UNIVERSITAT POLITÈCNICA DE CATALUNYA BARCELONATECH

Obra seminal de Anne Griswold Tyng (1951-1953) y su relación con Louis Isadore Kahn. La búsqueda por integrar espacio y estructura a partir de la geometría de la materia.

Vol. III: Apéndices y Anexos

Juan Manuel Villa Carrero

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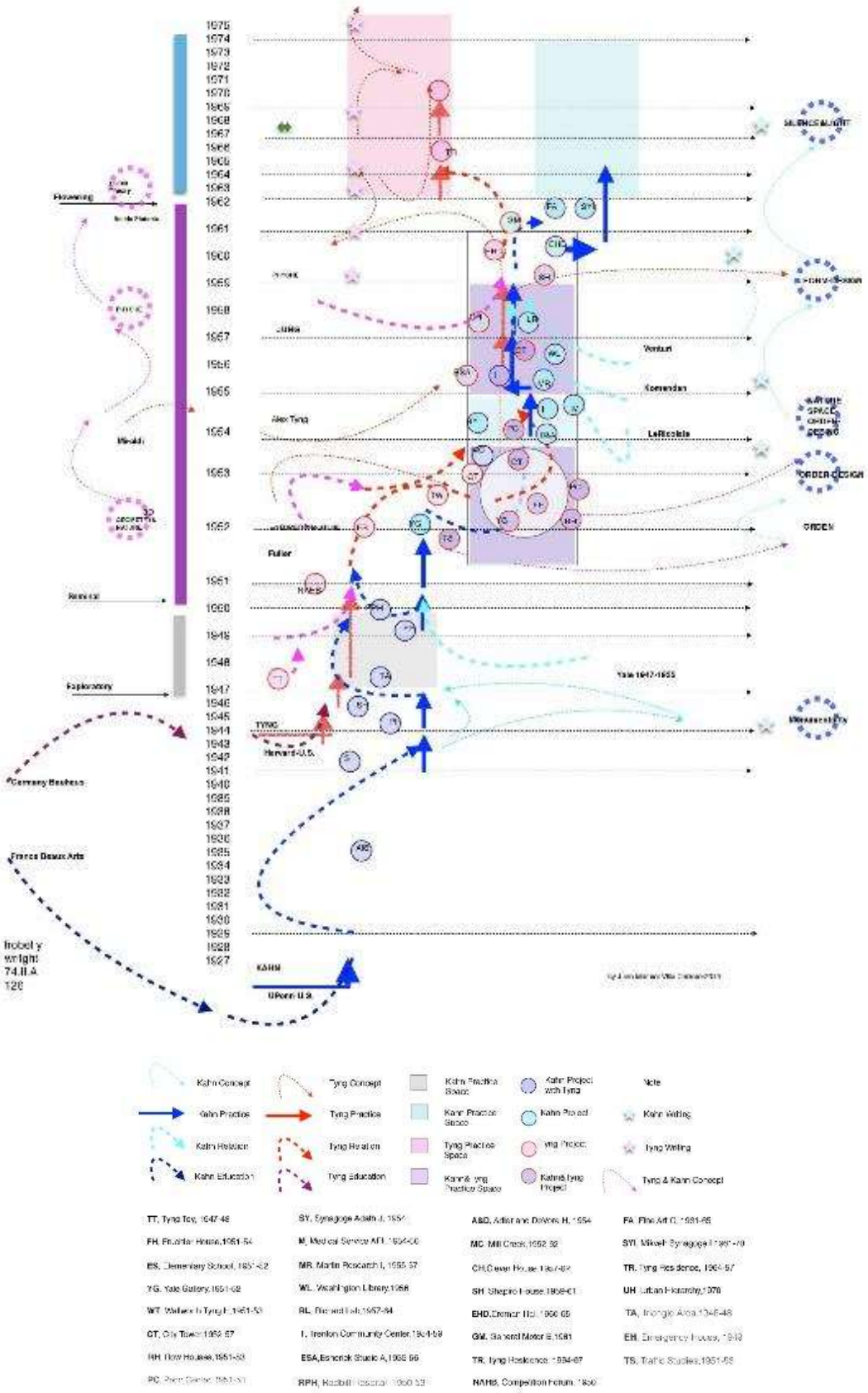
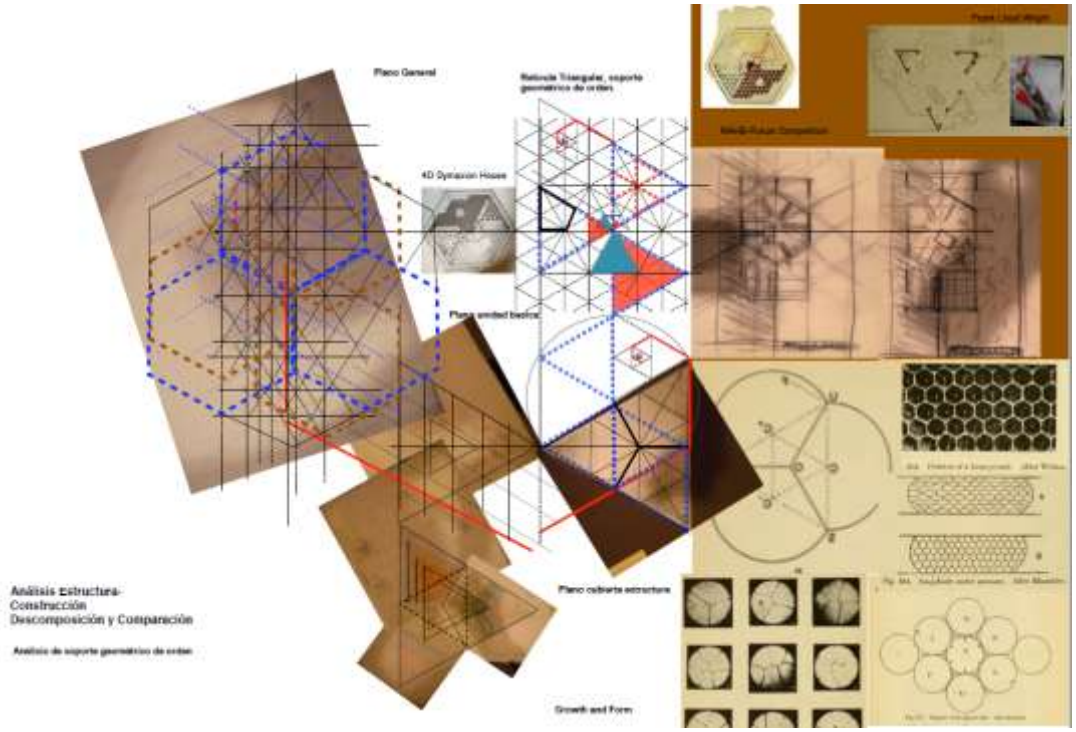


Apéndice A. Esquema de la estructura teórica y práctica entre Kahn y Tyng (1935-1975). Realizada por el autor en 2015 durante una *visiting scholar* en Upenn.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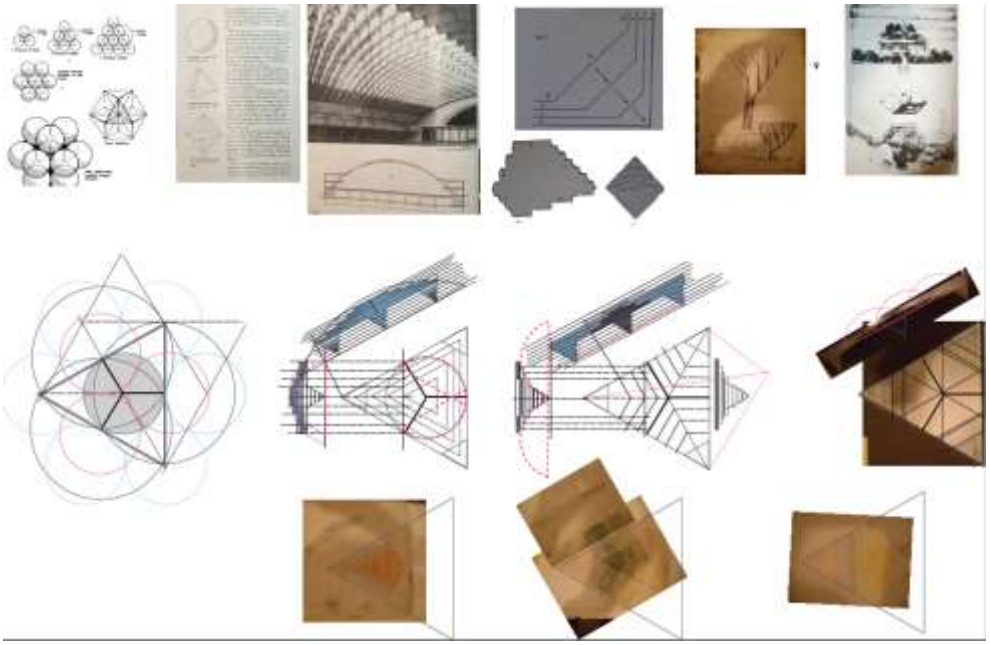
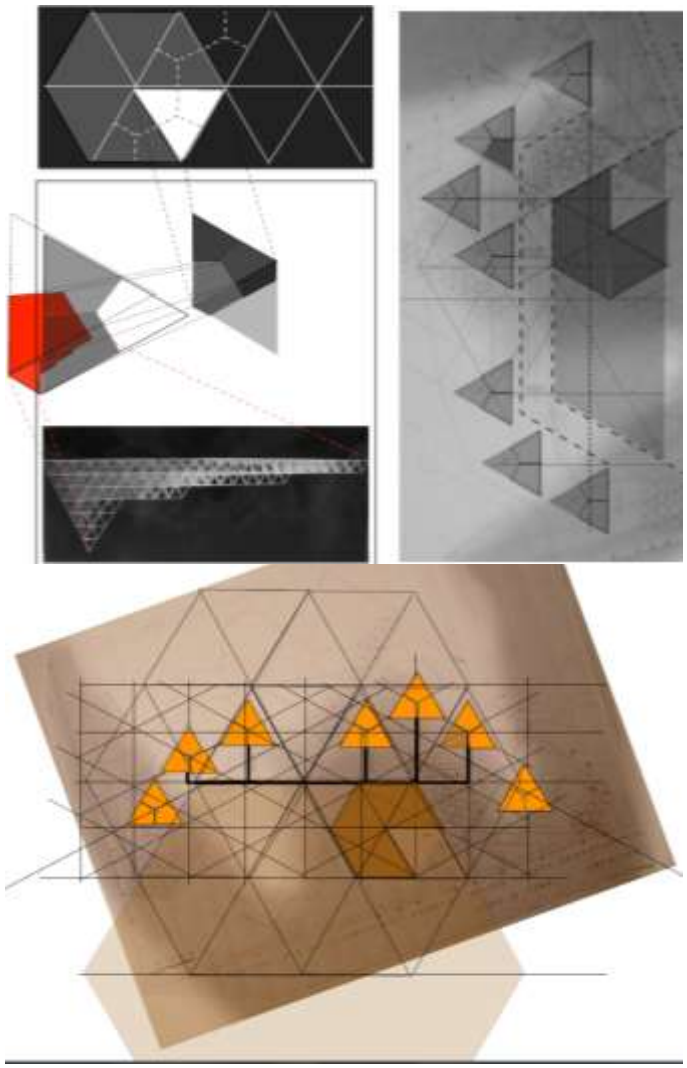
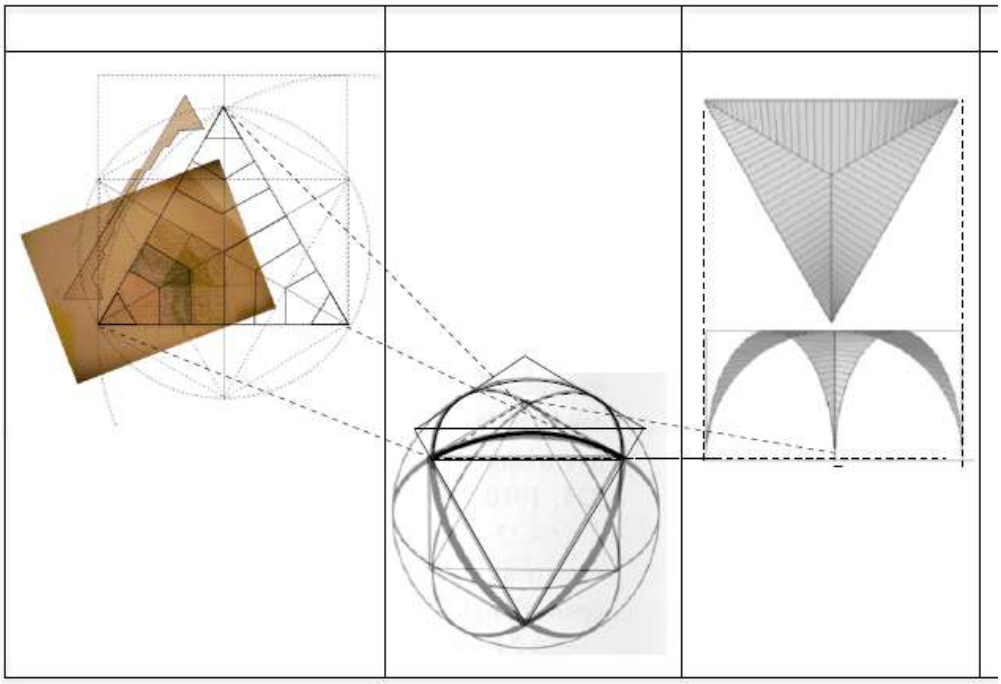
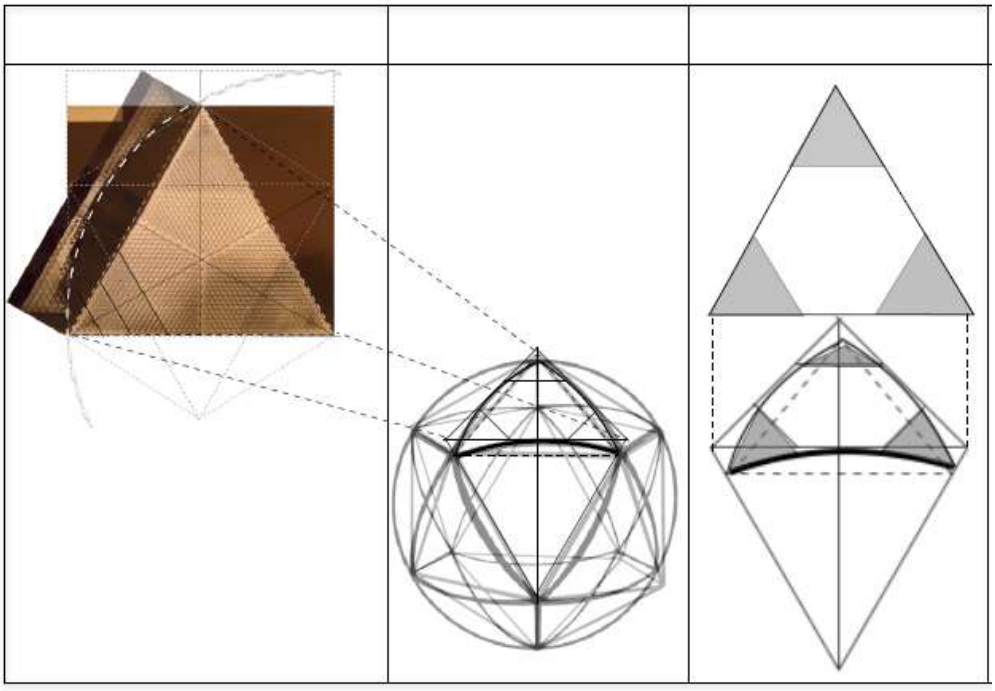
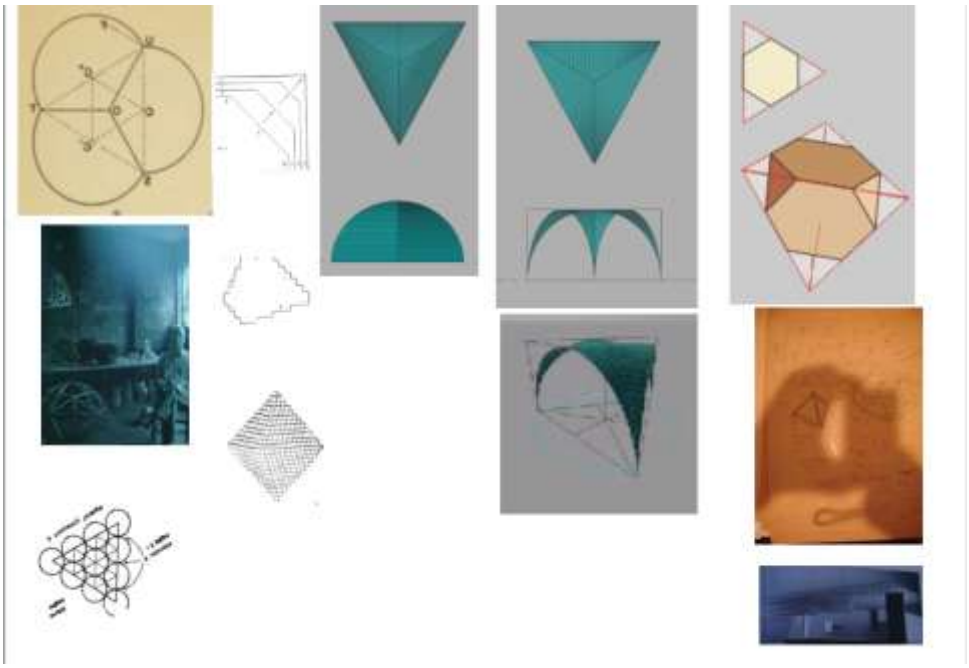
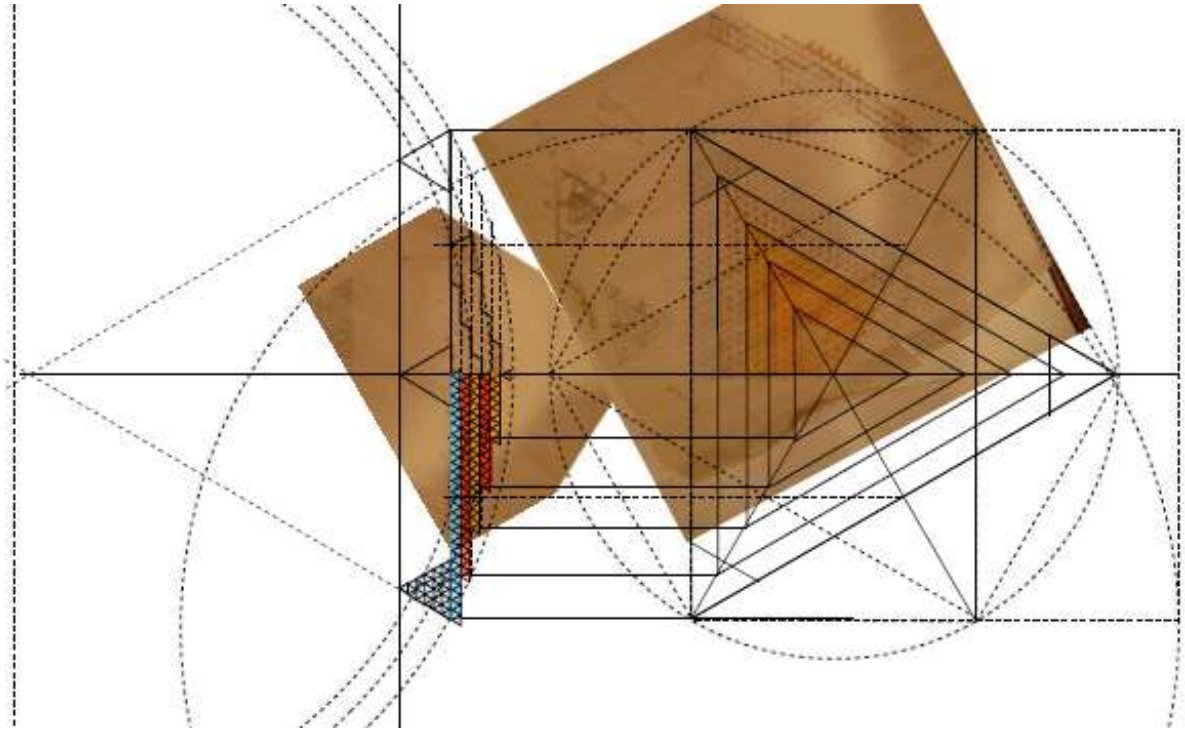


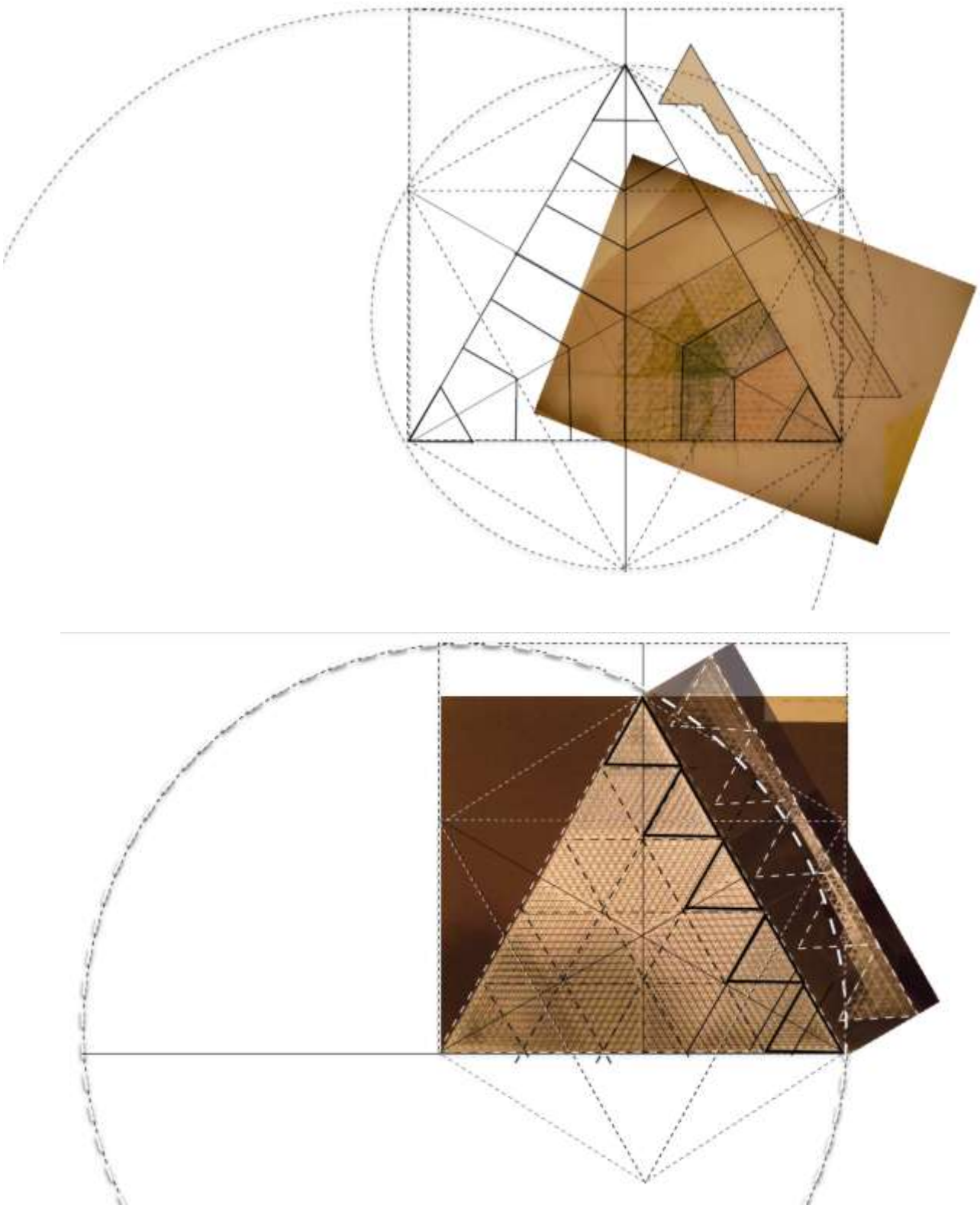












Apéndice B. Estudio de relacion de imágenes vinculadas con la Escuela elemental.

Seminal Works by Anne G. Tyng, and Louis I. Kahn 1951-1953

The Search for Integrating Space and Structure, to From the Geometry of Nature

"The spirit of the starts is the most marvelous moment at any time for anything. Because in the start lies the seed for all things that must follow. A things is unable to start unless it can contain all that ever can come from it." 1

Louis I. Kahn.

"At this moment in evolution, living man knows that he has evolved from forms that are not –living-, and he has within his rearch the possibility of giving life to inanimate forms. He can give life to forms which through his own creative are extensions of himself." 2

Anne G. Tyng.

The current rise of reconnections between architecture and generative models of the nature are part of a larger story. This has sparked interest in figures of architects, engineers and theorists who for more than a century have sought the self-generation. Many of them have remained hidden behind the great stories avoiding its visualization and causing a partial view of the problem. One of these cases is Anne G. Tyng (Fig 1), whose interest in the principles of generation or formation emerged in the fifties in a relationship close to the practice of Louis I. Kahn, one of the most significant architecture of the twentieth century. However today we do not know the true scope of this relationship and experimentation close to nature. This therefore is still an undiscovered territory, therefore justified enter it and decode it. This will contribute to the construction of a new critical path for architecture. Thus, within the framework of these contrasts we think that is necessary to study: The first explorations initiated with three-dimensional models by Anne G. Tyng (Fig 2). These explorations we believe contain the fundamentals of their practice and the key to decode his quest to integrate structure and space from principles formation implicit in nature. In other words, at the beginning of Anne G. Tyng we find the essence that allows us to understand what came later. In summary, our purpose is to delineate the following key premises on which we rely to prove our thesis. These premises are structured into four chapters: first the context, second, concepts, third, the seminal works of Tyng and finally their interaction with Kahn.

The beginning of Anne G. Tyng inhabits the seed that defines his work, this seed also preform everything that comes from it.

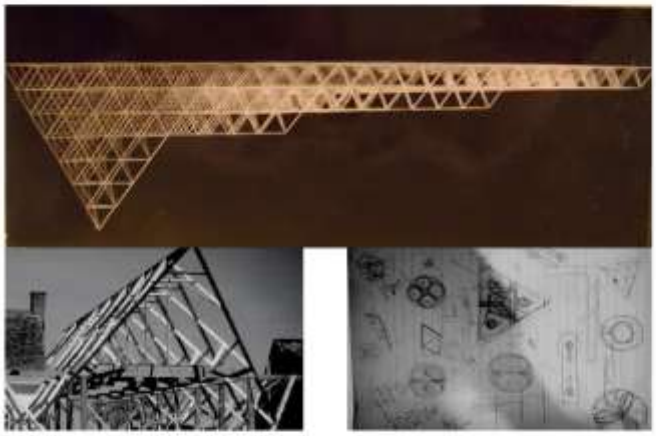


Figure. 2

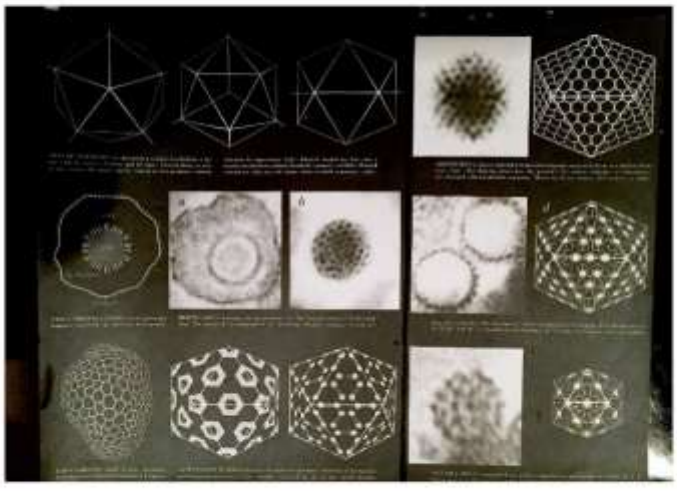
First is important to understand the context, in other words the gear of production the seminal work of Tyng. This will allow sharing and linking elements or separate individual parts, both in time and space. This strategy attempts to find the direct and indirect relationships of their cultural imaginary, and its manufacturing real world to try to explain them. In this way is possible to see the use and the appropriation, that makes Tyng of these imaginaries. For example, this is the case of a world given by the science and technology, which caused, the mid-twentieth century a space between nature and technic. This world is perceptible, from the

geometry of the underlying structures in seminal works and texts by Tyng. For instance, in which, Tyng extrapolate concepts of crystallography, psychology, chemistry, physics or biology (Fig.3). On the other hand, this strategy also serves to observe its connection with the architectural theories of the nineteenth and early twentieth century between Europe and the United States through an American educational system from French and Germanic connections, linked to nature (Fig.4). It's more, these connections also allow equally appreciate the link Tyng with traffic of ideas between the academic world and the professional world, between curricula and key figures. Starting with the figure of Louis I. Kahn who was linked to University of Yale and University of Pennsylvania, while working in his office Tyng. Continuing with figures such as Walter Gropius, Marcel Breuer at Harvard, where Tyng was formed as architect. Similarly, in this traffic of ideas, are the work experiences of Tyng in New York. For example, experience with Konrad Waschsmann as well as their pedagogical experiences Beaver College and the Philadelphia Museum of Art Children's Art Classes , where Tyng come in contact with the progeressive education.[3] Finally, the traffic of ideas prompted to Tyng to a turning point in her doing, especially focused on the ideas of Richard Buckminster Fuller (Fig.5) and somehow also in the work of engineers Pier Luigi Nervi and Robert Le Ricolais, who were a professional reference to her.

Second is crucial, that we rely on the concepts that shape the seminal works of Tyng. And so, understand the components of these works, the creative mechanism that gives them life and their multiple origins. For example, the concepts of unity, of growth and of form, strongly tied to principles and generative models in nature. However, these studies lack theoretical background developed at the time of manufacture. This forces us to use little-studied guidelines to address their development. These guides found mostly in the writings by Tyng a posteriori, in the theoretical sources of these writings, his practice and documents consulted. An example of these guides, are texts like: Anatomy of Form/ Atom to Urban, Urban Space Systems as Living Form, Geometric

"He can give life to forms which through his own creative are extensions of himself."

Anne G Tyng



that even that transgressed the physical object itself of these projects, and helped build some of the most important concepts of the work of Kahn. As was the case of concepts like: "Order" and "Form" or the concept of "Room".

In conclusion, at the beginning of Anne G. Tyng inhabits the seed that defines his work, this seed also preform everything that comes from it. Which contains the implicit generative principles in spatial structures in nature used by Tyng, in the early fifties, to give life to the forms that through their own creativity were extensions of herself. These explorations challenge greater stories, like that of Louis I. Kahn and also is part of a

These explorations challenge greater stories, like that of Louis I. Kahn.

broader history of architecture interested in generative models of nature, which currently affect contemporary logic design. Consequently, reveal this story contributes to building a critical path new to the architecture and to understand better how man comes into contact with the ideas and how materializes, issue that has been inherent in the practice of architecture at all times.

Endnotes

1 Kahn, L. I. (2003). *Louis I. Kahn Essential Text*. (R. Twombly, Ed.) New York-London: W.W. Norton & Company. P. 37

2 Tyng, A. G. (1968). Urban Space Systems as Living Form: Parts I. *Architecture, Journal of Royal Architects' Institute of Canada , 45* (11), 45-54. P. 45

3 Mertins, D. (2004). Biosconstructivism. In I.. Spuybroek, & I.. Spuybroek (Ed.), *NOX Machining Architecture* (pp. 360-369). London: Thames & Hudson. P. 360

4 Progressive Education is a pedagogical movement that began in the late nineteenth century, which have emphasis on learning by doing – hands-on projects, expeditionary learning, experiential learning.

5 Tyng, A. G. (1962-1965). *Anatomy of Form:Atom to Urban (Investigación no publicada)*. Chicago: Graham Foundation.

6 Gámiz, A. (2003). *Ideas sobre análisis, dibujo y arquitectura*. Sevilla: Secretariado de publicaciones Universidad de Sevilla.

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Figure. 2

Apéndice C. Presentación temática de tesis Visiting Scholar School of Design of University of Pennsylvania, Philadelphia P. A . US, (2015)

1° Encuentro de Morfología Metropolitano
Buenos Aires, 2018

LA ACCIÓN DE DAR FORMA A LA CITY HALL TOWER, L. I. KAHN Y A. G. TYNG, 1952-1953, EN BUSCA DE LA ESTRUCTURA DEL MAÑANA.

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***Resumen**: Este artículo estudió la transformación sufrida por la City Hall Tower de A. G. Tyng y L. I. Kahn, entre 1952 y 1953, con relación a la publicación de febrero de 1953 de la revista Architectural Forum, Is This Tomorrow's Structure?. La cual, analizo el fondo y las implicaciones del diseño tridimensional, en particular en los marcos espaciales. Es decir, este artículo abrió un espacio de experimentación historiográfico, en el cual, las especificidades pueden deconstruir los casos globales, en este caso en relación con L. I. Kahn y A. G. Tyng. Y, en particular, este estudió reveló las transformaciones de la City Hall Tower, tanto en su método de representación, como en su lógica estructural.*

*Este artículo se deriva del estudio producidos de caso de la City Hall Tower, de Louis I. Kahn y Anne G. Tyng realizado en el marco de la tesis doctoral en desarrollo: **"La obra seminal de Anne G. Tyng, y Louis I. Kahn"**. Universidad Politécnica de Cataluña, España tesis doctoral en curso iniciada en el año 2013*

1. INTRODUCCIÓN

En febrero de 1953, la revista Architectural Forum, publicó a manera de simposio un análisis sobre el fondo y las implicaciones del diseño tridimensional, en particular en los marcos espaciales. Este hecho ocurría mientras, A. G. Tyng y L. I. Kahn estaban aún en su proceso de formación de la City Hall Tower, en busca de la tan anhelada estructura del mañana.

En particular, este simposio presentó las experiencias y opiniones del ingeniero estructural Feliz J. Samuely, y una apreciación de otros expertos ingenieros y arquitectos, sobre la tendencia hacia las estructuras marco-espaciales en Norte America. Las cuales, según la revista, presagiaban una revolución en la arquitectura.

La revista Architectural Forum, a la cual, estaba suscrita A. G. Tyng, era editada por Douglas Putnam Haskell, interesado en las estructuras de marcos espaciales, y cercano a L. I. Kahn. *(Williams, 1996)* Igualmente, en la selección de expertos hecha por la revista para esta publicación, destacaban figuras relacionadas con A. G. Tyng y L. I. Kahn, como por ejemplo: R. B. Fuller, Robert Le Ricolai, Konrad Wachsman y Walter Gropius.

De lo anterior se infiere que, existió una relación entre el debate de la revista y el proceso de diseño de la City Hall Tower. Máxime, en momentos en que A. G. Tyng hacia un segundo intento para resolver muchas dificultades de su primera versión. Y, ella urgía por algunas luces que le permitieran encontrar otros caminos,

Más aún, Kahn, más o menos un año después escribía a A. G. Tyng reconociendo la importancia del pensamiento de F. J. Samuely sobre él y A. G. Tyng. Además, Kahn agregaba que F.J. Samuely era un maravilloso ingeniero, era más práctico, y más visible sus propuestas como productos, digno de compartir un lugar junto a R.B.Fuller, R. Le Ricolai, y P. L. Nervi. *(Tyng, 1997)*

Para mostrar mejor este punto, el siguiente texto confronta las dos versiones de la City Hall Tower, la de 1952 **Fig.1** y la de 1953 **Fig.2**, con las declaraciones de los expertos en el simposio en mención. Para así, desvelar los aportes que hizo este simposio a la segunda versión de la City Hall Tower, y al final a la ultima y definitiva versión de la City Hall Tower de 1957.

En particular, los panelistas consideraron dos puntos fundamentales para afrontar el reto de las estructuras marco espaciales, primero, el cambio de paradigma proyectual bidimensional por el tridimensional, y segundo el cambio conceptual de las lógicas estructurales tradicionales, por nuevas concepciones tridimensionales.

Estas consideraciones, fueron confrontadas con las procesos de ideación de las dos versiones de la etapa formativa para entender los derivaciones de este simposio sobre la segunda versión de la City Hall Tower. Así como, para desvelar los artificios surgidos de este cambio de paradigma proyectual y estructural, en el proyecto en mención por ejemplo el concepto de crecimiento.

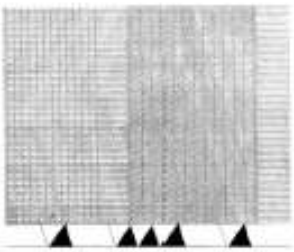


Figura 1. City Hall Tower 1952, fachada y planta, fuente: Tyng Collection , AAUP.

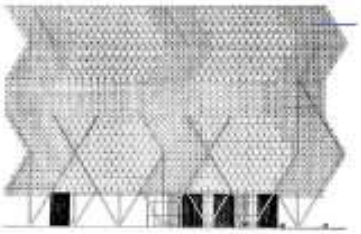
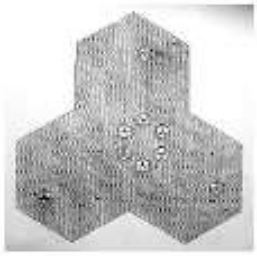


Figura 2. City Hall Tower 1953, fachada y planta, fuente: Tyng Collection , AAUP.



2. CAMBIO DE PARADIGMA PROYECTUAL

2.1 Del plano al espacio

Para empezar, por ejemplo, Felix J. Samuely principiando su artículo "Space Frame Defined" exponía que: "Para que nuestros edificios se puedan colocar fácilmente en el tablero de dibujo, cada parte estructural junto con su carga es usualmente considerado en un plano." *(Samuely, 1953)* Tal cual como, A. G. Tyng planteó su primera versión de la City Hall Tower.

Sin embargo, F. J. Samuely, afirmaba que este hecho restringe necesariamente la concepción tridimensional tanto a arquitectos como a ingenieros. Y además F.J. Samuely decía que, "La construcción espacial no puede ser concebida en un plano; estos espacios tienen que ser mostrados en su totalidad ya sea en varios planos o en isometrías." *(Samuely, 1953)* Así como, Tyng, hizo en su segunda versión de la City Hall Tower.

Igualmente, W. Gropius profesor de A. G. Tyng, cuando, ella estudiaba en Harvard University, coincidía con F. J. Samuely, y comentaba que efectivamente: "La formación actual del arquitecto […] ha dado como resultado "la arquitectura del tablero de dibujo" desarrollado en la llanura de la planta y la fachada." *(Gropius, 1953)*

su concepción estructural, ocasionado por las restricciones de su enfoque tridimensional.

Aún más, cuando, la anterior descripción de L. I. Kahn es comparada con su descripción de la segunda versión, las limitaciones en la concepción de la lógica estructural tridimensional de la primera versión se hace más evidente. Y al mismo tiempo, la claridad conceptual de la segunda versión es innegable.

Por ejemplo, L. I. Kahn decía sobre la segunda versión: La City Hall Tower: "Es una exploración de las formas resultantes de extender un sistema marco espacial triangular en una dirección vertical." *(Kahn, 1953)* **Fig.6**

Así que, esta segunda versión, esta vez, no pretende dar más forma a marcos triangulares a modo de columnas, como la versión más temprana, ni a ningún otro elemento ajeno a su lógica estructural. Esta segunda versión solo deja fluir libremente la geometría en toda su extensión.

Por tanto, continua L. I. Kahn describiendo la segunda versión de la City Hall Tower, y dice: "Los planos de la planta no están directamente uno sobre el otro, [estos] cambian en una relación triangular entre sí como resultado de la geometría de la estructura." *(Kahn, 1953)* Con esto Kahn quiere decir que, el edificio ya no es más el resultado de una prolongación bidimensional o extrusión, ahora el edificio es el resultado del despliegue de una lógica tridimensional del espacio.

Por tanto, A. G. Tyng dice que, comenzó durante este período de formación de la City Hall Tower a buscar en el rigor de una geometría tridimensional. Por ejemplo, Tyng se preguntaba en ese momento: "¿cómo se une la geometría, su tendencia genética [disposición natural] y cómo y dónde esa tendencia puede conducir a variaciones?." *(Tyng, 1997)*

Precisamente, F. J. Samuely en su artículo para el simposio definió, como se une o como era la disposición natural de la geometría de los marcos espaciales a través de lo que él denomino viga estrella. **Fig.8** Esto es, la conexión tridimensional de mínimo tres lados apoyados en sus extremos. Por ejemplo, "las cúpulas del gótico [las cuales decía F. J. Samuely] eran realmente construcciones tridimensionales." *(Samuely, 1953)*

Al respecto, R.B. Fuller replicó: "La viga estrella de Samuely demuestra la unidad estructural básica de [mi] "Energetic Geometric" porque el tetraedro (pirámide de tres lados) encierra el menor espacio con la mayor superficie y es la forma más rígida contra presiones externas." *(Fuller, 1953)* **Fig.9**

Conviene subrayar que, la investigación que menciona R. B. Fuller, seguida por A. G. Tyng tiempo atrás "Energetic Geometric", puede ser vistas como un ambicioso intento de R. B. Fuller para trasladar fenómenos a partir del mundo de los cuerpos sólidos y fuerzas estáticas dentro de fenómenos en un regenerativo patrón y dinámicas energéticas. *(Fuller R. B., 1999)*

Es decir, A. G. Tyng motivada por su interés por entender la disposición natural de la geometría, buscaba " el orden (el cual, según L. I. Kahn) es la unión a partir de la cual el diseño puede trabajar, [...]", para lo cual, esta vez A. G. Tyng generó herramientas tridimensionales como insistentemente recomendaron los participantes en el simposio de la revista Architectural Forum.

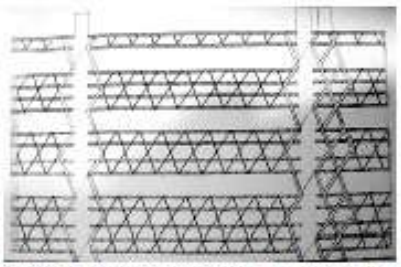


Figura 3. Sección estructura de una variante City Hall Tower 1952, la cual muestra las logica estructural de la versión mas temprana.
Fuente, Kahn Collection, AAUP.

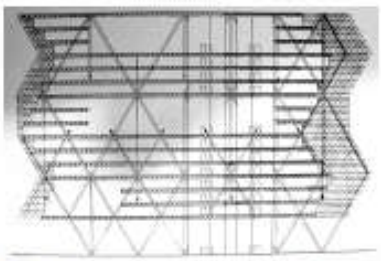


Figura 6. Sección estructura City Hall Tower 1953. Fuente, Kahn Collection, AAUP.

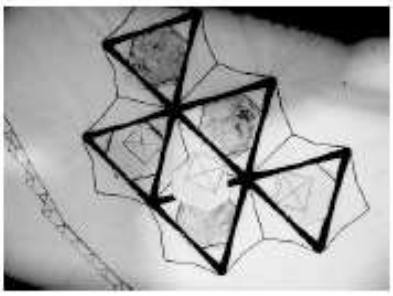


Figura 4. Detalle soporte tetra octaédrico de la City Hall Tower 1952. Fuente, Kahn Collection, AAUP.

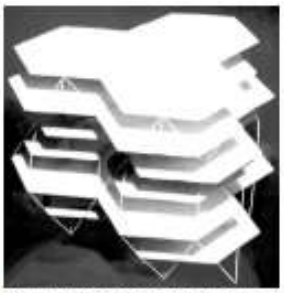


Figura 7. Modelo City Hall Tower 1953, Fuente, Kahn Collection, AAUP.

Figura 5. Recortes de patrones de los vacios para ascensores y escaleras de la City Hall Tower 1952. Fuente, Kahn Collection, AAUP.

Figura 8 y 9 . Viga en estrella de F. J. Samuely, modelos de la investigación "Energetic Geometric" de R. B. Fuller. Fuente Architectural Forum y Fuller Collection.

3.2 Modelo

Así pues, ya este modelo, permitió visualizar a A. G. Tyng un potencial de formas solo posibles de descubrir a través de medios tridimensionales. De hecho, años más tarde, de haber terminado la City Hall Tower, A. G. Tyng aseguraba que: "La creación de espacio mediante modelos amplía el proceso de diseño de dibujos bidimensionales a otro nivel de invención de formas potenciales." *(Tyng, 1978)*

Así pues, este modelo, una grilla de tetraedros, actuó como una matriz tridimensional que preformo todo aquello que broto de él, y paralelamente, permitió a A. G. Tyng descubrir formas inesperadas pero previsibles. Es decir, el proceso de hacer modelos o diseñar en tres dimensiones, dice A. G. Tyng:

"[…] es una forma de descubrir un concepto en otro nivel de diseño, explorando un nuevo conjunto de variables en tres dimensiones que simplemente no existen en dibujos de dos dimensiones, o en el ojo de las mentes." *(Tyng, 1978)*

Así pues, el modelo de representación tridimensional en madera realizado por A. G. Tyng desvelo las relaciones espaciales complejas propias de una estructura marco espacial. **Fig.** 7 Las cuales, difieren en gran medida de las relaciones de las estructuras tradicionalmente octogonales.

Por ejemplo, el simple acto de contener las columnas dentro del volumen de un edificio octogonal, no amerita mayor esfuerzo, porque, una simple extrusión o la repetición bidimensional de la estructura bastarían. Pero, hacer este mismo ejercicio en una estructura marco espacial dentro de una geometría tetra octaédrica, como lo hizo A. G. Tyng, es algo muy distinto.

Así que, A. G. Tyng resuelta a contener las columnas dentro del volumen del edificio de la segunda versión de la City Hall Tower, explica que: "Al desplazar el centro del conjunto de columnas por el plano (dice A. G. Tyng) pude eliminar las condiciones del borde donde solo una o dos de las tres columnas estaba contenidas por el volumen de la torre."*(Latour, 1986)*

Sin embargo, A. G. Tyng más tarde reconocería que esta operación de encastre entre los bordes de los planos hexagonales con la finalización del conjunto de columnas inclinadas en tres direcciones, en este segundo prototipo de la City Hall Tower, no fue coordinada completamente, como si, lo fue en la propuesta final de esta torre en 1957. *(Latour, 1986)*

Para lo cual, ella tuvo que generar otro modelo tridimensional de la City Hall Tower. *(Latour, 1986)* A través de este otro modelo de estudio, A. G. Tyng comprendió que: "cada 66 pies de altura (20m) la unidad estructural (tetra octaédrica de la torre) era idéntica en todos sus aspectos a cualquier otra unidad estructural y los muros de ángulo idéntico de las unidades "predestinaban" su "rotación".[1]

[1] Tyng Collection AAUP. (74 II C. 18)

4. DESENLACE

4.1 Artificio rotacional versión final 1957

En particular, este artificio rotacional, incompleto en el segundo prototipo de la City Hall Tower pero operativo, fue alcanzado completamente, cuando, A. G Tyng, tres años después, visualiza un patrón triangular en la rotación de estas unidades estructurales. El cual , dice A. G. Tyng "[…] sigue un simple triangulo en planta con cada unidad de 66 pies de altura moviéndose horizontalmente a lo largo de la mitad del lado del triángulo." [2]

Por lo cual, cuenta A. G. Tyng que para comprender y explicar mejor la City Hall Tower, ya para su ultima versión en 1957, tuvo que generar: "(…)dibujos exploratorios,(…) superponiendo varios planos en un solo dibujo o superponiendo varias secciones diferentes en un dibujo, en efecto utilizando un tipo de técnica de holograma como un paso intermedio entre dibujar y modelar." *(Tyng, 1978)* **Fig. 10**

En otras palabras, A. G. Tyng representó un modelo de la City Hall Tower en diferentes planos al mismo tiempo, logrando así que se entendiera como una imagen tridimensional, que complemento su modelo en madera. Estos modelos, permitieron a ella dar forma hexagonal a sus niveles y descubrir el inesperado borde helicoidal de su torre.

