

**City on the Hill**

*Palazzo della Commedia*

by

arian korkuti

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

of

Master of Architecture

in

Architecture

Steven Thompson, Chair

Dr. Mark E. Schneider

William U. Galloway III

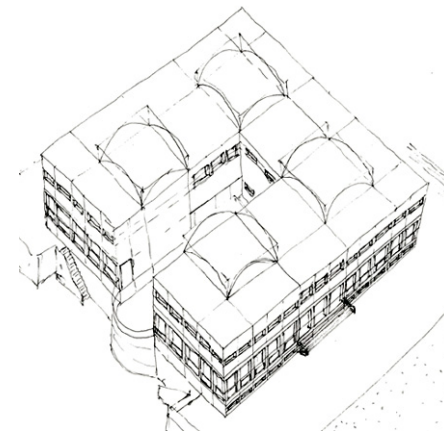
June 13, 2012  
Blacksburg, Virginia

architectural type(s), form, structure

## City on the Hill

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### abstract

This thesis is an exploration of three architectural types: *regia*, *tholus*, and *theatrum* which put together in the form of a building would demonstrate the nature of architecture.

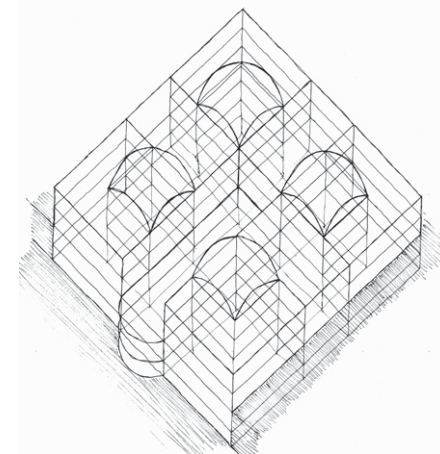
My quest traces these types in time and geography and combines them in a play that takes place in the form of a building in Blacksburg, Virginia and on the foothills of mythical Mount Alban near Rome, Italy.

Furthermore, this thesis addresses questions regarding methods of construction techniques, and building materials, used in each of the building forms presented. In doing so it reinterprets a traditional construction technique through a study model.

in memory of my father

## City on the Hill

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## acknowledgements

I wish to express my deepest gratitude to my Committee, Professor Steven Thompson, Professor Dr. Mark Schneider, and Professor William Galloway for their incessant support over the years.

This work is dedicated to my wonderful wife and my two beautiful children for their unconditional love and care.

I wish to thank all my dear friends who have supported and taken my endeavors to heart.

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**introduction**

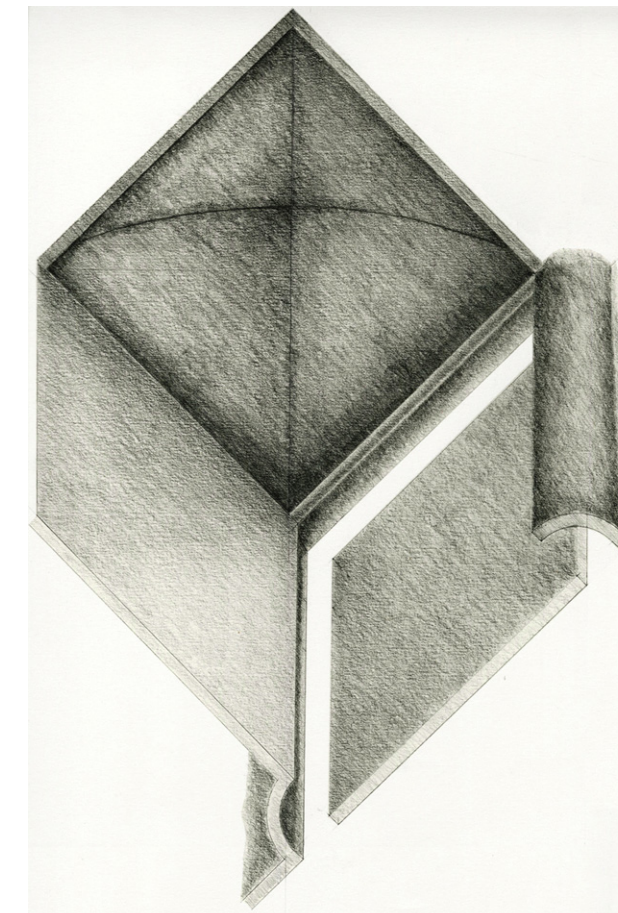
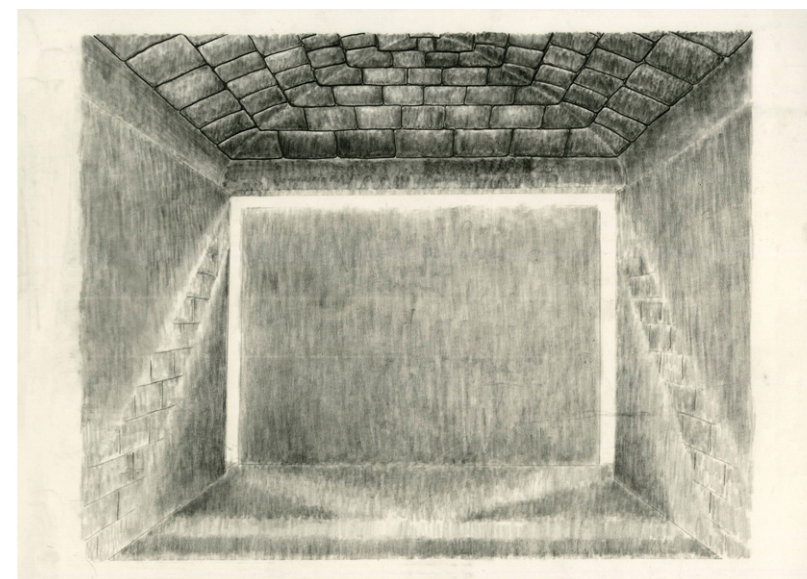
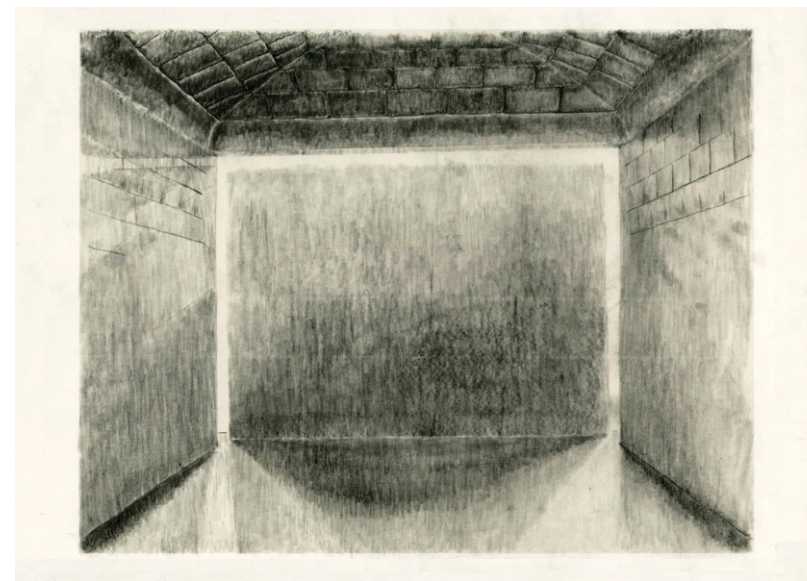
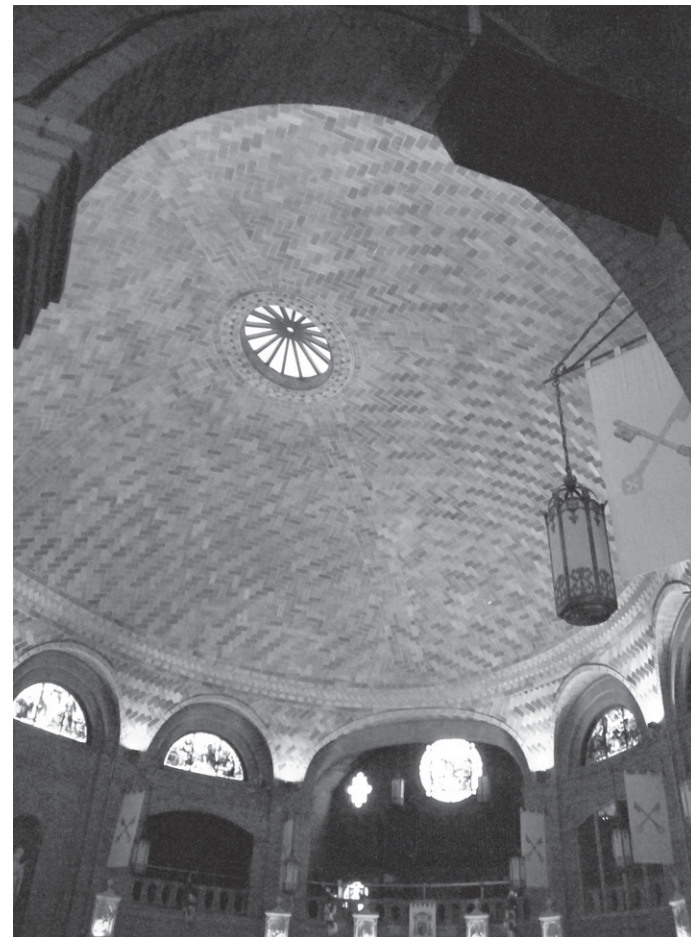


image of vault (center) – geometry of vault (right)



## catalan vaulting

### form and structure

Let us begin by tracing what is deeply rooted in tradition.

*Bóveda tabicada* is a Catalan vaulting technique is mainly based on bonding multiple layers of especially resistant tiles with fast setting grout. This process allows for the fast erection of a vault without the need of a center support. Multiple tile layers form a monolithic structure that acts cohesively, rather than in friction, like in the case of a stone vault.

Catalans presumed this method was related to the brick cohesive vaults in use in Mesopotamia. This technique is present in the Roman baths of *Caracalla*, in form of a permanent centering of laminated tiles that holds the concrete vaults. According to Choisy, such procedure progressed independently at some point after lapse of the Roman concrete.<sup>1</sup> In medieval times this technique may have spread in the southern Mediterranean region. Each country gave to this technique its own name. In Italy was known as *volta a foglia*. In France the name was *voûte plate*, or *voûte à la Roussillon*. In Spain was known as *bóveda tabicada*. This technique was re-discovered during Renaissance. Notable examples include: Sistine Chapel, Grand Salon of *Palazzo Farnese*, the *Loggia of Santa Maria Maggiore* in Rome, and *Palazzo Ducale* in Genoa.<sup>2</sup>

Successful erection of this type of vault depended in highly skilled artisans who mostly worked of experience and not of specific drawings.

This technique was introduced architecturally by Catalan [architects] contemporaries: Antoni Gaudí and Rafael Guastavino.

Even though Antoni Gaudí built structures that were con-

structed of stone masonry, the traditional Catalan cohesive technique was instinctive part of his understanding of structural continuity.<sup>3</sup>

Gaudí employed the Catalan cohesive technique in the attic of Casa Milà (Barcelona, Spain). Parabolic arches were constructed of layers of *terracotta* tiles, and turned sideways in support of the roof. He followed the different from traditional approach of the Catalan cohesive technique using the solera-type roof at the *Sagrada Família* School building in Barcelona, Spain.

On the other hand, Rafael Guastavino (the elder), is responsible for the spread of the Catalan traditional technique throughout many eastern cities of the United States. Images on the left show Guastavino's main dome in the Basilica of Saint Lawrence in Asheville, North Carolina. The Guastavinos (father and son) worked on a good amount of commissions, for which they employed the Catalan (cohesive) tile technique, and they patented many design elements regarding this system. They remained within the traditional use of Catalan vaults, domes, arches, and so on.

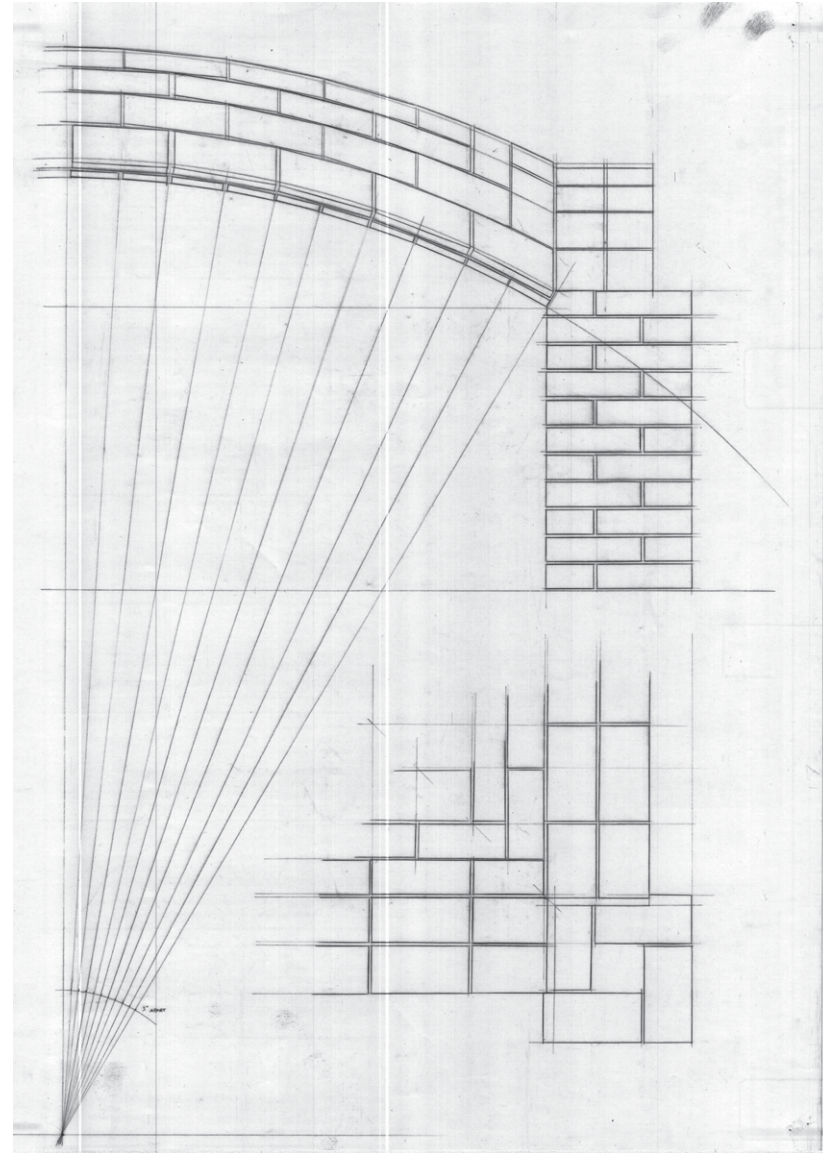
**Tile vault model** shown throughout the next set of images is a study of Catalan tile vault according to Rafael Guastavino (the elder). Model built at a quarter of the scale of a brick tile vault with arches spanning ten feet and a rise of one foot, uses for reference data offered on the Guastavino's table of theoretical stresses.<sup>4</sup>

Materials used for this vault model include terracotta pier members (2"x 1"x 3/8"), and glazed ceramic tiles (2"x1"x1/8") for vault layers. According to Guastavino's specifications, fast setting grout allows for rising of the structure (vault) without centering. In this case (a little) support to the vault layers is necessary until the setting of grout.



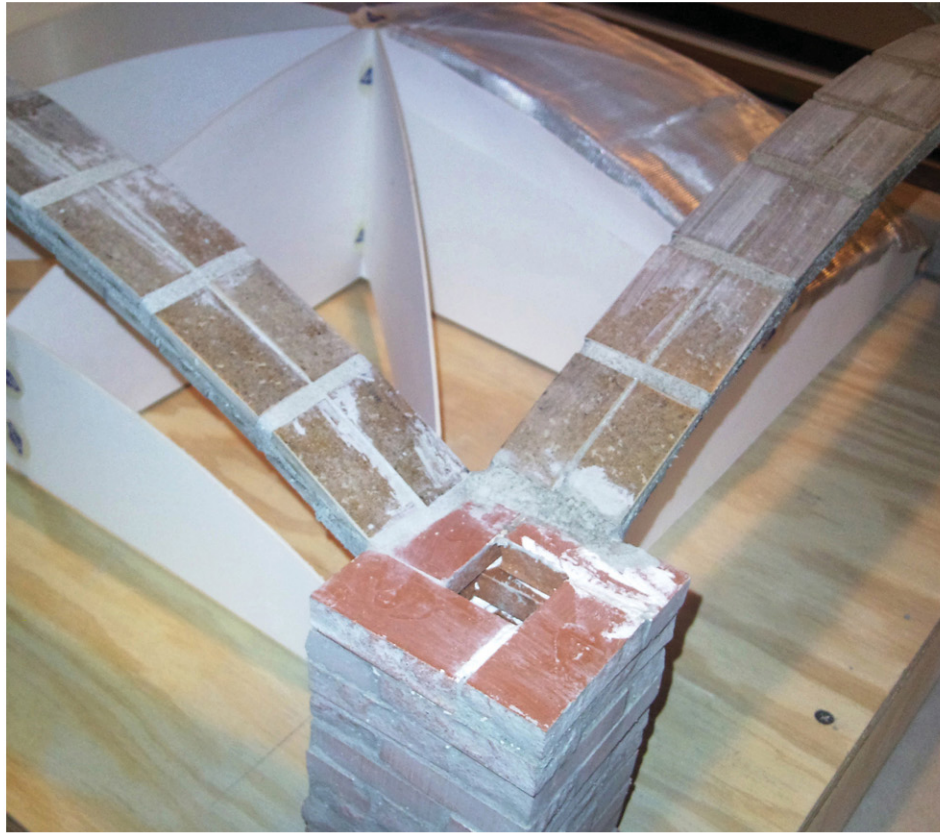
tile vault model





drawing scale : 1/2" = 1' - 0"

drawing of tile vault model





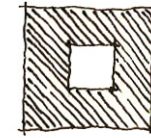
views of completed vault



interior of vault

## City on the Hill

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### *prologo*

My quest is about tracing the nature of architecture in a specific type of building. Moreover, the [future] building taken into consideration is constituted by three types of edifice; *regia*, *tholus*, and *theatrum*. Consequently, this mission extends towards the prospect of reconciliation between these three types, merging them into one building.

