

A Study for Middle-Income Multi-Family dwellings
In New York City

Submitted in partial fulfillment
of the requirements for the degree
Master in Architecture, August
twenty-fourth, nineteen hundred
and fifty one.

by ..

U
Elliot Saltzman

.....
Lawrence B. Anderson
Head of Department

/

A Study for Middle-Income Multi-Family Dwellings
in New York City

by Elliot Saltzman

Submitted for the degree of Master in Architecture
in the Department of Architecture on August 24, 1951.

A large majority of New Yorkers live in multi-family rental housing. Most of these dwellings today are poorly designed and are lacking in amenities. This is due in great part to the attitude of the speculative builder, who builds most of New York City's multi-family houses. Past history shows that the aim of all apartment house designers and builders has been to provide livability. However, the standard of living, and the degree of amenities that are felt to be required have been constantly increasing. This has resulted in older buildings soon becoming obsolete and difficult to rent. For this reason, apartment building has been looked upon as a speculative game, with the profit realized largely in the construction and in the first few years of the building's life, and who cares afterwards.

However, by designing now for higher standards than are now commonly accepted, it will be possible to assure a continued demand for space in the buildings. In this case the buildings' life will be longer, and it can be financed from the point of view of an investment. This will result in lower rents, or better livability at the same rents that are now common in ordinary new developments.

The building proper should be of fireproof construction. Although originally more expensive, new techniques have brought its price down to that of non-fireproof. Any by using fireproof construction, it will be possible to take advantage of new loosened building regulations, and design by using either a skip floor or balcony access system. The skip floor system is restricted to a corridor every other floor in New York, which limits its advantages. In fact, it was found impossible to design a skip floor scheme, with the desired apartment distribution, in which the advantages

decisively outweighed the disadvantages.

The balcony access scheme has its criticisms, but it is felt that its drawbacks can be negated to a great extent by proper design.

The final design is a U shaped building, of reinforced concrete, one apartment deep, with the access balcony running along the bottom of the U on the inside. The building is oriented so the summer breezes blow through, and the winter winds parallel to it. This prevents the wind from driving winter rain and snow onto the balcony. Each apartment has through ventilation. Privacy is assured by placing all living areas away from the balcony. In any case a maximum of three families walk past any one other apartment. Each apartment has a generous allowance of storage space. It also has at least two separate activity areas. Each apartment has its own balcony. Other amenities include ease of circulation in the apartment, no need to walk through any room to reach another, plenty of sunlight, individual heat control, ventilated kitchens.

It is believed that a house such as this can be built to rent for thirty dollars a room, and still give a return on a twenty per cent equity of over six per cent.

6 Bennett Street
Cambridge 38, Mass.
August 22, 1951

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

Dear Sir:

I should like to submit my thesis study, "A Study For Middle-Income Multi-Family Dwellings in New York City" in partial fulfillment of the requirements for the Degree of Master in Architecture from the Massachusetts Institute of Technology.

Respectfully submitted,

Elliot Saltzman

Table of Contents

Acknowledgements	p. 1
Introduction	p. 3
History	p. 8
The Speculative Attitude in New York City	p. 31
Livability	p. 36
Apartment Size Distribution	p. 53
Construction Types	p. 58
Plan Types	p. 68
Skip Floor vs. Balcony Access	p. 75
The Design	p. 81
Bibliography	p. 86
Appendix	p. 89

ACKNOWLEDGEMENTS

I wish to express my gratitude to the following for their aid and guidance, without which this thesis would not have been possible.

Pietro Belluschi

Dean, School of Architecture

Lawrence B. Anderson

Professor of Architecture,

Head of the Department

Herbert L. Beckwith

Professor of Architecture

William H. Brown

Associate professor of Architecture

Thomas F. McNulty

Instructor

Kevin A. Lynch

Assistant Professor of

City Planning

Robert B. Newman

Assistant Professor in Acoustics

Irving Seelig

Architect

Harry Finkelstein

Architect

Morris Kavy

Architect and builder

Phillip Birnbaum

Architect

Mr. H. Glass

Architect, Mayer and Whittlesey

Mr. W. Habeck

Carol Management Corp.

Miss E. Coit

The New York City Housing
Management

Benjamin Saltzman

Department of Housing and
Building New York City

Matthew W. DelGaudio

Architect

Walter C. Voss

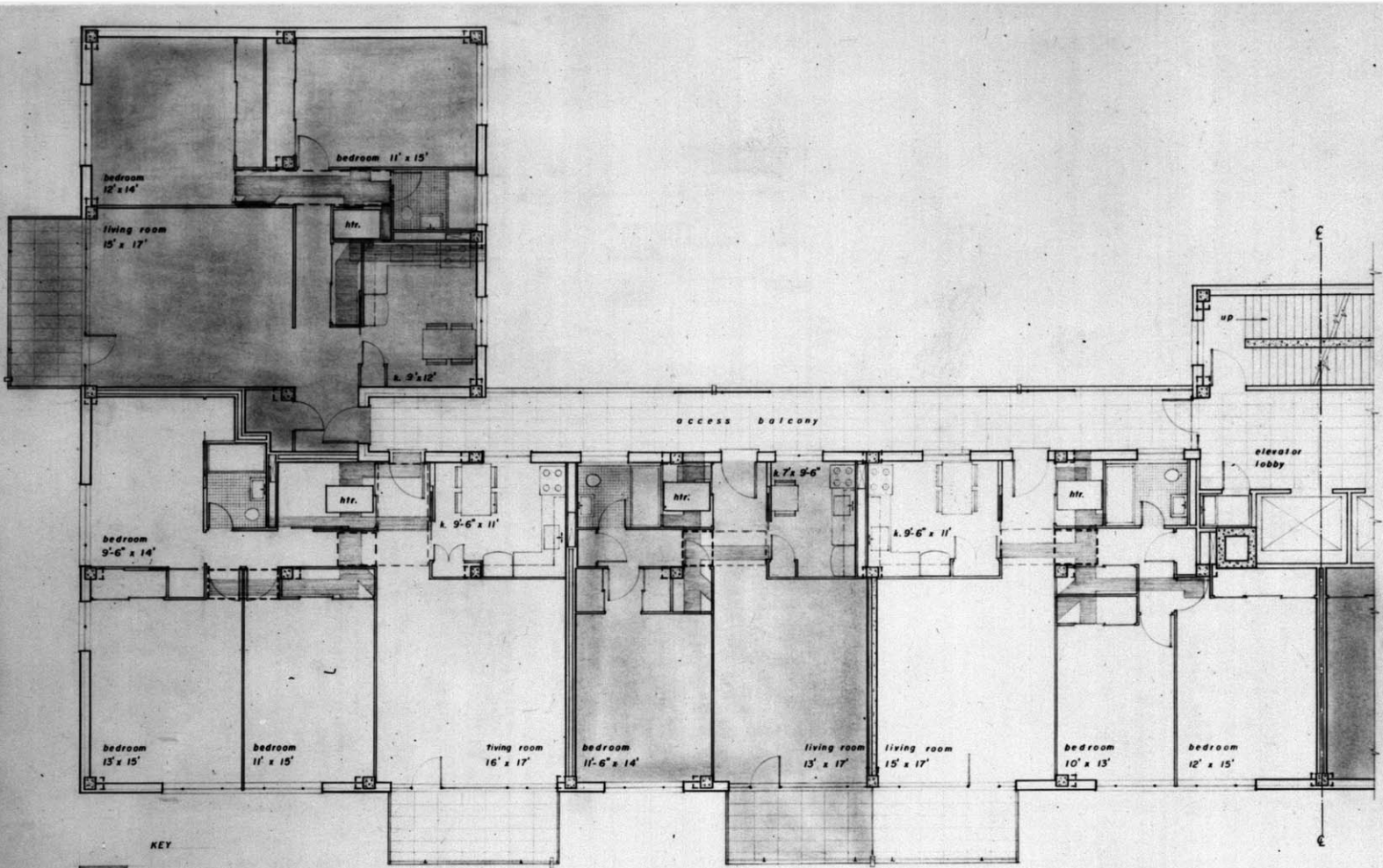
Professor of Building Construction
Head of the Department






Howard Simpson

Assistant Professor of Structural
Design

James Holt

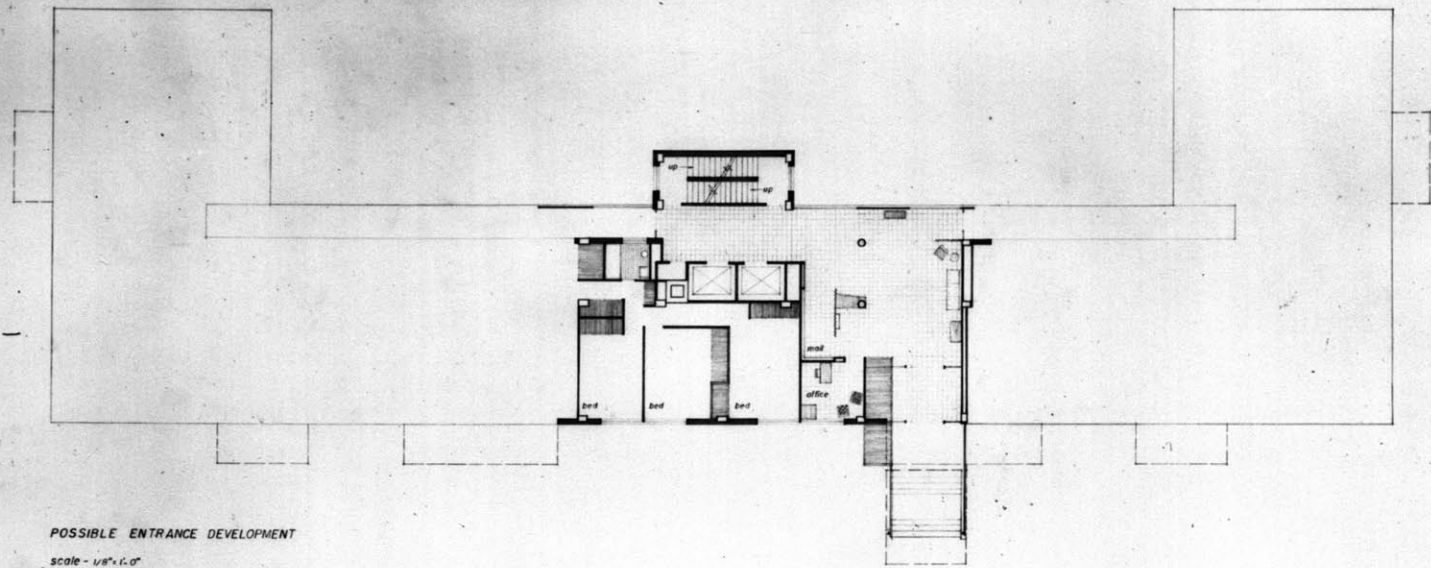
Professor of Mechanical Engineering



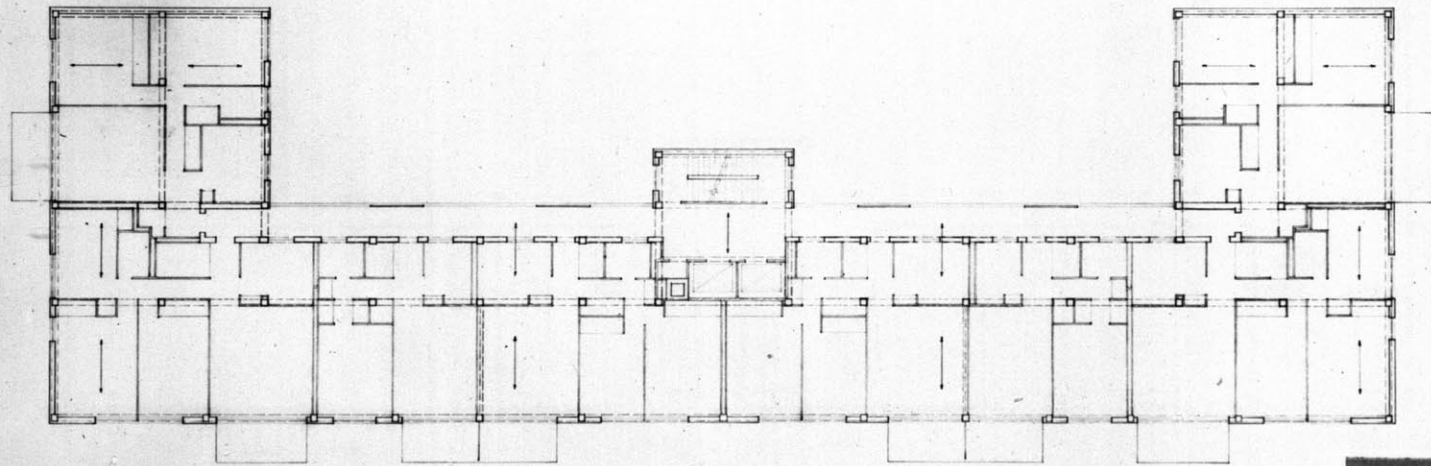
- KEY**
-  fresh air intake
 -  return
 -  warm air delivery
 -  8'-0" ceiling ht.
 -  7'-6" ceiling ht.

ONE-HALF TYPICAL FLOOR
 scale - 1/4" = 1'-0"

A. W. H. ARCHITECTS - 1001 N. 10TH ST. - PHOENIX, ARIZ.
 1951

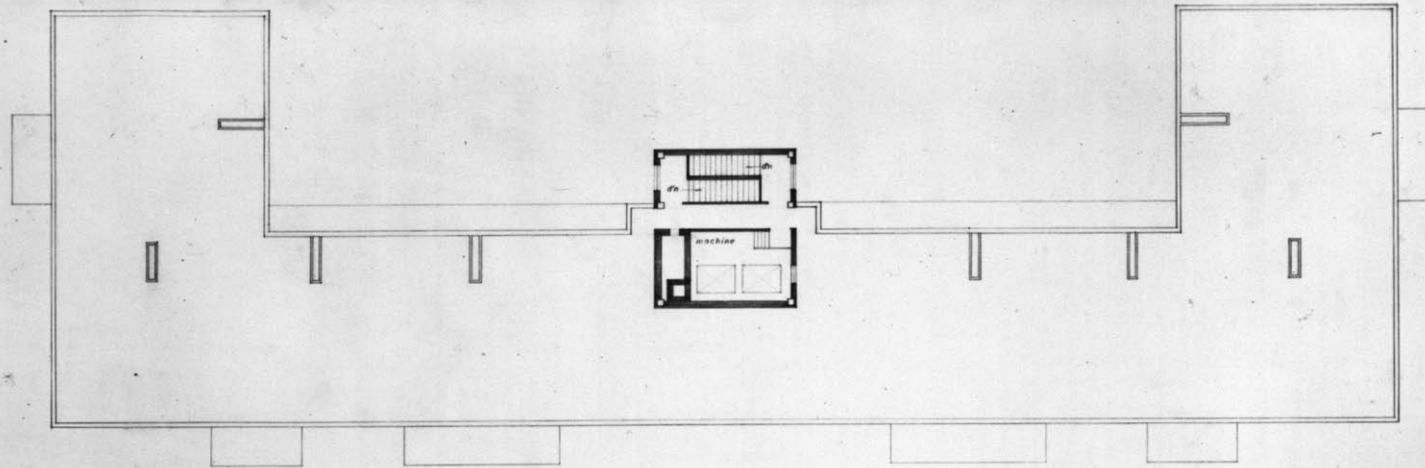


POSSIBLE ENTRANCE DEVELOPMENT
scale - 1/8" = 1'-0"

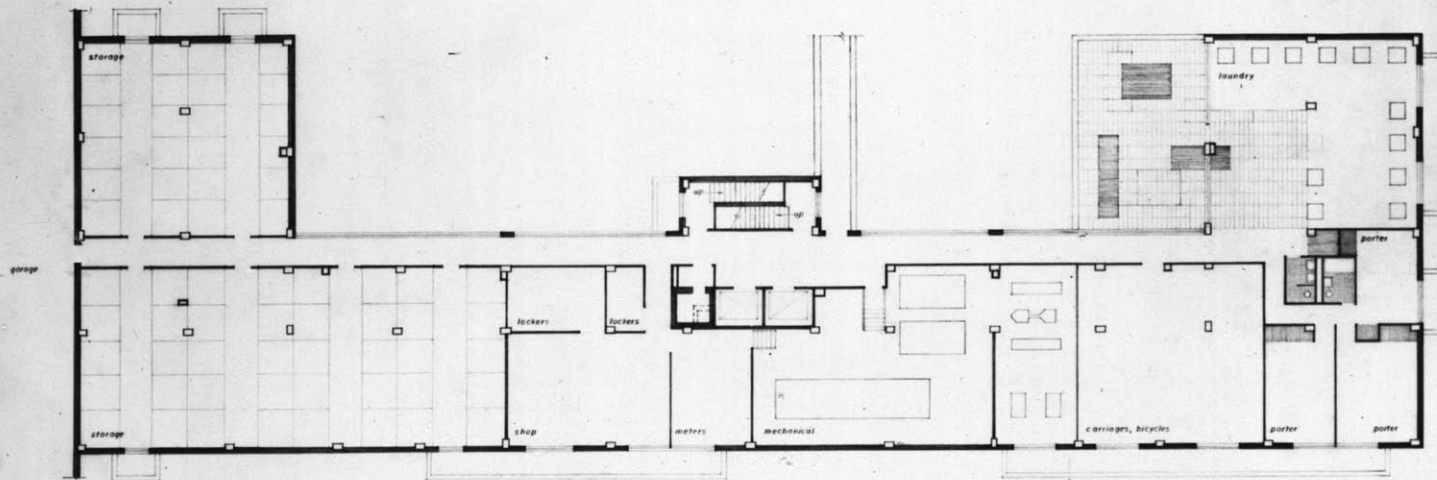


FRAMING PLAN
scale - 1/8" = 1'-0"

W. H. RAYMOND ARCHITECTS, INC.
NEW YORK CITY
1931
3

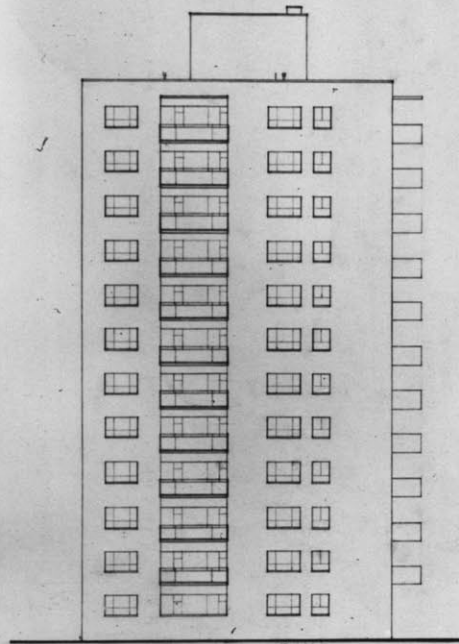


ROOF PLAN
scale - 1/8" = 1'-0"

