Louis I. Kahn

& his inspiration

a paper about travelling, inspiration, history, growth, principles... Louis I. Kahn and of course his masterpiece: the Capitol Complex in Dhaka.

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Introduction.

The Assembly Building is located in Dhaka, Bangladesh. It was built as a response to political changes. The decolonization of India led to the creation of West-Pakistan and East-Pakistan, the latter now known as Bangladesh. Because of the distance between East- and West-Pakistan (around 1600 kilometers) and the difficulties this entailed, the president of Pakistan, Ayub Kahn, decided to build two national capitol complexes. In West-Pakistand in Islamabad and the other one in East-Pakistan at the former capital of East Benghal, Dhaka.

This capitol complex was to be designed by Louis I. Kahn. However, before it was finished, East-Pakistan became independent. Kahn's design became a symbol for Bangladeshi people of their independence and democracy.

The first thing that stands out when looking at the Assembly Building is the apparent use of geometry. It gives the building a certain sense of monumentality and importance. To the naked eye, it seems that everything is based on geometry and proportions; things we hardly learn to work with at university. But isn't this exactly what gives the building its importance and monumentality?

This gives rise to the question how Kahn uses geometry. What inspired him to use geometry and proportion? Is there only a spiritual meaning (the strive for perfection, beauty, truth) or is there also a functional side to it? How did he use the mathematical side of geometry and proportions to accomplish these meanings?

The Assembly Building is part of a bigger plan. It was the first time Kahn developed a plan of this size. It was also the first time Kahn worked in a developing country; a country that only recently became independent.

During this time, other countries in Asia also became independent. Most of them were in need of a new government and citadel. Is it possible for us to compare Kahn's plan for Dhaka to other projects built in similar conditions?

It is well known that Kahn had a breakthrough in his career after travelling across Europe. From that moment on, he developed his typical style that became so famous and lauded; he finally found his own way of working. How did he use geometry and proportion throughout his career?

The buildings Kahn saw during his travels opened his eyes; almost all of them were very well-proportioned buildings, but all of them with different interpretations of the meaning of proportioning and the use of geometry.

In this essay, we will try to understand the Assembly Building based on the way Kahn used geometry and proportion in his previous buildings and based on the way it was used in history. We will start each chapter with a hypothesis, try to find (counter)arguments for this hypothesis and finally reach a conclusion.

Investigating Kahn's design for the citadel of Bangladesh felt like opening a door to an entirely new world. A world in which proportion and geometry are used to strive for perfection. It provided us with a keyhole to look back into history and see contemporary architecture in a new perspective.

Chapter I.

This chapter will focus on the use of proportion and geometry throughout history. This will be done in a chronological order.

A few examples of buildings are explicitly mentioned to be inspiring to Kahn, particularly for the Assembly Building in Dhaka. The baths of Caracalla with its pure massive geometries was an inspiration in general. The Pantheon in Rome, more specifically the sphere for the assembly hall. For the roof a few examples are the Piazza d'oro at Hadrian's villa and the renaissance domes, such as the dome in Bramante's Santa Maria delle Grazie in Milan. And – a more modern source of inspiration for the roof of the Assembly Hall- Los Manantiales restaurant and St Vincent Chapel in Mexico.

When looking at the plans, there are some striking similarities between Kahn's final plan for the Assembly Building and the plans of the Renaissance centralized churches.

We decided to take a look at buildings, which we think might have some similarities with the plan for Dhaka. The examples mentioned above are explicitly referred to in books about Kahn and his sources of inspiration, but we decided to have a somewhat different approach, taking a look at the buildings that Kahn probably saw during his trips and might have influenced his way of working. This is never explicitly mentioned, so this is our assumption. We will make a hypothesis for each building in comparison with Kahn's work and, after analysing it, try to conclude whether he referred to these buildings or not.

The earliest example we'll analyse is the Parthenon in Athens, because Greek architecture is the foundation of the use of geometry in European architecture. Proportions and geometry, as described by Vitruvius and others, were the starting point for the spatial arrangement of the Parthenon.

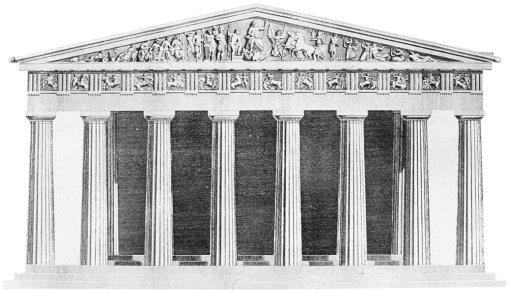
Our next investigation is the San Vitale Church in Ravenna, a centralized church from the 6th century. The arrangement of the central dome with the smaller structures assembled around it, reminds us of Kahn's composition of the several parts of the Assembly Building.

Another example of 'composition' in a building is the Villa Rotonda by Palladio, with its rectangular parts and a central dome placed on top of it. Villa Rotonda is only one example of many geometric buildings Palladio designed, which refer to ancient Greek (and Roman) architecture that regained interest during the Renaissance.

The next chronological step leads us to Durand, a French architect who wrote an extremely influential book: '*Précis des Leçons d'Architecture*'. He reduced architecture completely to construction and geometry, creating another inspiring way of thinking and working for us to compare with Kahn's work.

Parthenon.

447 BC, Athens, Greece



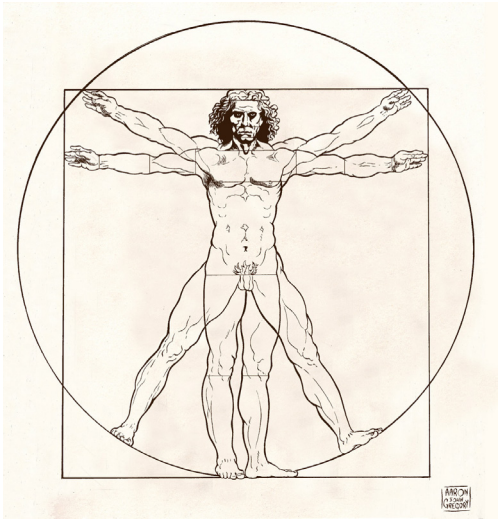
Parthenon

Starting at the roots of Western architecture.

Hypothesis: Both the Greeks and Kahn used geometry and proportions in a quest for beauty, to strive for perfection.

Even though we know little about the writings of ancient Greek architects, there is enough evidence to say that they used proportions in their designs. One of these writings is Vitruvius' *De architectura libri decem*. He offers not only practical advice, but also theoretical thoughts about origins, tasks and the aesthetics of architecture. According to Vitruvius, architects should know arithmetics and geometry. This is shown in his rules of design, combining both methods: all plans, and most elevations, are made by geometrical partitions and relations.

The diameter of the column functions as the base module from which all other measurements follow. However, this width is derived from the temple's width, which depends on the type of temple.

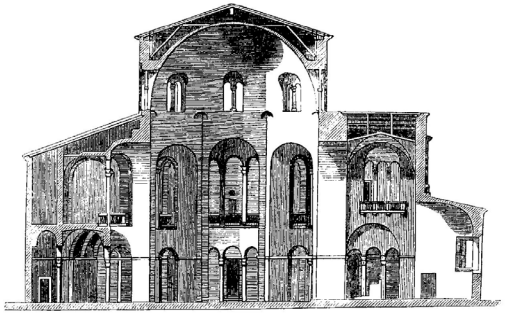


Vitruvian man

This interrelationship of modularity and geometry finds its resemblance in the human body. The figure of a man in a circle and a square supports Vitruvius' claim that 'no Temple can have a rational composition without symmetry and proportion, that is, if it has not an exact calculation of members like a well-shaped man'. Here, the human body is used as a paradigm for the required rules of proportion.
A widely accepted, but in our opinion wrong, claim is that the Parthenon, or any other Greek building, is based on the Golden Ratio. There is no recording of the Golden Ratio in ancient Greek writings. Even though there are numerous examples, pretending to show the Golden Ratio in the Parthenon, none of these examples use the width of the column as a base module. Nevertheless, the ideas of Greek architecture on proportion would form the basis for all future architectural theory.

Church of St. Vitale.

547 AD, Ravenna, Italy



Church of St. Vitale

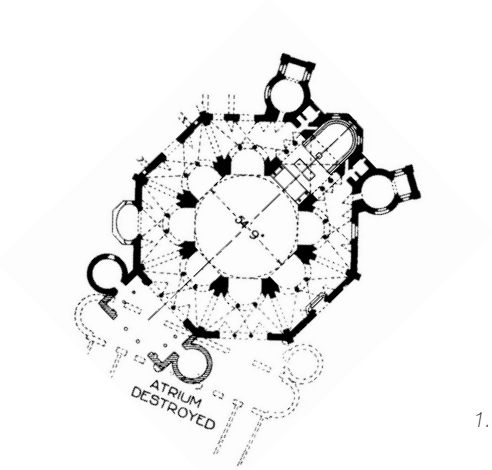
Hypothesis: The Assembly Building has been inspired by centralized churches – built during the Renaissance or the Byzantine era. Furthermore, Kahn applied the same measuring methods as the Byzantine masons did to build their designs.

In designing their buildings, Byzantine masons probably did not utilize architectural drawings: not for the design nor for the codification of ideas. On-site calculations, the application of geometry, modular units, proportional systems and standards of measurement determine the overall form of the building and positions its most significant features.

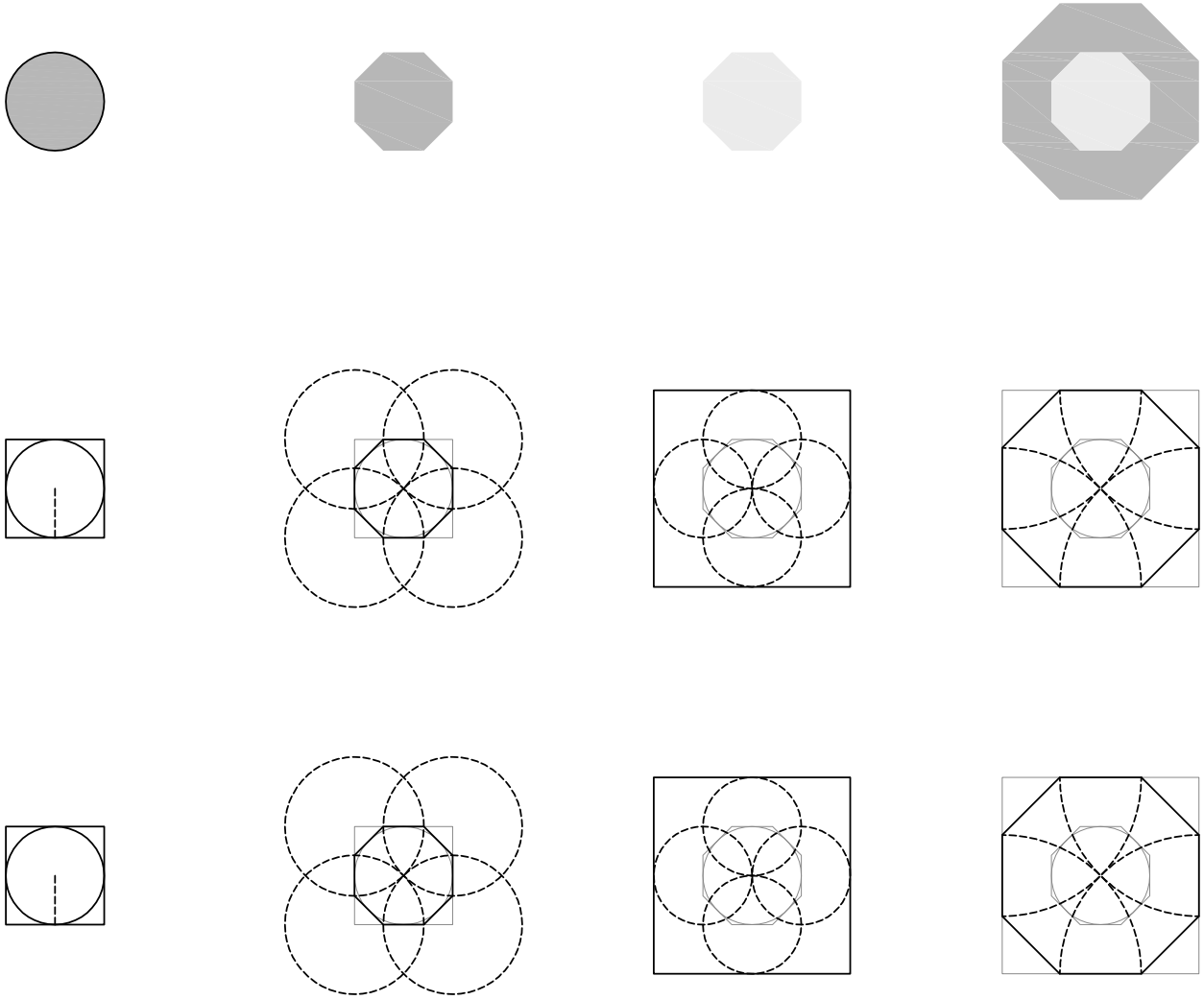
We suppose that this way of building has something to do with the design of the Assembly Building in Dhaka. Since Kahn wanted to be faithful to the building traditions and craftsmanship available in Bangladesh, the builders did not have access to high-tech resources.

In the following diagrams, we will try to show the similarities between Byzantian measurement methods and a possible method to measure the Assembly Building in Dhaka. However, no texts address this topic directly, so it is impossible to say whether these diagrams are correct. They only aim to show the similarities.

The diagrams at the top show the space which is created, the middle diagrams show the geometrical actions needed to create this space while the bottom diagrams show the elements of these geometrical actions which are used.



Originial floorplan Church of St. Vitale



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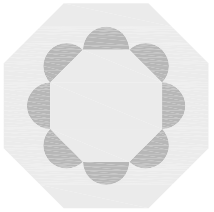

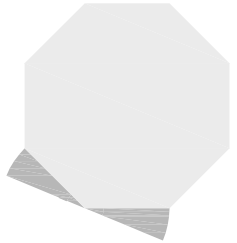

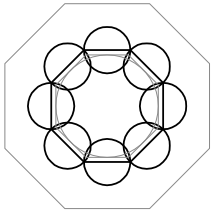

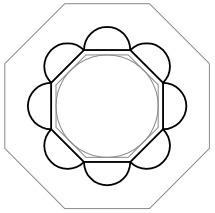

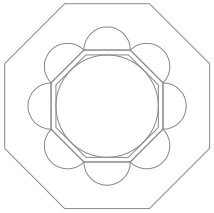

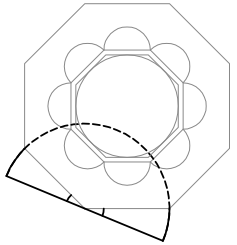

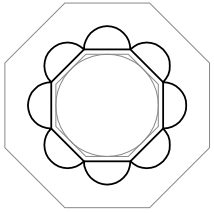

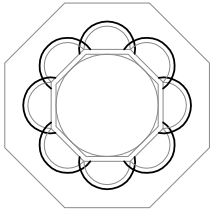

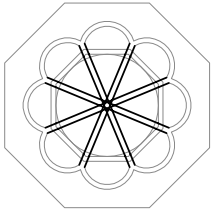

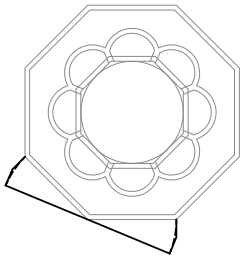

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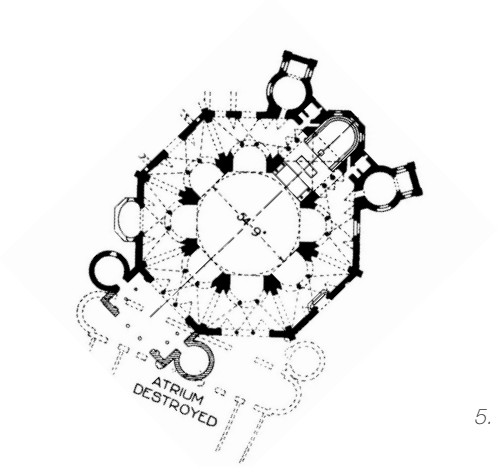

