

An Urban Edge for Innovation & Reservation

create a figurative stage for students to perform their lives

Kejia Wu

September 10 , 2010

Blacksburg, Virginia

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

Master of Architecture

William U. Galloway, Chair

Howard S. Gartner

Heinrich Schnoedt

Steven R. Thompson

Keywords: plane frame wall, symmetry, distance, porosity, axis, enclosure, hierarchy, history, campus, center

Copyright 2010, Kejia Wu

An Urban Edge for Innovation & Reservation

create a figurative stage for students to perform their lives

Kejia Wu

a b s t r a c t

The architect, as a coordinator of complex conditions and different disciplines, has a role in the development of the master plan for the entire site, balancing technical innovation with appreciation for cultural inheritance. This thesis attempts to explore approaches to design decision making, as a response to a project's site, its history, and the larger cultural context.

The above issues are investigated through the design of a multipurpose building at the east end of the Drillfield on the Virginia Tech campus in Blacksburg, Virginia. The building will form a "stage" to accommodate the daily life of the campus. In addition, the proposal was conceived to:

- a. emphasize both axial and radial geometric features of the site;
- b. redefine the edge of the oval Drillfield;
- c. create magnetic force between the proposed building and the existing War Memorial Chapel;
- d. translate the idea into tectonics.

d e d i c a t i o n

This thesis is dedicated to my beloved grandmother for everything she gives me. With her love, trust, and courage, I believe I can do better and will definitely achieve my goals someday.

Grandma, thank you and I miss you.

a c k n o w l e d g e m e n t s

First and foremost, I would like to thank my committees, William Galloway, Howard S. Gartner, Heinrich Schnoedt, and Steven Thompson, for demonstrating how to do research, for giving me opportunities to make mistakes, for guiding me to finish this thesis.

I would like to thank my supervisors and friends at Perkins + Will, San Francisco office, for providing me the greatest experience to put my skills and knowledge into practice, for teaching me how to become an architectural professional.

I would like to take this chance to thank my studio peers for their help, critics, and companionships. I would also like to thank my roommates and all my friends in Blacksburg, for making my life in this small American town not so miserable. I would especially like to thank my boy friend, Jingwei Zhang, for making my last year at Virginia Tech the happiest time in my life.

Finally, I would like to acknowledge my family, especially my parents for their support on every little step of this twenty year long trek of education, from kindergarten through graduate school, from China to the USA.

table of contents

ii	title page
iv	abstract
vi	dedication
viii	acknowledgements
X	table of contents
02	introduction
03	site and analysis
15	the chapel
22	approach and idea
28	symmetrical or not
31	define a distance
37	form the curve
45	frame or wall
60	hierarchy and enclosure
67	photograph the model
74	bibliography



I n t r o d u c t i o n

In my previous experience of study, most of my time was spent trying to find right answers for the question, or to find evidence to prove whether it is right or not. I seldom thought of how to raise a question. This habit brought about a big issue when I started with my thesis. Should I choose a site, or propose the diagram first? Actually there is no answer. The essence of the architectural thesis is not the process of exploring the best results for the question, but a series of exercises to find out some key questions, which became the driving force for this book.

How does a campus topology born in the late 19th century respond to modern materials and construction techniques and acquire cultural relevance? This fundamental question can be discussed in terms of the logic of the structure and the relationship between the new building and existing ones. The thesis exploration began with a simple notion to create a permeable structure of interaction and communication that aims to link the past and future. The structure can provide flexible in-between spaces, where terraces, gardens, and rooms can be easily accommodated.

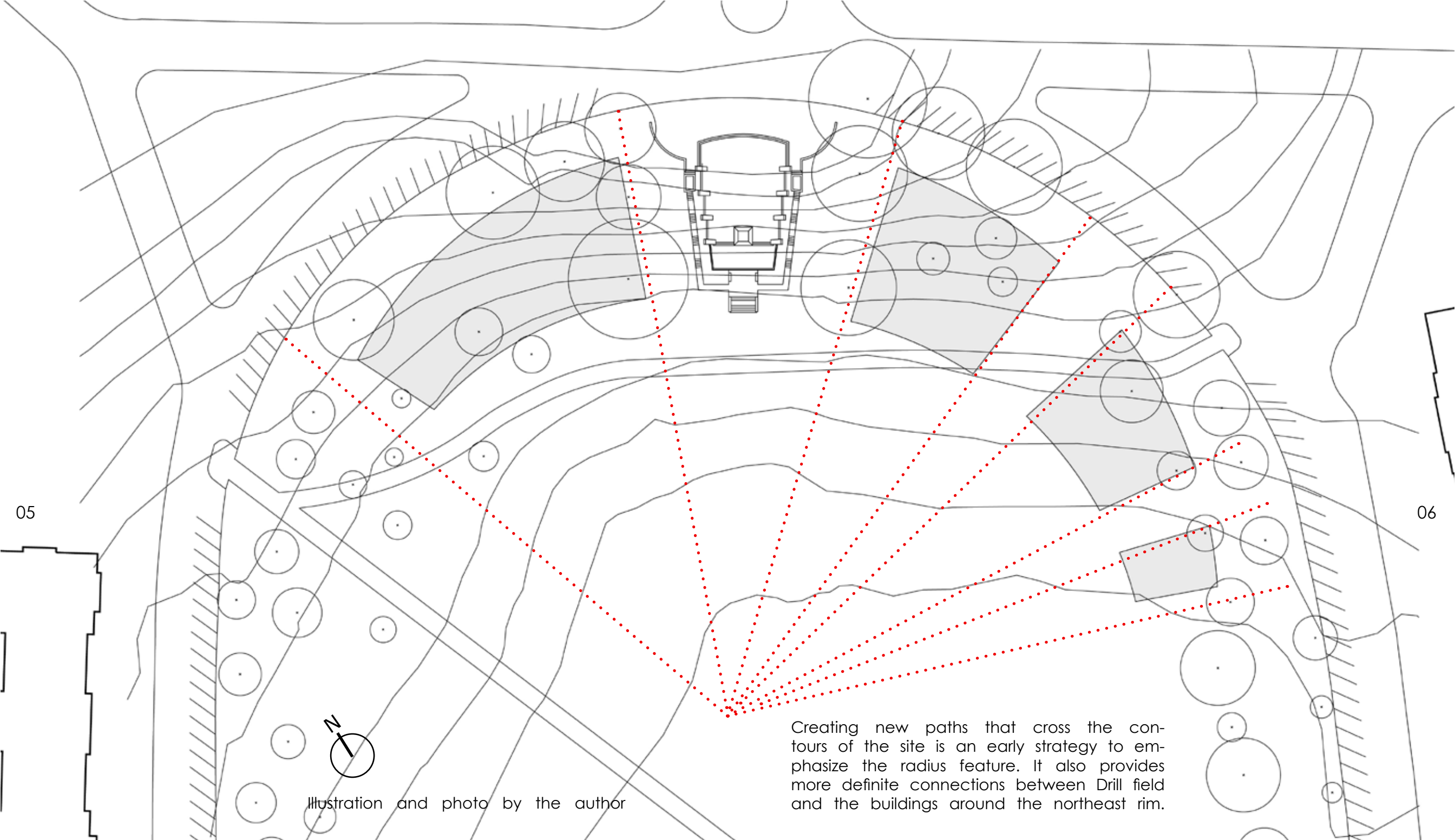
The building (I would rather to call it a big-scale "stage" on the Drillfield) offers both open and enclosed spaces for all kinds of performances and activities, while also providing a platform where students can watch the "show" on the Drillfield.

s i t e

Founded in 1872, the campus of Virginia Tech in Blacksburg, VA occupies 2,600 acres of rolling farmland with the largest full-time student population in Virginia. Evolving for 138 years, the campus development kept the characteristic of being "grand" and "heavy" as a research university and military school. The Drillfield, where the site is located, plays a significant role in the classic composition of the campus. The structure of the campus has a biaxial and centric theme, which is revealed clearly on the Drillfield. As the geometric center, the Drillfield dominates the system of the whole campus. Buildings and courtyard squares around the Drillfield are carefully articulated to form the oval shape.

Vehicles are not allowed to cross the Drillfield. There is a one-way loop road called Drillfield Drive around the rim, while pedestrian paths move across the Drillfield along the minor axis (north-south). The Drillfield retains its function as a drill and parade ground for the Corps of Cadets. It also develops as a social playground for students.

Background: Satellite site map



Creating new paths that cross the contours of the site is an early strategy to emphasize the radius feature. It also provides more definite connections between Drill field and the buildings around the northeast rim.





photos by the author

Burruss Hall on the north rim



Drill field Drive

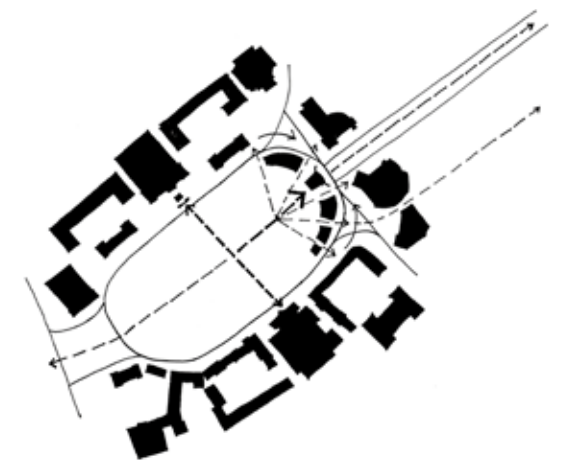


War Memorial pylon

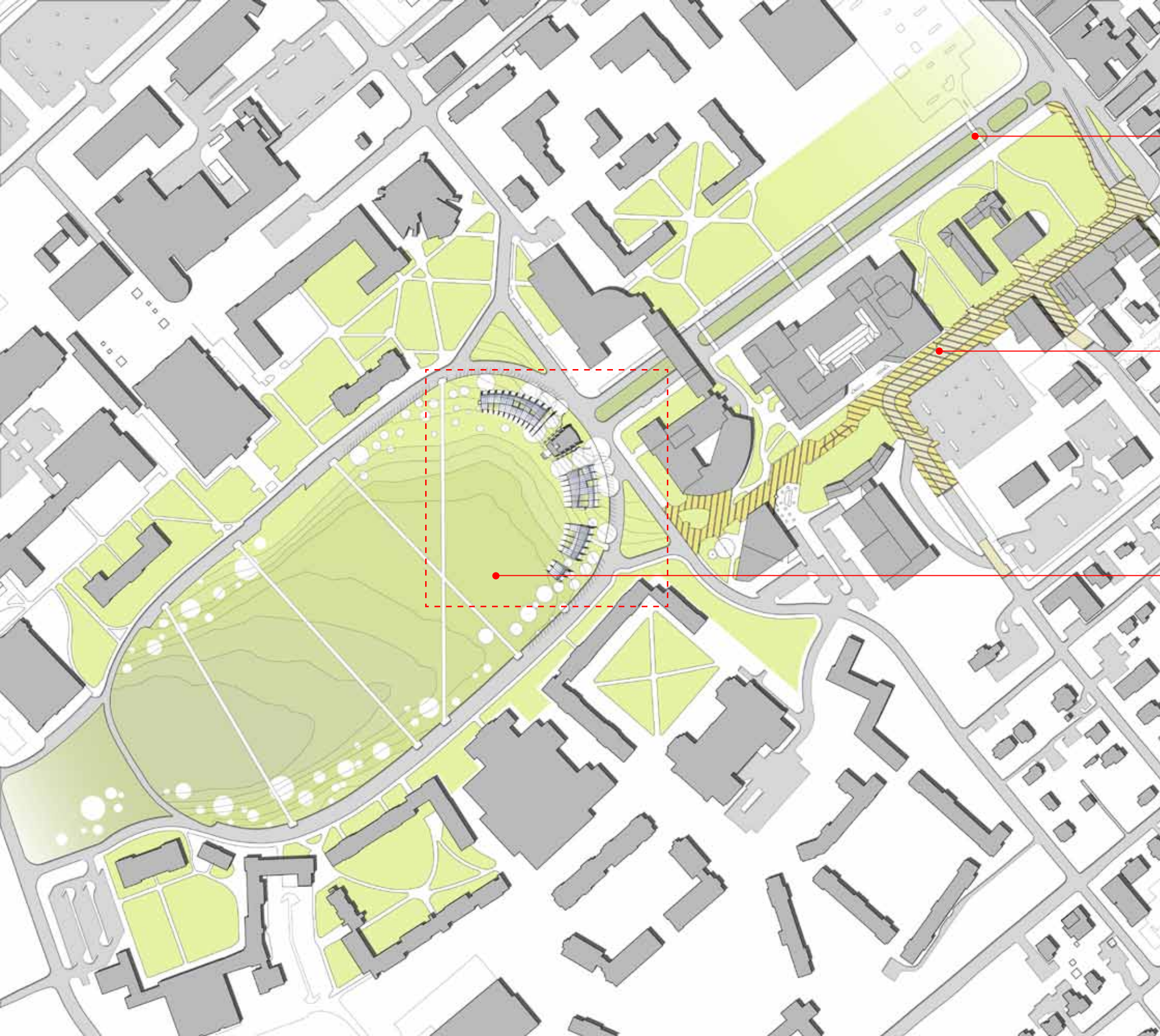
s i t e

The iconic building along the edge of Drillfield is the administrative building: Burruss Hall. It has some gothic elements and was built of local grey limestone. Burruss Hall and the gymnasium (War Memorial Hall) on the opposite side form the minor axis of the Drillfield and fill in the edge symmetrically. These heavy stone clusters have become an important part of the identity of the campus, referring to the school's military history and heritage.

