

A STUDY OF URBAN HOUSING

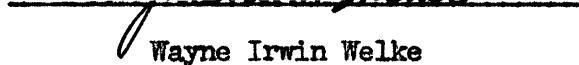
by Wayne Irwin Welke

Bachelor of Architecture
University of Minnesota, 1959


A THESIS SUBMITTED IN PARTIAL FULFILLMENT
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Accepted by


Professor Lawrence B. Anderson
Head, Department of Architecture

T H E A B S T R A C T

Title: A Study of Urban Housing

Author: Wayne Irwin Welke

Submitted to the Department of Architecture
August, 1961 for the degree of Master of
Architecture

The intention of this thesis is the study of the multiple factors involved in new housing for the urban center. The ills of today's city are many and complex, yet new housing within the city offers the possibility of effecting many improvements. The problems of physical communication with the urban core, renewal of deteriorated areas, and the establishment of an organization and form for the city are all within the scope of these projects.

This project concerns housing located in a particular relationship to the city pattern: the area peripheral to the urban core. A generalized program is developed from a site in the South End of Boston. This site is the Castle Square area bounded by Washington and Tremont Streets and Castle and Dover Streets. A design for high density housing is developed with a total of 1100 dwelling units on 20.2 acres.

The objectives were to determine a system of building form that is the result of the relationship of the project to the city pattern as well as to the considerations of the residential functions within the site itself. The synthesis is an architectural statement about the responsibilities of housing to the urban environment.

Cambridge, Massachusetts

August 23, 1961

Pietro Belluschi, Dean
School of Architecture and Planning
Massachusetts Institute of Technology
Cambridge 39, Massachusetts

Dear Dean Belluschi:

I hereby submit this thesis, entitled
"A Study of Urban Housing," in partial
fulfillment of the requirements for the
degree of Master of Architecture.

Very truly yours,



Wayne Irwin Welke

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B A C K G R O U N D

HOUSING IN AN URBAN ENVIRONMENT

Today's awareness of the rapid degeneration of our cities coupled with the mounting population explosion force us to take a new look at the problems of urban housing. On one hand the increase in population and the consequences of our technology on society are forcing people into the metropolitan regions in proportions never before experienced, and on the other hand the urban cores are suffering a decay and deterioration resulting from the chaos existing there. Even while a greater and greater segment of our society moves into lives directly related to the urban centers, these centers have become less capable of providing the environment and facilities required. The result has been the present urban sprawl: "bedroom" suburbs lacking any sense of community existence and spawning the hordes of automobiles which each day flood the downtowns in an impossible attempt at mechanical proximity. The importance of the city-center is undeniable; what is needed is the strengthening of its relationship to these people. Social, cultural, and technical forces have always drawn people together. The essential

gregariousness of man has made his inter-relating with one another an important part of his existence. The sophistication of these relations into cultural forces has reinforced the bonds of this communal life, as has the increase in mechanization and the decline in the agrarian population. The city is the focus of this communal existence; the city-center is the heart of this focus. The continuing importance of this city-center is denied by today's urban sprawl. The focus of today's life remains there but its functioning is seriously impaired by the distended paths of physical communication, the lack of direct relationships, and the resulting chaos of traffic. The city-center functions, but only at the cost of a tremendous expenditure of time and money, solely to overcome the handicap we have permitted to develop.

The solution seems clear: provide more people with a greater proximity to the core of urban life and create an urban environment that develops the potential of the city. This implies not only an improved facility for getting to the urban core but also a strengthening of the drawing power of the core itself and an elimination of the factors which originally contributed to the urban decay and hastened the outward sprawl. One of the means of implementing this solution would seem to be to improve the means of transportation, i.e. deve-

lop a mechanical proximity. This approach accepts the validity of the suburban housing per se and attempts to link it more strongly with the urban core. Indeed, today's concentration of superhighway construction is an expression of this approach. Unfortunately, the automobile is too inefficient as a means of carrying large numbers of people and is in its nature a contradiction to a dense urban environment. This mechanical proximity must come in the form of some sort of rapid transit system. As Professor Serge Chermayeff said, "The car is the implement of autonomy - at the other end of the spectrum of communal urban life and the public scale transportation. If we are talking about dense urban cores and their forms of life, we must look to forms of transportation indigenous to this."

In addition, the nature of the suburban development itself has serious drawbacks. The typical very low density promotes only the slightest social interaction and the sense of any real community is lost. The urban core is too remote to provide any bond and the suburban area itself is too dispersed. The result is the apathetic existence of the "bedroom towns" and the incompleteness of the lives of the inhabitants. The urban core supplies the qualities that the suburbs lack but here again the problem of proximity arises. To have to travel

ten miles for these day to day environmental qualities is self-defeating regardless of the speed of transport.

Finally, the emphasis on the suburbs and their mechanical connections does nothing to solve the problems of the urban core. Decay and deterioration of the city-center will continue and possibly be accelerated in the lack of attention. The life of the urban core will depend on the commuters and its very survival and existence will be threatened.

This suggests the possibility of the opposite approach as a means of achieving a solution: the intense development of housing in the city-center. This approach proposes a real physical proximity to the urban core, close enough to share in the urban activity on a day to day basis, and a high-density, high-population concentration to provide the source of that life. The role of the automobile is minimized, the public transportation is simplified. Communal existence functions simply and directly. The individual has a strong sense of the community merely from its physical implications and from his daily contacts with scores of other people. The high density allows him to make friends with people holding a great number of mutual interests beyond just that of living nearby. At the same time the individual can remain as

anonymous as he likes, a sort of privacy impossible in any other environment. He can participate in the community or not, as he prefers; the possibility is always there. This quality of selection adds an importance and richness to the individual's existence. The urban environment provides variety and choice in contrast to the shallowness of suburban life.

This development within the city-center can strengthen and clarify the framework of the city. It can be a means of reducing chaos, of stopping the deterioration, and of rebuilding the decayed. This concept, that the solution can have a positive physical contribution to the form of the city at the same time that it resolves the problems of residential function, is important.

This second approach is clearly more direct and more valuable. However, it fails to take into account the extensive and continuing existence of the suburbs around every large metropolitan center. The suburbs have potential advantages for families with small children and for workers at dispersed industrial developments. The suburbs also represent a huge financial investment that won't be given up just because of social shortcomings. The urban environment necessarily limits the amount of totally private space that one

individual has in order to provide more space common to all for the communal benefits to be gained.