Esto quiere decir que, el uso de la grilla tetra octaédrica en si, predestinó siempre los movimientos de la City Hall Tower. Por que, el control de las reglas o orden al interior de esta grilla solo dependió de la capacidad de A. G. Tyng para descifrar o comprender la lógica procesual de formación subyacente a esta geometría cercana a la materia, para así, ajustar los problemas de diseño.

Es decir, "La geometría de la torre, a fin de completarse a si misma, "quiso" rotar la planta sobre si misma de nivel a nivel para formar una hélice." *(Tyng, 1978)*

Por tanto, la articulación estructuro espacial tridimensional, conjuntamente con el orden geométrico basado en principios estructurales en la naturaleza y desde luego los ajustes del diseño proporcionaron la forma helicoidal, por la que es hoy conocida la City Hall Tower, versión 1957. **Fig.11**

5. CONCLUSIÓN

En definitiva, la segunda versión de la City Hall Tower en formación viro del plano al espacio, y con ello vislumbro la disposición natural de su geometría estructural, y de esa forma comprendió ese orden de crecimiento vertical que permitió conducir a variaciones y visualizar la estructura del mañana, como presagiaba la revista Architectural Forum.

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[2] Idem

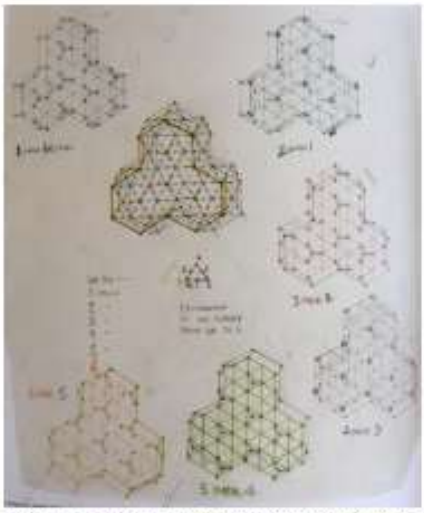

Figura 10. City Hall Tower 1957, dibujo exploratorio. Fuente, Kahn Collection, AAUP.

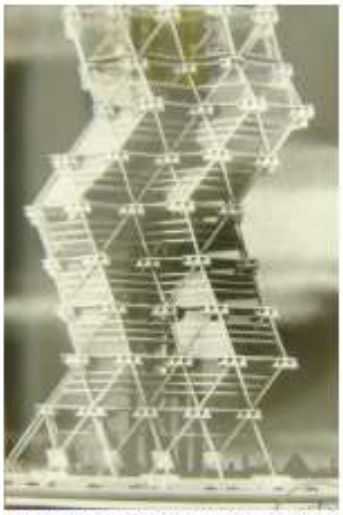

Figura. 11 City Hall Tower 1957, Slide. Fuente, Kahn Collection, AAUP.

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THE GEOMETRY AS A DECODER OF GRAVITY: ANNE G. TYNG'S ELEMENTARY SCHOOL IN BUCKS COUNTY P. A. U. S.

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Abstract. The emergence of complex phenomena in our time has forced creators to connect knowledge with design. In architecture, this situation has provoked an interest in hidden or little-known historical academics who, for years, sought design answers in the interconnection with different dimensions of reality. In particular, we have been interested in how this happens in the architecture of the American northeast, more precisely the derivations of European theories in the mid-twentieth century. Above all, we were interested in the person of Anne Griswold Tyng, —who had a close professional and personal relationship with Louis Isadore Kahn, but specifically, in the way she materialized her seminal work between 1951 and 1953.

In the text, this subject is addressed through her seminal project *Elementary School in Bucks County P. A.*, which makes up the DNA of this architect's work. The project is based on a prefabricated generative system of interconnected parts of tetrahedrons and octahedrons capable of producing a diversity of responses at different scales. Therefore, methodologically, we will penetrate A. G. Tyng's imaginary and real-world of manufacture. An ideology conceived thanks to a search to integrate space and structure. There, geometry acted as an instrument to extract the structural codes underlying matter, what enabled her to defy gravity.

The results of the study indicated that the ideal of progress, along with science and technology in the United States in the mid-twentieth century, fueled a flow of ideas between the professional and educational worlds. This led to a readjustment of the then-dominant reductive and totalizing architectural models. This fact guided Anne G. Tyng towards reflective inter- and transdisciplinary models close to generative systems and complex thinking, which helped this architect in her search to find the structures of tomorrow.

Keywords: Anne G. Tyng, Louis I. Kahn, Geometry, Structure, Seminal Works.

1 INTRODUCTION

"The spirit of the starts is the most marvelous moment at any time for anything. Because in the start lies the seed for all things that must follow. A thing is unable to start unless it can contain all that ever can come from it" [1].

In the early days of Anne G. Tyng's architecture lives the defining seed of her oeuvre. Works such as the *Elementary School in Bucks County, P. A.*, 1951-52, (see Fig. 1) the *Walworth Tyng House*, in Cambridge, Maryland, 1951-1953, or in the early versions of the *City Hall Tower of Philadelphia P. A.*, 1952-53, grew the seed that contains the codes to unscramble her original and subsequent work. Therefore, in the study of her seminal work —between 1951 and 1953— is the key to interpret the norms and rules that make up the theoretical-practical world of A. G. Tyng. These beginnings occurred when she worked in the office of L. I. Kahn; amid the optimism for the future, the mixed cultural dynamics of the U.S. educational system, and the movement of personalities of science and technology between Europe and North America, which nurtured the architecture of the twentieth century.

In the following text, this subject is addressed through her seminal project *Elementary School in Bucks County P. A.*, which makes up the DNA of this architect's work. The project is based on a prefabricated generative system of interconnected parts capable of producing a diversity of responses at different scales. Therefore, methodologically, we will penetrate A. G. Tyng's imaginary and real world of manufacture. An ideology conceived thanks to a search to integrate space and structure. There, geometry acted as an instrument to extract the structural codes underlying matter, what enabled her to defy gravity.

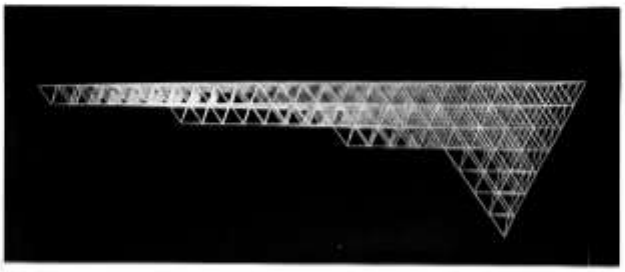

Figure 1: Wooden model for the Structures tetrahedrons and octahedrons for a Classroom Unit, Elementary School, Bucks County P. A., designed by A. G. Tyng 1951-1952. Source: Architectural Archive of University of Pennsylvania-Anne Griswold Tyng Collection. 74. IV.B.14-b

2 CASE STUDY, *ELEMENTARY SCHOOL, BUCKS COUNTY, P. A.*

2.1 The Geometry as a Decoder of Gravity

In the early 1950s, A. G. Tyng's recent interest in the principles of geometric formation led her to an experimental exercise as part of the design of an elementary school in County Bucks, Pennsylvania. This project was finished in 1952, followed by a publication introduced at the Mid-Atlantic States District Regional Conference of the American Institute of Architects, organized by the Philadelphia Chapter of the AIA [2].

The exercise focused its search on the challenge of gravity, abstracting the geometric codes of matter itself. To do this, first A. G. Tyng turned to L. I. Kahn's discourse on monumentality. She —like L. I. Kahn— thought that new architecture should use features whose tectonic authority was undeniable.

In pursuit of this objective, A. G. Tyng also appealed to R. B. Fuller's research on the geodesic dome, [1] product of the development of a vector system called Energetic-Synergetic Geometry, whose basic unit was the tetrahedron. These explorations represented R. B. Fuller's search for the fundamental structures of matter. In particular, it was an approach to close-packed-spheres, which led to basic configurations in space. R. B. Fuller as a functional whole in general terms, identical to platonic solids, conceived these configurations [3] (see Fig. 2).

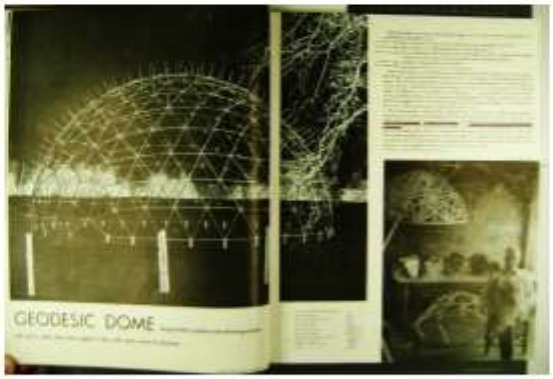

Figure 2: Interior image of the Architectural Forum magazine, August, 1951, part of the article that spreads the research of Buckminster Fuller, in Black Mountain College, 1948.

[1] A. G. Tyng said: "I Heard a lecture by Fuller, and I was very excited about it".

This starting point reveals A. G. Tyng's interest in exploring the order to integrate space and the structure of the elementary school. A. G. Tyng explains this idea as follows:

"The "classroom under a tree" (elementary school) was built up from the archetypal order of "triangle". Space-filling octahedron-tetrahedron geometry formed the canopy of diminishing layers of "branch and leaf" as well as the tapered "branch and trunk" support. Three triangular "trees" joined their branches in a tree classroom triangular unit on a larger scale. On an even larger scale, a "grove" of five triangles of "trees" formed the auditorium-administrative building as an open-sided hexagon" [4].

From this point, we will describe the writing process or geometric coding of this experimental project. In the case of A. G. Tyng, it is a question of considering design as a generative system or the art of unifying parts. In other words, it consists of their relationships as a whole within a synergy, rather than the simple addition of its parts. This means that from now on we will approach the subject of the elementary school from the relations between the two-dimensional simplicity of the triangle and the three-dimensional complexity of the tetraoctahedral geometries.

This creative process was the result of the ideas of A. G. Tyng, involved in a systemic paradigm, encouraged by contemporary prefabrication techniques. A model where the tectonics sets the course through a series of geometric codes, capable of reordering the dynamic forces of a building.

It is necessary to clarify that *The Whole* —represented in the general sketch of the elementary school— (see Fig. 3) took shape when beginning with logic of combinations of the triangle, the smallest and simplest figure or part in which we can divide the two-dimensional space [5]. In turn, this part or triangular cell served as a separate room or spatial unit, as a mass or void, that held a different and similar number of project activities, for example, the triad of classrooms or the vestibule to the administrative area of the school or, on a smaller scale, the classrooms in functional units or by school levels.

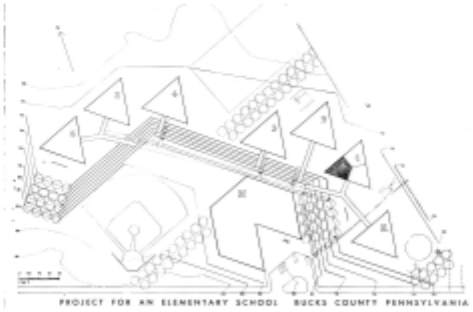

Figure 3: General sketch of the Elementary School, Bucks County P. A. Source: Architectural Archive of University of Pennsylvania-Anne Griswold Tyng Collection. 74. III.14.

Moreover, these connections or combinations provided the terrain design. For example, earthworks in the general sketch divided the area into classrooms and the administrative section of the school, ordering the parts of the project and establishing communication between its parts[2].

Besides, on a smaller scale, the figure of the triangle provided the form of flexible school furniture, which allowed to compose and recompose the spaces, grouping or combining their different parts. This is how A. G. Tyng represented it in the general sketch of the elementary school, achieving so rich and varied results that they resemble the combinations between elements of a language.

Later, A. G. Tyng mentioned the triangle as an alphabet available to the shape maker, that is, capable of generating many combinations, of an easy scalar transition and a great potential for the development of complex shapes within simplicity or vice versa [6].

The structural study we note is the material testimony of the theoretical applications of A. G. Tyng. Added to the seminal nature of the elementary school project, these properties are considered the DNA or the preform[3] of what will come next in the work of A. G. Tyng's architecture.

We can affirm that A. G. Tyng used the "structure for a classroom unit" as a cornerstone in the construction of the three-dimensional space of her school. Similarly, this system was based on a triangular logic, materialized in a minimal structure, consisting of the octahedron and the tetrahedron.

The latter, the tetrahedron, is a figure composed of the smallest number of planes that encloses three-dimensional space and can form a structural system. At the same time, it acts as a block, a crystalline cell, or a bullet from an idealized model of spheres in a compact package, capable of filling or forming and structuring the total space.

Indeed, with this order of solid bodies in nature, A. G. Tyng operated on the structure of the module of the triad of classrooms in the project. At the same time, this was the basic spatial pattern to form the totality of her elementary school. By this, we mean that A. G. Tyng connected three-dimensional spatial units of a smaller scale to make way for larger spaces in her school.

Also, this generative quality made it possible to repeat its basic structure or growth pattern on different scales without separating from the natural symmetry or altering the original figure in any of the cases, except for its carving. This attribute reveals a principle observed by R.B. Fuller: "The ability of the tetrahedron to "accommodate asymmetric aberrations" without altering the original figure" [7]. That is, the volumetry grew as layers of a compact package of tetrahedra and octahedra, which projected the

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[2] Kahn, L. I. (2003). Monumentality (1944). In A. Latour, Louis I. Kahn: escritos, conferencias y entrevistas (P. 23-33). Madrid: El Croquis Editorial. P. 31: "The project does not begin or end with the space that the architect has wrapped, but from the careful modeling of the adjacent land [...]. The contiguous terrain molding orders the architect's intention to configure it with geometric planes and more powerful cubes [...]".

[3] Kahn, L.I. (1959) said in Otterlo: "In the preform —in the beginning, in the first form—lies more power than in anything that follows [...]".

figure of this geometry as it changed scale or size[4]. For example, this order projected the shape of an inverted tetrahedron onto the support of the classroom module of the school. At the same time, the connection of these modules forged the total volume of this triad of classrooms, like an inverted trunk of a regular tetrahedron[5].

As R. B. Fuller already indicated in his theories, A. G. Tyng only had to remove the spheres from the compact packages and leave the vectors, to obtain a tetraoctahedral geometry [6], in other words, an octet-truss defined as follows: "[…] Regular tetrahedron and regular octahedron operating as complementary space fillers" [8].

In this way, A. G. Tyng succeeded in extending the shapes of her school differently from the isolated shapes of R. B. Fuller's domes and thus changed its scale, from one size to another. In this regard she said:

"[…] I was very interested in finding the asymmetric connections which still follow a natural geometric order, in other words, how they shift scale from one size to another […]" [9].

In short, A. G. Tyng planted this geometric order as an abstract seed of the structural potential in her architecture, which grew and materialized within a tetraoctahedral generative system. In this case, it served to create her idea of school (nature of the space or the institution).

Accordingly, this synergy allowed her to blur the limits of what a building covers and supports. In other words, she integrated the structural features of the classroom module, allowing her school's layers of enveloping tetrahedra to descend to the floor. As suggested by L. I. Kahn in his text of monumentality:

"Structural problems center about the roof. The permanence and beauty of this surface is a major problem confronting science. The surfacing of the domes, vault and arches appearing as part of the exterior contours of the building may be an integral part of the structural design" [10].

A. G. Tyng worked on the wraparound cover or canopy of her school not only in relation to the forms produced by the technological capacity of her time, but also with the exploration of those basic forms of the past, such as vaults or domes that evoked the Renaissance, Romanesque or Gothic style. L. I. Kahn introduced them when he helped her to prepare for the state exam as an architect.

In fact, L. I. Kahn said: "The great cathedral builders regarded the member of the structural skeleton with the same love of perfection and search for clarity of purpose.

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[4] Fuller, R. B. (1975). *Synergetic Exploration in the Geometry of Thinking*. New York: Macmillan Publishing. P. 337, 62107. The tetrahedron and octahedron can be produced by multiple layers of compact packing of spheres.

[5] The pyramid trunk is the geometric body that results from cutting a pyramid along a plane parallel to the base and separating the part that contains the vertex. That is, the tetrahedron can be sliced parallel to one of its faces, removing a layer of any thickness, to produce a new and smaller tetrahedron with the same shape, but different size than the original.

[6] Fuller, R. B. (1975). *Synergetic Exploration in the Geometry of Thinking*. New York: Macmillan Publishing. P. 135…420.01: "When the center of the sphere in the compact packaging is joined by the most efficient lines […] an "isotropic" matrix is discovered […]. This matrix constitutes a set of equilateral triangles that corresponds to the integral coordination more efficient nature […]".

Out of periods of inexperience and fear when they erected over-massive core-filled venerated walls, grew a courageous theory of a stone over stone vault skeleton producing a downward and outward thrust, which forces were conducted to a column or a wall provided with the added characteristic of the buttress which together took this combination of action" [11].

It is understandable why through this generative tetra-octahedral system, the challenging forms molded by A. G. Tyng on her classroom module cover made it possible to explore and depict the crossover covers of Gothic architecture, as well as the fullerian forms or prefabrication systems, particularities that fascinated the architect.

Then it is no coincidence if we consider that Gothic architecture and its thin ribbed vaults showed the way from solid construction to laminar or shell construction of the 20th century, for example. Moreover, then A. G. Tyng wanted to study the evolution of building structures through history, and thus approach the structures of her present[7].

We could even say that, from that moment, A. G. Tyng devoted herself to research on the evolutionary development changes of buildings in architecture until the last years of her professional life [12]. In this period, she also continued with geometric explorations in structural code inside nature.

2.2 Prototypes

Specifically, A. G. Tyng worked on three cover prototypes in her classroom module. They had in common the exploration of concave space formations, which follow the geometric principles of solid bodies in nature (see Fig. 4).

In turn, the conception of these three prototypes took into account circumstances as varied as the process of formation of the geodesic dome of R. B. Fuller, the construction of a cross vault by the masters of the Gothic or the placement of the mega-structures of P. L. Nervi (Exhibition Hall of the Moto Show, Turin, 1948)[8] (see Fig. 5-8).

Having said that, we believe that A. G. Tyng sought to explore the fundamental principles of past structures to approach a sphere in an alternative way, although close to the procedure of R. B. Fuller and his geodesic dome, or to what P. L. Nervi made with his vaults manufactured with prefabricated blocks. As shown in the Exhibition Hall in Turin.

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[7] Tyng, A. G. (1952). Scholarship Fulbright, proposed summary. 74. II.A.48 Anne Griswold Tyng Collection. Architectural Archives, University of Pennsylvania, Philadelphia.

[8] Considering this, she applied for a Fulbright scholarship in 1952, months after finishing her elementary school project. As a work plan, she proposed to increase her understanding of the historical-evolutionary process in building structures. To achieve this, A. G. Tyng planned to travel to Italy and study this structural evolution from the primitive hut of Trullo to the giant three-dimensional structures of the Italian engineer Pier Luigi Nervi. So, A. G. Tyng, as L. I. Kahn suggests in his article Monumentality, resorted to science, technology; but also, to the past to legitimize her architecture.

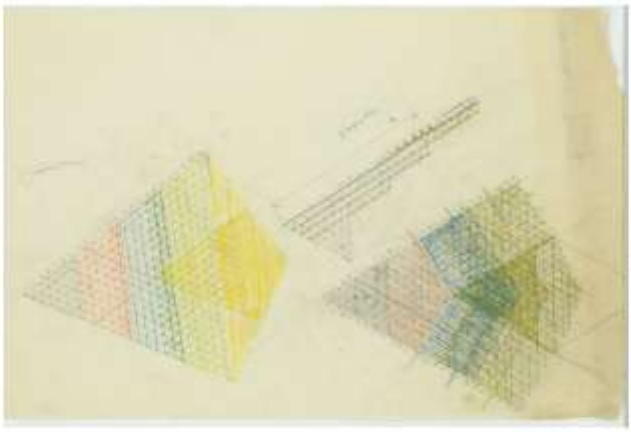

Figure 4: Drawing of the three prototypes made by A. G. Tyng for the Structure for a Classroom Unit*, Elementary School, Bucks County P. A. 1951-1952[9]. Source: Architectural Archive of University of Pennsylvania-Anne Griswold Tyng Collection. 74. III.14.-a

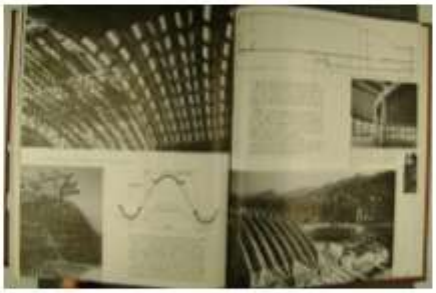

Figure 5: Interior image of the *Architectural Forum* magazine, July, 1951, part of the article that spreads the Exhibition Hall of Turin, made by P. L. Nervi, Italy, 1948. Vault under construction, made with prefabricated three-dimensional pieces, similar to the manufacturing method used by Tyng in her elementary school.

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* The direction of each layer in the prototypes provides its final shape.

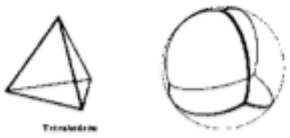

Figure 6: Projection of polyhedrons made by R. B. Fuller to reach the shape of his geodesic dome. More accurately, a drawing of Tetrahedron exploited in the geometry of a sphere. Source: R. B. Fuller (1975). Synergetic Exploration in the Geometry of Thinking. New York: Macmillan Publishing. P. 321 -610.20.

Figure 7: Book page *History of Architecture*. The book of Auguste Choisy was regularly consulted by L. I. Kahn, who helped A. G. Tyng prepare her architectural history exam for her license as an architect in 1949. The graphic shows the union of the layers to build a Gothic vault.

In other words, A. G. Tyng wanted to learn with the "clarity of forms and the logic of scale" [13] of the past, as well as the knowledge of her time and the way to adapt forms for the future. This is what she established with the three prototypes of her elementary school.

For this structural study on the connection of three of her structure for a classroom unit, she carved each prototype of these covers, adding each one cell or mixed block, as if to cover a cell of a vault. A. G. Tyng lined up each hollow row of tetrahedra perpendicular to what appeared to be the outline of the axes of the leading arches of the cover. Tetrahedra run perpendicular to the encounter of bricks at the edges of a vault [10].

Similarly, R. B. Fuller does it with his dome (a page from Energetic Geometry (Geometry in Action):

"In order to approach the sphere (dome), Fuller compounded tetrahedra into an octahedron, then into an icosahedron […], then in a sense, he exploded the icosahedron onto the surface enclosing it. This divided the surface of the sphere into a number of spherical triangles, or triangles with three bowed legs" [14].

This projection of polyhedrons made by R. B. Fuller to reach the shape of his geodesic dome would be compared with what happened with the prototypes of the cover of A. G. Tyng. She inflated this cover or polyhedral body like a balloon —as well

[10] Kahn, L. (1953). Toward a plan for Midtown Philadelphia. *Perspecta* (2), 11-27. "In Gothic times the architects built with solid stone. We can now do it in hollow stone".

as R. B. Fuller with his dome— but with the difference that A. G. Tyng inflated it layer by layer, block by block, mixing principles of the past, of nature and of prefabrication technologies of her time.

3 EPILOGUE

A. G. Tyng continued with her seminal ideas about the essence of geometry as an instrument for extracting structural codes in the matter, to the point of immediately impacting the structural design of the mezzanine plate of L. I. Kahn's Yale Gallery Art in 1952. In other words, the decoding of R. B. Fuller's research geometries within the elementary school project led her to a tetra-octahedral geometric order. In fact, at the end of this seminal period and untied from L. I. Kahn's office, A. G. Tyng built the Walworth Tyng House in 1953: an addition to her parents' house, which she called the first habitable spatial framework, in an attempt to inhabit these geometric codes that directed the dynamic forces of the structures that constituted her habitable spaces. In that same year, the project received a mention, within the framework of the AIA Chapter Philadelphia, for its "ingenious structural system" [15]. The previous collaboration and work with L. I. Kahn on some studies not commissioned for the city of Philadelphia —called by him Plan for Midtown of Philadelphia— allowed both architects to develop in 1952 and 1953 "the first concept of a fully triangulated three-dimensional tower"[11], whose hollow geometry permits its occupation. This is the vertical development of geometric codes of the concept of a habitable spatial framework.

Ten years after the discovery of these geometric keys in 1949, A. G. Tyng proposed, without success to the University of Pennsylvania, the study of geometry as a source for the development of basic architectural and more human forms. This was an attempt to discover the applications of the fundamental principles of structures in nature, which she had already incorporated into her practice. In 1963 she was awarded the AIA Brunner grant for the development of the study of these three-dimensional forms, aid that fostered the continuation of her research on basic forms. Thus, Tyng manages to gestate an unpublished manuscript called *Anatomy of Form / Atom to Urban 1962-64*, the basis of her theory of form. With the name *The Divine Proportion in the Platonic Solids* (1964)[12], the project was presented at the University of Pennsylvania, in an attempt to understand the principles of order in static geometry, necessary for the creation of more human forms. Likewise, Tyng had the help of the Graham Foundation (1965) to develop these works, which were the basis of her theory of form. Thanks to this scholarship she wrote the articles *Urban Space Systems as Living Form* and *Geometric Extensions of Consciousness*.

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[11] Anne Griswold Tyng Collection, Architectural Archives, University of Pennsylvania. 74. II.C.18.

[12] The Platonic Solids, august, 1964. University of Pennsylvania. Source: Tyng Collection, AAUP, 74.II.A.39.2

4 CONCLUSION

The seminal work of A. G. Tyng between 1951 and 1953 comes from the motivation for scientific and technological issues, related to structures and prefabrication. This led her to a search for new technologies that connected her with research on the intrinsic geometry in the organization of matter, as a key to the integration of space and structure in architecture. Therefore, in these beginnings, the foundations or the preform are found. These fundamentals contain principles of geometric order challenging the dynamics of forces. That allowed her to construct spaces in the practice of architecture during her professional life and at the same time cemented her postulates after 1960, which focused on the form itself and its processes of creation linked to a synthesis or holistic concept including geometry, architecture and human consciousness. In short, this story contributes to a new path of critique for architecture, and provides evidence to reassess the scope of Louis Isidore Kahn, one of the greats in architecture. For our time it reveals the visionary theories of A. G. Tyng, useful for other researchers interested in numbers, in the benefit of similarity with the logic of computer-assisted design, or design close to the scientific paradigm and complex thought.

5 ACKNOWLEDGEMENTS

I express my gratitude to the Polytechnic University of Catalonia, the ETSAB Barcelona School of Architecture and, especially to the academic director of this doctoral work, Dr. Antonio Pizza de Nanno, for providing this work opportunity. Similarly, to the Francisco de Paula Santander University (Cucuta, Colombia), which made possible my participation in the Official Master and the current PhD scholarship. I also want thank to the Pennsylvania Historical and Museum Commission of the University of Pennsylvania for giving me access to the Architectural Archives of the University of Pennsylvania and its collections, and I thank the University of Pennsylvania and its School of Design for extending me a visiting scholar to continue with my research topic.

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Anexo B. Publicación de Cret, P. P. (agosto de 1933). "Ten Years of Modernism". *Architectural Forum*, 91-94

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A Recent Aspect of an Old Conflict

BY PAUL PHILIPPE CRET, F. A. I. A.

IN the course of years given to educational work, we are at times compelled to examine the value of our methods. They may carry the authority of tradition, the warrant of famous teachers—even those most tangible proofs, successful students (insofar as we can credit ourselves for their achievements). Still we wonder if results could not have been achieved otherwise and to prove ourselves, under another rule or left to themselves, might not have found their way ultimately to the top. In other words—are our methods efficient?

Such healthy doubts are never more likely to arise than in the teaching of the Fine Arts. Here the useful certainty of mathematics, for instance, is lacking. Instead of finding a solid basis, unaffected by time or fashion, we must venture on quicksands where the fundamentals have always been, and still are, in a turmoil of conflicting theses, where even the glossary holds different meanings for each of the disputants.

There is an universally accepted principle in the art world, and no demonstration without its weak point. How could the educator escape questioning his own faith, wondering if his is a stronger foundation than personal prejudice? Is it the reflected image of his own temperament, he asks, or merely the echo of his youthful enthusiasm for contemporary trends uncritically accepted originally and since entrenched through habitudes? This uneasiness of mind, unpleasant as it may be to self-esteem, has its advantages. It helps us to get our bearings, to gauge our habits through comparison, to probe never carefully into what was taken for granted. Theologians confront doubt, but they rank mental strife a mortal sin; we ought to be over-confident in our artistic creeds. Any complacency of the kind we might have once entertained about standards and theories of architecture has been rudely shaken during the last ten years. Not that a sudden revolution was granted to the elect upsetting the established order. What took place was more in the nature of a severe sweep of the pendulum, bringing to the fore problems and views refreshed through their temporary eclipse. If not fully sharing in the enthusiasms, we had nevertheless to take notice of the claims loudly hailing the new era. To hold the usual proportion of accessory outlaws or professional advocated thinkers; its real strength came from those architects who had constantly disagreed with the doctrines in vogue and felt that a much needed revolution was at last under way.

Schools could not ignore the conflict thus raising the profession. Some sided at once with the newcomers, drawing it perhaps more flattering as much with a vanguard. That this took time enough to inquire into the consequences of such a change as to find out how prepared they were to substitute a new educational system for that evolved through many years of experiment, might be questioned. Until two or three years ago, all the schools followed the methods of architectural training developed in France in the last century and adopted in this country about fifty years ago. Previously, but to a few exceptions, architectural education

...to an understanding the artist, was practically unknown. The most important element of this education was the development of taste along the standards of Classic and Renaissance architecture. Had this method failed? The simplest way to answer this question is to see how the present generation of architects (a large portion of those formerly students of the schools) compares with the general run now in vogue and in the achievements of the Colonial times, more congenial as regards style than the Classic. Still a severe critic will be very hard during the Twentieth century, American architecture gained a world-wide recognition which it did not have in the second half of the Nineteenth, and this corresponds in time to the spreading influence of the schools. These essential qualities—proportion, harmony in planning, adaptation of the work, refinement in details—have worked for generations, and what is more, instead of being the prerogative of a few leaders, they are in evidence all over the country. Credit for such a condition must go, for a large part, to a more efficient training of the profession and to the standardization of teaching methods. That the schools have been doing their work well is further demonstrated by the increasing number of Americans who...

...to Europe in order to secure the proper...

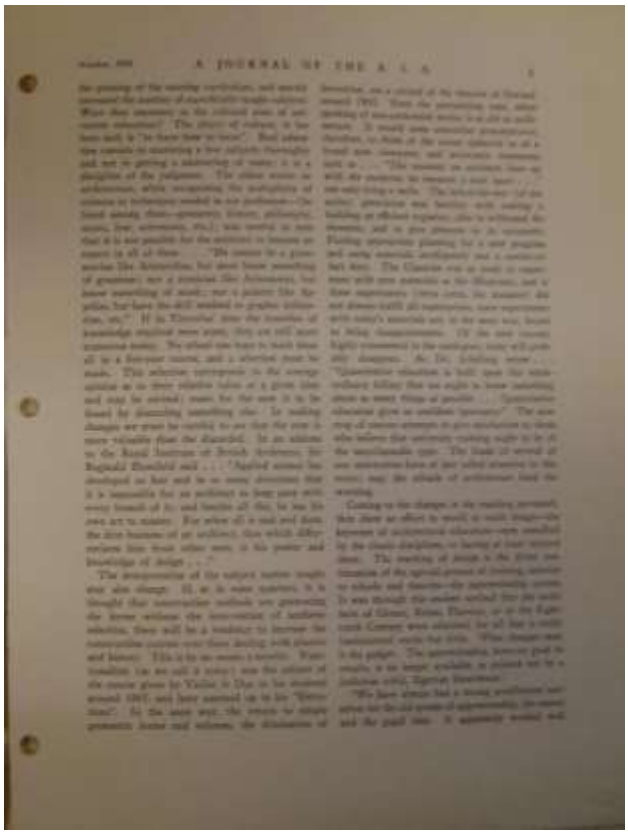
Now it may seem strange suddenly to find under suspicion (either real, threatened or subjective) a system which undoubtedly raised the level of professional ability. Looking more closely into the matter though, we discover that it is not actually educational methods which are under fire. Wiped by a minority of architects, supported by those who talk and write about architecture with a superficial knowledge, the battle is essentially against classical traditions and for the triumph of the "modernistic" trend. Educational reform is merely a consequence, although there is probably no more justification for it than for reviving the reading of plays under which Dionysus pursued at Athens is to be played. It is advanced that the change of methods will turn our students into "creative artists"—creators of new forms, of course—which is obviously absurd. Students do not possess the necessary maturity for originality, which is an attribute of full-fledged artists—and maybe not of them at that! The student cannot be expected to work beyond existing artistic standards or...

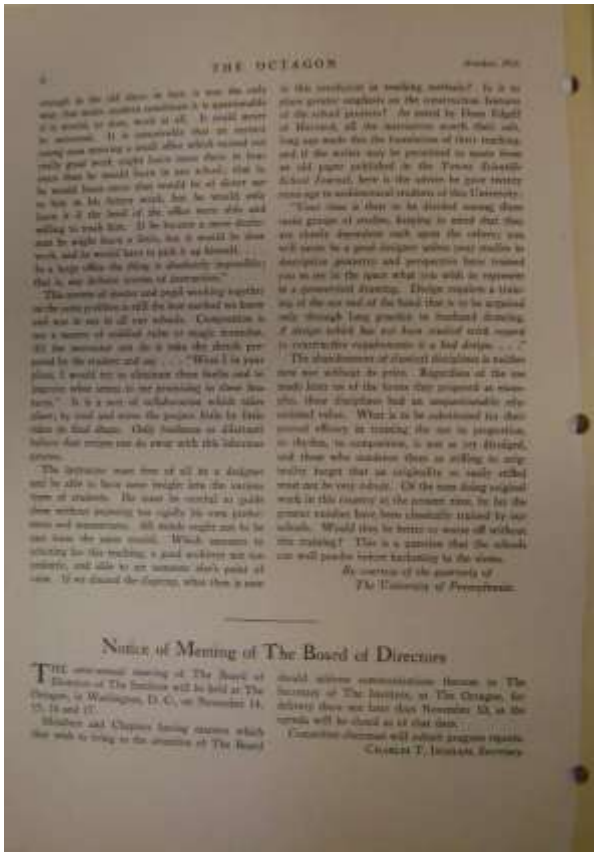
...to contemporary production.

A school teacher has to see the work world presented to the artist and to create. With such a definition as a base, the educator's creed ought to be (in the words of Plato) . . . "This am, O Socrates, their contemporaries termed Beauty, and disregard the kind of Beauty which is beautiful to any man and not to that other man . . ." What must be avoided above all is the confusion in values which these novelty in beauty. The adventurous spirits oppose the schools to mock and: "How things which will become the art of tomorrow." And who knows what the Art of Tomorrow will be, or if Tomorrow will have any art worthy of the name? There are plenty of patrons in art history showing total indigence in the Fine Arts. "O," wrote Julius Benda, "you were only seeing the forms which might become the art of tomorrow, you would cancel me of this crushing power. I see in an English garden rendering me, in these words—Give the grass a chance!"

The schools were taken to task severely, and being sensitive to criticism, they looked for a new orientation. To guide them they had a few conservative evaluations and countless suggestions certainly offering the architect in the most far-reaching proposals. A large part of these suggestions came from men entirely unfamiliar with teaching, and all of them were, of course, unjustified. We have all in the past advocated some improvement of the kind. When a few years demonstrated their worthlessness, the only consolations could have been the students who played the guinea pig's role. Intending to give satisfaction to whatever they could make out of these hare notions, the schools resorted either to a modernization of the faculty or to the introduction of a few new courses.

What is the true protocol? On the one hand, we are told a more "practical preparation" to professional duties; on the other, the upbuilding of a new aesthetic creed involving the repudiation of the rules of classic art and the promotion of those forms which have been called (among other names) the International Architecture. So "practical preparation", a few new courses in subjects of learning scientific—metallurgy, heating, or those concerning the economics of an office—were introduced. These additions to an already overburdened program meant





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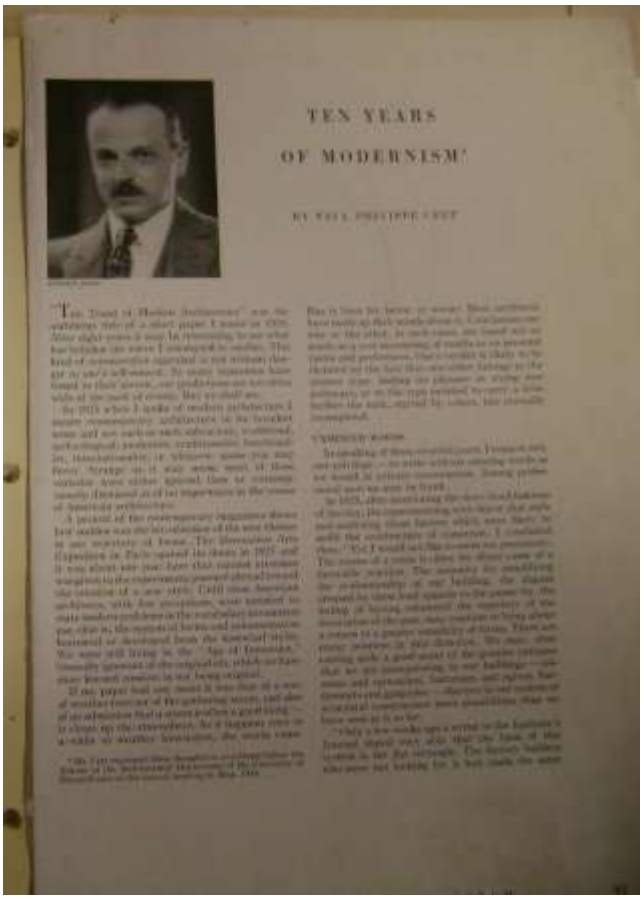
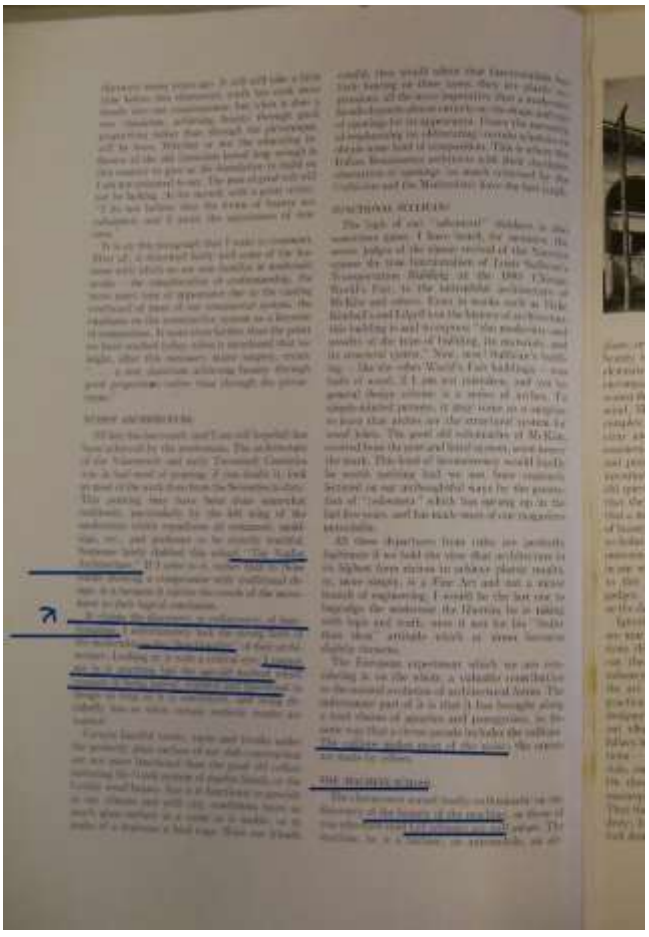
Anexo A. Publicación de Cret, P. P. (octubre de 1938). “A Recent Aspect of an Old Conflict”.



TEN YEARS OF MODERNISM*

BY PAUL PHILIPPE CRET



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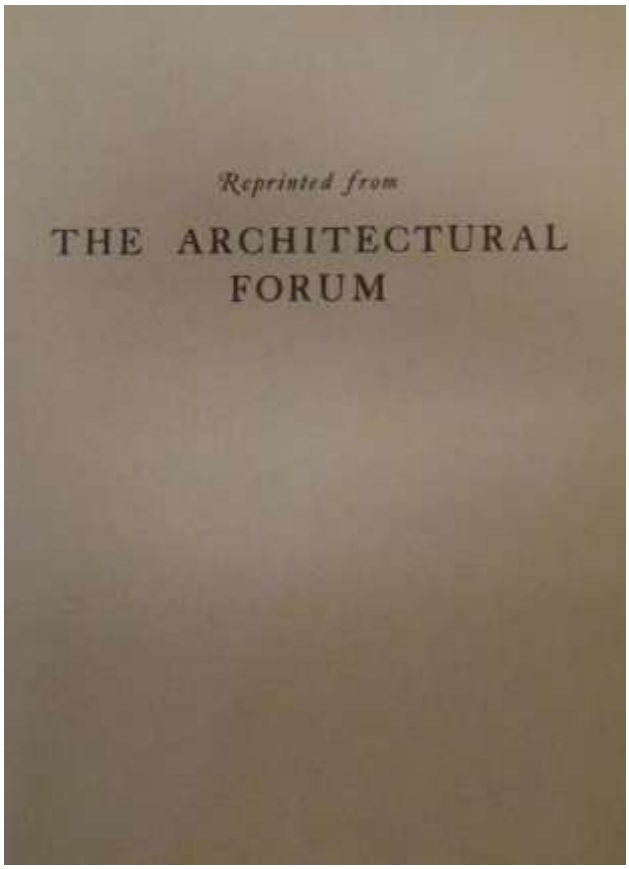
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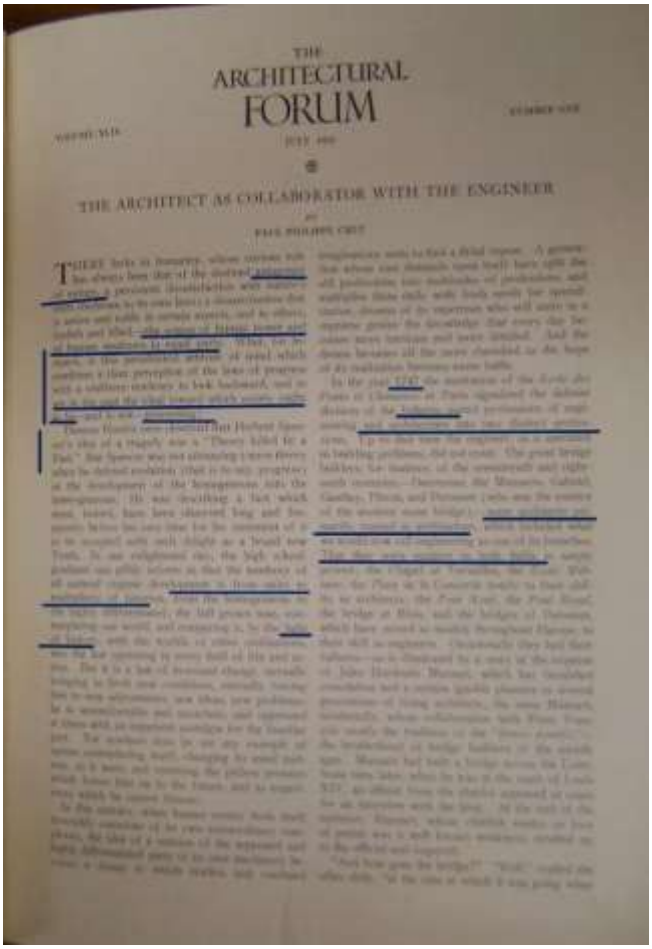
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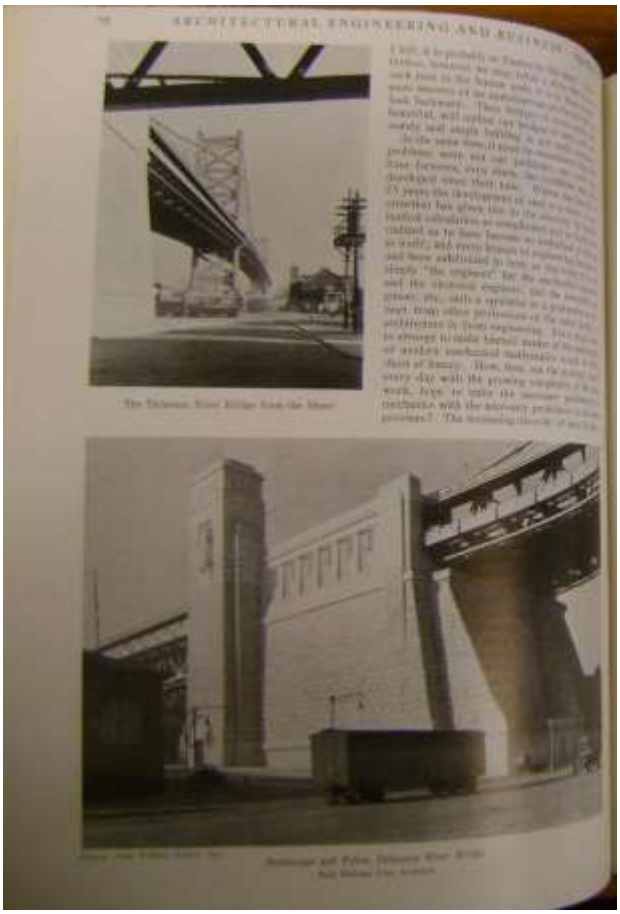
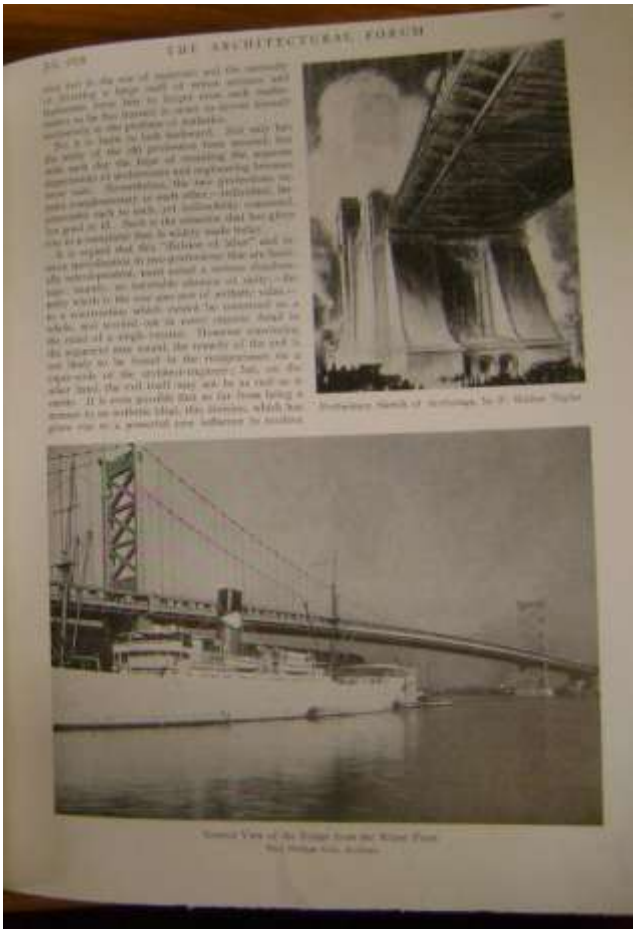
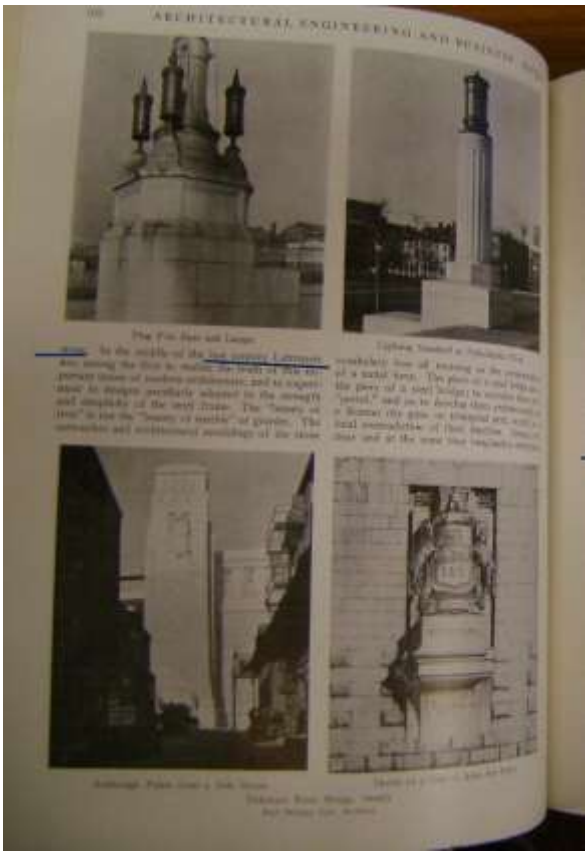
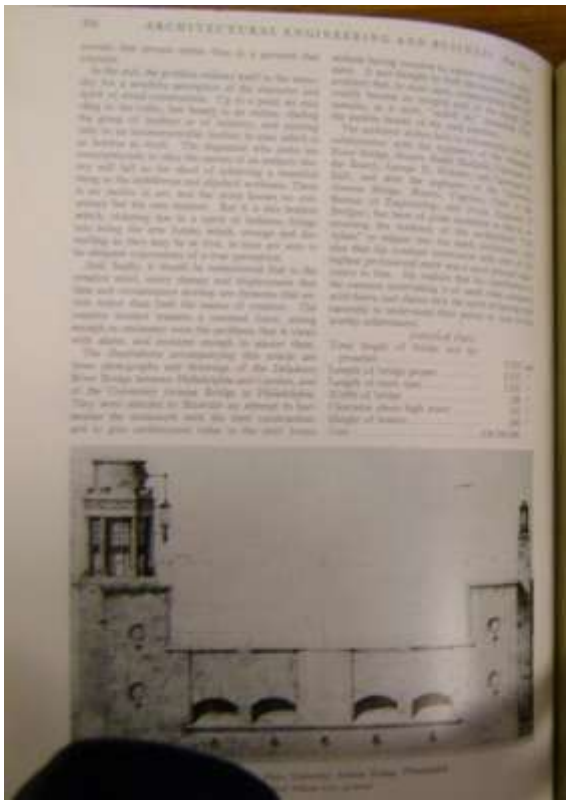




The Base of a Pier





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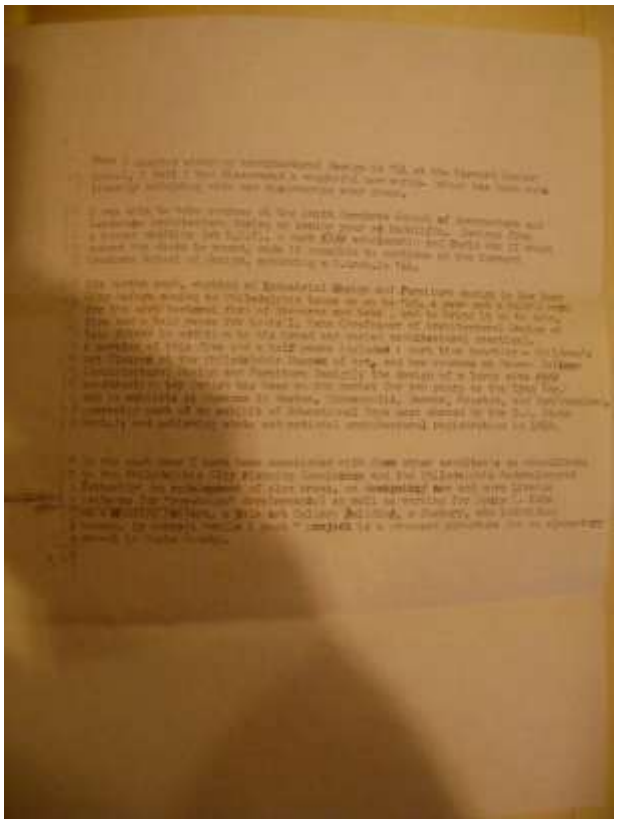


Anexo D. Curriculum Vitae de Tyng, 1952.

