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# The Attraction of Interstate Radial Freeway Corridors for New Office Sites

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THE ATTRACTION OF INTERSTATE RADIAL  
FREEWAY CORRIDORS FOR NEW OFFICE SITES

by

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# THE ATTRACTION OF INTERSTATE RADIAL FREEWAY CORRIDORS FOR NEW OFFICE SITES

by Dr. Murray Frost and Dr. Armin K. Ludwig

## Abstract

This paper discusses the impact of Interstate radial freeway corridors upon the location of new office developments in the 1970-76 period in seven United States cities. Data indicated that in each of the seven cities, greater growth occurred outside of the downtown Core than in it. Growth of the office sites compared to previous development ranged from 12% to 110% in the Cores with an average of 24%, compared to 106% to 307% for non-Core areas with an average of 207%. Growth expressed in terms of gross square feet had a similar pattern. Of the 1970-76 office development, the greatest proportion of new sites occurred in Interstate radial corridors (average of 34%); when analyzing gross square feet of new office development, the Interstate Radial freeways' growth exceeded all non-Core transportation corridors, but not the Core itself. An analysis of factors theoretically associated with these patterns, suggests that accessibility to residences of white collar workers--especially those of office location decision-makers--was most important. Other factors examined (including accessibility to the Core, metropolitan tax differentials, cost of land, and availability of land) were found to be unrelated or much less significant.

# THE ATTRACTION OF INTERSTATE RADIAL FREEWAY CORRIDORS FOR NEW OFFICE SITES <sup>1</sup>

by Dr. Murray Frost and Dr. Armin K. Ludwig

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University of Nebraska at Omaha)

## Introduction

Completion of the Interstate highway network in American metropolitan areas has opened a wide variety of locational options for urban land uses. New office sites have been salient among these developments. The purpose of this study is to compare Interstate radial freeway corridors with other spatial units in seven metropolitan areas to determine their differential attraction for new office sites in the period 1970-1976. The seven metropolitan areas studied are Atlanta, Dallas, Denver, Louisville, Minneapolis-St. Paul, Omaha, and San Jose.

Definitions. An office site for this study is one in which the prime functions of the units which occupy it are the creation, storage and dissemination of information regarding services performed, goods held or transferred and personnel employed. A site may comprise a single office building, an office park of several buildings or a complex of buildings built by the same developer within a limited time period. A service may be performed at the same location, e.g., physicians see patients and insurance agents sell policies, but rarely is the good for which the records are surrogates present at the office location. No steel ingots, for example, are found in the U. S. Steel headquarters building. The study includes office sites which are both renter-occupied and owner-occupied. It excludes all office sites that are wholly occupied by Federal, state and local government agencies whether these buildings are leased from the private sector or not. This is done because it is assumed that most government

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<sup>1</sup>The research and original report forming the basis for this paper were conducted pursuant to Contract DOT-FH-11-8752 with the Socio-Economic Studies Division, Office of Programming and Policy Planning, Federal Highway Administration, Department of Transportation. The authors of the original contract report, Radial Freeways and the Growth of Office Space in Central Cities, included the authors of this paper in addition to: Thomas C. Moss, Paul S. T. Lee, Yeshen J. Chen, John M. Crane, Ralph H. Todd and William B. Rogers.

office location decision makers operate under a different set of constraints from those in the private sector. The study also excludes corporate headquarters located at the site of production facilities. Buildings with less than 25,000 square feet of gross floor area are excluded from the study. This allows the establishment of a manageable universe of sites, within each city's metropolitan area. It also permits the study to make maximum use of some existing public and private agency inventories which provide relevant data only on office sites in their cities that contain at least 25,000 square feet of gross floor area.

An Interstate radial is defined as a Federally-funded Interstate highway anchored at or near the central business district (CBD) of that metropolitan area. It extends outward from the CBD like a spoke of a wheel and, in most cases, intersects the Interstate circumferential highway. A Non-Interstate radial has the same geographic pattern as the Interstate radial but it is not necessarily a limited access route. A radial corridor is defined as that area which lies within one mile on either side of a radial highway and extends from the CBD to a point four miles beyond the Interstate circumferential. A corridor two miles wide is also developed along the Interstate circumferential in each metropolitan area.<sup>2</sup>

Each of the metropolitan areas under study contains a cluster of downtown office sites that are roughly coincident with the CBD. In no case, however does this cluster extend more than 1.4 miles linearly, and in most it is less than one mile. Consequently it is possible to enclose the downtown cluster in every metropolitan area with a circle whose radius is .7 miles. The CBD as defined in the Census of Retail Trade might be used as the base for some metropolitan areas but in others it is not spatially coincident with the cluster of downtown office sites. In this study the term core rather than CBD will be used to designate the downtown office area.

The non-corridor area is comprised of all space inside a line four miles from the Interstate circumferential which space is not included in one of the types of spatial units described above. The number and types

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<sup>2</sup>In some of the metropolitan areas the circumferential is not composed entirely of Interstate routes. The short segments of state routes used to close the circumferential are in this study included as part of the Interstate circumferential.

of the spatial units described above and the square miles they contain in each metropolitan area are shown on Table 1. They also appear individually on Maps

The period 1970-1976 was selected for study because for most of the metropolitan areas it marks both the completion of the Interstate system as well as a sharp increase in office site development (Table 1).

Selection of Metropolitan Areas for Study. The seven metropolitan areas studied were selected from among sixty SMSA's (Standard Metropolitan Statistical Areas) which met the following criteria: A central city population of at least 100,000 but fewer than one million inhabitants; a central city with at least one core-anchored Interstate radial which was toll-free and which contained at least three interchanges between the core and the circumferential; and the existence of a comprehensive and accurate office site inventory.

An attempt was made to provide as good a regional distribution as possible of metropolitan areas to be studied. Selecting them from diverse geographical areas allowed for the inclusion of metropolitan areas of differing ages with differing regional functions and ties. Their distribution represents most of the large regions of the United States; San Jose represents the west coast; Denver, the west; Dallas, the southwest; Omaha and Minneapolis-St. Paul, the midwest; and Louisville and Atlanta, the southeast. Only the traditionally industrial and commercial northeast quarter, where most of the cities are old and well-built-up with little space for office site development between the core and the circumferential is not represented.

#### Increase and Centrifugal Movement of Office Sites and Office Gross Space Footage, 1970-1976

The 1976 pattern of office sites in the seven metropolitan areas is a product of seven years of growth which might well be referred to as an office "boom" in some areas. The 480 sites developed in the 1970-1976 period represent a more than 90 percent increase over the number of sites developed prior to 1970<sup>3</sup> (Maps 1, 2, 3, 4, 5, 6, 7 and Table 2). More than 62.5 million gross square feet of space were put in place in this period, increasing the pre-1970 footage by 85 percent. By 1976,

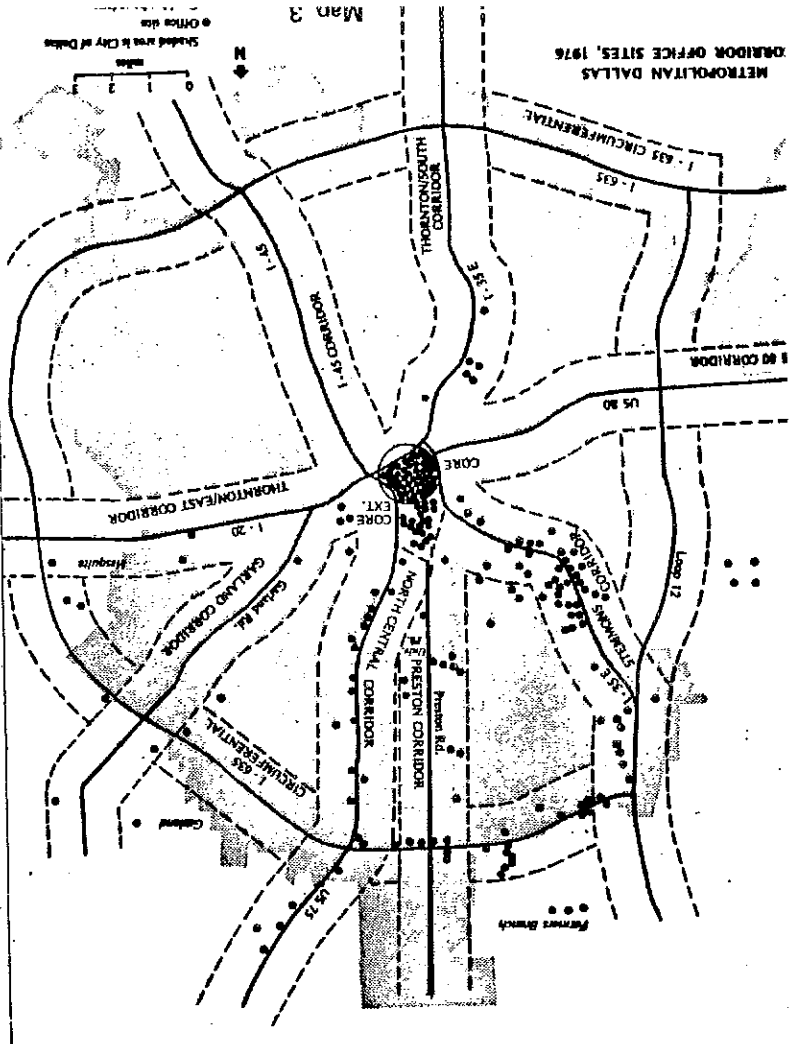
<sup>3</sup>Pre-1970 sites include only those that were developed before 1970 and that were still in place in 1976.