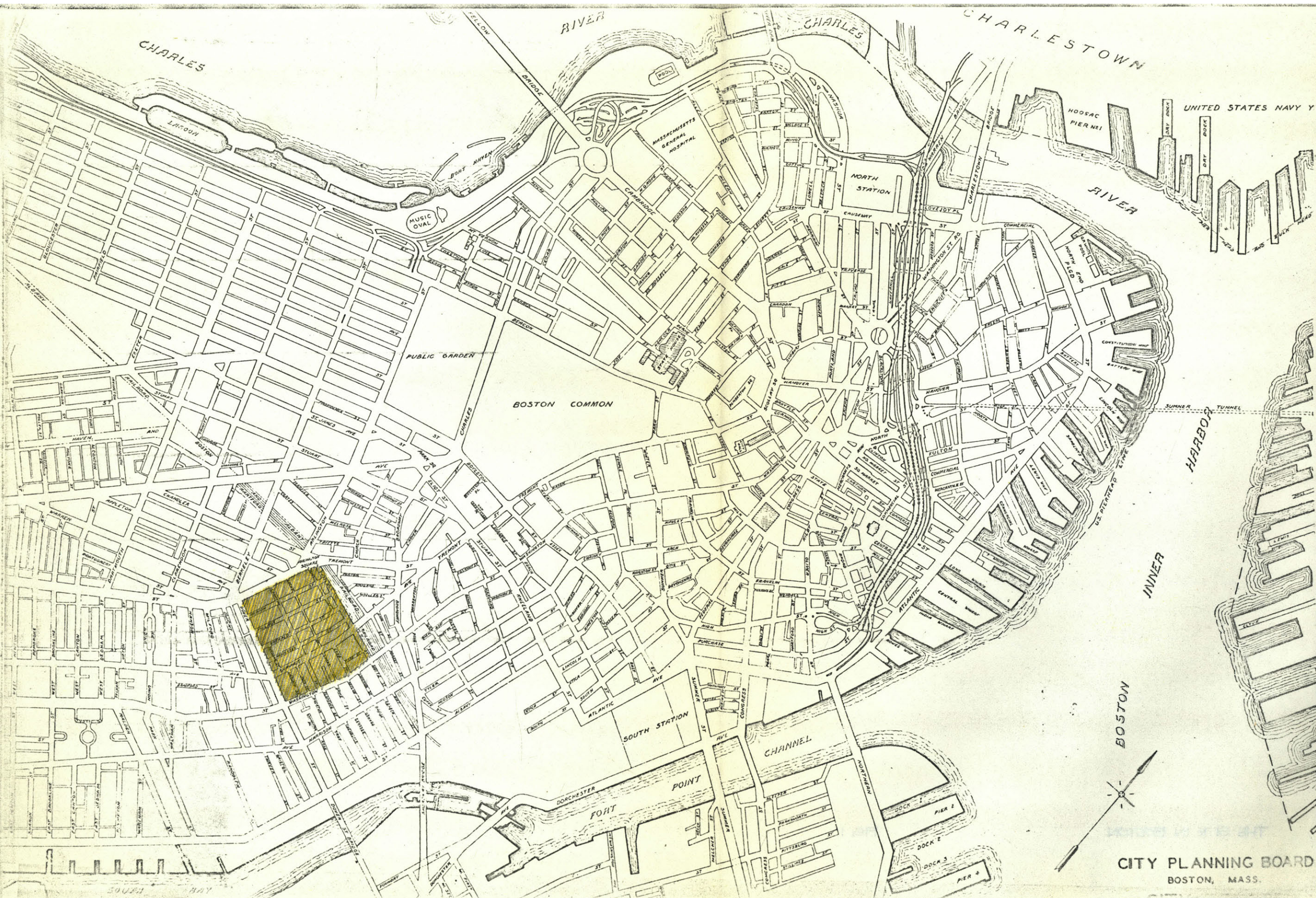
Thus it becomes clear that our approach must include a consideration of the suburban areas as part of the total urban problem. However, the essence of the problem lies in providing housing close to the urban core. The connection to the suburban areas would be primarily rapid transit together with a systematized pattern of thorofares for auto traffic. This thesis proposes to investigate this approach, considering a specific condition in a theoretical city-center, generalized from an existing site in Boston.

THE BASIC THESIS PROBLEM

It is intended to study housing primarily in its relation to the urban core. The attempt will be to solve the large system as a framework in which the particular requirements of a residential development can occur. For optimum investigation the site should be from 20 to 30 gross acres. Again for an optimum generalized investigation the site should not make strong topographical demands on the solution but rather be anonymous enough to permit a development that considers more directly the fundamental problems of housing in the city. It is intended that the study cover high-density housing, with about 45 to 65 units per gross acre. A generous range of apartment unit sizes should be incorporated in the development. In addition, commercial, community center, and parking facilities as related to the residential should be included.

