EVALUATION AND MODIFICATION

OF

THE NEIGHBORHOOD UNIT FORMULA

THESIS FOR THE DEGREE OF M.U.P.

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ABSTRACT

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By

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During the past few decades, society has been experiencing the growing impact of technological achievements. Some of its effects have been felt in our perception of physical distance and increased awareness of the value of time.

While the impact of these achievements has been experienced in all aspects of our lives, the "Neighborhood Unit Formula," introduced almost half a century ago, is still accepted as is. This formula was mostly applied to building new communities while the need for its application to older areas was more urgent.

The "Neighborhood Unit Formula" was introduced by Clarence A. Perry as part of the Regional Plan of New York. It defined the physical relationships between families and the services and facilities they need. However, its basic guidelines were heavily criticized because of its social ramifications. Others contend that the formula is simply a proposal for the arrangement of the physical environment intended to provide measures of safety and convenience to urban populations. As a result, it became fashionable to

draw circles stipulating that activity patterns would be confined within these areas. This, however, can rarely be the case, which underlines the need for a realistic appraisal of the formula's principles and standards.

Accordingly, the primary purpose of this research was directed toward evaluating the "Neighborhood Unit Formula," and accomplished in two phases:

(1) Investigate the types of activity patterns which occur within the residential environment. Once this is accomplished, the various design principles, standards and spatial arrangements can be evaluated.

(2) Based on this evaluation, problems can be identified and modifications or alternative solutions can be recommended.

The resulting analysis and evaluation indicate various problems due to the limitations imposed on its size, capacity and design arrangements. Also illustrated are its non-conformity to household activity patterns as well as its rigidity which prevents possible adaptation or modification. Accordingly, an alternative solution is presented. The guidelines proposed for this alternative solution attempt to achieve two objectives. One is to avoid the problems inherent in Perry's design. The other is to allow for maximum flexibility if any changes or alterations become necessary.

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CHAPTER I

INTRODUCTION

During the past few decades, society has been experiencing the growing impact of technological achievements. The introduction and availability of the automobile, for example, radically affected the concept of physical distance and increased people's awareness of the value of time. Modern appliances and storage facilities changed shopping habits, reduced the importance of the corner grocery store and increased that of the supermarket. The wide use of mass media and electronic equipment not only changed the function, operation and scope of services of various facilities but also opened up new avenues of communication and understanding between the urban population.

While the impact of these technological achievements has been felt in all aspects of our lives, many changes and alterations have been experienced in the urban environment. Yet, the "Neighborhood Unit Formula" as an urban design concept introduced almost half a century ago, is still accepted as is.

The "Neighborhood Unit Formula" is a design concept often proposed in general planning reviews as a method for

reorganizing the residential areas. The formula states principles and standards for the spatial relationships of dwellings, schools, shopping centers, churches, libraries and similar elements of the physical environment.

Since its inception, the formula became widely accepted but variously and inconsistently used. At times, it deals with areas having common physical, social or cultural characteristics and at others, it refers to human activities and relationships that may occur among the residents of these areas. Because of these inconsistent interpretations, planners were always reluctant to effectively utilize its principles and standards to solve the problems of physical disorder in well established urban communities. As a result, the formula was mostly applied to building new urban environments while the need for its application to older areas was more urgent. Such limited use did not afford planners the opportunity to examine its principles and standards as a general planning tool capable of organizing the urban form, new and old alike.

Although planners are always in need for planning tools to help build a viable and organized urban environment, there is also a need for examining the capabilities and limitations of these tools before shaping this environment for decades to come. This process of examination, however, was difficult to perform due to the lack of needed information which can adequately describe the

complex interaction between people and physical facilities that takes place within the urban environment. Fortunately, this information became available from surveys conducted by Tri-County Regional Planning Commission in the Lansing-East Lansing Metropolitan Area.[1]

Accordingly, the primary purpose of this research will be directed toward evaluating the "Neighborhood Unit Formula." This will be accomplished by testing its principles and standards, thus developing a notion as to how they actually work in real life.

Study Approach

The approach presented in this study will be as follows:

(1) Examination of the basic assumptions stated by the "Neighborhood Unit Formula."

(2) Testing its principles and standards. To accomplish this, a hypothetical model will be developed.

(3) Evaluation of the formula's principles and standards by comparison with the derived findings. Based on this comparison, guidelines for modifications will be recommended.

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[1]Tri-County Regional Planning Commission, Format and Description of Data in Card or Tape Form (Lansing, Mich., 1967).

CHAPTER II

HISTORICAL BACKGROUND

The idea of people living together in a geographic area has long intrigued man. Since early civilizations communities were built in a sufficiently condensed form to afford the needed facilities in a minimum space. The division of large communities into small sections, or "neighborhoods," goes back to ancient cities of the Middle East and Europe. Distinct districts were evident in ancient Rome where the temple, the public bath and the market place were common features. The church was a profound influence on European cities. Such an idea was recorded by Lewis Mumford as follows:

> The division of the town into quarters, each with its church or churches, often with a local provision market, always with its own local water supply, a well or a fountain. Often as in Venice the neighborhood unit would be identified with the parish and got its name from the parish church: a division that remains to this day.[1]

Along with the industrial revolution came the mass migration from rural areas to urban communities. Older sections of cities turned into overcrowded slums unsuitable for

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[1]Lewis Mumford, The City in History (New York: Harcourt, Brace and World, Inc., 1961), p. 310.

human habitation. Such situations became the concern of a new planning movement in an attempt to eliminate these undesirable conditions and improve the quality of urban life. Among the leaders of this movement was Ebenezer Howard, who introduced the "Garden City" concept.[1] The concept deals with totally new communities of 30,000 people. Each community was divided into wards of 5,000 people. The ward was bounded by radial boulevards and circular avenues described as:

> Six magnificent boulevards--each 120 feet wide--traverse the city from center to circumference, dividing it into six equal parts or wards.[2]

Each ward was served by a centrally located school, open spaces, and other services alongside its boundaries.[3]

The implementation of Howard's idea took place in two communities--Letchworth and Welwyn--built near London. Shortly thereafter, its influence became evident in France, Germany, Holland, Italy, Belgium, Poland, Czechoslovakia, Spain, Russia and the United States.

The growing concern which followed has been witnessed and documented. Many theories have been introduced and different approaches to account for the new challenge have been implemented. These theories are evident not only in the areas of transportation and housing, but also in

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[1]Ebenezer Howard, Garden Cities of Tomorrow (London: Faber and Faber Ltd., MLF Paperback Edition, 1965).

[2]Ibid., pp. 51-52. [3]Ibid., p. 53.

civic design and land use, to name a few.

Another pioneer that got involved in this planning movement was Clarence A. Perry. As part of the Regional Plan of New York, he introduced a new concept called the "Neighborhood Unit Formula."[1]

The "Neighborhood Unit Formula" deals with the arrangement of family life communities. As defined by Perry, the unit was described as an area which embraces all public facilities needed by its inhabitants. Each unit provides housing for 5,000 people.

The area is bounded on all sides by arterial streets, provided by a system of small parks and recreation spaces, served by an elementary school, a library, local assembly area and other institutions suitably grouped about a central core with one or more shopping districts laid out in the circumference, preferably at traffic junctions, and a special street system to facilitate internal circulation and to discourage through traffic. Through these physical arrangements, services and facilities would be located within convenient and safe walking distance of the area residents. In addition to providing safety and convenience measures to the area residents, the design concept intended

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[1]Clarence A. Perry, Neighborhood and Community Planning, Vol. VII of the Regional Survey of New York and Its Environs (New York: Regional Plan of New York and Its Environs, 1929). Also, Clarence A. Perry, Housing for the Machine Age (New York: Russell Sage Foundation, 1939).

to recognize a fundamental limitation concerning the size of an area and the number of people who could effectively get together and actively participate in matters that affect them individually or collectively. As a result, civic interest and responsibility, particularly toward maintaining a sound and wholesome urban environment, would be achieved.

