

Philadelphia City Tower

an exploration of architectural representation through drawings
and photographs of physical models

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The architect, history and her drawing

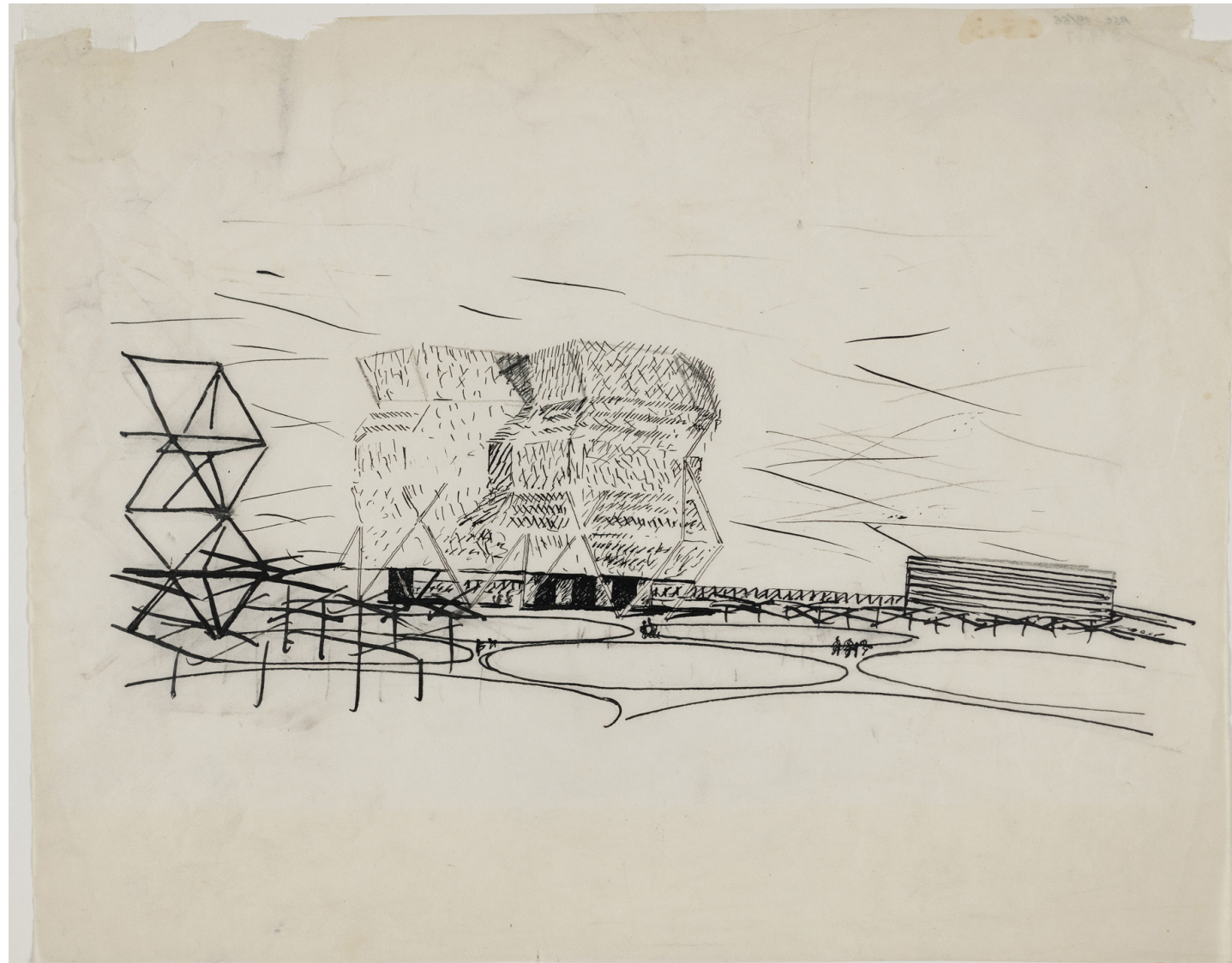
Supervisor: Jurjen Zeinstra

Dedicated to the memory of
my father.

In the course of exploring the
representational methods in
the field of architecture, this
thesis was supervised by Jurien
Zeinstra, whom I want to thank
for his advice and continuous
guidance throughout the whole
process.

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The City Tower project by L. Kahn and A. Tyng, 1952-53. Perspective sketch, ink and graphite on tracing paper.

Contents

Introduction	4
I. The plan for Midtown Philadelphia	8
I.1 The City Tower	
II. Anne Tyng and Louis Kahn: Ideas, principles and creative minds behind the City Tower	18
III. Architectural representation of the City Tower: tools, methods and analysis	28
III.1 The Perspective Sketch Drawing	
III.1.1 The Tower	
III.1.2 The Space Frame Structure	
III.1.3 The Rectilinear Structure	
III.1.4 The Ground	
III.2 The Physical Model(s)	
IV. Final Thoughts	40
References	42

Introduction

Towards a plan for Midtown Philadelphia, was a comprehensive urban proposal for the redevelopment of Philadelphia City, USA, published in 1953 by Louis Kahn in his capacity as a member of the Planning Committee of Philadelphia. Besides an urban plan that would re-define the use of the existing infrastructure, offer a decentralized proposal for the city of Philadelphia and advance the circulation movement within the city center, Kahn proposed the Philadelphia City Tower, a new municipal building that would host civic offices. Anne Tyng, a key figure of American women architects of the 20th century and a collaborator of Kahn, had a leading role in the design of the City Tower. The project was never realized; however, it was included in the exhibition entitled *Visionary Architecture* organized by the Museum of Modern Art (MoMA) in 1960 which comprised projects of the 20th century that were deemed “too revolutionary to build” (MoMA, 1960, p. 1). In the exhibition, Kahn and Tyng presented a physical model of the Tower along with a perspective hand-drawn sketch and other orthographic drawings.

Initially, Kahn was reluctant to give any credit to Anne Tyng for the conception of the Philadelphia City Tower and mention her name as a contributor to the project¹. However, in 1972, two years before his death, Louis Kahn affirmed that “Anne Tyng was the geometry conceiver of the Philadelphia Tower”² (Ruan, 2007, p. 101). The proposal for the City Tower is a space frame building that encompasses strong geometrical ideas and utilizes the Platonic solids (tetrahedron) to form a three-dimensional vertical frame structure, ideas that Anne Tyng vastly researched and incorporated in her work, such as the Elementary School in Bucks County (1950-51) and Walworth Tyng House (1950-1953).

¹ Anne Tyng in one of her last lectures mentioned: “the Museum of Modern Art was going to have an exhibit; I never got an invitation to the opening. So, I asked around - the secretary said ‘you better speak to Louis Kahn’. He is a rascal; he actually took my name off. I went to his office and said to him ‘wouldn’t it be better if you called them?’” (Tyng, 2011, Oct. 14). After their discussion, Kahn included her name at the MoMA exhibition as collaborating artist.

² Yet, Louis Kahn remained hesitant in giving her full authorship, as he added: “well, that is not exactly so because I thought of the essence but she knew its geometry” (Ruan, 2007, p. 101).

The perspective sketch presented at the MoMA exhibition illustrating the Philadelphia City Tower (figure 1) is one of the few drawings that were published for this project along with photos of physical models. Who was really the creator of this drawing? Louis Kahn, as he first claimed authorship, or Anne Tyng, as she insisted to be included as a collaborator? More importantly, how could a free hand-drawing represent the preciseness and rigidity of geometrical ideas? Departing from this drawing, there arises a broader question in regards to the tools used to translate architectural ideas through drawings, sketches and physical models. Do the representation tools chosen by the architects function as the vehicle to express their architectural ideas and principles? Representation is a central aspect of architectural practice; the choice of the medium and techniques play a catalytic role in the way a project is perceived. In an attempt to highlight how the philosophy and interests of both Tyng and Kahn are translated through the architectural tools of representation, the main question stirring this research will be:

How do the various representations of the Philadelphia City Tower reflect the main architectural ideas of Louis Kahn and Anne Tyng?

To answer the research question, this thesis in part I will outline the ambitions of the Midtown Philadelphia City project as perceived by L. Kahn and the general framework behind its conception; moreover, it will focalize on the Philadelphia City Tower, the geometrical application of the project conceived by both Anne Tyng and Louis Kahn. The following part II will emphasize on illustrating Anne Tyng - as an architect and theorist whose work is not widely known- and her architectural positions that acted as a catalyst for the project. Additionally, the principles Tyng shared with Kahn will be presented in order to establish the backdrop on which the Philadelphia City Tower

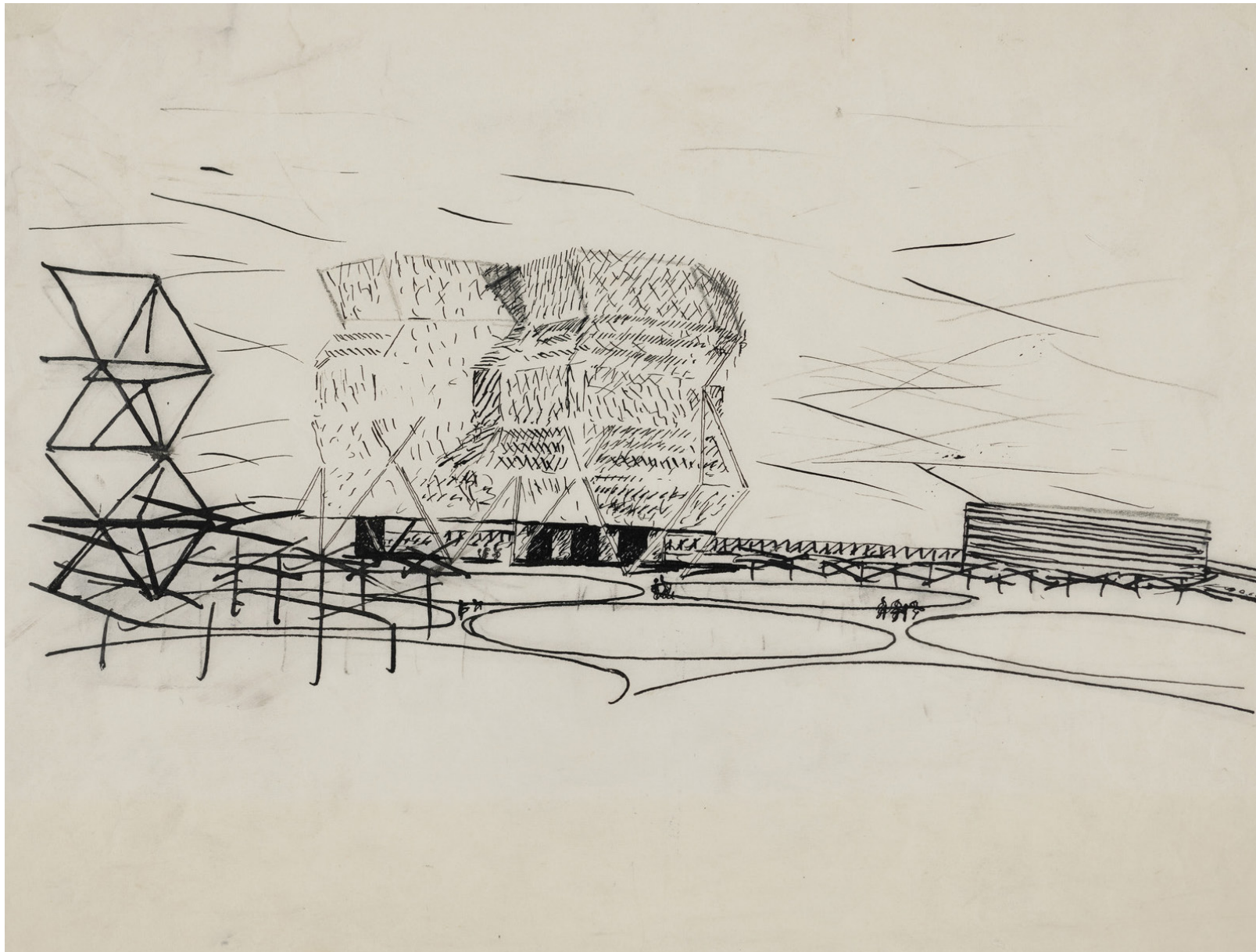


Figure 1: The City Tower project (perspective sketch) by
L. Kahn and A. Tyng (Kahn & Tyng, 1952-53)

was designed. Part III will focus on the available representation materials of the project, in particular on the perspective sketch and the photographs of two physical models, that will be described, analyzed and compared. The final part IV will recapitulate the main findings of this research and will host some final thoughts on architectural representation.

I. The Plan for Midtown Philadelphia

The redevelopment of the city center of Philadelphia dates back to the 1950's. After World War II, Philadelphia's growth in both population and size required prompt planning to reorganize the structure of the city. As Morris (1963, p. 94) mentions, there was a need for immediate and outright evolution in the quality of the city that started in a period of political reform and began with the establishment of the City Planning Committee in 1943 (Brownlee & De Long, 1991, p. 304). Louis Kahn, as a member of the Committee, was actively involved in the creation of the Comprehensive Urban Plan for the city of Philadelphia. The primal area for this transformation and the subject of Kahn's designs was the city center (figure 2) as part of the "Triangle Plan", with interventions in a large parcel of land with empty lots and decaying buildings³. Kahn expressed his idea and materialized his suggestion, among other means, through perspective sketches; in figure 3, for example, he depicted the proposed separation of the land into four areas: Philadelphia's New Business Address, Civic Center, Amusement Center, and New in Town Living Center. In other perspective sketched developed later (figure 4 & figure 5), Kahn portrayed the new business district west of City Hall, an area that was later developed as the Penn Center (Brownlee & De Long, 1991, p. 304), where the City Tower was situated.

