Socio-Economic Change in Vicinity of Capital Beltway in Virginia

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•A STUDY, begun in September of 1958, of changing economic and social factors in the vicinity of the Virginia section of the Capital Beltway, I-495 is the basis of this report. The investigation is designed as a "before" and "after" study to determine over a period of time changes in land and real property values, land uses, traffic patterns, travel habits and residents, and business activity.

Only the before portion of the study has been completed. Some continuing inventories of data and analyses are presently being conducted by the Bureau of Population and Economic Research at the University of Virginia and will be used for comparative analysis in the after study. Some of these more recent inventories are also utilized in this discussion. Actually, it is too early for any final evaluation of the effects of the Beltway, but we can see many things happening in this blooming area that should be of some interest. Only some of the more obvious occurrences are discussed. Copies of the before portion of the study itself are available from the Bureau of Population and Economic Research. Change in population, land values and use, retail sales, and traffic volume are the principal indicators explored here.

The Beltway is a four- and six-lane limited-access freeway which encircles the most densely populated part of the Washington, D. C., metropolitan area. Located 6 to 12 miles from the Capitol, it is approximately 64 miles in length and has about 35 interchanges. Twenty-two miles and 12 of the interchanges are located in Virginia. The new highway facilitates bypassing of the District of Columbia and other congested portions of the area and permits the driver the choice of the most appropriate radial for entry to or egress from the central city. The road network becomes analogous to a great wheel. Vehicles can travel north-south over the rim without suffering the congestion and loss of time which they might incur in traveling through the hub. Or, vehicles can travel along the rim until they reach the radial which provides the most direct or least congested route to the central city or hub. Thus, assuming some relief of congestion on existing arterials and easier access between points, the Beltway represents a potential savings in time and money to the vehicle operators. However, the impact of the Beltway goes much further. The facility increases accessibility to land so that new sites are made available for new uses. It also affects transportation costs in general and alters the structures of demands and costs throughout the area. Thus, the Beltway is playing and will play a significant role in the determination of the future pattern of development of the region. Some of the changes which appear to be taking place, particularly in the vicinity of the new facility, are considered here.

NOTE ON METHODOLOGY

For the population analysis it was felt that census and subcensus tracts would be most revealing and would make the data comparable to other areas. For the most part, however, the county and city tax grid systems were used to define the Primary Study Area and to break this area down into small components. The Primary Study Area (Fig. 1) is an L-shaped corridor ranging in width from 1 to 2 miles on each side of the Beltway. It has been outlined in terms of tax-map sections in Fairfax County

Paper sponsored by Committee on Indirect Effects of Highway Improvements.

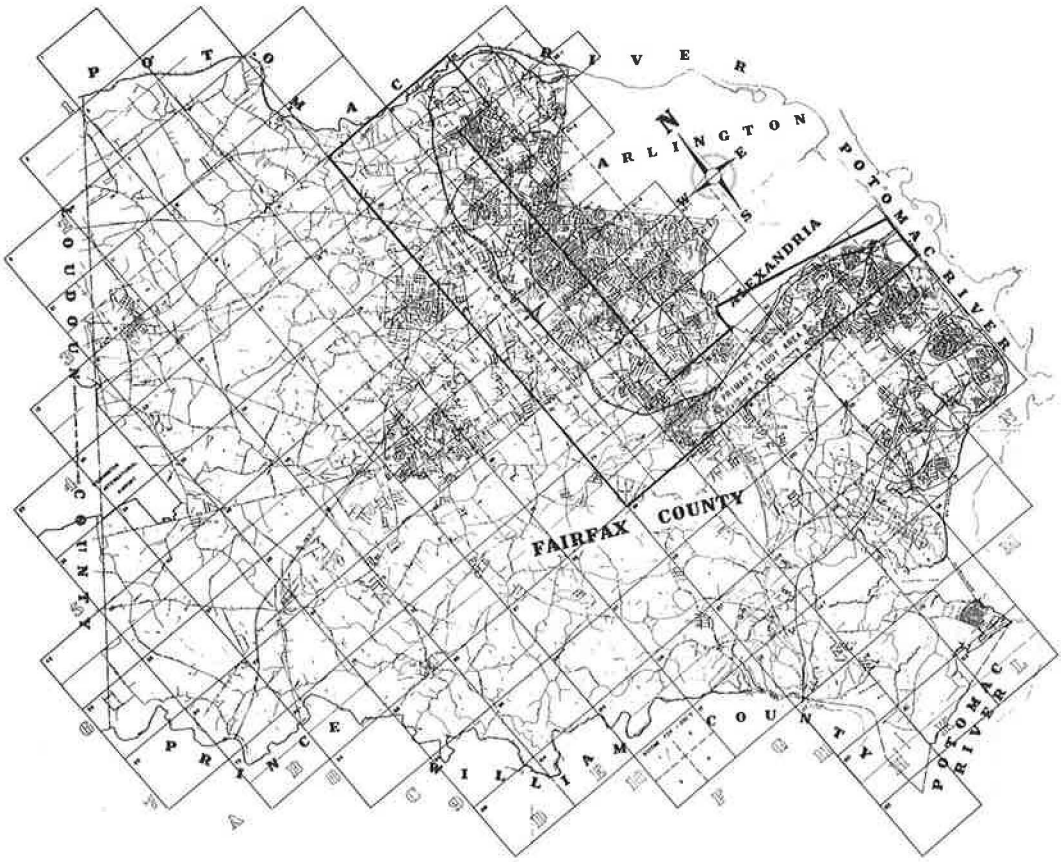


Figure 1. Primary study area.

and the City of Alexandria. The tax-map sections vary somewhat in size, but they represent a ready-made grid system which ties in directly with much of the data available in the two jurisdictions. By including in the Primary Study Area all map sections through which the facility will pass and map sections adjoining these sections, a corridor is outlined. Most of the map sections in Fairfax County are 6,000 by 5,000 feet and contain an average private land acreage of 560 acres. Map sections (including a combination of the smaller downtown sections in Section 100) in Alexandria range from 375 to 149 acres. Within each of these map sections are many individual parcels of land ranging in size from 1,800 square feet in downtown Alexandria to hundreds of acres in the more sparsely settled sections of the Primary Study area.

There are over 25,000 parcels and more than 2,000 real estate sales per year in the Primary Study Area. This study is more concerned with what occurs in areas such as interchange areas, market areas, communities of interest, towns, and cities than with what happens to the thousands of individual parcels. For this reason the collection and compilation of data have been on the tax-map section basis. No attempt has been made to retain identity of each residential parcel. There are 61 tax-map sections in the Primary Study Area and by working with each map section as a whole, the number of parcels is reduced to 61. In some cases it seemed feasible to combine all of older Alexandria into one section. This has been done and it has been designated Section 100.