These premises were based on the assumption that the proper arrangement of schools, retail stores, open spaces, streets, and dwellings would provide a family with better living conditions.[1]

In addition to introducing some design principles to achieve physical order within the residential environment, the concept attempted to achieve the following objectives:[2]

1. Create a safe and pleasant residential environment where a child can easily and safely walk to school, shopping facilities are within reach of housewives, and playgrounds are available for children and adults.
2. Reduce the residential environment to proportions similar to the rural or semi-urban communities,

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[1]Perry, Housing for the Machine Age, pp. 17-18.

[2]Arthur B. Gallion and Simon Eisner, The Urban Pattern (Princeton, N.J.: Van Nostrand Company, Inc., 1963), pp. 250-264; Peter H. Mann, An Approach to Urban Sociology (London: Routledge and Kegan Paul, 1964), p. 17; John Tetlow et al., Towns and Traffic (London: Faber and Faber, 1965).

where people can find friendliness, relaxation, convenience, and safety, as well as opportunities for self expression and citizenship on a manageable scale.[1]

3. Encourage the association among neighbors by generating social relations through face-to-face interaction.
4. Stimulate local loyalties, attachment and feelings of identity and community spirit. One of the most pleasant memories old-timers have is of the friendly community spirit that used to be strong years ago.

This plan aims to confirm and recreate that congenial feeling in modern garb, through the organization of the town into "neighborhood units" of 1,500 families (5,000 people) each. By living in a compact community environment, children will develop a sense of security and belonging, while adults will feel themselves closely integrated into a personal social unit.

Examination of Basic Assumptions

The "neighborhood unit formula" was welcomed by planners because it introduced a new method for rearranging the residential environment according to new guidelines--

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[1]James Dahir, The Neighborhood Unit Plan (New York: Russell Sage Foundation, 1947), p. 5.

different from the traditional gridiron pattern. It defined the physical relationships between families and the services and facilities they need. More important, it established a manageable unit of urban design with which planners can deal.

In brief, Perry's proposal can be described as an urban design concept intended to introduce principles of physical order to the residential environment. This objective has been clearly stated by Gallion and Eisner in The Urban Pattern.

> The neighborhood unit is not some sociological phenomenon, it embraces no particular theories of social sciences. It is simply a physical environment in which a mother knows that her child will have no traffic streets to cross on his way to school, a school which is within easy walking distance from home. It is an environment in which the housewife may have an easy walk to a shopping center where she may obtain daily household goods, and the man of the hosue may find convenient transportation to and from his work. It is an environment in which a well-equipped playground is located near to home where the children may play in safety with their friends.[1]

Simply stated, therefore, the concept refers to a service area and population sharing shops, playgrounds, and a centrally located school, a library and a local assembly area, arranged within walking distance to individual households. It was assumed, however, that these principles and standards will be enjoyed by the urban population. So it was assumed that a walking distance of one-fourth or

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[1]Gallion and Eisner, op. cit., p. 251.

one-third of a mile from a school or shops would be convenient for children and adults, and a particular arrangement of services and facilities would confine local activities within these service areas.

All these design arrangements emphasize the importance of the walking distance. As a result, it became fashionable to draw circles at certain distances apart stipulating that people within these areas have only these distances to walk to their destinations. Furthermore, it was assumed that the given services and facilities as well as activity patterns are not subject to change. This, however, can rarely be the case, which underlines the need for a realistic and detailed appraisal of these principles and standards.

These guidelines, however, were opposed by social planners. They heavily criticized Perry's formula because of its social ramifications.[1] They submitted that:

1. It is a dogmatic and inadequate formula impediment to the democratization of cities.
2. It tends to divide the city into social, physical and political cells which have no basis in present or future community life, discouraging and preventing the representation of small areas.

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[1]Reginald R. Isaacs, "The Neighborhood Theory: An Analysis of Its Adequacy," Journal of the American Institute of Planners (Spring 1948), p. 15.

3. It would create isolated communities in which undesirable social exclusiveness between urban residents might lead to social snobbishness.
4. It discourages the imitation of better living conditions which more intensive contact between the different sections would produce.
5. It would drain the leadership from one area to another, thus denying the deprived areas the talents of their influential and knowledgeable potential leaders.

In addition, several studies have challenged Perry's basic assumptions concerning the division of the city into smaller units with better physical arrangements to establish more stable family life, enhance neighborly face-to-face relations or stimulate the formation of social contacts and friendship.[1] These studies concluded that physical distances as such are no longer considered sufficient to account for the formation and perpetuation of social contacts, especially of the more enduring sort. This can be observed in many instances of physically compact units where residents, though physically close, do not establish any relationships with one another. If these relations exist, it must be rooted in shared ideas and beliefs.

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[1]Leo Kuper, ed., Blue Print for Living Together (London: Cresset, 1953), pp. 86-90. Also, Herbert J. Gans, "Planning and Social Life," Journal of the American Institute of Planners, XXVII (May 1961), 134-140.

Barring this, neighborly relations will either fail to be established or, if established, they will be temporary, unreliable and ineffectual.

It was also argued that the "neighborhood unit formula" has tried to affect social relations by reducing the physical distance or the functional distance between neighbors. The physical distance may be reduced by improving accessibility through better means of transportation or by smaller geometric distances. Functional distances may be reduced by better site planning and building arrangements. Evidence of these distances on social relations, however, is inconclusive. Even under special conditions where the physical or functional distances are manipulated, their impact on face-to-face interaction or social relations among neighbors is uncertain but rather it may increase hostility and interpersonal friction.[1] Accordingly, the reduction of distance, physical or functional, to increase visual and personal contacts among neighbors may not necessarily be followed by sociable contacts among them.

Other studies also argued that the "neighborhood" describes a community bound together by common social and economic characteristics and cultural traits. The formation of these communities, therefore, does not evolve from

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[1]Theodore Caplow, et al., The Urban Ambience (New Jersey: Bedminster, 1964), pp. 166-170.

simple physical arrangements.

Additionally, social, economic or cultural characteristics always overlap from one part of the city to the other. Accordingly, these characteristics cannot be confined within physical boundaries. These issues, in turn, lead to a considerable concern about the undesirable effects on the social fabric of urban population if the concept is implemented.

These issues, however, were not but mere speculation for two main reasons. One is the lack of testing grounds, particularly in well established urban communities, to justify these accusations. Second is the absence of conclusive evidence that can clearly describe the effect of distances, physical or functiona, on the formation of social interaction.

CHAPTER III

DESIGN CRITERIA

Introduction

As is the case with any urban design, evaluation of Perry's proposal requires an analysis of the activity patterns which occur within the residential environment. These activities, however, are performed by households with differing needs most suited to their particular social, economic and cultural characteristics. These characteristics initiate different values, each with its sets of sensory inputs creating a series of different worlds. Accordingly, an investigation into the types of activity patterns which occur within the residential environment is not only needed but is a necessity. Once accomplished, the various design principles, standards and spatial arrangements can be evaluated, and modifications can be recommended.

Household Classification

Home-related activities may be defined as those movements performed by a family to fulfill its domestic needs. These activities stem from the way a household lives. Its way of life, however, is influenced by many

constraints.[1] Some originate from its social, economic and cultural characteristics. Households choose where to live because their income allows them to do so. Age, sex, size and other social characteristics of a family determine the types of activities performed by its members and influence its decision to locate near services or facilities. Race, language, education, ethnicity and similar cultural characteristics shape the family's habits, customs and values determining its association with others in work or at home.

Among these constraints, the income level and occupation of the household head were selected as indices to identify the various activity patterns. These were selected for the following reasons:

1) Income and occupation can provide convenient bases for comparison between households. They can serve as major indices for evaluating the social role a household head performs in society. Learning the specific attributes of these two factors, this role can be identified.
2) Income and occupation can provide observable criteria for rating households. Both can be transformed into consumptive units indicating certain behavior or life style which can describe different interests and values.

