

EXTENSION OF THE AXIS MUNDI

by

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Thesis submitted to the faculty of the Virginia Polytechnic Institute
and State University in partial fulfillment of the requirements for the
degree of

MASTER OF ARCHITECTURE

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December 2001

Blacksburg, Virginia

Keyword: Architecture, Tower, Mega-structures, Urban Design

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(Abstract)

A work develops through methodical inquiry based on the reciprocity inherent in the construction of an object and its evaluation. A physical object informs an initial concept and acts as the fundamental catalyst for subsequent findings. Ordered elements result in the description of a vertical structure. Exploring this structure through a rational and modern approach, the author designs an urban center in the form of a tower. The tower, as a cellular mega-structure, maintains the density and complexity of a city's existing urban fabric. An urbane mega-structure offers a new contribution to humanity through architecture. This proposal establishes a relationship between public spaces, which elevate civic and social life, and private spaces that support individuality. The evaluation of precedent works and the investigation of modern technology support an appropriate solution toward the technical realization of these spaces. The thesis seeks an architecture that augments the tangible, replaces the hopeless and invents the absent.

ACKNOWLEDGMENTS

My Parents for pencils, pens, brushes, paper, bags, boxes.....

Nancy Weigle for her Patience, Encouragement and Love

My Thesis Committee for their Vision, Generosity and Humor

Hans, Elizabeth and Maria-Teresa Rott for their Friendship

Ed, Jen and Summer Rain Novak for their Friendship, Fish and
Open House

3.1 Graduate studio and Kirsten Karch for their modelmaking assistance

Christen Robbins, Margret Biglan, Chad Daby, Kelly Blanchard and
Doug Satteson for their contribution to my thesis defense set-up

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PREFACE

This thesis explores method and its relationship to design. Drafting a product is simply an end in itself, and remains a practical matter. Methodical inquiry, on the other hand, reveals the creative endeavor that is the result of individual decisions. Art and architecture exist within the circumstance of infinite possibility. Methodical inquiry allows one to reflect on and determine an approach that penetrates the infinite. As an object is made, each unique resolution carries its own consequences. Established limits therefore allow the architect to proceed toward the object of architecture. Architecture, more than pure art, admits to physical limits and indeed exploits these laws. Architects rationally generate design limits that engage the physical but are not confined to the ordinary. Limits conceived through the imagination of the maker become the working method. Knowledge generated through the method of investigation is vital. It propels the author towards certainty and therefore thrusts a design idea forward. A working method not only embraces the world of the object made but also reflects on the reasons for making.

The thesis regards “making” as an operation of discovery. An architect inhabits a constructive realm, circumscribed by the oscillation between the known and the unknown, in which a rational exploration yields a concrete object. The source of that object necessarily resides in the distinct, imaginative resolve of the individual. Reciprocity, inherent in the creation of an object and its subsequent evaluation, becomes primary to the clarification of the initial design concept. This dialogue is fundamental to the realization of architecture. The maker must possess the capacity to recognize that critical moment, a *sui generis* instant, where the object carries potential to become architecture. Formulas can only help to clarify certain conditions. A man’s vision, of what is to be made and the world that is defined through its making, can inspire architecture.

Governed by the rational and the sensible, the thesis develops a modern tower through principles of basic design. Geometry and perception order the initial design concept. A clear, simple beginning generates the construction of a more complex conception. The design concept depends on nothing more than a physical entity and the relationship of the physi-

cal whole to its constituent parts. The conception, a description of an architectural potential, gains its complexity through the consideration and incorporation of the physical factors inherent in producing architecture. Architecture, not being a pure art but rather formative, places limits on the imagination and is therefore subject to limitations through scale and material, economics and politics, and structural and functional necessity. Despite this “conditional situation,” these factors are not the cause of architecture; it does not originate from the necessary. Reliance on any one of these factors alone can result in a mechanistic approach that has little or nothing to do with the realization of an architectural idea. The reduction of architecture to function, representation, or an “aesthetic” is a formulaic response. However, the treatment of economic, functional and aesthetic factors as external is negligent. Architecture resides in the realization of physical constructs cognizant of these factors. Among its primary concerns is the support of civic life that is sustained by a physical environment. All these factors are “threads” the architect weaves into the complex structure that informs a work of architecture.

A study of precedent works served to inform and confirm ideas that surfaced during the design phase of the thesis. Precedent ideas, both imagined and built, led to the recognition of conditions present in the thesis design and relevant to the development of an urbane architecture. This study culminated in the investigation of a modern tower crucial for the future of the “city.” Ecological considerations, as well as articulated and civilized spaces that reinforce an urban existence, emphasize the potential contribution of this tower toward the technical realization of humane mega-structures.

Drawings, sketches and models that outline the method are presented in the body of the book. The development of the design concept is traced from drawings on the movement of a divided object to the more complex geometrical description of a vertical line. Elements that defined this line establish a hierarchical composition. Analysis of this composition implied a distribution of spaces that defined the conception of an urban tower. The abstract nature of the geometrical composition provoked an initial investigation that related the construct to human scale. At this critical moment modern urban design became the subject of consequence. An inquiry engaged scale to order the hierarchy of spaces and define the constructed design of a tower. The result describes an urban center. Such a place maintains a density fundamental to urbane conditions that foster the social life of man and recognizes the need of dwelling for the individual.

Supported by a primary cruciform structure, secondary cubic districts contain small cellular units that compose distinct individual dwellings. A network of complex, private, semi-private and public spaces unfold within this structural framework in support of the urban domain. Inhab-

itants are provided with physical and visual choices. There are dwellings in the sun and shade, with mountain and river views, close to the ground or towering into the sky. Four ten-story dwelling units occupy the corners and define the residual, “internalized” public spaces of each of the twelve districts. The orderly arrangement of these spaces around a center, clearly defined by boundaries and edges, allows the inhabitant orientation within the whole. Spatial and programmatic differences heighten one’s awareness of the distinct districts. An open view presented from one district to the next extends the tower’s dominant vertical nature. Major horizontal spaces, however, contained between the corner dwelling units, provide central public landings in each district that act to carry the ground up and into the tower. The tower becomes a city with a constructed topography.

This type of urbane tower defines places that enable the inhabitant to live among others in anonymity, preserving the private life of the individual. At the same time, the tower also contributes urban places that foster the potential for individuals to interact with others of mutual interest. Such places would be assimilated into the fabric of the different districts and could be developed as schools, churches, restaurants, shops, general businesses, urban parks and playgrounds. Public spaces, found among the dwelling units, offer an affinity and density between these social layers that current suburban development cannot offer. Subdivisions take little account of articulated urban fabric that socially engages people, and are ultimately inconsistent with civic life. The suburban street becomes an extended driveway, a closed corridor, or at best a hazardous playground. As a social critique of decentralized development and its rapid proliferation, the thesis endeavors to exhibit physical alternatives. In opposition to a relativistic outlook on “place,” the thesis attempts to establish precise spatial relationships that enable the citizen to comprehend choices within the constructed whole.

Haphazard suburban developments do not support the density that parallels the idea of city, and actually promote alienation among people. Definitive centers are reduced to functional yet desolate strip buildings. People are transported from the realm of civic humanity, the realm of the community of individuals, to a pseudo-individualistic state of existence. But social existence of man is not the lone concern. The suburban model of development threatens our agricultural land as well as our wilderness. A Malthusian view is not advanced here. While devastating poverty and hunger exist, fueled by complex political, economic and social factors, the thesis supports an optimistic view of the human capacity to deal with these issues in a constructive manner. A purely cynical outlook is convenient since it absolves people of the responsibility of discovering solutions. By the time necessity demands increasing density and high rise construction, it may be too late to achieve a compassionate model for future development. Inevitably the open land that encompasses our met-

ropolitan areas will become inundated by them and will cease to be truly natural.

Although this thesis attempts to define a new approach for establishing a vertical urban architecture, it in no way means to insinuate the restriction of people's right to choose how and where they live. It suggests that in accepting the current suburban model, the urban and the rural are actually lost and people are deprived of choice. In redefining an urban context the thesis seeks to preserve the truly rural and wild. Architecture concerning the urban is the main concern of architecture. This thesis does not consider the concept of mass housing as aligning with the aforementioned architecture of the urban. Providing the minimum can not sustain a humane urban climate. Architects must become involved in transforming this course of development toward structures that support humanity through civic life and ecological conservation. The alternative is a stifling, avant-garde architecture that rejects the rational, benevolent and dignified in favor of novelty. Architects must be willing to envision grand proposals and seek out patrons of corresponding intentions. At the same time they must also preserve their capacity to ascertain the consequences of their proposals.

Cities, like other manifestations of human endeavor, acquire an identity over time. How character develops is not necessarily related to a particular length of time, however. A city's growth over a period of two centuries does not ensure that it is a better place than it was when it was younger. The apparent immediacy of mega-structure construction has fostered the doubt that these monoliths could acquire the character of a city. Arguably this process has been significantly undermined already by the rapid advance of suburban development. These developments expeditiously pursue mediocrity in both urban and material quality. If architecture extends previous utopian mega-structure proposals toward models that nourish a developing identity then they can become substantial contributions to city form. People have always only built as fast as physical, technical and economic means allowed. The quality of a construction is therefore as pertinent to the idea of identity as time. Current technology enables the realization of humane, economic and ecological structures to accommodate vast numbers of people. Mega-structures could bundle systems, within an ordered whole, and demonstrate economic and environmental efficiency. Indifference to the materiality that manifests itself in the built work is detrimental to establishing the dignified identity of the work itself and disrespectful of its context. While economical, structural, environmental and urban factors are integral conditions that must inform the object, integrity in the built object is foremost. Architecture realizes its physical nature in elements composed through repetition, scale, and hierarchy that fundamentally relate to the human frame. Materials placed within constructed relationships support dwelling within a built work of architecture. This dwelling subsequently gives life to architecture. Human

presence marks the materials with traces that reveal the building as a civic monument.

Buildings constructed with these conditions in mind possess potential to support the cultural identity of a place. Made for their time, they hold the potential to be timeless. Skyscrapers and mega-structures are not generally thought of as regional entities. However, if architects create urbane conditions within these structures then they engage in the generation of a place that can establish a unique identity through the acts of the people who live within it. This is the only way in which architecture can truly become formative of culture. To suggest that architecture can ensure certain ways of living through its making is sentimental and leads only into behaviorism. Architects are not agents underwriting behavior or eliciting responses. Architects cannot, however, ignore the impact of what is made on how people live. Architecture can only attempt to provide moments within generous spaces that accommodate choice. Architecture offers an ordered background for people to live, work and carry out those acts that foster humanity.

Architecture provides humanity with physical spaces that enhance our most basic freedom- the opportunity to make choices. Theory becomes the tool that allows us to comprehend why we have made what we have. The thesis therefore implements theory for its evaluative and exegetic nature and not as an operational constructive tool. Placement of theory at the periphery of the manifestation of architecture seeks to engage the certainty of the physical object and not to prescribe meaning or annul it through theoretical discourse. The thesis pursues an architecture unsympathetic to intentional stylistic or symbolic reference. Through precedent works it acknowledges that which came before. While recognizing the value of statistical tools, the thesis does not rely solely on formulas to develop its programmatic framework. Design mediates between the rational and the phenomenal, empirical world and does not always yield to scientific analysis. Focusing on the differentiation of urban form, the thesis explores the dialogue between the public and private realm that is reinforced by the marginal spaces between them. These semi-private spaces provide the extension of one to the other, defining a complex structural relationship that makes a place for man within the whole. The proposal aspires to contribute to the foundation of knowledge that advances architecture through making places bound by the universal civic condition of mankind.

PRECEDENTS

Civic life is the foundation of the cultural existence of humanity. Works of architecture, composed of physical elements, provide the spaces that become the background for civic life. Sequences of defined public and private spaces create a framework in which residual spaces become connecting elements that solidify urban form. This type of urban context offers an environment that accommodates the choices of its inhabitants. Tranquil moments are found within close proximity to bustling areas. Spiritual centers and schools reside near financial districts. Museums, cafes and shops are linked to parks. The immediacy of these individual places inevitably draws people of similar interests toward each other.

Suburban development, on the other hand, promotes the estrangement of people from vital relationships with others. Spatial relationships between dwellings and urban institutions disintegrate. Such sprawling development has dominated housing and overrun planning for the last half century. Architecture has yielded to this movement, and offered few humane built works that engage dense urban life to counter this tendency. It is essential that architecture reconsider its position concerning urban living structures.

The following precedent works offer evidence of the cultural role building plays in the human endeavor toward a civil society. These works serve as an introduction to the modern urban condition the thesis explores. They present a civic and a technological base for the possibility and appropriateness of constructing an urbane mega-structure.

Dense “urban” conditions can be found in ancient settlements. The Mesa Verde cliff dwellings (figure 1) of the Anasazi are shrouded by mysticism. However, their complex but ordered organization of earthen structures is clear. Composed of the right angle, these structures distinctly recognize the contrast between man and nature. Such crafted insertion of structure into superstructure established a center for a society. An intricate arrangement of spaces indicates that shelter was not the Anasazi’s sole concern. Particular spaces provide for gathering, while others articulate individual dwelling conditions. Despite what could be considered a harsh environ-



Figure 1

ment, the beautiful view the Anasazi created is most evident. A low winter sun must have warmed the skin and heated the blocks of their dwellings. Massive cliffs must have provided shelter from the scorching high summer sun. The precision of the building blocks, along with their functional value as heat storing substance, are eloquent examples of the link between the natural and technological forces that man rationally exploits.

Are we capable today of such eloquence? Can we apply our technology in profound and meaningful ways without destroying our bond with nature? And perhaps most importantly, is it possible for us to construct appropriately dense and complex spaces that establish an urban order and sustain a livable environment for man? Mesa Verde probably did not shelter many, and cannot be compared to the megalopolis of today. However, the remaining physical conditions of the dwellings indicate the timelessness of human social existence.

Reyner Banham, in his book entitled *Megastructure*, offers the Ponte Vecchio in Florence, Italy (figure 2) as a precedent for modern mega-structural construction. Perhaps the most intriguing aspect of the bridge is not its connection from one side of the city to the other, but rather its extension of the city along its structure. The bridge becomes a container for urban existence. It is an example of man's inclination to maintain density through new methods and ideas of construction. The civic importance of maintaining the center is recognized and man is distinct within the context. His relationship to the city and the river is articulated.

Visionary architects like Giovanni Battista Piranesi, whose ideas pushed the boundaries of the prevailing building technology, certainly contributed to an architectural fascination with the sublime. Piranesi's visionary etchings (figure 3) are a testament to human imagination. Their figural genius complements a critique of existing social thought at the time of the enlightenment and the subsequent "spiritual confusion and acedia" that resulted.¹ These "prisons" of relative space speak profoundly of the human desire to associate in urban situations with others. Piranesi's search for a human scale within the structure exhibits his desire to define man as the measure of place (figure 4). An eloquent statement by the psychologist Erich Fromm depicts in thought that which Piranesi etched.

Man is torn away from the primary union with nature, which characterizes animal existence. Having at the same time reason and imagination, he is aware of his aloneness and separateness; of his powerlessness and ignorance; of the accidentalness of his birth and of his death. He could not face this state of being for a second if he could not find new ties with his fellow man which replace the old ones, regulated by instincts. Even if all his physiological needs were satisfied, he would



Figure 2

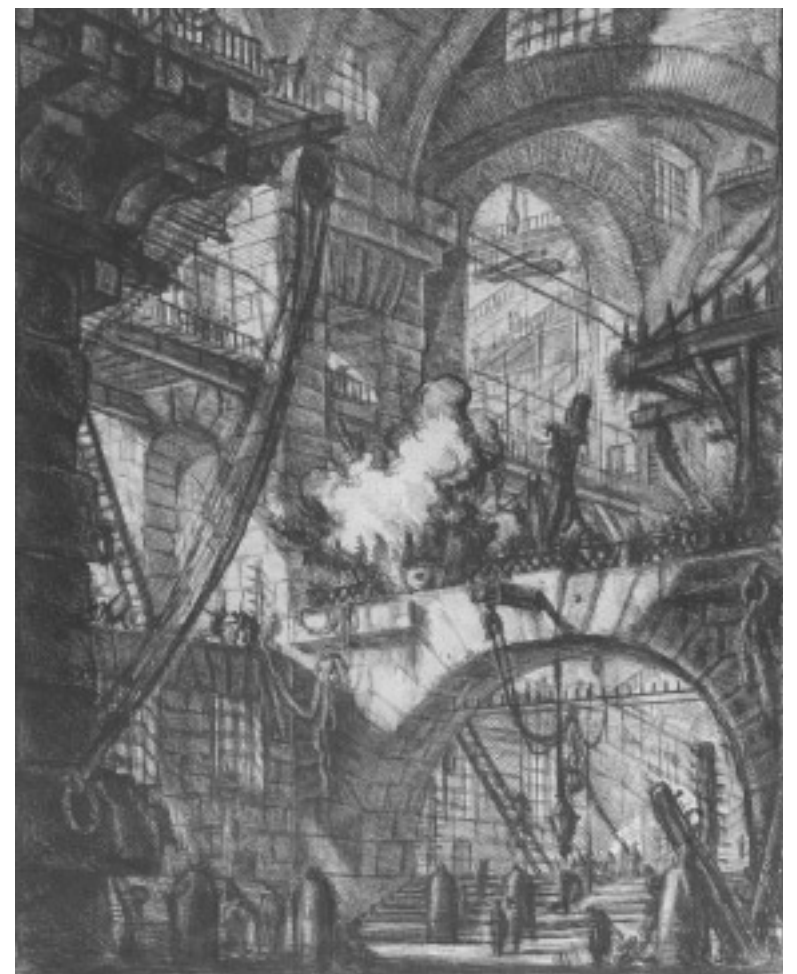


Figure 3

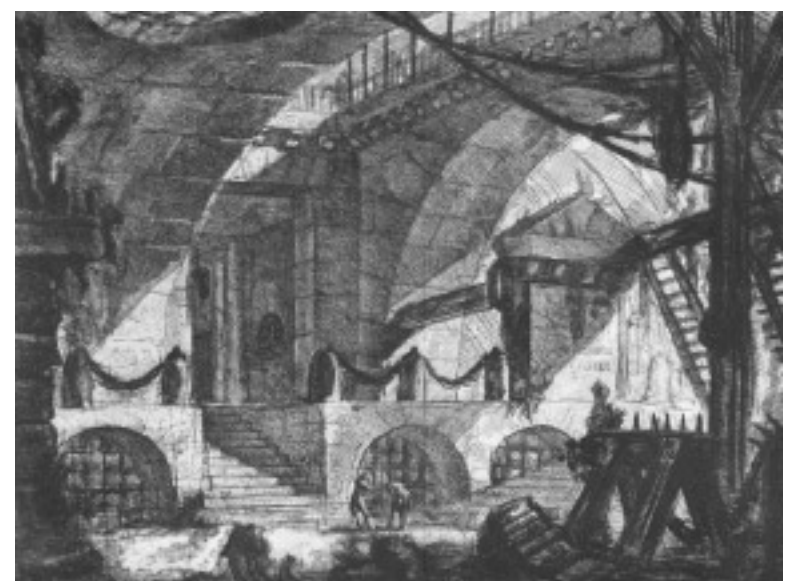


Figure 4

experience his state of aloneness and individuation as a prison from which he had to break out in order to retain his sanity. In fact, the insane person is the one who has completely failed to establish any kind of union, and is imprisoned even if he is not behind barred windows. The necessity to unite with other living beings, to be related to them, is an imperative need on the fulfillment of which man's sanity depends. This need is behind all phenomena which constitute the whole gamut of intimate human relations, of all passions which are called love in the broadest sense of the word.²

A mega-structure solution is not fully recognized until Le Corbusier and others made proposals at the end of the nineteenth and early twentieth century. Modern technologies presented methods of construction to support such vast ideas while social considerations began to provide the context in which these vast constructions might be appropriate. Despite Le Corbusier's success in realizing several projects, mega-structure proposals which surfaced during the mid to latter half of the 20th century remained utopian. The structures of Buckminster Fuller, Stanley Tiggerman, Archigram and the Metabolists were often designed with structural clarity and incorporated current and future technologies, but were otherwise sceneography in advance of theory alone. Nonetheless the arrival of new technology made it possible to build the cliff to house the dwelling. However, as clear as the proposals might be structurally, they lacked that sense of place that could be found even in the most ideal drawings of Piranesi. Sharp critiques must be leveled against these proposals especially the lack of regard for defining complex, intimate conditions within the whole. The living spaces are subordinate to the idea of bigness. Such conceptions offer little differentiation at the human scale or evidence of what it might be like to live, work, eat or sleep in the building. All exhibit a functionalist, reductive ethos realized as hopeless structures that at best might provide the minimal for human living.

Stanley Tiggerman produced a project in the 1970's that envisioned a series of pyramidal structures (figure 5) that allow a roadway to pass beneath them. These projected megastructures appear monolithically beautiful. However, it is clear from the plans (figure 6) and the model that the proposal does not offer insights into the individual quality of spaces. What is it like to exist between the steel structure and glass walls? This thesis challenges the indifference to the character of hierarchical spaces, essential to any mega-structure proposal that attempts to insinuate livable urban spaces. It challenges the notion that the idea of bigness is sufficient and insists that a design of this magnitude must be explored beyond the idea. A design must consider complex articulated spaces consistent with the scale in which humans exist, and provide insight into the physical nature that makes such places livable. Images conceived from a mile away can only provide a beginning. Architecture of this scale must maintain its mass but essentially must accommodate the human scale.

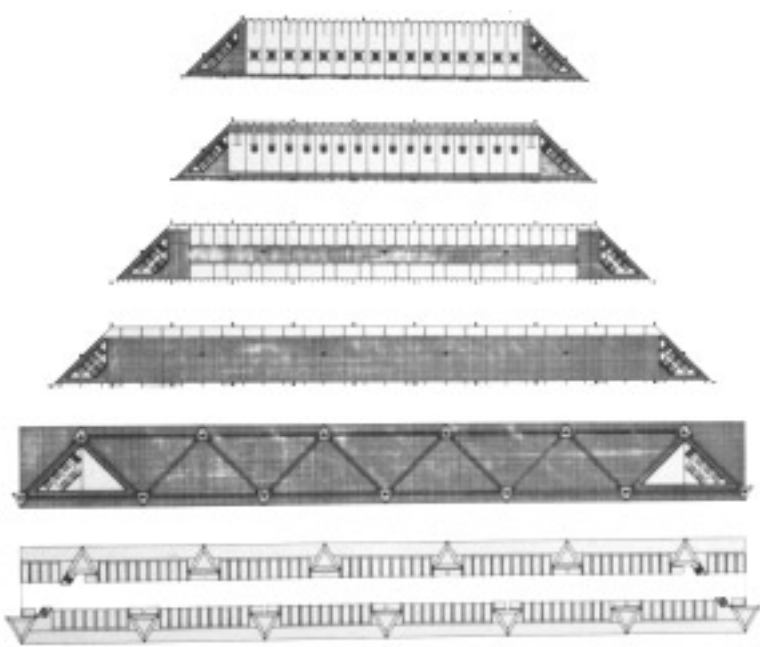


Figure 5



Figure 6

The work of Paolo Soleri engages this mode of thinking. Soleri's book on *Arcology* presents an inquiry into a structure that upholds the dignity of civic life and refutes the validity of suburban "surface" existence both socially and ecologically. In his own words: "The condition of man is strictly dependent on environment because man is eminently an environmental animal. If one adds that man is also eminently a social animal, then one sees that environment comes close to being preponderantly the city. The city is the true concern of architecture."³ Soleri extends his thoughts toward design through drawings and models of over thirty mega-structure concepts. The proposals tend toward massive structures (figure 7) accommodating 20-30,000 inhabitants. Although detailed plans of individual spaces are not published, evidence of the essential nature of individual place within a hierarchy of public and private spaces can be found in his drawings (figure 8). Hanno-Walter Kruft has placed an anti-technology and anti-functionalist spin on Soleri's work.⁴ It appears, however, that his approach primarily intends to discover livable spaces within an organized superstructure inherently employing the economy of modern technology as a way to realize a functional, economical urban cluster. The privileging of aesthetics is not necessarily at odds with this aim. Soleri sees the physical manifestation of the city as important. He states that "the technological could be defined as the substructure of the aesthetic which is essentially 'formal' that is to say the super-structuration engendered by man's compassion on the structure of existing things."⁵ Thoughtful construction of articulated spaces, devoted not simply to the needs but to the desires of human life, offers choice to individuals and designs a physical environment that the inhabitants can reciprocally sustain. Soleri exposes this as the only course that would allow a mega-structure to maintain an element of the humane. He states in *Arcology*, "Metropolitan existence is a construct of private and public life so articulated as to provide each resident with a plentiful physical and economic access to both."⁶

Soleri's work remains utopian in the sense that his visions and theories offer the suggestion of a salvation through aesthetic architecture. Although utopian in nature, Soleri offers significant evidence to reinforce the reality of his proposals and presents the "need for bold investigation-experimentation".⁷ He recognizes that "the results are not a blueprint for a city-civilization but only a guideline toward a new option."⁸ Influenced by Le Corbusier's ideas on urban planning, Soleri encourages centers of civilization and attempts to recenter "man as the measure of things and primarily as the compassionate measure of himself and nature."⁹

The juxtaposition of Buckminster Fuller's dome and the "Large Sphere" by sculptor Arnaldo Pomodoro (figure 9) at the 1976 Montreal World's Fair is striking. Fuller's Dymaxion House and similar projects advanced purely technical, standardized solutions for functional housing at the risk

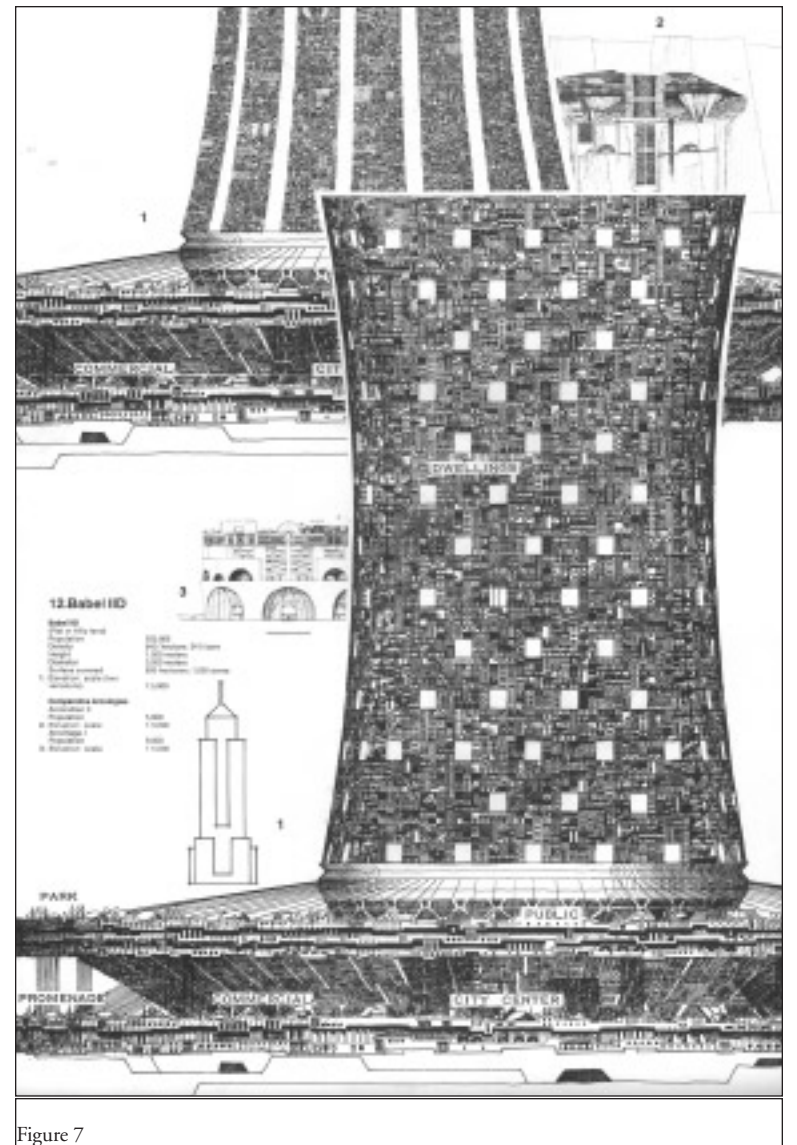


Figure 7



Figure 8



Figure 9

of annihilating aesthetic conditions. Fuller projected a geodesic dome for Manhattan, which offers little to the city itself outside of the capsulation of a controlled environment. Fuller's dome, interesting as it might be structurally, appears cold and hopeless when considered as a space of inhabitation. The closed and sterile idea of a functional reductionism elevates need above man's desire. Architecture is not primarily a question of need. Although his proposals offer articles of convenience to the individual, they fail to recognize fundamental conditions that are the concern of architecture and support the individual within the urban context. Le Corbusier exclaims, in *Towards a New Architecture* that "Architecture only exists when there is a poetic emotion."¹⁰ The lack of poetic emotion exhibited by Buckminster Fuller is manifest in Arnaldo Pomodoro's sculpture. Although architecture is distinct from the art of sculpture, visually sculpture can inform architecture. The "Large Sphere" suggests depth and physical presence within a hierarchy of spaces. The tension between superstructure and skin is somehow reminiscent of the cliff dwellings. As a visual object, it offers direction and a density of individual spaces. Human imagination can conceive an existence within this construction born of desire. Indeed Sam Hunter, in his book on Arnaldo Pomodoro, has described some of the sculptures as "dysfunctional skyscrapers."¹¹

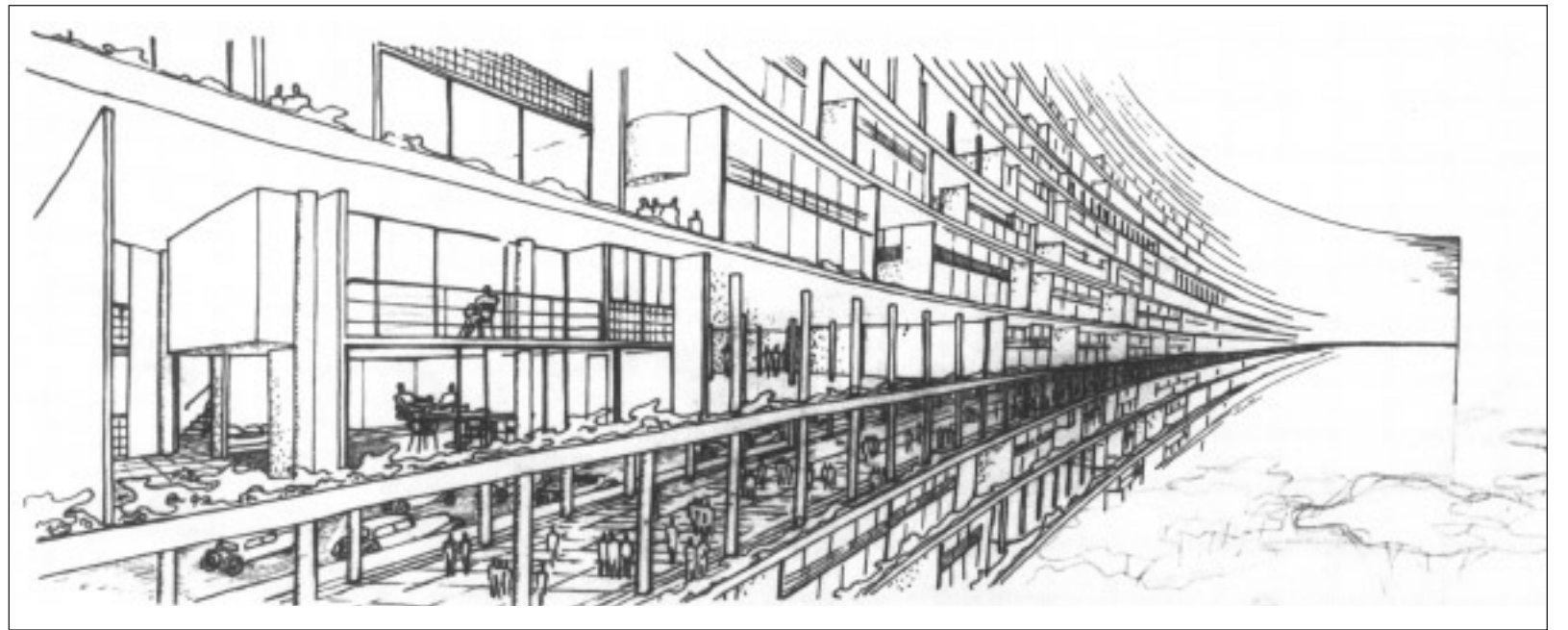


Figure 10 and Figure 11

Initially Pomodoro's sculptures and the work of Le Corbusier might seem distant. However, evidence of a common thread can be found in a comparison of the sculpture "Large Radar" (figure 10) and Le Corbusier's study for Algiers (figure 11). A subtractive nature, exhibited by the carving out of a massive superstructure, binds both works. Pomodoro visually captures the density of the city with a sculpture that expresses a sensual, primal awareness, also evident in the drawings of Soleri. One can envision massive public spaces surrounded by dense dwellings that form a framework held by a superstructure. Le Corbusier expresses in Algiers the rational arrangement of elements that compose a dense urban megastructure. Clusters of individual sites for living support the existence of the whole. The cellular structure contributes clearly defined and generous spaces both private and public. Standardization reveals itself simply while the complexity of Le Corbusier's personal conception presents a

humane measure. Another similar drawing of the Algiers project, analyzed by Herman Hertzberger, reveals in-fill structures of diverse character within the superstructure. The drawing “shows that the most divergent designs and construction method can co-exist harmoniously, and that it is the megastructure that not only makes this diversity possible, but moreover makes the complex as a whole infinitely richer than any one architect, however ingenious, could ever make it.”¹²

Le Corbusier has received widespread criticism for his theories and projected urban planning projects. In particular, his vision for the rebuilding of Paris as outlined in his book *Urbanisme*. Hanno-Walter Kruft, who sees this book as “one of the most disastrous books on architectural theory ever written”¹³ has denounced many of the architect’s ideas as dogmatic. However, when faced with the reality of the work Kruft states “our necessarily critical view of Le Corbusier the theorist must not be allowed to detract from the achievement of Le Corbusier the creative architect, although the question has to be faced, especially in his housing projects, of the extent to which his buildings are merely demonstrations of his theory.”¹⁴ Demonstrations of theory or not they are real works that have a positive presence. Le Corbusier enlists geometry and functionalism to unfold a rational aesthetic. Manfredo Tafuri observes that for Le Corbusier “rationalization must be carried out in order to be surpassed, in order to recuperate other universes of ends.”¹⁵ His pronounced detachment and aversion, through the study of mathematics, to the picturesque is coupled with his inclination to transcend dogmatic theories toward personal judgement in the practical realization of a project. Le Corbusier observed that Juan Gris, the painter, employed geometry as “a springboard, not a straight jacket” and was “never a victim of a hollow and pedantic method which bound both his mind and his hand.”¹⁶ Indeed, Le Corbusier instructed his assistants to disregard the modulator, in favor of the eye, when the modulator did not work.¹⁷

Le Corbusier is one of the few modern architects that successfully realized spaces for the individual in a project at the scale of a mega-structure. These monumental structures employed current technology and were ordered by the modular proportional measuring system created by the architect. His concern for the autonomy of the individual within the urban is manifest in the Unite d’ Habitation projects. Each apartment is constructed as a unit that is inserted into the primary framework (figure 12). Each unit is located on “its own sub-frame of steel joists, which rest on lead pads to absorb vibration and prevent sound transmission through the structure.”¹⁸ The balcony section (figure 13-16) defines an extension of the individual dwelling to the outside and incorporates human measure into the superstructure. Everyone is offered sun and sky. Two story spaces adjacent to the balcony admit light deep into the narrow apartment. The structure provides certain boundaries within which the inhabitants maintain the freedom to organize their own living space. The

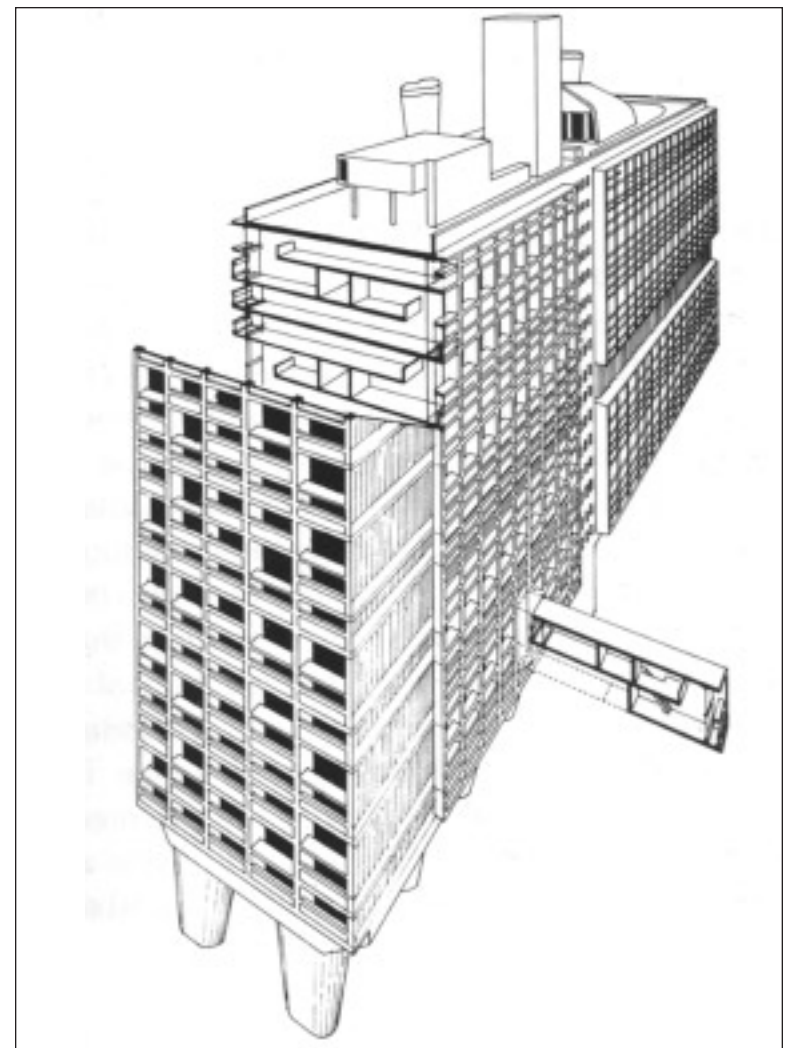


Figure 12



Figure 13



Figure 14

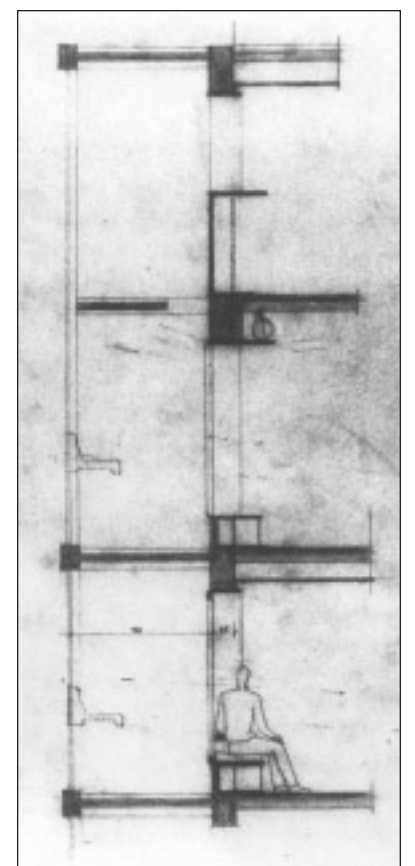


Figure 15



Figure 16

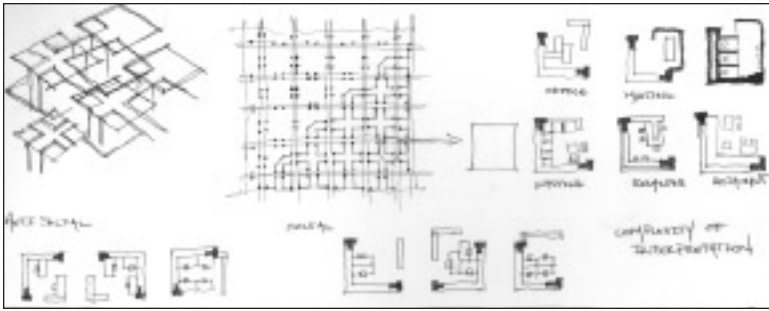


Figure 17



Figure 18



Figure 19



Figure 20



Figure 21



Figure 22

realized Unite de Marseille achieves a sensual, livable space for the individual while maintaining an urban whole. The integrity of the whole is clearly defined. A central level becomes a shopping area and public spaces on the roof compose a plaza and pool that offer magnificent views.

Le Corbusier realizes an urban architecture through the constructive arrangement of elements and recognizes man as the measure of this arrangement. The realization of the Unite de Marseille is consistent both structurally and mechanically with his embrace of technology. It maintains the architectural vision of a rational, functional place for living that acknowledges the desire and hope of man. Although Marseille has also been criticized as an oversimplified urban model, it appears to be a very good working model. Such a cynical critique seems more concerned with debunking a centralized scheme and turns a blind eye to the opportunities the structure offers. Rather the Unite de Marseille is urban and offers generously to those that inhabit it.

Herman Hertzberger integrates urban conditions into several of his projects. Particularly, in the conception of his design for the Central Beheer Office Building in the Netherlands. Within the constraints of an established grid, Hertzberger organized elemental units in a cellular manner that forms a superstructure. The units are linked by interior streets, which establish a public domain and connect the units with the central public space creating a city-like arrangement of articulated spaces within the building. The grid allows for the subtraction of the corners of specific units around which he organizes his interior spaces (figure 17). As seen from the sketches above (figure 17), he works within this strict arrangement to accommodate several types of complex social spaces out of virtually identical components. The organization of these spaces is in accordance with his ideas on “polyvalent form”, meaning “a form that can be put to different use without having to undergo changes itself, so that a minimal flexibility can still produce an optimal solution.”¹⁹ Flexibility for Hertzberger does not mean an alterable environment, but rather one that provides enough differentiation within the defined unit to accommodate new demands (figures 18-20). Nor does he suggest an explicitly functional approach. He states in *Lessons For Students In Architecture*, “The rapid obsolescence of all too specific solutions leads not only to disfunctionality but also to serious inefficiency.”²⁰ This does not imply a relative or neutral approach. His attention in designing “distinctive features” into these spaces present options to the inhabitants for determining how they will be used.

Other architects characteristically incorporate urban design into individual buildings. Luigi Snozzi embodies urban planning in his single-family houses. Through articulation and extension of space within small dwellings, Snozzi makes distinct places. Merging public and private spaces in this way suggests an urban method that could be incorporated into mega-

structures. The interpenetrating volumes apparent in the Kalman House (figure 21) define hierarchical places within the main structure. Creating an extension to the dwelling, usually in the form of a simple open structure, (figure 22) allows for reflection on the individuals' domain while reinforcing the relationship to nature that mediates between the two structures.

Louis Kahn dedicated much of his architectural pursuits toward the city. He exalted the city as “the domain of a child for which he can know what he wants to be”²¹ and established a link between his design and his philosophy. Phillips Exeter Library in New Hampshire offers a unique spatial sequence of urban proportions. The interior entrance expresses a richness, physical and visual, which Kahn recognized as necessary to the individual place. This manipulation of space invites an experience, a journey into a city that admits human scale within its grandeur. The traverse along the stair provides an open view to the interior space (figure 23), elevating ones anticipation and reinforcing the center. Framing the view, a structural lintel acts to compress the point of arrival at the upper landing. By admitting human scale at this landing, prior to release into the grand central space, Kahn achieves complex spatial and material ideas and makes a place.

Kahn imagines urban spatial complexity in his design for the Broadway United Church of Christ and Office Building in New York. The section sketch (figure 24) reveals a vertical building comprised of public and private spaces. Urban by site alone, it appears that Kahn's endeavor was to also realize urban spaces within the tower itself. The initial design is extraordinary in its attempt to define generous spaces within a vertical structure. Opposing the typical slab building is crucial to its architectural statement. Kahn recognizes the desire of man to dwell in urban spaces. The urban office tower is conceived as the “place of assembled institutions”²² and recognizes “the room” as a distinct “place of the mind” where individuals thoughts occupy particular spaces.²³

Although the design changes, Kahn continued to search for livable space within the vertical tower. Another sketch (figure 25) for the project shows Kahn's orderly separation of servant and served spaces. Corner service towers suspend floors that maintain spans allowing large public spaces in the center and at the top of the tower to be preserved. The Knights of Columbus Headquarters in New Haven, Connecticut (figure 26), by Kevin Roche, demonstrates a similar design. However, the conventional slab like conditions long associated with office building suggest a compromise of the vision that Kahn had presented. The double height of the entrance is the only visible suggestion of truly public space.

Norman Foster's Commerzbank Tower in Frankfurt, Germany (figure 27) appears to correspond with the aforementioned ideas of Kahn. It also



Figure 23

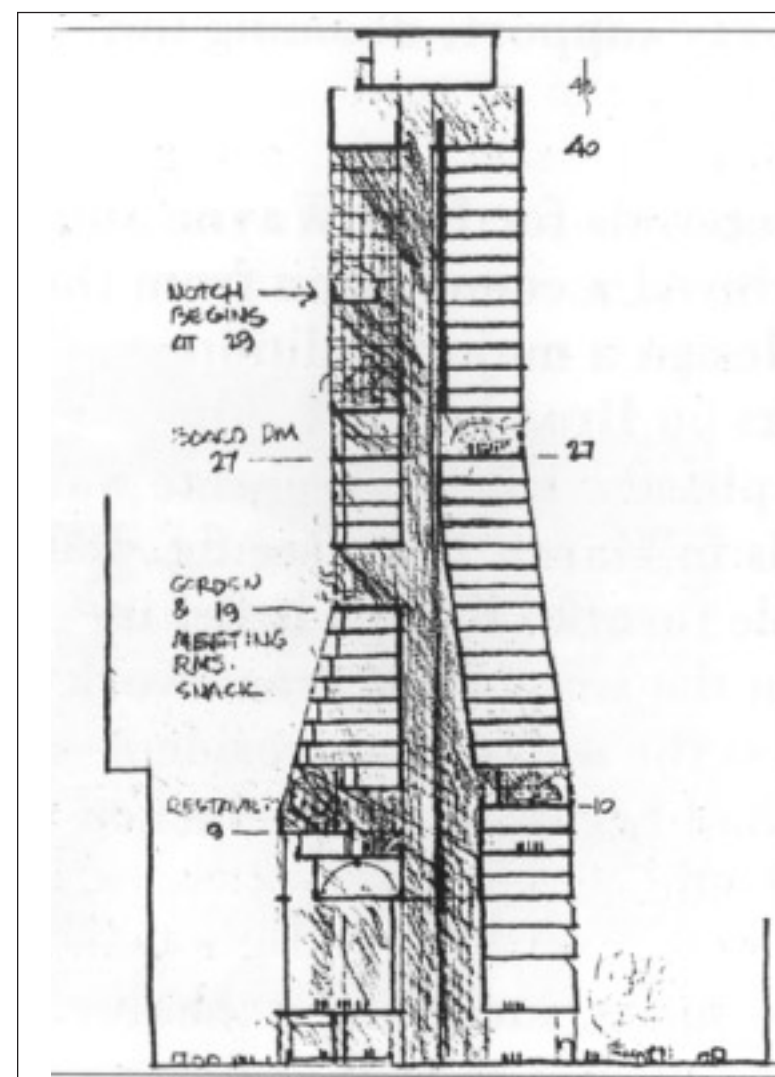


Figure 24

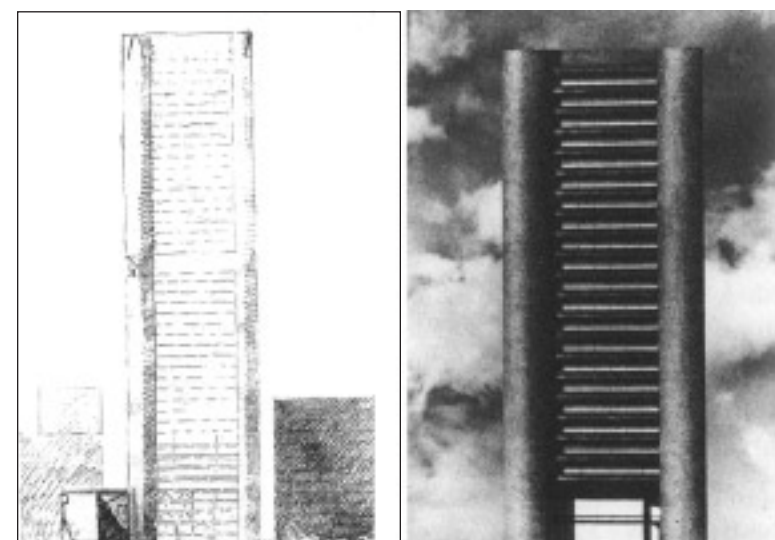


Figure 25

Figure 26



Figure 27

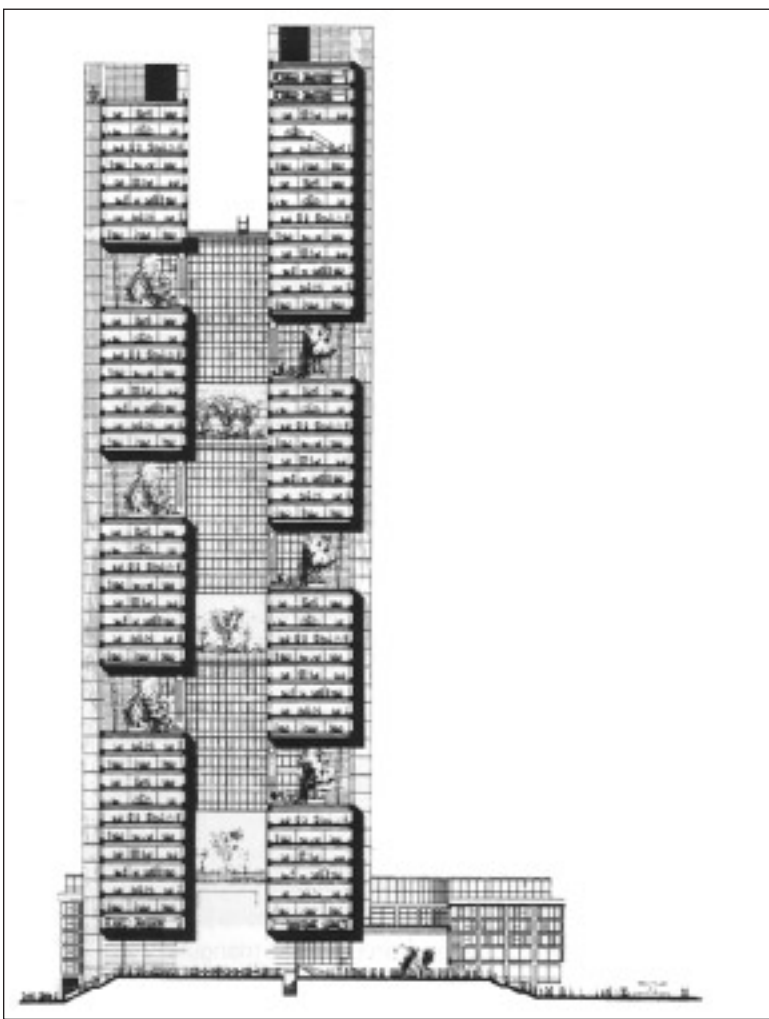


Figure 28

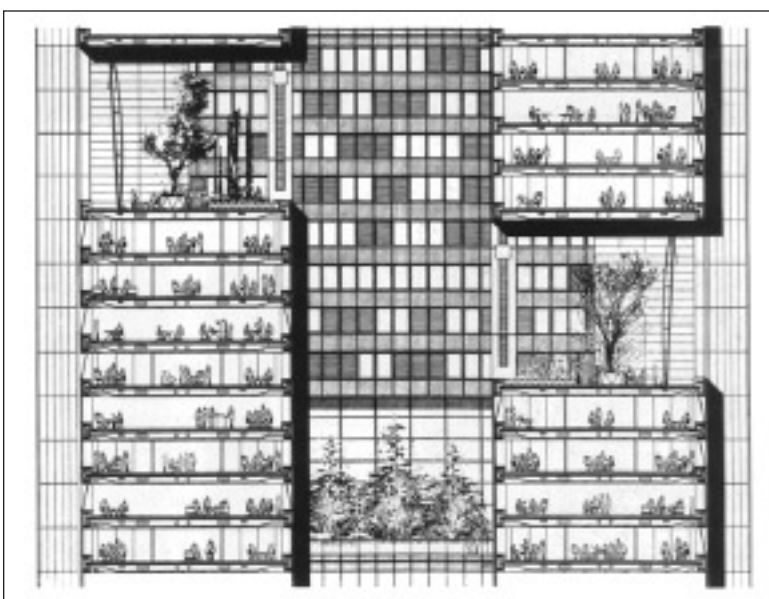


Figure 29

bears a striking resemblance with the construction principles established in Kahn's second sketch and the realized design of Roche. Vierendeel trusses are suspended from the service towers, in the form of cylinders pulled to the exterior of the structure, and define full floor heights. The section (figure 28) shows the distribution of floors containing offices that rotate sequentially in plan between these cylinders and provide the double height spaces that serve as public gardens (figure 29). Elevating the ground is a substantial contribution to vertical design. Gardens link the offices with the public spaces visually and physically. Double height glazing admit shafts of light that penetrate the building's core (figure 30) and reinforce the important element of natural light within the structure. Adjustable windows that admit natural ventilation offer choices to the user and counter the perfunctory and standard hermetically sealed office tower.

Spatially, economically and ecologically the Commerzbank Tower is an innovative solution to vertical design. It turns the typical core and slab approach inside out and allows open spaces to complement the office blocks within the structure of the tower itself (figures 31-32).²⁴ Europe's tallest building exemplifies structural clarity, economic efficiency and urban density in one building. The Commerzbank Tower could have been realized as a larger tower and remained a civilized example of a mega-structure. It presents the future of urban planning within a singular construction. Foster succeeds in realizing humane spaces, both public and private, that offer the occupants a distinctive existence. In so doing, he has provided a model for future construction of livable urban spaces within the vertical environment.

The development of skyscrapers in the East, notably in Hong Kong and Shanghai, has summoned recent attention to tall buildings. Fulvio Irace in the article "*Geopolitics of the Skyscraper*" recognizes the economic and political nature of urban growth in general and new vertical growth in particular. Urban imprints "strung out over the map along the coordinates of political cartography" represent "the visible indicators of rapid economic glaciations, the sharp fractals of the lines of expansion of global markets: the web of their locations reproduces the exact geometries of a *vue des formes*, as if it were driven by the independent rhythm of its own, irrepressible biological supremacy."²⁵ Economic and political factors undeniably play a role in urban growth. Perverse applications of new technologies can certainly result in misguided creations. Often these misapplications constitute works that serve to empower old political institutions and are realized as repressive housing blocks or mere "signs of economic virility."²⁶ Le Corbusier's urban planning ideals, as realized in the *Unite de Marseille*, were "lost in the translation as it worked its way through less able interpreters".²⁷ Many professions have seen similar indiscretions but have been more open to advances in practice that potentially outweigh the misuse of influential knowledge. Architects must learn

from other professions and be willing to advance good places through appropriately embracing new methods. Exploring and presenting noble proposals that express human institutions is the architect's responsibility. Le Corbusier recognized human invention in *Urbanisme*:

The men who build the barrage are everyday units, like you and me. But the barrage itself is magnificent. Because, even though man is petty and narrow-minded, he has within him the possibility of greatness. The difficulty is no longer an overwhelming one, it can be subdivided indefinitely into stages: and each stage can be adapted to the individual. It depends on ourselves to tackle it. Men can be paltry. But the thing we call Man is great. The barrage is great. What gives our dreams their daring is that they can be realized.²⁸

Irace points out that “the enthusiasm for the new, curbed in Europe by the extensive influence of the culture of conservation”²⁹ subdues the possibilities that the Commerzbank cultivates for restructuring and reestablishing centers within cities. When built with thought and care, mega-structures would offer built works that inspire reverence reserved for worthy structures of architecture despite their age. The opposite of this conservatism can be found in the rapid advance of eastern development. Particular attention has been given to the expeditious construction of towers within urban contexts that have resulted in haphazard growth similar to suburban development of the west. Lack of urban planing methods to order the development of these structures must be countered, otherwise bigness will remain the fundamental difference with the entrenched ideas of sprawling development. They “simulate the grandeur of the architectural gesture as a shortcut that avoids the intermediation and long time scales required by planning.”³⁰ Planners and designers must assess their commitment to vertical urban structures and reformulate long term planning strategies to find ways to develop them well, even within increasing time constraints. Attention should be paid to the fundamental premise behind Le Corbusier’s “devastating” book *Urbanisme* which holds that:

a form of town planning which preoccupied itself with our happiness or our misery and which attempted to create happiness and expel misery would be a noble service in this age of confusion. Such a preoccupation, creating its appropriate science, would imply an important evolution in the social system. It would denounce on the one hand the harsh and futile individualistic rush for egotistical gratification, by which our great cities have been created. It would show, on the other hand, that at the critical moment an automatic recovery had taken place; that feelings of solidarity, pity and the desire for good had inspired a powerful will toward a clear, constructive and creative end. Man at certain periods takes up again the business of creation, and it is at such moments that he is happy.³¹



Figure 30



Figure 31



Figure 32



Figure 33



Figure 34

Kenneth Frampton points out in the 1992 edition of *Modern Architecture* that “there will be fifty cities with populations of well over ten million by the year 2000”.³² In his view it is not possible for “the building industry or the architectural profession” to “serve urban migrations of this magnitude.” “The loss of the finite city as a significant cultural object no doubt partially accounts for the deliquescence of avant-garde thought and for the recognition that architecture can no longer intervene at a global scale.”³³ With this in mind, it is important to look back to Le Corbusier’s *Unite de Marseille* project and Soleri’s conceptions to find, in modern architecture, examples of a place analogous to the “cultural object” Frampton refers to. Harry Wolf’s NCNB tower (figure 33) in Tampa, Florida, has its own implications for monolithic cultural works. Deep recesses in the limestone cladding, governed by an intricate geometric pattern, provide openings with a horizontal member offering a sense of stability for those looking out of the tower. Wolf not only recognizes the human frame within the façade section, but also provides solace from the hot sun of the region. Conveying this regard for human scale throughout the tower, Wolf extends the pattern in a pavilion structure and a magnificent plaza that mediate at the street level. Crape myrtles, organized on a grid with water and sitting elements, define the urban plaza (figure 34) as a human scaled canopy. While this tower hardly constitutes a mega-structure, it significantly supports the reconciliation of man and vertical structure while recognizing the city and the region. None of these examples ensure the success of architecture in dealing with this population surge, however they suggest that architecture has no substantial place outside of the confronting these issues. Irace continues “the physical nature of highrises that planners and politicians like to see grow ever more immense and complex translates into a ‘metaphysics of extent.’ Unexpectedly, this brings Frank Lloyd Wright’s prophecy of a skyscraper that instead of devastating the city would become one in its own right, bang up to date: ‘no one can afford to build it now, but in the future no one can afford not to build it’.”³⁴

Inspired by Sullivan and coincident with Broadacres (figure 35), Wright’s conception for the mile high tower (figure 36) was a personal glimpse into the future. At that time, the tower was perhaps beyond the buildable, but it represented an urban ideal in contradiction with the Broadacres model. Although the four square mile model included space for 7000 inhabitants,³⁵ the general concept for Broadacres (figure 37) was decentralization not urbanization. Wright’s decentralized notions therefore exist in direct contradiction to the true possibilities of his mile high skyscraper. Broadacres relationship to the city, if any, is defined by the linear, horizontal directionality of the transportation system, where Wright attempted to focus principle activities as roads spread outward from the city core.³⁶ In fact, while Wright suggests a designed enclave, the model recognizes the principle foundation that would lead to the haphazard suburban developments established in the United States. He successfully anticipated the

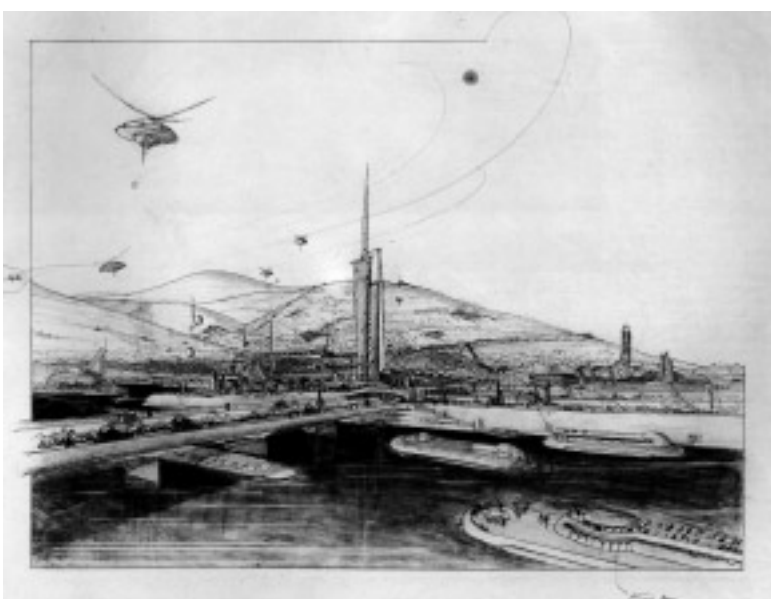


Figure 35

regional and eventually the national success of American suburbia.

Regional considerations for mega-structures also emerge. Architects must address “whether the skyscraper should be regarded as a typical imported commodity and therefore not susceptible to alterations that might change its identity or on the other hand, the individual interrelations between its place of origin and the regional contexts in which it is applied can in the long run bring about structural modifications and not just an aping of forms.”³⁷ Irace suggests that “in this elastic tension between center of origin and places of application a game has been played in which differences have been no less important than continuities. This has resulted in a polarization between internationalism and regionalism that leaves the field of design open to unprecedented developments.”³⁸ New structures might be “no longer, perhaps, radically alternative to the myth of Nature but elements of transmission in a pact of reasonable sustainability.”³⁹

A Wall Street Journal article entitled “*Arizona’s Rural Sprawl: Fast Growth Spawns ‘Wildcat’ Subdivisions*” epitomizes the lack of forethought endemic to land development and offers concrete evidence that mega-structures deserve consideration. The article describes a growing settlement as “sprawling tracts of land divided by a succession of owners in a way that leaves them exempt from basic county building requirements”, outside other standard regulations and with few revenue options to fund basic amenities. Inexpensive land in the proximity of the city and an amiable climate are a few factors that are enticing new developments despite the absence of amenities including paved streets and sewer systems. The subdivision is one of a growing number of tracts of land being haphazardly developed in Arizona, a state that has seen a 40% population growth over the last ten years. “Pima, the state’s largest urban county, has been adding an average of about 17,000 new residents yearly since 1970, and topped 20,000 last year alone. County officials here say that continuing to house arrivals at that rate would require 70 additional square miles of development over the next 20 years- a crushing footprint on a fragile ecosystem.”

