8 3.4/6.3	0.5 0.0/100	1.4 33.3/66.7	1.4 0.0/100		0.5 0.0/100	0.5 100/0.0		214
Rosslyn	1300 N. 17th Street	800	13.9 31.2/68.8	4.4 0.0/100	70.4 3.7/21.0	4.4 20.0/60.0	1.7 0.0/100	0.9 0.0/100	2.6 0.0/100	1.7 0.0/100	115
	AM Building	1,000	31.0 48.4/41.9	4.0 0.0/100	52.0 5.8/13.5	5.0 20.0/60.0	6.0 0.0/33.3	2.0 0.0/100			100
	Air Force Association Building	2,200	32.7 27.8/66.7	1.8 0.0/100	60.0 36.4/72.7		1.8 0.0/100	1.8 0.0/100	1.8 0.0/100		55
Crystal City	Crystal Mall 1	200	6.8 39.3/57.1	4.4 11.1/72.2	80.0 2.7/10.9	6.0 4.0/68.0	1.9 0.0/12.5	0.5 0.0/50.0	0.2 0.0/100	0.2 0.0/0.0	414
	Crystal Square 2	1,000	4.6 40.5/50.0	3.0 17.8/54.0	82.3 3.3/9.7	5.8 1.9/79.2	1.1 0.0/30.0	0.7 0.0/100	1.5 0.0/92.9	1.0 11.1/66.7	940
	2711 Jefferson Davis Highway	2,500	3.7 16.7/66.7	1.2 0.0/100	82.8 0.0/6.9	4.9 0.0/87.5			1.8 0.0/100	0.6 0.0/0.0	164
Van Ness-DC	Van Ness Station	100	94.5 8.7/14.0		0.9 0.0/100	0.5 0.0/100			1.4 0.0/100	2.7 0.0/0.0	219
	Intelsat	300	94.9 2.7/10.8					2.6 0.0/100	2.6 0.0/100		39
Silver Spring	1100 Wayne Avenue	200	8.0 50.0/33.3					2.7 0.0/0.0	81.3 0.0/23.0	8.0 0.0/0.0	75

1/ Source: Workplace Surveys

2/ 89.2 Percent of trips by destination
17.4/17.1 Percent transit/auto mode share for each destination

Table 9. Destination of Non-walk Mid-day Trips for Office Employees[1/]

Metrorail Station	Office Building	Distance to Station	Destination of Mid-day Trip: District of Columbia	Fairfax County	Arlington	Alexandria	Elsewhere in VA	Pr. Georges County	Montgomery County	Elsewhere in MD	Sample Size
Metro Center & Farragut West	International Square	200	65.1[2/] 71.0/29.0	1.9 100/0.0	15.1 81.3/18.7	5.7 50.0/50.0	2.8 66.7/33.3	3.8 75.0/25.0	5.7 16.7/83.3		106
	NCPC Building	500	82.7 53.6/46.4		3.8 100/0.0	1.9 0.0/100	1.9 100/0.0	3.8 100/0.0	3.8 0.0/100	1.9 100/0.0	52
	Olmsted Building	700	87.0 35.0/65.0	4.3 0.0/100	4.3 100/0.0				4.3 0.0/100		23
	McKee Building	900	83.3 56.0/44.0	6.7 0.0/100	6.7 50.0/50.0			3.3 100/0.0			30
	Realtor's Building	1,200	57.1 75.0/25.0						42.9 0.0/100		7
	American Institute of Architects	2,800	69.0 31.0/69.0	3.4 0.0/100	10.3 33.3/66.7	10.3 0.0/100		3.4 0.0/100	3.4 100/0.0		29
Rosslyn	1300 N. 17th Street	800	30.2 31.2/68.8	9.4 0.0/100	37.7 15.0/85.0	7.6 25.0/75.0	3.8 0.0/100	1.9 0.0/100	5.7 0.0/100	3.8 0.0/100	53
	AM Building	1,000	56.0 53.6/46.4	8.0 0.0/100	20.0 30.0/70.0	8.0 25.0/75.0	4.0 0.0/100	4.0 0.0/100			50
	Air Force Association Building	2,200	38.6 29.4/70.6		59.1 7.7/92.3		2.3 0.0/100				44
Crystal City	Crystal Mall 1	200	25.5 40.7/59.3	12.3 7.7/92.3	42.5 20.0/80.0	17.0 5.6/94.4	0.9 0.0/100	0.9 0.0/100	0.9 0.0/100		106
	Crystal Square 2	1,000	16.3 44.6/55.3	10.7 48.0/52.0	42.1 25.5/74.5	18.5 2.2/97.8	1.3 0.0/100	2.6 0.0/100	5.6 0.0/100	3.0 14.3/85.7	233
	2711 Jeff-Davis Highway	2,500	18.5 20.0/80.0	7.4 0.0/100	37.0 0.0/100	26.0 0.0/100			11.1 0.0/100		27
Van Ness-UDC	Van Ness Station	100	88.9 39.6/60.4	1.9 0.0/100	3.7 0.0/100			1.8 0.0/100	3.7 0.0/100		54
	Intelsat	300	71.4 20.0/80.0					14.3 0.0/100	14.3 0.0/100		7
Silver Spring	1100 Wayne Avenue	200	26.3 60.0/40.0						73.7 0.0/100		19

1/ Source: Workplace Surveys

Table 10. Summary Analysis of Transit/Auto Mode Share of Non-walk Mid-day Trips for Office Buildings[1/]

Office Location	Sample Size	Destination of Mid-day Trip: District of Columbia	Virginia	Maryland
Metro Center/ Farragut West	247	74.1[2/] 53.6/46.4	13.2 49.5/50.5	12.7 89.6/10.4
Rosslyn/Crystal City	513	30.9 36.6/63.4	62.6 9.8/90.2	6.5 2.4/97.6
Silver Spring	19	26.3 60.0/40.0	0.0 0.0/0.0	73.7 0.0/100
Van Ness-UDC	61	80.1 29.8/70.2	2.8 0.0/100	17.1 0.0/100

1/ Source: Workplace surveys

2/ 74.1 Percent of non-walk trips by destination of mid-day trips
53.6/46.4 Percent transit/auto mode share for each destination

not only at the downtown stations but also at the suburban stations. Locating office buildings at suburban stations should have the effect of increasing mid-day transit ridership through job-related trip interchange between that location and offices near other rail stations. Suburban employers with substantial business downtown would be most ideally situated near rail stations. An indirect effect of making mid-day job-related trips accessible by transit is the greater possibility of those suburban employees commuting to their offices by transit (e.g. a feeder bus service), since their car would be needed less frequently for mid-day travel.

Office Visitors

As mentioned previously, the response rate from the visitor surveys was low (about 13 percent of the visitors estimated by the employers surveyed). The mode share of visitors for four office buildings is shown on Table 11. The Metro Center office building had the highest transit percentage. The remaining three sites each had nearly twenty percent transit even though the distance from the station varied. The purpose of the trips may have influenced transit ridership. For example, the majority of the trips to the AM Building were to a dental office and to the Van Ness Station to visit the University of the District of Columbia credit union. As a result, the auto ridership was high at the AM Building and the number of walking trips high at the Van Ness Station.

RESIDENTIAL

Eight residential developments were surveyed via a mail-back home-based survey or telephone interview. In either case, the primary objective was to obtain information on the trip-making characteristics of residents. Site characteristics are contained on Table 12. For both types of surveys, survey responses were obtained from typically 15 percent of the total number of dwelling units.

Data Collection

The mail-back home-based surveys (see Figure 12) were distributed to four of the eight residential developments. Managers of several complexes allowed the surveys to

Table 11. Mode Share for Visitors to Office Buildings[1/]

rorail Station	Office Buildings	Distance to Station	Auto	Rail	Bus	Walk	Other	Sample Size	Summary % Auto	Summary % Transit
ragut West	International Square	200	21.4	28.6	0.0	42.9	7.1	14	21.4	28.6
slyn	AM Building	1,000	68.2	18.2	0.0	9.1	4.6	22	68.2	18.2
stal City	Crystal Square 2	1,000	51.5	18.2	3.0	24.2	3.0	33	51.5	21.2
Ness-UDC	Van Ness Station	100	31.6	13.2	5.3	50.0	0.0	38	31.6	18.5

Source: Visitor Surveys

Table 12. Site Characteristics of Residential Developments

Metrorail Station	Residential Development	Distance to Station	Number of Units: Total	EFF	1 BR	2 BR	3 BR	Percent Occupied	Number of Pkg. Spaces	Parking Cost/Month	Year Constructed
Rosslyn	River Place North	1,000	432	220	180	32	0	96	300	$75 indoor reserved $50 outdoor reserved $40 outdoor unreserved	1981
	Prospect House	2,200	268	83	100	85	0	100	361	owner: $10 renter: $50 outdoor $75 indoor	1964
Crystal City	Crystal Square Apts.	500	378	58	247	58	15	100	1/	1 space included in rent, additional space $45	1975
	Crystal Plaza Apts.	1,000	540	94	184	214	48	100	570 2/	1 space included in rent, additional space $45	
Van Ness-UDC	The Consulate	300	268	0	206	62	0	100	150	$65	1978
	Connecticut Heights	3,800	612	261	306	45	0	98	221	$50	1975
Silver Spring	Twin Towers	900	286	72	177	36	1	100	400 3/	$40	1966
	Georgian Towers	1,400	762	216	376	170	0	99	550	$50 reserved $35 unreserved	1968

1/ Shared parking with entire Crystal Square complex, tenants are guaranteed one space/dwelling unit, no waiting list at present time.

2/ Approximately 218 spaces rented out to area workers on a monthly basis, these employees must be out of garage by 5:30-6:00 pm.

3/ Includes parking for 50 hotel rooms.

WASHINGTON METROPOLITAN AREA TRAVEL SURVEY

004

This survey is part of a continuing effort, approved by the Washington Metropolitan Council of Governments to plan for the transportation needs of residents within the Washington Region. We would greatly appreciate your help by answering the following questions. The information obtained from this survey is completely confidential and will only be documented in summary form. Your name and address are not required. When you have completed this survey, please drop it in any mailbox. No postage is required. If you have further questions about this survey, please contact Sandra Woods at 370-2411. Thank you for your assistance.

1. Including yourself, how many people live in your household? Please indicate the number of people in each age group.

1. _____ Under 16	4. _____ 36 - 45
2. _____ 16 - 25	5. _____ 46 - 55
3. _____ 26 - 35	6. _____ 56 - 65
	7. _____ Over 65

2. How many vehicles are owned or regularly used by members of your household? (Include vans, pick-up trucks, and company cars kept at home) _____

3. What type of parking do you use at your residence? (Circle one for each vehicle)

	Vehicle No. 1	Vehicle No. 2	Vehicle No. 3
1. Lot or garage at residence	1	1	1
2. Other lot or garage	2	2	2
3. On-street metered parking	3	3	3
4. On-street free parking	4	4	4
5. Other (Please specify)	5 _____	5 _____	5 _____

4. In order to determine parking and transportation needs for residential developments, we would like to have each resident 16 years of age and over describe all the trips they made to and from your home during the last weekday before you received this form.

On the form, a single trip is defined as the time between when you left your home to the time you returned. The example provided below describes a trip in which the person left home at 7:30 AM by driving 3.5 miles to commute to work in Fairfax County. This person returned to their home in Alexandria at 12:10 PM for a meal or snack, again by driving 3.5 miles.

Please use the numbers below to fill out your response.

Means of Travel	Purpose of Trip	Origin or Destination of Trip
1. Drive a car	1. To or from work	1. District of Columbia
2. Ride in a car	2. Job-related business	2. Fairfax County
3. Metrorail only	3. Personal business	3. Rosslyn
4. Metrorail and auto	4. Meal or snack	4. Crystal City
5. Metrorail and bus	5. Shopping	5. Elsewhere in Arlington
6. Bus only	6. Educational	6. Alexandria
7. Walk only	7. Recreational	7. Silver Spring business district
8. Bicycle	8. Other	8. Elsewhere in Montgomery Co.
9. Other		9. Prince Georges County
		10. Elsewhere - please specify in Table

PLEASE FOLD HERE - STAPLE OR TAPE AND DROP IN ANY MAILBOX

Please have each resident answer the following questions and describe their trips in the spaces provided below. First, fill in the date for which you are filling out your trips here: 1/86

Resident 1 (16 years or older)

Sex: 1. Male 2. Female Employed 1. Yes 2. No Age to the nearest 10 years _____

Does this person have a current driver's license? 1. Yes 2. No

Did this person make any trips to or from home on the above date? 1. Yes 2. No If yes, describe trips below.

(See choices at bottom of page 1)

Trip No.		Time (Specify AM or PM)	Means of Travel	Purpose of Trip	Origin or Destination of Trip	Approximate Distance of Trip (Miles)
Example:	Left home	7:30 AM	1	1	To: 2	3.5
	Returned home	12:10 PM	1	4	From: 6	3.5
1	Left home	:			To:	
	Returned home	:			From:	
2	Left home	:			To:	
	Returned home	:			From:	
3	Left home	:			To:	
	Returned home	:			From:	
4	Left home	:			To:	
	Returned home	:			From:	

Resident 2 (16 years or older)

Sex: 1. Male 2. Female Employed 1. Yes 2. No Age to the nearest 10 years _____

Does this person have a current driver's license? 1. Yes 2. No

Did this person make any trips to or from home on the above date? 1. Yes 2. No If yes, describe trips below.

Trip No.		Time (Specify AM or PM)	Means of Travel	Purpose of Trip	Origin or Destination of Trip	Approximate Distance of Trip (Miles)
Example:	Left home	7:30 AM	1	1	To: 2	3.5
	Returned home	12:10 PM	1	4	From: 6	3.5
1	Left home	:			To:	
	Returned home	:			From:	
2	Left home	:			To:	
	Returned home	:			From:	
3	Left home	:			To:	
	Returned home	:			From:	
4	Left home	:			To:	
	Returned home	:			From:	

Figure 12. Sample Home-Based Survey

Resident 3 (16 years or older)

Sex: 1. Male 2. Female Employed 1. Yes 2. No Age to the nearest 10 years _____

Does this person have a current driver's license? 1. Yes 2. No

Did this person make any trips to or from home on the above date? If yes, describe trips below. 1. Yes 2. No

Trip No.		Time (Specify AM or PM)	Means of Travel	Purpose of Trip	Origin or Destination of Trip	Approximate Distance of Trip (Miles)
Example:	Left home	7:30AM	1	1	To: 2	3.5
	Returned home	12:10PM	1	4	From: 6	3.5
1	Left home	:			To:	
	Returned home	:			From:	
2	Left home	:			To:	
	Returned home	:			From:	
3	Left home	:			To:	
	Returned home	:			From:	
4	Left home	:			To:	
	Returned home	:			From:	

Resident 4 (16 years or older)

Sex: 1. Male 2. Female Employed 1. Yes 2. No Age to the nearest 10 years _____

Does this person have a current driver's license? 1. Yes 2. No

Did this person make any trips to or from home on the above date? If yes, describe trips below. 1. Yes 2. No

Trip No.		Time (Specify AM or PM)	Means of Travel	Purpose of Trip	Origin or Destination of Trip	Approximate Distance of Trip (Miles)
Example:	Left home	7:30AM	1	1	To: 2	3.5
	Returned home	12:10PM	1	4	From: 6	3.5
1	Left home	:			To:	
	Returned home	:			From:	
2	Left home	:			To:	
	Returned home	:			From:	
3	Left home	:			To:	
	Returned home	:			From:	
4	Left home	:			To:	
	Returned home	:			From:	

If you have any comments on transportation within the Washington Metropolitan area, please include them here. Thank you. _____

_____

_____

No Postage Necessary If Mailed in the United States

Business Reply Mail

First Class Permit No. 5991 Alexandria, VA

Postage Will Be Paid By Addressee

Washington Metropolitan
Area Travel Survey
4660 Kenmore Ave., Suite 1112
Alexandria, VA 22304

Figure 10 Sample Home-Based Survey (Continued)

be placed in the in-house mailbox by project staff or allowed a staff member to distribute the surveys to the door of each residence.

The remaining residential developments were surveyed exclusively by telephone interviewing. The interviews followed the same format as the mail-back survey. The interviews were conducted on Tuesdays, Wednesdays and Thursdays from 7:00 PM until 9:00 PM. The names and phone numbers of residents were obtained from the Haines Directory.

Analysis

Although the data collection techniques were different, both types of residential surveys were designed to obtain the same basic data, including socioeconomic, demographic, and trip-making data from a sample of households within selected dwelling units. The data structure is included in the technical appendices for both surveys. The frequencies and crosstabs computed for selected variables are also included in the technical appendices.

Similar to the office workplace surveys, certain summary tables were produced:

- overall modal split for all trips reported by residents
- transit/auto mode share by destination of trip
- transit/auto mode share by purpose of trip

Results

Table 13 illustrates the modal split for all trips from the residence for each development by distance from the station. Residential data were collected from two dwelling units at each of the four Metro stations where surveys were conducted: Rosslyn, Crystal City, Van Ness and Silver Spring. Due to the lack of residential developments of the size required for the study near the Farragut West and Metro Center stations, no data from the downtown is available for analysis. However, the percent of transit use for the suburban locations, like the results for office buildings, is substantial.

Figure 13 illustrates the distance vs. transit mode share relationship. The results were fairly consistent, with higher transit ridership typically occurring at residential buildings closer to a rail station. However, at Crystal City, the relationship was reversed. The data in Table 14 may help to explain at least part of the difference,

Table 13. Mode Share for Residential Developments[1/]

Metrorail Station	Residential Development	Distance to Station	Auto	Rail	Bus	Walk	Other	Sample Size	Summary % Auto	Summary % Transit
Rosslyn	River Place North	1,000	41.5	45.3	1.9	5.7	5.7	53	41.5	47.2
	River Place South	1,500	60.0	40.0	0.0	0.0	0.0	20	60.0	40.0
	Prospect House	2,200	81.8	18.2	0.0	0.0	0.0	44	81.8	18.2
Crystal City	Crystal Square Apts.	500	48.8	36.3	1.2	13.7	0.0	80	48.8	37.5
	Crystal Plaza Apts.	1,000	45.0	44.0	3.0	8.0	0.0	100	45.0	47.0
Van Ness-UDC	The Consulate	300	32.6	63.0	0.0	4.4	0.0	46	32.6	63.0
	Connecticut Heights	3,800	56.0	24.0	12.0	6.0	2.0	50	56.0	36.0
Silver Spring	Twin Towers	900	52.3	36.4	11.4	0.0	0.0	44	52.3	47.8
	Georgian Towers	1,400	43.1	34.7	6.9	9.7	4.2	72	43.1	41.6

1/ Source: Home-based surveys and telephone interviews

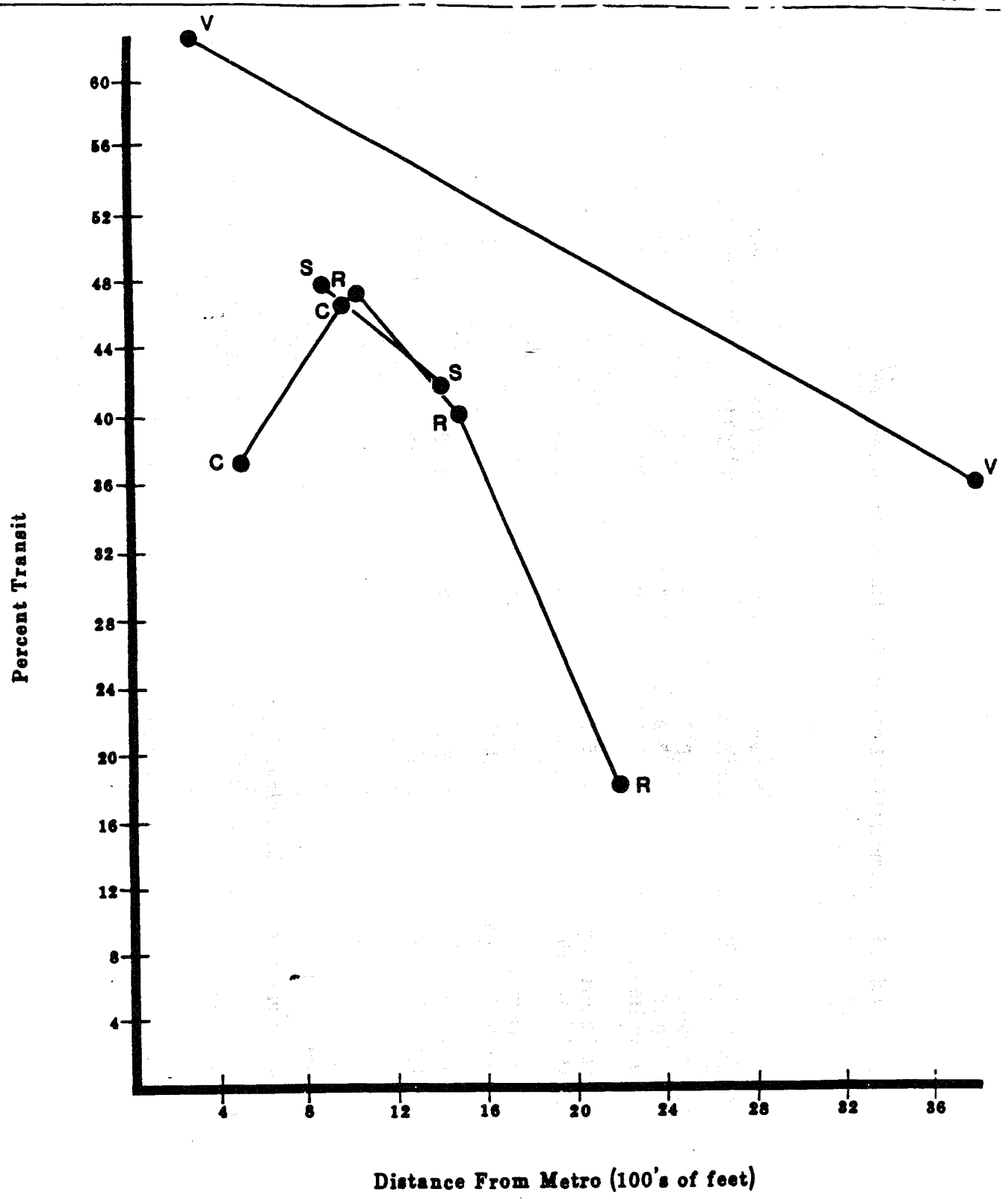


Figure 13. Distance-Transit Relationship for Residential Developments

Table 14. Demographic Data for Residential Developments[1/]

Metrorail Station	Residential Development	Distance to Station	Mean Age	Percent Not Employed	Mean Number of Vehicles/ Dwelling Unit	Mean Number of Residents/ Dwelling Unit
Rosslyn	River Place N.	1,000	33.3	12.1	1.32	1.42
	River Place S.	1,500	31.8	30.4	1.19	1.30
	Prospect House	2,200	45.0	28.9	1.56	1.74
Crystal City	Crystal Square Apts.	500	48.2	23.2	1.16	1.53
	Crystal Plaza Apts.	1,000	54.5	31.5	1.24	1.49
Van Ness-UDC	The Consulate	300	36.1	4.6	1.10	1.20
	Connecticut Heights	3,800	32.9	28.6	1.28	1.47
Silver Spring	Twin Towers	900	42.7	12.8	1.15	1.55
	Georgian Towers	1,400	45.3	20.6	1.30	1.66

1/ Source: Home-based surveys and telephone interviews

summarizing socioeconomic and demographic data for all eight developments studied. Crystal Square and Crystal Plaza Apartments are similar except that the mean age of residents at Crystal Plaza is 6.3 years older, and the percent of those not employed is 8.3 percent greater.