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[1]Herbert J. Gans, People and Plans, Essays on Urban Problems and Solutions (New York: Basic Books, Inc., 1968), pp. 44-47.

3) Income and occupation are highly correlated with the education attained by the household head. Education, in turn, suggests the type of associates he can come in contact with. In addition, education can describe the type of friends or neighbors the family would like to have and the suitable playmates or classmates for its children.
4) Income and occupation of the household head can describe the contribution he makes for the community welfare and hints at the degree of his authority over others. Such aspects confer prestige on people and recognize more accurately their skills at work. In addition, both factors illustrate his potential and success which can describe his present and future role he may perform in the society.
5) Income and education can clearly indicate the life cycle stage of the household head. For example, two persons belonging to the same occupation can have different income levels due to additional experience. More experience, in turn, indicates additional years at work. Similarly, occupation represents the accumulation of knowledge during a certain number of years spent in education. Accordingly, income and education can indicate the life cycle stage of the household head and, therefore, the probable social composition of the family.

6) Income and occupation always refer to precise definitions and represent recognizable units easily perceived by the majority of people.
7) Income and occupational data can be collected easily and objectively without any bias due to personal interest or value judgment.
8) Income and occupational data represent a relatively stable information holding the same meaning for longer periods of time. Therefore, any re-evaluation, adjustment or additional information can be easily pursued.

It should be noted, however, that a household classification based on these two dimensions separately may lead to questionable results. This is due to some misleading expressions about household characteristics. A particular group of households, for example, may have similar norms or values, yet economic constraints may limit their choice of residential location. Similarly, some households may have the same income level but their race, ethnicity or educational attainment may limit their endurance to continue living in an area or establish neighborly relations with other residents. Based on these considerations, a combination of income-occupation classification would help describe households that would live together voluntarily more accurately. Therefore, classify urban households into groups that can afford living together in a residential area as

well as establish more enduring neighborly relationships.

Description of Data

The data utilized in this study are part of the Home Opinion Surveys performed by Tri-County Regional Planning Commission in the Tri-County area. The data include the following information:

1. The income level and occupation of the household head.
2. The estimated distances from a given list of services and facilities.
3. The expressed level of satisfaction from this distance given as very satisfied, fairly satisfied, fairly dissatisfied or very dissatisfied.

Income-Occupation Matrix

a. Income Classification

The income levels included in the survey were divided into nine categories ranging from incomeless households to those with $25,000 or more annual income. However, for the purpose of this study families were classified into four income levels shown in Table 1. These are:

I. Low Income (group A) under $5,000/yr.
II. Lower Middle (group B) $5,000 to $9,999/yr.
III. Upper Middle (group C) $10,000 to 14,999/yr.
IV. Upper Income (group D) $15,000/yr and over.

Table 1. INCOME-OCCUPATION MATRIX

Income / Occupation	Group A $0,000-$4,999		Group B $5,000-$9,999		Group C $10,000-$14,999		Group D $15,000 and above	
	No. of respondents	Percent of population	No. of respondents	Percent of population	No. of respondents	Percent of population	No. of respondents	Percent of population
Group I	165	14.32	60	5.21	33	2.86	12	1.04
Group II	50	4.34	214	18.58	196	17.01	119	10.33
Group III	9	0.78	45	3.91	79	6.85	80	6.94
Group IV	7	0.63	9	0.78	27	2.34	47	4.08

Total sample, 1,152 respondents.

b. Occupation Classification

To classify the households into occupation groups, each occupation was assigned a socio-economic index.[1] Households were then classified as follows:

Occupation Group I	Socio-Economic Index
Laborers, except farm & miners	7
Private household workers	8
Farm laborers and foremen	9
Occupation Group II	
Farmers & farm managers	14
Service workers except household	17
Operatives & kindred workers	18
Not in labor force, unemployed, retired, housewife, student, not applicable	19
Occupation Group III	
Craftsmen, foremen, & kindred workers	31
Clerical and kindred workers	45
Sales workers	49
Occupation Group IV	
Managers, officials & proprietors except farm	57
Professionals, technical & kindred workers	75

[1]Albert J. Reiss, Jr., Occupation and Social Status (New York: The Free Press of Glencoe, Inc., 1961), p. 155.

Methodology

To develop the income-occupation matrix, the sample--recorded on computer punched cards--was sorted into four income groups. Each group was further sorted into four occupation subgroups. A computer program was then developed to compute the following:

1. The number of households located within 0.20 mile increments from the assigned list of services and facilities (i.e., 0.20, 0.40, 0.60 miles, etc.).
2. The expressed levels of satisfaction corresponding to these distances.
3. The average distances from services and facilities were calculated by considering the number of observations as weights. Moments were calculated around services and facilities as points of origin. The resultants of these moments were considered as median distances, each with a corresponding level of satisfaction.

Median distances corresponding to each level of satisfaaction are shown for the various income levels. These median distances were computed for each service and facility separately. The results of these computations are shown in Tables 2 through 14.

Table 2. MEDIAN DISTANCE: SUBGROUP I-A

Type of Service or Facility \ Degree of Satisfaction	Very Satisfied		Fairly Satisfied		Fairly Dissatisfied		Very Dissatisfied		Other
	Miles	Percent	Miles	Percent	Miles	Percent	Miles	Percent	Percent
Library	1.89	54.9	2.28	19.1	1.52	3.1	1.05	1.2	21.7
Shopping Center	1.49	64.6	2.22	22.0	1.02	6.7	1.45	2.4	4.3
Elementary School	1.03	41.1	1.00	5.5	--	--	--	--	53.4
Junior High School	1.66	32.5	1.67	8.6	3.00	0.6	0.60	0.6	57.7
High School	1.90	35.4	2.10	9.1	3.00	0.6	1.60	0.6	54.3
Church	1.25	69.4	1.48	14.3	1.60	1.9	3.32	3.1	11.3
Park	0.91	51.8	1.70	14.6	--	--	1.96	3.0	30.6
Job	0.97	12.9	1.90	2.5	1.50	1.2	--	--	83.4
Bus Service	0.39	49.4	0.75	7.3	1.30	2.4	0.78	6.1	34.8

Occupation Group: I Income Group: A

Number of Respondents: 165 Percent of Total Population: 14.32

Table 3. MEDIAN DISTANCE: SUBGROUP I-B

Type of Service or Facility \ Degree of Satisfaction	Very Satisfied		Fairly Satisfied		Fairly Dissatisfied		Very Dissatisfied		Other
	Miles	Percent	Miles	Percent	Miles	Percent	Miles	Percent	Percent
Library	1.62	60.0	2.54	16.7	4.00	3.3	2.00	1.7	18.3
Shopping Center	1.54	74.6	2.25	20.3	6.00	3.4	0.60	1.7	--
Elementary School	0.91	58.3	0.87	5.0	1.00	1.7	--	--	35.0
Junior High School	1.84	53.3	1.50	3.3	2.60	3.3	--	--	40.1
High School	2.05	50.0	2.00	6.7	3.30	5.0	--	--	38.3
Church	1.40	84.7	2.48	8.5	0.70	3.4	2.00	1.7	1.7
Park	1.20	68.3	1.40	6.7	0.80	5.0	0.40	3.3	16.7
Job	2.85	60.3	3.69	12.1	10.00	1.7	--	--	25.9
Bus Service	0.59	48.3	0.40	3.4	1.73	5.2	0.60	12.1	31.0