The area approach seems quite practical as a means of examining socio-economic factors. By maintaining a consolidated record of changes in each of the 61 (or 56 if Section 100 is used) sections, it can be determined in which section significant changes

TABLE 1

GROWTH IN NUMBER OF DWELLING UNITS IN PORTIONS OF FAIRFAX COUNTY[a]

Census Tract No.	No. of Dwelling Units		
	1955	1958	1963
(a) Inside Beltway			
15	828	828	833
16	920	1,094	2,168
17	1,393	2,110	2,207
18	773	868	1,257
19	861	1,650	2,358
20	1,116	2,348	3,912
23	1,553	1,626	1,636
24	1,654	1,774	1,696
26	663	899	1,322
27	1,092	1,338	1,230
28	1,177	1,273	1,197
29	811	1,227	1,645
31	1,072	1,232	1,895
37	1,108	1,307	1,411
38	1,534	1,664	1,959
39	823	1,144	2,489
40	799	1,057	2,179
Total	18,177	23,439	31,494
Ann. rate of change (%)		9.64	6.84
Growth rate decline (%)			29
(b) Outside Beltway			
1	953	961	1,014
2	996	1,046	1,265
3	1,148	1,185	1,535
4	1,478	2,032	2,373
5	1,221	1,883	3,544
6	546	955	1,728
9	902	2,244	2,712
10	889	1,613	2,461
11	1,353	1,812	1,767
12	1,106	1,359	2,159
21	804	1,560	2,328
22	530	860	926
25	699	869	878
30	658	841	3,428
32	1,352	1,222	1,806
33	984	1,812	4,051
34	647	1,427	1,803
35	1,196	1,629	4,101
36	1,063	1,363	1,283
Total	18,525	26,673	40,734
Ann. rate of change (%)		13.0	10.3
Growth rate of change (%)			19

[a]Source: estimates of the Fairfax County Master Plan Office.

are taking place, and analysis of the pertinent factors in specific map sections can be carried out. Data for the map sections can then be tied in with the overall changes in the entire Primary Study Area, larger areas in Northern Virginia, the northern Virginia region and the Washington Metropolitan area.

POPULATION

Population growth has been rapid for the past 20 years in the Washington metropolitan area. With an eye toward determining the effect of the Beltway on the area, Fairfax County was divided into several areas. Data regarding two of these divisions and changes in number of dwelling units in each are given in Table 1. The two areas closest to the Beltway are (a) inside the Beltway and (b) outside the Beltway. In evaluating this situation, census tracts were used because of the availability of data on a census tract basis.

Data are given for the years 1955, 1958 and 1962. The 1955 figures were the result of a special census undertaken by the County at that time. The year 1958 is the year the facility was started and 1962 is the latest year available. Table 1 indicates the growth inside and outside the Beltway for the three selected years.

On both sides of the Beltway the growth rate has declined; it has declined more inside than outside the Beltway. Growth in population has continued at a faster rate outside the Beltway for the whole period under consideration (1955 to 1963). Inside the Beltway there were added 5,262 dwelling units between 1955 and 1958 (1,754 per year) and 7,955 dwelling units between 1958 and 1963 (1,591 per year). This slowing down is to be expected because the density of population on the inside was already high in 1955. Outside the Beltway there were added 8,148 dwelling units between 1955 and 1959 (2,716 per year) and 14,061 dwelling units between 1958 and 1963 (2,972 per year). Obviously residential construction is continuing at a much faster pace outside the Beltway. It is interesting to note that the two areas had about the same number of dwelling units in 1955. The inside increased by approximately 73 percent over the 8-year period, whereas the outside increased by 120 percent. Increased accessibility and the continuing pressure of expanding population have made the outlying areas, which contain vacant and larger land tracts, more desirable as subdivision sites. Certainly the Beltway cannot be regarded as a barrier to further dispersion of the population.

On the whole, the Beltway appears to be exerting what may be called a distributional effect. This effect is illustrated in Figure 2 which shows Route 236 in the center and the Beltway in Fairfax County. Route 620 is not visible in the background, being obscured by trees. The construction of the Beltway with points of access at Routes 236 and 620 greatly enhanced the accessibility of a large vacant tract just east of the new highway between Routes 236 and 620. This tract was recently zoned for apartments and

Figure 2. Interchange of Route 236 and Capital Beltway under construction in November 1959, showing large vacant tract in upper left.

Figure 3. Interchange of Route 236 and Capital Beltway in May 1963, showing new apartment project on vacant tract.

as of January 1, 1963, over 400 apartment units had been constructed with a population of 1,300 (Fig. 3). As of that date less than a third of the land zoned for apartments here had been developed. The developer at one time was thinking in terms of 3,000 apartment units. About 6 miles north of this location is the Tyson's Corner area (around the intersection of Routes 123 and 7) where quite a bit of apartment activity is planned. This activity is due in part to the fact that the Beltway forms a triangle with Routes 123 and 7 with full interchanges at each intersection. The County has zoned two large tracts for apartment development, one just west of the Route 123 interchange and one just northeast of the Route 7 interchange. The County master plan calls for further apartment zoning in this area. A great deal of commercial development is also anticipated. It might be added at this point that when the first survey was made of the Primary Study Area, it was felt that this subarea was about the most rural and the quietest place

TABLE 2

Tax-Map Section No.	Land Value ($)				Increase 1958/1951 (%)
	1951	1954[a]	1956[a]	1958	
71-1	576	811	973	1,322	129.5
60-1	487	550	805	1,429	193.4
49-3	376	318	474	518	37.8
30-3	236	293	379	410	73.8
29-3	259	252	354	354	36.7
39-3	233	233	238	278	19.3
21-3	224	233	254	325	45.1
81-4	142	201	302	381	168.3
29-4	120	145	146	159	32.5
79	69	69	119	163	136.2

[a]Assessed value of land only.

TABLE 3

RESIDENTIAL AND VACANT LAND VALUES[a]

Area	Year	$ per Acre	Change in Value (%)	No. of Sales
Primary Study Area (total)	1951	1,620	39	789
	1954	2,779	68	1,057
	1956	3,798	92	2,053
	1958	4,116	100	1,900
	1960	10,012	243	2,808
	1962	9,266	225	2,671
Fairfax County section	1951	1,507	39	703
	1954	2,648	68	975
	1956	3,668	95	1,871
	1958	3,877	100	1,786
	1960	9,806	253	2,605
	1962	9,086	234	2,569
City of Alexandria section (total)	1951	7,963	93	86
	1954	16,087	188	82
	1956	6,294	73	182
	1958	8,564	100	134
	1960	17,220	201	203
	1962	29,624	346	102
City of Alexandria (old section)	1951	27,870	59	73
	1954	24,916	53	61
	1956	28,889	61	48
	1958	47,306	100	62
	1960	47,999	101	60
	1962	62,317	132	30
City of Alexandria (annexed section)	1951	4,278	70	13
	1954	8,429	138	21
	1956	5,319	87	134
	1958	6,129	100	72
	1960	13,309	217	143
	1962	23,603	385	72

[a]Year 1958 used as base year; trends expressed as percentage of this year (source: records of the Real Estate Assessment Department, Fairfax County).

in the whole area. There appears to be little doubt that the Beltway is leading to more intensive land utilization, particularly in areas made easily accessible by interchanges.

In addition to the changes in number and distribution of dwelling units, another change is in progress in the area. As land has filled up closer to the central city and as accessibility has made land farther out more attractive, the character of the dwelling unit has begun to change. Apartment (primarily garden-type) construction has begun to move out into the County. In 1958, the two areas (inside the Beltway and outside the Beltway) contained approximately 4,600 apartment dwelling units. Between 1951 and 1958, there was very little apartment construction. Whereas single-family dwelling units increased over 100 percent, apartment dwelling units increased only about 10 percent. Of the 4,600 apartments, 1,300 were outside the Beltway and 3,300 were inside. The fact that most of the "outside" apartments are just south of Alexandria and that most of the "inside" apartments are adjacent to Arlington County along the Leesburg Pike between Seven Corners and Bailey's Cross Roads is a reflection of the importance of proximity to the central city. Since 1958, approximately 2,800 apartment dwelling units, 1,500 inside and 1,300 outside, have been constructed. There have also been many requests by developers for apartment zoning. As a result, the Fairfax County Planning Division conducted an apartment study, out of which developed the master plan for apartment development. There is no doubt that the Beltway has been considered in these plans which call for considerable apartment development in areas adjacent to the Beltway. Again this emphasizes the distributional effect of the Beltway; i.e., the facility plays a significant role in distributing the rapidly growing population in Northern Virginia.