TABLE 1

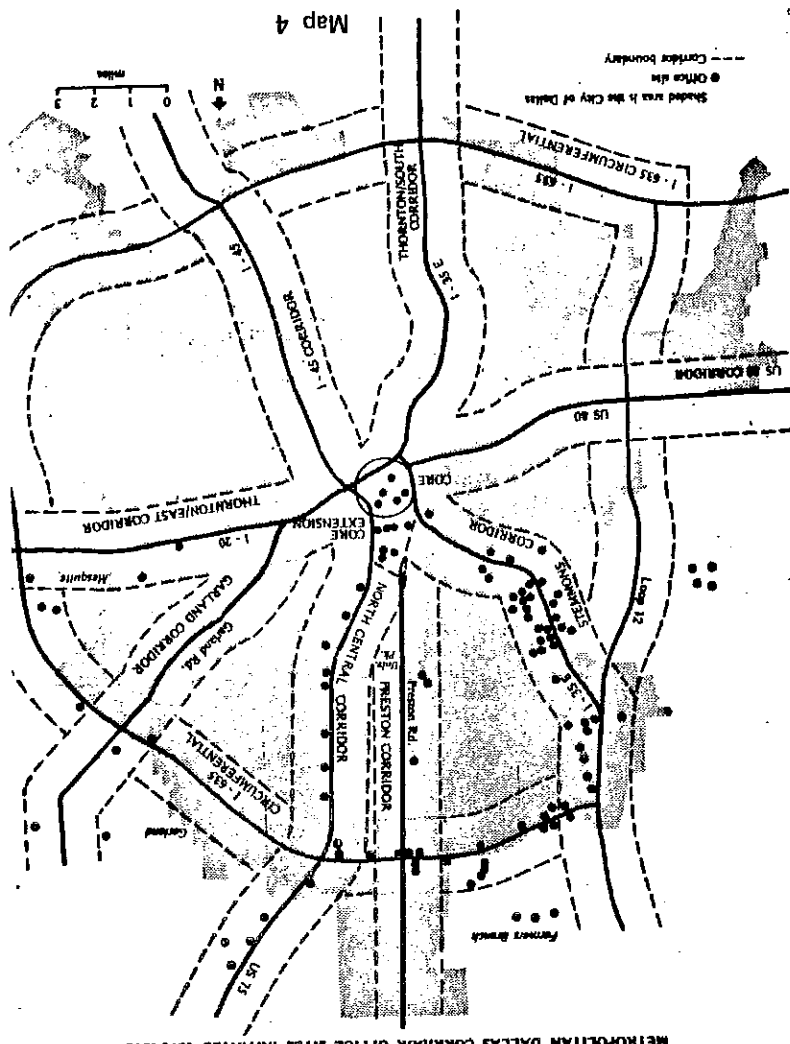
Number and Area of Spatial Units in the Seven  
Metropolitan Areas

	Metropolitan Area															
	Atlanta		Dallas		Denver		Louisville		Minneapolis- St. Paul		Omaha		San Jose		Total	
	No.	Sq.Mi.	No.	Sq.Mi.	No.	Sq.Mi.	No.	Sq.Mi.	No.	Sq.Mi.	No.	Sq.Mi.	No.	Sq.Mi.	No.	Sq.Mi.
Interstate Corridors	5	120.4	4	98.5	4	88.3	2	38.6	5	111.5	1	18.5	2	24.1	23	499.9
Non-Interstate Corridors	4	80.0	4	87.0	3	53.5	2	38.0	5	113.4	1	19.1	4	62.7	23	453.7
Interstate Circumferentials	1	80.0	1	88.0	1	19.5	1	21.5	1	114.0	1	29.4	0	0	6	352.4
Core and Cord Extension	1	4.5	1	2.7	1	2.7	1	1.5	2	3.0	1	1.5	1	1.5	8	17.4
Non-Corridor Areas		<u>254.1</u>		<u>310.8</u>		<u>282.6</u>		<u>51.4</u>		<u>398.1</u>		<u>64.1</u>		<u>66.2</u>		<u>1,427.3</u>
Total		539.0		587.0		446.6		151.0		740.0		132.6		154.5		2,750.7