40

Over 500 homes exist on a 640-acre tract of desert that makes up one of the subdivisions mentioned in the article cited above. Although the article does not state an exact population the national average is 2.63 persons per household according to the U.S.Census. Even if one were to double that figure and assume 6 occupants per household then the development would include 3000 inhabitants at a density of .2 persons per acre. Ironically, not far away Paolo Soleri continues to work on his ideas for mega-structures in Arizona at Arcosanti. The structure Soleri proposed for Phoenix in 1968 had a density of 268 persons per acre.⁴¹ Many of these proposals would inhabit approximately 30,000 people. Had ten of these structures been realized, enough sites to accommodate the average residential influx cited above could have been provided. If

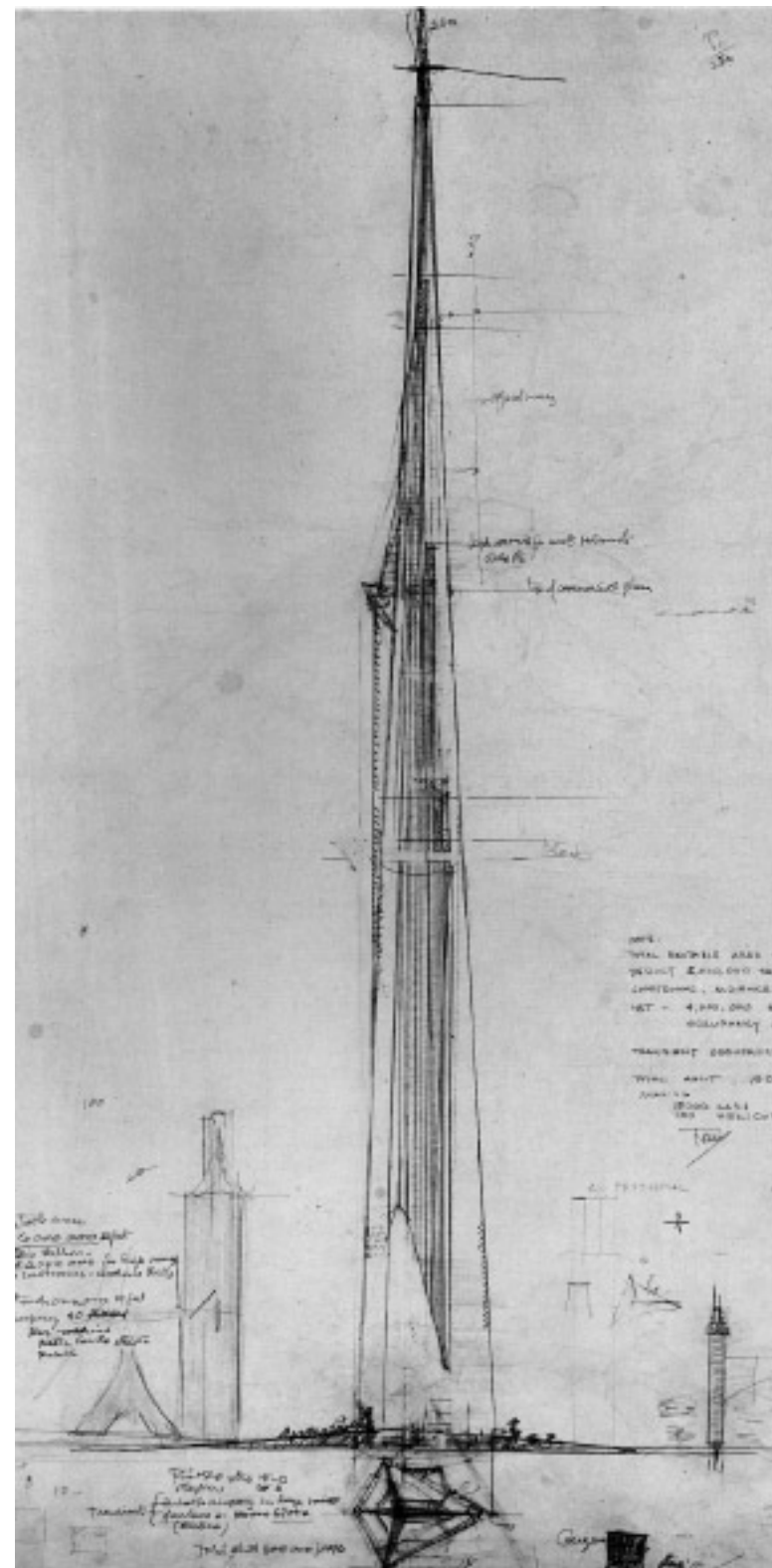


Figure 36

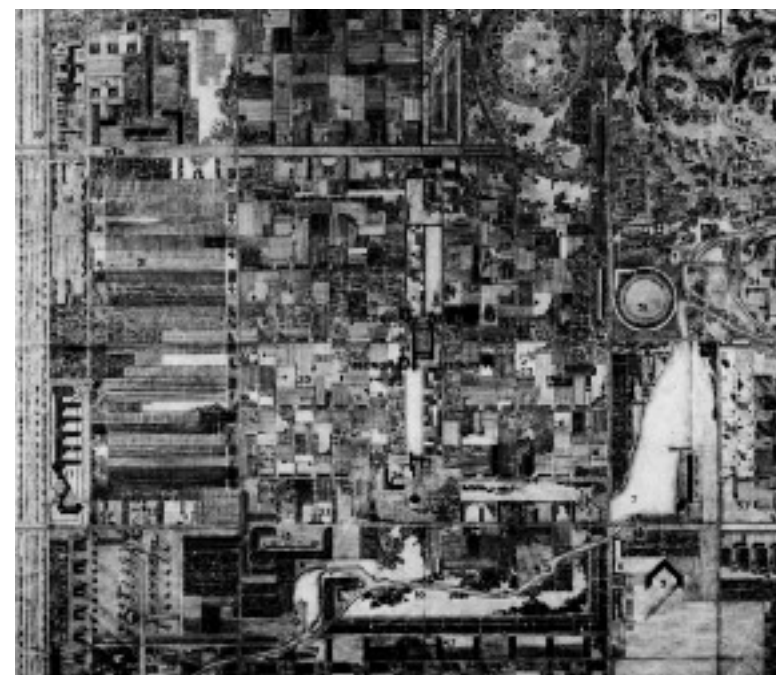


Figure 37

each arcology occupied 160 acres (1 acre = 43,560 square feet; 1 square mile = 640 acres) or $\frac{1}{4}$ of a square mile as a footprint, then it could accommodate 300,000 people. Adequate infrastructure could easily be concentrated in these mega-structures providing standard if not optimal service to the inhabitants while offering unprecedented views of the deserts unique topography. From this perspective, developments like the “wildcat” subdivision completely undermine the future of such beautiful places and hardly preserve the dignity of individuals.

Why do people choose to live in these base developments? Many, including one resident quoted in the Wall Street Journal article, moved to the originally rural area longing for those open vistas and lonely sunsets that appear as the token postcards of the west. This fleeting illusion evaporates as the “original” inhabitants eventually find themselves in a dust bowl surrounded by other dwellings. Despite the consequences the influx continues. Advocates avow to uphold an individual right to purchase and settle land.⁴² As strong as the desire to uphold individual rights of landowners may be, what is the tradeoff? This thesis does not suggest suppressing the individual right to select, purchase and develop land. Nor does it advocate increasing bureaucratic control over these rights. Architects and urban planners must envision alternatives to the developments like those in Arizona and Las Vegas (Figure 38) that are not unique in the US. Grand proposals that reflect human achievement and progress, that recognize the fundamental desires of people and not simply familiar and nostalgic whims must be presented. Such proposals inevitably must be justified in economic terms. Political and economic factors become major obstructions for mega-structural development. Perhaps these factors are a greater obstacle than the technical construction. The construction might be completed in the amount of time it takes for political debate to justify it. Few individuals have the means to fund such immense projects, however investment by a multitude with foresight might. Imagine the financial resources that would be brought into the city center by such a project. It is hard to image these dwellings and business places without willing patrons that would prosper financially.

The intimidating nature of mega-structures is due not only to their awesome physical presence but also to the daunting task to describe them. The architecture profession’s lack of understanding and failure to engage in appropriate studies to define them is the source of ignorance. Engaging studies are the tool of insight and communication within the profession. Substantial conceptions must accompany the idea of the future to counter the complacent attitude of the general public confronted with preconceived notions of change. Architects must be willing to engage in defining the physical nature of these structures, despite the time and effort necessary to describe them. Economic, constructional and political aspects can be justified through statistics. However, numerical data can only indicate its economic and functional value. Architects and people

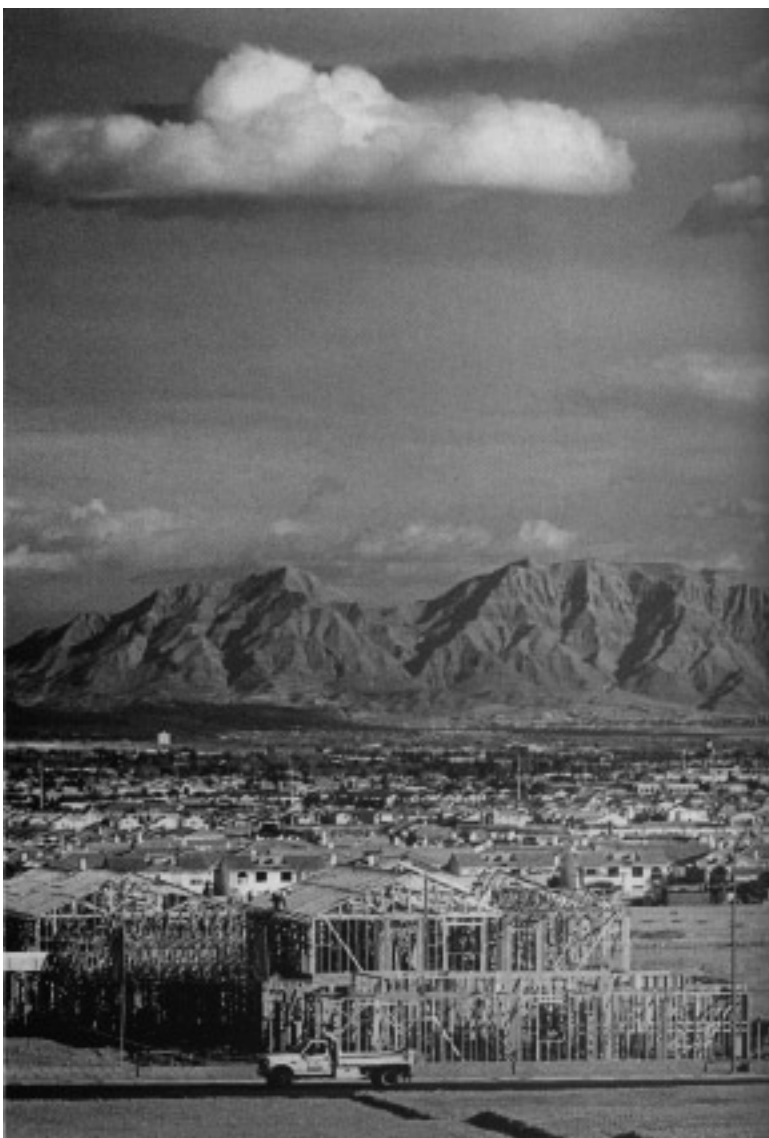


Figure 38

in general need physical models to form a vision of place. Statistics are fundamental to the realization of such a place but must be accompanied by a tangible vision of its presence.

The idea of being confined within such a great structure, potentially far from the comfort of ground level contributes to an initial distrust of such structures. It simply is not familiar. Access and safety concerns are often the major arguments for the opposition to vertical constructions. Several precedents take into account the built-in safety factors existing in large structures. One such example, taken from *Why Buildings Fall Down*, involves one of the first and perhaps the most well known skyscrapers in the world. The Empire State Building reaches a height of 1250 feet, which extends into the path of flight of planes taking off and landing at nearby airports. Due to existing weather conditions and pilot negligence, a B-25 bomber collided with the tower at the seventy-ninth floor on the morning of July 28, 1945. The tower suffered a direct hit on the floor, which left a major column slightly damaged and tore out a steel beam. Both wings of the plane were sheared off. Thirteen victims were claimed, most by a fire resulting from spilled gasoline. The tower itself was hardly damaged due to the structural redundancy built into the rigid steel frame. The tower “was designed to resist a wind load momentum two hundred times the momentum of the B-25.” Dampening, which resists harmonic vibration, was built into the structure of the building and protected it from more than isolated damage suffered from the physical impact. The technology to deal with chance events like this one and physical impacts of the everyday were present over fifty years ago.⁴³

A more modern precedent can be found in the World Trade Center towers (figure 39) in New York City completed in 1972. The two towers and five other buildings that make up the Center rest on sixteen acres and are inhabited by fifty thousand working occupants and another eighty thousand visitors on average daily.⁴⁴ The towers rest on bedrock and are reinforced against the Hudson River by a basement constructed like a bathtub with a 3,100-foot perimeter. Square in plan, the building structure consists of a tubular steel framework that reaches a height of 1350 feet. Five thousand and five hundred dampers are enclosed within each wall of a single tower and can resist a wind displacement of four feet in both directions.⁴⁵

Designed to withstand an impact greater than that of a Boeing 707⁴⁶ the towers structural capacity was severely tested thirty years after its completion. A terrorist bomb exploded in tower one on February 26, 1993 at 12:17 PM. Fifteen hundred pounds of explosives were detonated at one level of the basement in an attempt to topple the tower.⁴⁷ Neither of the towers’ structural integrity was seriously compromised even though investigators described the impact as the “largest by weight and by damage of any improvised explosive device” that had been encountered since the



Figure 39

introduction of modern explosive forensics in 1925.⁴⁸ All six people killed were located in the basement and within close proximity to the van that delivered the bomb. Although many more were injured, most from smoke inhalation due to fires started by the blast, it is remarkable that only six casualties resulted from an attack during peak hours of occupation. Inhabitants throughout the tower felt the explosion; however, measurement devices did not detect significant movement. These devices noted structural shifts from sustained fifty five mile per hour winds a week later, but with no diminished structural stiffness as a result of the bomb.⁴⁹

The construction of the World Trade Center towers not only marked structural innovations in tall buildings but also diminished barriers to vertical transportation in large buildings. Innovations in elevator arrangement were based on a series of vertical zones within the tower that serve as transitional platforms for passengers to arrive and depart. Vertical shafts were divided between express service to the lobbies of three zones and to the top of the tower, and local service, serving the floors of each zone. Designers therefore consolidate local service and reduce the amount of floor space devoted to shafts. Express elevators that serve the lobby of each zone reduced elevator wait time. However the occupants did have to walk from the express elevator across the lobby to the local. Otis designed unique cabs with doors on both sides that allowed the first traveler on to exit first. Express elevators moved at 16,000 feet per minute and could carry about fifty-five people, while the locals consisted of standard elevators moving at 800 feet per minute allowing a passenger to move from the street level to fortieth floor in 25 seconds. These innovative ideas allowed the World Trade Center to be designed with 75% usable space versus the 62% best in other skyscrapers.⁵⁰ Approximately 40,000 people work within the building and an estimate of 450,000 trips are seen by the elevators every day.⁵¹ One major criticism of the twin towers was the potential increase of congestion in the Manhattan area due to the sheer number of people working in the building. The catastrophe that some predicted has never really materialized. In fact, varying working hours due to the number of unique business housed in the towers, as well as restaurants and other shopping activities located within the building, reduce the amount of people leaving directly. Generally, evenings are less hectic than morning rush hour at the World Trade Center. Certainly adequate infrastructure is necessary for such large-scale developments, however, those opposed to the development in general easily leverage such scare tactics to gain opposition support.⁵²

Technology that decreases construction costs and increases the safety of the occupants as well as the practical movement of those inhabiting a mega-structure is continually improving. Otis elevators' recent Odyssey concept offers an alternative to traditional inter-building transportation. Otis's conceptual design envisions capsules that travel horizontally as

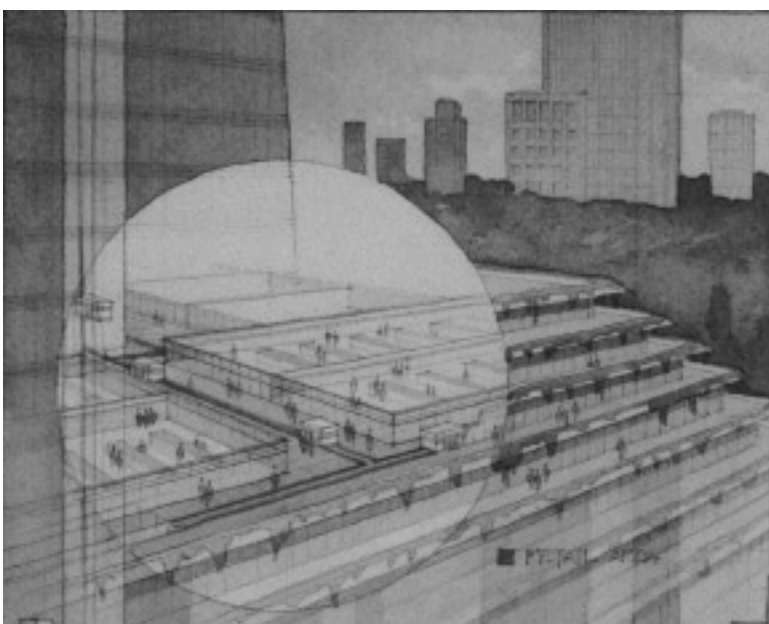


Figure 40

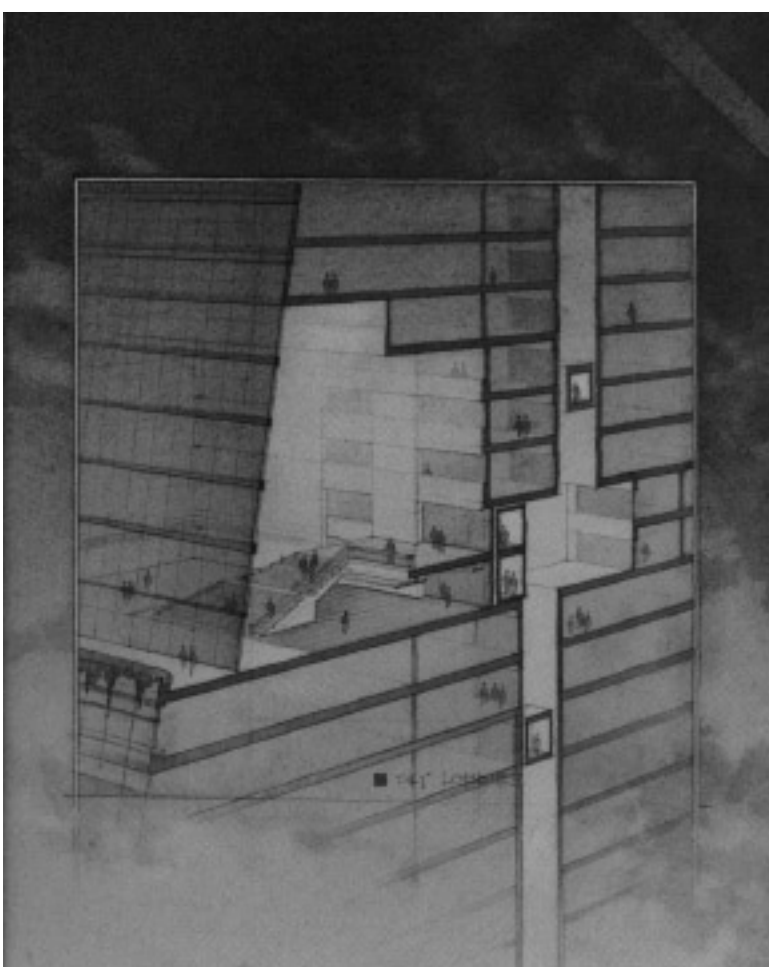


Figure 41

well as vertically. Inter-changeable horizontal and vertical transportation (figure 40) increases the feasibility of efficient travel in large structures. Multiple modules inhabit a single hoist-way with offset horizontal landings for unloading (figure 41). Landings not only become a transition point from vertical to horizontal movement but also allow other modules within the same hoist-way to move past vertically. The number of hoist-ways and machine rooms can therefore be reduced, saving construction costs and increasing usable floor area. Otis asserts, in the Odyssey brochure, that the elevator modules' dual capacity would enable the system to move an individual horizontally, from a parking lot and then vertically to a sixty-story sky lobby in 90 seconds. Conceptual transportation designs increase the potential for large structures to be practically realized.⁵³

Most damaging to the potential of mega-structure construction is the inevitable doubt of those who see the project as a utopian fantasy. Doubt surfaces within the architecture profession as well as outside it, and cannot be underestimated as an impediment to progress. Students and practitioners, who resist contemplating the potential of human endeavor and desire to make such a construction, idly brush the project off as unreal or romantic. They are content to remain within the comfortable confines of what they "understand". The author recognizes his own struggle on this account and thanks his thesis committee for pushing him beyond his comfort zone. Through the efforts of this study the author has expanded his worldview and realized the potential contribution to humanity that designs like the thesis proposal offer. Although shortcomings in the thesis work must be recognized, the work realizes a physical model that must precede the architecture and was never meant as a final proposal. In order to achieve a humane urban environment, the nature of such structures must be studied through design.

A way of working must be defined. Carlo Scarpa's profound drawings (figures 43-44) testify to the power of individual judgement. Working toward the final design (figure 42) Scarpa explores moments through sketches transformed by the interjection of the human figure into a place. These drawings express the joy of composing a work of architecture.

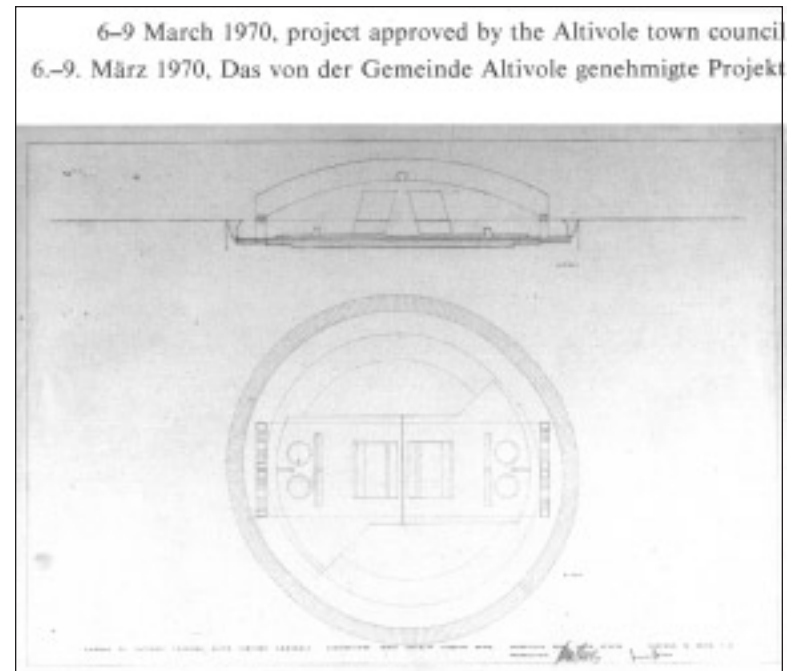


Figure 42

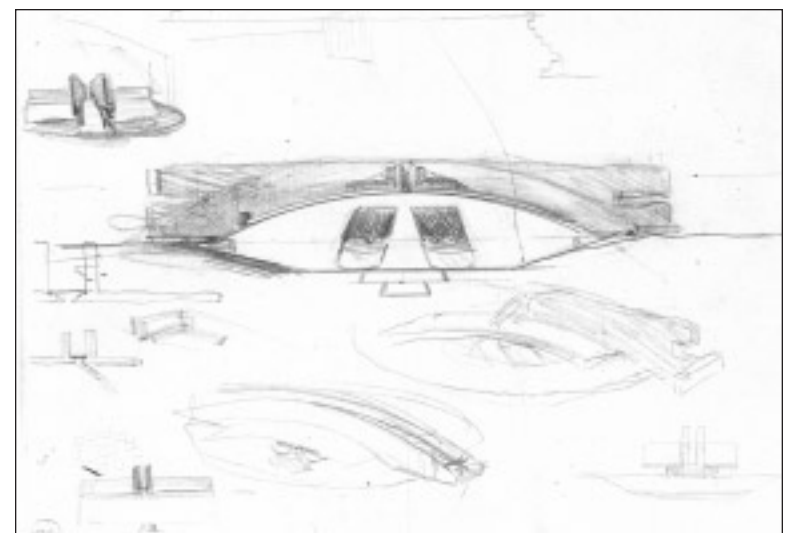


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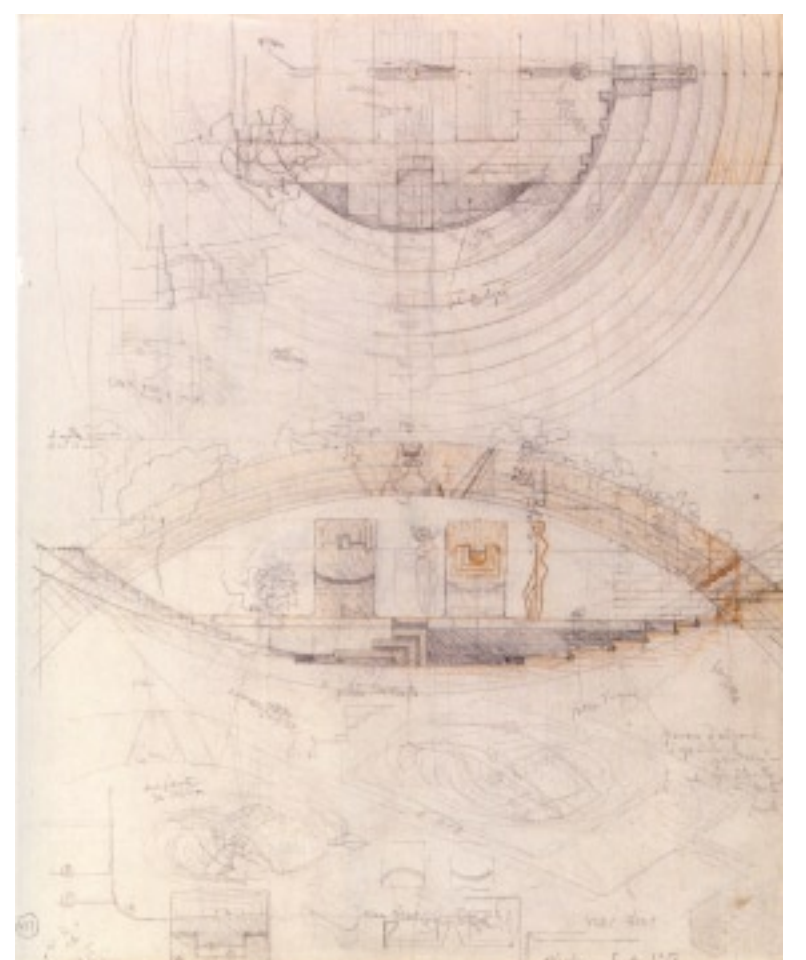
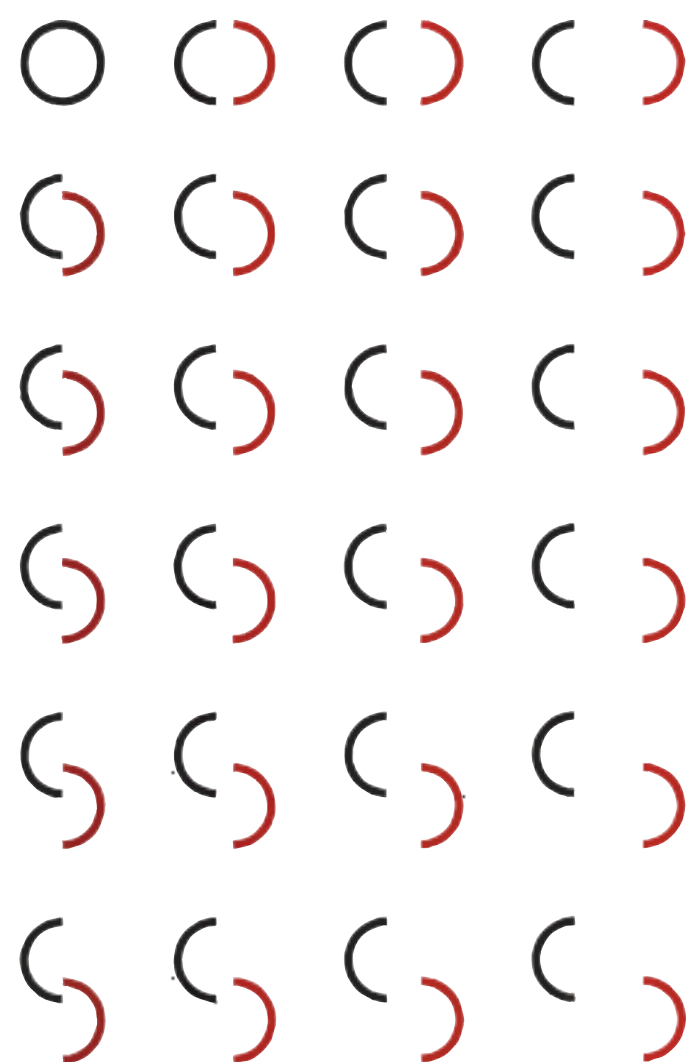
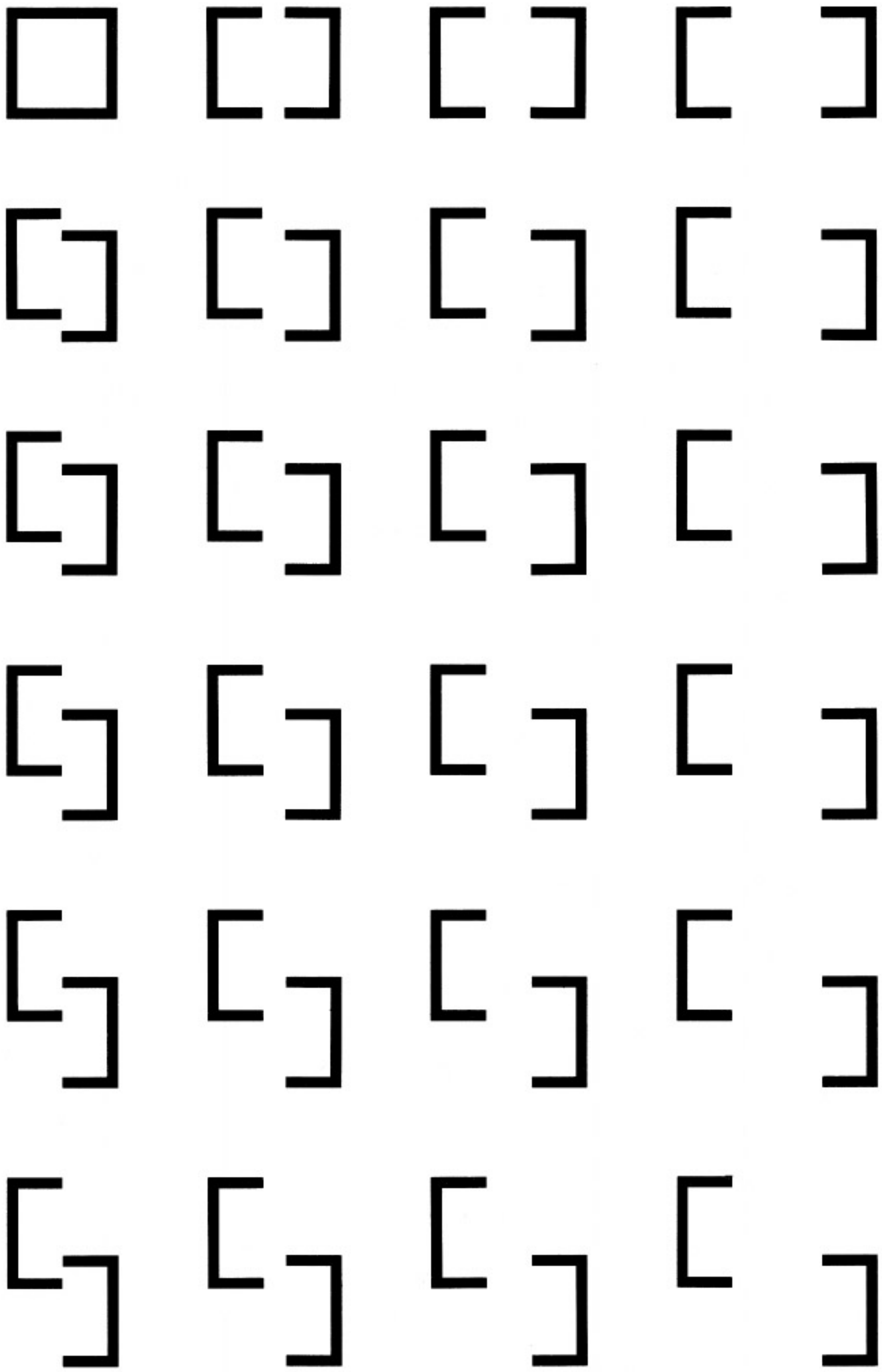


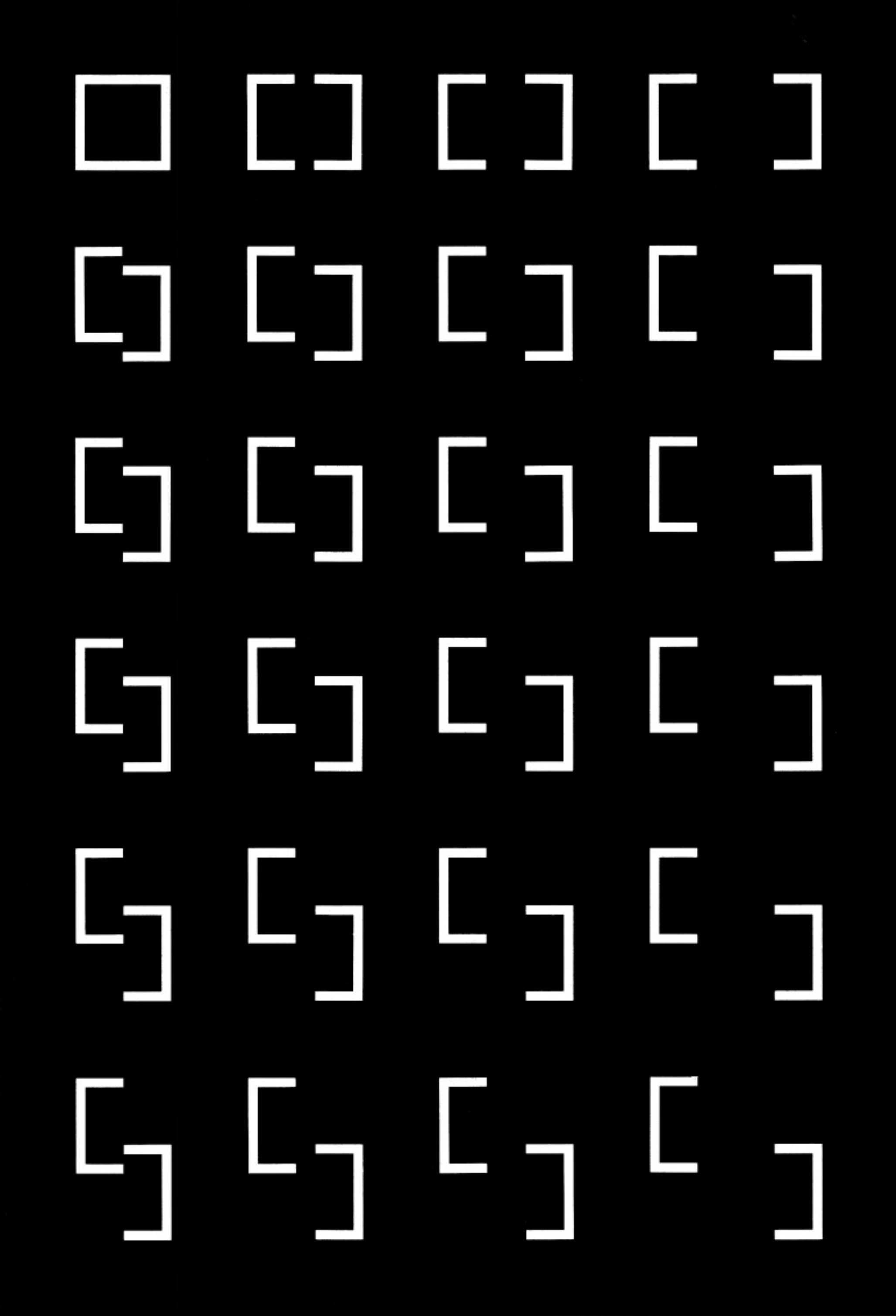
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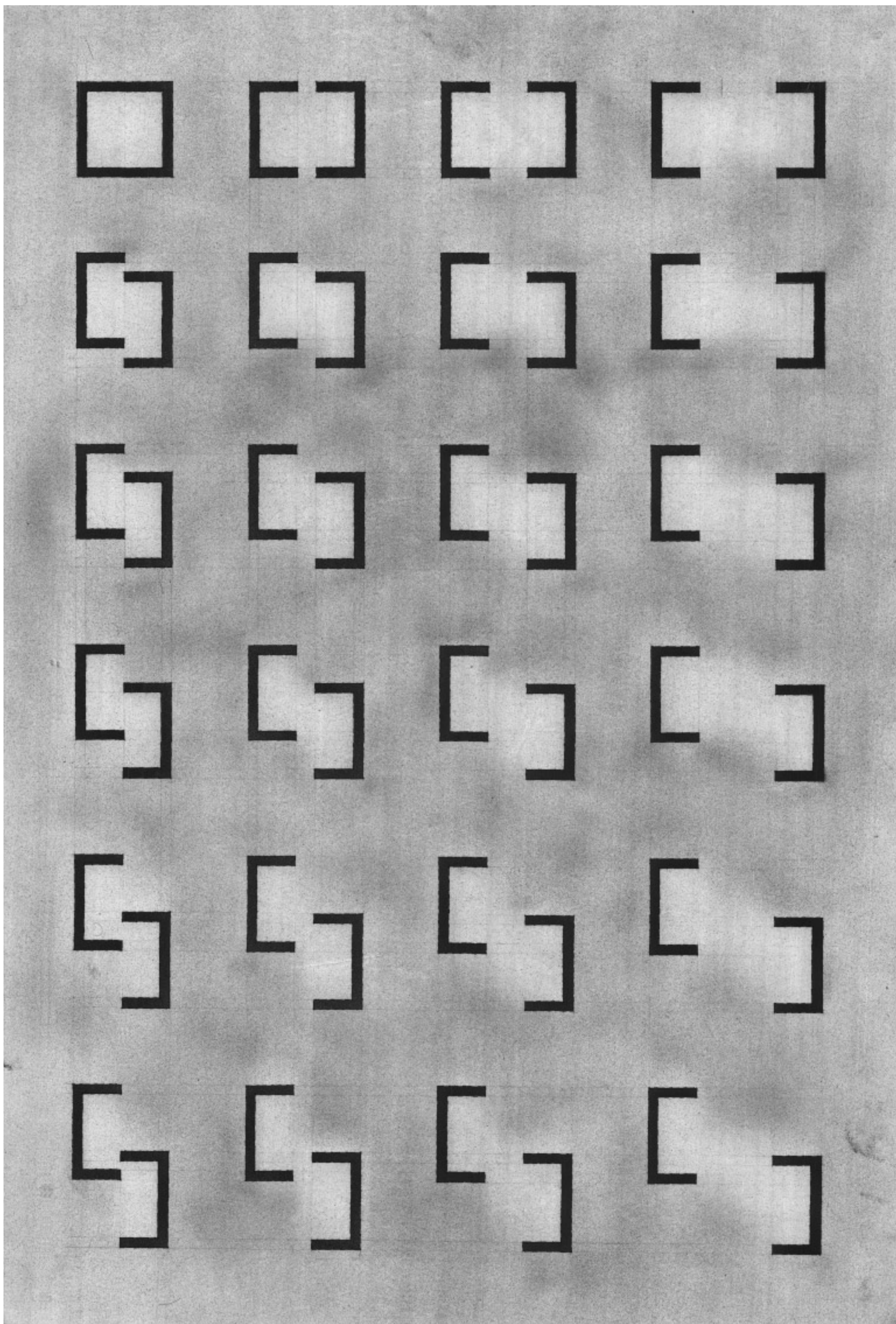
PLATES

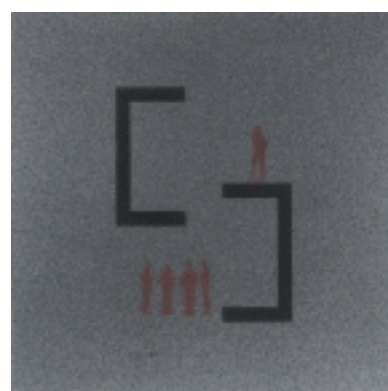
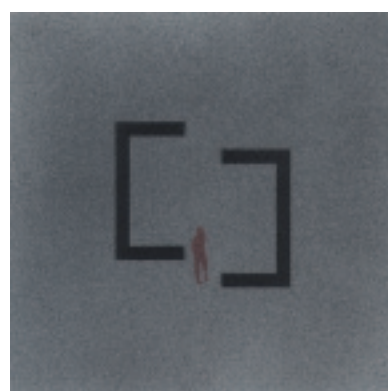
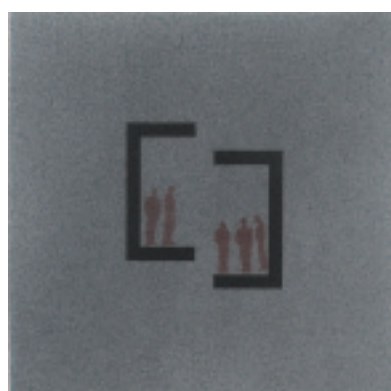
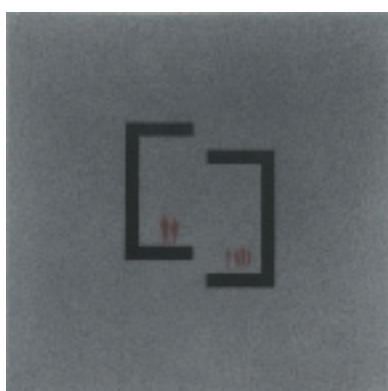
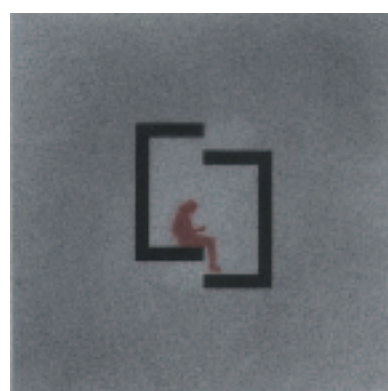
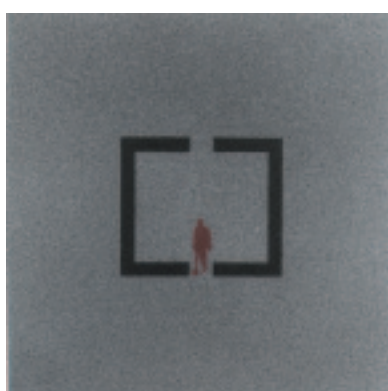
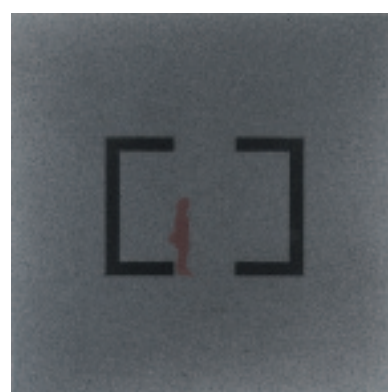
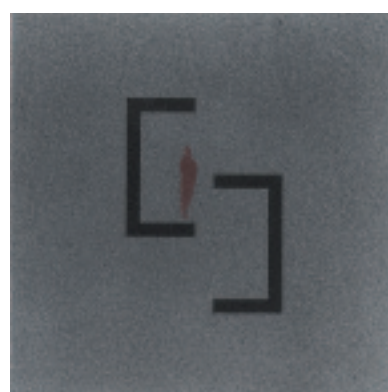
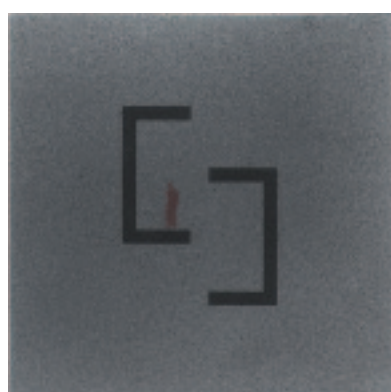
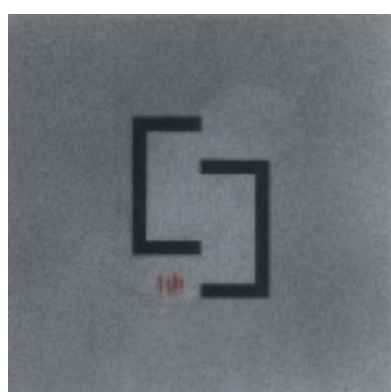
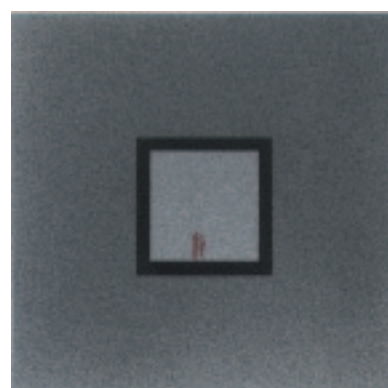
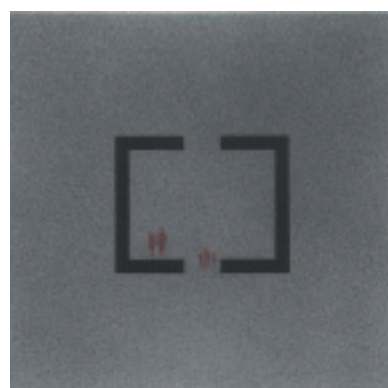
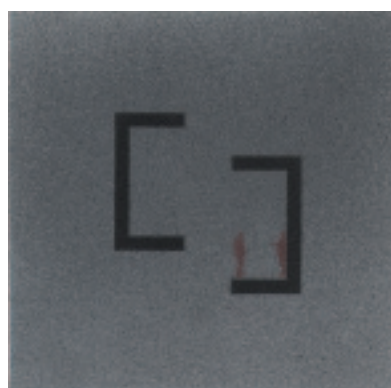
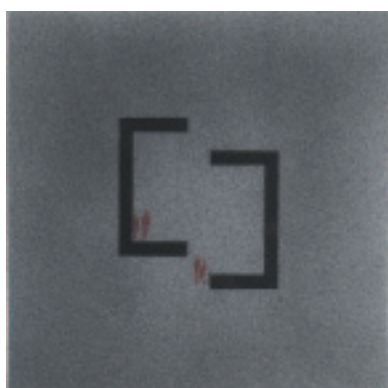
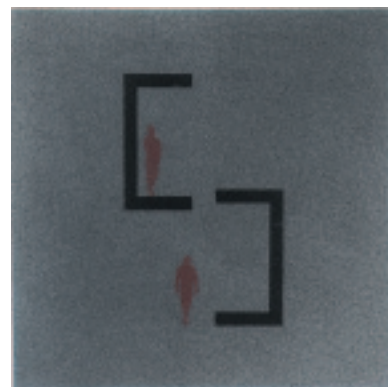
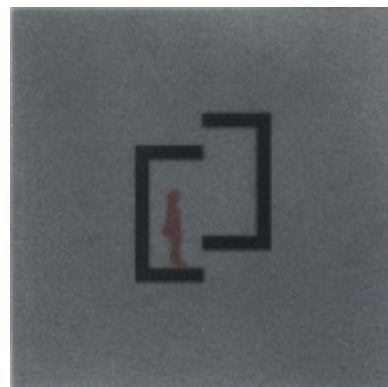
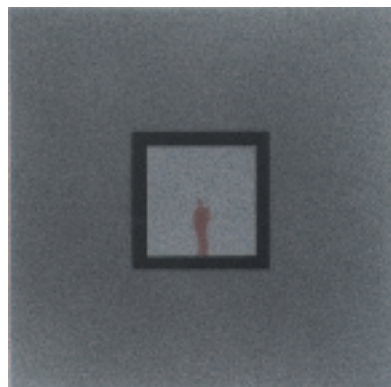




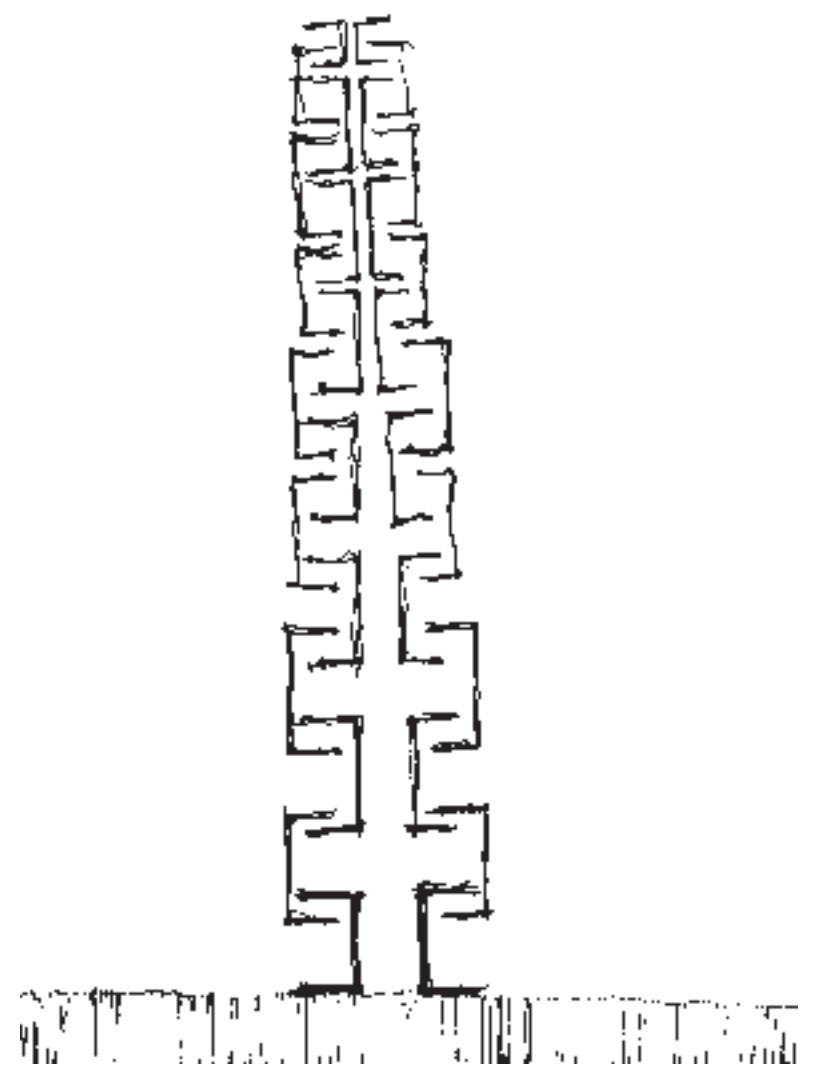


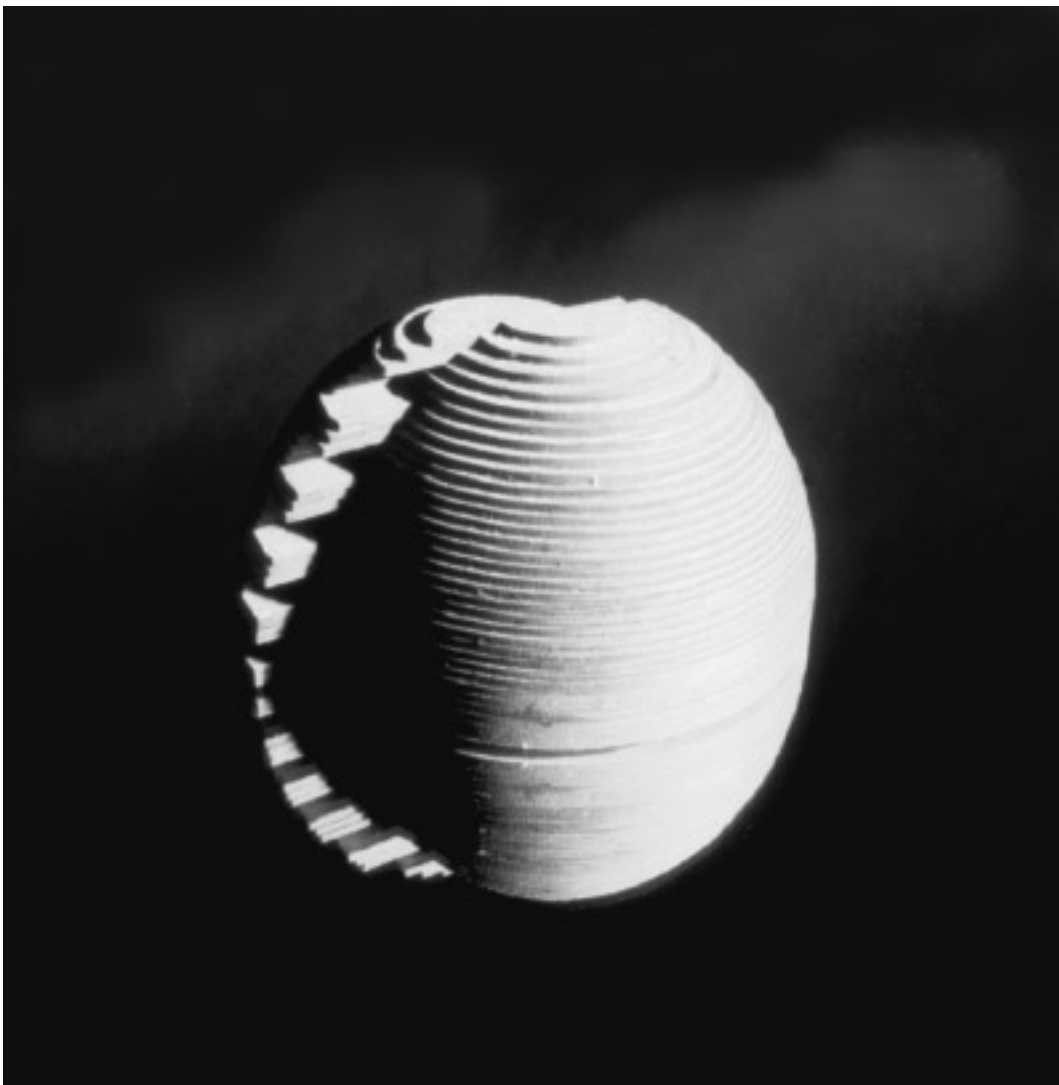
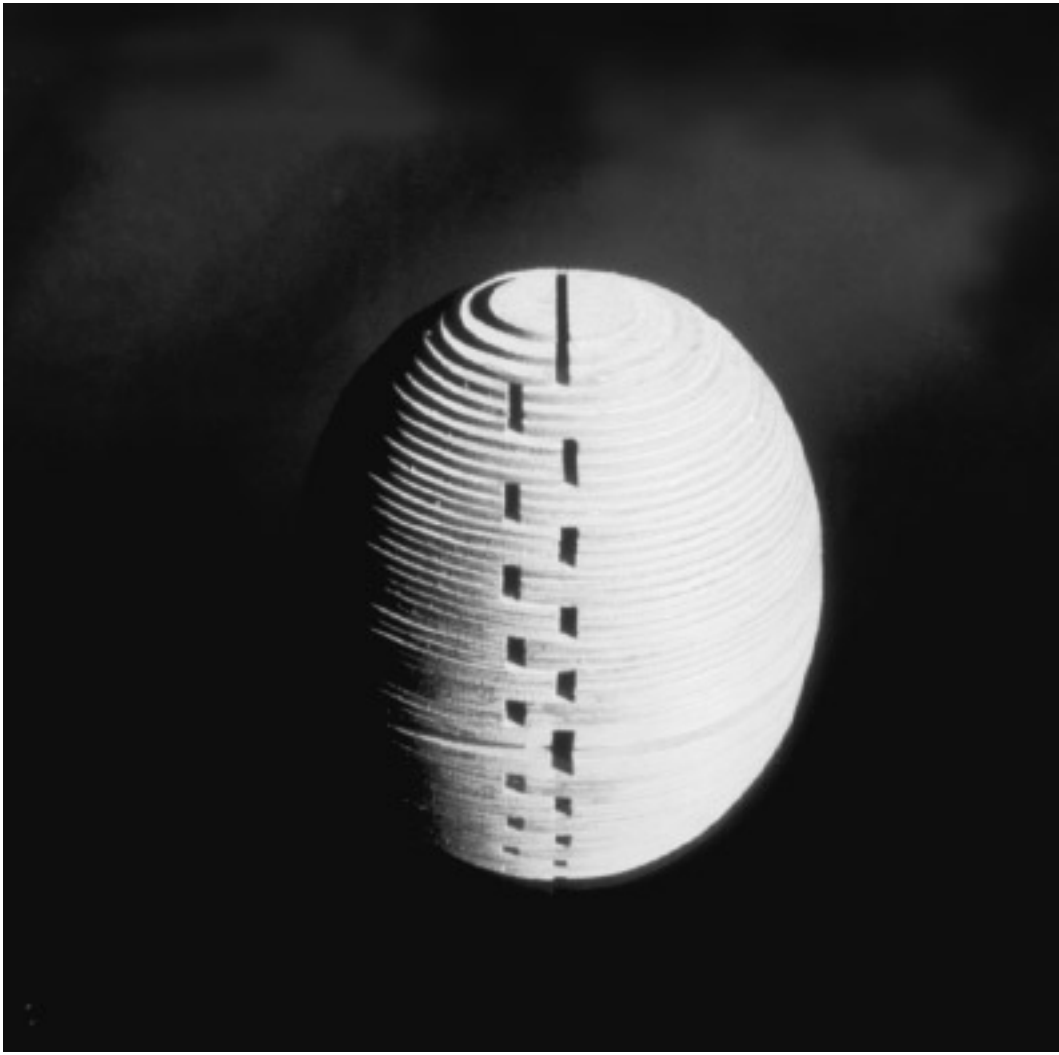






IDEA FOR A TOWER

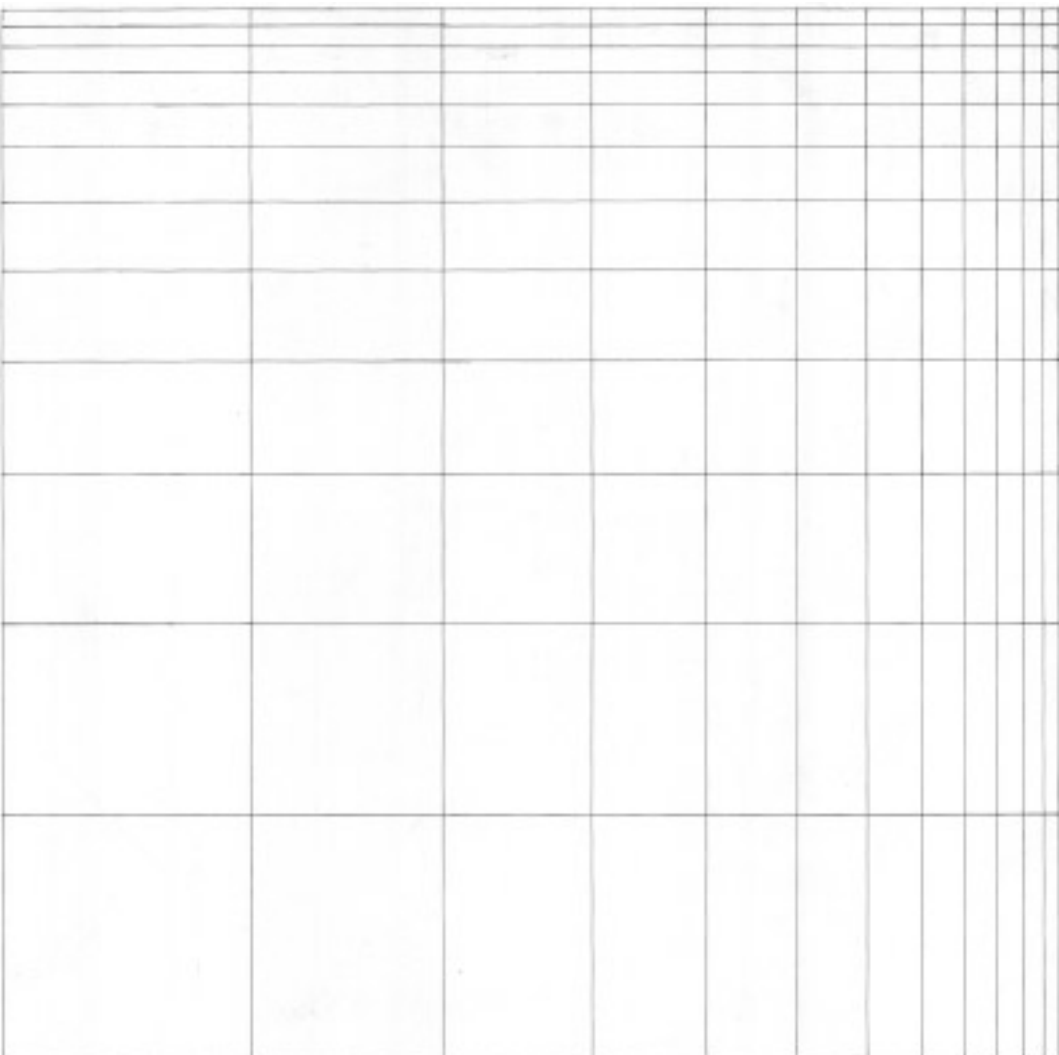


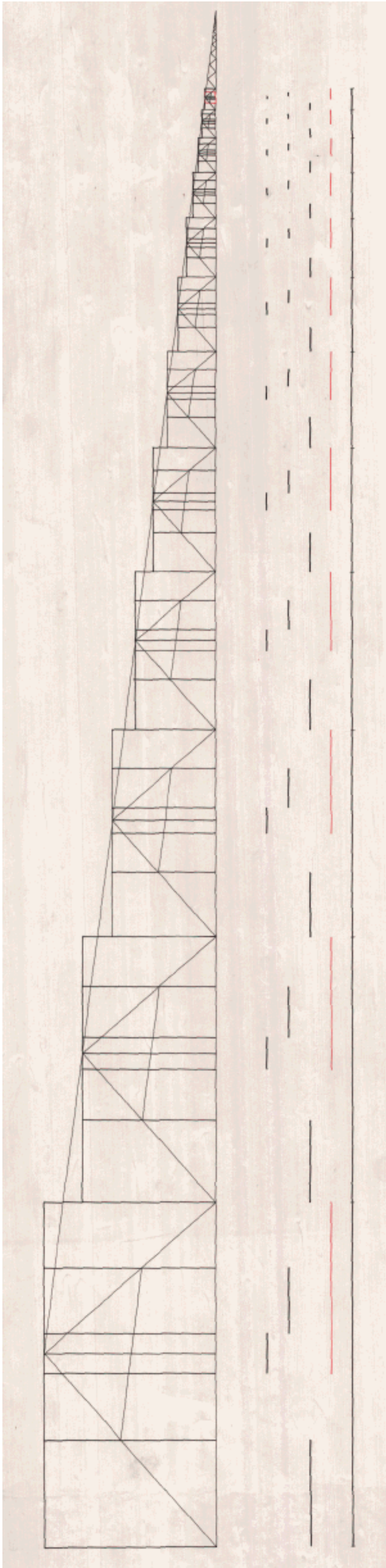


The initial design concept was discovered within small models of a cube, a cylinder and a sphere. Each model was constructed with a joint at its center to allow the object to be split into halves. Spatial relationships between these divisions were established as each half was pushed or pulled toward or away from the other. A series of watercolors, constructed to explore the limits of such movement, became objects in themselves. These fields, exhibited in the previous plates, offered clues to restructure the direction of the thesis.