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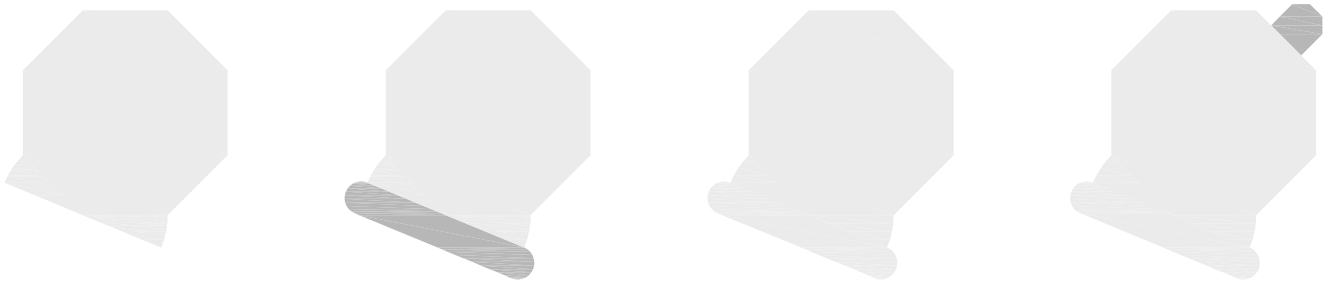
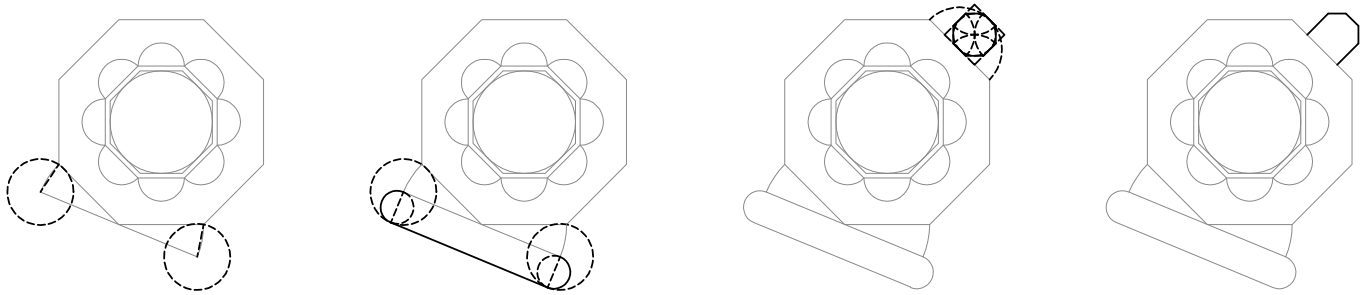
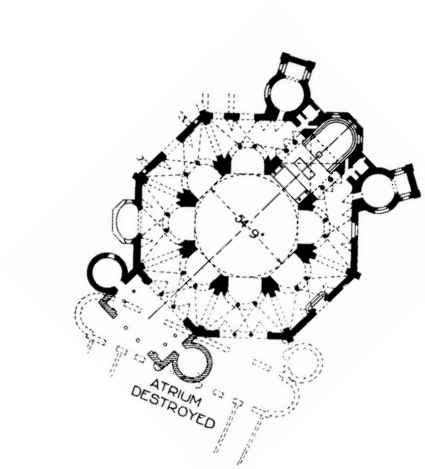
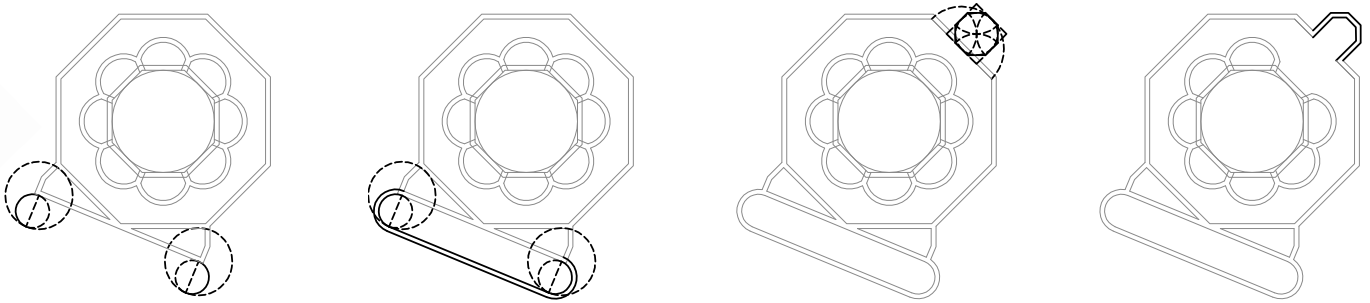






Originial floorplan Church of St. Vitale



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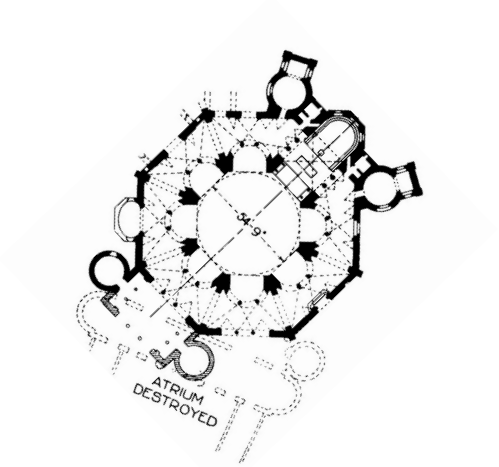
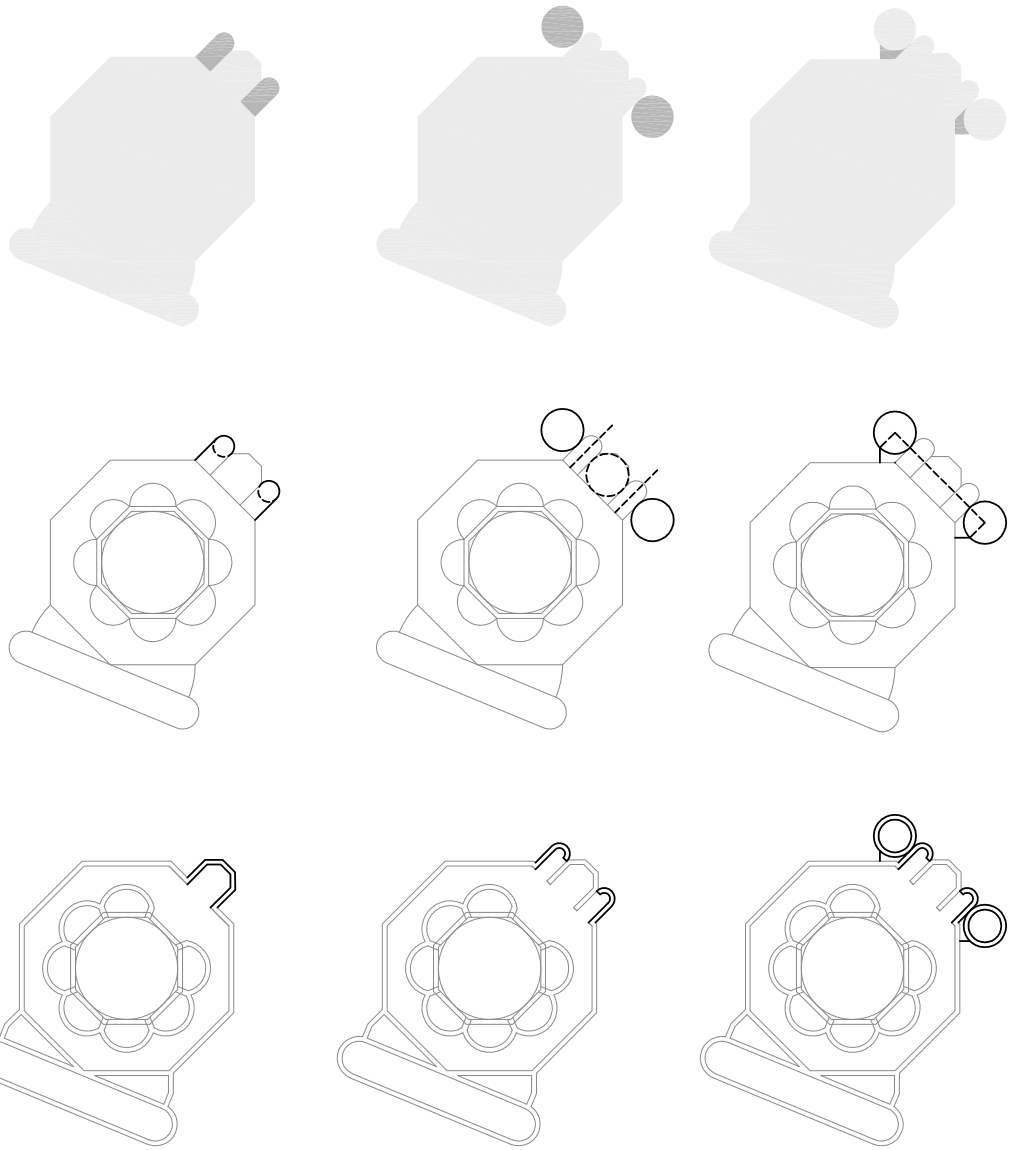


Originial floorplan Church of St. Vitale



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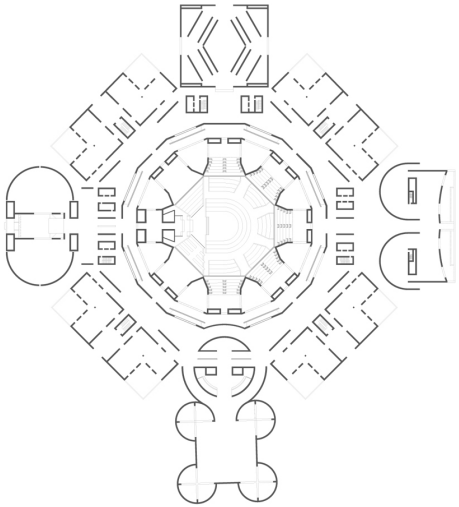

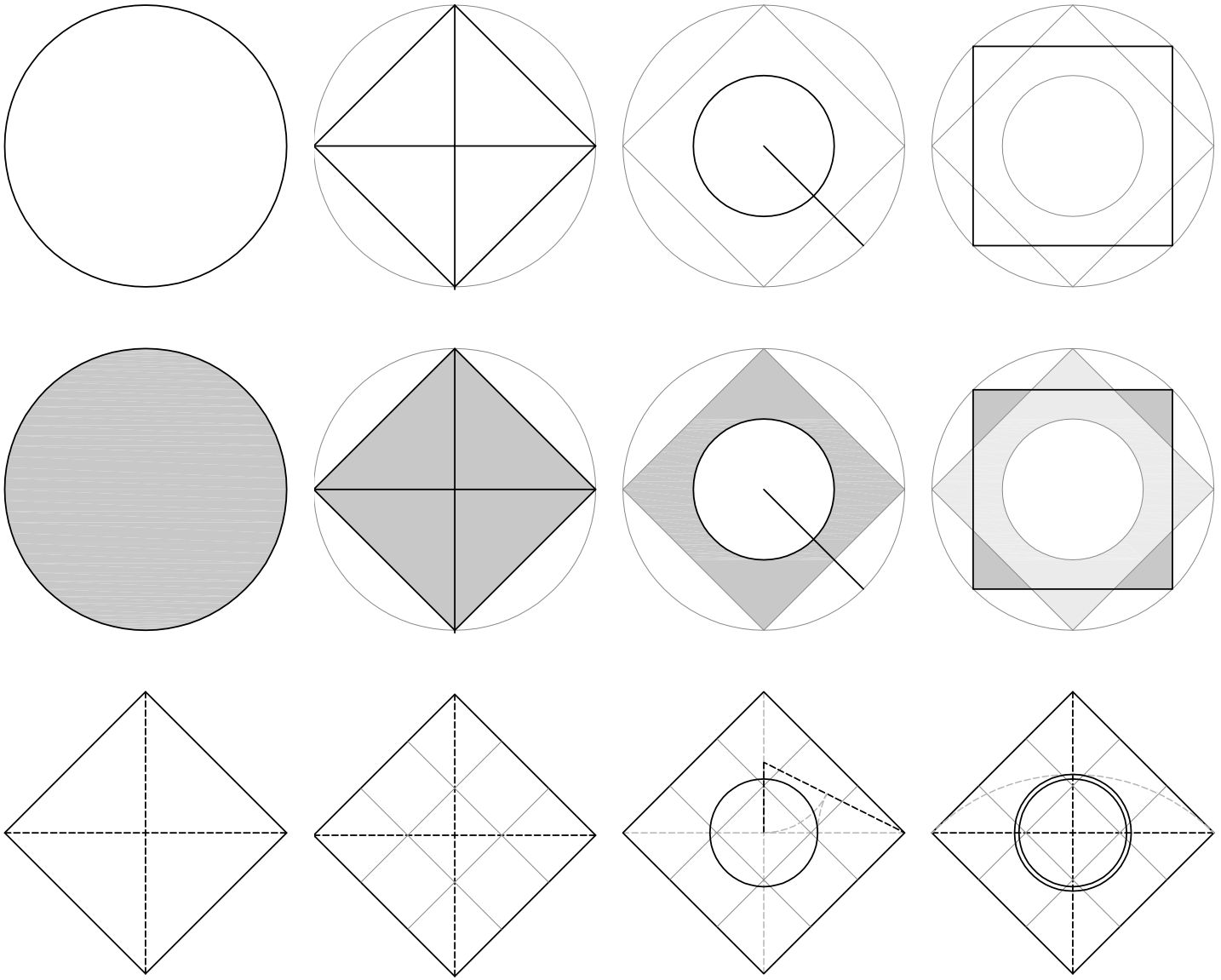

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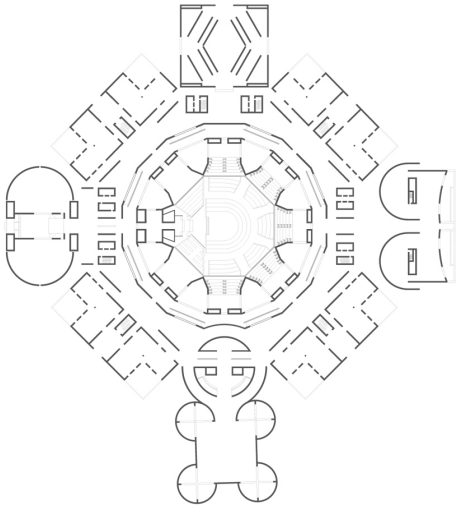
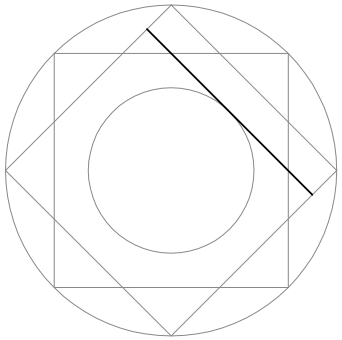
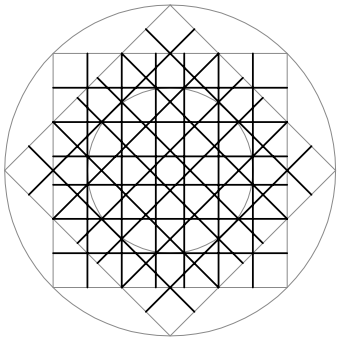
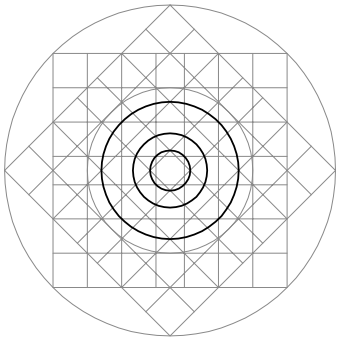
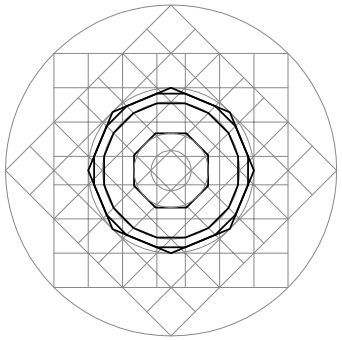
Floorplan of the Assembly Building, Dhaka