However, limestone and collegiate gothic architectural style has been used excessively around the Drillfield. Adding a new building with modern design elements will be considered and tested within this project.



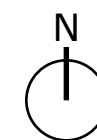
Analysis of the axial and centric forms on Drill field (Illustration by the author)



the "university mall"

college avenue

site: drill field



overall site plan
Illustration by the author



Illustration by the author

The "University Mall" is a gateway to commemorate the sons of Virginia Tech who made the ultimate sacrifice in the nation's wars. It runs from downtown to the War Memorial Chapel. The Chapel is not only a terminus of the Mall, but also a pivot point between the linear gateway and the oval space of the Drillfield. The imposition of the "University Mall" is similar to the Drillfield in dimension. It is also overlapped with the longer axis of the Drillfield (see left).

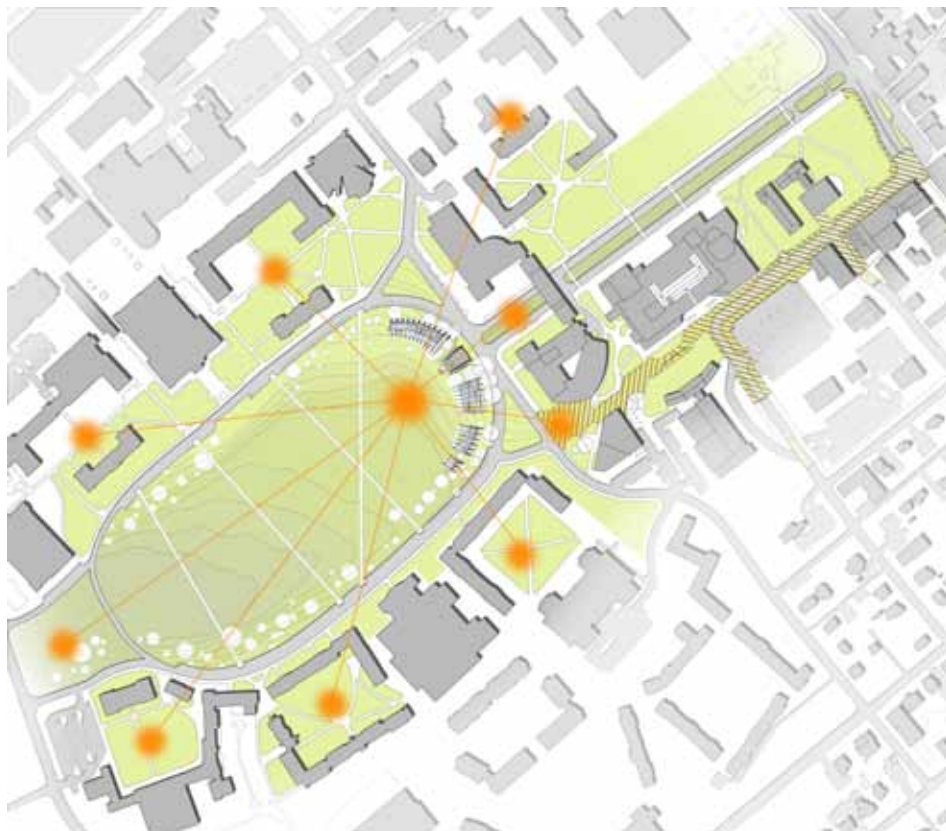


Illustration by the author

Green spaces and courtyard squares stretch out radially from the Drillfield (see left). As vertical elements, trees around the rim of the Drillfield help to define the oval space physically.

Another access from downtown to the campus is via College Avenue. Different from the "University Mall", this road has a more flexible arrangement for its commercial uses. This is a very dynamic place: shops, restaurants, and academic buildings merge together without clear boundary; and it rotates at the end to avoid direct alignment with the campus heart by offsetting from the major axis.

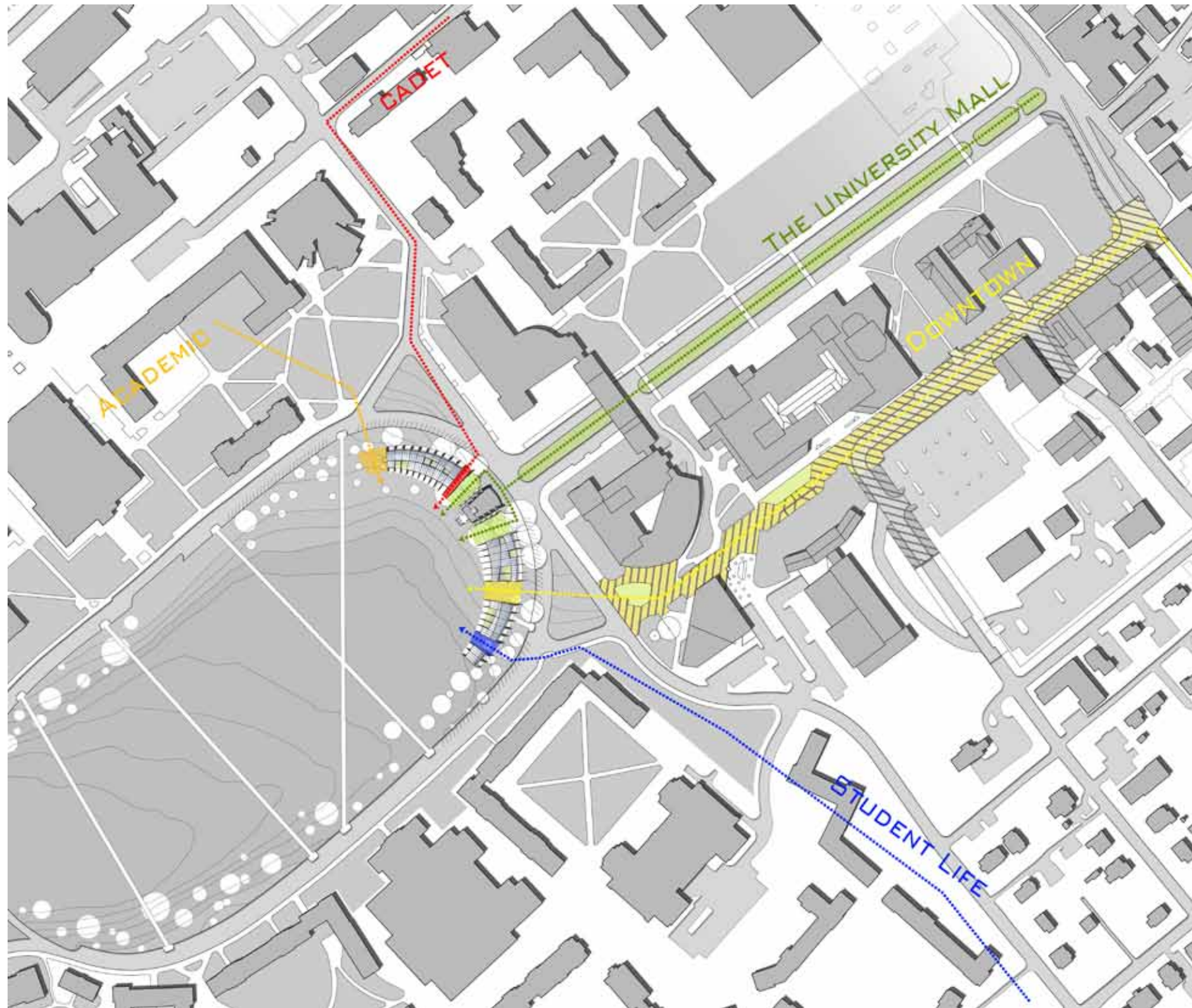
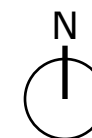


Illustration by the author

Organized around the Drill-field, academic/administrative buildings, library, chapel, dining hall, and dormitory are divided into several areas. The site is a place gathering all kinds of participations. As the drawing at left shows, five major accesses should be considered and well designed. The proposal is to create openings with different sizes along the edge. The height to width aspect ratio of the opening can be important to create a specific atmosphere.





15



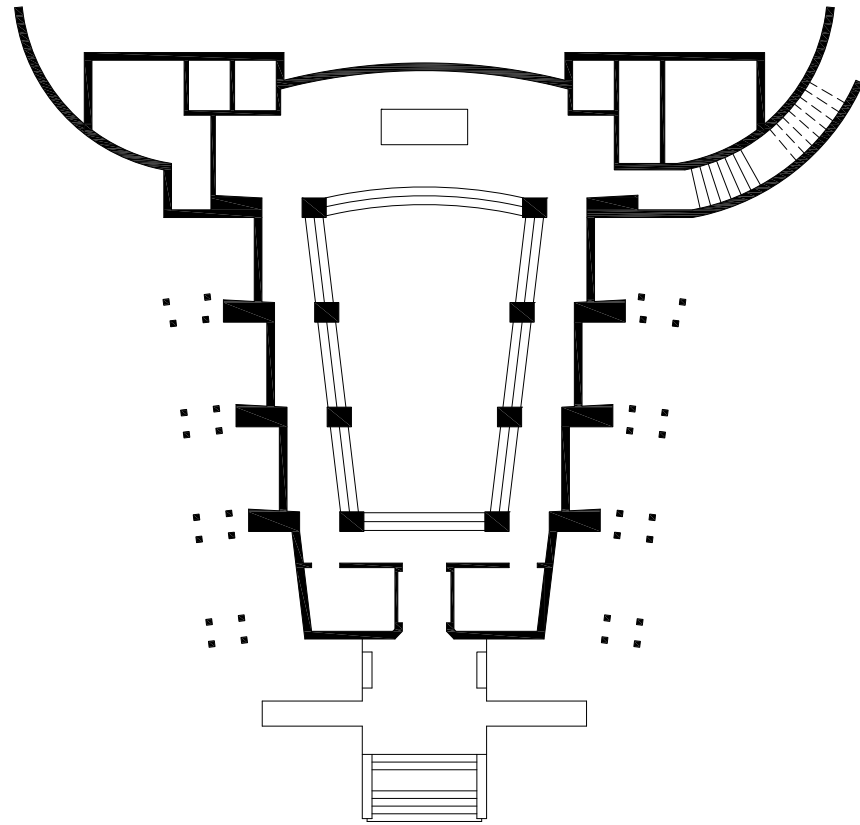
16

Photo by the author

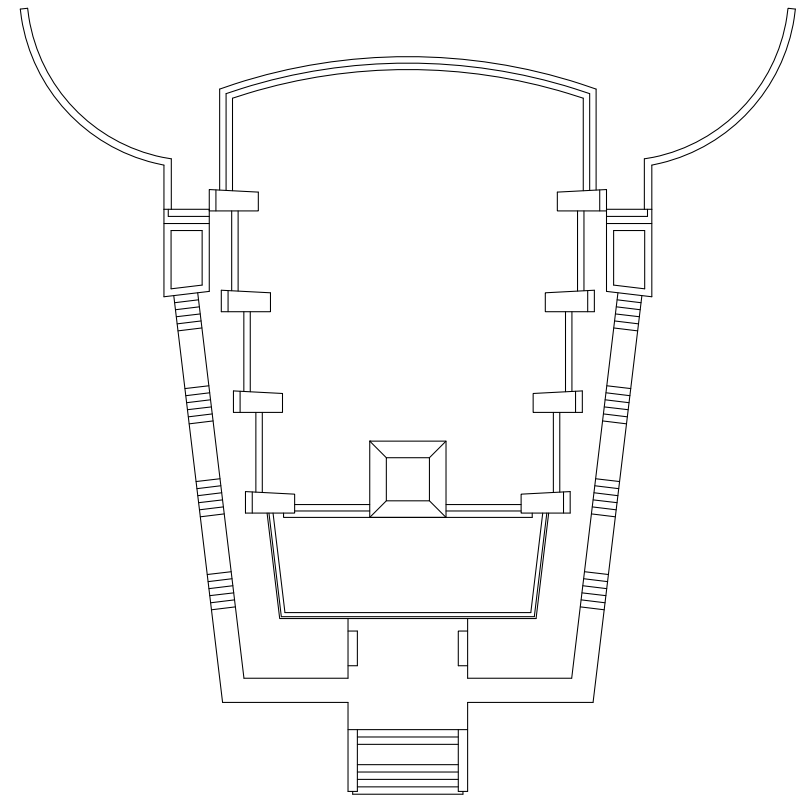
t h e c h a p e l

"This memorial is a shrine to fortify education with worship and inspiration. It is dedicated to those who gave their all; yet it is designed to inspire the living, especially the Virginia Tech graduates of the future." -- War Memorial Chapel by Virginia Polytechnic Institute and State University, 1962.