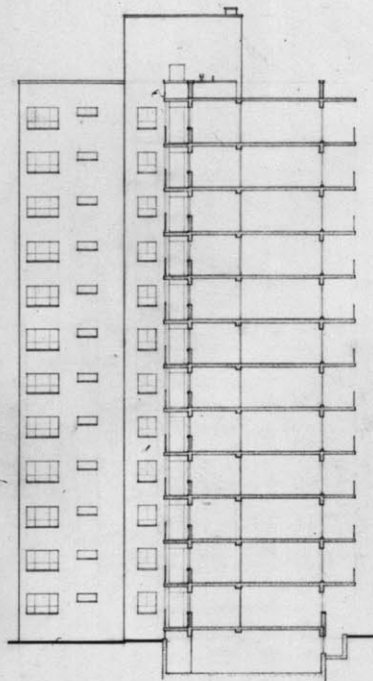


POSSIBLE CELLAR DEVELOPMENT
scale - 1/8" = 1'-0"

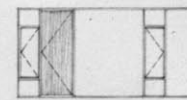
A WHEELER - TRUMBULL MULTI-FAMILY HOUSING
FOR THE CITY OF
CHICAGO, ILL., 1951
ARCHITECTS
WHEELER - TRUMBULL ARCHITECTS
411 EAST WASHINGTON



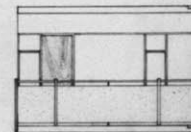
WEST ELEVATION
scale - 3/32" = 1'-0"



CROSS SECTION
scale - 3/32" = 1'-0"



living room



living balcony



bedroom



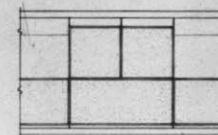
stair



kitchen



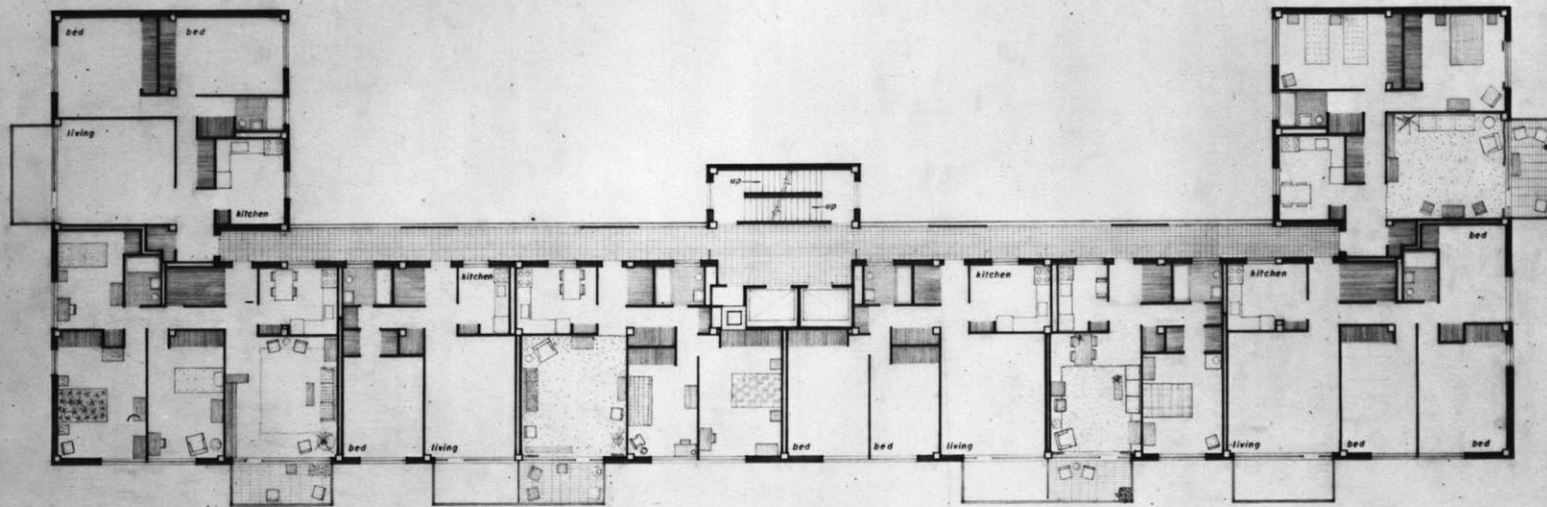
bath



access balcony

WINDOW & BALCONY ELEVATIONS
scale - 1/4" = 1'-0"

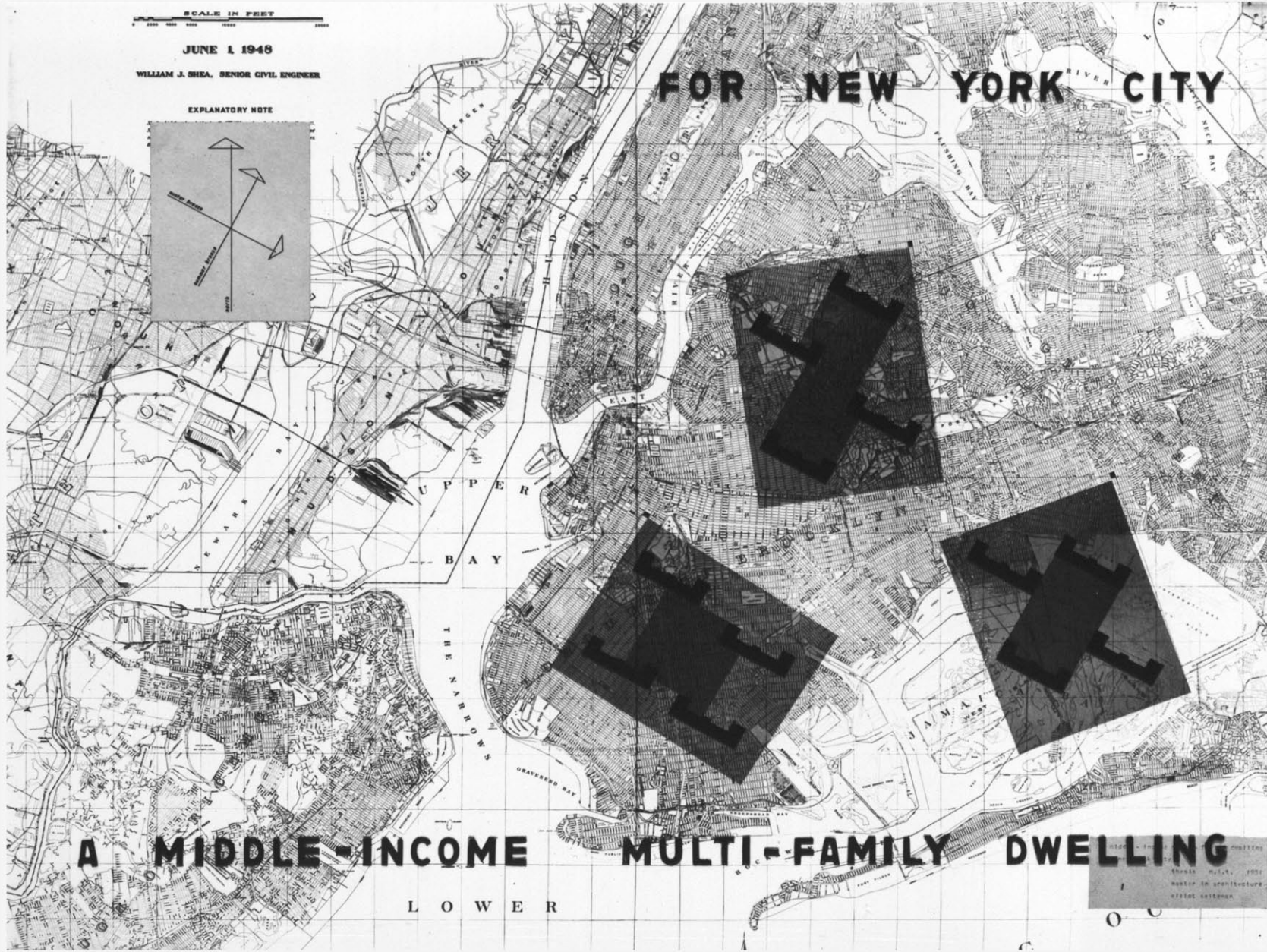
A window - window - window - window
for new 2005 style
window - window - window
window - window - window
window - window - window



TYPICAL FLOOR PLAN

scale - 1/8" = 1'-0"

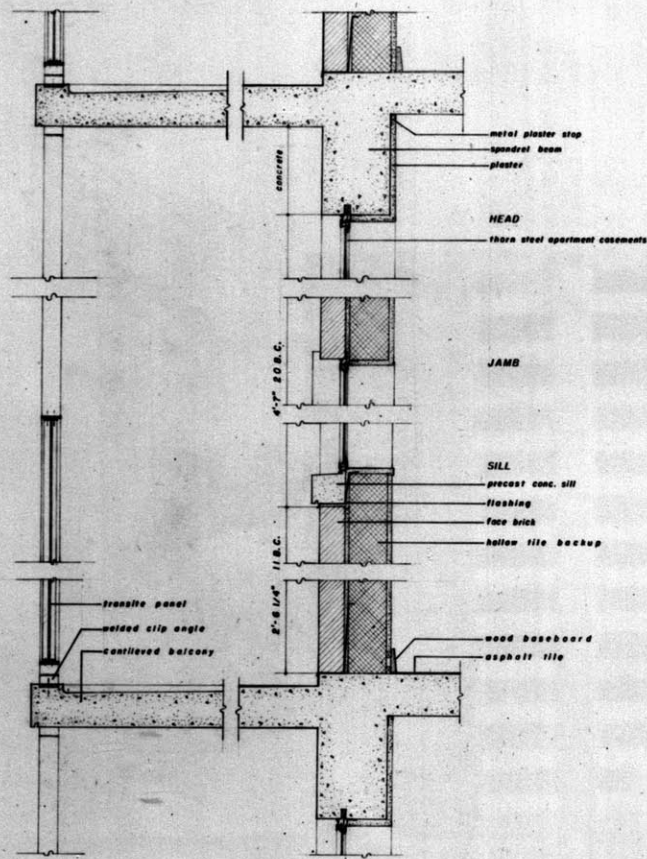
A Study - House with a Floor Plan
 for the construction
 of the house
 in the city
 of New York
 1921



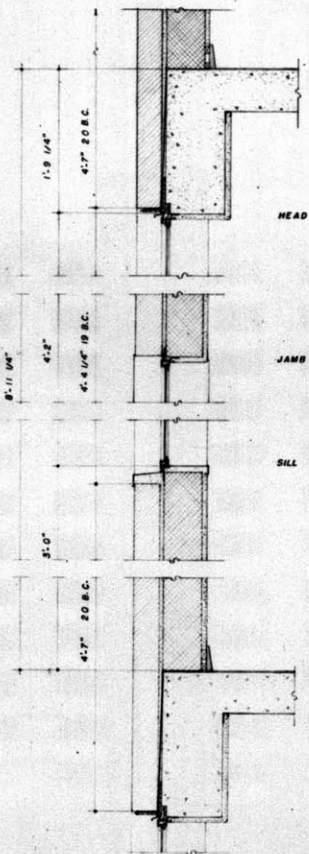
FOR NEW YORK CITY

A MIDDLE-INCOME MULTI-FAMILY DWELLING

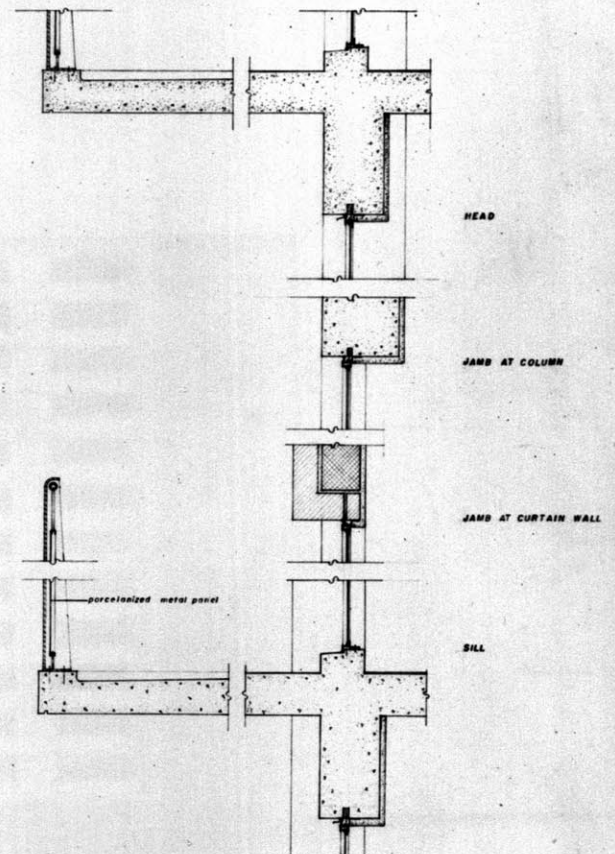
LOWER



WALL SECTION - ACCESS BALCONY
scale - 1/2" = 1'-0"

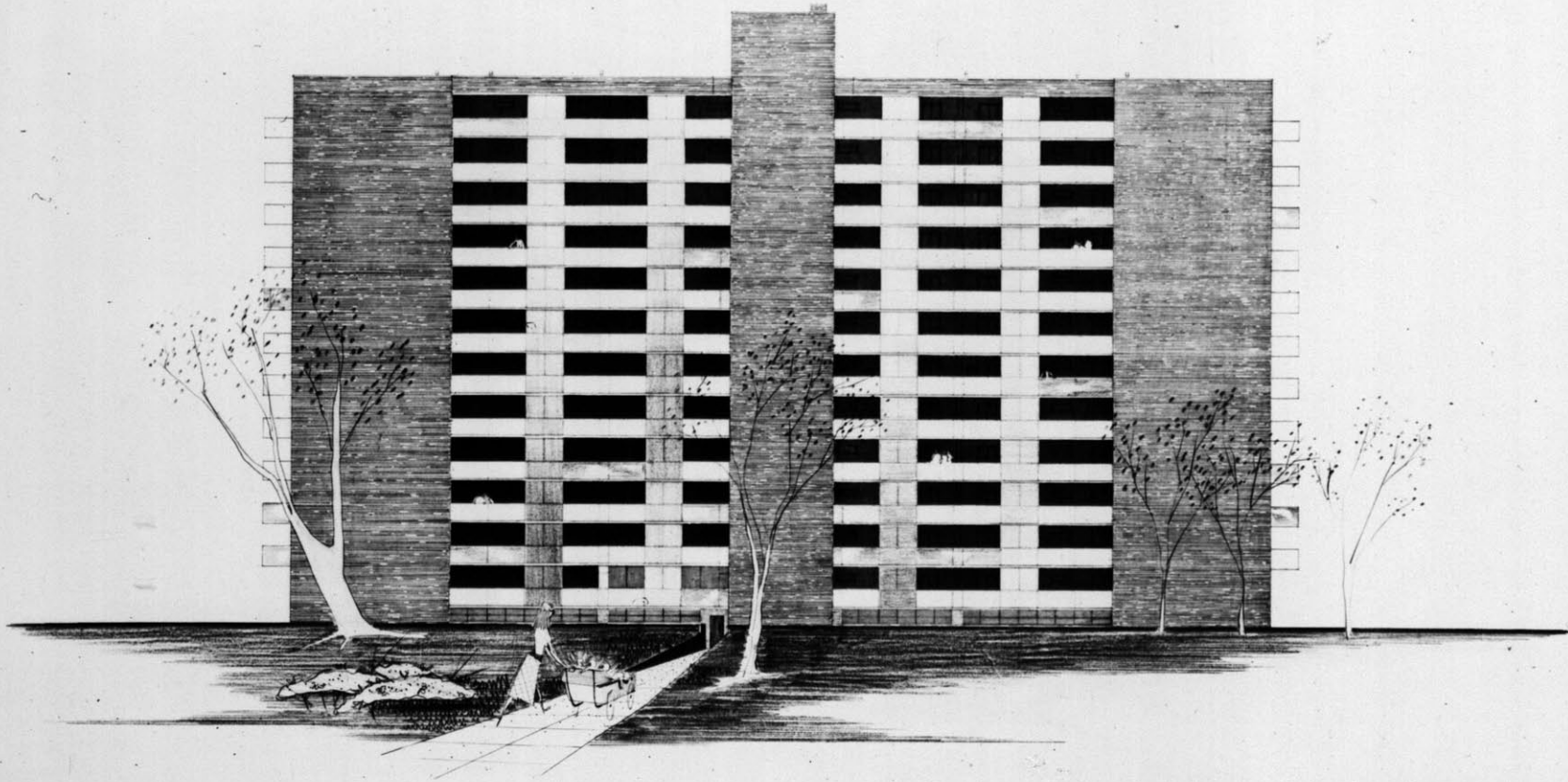


WALL SECTION - BEDROOMS
scale - 1/2" = 1'-0"



WALL SECTION - LIVING BALCONY
scale - 1/2" = 1'-0"

11010 - 10000 Multi-Family Building
 For New York City
 August 14, 1951
 Walter D. Brant
 Chief Architect



NORTH ELEVATION
scale - 3/32" = 1'-0"

A middle-income hotel - family dwelling
for New York City
THOMAS H. CLAY, 1951
MASTER IN ARCHITECTURE
OFFICE PARTNER



SOUTH ELEVATION
scale - 3/32" = 1'-0"

A. J. ROSS ARCHITECTS
FOR NEW YORK CITY
1931
NEW YORK CITY
ARCHITECTS

INTRODUCTION

New York City is known as the "City of Apartment Houses". And justly so, for a majority of the people that comprise the sprawling metropolis known as Metropolitan New York do indeed live in multiple dwellings of one sort or another. Exactly how many will not be known until the new census figures are released. But the census figures for 1940 will give an approximate idea. They show that over sixty-two percent of the population live in rented apartments in multiple dwellings of five families or more.

I am, always have been, and very likely will continue to be part of that majority. The same holds true for my fairly immediate family, and nine tenths of my friends. I therefore have a personal, as well as a professional interest in the adequacy of these dwellings.

And exactly how adequate are these apartment houses as places in which to live?

I believe that the people who live in them, will agree with most authorities in stating that they aren't very good. But they are forced to live where they do for two reasons:

One - convenience. There are not very many sections of the city that contain private homes that are close enough to

the work areas. However, with the construction of the new superhighways leading in and out of the cities, and the revamping being done to the various commuter railroads, more and more people are moving to the outlying districts where private homes are mushrooming up wherever there is room for them.

Two - the transient nature of a large proportion of the population. According to the 1950 census, over nine percent of the population moved last year - five percent from one of the five counties comprising the city to another. This means that every eleven years there has been a total movement equal to the entire population of the city.

Under these circumstances, it is not possible for many people to own their own home. Nor do they want to, for many prefer the flexible nature and freedom of their present status. However, they do wish that their apartments offered at least a little more of the amenities of the private individual house.