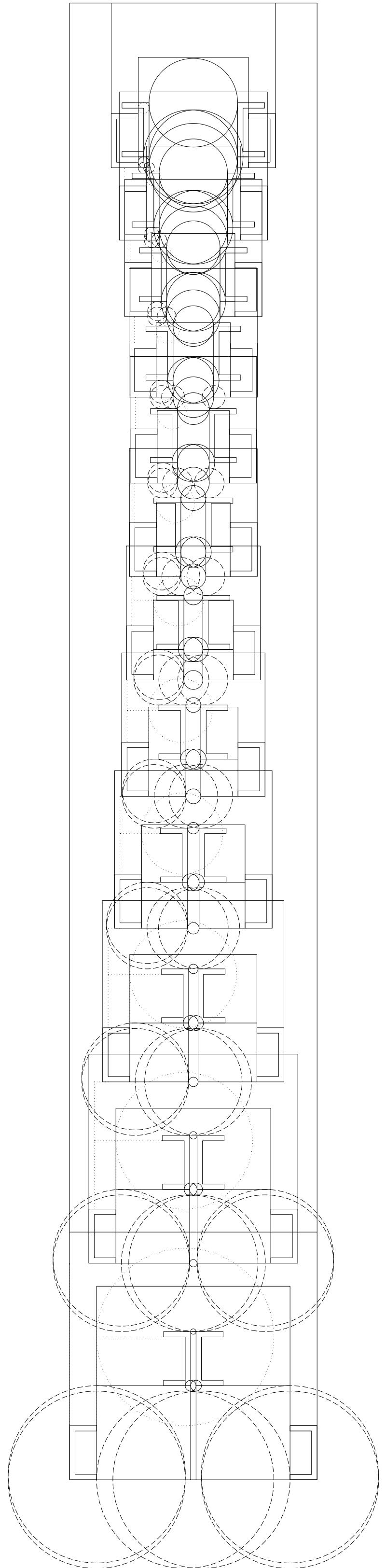
Initially, the disjoining of the halves by arbitrary increments of separation governed the layout of the plates. An attempt to restructure the movements according to a determined measure was made based on various proportions. Finally, a configuration based on a Fibonacci series established increments of separation that defined a new field of objects. Rather than produce this field as another watercolor plate, a decision to insert the human figure into isolated cells framed the direction of rest of the study. What were once merely planes became a pair of walls. A series of twenty-four sectional plates were developed that would ultimately find their way into the design of an urban mass.

During the making of this series of plates, the wall elements were arranged along a line and an idea developed for the form of a tower. An initial sketch describes this impulse with a crude line. A way to define the line was necessary. Taking the thickness of a wall element as a module a line was constructed that defined the massing of a tower. Distinguished tones served as divisions of space in-between these wall sections and implied a spatial depth. Each section along the line was disassociated from the whole and explored through axonometric drawings. Spatial distinctions between each section became more evident, yet the drawings lacked a definitive solid or void.

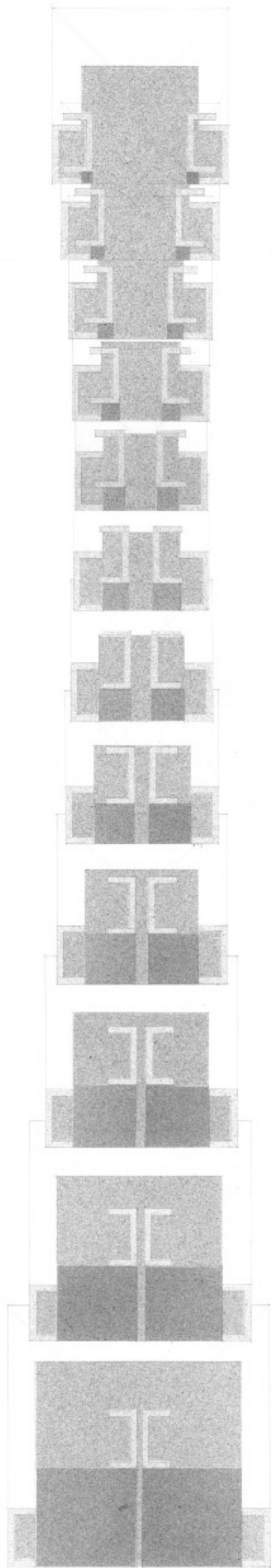


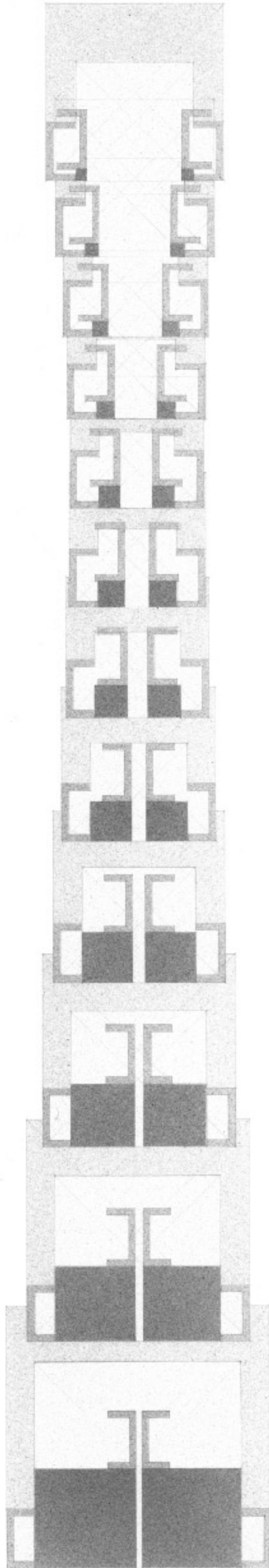


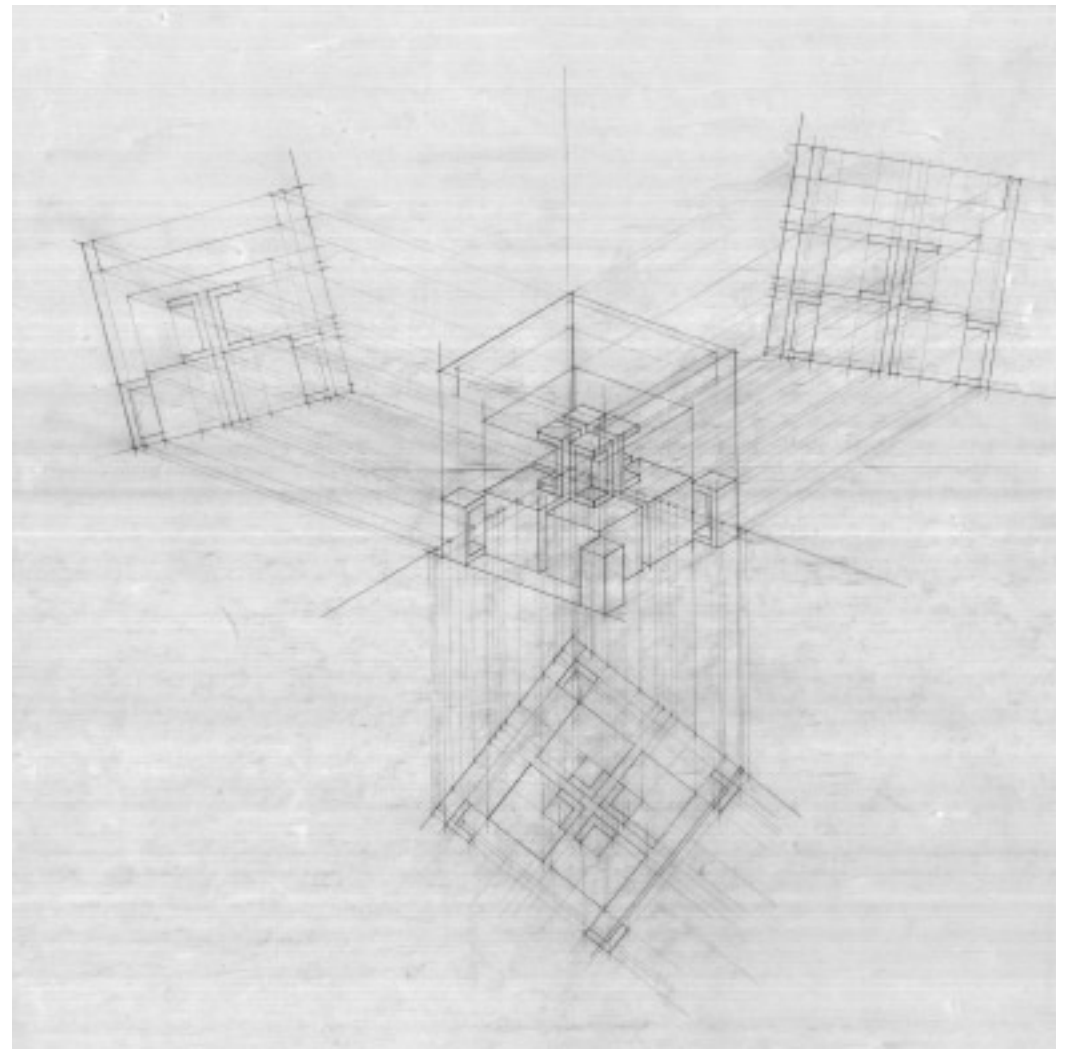
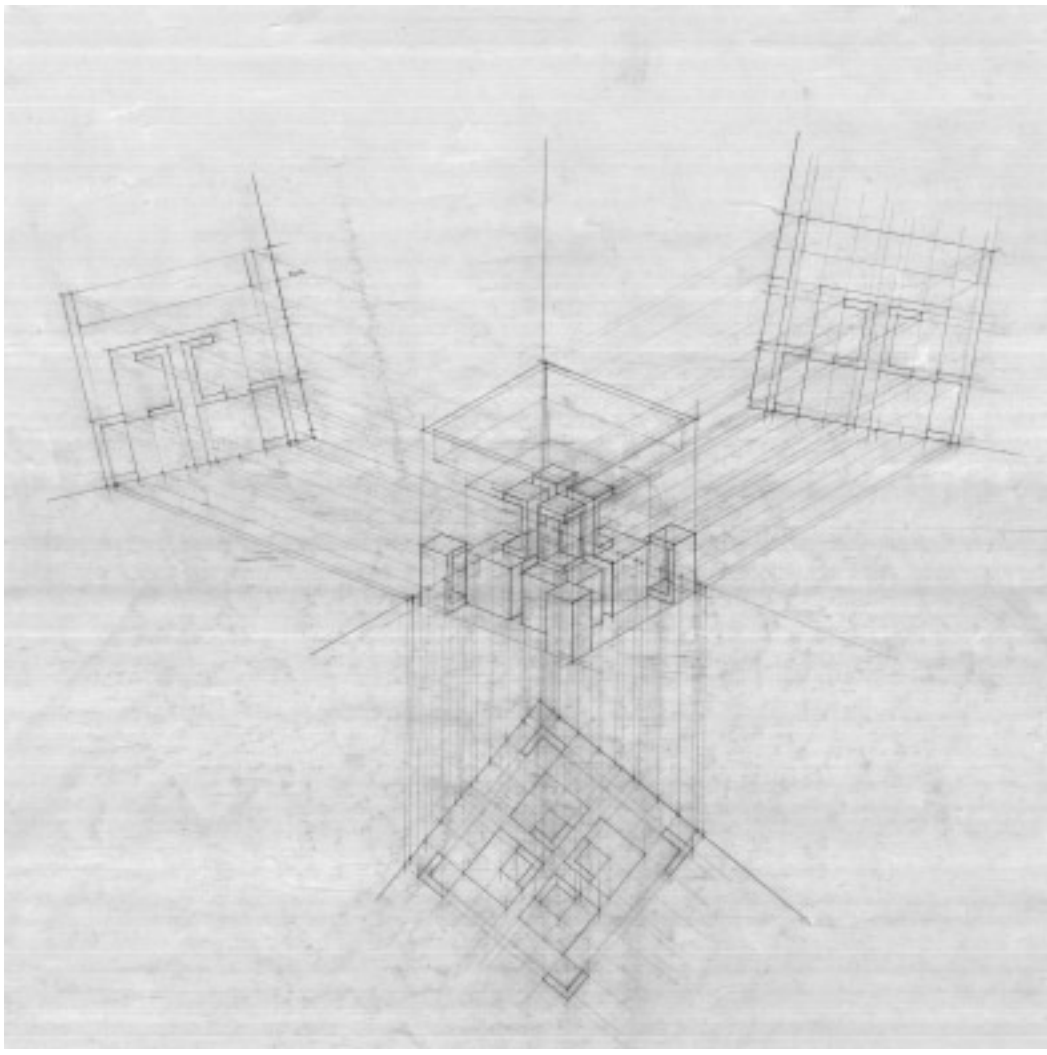
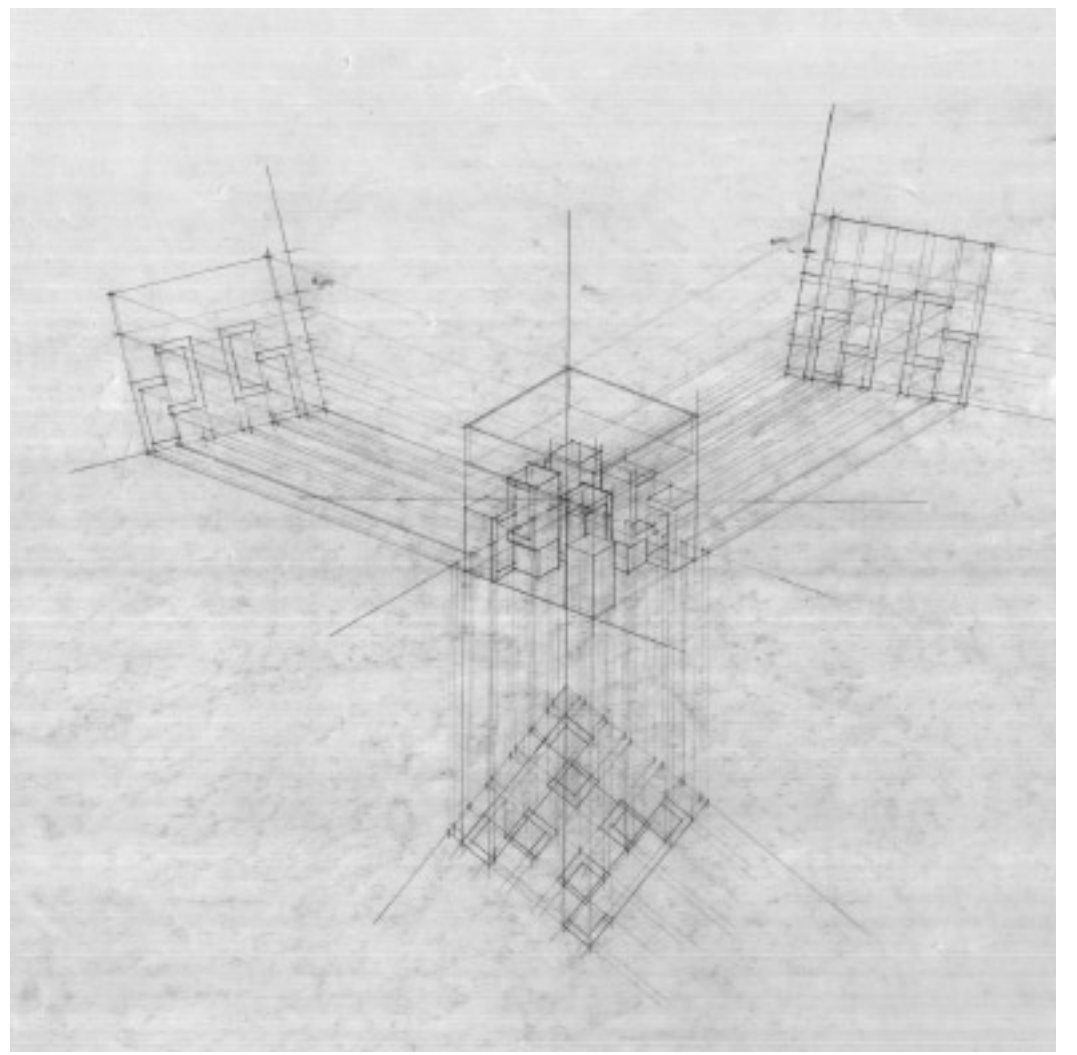
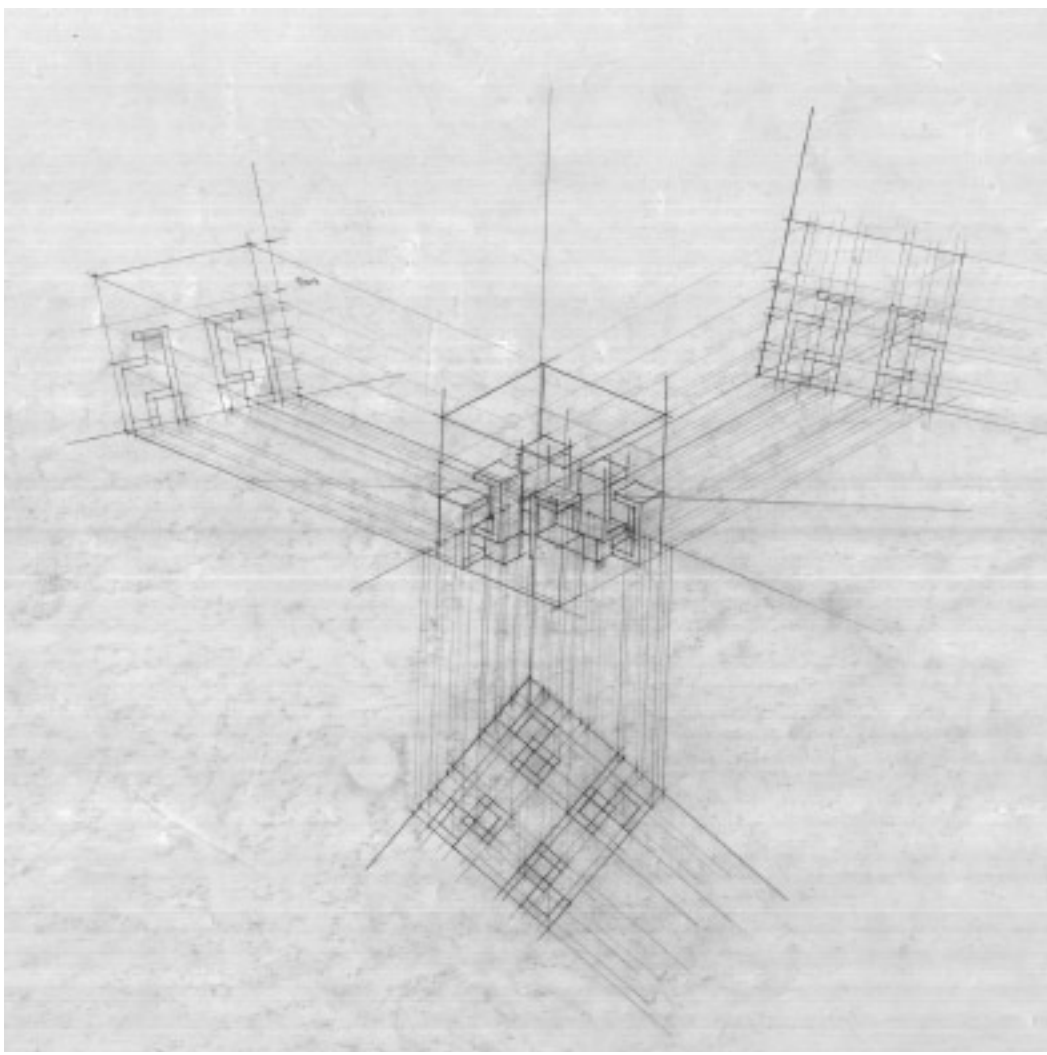
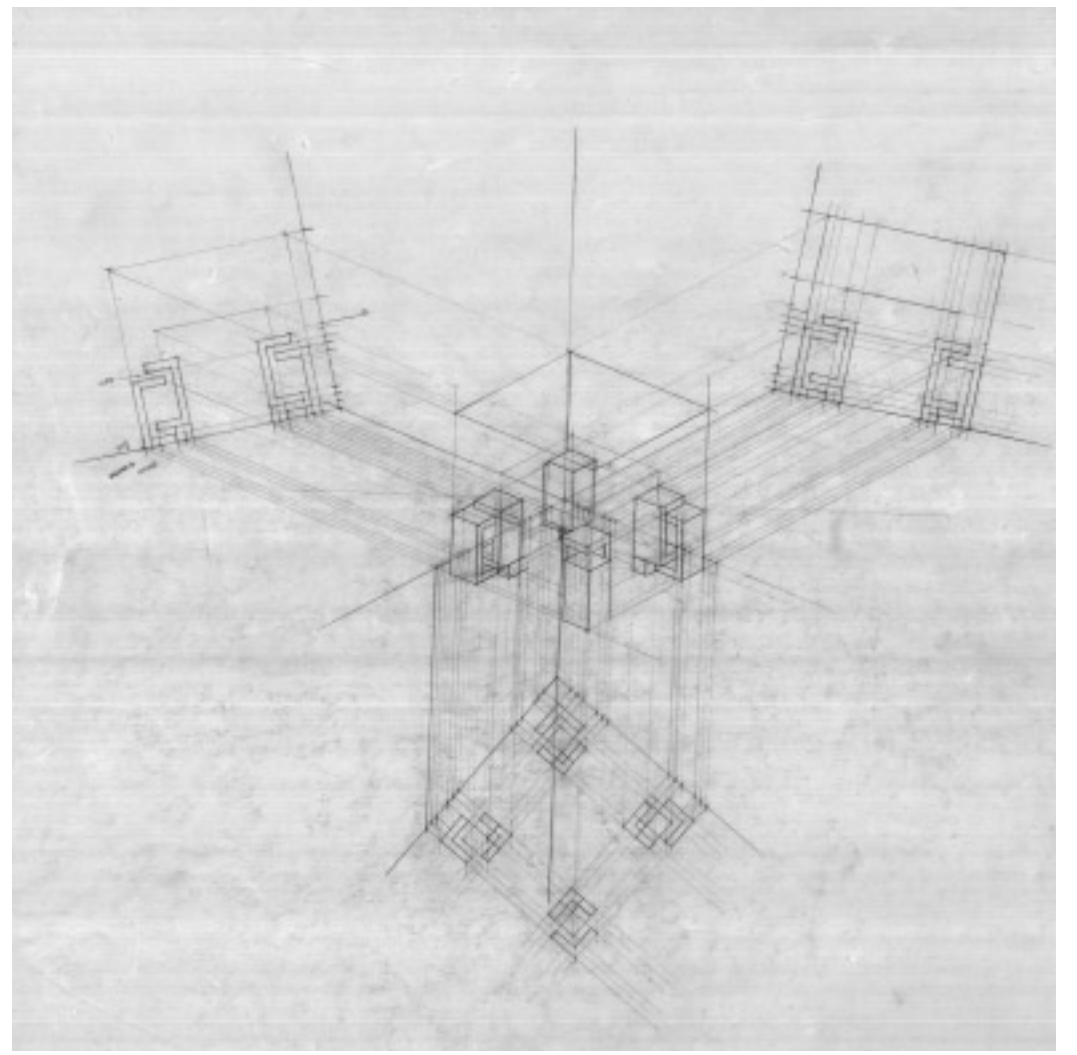
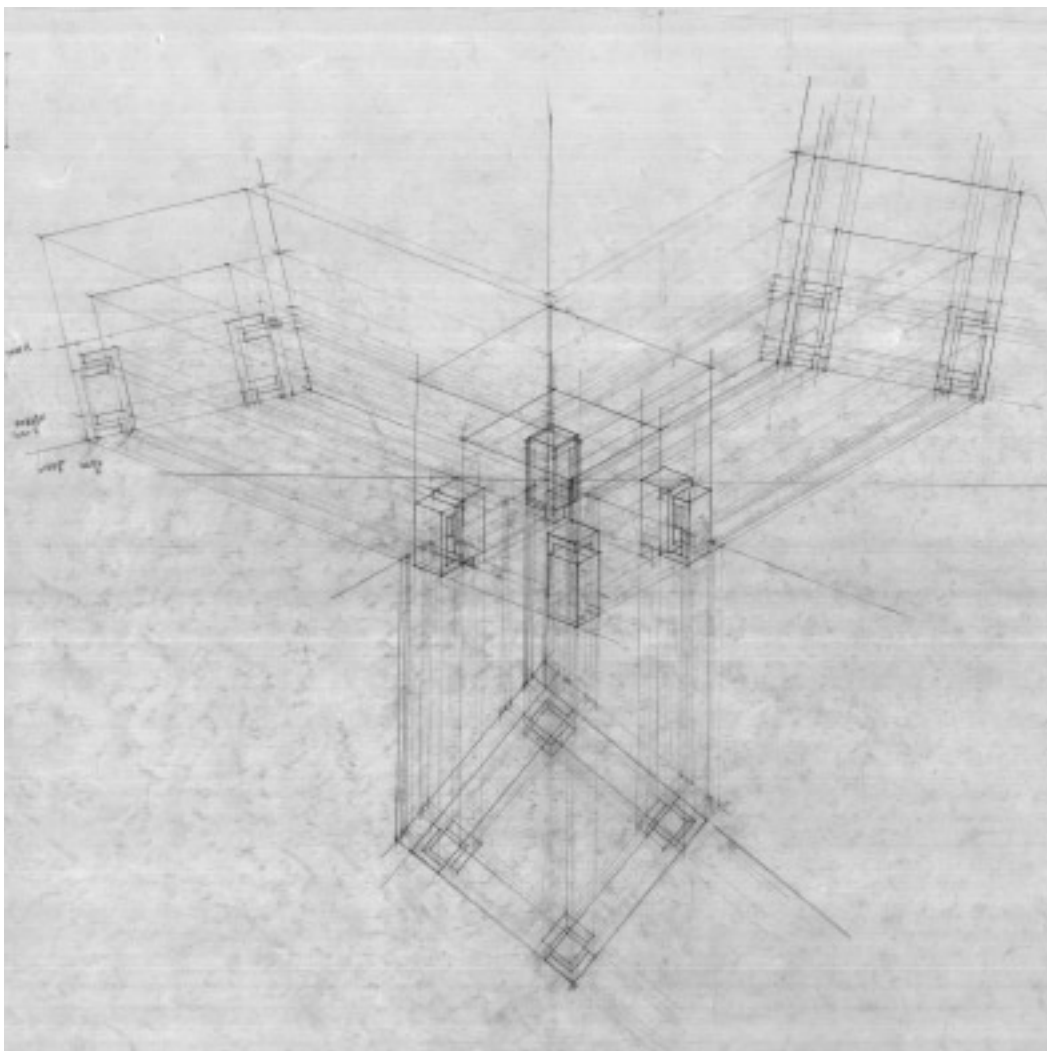
Fibonacci ratio used to establish a measure governed by a single unit.

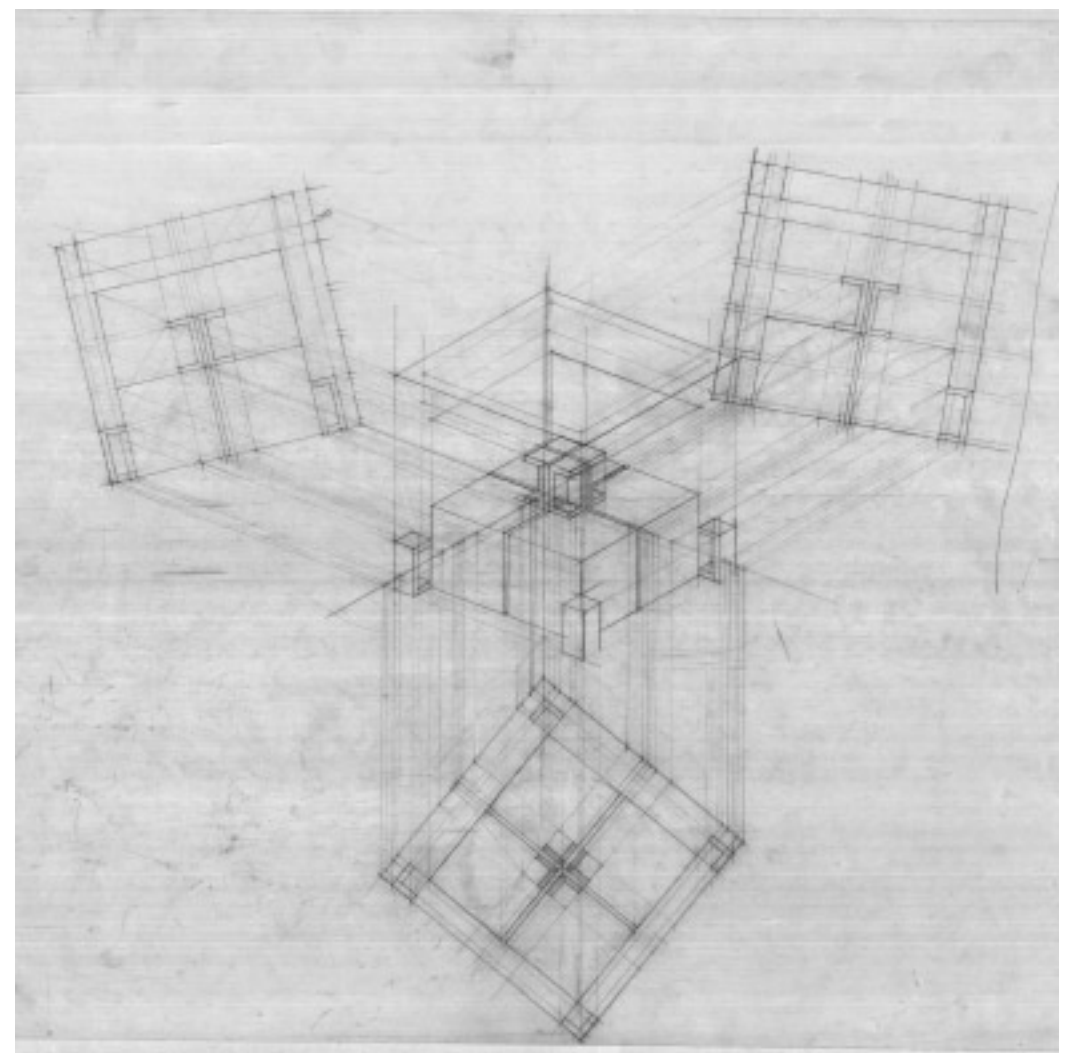
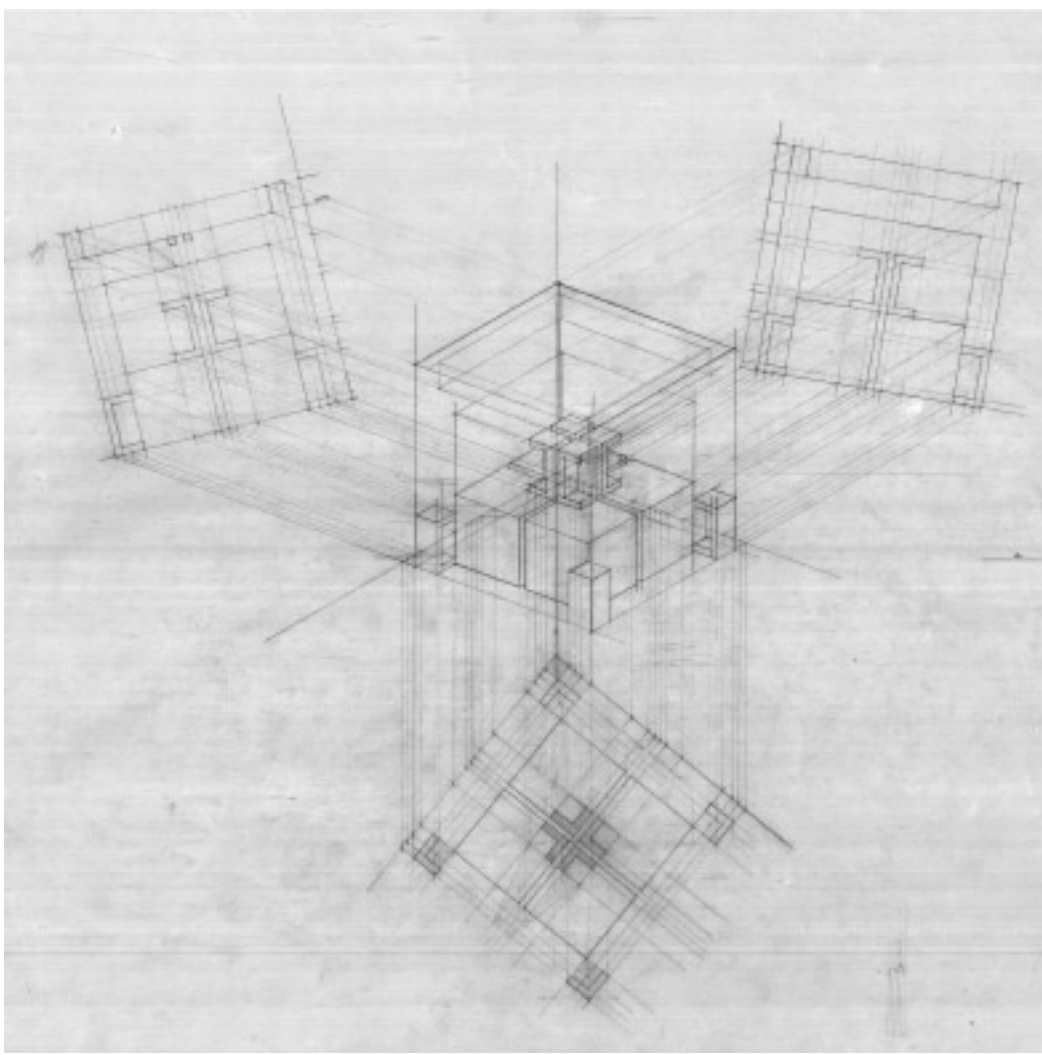
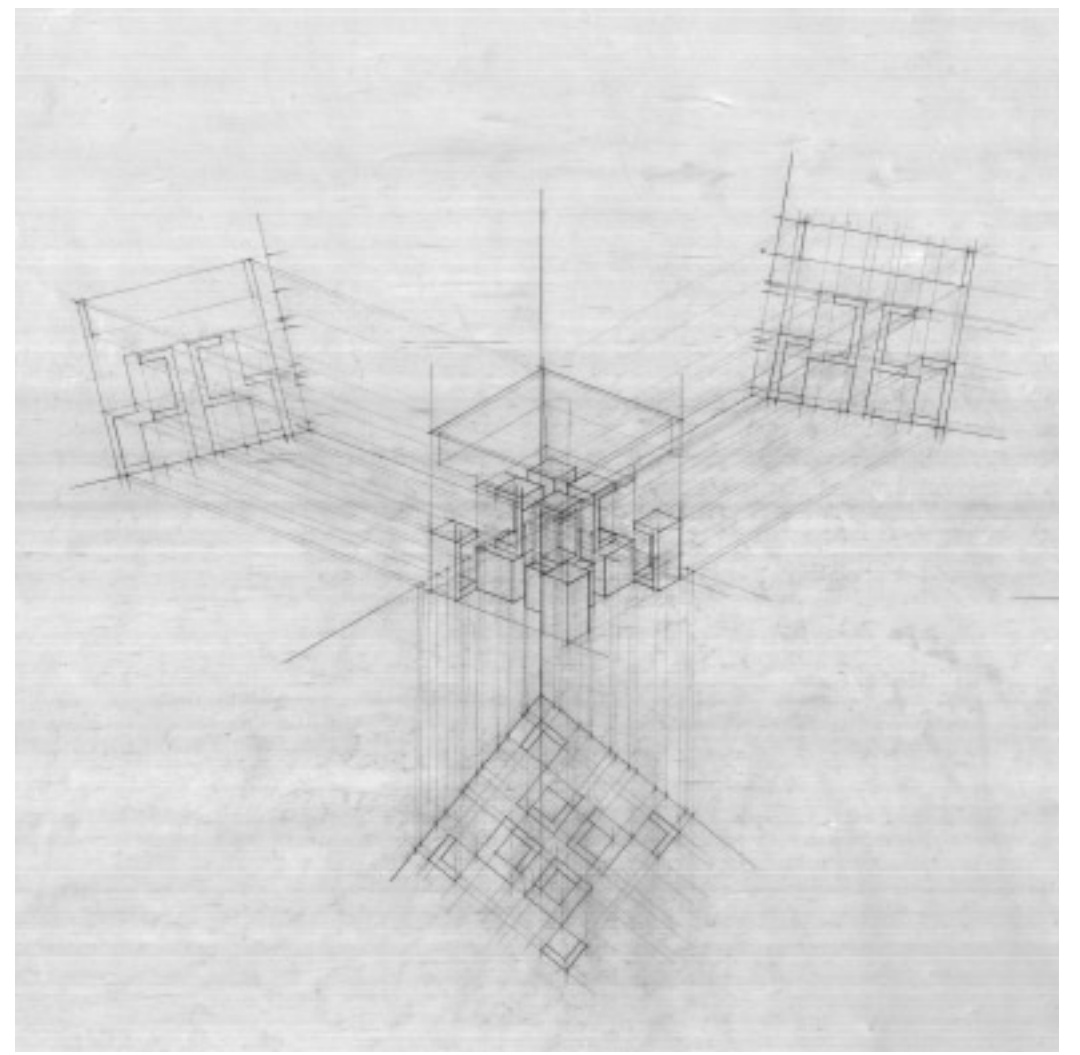
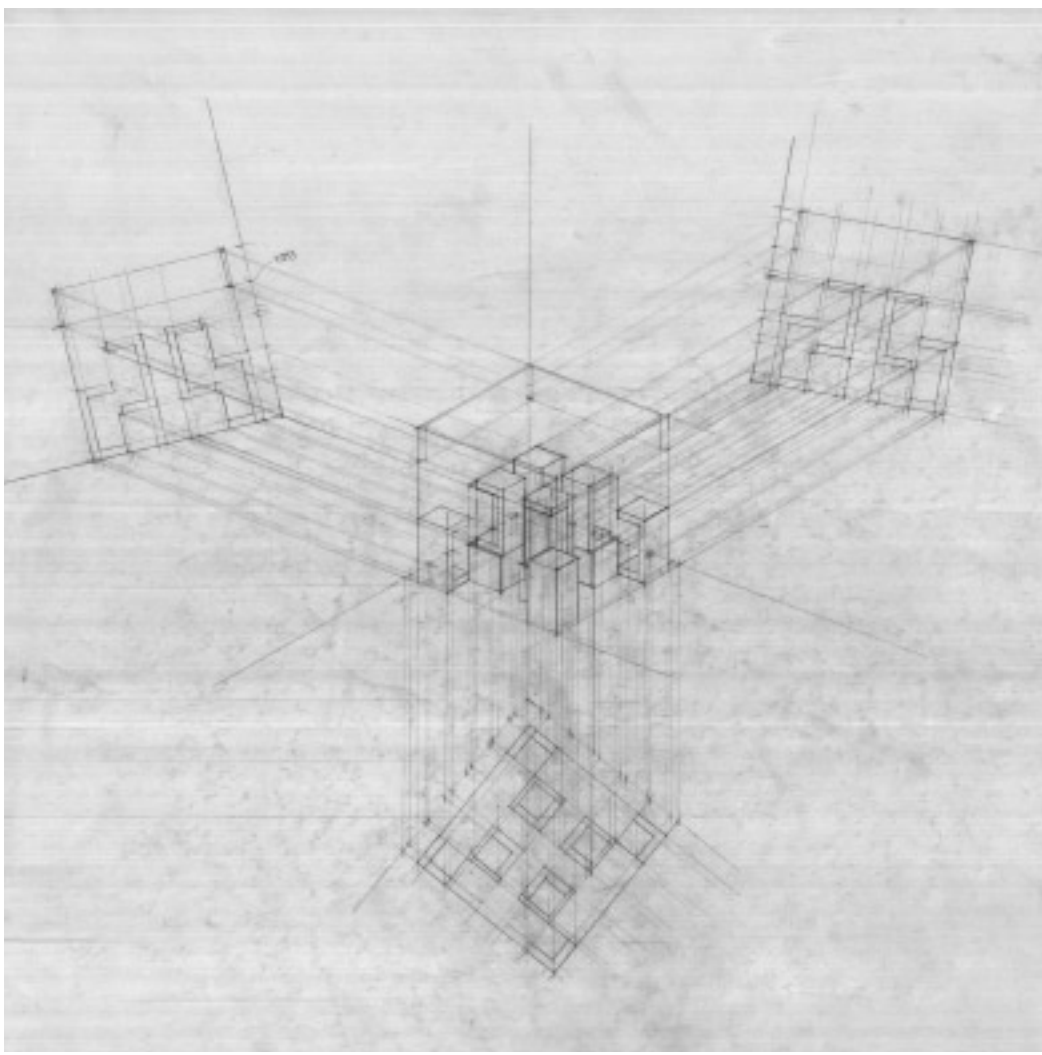
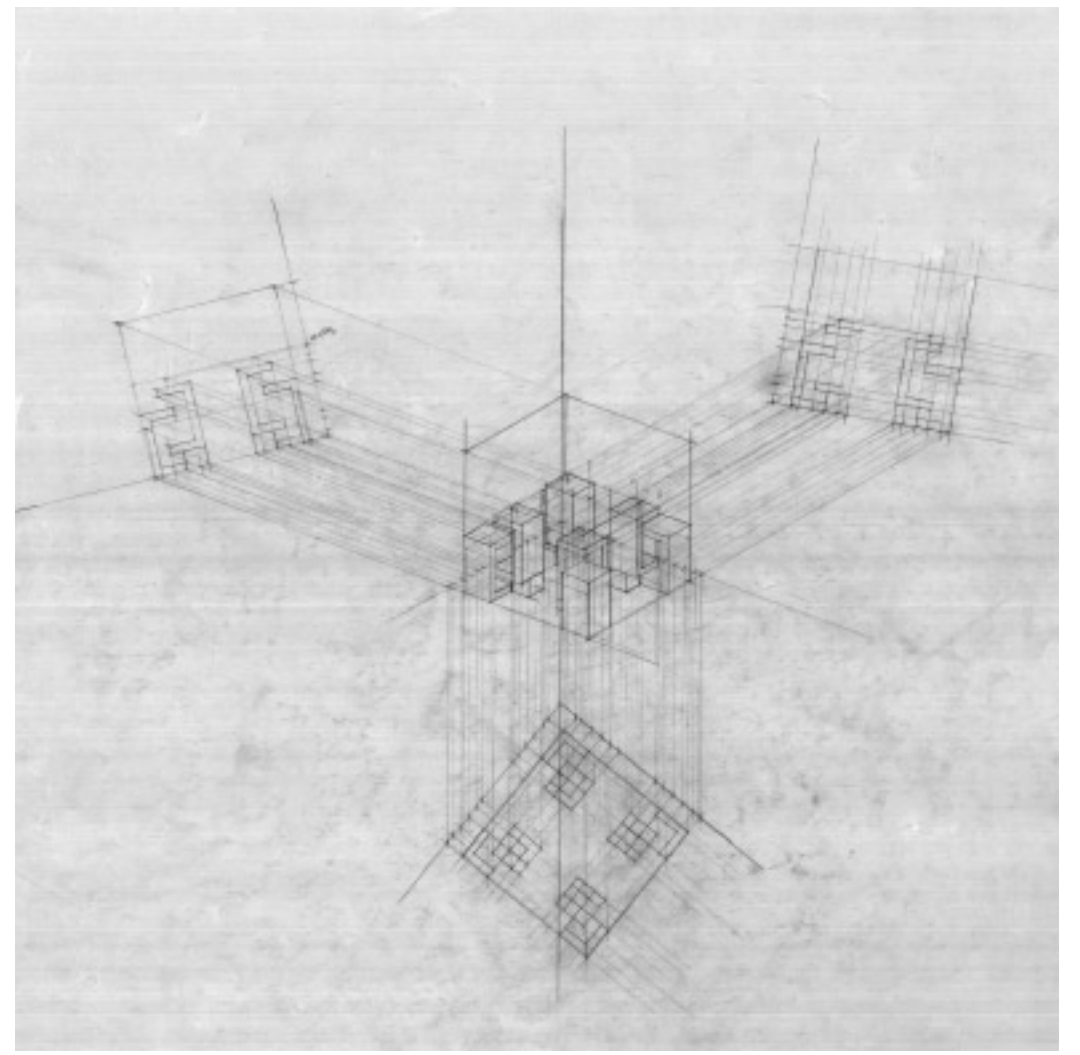
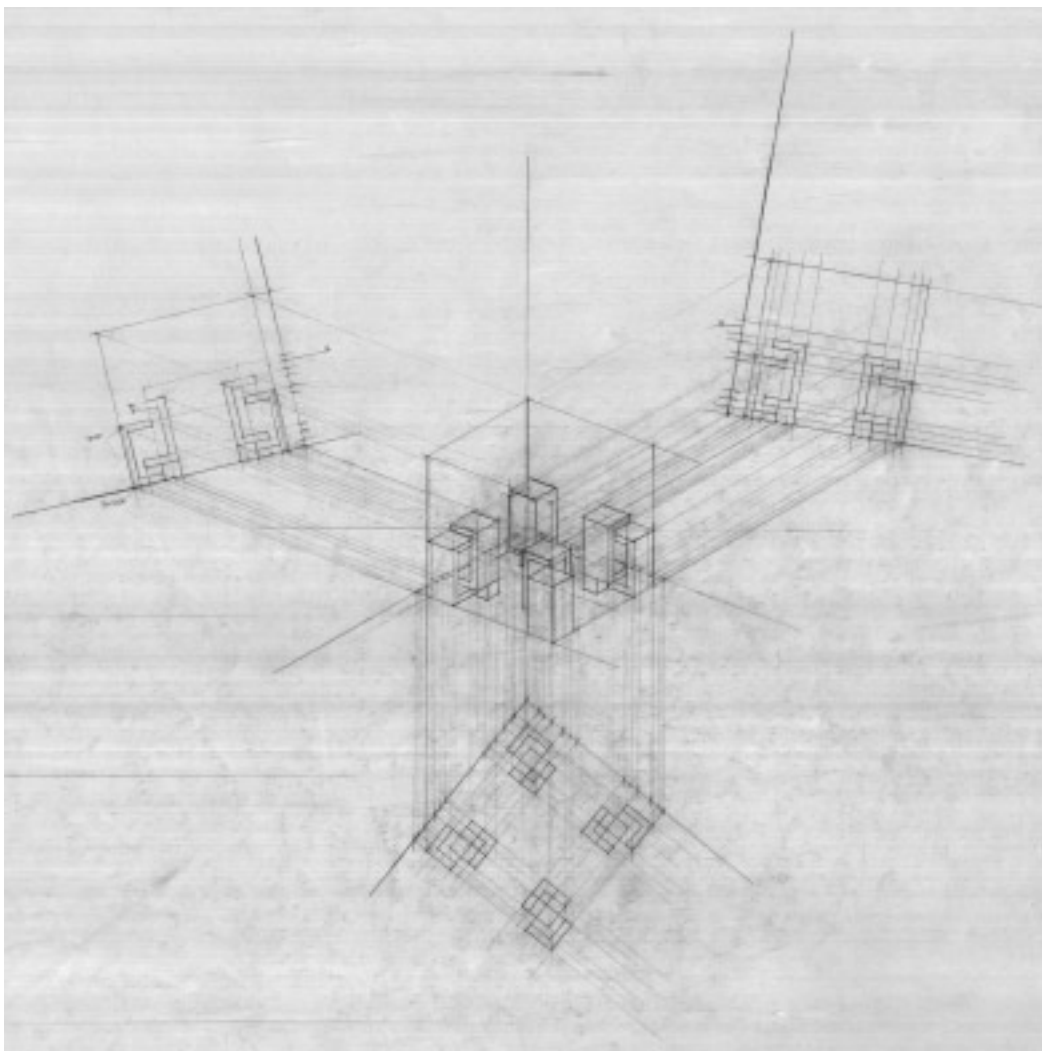


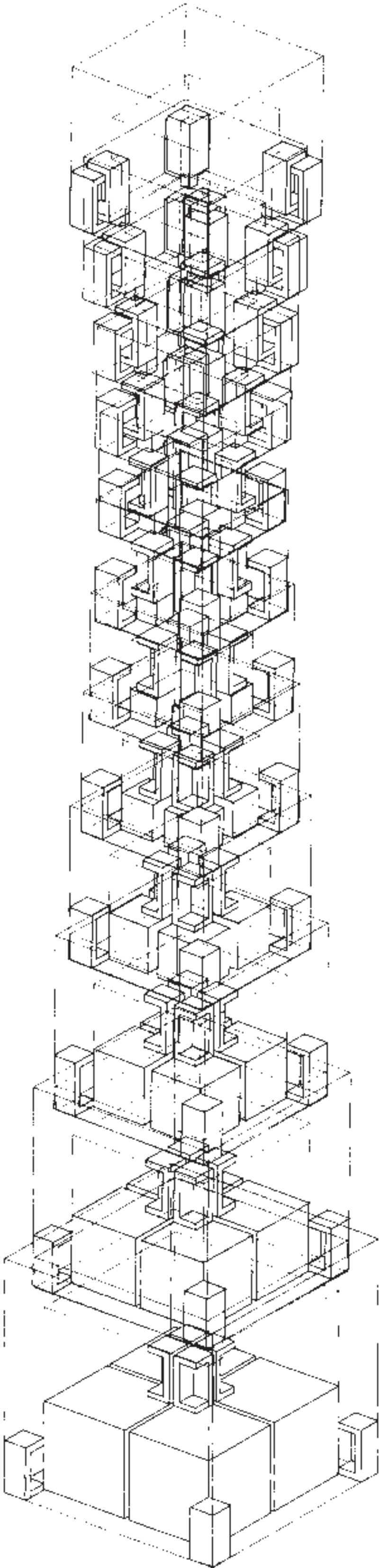
Units from Fibonacci ratio applied to the geometrical construction of a line



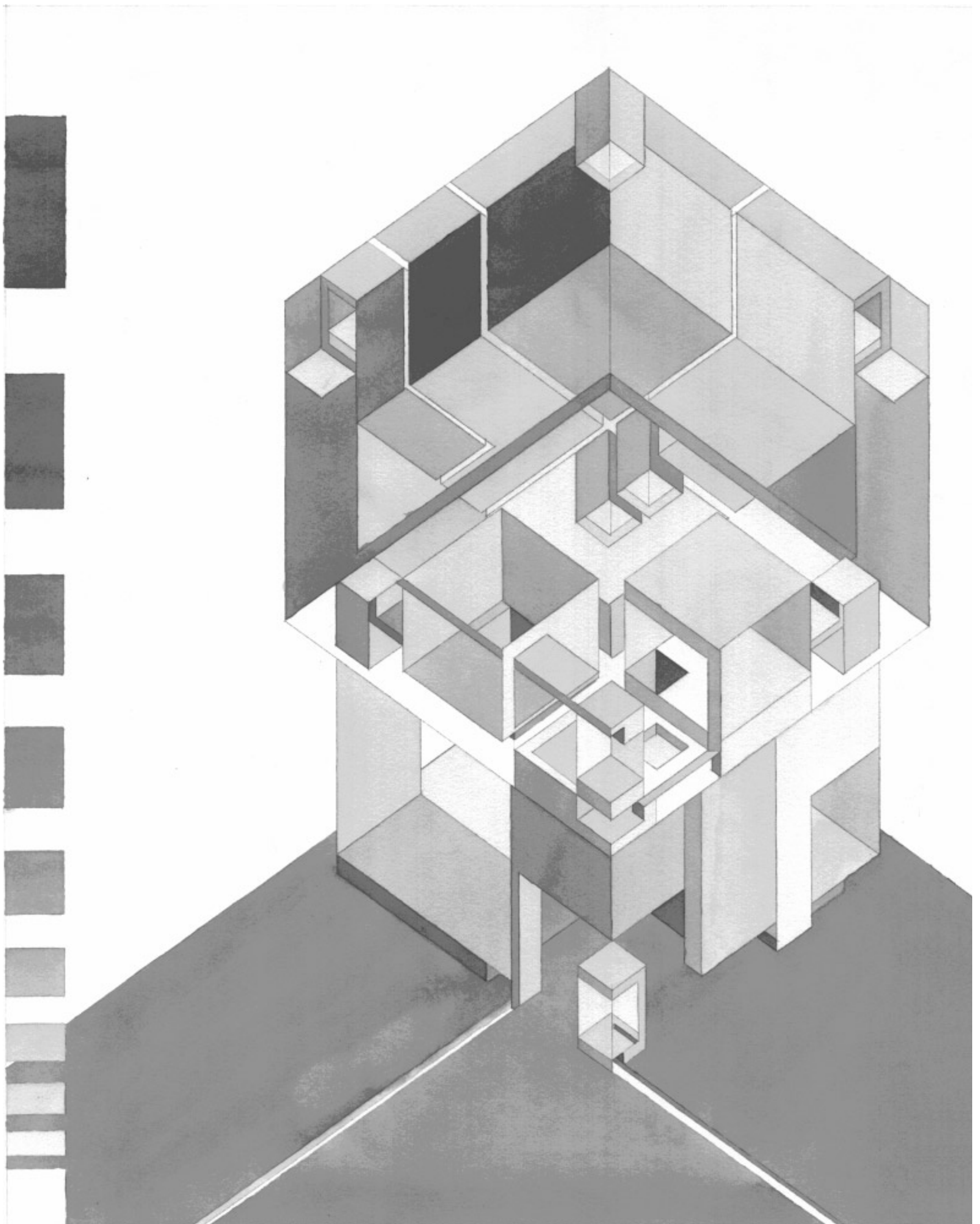








A wireframe reassembles the sections, and although the lines define certain boundaries, they remain characterless and without scale. Another watercolor explored several sections of the overall construction. Mass, volume, surface and scale remained ambiguous. Mathematical abstractions can guide and measure, however, to develop architecture a physical character must be defined. Translation of these abstractions toward a physical place in the world requires a leap, a transformation from ideal exactness to the tangible.



ROME

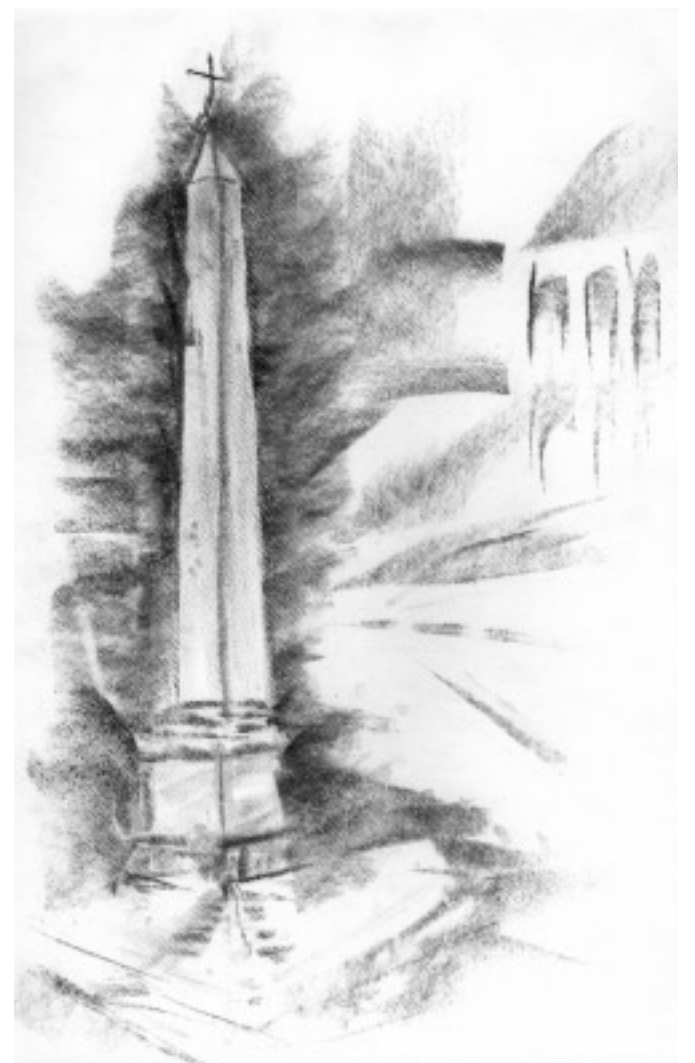




Figure 45 - View of Roman Forum and Palatine Hill Looking South



Figure 46 - View of Trajan's Forum Looking Southwest to the Vittorio Emanuele II Monument



Figure 47 and 48 - View Looking Southwest to the Vittorio Emanuele II Monument during construction



Figure 49 - View from Piazza del Popolo looking South down the Via Corso

Rome is certainly by nature a vertical city. Layer upon layer, the city has been built upward, building on top of building, new on top of old. Developed over the centuries, the city's core is a dense and particularly vital part of the city. Although this density has grown from the Palatine Hill since Rome's mystical founding to the Roman Forum (figure 45) and established a core, development outside of the center may be undermining this density. Increasing restrictions on new works and the dismantling of illegally constructed additions to the rooftops of residential buildings in Rome's center threatens its density and perhaps more its vitality. Preservationists' sentimental desire to return certain areas to some former glory adds uncertainty to the future of the city. Although many structures are obviously worthy of being maintained, historical positivism at its worst preserves a city right out of the very existence that made the city historical. At what point is the historic nature of Rome's permanence, as a vibrant cultural city, recognized over stylistic preferences? What is certain is that people want to live in the heart of Rome. Placed in Rome, the tower offers modern Romans a place to live and work in the city center.

The Vittorio Emanuele II monument (figure 46) was constructed between 1885 and 1911 in memorial of the first king to rule an independent and united Italy. Construction of the monument significantly altered the existing piazza (figure 47 and 48). Certainly this technique of replacing outdated, inadequate or unwanted constructions to improve the urban environment was typical of the development of Rome for centuries. The massive neoclassical building terminates the axis of Via Corso, the famous street that begins at the Piazza del Popolo (figure 49). Supposed symbol of independence and freedom, it assumes a position on the Capitoline Hill next to the Capitol and divides the Piazza Venezia from the Roman Forum. Its monumentality is contingent upon symbolism and bigness. Outsized proportion resides in virtually every component of the building from the imported blocks of marble to the tremendous figure of Emanuele on horseback. Stairs may be the only element that the visitor can engage at the human scale. Besides misguided largeness, the true baseness of this building lies in its real inaccessibility to the free people of Italy. An imperial relic thrust upon the city by the politically empowered, it houses presidential quarters and an infrequently open museum of 19th century cultural revival. Although many of the structures of Rome originated from ecclesiastic or political power, the monument to Vittorio Emanuele lacks the elegance and accommodation found in many of the magnificent buildings of the city. Minimally significant to the city and its people, the thesis determined to replace the monument with a tower (figure 50 and 51). Terminating the axis of Via Corso with bold dignity, the mega-structure offers the people of Rome both public and private spaces to view the richness of the city and its seven hills. Radiant views of the Tiber River, Hadrian's Villa and the Campagna and even the Tyrrhenian Sea would be possible.

During the latter part of the 19th century a restructuring of the historic center and several other quarters determined to limit the height of buildings to "six storeys (sic)- as high as the building techniques of the time would permit."⁵⁴ Today, Rome's leaders recognize the need for further restructuring of the center. A wonderful map (figure 52), taken from the *Atlas of Rome*, was produced as part of an endeavor to study existing conditions and means of improving the historic center. Speculation during the middle of the 20th century provoked an increase in misguided construction on existing buildings according to the authors of the atlas. The cannibalization of the buildings to accommodate new services and new quar-



Figure 50 - Aerial View of the Vittorio Emanuele II Monument



Figure 51 - Aerial View of the Vittorio Emanuele II Monument replaced by the Tower

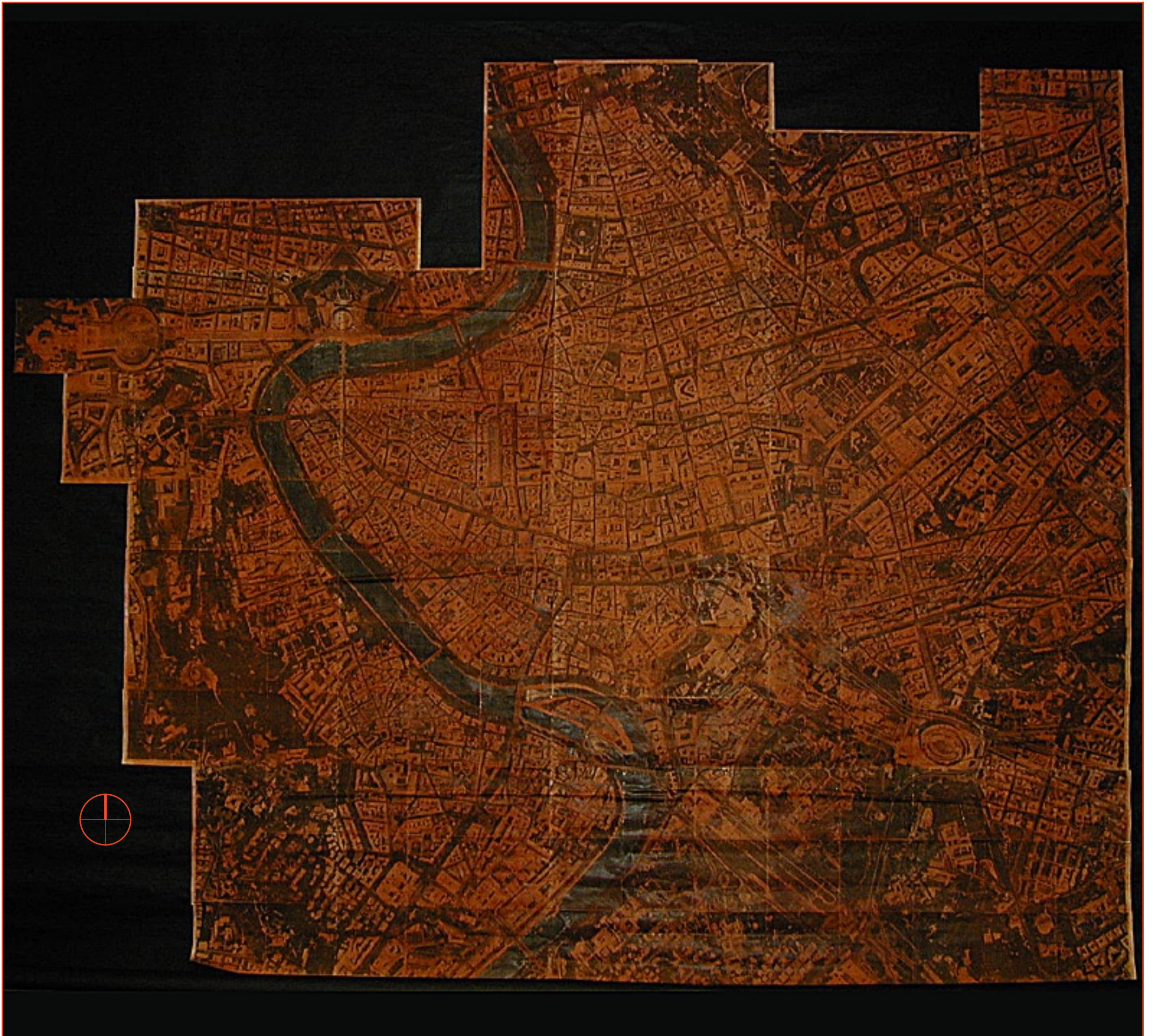


Figure 52 - Map of Rome



Sun diagram defining the shadow of the Tower on December 21

ters resulted in the ruination of the ground floors and increased the loss of sunlight at street level. Many tenants satisfied the quest for residential life in the center by “raising building heights in the absence of any mandatory regulations or, as was more often the case, the will to respect them where they did exist.”⁵⁵ The author’s of the Atlas suggest that there is “no doubt that staying within the limits set by nineteenth-century developments would be the optimum solution in a city not subject to demographic pressure.”⁵⁶ However, they determine that the service industry takeover of the historic center, indeed recognized as a two century old endeavor, has somehow reached its height and is one main cause for the displacement of residences and further ruination of the center today. Offering little evidence for interpreting a lack of demographic concern for Rome, the authors go on to explain that estates are moving outward and into the suburbs. Expansion out of the center of the city is not a simple matter and might not be blamed solely on the service industry. Perhaps contributing to movement out of the center are deficient living conditions and increasing pressure to arrest additions. The author’s desire to “reconstruct” optimal conditions and glorify the past nobility appears more concerned with advocating severe bureaucratic control over stylistic development. Such scenographic allure would only sustain the very center they claim to despise and hardly addresses real ideas to bring residents back into the city. A modern solution in the form of a tower would actualize estates and apartments, parks and businesses. The tower would maintain a greater density and also offer greater access to sun and natural elements.

