TEXAS TECHNOLOGICAL COLLEGE

AN OFFICE BUILDING

BY

ROBERT H. LEMOND

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PREFACE

The skyscraper is distinctively American. Its design and development have been largely the work of American architects. The successful operating of huge buildings is an American enterprise. The success of the skyscraper is due to the fact that it fits admirably into the scheme of American life and business. When properly designed, it is the most effective type of business building that can be provided and it contributes greatly to the efficiency of business generally. This is accomplished by providing quarters which are conducive to better work and also in providing a great number of neighbors in the same building with whom business may be speedily transacted.

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CHAPTER I

HISTORICAL INTRODUCTION

Definition

"It is significant that the simpliest definition of the skyscraper -- an unusually tall building -- has not been universally adopted."[1] Perhaps the man on the street thinks so, but scholars have generally incorporated some additional factor in their definition of the term. Thomas E. Tallmadge in his book Architecture in Old Chicago, defines skyscraper as "a tall building of skeleton construction". And Winston Weisman in his paper "New York and the Problem of the First Skyscraper" published in the Journal of the Society of Architectural Historians, No. 12, (1953) defines skyscraper as "a tall office building".

I do not know of any reason for limiting this conception, skyscraper, to office buildings. It is true that something must be done to exclude things like the Washington Monument, Eiffel Tower, etc., which have been invaribly omitted from the modern class skyscraper. Seemingly there is a better way to do this, although this paper will deal exclusively with office buildings. We must ask the questions: Just what is a skyscraper? What is the most valid and useful conception of the skyscraper?

First, I shall present a list of factors which it is suggested make up a valid modern conception of the skyscraper based on its developed form rather on early approaches to it. Second, to bring

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[1]Webster, J. Carson "The Skyscraper: Logical & Historical Considerations," Journal of the Society of Architectural Historians, (Dec., 1959.), Vol. XVIII, No. 4, p. 126

forward some new historical material bearing on the appearance and meaning of the term skyscraper, and to compare this with ideas of the skyscraper found in some of the early serious studies of it. The setting off present day against historical approaches to the term will help us attain a greater degree of clarity and objectivity in our ideas.

It is suggested then that the following are necessary factors in the developed skyscraper:

A. Essential characteristics (the end)

1. Great height (relative to buildings)
2. Arrangement in stories (interior)
3. Utmost space and light (potentially) in a story

B. Necessary means

1. A structural system adequate to achieving the essential characteristics taken together. To date, this means skeleton construction.
2. Materials necessary to the structural system
3. Passenger elevators

C. Favoring conditions

1. Economic -- such as high value of land, availability of labor and capital, etc.
2. Social -- such as living in large groups, enterprise, organization of work, publicity, etc.
3. Technological -- such as availability of suitable tools, processes, and sources of power, development of plumbing, heating, etc., growth of engineering, development of the craft of building to a certain point, etc.

4. Psychological -- desires (conscious or unconscious) which a tall form can express.
5. Aesthetic --liking for height, preference for the effect of towers related to lower buildings, etc.[1]

Skeleton construction is listed as a necessary factor in our conception of the skyscraper because, in the skyscraper as we know it, this construction is absolutely necessary in order to achieve the desired aim. It has been said that to make it a factor in the conception or definition represents an over-emphasis on technology.[2] But I would suggest that the structure of a building has considerably more than technological significance. The modern feeling that design should be related to structure is an indication of this; that is, we feel today that structure as a basic aesthetic revelance as well as it practical significance. A long tradition in architectural thought considers structure to be one of the fundamentals of architecture, as in the off-quoted trinity, commodity, firmness, and delight. It can hardly be an exaggeration of any kind to make the characteristic structure of a type of building an essential factor in our definition of that type. The fact that skelleton construction has been used in low buildings is beside the point. The relation between skyscraper and skeleton construstion is as follows: In what we call a skyscraper skeleton construction is used in the service of height, light, and space. It permits greater heights with the desired amount of light

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[1]Webster, op. cit. p. 127

[2]Ibid., p. 129

and with a greater amount of usable space on every floor. This relationship is fundamental to the conception - skyscraper.

I believe there are some considerations in favor of the structural definition and the ideas on which it is based. First, and most obviously, it will distinguish between the buildings with skeleton construction and those without it, that is, between the early attempts at heights and the perfected solution of this problem. Second, it seems that skeleton construction is important enough to require that such a distinction be made, since it is a crucial factor. All the factors which were tending in the last quarter of the nineteenth century toward the skyscraper as we know it -- business, land value, elevators, even the so called cage construction, etc. -- would have been helpless by about 1890 to produce the skyscraper, or to carry the development of the tall building further without the introduction of skeleton construction. Third, there is some value in accepting the term as it has developed. In our tradition of historical studies the conception skyscraper developed so as to include the factor of skeleton construction, and this was not a mere convention created by the historians of architecture. It reflected a development that actually took place in the buildings. After groping experiments in the construction of taller buildings a way was finally found in which great heights could be satisfactorily achieved, namely, the use of skeleton construction. It would therefore seem preferable as well as more convenient to continue the use of the term in the developed sense.

Some citation of specific buildings will doubtless be welcome after this discussion of indefinite terms, and we are lead to this question that now arises. If we should adopt the conception of the skyscraper -- an unusually tall building of skeleton construction arranged in stories -- what shall we call such buildings as the Tribune, New York, and the Montauk, Chicago? An apt term is at hand, for they were for years called elevator buildings, a name which calls attention to the factor which allowed them to exceed five or six stories and thus initiate the development in heights which eventually lead to the skyscraper. It is to be understood that their walls are traditional walls which bear at least their own weight. Their height frequently ran up to ten or twelve stories, but usually was well under 200 feet. Occassionally this was exceeded as in the well-known Monadknock Building, Chicago, and the Havemeyer Building, New York. The later building, designed by Post and built in 1891, is an impressive example of the so called cage construction. The interior may be said to be in skeleton construction, but the exterior walls bear their own weight in traditional manner and even bear the weight of a short section of the upper floors. They also contribute to stability of the interior structure, which was not considered able to resist wind stresses before the exterior walls were up. Raising it fourteen or fifteen stories to just over 180 feet, including the roof house, it approaches a possible border line in height between the pre-skyscraper and the skyscraper.[1]

Since buildings with this cage construction had what amounted to skeleton construction in their interiors, the difference is not great when we come to the buildings of skeleton construction. But, it is decisive. With the application of skeleton construction to the exterior

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[1]Birkmire, William H. Skeleton Construction in Buildings (New York, 1893), p. 109

walls the way was finally opened to the great heights of the skyscraper, together with the possibilities as to light and space which are essential. Thus the Home Insurance Building, Chicago, 1884, had considerably more to do with the skyscraper than did the simple elevator buildings. It remains peculiarly important, however, because it represents the point at which the development of tall buildings intersected the developing metal skeleton in exterior walls. The particular position of this building in the development is thus very justly indicated in the concluding phrase of the report of the committee which examined it during its dismantling. It is characterized as the "Father of the Skyscraper".

Now returning to the outline presented above, which, in view of the historical considerations just aduced seems to substanuate the corresponding definition that the skyscraper is an unusually tall building of skeleton construction. Those who are not satisfied with either of the chief solutions to the meaning of the term skyscraper, or the definitions, may well feel that the term is more troublesome than useful. Perhaps it lead to imposing an artificial unity on a complex of several types of buildings, thus extending the term so much that it becomes rather useless. The term has no doubt lost its original flavor, compounded of humor, bragging, and some community feeling. So whether used in manner of fact way or to recall the heroic days of its beginning, perhaps it is still useful for the name for the rather striking architectural type. As long as its used and whenever we wish a degree of precision in our terms, I suggest that the most useful conception of the skyscraper will be represented by this definition that the skyscraper is an unusually tall building of skeleton construction.

History

As early as 1780 -- even before the introduction of steam power -- cast iron columns were replacing wooden posts as roof supports in English cotton mills.[1] The interior uses of the cast iron column are found most every where in Europe. In 1794 in Lackinton's "Temple of the Muses", a London bookshop, decorated iron columns were used for the interior supports. Decorated cast iron columns were also found in John Nash's Royal Pavilion, Brighten, England, in 1818. Mass production of cast iron columns was found in the Paris Exhibition of 1867. These columns were used in the rebuilding of Paris. Indeed, the cast iron column -- used without precision or restraint -- became one of the symbols of the 19th century".[2] In 1801 Phillip and Lee's cotton mill, Salford, Manchester, England, represented the first experiment in iron pillars and beams for the whole interior frame work. This building, which was seven stories high, was the initial example of the light and airy quality that iron pillars and beams gave to the interior of the building. From 1801 to 1824 little or no changes took place in the form of beams. It was not until 1830, when machinery was developed to roll iron beams and columns that William Fairbairn in his English refineries developed cast iron columns, and mass production of wrought iron was used for beams and also floor plates.

The iron boom was also felt in the United States, when in 1848 James Bogardus erected his five story factory in New York City. It was

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[1] Giedion, Sigfried, Space, Time and Architecture, (Cambridge; Harvard University Press), 3 rd Edition, (1956), p. 132

[2] Ibid., p. 188

the first use of the cast iron column on the exterior. Bogardus was the first known architect to use prefabricated parts. In using these parts he erected buildings in every section of the United States. In 1854 that Bogardus built his famous Harper and Brothers Building in New York City and it was this same year that he gave us a project for the New York Worlds Fair. The structure was a cast iron amphitheater 120 feet in diameter with a 300 foot cast iron tower rising in its center. The entire project was to be made using cast iron columns and beams which were straight and could be resold and reused again. It was our great loss that Bogardus's project was never erected.

The first building of the true skeleton type of construction, the Chocolate Works, by Jules Saulenier at Noisel-sur-Marne, near Paris, was built in 1871.[1] George Johnson's Kendall Building, built in 1872, was the first example of the use of hollow tile in the floors and walls thereby creating the first fire resistant building of this type.

The beginnings of the skeleton construction of the present day are met with as early as 1848 in the home of the skyscraper, the United States. The stages leading up to the American skyscraper are not known with any exactitude. As E. M. Upjohn remarks, "At least three cities -- New York, Chicago, and Minneapolis -- have sought being the birthplace of the skyscraper, and several architects have laid down claim to distinction as its inventor".[2] The claims

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[1]Giedion, op. cit., p. 202

[2]Upjohn, E. M. "Buffington and the Skyscraper," Art Bulleton XVII (March, 1935), pp. 48-70.

the Minneapolis architect, Leroy S. Buffington, have been advanced more often than others. They were certainly urged quite strongly by Buffington himself, who claims to have invented the skyscraper in 1880 deriving his inspiration from Voillet-le-Duc's Lectures on Architecture which appeared in a translation about the time. The passage that aroused his interest occurs in Volume 2 of the Lectures, on page 1 and 2, where Voillet-le-Duc remarks, "That a practical architect might not unnaturally conceive the idea of erecting a vast edifice whose frame should be entirely of iron,...preserving that frame by a means of a casing of stone." The possibilities of a building with a 'frame of iron...clothed with masonry' had been suggested to him. Buffington, so he relates, looked through all the material available at public libraries for an account of such structure, but without finding any. That being the case he was quite justified in supposing the system of skeleton construction which he finally developed to be entirely original. Nevertheless, although Saulier's methods differ in several respects from those which Buffington proposed, the French constructor had anticipated him on one essential point; he had erected, almost a decade earlies, a building whose outer walls were supported 'exclusively' by wrought iron girders. The mill at Noisel was, essentially, an iron frame clothed in masonry.

It is well known that the first skeleton construction actually built (and not merely planned) along modern principals of construction was the ten story building of the Home Insurance Company of Chicago by William LeBaron Jenney.[1] The company demanded a new type of office

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[1] Giedion, op. cit., p. 206

building which would be fireproof and offer the maximum amount of light for every room.[1]

Since the elevator is essential in the height of buildings and comes now in chronological order, the following will trace its growth. In 1853 Elisha Graves Otis's elevator was exhibited in the Crystal Palace Exposition. In a department sotre in New York City in 1857, Otis installed his first passenger elevator. In 1859 Tufts of Boston, Massachuesetts, installed his 'vertical screw railway' in the Fifth Avenue Hotel in New York City. The first European elevator was found in the Paris Exposition of 1867, it was of the hydraulic type and was found in the famous Galarie des Machines. In 1889 the first elevator system of skyscraper proportions was developed for the Eiffel Tower. Its double deck elevator ascended to a height of 1,000 feet with the total trip taking just 7 minutes and approximately 2,350 passengers could be

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[1] Ibid., p. 205. The late William B. Mundie's opinion on Buffington's claim may be of interest. William Mundie was a younger partner of William LeBaron Jenney.

"I feel at a loss just how to approach this claim of William Buffington's for himself as inventor and the City of Minneapolis as the firthplace of skeleton construction. From my view point it should be ignored, but it has been given such widespread publicity and the Patent Office did issue letters patent calling it an 'invention' under the name of 'Iron Building Construction', Patent No. 383, 170. Inventor L. S. Buffington, Date May 22, 1888. That cannot be ignored, but it can be controverted."

After some details of the legal controvercies between Jenney and Buffington, Mr. Mundie goes on to observe, "All he patented was the use of said construction (which was then well known) in connection with his laminated steel plate column, composed of plates riveted together side by side, and breaking joints, thus forming a solid steel column from bottom to top. This column being solid was so extravagant that no one ever had a desire to use it. Parties who called to interview Mr. Jenney about the patent, who afterwards proved to be Mr. Buffington's attorneys, were told by him that if they could find anyone using that extravagant column, they certainly could be prosecuted for using it, but no architect or engineer of any scientific knowledge would be quilty of using it; in skeleton construction is was worthless."

transported to the summit every hour..

Returning to the development of the skyscraper, we find that during the 1880's a whole colony of buildings suddenly sprang up in Chicago -- to heights of twelve, fourteen, sixteen, and twenty-three stories. These buildings were erected not in isolation, as they were in other cities but in close proximity to each other because of the devastation created by the Chicago fire. The Chicago School is bound up with the creation of the modern office building, in other words, with the creation of the administration center.

Following Jenney's Home Insurance Building was Holbird and Roche's Tacoma Building which was built in 1889. In 1891 the Monadnock Block by Burnham and Root was the last tall building with solid masonry walls. It was sixteen stories high and the wall thickness at the base was 72 inches. The Montauk Block was built in 1882, also, by Burnham and Root and was unique in that it was the first example of the 'floating raft foundation' which was a concrete slab with criss-crossed iron rails, developed for the soft and compressible soil of Chicago. In 1891 William LeBaron Jenney built his Manhattan Building which had an undulating wall - bay windows to give all the light possible -- because it was built on a narrow Chicago Street. It was felt that bay windows would capture a sufficient amount of sunlight to light the interior. In the Fair Building of Jenney's, built in 1891, we find the first example where the skeleton is made the determining factor in design. The skeleton actually shows up on the outside walls and it creates the exterior design concepts. In 1894 Daniel Burnham built the Reliance Building. "In its airiness and purity of proportion this building serves to symbolize the spirit of the Chicago School whose 'swan-song' it was."[1]

In 1899 the genius of Louis Sullivan is felt in his Carson, Pirie, Scott Store at the corner of State and Madison Streets in Chicago, 'the world's busiest corner'. Sullivan in this store developed his 'Chicago windows'. The whole front is executed with a strength and precision that is matched by no other building of the period. In 1899 Adler and Sullivan built the Wainwright Building in St. Louis, Missouri. This building, which is perhaps the most famous of the Sullivan sky-scrapers, is built of the earth colored brick with decorated terra cotta spandrels and windows giving a feeling of immense height to a rather small building. Its termination is an extremely beautiful terra cotta cornice, one of the finest examples of the cornice as developed by the Chicago School. In 1904 the name of Frank Lloyd Wright appears upon the skyscraper scene with his Larkin Building in Buffalo, New York. Although no skeleton was used in the Larkin Building, it is important because it is the first evidence of the metal file systems and furnishings and it is the first completely air conditioned office building.

In the 1922 competition for the Chicago Tribune Building, the plans of competant American architect -- Raymond Hood -- won the first prize. By this time, however, the confidence and beliefs that had sustained the Chicago School had completely disappeared. The school might just as well never existed; its principals were crossed out by the vogue of

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[1] Giedion, op. cit., p. 384

"Woolworth Gothic".[1] The $100,000 international competition for the Tribune Building drew entries from everywhere. The projects submitted give an invaluable cross section of the architecture of that period. One of the foreign entrants was Walter Gropius. Both the jury and the public must have considered that his scheme was quite unstylish and old fashioned. There is no doubt, however, that it was much closer in spirit to the Chicago School than the Gothic Tower which was executed.

