SHOPPING CENTERS AND THE GEOGRAPHY OF URBAN AREAS

A Theoretical and Empirical Study of the
Spatial Structure of Intraurban
Retail and Service Business

by

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A thesis submitted in partial fulfillment

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We have carefully read the thesis entitled **Shopping Centers and the Geography of Urban Areas. A Theoretical and Empirical Study of the Spatial Structure of Intraurban Retail and Service Business.** submitted by **Brian Joe Lobley Berry** in partial fulfillment of the requirements of the **Doctor of Philosophy** and recommend its acceptance. In support of this recommendation we present the following joint statement of evaluation to be filed with the thesis.

This study makes an important contribution to the understanding of locational patterns of urban retail and service business. Mr. Berry developed, making full use of current theory and existing empirical work, a spatial model of shopping centers. This is related to more general problems of urban land use and rents. Utility of the model was evaluated by comparing it with data concerning urban business collected in Spokane, Washington.

Results of Mr. Berry's study are of great interest and value. He has clarified the nature of the hierarchy of urban business, and has identified hitherto little-noted instances of orderly functional differentiation and spatial patterns of urban business. These instances he related to additional characteristics of the urban area. His disclosures facilitated immediate re-finement of the shopping center model, enabled incisive and immediately practical evaluations of present planning for urban business to be undertaken, and were used to point the way for further productive research based upon the findings of the study.

The committee members are of the opinion that Mr. Berry's thesis is in every way a creditable professional research effort and that the findings are a significant contribution to knowledge.

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

SHOPPING CENTERS AND THE GEOGRAPHY OF URBAN AREAS

A Theoretical and Empirical Study of the
Spatial Structure of Intraurban
Retail and Service Business

CHAPTER I

INTRODUCTION

At an early date it was recognized by such geographers

as de Geer and economists as Haig that there was a basic

underlying lawful order of urban land uses. De Geer wrote:

> That geographical laws determine the best position
> and distribution of each phenomenon is rarely a
> matter of conscious appreciation. Yet it is such
> laws that determine the areal growth and internal
> shape of the city as well as the distribution of
> functions between its different parts and so differ-
> entiation in internal structure.[1]

Yet today there still remain strong complaints about the

largely non-theoretical character of work with problems of

land use in cities.[2] Too, there have been but few conceptual

advances in the field of urban land uses since the original

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[1] "Stockholm, A Geographical Appraisal," _Geographical Review_, vol.13 (1923), pp. 487-500.

[2] Walter Isard recently complained about the character-istic non-theoretical type of study of urban areas, for ex-ample. _Location and Space Economy_ (New York: The Technology Press of the Massachusetts Institute of Technology and John Wiley and Sons Inc., 1956), p. 200.

statements of Haig.[3] Need is evident for development of

concepts and theory concerning problems of urban land use.[4]

The purpose of this study is to develop foundations
for a better theory concerning one type of urban land use.
At both theoretical and empirical levels it attempts to pro-
vide systematic statements of causal processes and resulting
spatial structures of retail and service business within the
city. There is a concomitant endeavor to show that such
processes and structures may be conceived as integral parts
both of more general theories of land use and land value,
and of tertiary activity.

These systematic statements are then used to evaluate
previous studies of the spatial structure of urban business,
for example the studies of Proudfoot, Rolph, Ratcliff et al.
(summarized by Kelley), and of the Boston Globe and Cincinnati
Enquirer (see below, Chapter II). Also evaluated in view of
the statements are generally accepted tenets of planning for
urban business. Failure both of previous studies and accepted

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[3]These remarks follow those of R. U. Ratcliff. "Ef-
ficiency and the Location of Urban Activities," The Metropolis
in Modern Life, ed. R. M. Fisher (New York: Doubleday & Co.,
1955), pp. 125-148.

[4]Mayer has noted that this is particularly true in the
case of non-residential land uses. "What We Need to Know About
the Internal Structure of Cities," Needed Population and Urban
Research, ed. D. J. Bogue (Oxford, Ohio: Scripps Foundation for
Population and Urban Research, 1953), p. 13. P. F. Wendt also
makes some apposite comments in this context. "Theory of Urban
Land Values," Land Economics, vol.33 (1957), pp. 228-240.

tenets to identify precise hierarchical structuring of urban
business, and also what is recognized in this study as the
supplies-repair-arterial business conformation is noted.

In Chapter II a theory of intraurban business struc-
ture is formulated. Existing theory of land use and land
value is merged with diverse theoretical and empirical notions
concerning urban retailing and with a theory of tertiary
activity developed from central place theory. Implications
for systems of urban rents of threshold requirements of
business establishments and hierarchical spatial ordering
of business land uses are explored. Some generated theo-
retical questions are then discussed, namely, the effect of
persistent pre-equilibrium consumer shopping habits upon
business structure and the impact of city planning parameters
upon distributions of urban business.

Empirical tests of the developed classification of
urban business centers are presented in Chapter III. Re-
lationships of business structure, traffic patterns and
population distribution are explored within the City of Spo-
kane, the location of the empirical work. Mayer has commented
in the past about lack of application of powerful modern
analytic tools to problems of urban land uses.[5] It is hoped
that uses of correlation and linkage analysis techniques

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[5]Op. cit., p. 15.

presented in this study provide means of grouping of increased technical efficiency.

In Chapters IV and V theoretical implications of the empirical findings are formalized. Chapter IV also contains an evaluation of the City of Spokane's policy towards business site selection in light of the empirical findings and final theoretical structure. This latter step is undertaken to identify serious conceptual limitations of planning decisions of the city, and is intended as a critique of levels of information available both to the city and to various planning and research organizations upon whose studies the city bases its decisions. Suggestions are made for the improvement of planning. In this section in particular is revealed the power of an empirically valid theory structure both in initiating further research and in evaluating and reformulating planning and policy decisions.

Relationship of the Study to the Current
Needs of Geographical Research

Perhaps the most pressing requirement of fundamental geographic research is the development of an empirically valid theory structure. A theoretical framework is probably as important for the discipline at this time as definition of the earth's physical matrix was at an earlier stage in the

science.[6] It is in this context that the study is designed to meet basic needs recognized for work in geography today.

An efficient method for the development of theory is the use of modern scientific method. A theoretical framework can be achieved with greatest efficiency if requirements of a consistent scientific methodology are satisfied. Creative science is concerned with the organization of knowledge. Theory is the result of this organization, an integrated statement of the lawful processes and significant patterns of relationships in seemingly diverse facts. Levels of understanding are reflected by the degree to which theory explains the real world. Good theory results in a high level of understanding, often appearing as an explicit statement or model expressing complex functional relations. Development of good theory increases efficiency, for it allows generalization from limited empirical experience and enables efficient approaches to be made to problem-solving.

Geography has in the past, with its idiographic emphasis, been unable to develop a body of spatial type theory concerning society largely because, preoccupied with the unique,

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[6]This need is stated forthrightly by E. Ackerman, "Geography as a Fundamental Research Discipline" (forthcoming as a research monograph of the Department of Geography, University of Chicago), p. 40. It should be emphasized that the reference is here to an n-dimensioned space whereas that of Ackerman was to but two dimensions.

the discipline failed to recognize the existence of an
underlying lawful spatial order. Areal differentiation of
social phenomena was inimical to the adoption and utilization
of scientific method.[7] Hence the present need for theory;
geography needs far better comprehension of the impact of
lawful spatial processes upon society.[8]

It is to the end of better comprehension of the im-
pact of such processes upon one form of social organization,
the structure of urban retail and service business, that this
study is devoted. The study attempts to develop better
theoretical understanding of the problem within a context
of theories of the wider space economy. Concomitantly, re-
search has been undertaken in a manner most compatible with

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[7]Spatial variations of social phenomena remain the
reason for there to be a discipline of geography, for they
are the observable result of the impact of lawful spatial
processes upon society. However, segregation of continuously
varying phenomena into arbitrary regional subsets subsequently
treated as uniques (i.e. areal differentiation), even though
a useful heuristic device, has been antipathetic to any
recognition of underlying lawfully ordering spatial processes.

[8]Many recent articles comment upon the theoretical
paucity and consequent conceptual needs of the discipline.
See for example, A. K. Philbrick, "Principles of Areal Func-
tional Organization in Regional Human Geography," Economic
Geography, vol.33 (1957), p. 303, and idem. "Areal Functional
Organization in Regional Geography," Papers and Proceedings,
Regional Science Association, vol.3 (1957), pp. 87-98.
M. Ballabon makes similar statements in the case of economic
geography. "Putting the 'Economic' into Economic Geography,"
Economic Geography, vol.33 (1957), pp. 217-223.

current demands upon the scientific operator, within restrictions imposed upon social sciences in general.

Some General Implications of the Study

Additional implications of the research are to be noted. Any study should result in reformulation of theory in the light of better levels of information. Reformulated theory may ask more questions than it answers, and further empirical work is thereby initiated. Better theoretical systems also lead to more efficient and sophisticated replicative studies. It would be interesting to undertake the Boston and Cincinnati studies (see below) again in the light of better levels of information, and compare the results with those of the previous studies.

Too, better understanding of urban land uses and land values facilitates better understanding of a wide range of complex problems such as those, for example, of urban circulation, for there are many links between land use, land values, and patterns of movement within cities.[9] Better understanding of the complex system in this example gives incisiveness to

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[9]R. B. Mitchell and C. Rapkin present a preliminary statement of the relations of urban land use and traffic in <u>Urban Traffic: A Function of Land Use</u> (New York: Columbia University Press, 1954). It will be noted later in the discussion that movement and connections between specialized sectors of the urban economy are the major ordering forces in city structure.

the highway planning process and to the evaluation of the
location and subsequent economic impact of highway facilities.
Need for better theoretical understanding in these respects
has been noted elsewhere.[10] The study has been undertaken
as part of a project the concern of which is with just such
a better understanding of urban circulation and the urban
economy.

[10]William L. Garrison and Brian J. L. Berry, "A Source
of Theory for Highway Impact Studies," Economic Impact of
Highway Improvement, Special Report 28, Highway Research Board
(Washington, D.C.: Highway Research Board, 1957), pp. 79-84.

CHAPTER II

THE THEORY OF URBAN LAND USE, LAND VALUE,
AND BUSINESS STRUCTURE

The original outline of the theory of urban land use
is today usually attributed to the work of R. M. Haig.[1]
Numbers of studies have been completed since those of Haig.[2]
Conceptual contributions of these, however, have been limited;
most have served only to restate Haig's theory. In the
present chapter the device used is to structure the work of
Haig, relating where appropriate to such supplementary studies
as those of Isard, Ratcliff, and others.[3] Thereafter,

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[1]"Toward an Understanding of the Metropolis," Quarterly
Journal of Economics, vol.40 (1926), pp. 179-208 and 402-434;
Idem. "Major Economic Factors in Metropolitan Growth and Ar-
rangement," Regional Survey of New York and Its Environs (New
York: Regional Plan of New York and Its Environs, 1927), p. 39
et seq. The earlier work of Hurd has by no means the breadth
and depth of Haig's studies. R. M. Hurd, Principles of City
Land Values (3rd. ed., New York: The Record and Guide, 1911).

[2]Such subsequent works include H. B. Dorau and A. E.
Hinman, Urban Land Economics (New York: Macmillan, 1928); A.
M. Weimar and H. Hoyt, Principles of Urban Real Estate (New
York: Ronald Press, 1939); R. S. Ely and G. S. Wehrwein, Land
Economics (New York: Macmillan, 1940); R. U. Ratcliff, Urban
Land Economics (New York: McGraw Hill, 1949). Restatement of
the theory in ecological terms of an organism and its environ-
ment has been the work of human ecologists. See for example,
W. Firey, Land Use in Central Boston (Cambridge: Harvard Uni-
versity Press, 1947) and A. H. Hawley, Human Ecology (New York:
Ronald Press, 1950).

[3]Isard, op. cit., pp. 200-206; Ratcliff, op. cit.,
pp. 346-405.

implications for patterns of business land use of existing empirical and conceptual contributions to the understanding of urban retailing are discussed, and a process-oriented model is developed utilizing the recently reformulated theory of tertiary activity. This model is related to systems of urban rents and its direct relations with the original Haig hypotheses are shown. Examples of generated theoretical problems are then discussed to indicate the viability of the developed theory and to present some needs of current empirical work.

Theory of Land Use and Land Value

Haig and subsequent contributors recognize that a basic ordered system of land uses results from operation of economic processes in society. Ratcliff, for example, has written, ". . . the locational pattern of land use in urban areas results from basic economic forces, and the arrangement of activities at strategic points on the web of transportation lines is a part of the economic mechanism of society."[4]

Pertinent economic forces and mechanisms may be outlined as follows:

(1) Each economic activity has an ability to derive utility from every piece of land. The utility is measured

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[4]Ibid., p. 368.

by the rent which the activity is willing to pay for the land.[5]

(2) The greater the derivable utility, the greater the rent which an activity is willing to pay. In the long run competitive bidding for land will be such that each site is occupied by the highest and best use. This use is the one which can derive the greatest utility from the site, and is therefore willing to pay most to occupy it.[6]

(3) As an outgrowth of the occupation of each site by the highest and best use there results an orderly pattern of land use in which rents throughout the system are maximized.[7]

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[5]Rent is interpreted in its strict economic sense as land value discounted at the current rate of interest. Land value is the total payment necessary to keep alternate uses, whether firms or industries, from using the land. The greater the utility attached to land by a use, the more it is willing to pay to keep alternate uses out. If the supply of land is short all profits other than normal profit will accrue as rent. To the degree that a use enjoys more limited competition for land, it has the opportunity to earn some excess profits. See the discussion of rent and excess profits below.

[6]The alternatives of adaptive and adoptive behavior can be thought of here with equal facility. In the former case each site is occupied by the highest and best use because each use optimizes its position in the system relative to all other uses. In the latter case, which is probably more realistic, the economic system selects out of potential uses those which are the highest and the best. Actual conditions may be considered to approach the adoptive rather than the adaptive end of the behavioral continuum. See C. M. Tiebout, "Location Theory, Empirical Evidence, and Economic Evolution," Papers and Proceedings, Regional Science Association, vol.3, (1957), pp. 74-86; A. S. Alchian, "Uncertainty, Evolution, and Economic Theory," Journal of Political Economy, vol.58 (1950), pp. 211-221.

[7]For further demonstrations of these arguments see Ely and Wehrwein, op. cit., pp. 112-155, and Alfred Marshall, Principles of Economics (8th. ed., London: Macmillan, 1925).

Relation to Theories of Agricultural

Location and Resource Use

Identity of concepts of processes leading to optimal

patterns of urban land use (which were identified above) and

Thünen-Heady-Dunn schemes of agricultural location and re-

source use[8] is self evident. True, they are not generally

considered identical. It is argued that agricultural rents

are aggregative and urban rents the result of individual firms

bidding one with another. This apparent distinction would

seem to be of little importance. In both cases, patterns of

land use result from competition among land uses according

to their rent-paying ability; in both an optimal pattern of

individual firms and aggregative uses and intensities results

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[8]J. H. von Thünen, Der Isolirte Staat in Beziehung auf
Landwirtschaft und Nationalökonomie (3rd ed., Berlin:
Schumacher-Zarchlin, 1875), trans.(in part) W. K. & L. L. Kapp,
eds., Readings in Economics (New York: Barnes and Noble, 1949);
E. O. Heady, Economics of Agricultural Production and Resource
Use (New York: Prentice Hall Inc., 1952); E. S. Dunn, The
Location of Agricultural Production (Gainesville: University of
Florida Press, 1955). See also E. M. Hoover, The Location of
Economic Activity (New York: McGraw Hill Book Co., 1948);
A. Lösch, Die Räumliche Ordnung der Wirtschaft (2nd ed., Jena:
Gustav Fischer, 1943), trans. W. H. Woglom and W. F. Stolper
as The Economics of Location (New Haven: Yale University Press,
1954).

and rents in the system are maximized.[9]

Chamberlin argues conversely.[10] He asserts that there is a dichotomy between urban rents (for example for such purposes as retailing) and agricultural rents. The former, he argues, are entirely products of monopolistic elements in monopolistic competition, the latter results of perfect competition; the former result because a place can sell more, the latter because of physical qualities of the site.

Ratcliff has indicated, however, that no urban rent is a monopoly return, because all sites have the potentiality of being used by a variety of alternate uses. It is competition between these uses for sites that gives rise to rent.[11] Later in this discussion it will also be shown that in the case of retail and service business there may be some excess

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[9]Ely and Wehrwein's discussion of optimal building heights (op. cit., pp. 54-57) is directly comparable in this respect with discussions of optimal intensities of agricultural land use. See for example in the latter respect, M. J. Beckmann and T. Marschak, "An Activity Analysis Approach to Location Theory," Cowles Foundation Paper, No. 99, Cowles Foundation for Research in Economics at Yale University (New Haven: Yale University, 1956), pp. 334-335; W. L. Garrison and D. F. Marble, "The Spatial Structure of Agricultural Activities," Annals of the Association of American Geographers, vol.47 (1957), pp. 137-144. The discussions of Isard, op. cit., pp. 205-206, and C. Ponsard, Economie et Espace (Paris: Sedes, 1955), pp. 187-190, are both valuable in this context.

[10]E. Chamberlin, The Theory of Monopolistic Competition (Cambridge: Harvard University Press, 1933), Appendix D.

[11]Op. cit., pp. 365-366.

profits in the system which do not accrue as rents. It is these and not rents which are results of monopolistic competition in a spatial context. Rents paid by retail and service businesses are determined on the basis of competition with alternate uses, and they subsequently are embodied as part of the threshold requirements of the retail or service firm.

We find from the foregoing discussion that no real dichotomy exists between urban and agricultural rents. Basic notions underlying urban land use theory and theories of agricultural location and resource use have essential similitude, and statements of one can be substituted for statements of the other. In both cases, too, physical qualities of the site may affect competitive bids for the land and therefore rent levels. Urban and agricultural land use theories may be treated more generally as one.

The Simplest Spatial Model

Haig in the case of urban land use and Thünen in the case of agricultural location both maintained that the optimal spatial pattern of land use resulting from competitive bidding for land would be one in which friction of distance in the system was minimized. The dual of this is interpreted as implying that where the friction of distance is minimized,

rents are maximized.[12] Therefore, rents vary directly with accessibility. As accessibility increases, friction of distance is diminished. More funds are available to the firm to bid for the land, and rents therefore increase. Surpluses available to bid for land will be greatest for those activities which receive the greatest benefits from occupying accessible locations. Therefore, activities may be ranked according to the advantages they receive from occupying central locations. This ranking also describes ability to compete for these locations, and an orderly pattern of land use results in which sites are occupied not merely by the activity which can pay most, but by the activity which receives greatest positive advantages in terms of accessibility from using the site. One ranking of this kind has been described by Ratcliff (see below, footnote 23).

The simplest model which illustrates this notion in the case of urban land use is the 'concentric circle' scheme,[13] which may be adapted and developed by utilizing the discussion of Isard. In this case, volume of sales (or utility in a

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[12]Haig, "Toward an Understanding of the Metropolis," op. cit., p. 422; idem, "Major Economic Factors in Metropolitan Growth and Arrangement," op. cit., p. 39; Thünen, op. cit.

[13]E. W. Burgess, "The Growth of the City," Proceedings of the American Sociological Society, vol. 18 (1923),

broader sense) varies directly with distance from the city
center, the effect of friction of distance, and costs of
the firm vary with volume of sales. Given these circum-
stances, a concentric circle pattern of land use results.
Rents are maximized with every site occupied by the highest
and best use and the friction of distance upon sales volumes
is minimized.

Figure 1 illustrates in this example how utility de-
rivable from each location by any use diminishes linearly
with distance from the city center for any activity (say a
retail store, x_1). This diminution is expressed by the line
$A-A_1$. Given many retail establishments of varying efficiency,
price mark-up, scale of advertising, etc., there will be in
reality a scatter of curves about $A-A_1$, which is here assumed
to be a mean for this distribution of curves. Figure 1 shows
that at a distance OT from the city center, the dollar volume
of sales (utility to the retail firm) is OS.

To achieve OS dollar volume of sales at the site will
involve costs. These are accounted for in Figure 2. PQP_1 is

Footnote 13 continued--
pp. 85-89, reprinted in R. E. Park, E. W. Burgess, and R. D.
McKenzie, The City (Chicago: The University of Chicago Press,
1925); C. C. Colby, "Centrifugal and Centripetal Forces in
Urban Geography," Annals of the Association of American
Geographers, vol. 23 (1933), pp. 1-20; H. Blumenfeld, "On the
Concentric Circle Theory of Urban Growth," Land Economics,
vol. 25 (1949), pp. 208-212; Hawley, op. cit., pp. 264-287;
Ely and Wehrwein, op. cit., pp. 442-447; C. D. Harris and
E. L. Ullman, "The Nature of Cities," Annals of the American
Academy of Political and Social Science (1945), pp. 7-11.
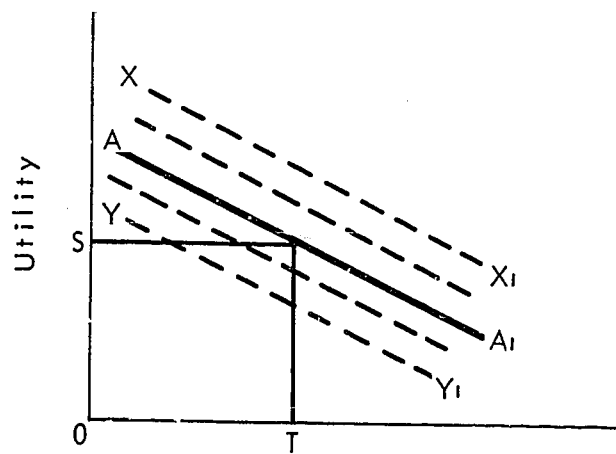
FIGURE 1. UTILITY AND DISTANCE
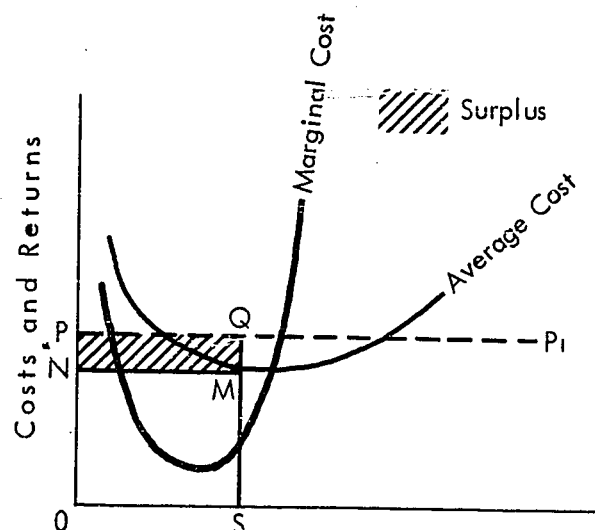
FIGURE 2. COSTS, UTILITY AND SURPLUS
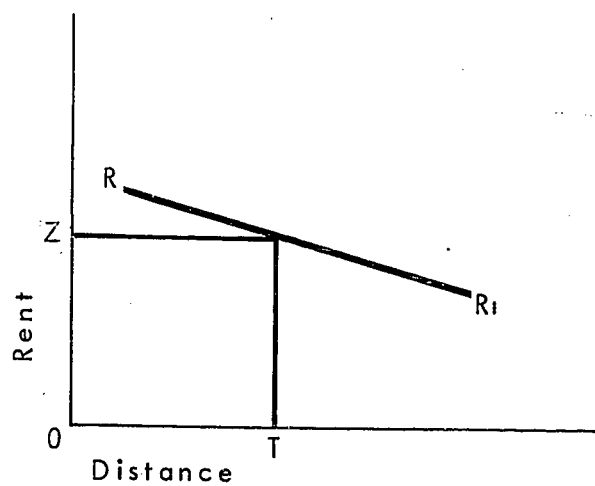
FIGURE 3. RENT AND DISTANCE
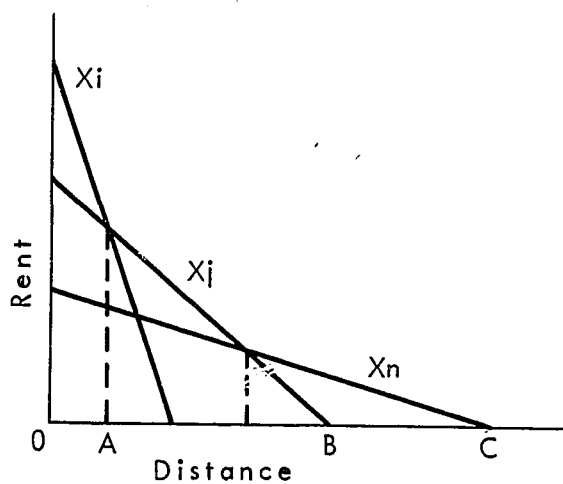
FIGURE 4. THE SIMPLEST PATTERN
OF LAND USE

the actual return per unit sold to the activity at the site. When OS sales are achieved, returns exceed costs ON by an amount NP, and the rectangle MNPQ describes the surplus revenues (profits) accruing to the establishment. In the process of competition for the land it is this surplus which accrues to the landowner as rent (if we assume perfect freedom of entry and competition).

Profits MNPQ are taken to accrue as rents OZ to the landowner in Figure 3 assuming perfect competition for the land. These rents OZ are, of course, those paid at a distance OT from the city center. By the procedure already outlined, rents for all other locations at all other distances from the city center may be plotted. For activity x_1 the resulting rent function is described by R-R_1.

In Figure 4, rent functions for three activities x_i, x_j, x_n have been derived out of a set of potential uses of the land $x_1, \ldots x_i, \ldots x_j, \ldots x_n$. Assuming that the system has only these three uses as competitors for the land, an optimal pattern of land use has been developed. The competitive process is such that the highest and best use occupies the land. Therefore, at all distances from the city center to A, x_i outcompetes other activities; from A to B, x_j is the most successful competitor; from B to C, x_n is the tenant. If the system is generalized from two to three dimensions by the rotation of OC about O, then a concentric circle system of land use results.

More Complex Models

A general statement of the action of friction of
distance gives tacit recognition to more complex models of
land use. Factors, in addition to friction of distance,
influencing competitive bidding for urban land have been
suggested by Dorau and Hinman, Wendt, and Weimar and Hoyt.[14]
Hoyt has also suggested an alternate model for residential
land uses comprising blocks and sectors, and has provided
the most advanced discussion of factors which can affect
the residential site selection of high class residential
neighborhoods.[15]

Dunn commented, in the parallel case of agricultural
location, that when a variety of complicating factors are
applied to the concentric system of Thünen

> The simplicity of land use patterns is destroyed
> once and for all. However, this does not mean that
> order and system are destroyed. It means that the
> order imposed by the influence of economic distance
> takes on increasingly complex forms. . .16

It has already been argued that urban and agricultural
location theories have basic similitude. Therefore, it may

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[14]Supra, pp. 7-8.

[15]H. Hoyt, The Structure and Growth of Residential
Neighborhoods in American Cities (Washington, D.C.: United
States Housing Administration, 1939).

[16]Op. cit., pp. 92-93.

be asserted (after Dunn) that when complicating factors are
added to the simple concentric urban scheme, order takes on
increasingly complex forms, but that nevertheless order re-
mains.

Business Foci as Keys to Order

A good picture of the extreme complexity of patterns
of urban land use has been provided by Bartholomew.[17]
Bartholomew did not recognize underlying systems of order.
However, empirical evidence is increasing that order and
system obtains and that this order is to be found in the
areal functional organization of the urban area about focal
points.[18]

Perhaps one of the most pervasive types of focal point
in the city is the business center. The central business
district provides the most central location in the city, a
point of maximum accessibility, with the highest land values.
Around the central business district patterns of land use
develop as accessibility diminishes and rents decrease at
different rates for different types of use. In the same way

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[17]H. Bartholomew, Urban Land Uses (Cambridge: Harvard
University Press, 1932), vol. 14, Harvard University Planning
Series; Idem., Land Uses in American Cities (Cambridge: Harvard
University Press, 1955).