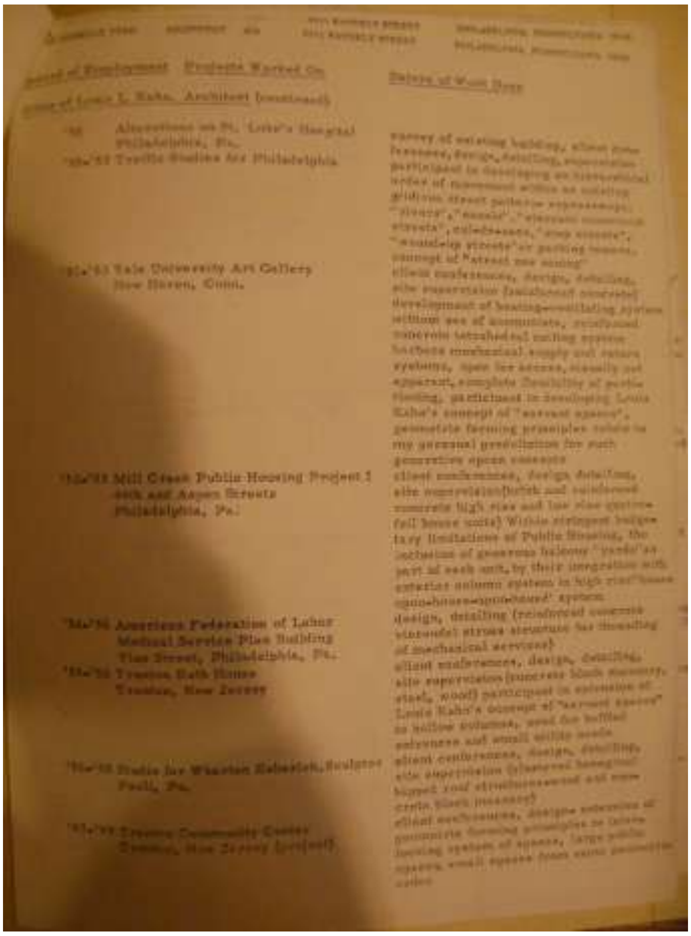
Fuente: AAUP, Anne Griswold Tyng Collection, carpeta 74. I. D.1

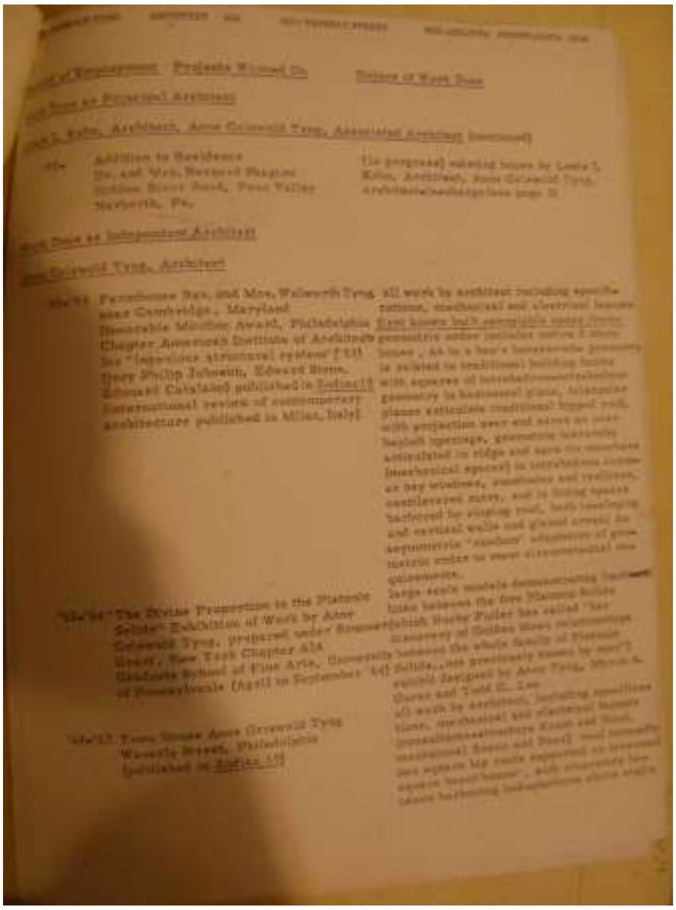
[illegible]

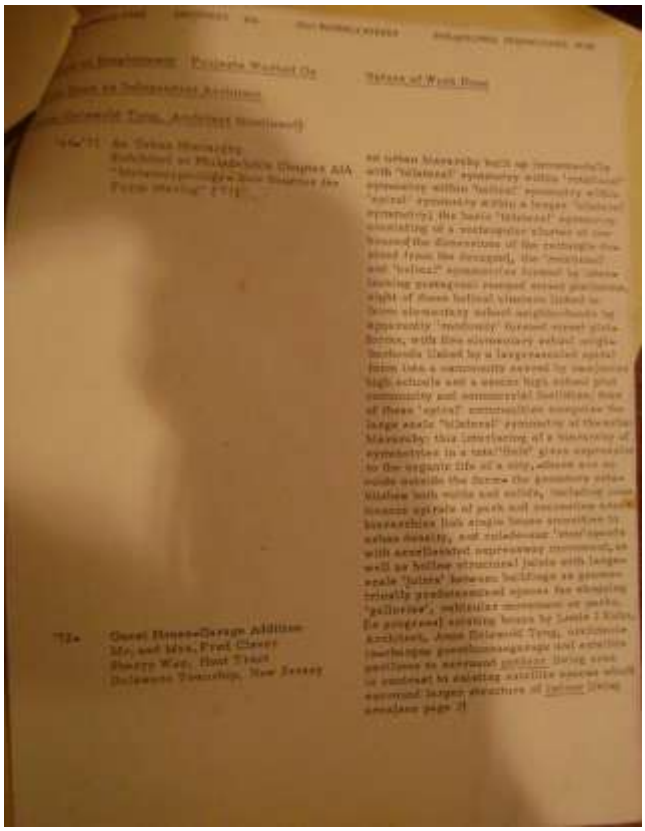
ANNE GRISWOLD TYNG ARCHITECT AIA 2511 WAVERLY STREET PHILADELPHIA PENNSYLVANIA 19146

1/

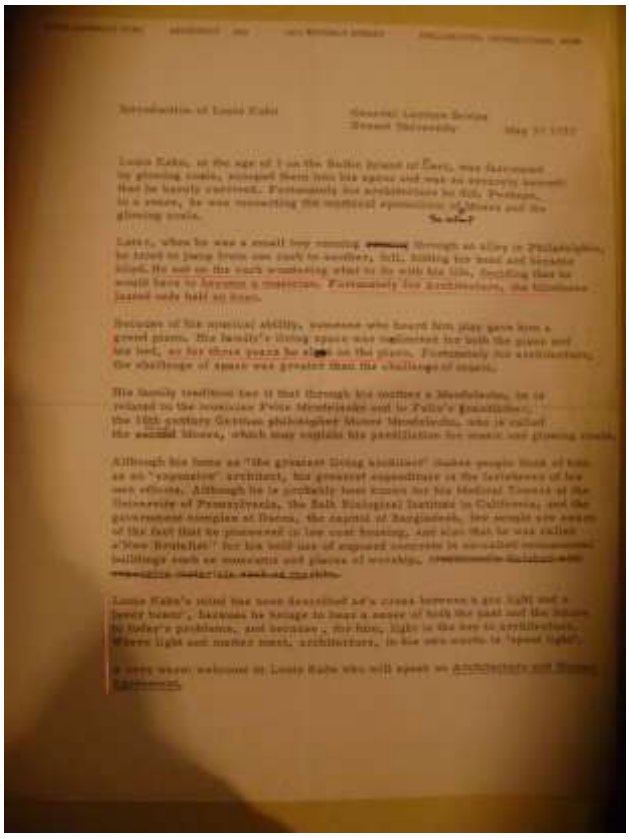
Record of Employment	Projects Worked On	Nature of Work Done
'44	Office of Konrad Wachsmann New York City	perspective drawings of prefabricated houses, details
'44	Office of Van Doren, Nowland and Schladermundt, Industrial Designers New York City	subway station designs, prototype shopping pavilions- drawings and details
'44-'45	Knoll Associates Inc. Planning Unit New York City	designs and details for commercial interiors, design and details of furniture
'45-'47	Office of Stonorov and Kahn, Architects Philadelphia	
'45-'46	Prefabricated Steel Houses Phoenixville, Pa.	site survey, design, detailing, site supervision
'46-'47	Solar House (project) sponsored by Libby-Owens Ford for book 50 Solar Houses	design and detailing
'45-'49	Residence Dr. and Mrs. Philip Q. Roche, Whitemarsh Township, Montgomery County, Pa.	client conferences, design, detailing, site supervision (wood and brick)
'46-'52	Triangle Area Redevelopment Plan for Philadelphia Wheelright and Stevenson, Landscape Architects	(proposals for demolition of 'Chinese Wall' area of Philadelphia) Condition and use surveys of all existing properties, design of area development, design of building types, street and traffic proposals
'47-'49	Coward Shoe Store, Philadelphia	survey of existing building, design and detailing for prototype store
'47-to present	Office of Louis I. Kahn, Architect Philadelphia	
'47-'49	Residence Dr. and Mrs. Winslow Tompkins, Apologen Road (project) Philadelphia	client conferences, design, detailing
'48-'49	Residence Mr. and Mrs. Morton Weiss, Whitehall Rd. East Norriton Township Montgomery County, Pa.	architect-in-charge, client conferences design, detailing, site supervision winner of 1950 Gold Medal Award, Phila. Chapter American Institute of Arch. (wood and stone)
'49-'51	Residence Mr. and Mrs. Samuel Genel Indian Creek Drive and Lancaster Ave. Lower Merion Township, Montgomery County, Pa.	architect-in-charge, client conferences, design, detailing, specifications, site supervision
'49-'53	Philadelphia Psychiatric Hospital Ford and Monument Roads Philadelphia, Pa.	site studies for site development of hospital complex
'49-'50	Occupational Therapy Building Philadelphia Psychiatric Hospital	design and detailing, site supervision (wood and steel)
'50-'53	Samuel Radbill Building Philadelphia Psychiatric Hospital	design, detailing, site supervision, development of new security concepts and nursing unit arrangements for psychiatric care, triangular porte cochere design and detail, sunshade details (flat slab concrete structure, slate facing)


Projects Worked On
Nature of Work Done
Louis I. Kahn, Architect (continued)
Alterations on St. Luke's Hospital
Philadelphia, Pa.
Traffic Studies for Philadelphia
Yale University Art Gallery
New Haven, Conn.
Mill Creek Public Housing Project I
Aspen Streets
Philadelphia, Pa.
American Federation of Labor
Medical Service Plan Building
Philadelphia, Pa.
Trenton Bath House
Trenton, New Jersey
Studio for Wharton Esherick, Sculptor
Paoli, Pa.
Trenton Community Center
Trenton, New Jersey (project)


Projects Worked On
Nature of Work Done
Kahn, Architect, Anne Griswold Tyng, Associated Architect (continued)
Addition to Residence
Narberth, Pa.
Work Done as Independent Architect
Anne Griswold Tyng, Architect
Farmhouse Rev. and Mrs. Walworth Tyng
near Cambridge, Maryland
Honorable Mention Award, Philadelphia
Chapter American Institute of Architects
published in Zodiac
architecture published in Milan, Italy)
"The Divine Proportion in the Platonic
Solids" Exhibition of Work by Anne
Griswold Tyng
Graduate School of Fine Arts, University
of Pennsylvania
Town House Anne Griswold Tyng
Waverly Street, Philadelphia
(published in Zodiac 13)



Anexo E. Record of Employment 1972, AAUP, Anne Griswold Tyng Collection, carpeta, 74.I.D.4



Anexo F. Introducción para presentar a Kahn en Drexel University, 1973.

Fuente: AAUP, Anne Griswold Tyng Collection, Carpeta 74. II.E.2.9 Drexel University. General Lectures Series-Intruduction of Louis Kahn, 1973.


Victory
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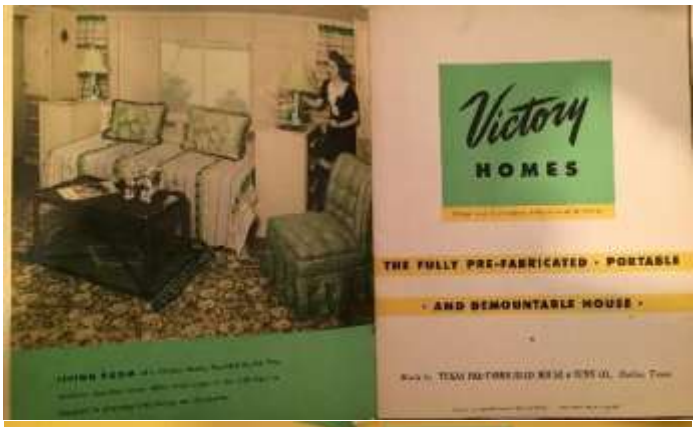
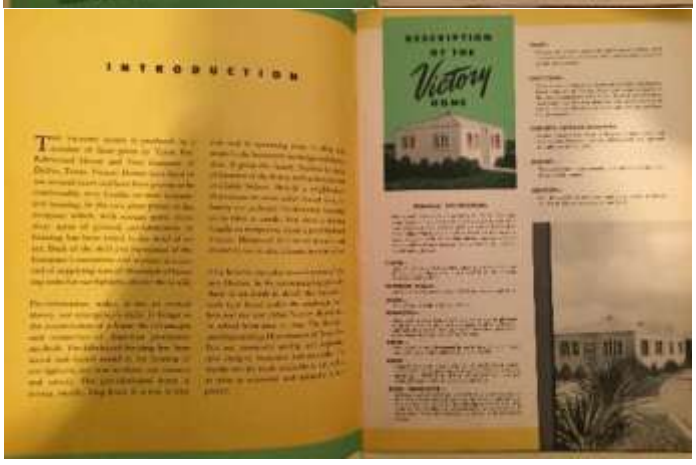
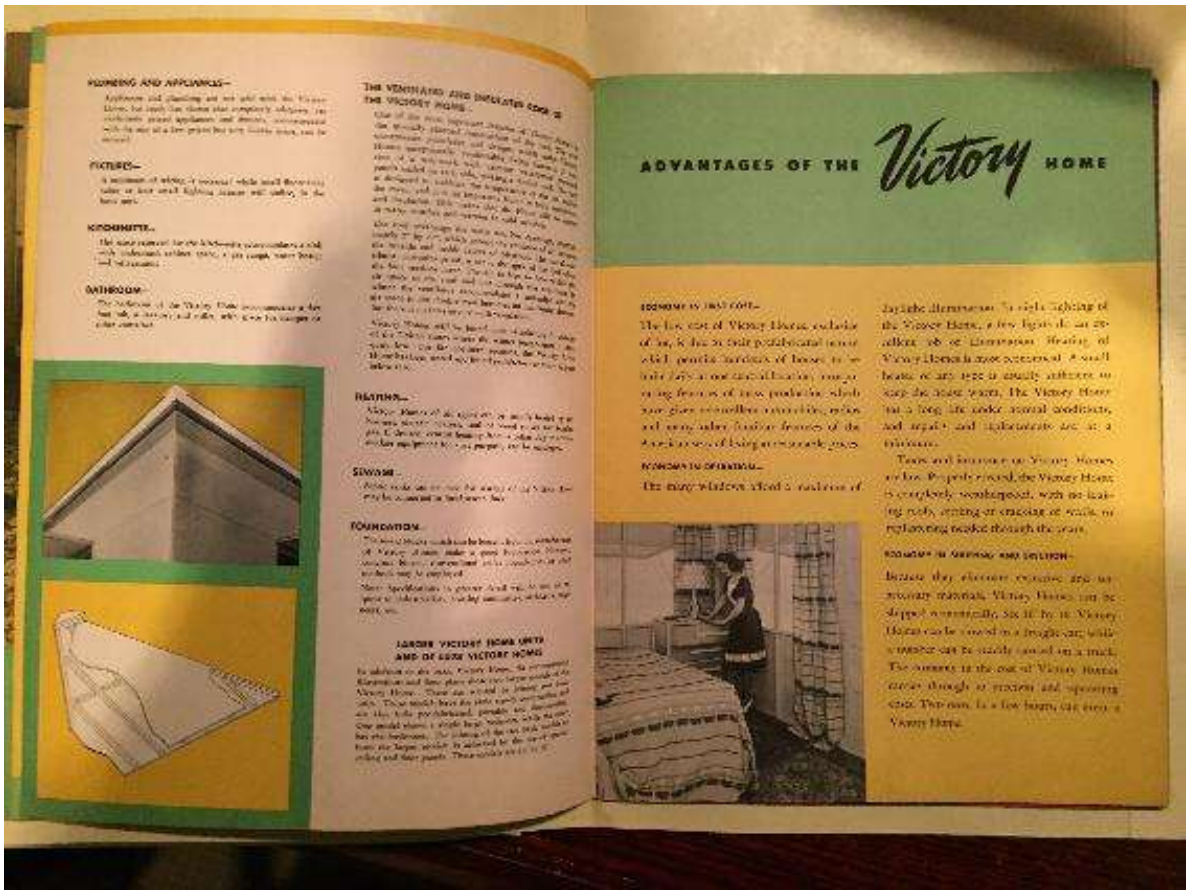

Victory
HOMES
THE FULLY PRE-FABRICATED - PORTABLE
- AND DEMOUNTABLE HOUSE -


INTRODUCTION
DESCRIPTION OF THE
Victory
HOME



PLUMBING AND APPLIANCES—

FIXTURES—

KITCHENETTE—

BATHROOM—

HEATING—

SIDING—

FOUNDATION—

LABOR VICTORY HOME UNITS AND OF LESS VICTORY HOMES

THE VENTILATING AND INSULATION CORE OF THE VICTORY HOME—

ADVANTAGES OF THE *Victory* HOME

ECONOMY IN FIRST COST—

ECONOMY IN OPERATING—

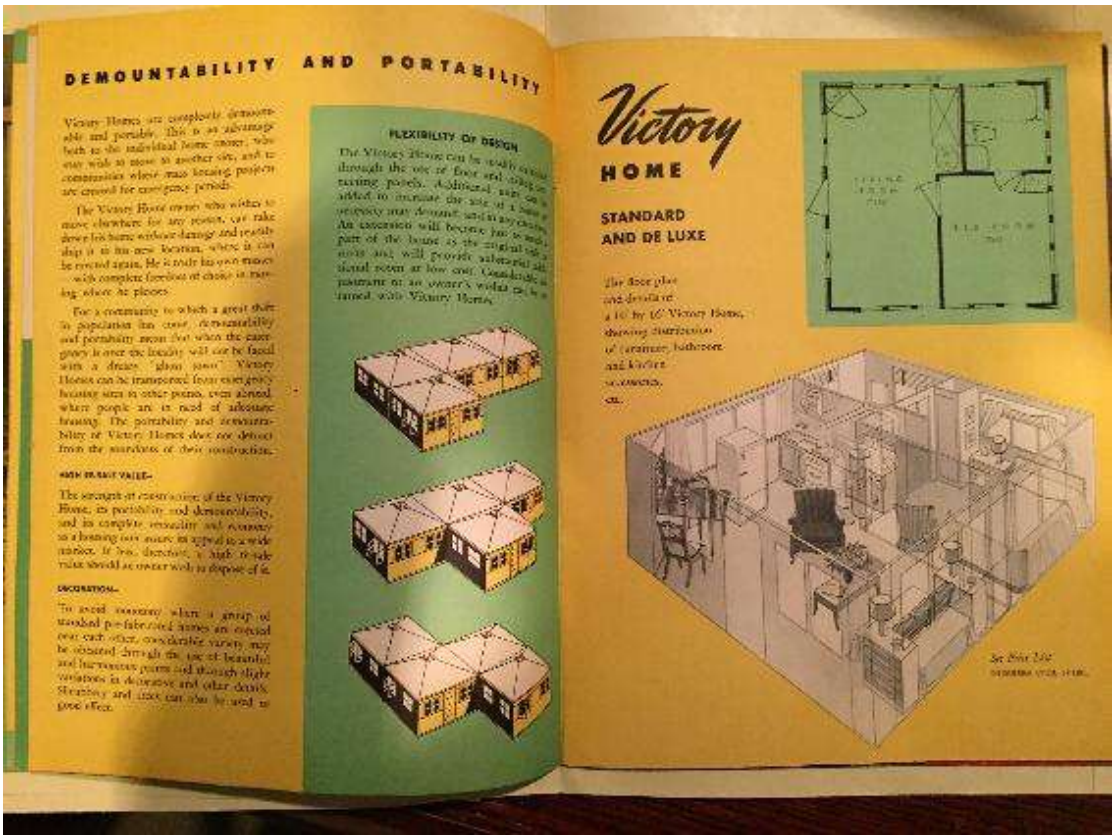
ECONOMY IN UPKEEP AND REPAIR—

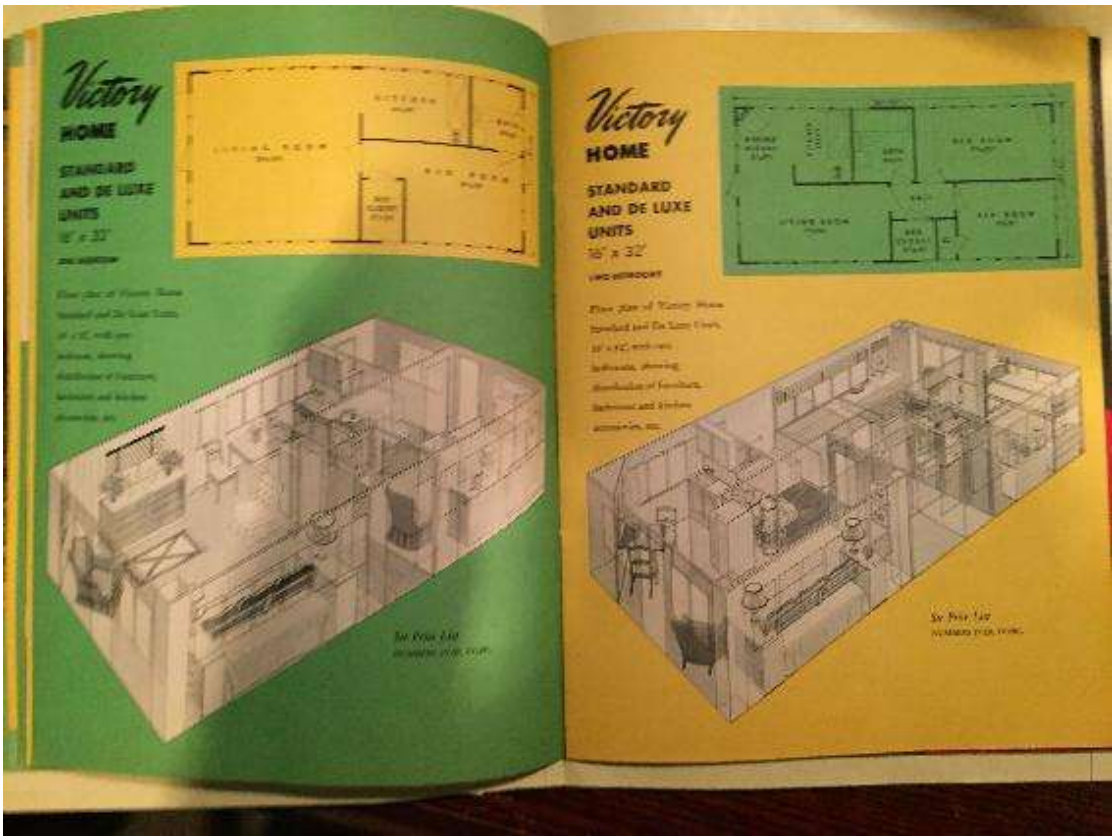
FREEDOM FROM LONG TERM DEBT

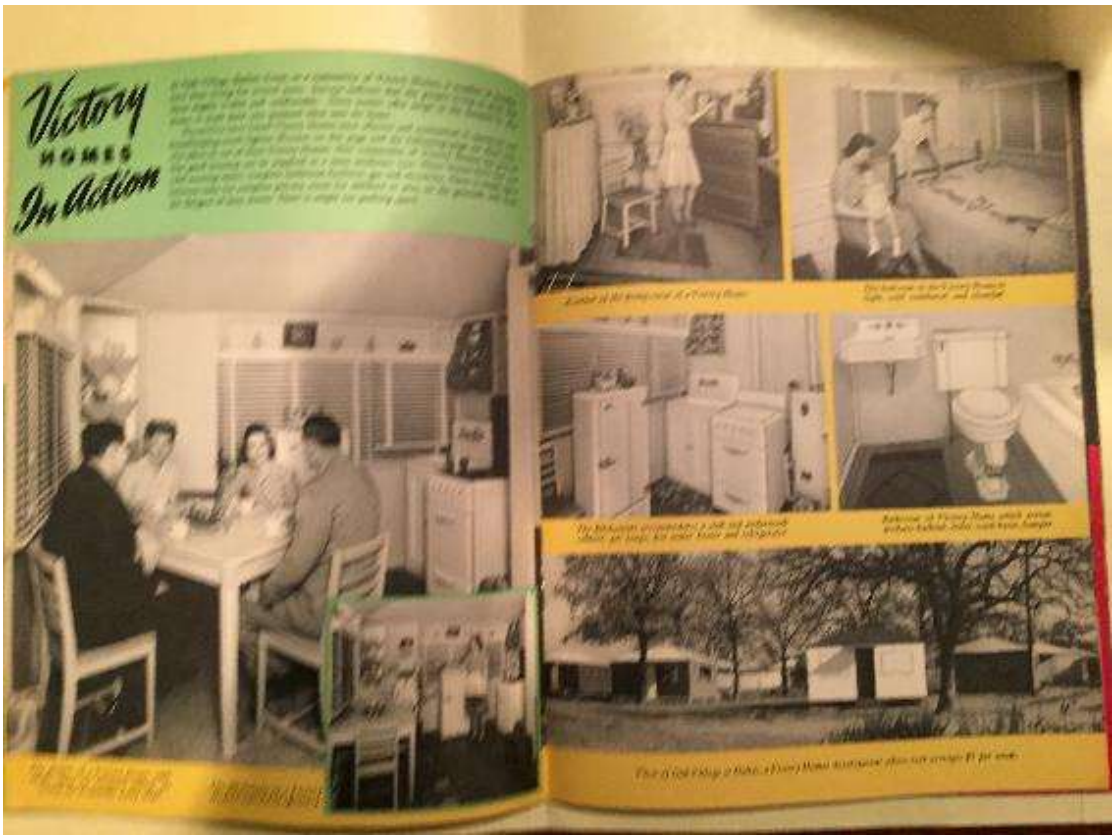
PURCHASE OF A VICTORY HOME LIGHTENS THE INTEREST LOAD

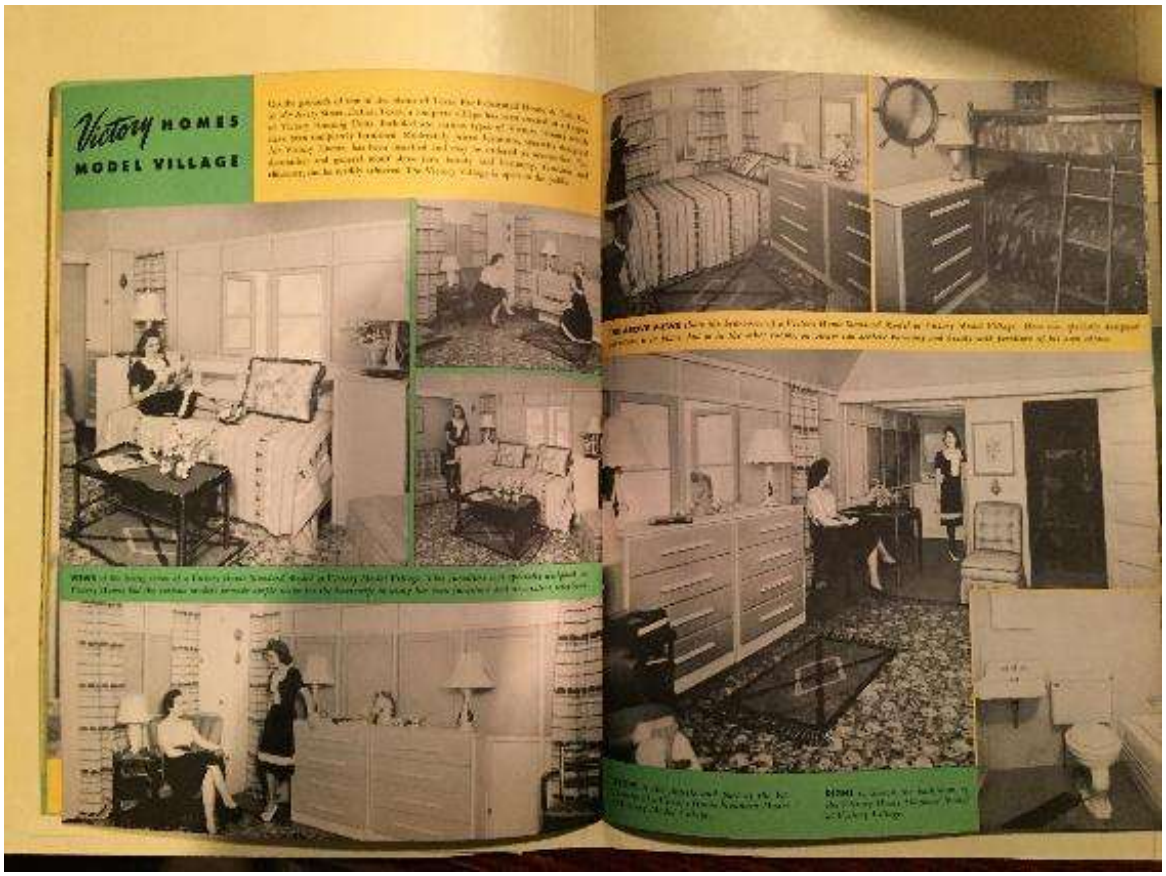
SIMPLIFICATION OF HOUSEWORK—

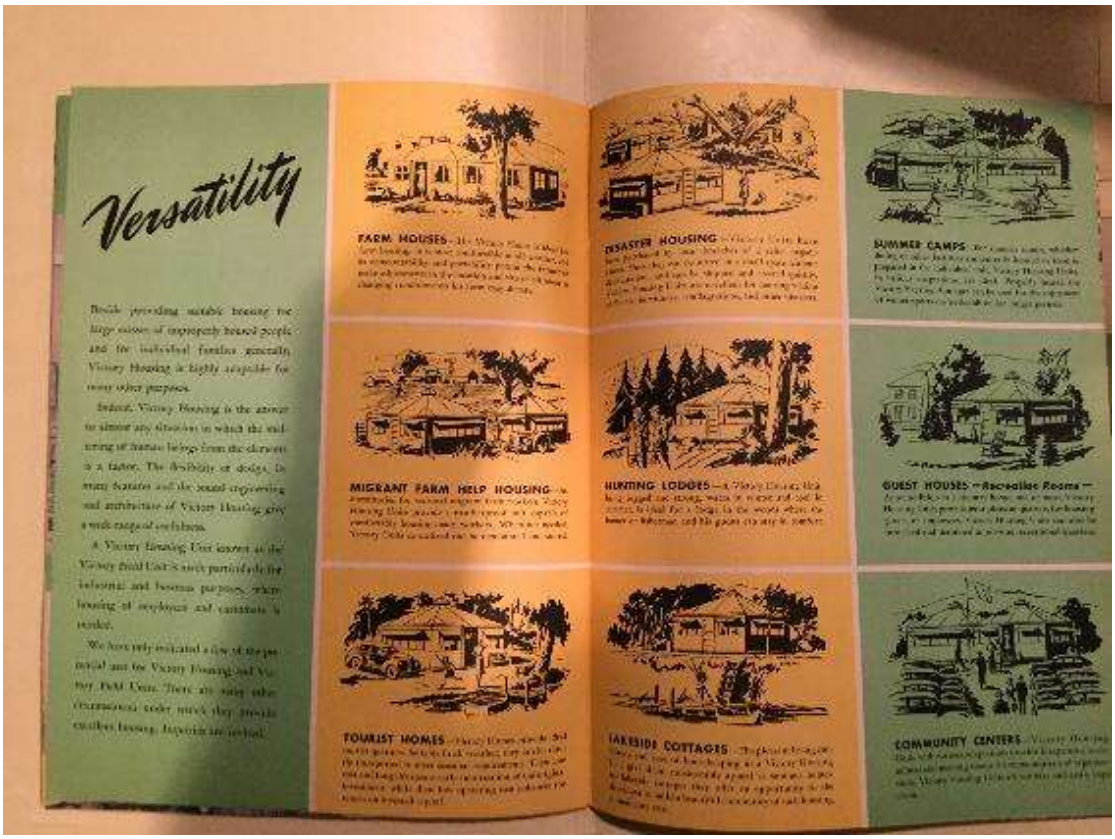
DESIGN OF CONSTRUCTION—

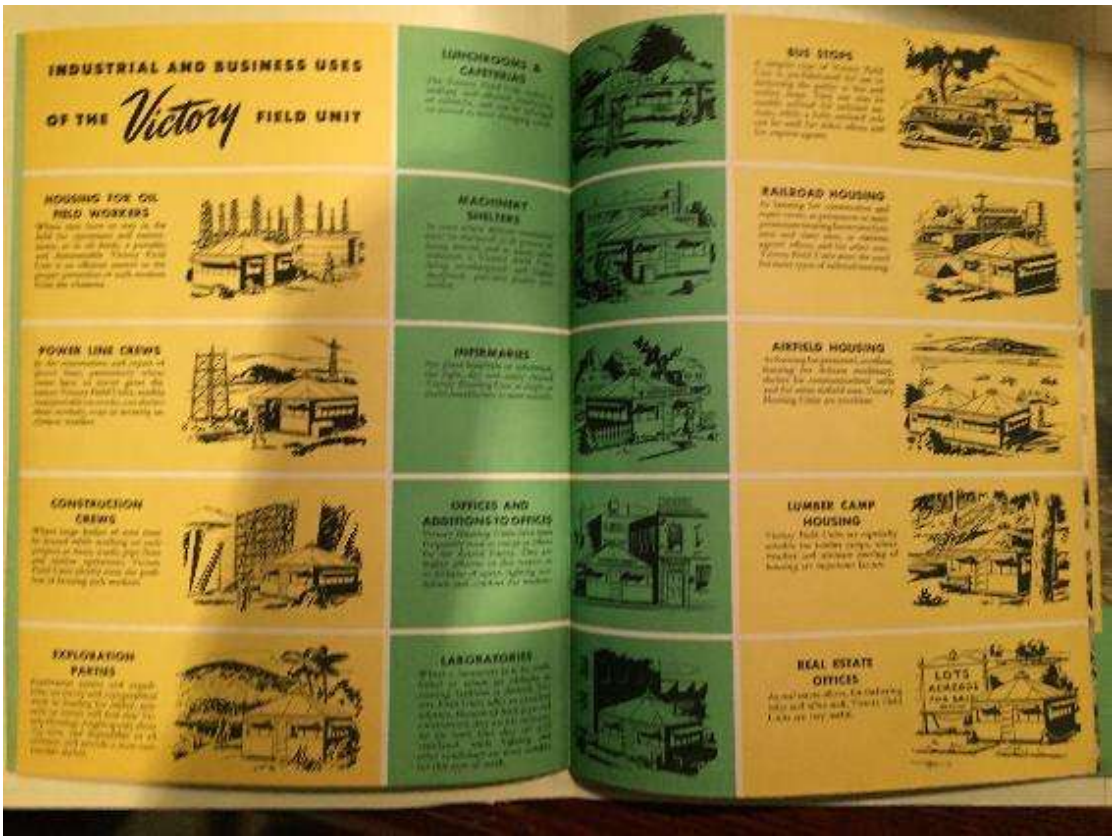

DEMOUNTABILITY AND PORTABILITY
FLEXIBILITY OF DESIGN
Victory
HOME
STANDARD
AND DE LUXE

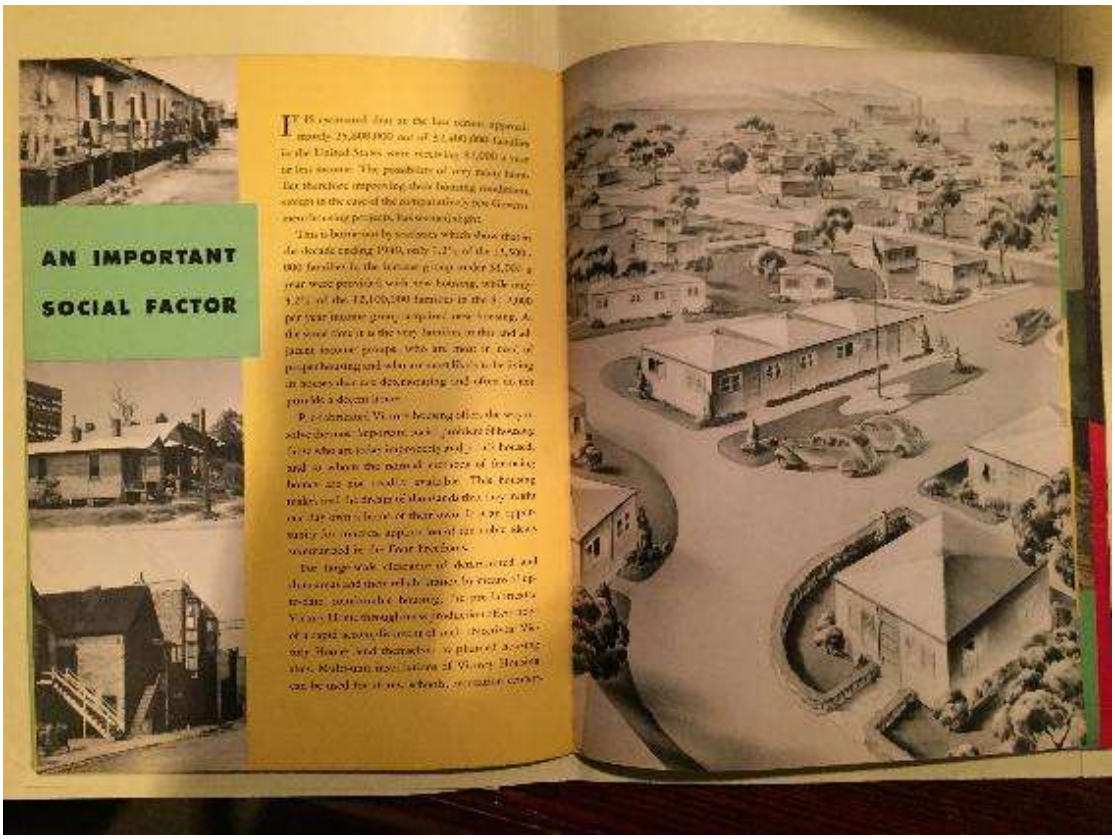

Victory
HOME
STANDARD
AND DE LUXE
UNITS
16' x 32'
Victory
HOME
STANDARD
AND DE LUXE
UNITS
16' x 32'


Victory HOMES In Action

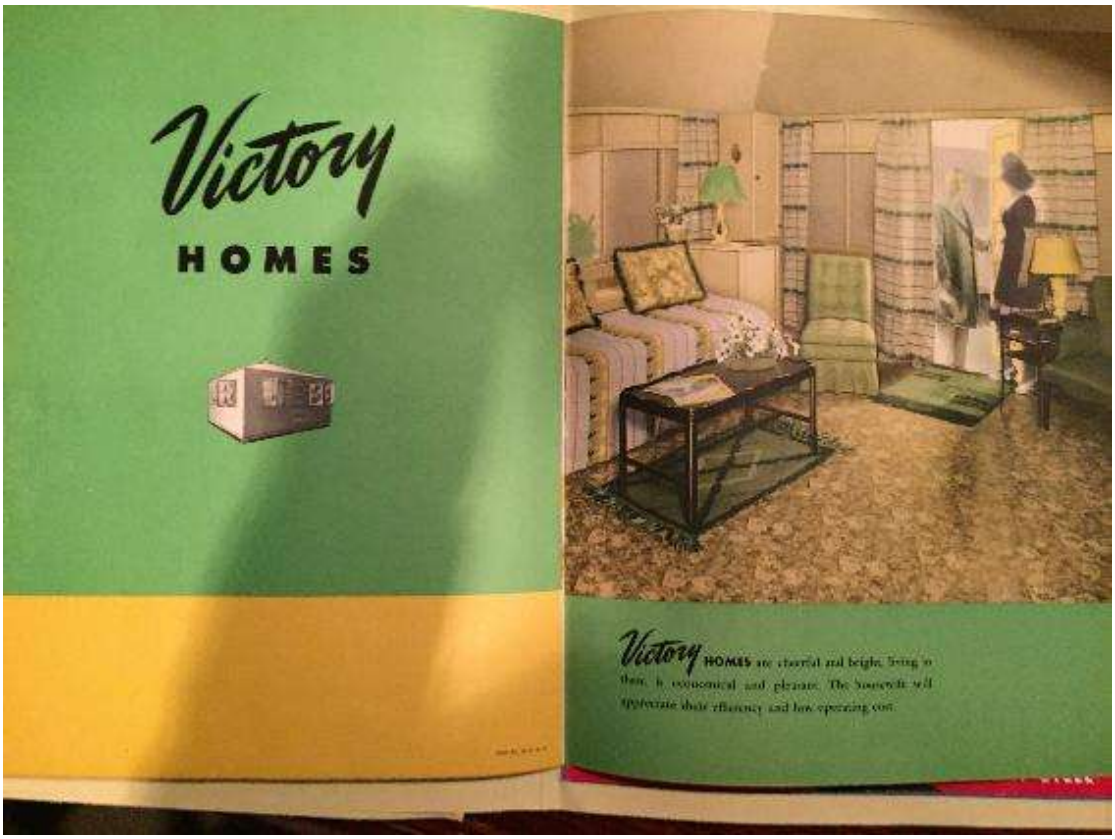

Victory HOMES
MODEL VILLAGE


Versatility
FARM HOUSES
DISASTER HOUSING
SUMMER CAMPS
MIGRANT FARM HELP HOUSING
HUNTING LODGES
GUEST HOUSES
TOURIST HOMES
LAKESIDE COTTAGES
COMMUNITY CENTERS


INDUSTRIAL AND BUSINESS USES OF THE Victory FIELD UNIT
LUNCHEONETTES & CAFETERIAS
BUS STOPS
HOUSING FOR OIL FIELD WORKERS
MACHINERY SHELTERS
RAILROAD HOUSING
POWER LINE CREWS
INFIRMARIES
AIRFIELD HOUSING
CONSTRUCTION CREWS
OFFICES AND ADDITIONS TO OFFICES
LUMBER CAMP HOUSING
EXPLORATION PARTIES
LABORATORIES
REAL ESTATE OFFICES
LOTS ALREADY FOR SALE

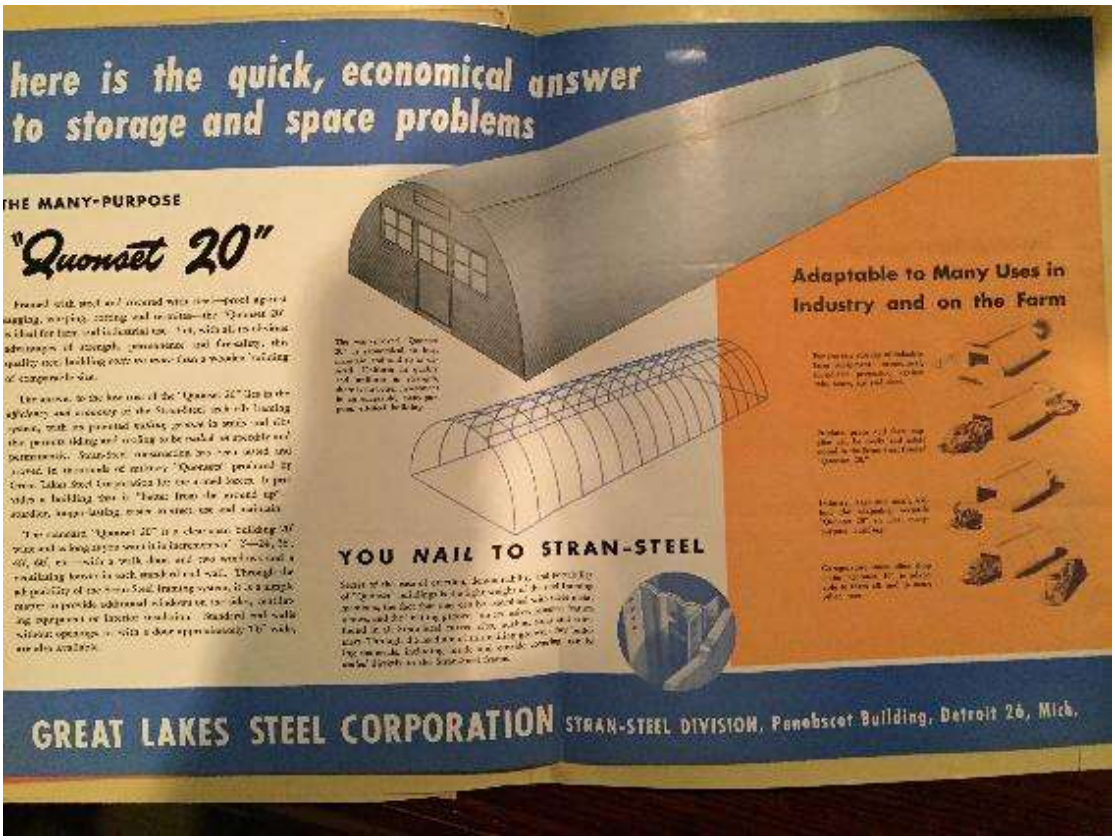

AN IMPORTANT
SOCIAL FACTOR


THE INSULATED
Victory
ARCTIC HOME
DESIGNED FOR SUB-ZERO REGIONS
Texas Prefab's Answer to
Housing Our War Workers
TEXAS PRE-FAB
has designed the
Victory War Workers
Home with special
floor plans and
arrangements. A
complete description
will be sent on request.
TEXAS PRE-FABRICATED HOUSE & TENT CO.