In this same light, in 1921 the German architect, Meis van der Rohe, gave to us his project for a glass tower. It was a modern excursion into the realm of fantasy, something of whose spirit, nevertheless, had been anticipated in the Reliance Building. It is to be seen that this project had a great influence on some of Meis van der Rohe's later buildings. Again in 1921 Frank Lloyd Wright projects a skyscraper in his St. Marks Tower project for New York City. It is the first example of his quadrantly arranged, tap root construction.

In 1928 Eric Mendelsohn built his Schocken Department Store in Chemnitz, Germany. Considered Mendelsohn's masterpiece, the nine story Schocken Department Store covers an irregular site: two sides adjoining a curved avenue. Its shape is a sector of a circle, the circumference forming a 220 foot facade. Broad horizontal windows with panels of uninterrupted glass are equally impressive in day light and when lit up at night. The three upper stories are recessed, and large vertical windows on each end of the building mark its staircases.

[1] Stemming from the Woolworth Building in New York, 1911 - 13 by Cass Gilbert, Architect.

The Daily News Building by Hood and Howells in New York City was built in 1930 and it is one of New York's most distinguished skyscrapers. The building is designed with a vertical emphasis. This tall feeling is achieved by the soaring assymetrical contours and by the facade in which bands of white brick walls are alternated with unbroken bands of window glass and dark spandrels. The roof area with utilities is concealed behind several story heights of wall.

In 1931-1932, Howe and Lascaze built their Philadelphia Savings Fund Society Building in Philadelphia, Pennsylvania. In this celebrated skyscraper design, a T-shaped plan above the fifth floor of this thirty-three story building provides maximum daylight. The floors are cantilevered beyond the supporting columns to provide walls in which bands of glass alternate with light gray brick. A large marble entrance hall with an enormous glass window leads to the second floor main banking area. The elevators are concentrated in one block of glazed black brick.

In 1929, Shreve, Lamb, and Harmon designed and work began on the world's tallest building, the Empire State Building, which including the spire, rises 102 stories to an approximate height of one-fifth a mile. The building which is built on the corner of 34th Street and Fifth Avenue in New York City, sits on a base 197'5" x 424'9½" and according to the 'New York Set-back Law' reduces these dimensions at the 6th, 21st, 25th, 30th, 72nd, and the 81st floors. The design is simple, with ornamentation found around the base and on the spire. The height is emphasized by the long slender bands of buff brick and the darker colored spandrels.

Rockefeller Center designed by Reinhard, Hofmeister, B. W. Morris, Corbett, Harmon, and MacMurry, Hood and Fouilhoux was erected in New York City between 1931 and 1937. This group of fourteen skyscrapers, planned as unified office and entertainment center, is simple in architectural design and highly imaginative in urban approach. It stands in a cleft of the choatic city, nearly three blocks cut out of the narrow-scale gridiron system of New York and organized in a completely new and independent manner. The great slab of the central building dominates one of the first and the most dramatic modern civic centers. The huge buildings are grouped around a fountained plaza and a small garden. The interiors are enriched by the allied arts of painting, sculpture and mosaics. Here the American skyscraper has found a superb setting.

The S. C. Johnson and Son, Incorporated, Building in Racine, Wisconsin, was designed by Frank Lloyd Wright in 1936. The most famous feature of the administration building is the "lily pad" piers which emphasize the interior space and combine at their top to form the ceiling. The exterior walls are birck screens striated with bands of heat-resisting glass tubing, with interior walls of plate glass. The nearby fourteen story research tower is enclosed in a similiar "glass envelope", and its floors are cantilevered from a central shaft. The first major building built on this new type skeleton construction or "tap root-tree construction."

In 1937, in Rio de Janerio, Brazil, the architects, Lucio Costa, Oscar Niemeyer, Affonso Reddy, Carlos Leau, Jorge Poreira, and Herrani Vasconcelos (Le Corbusier, consultant) designed their famous Ministry of Education and Health Building. Designed for civic benefit and beauty by a selected group of Brazilian architects, this great building housed fifteen floors of offices, an amphitheater, and exhibition halls. This building is the most striking symbol of modern architecture in Brazil and the first application, on a ground scale, of Le Corbusier's ideas -- the ideas being the open plaza, the space given by raising the building up on 'pilotis', the blind walls at each end, and the breaking up of the flat slab-like wall. Wall surfaces are varied both in texture and color: rose granite, blue and white ceramic tile, uninterrupted windows covered by a huge sunshade. Condido Portinari's tile mural, a high relief on the Amphitheater's facade by Jacques Lipchitz and sculptures by Berino Giorgio and Antonio Celso in the beautifully landscaped garden are outstanding examples of the integration of related arts.

The United Nations Secretariat Building in New York City with Wallace K. Harrison, an American architect, in charge, was designed in 1950. A slab skyscraper with the inspiration of the French architect, Le Corbusier, and his afore-mentioned ideas. This monumental building is the office of the 3400 employees of the United Nations Secretariat. The ends of the slab are of White marble and the side of green-tinted glass. Atop the tower, an aluminum grille conceals service equipment, and service floors divide the facades into three horizontal parts. Since the aris is north-south, the building has a view of the East River on the east and holds a gigantic mirror to the Manhattan skyline on the west.

The Lever House by architects, Skidmore, Owings and Merrill, partner in charge William S. Brown, partner in charge of design, Gordon Bunshaft was built in New York City in 1952. This striking green-glass tower seems to float three stories above the bustle of New York's Park Avenue. The ground floor contains only a lobby and a small service area, leaving almost all the site open for walks and a garden. The second floor, a strip of offices, is raised on columns sheathed in stainless steel. This forms an arcade around the garden. The glistening glass curtain wall mirroring the city scape about it makes it one of the most influential office buildings in modern architecture.

Also in 1952, Harrison and Abramoritz created their Alcoa Building. Appropriately, the building that the Aluminum Corporation of America built for its offices was the first aluminum-sheathed skyscraper in the United States. The walls of this thirty story tower are made up of prefabricated six foot x twelve foot screens of aluminum, each with a vertically pivoted window in the center. The glass-walled entrance hall, four and one-half stories high, has a roof cantilevered from the tower itself.

The H. C. Price Tower in Bartlesville, Oklahoma by Frank Lloyd Wright rises 136 feet above the Oklahoma plain. This spectacular building is Wright's first residential skyscraper; a plan of his which is reminiscent of his St. Mark's Tower Project. Its exterior colors are brilliant blue-green copper fins and facings, golden tinted windows. Each floor is divided into four quadrants, three of them devoted to office and the other one comprising a vertical half of a duplex apartment. This is wright's second building with the tap root structural system.

I. M. Pei's, Mile High Center, in Denver, Colorado was built in 1955. The Mile High Center is a towering twenty-one story rectangular block. The particularly sensitive use of glass in an aluminum and porcelain gird makes both the external and internal structure apparent. Heating and cooling units are clearly visible from the exterior. The liveliness of the details and the transparency of the whole make an effective contract to the structural austerity.

The Seagram Building by Ludwig, Mies van der Rohe, and Phillip Johnson was built in New York City, in 1958. This Manhattan office building is a master statement expressing the skyscraper's essentially cage-like structure directly and dramatically. Set back on a marble and granite plaza, the thirty-eight story tower is flanked by two low wings which provide a backdrop and accentuate the impression of sheer height. The simple geometery of the building's module carried from top to bottom gives it unsurpassed unity and rhythm. The bronz-sheathed steel frame, warm tented glass, and polished travertine provide a richness that heightens the building's simplicity and precision.

The Time and Life Building in New York City by Harrison and Abramoritz is located opposite Radio City Music Hall and is the newest addition to Rockefeller Center, this building, as the others, will provide an open plaza area, in this case 200' x 600'. Preliminary plans for the space invision trees, planting, pools, and sculpture for it.

Carson and Lundin's proposed Astor Plaza Building will be built in New York City, located directly north of the New Seagram Building and directly east of the Lever House, this project -- as they -- will feature a landscaped plaza of considerable area. The interrelationship of the three high shafts and their open ground areas should provide a spatial complex of uncommon architectural interest.

Slated for completion in 1960 is the 33 West 51st Street Building by Harrison and Abramoritz. This gaint will be sheathed in stainless steel and upon completion will become the largest structure in the world so clad. The structure's sixty floors will rise 775 feet above the New York Streets.

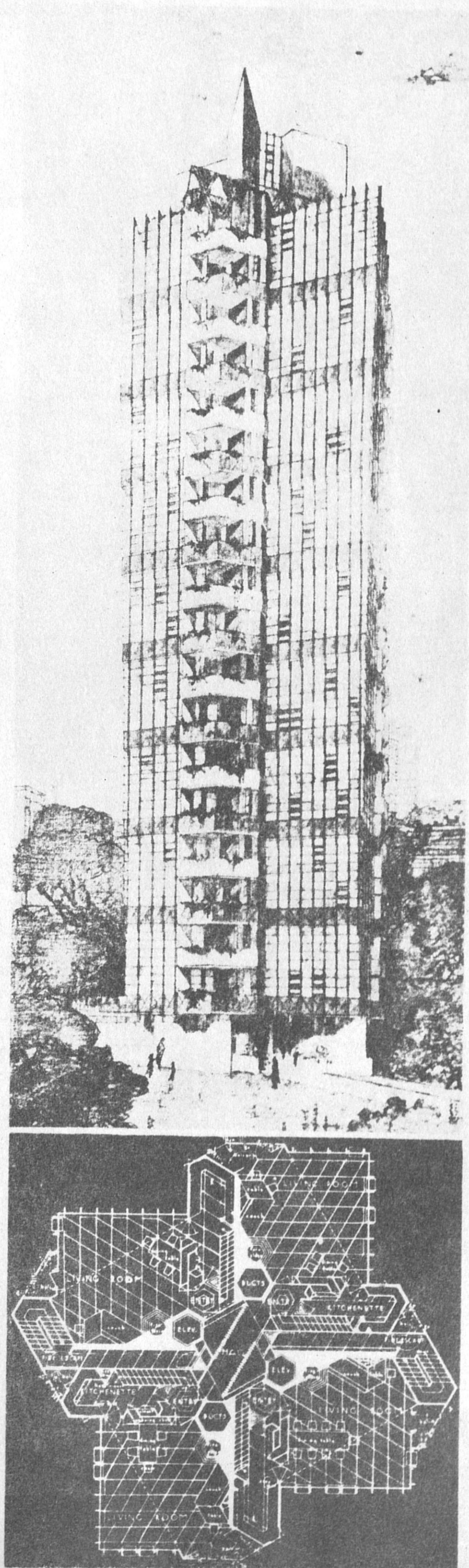
The Southland Center in Dallas, Texas, by Welton Becket and Associates, is a striking complex of two office buildings and a twenty-eight story 600 room hotel with gardens, arcades, and shops at ground level.

Skidmore, Owings, and Merrill's Chase Manhattan Bank Building in New York, should be completed in 1960. This imaginative project will make the first significant break in the canyon-like pattern of downtown New York by devoting 70 percent of the two block site to an open plaza. A glistening glass and metal shaft -- its vertically emphasized outer columns -- will soar skyward from the man-made spread of the platform, otherwise punctured principally by the circular sunken garden for the bank below.

The Mile High Illinois was projected for Chicago, Illinois by architect, Frank Lloyd Wright. This "cantilever sky-city" is large in scope, daring in concept, and hauntingly provocative. The building would house 130,000 population in a combination office-apartment building. It would have a gross floor area of 18,500,000 square feet and a bank of 56 tandem-cab atomic powered elevators which could vary their speed up to one mile per minute. The building is the most flamboyant expression of Wright's "tap root" cantilever type construction.

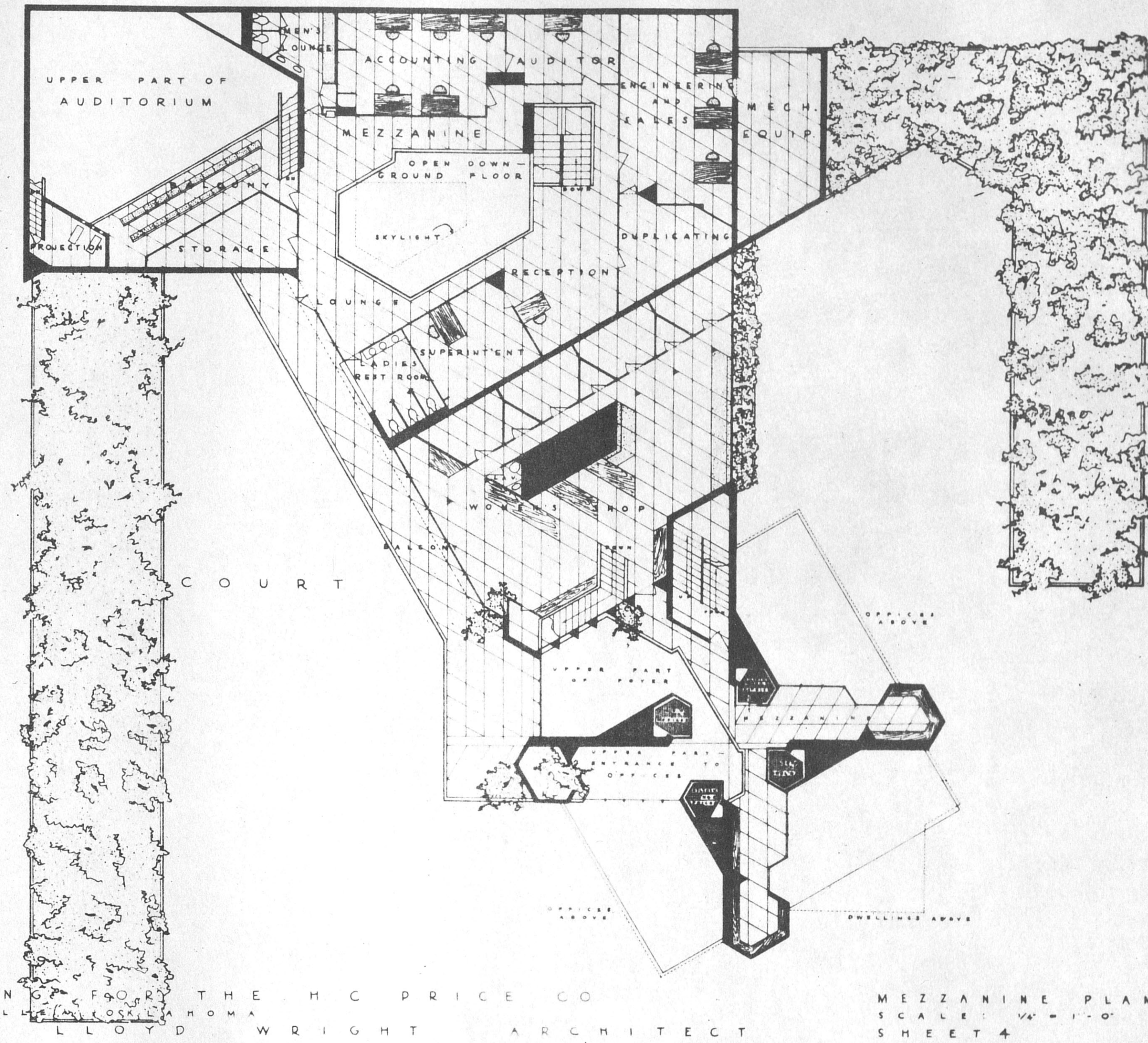
Skyscraper design stubbed its toe on traditionalism early in this century and has regained balance to step forward with assurance only in the past 25 years. Today, the tall office building with its best manifestation, can take its place in architectural history as a new and valid expression. One that embodies a fundamental articulation of space, structure, material, and utilities in a manner true to contemporary industrialized technology. The curtain-wall plus skeleton construction can be added to the historical listing of construction methods along with the post and lintel, arch and vault. The office building has become a useful, and sometimes beautiful, tool for our kind of society.