In 1953, Kahn published the Plan for Midtown Philadelphia (Kahn, 1953) summarizing the ideas that had been previously explored and focusing mainly on two urgent issues for the town of Philadelphia: traffic congestion and the need for a new City Hall (Brownlee & De Long, 1991, p. 306). Louis Kahn suggested a holistic solution for the redevelopment of the Philadelphia City, centered on the optimization of the infrastructural system of the city, the implementation of new housing projects and at the same time, the formulation of a

³ "A 200-acre parcel of land bordered with Benjamin Franklin Parkway, the Schuylkill River, and Market Street, with an apex at City Hall" (Brownlee & De Long, 1991, p. 304).

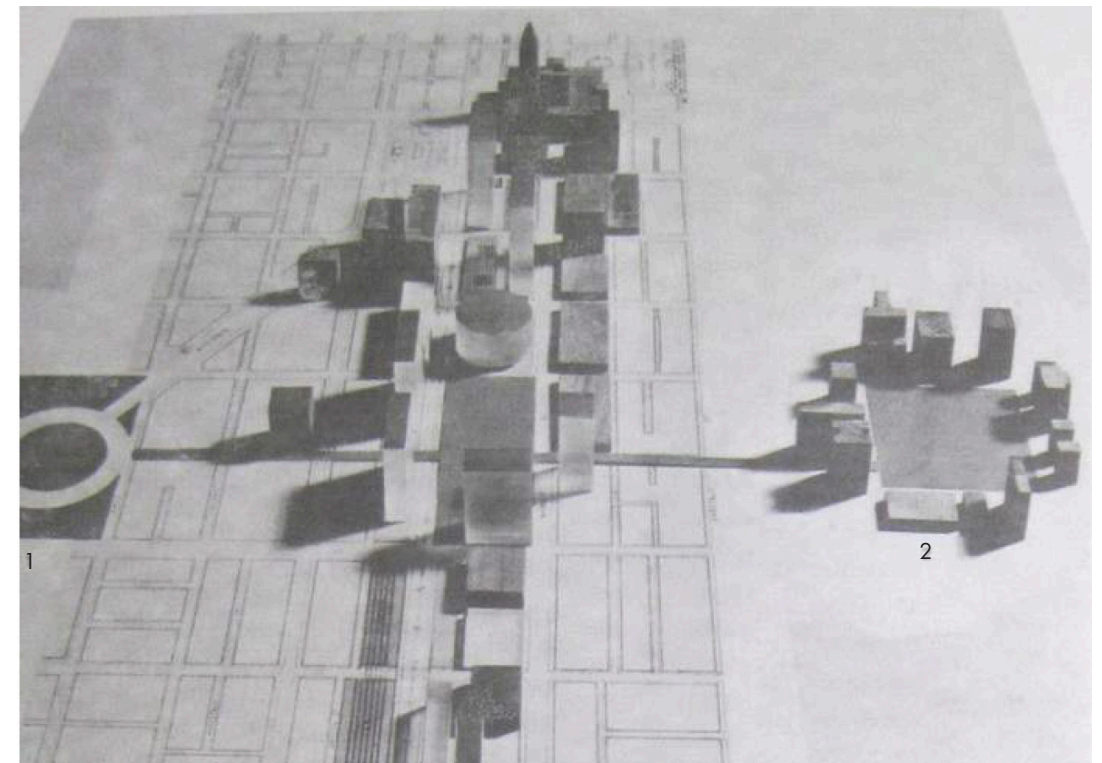


Figure 2: Schematic physical model showing part of the City Center, as proposed in Kahn's development plan. (1: Logan Square, 2: Rittenhouse Square). (Ronner & Jhaveri, 1987, p. 28)

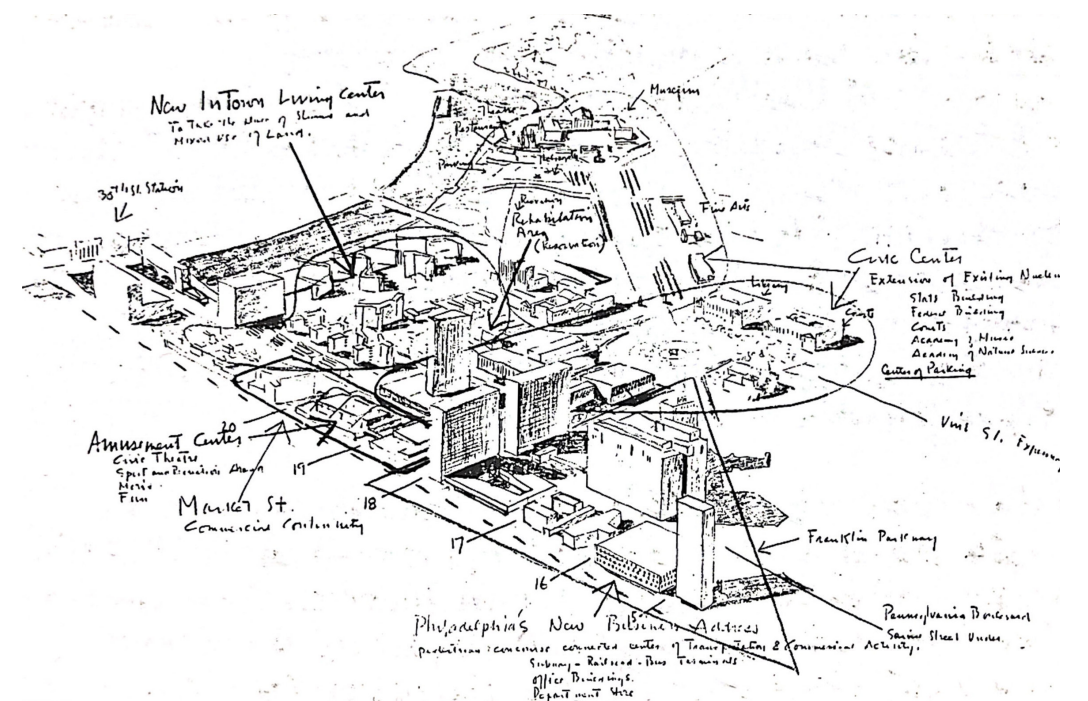


Figure 3: Triangle Plan Redevelopment. Bird's eye perspective, ca.1947. (Brownlee & De Long, 1991, p. 305)

distinct city center. In a series of sketches and drawings, Kahn and his team firstly intended to “redefine the use of streets and separate one type of movement from another” (Kahn, 1953, p. 11)⁴. This new circulation pattern (figure 6)⁵ aimed to further establish a system that would “stimulate more imaginative development of shopping centers” (Kahn, 1953, p. 11), as the programmatic implications of shopping imposed a pattern of movement for the pedestrians and vehicles. This reorganization of the infrastructural system, besides alleviating traffic issues within the city, became an opportunity for the development of new programmatic interventions to service the citizens of Philadelphia. Even though Kahn’s plans were endorsed by his colleagues of the City Planning Committee, he never got their full support. Kahn expressed his frustration with the committee’s inability to “appreciate the conceptual or theoretical nature of his plans” (Brownlee & De Long, 1991, p. 307).

⁴ As Anne Tyng had stated “Lou always wanted a distinction between things” referring mainly to his way of detailing architecture projects that could however be also implemented on the urban scale (Brownlee & De Long, 1991, p. 55).

⁵ In this drawing Kahn differentiated the types of movement, vehicle and people, using different symbols and arrows of various sizes, intensity and sketch. In the proposed traffic pattern drawing, he reorganized the movement to propose order and flow for each movement (Brownlee & De Long, 1991, 55).

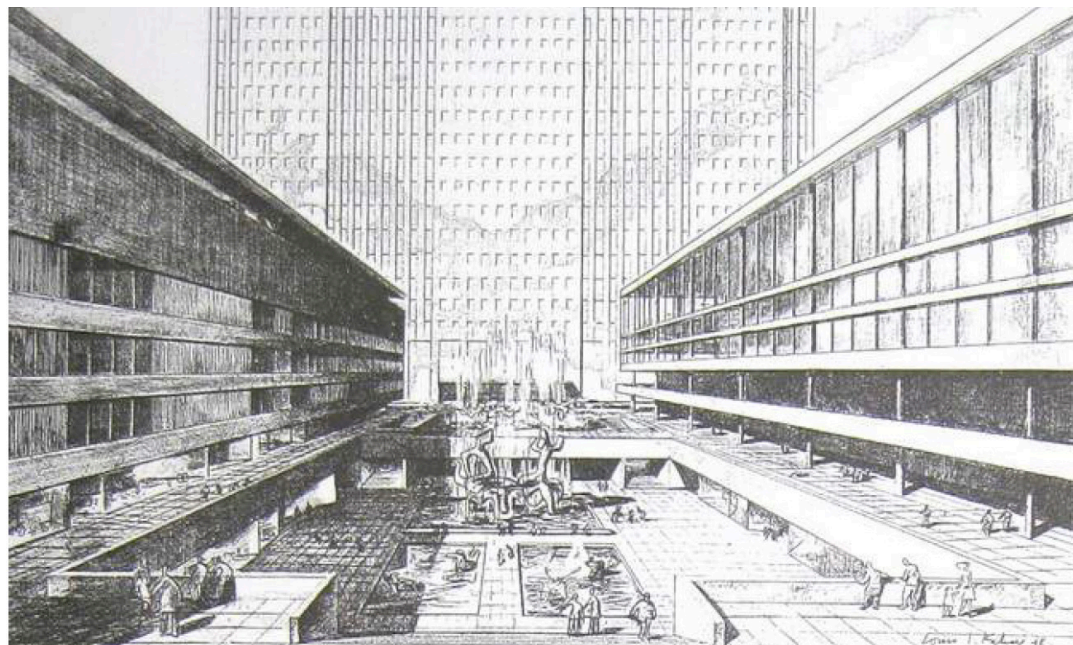


Figure 4: Perspective of concourse, looking north toward Suburban Station. Triangle Area Redevelopment. Bird's eye perspective, ca. 1947. (Brownlee & De Long, 1991, p. 305)

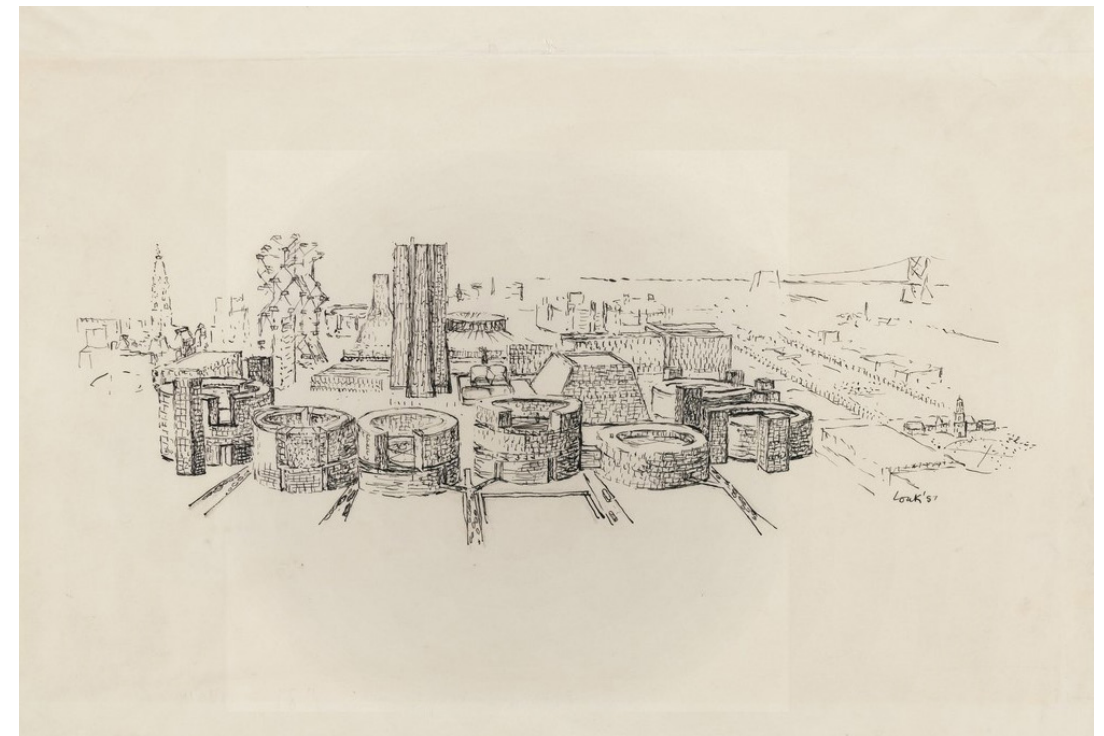


Figure 5: Aerial perspective sketch, showing a study of the civic center of Philadelphia (by Louis Kahn). Retrieved from https://www.moma.org/collection/works/579?artist_id=2964&page=1&sov_referrer=artist

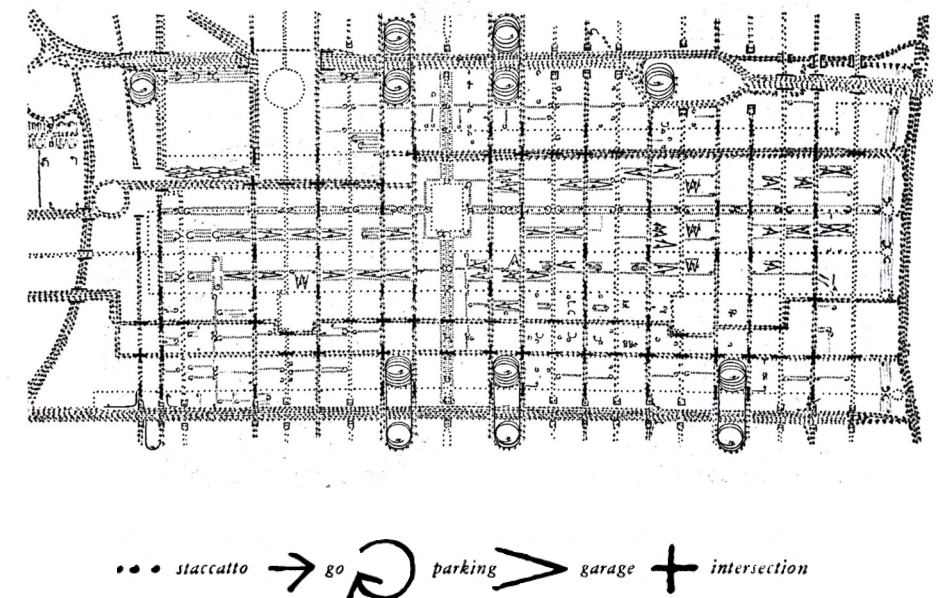


Figure 6: Philadelphia traffic pattern proposed by L. Kahn, 1951-53. (Brownlee & De Long, 1991, p. 66)

I.i The City Tower

A key component of the proposal for the redevelopment of the Philadelphia city center (also known as the Penn Center) was the City Tower, an emblematic high-rise municipal building created in collaboration with Anne Tyng. In 1951-52, the proposal for the new civic center comprised three buildings in the form of a superblock, shaped in pure geometric forms: a cylinder, a prism and a cube (figure 7) (Brownlee & De Long, 1991, p. 307). In 1953, they suggested a new typology of the office building, “a tower of spaces for public areas and city departments” (Wesley, 2021, p. 446), that took over the placement of the prism-shaped building. This 1953 version was the one depicted in the perspective drawing published at the exhibition of MoMA in 1960 (figure 1). The placement of the Philadelphia City Tower was initially proposed to be west of the existing Hall, as part of the Penn Center, in a desire to establish a “new Philadelphia landmark” (Wesley, 2021, p. 450).