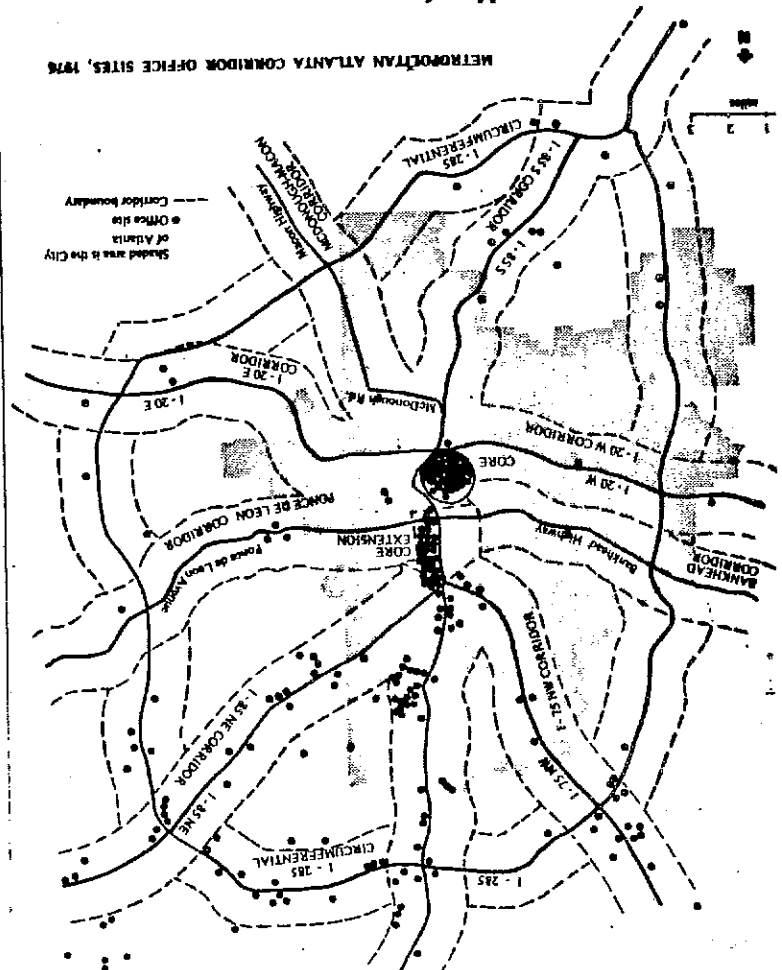
METROPOLITAN DALLAS CORRIDOR OFFICE SITES, 1976



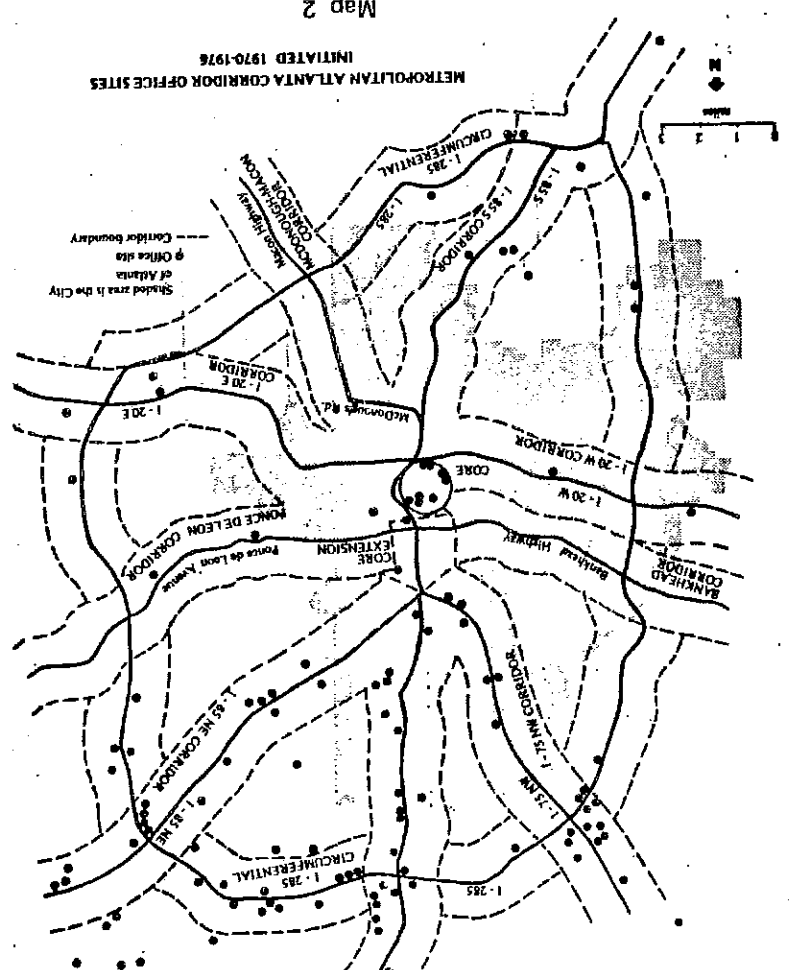
Map 4



Map 1

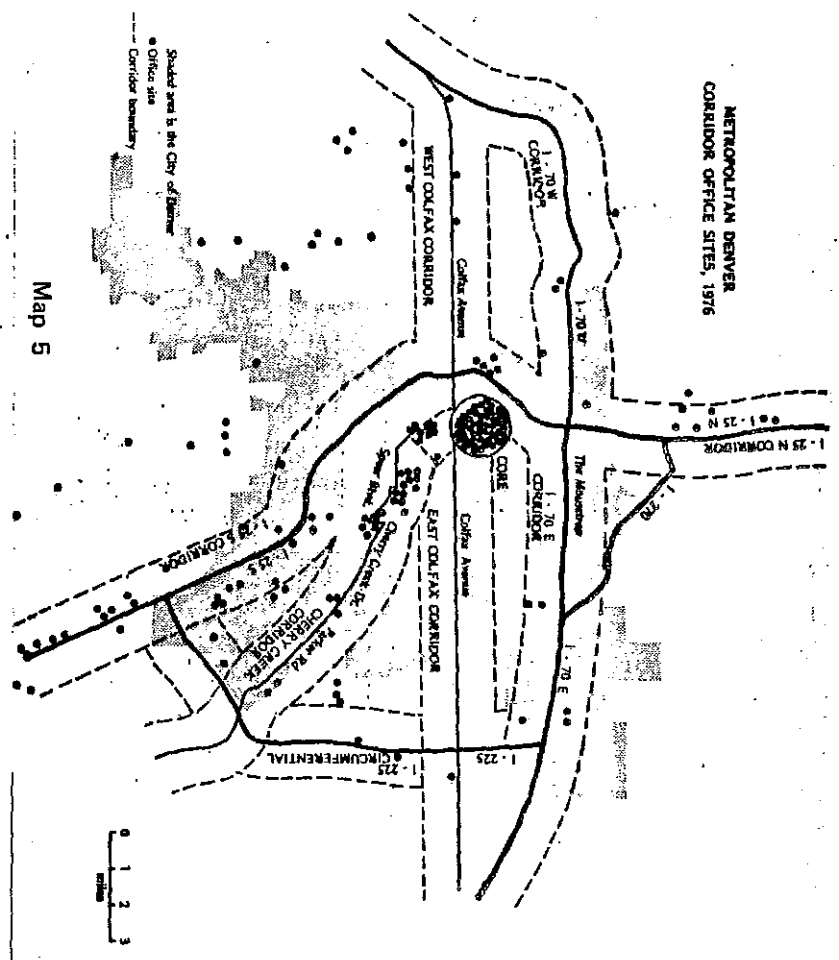


Map 2



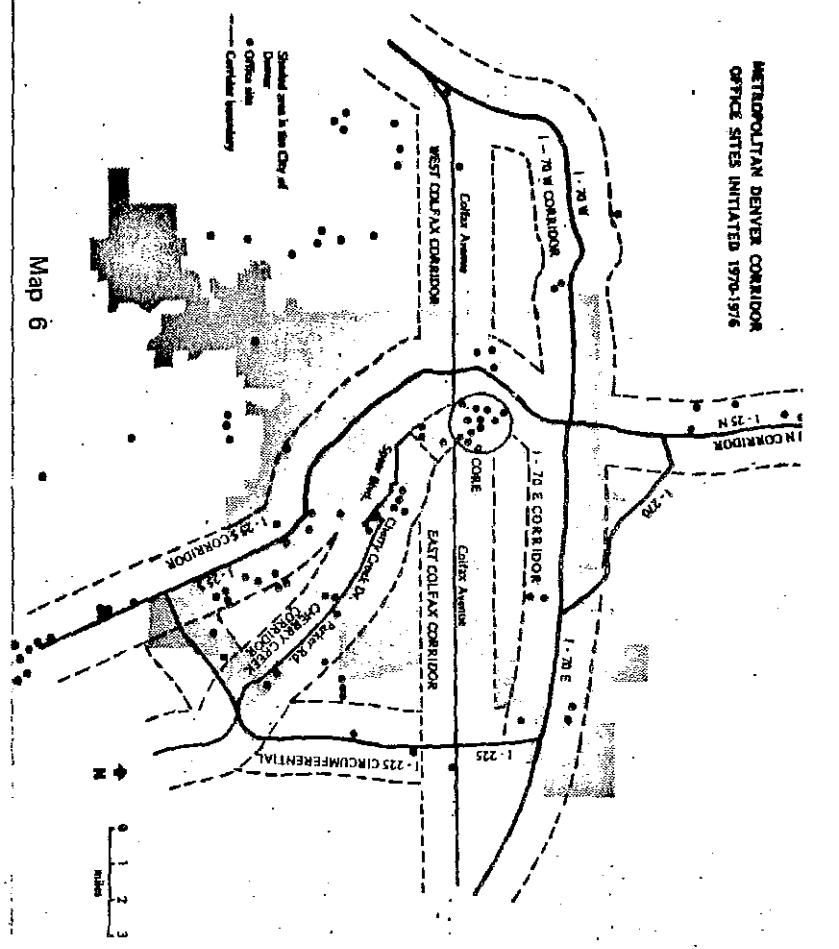