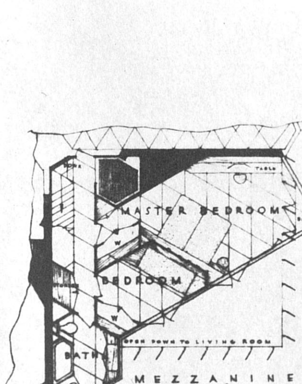
THE STORY OF THE TOWER



St. Mark's Tower, Project,
New York City, 1929

FIG. 1


UPPER PART OF AUDITORIUM
MEN'S LOUNGE
ACCOUNTING
AUDITOR
ENGINEERING AND SALES
MECH. EQUIP.
MEZZANINE
OPEN DOWN — GROUND FLOOR
BALCONY
SKYLIGHT
PROJECTION
STORAGE
DUPLICATING
RECEPTION
LOUNGE
SUPERINT'ENT
LADIES REST ROOM
WOMEN'S SHOP
BALCONY
COURT
OFFICES ABOVE
UPPER PART OF FOYER
MEZZANINE
UPPER PART ENTRANCE TO OFFICES
OFFICES ABOVE
DWELLINGS ABOVE
BUILDING FOR THE H C PRICE CO
BARTLESVILLE OKLAHOMA
FRANK LLOYD WRIGHT ARCHITECT
MEZZANINE PLAN
SCALE: 1/4" = 1'-0"
SHEET 4


MASTER BEDROOM
BEDROOM
OPEN DOWN TO LIVING ROOM
BATH
MEZZANINE

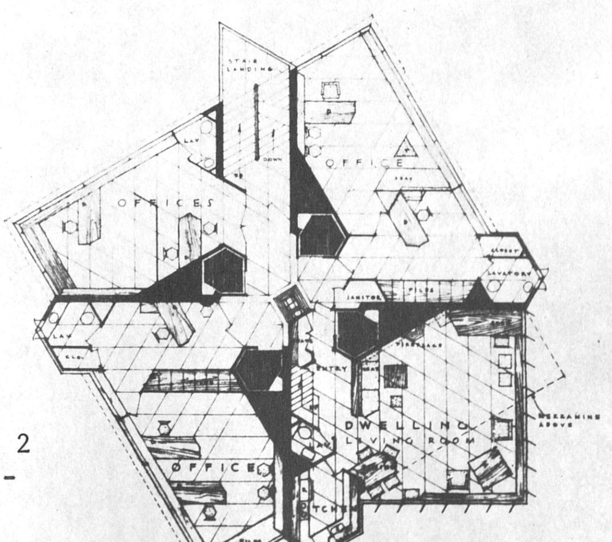

STAIR LANDING
OFFICE
OFFICES
JANITOR
FILES
ENTRY
DWELLING
LIVING ROOM
OFFICE
KITCHEN
MEZZANINE ABOVE

FIG. 2

- -

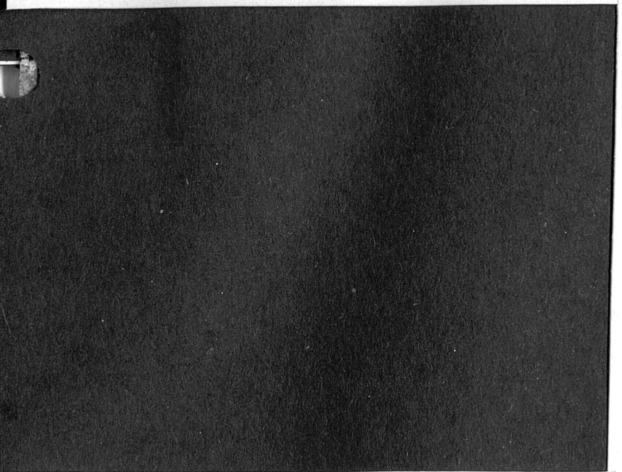
A walk around the building (views can be compared with plan) shows that no two facets of the tower are alike. Each element expresses the use of the space within, and the architect has modeled his basically simple forms to achieve an unparalleled richness of design.

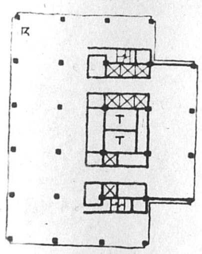
1 2 3

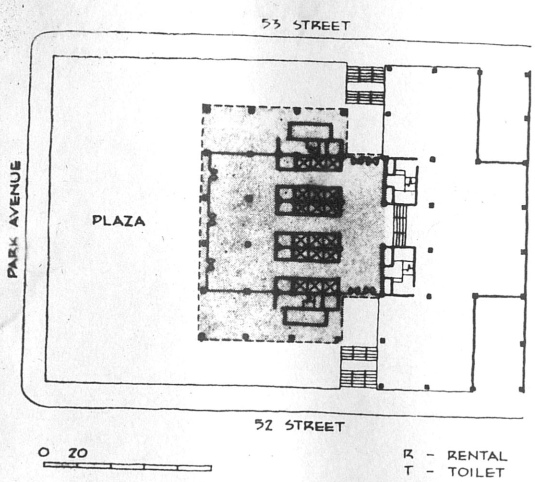
FIG. 3

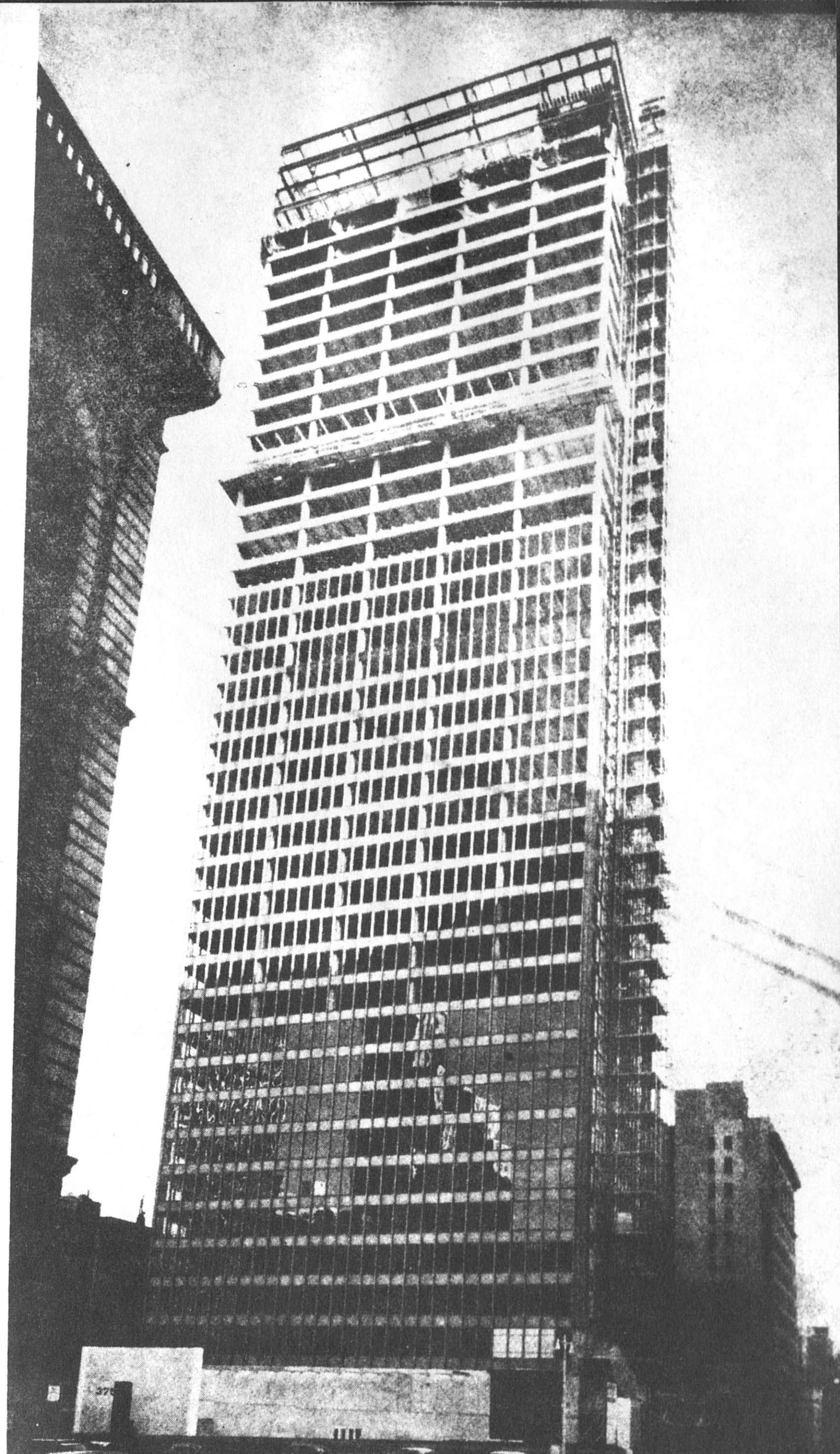
THE HOUSE OF SEAGRAM

375 Park Ave., New York

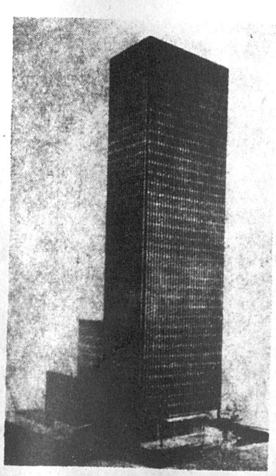


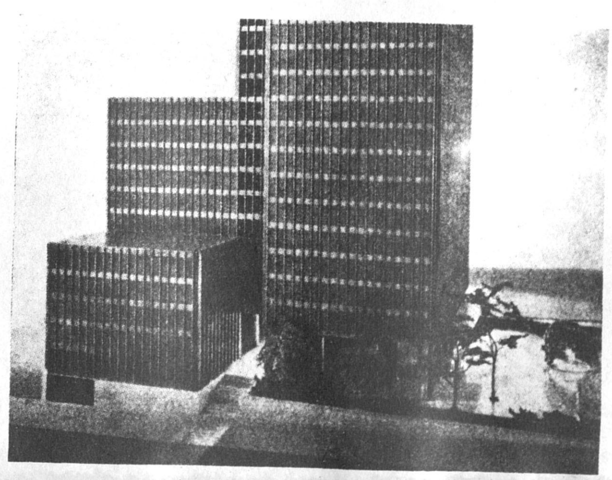






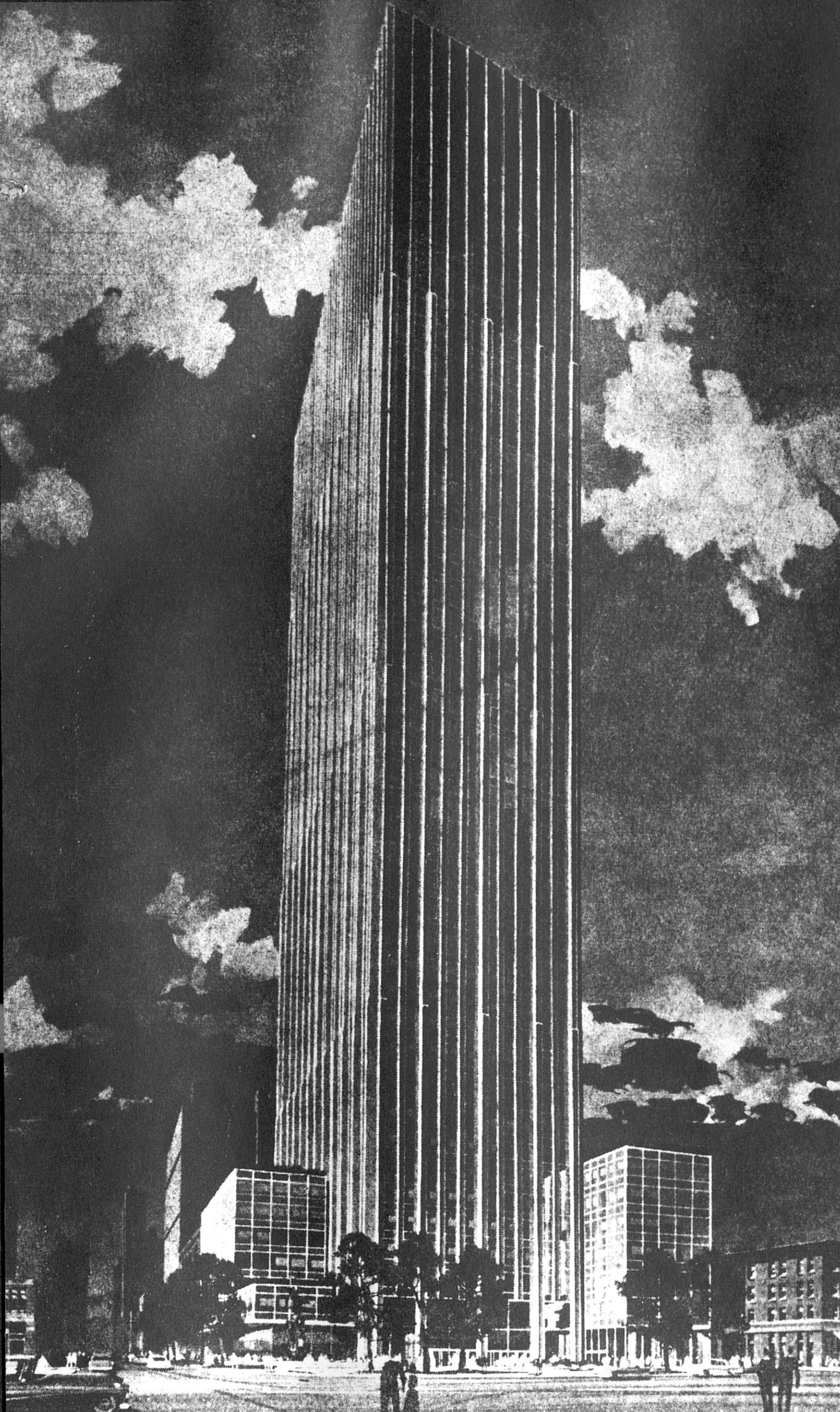
Joseph W. Molitor

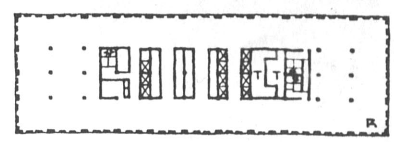


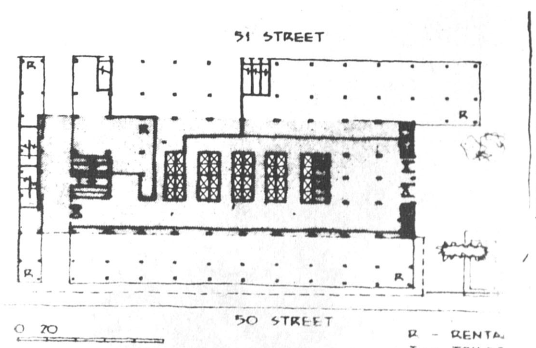


TIME AND LIFE BUILDING

50th to 51st Sts., Sixth Ave., New York







Left to right: Monadnock Block, Chicago, 1891, Burnham & Root; Home Insurance Building, Chicago, 1885, William LeBaron Jenn
Tacoma Building, Chicago, 1887, Holabird & Roche; Masonic Temple, Chicago, 1890, Burnham & Root

