

Hollow Walls

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“I see the sun, and if I don’t see the sun, I know it’s there.

And there’s a whole life in that,

in knowing that the sun is there.”

Fyodor Dostoevsky, Brother Karamazov

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“The wall did well for man. In its thickness and its strength, it protected man against destruction. But soon, the will to look out made man make a hole in the wall, and the wall was pained, and said, “What are you doing to me? I protected you; I made you feel secure - and not you put a hole through me!” And man said, “But I see wonderful things, and I want to look out.” And the wall felt very sad.

Later man didn’t just hack a hole through the wall, but made a discerning opening, one trimmed with fine stone, and he put a lintel over the opening. And soon the wall felt pretty well.

Consider the momentous event in architecture when the wall parted and the column began.”¹

The Library of the Phillips Exeter Academy, Exeter New Hampshire. Photo by John Lobell



Introduction

1. Louis I. Kahn, “Architecture: The Making of a Room,” lecture at Pratt Institute, 1971, in Louis Kahn: Essential Texts, ed. Robert Twombly (New York: W.W. Norton & Company, 2003)

2. In *We Have Never Been Modern*, Bruno Latour describes the perceived modern conception of the world as a society and nature pole where the modern man occupies the society pole while everything non-human occupies the nature pole. According to Latour, the modern man believes that the premodern man exists in a premodern overlap between nature and society, while only the modern man sits apart at his own pole. Latour’s argument continues that this is a critical misunderstanding of modernism as it does not accurately describe modern man’s relation to the world. Whether or not the modern man is capable of the separation he supposedly achieves, Latour identifies that a key aspect of the modern mind is the desire for separation.

This notion of separation can trace its origins to enlightenment thinkers like Bacon and Kant, however the physical manifestation of such a philosophy is made most explicit with modernism. The five points put forward by Corbusier all point to the separation of a whole into discrete parts given a quantifiable function, and it is this approach which loosely guides the modern movement.

Bruno Latour, *We Have Never Been Modern*, trans. Catherine Porter (Cambridge, MA: Harvard University Press, 1993) Le Corbusier, “Five Points Towards a New Architecture” (1926), in *Programs and Manifestoes on 20th-Century Architecture*, ed. Ulrich Conrads, trans. Michael Bullock (Cambridge, MA: MIT Press, 1970)

3. In many ways the post-modernism of Venturi and others can be understood as a critical evolution of modernism, especially in the logic of its construction. There are many clear changes such as the use of historical reference and a move towards pluralism over the uniformity from modernism. But most important perhaps is it’s separation into thing and sign of thing poles. Robert Venturi, Denise Scott Brown, and Steven Izenour, *Learning from Las Vegas: The Forgotten Symbolism of Architectural Form*, rev. ed. (Cambridge, MA: MIT Press, 1977), 91.

Among the steel and glass of the architecture of mid twentieth century, the red brick buildings of Louis Kahn make a conspicuous appearance. The advent of modernism was totalising and the effects are still felt profoundly. The route away from modernism was far less clear. While the most widely understood movement to follow modernism is defined by Robert Venturi, Peter Cook, and the Smithsons, among many others, there remains another, very different, path away from modernism provided by Louis Kahn.

Throughout his life he formulated it in many different terms, but one can say that it is an architecture of light and material. The modern conception of ‘space’ is replaced with a simple room. It is as much in dialogue with ancient Rome and Medieval Estonia as it is with modernism. For Kahn, history has not ended. Critically, Kahn built with load bearing walls. It is an act which is fundamentally un-modern; the goal of the modern project is that of separation², and the return to a system of construction which is unifying represents not a continuation, but a denial.³

From 1950 until his death in 1974 Kahn built a great many projects both in the United States and abroad. They span a wide range of scales and themes, even perhaps levels of success. He built with walls and he built with columns, arches and lintels. For the purpose of this study I have limited the analysis to four projects; Trenton, Rochester, Ahmadabad, and Exeter. They are the four which I found the most representative of his changing treatment with the wall and between them I hope that one begins to see a picture of his understanding of the wall. Kahn is an architect who has been studied extensively and with great rigour, yet still there are many themes present in his work that would provide ample material for further exploration. Due to the relatively short length of this study, much will be left untouched. In order to talk concretely, one must be specific. And so it is through the element of the load bearing masonry wall that I want to approach Kahn’s work.

1.

Louis Kahn

Louis Kahn, Carlo Scarpa and Dino Buzzati in front of a model of a project in the Giardini della Biennale, January 1969. Graziano Arici Archive

*Background*

Twenty five years after graduating from the University of Pennsylvania, the architecture of Louis Kahn began. In his 1991 treatise on Louis Kahn, David Brownlee wrote the following words;

*"Louis Kahn lived for fifty years and worked as an architect for more than a quarter century before fame found him. His first five decades do not, however, contradict what he did later; neither do they explain it. He was, during that time, a successful architect within the boundaries imposed by youth, the great depression, and the second world war. He learned, he built, he taught, and he devoted himself to the central preoccupations of his generation in architecture: He succeeded. But in later life he reformulated those concerns, subsuming them within a new understanding of the nature of architecture, and in doing so he established more rigorous criteria for success. And by those standards he succeeded again."*⁴

4. David Brownlee and David G. De Long, Louis I. Kahn: In the Realm of Architecture (New York: Rizzoli, 1991) 20.

5. At this time the school was run by the celebrated French architect Paul Philippe Cret. The architecture that was taught at the academy was in the slightly abstracted 'modernised' version of the classical version of the beaux-arts that had been established in Paris. This style was fairly prominent in America in the beginning of the twentieth century however it also became the adopted style of Mussolini after he grew tired of his flirtation with modernism. As such it became practically taboo to build in such a way in America once it had been critically deemed as 'fascist' architecture.

Born Itze-Leib Schmuilowsky, in what is in present day Estonia on the island of Saaremaa in 1901, his family emigrated to Philadelphia when he was five years old. After rejecting a full scholarship to study art the Pennsylvania Academy of the Fine Arts, Kahn studied architecture at the University of Pennsylvania School of the Fine Arts under Paul Philippe Cret. At the time this offered an education in the beaux-arts tradition.⁵ In the years following his graduation in 1924, Kahn established himself in the city of Philadelphia and its surroundings. For twenty-five years Kahn worked on a variety of projects either for himself or others which continued in a rather tame version of the International Style epitomised by the Miesian box. However, in 1950, a sudden and radical change took place.

"When in 1951 Louis Kahn received the commission for the Yale Art gallery, he was a well-respected but hardly famous architect. Few besides those who worked with him sensed the potential that would, within the decade, lead to international acclaim, yet in the relatively brief span of ten years following the Yale commission, he evolved an orig-

*inal vocabulary that responded to concerns being voiced by an entire generation of architect. And in the years that remained before his death in March 1974, he worked with that vocabulary to reshape architecture.*⁶

The commission for the Yale Art Gallery, likely due in large part to his position teaching there which had started four years prior, was the first of a series of his canonical projects which took place over the following two and a half decades. There is a great deal of speculation as to what caused this change in his work. Often credited is a fellowship at the American Academy in Rome in 1950, as well as his growing friendship with Robert Venturi, and his appointment teaching at Yale. In part, these may all be true, however I will focus primarily on the influence of his fellowship in Rome.

The architecture that Kahn began to develop from the fifties onwards stood in stark contrast to the International Style and Bauhaus influence that had become the de-facto standard. His work was heavy; “sitting on the ground rather than as a floating plane on a frame.”⁷, the modernist rejection of history is all but invisible in his work and the ‘liberation’ of space from structural constraints was nowhere to be found.

After the Modern Paradigm

Despite his beaux-arts education, in the early years of Kahn’s career, the prevailing movement of the time in America was the International Style. In the post-war period, while the modernism proposed by Le Corbusier among many others was widely accepted, the freshness of the idea was beginning to wear off. The pared back, refined structural aesthetic of abstraction of the International Style seemed to dominate most current building.⁸ There were, however, two other (far less prominent) directions in which architects advanced in this period in America. These can be loosely defined as architecture as “social factor” and architecture as ‘language’.⁹

Those who viewed architecture as ‘social factor’ increasingly found an internal tension in the civic building that

6. David Brownlee and David G. De Long, *Louis I. Kahn: In the Realm of Architecture* (New York: Rizzoli, 1991) 21, 22.

7. Robert Venturi, “Louis Kahn Remembered: Notes from a Lecture at the Opening of the Kahn Exhibition in Japan, January 1993”, in *Iconography and Electronics Upon a Generic Architecture* (Cambridge, Massachusetts: The MIT Press, 1996)

8. The presence of Mies Van der Rohe in America during this time cannot be overstated. In a lecture Vincent Scully describes him as a ‘lion in the path of all architects’. After his emigration to the United States he had an incredibly prolific period from 1939 until his death in 1969. His teaching at the IIT in Chicago also resulted in a large number of young architects who began their careers with a large influence at the outset.

9. James Ackerman argued these points in the forum entitled, “Monumentality and the City,” held on December 12, 1981. See “Monumentality and the City: Forum Transcript,” in *The Harvard Architecture Review* IV (Spring 1984), 36.

10. Perhaps most emblematic of this group is Aldo van Eyck.

11. Giedion viewed monumentality as a timeless quality in architecture that evokes collective memory, cultural continuity, and emotional resonance.
Sigfried Giedion, José Luis Sert, and Fernand Léger, *Architecture and the Phenomena of Transition* (Cambridge, MA: Harvard University Graduate School of Design, 1941)

12. This group is more varied, but contains figures like Bernard Rudofsky.

13. Spavit Darnthamrongkul, “Challenging Orthodoxy”, PhD Diss. (University of Pennsylvania, 2024), 10

14. Louis I. Kahn, “Monumentality,” in *New Architecture and City Planning*, ed. Paul Zucker (New York: Philosophical Library, 1944), 577.

15. Ibid.

16. Louis I. Kahn, “Monumentality,” in *New Architecture and City Planning*, ed. Paul Zucker (New York: Philosophical Library, 1944)

needed to express the ideals and ambitions of both the individual and society.¹⁰ In the abstract functionalism of modernism, physical life could be accommodated but psychological needs were often neglected and this approach could not host a social expression which began to be raised by the idea of a ‘new monumentality’ that was proposed by Sigfried Giedion.¹¹

Those proponents of architecture as ‘language’ encountered a separate set of issues with the International Style of the era. In the ambition to strip everything from buildings which was deemed unnecessary, heavily ornamented facades were replaced by clean lines and planar surfaces. This approach lacked the depth of communication that was present in earlier buildings.¹² The idea of architecture as ‘language’ was largely in response to this. Despite the wholesale rejection of ornament in modernism, it began to reemerge as an attempt to communicate to the public.¹³

It is pointless to try and fit Kahn into either of these subsets, while he certainly took elements of both, his early career is still most closely associated with the predominant International Style. Kahn’s work during the forties is largely unremarkable, however in an essay published 1944 in Paul Zucker’s *New Architecture and City Planning* in response to a symposium dedicated to the ‘Nine Points on Monumentality’ by Giedion, one can glean valuable insights to his approach during this time. Kahn’s view on monumentality differed in some important ways to that of Giedion. Kahn described monumentality as “a spiritual quality inherent in a structure which conveys the feeling of its eternity, that it cannot be added to or change”¹⁴. In keeping with Giedion’s views, in his essay Kahn states that architecture of all periods shows “the desires, the aspirations, the love and hate of the people whose heritage it became”¹⁵. Kahn also expounds on his appreciation for tubular steel member as opposed to the flange that had become the favoured choice of modernism. His argument for it is largely functional and not altogether sound, however it provides an interesting precursor to the ideas of hollow structural elements that would play such a prominent role in his later work.¹⁶

Towards a Heavy Architecture

In December of 1950, Kahn travelled to Rome to stay at the American Academy for three months. He was ostensibly “advising the fellows in architecture, accompanying them on trips, and supervising the annual collaborative project among the architects, painters and sculptors.”¹⁷ however he used this break from his previous work to visit the ancient monuments both throughout Italy as well as in Egypt and Greece. What he experienced on this trip would prove to have a tremendous influence on him and is most often credited as the catalyst for the great change that would be present in his following work. A letter he wrote from Italy reads as follows.

“I firmly realise that the architecture in Italy will remain as the inspirational source of the works of the future. Those who don’t see it that way ought to look again. Our stuff looks tinny compared to it and all the pure forms have been tried in all variation. What is necessary is the interpretation of the architecture of Italy as it relates to our knowledge of building and needs. I care little for the restorations (that kind of interpretation) but I see great personal value in reading one’s own approaches to the creation of space modified by the building around as the points of departure. I find it of little difficulty translating the masonry construction into steel and concrete and I intend to have the Fellows explore their reactions to what they see into similar aims. They are quite excited about the idea.”¹⁸

This was not, however, Kahn’s first trip to Europe. Shortly after his graduation from University of Pennsylvania, Kahn travelled to Europe with the dual intention of viewing the canonical buildings of western architecture as was a common tradition dating to the days of the Grand Tour, as well as to visit his birthplace of Saaremaa Island in Estonia.¹⁹ This trip lasted almost a year and although he visited a wide variety of places, his favourite destination was seemingly Italy where he stayed for five months. His sketches from the time showed an acute interest in certain monuments, however one can gather that it was only with his maturity of 1950 that their tremendous influence was reflected in his

17. Eugene J. Johnson and Michael J. Lewis, Drawn from The Source: The Travel Sketches of Louis I. Kahn (Cambridge, Massachusetts: The MIT Press, 1996), 67.

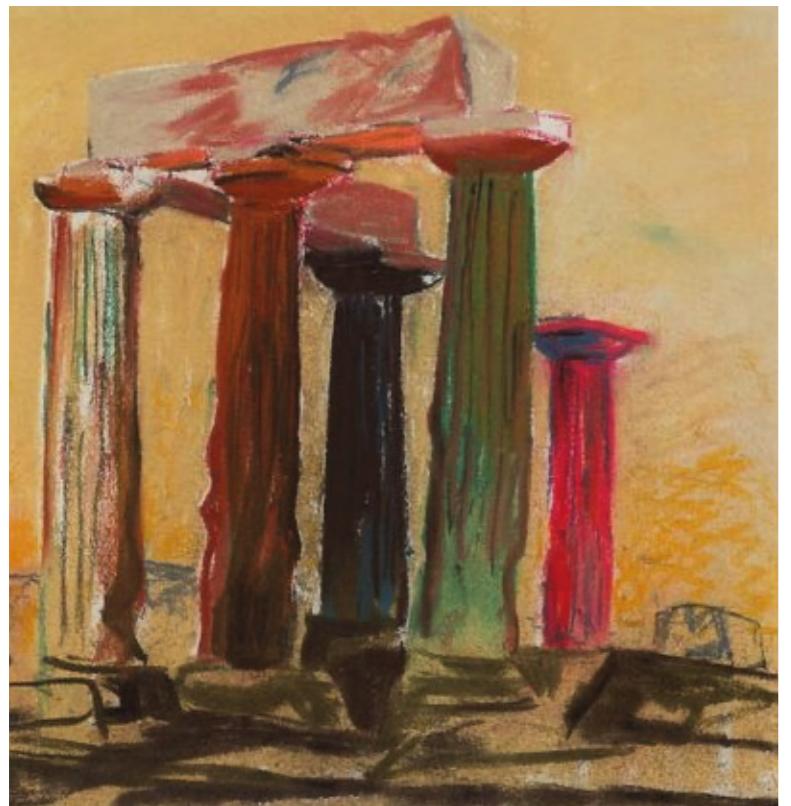
18. Kahn’s letter dated on December 6, 1950 sent to his colleagues in Philadelphia cited in Eugene J. Johnson and Michael J. Lewis, Drawn from The Source: The Travel Sketches of Louis I. Kahn (Cambridge, Massachusetts: The MIT Press, 1996), 72.

19. Students of Kahn at University of Pennsylvania during 1971-1972, Per Olaf Fjeld and Emily Randall Fjeld argued that Kahn’s time in Saaremaa during this trip had a profound influence on his later work. This may well be true, certainly there are many strong parallels between several building on Saaremaa as is documented in the photographic work of Arne Maasik. Nevertheless, this nordic influence was reflected in his later buildings rather than in the projects he completed recently after. Per Olaf Fjeld and Emily Randall Fjeld, Louis I. Kahn: The Nordic Latitudes (Fayetteville: University of Arkansas Press, 2019), 3.