Before I came to M.I.T., I worked in an architectural office that was doing a lot of work in the speculative

apartment field. I was extremely disappointed at the quality of the work and was amazed to see that the buildings designed differed little from those of the twenties and thirties. A little investigation on my part soon showed me that although some advances had been made (as will be discussed in history), particularly in the field of public housing, most private building was, design-wise, still in about the same state that it was ten to twenty years ago.

So much attention has been paid to the small home in recent years. Surely similar attention had been shown the multiple dwelling? Apparently not in New York. Some thought had been given to the subject, but not enough. Apparently, most architects had the feeling that the New York City Building Code, and the State Multiple Dwelling Law stymied any fresh approaches, and the best that they could hope to do was to search the code to find loopholes, that would allow them to have a window more (or, unfortunately, sometimes less) than before.

However, I did find a group of progressive men who are trying to get the Laws changed to allow them to use new design approaches. They had already achieved partial success, and more victories are just over the horizon. I decided to ally myself with this

faction, and using the new freedoms just gained, to see what could be done in the way of obtaining good living conditions for those in New York City who, through choice or circumstances, live in apartment houses.

HISTORY

The evolution of the apartment house in New York City has been a fairly steady and orderly process. It is characterized by an increase in the amenities furnished to the tenant, and has been retarded in its development by the traits of conservatism and cupidity found in the speculative builders, who are responsible for the greatest part of apartment house construction in the city.

The increase in the amenities furnished has been parallel to the increase in the health and living standards of the nation in general. But that certain amenities should always be present was recognized. It was merely a question of degree.

For example: The first apartment buildings built were largely built within restricted city limits and often on lots previously occupied by one or two dwellings. As a result, their plans were generally of the long and narrow type, depending for their side light on inadequate alleys or courts, often less than six feet wide, for a five story building; the living rooms placed across the fronts and the dining rooms across the

rears, with long, dark corridors between, along which are strung the bedrooms, baths, and service rooms, the whole arrangement resembling more that of a train of railroad cars rather than a home. These were the notorious "dumbbell" tenements.

Yet at the time these were being built, the following comment appeared in an architectural and building trades journal of the day, "Each suite must have as cheerful and sunny an aspect as is possible, with all the light and air that it can possibly get. To secure to each suit its fair proportion of sun is one of the hardest tasks of the architect."¹

Contemporary with the above quote was the Tenement House Law. This law imposed minimum standards on future tenements and required that improvements be made in existing tenements. New windows had to be cut into existing rooms, toilets had to be installed, and occupancy of cellars and basements was curtailed. Thus the increased standard of the turn of the century found the buildings of a decade earlier inadequate.

Although selfish interests fought against the Tenement House Law, and succeeded in reducing its

1. Brickbuilder, December, 1902.

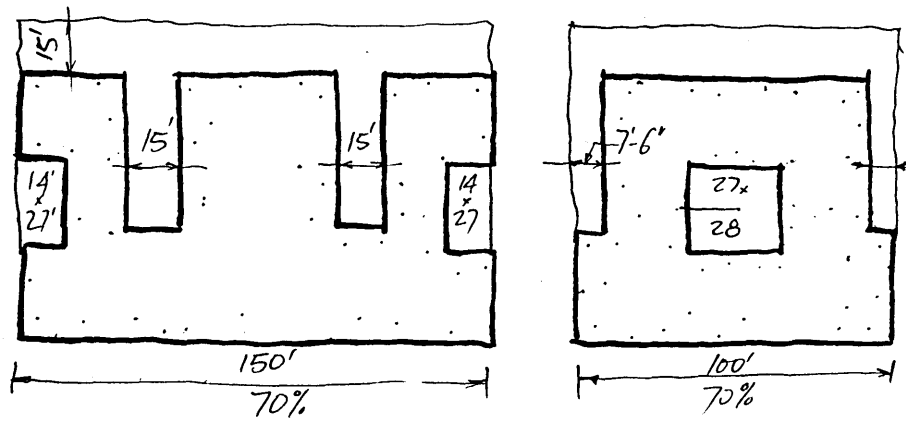
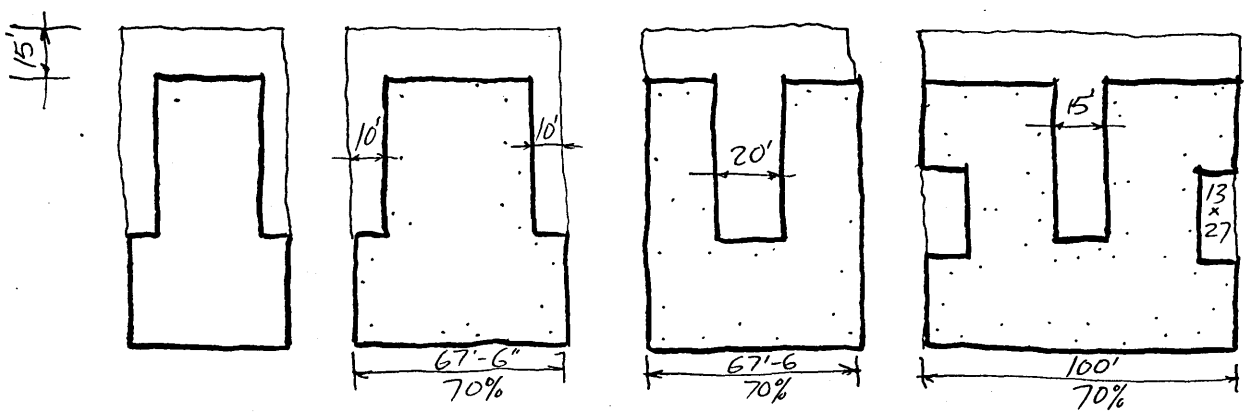
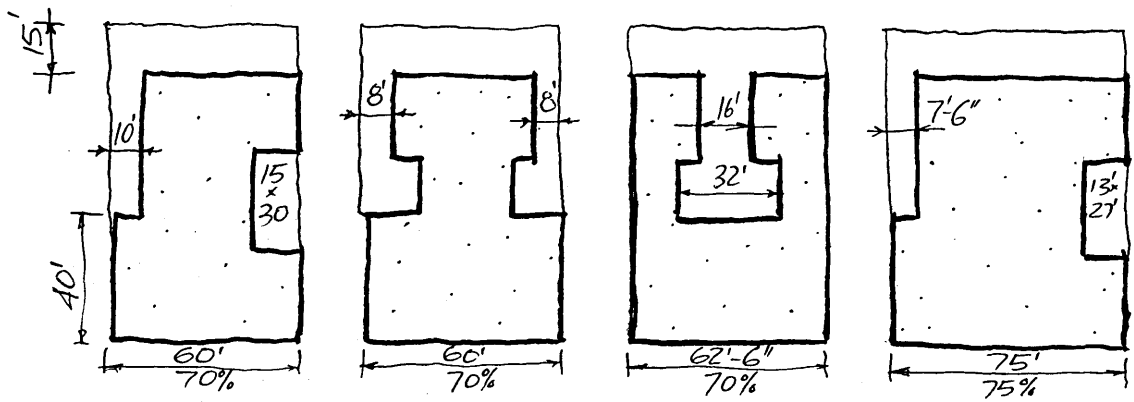
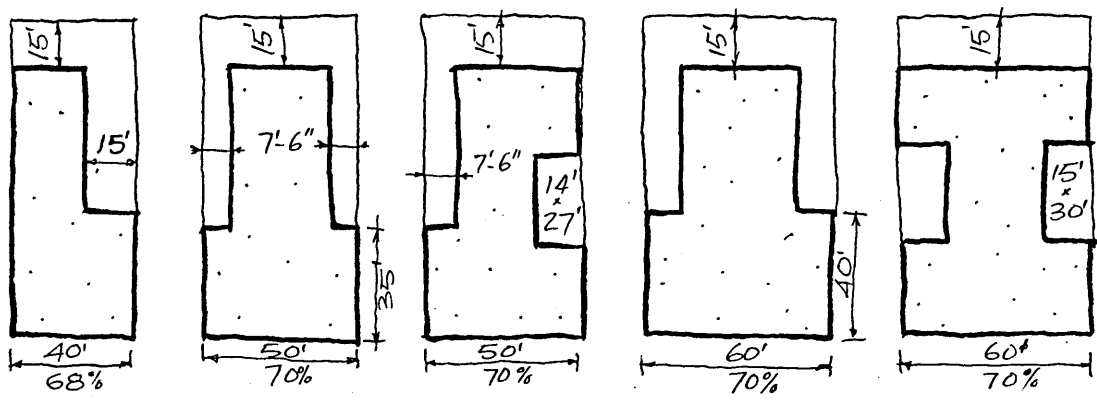
power, reformers in 1912 succeeded in restoring its original vigor, and it was finally accepted by the architects as being fair in its minimum requirements. An authoritative book on apartment house planning, written in 1917, has the following to say.¹ "The New York City Tenement House Law is very satisfactory in respect to sizes of courts and yards for inside plots." However, the author of this book goes on to say that it is still possible to plan "apartment houses on inside plots which occupy very much greater area than is allowed by law, and it is possible to obtain a workable well lighted apartment with fairly good distribution of rooms."

One of the contemporary planning standards was expressed by this same author as ... "For the principle of good hygienic planning, dark spaces cannot be allowed except to a very small extent in halls and corridors, where in apartments they are nearly unavoidable."

Yet a glance at the following diagrams will show the large percentages of lots covered, and the minimum court sizes that were allowed.

Two typical plans which then resulted were the

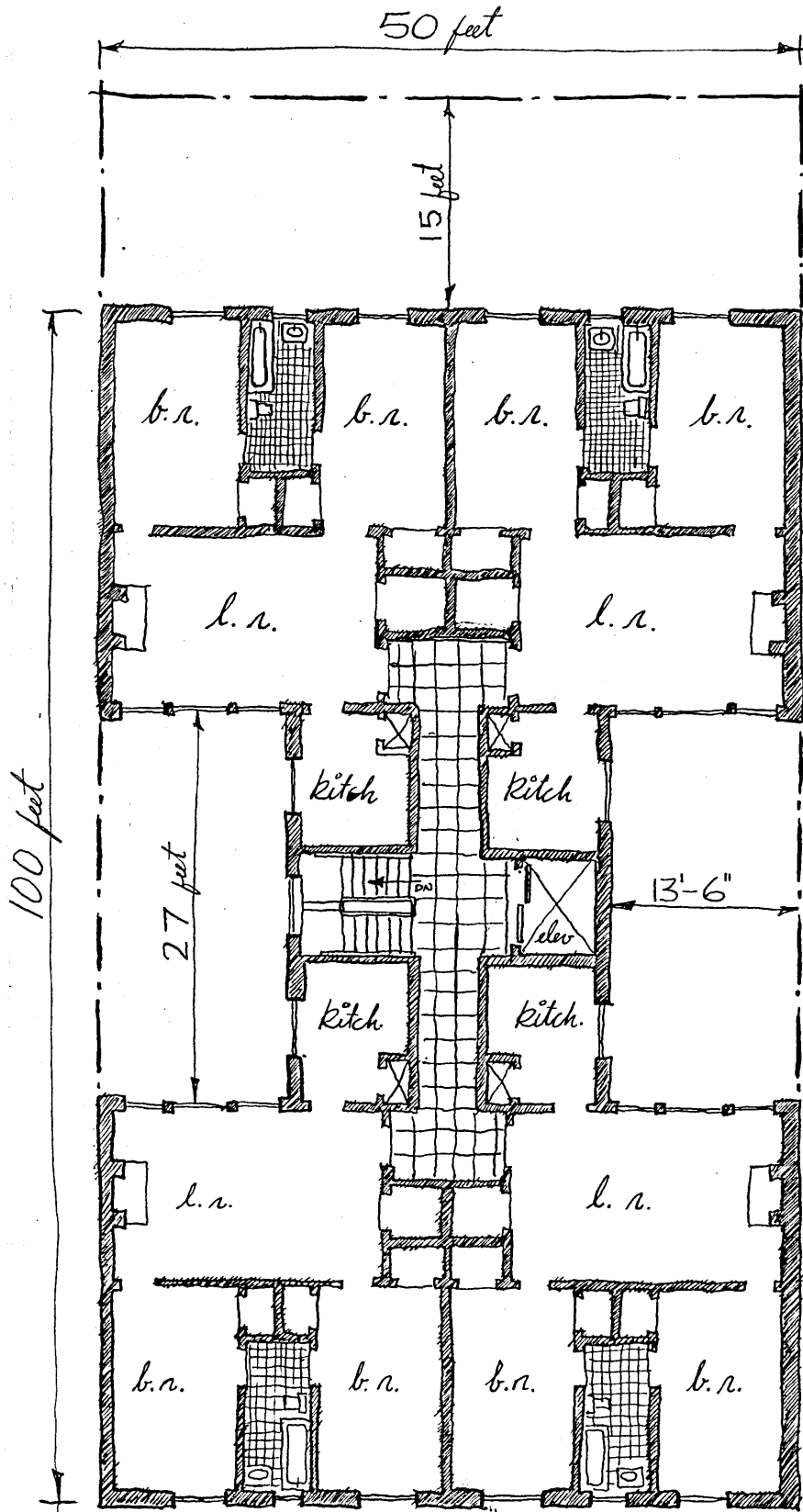
1. Bent, T.J. Van der - Planning of Apartment Houses and Country Homes, 1917.



DIAGRAMS FOR INSIDE PLOTS - MAXIMUM HEIGHT 90 FEET
LAWFUL SIZES OF YARDS AND COURTS.

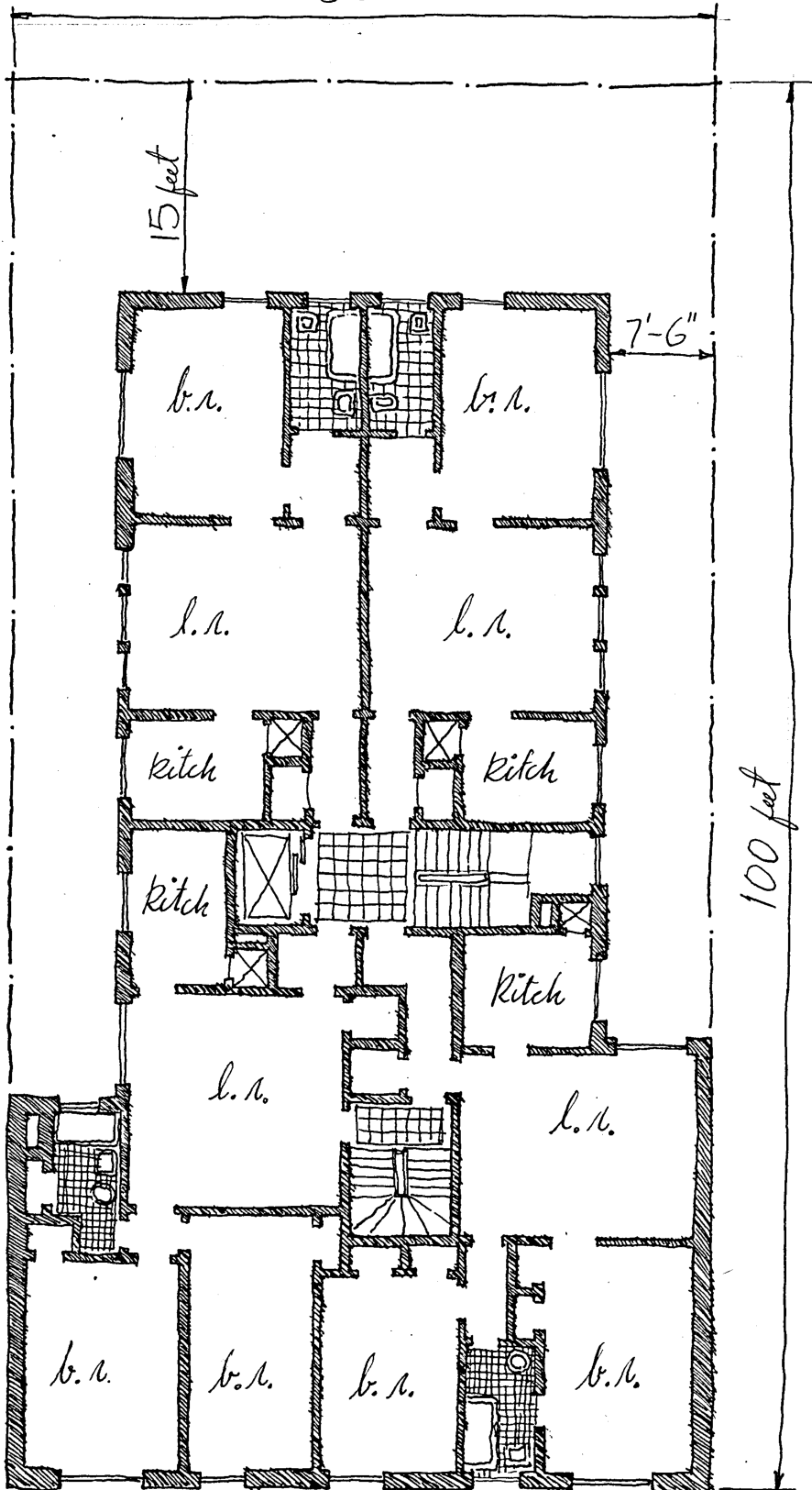
"I" and the "T". The "I" plan abandoned the former front hall and stairway circulation and located the public halls and stairways more nearly in the middle of the building. This resulted in the principal rooms occupying the spaces at the front and back. The "T" plan was somewhat similar, with the exception that the side courts were narrower, and ran back to the rear yard - the front of the building was still built solidly from party wall to party wall. In both these schemes, the only open areas given to the occupants were those specifically required by the Tenant House Law.

The ensuing years brought a marked improvement in interior plans and arrangements. The first step forward was the New York City Zoning Resolutions, which limited heights, and increased the sizes of courts and yards, and decreased the amount of the lot that could be covered. There was, however, an even greater advance in the standard of exterior appearance, especially in the general setting and atmosphere and in the marked effort to make the apartment house something more than a warehouse for the storage of human beings. The expressed aims of the designers of this period can be gathered



I - plan

50'



T-plan

from the following quotations which were found in an issue of Architectural Forum, contemporary with this period, devoted entirely to apartment houses.