Hedrich Blessing

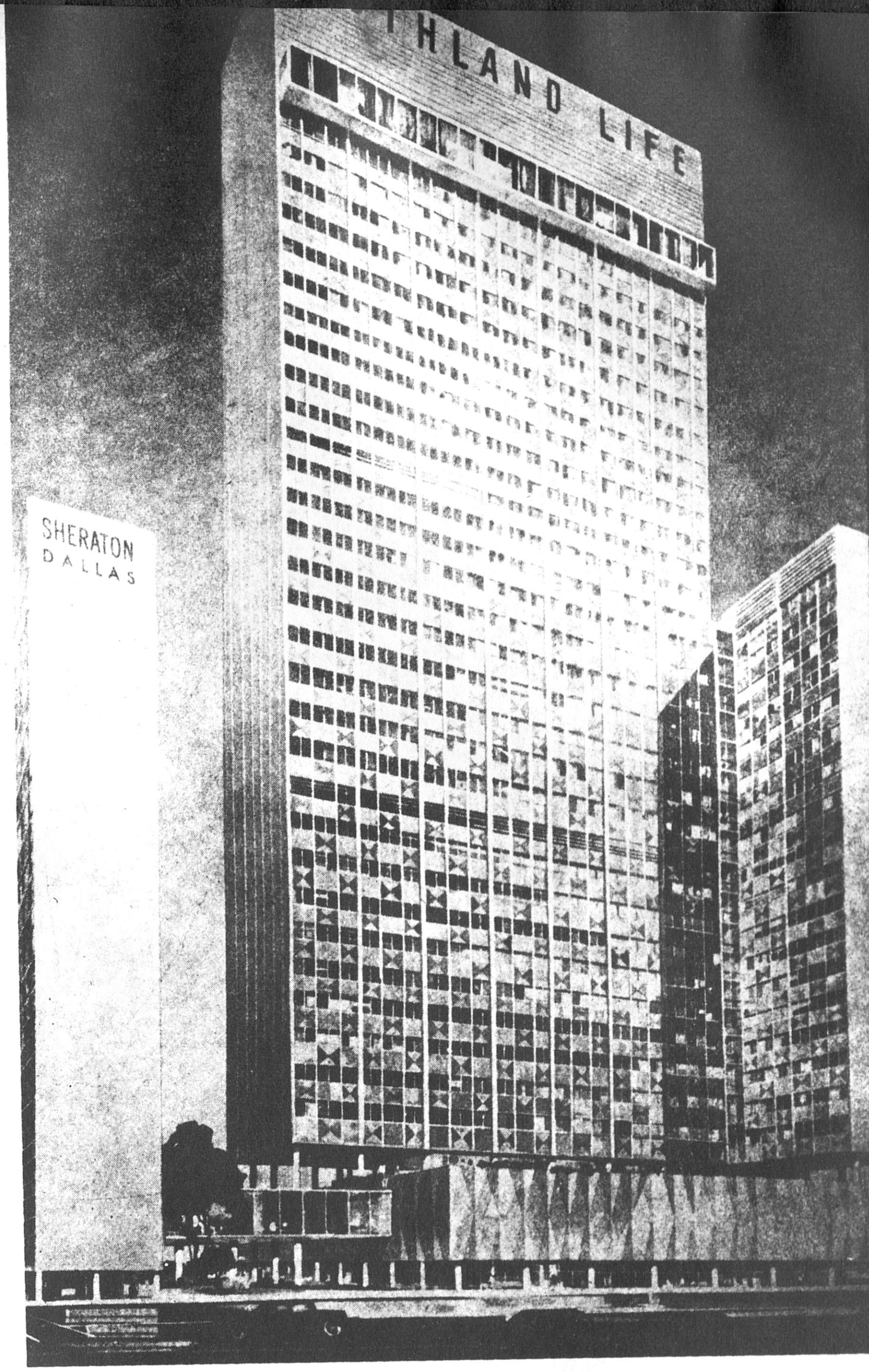
Bettman Archive

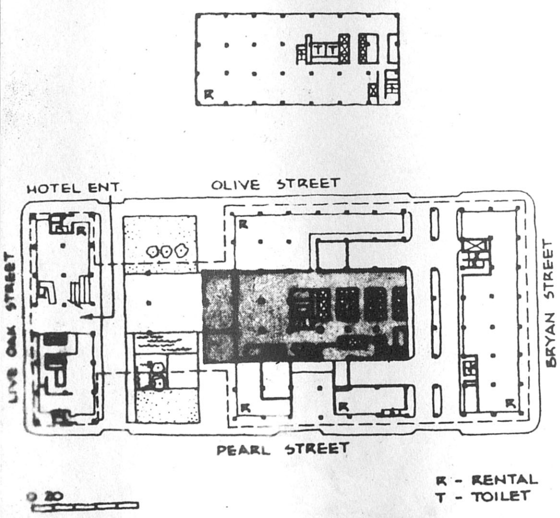
Bettman Archive

Bettman Archive

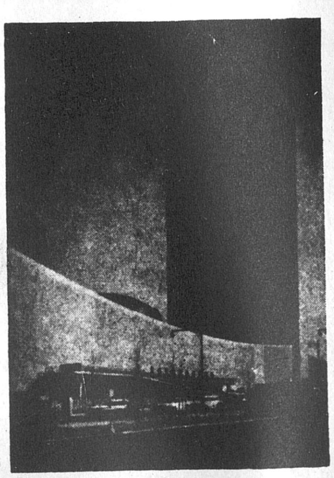
SOUTHLAND LIFE BUILDING

Live Oak, Pearl, Bryan & Olive Sts., Dallas

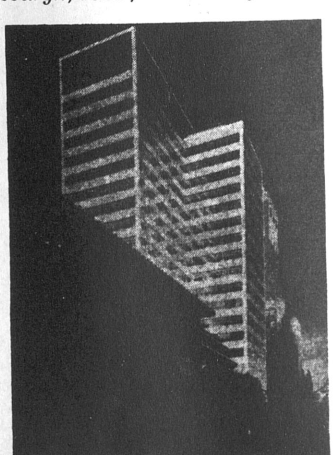




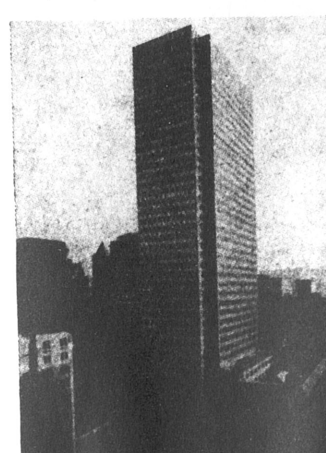
*U.N. Secretariat, New York, **1950**, Wallace K. Harrison, Director of Planning; First National Building, Tulsa, 1950, Carson & Lundin; Mellon-U. S. Steel Building, Pittsburgh, 1952, Harrison & Abramovitz; Lever House, New York, 1952, Skidmore, Owings & Merrill*

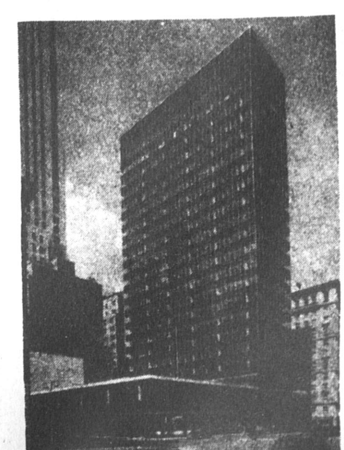


Joseph W. Molitor



Ezra Stoller

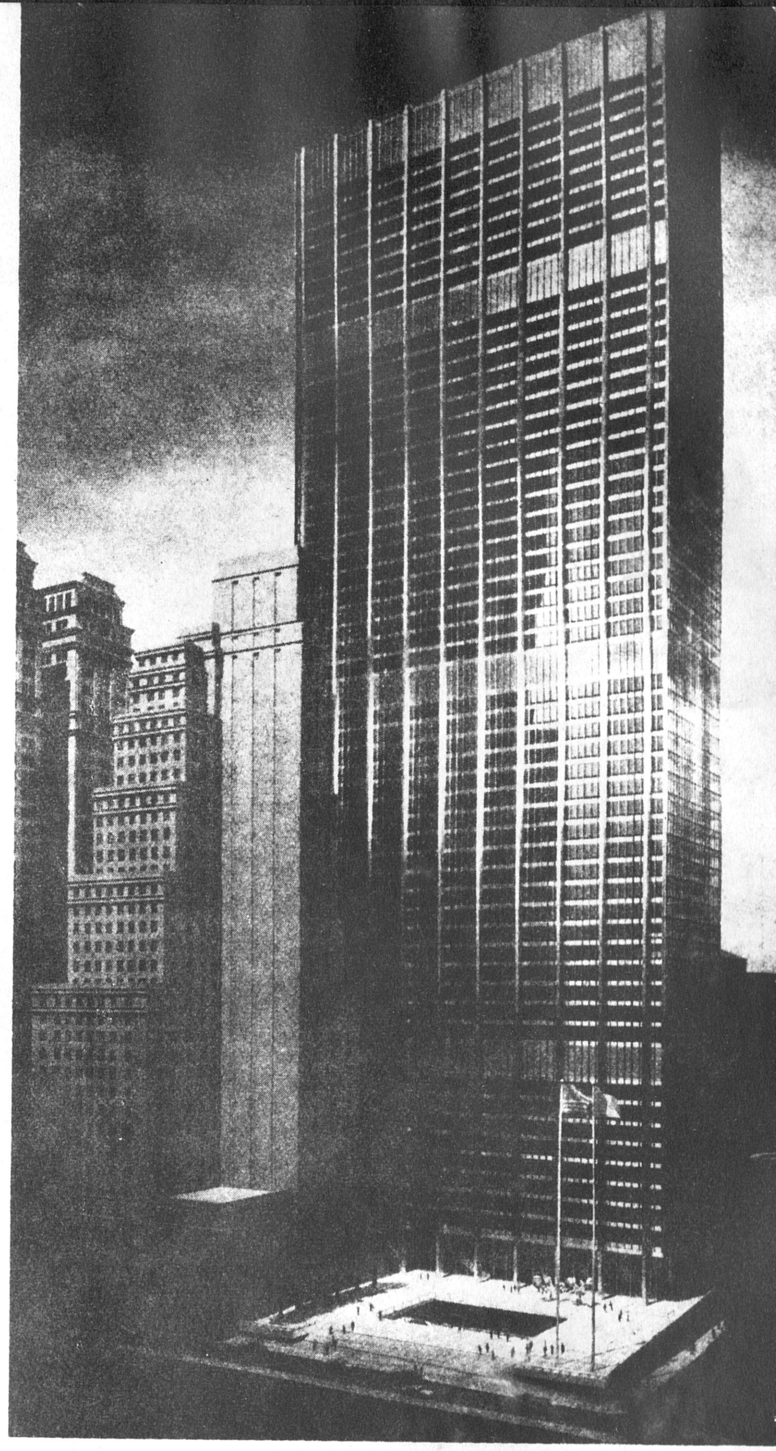


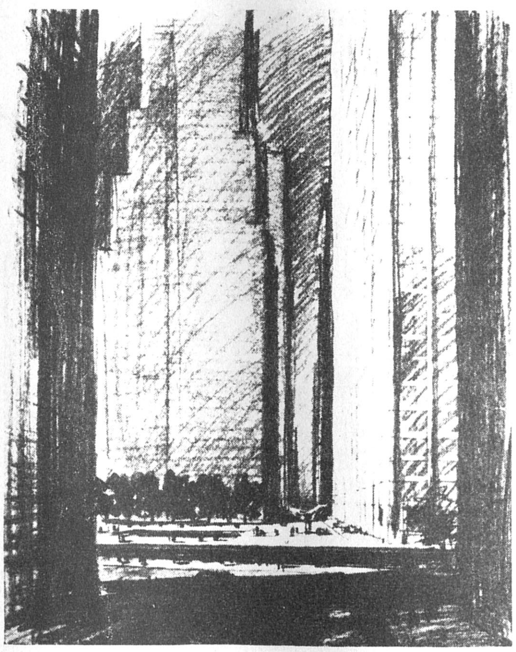


Wurts Brothers

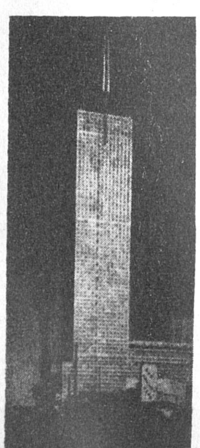
CHASE MANHATTAN BANK

Liberty & Williams Sts., New York

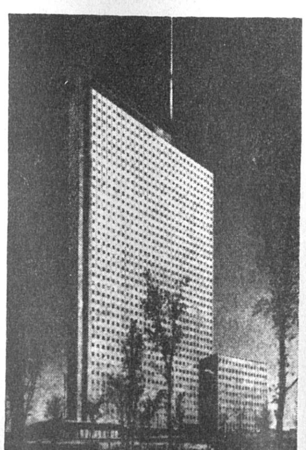




Left to right: Republic National Bank, Dallas, 1955, Harrison & Abramovitz; Gill & Harrell; Prudential Building, Chicago, 1956, Naess & Murphy; Lutheran Brotherhood, Minneapolis, 1956, Perkins & Will; Price Tower, Bartlesville, 1956, Frank Lloyd Wright

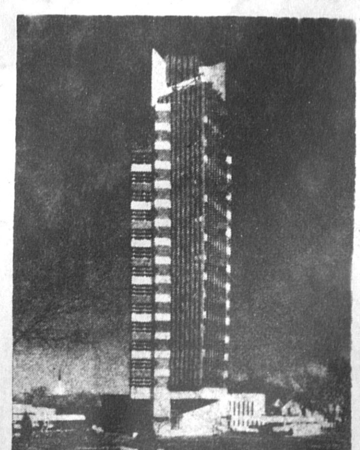


Ulric Meisel

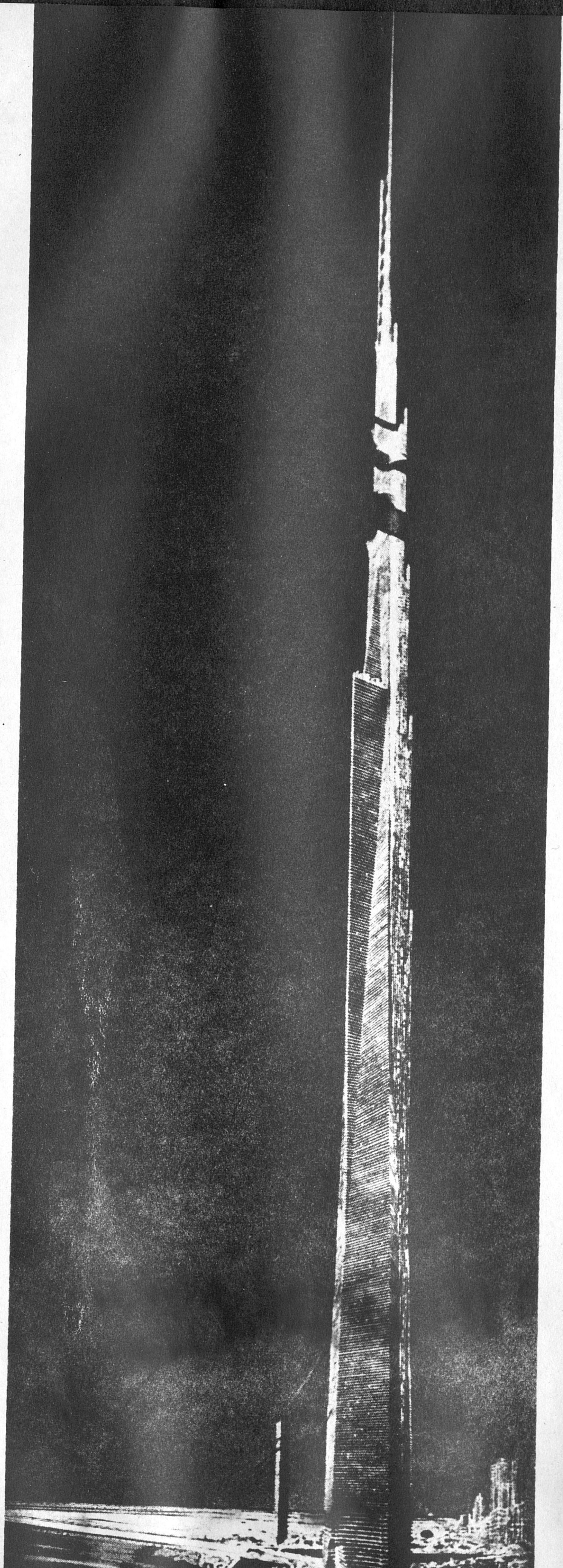


Chicago Arch Photo Co

Hedrich-Blessing



Joe Price



THE MILE HIGH ILLINOIS

CHAPTER II

THE REQUIREMENTS OF AN OFFICE BUILDING

Primary Considerations:

The office building of today is a typical development of the times. Its plan and design require familiarity with the demands of modern business for efficient, comfortable, space capable of highly flexible subdivisions. The average office space provided by many buildings of the past is no longer acceptable. This is proved by the large number of offices only a few years old, but already obsolete and deserted because of the newer and better planned structures. The architect must therefore plan to meet the requirements of many years to come.

The problems involved in the solution of the modern office building are many and require not only careful consideration of plan, construction, mechanical equipment, and familiarity with land values, but also judgement on the part of the designers as to the desirability of location and the possible return on the investment. In other words, the architect in charge is expected to be a combination of trained designer, engineer, realtor, financier, and building manager.

The location has much to do with the success of an office building. Land with at least three exposures is preferable to that with only two, since this allows a proportionately large rentable floor space. The most desirable is a site which offers exposure on all sides. The width of the property, especially, has an important bearing on its development.

Courts, where necessary, reduce the occupiable area and consequently the rentable space. In court buildings, a rentable net area of 50% of the lot is rarely exceeded. On smaller lots, where courts are not required, this rentable area may be increased to nearly 70%. One thing is definitely established, that the importance and rental value of a structure increase with its size. Tenants as a rule prefer offices in a large and outstanding building.