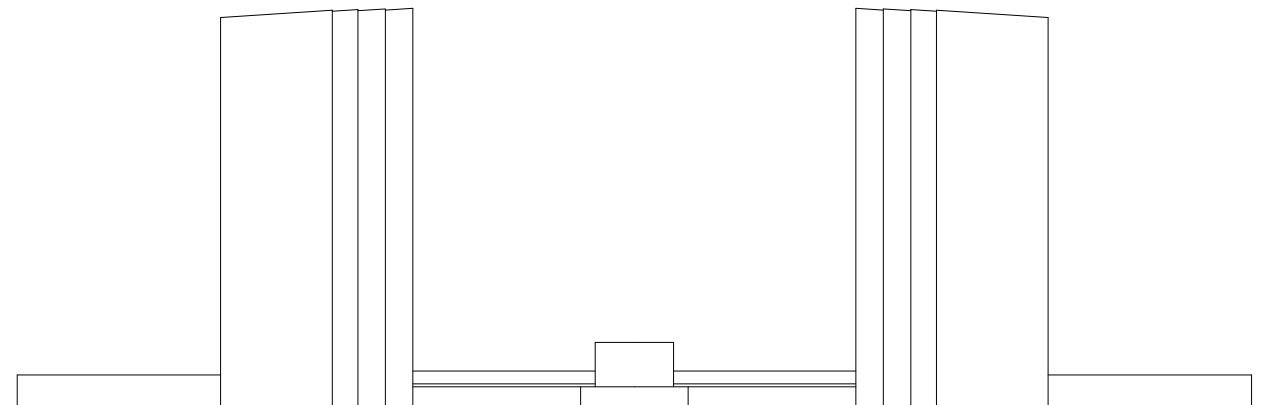
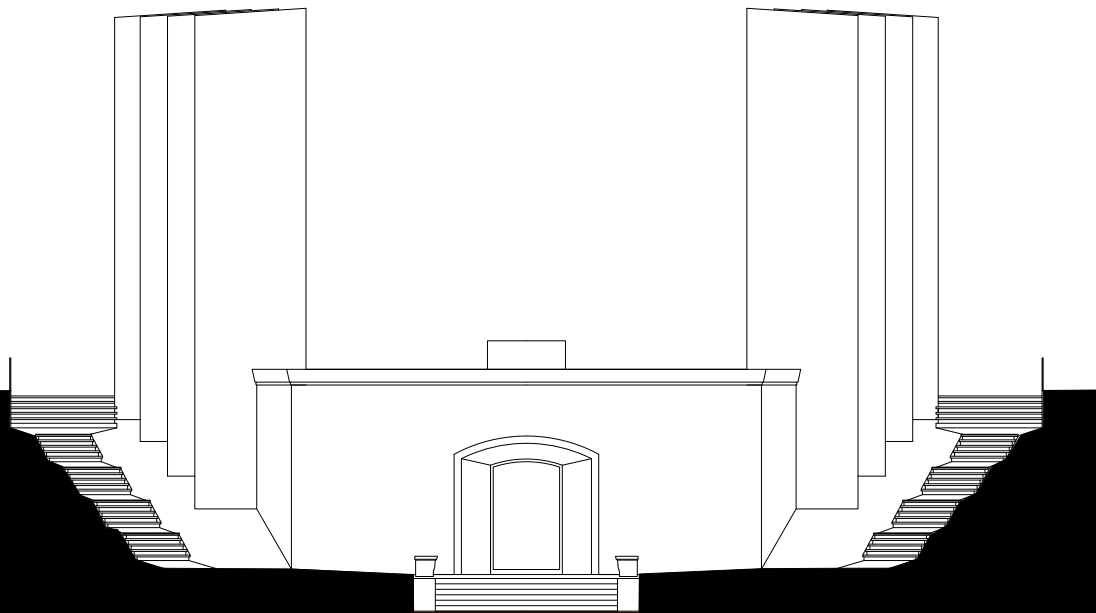
Taking advantage of a difference in elevation from east to west, the roof of the War Memorial Chapel becomes a platform on the east side and almost level with the "University Mall". The interior of the chapel can be entered from the Drillfield or via stairs from the side facing the University Mall. The big trees around the chapel screen the building from noise and emphasize the central void space created by the eight pylons of the War Memorial.