The Via del Corso, one of the most prominent streets in the world, begins at the Piazza del Popolo at the north end of the city and runs south for about one mile, terminating at the Piazza Venezia. The Corso “marks and orients the city” and Goethe, who in the 18th century recognized the wonderful variety of activities found in this narrow space, praises its distinct public nature.⁵⁷ Major public spaces at both ends and public squares contained between the major piazzas assure activity along the street. The buildings that define it reach a height of 65 to 75 feet and are generally four to six stories tall while its width is approximately 36 feet.⁵⁸ A width to height proportion of 1:2 does not offer much sunlight to pedestrians on street level but does not seem to discourage use. A concentration of shops indulge crowds up to “850 to 1000” that “can pass a given point during a five-minute period on a shopping afternoon.”⁵⁹ Allan Jacobs in *Great Streets* contends the Via del Corso is relentless



Sun diagram defining the shadow of the Tower on March 21

and long. Via Corso maintains a defined form within a medieval network of streets, however its end at the Piazza Venezia does not reinforce the powerful beginning at Piazza del Popolo. A “slight bend at the Via di Caravita makes the ends difficult to see from some points”.⁶⁰ Imagine a tower to mark the end of the street, clearly visible from the gates of the city.

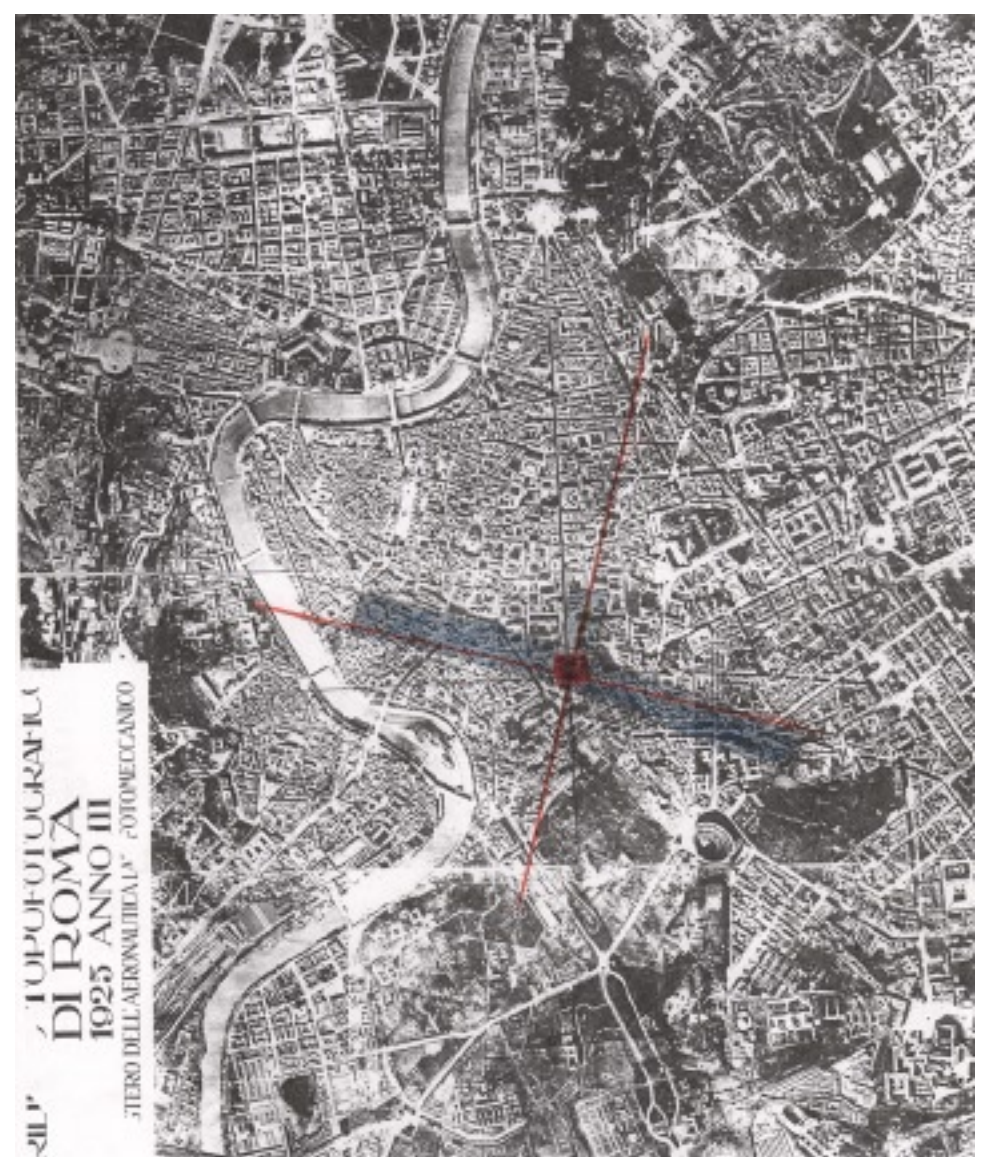
Heavy building elements combine with noise and narrow sidewalks toward the south end of the street, which becomes corridor-like before opening into the Piazza Venezia. Crowding on narrow sidewalks often forces pedestrians up to 13 feet into the street at rush hour when the flood of people has been counted at 15 people per minute per meter.⁶¹ Major public spaces at every level of the tower would easily accommodate leisurely walks and offer fresh air and sunlight. Dwelling units closely related to public spaces would offer the potential for vital social places at most times during the day and evening. A “minimum net residential density of 15 dwellings per net acre can achieve active urban communities.”⁶² Differentiation within the structure mimics the differentiation found within the city of Rome, which has 504 intersections and 419 blocks that are on average 198 feet long.⁶³ Over 100 significant intersections and 64 blocks would be contained within the tower alone.

The population of Rome, at 2,775,250, occupies over 582 square miles (1508 km²) of city. The density of the city, at 7.45 persons per acre (4768 per mile² and 1,840 per km²) is not far behind Vatican City, which is listed as the third most densely populated city in the world. Just under seven acres (548x548=300304 ft² at 43,560ft² per acre = 6.89 acres) at the tower base, two of the eight dwelling units at the lowest district could easily house the fifty-two people the site would require to maintain Rome’s density. If the tower accommodates 25,000 people for a density of 3,571 persons per acre it would exist at 510 times the current density of Rome and perhaps contains more open public spaces.

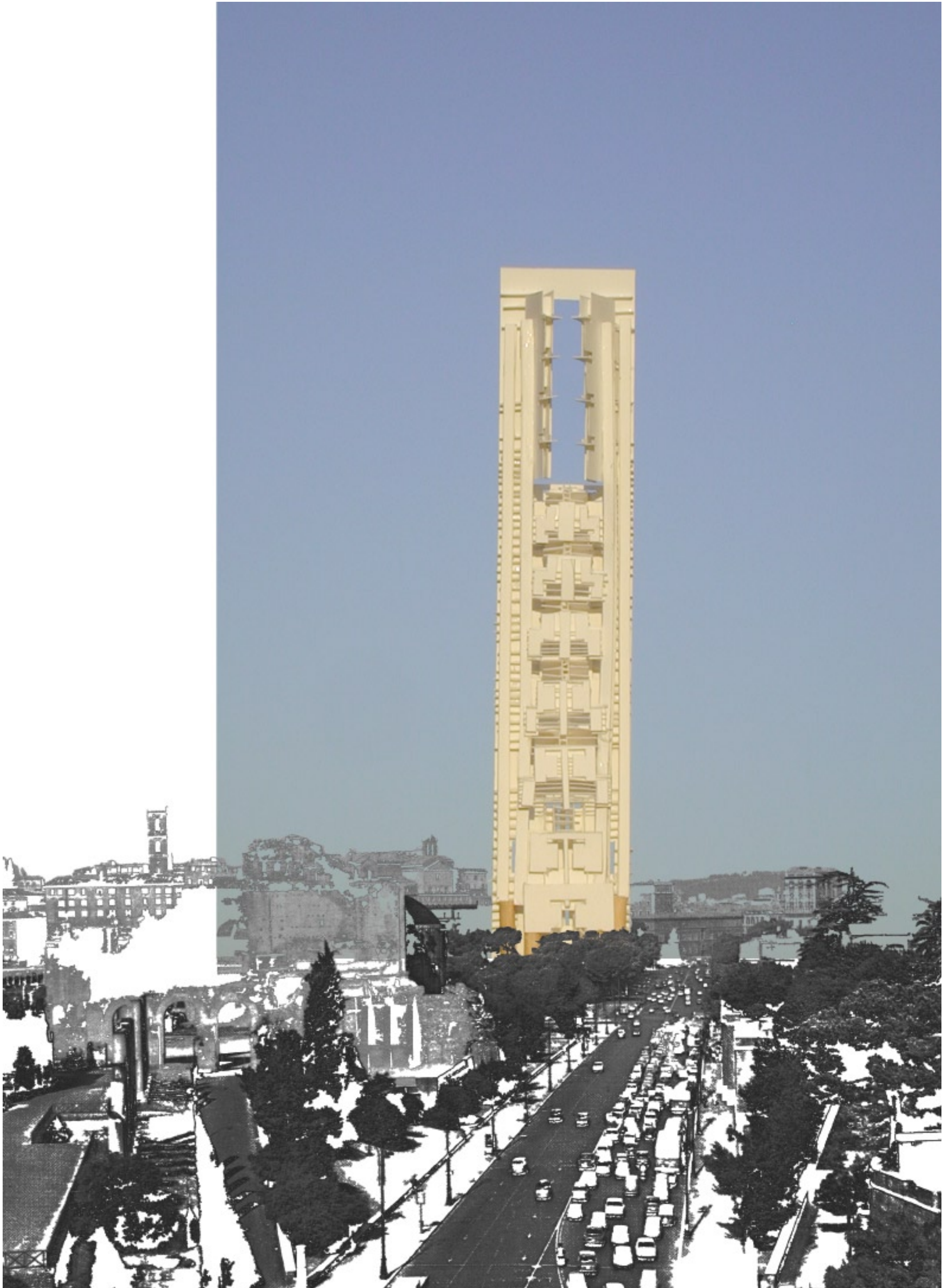
Sun-shading diagrams track the course of the sun at 42 degrees north latitude 12 degrees east longitude on a site angle of 16 degrees north west of north. Diagrams are constructed for February 21, March 21, June 21 and December 21 at 8 am, noon and 5pm. Clearly the tower would produce a long shadow. This trajectory, however, would not leave any spaces without sun for much longer than occurs presently. In fact the proportion of many of Rome’s streets already inhibit all but the midday sun at the street level. The tower could actually serve to orient people of the city as a giant sundial might.

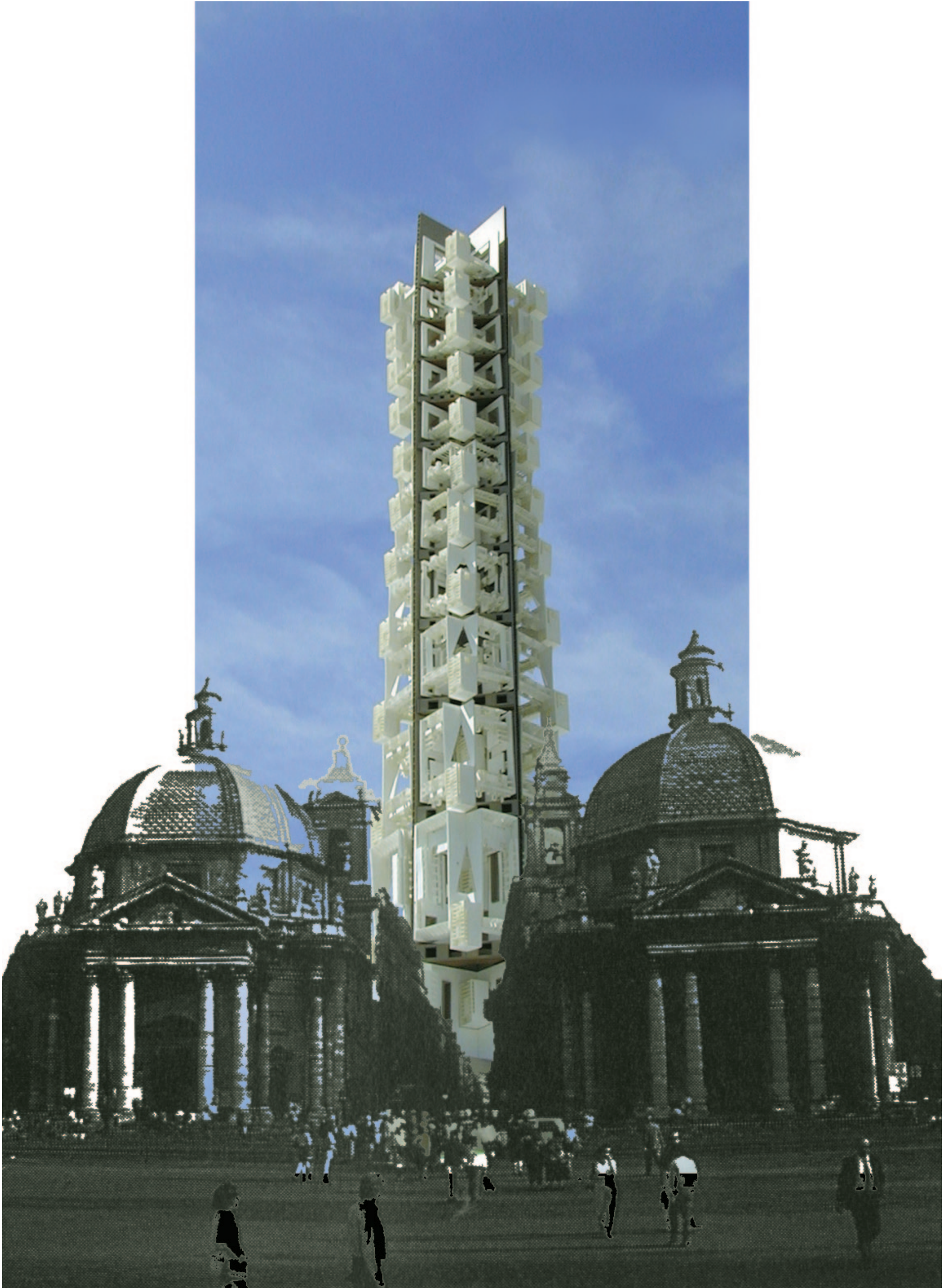


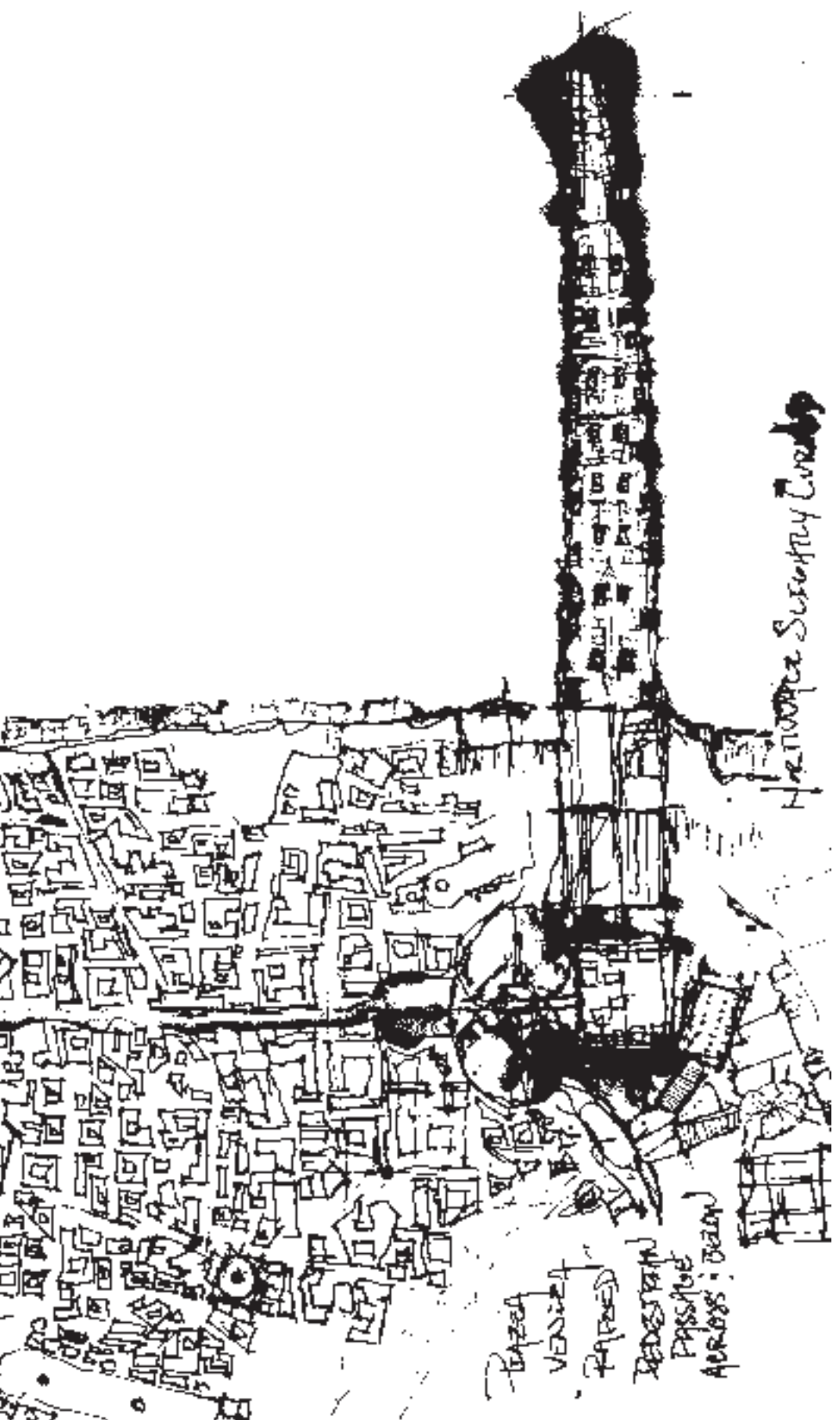
Sun diagram defining the shadow of the Tower on February 21



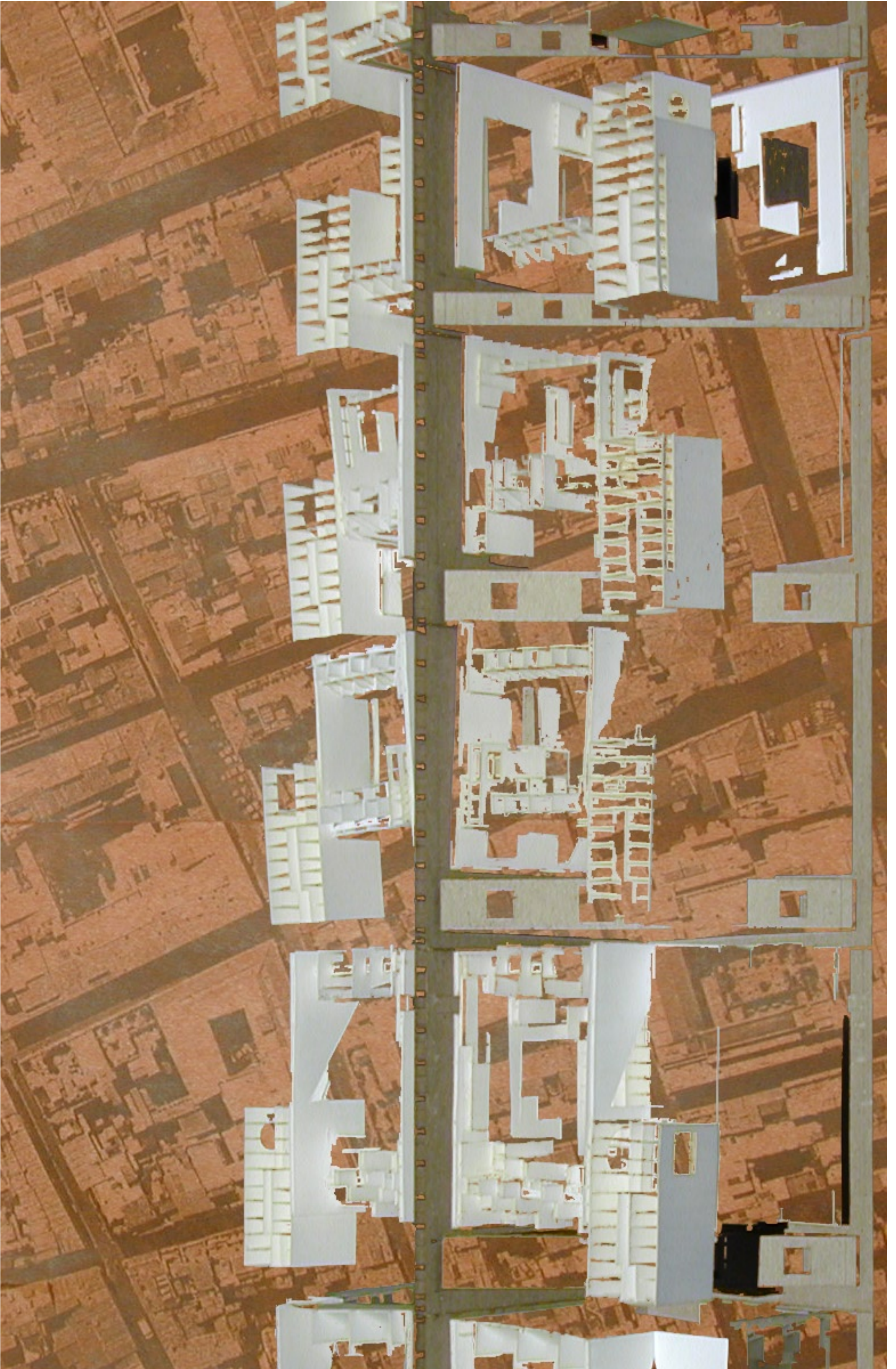
Sun diagram defining the shadow of the Tower on June 21



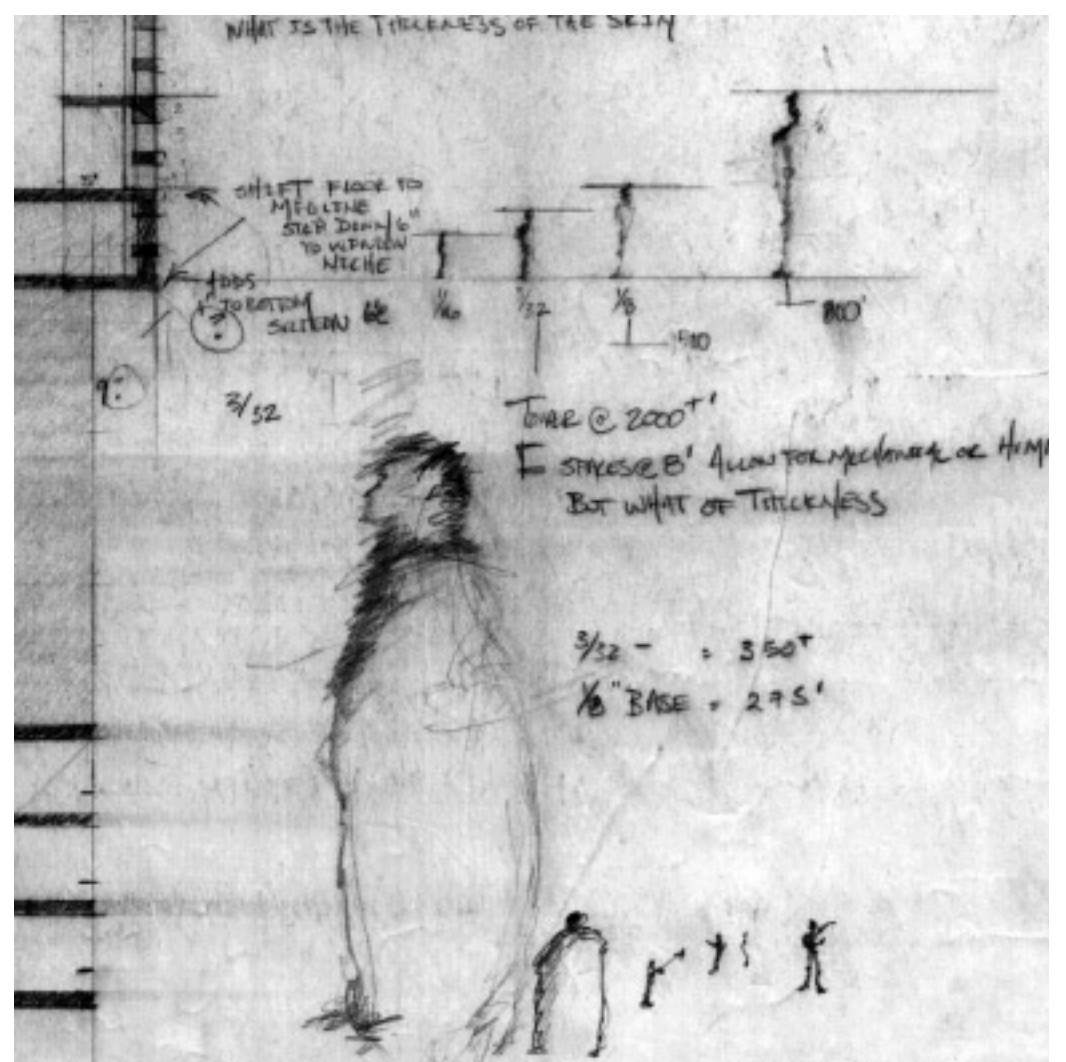


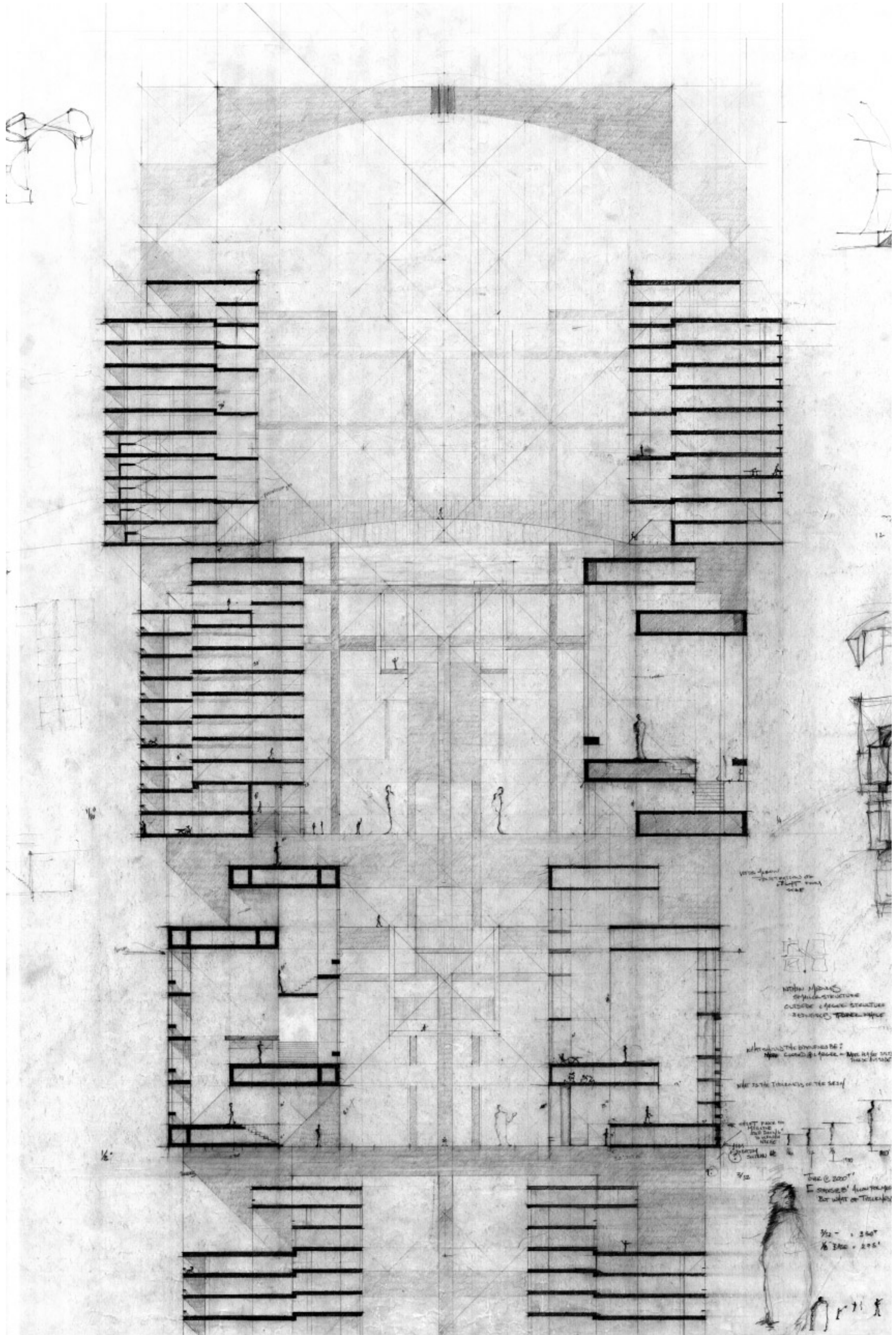


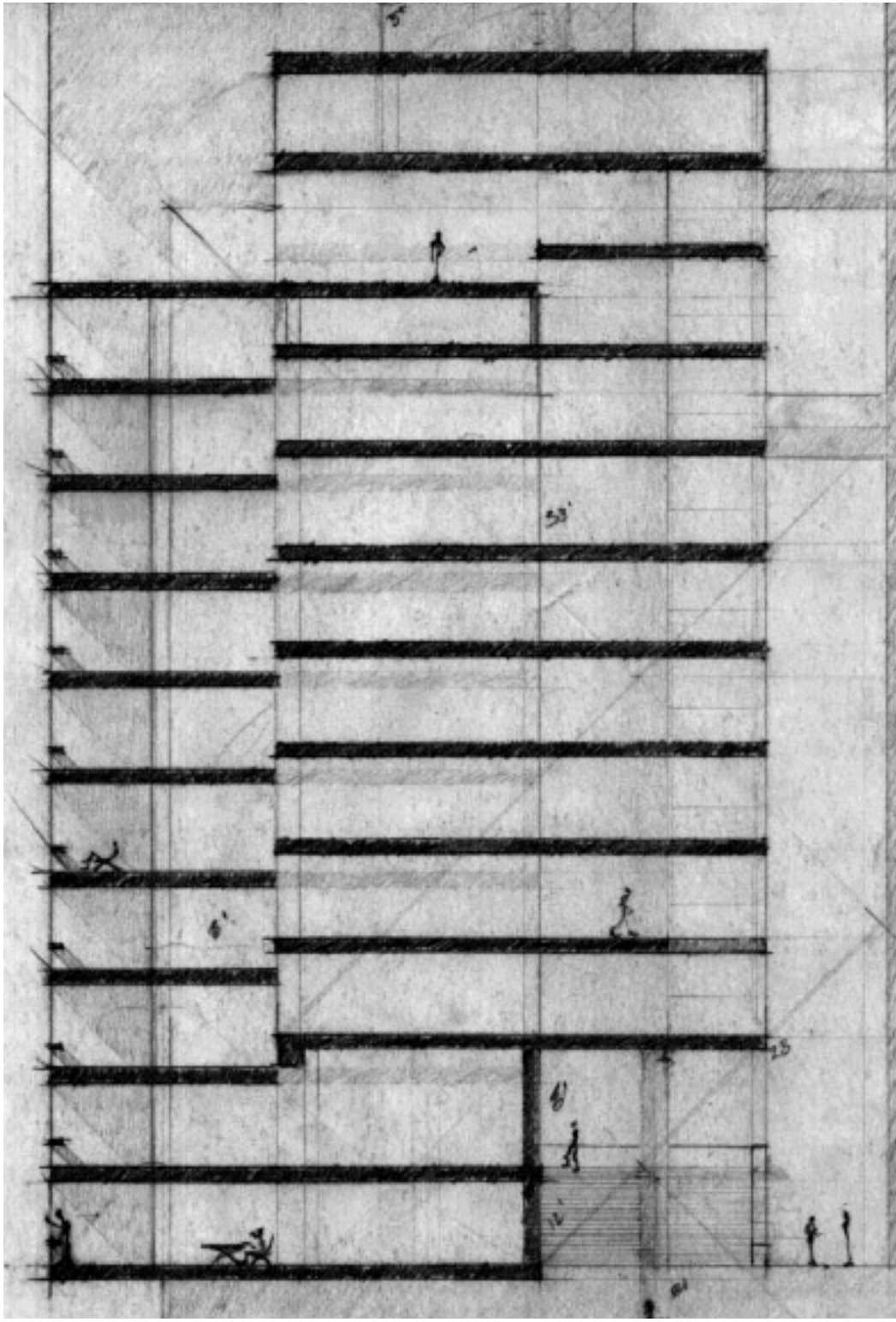
1000 West Street - Hesperia Streetcar



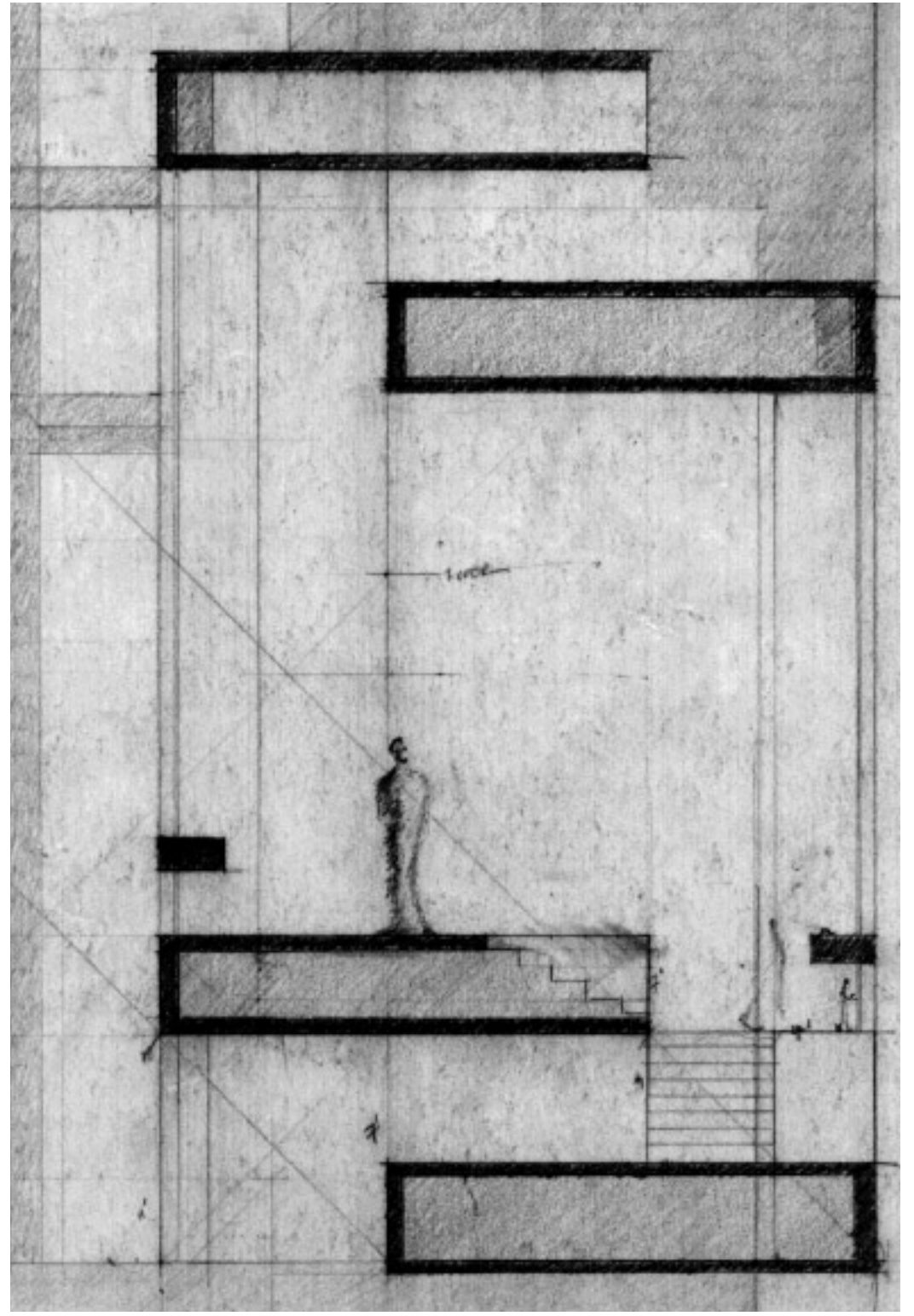
SCALE AND PLACE





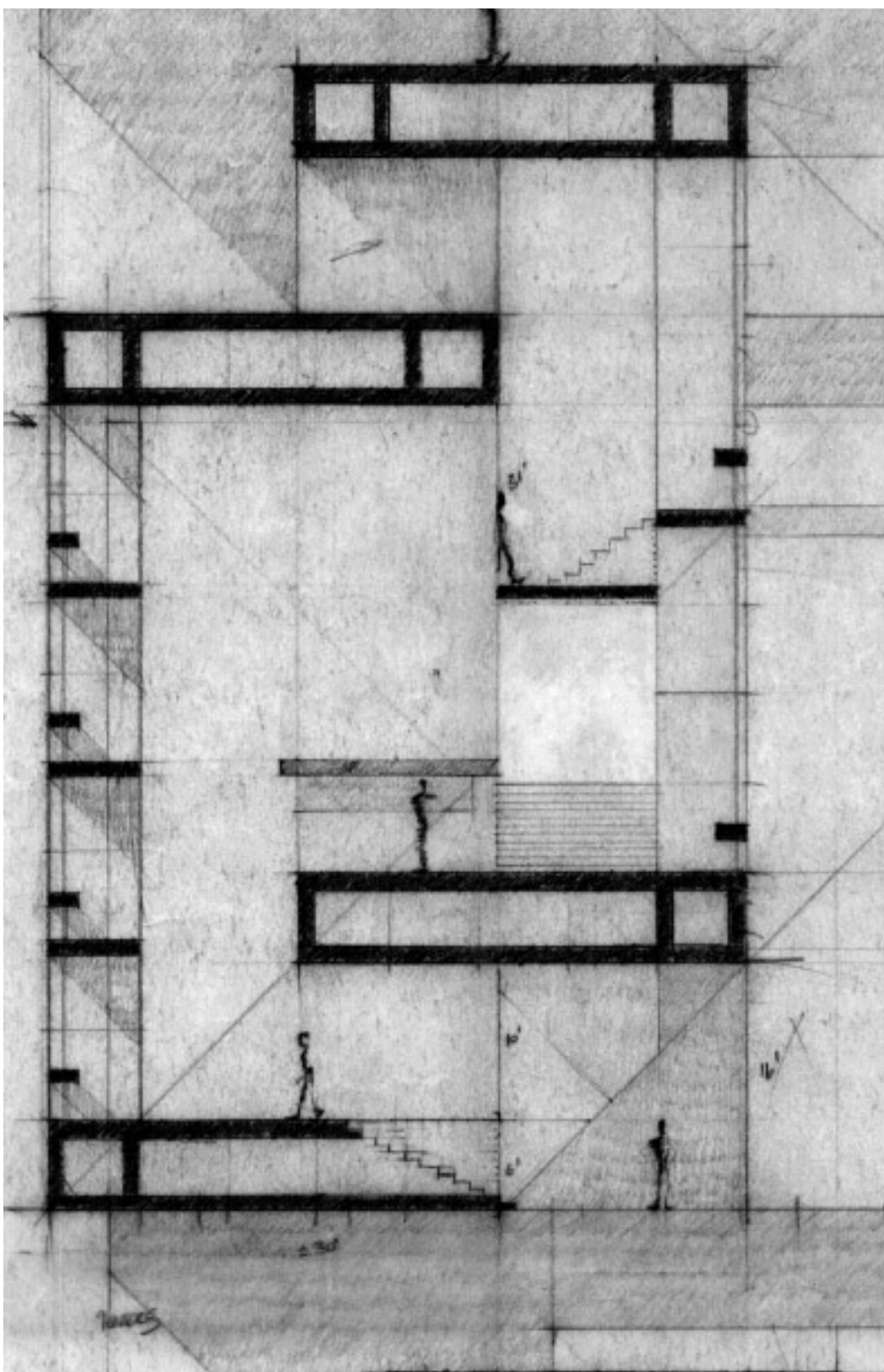


3/32" = 1' scale applied to the tower geometry

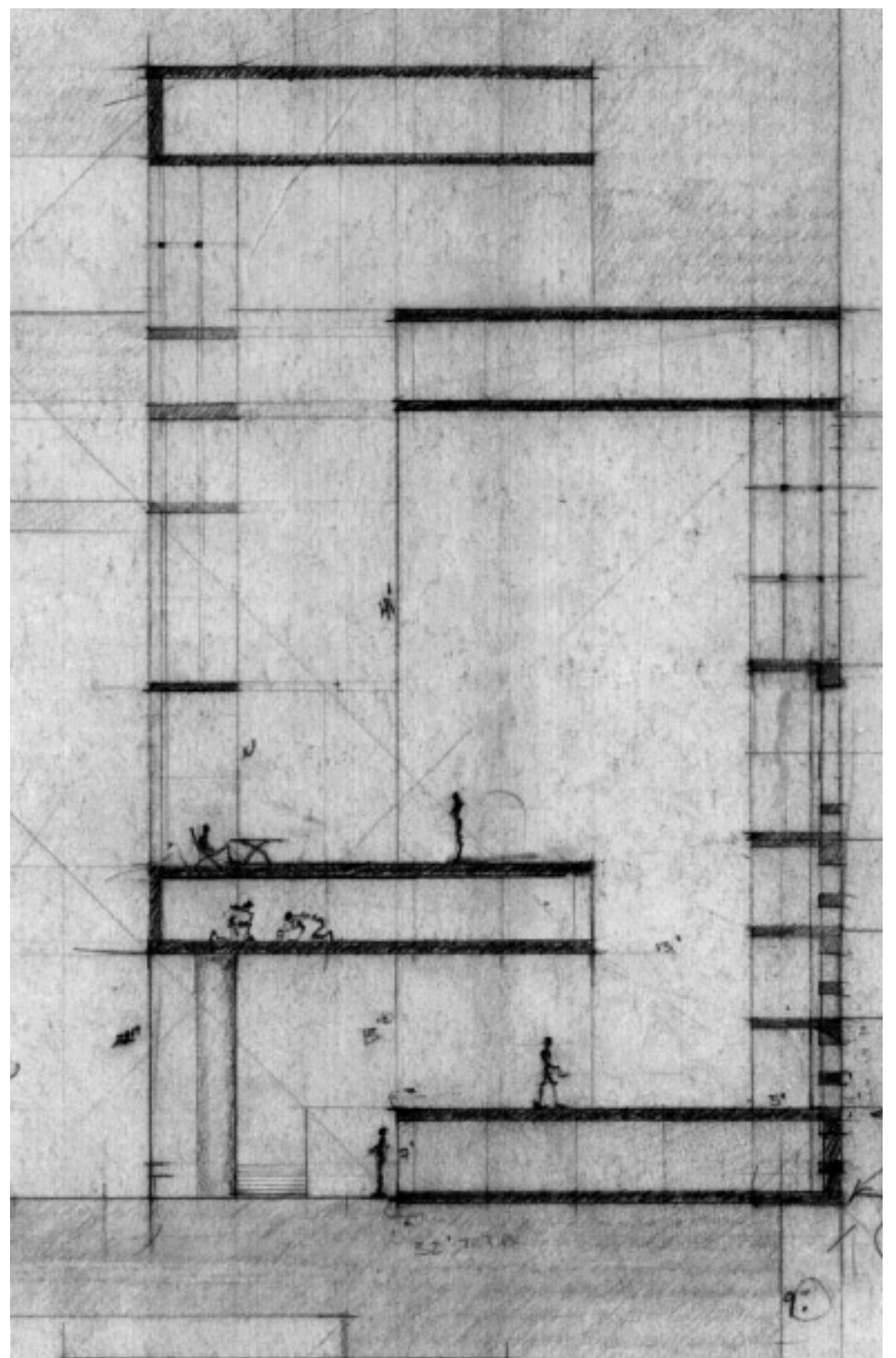


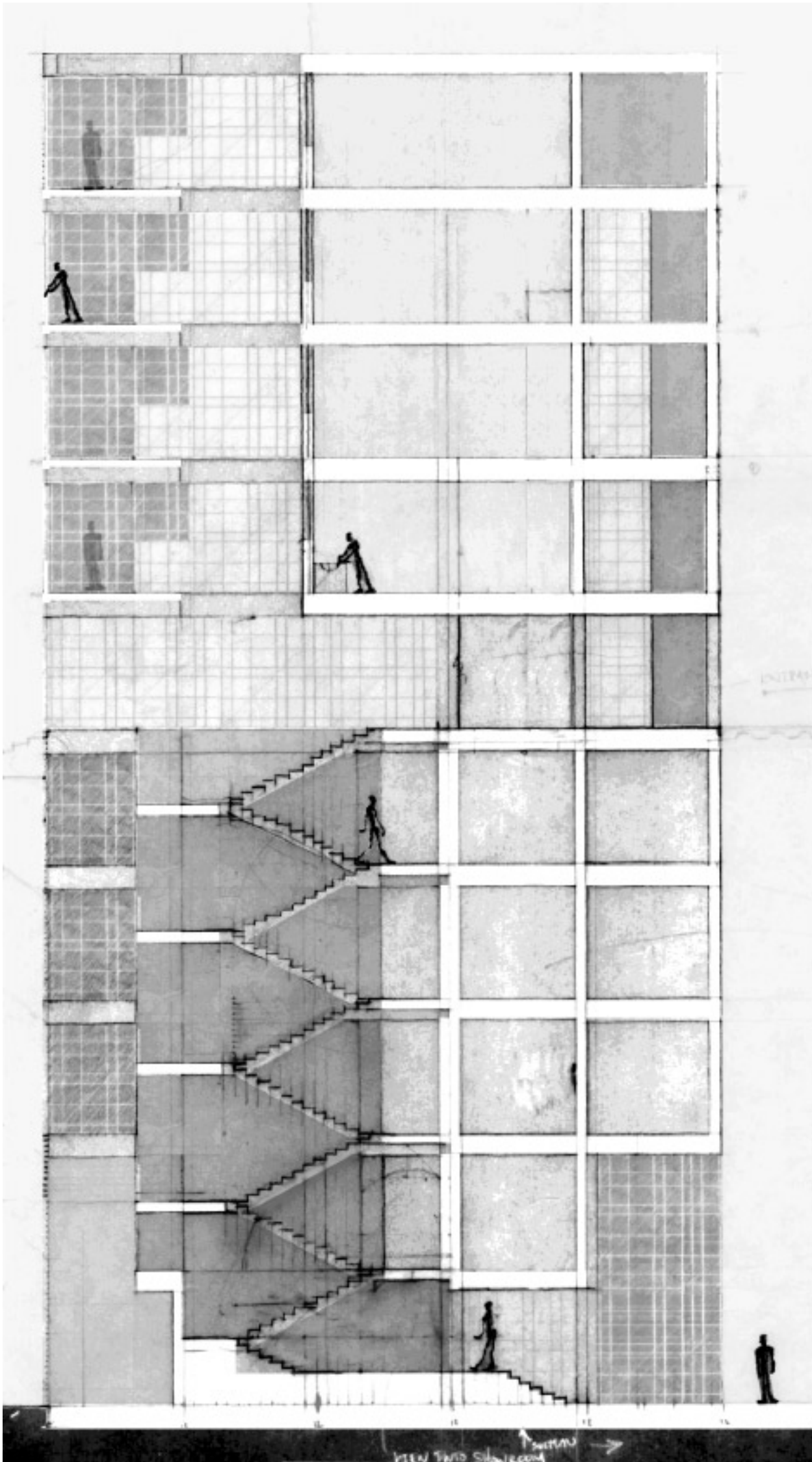
1/4" = 1' scale applied to the tower geometry

1/8" = 1' scale applied to the tower geometry



1/16" = 1' scale applied to the tower geometry

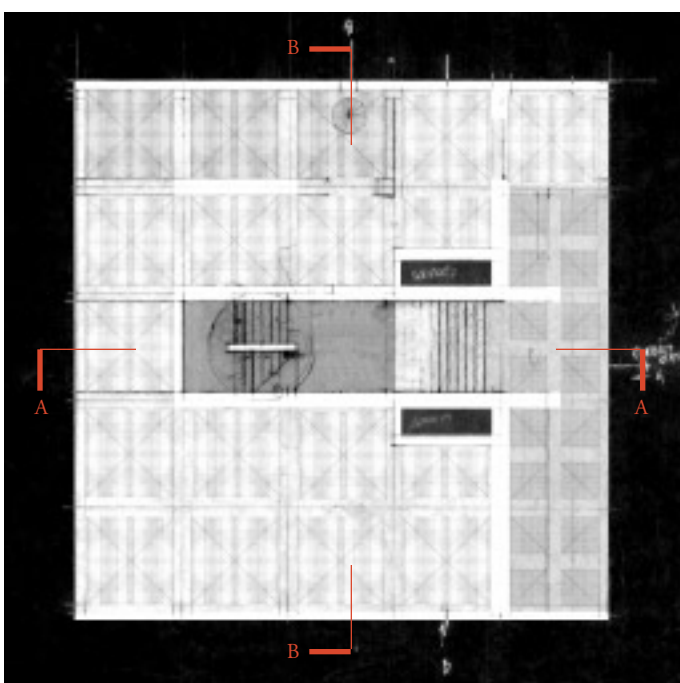




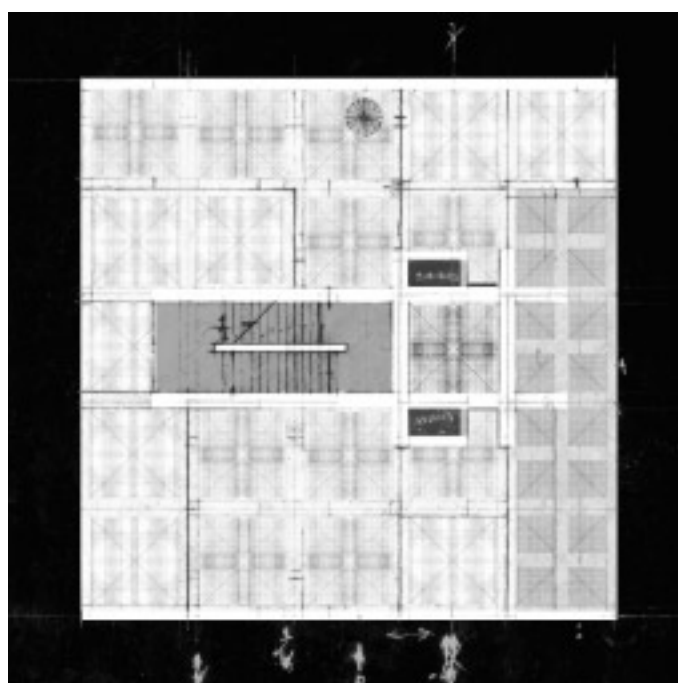
Section A-A

Inserting the human figure into the construction determined the scale of the tower. While the geometry of the tower remained fixed, the drawing explored the potential of four different scales. A quarter inch figure resulted in a tower that contributed units of single dwellings and lacked any grand public spaces. Much of the internal space would have been needed to provide vertical channels of movement and infrastructure. The two middle scales left the single unit sectional width as uninhabitable space, which only services could occupy. Public and private spatial differentiation improved, however a lack of generosity remained that was only resolved in the smaller scale. At this scale a person could move freely inside the arm of the initial c-section. Ten story units, with a floor to floor height of twelve feet, became possible. Grand public spaces mediated between these units. Each level became its own district on the scale of a city block. Urban planning became a reality within the tower itself. It was no longer solely an element of the city, it was a city. A mega-structure reaching a height of 3,275 feet had been discovered.

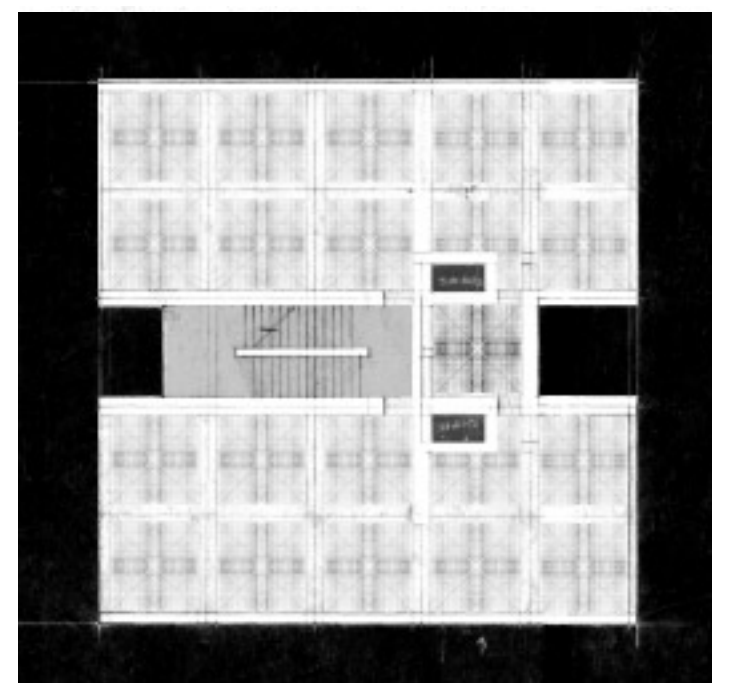
The initial massing was defined, but individual places had to be developed. People would live and work here. The square units had driven the project initially and would become ten story dwelling structures on a twelve foot module. Drawings to describe these units were developed in section and plan. Section A slices through the entrance and stair core at the lower levels and through balcony sections that inhabit a centrally positioned void on one side of the upper dwelling spaces. The unit was initially composed of a two-story retail space. The ground floor houses a retail space that surrounds a central stair core used to access the second floor offices and conference room of the primary retail space below. Open plan offices are located on either side of the stair in the third, fourth and fifth levels. An open public space allows for a transition between the offices below and the residences above. The stair core empties into this space, which was to be linked with another space in the greater public space to be resolved later in the tower design. A new stair occupies one corner of the unit and accesses the dwellings and a roof garden. A series of apartment configurations presented two story units with full height living space toward the exterior wall. The units surround a balcony located in the central void also on the exterior side of the unit. These private spaces were conceived as an extension of the dwelling unit into the vertical realm. The ninth floor explores the design of a single unit for a family. At the tenth floor two smaller units are considered. This quick study gave priority to the individual dwelling unit. Developing unique units and combinations of units seemed endless. Certainly a place for the individual to dwell is established within the massive urban structure.