Sketch from Assisi when Kahn travelled to Europe in 1929. At this time his sketches are far lighter, beautiful - certainly - but with none of the self certainty that appears in his later pastel sketches.

Louis I. Kahn, Convent of Saint Francis of Assisi, Italy, 1929, drawing.



Louis I. Kahn, Paestum Drawing, from the Louis I. Kahn Paestum Drawing Collection, pastel drawing of temple, Paestum, Italy.

Below: Pastel drawing from Kahn's second trip to Europe, the impression of mass and solidity is clear.

Louis I. Kahn, Campidoglio Drawing, from the Louis I. Kahn Campidoglio Drawing Collection (351), pastel drawing of the Piazza del Campidoglio, Rome, Italy.



buildings. When he visited in 1928 he was a young man, caught up in the excitement of a modernism in full swing, when he returned twenty years later this excitement was waning. The post-war period spelled the slow beginning of the end for modernism and it was precisely at this time that he found three months welcome respite among the ruins.

There are a great number of themes that Kahn began to consider after this trip, but for the purposes of this study I will focus primarily on a single one, from which much can be extrapolated. Namely, weight. Across these historic sites, Kahn saw ruins from which all lightness has disappeared to time. What remained in were only the most robust structural elements of the original buildings - walls, arches, columns - forming space. Brownlee writes,

"Kahn perceived that the quality of monumentality in these monuments—their sense of durability and timelessness—was inherent in their structure. The massive brick walls, with no decoration, and their pure geometrical volumes enormously impressed him. What Kahn discovered through his direct experience of these monuments was the power of structure, particularly power of the walls and columns that still stood while others had disappeared."²⁰

20 David Brownlee and David G. De Long, Louis I. Kahn: In the Realm of Architecture (New York: Rizzoli, 1991) 50..

21 Kazumi Kawasaki, "Thoughts about Louis I. Kahn," (A+U, November 1983), 218..

22. Ibid.

Michael Graves recalls Kahn's reflections on this period in an interview with Kazumi Kawasaki in 1983. Kahn told Graves that "he regretted wasting so much of his time trying to be a modern architect."²¹ and that he had followed the principle of modern architecture to make the wall "thinner and thinner and thinner."²²

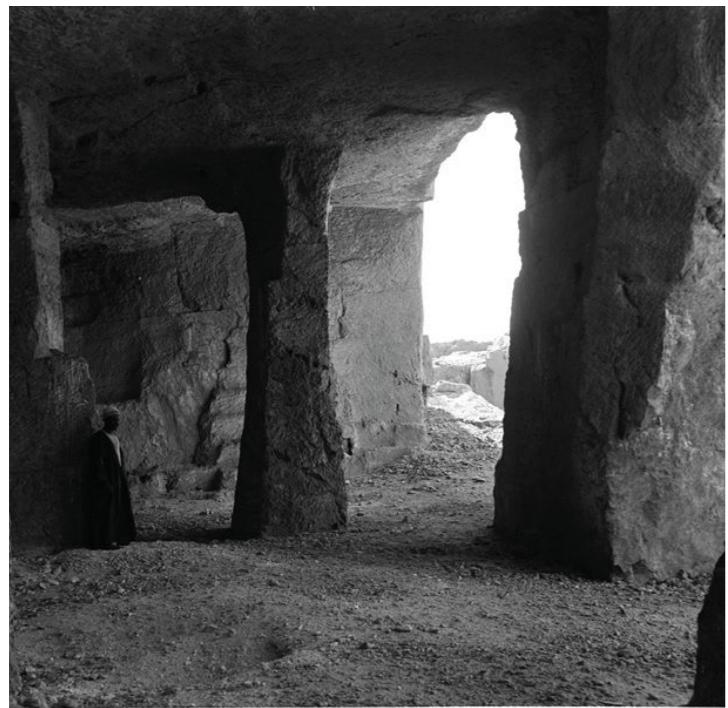
In the years that would follow from 1950 until his death, this theme runs - to varying degrees - through all of his work. Whether as a hollow column in Trenton, a folded wall in Rochester, a false plane in Exeter, or a truly massive wall in Ahmedabad, the concept of weight and solidity dictated a large part of Kahn's late work. It is through this lens that I intend to approach these four projects that provide the basis of this study; as a careful analysis of the exterior load bearing masonry walls of these buildings and their real - or perceived - weight.

2.

Systems of Construction

The cave; archetype of stereotomic construction

Photograph of Cave, Qau el-Kebir, inside the caves where the quarries were located. Schiaparelli excavations, 1905–1906.



The hut; archetype of tectonic construction

Marc-Antoine Laugier, *Essai sur l'architecture* (Paris: Jean Mariette, 1753), The Primitive Hut.



To consider the projects of Louis Kahn in such a way, it is important to look first at the masonry traditions that created the ruins which influenced him so profoundly. Throughout the history of masonry construction, one can isolate two primary building systems which dictate the constructive coherence of a building; tectonic and stereotomic - terms coined by Gotfried Semper and brought to the present by Kenneth Frampton.

23 “Stereotomic architecture is understood as that in which the force of gravity is transmitted in a continuous way, in a continuous structural system and where the constructive continuity is complete. It is the massive, stony, heavy architecture. The one that sits on the earth as if it was born from it. It is the architecture that seeks the light, that pierces its walls so that the light enters it. It is the architecture of the podium, of the base, of the stylobate. In short, it is the architecture of the cave.”

Alberto Campo Baeza, “Stereotomic vs. Tectonic,” in *Trece trucos de arquitectura* (Madrid: ACB, 2020).

24. “Tectonic architecture is understood as that in which the force of gravity is transmitted in a syncopated way, in a structural system with knots, with joints, and where the construction is articulated. It is the bony, woody, light architecture. The one that rests on the earth as if rising on tiptoe. It is the architecture that defends itself from the light, that has to veil its hollows in order to control the light that floods it. It is the architecture of the shell. That of the abacus. It is, to sum it up, the architecture of the hut.”

Alberto Campo Baeza, “Stereotomic vs. Tectonic,” in *Trece trucos de arquitectura* (Madrid: ACB, 2020)

25. “In architecture the material becomes matter whenever its use is generated by an idea. In other words: matter is a material with an architectural idea. A brick is nothing more than a baked piece of mud. This brick used the Caracalla Baths or in the Pantheon, is the matter of the architectural idea. The brick used in these buildings speak of scale, of building order, of structural order.”

Jesus Maria Aparicio Guisado, El Muro, Personal translation Laura Carter, (Buenos Aires: Edicion Libreria Tecnica, 2002)

26. “In Greek and Egyptian traditions, one of the key principles seems to be precisely the intention to always keep such constructive and representational coherence alive and make it comprehensible through form.”

Francesco Cacciatore, *The Wall as Living Place: Hollow Structural Forms in Louis Kahn's Work* (Siracusa: LetteraVentidue, 2016), 19.

27. It's nature of being - the reality of its construction...

28. It's nature of meaning - what it attempts to convey...

The term stereotomic comes from the Greek stereos, solid, and tomia, cut. Stereotomic architecture is that which is homogenous in its constructive approach. One can understand it as an excavation of matter from an existing whole. “We understand as stereotomic the architecture linked to the earth where it is born. It is architecture built with heavy materials that transmit their weight directly to the earth.”²³ In stereotomic architecture the part is often indistinguishable from the whole.

The term tectonic derives from the Greek word tekton which translates directly to builder or carpenter. Its contemporary understanding however is that of a constructive logic of connections, wherein discrete components are assembled to form a coherent whole. “It is the architecture built with light materials that rests on the earth through punctual systems. As if it were resting on tiptoe on the earth.”²⁴

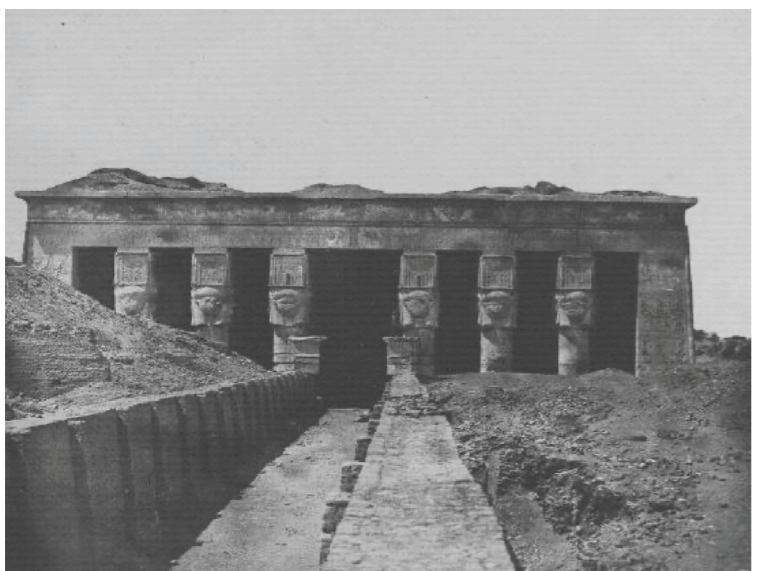
The earliest examples of masonry architecture can be traced back to ancient Egypt. In Egyptian architecture the primary interest is the representation of physical matter through its phenomenological properties.²⁵ It's apparent goal being to read a perfect unity between the ontological and symbolic aspects of matter in built form.²⁶ Such unity between the ontological²⁷ and the symbolic²⁸ in architecture is to some extent inherent in the stereotomic. The work required to transform the material into matter is reflected in the intention of the material.

“In Egyptian architecture, this layering and excavation even became transformed into the idea of building itself... What is heaped, stacked or piled up can also, in turn, be dug out. The most outstanding examples are the pyramids,



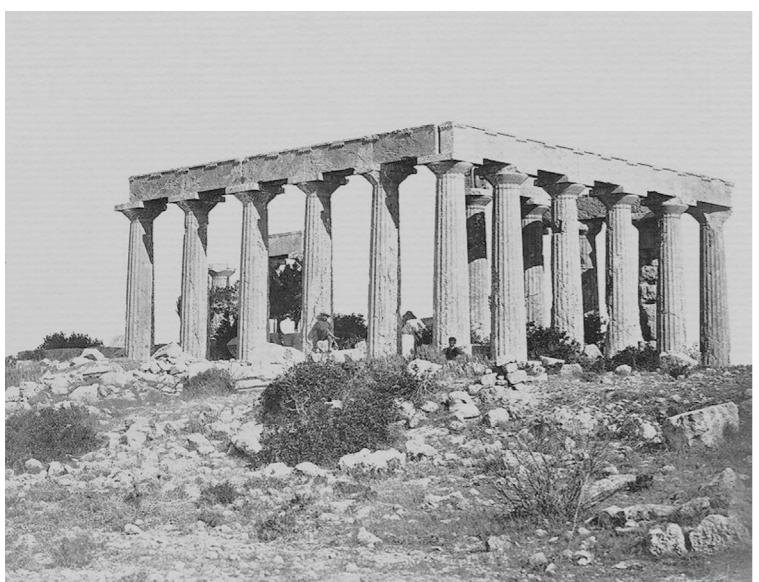
Egyptian temple. Here the idea of egyptian architecture as excavation becomes clear. The construction and the expression are one and the same.

Maxime Du Camp, General View of the Temple of Dakkeh Pselcis, Taken from the North, April 5, 1850, photograph.



Egyptian temple. There is a tectonic approach in the sense of the use of column and lintel, however the intent to express the mass of the material is evident even in such construction methods.

General View, Great Temple of Dendera (Teutynres), Upper Egypt, 1849/51, photograph, photographer unknown.



Hellenic temple. The rounded form of each column makes them appear more clearly as distinct objects. The construction aims to make the temple seem as light as possible. The wooded roof that would have rested on top has been lost to time.

Temple of Aphaea, photograph, 1885, photographer unknown.

*whose passages, galleries, shafts and burial chambers are carefully left as gaps in the stacked mass, having been mined and extracted from the larger whole, as it were. Such gaps are built excavations.*²⁹

With the Hellenic temple, one finds an architecture that is both ontologically and symbolically tectonic. Its construction is that of column and lintel and the roof structures is of taut wood. The symbolic intent is in complete unity with this technique. Hellenic temples are articulated in such a way that they appear to touch gently on the ground. Slender fluted columns and delicate capitals replace the carved masses of Egyptian temples. In Hellenic temples the part is immediately discernible from the whole.

29. Ross Jenner, "Making Emptiness: Aires Mateus," paper presented at ARCHTHEO'15 Conference, Istanbul, 2015, accessed January 5, 2025

30. It is important to note that despite this spiritual desire to represent stone as both matter and material, the column as we know it originates in Egypt, as does the temple.

In fact much of Egyptian architecture is tectonic in construction. Nevertheless, that which is tectonic is still fully constructed from stone and (especially upon comparison with Greek) the temples aim to represent solidity and mass, rather than lightness and air.

If Egyptian architecture provides a basis for the stereometric,³⁰ and Hellenic architecture represents the tectonic, Roman architecture can be seen as a superposition of the two systems. Although it appears at first to be stereometric in nature, it's construction belies a different method entirely.

“...while the wall and vault system conceptually tends to a monolithic dimension, the actual complexity of static problems, the building process and actual performance of concrete itself imply a different qualification of its different parts before full solidity is achieved. What we confront here is a principle of discontinuity, a necessary departure point for a possible process of formal definition. The building discontinuity of the Roman wall leads to a qualification of its different parts according to its different structural functions, and to its articulation in specific elements in consideration of the actual roles they play. What remains to be seen, therefore, is where such slow formalising process of the wall begins, a process that would continue beyond the boundaries of Roman architecture’s history. Without doubt, the void is where most elements of discontinuity are concentrated. And it is precisely the void that becomes the ultimate representation of wall discontinuity. The alternative to the wall, void versus solid. The void qualifies the wall that reveals several different elements with specific building rules, exactly necessary to solve the problems raised by its very appearance. The trabeated void did this by imposing

the principle of the architrave system on the wall, while the void is created by the relieving arch. The arch is determined as the natural shape that relieves a wall and in this sense provides the foundation for the formalisation of this.”³¹

In this superposition of systems there is a clear acceptance of the duality between the ontological and the symbolic. While the stereotomic system responds to its building and load bearing function - the ontological - the tectonic system responds to its representational function - the symbolic. Implicit in this idea is the notion that a heavy masonry Roman wall³² can take on all the properties of discontinuity, addition, dynamism, and lightness that are intrinsic to the tectonic system.³³ This idea of superposition of constructive systems is in alignment with the idea of partialisation of the elements that make up a tectonic masonry system while maintaining the primordial idea of integration that is characteristic of the stereotomic. The expressive nature of column and entablature create a dialogue with the weight of the arch.

In Roman architecture the idea of the inhabitable wall begins to emerge. If the construction of the wall is made up in a tectonic system of layers, then it must be possible to discover a space in the depth of the wall that is created by the layers that constitute the wall. In such a system the wall requires a complex articulation to express both conditions.³⁴ With Roman construction the matter of the walls and the vaults becomes increasingly light from bottom to top and the masonry is framed with stone ribs or relieving arches. This approach is often not expressed on the exterior of the building however as “they view of all solid parts, beyond the wall’s edge, as a homogenous block, as though space had been created like a mould from a shapeless dough”³⁵

Leonardo Benevolo describes this process,

“Such compromise generates the structure by concretion,³⁶ given the habit of filling all the wall thicknesses with horizontal pillared layers of concrete into which the secondary frame is drowned.

... But the need to balance the side thrusts, when the vaults

31. “In the Roman wall, the process concerning the shape the void opened in the wall itself should adopt was developed in two phases. In the first phase, its different components were identified as discontinuities of the wall they are part of, as such the archivolt, springing lines, lambs, etc. In the second phase, they were given a building similarity with the corresponding elements in the architrave system, and assigned the form of architrave, capitals, pilasters strips, etc. As a result, a series of architectural elements appeared around the openings, independent from the wall and interconnected by a new relation.”