METROPOLITAN DENVER  
CORRIDOR OFFICE SITES, 1976



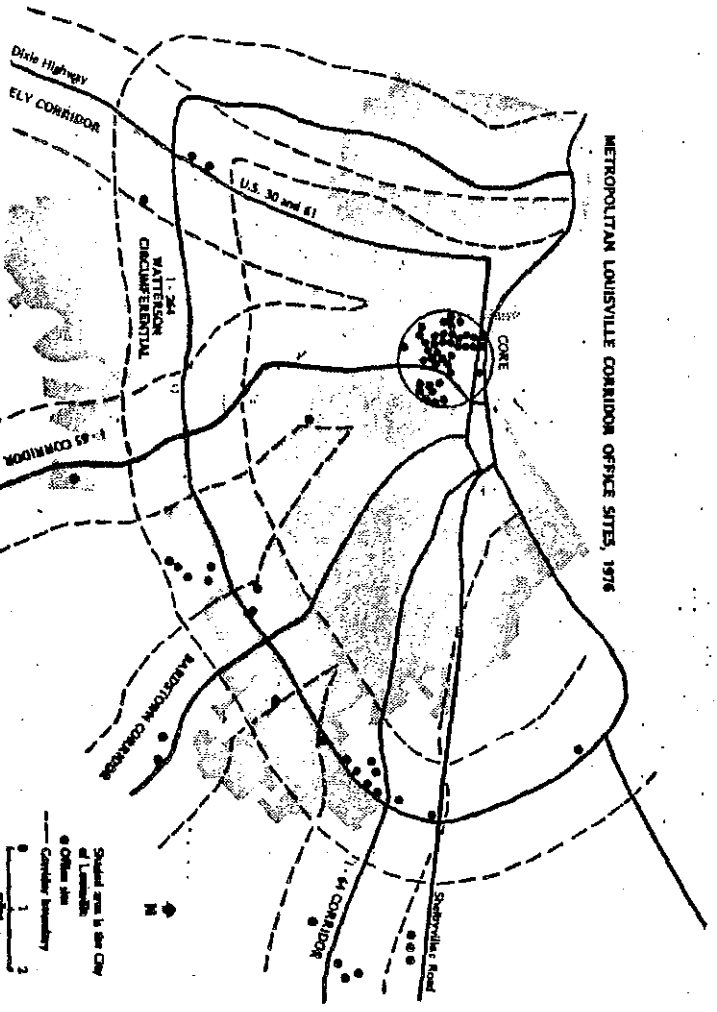
Map 5

METROPOLITAN DENVER CORRIDOR  
OFFICE SITES INITIATED 1970-1976

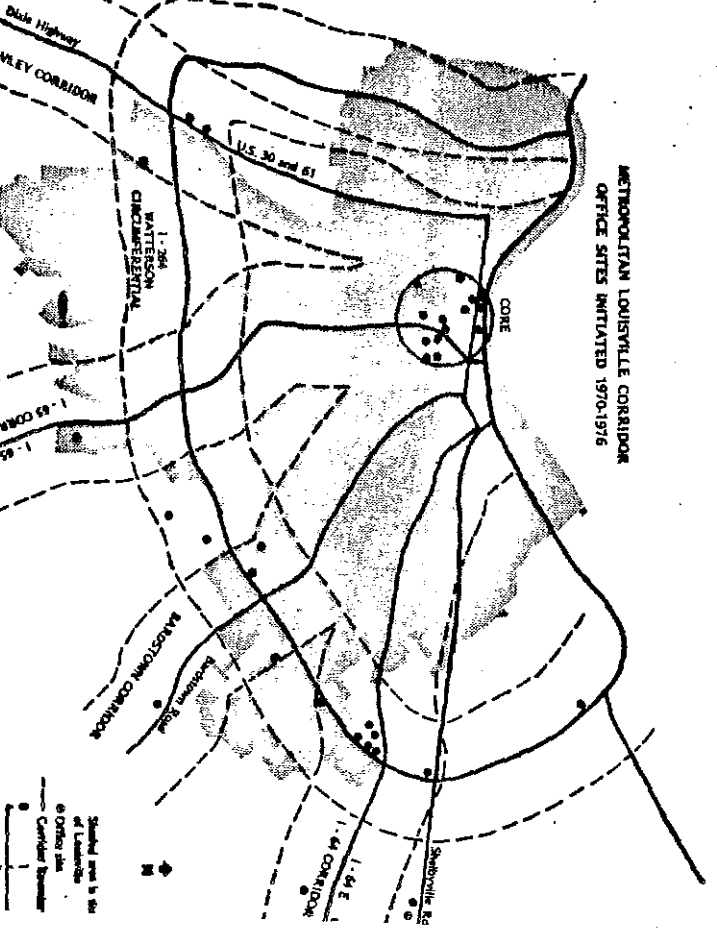