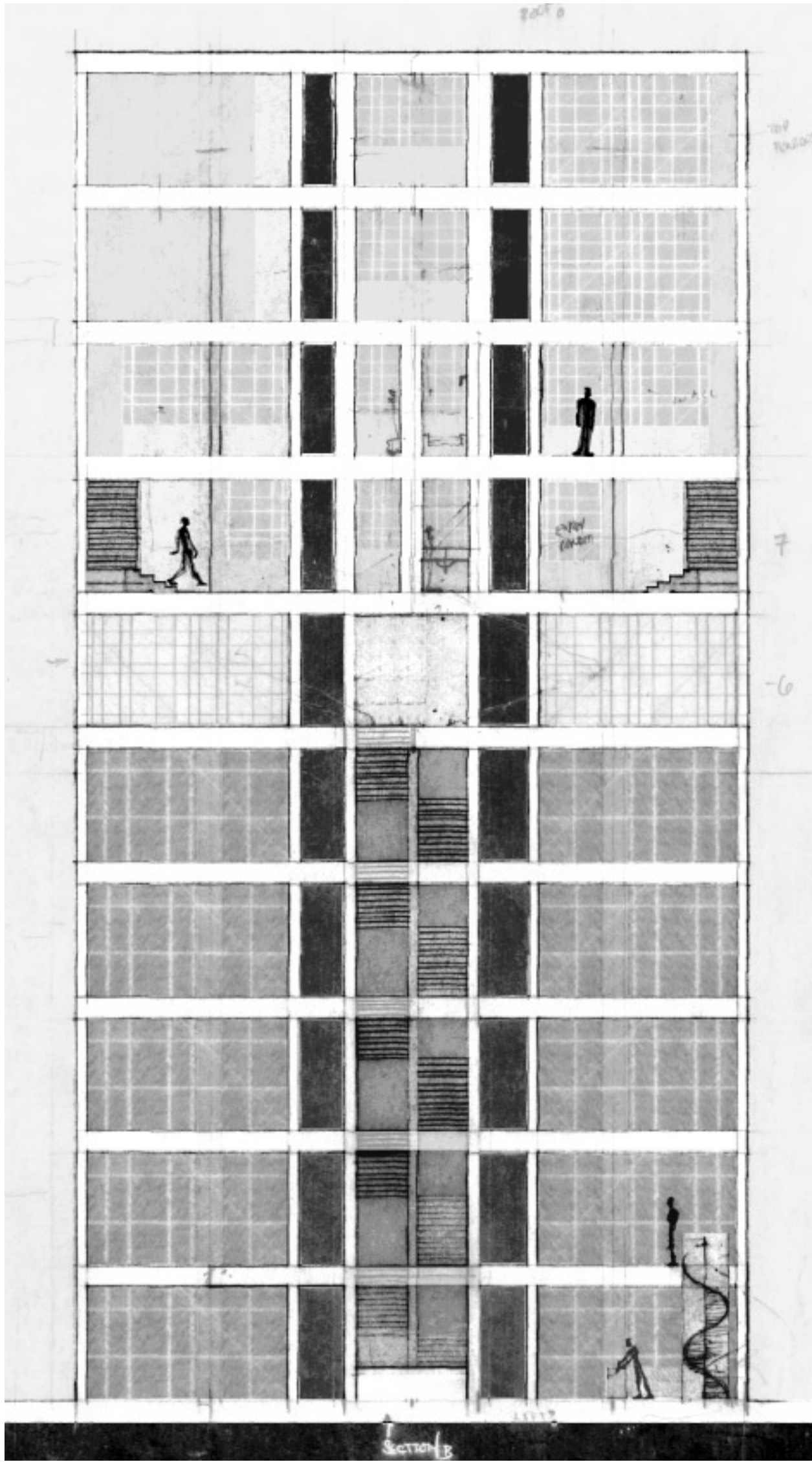
Plan- Ground Floor- Commercial space



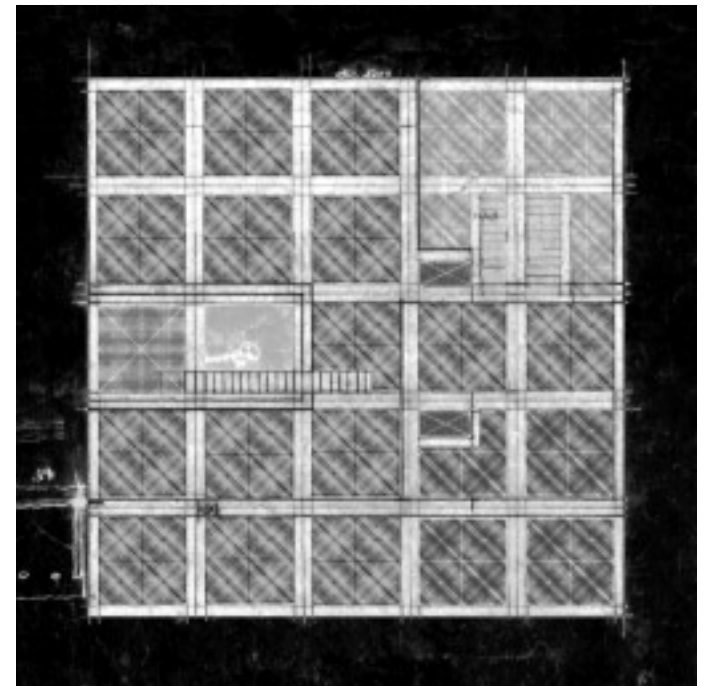
Second Floor- Commercial space containing office and conference room open to space below



Third -Fifth Floors- Open plan offices on either side of stair core



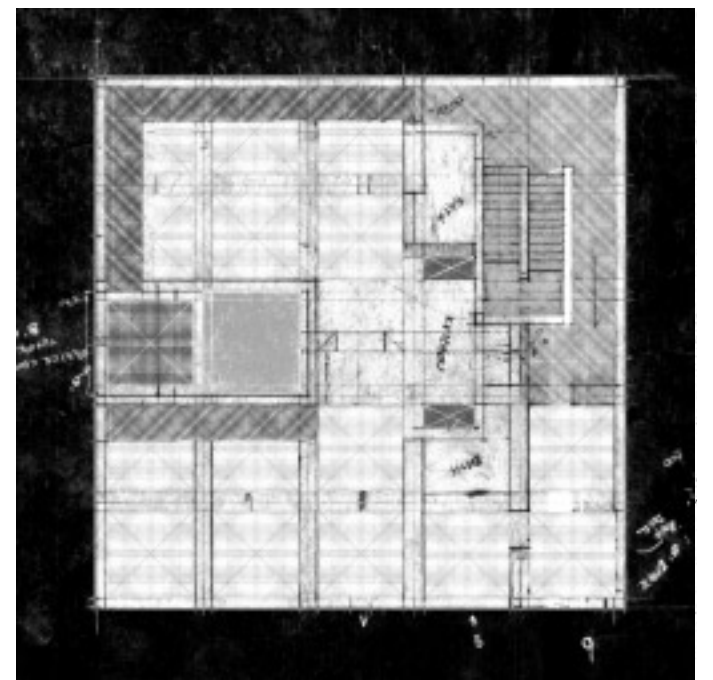
Section B-B



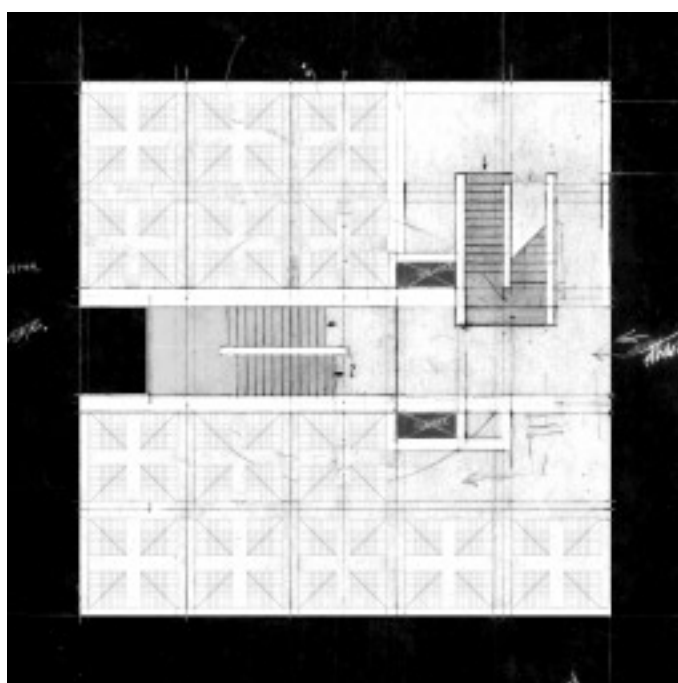
Roof



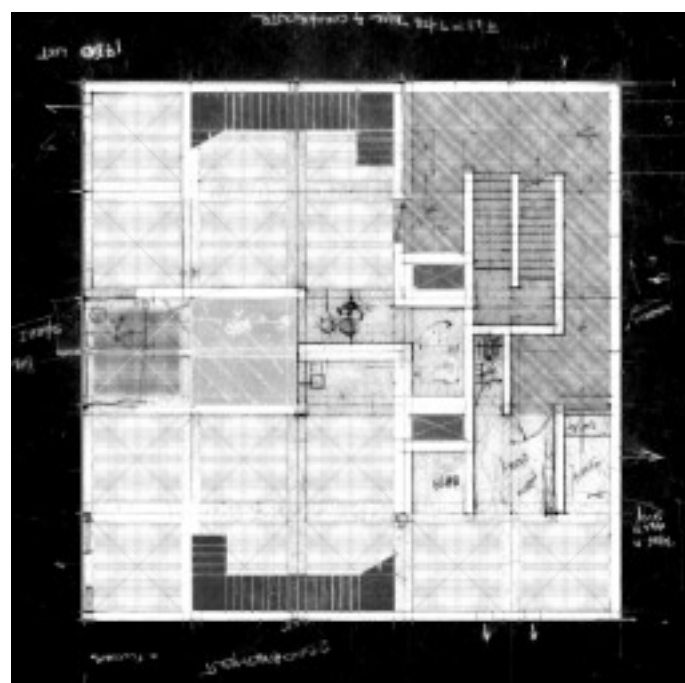
Tenth Floor- Apartments



Ninth Floor- Apartments



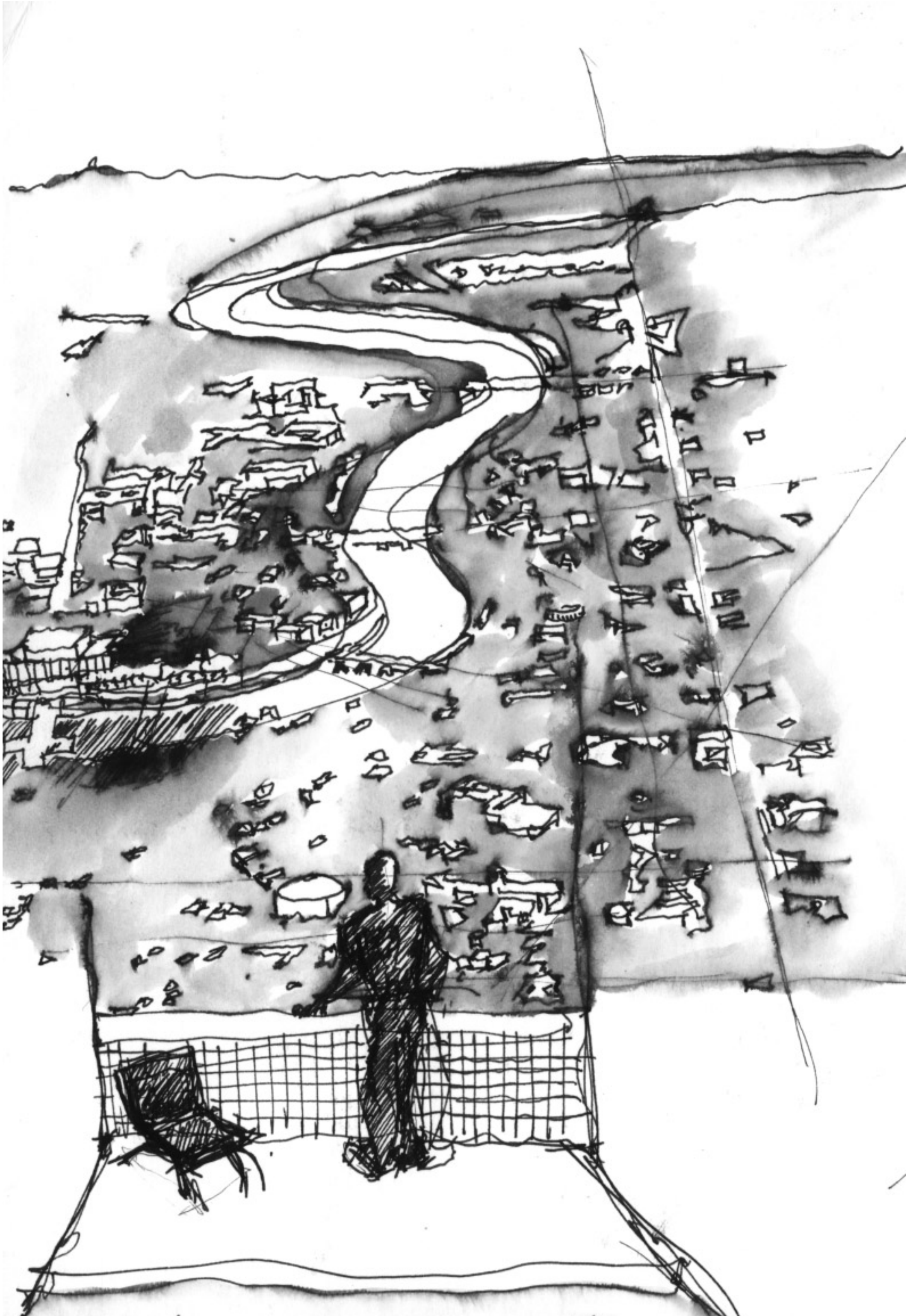
Sixth Floor- Transition floor between offices below and apartments above

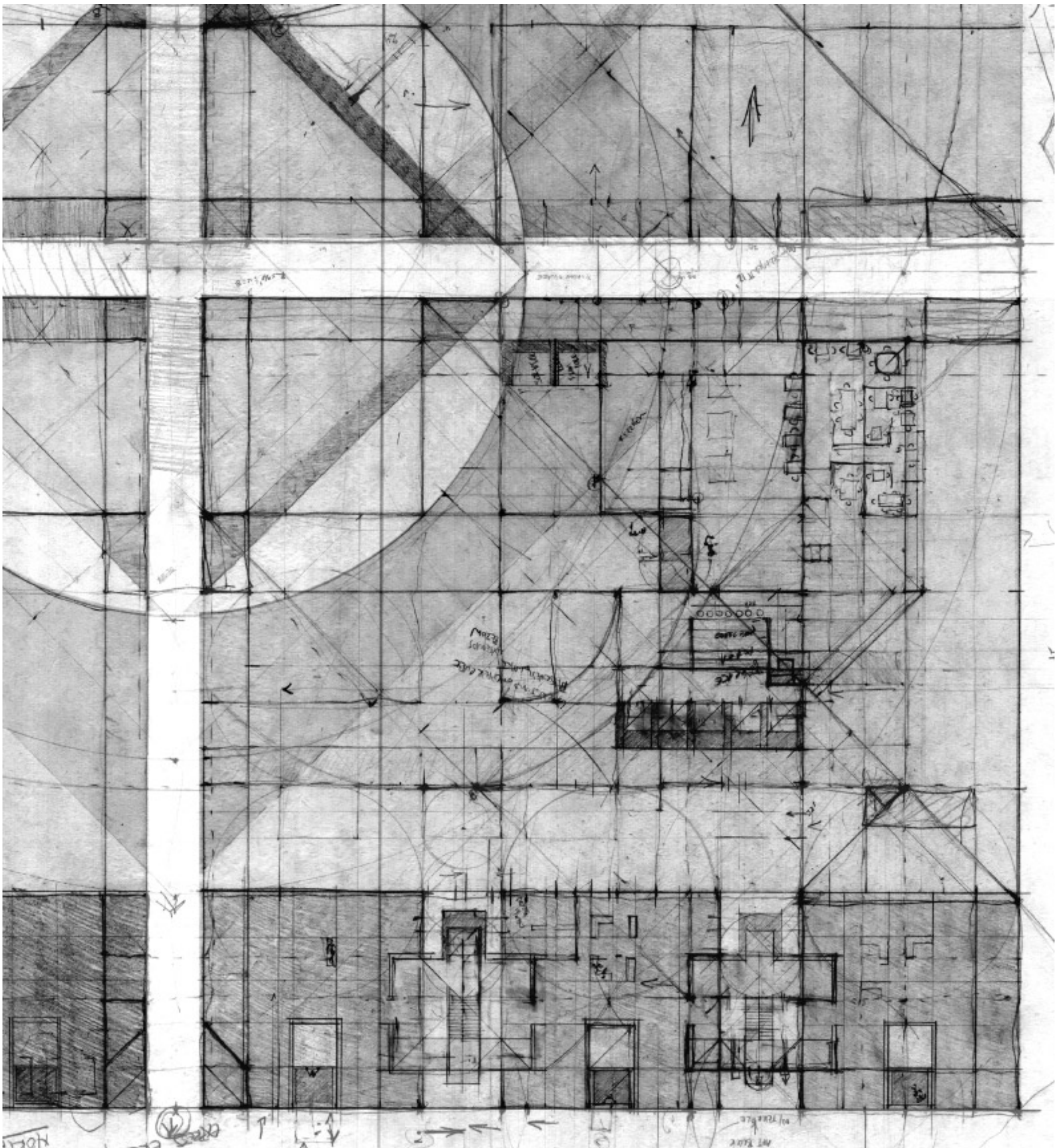


Seventh Floor- First floor of 2 level apartments on either side of central void



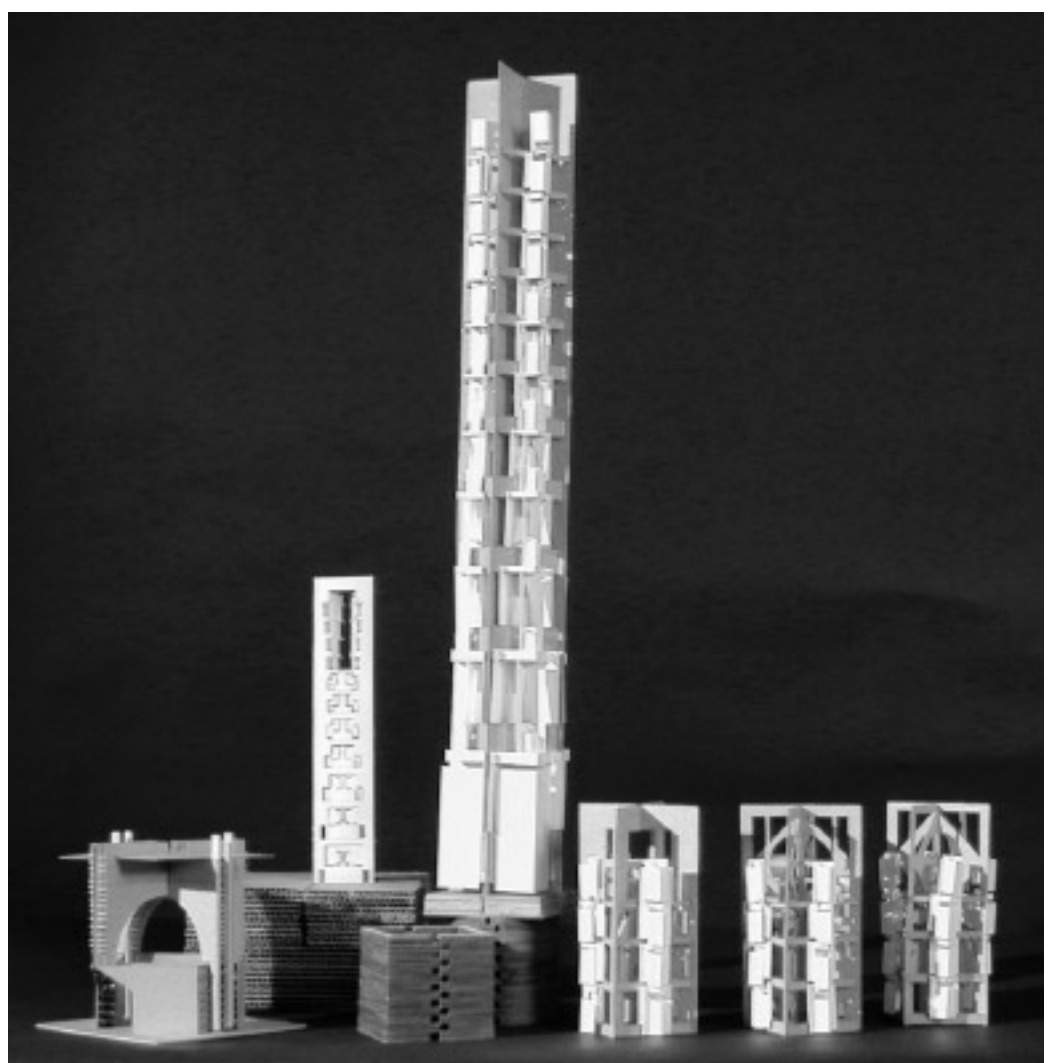
Eighth floor- Second floor of apartments with space open to below

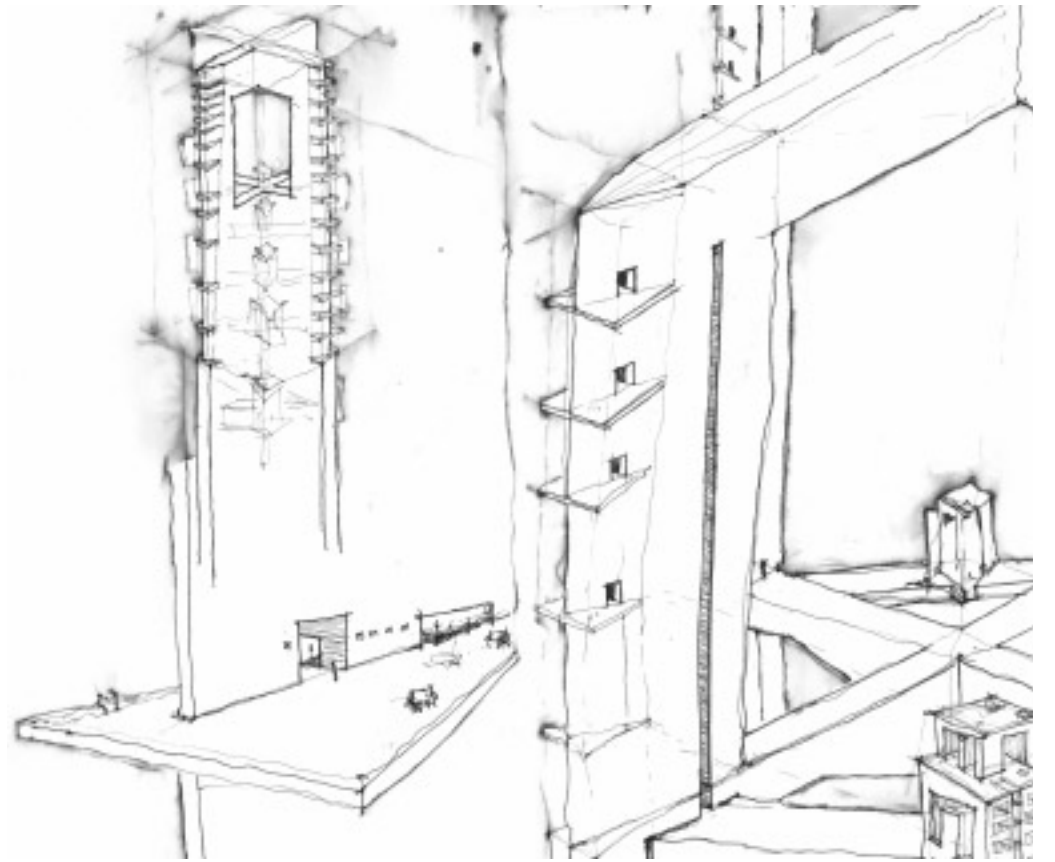
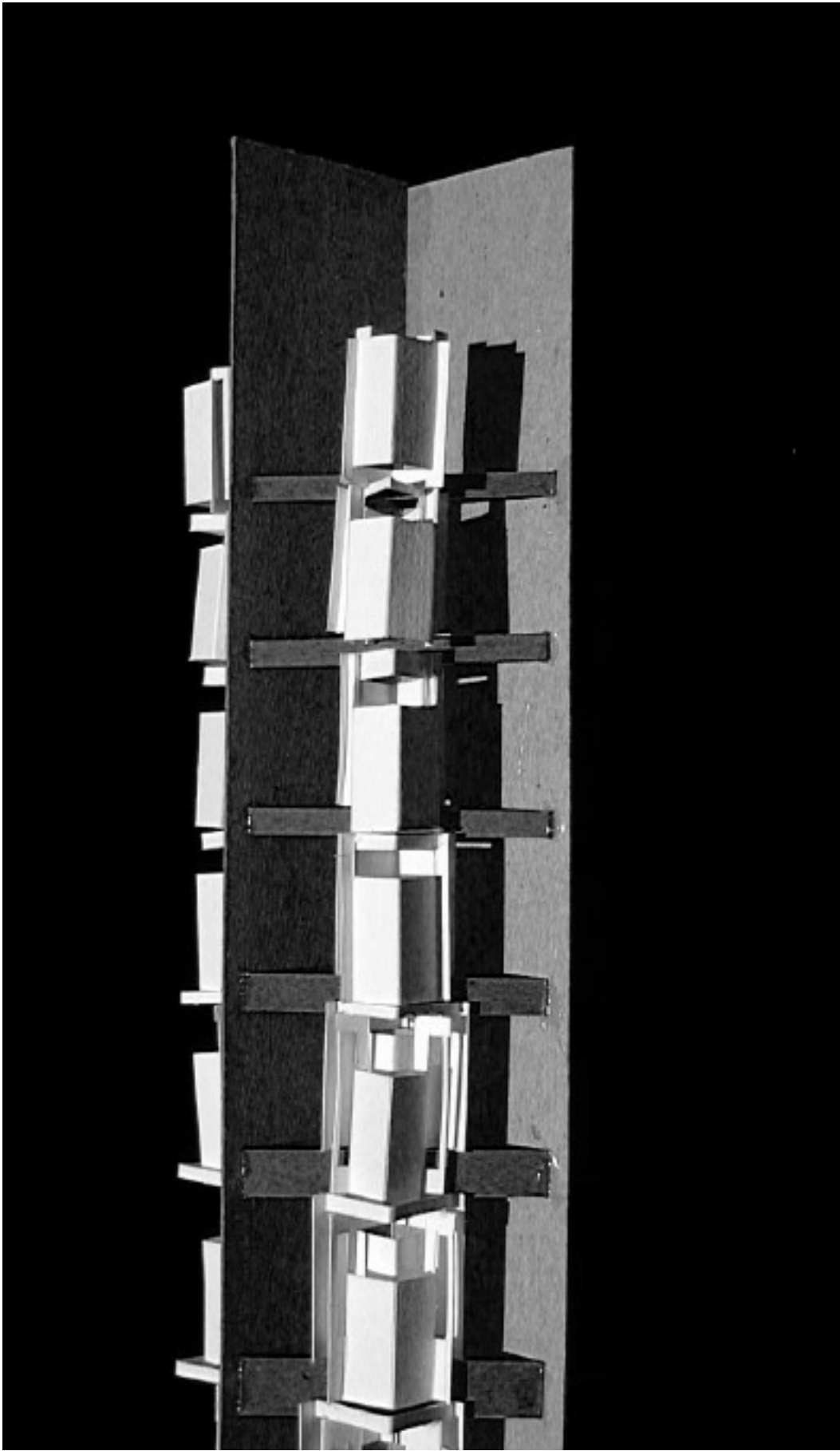




Plan for a grouping of dwelling units at one of the lower districts

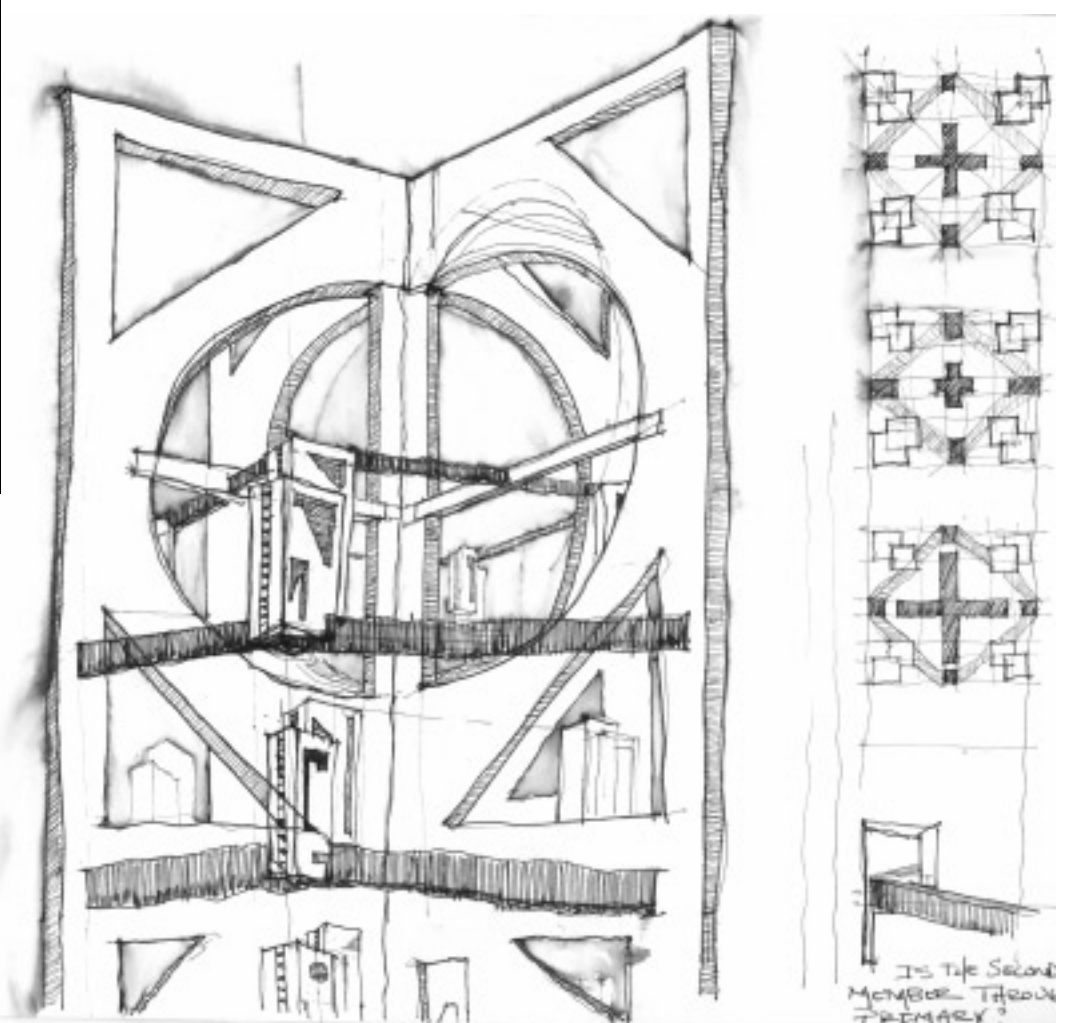
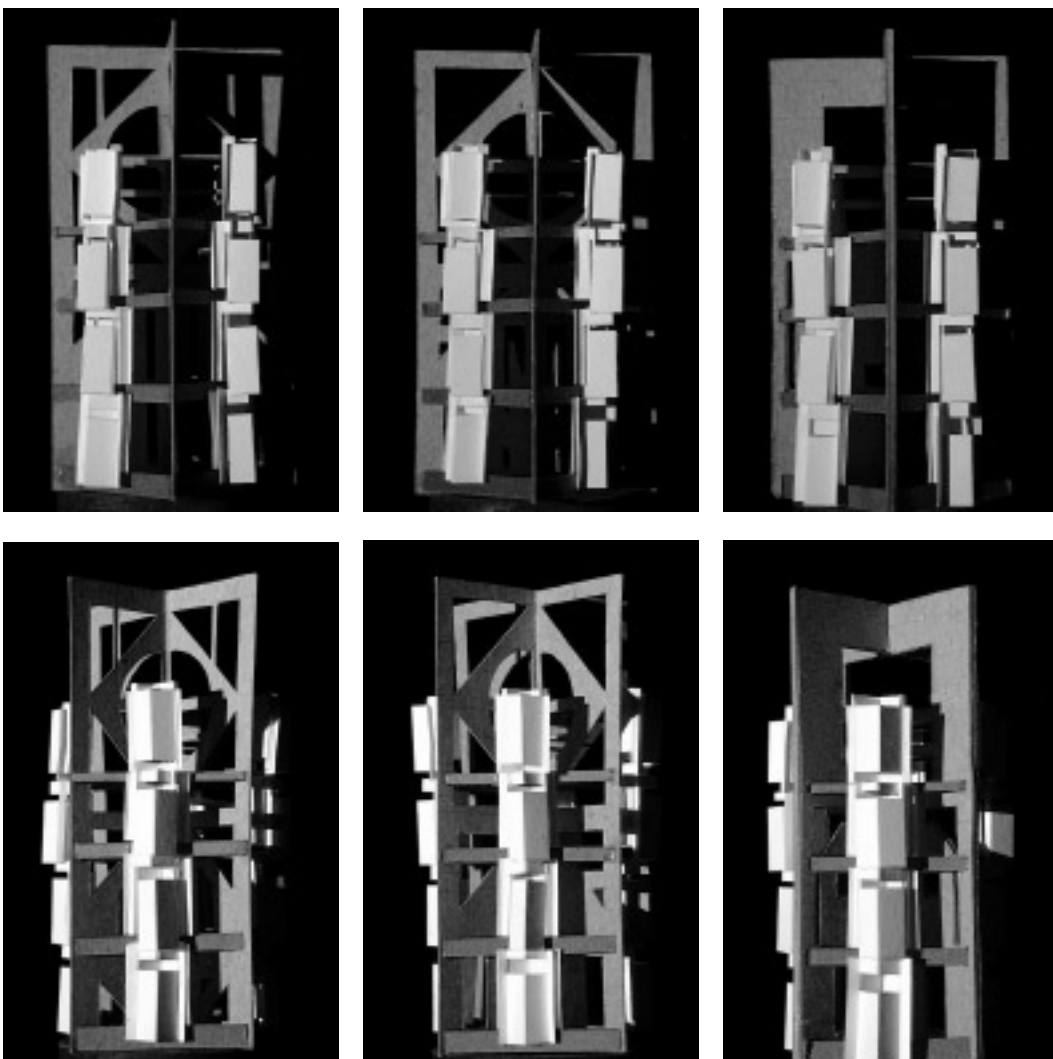
MODELS AND DRAWINGS

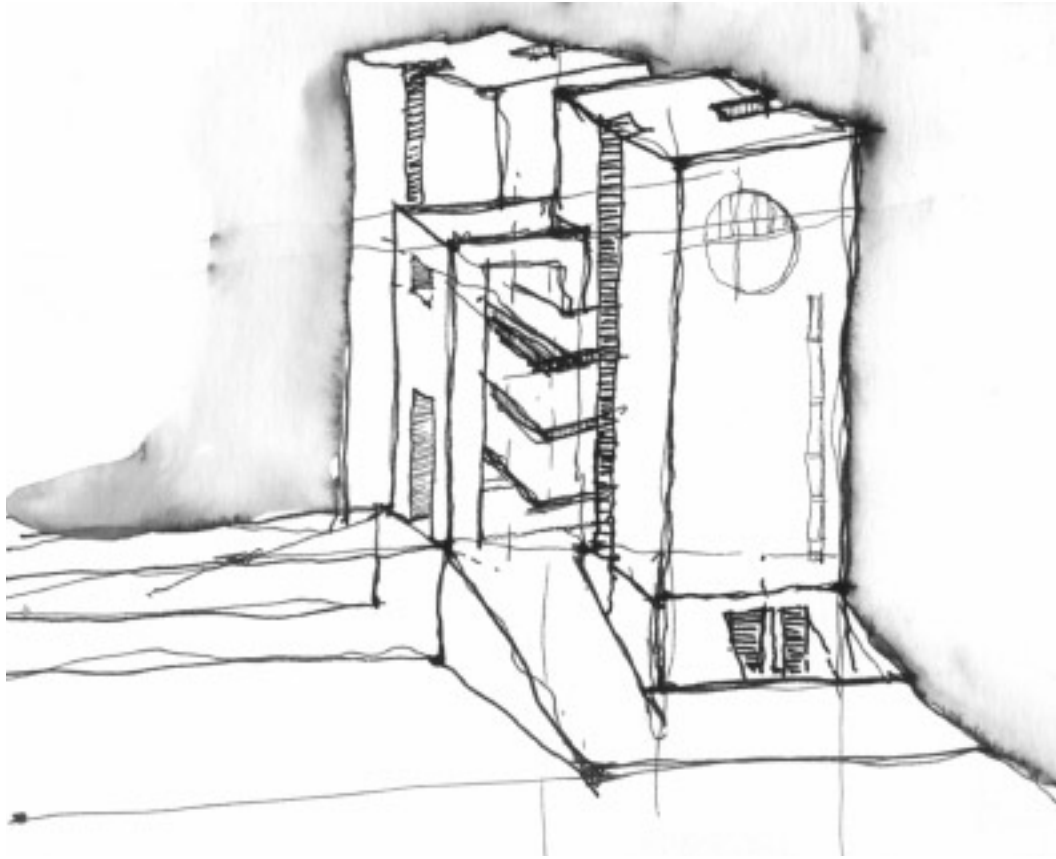




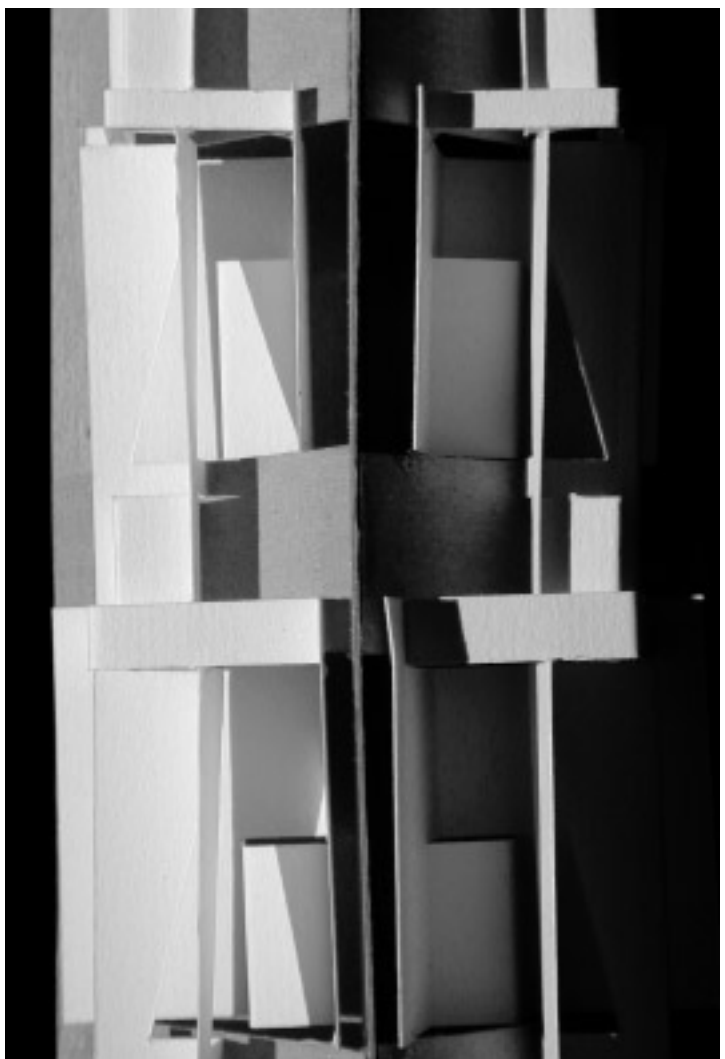
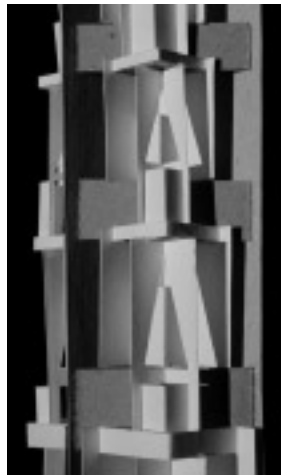
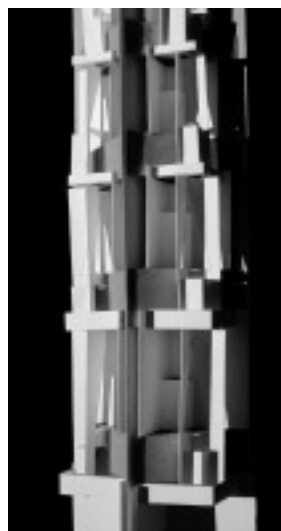
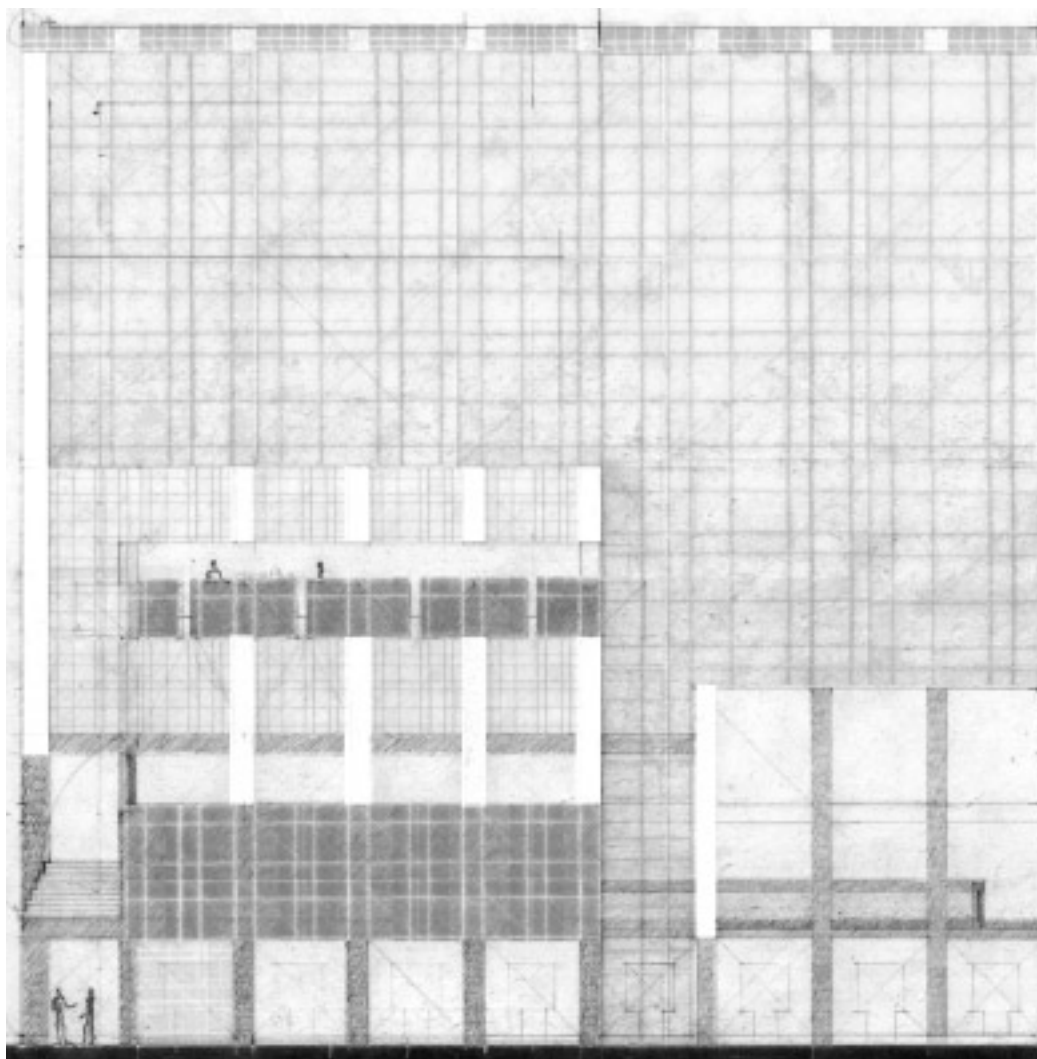
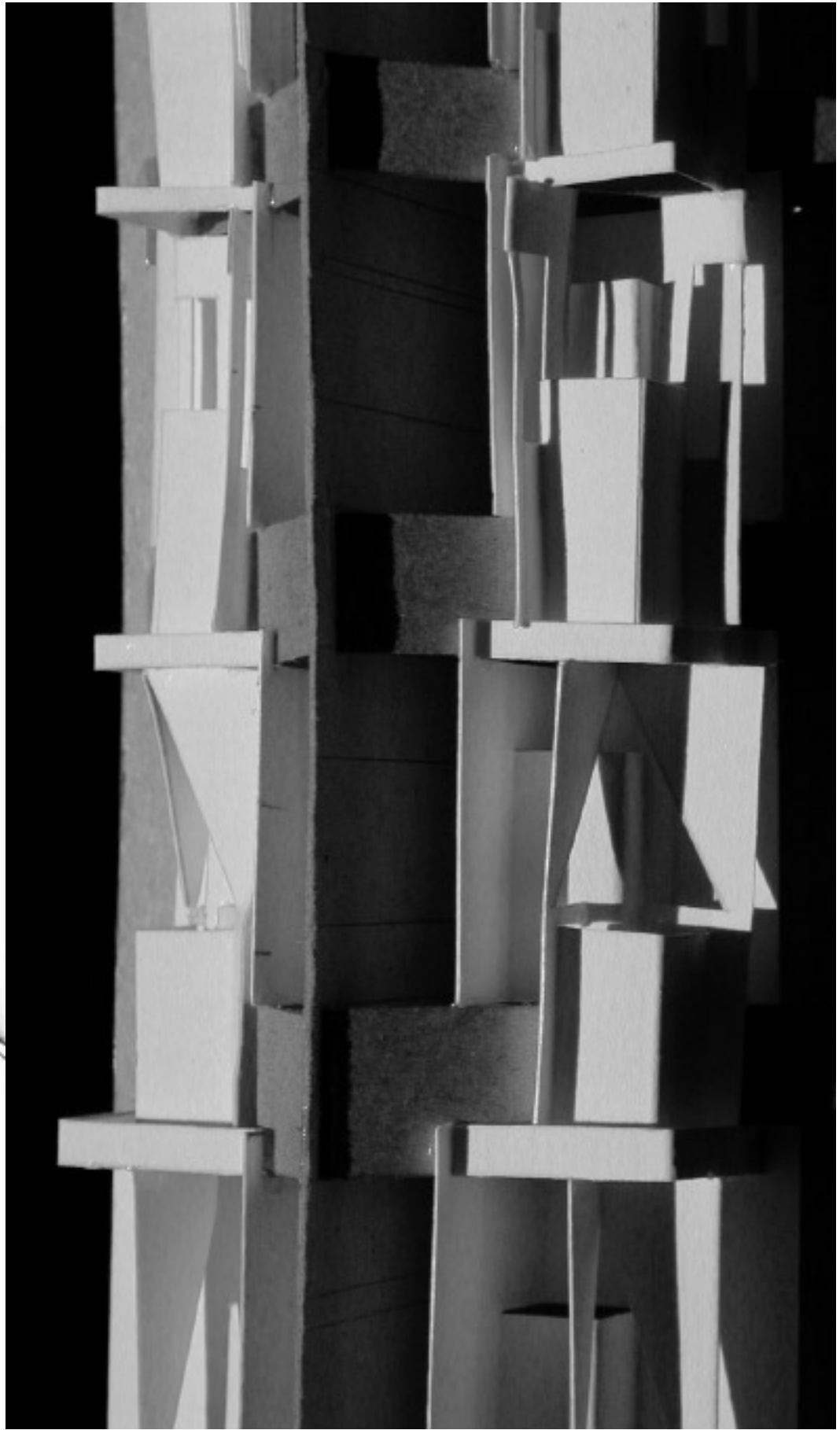
The physical character of the tower first manifests itself in these models. Drawings examined the spatial composition of the tower and stimulated the idea for a cellular structure. Clarification of this structure was revealed through making the model. A cruciform primary spine reinforced by diagonal bracing served as the primary structure to carry secondary cubic volumes.

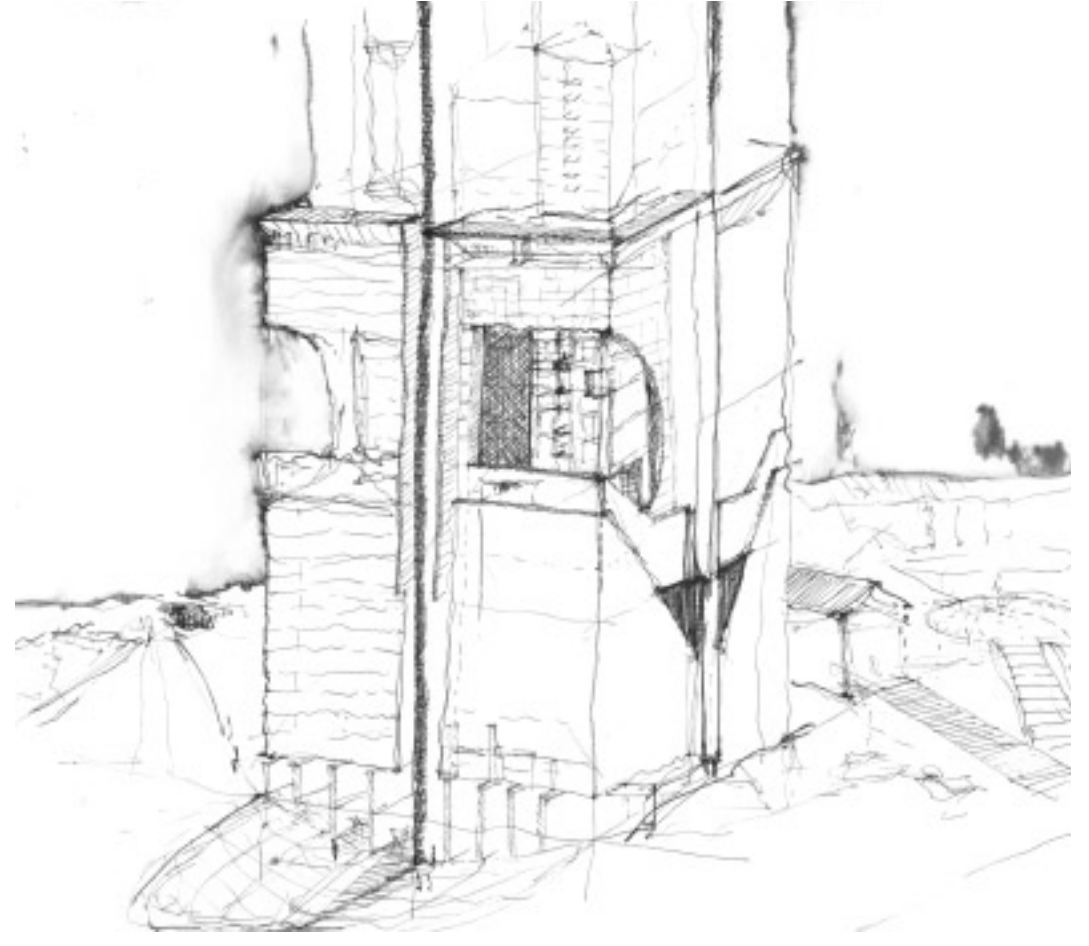
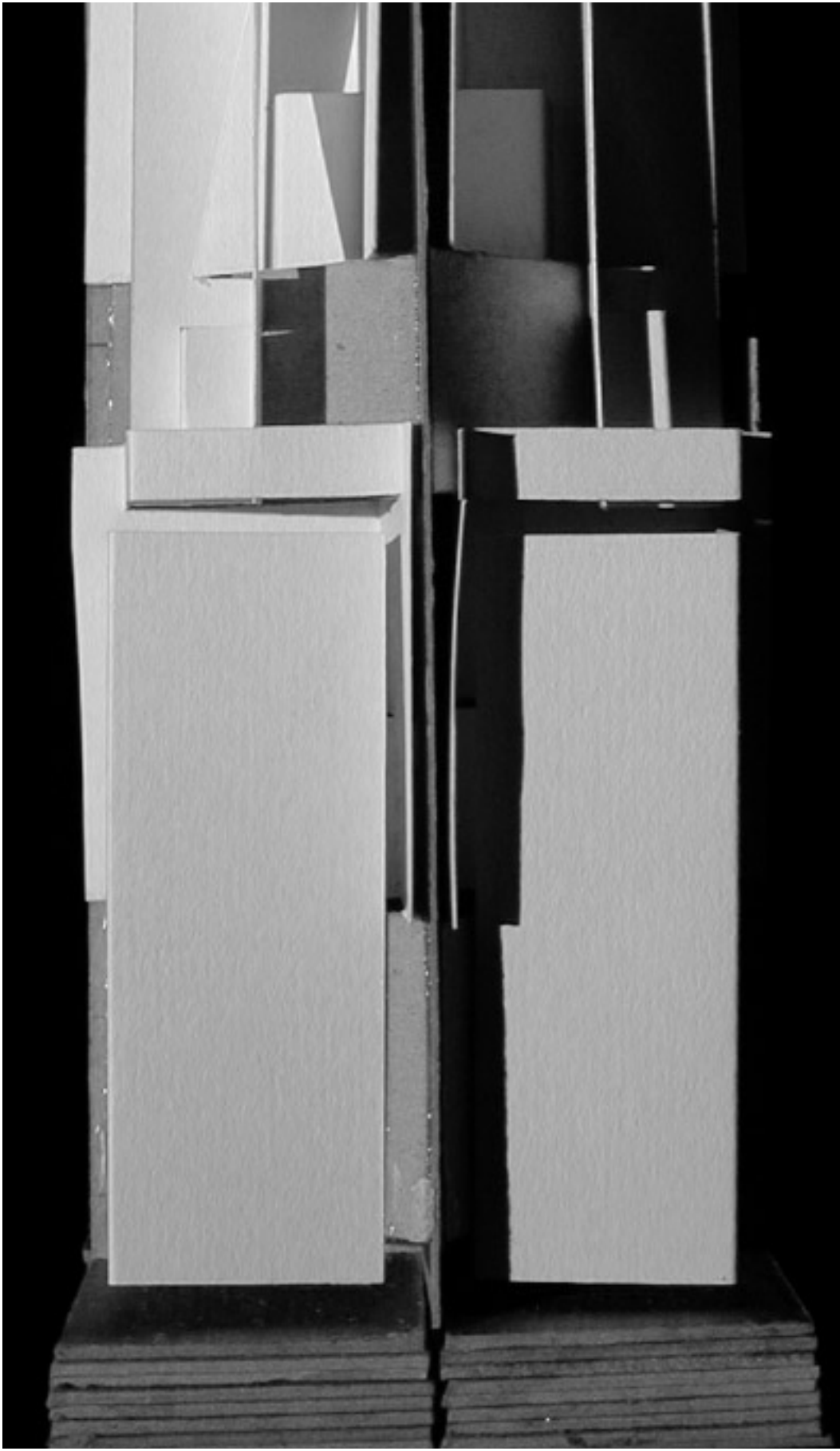
Specific ideas regarding differentiation of the apex of the tower from the base were formulated. A series of subsequent study models of the top began to define an open framework and a more realistic thickness for the primary spine. Walls of the primary structure opened to make a window on the sky and offer a grand public piazza, 3,000 feet from the city below.



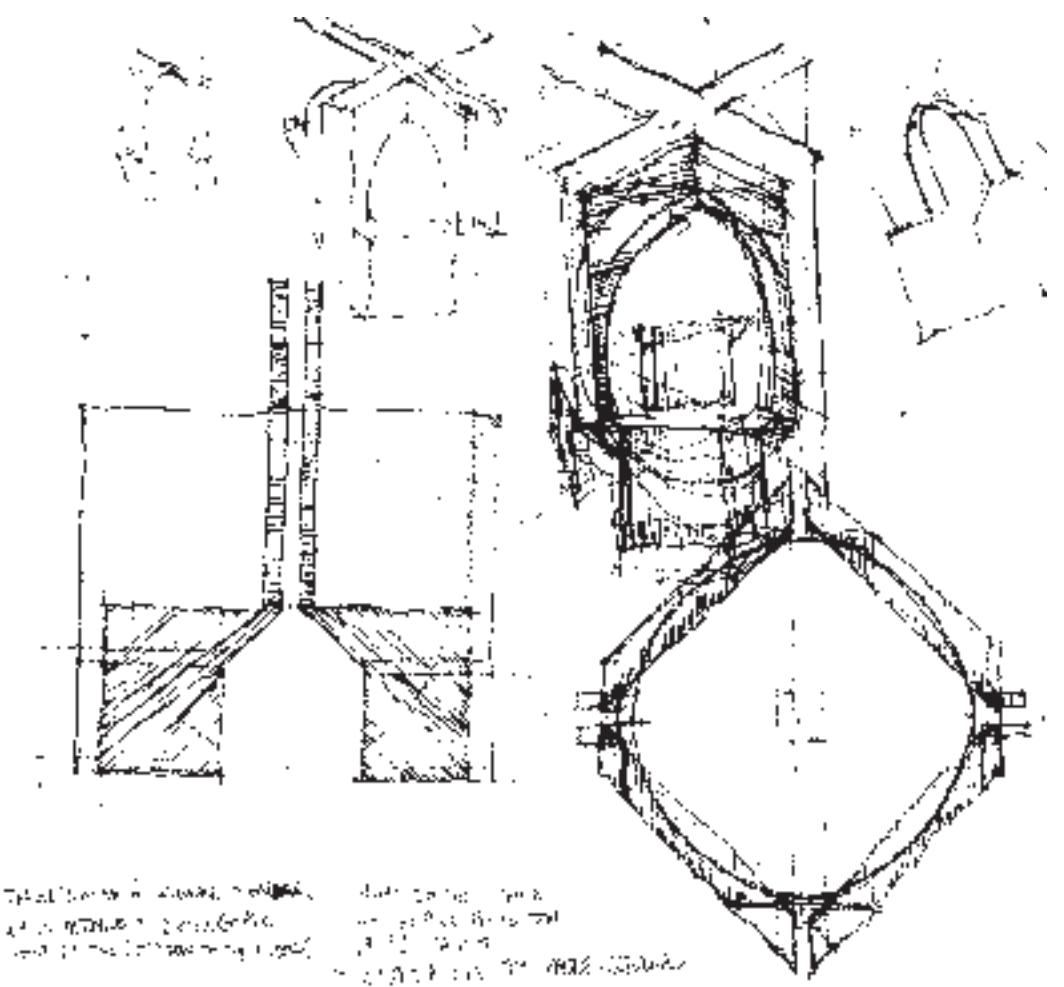
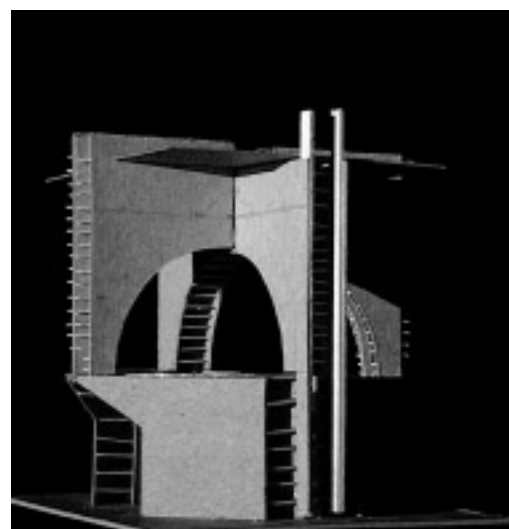
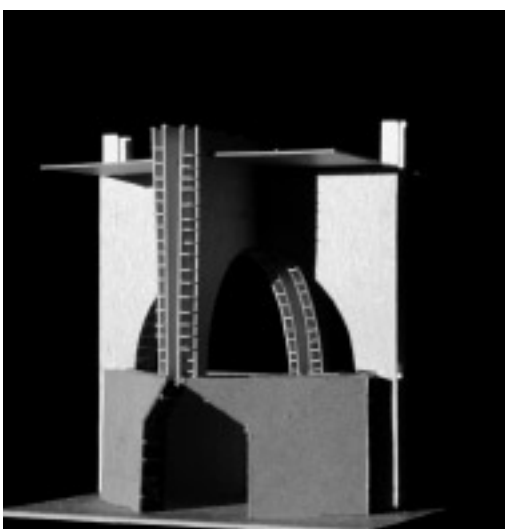
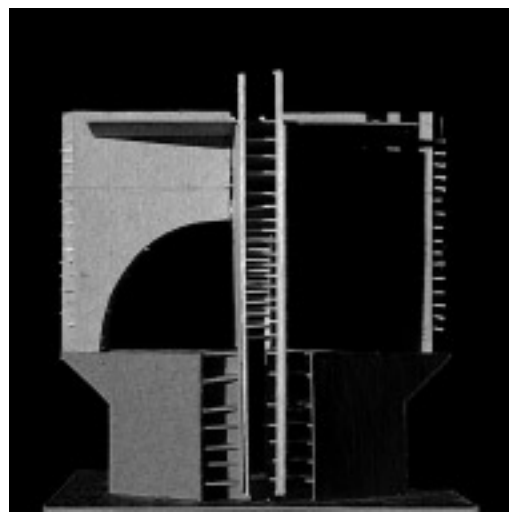
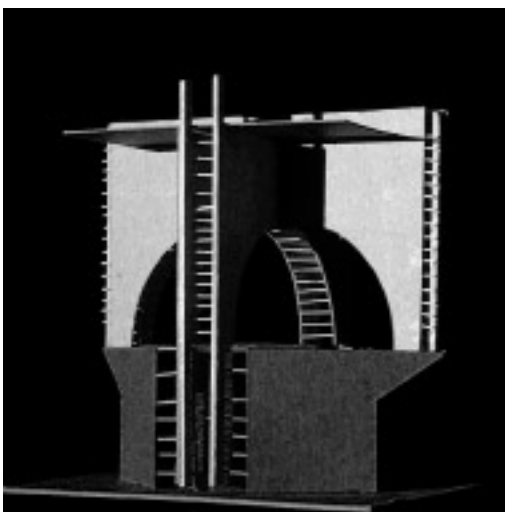


Modeling the cubic districts revealed the changing spatial relationship of the dwelling units to each other and to the primary structure. Bridges complete the cubic volume by connecting the dwelling units to walls parallel to the primary spine. Ultimately, this study uncovered a possible structural connection between the primary and secondary units in the hierarchy. Wall segments were envisioned as rotated elements that provided a surface from which to hang the cubes. Voids within the spine would be created by the rotations and would allow a spatial relationship between the corner cubes of each district to develop.

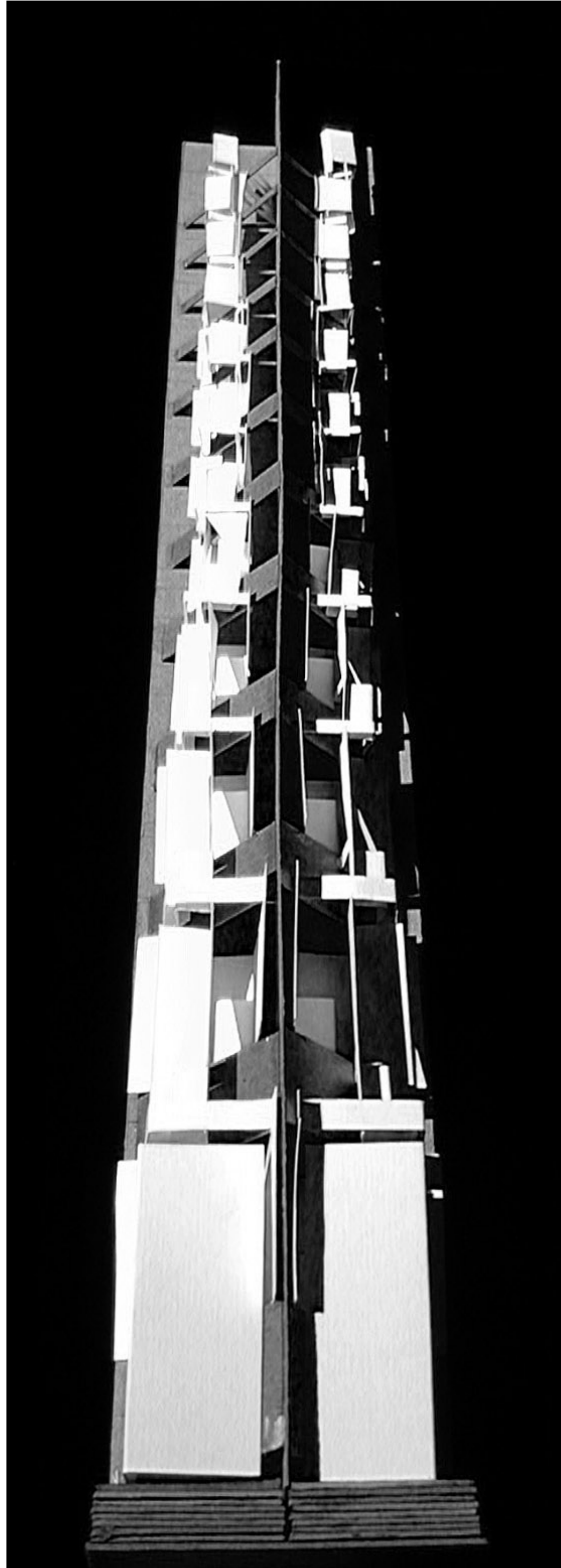




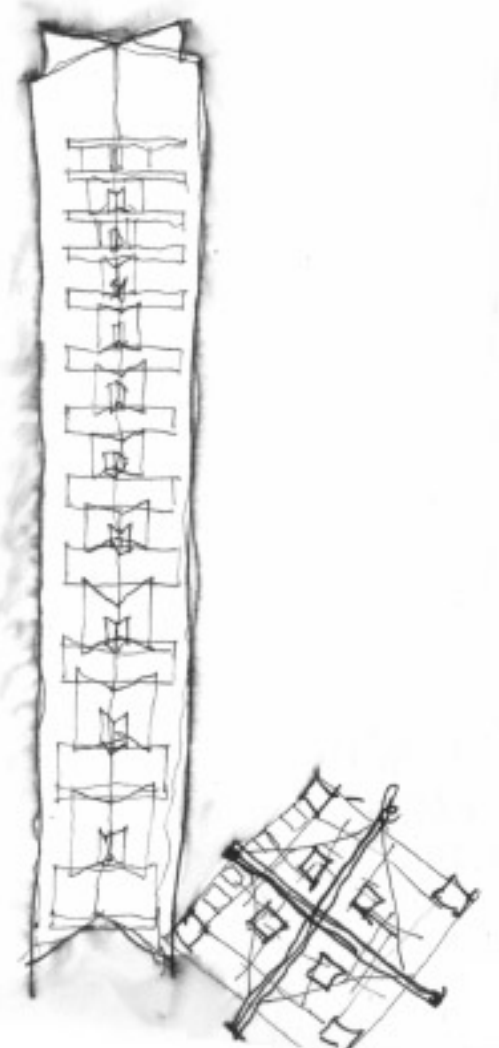
A monumental face at the base of the tower developed. The inner space retained that monumentality in a large public room. Open questions regarding the scale were studied in subsequent sketches. Crucial in establishing the physical nature of the tower, the model expressed an imperative definition in structure yet proved incomplete. A closer look was essential and the investigation continued.



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STRUCTURE





Dwelling units and bridges forming each district extend from the primary structure

A hierarchical series of wall elements governs the structural development of the tower. The primary element was conceived as a cruciform mass made in a series of concrete pours. Over 42,600,000 cubic feet of concrete would be needed to cast the element, not including the foundation. More than 175,000 nine-yard truckloads would need to be delivered along the streets of Rome. Alluvial soils would present structural challenges for a solid foundation that could potentially double the volume of concrete necessary.

Generally, most monolithic wall structures taper from the base to the top. Physically this reduces the weight at the top of the wall while allowing more mass at the base to carry the significant load. Applying an alternative method, the thesis holds the primary wall at a consistent thickness from the base to the top of the tower. Each arm of the cruciform plan takes its width from the original module of the originating geometry. Despite the logic of the geometry, the tower's true thickness would ultimately be established as the minimum thickness allowable to support the whole. Subtractions to the primary structure would increase as the tower wall ascends, terminating in a vast opening that constitutes a major public plaza at the top of the tower. The weight of the primary structure would be reduced from the base to the top. Openings, distributed along the wall's long section, define diagonal force flows that carry the weight from the top of the tower to the base. Redundant bracing, in the form of trussed structures, occurs at each district and also follows the logical reduction in weight from top to bottom. William LeMessurier insists that "a system possessing vertical continuity in a continuous partition located at the farthest extremity from the horizontal center" comes closest to the form ideally suited to endure bending and shearing stresses.⁶⁴ Continuity at the extreme of the cruciform wall structure is maintained.

The slenderness ratio of the tower is 7.5:1 and is within the generally accepted maximum ratio of 10:1. According to an article in *Architectural Record* in January of 1985 "super-tall buildings are generally defined in architectural terms as skyscrapers with a silhouette whose proportion in height to width is at least 5:1."⁶⁵ Wind loads are a significant factor in determining the structural design and actually "the engineering demands posed by lateral loads exceed those of gravity" when the proportion exceeds 5:1.⁶⁶ Wind tests to determine the Shear Rigidity Index would need to be considered in further design efforts. Differentiation is maximized within the cubic districts in an attempt to break up any wind forces and distribute them to the different arms of the tower. The primary wall could also be hollow in places particularly at the top, which could incorporate a counterweight to counteract dynamic wind forces and reduce swaying. Functionally, a hollow space could serve to carry main vertical services that would be used to supply local services at each district. Economically it could significantly reduce the amount of concrete necessary.

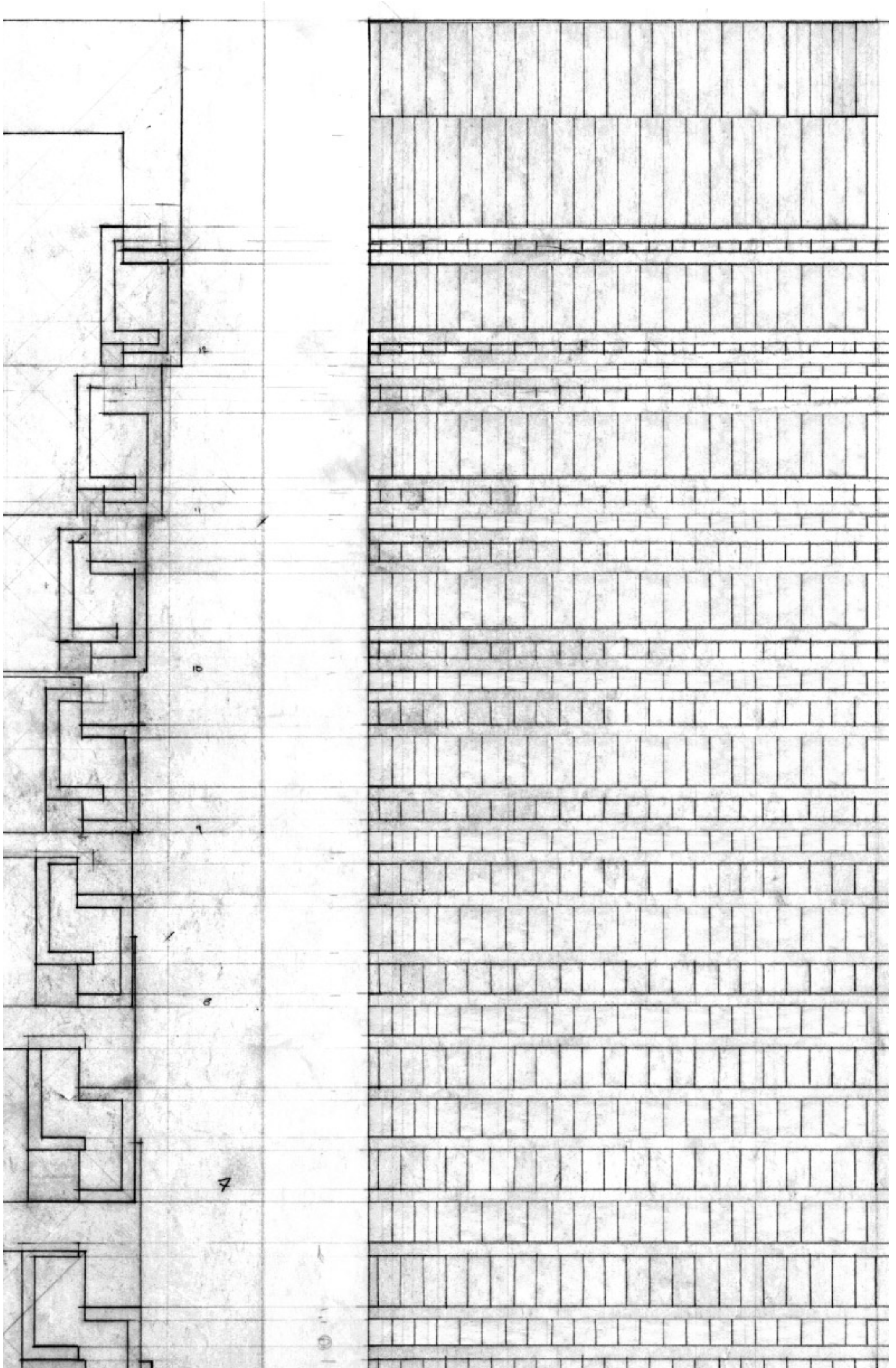
Walls rotated out of subtractions in the primary spine provide the connection from which the secondary cellular cubes hang. These units comprise the districts of the tower. Compact cells of concrete and steel make the rigid bridges the span from the walls of the district to the dwelling units and define horizontal public spaces open to the air. Dwelling units comprise the outer corners of the tower and are also cellular structures.