Occupation Group: I Income Group: B

Number of Respondents: 60 Percent of Total Population: 5.21

Table 4. MEDIAN DISTANCE: SUBGROUP I-C

Type of Service or Facility \ Degree of Satisfaction	Very Satisfied		Fairly Satisfied		Fairly Dissatisfied		Very Dissatisfied		Other
	Miles	Percent	Miles	Percent	Miles	Percent	Miles	Percent	Percent
Library	2.26	66.7	3.34	21.2	--	--	4.00	3.0	9.1
Shopping Center	1.28	78.1	4.90	6.3	5.20	6.3	3.00	9.4	--
Elementary School	0.73	45.5	1.73	15.2	--	--	2.40	6.1	33.2
Junior High School	1.09	42.4	1.17	21.2	--	--	--	--	36.4
High School	0.91	42.4	2.57	18.2	--	--	2.60	3.0	36.4
Church	1.30	69.7	2.49	21.2	--	--	4.00	3.0	6.1
Park	1.08	53.1	1.17	18.8	--	--	5.80	6.3	21.8
Job	3.47	70.0	1.73	10.0	5.00	3.3	6.00	3.3	13.4
Bus Service	0.70	59.4	0.20	3.1	0.60	3.1	4.00	9.4	25.0

Occupation Group: I Income Group: C

Number of Respondents: 33 Percent of Total Population: 2.86

Table 5. MEDIAN DISTANCE: SUBGROUP I-D

Type of Service or Facility \ Degree of Satisfaction	Very Satisfied		Fairly Satisfied		Fairly Dissatisfied		Very Dissatisfied		Other
	Miles	Percent	Miles	Percent	Miles	Percent	Miles	Percent	Percent
Library	1.80	66.7	1.07	25.0	1.00	8.3	--	--	--
Shopping Center	2.63	58.3	--	--	1.87	25.0	1.00	16.7	--
Elementary School	0.93	50.0	0.40	25.0	1.50	16.7	--	--	8.3
Junior High School	1.20	50.0	1.13	16.7	9.00	8.3	--	--	25.0
High School	2.04	41.7	1.50	16.7	9.00	8.3	--	--	33.3
Church	1.43	50.0	1.80	16.7	2.00	8.3	--	--	25.0
Park	1.10	66.7	1.20	16.7	2.00	8.3	--	--	8.3
Job	1.50	83.4	4.00	8.3	4.00	8.3	--	--	--
Bus Service	0.40	33.3	--	--	--	--	2.50	33.3	33.4

Occupation Group: I Income Group: D

Number of Respondents: 12 Percent of Total Population: 1.04

Table 6. MEDIAN DISTANCE: SUBGROUP II-A

Type of Service or Facility \ Degree of Satisfaction	Very Satisfied		Fairly Satisfied		Fairly Dissatisfied		Very Dissatisfied		Other
	Miles	Percent	Miles	Percent	Miles	Percent	Miles	Percent	Percent
Library	1.90	68.0	1.85	24.0	3.93	6.0	--	--	2.0
Shopping Center	0.86	72.0	2.06	26.0	3.00	2.0	--	--	--
Elementary School	0.78	42.0	1.58	16.0	--	--	--	--	42.0
Junior High School	1.87	28.0	3.00	14.0	3.00	2.0	2.00	2.0	54.0
High School	2.05	30.0	2.17	14.0	3.00	2.0	3.00	2.0	52.0
Church	1.32	54.0	2.28	32.0	1.80	4.0	10.00	2.0	8.0
Park	0.82	56.0	1.73	22.0	1.00	4.0	--	--	18.0
Job	1.11	26.5	2.50	4.1	6.00	4.1	--	--	65.0
Bus Service	0.36	38.0	0.60	8.0	0.20	2.0	0.48	10.0	42.0

Occupation Group: II Income Group: A

Number of Respondents: 50 Percent of Total Population: 4.34

Table 7. MEDIAN DISTANCE: SUBGROUP II-B

Type of Service or Facility \ Degree of Satisfaction	Very Satisfied		Fairly Satisfied		Fairly Dissatisfied		Very Dissatisfied		Other
	Miles	Percent	Miles	Percent	Miles	Percent	Miles	Percent	Percent
Library	2.57	62.9	3.07	18.1	4.52	4.8	4.90	2.4	11.8
Shopping Center	2.14	76.3	3.05	17.4	5.94	3.4	2.64	2.4	0.5
Elementary School	1.22	67.3	2.81	12.1	3.45	1.9	4.00	0.5	18.2
Junior High School	2.05	54.0	3.90	16.1	2.70	2.8	2.59	3.8	23.3
High School	1.97	55.2	4.63	14.6	2.56	5.2	4.00	2.8	22.2
Church	1.42	76.3	2.54	13.3	4.80	2.4	--	--	8.0
Park	1.50	70.3	2.70	12.3	6.57	3.3	2.44	5.7	8.4
Job	2.73	70.6	4.29	18.2	3.17	3.2	5.00	2.1	5.9
Bus Service	0.80	44.1	1.39	8.0	1.09	3.8	1.40	8.5	35.6

Occupation Group: II Income Group: B

Number of Respondents: 214 Percent of Total Population: 18.58

Table 8. MEDIAN DISTANCE: SUBGROUP II-C

Type of Service or Facility \ Degree of Satisfaction	Very Satisfied		Fairly Satisfied		Fairly Dissatisfied		Very Dissatisfied		Other
	Miles	Percent	Miles	Percent	Miles	Percent	Miles	Percent	Percent
Library	2.33	69.1	2.98	12.9	3.44	5.7	4.54	3.6	8.7
Shopping Center	1.82	76.6	2.86	13.0	4.78	4.7	5.20	4.2	1.5
Elementary School	1.28	68.2	1.23	8.2	1.05	2.1	1.05	2.1	19.4
Junior High School	2.67	54.9	3.42	13.8	2.74	5.1	3.24	5.1	21.1
High School	2.49	55.9	3.49	12.8	2.80	6.7	3.73	4.6	20.0
Church	1.92	81.0	2.46	11.6	4.55	4.2	0.80	0.5	2.7
Park	1.33	64.8	2.27	11.4	6.63	6.7	2.40	6.7	10.4
Job	2.98	71.8	4.94	14.7	3.94	4.7	3.33	1.8	7.0
Bus Service	0.78	49.0	0.90	6.3	2.27	7.3	2.43	6.3	31.1

Occupation Group: II Income Group: C

Number of Respondents: 196 Percent of Total Population: 17.01

Table 9. MEDIAN DISTANCE: SUBGROUP II-D

Type of Service or Facility \ Degree of Satisfaction	Very Satisfied		Fairly Satisfied		Fairly Dissatisfied		Very Dissatisfied		Other
	Miles	Percent	Miles	Percent	Miles	Percent	Miles	Percent	Percent
Library	1.85	68.4	2.76	21.4	3.00	1.7	3.80	4.3	4.2
Shopping Center	1.50	75.6	0.66	20.2	1.40	2.5	5.50	1.7	--
Elementary School	1.01	73.9	1.91	5.9	--	--	2.63	5.0	25.2
Junior High School	1.48	50.4	2.49	9.2	1.40	3.4	3.33	6.7	30.3
High School	1.78	51.3	2.51	10.9	3.87	2.5	3.60	7.6	27.7
Church	1.54	78.8	3.72	14.4	3.00	2.5	1.00	0.8	3.5
Park	0.91	66.9	1.19	11.0	3.20	7.6	1.53	5.0	9.4
Job	2.32	72.7	4.59	19.1	2.33	2.7	5.00	0.9	4.6
Bus Service	0.46	50.0	0.87	6.0	1.85	3.4	0.72	4.3	36.3