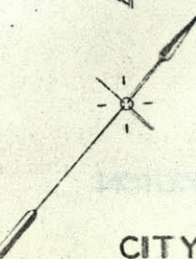
THE BOSTON SITE

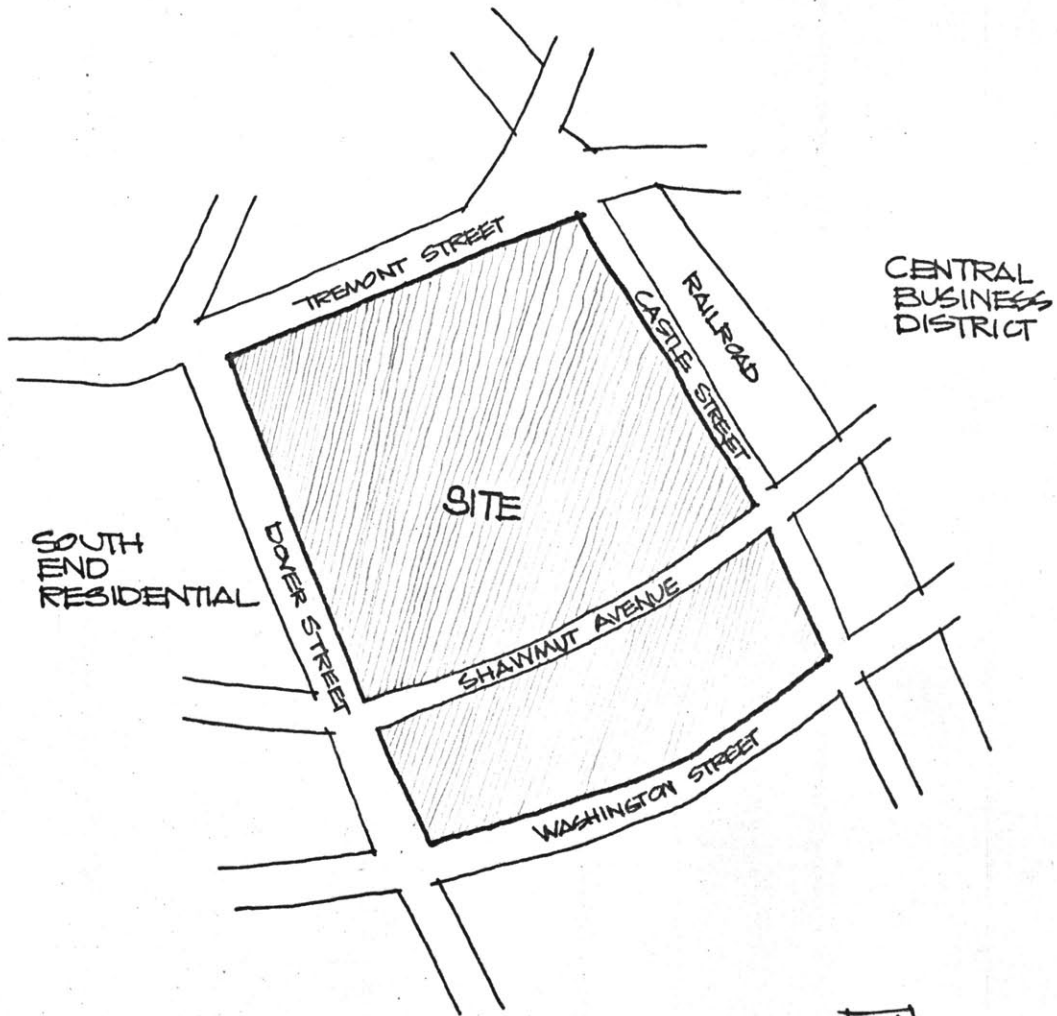
A site was selected in Boston on the basis of conferences with the Boston Redevelopment Authority. This was done in order to give the study a realistic base that would have the typical conditions of the generalized problem. The area chosen is that known as Castle Square. It is located in the South End of Boston between Tremont and Washington Streets on the northwest and southeast respectively and between Castle and Dover Streets on the northeast and southwest respectively. (see fig. 1, p. 15) Paralleling the northeast side of Castle Street are the tracks of the New York-New Haven and New York Central Railroads leading into South Station. This right-of-way is depressed below the level of the surrounding land so as to allow the roads to bridge straight across. This right-of-way is also the path of the proposed turnpike toll road extension. The area across the right-of-way to the northeast of the site has been classified as Central Business District by the Redevelopment Authority. The site is of the order of magnitude of 1000 feet square or 20.2 acres within the boundaries of the streets named previously, except to the edge of the railroad right-of-way instead of to Castle Street. (see fig. 2, p. 16)



CITY PLANNING BOARD
BOSTON, MASS.

BOSTON





SITE RELATIONSHIPS

FIG. 2

The South End is dominantly four and five-story brick-frame row houses, not fire-proof, and from fifty to one-hundred years old. Many of the buildings are used as rooming houses. The existing density is about 61 units per net acre, a high figure for this low-rise housing. The existing recreation space is only about four per cent of the total area. ¹

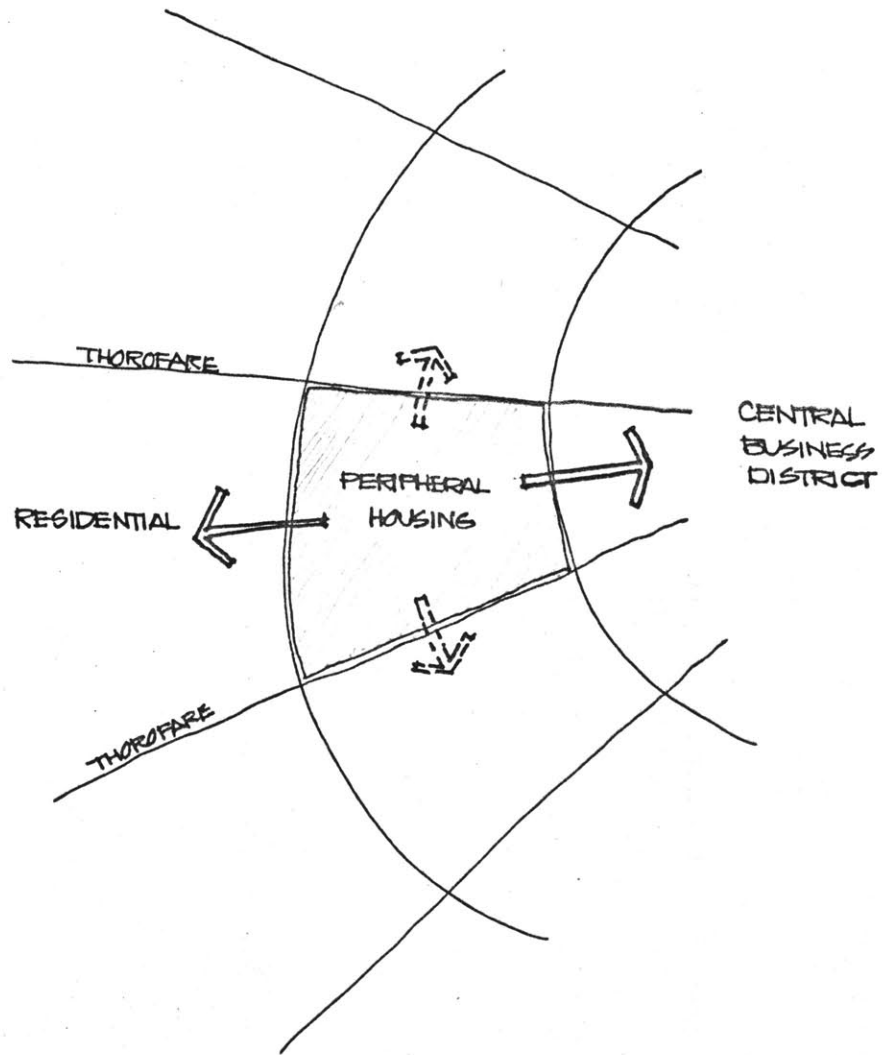
The South End in general is a prime prospect for redevelopment and the area of the site is a unit scheduled for complete clearance. This coincides with the proposed problem in that a generalized study is to be made instead of merely a solution of a particular existing neighborhood. In addition, the site chosen is virtually flat; this also allows for a generalized solution.