The exposures have much to do with the desirability of the sites. North light is generally preferred by tenants, and next to this comes east light.[1] While as a rule the site is chosen because of its particular location, it is well to caution property owners about looking into soil conditions before purchasing. This is especially true when several sites are under consideration. Excessive cost of foundation work may be saved in this manner.

In the planning of the office building there are generally possible several solutions. Every effort will naturally be made to develop maximum rental area. Careful consideration must be given to the advisability of smaller but more desirable office spaces.

Modern practice tends toward shallower offices. Until recently, 26 to 28 feet was considered none to deep, offices of a maximum depth of 20 feet now prove to be in greater demand. Where offices face inner courts these are best made not to exceed 16 feet in depth. As to their width, the generally accepted plan provides from 16'6" to 17' between centers of dividing partitions. A very practical arrangement is a plan permitting widths of 16 feet alternating with 12 foot widths. This satisfies a large demand for small offices, especially in the best buildings.[2]

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[1] Kahn, Albert, "Designing Modern Office Buildings", Architectural Forum Vol. 52 (April-June, 1930), p. 775

[2] Ibid, p. 775

In planning the corridors it is more economical to have them serve offices at both sides rather than offices on only one side. Corridors when fairly long should not be less than seven feet in width. The entrance doors to offices should preferably not be opposite one another, but rather staggered, and placed not in the center of the office space but to one side. Office entrance doors should not be less than 3'4" wide, to permit the taking in of desks and other furniture. Intercommunicating doors may be less in width.[1]

In many cases, it is found desirable to leave the office space quite clear of partitions, subdividing them later, to meet the requirements of the tenants or to have the desirable open office space.

Buildings of large dimensions at the base, also those designed to conform to set back requirements, frequently, necessitate deeper areas in their lower stories. Such are often desirable for concerns where space for files, vaults, etc., is necessary and where they may be grouped in the center of the floors. The area of such deeper space should be carefully considered, for unless it can be used for specific purpose it will be unrentable.

Since it is a commercial venture, an office building that fails as an investment would be better never built. Commercial considerations will inevitably dictate both its working size and its rentable shape. The basic design must of course be tempered by zoning requirements, common sence, and aesthetics -- but the end results must please the bankers.

It is well known that expensive property dictates a tall building

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[1]Kahn, op. cit., p. 775

for adequate rental returns. A ten story building at Park Avenue and 50th would be a disaster. The added cost of constructing a higher tower is off-set by the premium rentals the upper floors bring. Such space is quiter and cleaner; offers daylight, privacy, prestige, and a view. At any level the area not more than 26 to 30 feet from daylight pays larger rentals than darker spaces, hence the popular 'slab' and 'tree-like' forms.

The principal difficulty with todays skyscraper city is the ground below, where confusion, conjestion, and chaos prevail. In the city, an open space with a touch of green is a blessing, as the architects and owners of Rockefeller Center demonstrated in the 30's. The lesson stood without emulation until the early 50's. More recently the value of ground space and planning has received wider recognition so that today, one can point out the several further examples, and more on the drafting boards.

At present, the plaza idea seems to be restricted to projects for corporate clients willing to make a conspicuous gesture for the sake of the prestige and the aura of success such a scheme lends to their headquarters. However, the hard fact remains that when a part of such space is leased it yeilds top returns.

The lower floors of office buildings as well as their settings are due for more intensive study. The day of the lobby-elevator-rental-area is shortening.

Today, the steel cage, conplete with cantilever, is a highly developed commonplace. The structural future would appear to lie in completely new concepts. Wright has advanced one; there will undoubtedly be others.

The light weight curtain-wall has come of age in the form of modular, industrialized units. For its facings a variety of materials have been used, tried, or dreamed of -- with more to come; glass, plastics, then stone, metals, ceramics, etc. There are exciting potentials here, but considerations of facing will scarcely alter the fundamental nature of this curtain wall.

We now see the glass wall, the modified glass wall, and the curtain wall interrupted by vision panels. There is wide use of various kinds of colored glass, ostensively to reduce sky-glare and cooling load. Out of all these variants no clear trend or uniformity appears. This is p robably all to the good.

There does seem to exist, among clients, a continuing demand for large glass areas despite the fact that many occupants then proceed to cover considerable portions of the glass with venetian blinds, hangings, etc.

The problem of interrupting sunlight before it reaches the skin of the building promises to create a whole new series of patterns, textures, and even profiles for our tall and likewise for our lower buildings.

Traditional architectural conservatism with color appears to be undergoing a change, for increasing numbers of offices buildings. This development tastefully handled, can lead to a beautiful and colorful city. Not an unpleasant prospect, provided clean air make it possible for one to view it and maintain it in all its radiance.

Air conditioning, sound control, and good lighting are office building musts today. High velocity, small duct systems for air distribution are now a well developed reality, widely used, often in a peripheral belt supplemented by the central core system. For illumination, the demand runs to ever higher total intensities from large, low brightness sources. Modular ceiling, incorporating lighting, sound control, sprinkler heads, and air diffusers are now stock items. This is evidence that such utilities are increasingly thought of as part of the building and not as added features in bits and pieces. The future will see the integration of all utilities into the very fabric of the building itself.

Particularly important to the ultimate success of the building are the number, type, and location of the elevators. The best equipment is necessary in the modern building. The great height in which we build is made possible only though the development and perfection of the modern elevator and to economize here is bound to prove a serious mistake. Determining the number of elevators required is a matter needing careful computation. Modern practice demand that the parting interval for each group be not greater than 25 seconds, this in some instances being reduced to 20 seconds.[1] The character of the occupancy must be considered in deciding on the required number of cars to provide such intervals as must also be the height of the building, the loading, and unloading time. No "rule of thumb" can determine the number of cars required. Every building presents its own problem and must be independently analyzed.

The system of placing elevators in pockets or alcoves, grouping them for local as well as express service has proved practical. Naturally, elevators are best placed where they sacrifice the least

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[1]Kahn, op.cit., p. 776

amount of exterior wall space with outside light. It is generally considered that no matter what may be the size of the building, elevators are best grouped rather than placed at different points. This does not mean that special groups for special purposes are not to be placed where most convenient for the quarters they are to serve.

The number or location of toilet rooms must depend upon the arrangement adopted. They are preferably on every floor rather than concentrated on one or a few. This saves much intercommunicating elevator service. Outside light is desirable though not essential in toilet rooms, since they should be in any case mechanically ventilated. Toilet rooms should never open off public stairways but off mainccorridors. In some recent office buildings, even the wash basins have been concentrated in rooms adjoining the toilet rooms, doing as much as possible without individual basins for the different offices.

It is unnecessary to dwell upon the need of a sufficient number of janitor's closets of adequate size and convenient location on every floor. Meter closets, pipe shafts, ample space for vent stacks to provide for possible future requirements are also a necessity. Janitors locker and toilet rooms, liberal provisions for store and supply rooms and other conveniences are needed requirements for the management of important structures.

Any statement on the planning of the modern office building would be incomplete without calling attention to the desirability of providing garage space for the tenants and employees cars. By taking care of this need, some of the most recent structures have proved successful in renting space when others built at the same time have been slow in gaining tenants and in keeping desirable employee relations.

Organizations

To practice the art of scientific management, one must know how scientific management evolved. One must master its analytic methods if he is to make fruitful contributions to business operations and reap commensurate rewards. The scientific management movement evolved during the first half of the twentieth century to meet the challenge of the increasing complexity of modern business enterprise. It grew from the recognition of the possibility for more efficient operation.

The growth of the factory system of output created the complex managerial probelm of combining and co-ordinating the factors of production. This problem was a natural consequence of increased plant size, greated diversity and volume of manufactured products, intricacy of fabrication processes, and specialization of labor. The science of management seriously lagged behind the technical developments of the new industrial era.

The manager in the eighteenth and nineteenth centuries was usually autocratic, forceful, and self-trained. In managing business he relied on intuitive judgment and "rule of thumb" practices and procedures.[1] Although specialists in manufacturing techniques were available, there were no specialists trained in management. Managerial functions and practices were frequently improvised to meet problems as they arose. Such improvised methods became fixed managerial practice, and re-examination and reappraisal of them were seldom considered. But the complexities of present-day enterprise demand the attention of specialists in both management and production operations. These specialists provide effec-

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[1]Shubin, John A. Business Management (New York, 1959), p. 1

tive direction and co-ordination of departmentalized functions (finance, engineering, procurement, managacturing, sales, and personnel). The need for improved business operation can be met by applying the analytic method of scientific management.

The procedure for a scientific managerial survey are as follows: (1) State concisely the business problem, need, or goal. (2) Compile all data relevant to the stated purpose; i. e., apply the latest fact-finding and statictical procedures -- using financial statements, flow process charts, job analysis, sampling, statistical correlations. (3) Classify and thoroughly analyze the date in order to discover a program of action, a system of practices, or a technique. (4) Formulate carefully the new plan, standard procedure, or technique that is based upon the factual relationships which have been found. (5) Apply the scheme or solution; follow up in order to check on effectiveness in achieving the desired goal; and modify, when necessary, in the light of new findings or changed conditions.[1]

In short, scientific management is not a system with a definitely fixed content and always applicable in all its features; it is rather a system for approaching and solving managerial problems -- a system from which grow definite managerial practices suitable for particular situations. The scientific-management approach can be applied to many kinds of surveys: for example, it can be used to formulate procedures for setting up an organization structure, for laying out a new plant, or for designing a wage system.

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[1]Balderston, et. al., Management of an Enterprise, Second Edition, (1949) Prentice Hall, p. 5

Business management is generally divided into two major categories; (1) Administration and (2) management proper. Although each has its area of concentration and responsibility, successful enterprise requires close integration of over-all planning and detailed execution.

Administration in industry has as its functions the over-all determination of policies and major objectives and the co-ordination of finance, production, and distribution. These fundtions are assumed by the board of directors and major executives (the president, general manager, and usually, vice-presidents). Administrators define the intrinsic purpose of the company, establish the primary objectives, formulate the general plan of organization and procedure, inaugurate the broad program, and approve the specific major projects in the program.

The execution of the over-all policies and plans determined by administration is the function of management proper -- division and department head, superintendents, foremen and, sometimes, top executives, for company officers frequently serve in an administrative capacity for making over-all pllicy as well as in a managerial capacity for implementing policy.[1]

The line-and-staff organization structure of a modern corporation includes top management (board of directors and officers), line departments and sections, service department, staff-assistant positions, and committees.

Stockholders: Stockholders with voting shares elect the board of directors and have the right to accept or reject proposed amendments

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[1]Shubin, op. cit., p. 5

to the charter and bylaws. All stock holders receive an annual report on the condition and progress of the company.

Board of Directors: The main function of the board is to determine company objectives, general policies, and plans. Acting as a body, the board has ultimate control; it keeps check upon company affairs to insure that the general policies are being observed and that the objectives are being achieved. The board usually selects from its membership an executive committee to handle affairs between meeting and appoints the chairman of the board to preside over the committee. It may appoint a financial committee to handle fiscal matters -- subject to board approval. It may also form an auditing committee, which will hire public accountants to examine the books and certify the financial statements.

The board selects the president, general manager, vice-president, and perhaps other principal officers and lays down the over-all plans for them to follow. The president and other principal officers are themselves frequently members of the board of directors.

President: The president derives his authority from the board for the direction of the business and the implementation of the company policies. He selects, usually with the aid of the general manager, executives for major departments or divisions and appoints staff assistants (administrative, public-relations, legal) who report to him. He presides over the operating executive committee, whereby he co-ordinates the main functions (manufacturing, engineering, sales, finance, and personnel) and formulates key departmental policies within the scope of the general policies laid down by the board of directors.

General Manager: The general manager assumes the immediate functions of directing, co-ordinating, and controlling the operating phase of the business os that the various departments work together as a team. He may serve as a vice-president.

Secretary: The secretary takes custody of important documents and corporation books, submits reports and statement to the state and federal governments, is in charge of the transfer of corporate sotck, and keeps the minutes of stockholders' meetings.

Treasurer: The treasurer formulates financial policies, subject to the approval of the president and the committee of the board which reviews such affairs. He controls investment funds and securities, is in charge of financial reports, and manages other related matters. In a small firm his functions may be combined with those of the controller, who deals with the internal phase of the problem.

Major Departments: According to the character and needs of the business, the activities of the firm are segrated into major functions. The company is then so organized that a department is set up to perform each function. Each department, in turn, is broken down into subdivisions, which execute phases of the functions.

Engineering Department: The engineering department has charge of product research and development, the design of products, the preparation of drawing and other specifications for production, the selection of equipment and methods (usually in collaboration with the process-engineering or industrial-engineering section), and the preparation of data necessary for manufacturing and production control.[1]

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[1]Shubin, op. cit., p. 33

Manufacturing Department: The manufacturing department has charge of the subfunctions of production operations and of service activities.

Production-Operations Sections. Directly under the manufacturing, or works, manager is the superintendent of production operations, who supervises the activities of the foremen of the various plant-operating departments. (Foremen usually have assistant foremen who direct the workers in various sections of their departments.)

Service Sections. Generally four service subdivision facilitate the work of production operations: (1) production-planning and control, (2) inspection, (3) plant engineering and maintenance, and (4) industrial engineering. The production-planning-and-control section prepares and releases to the plant production orders based on sales requirements. The inspection section checks materials and the quality of work against the specificati ns made by the engineering department. The plant-engineering-and-maintenance section is in charge of upkeep and repair of the plant and its equipment. The industrial-engineer section undertakes managerial and cost-reduction programs (e.g., reappraisal of organization structure, work simplification, and moderniaation of plant). The recommendations they make as a result of the studies are, when approved, put into effect.[1]

Purchasing Department: The purchasing department is in charge of procurement of materials, component parts, supplies, tools, machinery, and office equipment. In addition, it seeks out new types of materials as a service to the engineering department, and it sells obsolete materials and scrap. When procurement activities are compara-

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[1]Shubin, op. cit., p. 33

tively simple, the purchasing function should be placed under manufacturing.[1]

Sales Department: The sales department is in charge of merchandising and distribution. This includes the development of channels of outlet, the opening up of new markets, sales forecasting, actual slaes, and sometimes the servicing of goods which have been sold. The department is likewise responsible for making specific recommendations for improving company products and for suggesting new products.[2]

Controller's Department: The controller's department maintains records, manages and controls internal finance, and provides general office services for the company. The departmental functions include accounting (general, cost, and tax); preparation of financial reports, payrolls, and statistical reports; budgeting; supervision of credit and collections; and the provision of stenographic, filing, duplicating, and mailing services.

Personnel Department: The function of the "industrial-relations" department includes all the activities necessary to secure and maintain an efficient working force. In a large organization, the industrial-relations director repports to a major executive and has jurisdiction over all matters pertaining to the company personnel. The personnel function includes recruitment, placement, and retirement of employees; training; participation in wage administration (job evaluation, incentives); transfer and promotion; health and safety measures; and labor-management

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[1]Shubin, op. cit., p. 33

[2]Ibid., p. 34

[3]Ibid., p. 34

relations. Frequently the personnel director reports to the head of the manufacturing department since that department has the largest payroll and, therefore, the largest amount of personnel work.[1]

A well-designed organization structure with qualified personnel in all key positions achieves effective execution, co-ordination, and control of the policies and functions of the firm. Although a line-and-staff type of organization is now generally used by medium and large-sized firms, it has many variations even amoung companies engaged in the same field of business. When an enterprise is started, the organization structure should be designed to suit the size of the company, the scope of its business operations (including the kinds of products and processes), the channells of distribution, and the plans for future development. As the company grows and as business conditions change, the structure must be modified and kept up-to-date through periodic re-examination.

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[1]Shubin, op. cit., p. 34

CHAPTER III

PROPOSED OFFICE BUILDING

Statement of the Problem:

Scope:

Tel-Airesearch Corporation, a corporation of the research and development type, manufactures aircraft instruments for military and civil aircraft. They have decided to move their entire administrative force to a new office tower in Fort Worth, Texas. Previously, their main force along with the executives occupied a part of their main, largest plant located near Arlington, Texas. The research facilities are also located in the Arlington plant. Because this administrative section has grown so large and equally as spread out, with smaller parts of it located in their other plants at San Diego, California; Topeka, Kansas; Buffalo, New York; and Atlanta, Georgia, the corporation has decided to consolidate their administration in a new administration building in Fort Worth. For reasons that it will; involve the smallest amount of movement of employeed, allow easy commuting of existing employees not living in Fort Worth because of the new tollroad which connects with the site in two ways, Fort Worth's average total tax per $100 of present market value is $2,0052 compared to mearly $4. for approximately the same site in Dallas,[1] because of the close connection with their largest plant and research center in Arlington and for several other reasons that will provide economy, efficiency and public prestige to their operation.