Occupation Group: II Income Group: D

Number of Respondents: 119 Percent of Total Population: 10.33

Table 10. MEDIAN DISTANCE: SUBGROUP III-B

Type of Service or Facility \ Degree of Satisfaction	Very Satisfied		Fairly Satisfied		Fairly Dissatisfied		Very Dissatisifed		Other
	Miles	Percent	Miles	Percent	Miles	Percent	Miles	Percent	Percent
Library	2.76	75.6	3.80	11.1	3.67	6.7	4.00	2.2	4.4
Shopping Center	2.33	81.8	3.20	11.4	5.00	4.5	--	--	2.3
Elementary School	1.53	66.7	4.30	8.9	--	--	--	--	24.4
Junior High School	2.27	60.0	5.53	6.7	1.50	4.4	2.50	4.4	24.5
High School	2.65	68.2	4.73	6.8	1.30	4.5	--	--	20.5
Church	2.01	84.4	3.00	6.7	6.00	4.4	--	--	4.5
Park	1.87	73.3	3.53	6.7	3.90	4.4	1.00	2.2	13.4
Job	3.27	76.7	5.40	7.0	9.60	4.7	1.00	2.3	9.3
Bus Service	1.06	58.8	2.60	4.5	7.00	2.3	--	--	36.4

Occupation Group: III Income Group: B

Number of Respondants: 45 Percent of Total Population: 3.91

Table 11. MEDIAN DISTANCE: SUBGROUP III-C

Type of Service or Facility \ Degree of Satisfaction	Very Satisfied		Fairly Satisfied		Fairly Dissatisfied		Very Dissatisfied		Other
	Miles	Percent	Miles	Percent	Miles	Percent	Miles	Percent	Percent
Library	1.79	66.7	3.16	14.1	3.76	6.4	--	--	12.8
Shopping Center	1.45	76.6	2.43	16.9	2.50	2.6	0.70	2.6	1.3
Elementary School	0.89	64.6	1.80	7.6	--	--	0.60	1.3	26.5
Junior High School	1.61	55.7	1.88	10.1	1.00	1.3	3.08	6.3	26.6
High School	1.97	55.7	2.06	12.7	2.87	3.8	1.67	3.8	24.0
Church	1.43	82.3	3.95	10.1	7.60	1.3	--	--	6.3
Park	1.39	69.6	1.95	10.1	1.30	5.1	1.40	3.8	11.4
Job	3.75	66.7	4.85	16.7	5.80	2.8	2.67	4.2	9.6
Bus Service	0.44	51.9	1.20	6.3	1.00	1.3	1.63	10.1	30.4

Occupation Group: III Income Group: C

Number of Respondents: 79 Percent of Total Population: 6.85

Table 12. MEDIAN DISTANCE: SUBGROUP III-D

Type of Service or Facility \ Degree of Satisfaction	Very Satisfied		Fairly Satisfied		Fairly Dissatisfied		Very Dissatisfied		Other
	Miles	Percent	Miles	Percent	Miles	Percent	Miles	Percent	Percent
Library	1.44	77.5	2.74	16.3	3.20	2.5	5.80	2.5	1.2
Shopping Center	1.34	81.3	1.68	10.0	1.83	7.5	2.60	1.2	--
Elementary School	0.68	71.3	1.54	12.5	2.00	1.2	--	--	15.0
Junior High School	1.14	58.5	2.46	12.5	2.00	8.8	1.80	5.0	15.2
High School	1.41	57.5	2.55	16.3	1.95	5.0	1.95	5.0	16.2
Church	1.64	81.0	2.77	8.9	4.67	3.8	9.00	1.3	5.0
Park	0.62	72.5	1.58	12.5	3.50	2.5	0.40	2.5	10.0
Job	2.22	84.0	4.44	12.0	9.00	1.3	5.00	1.3	1.4
Bus Service	0.54	47.5	2.23	8.8	1.10	2.5	1.13	7.5	33.7

Occupation Group: III Income Group: D

Number of Respondents: 80 Percent of Total Population: 6.94

Table 13. MEDIAN DISTANCE: SUBGROUP IV-C

Type of Service or Facility \ Degree of Satisfaction	Very Satisfied		Fairly Satisfied		Fairly Dissatisfied		Very Dissatisfied		Other
	Miles	Percent	Miles	Percent	Miles	Percent	Miles	Percent	Percent
Library	2.53	74.1	1.87	22.2	1.00	3.7	--	--	--
Shopping Center	1.15	81.5	4.75	14.8	5.00	3.7	--	--	--
Elementary School	0.91	74.1	4.00	3.7	--	--	--	--	22.2
Junior High School	2.00	63.0	2.15	14.8	--	--	--	--	22.2
High School	2.07	63.0	2.00	14.8	2.20	3.7	--	--	18.5
Church	1.14	81.5	3.33	11.1	1.20	3.7	--	--	3.7
Park	1.18	63.0	0.40	3.7	--	--	0.40	3.7	29.6
Job	3.50	73.1	7.33	11.5	--	--	--	--	15.4
Bus Service	0.48	59.3	1.00	3.7	--	--	1.00	3.7	33.3

Occupation Group: IV Income Group: C

Number of Respondents: 27 Percent of Total Population: 2.34

Table 14. MEDIAN DISTANCE: SUBGROUP IV-D

Type of Service or Facility \ Degree of Satisfaction	Very Satisfied		Fairly Satisfied		Fairly Dissatisfied		Very Dissatisfied		Other
	Miles	Percent	Miles	Percent	Miles	Percent	Miles	Percent	Percent
Library	1.70	74.4	1.88	17.0	3.40	4.3	6.50	4.3	--
Shopping Center	1.41	76.6	1.45	17.0	2.00	2.1	3.00	2.1	2.2
Elementary Scho	0.78	72.3	1.00	8.5	--	--	1.50	4.3	14.9
Junior High School	1.86	59.6	2.26	14.8	1.30	4.3	4.50	4.3	17.0
High School	2.35	63.8	2.50	12.8	4.00	6.4	4.33	6.4	10.6
Church	1.97	74.5	2.93	12.8	3.00	2.1	8.00	2.1	8.5
Park	0.89	72.3	1.70	12.8	3.00	2.1	2.00	4.3	8.5
Job	3.40	83.7	5.27	14.0	--	--	--	--	2.3
Bus Service	0.52	39.1	1.65	8.7	0.20	2.2	0.60	6.5	43.5

Occupation Group: IV Income Group: D

Number of Respondents: 47 Percent of Total Population: 4.08

Findings

The data findings indicate a direct relationship between the socioeconomic characteristics of households and the level of satisfaction they expressed from the travel distance to services and facilities. These are summarized in the following observations:

Library

The location of the library within the residential areas is viewed differently by urban households. Generally, their expressed levels of satisfaction were directly related to household occupations which represent the educational attainment. It was noticed, for example, that Occupation Groups I and II are satisfied with a library distantly located from where they live regardless of their income. This may be attributed to their less frequent use of the facility. This lack of interest is also represented by the low response to the questionnaire. On the other hand, the response to the questionnaire by Occupation Groups III and IV was considerably higher due to their level of educational attainment. However, they also expressed their satisfaction from distances similar to those expressed by Occupation Groups I and II. Their tolerance to travel longer distances in that case may be attributable to their desire to live in better quality or lower density residential areas not available in the immediate vicinity of the

library. In all cases, however, the median satisfactory distance expressed by the households, regardless of income or occupation, was considerably longer than that recommended by Perry's proposal.

Shopping Center

Unlike the library, the data findings indicate no relationship between the socioeconomic indices of households and the travelled distances to shopping centers. It was observed, for example, that households of Occupation Groups I and III have expressed their satisfaction from similar distances despite the differences in their socioeconomic characteristics. Meanwhile, those of Occupation Groups II and IV have indicated limited tolerance to travel longer distances. In general, the median satisfactory distances to shopping centers were significantly higher than the maximum distance recommended by Perry's design concept. This may be attributed to less frequent use or availability of storage space. Nevertheless, the location of the facility was of considerable concern to urban households. This is illustrated by the high response to the questionnaire, ranging from 89 to 98 percent.