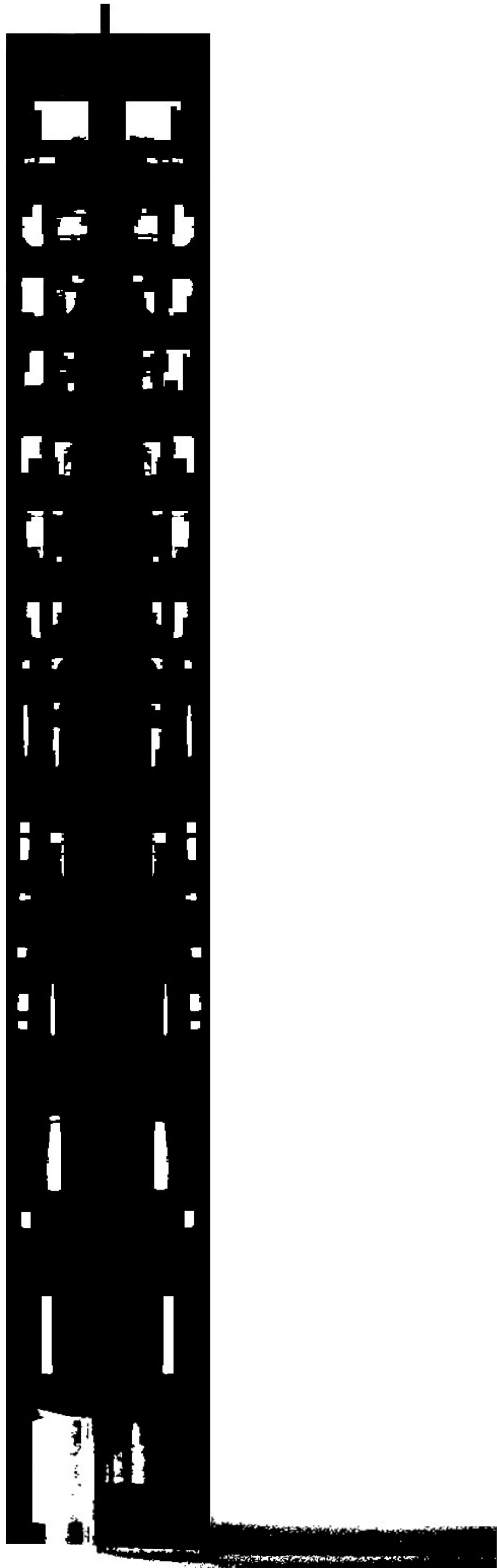
Walls rotated out of the primary structure hold the districts

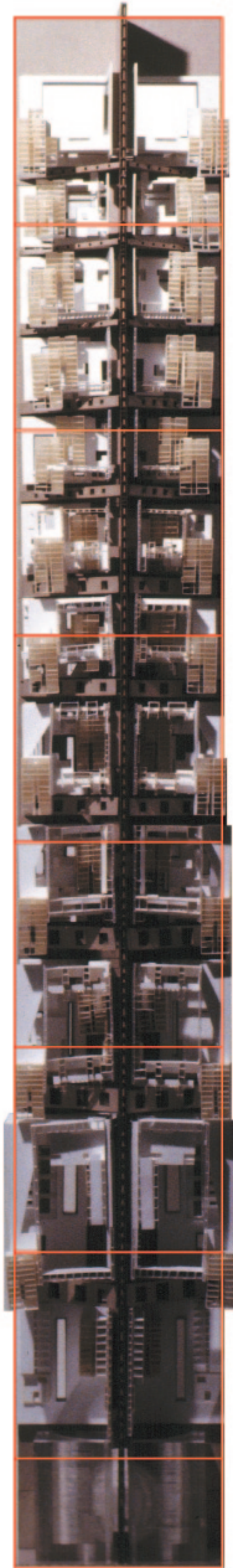


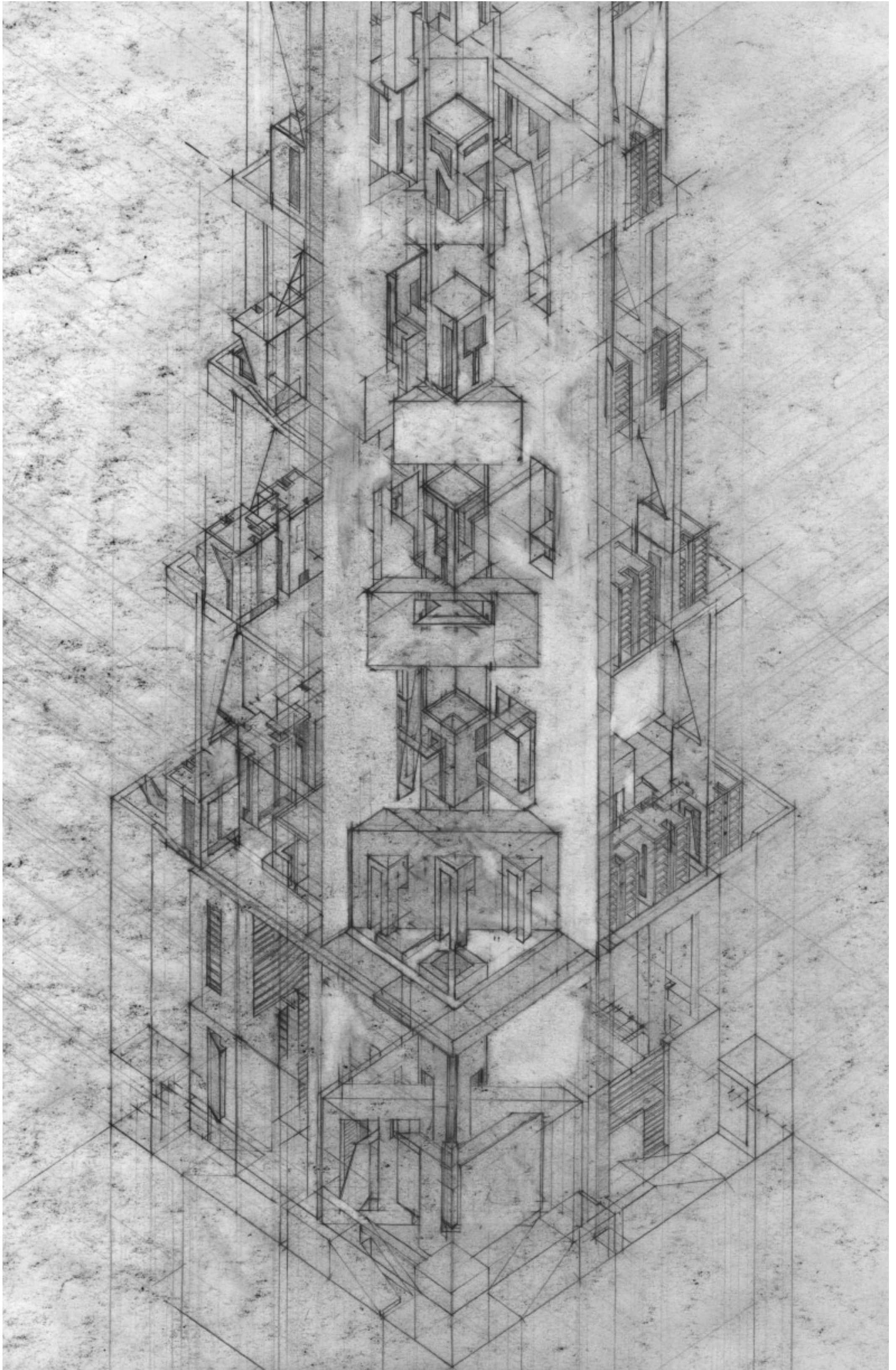
Voids in the walls of the districts

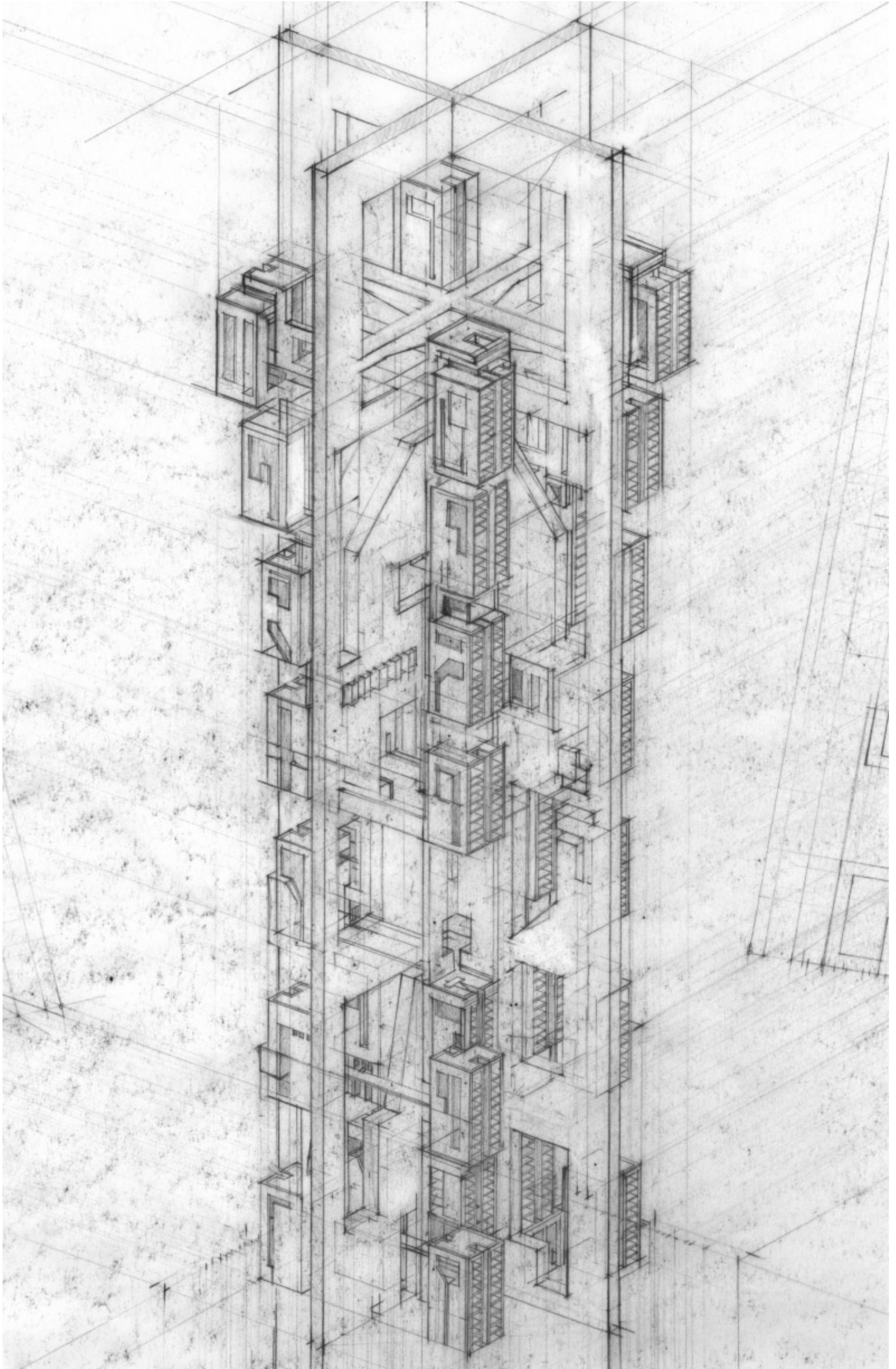


Divisions in the primary mass anticipate a panel formed structure

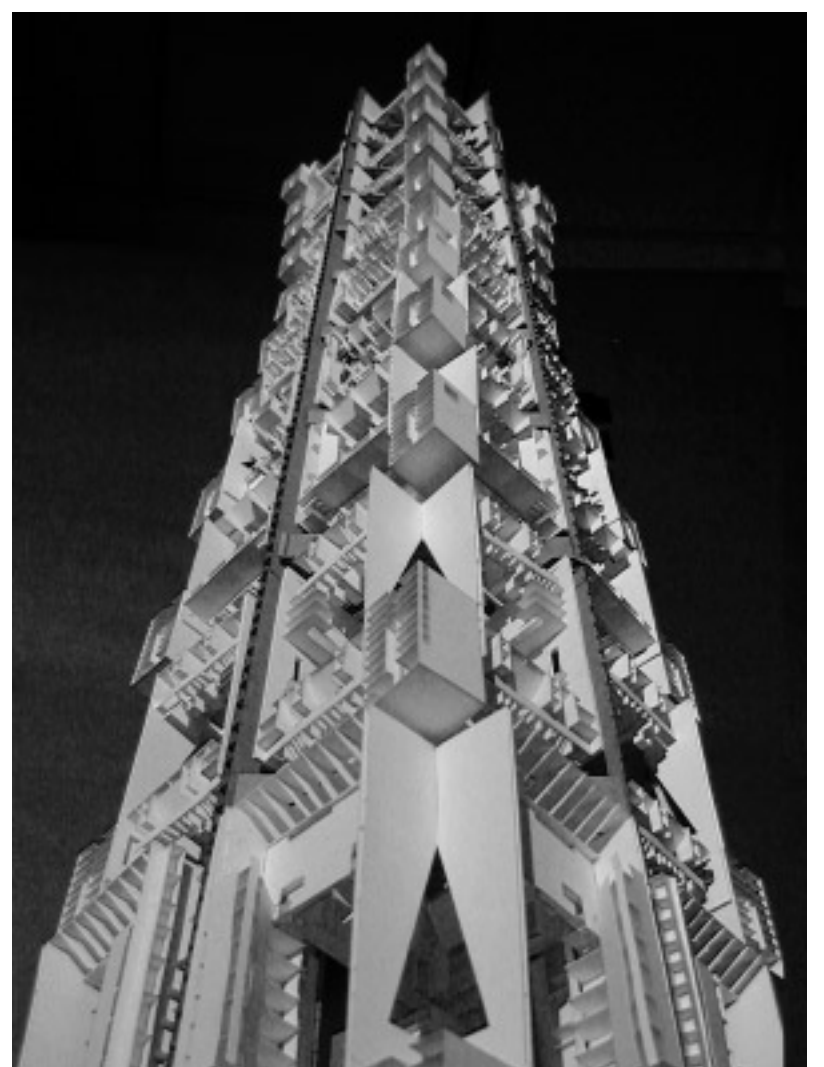


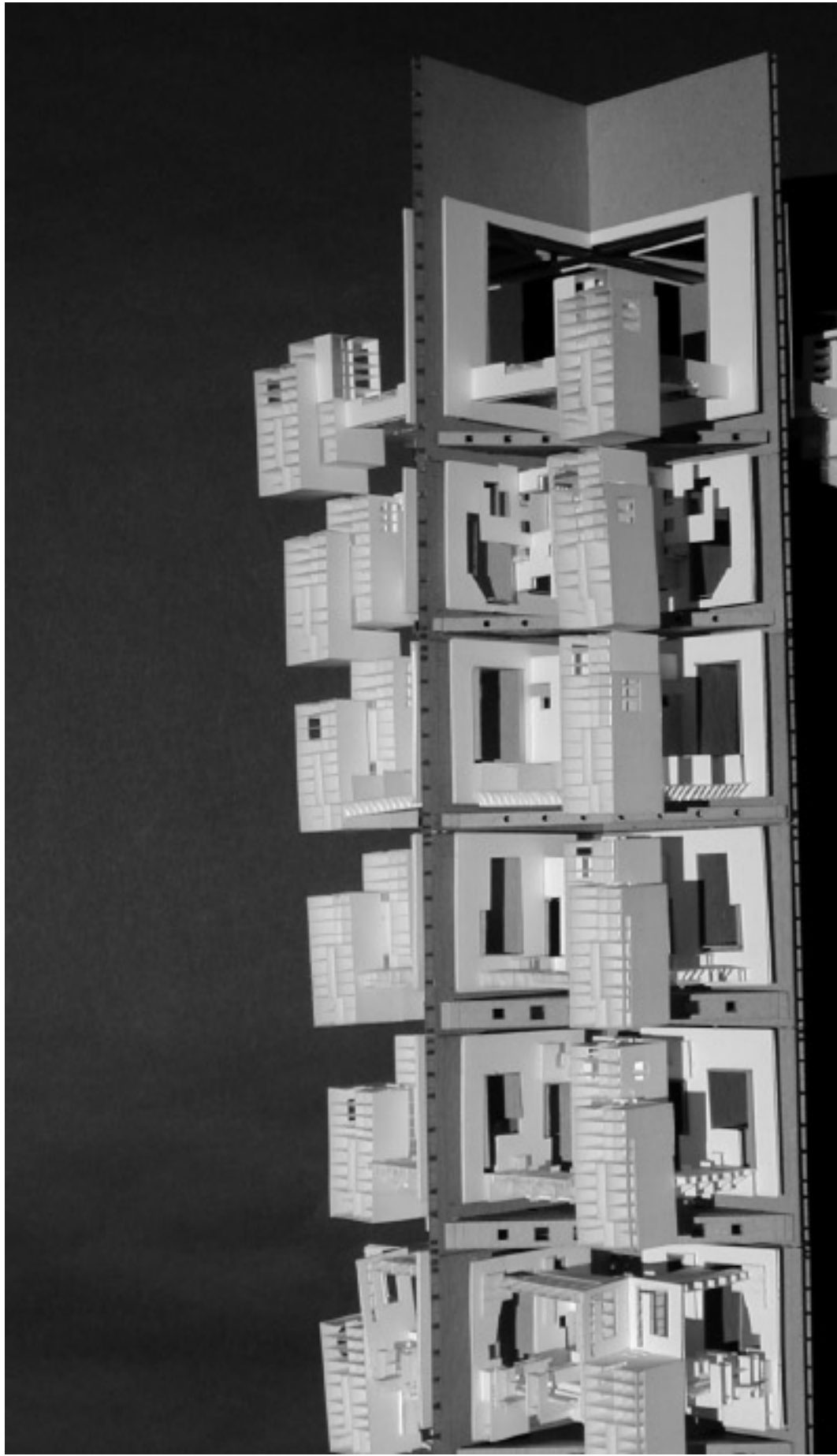




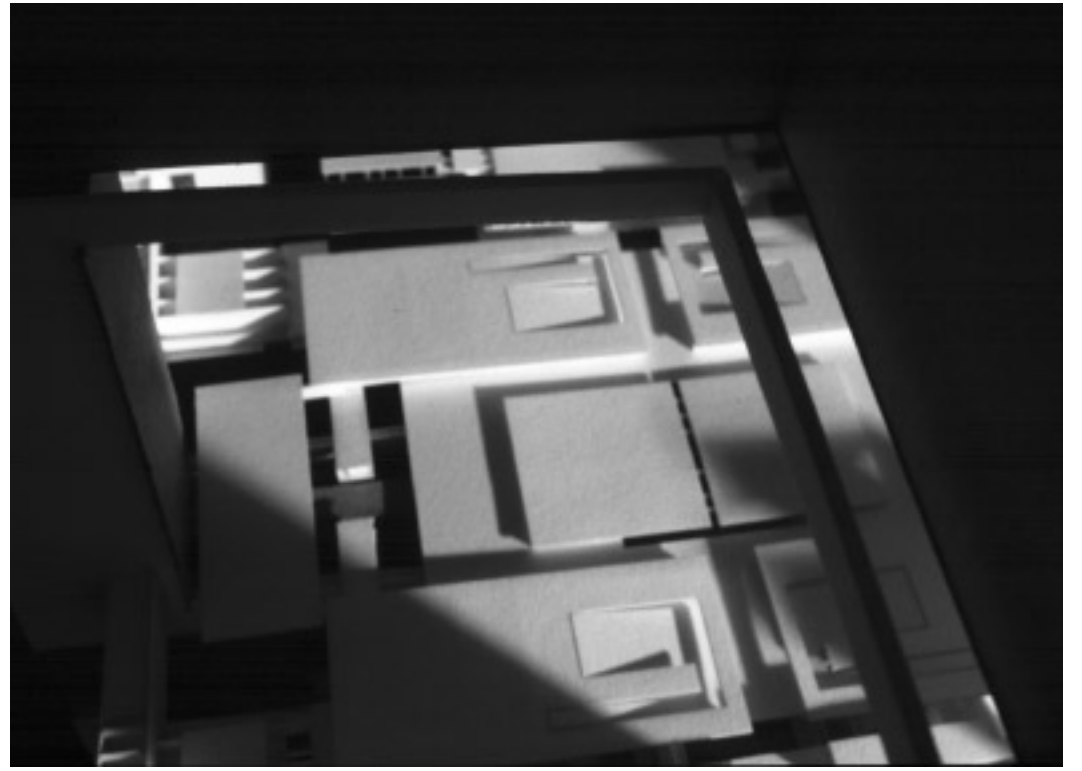


VERTICAL CITY





Silhouette of Districts Seven through Twelve



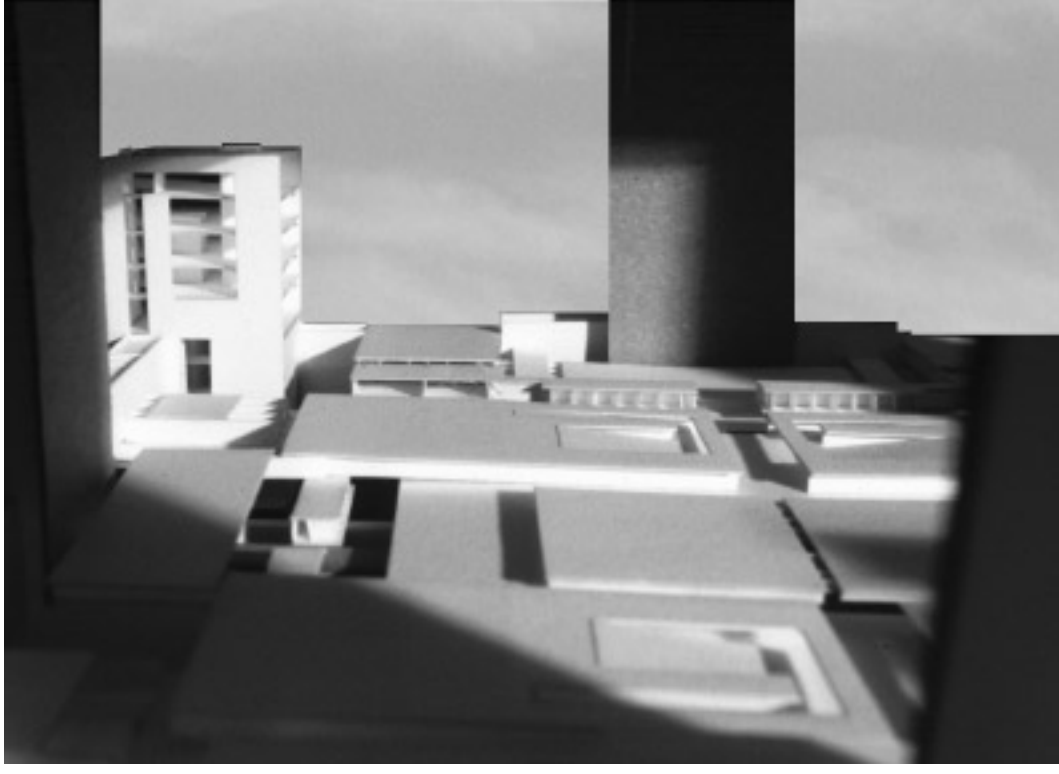
Elevation 3275' - view from sky jetty piazza below

The upper reaches of the tower reveal three acres of public space, exposed by massive cuts in the primary structure. Corner dwelling units 3,200 feet above the old city define this grand piazza. Exposed to wind, water and sun like other piazza of Rome, the tower's piazza is a high plateau with a sublime view. The sky becomes a transparent wall. Thousands visit this piazza in the sky every day. Walls, steps and slopes differentiate the surface of the plaza. Small pools of water offer a reflection of the sky. Trees and plants grow in gardens, and narrow, polluted streets appear distant. Rome's people have their own mountain top from which to survey the region.

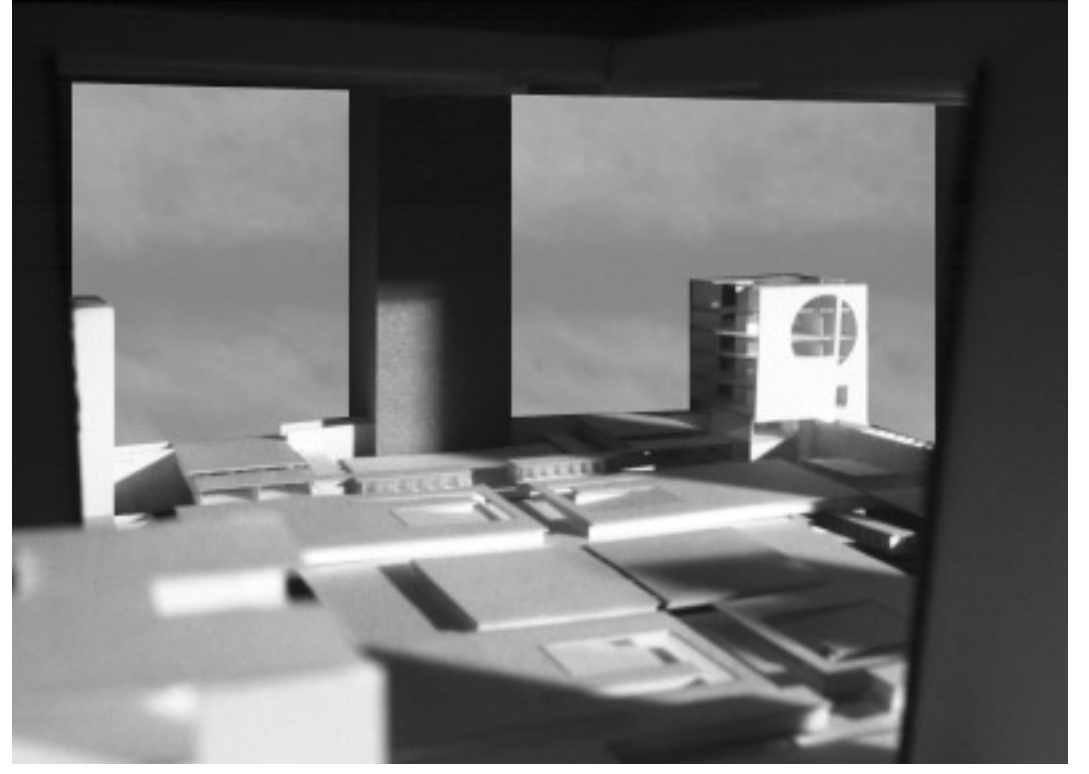
Elevators ascend above the piazza to the very top of the tower allowing people to walk the sky jetties. These long vertical piers, with walls five feet high on either side, run the length of the primary cruciform structure and allow people to peer over the edge to the city below. Corresponding to the thickness of the structure at the base, the dimension of the jetties exhibits the structural continuity governing the primary walls. Massive chambers harboring the counterweights that resist winds could be toured. The complex, inner workings of the tower are on display.

Dwellings on the edge offer magnificent spaces for the 1,000 residents who live in the Twelfth District. The dwellings present a public face to the urban piazza, while the sky side exhibits the individual cells expressive of the interior. These framed views from the individual cells admit the landscape into the interior scale of the units. Peripheral spaces between the dwellings and the main piazza offer the residents their own courtyards. The elements of the piazza mediate the public scale at the "ground level," while the primary structural walls rise up and express the tower's grand scale. Although this district exists far from the ground, places to sit and read, bask in the sun or have a coffee are plentiful. Restaurants, shops and bars within walking distance reinforce the urban nature of this park. The street is brought into the sky.

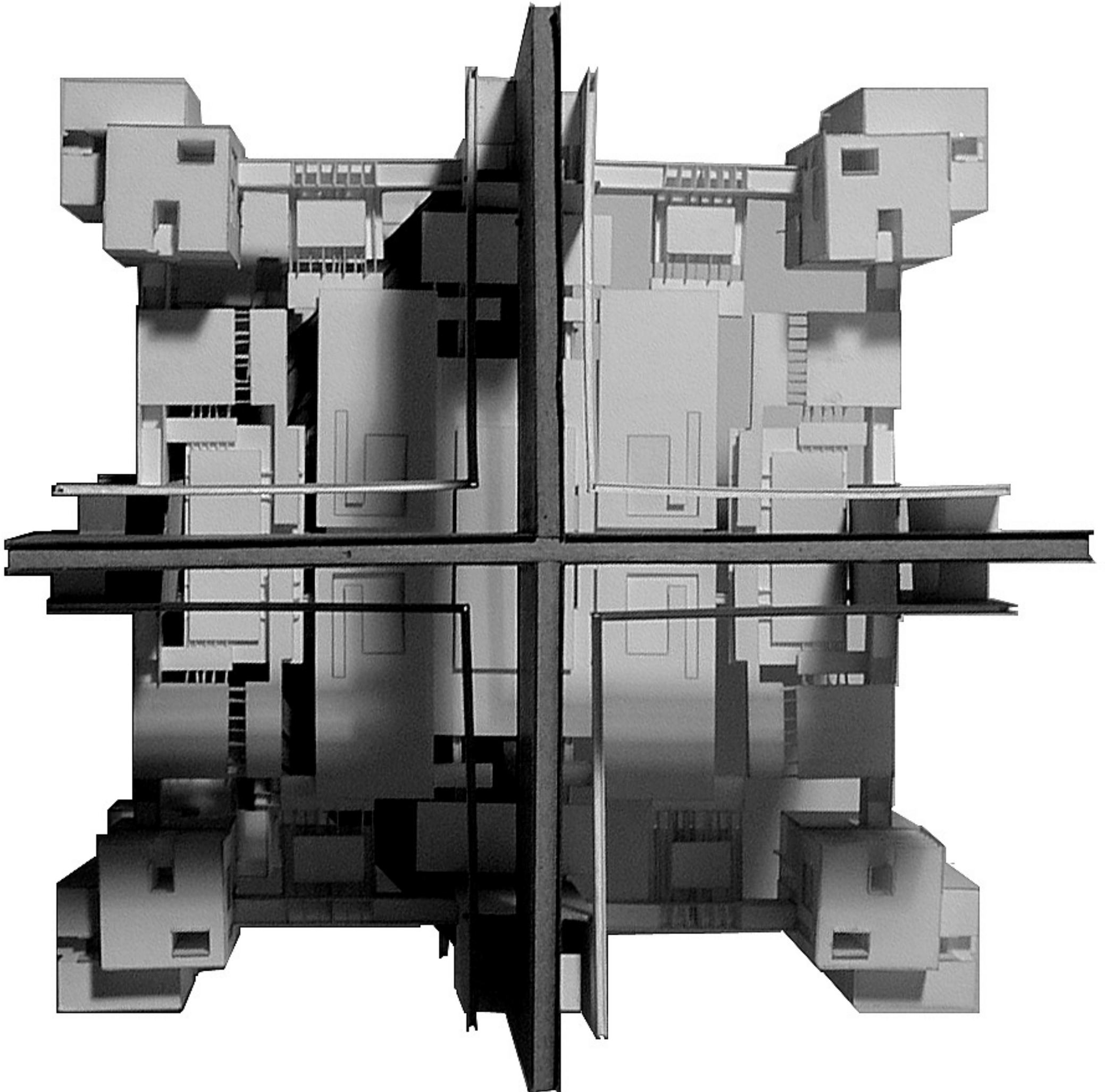




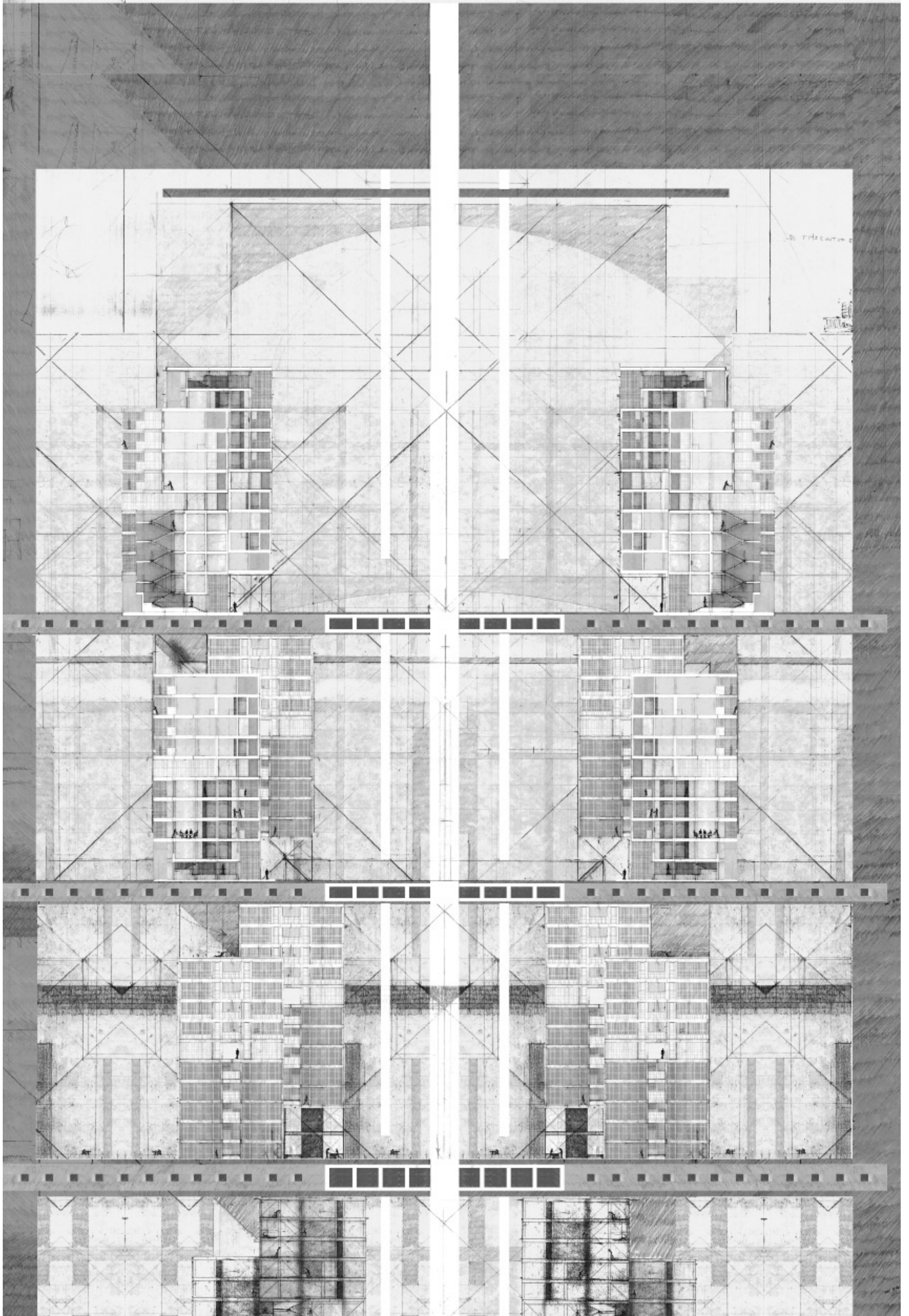
View across the piazza from the elevators to the sky jetties



View across the piazza from the rooftop of a dwelling

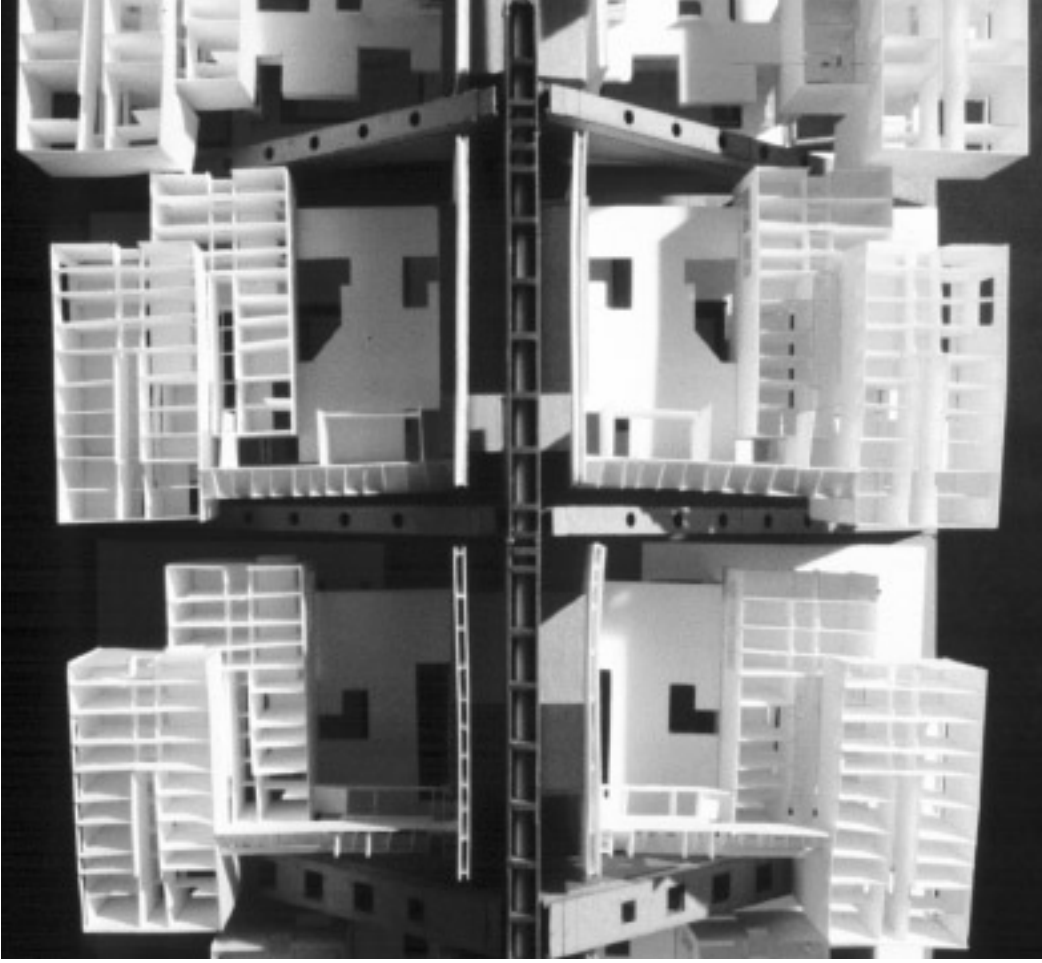


Roof plan at District Twelve - Dwelling units define 3 acres of public piazza while the cruciform, primary structure creates the sky jetties

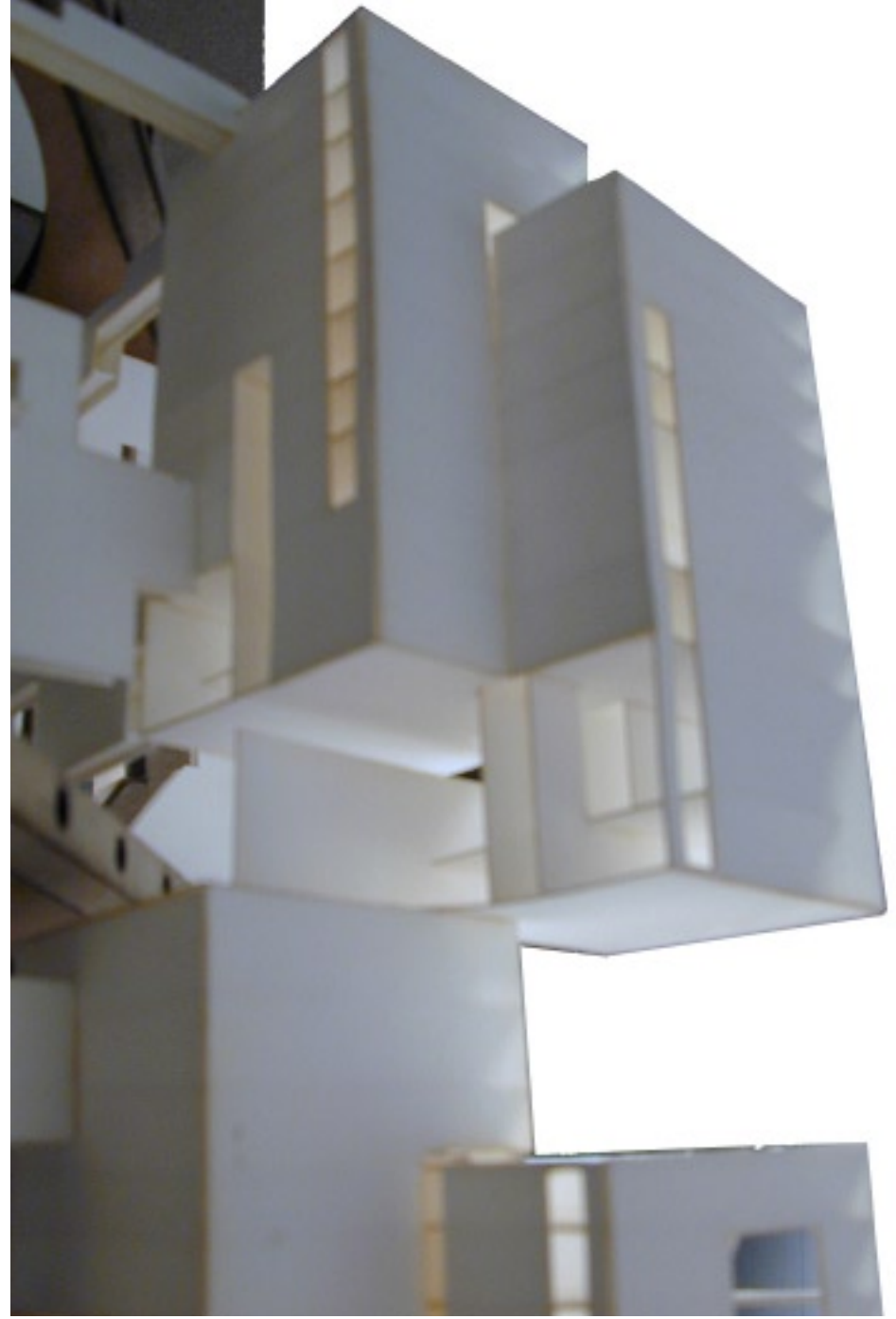


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Section through Districts Ten, Eleven and Twelve



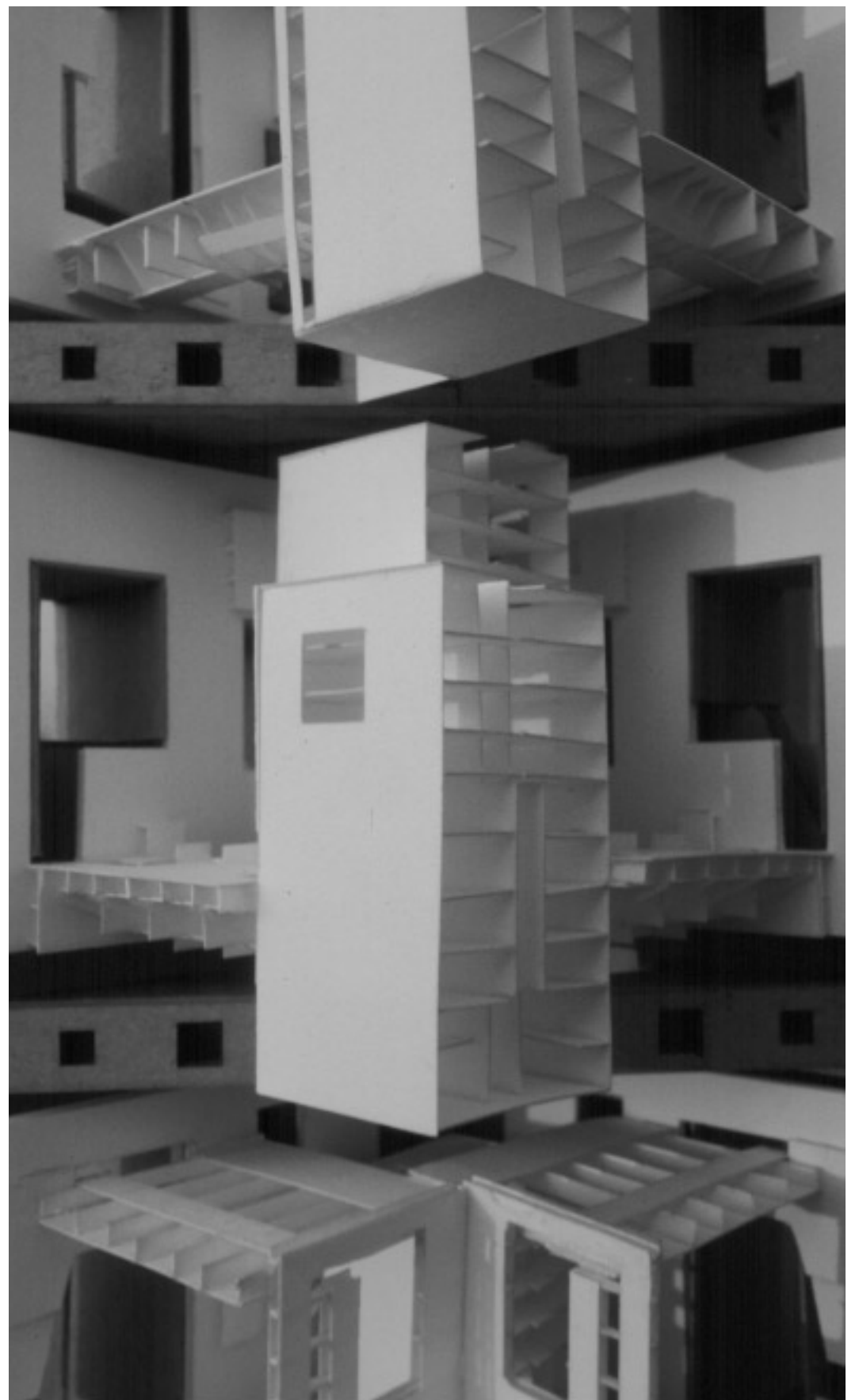
Intersections of the upper dwelling units and the interior walls of the interior public spaces

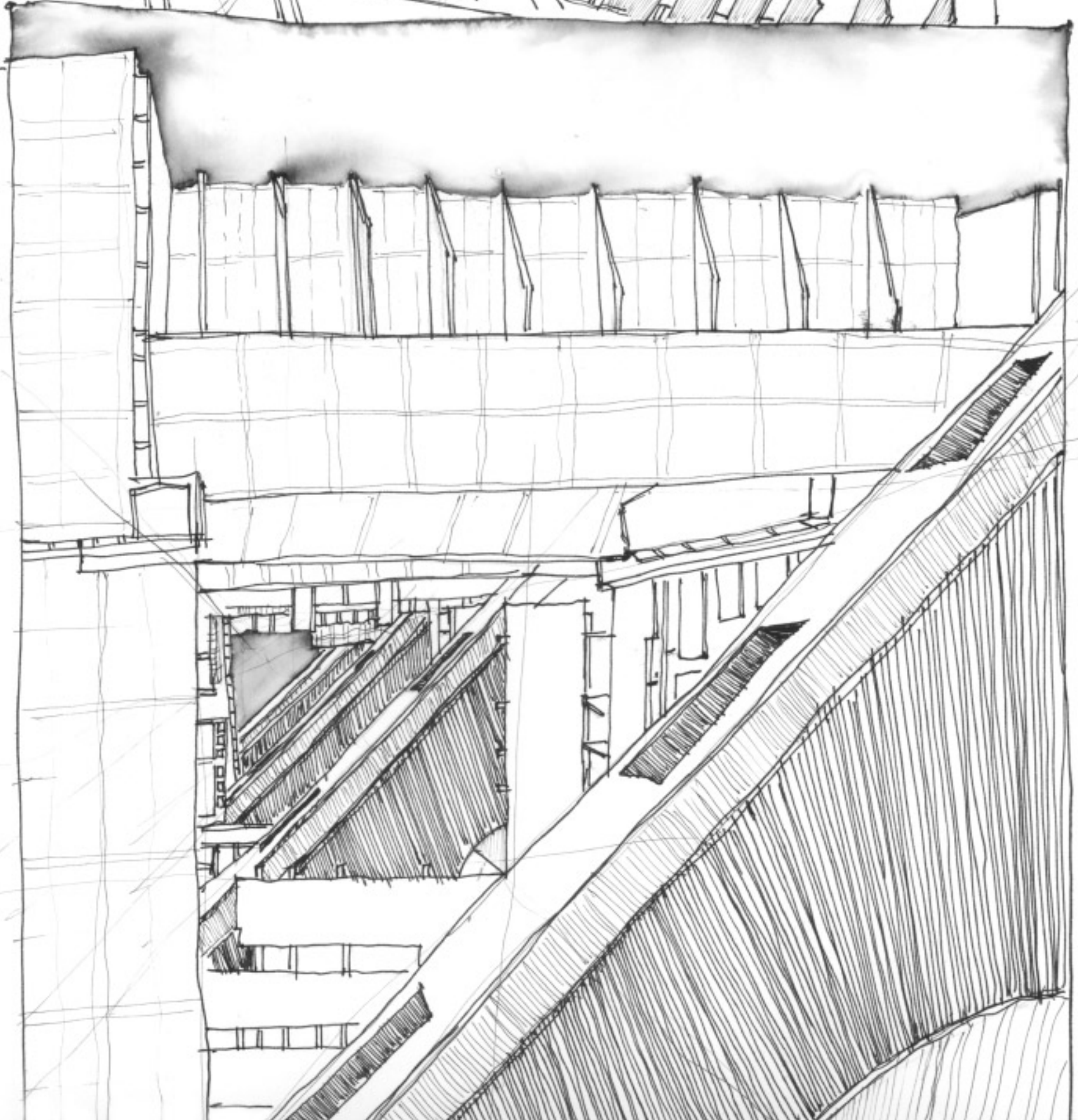
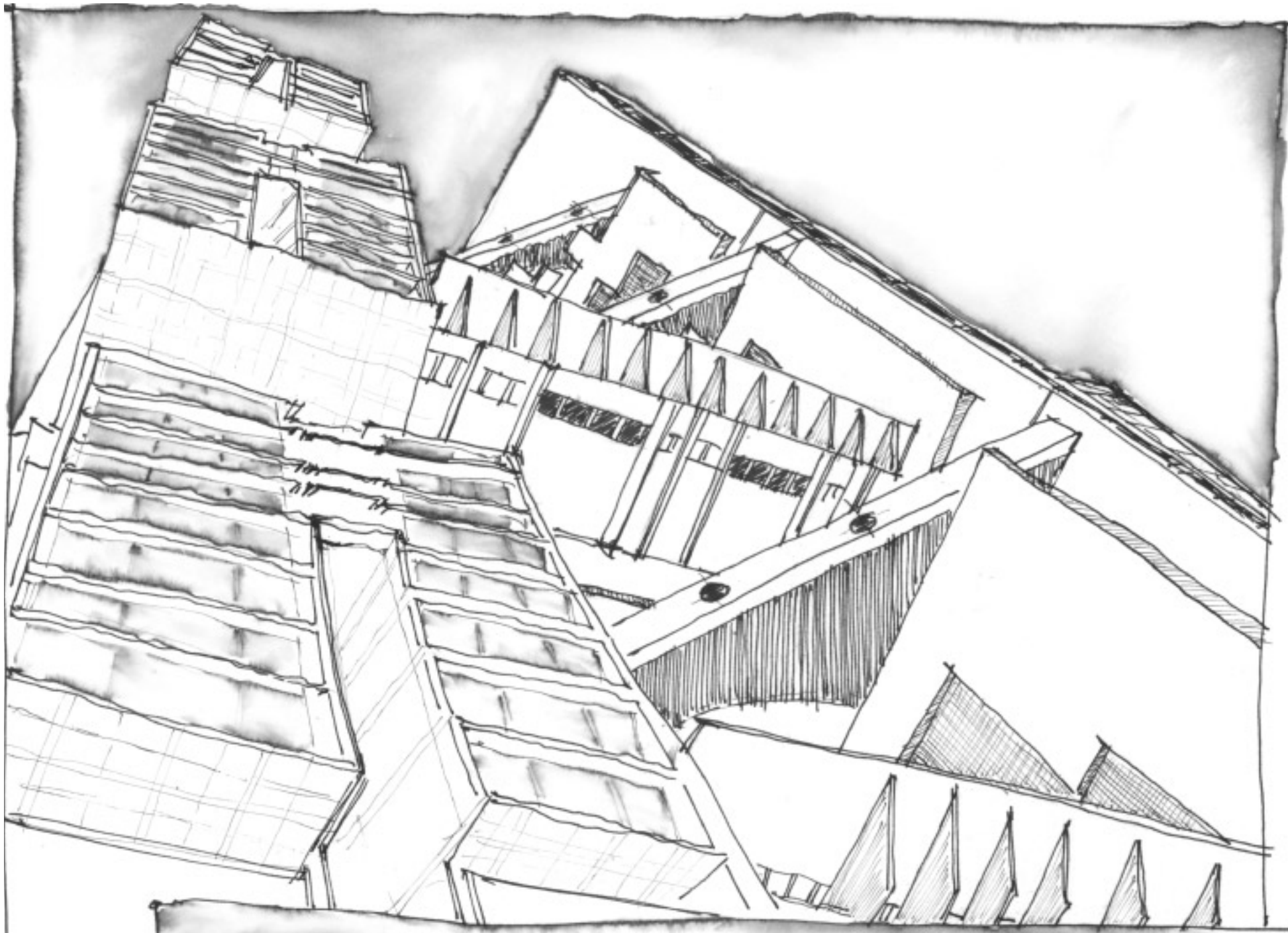


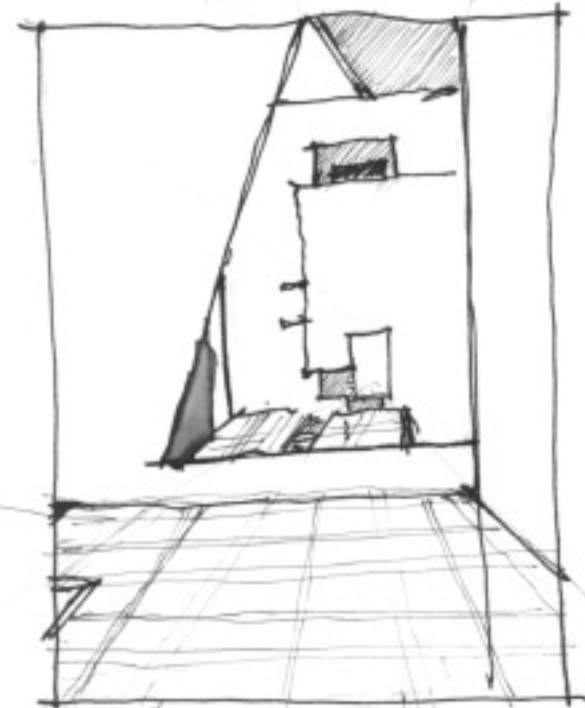
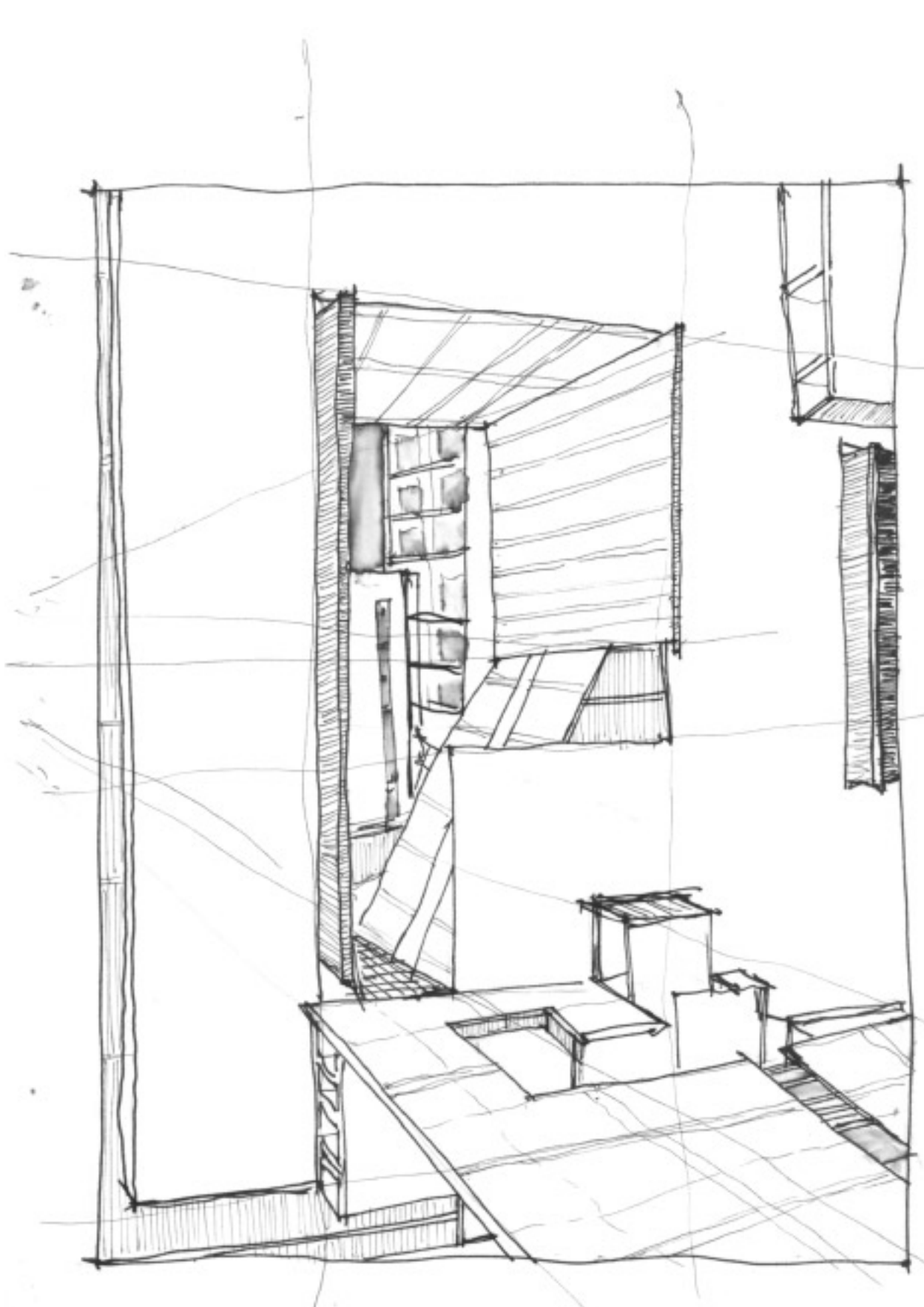
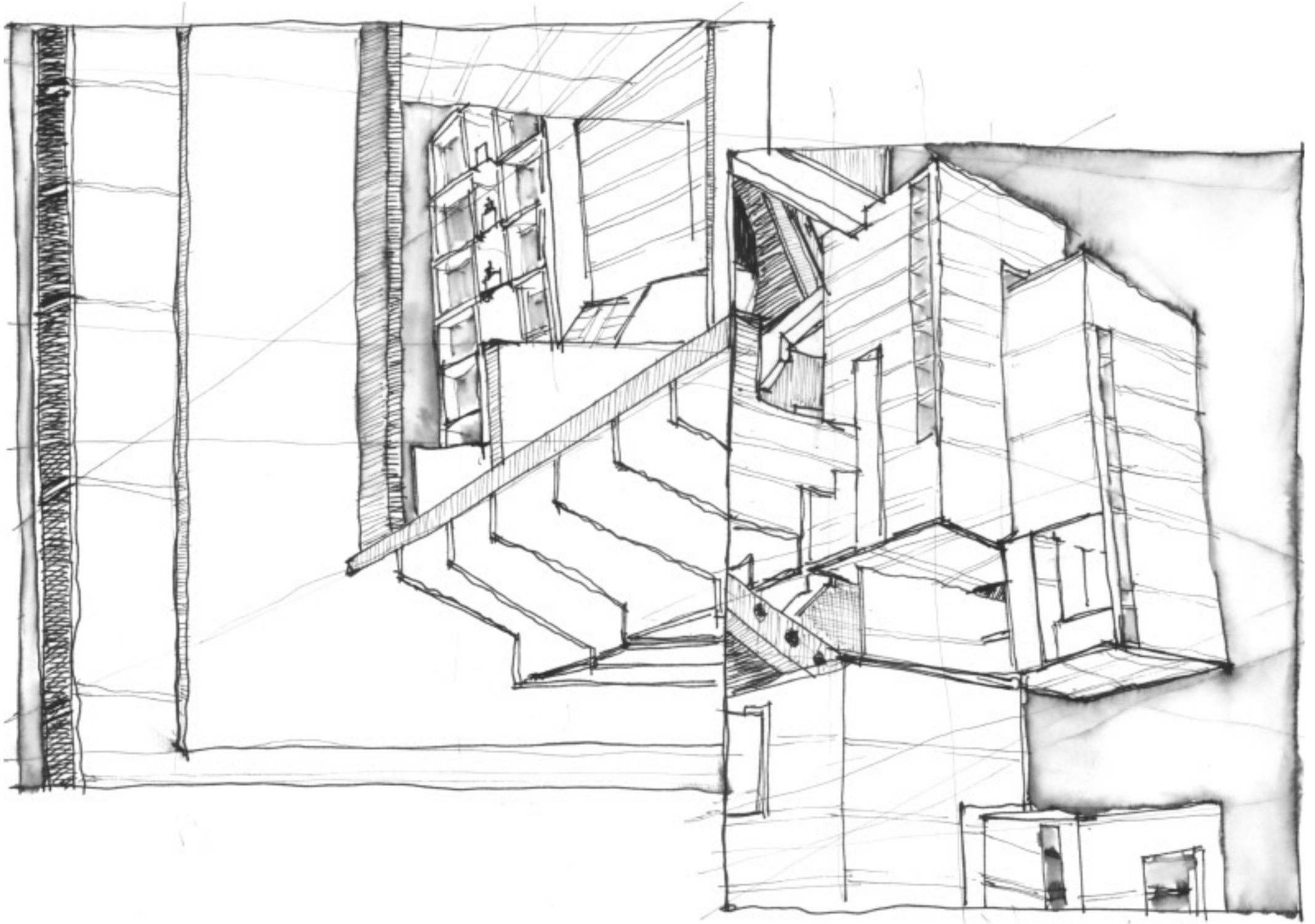
Floor planes and roof decks define terraced spaces between dwelling units at the upper districts

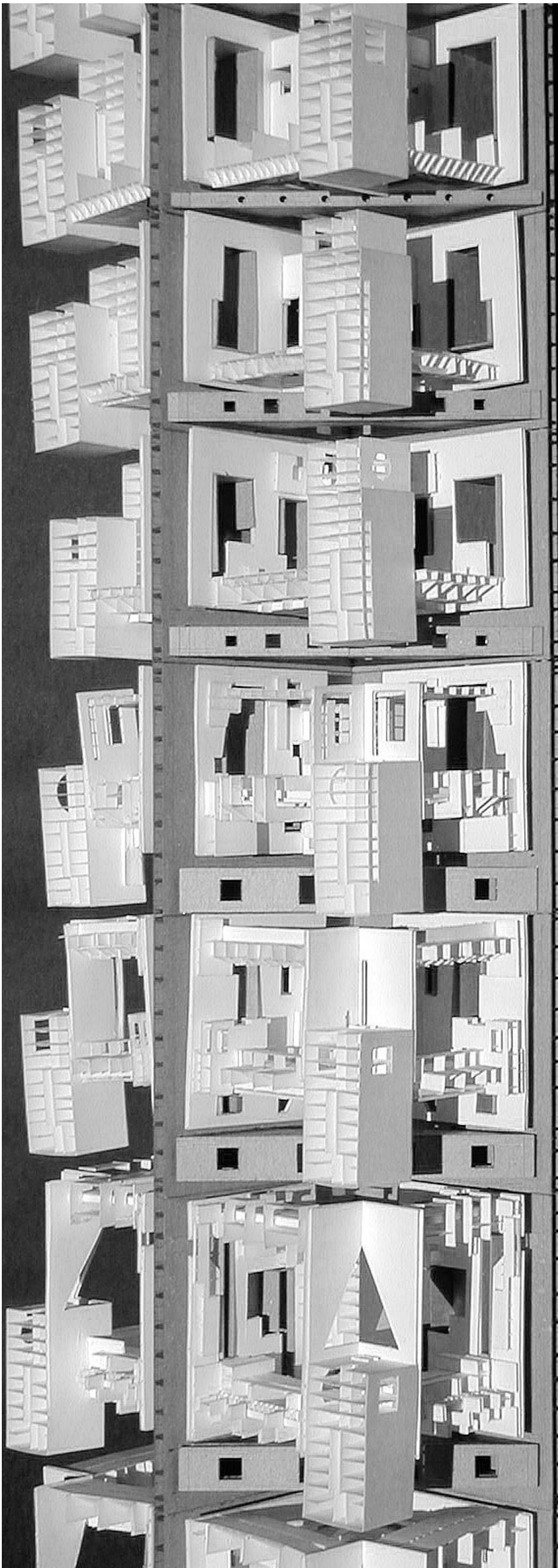
A section through the Tenth, Eleventh and Twelfth Districts exhibits the hierarchy of spaces that surround the dwellings. Dwelling units, inhabited by over 3,000 residents, intimately cling to each other in these upper districts. The intersection between residential units creates a unique sequence of spaces surrounding the exterior of the units. Vertical inter-relationships between districts define unique sequences of semi-public and public spaces. Floor planes of upper dwelling units hover above lower residential complexes and become canopies for roof decks.