REAL ESTATE SALES DATA: LAND VALUES

The vast amount of change in land use resulting from population pressure, transportation and other factors has enhanced the value of land in Northern Virginia. The assessment values, as determined by the local assessment office, indicate a great deal of value change in the areas of the county. Data pertaining to a few of the tax-map sections in the vicinity of the Beltway indicate considerable enhancement of value between 1951 and 1958 (Table 2). Typically, the sections indicating the lowest percentage increase are those in which little development activity has been contemplated or undertaken.

In an effort to quantify changes in the value of land in the vicinity of the Beltway, the Beltway corridor was divided into narrow bands at various proximities to the highway

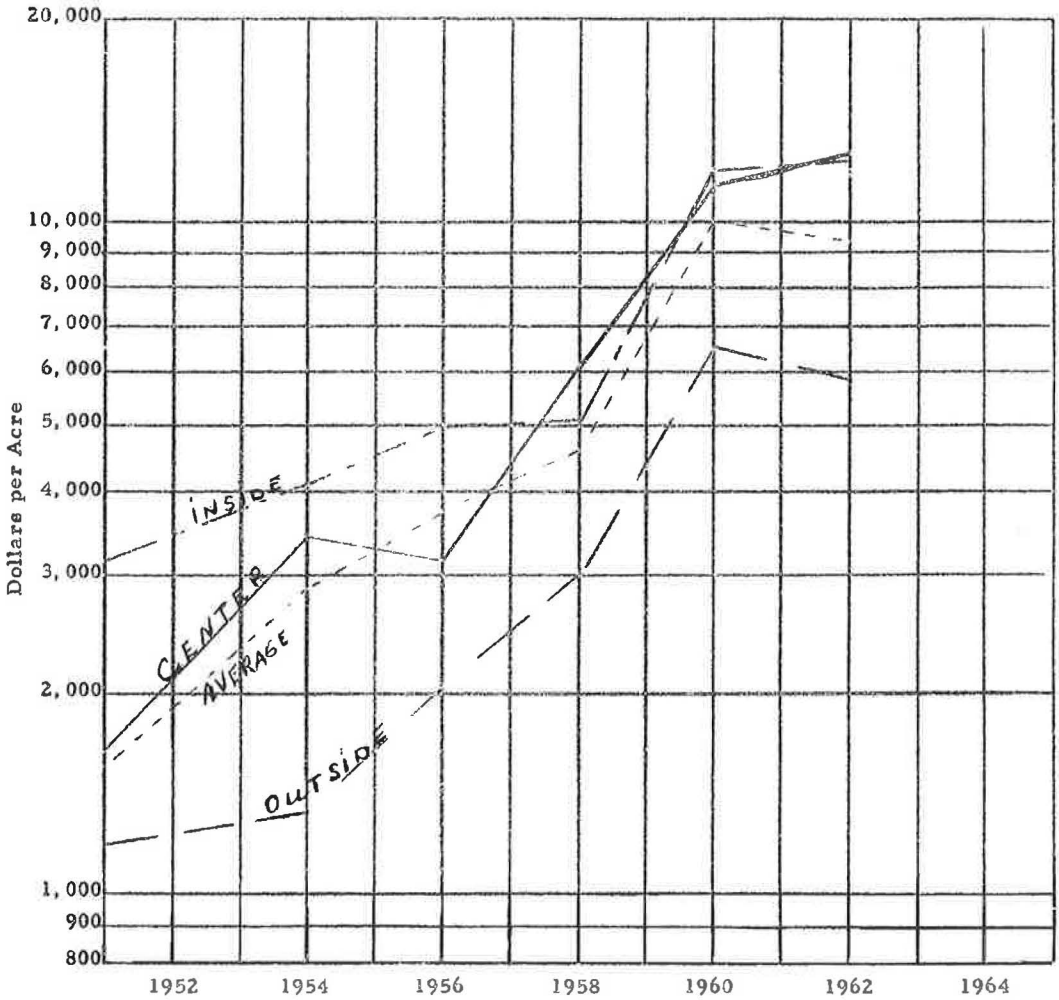


Figure 4. Residential and vacant land values based on market sales values for bands of Primary Study Area.

itself. Changes in land values were observed in the total area and comparisons were made between the total and the various band segments. The study bands were further divided into mile-square blocks. This technique allows comparisons of changes around an interchange, for example, with other areas having less accessibility to the Beltway.

Looking first at the Study Area, i.e., the Beltway Corridor as a whole (Table 3), land values show a steady rise for all trend years from 1951 with the exception of 1962. The increase is five-fold from 1951; land values have doubled since 1958. The decrease noted in 1962 represents an 18 percent drop from 1960. The cause of the decrease from 1960 to 1962 is not clear at this time. Perhaps overspeculation has caught up in some instances.

The greatest increases in land values in the Study Area were observed in Alexandria. In the section which was annexed from Fairfax County by Alexandria in 1952, land values have increased four times from 1958 to 1962. Whether or not it can be proved that this increase is the result of the construction of the Beltway, it is a fact that the completion of this facility puts this area in a unique position with regard to transportation facilities. The Beltway parallels two major railroad lines and, with the Shirley Highway, provides ideal transportation facilities for the area. One railroad has already developed a piggy-

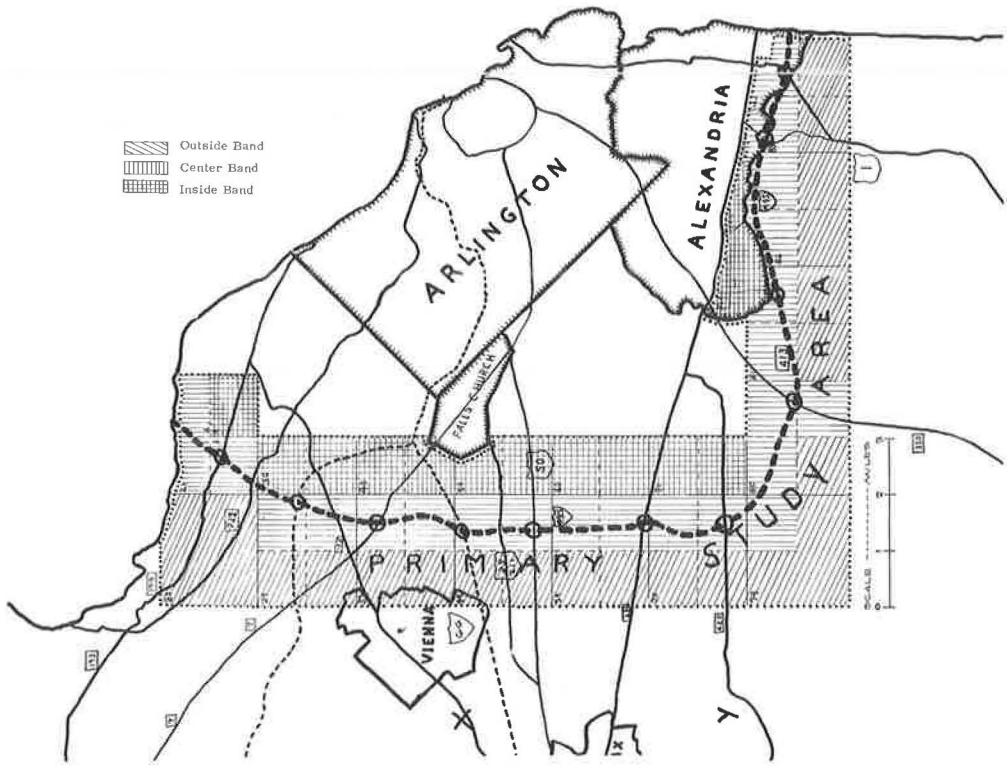


Figure 5. Capital Beltway, Northern Virginia study area, real estate sales.