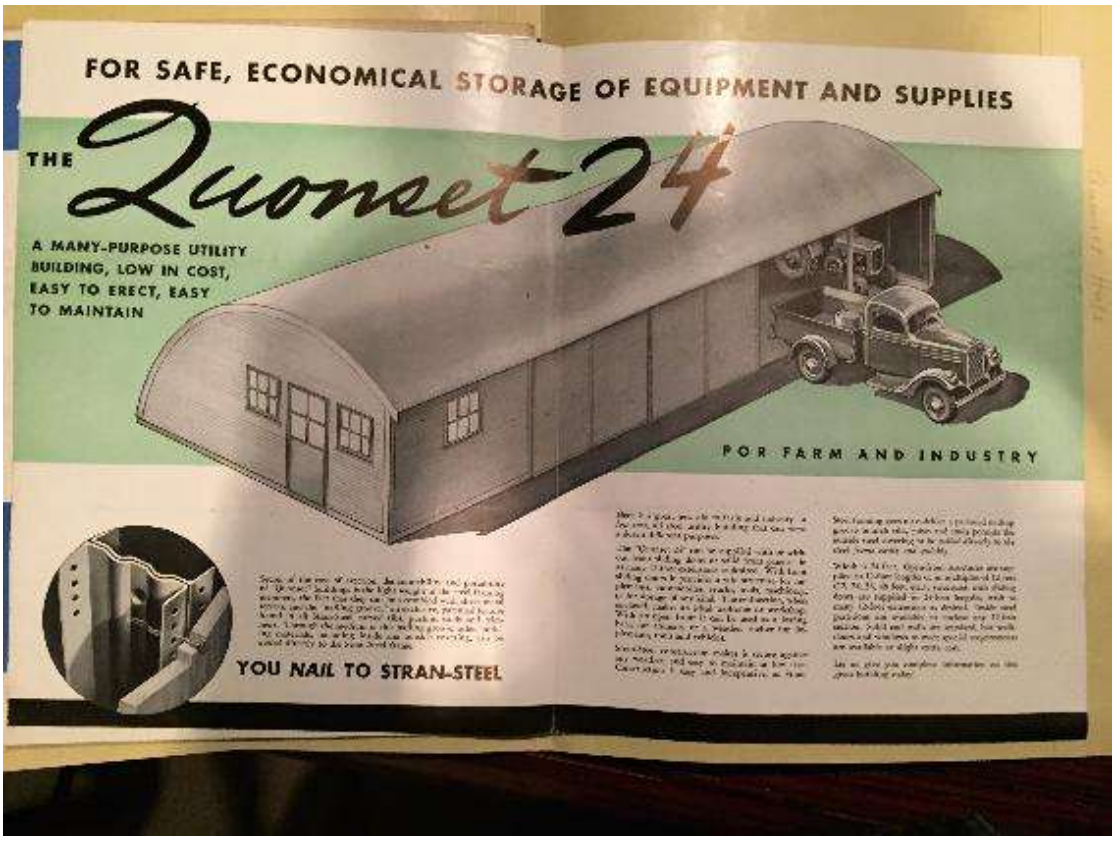

Victory
HOMES
Victory HOMES


simplify your warehousing and building problems with economical, flexible, easy-to-erect, fire-resistant STRAN-STEEL
THE SINGLE ARCH-RIB BUILDING
40' X 100'
THE MULTIPLE ARCH-RIB BUILDING
102' X 100'
YOU NAIL TO STRAN-STEEL
BUILDINGS REPRESENTING THE UTMOST IN SPACE AT AN ECONOMICAL PRIC


SPECIFICATIONS
GREAT LAKES STEEL CORPORATION
THE
QUONSET 20
AN ALL-STEEL GENERAL PURPOSE BUILDING
FOR FARM AND INDUSTRY

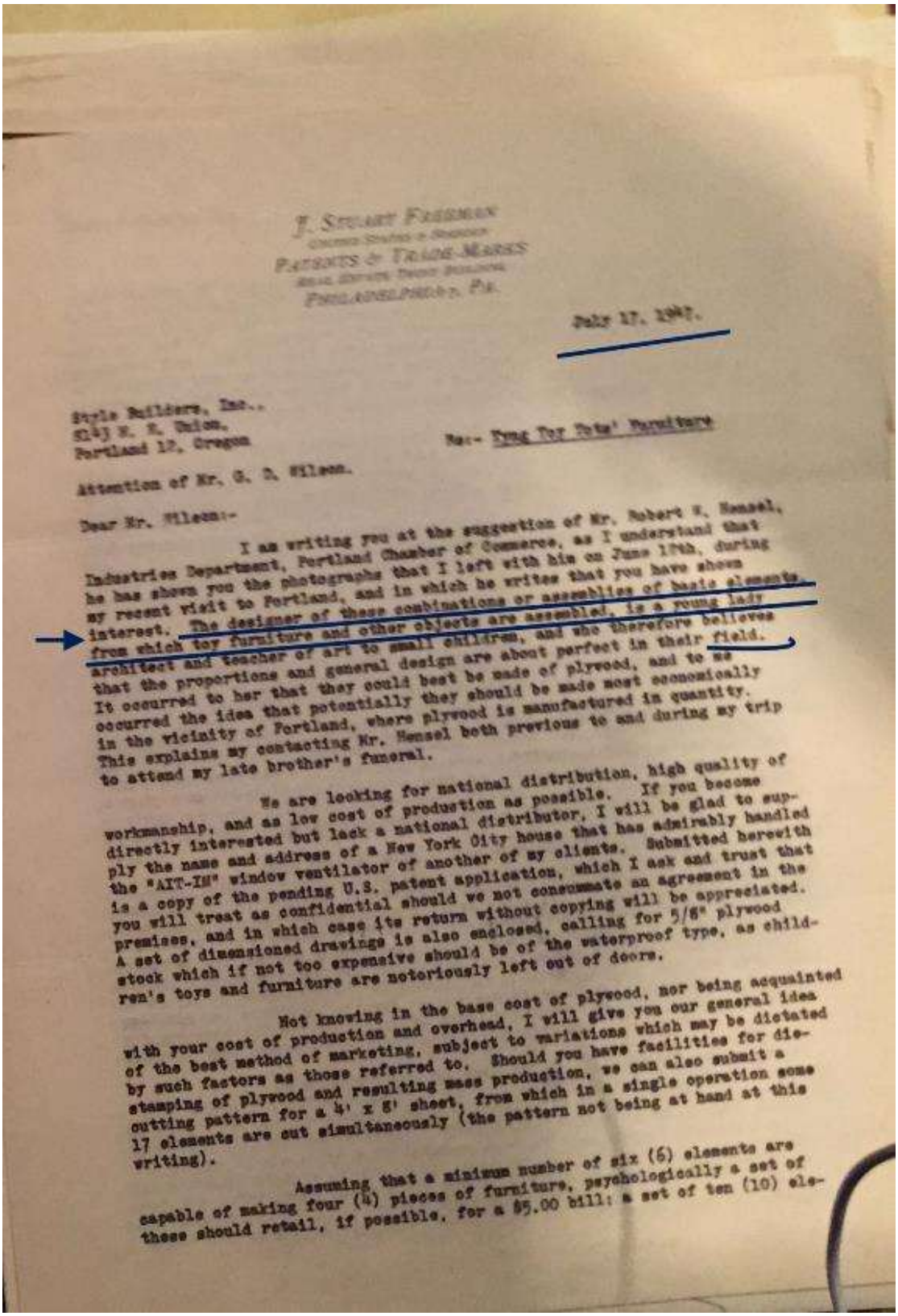

here is the quick, economical answer
to storage and space problems
THE MANY-PURPOSE
"Quonset 20"
Adaptable to Many Uses in
Industry and on the Farm
YOU NAIL TO STRAN-STEEL
GREAT LAKES STEEL CORPORATION
STRAN-STEEL DIVISION, Penobscot Building, Detroit 26, Mich.


Adaptable! Versatile! Economical!
SPECIFICATIONS (Condensed) THE "QUONSET 20"
THE
Quonset 24
GREAT LAKES STEEL CORPORATION
STRAN-STEEL DIVISION PENOBSCOT BLDG. DETROIT 26, MICHIGAN
UNIT OF NATIONAL STEEL CORPORATION


FOR SAFE, ECONOMICAL STORAGE OF EQUIPMENT AND SUPPLIES
THE Quonset 24
A MANY-PURPOSE UTILITY BUILDING, LOW IN COST, EASY TO ERECT, EASY TO MAINTAIN
FOR FARM AND INDUSTRY
YOU NAIL TO STRAN-STEEL

Anexo G. Catálogo *Victory Home* de General Housing Company, de 1943. Catálogo Quonset Hut, de 1941.

Fuente: Anne Griswold Tyng Collection, AAUP Carpeta 74.II.A.120 y Anne Griswold Tyng Collection, AAUP



J. Stuart Freeman
Patents & Trade-Marks
Philadelphia, Pa.

July 17, 1947.

Style Builders, Inc.,
5143 N. E. Union,
Portland 12, Oregon

Re:- Tyng Toy Tots' Furniture

Attention of Mr. G. D. Wilson.

Dear Mr. Wilson:-

I am writing you at the suggestion of Mr. Robert H. Hensel, Industries Department, Portland Chamber of Commerce, as I understand that he has shown you the photographs that I left with him on June 17th, during my recent visit to Portland, and in which he writes that you have shown interest. The designer of these combinations or assemblies of basic elements from which toy furniture and other objects are assembled, is a young lady architect and teacher of art to small children, and who therefore believes that the proportions and general design are about perfect in their field. It occurred to her that they could best be made of plywood, and to us occurred the idea that potentially they should be made most economically in the vicinity of Portland, where plywood is manufactured in quantity. This explains my contacting Mr. Hensel both previous to and during my trip to attend my late brother's funeral.

We are looking for national distribution, high quality of workmanship, and as low cost of production as possible. If you become directly interested but lack a national distributor, I will be glad to supply the name and address of a New York City house that has admirably handled the "AIT-IN" window ventilator of another of my clients. Submitted herewith is a copy of the pending U.S. patent application, which I ask and trust that you will treat as confidential should we not consummate an agreement in the premises, and in which case its return without copying will be appreciated. A set of dimensioned drawings is also enclosed, calling for 5/8" plywood stock which if not too expensive should be of the waterproof type, as children's toys and furniture are notoriously left out of doors.

Not knowing in the base cost of plywood, nor being acquainted with your cost of production and overhead, I will give you our general idea of the best method of marketing, subject to variations which may be dictated by such factors as those referred to. Should you have facilities for die-stamping of plywood and resulting mass production, we can also submit a cutting pattern for a 4' x 8' sheet, from which in a single operation some 17 elements are cut simultaneously (the pattern not being at hand at this writing).

Assuming that a minimum number of six (6) elements are capable of making four (4) pieces of furniture, psychologically a set of these should retail, if possible, for a $5.00 bill; a set of ten (10) ele-

Anexo H. Correspondencia de Stuart Frreman, quien colaboraba con Tyng en la patente de su "Tyng Toy", a G. D. Wilson, empresario. Julio 17 de 1947.

purpose

To give young people an opportunity to grow in their understanding of art as a natural and important part of life. Encouraged to explore their own imagination and experience through the use of the materials of art, students are urged to *interpret* rather than to *imitate* what they see and feel. Many will develop special talents, but all will be enriched by their own creative efforts; by working co-operatively as individuals and as members of a group toward a common goal; and by learning to enjoy many of the works of art in the Museum's collection.

registration

All children between the ages of 6 and 16 are eligible for admission to the Art Classes and are accepted in the order in which they apply until the group quota is reached. The working groups are divided by age into 6 through 8, 9 through 11, and 12 through 16.

workshop program

Students will receive instruction in easel and mural watercolor painting, oil painting (limited to 12 through 16's), finger painting (for 6 through 8's only), sketching out-of-doors, drawing in ink, pencil and charcoal, clay modeling and plaster casting, linoleum block printing, lithography and etching (for all except 6 through 8's) and collage.

Rhythmic dancing is being introduced for all age groups so that every member of the Art Classes may be able to enjoy several periods of dancing throughout the season. Children who learn to express their feelings through the practised use of their bodies will, we believe, carry over this new awareness to their creative efforts in painting, sculpture and printmaking.

learning to see

It is recommended that all students use sketchbooks (obtainable at the Museum) for work at home and at the Museum to record the things around them that seem most interesting. (Parents are urged to avoid making comments concerning the character or quality of their children's efforts as they may have the effect of discouraging them from expressing themselves in the only way which their age and growth make possible.) The habit of using a sketchbook has great value in training young people to discover new meaning in the seemingly trivial everyday things.

The outdoor sketching trips which are planned for all age groups at the Museum also serve to develop in young people a fuller and richer response to the exciting things that exist everywhere, once they learn to observe them. These trips also help to make vividly clear to students the difference between the three-dimensional, flesh-and-blood reality of life and that recreation from life which, at its best, we call art.

toward understanding

In close relation to the work of the classes, frequent use is made of how-to-do-it demonstrations, gallery visits, as well as color-slide talks, movies and conferences many of which are held regularly in the second floor auditorium for all members of the Art Classes. Parents are always welcome to attend the activities held in the auditorium.

These events include an illustrated talk, *What the Museum can mean to you*, by E. M. Benson, Chief of the Division of Education, on Saturday morning November 8 from 9:30 to 10:00 and another talk, *Growth through Doing*, on Saturday morning April 17, when Mr. Benson will explain the value of the children's work completed during the season. Other brief talks and demonstrations on subjects relating to workshop problems will be given by staff instructors from time to time throughout the year.

class dates . . . consultation hours Classes meet on the following 20 Saturday mornings from 9:30 to 11:30 A.M. during the season of 1947-1948: November 1, 8, 15, 22, December 6, 13, January 10, 17, 24, 31, February 7, 14, 21, 28, March 6, 13, April 3, 10, 17, 24.

Parents of students who wish to consult with members of the teaching staff are invited to do so preceding classes from 9:00 to 9:30 A.M.

fee The combined registration and materials fee for the complete winter-spring term of 20 periods is $20 payable in advance of the first session. All checks should be made payable to the Philadelphia Museum of Art and sent to the Registrar of Art Classes from whom application forms for admission to the Art Classes may be obtained. Applicants will only be accepted on a seasonal basis and no refunds will be made for any reason, after registration.

staff Instruction is provided by a large staff of highly skilled artist-teachers under the supervision of Samuel L. Feinstein assisted by Morris Blackburn in charge of the Adult Workshop Group, Alice Dunham, Elsa Freed, Rita Ruben, Leroy Weber, Arnold Tierkel, I. Sankowsky, Peter Lauck, 3rd, Anne Tyng and Nadia Chilkovsky in charge of rhythmic dancing.

The entire staff has a sympathetic understanding of the needs of children and considerable experience in the fields of art and education.

for parents only

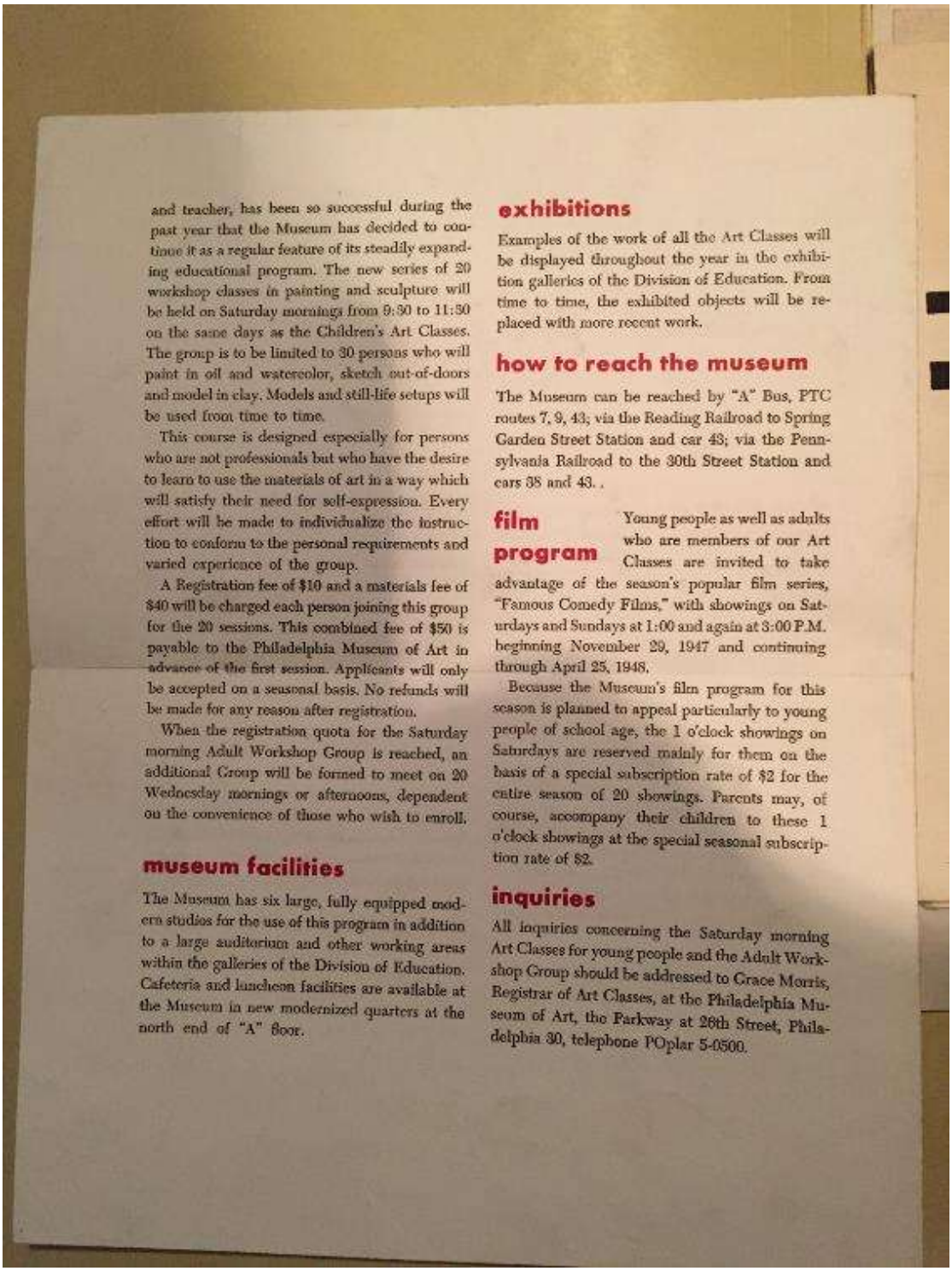
Two conferences are being planned especially for parents of the children who are members of the Art Classes, the first on Saturday December 6 from 10:00 to 11:00 and the second on Saturday March 6. At these informal meetings, to be held in the 2nd floor auditorium, Mr. Benson will explain his department's point of view in regard to art education for young people, and will answer questions relating to the work of the Art Classes.

Since the success of the Museum's work for young people is dependent, to a large degree, on the extent to which parents have an understanding of the Museum's objectives, it is important that all parents make an effort to be present at these meetings. Following these conferences parents are invited to visit the classes in session.

A special series of eight *Know-Your-Museum* Gallery Tours for parents of children attending the Art Classes will be conducted by Grace Morris on the following Saturday mornings from 10:00 to 11:00 o'clock: November 22, December 13, January 17 and 31, February 14 and 28, March 13, April 10. Museum members and visitors are invited to join these tours.

the adult workshop group in painting and sculpture

The Adult Workshop Group under the direction of Morris Blackburn, well-known artist



and teacher, has been so successful during the past year that the Museum has decided to continue it as a regular feature of its steadily expanding educational program. The new series of 20 workshop classes in painting and sculpture will be held on Saturday mornings from 9:30 to 11:30 on the same days as the Children's Art Classes. The group is to be limited to 30 persons who will paint in oil and watercolor, sketch out-of-doors and model in clay. Models and still-life setups will be used from time to time.

This course is designed especially for persons who are not professionals but who have the desire to learn to use the materials of art in a way which will satisfy their need for self-expression. Every effort will be made to individualize the instruction to conform to the personal requirements and varied experience of the group.

A Registration fee of $10 and a materials fee of $40 will be charged each person joining this group for the 20 sessions. This combined fee of $50 is payable to the Philadelphia Museum of Art in advance of the first session. Applicants will only be accepted on a seasonal basis. No refunds will be made for any reason after registration.

When the registration quota for the Saturday morning Adult Workshop Group is reached, an additional Group will be formed to meet on 20 Wednesday mornings or afternoons, dependent on the convenience of those who wish to enroll.

museum facilities

The Museum has six large, fully equipped modern studios for the use of this program in addition to a large auditorium and other working areas within the galleries of the Division of Education. Cafeteria and luncheon facilities are available at the Museum in new modernized quarters at the north end of "A" floor.

exhibitions

Examples of the work of all the Art Classes will be displayed throughout the year in the exhibition galleries of the Division of Education. From time to time, the exhibited objects will be replaced with more recent work.

how to reach the museum

The Museum can be reached by "A" Bus, PTC routes 7, 9, 43; via the Reading Railroad to Spring Garden Street Station and car 43; via the Pennsylvania Railroad to the 30th Street Station and cars 38 and 43. .

film program

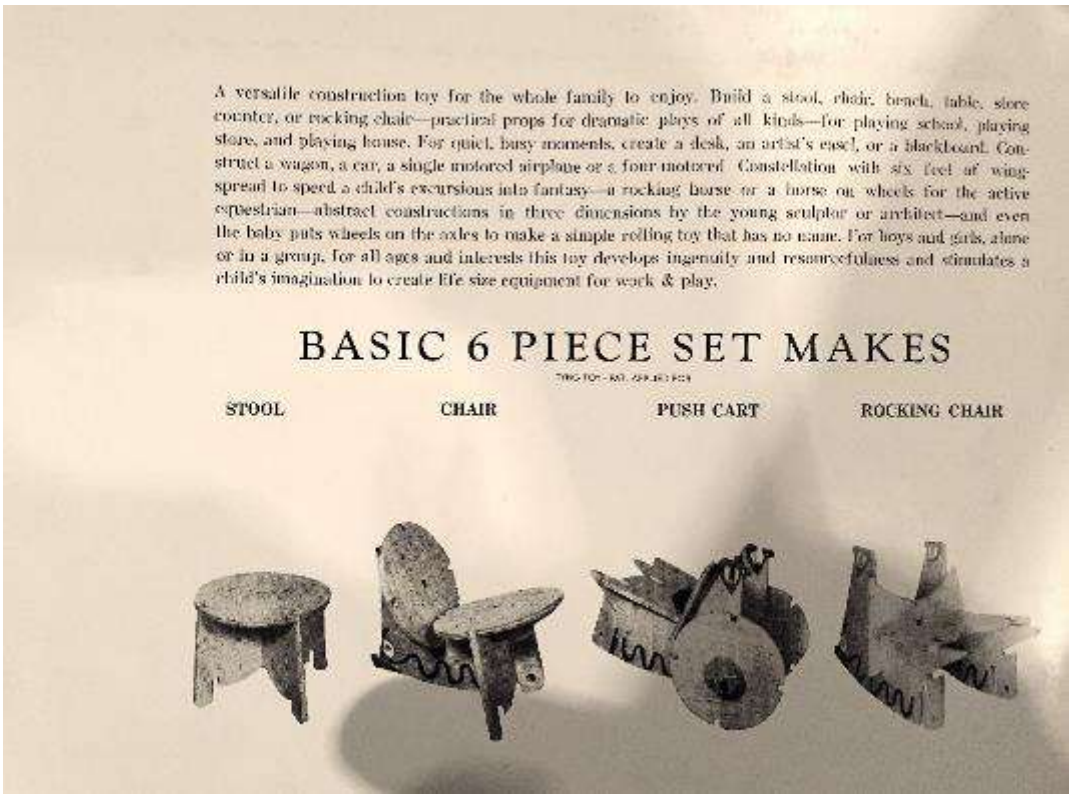
Young people as well as adults who are members of our Art Classes are invited to take advantage of the season's popular film series, "Famous Comedy Films," with showings on Saturdays and Sundays at 1:00 and again at 3:00 P.M. beginning November 29, 1947 and continuing through April 25, 1948.

Because the Museum's film program for this season is planned to appeal particularly to young people of school age, the 1 o'clock showings on Saturdays are reserved mainly for them on the basis of a special subscription rate of $2 for the entire season of 20 showings. Parents may, of course, accompany their children to these 1 o'clock showings at the special seasonal subscription rate of $2.

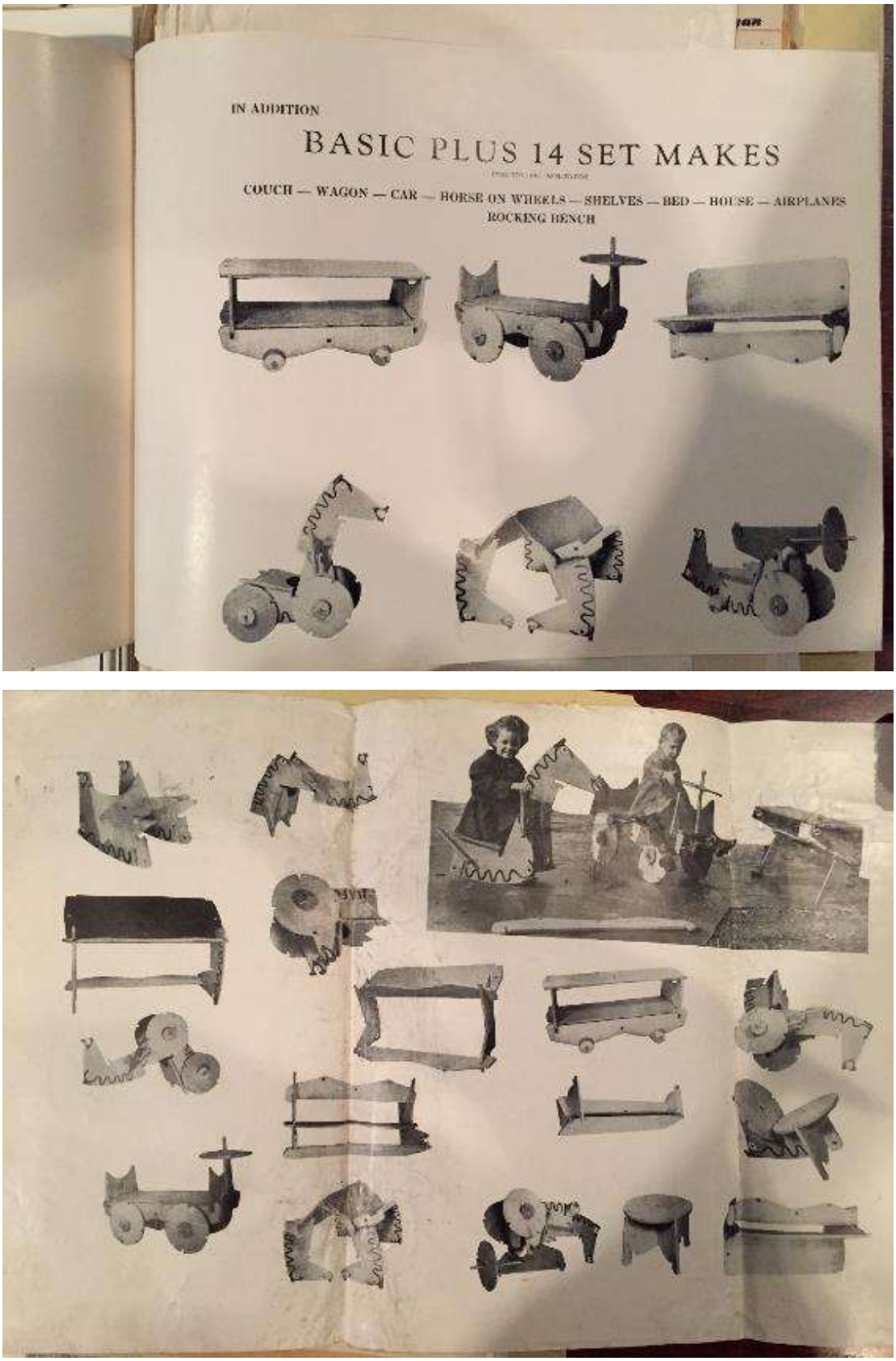
inquiries

All inquiries concerning the Saturday morning Art Classes for young people and the Adult Workshop Group should be addressed to Grace Morris, Registrar of Art Classes, at the Philadelphia Museum of Art, the Parkway at 26th Street, Philadelphia 30, telephone POplar 5-0500.

Anexo I. Folleto 1947-1948 del Museo de Niños.

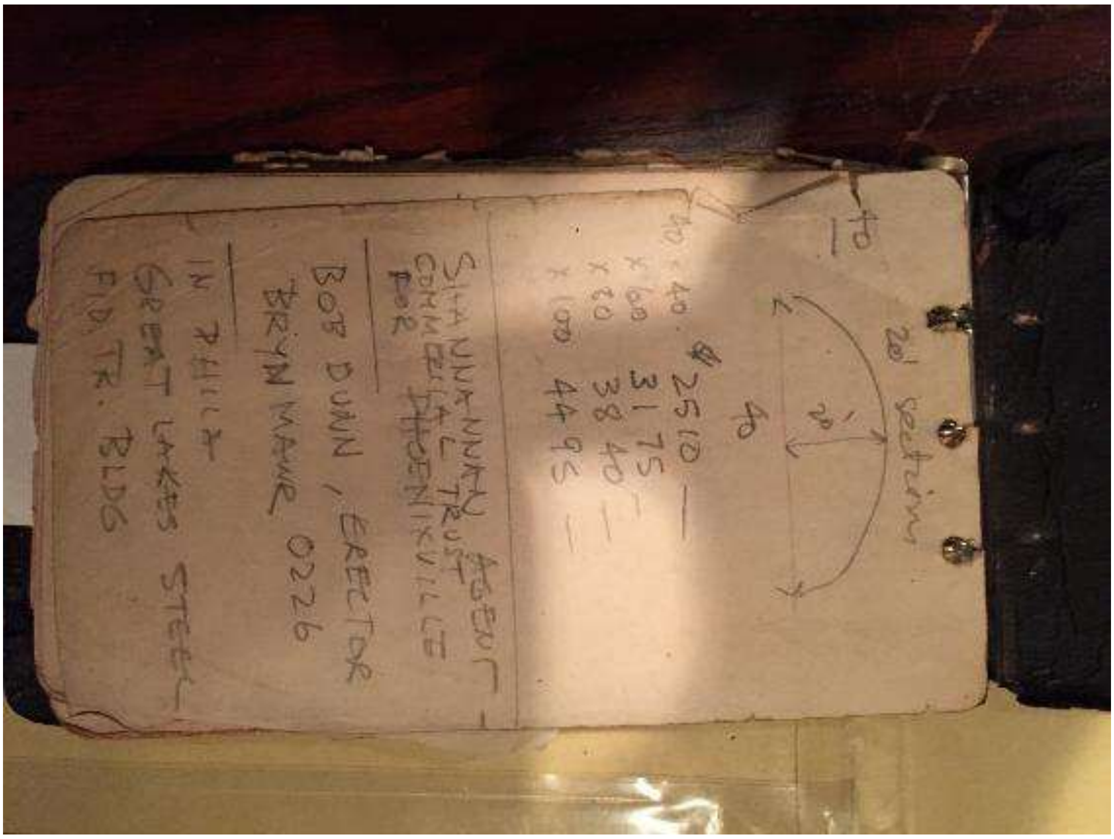

A versatile construction toy for the whole family to enjoy. Build a stool, chair, bench, table, store counter, or rocking chair—practical props for dramatic plays of all kinds—for playing school, playing store, and playing house. For quiet, busy moments, create a desk, an artist's easel, or a blackboard. Construct a wagon, a car, a single motored airplane or a four motored Constellation with six feet of wing-spread to speed a child's excursions into fantasy—a rocking horse or a horse on wheels for the active equestrian—abstract constructions in three dimensions by the young sculptor or architect—and even the baby puts wheels on the axles to make a simple rolling toy that has no name. For boys and girls, alone or in a group, for all ages and interests this toy develops ingenuity and resourcefulness and stimulates a child's imagination to create life size equipment for work & play.
BASIC 6 PIECE SET MAKES
STOOL
CHAIR
PUSH CART
ROCKING CHAIR

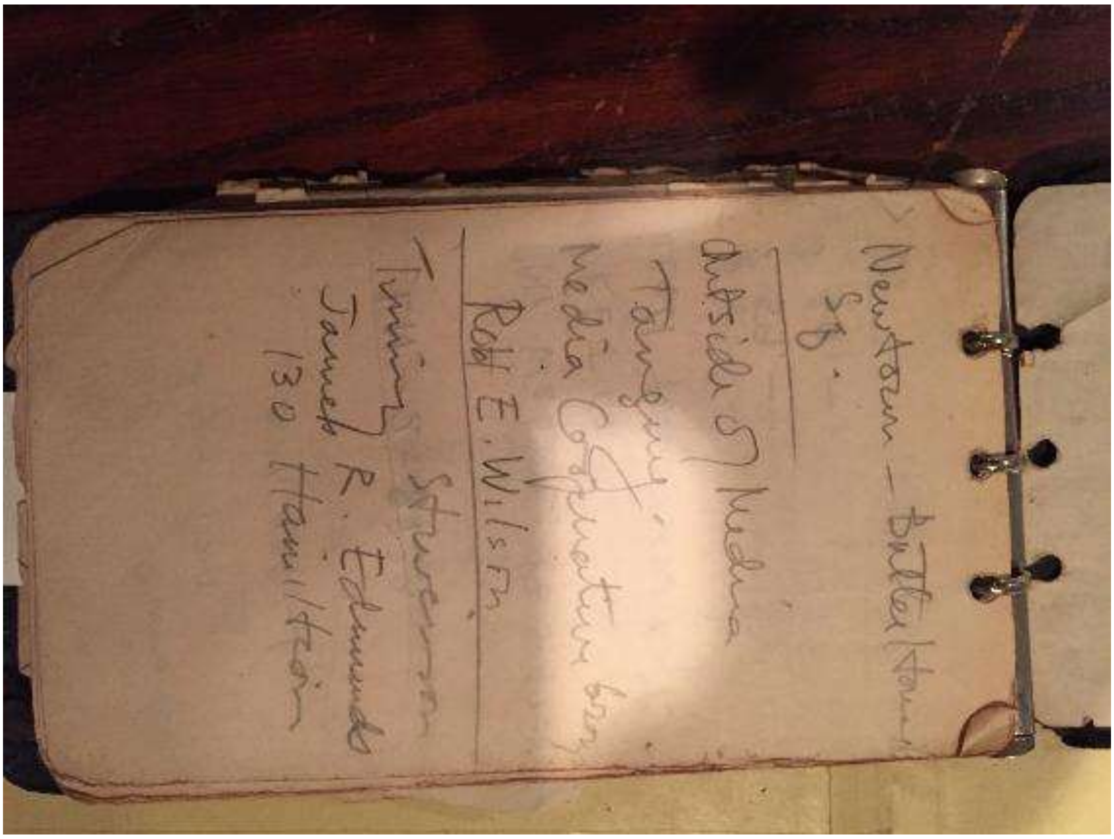

IN ADDITION
BASIC PLUS 5 SET MAKES
TABLE — PUSH-HORSE — BENCH — BLACKBOARD — ROCKING HORSE — STORE COUNTER



Anexo J. Catálogo publicitario "Tyng Toy".

Fuente: Tyng Collection AAUP. 74. II. A.148.


20' section
$2510 —
3175 —
3840 —
4495 —
SHANNAHAN AGENT
COMMERCIAL TRUST
FOR PHOENIXVILLE
BOB DUNN, ERECTOR
BRYN MAWR 0226
IN PHILA
GREAT LAKES STEEL
FID. TR. BLDG


Newtown - Bitter Hamilton
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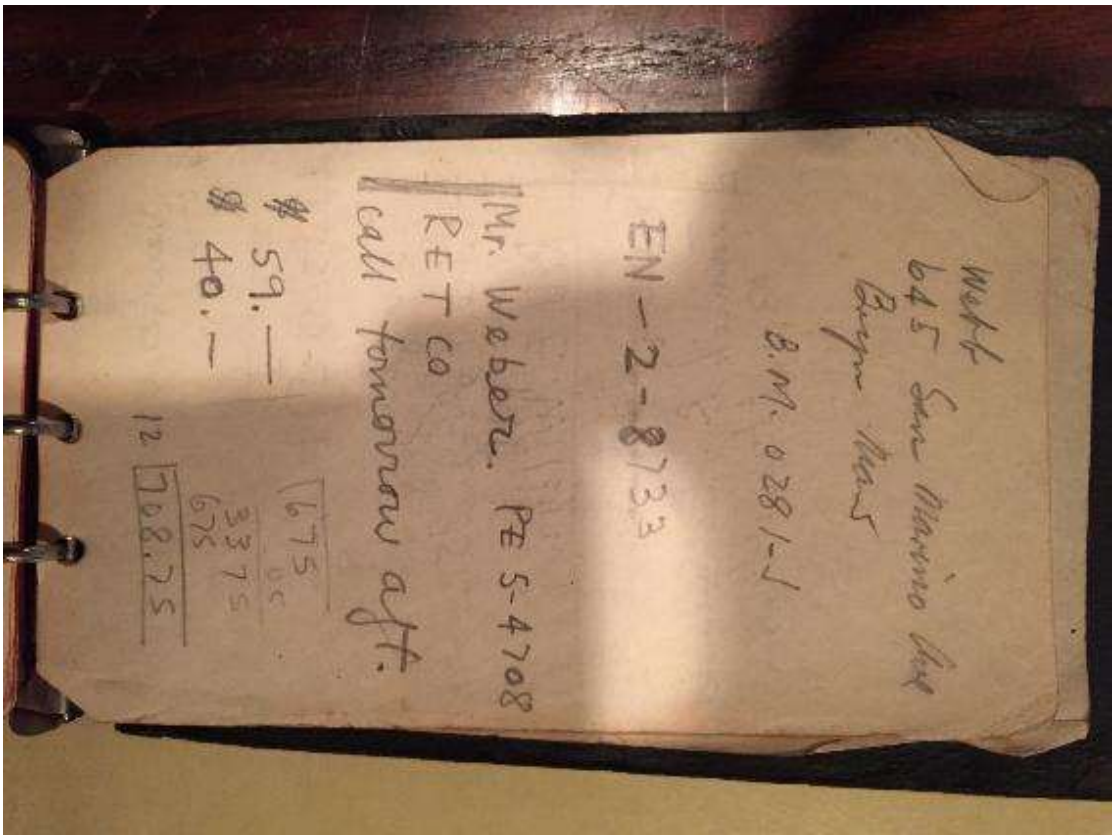
Media Cooperation
Robt E. Wilson
Turning Stevenson
James R. Edmunds
130 Hamilton


Work
645 San Marino Ave
Bryn Mawr
B.M. 0281-J
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Mr. Weber. PE 5-4708
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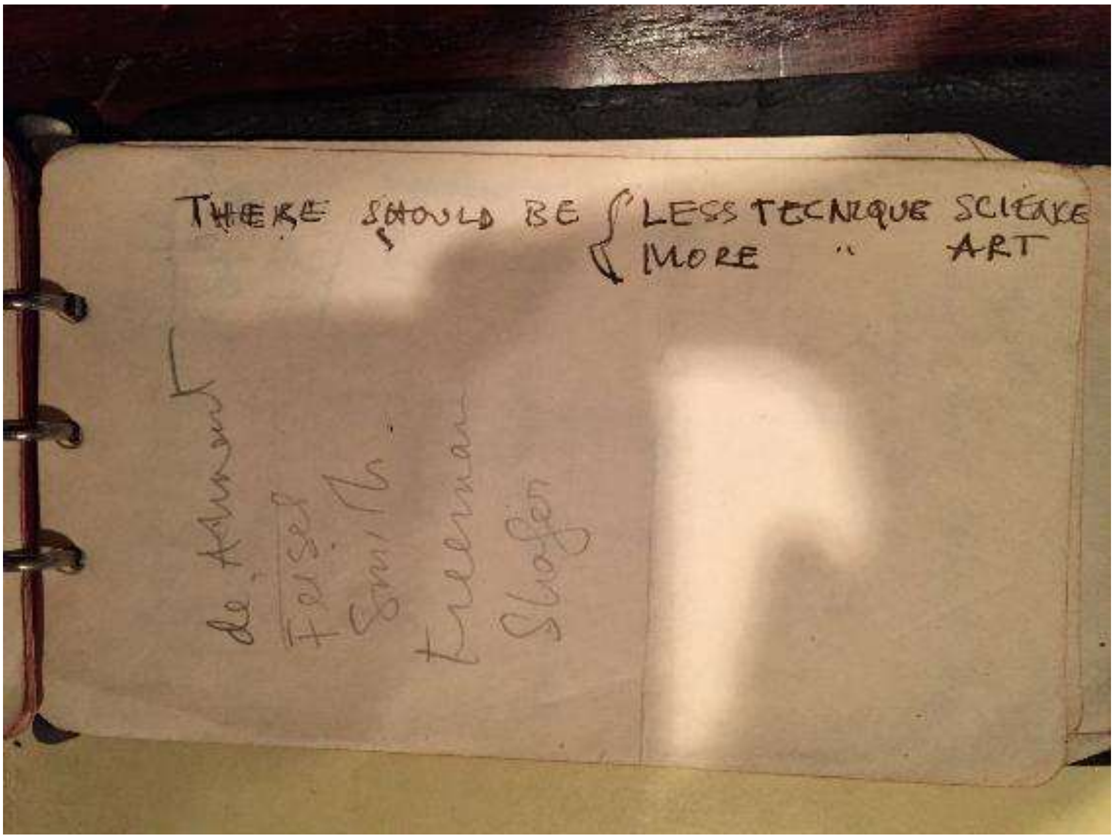
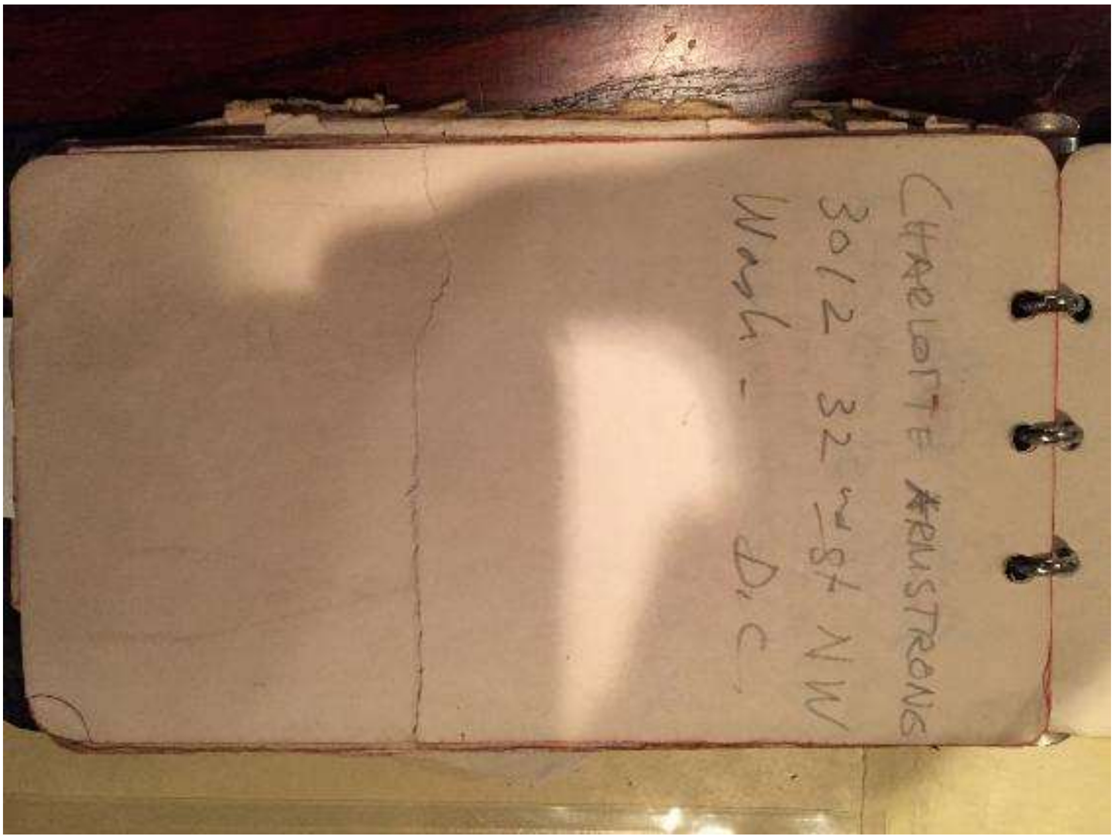
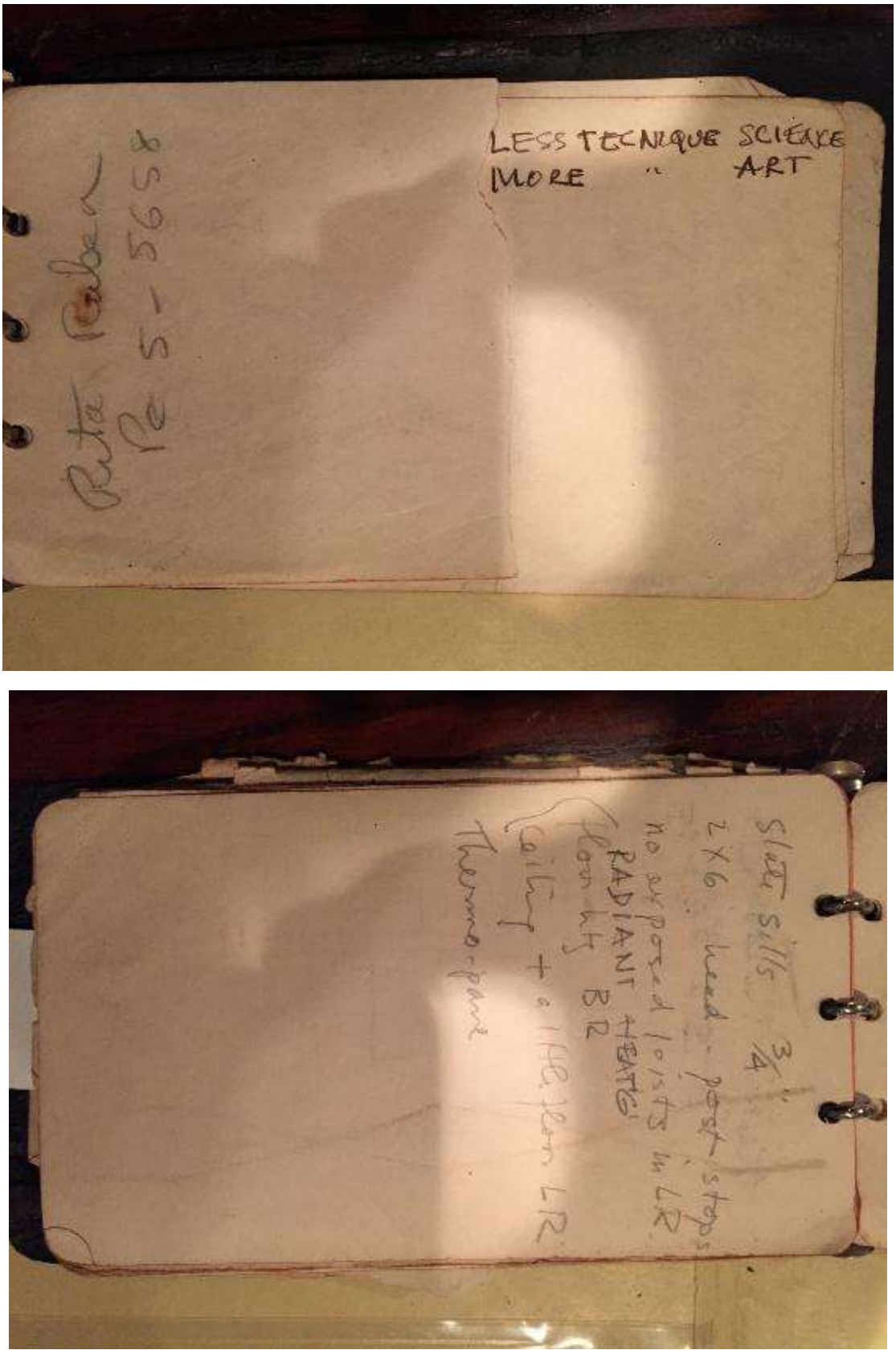

THERE SHOULD BE { LESS TECNIQUE SCIENCE
MORE " ART


CHARLOTTE ARMSTRONG
3012 32nd St NW
Wash. D.C.



