

A STUDY OF THE  
GRAPHIC ARTS IN BOSTON

by

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ABSTRACT OF THESIS

Title: A STUDY OF THE GRAPHIC ARTS IN BOSTON

Author: John L. Culp

Submitted to the Department of City and Regional Planning on May 25, 1959, in partial fulfillment of the requirements for the degree of Master in City Planning.

Essentially this study is only part of what might be called an economic base study for the city of Boston. It is a descriptive analysis based on depth interviews and statistical analysis of employment trends for the metropolitan area, the city of Boston, and subareas of the city. The purpose of the thesis was to determine whether graphic arts--a segment of the printing and publishing industry--was a central city oriented industry and whether it could be expected to remain in the central city.

It was shown that during the decade 1947-1957 the city as a whole increased its relative share of the metropolitan area employment in graphic arts. Within the metropolitan area graphic arts employment is highly concentrated in two areas of Boston--downtown and frame (a commercial and industrial area immediately adjacent to downtown). An investigation of moves indicated that downtown was the most preferred location but that the larger firms were moving to the frame.

An analysis of location factors revealed that graphic arts is in essence a business service in which the element of time is critical. Because the city, and especially downtown, is the principal location of customers, graphic arts firms seek proximate locations to customers in downtown to minimize the friction of space and to reduce transport inputs. However, the available evidence indicated that much of current supply of loft space in downtown and the frame will become unusable in the future because of functional and physical obsolescence.

It was concluded that graphic arts has a long-run rationale and need for remaining in Boston, and from the metropolitan view it makes economic sense for graphic arts to remain. Therefore it was suggested that the rehabilitation of wool warehouses in South Boston (part of the frame) would meet the needs of both industry and the community.

Thesis Supervisor:

Burnham Kelly  
Associate Professor of City Planning

LETTER OF TRANSMITTAL

May 25, 1959

Professor John T. Howard  
Head  
Department of City and Regional Planning  
School of Architecture and Planning  
Massachusetts Institute of Technology  
Cambridge, Massachusetts

Dear Professor Howard:

I hereby submit my thesis entitled, A Case Study of the Graphic Arts in Boston, in partial fulfillment of the requirements for the degree of Master in City Planning.

Yours sincerely,

John L. Culp

## ACKNOWLEDGEMENTS

I wish to thank Gregory B. Wolfe, Director of the Greater Boston Economic Study Committee for the encouragement he has given me in getting this thesis done. It would have been exceedingly difficult to complete this work within such a limited time span without his sympathetic understanding.

A debt of gratitude is also owed Warren Deem, formerly of Arthur D. Little, Inc. for urging me to undertake this study, and permitting me, while working under him, to do special work with the graphic arts industry.

I am greatly indebted to the faculty of the Department of City and Regional Planning for their great understanding, their quiet guidance, and their patience. I wish especially to thank Professor Burnham Kelly, my thesis advisor, for his incisive comments and direction.

In addition, I wish to thank James Saalberg my fellow worker at G.B.E.S.C. for his challenging comments and ideas, and Joseph Savitzky and Brigitte Orent for their advice and encouragement. Finally I wish to thank Mrs. Warren Dillon who "burned the midnight oil" in the typing of this manuscript.

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CHAPTER I  
INTRODUCTION

When preparing general plans for the central city, the planner is faced with the need to determine the future economic role of the city in the metropolitan area. To make this determination, he will need to examine in some detail the variables affecting each economic activity. For the central city or other small areas of large metropolitan areas, the traditional economic base analysis is inadequate. It is inadequate because at some point it involves extrapolation of past trends or ratios. To extrapolate on the small local level, is to anticipate actions, not of many firms, but of a relatively few large firms in any one activity. However, the planner should survey past trends in employment and numbers of firms for each activity not only for the city and the metropolitan area, but within the city. More importantly, he will need to thoroughly survey the requirements and intentions of management of these activities in order to arrive at some conclusions about what activities, or functions performed by activities, for the time span of the general plan are only temporary inhabitants of the central city and what activities are permanent inhabitants. In effect, the planner should attempt to determine for each activity, or at least for those which he considers to be the most important because of their size or growth or decline, how important the need for relationships with other activities in the city or metropolitan area are in determining the

location of a particular activity. He also will want to know what distortions in location are caused by space needs, rents, inertia, etc.. That is, he will want to know if the physical environment is effecting the relocation of activities out of the city which actually may have strong economic reasons for remaining.

The end result of such a survey is the preparation of a general plan. Additionally, it provides information for the development of policies, priorities and specific projects.

### Purpose of Thesis

Because activities make the city what it is, and because it is necessary to know what activities are likely to remain in the city and where they will locate in the city, a case study of the graphic arts in Boston is undertaken to determine:

1. How much of the employment and firms in graphic arts are concentrated in the city? Within the city what is the spatial distribution of employment and firms? What have been the trends in employment and firms within the metropolitan area and within the city?
2. What factors seem to influence the spatial distribution of graphic arts? In what way does the interaction of relationships with other land users and the availability of accommodations--building structures and rents--affect the location of firms in the graphic arts?
3. What is the future of graphic arts in Boston?
4. How can such a case study aid planning?

### What is the Graphic Arts

For purposes of this thesis, selected subcomponents of



the printing and publishing industry have been selected for analysis. These subcomponents are commercial printing and lithography, bookbinding and finishing, paper ruling and blankbookmaking, loose-leaf binding and devices, typesetting, engraving and plate printing, photoengraving, and electrotyping and stereotyping.<sup>1</sup> This group of activities is referred to in this thesis as the graphic arts.

While most of the activities included in graphic arts are easily understood from their descriptive captions, photoengraving, electrotyping and engraving and plate printing are not. Photoengraving involves the preparation of illustration plates for printing by others; electrotyping involves the preparation of printing plates containing both words and illustration for printing by others, i.e., it combines the composition of the typesetter with the illustration plate of the photoengraver; and engraving and plate printing involves engraving or etching steel and copper plates to be used by the firm preparing them to print stationery, invitations, etc.

The printer is the organizing element within the graphic arts, since, in addition to operating pressrooms, he may, though in many cases he does not, perform the production

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<sup>1</sup>These subcomponents have the following Standard Industrial Classification (SIC): 275 and 276, 2781 and 2789, 2782, 2783, 2791, 2792, 2793, and 2794. Throughout this thesis SIC 275 and 276 are considered only as job or commercial printing. The distinction made between these two industries is largely in terms of type of press used--letterpress or offset press--and is becoming an unrealistic distinction, since most printers (at least in Boston) now operate both types of presses. SIC 2781 and 2789 are treated as one since they are related to the last stages of production and are to an important extent interdependent. SIC 2782 and 2783 have been aggregated since there are too few cases in Boston in SIC 2783 to justify a separate classification.

functions of typesetting, photoengraving, electrotyping, paper ruling, and binding. The existence of specialists in typesetting, photoengraving, etc. has developed largely to service the printer, though some firms in these specialties service important customers outside of printers or graphic arts. The graphic arts, then, is composed of a group of industries each of which specializes in one function of the total production process.