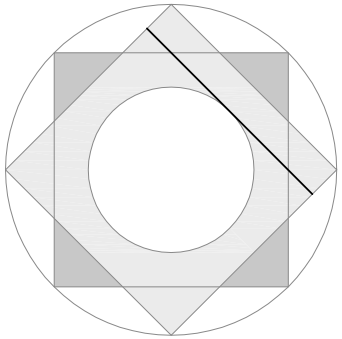


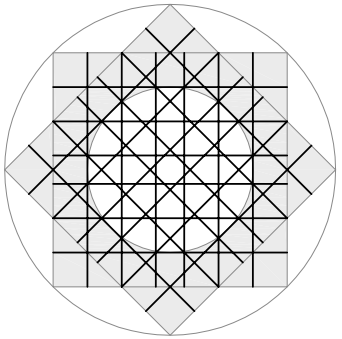


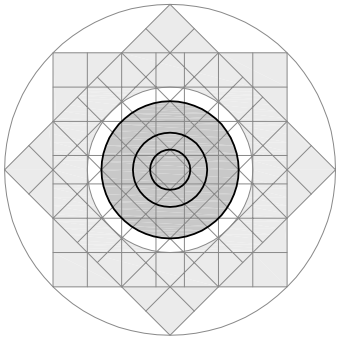


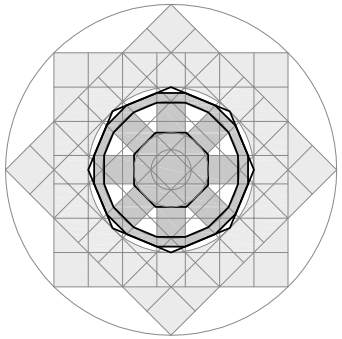


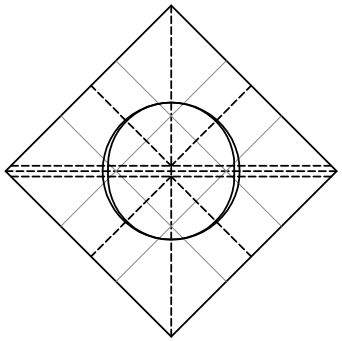


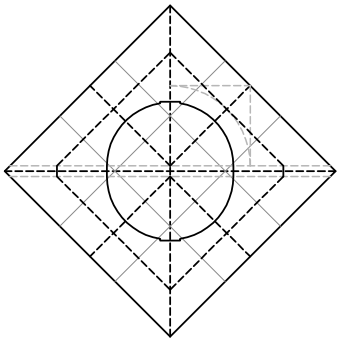


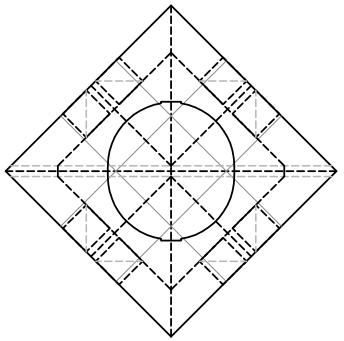


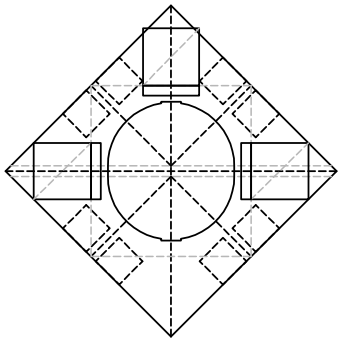












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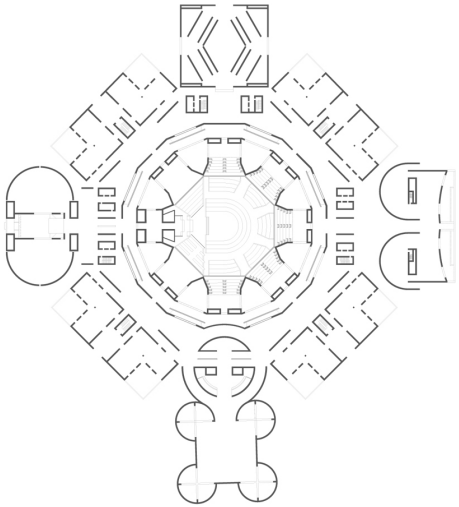
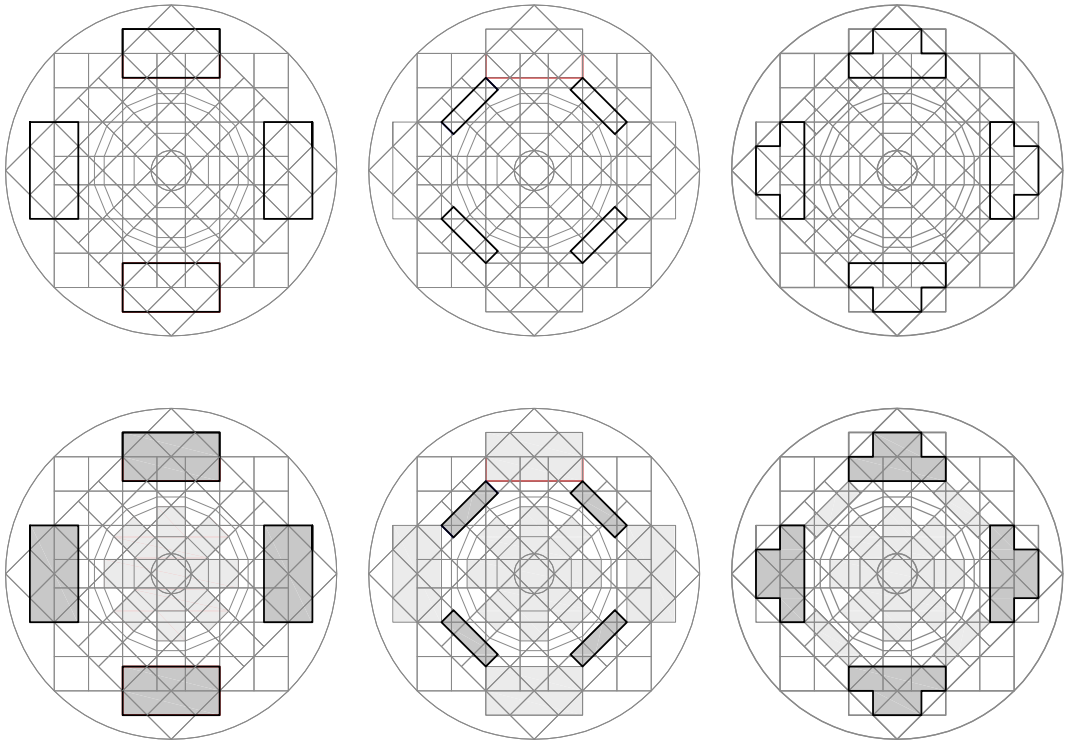
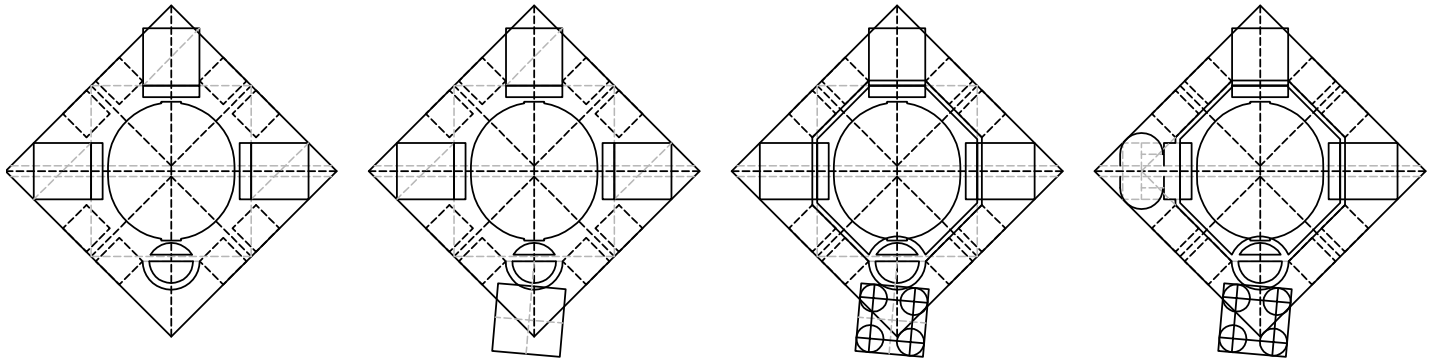
Floorplan of the Assembly Building, Dhaka







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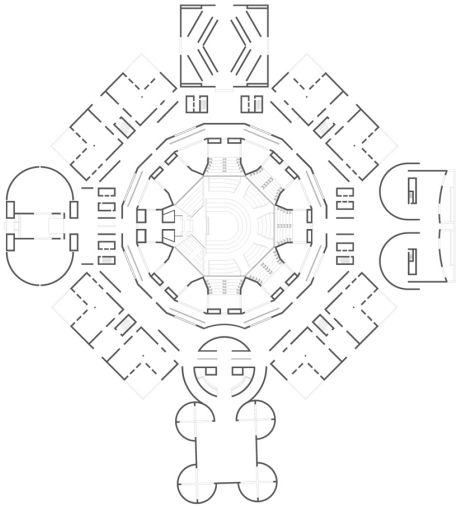
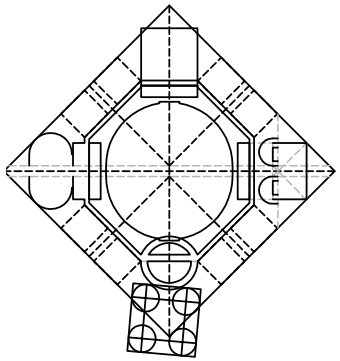
Floorplan of the Assembly Building, Dhaka





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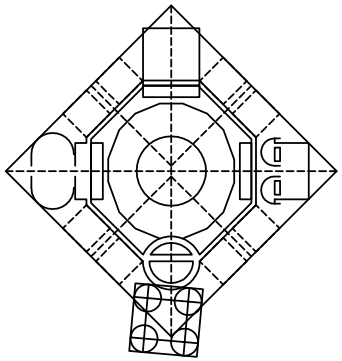

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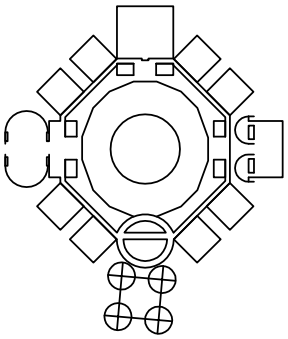

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Floorplan of the Assembly Building, Dhaka

Returning to the hypothesis:

measuring methods by the Byzantines

Hypothesis: The Assembly Building has been inspired by centralized churches – built during the Renaissance or the Byzantine era. Furthermore, Kahn applied the same measuring methods as the Byzantine masons did to build their designs.

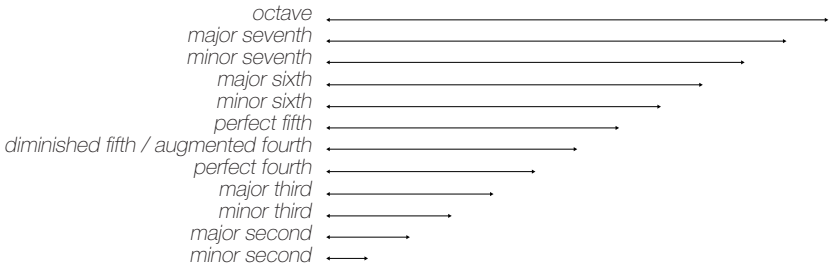
After analyzing the St. Vitale and comparing it to the Assembly Building, we can conclude that most of the Assembly Building is designed to be ‘easily’ measured and constructed with tools like ropes and sticks.

We also think that Kahn was inspired by the organisation of centralized churches in general, though most of these churches don’t have a seperation between the central space and the secondary functions. In the Assembly Building this seperation is made by the circulation space. This circulation space is a dominant element in the building, so this clearly differs from the centralized churches.

Villa Almerico Capra ‘La Rotonda’.

1571 AD, Vicenza, Italy

The Greek music scale



Additional proportions

Hypothesis: The use of proportions in the work of architects in the Renaissance – the rebirth of antiquity- is based on the way the ancient Greek and Romans proportioned their buildings and organised their spaces, adapted to the current era. Villa Rotonda by Palladio is one of these typical Renaissance villa’s in which the proportions and geometric shapes play a dominant role in the design of the spaces and the sequence of these spaces. This approach is also recognizable in Kahn’s Assembly Building.

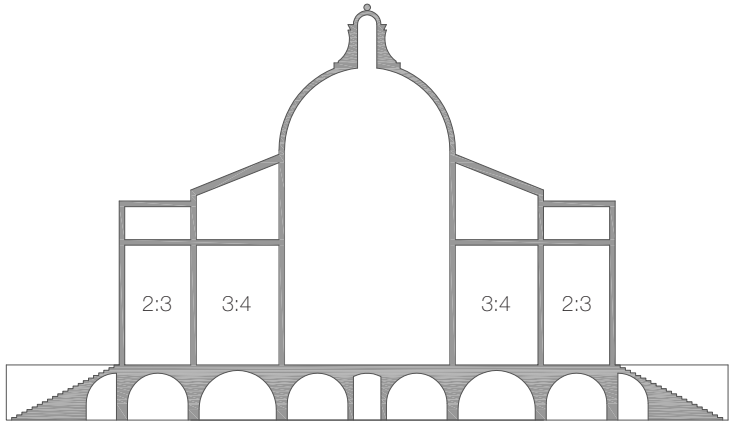
In his *Quattro Libri*, Palladio discusses the problem of harmonic proportions. In this book, he uses his own buildings as examples. The published illustrations weren’t only to show the layout of the building, but also to show the harmonic proportions. Palladio’s intentions were to demonstrate the general and universal proportions, which couldn’t be used in a building on its own. To understand these universal proportions, one has to look at Palladio’s complete work.

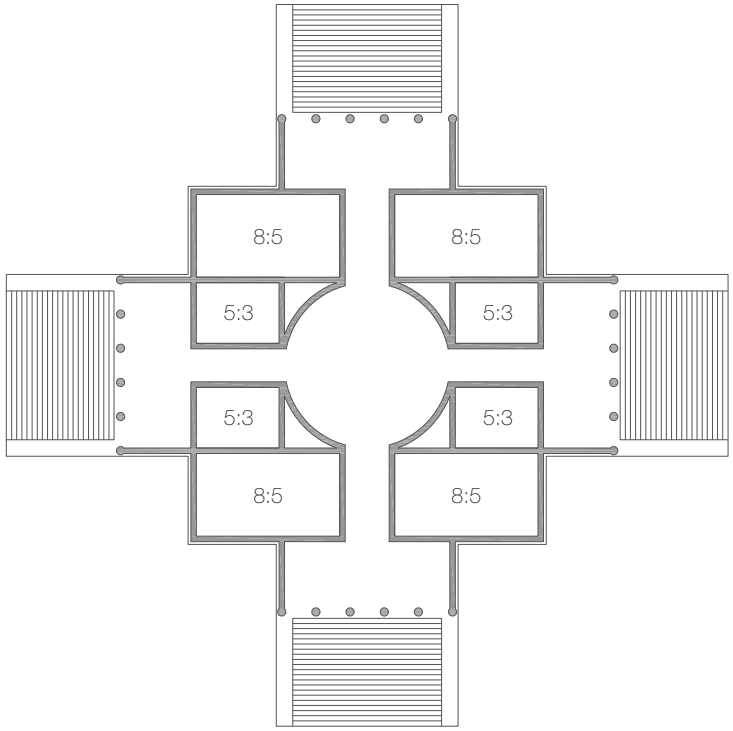
In his work, Palladio used seven different proportions for the different spaces. These were:

Villa Almerico Capra ‘La Rotonda’

- Circle
- Square (1:1)
- Diagonal of the square used as the length of the square (1:√2)
- A square and one third (3:4)
- A square and a half (2:3)
- A square and two third (3:5)
- Two squares (1:2)

The systematic connection of one space to the next by using harmonic





proportions formed the fundamental innovation of Palladio's architecture. He formulated his conception of residential building in the theorem:

'But the large spaces should be designed in such a relation to the medium and those to the small spaces (compartite) so that, as I've said before, the different parts of the building correspond to each other, in such a way that the whole possesses a certain harmony (convenienza) between the elements giving the building its grace and beauty.'

The proportions used by Palladio find their consonance in the Greek music scale. These proportions relied on discoveries made by Pythagoras. But this doesn't mean that those were the only proportions used by Palladio in designing his plans. With the development of music, proportions were invented which were unheard of before the 15th century. At the start of the 16th century, Palladio started using additional proportions:

- Minor third (6:5)
- Major third (5:4)
- Minor sixth (8:5)
- Major sixth (5:3)
- Minor decime (12:5)
- Major decime (5:2)
- (3:8)
- Minor sixth in higher octave (5:16)
- Major sixth in higher octave (3:10)

The arithmetic mean defines the proportion of the two (e.g. 6:5 and 5:4 in which 5 is the arithmetic mean of 6 and 4.)
'Wherever there is proportion, there is no room for the obsolete. And just

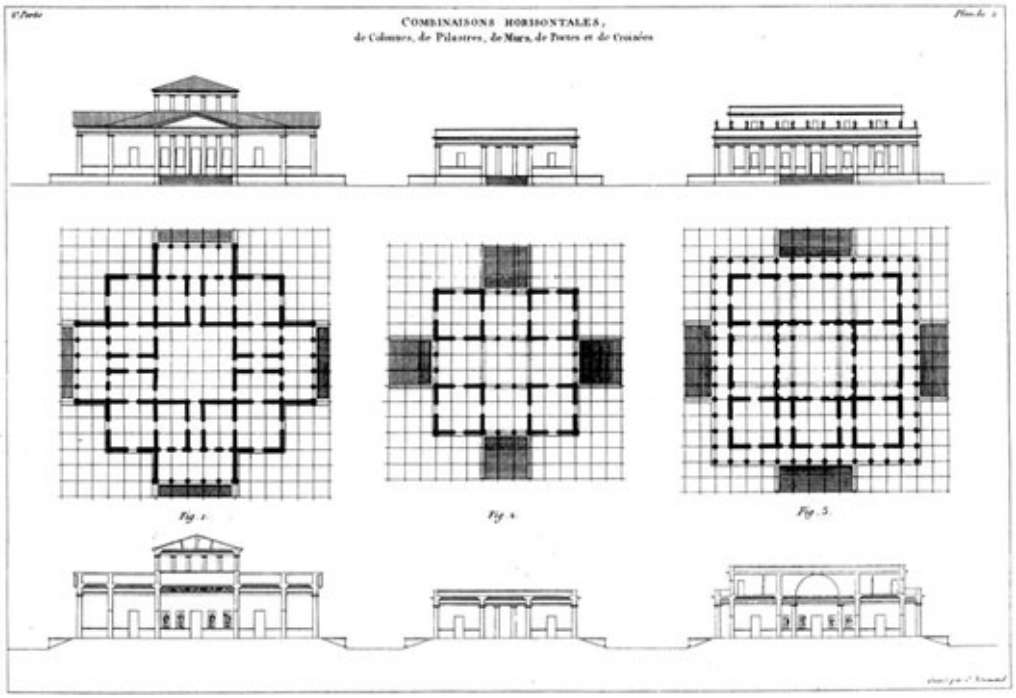
like the instinct of nature defines the natural proportions, the rules of art define the artificial proportions.
This leads to the conclusion that proportion is part of the shape instead of the matter, and where there are no parts, there can be no proportion.'