Table 15 illustrates the percent of trips for each purpose made throughout the course of an entire day, as well as the percent of transit vs. percent of auto trips. As could be expected, the majority of trips made from residential units were to work (59 percent) with nearly fifty percent of these trips utilizing transit. Transit was used for 40 percent of the educational trips; however, only seven percent of the total trips were for educational purposes. Transit ridership from residential units appears to be highest with trips that are regularly scheduled. Those trips that do not occur on a regular basis, such as personal business, eating, shopping or recreational trips, averaged a transit ridership of only 14 percent.

Similar to the "Destination of Mid-day Trip" table for office buildings, Table 16 contains information on:

- percent of total trips to each destination by residential development
- transit/auto mode split for each destination

This table illustrates the trend of how distance from the station affects transit usage for each destination listed in the table. In most cases, as distance from the station increases, transit ridership falls off. A summary table, Table 17, was developed to illustrate the overall trends, such as the percentage of trips to each destination group and the transit/auto mode split. This table, however, does not illustrate how distance from the station affects ridership. One observation from this table is that although only a small percentage of the Maryland residents surveyed went to Virginia, a high percentage of those who did so utilized transit. However, the opposite is true for the Virginia residences. Only a small percentage of Virginia residents used transit to Maryland.

RETAIL

Six retail sites were selected for the survey. These sites varied in the types of tenants, as well as in size, from 65,000 to 530,000 gross square feet (GSF) of floor area. For example, The Underground in Crystal City and The Rosslyn Center, both with direct access to the Metro station, cater primarily to the occupants of the office buildings adjacent to the retail centers. These locations are convenient for those

Table 15. Transit/Auto Mode Share by Purpose of Trip for Residential Developments[1/]

Metrorail Station	Residential Development	Distance to Station	Purpose of Trip: To or from Work	Job-related Business	Personal Business	Meal or Snack	Shopping	Educational	Recreational	Other	Sample Size
Rosslyn	River Place North	1,000	64.7[2/] 48.5/39.4	2.0 0.0/100	13.7 28.6/57.1		3.9 50.0/0.0	11.8 66.7/33.3		3.9 50.0/50.0	51
	River Place South	1,500	55.0 54.6/45.4	5.0 0.0/100	15.0 0.0/100			20.0 50.0/50.0	5.0 0.0/100		20
	Prospect House	2,200	56.0 21.4/78.6	2.0 100/0.0	18.0 0.0/100		10.0 0.0/100	6.0 33.3/66.7	8.0 0.0/100		49
Crystal City	Crystal Square Apts.	500	50.0 49.0/24.5	7.1 28.6/71.4	11.2 27.3/63.6	2.0 0.0/100	13.3 0.0/92.3	6.1 0.0/100	5.1 0.0/80.0	5.1 20.0/60.0	98
	Crystal Plaza Apts.	1,000	42.3 62.1/25.9	5.8 50.0/50.0	15.3 23.8/76.2	2.9 0.0/75.0	9.5 30.1/61.5	5.1 14.3/85.7	12.4 11.8/88.2	6.6 22.2/66.7	137
Van Ness-UDC	The Consulate	300	72.9 60.5/34.9	5.1 100/0.0	5.1 0.0/66.7	3.4 100/0.0	3.4 0.0/100	3.4 50.0/50.0	6.8 25.0/50.0		59
	Connecticut Heights	3,800	59.3 37.5/50.0		13.0 28.6/71.4		14.8 12.5/87.5	9.3 40.0/60.0		3.7 0.0/100	54
Silver Spring	Twin Towers	900	69.8 46.0/46.0	5.7 0.0/100	5.7 0.0/66.7	3.8 0.0/50.0	9.4 0.0/40.0	1.9 0.0/0.0	3.8 0.0/50.0		53
	Georgian Towers	1,400	61.3 60.9/28.3	8.0 0.0/100	16.0 8.3/75.0		9.3 14.3/42.9	1.3 100/0.0	1.3 0.0/100	2.7 50.0/50.0	75

1/ Source: Home-based surveys and telephone interviews

2/ 64.7 Percent of trips by purpose
48.5/39.4 Percent transit/auto mode share for each purpose

Table 16. Transit/Auto Mode Share by Destination of Trip for Residential Developments[1/]

Metrorail Station	Residential Development	Distance to Station	Destination of Trip: District of Columbia	Fairfax County	Rosslyn	Crystal City	Elsewhere Arlington	Alexandria	Silver Spring CBD	Elsewhere Montgomery County	Pr. Georges County	Elsewhere	Sample Size
Rosslyn	River Place North	1,000	62.3[2/] 57.6/33.3	13.2 14.3/85.7	13.2 0.0/57.1	5.7 0.0/100	1.9 100/0.0	1.9 0.0/100	1.9 100/0.0				53
	River Place South	1,500	65.0 61.5/38.5	10.0 0.0/100	5.0 0.0/100	5.0 0.0/100	15.0 0.0/100						20
	Prospect House	2,200	64.0 21.9/78.1	10.0 0.0/100			20.0 10.0/90.0		2.0 0.0/100		2.0 0.0/100	2.0 0.0/100	50
Crystal City	Crystal Square Apts.	500	36.4 66.7/33.3	7.1 14.3/85.7	5.1 50.0/50.0	21.2 0.0/23.8	12.1 25.0/75.0	11.1 9.1/90.9	1.0 0.0/100	5.1 0.0/100		1.0 0.0/100	98
	Crystal Plaza Apts.	1,000	42.1 66.1/30.4	9.0 8.3/91.7	0.8 0.0/100	15.8 19.1/42.9	20.3 18.5/81.5	4.5 33.3/66.7		3.0 0.0/100	0.8 0.0/100	3.8 20/80	133
Van Ness-UDC	The Consulate	300	79.0 64.4/28.9	3.5 50.0/50.0		1.8 100/0.0	1.7 0.0/100	1.7 0.0/100		10.5 33.3/66.7		1.8 0.0/100	56
	Connecticut Heights	3,800	78.2 37.2/53.5	1.8 0.0/100						16.4 22.2/77.8	3.6 0.0/100		55
Silver Spring	Twin Towers	900	37.7 55.0/30.0			1.9 0.0/100	9.4 80.0/0.0		26.4 14.3/50.0	11.3 0.0/83.3	7.6 0.0/100	5.7 0.0/100	53
	Georgian Towers	1,400	52.0 59.0/35.9	2.7 50.0/50.0		1.3 100/0.0		2.7 100/0.0	17.3 7.7/38.5	12.0 22.2/77.8	10.7 28.6/71.4	1.3 0.0/100	75

1/ Source: Home-based surveys and telephone interviews

2/ 62.3 Percent of trips by destination
57.6/33.3 Percent transit/auto mode share for each destination

Table 17. Summary Analysis of Transit/Auto Mode Share by Destination of Trip for Residential Developments[1/]

Residential Location	Sample Size	Destination of Trip: District of Columbia	Virginia	Maryland
Van Ness-UDC	111	78.6[2/] 50.8/41.2	5.2 31.2/68.8	16.2 9.3/90.7
Rosslyn/Crystal City	354	54.0 54.8/42.7	41.6 13.9/78.3	4.4 9.6/90.4
Silver Spring	128	44.9 57.0/33.0	9.0 70.0/25.0	46.2 9.1/77.7

1/ Source: Home-based surveys and telphone interviews

2/ 78.6 Percent of trips by destination of trip
50.8/41.2 Percent transit/auto mode share for each destination

walking through the building to get to the Metrorail station or to their parked car. Neither establishment contains a large anchor tenant. The second type of establishment surveyed was the single tenant building. Three locations of this type were surveyed. The Hecht Company and Garfinckels at Metro Center and Hechts at Silver Spring. The last type of retail establishment surveyed was a shopping mall with several large anchor tenants, in this case Ballston Common. Table 18 presents the site characteristics for the retail establishments.

Data Collection

The pedestrian-based survey was designed to gather information on particular trip characteristics, such as trip purpose, trip mode, and trip origin-destination (to determine if the trip was a linked trip). A sample retail patron interview form is shown as Figure 14. The interview was conducted in person by reading the questions from left to right and marking the answers in a single row for each respondent.

For the single tenant developments, the interviews were conducted primarily at the entrances to the building. Pedestrian counts were also conducted at these locations for use in weighting survey responses at each entrance. The survey responses were weighted by entrance. The weighting factor for each entrance was derived as the ratio between the number of persons entering at each entrance and the number of interviews conducted at that entrance. The interviews conducted at the entrance were then multiplied by the weighting factor and the results from all the entrances were summed. This procedure eliminated the bias that would have otherwise resulted, since the interviews were not conducted in exact proportion to the number of people entering the store at each entrance.

The multi-tenant developments were surveyed with the interviewer randomly selecting patrons within the building. This procedure reduced the possibility of biased responses since a transit rider would have the same chance of being interviewed as an auto user.

The interviews were conducted from the time the establishments opened through six o'clock PM on a Tuesday, Wednesday or Thursday.

Table 18. Site Characteristics of Retail Establishments

Metrorail Station	Retail Establishment	Distance to Station	Gross Square Feet (1000)	Selling Square Feet (1000)	No. Parking Spaces	Year Constructed
Metro Center	The Hecht Company	100	270	204	none	Oct. '85
	Garfinckels	800	342	139	none	1930
Rosslyn	Rosslyn Center	100	Total: 350 Retail: 65	Retail: 52	450[1/]	1979
Crystal City	The Underground	100	-	150	200[2/]	1979
Ballston Common	Ballston Common	1,000	530	530	2,900[3/]	Oct. '86
Silver Spring	The Hecht Company	1,100	220	129		1959

1/ Arlington County limited the number of parking spaces to be built. The 450 spaces is inadequate for the daily and monthly parking needs.

2/ 200 commercial parking spaces (at any one time not more than 50 percent are used by The Underground).

3/ Arlington County owns the parking structure.

WMATA Ridership Survey for Retail Sites

Sheet ___ of ___

Location: _____ Date: _____ Observer: _____ Weather: _____ Entrance: _____

Begin Time (this sheet): _____ End Time: _____

Cumulative number of people in: _____ Cumulative number of people out: _____

Interviews:

Excuse me, we are conducting a travel survey in _____ (name place) today. Could I ask you a few brief questions about your trip to this store?

Arrival Time (Military)	1) Are you shopping @ _____ 1) shopping 2) dining 3) walking thru 4) store employee 5) other	2) Where was your last stop before coming here? ask for zip if appropriate	3) Was this your office? home? Another store? etc. (ask based on Q.2) 1) Your office 2) Home 3) Store/bank 4) Restaurant 5) Other Office 6) Hotel 7) Other ____	4) How did you get to _____ (name the location) 1) Auto 2) Walk 3) Metrorail 4) Bus 5) Taxi 6) Other	If person used Metrorail or bus: 5) Did you have a car available for your trip? 1) Yes 2) No	All: 6) How many people came in the group with you?	7) What time do you expect to leave ____? (military time)	8) Where will your next stop be after you leave here? ask for zip if appropriate	9) Is this your office? home? etc. 1) Your office 2) Home 3) Store/bank 4) Restaurant 5) Other Office 6) Hotel 7) Other ____

Analysis

The following summary tables were calculated using the CRISP outputs:

- overall mode share for each retail establishment
- transit/auto mode share by purpose of trip for each retail establishment
- transit/auto mode share by the location of the last stop of the retail patron for each retail establishment

Results

Table 19 illustrates the mode share for each of the retail establishments by distance from the station. The downtown Crystal City and Rosslyn locations were accessed primarily by walking. The two suburban locations, Ballston Common and Silver Spring, both at least 1,000 feet from the Metrorail stations experienced low transit ridership. Access by automobile is more convenient at these locations for the corresponding market areas.

The mode shares for retail establishments are illustrated on Figure 15. Here the trend in distance from station verses percent transit is evident for the single tenant establishments (Hecht's and Garfinckels), and the large shopping mall, Ballston Common. The shopping centers with direct access to Metrorail (The Underground and Rosslyn Center) exhibit disproportionately low transit ridership concerning their close proximity to the stations. However, this is due to the fact that the shops are designed to cater primarily to nearby offices and not to bring in patrons from long distances away.

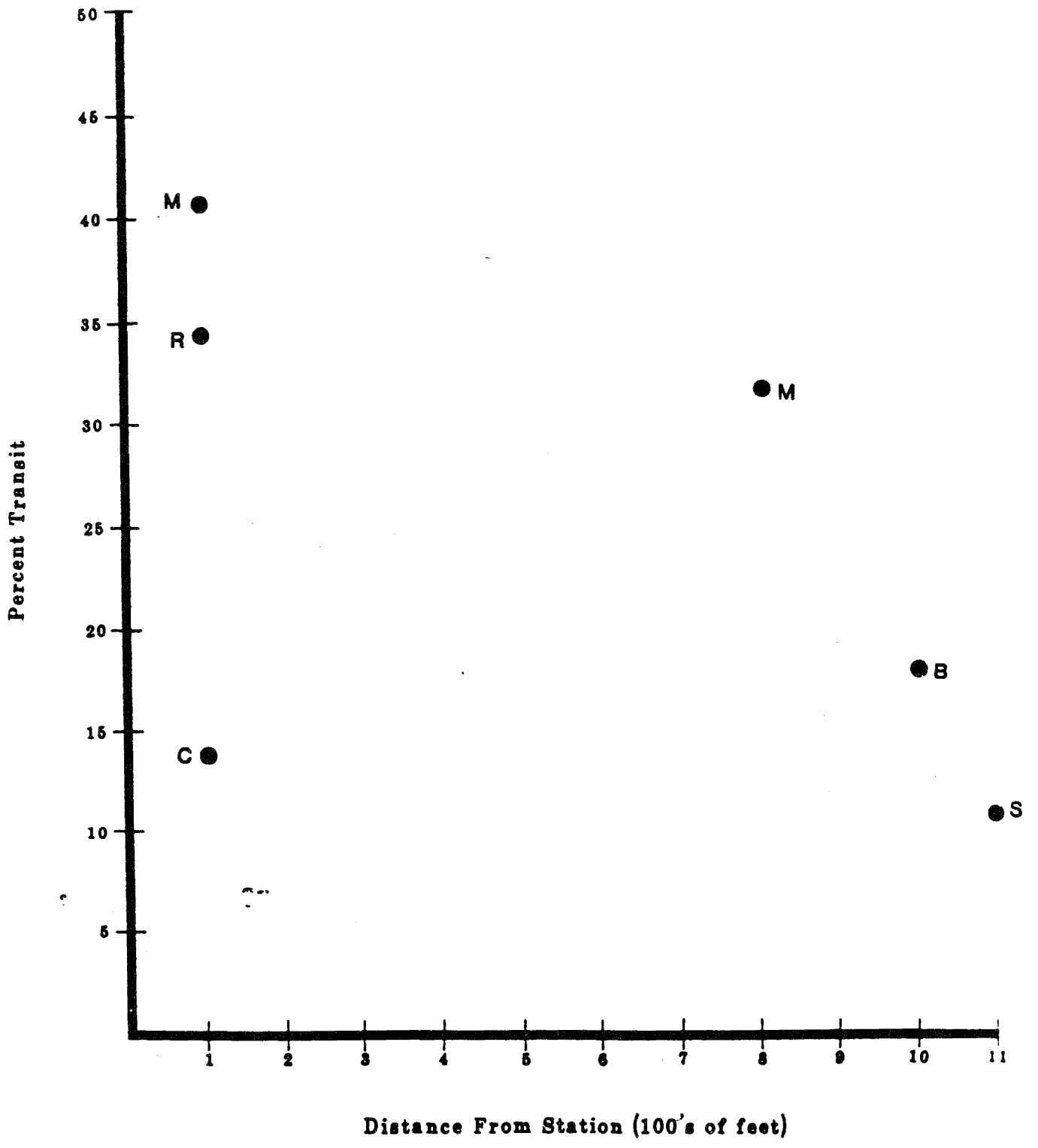
Table 20 illustrates for each location the mode share for shoppers and employees. Because a disproportionately high number of store employees were surveyed at Rosslyn Center, the overall percent of walking was 31.8 percent. For Rosslyn Center, Table 20 reveals that nearly 60 percent of the shoppers arrived by walking. The Underground also has a category for those people going to restaurants. For these people, the majority worked within the Crystal Square and Crystal Plaza developments, and as a result, over 80 percent walked. It is interesting to note the similarities between the retail employee and office employee mode shares. The percent of auto and transit are fairly consistent with the corresponding location. However, retail employees tend to have a higher percentage of bus riders.

Table 19. Mode Share for Retail Establishments[1/]

Metrorail Station	Retail	Distance to Station	Auto	Rail	Bus	Walk	Other	Sample Size	Summary % Auto	Summary % Transit
Metro Center	The Hecht Company	100	7.1	34.3	5.9	50.2	2.5	238	7.1	40.2
	Garfinckels	800	17.0	22.3	9.9	43.2	7.6	267	17.0	32.2
Rosslyn	Rosslyn Center[2/]	100	30.9	28.2	6.4	31.8	2.7	113	30.9	34.6
Crystal City	The Underground	100	14.8	12.3	1.3	69.7	1.9	155	14.8	13.6
Ballston	Ballston Common	1,000	64.9	10.4	7.7	15.3	1.8	222	64.9	18.1
Silver Spring	The Hecht Company	1,100	58.3	1.1	9.7	29.6	1.5	206	58.3	10.7

1/ Sources: Retail Patron Interviews

2/ Disproportionately large number of store employees interviewed



LEGEND:

M - Metro Center
R - Rosslyn
C - Crystal City
S - Silver Spring
B - Ballston

Figure 15 Distance-Transit Relationship for Retail Establish

Table 20. Mode Share by Purpose of Trip for Retail Establishments[1/]

Metrorail Staion	Retail Establishment	Purpose of Trip	Auto	Rail	Bus	Walk	Other	Sample Size
Metro Center	The Hecht Company	Shopper	6.8	35.1	5.7	50.2	2.2	216
		Employee	31.3	37.5	15.6	15.6	0.0	8[2/]
	Garfinckels	Shopper	15.6	21.8	10.4	43.7	8.5	238
		Employee	36.0	52.5	11.5	0.0	0.0	7[2/]
Rosslyn	Rosslyn Center	Shopper	18.2	18.2	6.1	57.6	0.0	33
		Employee	65.6	25.0	3.1	3.1	3.1	32
Crystal City	The Underground	Shopper	12.0	13.3	1.3	72.0	1.3	75
		Employee	60.0	40.0	0.0	0.0	0.0	5[2/]
		Restaurant	5.9	3.9	2.0	84.3	3.9	51
Ballston	Ballston Common	Shopper	70.6	6.5	5.2	16.3	1.3	153
		Employee	46.5	25.6	18.6	4.7	4.7	43
Silver Spring	The Hecht Company	Shopper	58.9	0.5	8.9	30.2	1.6	192
		Employee	50.0	12.5	20.8	16.7	0.0	24

1/ Source: Retail Patron Interviews

2/ Sample size very low - subject to large errors

The transit/auto mode share by location of last stop is shown on Table 21. These results are similar to the office building results of mode share by destination of trip. That is, the location of the last stop corresponds well with the retail establishment location.

HOTEL

The five hotels chosen for study were full-service hotels, ranging in size from 303 to 773 guest rooms. The site characteristics are shown on Table 22. Conference/meeting space also varied from 6,020 to 28,360 gross square feet. A wide range of distances from Metrorail stations was obtained.