To the quest, this thesis contains more than one demonstration.

Shown in form of a theatrical play - *regia*, *tholus*, and *theatrum* are the actors.

This play is divided in *due atti*;

*Atto primo* - There is what has come - building situates between Lee and Washington Street on the left and right respectively, and Piedmont Street in front. On the opposite side it overlooks the town of Blacksburg, Virginia.

*Intermezzo - passaggio*

*Atto secondo* - That which is to come - legend wants the set to be at the foot of *Alban* hills on *Mons Albanus*, overlooking the *Alba Longa*.

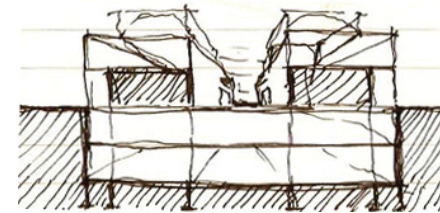
## City on the Hill

*Palazzo della Commedia*

**situation**

*atto primo*

*scena prima*



Located between Lee and Washington Streets on the left and right respectively, and Piedmont Street in front, on the opposite side the building overlooks the town of Blacksburg, Virginia.



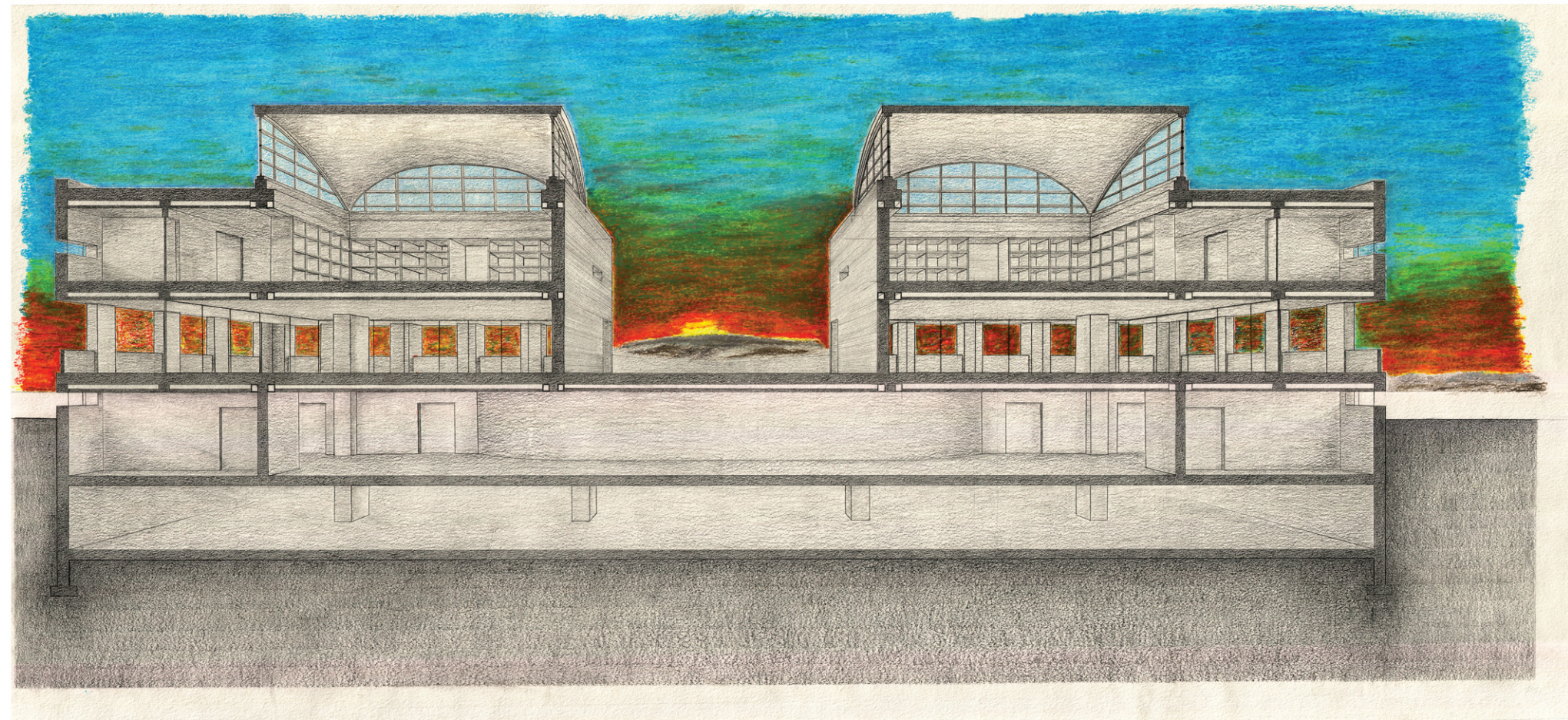
left : nov. 19 - '09 - 4:45 pm  
center : nov. 20 - '09 - 4:15 pm  
right : nov. 21 - '09 - 5:00 pm



left : nov. 22 - '09 - 4:30 pm  
center : nov. 25 - '09 - 4:45 pm  
right : nov. 26 - '09 - 4:50 pm

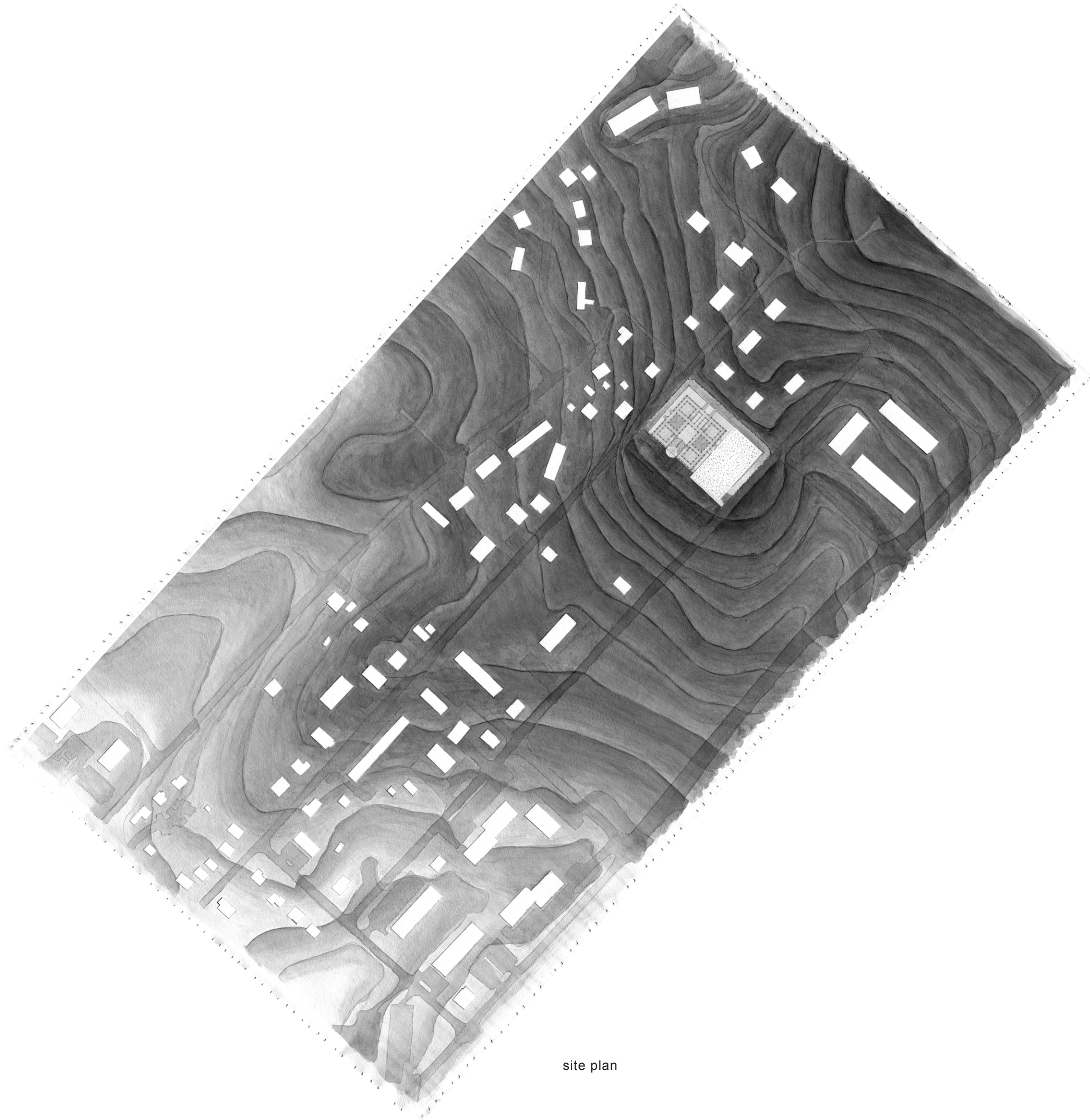


left : nov. 27 - '09 - 4:45 pm  
center : dec. 05 - '09 - 4:15 pm  
right : dec. 06 - '09 - 5:00 pm



drawing scale : 1/16" = 1' - 0"





north : up  
original painting scale : 1/128" = 1' - 0"

site plan

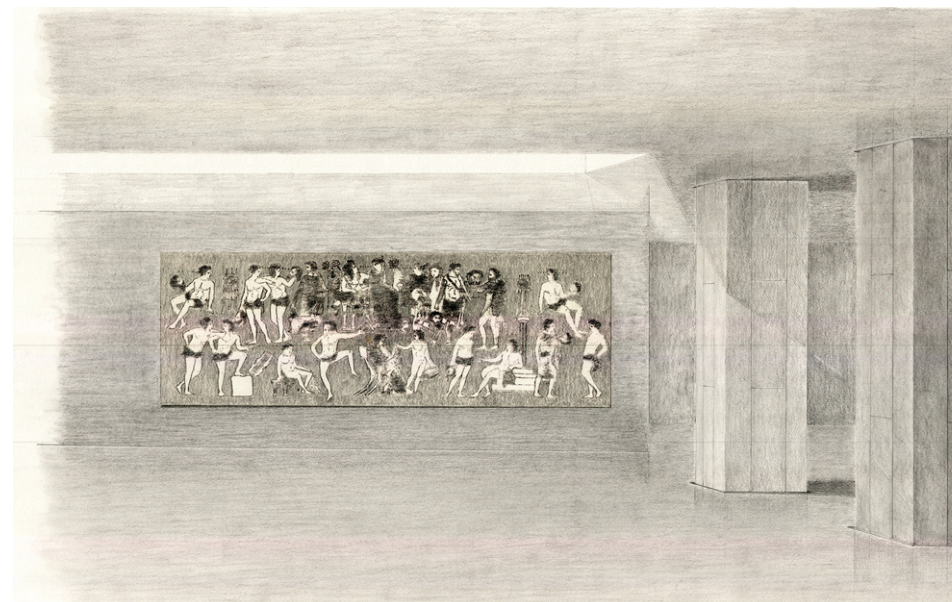
## City on the Hill

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***sagoma dell'incognito***

*atto primo*

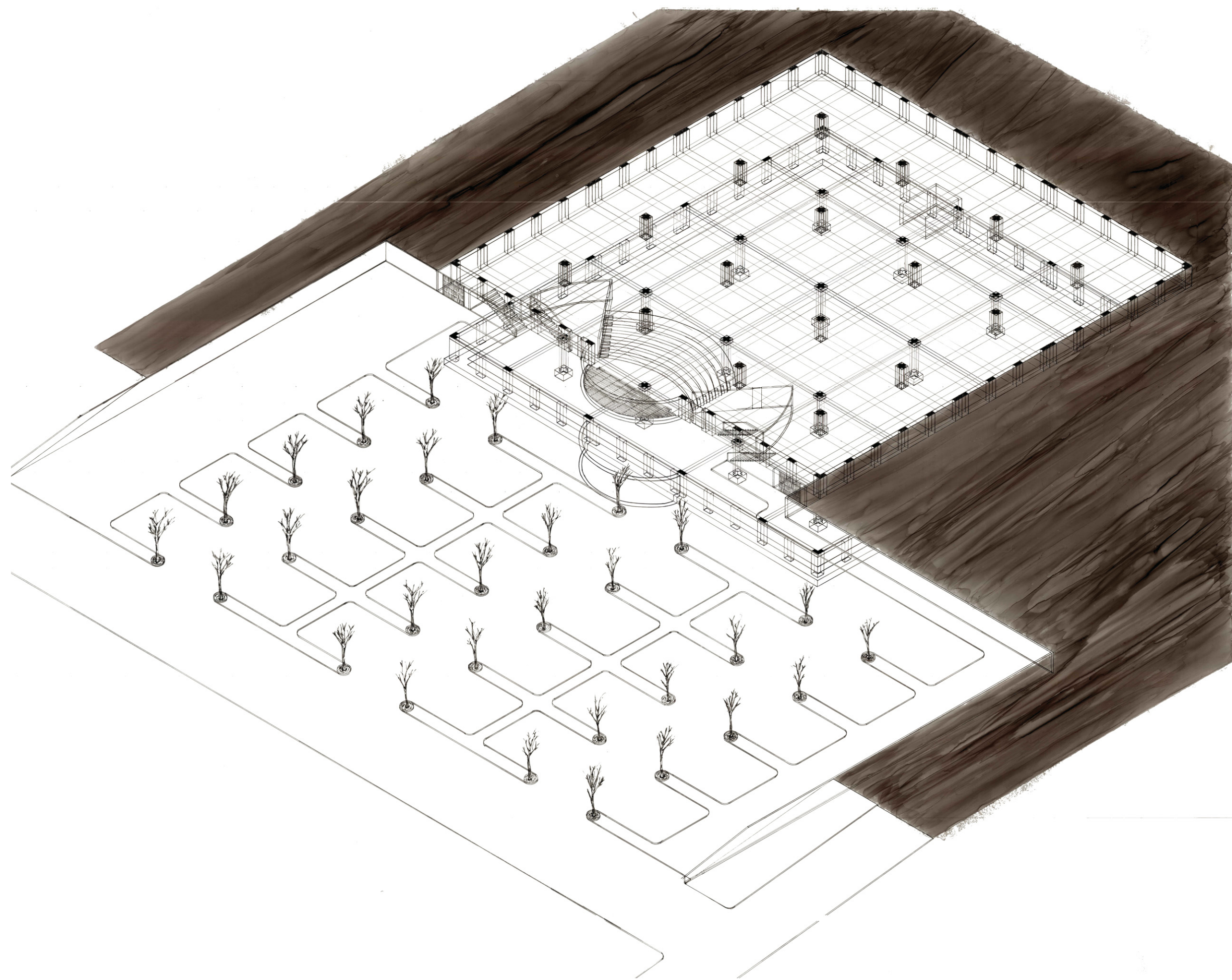
*scena seconda*



Plans of the building shown through *atto primo* are constructed in true axonometric technique.<sup>5</sup>

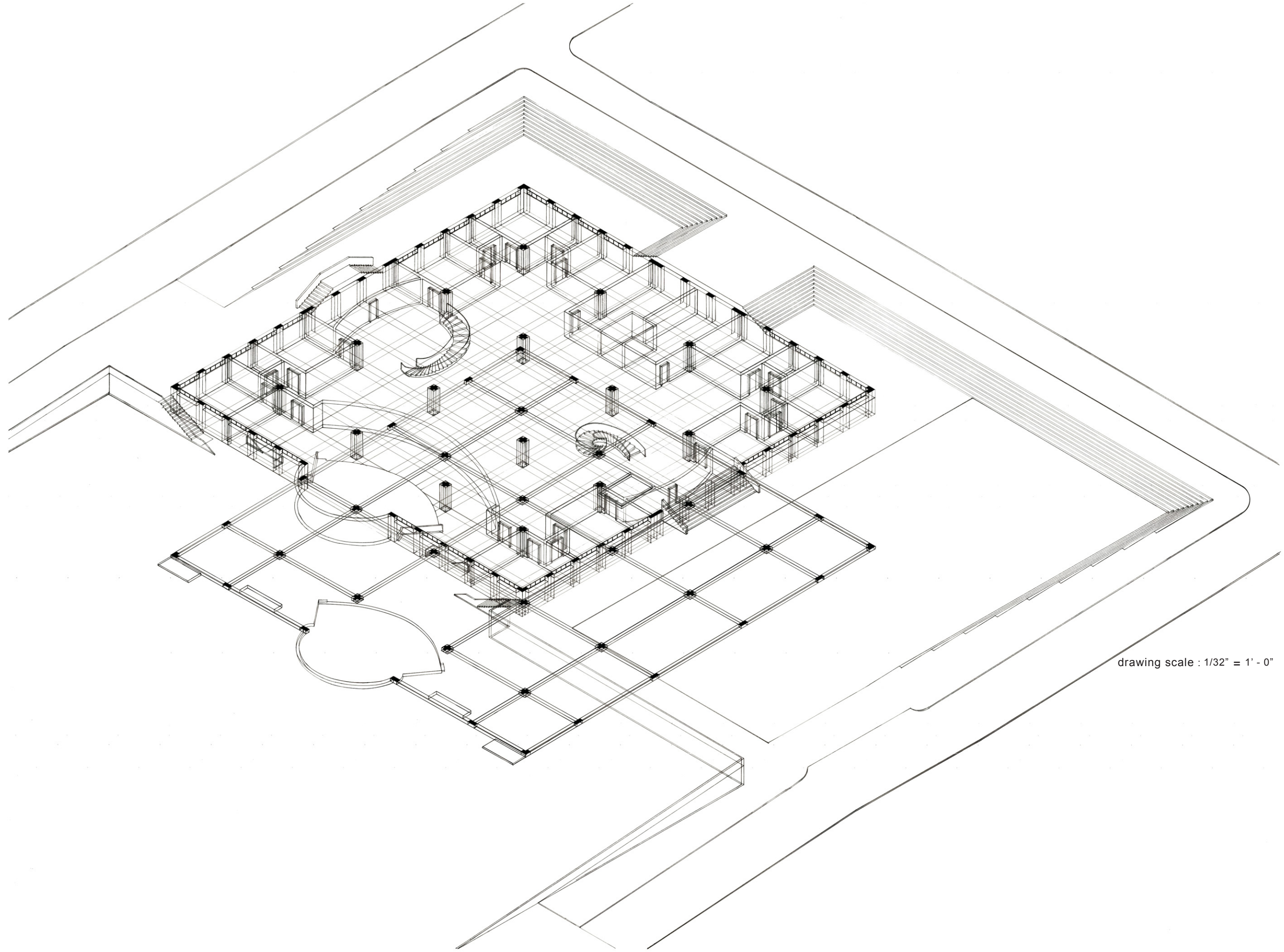
Plan belongs to the palazzo type, composed of *regia* (governing), *tholus* (venerating), and *theatrum* (theater).