THE GENERALIZED PROGRAM

SITE

Abstracting from the conditions present in the Boston site, it is possible to describe a program of quite general nature. Basically the site is located on the periphery of the Central Business District with residential development on the opposite side and on the other two sides it is bordered by major thoroughfares extending radially from the CBD. (see fig. 3, p. 19)

In a theoretical city plan this site would be a segment in a ring of residential development surrounding the CBD. Progressing radially from the city core, the site would be a link between the core and other residential areas of increasingly lower density. This quality of a link and the attendant considerations of the relationship to the business district and the continuing residential development are the prime design conditions of this problem. In addition, the thoroughfares adjoining the site present special conditions affecting the design.



THEORETICAL CITY PLAN

FIG. 3

OBJECTIVES

Fundamentally, the objective of the study is to determine the physical form of a residential development located peripheral to the urban commercial core. This objective implies four points of consideration:

The physical form in terms of the small scale environment within the site;

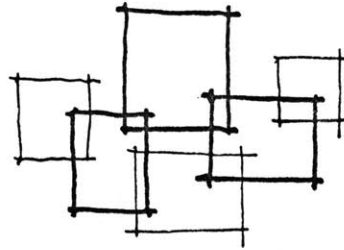
The form in terms of the site area as an entity;

The form in terms of its relationship as part of the organization of the city;

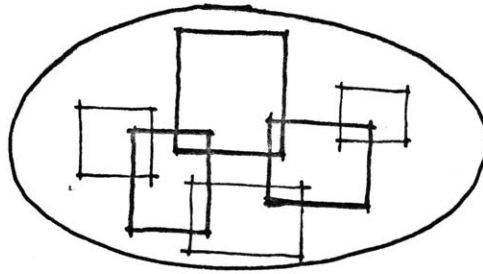
The form as an expandable pattern of physical development. (see fig. 4, p. 21)

These considerations deal with the responsibilities of this housing system in creating an environment with the qualities and amenities required by the residents and at the same time creating a larger scale pattern which gives continuity and an image to the neighborhood or segment as a whole. Most important, the system must reflect its position in the city as an edge to the business district and as a part of a progression or a link to this district. This spatial progression would be developed for the circulation of pedestrians to and from downtown and secondarily for the segregated automobile traffic. The "link" aspect of the form is a vital consideration in the problem of giving a pattern to the urban environment as

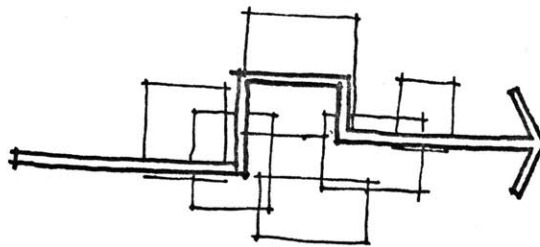
the physical form in terms of the environment within the site



the form in terms of the neighborhood as an entity



the form as a part of the pattern of the city: a progression



a whole and establishing the beginnings of an order to the city. The creation of a recognizable framework at a large scale in this project (and this project extrapolated) is essential to the development of any systematization of the organization of the urban area. Finally, to be compatible with expansion and continuation, the system must determine a form that has the quality of accepting further developments on any site of it.

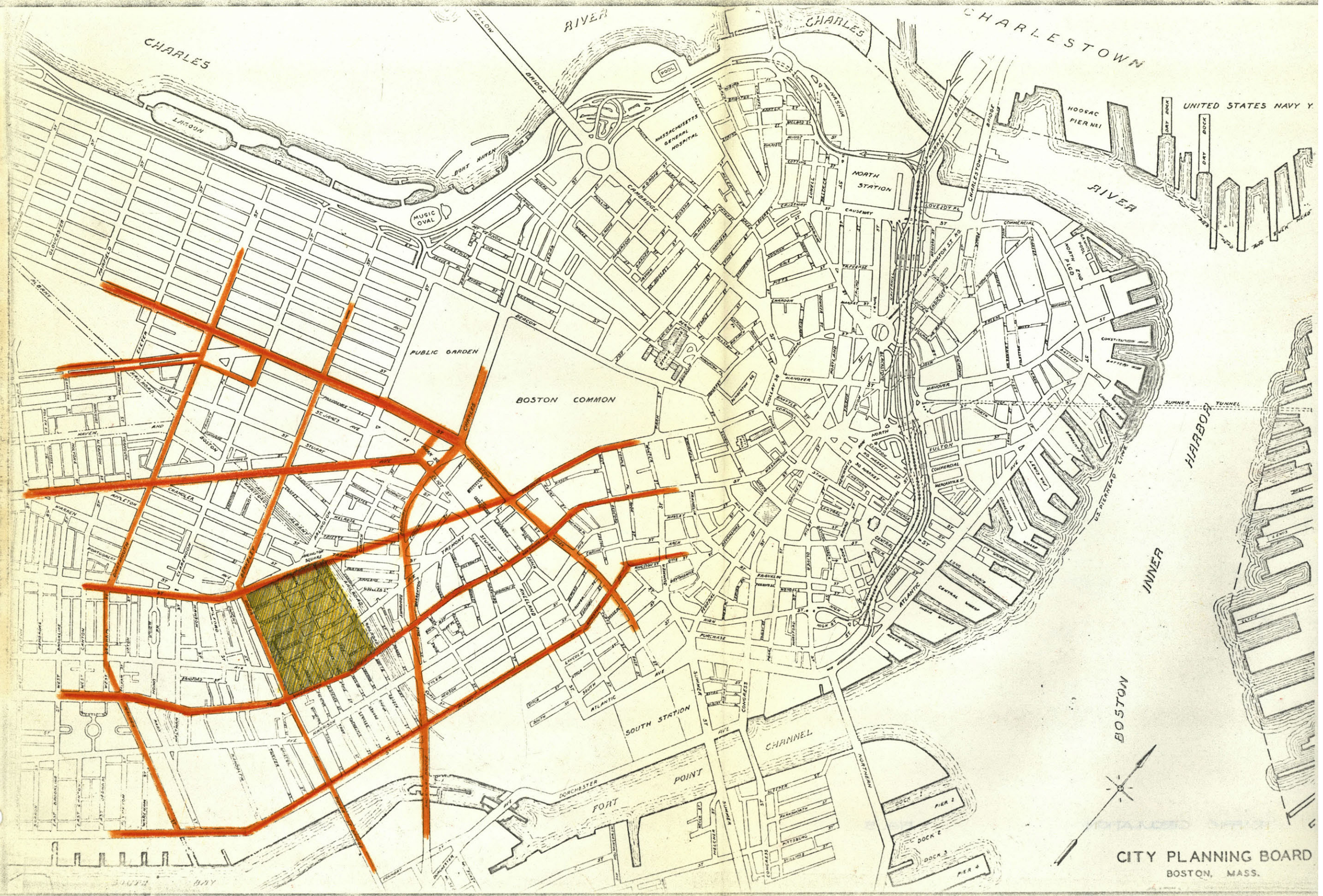
A S S U M P T I O N S A N D R E Q U I R E M E N T S