This specialization of production functions has developed because much of the work done by printers involves a small unit output of a variety of products.<sup>2</sup> A further consequence of this specialization of production functions is that the employment size of the firm is small. In Boston in 1957, the median employment size of firm for the graphic arts was 6.8. As Table 1.0 shows there is considerable variation among the specialties, but for no graphic arts subcomponent does the median exceed 25 employees.

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TABLE 1.0 MEDIAN EMPLOYMENT SIZE  
OF GRAPHIC ARTS IN BOSTON, 1957

	Median	Per cent of City Employment
ALL GRAPHIC ARTS	6.8	100.0
Commercial printing	5.9	72.2
Bookbinding and finishing	6.0	8.1
Paper ruling & loose-leaf	2.8	1.4
Typesetting	14.8	7.1
Engraving & plateprinting	6.8	3.5
Photoengraving	25.1	4.6
Electrotyping & stereotyping	22.0	3.0

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<sup>2</sup>For a brief, good discussion of the economics involved in small batch work production, see Eric Gustafson, Printing and Publishing, New York Metropolitan Region Study, unpublished draft October-November 1958, Chapter 2.

In summary, the graphic arts is a group of sub-industries of the printing and publishing industry which are interrelated and which are characterized by a small size of firm. Within the graphic arts, commercial or job printing is the organizing element.

## CHAPTER II

### METHODOLOGY

The analysis of the graphic arts is a combination of personal interviews, statistical data, and a survey of literature on the printing and publishing industry.<sup>1</sup> It is believed that only through such a combination of approaches can adequate answers be supplied to questions concerning the future economic role of central cities.

#### Interviews

Interviews with managements of graphic arts firms were conducted by the author during the summer of 1958 as part of a study on the changing function of downtown Boston by the Greater Boston Economic Study Committee. The managements of twenty graphic arts firms were interviewed as well as people considered to be knowledgeable about the industry.<sup>2</sup> The interviews did not follow a highly structured questionnaire, and though there is an unevenness in the quality of the responses, each interview did shed additional light on location needs of the graphic arts. Information concerning the following was sought: the types of functions performed, how long the

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<sup>1</sup>The reading materials are found in the bibliography.

<sup>2</sup>In addition, the findings and insights obtained from the Boston interviews have been compared to the findings and insights of Peter Stern of Arthur D. Little, Inc. who is currently studying the printing industry of Philadelphia for the Philadelphia Planning Commission. Close correspondence has been found for the two cities as well as some interesting deviations.

typical job of the firm would take to produce; types of customers; geographic distribution of sales; the importance of various customers, services, and suppliers on the location of the firm interviewed; whether any of the functions performed could be physically separated; location preferences, i.e., general area of present location, downtown, South Boston, South End, outside of the City, etc.; most previous location; why moved; current rents of the firm and how this compared to the industry average; rents would be willing to pay for better space; building requirements; floor area presently occupied; how workers came to work; and how goods were moved. Depending upon the receptiveness of the respondent more stress was placed on some areas of needed information than on others.

#### Statistical Data

Employment statistics were collected for 1947 and 1957 by address of each graphic arts firm in the city of Boston reporting employment to the Massachusetts Division of Employment Security (D.E.S.). In a number of instances the records of the D.E.S. were found to be unsatisfactory or incorrect. A number of firms had been reclassified between 1947 and 1957, but no change had been made to the SIC code assigned in 1947 or to the employment tabulations made for that year. In other cases, the reclassification was found to differ from the SIC code assigned by other government agencies, or from the principal product by which the firm described itself in the Classified Telephone Directory. In other instances, it was found that firms were suspended from the requirement to

file employment reports, not because they had gone out of business, but because their employees failed to work a sufficient number of legally required consecutive weeks. The need for comparable statistics for 1947 and 1957, and the desire to know employment changes resulting from firms coming into business and those actually going out of business, led to a detailed check of the D.E.S. records.

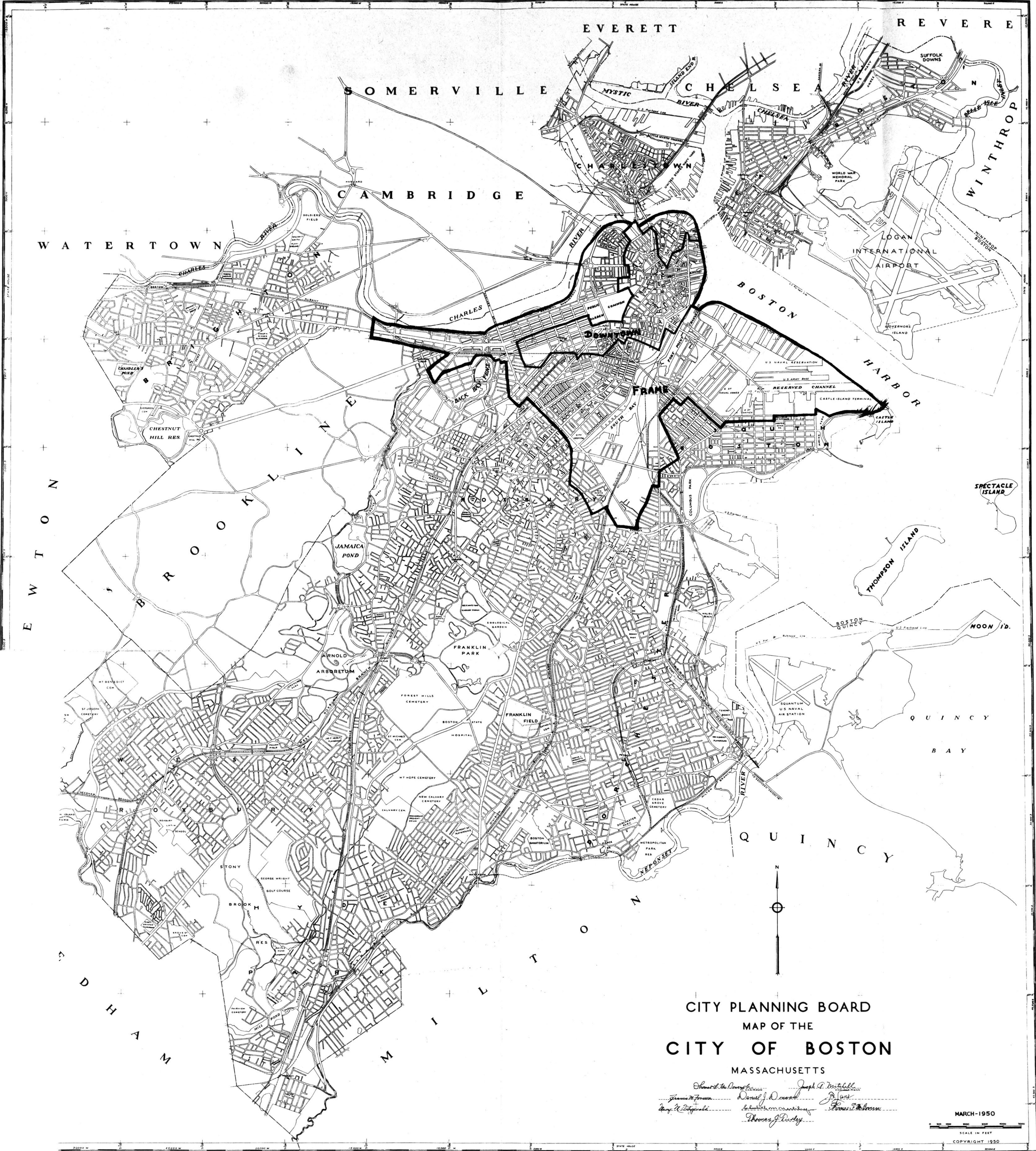
As a result of this detailed check, a number of modifications were made to the original D.E.S. listing of employment and firms for both the city and the metropolitan area. The end product is believed to be the best statistical tabulation available for the city and the metropolitan area.