Bridges, connecting dwelling units to the primary structure, offer platforms that provide smaller public plazas with businesses and planted spaces. Folded into the interior, rooms defined by massive walls enclose theaters, restaurants and gallery spaces. Romans, foreigners, businessmen and artists converge in these metropolitan spaces. At any moment of the day, 4,000 people are working in or visiting the upper districts of the tower.









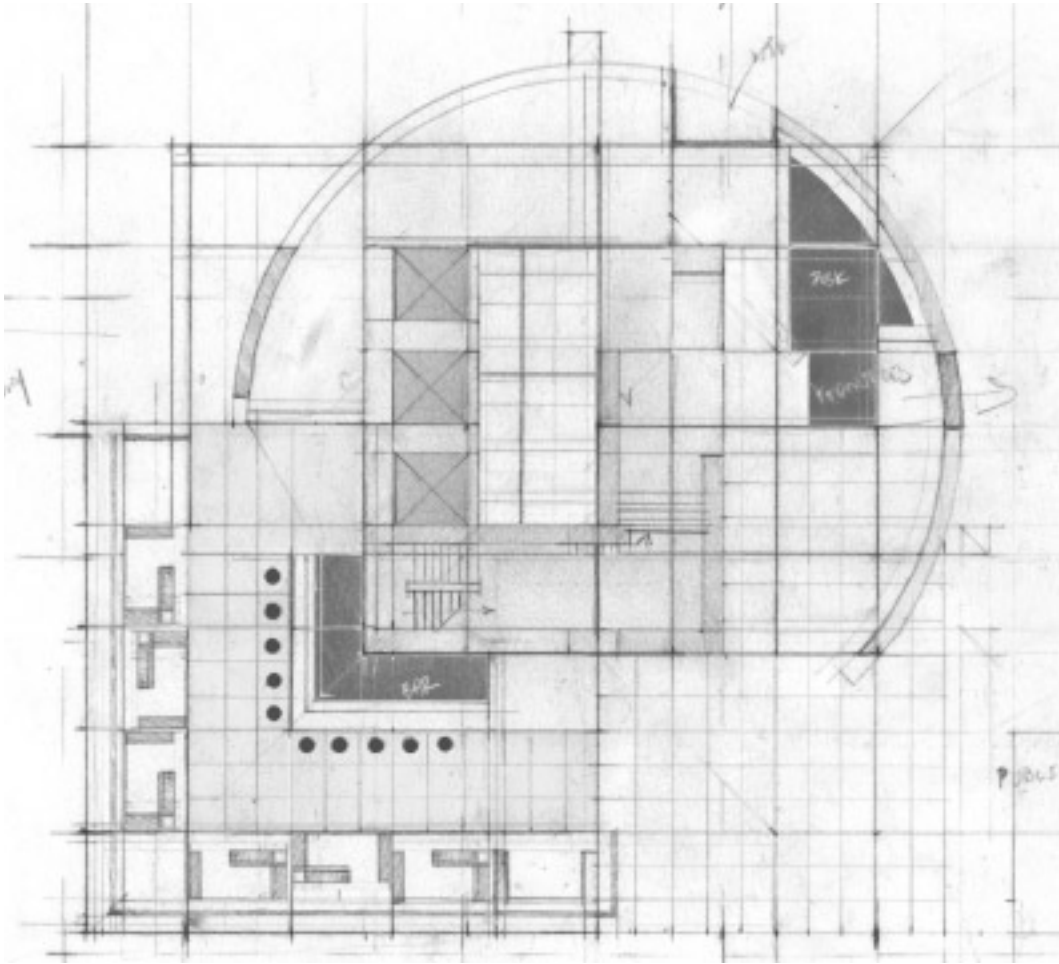
Bridge spanning from opening in primary structure to dwelling unit

Order and orientation define the generous urban layout. Except for its dominant vertical nature, the tower is no different than a well-planned city. Views extend up and through the structure of the tower inviting inhabitants to explore the upper districts. Elevators climb in-between the primary walls and the enclosing walls of each cubic district. A complex path of movement becomes possible through the inter-penetration of wall elements. Openings through the primary walls allow one to roam from quadrant to quadrant within each district. Intimate spaces are arranged among spaces of grandeur. Local moments allow for the further differentiation and the individual character of each district is thus established.

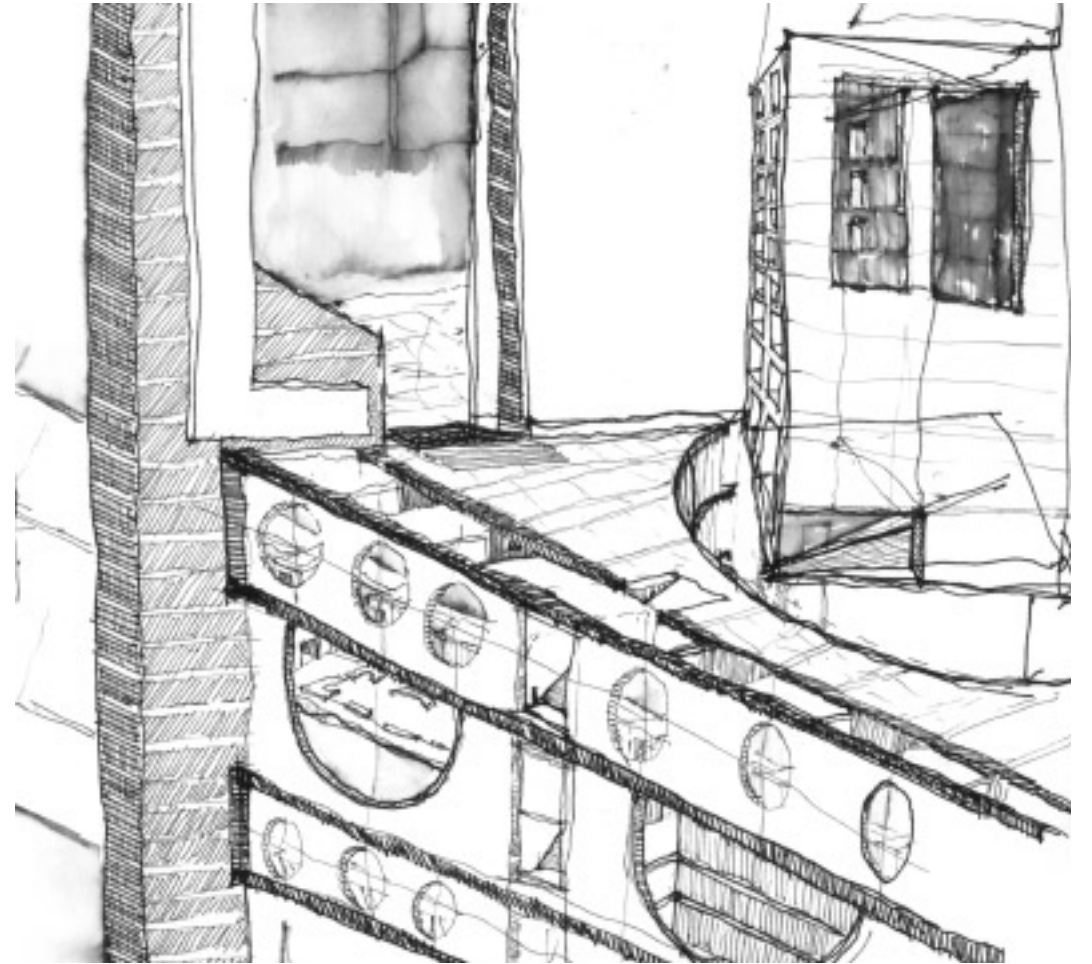
The variable spatial relationship between the singular dwelling units expresses a serrated character. There is a continuous reversal of interior and exterior spaces. At the lower districts, corner and interior units maintain a singular existence and establish distant spatial relationships between each other. In the upper districts, these units intersect and create distinct spaces around their perimeter.

Connections between the dwellings become defining urban elements and carry the infrastructure from the primary spine to the outer units. Main stations providing services would be located in the diagonal reinforcing elements at each district. These stations receive supplies that are conducted efficiently along the primary walls from a main plant located below ground.

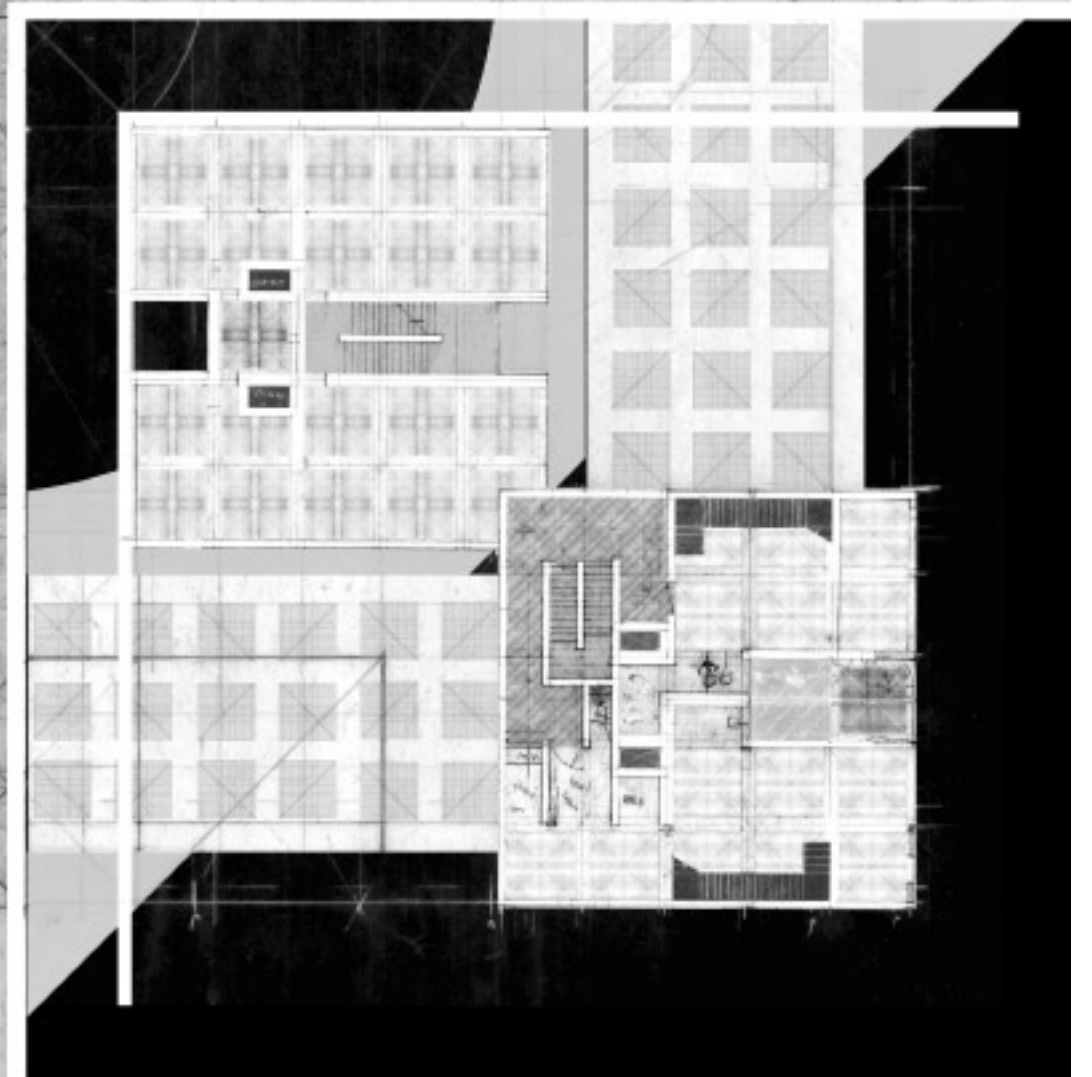
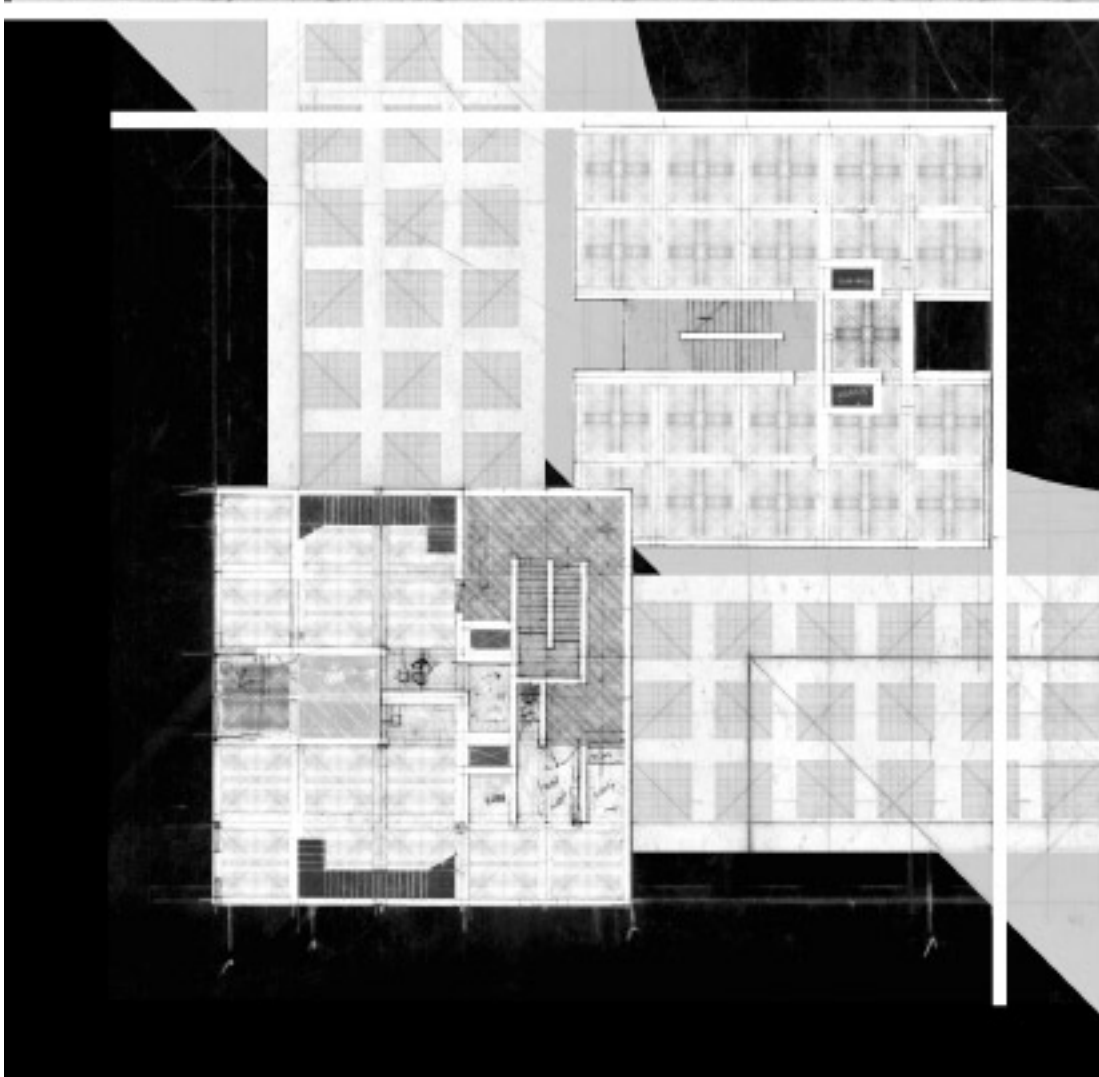
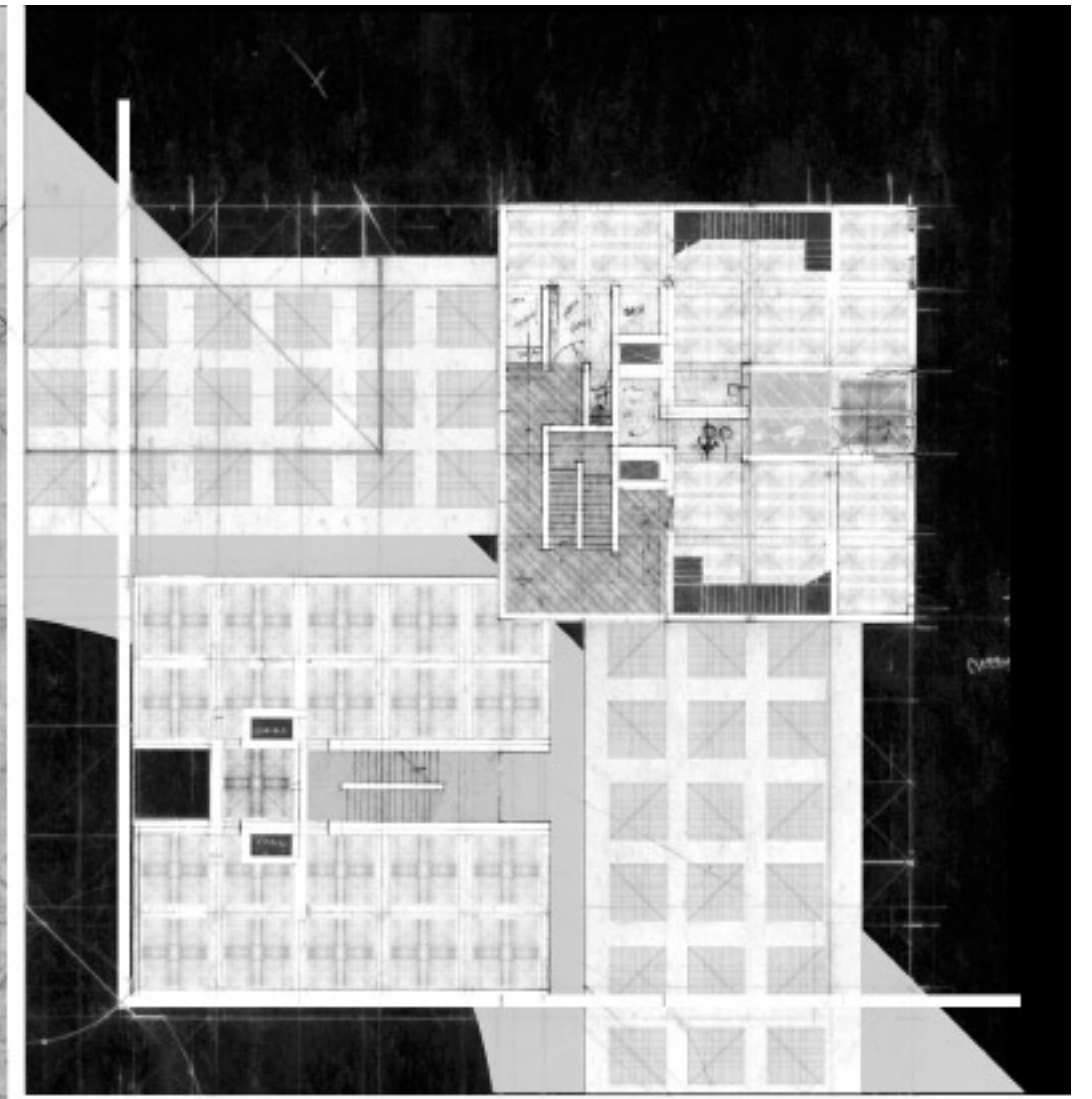
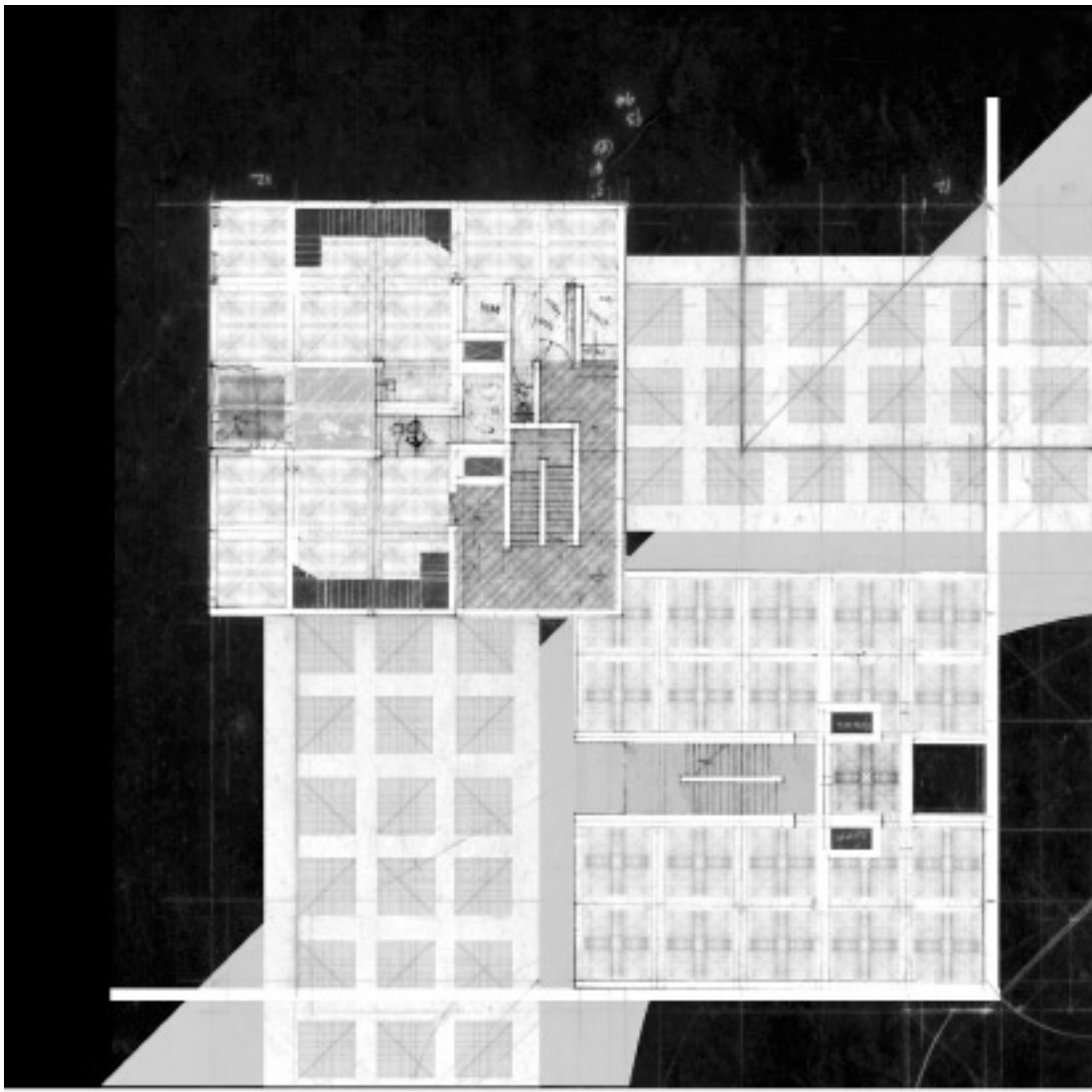
Over 5,000 residents occupy the Sixth through the Ninth Districts shown in the model, while 9,000 more work and travel to and from these levels.

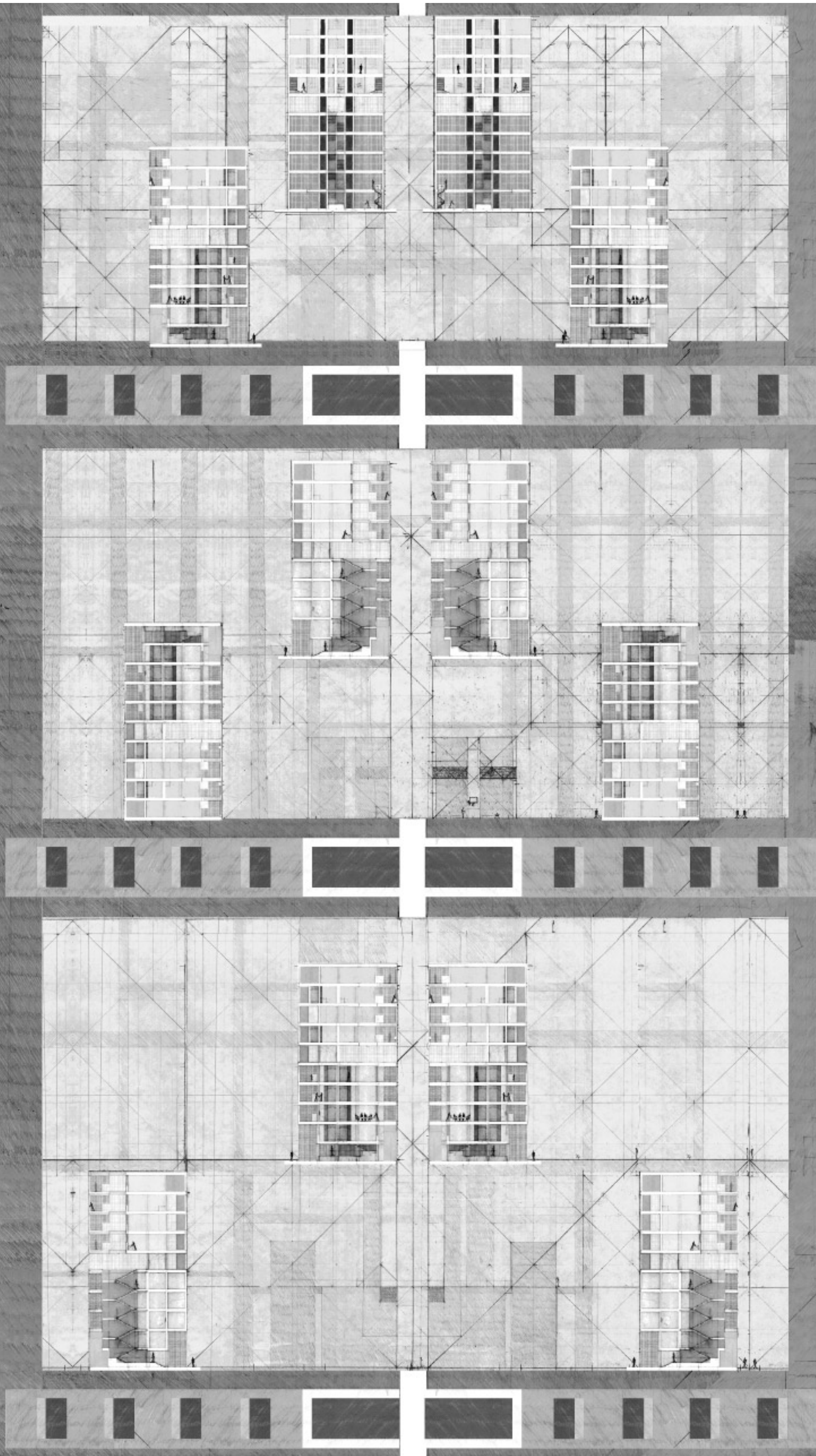


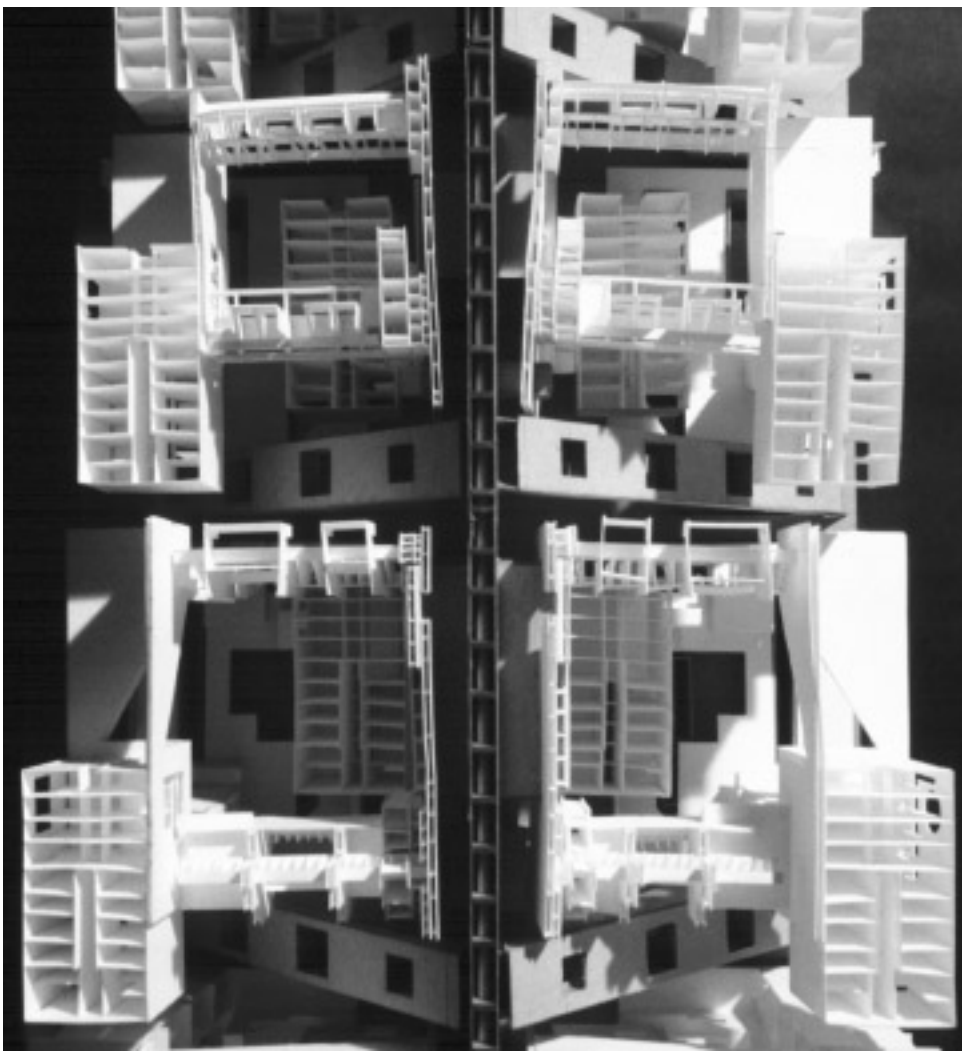
Sketch for hotel lobby and bar in one of the quarters of district eleven



Early sketch of one of the upper districts







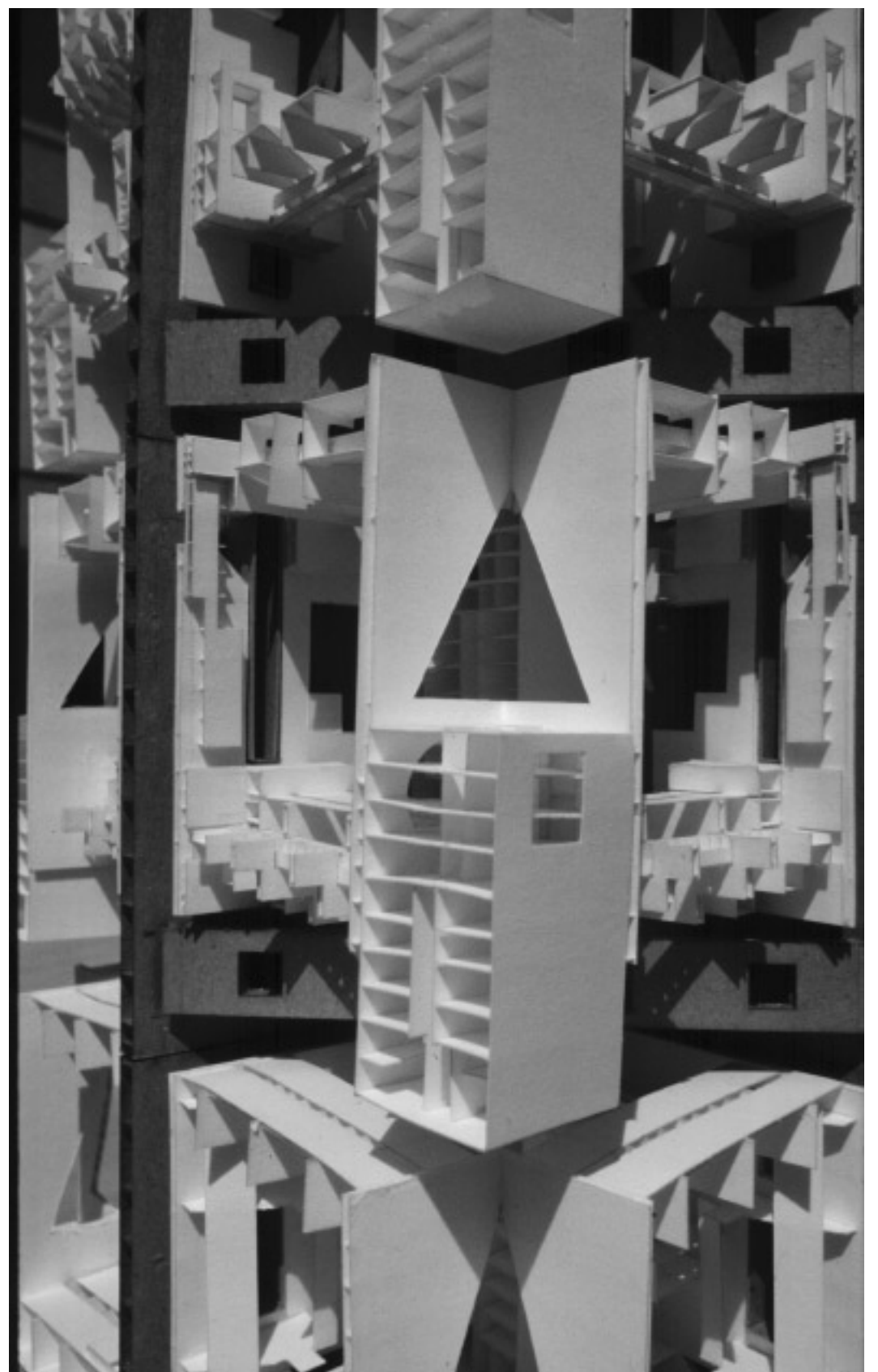
Elevation of dwelling units set deep within the "cubes" of the middle districts



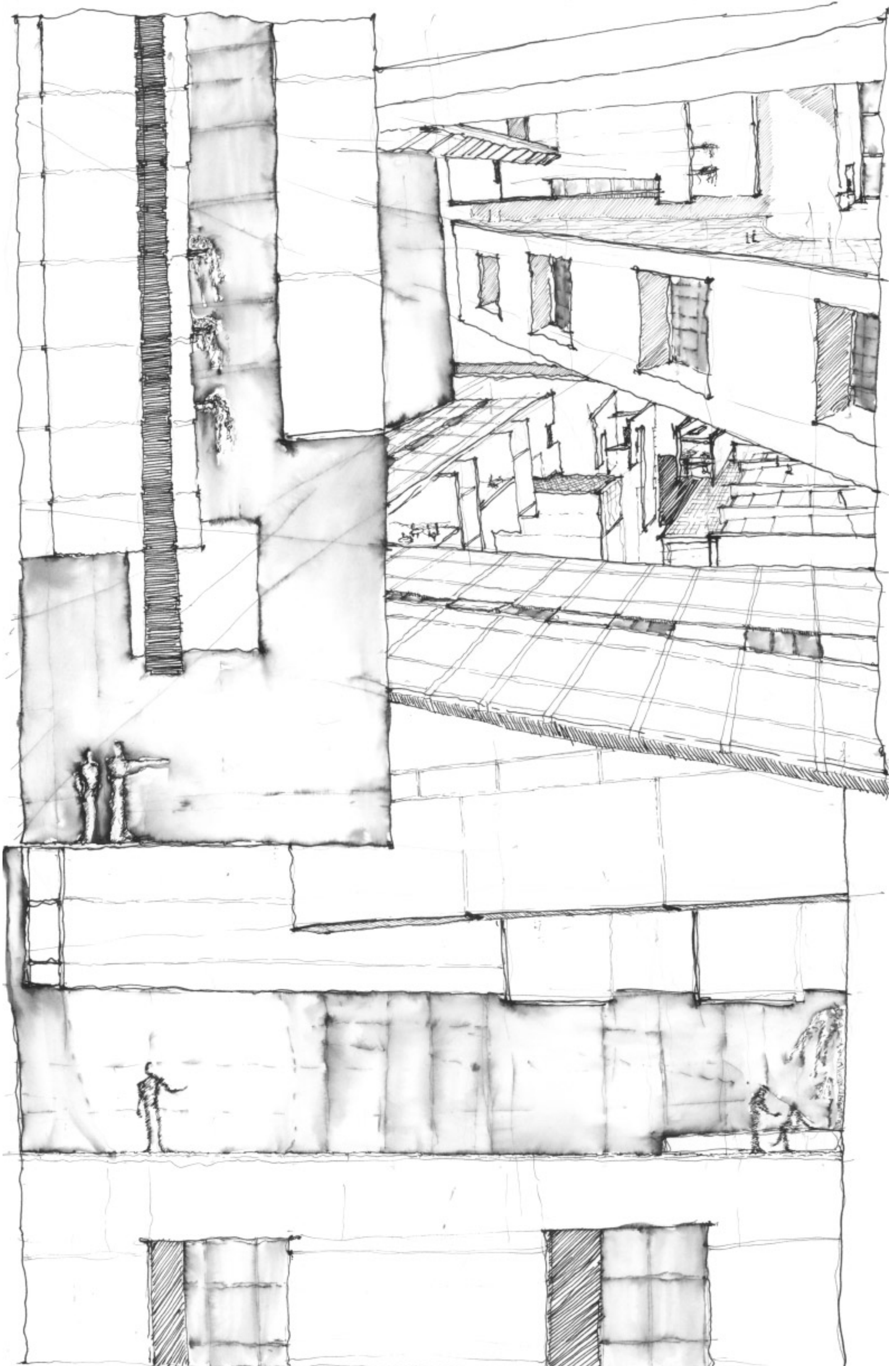
Sunset at the lower districts

At the lower districts, dwelling units at the outer edges are offset from interior units. This allows each to establish an individual existence and maintain a view to the landscape. Almost 7,000 people reside in the Third through the Fifth Districts. A section shows dwelling units at these districts pull away from each other, defining large public spaces open to the outside. Offices, schools and libraries inhabit the cellular connections that define these larger spaces and offer daily refuge for over 13,000 people.

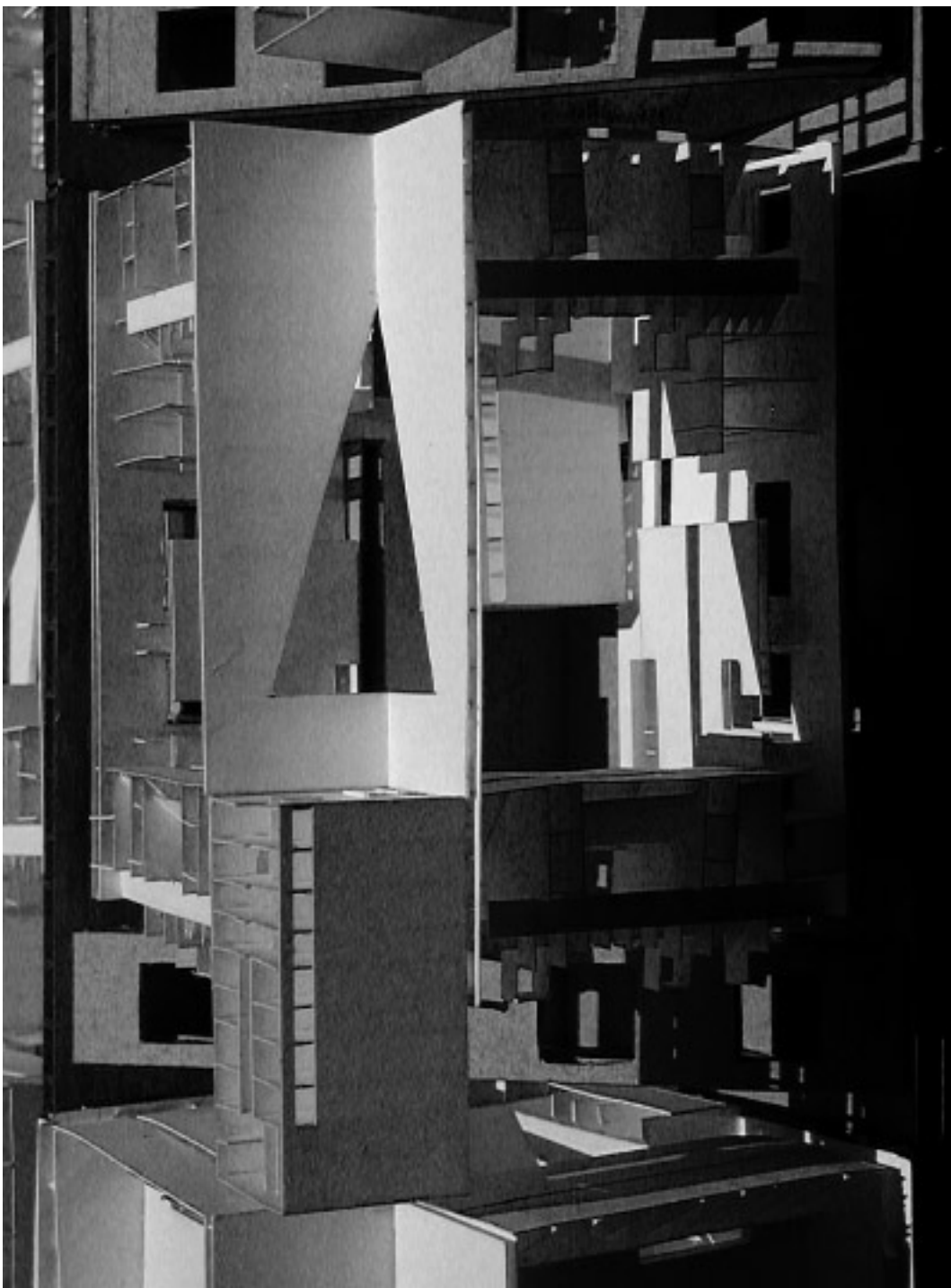
A transitional space occurs as one passes underneath the vertical elements that define the inner walls of the cubic districts. A compressive space is characteristic of the entry to each district, introducing the human scale. This entry offers a release upon passage into massive public spaces. Terraces, created by the vertical rhythm of the bridges and diagonal reinforcing, offer views to the different levels.



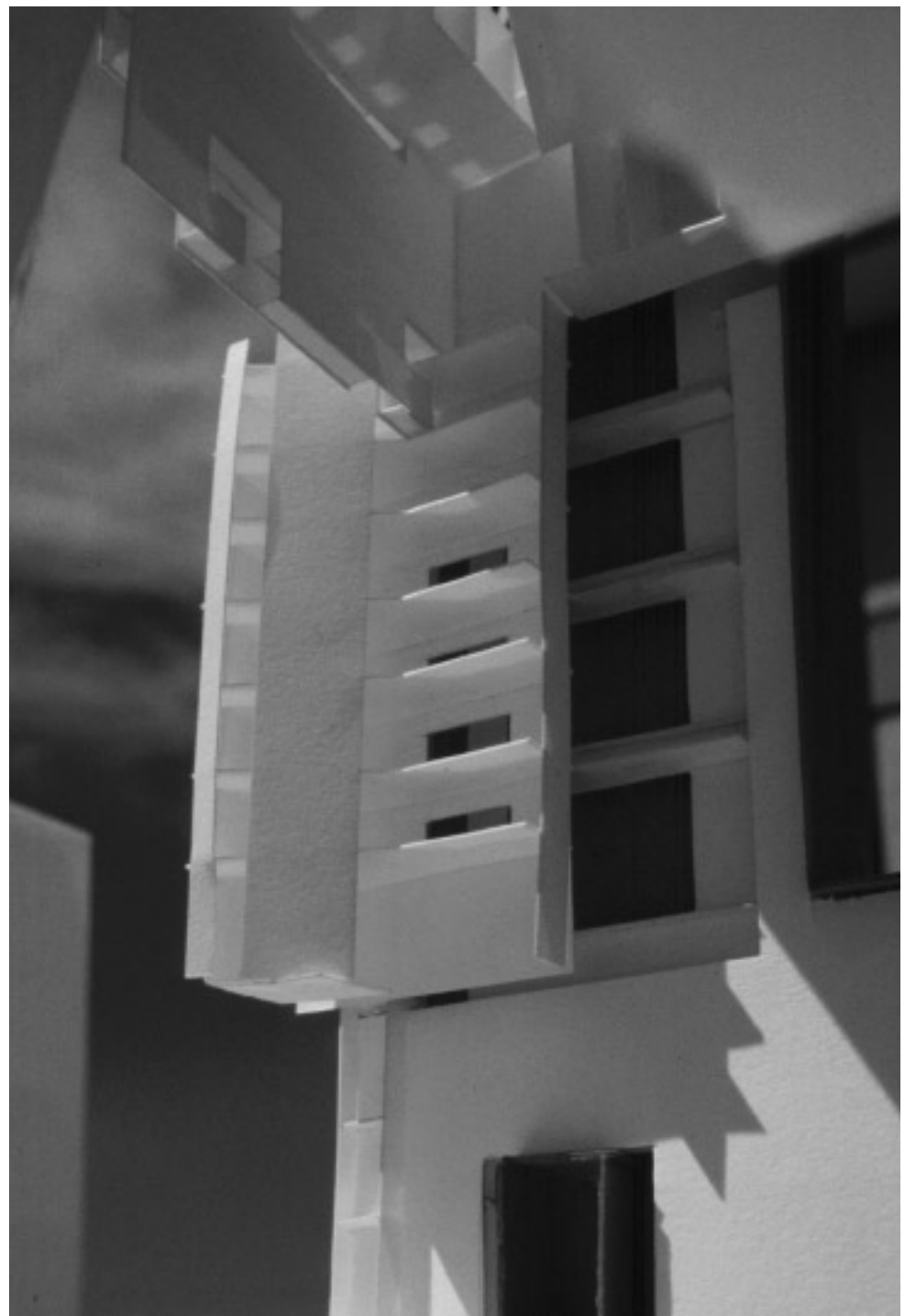
Hanging dwelling unit at the corner of District Six



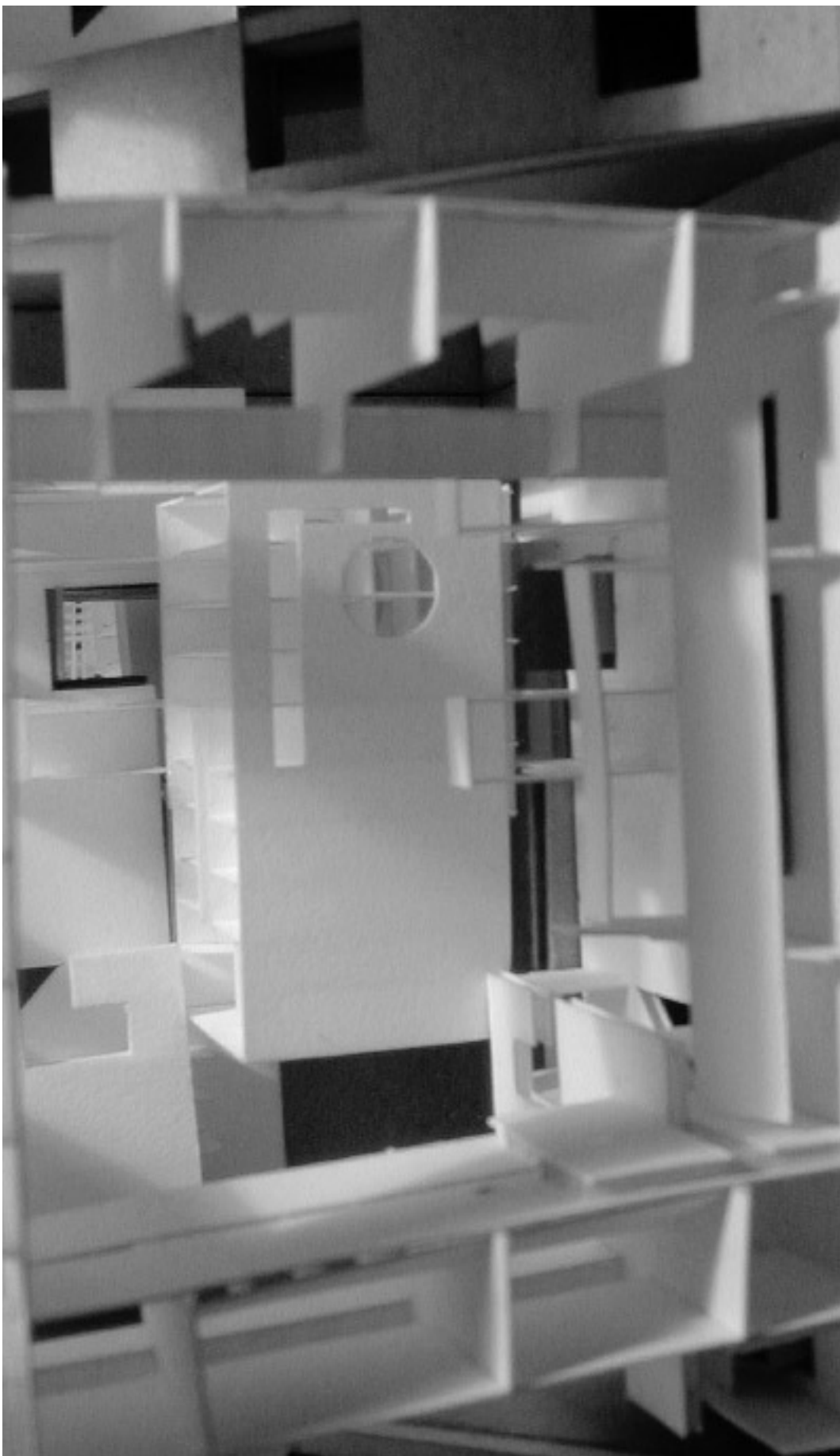




Sunlight deep within the interior of a lower district



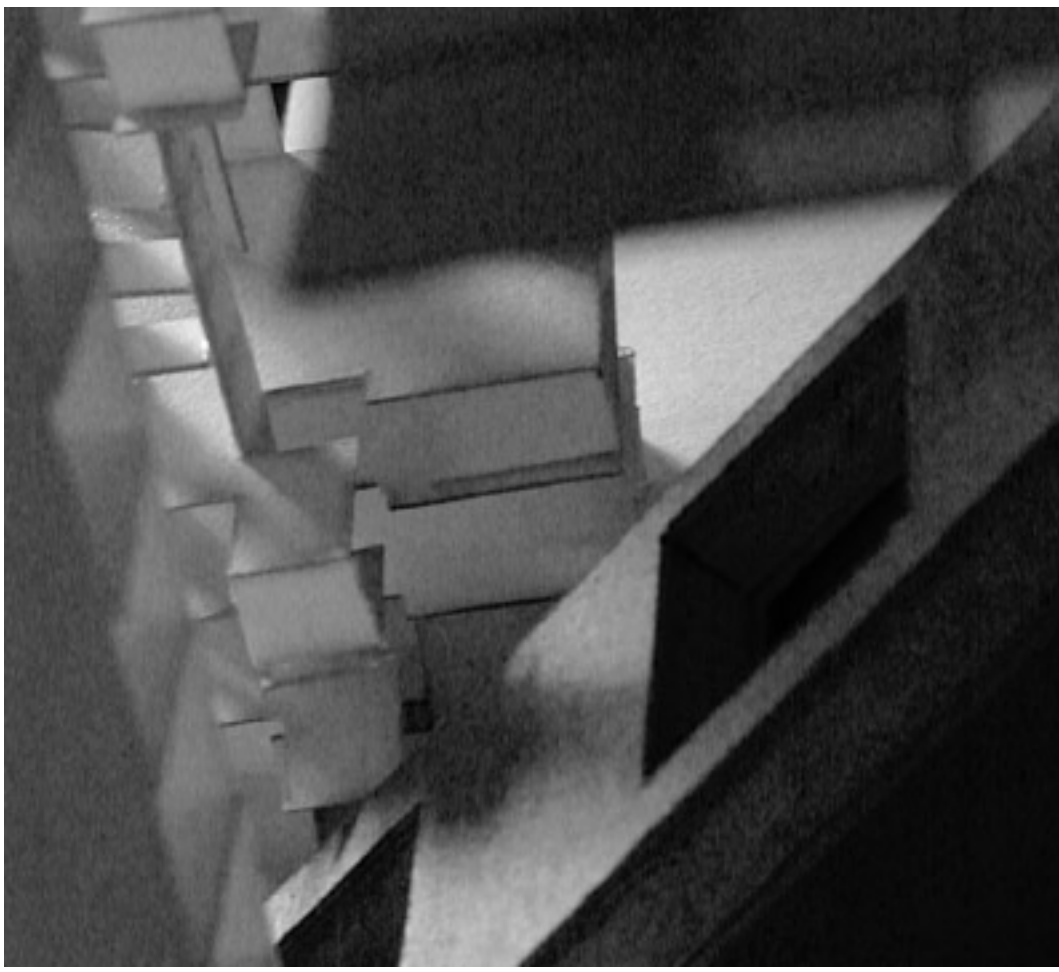
Offices located on the periphery of a lower cubic district



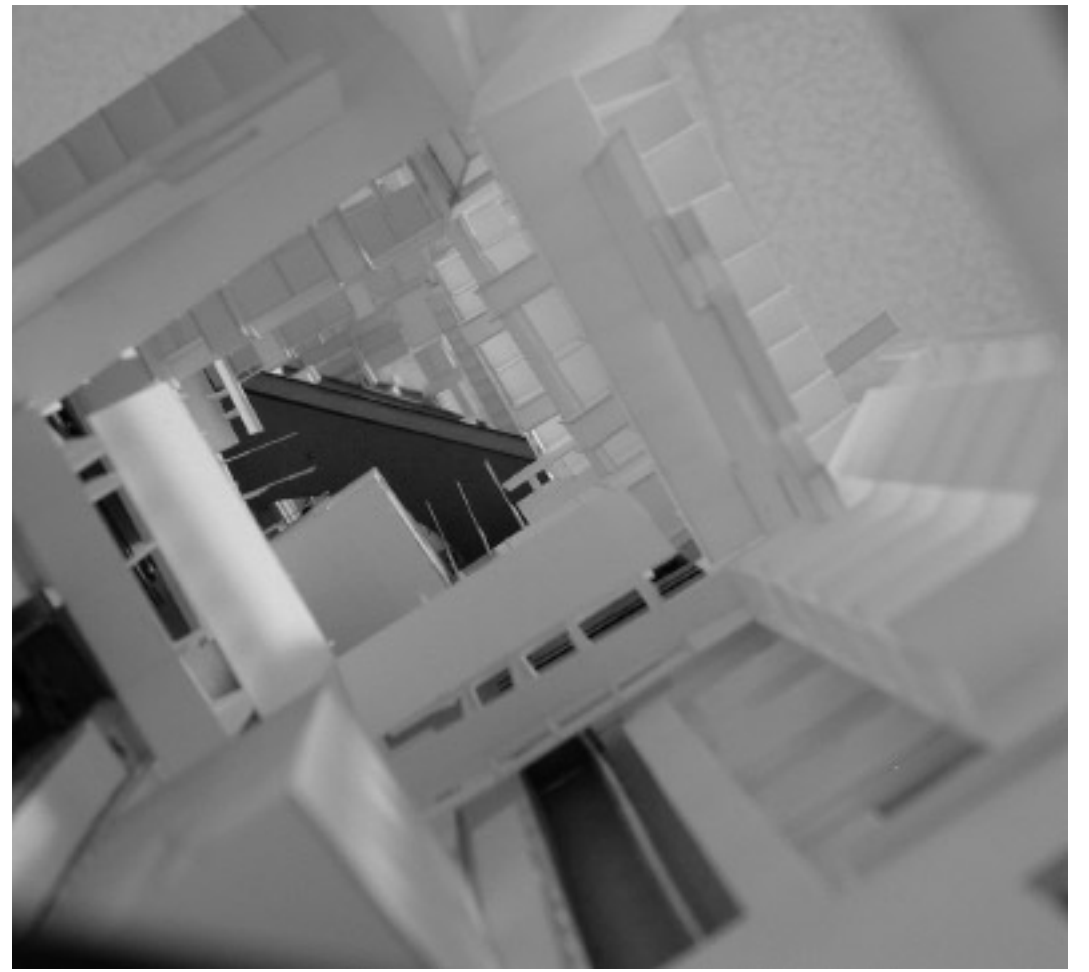
Interior dwelling unit enclosed by public plazas

The complex interior landscape is directly expressed to the exterior. Shadows enliven the austere forms. Patterns of light and shadow become markers for each district's individual layout and solidify the concept of an urban landscape. Directions from the west plaza of District Ten for a walk to the north plaza and a view to St. Peter's Cathedral are simple. The spatial organization is transparent.

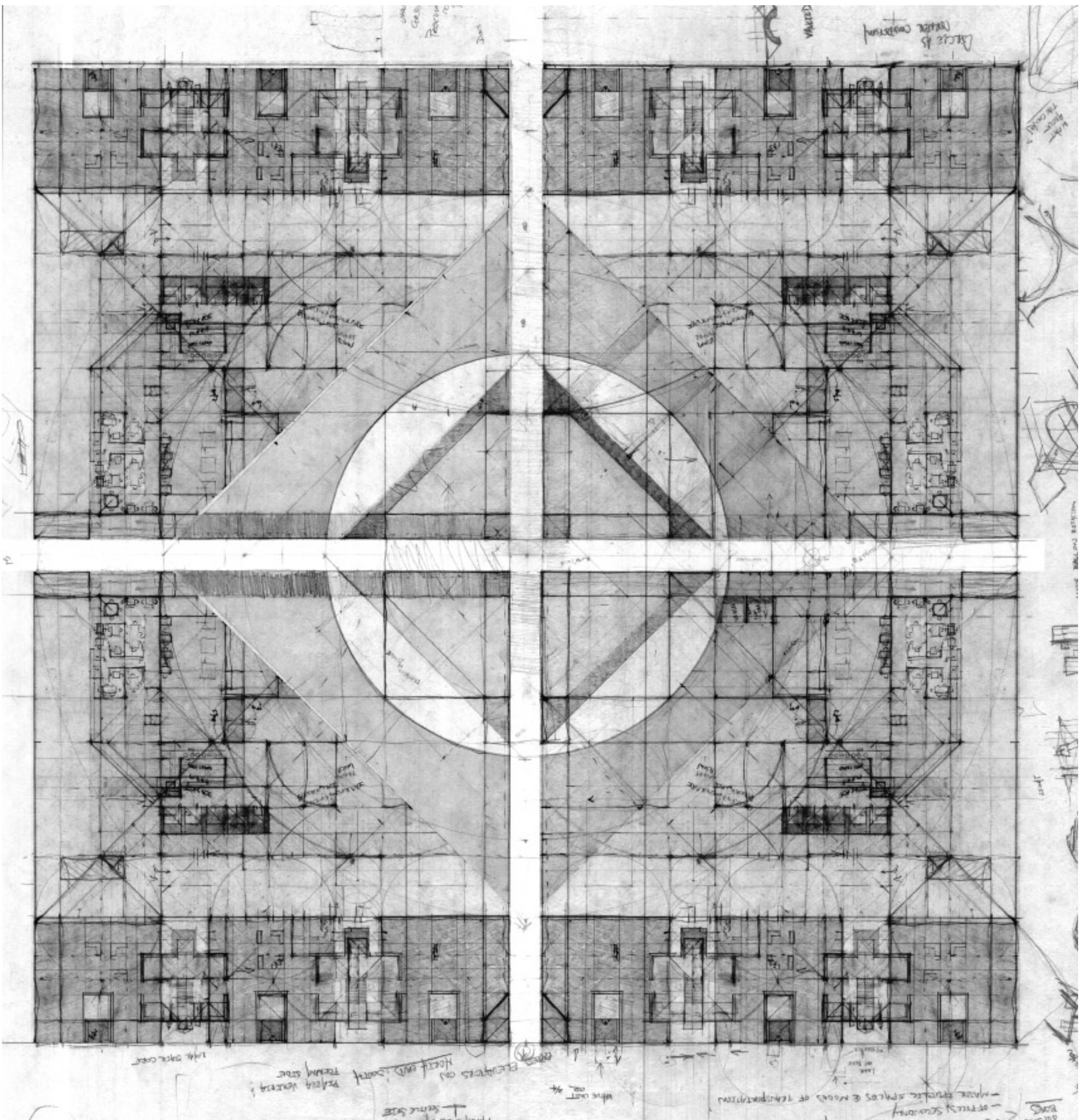
The dimensions of the plan at the lower districts allows for the insertion of multiple dwelling units. Districts Two and Three offer housing to over 7,000 residents. Increased wall-surface along the vertical extremities of the cubic districts provides sites for multi-level buildings. Larger connecting structures and wall units provide space for 28,000 more people to work here. These districts serve as the business and financial center of the tower.