Schools

The data findings illustrate that households are more aware of school locations regardless of their social or economic characteristics. This can be observed from

the increased response to the questionnaire by the majority of households detected from the smaller percentages of "don't know" or "other." However, the calculated median distance to elementary schools were more consistent than those to junior high or high schools. Such consistency can be observed from the differences between the shortest and longest distance expressed by the four occupation groups. In the case of elementary schools, for example, the median distances ranged from 0.68 to 0.78 mile for a difference of 0.1 mile. These ranges were considerably higher for junior high or high schools where these differences were 0.77 and 1.16 miles respectively.

The data findings also indicate that the calculated median distances to school facilities are affected by the family composition rather than its income level or occupation. These relationships are obvious in cases of childless or retired families belonging to high income households of all occupation groups. On the other hand, the awareness to elementary school locations is well represented by a limited tolerance to travel and high response to the questionnaire of middle and upper-middle income households.

Church

The data findings indicate that households are aware of the church locations. This can be detected from the frequency of response to all levels of satisfaction and the

small percentage given as "don't know" or "other." At the same time household tolerance continuously increased for Occupation Groups I, II and III but decreased for Occupation Group IV.

It was also observed that the response to this facility is similar to that of the elementary school. However, the tolerance to travel increased considerably. This is indicated by the calculated median distances for both facilities. Such increase is attributed to the type of service and frequency of use each facility offers.

Park

The data findings clearly illustrate that households prefer to live in residential areas in close proximity to park locations. This is illustrated by the limited tolerance to travel observed from the calculated median distances to the facility regardless of income or occupation.

The awareness to park locations was also expressed by the household survey. This is reflected by the high frequency of response to all levels of satisfaction rather than to "other" or "don't know."

It was also observed that the calculated median distance ranged from 0.91 to 0.62 mile for Occupation Groups I and III, respectively. These slight differences may be attributed to density considerations or the existing types of park facilities available to the various occupation groups.

Job

The data findings indicate a considerable change in households' tolerance to travel to their place of work. This can be observed from the calculated median distances for the various occupation groups. It was observed, for example, that households belonging to Occupation Groups I and II do not tolerate travelling longer distances. Their calculated median distances were 0.97 and 1.11 miles respectively. On the other hand, the calculated median distances for Occupation Groups III and IV were 2.22 and 3.40 miles. These differences may be attributed to the social and economic constraints influencing their decisions to select their residential areas. While Occupation Groups I and II would prefer to live near work where low cost housing is available, they also attempt to eliminate transportation cost or reduce it to a minimum. On the other hand, Occupation Groups III and IV would substitute high transportation cost for better quality residential areas not available near their place of work.

Bus Service

The data findings show that the calculated median distances to bus service were the shortest for all given services and facilities. These ranged from 0.36 to 0.48 mile for Occupation Groups II and IV respectively. It was also observed that households are aware to the location of

public transit routes regardless of their socioeconomic indices. This is represented by the high frequency of response to the questionnaire. These observations clearly indicate that urban households rely on vehicular transportation to perform their daily activities.

CHAPTER IV

EVALUATION

The previous approach represents an empirical method used to derive the median distances to services and facilities from household surveys. These median distances establish two important guidelines:

1. They illustrate how the different services and facilities are distributed over the study area.
2. They establish pertinent information indicating where urban households would choose to locate if a satisfactory distance from a service or facility is desired.

These important considerations will be utilized to evaluate Perry's design proposal. To accomplish this, the previous observations for household subgroups were combined into three categories representing low, middle, and high income households. These are:

Low-Income Households

Annual income: $0,000 to $4,999

Subgroups: I-A and II-A

Middle-Income Households

Annual income: $5,000 to $14,999

Subgroups: I-B, II-B, III-B, I-C, II-C, III-3 and IV-C

High-Income Households

Annual income: $15,000 and above

Subgroups: I-D, II-D, III-D and IV-D

The reason for selecting these three categories is to simulate a situation that normally exists in residential areas. It should be noted that the selection of the three household categories was based on income rather than occupation. This is due to the clustering of median distances observed when income and occupation classifications were compared. These observations are illustrated in Tables 15 through 22, with accessibility standards shown in Table 23.

To derive these accessibility standards, the shortest distances expressed by each subgroup for the different services and facilities were selected. This selection was based on the assumption that if a longer distance to a service was expressed as satisfactory, shorter distance with lower level of satisfaction would be more satisfactory.

It should also be noted that in some instances, the fairly or very dissatisfactory distances were smaller than very or fairly satisfactory ones. To correct these irregularities, median distances expressed by the majority of household subgroups were selected (see Table 23).

Table 15. SERVICE AREAS FOR LIBRARY

Income Level	Socio-economic group	% of pop.	Service distance (miles)											
			0.50	1.00	1.50	2.00	2.50	3.00	3.50	4.00	4.50	5.00	5.50	6.00
Low	I-A	14.32								X				
	II-A	4.34							X					
Middle	I-B	5.21						X						
	II-B	18.58										X		
	III-B	3.91											X	
	I-C	3.8									X			
	II-C	17.01									X			
	III-C	6.85							X					
	IV-C	2.34							X					
High	I-D	1.04				X								
	II-D	10.33							X					
	III-D	6.94						X						
	IV-D	4.08							X					

Table 16. SERVICE AREAS FOR SHOPPING CENTER

Income Level	Socio-economic group	% of. pop.	Service diameter (miles)										
			0.50	1.00	1.50	2.00	2.50	3.00	3.50	4.00	4.50	5.00	5.50	6.00
Low	I-A	14.32						X						
	II-A	4.34			X									
Middle	I-B	5.21						X						
	II-B	18.58									X			
	III-B	3.91									X			
	I-C	3.86					X							
	II-C	17.01							X					
	III-C	6.85						X						
	IV-C	2,34					X							
High	I-D	1.04											X	
	II-D	10.33			X									
	III-D	6.94					X							
	IV-D	4.08						X						

Table 17. SERVICE AREAS FOR ELEMENTARY SCHOOL

Income Level	Socio-economic group	% of pop.	Service diameter (miles)										
			0.50	1.00	1.50	2.00	2.50	3.00	3.50	4.00	4.50	5.00	5.50	6.00
Low	I-A	14.32				X								
	II-A	4.34			X									
Middle	I-B	5.21							X					
	II-B	18.58					X							
	III-B	3.91						X						
	I-C	3.86			X									
	II-C	17.01					X							
	III-C	6.85				X								
	IV-C	2.34				X								
High	I-D	1.04				X								
	II-D	10.33				X								
	III-D	6.94			X									
	IV-D	4.08			X									

Table 18. SERVICE AREAS FOR JUNIOR HIGH SCHOOL

Income Level	Socio-economic group	% of pop.	Service diameter (miles)										
			0.50	1.00	1.50	2.00	2.50	3.00	3.50	4.00	4.50	5.00	5.50	6.00
Low	I-A	14.32							X					
	II-A	4.34							X					
Middle	I-B	5.21						X						
	II-B	18.58								X				
	III-B	3.91									X			
	I-C	3.86				X								
	II-C	17.01											X	
	III-C	6.85						X						
	IV-C	2.34							X					
High	I-D	1.04					X							
	II-D	10.33						X						
	III-D	6.94					X							
	IV-D	4.08							X					

Table 19. SERVICE AREAS FOR HIGH SCHOOL

Income Level	Socio-economic group	% of pop.	Service diameter (miles)											
			0.50	1.00	1.50	2.00	2.50	3.00	3.50	4.00	4.50	5.00	5.50	6.00
Low	I-A	14.32								X				
	II-A	4.34								X				
Middle	I-B	5.21								X				
	II-B	18.58								X				
	III-B	3.91											X	
	I-C	3.86				X								
	II-C	17.01										X		
	III-C	6.85										X		
	IV-C	2.34								X				
High	I-D	1.04						X						
	II-D	10.33							X					
	III-D	6.94						X						
	IV-D	4.08									X			