The collection of the statistics by firms and by address, permitted analysis of movements by firms, births, deaths, and the employment growth of firms surviving the decade 1947-1957. That is, the collection of the statistics permits the analysis of changes in the spatial distribution of employment and firms in the city of Boston.

#### Geographic Definitions

To facilitate the analysis of the spatial distribution of firms and employment within the city, the city was divided into three areas--downtown, frame, and rest of city. The definition of downtown is that of the Greater Boston Economic Study Committee. This definition is very similar to that of the Boston Planning Board. Both definitions are based on an analysis of land use within the area defined as downtown. The frame is a commercial and industrial land area immediately

contiguous to the downtown. The rest of the city is by definition everything not included in the downtown and the frame. (See map for the exact boundaries of downtown and the frame.)



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SOMERVILLE

CHELSEA

CAMBRIDGE

WATERTOWN

BOSTON

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THOMPSON ISLAND

MOON I.D.

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CITY PLANNING BOARD  
MAP OF THE  
CITY OF BOSTON  
MASSACHUSETTS

*Thomas H. Donohoe* Joseph P. Mitchell  
*Francis W. Johnson* Daniel J. Donovan  
*Raymond W. Johnson* Robert W. Johnson  
*Thomas J. Donohoe* Thomas J. Donohoe

MARCH-1950  
SCALE IN FEET  
COPYRIGHT 1950



## CHAPTER III

### SPATIAL DISTRIBUTION OF GRAPHIC ARTS

The first part of this chapter shows the distribution of graphic arts within the Boston Metropolitan Area, and briefly analyzes, for the decade 1947-1957, the change in employment and firms. The second part of this chapter focuses on the spatial distribution of graphic arts within the city, and the changes which have occurred in this spatial distribution. This chapter, then, answers the first question which was posed under the section on the purpose of thesis:

How much of the employment and firms in graphic arts are concentrated in the city? Within the city what is the spatial distribution of employment and firms? What have been the trends in employment and firms within the metropolitan area and within the city?

#### Spatial Distribution Within Boston Metropolitan Area<sup>1</sup>

In 1957, graphic arts employment in the metropolitan area amounted to 10,489 jobs, as can be seen in Table 3.0. During the decade 1947-1957, employment increased by 469 workers or 4.7 percent. This overall growth in the metropolitan area was the result of differential growth rates among sub areas. The most central area of the metropolis--the city of Boston--accounted for the entire growth in graphic arts as a whole. Employment in the city increased by 597 workers or 10.0 percent, while in the rest of the metropolitan area it declined by 128

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<sup>1</sup>The definition of the Boston Metropolitan Area used in this thesis is that of the Massachusetts Division of Employment Security which includes 70 cities and towns.

jobs, or 3.2 percent. As a result, Boston's share of the metropolitan area employment in graphic arts increased from 59.8 percent in 1947 to 62.8 percent in 1957.

The individual graphic arts subcomponents varied considerably in their employment experience, as can be seen in Table 3.1. The most significant employment growth in the city was in commercial printing. In fact, it was the growth in this activity which accounted for the overall increase in graphic arts in the city, and thus, the increase in the relative concentration of metropolitan employment in the city.

This increase of employment in commercial printing in the city was much greater than would have been expected based on the assumption that the city's share of the total employment gain in the metropolitan area should have been identical to the proportion of commercial printing employment in the city in 1947. If a central city location had no particular attractions or advantages for commercial printing, it would have been expected that the employment increase would have amounted to 60 percent of the metropolitan employment gain; whereas in fact, the city captured 86 percent of the metropolitan employment increase in commercial printing. It, therefore, seems reasonable to conclude that commercial printing finds a central city location particularly attractive; at least it had through 1957. As will be shown in the next chapter, there are very good reasons why printers find a central city location highly desirable.

However, the reverse reasoning cannot be applied to the fact that the concentration of employment declined in the city

in engraving and plateprinting, photoengraving, and electrotyping. That is, it cannot be deduced that these activities find the central city a less attractive or desirable location than a suburban location. Rather, it is thought that the growth which occurred in suburban locations was in response to a previously low level of activity in these three activities which had been insufficient to meet the demands of the suburban printer and other graphic arts firms. It is also thought that because of the high concentration in the city of firms and employment in these three activities in 1947, city employment was more subject to vicissitudes occasioned both by the increasing use of new equipment by the engraver and electrotyper which increases productivity and reduces the need for manpower, and by the tremendous growth in the use of photo offset techniques of production by the printer which greatly reduces his need for outside engraving and platemaking. Evidence presented in Table 3.2 offers support for this latter contention as employment in surviving firms declined in both photoengraving and electrotyping, and several firms in engraving and plate printing changed their output to other kinds of metal engraving. However, the one photoengraver which moved out of the city did so because of his inability to find space in the city of Boston, and because he has changed the emphasis in his production which has resulted in his being indifferent to a central location.

In summary, the employment in graphic arts in the metropolitan area has become more concentrated within the city of

of Boston. Significantly this increasing concentration was the result of a very large absolute increase in employment in commercial printing in the city. The employment increase in commercial printing in the rest of the metropolitan area was less than might have been expected, and was insufficient to offset sizeable employment losses occurring in bookbinding and finishing and typesetting.