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1 _____"Facts and Figures", Fort Worth, Texas, Fort Worth Chamber of Commerce Bulletin, (Jan., 1959), p. 3

Location

In a little over a century, Fort Worth, Texas, has grown from an infant military outpost into a modern and progressive city. The discovery of oil in north and west Texas, the establishment of the aircraft and automotive industries, the development of irrigated agriculture in western trade areas, and the evolution of Fort Worth as a light manufacturing and wholesale and retail trade center have created a metropolitan area with well-recognized commercial and industrial activities.

Reminiscent of a quarter of a century darlier, the outbreak of World War II resulted in Fort Worth's becoming a major military and defense center. Unlike the minor influence of World War I military installations upon the city, the establishment of a major aircraft assemply plant and Carswell Air Force Base in 1942 ushered in a new era of expansion and development affecting the entire Fort Worth and north Texas area. These major installations prompted the growth of numerous supporting industries in aircraft parts manufacturing, machine tooling, and metal casting and fabrication of all types.

Railways, highways, and airways have been major factors, directly or indirectly, in the growth and development of the Fort Worth metropolitan area. As in the case of the railways in early years, the leadership of the city has been very active in encouraging the location of many transportation manufacturing concerns in metropolitan Fort Worth.

Resources: The metropolitan Fort Worth area -- which is synonymous with Tarrant County -- contains 561,280 acres. There are over 30 different municipalities in the area, including Fort Worth proper and such cities as Arlington, Haltom City, River Oaks, White Settlement, Euless, Hurst, and Grapevine. The topography is gently to strongly rooling, and there are some steep slopes and hilly areas. The soils are largely Grand Prairie and Cross Tembers types, with only a relatively small section of Blacklands soils along the eastern border of the county.

Fort Worth's climate is moderate. The temperature averages about 46° in January and 84° in July, with an annual mean temperature of about 66°. The growing season is approximately 251 days. Annual precipitation averages around 32 inches. Mineral resources consist primarily of shale, sand, gravel, limestone, and materials suitable for cement production.[1]

Underground water supplies and the numerous streams in the North Texas area, coupled with the availability of suitable dam sites, have enabled Fort Worth metropolitan area to obtain an adequate supply of high-quality water. Most of the water used by the City of Fort Worth comes from three lakes on the West Fork of the Trinity River. Water used in adjacent towns and in other sections of the metropolitan area is supplied mainly by wells drawing primarily from the Paluxy and Trinity sands.

Daily average consumption of water in Fort Worth is approximately 45 million gallons, with a peak summer usage of around 100 million gallons. Filtration facilities, which will handle about 129 million gallons a day, and filtered water storage of almost 50 million gallons provide an ample margin for satisfying maximum water demands. Almost 1,300 miles of water mains and six booster pump stations maintain service and adequate water pressure for the more than 100,000 meters served by

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1 "Business Review, Fort Worth," Federal Reserve Bank of Dallas, (July, 1959.), p. 3

Fort Worth. At the present time civic leaders are making plans for water supplies to meet the city's needs until the year 2000 at least.[1]

Population: Metropolitan Fort Worth is the fourth most populous center in the State. In each decade since 1900, its rate of population gain has outstripped that of either Texas or the Nation. The continuous and rapid growth in the area's population is indicative of the employment opportunities made possible by the expansion in manufacturing and trade. From 1940 to 1950, the Fort Worth metropolitan population increased 60 percent, or three times the rate for the State as a whole. The rate of gain has not been as great since 1950, but in terms of absolute numbers, population growth during the current decade is likely to exceed that in the 1940-50 decade.

The growth rate of the labor force in the Fort Worth area has paralleled that of the population. Most of the labor force gain has resulted from the immigration of persons formerly engaged in agriculture. The large reservoir of labor in Texas has been one of the favorable factors for the expansion of industry in both the State and Tarrant County. About one-third of the labor force in the area is women.

A tradition of hard work and independence and the ability to learn and adjust to a wide range of situations made the rural immigrant an excellent training subject for non-farm jobs. Almost 41 percent of the population in Tarrant County in 1950 had finished high school, compared with about 30 percent for the State. The favorable climate and living conditions in Fort Worth, coupled with the steadily

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1 ____op.cit., p. 4

increasing range of job opportunities, have made it possible for the city to hold its present work force and to attract additional workers.

Employment and Income: The vigorous growth of Tarrant County and the breadth of the area's economy are illustrated by the trends and distribution of the employment and income of its residents. The decade beginning in 1940 was one of the periods of greatest growth in metropolitan Fort Worth. The outbreak of World War II and the concurrent demands for war production provided a sharp impetus to non-agricultural employment, particularly in aircraft and related manufacturing.

The manufacturing employment in the Fort Worth area since 1950 has increased 35 percent, slightly more than in the State. Currently, Tarrant County accounts for about 11 percent of the State's total manufacturing work force. In the case of some other broad types of employment, gains in Fort Worth have not been as great as those for Texas.[1]

The distribution of wage and salary employment in Tarrant County points up the importance of manufacturing to the economy of metropolitan Fort Worth. Workers in manufacturing comprised about 28 percent of the total non agricultural work force in the metropolitan area in March 1959, compared with 26 percent in 1950 and 18 percent in 1940. In the state, manufacturing employment constituted 17 percent of total non agricultural employment -- a fractionally larger proportion than in 1950 and only moderately larger than in 1940.[1] Consequently, in terms of occupational distribution, a larger propostion of workers was employed

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[1] op. cit., p. 5

in manufacturing in the Fort Worth area than in the State even before the outbreak of World War II, when the Southwest began its greatest industrial expansion.

The varying impact of World War II industrial developments upon the Texas and Fort Worth economies accounts for a major part of the differential rates at which the principal employment categories advanced between 1940 and 1950. The rapid rise of the aircraft industry in Fort Worth during World War II was the major influence triggering the sharp increase in manufacturing employment in Tarrant County. The location and growth of this industry in the Fort Worth area provided the impetus for an increase in all types of manufacturing and for expansion in trade and service employment. Fort Worth ranks first in the Southwest and thirteenth in the Nation in the number of employees in transportation equipment manufacturing, such as aircraft, automobiles, boats, mobile homes, and specialized mobile equipment manufacturing. The demands for new plants for war production purposes furnished the basis for the rapid rise in construction, which closely allowed manufacturing in the rate of gain in employment.

Further insight into the growth and structure of metropolitan Fort Worth's economy is afforded by an analysis of the changes and composition of the sources of income in the area. Personal income in the Fort Worth metropolitan area in 1957 totaled slightly over $1 billion, compared with less than one-half as much in 1948. Wages and salaries increased 139 percent between 1948 and 1957, paced by manufacturing payrolls -- which more than tripled. Payrolls from both

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[1] ____ op. cit., p. 6

mining and government employment were more than double those of a decade earlier. Farm proprietors' income, which declined about one-third, showed the only decrease.[1]

Manufacturing payrolls accounted for over 39 percent of the total wages and salaries in metropolitan Fort Worth in 1957, compared with 21 percent in the State, As a percentage of total personal income from all sources, manufacturing account for 29 percent, or double the proportion in the State. Part of the variance in the proportional structure of wages and salaries for manufacturing in Fort Worth and in Texas results from the relatively greater importance of manufacturing employment in Fort Worth.[2]

In terms of employment and income, the principal economic activities in metropolitan Fort Worth are manufacturing and trade. Government, service, and transportation employment also makes substantial contributions to the area's economic base. Many other supporting types of activity -- such as construction, finance, public utilities, and agriculture -- provide further diversification and income.

Manufacturing: Fort Worth has long been a southwestern manufacturing center, although the greatest expansion has occured since 1940. The growth in manufacturing in Tarrant County is indicated by changes in the value added by manufacture. The Census of Manufactures shows that both employment and the value added by manufacture were relatively stable in Tarrant County in 1919, 1929, and 1939. The value added by manufacture ranged from $30 million to $34 million, and employment

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[1] ____ op. cit., p. 6

[2] Ibid., p. 7

varied from 8,000 to a little over 9,000. The value added reached over $146 million in 1948 but, by 1957, had more than tripled. The fifteen-fold increase in the value added by manufacture in Tarrant County between 1939 and 1957 compares with an elevenfold increase for the State. The rate of growth in manufacturing after World War II was more moderate in both Fort Worth and Texas, but the gains for metropolitan Fort Worth continued to outpace those for the State in both the value added and the number of manufacturing establishments.[1]

Manufacturing payrolls in Tarrant County in 1957 totaled $315 million, or 39 percent of total wages and salaries in the county and almost 29 percent of total gross personal income. Metropolitan Fort Worth accounted for about 14 percent of total manufacturing wages in Texas. Although the range of manufacturing is quite diverse, the bulk of the activity accounted for one-half the value added in 1954.[2]
Payroll data indicate that manufacturing activity in Tarrant County is concentrated heavily in a few major industries. One-fifth of total manufacturing payrolls for Tarrant County in 1957 was provided by three major manufacturers of transportation equipment. These employers and the military installations in the area accounted for over one-tenth of total direct wages and salaries from all sources in metropolitan Fort Worth.

Air craft production began in Fort Worth early in 1942 on a site adjacent to Lake Worth, and the scope of the industry's operations has permeated the entire economic life of the community. The need for

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[1] ____ op. cit., p. 8

[2] Ibid., p. 8

dispersing aircraft production centers from doastal areas in the northeast and Pacific coast sections to interior points during World War II focused attention upon suitable location in the central part of the United States. An abundance of clear weather and moderate winters made north Texas an excellent place for aircraft production, maintenance, and testing. Large areas of relatively flat and inexpensive land were available for the extensive type of buildings and hangars needed for efficient aricraft manufacturing. A pool of easily trained labor also was available from the cities, small towns, and farms in north Texas.

Once initial aircraft production facilities were located in the area, a large number of allied industries were attracted to Tarrant County, adding further to the importance of transportation equipment manufacturing. Subcontracting by major airdraft manufacturers contributed to the growth of numerous small industries which are now engaged in non-defense-related production. During the past few years, one of the most important helicopter plants in the Nation started operating in the County, and employment in air-borne equipment manufacturing has expanded. It is conservatively estimated that the aircraft and aircraft parts industries currently employ 25,000 persons and have annual payrolls in excess of $165 million.[1]

The future of the aircraft industry is interwoven with the defense needs of the country and with the ability of individual companies to obtain their share of the available contracts. It seems probable that, in the future, more emphasis will be placed upon upgrading workers' skills in aircraft production to meet the needs of the space age. Modern

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1 _____ op. cit., p. 9

weapons production is placing greater reliance upon engineering and electronics training, which may necessitate a larger proportion of technicians to assembly workers than has been the case in the past. Such changes in types of employment suggest higher average wages and salaries for any given level of employment and a larger value added by manufacture.

The area's dependence upon transportation equipment manufacturing is probably somewhat greater than is desirable, especially the reliance upon defense-oriented aircraft production. Employment in transportation equipment manufacturing during early 1957 comprised almost 18 percent of total nonagricultural employment, although cutbacks in aircraft employment currently have reduced the proportion to around 14 percent. However, if employment in industries dependent upon transportation equipment manufacturing could be accurately assessed, the total work force directly or indirectly dependent upon such manufacturing would be considerably higher.

Site:

The building is to be built on a site 460 x 710 feet which is eight blocks west of the main business district of Fort Worth. It is a high bluff overlooking the Trinity River and West Fort Worth. The site is bound on the north by Lancaster Street, the main east-west thoroughfare that connects West Fort Worth to East Fort Worth, Arlington, and Dallas, On the east of the site is a main arterial, Summit Avenue, which four blocks to the south connects with the East-West Expressway and therby the Dallas-Fort Worth Toll Road. Approaching from the west by way of the long and beautiful Lancaster Street bridge we see that the land slopes rather sharply, dropping approximately one hundred feet and ~~then~~ gently down to the Trinity River. The land immediately west of the site contains Fort Worth's largest park, Trinity Park; Farrington Field, the high school football field; Casa Manana, and the Will Roger's Coliseum-Auditorium complex, Fort Worth's cultural center. The site itself is almost flat, sloping only two feet in two hundred and ninety. Post Office, Railway, and Bus facilities are only thirteen blocks to the East along Lancaster Street. (See enclosed map. FIG. 9)

TO DALLAS
POST OFFICE
RAIL WAY TERM.
627
4 LANE
BLVD
St Ignatius Sch
Austin Sch
HILL
Hall
Burnett Park
BM 620
VICKERY
N
Masonic Temple
LANE
VETERANS
550
ST
EXPRESSWAY
EAST - WEST
PACIFIC
Cook Mem Hospital
Water Works
LANCASTER STREET
SITE
Harold Park
BM 619

<u>Requirements:</u>

(3)*, Chairman of the Board of Directors

secretary and receptionist

personal secretary

(3) President

secretary and receptionist

personal secretary

(15) Legal Counsel

3 staff attorneys

7 legal secretaries

receptionist

3 stenographers

(3) Director of public relations

secretary - receptionist

personal secretary

(2) Secretary-assistant to the president

personal secretary

(4) Treasurer - director of development

secretary

tax consultant

accountant consultant

(4) Executive Vice President

secretary - receptionist

personal secretary

executive assistant

necessary vaults, public and private rest rooms, storage and maintenance space

(3) Vice President in charge of industrial relations

	departments	facilities
(8)	employment	director and staff
(2)	training	director, 10 training engineers (circulating in plants)
(4)	health and safety	director and staff (engineers in plants)
(6)	labor relations	director and staff
	Supplementary employee service	

necessary records, vaults, public and employee rest rooms, storage and maintenance spaces

(3) Vice President in charge of product development

(16)	engineering	chief, 12 engineers and staff
(22)	drafting	head, 20 draftamen, printers and staff

necessary records, vaults, public and private rest rooms, storage and maintenance spaces

(3) Vice President in charge of purchasing

(18)	purchasing agent	agents and staff
(6)	sub-contracting	director and staff

necessary records, vaults, public and private rest rooms, storage and maintenance spaces

(3) Vice President in charge of sales

(8)	advertising and promotion	directors, artists and staff
(6)	factory sales office	director and staff
(6)	branch sales office	director and staff
(6)	service	director, representatives and staff

(3) Comptroller

(21)	general accounting	head, staff accountants and bookkeepers
(21)	cost accounting	head, staff accountants and bookkeepers
(7)	credit	manager, accountants and staff
(12)	payroll	manager, bookkeepers and staff
(8)	taxes	director, accountants, bookkeepers and staff

necessary records, vaults, public and private rest rooms, storage and maintenance spaces

(3) General Manager - West Coast Region

(3) General Manager - Rocky Mountain Region

(3) General Manager - Mid-West Region

(3) General Manager - Gulf Coast Region

(3) General Manager - East Coast Region

all executives shall have a personal secretary and secretary-receptionist and all necessary above mentioned spaces

(15) Cafeteria

(3) IBM shop, rooms, and records

conference rooms

committee rooms

communications rooms

Closed-circuit TV rooms (viewing room - movies)

display rooms

executive suite for visiting executives

The following is inserted so as to enable the reader to better understand the process and divisions of the average plant of this nature.