Map 6

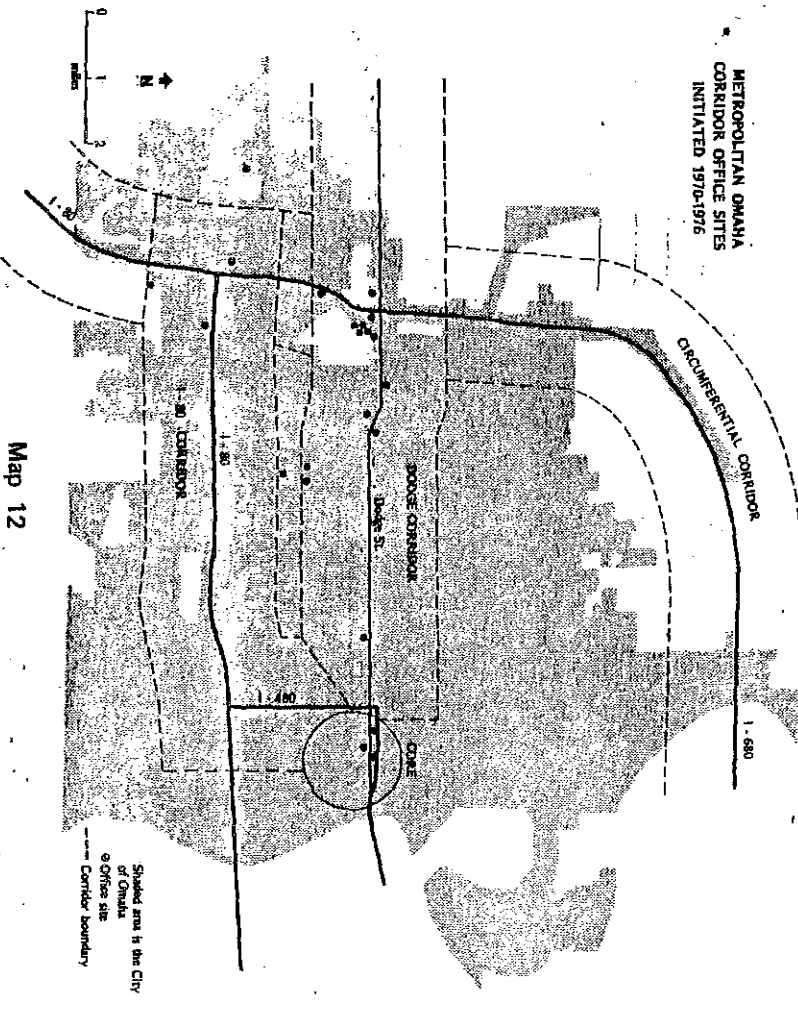
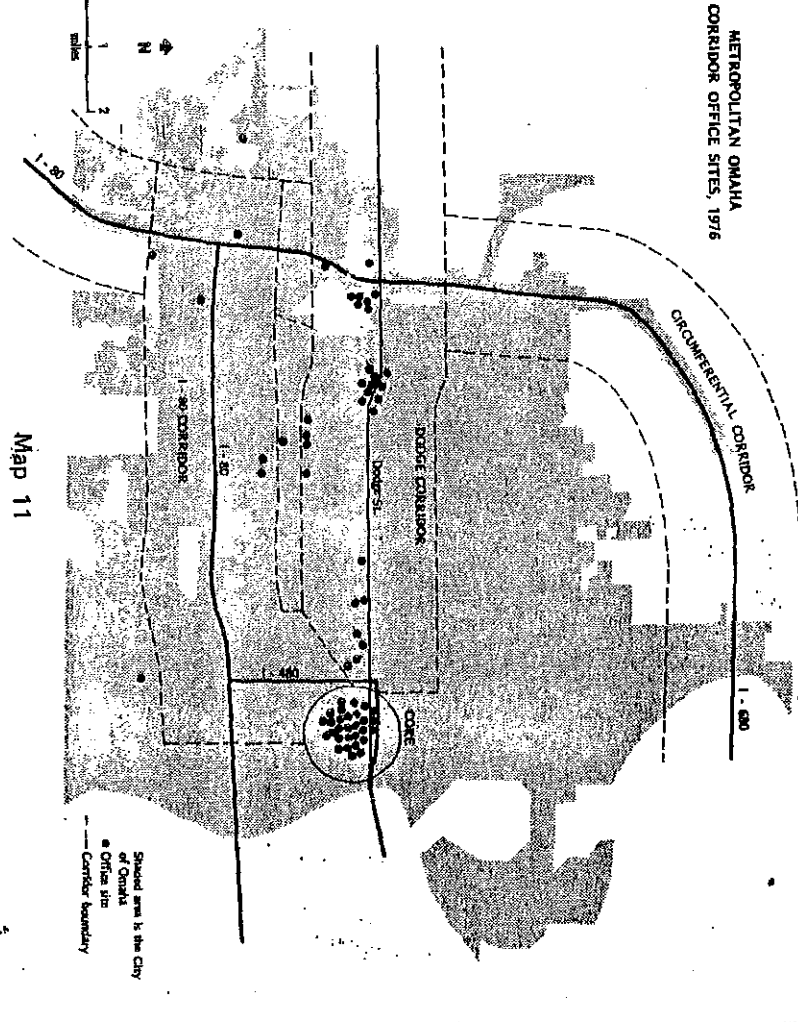
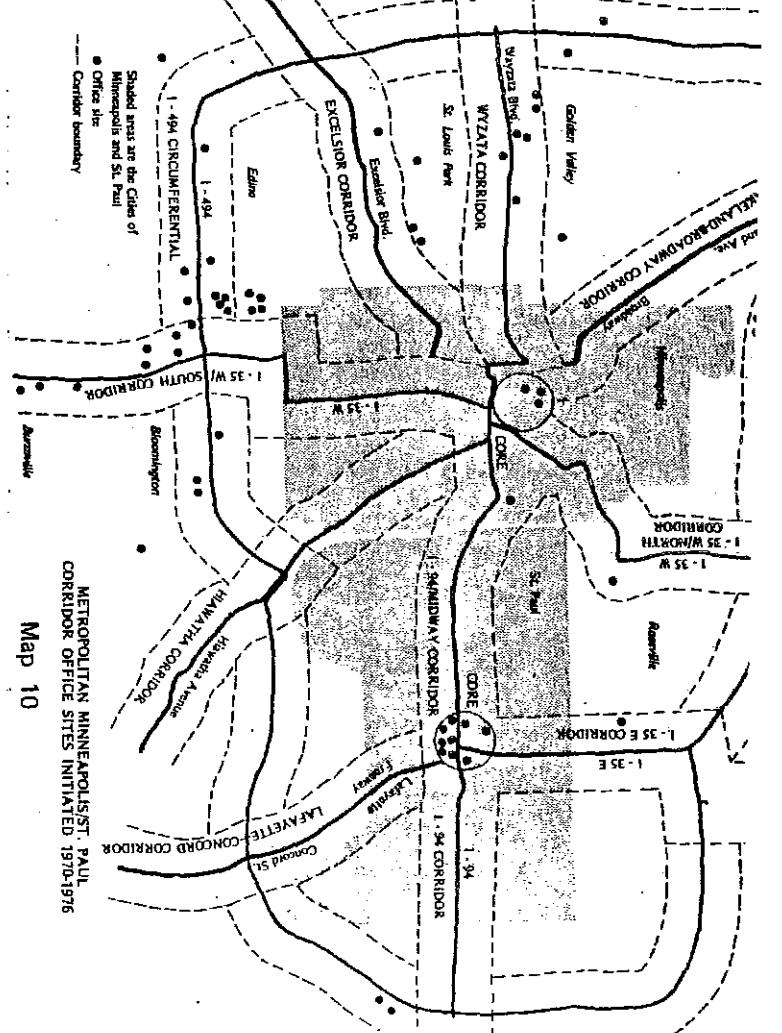
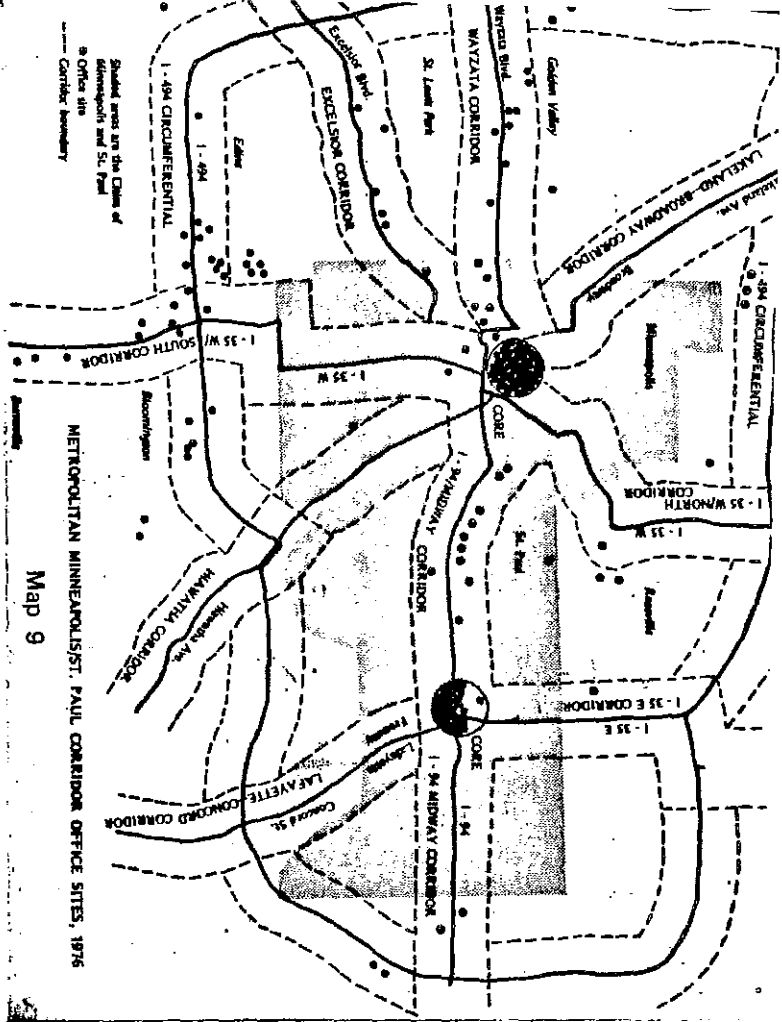
METROPOLITAN LOUISVILLE CORRIDOR OFFICE SITES, 1976