TRAFFIC

The existing street pattern in Boston was revised somewhat to simplify the pattern of circulation. A potential system of thorofares was outlined in order to indicate the position of the site in the framework of the city. (see fig. 5,p. 24) Tremont Street was straightened to facilitate its role as a thorofare. It was decided to eliminate Shawmut Avenue because of its redundancy with Tremont Street. Dover Street is considered to be one of the major transverse roads, cross-connecting the downtown-bound thorofares. Castle Street was eliminated from the site. This circulation proposal does not presume to be the result of any great technical study but rather a suggested pattern to establish the relationship of the site to the urban area as a whole in terms of the generalized investigation.

DENSITY

The density value of the site was developed in light of these considerations: the land near the Central Business District will necessarily be expensive and a high density of occupancy



CHARLES RIVER

CHARLES RIVER

CHARLES RIVER

CHARLESTOWN

UNITED STATES NAVY YARD

PUBLIC GARDEN

BOSTON COMMON

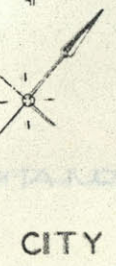
CHARLES RIVER

SUMNER TUNNEL

HARBOR

INNER

BOSTON



CITY PLANNING BOARD
BOSTON, MASS.

will make it more economical; housing at this proximity to downtown will be desirable to many people; a dense occupancy develops more of the potential positive values of the project. For these reasons the density was maximized to a reasonable limit. A range of from 75 to 110 units per net acre was selected. The net acreage is defined as "the land devoted to residential buildings and accessory usages on the same lots, such as informal open space, drives, and service areas, but excluding land for streets, public parking, playgrounds, and non-residential buildings." ² This density yielded a total of approximately 1000 units on the site. The number of persons per family was assumed to be 3.0, slightly lower than the average for the city as a whole but in keeping with the nature of the residents expected in an urban core residential area. Very large families will probably locate where they can have more land directly related to their dwelling unit, and a larger than average proportion of single individuals will probably locate close to the center-city area. The total population then will be about 3000 persons.

COMMUNITY FACILITIES

A commercial development for the convenience of the residents of the site was included as a program requirement. An area of

19,000 square feet of sales floor was established as reasonable for a project of this size.³ This number is widely variable; many existing situations have proportionately more area. For instance, San Francisco averages about 1.2 acres of neighborhood commercial (including parking area) per 1000 population. The equivalent area for this project would be 40,000 square feet of sales area. The design should permit expansion of the commercial area within the framework of the project. Space was included in conjunction with the commercial for a community center. Nursery schools were also included in the site. Ideally an elementary school would be integrated into a project of this nature. However, the population involved in this particular problem was insufficient to warrant providing the necessary facilities. In this case the elementary school would be combined with an adjacent residential area, probably one of similar physical form located across Dover Street to the southwest. This solution would relate satisfactorily to the nature of the project as a continuing pedestrian-oriented progression.

PARKING

Parking space for residents was established at the ratio of

80 cars per 100 dwelling units, a sufficiently generous total especially considering the location of this housing in the city. Living close to downtown greatly reduces an individual's dependence on an automobile. Most destinations are within reach by walking or by taxi or public transportation in a few minutes time. Parking for the commercial services was also included. Space requirements for this were considered to be equal to the sales area of the commercial buildings themselves. Most sources, such as the Urban Land Institute, suggest a minimum of two times the sales area but this is considering the traditional city pattern where residents might drive to these shops. Since this project provides for complete pedestrian proximity to the neighborhood stores, this figure can be reduced. The commercial parking allotment also provides for night visitor's parking of about one car per ten dwelling units.

EXTERIOR SPACES

The recreation space requirements were based on the system of the National Recreation Association.⁴ This system includes three categories:

1) The playlot for children under eight years. This is the equivalent of the backyard. One playlot is required for approximately every 30 to 60 families; each is of 1500 to 2500 square feet.

2) The children's playground for ages five to fifteen years. This is the center of recreation for the neighborhood and serves dwellings within a maximum radius of one-quarter mile. It is preferably located adjacent to a community center for supervised recreation. The area required is about one acre per 1000 population.

3) The playfield for young people and adults, serving four to five neighborhoods. (This is outside the area of the site.) One playfield should be provided for each 20,000 population, serving dwellings within a maximum of a one mile radius. The area requirements vary between different sources from one-half acre per 1000 population to one acre per 800 population. The minimum size playfield is ten acres.