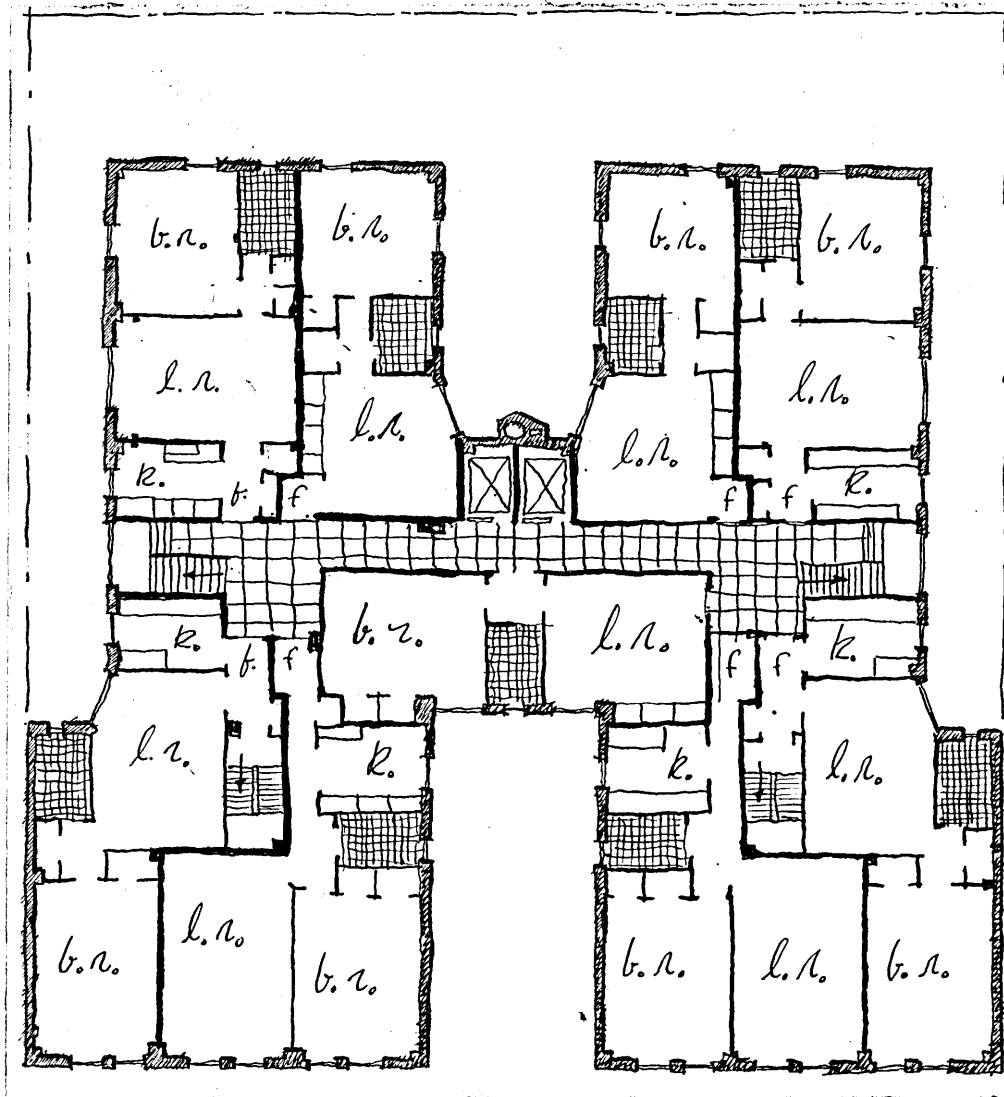
"The motive for the interior architectural finishing and furnishing of these apartments is the desire to create as far as possible the atmosphere of an individual house it is here that we relax, play, and live the apartment today, especially the large apartment is a real home, a goal which is reached only through the combination of beauty and individuality to the greatest extent which is humanly possible in such a hugh proposition."

"If the designer always holds before him the idea that he is competing in attractiveness with the individual house, and if he will bend his energies to rivaling, or to surpassing, if possible, the architectural merits of the small house in every part and detail of his apartment design, and if, in so doing, he will put into his design the same imaginative quality, the same inspiration, the same sense of perfect form and of exquisite detail which have made the individual house in its best examples,

whether large or small, the finest achievement in American architecture, he will then, and only then, succeed in making an apartment house which will be regarded as of an acceptable architectural type."

The sizes of lots built upon became larger, as the main centers of construction moved out of the intensely built up sections of the city into the more sparsely settled residential areas. It was during this period that the major portions of the Boroughs of Brooklyn and the Bronx were covered. Here there were fewer constructions in the form of narrow frontages, and as a result, the architects were often given lots of a reasonably square shape, a usual size being one hundred feet by one hundred feet. On these lots the designers often introduced "charming interior courtyards full of possibilities in architectural and landscape treatment, and brought into the lives of the dwellers in city apartments something of the charm of life in the individual free-standing houses of the suburbs."* These "charming courts" were often twenty to thirty feet wide by forty to fifty feet in length, for buildings sixty feet in height. (It does not take

*Architectural Forum - Apartment House Reference Number - 1925.



COURT plan

much imagination to realize how long they remained beautifully landscaped.) And a bit of green was often added in front of the building - as the law required the buildings to be set back from the street. These green strips varied from three to ten feet in depth, seldom more.

This type of apartment house, as was previously stated, soon covered large areas of the city. It was possible to go for blocks and see nothing but sheer walls of brick rising up on both sides of the street, placed as close to the building lines and the street as the law would allow.

However, reaction soon set in, and thinking professionals soon began to criticize the complete lack of feeling with which the city was being covered. Especially, as the builders sought to bring their cliff dwellings into the suburban areas, was the call for re-examination of the apartment house demanded.

"There are many instances in which builders and real estate promoters have outraged public opinion in towns and cities which have never had apartments, by thrusting the intensive, over-built, ugly city apartment type into the very heart of a residential

neighborhood. In such a case we have the picture of a charming, tree-lined residence street which is ruined by a clumsy, cubical, vertical apartment house, occupying the maximum area of the plot, built solidly up to the building and property lines, with sheer, prison-like walls on all sides, broken only by rudimentary courts Its design is based on a top-heavy ratio of building value to land value, involving the over-capitalization of the land by an excessively large building. The individual apartments are liable to be badly planned and to lack the fundamentals of daylight, cross-ventilation and garden outlook, without which no residence can really be a home. An apartment house which does not offer home-like surroundings to tenants is a dangerous financial proposition, because its rental value will suffer in competition.*

"The fact is, that when the apartment house is introduced into a district where land values are low because of being based on sites for individual homes, a large plot of land may be had at a price low enough to permit of a low percentage of covered

*Architectural Forum - Apartment House Reference Number - 1925.

area. The fatal error of overbuilding the land has probably done more to create and maintain the existing low standards of apartment house design than anything else."*

Apparently this sort of criticism had some effect, for the trend toward less coverage and more light and air was soon effected, allowing an anthology of apartment houses, in 1929, to say that "at one time, then, not so many years ago, the one outstanding consideration was to save the housewife steps..... Now, however, health and the safety of tenants are given a thought, at least. The question of light and air, practically unheard of in the days of the railroad type, is now given careful consideration. The result has been an effort to open up the plan by means of courts, gardens and playgrounds. It might be said that the average apartment building today, in the city as well as in the suburban districts, covers approximately only fifty percent of the lot area. But with the grouping of the rooms and the elimination of the long hallways, about the same number of rooms on each floor are retained as in the old type of house which covered approximately seventy percent

*Architectural Forum - Apartment House Reference Number - 1925.

of the lot area. These results, naturally, a great improvement in the light and in the ventilation."*

The same sort of feeling about a lower coverage was expressed by Mr. Kamenka, in reference to the Multiple Dwelling Law. (Legislation passed by the State of New York to control minimum standards in apartment houses, tenements, and hotels. It was adopted by the city in 1929.) In referring to it, Mr. Kamenka states, "Still, the reduction of the lot-coverage to sixty-five percent would appear to inflict a loss of eight to ten percent of each floor, but in practice the position is far different, with adequate planning, this reduction will affect only the interior dark portions of each floor, without harm to the rentable area.

"From the personal experience in planning an Apartment House on a hundred foot square lot according to the old zoning and replanning it under the new law the reduction amounts to eight hundred square feet, or eleven percent, the actual loss of rentable area is only one small room (one hundred and thirty square feet) the remaining is saved by compress-

*Sexton, R.W. - American Apartment Houses Hotels and Apartment Hotels of Today, 1929.

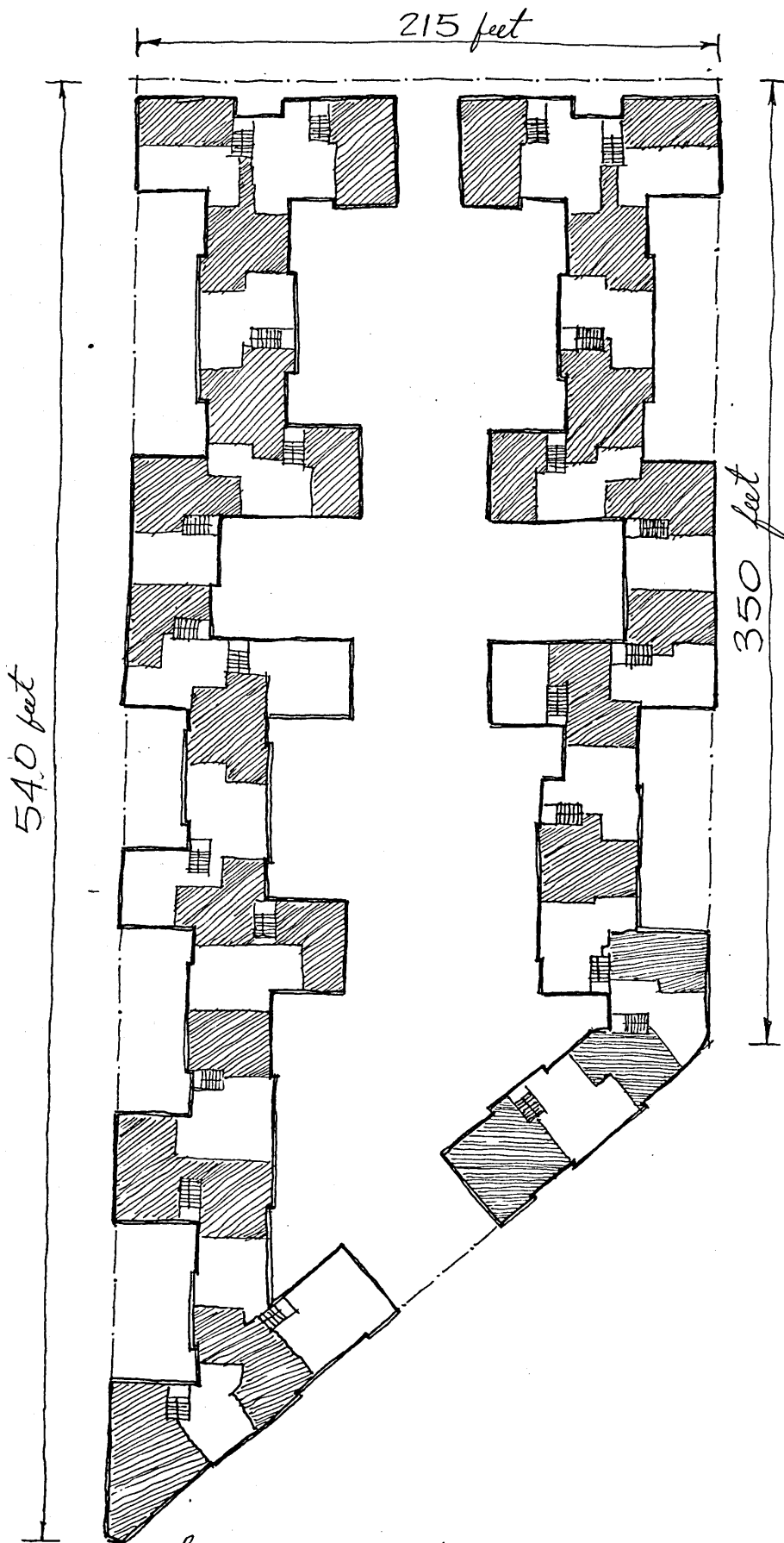
ing the unrenumerative dark space, inevitable in plans with a high lot coverage. The dimensions of all other habitable rooms are practically unaltered in the new version, and kitchens, bathrooms, etc., have better light, due to the development of the rear frontage. Thus the rentable floor area remains practically unchanged, but a considerable economy is achieved by reducing the volume of the building."*

However, it was still felt that more needed to be done, and Architectural Forum for 1930 in discussing the situation stated "it is not surprising that people are being attracted to apartment houses outside the city, providing these structures can satisfy the wants of their discriminating tenants. The advantages which they expect are more light and air, less noise, cross ventilation, and an attractive outlook. Experience has shown that in order to meet their expectations, the buildings should be set well back from the street with attractively landscaped grounds, and ample provisions for both parking and housing automobiles.

*Kamenka, H. - Flats, 1947.

"That these conditions can be fulfilled on a financially profitable basis is due, of course, to the lower cost of land in suburban areas. It is doubtful whether enough advantage of this fact has been taken, and it might be mentioned here that such advantage does not necessarily preclude high apartment units. There is much to be said in favor of suburban apartments of six or more stories, provided the coverage of the site is limited proportionately. The upper floors gain in light and air, and every tenant has the advantage of an increase in the surrounding garden space."

As the tendency towards lower coverage increased, so also the sizes of the developments. It was found to be rather difficult to plan on a typical one hundred by one hundred foot lot, as it was impossible to control the spaces that were being opened up. So the lots increased in size, finally to include a whole city block. In fact, it was soon discovered that, in New York City, at any rate, the most economical unit size in which to build was the full city block. The more advanced builders of the day estimated that by studying the cost per family of the land used, and keeping in mind that they were



low coverage block development

5 STORY APTS

competing with the individual house, they could still build over only thirty-eight percent of the lot area, cover with apartments only six stories high and create pleasant gardens and open spaces.

Concurrent with the decreasing percentage of lot coverage was the attempt to reduce the apartments in cost. This was especially true of the central districts of the city where the high cost of land forced the builder to lower costs in some way in order to bring his rents down to a reasonable level. However, the practice soon spread to the more outlying districts, where, though land costs were low, the low coverages sought for raised the land cost per dwelling unit.

The builders sought to reduce costs by doing away with all superfluous rooms and unnecessary conveniences. In many cases wash tubs were removed from the kitchens, and steam laundries were installed in the basements. This eliminated many fixtures, cut down the cost of the plumbing, and made available many square feet for use elsewhere. The old time bathroom with its six-foot tub and dressing room space was reduced to a minimum. With the advent of showers, tubs became even smaller. Use of scientific

plumbing connections permitted a closer crowding of the fixtures. The flushometer did away with the bulky water tank. The bathroom shrank to half its former size, becoming not a room, but a machine for bathing. Next to come under the economic axe were the main rooms. People had found that the local restaurants could offer a first rate meal for less than the housewife could provide it for, and she, by eating out, avoided the annoyances of cooking and dish washing. Breakfast and luncheon were really the only meals that had to be provided at home. Why then the necessity for a large dining room and kitchen? The kitchen fixtures were reduced in number and were more compactly arranged. In extreme cases they were reduced to a kitchen alcove, which was tucked away in the living room or foyer. By adding a few feet to the living room, a table and chairs could be set up and the dining room could be done away with. If desired, an alcove could be placed in the living room near the kitchen. This could function as a dining room and still help in increasing the apparent area of a smaller living room. With the increase in the ease and speed of travel, the overnight guest became a rarity, and the

guest room was done away with entirely.

The efficiency apartment also came into being. This called for use of double purpose rooms, made possible by first the invention of the fold-away bed that could be concealed in a closet, and later the studio couch, or bed. These combined the functions of sleeping and living into one room that could be made larger than either a living room or a bedroom, but smaller than both put together. All of these economies have now become standard in apartment houses; in fact, most of them have been adopted into small homes as well. Actually, they did not encroach greatly on the standard of living of apartment dwellers, but instead recognized the fact that their way of life had changed.

As the tendency towards more light and air continued, the evolution led to the placing of single buildings on the site, as opposed to placing them together in long strung-out affairs. The need for a large number of apartments per floor to make elevators economical and the desire for cross-ventilation in as many apartments as possible resulted in the adoption of the cruciform plan. This placed the elevator and fire or service stairs in a central core,

with the apartments radiating out in the form of four wings, with usually two apartments to a wing. This gave each apartment, if not through ventilation, at least cross. These cruciform plans were often built extremely high, and spaced widely apart, and changed the shape of the apartment house from a squat, cubical mass to a series of independent towers. The cruciform plan, with various ramifications, attracted the fancy of many architects, and often the basis cross was strung together with several of its brothers to produce long restless buildings. The Federal Housing Agency and the New York City Housing Authority looked upon the cruciform and its combinations with great favor, and it has become the principal form of apartment houses built since the late 1930's.

Developing at the same time as the cross plan was the realization that the gridiron plan of New York City was too small in scale to really allow good placement of buildings on a site, for with setback laws forcing the buildings back from the street, a block two hundred feet wide, would, with a twenty-five foot setback on each street, be reduced to a width of one hundred and fifty feet - really too narrow for the proper siting of two tall buildings

opposite each other. And there was no need for service streets placed so close together - so the next step was the shutting off of certain streets in order to form "superblocks" of two or more ordinary two hundred by six hundred city blocks. These superblocks could have buildings placed around their outside perimeter, set back further than the former minimums, and the area that was formerly taken up by the street down the center could be turned into much needed play areas and park-like garden belts.

So the apartment house, or multiple dwelling has advanced in the last sixty years from a series of rooms strung along a dark corridor, inadequately lit and ventilated by tiny air shafts, the whole mess squeezed between two party walls twenty or twenty-five feet apart, and covering up to ninety percent of the lot, to a light airy tower, covering less than thirty percent of the lot, and placed in a green garden and play area. History shows that the improvement was due to a continual increase in the standard of living, and in the minimum amounts of sun, light, and air that were considered essential. Buildings planned to existing standards were deemed inadequate amenity-wise fifteen years later, while

they were still structurally capable of being used for another thirty years, at the very least. This has been true in the past, there is no reason to doubt its continuing to be in the future. Yet how many builders care to learn this lesson, or, having learned it, care to apply it.

THE SPECULATIVE ATTITUDE

IN NEW YORK CITY

As I stated earlier, most of the apartment house building in New York is done by speculative builders. And there is nothing of the pioneer in the speculative builder of New York. His bag of tricks does not include a leaning toward the unusual or the new. In all justice, I must admit that he is prevented by the building codes to a tremendous extent, from trying anything new. So he sticks to the same basic schemes, sometimes trying various adaptations or variations of these schemes, but as a rule remaining content to stick with what has been done in the past, what he, his father before him, and, he feels, his son after him will do. The plans are stock, the construction standards and the architect's fee is low. He knows from many previous examples almost exactly what his costs are going to be, and he knows of many contracting firms who have been building exactly these types of buildings in the past, and can therefore give him an exact bid, without having to allow an extra ten percent for contingencies. In fact, so standard are the construction system and the plans, that no construction details are necessary, and if furnished, are seldom, if ever, looked at on the job. The specifications furnished are usually treated the same way as the details.

However, it is because of the uniformity of these buildings that much of the danger in the industry lies. Since he feels he can figure costs so exactly, the builder works to a very close margin; as a result, if anything should go wrong he is liable to be ruined. He uses a very small capital outlay, usually obtaining a mortgage for as much as eighty percent of the construction costs before he starts. He usually pads the cost estimate for the purpose of the mortgage, and afterwards starts to skimp and cut corners on his already barely minimum construction system. By this method, he is left with only a ten to fifteen percent equity in the building by the time it is finished. On this equity he demands a profit of fifteen to twenty percent for the risk he is taking. If maintenance costs should rise, or land values change, or the neighborhood deteriorate, and as a result, rents fall off, he is immediately faced with a drastic cut in the return on his investment. The mortgager, holder has prior lien, and is fairly well assured of his interest. Any loss in the building management and operation is first absorbed by the builder, and is only passed on to the mortgagor after all the builders return has disappeared. The risk is so high it is no wonder the

the builder demands at least a fifteen to twenty percent return on any capital he invests.