The 1953 version of the civic center, known as the City Tower, was an exploration of a space frame tower in the vertical direction (figure 8) with a tetrahedral structure to articulate the potentials of three-dimensional constructions, a mega-structure that distributes weights and resists the wind (Juárez Chicote, 1997, p. 145). As stated by Kahn (1953, p. 23), the program of the Philadelphia municipal building required generous public areas, meeting rooms and exhibit spaces; this led Kahn’s architectural team to propose a building of 65m in height with 6 major floors, with the possibility to subdivide each floor into three additional ones. The footprint had a large hexagonal floor area for the public areas that shifts in a triangular relationship. Mezzanine levels would be used as working areas for smaller offices. Anne Tyng, many years later, pointed out that the ambition for this rotation was to “animate the building to some degree [...] because it looks as though it might be in motion, possibly, if you have enough imagination” (Tyng, 2011, Oct. 14).

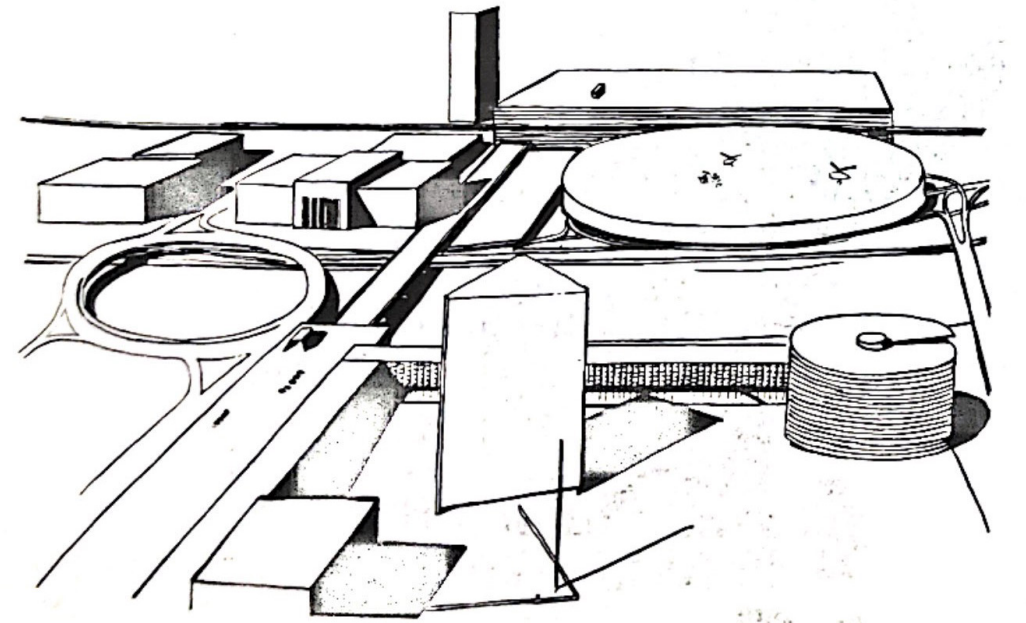


Figure 7: The 1951-52 proposal for the civic center. Bird's eye perspective drawing by L. Kahn (Brownlee & De Long, 1991, p. 307)

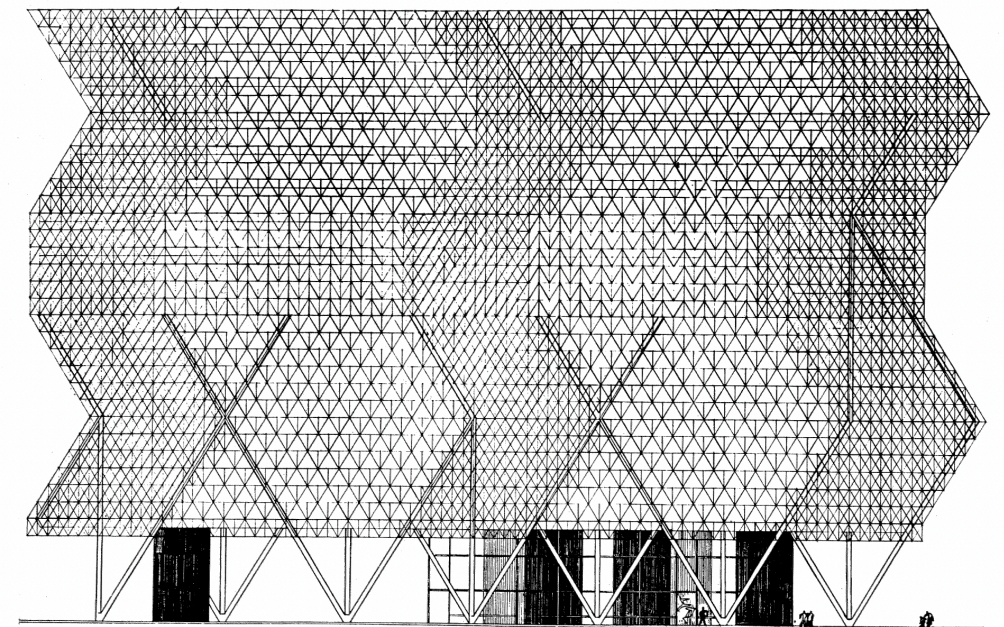


Figure 8: Elevation of the 1953 version of the City Tower. (Kahn, 1953, p. 26)

One of the most inventive features of the Tower was the structural system created with the Platonic solid geometry, separating it from the glass skin of the façade. This design decision rejected the conventional, economic beam and column support system of Modern architecture of the mid-1950's, a quality that made the tower innovative⁶ (Juárez Chicote, 1997, p. 134). The geometric principles and the independent expression of the structural system allowed the design to evolve on its own, organically, without any specific preconceived formal idea, characterized by Kahn and Tyng as "a concept of natural growth" (Juárez Chicote, 1997, p. 143). The Tower was intended to be constructed with precast, prestressed concrete struts forming the triangulated frame system with spaces of 8 meters (27 ft.) in height (Kahn, 1953, p. 27). As a result, the central space is column-free allowing the floor plan to have a desired flexibility.

Revisiting this second version of the City Tower in 1956-57, rather than suggesting a new City Hall building in the civic center, the architects proposed an annex building adjacent to the existing City Hall on Rayborn Plaza (figure 9), that was favored by the Planning Committee (Wesley, 2021, p. 451). This third version of the City Tower demanded a more complex geometry input and Anne Tyng had the leading role in its design⁷ (figure 10). The 1957 proposal was commissioned by the Cement Atlas Company that was searching for new ideas⁸ (Wesley 2020, 1:08:50). Architect and photographer Robert Damora, photographed the physical models created by Kahn and Tyng and produced the advertisements for the company (figure 11) (Wesley 2020, 1:09:26). The architects tripled the height of the original proposal -from 6 to 18 stories- and integrated the addition of a plaza with orthogonal geometry comprised of squares and circles, a three-layer platform acting as a base for the tower (Weiss, 2011, p. 100). Following the same idea of orchestrating the street as an "equally organized element", the

⁶ The project, as mentioned in the introduction, was part of the 1960 MoMA exhibition, *Visionary Architecture*, for projects that were too revolutionary to be built.

⁷ At the same period of time, Robert Venturi had joined the office of Louis Kahn. Tyng mentioned: "The tower is really just something I did. Bob Venturi recently joined the office and he did a lot of work on the base of the tower. Lou also worked on the base, so he didn't have much to do with the tower either. He didn't really grasp the geometry that well (Tyng et. al., 2011, p. 100).

⁸ Kahn and Tyng summing up the intentions of the City Tower stated that "utilizing one of nature's strongest, simplest shapes – the triangle- these triangular shapes of precast, prestressed concrete buttress this high rising structure. It grows upwards in a succession of pyramid form to provide maximum areas of easily divided space, with a variety of ceiling heights. Through the hollow concrete sections run arteries which carry air conditioning, heating and other service lines, while a central core consolidated elevators and stairways. Thus, a meaningful form evolves out of a municipal structure's needs- and is expressed in concrete, the versatile building material" (Gargiani, 2014, p. 120).

three levels of the base integrated a shopping passageway at the street level, a pedestrian plaza above street level and finally a lower parking and service level (Wesley, 2021, p. 446). The development of the project included the construction of a physical model of the tower with the plaza (figure 21), in order to be included in a published booklet and advertising brochure (Gargiani, 2014, p. 118).

The version of the tower published for the Cement Atlas Company was acknowledged as "Tomorrow's City Hall: High-rising tower of triangular concrete frames", that was not only designed for the city of Philadelphia, but could potentially be situated in any American city. As stated in the advertisement, the aim was "to promote interest in architectural contributions for a greater America through the medium of concrete" (Gargiani, 2014, p. 118). The publication of the Universal Atlas Cement Company, taking advantage of the powerful image of the physical model, illustrated the tower as one of the most innovative proposals for a tower for the 20th century using reinforced concrete (figure 11). This publication was the last attempt of Kahn and Tyng to get the funding for the construction of the tower, yet the tower was never realized (Gargiani, 2014, p. 120).

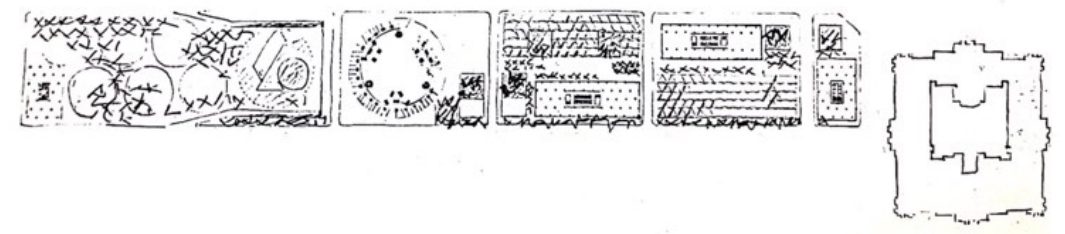


Figure 9: L. Kahn's hand drawing showing the alternate esplanade plan, next to the existing City Hall (far right). (Brownlee & De Long, 1991, p. 308)

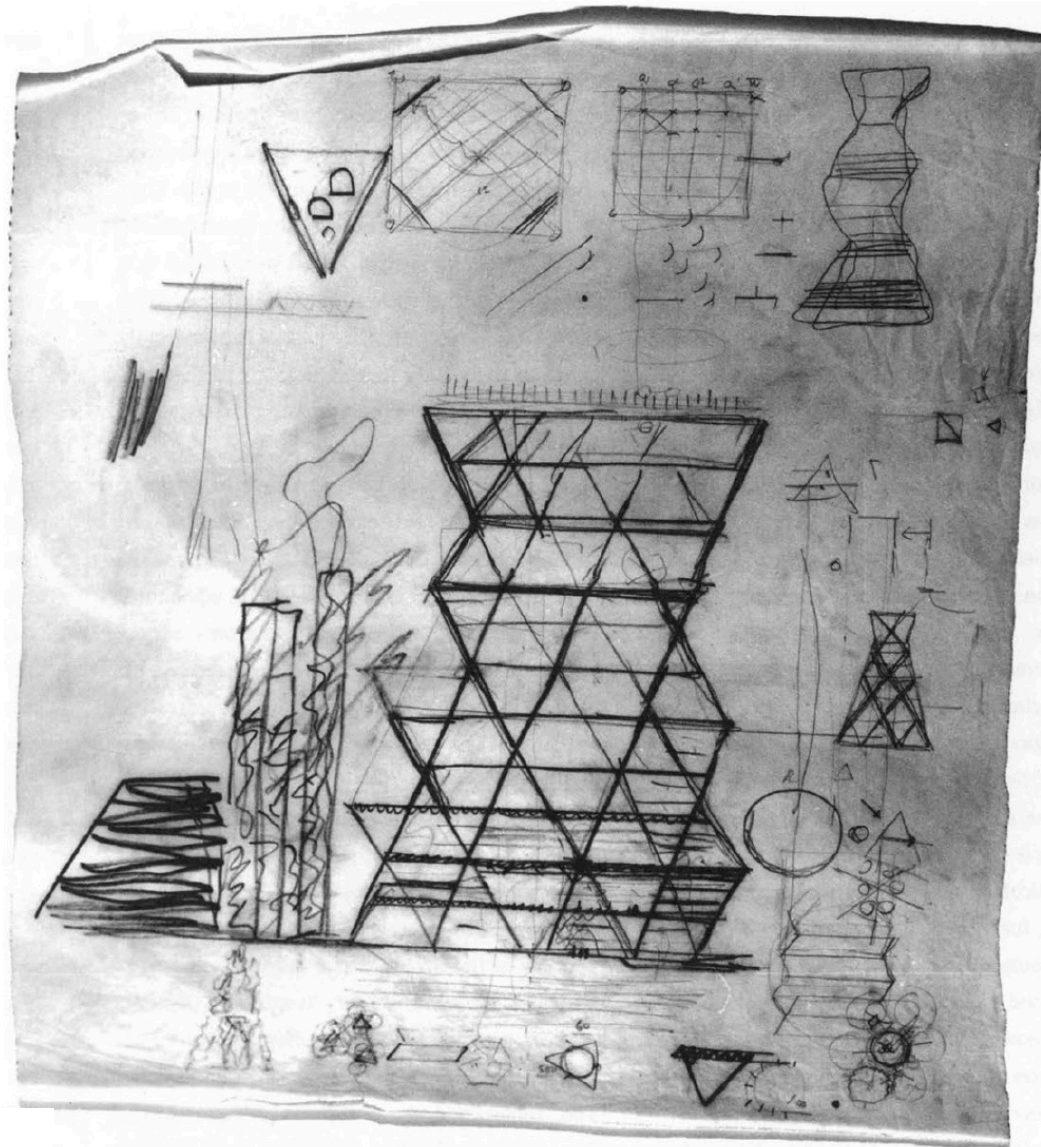


Figure 10: Conceptual sketches by the L. Kahn team for the Philadelphia City Tower (Juárez 2000, p. 78)

The advertisement of 1957, most likely contributed to the inclusion of the project in the 1960' MoMA exhibition Visionary Architecture exhibition. In a TIME magazine article entitled "Art: The Dream Builders" (Oct. 17, 1960) regarding the exhibition where Anne Tyng's name was, again, not mentioned, the author criticized the project stating: "Philadelphia's Louis Kahn dramatically ignoring the necessity of rectilinear symmetry, modeled a skyscraper that suggests a tottering, concrete Erector set". Wesley, while presenting the City Tower, stated that this was one of the first but not the last misinterpretation of the Tower, as well as the first but not the least time the authorship of the Tower would be incorrectly credited (Wesley, 2020, 1:10:07).