[18]Philbrick (op. cit.) points out that all forms of
social organization are basically focal in character.

business centers below the level of the central business
district provide secondary foci at other accessible points
within the city. Much empirical evidence to this effect is
accumulating. Both William-Olsson and Dickinson have com-
mented upon 'regionalizations' within the city which result
from intraurban focal orientations.[19] Harris and Ullman
suggested a heteronucleated urban structure, and Rolph has
provided information of value in this respect.[20] Mayer and
McKenzie both provided evidence of the peaking of land values
at major traffic intersections, differential peakings accord-
ing to the relative importance of the intersections, and the
association of such peaked land values with business use
of the land at and around the intersections.[21] The conclusion
is evident. Since business foci provide one observable set
of central locations and focal points in present complex

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[19]W. William-Olsson, "Stockholm: Its Structure and De-
velopment," Geographical Review, vol. 30 (1940), pp. 420-438;
R. E. Dickinson, City, Region and Regionalism (London: Kegan
Paul, Trench, and Trubner, 1947).

[20]Harris and Ullman, op. cit.; I. K. Rolph, "The Lo-
cational Structure of Retail Trade," Domestic Commerce Series,
#80 (United States Bureau of Foreign and Domestic Commerce,
1929); Idem., "Nucleation: The Pattern of Retail Marketing,"
The Metropolitan Community, ed. R. D. McKenzie (New York:
McGraw Hill Book Co., 1933), pp. 250-266. See also A. M.
Voorhees, G. B. Sharpe, J. T. Stegmaier, "Shopping Habits and
Travel Patterns," Technical Bulletin, #24, Urban Land Insti-
tute (1955).

[21]H. M. Mayer, "Patterns and Recent Trends in Chicago's
Outlying Business Centers," The Journal of Land and Public
Utility Economics, vol. 18 (1942), pp. 4-16; R. D. McKenzie,
The Metropolitan Community, op. cit., pp. 236, 238.

patterns of urban land uses and rents, they can provide
clues to the eventual understanding of the larger problem
of competitive bidding for urban land, and resulting patterns
of land uses.

Factors Affecting Business Site Selection

What factors have been hypothesized to affect competi-
tive bidding by businesses for land and may therefore be
indicative of processes which give rise to lawfully ordered
spatial structures of land uses within cities? A variety of
such factors have been suggested and these are outlined be-
low. It will be noted that it is by no means clear how these
factors operate in lawful processes which structure patterns
of land use; they provide no model from which examples of
patterns may be produced. Suggested factors are:

(1) Complicated accessibility patterns and frictions
of distance which are related to the complex structure of
intraurban movement and connections.[22]

(2) Characteristics of the urban market including
such considerations as distribution of population within the
urban area, income characteristics, peculiarities of demands
and purchasing power derived from income and from racial,

[22]For further discussion of this factor see Ratcliff,
"Urban Land Economics," op. cit., pp. 386 et seq.; Firey,
op. cit., p. 246; Rolph, "Nucleation: The Pattern of Retail
Marketing," op. cit.

ethnic, and social variations of the population; and the
frequency, convenience, shopping, and postponability charac-
teristics of the shopping trip.[23]

(3) Competition between stores, location of competi-
tive outlets, and range and type of goods provided by these
outlets.[24]

(4) Characteristics of the supplying firm such as
extent of advertising, price mark-ups, type and range of
goods offered.[25]

(5) Type of activities in the immediate area, whether
complementary or antipathetic, whether they facilitate
attraction or repulsion of prospective customers, whether
they facilitate cutting of costs, etc.[26]

Patterns and Classifications of
Urban Business Structure

Since it is by no means clear how the factors listed
above result in particular structures and patterns of business
within cities, it is apposite to examine some of the structures

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[23]Ibid., and R. U. Ratcliff, "The Problem of Retail
Site Selection," Michigan Business Studies, vol. 9 (1939),
p. 60 et seq.

[24]See for example H. G. Canoyer, "Selecting a Store
Location," Economic Series, #56 (Washington, D.C.: Office of
Domestic Commerce, United States Department of Commerce, 1946).

[25,26]Isard, op. cit., p. 205.

which they are asserted to produce. A variety of classi-
fications of urban business are available. This discussion
will consider those of Ratcliff, Proudfoot, and Kelley, and
relate these to the generally accepted system in the field
of urban planning.

Ratcliff argues that the focal point of every city is
the central business district, which has the most intense
retail activity at the convergence of all traffic and trans-
portation channels. Beyond this area the pattern of business
structure consists of combinations and variations of two
basic conformations. These are:

(1) String street developments or business thorough-
fares, which consist of businesses located along traffic
arteries, but rarely down intersecting streets. Here the
nature of uses depends upon the extent to which the street
is a main traffic artery, and the degree to which it is the
core of a residential area. Uses serving the artery and
uses intended for immediate convenience of local residential
areas are both attracted to the artery. Residential functions
appear as nucleated 'beads' in string street developments.

(2) Business nucleations consisting of clusters of
retail uses at important intersections create pyramiding of
land values to peaks at the intersections. Nucleations vary
in nature from isolated grocery and drug stores and neigh-
borhood facility combinations to major retail subcenters and

to the central business district (which is itself described by the pattern of nucleation). Nucleations are usually concentrated on a primary street, though frequent short spurs may extend down cross streets.[27]

By combining findings of Proudfoot and the above work of Ratcliff, Kelley derived a classification of urban business according to its basic asserted conformations. This classification he then structured according to the generally accepted planning distinctions between neighborhood, community, and regional shopping centers. A difference was also noted between unplanned and planned business districts. The resulting classes of business center developed by Kelley are as follows:

1. Central Business District

2. Main Business Thoroughfares (String-Streets)

3. Secondary Commercial Sub-Districts (Unplanned)
   (a) Neighborhood
   (b) Community or District
   (c) Suburbs or Outer

3a. Controlled Secondary Commercial Sub-Centers
   (a)' Neighborhood
   (b)' Community or District
   (c)' Suburbs or Outer

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[27]"Urban Land Economics," op. cit., p. 387 et seq. The arguments are developed from Ratcliff's empirical work described in "The Problem of Retail Site Selection," op. cit. This work is, however, mainly concerned with the arrangement of land uses internal to shopping districts. See also Rolph, "The Locational Structure of Retail Trade," op. cit., and M. J. Proudfoot, Intra City Business Census Statistics for Philadelphia (Washington, D.C.: United States Department of Commerce, Bureau of the Census, 1937).

4. Neighborhood Business Streets

5. Small Clusters and Scattered Individual Stores

6. Controlled Regional Shopping Centers[28]

The rationale for distinguishing between planned and unplanned centers is obvious. Functionally they may be no different, but morphologically they may vary considerably. Too, Kelley's concern was with planned centers. Distinctions between neighborhood, community, and suburban stratifications of the nucleated conformation may be less obvious. This distinction results from the work of urban planners who argue that goods demanded are of two kinds, convenience and shopping, and from such well-known associated studies of urban business as those of Cincinnati and Boston.[29] Convenience goods are supplied frequently to the immediate neighborhood by neighborhood shopping centers. Shopping goods

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[28]E. J. Kelley, Shopping Centers (Saugatuck, Conn.: Eno Foundation for Highway Traffic Control, 1956), pp. 66-67; idem., "Retail Structure o. Urban Economy," Traffic Quarterly (1955), pp. 411-430. See also Proudfoot, "The Major Outlying Business Centers of Chicago" (unpublished dissertation, University of Chicago, 1938); idem., "The Selection of a Business Site," Journal of Land and Public Utility Economics, vol. 14 (1938).

[29]A detailed breakdown of goods defined as 'convenience' and 'shopping' is to be found in W. Applebaum and B. L. Schapker, A Quarter Century of Change in Cincinnati Business Centers (Cincinnati: The Cincinnati Enquirer, 1956). A typical use of the classification, representative of its widespread utilization, is in Shopping Centers (Phoenix, Arizona: First National Bank of Arizona, 1957). The Boston Globe study has a similar breakdown to that used in the Cincinnati study. It should be noted that the terms 'convenience' and 'shopping' are of long standing in the field of marketing.

are supplied to groups of neighborhoods by community or
suburban shopping centers, which tend to be miniature repli-
cas of the central business district. The distinction be-
tween community and suburban shopping centers is not founded
in functions performed, but in area served.[30]

Many studies are available which present empirical
evidence of use in evaluating the classification of Kelley.
Examples are the work of Lung with Seattle neighborhood
shopping centers and Garrison with business centers in a
portion of the Chicago Metropolitan Area.[31] Such studies
suggest the general validity of Kelley's structure.

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[30]Kelley, op. cit. A wide sample of the planning
literature most widely used in the field by city planners
is provided by the Urban Land Institute. See S. H. Mott and
M. S. Wehrly, "Shopping Centers: An Analysis," Technical
Bulletin, no. 11, Urban Land Institute (1949); H. Hoyt,
"Market Analysis of Shopping Centers," Technical Bulletin,
no. 12, Urban Land Institute (1949); J. R. McKeever,
"Shopping Centers," Technical Bulletin, no. 20, Urban Land
Institute (1953); Voorhees et al, op. cit.; Community Build-
ers' Handbook, Urban Land Institute (1953); J. R. McKeever,
"Shopping Centers Restudied," Technical Bulletin, no. 30, vols.
1 and 2, Urban Land Institute (1957).

[31]V. L. Lung, "A Method for Determining the Land Needed
for Neighborhood Shopping Centers with Special Reference to
Eight Seattle Centers" (unpublished M. A. thesis, University
of Washington, 1955). This work contains an extensive review
of the planning literature concerning shopping centers and
their functional characteristics. W. L. Garrison, "The
Business Structure of the Consumer Tributary Area of the
Fountain Square Major Outlying Business Center of Evanston,
Illinois" (unpublished Ph.D. dissertation, Northwestern Uni-
versity, 1950). This study makes an exhaustive analysis of
business frontage occupied by various uses located in several
types of centers.

Listing of factors, generation of classification systems, and provision of general empirical evidence is not enough. A variety of questions remained unsolved. Do the factors outlined actually generate a business structure comprising two basic conformations and two levels between the central business district and the scattered stores? Are there other important causal processes? What are the relations of the factors, one to another? Is the generated classification of business in fact a valid one? What comprise convenience and shopping goods? What are the implications of a lawful spatial structure of business centers for systems of land use and rents in the urban area as a whole? What are the relations of the structure to systems of movement within the urban area? These questions and more are left unanswered by present work in the field of urban land uses and business structure.

Development of a Theory of Intraurban Business from Central Place Theory

The need is obvious for better process-oriented theoretical statements which will answer questions such as are listed above. Statements of this nature may be derived from central place theory as recently reformulated as a theory of tertiary activity. Functional significance of the various listed factors may be demonstrated within the resulting system.

Structures of the type of the Kelley classification may be developed, and empirical tests may therefore be undertaken with far greater implications than the scope of the immediate problem. Too, relations with more general systems of land use and land values may be illustrated.

Originally, the central places of central place theory were urban centers. Studies of central places by Christaller and Lösch, for example, were concerned with the distribution of tertiary activities in alternate urban centers. Since Lösch's contributions, theory has been reformulated to consider not only tertiary activities in alternate urban centers, but also retail and service business of shopping centers within cities. Central place theory has thus been extended to a general theory of the spatial structure of tertiary activity. The extended theory may be outlined as follows:[32]

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[32]This outline follows the development of the hierarchical spatial structure in Brian J. L. Berry and William L. Garrison, "Recent Developments of Central Place Theory," Papers and Proceedings, Regional Science Association, vol. 4 (1958, forthcoming). Associated discussions are contained in idem., "Functional Bases of the Central Place Hierarchy," Economic Geography (1958, forthcoming) and idem., "Central Place Theory and the Range of a Good," Economic Geography (1958, forthcoming). It should be noted that one of the first suggestions concerning the application of central place theory to intraurban studies was that of E. L. Ullman, "A Theory of Location for Cities," American Journal of Sociology, vol. XLVI (1941), pp. 853-864.

Definitions.

(1) The Range of a Good. The range of a good offered from a business center has an upper limit beyond which the business center is unable to attract purchasers for the good, and a lower limit which incorporates the threshold purchasing power needed for the good to be offered (see below). It thus defines the market area of the business center for the good.

(2) Threshold. There is some minimum size of market below which the business center will have no economic justification to supply the good. This is the point at which sales are large enough only for the firm to earn normal profits. It constitutes a minimum scale or condition of entry defined by the lower limit to the range of a business center for the good. Such a minimum scale of purchasing power necessary to support the supply of a central good from a business center is here termed the threshold sales level for the provision of the good from a center.

Development of the business hierarchy. For the sake of exposition assume that a city is to be supplied with n types of central goods. Let these be ranked from 1 to n in ascending order of their threshold sales requirements. The business center supplying good n will require the largest market area (in terms of amount of purchasing power) for its

support. Let a central place supplying good n be called an
A center.

As many A centers will exist in the city as there are
threshold sales levels to support firms supplying good n.
These firms compete spatially, hence are distributed so as
to supply their own threshold most efficiently. If total
sales levels are an exact multiple of thresholds for good n
market areas will be bounded by lower limits to the range of
A centers. Firms will earn only normal profits, and these
only if they minimize costs by locating to minimize distri-
bution costs if the product is delivered, or locating to
minimize consumer movement if the consumer comes to purchase
the product. Hence the extreme importance of accessibility
in the system. If sales in the whole area are slightly
greater than an exact multiple of threshold, but not great
enough to justify another A center, then excess profits may
be earned and ranges reach a more competitive upper limit.

The question arises as to how good n-1 will be pro-
vided. Presumably it will be supplied from A centers, which
have sought out the most efficient least-cost points of
supply central to maximum profit areas at their command.
Too, there will be advantages of association with other es-
tablishments providing central goods. The threshold of good
n-1 is less than that of good n and spatial competition de-
termines market areas, which are delimited by upper limit

ranges. Excess profits may be earned. This argument will be the case for all other goods n-2, n-3,...,1.

But there may be one or more goods, say good n-i, in which case the interstitial purchasing power located between threshold market areas of A centers supplying good n-i will reach threshold size. In this case greater efficiency is reached if a second set of centers, which may be termed B centers, supply the good. These B centers again locate most efficiently relative to their threshold market areas. If the market area is just at threshold only normal profits are earned by firms supplying good n-i. If part-multiples of threshold are present some excess profits are earned. Good n-i may be termed a hierarchical marginal good. B centers will also provide lower threshold goods n-(i+1),...,1.

Let it be assumed that good n-j (j>i) is also a hierarchical marginal good, supporting a third set of central places designated as C places. These are a lower order of business center and provide only goods n-j,...,1.

The pattern of provision of goods by centers in this hierarchical system may be displayed in an array as in Table I. The table displays how sets of goods build up hierarchies of types of business centers. For example, a set of C centers and places in the tributary areas of C centers rely upon either B or A places for goods n-i through n-(j-1) and upon A places for goods n through n(i-1).

TABLE I

THE SUPPLY OF n GOODS TO M TYPES OF CENTER

Centers	Goods			
	$n^*,n-1,\ldots$	$n-i^*,n-(i+1),\ldots$	$n-j^*,n-(j+1),\ldots\ldots$	$k,k-1,\ldots,1$
A	X	X	X	X
B		X	X	X
C			X	X
.		.	.	.
M				X

* indicates a hierarchical marginal good.

X indicates the set of goods supplied by the center.

B places rely upon A places for goods n through n-(i-1).
All places are positioned at the point of most efficient
supply of their tributary areas.

Excess profits may be earned in the system. Where n
goods are provided it is likely that the hierarchical
marginal firm will tend to earn only normal profits. This
is the firm which satisfies Lösch's conditions that all ex-
cess profits shall be at a minimum.[33] However, all supra-
marginal firms in the hierarchy will have an opportunity to
earn excess profits to the extent that they are able to
compete spatially with other firms for purchasing power
located between threshold market areas in the spatial system.

Significance of the hierarchy. The system developed
demonstrates important processes and illustrates a resulting
structure of business centers. Too, it is compatible with
recent theories of retailing and the consumer in economics.[34]
Its utility may further be developed by showing that it
allows explicit discussion of factors previously cited as

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[33]Op. cit., pp. 109-114. This reference is to the
ideal system of hexagonal morphology developed in the original
central place system generalized by Lösch from W. Christaller's
special case presented in Die zentralen Orte in Süddeutschland
(Jena: Gustav Fischer, 1933).

[34]See Berry and Garrison, "Recent Developments of
Central Place Theory," op. cit. for a discussion of basic
elements of compatibility of the theories.

suggested forces affecting competitive bidding for land, and also that it may be used to develop the classification of business asserted by Kelley. In discussing the latter it should be emphasized that ability to generate the classification is not necessarily indicative of the value of Kelley's assertions. Adequate empirical validation should be undertaken prior to general acceptance, even though assertions have been developed out of previous descriptive studies of business.

Suggested Factors and the Hierarchical Structure

Five types of factor were suggested previously to affect competitive bidding for the land by businesses. They may now be related to the theory of business structure developed above.

(1) Accessibility. The basic importance of accessibility in the system has already been outlined. The locational choice of firms is intimately related to minimization of costs of consumer movement or of distribution, given the nature of the market area, for the firm locates at the least-cost point central to the maximum profit area at its command. Hence, spatial patterns assumed by the hierarchy are obviously closely linked to patterns of movement and traffic flow within the city, for these reflect lines of

least resistance or greater accessibility.[35]

(2) Characteristics of the Urban Market. The spatial distribution of central places of each rank is critically conditioned by the distribution of purchasing power. Where purchasing power is available in large amounts because of the concentration of consumers within small areas, centers of each rank are closely spaced; where purchasing power is widely dispersed, so are central places. Hence the differences in the distribution of central places which appear in the urban-rural continuum; cities have closely spaced centers; in rural areas they are of less frequent occurrence. The urban market comprises far more than a simple distribution of purchasing power, however. It consists of people with available purchasing power varying widely with income differences, and hence, with demands for baskets of goods of widely varying character; it consists of people of different social and ethnic backgrounds who have differential satisfaction functions and preference structures. Variations of this character are especially likely to create variations in

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[35]Lösch associates the more restrictive body of central place theory with the transport network in another way--through the system of intersections in a traffic system, and this association has been discussed by Berry and Garrison, ibid. It is obvious that in the case of the urban area it is not variations in the number of rays intersecting at a point which provide the keys to the relations of accessibility and the hierarchy of central places, but variations in the friction of distance which various elements of a basic four-ray system with rectangular street grid possess.

the elements of the hierarchical structure. Certain goods may be provided in low income areas, and other goods are substituted for these in areas of higher income; kosher meat shops in a Jewish community may be substituted for the wurst-haus of the German. Hence, the structure is viable in terms of variable characteristics of the urban market; their influences within the process-system may be traced. It should, however, be noted that the viability is far less than in the case of accessibility.

(3) Competition between Stores. The theoretical structure shows that competition between stores should be interpreted in a special sense. In the spatial system competition is for demands in excess of threshold, located between threshold market areas. For these surplus demands over which the store does not have a spatial monopoly competition may take the form of normal spatial competition in terms of accessibility. It is also possible for it to assume all the forms of monopolistic competition as well.

(4) Characteristics of the Supplying Firm. Characteristics of the supplying firm are defined in terms of threshold requirements of the firm, and their role is quite explicit within the theoretical system.

(5) Types of Activities in the Immediate Area. The hierarchical system contains definitions of complementary

uses at each level of the hierarchy.[36]   Effects of comple-

mentary and antipathetic uses upon rent functions are dis-

cussed below.

Classifications of Business Structure and
the Hierarchical Theoretical System

In the same way as the validity of the suggested

factors influencing business site selection has been examined

in light of the process-oriented business structure, so

viability of the structure in explaining the empirically de-

rived classification of Kelley into community and neighbor-

hood centers and string-street and nucleated conformations

may be evaluated.   All distinctions between planned and un-

planned centers, and between community and suburban centers

will for the purposes of this discussion be ignored.

(1) Community and Neighborhood Centers. Asserted

distinctions between community and neighborhood business

centers may be considered distinctions arising between differ-

ent levels of the hierarchy; for example, they could exist as

B and C type centers between the A type central business dis-

trict and the M type isolated stores and minor groups of

business (Table I).

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[36]Other land uses may also be complementary, particu-
larly those which have positive effects upon the distribution
of purchasing power.

(2) String-Street and Nucleated Conformations.
Distinctions between two basic conformations can be thought
to arise from one or both of two conditions. The first con-
dition is that businesses will nucleate in order to minimize
the costs of shopping and therefore maximize purchasing
power.[37] Businesses which need not be nucleated and which
deliver products demanded or perform services at the point
of demand will be oriented to the means of best access to
the demand, major arterials. Secondly, differential business
location will take place in response to different types of
demand. Where the demand is for food and other immediate
consumer goods, and the shopping trip is home based, stores
will be located in a manner best suited to serve the home
consumer. But other types of demand are evident with dif-
ferential distributions. One example is of demands origi-
nating from multiple reference-points, associated with people
moving by automobile through the city or to and fro on the
journey to work. Stores serving such demands will be oriented
to the main arteries of movement.

It is clear that two basic conformations can be de-
veloped by appropriate modifications of the theoretical
structure, and plausible explanations are thereby provided.

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[37]See Ratcliff, "The Problem of Retail Site Selection,"
op. cit. for studies of nucleation tendencies in response to
consumer shopping habits and needs.

However, plausibility also requires further empirical evidence and verification. There is need to verify that differential conformations exist and to identify their character before they can be generally accepted or included within explicit theoretical statements.

Hierarchical Business Structure and Spatial Organization of Urban Land Uses

It was argued earlier that order and system in complex patterns of urban land use are to be found in the areal functional organization of the city about focal points, one pervasive type of which consists of business centers. Given the concept of a hierarchical business structure, the validity of this argument must be examined. Are there indeed such close links to be observed between the general pattern of urban land uses and business structure? Does an appreciation of the structure of urban business provide keys to the understanding of the pattern of land use throughout the urban area?

Assume the patterns of business developed above.[38] Businesses ranked according to threshold requirements fall into a hierarchical structure as a result of the spatial operations of forces of distribution and consumption. Too, each level occupies the location most accessible to its market.

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[38]Supra, pp. 30-34.

Lower levels of the hierarchy serve smaller markets from sites best able to serve these markets. Lower level centers are, however, located at sites with poorer accessibility characteristics than are higher level centers. Each level of the hierarchy has particular characteristics of access to sectors of the urban market; higher levels occupy more accessible locations than lower levels.

Stratification in terms of accessibility implies stratification in terms of a general level of rent for the rank of the hierarchy. Each level of the hierarchy has to pay a minimum rent to keep alternate potential uses from occupying the site with desired access characteristics.[39] Since desired accessibility varies with each level of the hierarchy, it follows from the earlier discussion of the relations of utility and distance (accessibility) that so does general rent level, and the general rent comprises an additional threshold requirement of each use at each level if they are to occupy the desired site.

Some uses will pay a rent in addition to the general level. The general level is rent paid by each use at each level of the hierarchy. If any of these uses demands a

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[39]Ralph Turvey's discussion of general accessibility develops this idea of a general rent level for business uses. The Economics of Real Property (London: George Allen and Unwin, 1957), pp. 48-50.

special location within the shopping center, an extra rent
must be paid to keep out other businesses.[40] This extra
payment could be for location in proximity to another type
of business, or to occupy a point of maximum pedestrian
traffic. Within the shopping center there will be variations
in rent above the general level for the particular rank of
the hierarchy.

To the extent that business centers provide focal
points for the system of urban land uses, it is therefore
plain that a hierarchically structured spatial system of
rent-peaks will be found within the city. To the extent that
accessibility provides the key to understanding of patterns
of urban land uses other than business, these land uses will
be oriented to a ranked spatial system of rents, and types
of uses about business foci will be directly related to the
rate of diminution of rents from the foci. Figure 5 provides
an example of one possible resultant pattern of land use.

Modifications of the Hierarchical Structuring of
Patterns of Urban Land Uses

The hierarchically structured patterns of urban land
use oriented about business foci which result from competitive
bidding for centrality will be modified by a variety of

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[40]Turvey, op. cit., pp. 50-51.

factors. Several of these are suggested below.

(1) Complementary and Antipathetic Uses. Spatial proximity of any pair of uses may be so inimical to their operations that they select locations at great distance from each other, or protected from each other.[41] This is illustrated in Figures 6 and 7. Figure 6 shows the competitive bids for the land of two uses, (a) and (b), without the knowledge that the other is bidding. In Figure 7 use (a), offering more for the most attractive site, becomes the tenant. Use (b), recognizing the deleterious effects of potential proximity to use (a), modifies his bid for accessible locations. The most desirable location 0 is now no longer so attractive; it is location X, with secondary characteristics of desirability, which is afforded the greatest bid. Use (b) positions itself at a less desirable spot, but one with greater advantages once use (a) has selected its location. Uses (a) and (b) are antipathetic.

The converse is the case of complementary activities. These are activities which experience positive benefits from proximity (such as reduction of costs of shopping to the consumer is a joint purpose shopping trip). This is illustrated in Figures 8 and 9. Figure 8 is the 'before' situation; advantages of complementarity are not realized. In Figure 9

[41]Harris and Ullman, op. cit.
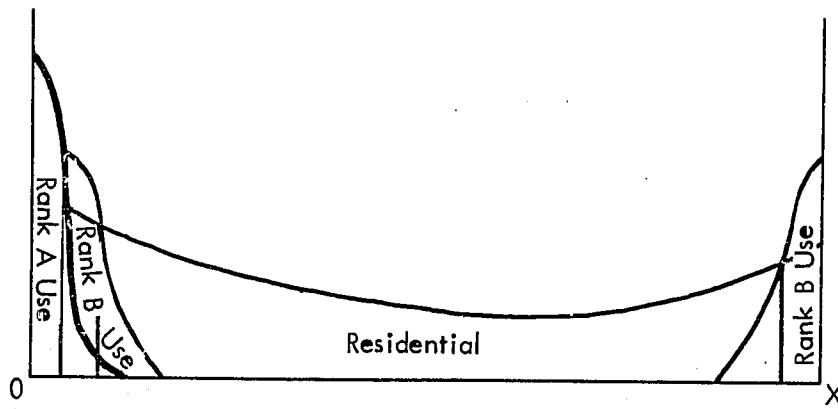
FIGURE 5. ONE POSSIBLE LAND-USE PATTERN
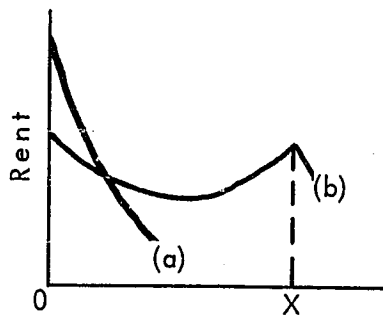
FIGURE 6. ANTIPATHETIC ACTIVITIES:
ORIGINAL BID PATTERN
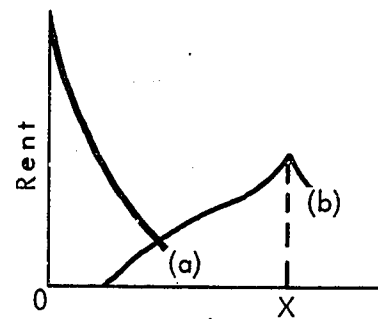
FIGURE 7. ANTIPATHETIC ACTIVITIES:
CONDITIONED BIDS
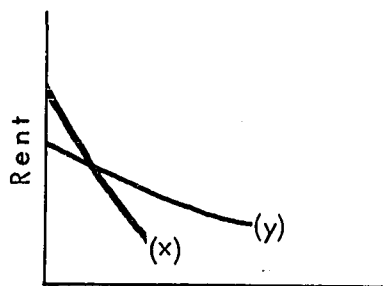
FIGURE 8. COMPLEMENTARY ACTIVITIES:
ORIGINAL BID
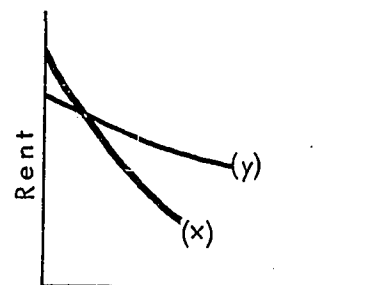
FIGURE 9. COMPLEMENTARY ACTIVITIES:
CONDITIONED BIDS

both (x) and (y) locate in proximity, and they benefit from the advantages of being together.