Anexo K. Planificador semanal y bloc de notas de Tyng y Kahn, 1948.

Fuente: Anne Griswold Tyng Collection, The Architectural Archives, University of Pennsylvania. Carpeta, 74.I.F.2.1

August 4, 1964

Mr. Lancelot L. Whyte
93 Addington Road
London N.W. 3

Dear Mr. Whyte:

It seems appalling to me that I have not read them before now, but it has only been in the last few months that I have read your books, The Next Development in Man, Focus and Diversions, and Accent on Form, although I do remember being impressed with your introduction to Aspects of Form and I've been a long-time fan of D'Arcy W. Thompson. What is particularly exciting to me is the possibility that what I have been working on may be a specific instance of your theory of "symmetric form and asymmetric process".

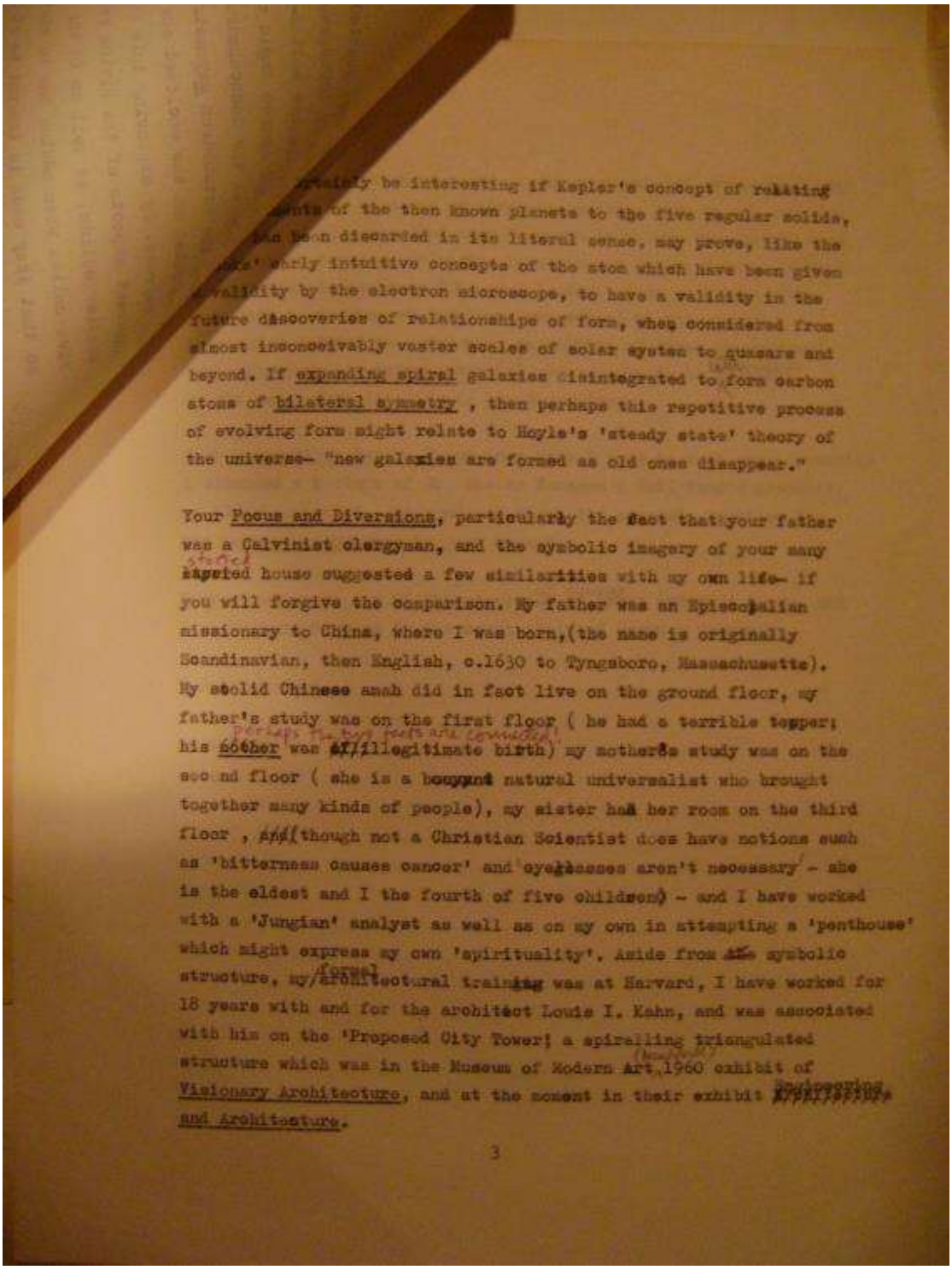
The enclosed announcement refers to an exhibit of some work I have done on the Platonic Solids, an exhibit now scheduled to remain through August 31st. I understand you are planning to visit the U.S. this fall. Perhaps it would be possible for you to see the exhibit. Motivated by a dissatisfaction with the static 'pure' forms developed by Buckminster Fuller, I undertook a search for underlying principles ordering the relationships between the five regular three dimensional solids as the basis for meaningful asymmetry and transitions in scale- principles which might be the basis for the creation of more humanized forms.

The Divine Proportion of Golden Section is apparently such a principle- on which one may base an order of 'gnomons' of edge, plane and volume, to create an infinite variation of forms.

[illegible] I had been puzzled by the small difference between [illegible]di' angle of 109degrees 28', which results from symmetrical [illegible] of the simpler solids- the tetrahedron cube and octahedron-, and the exact 108 degree angle of the pentagon which appears in the 'higher' solids- the dodecahedron and icosahedron. I found that by dividing the octahedron asymmetrically in the Divine Proportion, - as indicated on the enclosed sketch- that one gets an angle of exactly 108 degrees. By exploring this further I found other indications of inherent aspects of the Divine Proportion - in inner divisions of the simpler solids, as well as in the relation of edge dimensions of all five solids when adding one to another in the order of their complexity so that ~~they~~ each is tangent to at least one other solid. ~~It/the~~

In the exhibit which I mentioned, colored dowels to express different dimensions are used in models to show fundamental relationships from edge to plane to volume, ~~after/reading/your/books~~ in both internal divisions and additive forms.

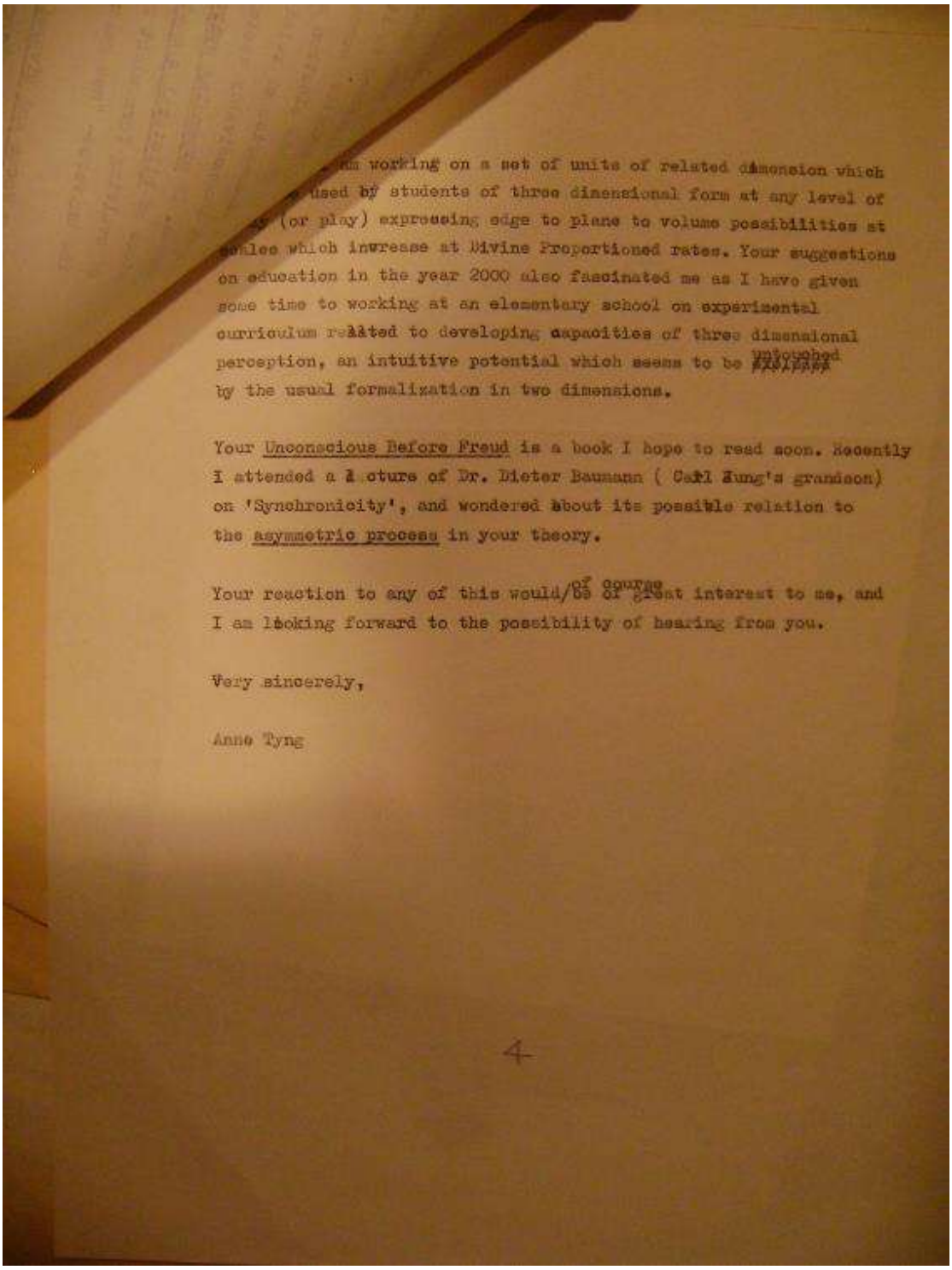
From all of this, a simple theory of evolving form - ~~perhaps~~ too simple- seemed to be indicated by a series of specific examples, and I use here, ~~perhaps incorrectly,~~ your terms 'symmetric form' and 'asymmetric process'. The Divine Proportion (the term is used not in any theological sense) seems to play a most fascinating role as an asymmetric process; providing a continuous link from simple 'bilateral symmetry'- tetrahedron, cube and octahedron forms of crystals- through 'asymmetric process' to pentagonal or centrifugal symmetry of the dodecahedron and icosahedron, forms found in one-celled marine protozoa or radiolarian; through further 'asymmetric process' achieving a more evolved symmetry such as the spiralling symmetry of DNA; and again through 'asymmetric process' which adds another dimension to the symmetry, achieving an expanding spiral symmetry as in phyllotaxis, the nautilus shell or even a spiralling galaxy. Such an evolving symmetry then could express a fundamental order of relationship, continuously including new factors of movement and direction through an 'asymmetric process' based on the Divine Proportion.



...certainly be interesting if Kepler's concept of relating ...nts of the then known planets to the five regular solids, ...n been discarded in its literal sense, may prove, like the ...s' early intuitive concepts of the atom which have been given ...validity by the electron microscope, to have a validity in the future discoveries of relationships of form, when considered from almost inconceivably vaster scales of solar system to quasars and beyond. If expanding spiral galaxies disintegrated to form carbon atoms of bilateral symmetry , then perhaps this repetitive process of evolving form might relate to Hoyle's 'steady state' theory of the universe- "new galaxies are formed as old ones disappear."

Your Focus and Diversions, particularly the fact that your father was a Calvinist clergyman, and the symbolic imagery of your many storied house suggested a few similarities with my own life- if you will forgive the comparison. My father was an Episcopalian missionary to China, where I was born,(the name is originally Scandinavian, then English, c.1630 to Tyngsboro, Massachusetts). My solid Chinese amah did in fact live on the ground floor, my father's study was on the first floor (he had a terrible temper; perhaps flaying feet are connected his mother was of illegitimate birth) my mother's study was on the second floor (she is a buoyant natural universalist who brought together many kinds of people), my sister had her room on the third floor , and (though not a Christian Scientist does have notions such as 'bitterness causes cancer' and eyeglasses aren't necessary - she is the eldest and I the fourth of five children) - and I have worked with a 'Jungian' analyst as well as on my own in attempting a 'penthouse' which might express my own 'spirituality'. Aside from the symbolic structure, my (formal) architectural training was at Harvard, I have worked for 18 years with and for the architect Louis I. Kahn, and was associated with him on the 'Proposed City Tower' a spiralling triangulated structure which was in the Museum of Modern Art (Houston?) 1960 exhibit of Visionary Architecture, and at the moment in their exhibit Environments and Architecture.

3



...working on a set of units of related dimension which ...used by students of three dimensional form at any level of ...(or play) expressing edge to plane to volume possibilities at ...ples which increase at Divine Proportioned rates. Your suggestions on education in the year 2000 also fascinated me as I have given some time to working at an elementary school on experimental curriculum related to developing capacities of three dimensional perception, an intuitive potential which seems to be untouched by the usual formalization in two dimensions.

Your Unconscious Before Freud is a book I hope to read soon. Recently I attended a lecture of Dr. Dieter Baumann (Carl Jung's grandson) on 'Synchronicity', and wondered about its possible relation to the asymmetric process in your theory.

Your reaction to any of this would, of course, be of great interest to me, and I am looking forward to the possibility of hearing from you.

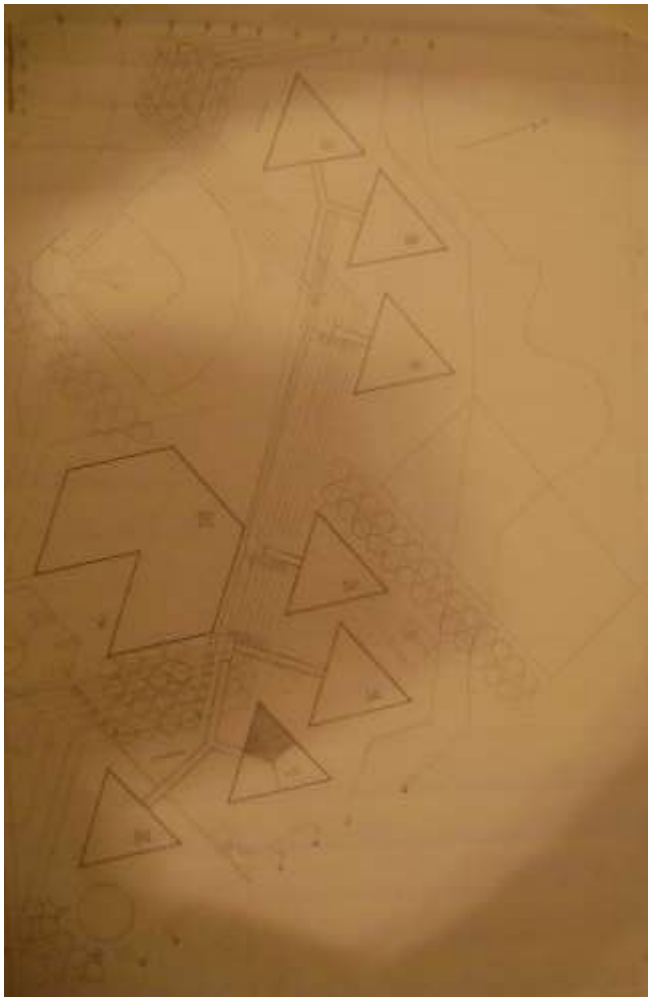
Very sincerely,

Anne Tyng

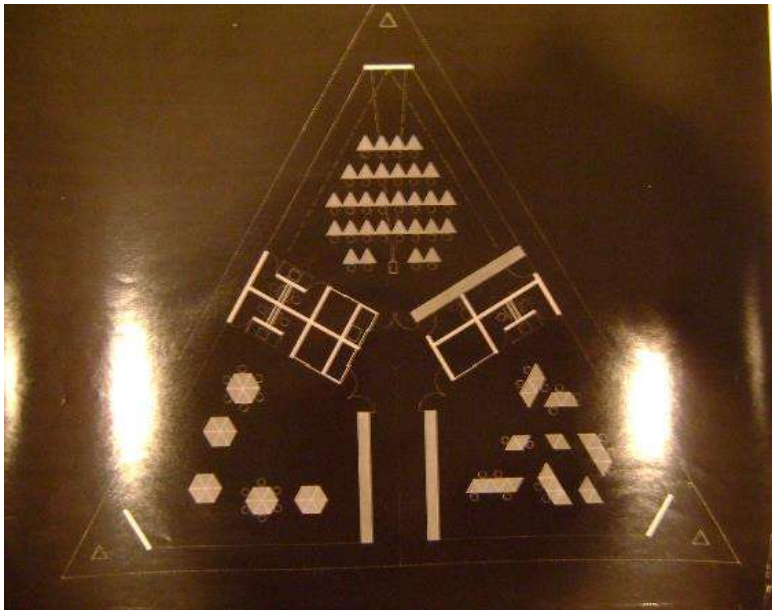
4

Anexo L. Carta de Tyng a Lancelot Law Whyte en 1964.

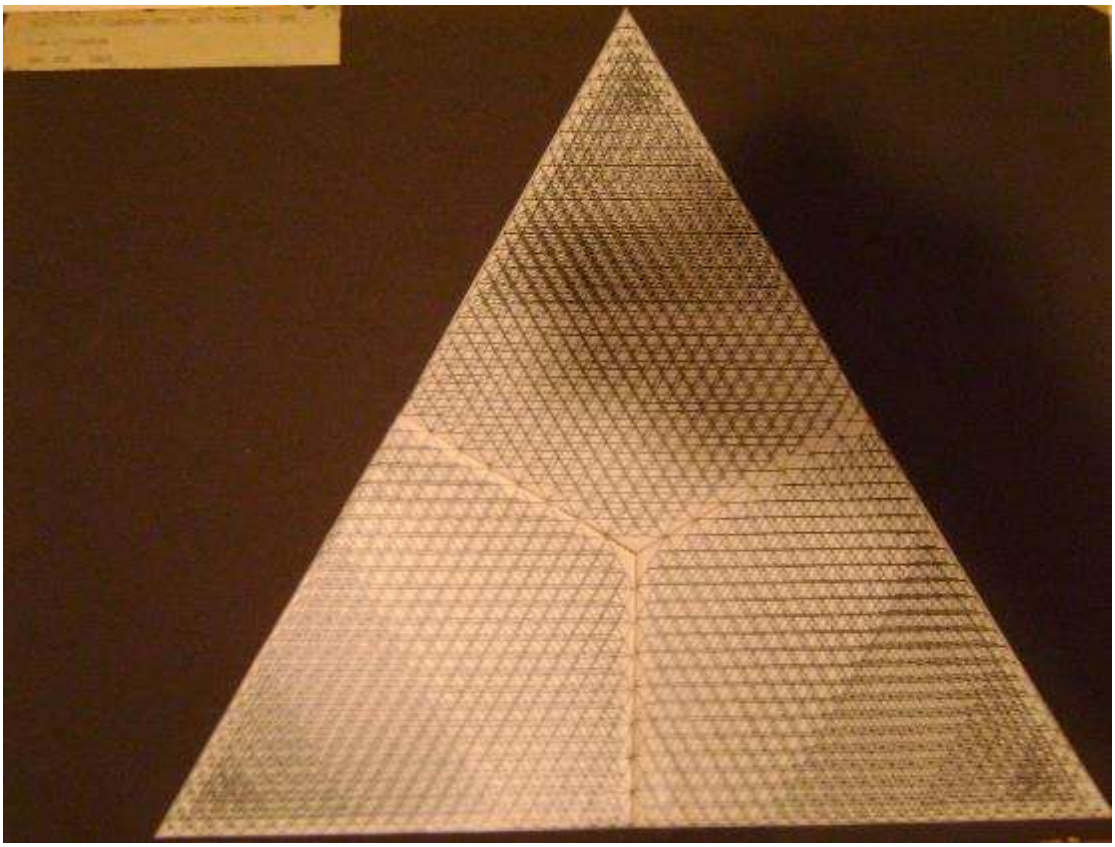
Fuente: AAUP, Anne Griswold Tyng Collection, carpeta 74. II. A. 39.2



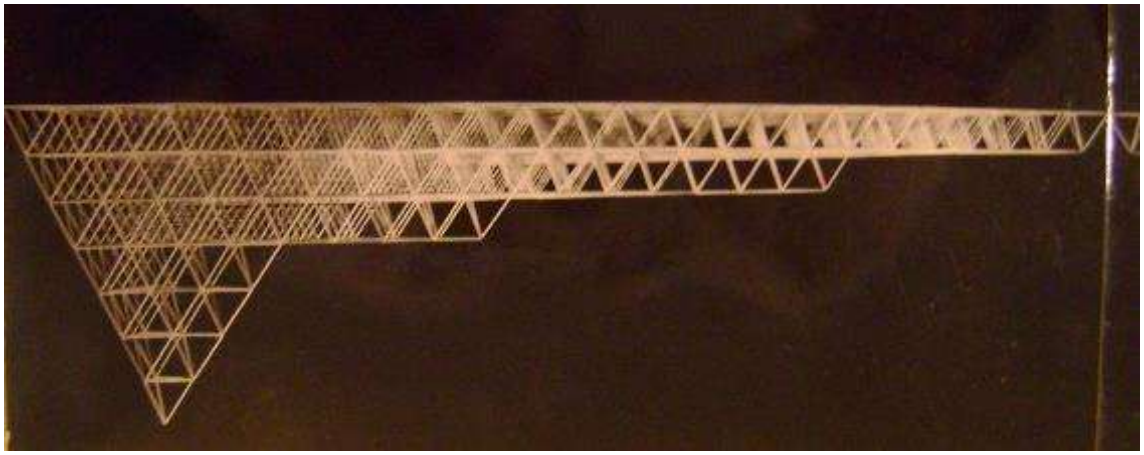
Croquis general



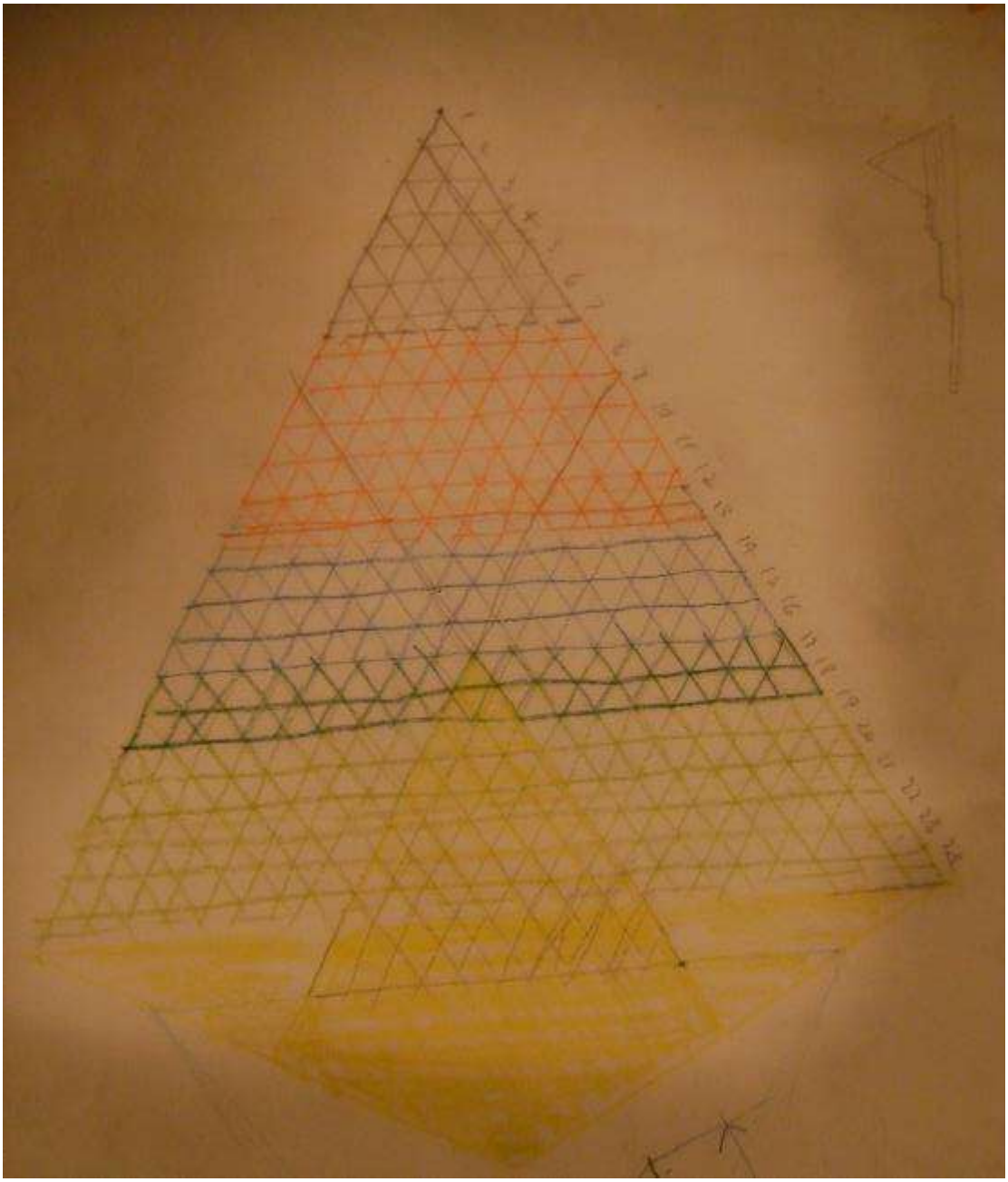
Planta triada de módulos de aulas



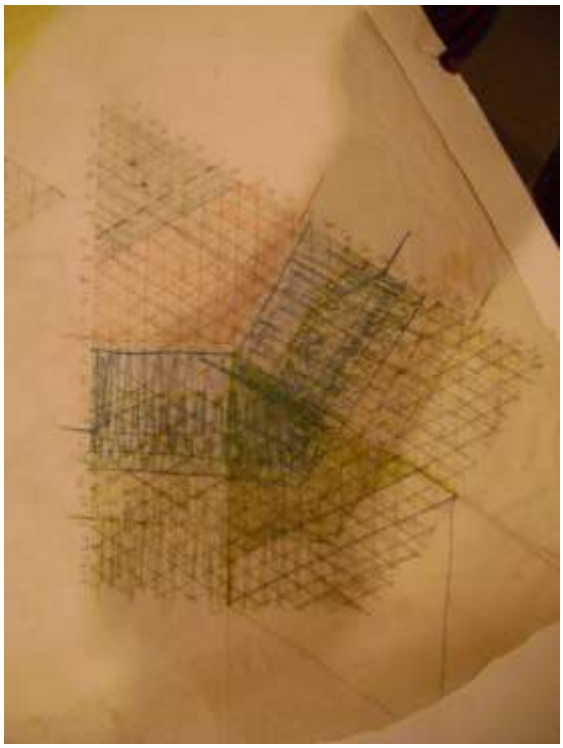
Planta estructural de cubierta

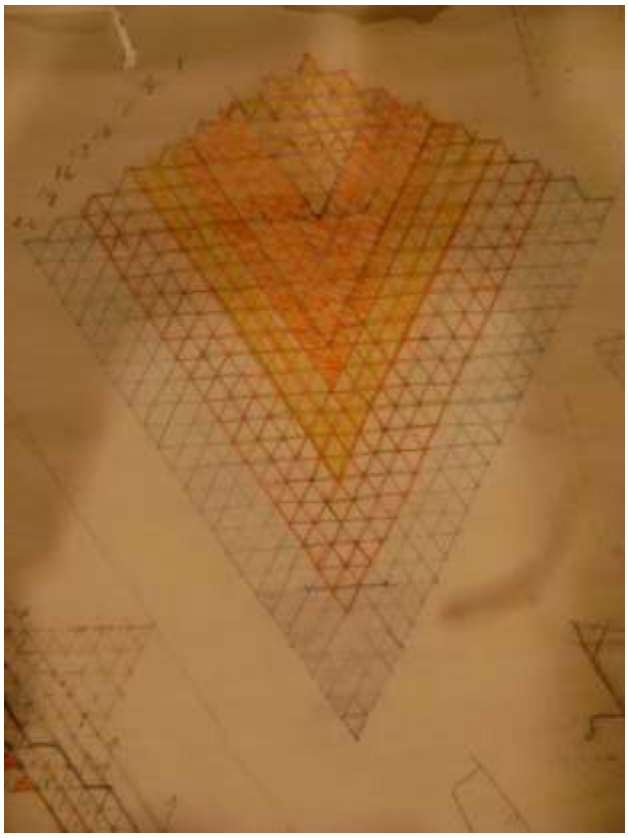


Vista lateral de la estructura

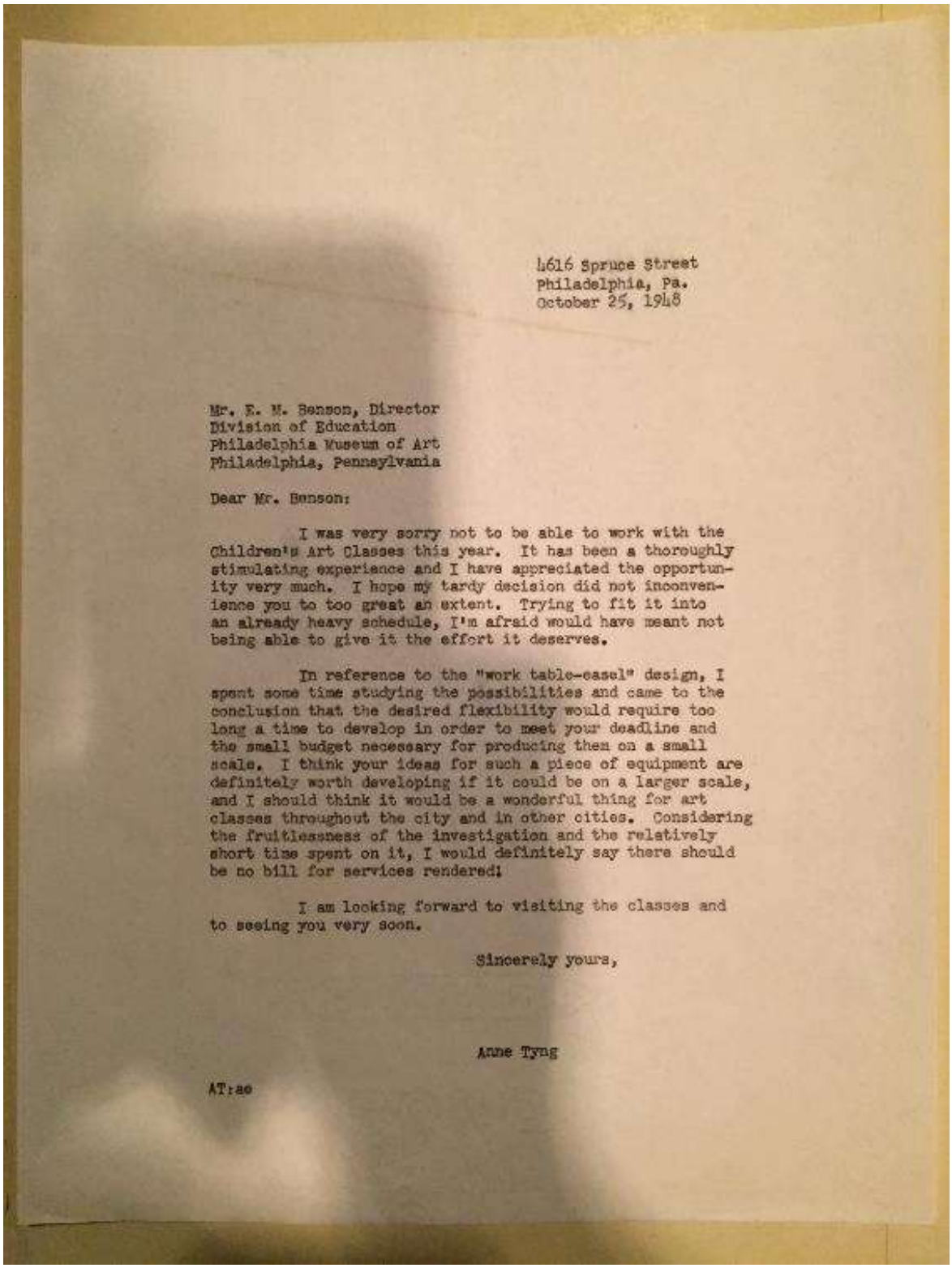


Dibujo exploratorio de la organización de capas de tetraedros que conforman la estructura del módulo de aulas, como una plementería de una bóveda.





Anexo M. Dibujos del proyecto seminal Elementary School, Bucks County, P. A. 1951-1952. Fuente. AAUP, Anne Griswold Tyng Collection, carpeta 74.III.14



4616 Spruce Street
Philadelphia, Pa.
October 25, 1948

Mr. E. M. Benson, Director
Division of Education
Philadelphia Museum of Art
Philadelphia, Pennsylvania

Dear Mr. Benson:

I was very sorry not to be able to work with the Children's Art Classes this year. It has been a thoroughly stimulating experience and I have appreciated the opportunity very much. I hope my tardy decision did not inconvenience you to too great an extent. Trying to fit it into an already heavy schedule, I'm afraid would have meant not being able to give it the effort it deserves.

In reference to the "work table-easel" design, I spent some time studying the possibilities and came to the conclusion that the desired flexibility would require too long a time to develop in order to meet your deadline and the small budget necessary for producing them on a small scale. I think your ideas for such a piece of equipment are definitely worth developing if it could be on a larger scale, and I should think it would be a wonderful thing for art classes throughout the city and in other cities. Considering the fruitlessness of the investigation and the relatively short time spent on it, I would definitely say there should be no bill for services rendered!

I am looking forward to visiting the classes and to seeing you very soon.

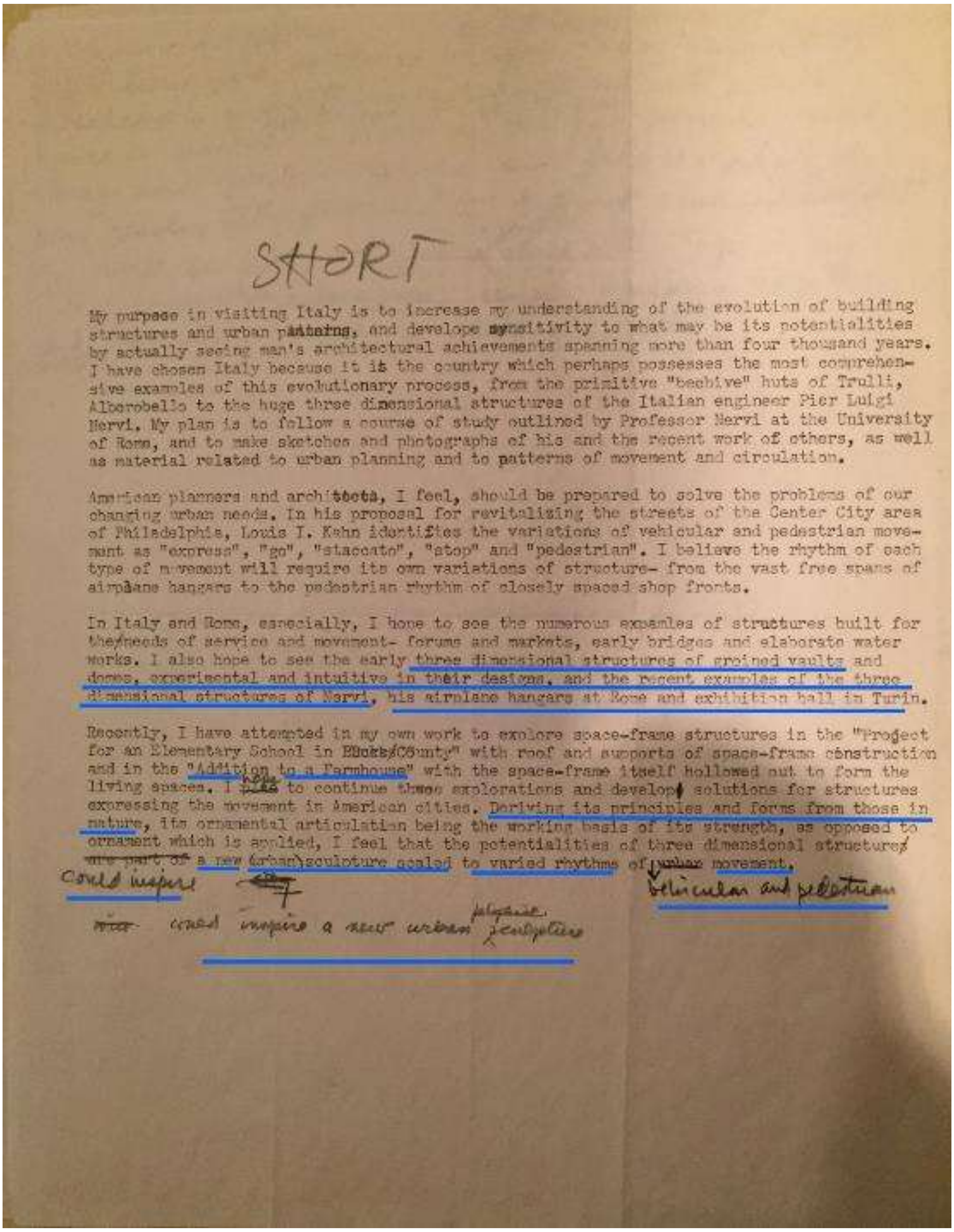
Sincerely yours,

Anne Tyng

AT:ao

Anexo N. Correspondencia de Tyng a E. M. Benson director del programa de educación del Philadelphia Museum of Art.

Fuente: Anne Griswold Tyng Collection, Architectural Archives, University of Pennsylvania. Carpeta 74. II. A.109.



SHORT

My purpose in visiting Italy is to increase my understanding of the evolution of building structures and urban patterns, and develope sensitivity to what may be its potentialities by actually seeing man's architectural achievements spanning more than four thousand years. I have chosen Italy because it is the country which perhaps possesses the most comprehensive examples of this evolutionary process, from the primitive "beehive" huts of Trulli, Alberobello to the huge three dimensional structures of the Italian engineer Pier Luigi Nervi. My plan is to follow a course of study outlined by Professor Nervi at the University of Rome, and to make sketches and photographs of his and the recent work of others, as well as material related to urban planning and to patterns of movement and circulation.

American planners and architects, I feel, should be prepared to solve the problems of our changing urban needs. In his proposal for revitalizing the streets of the Center City area of Philadelphia, Louis I. Kahn identifies the variations of vehicular and pedestrian movement as "express", "go", "staccato", "stop" and "pedestrian". I believe the rhythm of each type of movement will require its own variations of structure- from the vast free spans of airplane hangars to the pedestrian rhythm of closely spaced shop fronts.

In Italy and Rome, especially, I hope to see the numerous examples of structures built for the needs of service and movement- forums and markets, early bridges and elaborate water works. I also hope to see the early three dimensional structures of groined vaults and domes, experimental and intuitive in their designs, and the recent examples of the three dimensional structures of Nervi, his airplane hangars at Rome and exhibition hall in Turin.

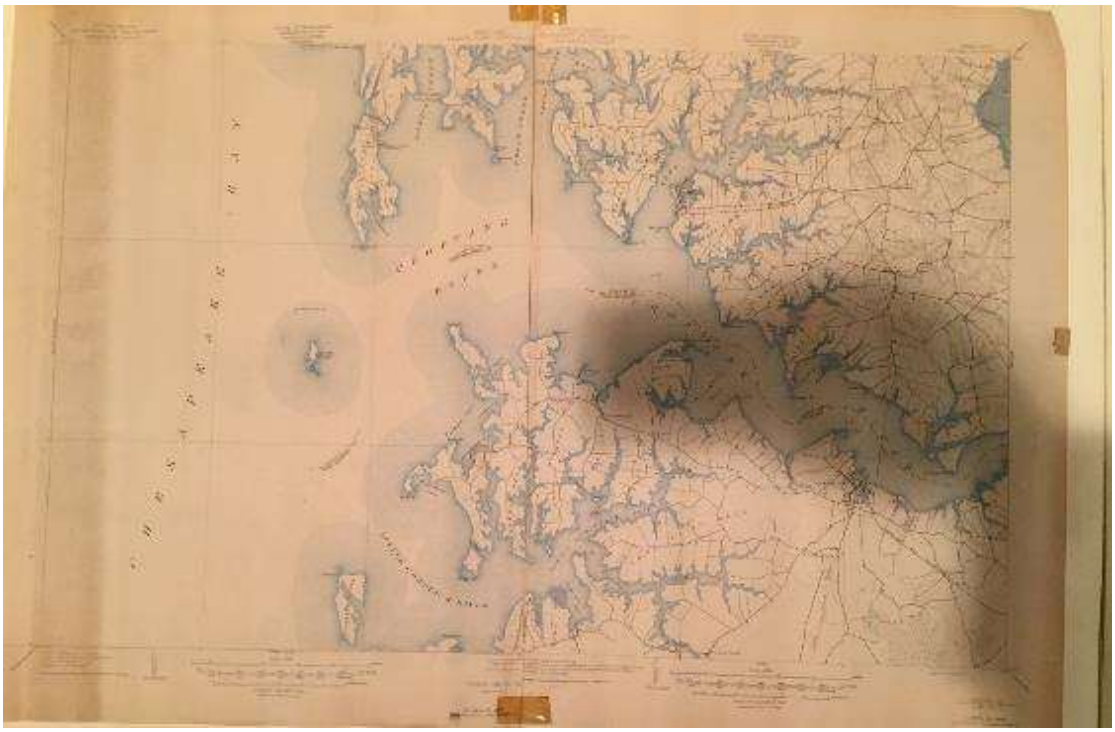
Recently, I have attempted in my own work to explore space-frame structures in the "Project for an Elementary School in Bucks County" with roof and supports of space-frame construction and in the "Addition to a Farmhouse" with the space-frame itself hollowed out to form the living spaces. I hope to continue these explorations and develop solutions for structures expressing the movement in American cities. Deriving its principles and forms from those in nature, its ornamental articulation being the working basis of its strength, as opposed to ornament which is applied, I feel that the potentialities of three dimensional structure ~~are part of~~ a new (urban) sculpture scaled to varied rhythms of ~~urban~~ movement.

Could inspire — vehicular and pedestrian

could inspire a new urban sculpture

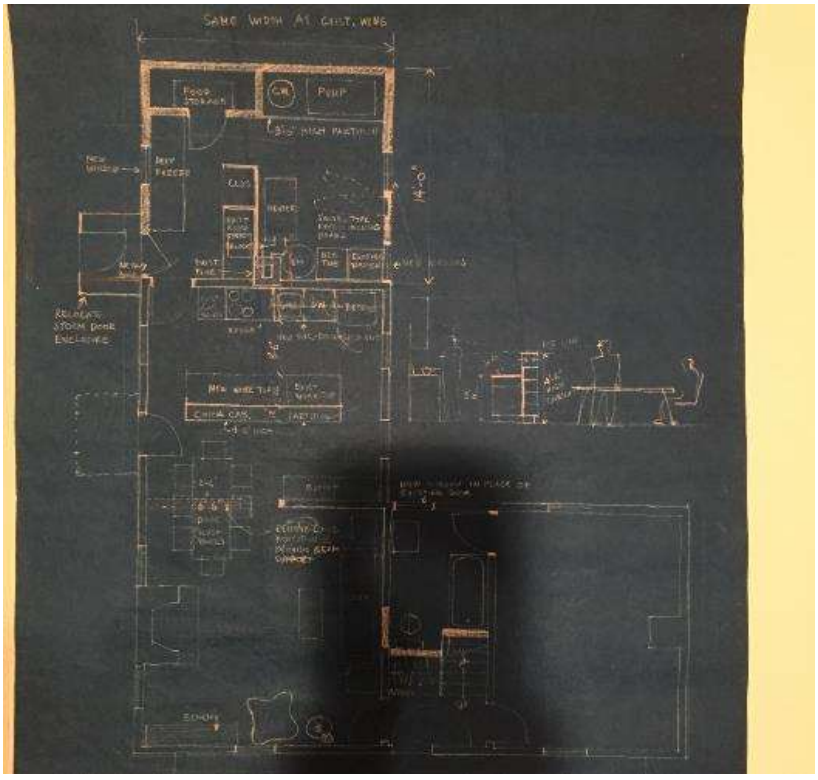
Anexo O. Correspondencia de Tyng para aplicar a una Fulbright Grant (1952-53), propuesta corta.

Fuente: AAUP, Anne Griswold Tyng Collection, carpeta 74.II.A.48.