Manuel Iñiguez, *La Columna y el Muro: Fragmentos de un Dialogo*, Personal translation by Laura Carter, (Barcelona: Edicion Caja de Arquitectos, 2001), 91,104.

32. “...enhanced by means of the perfect execution of the seams between the quoins, virtually invisible in the general view of the wall, and made more powerful by reliefs and frescoes that further contribute to erase any idea of separation and discontinuity.”

Manuel Iñiguez, *La Columna y el Muro: Fragmentos de un Dialogo*, Personal translation by Laura Carter, (Barcelona: Edicion Caja de Arquitectos, 2001), 48.

33. Francesco Caciatore, *The Wall as Living Place: Hollow Structural Forms in Louis Kahn’s Work* (Siracusa: LetteraVenti-due, 2016), 19.

34. Manuel Iñiguez, *La Columna y el Muro: Fragmentos de un Dialogo*, Personal translation by Laura Carter, (Barcelona: Edicion Caja de Arquitectos, 2001), 145.

35. Leonardo Benevolo, *Introduzione all’Architettura* (Bari: Laterza, 1984), 69,74.

36. A local accumulation of matter.



The fresco was originally located in the Vatican Grottoes before being detached and moved to its current location in the sacristy. The image shows the original nave and aisles of Constantine's Basilica, prior to the destruction of the nave and aisles and the construction of a separating wall by Sangallo the Younger in 1538. The stereotomic wall is placed physically above the tectonic system of columns.

Domenico Tasselli, Reconstruction of the Interior of Old St. Peter's, 1500-50, fresco, Sacristy, Basilica di San Pietro, Vatican.



are particularly large, produces a definite break of the continuity of the masonry fabric, with a transversal staggering of the structures of the pier in the direction of the thrusts.

The Romans try to avoid such difficulty with a systematic buffering of vaults with vaults so that the thrusts are mutually eliminated. Only from a certain point - from the pantheon on, we may say - does emerge the solution of a large isolated vaulted building that must support itself with a proper inner articulation. Given this kind of problem, it becomes impossible to consider the masonry mass as a mere homogeneous limit, and its articulation necessarily influences the architectural composition.³⁷

37. Leonardo Benevoli, Introduzione all'Architettura (Bari: Laterza, 1984), 69,74.

If we look, as he suggests, at the Pantheon, this process is clearly visible. Its exterior presence - save that of the portico - is almost entirely inarticulate, however the interior and in plan its structural logic is fully expressed. As one enters the building, the immense depth of the wall is experienced and along the perimeter of the interior, deep niches create habitable rooms in the space of the wall.³⁸

38. Despite a largely blank exterior facade, the visible relieving arches betrays its far more complex construction. These relieving arches will be seen later in the work of Kahn, most explicitly in the Indian Institute of Management.

39. Francesco Caciato, The Wall as Living Place: Hollow Structural Forms in Louis Kahn's Work (Siracusa: LetteraVentidue, 2016), 22.

In the architecture of the early Christian Basilica, there is a markedly different approach to the superposition of tectonic and stereotomic systems. Here the juxtaposition is played out in the height of the wall. There is an apparent contradiction in the heavy stereotomic wall resting on the tectonic system of the lower columns.³⁹ In the following years, however, the column would slowly lose its discrete nature and become absorbed almost entirely into the stereotomic logic of the wall. This is likely due in large part with the loss of construction technology that followed the collapse of the Roman Empire, and by the Middle Ages, the majority of construction had returned to a largely stereotomic logic.

This is seen most clearly in the heavy castles of the middle ages. During the Middle Ages, castles were built extensively throughout Europe and there is very little evidence of the dual logic of the Romans. These buildings appear as truly looming inert masses and their constructive logic is aligned with their appearance. The Roman methods of concrete and masonry are replaced by a far more straightforward system of brick or stone masonry. In these castles, however, the

idea of the inhabitable wall - which has its origins in Roman construction - begins to take on a new strength. Due to the immense width of the walls in these constructions, they often play host to the secondary rooms that service a large central space.⁴⁰

It is not until Alberti, that the Roman system of superposition is revisited. Alberti understood the Roman constructive system as a whole, where both the symbolic and ontological functions of the building are integrated into the *firmitas*⁴¹ of the load bearing wall. While the Roman wall contained the dualism of the two systems inherent in their construction, Alberti aimed to use the symbolic order of the Greek tectonic system in unison with the strength of the Roman ontology of load bearing walls.

"The main goal of Alberti's proposal was to overcome such divergence of meanings; for this reason he gave the load-bearing wall a prevailing role as the supporting element within the system not so much in terms of form as in terms of concept. With his work Alberti brought the origin of architecture back to the wall, thus introducing a completely different building concept that would lay the basis for a radically different reading of the Roman architectural system. Furthermore, Alberti revitalised the Roman superposition, by giving the order a new meaning in what could be already defined as a wall-based system..."

...Such process of relating the order to the wall would be developed in two successive phases: the first one, of a quantitative nature, excavates the wall and generates first the pilaster strip and then the actual pilaster; the second one implies a qualitative leap that finally results in the column"⁴²

The building that best exemplifies this is the Malatesta Temple in Rimini. Here a heavy masonry wraps the existing medieval building, the row of rooms along the side express the piers as pilasters connected above by an arch. So heavy in appearance that it seems as though the space in between has been excavated from a solid wall. The pilaster becomes the key element taking on constructive and symbolic meaning. Consequently, the facade becomes the most complex element of the building as it hosts the array of interior and

40. These themes would have a great influence on Kahn in the later part of his career. See chapter 4 Inhabitable Walls for a more detailed look at a small selection of Castles.

41. Alberti carried on the Vitruvian idea of *firmitas*, *utilitas*, and *venustas* (structural stability, spatial utility, and attractive appearance).

Temple Malatestiano. Alberti imposes the greek order and beauty of the tectonic system against the *firmitas* of the load bearing wall.

Alberti, architect. Malatestiano Temple. Photograph by Menkin Al Rire. 2023. Rimini



42. Manuel Iñiguez, *La Columna y el Muro: Fragmentos de un Dialogo*, Personal translation by Laura Carter, (Barcelona: Edicion Caja de Arquitectos, 2001), 128.

43. Francesco Caciato, *The Wall as Living Place: Hollow Structural Forms in Louis Kahn's Work* (Siracusa: LetteraVentidue, 2016), 24.

exterior forces that are expressed through the physical support of the wall.⁴³

Although this provides only a cursory image of the systems of masonry construction from Egypt until the mid fifteenth century, I believe it is a necessary groundwork to approach the late projects of Kahn. It is also true that the teaching of the beaux-arts at the University of Pennsylvania had a tremendous influence on Kahn's architecture, however this influence does not correspond as clearly to the shift that took place in the 1950's.

3.

Four Brick Buildings

Exterior of Trenton bathhouse. The articulation of the 'columns' appear massively oversized from the exterior. The roof seems at once to be hugely heavy and yet held lightly by small connections.

Soriano, Mike, photographer. The Trenton Bath House. Louis Kahn, architect. New Jersey, USA.



Trenton

In 1955, Kahn was given the commission for a small bath house in Merson, New Jersey as part of a larger jewish community centre. This came several years after his Yale commission. Where in the Yale Art Gallery Kahn had shown his interest in mass and the monumental, in Trenton, Kahn addresses the weight of the wall. It is a project that was of great personal importance to Kahn in his new understanding of architecture. Many years after it's completion he reflected;

*"If the world discovered me after I designed the Richards towers building, I discovered myself after designing that little concrete block bathhouse in Trenton."*⁴⁴

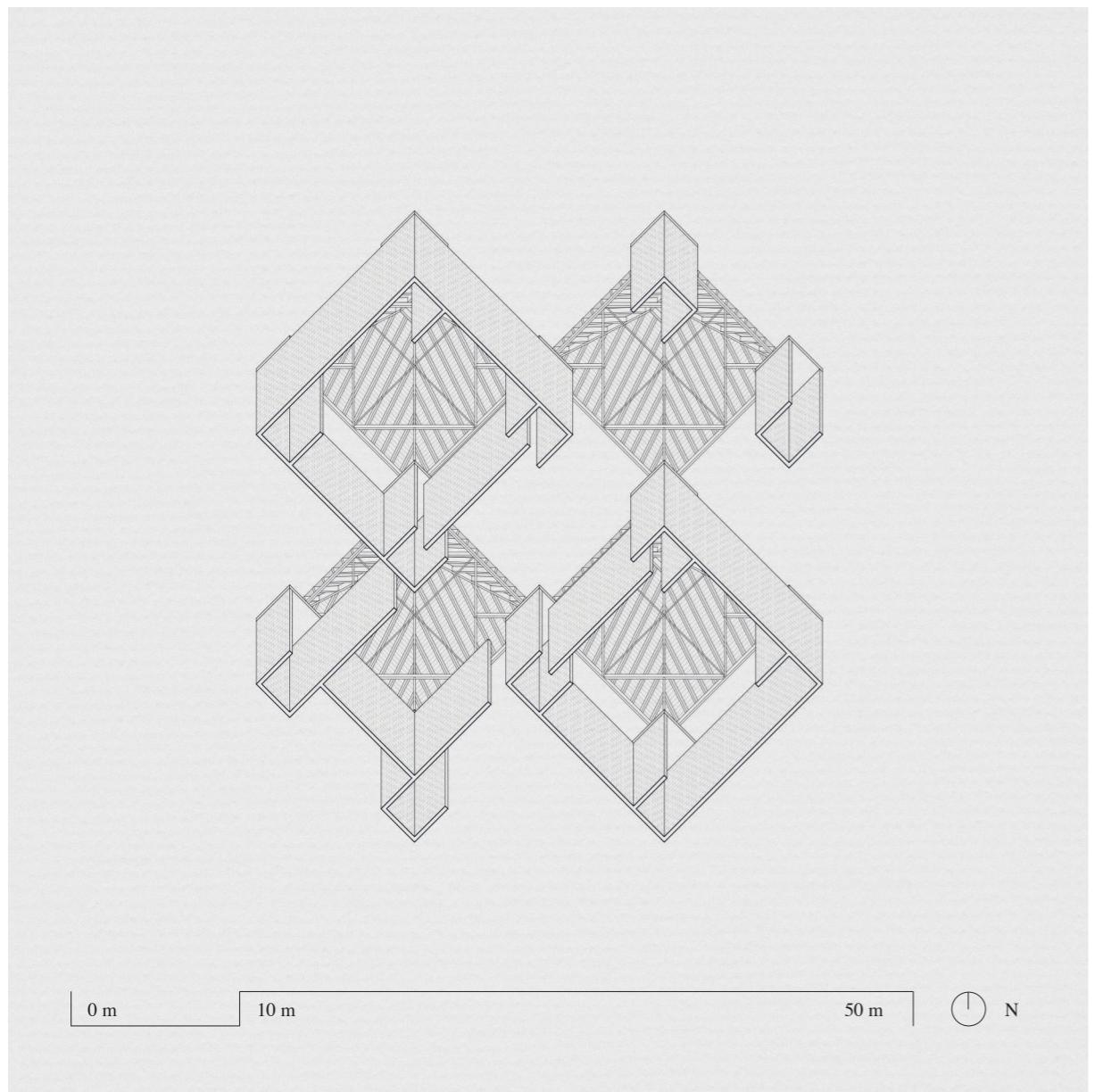
The proposed scope of the project included a main community centre building as well as a day camp pavilion, however the main community centre building was never completed. For the purposes of this study I will focus only on the Bath House.

44. Louis Kahn quoted in David Brownlee and David G. De Long, Louis I. Kahn: In the Realm of Architecture (New York: Rizzoli, 1991) 318.

It is a building of such simplicity that it sits on the fringes of even being a building. There is no thermal or environmental enclosure, the walls are constructed of a single material and the roof opens directly to the sky. And yet, upon closer inspection its extreme simplicity gives way to incredible complexity. The plan is organised in a cruciform with four square rooms (six and half meters wide) enclosing a fifth central space. Each room serves a single function. Two changing rooms face across from one another while the remaining rooms are a reception desk and the portal to the swimming pool. Each of the four rooms is covered by a large angled roof with a central skylight, the fifth central space remains uncovered. Supporting the four roofs and sitting at the four corners of each square, are large (two and a half meter wide) 'hollow columns'. These are made from the same concrete block as the rest of the structure. While they appear at first to be solid, when one enters the building it is revealed that they are completely hollow and constructed of three planes of concrete block with one side always left open. Where two squares share a corner, the column

Personal drawing by author.

Worms-eye axonometric of Trenton Bathhouse



is shared. As such the central void space is made up of the interior corner 'columns' of each of the four rooms. These 'columns' are in effect twelve smaller rooms that service the main spaces.

The building can be deconstructed into discrete elements; wall and roof. First, the wall. Constructed from a single wythe of concrete block it makes up both wall and 'column'. At times these elements appear as separate from one another and at time the wall becomes the 'column' so that only a thin concrete cap distinguishes it from the length of the wall.

On approaching the building, the 'columns' appear at first to be fully solid. The 'columns' seem monumental, not in size but in proportion. The modesty of this project is such that the extreme oversizing of what are first read to be structural elements is arresting. To the front of the building, the two nearest columns read as solid while the two changing rooms set behind it engulf their 'columns' with the changing room wall. On entering, you emerge at the covered reception desk. Looking ahead the view goes directly through the building to the stairs that lead out towards the pool. Once inside the logic of the building begins to reveal itself. The 'columns' which stand to left and right are revealed to be hollow and the wall that obscures the changing rooms from the central space creates an greater depth of shadow on the inside of the 'columns'. The central space is open to the sky. With the constellation of walls and roofs Kahn creates four distinct types of 'rooms'.

The entrance room is the tightest, the space left over from the 'columns', and it projects one forward, in a direct view that cuts through to the other fourth room. It has wall and roof, and yet it seems tucked into leftover space, it promises much. The central room is perhaps the most enigmatic. It has no roof, and in a sense it has no walls either, saved those that it borrows from the four surrounding rooms. It has no elements which it can call its own. It is a room of negative space and yet it's geometry is entirely positive, the copy of the surrounding rooms. It is both room and void.⁴⁵

45. Susan G. Solomon, *Trenton Jewish Community Centre* (New York: Princeton Architectural Press, 2000), 87.

The flanking changing rooms deliver on the promise. One enters through the wall, following a partition wall that disappears into the 'columns', and turns a hundred and eighty degrees turning through the 'column'. Inside the changing rooms is the purest expression of the 'room' that is the primordial act of this project. The deep shade of the interior of the 'column' is replaced with filtered light, both from the upper perimeter of the wall and a single square oculus in the roof. Once inside the changing room, the illusion of thickness has been almost fully dissolved. The cruciform organisation of the plan has now been made clear and once inside the changing rooms the final outermost 'columns' that are wrapped in wall become clear. At each corner the 'column' houses service functions to the room, toilets and showers. The space remaining between the columns mirrors the cruciform of the building plan.

The final rooms leads from the space up towards the pool. Here there is a roof but no walls. Yet it is clearly defined by the four 'columns' at its edge. As one leaves the building a small set of stairs leads one just over a metre up and out of the building. The grade of the grassy ground rises along the depth of the 'column'. It appears sunken, as if one had only to excavate further to find that these structures continued deep below. And yet, the two 'columns' that frame the exit face in opposite directions. Of the eight perimeter three sided 'columns', this single one is rotated outwards to reveal its hollowness to the viewer.

And then there are the roofs. Compared to the light concrete walls, the dark tiled roofs sit darkly above them. Despite - or perhaps because of - their apparent weight, they seem to spring with incredible lightness from small connections atop the giant 'columns'. Again, Kahn's use of proportion rather than sheer size gives the building a monumental character. The connection to the 'column' raises the roof thirty centimetres above the walls where - in complete opposition with its perceived weight - it seems to float. On the underside of the roof, a wooden structure is exposed, until one stands underneath, the presence of the underside of the roof is one of deep shade. A single square skylight in the centre of the pyramidal structures traces light across each

Bell tower on the island of Saaremaa where Kahn was born and revisited on his trip to Europe in 1928. Kahn has never explicitly discussed the influence of this small building but it was noted that several other buildings on the island had an influence on him. Purely from a visual standpoint it is likely that this building had some influence on his design of the Trenton bathhouse. Kahn's use of primary forms and archaic construction methods draw many parallels with medieval construction.