TABLE 4

RESIDENTIAL AND VACANT LAND VALUES[a]

Area	Year	$ per Acre	Change in Value (%)	No. of Sales
Primary Study Area (total)	1951	1,620	39	789
	1954	2,779	68	1,057
	1956	3,798	92	2,053
	1958	4,116	100	1,900
	1960	10,012	243	2,808
	1962	9,266	225	2,671
Inside Band	1951	3,157	62	298
	1954	4,026	80	390
	1956	4,977	98	799
	1958	5,061	100	772
	1960	12,107	239	1,105
	1962	12,500	247	986
Center Band	1951	1,706	28	204
	1954	3,516	57	280
	1956	3,132	51	337
	1958	6,122	100	453
	1960	11,416	186	1,065
	1962	12,890	211	923
Outside Band	1951	1,165	39	293
	1954	1,335	44	391
	1956	2,031	68	927
	1958	3,008	100	678
	1960	6,570	218	638
	1962	5,754	191	762

[a]Year 1958 used as base year; trends expressed as percentage of this year (source: records of the Real Estate Assessment Department, Fairfax County and the City of Alexandria).

TABLE 5

RESIDENTIAL AND VACANT LAND VALUES OF AREAS OF LIMITED ACCESSIBILITY[a]

Area	Year	$ per Acre	Change in Value (%)	No. of Sales
Primary Study Area (total)	1951	1,620	39	789
	1954	2,779	68	1,057
	1956	3,798	92	2,053
	1958	4,116	100	1,900
	1960	10,012	243	2,808
	1962	9,266	225	2,671
Areas of limited access-ibility (total)	1951	1,224	27	133
	1954	2,387	53	176
	1956	2,727	61	372
	1958	4,491	100	368
	1960	8,588	191	425
	1962	10,017	223	692
Inside	1951	3,459	57	39
	1954	4,887	80	76
	1956	8,790	144	169
	1958	6,116	100	185
	1960	10,599	173	203
	1962	13,776	225	161
Center	1951	1,742	35	51
	1954	1,825	36	45
	1956	3,581	72	124
	1958	5,001	100	115
	1960	7,982	160	138
	1962	10,816	216	238
Outside	1951	797	32	43
	1954	1,708	68	55
	1956	1,485	59	79
	1958	2,518	100	68
	1960	6,563	261	84
	1962	8,100	322	293

[a]Year 1958 used as a base year; trends expressed as percentage of this year (records of Real Estate Assessment Department, Fairfax County and City of Alexandria).

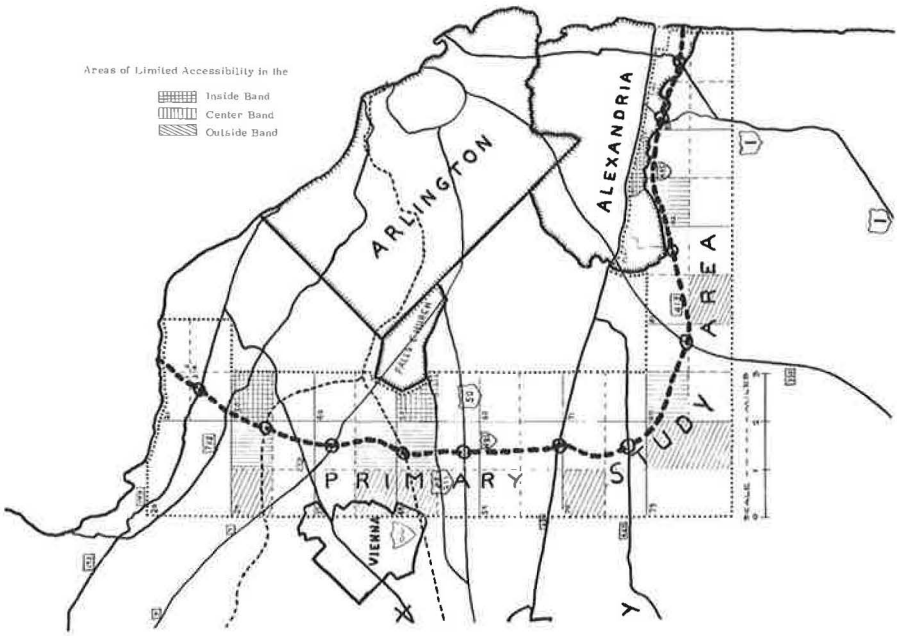


Figure 6. Capital Beltway, Northern Virginia study area, real estate sales.

back loading operation within a mile of an interchange, and the area's potential for industrial development looks promising.

We may consider next the land value studies using the band segments. The bands cover a 3-mile area of which the right-of-way is approximately the center. The Inside Band is the mile-wide area nearest the metropolitan center, the Center Band extends approximately ½ mile on either side of the highway itself, and the Outside Band is the outside mile, the area at the greatest distance from the metropolitan center. Because the bands are drawn in terms of tax-map sections on maps utilized by the local jurisdictions, the right-of-way is not exactly in the center of the middle band. Because of the way data were compiled, it was felt that this method was the best available.

To provide a picture of the different rates of change among these configurations, the data for each band were plotted on semilogarithmic graph paper (Fig. 4). These bands are shown in Figure 5. Table 4 gives value changes in the three bands.

From 1951 to 1956, aside from the trend of increasing land values, each area retained its position relative to the others in terms of value. Between 1956 and 1958, the rise in value of the Center Band exceeded that of the Outside and Inside Bands to the extent that this relationship no longer held. After 1958, the trend of values in the Center Band continued rising at the greater rate and, as a consequence, land values in this band are equaling and exceeding those of the Inside Band. The primary factor to which this marked change can be attributed is the Beltway.

This thesis, that the construction of the Beltway is the primary factor influencing the rapid rise in land values in the Center Band, is reinforced empirically in the study of land values in areas of least accessibility. The mile-square sectors of least accessibility used for this study are identified in Figure 6. Figures used in plotting the rates of change in these sectors (Table 5 and Fig. 7) represent a total depending on the location of the mile-square (tax-map) sectors in the Inside, Center or Outside Bands.

Although the general trend in the tax-map sections of least accessibility is one of increasing value, the sections in each of the three bands maintain their relative values to one another from 1951 through 1962. Hence, where the direct Beltway influence is not felt because of lack of accessibility, the picture of land value changes is not the same as in the overall band which includes the accessible areas.