(2) Other Foci. Other focal points may exist in the city in addition to rent-peaks associated with business land uses. Hoyt has provided the example of the homes of community leaders which act as focal points for development of high value residential districts.[42] These and many other examples serve to illustrate that peakings in rent functions may be other than business-oriented and accessibility-conditioned.

(3) Special Site Characteristics. Likewise, special site features may affect competitive bids for land and therefore condition patterns of urban rents and land uses in other than a business-oriented manner. Such special site features can include view property for residences, large tracts of flat land, availability of water for industry. Topographic configurations may have an impact upon the pattern of bidding for land. This impact differs according to type of land use. For any affected use the shape of the rent function is modified.

Rent and Excess Profits

In the discussion of the simplest spatial model all excess profits were taken to disappear as rent, yet in the

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[42]Hoyt, The Structure and Growth of Residential Neighborhoods in American Cities, op. cit.

development of the notion of hierarchical business structure a specific possibility of excess profits was mentioned. Too, rents have subsequently been discussed as integral parts of threshold requirements of firms. There are apparent contradictions here which must be examined in greater detail.

Rent is a payment to keep alternate uses from occupying the land and as such it is included as part of the threshold requirements of firms. Yet it is also a payment to use the land in the face of competition between uses of similar kinds (for example, between clothing stores) and it is this context that it was suggested that all profits must accrue to the landowner as rent. This viewpoint is entirely compatible with classical economics, within the assumption of large numbers of potential firms with perfect freedom of entry.

Now consider the formulation of the hierarchy. In this case firms compete spatially, and the most successful of each type assume their places in the hierarchical structure, paying the rent necessary to keep alternate uses from the land. This rent becomes an integral part of threshold requirements and one of the determinants of the nature of the hierarchical system. Once established it becomes possible for firms other than marginal hierarchical firms to compete for some surplus in their spatial context and it becomes possible to earn excess profits.

The question remains, do these excess profits accrue
as extra rent? If further firms appear and offer the land-
owner rent presumably they will, for the firm offering the
lowest rent will be displaced from the land. But in reality
threshold requirements are likely to be of such a magnitude
that conditions of entry become considerably restricted,
especially for firms at higher levels of the hierarchy with
larger threshold conditions of entry. Depending upon free-
dom of entry will be the extent to which excess profits
accrue as rent, and the actual situation is likely at any
one time to consist of a combination of excess profits and
extra rents above needed general and specific threshold
levels.

Pre-Equilibrium Connections and the Hierarchy

Once the structure of urban business centers is de-
veloped and focal relations with consumers recognized certain
other questions become evident. One of these relates to
connections of consumers and centers and the effect of these
upon the character of centers.[43]

Consider a map of shopping centers and their market
areas. This is a static pattern which masks a myriad of

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[43]This discussion follows that of Berry and Garrison,
"Recent Developments of Central Place Theory," op. cit.

consumer movements to purchase goods and services. It
assumes that each individual movement is in an equilibrium
condition, with optimal patterns of spatial connections.
If a new consumer locates himself in the system an ex-
post view is taken that all his spatial connections are
immediately determined.

But obviously this is not so. We know that a con-
sumer newly locating himself in a city will tend to 'shop
around' and from personal experience thereafter develop his
system of connections. For goods which the consumer buys
frequently the period of shopping around will be relatively
short. Many contacts imply rapid determination of optimal
shopping habits. Accordingly, stores visited frequently are
located within a pattern of optimal spatial connections, and
therefore locate rationally within the hierarchical structure.

Stores visited less frequently, but which are fewer
in number (with larger thresholds) will likewise be positioned
rationally within the structure, for they will have relatively
large numbers of their consumers who have been in the city
for long periods and who hence have stabilized their shopping
habits.

Some types of stores are visited infrequently. They
are few in number, and have minimal conditions of entry and
contacts with relatively few of the total number of consumers
in the city. For these stores the period of 'shopping around'

may never cease. Advertising and product differentiation
may be of substantial importance for these types of business
as competitive devices. Since optimal spatial connections
are not present, locations of firms need not be optimal.
Urges to optimization are absent.

This non-optimal tendency leads to aggregation of
businesses in specialized shopping districts to facilitate
comparison buying, or to apparently irrational scatters of
stores throughout the city (for example, the exotic gift
store).[44] These may or may not orient themselves to other
business centers. There may well be a tendency for hap-
hazard locational patterns, and a disturbance of ordered
patterns of land uses and rents.

The Impact of City Planning

In the city of today the impact of planning decisions
armed by the legal powers of the zoning ordinance and build-
ing permit is of considerable importance for business. Local
government agencies vary considerably in intensity and level
of activity, but many attempt to control the business struc-
ture of areas under their jurisdiction. Sites may be speci-
fied where businesses are allowed to locate, with all other

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[44]See the discussion to follow of the location charac-
teristics of gift and novelty stores, photographic and audio-
visual establishments, and feed and seed stores, in Spokane.

locations restricted to non-business uses. Types of uses allowed at different sites may be specified. There may be attempts to abate uses which do not conform to the locational planning of the city.

Such activities can be of greatest value to the urban area if imaginatively planned to facilitate growth of an 'optimal' system. At the same time they can be most inimical if they impose upon the urban area a pattern of business which is inefficient in terms of urban living. This is because inability of business to locate at optimal sites results in inability to bid so actively for the land, for the following reasons. Consumer movements are not minimized. Hence, consumers have less income to expend upon goods and services. Less purchasing power implies a diminished ability of firms to achieve threshold requirements and less ability to maintain rent levels. In many instances elimination of uses from certain locations can only mean that benefits to the landowner are reduced because he must be content with the rent which a lower use is willing to pay. Land is not occupied by the highest and best use.

Rent may thus be used as an indicator of the inefficiencies introduced by adverse city planning activities so far as business location is concerned. This is illustrated by Figures 10 and 11. Figure 10 provides an example of an optimal rent system (hypothesized) in which two levels of the
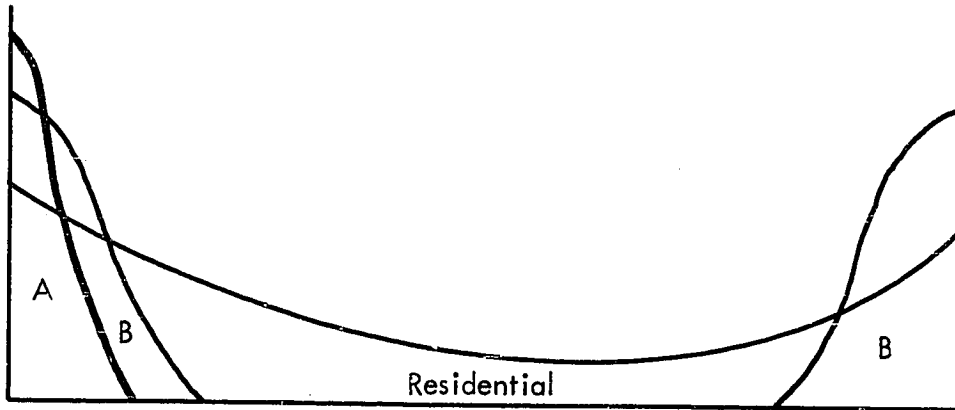
FIGURE 10. A RENT SYSTEM PRIOR TO PLANNING RESTRICTIONS
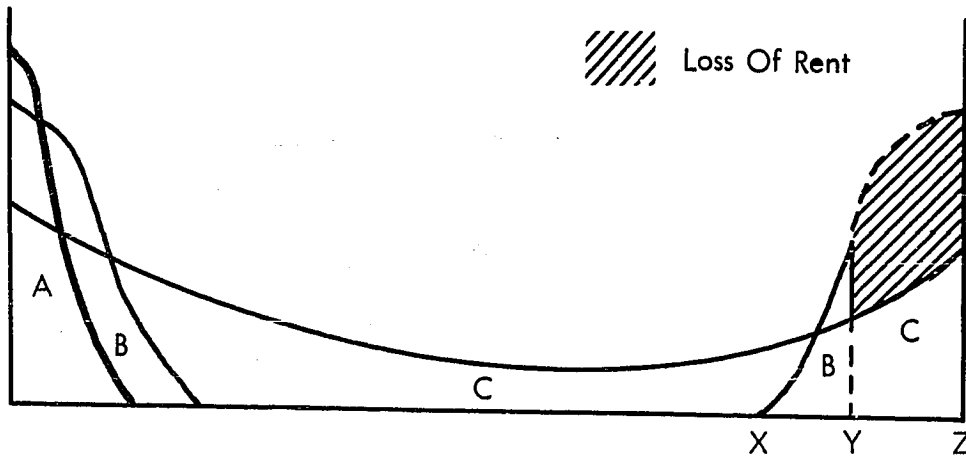
FIGURE 11. RENT LOSSES WITH PLANNING RESTRICTIONS
(Use B Limited to XY, Cannot Bid for YZ)

hierarchy are present, A and B, together with residential
land use. Figure 11 shows what would happen if the activities
of the city planners were to restrict level B to a site other
than the optimal location. The shaded areas indicate los
rents and provide a measure of the degree to which the urban
system diverges from an optimum in which satisfactions are
maximized, other things remaining equal.

Planned Centers as a 'New Force'

It has often been asserted that planned centers mani-
fest new forces affecting business structure of urban areas,
causing the decline of traditional central business districts.
Morphologically, they may be innovations. Integrated facili-
ties often with considerable architectural merit, sited to
favor the automobile, have been constructed. But economically
they are an integral part of the spatial system. With ex-
pansion of suburban areas of cities, threshold requirements
of centers of ranks other than immediate neighborhood levels
have been reached in many areas, and new planned centers have
appeared to fill the justified need. Larry Smith has written,
"As cities increase in size the logic of developing larger
and larger commercial facilities in the suburbs increases . . .
this is not specifically a function of the times, but rather
a function of the size of the city."[45]

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[45]"Commercial Location Trends and Their Effect Upon
Urban Areas," Urban Development and Urban Transportation
(Princeton University, 1957), pp. 40-50.

Recently published comparative data concerning sales
in central business districts and metropolitan areas tend
to bear out these observations. For example, retail sales
in the central business districts of all cities studied ex-
cept those of more than one million population in 1950 were
increased or maintained at 1948 levels over the period 1948-
1954. Rapid rates of increase of retail sales were observed
in metropolitan areas with rapid rates of population in-
crease outside the central city.[46]

It is clear, then, that the planned shopping center
does not manifest drastic new forces affecting the lawful
processes of distribution and consumption. Well-known
tendencies and processes have resulted in the growth of the
suburban shopping facility once necessary threshold require-
ments to justify economic operation have been reached. After
Alchian, it is possible to argue that business centers are
planned and therefore adaptive rather than adoptive, and in
some sense therefore non-natural. But they are only adapted
when the economic system is ready to adopt them!

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[46]Murray D. Dessel, "Central Business Districts and
Their Metropolitan Areas," Area Trend Series No. 1 (Office
of Area Development, U. S. Department of Commerce, 1957).

CHAPTER III

THE STRUCTURE OF BUSINESS IN SPOKANE

"To ask for an explanation in science is to ask for a theory. No further justification has to be given for interest in theories: the quest for explanation is the quest for theory."[1] The purpose of this study is to develop a better understanding and explanation of the retail and service business structure of the city. Accordingly, existing concepts, assertions, and empirical studies have been reviewed and a model developed within the broader framework of theories of land use, land value, and tertiary activity. A classification of retail and service business derived from such concepts, assertions, and empirical work has been examined and shown to be plausible within the framework of theory.

Plausibility should not be taken to indicate validity, however. The question remains: How realistic is the classification of business structure? Can we observe in reality a system of business internal to cities (and outside the central business district) similar to asserted patterns which comprise

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[1]Hans L. Zetterberg, On Theory and Verification in Sociology (Stockholm: Almqvist and Wiksell, 1954), p. 10.

two basic conformations: (a) string street developments
depending upon the importance of a street as a traffic
artery, with beads of other retail uses which are dependent
upon centrality to residential areas; (b) business nucleations,
consisting of clusters of retail uses at important inter-
sections and hierarchically structured into neighborhood and
community shopping center types below the highest level of
the central business district?

It is to the problem of testing the above hypothesized
pattern of business that the empirical study of business in
Spokane was addressed. Testing with consequent verification
and modification (or outright rejection) of theory is part
of a continuous process designed to provide an ultimate
accurate representation and explanation of reality which may
be used for predictive purposes. The empirical study of
Spokane should be viewed with this ultimate objective in mind.

Location of the Empirical Work

The site selected for the empirical work was the city
of Spokane, Washington. Spokane has a population of 185,000
within its legal limits, and perhaps 40,000 additional people
residing in its larger metropolitan area. It has long been
pre-eminent as the regional capital of the area known as the
'Inland Empire,' serving regions of mining and forest
activity to north and east, and agricultural communities

to south and west. In recent years the city has also had
an expanding manufacturing function which reflects growth
of the aluminum industry within its metropolitan area. Many
detailed studies are available which outline the history,
physiography, regional importance and functions, employment
and population characteristics of the city.[2] Hence, these
will not be outlined here. These preliminary comments serve
to orient the reader; major concern is with the spatial
structure of those retail and service businesses which serve
requirements of the population within the legal limits of
the city.

Nature of Data Utilized

A complete census of business was undertaken in the
city of Spokane for each of the 296 business centers of the
city outside the central business district (Figure 12). The

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[2]W. T. Buckley, "The Geography of Spokane" (unpublished
M. S. thesis, University of Washington, 1930); R. D. Tousley
and R. F. Lanzillotti, "The Spokane Wholesale Market," Economic
and Business Studies, Bulletin 18 (Pullman: Bureau of Business
Research, State College of Washington, 1951); D. C. Gibbons,
"Spokane, Washington: A Demographic and Ecological Analysis"
(unpublished M. A. thesis, University of Washington, 1953);
U. S. Department of Commerce, Bureau of Census, Spokane,
Washington: Census Tract Bulletin P-D52 (Washington, D.C.:
U. S. Government Printing Office, 1952); Spokane, City Plan
Commission, "Population," City Plan Series, no.1 (Spokane:
City Plan Commission, 1953); idem, "Employment," City Plan
Series. no.2 (1953); idem, "Population Distribution," City Plan
Series, no.3 (1953); idem, "Land Use," City Plan Series, no.4
(1954).

census was compiled by field observations, utilization of available directories, and by checking data developed against records of the City Plan Commission. Since the purpose of the study was to test concepts relating to business structure external to the central business district, field work did not extend into this area. Data presented for the central business district in Table VI were developed from the city directory and checked against central business statistics of the U. S. Bureau of the Census.[3]

The aim of the census was to count number of stores in each of 60 types of retail and service businesses located in the 296 business centers of the city. A business center was defined as one or more business uses spatially separated from other business uses by alternate types of land use (residential, wholesale, manufacturing industry, etc.). A problem of classification developed along major arterials leading north and east from the central business district. Here extended ribbons of business uses were beaded at intervals by shopping centers. It was observed empirically that in the latter centers pedestrian traffic was high, in the former slight; in the latter, where businesses were surrounded by

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[3]R. L. Polk and Company, Spokane City Directory (R. L. Polk and Company, Publishers, Seattle, 1956); U. S. Department of Commerce, Bureau of the Census, Central Business District Statistics: Spokane, Washington, Bulletin CBD-88 (Washington, D.C.: U. S. Government Printing Office, 1956).

parking lots or special parking facilities, consumers made
several shopping visits per shopping trip, in the former
parking was frequently roadside, and customers made single-
purpose visits to special stores. Too, in the former case
many businesses were not visited by consumers; they served
as offices and centers for functions most often performed
directly in the home. Hence, it was thought appropriate to
distinguish between sections of business use along major
arterials. The process of delineation was based on strong
intuitive notions of difference mentioned above, and the de-
gree to which these differences could be observed in the
field. The classification of business types used was that
of the City Plan Commission of Spokane, and is as follows:

A. FOOD GROUP

    1. Grocery, including Supermarkets
    2. Meats
    3. Fruit and Vegetable Stands
    4. Confections
    5. Dairy
    6. Bakery
    7. Food Lockers

B. EAT AND DRINK GROUP

    1. Restaurant
    2. Bar

C. GENERAL MERCHANDISE

    1. Department
    2. Variety

D. APPAREL

    1. Clothing
    2. Shoe
    3. Other

E. FURNITURE

    1. Furniture
    2. Appliance
    3. Radio and Television, Sales and Service

F. AUTOMOTIVE

    1. Auto Dealer
    2. Used Autos
    3. Auto Accessories
    4. Other Auto

G. GAS

    1. Gas

H. LUMBER, ETC.

    1. Lumber Yards
    2. Building Supplies
    3. Hardware
    4. Farm Equipment

I. OTHER RETAIL

    1. Drugs
    2. Second Hand
    3. Feed and Seed
    4. Jewelry
    5. Sporting, Bicycle, etc.
    6. Florist, Nursery, etc.
    7. Gift and Novelty
    8. Music and Hobby
    9. Photographers, Audio-Visual, etc.
  10. Office Equipment
  11. Printing
  12. All Other Retail

J. OFFICE AND BANK

    1. Office
    2. Doctor
    3. Dentist
    4. Real Estate and Insurance
    5. Lawyer
    6. Other Professions
    7. Bank
    8. Post Office

K. SERVICE

    1. Barber
    2. Beauty
    3. Cleaners and Laundry
    4. Funeral
    5. Shoe Repair
    6. Miscellaneous Business
    7. Business Services

L. HOTEL, ETC.

    1. Hotel
    2. Motel

M. REPAIR

    1. Auto Repair
    2. Miscellaneous Repair, Including Plumbing

N. AMUSEMENT

    1. Theatre
    2. Other Amusement, Including Billiard Hall and
        Bowling Alley

O. SCHOOLS

    1. Music and Dance Schools

P. OTHER

    1. Missions

Certain classification problems are obvious in this
listing. When, for example, does a general store become a
grocery, and when does it constitute a variety store or de-
partment store? How are establishments which provide joint
functions (for example, gas and auto repair, or auto dealer
and used autos) to be classified? In cases such as the former,
questions in the field usually served to provide the necessary
answer. In cases such as the latter, two entries were usually

made, one for each type of business.

Use of simple counts of business has its problems, for no account is thereby taken of the variations in size of stores, amount of business undertaken, etc. Various alternate measures were possible. Perhaps most satisfactory would have been to know total volume of sales for every type of business in each center. Unfortunately, such data were not available in sufficiently detailed amounts. A measure could have been made of total front feet occupied by each type of business in each center. This method, too, has its limitations. There are great variations in the productivity per front foot of establishments within store types as a result of the recent rapid evolution of retailing techniques. Intermixture of stores with older and newer techniques both wasteful and conserving of store area, especially between older and newer sections of the city, would seriously bias measurements. Use of total number of employees in each type of business in each of the centers as a measure was likewise possible. This measure also has many limitations given rapid evolution of retailing and more widespread advent of self-service. Because of these limitations, and non-availability of ideal data relating to total volume of sales by type by center, the technique used was to select the simplest of alternate counts, the number of businesses of each type.

Initial Processing of the Data

Data collected were then prepared for analysis. The
first step was to eliminate meaningless categories such as
miscellaneous business, other auto, other amusement, other
clothing. It was not considered fruitful to maintain these
types for purposes of subsequent analysis. Also disregarded
for subsequent purposes were certain types of business which
had been isolated, but which on examination proved to con-
tain a great many members not performing retail or service
functions for the urban population. Such categories included
office, farm equipment, and confections (which included manu-
facturing establishments). Special types associated with
local conditions were also excluded, such as business
services in proximity to the central business district and
second hand stores in the oldest section of the city's resi-
dential area, now degenerating to slums. Missions were left
in the study for subsequent comparative purposes. Finally,
also to be excluded were feed and seed stores (mostly pro-
viding the seed function) and photographic and audio-visual
establishments, the argument being that these types of busi-
ness were of haphazard locational pattern, perhaps subject
to the persistence of pre-equilibrium consumer shopping habits.
For purposes of comparison, a third member of this group, the

gift and novelty store, was retained.[4]

During this process of rationalization of types of business prior to analysis a ranking system of the 60 types of business was developed based upon frequency of occurrence in the 296 centers. Ranks for the 49 types of business subsequently analyzed are recorded in Table II.

Reduction of total numbers of types of business from 60 to 49 resulted in a reduction of the number of centers considered from 296 to 285. Eliminated were centers 80, 86, 161, 221, each possessing a single isolated store in one of the 'other' categories, centers 35, 102, 145, 207, 223, 232, 249, each possessing an isolated feed and seed, home photographer, dance school, or farm equipment establishment. These centers may be located on Figure 12.

Final analysis of the business structure of Spokane was therefore performed utilizing a census of numbers of stores of each of 49 types located in 285 business centers of the city.

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[4]For an evaluation of the role of pre-equilibrium spatial connections in conditioning the spatial occurrence of Spokane businesses, see the discussion in Brian J. L. Berry, "Pre-Equilibrium Consumer Connections and the Structure of Urban Business" (unpublished manuscript, Department of Geography, University of Washington, 1957).

Analytic Techniques Utilized

Consider that each of the 49 remaining types of business has been mapped, and there are 49 maps of Spokane each containing information relating to numbers of stores of a particular type at 285 locations. The problem for empirical study can be thought of in these terms: What is the composite pattern of correspondence of the 49 geographical distributions? What geographical associations of business types occur? What implications do geographical clusters of business types have for the pattern and structure of business centers? With these questions answered empirical functions of verification, rejection, or modification of asserted classifications of business structure and the theoretical discussion of shopping centers and tertiary activity will be facilitated.

Requirements in terms of analytic techniques are two. First, provision of a measure of association of geographical distributions. Second, an objective method of developing from the data tendencies for distributions to cluster and describing objectively classes of clustered variables.

A variety of measures of association of geographical distributions has been suggested. The most recent and satisfactory for describing associations of continuous

distributions is that of Robinson and Bryson.[5] However, the distributions of concern in this study are not continuous. They can be described in terms of 285 points. Methods for measuring the associations of such types of distributions are not to be found in the geographic literature. This study uses simple correlation coefficients because they are the simplest alternate measure of association available.

Objective grouping techniques of the type required are similarly non-existent in the geographical literature, and it is to fields other than geography that the researcher must turn for his methods. Perhaps the most intensive development of grouping techniques has been in psychology, and it is from psychology that the methods used in this study have been derived. Cattell has described a great variety of methods of clustering developed in psychological research.[6] Other techniques have been developed by Fruchter.[7] A defect of all of these techniques is that they depend upon a decision by the researcher of the lower limit for admission to a cluster.

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[5] A. H. Robinson and R. A. Bryson, "A Method for Describing Quantitatively the Correspondence of Geographical Distributions," *Annals of the Association of American Geographers*, vol.47 (1957), pp. 379-391.

[6] R. B. Cattell, "A Note on Correlation Clusters and Cluster Search Methods," *Psychometrika*, vol.9 (1944), pp. 169-184.

[7] B. Fruchter, *Introduction to Factor Analysis* (New York: D. Van Nostrand Company, Inc., 1954), pp. 12-17.

It is from the recent work of McQuitty that a solution to this problem of defining clusters has been derived.[8] McQuitty's _linkage_ _analysis_ provides a technique whereby, given a matrix of correlation coefficients between a series of variables, groups of associated variables may be derived objectively from the data, with no need on the part of the researcher to define limits to his groups. Both members and limits emerge naturally in the process of analysis, and the system of grouped variables is thereby derived objectively on the basis of the degree to which variables are associated (as measured by the correlation coefficient).

The _method_. Since linkage analysis of this type has never previously been applied to research in geography, the method, assumptions, and procedures must be outlined with care.

Linkage analysis is an objective method capable of classifying variables into a number of groups or types determined by the data (a matrix of measures of association of the distributions of each of the variables with every other variable). A group is defined as a category of such a nature

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[8]L. L. McQuitty, "Elementary Linkage Analysis for Isolating Orthogonal and Oblique Types and Typal Relevancies," _Educational_ _and_ _Psychological_ _Measurement_, vol.17 (1957), pp. 207-229. The following discussion of linkage analysis follows closely that of McQuitty.

that every variable in the category is more like some other variable in the category than it is like any variable outside the category.[9] The method may be looked at in these terms: Suppose there are 5 maps of geographical distributions of business types. A measure of association of each map with every other map may be made. This measure may be a correlation coefficient, although it is possible to have any other measure of association. A matrix of correlation coefficients is prepared. In terms of the correlation coefficients, every variable in a type has higher correlation coefficients with some other member of the type, than with any variable not in the type. The limits to **each** group or type are objectively defined by the association of each variable with other variables in terms of its highest coefficient of correlation. The mathematical bases of this method follow.

Mathematical development. Let r'_{ij} represent the index of association between any two variables such that the variable i has its highest r with variable j, and variable j has its highest r with i. This is a reciprocal relationship

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[9]This is essentially the 'nearest neighbor relationship' of the statistical ecologists. See P. J. Clark and F. C. Evans, "Distance to Nearest Neighbor as a Measure of Spatial Relationships in Populations," Ecology, vol.35 (1954), pp. 445-453; P. J. Clark, "Grouping in Spatial Distributions," Science, vol.123 (1956), pp. 373-374.

(represented by the symbol $\longleftrightarrow$ in Tables II, IV, VII, IX). Every matrix has at least one reciprocal relationship because every matrix has one or more highest r.

Assume a matrix with n/2 reciprocal relationships. Then it is obvious that $0 < n/2 < m/2+1$, where m is the number of variables in the matrix and n is the number of variables sharing in reciprocal relationships. Every n is assigned to the type represented by the pair of which it is a reciprocal member. Call all assigned variables n the i_n and all unassigned variables the i_u. For every matrix all i_u have their highest r with an i_n. To prove this assume the contrary. There is no i_u which has its highest r with an i_n. In this case there must be a highest r within the remaining i_u, and this r would be the largest of all and therefore reciprocal, and these variables would therefore be i_n. But no i_u are i_n, therefore a fallacy exists, and the converse must be the case. Every i_u has its highest r with an i_n.

After all reciprocal pairs are identified and the cores of groups therefore established all that is necessary is to assign the i_u to types which contain the i_n with which they have their highest r. The i_u therefore join types according as they either have their highest r with members of reciprocal pairs or they have their highest r with non-reciprocal variables already assigned to a type. The method

continues until all variables are assigned to types, and the limits of types therefore emerge naturally from the data.

Geographical Groupings of Spokane Business

The first requirement in the empirical work was to determine whether various types of business fell into observable patterns of geographical association; the second was to find out if the patterns observed resulted in a distinctive spatial structure of urban business centers.

Groupings of types of business were developed in a series of steps. First, a measure of association was calculated to quantify the degree of geographical association of each type of business with every other type. A matrix of correlation coefficients resulted from this step. Second, linkage analysis was applied to the matrix and groupings of types of business were developed. The matrix was reorganized according to the group structure (Table II). Third, average inter-group correlations were calculated, and linkage analysis applied to the resulting matrix to determine the existence of tendencies for inter-group associations (Table III).

Measures of association. The 1,152 correlation coefficients measuring the association of each type of business with every other type were computed utilizing high speed data processing machinery which prepared for every pair of business

types a product-moment correlation coefficient.[10] These correlation coefficients, r, were arrayed in a matrix (Table II). The r^2 or coefficients of determination are capable of ready interpretation, describing the amount of one distribution explainable in terms of the other. A value of r^2 = 1.0 indicates perfect explanation, a value of r^2 = 0.0 no explanation whatsoever.

Groups of business types. Groupings of business types are also to be found in Table II. The symbol $\longleftrightarrow$ indicates a reciprocal pair (i_n); the symbol $\longrightarrow$ indicates the direction of linkage of an i_u with an i_n. Both symbols indicate a 'greatest similarity' relationship, and in these terms groups of business are defined. Doctors and dentists form a reciprocal pair; banks are more like shoe stores, and shoe stores more like department stores in occurrence habits and geographical distribution than they are like any other kind of business.

In all, nine groups of business were identified, and these are listed from A through I in Table II. Group A is a gas-restaurant-auto repair group, group B a grocery-drugs-cleaners combination. Further details of functional character may be obtained from Table II.

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[10]This stage of the analysis was facilitated by the grant of ten hours of free time upon the I. B. M. 650 digital computer of the Western Data Processing Center, University of California (Los Angeles).