The structure of the building is based on a framework of cast-in-place horizontal and vertical beams. Its walls are filled in *terracotta* brick and their surfaces are covered with plaster.



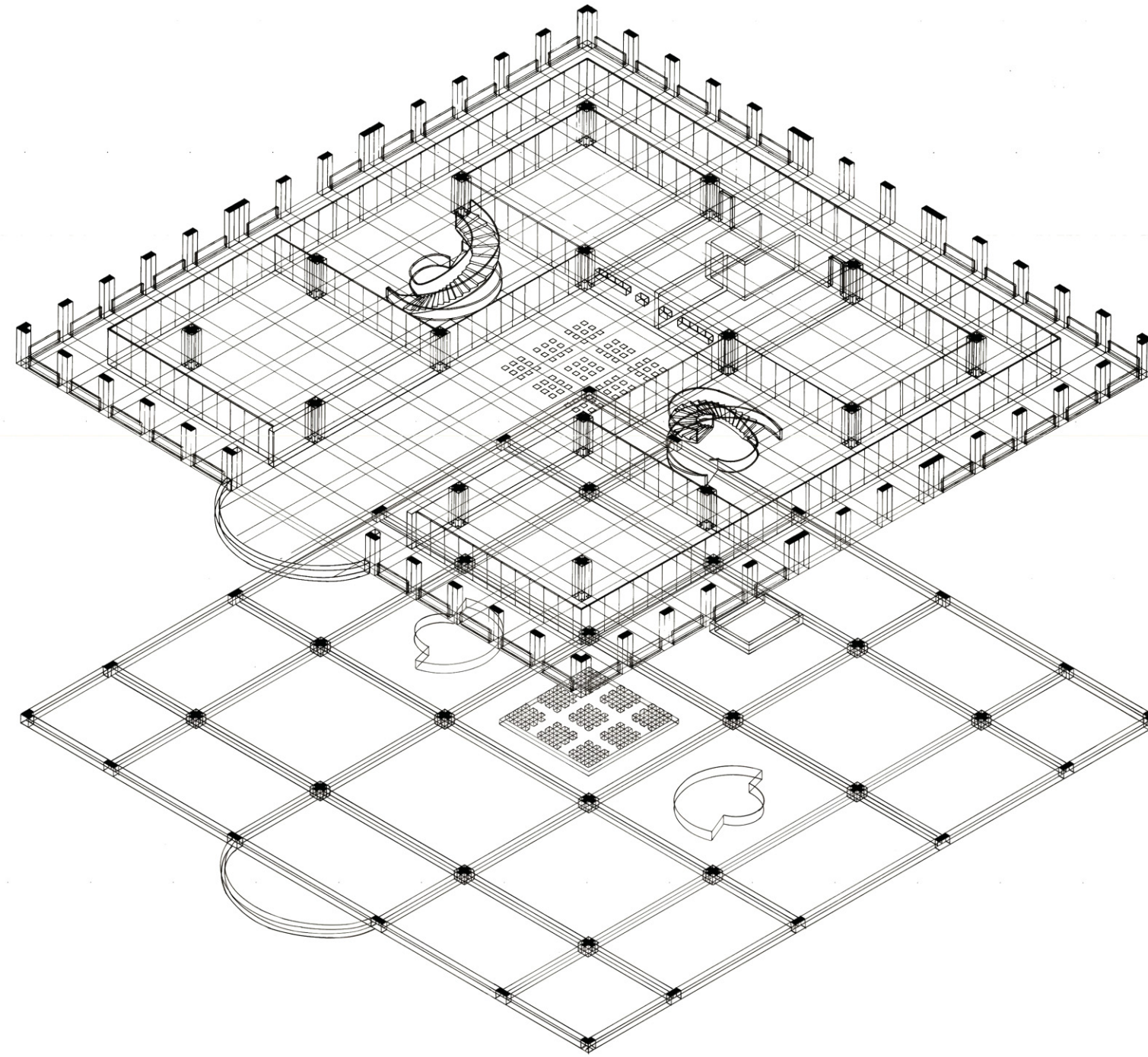
drawing scale : 1/32" = 1' - 0"

*piano sotterraneo* (level below grade)



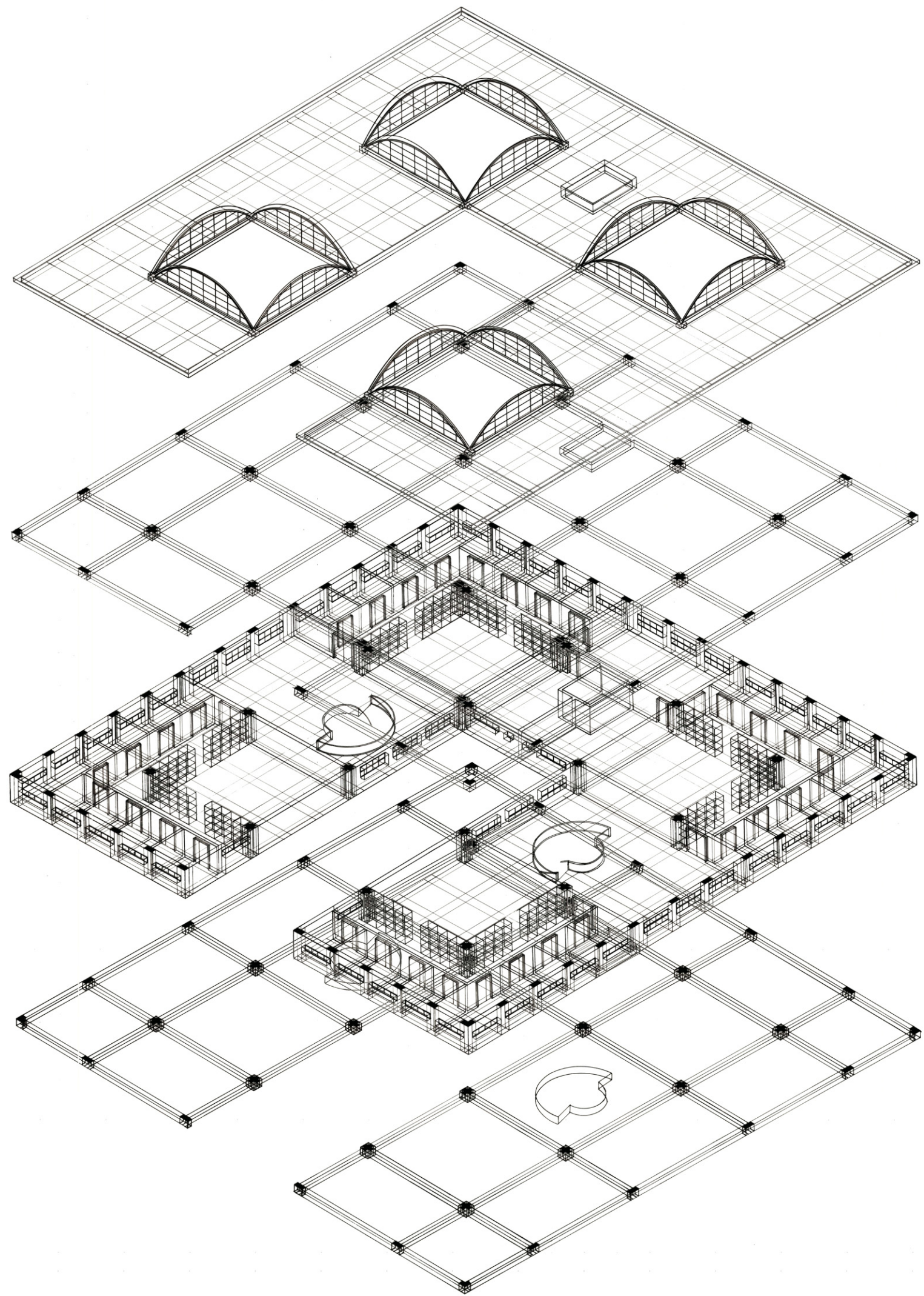
drawing scale : 1/32" = 1' - 0"

*piano terra* (ground level)



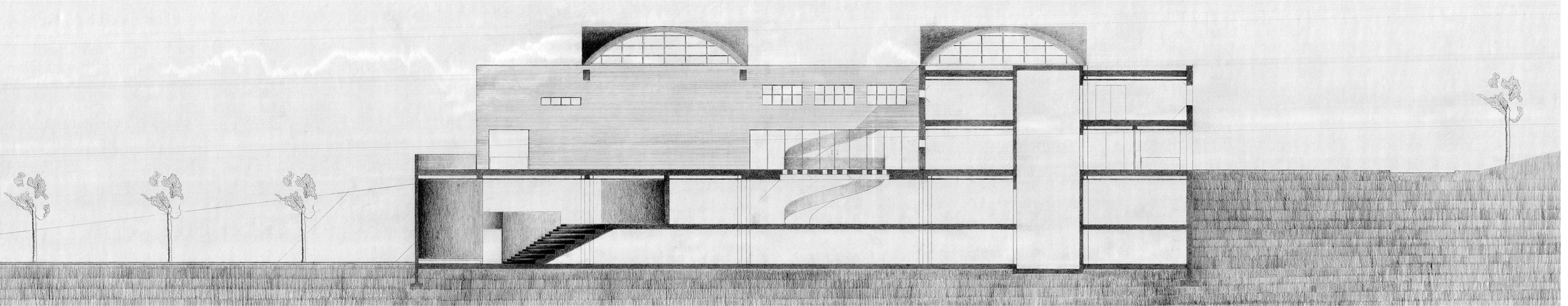
drawing scale : 1/32" = 1' - 0"

*piano nobile* (first level)



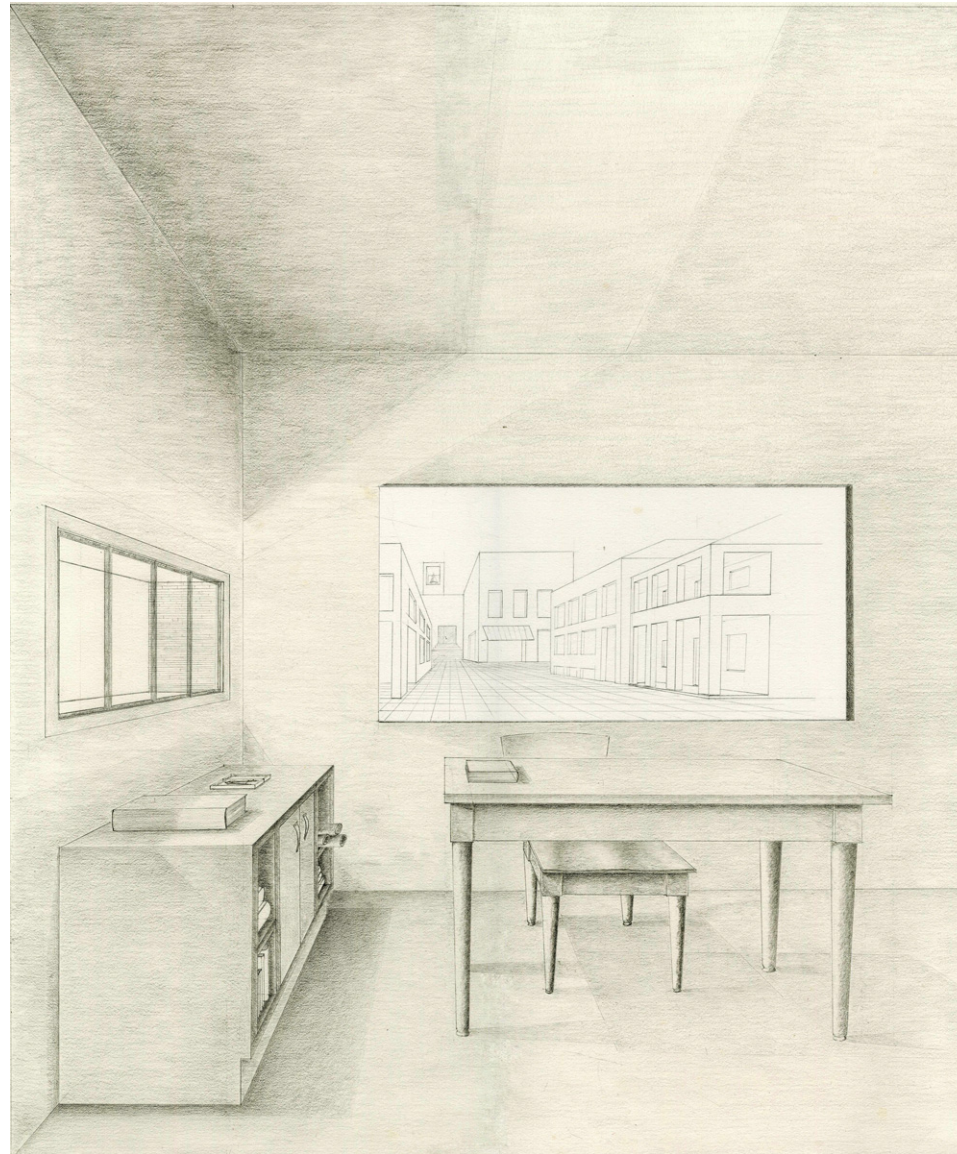
drawing scale : 1/32" = 1' - 0"

*piano superiore* (second level)



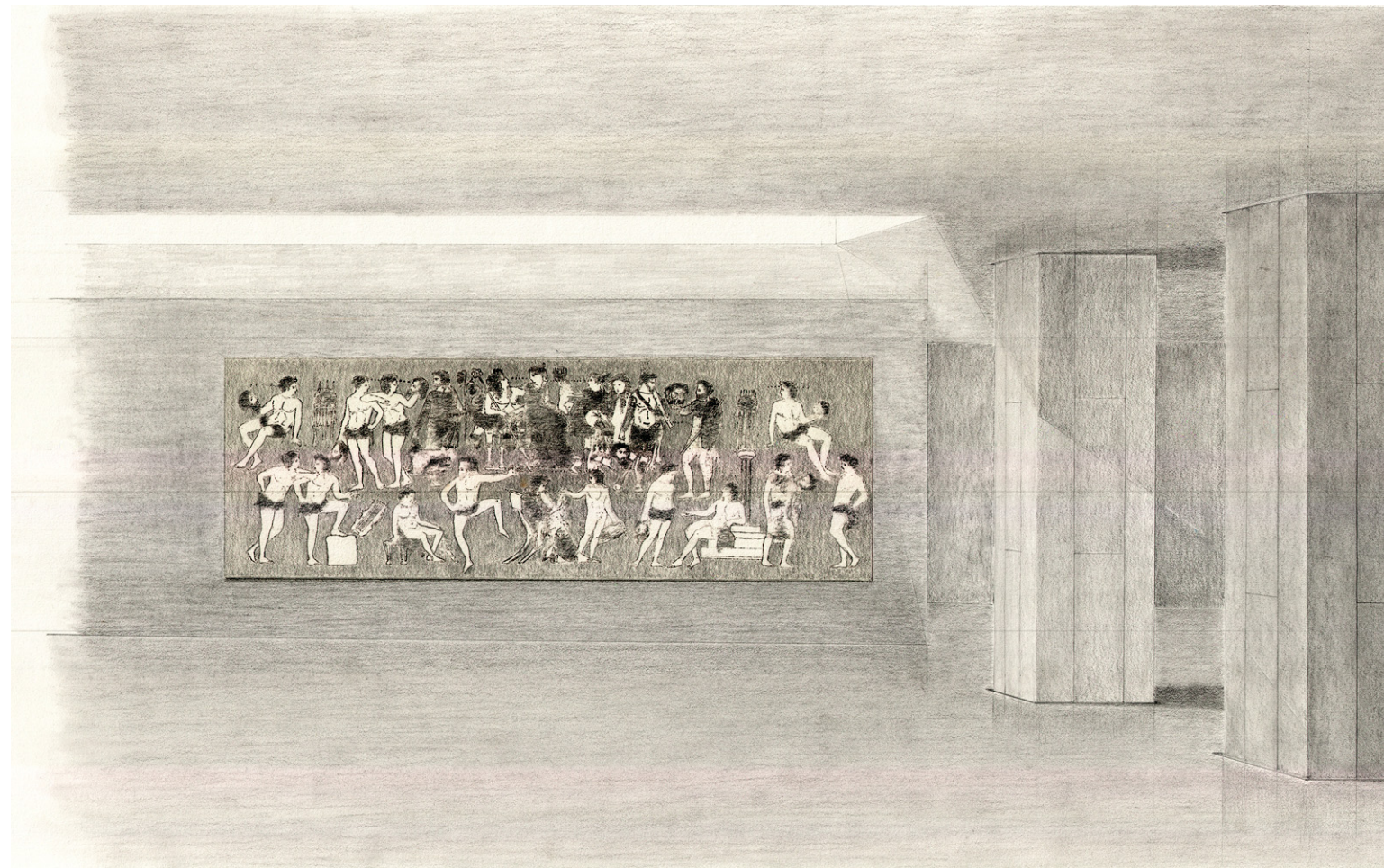
drawing scale : 1/16" = 1' - 0"