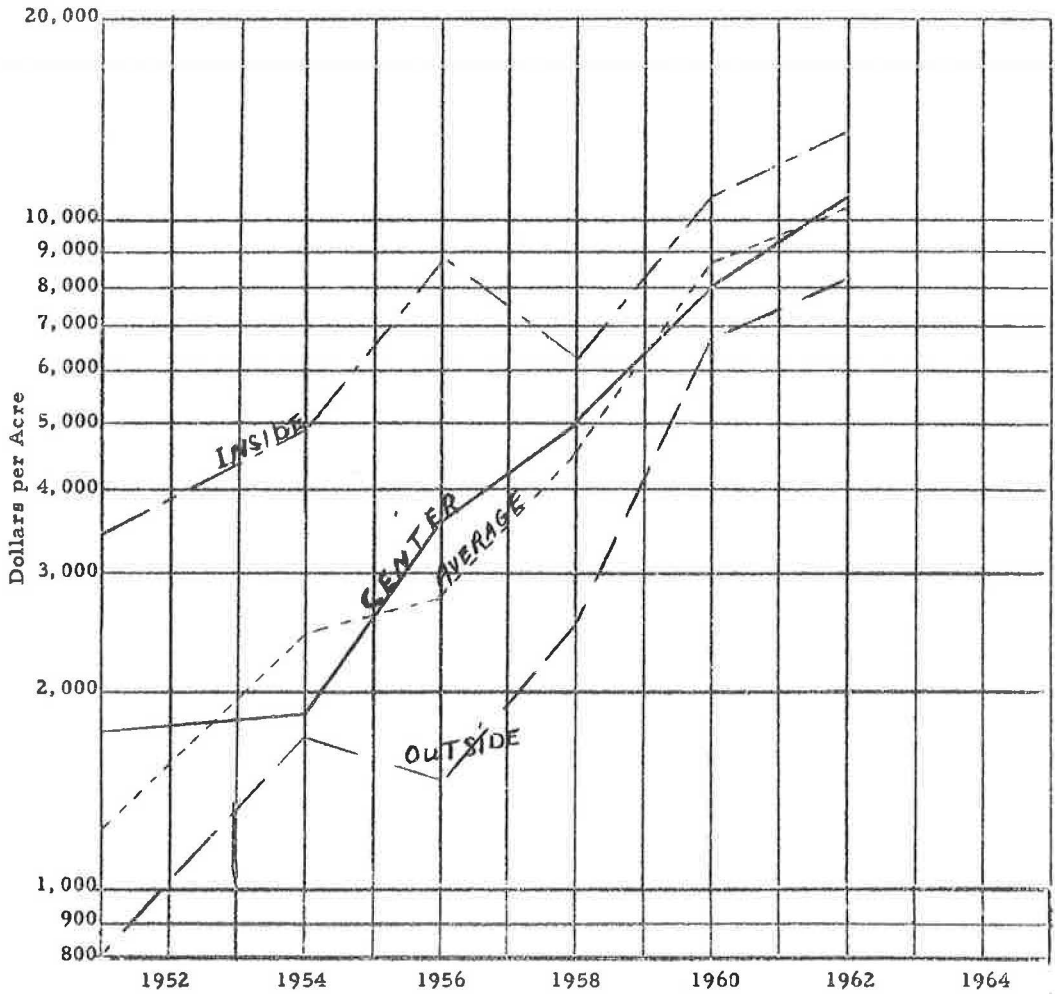


Figure 7. Residential and vacant land values based on market sales values for areas of limited accessibility.

From these data, the principal observations to date with respect to changes in land value in the Primary Study Area, the following conclusions may be drawn:

1. Sales data expressed as dollars per acre reflect an upward trend in land values.
2. The Beltway is exerting a direct influence on land values in those areas immediately adjacent to it, particularly in the more accessible places.
3. In the areas of least accessibility, there is no indication of the Beltway's overriding influence on land values such as was evident in the band adjacent to the Beltway.

BUSINESS ACTIVITY

Although commercial and industrial activity accounts for a relatively small portion of Fairfax County's total income, it has multiplied in recent years. Retail business has grown from 493 establishments and $54,458,000 in sales in 1954 to 652 establishments and $114,661,000 in 1958, a tremendous upsurge in retail trade (110.5 percent increase). Population during the same period expanded 38.5 percent. The fact that growth of retail activity far exceeded the growth of population points up the rapidity with which retail activity developed in the area to catch up with the population explosion.

TABLE 6

RETAIL SALES IN FAIRFAX COUNTY[a]

Trading Centers	1952	1954	1956	1958	1959[b]	1960	1962[b]
Annandale					(51)		(57)
Sales ($)	1,978	3,059	5,654	9,437	9,152	15,103	17,259
Index of change	21	32	60	100	97	160	183
Springfield[c]					(43)		(67)
Sales ($)	--	--	2,631	4,735	8,814	10,524	16,520
Index of change	--	--	56	100	186	222	349
Belle View					(18)		(17)
Sales ($)	2,123	2,925	4,645	4,556	5,280	5,594	5,663
Index of change	47	64	102	100	116	123	124
Penn Daw					(14)		(17)
Sales ($)	85	48	249	465	2,019	5,294	6,478
Index of change	18	10	54	100	434	1,138	1,393
Bailey's Cross Roads					(54)		(61)
Sales ($)	1,747	3,049	4,905	9,668	11,781	12,421	16,901
Index of change	18	32	51	100	122	150	175
Seven Corners					(67)		(66)
Sales ($)	--	4,466	17,567	35,342	40,674	42,892	46,666
Index of change	--	13	50	100	115	121	132
McLean					(36)		(52)
Sales ($)	899	1,197	2,364	4,406	5,753	10,316	12,814
Index of change	20	27	54	100	131	234	293
Vienna					(50)		(270)
Sales ($)	2,900	3,438	3,919	5,103	6,967	9,939	15,919
Index of change	57	67	77	100	137	195	312
Town and City of Fairfax					(99)		(181)
Sales ($)	1,848	2,929	8,643	13,153	16,371	24,233	38,301
Index of change	14	22	66	100	124	184	291
Primary Study Area							
Sales ($)	3,113	6,929	15,700	23,366	31,264	46,221	60,991
Index of change	13	30	67	100	134	194	261

[a] Source: Department of Assessments, Fairfax County, Va.
[b] Numbers in parentheses refers to number of retail outlets in 1959 and 1962.
[c] 1952 and 1954—negligible (gas station).

Estimates show that retail activity in Fairfax County has continued to increase since 1958, but at a considerably slower rate. (The annual rate of growth from 1958 to 1962 was 16.8 percent as compared with a rate between 1954 and 1958 of 27.6 percent.) Sales Management's "Survey of Buying Power" for 1962 estimates retail sales of $192,909,000, an increase of 67.4 percent over 1958. Even greater increases are revealed when specific commercial areas are considered (Table 6).

The creation of highly accessible vacant sites in the interchange areas will certainly exert some influence over the businessman's decisions as to location; it will be more of a factor in regionally oriented business than in local or neighborhood centers. There is little evidence that the "convenience goods" centers are as concerned with the Beltway's location as with location of subcenters of population in the metropolitan periphery.

TABLE 7

FAIRFAX COUNTY HIGHWAYS

Type	Mileage		
	1951	1962	% Change 1962/1951
Primary	164.2	132.8	-19
Interstate		28.3	
Total	164.2	161.1	- 2
Secondary			
Hard surfaced	406.3	1,021.7	+151
Untreated, all weather	203.0	103.9	-49
Untreated, light surface	83.8	53.3	-36
Unsurfaced	36.1	10.4	-71
Total	729.2	1,189.3	+63
Grand total	893.4	1,350.4	+51

As a matter of interest, the project research team decided to determine where shoppers came from who patronized a large neighborhood shopping complex and what routes they used in getting to the center, located in Springfield at the intersection of the Shirley Highway and Franconia Road about 7 miles southwest of the District of Columbia.