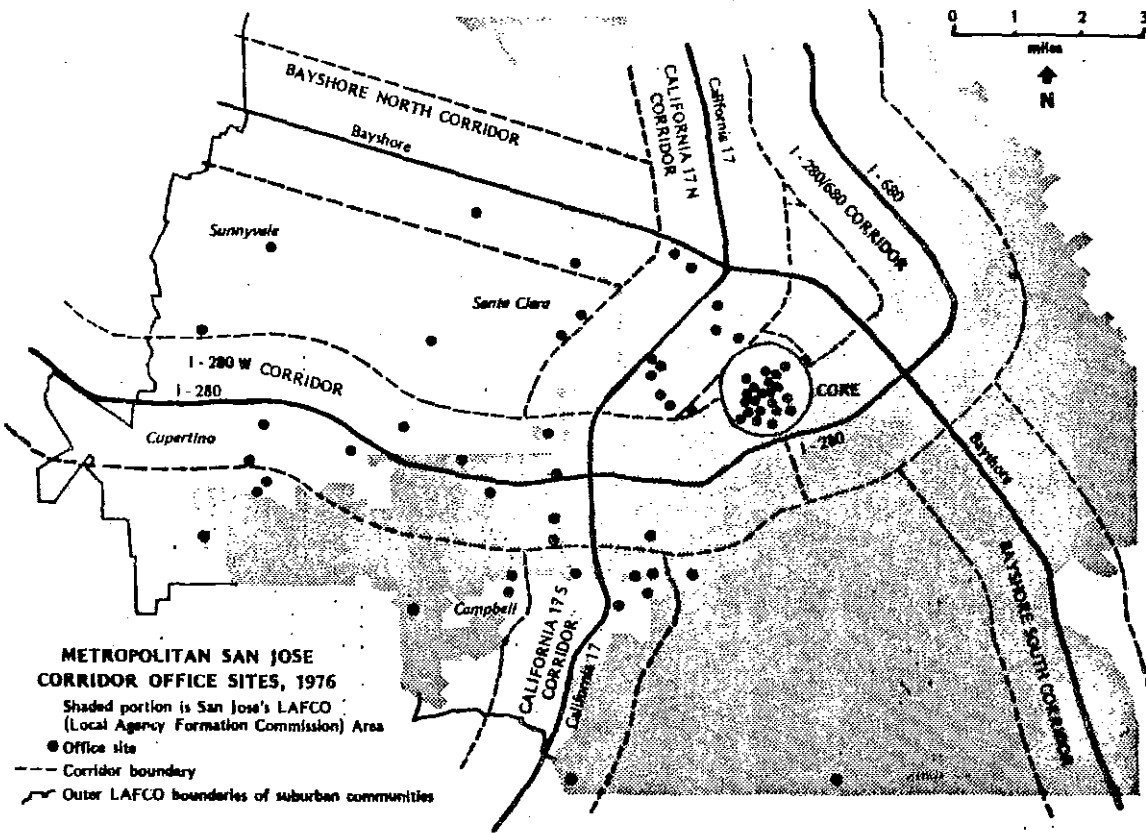


METROPOLITAN LOUISVILLE CORRIDOR  
OFFICE SITES INITIATED 1970-1976

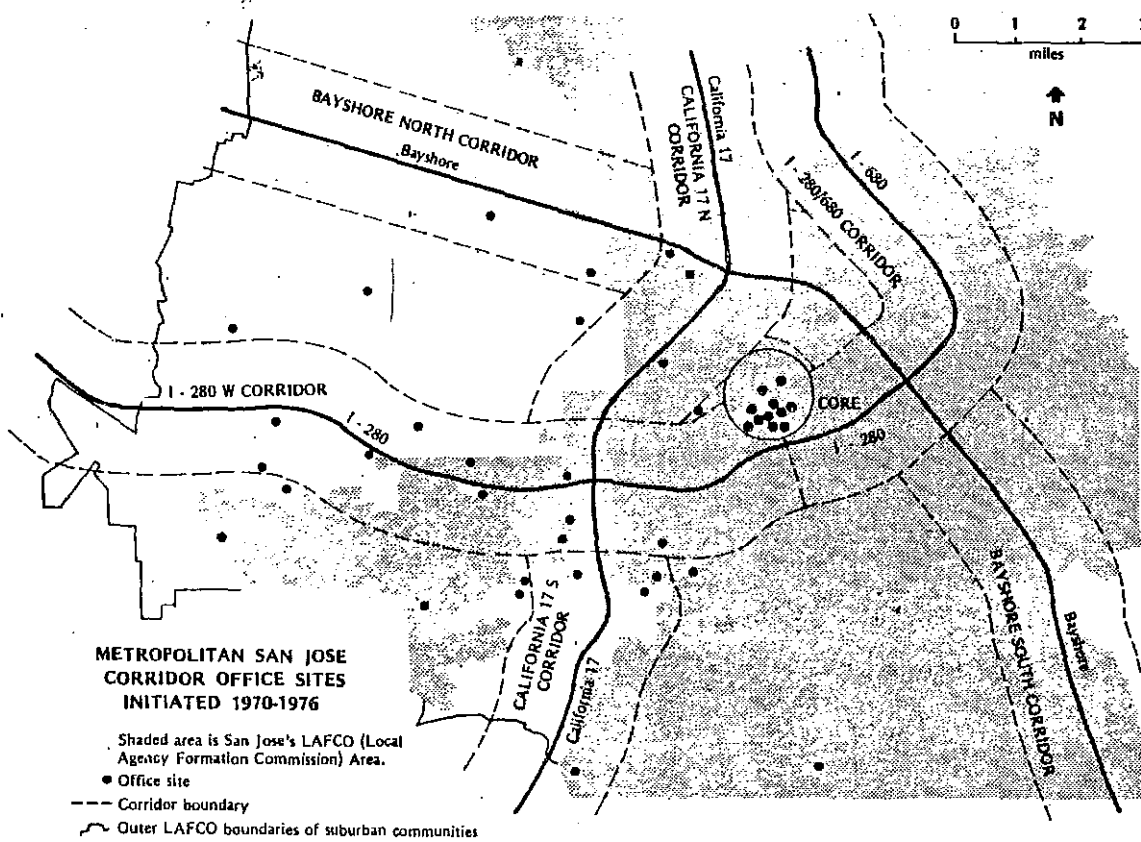


Map 8





Map 13



Map 14

TABLE 2

Historical growth of Office Sites and Gross Square  
Footage in the Seven Metropolitan Areas

	Sites		1976 Total	1970-1976 Growth as % of Pre-1970 Sites
	Pre-1970	1970-1976		
Atlanta	119	118	237	99.2
Dallas	120	102	222	85.0
Denver	68	98	166	144.1
Louisville	33	39	72	118.8
Minneapolis- St. Paul	120	60	180	50.0
Omaha	44	22	66	50.0
San Jose	<u>24</u>	<u>41</u>	<u>65</u>	<u>170.8</u>
	528	480	1008	90.9

Gross Square Footage  
(in 000's)

	Gross Square Footage			1970-1976 Growth as % of Pre-1970 Gross Square Footage
	Pre-1970	1970-1976	1976 Total	
Atlanta	19,257	17,456	36,713	90.6
Dallas	20,512	17,322	37,834	84.4
Denver	5,819	11,003	16,822	189.1
Louisville	2,889	4,393	7,282	152.1
Minneapolis- St. Paul	18,000	7,753	25,753	43.1
Omaha	5,333	1,751	7,084	32.8
San Jose	<u>1,499</u>	<u>2,846</u>	<u>4,345</u>	<u>189.9</u>
	73,309	62,524	135,833	85.3

San Jose, Denver and Louisville had more than doubled the number of their pre-1970 office sites, and Atlanta nearly did so. A similar pattern held across the seven metropolitan areas for increases in gross square footage. Among the seven only Omaha and Minneapolis-St. Paul could be described as showing but modest growth during the 1970-1976 period.

This seven year period saw not only a rapid expansion but also an outward shift--a centrifugal movement--of office sites in all the metropolitan areas under study. In the aggregate the cores of these metropolitan areas witnessed modest growths of 23 percent in number of sites and 40 percent in gross square footage (Table 3). The non-core areas, on the other hand, experienced growth rates of over 200 percent in the number of sites and more than 170 percent in gross square footage. The growth rate differentials between number of sites and gross square footage results from the fact that non-core sites tend to be smaller than those in the cores. Two areas with strong and active urban re-development programs, San Jose and Louisville, both more than doubled their pre-1970 square footage during the 1970-1976 period. Nevertheless, non-core growth in even these two areas exceeded 200 percent. In every metropolitan area the number of sites in the non-core area more than doubled in the period. This is the single most important growth rate in the metropolitan area, for, regardless of the square footage involved, these new sites represent an aggregate of individualized location decisions.

#### Channeling of the Centrifugal Movement

Office site growth outside the cores was not, however, evenly distributed over the non-core areas. The largest proportion of growth in the seven metropolitan areas in the 1970-1976 period occurred in Interstate radial freeway corridors (Table 4). In Atlanta, Dallas, Denver and Louisville Interstate radial corridors ranked first among all non-core spatial units in office site growth. In San Jose the Interstate radials ranked second but the proportions of the metropolitan increase were unusually well distributed among the three non-core spatial units. This was not the situation in Omaha where the non-Interstate radial (Dodge Street) absorbed the bulk of the increase putting the Interstate radial corridor a distant second. Nor was it the case in Minneapolis-St. Paul where the Interstate circumferential ranked first in non-core growth and the Interstate radial corridors second.

TABLE 3

1970-1976 Growth of Office Sites and Gross Square Footage in Core and Non-Core Areas in the Seven Metropolitan Areas

	Sites		Non-Core Areas		Gross Square Footage			
	Cores				Cores		Non-Core Area	
	Number 1970-1976	Percent Increase	Number 1970-1976	Percent Increase	Gross Square Footage 1970-1976	Percent Increase	Number 1970-1976	Percent Increase
Atlanta	10	13.6	108	234.8	4,687	41.1	12,769	162.4
Dallas	11	17.8	91	193.6	4,378	29.2	12,944	233.6
Denver	15	36.5	83	307.4	3,597	84.6	7,406	472.0
Louisville	14	53.8	25	280.0	2,409	103.3	1,984	280.7
Minneapolis- St. Paul	12	14.3	48	133.3	2,815	23.9	4,938	79.3
Omaha	3	11.5	19	105.6	465	15.2	1,286	56.4
San Jose	<u>11</u>	<u>110.0</u>	<u>30</u>	<u>214.3</u>	<u>1,013</u>	<u>150.0</u>	<u>1,833</u>	<u>222.5</u>
	76	23.6	404	207.2	19,364	40.0	43,160	173.5

TABLE 4

## GROWTH OF OFFICE SITES IN SEVEN METROPOLITAN AREAS, 1970-1976

(1970-76 Increase In Number Of Sites In Each Spatial Unit As A Percent Of The Total 1970-1976 Growth In The Metropolitan Area)

	Increase In Interstate Radials		Increase In Non-Interstate Radials		Increase In Circumferentials		Increase In Cores And Core Extensions		Increase In Non-Corridor Areas		Total Metropolitan Increase In Number
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	
Atlanta	47	39.8	23	19.5	25	21.2	10	8.5	13	11.0	118
Dallas	42	41.2	26	25.5	15	14.7	11	10.8	8	7.8	102
Denver	39	39.8	15	15.3	4	4.1	15	15.3	25	25.5	98
Louisville	12	30.8	7	17.9	3	7.7	14	35.9	3	7.7	39
Minneapolis- St. Paul	11	18.3	11	18.3	18	30.0	12	20.0	8	13.3	60
Omaha	3	13.6	14	63.6	0	0	3	13.6	2	9.2	22
San Jose	<u>10</u>	<u>24.4</u>	<u>9</u>	<u>22.0</u>	<u>--</u>	<u>--</u>	<u>11</u>	<u>26.8</u>	<u>11</u>	<u>26.8</u>	<u>41</u>
Total	164	34.2	105	21.9	65	13.5	76	15.8	70	14.6	480

On the basis of the increase in gross square footage, Interstate radial corridors in Atlanta, Dallas, Denver and Louisville recapitulate the site rankings and lead all non-core spatial units in these metropolitan areas (Table 5). The larger size of office sites in the San Jose Interstate radial corridors contributed to raising these spatial units to first ranking. Interstate radial corridors in Omaha and Minneapolis continued to lag behind the non-Interstate radial corridors and the Interstate circumferential, respectively, in their proportion of the total metropolitan growth in gross square footage in the 1970-1976 period.