This quote, by Daniele Barbaro, touches the essence of the idea of proportion in the Renaissance. It goes back to the Aristotelian meaning of shape and matter in philosophy. Barbaro perceives it as a necessary condition for 'formed matter' to be made out of different parts which have a certain proportion to each other. Both Palladio as Barbaro were convinced that in proportions 'all secrets of art' were hidden.

Just like Palladio, Kahn used proportions to strive for beauty and perfection. This can be seen in the symmetrical layout and geometrical shapes in the façade.

Précis des lecons d'architecture.

Published in1802 AD, written by Durand



Précis de Lecons d'architecture

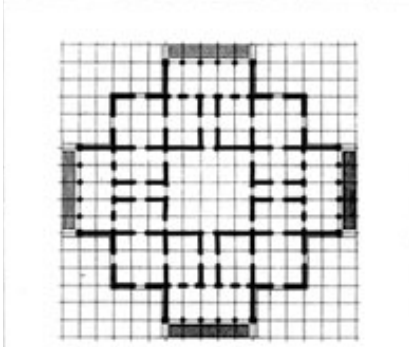
Hypothesis: Both Durand and Kahn used geometry to construct buildings in a more economical way.

Durand reduced architecture to construction and geometry. Architecture shouldn't be about pleasing people and looking for beauty by copying historical elements, but it should be functional.

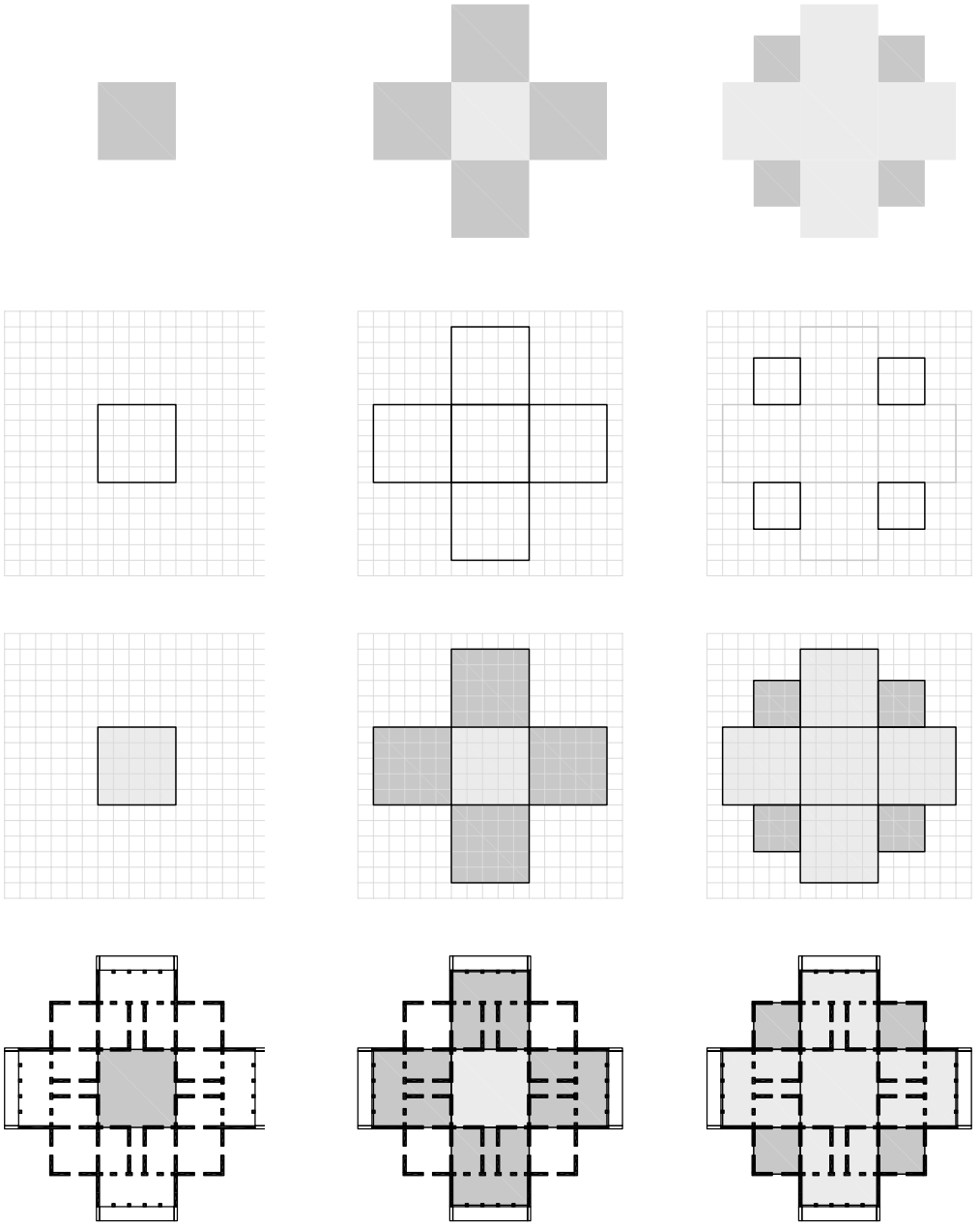
Focusing the practice of architecture on utilitarian and economic values, Durand assailed the rationale behind classical architectural training: beauty, proportionality, and symbolism. His formal systematization of plans, elevations, and sections transformed architectural design into a selective modular typology in which symmetry and simple geometrical forms prevailed.

We've analyzed one of the buildings from Durand's book *Precis de lecons d'architecture*.
In this particular example, we tried to find his logic by drawing grids, lines and room, and looked for the geometry and the proportions in his composition of spaces. This is only one many examples in his book. However, none of these examples have been build. This meant we could only look at Durand's drawings and compare those to the Assembly Building.

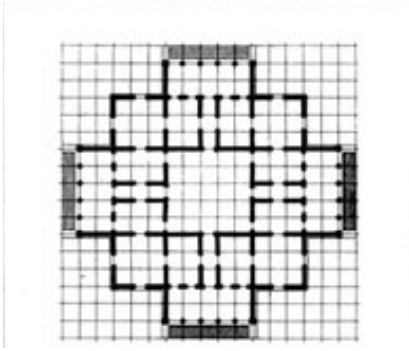
In the following diagrams, the top row shows the space created with each step. The second row shows the creation of the different rooms by applying Fibonacci's rule. The third row is a combination of the first and second row. The bottom row shows how each diagram is located in the plan.



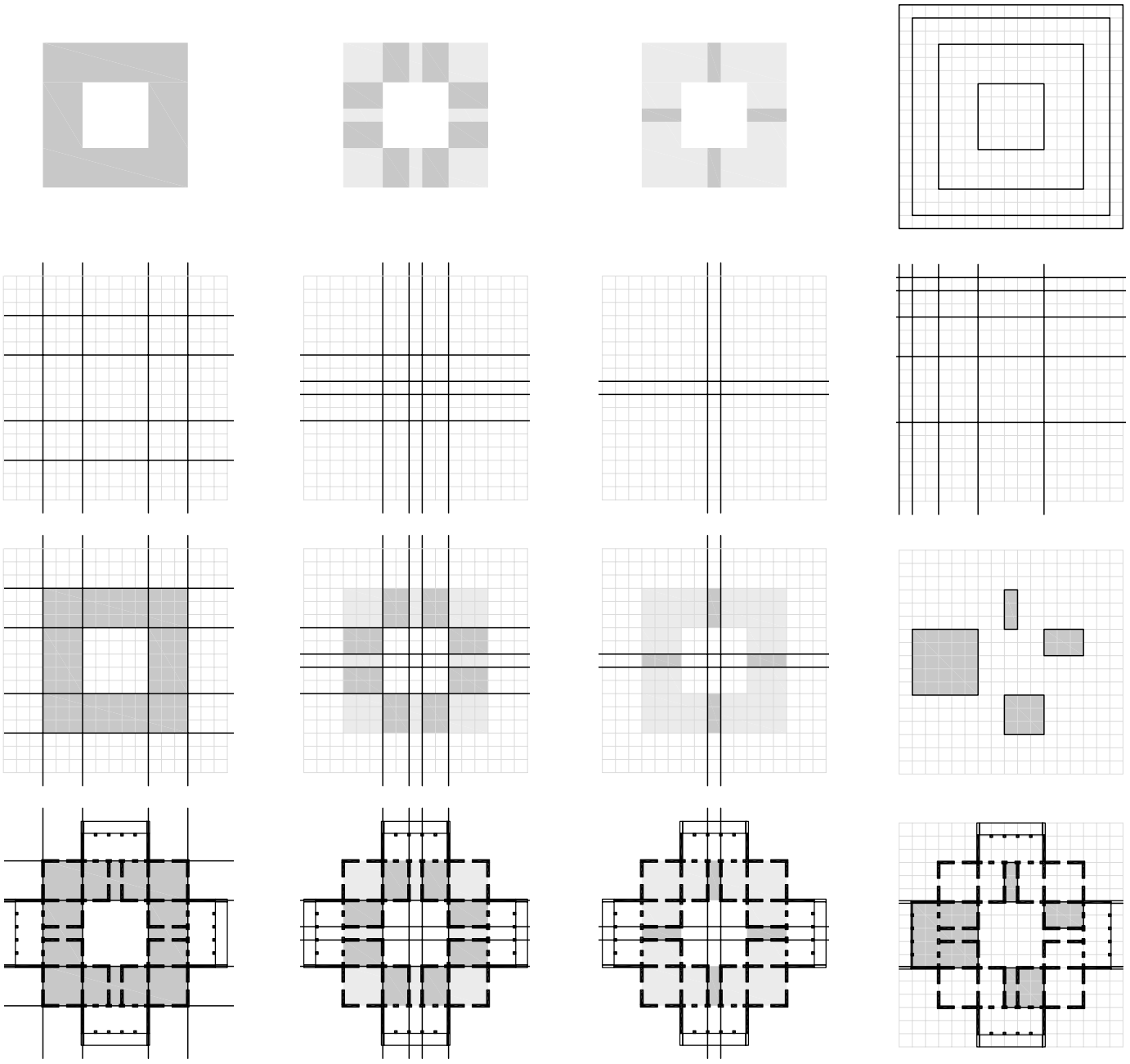
Original floorplan



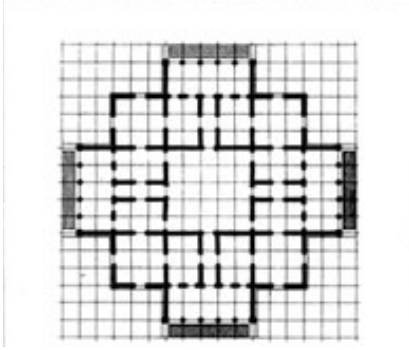
1. *2.* *3.*



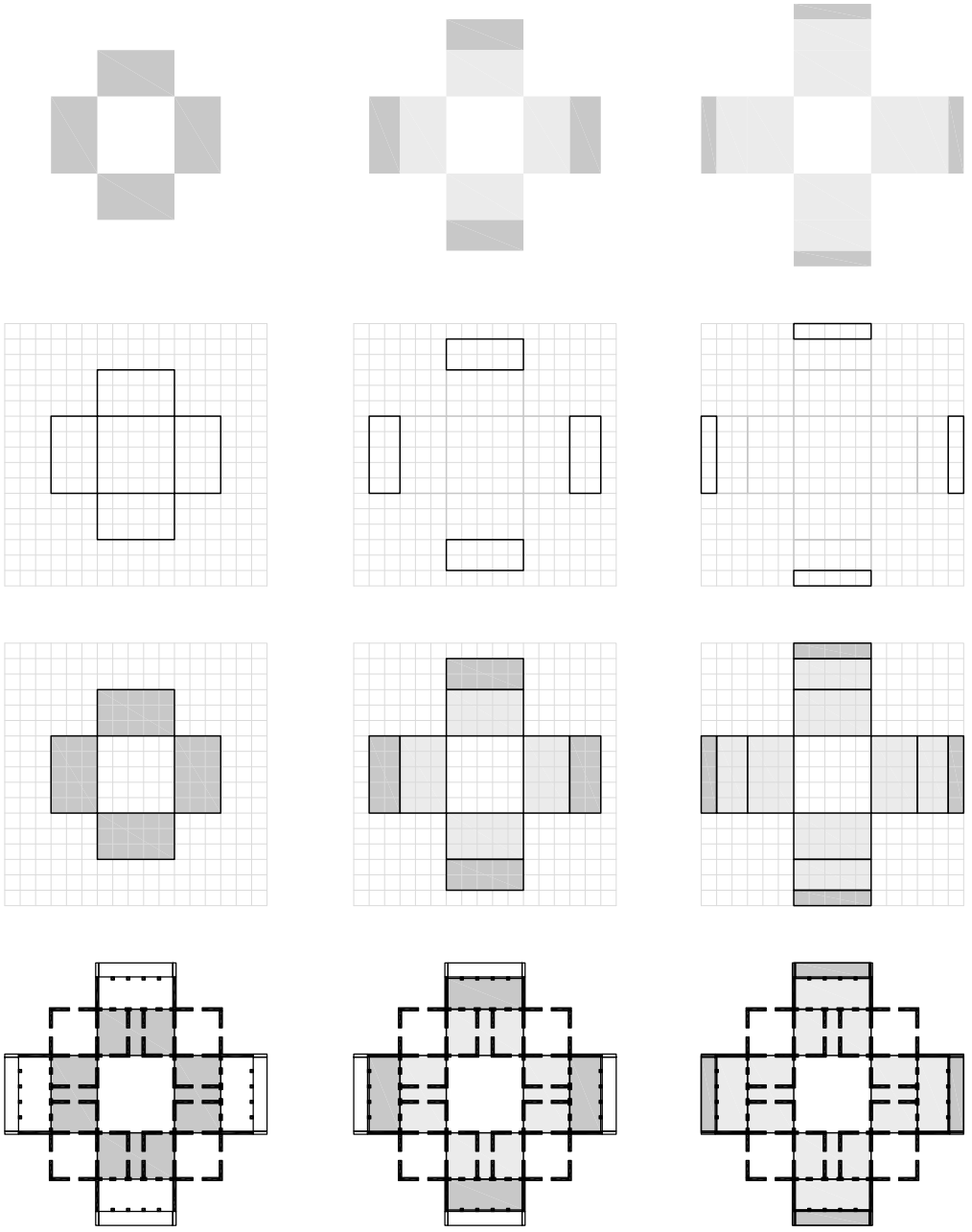
Original floorplan



1. *2.* *3.* *4.*



Original floorplan



1. *2.* *3.*

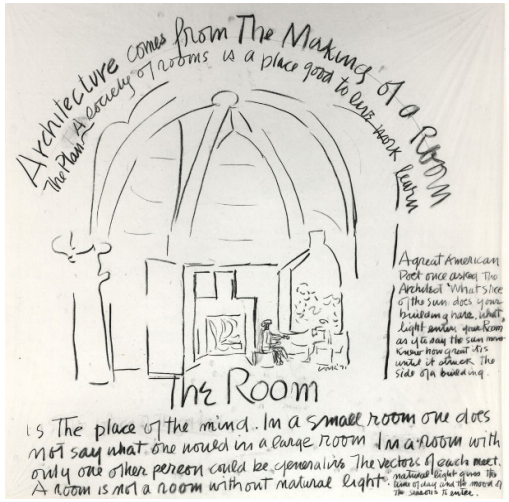
Chapter II.

Another way of attempting to understand the philosophy behind the Assembly Building, is by taking a look at Kahn's own work and development throughout his career. How did Kahn's own work change during his career?

During the mid-fifties, right after his travels through Greece, Italy and Egypt, Kahn undertook a new way of creating his architecture. He developed a signature style of building, relying on light and monumentality. Vincent Scully calls this period "the moment when the first monumental architects of the Mediterranean world broke through to him and set him on his way."

How did he connect the different functions in his designs? Are there any similarities and/or differences noticable in his design when looking at circulation and routing? In the Assembly Building, one of the greatest spatial qualities is the circulatory street. In what way did his earlier work influence the composition of functions in the Assembly Building and how did he come up with the use of this street in the Assembly Building? We can see some similarities with the circulation in Rochester Church, and will analyse this. Are there any other similarities to be discovered in his other work?