Table 20. SERVICE AREAS FOR CHURCH

Income Level	Socio economic group	% of pop.	Service diameter (miles)										
			0.50	1.00	1.50	2.00	2.50	3.00	3.50	4.00	4.50	5.00	5.50	6.00
Low	I-A	14.32					X							
	II-A	4.34					X							
Middle	I-B	5.21						X						
	II-B	18.58						X						
	III-B	3.91								X				
	I-C	3.86					X							
	II-C	17.01								X				
	III-C	6.85						X						
	IV-C	2.34					X							
High	I-D	1.04						X						
	II-D	10.33						X						
	III-D	6.94							X					
	IV-D	4.08								X				

Table 21. SERVICE AREAS FOR PARK

Income Level	Socio-economic group	% of pop.	Service diameter (miles)										
			0.50	1.00	1.50	2.00	2.50	3.00	3.50	4.00	4.50	5.00	5.50	6.00
Low	I-A	14.32				X								
	II-A	4.34			X									
Middle	I-B	5.21				X								
	II-B	18.58						X						
	III-B	3.91								X				
	I-C	3.86				X								
	II-C	17.01					X							
	III-C	6.85						X						
	IV-C	2.34					X							
High	I-D	1.04				X								
	II-D	10.33				X								
	III-D	6.94		X										
	IV-D	4.08				X								

Table 22. SERVICE AREAS FOR BUS SERVICE

Income Level	Socio-economic group	% of pop.	Service diameter (miles)										
			0.50	1.00	1.50	2.00	2.50	3.00	3.50	4.00	4.50	5.00	5.50	6.00
Low	I-A	14.32		X										
	II-A	4.34	X											
Middle	I-B	5.21		X										
	II-B	18.58			X									
	III-B	3.91				X								
	I-C	2.86			X									
	II-C	17.01			X									
	III-C	6.85		X										
	IV-C	2.34		X										
High	I-D	1.04		X										
	II-D	10.33		X										
	III-D	6.94		X										
	IV-D	4.08		X										

Table 23. ACCESSIBILITY STANDARDS
(Miles)

Facility \ Income	Low Income	Middle Income	High Income
Library	1.88	2.28	1.66
Shopping Center	1.34	1.82	1.10
Elementary School	0.95	1.13	0.84
Junior High School	1.71	2.08	1.43
High School	1.93	2.10	1.76
Church	1.27	1.59	1.64
Park	0.84	1.36	0.84
Job	1.00	2.94	2.45
Bus Service	0.38	0.68	0.49

Physical Proximity

One of the basic principles of urban design is the physical relationships between its elements. These relationships are normally based on physical proximity expressed in terms of geometric distances. It is assumed, as in the case of Perry's proposal, that shorter distances would allow the urban households better accessibility to services and facilities. Yet, it is always overlooked that nearness and distance, though spatial concepts, depend on more than physical space. Rather, they have a multitude of

social, economic and cultural dimensions as well.

These aspects have been illustrated by the derived accessibility standards where a change in income level was always accompanied by a change in the median distance to the same service or facility.

These significant changes may be attributable to many reasons. In the case of low-income households, for example, the tolerance to travel was limited. This is due to their economic constraints which prevent them from affording desirable means of transportation or limiting their choice to locate in close proximity to the needed services or facilities or both.

Such limited tolerance to travel was also expressed by high-income households despite the absence of the economic constraints to limit their locational choice or prevent them from affording convenient means of transportation. Their dissatisfaction at travelling longer distances, therefore, originates from their desire to spend less time on essential daily activities in order to allocate more time to other conveniences and enjoyments they can easily afford.

As for the accessibility standards expressed by middle-income households, the travel tolerance was considerably higher than that expressed by low or high-income households. This may be attributable to the high mobility rates which characterize this income level. Their

endurance to travel longer distances, therefore, is a product of their particular life style and their desire to obtain better quality services.

The above discussion leads to the following conclusions:

1. That design considerations should not be based on shorter geometric distances if a meaningful physical arrangement of services and facilities is to be accomplished. Rather, the social and cultural dimensions should be equally considered.
2. That the socioeconomic characteristics of households have a considerable impact on the design arrangements and the physical relationships of its elements. Accordingly, one particular design proposal should not be recommended for urban communities. Rather, there are at least three alternative proposals most suited for the three income levels.

Walking Distance Concept

One of Perry's principles is to arrange services and facilities within small units of 0.25 mile radius. Such arrangement was meant to achieve two purposes. First, to locate services and facilities within a walking distance from area residents. Second, to eliminate unnecessary traffic movements, thereby introducing measures of safety to the residential environment.

However, the derived accessibility standards clearly indicate a considerable increase in household tolerance to travel. In all cases surveyed, these accessibility standards were three to five times those recommended by Perry's proposal.

These observations lead us to believe that our activity patterns are no longer based on the walking distance idea. This is due to the availability of the car, affording the urban population with more mobility, convenience and better accessibility which conforms with our ways of life.

One may conclude, therefore, that Perry's design configurations do not coincide with the activity patterns expressed by the urban households. Neither is there any assurance that the car will be ignored if services and facilities are placed within a walking distance from these households.

Density Considerations

One of the basic principles of land use planning involves the proper balance between residential density and the services and facilities needed to serve urban households. This is evident in high density residential areas where closely spaced services and facilities would be required to serve more households. Similarly, low density residential areas are served by widely spaced services for the same number of households.

This rule of thumb does not coincide with Perry's recommended standards due to the difficulty involved in implementing them in large urban areas. This difficulty originates from density variations ranging from less than five to more than thirty dwelling units per acre. In such a case, the implementation of Perry's standards would be either inefficient and more expensive to operate or would impose financial burdens on local authorities.

Design Arrangements

The derived accessibility standards also illustrate that the distribution of services and facilities does not follow the same pattern recommended by Perry's proposal. Service areas of elementary schools, for example, do not coincide with library or church locations. This is due to the differences of activity patterns involved in each situation and the nature of service offered by each facility. Grouping of these facilities in that case would generate unrelated and conflicting activities.

Design Core

Perhaps the most important element of Perry's design proposal is the elementary school. Its capacity determines the number of families that can live in a particular area. Boundaries are fixed so that a particular physical distance of 0.25 mile may not be exceeded. Its location was

selected as the focal point of other facilities such as a community center, library and churches. Such accumulated assumptions tend to over-emphasize the importance of the elementary school. Yet, it only affects a small segment of the urban population. These views were clearly stated by Gans as:

> The elementary school which is the center of the planner's neighborhood actually impinges on only a minority of the residents. Its activities only affect the compulsory clientele, the parents of those students who take an interest in the school and other adults who participate in the organizational activities that are centered in the school. Residents without school-age children, and those without interest in their children's schooling or in the organizational participation are little touched by it.[1]

Not only does this over-emphasis favor young families with young children, but it also disregards the needs of other households in various life cycles such as the unmarried, the childless and parents with older children. One may expect, therefore, that any changes in the social characteristics of area residents--and this more than likely will occur in the long run--will alter the basic principles of the urban design concept.

It has also been known that educational institutions are vulnerable to technical and political changes. Technical changes have been felt through the introduction of mass media, visual aids, group teaching and other educational techniques. Such changes have been experienced in other

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[1]Gans, People and Plans, p. 23.

parts of the world such as Sweden and the Soviet Union where a complete reorganization of the physical configurations of the design scheme became necessary.[1]

Political changes are evident from the recent Supreme Court decisions on school busing in order to achieve social and cultural integration among urban populations. If these decisions became strictly enforced, the close proximity of the elementary school would not serve the purpose intended by Perry's proposal.

Implementation

Although there was a considerable emphasis involving the types and locations of services and facilities recommended by Perry's design proposal, there was no indication of how these specific arrangements would be implemented. The services and facilities in question can be classified into three categories. Some like shopping centers are owned and operated by private enterprise; others such as schools and libraries are owned and operated by public institutions; still others, such as churches, belong to semi-public organizations.