17

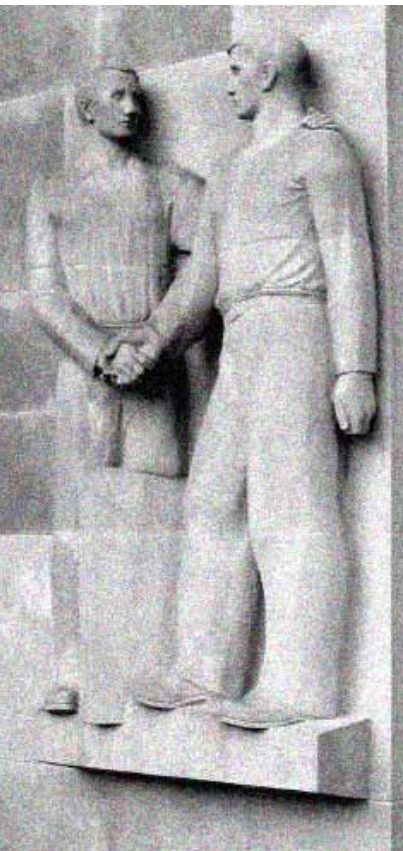


18



t h e c h a p e l

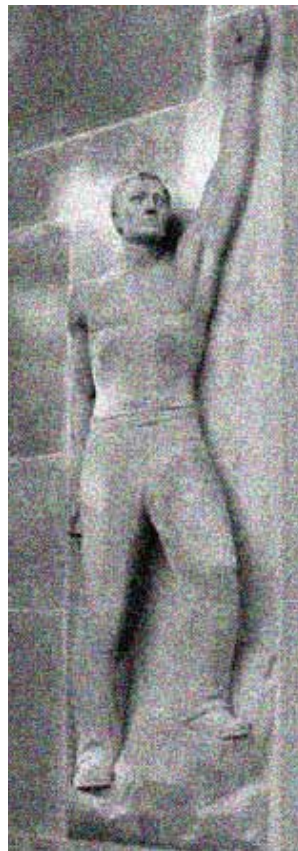
e i g h t p y l o n s



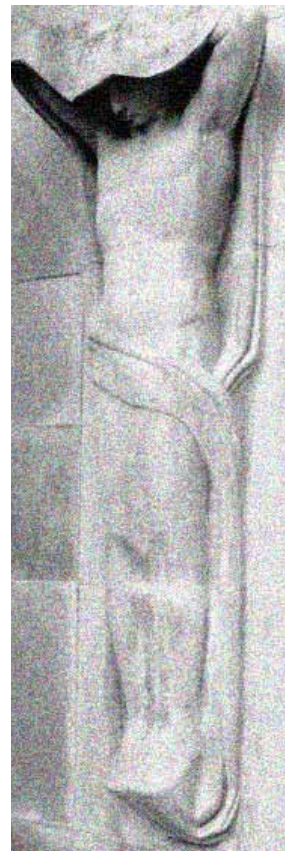
brotherhood



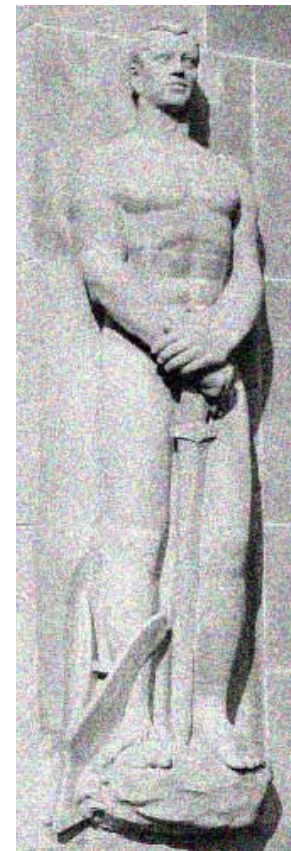
h o n o r



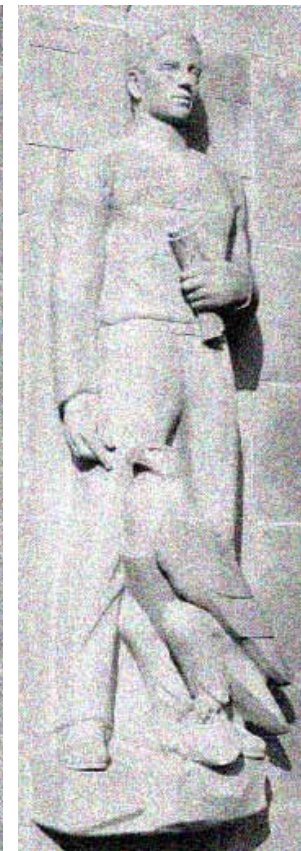
leadership



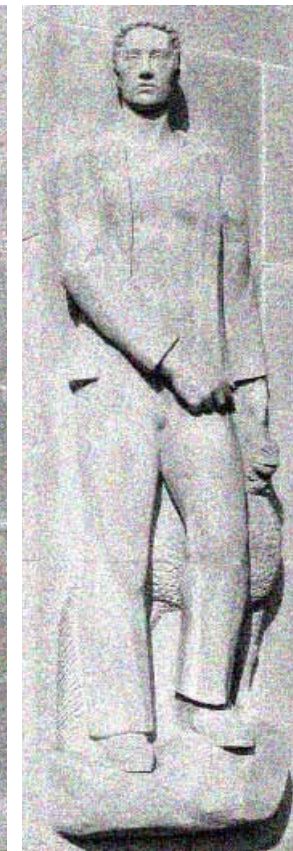
sacrifice



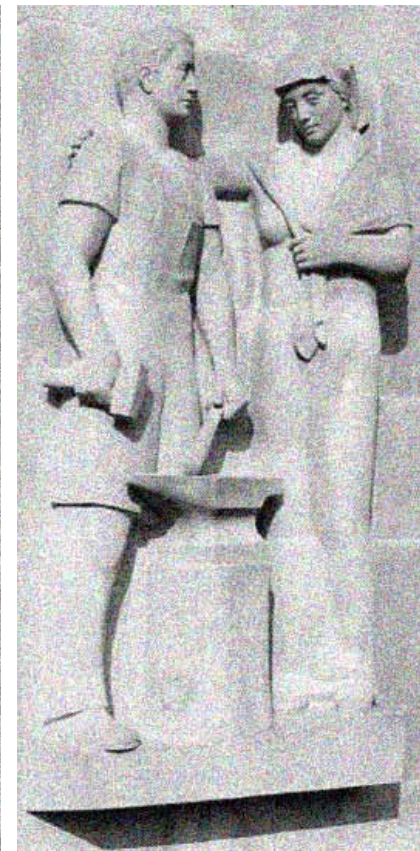
service



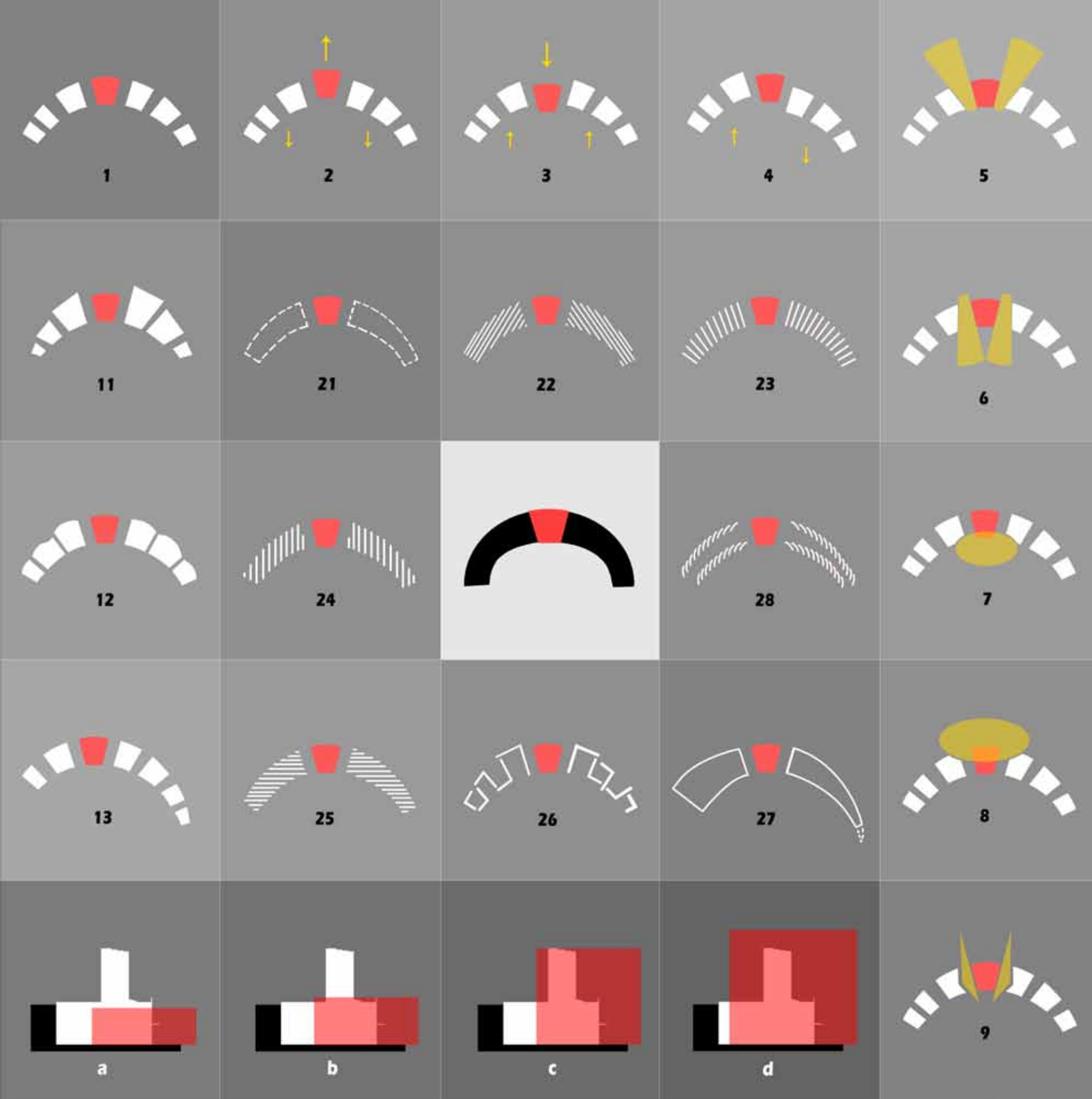
l o y a l t y



d u t y



U t P r o s i m



a p p r o a c h

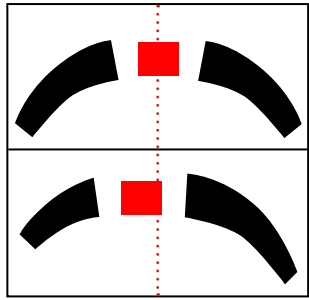
The design process of this thesis proceeds in a step-by-step manner from the knowledge of the site, to conceptual layouts, to the program, to refinements based upon approved schemes. This linear process seems basic, but sometimes the forward momentum can be challenged by raising new questions or reevaluation of the goals, requiring circular and even backward process.

The drawing on the left is a series of tests showing how the new building is related to the existing chapel and the possibilities for the new structure.

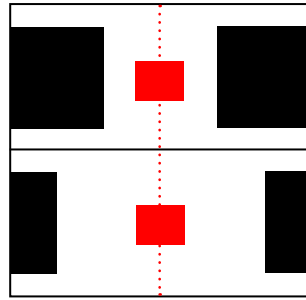
Centre: prototype of the layout
 1: breaking into blocks similar in size to the volume of the chapel, and making the chapel be part of the new building;
 2 - 4: moving the blocks;
 5 - 9: carving the blocks;
 11-13: changing the shape;
 21-28: different structures to form the curve;
 a-d: difference in height.

The diagram also shows some key questions in the project: Should the layout sited on a symmetric square be symmetrical as well? How to define a proper distance between two buildings? What is a better structure for the site? How is the structure erected?