#### Role of Accessibility Factors

The role of the interstate freeway as an attractive force encouraging office development to locate nearby can be traced through several variables usually found in industrial location theory. Primary among these is accessibility. The concept of accessibility, however, is most useful in explaining the impact of an interstate freeway--or any other linkage in the transportation network--when it is differentiated rather than generalized into a single measure.

At a minimum the accessibility of a site can be viewed from several different levels. Macro-accessibility relates the office development site to other important activity nodes within the metropolitan area. These nodes should be differentiated. Accessibility to the Central Business District (CBD) or Core--the traditional center of office and governmental functions--must be considered. Accessibility of the site to potential employees (i.e. white collar workers) should also be examined, especially since labor supply is a prominent variable in industrial location models. The realities of office location decision-making also requires an examination of the relationship between the site selected and the residences of the decision makers and other executives. Accessibility to clients (or markets) is another standard factor in industrial location models. But it should be noted, however, that offices are not an undifferentiated mass, and that the location of clients may be of no concern to the purely administrative (or headquarters) office, but of considerable importance to offices oriented towards a local market because of its "sales" activities (e.g. real estate, lawyers, insurance).<sup>4</sup>

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<sup>4</sup>For the division of the office market, see Regina Belz Armstrong The Office Industry: Patterns of Growth and Location (Cambridge: The MIT Press, 1972).



TABLE 5

## GROWTH OF OFFICE GROSS SQUARE FOOTAGE IN SEVEN METROPOLITAN AREAS, 1970-1976

1970-76 Increase In Gross Square Footage In Each Spatial Unit As A Percent Of The Total 1970-76 Growth In The Metropolitan Area.

	Increase In Interstate Radials		Increase In Non-Interstate Radials		Increase In Circumferential		Increase In Cores And Core Extension's		Increase In Non-Corridor Areas		Total Metropolitan	
	Gross Square Footage (000)	Percent	Gross Square Footage (000)	Percent	Gross Square Footage (000)	Percent	Gross Square Footage (000)	Percent	Gross Square Footage (000)	Percent	Gross Square Footage (000)	Percent
Atlanta	4,896	28.1	2,395	13.7	4,422	25.3	4,687	26.9	1,056	6.0	17,456	27.9
Dallas	5,426	31.3	5,186	29.9	1,660	9.6	4,378	25.3	672	3.9	17,322	27.7
Denver	4,160	37.8	1,330	12.1	300	2.7	3,597	32.7	1,616	14.7	11,003	17.6
Louisville	1,129	25.7	263	6.0	308	7.0	2,409	54.8	284	6.5	4,393	7.0
Minneapolis- St. Paul	1,040	13.4	1,024	13.3	1,911	24.6	2,815	36.3	963	12.4	7,753	12.4
Omaha	245	14.0	825	47.1	0	0	465	26.6	216	12.3	1,751	2.8
San Jose	<u>742</u>	<u>26.1</u>	<u>581</u>	<u>20.4</u>	<u>--</u>	<u>--</u>	<u>1,013</u>	<u>35.6</u>	<u>510</u>	<u>17.9</u>	<u>2,846</u>	<u>4.6</u>
Total	17,638	28.2	11,604	18.6	8,601	13.7	19,364	31.0	5,317	8.5	62,524	100.0

A second level of accessibility is meso-accessibility which refers to the relationship of the office development site to the freeway. The speed and ease of entry to and exit from the freeway system can be an important factor. Development is much more likely at freeway intersections than between exits; and the data presented in the earlier portion of this paper indicate office development is generally more likely to occur within a mile of a freeway than further away. An example of the effect of meso-accessibility is the attractiveness of interstate freeways for office development in Dallas which is strongly influenced by the extensive use of frontage or service roads paralleling the freeway. A negative example may be cited in San Jose; there an office building adjacent to the freeway but with limited access to freeway drivers because a nearby exit is provided only for eastbound traffic, has had a high vacancy rate for several years.

The third level of accessibility is micro-accessibility which refers to the ease of entry and exit from the office development, and includes such factors as the number and location of driveways and parking facilities. This factor is virtually totally controllable by the developer of the site, and is unrelated to the location of freeways or other major linkages in the transportation network. But it may enter the decision-making of a potential office space renter or user, and therefore may contribute to the attractiveness of the specific development. This in turn may contribute to the broad pattern of office development location because the speed at which a development fills influences other investors and developers, who may not adequately assess the reasons for success or failure.

White collar worker accessibility. Accessibility to residences of white collar office workers is highly related to the attractiveness of a freeway corridor for office development. In general, office development occurs in the direction of the predominant concentration of white collar workers. For instance, the largest concentrations of white collar workers in the metropolitan Louisville area occur in the eastern portions near I-64E; this freeway is also marked by a large proportion of recent office development. Similarly, in the Dallas area, the white collar population is concentrated north of the CBD, and recent population trends suggest a continuation of this trend; not unexpectedly, therefore, all of the office development since 1970 has been north of, or inside, the CBD. The result

is that I-35E north of the CBD exhibits large growth in this decade, while the continuation of this freeway south of the CBD shows no attraction for new development (and relatively little development prior to 1970).

The pattern is repeated in San Jose where the highest white collar accessibility occurs in the western portion of the study area served by I-280, which in turn is highly attractive to office developments. In contrast, the continuation of I-280 east of the CBD, designated as I-680 does not serve white collar workers and does not have any large office developments. Atlanta's concentration of white collar workers is north of the CBD, as is most of its office development.

Executive accessibility. Even more important than the accessibility of secretaries and clerks are the desires of their bosses, who are the office location decision-makers. The importance of accessibility of office developments to the residences of location decision-makers has been noted by analysts and practitioners alike. For instance Quante concluded, "The most important consideration in headquarter relocation is usually an interest in reducing the commuting burden of senior executives. Indeed, this factor is so important that many headquarters choose locations close to the residences of top management."<sup>5</sup> Location theories stress the economic rationality of maximizing profit and/or minimizing costs, and may exclude this factor as subjective and exogenous. But Quante argues that corporations which place a high value on the well-being of its senior executives are making a rational economic decision.<sup>6</sup> Manners observed, "The reasons for the growth of suburban office activities are not difficult to find. Above all else, it is the transportation convenience of suburban locations which has been the most influential with office managers and developers alike. A shorter journey to work for at least the key executives, the ability to use automobiles with free or low cost parking at the office...are all decisive in the locational trend."<sup>7</sup> A Dallas leasing agent expounded on an "Intercept Theory" explaining, "This theory is nothing more than the idea

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<sup>5</sup>Wolfgang Quante, The Exodus of Corporate Headquarters from New York City (New York: Praeger, 1976), p. 104.

<sup>6</sup>Ibid.

<sup>7</sup>Gerald Manners, "The Office in Metropolis: An Opportunity for Shaping Metropolitan America," Economic Geography, L:2 (April 1974), p. 96.

that if you can put a building close to where the decision-makers live, you will lease your space."<sup>8</sup> Dallas provides some additional data to support this contention. Although northeast Dallas and neighboring Garland have some large concentrations of white collar workers, corporate managers are more likely to found northwest of the CBD--and this is where new office development has been concentrated.

This factor becomes especially important for office location decisions because traditional industrial location theory with its emphasis upon labor, raw materials, and marketing costs is not applicable for offices. Their "main products--decisions--are intangible, and most of their inputs are unquantifiable."<sup>9</sup>

In summary, accessibility of office sites to white collar workers--especially top executives--is an important factor determining location of recent office developments. The freeway, therefore, contributed to the suburbanization of office space by first contributing to the suburbanization of residences; once the executive lived in the suburbs and commuted to the CBD, he began to think of suburbanizing his place of work as well.

Accessibility to the Core. The traditional site for office buildings and government centers and auxiliary services has been the Central Business District (CBD) or Core of a city. This has been declining in recent years for a number of reasons. One of these reasons, certainly, is that developments away from the Core may still enjoy excellent access to it because of improvements in the transportation network. The completion (or near-completion) of the freeway system, with radials extending from the Core and linking into a circumferential freeway, has given outlying areas excellent access to the business and cultural attractions remaining in the Core. The decline of the Core can also be traced to the physical decline of the area, and the physical and social decline of surrounding neighborhoods. Another factor contributing to the relative decline of the Core as a site for offices has been the improvement of the communication system which has resulted in a decreased need for face-to-face communication. In addition the increasing size and complexity of modern businesses have

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<sup>8</sup>Quoted by David Wolfe, "Why Office Buildings Have Become a Space Odyssey," in Dallas Chamber of Commerce, 1974-75 Guide to Dallas Office Buildings (Dallas, 1974), p. 31.

<sup>9</sup>Quante, op.cit. p. 4.

resulted in corporations increasingly relying upon their own staffs for financial, legal, and other services, rather than purchasing them from nearby firms. More firms, therefore, find that they do not need the amenities of the Core.