More difficult to define are the spaces devoted to social activities and unorganized relaxation. Here are three possible classifications, again from Gallion:

1) Public squares. These are the open urban spaces for social intercourse and relaxation; these are especially important to a project of this size and nature. The size and distribution of these spaces can vary with density, specific activity, spatial pattern, etc.

2) City park. These are the breaks in the urban area of the nature of the Boston Common. They should be located about five miles apart and should provide one acre per 2000 population, with a minimum size of 30 acres.

3) Metropolitan region park, such as New York's Central Park or larger. These are generally of 1000 to 4000 acres.

The last two classifications, of course, lie outside the scope of this site.

THE SYNTHESIS

The design proposal for this site takes the form of two continuous twelve story slab buildings of apartments, arranged in a rectilinear pattern so as to form an enclosure between them. The strength of these buildings gives the total site development a unity and in addition defines and emphasizes the direction of the site as a link. The irregular configuration of the slabs permits a full continuity with any expansion of the pattern on surrounding sites. Adjacent to the slabs are low one story buildings for commercial and community center and landscape elements which break up the ground plane into three separate spaces or plazas. These low elements define the spaces which are directly related to the pedestrian. Because of their low size, they can provide the small scale variations necessary to enrich and elaborate on the space occupied by the human being. This function can not be fulfilled by the tall slabs alone. Because of their mass they can not take on the small-dimension configurations important at the ground. Just as these buildings have a scale as physical forms, so similarly the significant variations in these forms must be of the same scale. Except for the long range view, the imparted sense of

direction, this scale is not the scale of the person walking on the ground. It is, however, the scale of the faster moving automobile, the neighborhood as a whole, the site as a segment of the city pattern. From the ground the pedestrian is conscious of the coherent form of the tall apartment buildings, and the sense of connection to downtown indicated by the direction of the buildings and the two major openings or "gates". He is more closely aware of the activity on the ground around him in the plazas defined by the low shop buildings.

In order to clarify circulation within the site, the eight elevator towers of the apartment buildings have been expressed on the exterior of the buildings. They occur consistently at turns in the slabs and form part of a glazed link. In addition to expressing the system of vertical circulation, these towers indicate the major points of horizontal circulation to the less formally developed open space beyond the apartment slabs. These towers also mark the points at which automobile access approaches the buildings. A continuous raised level beneath the slabs provides a circulation way between the eight elevator towers and also connections to the parking structures and to the community center facilities.

HOUSING

The apartment slabs are based on a skip-stop elevator system. The single-loaded corridors occur only on alternate levels and the units are at half a level above or below the corridor. The units above the corridor run completely through the building for cross ventilation. The corridors are always on the side of the slab away from the central space and the living areas of the units always are oriented towards this space. This system was chosen in order to let the units participate in the activity of the urban space and to reinforce the introverted nature of the entire project. Four types of apartment units are provided: efficiency, one-bedroom, two-bedroom, and three-bedroom. In addition, the one-bedroom units are divided into two variations, the through-the-building unit on a split level (A), and a slightly more generous one-orientation unit on one level (B).

Balconies are provided for all units except the efficiencies where the equivalent space is used to make a more generous living area. It is felt that balconies are an extremely valuable amenity, providing direct contact with the outdoors regardless how high above the ground the unit may be. Lack of this very simple contact greatly reduces the "livability"

of the unit. This is particularly important where children are concerned. Each unit also has an individual bulk storage room directly related to the unit entrance. Both the balcony and storage room vary in size according to the size of the unit. The average gross area per unit (including public circulation and storage) is 1152 square feet.

The apartment units are combined within the building in a repeated two story, six bay module. The range of units within this module permits an orderly but varied pattern of solids and voids on the building facades.

Apartment units are as follows:

Ratio of Types	Unit Type	Square Footages		
		Room	Balcony	Storage
2	Efficiency	512	0	80
4	1 BR. A	640	128	48
	1 BR. B	760	128	48
1	2 BR.	864	128	96
1	3 BR.	1524	256	96

In keeping with the high land costs as well as living costs in the urban core it is expected that these units would range from moderate to luxury in their rents. It is felt that it is desirable to obtain as wide a range as possible in the income

levels present in a neighborhood such as this one. This would not only make for a more varied environment but would also increase the stability of the neighborhood as well.

The total area of the site is 20.2 acres; of this 11.9 acres is the net area of residential usage, or 0.6 of the gross area. There are 1100 apartment units provided on the site for a total population of 3300. The final gross density is 55 units per acre; the net density is 92.5 units per acre.

COMMERCIAL

The commercial development is located in the low building mass, in a position that defines (and thus relates directly to) the three plazas within the site and also is centrally located between the apartment slabs. An area of 19,000 square feet is provided for shops of the following types: market, drugs, bar and grill, laundry, dry cleaner, stationer, specialty shops, beauty shop, barber shop, delicattessen, bakery, and restaurant. ⁵

COMMUNITY CENTER

Within the low building element are also located the community center facilities. These occupy about 9000 square feet and include a small auditorium, club rooms, and an indoor recreation space. The roof of this building can also be used for community activities, recreation, and dining, etc. Future expansion of the community center as well as of the commercial can take any of three directions. The present low building can be enlarged on one floor; a full or partial second floor can be added; or another low building mass can be added within one of the plazas.

SCHOOLS

The project provides for eight nursery schools. The total of 1100 units at the average of three persons per family would indicate a total of about 130 children in nursery school, or about 16 in each school.⁶ Each school building requires about 50 square feet per child or 800 square feet.⁷ In addition, sixteen playlots are provided, approximately one for each 70 families. Each playlot is of about 1900 square feet. Three playgrounds totalling 3.3 acres are included in the site, based on the National Recreation Association requirements.

PARKING

The total of the required parking space is included in four ramps which are closely related to the access roads into the site and to the elevator tower entrances. Each ramp has 71,700 square feet on four levels for a total for the site of 287,000 square feet. This total provides one space each for 80 per cent of the 1100 dwelling units (264,000 square feet) plus an area equal to the commercial space (19,000 square feet). In addition some surface parking is provided for overflow situations.