section with partial elevation



interior perspective





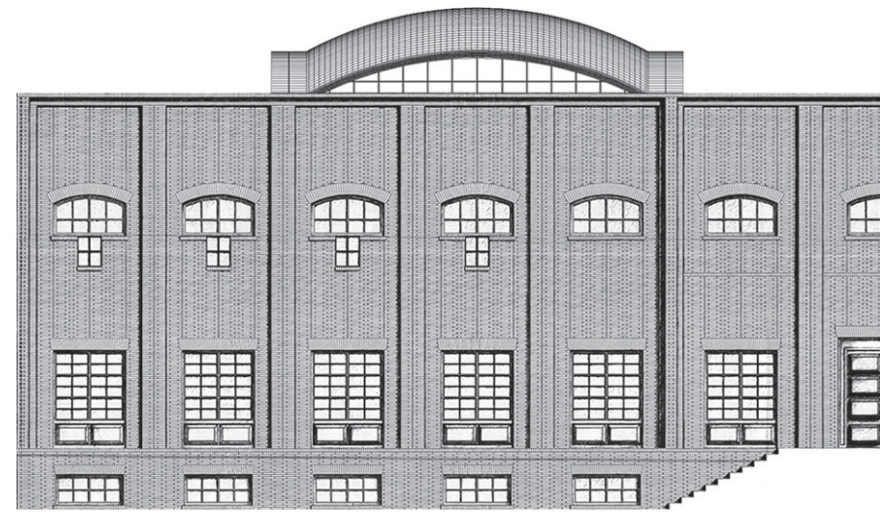
satirical players

**City on the Hill**

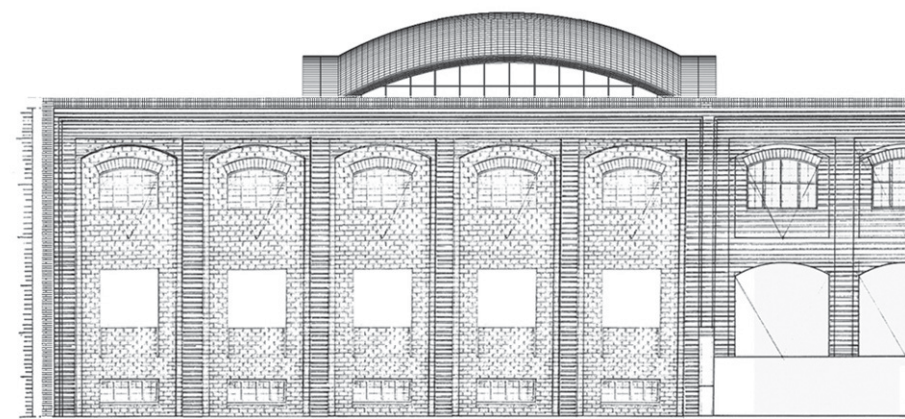
*Palazzo della Commedia*

**intermezzo**

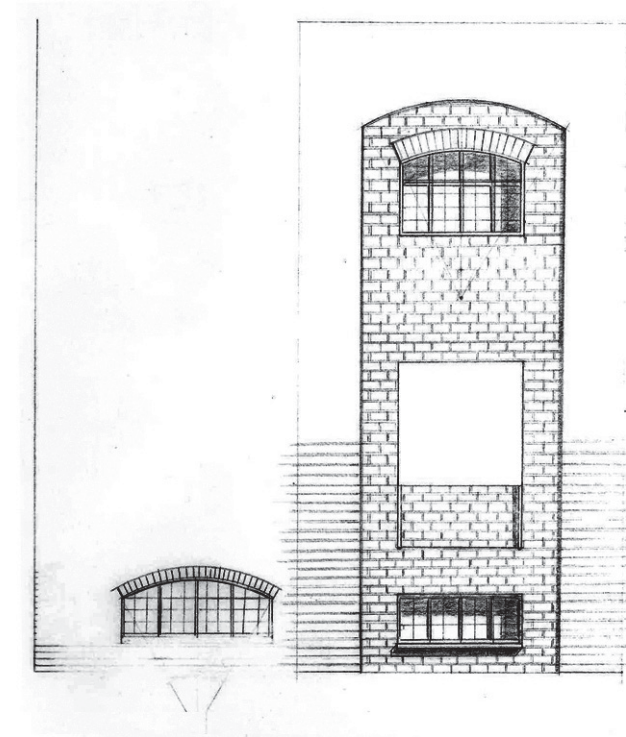
passaggio



scale : 1/16" = 1' - 0"

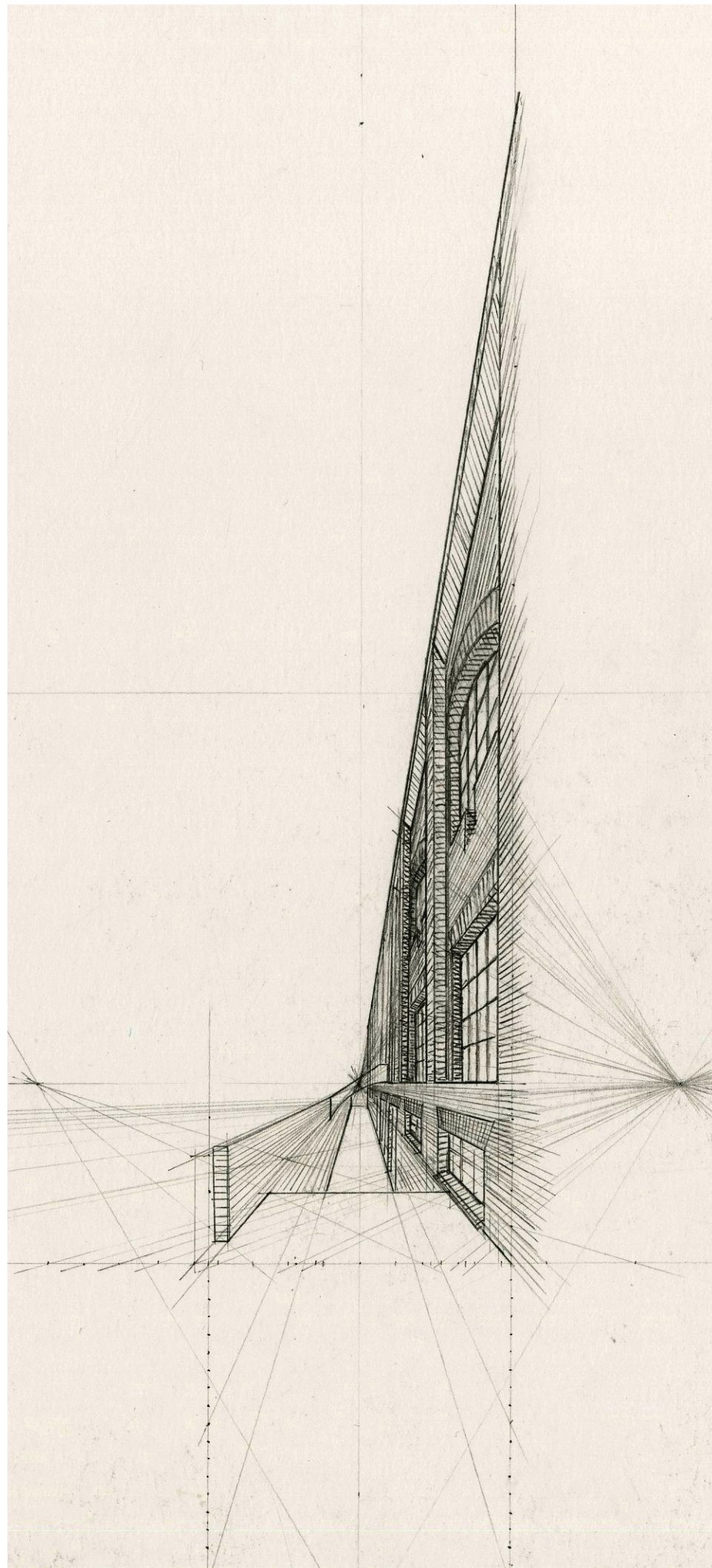


scale : 1/16" = 1' - 0"

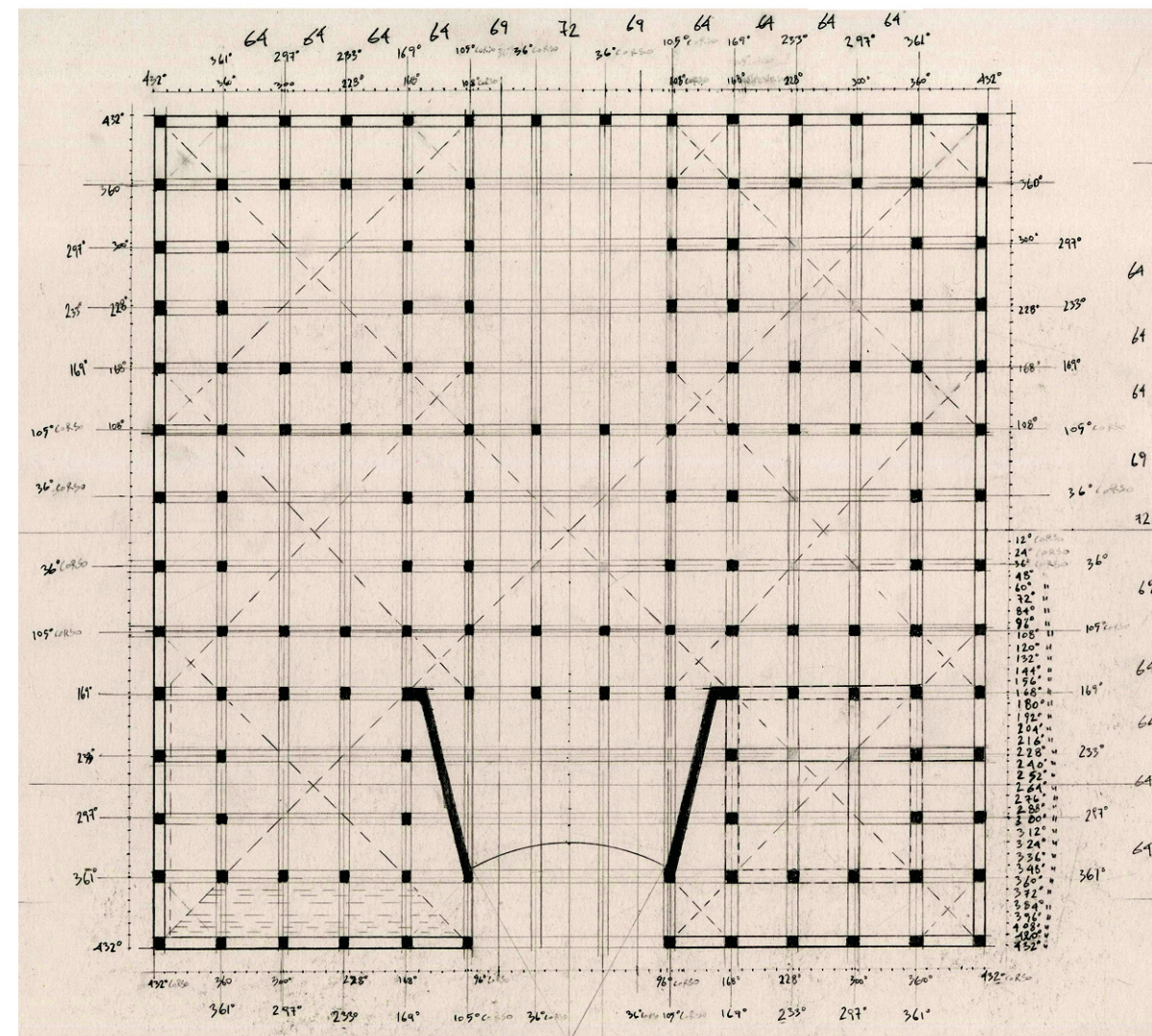
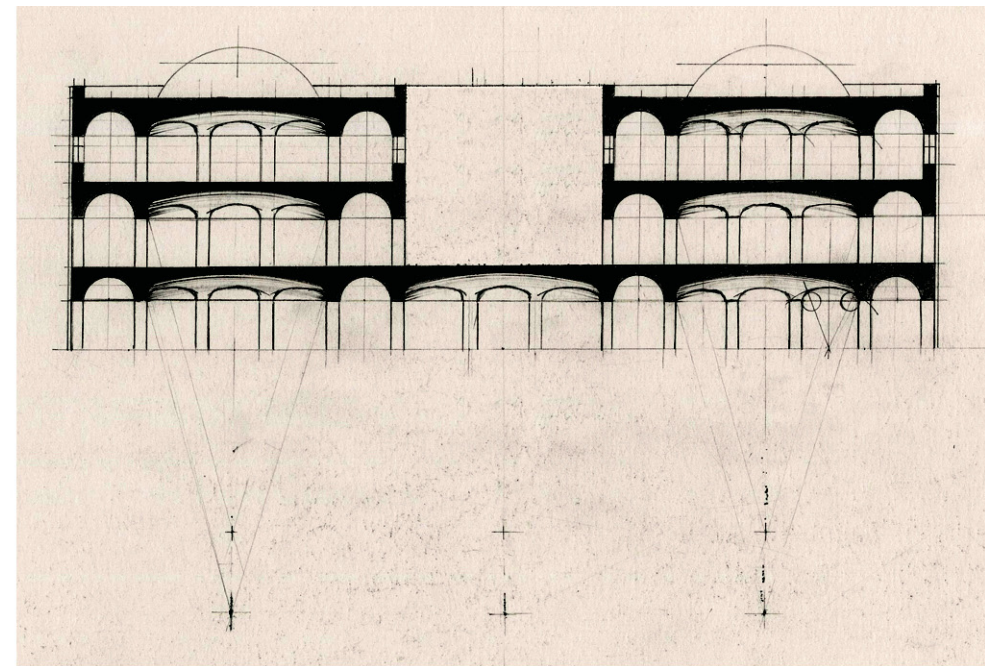


scale : 1/8" = 1' - 0"

*due maschere a metà* (top + bottom) – section module (right)