TABLE II – CORRELATION MATRIX AND PRIMARY

Var	A 2	3	6	B 1	4	5	8	9	10	11	57	C 15	16	32	36	45	47	D 33	37	39	42	46	E 22	23	24	38	41	50	54	7	12
2	1.0	.64	.44	.13	.46	.38	.33	.53	.43	.30	.09	.36	.27	.20	.29	.19	.14	.19	.28	.28	.20	.20	.15	.31	.39	.22	.35	.08	.06	.62	.44
3		1.0	.34	.16	.55	.43	.39	.56	.63	.40	.13	.44	.35	.22	.47	.22	.21	.16	.37	.24	.18	.26	.16	.18	.28	.27	.27	.03	-.04	.56	.60
6			1.0	.06	.26	.32	.17	.20	.21	.17	.03	.12	.15	.16	.05	.03	.04	.03	.14	.15	.06	-.01	.06	.12	.15	.06	.07	.10	-.03	.39	.21
1				1.0	.44	.39	.39	.19	.38	.30	.00	.21	.41	.10	.38	.14	.18	.28	.31	.03	.13	.04	.10	.09	-.04	.05	.02	-.01	.03	.08	.29
4					1.0	.63	.66	.47	.65	.55	.21	.52	.64	.20	.57	.43	.43	.53	.56	.46	.47	.35	.30	.16	.23	.19	.21	.18	.22	.52	.60
5						1.0	.54	.45	.55	.60	.17	.53	.51	.23	.48	.37	.36	.51	.45	.30	.40	.24	.25	.04	.10	.20	.10	.10	.13	.42	.52
8							1.0	.46	.57	.44	.23	.48	.62	.21	.56	.44	.36	.41	.40	.30	.38	.16	.18	.03	.14	.18	.11	.11	.12	.32	.44
9								1.0	.57	.52	.31	.51	.44	.29	.52	.47	.30	.49	.54	.45	.47	.48	.22	.11	.19	.24	.29	.11	.17	.52	.53
10									1.0	.51	.14	.46	.53	.25	.58	.33	.34	.37	.53	.25	.40	.49	.29	.18	.18	.27	.31	.06	.16	.48	.63
11										1.0	.10	.39	.48	.16	.44	.35	.28	.38	.46	.29	.33	.33	.23	.04	.01	.21	.08	.12	.11	.37	.49
57											1.0	.27	.31	.00	.00	.00	.15	.05	.10	.09	.22	.17	.08	.00	.00	.09	.14	.00	.00	.17	.12
15												1.0	.45	.31	.57	.58	.45	.33	.32	.29	.52	.26	.20	.00	.07	.19	.29	.09	.03	.44	.36
16													1.0	.35	.68	.50	.54	.58	.55	.35	.51	.37	.31	.01	.02	.15	.12	.22	.23	.32	.55
32														1.0	.29	.16	.22	.09	.14	.11	.30	.13	.08	.03	.29	.17	.20	.12	.00	.35	.26
36															1.0	.49	.38	.44	.46	.21	.46	.36	.24	-.02	.07	.16	.12	.08	.37	.29	.55
45																1.0	.54	.56	.37	.39	.47	.30	.16	-.02	.06	.05	.07	.08	.21	.22	.31
47																	1.0	.41	.35	.25	.41	.26	.30	.05	.04	.11	.10	.24	.17	.25	.32
33																		1.0	.71	.60	.57	.37	.19	.00	.14	.04	.02	-.01	.46	.23	.45
37																			1.0	.48	.54	.43	.29	.05	.05	.32	.11	.00	.33	.32	.52
39																				1.0	.49	.45	.29	.24	.38	.14	.17	.07	.41	.33	.35
42																					1.0	.56	.58	.43	.32	.38	.45	.17	.50	.32	.37
46																						1.0	.48	.29	.23	.28	.35	.27	.40	.29	.38
22																							1.0	.60	.47	.43	.50	.52	.48	.18	.37
23																								1.0	.75	.31	.49	.31	.40	.29	.16
24																									1.0	.31	.40	.23	.32	.33	.28
38																										1.0	.40	.12	.20	.21	.24
41																											1.0	.21	.32	.22	.23
50																												1.0	.19	.07	.31
54																													1.0	.12	.16
7																														1.0	.52
12																															1.0

PRIMARY GROUP LINKAGES

GROUP	LINKAGE
A	2 → 3 ; 6 → 2
B	1 ; 8 ← 4 ← 5 ← 11 ; 4 → 10 → 9 ← 57
C	15 → 45 ; 47 ; 36 ← 16 ; 32 ; 15 ↕ 36
D	42 — 46 ; 37 → 33 → 39
E	50 ; 24 → 23 → 22 ← 41 ; 54 ; 38
F	13 ← 12 → 17 — 7 ; 44 ← 26 ; 20 ; 14 ; 21 ; 60 ; 55 → 18 → 19
G	40 → 56
H	30 → 31
I	28 → 52 → 51

← → INDICATES A RECIPROCAL PAIR

→ INDICATES A GROUP LINKAGE

* – FREQUENCY OF OCCURRENCE (Value of 1.0 means occurre

38	41	50	54	7	12	13	14	17	18	19	20	21	26	44	55	60	40	56	30	31	28	51	52		TYPE OF BUSINESS	*
.22	.35	.08	.06	.62	.44	.41	.29	.48	.43	.50	.46	.36	.27	.09	.25	.03	.37	.34	.15	.13	.30	.12	.30	2	GAS	.38
.27	.27	.03	-.04	.56	.60	.50	.40	.54	.52	.57	.34	.38	.27	.15	.41	-.03	.41	.43	.26	.27	.37	.19	.27	3	RESTAURANT	.22
.06	.07	.10	-.03	.39	.21	.20	.15	.22	.24	.16	.16	.23	.18	.17	.08	.16	.15	.26	.00	.11	.20	.18	.31	6	AUTO REPAIR	.15
.05	.02	-.01	.03	.08	.29	.22	.40	.14	.13	.24	.05	.25	.01	.16	.23	.05	.09	.06	-.03	.07	.05	.05	-.04	1	GROCERY	.59
.19	.21	.18	.22	.52	.60	.51	.55	.54	.40	.58	.34	.48	.29	.18	.30	.07	.23	.21	.12	.16	.37	.21	.11	4	BARBER	.20
.20	.10	.10	.13	.42	.52	.46	.44	.46	.29	.41	.19	.41	.19	.11	.21	.17	.10	.17	.18	.12	.30	.23	.04	5	CLEANERS AND LAUNDRY	.20
.18	.11	.11	.12	.32	.44	.49	.50	.35	.23	.38	.14	.41	.30	.05	.27	.23	.28	.23	.17	.26	.30	.20	.12	8	DRUGS	.14
.24	.29	.11	.17	.52	.53	.42	.36	.52	.34	.56	.26	.41	.13	.06	.27	.02	.45	.31	.45	.51	.30	.14	.23	9	REAL ESTATE AND INSURANCE	.13
.27	.31	.06	.16	.48	.63	.49	.53	.56	.33	.56	.29	.49	.22	.18	.35	.09	.32	.14	.14	.16	.27	.16	.10	10	HARDWARE	.12
.21	.08	.12	.11	.37	.49	.36	.42	.46	.23	.39	.15	.22	.10	.18	.15	-.02	.10	.10	.24	.19	.17	.25	.02	11	BEAUTY	.12
.09	.14	.00	.00	.17	.12	.10	.08	.17	.06	.16	.00	.09	.11	.00	.00	.09	.00	.00	.07	.04	.00	.00	.00	57	THEATRE	.01
.19	.29	.09	.03	.44	.36	.21	.26	.41	.25	.48	.17	.42	.17	.01	.16	.03	.08	.05	.17	.14	.14	.13	.05	15	CLOTHING	.08
.15	.12	.22	.23	.32	.55	.42	.54	.52	.23	.35	.13	.34	.15	.17	.11	.00	.14	.03	.08	.10	.27	.18	-.02	16	VARIETY -- 5 and 10	.07
.17	.20	.12	.00	.35	.26	.27	.14	.33	.13	.31	.18	.23	.29	.13	.00	.00	-.03	.00	.05	.10	.13	.18	.12	32	DAIRY	.04
.16	.12	.08	.37	.29	.55	.40	.50	.47	.34	.45	.13	.42	.14	.00	.15	.00	.17	.44	.05	.16	.25	.00	.13	36	JEWELRY	.04
.05	.07	.08	.21	.22	.31	.25	.26	.19	.19	.33	.14	.32	.06	.03	.14	.00	.13	.04	.23	.18	.27	.06	.08	45	LAWYER	.03
.11	.10	.24	.17	.25	.32	.09	.32	.24	.10	.34	.10	.26	.05	.13	.00	.15	.09	.00	.10	.11	.14	.00	.00	47	POST OFFICE	.03
.04	.02	-.01	.46	.23	.45	.38	.46	.36	.24	.42	.21	.37	.08	-.01	.21	.00	.27	.06	.16	.15	.32	.05	.03	33	DEPARTMENT	.04
.32	.11	.00	.33	.32	.52	.51	.47	.51	.27	.52	.23	.35	.19	.09	.22	.00	.33	.13	.21	.17	.29	.25	.07	37	SPORTING GOODS AND BICYCLE	.04
.14	.17	.07	.41	.33	.35	.37	.28	.36	.13	.31	.33	.30	.32	.13	.20	.00	.17	.00	.33	.22	.47	.33	.29	39	OTHER PROFESSIONS	.04
.38	.45	.17	.50	.32	.37	.26	.27	.37	.10	.38	.19	.23	.22	.00	.14	.00	.23	.00	.13	.06	.29	.14	.00	42	SHOES	.03
.28	.35	.27	.40	.29	.38	.18	.23	.37	.07	.25	.13	.21	.06	.14	.21	.00	.19	.00	.24	.06	.25	.00	.00	46	BANK	.03
.43	.50	.52	.48	.18	.37	.24	.27	.27	.08	.25	.16	.12	.06	-.02	.19	.05	.23	.00	.07	.10	.38	.09	-.02	22	BAKERY	.05
.31	.49	.31	.40	.29	.16	.26	.01	.11	.21	.34	.28	.07	.21	.03	.26	.07	.22	.05	-.02	.00	.26	.05	.06	23	AUTO DEALER	.05
.31	.40	.23	.32	.33	.28	.31	.15	.26	.17	.43	.38	.24	.37	.01	.47	.22	.25	.16	.01	.09	.39	-.02	.14	24	USED AUTOS	.05
1.0	.40	.12	.20	.21	.24	.27	.09	.20	.11	.22	.02	.04	.25	.05	.14	.00	.29	.18	.18	.07	.21	.20	.05	38	FLORIST AND NURSERY	.04
	1.0	.21	.32	.22	.23	.17	.07	.22	.14	.27	.25	.17	.12	.00	.17	.00	.47	.27	.17	.07	.20	.00	.11	41	FOOD LOCKERS	.03
		1.0	.19	.07	.31	.16	.17	.12	.22	.07	.03	.05	.00	.00	.10	.16	.12	.00	.02	.06	.35	.00	.00	50	MUSIC AND HOBBY	.02
			1.0	.12	.16	.19	.15	.08	.04	.16	.11	.11	.00	.00	.14	.00	.26	.00	.07	.03	.25	.00	.00	54	HOTELS	.02
				1.0	.52	.42	.33	.64	.40	.59	.55	.41	.39	.22	.18	.17	.22	.16	.14	.16	.34	.13	.32	7	BUILDING SUPPLIES	.14
					1.0	.57	.60	.67	.50	.55	.43	.55	.33	.04	.38	.25	.33	.19	.09	.15	.50	.19	.10	12	BAR	.11
						1.0	.47	.39	.44	.46	.30	.48	.28	.07	.43	.23	.39	.23	.16	.16	.07	.45	.16	13	RADIO - TV, SALES & SERVICE	.10
							1.0	.47	.34	.41	.26	.43	.16	.09	.31	.17	.25	.09	.05	.15	.30	.07	.02	14	SHOE REPAIR	.09
								1.0	.29	.55	.55	.40	.32	.13	.14	-.02	.16	.05	.07	.13	.45	.30	.20	17	FURNITURE	.07
									1.0	.54	.24	.39	.15	-.03	.51	.00	.31	.27	.03	.18	.35	.05	.17	18	AUTO ACCESSORIES	.07
										1.0	.44	.40	.27	.03	.37	.00	.25	.17	.12	.26	.30	.05	.20	19	APPLIANCE	.06
											1.0	.44	.27	.13	.22	.12	.24	.03	.02	.05	.27	.06	.12	20	OTHER RETAIL	.06
												1.0	.26	.05	.44	.48	.29	.10	.02	.09	.26	.10	.03	21	MISCELLANEOUS REPAIR	.06
													1.0	.03	.11	.22	-.02	.00	-.01	-.01	.25	.25	.17	26	LUMBER YARD	.05
														1.0	.10	.00	.00	.00	.11	-.01	.03	.00	.00	44	GIFT AND NOVELTY	.03
															1.0	.00	.36	.25	.08	.14	.31	.00	.00	55	MOTELS	.02
																1.0	.00	.00	.04	.00	.11	.00	.00	60	MISSIONS	.01
																	1.0	.79	.09	.20	.35	.00	.11	40	MEATS	.03
																		1.0	.07	.25	.29	.00	.43	56	FRUIT, VEGETABLE & PRODUCE STANDS	.01
																			1.0	.77	.08	-.02	.08	30	DOCTOR	.05
																				1.0	.18	-.01	.19	31	DENTIST	.05
																					1.0	.39	.53	28	PRINTING	.05
																						1.0	.50	51	OFFICE EQUIPMENT	.02
																							1.0	52	FUNERAL HOMES	.02

Column group labels (top): E, F, G, H, I

Row group labels (right): A, B, C, D, E, F, G, H, I

URRENCE (Value of 1.0 means occurrence in all centers)

Two types of business were left in the study in order
to evaluate elimination of business types associated with
peculiar local conditions and with persistent pre-equilibrium
consumer connections. These business types, missions and
gift and novelty stores respectively, display the lowest
measures of correspondence with other business types of any
type studied. This intuitively indicates the validity of the
initial assertion that they should be excluded because the
causal processes which locate them derive from immediate
local conditions or from continued 'shopping around' by the
consumer for goods which he buys quite infrequently. To
burden the study with such types of business is to make more
difficult recognition of the forces which condition the more
general pattern of business.

Associations of Groups of Business Types to Produce Larger
Nucleated and Arterial Conformations of Business

For each of the groups of correlation coefficients in
Table II associated with groups of business-types, the average
of the correlation coefficients was calculated. Using the
matrix of these average intergroup correlations (Table III)
linkage analysis was again applied, and two overall conforma-
tions of types of business emerged.

The first of these conformations comprised groups
B, C, D, and E, and will hereafter be identified as the

TABLE III. GROUP CORRELATIONS AND LINKAGES

A	B	C	D	E	F	G	H	I	Group
.47	.31	.22	.18	.15	.33	.33	.15	.25	A
	.41	.26	.34	.13	.30	.17	.18	.15	B
		.45	.35	.13	.25	.10	.12	.12	C
			.52	.25	.27	.14	.17	.19	D
				.38	.17	.18	.07	.13	E
					.35	.18	.09	.18	F
						.79	.15	.20	G
							.77	.08	H
								.47	I

LINKAGES OF GROUPS

Conformation	Linkage
N.S.	C ←——→ D B↗ ↑ H↗ B↗ E
S.R.	F ←——→ A G↗ ↑ G I

Reciprocal Pair ←——→

Group Linkage ——→

1. N.S. — Nucleated Shopping Conformation
2. S.R. — Supplies, Repair, and Arterial Conformation

Nucleated Shopping Conformation. The second consisted of groups A, F, G, and I, and will be called the Supplies-Repair-Arterial Conformation. Group H, the Clinic Group, linked with the nucleated shopping conformation, but very weakly, and hence was treated as a minor group apart. This latter treatment is plausible when location habits of clinics are examined. They are typically peripheral to larger business districts, or isolated from other types of business within residential areas. As Table II indicates, the constituent doctor and dentist types correlate at the 0.77 level. The highest association which either of these types has with any other type exceeds 0.30 only in the cases of real estate offices and 'other professions.'

Reference to Table II will demonstrate the differential frequency habits of the constituent groups of the conformations. A frequency of 1.0 would imply that a function occurs in all centers, a frequency of 0.5 that a business type is found in half the centers, 0.0 in none. The nucleated shopping conformation comprises four groups of business types, and these represent three groups of frequency habits, group B occurring most frequently, group C less, and groups D and E together the least. It will be noted later that group E is a special case. In the supplies-repair-arterial conformation there is a marked difference between the frequency habits of groups A and F. Groups G and I occur with approximately the same

frequencies as members of group F found least often in the business centers of the city.

Classes of Centers

With groups of business types recognized, the second requirement of the empirical work was to determine whether these grouping tendencies resulted in a distinctive spatial structure of urban shopping centers. The data were prepared in the following manner. Spokane possessed 142 centers with a single type of business. Of these, 84 were isolated groceries, 21 were gas stations, and another 28 were drawn from groups A, B, and F. Therefore on the average, centers with one type of business had 0.59 groceries (84/142), 0.19 gas stations (21/142), etc. Similar averages were computed for the 44 centers with two types of business, the 14 with three, 7 with four, 15 with five, and so forth. These 'average centers' were then correlated, each with every other, and a correlation matrix prepared (Table IV). Linkage analysis was applied to the matrix and provided a grouping of the average centers into four classes, hereafter numbered I - IV (Table IV).

Two hundred twenty-two of the business centers of the city of Spokane fell into Class I, 45 into Class II, 16 into Class III, and 2 into Class IV. What is the functional character of these classes of centers? Table V shows the

TABLE IV. CORRELATION MATRIX AND CLASSES OF SPOKANE CENTERS

	IV		III										II										I					No. of Types of Business in Centers	
	34	33	30	28	22	21	20	19	18	17	16	15	14	12	11	10	9	8	7	6	5	4	3	2	1		
	1.0	.93	.81	.91	.59	.89	.83	.68	.86	.76	.74	.68	.71	.73	.68	.67	.75	.52	.44	.60	.51	.54	.41	.40	.43	34	IV
		1.0	.91	.90	.64	.88	.81	.68	.87	.79	.76	.59	.62	.69	.65	.63	.68	.41	.44	.49	.39	.42	.28	.25	.37	33	
			1.0	.89	.68	.94	.90	.86	.83	.38	.91	.75	.75	.80	.81	.77	.76	.47	.61	.68	.50	.56	.42	.38	.46	30	
				1.0	.63	.97	.92	.82	.90	.96	.91	.84	.87	.89	.84	.84	.88	.70	.63	.78	.68	.72	.60	.58	.63	28	
					1.0	.64	.66	.78	.72	.67	.68	.53	.56	.32	.45	.55	.43	.17	.35	.45	.36	.31	.21	.16	.18	22	
						1.0	.93	.85	.85	.93	.91	.83	.84	.87	.83	.81	.84	.59	.59	.79	.60	.67	.53	.50	.51	21	III
							1.0	.92	.80	.91	.93	.87	.91	.89	.87	.85	.88	.67	.70	.79	.70	.74	.61	.59	.63	20	
								1.0	.83	.91	.97	.92	.92	.78	.89	.92	.85	.65	.80	.86	.78	.79	.69	.65	.66	19	
									1.0	.88	.88	.80	.82	.73	.81	.86	.83	.65	.71	.74	.71	.70	.62	.59	.64	18	
										1.0	.97	.90	.91	.89	.90	.91	.89	.73	.73	.86	.75	.78	.69	.65	.70	17	
											1.0	.94	.94	.89	.95	.96	.92	.73	.83	.90	.80	.83	.73	.69	.73	16	
												1.0	.99	.90	.96	.97	.96	.86	.87	.98	.93	.96	.89	.87	.82	15	
													1.0	.91	.95	.97	.97	.88	.86	.96	.93	.94	.88	.86	.84	14	
														1.0	.94	.88	.96	.86	.79	.88	.80	.87	.78	.77	.81	12	
															1.0	.98	.97	.87	.93	.94	.89	.93	.87	.84	.86	11	II
																1.0	.97	.87	.93	.95	.93	.94	.89	.86	.87	10	
																	1.0	.92	.88	.93	.92	.95	.89	.87	.88	9	
																		1.0	.87	.86	.95	.95	.96	.96	.97	8	
																			1.0	.85	.92	.91	.91	.89	.93	7	
																				1.0	.92	.96	.91	.89	.80	6	
																					1.0	.98	.98	.98	.94	5	
																						1.0	.98	.97	.93	4	
																							1.0	1.0	.94	3	I
																								1.0	.94	2	
																									1.0	1	

LINKAGES OF CENTERS

Class	Linkage
I	1 ; 2 ←→ 3 ; ↕ ; 4 ←→ 5
II	6 ←→ 15 ; 7 9 14 ; 10 ; 11 ← 12
III	30 → 21 ←→ 28 ← 18 ; 16 → 19 ; 7 20 22
IV	33 ←→ 34

←→ Reciprocal Pair

→ Group Linkage

association of Class I centers with types of business in groups B and A, with some drawn from group F. In Class II centers there are greater ranges of functions in the B and A groups, group F business types are as numerous as group A types, and there are some types from group C now appearing. Class III centers possess many more types of business drawn from groups B, C, and F and functions from groups D, E, and I also appear. Full ranges of business types from most groups are characteristic of Class IV centers. Particularly apparent is the contrast between the distribution of groups C and D in Class III and Class IV centers. Variation in the importance of each business group in each class of center is illustrated by the second part of Table V, which displays the percentage breakdown of each business group for each class of center. One may note, for example, the diminishing relative importance of groups B and A, the gradual expansion of groups C and F, and the very rapid rise to significance of group D, as one passes from Class I to Class IV centers.

Table VI consists of a random sample of Spokane business centers within each class, and provides further evidence concerning the functional character of the four classes of center. It provides, in addition, some interesting conclusions relating to the significance of the two conformations in the city. Reliance of Class I centers upon B and A type functions is evident, and the particular significance of the grocery

TABLE V

AVERAGE OCCURRENCE OF BUSINESS TYPES BY
GROUP IN CLASS OF CENTER IN SPOKANE

Class of Center	Group of Business[a]								
	B	C	D	E	H	A	F	G	I
I	1.33[b]	0.11	0.03	0.14	0.07	0.85	0.41	0.00	0.00
II	3.62	0.93	0.21	0.46	0.22	2.02	2.26	0.22	0.19
III	5.44	2.07	1.45	1.67	0.59	2.24	6.39	0.43	0.81
IV	7.00	5.50	5.00	2.50	2.00	2.00	8.50	0.50	0.50
Total possible	8.00	6.00	5.00	7.00	2.00	3.00	13.00	2.00	3.00

	Expressed as a Percentage of Class									Total %
I	45.2[c]	3.7	1.0	4.7	2.3	28.9	13.9	0.0	0.0	100
II	35.7	9.1	2.0	4.5	2.1	19.9	22.3	2.1	1.8	100
III	25.7	9.8	6.8	7.9	2.7	10.6	30.2	2.0	3.8	100
IV	20.8	16.4	14.9	7.4	5.9	5.9	25.3	1.4	1.4	100

[a]See Table II.

[b]A value of 1.33 indicates that a center of Class I has on the average one and one-third types of business drawn from Group B.

[c]i.e. 45.2% of the business types in a Class I center are members of Group B.

TABLE VI.- SAMPLE OF SPOKAN

CLASS	Center	| B: 1	4	5	8	9	10	11	57	| C: 15	16	32	36	45	47	| D: 33	37	39	42	46	| E: 22	23	24	38	41
I	1	1																							
	3	1																							
	22																								
	23																								
	19	2	1																						
	250																								
	94	1																							
	26	1	1	1																					
	128																								
	241	1	1	1	1			1																	
	38	1		1																					
II	69	1	1	1	1	1	1																		
	259	1	1		1																				
	163		1	1																					
	286	3		3			2	1								1									
	79	2	1																						
	29	2	2	2	1			2			1			1											
III a	204	3	2	1	1	1	1	1		1					1	1					1		1		
	263	2	1		1	1	1	1			2	1	1	2	1						1				
	269	1	2	3	2	2	1	1		5	1		1	5	1	2			1				1		
III b	272		2		1										1		2								
	268				1	5	1																	1	1
	258		2	1	1	1										1		2				2	8		
III c	254		1			1	1											1	2	1	4	8	8	2	2
III d	273	3	2	4	2	2	2	2		1	2	1	1			1	2		1		1			2	
	255	6	3	2	2	4	3	1		2	1			2	1	2	1							2	
IV	294	4	5	4	2	5	2	2		1	3		1	3	1	8	3	3	2	1	1				
	62	2	4	3	2	7	3	2	1	6	2	1	2	2	1	1	1	1	2	1	1			1	1
CBD		21	60	37	27	314	1	67	4	106	10	2	37	165	1	34	8	73	27	8	5	30	35	13	2

a. - Nucleated Conformation Dominant   b. - Arterial Conformation Dominant

Column groups: **E** (23, 24, 38, 41, 50, 54) · **H — CLINIC** (30, 31) · **A** (2, 3, 6) · **F — SUPPLIES – REPAIR – ARTERIAL CONFORMATION** (7, 12, 13, 14, 17, 18, 19, 20, 21, 26, 44, 45, 60) · **G** (40, 56) · **I** (28, 51, 52)

23	24	38	41	50	54	30	31	2	3	6	7	12	13	14	17	18	19	20	21	26	44	45	60	40	56	28	51	52
								1																				
								1																				
								1	1																			
								1																				
								1		1	1																	
								1		1	1																	
								1																				
								1	1																			
								3	2	2		2			1													
									2	1		2		1														
								2	1		1	1					1	1									
								4	1	1					1	1												
	1					1	2	2							1		1											
			1					2	1				3	1	1		1	1										
1								3	1		1						1	1	1									
								4	2	1	2	1	1		1	1		1		1						2	2	2
	1	1	1			1	2	7	5	2	1	1	1			1								3	3	1		1
2	8							7	3	1	2	2	1	1	3		2	3	1	2			1			1		
8	8	2	2	1	1			3			1	1	1				1	1				1		1				1
		2						2	3	1	1	3	3	1	4		1					1		1			1	2
	2						2	2			1	4	3	2	1	4	3	1	2				3	1	1	1		
					1	2	1	2			1	3	2	2	2	1	2	1	1					1		1		
				1	1	1	1	5	5	1	4	3		1	4	1	3				1	1						
30	35	13	2	4	106	141	199	46	120	32	30	101	34	10	56	34	47	21	24	1	9	1	19	12	8	17	13	3

nt   c.- East Sprague Auto District   d.- Joint Conformations

store and gas station within these groups shown. Alternate
business types are drawn from most frequently-occurring
functions in groups A and B. If other types of business
are to be found, they come from group F. Class II centers
are defined upon more complete ranges of types of business
found in groups B and A. Group F grows in significance, and
a scatter of types comes from groups C and D.

Further significance of the two conformations of
business is brought out when Class III centers are examined
closely. Set a of these are centers in which the nucleated
shopping function is dominant. Here a full range of groups
B and C are found, with scatters of groups D and E, and with
limited numbers and ranges of groups A and F. Set b is the
reverse. Here the supplies-repair-arterial conformation
dominates. Centers have complete or wide ranges of groups
A, F, G, and I business types. Only from groups B and E are
substantial ranges of the alternate conformation drawn. It
is noticeable that a excludes auto repair establishments,
and b excludes grocery stores.

The special significance of business group E is illus-
trated by set c. This is center 254, an extension of the
automobile row of the central business district eastwards
along Sprague Avenue, the main eastward arterial of the city.
Only in this case is a full range of group E to be found in
a center.

In set d neither conformation dominates. Here are
centers with business types drawn from groups B and C, A
and F, and with scattered types drawn from other groups.
This pattern is carried through to Class IV centers which
have all the characteristics of d, but are further dis-
tinguished by full ranges of group D and group H. Occur-
rence of E, G, and I functions is spasmodic.

For comparative purposes, Table VI also presents
relevant data concerning the central business district of
the city. Classes of centers and their spatial distribution
in Spokane are presented in Figure 12. Appendix A contains
detailed information of the functional character of every
center in the city. These centers may be located in
Figure 12.