Kahn sought a historically rooted approach to modern architecture and organized his buildings with 'served' and 'servant' spaces, respectively primary and secondary spaces. The main themes in his interior spaces are connecting spaces, contemplative spaces and the human scale.

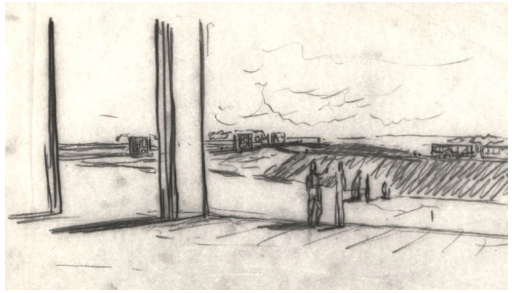


"Architecture comes from the making of a room"

Society of rooms

Louis Kahn rejected the modernist convention of an open floor plan. Instead, he developed an approach which was completely different from

from other progressive architects at the time. He adopted the idea that the room was the basis of architecture. Each room was to have a unique character, which could be recognized by all its inhabitants.



Perspective from Meeting House Veranda, Salk Institute for Biological Studies

Perspective of Reading Area with Study Carrels, Phillips Exeter Academy library

These purposeful spaces would encourage three kinds of activities; living, working and learning. He created a set of distinct rooms but he did not necessarily isolate their functions. By doing so he intended an arrangement of rooms that would encourage circulation between the rooms, fostering human interaction. Thus his spaces would instill a sense of community among their users, creating what he described as a "society of rooms."

"It is different when there is more than just another person. Then, in this little room, the singularity of each is so sensitive that the vectors do not resolve. The meeting becomes a performance instead of an event with everyone saying his lines, saying what has been said many times before." – Kahn, 1971

The room of the mind

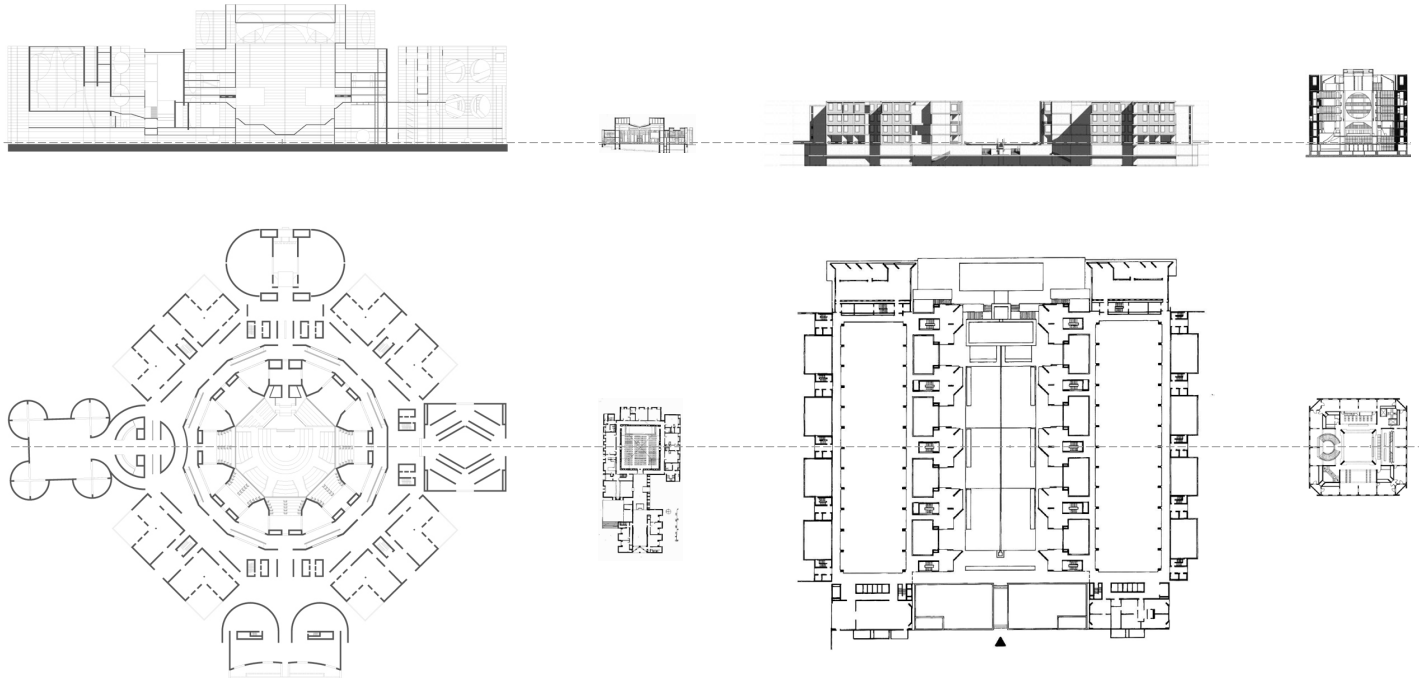
Louis Khan believed that the design developed naturally by looking back to the initial human desires, together with an understanding of the function. It was the mind of the architect which translated the ideal of the room into physical form.

The room of the mind encourages thought and reflection. Kahn accommodated the realm of the intellect—learning, commemoration, and appreciation—in his designs.

"The room is the beginning of architecture. It is the place of the mind. You in the room with its dimensions, its structure, its light respond to its character, its spiritual aura, recognizing that whatever the human proposes and makes becomes a life." – Kahn, 1971 (6)

Louis Kahn believed that light was an architectural element on par with every other element of a structure.

“Every space must have natural light, because it is impossible to read the configurations of a space or shape by having only one or two ways of lighting it. Natural light enters the space released by the choice of construction.” – Kahn, 1961 (7)



Assembly Building Dhaka, First Unitarian Church, Salk Institute for Biological Studies, Philips Exeter Academy Library

1:2000 on scale comparison

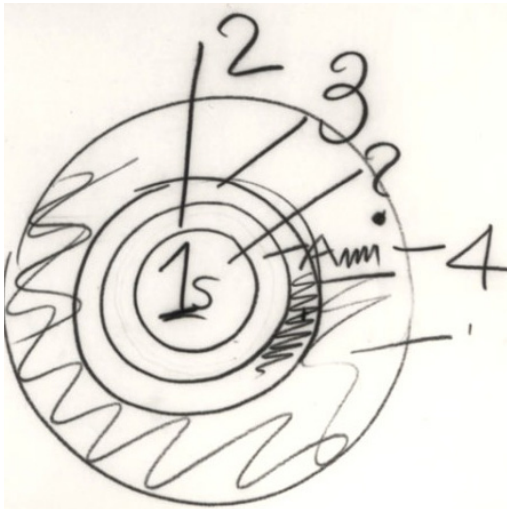
First Unitarian Church.

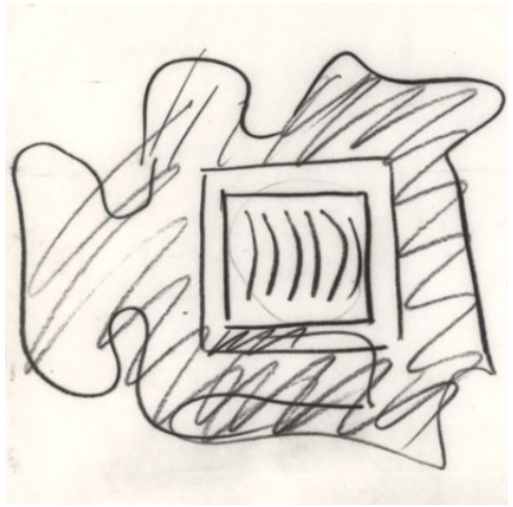
1959-1962, Rochester, NY, USA

First Unitarian Church

Hypothesis: Kahn re-used the playfulness and dramatic effects of light and shadows which can be seen in the First Unitarian Church, in the Assembly Building in Dhaka. Furthermore, the centralized design and organization of spaces in the First Unitarian Church is based on centralized churches.

The First Unitarian Church is located in Rochester, New York. It was designed from 1959 to 1961 and completed by the end of 1962. The actual church is designed as a core room in the building, surrounded by additional functions including offices, community rooms and a kindergarten. The building doesn't use a grid to determine the size of the rooms. Instead, rooms are more differentiated, using the symmetry of component parts. Their axes correspond with the axes of the core room. Those additional functions are located around the core room, linked together by a surrounding corridor.
Light is used as a shaping medium, creating volumes through the penetrating effect of shadow and giving a new value to the periphery of the building. Its external appearance is a moving and massing continuum, conveying an impression of strength and permanence, but more particularly of introversion and concentration on the center.
Light and shade lead to the form of the building, thus form invokes function. Kahn speaks of a wish to express and not of the program.

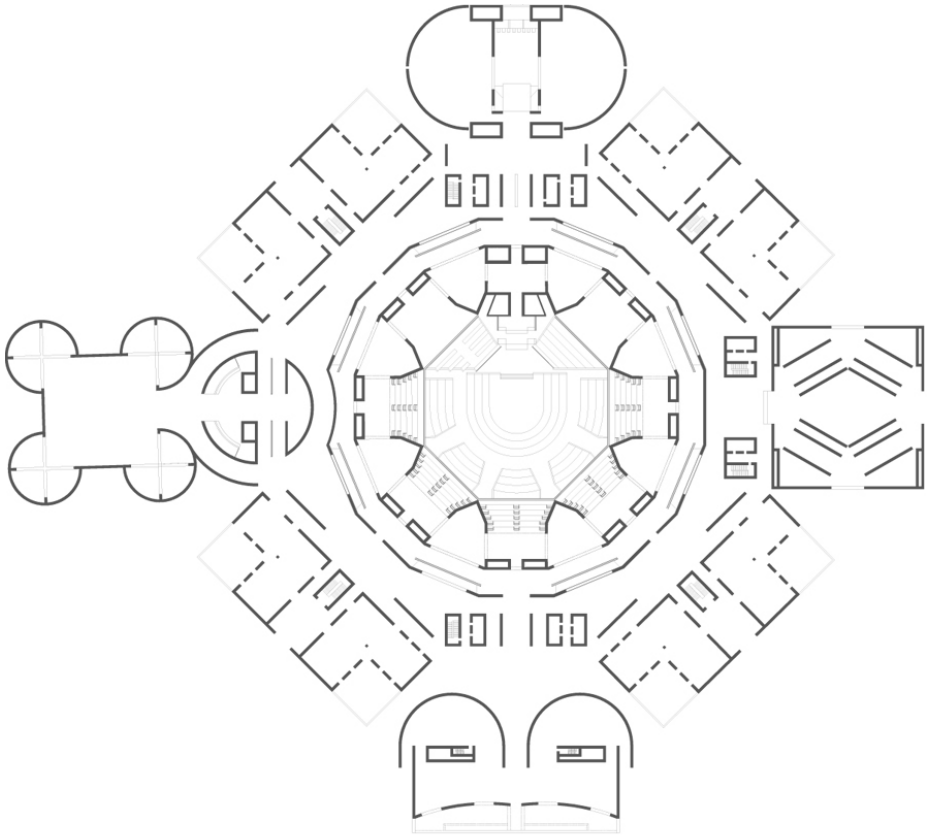


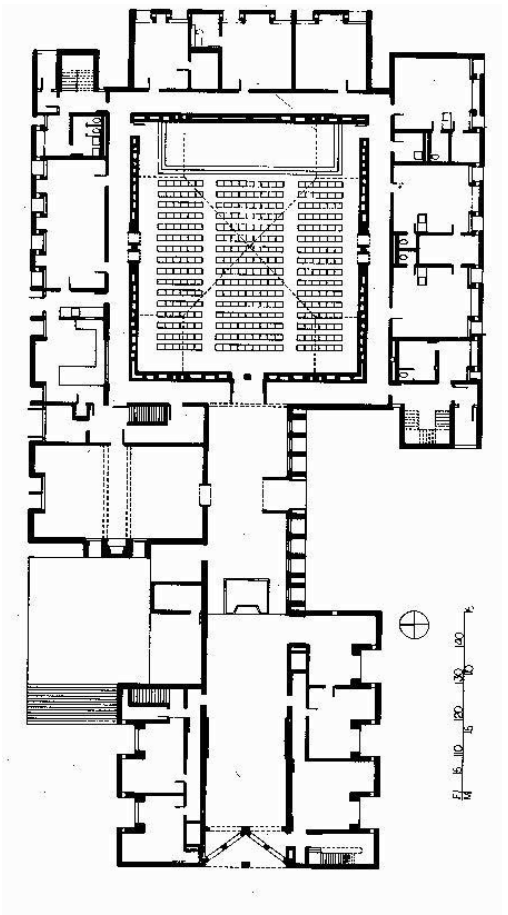


Explanatory Diagram of Relationship of Spaces, First Unitarian Church

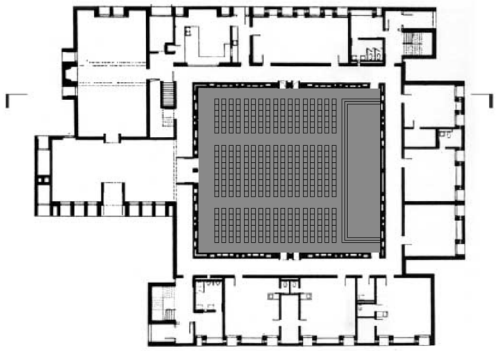
The roof is kept low, in contrast with customary churches, so that man is not made small in relation to God. The location of façade openings gives the interior a subdued light similar to shaded sunlight.

Everything seems to form an integrated whole, creating a monolithic building sculpture. There is a clear hierarchy in the relationship of 'servant' peripheral sections and the 'served' dominant center.

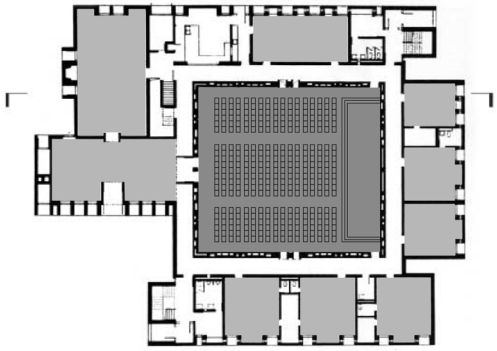




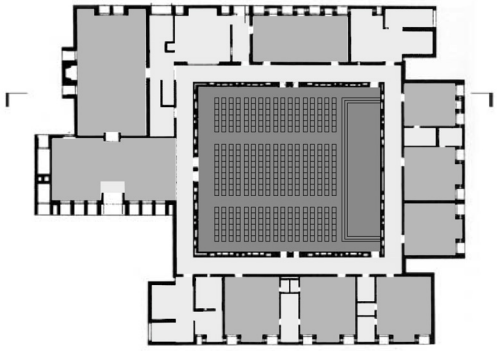
Assembly Building Dhaka, Salk Institute for Biological Studies



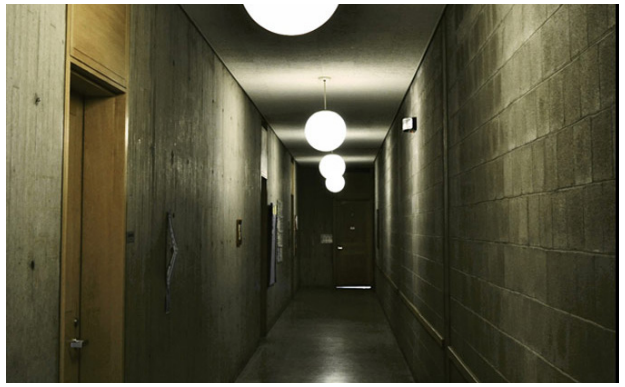
served space



servant spaces



servant spaces



Looking back at the hypothesis:

Kahn re-used the playfulness and dramatic effects of light and shadows which can be seen in the First Unitarian Church, in the Assembly Building in Dhaka. Furthermore, the centralized design and organization of spaces in the First Unitarian Church is based on centralized churches.

The use of light as a shaping medium can also be seen in the Assembly Building. Here, Kahn uses light to emphasize the double façade. In the First Unitarian Church as well as the Assembly Building, the central space receives its natural light indirectly from above. By doing so, the spiritual ambiance of these central spaces is strengthened.

When comparing the First Unitarian Church with the Church of St. Vitale in the previous chapter, remarkable similarities can be seen. The basic layout of the plan is almost identical. The prayer space is located in the centre while the other spaces (e.g. chapels and rooms) are located around this central space. The Assembly Building in Dhaka has a clear street, seperating the served space from the serving spaces. This seperation is less clear in the First Unitarian Church. There is a seperation, but it is less explicitly presented.

Salk Institute for Biological Studies.