Plant Processes and Divisions

General Manager - Vice President in charge of manufacturing

(1) Plant Manager

(1) Plant Engineer

(1) 1. superintendent of maintenance

(15) foremen

(60) workmen

(6) general equipment maintenance

(3) building maintenance

(3) carpenter shop

(5) Plant protection

outside trucking

(1) boilers

(10) janitor service

(2) building construction

(1) compressors

(10) inside trucking

(3) yard work

(1) elevators

(3) garages

(10) heat, light, power, and water

(2) scrap bailing

(1) 2. tool supervisor

(10) foremen

(36) workmen

supervision tool, die, pattern departments

tool and gage inspection

tool costs estimates

approve tool designs

make and maintain tool schedules

outside tool requisitions and follow up

maintain stock of perishable tools

supervise tool tryouts

approve tool invoices

maintain cost estimates

(1) Industrial Engineer - engineering manager

(4) tool design

(6) tool designs and drawings

assign tool numbers

check tool drawings

(1) Product engineer

(7) product drawing and parts list

(14) approve engineering changes

determine quality standards

maintain files and blueprints

part and tool numbers

template and key records

general notices

(2) process engineers

(7) cost estimate and processing

plan new jobs

new equipment specification

select equipment

investigate new manufacturing processes

engineering investigation

metallurgical control

(1) methods and rate setting

(4) route cards

(8) time and motion study

set p.w. prices

cost reduction

(1) plant layout

(3) building and equipment records

plant layouts

issue work orders for rearrangement

cost estimates

(1) General Superintendent

(1) plant service manager

(1) packing and shipping

(9) final stock warehousing

(45) stock picking and sorting

shipping records

packing

traffic

carton making

packing specs

carton stock controls

(1) receiving and stores

(7) receiving

(21) raw material stores

process stores

receiving tickets

check weights and counts

records

supply control and stores

(1) inspection manager

(8) incoming material inspection

(32) process inspection

final inspection

inspections reports

investigation of product complaints

returned goods inspection

sample inspection

production counts

(1) factory manager

(15) general foreman

(45) foremen

(315) workers

maintain production

maintain quality standards

maintain costs standards

maintain budgets

maintain equipment

maintain employee relations

keep abreast of new technical development

maintain good housekeeping

select and train personnel

Total employees in plant - 700

Total in five plants - 3500 to 4000

Total in research - 60

Total in Administration - 225 - 240

*Source: Personnel numbers are assumptions made during meetings with the management d epartment of Texas Technological College, February, 1960.

PRODUCTION	RESEARCH	SALES
Idea or Need ~~Attorney~~	Idea	Idea or Need
Patent data Attorney	Prelimenary approval Director or Reasearch	marketing research Salesmen
	Project approval Committee I	
Final approval Top management	Research specifications Director of Research	
	Experimental investigations Laboratory technicians	
	Progress reports Director of Research	
	periodic Review Committee I	
Patent application Attorney	Test runs and samples Research supervision	
	Final report Director of Research	
	Approval of production Committee I	
Approval Management	Release of Production Research Director	
Engineering of equipment Engineering Department		
	Actual production	

Top Management

- Chairman
- President
- Executive Vice President
- Secretary
- Treasurer
- Comptroller

Committee I

- Vice President - Sales
- Vice President - Product development
- Comptroller
- General Manager of area

Source: Bethel, et. al. Industrial Organization and Management, Second Edition, New York, McGraw Hill Book Company, Inc., 1950.

Solution:

To the designer the tower rising out of the platform seemed the best solution to this problem. As mentioned in the section 'Requirements of an Office Building', the tower form best fulfills the needs of the office building. It affords exposures to light,,air, and vistas on many sides, together with shallower, flexible offices without expensive and space consuming corridors. Premium rentals can be realized from upper floors in a tall building because they are cleaner, quieter, allow more daylight, privacy and prestige. The tall building assumes less available land area which affords the designer and owner the use of more land for green areas, which not only sets off the building, but helps in the control of the conjestion which now chokes many of our cities.

The horizontal element or platform in this design contains the large departments of the corporation. This space is given these departments because of the ease of interoffice communication, large, highly flexible floor areas and in case of future expansion. The large plaza is actually the roof of the parking area below. This lower level contains employee parking, dining facilities and accomocations for all building services. The tower itself rises out of this platform. The tower's structural system is of the core and cantilever type chosen by the designer because it groups the mechanical needs of the building into a central shaft and it seems fitting to group the mass of the structure there, also, allowing more freedom on the periphery of each of the cantilevered floors.

CHAPTER IV

CONCLUSIONS

The questions of blight, filth, and chaos that prevail in the city of today can best be answered by the tall office building -- rising out of serene, beautiful, and tranquil planned open areas. With proper design and technology, the tall office building in these areas should relieve the problems of the conjested city. Instead of a multitude of low, unrelated buildings spreading outward, expansion can be handled by one tall building compatibly planned with its environment, adding to the drama and drawing power of our metropolitan centers. The closely knit units would house the varieties of services needed. And because of its very nature the American Skyscraper, the administrative, commercial center, increases the speed and ease of transaction that is an essential part of modern business.

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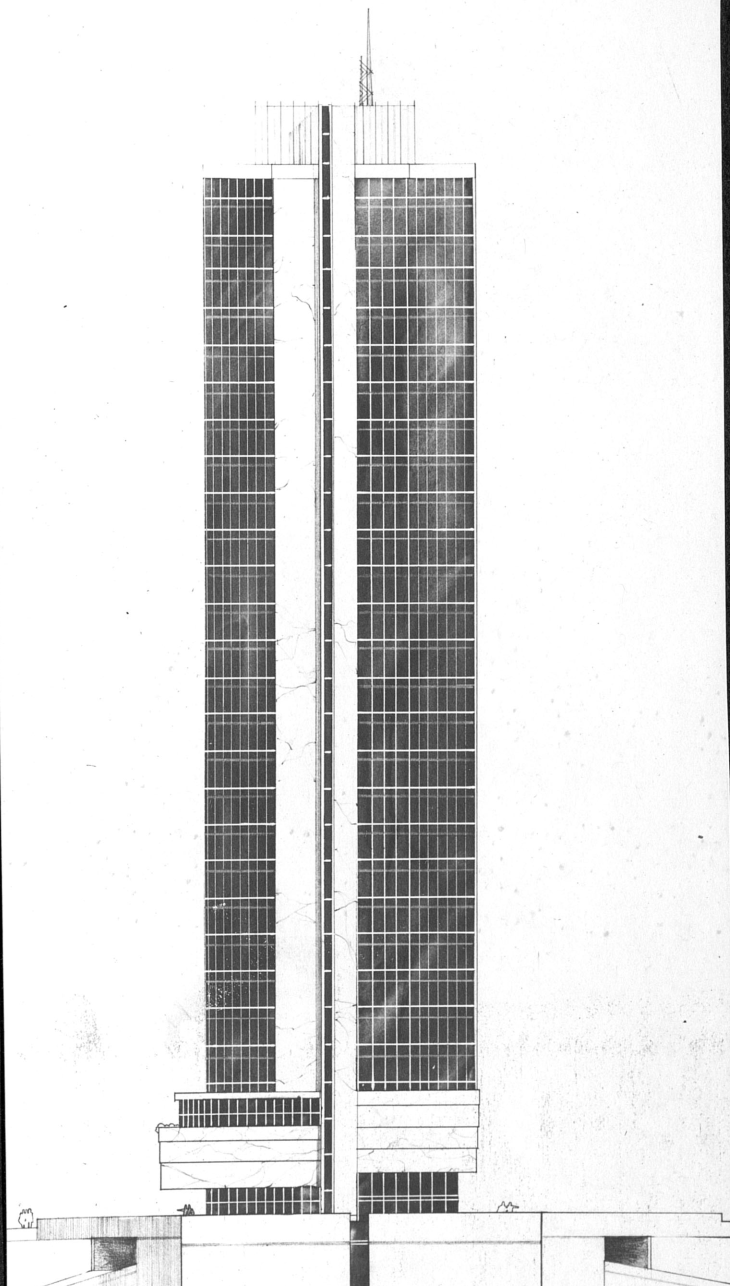
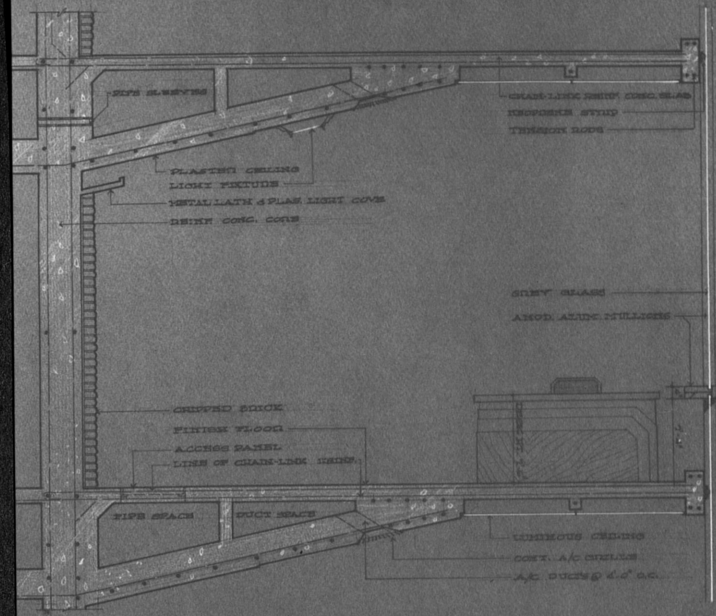
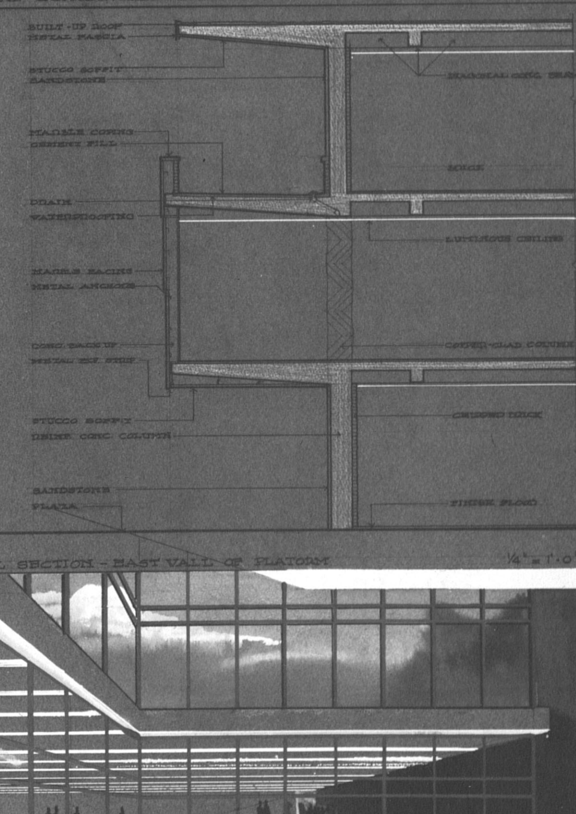


WEST ELEVATION 1/16" = 1'-0"

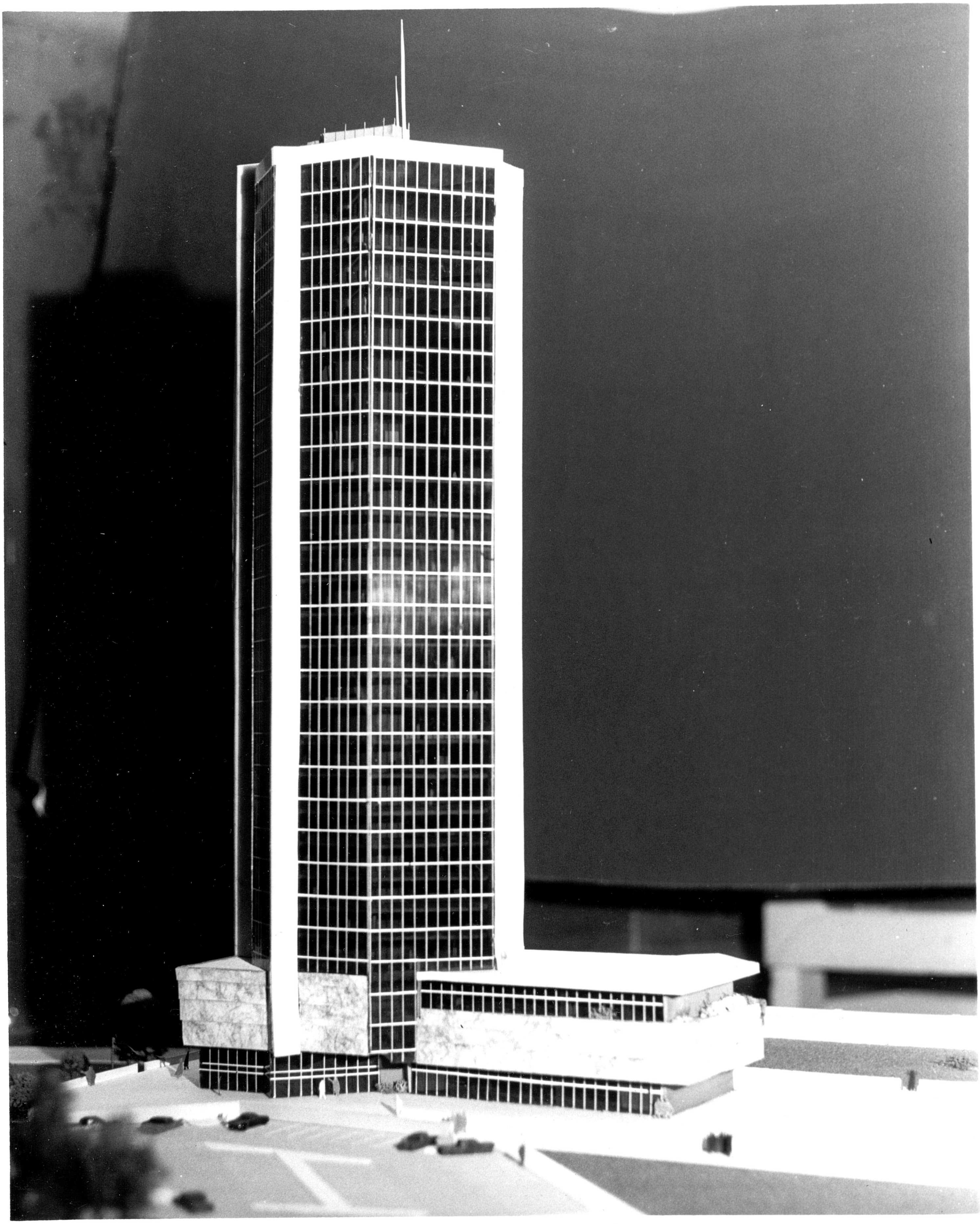


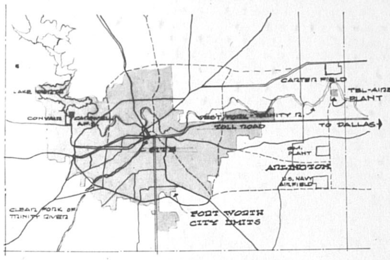
TYPICAL CANTILEVERED FLOOR - TOWER SCALE 3/4" = 1'-0"



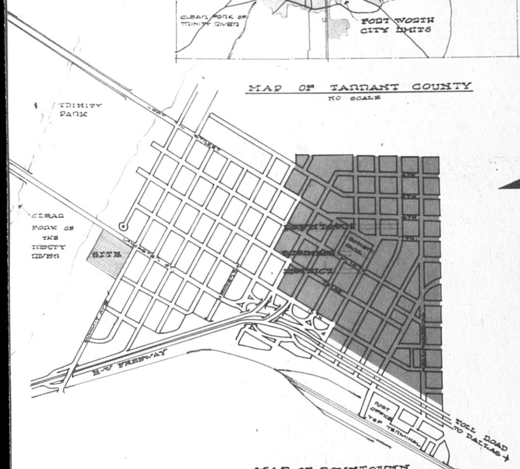
WALL SECTION - EAST WALL OF PLATFORM 1/4" = 1'-0"