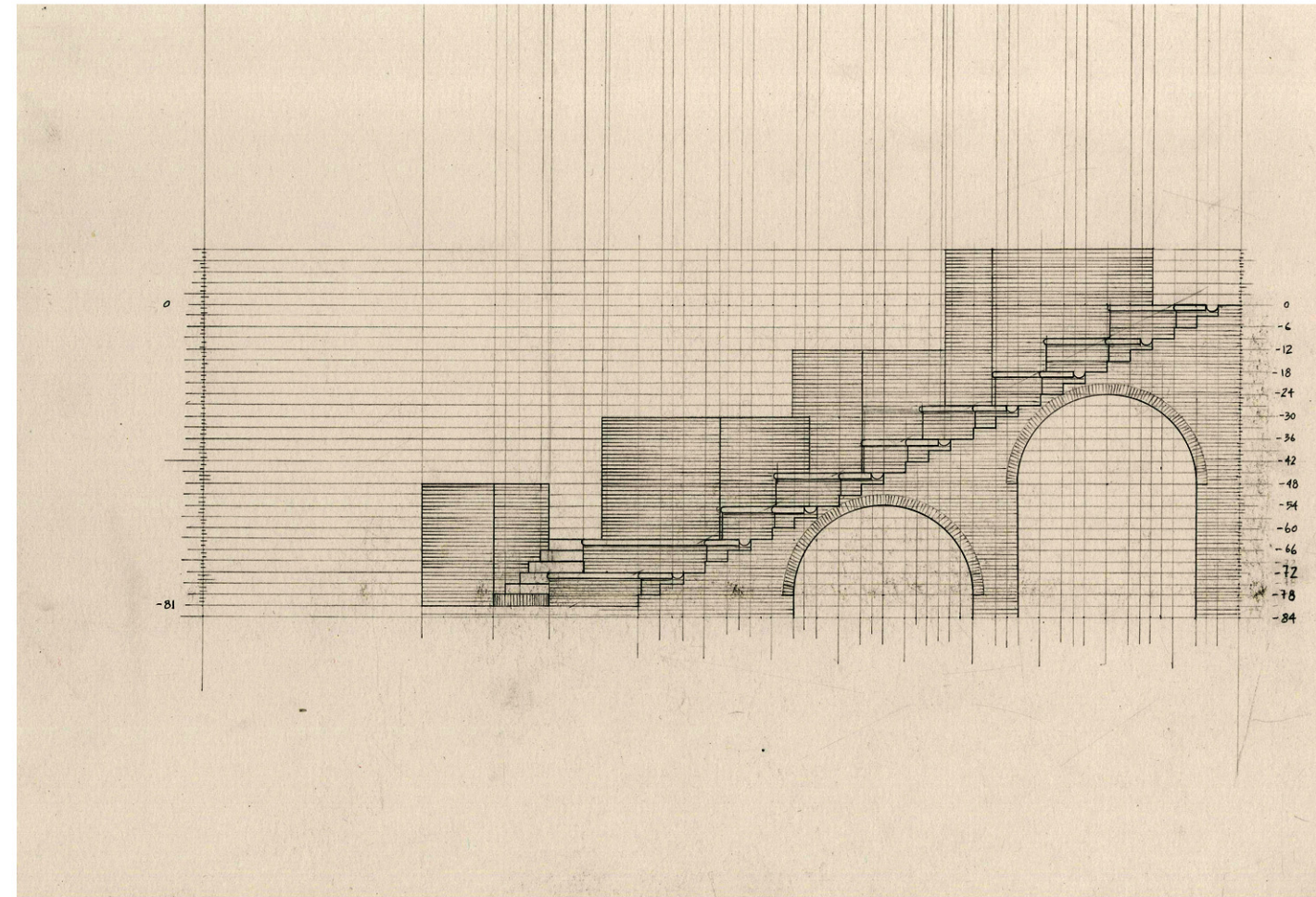
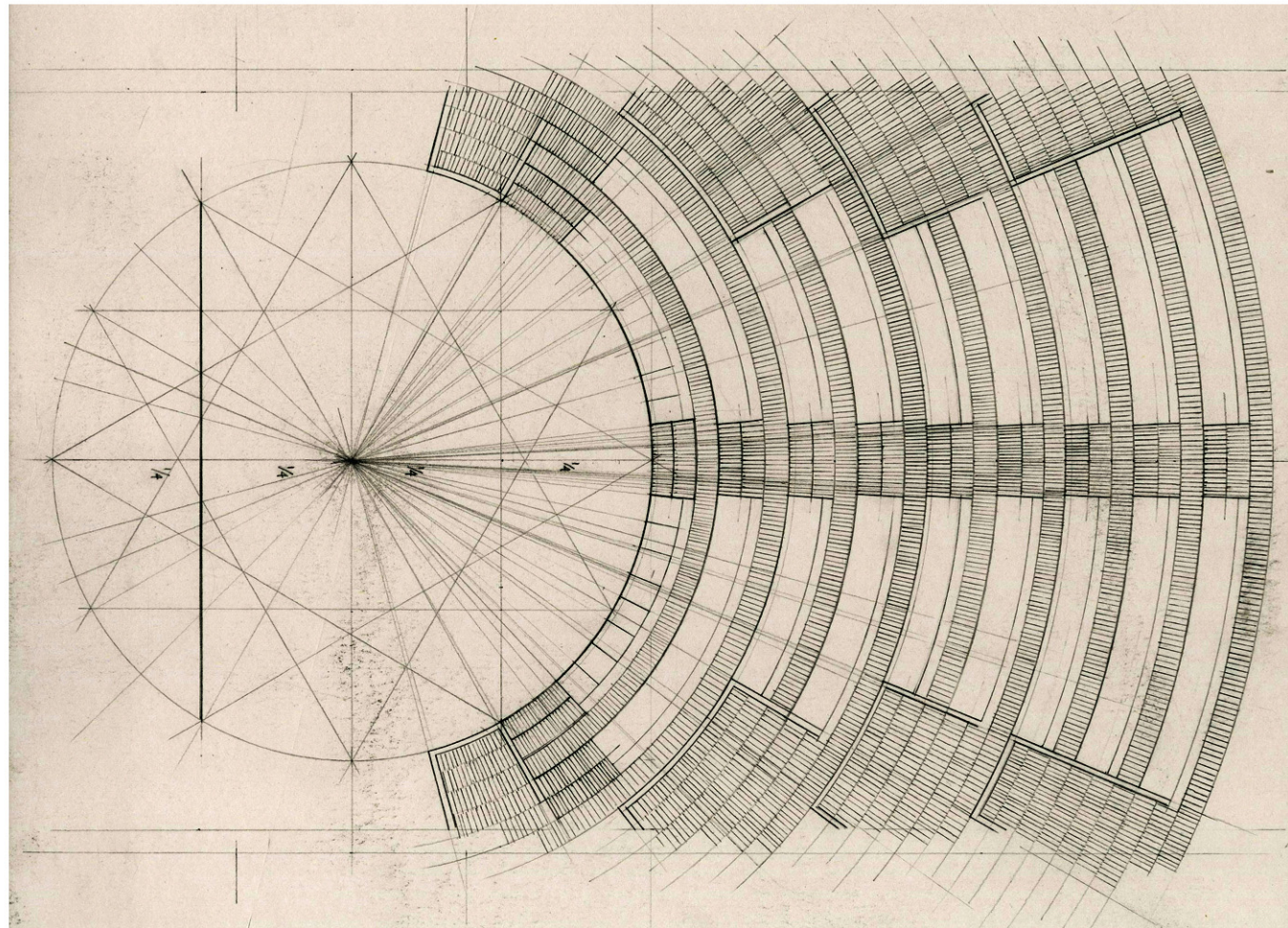


perspective mask 6



*modulor* is based on an individual unit of terracotta, which length equals three times its width and six times its thickness.

There are one hundred forty four units on each side of the building footprint.



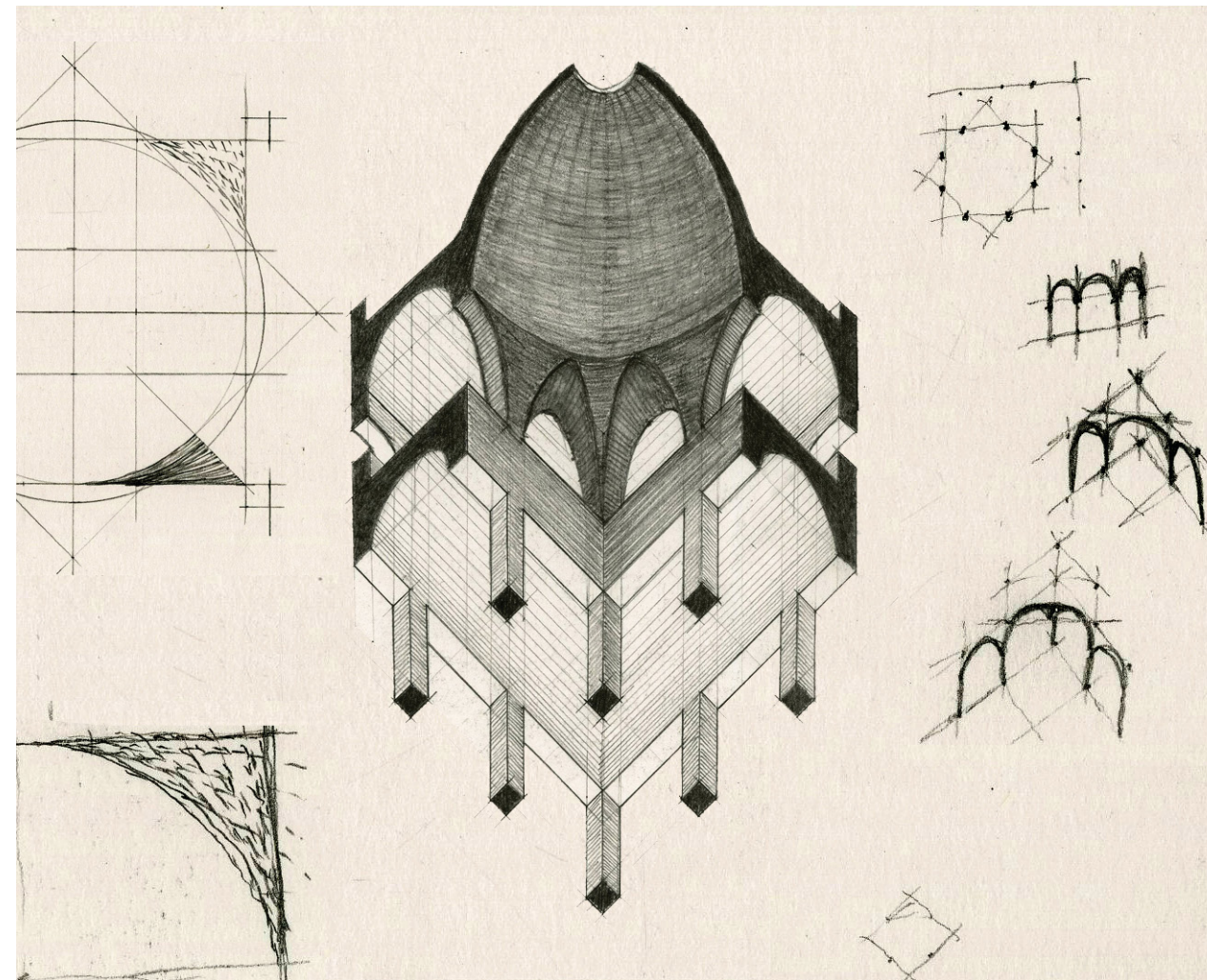
*theatrum* – plan (left), section with partial elevation (right)

**City on the Hill**

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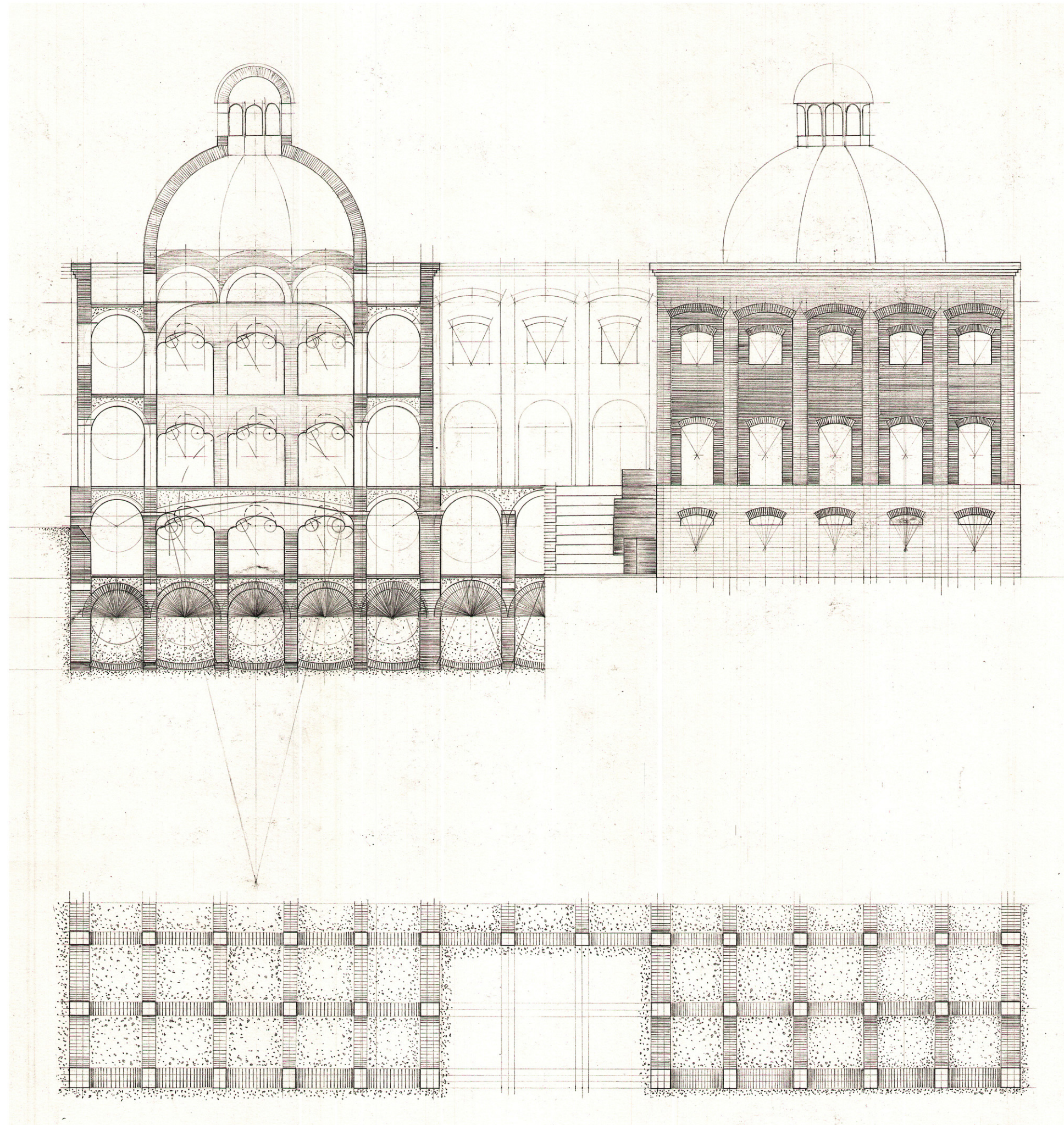
***sogno della verità***

*atto secondo*

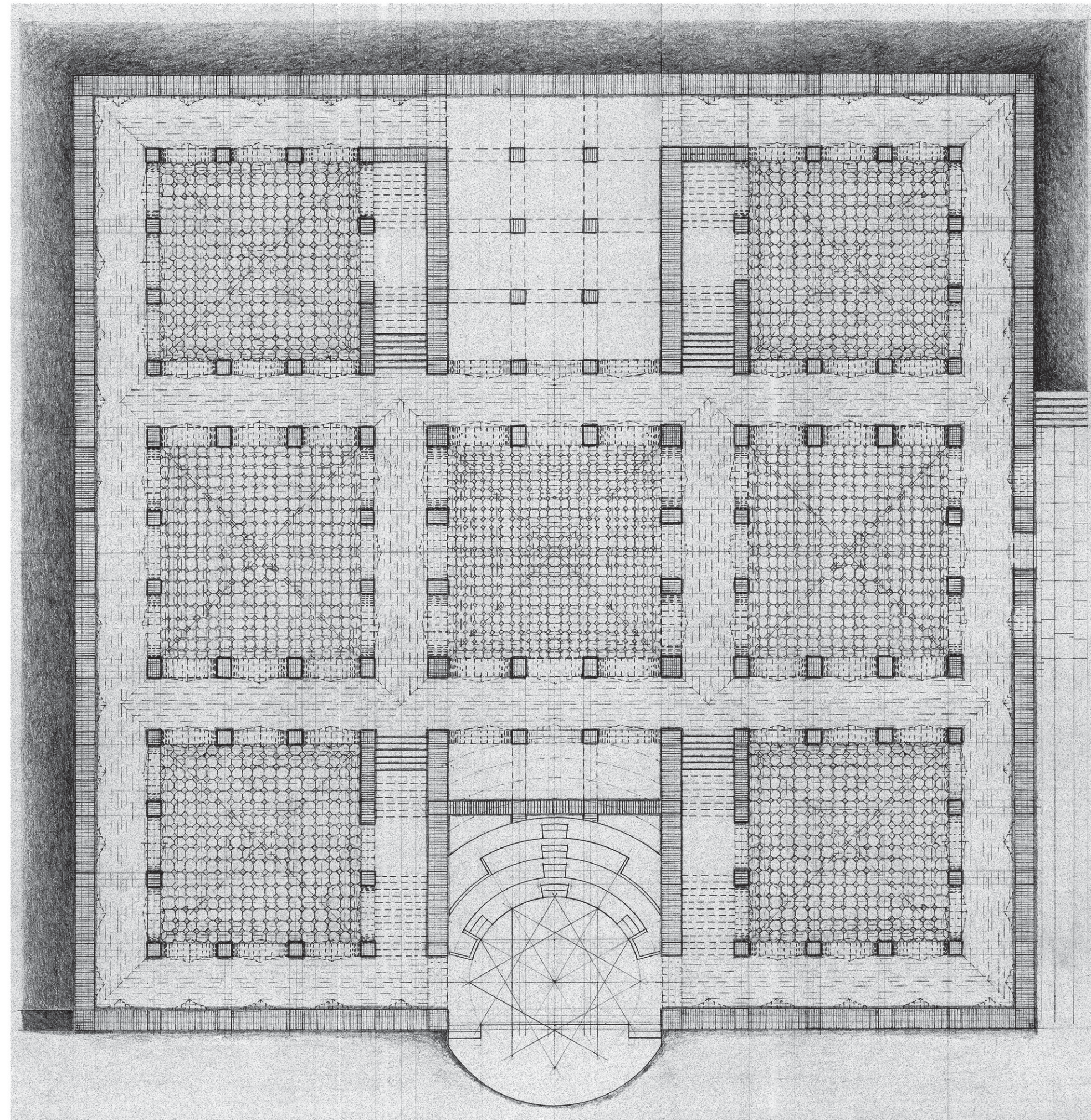
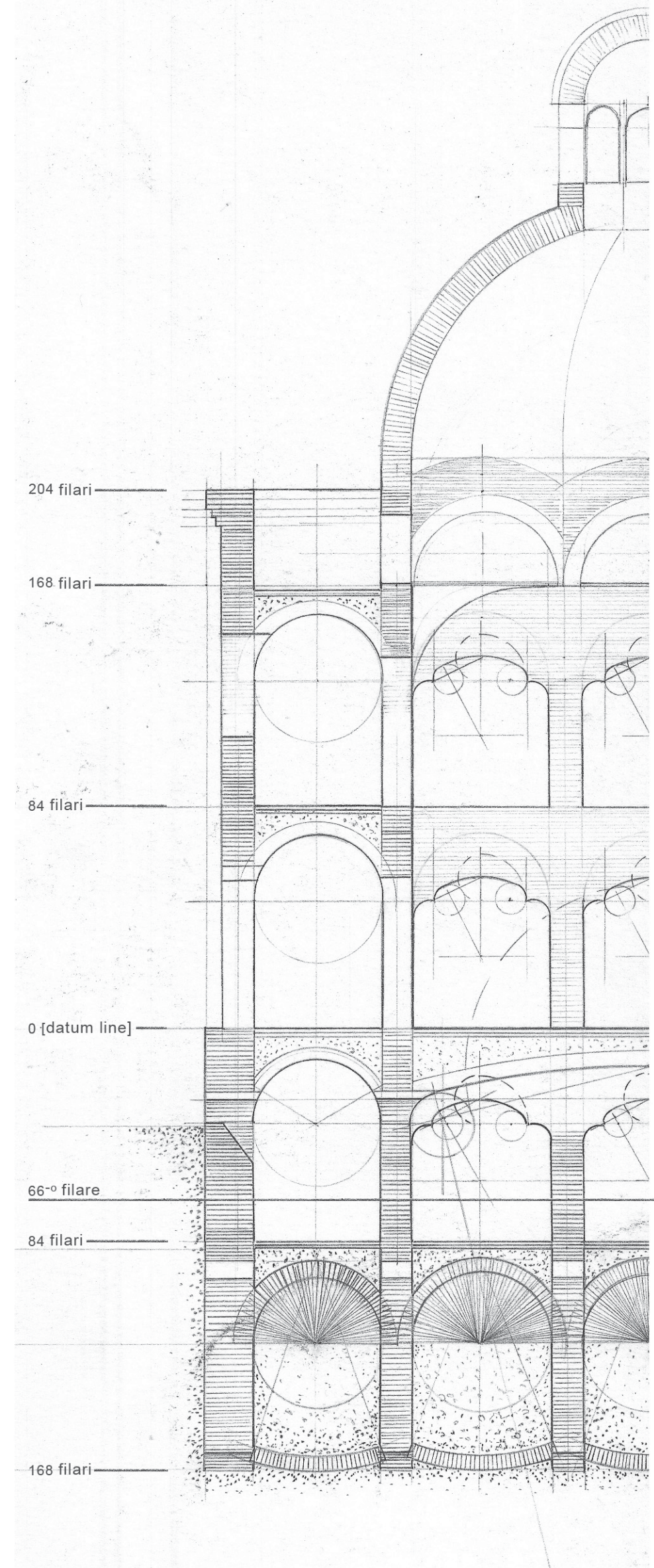


Legend wants the set to be at the foot of *Alban* hills on *Mons Albanus*, overlooking the *Alba Longa*.