1959-1967, La Jolla, San Diego, CA, USA

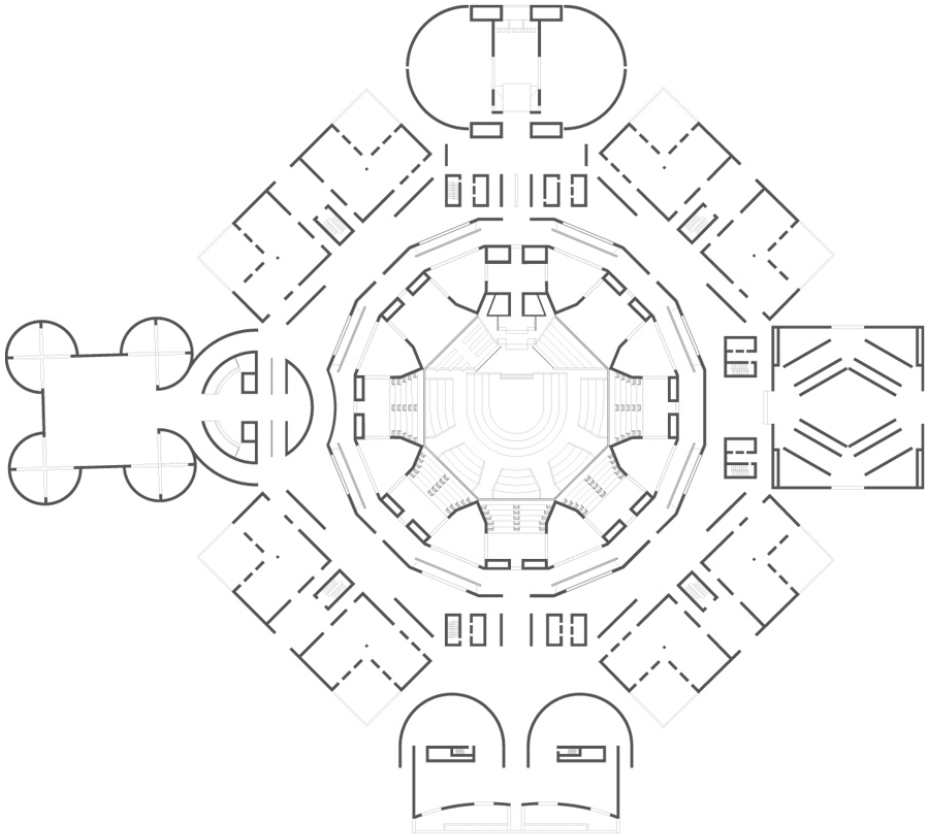
Salk Institute for Biological Studies

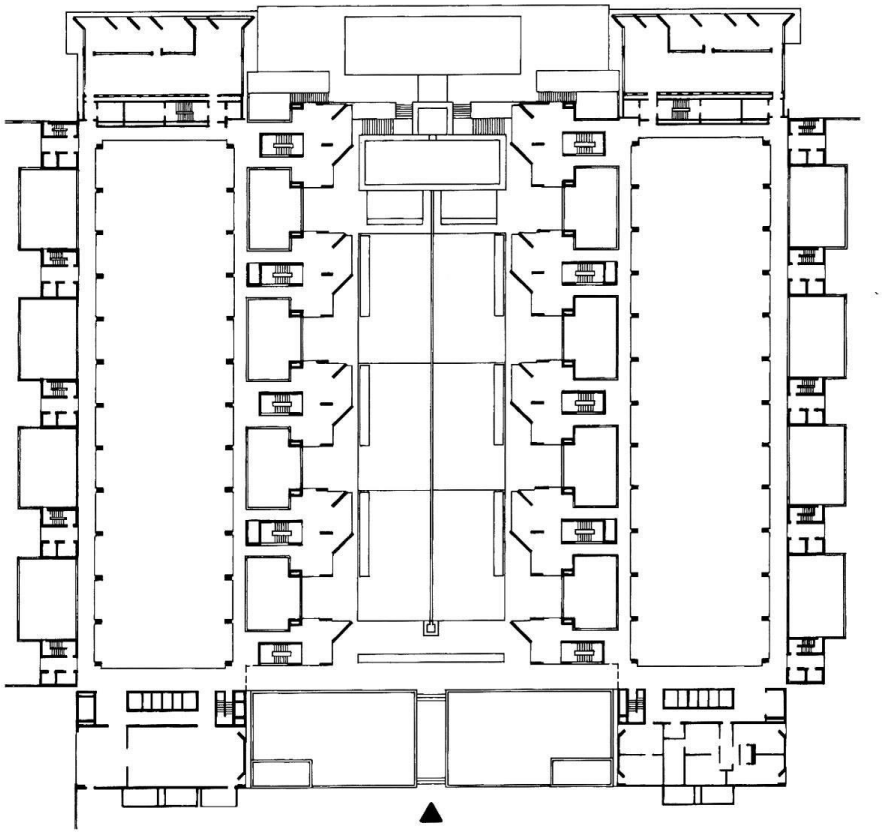
Hypothesis: Kahn used the circulation space as a ‘street’. There are no more narrow corridors and every space functions as room. These aspects can also be seen in Dhaka.

The final plan for the Salk Institute arranges two similar laboratory wings symmetrically, creating a courtyard in between. The courtyard is flanked by separate rooms for researchers, so-called ‘thinking-cells’. Each of those cells is linked to the main laboratory wing by stairs and bridges. Both wings have three support-free floors with structural floors between them.

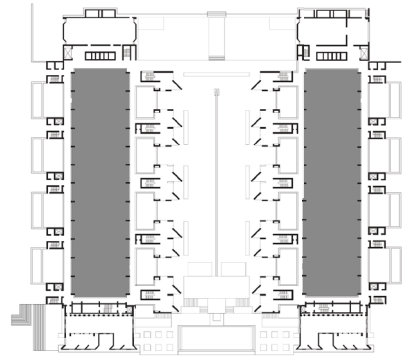
Just like his design of the Unitarian Church, Kahn uses the motif of the center for the Salk Institute. Because of the emphasis laid on its axis, the courtyard becomes the center of the building. It seems like the ‘servant’ buildings, the study rooms for the scientists, are dominant. This is contradictory to his design for the Unitarian Church. Kahn no longer holds on to the strict concept that ‘served’ elements should dominate ‘servant’ elements.

The circulation space is located around the laboratory wings, forming a street. Because of the use of columns instead of walls, there is a clear connection between the street and the central space. It gives the users a chance to interact with eachother, even though they aren’t in the street itself. This can also be seen in the Assembly Building. It provides clear views to the upper floors so people can interact with each other.

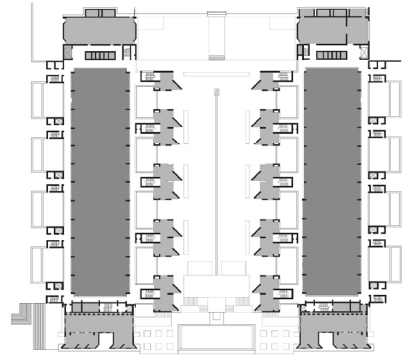




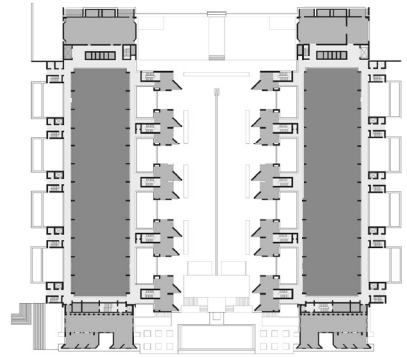
Assembly Building Dhaka, Salk Institute for Biological Studies



served space



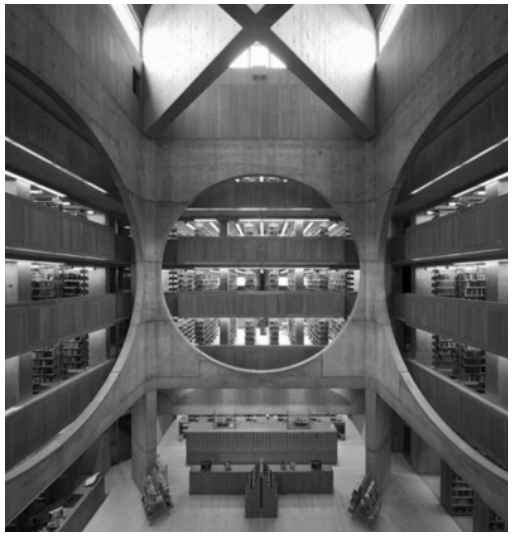
servant spaces



servant spaces

Phillips Exeter Academy Library.

1965-1971, Exeter, NH, USA



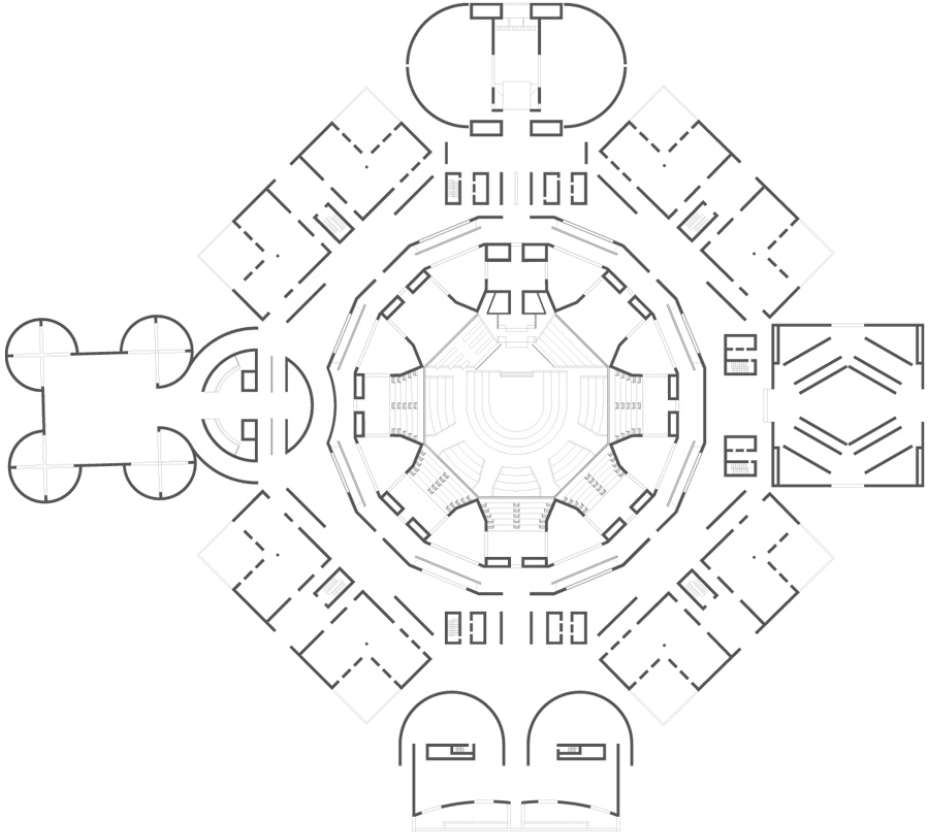
Philips Exeter Academy Library

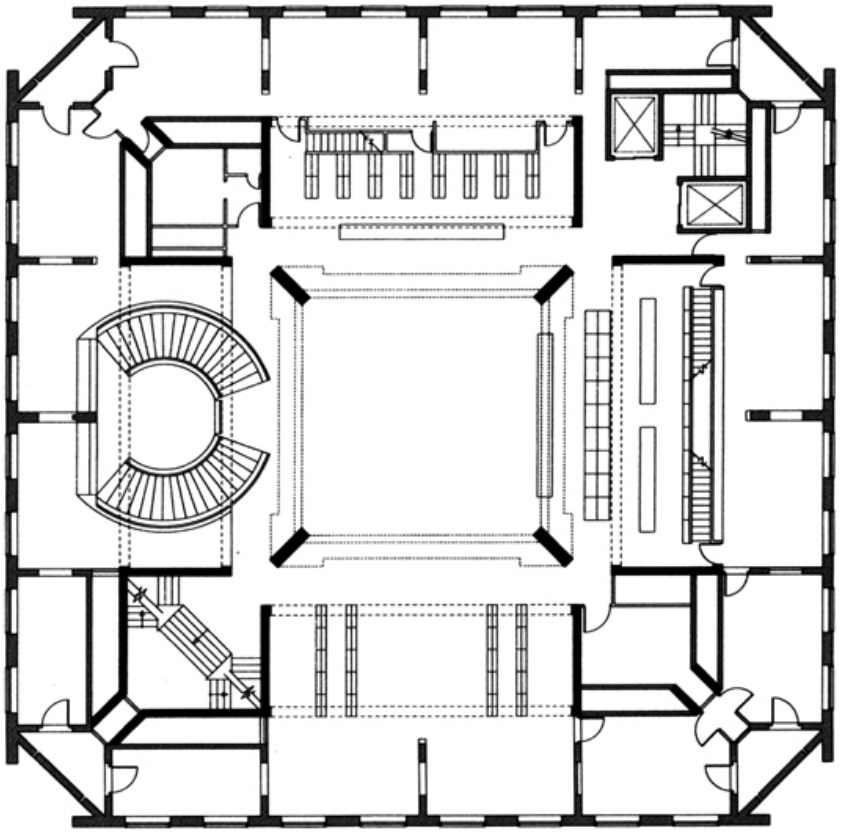
Hypothesis: the Exeter Library has the biggest resemblance to Dhaka. It is a centralized design and Kahn applies a game of light and shadow coming in from the ceiling.

The library is part of the Phillips Exeter Academy. The final design by Kahn was finished in 1969, the construction of the building ended in 1971. The only relation of the building with the surrounding neo-classical buildings is its exterior material. The windows were made out of wooden panels, fitted into the masonry openings. The interior is dominated by the use of smooth concrete. From the outside it seems like the building has five floors, while it actually has eight floors. These additional floors are set back from the façade, so they aren't visible from the outside.

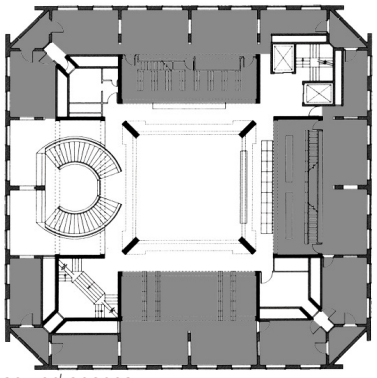
The ground plan shows a circular arrangement of functions. In the center is the hall area, getting natural light from above. Books are stored around this central hall on open shelves. Stairs, shafts and electrical equipment are located on the corners of this 'book-zone'. The outer ring contains the students' reading zone. The ground floor is set back, creating an arcade which functions as a transition zone between outside and inside. To enter the main hall, visitors have to go up to the first floor, symbolizing the ascend into the 'Olympus of Knowledge'.

The Assembly Building has a simillar layout as the Phillips Exeter Academy Library. The assembly room gets natural light from above. The 'book-zone' can be seen as the 'street' in the Assembly Building. Both contain stairs, shafts and electrical equipment. The offices form the outer layer of the building, just like the students' reading zone in the library.

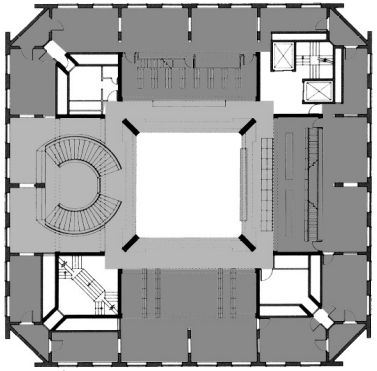




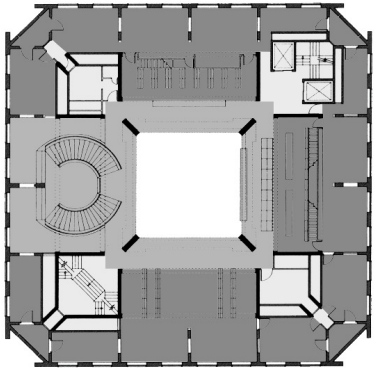
Assembly Building Dhaka, Salk Institute for Biological Studies



served spaces



servant spaces



servant spaces

Chapter III.

During the 20th century, the decolonisation of most countries in Asia took place and changed entire societies. This meant that the people were in need of an own government and the appurtenant parliament buildings and complexes. This was the case in for instance Sri Lanka, India and of course Bangladesh.

Le Corbusier's design for the Capitol of Chandigarh and its surroundings in India seems to be a comparable project. How is the design of the complex connected to Kahn's ideas during the design process for the Dhaka Parliament complex? What are the differences and similarities between these two designs for the new Capitol Complexes; in composition of the buildings in the plan, the design of the buildings and the landscape? What about the use of geometry, climatic concepts, the combination of modern architecture with traditional building, the way of joining Eastern and Western culture and how to find a way to represent the newly independent countries architecturally.

After the decolonisation of the Far East in the mid-20th century, a complete transition of the structure and consistency of societies took place. Except for the misery this shift in society created, it also gave hope and optimism. Finally, people got their independency and their own governments.

This also meant that these new governments needed a new citadel. In Chandigarh, a new capital for the province of Punjab in India arose, mainly designed by Le Corbusier. The capitol complex was part of this new city and functioned as a symbol for the new optimism in Punjab.

Roughly ten years later, Louis Kahn was selected to work on a design for the citadel in the new capital of East Pakistan - or later Bangladesh - Dhaka.