Raun, Enno. Bell Tower in Kihelkonna, Saaremaa Island, 1985–1988. Rahvusarhiiv.



View from inside towards the entrance of the bathhouse.

Kahn, Louis. Trenton Bath House, Trenton, NJ, 1955. Photographer unknown.



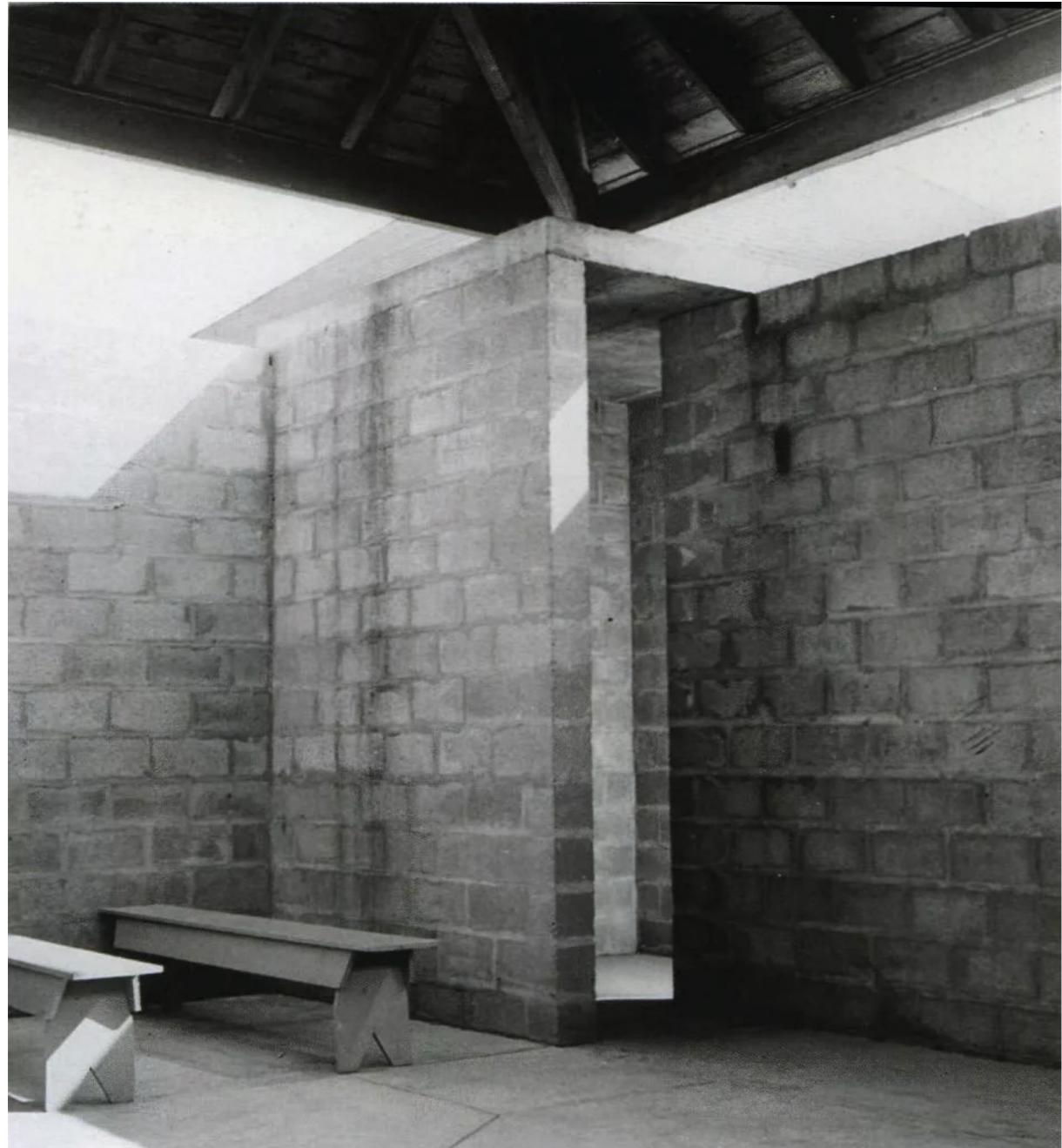
The 'fifth room' of the bath house. It is the same in dimension as the other four but lacks any defining architectural feature; room and void.

Kahn, Louis. Trenton Bath House, Trenton, NJ, 1955. Photographer unknown, On Something, 2013



Interior of changing room. The column is here clearly revealed to be constructed of planes and the apparently heavy roof seems to touch gently on a small connection. Light can slant into the space from the gap between roof and wall.

Kahn, Louis. Trenton Bath House, Trenton, NJ, 1955. Photo by Guillermo, 2015. WikiArquitectura, 11 Jan. 2017.



46. One can also find similarities in the approach to the geometry of the room in relation to the room. The Pantheon uses a cylindrical 'drum' to form the main room with a perfect semi-hemispherical dome which if completed into a full hemisphere marks the floor height of the 'drum'. Kahn uses a perfect square with a pyramidal roof, however if one mirrors the pyramidal form on its axis, like the Pantheon, it marks the height of the floor of the Bathhouse.

room. This square skylight brings with it a memory of the oculus in the Pantheon.⁴⁶ In its simplicity it evokes comparison with endless building which no doubt influenced him. A bell tower on his home island of Saaremaa shows many similarities. Each element Kahn employs seems entirely primordial, yet thorough his composition of elements he achieves a great complexity.

Nevertheless, it is perhaps the most approachable of Kahn's later work. And in it we see the emergence of themes that Kahn would continue to explore in the coming two decades. Although the Yale art gallery shows a first inkling of Kahn's interest in weight and monumentality, it is in Trenton Kahn begins to establish the language of his walls.



South Side of Building at Time of Completion, labeled December 1962.
For Slideshow.

Rochester

In June of 1959, Kahn began the design for the new First Unitarian Church in Rochester New York. The church was forced to leave their old Gothic Revival the previous year. The new building was to include the worship and auxiliary spaces of the old building as well as include a school which had not been present in their previous location. Kahn conceived of the church as three major elements; sanctuary, ambulatory, and school. He placed the sanctuary in the middle as the most important room of the church, around it he imagined the ambulatory that also provided the main circulation of the church. Finally he envisioned the school as "... as the wall of the entire area"⁴⁷; surrounding and enclosing the ambulatory and sanctuary.

47. Louis Kahn, "Louis Kahn," *Perspecta* 7 (1961), 14.

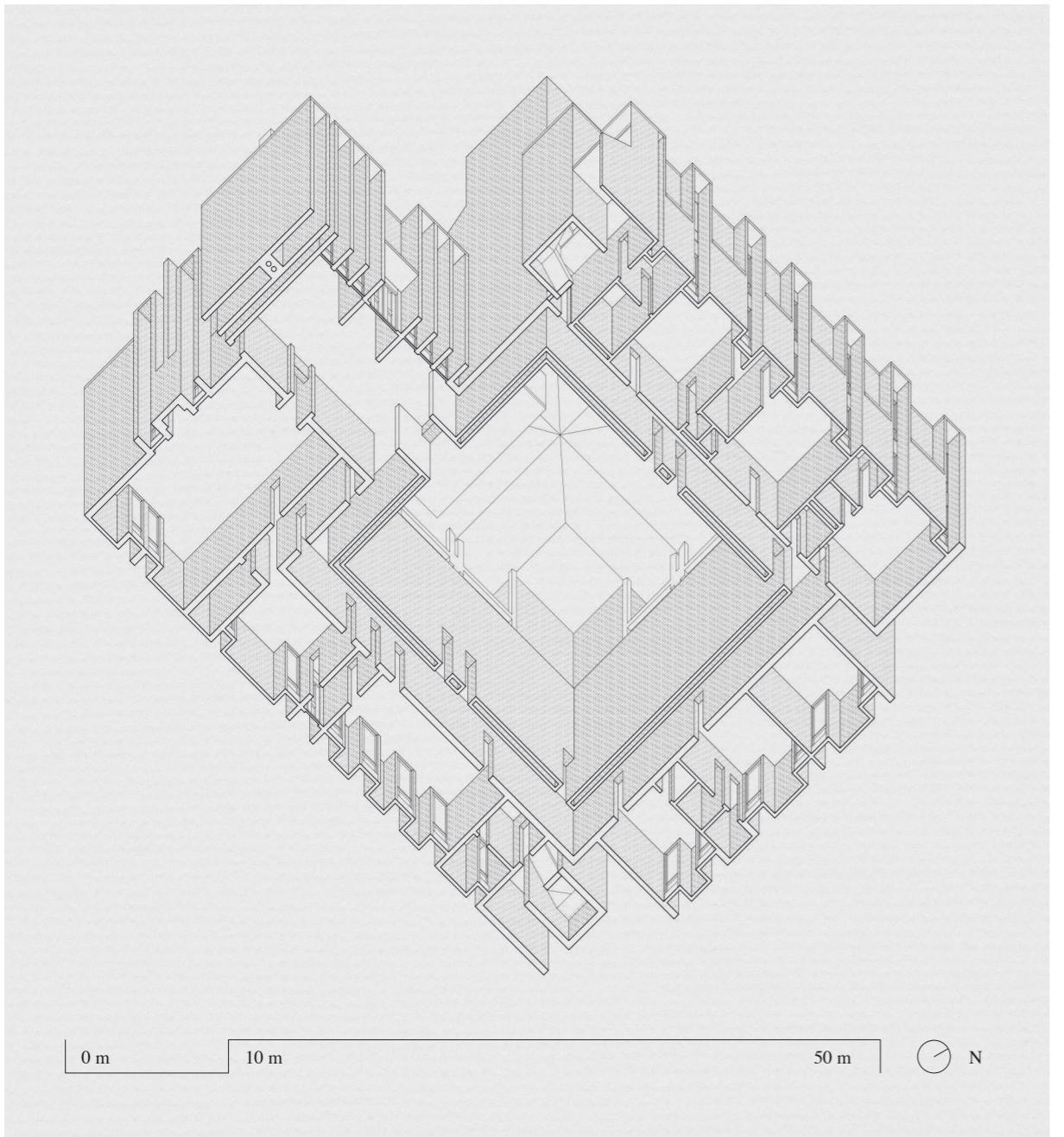
In 1958, Kahn presented his first version of the scheme. It consisted of a square sanctuary in the centre surrounded by a twelve sided ambulatory around which ran a circular corridor. The classrooms and other facilities wrapped around the whole composition. Kahn had separated the classrooms with openings that had windows inserted into them. This scheme was received with negative feedback and in February of 1960 he presented a second scheme. With some slight adjustments over the following months, this was the scheme that was to be followed for the final building.⁴⁸ There were several large changes between the first proposal presented and the final scheme. The plan was no longer concentric, and appears generally to be far less rigid in its organisation. The corridor around the ambulatory was changed from circular to rectangular and the classrooms were grouped and rearranged. Nevertheless, the general relationships between the three major programs remained largely the same. Central sanctuary, surrounding ambulatory, and the school as a wall enclosing the building.

48. There was an addition made to the church by Kahn shortly after, for the sake of this study I will be looking only at the 1960 scheme that was originally built. Thematically the building remain largely the same with the inclusion of some ideas which Kahn was starting to explore further in 1966.

"The ambulatory I felt necessary because the Unitarian Church is made up of people who have had previous beliefs...I drew the ambulatory to respect the fact that what is being said or what is felt in a sanctuary was not necessarily something you have to participate in. And so you could walk and feel free to walk away from what is being said. And then

Personal drawing by author.

Worms-eye axonometric of Rochester First Unitarian Church.



49. Louis Kahn, "Louis Kahn," *Perspecta* 7 (1961), 14.

49. Louis Kahn, "Louis Kahn," *Perspecta* 7 (1961), 14.

*I placed a corridor next to it—around it—which served the school which was really the wall of the entire area...so the school became the walls which surrounded the question.*⁴⁹

From the exterior, the church appears to sit as a red brick acropolis on the slight hill on which it stands. A double height brick wall folds its way along the perimeter. Above the wall, in the centre of the building, four massive brick structures reach upwards. First these appear as individual extrusions each with an L shaped geometry, however when one approached the entrance their connection - both to each other, and to the ground - is shown. As such the perception changes, no longer do they appear as four fragments near the centre of the structure, but rather as a single mass from which a inverted 'house-like' shape has been carved. This reading gives a more characteristic understand of the building; a folded wall, dense with shadow, surrounding a massive central upwards turning space.

In Rochester, Kahn took the hollow 'column' that he had employed as the housing of so called 'servant spaces' in Trenton, and reimaged it as an entire wall. While the division of 'servant spaces' and 'served spaces' is less explicit in Rochester, the relationship remains largely the same, and the folded hollow wall houses the series of spaces that are complimentary to the primary central space of the sanctuary. Here the wall can be considered as three thicknesses. First the true depth of the masonry construction which is shown from the beginning in the fins that fold out from the building, This read as solid red brick but in reality is constructed around a single wythe of concrete block with a wythe of red brick facing each side. Despite the change in material, the construction method remains the same. The second understanding of the wall is that of the depth of the fold. This is perhaps the one which Kahn makes most implicit. When viewed from the outside it does not reveal its purpose and the scale of the rhythm is not one that appears as familiar. When inside however, the spaces between the folded wall house wooden benches and windows which provide a soft light. These window seats would become very important for Kahn.

“Before (in the second scheme) the windows punched out of the walls. We felt the starkness of light again, learning also to be conscious of glare every time... this (final scheme) is the beginning of a realisation that the reveals are necessary. And this came about also because there was a desire to have some window seats... This window seat had a lot of meaning and it became greater and greater in my mind as a meaning associated with windows.”⁵⁰

The third understanding of the depth of this wall can be as the whole classroom. This reading is the one which Kahn makes perhaps most explicit⁵¹ although it is less intuitive.

This understanding of room as wall is one which was likely influenced by Kahn’s interest in medieval castles.

“I have a book on castles and I try to pretend that I did not look at this book, but everybody reminds me of it and I have to admit that I looked very thoroughly through this book.”⁵²

Most often cited as influential are a series of Scottish and English castles, perhaps because of the book that he references, but there is as much visual and conceptual reference in castles in Sicily constructed under Frederick II and on his home island of Saaremaa. One cannot look at the personal window seats of his Unitarian church without recalling his words

“Thick, thick walls. Little openings... Splayed inwardly to the occupant. A place to read, a place to sew... Places for the bed, for the stair... Sunlight. Fairy Tale.”⁵³

Inside the wall of classrooms, sits the central sanctuary. Here, again, Kahn play with the thickness of the wall. Constructed from two layers of concrete block with a fifty centimetre gap between them, it appears as full height until one passes through the doorway into the sanctuary. Passing through the doorway, one grasps the large supposed depth of the wall, but once inside it reveals itself fully. The wall reaches only a part of the way up, at which point it stops and the dimensions of the ambulatory are continued to create the brick extrusion that one sees on the outside. Here, giant

50. Louis Kahn quoted in David Brownlee and David G. De Long, Louis I. Kahn: In the Realm of Architecture (New York: Rizzoli, 1991) 69.