Figure 11: Advertisement of the Philadelphia City Tower for Universal Atlas Cements, in Time Magazine, April 22, 1957

II. Anne Tyng and Louis Kahn: Ideas, principles and creative minds behind the City Tower

The formal language of the Philadelphia City Tower undoubtedly creates a design case that encompasses the architectural ideas of two key figures of the 20th century history of architecture, Louis Kahn and Anne Tyng. What were the ideas that contributed to the design of the Philadelphia Tower? In order to delve into the representational analysis of the projects through the drawings, sketches and photographs of models, it is important to delineate the architectural ideas that led to the creation of the Tower.

Anne Tyng (1920-2011) was born in China where she lived until 1934⁹. After having relocated in the USA, she majored in fine arts at Radcliffe College and in 1942 continued her graduate studies at Harvard University, where she studied architecture under Walter Gropius and Marcel Breuer. As a licensed architect, along with her limited personal projects, she collaborated with Louis Kahn from 1947 until 1962 and contributed to various projects while working with his architectural firm, with the Philadelphia City Tower being one of them¹⁰. From 1960 until her death, Anne Tyng focused on theoretical research on geometry and its transformational power, earned her Ph.D. and taught at the University of Pennsylvania.

Professionally, Tyng was not independently known in the architectural realm of the 20th century; she was mostly credited for her collaboration and personal relationship with Louis Kahn. Yet, Anne Tyng as an architect had designed several projects on her own and conducted personal research in regard to geometry. Drawing from her personal experiences, Anne Tyng's research on how geometry can be the driving force for architectural design is noteworthy. From her early career, she

⁹ Anne Tyng's biographical information is from Schaffner & Whitaker, 2011, pp. 98-110.

¹⁰ Other projects include the Yale University Art Gallery (1951-53) and the Trenton Bath House (1955-56).

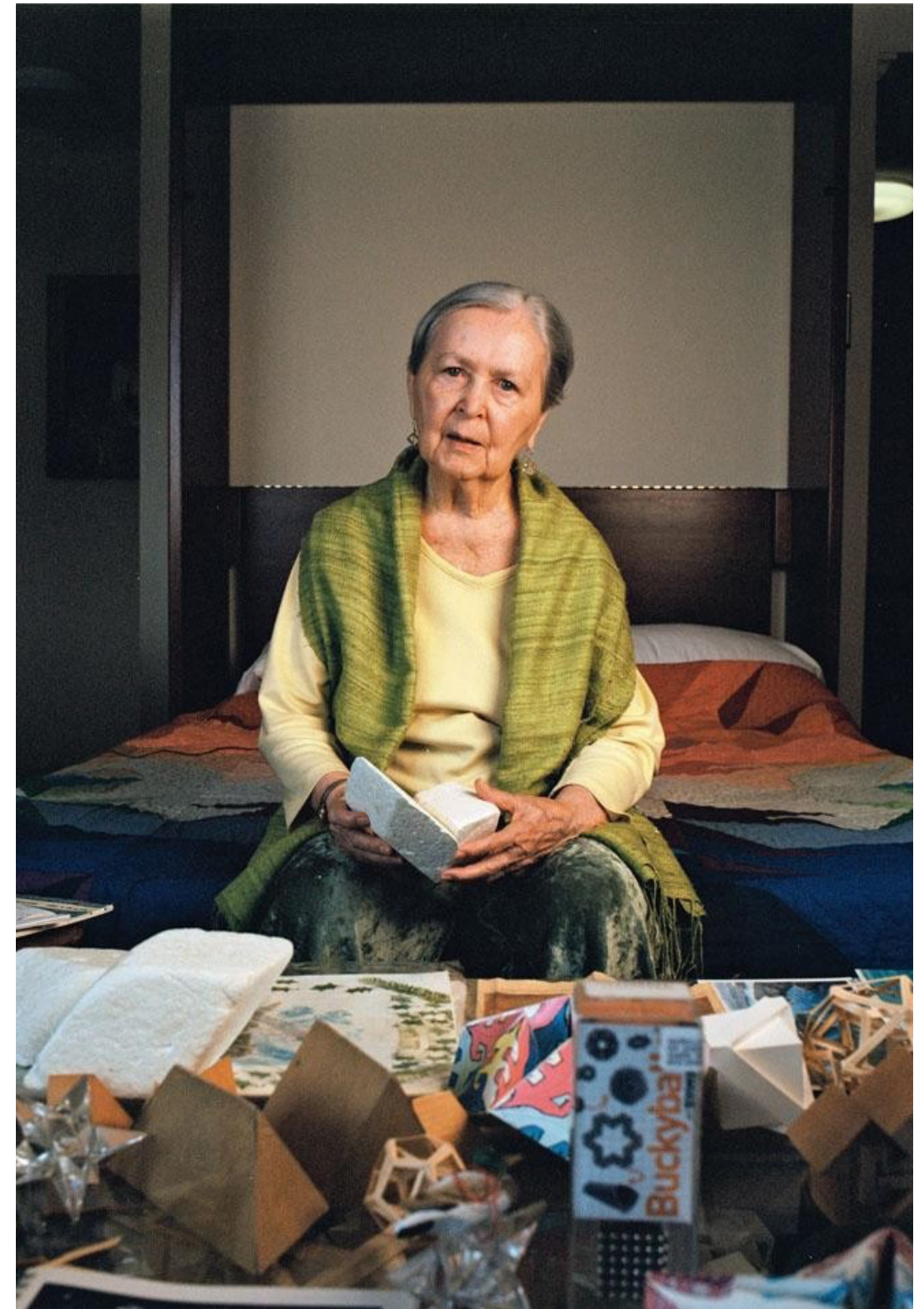


Figure 12: Anne Tyng in her house, one of her last photos. (Weiss, 2011, p. 98)

developed an interest in the relationships of geometry as a form giver while exploring at the same time human consciousness¹¹. In her "Geometric extensions of consciousness" (1969), one of her most important theoretical essays, Tyng through diagrams and writing, presented how she conceives architecture based on geometrical forms; she also highlighted her research on geometrical principles¹² such as the Platonic solids, "the only regular possible forms in three-dimensional space" (p. 137), mentioning their formal occurrence in the biological and natural world¹³. The quality of the Platonic solids that fascinated Tyng (figure 13) was that even though they are static, the relationship between them is not (Imperiale, 2011, p. 89). One can say that geometry and its transformative power constituted Tyng's architectural 'alphabet', a collection of tools to design with simpler to more complex forms.

Architecturally, her interest in geometry can be translated into different scales: "You start with something in the scale that you live in, or that you relate to, and then you go out in the world where you encounter various other scales" (Weiss, 2011, p. 100). Indeed, several of her personal projects (figures 14, 15 & 16), from the Walworth Tyng House (1950-1953) to the Elementary School in Bucks County (1950-51)¹⁴ employed this geometry formally with the habitable space frame¹⁵, "a total space frame structure hollowed out for living like a bee's honeycomb" (Tyng, 1997, p. 47) (figure 17). It seems that all these geometrical principles that Anne Tyng explored theoretically can be traced as the fundamental principles of the Philadelphia City Tower design she worked on with Louis Kahn.

Louis Kahn (1901 - 1974), one of the most influential architects of the twentieth century, was a multi-faceted representative of the modernist movement and at the same time a painter, writer and university teacher at Yale and the University of Pennsylvania. The architectural ideas that were explored through his work

¹¹ As indicated in Tyng's Essay "Geometric Extensions of Consciousness" primal applications of form – expressed through the Platonic solids, the helix and the spiral– have a connection with our spiritual, biological and psychic understanding of the world (Allison, 2012, p. 97).

¹² Tyng also presents the formal implications of the Divine Proportion and the Helix (spiral).

¹³ As Imperiale (2011) explains: "The Platonic Solids are the only equiangular and equilateral polyhedra and were described by Plato in his *Timaeus* as the smallest units and the origin of all nature; their combinations could account for the unique complexity of all manifestations of matter". Tyng translates the geometry present in ineffably beautiful and complex natural objects- such as the double spiraling seen in the head of a sunflower. She then transposes this knowledge to her design" (p. 90).

¹⁴ Leopold (2020) explaining the application of Platonic solid geometry in the Elementary school in Bucks County: "In her design of an Elementary School [...], she designed a structure out of octahedra and tetrahedra in several space layers that converge finally in a point and become a pillar", essentially creating a column that 'grows' (p. 177).

¹⁵ Tyng refers to her parents' house as "the first built habitable total space frame" and the tower as 'the first conceptual tower structure that was a totally triangulated habitable, space frame' (Juárez Chicote, 2020, p. 11).

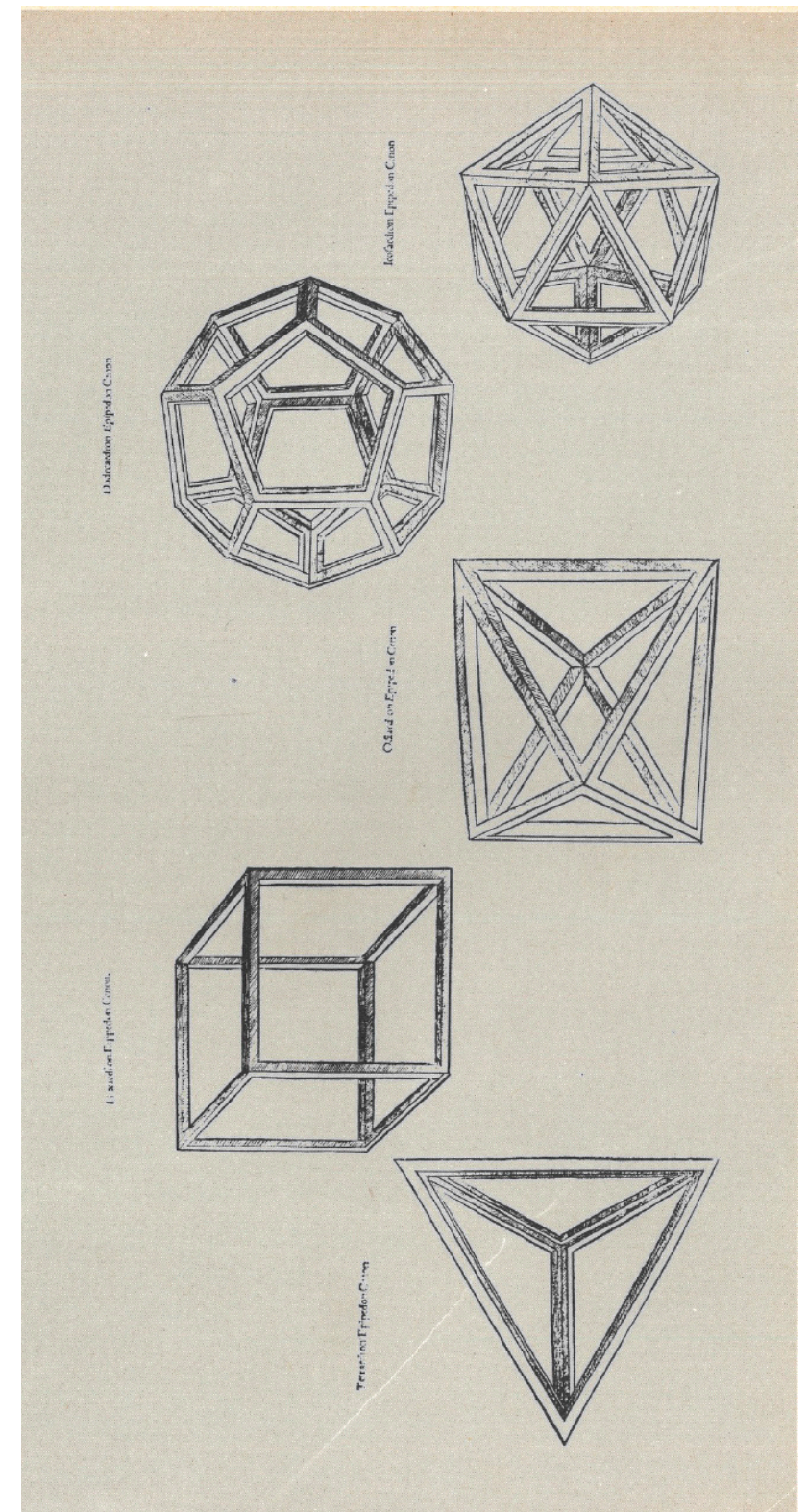


Figure 13: Anne Tyng's diagram showing the Platonic solids (Tyng, 1969, p. 134)