But his risk is high mainly due to the fact that the building may find it difficult to attract and hold tenants. Why? Because it offers nothing more to the tenant than the thousands of other buildings it is in direct competition with. And shoddy construction leads to early obsolescence, along with the fact that other, newer buildings are being built exactly similar to his, but with a newer stove, and other newer appliances. So why stay in the old building! It is true that today, with the housing shortage, feeling is prevalent that there is no fear of lack of tenants. Yet new construction in the thirty to thirty-five dollar a room class, is standing over twenty percent vacant, even after a year or more of renting, all over New York City. (Thirty to thirty-five dollars a room seems to be the price most private builders are asking today.) But already many of these buildings are being forced to lower their rents, in order to fill their apartments, and with this lowering, the profit margin of the builders is decreasing rapidly.

Can anything be done about this present state of affairs? The answer is yes. It is up to the builders,

and their architects, to thoroughly re-examine their approach to the apartment house problem. They should realize, that in the strictest business sense, there is no profit in stereotyped apartment house design as it is done today. The apartment house has a long life, in fact it has to have a long life in order to lengthen the amortization period on today's high building costs. It is impossible that a building built today to yesterday's standards, and by that fact already ten to twenty years old before it is even finished, be expected to be able to meet the standards of fifty to sixty years ago. The public liked and accepted the designs, and attendant amenities twenty years ago, as the most forward-thinking of ideas. And they were, twenty years ago. But today, their inadequacies are recognized, and criticized. What will be the attitude fifty years hence? They most likely will be considered slums, and looked upon with the same repugnance we have today towards the earlier "I" and "T" plans.

The only solution is to build into the buildings amenities or livability elements that might appear as luxuries today, but which will be taken for granted in the years to come. By thus anticipating the in-

creased standard of living, the builder can keep his building young, and be sure that it will be popular for years to come. In this case, the major part of the risk has disappeared, or has been greatly minimized, and the apartment house can be looked up on as a true investment, rather than a speculation. This is the attitude that should be taken, for it is healthier, will attract more capital into the housing field, and will result in better housing. That I am not alone in my thinking is borne out by Eastgate, which was conceived as a result of the same sort of reasoning.

Builders and architects alike cry that the various building laws throttle any new approaches. It is true that the codes were written with respect to the designs as they existed twenty years ago, and have proved inflexible to a great extent. However, this is realized, and today they are being rewritten, or amended, and brought up to date. Perhaps it is not being done as fast as some would like, but new opportunities are being created. It is now up to the architect and builder to take advantage of them.

LIVABILITY

Livability standards are not well-defined in the local building regulations, which generally are concerned far more with sanitation and how houses are constructed rather than with how families have to live in them. However, the importance of livability elements cannot be underestimated. It has already been explained how progressiveness of thought in these respects can delay obsolescence of the apartment building. How it can also attract tenants is brought out very plainly by a few statistics, which break down the reasons that induce people to move to another apartment as follows:*

Apartment layout	20.2%
More light and air	12.1%
Changes in family size	15.2%
Nearness to work	14.1%
Nearness to school	6.1%
Nearness to transportation	5.2%
Others	27.1%

The first two items show us that by raising the standard of living conditions we can improve rentability by nearly one third.

*Kamenka - Flats, p.40

The most important factors affecting livability are apartment layout and size. For purposes of establishing proper sizes and distribution of spaces, the apartment may be divided up into several general zones. They are: one or more sleeping areas, separated as much as possible from the noisier sections of the apartment, a work center, which may also be a part-time living area and finally there will be the general living area, which will include outdoor as well as indoor space. In order to determine individual room design, it is important to be able to assign home activities and household functions to probable conventional room locations.

The following is a classification of home activities by household functions and needs.*

Functions and Activities	Room in which occurs predominantly	Room in which occurs secondarily	Floating Activity
removal, care of outer clothing			entrance
sleeping	bedroom		
resting	bedroom	living room	
dresssing	bedroom	bathroom	
washing, bathing			
elimination	Bathroom		
laundry	laundry	kitchen bathroom	

*Planning the Home for Occupancy - A.P.H.A., 1950

Functions and Activities	Room in which occurs - predominantly	occurs - secondarily	Floating Activity
housecleaning	all rooms		
dishwashing	kitchen		
care of sick	bedroom	bathroom	
food planning, storage	kitchen		
food preparation	kitchen		
serving and dining	dining room	living room Kitchen	
sexual life	bedroom		
care of infant	bedroom	kitchen	
	bathroom		
conversation	living room	kitchen	
children's play alone	bedroom		
supervised	dining space	kitchen	
with parents	living room		
cards, games	living room	dining space	
dancing	living room		
light refreshments	living room	dining space kitchen	

Functions and Activities	Room in which occurs - predominantly secondarily		Floating Activity
training children	all rooms		
writing, study by adults			dining space
			living room
			bedroom
school child's study			bedroom
			dining space
listening to music	living room		
reading	living room		
quiet hobbies			dining space
			living room
			bedroom
crafts, etc.			kitchen
personal grooming	bathroom	bedroom	
ironing			bedroom
			kitchen
sewing			dining space
			living room
			bedroom
celebrations	living room	all rooms	
entertaining guests	living room	dining space	
		bedroom	
accommodating house guests	living room	bedroom	

However, total space is divided, each individual room should have ample wall space to accommodate large pieces of furniture and to permit effective furniture arrangement. It should be possible to place furniture so that it will be a comfortable distance from heat sources without blocking heat circulation and will be free of interference with doors, windows, radiator controls, light switches and stored equipment. There should be sufficient clearance to open the doors of any room or closet with furniture in place. Floor area should be adequate for safe and easy circulation and should permit convenient maintenance and cleaning. Each room should have pleasing proportions and pleasant vistas from one room to another and to the out-of-doors.

All double bedrooms should be sufficiently large and properly planned to accommodate either a double bed or two single beds. Certain minimum widths are essential - the smallest dimension of a room occupied by one person should not be less than eight feet, and of a room occupied by two persons, not less than ten feet. A bedroom should contain enough area to have space for quiet reading or study, or play space for a child.

The kitchen is the most important room in the house

because it is the area of greatest use. Here, the need for relating activity areas within a room is most obvious. Equipment may be set up in U-shape, or on a corridor plan, but time will be saved and fatigue minimized if work centers, organized in themselves, are arranged to follow a smooth production line, progressing from one center to the next.

In these days of informal living, it is not uncommon for the preparation, as well as the consumption of all food to be a somewhat social function in which all the family and even guests may share.

Dining space is the most variable and flexible factor in housing planning. Meals may be served in a separate dining room, in the kitchen, or in the living room, depending on family size and habits. Due to area limitations, we shall have to forego the advantages of a separate dining room. Actually, it is a rather inefficient space, for it is seldom in use for more than ten percent of the day.

In part, the desire for space in the kitchen for eating is directed toward reducing the laboratory atmosphere, but the main reason is convenience; saving work at lunch time when most of the family is away, feeding young children, or providing informal evening snacks for adults.

If dining occurs regularly in the kitchen or the living room, space for dining furniture must be provided in addition to the living room or kitchen space. Additional circulation space is also necessary, although part of it can be taken from the living room or kitchen area. The exact amount will vary with the individual design, and a combination living-dining or kitchen-dining room may be somewhat smaller than the aggregate space needed for separate areas, but combined use should not be a justification for any substantial reduction. If only one area can be provided for dining, it is preferable to locate it outside the kitchen in an alcove in an area off the living room.

Household storage needs are large in proportion to total area, amounting to about one-sixth of total space requirements. Convenient and efficient location of storage space is as important as its total amount, and proper provision of such space should conform to the following requirements:

Permit storage of articles as close to activity space as possible.

Give preferred space nearest the activity area to articles used most frequently.

Allocate storage areas to achieve minimum expenditure of time and energy for removal and replacement of items

used recurrently in household activities.

Separate storage space used by children from that used by adults.

If these recommendations are to be translated into the numbers and location of closets, cabinets and storage spaces, a decision must be made between central and individual room storage.

General storage is desirable for materials which are seldom used, or those used only at special seasons. In apartments, a part of the general storage space is frequently provided on a community basis rather than within the individual unit. For many of the articles assigned to general storage, community storage is not a practical substitute for private dwelling space.

The greater part of the storage space necessary in the apartment is that for articles in frequent use and should be provided where the stored materials are needed. Personal clothing must be stored in the bedroom or closely adjacent to it, but the linen should be in a closet central to the various bedrooms which it serves. The rooms and cleaning materials used in the daily housekeeping routine should be stored in a convenient central space. Storage space for materials used for various recreational purposes should be provided in the living room or immediately adjacent to it.

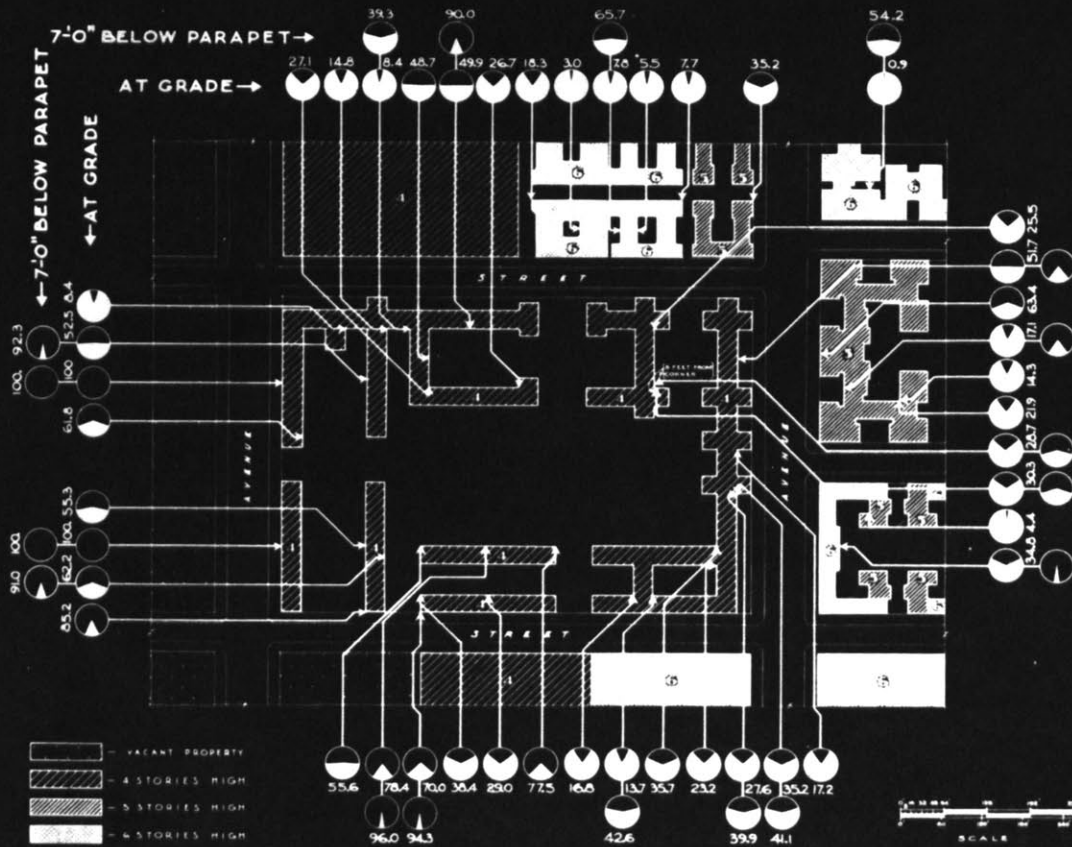
Shelf space is necessary for books, magazines and phonograph records. There should be a coat closet at the entrance for outdoor clothing of the family and guests.

Proper functioning of the household is dependent on proper interrelation of the various rooms. Each room, in relation to the other rooms, should permit efficient circulation which affords privacy, since privacy depends not only on the amount of structural separation but on traffic within the dwelling. Any room used constantly to reach other rooms, or the entrance, is essentially a hallway. The ideal arrangement would permit access to all parts of the apartment and to the apartment entrance from each room without passing through any other room. This is not always possible, but no bedroom, bathroom, or kitchen should be traversed to reach other rooms. There should be privacy of circulation from the bedroom or bedrooms to the bathroom with no need to go through a bedroom to get to the bath.

Some of the other factors which contribute to the livability of a multi-family dwelling are:

More light and air - this phase of planning is a primary concern of the building codes, but their standards are far below those that should be followed.

COMPUTATIONS BY
 HERBERT S. SWAN & FLORENCE W. TUTTLE
 CONSULTANTS ON NATURAL ILLUMINATION



NEW YORK CITY HOUSING AUTHORITY

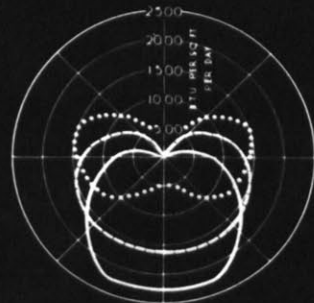
RELATIVE DAYLIGHT VALUES

THE SOURCE OF DAYLIGHT ON A VERTICAL IS THE UNOBSTRUCTED HALF DOME OF THE SKY. A POINT UPON A VERTICAL WALL IS GIVEN A DAYLIGHT VALUE OF 100 WHEN THERE IS NO OBSTRUCTION BETWEEN THAT POINT AND THE HALF DOME OF THE SKY. THE DISKS AND FIGURES INDICATE THE RELATIVE DAYLIGHT AT VARIOUS POINTS UPON VERTICAL WALLS OF 4, 5 AND 6 STORY STRUCTURES WHEN ARRANGED AS IN THE COMPOSITE SITE PLAN. REFLECTION IS NOT CONSIDERED. THE ILLUMINATION OF THE SKY IS MOMENTARILY CHANGING WITHIN BROAD LIMITS. WHEN THE UNOBSTRUCTED ILLUMINATION OF THE HALF DOME OF THE SKY ON VERTICAL AND HORIZONTAL SURFACES IS 400 FOOT CANDLES, A FAIR AVERAGE VALUE FOR NEW YORK THE DATA GIVEN IN THE DIAGRAM SHOULD, IN ORDER TO BE CONVERTED INTO FOOT CANDLES, BE MULTIPLIED BY 4.

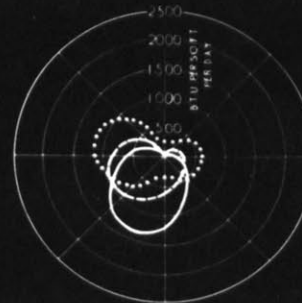
REVISIONS		NEW YORK CITY HOUSING AUTHORITY	
NO.	DATE	RELATIVE DAYLIGHT VALUES	
		SCALE	901
		DRAWN	DATE
		JAP	6

QUANTITY OF SUN HEAT RECEIVED ON VERTICAL SURFACES IN VARIOUS POSITIONS AT DIFFERENT TIMES OF THE YEAR

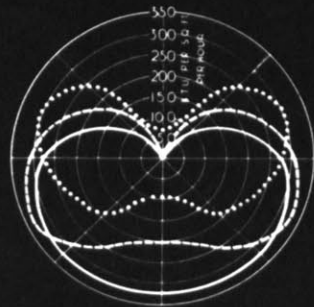
TOTAL DAILY SUN HEAT ON VERTICAL WALL SURFACES AT THE VARIOUS SEASONS OF THE YEAR LIKELY TO BE RECEIVED AT THE MAXIMUM OR ON A PERFECTLY CLEAR DAY



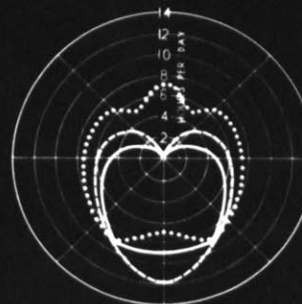
AVERAGE DAILY AMOUNT OF SUN HEAT ON VERTICAL WALL SURFACES AT VARIOUS SEASONS OF THE YEAR LIKELY TO BE RECEIVED DURING A TYPICAL SERIES OF DAYS TAKING INTO ACCOUNT AVERAGE WEATHER CONDITIONS



MAXIMUM AMOUNT OF SUN HEAT LIKELY TO BE RECEIVED DURING THE ONE HOUR PERIOD WHEN SOLAR RADIATION WILL BE STRONGEST ON THE VARIOUS VERTICAL WALL SURFACES



NUMBER OF HOURS DURING WHICH THE SUN WILL SHINE ON A VERTICAL WALL FACING IN A GIVEN DIRECTION ON A PERFECTLY CLEAR DAY



WINTER SOLSTICE ———
 SPRING & FALL EQUINOX - - - -
 SUMMER SOLSTICE ·····

GRAPHS BY
HENRY NICCOLLS WRIGHT

DATA FROM U.S. DEPARTMENT OF AGRICULTURE
 NEW YORK CITY WEATHER BUREAU
 10 YEAR AVERAGE

NEW YORK CITY HOUSING AUTHORITY

NEW YORK CITY HOUSING AUTHORITY
100 WEST STREET
NEW YORK 11
TELEPHONE BR 5-1111

NEW YORK CITY HOUSING AUTHORITY
100 WEST STREET
NEW YORK 11
TELEPHONE BR 5-1111

Perhaps more progress has been made in the last decade in this field than in any other, but there is still a lot of room for improvement. Every apartment should, ideally, have through ventilation. It should also receive as much sunshine as is possible in its main living areas. The exact amount cannot be expressed in percentage form, but each apartment should have direct sunlight during some major portion of the day, especially in the winter. In reference to this, a design error that is often made is the casting of one building's shadow on another. The Citizen's Housing Council of New York accepts the principal that "the distance between rows of buildings should be at least equal to twice their height." This proportion is based on the height of the sun at the winter solstice, which at the latitude of New York is approximately twenty-six and one-half degrees. That position of the sun represents "extreme winter conditions".

And an often-abused phase of privacy is that between neighbors. New York apartment house living has often, and justly so been criticized for the fact that the individual family seldom has contact with his neighbors in the building, and often not even with those on his own floor. This problem can be solved very adequately by maintaining social rooms and centers within

the building groups where people of like interests can meet and pursue their mutual goals.

But the privacy of the individual apartment should still be strictly maintained. This means adequate soundproofing of walls, and, planning-wise, the avoidance of placing windows of one apartment where they can be overlooked by those of another. What good is a window, if, in the interest of privacy, it has to be continually muffled by curtains and blinds. People still do not like living in goldfish bowls.