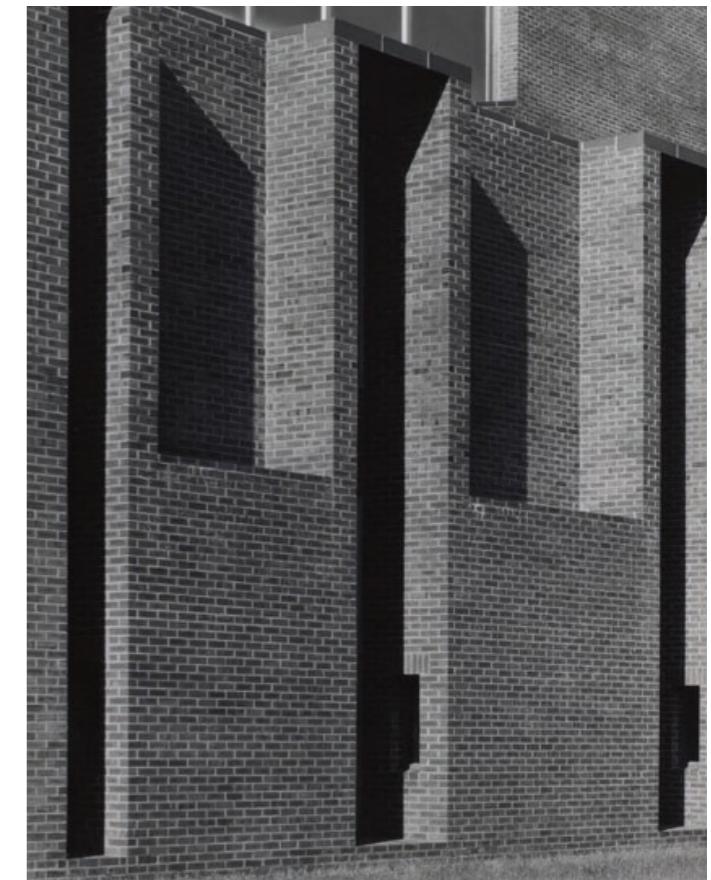
51. “... the school which was really the wall of the entire area...so the school became the walls.” Louis Kahn, “Louis Kahn,” *Perspecta* 7 (1961), 14.

52. Louis Kahn quoted in David Brownlee and David G. De Long, Louis I. Kahn: In the Realm of Architecture (New York: Rizzoli, 1991) 102.

53. Louis Kahn quoted in David Brownlee and David G. De Long, Louis I. Kahn: In the Realm of Architecture (New York: Rizzoli, 1991) 68.

The exterior facade. Note the folding wall that gives an impression of mass

White, Minor. First Unitarian Church of Rochester (MWA 64-125-1), May 1964, gelatin silver print. The Minor White Archive, Princeton University Art Museum, bequest of Minor White, MWA 64-125-1. © Trustees of Princeton University.



The interior window seat. The idea of a seat and window being intrinsically linked began in this project for Kahn.

White, Minor. First Unitarian Church of Rochester (MWA 64-129-1), May 1964, gelatin silver print. The Minor White Archive, Princeton University Art Museum, bequest of Minor White, MWA 64-129-1. © Trustees of Princeton University



inward turning skylights bounce light indirectly down into the space. A massive concrete cross spans the length and width of the room. Supporting this cross, are concrete column which disappear into the width of the sanctuary double-wall. Along the inner wall of the sanctuary, tall vertical slits reveal that the concrete structure that supports the roof sits in the gap between the double layered wall. Where in Trenton Kahn used only relatively modest sized elements and it was proportion and composition that gave them their monumentality, in the concrete roof structure in Rochester, Kahn uses sheer size to impress. This oversizing of elements was almost certainly due largely to the enormous influence that Roman architecture had on Kahn. Kenneth Frampton describes well the impact of this monumental structure;

*"The full spirituality of this church as an institution is expressed in the roof section, from which a mysterious light enters into the four cubic corners of the meeting room, highlighting the flying tie beams that serve to sustain the stability of its quadripartite shell form."*⁵⁴

Despite Kahn's continued rhetoric about the hollow wall, the sanctuary wall in Rochester is one of the only walls that is hollow in the most literal sense of the word.⁵⁵ The hollowness of Kahn's walls - in almost every other instance - is inhabitable. Here, he uses it purely for the impression of depth that it gives, and yet it is not deceptive. On the inside he makes it clear that this perceived depth is not with the intent of pretending that it holds the massive concrete structure above. In fact he does exactly the opposite, by revealing that the wall is entirely non-structural, the depth can only be for its own sake.

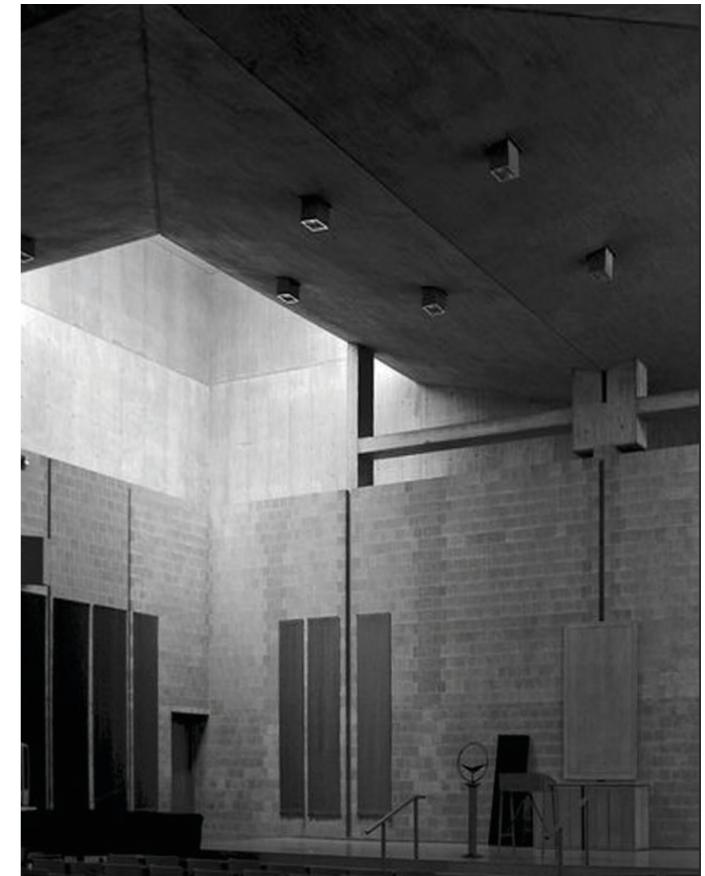
The church in Rochester picked up on many of the themes that Kahn began to explore in Trenton. While in Trenton he achieved this with a rigid set of elements for a very simple building, here, Kahn expands his language on a building which asked much more from him. The approach to the folded wall is probably best exemplified in Rochester, it would remain as a theme throughout his life's work but one of far less prominence.

54. Kenneth Frampton, *Studies in Tectonic Culture: The Poetics of Construction in Nineteenth and Twentieth Century Architecture*, ed. John Cava (Cambridge, MA: MIT Press, 1995), 235.

55. By this I mean as a double layered system with a gap in between that is not made explicit to the occupant.

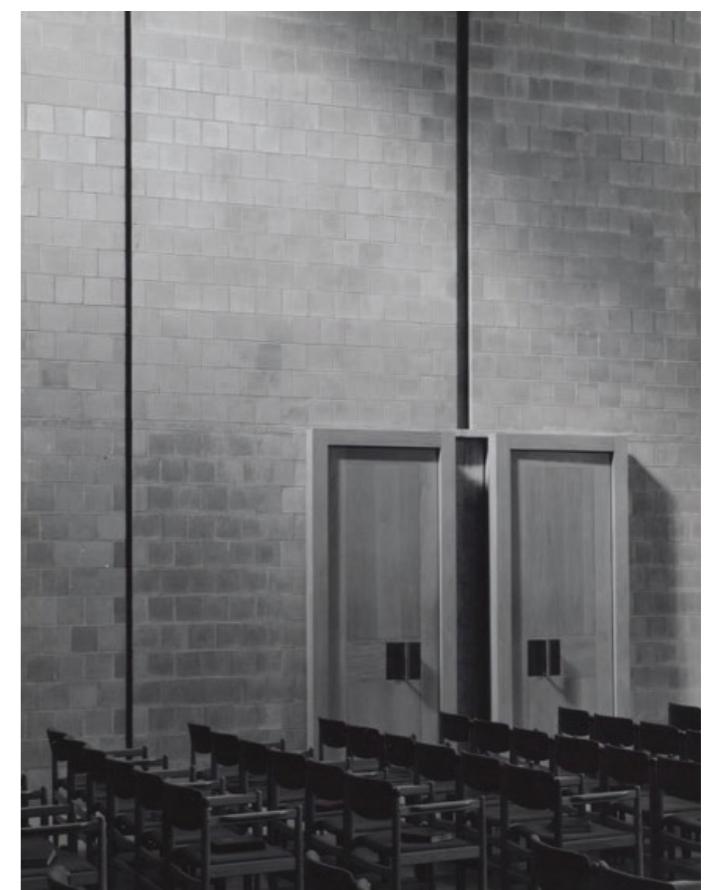
Interior of the sanctuary. Concrete beams hold the reinforced concrete cross that provides the structure for the skylight.

Kahn, Louis. First Unitarian Church, Rochester, NY, 1962. Photo by Rudy/ Godinez, 2015.



Interior of the sanctuary. Where the concrete columns sit behind the sanctuary wall, a slit is opened in the wall to reveal the structural member behind.

Kahn, Louis. First Unitarian Church, Rochester, NY, 1962. Photo by Rudy/ Godinez, 2015.





Dormitory building at the Indian Institute of Management Ahmedabad.

"Indian Institute of Management Dormitories, Ahmedabad, by Louis Kahn." Where Architecture Is Fun, 1 Oct. 2015

Ahmedabad

The fifties had been a time of revelation for Kahn. The language that he developed in that decade - at least in respect to his treatment of the wall - was perhaps epitomised in Rochester. In the sixties, however, Kahn began to move in a slightly different direction. Thematically similar, certainly, but with some marked difference both in his ideas and his execution of those ideas.

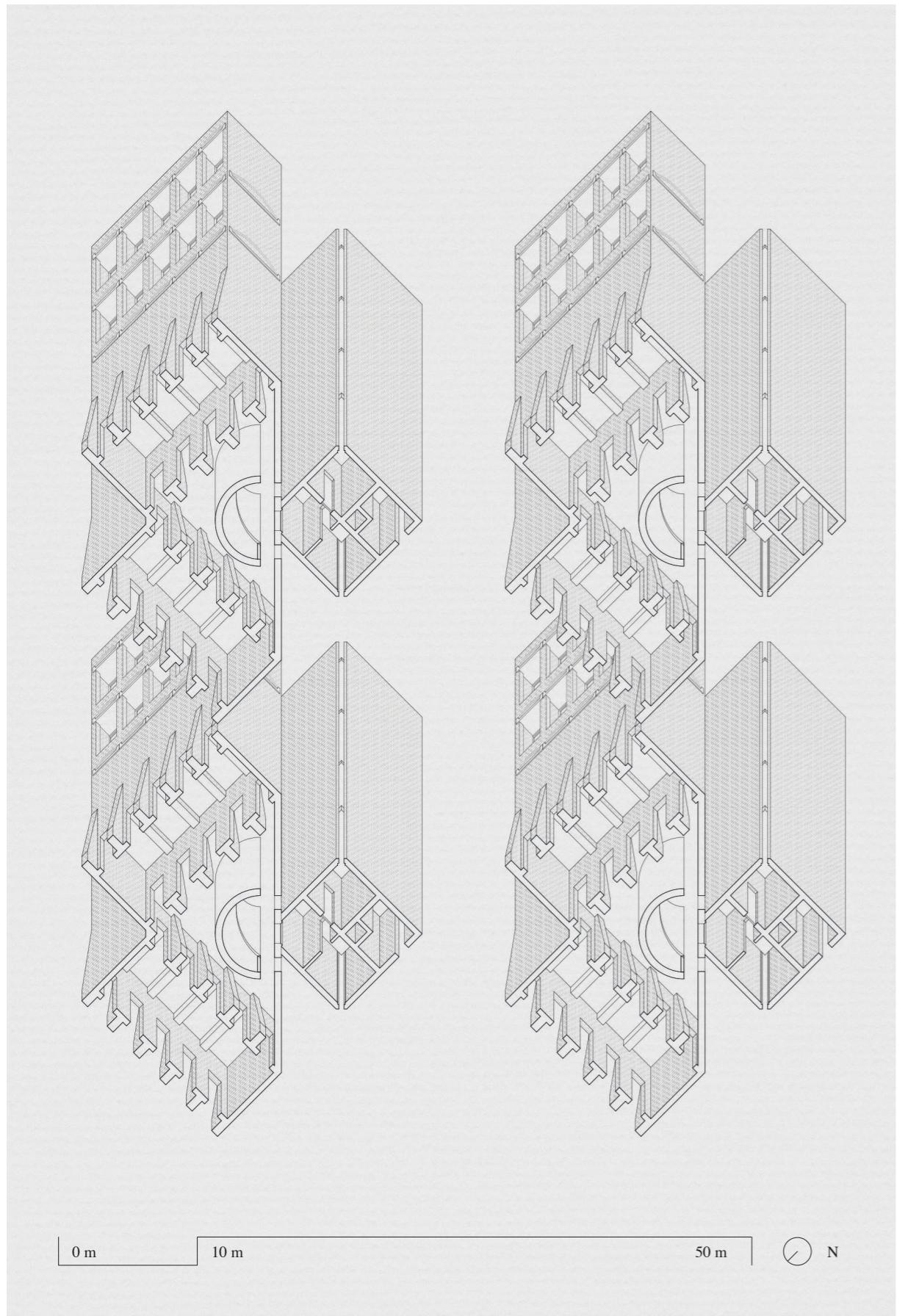
In 1962, Kahn travelled to India to start the project of a new campus for the Indian Institute of Management in Ahmedabad. It was created with the support of the state as well as the sponsorship of several private parties, most notably the Sarabhai family who had contracted Le Corbusier many years earlier. Shortly prior to this contract, Kahn had worked on two university projects; The Salk Institute in California, and the Bryn Mawr Dormitories in Pennsylvania. In both of these projects, Kahn had ambitions of continuing beyond the single campus fragment that was built. In Ahmedabad, he was finally able to realise these ambitions. The campus is huge, sprawling over thirty buildings across a vast swath of land.⁵⁶

56. Louis Kahn quoted in David Brownlee and David G. De Long, Louis I. Kahn: In the Realm of Architecture (New York: Rizzoli, 1991) 162.

For the purposes of the study I will focus only on the dormitory building which is designed as a single a unit repeated eighteen times. It is probably the simplest unit of the whole campus, the most straightforward, but the ideas that it expresses it does so with complete clarity.

The primary concern - according to Kahn - for the design of the campus, was air flow. The Campus is organised at such an angle that the prevailing southwest winds provide air circulation through all buildings. This need for air circulation was likely overstated, but in an excerpt from the time one can see how important he held this concern.

"I was impressed with the need for air when I happened, with twenty other people, in the palace, Lahore, where the guide showed us the ingenuity of a craftsman who had covered an entire room with multicoloured mosaics. To demonstrate the mystery of the reflections, he closed all the doors



and lit a match. The light of the single match gave multiple and unpredictable effects but two people fainted for lack of air in the short moment that the room was shut off from the breeze. In that time, in that room, you felt that nothing is more interesting than air.”⁵⁷

57. Louis Kahn quoted in David Brownlee and David G. De Long, Louis I. Kahn: In the Realm of Architecture (New York: Rizzoli, 1991) 163.

This is reflected not only in the building orientation, but also in the construction methods. Massive brick walls make up the entire construction. Into these walls are carved huge apertures, usually arcuated with brick soldier courses marking their frame. One hardy sees glass in this building, where possible Kahn leaves it open to the breeze, and where enclosure is required, it is set deep behind the massive brick facing walls. Above the windows, Kahn employs a design which would recur throughout this project; the concrete tie. Although much of the brick is arcuated with semicircles, above the windows Kahn uses a very shallow arch. Directly beneath this arch, Kahn places a concrete tie. It is a beautiful detail with simple a logic to the statics of the arrangement. The shallow arch does not resolve into a semicircle and so it has a greater outwards force. The concrete tie acts in tension, resolving the forces and leaving an inert object in the wall. In this way Kahn is able to create vast horizontal spans. It is an act of perfect material expression.

“You say to brick, ‘What do you want, brick?’ Brick says to you, ‘I like an arch.’ if you say to brick, “arches are expensive and I can use a concrete lintel over an opening. What do you think of that, brick?” Brick says: ‘I like an arch.’”⁵⁸

58. Wendy Lesser, You Say to Brick: The Life of Louis Kahn (New York: Farrar, Straus and Giroux, 2017).

Opposite page: Personal drawing by author.

Worms-eye axonometric of dormitory building at the Indian Institute of Management Ahmedabad.