DETAILS

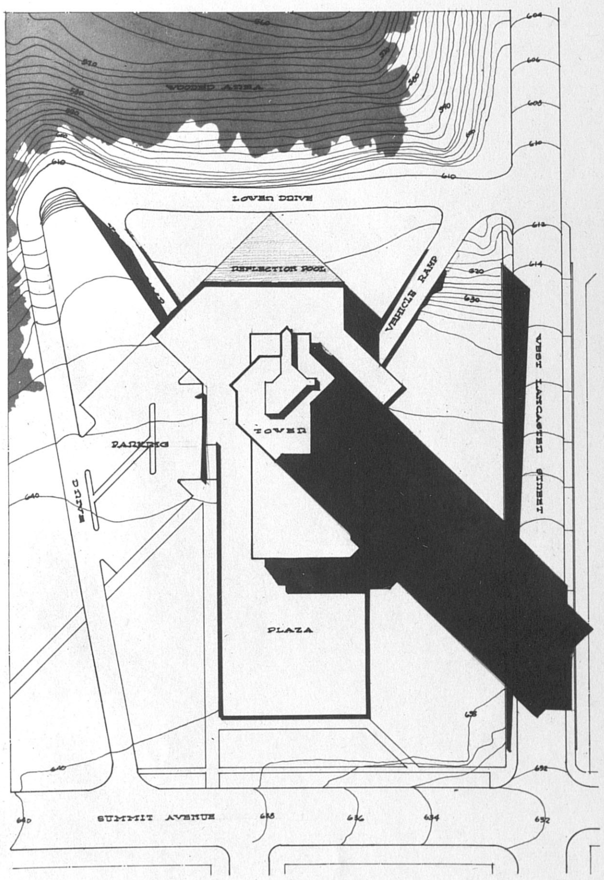




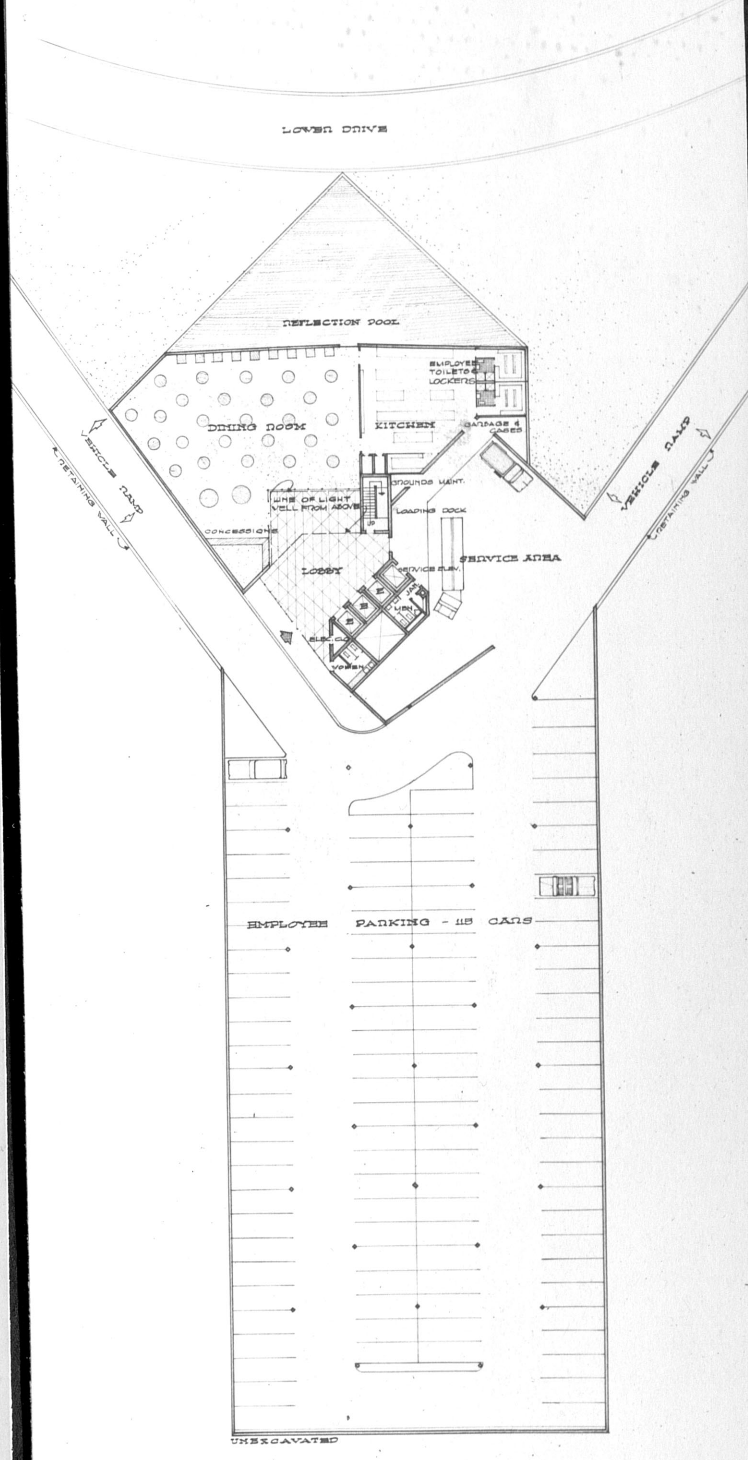
MAP OF TARRANT COUNTY
NO SCALE



MAP OF DOWNTOWN
FORT WORTH, TEXAS
NO SCALE

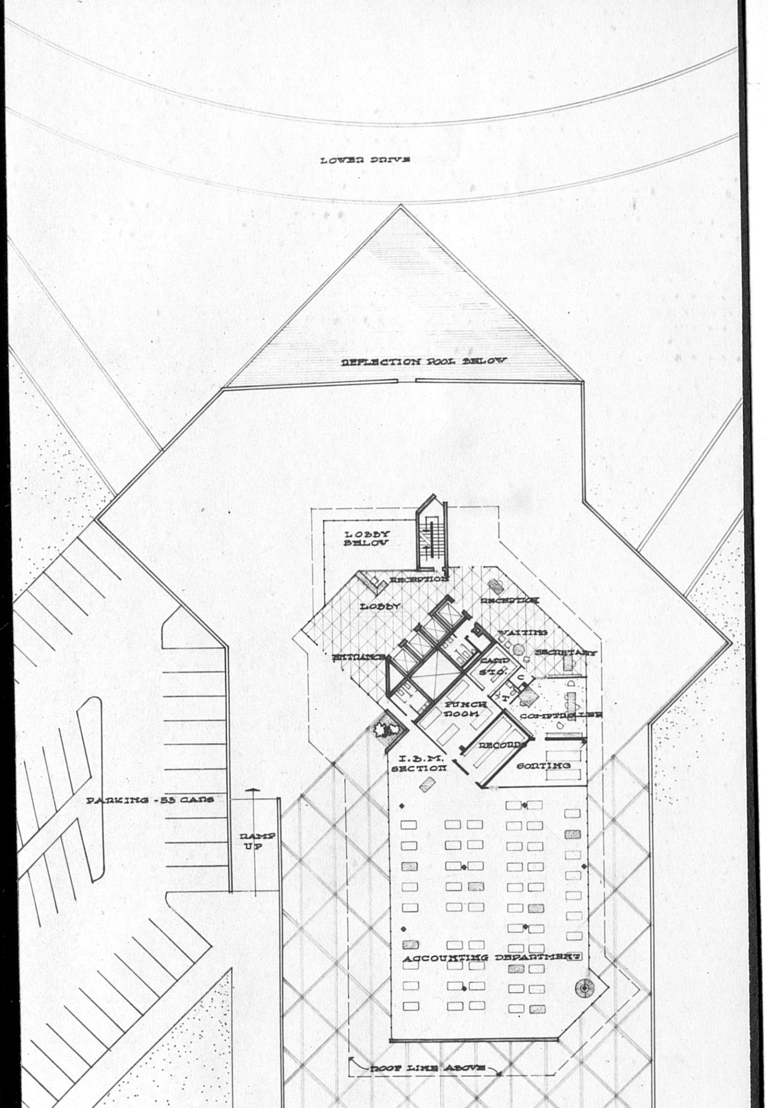


SITE PLAN
SCALE 1" = 40'-0"

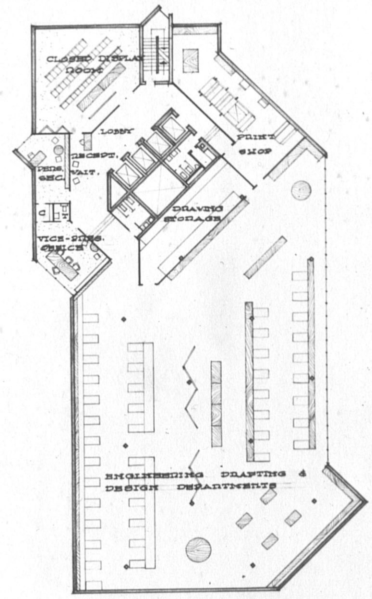


Gr PARKING, SERVICE & DINING AREAS

FLOOR PLANS



1st PUBLIC ENTRANCE & ACCOUNTING



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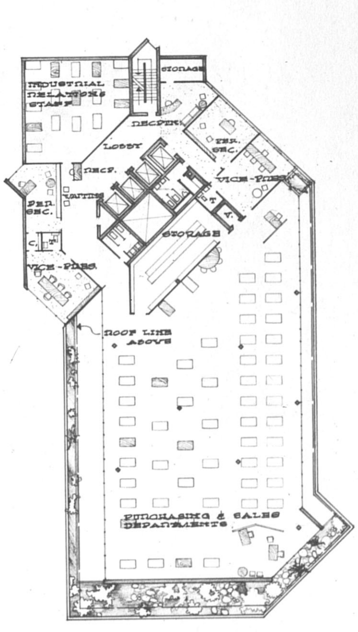
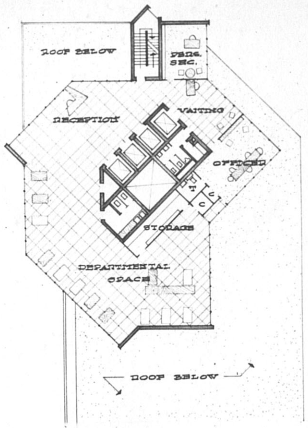
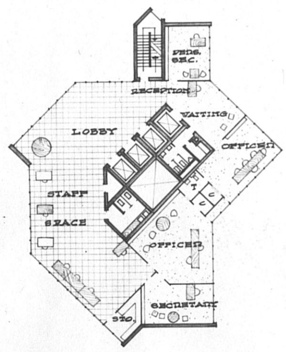


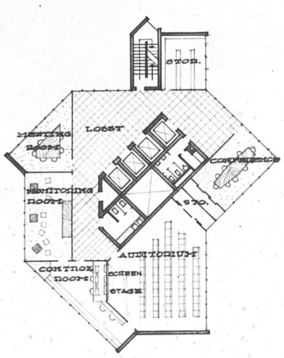
3rd INDUSTRIAL RELATIONS, PURCHASING & SALES



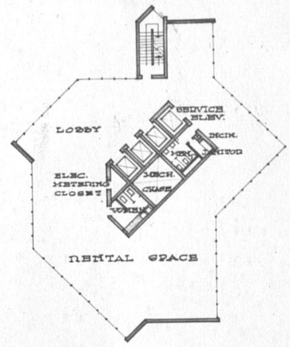
4th-5th LEGAL & PUBLIC RELATIONS



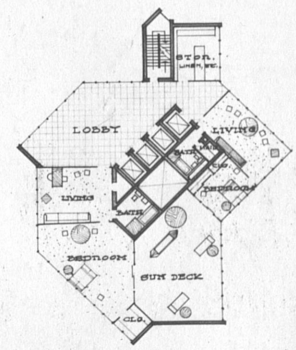
6th-7th GENERAL MANAGERS



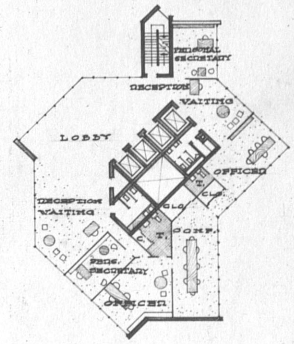
8th COMMUNICATIONS & CONFERENCE



13th-28th RENTAL FLOORS

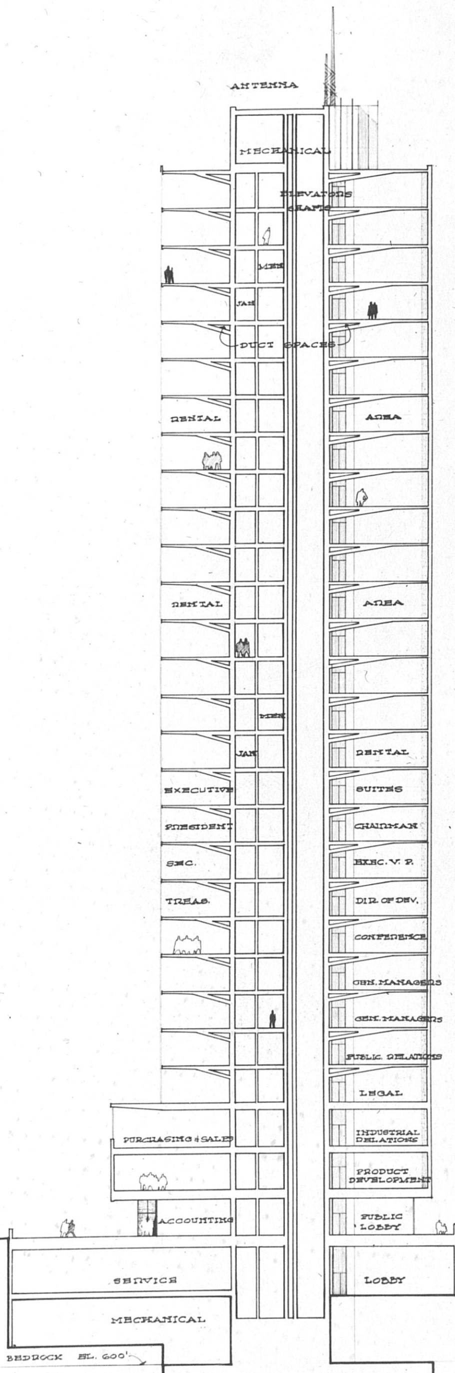


12th EXECUTIVE SUITES

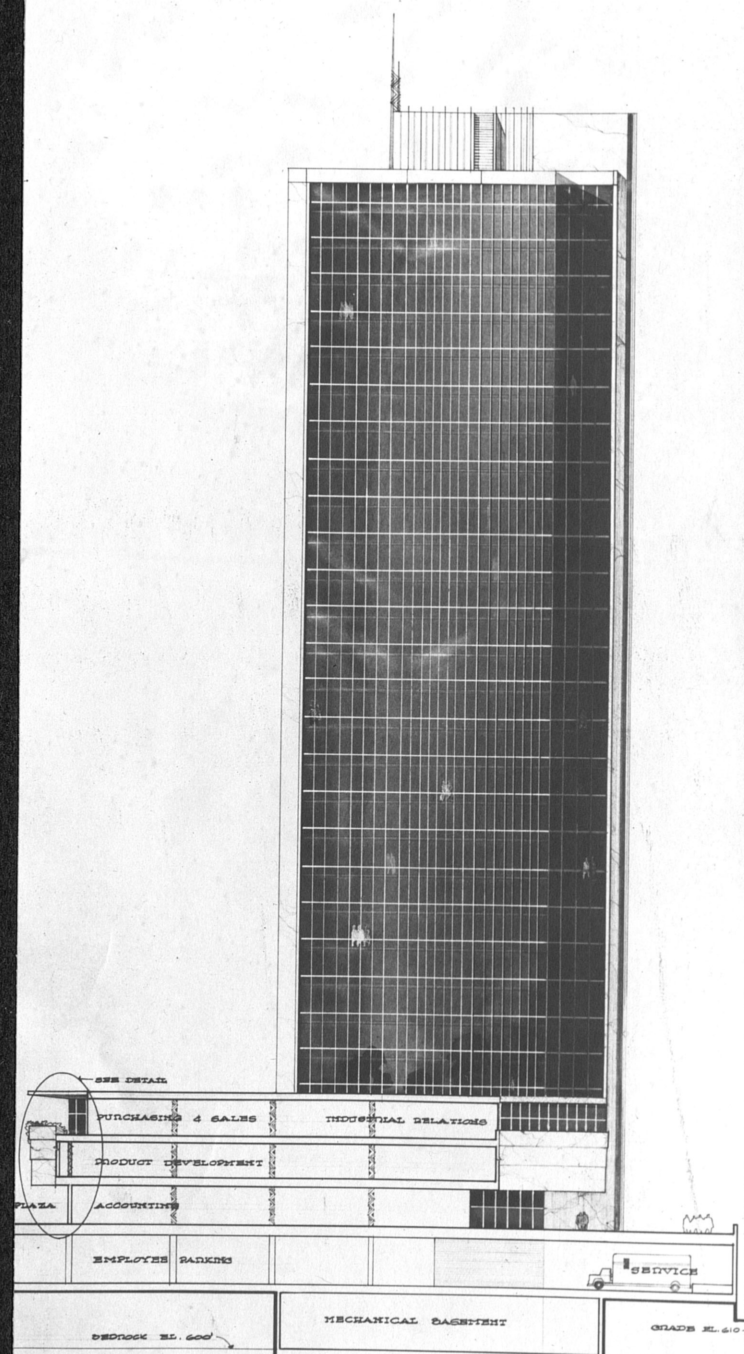


9th-10th-11th EXECUTIVE OFFICES

SCALE 1/16" = 1'-0"



A TRANSVERSE SECTION 1/16" = 1'-0"



B LONGITUDINAL SECTION - ELEVATION 1/16" = 1'-0"