The Nucleated Shopping Conformation

Table VI indicated the significance of different
mixes of nucleated shopping and supplies-repair-arterial
business in differentiating the shopping centers of Spokane.
What, then, is the spatial structure of centers possessing
the nucleated shopping conformation? This question was
answered by preparing data in the identical manner that data
were prepared for examination of the overall classes of
shopping centers. 'Average' nucleated shopping centers were
calculated on the basis of number of types of nucleated

CENTRAL BUSINESS DISTRICT

C. W. Beetschen
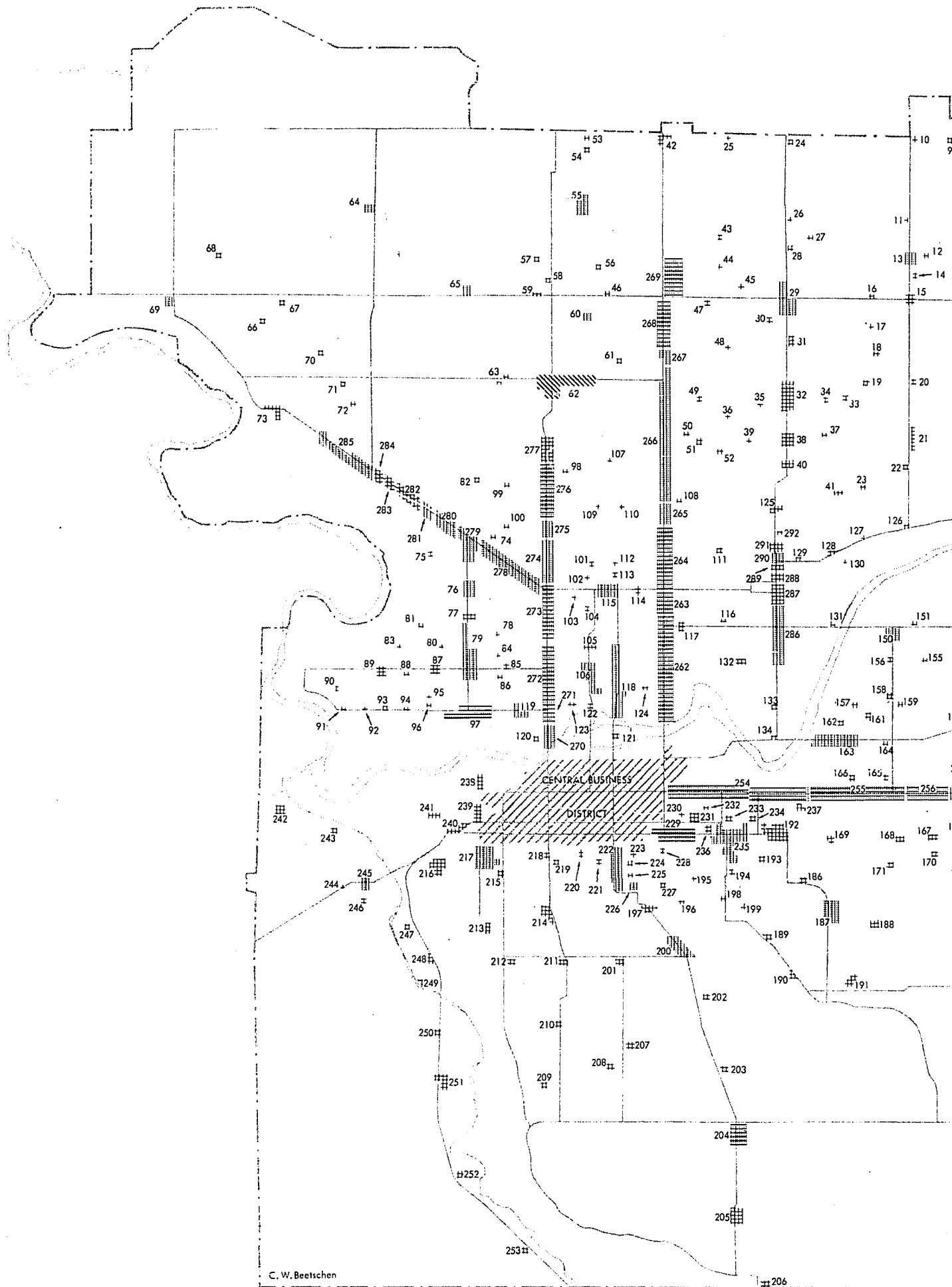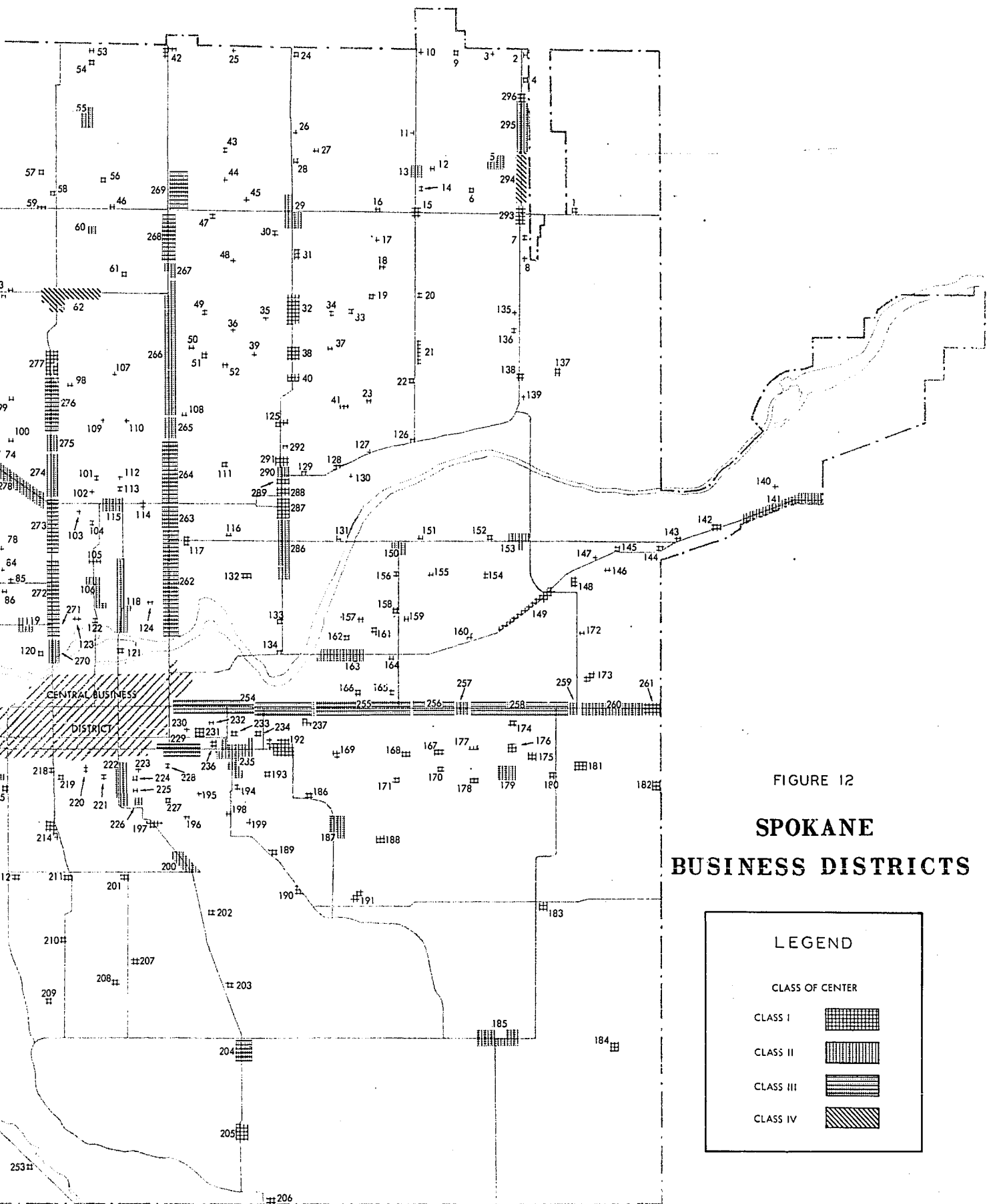
FIGURE 12

SPOKANE

BUSINESS DISTRICTS

LEGEND

CLASS OF CENTER

CLASS I	
CLASS II	
CLASS III	
CLASS IV	
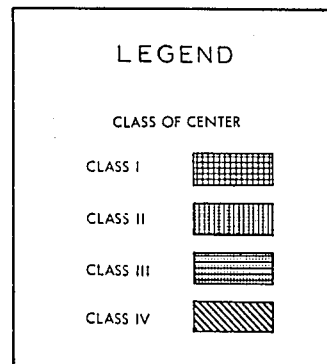
shopping functions possessed. Each average center was correlated with every other average center, and a matrix of correlation coefficients prepared (Table VII). To this matrix linkage analysis was applied, and classes of centers on the 'most alike' basis recorded in Table VII.

Three classes of center emerged, called here I_A, II_A, and III_A. There were 223 centers of class I_A, 3 of II_A, and 2 of III_A. Of group I_A, only 7 centers had from nine to thirteen types of business, and 218 had from one to eight. A total of 57 centers did not have nucleated shopping functions. Implications of this classification system for spatial associations and groupings of business types are to be seen in Table VIII.

Class I_A centers draw most of their functions from group B, with but few from group C. Class II_A centers have a full range of group B functions, and expanded numbers of group C functions. Class III_A centers are distinguished by a full range of functions of groups B, C, and D. Relative changes in significance of each group of functions for the various classes of center are illustrated by the percentage figures in Table VIII.

TABLE VII. NUCLEATED SHOPPING CONFORMATION: CLASSES OF CENTERS

*	IA												IIA			IIIA	
	1	2	3	4	5	6	7	8	9	10	12	13	14	15	16	19	21
21	.67	.63	.68	.78	.73	.57	.85	.62	.70	.75	.65	-.10	.92	.94	.90	.97	1.0
19	.72	.66	.71	.78	.78	.60	.83	.63	.67	.81	.66	-.13	.89	.87	.90	1.0	
16	.92	.90	.93	.97	.95	.87	.99	.90	.93	.94	.91	.31	.99	.95	1.0		
15	.78	.77	.81	.89	.82	.73	.95	.74	.87	.80	.80	.22	.98	1.0			
14	.87	.86	.89	.95	.91	.83	.99	.87	.92	.90	.90	.29	1.0				
13	.57	.64	.59	.51	.50	.70	.43	.68	.64	.42	.66	1.0					
12	.98	1.0	.99	.98	.98	.99	.95	1.0	.99	.95	1.0						
10	.99	.96	.98	.97	.99	.94	.94	.94	.91	1.0							
9	.95	.97	.97	.98	.95	.96	.97	.99	1.0								
8	.98	.99	.99	.98	.97	.99	.94	1.0									
7	.94	.93	.95	.99	.95	.91	1.0										
6	.99	1.0	.99	.96	.97	1.0											
5	1.0	.98	.99	.98	1.0												
4	.98	.97	.99	1.0													
3	1.0	1.0	1.0														
2	.99	1.0															
1	1.0																

CLASSES OF SHOPPING CENTERS

Class	Linkage
IA	1 ⟷ 5; 3 ⟷ 2; 2 ← 8; 4 ← 7; 2 ⟷ 13; 6 ← 13; 12 → 9; 6 ← 10
IIA	15 ⟷ 14; 15 ← 16
IIIA	21 ⟷ 19

⟷ Reciprocal Pair

↑ Group Linkage

* Number of Nucleated Shopping Functions in Center

TABLE VIII

AVERAGE OCCURRENCE OF NUCLEATED SHOPPING FUNCTIONS BY GROUPS IN CLASSES OF NUCLEATED CENTERS IN SPOKANE

Class of Center	Group of Business[a]			
	B	C	D	E
I_A	4.24[b]	1.14	0.55	0.26
II_A	7.00	4.33	2.33	1.33
III_A	7.00	5.50	5.00	2.50
Total possible	8.00	6.00	5.00	7.00

	Expressed as a Percentage of Class				Total %
I_A	68.4[c]	18.4	8.8	4.2	100
II_A	46.6	28.8	15.5	8.8	100
III_A	35.0	27.5	25.0	12.5	100

[a]See Table II.

[b]i.e. there are 4.24 Group B business types in an average Class I_A center.

[c]68.4% of a Class I_A center's business types are on the average members of Group B.

CENTRAL BUSINESS DISTRICT

C. W. Beetschen
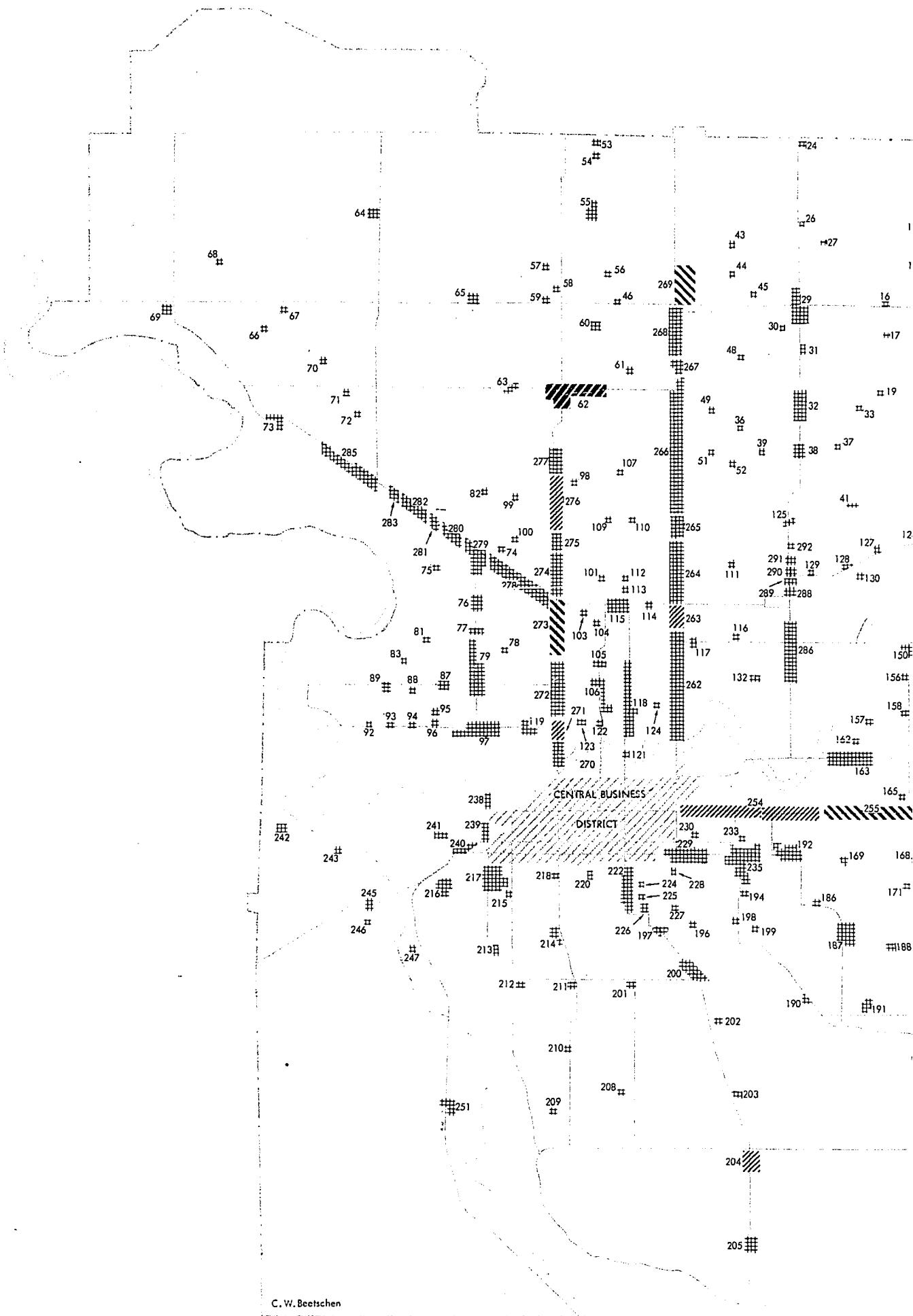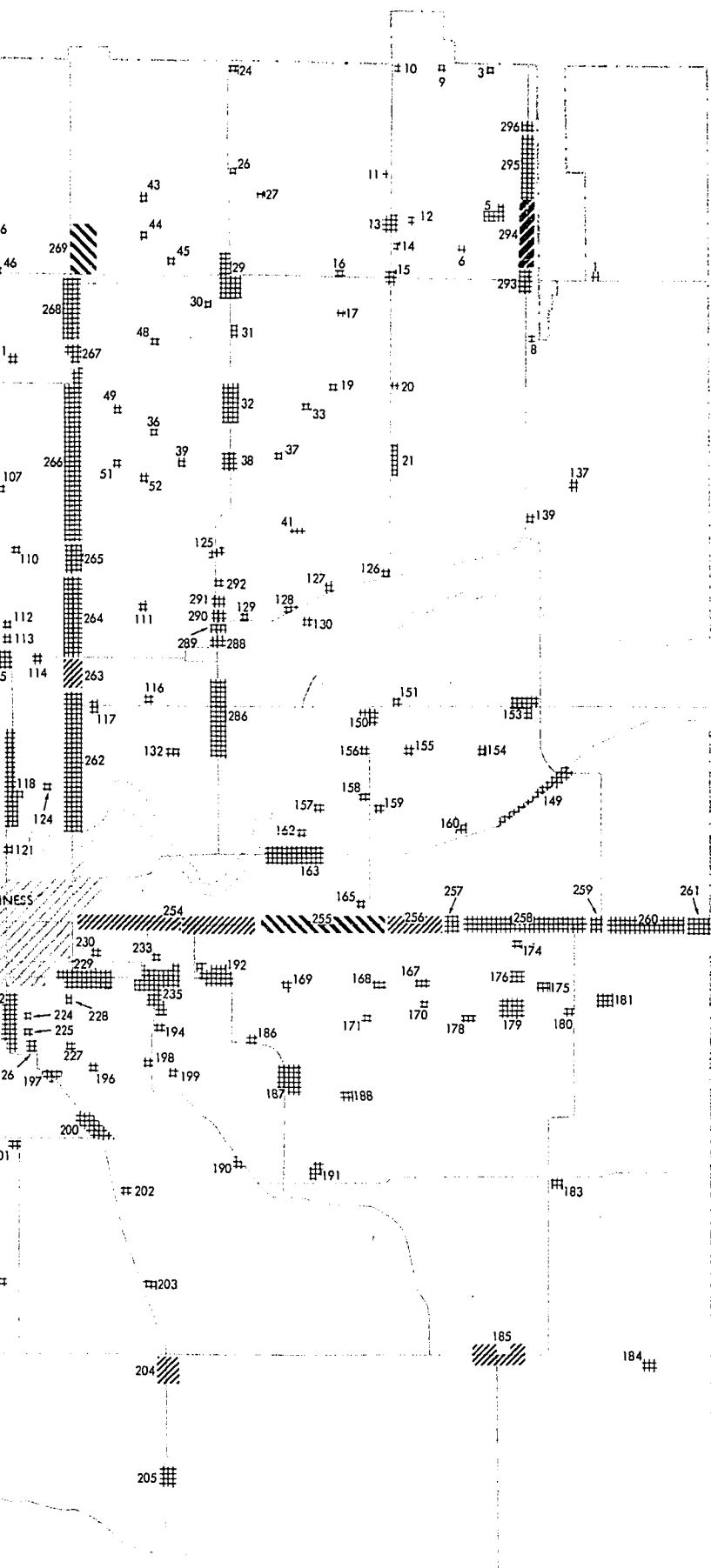
FIGURE 13

NUCLEATED
SHOPPING CENTERS

LEGEND

CLASS OF CENTER

CLASS IA
{ 1 - 8
  .
  9 - 13

CLASS IIA

CLASS IIIA

The Supplies-Repair-Arterial Conformation

To reveal the spatial structure of centers possess-
ing business types of the supplies-repair-arterial conforma-
tion, data were again prepared in the manner outlined above.
'Average' centers were calculated on the basis of number of
types of supplies-repair-arterial business they possessed.
A correlation matrix of each average center with every other
center was constructed and linkage analysis was used to de-
velop four classes of centers, Class I_B - IV_B (Table IX).

Out of the 285 centers in the city, 122 did not
poseess functions of this conformation. Of the rest, 116
fell into Class I_B, 19 into Class II_B, 15 into Class III_B,
and 13 into Class IV_B. Implications of this structure for
the geographical distribution of groups of associated supplies-
repair-arterial business types are presented in Table X.

It is evident that the four classes are distinguished
by differing mixes of group A and F businesses. Groups G
and I are at all times insignificant, and only in Class IV_B
centers does group I show any tendency for more widespread
occurrence. Class I_B is closely associated with group A
functions, with a scatter of group F. In Class II_B there
is in most cases a full range of group A businesses, and
more F business types are seen. Class III_B is characterized
by an expanded range of F functions and the first appearances
of G and I groups. Further increases of F, G, and I groups

TABLE IX. SUPPLIES-REPAIR-ARTERIAL CONFORMATION:CLASSES OF CENTERS

	*	IV_B							III_B			II_B		I_B		
Class		15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
IV_B	15	1.0	.96	.84	.95	.93	.95	.98	.87	.87	.84	.62	.71	.41	.18	.01
	14		1.0	.94	1.0	.99	1.0	.99	.95	.95	.94	.77	.84	.59	.38	.20
	13			1.0	.95	.90	.93	.93	.87	.87	.87	.70	.79	.54	.35	.21
	12				1.0	.98	1.0	.99	.95	.95	.94	.77	.85	.59	.38	.21
	11					1.0	1.0	.96	.99	.99	.98	.86	.91	.70	.51	.34
	10						1.0	.98	.97	.97	.96	.81	.88	.65	.45	.28
	9							1.0	.91	.91	.98	.68	.77	.48	.26	.08
III_B	8								1.0	1.0	1.0	.92	.96	.79	.62	.47
	7									1.0	1.0	.93	.97	.81	.64	.49
	6										1.0	.94	.98	.83	.67	.52
II_B	5											1.0	.99	.97	.88	.78
	4												1.0	.93	.82	.70
I_B	3													1.0	.97	.91
	2														1.0	.98
	1															1.0

CLASSES OF SUPPLIES-REPAIRS CENTERS

Class	Linkage
I_B	1 → 2 , 1 → 3
II_B	4 ⟷ 5
III_B	6 ⟷ 8, 7 → 6, 7 → 8
IV_B	10 ⟷ 14, 14 ⟷ 9, 11 ⟷ 12, 12 ⟷ 9, 10 → 12, 11 → 13, 13 → 15, 15 → 9

↔ Reciprocal Pair

→ Group Linkage

* Number of Supplies-Repair Functions in Center

TABLE X

AVERAGE OCCURRENCE OF SUPPLIES-REPAIR-ARTERIAL
FUNCTIONS BY GROUP IN ARTERIAL CENTERS

Class of Center	Group of Business[a]			
	A	F	G	I
I_B	1.35[b]	0.72	0.00	0.01
II_B	2.10	2.25	0.05	0.10
III_B	2.43	4.17	0.19	0.23
IV_B	2.52	7.67	0.55	1.26
Total possible	3.00	13.00	2.00	3.00

	Expressed as a Percentage of Class				Total %
I_B	64.9[c]	34.6	0.00	0.00	100
II_B	47.7	51.1	0.11	0.22	100
III_B	34.6	59.4	2.7	3.2	100
IV_B	21.0	63.9	4.5	10.5	100

[a]See Table II.

[b]i.e. there are 1.35 Group A business types in an average Class I_B center.

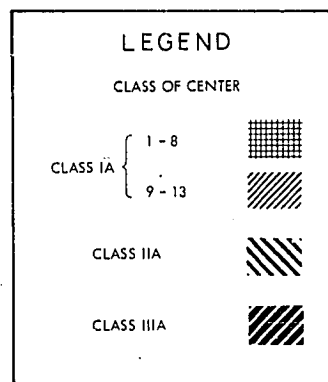[c]64.9% of a Class I_B center's business types are on the average members of Group A.

64

55

42

25

28

13

5

65   59

269   47   29   18   15

69   60   62

268   49   32   34   21   22

267

285   284   266   50   38   40   41   23   125   128

73   282   277   108   265   290   289   288   287   131   152

280   276   264   286   150   156

281   279   278   275   266

76   274   290

77   273   114   115   263   117   132   133   150   163   164

79   84   104   262   134   166   257

88   87   85   105   272   106   118   255   256

90   91   93   94   119   271   122   124   177   185

97   120   270   121

238   CENTRAL BUSINESS   254   255

241   239   DISTRICT   229   231   233   234   237   177

242   240   222   236   235   192

243   217   226   193

244   245   216   214   195   186

247   197   196   187

248   200   189

212   201

250

251   204

252   205

253   206

C. W. Beetschen

FIGURE 14

SUPPLIES · REPAIR
ARTERIAL CENTERS

LEGEND

CLASS OF CENTER

CLASS IB

CLASS IIB

CLASS IIIB
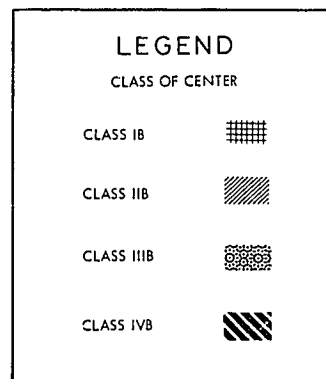
CLASS IVB

are characteristic of Class IV_B centers. The relative
diminution of group A, and the rise to dominance of group F
is well illustrated by the percentage figures in the lower
half of Table X.

Role of Alternate Conformations

The nucleated shopping conformation gives rise to a
tripartate classification of centers. Many small centers
have group B functions. A second level is defined upon
groups B and C. A few complex centers possess group D in
addition to groups B and C.

Four classes result from groups of supplies-repair-
arterial business. The lowest class has group A functions.
Differentiation of the second, third and fourth classes is
based upon an increasing range of group F. The highest
class has, in addition, more substantial numbers of groups
G and I.

Of the 285 centers in the city, 57 possess only func-
tions of the supplies-repair-arterial conformation. Another
116 have only functions of the nucleated shopping conforma-
tion. The remaining 112 centers possess business types of
both conformations, and their character depends upon the
relative importance (strength of pull) of either the nucleated
shopping of the supplies-repair-arterial conformation. Some
of the results have already been noted in Table VI. There are

balanced centers displaying similar amounts and ranges of both conformations. Alternatively, there are centers dominated by the functions of either one conformation or the other, and possessing only a minimal range of the functions of the minor conformation. Class III centers display most graphically the effects of alternate tendencies towards either one conformation or the other.

Succeeding parts of this discussion will tend to show that not only is the functional character of centers related to the relative importance of the two conformations, but that site selection of any center is broadly determined by location habits of the dominant conformation.

Relations of Spatial Patterns of Classes of Centers,
Traffic Flow, and the Distribution of Population

Figures 13 and 14 present graphic evidence of the differential location habits of the two conformations of business isolated in the previous empirical work. Nucleated shopping centers (Figure 13) are widely dispersed throughout the city; supplies-repair-arterial centers (Figure 14) are highly concentrated, oriented to and outlining a few major streets.

The significance of such differential patterns is evident when these spatial distributions of the two conformations are compared with patterns of traffic flow in the city (Figure

15). Available data concerning traffic flow are relatively old, derived as they are from the 1946-1947 origin and destination survey for Spokane, yet obvious relationships between traffic flow and the two types of center appear. Supplies-repair-arterial centers are oriented to the routes with major traffic flows. Business types within this conformation seek out major axes of movement. This is suggested by the example of the traffic-oriented locational pattern of service stations and garages (Figure 16). There are, then, close resemblances between patterns of traffic flow and patterns of supplies-repair-arterial centers.

Nucleated shopping centers are on the other hand more diffuse. However, Class III_A and Class II_A centers, and the seven largest centers of Class I_A, are oriented to arterials, seeking out major traffic intersections. So does center 204, and centers 256, 263, 271, and 276, are located upon the major arteries leading north and east from the city center. Center 254 is an eastward extension of the automotive area of the central business district. Center 185 is small, but has expanded in the years since 1946-1947 with growth of southeastern sectors of the city. Smaller nucleated shopping centers are widely scattered, relatively evenly distributed throughout populated parts of the city. Associations of variations in number and density of these smaller centers and the distribution of population may be noticed (Figure 17).