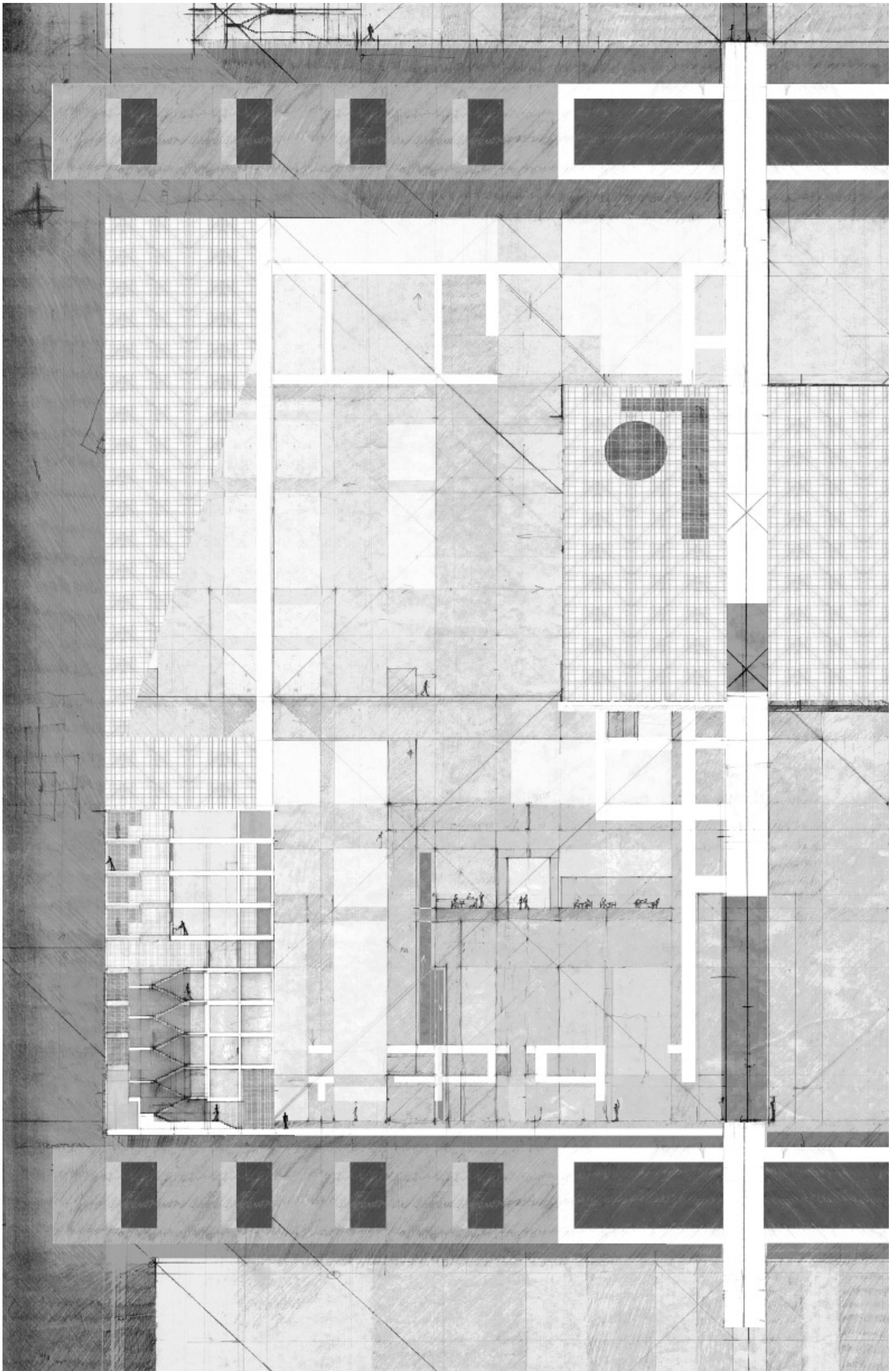
View up of diagonal structure engaging cellular structure



View from ground level of District Two upward



Plan at District Two



Section through one quarter of District Two



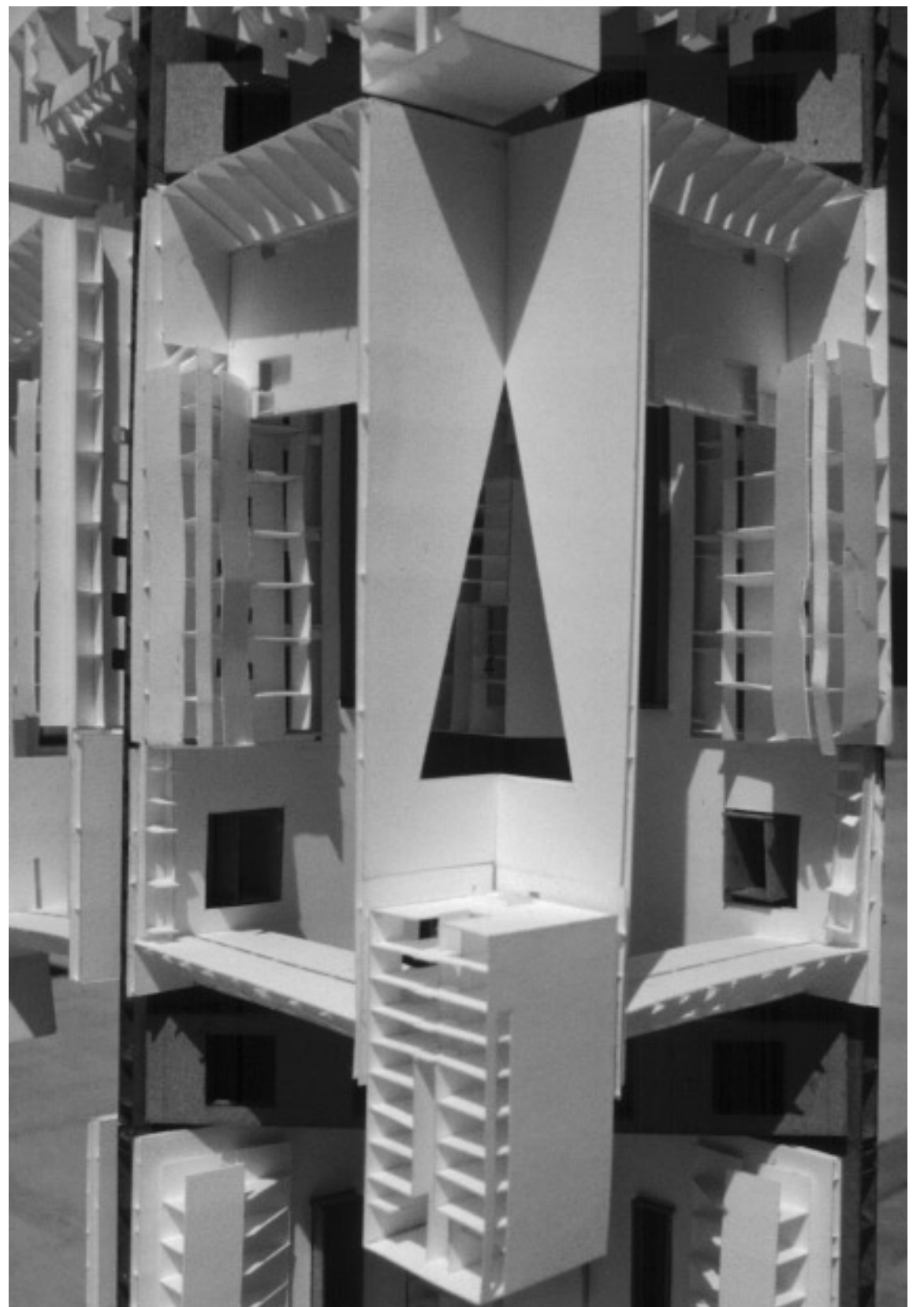
Offset dwelling units at district three



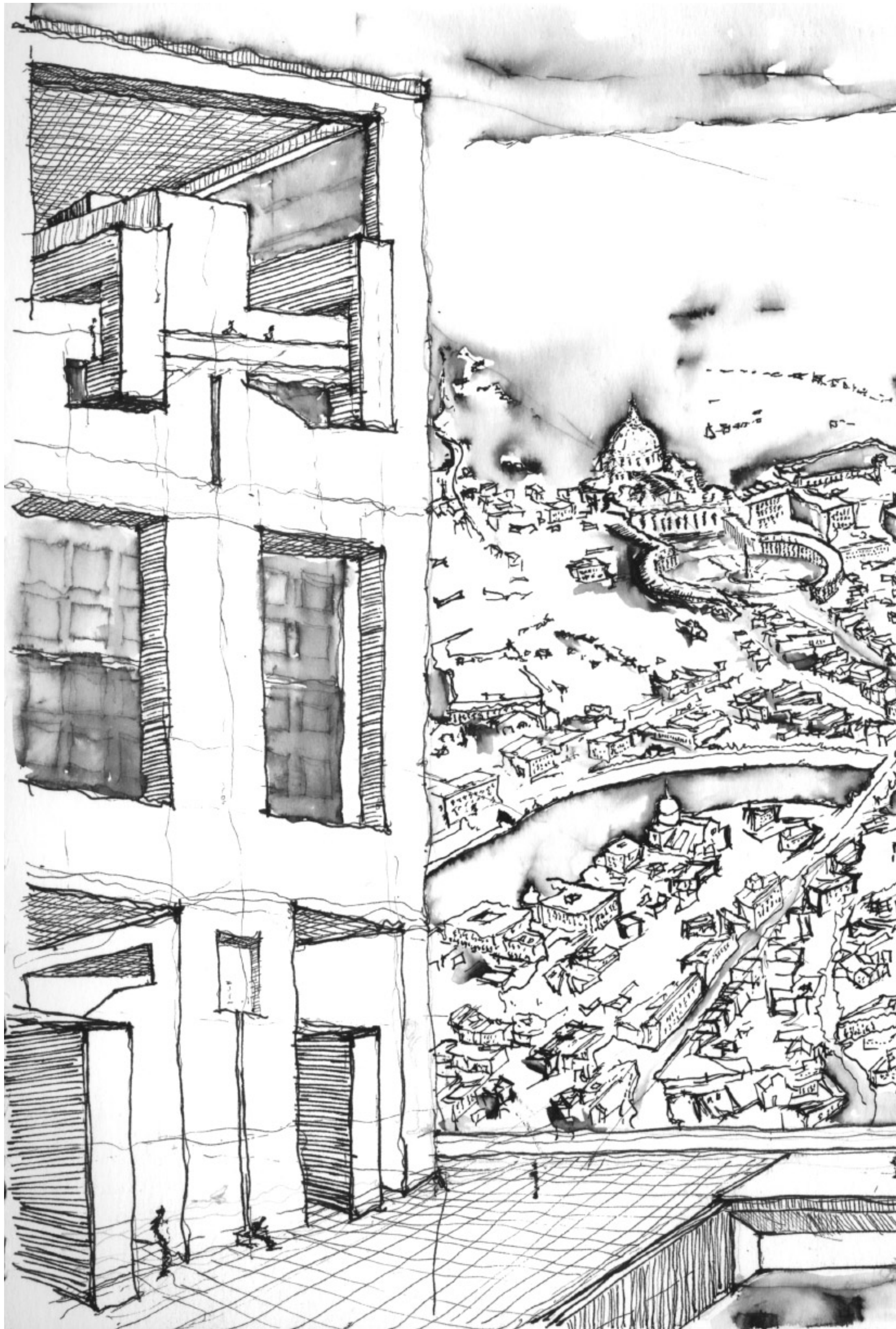
View up from the exterior of the tower

A section through one quarter of District Two expresses the multi-level nature of the lower districts. Each upper dwelling unit develops a relationship with an exterior public plaza while maintaining a distinct identity from the other lower units. Intermediate levels are located at distances where people can directly recognize others on the levels above and below. Establishing this type of spatial relationship creates a vertical urban environment that fosters complex social conditions.

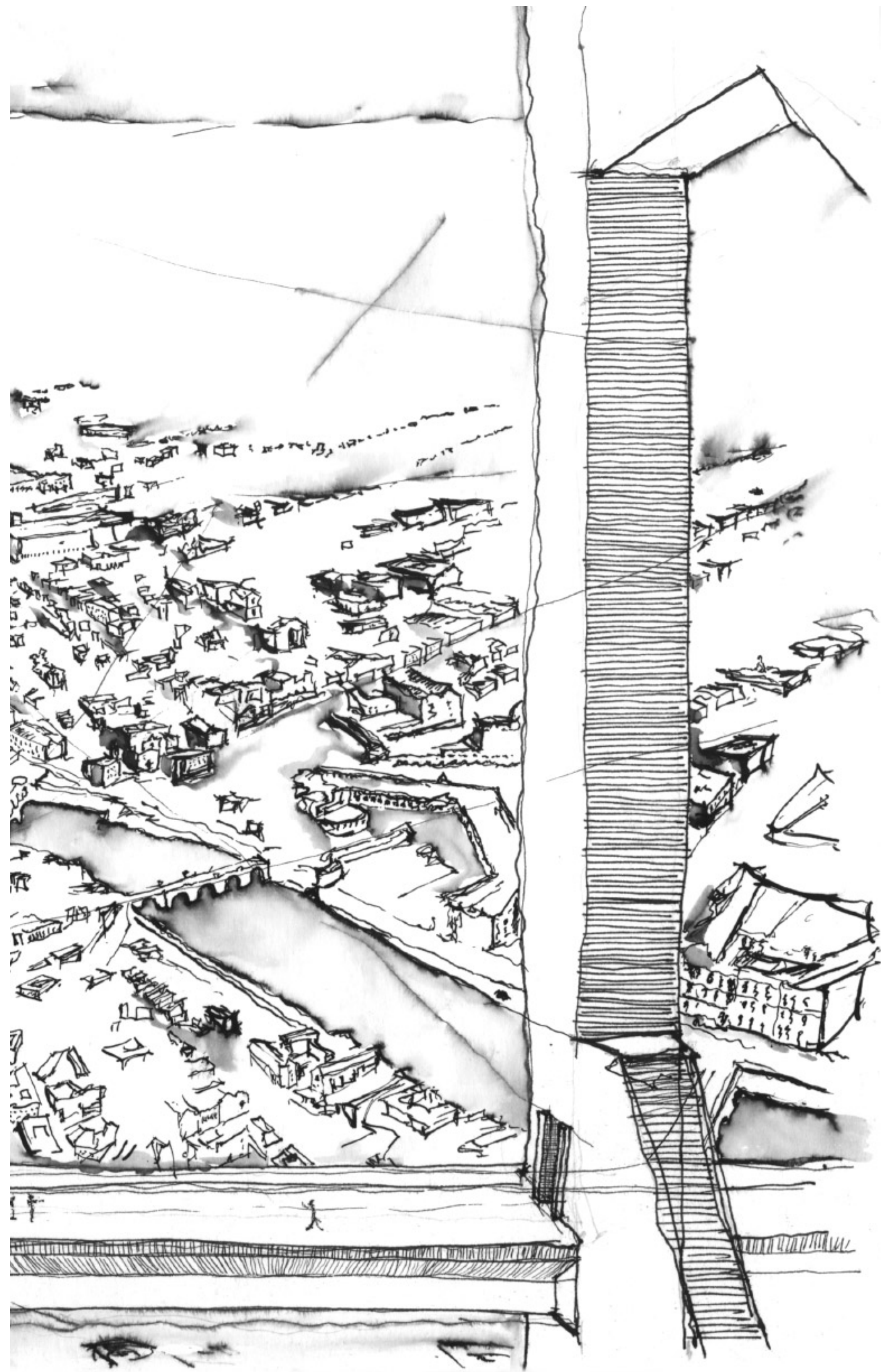
A view from the exterior corner shows massive walls that seemingly enclose the interior dwelling unit. However, when viewed from the side it is clear that the interior units are differentiated and openly framed.

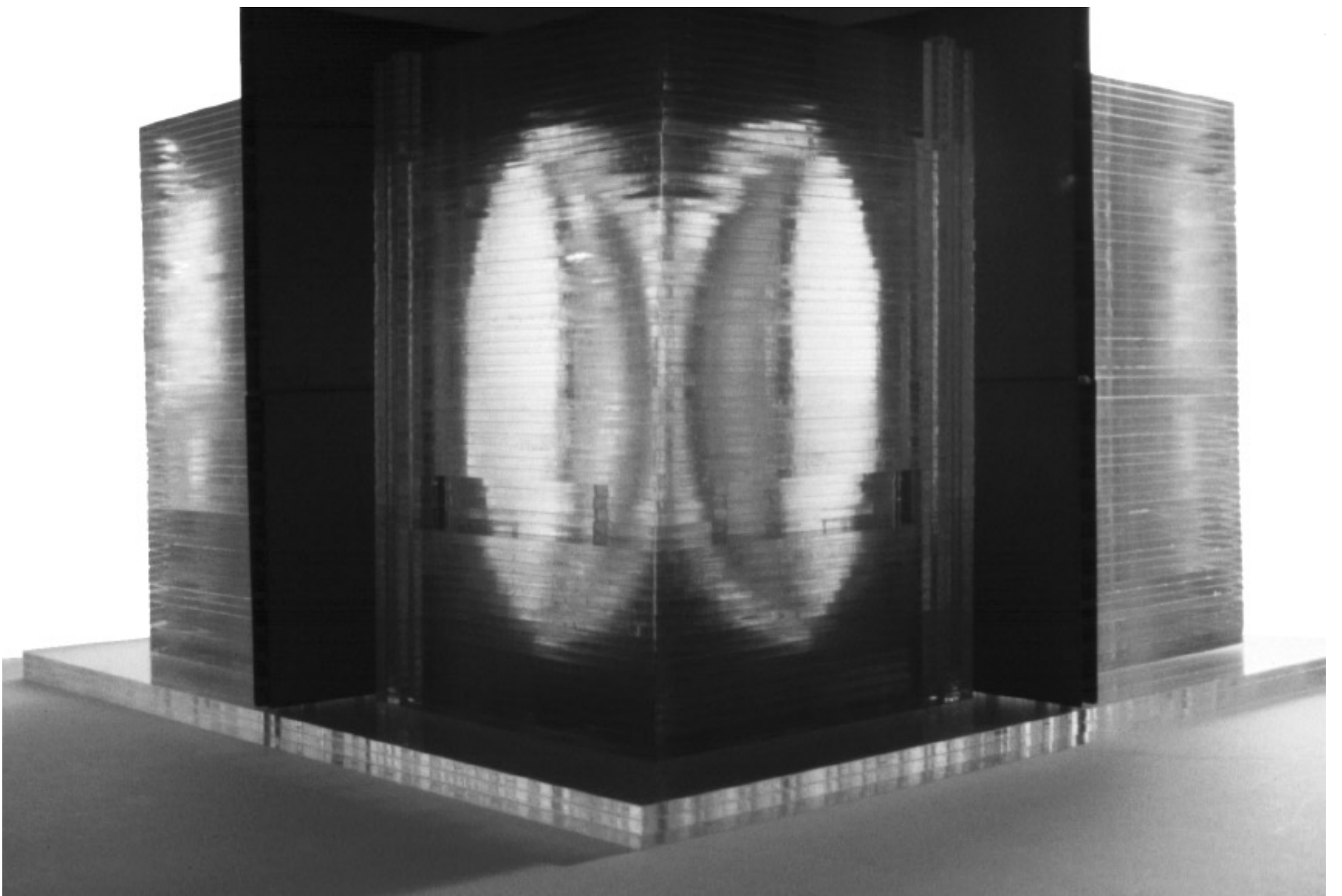


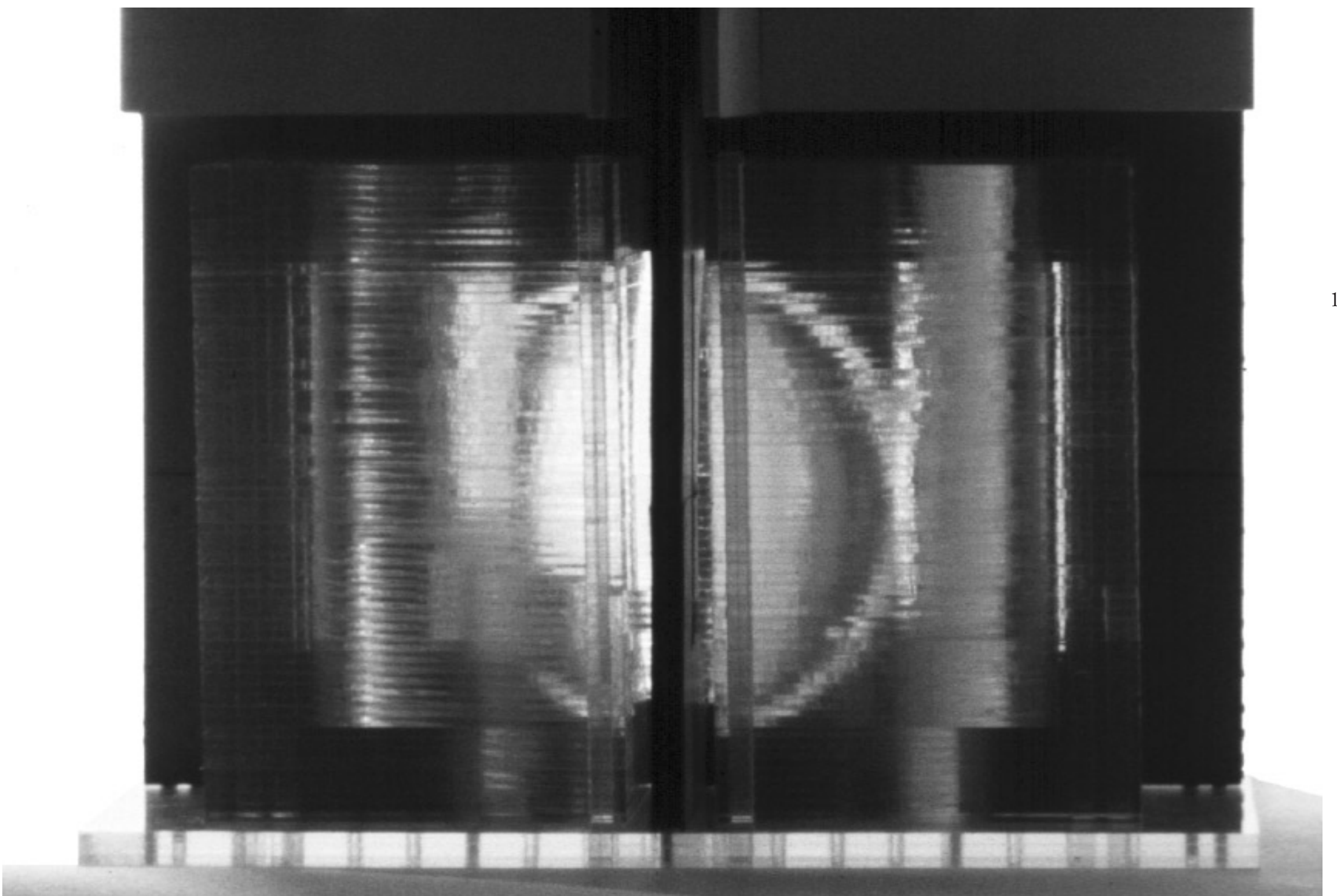
Corner dwelling units at District Two

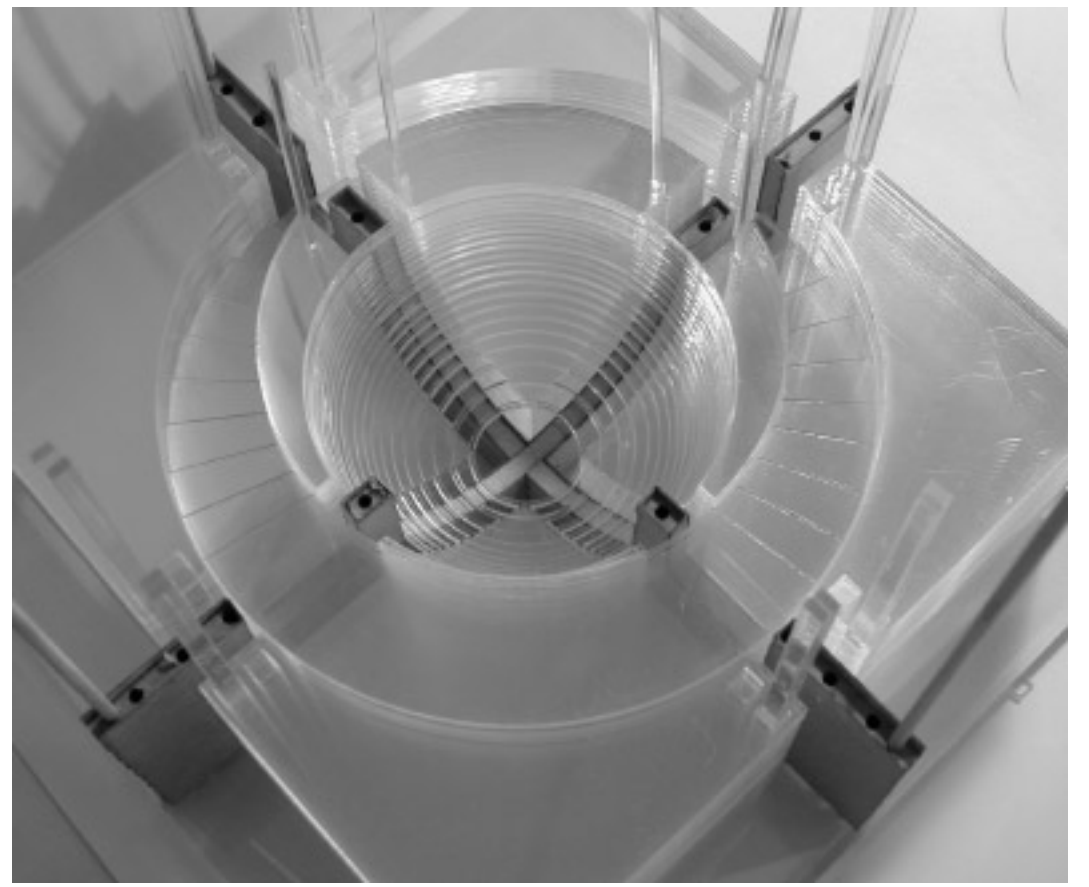
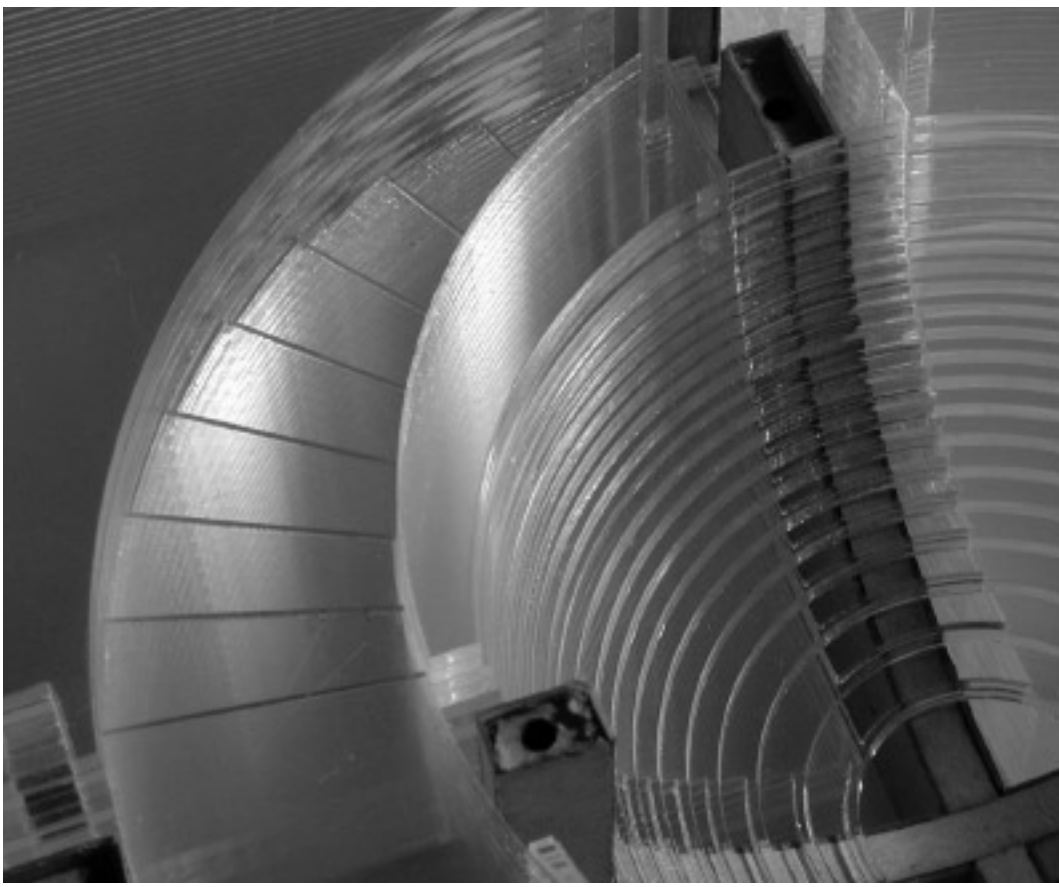


Northwest view from one of the upper districts out to the Pantheon, the Tiber River and Saint Peter's Cathedral









Cutaway view into the central space at the base of the tower

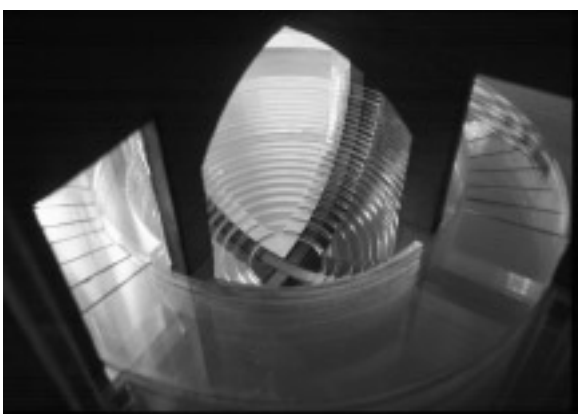


Stairs wrap through the void around the inner cylinder from the main entrance at the Piazza Venezia to the tower plaza overlooking the Roman Forum

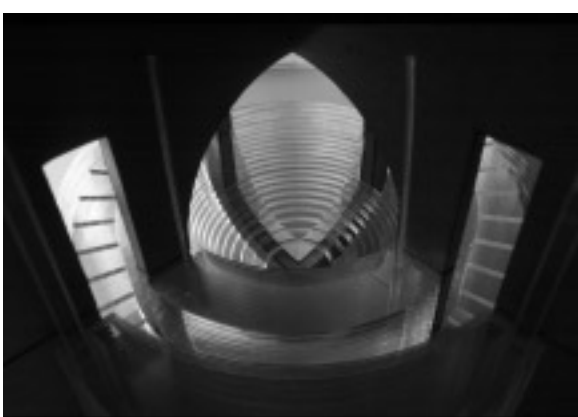
At the base, a solid mass surrounds two voids and firmly connects the tower to the ground. A cylindrical void serves as a staircase and main public entry. The staircase, beginning at the Piazza Venezia side of the tower base, inhabits a narrow vertical void that gradually becomes more generous as it climbs. Places to stop and rest are carved out of the solid cylindrical form that wraps the inner sphere. At the landing, a public plaza facing south is formed, and the entry into the massive, central space is located. The landing and plaza overlook the Roman Forum and allow a view into the central interior space of the tower.

The public nature and mass of this ground level district speak directly to the nature of the existing city. While the construction would certainly be of modern invention, the simple volumes of the cube and carved interior space are characteristic of public buildings in Rome. The central plazas and streets that organize the city reinforce these public monuments. While other plazas lead people along horizontal streets, the plaza at the base of this monumental tower opens on a vertical avenue.

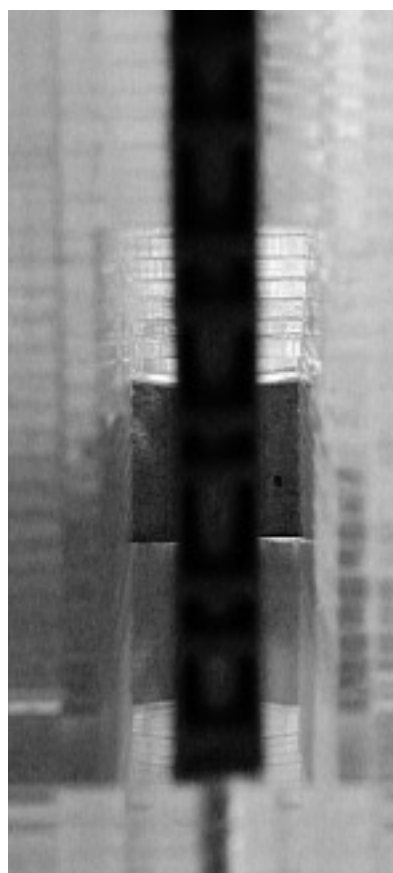
From the Piazza Venezia it is clear that the tower offers a complex pattern of urban spaces not dissimilar to the ones that exist as blocks within the city. The clarity of the tower's structure becomes a natural setting for an urbane world that recognizes places for human activity and enhances a complex society. This structure is a vertical map of the dense city, in which a play of scales and powerful visual details inform the art of modern urban design.



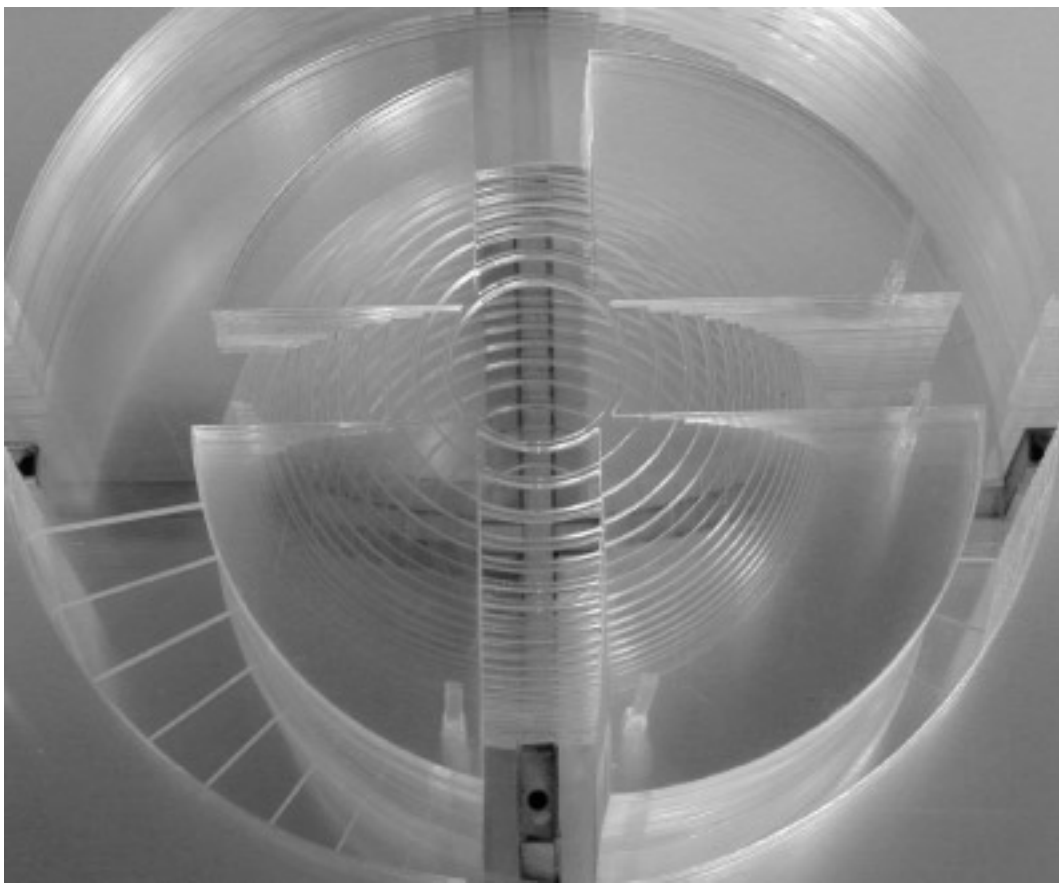
View of the plaza landing above the Roman Forum



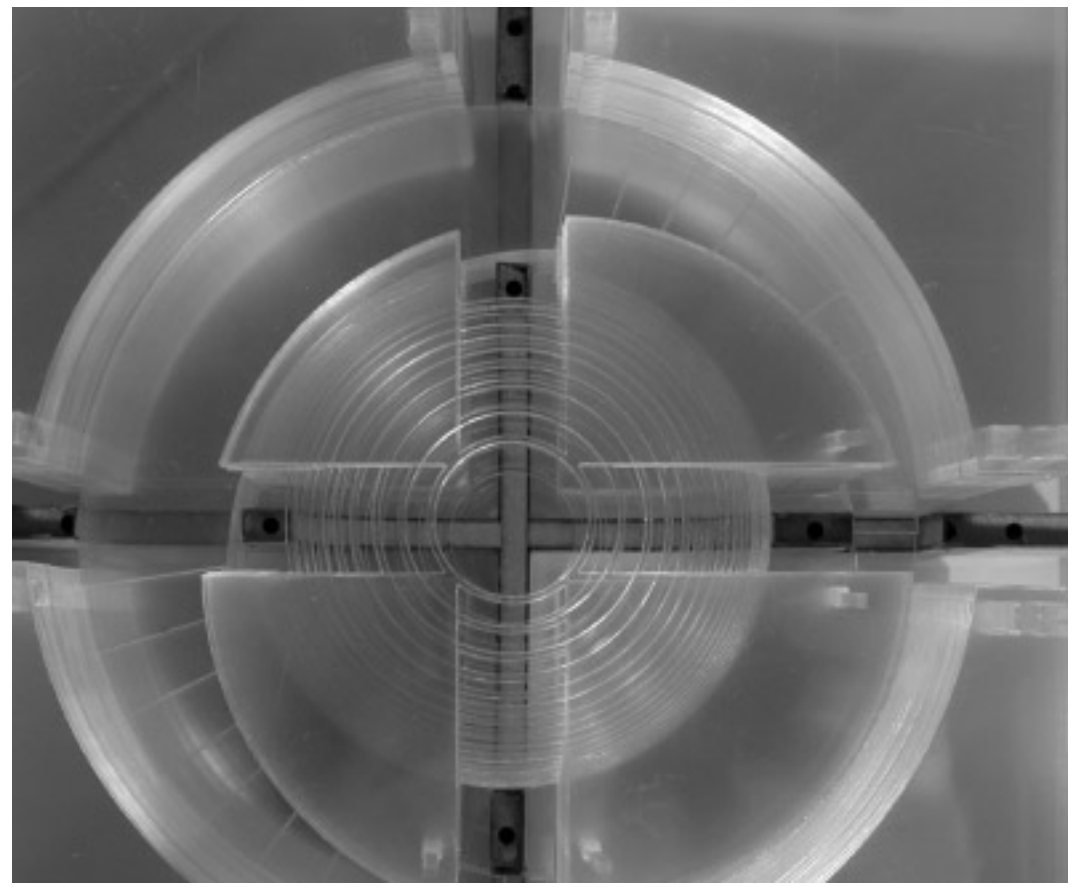
View from the Piazza Venezia side of stair from main entrance wrapping around cylinder and into public space



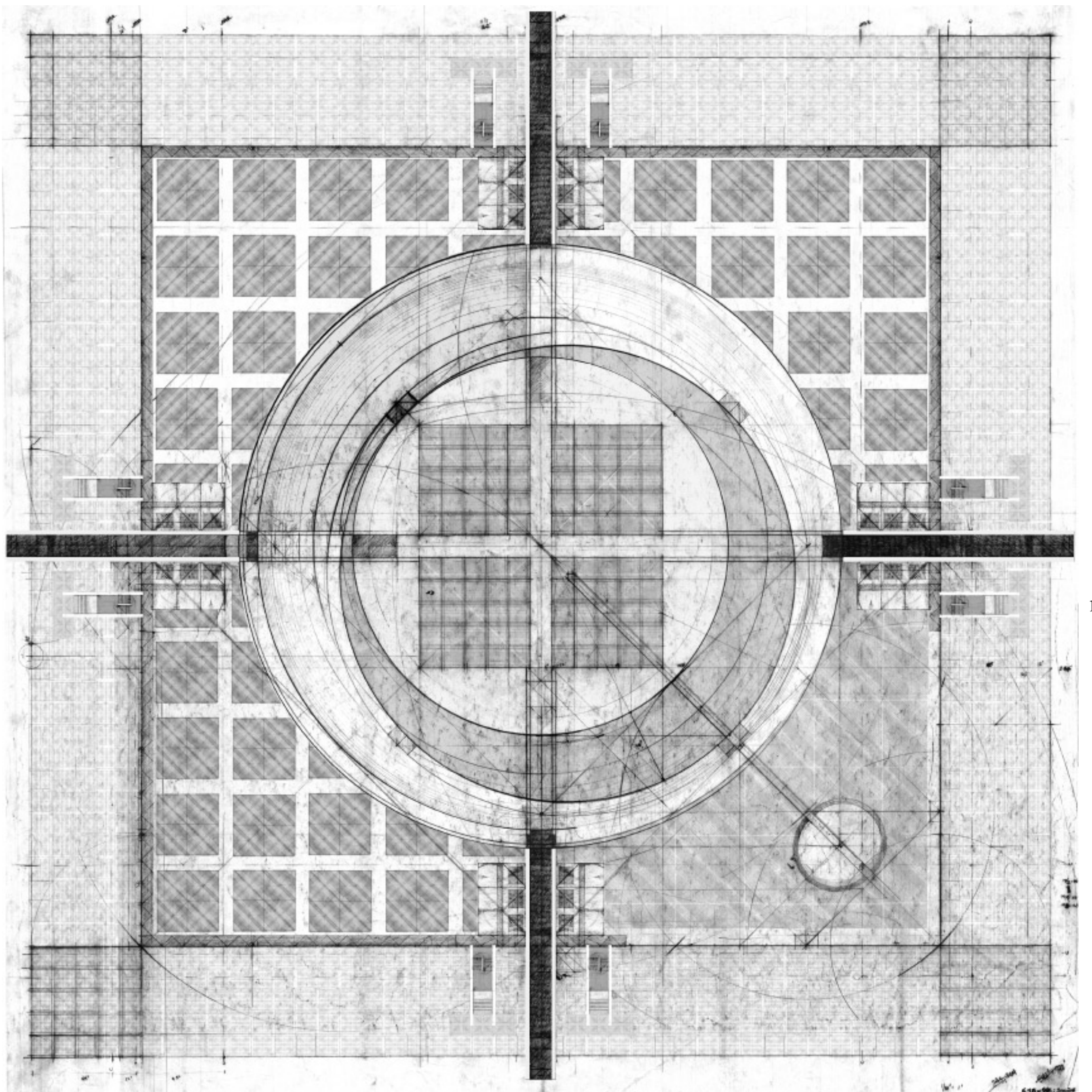
View past primary structure to inner chamber at ground level



Spatial model of public stair from the Piazza Venizza into the towers central space

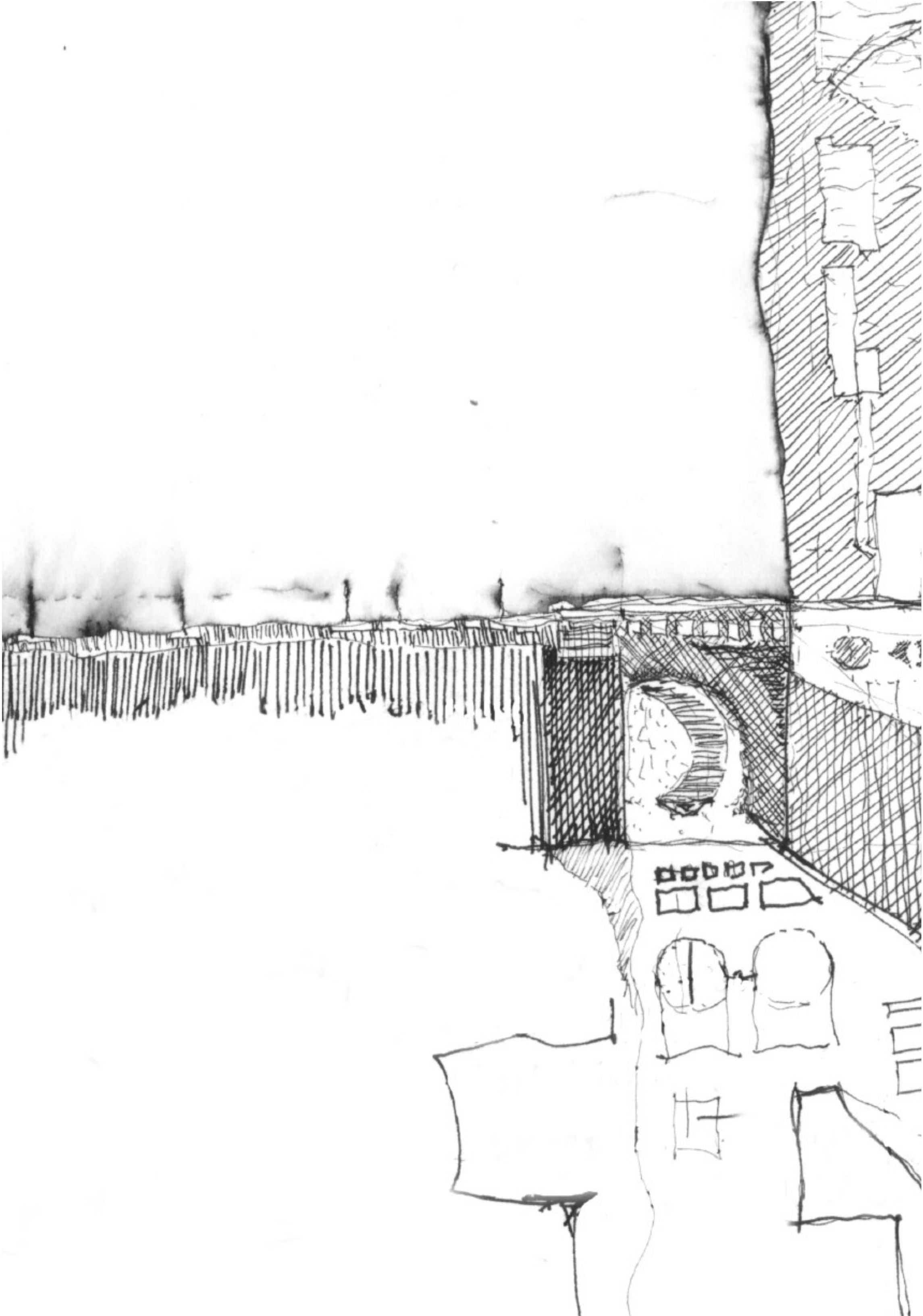


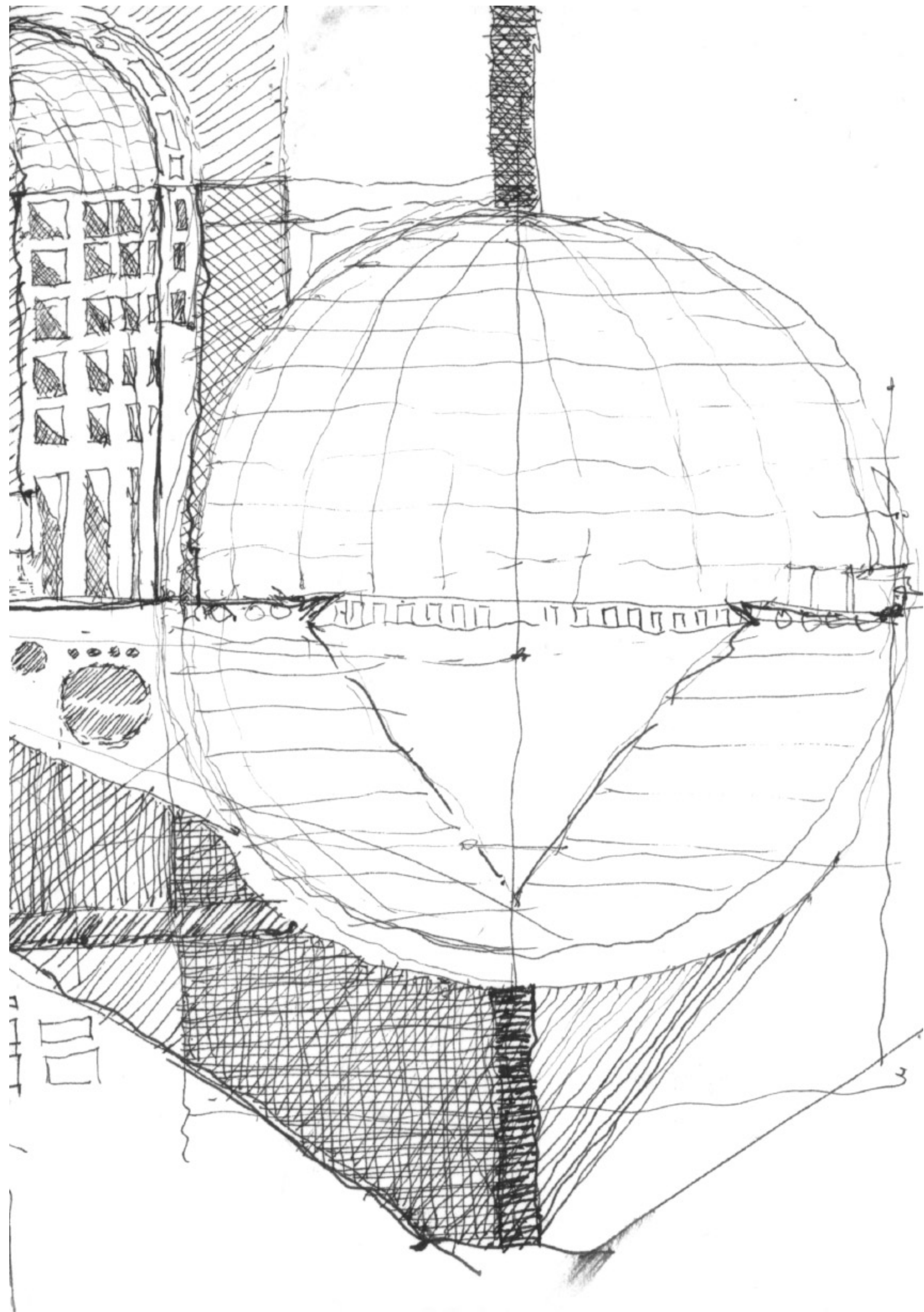
Plan view of the offset cylinders and void between for the public stair

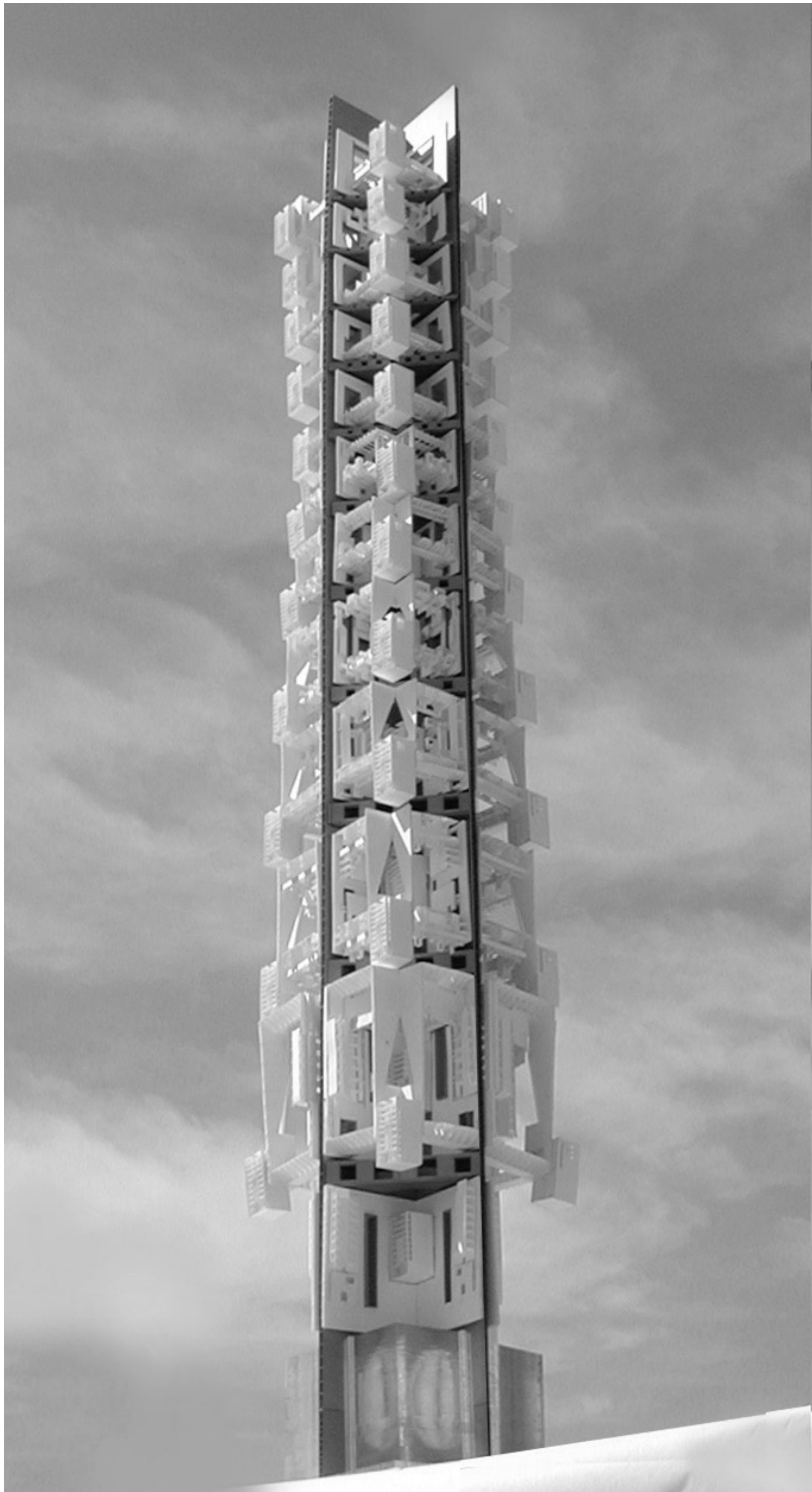


Plan at District One - ground level











NUMBERS

Table 1 Distribution of Dwellings, Private and Public Spaces per District

District	Dwelling	Office	Retail	Public	Service	Parking	Gross Sq. Ft./ Residents / Occupancy
1	720,000	1,655,309	827,655	237,394	968,936	757,279	5,166,573 sf / 3600 / 25,832
2	720,000	462,592	231,296	228,480	327,296	n/a	1,969,664 sf / 3600 / 9850
3	576,000	395,632	197,816	182,400	281,816	n/a	1,633,664 sf / 2880 / 8170
4	432,000	330,000	165,296	137,280	237,296	n/a	1,301,872 sf / 2160 / 6510
5	360,000	257,957	128,978	120,480	188,978	n/a	1,056,393 sf / 1800 / 5282
6	288,000	223,637	111,818	97,920	159,818	n/a	881,193 sf / 1440 / 4406
7	287,424	208,517	104,258	92,016	140,258	n/a	832,473 sf / 1437 / 4162
8	283,500	159,845	79,922	73,980	103,922	n/a	701,169 sf / 1418 / 3506
9	276,384	126,890	63,446	50,624	99,446	n/a	616,790 sf / 1382 / 3084
10	266,048	98,468	45,733	51,240	69,734	n/a	531,223 sf / 1330 / 2656
11	255,232	89,995	44,998	49,152	64,678	n/a	504,055 sf / 1276 / 2520
12	241,344	79,850	39,926	125,328	61,766	n/a	548,214 sf / 1206 / 2741
Totals	4,705,932	4,088,692	2,040,142	1,446,294	2,703,944	757,279	15,743,283 sf / 23,529 / 78,719

EVALUATION

The skills, dreams and inspiration that a student possesses propel an investigation toward an intention. Through the making of an object, a direction for subsequent exploration surfaces. Many students do not lack ideas for things to make, but rather find it difficult to listen to what is made. Reflecting on what is made encourages one to probe the relationship between reason, method and design. Reason is our singular means of developing a very human form of knowledge that resides on the threshold of the known. In architecture this knowledge guides the transformation of elemental design concepts from abstraction toward the manifestation of spatial entities. Creating is joyful when we approach, through reason, the possible. This thesis, though not free from oversight, approaches a design with thoughtful consideration. A rational course defines the thesis work and demonstrates the ultimate intention of realizing the design of a humane mega-structure to augment the density of an urban site.

The tower is an exploration of the accord between architecture and urban design at the scale of a mega-structure. We recognize this scale directly in relationship to our landscape; however, individual buildings at this scale are unfamiliar. The mega-structure, through the presence and arrangement of tangible and familiar elements, composes an “urban landscape.” Within the tower, the wall defines dwelling units that define the extent of major public places. A hierarchical framework of walls forms the primary social and individual places as built spaces. Edges between the private and public realm result in peripheral spaces that augment their relationship. These “margins in-between” extend the boundaries of the public and private worlds and therefore act to unify them as a monolithic whole. Elements arranged to create these conditions reinforce orientation within the urban fabric. In this respect, the tower does not deviate from archetypal urban form.

The vertical direction of the mega-structure marks a departure from the horizontal character typical of city form. The tower envisions an assemblage of man-made elements that vertically consolidate and distribute environmental and transportation systems. At the same time, it exceeds the population density of its site and provides generous public spaces.

Current and future technologies make this opportunity not only possible but also probable. The models and drawings attest to the potential for the tower to efficiently carry the fundamental systems necessary to maintain a habitable vertical environment. No matter what the orientation or scope of these “cities,” designing compassionate spaces remains fundamental to making architecture. Certainly not everyone will find the tower “beautiful,” however the design does establish elementary relationships between its parts and to the natural elements that activates the imagination.

While the internal arrangement of elements “within” the tower admits the human scale, the mega-structure carries the obligation of establishing an external architectural whole. A cellular structure unifies the internal and external as a series of interpenetrating spaces. These open spaces, rather than simply acting as a “void” between a distribution of buildings, constitute another “element” that defines the urban aggregate. This establishes an articulated “surface” that, from a distance, maintains its mass. It allows the eye to transition from the current horizontal axis to a vertical one. The density that is established structurally therefore sustains the density necessary for vital urban form.

The prospective tower design reveals challenges that would require considerable effort to achieve. Currently the base fails to establish a solid relationship to the street. Conceptually, the base joins the ground in a massive public space and establishes a link with the existing city. The design could be improved by further articulating the exterior mass of the base through smaller scale elements that allow the public space to be recognized from the exterior plaza as the model suggests. A “new” Piazza Venezia organized by the hierarchical principles that define the tower itself would allow urban elements from within to unify the base with the city. Visually these plaza elements could then draw the eye from the ground to the upper reaches of the tower.

The distinct districts are more successful at establishing relationships between elements composing the dwellings and the greater public spaces. Definite edge and boundary conditions, governed by the arrangement of architectural elements, support specific transitions between areas of public and private use. Walls and openings are arranged to offer inhabitants a choice of the level of social interaction they desire at a particular moment. Applied at appropriate scales, these elements allow inhabitants a measure of influence on the peripheral spaces that mediate between the dwellings and public spaces. For example, planting areas would enhance transitional spaces and could offer the inhabitants a further investment in the place. Plants and trees would be essential within such a massive construction, offering visual and culinary delights and enhancing transitional spaces.

At the top of the tower, the open public plaza presents a reversal of the enclosed public space at the base. As a site, it becomes a geographical

location from which man can reflect on his modest inhabitation within the vastness of nature and his extraordinary capacity to place himself in this perspective. Historically, man has often chosen to construct noble places surrounded by exceptional topography. Now it is possible to create these sites. Ironically, Rome, a city founded in proximity to swamps, inserts a mountain at its core. Views in every direction establish a connection with the Tyrrhenian and Mediterranean Seas, the piedmont and the Appennino Mountains.

Criticism has been leveled at the thesis for proposing a tower in what many consider a “sensitive” and historical site. The insertion of such a tower in the midst of Rome is a powerful gesture. By placing the architectural object in the center the urban density of the city is reaffirmed. The boldness that surrounds the proposed replacement of the Victor Emmanuel monument in Rome is not arrogance. It is a political statement opposing the government that would build, to commemorate the liberty of its citizens, an unoccupiable and ostentatious monument. However bold this proposal may seem, it transcends this singular gesture, towards a bolder vision of the potential for cities around the world. This way of building could encourage places to develop significant urban spaces, and bolster their economy through new modes of ecological and technological construction. Architecture must address these potentials or remain static. The tower ultimately proposes a building “type” that employs the advanced technology of modern engineering and employs the architect’s compassion to elevate our living conditions in order to contribute to the humanity of urban life.

While the project closely examines the juxtaposition of human scale within mega-scale it does not attempt to establish absolute thresholds of scale. Although statistical evidence is useful in defining certain extremes, quantitative analysis alone is not enough. There is no absolute formula for place. This seems precisely why Allen Jacobs’ *Great Streets* remains a sociological study that increases our knowledge of human behavior in existing places. These types of studies cannot offer a method for the design of good places through quantitative standards. Only through judgements, based on unique situations, can a designer truly determine what to make and how to make it. Inserting the human figure into the design at an early stage contributes a clear and rich composition defining the scope and limits of a variety of scales. Carlo Scarpa’s sketches reveal particular insight into this method of assessing scale. Something small, like the tomb at Brione, may assume a monumental stature. Likewise, something large may remain intimate through recognizing the human scale at certain key moments. These moments must be designed. Formulas cannot absolve the architect of the responsibility to design individual spaces within the city scale. Design, realized in the character of these places, is the most delightful condition of making architecture.

Architects should be compelled to examine ways to construct urbane environments within a superstructure. Otherwise, the profession may succumb

to the mediocrity and disorder existing within current models of urban and suburban development which is spiritually and economically detrimental. Ignoring this responsibility will lead architects to become "true specialists in the art of organizing the meager."⁶⁷ Designing the structure for such an event requires the "excruciatingly difficult task of genuine introspection, of attempting to deduce a larger order from humanity's needs, institutions, hopes, fears and beliefs," otherwise "we will continue to involve ourselves merely with Style. We will be environmental beauticians"⁶⁸ for these buildings of the future.

POSTSCRIPT

As this book was about to be printed, a second terrorist attack on the World Trade Center was committed. This devastating assault destroyed both towers and thousands of lives. It not only threatens our fundamental human need for security but also assails the human desire for progress. Understandably, in the wake of this aggression, people are questioning the appropriateness of building tall structures that may become future targets and place human lives at risk.

These threats must not discourage us from building toward the future. It has always been the responsibility of architects and engineers to ensure, to the best of their ability, the personal safety of building inhabitants. New ways of building may increase the security of tall buildings against future attacks. However, it is impossible to predict the irrational actions of a few extremists and the technology they will possess twenty years from now. To acquiesce to these threats is to cut ourselves off from the human capacity to entertain and construct the sublime. I do not believe we should build tall as a reaction to these radicals, but rather only as a contribution to humanity.

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- 4 Krufi, Hanno-Walter. *A History of Architectural Theory.*, p. 439
- 5 Soleri, Paolo. *Arcology: The City in the Image of Man.*, p. p18
- 6 Ibid., p. 7
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- 10 Le Corbusier. *Towards A New Architecture.*, p. 215
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- 12 Hertzberger, Herman. *Lessons for Students in Architecture.*, p. 109
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- 18 Ibid., p.36
- 19 Hertzberger, Herman. *Lessons for Students in Architecture.*, p. 147
- 20 Ibid., p. 146
- 21 Brownlee, David B. and DeLong, David G. Louis I. Kahn: In The Realm of Architecture.
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- 24 Moore, Rowan. "Foster's Serious Skyscraper.", p. ?
- 25 Irace, Fulvio. "Geopolitics of the Skyscraper," *Blueprint.*, p. 10
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- 28 Le Corbusier. *The Radiant City.*, p. 150
- 29 Irace, Fulvio. "Geopolitics of the Skyscraper," *Lotus.*, p. 11
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- 35 Ciucci, Giorgio and Francesco Dal Co, Mario Nanieri-Elia, Manfredo Tafuri. *The American City.*, p. 350
- 36 Ibid., p. 363
- 37 Irace, Fulvio. "Geopolitics of the Skyscraper," *Lotus.*, p. 12-13
- 38 Ibid., p. 14
- 39 Ibid., p. 14
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- 60 Ibid., p. 82-83
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