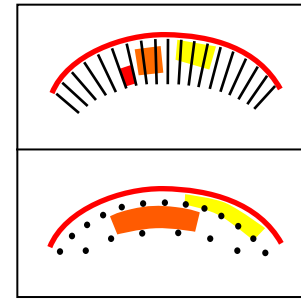
f o u r p r o b l e m s



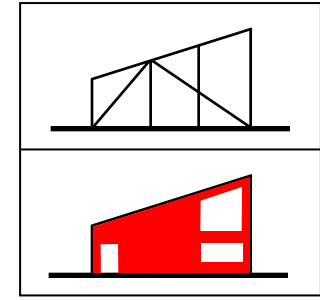
s y m m e t r y



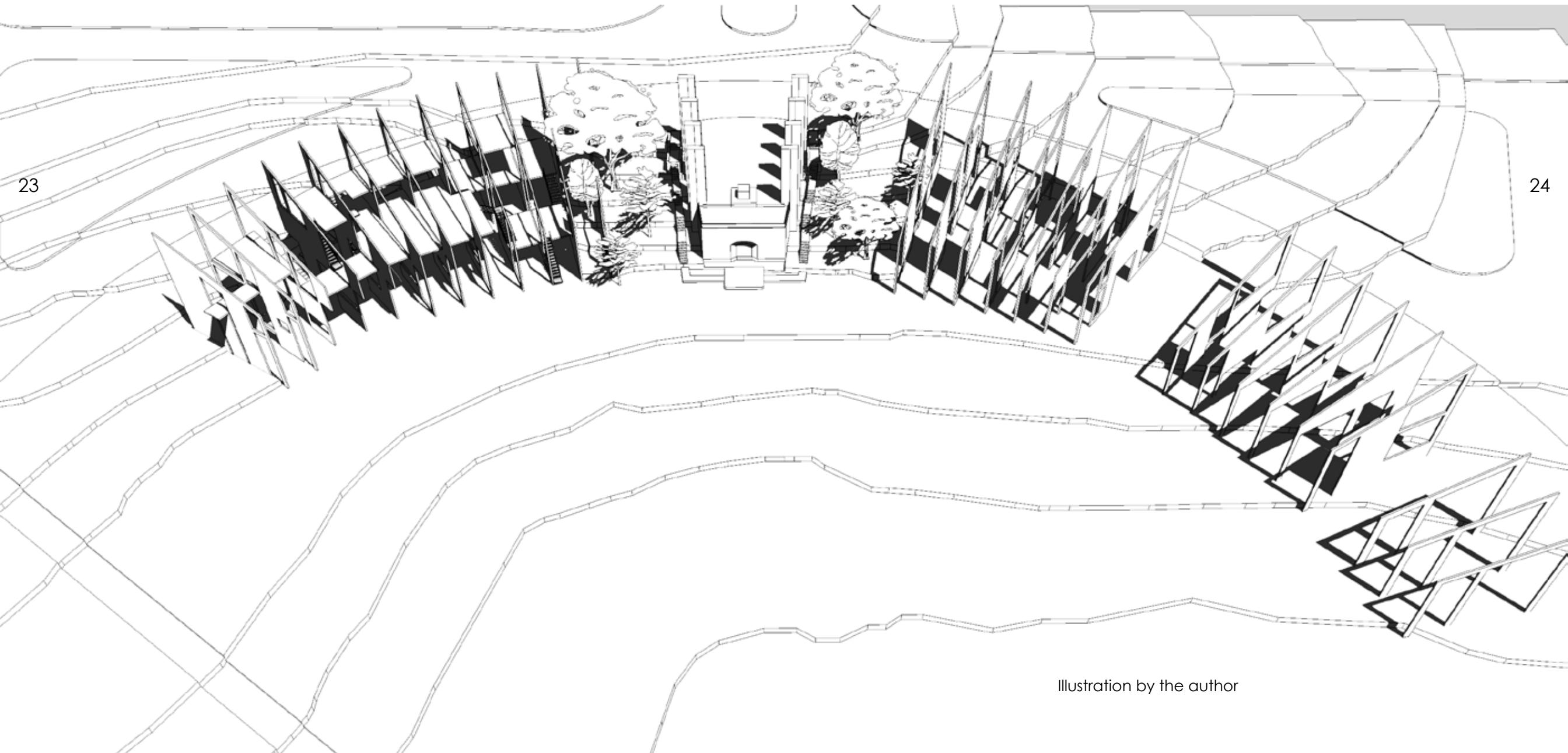
d i s t a n c e

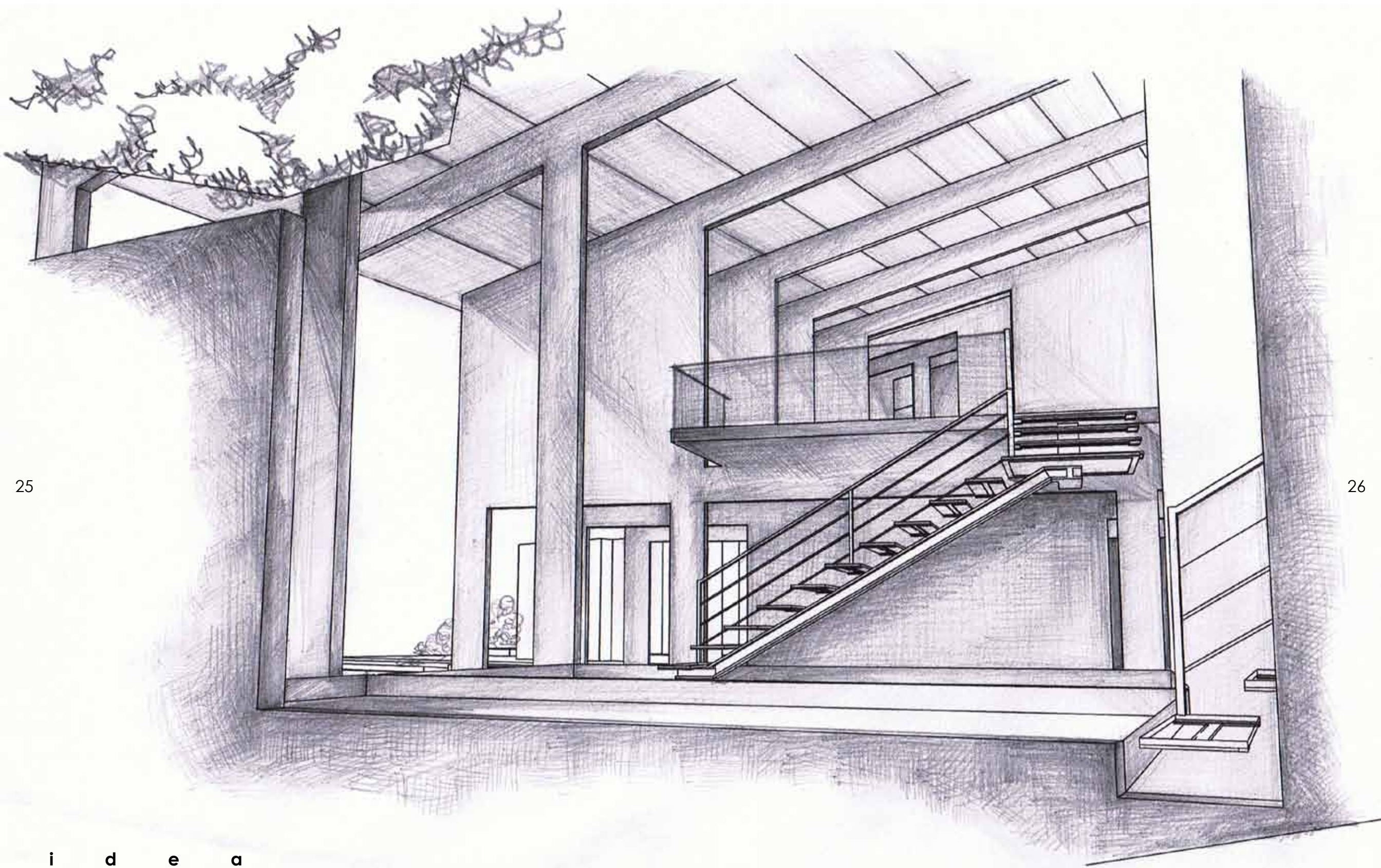


s t r u c t u r e



f r a m e / w a l l



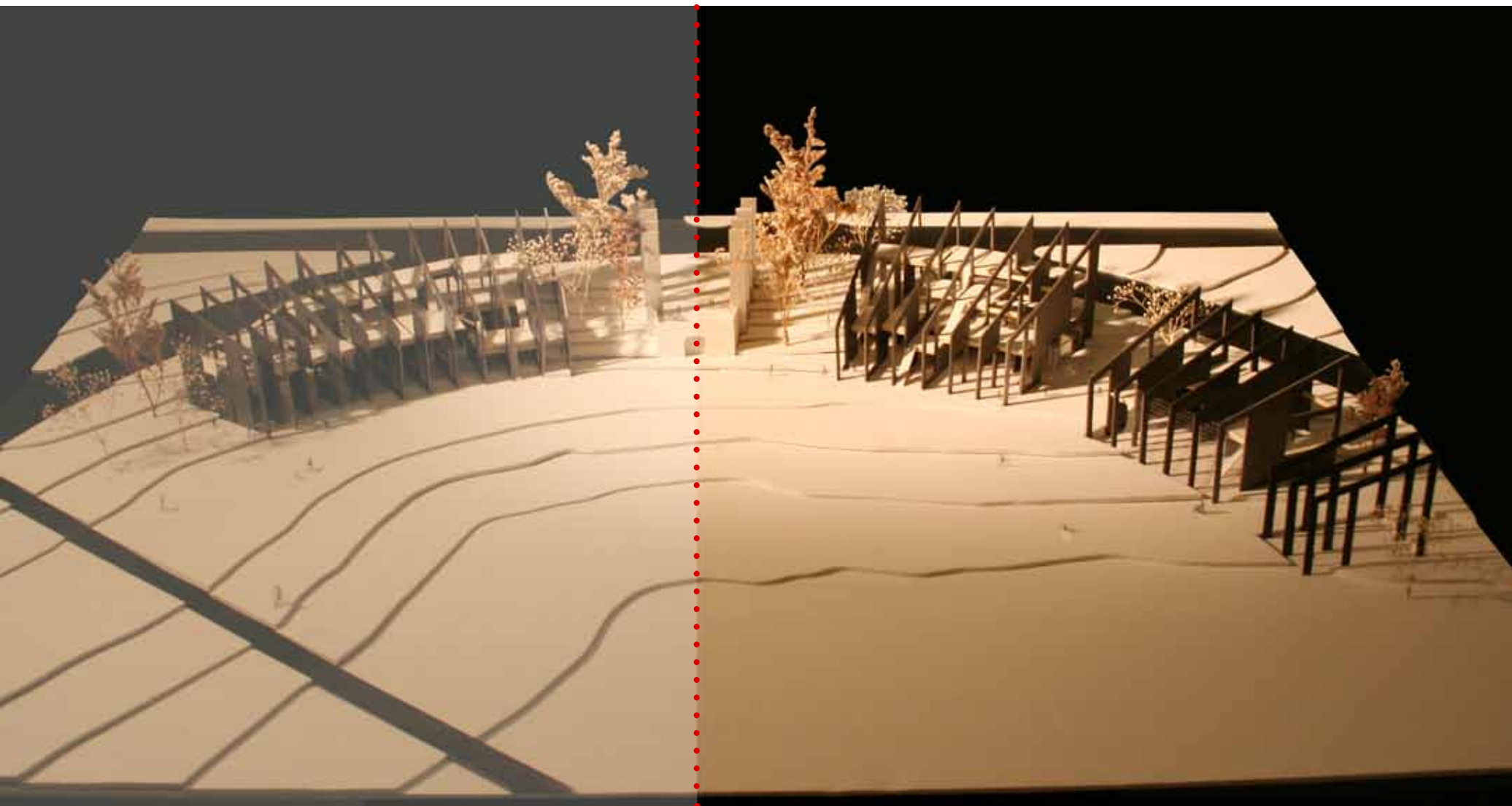
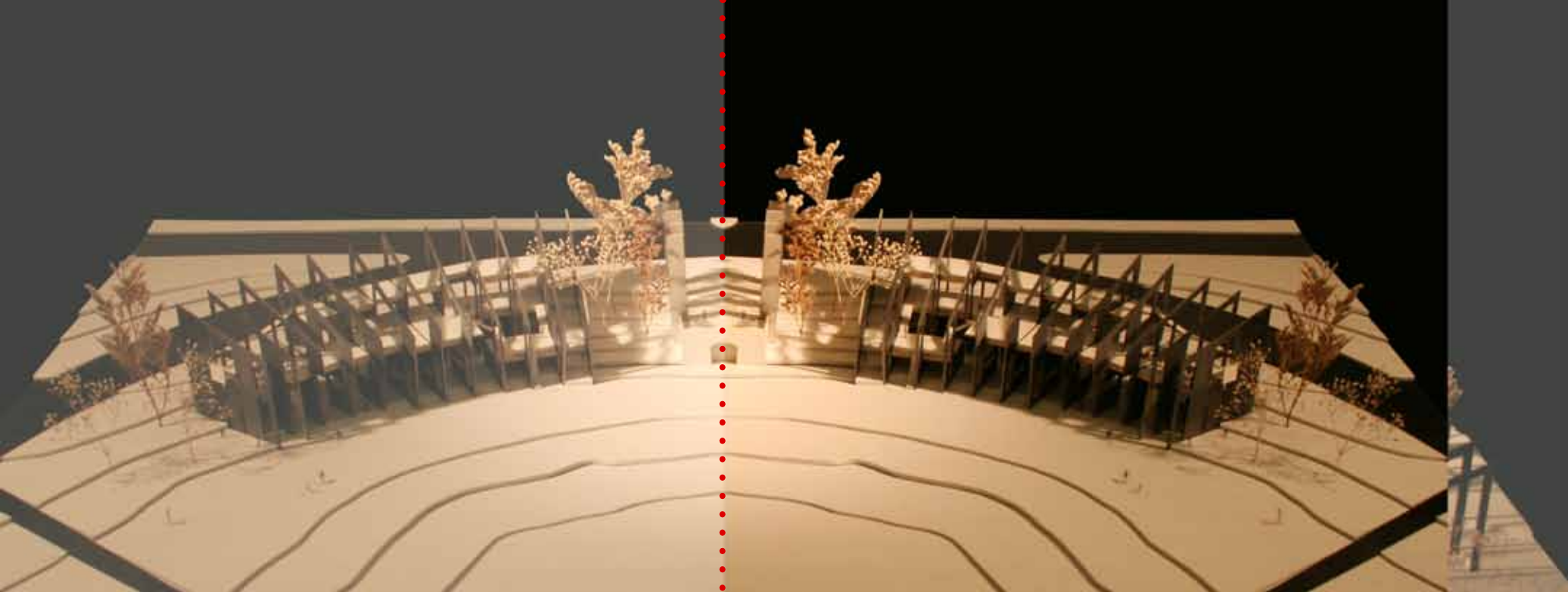


25

26

i d e a

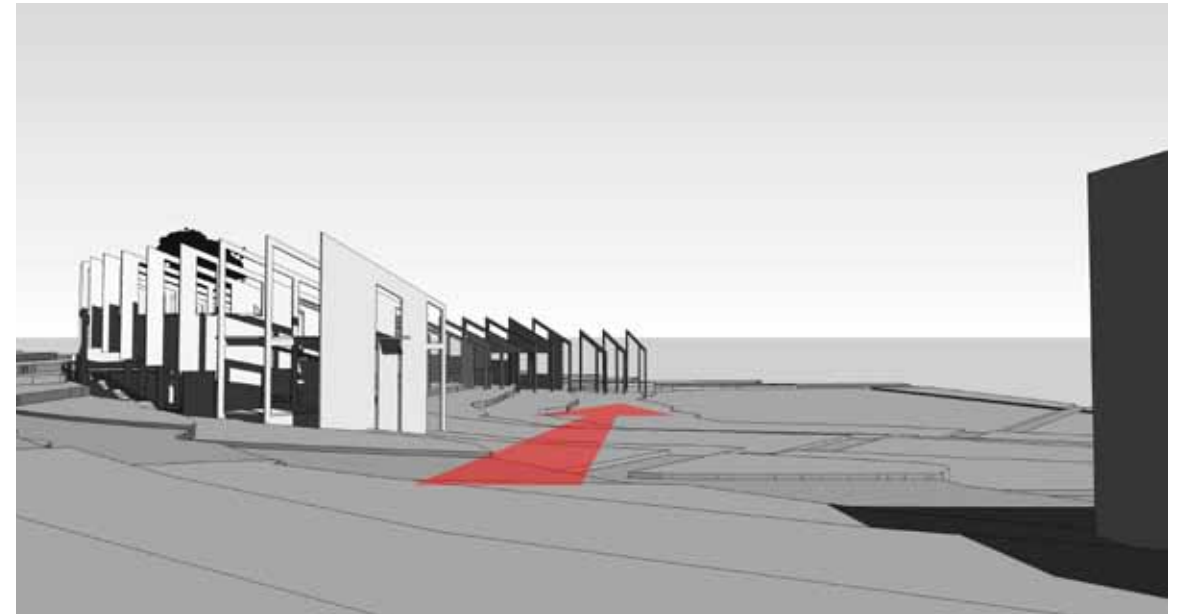
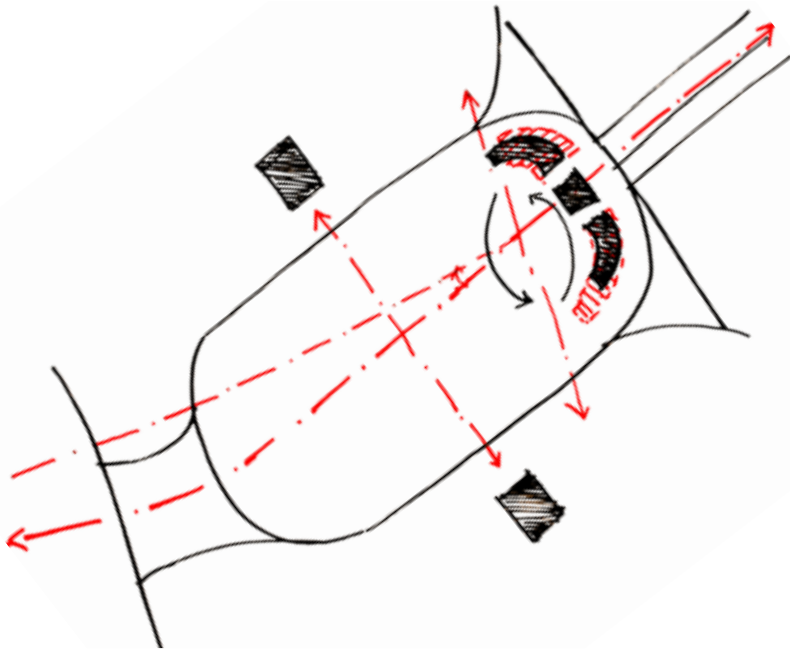
The idea is to elevate the edge of the Drillfield by a series of "plane-frame walls," which are made of precast concrete panels and embraced with metal beams and slabs. This is a dynamic system and provides terraces, interlocking spaces, and a colonnade.



s y m m e t r y ?

A symmetrical arrangement is widely used in many ways in architectural compositions, regardless of different cultures and regions. Why does symmetry exist in all time periods and across all cultures? It probably derives from the experience of our own bodies. The depiction and proportion of the human body had a tremendous effect on Greek architecture. A symmetrical plan is common in temples, churches, and government buildings. The strict axial symmetry establishes the sense of equilibrium within the space. The Drillfield and the Mall together form an example in urban scale which contains two spatial types--centre and path. Symmetry showing in the central space (War Memorial Chapel) relates to the importance and domination within the larger architectural space. The path (the Mall) relates to movement within the space. That's the reason I have designed paths on both sides of the chapel to encourage movement along the rim and emphasize that central space. Creating these paths and making symmetric voids are essential to realize the idea, not the symmetric solids.

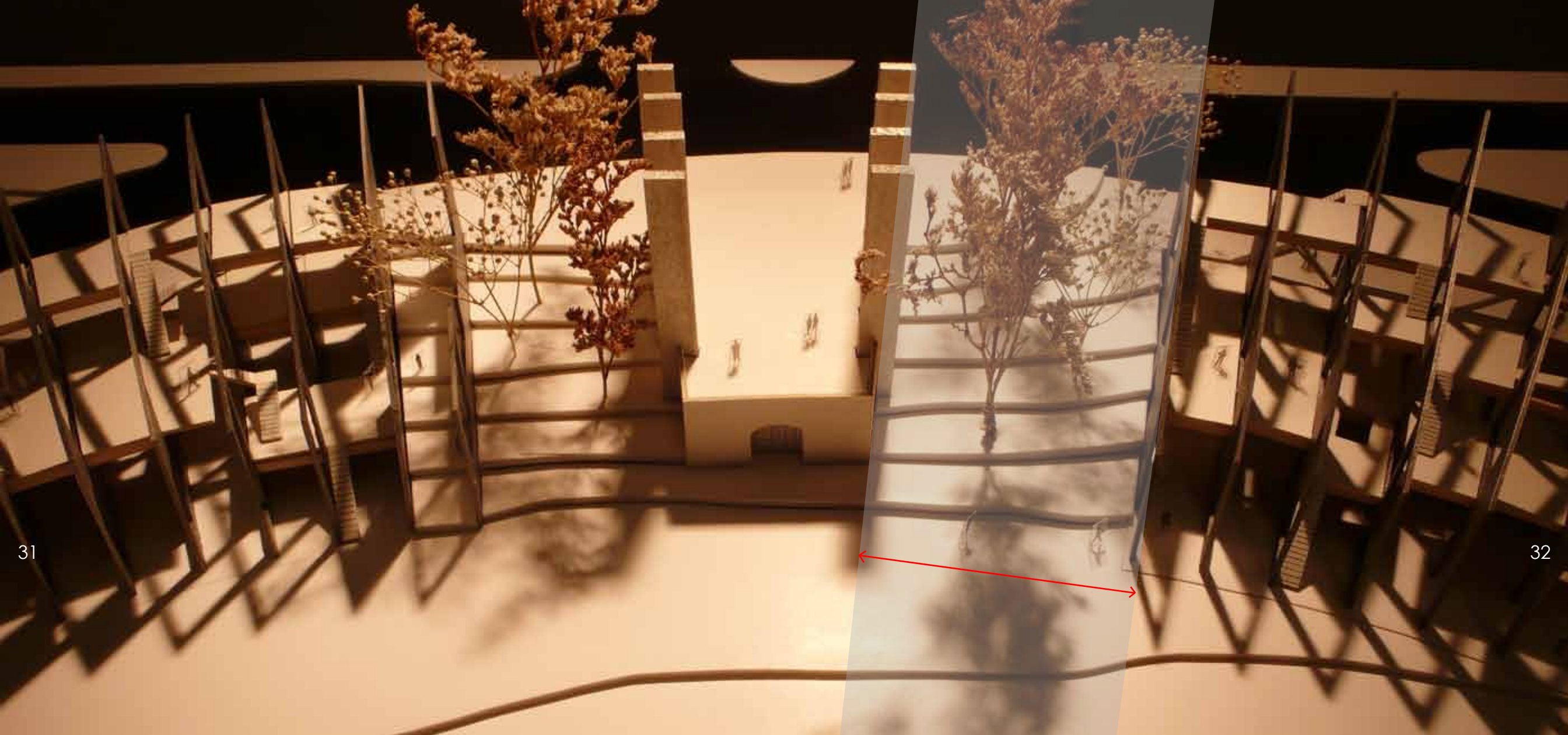
s y m m e t r y ?