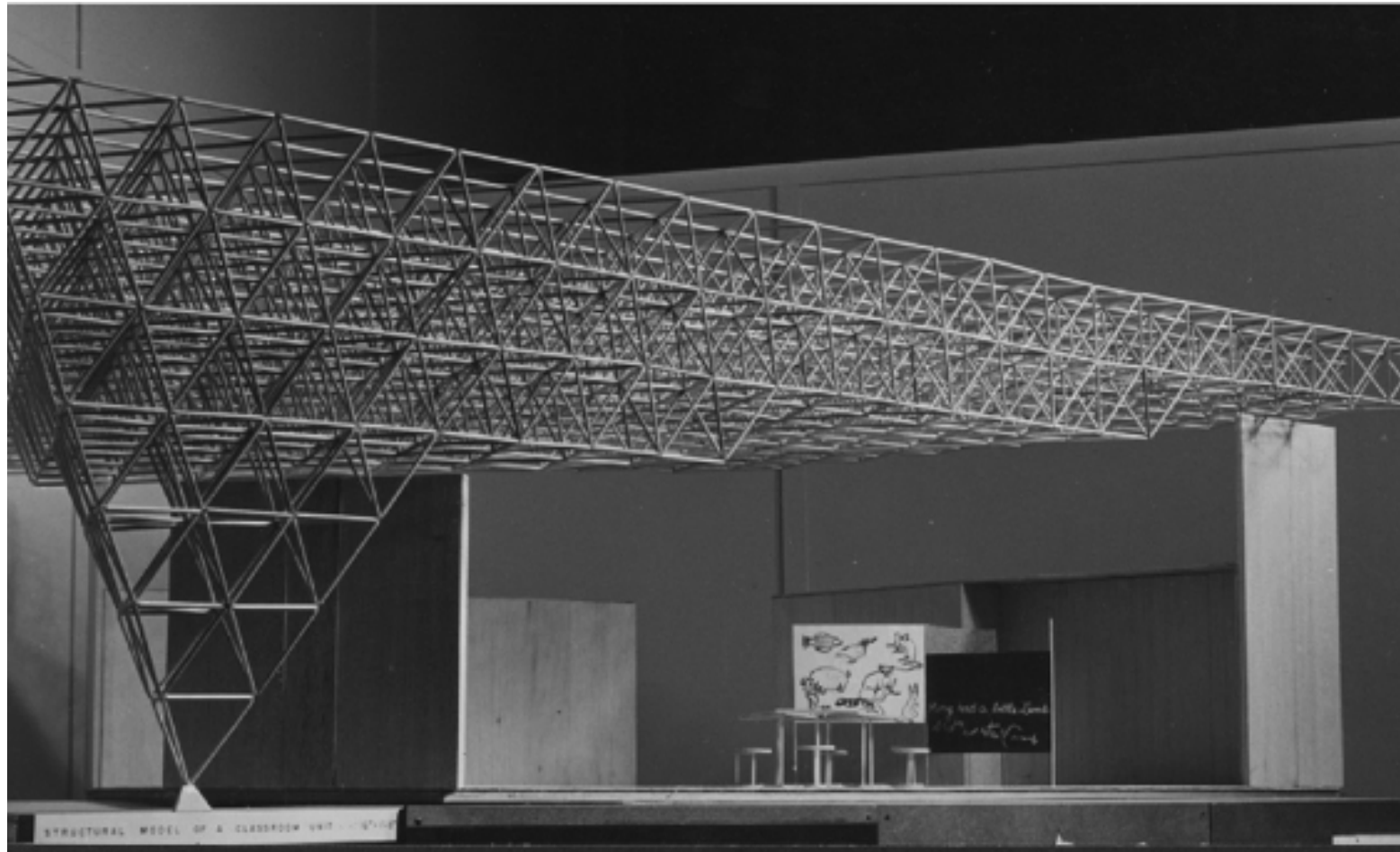


Figure 14: Elementary School, Bucks County. A structure of octahedra and tetrahedra converge in one point. Photograph of physical model. (Juárez, 2000, p. 74)



Figure 15: Photograph, Walworth Tyng House. (Tyng, 1969, p. 158)

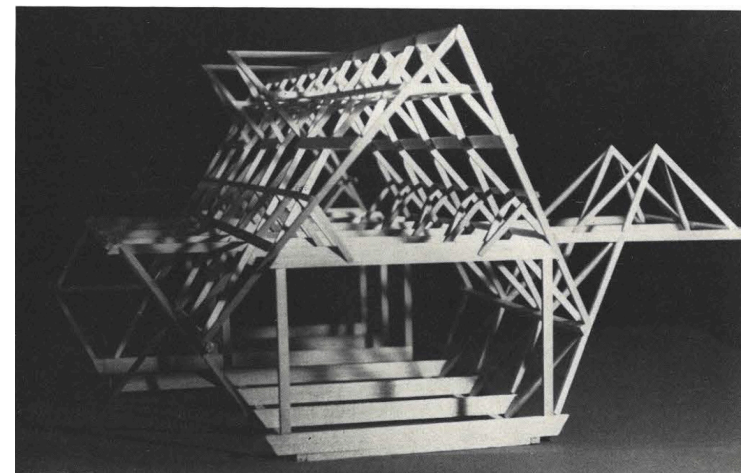


Figure 16: Photograph, physical model for Walworth Tyng House (Tyng, 1969, p. 158)

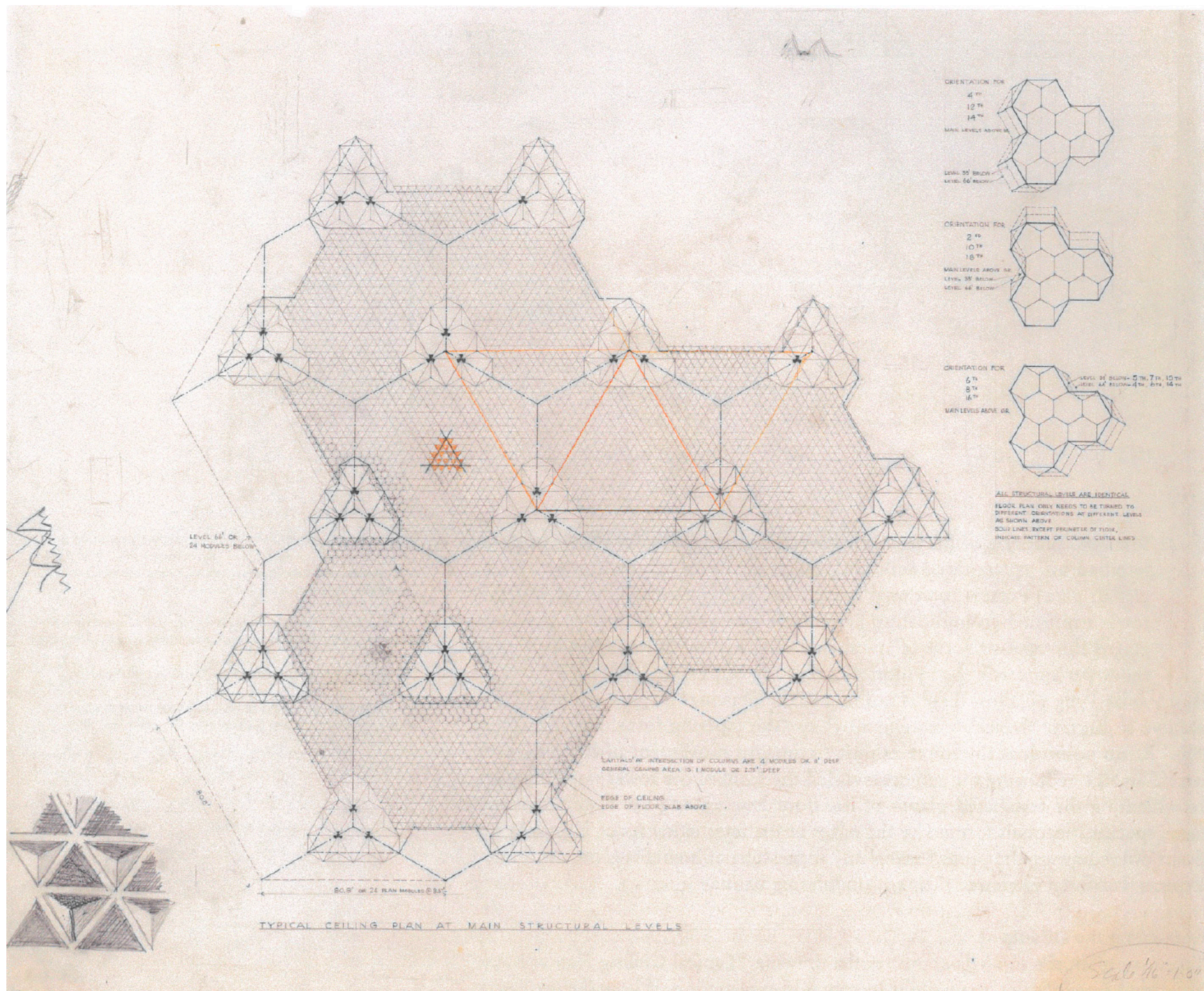


Figure 17: Typical ceiling plan at main structural levels with diagrams showing module types with the directions of the offsets and a sketch of the tetrahedral ceiling, City Tower, ca. 1956-57 (Wesley, 2021, p. 457)

were related to monumentality, structure, topology, growth and organicism (Juárez, 2000, p. 70). Tyng, commenting on the architectural work of Louis Kahn, noted that “he makes beauty in the world one of the ‘ideas’, the constant and unchangeable primal forms or primal principles of things to which human beings/artists can relate however transient they are and their world may be” (Gast et al., 1998, p. 185). His works have been thought to portray creative imagination informed not only by his training and historical understanding but also by his aesthetic intuition (Wiseman, 2007, p. 10).

Both Tyng and Kahn have strong personal viewpoints in regarding to architectural practice; nevertheless, the Philadelphia City Tower seems to be a dialogue of ideas and a collaboration of two architects who want to produce progressive projects. The proposal of the Philadelphia City Tower in both versions (1953 and 1957) expresses an innovative space frame that can be occupied with ‘life’. As the two architects had claimed when the proposal was submitted: “in gothic times, architects built in solid stones. Now we can build with hollow stones” (Kahn, 1953, p. 23). This statement clearly shows one of Kahn’s greatest concerns: inventing ways of construction with new technologies and materials (Juárez Chicote, 1997, p. 134). The space frame creating this ‘hollowness’ is seen by Tyng as an opportunity for humans to inhabit space (Juárez Chicote, 2020, p. 74) while by Kahn to hold mechanical equipment, an idea that they first explored in the Yale University Art Gallery (1951-53)¹⁶. In a search for structural order at a monumental scale, the tower is perceived as a continuous structural unity worth of being exposed (Juárez, 2000, p. 70). If Tyng defines architecture as “the art of form to number and number to form”¹⁷, Kahn explored architecture through the lens of construction, materials and the experience through space.

¹⁶ At the Art Gallery the structure is a continuous framework of slab with hollowed tetrahedral beams exposing utility equipment (Juárez, 2000, p. 74), yet the structure of the beams and the columns were still a separate system.

¹⁷ As explained in her interview with Robert Kirkbride in 2005, “You realize that number is a tremendously important tool, and you can almost say that number is form and form is number. The clustering of number gives scale, and also the sequences of number is a process.” (Tyng, 2005, p. 127).

So far, this thesis presented the framework of the urban development plan for the city of Philadelphia focusing on the Philadelphia City Tower and the architectural ideas that the tower was based on. As the project was never realized, the sketches, drawings and photographs of the physical models become an important repertoire in order to grasp the totality of the project. How are these ideas translated through the various types of representation?