As a consequence they are willing to move further from it. In fact, in Dallas, in 1974, a concentric zone 4-5 miles from the Core contained 13% of the office buildings and 12% of the gross floor area, but the zone only 1-2 miles from the Core had only 7% of the buildings and 3% of the office space. A zone still further away from the CBD 5-10 miles from the center) contained more than one-fourth (28%) of all office buildings and almost one-fifth (19%) of the gross floor area in Dallas County.<sup>10</sup>

In Louisville no office site on the I-64 radial is closer than seven miles to the Core, and there is only one office development between the Core and the Core side of the two-mile circumferential freeway corridor. Office developments 10 miles east of this Core, but near the radial freeway have been successful, and local developers expect still more development three miles further out when a new outer circumferential freeway intersects with the radial.

Similarly, in Minneapolis-St. Paul the nearest new office developments not in the Cores are eight miles out, while I-94 which links the two Cores has not had any office development in the 1970's. And the next office boom is expected to occur 16 miles south of the Minneapolis Core where I-35E and I-35W will merge.

The circumferential freeways--or more accurately, portions of them--are often more attractive to new office developments than the radials which extend into the Core (the heaviest concentration usually occurs near the intersections of a radial freeway and the circumferential freeway).

In summary, distance from the Core is of virtually no importance in the location of office development. Access to the Core, however, is still important; office developers and rental agents still boast "only minutes from downtown," as the freeway whisks the businessman to the Core. But the additional 5-10 minutes spent as a result of a location further away is easily tolerated, especially as these trips to the Core become rarer.

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<sup>10</sup>Dallas Chamber of Commerce, 1974/75 Guide to Dallas Office Buildings (Dallas, 1974), pp. 14-15.

### Role of Dollar Costs

The second broad category of variables potentially useful in explaining the office development location patterns is dollar costs, some of which are translatable from the accessibility measures just noted. Several types of costs are theoretically relevant for the office location decision-maker. For the developer, price of land and construction may be crucial, and in turn these costs are passed on to the office space consumer. Taxes is another cost factor frequently relied upon as an explanation for differentials in the rate of economic growth. Labor costs is the final theoretical cost category, although its utility in explaining intra-metropolitan location decision is quite limited as wage rates do not vary appreciably within a metropolitan labor market.

Tax differentials. Theoretically any cost differential should act as a factor attracting development to the less expensive site. And there are businessmen who point to higher tax rates to explain why they would leave an area for another. But generally these tax differentials are relatively small. For instance, in Dallas a \$1,000,000 office building would pay \$10,463 in real property taxes to the city; in University Park--an enclave surrounded by Dallas--the same building would pay \$5,720 in city real property taxes. This \$4,743 difference may seem large, but when it is proportioned over the typical size for a \$1,000,000 building, the difference is approximately 10¢ per square foot of floor area per year. This is less than the 50¢ variation in cleaning service costs experienced by different office building managers in the Dallas area.<sup>11</sup> This differential is only a small proportion of the average annual rental rate of \$6.42 per square foot, and an even smaller proportion of the total costs of operating an office when labor costs--as high as \$40-\$60 per year per square foot (and approximately 85% of total expenses<sup>12</sup>)--are included.

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<sup>11</sup> According to data supplied by the Dallas Association of Building Owners and Managers in September 1976, the variation in cleaning service costs was more than 50¢ per square foot even when the most extreme rate at each end of the cost range is ignored.

<sup>12</sup> Manners op. cit. p. 98.

Not only is the tax rate differential between cities usually small,<sup>13</sup> but it may be less significant than inter-city variations in assessment practice. A Denver developer added that differences in the "sophistication" of cities in the development process may be more important; a city such as Denver may be better prepared than some of the satellite communities to aid a developer by cutting time delays in granting permits, thus reducing the developer's front-end costs.

It should also be noted in any evaluation of the impact of tax (or other cost) differentials upon office development patterns, that office occupancy rates are more sensitive to quality considerations than cost considerations.<sup>14</sup> Buildings with low rental rates are often those with high vacancy rates because the building is not considered prime space.

Price of land. The relationship of the price of land to attractiveness for office development is not a simple one. At a minimum, as the land becomes more attractive (e.g. its accessibility is improved through transportation network improvements), its price increases.

The price of land may not be a critical factor for development because the higher price of a land parcel can be compensated for through more intensive development. Thus the Core in our study cities with land costs as high as \$25-75 per square foot is still a viable site for office development by substituting high rise development for garden-type development.

But the lower price for land further away from the Core enables the development of larger parcels which can provide ample space for free parking. This is an important inducement for firms currently located in the CBD. One observer sees it as the equivalent of a \$30 per month salary increase.<sup>15</sup>

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<sup>13</sup> Although tax differentials are usually relatively small, two of the metropolitan areas studied in this report (Minneapolis-St. Paul and Atlanta) had tax rates 2-3 times higher in the central city than in some of the outlying suburbs. Developers in Minneapolis-St. Paul were especially strong in their claims that higher taxes in the two central cities was an important factor in the suburbanization of office space in that metropolitan area, despite the provision of the Metropolitan Development Act of 1971 which redistributes a small portion of commercial property taxes to all cities in the metropolitan area.

<sup>14</sup> Manners, op. cit., p. 98.

<sup>15</sup> Wolfe, op. cit., pp. 31-2.

The use of larger parcels of land also permits the use of garden-type development or low-rise construction, which is cheaper. Cheaper land and cheaper construction combine to contribute to cheaper office space than can be found in comparably aged buildings in the Core.

In summary, if all other factors are equal, cheaper land will attract office development. But all other factors are rarely equal. Therefore, one must conclude that within limits, the price of land is not a determinant of where offices are developed.

#### Role of Available Land

Another variable, which may be considered a "necessary" condition before development can occur, is a supply of available land. An analysis of the impact of freeways upon the location of office development should examine this variable.

Available land. Freeways play an important role in making land available for development by providing access to it for potential users in the metropolitan area. An analysis of the location pattern of new office development must consider the role of available land in shaping the patterns. It is possible, for instance, for one freeway to pass through vacant land which when combined with improved accessibility attracts new development to the area, while another freeway is routed through an already developed area which may serve to inhibit new development despite the added accessibility. This is one explanation offered for the extensive office development along I-35W and the southwestern portion of I-494 in Minneapolis, while there is virtually no new development along I-94 linking Minneapolis and St. Paul.

An examination of vacant land in the seven cities studied leads to the conclusion that available land may be a necessary condition, but is not sufficient to attract development. For example there are large tracts of vacant land along the southern terminus of I-35 in Dallas and yet the new development is along the portion of I-35 north of the CBD (Stemmons Freeway). Similarly there is more vacant land near the southern leg of the I-635 circumferential than near its northern leg, and yet the latter is considered the "hot" area for development in the Dallas metropolitan area.

But even the conclusion that available land is a necessary condition for office development must be tempered by raising the question of what constitutes "available land." The concept cannot be limited to vacant



lots or larger parcels, because much of the new development in "suburban" areas occurs on land converted from agricultural use (e.g. much of San Jose's office development is in former fruit orchards). If land is devoted to another land use--whether it be agricultural, residential, or commercial--it may still be considered available for office development if the cost of purchasing and clearing it is no higher than the price of "vacant" land elsewhere, and if zoning and other land use restrictions permit it. Available land therefore is a function of price and zoning and not its current land use status.<sup>16</sup> It may also be a function of the size of the parcel; outlying land is more likely to be available in large parcels, while already developed land may be divided into smaller parcels spread over broader ownership thus making the aggregation of a sufficiently large land package a difficult process.

It should be noted that the importance of zoning and other land use restrictions (e.g. building height or setbacks) will vary with the ease with which they may be amended in any city. Increased concern for the environment and increased citizen participation have made variances more difficult to acquire, especially if residential land is affected.

### Conclusion

The data for the seven cities studied indicated that greater growth occurred outside the downtown Core than in it. The greatest proportion of office sites developed in the 1970-76 period occurred in Interstate radial corridors. Among the most significant factors influencing the pattern of new office sites was accessibility to residences of white collar workers, especially those of office location decision-makers. Other factors--distance to the downtown Core, metropolitan tax differentials, and availability and price of land--were much less significant.

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<sup>16</sup>This is not to say that adjacent land use is unimportant. The lack of development along much of I-80 in Omaha is attributable to the attraction of industrial and warehousing land uses to this area because of the Union Pacific railroad tracks which are adjacent to and parallel with the freeway. Similarly, the pattern of office development locations shown on Maps 1-14, indicates some agglomeration of similar units, as it is rare for an office site to be isolated from other office developments.