Data Collection

Data were collected from the hotel patrons using a pedestrian-based survey. The format and procedure were very similar to the retail surveys. The objective of the survey (Figure 16) was to determine:

- the purpose of the trip to the hotel
- mode of travel used to get to the hotel at the time of the interview
- where the trip to the hotel originated that morning or afternoon

Of particular interest was the mode of travel chosen by overnight guests and conference attendees for local trips. Additional information was obtained on auto availability, group size, arrival and departure time and mode of travel used by guests to get to the Washington area.

The pedestrian interviews were conducted at the entrances to the hotel or in the lobby area. In order to capture the AM and PM peaks as well as mid-day travel, the interviews were conducted from 7:30 AM until 9:00 PM. During this time, pedestrian trip generation counts were conducted at all the hotels except JW Marriott.

Analysis

CRISP was utilized to derive the following tables for each hotel:

- mode share
- mode share by purpose of trip

The results of the frequency distribution for each variable and the crosstabulations for selected variables are included in the technical appendices.

Table 21. Transit/Auto Mode Share by Location of Last Stop for Retail Establishments[1/]

Metrorail Station	Retail Establishment	Distance to Station	Location of Last Stop: District of Columbia	Fairfax County	Arlington	Alexandria	Elsewhere in VA	Pr. Georges County	Montgomery County	Elsewhere in MD	Sample Size
Metro Center	The Hecht Company	100	90.6[2/] 40.2/5.9	1.3 0.0/66.7	2.1 20.0/20.0	0.4 100/0.0	0.4 0.0/0.0	1.7 75.0/25.0	1.3 69.3/30.7	2.1 39.1/39.1	235
	Garfinckels	800	89.2 32.0/13.8	1.4 0.0/86.0	2.1 60.0/20.0	1.4 30.5/19.5		1.9 42.9/42.9	3.6 53.3/35.0	0.4 0.0/100	267
Rosslyn	Rosslyn Center	100	20.0 72.7/13.6	14.5 18.8/75.0	47.3 19.2/21.2	5.5 33.3/66.7		0.9 0.0/100	5.5 50.0/50.0	6.4 57.2/0.0	110
Crystal City	The Underground	100	5.8 77.8/22.2	0.7 0.0/100	83.9 6.9/7.7	6.5 40.0/60.0	0.6 0.0/100	1.3 0.0/100	0.6 100/0.0	0.6 0.0/100	155
Ballston	Ballston Common	1,000	10.4 47.8/47.8	14.4 15.6/71.9	60.8 11.9/64.4	6.8 20.0/80.0	2.3 0.0/100		2.3 80.0/0.0	3.1 14.3/85.7	22[illegible]
Silver Spring	The Hecht Company	1,100	12.1 4.0/88.0					3.9 0.0/87.5	83.0 11.7/52.6	0.5 0.0/100	206

1/ Source: Retail Patron Interviews

2/ 90.6 Percent of trips by location of last stop
44.1/12.7 Percent transit/auto mode share for each location of last stop

Table 22. Site Characteristics of Hotels

Metrorail Station	Hotel	Distance Station	No. Guest Rooms	GSF Conf. Space	Rest./Lounge Seats	No. Parking Spaces	Parking Costs	Year Constructed
Metro Center	JW Marriott	1,300	773	28,360	400			
Rosslyn	Hyatt Arlington	300	303	6,020	330	290	guests free conf. varies	1976
	Key Bridge Marriot	1,200	558	13,00	530	625	free	1959 1980-major renovation
Crystal City	Crystal Gateway	100	452	14,800	350	320	guest/conf. pay for pkg.	1982
	Crystal Hyatt	3,000	685	31,900	594	330	guest $7.50/day rest. validates weekend guests free	1982

WMATA Ridership Survey for Hotels

Sheet ___ of ___

Location: _____ Date: _____ Observer: _____ Weather: _____ Entrance: _____

Begin Time (this sheet): _____ End Time: _____

Cumulative number of people in: _____ Cumulative number of people out: _____

Interviews:

Excuse me, I am conducting a travel survey for the Washington Metropolitan Area Transit Authority. Could I ask you a few questions about your trip to the Hotel.

Arrival Time	1. Are you 1) an employee 2) a guest 3) attending a mtg./conference 4) going to the restaurant 5) going to the lounge 6) Other	If person is a guest: 2. How did you get to the Wash. area? 1) Air 2) Auto 3) Train 4) Bus 5) Other	3. How did you get to the Hotel just now? 1) Auto 2) Walk 3) Metrorail 4) Bus 5) Ride-on 6) Taxi/Limo 7) Other	If person did not use an auto: 4. Did you have a car available for your trip to the Hotel? 1) Yes 2) No	All: 5. How many people came in the group with you?	6. Where did your trip originate (this morning or this afternoon) ask for zip if appropriate	7. What time do you expect to leave the Hotel?
_____	_____	_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____	_____	_____
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Figure 16. Sample Hotel Interview Form

Results

Of the four types of land uses analyzed, hotels appear to be the most sensitive to distance from station. Table 23 presents the mode share for each hotel. Generally, transit ridership was very low. In only two cases, JW Marriott and Crystal Gateway, was the transit ridership greater than ten percent. Both these hotels have direct access to the Metrorail stations. The other three hotels experienced decreasing transit ridership as the distance from the station increased. Figure 17 presents graphically the distance from station and transit mode share relationship for hotels. The Crystal City Hyatt, at 3,000 feet from the station, had no Metrorail riders from the 198 interviews. This hotel on the day of the survey had a very large realtor's convention that attracted many local travelers, but the distance from the station seemed to greatly discourage Metro access. Their parking garage was completely filled, and the hotel ran shuttle vans to remote parking.

The expansion of the mode share table to include trip purpose is illustrated in Table 24. This table reveals that overnight guests consistently had a lower transit ridership than meeting/conference attendees. Many factors may influence transit ridership. For instance, lack of familiarity with the system may result in fewer overnight guests or out of town conference attendees choosing to take transit. Also, the reason the overnight guest is in town may influence their mode choice. For instance, an overnight guest visiting the area for pleasure rather than businesses may choose transit more often that the business person on a travel expense account. From the table, overnight guests predominately utilized the hotel van or a taxi to reach the hotel.

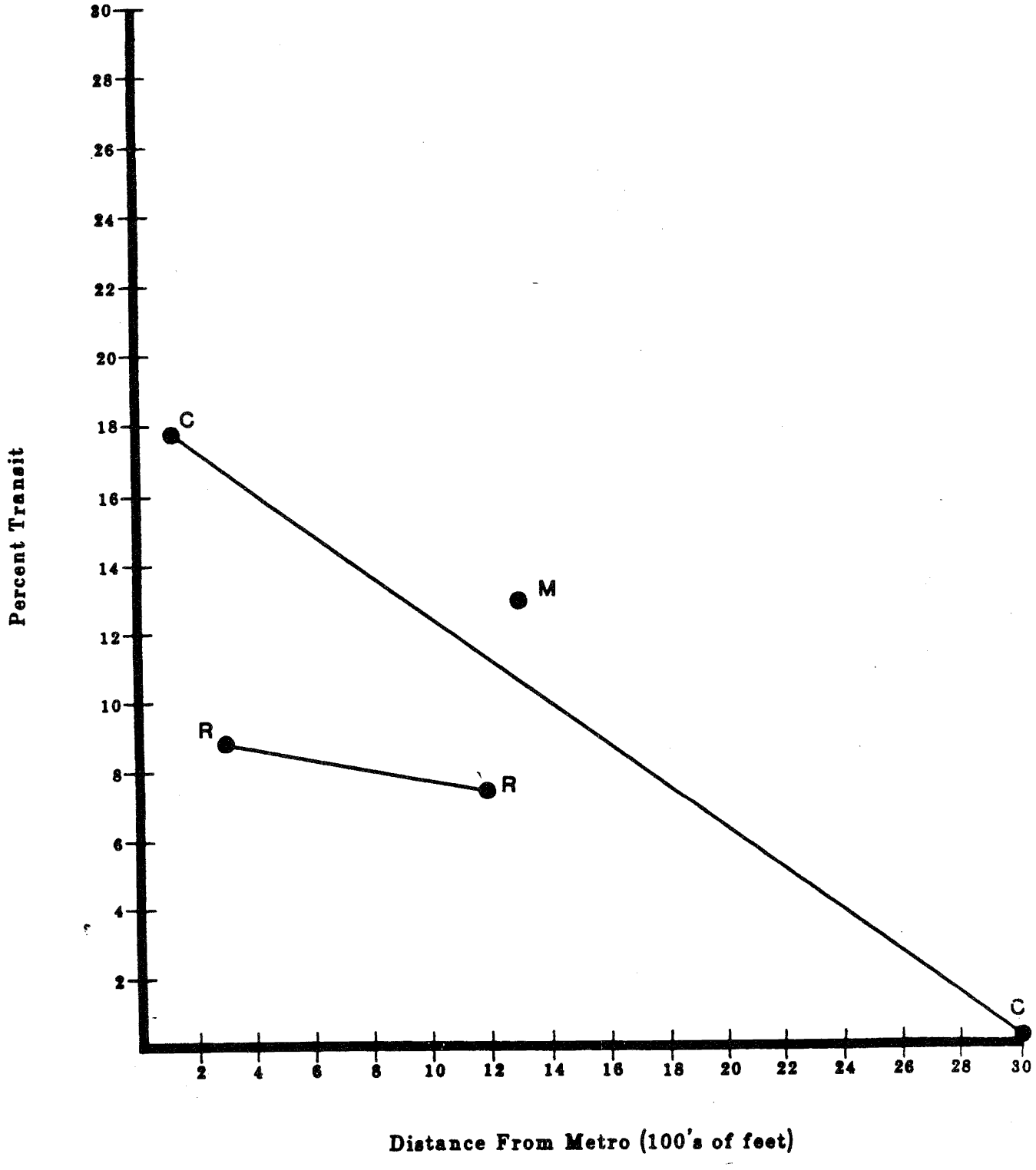
DATA FROM OTHER SOURCES

There are several other sources of data, similar to that collected in this study, that provide insight into travel behavior at sites near Metrorail stations. A study currently being completed by JHK & Associates for the Maryland-National Capital Park and Planning Commission involves the collection of mode split and trip generation data at sites along the Metrorail Red Line in Montgomery County. The Council of Governments has also conducted studies at several sites in the downtown and at the Van Ness station.

Table 23. Mode Share for Hotels[1/]

Metrorail Station	Hotel	Distance to Station	Auto	Rail	Tour Bus	Walk	Hotel Van or Taxi	Sample Size	Summary % Auto	Summary % Trans
Metro Center	JW Marriott	1,300	25.3	13.1	6.1	16.2	39.4	198	25.3	13.1
Rosslyn	Hyatt Arlington	300	30.2	8.8	2.5	16.4	42.1	159	30.2	8.8
	Key Bridge Marriott	1,200	55.9	7.4	10.8	2.9	22.5	204	55.9	7.4
Crystal City	Crystal Gateway	100	40.8	17.8	2.9	6.9	31.6	174	40.8	17.8
	Crystal Hyatt	3,000	70.7	0.0	3.5	4.6	20.2	198	70.7	0.0

1/ Source: Hotel patron interviews



LEGEND:
M - Metro Center
R - Rosslyn
C - Crystal City

Figure 17. Distance - Transit Relationship for Hotels

Table 24. Mode Share by Purpose of Trip to Hotels[1/]

Metrorail Station	Hotel	Purpose of Trip	Auto	Rail	Tour Bus	Walk	Hotel Van or Taxi	Sample Size
Metro Center	JW Marriott	Meeting/Conference	25.6	12.8	18.0[2/]	10.3	33.3	39
		Overnight Guest	27.1	4.7	4.7	8.4	55.1	107
		Restaurant/Lounge	21.9	34.4	0.0	34.4	9.4	32
Rosslyn	Hyatt Arlington	Meeting/Conference	75.0	25.0	0.0	0.0	0.0	8
		Overnight Guest	27.1	9.0	3.3	7.4	56.6	122
		Restaurant/Lounge	6.7	0.0	0.0	93.3	0.0	15
	Key Bridge Marriott	Meeting/Conference	77.1	11.4	0.0	0.0	11.4	35
		Overnight Guest	41.7	4.6	19.4	2.8	31.5	108
		Restaurant/Lounge	82.6	0.0	0.0	4.4	13.0	23
Crystal City	Crystal Gateway	Meeting/Conference	53.3	33.3	0.0	0.0	13.3	15
		Overnight Guest	31.8	5.9	0.0	2.4	60.0	85
		Restaurant/Lounge	63.9	25.0	0.0	8.3	2.8	36
	Crystal Hyatt	Meeting/Conference	84.4	0.0	2.2	3.3	10.0	90
		Overnight Guest	48.8	0.0	4.9	7.3	39.0	82
		Restaurant/Lounge	94.4	0.0	0.0	0.0	5.6	18

1/ Hotel patron interviews

2/ May not be representative of the typical day

Data from a number of sites in these studies has been included in Appendix B of this report. The data can be used for comparative purposes or for additional points of reference at rail stations other than those included in this study. In general, the data from the several studies support one another. Data from the downtown COG sites suggest a high transit mode share, similar to that found here. Sites further out on the system decrease in transit mode share, as would be expected. Several tables of data from these studies are provided in Appendix B.

3. FURTHER ANALYSIS OF TRENDS AND RELATIONSHIPS BETWEEN TRANSIT RIDERSHIP AND SITE FACTORS

This chapter takes the analysis of the survey data a step further. It discusses the development of mathematical relationships between transit ridership and the characteristics of building sites, and provides estimates of transit trip generation rates for the buildings studied. The objective of these analyses was to develop tools that could be used for land use and transportation planning in the vicinity of Metrorail stations. The development of the mathematical relationships is presented first, followed by the results of the trip generation analysis.

MATHEMATICAL RELATIONSHIPS BETWEEN TRANSIT RIDERSHIP AND SITE CHARACTERISTICS

One of the questions most often asked in the transportation analysis of development sites near Metrorail stations is "What percent of the employees, residents or patrons will come by transit?" The answer has implications on the roadway facilities required, on the amount of parking needed, and on the utilization of the transit system.

There is no perfect method of predicting what the transit mode share will be. Each building and its occupants are unique, in terms of the travel habits and O/D characteristics of its employees, the cost and supply of parking, and other factors. For example, a building that houses primarily real estate and insurance sales personnel may have quite different trip characteristics than one housing a computer firm. However, techniques can be used to identify trends and "typical" relationships between transit ridership and certain site characteristics. In this case, the technique applied was multiple linear regression analysis. Regression analysis enables the development of mathematical equations that best explain the variation in a dependent variable (transit mode share, in this case) on the basis of one or more independent variables (such as distance from a Metrorail station). The resulting equations provide the best estimate available of what the transit mode share will be. It must be understood, however, that these are not perfect predictors but only tools to be used for general planning purposes. Individual sites may have transit ridership characteristics that vary widely from the norm.

The regression analysis was performed for each land use type in two steps. The first step was to perform the regression analysis in stepwise form. In this case, the computer algorithm selects the variables to enter the equation in the order of their explanatory power. Simple correlation matrices were also developed to examine the correlation between pairs of dependent and independent variables. The second step used the results of the stepwise analysis and knowledge of correlations to develop equations that were practical for planning purposes. Some of the variables that may have been highly correlated with transit use were not practical for planning analyses and therefore had to be eliminated from consideration. Auto ownership is an example of an independent variable that is usually highly correlated with transit ridership but which is impractical for estimating transit mode share at a new site. Fortunately, several of the most powerful explanatory variables were also practical for inclusion into the equations. In several instances, planning-oriented variables had to be forced into the equation.

The candidate dependent and independent variables are discussed below for each land use type. Suggested planning equations are presented, and the equations are portrayed graphically.

Office

Some 24 candidate dependent and independent variables were identified in the office regression analysis. These are listed below:

Candidate dependent variables

- AWORKTRP - percent of work trips by auto
- TWORKTRP - percent of work trips by transit
- WALKWORK - percent of work trips by walking
- AMIDALL - percent of all mid-day trips by auto
- TMIDALL - percent of all mid-day trips by transit
- WALKMID - percent of all mid-day trips by walking
- ANOWALK - percent of non-walk mid-day trips by walking
- TNOWALK - percent of non-walk mid-day trips by transit

- AUTOOCC - average auto occupancy

Candidate independent variables

- AUTOAVAI - percent of those with an auto available for the trip to work
- DISTDC - distance of the building from the DC core, measured in airline miles between the Metrorail station and the closest edge of the DC core area. DISTDC was zero for the Farragut West and Metro Center stations.
- DEVEL - development setting: 1 = downtown DC, 2 = suburban
- EMPTYPE - employer type: 1 = multiple tenant, 2 = single tenant
- EMPL - number of employees
- EMPLSQ - employees per 1000 GSF
- GSF - gross square feet of building floor area (1000's)
- JURISPCT - percent of those residing in the same state as they work
- METRO - distance of the building from the station portal - walking distance in 100's of feet
- PCTFREE - percent of drivers with free parking
- PKGALL - cost for all drivers to park (dollars per day)
- PKGCOST - cost for those drivers that must pay for parking (dollars per day)
- PKGSPSQ - parking spaces per 1000 GSF
- TRANSCOST - cost for transit users (dollars per day for round trip)

The philosophy in developing the candidate variables was to include all those that could conceivably explain variations in travel characteristics and for which data were available. There were very fine differences between some of the variables (e.g. those related to parking cost). Others, such as the auto and transit variables, are complements of one another. Emphasis was placed primarily on developing equations to explain the variation in transit mode share, both for work trips and mid-day trips. Experimenting was also done with several of the other candidate dependent variables.

The analysis of the data was performed using two statistical programs in the CRISP package, CORR (Pearson correlations) and REGRESS (multiple regression).

CORR produces a matrix indicating the correlation coefficient (R) between pairs of variables. Variables that are perfectly correlated would have a value of 1.0. Variables that have low correlation have values near zero. Two separate correlation matrices were produced, one for the downtown sites and one for the suburban sites. These are presented in Appendix C, along with some of the other technical tables from the regression analysis. In the tables, R values greater than 0.5 are highlighted.

Following the production of the correlation matrices, the stepwise regression analysis was performed. The two primary dependent variables were percent transit for the work trip (TWORKTRP) and percent transit for the non-walk mid-day trip (TNOWALK). In the stepwise analysis, it was specified that a factor would be added to the equation only if it significantly added to the explanatory power of the equation as a whole. The explanatory power is summarized in the R-squared statistic. The R-squared is the proportion of the variance in the dependent variable that can be "explained" by the independent variables. If all the variance could be explained, the R-squared value would be 1.0. Several other tests also need to be conducted to determine the extent to which the given equation is valid. Several observations from the regression analysis for office buildings are discussed below:

- When all 15 sites were included in the data set, development type (DEVEL) was the variable most correlated with the percent of work trips by transit. This is because of the dramatic difference between the transit mode share for downtown and suburban sites.

- The distance from Metro (METRO) was next to enter, indicating that walking distance between the station and the building site was, in fact, an important consideration in propensity to take transit.

- Several other variables, including auto availability, transit costs and parking costs also entered the first-round equation. However, these did not substantially increase the R-squared value and are not easily used in planning applications.

- The initial analysis led to the conclusion that two separate sets of equations could be justified, one for downtown sites, and one for suburban sites. Four sets of planning equations were therefore developed to predict:
  - transit mode share for work trips to downtown offices
  - transit mode share for mid-day non-walk trips at downtown offices
  - transit work trips for suburban offices
  - transit mid-day non-walk trips for suburban offices

Equations for Downtown Offices

To predict transit mode share for downtown offices, the suggested equation is:

TWORKTRP = 61.5% - 0.76% x METRO

The R-squared value for this equation was moderate, at 0.57. It indicates that the transit mode share for a building directly adjacent to a station portal would be slightly over 60 percent. This would decrease by 0.76 percent for each 100 feet distance from the station portal. In reality, the relationship between transit mode share and distance from Metro is probably not linear. One would hardly expect that there would be much difference between propensity to take transit for buildings within 500 or so feet from the station. It is more likely that the transit mode share would stay fairly level up to a certain distance from Metro and then begin to fall off more dramatically as the distance from the station increased. Non-linear relationships were not tested. However, the above equation should suffice as an approximate tool for planning purposes. It should not be considered to be the final answer, but may need to be modified as the system and the land around it develops. More data would also help to improve the validity of this relationship.

The following equation is suggested to explain the transit mode share for mid-day non-walk trips:

TNOWALK = 58.0% - 0.92% x METRO

The R-squared value for this equation is 0.52.

Both of the above equations are graphed in Figure 18. It is important to note that the equations cannot be extended beyond the limits of the available data. A range of distance from Metro is specified for which the equation is valid at the indicated R-squared value.