TABLE 3.0  
 EMPLOYMENT AND FIRMS IN GRAPHIC ARTS  
 IN BOSTON METROPOLITAN AREA, 1947 AND 1957

Industry	City of Boston		Rest of Metro		Total Boston Metro Area	
	1947	1957	1947	1957	1947	1957
ALL GRAPHIC ARTS-empl.	5993	6590	4027	3899	10,020	10,489
no. of firms	365	360	163	161	528	521
Commercial printing-empl.	3953	4761	2838	2952	6791	7713
no. of firms	252	262	138	128	390	390
Bookbinding & finishing	558	539	458	165	1016	704
no. of firms	33	28	9	6	42	34
Paper ruling & loose-leaf	129	95	524	527	653	622
no. of firms	16	15	8	3	24	18
Typesetting-empl.	444	468	179	44	623	512
no. of firms	22	22	3	7	25	29
Engraving & plateprinting	252	229	5	57	257	286
no. of firms	19	16	2	9	21	25
Photoengraving-empl.	428	300	23	115	451	415
no. of firms	18	14	3	5	20	19
Electrotyping, stereotyping	229	198	-	39	229	237
no. of firms	4	4	-	3	4	7

TABLE 3.1  
 ABSOLUTE CHANGE IN EMPLOYMENT  
 AND FIRMS IN BOSTON METROPOLITAN AREA  
 1947-1957

Industry	City of Boston	Rest of Metro	Total Boston Metro Area
ALL GRAPHIC ARTS-empl.	+597	-128	+469
no. of firms	-5	0	-5
Commercial printing-empl.	+808	+114	+922
no. of firms	+10	-10	0
Bookbinding & finishing-empl.	-19	-293	-312
no. of firms	-5	-3	-8
Paper ruling & loose-leaf	-34	+3	-31
no. of firms	-1	-5	-6
Typesetting-empl	+24	-135	-111
no. of firms	0	+4	+4
Engraving & plate printing	-23	+52	+29
no. of firms	-3	+7	+4
Photoengraving-empl.	-128	+92	-36
no. of firms	-6	+2	-4
Electrotyping & stereotyping	-31	+39	+8
no. of firms	0	+3	+3

TABLE 3.2 BUSINESS EXPERIENCE FOR SELECTED GRAPHIC ARTS  
SUBCOMPONENTS IN CITY OF BOSTON, 1947 & 1957

INDUSTRY	Stayed in city		Moved into city	Birth	Death	Moved out of city during decade	Changed SIC during decade: no longer in G.A.	Merged during decade	Total city	
	1947	1957	1957	1957	1947	1947	1947	1947	1947	1957
Engraving & plate printing-emp.	201	223	-	6	-	-	51	-	252	229
No. of firms	15		-	1	-	-	4	-	19	16
Photoengraving-emp.	349	300	-	-	47	32	-	-	428	300
No. of firms	14		-	-	3	1	-	-	18	14
Electrotyping & stereotyping-emp.	229	198	-	-	-	-	-	-	229	198
No. of firms	4		-	-	-	-	-	-	4	4

Spatial Distribution Within The City

The number of firms and employees in graphic arts is highly concentrated within a very limited geographic area. In 1957, out of the 521 firms in the metropolitan area 322 firms, or 62 percent were located within the combined areas of downtown and the frame, or within 2.5 miles of Post Office Square. These firms employed 5,788 workers, or approximately 55 percent of the metropolitan employment. In terms of the number of firms and employment in the city, 89.5 percent of the firms employing 88.6 percent of the graphic workers were concentrated in this very limited geographic area.

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TABLE 3.3  
PERCENT DISTRIBUTION OF EMPLOYMENT IN CITY, 1957

	Percent			Employment
	Down- town	Frame	Rest city	Total City
ALL GRAPHIC ARTS	47.7	40.9	11.4	6590
Commercial printing	37.6	46.0	16.4	4761
Bookbinding & finishing	55.6	28.3	16.1	539
Paper ruling & loose-leaf	77.9	26.3	-	95
Typesetting	70.9	26.3	2.8	468
Engraving & plate printing	97.4	2.6	-	229
Photoengraving	86.3	13.7	-	300
Electrotyping & stereotyping	75.3	24.7	-	198

Though there was a slight decline during the decade in the concentration of employment in the combined area of downtown and the frame, this area remains the preferred location of graphic arts firms and within this area, downtown remains the most desired location. Between 1947 and 1957, some 114 firms moved, which had been located in downtown in 1947.<sup>2</sup> However,

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<sup>2</sup>For complete breakdown of moves, births, deaths see Appendix.



if a highly central location had not been desired, these firms were free to move to any place within the metropolitan area. That they by and large chose not to move out of the downtown is highly indicative of the attraction such a location holds for graphic arts. Seventy-eight firms, or 68.4 percent of all the firms which moved, relocated in the downtown. Of the 36 firms which moved out of downtown, 25 relocated in the frame, 5 firms sought locations elsewhere in the city, and 6 firms moved out of the city. That 25 firms sought frame locations further reinforces the conclusion that a central location within the city is the most desired location.

There appears to be a relationship between choice of location and the employment size of firm. For those firms remaining in downtown, the median employment size was 4.8, which is significantly below the median size of 6.8 for the entire city. In contrast, the median employment size of firms moving out of downtown was 16.5 for firms moving to the frame; 19.5 for firms moving out of the city; and only 3.0 for firms moving to other parts of the city.<sup>3</sup>

It would seem reasonable to suppose that the large firms had to seek quarters outside of the downtown because of their need for large one-floor areas. For example, a printer with 26 or more employees would require at least 10,000 square feet of floor space.<sup>4</sup> This supposition also is supported by inter-

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<sup>3</sup>The median employment size of firm moving to the rest of the city is somewhat misleading, as one of the 5 firms relocating in the rest of the city had over 300 employees.

<sup>4</sup>This estimate is based on an estimated median floor space per worker requirement of printers of 480 square feet. This require-

views with large firms which had moved out of downtown to locations in the frame. While their reason for moving was either the construction of the Central Artery or eviction by a landlord, their reason for leaving downtown was the inability to find adequate quarters in that area of the city.

The evidence, thus, indicates that graphic arts has a strong locational tie to the downtown area, but the larger firm is tending to seek a location in the frame which is immediately adjacent to downtown because of its inability to find adequate floor space in the downtown. However, firms and employment in graphic arts within the city have remained highly concentrated in the combined area of downtown and the frame.

#### Summary of Spatial Distribution

In answer to the questions posed at the beginning of this chapter the following geographic distribution of graphic arts was found:

1. In 1957, 62.8 percent of all metropolitan employment in graphic arts was located in the city, which is an increase of 3.0 points from 59.8 percent in 1947.
2. Within the city, graphic arts employment is located in a very small central area of the city. In 1957, downtown contained 47.7 percent of all graphic arts employment in the city, the frame 40.9 percent, and the rest of the city 11.4 percent. While there was considerable movement of firms during the decade, over 88 percent of the downtown firms moving remained either in downtown or relocated in the frame.

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(4 continued) ment was computed on the basis of employment and floor space for 24 printers. The source for the floor space requirements was interviews and records contained in the files of the Greater Boston Economic Study Committee. Employment was taken from the statistics gathered for this thesis.