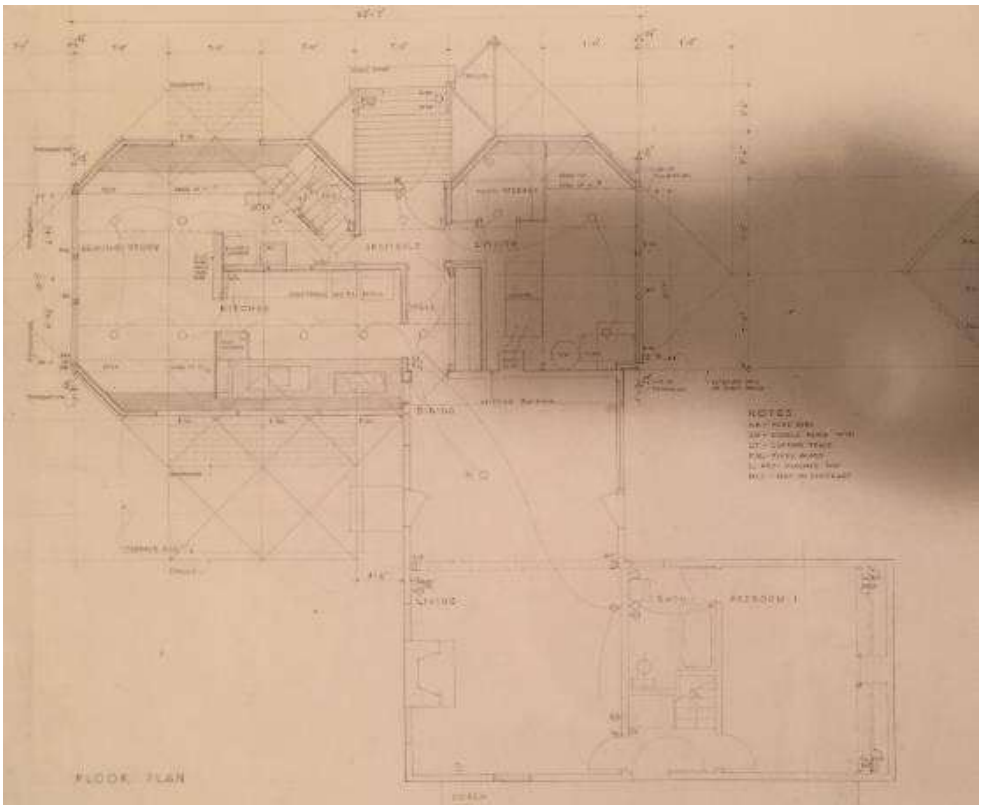


Mapa de la costa oriental de Chesapeake Bay, Cambridge, Maryland, donde estaba localizada la adición de la casa de campo de sus padres.

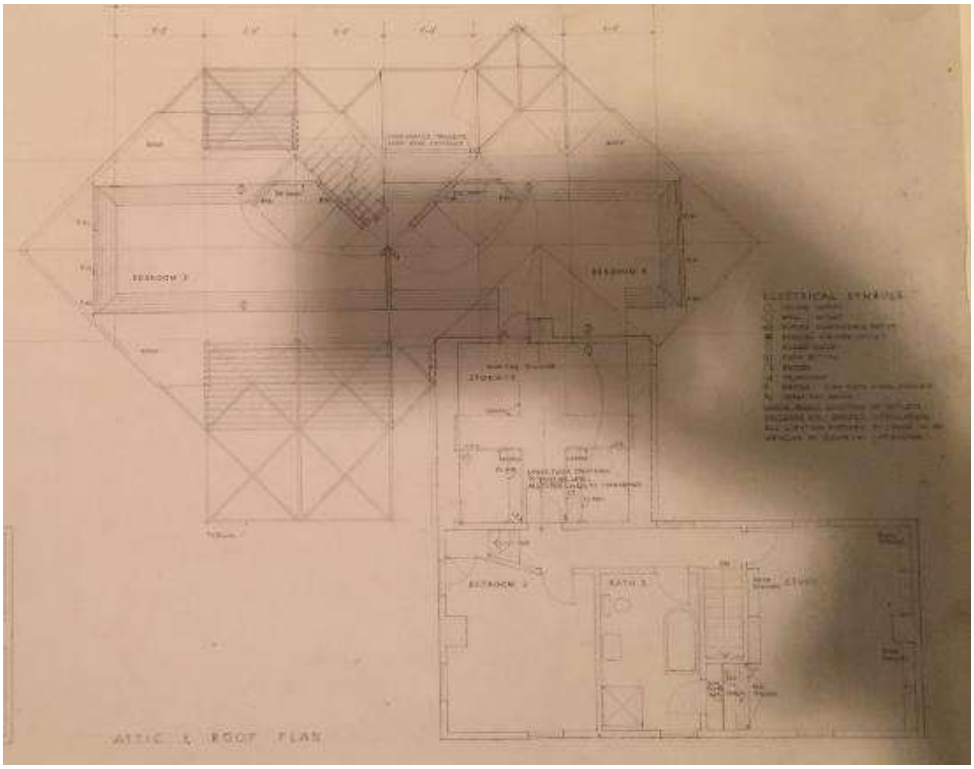
Fuente: AAUP, Anne Griswold Tyng Collection, carpeta 074.III.44.



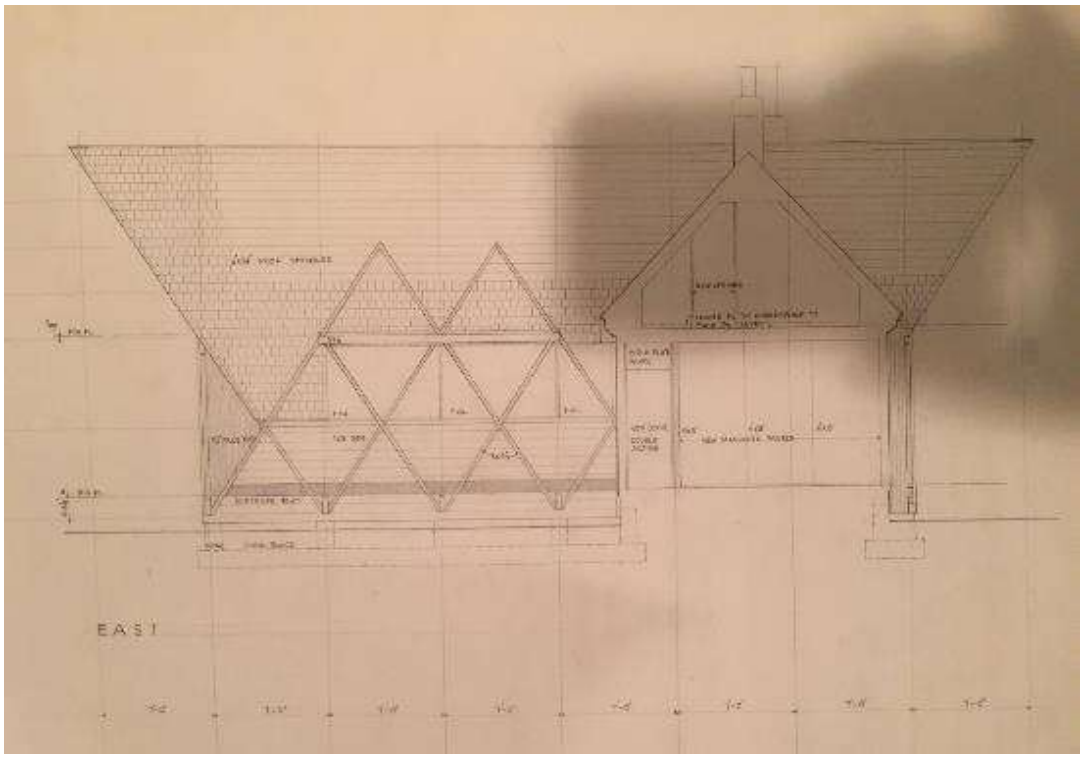
Primer esquema de la adición a la casa de campo Walworth Tyng.



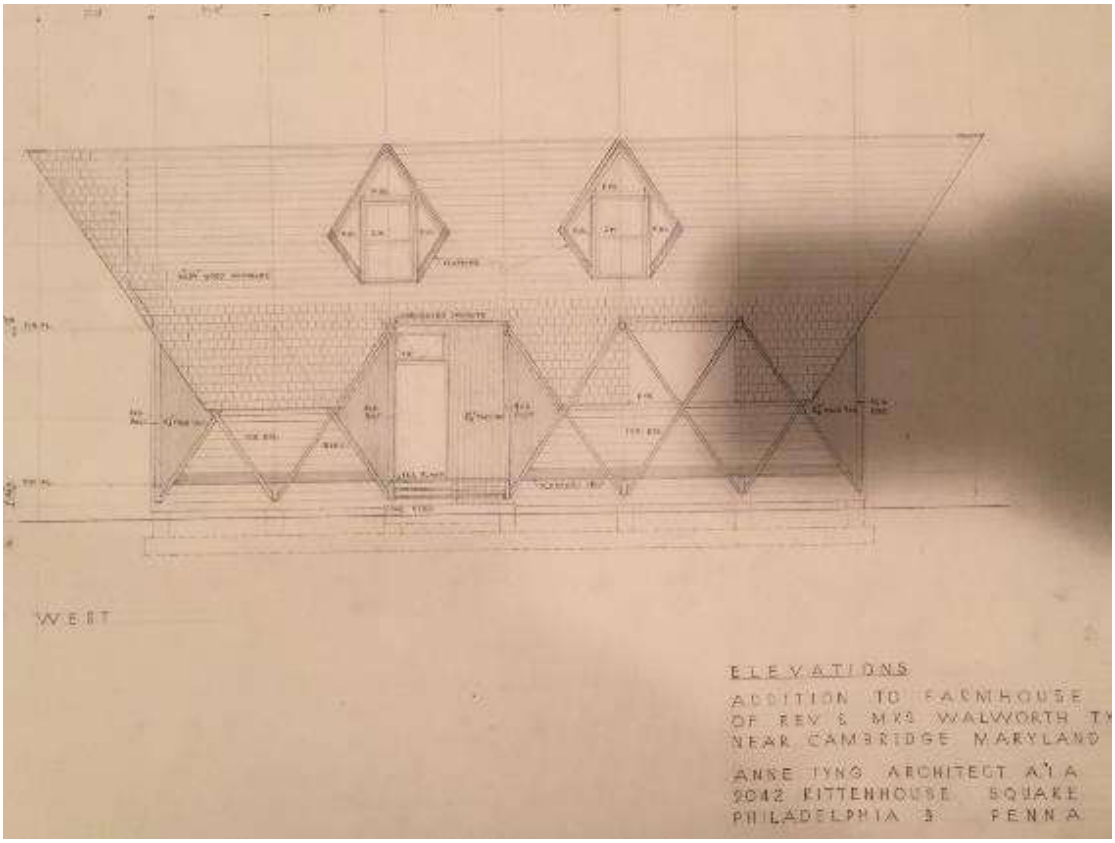
Planta de la adición de la casa de campo Walworth Tyng.



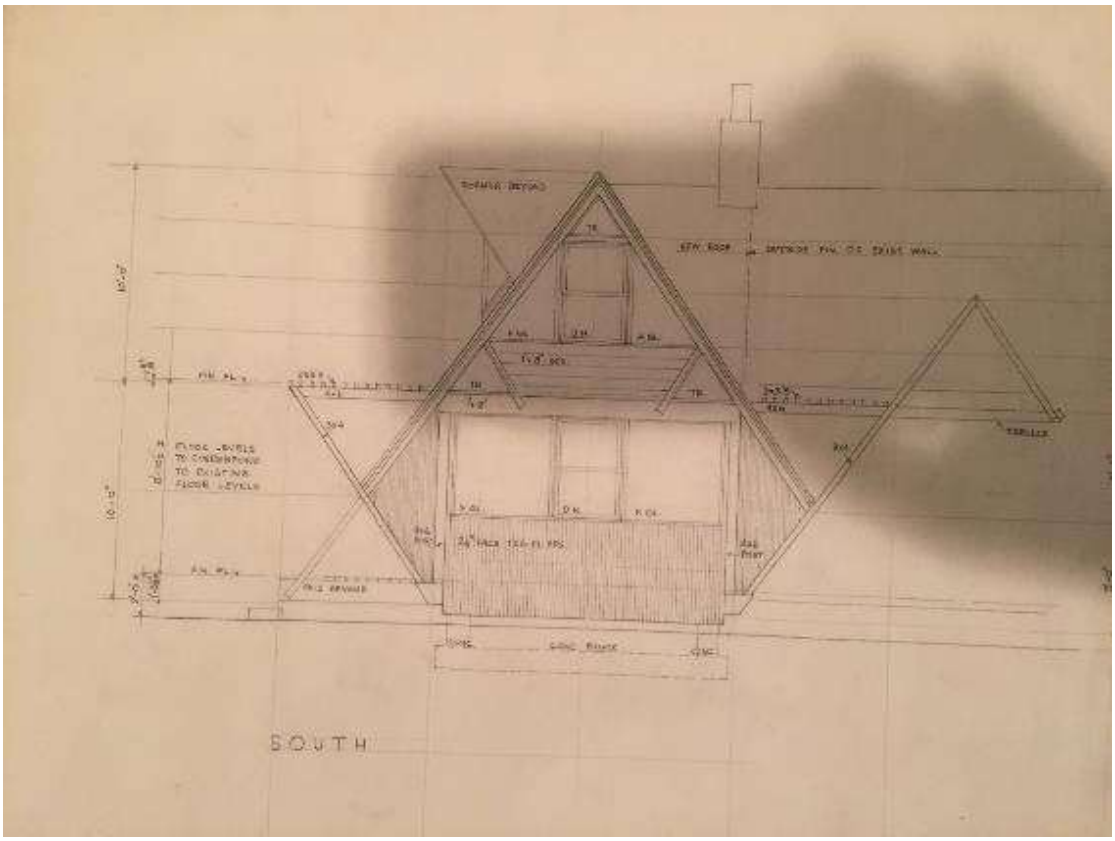
Planta del segundo piso de la adición de la casa de campo Walworth Tyng.



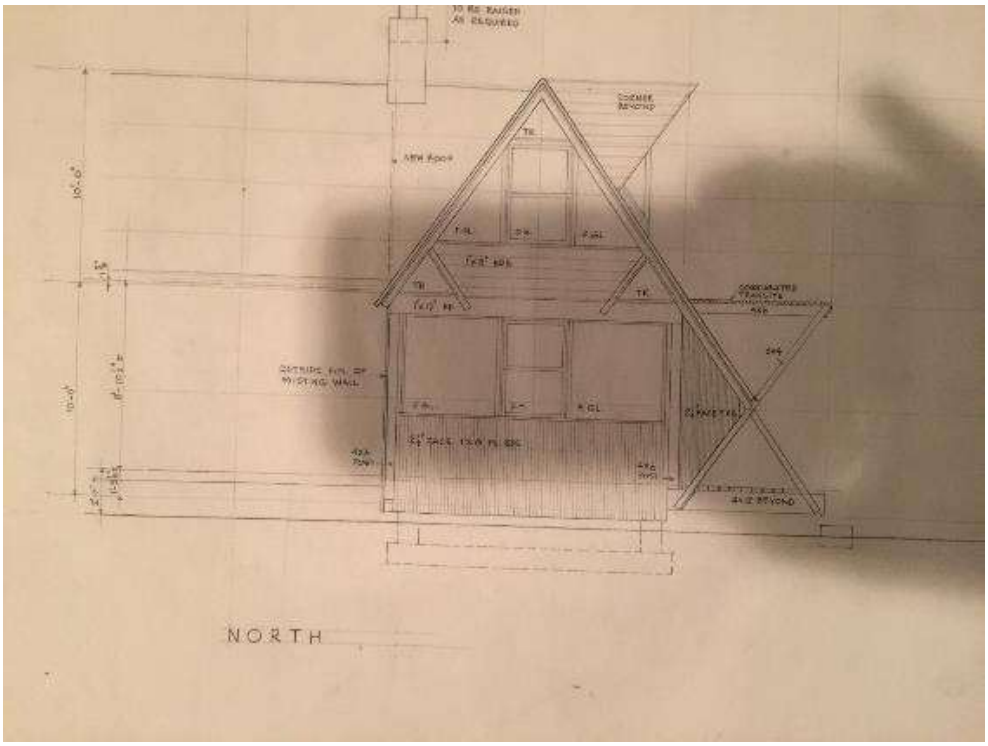
Sección de la adición de la casa de campo Walworth Tyng.



Vista de la adición de la casa de campo Walworth Tyng.



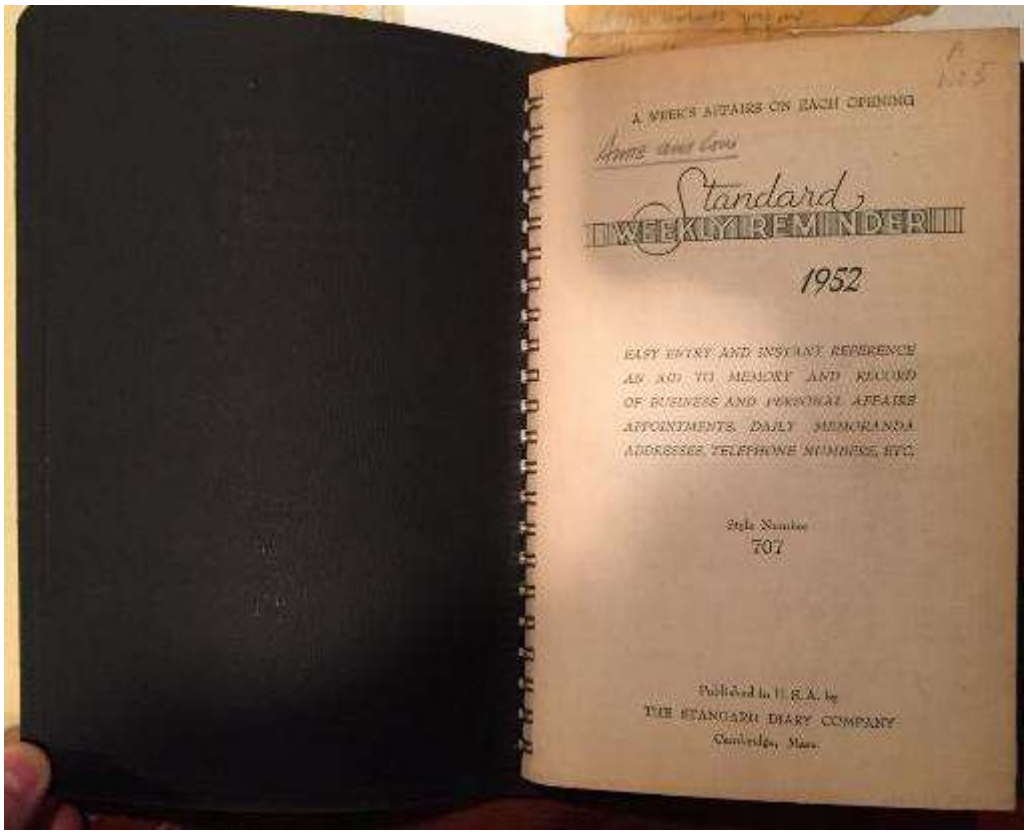
Vista de la adición de la casa de campo Walworth Tyng.



Vista de la adición de la casa de campo Walworth Tyng.

Anexo P. Dibujos de la adición de la casa Walworth Tyng.

Fuente: AAUP, Anne Griswold Tyng Collection, carpeta 074.III.44.



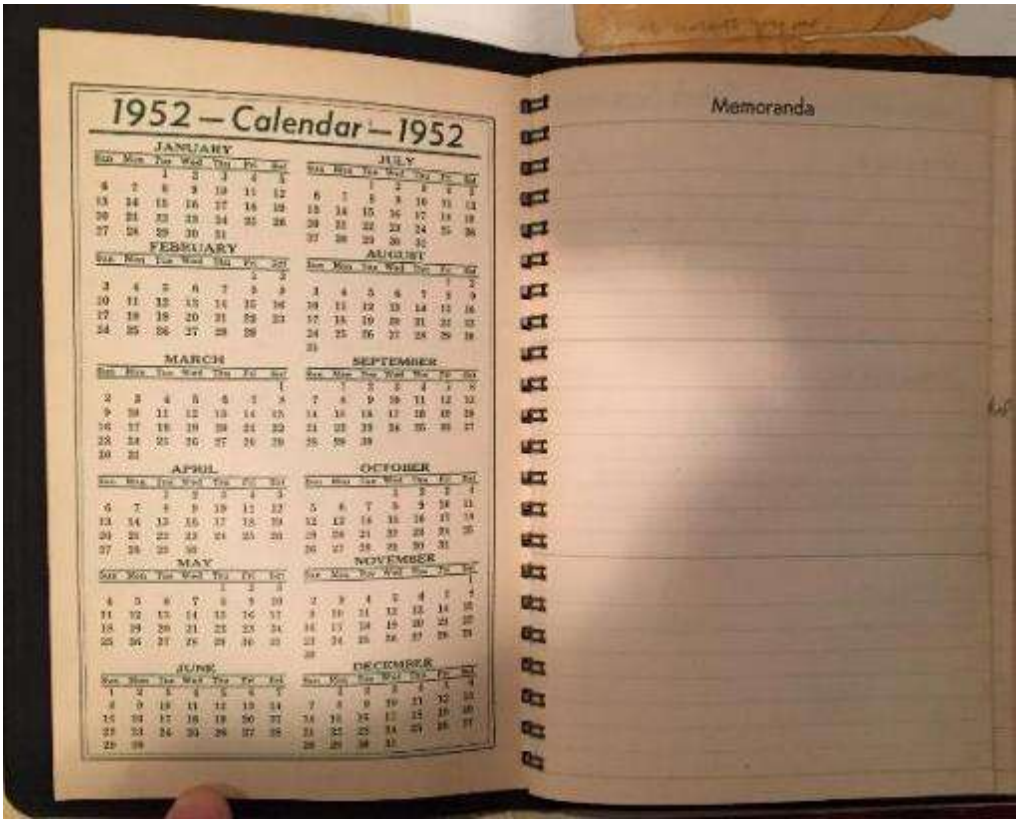
A WEEK'S AFFAIRS ON EACH OPENING

Standard
WEEKLY REMINDER
1952

EASY ENTRY AND INSTANT REFERENCE
AN AID TO MEMORY AND RECORD
OF BUSINESS AND PERSONAL AFFAIRS
APPOINTMENTS, DAILY MEMORANDA
ADDRESSES, TELEPHONE NUMBERS, ETC.

Style Number
707

Published in U. S. A. by
THE STANDARD DIARY COMPANY
Cambridge, Mass.



1952 — Calendar — 1952

JANUARY

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JUNE

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AUGUST

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SEPTEMBER

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DECEMBER

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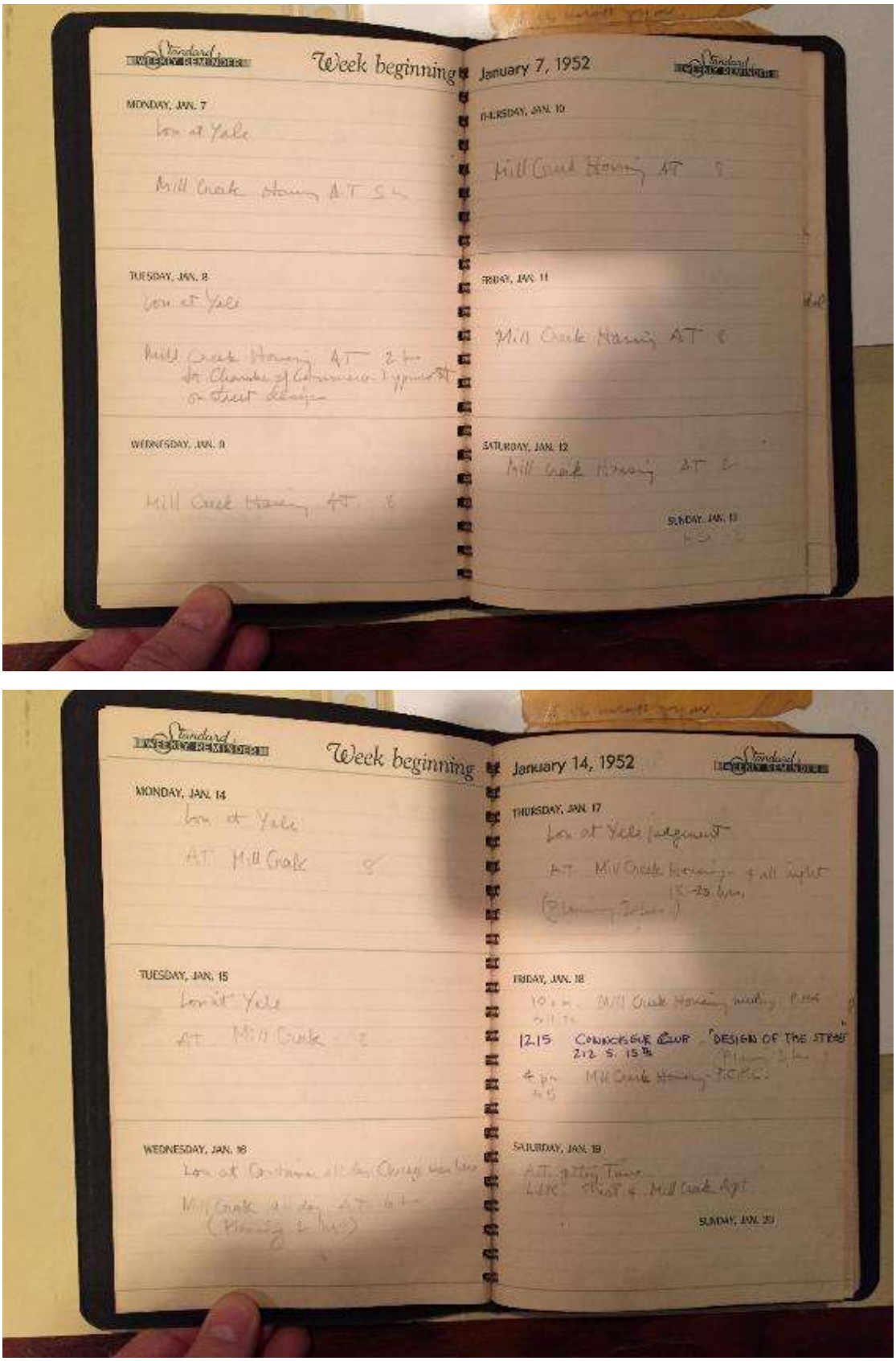
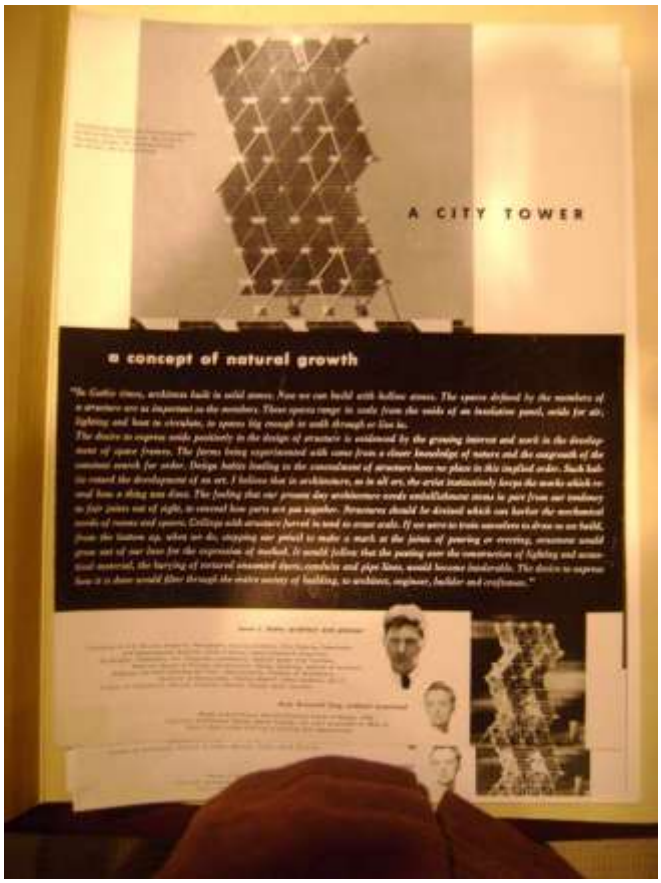
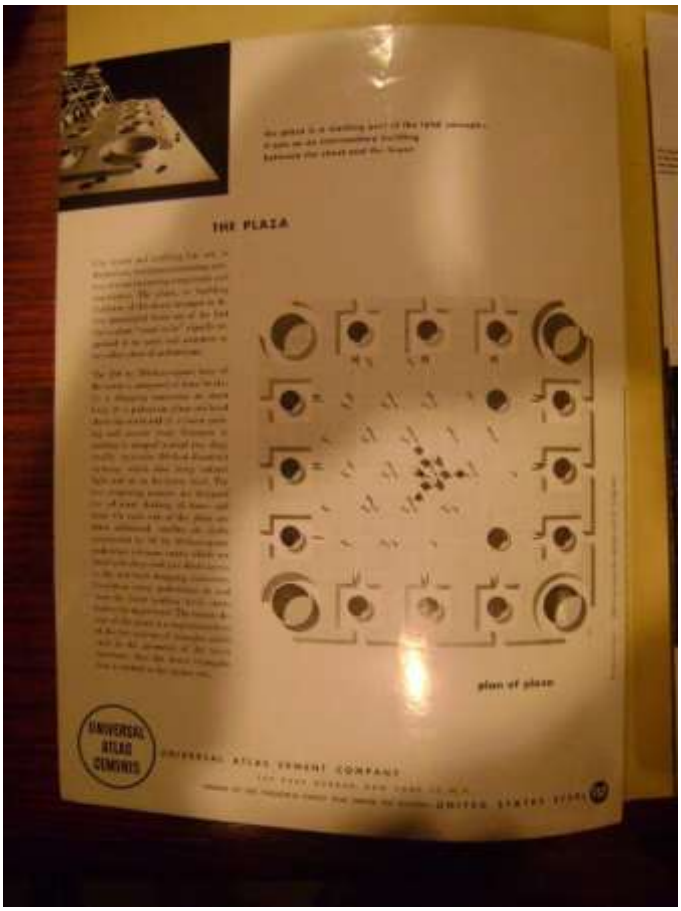
Memoranda

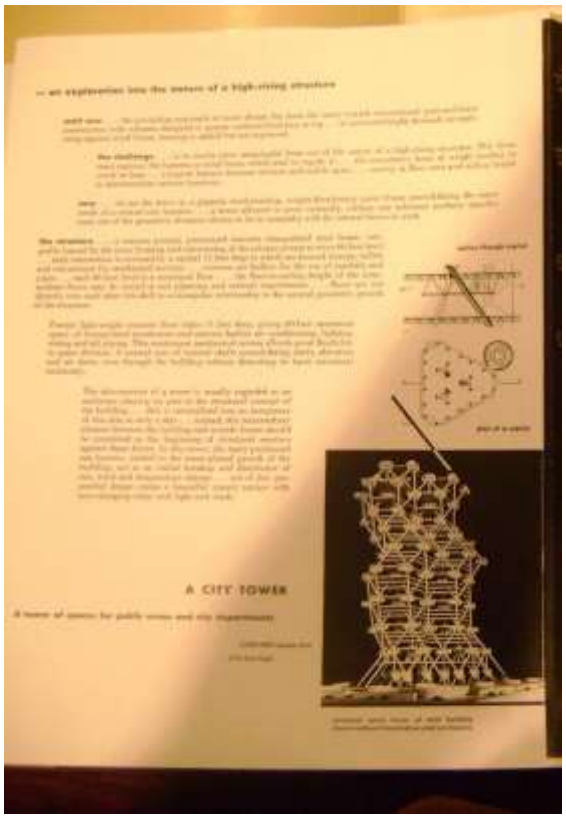


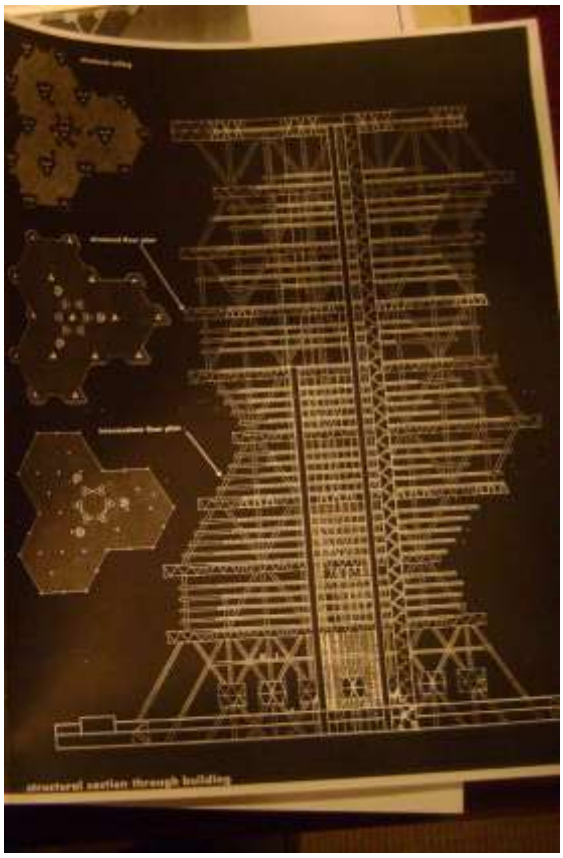
Anexo Q. Planificador semanal y bloc de notas de Tyng y Kahn 1952.

Fuete: AAUP, Anne Griswold Tyng Collection, carpeta 74.I. F.2.1


A CITY TOWER
a concept of natural growth

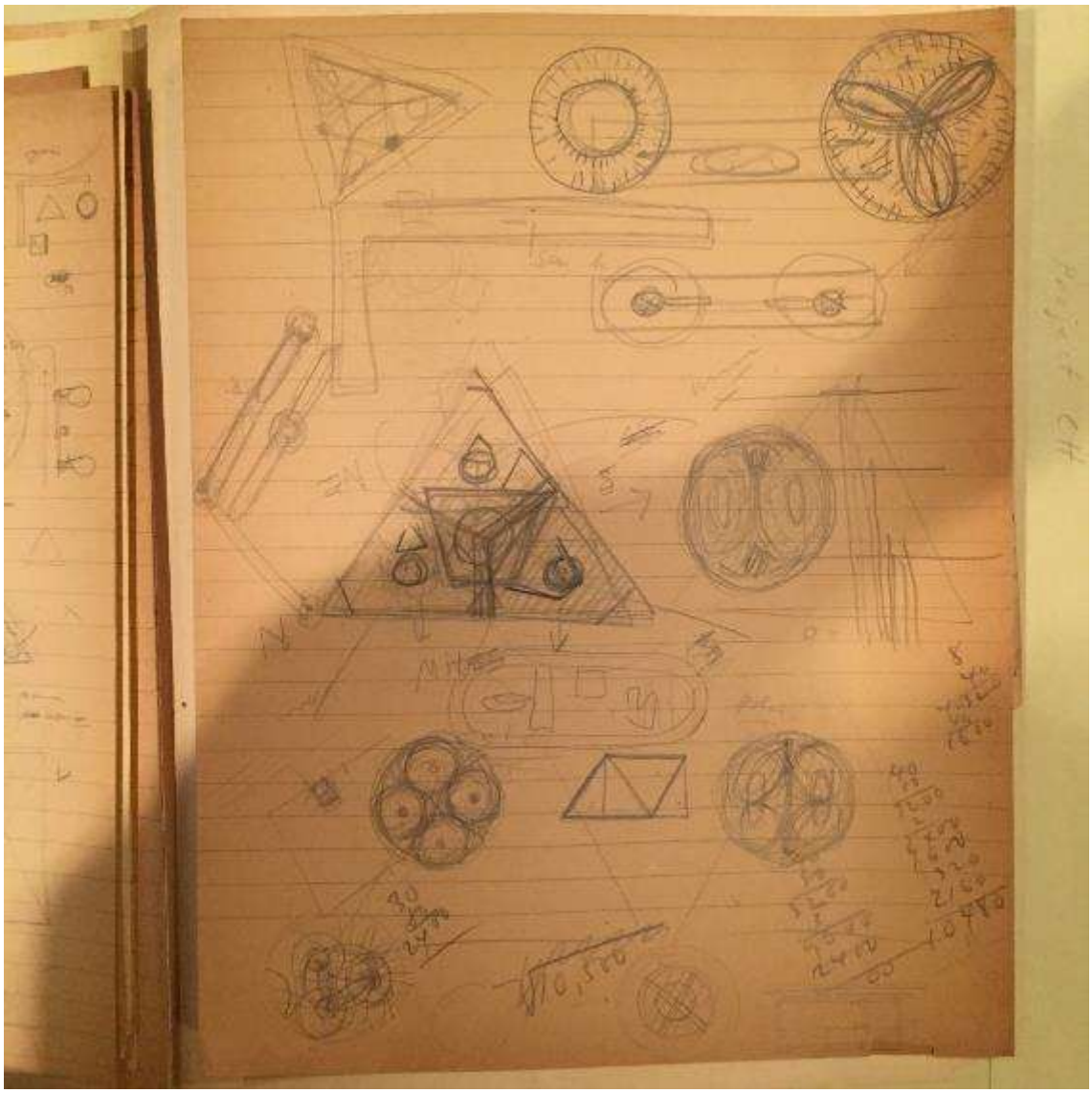

THE PLAZA
plan of plaza
UNIVERSAL ATLAS CEMENT

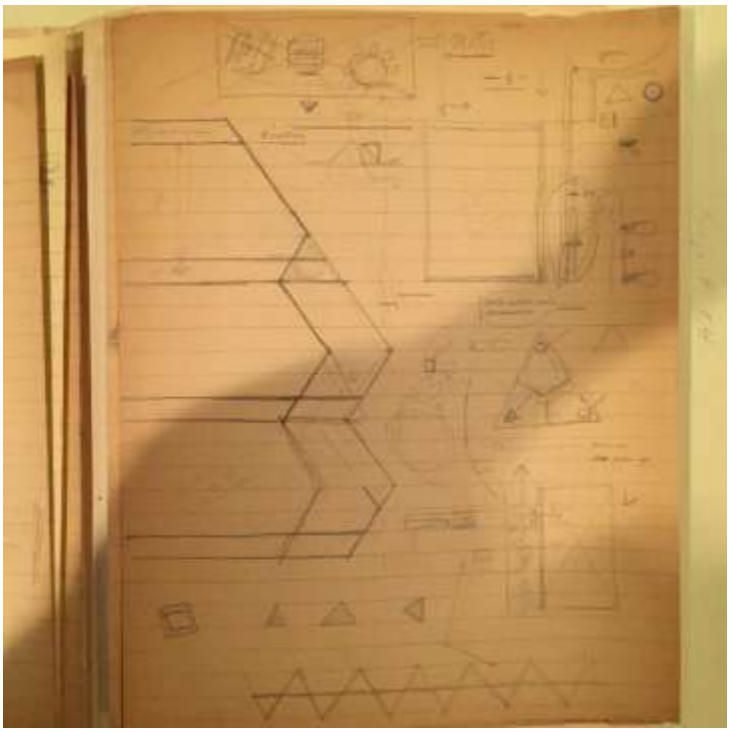


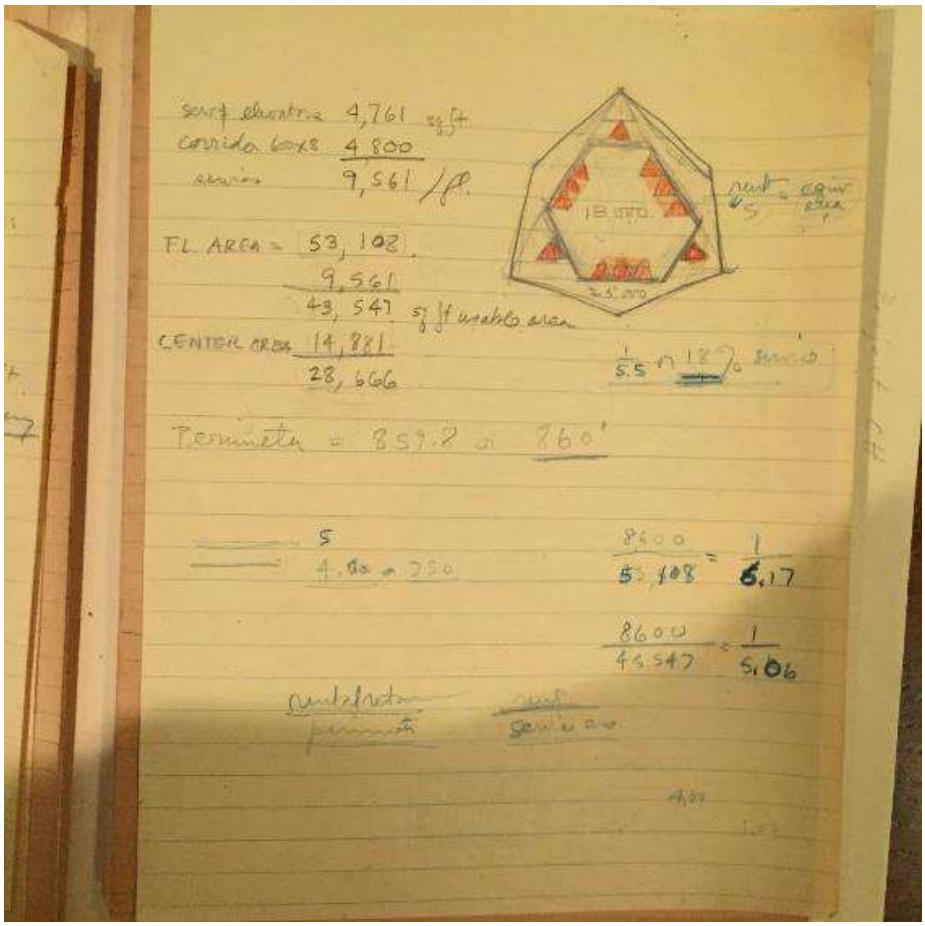


Anexo R. Publicación promocional de la Universal Atlas Cement Company "A City Tower: A Concept of Natural Growth" (nd)

Fuente: carpeta 74.I.E.50 de Anne Griswold Tyng Collection, The Architectural Archives, University of Pennsylvania.



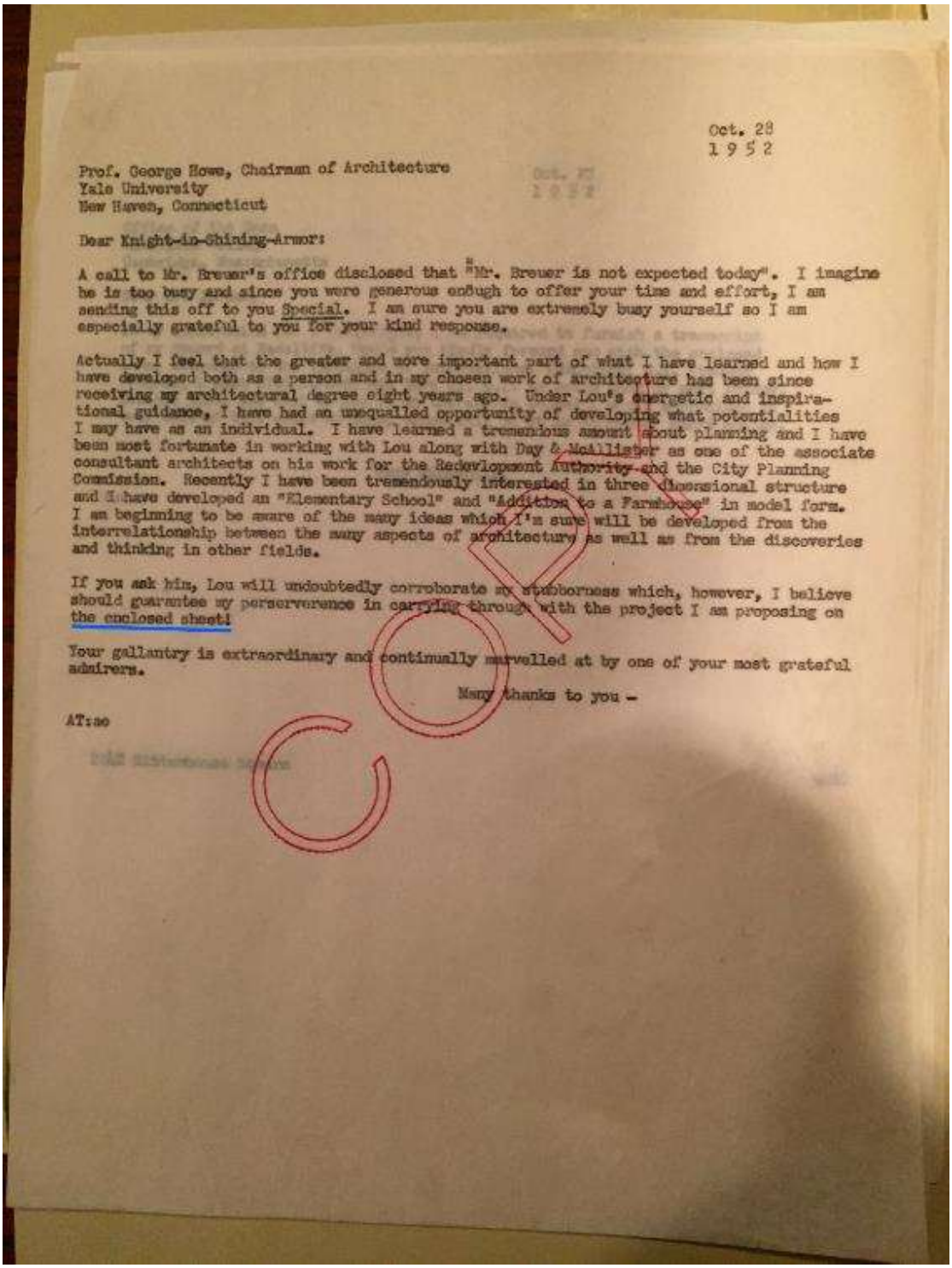




Anexo S. Primeros dibujos de la segunda versión de la City Hall Tower, probablemente de enero de 1953.

Anexo T. Propuesta del plan para el "Penn Center", publicado el 21 de febrero de 1952 en *The Eveling Bolletin*.

Fuente: AAUP, Anne Griswold Tyng Collection, carpeta. (074.I.F.1.6).



Oct. 28
1952

Prof. George Howe, Chairman of Architecture
Yale University
New Haven, Connecticut

Dear Knight-in-Shining-Armor:

A call to Mr. Breuer's office disclosed that "Mr. Breuer is not expected today". I imagine he is too busy and since you were generous enough to offer your time and effort, I am sending this off to you Special. I am sure you are extremely busy yourself so I am especially grateful to you for your kind response.

Actually I feel that the greater and more important part of what I have learned and how I have developed both as a person and in my chosen work of architecture has been since receiving my architectural degree eight years ago. Under Lou's energetic and inspirational guidance, I have had an unequalled opportunity of developing what potentialities I may have as an individual. I have learned a tremendous amount about planning and I have been most fortunate in working with Lou along with Day & Mcallister as one of the associate consultant architects on his work for the Redevelopment Authority and the City Planning Commission. Recently I have been tremendously interested in three dimensional structure and I have developed an "Elementary School" and "Addition to a Farmhouse" in model form. I am beginning to be aware of the many ideas which I'm sure will be developed from the interrelationship between the many aspects of architecture as well as from the discoveries and thinking in other fields.

If you ask him, Lou will undoubtedly corroborate my stubbornness which, however, I believe should guarantee my perserverence in carrying through with the project I am proposing on the enclosed sheet!