Equations for Suburban Offices

For suburban offices, the following equations are suggested, incorporating two independent variables - distance from the DC core, and distance from Metro:

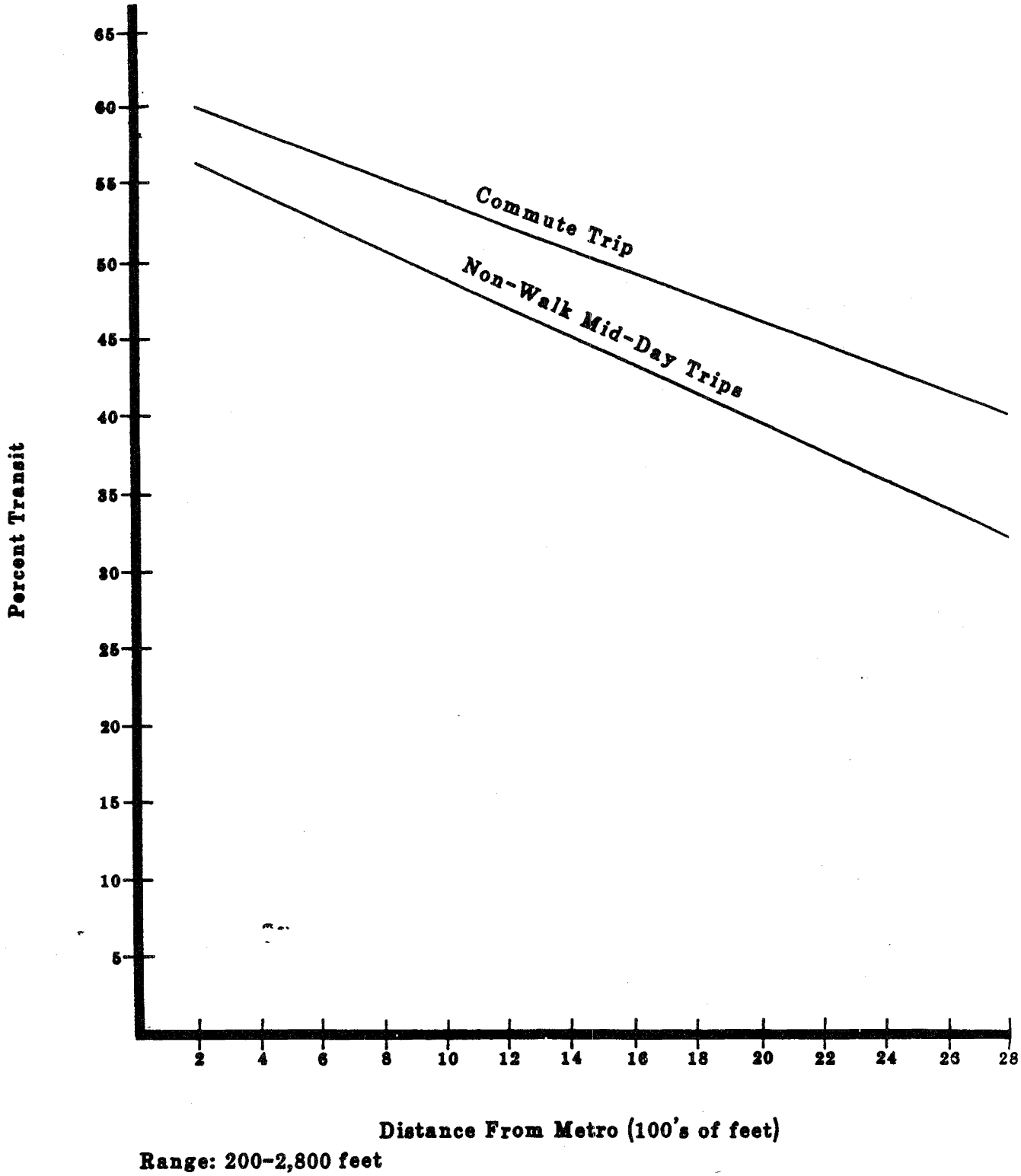


Figure 18 Downtown Office Regression Lines

TWORKTRP = 27.5% - (0.31% x DISTDC) - (0.74% x METRO)

TNOWALK = 29.8% - (1.3% x DISTDC) - (0.69% x METRO)

The R-squared values for the above equations are 0.67 and 0.39, respectively. The R-squared for the second equation is, at best, marginal, but at least indicates a trend of decreasing transit mode share as distance from the DC core and distance from Metro increase. The two equations are graphed on Figures 19 and 20, respectively.

Residential

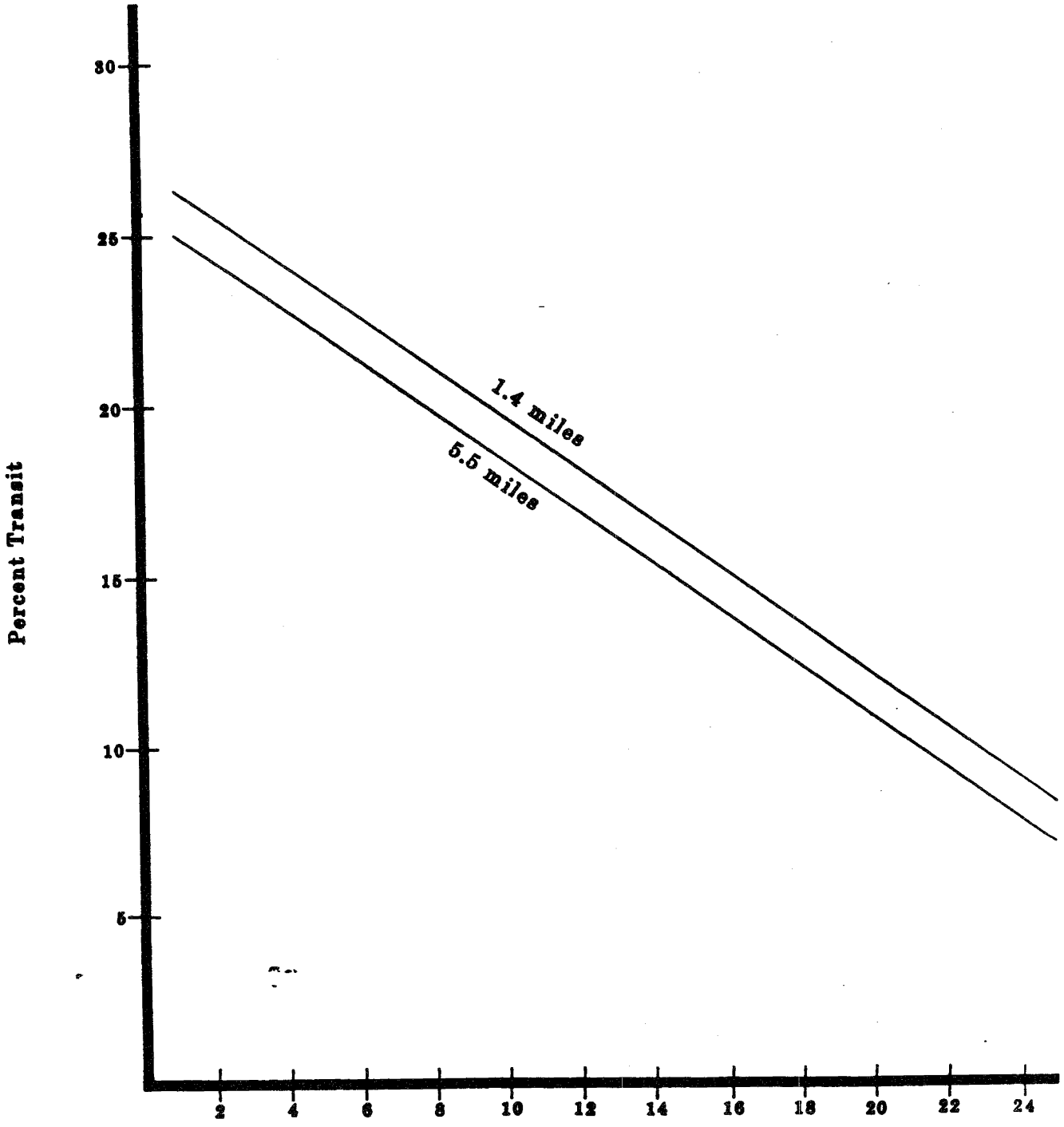
The regression analysis for residential uses proceeded in a similar fashion as the office analysis, but with a different set of variables. The candidate variables are as follows:

Candidate dependent variables

- AUTOALL - percentage of all trips by auto
- AWORKTRP - percentage of work trips by auto
- TRANSALL - percentage of all trips by transit
- TWORKTRP - percentage of work trips by transit
- WWORKTRP - percentage of work trips by walking

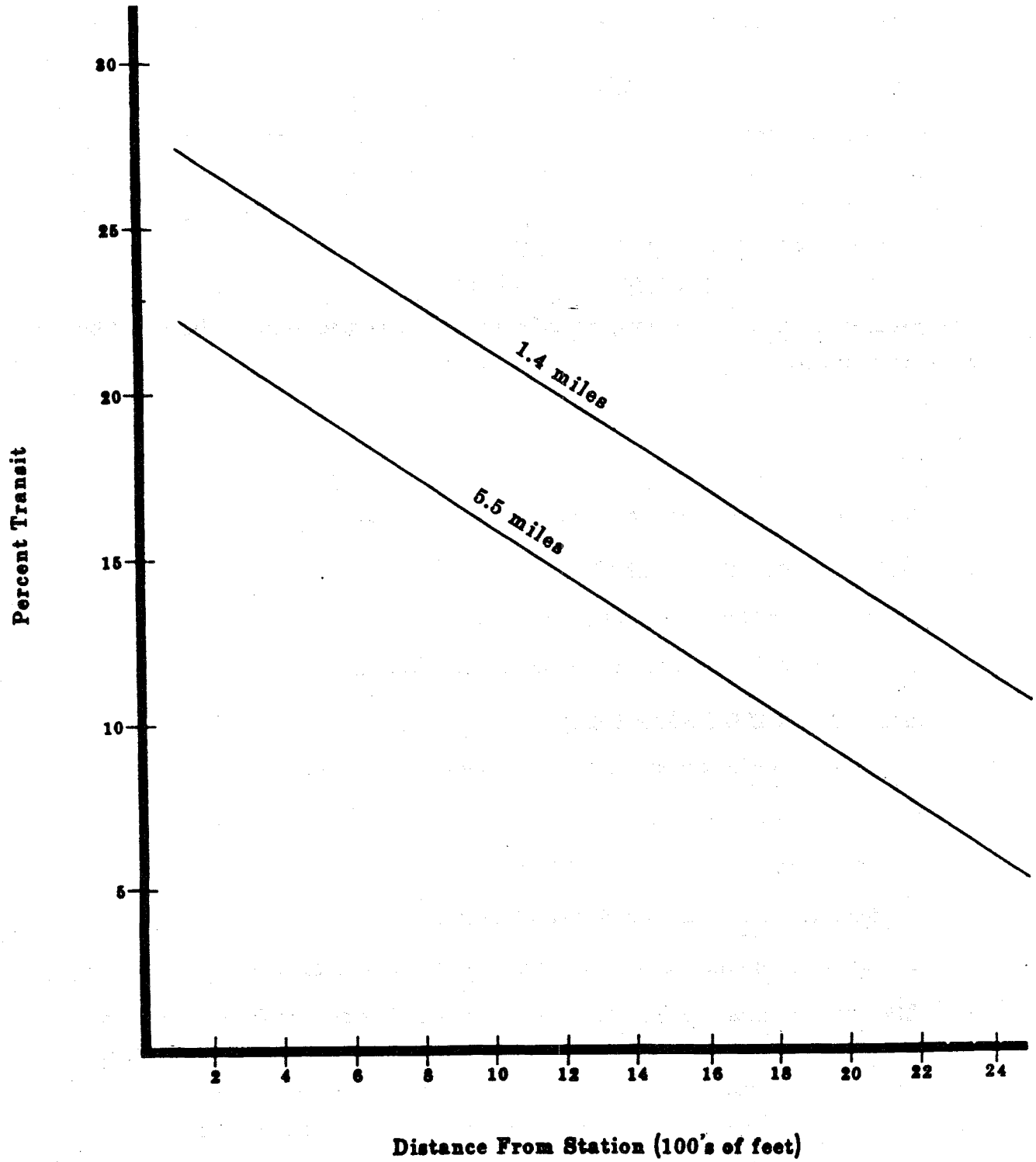
Candidate independent variables

- AGE - average age of residents
- DISTDC - distance from the DC core (miles)
- EMPLOYED - percentage of those employed
- METRO - distance from the Metro station portal, in 100's of feet
- PEOPLE - Average number of people (residents) per dwelling unit
- PKGUNIT - number of parking spaces per dwelling unit
- PKGCOST - monthly parking cost per vehicle
- UNITS - number of dwelling units
- VEHUNIT - average number of vehicles per dwelling unit



Range (METRO): 100-2,500 feet
Range (DIST DC): 1.4-5.5 miles

Figure 19 Suburban Offices, Commute Trip Regression Lines



Range (METRO):100-2,500 feet
Range (DIST DC):1.4-5.5 miles

Figure 20 Suburban Offices, Non-Walk Mid-Day Trip Regression Lines

The initial results of the stepwise regression analysis indicated that the average number of vehicles per dwelling unit was the best predictor of the transit mode share for trips to and from the residential buildings. However, for purposes of developing the planning equations, it was not felt that this variable was practical to include. The DISTDC variable was poorly correlated with transit mode share and was therefore eliminated. The resulting equations, using only distance from Metro, are as follows:

TWORKTRP = 58.4% - 0.73% x METRO

TRANSALL = 51.5% - 0.66% x METRO

The R-squared values were low, at 0.36 and 0.34, respectively. The equations are graphed on Figure 21.

Retail

The candidate variables for the retail analysis included:

Candidate dependent variables

- AUTO - percentage of shopping trips by auto
- TRANSIT - percentage of shopping trips by transit

Candidate independent variables

- DEVEL - development setting (1 = downtown, 2 = suburban)
- DISTDC - distance from the DC core
- GSF - gross square feet in 1000's
- METRO - distance from Metrorail station
- RETAIL - market draw (1 = regional market, 2 = local market)

The variable most strongly correlated to transit ridership by retail patrons was DISTDC. The variable METRO was a poor predictor variable, and offered negligible contribution to the explanatory power of the equation. However, this does not mean that there is no relationship but only that there was insufficient data to prove a relationship. The number of sites sampled was small, and there was only a small range of distances from Metro included. Distance from Metro is almost certainly involved in choice of mode to retail sites.

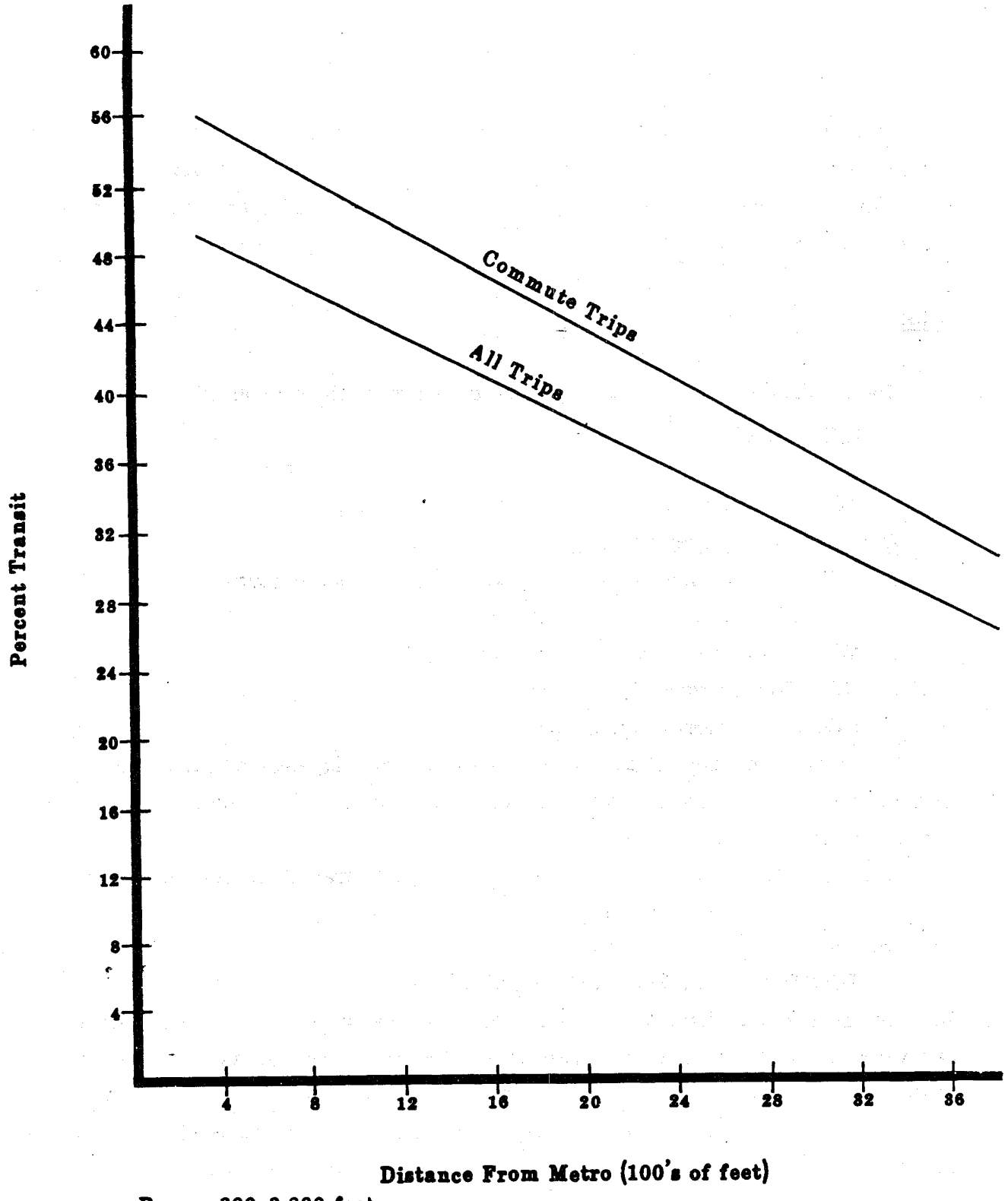


Figure 21 Residential Development Regression Lines

The selected planning equation for retail sites is as follows:

TRANSIT = 26.9% - 2.2% x DISTDC

This indicates that one could expect the percentage of trips by transit to decrease by slightly over two percent for each additional mile outside the DC core area. The R-squared is a high 0.94, but could be a combined function of chance and the small number of sites. The equations are graphed on Figure 22.

Hotel

The candidate variables for the hotel regression analysis included:

Candidate dependent variables

- TCONFRNC - percent of trips by transit for conference attendees
- TGUEST - percent of trips by transit for overnight guests

Candidate independent variables

- DEVEL - development setting (1 = downtown, 2 = suburban)
- DISTDC - distance from the DC core (miles)
- METRO - distance from a Metro station (100's of feet)
- NOPKGSP - number of parking spaces
- ROOMS - number of guest rooms

For both dependent variables, the correlation matrix revealed the distance from Metro to be the most strongly correlated variable. Distance from the DC core had low correlation for the sites sampled.

The suggested equation for the percent of trips by transit for overnight guests is:

TGUEST = 7.9% - 0.26% x METRO

For conference attendees, the equation is:

TCONFRNC = 29.2% - 1.07% x METRO

The constants and coefficients in these equations are drastically different, reflecting two very distinct transit usage patterns for the two types of hotel patrons. The conference attendees equation reflects similarities to the mid-day non-walk equation for offices. The R-squared values are high, at 0.84 and 0.90, respectively. Again, this could be partially due to the small number of sites sampled. The equations are graphed on Figure 23.