slight differences in length creates dynamic views rather than equilibrium



symmetric voids to emphasize the central space



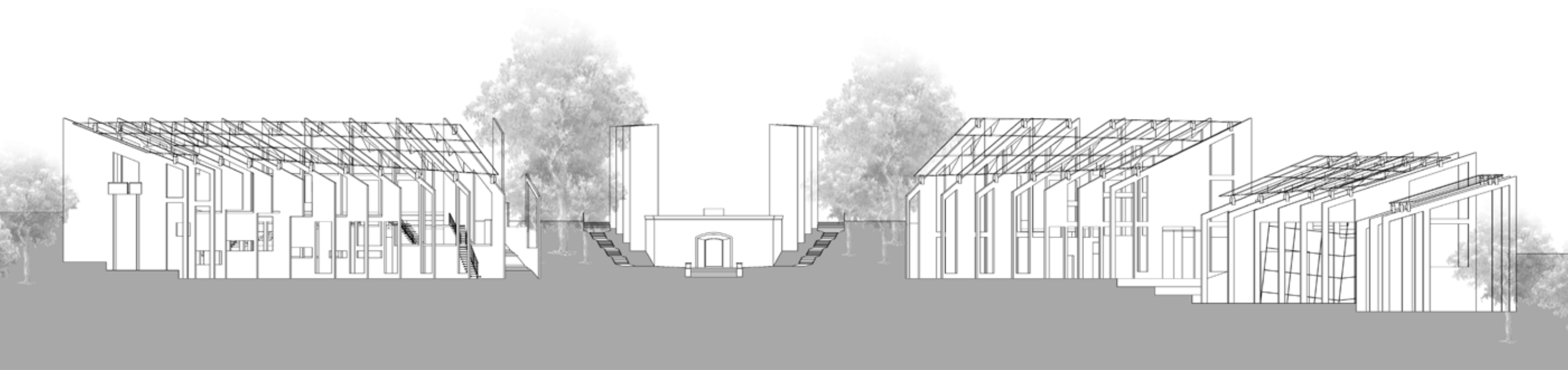
31

32

d e f i n e a d i s t a n c e

A distance between buildings can be defined by daylight, wind, distant views, etc. Apart from those functional aspects, a well-designed distance can also depict the characteristic of the space. For example, a long and narrow space establishes a sense of mystery, pressure, and aggression; a wide and low space reminds people of sweet and serene feelings.

Three points affect the design of the distance in the project. Firstly, trees are an important element for memorial ceremonies. Therefore, ample space should be kept for the big trees around the chapel. Secondly, the chapel dominates the new building on the site. Symmetry can influence the distance as well. Thirdly, the distance should be limited to maintain the linkage between the buildings.



w e s t e l e v a t i o n

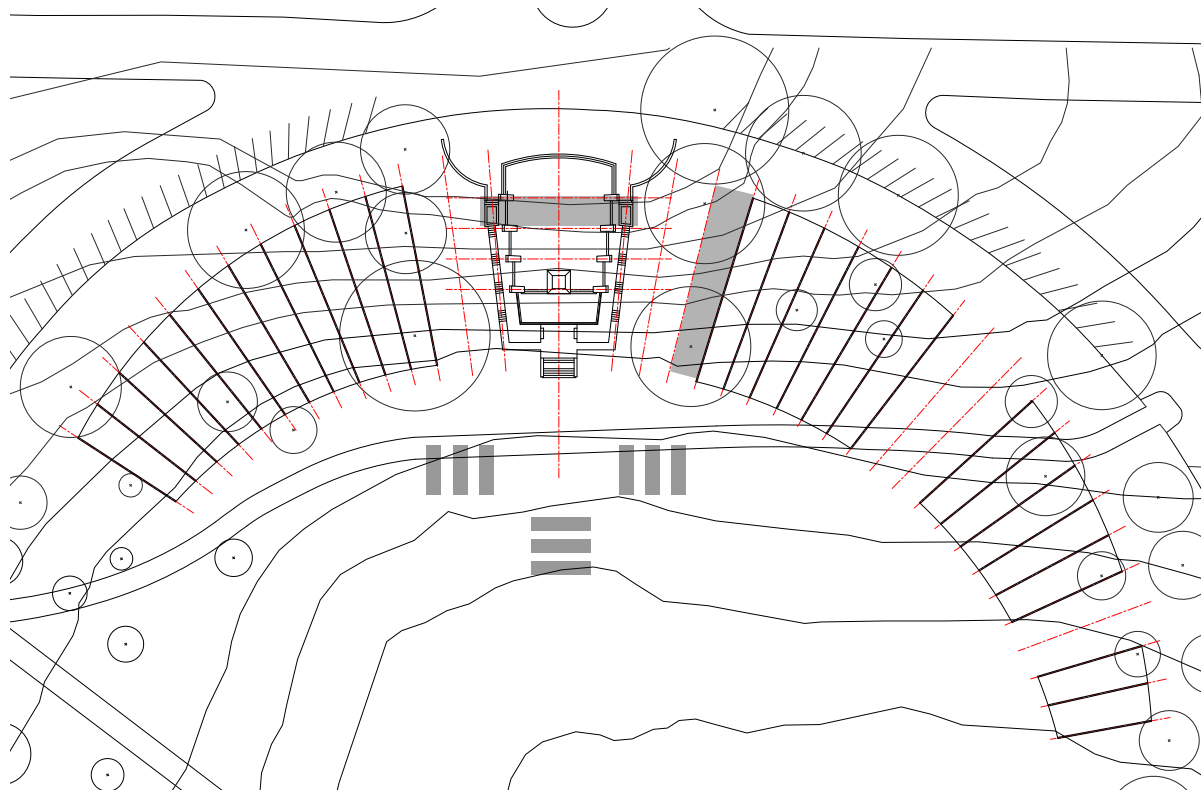
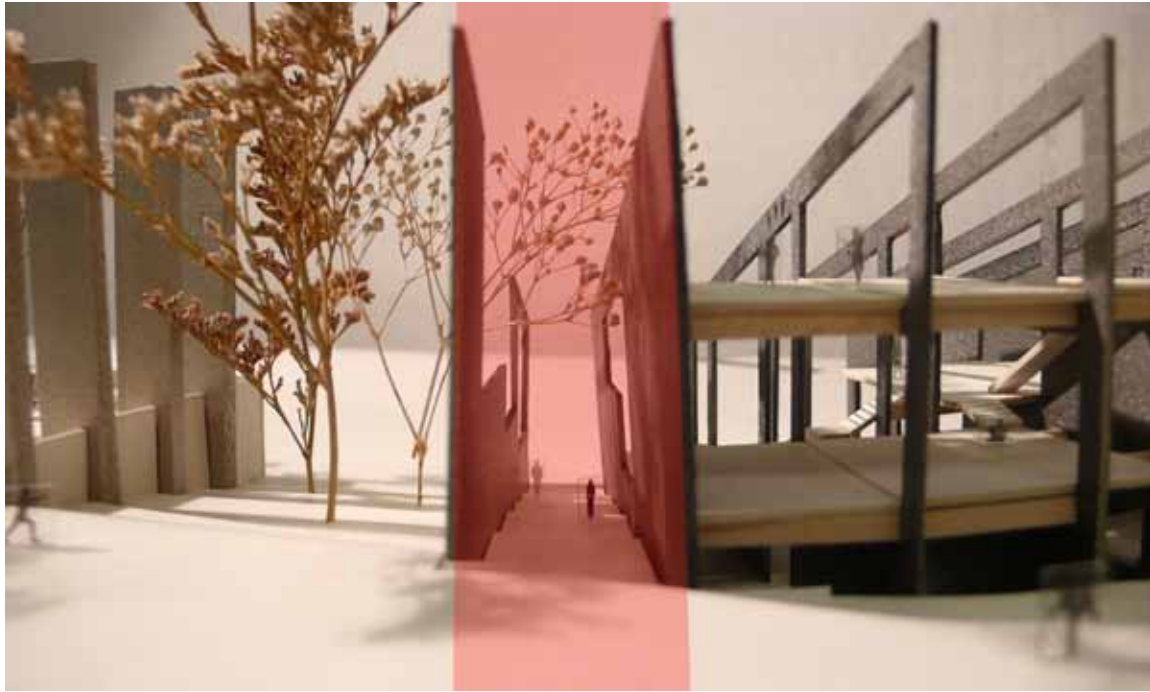


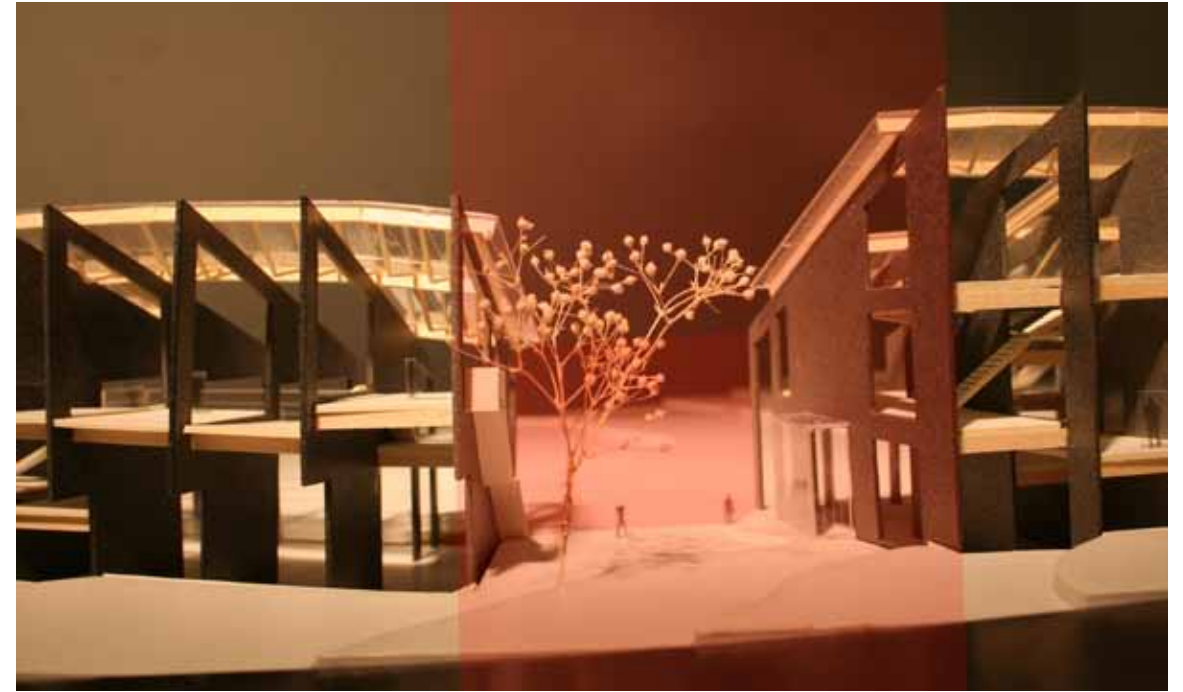
Illustration by the author

The new system relates to the old chapel (see left): The distance measuring from the center line of one pylon to the nearest other one (roughly 15 feet) defines the width of one structural bay. Program functions, circulations, and openings are accommodated within the system. There is a three-bay void on each side of the chapel.