TRAFFIC

The exact nature of the traffic on the streets surrounding the site is hard to estimate - it depends largely on an assumption regarding the role of the automobile in the future urban core. It is probably safe to assume that the automobile will always be an element of important consideration in our cities. The pattern of radial thorofares is a typical potential if not present situation in many cities. These could be developed to carry traffic between the downtown area and an "inner belt" freeway at a fairly constant speed of 30 to 40 miles per hour. The number of thorofares and the size of

the city would determine the exact traffic load. The concentric streets such as Dover Street would carry less traffic and be essentially connectors between the thoroughfares.

The important considerations of this traffic in this study are its segregation and definition. The auto traffic must be relatively isolated so that it can move without impediment. Any connection to it must be so designed to preserve the quality of free movement. The access roads in this project are separated from the boundary streets in order to provide maximum accessibility with a minimum of connections to the streets. The pedestrian traffic is directed within the superblock where the scale of space and activity is designed for the individual. The scale of space along the streets is very much larger. The speed of the automobile makes small variations meaningless. The larger spaces and articulation of the tall buildings and parking ramps create a progression in scale with the traffic.

Rapid transit is included in the project in the form of a subway station located at the central commercial area, a part of a relocated Washington Street line; and a bus stop at the pedestrian crossing over Dover Street. This surface transportation could provide concentric connection between the radial subway lines.

C O N C L U S I O N

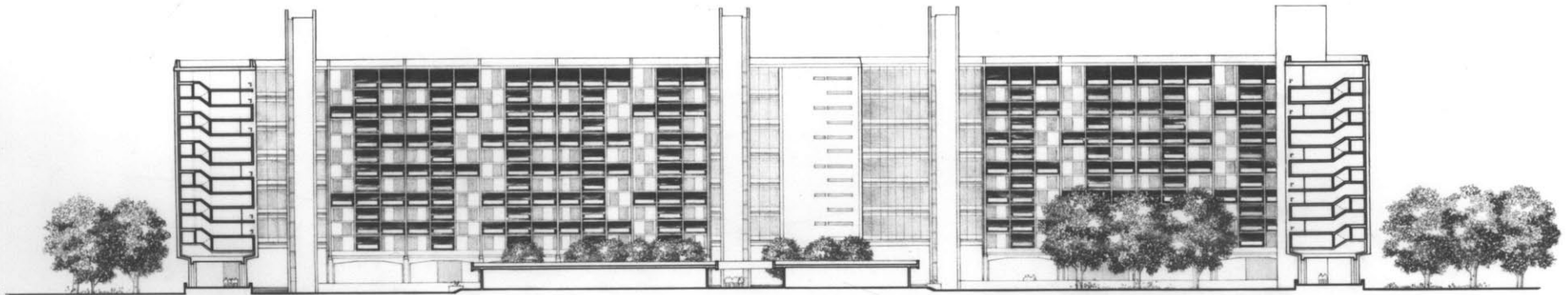
The result of this study is a housing system that relates to the city and solves the basic problems of a resident in an urban environment. The relationship is not so much to an existing city per se, but to a generalized pattern existing in our cities. The relationship is one of architectural form in terms of its location peripheral to the urban core: the creation of an edge to downtown; the organization and definition of pedestrian and automobile circulation through the directional emphasis and large scale space control of the major buildings. The building form explains the neighborhood as an entity yet allows it to work together with any extension of the system into more neighborhoods. The building form creates a central space to which all activity is oriented and which allows for a real expression of the life and vitality of the urban environment at the neighborhood level. The relationship of this space as part of a progression to the urban core gives it an importance to the residents greater than that achieved by the atmosphere of housing alone. The system of the project provides a framework on which may be developed any amount of further elaboration of the urban environment.

FOOTNOTES

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Chicago, 1948.



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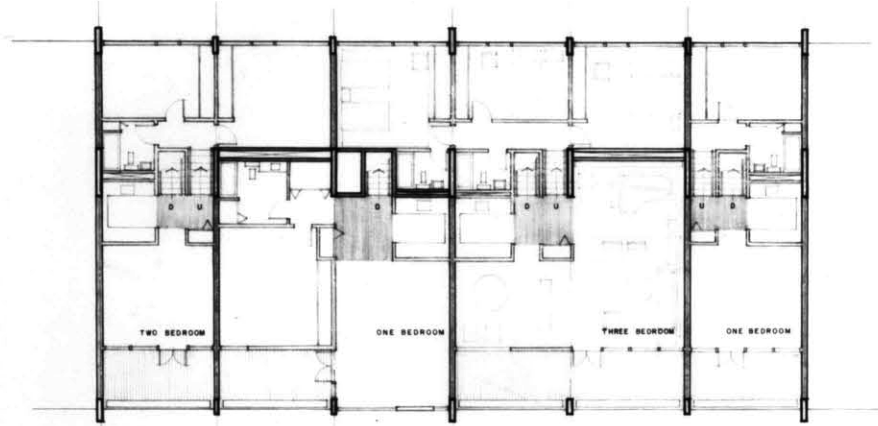
SECTIONS WAYNE IRWIN WELKE AUGUST, 1961



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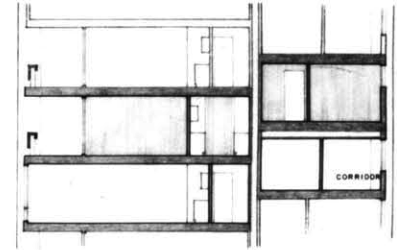
SECTIONS

WAYNE IRWIN WELKE AUGUST, 1961

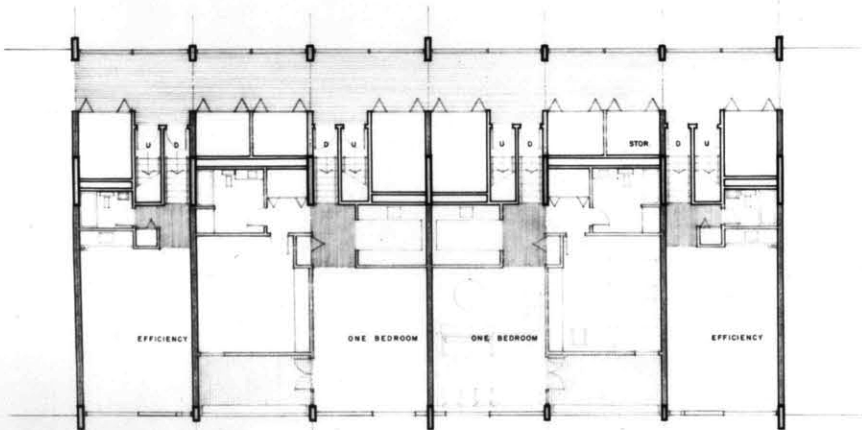
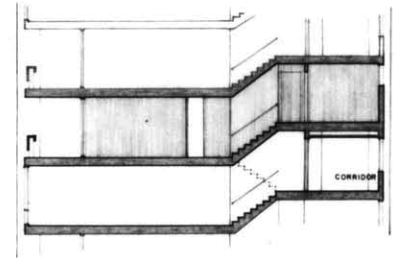