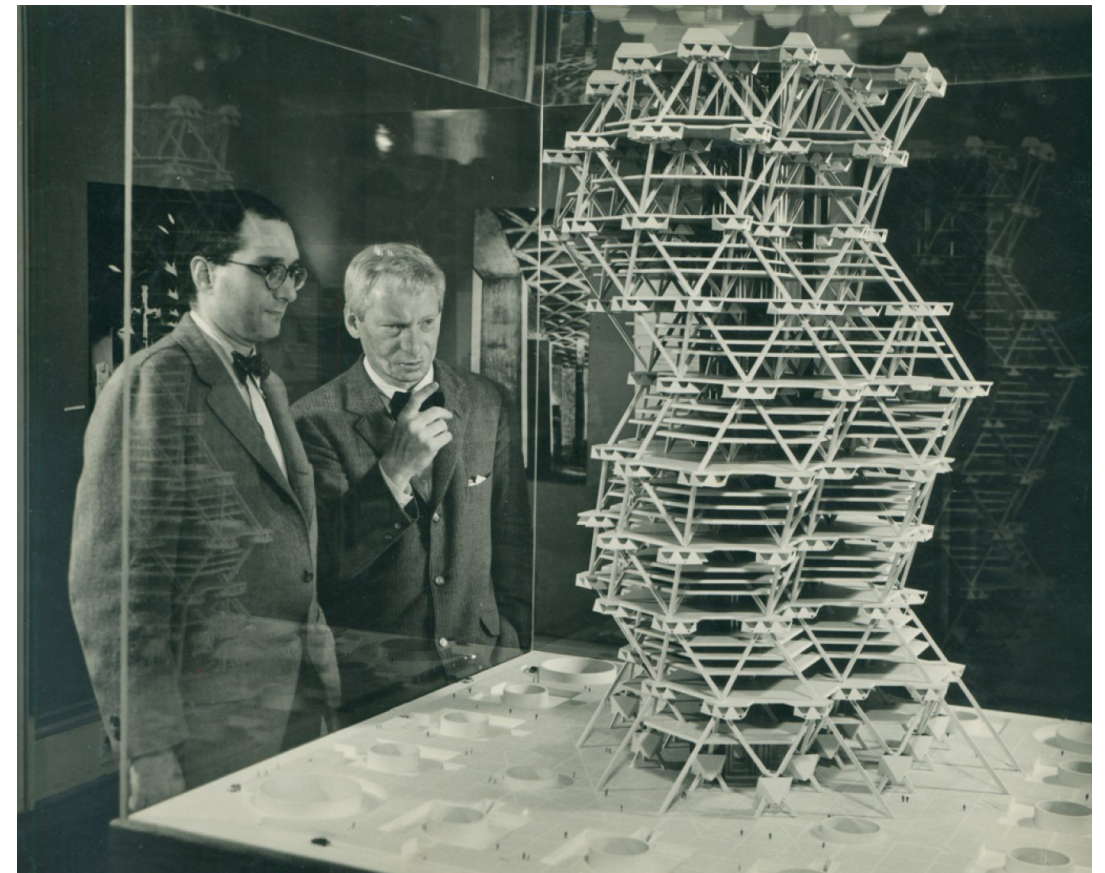


Figure 18: Louis Kahn and Jonas Salk with the physical model of City Tower at Cornell University, 1958. Photo by Sue Ann Kahn. Retrieved from <https://www.metalocus.es/en/news/louis-kahn-power-architecture>

III. Architectural representation of the City Tower: tools, methods and analysis

Architectural representation usually focalizes on the materials architects produce in pursuit of the architectural practice, such as drawings of buildings, photographs, physical models and digital images and models (Christenson, 2019 p. ix). Yet, architectural representation is not a simple task: it is a process of making specific choices, selecting and prioritizing, in order to communicate the architectural concepts and ideas of a project (Christenson, 2019, p. 2). For the Philadelphia City Tower, as a concept project, architectural representation is of crucial importance, as there is no built object to refer to. The most published drawing is the hand - drawn perspective ink and graphite drawing, dated in 1953 (figure 1), depicting the second version of the Tower and probably meant to capture the essence of the proposal. As Kahn stated in 1967: "the importance of drawing is immense, because it is the architect's language." (Wesley, 2021). However, is this perspective drawing adequate to communicate all the qualities of the Philadelphia City Tower?

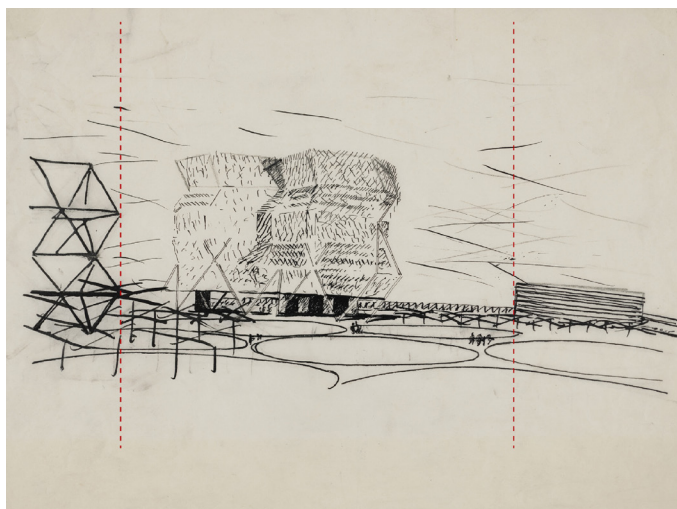


Figure 19: Visual analysis of the composition: three unequal parts, making the focus of the drawing the tower (own analysis)

III. 1. The Perspective Sketch Drawing

The perspective sketch drawing can be divided into three unequal parts, creating a hierarchy between the four main elements of the sketch: the tower, a space frame structure, the rectilinear structure and the ground (figure 19). This composition with all these elements introduces the viewer to some of the intentions of the architects, while putting emphasis on the focal point of the sketch: the City Tower.

III.1.1. The Tower

The tower is sketched off centre, however it takes up most of the drawing space. The various directions and the different opacities of the lines portray the geometric "faces" of the tower, making one side of the tower less defined and more transparent. This gives the illusion of depth in the perspective sketch while translating the "movement" of the structure. On the bottom of the tower, the lines create a geometric structure, looking like a pavilion, that visually connects the objects on the left and on the right with the tower.

III.1.2. The Space Frame Structure

On the left, the first third of the drawing, there is a structure-like object. As the object appears to be closer to the viewer, it seems to be of crucial importance to establish the geometrical language of the project: the space frame.

III.1.3. The Rectilinear Structure

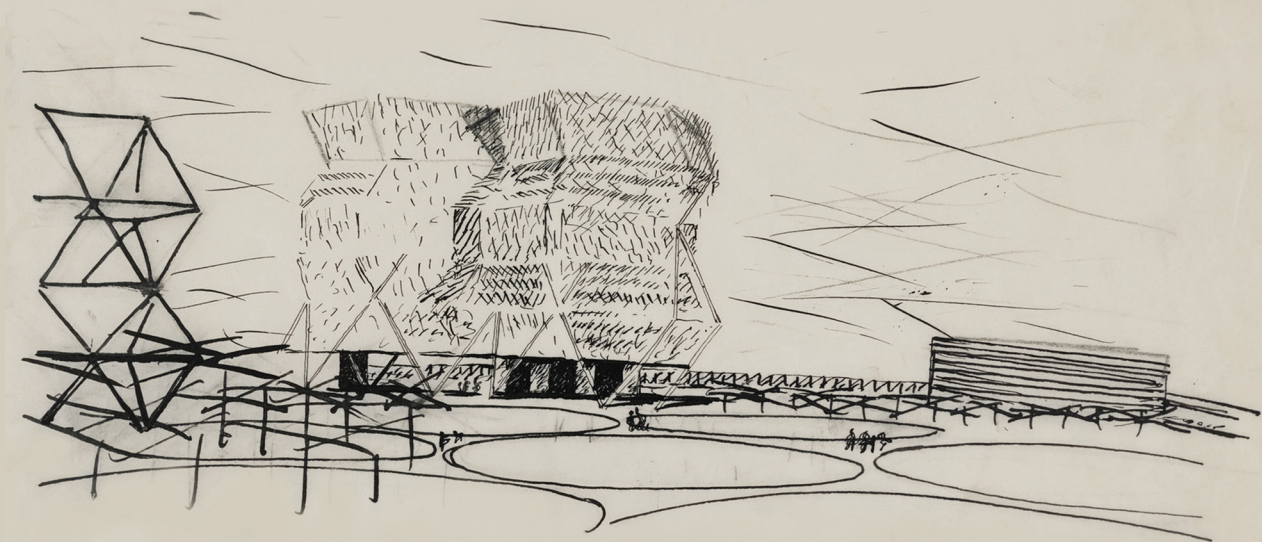
On the right of the main tower, a low-rise box-like volume gives an indication of the surrounding context. The building, being much lower than the tower, acts as an indicator of the importance of the scale for the tower.

III.1.4. The Ground

The ground in front of the buildings is represented with different sized circles, suggesting a landscaping that has some relation to the circulation of the human figures that seem to wander around. At the same time, the human figures serve as an indicator of the various scales of the buildings and the surrounding objects.

Besides the composition, however, the design technique and the various elements depicted are instrumental to the perception of the drawing. The drawing is simple and minimalistic in terms of the technique and the medium used - ink and paper- yet, through the different line weights and line styles of the pen, the graphic language may be clearly interpreted (figure 20). First, the lines that represent the 'geometry' are used in the structure-like-object on the left, the tower itself, as well as in the scaffolding that 'runs' through the drawing from the left to the right, unifying all the elements in the drawing. The structure-like-object on the left is composed by lines that clearly show 'bare' geometry as a hint for the structural system of the City Tower, although the geometrical language is only apparent in the bottom half of the tower.

Additionally, the stroke lines used to denote the shell of the building, indicate materiality on surfaces that could be categorized as 'hatching'. The stroke lines, diagonal and in different directions that form the proposed tower suggest some type of transparency, in comparison to the volume on its right, that is drawn with denser horizontal lines, indicating a much opaquer building. At the bottom of the tower, there are four black boxes, representing the core and the entrances to the building. Lastly, scattered lines in the 'sky' illustrate the general 'context' of the environment and portray the overall atmosphere and scale of the drawing. The scenery of this perspective drawing is represented with free strokes of various opacities portraying the sky or the wind. The way the atmosphere is depicted and the free - hand strokes that form the proposed tower are sketched in a similar way, hence there might be a close connection as to how the tower responds to physical phenomena, like the wind.



Geometry

Hatching

Context

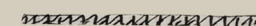
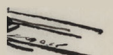
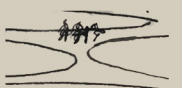
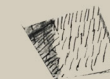


Figure 20: Visual analysis of the drawings, making a distinction between three different categories of 'lines' (Own analysis)

III.2. The Physical Model(s)

There are two physical models published for the Philadelphia City Tower, the one that was developed during the 1953 version of the project (figure 21) and the other that was developed to support the proposal of 1957 and the advertisement of the Cement Atlas Company (figure 22). The way light accentuates the formal qualities of the physical models, especially in Demorra photographs, intensifies the effect the geometry produces, highlighting the Tower's silhouette and geometric applications.

The physical model of the 1953 version is less intricate than the later one, yet it translates the advantages of the geometric language of the Tower. The cores that run through the structure are apparent, concentrating the services of the building in the center, thus allowing the use of maximal free space in the rest of the floor plate. The structural system of the space frame, that acts as both a column and a beam, is prominently evident making the geometry of the tetrahedra explicit. The level of detail in the framework of the later version of the model adds more definition to the way the structural system functions; the points of connections and the nodes highlight the possibilities of this geometry making the 'motion' of the structure clear to the observer. For both these models, the attempt to reveal the structural elements and leave out the materiality of the facade puts emphasis on the importance of the geometric language and highlights its most important feature: the hollow geometry.

The model of the 1957 version sits on a base that represents the plaza surrounding the City Tower. The detailed photo of the base (figure 23) shows a two - dimensional pattern on the pavement on the roof of the plaza, creating an orthogonal grid that, as claimed by the architects, would create a communication with the streets of the city (Wesley, 2020, 1:12:10). The horizontality of the base and its orthogonal

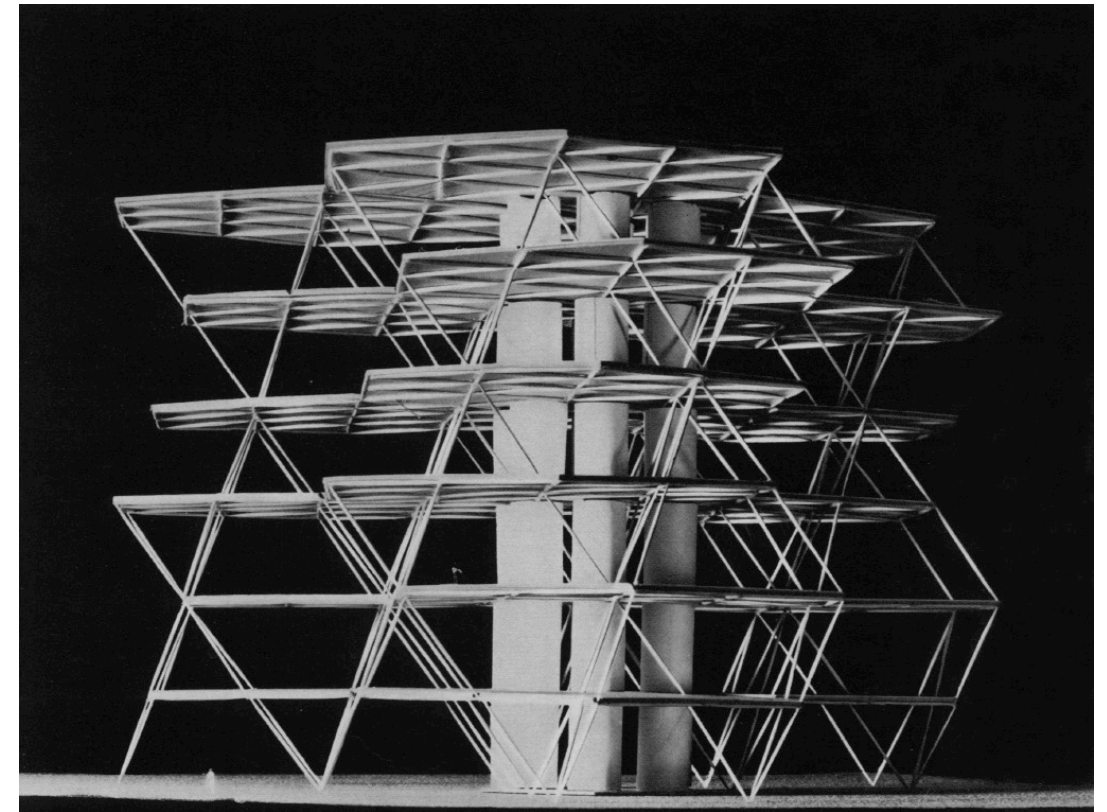


Figure 21: Photo of the City Tower physical model, 1953 version (Wesley 2021, 450)

geometry contrasts the triangular, dynamic and vertical qualities of the Tower, yet the pavement acts as an in-between layer of communication between the two elements. For Kahn, a city should have "entrances" and "gateways" suggesting cylindric structures that would surround the civic center and hold packing spaces to prevent decentralization and the influx of cars in the center. Figures 24 and 25 illustrate the analogy of a city and a defensive fortress with the parking structures circling the city center. (Brownlee & De Long, 1991, p. 307). In the 1957 model photos, the position of the parking structures is for the first time disclosed in a physical model, giving a much clearer scheme of their function and relationship to the City Tower itself.