The purpose was to establish a pattern of travel and shopping habits in the before period, run the same survey in the after period, and attempt to evaluate the impact of the Beltway on the market area for the large neighborhood commercial complex.

Of course, the after survey has not been made and it remains to be seen what the long-run effect will be, if any. It is quite possible that the addition of shopping centers in the vicinity will greatly complicate the picture. Shortly after the survey was made, a center of some size (100,000 square feet of stores and shops and 1,000 parking spaces) opened approximately 3½ miles east. Sometime later a discount store opened only 2 miles to the north. These openings naturally affect the Springfield complex.

Results of the survey indicated that shoppers at Springfield came primarily from the more densely populated north; 43 percent of the visits originated 5 minutes or less away; 32 percent, 6 to 10 minutes away; 19 percent, 11 to 20 minutes away; only 6 percent, over 20 minutes away. The majority of the visitors came to shop three or more times a week. It will be interesting to determine the extent of change as means of transportation improve. There is evidence already in the zoning and development around the newly formed interchanges that the Beltway is creating desirable sites.

In manufacturing, although this activity is relatively light, value grew from $2,011,000 in 1954 to $6,053,000 in 1958 and employment grew from approximately 1,600 employees in 1950 to 5,600 in 1960. In wholesaling, sales increased from $10,148,000 in 1954 to $14,370,000 in 1958, with an increase from 215 employees in 1954 to 262 in 1958.

Traffic is not as heavy on the portions open in the northern half of the Virginia portion of the Beltway. From Route 7 to the Dulles Airport Road the average was 4,700 vehicles. Traffic between the Dulles Airport Road and the Maryland line, across the Cabin John Bridge, averaged 7,500 vehicles. These figures indicate that the volume of traffic which will utilize the facility, when completed, will be great. Most of the through traffic, bypassing Washington, will be added to traffic already being generated.

The traffic already on the Beltway is a reflection of the tremendous growth in traffic on the entire network of roads in the Northern Virginia area. Examples of this growth can be seen in many areas. For instance, in 1950 the 24-hour average daily traffic volume on Franconia Road at the Shirley Highway interchange was 450 vehicles. By 1960 the count had risen to over 10,000 vehicles. This is a two-lane secondary State road. On Back Lick Road, also two-lane secondary, at the Franconia Road intersection, the picture was much the same with volume growing from 1,000 vehicles per day in 1950 to 11,300 in 1960. These increases are indicative of the growth in traffic which has occurred as a result of the rapid expansion of population in Fairfax County, particularly in the eastern half. Table 7 shows growth and improvement of the highway network in Fairfax County between 1951 and 1962. Increased mileage of the secondary system is also indicative of the tremendous growth in Northern Virginia.

Since 1958, a total of 46 industrial plants have settled in Fairfax County, 20 of them in the vicinity of the Beltway. Total increase in employment has been 3,340. Eleven plants with a contemplated employment of over 1,600 employees have been announced or are under construction. (These figures have been furnished by the Fairfax County Industrial and Economic Development Committee.)

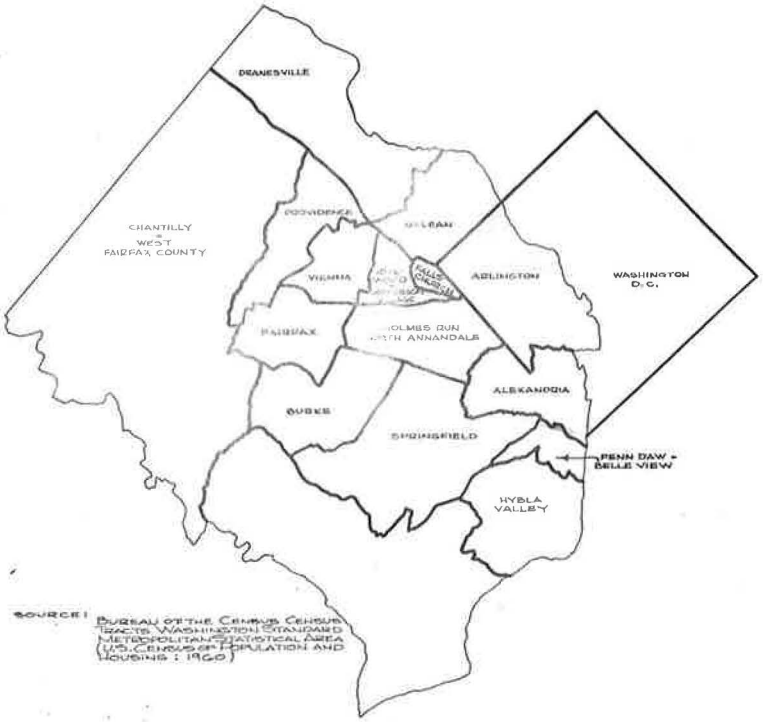


Figure 8. Location of 15 subregions.