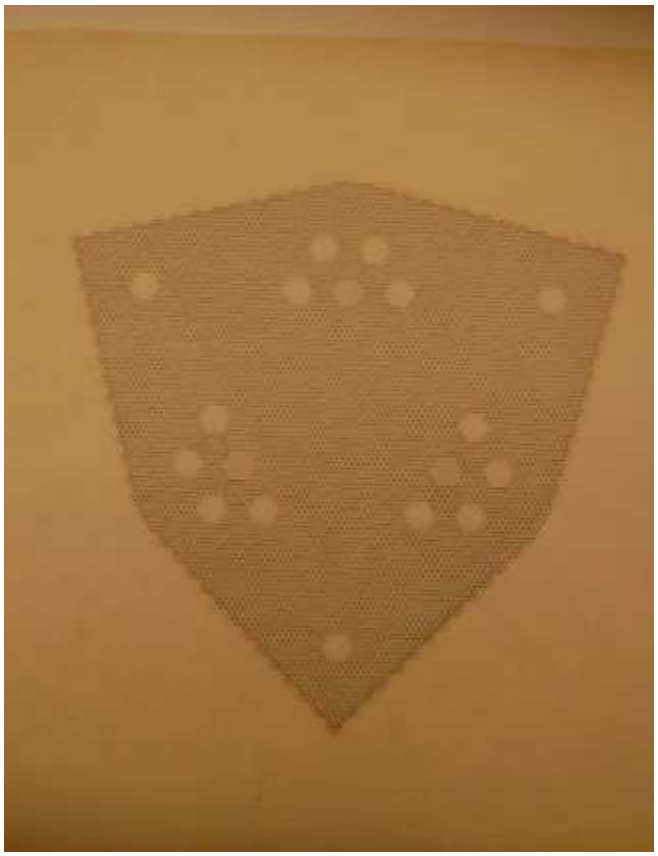
Your gallantry is extraordinary and continually marvelled at by one of your most grateful admirers.

Many thanks to you -

AT:ao

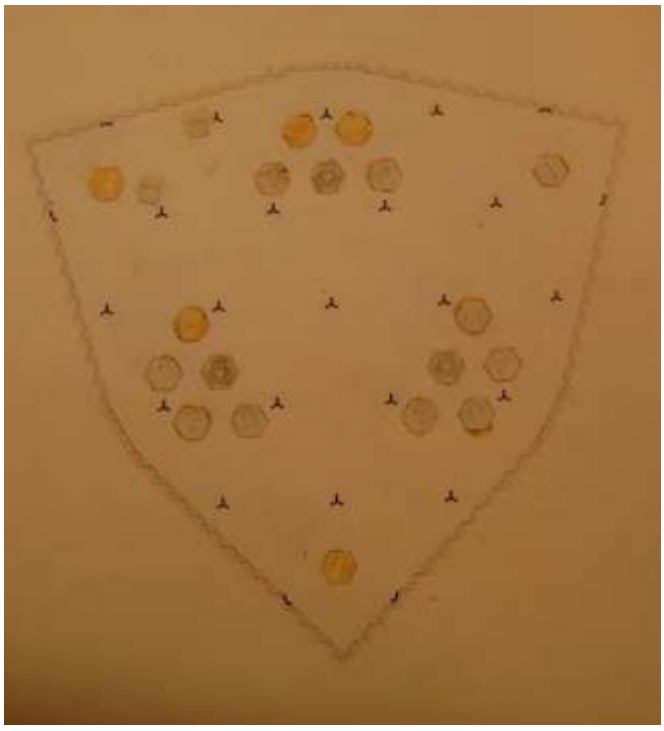
Anexo U. Correspondencia de Tyng para aplicar a una Fulbright Grant (1952-53), solicitud de recomendación a George Howe.

Fuente: AAUP, Anne Griswold Tyng Collection, carpeta 74.II.A.48.



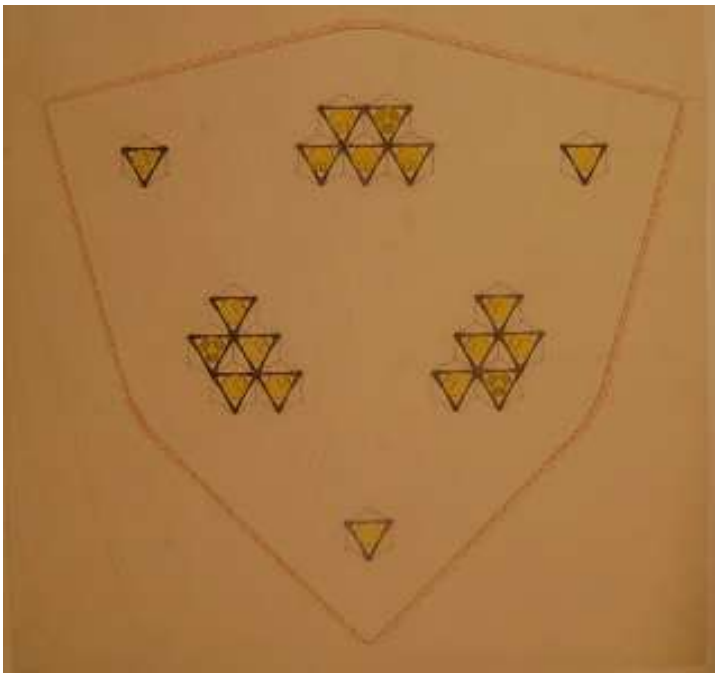
Sección en planta de la versión más temprana de la City Hall Tower.

Fuente: AAUP, Louis Kahn Collection, 0.30. IA.385.1



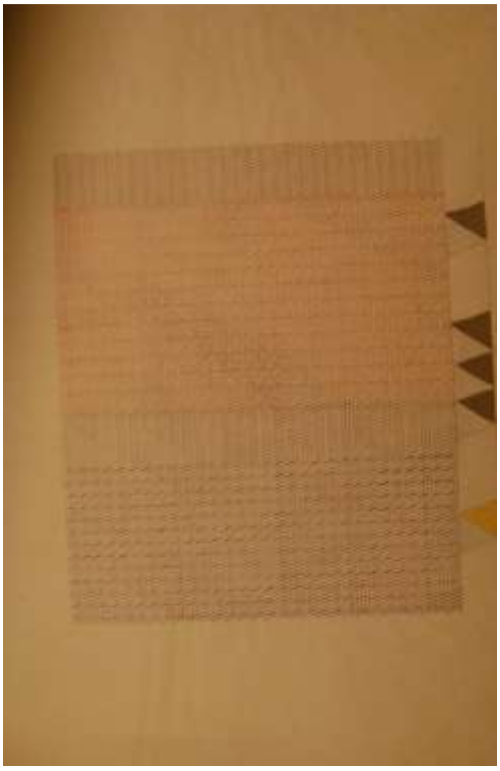
Sección en planta. Puntos fijos de la versión más temprana de la City Hall Tower.

Fuente: AAUP, Louis Kahn Collection, 0.30. IA.385.1.



Sección en planta de la versión más temprana de la City Hall Tower.

Fuente: AAUP, Louis Kahn Collection, 0.30. IA.385.1.

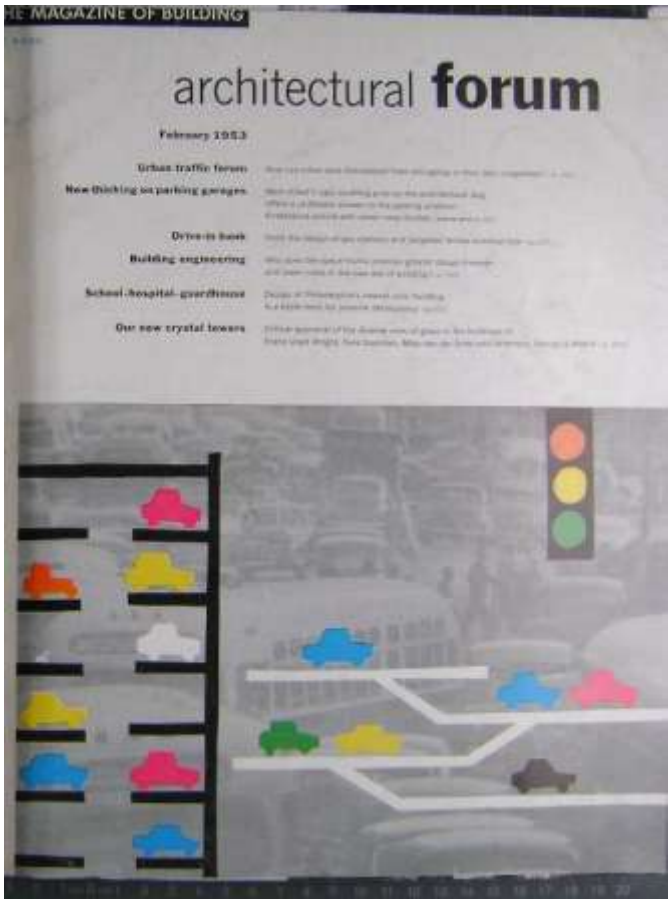


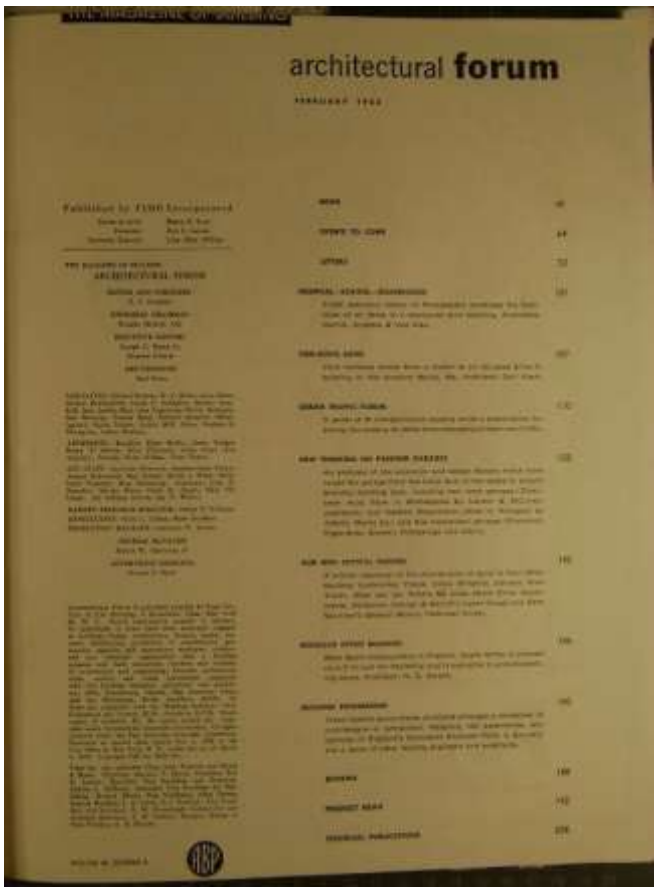
Vista de la versión más temprana de la City Hall Tower.

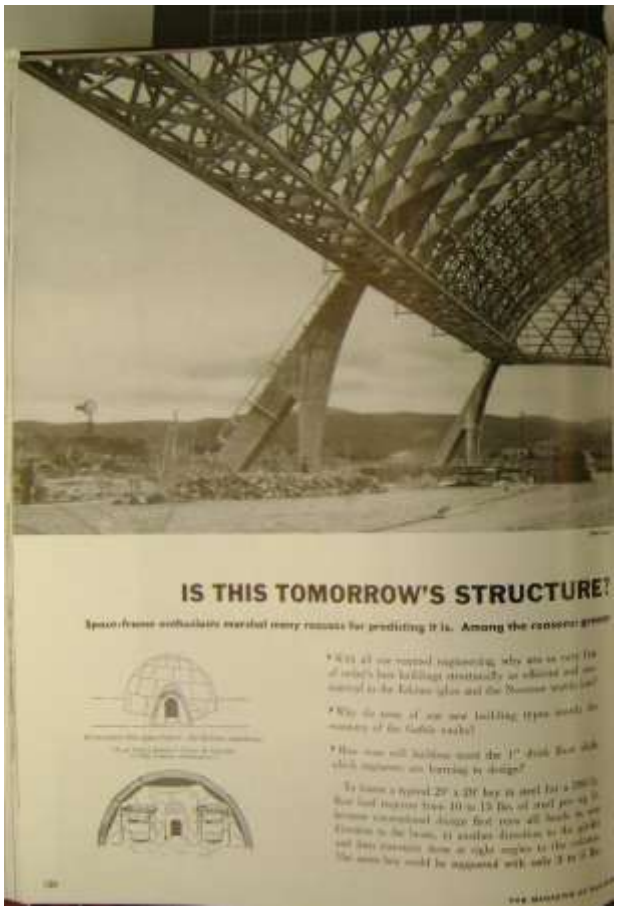
Fuente: AAUP, Louis Kahn Collection, 0.30. IA.385.1.

Anexo V. Dibujos de la primera versión de la City Hall Tower Philadelphia.

Fuente: AAUP, Louis Kahn Collection, 0.30. IA.385.1.


MAGAZINE OF BUILDING
architectural forum
February 1953
Urban traffic forum
New thinking on parking garages
Drive-in bank
Building engineering
School-hospital-guardhouse
Our new crystal towers

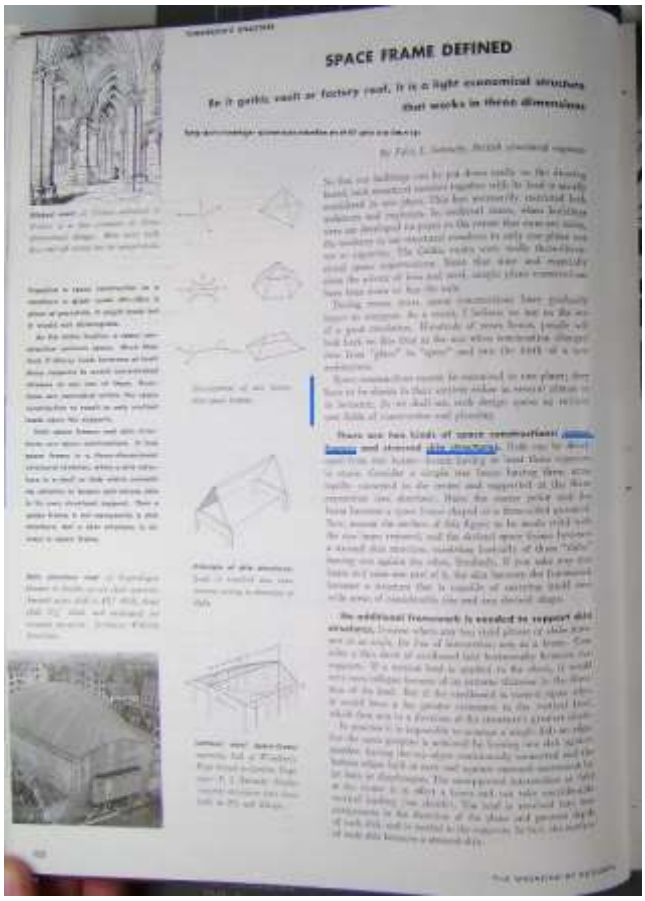

architectural forum



IS THIS TOMORROW'S STRUCTURE?

Space-frame enthusiasts marshal many reasons for predicting it is. Among the reasons given:

design freedom, lower building costs, more exciting structure



SPACE FRAME DEFINED

Be it gothic vault or factory roof, it is a light economical structure that works in three dimensions

There are two kinds of space construction:

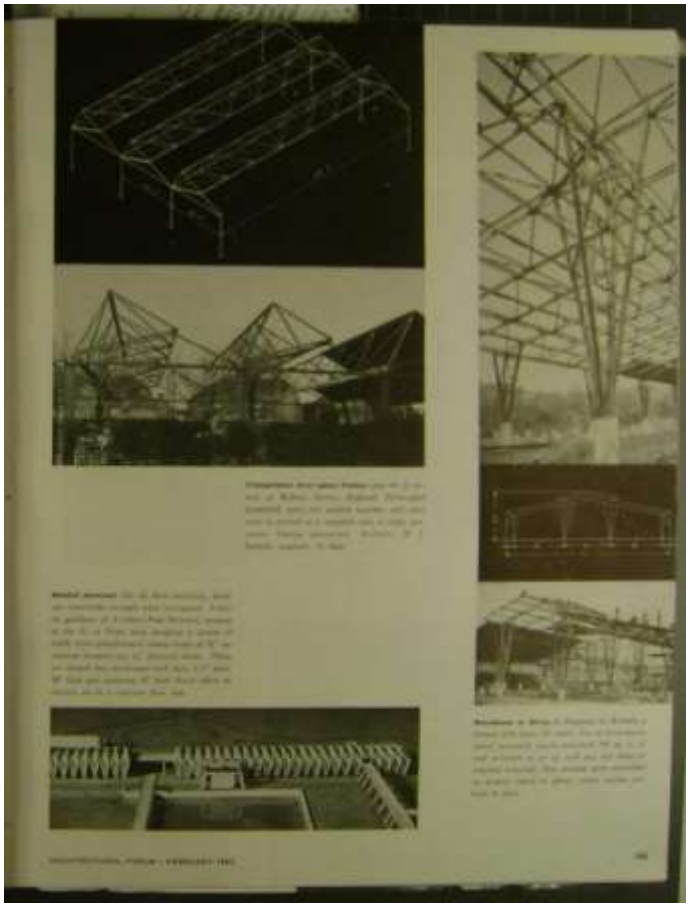
An additional framework is needed to support skin structure.

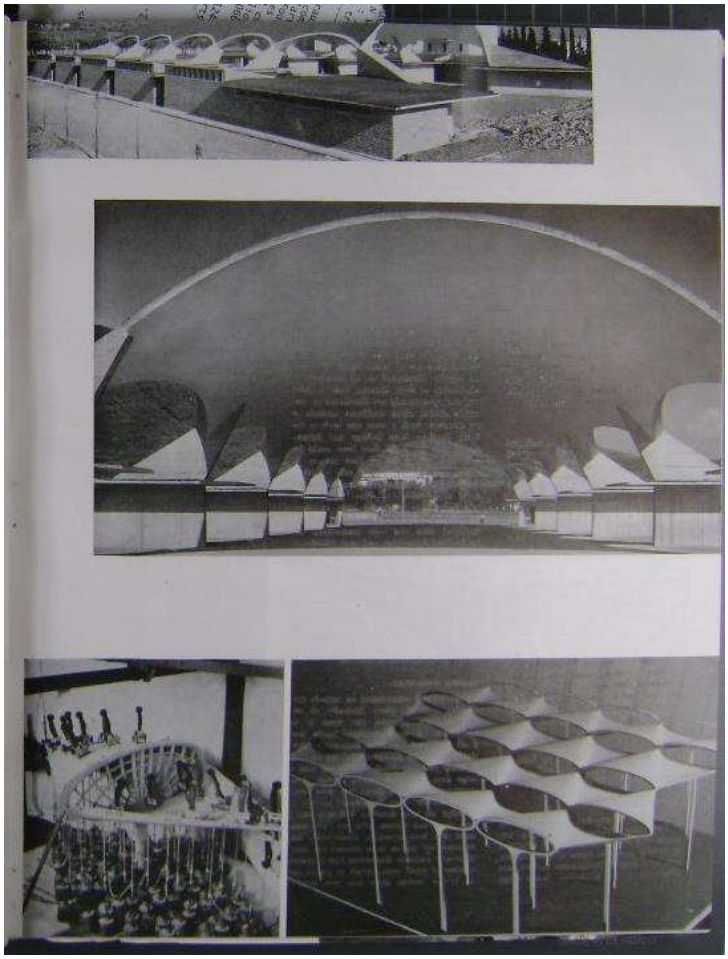
The system will not stand up without a diaphragm or tie member.

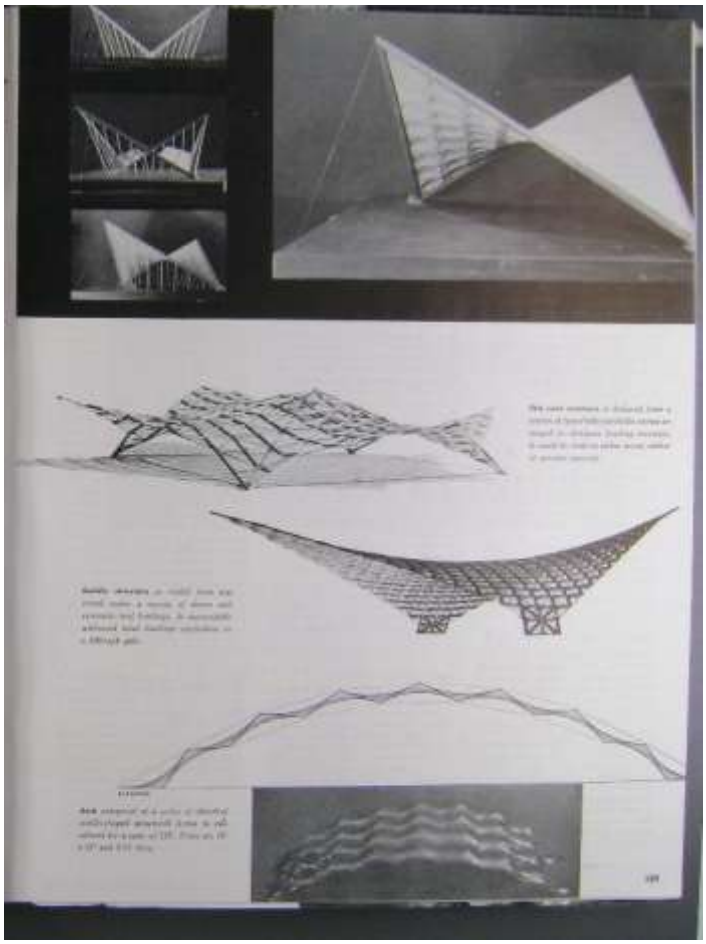
The space frame frees planning from the influence of construction.

SPACE FRAME DISCUSSED

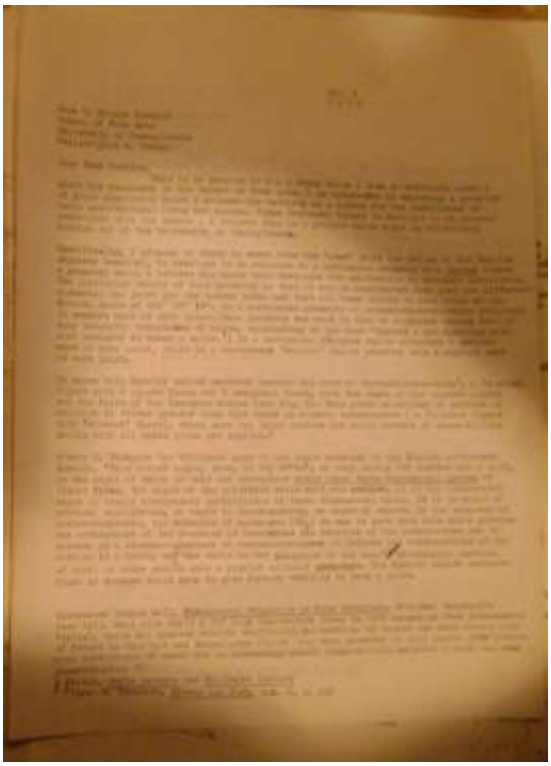
A symposium on its present uses and future implications by 19 space-conscious engineers and architects*



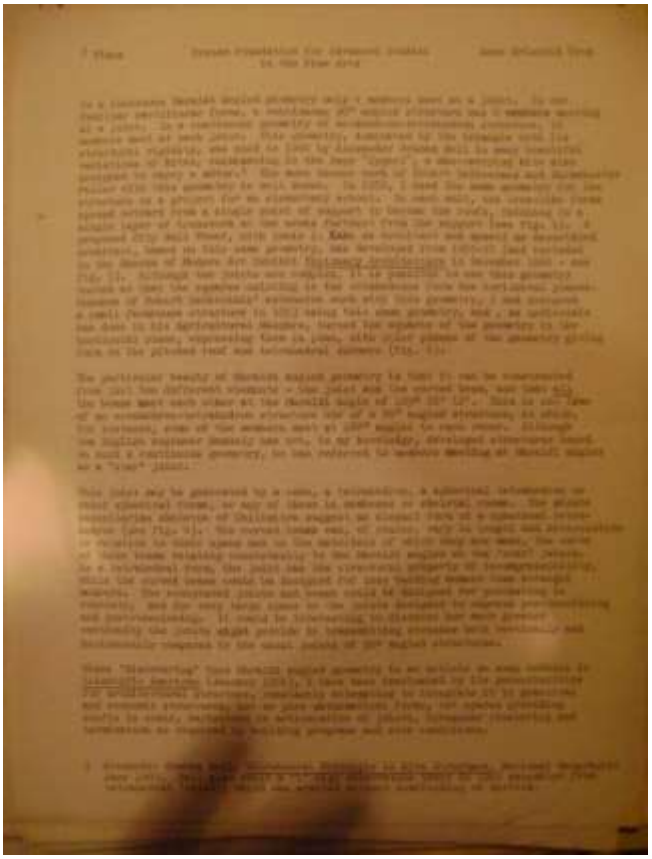


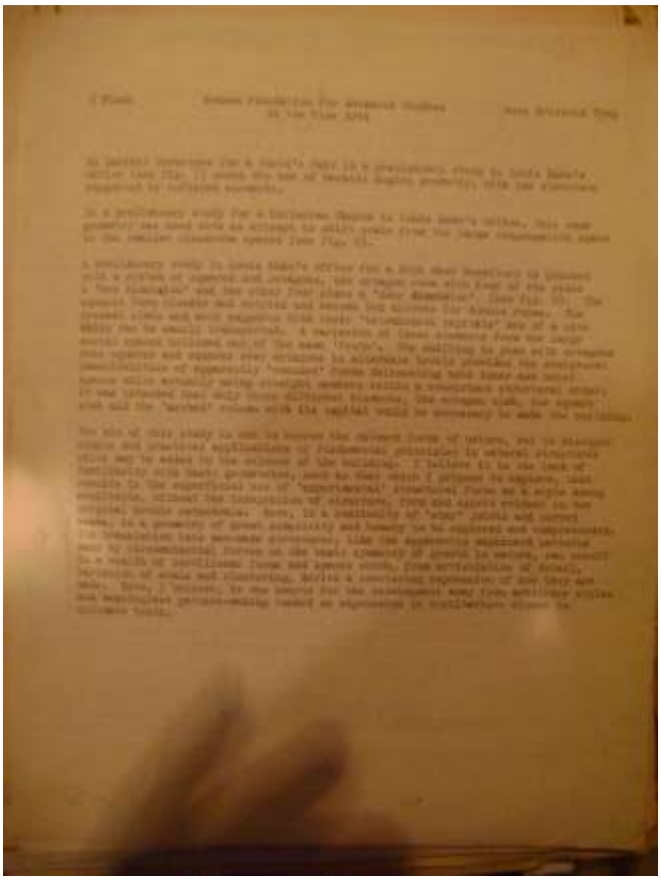


Anexo W. Revista *Architectural Forum*, de febrero de 1953, artículo titulado "Is This Tomorow's Structure?".

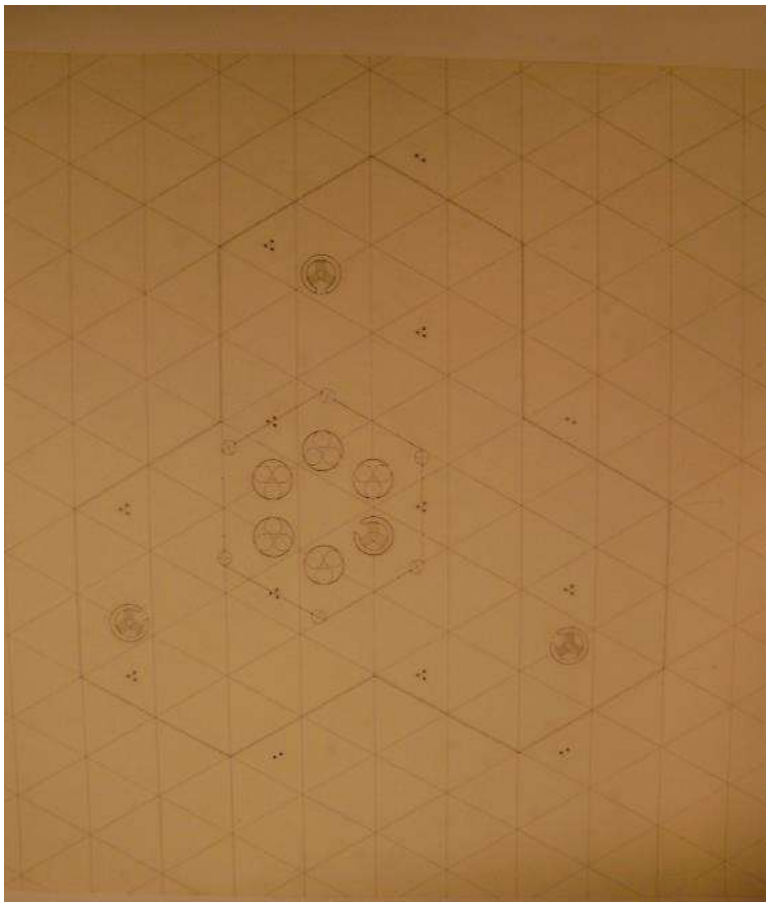


The Divine Proportion in the Platonic solids Funding (1959-1963). AAUP, Anne Grislwold Tyng Collection. Carpeta 74. II. A.39



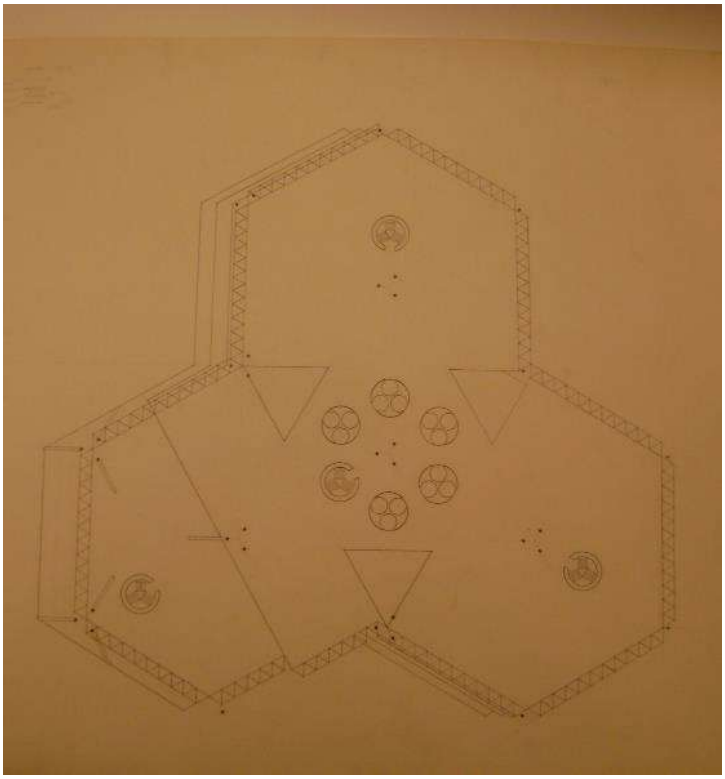


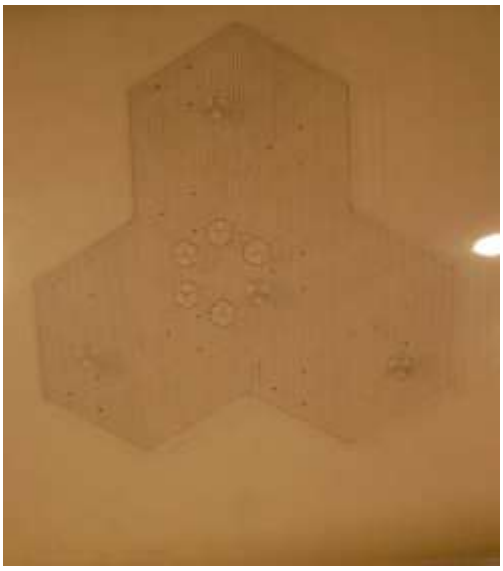
Anexo X. Propuesta para la beca de investigación sobre la geometría de la viga en estrella al Dean Holman Perkins, Fines Arts, University of Pennsylvania.



Sección en planta de la segunda versión de la City Hall Tower.

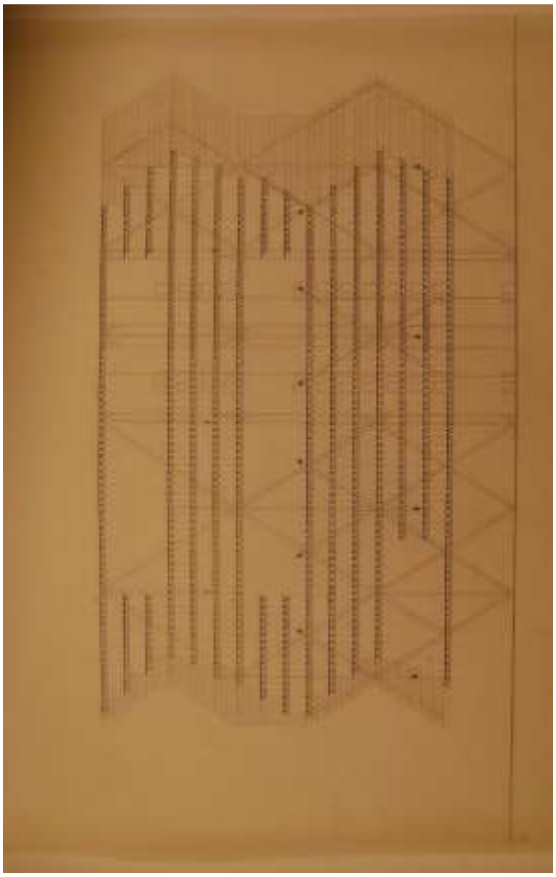
Fuente: AAUP, Louis Kahn Collection, 0.30. IA.385.1.





Sección en planta cubierta de la segunda versión de la City Hall Tower.

Fuente: AAUP, Louis Kahn Collection, 0.30. IA.385.1.

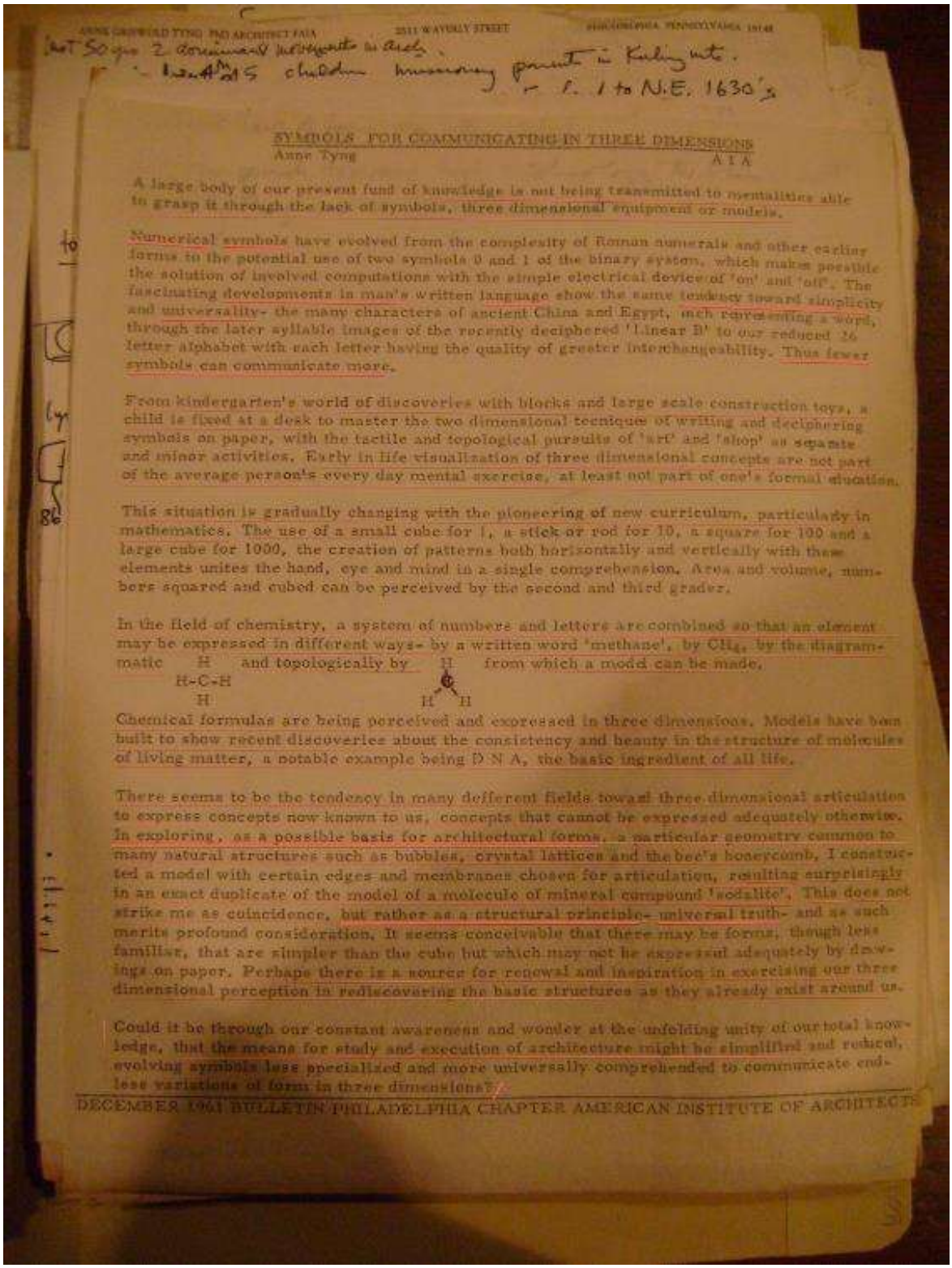


Sección en corte de la segunda versión de la City Hall Tower.

Fuente: AAUP, Louis Kahn Collection, 0.30. IA.385.1.

Anexo B. Dibujos de la segunda versión de la City Hall Tower.

Fuente, AAUP, Louis Kahn Collection, 0.30. IA.385.1.



SYMBOLS FOR COMMUNICATING IN THREE DIMENSIONS

Anne Tyng

A large body of our present fund of knowledge is not being transmitted to mentalities able to grasp it through the lack of symbols, three dimensional equipment or models.

Numerical symbols have evolved from the complexity of Roman numerals and other earlier forms to the potential use of two symbols 0 and 1 of the binary system, which makes possible the solution of involved computations with the simple electrical device of 'on' and 'off'. The fascinating developments in man's written language show the same tendency toward simplicity and universality- the many characters of ancient China and Egypt, each representing a word, through the later syllable images of the recently deciphered 'Linear B' to our reduced 26 letter alphabet with each letter having the quality of greater interchangeability. Thus fewer symbols can communicate more.

From kindergarten's world of discoveries with blocks and large scale construction toys, a child is fixed at a desk to master the two dimensional technique of writing and deciphering symbols on paper, with the tactile and topological pursuits of 'art' and 'shop' as separate and minor activities. Early in life visualization of three dimensional concepts are not part of the average person's every day mental exercise, at least not part of one's formal education.

This situation is gradually changing with the pioneering of new curriculum, particularly in mathematics. The use of a small cube for 1, a stick or rod for 10, a square for 100 and a large cube for 1000, the creation of patterns both horizontally and vertically with these elements unites the hand, eye and mind in a single comprehension. Area and volume, numbers squared and cubed can be perceived by the second and third grader.

In the field of chemistry, a system of numbers and letters are combined so that an element may be expressed in different ways- by a written word 'methane', by CH_4, by the diagrammatic H-C-H (H) and topologically by (H, H, H) from which a model can be made.

Chemical formulas are being perceived and expressed in three dimensions. Models have been built to show recent discoveries about the consistency and beauty in the structure of molecules of living matter, a notable example being D N A, the basic ingredient of all life.

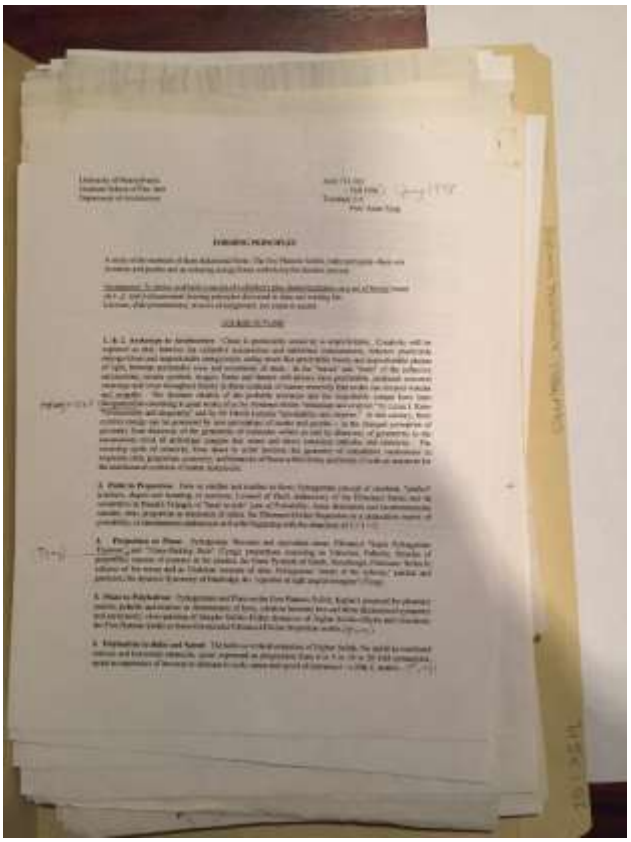
There seems to be the tendency in many different fields toward three dimensional articulation to express concepts now known to us, concepts that cannot be expressed adequately otherwise. In exploring, as a possible basis for architectural forms, a particular geometry common to many natural structures such as bubbles, crystal lattices and the bee's honeycomb, I constructed a model with certain edges and membranes chosen for articulation, resulting surprisingly in an exact duplicate of the model of a molecule of mineral compound 'sodalite'. This does not strike me as coincidence, but rather as a structural principle- universal truth- and as such merits profound consideration. It seems conceivable that there may be forms, though less familiar, that are simpler than the cube but which may not be expressed adequately by drawings on paper. Perhaps there is a source for renewal and inspiration in exercising our three dimensional perception in rediscovering the basic structures as they already exist around us.

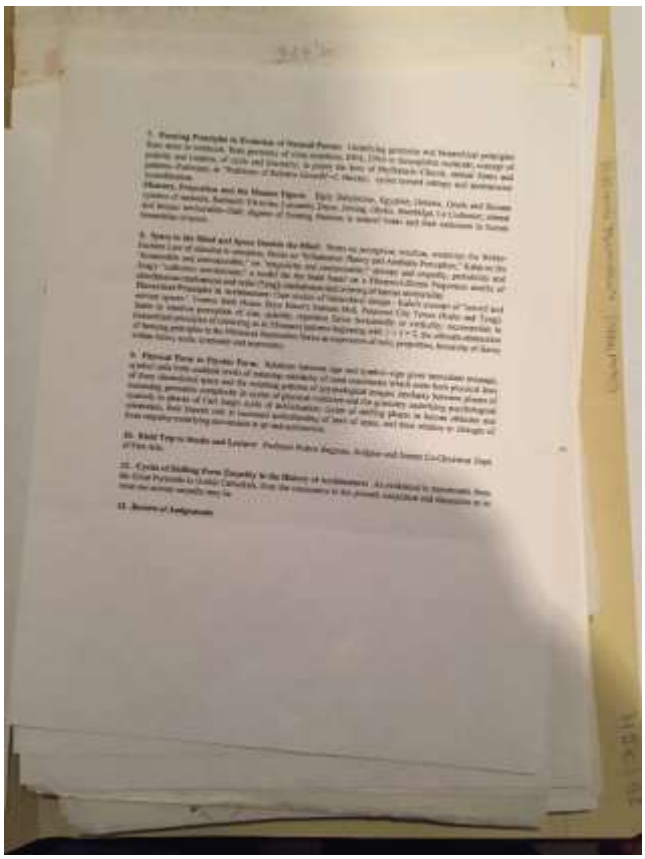
Could it be through our constant awareness and wonder at the unfolding unity of our total knowledge, that the means for study and execution of architecture might be simplified and radical, evolving symbols less specialized and more universally comprehended to communicate endless variations of form in three dimensions?

DECEMBER 1961 BULLETIN PHILADELPHIA CHAPTER AMERICAN INSTITUTE OF ARCHITECTS

Anexo Z. "Symbols for Communicating in Three Dimensions", *Philadelphia AIA Bulletin,* (noviembre de 1961).

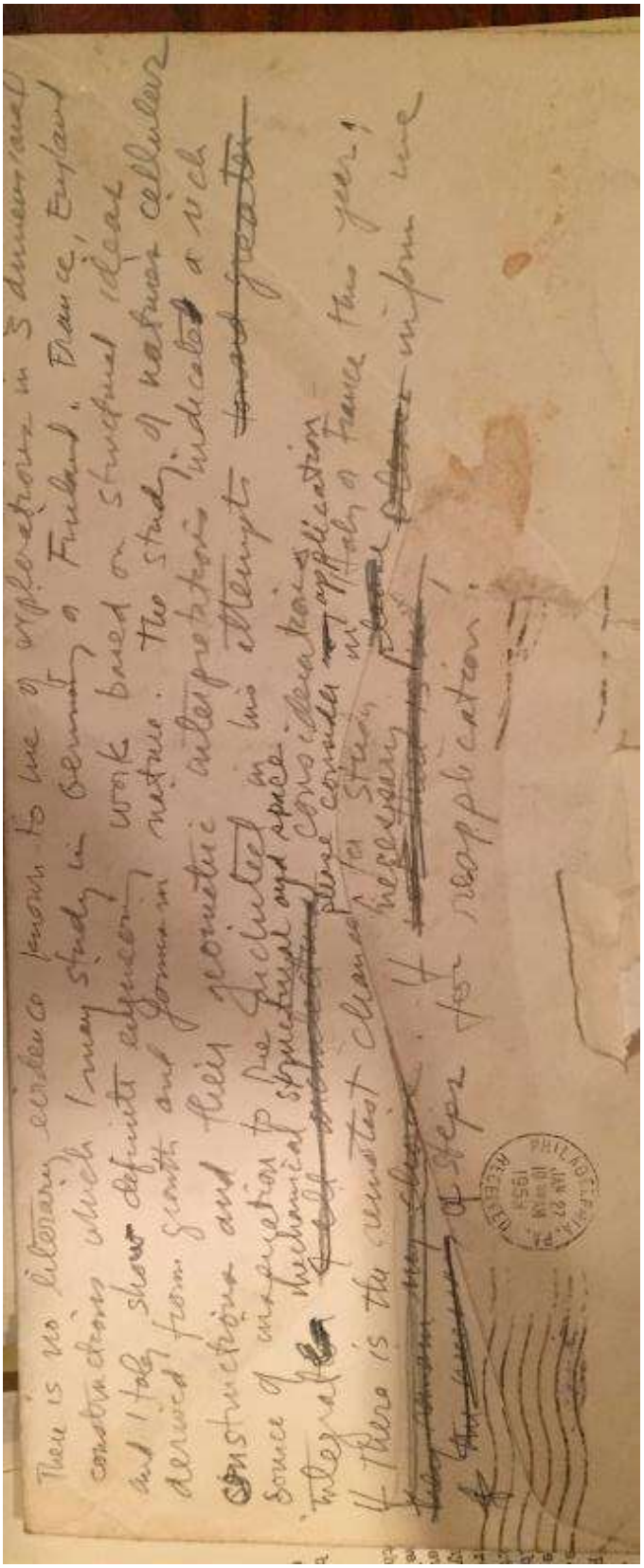
Fuente: AAUP, Anne Griswold Tyng Collection, carpeta 74.II.C.115.