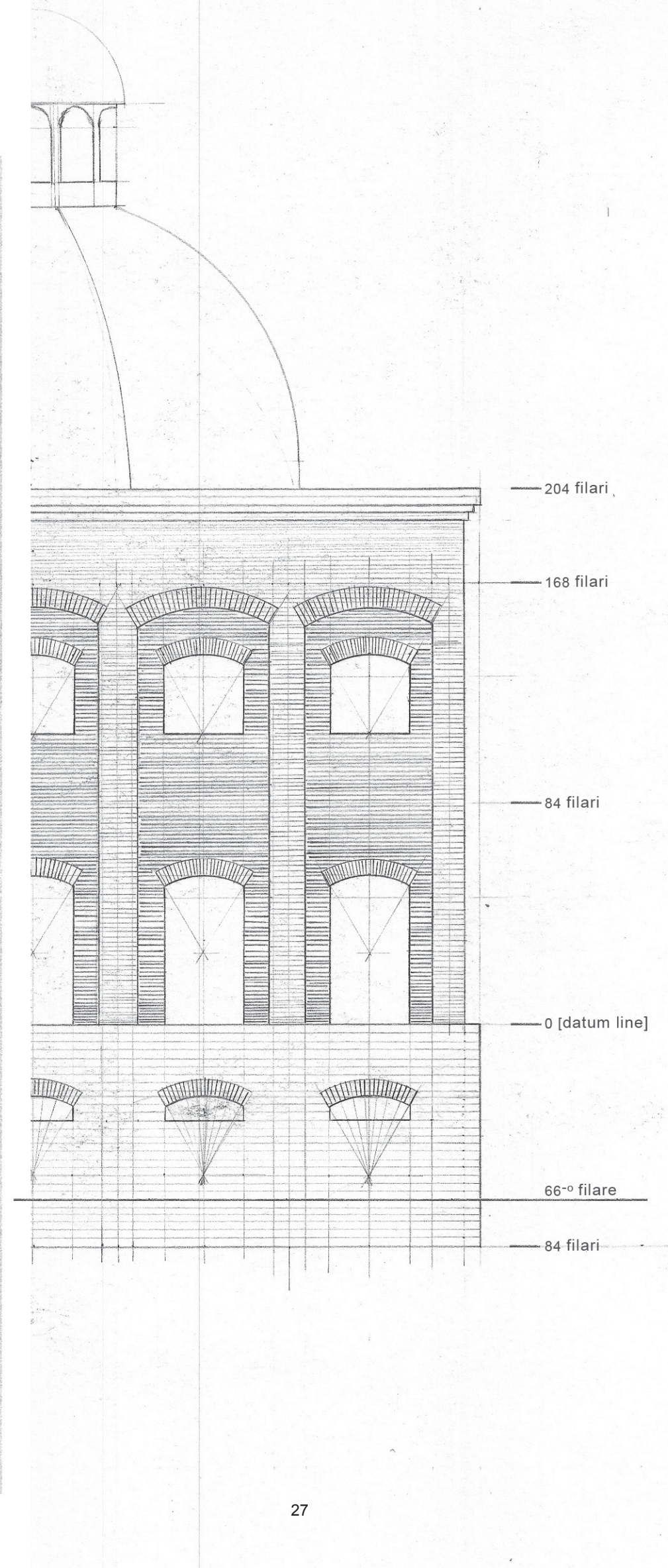
circle over square



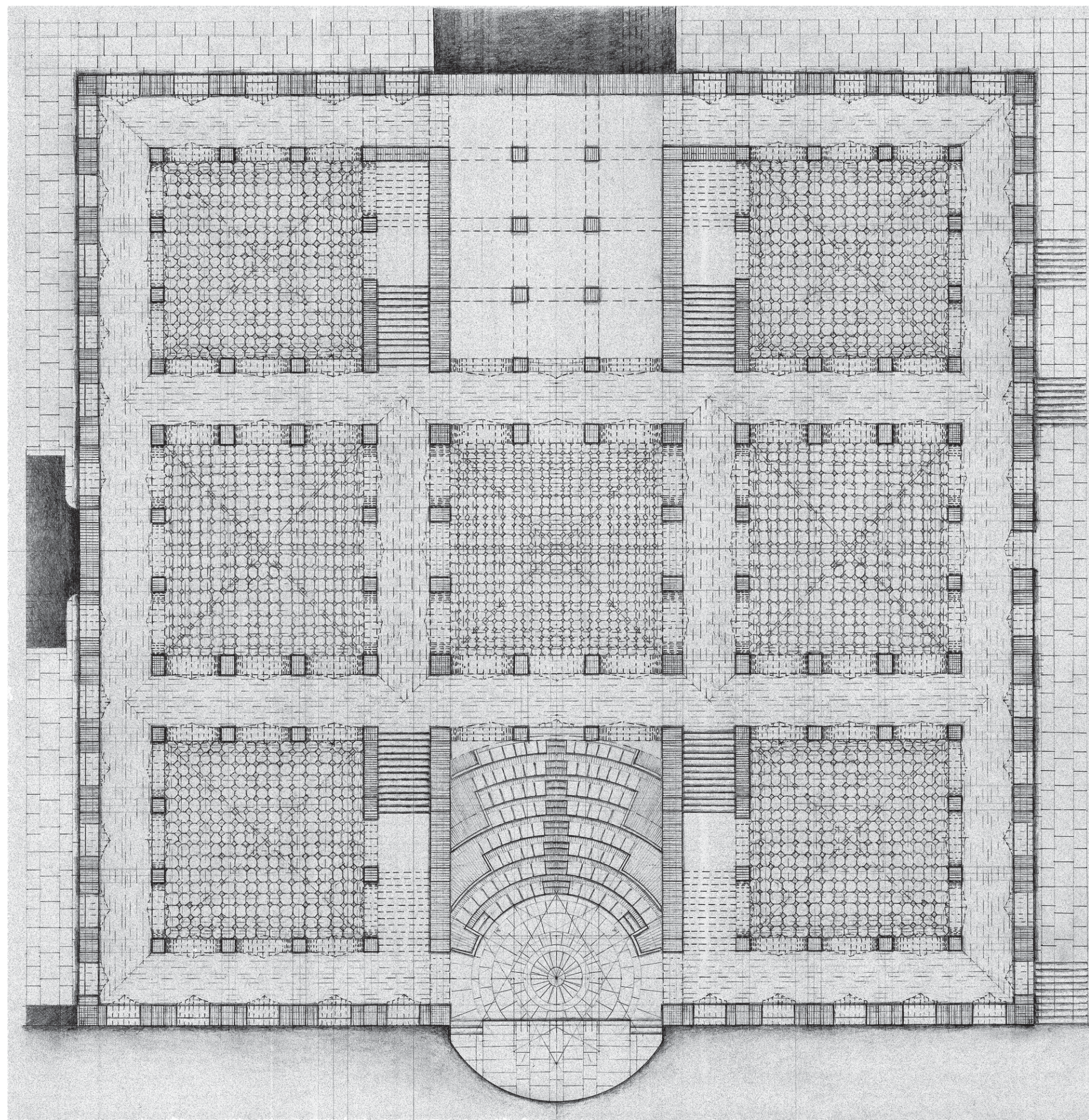
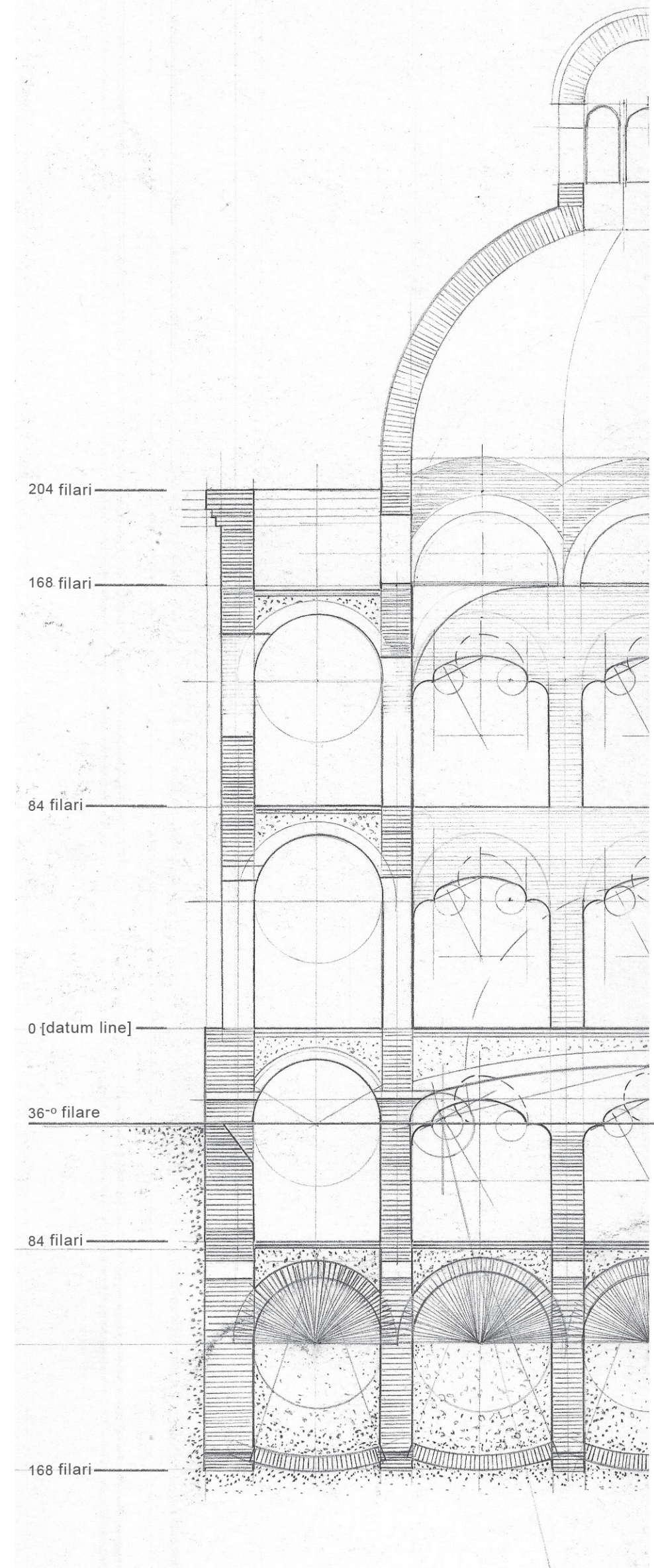
section with partial elevation