The decisions to provide these services and facilities vary considerably. Public facilities, for example, are sponsored by public institutions for non-profit

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[1]"Draft Report, Theme 2: Planning and Construction of New Towns," Ekistics, XVIII (1964), 283-288.

purposes. The provision of such facilities is undertaken by governing bodies on a community-wide basis. Provisions of privately owned facilities, on the other hand, are based on independent decisions motivated by profit making initiatives to minimize economic risk and insure the continuation of operation. These decisions are undertaken independently from one another. This issue raises the question of how the priorities are determined. They also involve coordinating the timing of developments unrelated in terms of need, function and allocation of financial resources.

It should also be noted that decisions to provide services and facilities, public or private, are determined according to the existing and expected demands for residential expansions. These, in turn, vary from one situation to another. In the case of new towns, for example, decisions are undertaken on a macro scale. These, however, are rare exceptions which cannot be applied in well established urban communities. On the other hand, the provision of services and facilities in older communities or residential expansions would be difficult to accomplish because they have to be coordinated with the existing pattern.

CHAPTER V

ANALYSIS, MODIFICATIONS AND RECOMMENDATIONS

Analysis

It is obvious that most of the problems associated with Perry's design proposal originate from its rigidity. This rigidity is created by the limitations imposed on size, boundaries design arrangements and standards. Other problems stem from the over-emphasis allocated to the elementary school by giving it the role of controlling the locations of other facilities. This over-emphasis represents the risk involved when a change in its function or operation becomes necessary. Changes of this nature require a total reassessment of the design standards, and also a complete rearrangement of its spatial relationships.

It was also assumed that the life styles, norms and activity patterns of urban households are similar. Accordingly, a single design was proposed. However, the derived accessibility standards expressed by the urban population suggest the need for different design arrangements due to the variations in their socioeconomic characteristics.

In addition, other issues relating to density considerations and the flexibility required to accommodate for

possible social, political or technological changes were also ignored.

Such problems should be avoided whenever attempts at modifications or alternative proposals are sought. These may be arranged according to the following guidelines:

1. Maintain maximum flexibility to allow for future changes. This can be achieved by eliminating the constraints imposed on size and boundaries.
2. Provide services and facilities as needed by each group of households according to their socioeconomic characteristics.
3. Establish accessibility standards for the location of services and facilities. These should be based on extensive household surveys. Incorporating these accessibility standards would provide meaningful design guidelines for alternative proposals.
4. Provide for alternative means of accessibility not limited to the "walking distance" concept.
5. Avoid the centralization of unrelated services and facilities. This can be achieved by investigating the various activity patterns performed elsewhere by urban households. Based on this investigation, the location of services and facilities can be easily determined.

Modifications

Possible modifications should maintain the properties discussed earlier. Such modifications cannot be achieved without changing the design arrangements of services and facilities. Modifying the design standards in order to coincide with those derived would mean that three different solutions would be required for the three income groups. Also, necessary adaptation of services and facilities locations means the elimination of the design core. Such modifications are difficult to achieve without disrupting Perry's design principles and arrangements. Accordingly, an alternative proposal for the design arrangements of residential units will be presented.

Recommendations

These residential units should include services and facilities selected according to the following:

Classification of Services and Facilities

Services and facilities fall into two different categories: local and non-local. Local facilities may be defined as those which provide services for a group of households sharing a small geographic area and seldom used by others. Non-local facilities, on the other hand, are those shared by various residential units. These are:

Local Facilities--Elementary school and recreational facilities.

Non-Local Facilities--Shopping center, junior high and high schools, churches and libraries.

Primary and Secondary Services and Facilities

Each category of services and facilities includes primary and secondary ones. Primary facilities are those which provide households with basic needs. Secondary facilities are those not directly related to basic needs.

Primary Facilities--Shopping center, schools and open space.

Secondary Facilities--Library and church.

Classification of Activity Patterns

Activity patterns can be classified according to the intensity, duration and frequency that a service or facility is used by urban households. Intensive activities are determined by the number of people using the facility. Duration of activities are measured by the length of time a facility is being used. The frequency of activities can be determined by the number of times a facility is used in a given period.

Based on these considerations, services and facilities are classified according to various characteristics of activity patterns. These are:

a. Classification by Intensity

High Intensity--Schools and open space.

Low Intensity--Shopping center, library and church.

b. Classification by Duration

Long Duration--Schools and open space.

Short Duration--Shopping center, library and church.

c. Classification by Frequency

High Frequency--Schools and open space.

Low Frequency--Shopping center, library and church.

Design Considerations

The proposed design aims to incorporate several residential units into a district. Services and facilities needed for each residential unit are selected from those which do not impose size, capacity or boundary constraints. They are also selected from those which provide basic needs, and which are more intensely and frequently used for long durations.

Accordingly, open space is the only service or facility which meets these requirements. In addition, its flexibility permits various possibilities for easy adaptation to future changes. Also, it facilitates the provision of different design arrangements, upgrades the physical appearance and contributes to the aesthetic quality of the residential environment. Furthermore, it provides for space needs to solve unforeseeable problems and help

integrate the circulation system more efficiently.

Other facilities such as schools, shopping centers, libraries and churches were intentionally excluded from the local units due to the different constraints they impose on the design. However, these facilities should be included on the district level. Their locations should be selected according to the derived accessibility standards expressed by the urban population.

This guideline proposed for the arrangement of residential areas can help provide different physical forms and design arrangements that coincide with the various socioeconomic characteristics of households. It can also help distribute services and facilities according to their specific needs. It can allow various densities and housing qualities for all income levels as well as provide desirable and continuous development patterns unrestricted by size or boundary limitations.

However, it is evident that these guidelines are based on surveys for a particular metropolitan area. Accordingly, they should not be considered for other urban areas unless preceded by similar household surveys. Such information can also provide valuable knowledge about the causes and effects of changes which take place in our environment, and avoid the problems that may arise in the future.

BIBLIOGRAPHY

BIBLIOGRAPHY

Books

Caplow, Theodore, et al. The Urban Ambience. New Jersey: Bedminster, 1964.

Dahir, James. The Neighborhood Unit Plan. New York: Russell Sage Foundation, 1947.

Gallion, Arthur B., and Eisner, Simon. The Urban Pattern. Princeton, N.J.: Van Nostrand Company, Inc., 1963.

Gans, Herbert J. People and Plans, Essays on Urban Problems and Solutions. New York: Basic Books, Inc., 1968.

Howard, Ebenezer. Garden Cities of Tomorrow. London: Faber and Faber Ltd., MLF Paperback Edition, 1965.

Kuper, Leo (ed.). Blue Print for Living Together. London: Cresset, 1953.

Mann, Peter H. An Approach to Urban Sociology. London: Routledge and Kegan Paul, 1964.

Mumford, Lewis. The City in History. New York: Harcourt, Brace and World, Inc., 1961.

Perry, Clarence A. Neighborhood and Community Planning. Vol. VII of The Regional Survey of New York and Its Environs. New York: Regional Plan of New York and Its Environs, 1929.

_____. Housing for the Machine Age. New York: Russell Sage Foundation, 1939.

Reiss, Albert J., Jr. Occupation and Social Status. New York: The Free Press of Glencoe, Inc., 1961.

Tetlow, John, et al. Towns and Traffic. London: Faber and Faber, 1965.

Articles and Periodicals

Gans, Herbert J. "Planning and Social Life," Journal of the American Institute of Planners, XXVII (May 1961).

Draft Report, Theme 2: "Planning and Construction of New Towns," Ekistics, XVIII (1964).

Reports

Tri-County Regional Planning Commission. Format and Description of Data in Card or Tape Form. Lansing, Mich.: Tri-County Regional Planning Commission, 1967.