The inescapable conclusion is that within the metropolitan area a very small land area--downtown and the frame combined-- is the most preferred location of graphic arts firms. The next chapter investigates the factors which are most important in accounting for the location preference.

CHAPTER IV  
LOCATION FACTORS

Among the host of location factors, such as markets, raw materials, transportation costs, labor supply, etc., three factors are most important in accounting for the concentration of graphic arts: location of customers or market; the importance of the element of time and face to face contact; and external economies--the concentration of graphic arts specialists in the city, the availability of suppliers, and the availability of certain kinds of needed business services. This chapter discusses how these three elements influence the location of graphic arts. The influence of accommodations on location is discussed in the following chapter. These two chapters together then answer the second question posed in the purpose of thesis:

What factors seem to influence the spatial distribution of graphic arts? How does the interaction of relationships with other land users and the availability of accommodations--building structures and rent--affect the location of firms in the graphic arts?

The discussion of location also suggests that an industry characterized by small scale production and unstandardized output may not need and is not bound to a central city location unless the element of time is critical in production. As Haig pointed out in the 1926 Regional Survey of the New York Environs, small scale production and unstandardized products are only symptoms, and because a firm or industry

possesses them does not mean that it is less likely to move out than a firm or industry which does not.

Location factors:

Location of Customers

Location of customers is a principal determinant in the location of firms in the graphic arts. This is true because graphic arts firms are supplying a service which from the customer's point of view is a minor component of all of his transactions, but from the view of the graphic arts firm is a matter of survival. In Mitchell's and Rapkin's framework, the customers are "dominant" land users and the graphic arts is a "subordinate" use.<sup>1</sup>

In Boston, the importance of the location of customers can be seen from the fact that for the graphic arts firms interviewed somewhere between 60 percent and 100 percent of all sales were with customers located in the city, and more importantly, between 60 and 90 percent of all sales were with customers located in the area between Kenmore Square and North and South Stations. Even for Boston firms which do a sizeable volume of business throughout New England and in the New York Metropolitan Area, the location of their major accounts in the city encourages them to locate in Boston.<sup>2</sup>

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<sup>1</sup>Robert B. Mitchell and Chester Rapkin, Urban Traffic A Function of Land Use, Columbia University Press, New York, 1954, p. 111.

<sup>2</sup>This influence of the location of principal accounts on the location of graphic arts firms was found to hold in Philadelphia by Peter Stern of Arthur D. Little, Inc. Concerning the influence of a major class of customers on the decision of Ampco to remain lower Manhattan, J. L. Stuart, stated:

The location of customers, however, explains only in part the high concentration of graphic arts in the city. The real influence of customer location on the location of graphic arts is determined by the importance of time required to service the customer. The key elements then in understanding the location requirements of the graphic arts, and especially commercial printers, are a combination of customer location and the element of time.

### Time

Time influences graphic arts location in several ways. First, many of the jobs performed by graphic arts have very short time deadlines. Indeed, for many printers the service provided customers is measured in minutes.<sup>3</sup> To have the maximum amount of time available for production, time devoted to transportation of proofs and finished product must be minimized. This is done by achieving propinquity to the customer or to an area in which most of the customers are located.

Second, concomittant with short production deadline is the frequent need for consultation with the customer concerning design, layout, alterations in format, proof reading, etc. The shorter the production deadline, the greater the percentage of production time devoted to consultation, and the greater

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(2 continued) "The location of ADVERTISERS could not geographically be improved upon since subways at the door brought us to any part of Manhattan within twenty-five minutes....and industrial New Jersey was easily accessible. Our New York State and Connecticut accounts were already quite satisfied with our service." See J. L. Stuart, "A Case History in Plant Relocation", Management in The Graphic Arts 1954, Carengie Institute of Technology, Pittsburg, Pennsylvania, p. 46.

<sup>3</sup>See J. L. Stuart, op. cit., p. 46.

the pressure to locate as near customers as possible. Where production deadlines are not so pressing, say 10 days or longer, then consultation takes a small percentage of total production time. Firms doing work with reasonably long deadlines do not have to locate near customers because the time loss through consultation is not sufficiently important to place a distant location at a competitive disadvantage with a near location.

Third, the printer calls on prospective customers, and travel time of salesmen is "dead" or non-productive time. Because of the high market potential between Kenmore Square and North and South Stations, the minimization of salesmen's travel time to this area is important. For the small shop this is very important because the owner-supervisor is frequently the salesman. As such, he must call on purchasing agents and public relations departments of a number of firms to bid on jobs, and, if he is a successful bidder, he must then dash back to the shop, set up specifications and production schedules for his employees, and then start the round of business calls again. For the small printer, this factor alone seems sufficient to compel a Boston location, and a fairly central location within the city. When coupled with the other elements of time, a city location is virtually mandatory. Even for firms that have 4-5 or 12 salesmen or for whom the other elements of time are not especially critical, the travel time of salesmen between plant and customer location acts as a restraint on the choice of location, though it does not necessarily confine the choice to Boston.

Fourth, because each phase of production is frequently

performed by separate firms and the total production schedule is very short, proximate locations of graphic arts specialists to one another are required in order to minimize the loss of time transferring work-in-process. The constant battle against time on the part of many firms in the graphic arts has resulted in a number of innovations which are particularly interesting to planners because they affect the physical movement of goods and persons among land users. Subcontractors, especially typesetters, have direct telephone lines to their principal accounts in order to reduce time losses and physical movement. This virtually places the typesetter in the same room with the printer, advertising agency, etc. Again to facilitate deliveries of work and pick up of orders, several typesetters operate trucks with 2-way radios. This tends to diminish both the number of vehicles needed to provide prompt service, and reduces the number of trips to and from the plant.

#### External Economies

The availability of external economies in the city of Boston make it difficult for many graphic arts firms servicing the Boston market to locate anywhere else than in the center of the market, even when they are not drawn there by considerations of deadlines and consultations with customers. These external economies take several forms and are of importance to planners because they reflect the interrelationships among land users which must be taken into account in preparing physical plans which are economically and socially sound.



The most obvious external economy is the availability of specialists within the graphic arts itself. The printer, as was mentioned in the introduction, is the organizing element of the graphic arts around which have developed subcontractors or specialists, such as typesetters, photoengravers, paper rulers, binderies, etc.<sup>4</sup> Consequently, printers who do nothing more than operate presses are tightly bound to the existing concentrations of subcontractors which have developed within the city. Even printers which perform many of the production functions rely on subcontractors for peak loads, for type faces only rarely needed, and for preparation of illustration plates for which there is too spasmodic a demand to prepare internally, or for work which requires unusual capital equipment. As a consequence, even these printers cannot be too far distant if they are to get service when required. At the same time many of the subcontractors, especially typesetters, photoengravers, and electrotypers, are forced into proximate locations because they do work for one another, the final product going either to a printer or to some other customer.