Outdoor living space - this has always been one of the major faults of apartment house living - the complete lack of any area where the family can go outside to eat or relax, or where the mother can leave her childer under close supervision while she is working in the apartment. While there has been a tendency, especially where the land coverage has been low, to develop park and play areas at the ground level for the tenants, there is still felt the need for a private yard "up in the sky", intimately connected with the individual apartment. This need for balconies has been realized for years, but nothing was provided, except in the higher class of buildings. The reasons advanced for this have been many and varied, but the real reason seems to have been a slight additional cost.

Some factual evidence of the desirability of balconies is presented in the enclosed study made by the firm of Mayer and Whittlesey, for the New York Life Insurance Company.

Indoor and rainy-day play space for children - There are conflicting opinions about solving this. One tentative solution advanced is an open area on each floor - common to four or more apartments - which would serve for children's play. However, this has the disadvantage of creating a disturbance right outside the tangent apartments, which has been found to be extremely annoying to those families that do not have small children. Any attempts to shield the apartments from the noise usually resulted in a loss of convenient supervision of the play area by the mothers of the children. Perhaps the best answer would be to place these play areas only at certain intervals and rent the adjacent apartments to families that have small children. This is still not ideal as it tends to restrict the flexibility of tenant selection of apartments.

Others think that the addition of a balcony to the apartment is adequate, feeling that the inclusion of the balcony area will be enough to avoid a cooped-up sensation. Perhaps the best solution is a properly

A Balcony Study for the New York Life Insurance Company
by Mayer & Whittlesey

22 people questioned at 240 Central Park South.

18 out of 22 tenants use balcony constantly, mostly for relaxation.

16 prefer balcony, while 6 would rather have space added to interior rooms.

21 tenants are not annoyed by other tenants use of balconies. One complained about washing.

15 tenants would seek balcony, 5 not, one not in city.

12 tenants would pay premiums for balcony, 9 not.

General Suggestions:

Screens: 3 tenants believe this would keep out insects.

Glazed: 2 tenants would like to use it as a solarium.

Water: 1 tenant believes outlet should be there for washing balcony.

Railings: 2 tenants feel railings should be closer together or even grilled to prevent accidents to children or pets.

Doors: 1 tenant feels a narrow leaf double door should replace single door (too much room wasted)

Electricity: 2 tenants feel there should be electric outlets.

Size: 2 tenants feel balcony should be larger.

Smoke: 1 tenant feels badly about smoke.

supervised play area both indoor and outdoor, for the use of all the tenants in the housing group. However, most private management concerns would rather avoid the headache of having to maintain such a supervised area.

To date, this remains one of the most difficult problems to solve.

Apartment Space Allowances: A Comparison
(given in square foot areas)

American Public Health Association Recommendations		P.H.A. Maximums
One-bedroom apt.		
living-dining	234	175
kitchen	76	65
bedroom	148	125
Two-bedroom apt.		
living-dining	391	190
kitchen	97	75
bedroom	148	125
bedroom	148	110
Three-bedroom apt.		
living-dining	476	215
kitchen	118	90
bedroom	148	125
bedroom	148	110
bedroom	74*	110

*This area for one person, all other bedrooms sizes
have been for occupancy by two people.

APARTMENT SIZE DISTRIBUTION

In planning an apartment house, it is common sense to have the apartment distribution (percentages of various sizes of apartments) worked out to meet the demand curve of the income group you are designing for. I am designing for the upper middle income group, but unfortunately, research turned up the startling information that there are no accurate figures available charting apartment size demand for any income class, or even for the city as a whole. The Citizen's Housing and Planning Council was cognizant of this fact, and had set a committee to work on this project. But they had produced no tangible results, to date. Perhaps when the census figures for the New York Metropolitan area are available, they will provide the necessary information. At the time of this writing they have still not been published.

The one fact everyone seems to be certain of is that there are not enough apartments larger than three bedrooms. Very few are being built at the moment. The reason given, and it seems to make sense, is: costs are too high - a large apartment would be so expensive to build that very few could afford the rent. Private builders also have other reasons: Large apartments bring too many small children, who

will deface the property, large families move less often, and it is to the advantage of the landlord to have tenants move often, for the new tenant does his own painting, and this saves the landlord money. These last excuses are questionable.

I have obtained apartment distributions as used by some of the various large scale builders of housing in the New York area. They are as follows:

Metropolitan Life Insurance Company

Parkchester (12,272 apartments)

0 b.r. - 1%
 1 b.r. - 58%
 2 b.r. - 35%
 3 b.r. - 6%
 plus 0.1% of larger apartments

Stuyvesant Town (8,755 apartments)

1 b.r. - 52%
 2 b.r. - 42.5%
 3 b.r. - 55%
 4 b.r. - 0.5%

Peter Cooper Village (2,495 apartments)

1 b.r. - 48.5%
 2 b.r. - 50.5%
 3 b.r. - 1%

Riverton (1,232 apartments)

1 b.r. - 49%

2 b.r. - 50%

3 b.r. - 1%

New York City Housing Authority

They have also expressed concern over the fact that there aren't enough large apartments. But they cannot build them due to the cost factor. They have a maximum rent that they can charge, and it is impossible to build large apartments for that rent. They also have to make a good showing in the cost per apartment column, if they are to continue getting money from the Federal and State Governments.

Federal apartment distribution requirements:

1 b.r. - 10%

2 b.r. - 63%

3 b.r. - 25%

4 b.r. - 2%

New York State allows the building of 1% studio apartments (0 b.r.).

The Housing Authority has another distribution curve for their no cash subsidy housing, which is designed for an income group up to \$4,900 per year.

- 1. b.r. - 25%
- 2 b.r. - 50% (bedrooms 135 and 130 sq.ft.)
- 2 b.r. - 17% (bedrooms 135 and 100 sq.ft.)
- 3 b.r. - 8%

Carol Management Corporation

One of the larger corporations in the city that owns and operates rental apartment buildings. They recommended the following distribution, considering the fact that my design was a school project and should therefore tend towards the ideal. Practically, they thought it a little heavy in the number of larger apartments.

- 0 b.r. - 1/16
- 1 b.r. - 2/8
- 2 b.r. - 5/8
- 3 b.r. - 1/16

These last figures are fairly close to those of the New York City Housing Authority for its higher income dwellings, and therefore shall be accepted as a guide in planning my buildings. However, since these are only arbitrary estimates as to what the distribution should be, and are not based on fact, I shall only follow them as far as general proportions,

and will make no especial attempt to achieve these exact ratios.

CONSTRUCTION TYPES

Almost all privately built apartment houses in New York City, with the exception of high income class dwellings, are of non-fire-resistive construction. This has been because the New York City building code allows non-fire-resistive construction for residences up to six stories in height, and, in the past, it was a lot cheaper than fire-resistive building. As a result, its use became almost universal, with construction details practically standard throughout the city, and a large army of contractors, sub-contractors, and artisans arose, all highly skilled at this, and only this, form of construction. However, it was a form of construction that did not require precise dimensioning or detailing in any way, and as a result, to save money, most contractors cut corners, and did sloppy work with the end result that most apartment houses look as if they were (and it is practically true) built with just a hatchet. The phrase non-fire-restrictive has become synonymous with shoddy. This does not necessarily have to be true, but it doesn't really matter for study shows the fallacy of continuing to use non-fire-resistive construction for multi-story buildings.

The original advantage of economy which was the strong point of non-fire-resistive building, and which attracted me to it in the first place, no longer exists. Modern construction techniques, such as the use of plywood forms, controlled concrete, the long-boomed crane and bucket for pouring, plus advanced structural systems, the higher allowable stresses in steel and concrete, and more accurate stress analysis methods, have combined to bring the price of fire-resistive construction down to within a few percent, cubic foot for cubic foot, of non-fire-resistive. And the greater freedom of planning which the codes permit in the case of a fire-resistive building, allows such savings in design as to produce the seeming paradox of building more cheaply by building more expensively.

Some of the planning limitations encountered with non-fire-resistive construction are:

Frequent fire wall partitions - these are both thick and permanent. Besides taking up valuable area they also limit the flexibility of any future alterations to the apartments.

Prohibition of interior bathrooms - this

necessitates placing the bathroom on valuable exterior perimeter, whereas otherwise it can be used to advantage in interior dark areas.

Fenestration difficulties - adequate area for piers must be left between windows to take bearing stress of walls. Large windows are impractical due to need for heavy and sometimes fireproofed lintels.

Balcony placement difficult - it is impossible to cantilever balcony out from straight wall section - the compressive stress on the wall at the point of cantilever support becomes too great. It is necessary therefore to have a re-entrant angle in which to place the balcony.

Ground coverage - this type of construction is limited in height to six stories. Therefore, more area of the plot must be covered by using six story buildings as opposed to eight or twelve story dwellings, if the same number of families are to be housed.

Access - because of heavy fire hazards, the codes require that each apartment have two separate and independent means of access from

the apartment to the street. This was solved by the aesthetically highly objectionable fire escape, usually placed on the front and rear of the buildings, and which managed to block some windows with its stair. The skip floor and balcony access are also prohibited.

Noise transmission - wood joist floors, and stud partitions have poor noise reduction characteristics. Wood joist floors, if not carefully laid, have a tendency to creak after a few years.

Maintenance costs higher - shrinkage in the wood studs and joists after a few years result in numerous plaster cracks. Fire insurance rates are higher.

Shorter life - this necessitates shorter amortization periods and higher rates.

The advantages of fire-resistive construction are:

Thinner exterior walls, thinner interior partitions - less waste space

Fewer firewalls, loft construction allow for greater flexibility in future modification of apartments.

Higher ceilings - or lower floor to floor heights (four inch slab versus ten inch wood joist floor construction).

Elimination of secondary means of access - no additional fire stairs or fire escapes. Interior bathrooms - can utilize otherwise wasted interior space.

Freedom in fenestration - windows can go any place desired between columns.

Freedom of balcony construction - they can be cantilevered out wherever desired.

Lower ground coverage possible - buildings up to fourteen stories economically feasible.

Lower maintenance costs - more durable construction, lower fire insurance rates.

Greater noise reduction - the greater mass of a concrete slab offers higher transmission losses.

Freedom to use skip floor or balcony access.

The trend in New York building legislation is towards more stringent restrictions on non-fire-resistive construction. It is believed that it will be eventually limited to buildings under four stories in height.

A recent study made by Architects H. I. Feldman and Andrew Thomas illustrates the advantage of fire-resistive construction.* This study was conducted in regard to buildings erected in the New York area and their conclusions as published showed the following economies inherent in fire-resistive construction; fewer firewall subdivisions, thinner partitions, elimination of fire escapes, use of interior baths and kitchens, interior location of halls and stairs, and increased space and flexibility of room arrangement.

In the typical plans, which the architects designed in the course of their analysis, one and one-half rooms were added in each floor of the fire-resistive building. Architects Feldman and Thomas concluded that:

The cost per rentable room for a six story fire-resistive apartment building is generally lower than for a non-fire-resistive building. In the example designed for study this amount was more than fifty dollars per room or 6.3 percent.

The gain in rentable rooms averages 8.6 percent.

*Fire-Safe Apartment Houses pay Dividends - Architectural Record - August 1946.

The addition of these rentable rooms costs on an average 5.1 percent more.

An average of 7.1 percent more income is received for the increased space and this increase is sufficient to pay for the increased cost in the first five years of operation.

An estimate of their comparative costs for the two buildings is given on the following page.

ESTIMATE OF COMPARATIVE COSTS (1939 PRICES)
For Six-story Bronx Apartment House

	<i>Non-Fire-Resistive</i>	<i>Fire-Resistive</i>
CONSTRUCTION COST (Building Cost and Job Expense)	\$192,456	\$202,124
GENERAL EXPENSE (Taxes, Interest, Finance Charges, Fees)	18,215	18,965
Total Cost	\$210,671	\$221,089
Cost Per Cubic Foot.....	\$0.339	\$0.361
Total Number of Rentable Rooms.....	157½	171
Cost Per Rentable Room.....	\$1,338	\$1,293

ITEMIZED ESTIMATE OF COMPARATIVE COSTS (1939 PRICES)

BUILDING COST	<i>Non-Fire-Resistive</i>	<i>Fire-Resistive</i>
Excavation.....	\$4,887	\$5,069
Concrete Work.....	12,427	20,083
Masonry.....	35,646	28,714
Structural Steel.....	8,096	13,452
Steel Joists.....	—	7,491
Carpentry.....	38,846	28,026
Plastering.....	23,228	29,387
Plumbing.....	12,000	12,250
Heating.....	8,880	9,065
Oil Burner.....	1,900	1,900
Electrical Work.....	7,690	9,048
Elevator.....	5,000	5,000
Painting.....	6,460	7,000
Miscellaneous Iron.....	3,360	270
Roofing & Sheet Metal.....	2,317	1,964
Tile Work.....	5,741	6,364
Terrazzo Work.....	758	404
Finish Hardware.....	1,544	1,675
Bathroom Ventilation.....	—	827
Miscellaneous.....	6,295	6,639
Total	\$185,075	\$194,628
JOB EXPENSE		
Superintendent (26 weeks @ \$100).....	\$2,600	\$2,600
3 Laborers (\$40 per week each for 17 weeks).....	2,040	2,040
Watchman (26 weeks @ \$20).....	520	520
Water (.002 x \$185,075).....	370	389 (.002 x \$194,628)
Cleaning (.0025 x \$185,075).....	463	487 (.0025 x \$194,628)
Removal of Rubbish (.00375 x \$185,075).....	694	730 (.00375 x \$194,628)
Fire Insurance (.00375 x \$185,075).....	694	730 (.00375 x \$194,628)
SUBTOTAL	\$7,381	\$7,496
Total Building Cost and Job Expense	\$192,456	\$202,124
GENERAL EXPENSE		
Taxes During Construction.....	\$1,500	\$1,500
Interest During Construction.....	1,800	1,800
Interest on Building Loan During Construction (1¼% of \$192,456).....	2,406	2,527 (1¼% of \$202,124)
Finance Charges (2½% of \$192,456).....	4,811	5,053 (2½% of \$202,124)
Architect and Supervision (4% of \$192,456)...	7,698	8,085 (4% of \$202,124)
SUBTOTAL	\$18,215	\$18,965
Total Cost	\$210,671	\$221,089

<i>Non-Fire-Resistive</i>	<i>Fire-Resistive</i>
622,100 cu. ft. @ \$0.339 = \$210,671	612,947 cu. ft. @ \$0.361 = \$221,089
161½ Rooms @ \$1,304 = \$210,671	175 Rooms @ \$1,263 = \$221,089
4 Deduct Superintendent's Apartment	4 Deduct Superintendent's Apartment
157½ Rentable Rooms @ \$1,338 Per Room = \$210,671	171 Rentable Rooms @ \$1,293 Per Room = \$221,089

Non-Fire-Resistive Construction:

Exterior walls - 12" brick

Corridor walls - 12" or 8" brick

Floors - 2" by 10" or 3" by 10" wood joists

16" O.C. spanning from corridor walls
to exterior walls. When necessary,
interior columns, and steel beams are
used to support the wood joists.

Interior partitions - 2" by 4" wood studs,
16" O.C. lathed and plastered.

Room finish - Exterior walls furred, lathed
and plastered.

Ceiling - lathed and plastered

Floors - wood sub and finish floors

Windows - wood double hung

Corridor Floors - 4" cinder concrete slab -
asphalt tile

First Floor - 4" cinder concrete slab, sleepers,
wood sub and finish floor

Roof - wood joists - 1" by 6" tongue and groove
roofing boards, 4-ply felt and asphalt finish.
2" blanket insulation between joists.

Fire-resistive Requirements in New York City

	<u>Fire-resistive</u>	<u>Non- Fire-resistive</u>
Exterior walls	3 hr.	3 hr.
Stairway enclosures	3 hr.	3 hr. bearing 2 hr. non-bearing
First floor	3 hr.	3 hr.
Other floors	1 1/2 hr.	n.r.
Public corridor floor	3 hr.	3 hr.
Roof	1 1/2 hr.	n.r.
Protection of interior columns	2 hr.	n.r.
Partitions enclosing public halls	3 hr.	3 hr. bearing 2 hr. non-bearing
Other partitions	1 hr.	n.r.

PLAN TYPES

All apartment houses achieve access to the various floors by means of a vertical circulation core. This consists of the elevator, or elevators, and the fire stairs. For economy of elevator operation, it is desirable to have one elevator serve from forty to sixty families. Modern collective control systems make it possible for a single elevator to handle this large number without inconvenience. With an average apartment building height of six to eight stories, this leads to the placing of seven to nine families per floor. For higher buildings, it is possible to either reduce the number of families per floor, or, keeping the same number, to use two elevators. The second method is preferable, owing to the extreme inconvenience to the tenants of the upper floors, when the single elevator is tied up as occurs when a tenant moves or repairs are made to the elevator mechanism.

The buildings may now be classified as to their means of access from the core to the individual apartments, and the distribution of the apartments about the central core.

The New York City building regulations have required that all apartments be reached by means of an

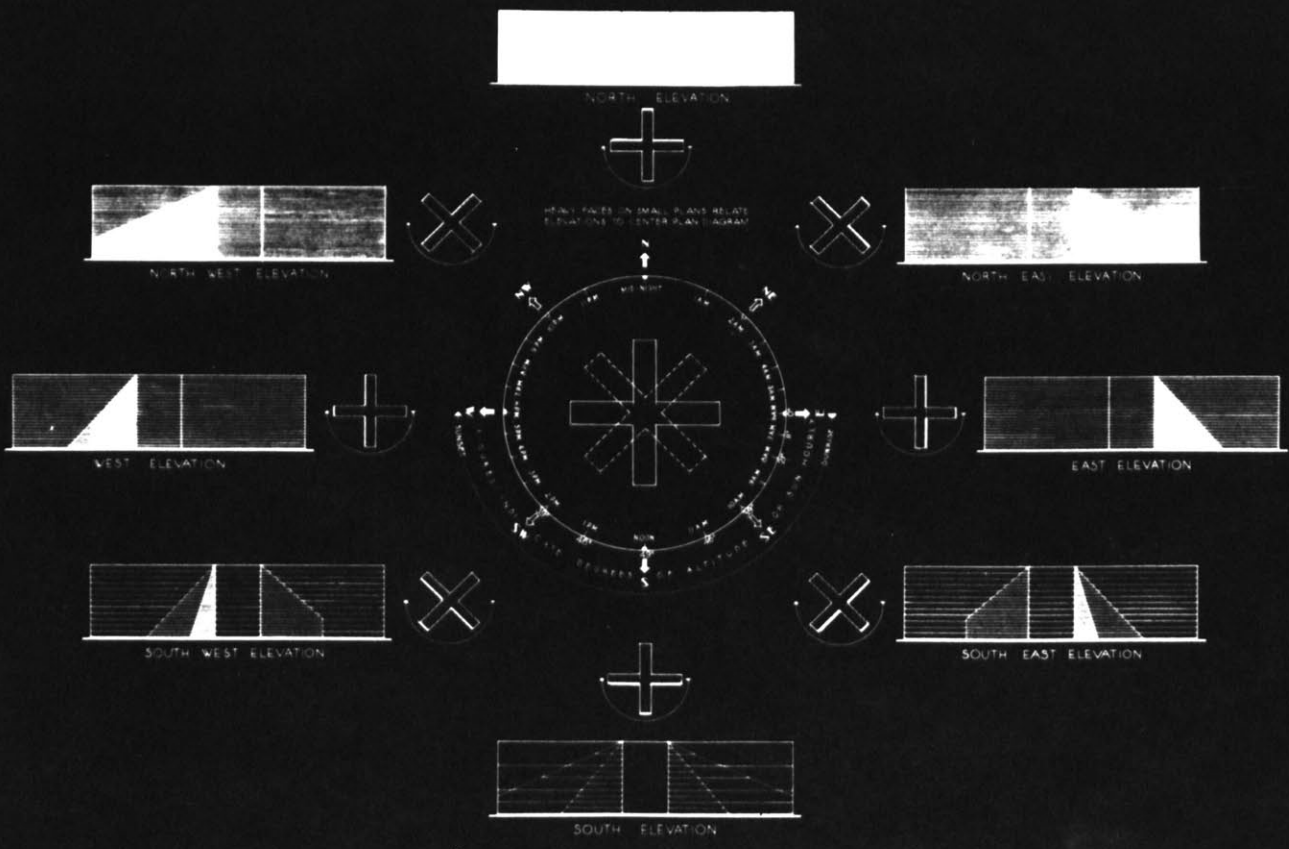
enclosed corridor, occurring on each floor. Recent attempts to achieve adequate natural ventilation, and keep the public areas reduced to a minimum while following these edicts have resulted in the following basic plan types:

The cruciform - This is a cross-shaped building, in which each wing is divided into two apartments, giving each apartment cross ventilation of a minor sort (usually only one room is on the second exposure). But it is difficult to orient, in fact four of the eight apartments will get only very minor sun early in the morning, and late in the afternoon. Furthermore, the wings at right angles to each other throw large shadows, hiding other parts of the building from a good deal of the sun. Privacy is at a minimum, for the right angled wings afford easy views into the windows of other apartments. They are ungainly shapes to site, producing a restless, confusing effect, and when paired together, as is often done, to increase density, are even worse.