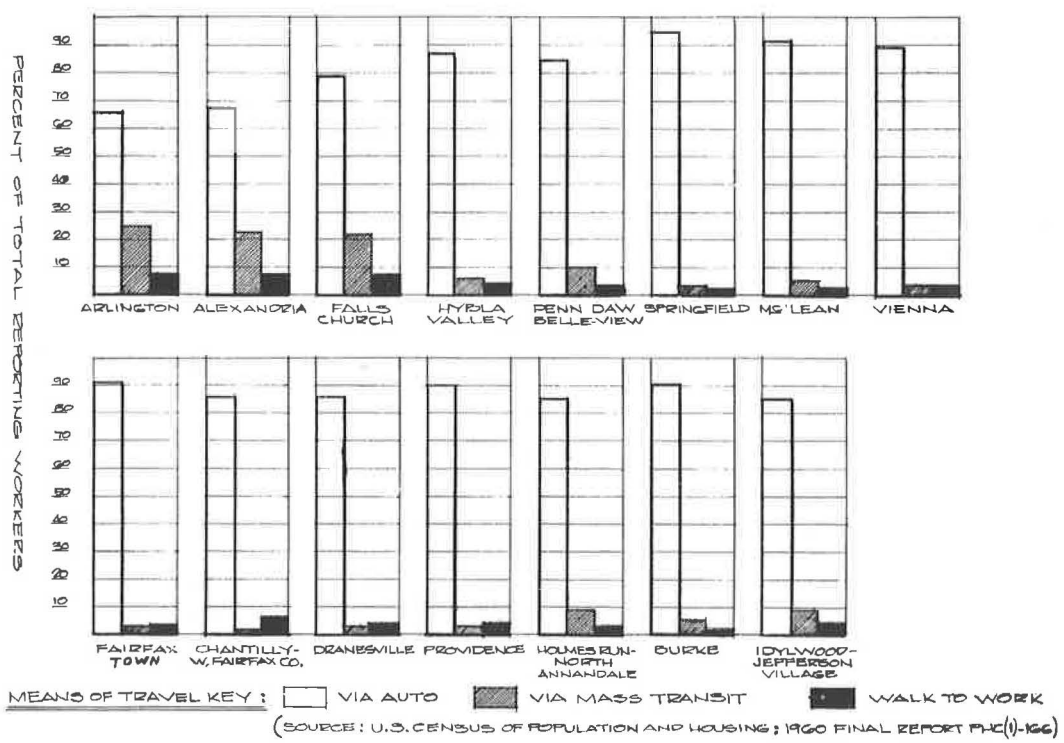
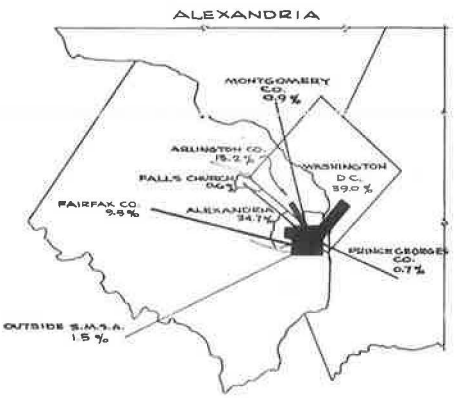
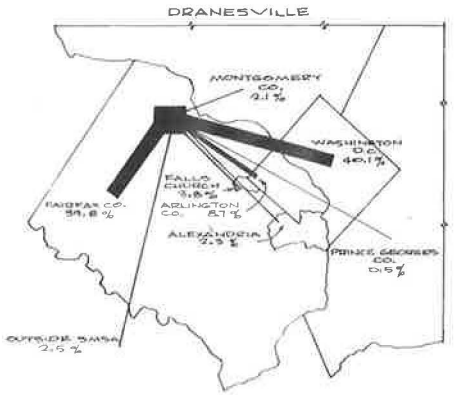
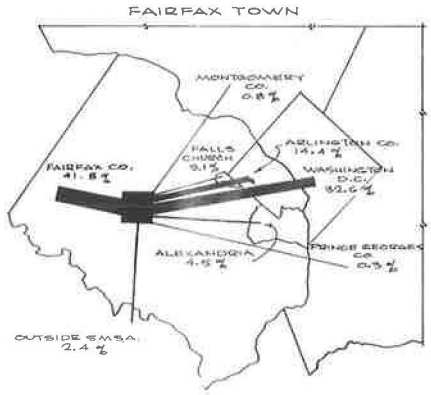
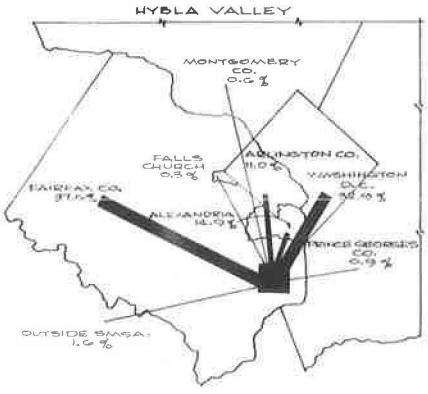


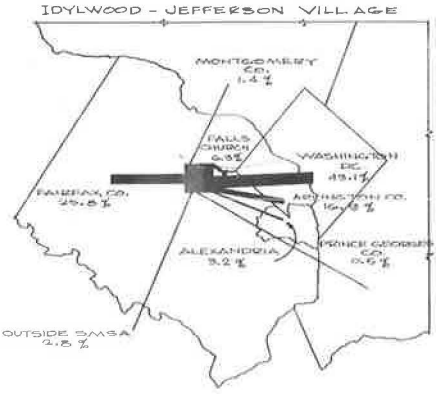
Figure 9. Relative distribution of trips by means of travel.

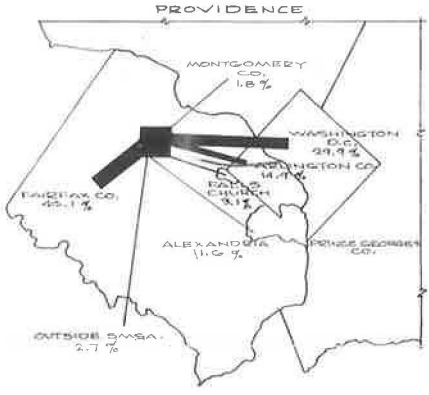












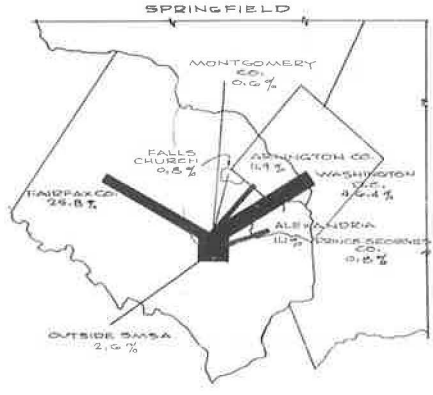
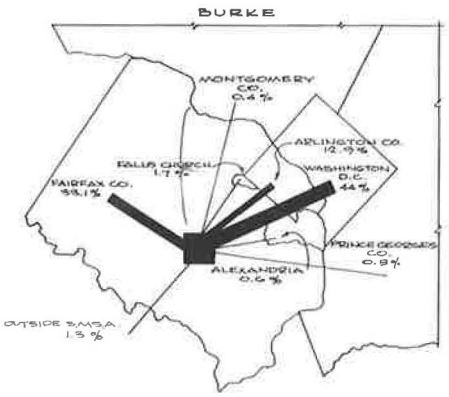
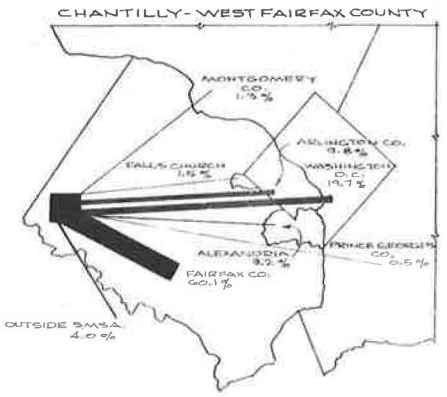
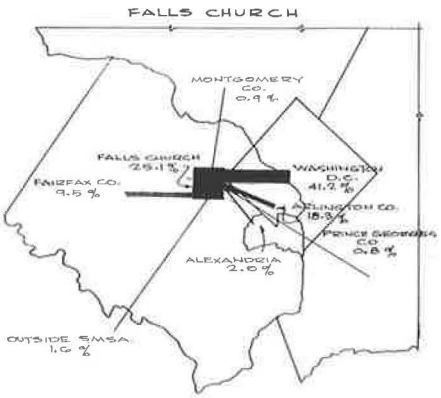
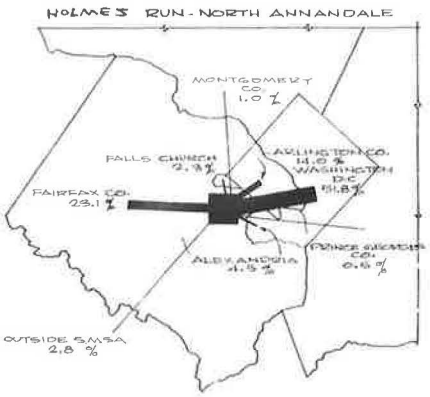