As a result of these factors there is a considerable flow of goods and persons among firms in the graphic arts as well as between graphic arts firms and other customers.

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<sup>4</sup>Although typesetters, photoengravers, and electrotypers do the bulk of their work directly for the printer they also do work directly for advertising agencies, periodical publishers, box manufacturing companies, etc. Even for firms in these three specialties which do a sizeable proportion of their business with customers other than printers, the factors of customer location and the time element, which affect the location of printers also operate on these three specialists.

However, the need for accessibility among firms in the graphic arts varies considerably. Results of a limited number of interviews indicate that the accessibility requirements among graphic arts firms ranges from the same building, to 3-5 minute walk, to a 15 minute drive.

Other external economies which are of considerable importance to firms in the graphic arts are the availability of commercial artists, mailing services, messenger services and supplies. The availability of these services and supplies are most important to the small and medium sized printers.

For many jobs the printer is required to provide layout and design ideas for the customer, and the printer subcontracts this work to commercial art studios which are located in downtown Boston. Frequently the artist accompanies the printer for design consultations with the customer. Thus, for a number of printers the ready availability of such services is a great convenience and a further reason for choosing a city location.

Mailing services in many respects should be considered part of the graphic arts industry, and are constantly used by the printer. Many, many jobs done by the printer are never delivered to the customer, but rather are distributed to the ultimate consumer for the customer by the printer via the mailing service. The ready availability of this service in Boston and within the downtown and frame area is another strong factor which pulls the graphic arts firm to Boston.

One of the most important messenger services utilized by

the graphic arts firm is the taxicab. In fact one of the largest fleet owners in the city has a number of contracts with graphic arts firms to provide regular messenger service. Taxis are used to pick up customers orders as well as to deliver proofs, composition, negatives, etc. among graphic arts firms. The availability of this messenger service reduces the need for labor and vehicles on the part of the graphic arts firm. While taxi service is available in other cities such as Cambridge, Brookline, etc., a location in Boston, especially in the frame or downtown area, enhances the rapidity of this service and keeps cost within bounds.

With the exception of printers the location of suppliers has little influence on the location of graphic arts firms. For many printers the nearby location of paper supply houses means quick delivery on orders, and hence reduces the need for the printer to maintain large paper inventories and reduces his space requirements.<sup>5</sup> This external economy is especially important for the printer doing a wide range of work. For such printers, keeping an adequate inventory is nearly impossible, since there is a tremendous range in the types of paper which may be required. In the field of "book

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<sup>5</sup>A number of the printers interviewed mentioned nearness to paper houses as an important location factor though not as important as customers or graphic arts specialities. One management who relocated his plant in the same block as a big paper supply house commented on the desirability of such a location as he was able to get immediate delivery on stock for small rush jobs. Another Boston printer whose customers are widely scattered within the State, located in Boston in order to be near paper supply houses, ink dealers, and suppliers of film, plates, chemicals, blankets, and standards. J. L. Stuart, op. cit., in discussing why Ampco Printing did not

paper" which is used for most job printing, there are 40 products classes, 12 grades, 33 finishes, 9 sizes and trims, 8 colors, and 19 types of packing.<sup>6</sup> With all but one of the important paper supply houses located in downtown or the frame, the small and medium sized printers find a central location within the city of tremendous convenience and one way to assure rapid delivery service on rush orders.

#### Summary of Location Factors

On the basis of the location analysis previously presented, the graphic arts industry is in essence a business service in which the time element is extremely important. Because the production of this service is frequently performed by a number of independent firms working on one phase of the product, there is a strong tendency for graphic arts firms to locate in close physical proximity to one another. As a business service, the graphic arts is strongly oriented to downtown which is the single largest business center in the metropolitan area.

The fact that the output of the industry is highly varied and produced in small batches would not in itself be a necessary or sufficient reason for the industry to be centrally

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(5 continued) move to Long Island from lower Manhattan stated:  
"Our increased distance from such sources as paper houses, ink houses, binders, typesetters, etc. would vastly increase the amount of production planning necessary and would necessitate larger inventories of all suppliers."p. 46.

<sup>6</sup>See Eric Gustafson, op. cit., Chapter 2, p. 23.

located, if the work could be performed at a leisurely pace and, as has been indicated previously, where time is not critical the firm is "footloose" with respect to location. Even the availability of external economies, especially specialist establishments within graphic arts would not be critical in determining a central location if the time element were not so important.

## CHAPTER V

### ACCOMMODATIONS

The relationships with other activities and the need for close contact with them determines the general area of location of graphic arts. However, the actual site selection depends upon the availability of buildings meeting certain structural requirements of the firm at rents which can be afforded.

#### Building Requirements

Graphic arts firms can occupy old loft buildings but these buildings must meet certain minimum structural requirements or they will not be occupied. The most important of these requirements are:<sup>1</sup>

1. Minimum floor loads of 200 to 250 lbs. per square foot
2. Column spacings between 18 feet and 22 feet
3. Minimum ceiling heights of 12 feet
4. At least two freight elevators each with a load capacity of between 5000 lbs. and 8000 lbs.
5. Truck loading facilities--preferably off-street
6. Concrete floor surfaces
7. Regular shaped floors sufficiently large to permit one floor operations and room for expansion
8. Sufficient electric power--either AC or DC depending upon the equipment used by the firm

In addition to these structural requirements, the building must meet certain other considerations, such as: it must be accessible seven days per week and 24 hours per day in order

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<sup>1</sup>For an excellent discussion of the physical or structural requirements printers look for when seeking new quarters, see J. L. Stuart, op. cit. This article contains a longer list of requirements, many of which would affect the choice between buildings which met the specifications set forth in this thesis.

to permit overtime work; and the building must be heated 24 hours per day during the winter to prevent equipment, especially presses, from "freezing up".

### Rent

In addition to the building requirements of graphic arts, building space must be at a reasonable rent. Interviews indicate that net rents paid by printers range between \$.60 and 1.05 per square foot per annum, and for typesetters, photo-engravers, and electrotypers between \$.90 and 1.25 per square foot per annum. Most managements interviewed indicated both an inability and an unwillingness to pay higher net rents even for better space, although a few firms did express a willingness to pay somewhat higher net rents for better quarters. The maximum net rent which commercial printers could be expected to pay would appear to be in the neighborhood of \$1.25 per square foot.

### Effect of Accomodation Requirement on Location

The effect of building and rent requirements makes graphic arts firms more selective towards space they will occupy. While much of the available loft space is ruled out initially because of the fairly heavy floor load requirements, the existence of the other requirements further reduces the supply of space which would have been considered. The interviews indicate that at present the larger firms (over 20 employees) are more selective towards space than are the smaller firms, and are likely to compromise the need and desire for a downtown and even a frame location in order to acquire better space.