In a typical stereotomic brick wall, an arch supports the downwards forces of the span. These downwards forces are carried through the arch and an outward force is absorbed by the wall. To create a square opening, wood - and later concrete - lintels were placed above the openings. This imposition of a tectonic construction to a stereotomic wall was clearly something which spoke to Kahn. The openings in Ahmedabad build on this dialectic. Brick is used purely in compression but allowed to show its force, and reinforced concrete is used in tension. Neither material performs in a way which the other could perform better.

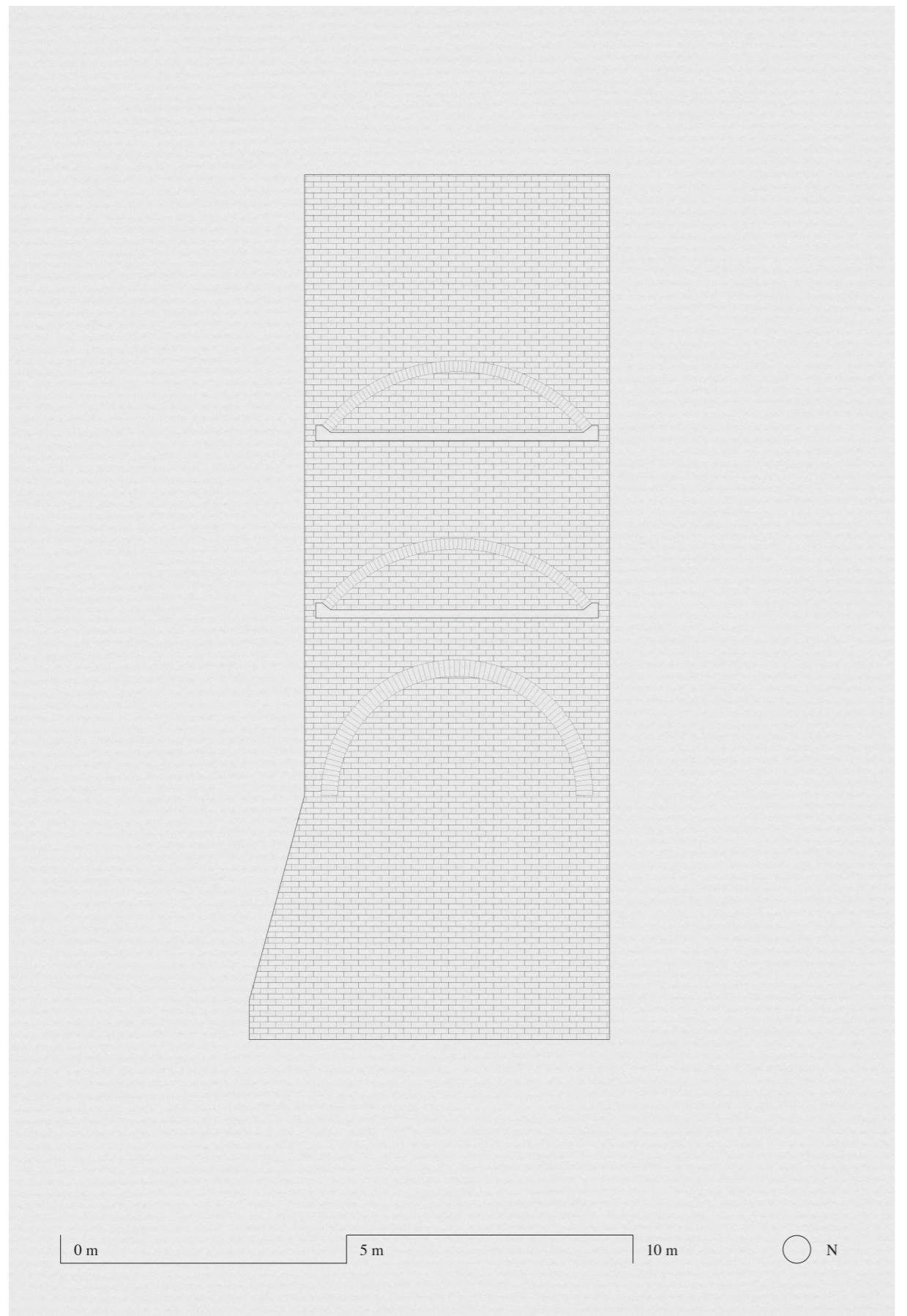
The dormitories are a simple composition of three volumes tied together by a triangular central space. Two mirrored building with a service tower standing next to it. Between the two mirrored buildings, the gap is filled with a staircase and common area which the service tower touches at its corner. In this composition Kahn once again conceives of the project as 'servant spaces' the tower containing bathrooms, showers, and supply rooms, and 'served spaces' the two blocks of sleeping rooms which face outwards.

The service tower is very simple, a plain brick tower, windowless save a single vertical slit running the height of the structure. On each of the corners that run parallel with the southeast orientation, Kahn cuts the wall just short, denying the corner. Ostensibly for air circulation, Kahn uses this to reveal the relative thinness of the wall and its planar construction. The triangular room that links the service tower with the two blocks of sleeping rooms, holds a semicircular stair. On the wall enclosing it, two huge double height circles are carved out, allowing for light and air. The extrusion of the stair geometry continues several meters above the top of the rest of the building, towards the side with windows it appears as a huge circular chimney but from behind it is left uncovered and reads as a thin shell.

The two buildings that contain the sleeping rooms are four stories tall, with rooms on the top two floors and common spaces on the bottom two floors. On the top floors, the concrete-tied windows allow for the wide windows to sit close to each other, a deep balcony placed in front of each room creates deep coves of shade before the bedroom. Here Kahn shows another facet of his concrete ties. The windows sit corresponding with each level of bedrooms, however below the bottom row of windows sits a row of windowless tied arches. On looking at this, one realises that the typical arrangement of one floor per opening is not followed. Instead, Kahn keeps the floor slab at the height of each concrete tie, part of the way down the opening, so that the arched portion of the aperture and the square portion of the aperture belong to different levels. This is confirmed when one looks up towards the top level of arches, and instead of seeing the ceiling above, blue sky pierces through.⁵⁹

59. I have not found an explicit explanation for such a system, but would speculate that it allows one to easier deal with sweeping and drainage.





Opposite page: Personal drawing by author.

Elevation of blind facade of dormitory building at the Indian Institute of Management Ahmedabad.

On the bottom level, the wall is heavily buttressed with thick brick supports. One of the most revealing elements of this building however is the side wall of the building containing the bedrooms. It is a blind wall, no apertures, and fairly short. However, Kahn places three elements onto it. Corresponding with the bottom two rows of concrete-tied arches on the main facades, Kahn places a set of elongated arches into the wall. Directly below, is a relieving arch purely in the roman fashion; semicircular and set flush with the blind wall. It is an act that seems to both contradict and reinforce his early ingenuity. It follows exactly the roman tradition of the relieving arch which implies a heavy load that must be carefully distributed, and carries the lateral load down to the articulated buttresses at each end.

In Trenton, Kahn starts to develop his approach to structure and solidity with his hollow 'column'. In Rochester the notion of the folding, inhabitable wall takes full form. In Ahmedabad, Kahn's approach to the wall is very different. In many ways, Kahn has a certain earnestness with his treatment of the wall. He no longer weaves the fine surface in and out to create pockets of space, but creates simple structures. Where this simplicity ends, however, is along the face of the wall. In the circles and tied arches, planes, and relieving arches, Kahn uses stereotomic weight of the wall to host the tectonic order he imposes onto it. Of all of Kahn's projects, the Ahmedabad campus seems the most archaic; one could almost mistake it for the Basilica Maxentius, oversized, devoid of detail, and endlessly heavy.



Maasik, Arne. Phillips Exeter Academy Library. 2016, Louis Kahn.

Exeter

In the intervening years between his design for the Indian Institute of Management in Ahmedabad, and the commission for the Exeter library, Kahn's understanding of architecture had undergone what would prove to be the final change.

Throughout the early and mid sixties, Kahn had spoken about his architecture in terms of 'form', 'rooms', 'existence and presence', 'belief and means'. While these are not perhaps the most transparent terms, they were far clearer than the rhetoric that Kahn began to use to refer to his architecture of the late sixties. Here Kahn starts to talk in terms of Silence and Light. Kahn explained that architecture lay at a point between 'a silent ideal' and 'the illumination of the real';

"The threshold where Silence and Light meet. Silence with its desire to be, and Light, the giver of all presences."⁶⁰

An excerpt from Brownlee;

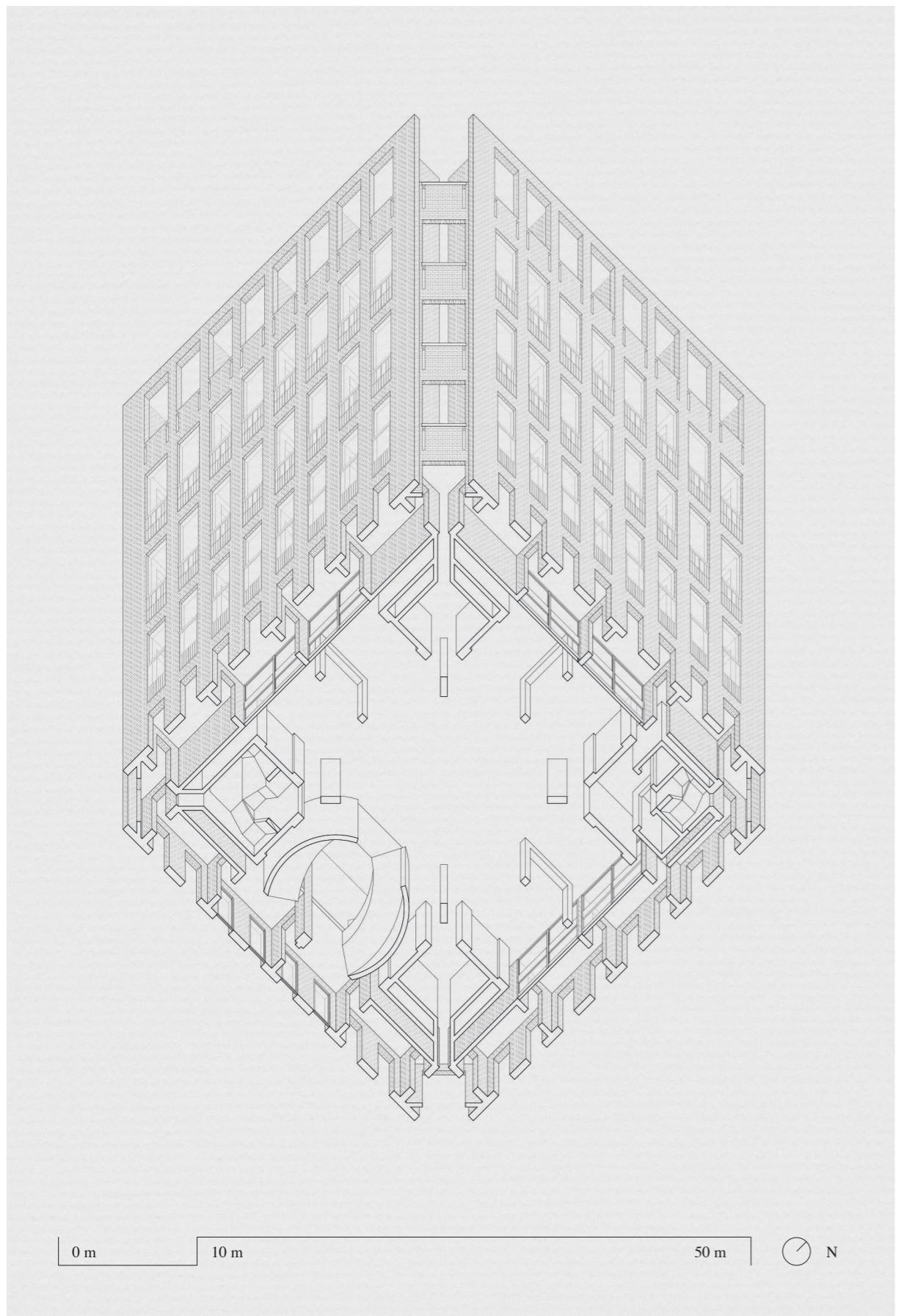
"Kahn elaborated on this theme. Silence was the realm of ideal truths which had existed before the pyramids had been built - "before the first stone was laid." Light, on the other hand, was the energy of the real; "I sense Light as the giver of all presences, and material as spent Light. What is made by Light casts a shadow, and the shadow belongs to Silence. Silence to Light - an ambiance of inspiration, in which the desire to be, to express crosses with the possible."⁶¹

60. Louis I. Kahn, Silence and Light (Zurich: Lars Müller Publishers, 1996)

61. Louis Kahn quoted in David Brownlee and David G. De Long, Louis I. Kahn: In the Realm of Architecture (New York: Rizzoli, 1991) 205.

This was accompanied with a sketch of a pyramid over which mirrored writing alluded to his discourse of Silence and Light. The way in which Kahn talked about architecture in these years was appreciated by some but certainly not all, his longtime friend and contemporary Vincent Scully reflected many years later;

"Sometimes even I and the people who loved him most found it hard to let him do it, to listen to him talking this terribly vague stuff and even slightly sort of false stuff. Then,



62. Vincent Scully interview with Alessandra Latour, September 15, 1982, in Louis I. Kahn: L'uomo il maestro, ed. Latour (Rome: Edizione Kappa 1986), 149.

63. This phrasing of material as spent light has interesting literal connotations. Whether or not this was the intended reading of it from Kahn, one can actually make this argument in a quite literal sense. Architects like Kiel Moe in recent years have emphasised how all energy and material can be traced back through an 'emergent' lineage to solar energy and photosynthesis. In effect all material actually is spent sunlight. Not coincidentally, Kiel Moe advocates the use of mass in contemporary buildings for reasons both of longevity and thermodynamics. Through a thermodynamic standpoint the words of Louis Kahn during this period take on an interesting - if somewhat tangential - meaning.

Kiel Moe, *Convergence: An Architectural Agenda for Energy* (London: Routledge, 2013).

Opposite page: Personal drawing by author.

Worms-eye axonometric of Phillips Academy Exeter.

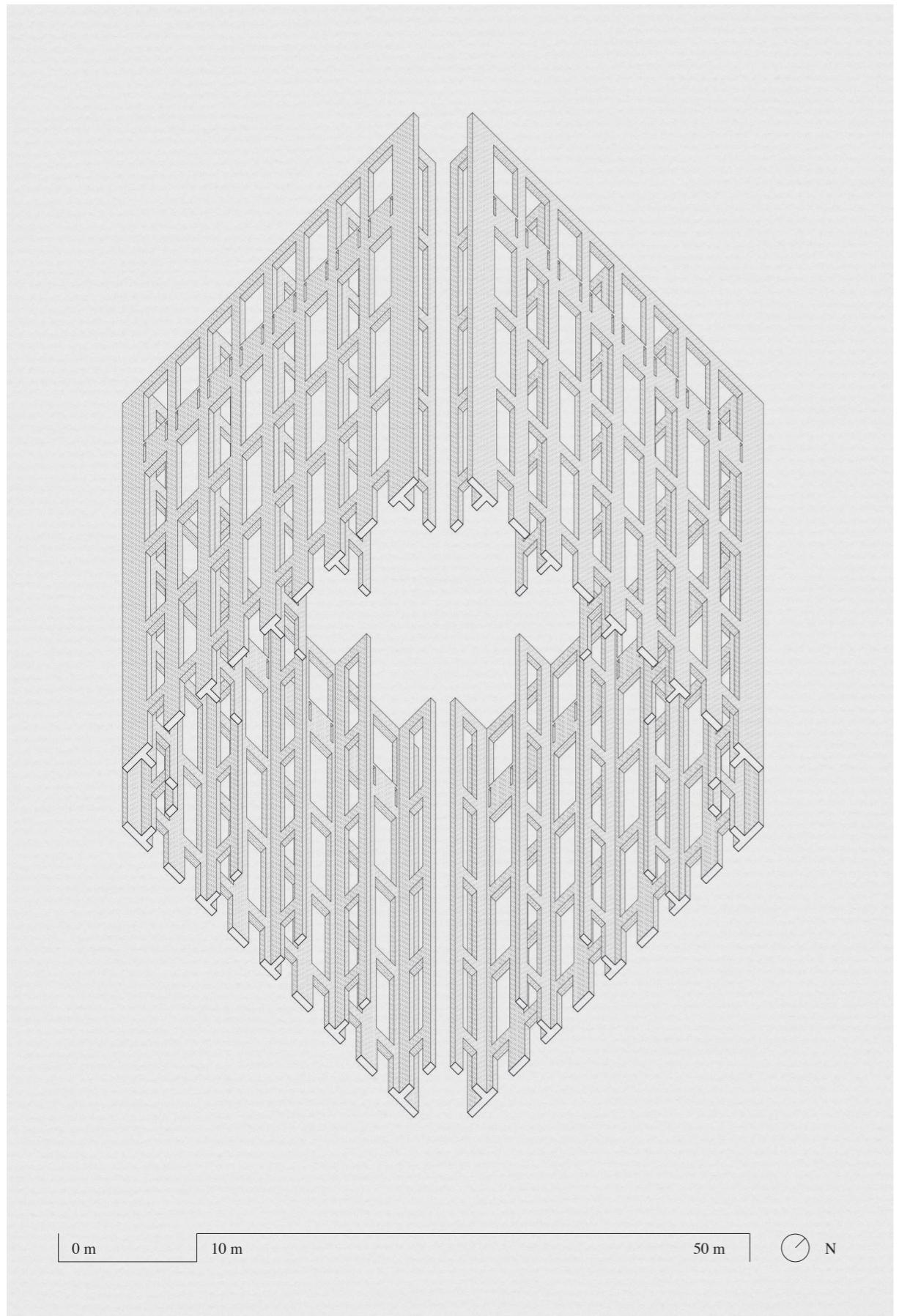
64. Louis Kahn, "The Continual Renewal of Architecture Come from Changing Concepts of Space." *Perspecta*, no. 4 (1957), 3.