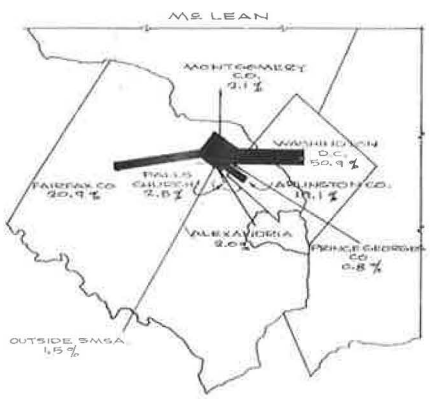
Figure 10. Journey-to-work

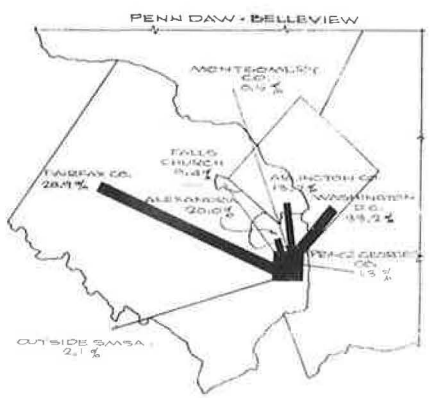


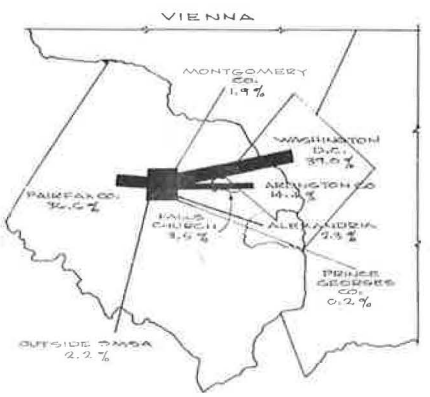












SOURCE: BUREAU OF THE CENSUS CENSUS TRACTS WASHINGTON STANDARD METROPOLITAN STATISTICAL AREA (U.S. CENSUS OF POPULATION AND HOUSING: 1960)

data for 15 subregions.

It is still too early to weigh the influence of the Beltway on industrial development, but when the large amount of vacant land around these interchanges is considered along with the fact that water and sewer facilities are available, it is unlikely that the Beltway will not exert some location effect and, in addition, generate new business with the accessibility it provides.

TRAFFIC

The influence the Beltway will exert on patterns is already becoming evident. Although only portions of the Beltway are open, spot checks indicate a great deal of traffic is already using the opened segments. The most traveled stretch is across the Woodrow Wilson Memorial Bridge to and from the Maryland line and US 1. Four 12-hour counts taken over a period of 9 months reveal an average volume of 14,200 vehicles per 12-hour period. This traffic started at 14,000 vehicles for the 12-hour period and changed very little between the initial and the final survey.

The average 12-hour count from Shirley Highway (Route 350) west to Braddock Road (Route 620) was 8,400 vehicles. The counts showed 7,900 vehicles in August 1962 and 10,000 in May 1963. These ranges cannot be considered exactly comparable because the counts may have fallen on different days.

Between Routes 620 and 236, the artery between Annandale and Fairfax, the average of four counts was 9,000 vehicles. All counts were substantially the same. North of Route 236 to Route 50, traffic averaged 6,500 vehicles. The range from the first count to the last was 4,300 to 8,600, a 100 percent increase.

Vehicle registrations in Fairfax County more than doubled between 1953 and 1959, as did the total vehicle miles traveled on the State secondary roads in the County. It is doubtful that the Beltway will do anything to relieve congestion substantially on these local feeders.

JOURNEY-TO-WORK

Although data are not yet available for evaluation of impact, the journey-to-work data for Northern Virginia given in the 1960 Census of Population and Housing were very interesting. A comparison of later data with the 1960 information should be quite revealing in terms of the effect of the Beltway on the journey-to-work habits of residents of Northern Virginia.

To lay the groundwork for observing change, the research team compiled certain data for areas in Northern Virginia. Information was available from the Bureau of Census on a census tract basis. These data were obtained for the Washington Standard Metropolitan Statistical Area, which comprises the following political jurisdictions: District of Columbia; Montgomery and Prince Georges Counties, Md.; Arlington and Fairfax Counties, Va.; and the independent cities of Alexandria and Falls Church, Va.

To show the travel patterns, certain census tracts were combined into larger subregions. The relevant data for the individual tracts were combined under the name of the subregion. Some of the larger census tracts are presented singly. The resulting subregions are shown and identified in Figure 8. These subregions represent considerable variations in degree of urban development, as well as in proximity to the Beltway path and the urban core. Thus, some interesting contrasts and comparisons should be possible when the new highway is in use and new data are available.

The percentage distribution of total work trips among the alternative forms of transport provide a basis for the study of vehicle choices both within and between the subregions. The percentages are depicted graphically in Figure 9 for those driving in private automobiles, riding mass transit facilities, and walking to work.

Figure 9 indicates that the privately owned automobile is used more than any other means of transportation to work in all of the subregions. Travel by mass transit is significant only in Arlington, Alexandria and Falls Church, all of which are relatively near the urban core. The figure suggests that the incidence of travel via mass transit facilities declines with distance from the center primarily because bus service to the urban core is more concentrated in the urban regions. Consequently, the highest incidence of automobile usage is in the more remote subregions.

The incidence of walking trips to work depends on the presence and scope of local employment centers. Although the percent of those walking to work is uniformly low, a relatively large portion of workers walk in Arlington, Alexandria, Falls Church, and Chantilly-West Fairfax County. It is obvious that the first three of these subregions are located either at or near the site of large-scale commercial and governmental activities.

The distribution of workers in the various subregions is rather interesting. To facilitate comparisons between the various subregions, the precentage distributions of reporting workers among the centers of employment are shown graphically through width lines in Figure 10. The maps shown in Figure 10 are largely self-explanatory. They provide a clear, easily assessed record of the sources and terminations of work trips in Northern Virginia. Similarly drawn maps in the after period should be quite revealing. Some changes might be indicated in the increased mobility of workers throughout the metropolitan area. For instance, very few of the residents of the subregions in Fairfax County worked in Montgomery or Prince Georges Counties, Md. The completion of the Beltway, with its two toll-free bridges, may change this picture considerably.

The importance of Washington, D. C., as an employment center is obvious with the percentage of trips to work terminating in the District ranging from 19 percent in western Fairfax County to 51.9 percent in Arlington County. To the researchers, some of these percentages were a little surprising. For example, it was thought (unscientifically) that the percentage of trips in the District from Arlington County would be higher in terms of percent of total trips, and higher than some of the other subregions farther out, which had approximately the same percentage (North Annandale and McLean).

CONCLUDING REMARKS

There is no doubt that the Capital Beltway is exerting its influence in the Northern Virginia Area. Changes in distribution of population, in land values, in traffic flows, and (soon) in journey-to-work travel habits can be attributed to the highway influence. In addition, as the outlying areas are made more accessible to the motorist who works in the central core but likes to live outside, further changes in land use will occur. Satellite shopping centers will follow the population movements and will tend to locate in areas of high accessibility such as those created by interchanges. Additional sites will encourage movement of business into the area and the relocation of business already operating in the area. The large percentage of vacant land in the interchange areas now being formed will contribute a great deal to this change.

A significant problem which has not been discussed in this paper is that of controlling land-use development in these interchange areas. There is no doubt that this is a problem of concern to local, State, and Federal government, and the potential conflict of interests between the local jurisdiction, which are hard pressed to increase their tax bases, and the State and Federal governments, which are concerned with the flow of traffic between regions and urban centers, will pose many difficult questions.