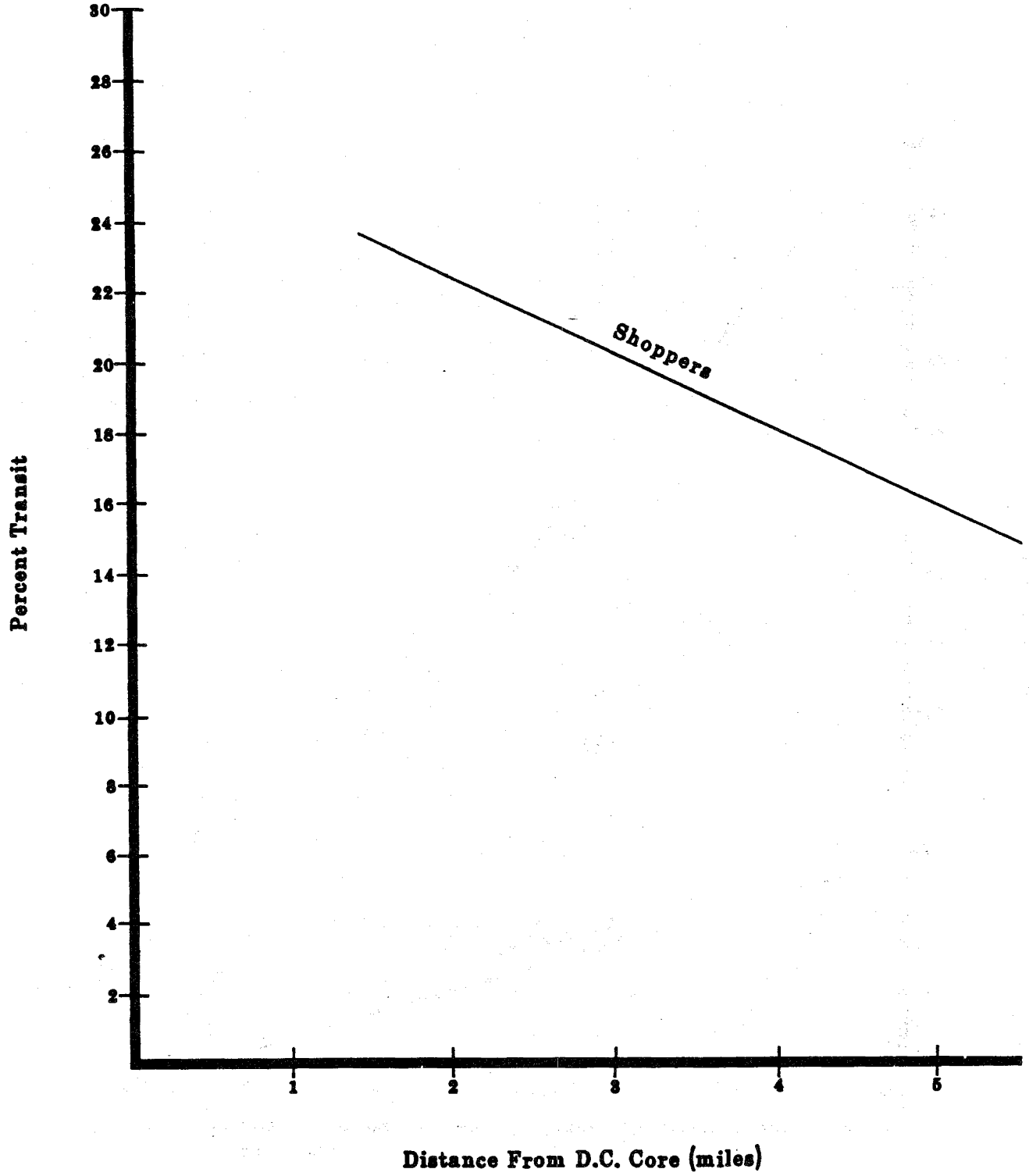


Figure 22 Retail Establishment Regression Lines

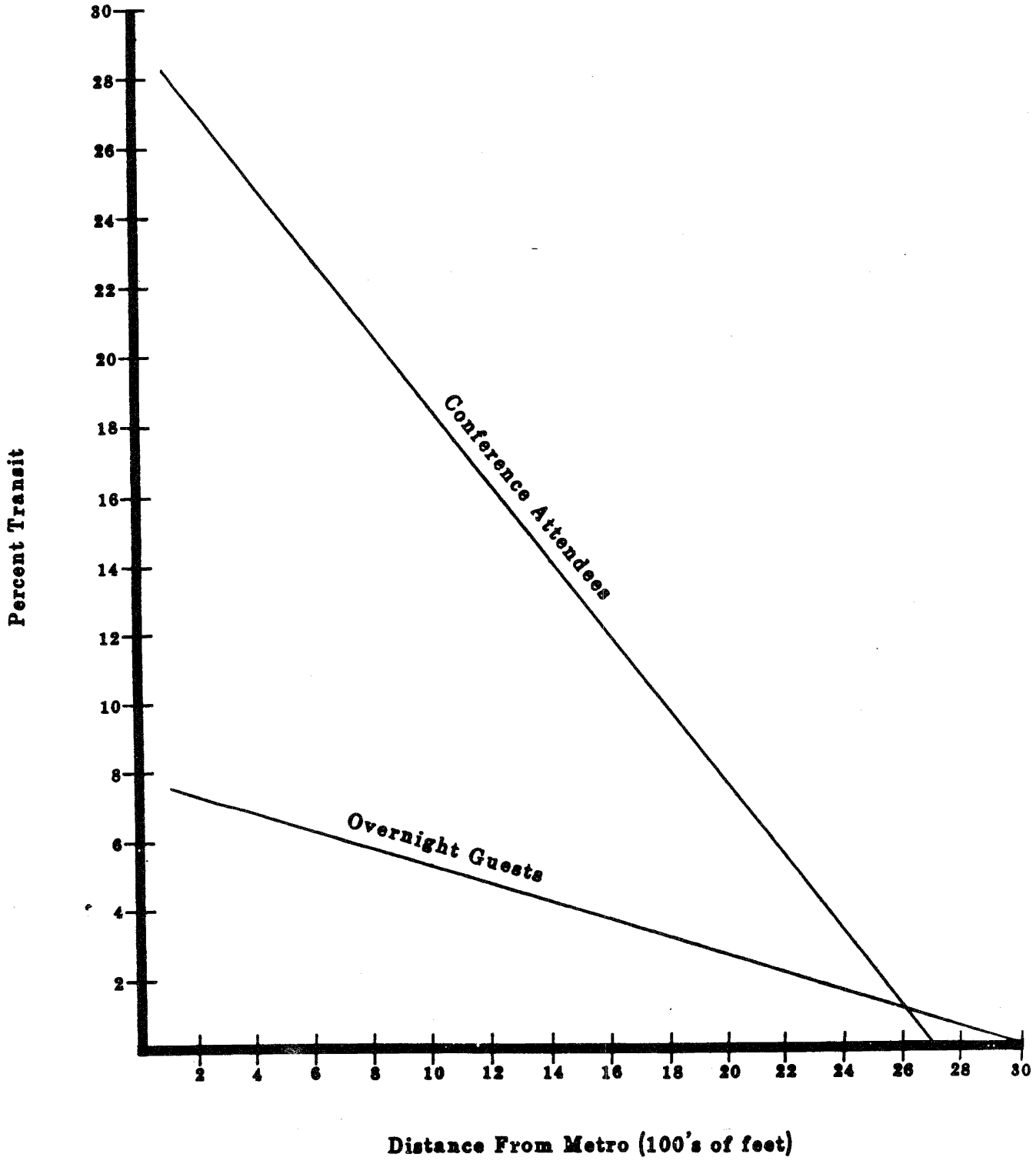


Figure 23 Hotel Regression Lines

Summary of Regression Results

The equations developed in the above section are a step forward in assessing the travel characteristics of sites near Metrorail stations. As previously stated, however, it is important to recognize the limitations of the data, such as limited sample sizes and ranges of independent variables, when considering an application of the equations. It must also be recognized that these relationships change over time, based on the extent of the transit system and development trends in the urban area. However, the suggested equations should be reasonable approximations of average transit mode shares for the next several years. The equations are summarized together in Table 25.

TRANSIT TRIP GENERATION RATES

One of the study objectives was to estimate the number of transit trips generated by the four types of land use under various conditions. Knowledge of the transit trip generation potential of various development types would significantly assist in land use planning decisions to optimize the development of land around each Metrorail station area. The first step was to identify the trip generation rate in terms of the number of persons travelling to and from the site on a daily basis. By multiplying the appropriate transit mode share factor by this trip generation rate, the number of daily trips could be estimated.

Trip generation rates could be quantified for most of the sites studied. The only exceptions included locations where through trips would have confounded the person-trip counts or where it was otherwise difficult to cordon off a site. To estimate daily trip generation rates, some of the data had to be expanded, using approximate factors from other sources. In general, however, the estimates of transit trip generation potential are believed to be a reasonable representation of trip generation characteristics of sites near Metrorail stations. The procedures for estimating trip generation rates are described below:

- Office - Expand the workplace surveys to represent total employment for the building. Expand the available visitor surveys to the estimated total visitor population. Sum the trips generated for each and divide by the building square footage to derive the number of person-trips per 1000 GSF.

- Residential - Expand the residential surveys to represent the total number of units in the complex (surveys were conducted on the basis of the dwelling unit, not the individual person). Adjust for any under-reporting detected in

Table 25. Summary of Regression Analysis Results

Land Use	Depend. Variable (% Transit)	Constant	Independent Variable Coefficient: Distance from Station (100's of feet)	Independent Variable Coefficient: Distance from DC Core (miles)	R^2
Office	Downtown Office Commute Trip (TWORKTRP)	61.5%	-0.76%		0.57
	Downtown Office Non-walk mid-day Trips (TNOWALK)	58.0	-0.92		0.52
	Suburban Office Commute Trip (TWORKTRP)	27.5	-0.74	-0.31%	0.67
	Suburban Office Non-walk mid-day Trips (TNOWALK)	29.8	-0.69	-1.30	0.39
Residential	Commute Trip (TWORKTRP)	58.4	-0.73		0.36
	All Trips (TRANSALL)	51.5	-0.66		0.34
Retail	Transit Trips by Shoppers (TRANSIT)	26.9		-2.18	0.94
Hotel	Transit Trips by overnight guests (TGUEST)	7.9	-0.26		0.84
	Transit Trips by conference attendees (TCONFRNC)	29.2	-1.07		0.90

the residential responses. Divide the number of trips by the number of dwelling units to derive the number of daily trips per unit.

Retail - Factor the survey responses by entrance, up to the number of incoming persons at each entrance. Since there were some hours not counted, expand the known trips by an estimated factor to account for the uncounted trips. General trip generation data can be used to develop a reasonable approximation. The trip generation rate is expressed as the daily number of trips per 1000 GSF.

Hotel - Use the same basic technique as for retail. The trip generation rate is expressed as the daily number of trips generated per guest room.

Tables 26 through 29 present the results of the trip generation analysis. In general, the trip generation rates are of the same order-of-magnitude as the rates found in other literature (after conversion from vehicle-trip generation rates to person-trip generation rates). Again, however, caution should be exercised in the use of the rates, as any individual site could have a rate that varied widely from those indicated here. Although office and residential trip rates should be relatively stable, retail and hotel rates are especially subject to variation.

A summary analysis was conducted to bring together the results in a form that could be interpreted for land use and transportation planning purposes. Table 30 presents a comparison of the transit trip generation rates for the four land use types on a consistent basis of trips per 1000 GSF of floor space. Residential and hotel rates are not usually expressed this way, and assumptions had to be made regarding the ratio of square footage to dwelling units and square footage to number of guest rooms. Exact figures were not available for the buildings studied. For residential units, 750 square feet per unit was assumed. For hotel, 750 square feet per guest room was assumed. Although the actual size of guest rooms for hotels is much smaller, the factor incorporates the large conference, dining and lobby areas associated with hotels of the type surveyed.

The table indicates that retail uses and offices generate the highest number of daily transit trips, when comparing all four land uses on the basis of trips generated per 1000 square feet of floor area. The strength of the transit trip generation potential of major retail sites is the volume of trips generated - two to six times the number of person-trips as other land uses. However, this high transit trip generation potential likely exists only for those retail sites having a regional market draw. Convenience-oriented retail or those attracting only local trips will have a small transit trip generation rate. Hotels have the smallest transit trip

Table 26. Office Building Trip Generation

Office Building	Distance to Station (feet)	Gross Sq. Ft.	Daily Person Trips/1,000 GSF	Percent Transit[1/]	Daily Transit Trips/1,000 GSF
Metro Center and Farragut West					
International Sq.	200	1,105	12.9	37.5	4.9
NCPC Building	500	300	13.5	33.4	4.5
Olmsted Building	700	284	9.3	29.9	2.8
McKee Building	900	365	7.6	32.7	2.5
Realtor's Building	1,200	139	16.5	32.0	5.3
Am. Inst. of Arch.	2,800	200	8.2	21.1	1.7
Rosslyn					
1300 N. 17th St.	800	430	12.8	13.5	1.7
AM Building	1,000	250	12.9	22.6	2.9
Air Force Assoc.	2,200	75	8.2	13.0	1.1
Crystal City					
Crystal Mall 1	200	210	13.9	9.4	1.3
Crystal Sq. 2	1,000	490	14.1	8.8	1.2
2711 Jeff-Davis	2,500	145	9.7	3.7	0.4
Van Ness-UDC					
Van Ness Station	100	190	15.8	16.8	2.7
Intelsat	300	650	3.0	20.2	0.6
Silver Spring					
1100 Wayne Ave.	200	190	11.3	18.0	2.0

1/ Daily average

Table 27. Residential Development Trip Generation

Residential Develop.	Dist. to Station (feet)	Number Dwell Unit	Trips/ Develop.	Daily Person Trips/Dwell Unit	Percent Transit	Daily Transit Trips/Dwell Unit
Riverplace North	1,000	432	1,081	2.5	47.2	1.2
Prospect House	2,200	268	1,041	3.9	18.2	0.7
Crystal Square Apts.	500	378	1,902	5.0	37.5	1.9
Crystal Plaza Apts.	1,000	540	2,679	5.0	47.0	2.3
The Consulate	300	268	933	3.5	63.0	2.2
Connecticut Heights	3,800	612	2,067	3.4	36.0	1.22
Twin Towers	900	286	1,068	3.7	47.8	1.8
Georgian Towers	1,400	762	2,242	2.9	41.6	1.2

Table 28. Retail Establishment Trip Generation

Retail Establishment	Distance to Station (feet)	GSF	Daily Person Trips/1,000 GSF	Percent Transit	Daily Transit Trips/1,000 GSF
Hecht's Metro Center	100	270	60.3	40.2	24.2
Garfinckels	800	342	20.2	32.2	6.5
Hecht's Silver Spring	1,100	220	33.2	10.7	3.6

Table 29. Hotel Trip Generation

Hotel	Distance to Station (feet)	Number of Rooms	Daily Person Trips/ Room	Percent Transit	Daily Transit Trips/ Room
Hyatt Arlington	300	303	6.7	8.8	0.6
Key Bridge Marriott	1,200	558	7.9	7.4	0.6
Marriott Crystal Gateway	100	452	9.0	17.8	1.6
Crystal Hyatt	3,000	685	8.6	0.0	0.0

Table 30. Estimate of Transit Trip Generation Potential Near Metrorail Stations, by Land Use Type

Land Use	Typical Daily Person-Trip Generation Rate (per 1,000 S.F. GFA)	Typical Daily Transit Mode Share[1/]	Estimated Transit Trip Generation Potential (per 1,000 S.F. GFA)
Office			
Downtown	15	35%	5.3
Close-in suburban stations	15	15	2.3
Residential[2/]			
Close-in suburban stations	5	35	1.8
Retail (major complex)			
Downtown	30	35	10.5
Close-in suburban stations	30	15	4.5
Hotel[3/]			
Downtown	14	15	2.1
Close-in suburban stations	14	10	1.4

1/ Transit as a percentage of all trips, including walk trips. Transit mode shares as a percentage of non-walk trips would be substantially higher, especially for office and retail uses.

2/ Assumes 750 square feet of building floor space per dwelling unit.

3/ Assumes 750 square feet of hotel floor space per guest room.

NOTE: Person-trip generation rates are "typical" rates, derived from a combination of sources, including data collected in this study, data from the M-NCPPC study of the Metrorail Red Line, and data from the Institute of Transportation Engineers' Trip Generation Manual. Rates for any individual site could vary widely from these typical rates.

generation rate, due primarily to the lower percentages of transit access. However, exceptions to this also occur. A major conference attracting a local audience, for example, could generate many trips by transit, if the hotel is located in close proximity to the station and if other pressures exist to take transit (e.g. a shortage of parking).

In summary, it can be concluded that the transit trip generation potential of all four land use can be substantial, if sites are optimally developed with access to the station in mind. The transit system is quite dependent on walk access, often at both ends of the trip. Because the convenience of walk access is highly dependent on distance from the station portal, it is important that a relatively dense, compact land use arrangement occur within the station area. This development philosophy is good not only for the vitality of the transit system but for regional transportation overall. More convenient access to the Metrorail system (through locating sizeable land developments in close proximity to rail stations) increases use of the system and thereby reduces the amount of auto travel that would otherwise be made (if a similar development was located far away from a rail station). For example, a 200,000 square foot office building in the downtown will generate nearly 300,000 transit trips per year, valued at approximately $500,000 of transit revenue. A similar building near a close-in suburban station would generate over $200,000 in transit revenue annually. For offices being considered for development in the suburbs, locating a 200,000 square foot office building close to a suburban rail station rather than in a remote area not served by transit could realize an annual reduction of some 500,000 vehicle miles of travel. Similar comparisons can also be made illustrating the economic and transportation benefits of increased density around rail stations.

Land use decisions around rail stations are crucial to the continued optimization of available transportation resources. It is difficult to overstate the importance of these decisions and possible benefits of rational land use planning around the stations. Although additional data would be helpful to expand and refine planning tools proposed here, they are at least a start. Hopefully they can be used to advantage as the Washington metropolitan area and its transportation system grows.

APPENDIX A
DETERMINING CONFIDENCE LIMITS FROM SURVEY DATA

A sample drawn from a given population is not likely to be an exact representation of the true characteristics of the population. However, it is possible to estimate the likelihood that the true value lies within a certain a range about the estimated value derived from the data. This range, or "confidence limit," can be determined assuming that the data correspond to an appropriate statistical distribution. This appendix provides the reader with a simple means of establishing confidence limits for the survey results, based on sample size and the travel characteristics being examined.

Table A has been prepared to permit the direct determination of 95 percent confidence limits for all data based on percentages. The typical way of expressing the statistical accuracy is that the percentage derived from the data is within plus or minus X percentage points with 95 percent confidence. The use of the 95th percentile is common, but other percentiles could also be used.

In Table A-1, the sample size for the value being investigated is located on the left side of the table. The percentage of respondents specifying a given answer is located in the column headings. If the percent frequency in the column heading is termed "p," it can be seen that both p and 1-p yield the same results for a given sample size. The 95 percent confidence limit is identified by the intersection of the appropriate sample size row and percent frequency columns. For example, if the percentage of trips by transit is 10 percent and the sample size upon which that estimate is based is 100, it could be said that the estimate is within 5.6 percent of the true value with 95 percent confidence. The equation used to derive Table A-1 can also be used directly, if desired.

Table A-1. Confidence Limits (±%) for 95% Significance Level

Actual Sample Size	Percent Frequency											
	1 or 99	2 or 98	3 or 97	4 or 96	5 or 95	7 or 93	10 or 90	15 or 85	20 or 80	30 or 70	40 or 60	50
10	±6.2%	8.7	10.6	12.1	13.5	15.0	17.0	22.1	24.8	28.4	30.4	31.0
25	3.9	5.5	6.7	7.7	8.5	10.0	11.2	14.0	15.7	18.0	19.2	19.6
50	2.8	3.8	4.7	5.4	6.0	7.1	7.9	9.9	11.1	12.7	13.6	13.9
75	2.3	3.2	3.9	4.4	4.9	5.8	6.5	8.1	9.1	10.4	11.1	11.3
100	1.9	2.7	3.3	3.8	4.3	5.0	5.6	7.0	7.8	9.0	9.6	9.8
150	1.6	2.2	2.7	3.1	3.5	4.1	4.6	5.7	6.4	7.3	7.8	8.0
200	1.4	1.9	2.4	2.7	3.0	3.5	4.0	4.9	5.5	6.3	6.8	6.9
300	1.1	1.6	1.9	2.2	2.5	2.9	3.2	4.0	4.5	5.2	5.5	5.7
400	1.0	1.4	1.5	1.9	2.1	2.5	2.8	3.5	3.9	4.5	4.8	4.9
500	0.9	1.2	1.5	1.7	1.9	2.2	2.5	3.1	3.5	4.0	4.3	4.4
700	0.7	1.0	1.3	1.5	1.6	1.9	2.1	2.6	3.0	3.4	3.6	3.7
900	0.6	0.9	1.1	1.3	1.4	1.7	1.9	2.3	2.6	3.0	3.2	3.3
1200	0.6	0.8	1.0	1.1	1.2	1.4	1.6	2.0	2.3	2.6	2.8	2.8
1500	0.5	0.7	0.9	1.0	1.1	1.3	1.5	1.8	2.0	2.3	2.5	2.5
2000	0.4	0.6	0.7	0.9	1.0	1.1	1.3	1.6	1.8	2.0	2.1	2.2
2500	0.4	0.5	0.7	0.8	0.9	1.0	1.1	1.4	1.6	1.8	1.9	2.0
3000	0.4	0.5	0.6	0.7	0.8	0.9	1.0	1.3	1.4	1.6	1.8	1.8

Equation:

$$\text{Confidence Limits } (d) = \sqrt{\frac{(\%\text{Freq.})(1-\%\text{Freq.})(1.96^2)}{\text{Sample Size}}}$$

APPENDIX B

RELEVANT DATA FROM OTHER RECENT SOURCES

Table B-1. Residential/Retail/Hotel Data from Additional Sources[1/]

Residential Development	Station Location	Distance to Station (feet)	Distance to DC Core (miles)	AM Peak Hour[2/] Percent Transit and Walk	Number of Dwelling Units
The Willoughby	Friendship Heights	1,200	5.0	53	804
Topaz House	Bethesda	2,000	6.9	50	365
Stoneybrook	Grosvenor	1,000	10.3	24	200
Parkside	Grosvenor	2,000	10.3	8	340
The Forum	White Flint	1,000	12.0	14	227
Americana	Rockville	500	16.0	34	425

Retail Development	Station Location	Distance to Station (feet)	Distace to DC Core (miles)	Mid-day[3/] Peak Hour Percent Transit	GSF (x 1,000)
Woodward & Lothrop	Friendship Heights	100	5.0	39	180
Saks Fifth Avenue	Friendship Heights	1,600	5.0	4	103

Hotel	Station Location	Distance to Station (feet)	Distance to DC Core (miles)	AM Peak Hour[4/] Percent Transit	Number of Rooms
Holiday Inn	Friendship Heights	1,800	5.0	9	227
Hyatt (Metro Center)	Bethesda	100	6.9	11	380

1/ Additional sources include: The Maryland-National Capital Park and Planning Commission study of the Metrorail Red Line (1986).

2/ AM Peak hour percentage includes transit plus walk.

3/ Transit percentage includes all persons to the retail developments.

4/ Transit percentage includes all persons to the hotels.

Table B-2. Office Building Data from Additional Sources[1/]

Office Building	Station Location	Distance to Station (feet)	Distance to DC Core (miles)	AM Peak Hour Percent Transit	GSF (x1,000)
National Place/ National Press Bldg.	Metro Center	100	0.0	59.3	409
1920 L Street	Farragut North	1,000	0.0	53.0	74.8
Van Ness Center	Van Ness-UDC	100	2.9	32.0	182.6
7500 Old Georgetown Road	Bethesda	100	6.9	13.3	
The Barlow Bldg.	Friendship Heights	700	5.0	23.5	240
Chevy Chase Bldg.	Friendship Heights	1,500	5.0	13.5	250
One Park North	Friendship Heights	2,000	5.0	9.0	132
Montgomery Bldg.	Bethesda	450	6.9	12.0	82.5
7315 Wisconsin	Bethesda	600	6.9	30.6	
Fairmont Bldg.	Bethesda	1,400	6.9	27.0	136
Landow Bldg.	Bethesda	2,000	6.9	9.0	225
7101 Wisconsin	Bethesda	2,000	6.9	17.8	
NRC Building	Bethesda	2,100	6.9	10.0	134

1/ Additional sources include: The Maryland-National Capital Park and Planning Commission study of the Metrorail Red Line (1986), and the National Capital Region Transportation Planning Board Trip Generation Studies of the National Place (1986) and the Van Ness Office Building (1985).