For example, one downtown printer needing two floors with at least 10,000 square feet per floor with dead and live floor loads of 250 lbs. per square foot, ceiling heights of 12 feet 6 inches, and wanting a building with two freight elevators each with 5,000 pound capacity and off-street truck loading facilities for at least four trucks, spent a year unsuccessfully looking for space downtown (his most preferred location) and finally had to take a location in a converted wool warehouse in the frame. An electrotyper located in downtown and highly desirous of remaining because of the transfer of goods-in-process with firms within one or two blocks of his location was recently given an eviction notice. Because of his dissatisfaction with the elevator service and his labor costs associated with such slow service, he restricted his search for a ground floor location containing 19,000 square feet. This electrotyper spent several months fruitlessly looking for such an accommodation in both the downtown and the frame and reluctantly was compelled to take space in Cambridge, which did not meet entirely his need for one floor but was better than anything that was available in Boston.

The available evidence suggests that managements of both the smaller and larger graphic arts firms will become increasingly selective towards space in the future. Therefore it seems reasonable to conclude that, over time, much of the supply of loft space in downtown and the frame will become unusable by the graphic arts firm. Given the need of many firms for close physical proximity to customers, to other



graphic arts firms, and to certain suppliers, such as paper merchants, and services, the question arises: what will be the future location of the industry?

CHAPTER VI  
CONCLUSIONS

The Future of Graphic Arts in Boston

It has been demonstrated that graphic arts wants to remain and has sound economic reasons for remaining in the highly accessible areas of the downtown and the frame. However, over time, it faces a prospect of a shortage of space which may cause it to seek locations outside of the city. From the community's interest, it should be encouraged to remain because it provides a small but vital service to the host of other activities which are located in the city. In effect, graphic arts is part of the external economies available in the central city which make the city such an attractive location. Furthermore, from the metropolitan point of view it seems inefficient to scatter an activity which has need for physical clustering simply because physical accommodations are not likely to be available in Boston.

So far, most firms which have moved have found satisfactory space in either the downtown or the frame, and as a consequence have not seriously altered the relationship between time savings, or accessible sites, and building requirements. Whether firms which are forced to move in the future can maintain the relationship between accessible sites and minimum building and rent requirements will depend upon the supply and availability of space in the downtown and frame which will meet the minimum requirements set forth in Chapter V.

In downtown, the construction of the Government Center plus the likely private redevelopment for office building in the next 5-10 years of the area between Summer Street and Fort Hill Square on the west side of the Central Artery will contract further the supply of building in downtown and will force a sizeable relocation of the industry (at least 36 firms or 10% of all firms in the city) in the next 5-10 years. As a result, downtown will continue to decline in importance as a location for graphic arts.

Where will these 36 firms which will be dislocated by the Government Center relocate? In addition to these firms, it is known that several of the very large graphic arts firms (each with over 100 employees) face location decisions within the next 5-7 years. One of these firms is seriously contemplating moving out of the city, and the other firms are in a position to do so because the time element is not critical to their operations. Because of the extreme uncertainty regarding the future location of a sizeable number of firms employing a considerable number of workers no reasonable estimate of future employment levels or space requirements can be made.

It is believed that planners should not attempt to make long run employment forecasts for small areas, but rather concentrate on 5-10 year estimates of firms likely to remain. This can be done readily through an interview or questionnaire concerning length of current leases, intentions to renew, and need for space, i.e., whether there is a possibility of leases being broken.

If something is to be done to encourage graphic arts to remain, then some provision for adequate accommodations will have to be made. It is felt that certain parts of the frame offer good future prospects for housing the industry. The most promising areas within the frame would appear to be:

1) the area in South Boston between Northern Avenue and Broadway bounded by the Fort Point Channel and D Street; and 2) the area in the South End, extending between Harrison Ave. and Albany Street from the railroad tracks to East Dedham Street. The South Boston area would appear the most desirable from both the industry's and community's point of view for the following reasons:

1. It contains a large number of wool warehouses that are gradually being vacated, which structurally would appear to meet the floor load, ceiling height, column spacing, floor size, and perhaps elevator requirements of the industry. However for these warehouses to be suitable they will need to have adequate electricity and plumbing facilities installed and such installation is very costly.
2. Based on rents paid by firms already occupying converted wool warehouses, the area is well within the rent range of the industry.
3. There is already a sizeable nucleus of graphic arts firms in the area, and one of the metropolitan area's largest paper merchants is located there.
4. It is reasonably accessible to the financial district, Back Bay, the graphic arts district, South Station and the airport (for express shipments to out-of-state customers) and the Central Artery.

5. The area is serviced by bus and subway.
6. The area is presently an industrial area and from a long run planning view, it appears desirable to preserve it as such.

Because the wool warehouses will need to be rehabilitated the city must decide whether it will and can do something to encourage this rehabilitation. Certainly if something is to be done for the small manufacturing firms in the city which are part of the elan of the city, then rehabilitation is perhaps the cheapest way though also the most difficult administratively and legally. However, the city has a golden opportunity to experiment in industrial rehabilitation in South Boston because it is displacing approximately 36 graphic arts firms from the area of the Government Center project.

While outside the scope of this study, industrial redevelopment for the industry appears doubtful because of both the low rent paying ability and unwillingness of firms to pay higher rents. There is also some doubt, based on the current experience of the developers of the New York Streets Redevelopment project (which is an industrial redevelopment area) that construction costs would permit net rents of less than \$1.45 per square foot. For these reasons, it is felt

that if anything is to be done to provide space for the graphic arts efforts should be focused on industrial rehabilitation.

#### How Does Such A Case Study Aid Planners

Essentially a case study is part of what might be called the economic base analysis of an area. The case study is essential for small area planning such as CBD's or central cities, because through the study of activities a better understanding is obtained of the relationships and need for relationships among land users, and hence a better knowledge as to what areas should be set aside for the various types of uses. These insights into the relationships among land users or lack of relationships provide the basis for determining which activities are likely to remain and which are likely to move out. For those activities which are likely to remain, the case study provides a basis for determining its importance to the city and the need for expenditures of social capital. In other words, case studies of activities provide insights into how the city functions, what factors influence location decisions, and what variables are most likely to influence the future of activities in the central city. To an important extent such studies probe the psychological factors of location, which are believed to be the important element in most location decisions, and are likely to be most influenced by the physical environment over which the planner has some control.

A case study approach to the economic base of a community also provides valuable information as to short run needs of

activities and the requirement for expenditures of social capital. One of the major contributions, then, of the case study would be in the preparation of what Martin Meyerson has called developmental plans, i.e., plans of 5-10 years duration. Because these plans are essentially stimulants to action, the interview phase of the case study provides important channels of information, and is an important tool in developing community organization. Thus, the case study approach in planning provides a basis for the preparation of both the long run comprehensive plans and the short run developmental plans.