WELLESLEY AV

NEVADA ST.

GARLAND AVE.

WALL ST.

NORTHWEST BLVD.

MONROE ST.

HOWARD ST.

WASHINGTON ST.

DIVISION ST.

ILLINO

ASH ST.

INDIANA

BOONE AVE.

HAMILTON

BROADWAY

CENTRAL BUSINESS
DISTRICT

3rd AVE.

3rd AVE.

SUNSET BLVD.

MAPLE ST.

CEDAR ST.

8th AVE.

PERRY ST.

14th AVE.

INLAND EMPIRE WAY

LINCOLN

GRAND BLVD.

C. W. Beetschen

WELLESLEY AVE.

NEVADA ST.

CRESTLINE ST.

MARKET ST.

DIVISION ST.

WASHINGTON ST.

HOWARD ST.

ILLINOIS

INDIANA

GREENE ST.

MISSION AVE.

HAMILTON

NAPA

TRENT AVE.

SPRAGUE AVE.

BUSINESS
DISTRICT

3rd AVE.

8th AVE.

PERRY ST.

14th AVE.

GRAND BLVD.

FIGURE 15

TRAFFIC FLOW

1946 - 1947

LEGEND

5
10
15
20
25
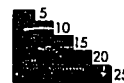
THOUSANDS OF VEHICLES PER WEEK-DAY
Twenty - Four Hour Volumes

C. W. Beatschen
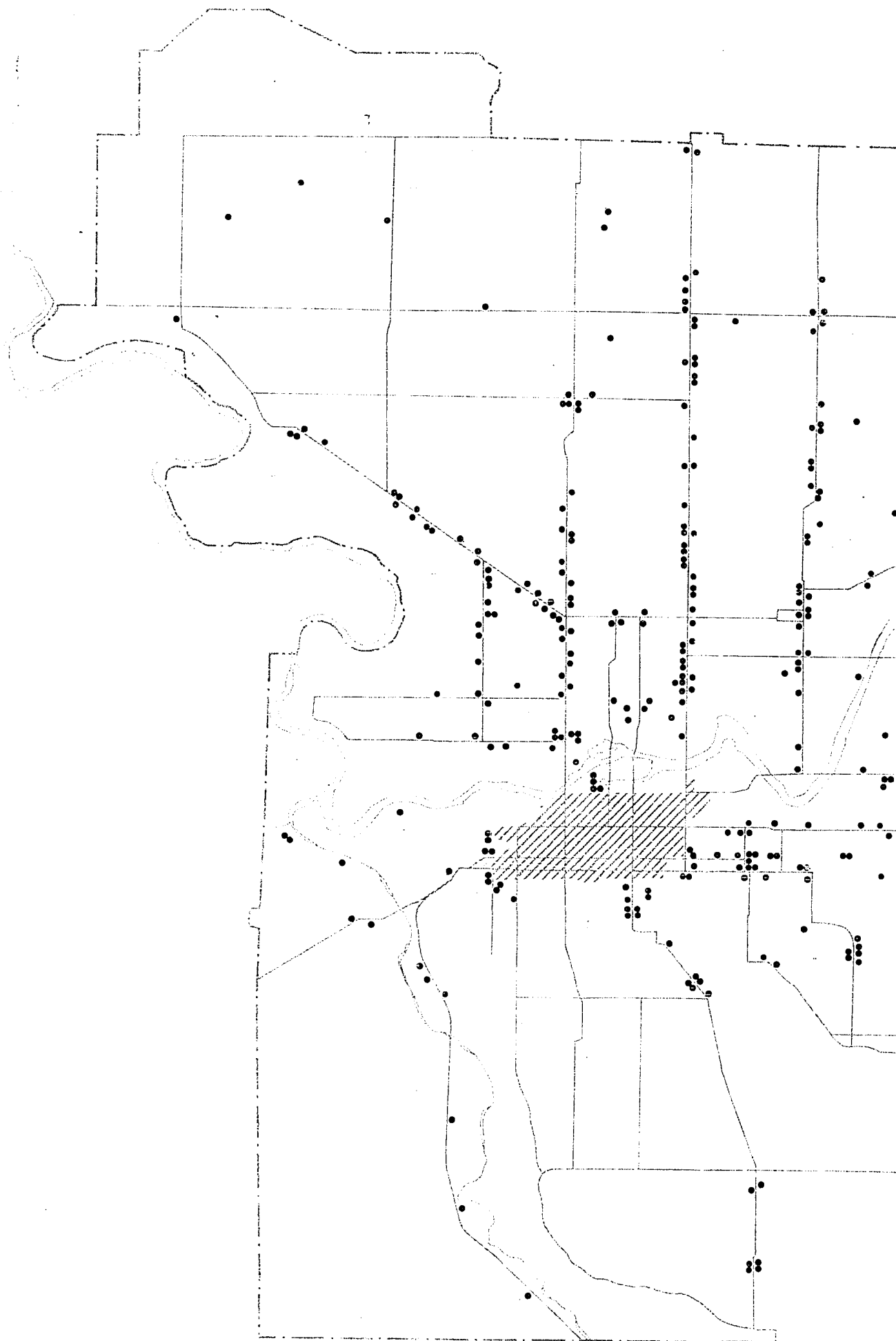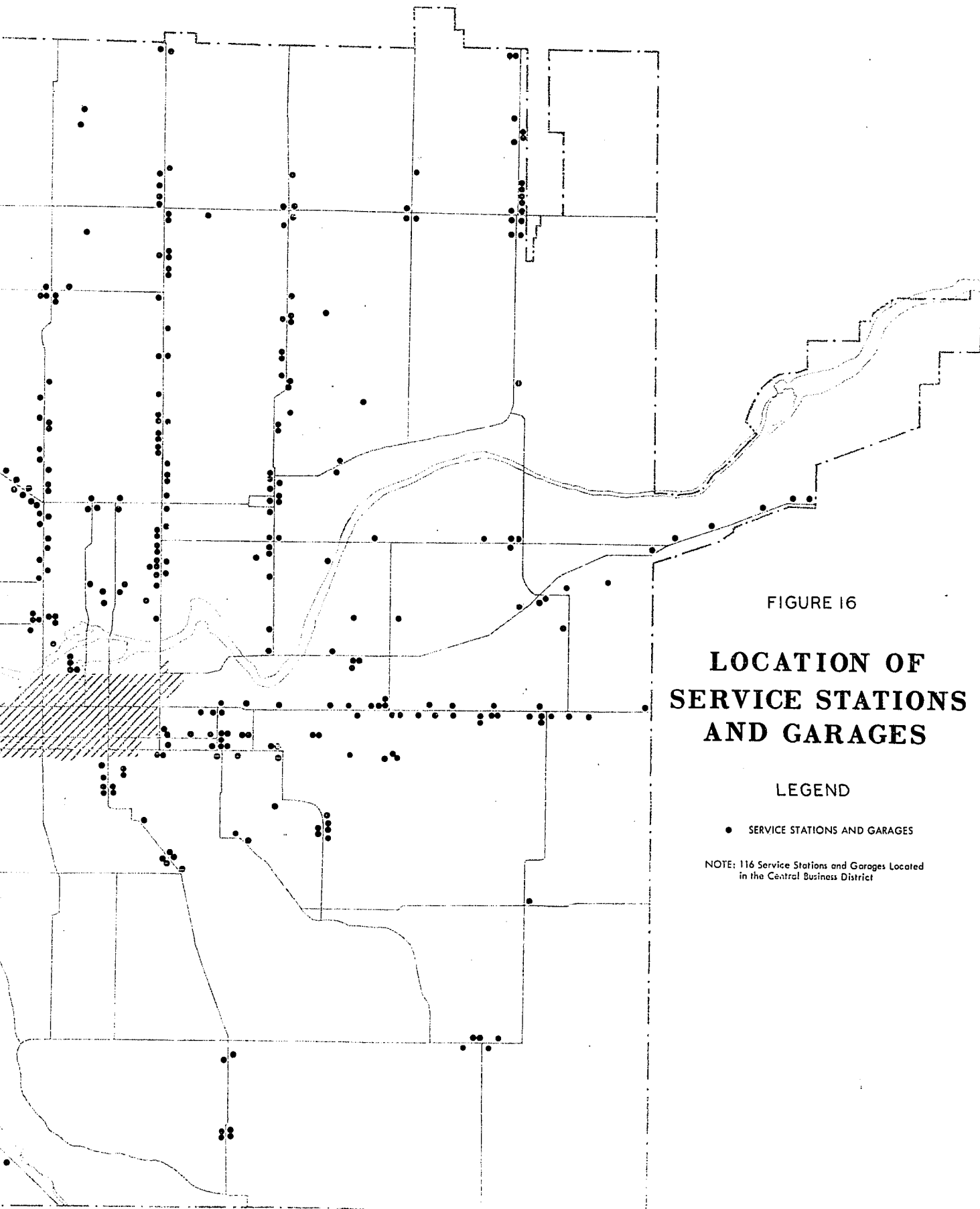
FIGURE 16

LOCATION OF
SERVICE STATIONS
AND GARAGES

LEGEND

●   SERVICE STATIONS AND GARAGES

NOTE: 116 Service Stations and Garages Located
    in the Central Business District

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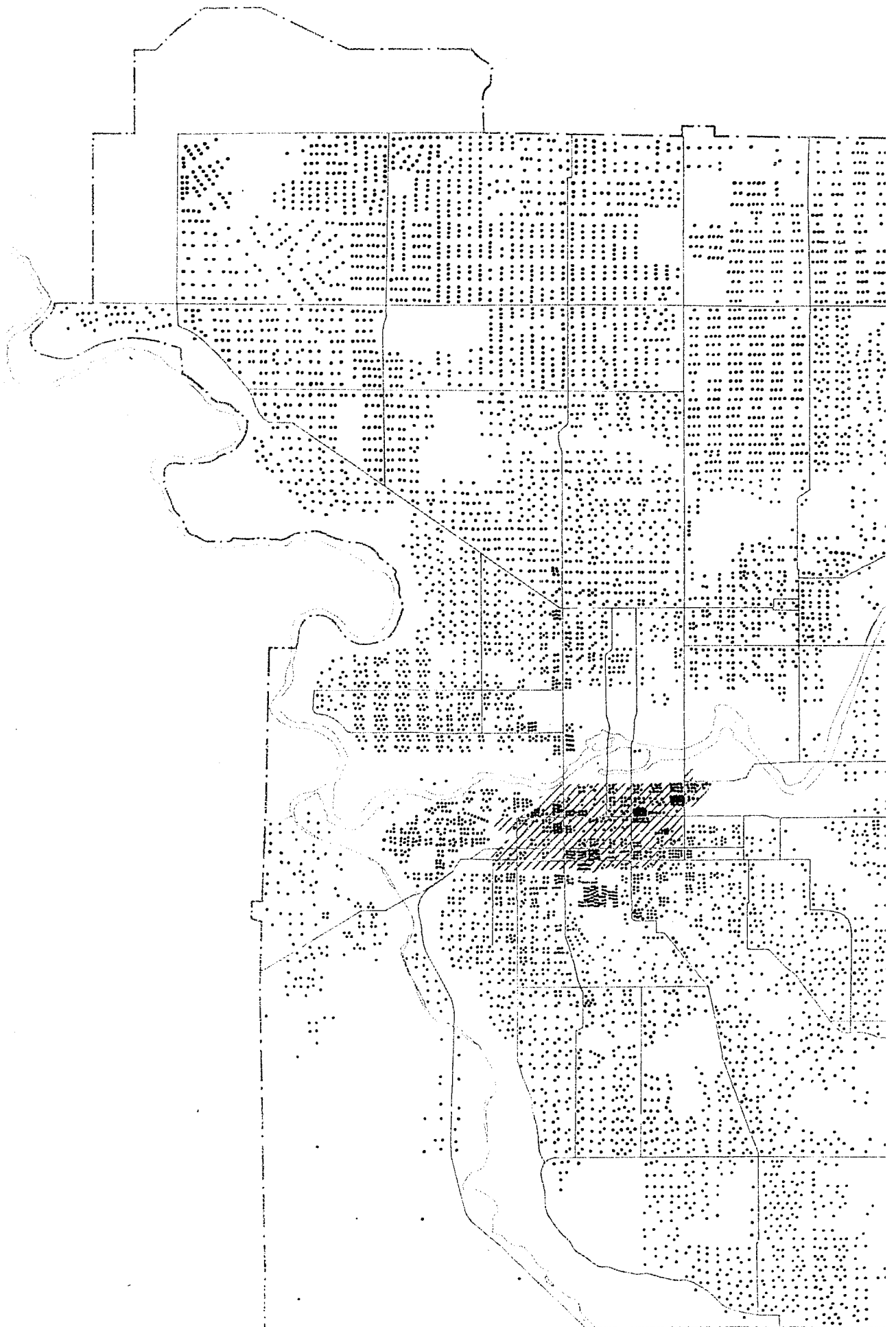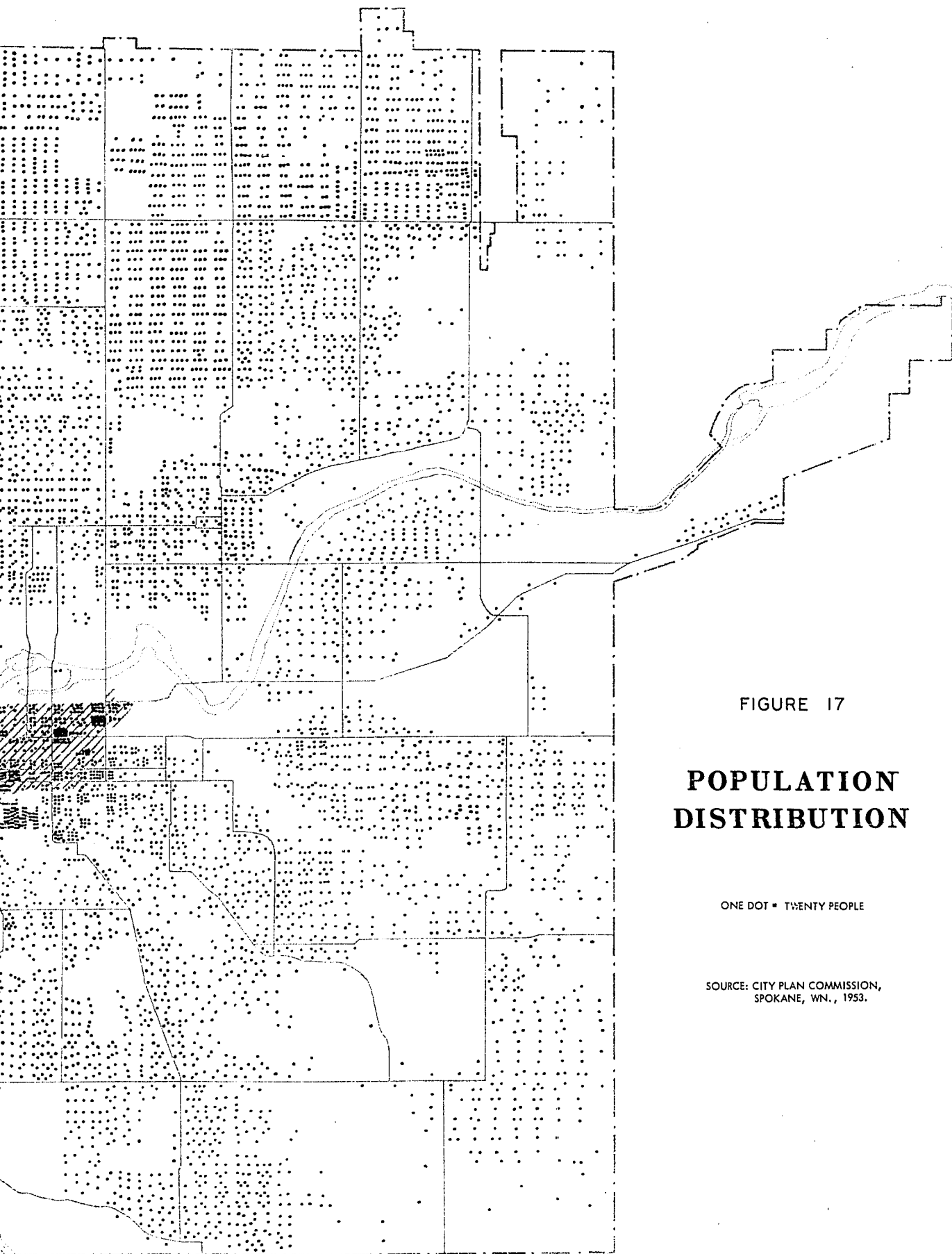
FIGURE 17

POPULATION
DISTRIBUTION

ONE DOT = TWENTY PEOPLE

SOURCE: CITY PLAN COMMISSION,
SPOKANE, WN., 1953.

CHAPTER IV

THEORETICAL AND PRACTICAL IMPLICATIONS
OF THE EMPIRICAL WORK

"The function of a science . . . is to establish general laws covering the behaviour of the empirical events or objects with which the science in question is concerned . . . If the science is in a highly developed stage . . . the laws which have been established will form a hierarchy in which many special laws appear as logical consequences of a small number of highly general laws expressed in a very sophisticated manner; if the science is in an early stage of development . . . the laws may be merely the generalizations involved in classifying things into various classes."[1]

The basic method of science is generalization or induction, the process of drawing inferences about a whole class from limited observations. This process is achieved by development of theory from existing knowledge, testing hypotheses developed from this first theory, refining, and asking further questions (generated by the inability of theory to provide

---

[1]R. B. Braithwaite, Scientific Explanation (Cambridge: The Cambridge University Press, 1955), p. 1.

adequate explanations) to be subjected to subsequent empirical testing. So the gradual building process of science takes place.[2]

Even the most restricted portions of the real world are complex. As a result, especially at an early stage of development, it is often necessary to abstract certain events from reality, analyze these, and relate them back to the more complex reality. This study, given the present very limited state of knowledge concerning the retail and service business structure of the city and its place within the broader hierarchy of theories of land use and tertiary activity, has abstracted the problem of generalizations involved in developing from reality an objective grouping and linkage (or classification) system of retail and service business in its spatial context within the urban area. It is not concerned with the development of a few generalizations and sophisticated laws.

Initial theory was formulated from existing theory of tertiary activity, related to theories of land use and asserted causal processes, and a classification system was shown to be plausible within the theory. Empirical work was undertaken to evaluate the validity of the classificatory

---

[2]E. Bright Wilson, An Introduction to Scientific Research (New York: McGraw Hill Book Co.,1952), pp. 21-35.

notions of structure. Tests and results have been described. Comparisons and evaluations remain to be undertaken. Too, theoretical implications of the empirical findings remain to be explored. A series of questions therefore has yet to be answered, and answers and generated questions related back to the theory of retail and service business. Implications for the more general theory of tertiary activity and land use will remain implicit.

First, it must be ascertained in what ways results of the present empirical work verify, call for modification, or demand rejection of the asserted classification of urban business. Second, there needs to be an evaluation of the extent to which theory provides plausible explanations for the observed structure and pattern and of specific require-ments for the improvement of theory. Third, requirements for further empirical research need to be indicated and di-rections for development of more sophisticated laws suggested.

Cohen[3] has emphasized the complexity of the real world, and he asserts that there are three levels of gener-ality which may be reached and considered as laws:

---

[3]M. R. Cohen, "Reason in Social Science," The Phil-osophy of Science, ed. H. Feigl and M. Brodbeck (New York: Appleton-Century-Crofts, Ltd., 1953). He writes, "In general social systems are networks in which one cannot change one factor without affecting a great many others. It is, there-fore, difficult to determine the specific effects of any one factor." Ibid., p. 665.

(1) Every general fact which is authenticated may be considered a law. It is not of utility to call these laws, however, because such statements hardly constitute science in which facts are connected by logical principles.

(2) Empirical or statistical sequences may be considered laws. Such sequences can include objectively determined classification systems. These are not the ultimate laws in science, however, because connecting links are ignored.

(3) Statements of universal abstract relations of causal processes which can be connected systematically with other laws in the field are the ultimate laws of any science, natural or social. "The ideal end is to attain universal statements about partial aspects of all the phenomena in a given class."[4]

Empirical sections of this study have been at the level of statistical sequences, concerned with development of a valid and objective pattern of retail and service business. Proven statements of universal abstract relations of causal processes have not been made. But the direction to the ultimate stage may be indicated, and probable constituent factors of the universal relation suggested as a result of the empirical findings.

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[4]Cohen, op. cit., p. 668.

Comparisons with the Kelley Classification

The Kelley classification asserted that business struc-
ture comprised basic nucleated and string street conforma-
tions, with the nucleated conformation stratified into neigh-
borhood and community types of center below the level of the
central business district. This classification resulted from
the empirical work of such students as Rolph, Proudfoot, and
Ratcliff, and from assertions characteristic of such city
planners as Hoyt and McKeever relating to levels of provision
of goods and services by urban shopping centers.

In the Spokane study existence of two basic conforma-
tions of business was recognized. These conformations con-
sist of scattered distributions of nucleated centers and
localized stretches of string street ribbon type centers.
As was suggested by Ratcliff, there is difference in form.
But in ways which neither Kelley nor Ratcliff emphasized
there is yet another distinction between the two conformations.
This is a functional differentiation. The nucleated conforma-
tion comprises types of business which serve the basic food,
clothing, drug, and personal service needs of the consumer.
Within the string street conformation are automotive func-
tions oriented to arterial highways, series of stores pro-
viding the whole range of household and building supplies,
and several types of business involved in repair work (often

calling at the home to perform their service). Hence, it was thought that a more realistic name for this conformation was the supplies-repair-arterial conformation, presenting more graphically a picture of its functional character.

The classification is at best of limited value when the stratifications of business derived from urban planning concepts are considered. Simple distinctions between isolated stores, neighborhood, and community types of nucleated centers are not enough. Both nucleated and supplies-repair-arterial conformations are stratified. Both conformations contribute to total business structure and condition it according to their own stratification and locational pattern. The result is a complex pattern of business which is hierarchically stratified.

Nucleated functions create a pattern comprising few large complex centers and many small less complex centers, and there is a total of three classes: a lower level of frequent occurrence and diffuse spatial distribution, and two upper levels of larger complex centers located at the city's major traffic intersections. The lowest of the three levels has a range of B functions, and some C functions; the second level has complete ranges of B and C functions; the uppermost level is distinguished by possession of a full range of functions of group D (Tables IV and VI).

Conversely the supplies-repair-arterial conformation creates a total of four classes of centers. Three upper classes are distinguished by increasing ranges of groups F, G, and I, with a complete range of A functions. The fourth and lowest level of many small centers is defined restrictively on the basis of an incomplete range of A functions (Tables IV and VI).

Some centers are affected entirely by the nucleated conformation, others entirely by the supplies-repair-arterial conformation. These centers are generally of the lower level types. At the upper levels, centers contain members of both conformations and are affected by each to the extent that they possess functions of each. When centers are dominated by the nucleated conformation they are widely diffused throughout the city, located at major traffic intersections, and central to urban population. Where centers are affected by the supplies-repair-arterial conformation to a greater extent than the nucleated they assume patterns oriented in string streets to the major traffic arteries of the city. Combined effects of the two business conformations serve to stratify the business centers into four classes. The complex character of Class IV centers reflects the complexity of upper classes of both conformations. The wider range of Classes III and II reflects both the supplies-repair-arterial pull for a wider range of upper class centers, and the greater breadth of

function characteristic of the lowest class of the nucleated conformation. Class I, too, represents a compromise between the restrictive lower class of the arterial conformation, and the greater flexibility of the nucleated conformation.

Are the Observed Patterns Optimal?

It is important for the discussion of planning which follows to ask whether the observed patterns of urban business are optimal patterns. The point of view taken is that actual economic conditions are adoptive (see the comments regarding A. S. Alchian in Chapter II above). In other words it is considered that as a result of competitive processes the economic system selects for every site the highest and best use, and therefore observed patterns of business are optimal. Some untried new firms are found and failing older establishments persist, for events occur in a time-space continuum of which growth and decay are inherent characteristics. But within these limits of growth and decay, overall distinctions between hierarchically stratified conformations of business are assumed to be outgrowths of the competitive urge to maximum efficiency in the economic system, and patterns are therefore optimal.

Plausibility of the Theory of Retail and Service

Business in the Light of the Empirical Findings

The theoretical statement of the arrangement of urban
shopping centers previously presented accounts for a hier-
archical stratification of centers. Functions have differen-
tial threshold requirements, and spatial relations of stores,
consumers, and shopping centers result in a hierarchy of
businesses and centers. It is evident from the study, how-
ever, that the simple hierarchical pattern presented in
Table I above holds only in part. There is stratification,
but centers at the lowest level do not possess all the func-
tions of the apposite groups of business. Considerable
variation exists between individual centers. Upper level
centers on the other hand do have a complete range of func-
tions appropriate to their level (Table VI).

What interpretation can be given to this situation?
Why should there be substantial variations of functional
character between smaller centers of the same class in a
local area and not between larger centers of higher level
classes? An answer may be found, perhaps, in the frequent
occurrence and close spacing of smaller centers. Several
occur within reasonably short distance of any residence, and
these are partially complementary, partially competitive.
Conversely, less frequently occurring types of business of
upper groups are found only in higher level classes of center,

and since they are more widely spaced, they are found in each of the higher level centers (Table VI). Less complementary relations exist between upper level centers. Empirical evidence is needed concerning the extent of complementarity between centers, and if the ideas are proved of value inclusion within a more general theoretical statement is required.

As developed, the theory makes no statements about tendencies for two conformations of business and to this extent it is inadequate. In its present form the theory is developed to account only for relations of a single aggregate of continuously varying purchasing power and of conditions of entry of retail outlets which satisfy demands associated with this purchasing power. The resulting optimum solution is an hierarchical system. The theory is cognizant neither of differentials in purchasing power, nor of differentials in the manner in which goods are provided.

Here are further needs for the development of theory. Theory must be modified to explain two conformations. What guideposts can be suggested for such modification? Several may be outlined:

(1) Nucleated and supplies-repair-arterial conformations are observed in reality to be of contrasting functional character. They serve different demands, different 'baskets' of purchasing power (elaborated below).

(2) The nucleated conformation is population-oriented, and major centers are located at points of maximum accessibility in the city as indicated by major traffic intersections. Conversely, the supplies-repair-arterial conformation is highly concentrated, oriented to major arterials, and has a spatial pattern much like the map of traffic flow. This would indicate not only differential types of purchasing power, but also differential locational incidence of demands.

(3) It may be inferred from the constituent store types that the nucleated conformation provides for daily or weekly shopping needs of the home. Hence its diffusion, and the orientation of larger centers to points of maximum accessibility. Similarly, it may be inferred that the supplies-repair-arterial conformation provides for needs of people on the move, moving through the city or to and from work, and for the needs of their automobiles. It also provides all repair needs of the home (such as radio and television repair and plumbing). Here further associations may be hypothesized. The arterial conformation includes functions which perform their service in the home and which deliver to the residence. These are perhaps located at the points of greatest ease of movement to be able to deliver more efficiently. Similarly, the conformation contains many of the household furnishing and supplies group. Such types of business may be located in ways which will facilitate and speed the single

purpose special trip and aid delivery of such commodities
as furniture to the home. It is perhaps for these suggested
reasons that the supplies-repair-arterial conformation is
oriented to the major traffic arteries of the city.[5]

Requirements for the Development of Theory

Two contrasting conformations of business have been
shown to have differing location habits and differing rela-
tions to traffic flow and population distribution. Any
universal theory of urban business must account for these
differences. But causal relations are by no means clear.
Further empirical work is needed to clarify relations of
business, accessibility, traffic flow, population, consumer
movement, and the like. Only with such clarification will
a sophisticated theory of urban business be developed.

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[5]These suggestions are not meant to deny other possible
causes. For example, it is entirely feasible that these lo-
cations also furnish lower priced business sites attractive
to easy entry, low income kinds of business. It can also be
a relic area for businesses unable to compete for the greater
centrality of nucleations. Information of relevance in this
context could be provided from relative land value data and
from considerations of the dynamics of urban business. We
have hypothesized two kinds of orientation: 1) people at home,
and 2) people on the move. It is evident that others are en-
tirely feasible.
  One other study is available in this context, but the
author has been unable to examine it: Paul R. Merry, "An
Inquiry into the Nature and Function of a String Retail De-
velopment. A Case Study of East Colfax Avenue, Denver, Color-
ado" (unpublished Ph.D. dissertation, Northwestern University,
1955). It would be interesting to compare Merry's results with
those above concerning the supplies-repair-arterial conforma-
tion, and the incidence of nucleation at major intersections.