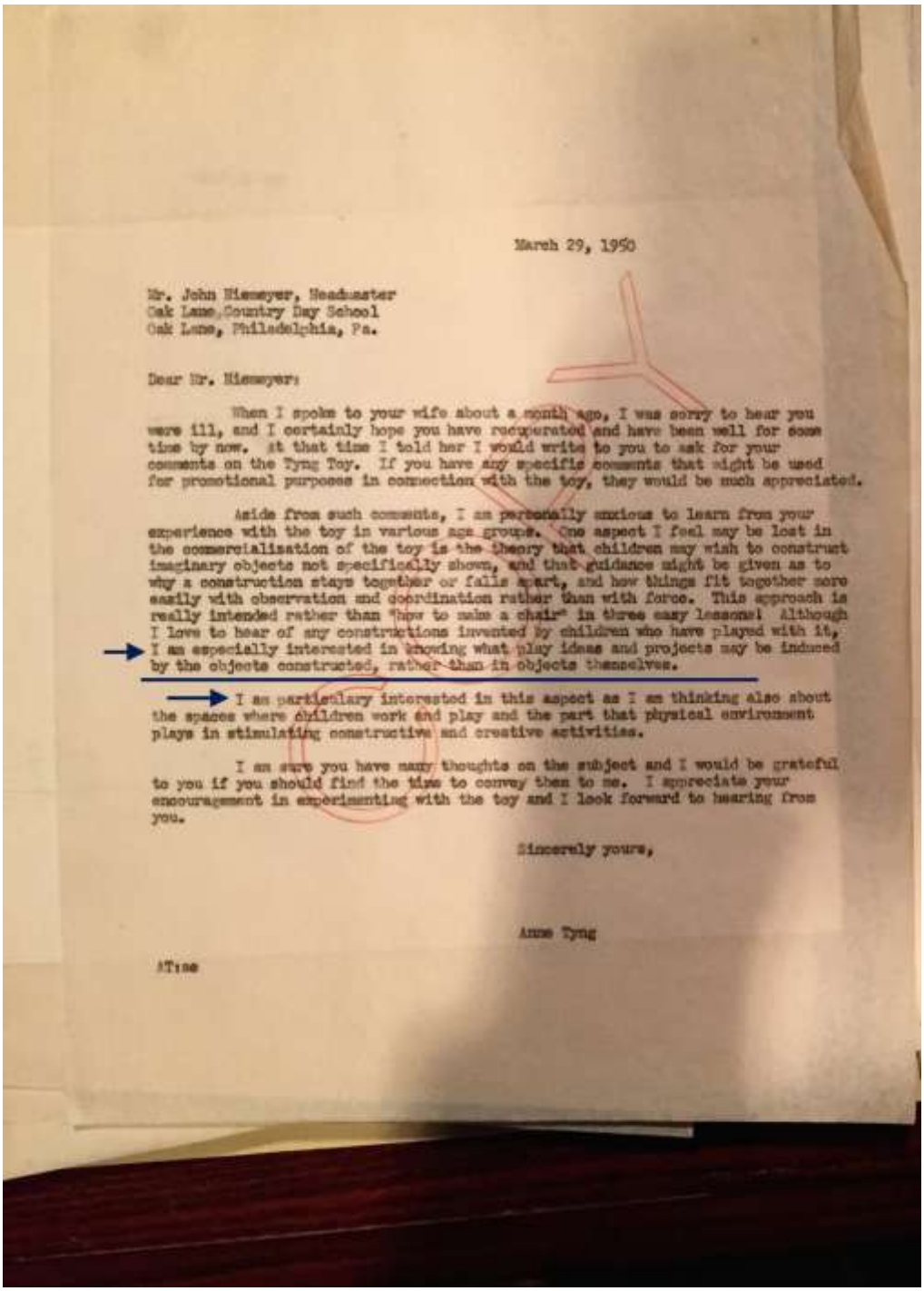
Anexo AA. Definición de la hélice por Tyng. Texto para curso *outline* en Upen Verano, 1998.

Fuente: Anne Griswold Tyng Collection, The Architectural Archives, University of Pennsylvania. Carpeta 74.II.E.1.82.



Anexo BB. Correspondencia de Tyng para aplicar a una Fulbright Grant (1952-53), nota preparativa de respuesta ante la negativa de la beca Fulbright para ir a Italia.

Fuente: AAUP, Anne Griswold Tyng Collection, carpeta 74.II.A.48.



March 29, 1950

Mr. John Hiemeyer, Headmaster
Oak Lane Country Day School
Oak Lane, Philadelphia, Pa.

Dear Mr. Hiemeyer:

When I spoke to your wife about a month ago, I was sorry to hear you were ill, and I certainly hope you have recuperated and have been well for some time by now. At that time I told her I would write to you to ask for your comments on the Tyng Toy. If you have any specific comments that might be used for promotional purposes in connection with the toy, they would be much appreciated.

Aside from such comments, I am personally anxious to learn from your experience with the toy in various age groups. One aspect I feel may be lost in the commercialization of the toy is the theory that children may wish to construct imaginary objects not specifically shown, and that guidance might be given as to why a construction stays together or falls apart, and how things fit together more easily with observation and coordination rather than with force. This approach is really intended rather than "how to make a chair" in three easy lessons! Although I love to hear of any constructions invented by children who have played with it, I am especially interested in knowing what play ideas and projects may be induced by the objects constructed, rather than in objects themselves.

I am particulary interested in this aspect as I am thinking also about the spaces where children work and play and the part that physical environment plays in stimulating constructive and creative activities.

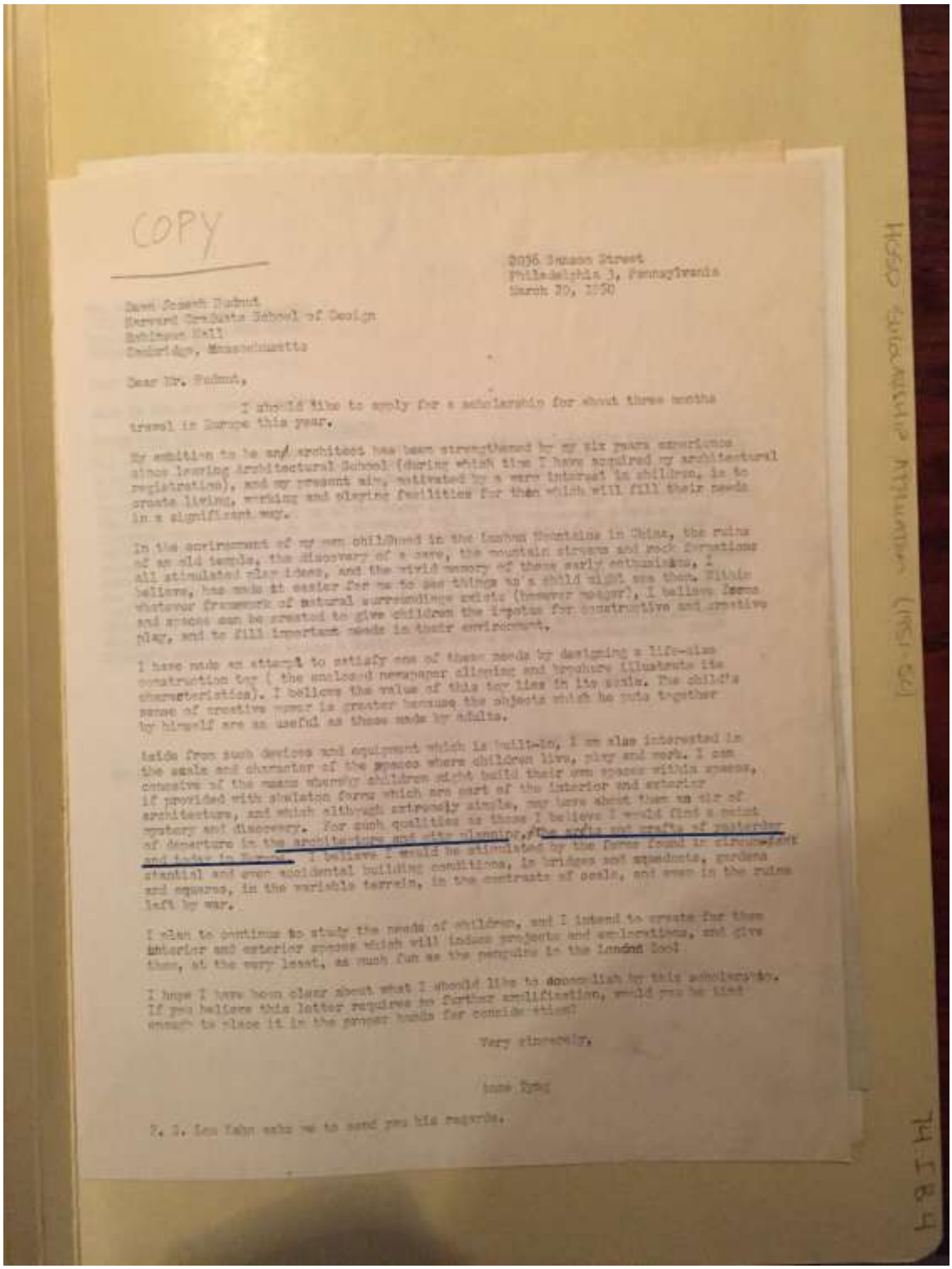
I am sure you have many thoughts on the subject and I would be grateful to you if you should find the time to convey them to me. I appreciate your encouragement in experimenting with the toy and I look forward to hearing from you.

Sincerely yours,

Anne Tyng

ATing

Anexo CC. Carta a rector de Oak Lane, Country Day School, sobre juguete "Tyng Toy", 29 de marzo 1950



COPY

2036 Benson Street
Philadelphia 3, Pennsylvania
March 20, 1950

Dean Joseph Hudnut
Harvard Graduate School of Design
Robinson Hall
Cambridge, Massachusetts

Dear Mr. Hudnut,

I should like to apply for a scholarship for about three months travel in Europe this year.

My ambition to be an architect has been strengthened by my six years experience since leaving Architectural School (during which time I have acquired my architectural registration), and my present aim, motivated by a keen interest in children, is to create living, working and sleeping facilities for them which will fill their needs in a significant way.

In the environment of my own childhood in the Taishan Mountains in China, the ruins of an old temple, the discovery of a cave, the mountain streams and rock formations all stimulated play ideas, and the vivid memory of these early enthusiasms, I believe, has made it easier for me to see things as a child might see them. Within whatever framework of natural surroundings exists (however meager), I believe forms and spaces can be created to give children the impetus for constructive and creative play, and to fill important needs in their environment.

I have made an attempt to satisfy one of these needs by designing a life-size construction toy (the enclosed newspaper clipping and brochure illustrate its characteristics). I believe the value of this toy lies in its scale. The child's sense of creative power is greater because the objects which he puts together by himself are as useful as those made by adults.

Aside from such devices and equipment which is built-in, I am also interested in the scale and character of the spaces where children live, play and work. I can conceive of the means whereby children might build their own spaces within spaces, if provided with skeleton forms which are part of the interior and exterior architecture, and which although artificially simple, may have about them an air of mystery and discovery. For such qualities as these I believe I would find a point of departure in the architecture and city planning of the Arabs and crafts of yesterday and today in [illegible]. I believe I would be stimulated by the forms found in circumstantial and even accidental building conditions, in bridges and aqueducts, gardens and squares, in the variable terrain, in the contrasts of scale, and even in the ruins left by war.

I plan to continue to study the needs of children, and I intend to create for them interior and exterior spaces which will induce projects and explorations, and give them, at the very least, as much fun as the penguins in the London Zoo!

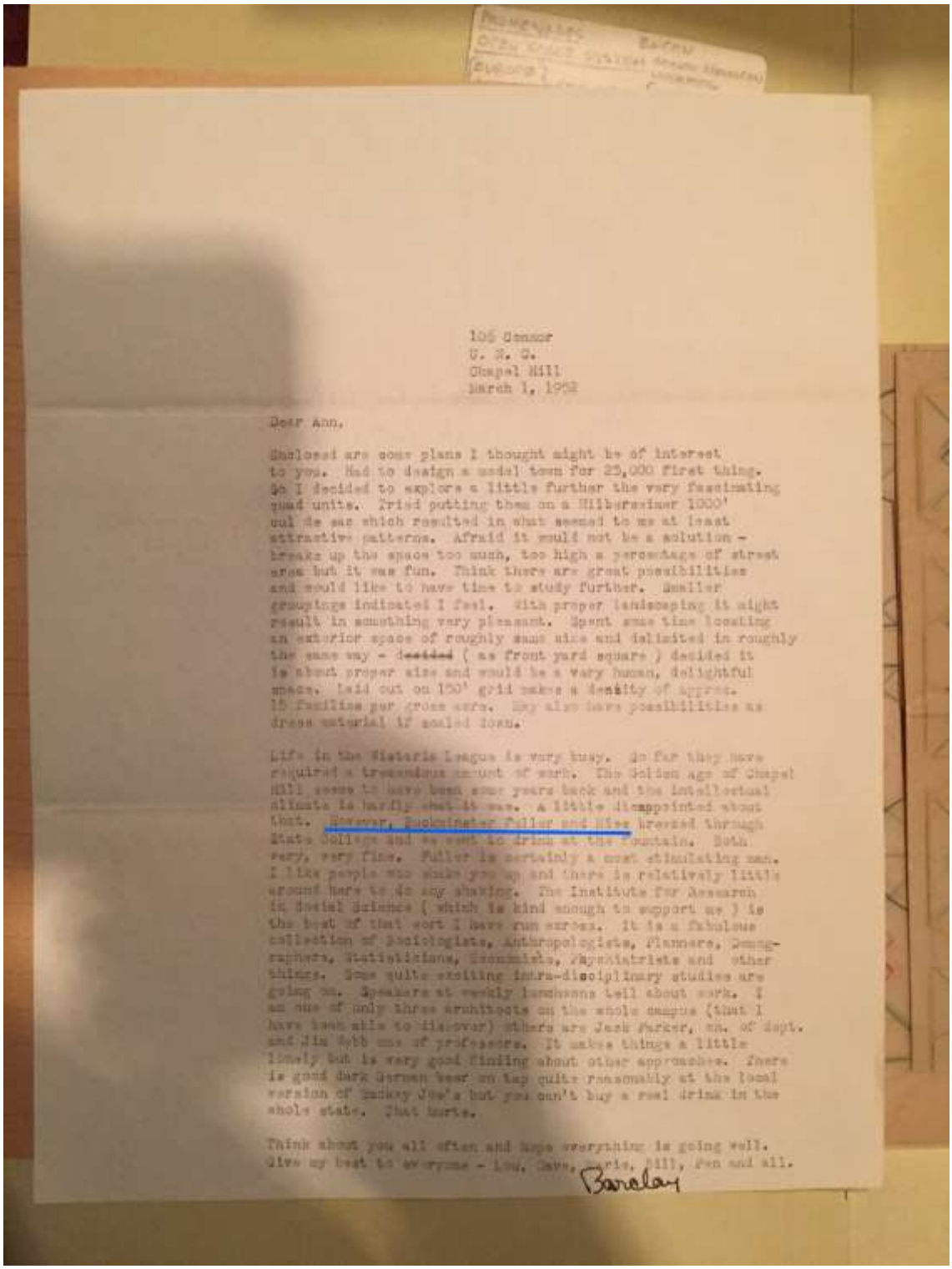
I hope I have been clear about what I should like to accomplish by this scholarship. If you believe this letter requires no further amplification, would you be kind enough to place it in the proper hands for consideration?

Very sincerely,

Tyng

P. S. Louis Kahn asks me to send you his regards.

Anexo DD. Carta de Tyng al Dean Joseph Hudnut Graduate School of Design, con el propósito de aplicar a una beca



105 Connor
U. N. C.
Chapel Hill
March 1, 1952

Dear Ann,

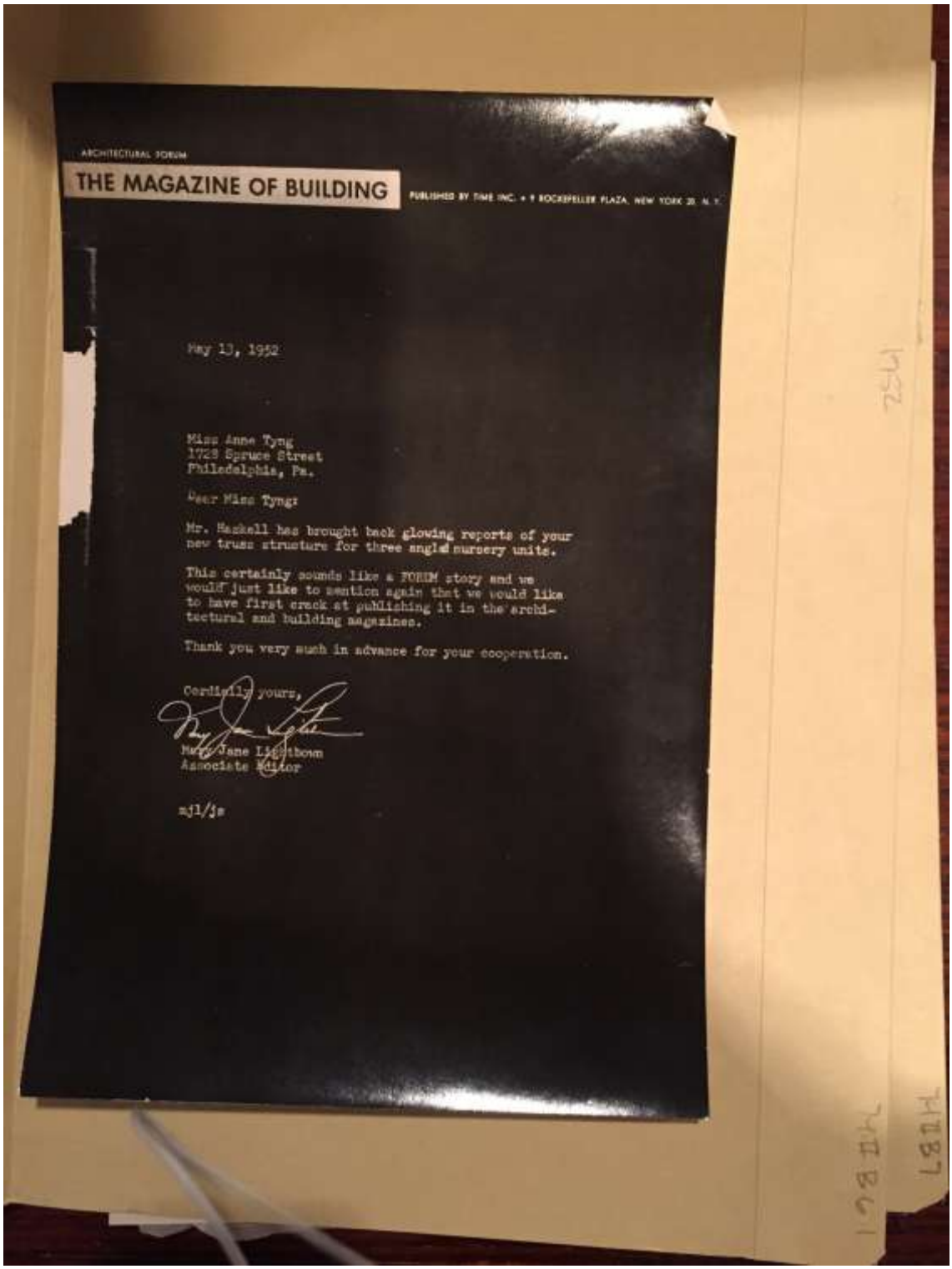
Enclosed are some plans I thought might be of interest to you. Had to design a model town for 25,000 first thing. So I decided to explore a little further the very fascinating quad units. Tried putting them on a Hilberseimer 1000' sq. de sac which resulted in what seemed to me at least attractive patterns. Afraid it would not be a solution - breaks up the space too much, too high a percentage of street area but it was fun. Think there are great possibilities and would like to have time to study further. Smaller groupings indicated I feel. With proper landscaping it might result in something very pleasant. Spent some time locating an exterior space of roughly same size and delimited in roughly the same way - decided (as front yard square) decided it is about proper size and would be a very human, delightful space. Laid out on 150' grid makes a density of approx. 15 families per gross acre. Lay also have possibilities as dress material if scaled down.

Life in the Victoria League is very busy. So far they have required a tremendous amount of work. The Golden Age of Chapel Hill seems to have been some years back and the intellectual climate is hardly what it was. A little disappointed about that. However, Buckminster Fuller and Alex Dreyer through State College and we went to drink at the fountain. Both very, very fine. Fuller is certainly a most stimulating man. I like people who shake you up and there is relatively little around here to do any shaking. The Institute for Research in Social Science (which is kind enough to support me) is the best of that sort I have run across. It is a fabulous collection of Sociologists, Anthropologists, Planners, Demographers, Statisticians, Economists, Psychiatrists and other things. Some quite exciting intra-disciplinary studies are going on. Speakers at weekly luncheons tell about work. I am one of only three architects on the whole campus (that I have been able to discover) others are Jack Parker, ex. of dept. and Jim Webb one of professors. It makes things a little lonely but is very good finding about other approaches. There is good dark German beer on tap quite reasonably at the local version of Mickey Joe's but you can't buy a real drink in the whole state. That hurts.

Think about you all often and hope everything is going well. Give my best to everyone - Lou, Dave, Doris, Bill, Jen and all.

Barclay

Anexo EE. Carta de Barclay, amigo de Tyng, sobre el diseño de la calle y las conferencias que Fuller hace a Chapel Hill University en marzo de 1952, quince días después de la conferencia que diera en UPenn



ARCHITECTURAL FORUM

THE MAGAZINE OF BUILDING

PUBLISHED BY TIME INC. • 9 ROCKEFELLER PLAZA, NEW YORK 20, N. Y.

May 13, 1952

Miss Anne Tyng
1723 Spruce Street
Philadelphia, Pa.

Dear Miss Tyng:

Mr. Haskell has brought back glowing reports of your new truss structure for three angled nursery units.

This certainly sounds like a FORUM story and we would just like to mention again that we would like to have first crack at publishing it in the architectural and building magazines.

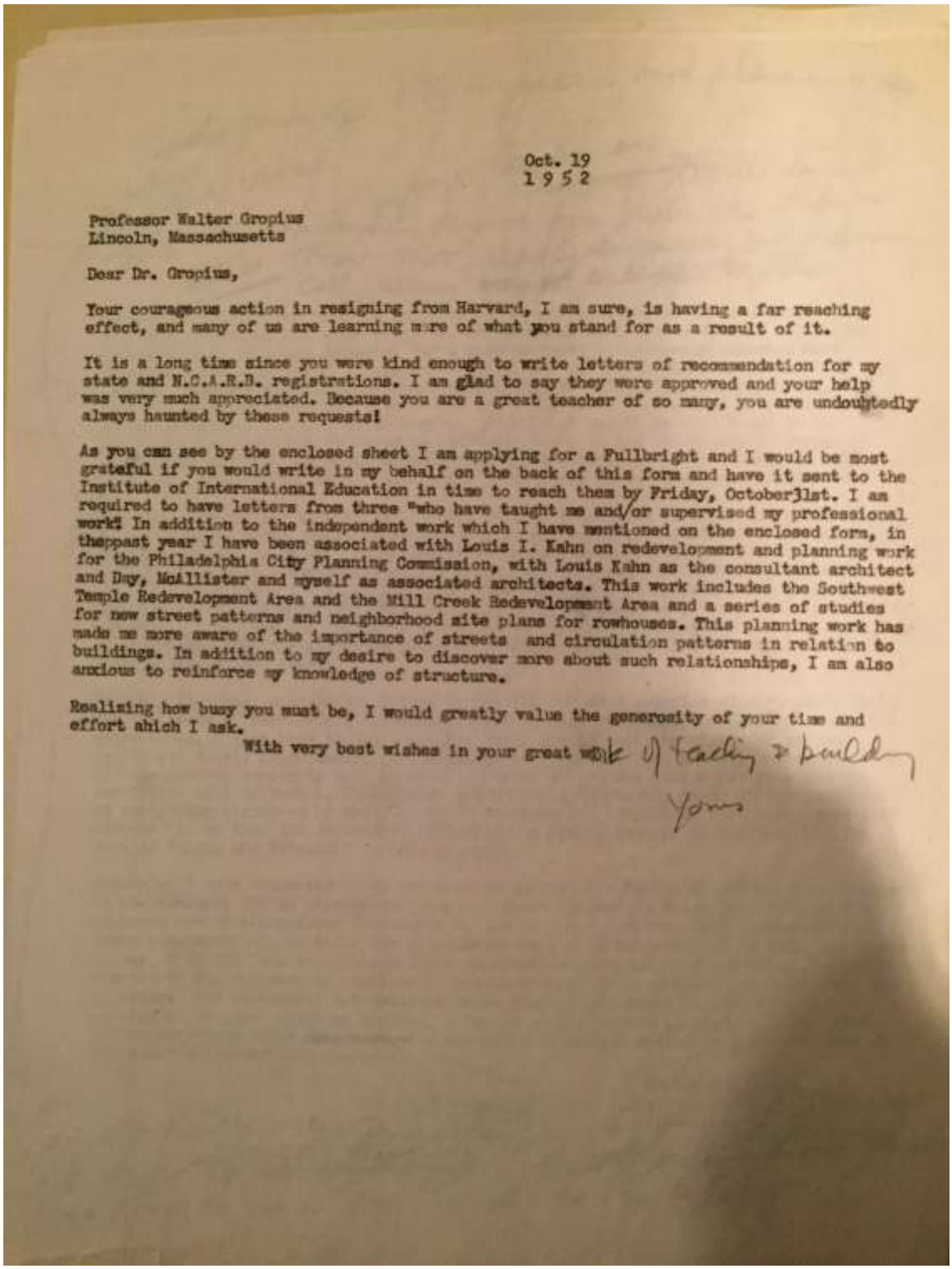
Thank you very much in advance for your cooperation.

Cordially yours,

Mary Jane Lighthorn
Associate Editor

mjl/js

Anexo FF. Carta de la Revista Architechtural Forum para Tyng, interesados en el juguete "Toy Tyng", fechada 13 mayo 1952



Oct. 19
1952

Professor Walter Gropius
Lincoln, Massachusetts

Dear Dr. Gropius,

Your courageous action in resigning from Harvard, I am sure, is having a far reaching effect, and many of us are learning more of what you stand for as a result of it.

It is a long time since you were kind enough to write letters of recommendation for my state and N.C.A.R.B. registrations. I am glad to say they were approved and your help was very much appreciated. Because you are a great teacher of so many, you are undoubtedly always haunted by these requests!

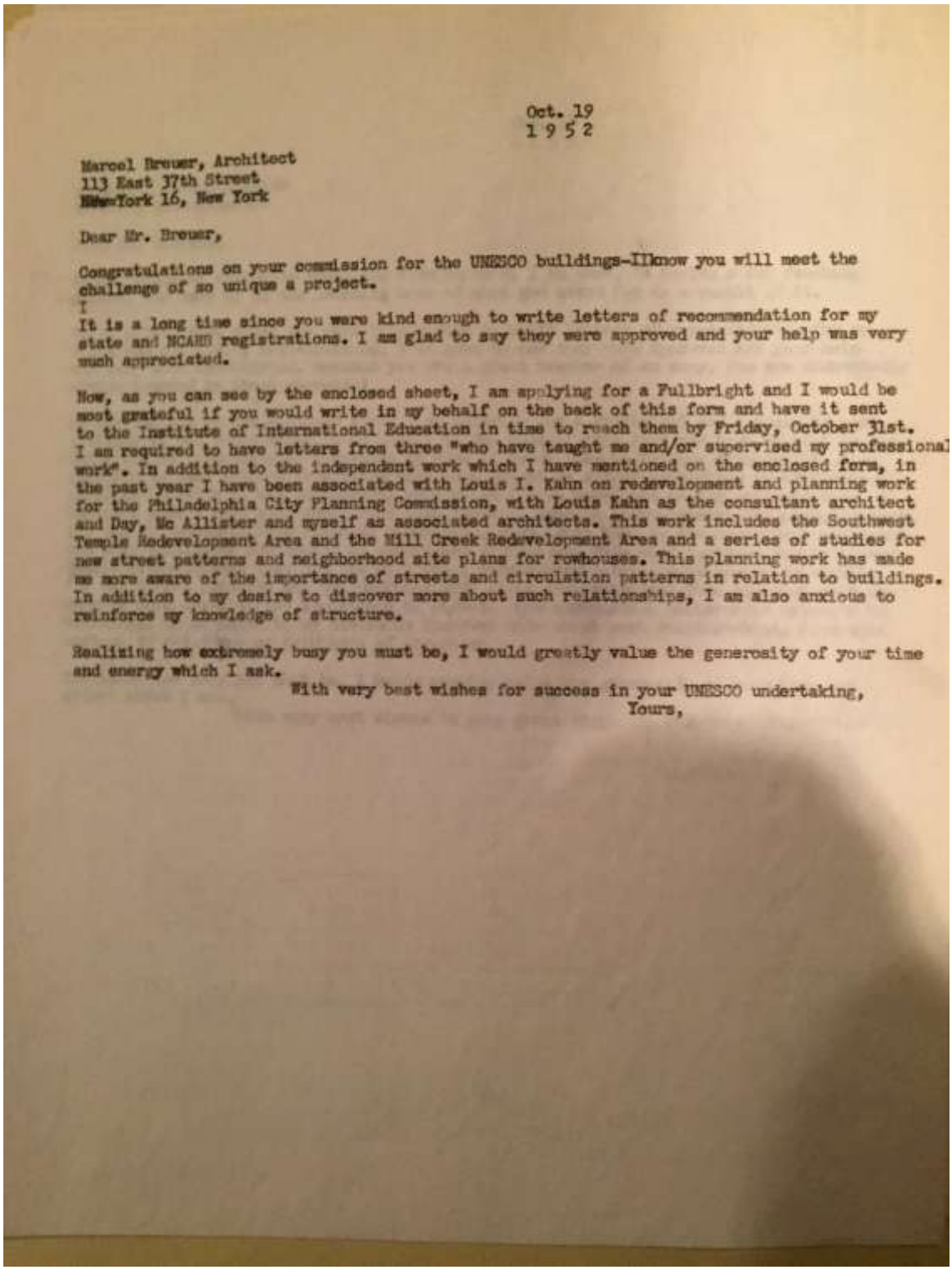
As you can see by the enclosed sheet I am applying for a Fullbright and I would be most grateful if you would write in my behalf on the back of this form and have it sent to the Institute of International Education in time to reach them by Friday, October31st. I am required to have letters from three who have taught me and/or supervised my professional work. In addition to the independent work which I have mentioned on the enclosed form, in thepast year I have been associated with Louis I. Kahn on redevelopment and planning work for the Philadelphia City Planning Commission, with Louis Kahn as the consultant architect and Day, McAllister and myself as associated architects. This work includes the Southwest Temple Redevelopment Area and the Mill Creek Redevelopment Area and a series of studies for new street patterns and neighborhood site plans for rowhouses. This planning work has made me more aware of the importance of streets and circulation patterns in relation to buildings. In addition to my desire to discover more about such relationships, I am also anxious to reinforce my knowledge of structure.

Realizing how busy you must be, I would greatly value the generosity of your time and effort which I ask.

With very best wishes in your great work of teaching + building

Yours

Anexo GG. Correspondencia de Tyng para aplicar a una Fulbright Grant (1952-53), solicitud de recomendación a W. Gropius



Oct. 19
1952

Marcel Breuer, Architect
113 East 37th Street
New York 16, New York

Dear Mr. Breuer,

Congratulations on your commission for the UNESCO buildings-I know you will meet the challenge of so unique a project.

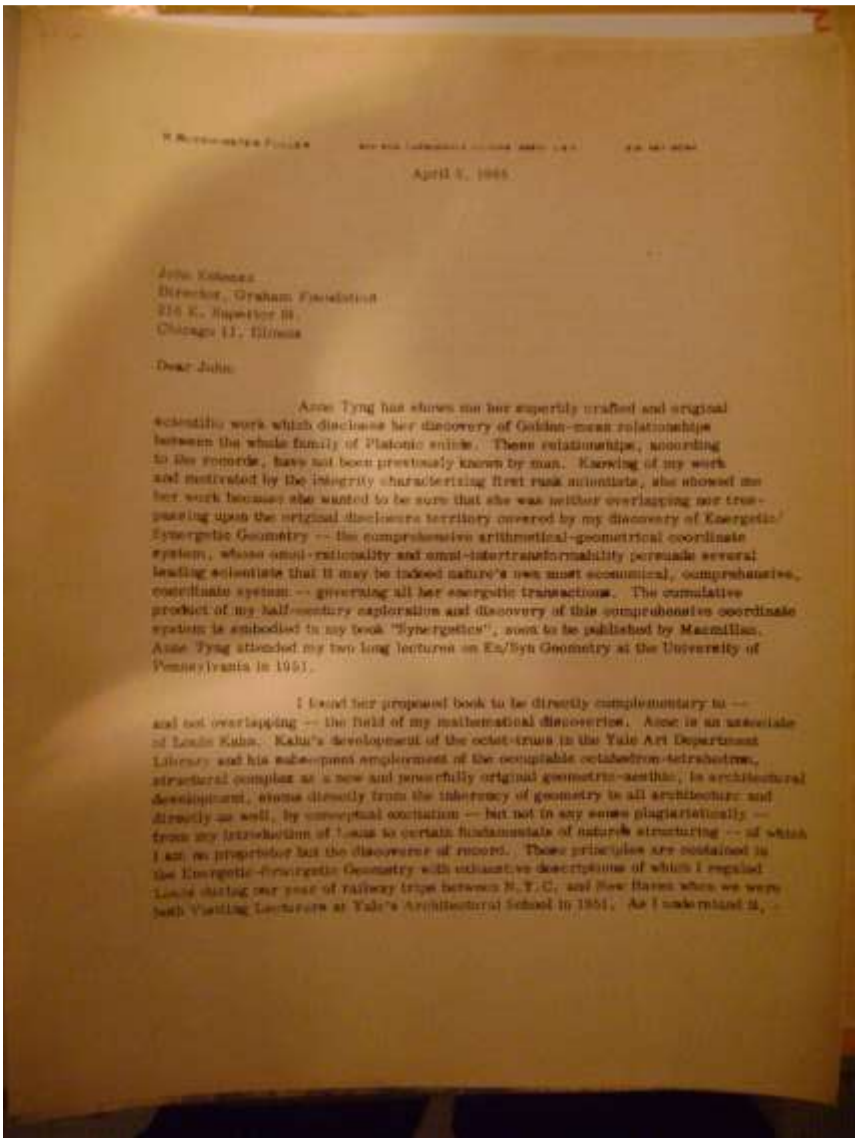
I
It is a long time since you were kind enough to write letters of recommendation for my state and NCARB registrations. I am glad to say they were approved and your help was very much appreciated.

Now, as you can see by the enclosed sheet, I am applying for a Fullbright and I would be most grateful if you would write in my behalf on the back of this form and have it sent to the Institute of International Education in time to reach them by Friday, October 31st. I am required to have letters from three "who have taught me and/or supervised my professional work". In addition to the independent work which I have mentioned on the enclosed form, in the past year I have been associated with Louis I. Kahn on redevelopment and planning work for the Philadelphia City Planning Commission, with Louis Kahn as the consultant architect and Day, Mc Allister and myself as associated architects. This work includes the Southwest Temple Redevelopment Area and the Mill Creek Redevelopment Area and a series of studies for new street patterns and neighborhood site plans for rowhouses. This planning work has made me more aware of the importance of streets and circulation patterns in relation to buildings. In addition to my desire to discover more about such relationships, I am also anxious to reinforce my knowledge of structure.

Realizing how extremely busy you must be, I would greatly value the generosity of your time and energy which I ask.

With very best wishes for success in your UNESCO undertaking,
Yours,

Anexo HH. Correspondencia de Tyng para aplicar a una Fulbright Grant (1952-53), solicitud de recomendación a Marcel Breuer



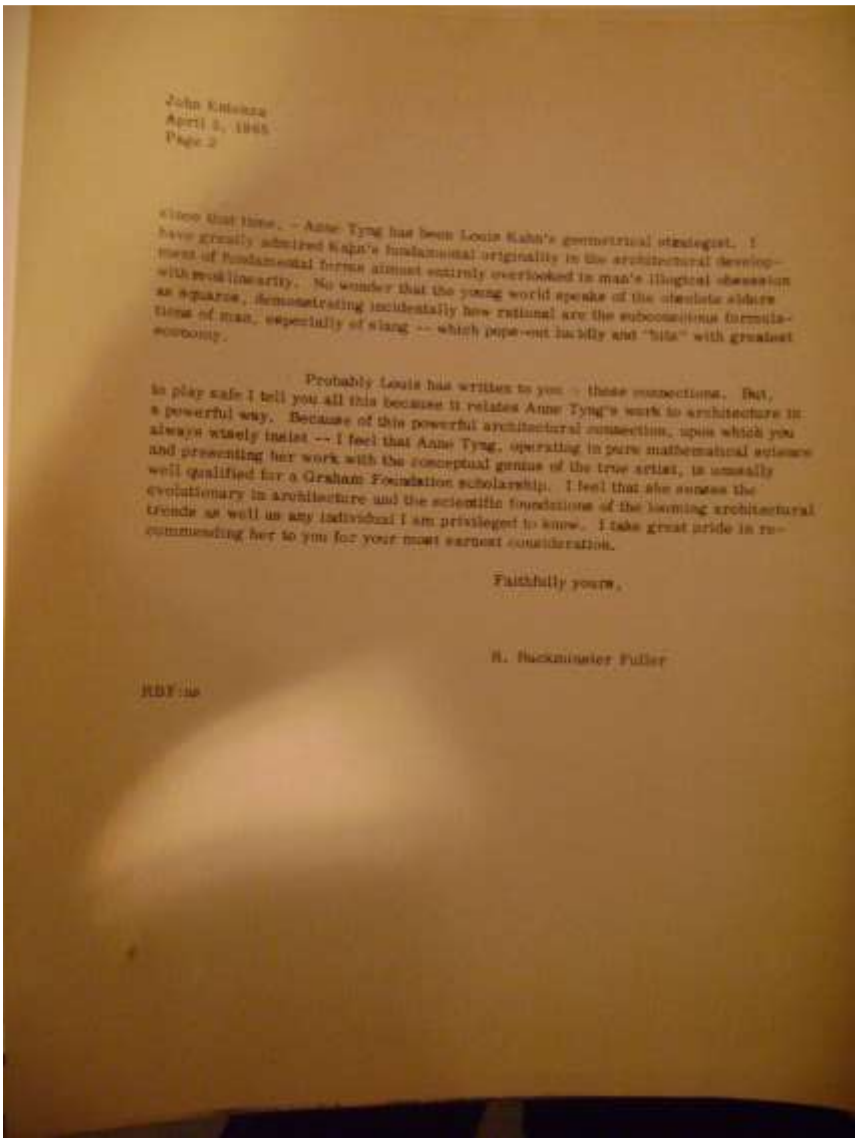
April 5, 1961

John Entenza
Director, Graham Foundation
216 E. Superior St.
Chicago 11, Illinois

Dear John:

Anne Tyng has shown me her superbly crafted and original scientific work which discloses her discovery of Golden-mean relationships between the whole family of Platonic solids. These relationships, according to the records, have not been previously known by man. Knowing of my work and motivated by the integrity characterizing first rank scientists, she showed me her work because she wanted to be sure that she was neither overlapping nor trespassing upon the original disclosure territory covered by my discovery of Energetic/Synergetic Geometry -- the comprehensive arithmetical-geometrical coordinate system, whose omni-rationality and omni-intertransformability persuade several leading scientists that it may be indeed nature's own most economical, comprehensive, coordinate system -- governing all her energetic transactions. The cumulative product of my half-century exploration and discovery of this comprehensive coordinate system is embodied in my book "Synergetics", soon to be published by Macmillan. Anne Tyng attended my two long lectures on En/Syn Geometry at the University of Pennsylvania in 1951.

I found her proposed book to be directly complementary to -- and not overlapping -- the field of my mathematical discoveries. Anne is an associate of Louis Kahn. Kahn's development of the octet-truss in the Yale Art Department Library and his subsequent employment of the occupiable octahedron-tetrahedron, structural complex as a new and powerfully original geometric-aesthetic, in architectural development, stems directly from the inherency of geometry in all architecture and directly as well, by conceptual contagion -- but not in any sense plagiaristically -- from my introduction of Louis to certain fundamentals of naturals structuring -- of which I am no proprietor but the discoverer of record. These principles are contained in the Energetic-Synergetic Geometry with exhaustive descriptions of which I regaled Louis during our year of railway trips between N.Y.C. and New Haven when we were both Visiting Lecturers at Yale's Architectural School in 1951. As I understand it, -



John Entenza
April 2, 1965
Page 2

since that time. - Anne Tyng has been Louis Kahn's geometrical strategist. I have greatly admired Kahn's fundamental originality in the architectural development of fundamental forms almost entirely overlooked in man's illogical obsession with nonlinearity. No wonder that the young world speaks of the obsolete elders as square, demonstrating incidentally how rational are the subconscious formulations of man, especially of slang -- which pops-out hardly and "hits" with greatest economy.

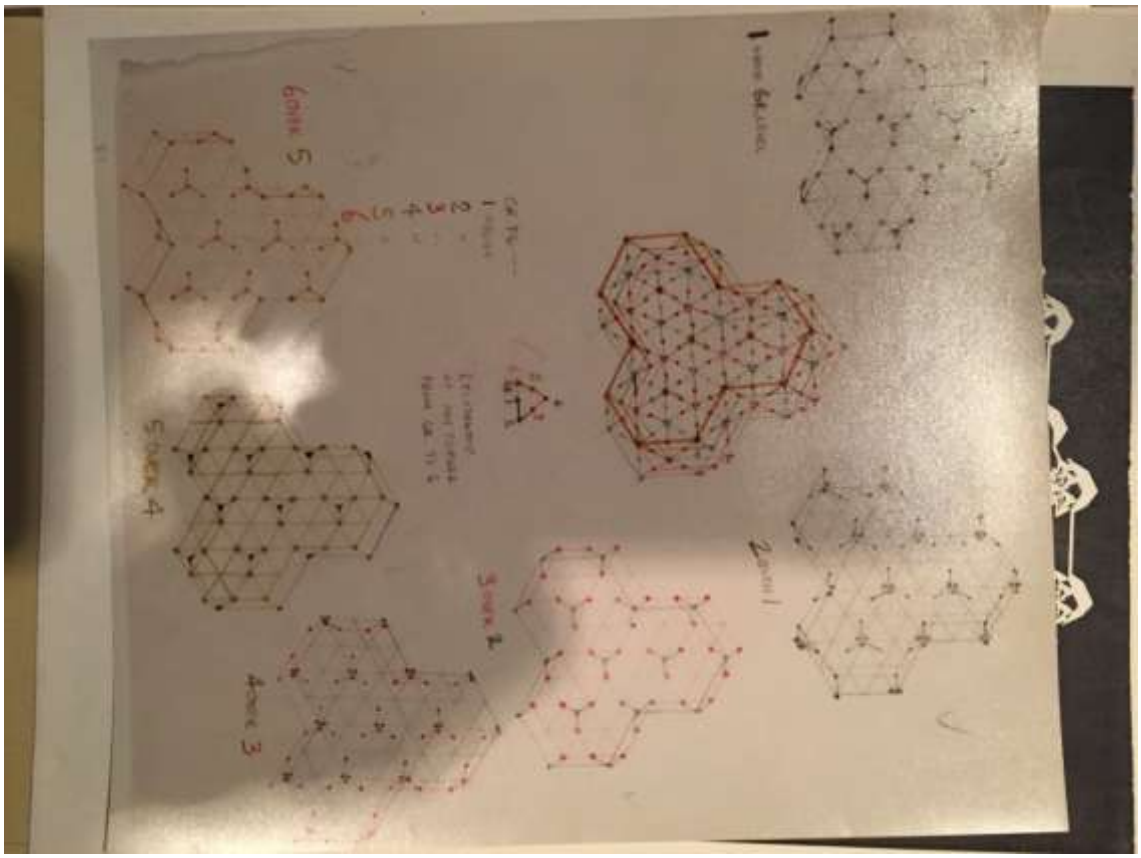
Probably Louis has written to you - these connections. But, to play safe I tell you all this because it relates Anne Tyng's work to architecture in a powerful way. Because of this powerful architectural connection, upon which you always wisely insist -- I feel that Anne Tyng, operating in pure mathematical science and presenting her work with the conceptual genius of the true artist, is unusually well qualified for a Graham Foundation scholarship. I feel that she senses the evolutionary in architecture and the scientific foundations of the burning architectural trends as well as any individual I am privileged to know. I take great pride in recommending her to you for your most earnest consideration.

Faithfully yours,

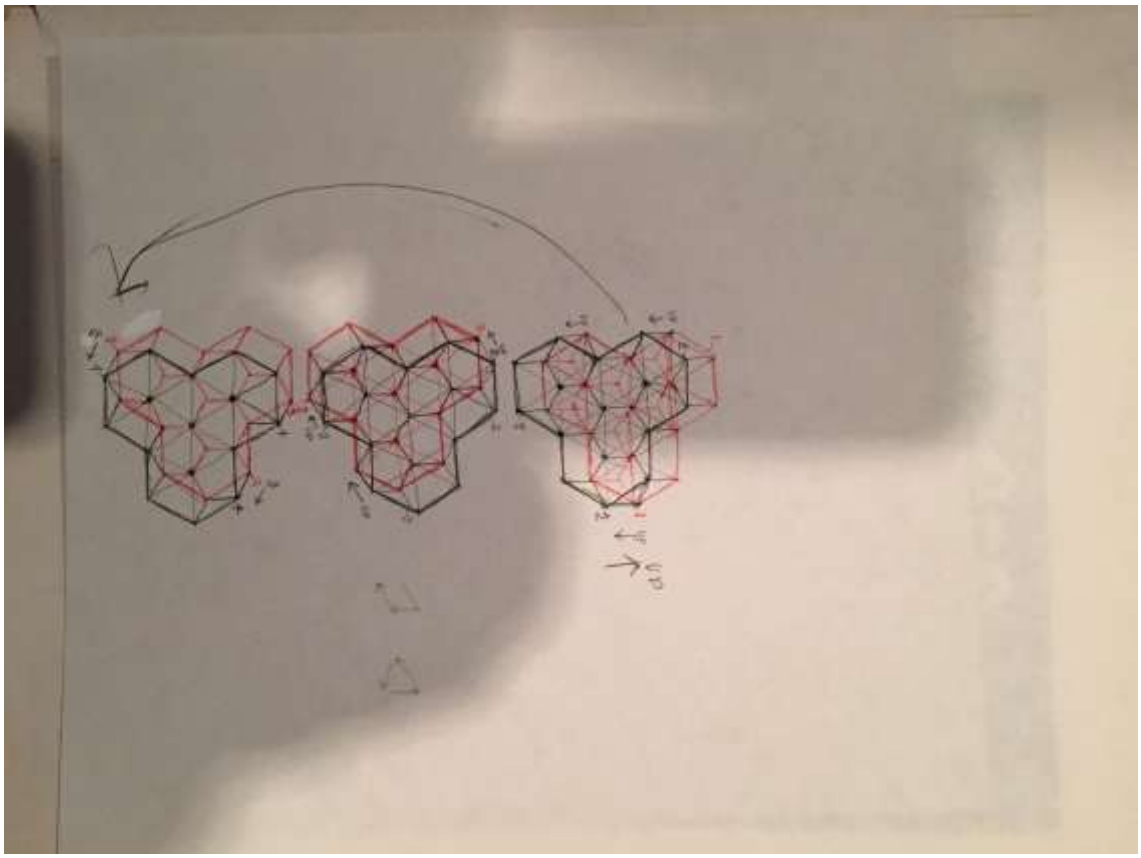
R. Buckminster Fuller

RBF:ne

Anexo JJ. Carta de recomendación escrita por Fuller, dirigida a John Stenza Graham Fundation con el propósito de apoyar a Tyng para una beca en 1965



Anexo KK Dibujos exploratorios de estructura de la última versión de la City Hall Tower



Anexo LL. Dibujos exploratorios de estructura de la última versión de la City Hall Tower