APPENDIX C

CORRELATION TABLES AND OTHER RESULTS FROM REGRESSION ANALYSIS

Correlation matrix File: OFFICE Date: 02-06-1987

FILTER: **Keep if DEVEL = 1**

The P-values shown are 2 tailed values.

	GSF	METRO	DISTDC	DEVEL	EMPTYPE	GOVTYPE	EMPL
GSF	1.0000	-0.5422	99.0000	99.0000	-0.2745	99.0000	0.3825
	0.0000	0.2664	1.0000	1.0000	0.5987	1.0000	0.0005
	(6)	(6)	(6)	(6)	(6)	(6)	(6)
METRO	-0.5422	1.0000	99.0000	99.0000	0.9293	99.0000	-0.5616
	0.2664	0.0000	1.0000	1.0000	0.0073	1.0000	0.2462
	(6)	(6)	(6)	(6)	(6)	(6)	(6)
DISTDC	99.0000	99.0000	99.0000	99.0000	99.0000	99.0000	99.0000
	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
	(6)	(6)	(6)	(6)	(6)	(6)	(6)
DEVEL	99.0000	99.0000	99.0000	99.0000	99.0000	99.0000	99.0000
	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
	(6)	(6)	(6)	(6)	(6)	(6)	(6)
EMPTYPE	-0.2745	0.9293	99.0000	99.0000	1.0000	99.0000	-0.2380
	0.5987	0.0073	1.0000	1.0000	0.0000	1.0000	0.6562
	(6)	(6)	(6)	(6)	(6)	(6)	(6)
GOVTYPE	99.0000	99.0000	99.0000	99.0000	99.0000	99.0000	99.0000
	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
	(6)	(6)	(6)	(6)	(6)	(6)	(6)
EMPL	0.3825	-0.5616	99.0000	99.0000	-0.2380	99.0000	1.0000
	0.0005	0.2462	1.0000	1.0000	0.6562	1.0000	0.0000
	(6)	(6)	(6)	(6)	(6)	(6)	(6)
EMPLSQ	-0.3222	0.6020	99.0000	99.0000	0.5687	99.0000	-0.4782
	0.5334	0.2061	1.0000	1.0000	0.2389	1.0000	0.3374
	(6)	(6)	(6)	(6)	(6)	(6)	(6)
PKGSPSQ	-0.3518	-0.0944	99.0000	99.0000	-0.1802	99.0000	-0.3311
	0.5615	0.8800	1.0000	1.0000	0.7718	1.0000	0.5863
	(5)	(5)	(5)	(5)	(5)	(5)	(5)
PKGALL	-0.7098	0.1037	99.0000	99.0000	0.0249	99.0000	-0.7158
	0.1141	0.8449	1.0000	1.0000	0.9625	1.0000	0.1097
	(6)	(6)	(6)	(6)	(6)	(6)	(6)
PKGCOST	-0.2857	-0.2103	99.0000	99.0000	-0.1842	99.0000	-0.3725
	0.5831	0.6892	1.0000	1.0000	0.7268	1.0000	0.4669
	(6)	(6)	(6)	(6)	(6)	(6)	(6)
PCTFREE	-0.2563	0.5023	99.0000	99.0000	0.2865	99.0000	-0.2286
	0.6240	0.3099	1.0000	1.0000	0.5820	1.0000	0.6631
	(6)	(6)	(6)	(6)	(6)	(6)	(6)
TRANCOST	0.4515	-0.4032	99.0000	99.0000	-0.4863	99.0000	0.4246
	0.3687	0.4204	1.0000	1.0000	0.3281	1.0000	0.4014
	(6)	(6)	(6)	(6)	(6)	(6)	(6)

	GSF	METRO	DISTDC	DEVEL	EMPTYPE	GOVTYPE	EMPL
AWORKTRP	0.0881	0.5500	99.0000	99.0000	0.7763	99.0000	0.0458
	0.8681	0.2582	1.0000	1.0000	0.0635	1.0000	0.9313
	(6)	(6)	(6)	(6)	(6)	(6)	(6)
TWORKTRP	0.0956	-0.7578	99.0000	99.0000	-0.8957	99.0000	0.1386
	0.8570	0.0809	1.0000	1.0000	0.0158	1.0000	0.7934
	(6)	(6)	(6)	(6)	(6)	(6)	(6)
WAL4WORK	-0.4531	0.4458	99.0000	99.0000	0.1334	99.0000	-0.4753
	0.3668	0.3755	1.0000	1.0000	0.7922	1.0000	0.3407
	(6)	(6)	(6)	(6)	(6)	(6)	(6)
AMIDALL	0.1893	-0.0785	99.0000	99.0000	-0.0044	99.0000	0.1549
	0.7195	0.8825	1.0000	1.0000	0.9934	1.0000	0.7695
	(6)	(6)	(6)	(6)	(6)	(6)	(6)
TMIDALL	0.3878	-0.6461	99.0000	99.0000	-0.3994	99.0000	0.3886
	0.0002	0.1657	1.0000	1.0000	0.4328	1.0000	0.0002
	(6)	(6)	(6)	(6)	(6)	(6)	(6)
WALKMID	-0.8632	0.5563	99.0000	99.0000	0.3241	99.0000	-0.8681
	0.0137	0.2510	1.0000	1.0000	0.5309	1.0000	0.0249
	(6)	(6)	(6)	(6)	(6)	(6)	(6)
ANOWALK	-0.6938	0.7242	99.0000	99.0000	0.5697	99.0000	-0.7152
	0.1217	0.1036	1.0000	1.0000	0.2379	1.0000	0.1101
	(6)	(6)	(6)	(6)	(6)	(6)	(6)
TNOWALK	0.6938	-0.7242	99.0000	99.0000	-0.5697	99.0000	0.7152
	0.1217	0.1036	1.0000	1.0000	0.2379	1.0000	0.1101
	(6)	(6)	(6)	(6)	(6)	(6)	(6)
AUTOOCC	-0.0133	-0.0801	99.0000	99.0000	-0.0473	99.0000	0.1711
	0.9800	0.8801	1.0000	1.0000	0.9292	1.0000	0.7459
	(6)	(6)	(6)	(6)	(6)	(6)	(6)
JURISDCT	-0.9386	0.6463	99.0000	99.0000	0.4368	99.0000	-0.8763
	0.0055	0.1673	1.0000	1.0000	0.3865	1.0000	0.0220
	(6)	(6)	(6)	(6)	(6)	(6)	(6)
SEX	0.3679	-0.0176	99.0000	99.0000	-0.0801	99.0000	0.3080
	0.4730	0.9736	1.0000	1.0000	0.8801	1.0000	0.5526
	(6)	(6)	(6)	(6)	(6)	(6)	(6)
AUTOAVAI	0.6566	0.0631	99.0000	99.0000	0.3873	99.0000	0.5647
	0.1566	0.9054	1.0000	1.0000	0.4481	1.0000	0.2430
	(6)	(6)	(6)	(6)	(6)	(6)	(6)

	EMPLSQ	PKGSPSQ	PKGALL	PKGCOST	PCTFREE	TRANCOST	AWORKTRP
GSF	-0.3222	-0.3518	-0.7038	-0.2857	-0.2563	0.4515	0.0681
	0.5334	0.5615	0.1141	0.5831	0.6240	0.3687	0.8681
	(6)	(5)	(6)	(6)	(6)	(6)	(6)
METRO	0.6020	-0.0944	0.1037	-0.2103	0.5023	-0.4032	0.5500
	0.2061	0.8800	0.8443	0.6892	0.3099	0.4204	0.2582
	(6)	(5)	(6)	(6)	(6)	(6)	(6)
DISTDC	99.0000	99.0000	99.0000	99.0000	99.0000	99.0000	99.0000
	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
	(6)	(5)	(6)	(6)	(6)	(6)	(6)
DEVEL	99.0000	99.0000	99.0000	99.0000	99.0000	99.0000	99.0000
	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
	(6)	(5)	(6)	(6)	(6)	(6)	(6)
EMPTYPE	0.5687	-0.1802	0.0249	-0.1842	0.2865	-0.4863	0.7763
	0.2389	0.7718	0.9626	0.7268	0.5820	0.3281	0.0695
	(6)	(5)	(6)	(6)	(6)	(6)	(6)
GOVTYPE	99.0000	99.0000	99.0000	99.0000	99.0000	99.0000	99.0000
	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
	(6)	(5)	(6)	(6)	(6)	(6)	(6)
EMPL	-0.4782	-0.3311	-0.7158	-0.3726	-0.2286	0.4246	0.0458
	0.3374	0.5863	0.1097	0.4669	0.6631	0.4014	0.9313
	(6)	(5)	(6)	(6)	(6)	(6)	(6)
EMPLSQ	1.0000	0.0917	0.2554	0.3780	0.0331	-0.1554	0.4184
	0.0000	0.8834	0.6252	0.4600	0.9503	0.7688	0.4090
	(6)	(5)	(6)	(6)	(6)	(6)	(6)
PKGSPSQ	0.0917	1.0000	0.5687	0.3344	-0.6893	0.2444	-0.6359
	0.8834	0.0000	0.3171	0.5823	0.1979	0.6919	0.2488
	(5)	(5)	(5)	(5)	(5)	(5)	(5)
PKGALL	0.2554	0.5687	1.0000	0.7874	-0.4897	-0.5837	-0.0088
	0.6252	0.3171	0.0000	0.0630	0.3241	0.2239	0.9868
	(6)	(5)	(6)	(6)	(6)	(6)	(6)
PKGCOST	0.3780	0.3344	0.7874	1.0000	-0.6727	-0.4513	0.1080
	0.4600	0.5823	0.0630	0.0000	0.1432	0.3690	0.8387
	(6)	(5)	(6)	(6)	(6)	(6)	(6)
PCTFREE	0.0331	-0.6893	-0.4897	-0.6727	1.0000	0.1576	-0.0357
	0.9503	0.1979	0.3241	0.1432	0.0000	0.7656	0.9465
	(6)	(5)	(6)	(6)	(6)	(6)	(6)
TRANCOST	-0.1554	0.2444	-0.5837	-0.4513	0.1576	1.0000	-0.6809
	0.7688	0.6919	0.2239	0.3690	0.7656	0.0000	0.1365
	(6)	(5)	(6)	(6)	(6)	(6)	(6)

	EMPLSQ	PKGSPSQ	PKGALL	PKGCOST	PCTFREE	TRANCOST	AWORKTRP
AWORKTRP	0.4184	-0.6359	-0.0088	0.1080	-0.0357	-0.6809	1.0000
	0.4090	0.2488	0.9868	0.8387	0.9465	0.1365	0.0000
	(6)	(5)	(6)	(6)	(6)	(6)	(6)
TWORKTRP	-0.5229	0.5588	0.0392	0.0243	-0.2201	0.6370	-0.9538
	0.2872	0.3275	0.9412	0.9636	0.6751	0.1737	0.0031
	(6)	(5)	(6)	(6)	(6)	(6)	(6)
WALKWORK	0.3052	0.1337	-0.1869	-0.4325	0.7499	0.4581	-0.4136
	0.5564	0.7474	0.7229	0.3917	0.0860	0.3610	0.4150
	(6)	(5)	(6)	(6)	(6)	(6)	(6)
AMIDALL	-0.0033	-0.9099	-0.1948	0.1857	0.1864	-0.4216	0.4835
	0.9950	0.0320	0.7115	0.7246	0.7237	0.4051	0.3313
	(6)	(5)	(6)	(6)	(6)	(6)	(6)
TMIDALL	-0.4489	-0.3220	-0.6902	-0.2850	-0.2634	0.4724	-0.0216
	0.3719	0.5972	0.1291	0.5841	0.6140	0.3442	0.9676
	(6)	(5)	(6)	(6)	(6)	(6)	(6)
WALKMID	0.3635	0.6922	0.6457	0.1448	0.1271	-0.1880	-0.2039
	0.4787	0.1952	0.1660	0.7843	0.8104	0.7214	0.6984
	(6)	(5)	(6)	(6)	(6)	(6)	(6)
ANOWALK	0.4343	-0.4142	0.2859	0.1179	0.5471	-0.6538	0.4588
	0.3895	0.4881	0.5828	0.8239	0.2612	0.1590	0.3601
	(6)	(5)	(6)	(6)	(6)	(6)	(6)
TNOWALK	-0.4343	0.4142	-0.2859	-0.1179	-0.5471	0.6538	-0.4588
	0.3895	0.4881	0.5828	0.8239	0.2612	0.1590	0.3601
	(6)	(5)	(6)	(6)	(6)	(6)	(6)
AUTOOCC	-0.8059	0.0839	-0.0438	-0.4690	0.0543	-0.1617	-0.1341
	0.0528	0.8933	0.9344	0.3480	0.9186	0.7595	0.8001
	(6)	(5)	(6)	(6)	(6)	(6)	(6)
JUBISPOT	0.1801	0.3478	0.6328	0.0868	0.2696	-0.5298	0.0338
	0.7327	0.5670	0.1775	0.8702	0.6053	0.2796	0.9493
	(6)	(5)	(6)	(6)	(6)	(6)	(6)
SEX	0.0728	-0.7406	-0.7742	-0.4374	0.6619	0.4284	0.0025
	0.8911	0.1523	0.0707	0.3858	0.1521	0.3967	0.9962
	(6)	(5)	(6)	(6)	(6)	(6)	(6)
AUTOAVAI	0.3580	-0.4889	-0.3130	0.0703	-0.3749	-0.0630	0.6897
	0.4859	0.4033	0.5458	0.8948	0.4640	0.9056	0.1295
	(6)	(5)	(6)	(6)	(6)	(6)	(6)

	TWORKTRP	WALKWORK	AMIDALL	TMIDALL	WALKMID	ANOWALK	TNOWALK
GSF	0.0956	-0.4531	0.1893	0.9878	-0.8832	-0.6398	0.6398
	0.8570	0.3668	0.7195	0.0002	0.0197	0.1217	0.1217
	(6)	(6)	(6)	(6)	(6)	(6)	(6)
METRO	-0.7578	0.4458	-0.0785	-0.6461	0.5569	0.7242	-0.7242
	0.0809	0.3755	0.8825	0.1657	0.2510	0.1036	0.1036
	(6)	(6)	(6)	(6)	(6)	(6)	(6)
DISTDC	99.0000	99.0000	99.0000	99.0000	99.0000	99.0000	99.0000
	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
	(6)	(6)	(6)	(6)	(6)	(6)	(6)
DEVEL	99.0000	99.0000	99.0000	99.0000	99.0000	99.0000	99.0000
	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
	(6)	(6)	(6)	(6)	(6)	(6)	(6)
EMPTYPE	-0.8957	0.1334	-0.0044	-0.3994	0.3241	0.5637	-0.5637
	0.0158	0.7922	0.9934	0.4328	0.5309	0.2379	0.2379
	(6)	(6)	(6)	(6)	(6)	(6)	(6)
GOVTYPE	99.0000	99.0000	99.0000	99.0000	99.0000	99.0000	99.0000
	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
	(6)	(6)	(6)	(6)	(6)	(6)	(6)
EMPL	0.1386	-0.4753	0.1549	0.9886	-0.8681	-0.7152	0.7152
	0.7934	0.3407	0.7695	0.0002	0.0249	0.1101	0.1101
	(6)	(6)	(6)	(6)	(6)	(6)	(6)
EMPLSQ	-0.5229	0.3052	-0.0033	-0.4489	0.3635	0.4343	-0.4343
	0.2872	0.5564	0.9950	0.3719	0.4787	0.3895	0.3895
	(6)	(6)	(6)	(6)	(6)	(6)	(6)
PKGSPSQ	0.5588	0.1937	-0.9099	-0.3220	0.5922	-0.4142	0.4142
	0.3275	0.7474	0.0320	0.5972	0.1952	0.4881	0.4881
	(5)	(5)	(5)	(5)	(5)	(5)	(5)
PKGALL	0.0392	-0.1869	-0.1348	-0.6902	0.6457	0.2859	-0.2859
	0.9412	0.7229**	0.7115	0.1291	0.1660	0.5828	0.5828
	(6)	(6)	(6)	(6)	(6)	(6)	(6)
PKGCOST	0.0243	-0.4325	0.1857	-0.2850	0.1448	0.1179	-0.1179
	0.9636	0.3917	0.7246	0.5841	0.7843	0.8239	0.8239
	(6)	(6)	(6)	(6)	(6)	(6)	(6)
PCTFREE	-0.2201	0.7499	0.1864	-0.2634	0.1271	0.5471	-0.5471
	0.6751	0.0860	0.7237	0.6140	0.8104	0.2612	0.2612
	(6)	(6)	(6)	(6)	(6)	(6)	(6)
TRANCOST	0.6370	0.4581	-0.4216	0.4724	-0.1880	-0.6538	0.6538
	0.1737	0.3610	0.4051	0.3442	0.7214	0.1590	0.1590
	(6)	(6)	(6)	(6)	(6)	(6)	(6)

	TWORKTRP	WALKWORK	AMIDALL	TMIDALL	WALKMID	ANOWALK	TNOWALK
AWORKTRP	-0.9538	-0.4136	0.4835	-0.0216	-0.2039	0.4588	-0.4588
	0.0031	0.4150	0.3313	0.9676	0.6384	0.3601	0.3601
	(6)	(6)	(6)	(6)	(6)	(6)	(6)
TWORKTRP	1.0000	0.1291	-0.4206	0.2139	0.0200	-0.6348	0.6348
	0.0000	0.8074	0.4063	0.6841	0.9700	0.1757	0.1757
	(6)	(6)	(6)	(6)	(6)	(6)	(6)
WALKWORK	0.1291	1.0000	-0.3472	-0.4677	0.5361	0.3053	-0.3053
	0.8074	0.0000	0.5002	0.3436	0.2729	0.5563	0.5563
	(6)	(6)	(6)	(6)	(6)	(6)	(6)
AMIDALL	-0.4206	-0.3472	1.0000	0.1899	-0.6109	0.4491	-0.4491
	0.4063	0.5002	0.0000	0.7185	0.1377	0.3717	0.3717
	(6)	(6)	(6)	(6)	(6)	(6)	(6)
TMIDALL	0.2139	-0.4677	0.1899	1.0000	-0.8933	-0.7372	0.7372
	0.6841	0.3436	0.7185	0.0000	0.0165	0.0945	0.0945
	(6)	(6)	(6)	(6)	(6)	(6)	(6)
WALKMID	0.0200	0.5361	-0.6109	-0.8933	1.0000	0.3890	-0.3890
	0.9700	0.2729	0.1377	0.0165	0.0000	0.4460	0.4460
	(6)	(6)	(6)	(6)	(6)	(6)	(6)
ANOWALK	-0.6348	0.3053	0.4491	-0.7372	0.3890	1.0000	-1.0000
	0.1757	0.5563	0.3717	0.0945	0.4460	0.0000	0.0000
	(6)	(6)	(6)	(6)	(6)	(6)	(6)
TNOWALK	0.6348	-0.3053	-0.4491	0.7372	-0.3890	-1.0000	1.0000
	0.1757	0.5563	0.3717	0.0945	0.4460	0.0000	0.0000
	(6)	(6)	(6)	(6)	(6)	(6)	(6)
AUTOOCC	0.1629	-0.2061	-0.2350	0.0683	0.0520	-0.1542	0.1542
	0.7578	0.6952	0.6540	0.8968	0.9221	0.7706	0.7706
	(6)	(6)	(6)	(6)	(6)	(6)	(6)
JURISDCT	-0.2083	0.3664	-0.2793	-0.3320	0.8794	0.6594	-0.6594
	0.6912	0.4750	0.5919	0.0068	0.0209	0.1543	0.1543
	(6)	(6)	(6)	(6)	(6)	(6)	(6)
SEX	-0.1007	0.3878	0.5340	0.3493	-0.5261	0.1484	-0.1484
	0.8494	0.4474	0.2751	0.4974	0.2837	0.7791	0.7791
	(6)	(6)	(6)	(6)	(6)	(6)	(6)
AUTOAVAI	-0.5411	-0.5008	0.2164	0.5431	-0.5370	-0.2464	0.2464
	0.2676	0.3116	0.6805	0.2655	0.2719	0.6378	0.6378
	(6)	(6)	(6)	(6)	(6)	(6)	(6)