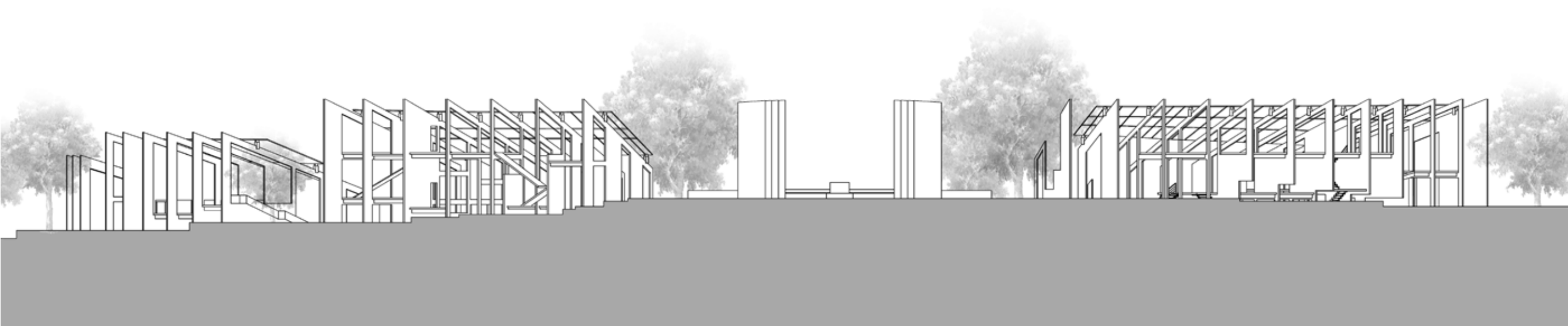
d e f i n e a d i s t a n c e



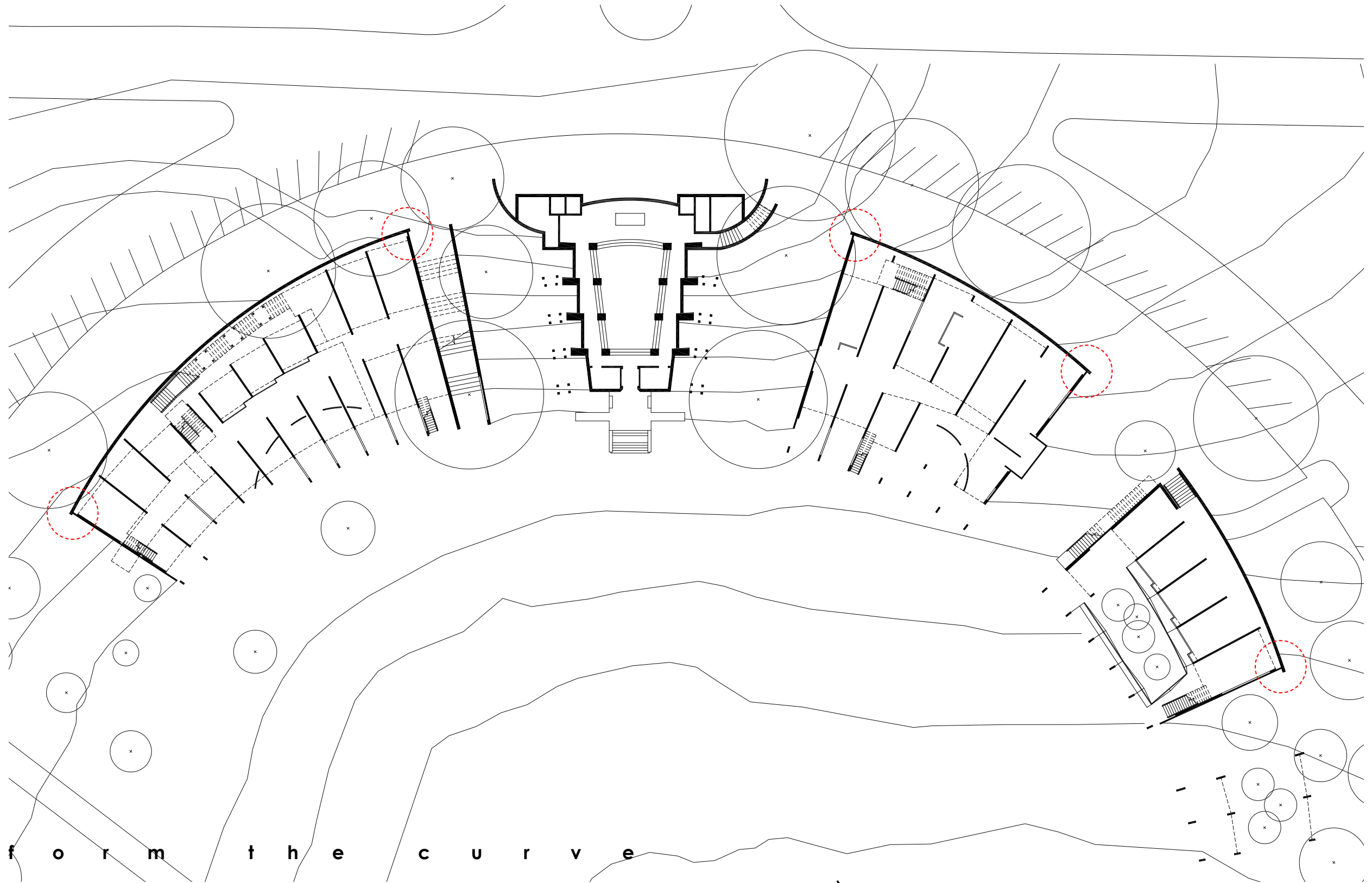
opening for cadets



opening towards College Avenue



e a s t e l e v a t i o n



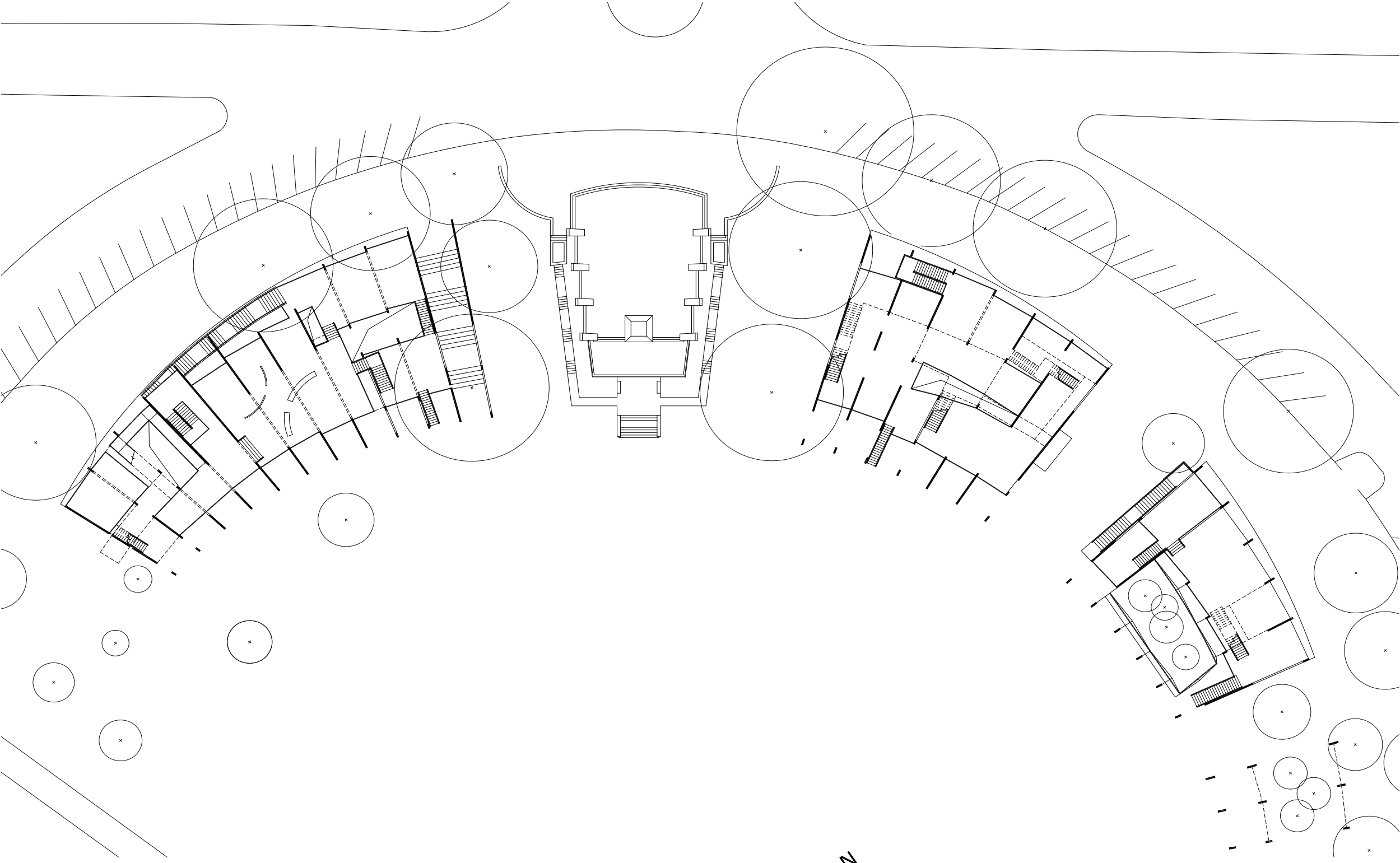
f o r m t h e c u r v e

In order to deal with constructive issues associated with the intersection of curve and straight line, the structure is set apart from the curved retaining wall. In the corner, they are linked by a segment of straight wall.