*to hear so many people pick it up as gospel, the sort of philosophical gospel of Lou, was distressful because in his later years, it had become more of a smoke screen around his actual methods that anything else.*⁶²

Nevertheless, one can understand the difficulty that Kahn had in talking plainly about his architecture, in his attempt to express what he found inexpressible, he turned to poetic language to reflect this new understanding of architecture.⁶³ I will not try to decipher the rhetoric that Kahn uses, perhaps it gives valuable insights, perhaps as Scully suggests, it is more of a smoke screen, either way it is beyond both my powers of comprehension and the scope of this study. What is clear however, is that the architecture that Kahn created during this time is some of his most profound. It was during these years that Kahn took received the commission for a new Library at the Phillips Academy in Exeter.

The programmatic requirements of the building were fairly simple; shelves for books, and places to read them. The building itself is anything but simple. It is arranged in a square plan with concentric layers of program. The centre of the building is left open, a single giant room four stories tall. In the centre of the room sits a table and chairs. Framing the space is a truly giant concrete structure. It appears as a perfect square extrusion from which huge circles are carved almost the full height of the space. This extrusion rests on short concrete walls that sit at a forty five degree angle to the square. Above this structure is a skylight supported by a massive concrete cross nearly 5 meters deep. Around this central void are rows of book stacks packed densely into the single height space. On the outermost layer, are individual reading nooks, in a double height space next to the windows along the exterior wall. This arrangement is an inversion of the typical library layout where a central reading room is surrounded by rows of bookshelves along the exterior wall. In Exeter, the book stacks are located in the darkest portion of the building while the reading nooks are next to the windows.

*"A man with a book goes to light.
A library starts that way."*⁶⁴



Opposite page: Personal drawing by author.

The four voxel walls of the Exeter with everything that is not brick removed from the drawing.

The structural logic of the building is twofold. Supporting the floor slabs, concrete skylight, and roof, is the huge concrete structure in the centre of the building. Along the perimeter of the building, it is enclosed with load bearing masonry. It is constructed as single wythe of fine red bricks sandwiching a single wythe of cheaper masonry blocks with a small airspace in between the interior brick wythe and masonry. It is upon this exterior masonry wall structure that I will focus.

From the exterior, the building appears at first to be a simple brick box. The rhythm of the windows is such that the top four apertures are double height while the bottom is a single height open colonnade. The top double height row is also open to the environment. As one approaches the building, similar to what Kahn had done in the service tower in Ahmedabad, the corner is cut at a forty five degree angle. Through the length of the facade, the heavy brick wall which seems to land in piers at the colonnade, is thinned out and the size of the windows increases until at the top level they read as fine brick columns. This effect is not noticeable for the windows at the intermediate level however as the windows block ones view. In this way only in the top and bottom rows can one grasp the depth which has changed drastically in between. Further, when one looks at the brick which sits in line with the window apertures, Kahn has used a jack arch which spans the full height of the spaces between the windows. If one imagines that the spanning arches are not wall in the most structural sense, the reading of the composition changes drastically. Instead of the imposing planar wall that first presents itself, the wall can be read as a set of nine huge tapering columns, each nine floors tall.

Where Kahn cuts back the corner, at the top floor where it is no longer enclosed by windows, one can see the brick stepping back and bringing a ninety degree wall several meters back from the front wall at each of the piers. When one enters the library and walks through the double height reading spaces, this is understood to be the structure for this portion. As such, the facade which appears at first to be a planar face of brick, is revealed to be in fact four separate voxel structures that touch at their inner corner to create

the cube. This is not explicit from a first impression of the building, and yet when one realises what Kahn has actually done, the chamfered corner seems to have been suggesting this all along.

In this way, the brick walls can be thought of as thick inhabitable structure that contain the full depth of the reading nooks. In Rochester, Kahn placed one in the wall and then folded the wall around them, both enclosing and projecting. In Exeter, Kahn places one in the wall in a wholly different way. One sits inside the wall because the wall is the mediator between the light of the exterior, and the silence of the shelves inside; a man with a book goes to the light.

Interior of the brick voxel wall at Exeter.
Kahn brings one into the wall without
making it explicit in the way he does in
Rochester.

Larry Speck, "Phillips Exeter Academy
Library," photograph, accessed January 13,
2025

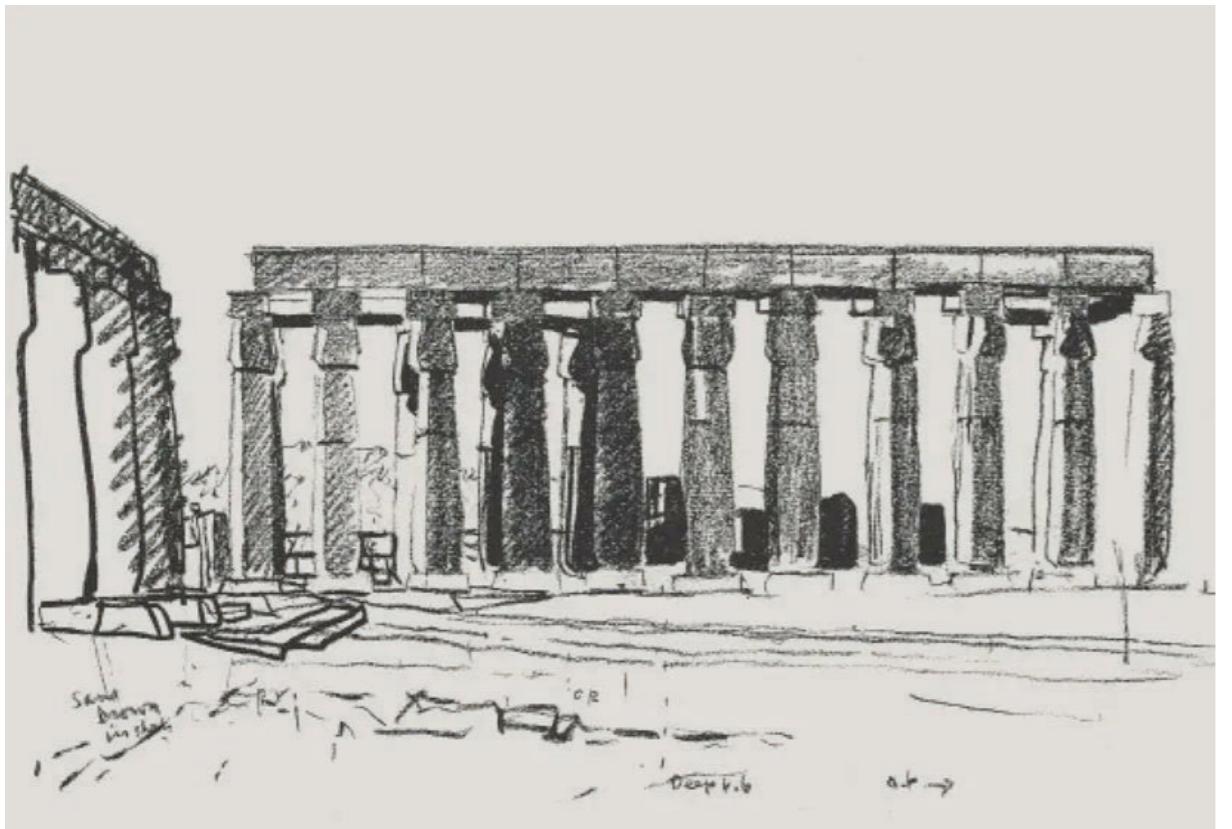


4.

Kahn's System

A pencil drawing from Kahn's fellowship in Rome on a trip to Egypt. In his representation the columns, he makes clear that they are a rythym of light and matter. In the rightmost column he allows it almost to dissapear into light.

Louis I. Kahn, Luxor Drawing, Pencil drawing of the temple, Luxor, Egypt.



The projects that I have discussed in the previous chapter provide only a small window into the complete oeuvre of Louis Kahn, but I believe they provide a fairly coherent overview of Kahn's approach to the brick wall throughout his late career. Given this, how then should one consider him in the tradition of masonry constructive systems previously discussed. If one can assume a lineage from Egypt to Greece, Rome, Early Christian to medieval, revived by Alberti and continuing until the abrupt break of modernism, in what manner does Kahn pick it back up?

Kahn's increasingly opaque rhetoric can both illuminate, and obscure the realities of his architecture. Through this study I have attempted to use it where it seemed comprehensible - often even helpful - and ignore it where it added confusion. There is one phrase of Kahn's I have ignored so far for precisely this reason.

65. Louis Kahn, "Architecture Is the Thoughtful Making of Spaces," Design Manifestos, accessed January 5, 2025

*"...long ago they built with solid stones. Today we must build with hollow stones."*⁶⁵

This idea of the hollow stone is one which has been often cited as one of the critical tenets of Kahn's architecture, indeed even by himself. Yet this statement holds immense contradiction and I believe often leads to a critical misunderstanding of his architecture. The stones that Kahn uses are as solid as any other stone, what at times can be hollow, however, are his walls. And so we arrive to solid stones creating hollow walls. Certainly in the fifties this was the case, in Trenton and Rochester, Kahn's treatment of the wall is to imply a thickness and solidity that is not reflective of its real thickness. This tendency to imply a thick wall ends with Rochester however. In Ahmedabad the thickness of the wall is presented very simply while the constructive logic of the wall itself is incredibly complex, and by the time Kahn constructs the library in Exeter this has undergone a complete inversion. Here the wall appears first to be a simple plane, its language is one of thickness certainly, but the real thickness of the 'wall' structure that he creates with his brick voxel is far thicker and sturdier than it initially appears. To place Kahn in the context of masonry tradition is a difficult task. As I limit the scope of this study to that of the

load bearing masonry wall, I will talk about it only in the context of the four projects that have been analysed. To say categorically that Kahn's work is either stereotomic or tectonic is futile. There is huge variation across his projects and even within a single projects the logic can change. Yet unlike most of his contemporaries, Kahn is one of the few who returns to the dialogue of solid construction after the break of modernism.

If one can assume that the wall is the primordial act of stereotomic architecture and the column is the primordial act of tectonic architecture, what information arises from Kahn's walls? In an essay from 1971, Kahn outlines his understanding of the wall.

“...the wall is the first kind of structure and that the wall is invented first in order to enclose inhabitable space and to protect users inside. Then comes the need for light in interior spaces, which forces the wall to be pierced, and the evenly pierced wall becomes a row of columns. Thus, the wall and column not only serve as a structure and create an enclosure, but also characterise the architectural space through the character of light. Without either of them, structure and light, the room cannot be identified.”⁶⁶

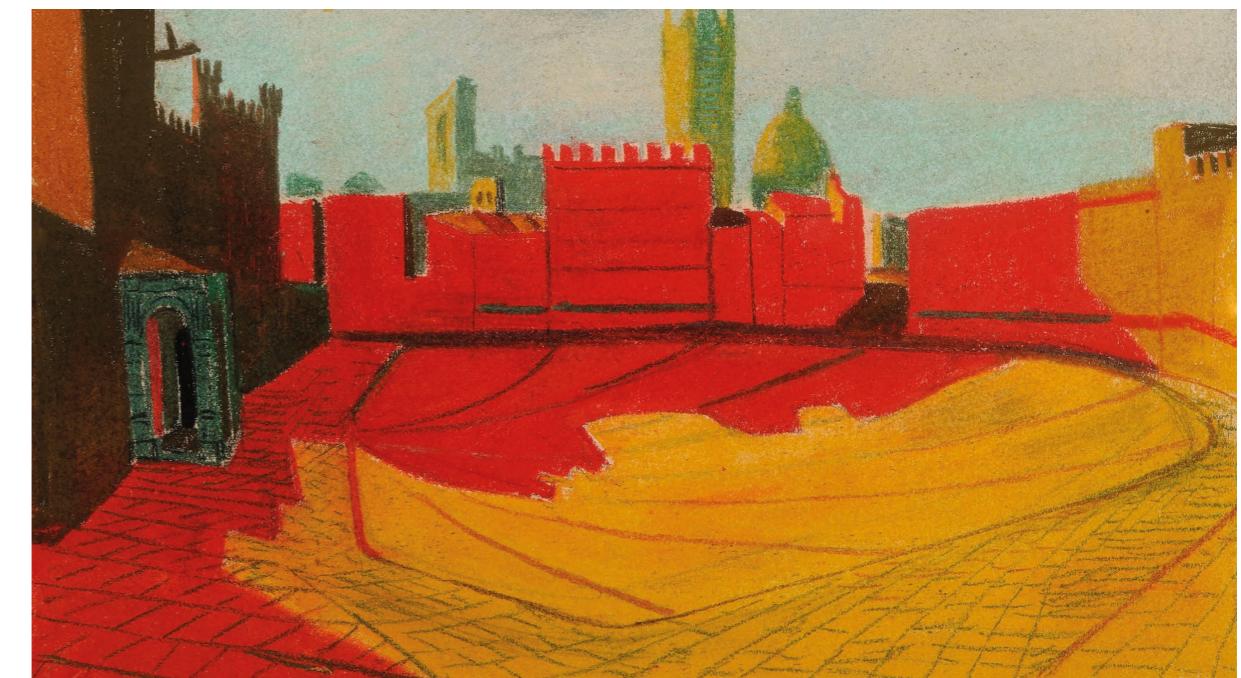
Kahn's phrasing that 'the evenly pierced wall becomes a row of columns', provides a good deal of insight into his framework for understanding the wall. To Kahn, the wall comes first. Even the column, he describes as practically excavated from within the wall. He describes the column in purely stereotomic terms. This concept one can also find in Kenneth Frampton's characterisation of Kahn's approach;

“Kahn ... finds reflection in his intense awareness of the ontological distinction between column and wall, his Albertian preference for the primordial separation of the two, by virtue of light penetrating into the opaque impassivity of the wall and thereby liberating the freestanding column from within its mass.”⁶⁷

This notion of liberating a column from within the mass is seen at its most profound in Exeter. On its walls Kahn

A pastel from Kahn's fellowship in Rome. His understanding of architecture as walls and rooms becomes evident.

Louis I. Kahn, Siena Drawing, pastel drawing of the Palazzo Pubblico, Siena, Italy.