These plans seem to have some striking similarities; they are both spacious designs with attention for the symbolic meaning of the landscape, placement of the different buildings at the complex and their – both symbolic and literal - relation to one another. Both designs are based on climatic concepts, are a well-balanced combination of Modernism and traditional building and of Eastern and Western culture. Both use pavement and ponds to structure the complex.

Kahn visited Chandigarh when he was already selected to work on a design for the Capitol Complex in Dhaka. There are no sources that explicitly mention Kahn being inspired by le Corbusier's plan for the capitol complex in Chandigarh. Both architects faced the same problems during these projects. What was their approach? In what way are these designs similar and what issues did they treat completely different? What inspired both architects?

Hypothesis: Le Corbusier and Kahn worked on more or less similar projects in a comparable political situation and geographical context. The architects have other backgrounds and work differently (Le Corbusier in a more sculptural way, Kahn has a more geometric approach), but came up with designs for the complexes and the parliaments that have striking similarities.

Both architects belong to the Modern Movement. The work of both of them turned out to be transcending their period.

Both Parliament buildings are rich in institutional and symbolic meanings, both possess an archaic character, and both stem from a stage in modern architecture which had long since rejected a wholly mechanistic utopia.

Both of the Capitol Complexes are works of maturity resting on clearly formulated architectural principles and languages, and both are steeped in Eastern and Western monumental traditions.

Because Le Corbusier's Capitol Complex in Chandigarh is a 'new' theme introduced in this chapter, we will start with an extensive background description of the city and the several plans that have been made for the city and the Capitol Complex.

By discussing both Le Corbusier's and Kahn's plans for the Capitol Complexes and Parliament Buildings later on in this chapter, the approaches of both architects, the way of handling eastern and western culture, climate and tradition and modernism; the similarities and differences will be shown.

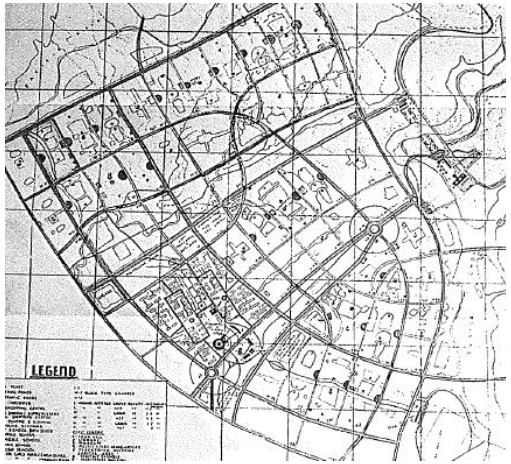
Background Chandigarh.

In 1947 India and Pakistan became independent states and this resulted in a border that dissected the province of Punjab. The old capital, Lahore, became part of Pakistan. In the adjacent province of Kashmir this division, and religious conflict, lead to an extremely bloody war that took the life of half a million people.

New Capital

Punjab needed a new capital, purely as a 'place of identification'. After becoming independent of the British Empire, the bloody civil war in Kashmir and the death of Mahatma Ghandi, India needed optimism.

A suitable area was found close to the main road connecting New Dehli to Simla, on a plain that merges the promontory of the Himalayas, in between two rivers. Without having to deal with existing buildings, a new city that showed the optimism of the establishing nation could be built here. It would be named after Chandi, a Hindu God.
Pandit Jawaharlal Nehru, Independent India's first Prime Minister, laid down the founding principles of the new city when he said: *"Let this be a new town, symbolic of freedom of India unfettered by the traditions of the past….. an expressions of the nation's faith in the future"*

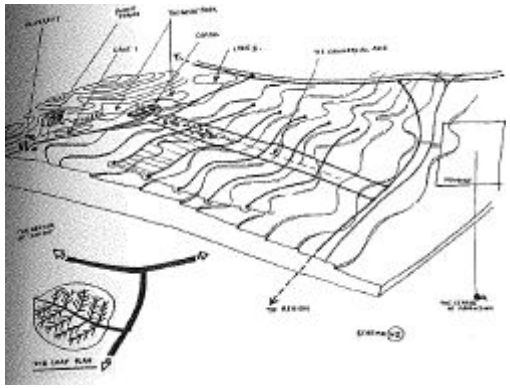


Mayer's plan, 1950

Mayer's master plan

Albert Mayer, an American architect that was already experienced with building in India, was commissioned to make a design for the city which had to inhabit 150.000 people and should be able to extend to a city that could inhabit half a million people.
In 1950, Mayer designed a master plan with curved streets that intersect and create sectors. He used the Radburn superblocks as an inspiration for the housing sectors, with the housing at the outside of the sector leaving space in the middle for parking, gardens and playgrounds.

This resulted in an extremely low density of buildings; as a quite radical alternative for the high density in traditional Indian cities, Mayer's master plan was a, maybe naïve, interpretation of new democratic urban design and lead to an over dimensioned Garden city. This design neither fitted with the design of a capital, nor with the symbolic function of this new city.



Nowicki's sketch

Maciej (Matthew) Nowicki

A talented young architect working in Albert Mayer's office, Matthew Nowicki, that used to work at Le Corbusier's office before, came up with a new interpretation: 'the leaf'. This contained a large main axis; facing the Capitol in the north east (the same place as in Mayer's plan), with all the commercial functions on this 'vain'.

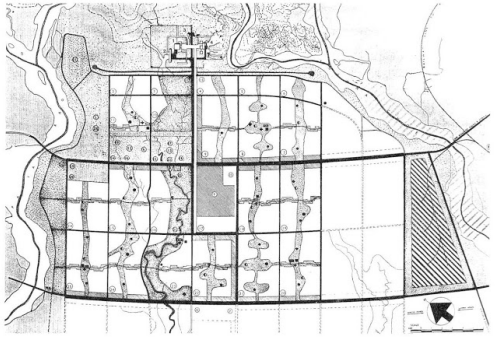
Nowicki placed the city centre closer to the Capitol, so the higher buildings would stand out better. The university was also placed a bit closer to the centre and the Capitol.

On an architectural scale, Nowicki proposed a plan for the Capitol Complex; monumental buildings like the Parliament, Secretary and Highest Court in an open area.

He designed differentiated architecture for the housing, inspired by traditional Indian architecture, visible in the facades, but without denying the modern age. The shops are also modern versions of the traditional Indian bazars, placed in the centre of the sectors.

Nowicki's design was never finished, since he died in a plane accident in 1950. Varma and Thapar, the co-workers of first Mayer and later Nowicki, now had to go looking for a new chief architect.

Le Corbusier.



Drawing of Chandigarh, le Corbusier

Le Corbusier's urban plan

A delegation was sent to Europe to find two new architects to work on the new capital of Punjab. They first visited Le Corbusier, who declared that his office was completely suited for the job. After visiting other countries, they returned to Paris to hire Le Corbusier. Three other architects were chosen as well; Maxwell Fry and Jane Drew, who were experienced with working in tropical environments, and Pierre Jeanneret. These three architects would be in India all the time and Le Corbusier would come and visit 2 months a year.
Mayer was also in the team again, but during the design process, Le Corbusier slowly pushed him aside.

Le Corbusier was experienced with and extremely interested in large urban designs and was working on monumentality as a theme in architecture for years. For instance, his church in Ronchamps emphasizes his dedication for free sculptural forms. In Chandigarh Le Corbusier would have all the freedom to experiment with these two aspects.

At the first design meeting in India, Mayer's plan is maintained, but Le Corbusier's ville radieuse is now mixed in. Le Corbusier speaks triumphantly of 'a new beginning'.

An orthogonal street grid creates sectors of 800 by 1200 metres, a bit bigger than Mayer's 500 by 800 metres. 800 metres by 1200 metres can – according to the various population densities set down in the program - be a container of 5000, 10.000, 15.000 or 20.000 inhabitants.

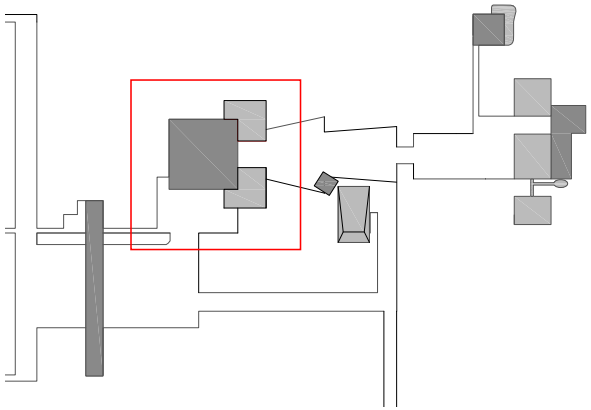
The Capitol remains at the north-eastern part of the city. Strips of green cross the city from the northwest to the southeast. One of Le Corbusier's favourite themes was the traffic planning; he made a hierarchic system of streets, of seven V's (voie, French for route) from larger regional streets to the green zones; and added a V8 later, for bicycle tracks. The central and most representative street is the Jan Marg (street of the people) and connects the city centre to the Capitol Complex. It's a V2 type of road, 100 metres wide, inspired by the Champs Elysées.

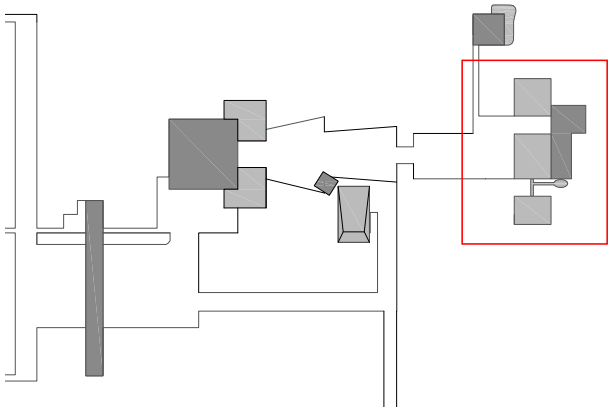
All sectors have the same size, only the density differs, depending on the social status of the inhabitants. It is a modern version of the traditional Indian cities, with quality of housing classified by caste. Le Corbusier's comment to this criticism: every house is designed with the same love and care, no matter what class.

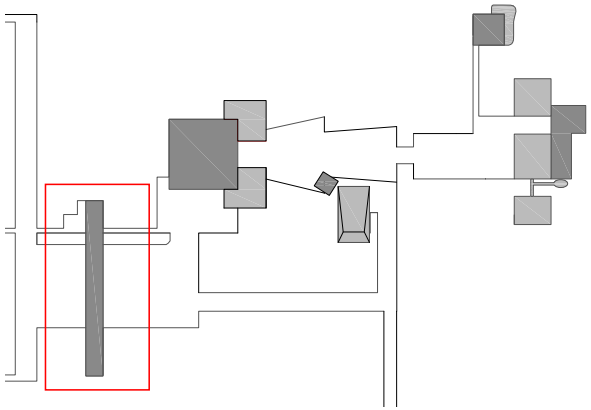
All housing was designed by his colleagues, so Le Corbusier could focus on the Capitol Complex. Just like Mayer and Nowicki already designed, this would become an open space with freestanding monumental buildings, to create spatial tension between them.

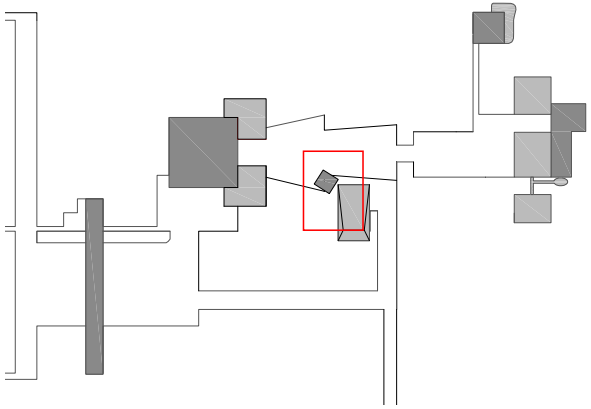
Like his British predecessor Lutyens in New Delhi, Le Corbusier sought a synthesis of Eastern and Western values in his designs for the monuments, but where Lutyens had had the job of anchoring the rule and splendour of the British presence, Le Corbusier had the complex task of expressing the traditions and the capacity for innovation of a newly independent India.

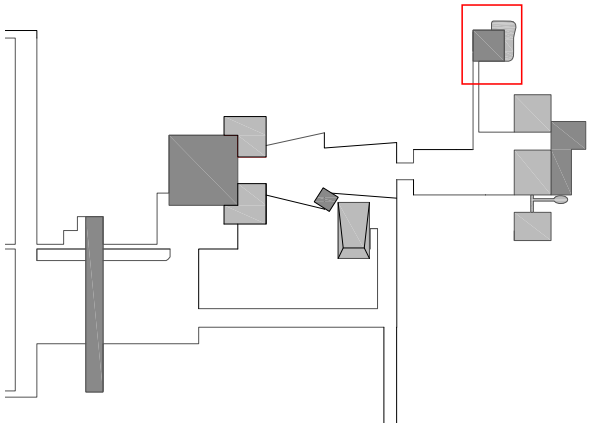
Impressions of the Capitol Complex.

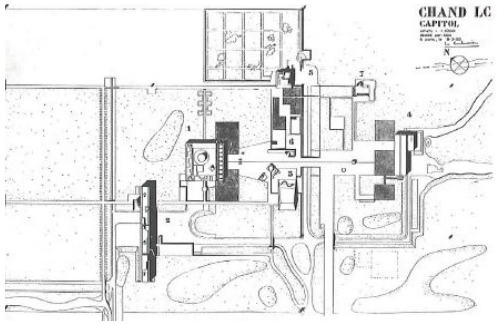












Drawing for Capital Complex, le Corbusier, 1956

The plan for the Capitol Complex

Le Corbusier's Parliament building stands among the other monuments of the Chandigarh Capitol, and contributes to the actual and figurative 'head' of the city. The building takes the central spot and the main road, the Jan Marg, ends in front of the big esplanade that connects the Parliament to the High Court. Within the acropolis complex itself it is the visual and symbolic counterpart of the Justice building opposite, whereas the Secretariat is subsidiary and to one side.

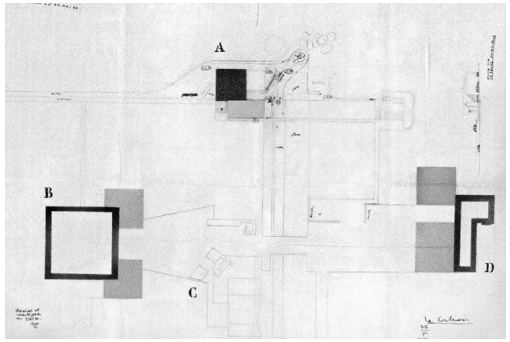
The intended crowning element, the Governor's Palace, was planned further to the north, surrounded by water and looking at the Open Hand Monument. Le Corbusier designed it as a small building, but of quite an importance for the capitol complex. It was supposed to be, like mentioned above, the 'crown' of the 'head' - the Capitol Complex - and the transition from the city to the surrounding nature. But the expressive design was found unfitting for a democratic governor, so the governor had to settle for less: a house just like the ones for the ministers, so the Governor's Palace was never built.
This Palace was later replaced in the plan by the Museum of Knowledge.

Behind the Parliament building, the Secretariat was placed. This building contained all ministries.

The placement of these buildings had symbolic, traditional and not in the least formal reasons. The placement of the Parliament building and the Palace of Justice across each other symbolizes the equality of the legislature and judiciary. It's also traditional, because the geometric ordering and the little shifts of the axis in the plan, together with the use of ponds which remind of the old palaces and gardens of the Moghul Empire.

Le Corbusier wanted to create a certain urbanity by placing these four great urban monuments – the parliament, the palace of justice, the secretariat and the governor's palace (never built) - on the capitol complex.

These buildings are not connected by structured streets, but only connected by a labyrinth-like system of squares, wide streets, green zones and ponds. His composition with shifting axes and interruptions in the connecting streets, do not function as binding elements, but more as separating elements. This is to emphasize the 'individual' pieces of architecture: the only thing that connects them is the fact that they are all in their own way very characteristic.



Esplanade

Le Corbusier also used climatic guidelines for the placement of the buildings at the complex. Freely quoting le Corbusier from his book about these guidelines:

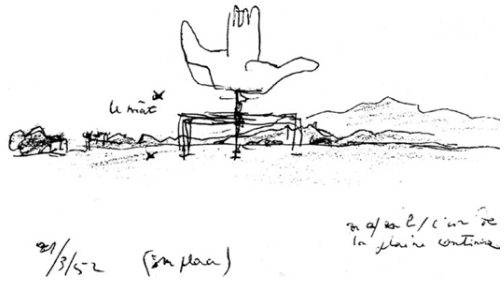
"The placement of the buildings in Chandigarh is partly decided by climatic circumstances. The Palaces of the High Court of Chandigarh and of the Secretariat (group of Seven Ministries) obey, first of all, the climatic conditions; they are placed crosswise to the prevailing winter winds and the prevailing summer winds which come from the opposite side. On the sunny side, the office windows are shaded 'brises-soleil'."