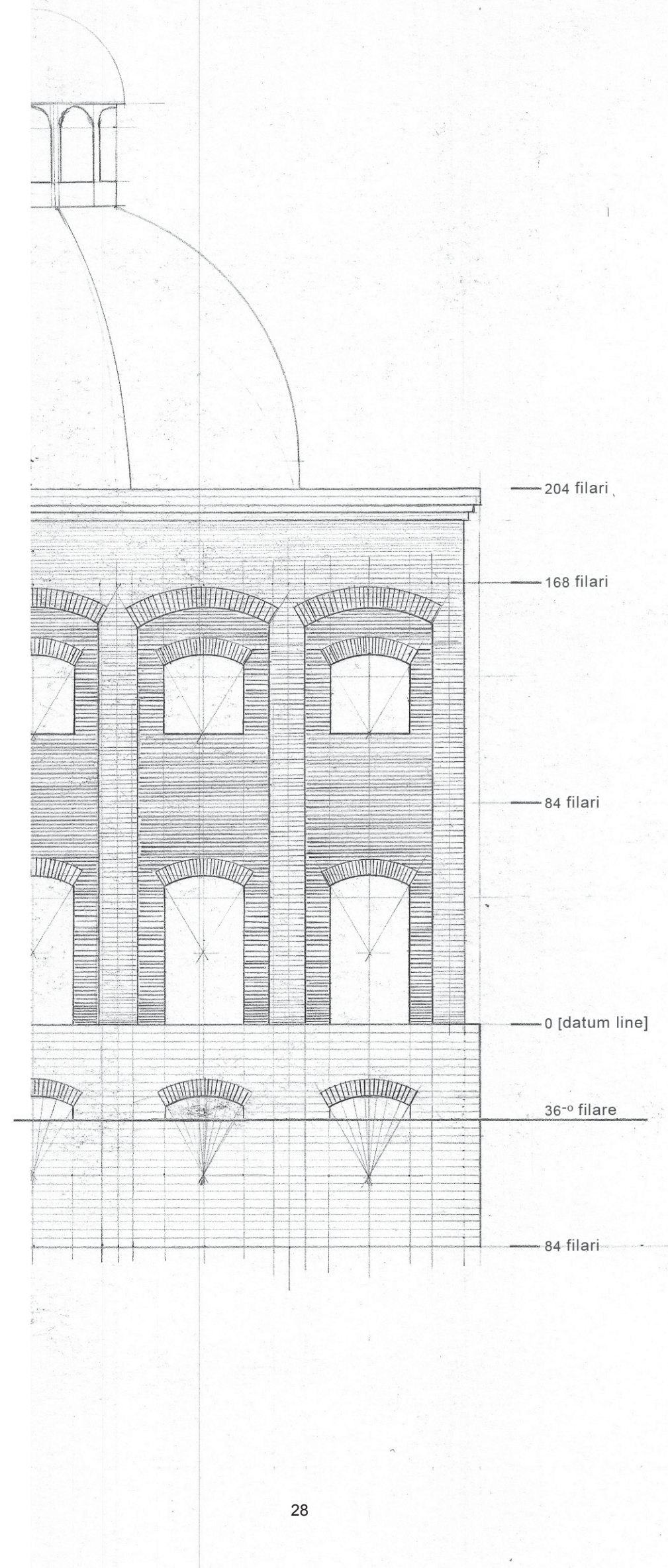
*pianta del piano terra – 66° filare*

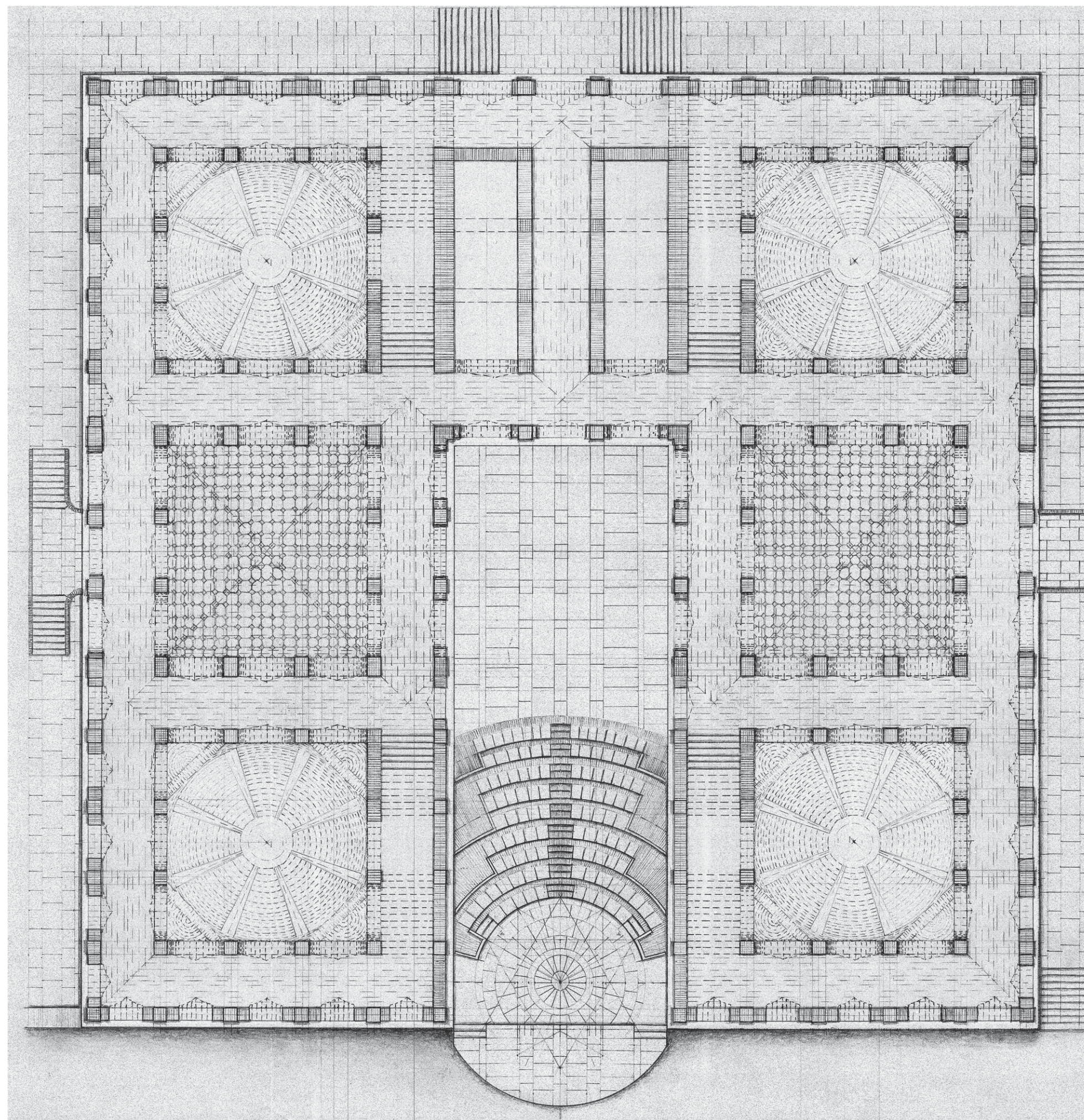
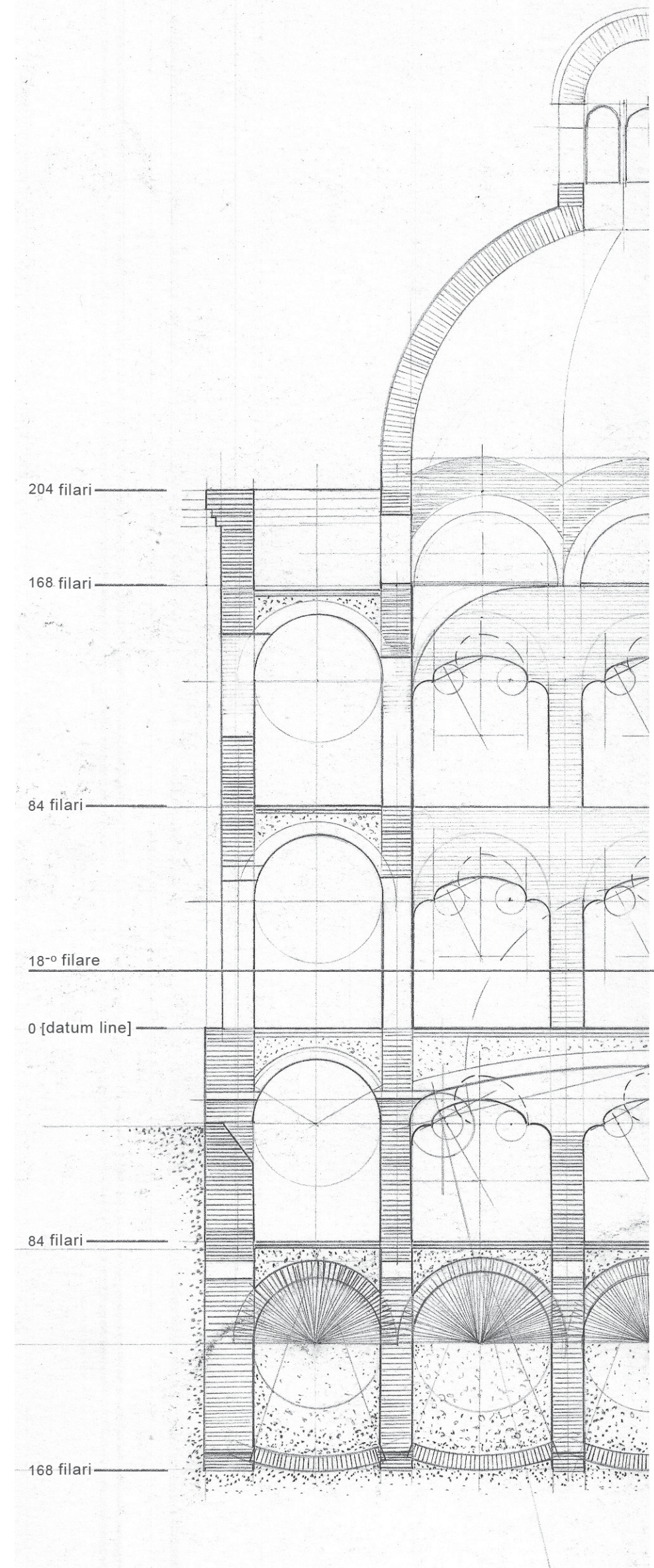




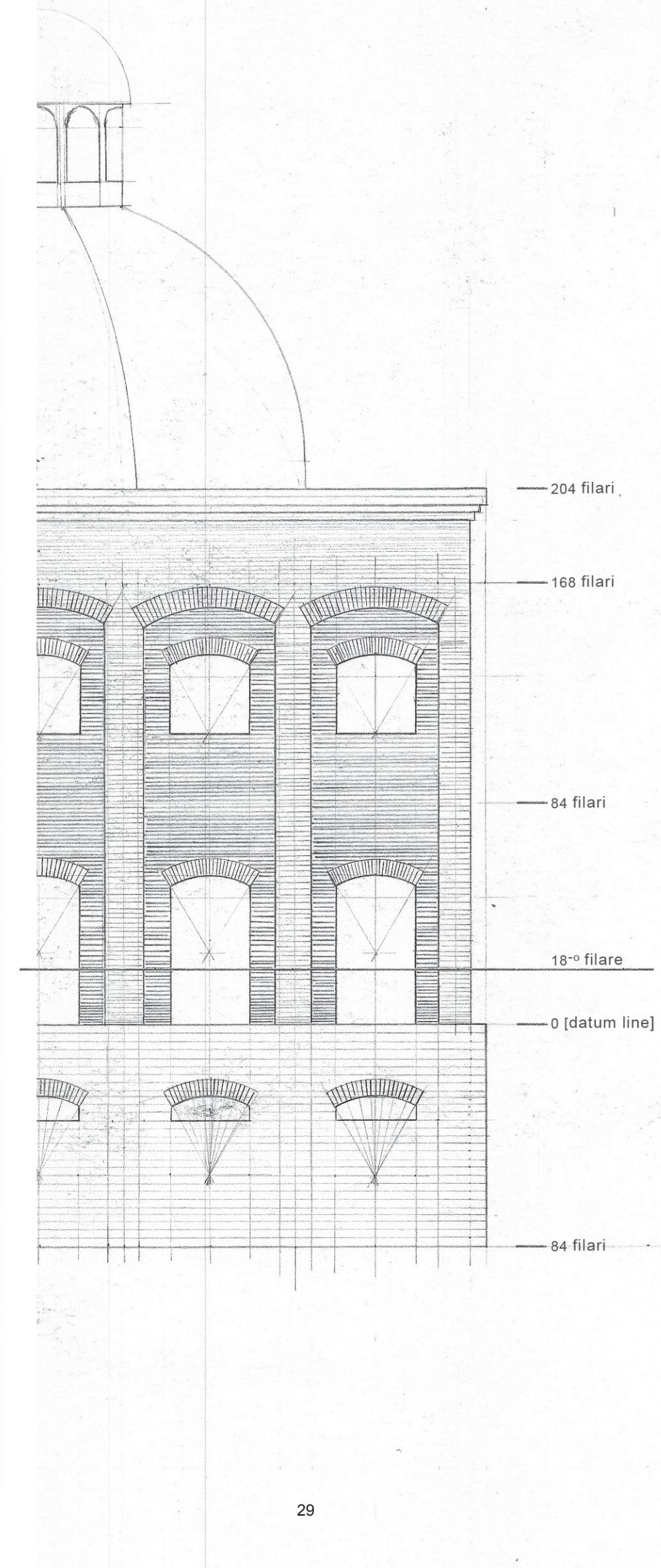


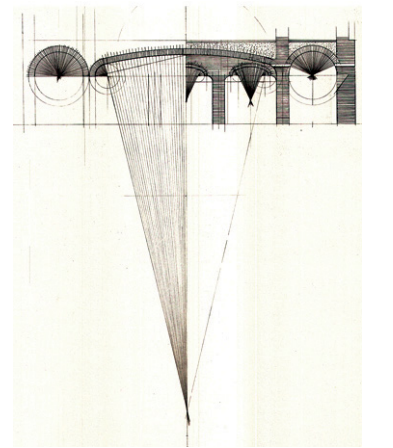
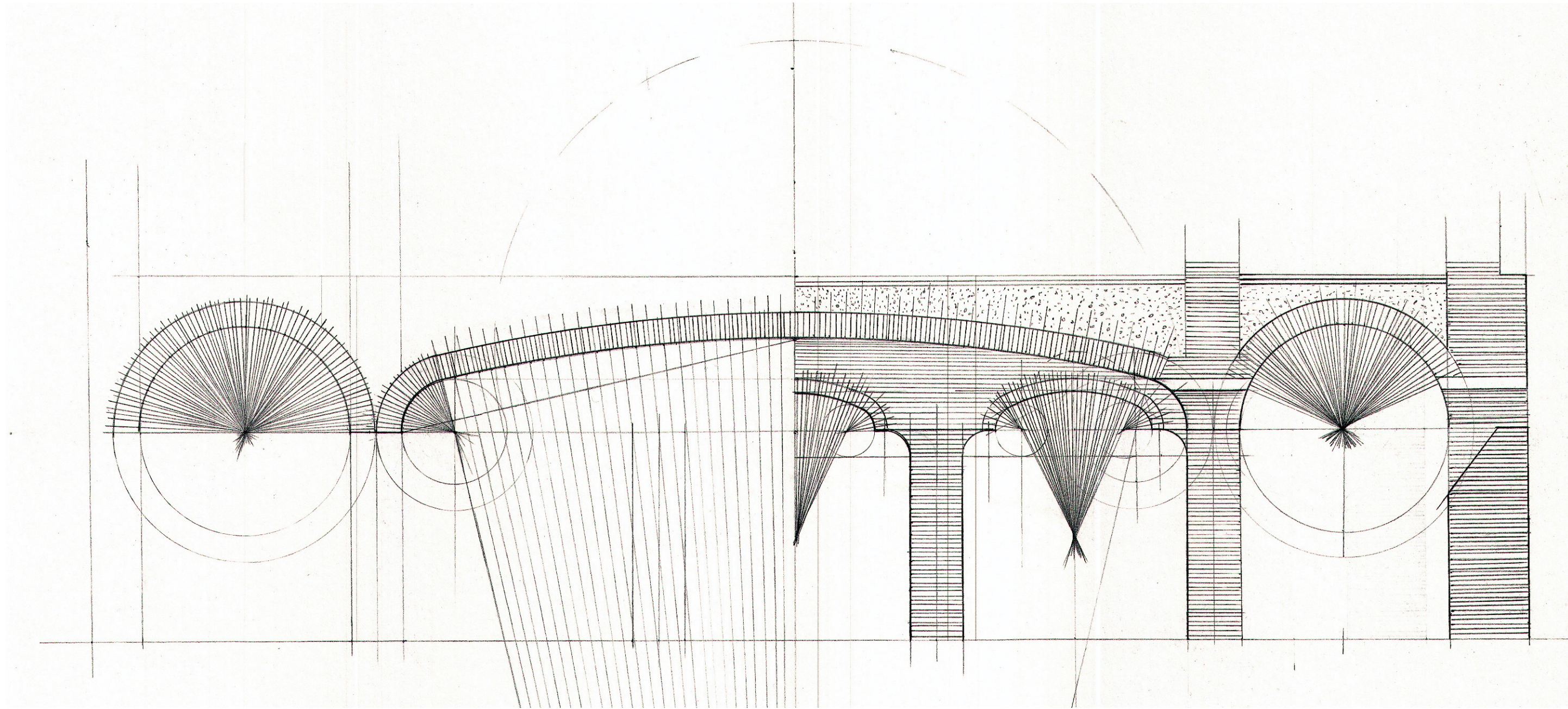
pianta del piano terra - 36° filare