At the same time relations between this theory of
urban business and more general theories of urban and agri-
cultural land use need to be explored. Likewise, further
evaluation of the parallels of central place theory (with
its single hierarchy) and the theory of urban business (with
dichotomous hierarchies) would be of considerable value.

Practical Implications of the Empirical Work

In spite of the intermediate stage of development of
a theory of retail and service business in the city, em-
pirical findings of the study have immediate practical value
in evaluating present planning for business by the city of
Spokane. The City Plan Commission has long sought with but
limited success (except in the case of the restriction of
noxious industries to certain areas) to impose an orderly
arrangement of land uses in the city by limiting the loca-
tional choice of new construction. One part of the policy
has concerned retail and service establishments. This part
has been developed in a situation of quite limited informa-
tion, and it is for this reason that the empirical results
presented are of utility.

Adequate amounts of land have in the past been zoned
for business, and enough has been found where needed. Only
in the cases of bars, auto wreckers (and the like) have zoning
restrictions prevented business establishments from locating

freely. However, a new and more restrictive zoning ordinance has been proposed to serve the changing needs of the city. Not only does this proposed ordinance impose greater restrictions upon locational choice; it is more restrictive of land zoned. Too, it is armed with an 'abatement clause' to eliminate within reasonable time, all uses defined as 'nonconforming'. Empirical evidence developed in this study facilitates a critical analysis of this proposed zoning ordinance. Practical values of the work immediately become evident.

Zoning for business, 1929-1958. Zoning restrictions in Spokane were first imposed by the zoning ordinance of 1929. With few modifications this ordinance is still in use to this day. New business was intended to be directed to selected locations by prior classification of land according to acceptable use. No powers of removal of existing uses were granted. Zones were defined upon existing patterns of land use broadened to include possible extensions, and were altered where sufficiently strong cases for rezoning or variance were presented to the City Commissioners.

In general, retail and service businesses were permitted in three 'districts' (zones):

(1) Class III, Local Business District. In this district were permitted all types of residential land use and retail and service establishments needed to serve demands of

residential districts. However, bars were specifically excluded.

(2) Class IV, Commercial District. All retail and service uses were permitted in addition to all types of food processing, wholesaling and warehouses, storage and contracting facilities.

(3) Class V, Manufacturing District. All types of uses permitted in the Class IV District, and all except noxious manufacturing uses, were allowed in this zone.

Considerable latitude existed in the locational choice of firms. The City Plan Commissions' Land Use report of 1954[6] noted that out of the total area of the city of 26,170 acres, 2,698 were zoned Class III, IV, and V. Of the acres zoned, only 1,392 were used for business, commercial, and industrial uses, and 819 were vacant. Too, 141 acres of land were used for business, commercial, and industrial uses in residential zones, and 433 acres were in business, commercial, etc., uses in the restricted industrial zone. Only 535 acres were used for business and commercial uses. More than 7,900 acres of the city were vacant. Too, until recently it has not been difficult to present an acceptable case for a variance or rezoning especially where several possible site alternates were available.

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[6]City Plan Commission, City of Spokane, "Land Use," City Planning Series, 4, 1954.

In the past five years the city has pursued a more active policy towards business. This has consisted both of attempts to direct new shopping center developments by restricting granting of variances, and also of development of a proposed zoning ordinance. The former attempts are integral parts of the latter undertaking and provide good indications of the direction of policy once it obtains more effective weapons in the form of the new ordinance and its constituent abatement clause.

Recent attempts to control shopping developments. In anticipation of the acceptance of the new zoning ordinance there has been very active planning concern with the location of new business developments, and decisions have been made in the light of expected planning powers. Premises used in the formulation of the new ordinance have been utilized in recent planning decisions and provide a clear picture of how the Plan Commission will operate with the new ordinance.

The proposed ordinance and the recent policy both assume (after the work of the Urban Land Institute and the American Institute of Planners) that there should be two types of shopping center, neighborhood and community, based upon two types of goods, convenience and shopping, with two types of associated trade area. Land has been designated for either neighborhood or community business center use and 'trade areas'

have been assumed (Figures 18 and 19--these should be com-
pared with Figures 12, 13, and 14) without any analysis
other than the stated requirement that neighborhood centers
should be approximately one-half mile apart and community
centers one and one-half miles.[7]

With these assumptions land required within each
'trade area' for business has been estimated by the Plan
Commission in the following manner. From the population
map estimate the total number of families in the assumed
trade area, and from census data estimate their aggregate
income. Assuming that 50% of incomes is spent upon goods
and services (one-third in the central business district,
one-third in community centers, and one-third in neighbor-
hood centers), estimate total funds to be spent in the type
of center being studied. Assuming that $50 per square foot
of retail floor area is required for a business to be 'in
the black,' estimate the gross retail floor area the assumed
trade area will support. To this add various allowances for
offices, gas station, parking (at the ratio of 3:1 sq. ft.
for stores, 2:1 for offices), walks, service areas, land-
scaping, etc., and a total area of land to be used for business
is found. Subtracting the area of present uses (except those

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[7]See Comprehensive Zoning Ordinance (Spokane: City Plan
Commission, 1956) and Zoning for Local Business Centers
(Spokane: City Plan Commission, 1953).

C. W. Beetschen
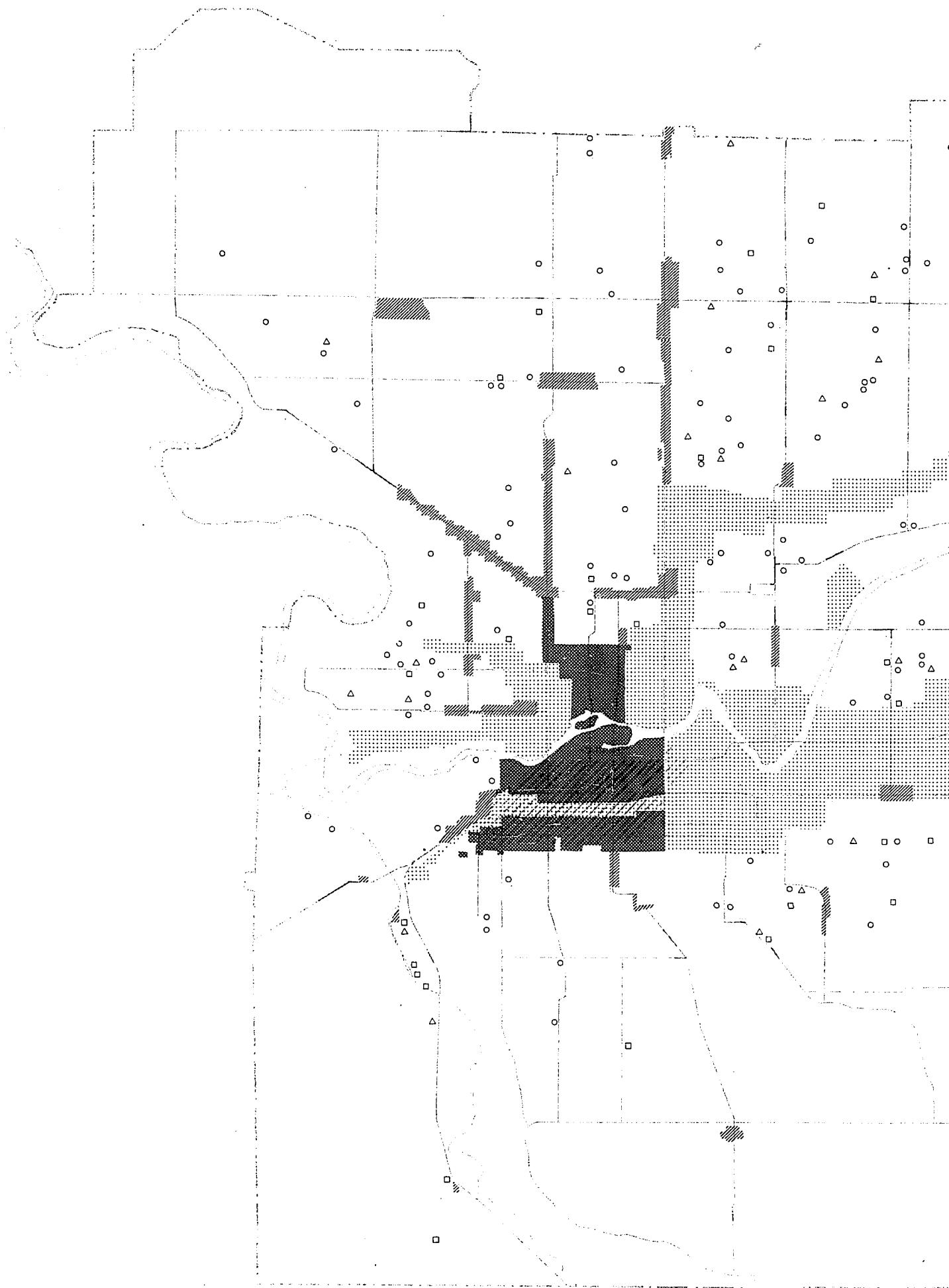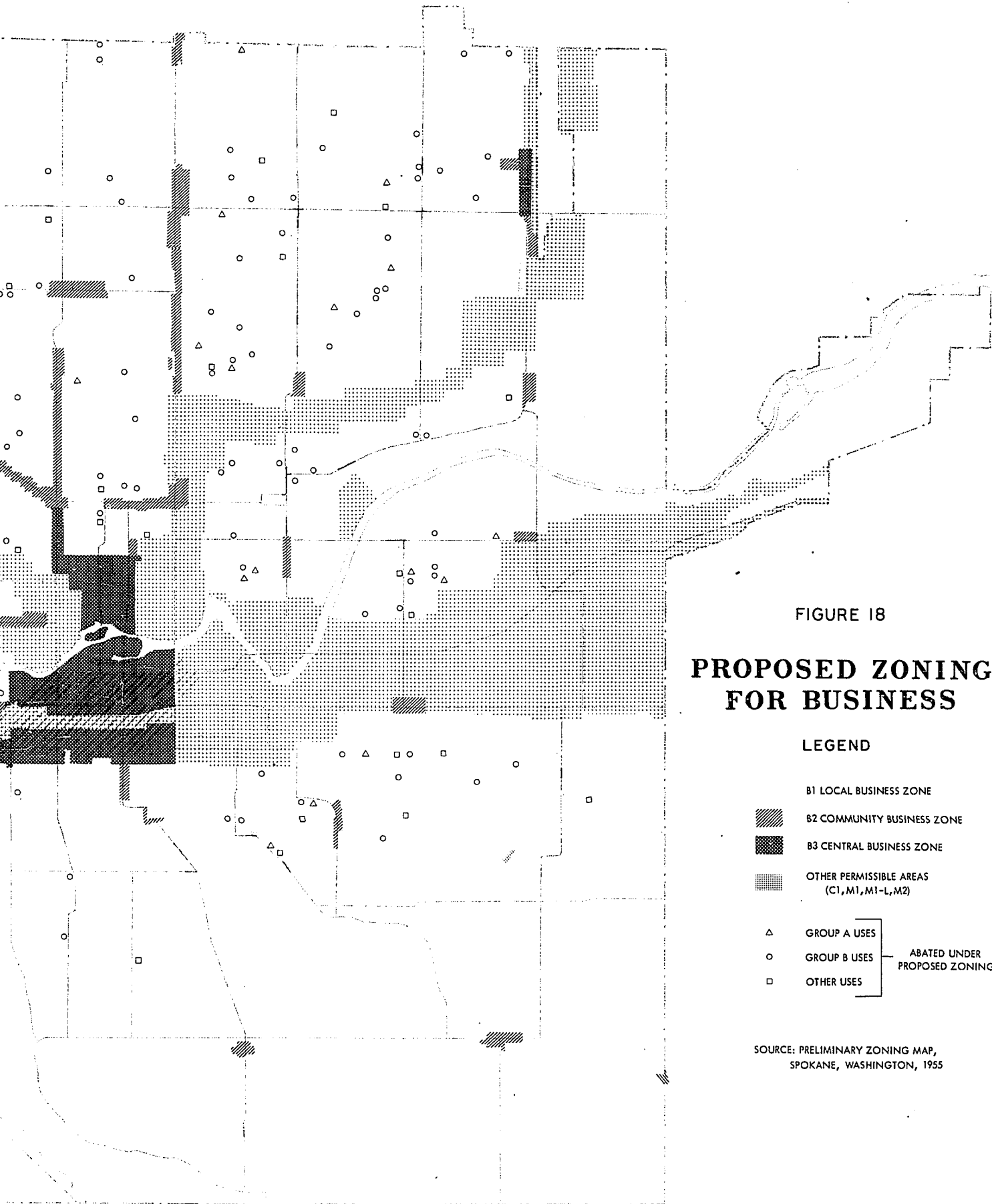
FIGURE 18

PROPOSED ZONING FOR BUSINESS

LEGEND

B1 LOCAL BUSINESS ZONE

B2 COMMUNITY BUSINESS ZONE

B3 CENTRAL BUSINESS ZONE

OTHER PERMISSIBLE AREAS
(C1,M1,M1-L,M2)

△   GROUP A USES

○   GROUP B USES   ⎯   ABATED UNDER
                          PROPOSED ZONING

□   OTHER USES

SOURCE: PRELIMINARY ZONING MAP,
SPOKANE, WASHINGTON, 1955

CENTRAL BUSINESS DISTRICT

C. W. Beetschen

FIGURE 19

ASSUMED TRADE
AREAS

FOR ESTIMATION OF
LAND REQUIREMENTS

LEGEND

———————————— B1 MARKET AREAS

······················ B2 MARKET AREAS

▬▬·▬▬·▬▬ B1 – B2 SUPER-IMPOSED

SOURCE: CITY PLAN COMMISSION,
SPOKANE, WASHINGTON

CENTRAL BUSINESS
DISTRICT
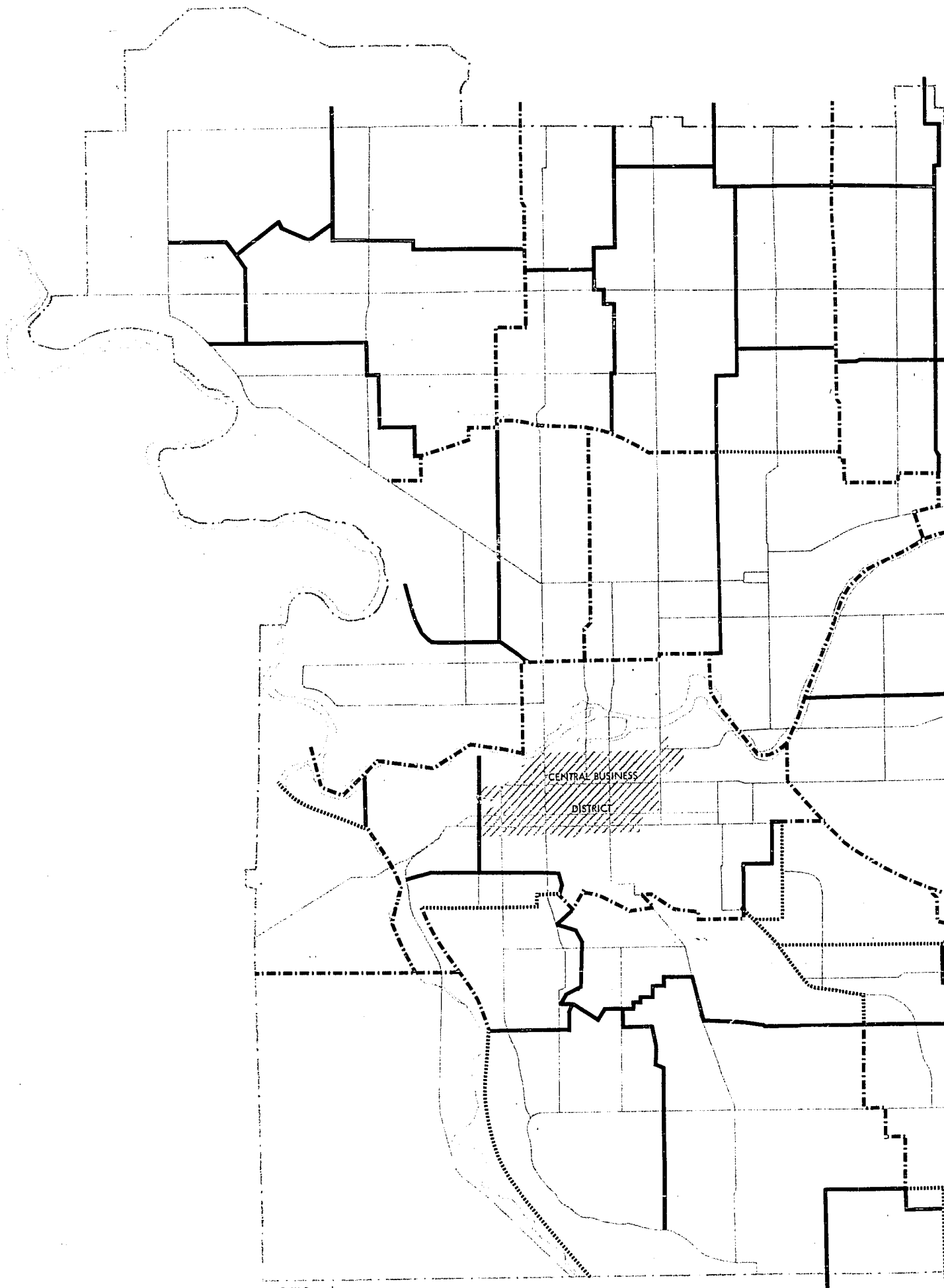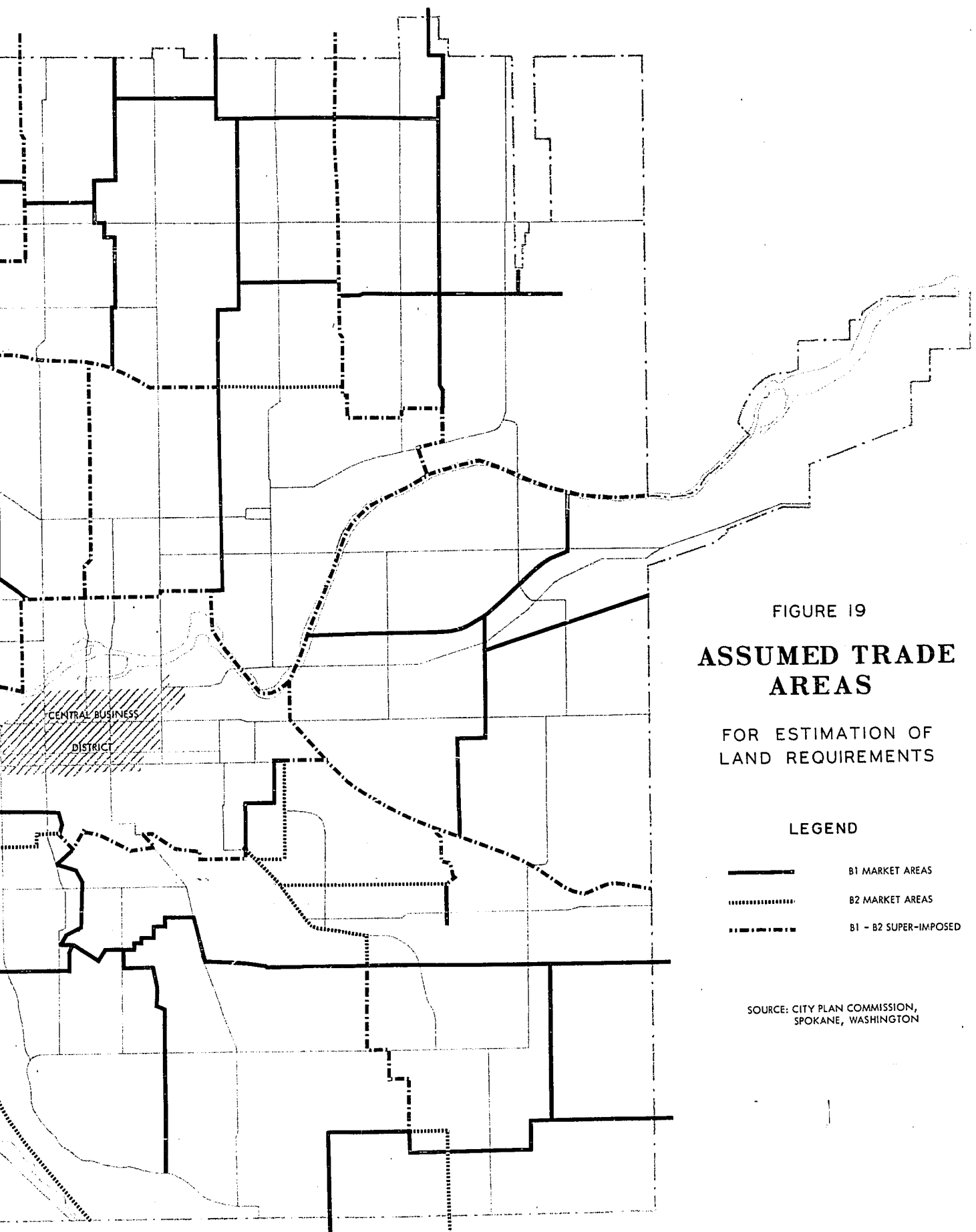
designated as nonconforming and therefore to be abated) there
remains the allowable land for present business expansion.
Using population forecasts, further amounts of land needed
for expansion at successive future time periods may similarly
be obtained.[8]

If a proposed business center development satisfied
a need for further business as estimated in the above manner
and a location was proposed compatible with the proposed
zones of Figure 18 then approval of the City Plan Commission
could be obtained. If these requirements were not satisfied,
the proposal was not supported (however, later approval could
be obtained from the City Commissioners who have the veto
power over the Plan Commission).

The proposed zoning ordinance. Critical assumptions
built into the proposed zoning ordinance are those which
classify the business centers of the city into community and
neighborhood centers, and those leading to calculations of
needed amounts of land based upon assumed trade areas.
Associated with these assumptions and restrictions are de-
cisions concerning size and spacing of centers and abatement
of uses which as a result are considered nonconforming.

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[8]For an example of a study using these methods see
The Manito Shopping Center Problem (Spokane: City Plan Com-
mission, 1956), mimeo. This study contains justifications for
the various estimating ratios utilized.

Retail and service business establishments are to be allowed differentially in several zones within the city:

(1) B1, Local Business Zone. This zone provides for small centers which contain retail and personal service establishments serving daily needs of a population residing within one-half mile of the business center. Only uses which serve the above purposes without detrimental effects upon surrounding residences are to be permitted. The location and quantity of land in a B1 zone is to be 'commensurate with the purchasing power and needs of the present and potential population residing within the neighborhood trade area.' Bars are specifically excluded. All uses have to satisfy certain specific site requirements. A list of uses allowed is as follows: apparel, art studios, bakery at retail, barber, bicycle sales and repair, confections, dress making and tailoring, drug stores, dry goods, dry cleaners pickup, fix-it, florists, fountains (not drive-in), frozen food lockers, gifts, grocery, fruit and vegetables, hardware and paints, hobby, interior decorating, jewelry, laundry pickup, meat markets except fish, music stores and studios, newsstands, offices employing less than five persons, photo studios and camera shops, parking lots, public service buildings, radio and television repair, restaurants (except drive-in, dancing and entertainment), gas stations (site requirements restricted), shoe sales and repair, sporting goods and

variety. Auto repairing is not to be permitted.

(2) B2, Community Business Zone. This zone is intended to accommodate and control larger shopping developments with community facilities serving several square miles of the city, comprising a group of neighborhoods within a distance of one and one-half miles of the B2 zone. Goods provided and land zoned are to be commensurate with purchasing power and needs of present and potential populations residing in the assumed trade area. Location is to be convenient to the city's arterial system. Permitted uses include all those of the B1 zone, plus amusement parks, appliances, banks, baths, boat sales, bowling alleys, building supplies, business colleges, catering, commercial artists, department stores, drive-ins, eating establishments, employment agencies, film exchanges, floor coverings, funeral homes, furniture stores, groceries and supermarkets, hotels, leather goods, lithographing and addressograph, offices and office supplies, massage, motor cycle sales and repair, nurseries and greenhouses, open lot sales, opticians, pet shops, public utility buildings, second hand stores, gas stations and fuel oil sales, studios, theaters (except drive-in), and motels (by special permit).

(3) Other Zones. Retail and service businesses of the above types will also be able to locate in the B3 Central Business District Zone, the C1 Commercial Zone, and the M1,

M1-L, and M2 Industrial Zones. In these various zones all retail and service business types excluded from the B1 and B2 zones are able to locate as well.[9]

(4) All Other Zones. The proposed ordinance also makes provision for abatement of all retail and service businesses located in all other zones.[10] Such potential non-conforming uses are outlined in Figure 18. In all, 217 are identified. As Figure 18 indicates they are largely isolated establishments drawn from groups A and B (Table II).

The planned pattern of business. The Plan Commission of the city of Spokane conceives a business structure for the city comprising neighborhood centers providing convenience goods and community centers providing convenience and shopping goods. Allowed uses reflect definitions of what constitute convenience and shopping goods. Amounts of land are determined as above. The whole system is to be oriented about the specialized central business district of the city. All uses

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[9] "Comprehensive Zoning Ordinance," op. cit. This may be contrasted with the requirements of the 1929 ordinance, Charter and General Ordinances (Spokane: The City of Spokane, 1939). A complete outline of the location standards for the various types of business centers is to be found in "Zoning for Local Business," op. cit.

[10] The abatement clause is discussed in "A Review of Information Collected and Considered in Preparation of Provisions for the Abatement of Nonconforming Uses Suggested for Inclusion in Spokane's Proposed Comprehensive Zoning Ordinance" (Spokane: City Plan Commission, 1957), mimeo.

in other than planned locations and of other than specified kinds in planned centers are to be abated. An actual trade area pattern is, by planning action, to be made to conform to the assumed pattern utilized in the analysis of land requirements and location of centers.

Critical elements of this planned pattern are stratification into neighborhood and community centers, specification of permitted 'convenience' and 'shopping' uses, and abatement of nonconforming businesses. Empirical evidence produced as a result of the Spokane study enables an objective evaluation of each of these critical elements.

Critique of Spokane Planning for Business

The nature of the empirical evidence developed indicates that not only are simple assumptions about types of goods and trade areas in error, but that out of the shopping needs of the city has emerged a far more complex structure of business than the Plan Commission imagines. There are three levels of a nucleated shopping hierarchy rather than two (neighborhood and community). Too, there is an arterial hierarchy for which there is no planning provision at present. It may be entirely possible for the Plan Commission to continue with its present policy, and ultimately force business into the pattern it desires, a pattern other than that which has developed as part of the natural interactions of demand

and supply in the city. However, to do so would be to risk
incurring substantial social losses to the consumer, to the
businessman, and to the city because of sub-optimization of
the system. It is the purpose of the ensuing remarks to
indicate the limitations of present policy, and to suggest
means whereby this policy may be improved.

Permitted uses. Planning policies assume two types
of good, convenience and shopping, and broad groups of uses
permitted in B1 and B2 centers are specified on this basis.
When the empirical evidence presented in Table II is examined
and contrasted with the broad use groups specified the in-
adequacy of the latter is clear. To be sure, they do not
exclude anything of significance. It may be argued that it
is the lack of exclusions and contrasts which create problems.

The distinction between nucleated shopping and supplies-
repair-arterial functions is not recognized. Yet this basic
dichotomy is not without importance for the planning of
business, since one type has one set of locational patterns,
the other an alternate. Efficient planning should recognize
and allow for such differential elements if business is to be
kept healthy, and the consumer to be served in an optimal
manner.

Too, simple stratification of business into two levels,
convenience and shopping, is far too diffuse. Groups of
associated business types within both conformations have more

limited and restrictive membership. It is possible, given
the empirical evidence developed to prepare a much more
precise plan for business at a greater series of better-
defined levels. This is possible not only for the gross
pattern of business, but also for both conformations.