The T plan - Some of the defects of the cruciform have been alleviated by removing one of the wings from the cross. This helps remedy the orientation problem by removing two of the sunless apartments; and

COMPARATIVE SUNLIGHT CHART MARCH-SEPT. 21ST

SHOWING HOURS OF DIRECT
SUNLIGHT RECEIVED ON WALL
SURFACES OF CROSS UNIT PLAN
SET ON NORTH-SOUTH AXIS
AND NORTHEAST-SOUTHWEST
AXIS • 41° NORTH LATITUDE •
EASTERN STANDARD TIME •



INDICATION OF HOURS OF SUN-
LIGHT ON WALL SURFACES •

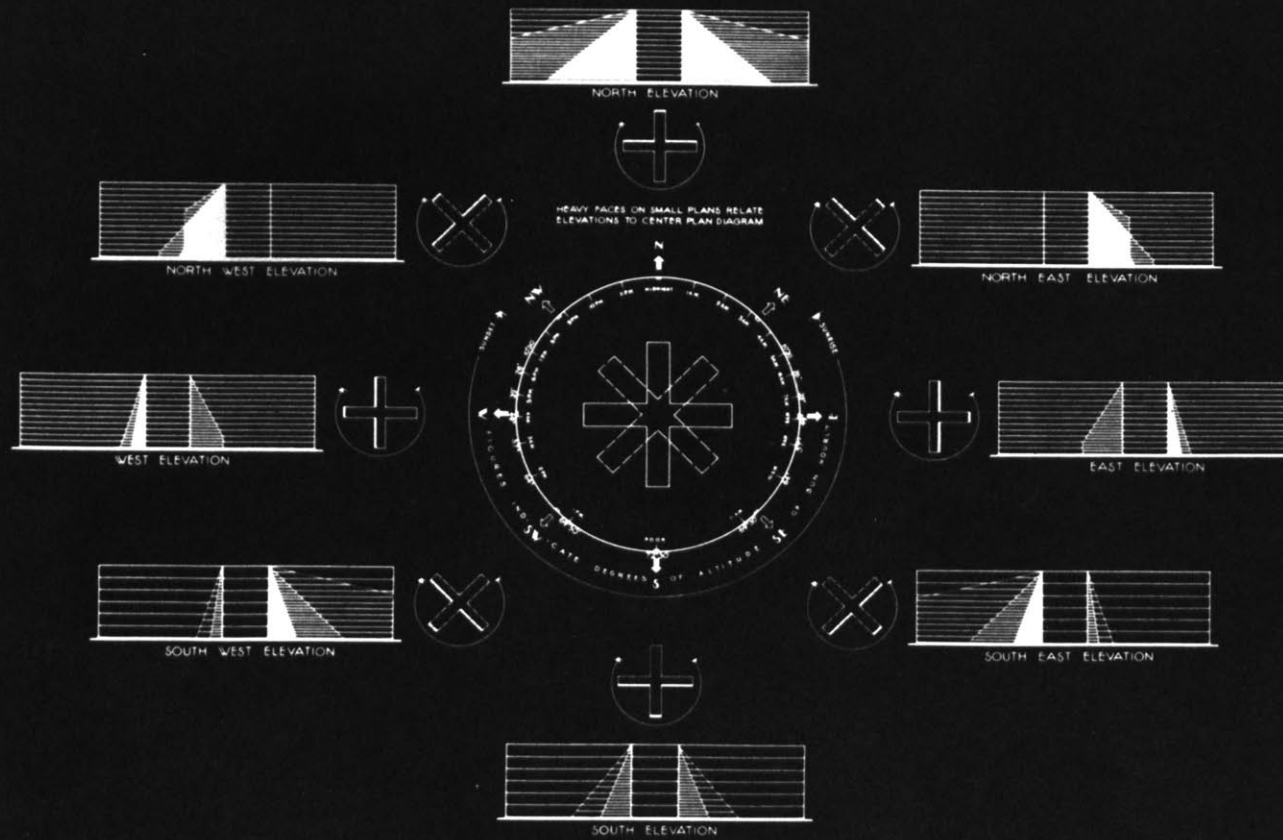
	0	HRS
	0 — 2	HRS
	2 — 4	HRS
	4 — 6	HRS
	6 — 8	HRS
	8 — 10	HRS
	10 — 12	HRS
	12	HRS

NEW YORK CITY HOUSING AUTHORITY

REVISIONS		NEW YORK CITY HOUSING AUTHORITY	
NO.	DATE	SUNLIGHT CHART MARCH-SEPT 21 ST	
1	4-8-38		
2			
3			
4			
5			
6			
7			
8			
9			
10			

COMPARATIVE SUNLIGHT CHART JUNE 21ST

SHOWING HOURS OF DIRECT
SUNLIGHT RECEIVED ON WALL
SURFACES OF CROSS UNIT PLAN
SET ON NORTH-SOUTH AXIS
AND NORTHEAST-SOUTHWEST
AXIS • 41° NORTH LATITUDE •
EASTERN STANDARD TIME •

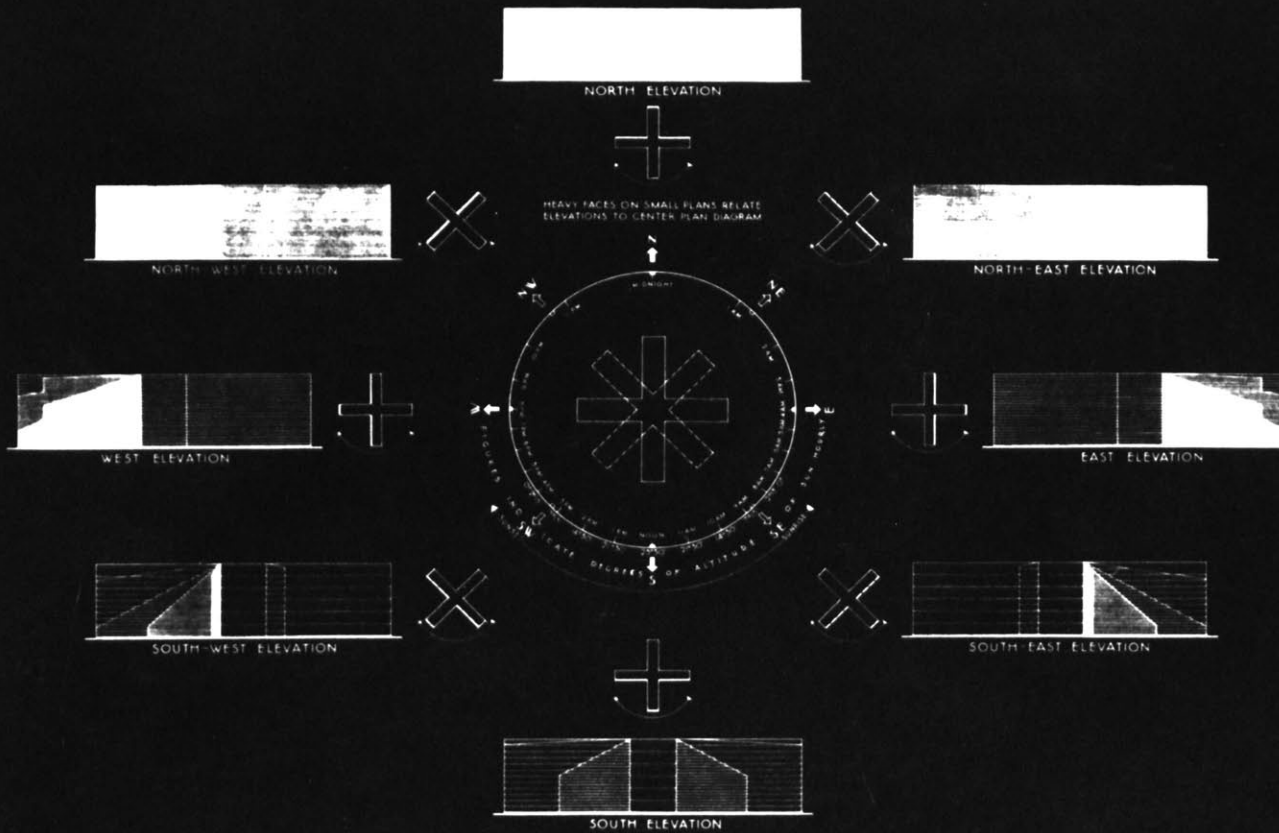


NEW YORK CITY HOUSING AUTHORITY

REVISIONS	NEW YORK CITY HOUSING AUTHORITY
NO. DATE	SUNLIGHT CHART JUNE 21 ST
	PLANNED BY: []
	DATE: []

COMPARATIVE SUNLIGHT CHART DECEMBER 21ST

SHOWING HOURS OF DIRECT
SUNLIGHT RECEIVED ON WALL
SURFACES OF CROSS UNIT PLAN
SET ON NORTH—SOUTH AXIS
AND NORTHEAST—SOUTHWEST
AXIS • 41° NORTH LATITUDE •
EASTERN STANDARD TIME •



NEW YORK CITY HOUSING AUTHORITY

REVISIONS	NEW YORK CITY HOUSING AUTHORITY
NO DATE	SUNLIGHT CHART DEC 21 ST
	DRAWN: [initials] CHECKED: [initials] DATE: 1948

by simplifying the shape, makes a more suitable building. However, its apartment capacity per floor, keeping the same standards of cross ventilation, is smaller.

The slab plan - Here the other wing comes off the T. This makes it much easier to orient and produces a restful building shape that is easy to site. However, only four of the apartments in a slab building can get even minor cross ventilation. An attempt has been made to push the apartments at the center of the slab out to form abbreviated wings; the wings being just long enough to get another window facing in a different direction into these central apartments. This is called "cross ventilation", but it actually is nothing but a lot of hokum. This scheme also has the disadvantage of a large amount of corridor space.

The Z - This is the best of the group. While not as easy to site as the slab, it gives good amounts of sunlight to all apartments, and cross ventilation to at least six. However, it still does not measure up to the cruciform as far as efficiency goes.

Thus you can see that none of the above types are really completely satisfactory. None offer

through ventilation to any but a very small percentage of apartments. All have at least one other major defect, either lack of privacy or lack of sun, or cross ventilation, or a complicated and restless building shape, or a large percentage of non-rentable public areas.

There are, however, two new plan types that are now possible in New York, due to the recent libertization of regulations on access. Now permitted, are a limited sort of skip floor access and, tentatively, balcony access.

SKIP FLOOR VS. BALCONY ACCESS

The approach to realizing greater livability will be through use of the new plan types now permitted in New York City, namely the skip floor, and balcony access systems.

The skip floor has proven to be economical to build. The cost of extra stairs is more than offset by the savings due to reduced corridor area and fewer elevator stops. It also gives through ventilation to all apartments on the non-corridor floors. Since most apartments have two exposures, it also is easier to orient.

However, it cannot be used to its fullest extent in New York. The controlling legislation that had to be amended to allow skip floor planning was the State Multiple Dwelling Law. The first attempt at amendment was defeated in the Legislative Assembly. The second attempt the following year passed the Assembly, but was vetoed by Governor Dewey. The third try finally received the governor's approval, only to be restricted by the New York City Fire Department, which will allow you to place an apartment above the corridor, with stairs up to it, but not one below. Their reasoning is that an aged or sick person would be able to go down a flight of stairs to

safety in the public corridor in case of a fire in the apartment, but that he might find it difficult to climb up to the corridor from the apartment below. Another, more valid reason, is that hot gases and smoke from a fire in a lower apartment would tend to rise into the apartment stair well, and trap the occupants. They will not accept agress through another apartment as an alternative way out.

So, as a result, skip floor apartment houses in New York have to have a corridor every other floor. This does not give the economy that a corridor every third floor would bring. Worse, it means that only half the apartments would have through ventilation. It also makes it very difficult to achieve the desired apartment distribution. I found it impossible to keep apartments to their correct area, and still get good room relationships, stack and duct alignment, and reasonable fenestration on the exterior. The unfavorable feature of either living rooms or corridors over bedrooms in some cases was also unavoidable. In the case of a central corridor scheme, orientation was also difficult. A building with a central corridor should be oriented with the long axis north-south, thus giving some sun to all

apartments. However, the summer breezes in New York are predominantly southerly, and would blow parallel to the building, instead of through it.

Thought was given to the possibility of a skip floor with balcony instead of corridor access. However, this is still not permissible by law, and had the disadvantage of a larger number of people walking in front of the apartments facing on the balcony corridor. It also resulted in living rooms over bedrooms, or corridor over bedrooms, or too large a corridor area in relation to the rentable space.

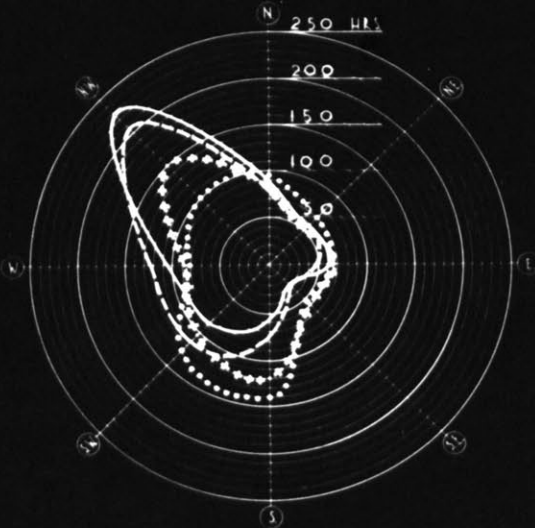
In short, while it is possible to design a skip floor apartment house under the present New York City restrictions, I found it impossible to design one in which the advantages decisively outweighed the disadvantages.

Architects are sharply divided as to their opinion of the balcony access plan. Those who dislike it compare present examples to the Italian slums of the last century. They are especially critical of the scheme in northern climates, where they feel the winter weather would make the balconies untenable, and disagreeable to traverse. Especially in high buildings, they feel the wind would tend to aggravate inclement weather.

However, there are several balcony access buildings in northern climates that have been tenanted for many years, with complete success. Wind velocities have been measured at various heights alongside high buildings and found to be no severer than at lower levels. Peoper orientation of the building to serve as a wind break for the balconies is also feasable. And if the balcony is exposed to the weather, and is therefore uncomfortable and cold in the winter, so is the sidewalk. Walking a balcony to your apartment is no different from walking the same extra distance on the ground. With the exception that in the case of the balcony you are more sheltered; having a roof, one solid wall, and a partial wall on the other side to screen you.

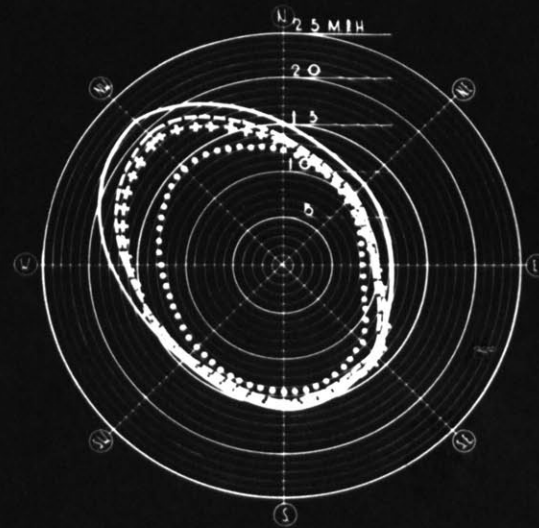
The question of snow and ice removal is still the most difficult to solve. It is felt that by proper screening and shielding, the amount of snow that will accumulate will be small, and removal either by a janitor or the tenants, will not be a difficult problem. An ideal system would be heating coils in the balcony slab, but in this particular case, I feel the cost would be too high to allow it.

WIND DIRECTION BY HOURS PER MONTH BY SEASONS OF THE YEAR



JAN FEB MAR ———
 APR MAY JUNE ++++
 JULY AUG SEPT
 OCT NOV DEC ---

WIND VELOCITY BY DIRECTION BY SEASONS OF THE YEAR



DATA FROM U.S. DEPARTMENT OF AGRICULTURE
 NEW YORK CITY WEATHER BUREAU
 10 YEAR AVERAGE

REVISIONS

NEW YORK CITY HOUSING AUTHORITY

NEW YORK CITY HOUSING AUTHORITY		
WIND GRAPHS		
SCALE	DATE	BY
1" = 5		
1" = 5		

U.S. WORKS PROGRAMS ADMINISTRATION PROJECT C-5-97-641 5104 SPANET

The question of privacy for the individual apartment can be solved by proper planning. Main rooms can be placed on the side away from the balcony, and the balcony exposure used for the kitchen, bathroom, and storage rooms.

Orientation is simple. The main rooms face in one direction, and can be given a southwesterly exposure. Then the summer breezes will flow at right angles to and through the building. The winter winds, from the northwest, will flow approximately parallel to the building, and will not drive snow or rain onto the balconies.