The buildings

The first building actually being built at the Capitol Complex was the Palace of Justice, in 1952. Two years later was the start of the construction of the secretariat. Le Corbusier used his modulor system – a way of proportioning he invented - and his experiences with the 'rue intérieure' in France for the latter one. Whilst constructing these two buildings, le Corbusier kept working on the design for the central and most complicated building at the complex: the parliament building. He wanted to combine the western world and the Indian tradition in this most meaningful and central building. The planned governor's palace was, as explained before, replaced by a museum in Le Corbusier's plan, but also this museum was never built.

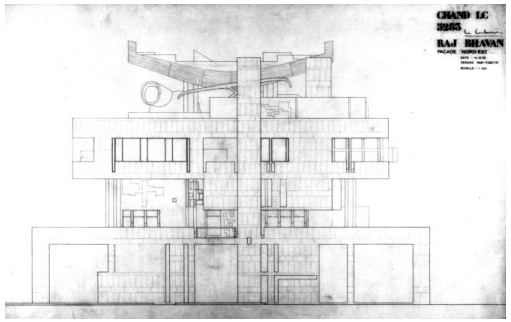
Le Corbusier designed a lot of monuments to place on the 360 metres long esplanade between the Parliament building and the Palace of Justice. Only the monument of the open hand and the Martyr were realised, since the other monuments were more or less the result of a passionate – and a bit obsessive - design process of Le Corbusier.

"The idea of the open hand arose in 1951; it was to face the chain of the Himalayas, standing at the head of the new Capitol."
- Le Corbusier in Modulor II



Sketch from 1952

Le Corbusier had the idea of the open hand in his head since 1948 and 'the open hand' found its first existence in Chandigarh. In Le Corbusier's head the open hand had to arise out of emptiness and this emptiness later became the 'Pit of Meditation'. During a visit to Chandigarh, he determined the first dimensions of the composition and he looked for regulating lines. After a while he continued working on it, but then on the basis of the Modulor. At the fortieth drawing, a valid solution appeared, fitting exactly into the Modulor grid.



Drawing of Governor's Palace,
with the upturned crescent clearly visable

Symbolic umbrella used in the colomns of the Parliament

He concentrated most of his attention on the Capitol monuments beginning with the Governor's Palace, in which he established the main symbolic motif of Chandigarh: the upturned crescent form supported on poles and creating a shaded space beneath it.

Thus his initial response to India was climatic, and it was this that led him to the common-sense device of a horizontal shading parasol against the tropical sun and the monsoons. A formulation like that came naturally from his architectural system, since horizontal overhangs on slender posts were virtually part of his vision of a concrete architecture.

The practical was quickly turned into the mythical, as Le Corbusier sought ways to poeticise this direct acknowledgement of natural forces. But the upturned crescent seems also to have been a transformation of an ancient symbol of authority, the umbrella.

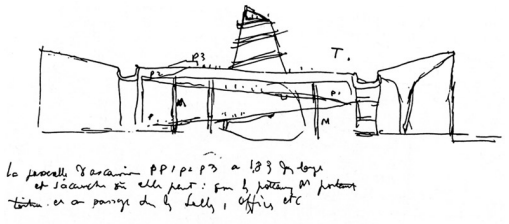
Parliament Building

Since the Governor's Palace was never built, the dominant structure at the complex is the Parliament.

The portico of the Parliament Building

"In the hot season, when all is parched and brown, the Parliament rhymes with the outcrops of the Himalayan foothills in the distance. Impeccable control of mass, silhouette and surface ensure sculptural tension from any viewpoint. The result is a building of solid dignity, as befits an emblem of state."
- William J.R. Curtis

The Parliament building began life as a large shaded box preceded by a tilted portico of which the top surface was upturned to act as a gutter; as at Ronchamp, Le Corbusier was intrigued by the idea of a roof as an enormous sluice for the rain. The entrance of the building is signalled by this long, low portico over an enormous enamel door preceding an inward-looking box into which the main 'objects' of the assembly funnel. The outer fringes of the box, other than the colonnade, are given over to offices on a much smaller scale and are furnished with deep cut brises-soleil which catch the shadow and give the building a greater sense of mass.

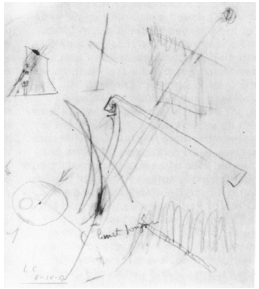


The 'cooling tower' in the Parliament

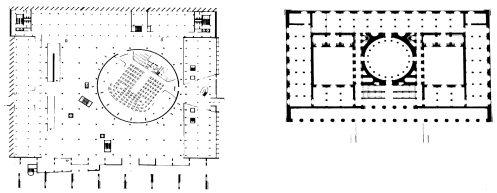
The interior arrangement extended a deeply engrained Corbusian pattern: a free plan with curved partitions defining the main functional organs within a grid of supports. It was when problems of lighting, ventilation and rhetoric carne to the fore that Le Corbusier broke the assembly form up through the roof to create a lighting and airing system, and a shape with symbolic potential.

But while cosmic overtones were intended, the hyperboloid shape seems to have been inspired by an industrial form: cooling towers.

The Pantheon



Sketch of funnel with light coming from above



Plans of the Parliament and Schinkel's Altes Museum

In some sketches he compared its section and lighting system to the dome of Hagia Sophia. Celestial connotations were reinforced when he introduced the idea of a single beam of light to descend from a hole in the top of the tunnel and hit the Speaker's area within, at the time of Parliament's opening. As to the source, it was surely was inspired by the Pantheon.

The Parliament's overall organization was a variant on the forms combining the portico, processional route, centralized domical space and fringe of secondary functions. The model of Schinkel's Altes Museum in Berlin has been suggested as being an inspiration; this seems feasible, as long as you do not assume that the example was imitated literally. Probably it is more correct to say that Le Corbusier grasped a hierarchical order suggested by the program which made the portico/dome formula a relevant typological tradition.

The dome, with its traditional typology of authority and divine approval for the head of state, would not have been an appropriate symbol for the newly independent India, even if Le Corbusier had been capable of using one.

In his view the symbolic form was a dead one, no longer engaging emergent social realities. So the parasol-dome was transformed into a counter-shape which may, in Le Corbusier's mind, have had a new connotation related to the 'Open Hand' an emblem of international peace and generosity fitting Le Corbusier's pan-cultural idealism. The upturned shape served further to link the building to the sky and the planets above. Intrinsic anthropomorphic qualities, were blended with new practical, structural, and symbolic purposes.
In 1959, a year after the civil war in Pakistan, the new president decided

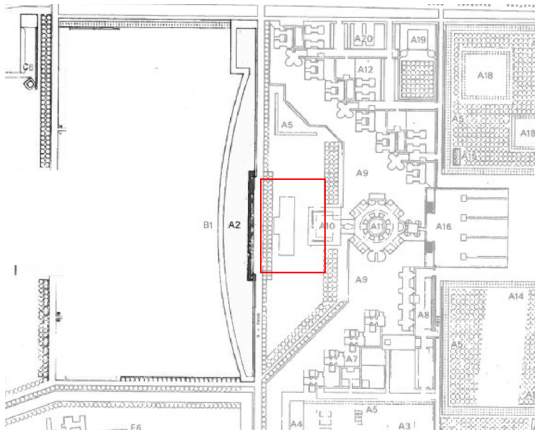
Dhaka.

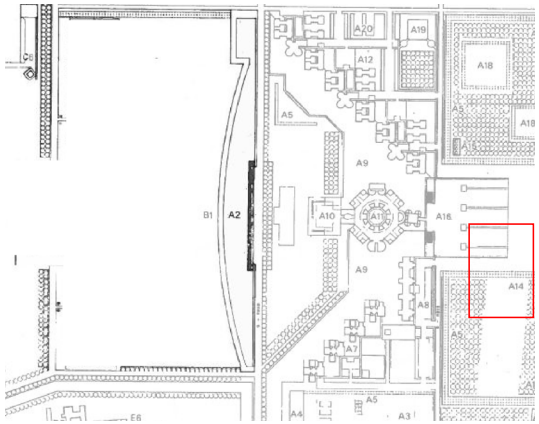
In 1959, a year after the civil war in Pakistan, the new president decided that West Pakistan and East Pakistan both needed a new capital. In this way, he wanted to cover up the parting of the two Pakistans and at the same time discretely fix it.

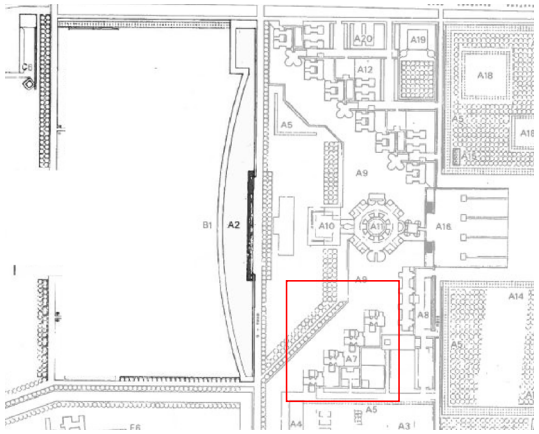
In West Pakistan the new capital Islamabad would emphasize the executive of the trias politica,
and in East Pakistan, the legislature would be expressed in Dhaka.

Greek architects were hired to design the new capital of West Pakistan. For East Pakistan, Le Corbusier was contacted first, since he worked successfully on Chandigarh. Le Corbusier was too busy working on other assignments, so he said no to the job. Alvar Aalto was second choice, but he was ill (or, according to the rumours; he was drunk and missed his appointment). Louis Kahn was the third architect on the list, who proved that he was more than qualified for the job and that was in no way of third class.

Impressions of the Capitol Complex.



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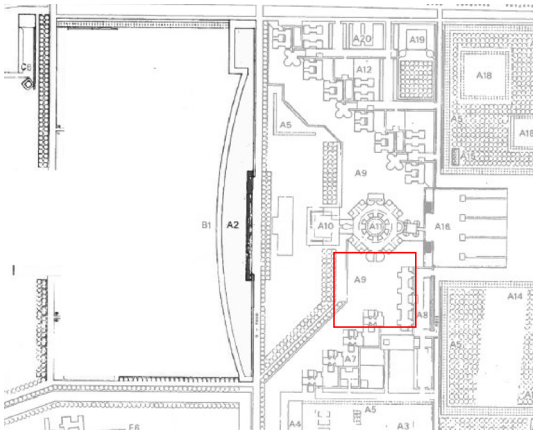
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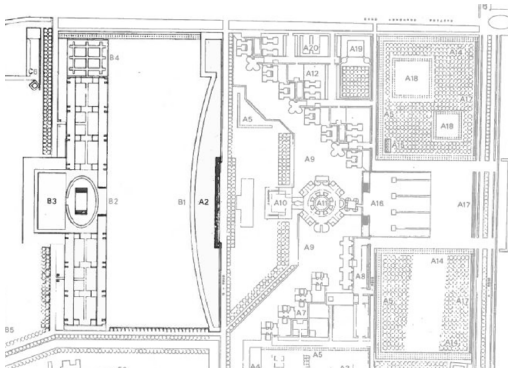
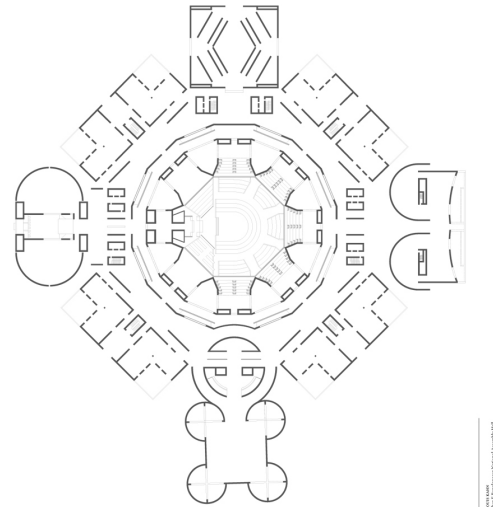


Plan of Complex (Secretary not built)



Plan of Assembly Building

The design

Louis Kahn's Parliament Building at Dhaka dominates its setting by standing on a raised platform as a fortified citadel. There is no doubt that it is the dominant element of the body 'politic', because it stands at the culmination of a major axis with the 'feet' of the Secretariat at the other, lower end. The anthropomorphic image of the city of powers is enhanced by the extending 'arms' of the various hostels in an array of diagonal buildings growing away from the Parliament.

The geometrical motifs used throughout the complex are intensified and magnified in the Parliament building itself. The primary axis of the complex as a whole links the Parliament to its setting over platforms and changes of level, but the axis of the assembly chamber itself is switched through 90 degrees.

The offices and supporting functions are grouped around the main space of the building in oblongs and cylinders.They mediate geometrically between the centric chamber of the assembly and the diamond shape of the perimeter.

Rough brick and concrete are the main materials used and they made sense in terms of local geographical and labour conditions, but also matched the intentions of creating a building with an ancient character. The vast cylinders and oblongs are punctuated by enormous voids that create shaded and well ventilated areas. If Le Corbusier's conception for coping with climate was a parasol, Kahn's was a protective layer of secondary spaces around the main chamber. This was also a way of registering a functional distinction between the offices (the 'servant' areas) and the main 'served' assembly.

Moghul Garden

Classical inspirations were so embedded in Kahn's mind that it sometimes becomes difficult to single out particular sources. The Parliament in Dhaka is a case, as we have seen in the former chapters, of a building issuing from a family of forms with roots in a number of different phases of the past.

The anthropomorphism of the Capitol as a whole, the suggestion of a body with a central spine and extending arms, may be seen as a long range reinterpretation of a schematic attitude descending from Palladio's villa ideas with their centralized structures, the hierarchy, their wings and their strict use of axes.

Moghul Garden

If these inspirations were present in Kahn's architectural system, they were thoroughly absorbed long before he went to Bangladesh. Kahn was also ready and willing to learn from Eastern architectural traditions on the Indian subcontinent.

There is little hard evidence concerning his travels, but Kahn was concerned to avoid creating an entirely Western import. The integration of gardens, ponds, processional ways and mandala-like plans (a Hindu symbol for the universe) in Moghul garden design may have made a deep impression on Kahn.

The Moghul tradition held out examples in the handling of primary and secondary axes, level changes, diagonal perceptions of structure, and the linking of one formal theme to another.

Taj Mahal

Hummayum

Kahn's preference for solid masonry cut into by figural openings (like in the dormitories, or the cut out figures in the façade of the Assembly building), for centralized geometries and for axial planning probably have drawn him to the central tomb structures on platforms close to Delhi and Agra (the tomb of Hummayum and the Taj Mahal). What Hindu temple complexes he may have known exactly is uncertain.

Whether the particular inspirations for his centralized form belonged more to Eastern or to Western traditions is not entirely clear. The fact is that he found common denominators between the two and worked with these.

The search for an appropriate symbolic form for the parliament emerges if one takes a look at Kahn's sketches. Evidently he conceived of a parliament as a sort of centralized assembly seeking a unified course of action. In fact this made it a close relative of synagogues and religious institutes. But while the circle was the idealized shape for this sort of assembly, the actualities of parliamentary debate were best handled by a variant on an amphitheatre. Finding a fitting compromise is part of designing.

Kahn's method of design emphasizes to an extreme what tends to happen in most design processes: An architect's pre-existing solutions and style influence the way a new problem is conceived and solved. Time and again in his buildings and schemes, Kahn resorted to square, diamond or circular forms in plan. Time and again he emphasized the distinction between served and serving areas.
Time and again he sought to articulate the separation of private rooms from public spaces - the latter often expressed as atria or covered courts of assembly.

Essentially, the Kahnian ‘genotype’ was a centralized space surrounded by a fringe of smaller spaces in a thickened structure, and entered on a corner or asymmetrically placed axis.

Not surprisingly, the Parliament was an ultimate expression of this formula; his latest work, his masterpiece.

Like Le Corbusier, he possessed a language of symbolic forms pregnant with expressive possibilities yet rooted in certain deeply engrained ideals concerning the integration of society with the natural order. This is why the sketches are so revealing, since they suggest the way in which Kahn sought to bring into equilibrium his own impulses towards an intuitive harmony, with the symbolic demands of a major state building.

Like Le Corbusier’s Parliament, Kahn’s was an emblem rich in ideas, nourished by traditions and by a private myth within.

Hypothesis: Le Corbusier and Kahn worked on more or less similar projects in a comparable political situation and geographical context. The architects have other backgrounds and work differently (Le Corbusier in a more sculptural way, Kahn has a more geometric approach), but came up with designs for the complexes and the parliaments that have striking similarities.

Taking another look at our hypothesis, we could say that both Le Corbusier and Kahn designed a complex that combines Eastern and Western Culture. By both designing a symbol for the newly independent, Eastern countries and combining the Eastern culture with aspects of, at that time almost exclusively Western, modern architecture. The modern use of materials and both of their visual languages blend in amazingly well with the more traditional aspect, e.g. the use the shifting of axes and platforms as in Moghul Gardens, or Kahn's centralized design and Le Corbusier's version of the dome - tfunnel. Both architects took the climate as a design principle; Le Corbusier's parasol, Kahn's double facades.

In these comparable circumstances; the tropical climate, the size of the project and the symbolic meaning and political significance, both architects created impressive, monumental, period transcending and timeless designs.

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