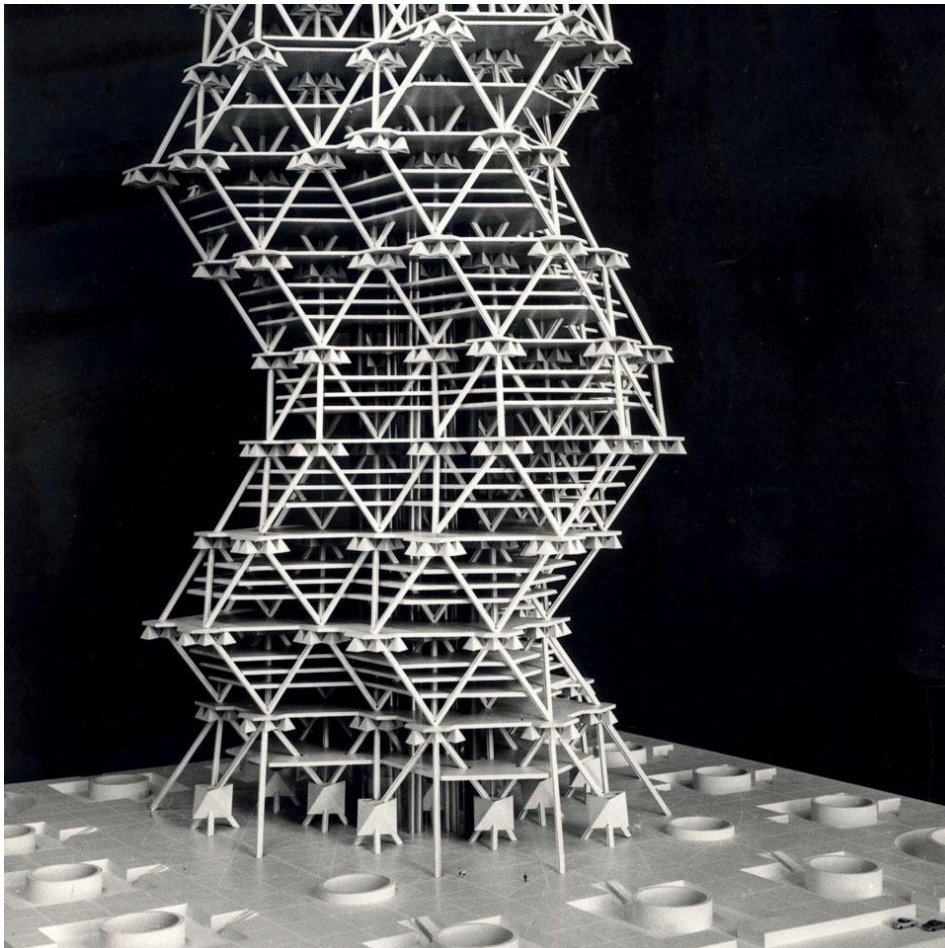


Figure 22: Photo (by Robert Damora) of the City Tower physical model, 1957 version (Wesley 2021, 450)

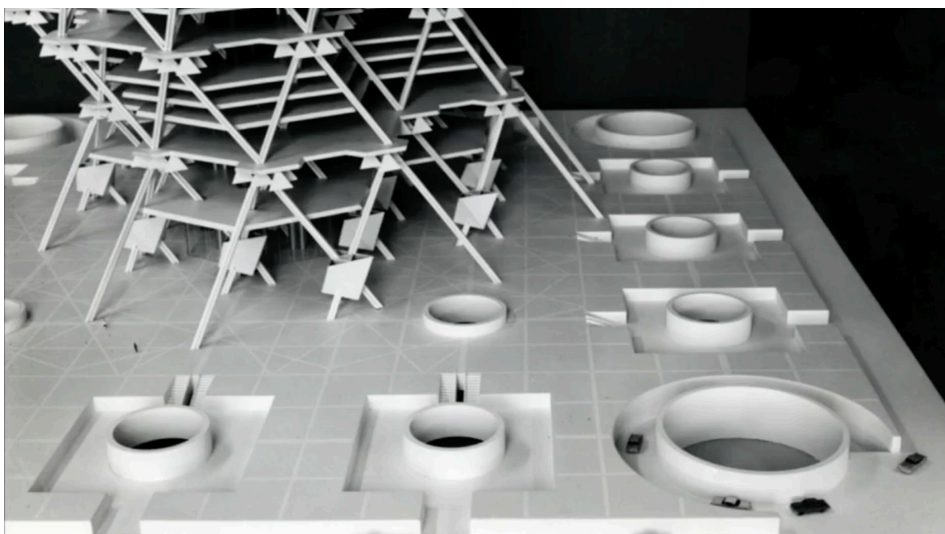


Figure 23: Photo (by Robert Damora) of the City Tower physical model – base details, 1957 version (Wesley 2020, 1:12:10)

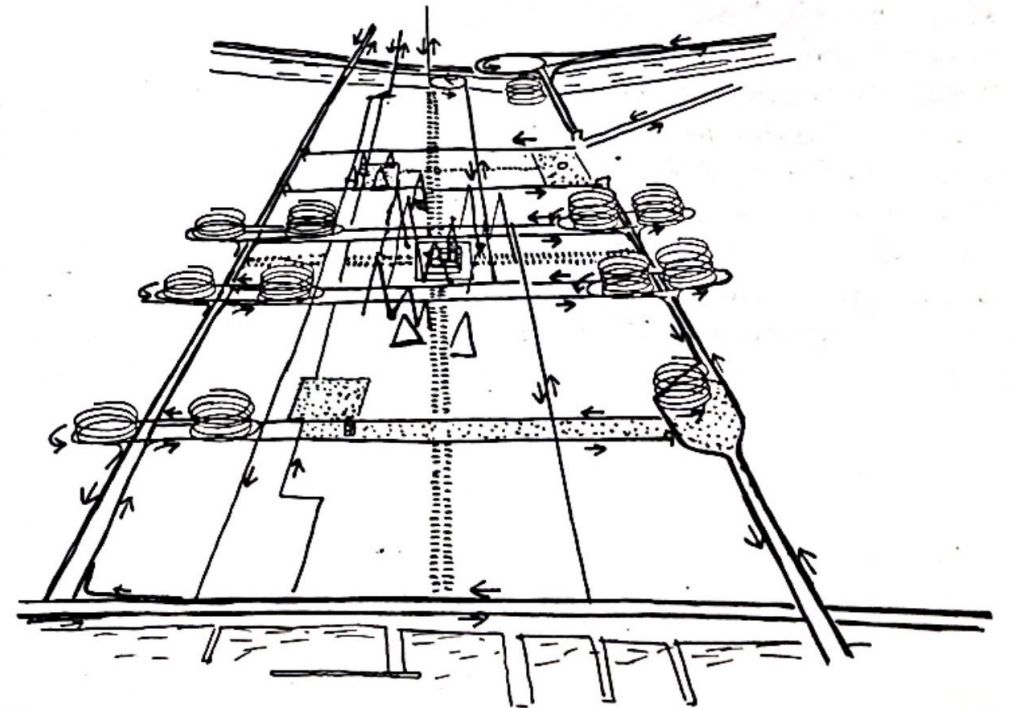


Figure 24: Philadelphia Traffic Studies, Philadelphia, Pa. 1951-53. Proposed Traffic pattern. (Brownlee & De Long, 1991, p. 307)

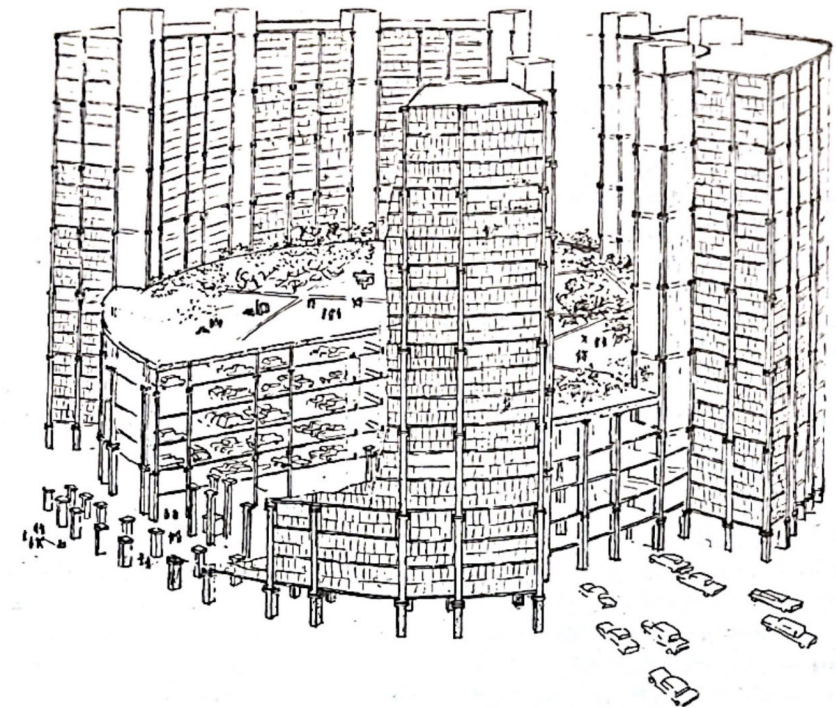


Figure 25: Civic Center, 1956-57. Cutaway perspective of parking tower. (Brownlee & De Long, 1991, p. 308)

III.2. Comparing the two representational methods

Through this detailed description and analysis of the 1953 City Tower drawing and physical models of 1953 and 1957 it seems that the graphic style of the perspective sketch 'softens' the geometric principles that Tyng advocated through her architectural positions. The physical models portray a more accurate geometrical image of the proposal, in contrast to the more free translation of the perspective sketch.

It is also worth mentioning that, when it comes to Tyng's drawings and sketches, they appear to be more mathematical, often including calculations, numbers and notes on the geometrical configuration (figure 26 & figure 27). In other perspective drawings made by Kahn for the Philadelphia Planning Committee (figure 28), the depiction of the City Tower at the far back of the drawing is less defined, in contrast to the objects with a more recognizable geometry and the surrounding contexts that aims to illustrate the experience of the space. Based on the above, it is more probable that the 1960 MoMA perspective sketch was Kahn's translation of the overall atmosphere of the civic center, by introducing human figures and giving small hints of the geometrical principles such as for instance the 'geometric lines'¹⁸.

This, of course, doesn't deprive Anne Tyng of the authorship of the drawing. In contrast, after closely observing the photographs of the City Tower models (figures 21, 22 & 23), the absence of any cladding or façade detailing, leads to the assumption that in all models the architects had a clear intention to represent the space frame as a way to make its geometry comprehensible. Indeed, Tyng had acknowledged the difficulty of representing the complexity of the three dimensionality of the City Tower in orthographic sketches and had noted that "Damora's dramatically lit photograph of the model provides

¹⁸ At the Conference *Anne Tyng-Ordered Randomness* of Princeton University in March 2020, archivist Heather Isbell Schumacher showed different drawings from the Philadelphia City Tower and explained their different qualities. She mentioned that, in general, Ann Tyng's drawings have more mathematical qualities to them, are more crisp and more geometric (such as in figure 25) whereas Louis Kahn focuses on showcasing the human experience (figure 26). This leads me to believe that the perspective drawing was indeed sketched by Kahn, even though the formal idea and geometry were Anne Tyng's. However, this is just an assumption. (Schumacher, 2020, 00:27:50 et seq.).

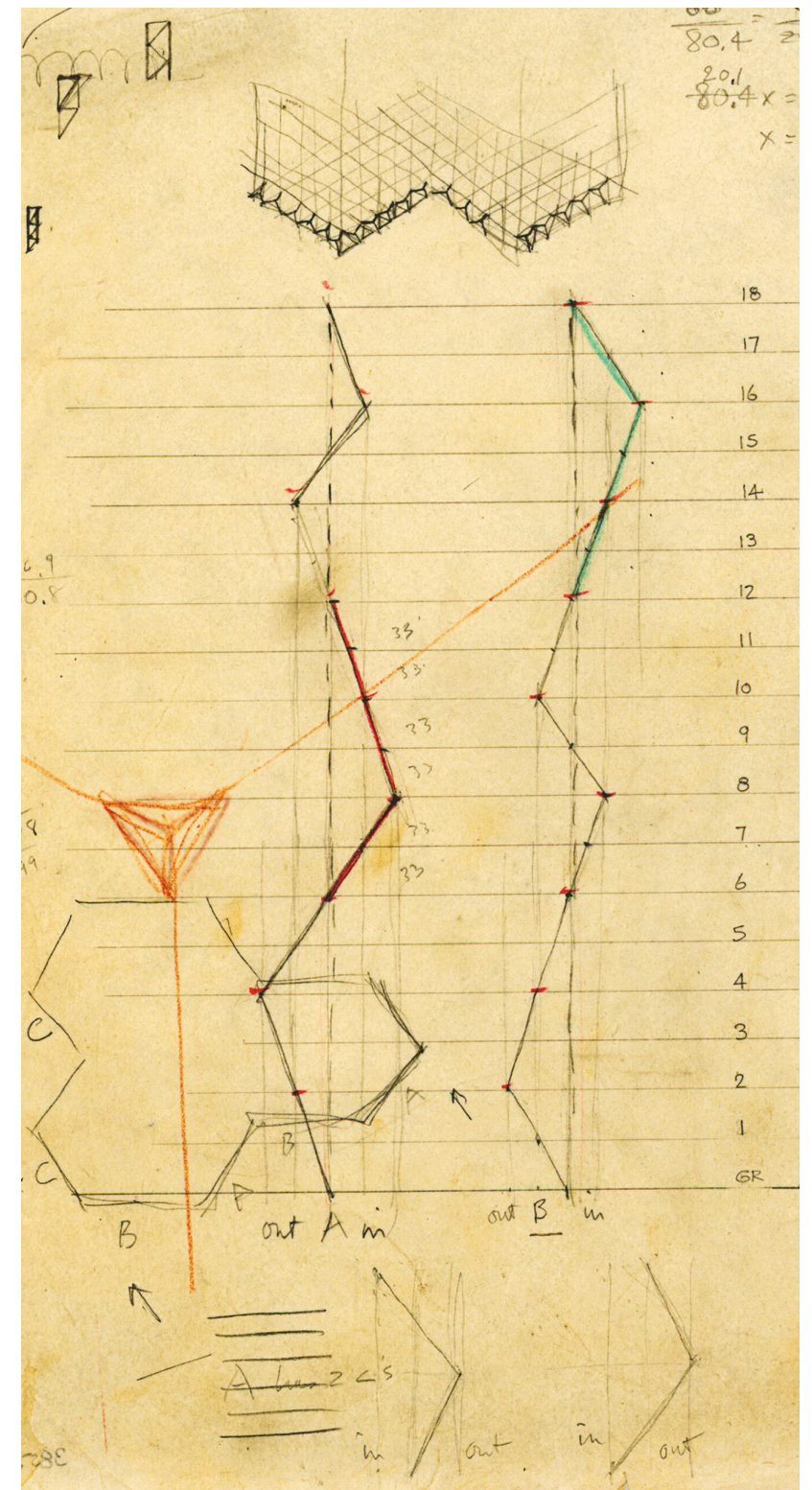


Figure 26: Sectional diagram of the offset algorithm of the tower (Wesley, 2021, p. 459)

the most effective means for comprehending the tower's overall three - dimensionality" (Wesley, 2021, p. 453) – see figure 22. Tyng had once more expressed the difficulty to use orthographic drawings, as the contractor of her parent's house was unable to frame the structure using the construction drawings (Wesley, 2021, p. 453). This was not because the drawings were not well made, nor because of the constructor's lack of skills, but rather because of the difficulty to depict the three dimensionality of triangular geometry in a drawing. Thus, in the mid 1950's the most suitable representational technique for Anne Tyng's formal ideas was the physical model.