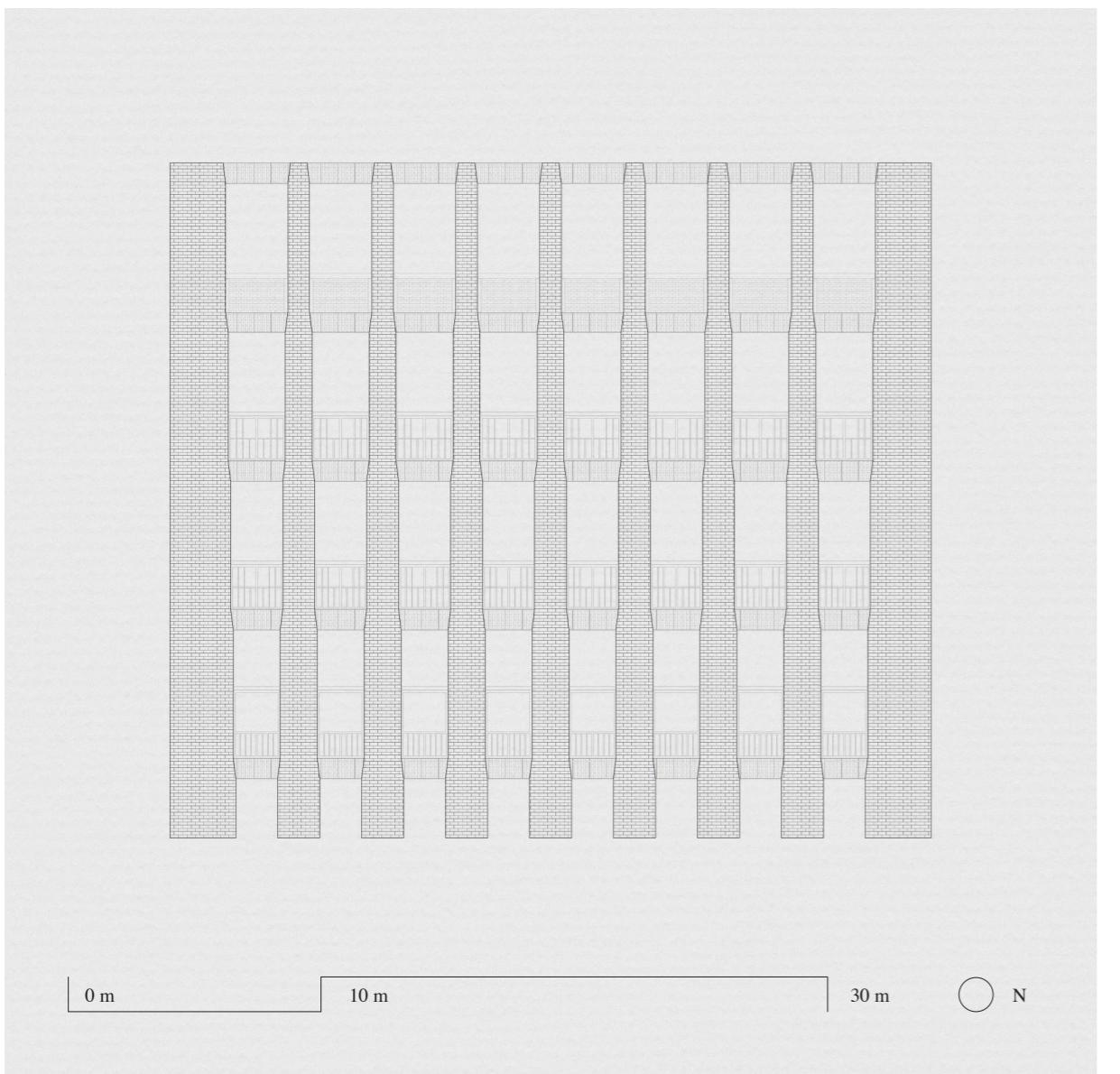


66. Louis Kahn, "The Room, the Street, and Human Agreement (1971)," in Louis Kahn: Essential Texts, ed. Robert Twombly (New York: W.W. Norton & Company, 2003), 255.

67. Kenneth Frampton, Studies in Tectonic Culture: The Poetics of Construction in Nineteenth and Twentieth Century Architecture, ed. John Cava (Cambridge, MA: MIT Press, 1995), 218.

Personal drawing by author.

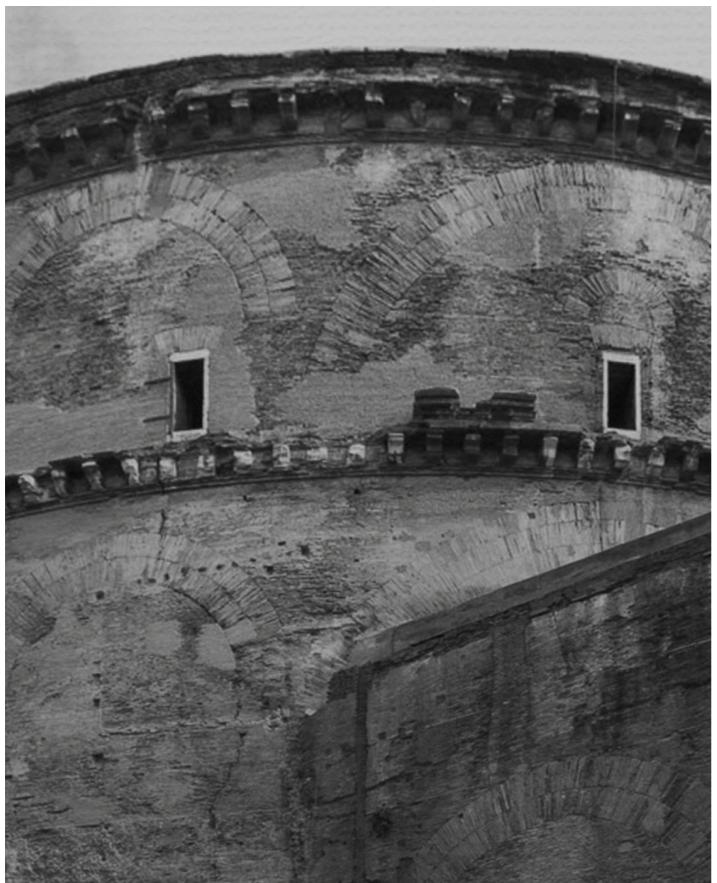
Facade of a single unit of exterior brick wall. Note the piers that are constructed of lateral layers of brick in comparison with the soldier courses of brick as infil.



does exactly this. Kahn widens the windows, places soldier courses of brick along the height of the windows, and creates a reveal at the top floor to show this effect. When one first sees the building it is a cube of four planar walls but with time the columns seem visually to excavate themselves. Nine giant piers with nothing but infill between. It is a trick that he gives away with the single level of brick infill at the fifth row of double height apertures. The column is finally liberated from the wall. Where Alberti took the tectonic orders of Greece and displayed them as the symbolic against the firmitas of a stereotomic ontology of the wall, Kahn's Exeter is symbolically stereotomic in its immense mass yet it allows one to discover the tectonic ontology of the structure.

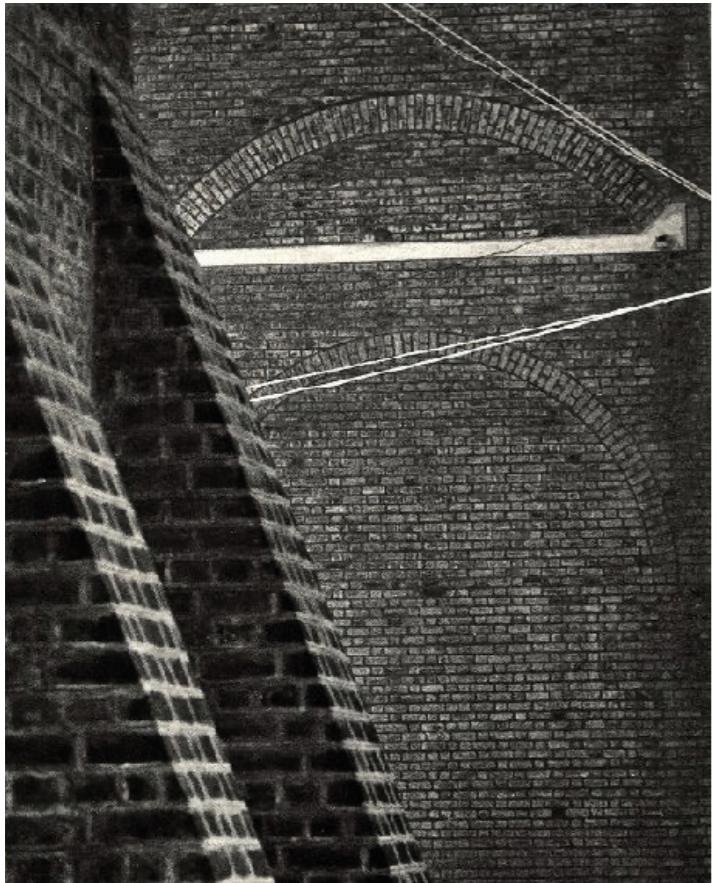
In the first two projects discussed, the dialectic between the systems is less pronounced. In many ways, Trenton and Rochester can be seen as a ontological and symbolic unity of the stereotomic. The symbolic intent is clearly defined; thick walls, implied mass. The construction of both buildings provides more questions. Although they are both a constructed of simple masonry, the notion of the 'hollow wall' often results in these buildings being described as wholly non-solid. This, I believe to be a mischaracterisation. It is of course true that the 'hollow wall' is a concept which Kahn utilises here, however it is critical that the idea of hollowness belongs to that which is solid. For a wall to be hollow it must first be solid. And hollowness does not disqualify solidity. One would not describe the Parthenon, or a geodesic dome as 'hollow', just as one would not describe the walls of a mediaeval castle as 'hollow', despite their embedded corridors, nooks, and rooms.

In Ahmedabad, Kahn's walls take huge influence from Rome, yet the pragmatic necessities of the Roman wall are replaced by the increasingly complex logic of Kahn. This approach to the construction can all be seen on the blind wall where Kahn places his concrete-tied arch. The concrete-tied arch is created as a means to span and distribute forces in a way which respects the inherent qualities of the material. Rather than use a typical arch which speaks of a stereotomic construction, Kahn reformulates it to be a tec-



Note the relieving arches set into the inarticulated exterior facade. The plain stereotomic 'drum' of the Pantheon relies on sophisticated Roman masonry to be structurally sound.

"Pantheon in Rome - 12," photograph, October 29, 2005, Wikimedia Commons



Kahn's version of the relieving arch in Ahmedabad, the construction of the arch is a mirror of the construction of the wall; stereotomic appearance with tectonic construction.

Louis I. Kahn, Indian Institute of Management, 1962–1974, photograph, Louis I. Kahn Collection, Architectural Archives, University of Pennsylvania.

tonic construction of two elements, one of which happens to be stereotomic (the arched bricks). If one takes the roman wall to be a tectonic assembly of brick and concrete, wall and arch, with a stereotomic affect of mass and unity, Kahn mirrors this logic of tectonic assembly with the placement of a concrete-tied relieving arch in a blind wall. This reformulation of the stereotomic wall as a tectonic assembly was used often by the Romans with typical arch, but by placing a concrete-tied arch which is inherently tectonic, Kahn displays the exact logic of the wall, scaled down and multiplied across as the concrete-tied arch. It is the ideal continuation of the Roman logic.

Despite insights one might gain from one specific building or another, the architecture of Kahn tends to avoid a simple categorisation into stereotomic or tectonic systems. Nevertheless, his architecture revives a dialogue between the two systems by reintroducing masonry into the contemporary dialogue of architecture.

Conclusion

I will return to a quote from Louis Kahn that sparked my interest for this study.

“Consider the momentous event in architecture when the wall parted and the column began.”⁶⁸

The dialectic between the column and the wall that Kahn identifies is one which is reflected beautifully in his buildings. Kahn was an architect for twenty five years before he began to make architecture. But when at last he began to build truly, he built in a language that had been discarded by modernism. By focusing specifically on Kahn’s treatment of the wall, I believe a great deal can be learned about the architect. I understand Kahn to be an architect completely at ease in dualism.

Kahn has a near obsession towards material expression, often subverts the ontological with the symbolic and vice versa. His buildings are tactile, yet they exist as strongly in the abstract as they do in the phenomenological. In the projects I have chosen for analysis, he returns to a system of masonry, yet he does not take verbatim the constructive system from those before him, and instead brings freshness to a system which had largely stagnated.

The final phrasing that Kahn rested on was that of Silence and Light. Despite his language changing often throughout his career, he tended always to formulate thoughts in dialectics. Silence and Light, to be/to be and to be/to express, Form and Light, and so on... I find this to be reflected in his approach to the wall. His architecture rests in the tension where two seemingly opposing things meet;

“The threshold where Silence and Light meet. Silence with its desire to be, and Light, the giver of all presences.”⁶⁹

This can be seen in his treatment of the wall. It is both wall and column, hollow and solid, impassable and porous. Sometimes perhaps more of one, sometimes the other. The strength of Kahn’s architecture lies in the acceptance of both.

68. Louis I. Kahn, “Architecture: The Making of a Room,” lecture at Pratt Institute, 1971, in Louis Kahn: Essential Texts, ed. Robert Twombly (New York: W.W. Norton & Company, 2003)

69. Louis I. Kahn, Silence and Light (Zurich: Lars Müller Publishers, 1996)

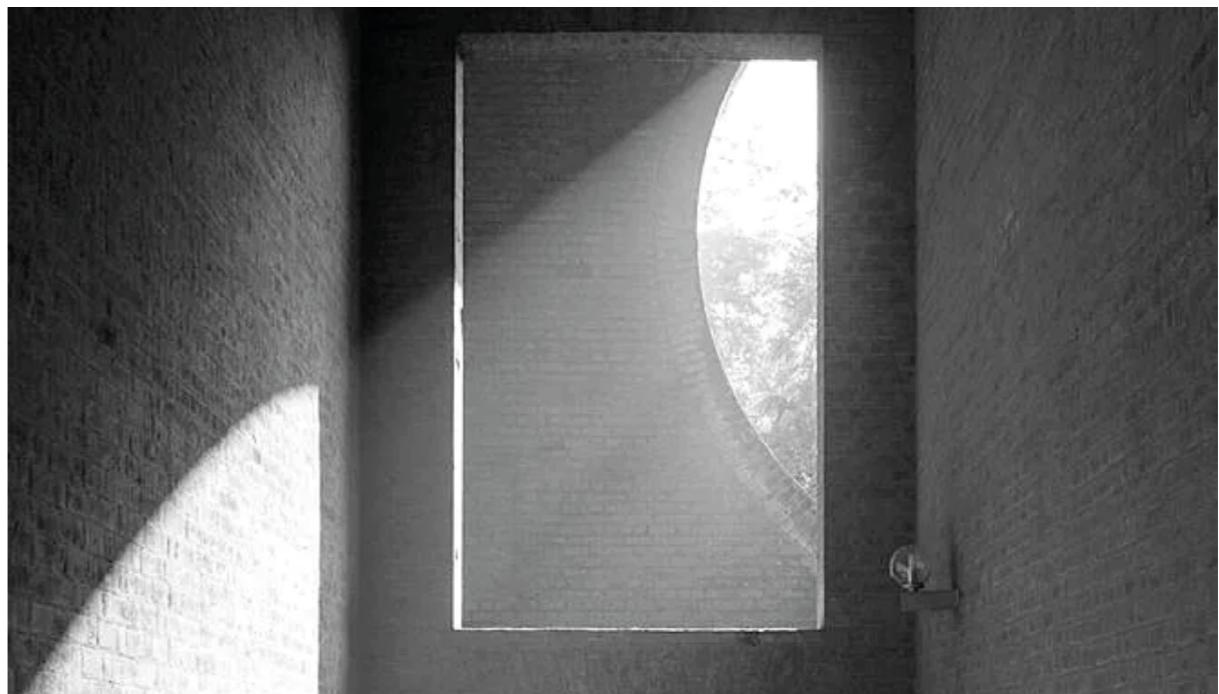
70. Ibid.

“The sun does not realise how beautiful it is until after a room is made...

Just think,

that a man can claim a slice of the sun. ”⁷⁰

Louis I. Kahn, Indian Institute of Management, 1962–1974, photographer unknown.



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