	AUTOOCC	JURISPCT	SEX	AUTOAVAI
GSF	-0.0133	-0.9386	0.3679	0.6566
	0.9800	0.0055	0.4730	0.1566
	(6)	(6)	(6)	(6)
METRO	-0.0801	0.6443	-0.0176	0.0631
	0.8801	0.1673	0.9736	0.9054
	(6)	(6)	(6)	(6)
DISTOC	99.0000	99.0000	99.0000	99.0000
	1.0000	1.0000	1.0000	1.0000
	(6)	(6)	(6)	(6)
DEVEL	99.0000	99.0000	99.0000	99.0000
	1.0000	1.0000	1.0000	1.0000
	(6)	(6)	(6)	(6)
EMPTYPE	-0.0473	0.4368	-0.0801	0.3873
	0.9292	0.3865	0.8801	0.4481
	(6)	(6)	(6)	(6)
GOVTYPE	99.0000	99.0000	99.0000	99.0000
	1.0000	1.0000	1.0000	1.0000
	(6)	(6)	(6)	(6)
EMPL	0.1711	-0.8763	0.3080	0.5647
	0.7459	0.0220	0.5526	0.2430
	(6)	(6)	(6)	(6)
EMPLSQ	-0.8059	0.1801	0.0728	0.3580
	0.0528	0.7327	0.8911	0.4859
	(6)	(6)	(6)	(6)
PKGSPSQ	0.0839	0.3472	-0.7406	-0.4889
	0.8933	0.5670	0.1523	0.4033
	(5)	(5)	(5)	(5)
PKGALL	-0.0438	0.6328	-0.7742	-0.3130
	0.9344	0.1775	0.0707	0.5458
	(6)	(6)	(6)	(6)
PKGCOST	-0.4690	0.0868	-0.4374	0.0703
	0.3480	0.8702	0.3858	0.8948
	(6)	(6)	(6)	(6)
PCTFREE	0.0543	0.2696	0.6619	-0.3749
	0.9186	0.6053	0.1521	0.4640
	(6)	(6)	(6)	(6)
TRANCOST	-0.1617	-0.5298	0.4284	-0.0630
	0.7595	0.2796	0.3967	0.9056
	(6)	(6)	(6)	(6)

	AUTOOCC	JURISPCT	SEX	AUTOAVAI
AWORKTRP	-0.1341	0.0338	0.0025	0.6837
	0.8001	0.9493	0.9962	0.1295
	(6)	(6)	(6)	(6)
TWORKTRP	0.1629	-0.2089	-0.1007	-0.5411
	0.7578	0.6912	0.8494	0.2676
	(6)	(6)	(6)	(6)
WALKWORK	-0.2061	0.3664	0.3878	-0.5008
	0.6952	0.4750	0.4474	0.3116
	(6)	(6)	(6)	(6)
AMIDALL	-0.2350	-0.2793	0.5340	0.2164
	0.6540	0.5919	0.2751	0.6805
	(6)	(6)	(6)	(6)
TMIDALL	0.0689	-0.9320	0.3493	0.5431
	0.8968	0.0068	0.4974	0.2655
	(6)	(6)	(6)	(6)
WALKMID	0.0520	0.8794	-0.5261	-0.5370
	0.9221	0.0209	0.2837	0.2719
	(6)	(6)	(6)	(6)
ANOWALK	-0.1542	0.6594	0.1484	-0.2464
	0.7706	0.1543	0.7791	0.6378
	(6)	(6)	(6)	(6)
TNOWALK	0.1542	-0.6594	-0.1484	0.2464
	0.7706	0.1543	0.7791	0.6378
	(6)	(6)	(6)	(6)
AUTOOCC	1.0000	0.2880	-0.3907	-0.3514
	0.0000	0.5799	0.4438	0.4946
	(6)	(6)	(6)	(6)
JURISPCT	0.2880	1.0000	-0.4857	-0.5877
	0.5799	0.0000	0.3288	0.2200
	(6)	(6)	(6)	(6)
SEX	-0.3907	-0.4857	1.0000	0.1079
	0.4438	0.3288	0.0000	0.8388
	(6)	(6)	(6)	(6)
AUTOAVAI	-0.3514	-0.5877	0.1079	1.0000
	0.4946	0.2200	0.8388	0.0000
	(6)	(6)	(6)	(6)

Correlation matrix File: OFFICE Date: 02-06-1987

FILTER: Keep if DEVEL = 2

The P-values shown are 2 tailed values.

	GSF	METRO	DISTDC	EMPTYPE	EMPL	EMPLSQ	PKGSPSQ
GSF	1.0000	-0.3838	-0.1411	0.7116	0.9783	-0.2680	-0.5418
	0.0000	0.2934	0.7170	0.0317	0.0000	0.5204	0.4582
	(9)	(9)	(9)	(9)	(8)	(8)	(4)
METRO	-0.3838	1.0000	-0.3507	-0.2639	-0.4471	0.6420	-0.0567
	0.2934	0.0000	0.3544	0.4923	0.2664	0.0863	0.9433
	(9)	(9)	(9)	(9)	(8)	(8)	(4)
DISTDC	-0.1411	-0.3507	1.0000	-0.0627	-0.1661	-0.1890	-0.3246
	0.7170	0.3544	0.0000	0.8725	0.6938	0.6535	0.6754
	(9)	(9)	(9)	(9)	(8)	(8)	(4)
EMPTYPE	0.7116	-0.2639	-0.0627	1.0000	99.0000	99.0000	-0.5784
	0.0317	0.4923	0.8725	0.0000	1.0000	1.0000	0.4216
	(9)	(9)	(9)	(9)	(8)	(8)	(4)
EMPL	0.9783	-0.4471	-0.1661	99.0000	1.0000	-0.3781	-0.0247
	0.0000	0.2664	0.6938	1.0000	0.0000	0.3553	0.9843
	(8)	(8)	(8)	(8)	(8)	(8)	(3)
EMPLSQ	-0.2680	0.6420	-0.1890	99.0000	-0.3781	1.0000	-0.4078
	0.5204	0.0863	0.6535	1.0000	0.3553	0.0000	0.7326
	(8)	(8)	(8)	(8)	(8)	(8)	(3)
PKGSPSQ	-0.5418	-0.0567	-0.3246	-0.5784	-0.0247	-0.4078	1.0000
	0.4582	0.9433	0.6754	0.4216	0.9843	0.7326	0.0000
	(4)	(4)	(4)	(4)	(3)	(3)	(4)
PKGALL	0.4657	-0.3688	0.3930	0.5409	0.1283	-0.2004	-0.8697
	0.2063	0.3284	0.2951	0.1326	0.7617	0.6337	0.1303
	(9)	(9)	(9)	(9)	(8)	(8)	(4)
PKGCOST	0.5327	0.0362	-0.2990	0.2198	0.5376	-0.3033	-0.8057
	0.1398	0.9263	0.4340	0.5696	0.1693	0.4638	0.1943
	(9)	(9)	(9)	(9)	(8)	(8)	(4)
PCTFREE	-0.3397	0.6479	-0.4086	-0.3708	-0.1817	0.3978	-0.6042
	0.3708	0.0593	0.2746	0.3256	0.6664	0.3285	0.3958
	(9)	(9)	(9)	(9)	(8)	(8)	(4)
TRANCOST	-0.2237	-0.0640	0.7837	-0.1101	-0.2663	0.2368	-0.4968
	0.5624	0.8699	0.0126	0.7777	0.5233	0.5717	0.5032
	(9)	(9)	(9)	(9)	(8)	(8)	(4)
AWORKTRP	-0.5931	0.7850	-0.1227	-0.5499	-0.4661	0.4139	0.8745
	0.0924	0.0124	0.7529	0.1251	0.2440	0.3075	0.1255
	(9)	(9)	(9)	(9)	(8)	(8)	(4)
TWORKTRP	0.5468	-0.8087	0.1667	0.5202	0.4269	-0.4399	-0.8780
	0.1277	0.0084	0.6678	0.1510	0.2911	0.2750	0.1220
	(9)	(9)	(9)	(9)	(8)	(8)	(4)

	GSF	METRO	DISTDC	EMPTYPE	EMPL	EMPLSQ	PKGSPSQ
WALKWORK	0.6365	-0.1023	-0.2538	0.5513	0.3519	0.4656	-0.2222
	0.0654	0.7932	0.5096	0.1239	0.3921	0.2446	0.7778
	(9)	(9)	(9)	(9)	(8)	(8)	(4)
AMIDALL	-0.3656	0.4827	-0.3770	-0.2590	-0.2761	0.7275	0.5672
	0.3328	0.1880	0.3163	0.5006	0.5074	0.0411	0.4328
	(9)	(9)	(9)	(9)	(8)	(8)	(4)
TMIDALL	-0.2533	0.0653	-0.4554	-0.3262	0.0599	0.2013	0.6571
	0.5104	0.8674	0.2178	0.3912	0.8877	0.6322	0.3429
	(9)	(9)	(9)	(9)	(8)	(8)	(4)
WALKMID	0.3725	-0.4217	0.4347	0.3021	0.2191	-0.6700	-0.6560
	0.3231	0.2580	0.2421	0.4290	0.6017	0.0693	0.3440
	(9)	(9)	(9)	(9)	(8)	(8)	(4)
TNOWALK	-0.0034	-0.4653	-0.2240	-0.2122	0.3492	-0.2616	0.6082
	0.9931	0.2068	0.5620	0.5833	0.3960	0.5309	0.3918
	(9)	(9)	(9)	(9)	(8)	(8)	(4)
JURISPCT	-0.0939	0.0573	0.0227	-0.5324	0.4465	0.1792	0.8059
	0.7981	0.8823	0.9537	0.1401	0.2671	0.6708	0.1941
	(9)	(9)	(9)	(9)	(8)	(8)	(4)
SEX	0.6487	0.1819	-0.3492	0.2555	0.5384	-0.1926	-0.4610
	0.0589	0.6393	0.3566	0.5066	0.1171	0.6473	0.5390
	(9)	(9)	(9)	(9)	(8)	(8)	(4)
AUTOAVAI	0.2520	0.5157	-0.2521	0.1594	0.0817	0.5623	0.2615
	0.5126	0.1552	0.5125	0.6817	0.8473	0.1468	0.7385
	(9)	(9)	(9)	(9)	(8)	(8)	(4)

	PKGALL	PKGCOST	PCTFREE	TRANCOST	AWORKTRP	TWORKTRP	WALKWORK
GSF	0.4657	0.5327	-0.3397	-0.2237	-0.5931	0.5468	0.6365
	0.2063	0.1398	0.3708	0.5624	0.0924	0.1277	0.0654
	(9)	(9)	(9)	(9)	(9)	(9)	(9)
METRO	-0.3688	0.0362	0.6479	-0.0640	0.7850	-0.8087	-0.1023
	0.3284	0.9263	0.0593	0.8699	0.0124	0.0084	0.7932
	(9)	(9)	(9)	(9)	(9)	(9)	(9)
DISTDC	0.3930	-0.2990	-0.4086	0.7837	-0.1227	0.1667	-0.2538
	0.2951	0.4340	0.2746	0.0126	0.7529	0.6678	0.5096
	(9)	(9)	(9)	(9)	(9)	(9)	(9)
EMPTYPE	0.5409	0.2198	-0.3708	-0.1101	-0.5493	0.5202	0.5513
	0.1326	0.5696	0.3256	0.7777	0.1251	0.1510	0.1239
	(9)	(9)	(9)	(9)	(9)	(9)	(9)
EMPL	0.1283	0.5376	-0.1817	-0.2663	-0.4661	0.4269	0.3519
	0.7617	0.1693	0.6664	0.5233	0.2440	0.2911	0.3321
	(8)	(8)	(8)	(8)	(8)	(8)	(8)
EMPLSQ	-0.2004	-0.3039	0.3378	0.2368	0.4139	-0.4399	0.4656
	0.6337	0.4638	0.3285	0.5717	0.3075	0.2750	0.2446
	(8)	(8)	(8)	(8)	(8)	(8)	(8)
PKGSPSQ	-0.8697	-0.8057	-0.6042	-0.4368	0.8745	-0.8780	-0.2222
	0.1303	0.1943	0.3958	0.5032	0.1255	0.1220	0.7778
	(4)	(4)	(4)	(4)	(4)	(4)	(4)
PKGALL	1.0000	0.3201	-0.8008	0.4962	-0.5507	0.5345	0.2738
	0.0000	0.4007	0.0096	0.1742	0.1244	0.1382	0.4754
	(9)	(9)	(9)	(9)	(9)	(9)	(9)
PKGCOST	0.3201	1.0000	0.0734	-0.1394	-0.2970	0.3007	-0.0688
	0.4007	0.0000	0.8509	0.7203	0.4373	0.4312	0.8602
	(9)	(9)	(9)	(9)	(9)	(9)	(9)
PCTFREE	-0.8008	0.0734	1.0000	-0.2587	0.4768	-0.4670	-0.2456
	0.0096	0.8509	0.0000	0.5011	0.1342	0.2048	0.5237
	(9)	(9)	(9)	(9)	(9)	(9)	(9)
TRANCOST	0.4962	-0.1394	-0.2587	1.0000	-0.1604	0.1843	-0.1034
	0.1742	0.7203	0.5011	0.0000	0.6798	0.6347	0.7910
	(9)	(9)	(9)	(9)	(9)	(9)	(9)
AWORKTRP	-0.5507	-0.2970	0.4768	-0.1604	1.0000	-0.9917	-0.3634
	0.1244	0.4373	0.1342	0.6798	0.0000	0.0000	0.3360
	(9)	(9)	(9)	(9)	(9)	(9)	(9)
TWORKTRP	0.5345	0.3007	-0.4670	0.1843	-0.9917	1.0000	0.2607
	0.1382	0.4312	0.2048	0.6347	0.0000	0.0000	0.4977
	(9)	(9)	(9)	(9)	(9)	(9)	(9)

	PKGALL	PKGCOST	PCTFREE	TRANCOST	AWORKTRP	TWORKTRP	WALKWORK
WALKWORK	0.2738	-0.0688	-0.2456	-0.1034	-0.3634	0.2607	1.0000
	0.4754	0.8602	0.5237	0.7910	0.3360	0.4977	0.0000
	(3)	(3)	(3)	(3)	(3)	(3)	(3)
PKIDALL	-0.5586	-0.1305	0.6476	-0.0706	0.3666	-0.3234	-0.1270
	0.1180	0.7376	0.0534	0.8567	0.3315	0.3956	0.7446
	(3)	(3)	(3)	(3)	(3)	(3)	(3)
TMIDALL	-0.1316	0.2904	0.2695	0.0189	-0.1897	0.2131	-0.1653
	0.7354	0.4480	0.4828	0.9615	0.6247	0.5817	0.6706
	(3)	(3)	(3)	(3)	(3)	(3)	(3)
WALKMID	0.5026	0.0338	-0.6132	0.0542	-0.2580	0.2156	0.1495
	0.1678	0.9311	0.0792	0.8897	0.5024	0.5771	0.7008
	(3)	(3)	(3)	(3)	(3)	(3)	(3)
INCWALK	0.1068	0.1893	-0.1631	0.0310	-0.5869	0.5756	0.0556
	0.7842	0.6254	0.6747	0.9368	0.0367	0.1049	0.8868
	(3)	(3)	(3)	(3)	(3)	(3)	(3)
JURISPCT	0.0225	-0.0589	-0.2346	0.0940	0.3420	-0.3353	-0.0213
	0.9541	0.8803	0.5431	0.8097	0.3673	0.3765	0.9566
	(3)	(3)	(3)	(3)	(3)	(3)	(3)
SEX	0.2230	0.7812	0.1035	-0.2643	-0.1454	0.0773	0.3269
	0.5638	0.0131	0.7309	0.4915	0.7087	0.8432	0.3901
	(3)	(3)	(3)	(3)	(3)	(3)	(3)
AUTOAVAI	-0.0340	0.0379	0.1203	-0.1822	0.4884	-0.4989	0.2720
	0.9307	0.8019	0.7564	0.6386	0.1821	0.1715	0.4785
	(3)	(3)	(3)	(3)	(3)	(3)	(3)

	AMIDALL	TMIDALL	WALKMID	TNOWALK	JURISPOT	SEX	AUTOAVAI
GSF	-0.3656	-0.2533	0.3725	-0.0034	-0.0999	0.6487	0.2520
	0.3328	0.5104	0.3231	0.9931	0.7981	0.0589	0.5125
	(9)	(9)	(9)	(9)	(9)	(9)	(9)
METRO	0.4827	0.0653	-0.4217	-0.4653	0.0579	0.1819	0.5157
	0.1880	0.8674	0.2580	0.2068	0.8823	0.6393	0.1552
	(9)	(9)	(9)	(9)	(9)	(9)	(9)
DISTDC	-0.3770	-0.4554	0.4347	-0.2240	0.0227	-0.3492	-0.2521
	0.3169	0.2178	0.2421	0.5620	0.9537	0.3566	0.5125
	(9)	(9)	(9)	(9)	(9)	(9)	(9)
EMPTYPE	-0.2590	-0.3252	0.3021	-0.2122	-0.5324	0.2555	0.1594
	0.5006	0.3912	0.4290	0.5833	0.1401	0.5066	0.6817
	(9)	(9)	(9)	(9)	(9)	(9)	(9)
EMPL	-0.2761	0.0599	0.2191	0.3492	0.4465	0.5384	0.0817
	0.5074	0.8877	0.6017	0.3960	0.2671	0.1171	0.8473
	(8)	(8)	(8)	(8)	(8)	(8)	(8)
EMPLSQ	0.7275	0.2013	-0.6700	-0.2516	0.1792	-0.1926	0.5623
	0.0411	0.6322	0.0693	0.5309	0.6708	0.6473	0.1468
	(8)	(8)	(8)	(8)	(8)	(8)	(8)
PKGSPSQ	0.5672	0.6571	-0.6560	0.6082	0.8059	-0.4610	0.2615
	0.4328	0.3429	0.3440	0.3918	0.1941	0.5390	0.7385
	(4)	(4)	(4)	(4)	(4)	(4)	(4)
PKGALL	-0.5586	-0.1316	0.5025	0.1068	0.0225	0.2230	-0.0340
	0.1180	0.7354	0.1678	0.7842	0.9541	0.5638	0.9307
	(9)	(9)	(9)	(9)	(9)	(9)	(9)
PKGCOST	-0.1305	0.2904	0.0338	0.1853	-0.0589	0.7812	0.0979
	0.7375	0.4480	0.9311	0.6254	0.8803	0.0131	0.8019
	(9)	(9)	(9)	(9)	(9)	(9)	(9)
DOTFREE	0.5476	0.2595	-0.6132	-0.1531	-0.2346	0.1035	0.1209
	0.0594	0.4826	0.0792	0.6747	0.5431	0.7909	0.7564
	(9)	(9)	(9)	(9)	(9)	(9)	(9)
TRANCOST	-0.0706	0.0183	0.0542	0.0310	0.0940	-0.2643	-0.1822
	0.8567	0.9615	0.8897	0.9368	0.8097	0.4315	0.6386
	(9)	(9)	(9)	(9)	(9)	(9)	(9)
OWORKTRP	0.3666	-0.1897	-0.2580	-0.5869	0.3420	-0.1454	0.4884
	0.3315	0.6247	0.5024	0.0967	0.3673	0.7067	0.1821
	(9)	(9)	(9)	(9)	(9)	(9)	(9)
TWORKTRP	-0.3234	0.2131	0.2156	0.5756	-0.3359	0.0773	-0.4383
	0.3556	0.5817	0.5771	0.1049	0.3765	0.8432	0.1715
	(9)	(9)	(9)	(9)	(9)	(9)	(9)

	AMIDALL	TMIDALL	WALKMID	TNOWALK	JURISPCT	SEX	AUTOAVAI
WPLKWORK	-0.1270	-0.1653	0.1495	0.0556	-0.0213	0.3269	0.2720
	0.7446	0.6706	0.7008	0.8868	0.9566	0.3901	0.4785
	(9)	(9)	(9)	(9)	(9)	(9)	(9)
AMIDALL	1.0000	0.5248	-0.9751	-0.0752	0.1513	-0.3646	0.4096
	0.0000	0.1469	0.0000	0.8474	0.6972	0.3344	0.2733
	(9)	(9)	(9)	(9)	(9)	(9)	(9)
TMIDALL	0.5248	1.0000	-0.7005	0.7425	0.1499	-0.0802	-0.2237
	0.1469	0.0000	0.0358	0.0221	0.6999	0.8374	0.5625
	(9)	(9)	(9)	(9)	(9)	(9)	(9)
WPLKMID	-0.9751	-0.7005	1.0000	-0.1304	-0.1659	0.3266	-0.2851
	0.0000	0.0358	0.0000	0.7378	0.6693	0.3907	0.4567
	(9)	(9)	(9)	(9)	(9)	(9)	(9)
TNOWALK	-0.0752	0.7425	-0.1304	1.0000	0.0735	0.0101	-0.6376
	0.8474	0.0221	0.7378	0.0000	0.8507	0.9793	0.0649
	(9)	(9)	(9)	(9)	(9)	(9)	(9)
JURISPCT	0.1513	0.1499	-0.1659	0.0735	1.0000	-0.0882	0.4448
	0.6972	0.6999	0.6693	0.8507	0.0000	0.8212	0.2300
	(9)	(9)	(9)	(9)	(9)	(9)	(9)
SEX	-0.3646	-0.0802	0.3266	0.0101	-0.0882	1.0000	0.1799
	0.3344	0.8374	0.3907	0.9793	0.8212	0.0000	0.6430
	(9)	(9)	(9)	(9)	(9)	(9)	(9)
AUTOAVAI	0.4096	-0.2237	-0.2851	-0.6376	0.4448	0.1799	1.0000
	0.2733	0.5625	0.4567	0.0649	0.2300	0.6430	0.0000
	(9)	(9)	(9)	(9)	(9)	(9)	(9)

Multiple Regression File: DEVEL1 Date: 02-23-1987

FILTER: None

Dependent variable: TWORKTRP

Step 1 Variable entered: METRO

Multiple R	0.7578	Analysis of variance					
R-Square	0.5743	Source	DF	SS	MSS	F	P
Adjusted R-Square	0.4679	Regression	1	5.293	5.293	5.397	0.0809
Standard Error	0.9903	Residual	4	3.923	0.981		

Variables in the model

Variable	B	Beta	Std. Error	F-to-Remove	P-Value
METRO	-0.75748	-0.75784	0.32606	5.397	0.0809
Const.	61.50350				

Variables not in the model

Variable	Partial Corr.	Tolerance	F-to-Enter
TNOWALK	0.19107	0.476	0.114

Step 1 Variable entered: METRO

Multiple R	0.7242	Analysis of variance					
R-Square	0.5244	Source	DF	SS	MSS	F	P
Adjusted R-Square	0.4056	Regression	1	7.824	7.824	4.411	0.1036
Standard Error	1.3318	Residual	4	7.095	1.774		

Variables in the model

Variable	B	Beta	Std. Error	F-to-Remove	P-Value
METRO	-0.92096	-0.72419	0.43849	4.411	0.1036
Const.	58.02012				

Variables not in the model

Variable	Partial Corr.	Tolerance	F-to-Enter
TWORKTRP	0.19107	0.426	0.114

Multiple Regression File: DEVEL2 Date: 02-23-1987

FILTER: None

Dependent variable: TWORKTRP

Step 1 Variables entered: METRO
DISTDC

		Analysis of variance					
Multiple R	0.8183	Source	DF	SS	MSS	F	P
R-Square	0.6696	Regression	2	4.446	2.223	6.081	0.0358
Adjusted R-Square	0.5595	Residual	6	2.194	0.366		
Standard Error	0.6047						

Variables in the model

Variable	B	Beta	Std. Error	F-to-Remove	P-Value
METRO	-0.74131	-0.85549	0.21713	11.656	0.0145
DISTDC	-0.30574	-0.13331	0.57467	0.283	0.6133
Const.	27.53203				

Variables not in the model

Variable	Partial Corr.	Tolerance	F-to-Enter
TNOWALK	0.32844	0.613	0.605

Step 1 Variables entered: METRO
DISTDC

Multiple R	0.6224	Analysis of variance				
R-Square	0.3874	Source	DF	SS	MSS	F	P
Adjusted R-Square	0.1832	Regression	2	4.230	2.115	1.897	0.2282
Standard Error	1.0558	Residual	6	6.688	1.115		

Variables in the model

Variable	B	Beta	Std. Error	F-to-Remove	P-Value
METRO	-0.68905	-0.62012	0.37913	3.303	0.1191
DISTDC	-1.29838	-0.44150	1.00342	1.674	0.2429
Const.	29.83309				

Variables not in the model

Variable	Partial Corr.	Tolerance	F-to-Enter
TWORKTRP	0.32844	0.330	0.605

Correlation matrix File: RESIDNTL Date: 02-06-1987

FILTER: None

The P-values shown are 2 tailed values.