An efficient approach to planning using natural group-
ings of business to develop permitted uses would be to
identify (1) two conformations of business types, and (2)
precise hierarchical stratification of businesses and cen-
ters of each conformation. Recognition of these provide
the first steps. Also needed is information concerning
location habits of the various resultant types of centers,
and their relations to purchasing power and trade areas.

Classes of center. The proposed zoning ordinance
developed, using an assumption of two types of goods, a
bimodal stratification of business centers into neighborhood
and community classes. Just as the empirical evidence indi-
cated the invalid character of the assumption, so it shows
the lack of validity in the concept of two classes of center.
If any bimodal character exists, it is between nucleated
shopping and supplies-repair-arterial types. The two have
differing functional characters and differential location
habits. Diffusion, with orientation to home-based purchasing
power, and situation at intersections stratified according to

traffic intensity is characteristic of the former. The latter is highly concentrated, oriented to major traffic arteries and to the demands of people moving. Also found here are uses which provide their service in the home and are consequently located better to be able to reach the home. The former rely upon parking and pedestrian traffic between stores, the latter upon the single purpose trip by automobile to the particular store upon the arterial. Parking is therefore a composite problem for the nucleated center, and is a direct function of the individual store for the supplies-repair-arterial type. Nature of hierarchical stratification likewise differs between the two conformations.

It is evident that not only should efficient planning take account of the differential natural grouping of functions to prescribe permitted uses, it should also take account both of differential location habits and different patterns of hierarchical stratification. A modification of the present zoning system would be adequate to account for the nucleated shopping facilities, but a totally new concept would be required to plan the supplies-repair-arterial conformation, reserving stretches along or set back parallel to major traffic arteries for these types of business, and recognizing the essentially individual nature of the parking requirements of each type of store. Since it is evident that there is little functional relationship between the two

conformations of business, both as regards shopping trip
and location of purchasing power, an efficient policy could,
without social loss, maintain a dichotomous planning and
zoning structure based upon the conformations. These points
are elaborated below in the discussion of gains and losses.

Trade areas. Calculations of land requirements based
upon assumed trade areas are suspect. It is evident from
the foregoing that they are extremely inaccurate. Purchas-
ing power is not a single aggregate to be parcelled between
two types of shopping center and the central business district.
There are two separate elements to the purchasing power
aggregate. The first of these comprises expenditures made
during shopping trips to one or other levels of the nucleated
shopping hierarchy, and these expenditures have to be shared
between the various levels according to the amounts of goods
purchased in each. The second consists of a diverse group
of expenditures upon goods and services associated with the
automobile and its needs, with repairs, with furniture and
supplies, etc. This, too, must be parcelled out according to
the various purchases, and the position of the serving busi-
nesses in the centers of the supplies-repair-arterial hier-
archy.[11]

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[11]Perhaps the most complete detailed source of infor-
mation concerning consumer expenditures upon goods and services
is The Study of Consumer Expenditures (University of Pennsyl-
vania: The Wharton School in cooperation with the Bureau of
Labor Statistics, 1950 et seq.) in 18 volumes.

This means that trade areas vary. The concept of a
trade area defined upon a home-base is adequate for the
nucleated shopping type of business. However, it is doubt-
ful whether this can be applied with equal validity to the
more diverse supplies-repair-arterial conformation. Here
the trade areas are likely to be multiple-referent composites
of home-based, work-originating, highway-oriented, and
business-service areas. In both cases prior assumptions
about shape and extent of trade areas are of doubtful value.
Certainly, if land requirements are to be calculated the
first need is a detailed trade area study both for the two
conformations and also for each level of the stratified
hierarchy within the conformations. From this kind of study,
supplemented by information of the type developed in the
"Study of Consumer Expenditures"[12] desired information con-
cerning total funds spent in each shopping center should be
derivable.[13]

Abatement. Suggested abatements would remove some
217 business establishments widely scattered throughout the

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[12]Ibid.

[13]Of course, equally valid and far simpler would be
the computation of total sales volumes for each level of the
hierarchy and each type of business (these data are collected
by the Bureau of the Census), and a simpler and quicker trade
area study if such should be desired.

city. These establishments are important parts of the low-
est stratum of both nucleated shopping and the supplies-
repair-arterial conformations; only 28 are business types
of neither group A nor group B. It is by no means clear
that removal of these scattered uses would lead to greater
social gains, for they are integral parts of the complex
system of complementary provision of goods and services to
immediate residential areas at the lowest level. It is en-
tirely feasible that many of them are necessary parts of
the system. Certainly, the question of abatement should be
studied far more carefully in the light of the empirical
evidence. Whether it is more desirable to force the lowest
level constellation of complementary uses into single cen-
ters, or to allow them to remain more diffuse locationally
certainly merits further detailed study. Without this fur-
ther study any active policy of abatement, even though it
may have immediate intangible merits, is questionable.

Some measures of gain and loss to the city. Both
tangible and intangible losses and benefits are likely to
accrue from the direction of potential uses into sub-optimal
locations, or from abatement of uses which are constituent
parts of an optimal system.

If the observed patterns of business are optimal, then
restrictions which eliminate lower levels of the nucleated

shopping hierarchy and which do not make special provision
for the supplies-repair-arterial hierarchy will result in
tangible losses. The consumer will have to travel further
to obtain his needs and therefore will have diminished
purchasing power. Lower effective purchasing power means
wider spacing of an optimal system of shopping centers.
Uses of near marginal-hierarchical character become marginal
and sub-marginal and in the long run fail or have to seek new
locations. Therefore, ability of businesses to compete for
the land is reduced and general rent-levels are diminished.
The landowner suffers as well as the businessman. Fewer
uses also mean lower revenues to the city. For example, all
other things remaining equal, if assessed values of gas
stations per front foot are $52, and single family residences
are assessed at $32 per front foot, replacement of the former
by the latter would mean a loss to the city of assessed
values of $20 per front foot. Other potential losses are
suggested by the following figures, which are averages per
front foot on Division Street between Francis and Euclid
Avenues (Source: Spokane County Assessor's Office. 1956
data): vacant land $13, single family residences $32, clean-
ers $40, building supplies $42, gas stations $52, plumbing
and heating $60, drugs $70, supermarket $271 (double depth).

One of the major arguments for planning business loca-
tions is that many other tangible and intangible losses are

thereby avoided, or benefits thereby gained. For example, provision of special parking facilities and planned access greatly facilitates movement along arterials, and reduces congestion. Planning of shopping centers is also desired to maintain community and neighborhood character, and by preventing cluttering and conflicts it is held to avoid depreciation of residential land values in proximity to businesses. Included within the locational standards of the city of Spokane are several of these tangible and intangible factors not directly associated with the sale and purchase of goods and services but asserted to be responsible for either benefits or losses: compatibility with surrounding developments, assurance that the morals and well-being of residents will not be jeopardized, provision of safe access via a 'feeder' street, assurance against over expansion and loss of neighborhood character.

There is no explicit model of the residential sector of the urban economy which shows that uncontrolled developments can lead to losses in these several respects. But at the same time it should not be inferred that planning for business compatible with optimal location requirements is inimical to the maintenance of such standards if they are shown to be essential. This is best illustrated in the case of the supplies-repair-arterial hierarchy, planning for which would be in such complete contrast to accepted concepts and

practices. It would be entirely possible to plan for a string of arterial type business along a highway as a unit if the string of business along the arterial were set back with adequate off-street parking and a common controlled access from the arterial, so that congestion and the risk of accidents were reduced, yet with each business maintaining its apparently required visibility from the highway. Common site screening for the entire string could ensure against loss of neighborhood character and maintain land values of proximal residences. Recognition of the character and needs of the supplies-repair-arterial hierarchy would be the assurance against over-expansion. Such planning would result in additional intangible benefits at the same time, for arterial business would thereby be kept out of nucleated centers and needless traffic through residential areas avoided by keeping arterial demands confined to the arterials.

There are both pros and cons, and discussion often resolves itself into assertions and counter assertions. Certainly, any planning decisions need to be based upon higher levels of empirically valid information than is at present evident in the work of the Plan Commission of the

city of Spokane. But some limitations have been identified[14].

and at least intuitively it seems that it is possible to

plan for business centers located in an optimal manner and

still both avoid tangible and intangible welfare losses and

profit from maintenance of location standards and beneficial

safeguards.

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[14]Of course, to attribute all of these limitations to
the Plan Commission of the city of Spokane would be unjust.
The Plan Commission is working with information it has ob-
tained from other sources. Since the research worker wishes
to know which works contain spurious concepts, it is apposite
at this stage to facilitate subsequent searches of literature
by students to indicate the sources of the specious concepts
used by Spokane's city planners. Several works are mentioned
in the study "Zoning for Local Business" (op. cit.):
Community Builders' Handbook, Urban Land Institute, 1950;
H. Hoyt, "Market Analysis of Shopping Centers," Technical
Bulletin, No.12, Urban Land Institute, 1949; Planning the
Neighborhood, American Public Health Association, 1948;
L. Segoe, Local Planning Administration, Institute of Train-
ing in Municipal Administration, 1941; S. H. Mott and M. S.
Wehrly, "Shopping Centers: An Analysis," Technical Bulletin,
No.11, Urban Land Institute, 1949. Such works, and undoubtedly
more of the same type (for example, the references supra,
Chapter III, footnote 30), may be disregarded with safety and
without detriment to the axiom structure of further theoretical
and empirical work.

CHAPTER V

SUMMARY OF CONCLUSIONS

This study developed out of previous empirical and theoretical work a theory of intraurban retail and service business, and this theory was shown to be compatible with existing theory of tertiary activity and with theories of urban land use and urban land value. In the latter case it provided welcome keys to understanding the ordered system of urban land values and uses, found in the areal functional organization of the urban area about focal points such as business centers.

Forces suggested to affect urban business locations were evaluated in the light of theory, and their specific role was clarified. Too, plausibility of a classification of urban business was demonstrated. Certain other problems were shown to be capable of more intelligible attack given development of the theory. These included problems of the impact of persistent pre-equilibrium consumer connections upon patterns of urban business trending to optimum, and the impact of city planning upon levels of urban rents and the organization of urban land uses one to another. An assertion

that planned shopping centers are a new force in urban re-
tailing was shown to be quite unrealistic.

The classification of urban business shown to be
plausible within the limits of the developed theory was then
subjected to empirical testing in the city of Spokane,
Washington. Major findings of the empirical work may be
outlined as follows:

(1) Businesses tend to associate geographically in
nine groups, defined on the basis of strongest correlations.
Eight of these nine groups associate in two conformations,
called the nucleated shopping conformation and the supplies-
repair-arterial conformation. One remaining group, the clinic
group, remained unassigned.

(2) Associations of businesses in groups and groups
in conformations are such that business centers fall into
hierarchical structures comprising three levels of a nucleated
shopping hierarchy, and four levels of a supplies-repair-
arterial hierarchy. In combination the dual hierarchies
create an overall four-level hierarchical system of business
in the city of Spokane. Functional character of any indi-
vidual center is directly related to the relative importance
of one or other conformation of business in the center.

(3) The hierarchy of nucleated shopping centers
assumes scattered spatial patterns throughout the city. In
the case of lower level centers possessing ranges of B functions,

and few C functions (Table II) the distribution of centers may be related closely to the distribution of urban population. Higher level centers possessing both complete ranges of B and C functions and also complete ranges of D functions are found at those major intersections which are points of maximum accessibility in the city. Group E functions are a special case located on an eastward extension of the central business district along Sprague Avenue. A tentative hypothesis is that nucleated shopping functions are closely related to pedestrian traffic, and have common parking problems to meet the needs of customers who operate from a home base.

(4) The hierarchy of supplies-repair-arterial centers has a highly concentrated spatial pattern oriented to major traffic arteries of the city. Generally, the greater the traffic flow the higher in the hierarchy is a center of this type. Tentative hypotheses relate these centers to special trips from the home, to movements from store to home to perform services, and to commuting traffic with stops to satisfy needs of the automobile. Parking tends to be a function of individual stores, and pedestrian traffic is limited between stores.

(5) Clinics are a special case, located peripheral to larger centers, or scattered in residential areas.

(6) The lowest level of the composite hierarchy and of each of the two conformation-hierarchies comprises many

small centers of diffuse functional character. Series of
these small centers seem partially competitive, partially
complementary in each local area, so closely are they spaced.

Durden[1] after Merton[2] has written that "empirical re-
search . . . performs at least four major functions which
help the development of theory. It initiates, it reformu-
lates, it deflects, and clarifies theory." The findings of
the empirical study of business in Spokane perform all of
these functions.

(1) Initiation. As a foundation for future work
the study provides only classificatory axioms. Further work
is required to throw light on the operation of lawful causal
processes before any universal abstract relation may be
formulated, for such universals demonstrate how empirically
valid structures and classifications emerge naturally from
the operation of lawful processes.[3] However, the study does
demonstrate certain associations and make tentative hypotheses
which can serve to generate the needed studies of causes.
More information is needed about relations of the differential

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[1]D. C. Durden, "Some Geographical Aspects of Motor
Vehicle Travel in Rural Areas" (unpublished Ph.D. disserta-
tion, University of Washington, 1955).

[2]R. K. Merton, "The Bearing of Empirical Research on
the Development of Social Theory," American Sociological
Review, vol.13 (1949), p. 506.

[3]See Cohen, op. cit.

conformations of business and the demands which they serve.
This implies studies of the relations of purchasing power
and other characteristics of consumers, the origin and nature
of shopping trips, and the location of business. Generaliza-
tions are needed about the dichotomous location habits of the
two conformations, nucleated and arterial, and their associa-
tions with demands and purchasing power. Too, studies of
differences in shopping habits at stores are needed. Is,
for example, the tentative hypothesis about pedestrian
traffic in nucleated centers, and single-purpose automobile
visits to arterial centers valid? This study serves to initi-
ate these and other empirical studies as foundations for a
sophisticated body of theory concerning urban retail and
service business.

(2) Reformulation. The hierarchical stratification
of the Kelley classification is, in the light of the em-
pirical evidence, to be rejected. Neighborhood and community
shopping centers as levels should be replaced by more real-
istic recognition of a finely structured complex system of
two hierarchies which in combination give an individual
character to each business center of the city.

(3) Deflection. As outlined above, theory is to be
deflected from the stratification of urban planners, based
upon simple untested assertions. The direction of deflection
is towards reality.

(4) Clarification. It is evident that the two con-
formations are not simple aggregations of business differing
in form, as was suggested by Ratcliff. They are dichotomous
functional groups, each with its own hierarchy throughout
the whole range of shopping centers, and each contributing
to the composite business structure of the city. Here is
clarification as a result of the empirical study. In other
ways clarification appears, too. For example, the single
purchasing power aggregate of the theory of urban business
as developed initially is obviously invalid. Here there is
clarification of the nature of the purchasing power factor.
Also, better understanding is developed of the nature of the
lower levels of the hierarchy where closely spaced centers,
each with differential baskets of goods, are partly comple-
mentary in the local area.

Beyond the four functions of Durden and Merton, the
study also has both practical and technical implications.
At the practical level the invalid character of the City Plan
Commission's notions of types of goods, types of centers,
trade areas, spacing of centers, abatement of lower level
uses, etc., is noted. The sources of these erring concepts
are recorded, and the researcher is saved much effort in his
search of the previous literature. As a result of evaluation
of city planning in Spokane it becomes overwhelmingly evident
that if planning is not to create the possibility of incurring

substantial social losses it must work with higher levels of valid information than it has to the present time. Such better levels of information are provided by results of the empirical study outlined above and suggestions are made for a better city policy concerning planning for business. Some of these suggestions are that stratification of uses in present and proposed planning be replaced by the greater number of levels of more highly restricted functional character of the nucleated shopping conformation, and that a new concept in zoning be introduced with specific planning for a hierarchy of centers of the supplies-repair-arterial type. Since little functional relation is to be found between the two conformations, it is further suggested that these may be zoned separately without loss of efficiency or sub-optimization of business.

At the practical level the study has certain technical implications for work in geography. The objective grouping methods provided by McQuitty's linkage analysis result in the availability to geographers of far more powerful techniques for their studies of associations and groupings than have been found in the tool bag of geographical science before.

With a basis of an empirically valid classification which provides a lowest stratum of axioms, with the techniques for increasingly effective empirical work, with some of the directions for examination of the operation of lawful causal

processes indicated, it is hoped that this study will pro-
vide a starting ground for the development of that ultimate
body of universal theory which will not only provide a needed
theoretical framework from its partial point of view, but
will also lead to more general associations of the wider
range of partial theories at present in a developmental
stage. The broadest objective of any geographical research
is the understanding of the impact of spatial processes upon
social organization, and it was towards such an ultimate
that this study was directed.

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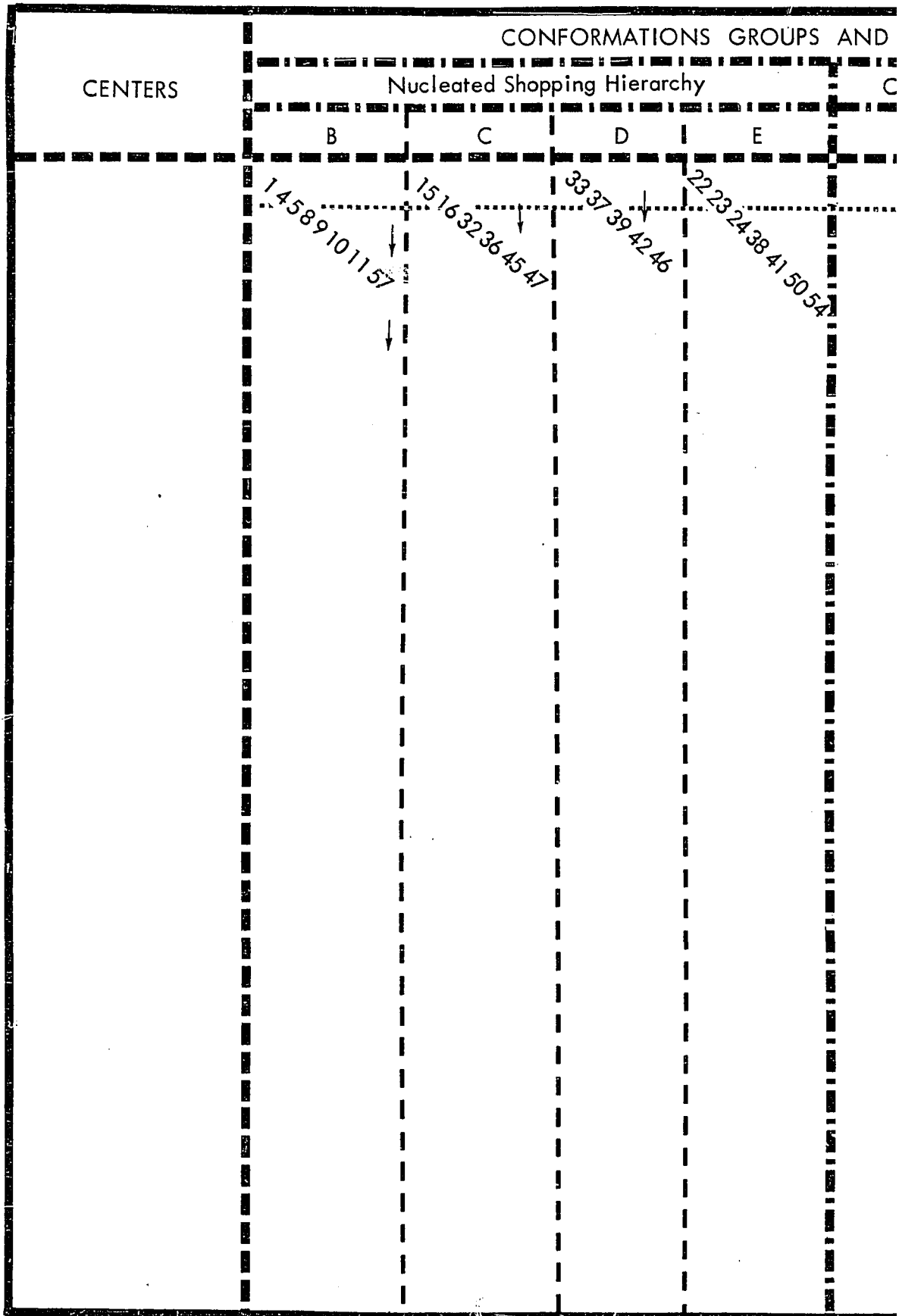
CENTERS	CONFORMATIONS GROUPS AND				C
	Nucleated Shopping Hierarchy				
	B	C	D	E	
	1 4 5 8 9 10 11 57	15 16 32 36 45 47	33 37 39 42 46	22 23 24 38 41 50 54	

ORMATIONS GROUPS AND TYPES OF BUSINESS [b]

g Hierarchy			Clinic Group		Supplies-Repair-Arterial Hierarchy			
D		E	H		A	F	G	I
37 39 42 46	22 23 24 38 41 50 54		30 31		236	7 12 13 14 17 18 19 20 21 26 44 55 60	40 56	28 51 52

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CLASS IV

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CLASS III

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269	1232211	51 151	2 1	1	
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263	21 1111	21121		1 1	
268	151			111	
271	111 131	1 1	1	1	
256	11 322	1	11 1	1	
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          111              12         752      111  1                33      1 1
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11 1        1              4          34       111          11
2                                     421      211 11 1 1                    222
1         1  1             12         2          1   2
            1                         2 2      2221    121  2
                                      213      31 11         1
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137	621111	1 1			1
266	21 11			42	
274	11 211	1	1	1	
185	2211 2	111		1	
235	213	1 1		11 1	
29	2221 2	1 1			
267	1 1111				
290	11 1 1	1 1			
118	1 1	1	1		
217	113				
277	21		1	1	
115	12 1	1		1	
65	1111 1				1
285	3221121			1	
295	1	1	1	2	
278	2	2		11	5
279	3 2	1 1			
280	1112 2	1 1			
79	21	1			
286	3 3 21		1		
222	2 3 5 2		1		
179	1111 1	1			
64	1111 1	1	1		1
153	1111 1	1 1			

22		1	624	2 1 2		1	1
11			421	1 2 1 1			
		1	521	1 11			
42			44	212 33 1			
1 1			212	2 1		2	
1			311	11			
11 1				2 1 1		1	
			411	11			
		1	111 1	1			
		111	1 1				
1				2 1 1 21 1			
			314	1 3 1 1			
1	1		312	1 1	1		
1			423	1 2			
	11		11	1			
1			1	2			
1 2			2 2	1 2 1			
11	5		52	1 1			
			31	11 1			
			1	1			
			21	11 11			
			21	2 1			
			6	21 1			
			1	1 1			
1		1	1				
			21				

CLASS II

ID	C1	C2	C3	C4	C5	C6	C7	Last
265	1 32			1		22		1	624
141	111 1		1	1		11			421
137	621111			1 1				1	521
266	21 11					42			44
274	11 211			1		1	1		212
185	2211 2			111			1		311
235	213			1	1		11	1	
29	2221 2			1 1					411
267	1 1111								1
290	11 1 1			1	1				111
118	1 1			1		1			
217	113								314
277	21					1	1		312
115	12 1			1			1		423
65	1111 1							11	11
285	3221121						1		1
295		1		1		1	2		2 2
278		2		2			11	5	52
279	3 2			1 1					31
280	1112 2			1 1					1
79	21			1					21
286	3 3 21				1				21
222	2 3 5 2				1				6
179	1111 1			1					1
64	1111 1			1		1		1	1
153	1111 1			1 1					21

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24    2   1 2              1       1              106          1
21    1   2 1 1                                  226           15 1
21    1 11                                       281        2 1 1 1        1
 4    212 33  1                                  260
12    2     1                  2                 275             1
11              11                               163          11
       2     1 1              1                  270          11  1
11       11                                      200        1 1 1          2
 1    111     1          1                       259        11 1
11    1 1                                         76        2 11  1
       2 1 1   21 1                               55        3111 1
14    1     3 1 1                                150        1111 12
12    1     1            1                        69        111111
23    1        2                                 119             1
 1       1                                       257        1                1
                2                                  5        2   1 1
  2    1        2 1                              245        2 1              1
 2     1 1                                        13        2 1    1
 1              11 1                              60        11
 1       1
21    11        11
21    2 1                                        CLASS I
 6    21  1
 1    1 1                                        293
 1                                               114             2
21                                               282             21
                                                 149        1
```

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                    1                   111      1     1                        1
      1        1                   99        1
1                                                         1                         11
                        13              1        11    1    1
              1              1         2 1              1    1
                                       322       2    1
                                       1         1   1   2
2               1                      41
                                       11                   1        1
                                       1 1           1
                                       2                    1
                                                 1
                                       1
    3                                  1 1          1                   1
      1                    1           2       2 1
                                       11        1
1                                      1 1                   1
                                       1           1 1
                                       11        1        1


                111                    3              1
          1          1          1      1
          1                            3     1
                                       321       1
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216	1	1					1	2	1
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105	11	1					1	1
21	31	1					1		1
32	32	1					31	
241	1111	1						
15	1						3	11
128	1						1 1	1
197		1	11				1	
192				1			21	2
180	11	1						1
137	111						1	
205	2	11					4	
138							21	1
121				1			1	1
104	1	1						1
41	1	1					2	
117	1	1					1	
243	1						1	1
125	1						1 1	
201	11							1
240	2	1					1	
42							11	1
287							212	

ID					
89	3 1	1			
51	111				
26	111				
233	1				1
238	1				1
122		1	1		
132	1		2		
88	1		1		
289		1	2		
212		1	1		
251	2		1		
247	1		1		
242	2		2		
239	1		3		
186	1		1		
156	2		1		
94	1		1		
93	2		1		
77	2		1		
135				1	1
124				1	1
146			1		1
248			1 2		
231			1 1		
148			1 1		
142			1 1		
2			2 1		
250			11		
234			11		

	Col1	Col2	Col3	Col4	Col5
196			1		1
123			1	1	
296	1			1	
36	1			1	
63	2			1	
24	1		1		
165	1	1			
46	1	1			
291	1	1			
283	1	1			
170	1	1			
71	1	1			
126	1	1			
181	31				
155	11				
129	11				
54	11				
19	21				
173					
120					
136					1
4					1
147					1
193					1
152					1
50					1
237					1
195					1
166					1

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220		1
167		1
194		1
159		1
160		1
67		1
215	1	
61	1	
208	1	
130	1	
103	1	
227	1	
211	1	
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14	1	
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111	2
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109	1

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8	1	
6	1	
3	1	
1	1	

12	86
11	161
10	221
9	35
8	207
7	232
6	145
5	249
4	80
3	102
2	223

VITA

Brian Joe Lobley Berry was born on February 16, 1934,
at Sedgley in the County of Stafford, England. His parents
are Mr. and Mrs. J. Berry of London, England. Mr. Berry
was educated at Queen Elizabeth's Grammar School, Gains-
borough, England, and at Acton County School, London, England.
He matriculated in 1950 and obtained his General Certificate
of Education, Advanced Level, in 1952, together with a State
Scholarship for university work. In the period 1952-1955 he
attended University College, University of London and there
received his B.Sc.(Economics) degree with first class honors
in 1955. He was awarded a Fulbright travel grant and entered
the University of Washington in 1955, obtaining his M.A. de-
gree in geography in 1956. At the University of Washington
he has successively held posts of teaching and research
assistant (1955-1957), predoctoral associate (1957), and at
present he is acting instructor in the Department of Geography
and research instructor in the Department of Civil Engineering.
In the summer of 1956 he was a research assistant for the
Washington State Civil Defense Survival Plan Studies and he
shared in the monograph which resulted from the research.
During the summer of 1957 Mr. Berry held the position of engi-
neering research aide for the City Plan Commission of the
City of Spokane, where he undertook preliminary phases of the

Spokane Metropolitan Area Study. At present he is associated
with the Highway Economic Impact Studies of the U. S. Bureau
of Public Roads, and his thesis forms an integral part of
the project research. Computations in his doctoral thesis
were facilitated by an award of free computer time from the
Western Data Processing Center of the University of Cali-
fornia, Los Angeles. Upon completion of present project re-
search, Mr. Berry will assume the position of Assistant Pro-
fessor in the Department of Geography, University of Chicago.