## APPENDIX A

EMPLOYMENT & FIRMS IN GRAPHIC ARTS IN BOSTON  
1947, 1957

Industry	Downtown		Frame		Rest of City	
	1947	1957	1947	1957	1947	1957
Commercial printing-emp.	2542	1792	1196	2189	215	780
No. of Firms	192	167	38	59	22	36
Bookbinding & finishing-emp.	391	310	158	220	9	9
No. of Firms	27	19	5	8	1	1
Paper ruling & loose-leaf-emp.	101	74	28	21	0	0
No. of Firms	14	12	2	3		
Typesetting-emp.	420	332	11	123	13	13
No. of Firms	20	16	1	5	1	1
Engraving & plate printing	252	223	0	6	0	0
No. of Firms	19	14	0	1	0	0
Photoengraving-emp.	404	259	24	41	0	0
No. of Firms	16	12	2	2		
Electrotyping & stereotyping	190	149	39	49	0	0
No. of Firms	3	2	1	2		
ALL GRAPHIC ARTS-emp.	4300	3139	1456	2649	237	803
No. of Firms	291	242	49	80	24	38



APPENDIX B-1 SUMMARY OF BUSINESS EXPERIENCE IN GRAPHIC ARTS FOR CITY OF BOSTON, 1947-1957

Industry	Stayed in city		Moved into city	Birth	Death	Moved out of city during decade	Changed SIC during decade: no longer in Graphic Arts	Merger - employees now in another firm	Total City	
	1947	1957	1957	1957	1947	1947	1947	1947	1947	1957
<b>Commercial printers-emp.</b>	3675	4355	56	350	105	88	74	11	3953	4761
No. of firms	220	220	2	40	23	5	3	1	252	262
<b>Bookbinding &amp; finishing-emp.</b>	465	539	-	-	28	65	-	-	558	539
No. of firms	28	28	-	-	4	1	-	-	33	28
<b>Paper ruling &amp; loose-leaf-emp.</b>	97	79	-	16	6	25	-	1	129	95
No. of firms	13	13	-	2	1	2	-	1	16	15
<b>Typesetting-emp.</b>	444	468	-	-	-	-	-	-	444	468
No. of firms	22	22	-	-	-	-	-	-	22	22
<b>Engraving &amp; plate printing-emp.</b>	201	223	-	6	-	-	51	-	252	229
No. of firms	15	15	-	1	-	-	4	-	19	16
<b>Photoengraving-emp.</b>	349	300	-	-	47	32	-	-	428	300
No. of firms	14	14	-	-	3	1	-	-	18	14
<b>Electrotyping &amp; stereotyping</b>	229	198	-	-	-	-	-	-	229	198
No. of firms	4	4	-	-	-	-	-	-	4	4
<b>TOTAL (emp.)</b>	5460	6160	56	351	186	210	125	12	5993	6590
no. of firms	316	316	2	42	31	9	7	2	364	360

APPENDIX B-2a. SUMMARY OF BUSINESS EXPERIENCE IN DOWNTOWN, 1947-1957

Industry	Stayed same address		Moved within D.T.		Birth	Death	Moved to Frame	Moved to rest city	Moved out-city	Merger	Changed SIC
	1947	1957	1947	1957	1957	1947	1947	1947	1947	1947	1947
Commercial printers-emp.	1157	1191	352	470	138	102	518	353	73	-	55
No. of firms	90		54		22	22	15	4	4	-	2
Bookbinding & finishing-emp.	210	256	50	53	-	28	103	-	-	-	-
No. of firms	12		7		-	4	4	-	-	-	-
Paper ruling & loose-leaf	23	18	57	42	14	6	11	-	3	1	-
No. of firms	7		4		1	1	1	-	1	1	-
Typesetting-emp.	305	284	35	48	-	-	80	-	-	-	-
No. of firms	11		5		-	-	4	-	-	-	-
Engraving & plate printing-emp.	143	178	57	44	-	-	-	1	-	-	51
No. of firms	9		5		-	-	-	1	-	-	4
Photoengraving	241	203	84	56	-	47	-	-	32	-	-
No. of firms	9		3		-	3	-	-	1	-	-
Electrotyping & stereotyping	169	149	-	-	-	-	21	-	-	-	-
No. of firms	2		-		-	-	1	-	-	-	-

APPENDIX B-2b. SUMMARY OF BUSINESS EXPERIENCE IN FRAME, 1947-1957

Industry	Stayed same address		Moved with- in frame		Moved into frame from D.T.	Moved into frame from out-city	Birth	Death	Moved to rest of city	Moved out of city	Merger
	1947	1957	1947	1957	1957	1957	1957	1947	1947	1947	1947
Commercial printers-emp.	871	1076	290	364	635	10	104	3	19	2	11
No. of firms	27		6		15	1	11	1	2	1	1
Bookbinding & finishing-emp.	93	81	-	-	139	-	-	-	-	65	-
No. of firms	4		-		4	-	-	-	-	1	-
Paper ruling & loose-leaf--emp.	6	16	-	-	3	-	2	-	-	22	-
No. of firms	1		-		1	-	1	-	-	1	-
Typesetting-emp.	11	13	-	-	110	-	-	-	-	-	-
No. of firms	1		-		4	-	-	-	-	-	-
Engraving & plate printing-emp.	-	-	-	-	-	-	6	-	-	-	-
No. of firms	-		-		-	-	1	-	-	-	-
Photoengraving	4	18	20	23	-	-	-	-	-	-	-
No. of firms	1		1		-	-	-	-	-	-	-
Electrotyping & stereotyping	39	36	-	-	13	-	-	-	-	-	-
No. of firms	1		-		1	-	-	-	-	-	-

APPENDIX B-2c. SUMMARY OF BUSINESS EXPERIENCE IN REST OF CITY, 1947-1957

Industry	Stayed same address		Moved within R.ofC.		Moved in from D.T.	Moved in from frame	Moved in from out-city	Birth	Death	Changed SIC
	1947	1957	1947	1957	1957	1957	1957	1957	1947	1947
Commercial printers-emp. No. of firms	143 5	140	50 6	25	442 4	19 2	46 7	108 7	- -	22 1
Bookbinding & finishing-emp. No. of firms	9 1	9	- -	-	- -	- -	- -	- -	- -	- -
Paper ruling & loose-leaf--emp. No. of firms	- -	-	- -	-	- -	- -	- -	- -	- -	- -
Typesetting-emp. No. of firms	13 1	13	- -	-	- -	- -	- -	- -	- -	- -
Engraving & plate printing-emp. No. of firms	- -	-	- -	-	1 1	- -	- -	- -	- -	- -
Photoengraving-emp. No. of firms.	- -	-	- -	-	- -	- -	- -	- -	- -	- -
Electrotyping & stereotyping-emp. No. of firms	- -	-	- -	-	- -	- -	- -	- -	- -	- -

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