	UNITS	METRO	DISTDC	PKGUNIT	PKGCOST	VEHUNIT	PEOPLE	AGE	EMPLOYED	AWORKTRP	TWORKTRP	WWORKTRP	AUTOALL	TRANSAL
UNITS	1.0000	0.3900	0.3200	-0.4569	-0.2433	-0.6559	0.2266	0.0844	-0.4023	-0.3786	0.3651	0.2318	-0.2358	-0.0518
	0.0000	0.3390	0.4391	0.2547	0.5610	0.0775	0.5889	0.8423	0.3226	0.3546	0.3733	0.5801	0.5734	0.9028
	(8)	(8)	(8)	(8)	(8)	(8)	(8)	(8)	(8)	(8)	(8)	(8)	(8)	(8)
METRO	0.3900	1.0000	-0.1618	-0.2510	0.2736	0.1992	0.3385	-0.3365	-0.5772	0.5923	-0.6000	-0.3108	0.5537	-0.5849
	0.3390	0.0000	0.7015	0.5483	0.5115	0.6358	0.4116	0.4145	0.1341	0.1219	0.1159	0.4531	0.1544	0.1277
	(8)	(8)	(8)	(8)	(8)	(8)	(8)	(8)	(8)	(8)	(8)	(8)	(8)	(8)
DISTDC	0.3200	-0.1618	1.0000	0.1267	-0.0889	-0.7386	0.2938	0.2202	0.1924	-0.2792	0.3477	0.0295	-0.1963	0.1368
	0.4391	0.7015	0.0000	0.7647	0.8333	0.0366	0.4795	0.5937	0.6476	0.5025	0.3982	0.9445	0.6409	0.6400
	(8)	(8)	(8)	(8)	(8)	(8)	(8)	(8)	(8)	(8)	(8)	(8)	(8)	(8)
PKGUNIT	-0.4569	-0.2510	0.1267	1.0000	-0.3711	0.2958	0.6523	0.6569	-0.2879	0.3278	-0.3894	-0.0687	0.6099	-0.4963
	0.2547	0.5483	0.7647	0.0000	0.3650	0.4764	0.0797	0.0769	0.4888	0.4274	0.3398	0.8714	0.1085	0.2107
	(8)	(8)	(8)	(8)	(8)	(8)	(8)	(8)	(8)	(8)	(8)	(8)	(8)	(8)
PKGCOST	-0.2433	0.2736	-0.0889	-0.3711	1.0000	0.0932	-0.2783	-0.8202	0.5392	0.5485	-0.3069	-0.7363	0.0587	0.1252
	0.5610	0.5115	0.8333	0.3650	0.0000	0.8259	0.5040	0.0129	0.1677	0.1592	0.4592	0.0375	0.8893	0.7674
	(8)	(8)	(8)	(8)	(8)	(8)	(8)	(8)	(8)	(8)	(8)	(8)	(8)	(8)
VEHUNIT	-0.6559	0.1992	-0.7386	0.2958	0.0932	1.0000	-0.0960	-0.1391	-0.1931	0.5661	-0.6303	-0.1946	0.4951	-0.3013
	0.0775	0.6358	0.0366	0.4764	0.8259	0.0000	0.8207	0.7422	0.6464	0.1435	0.0940	0.6438	0.2120	0.4678
	(8)	(8)	(8)	(8)	(8)	(8)	(8)	(8)	(8)	(8)	(8)	(8)	(8)	(8)
PEOPLE	0.2266	0.3385	0.2938	0.6523	-0.2783	-0.0960	1.0000	0.4702	-0.6258	0.4137	-0.5106	-0.0519	0.7451	-0.8418
	0.5889	0.4116	0.4795	0.0797	0.5040	0.8207	0.0000	0.2334	0.0964	0.3079	0.1958	0.9026	0.0341	0.0089
	(8)	(8)	(8)	(8)	(8)	(8)	(8)	(8)	(8)	(8)	(8)	(8)	(8)	(8)
AGE	0.0844	-0.3365	0.2202	0.6569	-0.8202	-0.1391	0.4702	1.0000	-0.5218	-0.2674	0.2172	0.2843	0.1611	-0.2179
	0.8423	0.4145	0.5937	0.0769	0.0129	0.7422	0.2334	0.0000	0.1846	0.4894	0.6049	0.4944	0.7028	0.6037
	(8)	(8)	(8)	(8)	(8)	(8)	(8)	(8)	(8)	(8)	(8)	(8)	(8)	(8)
EMPLOYED	-0.4023	-0.5772	0.1924	-0.2879	0.5392	-0.1931	-0.6258	-0.5218	1.0000	-0.2257	0.3610	-0.1201	-0.5961	0.7279
	0.3226	0.1341	0.6476	0.4888	0.1677	0.6464	0.0964	0.1846	0.0000	0.5904	0.3792	0.7766	0.1189	0.0409
	(8)	(8)	(8)	(8)	(8)	(8)	(8)	(8)	(8)	(8)	(8)	(8)	(8)	(8)
AWORKTRP	-0.3786	0.5923	-0.2792	0.3278	0.5485	0.5661	0.4137	-0.2674	-0.2257	1.0000	-0.9175	-0.6969	0.8540	-0.6615
	0.3546	0.1219	0.5025	0.4274	0.1592	0.1435	0.3079	0.4894	0.5904	0.0000	0.0014	0.0549	0.0071	0.0742
	(8)	(8)	(8)	(8)	(8)	(8)	(8)	(8)	(8)	(8)	(8)	(8)	(8)	(8)
TWORKTRP	0.3651	-0.6000	0.3477	-0.3894	-0.3069	-0.6303	-0.5106	0.2172	0.3610	-0.9175	1.0000	0.3543	-0.9134	0.8127
	0.3733	0.1159	0.3982	0.3398	0.4592	0.0940	0.1958	0.6049	0.3792	0.0014	0.0000	0.3887	0.0017	0.0144
	(8)	(8)	(8)	(8)	(8)	(8)	(8)	(8)	(8)	(8)	(8)	(8)	(8)	(8)
WWORKTRP	0.2318	-0.3108	0.0295	-0.0687	-0.7363	-0.1946	-0.0519	0.2843	-0.1201	-0.6969	0.3543	1.0000	-0.3629	0.0899
	0.5801	0.4531	0.9445	0.8714	0.0375	0.6438	0.9026	0.4944	0.7766	0.0549	0.3887	0.0000	0.3765	0.8320
	(8)	(8)	(8)	(8)	(8)	(8)	(8)	(8)	(8)	(8)	(8)	(8)	(8)	(8)
AUTOALL	-0.2358	0.5537	-0.1963	0.6099	0.0587	0.4951	0.7451	0.1611	-0.5961	0.8540	-0.9134	-0.3629	1.0000	-0.9184
	0.5734	0.1544	0.6409	0.1085	0.8893	0.2120	0.0341	0.7028	0.1189	0.0071	0.0017	0.3765	0.0000	0.0014
	(8)	(8)	(8)	(8)	(8)	(8)	(8)	(8)	(8)	(8)	(8)	(8)	(8)	(8)
	UNITS	METRO	DISTDC	PKGUNIT	PKGCOST	VEHUNIT	PEOPLE	AGE	EMPLOYED	AWORKTRP	TWORKTRP	WWORKTRP	AUTOALL	TRANSAL
TRANSALL	-0.0518	-0.5849	0.1368	-0.4963	0.1252	-0.3013	-0.8418	-0.2179	0.7279	-0.6615	0.8127	0.0899	-0.9184	1.0000
	0.9028	0.1277	0.6400	0.2107	0.7674	0.4678	0.0089	0.6037	0.0409	0.0742	0.0144	0.8320	0.0014	0.0000
	(8)	(8)	(8)	(8)	(8)	(8)	(8)	(8)	(8)	(8)	(8)	(8)	(8)	(8)

Multiple Regression File: RESIDNTL Date: 02-24-1987

FILTER: None

Dependent variable: TWORKTRP
Method is forward stepwise regression with F-to-enter=1, F-to-remove=1.

Step 1 Variable entered: METRO

Multiple R	0.6000	Analysis of variance					
R-Square	0.3600	Source	DF	SS	MSS	F	P
Adjusted R-Square	0.2533	Regression	1	483.817	483.817	3.374	0.1159
Standard Error	11.9740	Residual	6	860.262	143.377		

Variables in the model

Variable	B	Beta	Std. Error	F-to-Remove	P-Value
METRO	-0.73365	-0.59997	0.39938	3.374	0.1159
Const.	58.41694				

Variables not in the model

Variable	Partial Corr.	Tolerance	F-to-Enter
UNITS	0.81322	0.848	9.763
DISTDC	0.31749	0.974	0.560

Multiple Regression File: RESIDNTL Date: 02-24-1987

FILTER: None

Dependent variable: TRANSALL
Method is forward stepwise regression with F-to-enter=1, F-to-remove=1.

Step 1 Variable entered: METRO

Multiple R	0.5849	Analysis of variance					
R-Square	0.3421	Source	DF	SS	MSS	F	P
Adjusted R-Square	0.2325	Regression	1	393.076	393.076	3.121	0.1277
Standard Error	11.2234	Residual	6	755.793	125.965		

Variables in the model

Variable	B	Beta	Std. Error	F-to-Remove	P-Value
METRO	-0.66128	-0.58493	0.37435	3.121	0.1277
Const.	51.46283				

Variables not in the model

Variable	Partial Corr.	Tolerance	F-to-Enter
UNITS	0.23604	0.848	0.295
DISTDC	0.12766	0.974	0.083

No further variables can be entered or removed.

Correlation matrix File: RETAIL Date: 02-06-1987

FILTER: None

The P-values shown are 2 tailed values.

	GSF	RETAIL	DEVEL	METRO	DISTDC	AUTO	TRANSIT
GSF	1.0000	-0.7052	-0.1832	0.6223	0.1440	0.5609	-0.1170
	0.0000	0.1176	0.7282	0.1870	0.7854	0.2469	0.8253
	(6)	(6)	(6)	(6)	(6)	(6)	(6)
RETAIL	-0.7052	1.0000	0.5000	-0.6929	-0.1125	-0.4347	-0.1682
	0.1176	0.0000	0.3125	0.1270	0.8320	0.3890	0.7500
	(6)	(6)	(6)	(6)	(6)	(6)	(6)
DEVEL	-0.1832	0.5000	1.0000	0.1333	0.7697	0.5459	-0.8877
	0.7282	0.3125	0.0000	0.8013	0.0735	0.2625	0.0182
	(6)	(6)	(6)	(6)	(6)	(6)	(6)
METRO	0.6223	-0.6929	0.1333	1.0000	0.6223	0.8273	-0.5005
	0.1870	0.1270	0.8013	0.0000	0.1870	0.0422	0.3119
	(6)	(6)	(6)	(6)	(6)	(6)	(6)
DISTDC	0.1440	-0.1125	0.7697	0.6223	1.0000	0.8465	-0.9123
	0.7854	0.8320	0.0735	0.1870	0.0000	0.0335	0.0112
	(6)	(6)	(6)	(6)	(6)	(6)	(6)
AUTO	0.5609	-0.4347	0.5459	0.8273	0.8465	1.0000	-0.7413
	0.2469	0.3890	0.2625	0.0422	0.0336	0.0000	0.0918
	(6)	(6)	(6)	(6)	(6)	(6)	(6)
TRANSIT	-0.1170	-0.1682	-0.8877	-0.5005	-0.9123	-0.7413	1.0000
	0.8253	0.7500	0.0182	0.3119	0.0112	0.0918	0.0000
	(6)	(6)	(6)	(6)	(6)	(6)	(6)

Multiple Regression File: RETAIL Date: 02-24-1987

FILTER: None

Dependent variable: TRANSIT
Method is forward stepwise regression with F-to-enter=1, F-to-remove=1.

Step 1 Variable entered: DISTDC

Multiple R	0.9123	Analysis of variance				
R-Square	0.8323	Source	DF	SS	MSS	F	P
Adjusted R-Square	0.7904	Regression	1	10.410	10.410	19.850	0.0112
Standard Error	0.7242	Residual	4	2.098	0.524		

Variables in the model

Variable	B	Beta	Std. Error	F-to-Remove	P-Value
DISTDC	-2.18497	-0.91230	0.49042	19.850	0.0112
Const.	26.90076				

Variables not in the model

Variable	Partial Corr.	Tolerance	F-to-Enter
GSF	0.03554	0.979	0.004
RETAIL	-0.66563	0.987	2.387
DEVEL	-0.70942	0.408	3.040
METRO	0.20963	0.613	0.138

Correlation matrix File: HOTEL Date: 02-06-1987

FILTER: None

The P-values shown are 2 tailed values.

	ROOMS	DEVEL	METRO	DISTDC	NOPKGSP	AGUEST	TGUEST	VGUEST	ACONFRNC	TCONFRNC	VCONFRNC
ROOMS	1.0000	-0.6572	0.6974	-0.4002	0.3360	0.3371	-0.7542	-0.3314	-0.4125	-0.7118	0.8044
	0.0000	0.2281	0.1905	0.5044	0.6640	0.5790	0.1407	0.5859	0.4901	0.1775	0.1008
	(5)	(5)	(5)	(5)	(4)	(5)	(5)	(5)	(5)	(5)	(5)
DEVEL	-0.6572	1.0000	-0.0585	0.8785	99.0000	0.4767	0.0242	-0.2989	0.8750	0.1602	-0.9060
	0.2281	0.0000	0.9256	0.0499	1.0000	0.4169	0.9692	0.6252	0.0521	0.7969	0.0341
	(5)	(5)	(5)	(5)	(4)	(5)	(5)	(5)	(5)	(5)	(5)
METRO	0.6974	-0.0585	1.0000	0.1152	0.0952	0.7863	-0.9175	-0.6363	0.3153	-0.9485	0.1445
	0.1905	0.9256	0.0000	0.8537	0.9048	0.1147	0.0281	0.2484	0.6053	0.0139	0.8167
	(5)	(5)	(5)	(5)	(4)	(5)	(5)	(5)	(5)	(5)	(5)
DISTDC	-0.4002	0.8785	0.1152	1.0000	-0.4880	0.5653	-0.2628	-0.1580	0.6968	0.1121	-0.6790
	0.5044	0.0499	0.8537	0.0000	0.5120	0.3207	0.6692	0.7996	0.1910	0.8576	0.2075
	(5)	(5)	(5)	(5)	(4)	(5)	(5)	(5)	(5)	(5)	(5)
NOPKGSP	0.3360	99.0000	0.0952	-0.4880	1.0000	0.3809	-0.1459	-0.7795	0.2321	-0.3236	0.3955
	0.6640	1.0000	0.9048	0.5120	0.0000	0.6191	0.8541	0.2205	0.7679	0.6764	0.6045
	(4)	(4)	(4)	(4)	(4)	(4)	(4)	(4)	(4)	(4)	(4)
AGUEST	0.3371	0.4767	0.7863	0.5653	0.3809	1.0000	-0.8314	-0.8303	0.6746	-0.7120	-0.2388
	0.5790	0.4169	0.1147	0.3207	0.6191	0.0000	0.0810	0.0818	0.2116	0.1773	0.6989
	(5)	(5)	(5)	(5)	(4)	(5)	(5)	(5)	(5)	(5)	(5)
TGUEST	-0.7542	0.0242	-0.9175	-0.2628	-0.1459	-0.8314	1.0000	0.5890	-0.2002	0.8062	-0.2649
	0.1407	0.9692	0.0281	0.6692	0.8541	0.0810	0.0000	0.2960	0.7468	0.0994	0.6667
	(5)	(5)	(5)	(5)	(4)	(5)	(5)	(5)	(5)	(5)	(5)
VGUEST	-0.3314	-0.2989	-0.6363	-0.1580	-0.7795	-0.8303	0.5890	1.0000	-0.5902	0.7480	0.1453
	0.5859	0.6252	0.2484	0.7996	0.2205	0.0818	0.2960	0.0000	0.2948	0.1460	0.8156
	(5)	(5)	(5)	(5)	(4)	(5)	(5)	(5)	(5)	(5)	(5)
ACONFRNC	-0.4125	0.8750	0.3153	0.6968	0.2321	0.6746	-0.2002	-0.5902	1.0000	-0.2811	-0.8634
	0.4901	0.0521	0.6053	0.1910	0.7679	0.2116	0.7468	0.2948	0.0000	0.6468	0.0594
	(5)	(5)	(5)	(5)	(4)	(5)	(5)	(5)	(5)	(5)	(5)
TCONFRNC	-0.7118	0.1602	-0.9485	0.1121	-0.3236	-0.7120	0.8062	0.7480	-0.2811	1.0000	-0.1959
	0.1775	0.7969	0.0139	0.8576	0.6764	0.1773	0.0994	0.1460	0.6468	0.0000	0.7522
	(5)	(5)	(5)	(5)	(4)	(5)	(5)	(5)	(5)	(5)	(5)
VCONFRNC	0.8044	-0.9060	0.1445	-0.6790	0.3955	-0.2388	-0.2649	0.1453	-0.8634	-0.1959	1.0000
	0.1008	0.0341	0.8167	0.2075	0.6045	0.6989	0.6667	0.8156	0.0594	0.7522	0.0000
	(5)	(5)	(5)	(5)	(4)	(5)	(5)	(5)	(5)	(5)	(5)

Multiple Regression File: HOTEL Date: 02-24-1987

FILTER: None

Dependent variable: TCONFRNC
Method is forward stepwise regression with F-to-enter=1, F-to-remove=1.

Step 1 Variable entered: METRO

		Analysis of variance				
Multiple R	0.9485	Source	DF	SS	MS	F	P
R-Square	0.8996	Regression	1	599.552	599.552	26.891	0.0139
Adjusted R-Square	0.8662	Residual	3	66.888	22.296		
Standard Error	4.7219						

Variables in the model

Variable	B	Beta	Std. Error	F-to-Remove	P-Value
METRO	-1.06682	-0.94849	0.20573	26.891	0.0139
Const.	29.08846				

Variables not in the model

Variable	Partial Corr.	Tolerance	F-to-Enter
ROOMS	-0.22139	0.514	0.103
DEVEL	0.33137	0.997	0.247
DISTDC	0.70333	0.987	1.958

Multiple Regression File: HOTEL Date: 02-24-1987

FILTER: None

Dependent variable: TGUEST
Method is forward stepwise regression with F-to-enter=1, F-to-remove=1.

Step 1 Variable entered: METRO

		Analysis of variance					
Multiple R	0.9175	Source	DF	SS	MSS	F	P
R-Square	0.8417	Regression	1	35.296	35.296	15.957	0.0281
Adjusted R-Square	0.7890	Residual	3	6.636	2.212		
Standard Error	1.4873						

Variables in the model

Variable	B	Beta	Std. Error	F-to-Remove	P-Value
METRO	-0.25885	-0.91747	0.06480	15.957	0.0281
Const.	7.89438				

Variables not in the model

Variable	Partial Corr.	Tolerance	F-to-Enter
ROOMS	-0.40120	0.514	0.384
DEVEL	-0.07418	0.997	0.011
DISTDC	-0.39772	0.987	0.376
TCONFRNC	-0.50795	0.100	0.695

No further variables can be entered or removed.

CASE 96-3

EXHIBIT 68

HAS OVERSIZED DOCUMENT

SEE FILE AT ZONING COMMISSION