TYPICAL GROUP: UPPER LEVEL
 0 5 10 20

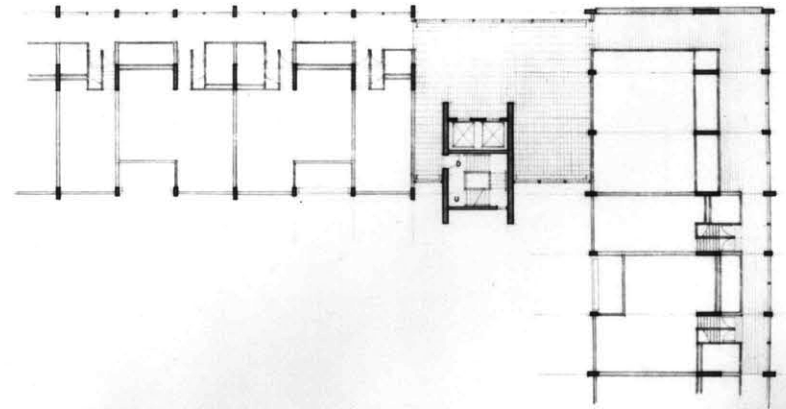
TYPICAL SECTION AT UTILITIES
 0 5 10 20



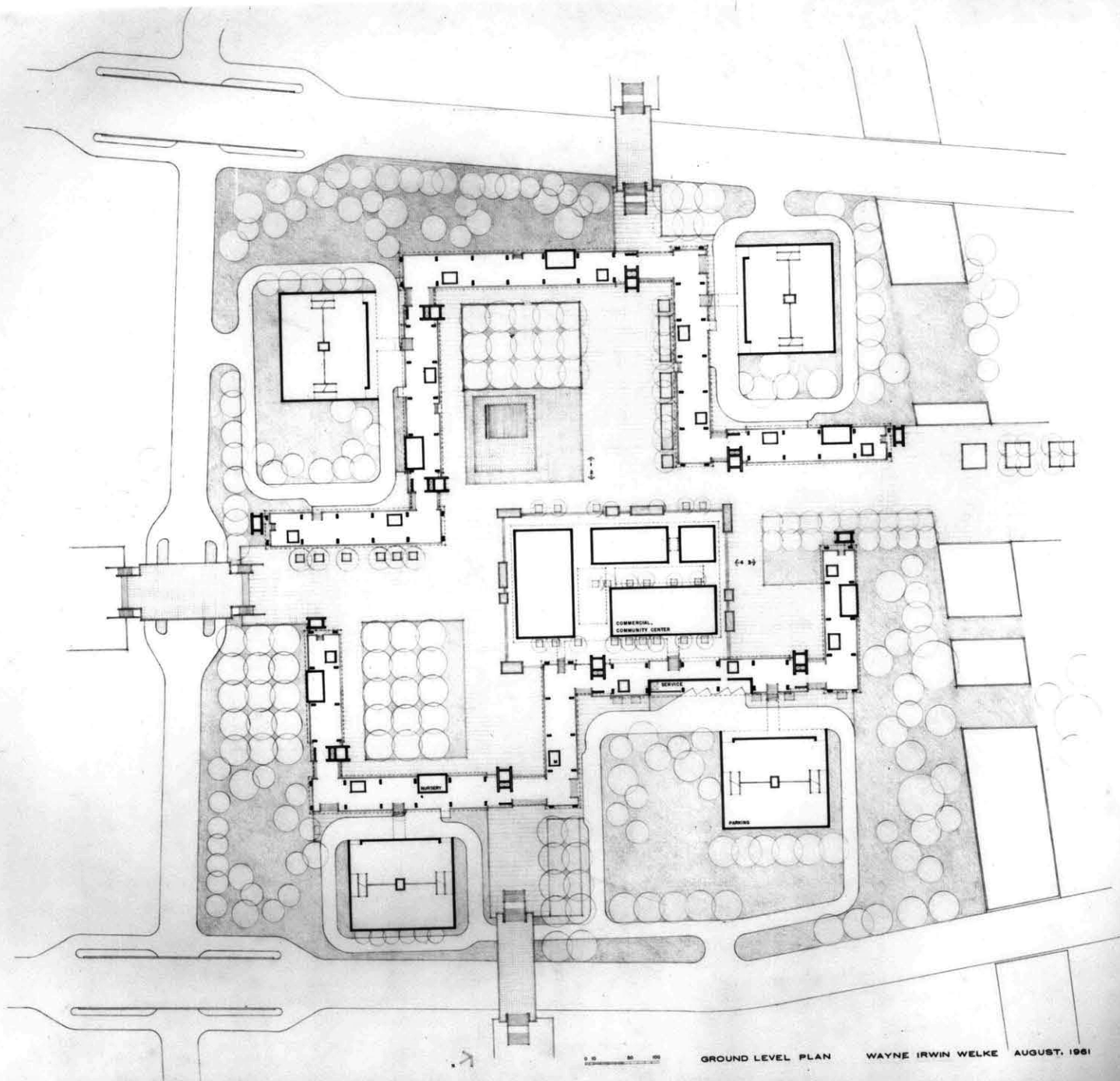
TYPICAL SECTION AT STAIRS
 0 5 10 20



TYPICAL GROUP: LOWER LEVEL
 0 5 10 20



TYPICAL PLAN AT ELEVATOR LOBBY
 0 5 10 20



GROUND LEVEL PLAN

WAYNE IRWIN WELKE AUGUST, 1961