THE DESIGN

The final design solution consists of a building in the shape of a shallow U. The access balcony runs along the bottom of the U on the inside face, and is sheltered from winds by the legs. The vertical access core is in the center of the building, thus giving as short a travel distance as is possible to each apartment. The maximum distance to be traversed along the open balcony is fifty-eight feet. The elevator and stair lobby on each floor is enclosed.

Each floor contains eight apartments. The building is designed for two heights - eight story, with one elevator, or twelve to fourteen stories, with two elevators. A garage for tenants' cars is an integral part of each building. It is located so as to be conveniently accessible from the vertical circulation core. The top of each garage will be landscaped and used as play areas.

The building will be oriented as previously explained, with the access balcony running roughly northwest-southeast. This gives the main living areas a southwest exposure, and plenty of sun. The southerly summer breezes then flow at right angles to and therefore through the building. The winter winds are from the northwest, and flow parallel to the balcony. As a result, there will be little snow and

rain driven on to the balconies in winter time.

Each family is also given its own private balcony, projecting out in front of the living room. The glass of the living room wall reaches to the floor, thus visually extending the volume of the room out to include the balcony. This gives added spaciousness to the living room. It also has the advantage of making it simpler for the mother to supervise her children playing on the balcony.

Balcony facings will be solid, to give additional privacy to the users, and to add a feeling of security which might be necessary for those tenants who are first becoming acquainted with balcony living.

It might be felt that a solid parapet on the balcony will interfere with the view. Actually, in most cases, there will be no exceptional view. And in any case, the balcony slab alone would serve to cut off most of the view down to the garden areas below. The addition of the solid parapet therefore, does not obstruct very much.

The living rooms have been limited in depth to seventeen feet, to avoid any feeling of darkness due to the balcony overhang.

Privacy of each apartment is assured. The main living areas face out on the exterior of the U, therefore windows do not face each other. The access balcony exposure is taken up with bathrooms, (which are given high windows of obscured glass) storage, entrance halls, and kitchens. The sleeping areas are placed as far as possible from any contact with the access balconies.

Sound transmission between apartments is minimized by the placing of a wall giving a transmission loss of approximately fifty-five decibels between apartments where they adjoin.

The apartments have been laid out for a maximum of convenience. There is no circulation through the living room. All areas are tangent to the entrance foyer, and circulation from one to the other is simple and direct. There is no need to pass through one room in order to get to another. The bathroom-bedroom relationships are so arranged that it is possible to go from one to the other without being seen from the living room. Closets have been located where needed. There is a closet in each bedroom, a linen closet conveniently placed, a coat closet near the entrance, and a large storage closet near the entrance.

This storage closet can be partially used for pram or bicycle storage, when necessary.

Each apartment has one bedroom that is large enough for a desk or worktable. Thus, the bedroom can be used for an activity center. This gives each apartment two main activity centers, an area for noise and one for quiet, or one for the parents and one for the children. The kitchen is large enough to dine in regularly, if desired, and may also be used as an additional activity area. The kitchen is adjacent to the living room, for ease of serving, if it is desired to eat out of the kitchen.

Structural framing is of reinforced concrete. There are three continuous beams that run longitudinally through the building. The floors are flat slabs spanning from beam to beam, and the balconies are cantilevered out on either side. With this system, no beams are present in the rooms, and where they appear in the ceiling, they do so at the room opening, where they are visually acceptable, and in the case of the living room, desirable. The ceilings are not plastered, the flat concrete slab is simply painted.

The heating system chosen consists of a hot air unit heater placed in each apartment. These contain

heating elements fed by steam risers. The hot air is circulated in ducts furred into corridor and closet space, leading to each room. The return is located by the apartment entrance door. With this system, individual automatic heat control is possible in each apartment. The problem of hiding pipes in walls and spandrels, common with convector heating, is avoided. It is felt that this system will be no more expensive than heating with convectors.

Each kitchen has an exhaust outlet over the stove to carry away cooking odors. These outlets lead to vertical flues which are collected at the roof level and brought to central fan housings. With this system, more positive exhaust action will be obtained, at a lower cost than if individual exhaust units in each kitchen were used.

The final apartment distribution obtained is as follows:

- 1 b.r. - 25%
- 2 b.r. - 50%
- 3 b.r. - 25%

BIBLIOGRAPHY

- Joseph H. Abel, Fred N. Severud - Apartment Houses
New York, Reinhold Publishing Corp.: 1947
- Charles Abrams - The Future of Housing,
New York, Harper Brothers: 1946
- American Public Health Association - Planning the
Home for Occupancy
Chicago, Public Administration Service: 1950
- Architectural Forum - Apartment House Reference Number
Volume 43 No. 3, September 1925
- Architectural Forum - Apartment House Reference Number
September 1930
- Architectural Forum - Balcony Apartments
Vol. 94, No. 5, pp. 114-129, May 1951
- Architectural Forum - A New Kind of Apartment
Vol. 94, No. 4, pp. 128-136, April 1951
- J. Backman, A. Gitlow - Rollover in Rental Housing
Land Economics Vol. 27, pp. 58-66, February 1951
- Teunis J. Van der Bent - The Planning of Apartment
Houses, Tenements and Country Homes
New York, Brentano's: 1917
- Brickbuilder - Vol. 11, Jan.-Dec. 1902, pp. 245-248
- Citizen's Housing and Planning Council of New York, Inc. -
Bricks and Mortals
New York, 1951

- Engineering News Record - Construction Accounts for
69% of Public Housing Costs in New York City
Vol. 136, pp. 558-559, April 18, 1946
- Engineering News-Record - How to Build Housing
Economically, Fast
March 23, 1950, pp. 200-203
- H. I. Feldman, Andrew Thomas - Fire Safe Apartment
Houses Pay Dividends
Architectural Record Vol. 100, pp. 122-123, Aug. 1946
- H. Kamenka - Flats, Modern Developments in Apartment
House Construction
London, Lockwood and Son, Ltd.: 1947
- Joseph D. McGoldrick, Seymour Graubard, Raymond J.
Horowitz - Building Regulation in New York City
New York, Commonwealth Fund: 1944
- U.S. National Housing Agency - Housing Practices, War
and Prewar
Washington, U.S. Government Printing Office: 1946
- National Housing Agency - Public Housing Design,
A Review of Experience in Low-Rent Housing
Washington, U.S. Government Printing Office: 1946
- New York City Housing Authority - 17th Annual Report,
January-December 1950
- New York City Housing Authority - Project Statistics,
April 1951

Progressive Architecture - New Dimensions in Housing

Design

Vol. 32, No. 4, pp. 57-68, April 1951

R. W. Sexton - American Apartment Houses, Hotels
and Apartment Hotels of Today

New York, Architectural Book Publishing Company, Inc.:

1929

F. R. S. Yorke, Frederick Gibberd - The Modern Flat

London, The Architectural Press: 1937

Building Regulations - The City of New York 1950

The New York State Multiple Dwelling Law 1950

APPENDIX

Outline Specifications:

construction - concrete foundations, frame, arches

walls - brick and back-up tile

windows - steel casement - caulked

roofing - 4-ply 20 year Celotex insulation

interior doors - metal bucks, flush wood doors

apartment doors - Kalemein

furring - metal lathe and base

interior partitions - 2" solid plaster

no plaster on ceilings

bathrooms - tile floor and base

floor finish - asphalt tile

carpentry - kitchen cabinets

glazing - "B" quality double strength

hardware - Parkerized finish

painting - 2 coats

heating - vacuum steam oil-fired to unit heaters

hot air in each apartment

Rough Financial Estimate

12 story building

96 apts - 102,000sq. ft. @ \$10.00	\$1,020,000
balconies - 96 @ \$400.00	38,400
land - 96 apts @ \$1500.00	144,000
	<hr/>
TOTAL COST	\$1,202,400

Running Expenses

Amortization @ 2½%	\$30,000
Interest @ 4% of 80%	38,400
Taxes @ 3% of 80%	28,800
Maintenance - 384 rms @ \$75	28,800
	<hr/>
TOTAL EXPENSES /YEAR	\$126,000

Income (at 7% vacancy)

432 rms @ \$30.00 for 12 months	
@ 93%	\$144,500

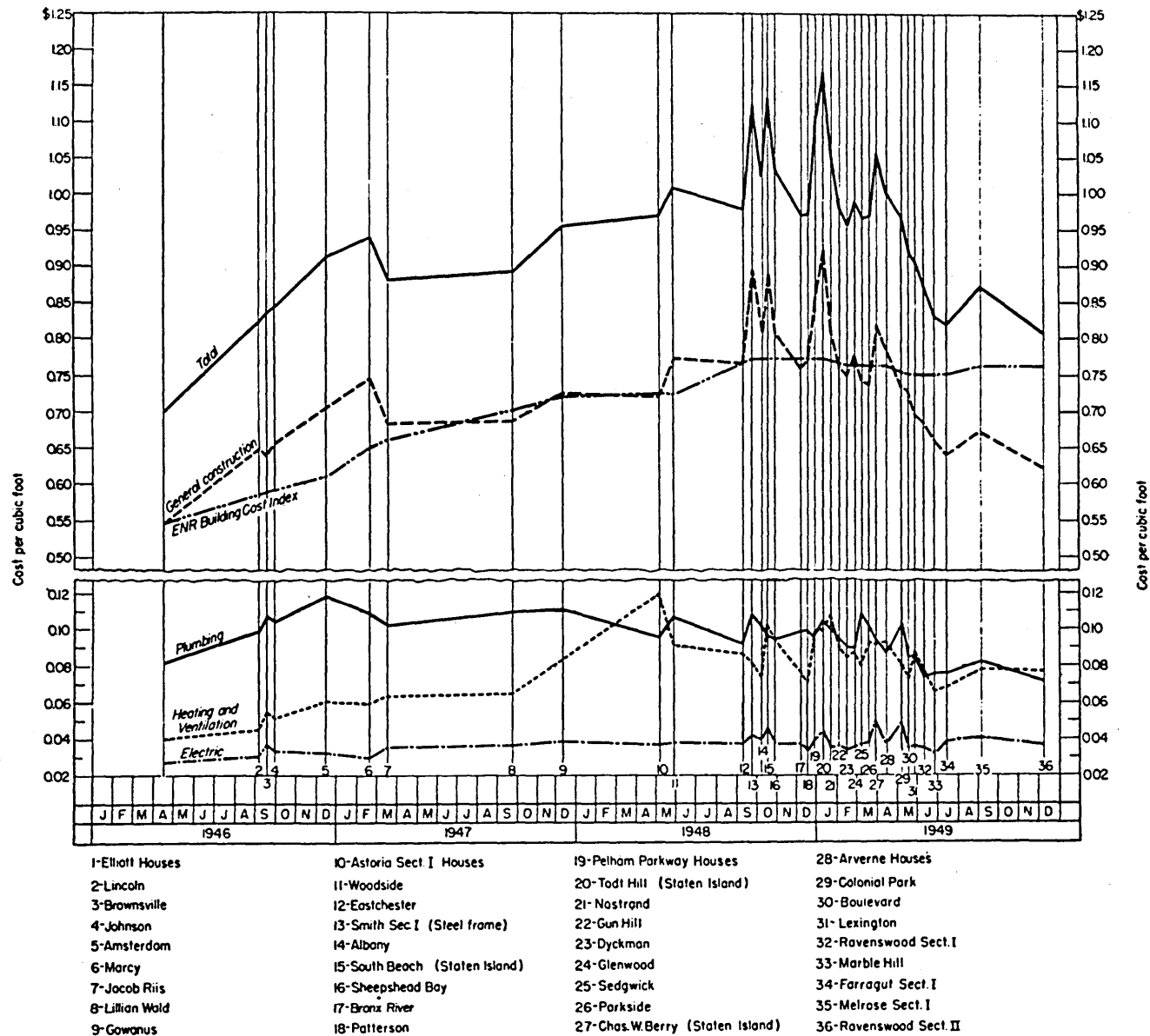
Profit on 20% equity

\$144,500 less \$126,000	\$18,500
--------------------------	----------

or 7.3%

Table 13.--INCOME IN 1949 OF FAMILIES AND UNRELATED INDIVIDUALS, FOR THE NEW YORK-NORTHEASTERN NEW JERSEY STANDARD METROPOLITAN AREA AND NEW YORK CITY, NEWARK, AND JERSEY CITY

Area and income level	Families and unrelated individuals	Families	Percent distribution		Area and income level	Families and unrelated individuals	Families	Percent distribution	
			Families and unrelated individuals	Families				Families and unrelated individuals	Families
NEW YORK-NORTHEASTERN NEW JERSEY STANDARD METROPOLITAN AREA					NEW YORK CITY				
Total.....	4,411,400	3,369,800	...	...	Total.....	2,758,400	2,064,200	...	...
Number reporting....	4,109,100	3,188,900	100	100	Number reporting....	2,605,600	1,978,800	100	100
Under \$500.....	407,400	205,700	10	6	Under \$500.....	271,700	133,000	10	7
\$500 to \$999.....	203,600	83,200	5	3	\$500 to \$999.....	139,100	58,000	5	3
\$1,000 to \$1,499...	208,000	122,200	5	4	\$1,000 to \$1,499..	150,100	88,700	6	4
\$1,500 to \$1,999...	244,700	156,800	6	5	\$1,500 to \$1,999..	167,500	106,100	6	5
\$2,000 to \$2,499...	347,400	230,800	8	7	\$2,000 to \$2,499..	237,400	159,400	9	8
\$2,500 to \$2,999...	364,700	291,000	9	9	\$2,500 to \$2,999..	231,600	184,000	9	9
\$3,000 to \$3,499...	460,100	364,800	11	11	\$3,000 to \$3,499..	292,900	230,700	11	12
\$3,500 to \$3,999...	334,200	298,800	8	9	\$3,500 to \$3,999..	217,200	188,700	8	10
\$4,000 to \$4,499...	306,200	272,400	7	9	\$4,000 to \$4,499..	196,700	176,900	8	9
\$4,500 to \$4,999...	204,400	191,400	5	6	\$4,500 to \$4,999..	121,200	113,700	5	6
\$5,000 to \$5,999...	347,500	327,200	8	10	\$5,000 to \$5,999..	215,800	200,200	8	10
\$6,000 to \$6,999...	204,900	195,500	5	6	\$6,000 to \$6,999..	117,700	111,100	5	6
\$7,000 to \$9,999...	269,100	256,200	7	8	\$7,000 to \$9,999..	149,200	140,200	6	7
\$10,000 and over...	206,900	192,800	5	6	\$10,000 and over..	97,600	88,200	4	4
Income not reported..	302,300	181,000	...	...	Income not reported.	152,800	85,400	...	...
Median income.....	\$3,303	\$3,734	...	...	Median income.....	\$3,180	\$3,578	...	...
New York Portion					NEWARK				
Total.....	3,300,900	2,470,800	...	...	Total.....	147,800	115,000	...	...
Number reporting....	3,095,300	2,344,700	100	100	Number reporting....	138,800	109,100	100	100
Under \$500.....	306,100	150,500	10	6	Under \$500.....	18,100	8,700	13	8
\$500 to \$999.....	163,700	64,600	5	3	\$500 to \$999.....	8,000	3,300	6	3
\$1,000 to \$1,499...	169,000	97,400	5	4	\$1,000 to \$1,499..	8,000	4,800	6	4
\$1,500 to \$1,999...	193,700	121,500	6	5	\$1,500 to \$1,999..	9,700	6,800	7	6
\$2,000 to \$2,499...	271,200	173,700	9	7	\$2,000 to \$2,499..	14,900	11,700	11	11
\$2,500 to \$2,999...	265,800	208,000	9	9	\$2,500 to \$2,999..	15,100	12,900	11	12
\$3,000 to \$3,499...	342,000	262,400	11	11	\$3,000 to \$3,499..	15,900	14,300	11	13
\$3,500 to \$3,999...	247,900	218,200	8	9	\$3,500 to \$3,999..	10,300	9,200	7	8
\$4,000 to \$4,499...	233,900	205,300	8	9	\$4,000 to \$4,499..	8,300	7,700	6	7
\$4,500 to \$4,999...	149,700	138,900	5	6	\$4,500 to \$4,999..	6,000	5,800	4	5
\$5,000 to \$5,999...	257,400	240,700	8	10	\$5,000 to \$5,999..	10,200	10,000	7	9
\$6,000 to \$6,999...	190,800	143,100	5	6	\$6,000 to \$6,999..	5,500	5,300	4	5
\$7,000 to \$9,999...	197,300	186,200	6	8	\$7,000 to \$9,999..	6,000	5,900	4	5
\$10,000 and over...	146,900	134,200	5	6	\$10,000 and over..	2,800	2,700	2	2
Income not reported..	205,600	126,100	...	...	Income not reported.	8,900	5,900	...	...
Median income.....	\$3,260	\$3,716	...	...	Median income.....	\$2,854	\$3,222	...	...
New Jersey Portion					JERSEY CITY				
Total.....	1,110,500	899,000	...	...	Total.....	93,800	78,200	...	...
Number reporting....	1,013,800	844,200	100	100	Number reporting....	89,200	75,100	100	100
Under \$500.....	101,300	55,100	10	7	Under \$500.....	8,500	4,800	10	6
\$500 to \$999.....	39,900	18,600	4	2	\$500 to \$999.....	3,400	1,600	4	2
\$1,000 to \$1,499...	39,000	24,700	4	3	\$1,000 to \$1,499..	3,500	2,500	4	3
\$1,500 to \$1,999...	50,900	35,300	5	4	\$1,500 to \$1,999..	4,800	3,200	5	4
\$2,000 to \$2,499...	76,200	57,200	8	7	\$2,000 to \$2,499..	9,400	7,200	11	10
\$2,500 to \$2,999...	98,900	83,000	10	10	\$2,500 to \$2,999..	9,900	8,700	11	12
\$3,000 to \$3,499...	118,000	102,400	12	12	\$3,000 to \$3,499..	12,800	11,700	14	16
\$3,500 to \$3,999...	86,400	80,600	9	10	\$3,500 to \$3,999..	7,800	7,300	9	10
\$4,000 to \$4,499...	72,300	67,100	7	8	\$4,000 to \$4,499..	7,600	7,200	9	10
\$4,500 to \$4,999...	54,700	52,600	5	6	\$4,500 to \$4,999..	4,400	4,300	5	6
\$5,000 to \$5,999...	90,100	86,500	9	10	\$5,000 to \$5,999..	6,300	6,100	7	8
\$6,000 to \$6,999...	54,200	52,400	5	6	\$6,000 to \$6,999..	4,100	4,100	5	5
\$7,000 to \$9,999...	71,800	70,100	7	8	\$7,000 to \$9,999..	4,700	4,600	5	6
\$10,000 and over...	60,000	58,600	6	7	\$10,000 and over..	1,800	1,800	2	2
Income not reported..	96,700	54,900	...	...	Income not reported.	4,600	3,100	...	...
Median income.....	\$3,427	\$3,784	...	...	Median income.....	\$3,199	\$3,408	...	...



UNIT COSTS for projects of the New York City Housing Authority rose continuously after World War II until 1949, when the trend was reversed, as indicated by the curves. For comparison, the ENR building cost index is also shown.