The juxtaposition of the sketch drawing to the physical models showcases that the two different ways of representation are meant to translate different qualities. The geometric language of the proposed tower is not that visible in the perspective sketch which aims to transfuse the atmospheric qualities of the proposal. In contrast, the physical models translate the more realistic and structural attributes of the City Tower. Connecting the 1953 perspective drawing and the two models with some of the comments the two architects made on the project, it seems that the sketch illustrates the capacity of the tower to be inhabited by the humans (Juárez, 2000, p. 73), whereas the model communicates the capacity of the structure to host the mechanical equipment and the utility space (Juárez Chicote, 2000, p. 74). If we assume that the perspective drawing was done by Kahn and the model by Anne Tyng, there is a paradox, as Kahn was more interested in the materials, technology and the mechanical equipment, whereas Tyng in the inhabitation of the space by people. No matter who put the 'final touch', it seems that both architects worked together complementing each other ideas and that the final product belongs to both of them.

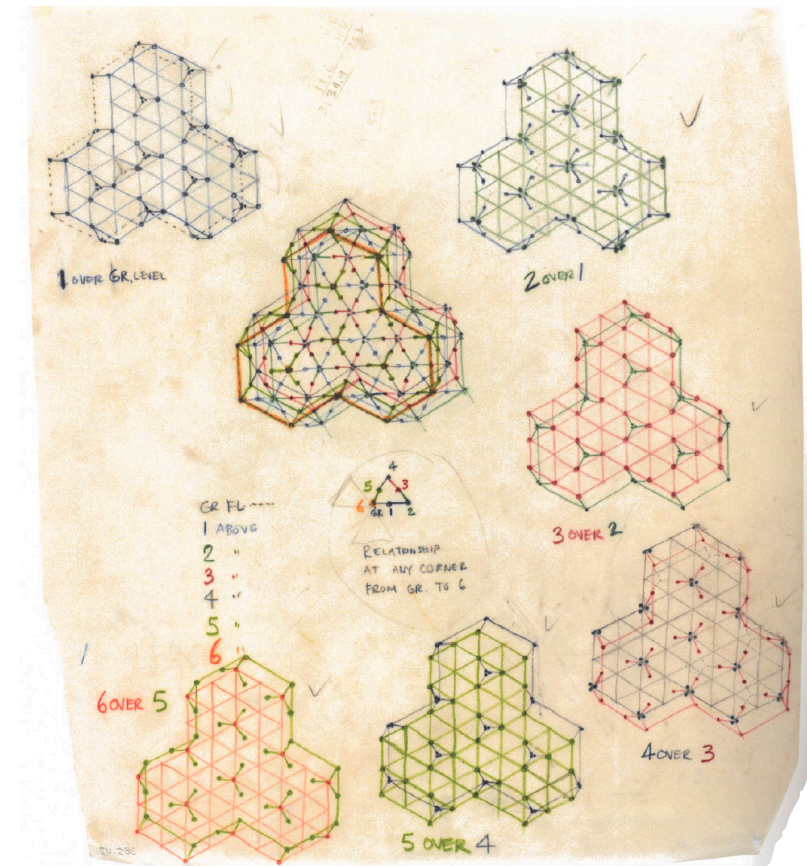


Figure 27: Plan diagram, pencil and colored pencil on vellum by Anne Tyng (Tyng et al., 2011, 60)

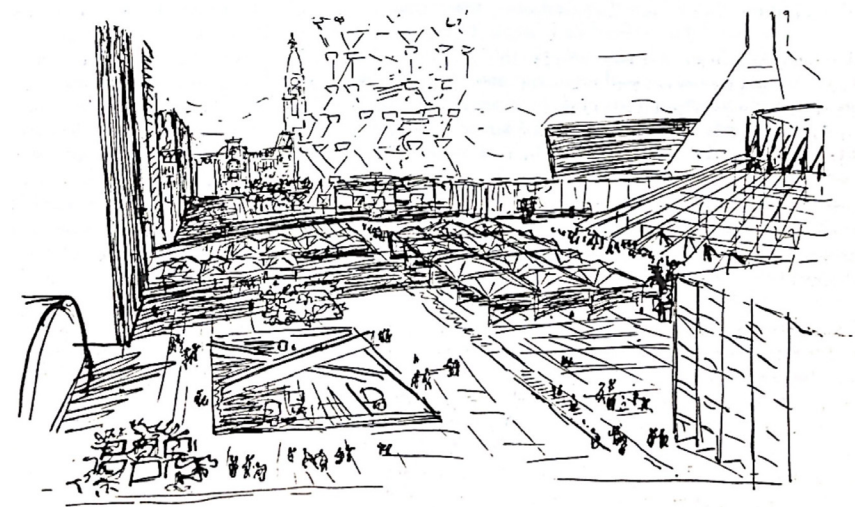


Figure 28: Market Streets East Studies. Bird's eye perspective of Civic Center by L. Kahn, looking west, ca. 1957. (Brownlee & De Long, 1991, p. 307)

VI. Final Thoughts

This thesis focused on the analysis of the representational methods that were used for the proposal of the Philadelphia City Tower, an idea for an innovative high - rise building that would be seen as a landmark for the city of Philadelphia. This City Tower grew out mostly of geometry, the driving force of Anne Tyng's architectural design, a pioneer woman architect who fought to stand out in the architectural men's world¹⁹. Over the course of the years, the different versions that Anne Tyng and Louis Kahn designed encompassed ideas on geometry, materiality, growth and monumentality. Regardless of the fact that it was never built, what remains as a legacy are the drawings, sketches and photographs of physical models.

Departing from the most published perspective drawing, the 1960 MoMA perspective sketch, the description and analysis of the drawing and the comparison with the photographs of the 1953 and 1957 physical models available, showcase that for specific architectural qualities there are more 'suitable' ways of representation. The selection of different means of architectural representation is associated with the specific intention of the designer, depending on the audience addressed: colleagues (engineer or architect), constructors, prospective customers, or the general public. As in the case of the City Tower, the physical models seem to portray the geometry in a way that is more comprehensible than the abstract mathematical drawings, while the perspective drawing targets to facilitate the viewer to perceive the atmosphere of the City Tower and its architectural surroundings; research and experienced architects suggest that we first 'feel' the atmosphere of space before our brain focuses on details²⁰.

¹⁹ In the eyes of the world of that period, the work of women could often be seen just through the work of men; however the way Anne Tyng approached geometry through her designs are clear through the physical models and drawings made for the project. Anne Tyng, as a figure, challenged the status quo and openly reflected and wrote on the role of women as 'muses' for sparking men's creativity: "the role of muse to a great man can be just as inflated as the role of hero" (Tyng, 1989, p. 183).

²⁰ Peter Zumthor, addressing prospective architects emphasized that "'atmospheres' is the guiding force in your architectural practice" (Havik, Teerds, & Tielens, 2013, p. 5) and Juhani Pallasmaa, who has extensively studied the theory behind atmospheres, said that our perception is holistic: "we grasp the atmosphere before we identify its details or understand it intellectually" (Pallasmaa, 2014, p. 232).

As a final thought, we may say that in that period of mid 1950's -still relevant today- the use of various types of representation such as perspective drawings sketches and models meant to offer a holistic image of a project that is open to interpretation. This is also the beauty of architectural representation: an analysis of the various means through which a project is presented may become a point of discovery for new qualities.

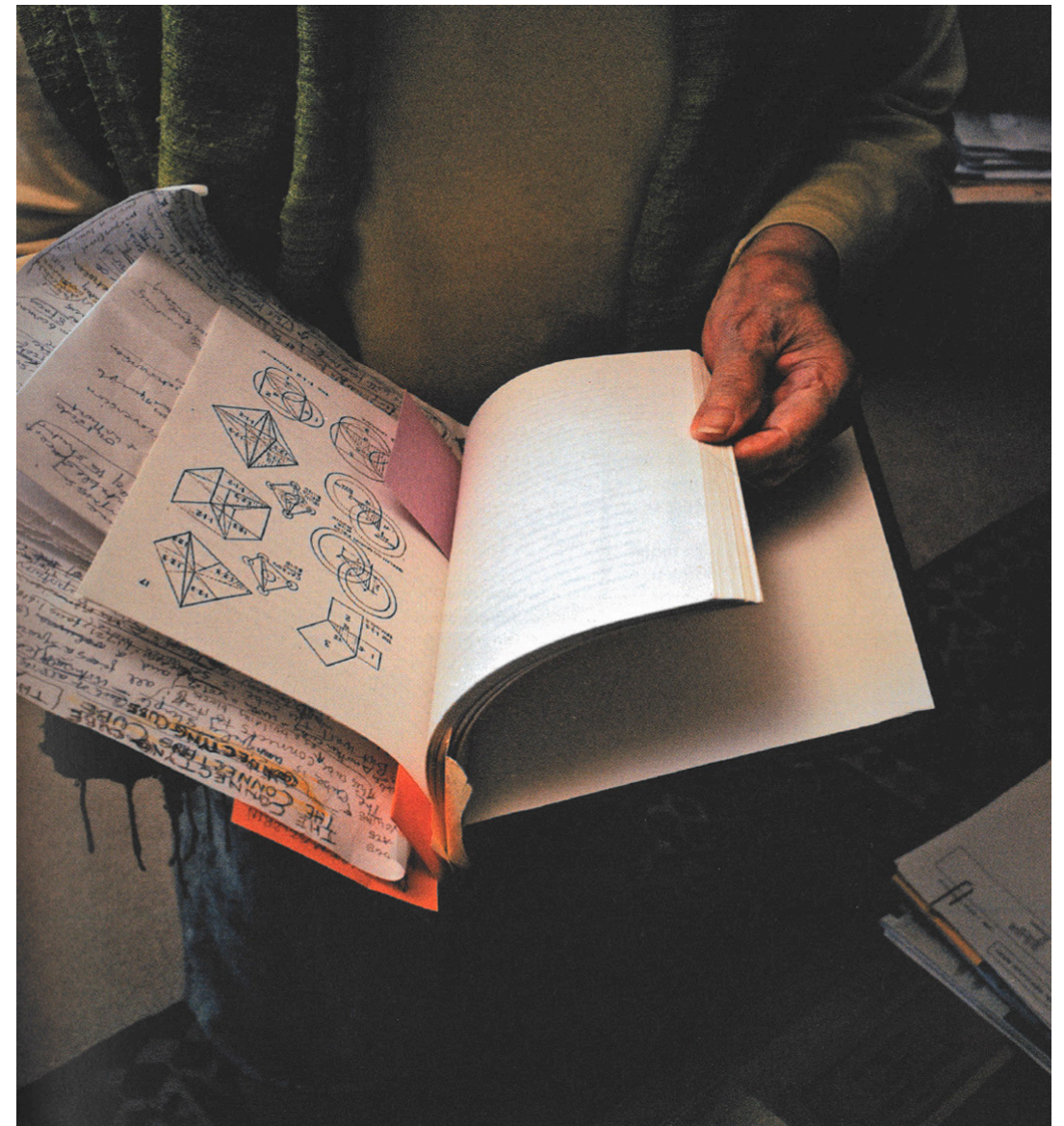


Figure 29: Anne Tyng holding her sketchbooks (Weiss, 2011, p. 101)

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her drawing

'The City Tower' project by Anne Tyng and Louis Kahn.

From 1952 to 1957 Anne Tyng and Louis Kahn collaborated on the proposal of the Philadelphia City Tower, an idea for an innovative high-rise building that would be seen as a landmark for the city of Philadelphia, USA. Even though initially Anne Tyng did not get credit for her work, her contribution to the proposal is apparent; the City Tower design encompasses Anne Tyng's approach in architecture, heavily based on geometrical and mathematical notions. Yet, the stylistic approach of the sketch, the free hand strokes and the different line weights contrast the concrete science behind geometry and the overall approach Anne Tyng had towards drawings.

Who was really the creator of this drawing?

And, more importantly, how do the representation tools used by the two architects translate their architectural ideas?

Architectural representation is a crucial aspect of the architectural practice; the choice of the medium and the tools plays a catalytic role as to how a project is perceived. Through the analysis and comparison of the drawings, sketches and physical models of the Philadelphia City Tower, this thesis attempts to highlight how the philosophy and interest of each architect is translated through the various architectural tools of representation.