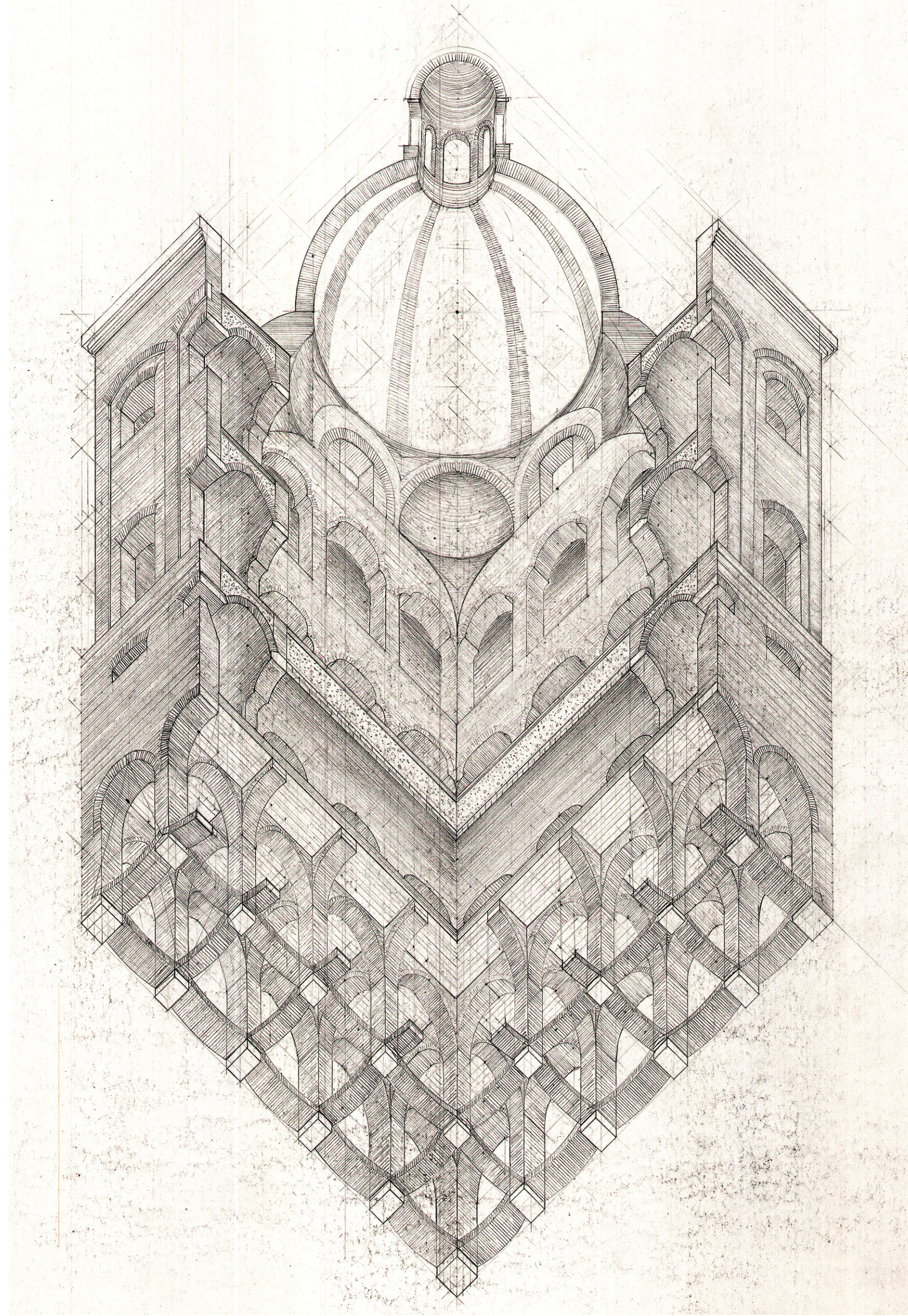




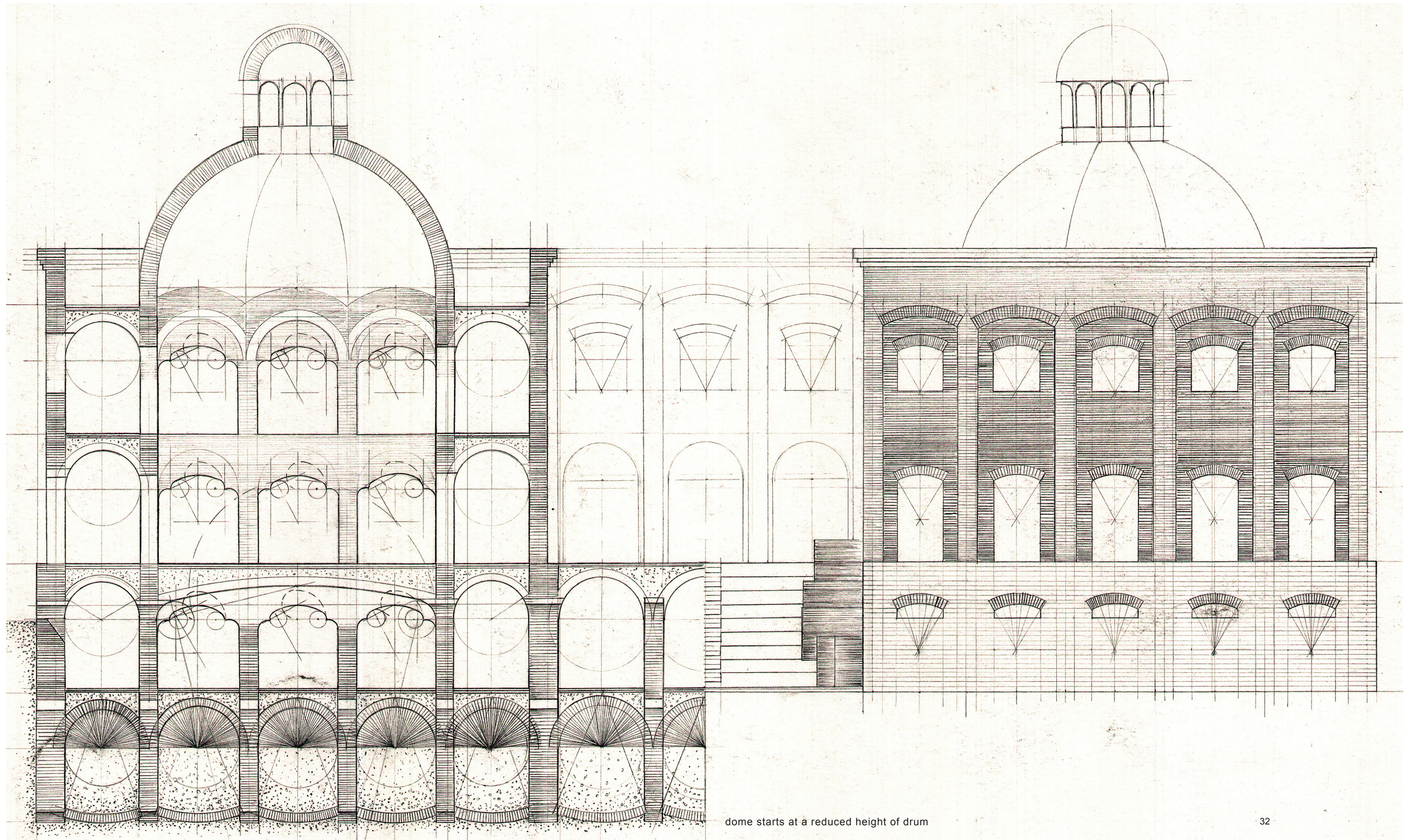
*pianta del piano nobile – 18° filare*



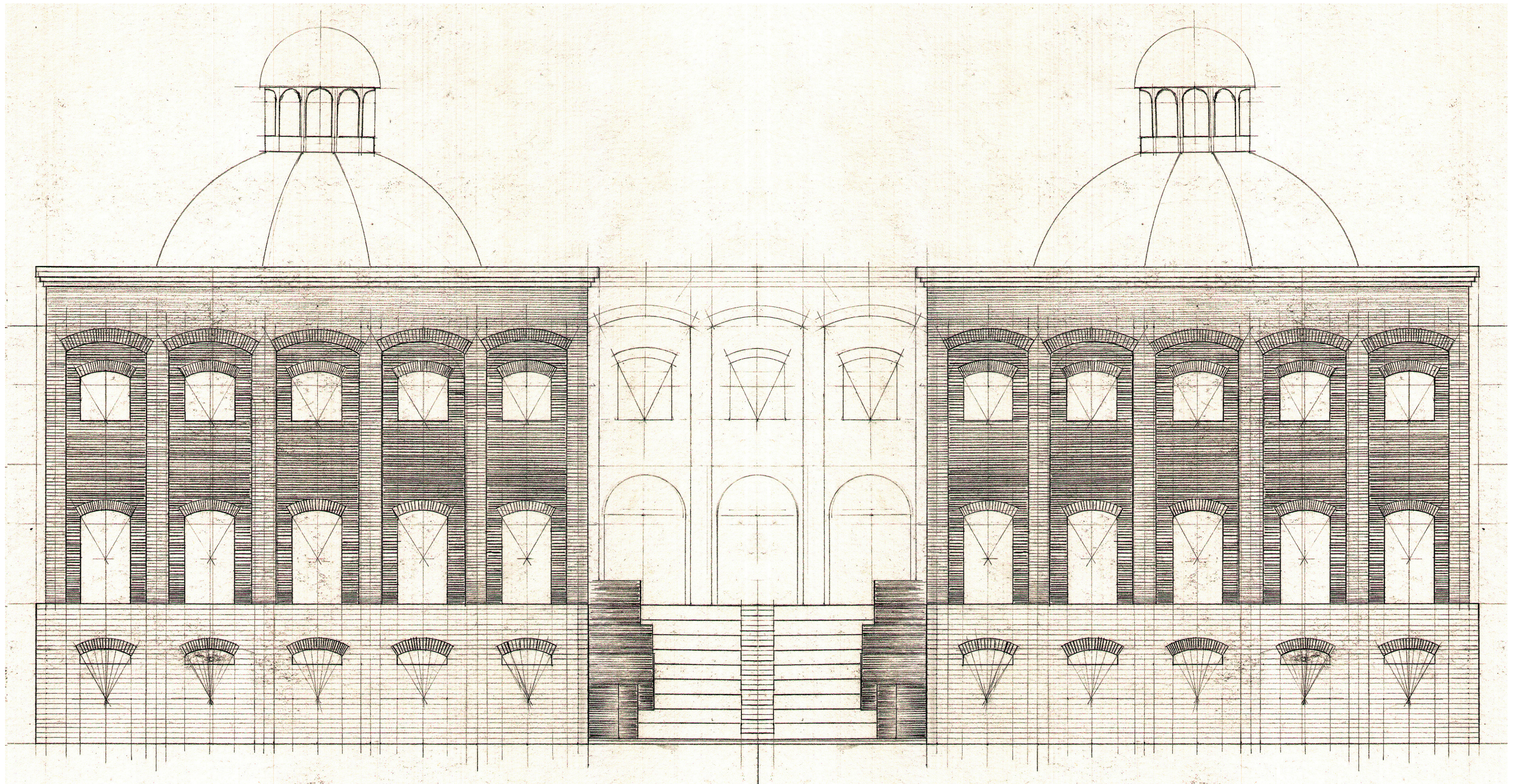




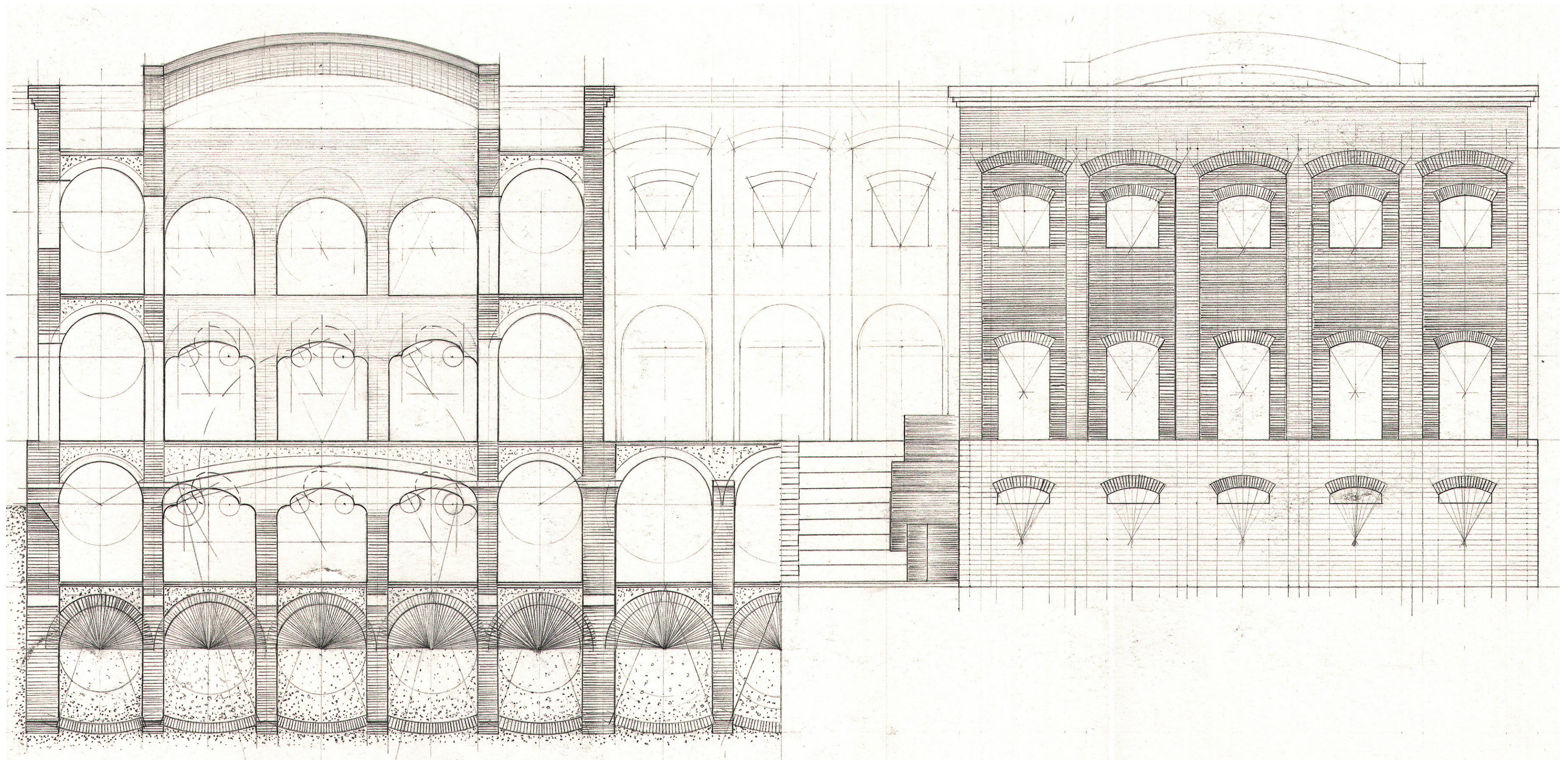
cutaway  
axonometric  
of interior corner  
and dome



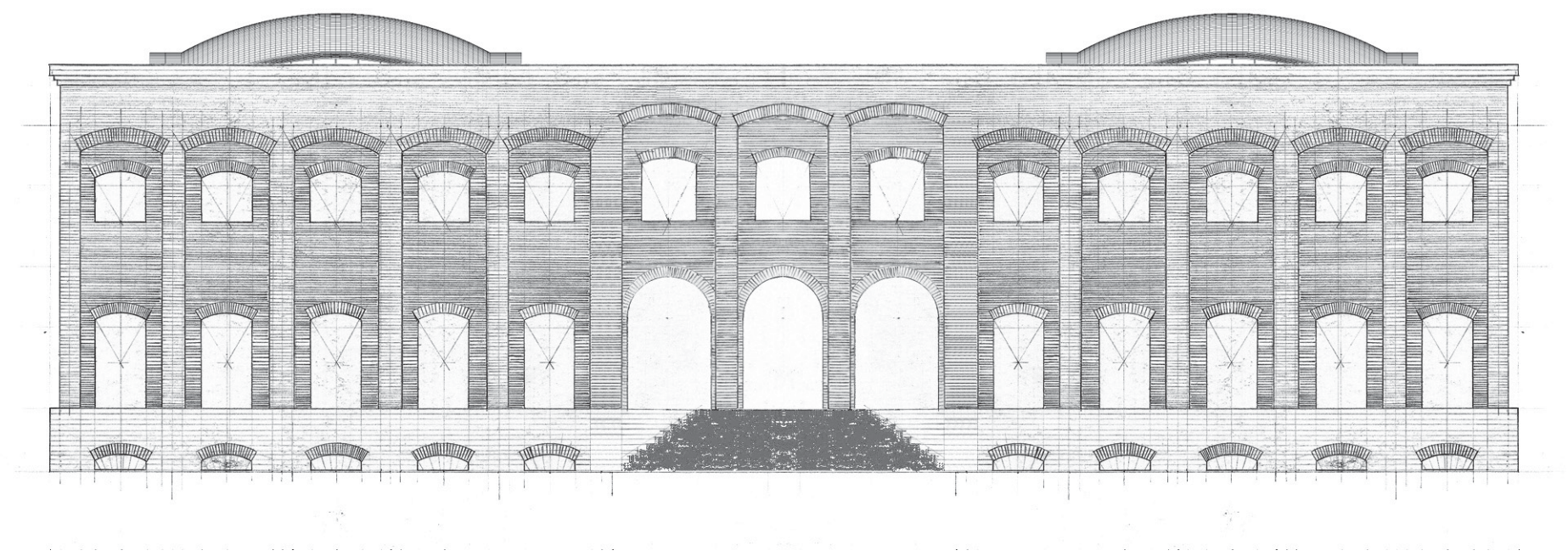
dome starts at a reduced height of drum



rear elevation



*terracotta* tile vaults replace hemispherical domes



front elevation



## **City on the Hill**

*Palazzo della Commedia*

“I need geometry to see distinctively where Alba is situated, at the foot of the Alban Hills on a promontory, in the saddle of this gorge. I need geometry and the simple science of language to draw the chiasma of Mettius and the distressing star of his dispersion. I need analysis and science to see Alba in the mist of its atoms of dust, the last scattered parts of the destroyed city like the limbs of its dictator, houses in ashes and laurels in powder. So I need Evander, the son of Hermes, in order to see it clearly; I need Athens in order to evaluate the Alban indeterminacy. Livy, bringing in history and the rite of Hercules, no doubt needed them as well. I need to know what time and history are in order to evaluate the river of Albula in its valley tears. I need Jerusalem for the coding of history on the white, indeterminate river. I remain Judeo-Greek in logos and in time.” <sup>7</sup>

## **epilogo**

## City on the Hill

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### notes

1. George R. Collins, (1963). Antonio Gaudi: Structure and Form. *Perspecta*, 8, 69.

2. George R. Collins, (1968). The Transfer of Thin Masonry Vaulting from Spain to America. *Journal of the Society of Architectural Historians*, 27(3), 189.

3. George R. Collins, (1963). Antonio Gaudi: Structure and Form. *Perspecta*, 8, 72.

4. Rafael Guastavino, (1893). Essay on the theory and history of cohesive construction, applied especially to the timber vault (2d ed.). Boston: Ticknor, 148.

5. Drawings constructed in true axonometric mode, according to Fritz Hohenberg, (1956) *Konstruktive Geometrie für Techniker*, Springer-Verlag, Wien, 111.

6. Perspectives shown throughout this work are based on the *metodi pratici della prospettiva* of Mario Ridolfi, & Consiglio nazionale delle ricerche (Italia). (1946). *Manuale dell'architetto*. Roma: Ufficio informazioni Stati Uniti, A 7b.

7. Serres, Michel. (1991). *Rome : the book of foundations*. Stanford, Calif.: Stanford University Press, 61.

## City on the Hill

### *Palazzo della Commedia*

#### annotated bibliography

Collins, George R. (1963). Antonio Gaudi: Structure and Form. *Perspecta*, 8, 64.  
Retrieved August 12, 2010, from <http://www.jstor.org/stable/1566905>

According to Collins, the character of mortar used in the Catalan vaulting procedures is very important and it takes up to 50% of the depth of masonry. Use of plaster of Paris for the first layer of tiles is due to its fast setting qualities.

Collins, George R. (1968). The Transfer of Thin Masonry Vaulting from Spain to America. *Journal of the Society of Architectural Historians*, 27(3), 177.  
Retrieved July 12, 2010, from <http://www.jstor.org/stable/988501>

Rafael Guastavino divided architecture in two categories: the gravity system where the load distributes from the center sideways-down like in the case of an arch, and the cohesive system in which the adhesion friction is the stabilizing device. To the second system also belong Roman, Byzantine, and Islamic architecture. Guastavino was more inclined towards Persian, Byzantine, and Moorish styles.

Collins, George R. (1968). The Transfer of Thin Masonry Vaulting from Spain to America. *Journal of the Society of Architectural Historians*, 27(3), 180.  
Retrieved July 12, 2010, from <http://www.jstor.org/stable/988501>

Tile vault, compared to the stone or brick vaulting, is very light and due to cohesive effect acts as a monolithic structure and it causes very little lateral thrust, allowing so for low rise at the center.

Neumann, Dietrich. (1999). The Guastavino System in Context: History and Dissemination of a Revolutionary Vaulting Method. *APT Bulletin*, 30(4), 9-10.

Retrieved July 12, 2010, from <http://www.jstor.org/stable/1504703>

The author offers an exposé of the Guastavino vaulting system in the context of Catalan vaulting technique, and its influence on modernist movement in the 20th century. Le Corbusier's *Maison Jaoul* (Paris, France) uses the Catalan vaults as permanent formwork in the barrel vaults influenced by the Roman use of the tile vaults as permanent centering.

Parks, Janet. (1999). Documenting the Work of the R. Guastavino Company: Sources and Suggestions. *APT Bulletin*, 30(4), 21-25.

The sample of Guastavino tile taken in consideration by the author is a standard corrugated rough tile of dimensions; 15"x6"x1".

Pelt, R. J. van, & Westfall, Carroll William. (1991). *Architectural principles in the age of historicism*. New Haven: Yale University Press, 138-167.

Westfall states, "A building type is a generalized idea of a building, containing within it all the possible examples of actual buildings of that type that have been and can be built."

Type can be seen as part of flexible terminology in classical terms. Vitruvius in his *De Architectura* uses the term kind for type as for grouping of the kinds of rooms, courtyards, kinds of orders of columns, and so on. Alberti categorized buildings based on their purpose they were to serve, situated within the city's political community. Furthermore he made the distinction between sacred and secular, public and private. Other Alberti's distinctions dealt with the size of buildings, and differences consisting in the amount of ornaments used in buildings.

"... the beauty of the thought was conveyed in the form of the whole rather in the logical interconnection of all individual parts."

Cartesian definition of building type allows only for certainty based on person's own judgment, a rejection of Alberti's theory of unity. Division of the whole into various levels of difficulty, and as many parts as possible would put a person in control of the outcome. This could very well be considered as the point of *capovolgere* of the classical theories.

Nevertheless, a type represents a continuum that exists beyond the time of past and present. It is true to its nature and it is not identifiable by time. It exists through the symbol of its purpose.

Serres, Michel. (1991). *Rome : the book of foundations*. Stanford, Calif.: Stanford University Press, 61.

"I need geometry to see distinctively where Alba is situated, at the foot of the Alban Hills on a promontory, in the saddle of this gorge. I need geometry and the simple science of language to draw the chiasma of Mettius and the distressing star of his dispersion. I need analysis and science to see Alba in the mist of its atoms of dust, the last scattered parts of the destroyed city like the limbs of its dictator, houses in ashes and laurels in powder. So I need Evander, the son of Hermes, in order to see it clearly; I need Athens in order to evaluate the Alban indeterminacy. Livy, bringing in history and the rite of Hercules, no doubt needed them as well. I need to know what time and history are in order to evaluate the river of Albula in its valley tears. I need Jerusalem for the coding of history on the white, indeterminate river. I remain Judeo-Greek in logos and in time."