10 20 40 feet

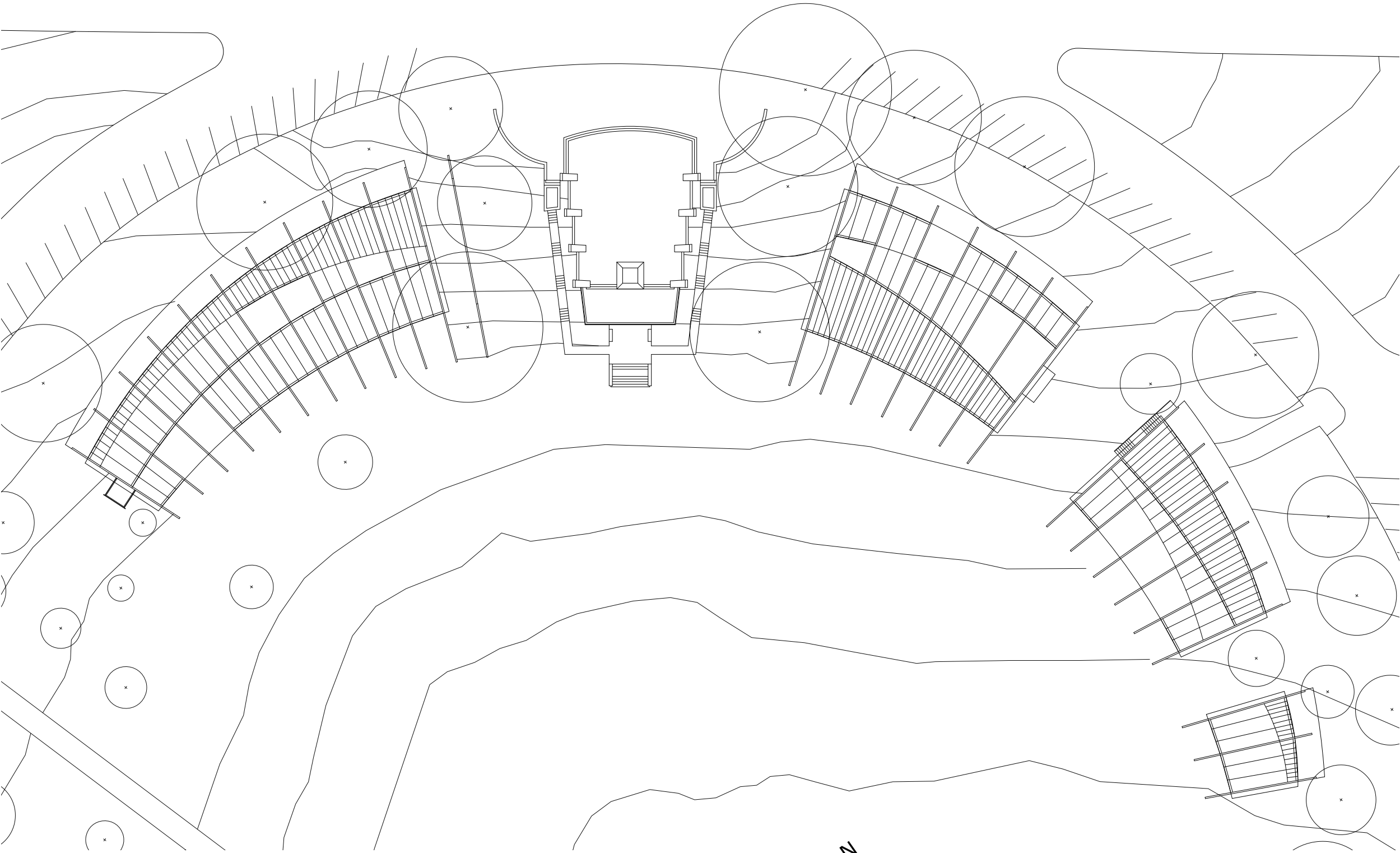
podium level plan



f o r m t h e c u r v e

41

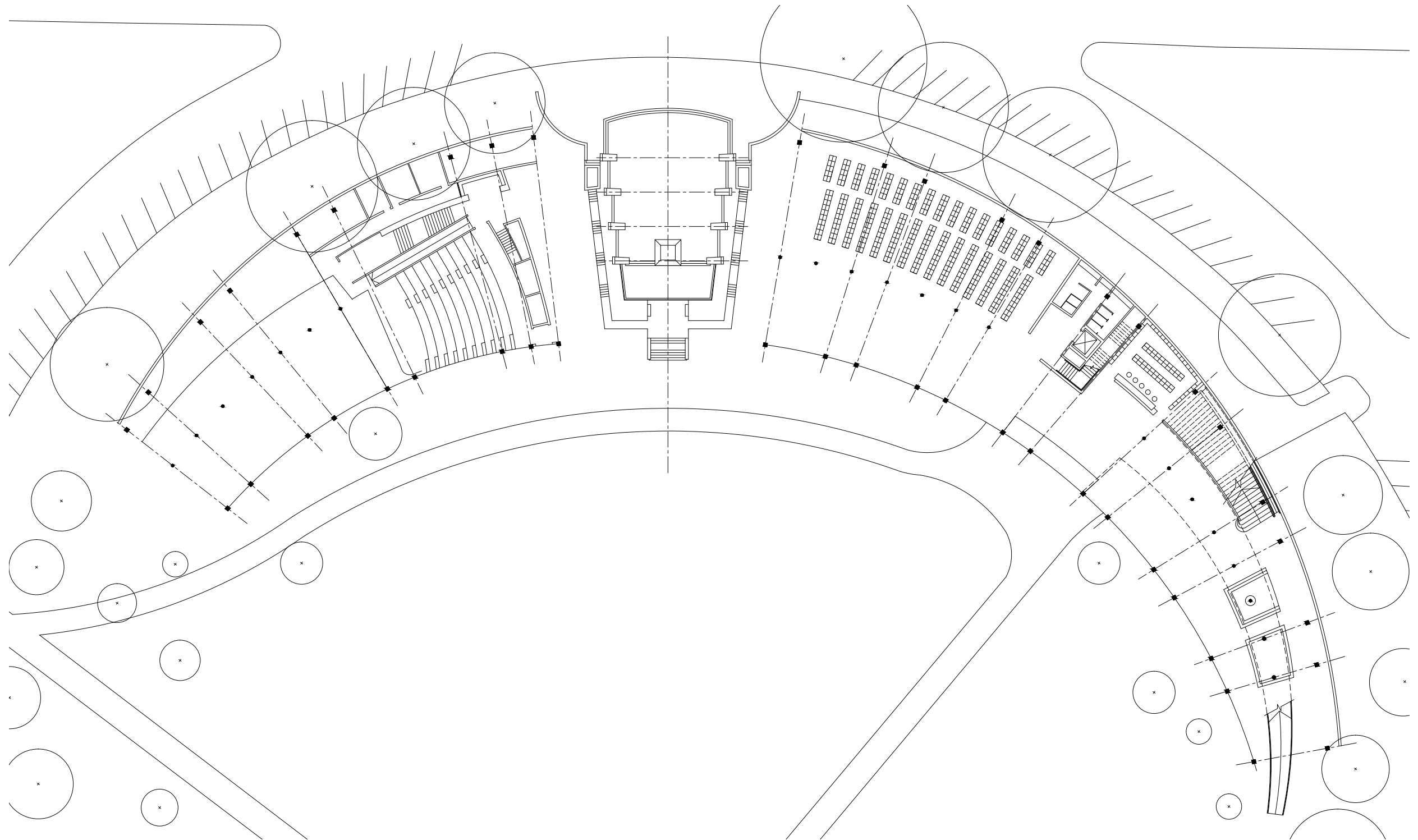
42



p l a n s t u d y



roof plan



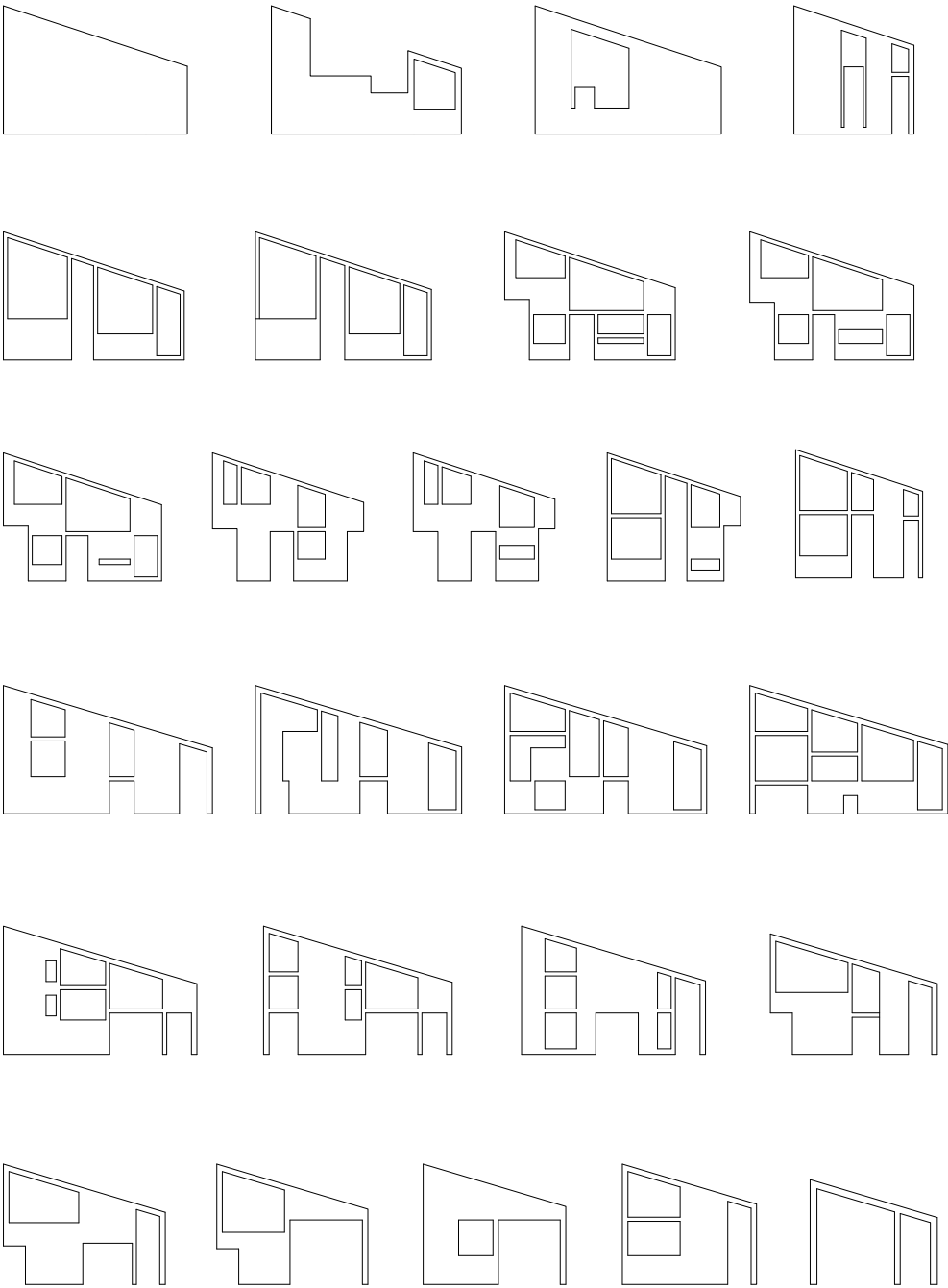
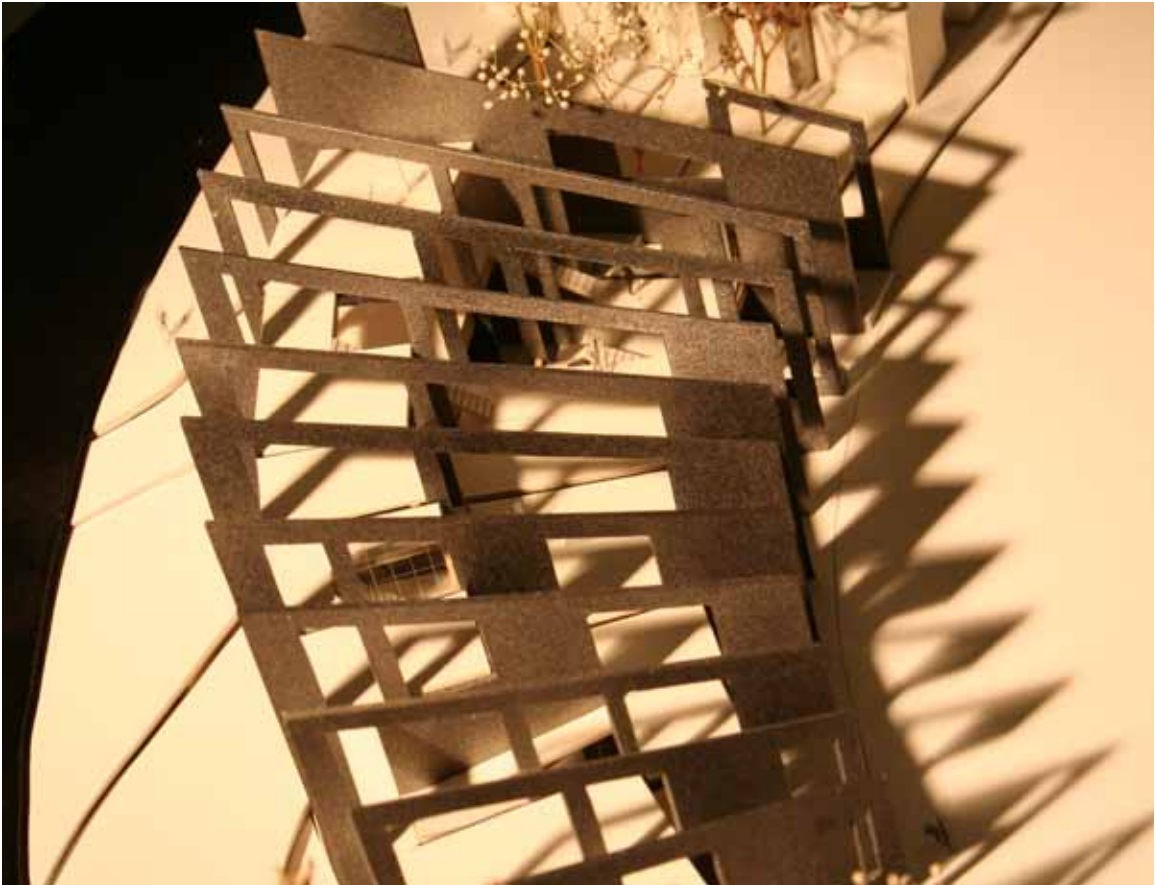
The plan shows a previous thought of forming the curve by rotation from one point. The idea is abandoned since the movement is interrupted by the chapel, and the chapel is not punctuated.



f r a m e o r w a l l ?

The major structure of the project is made of twenty-eight “plane frame walls” (twelve on the north wing, sixteen on the south). This element combines the functions of a frame and a wall. In other words, this is a plane where openings can be positioned as desired and access blocked off as needed.

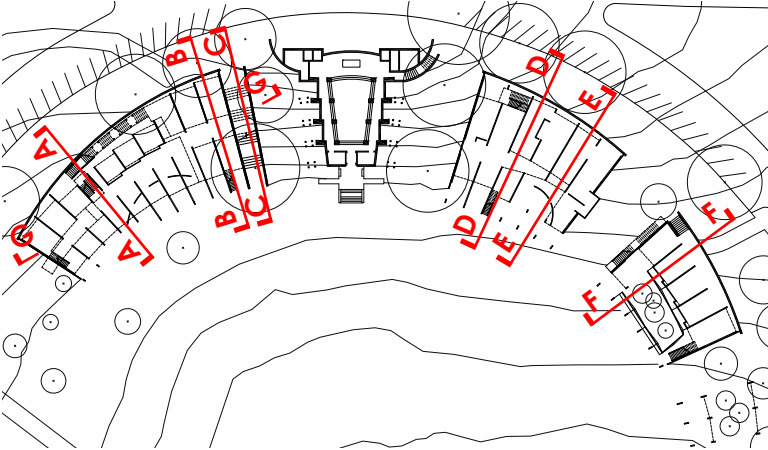
Although arrayed in a standard grid system, these “plane frame walls” have the flexibility for multi-use and change. Holes in the plane give access from one bay to another to create a bigger room. By arranging the holes’ positions, the space can be carved as a result.



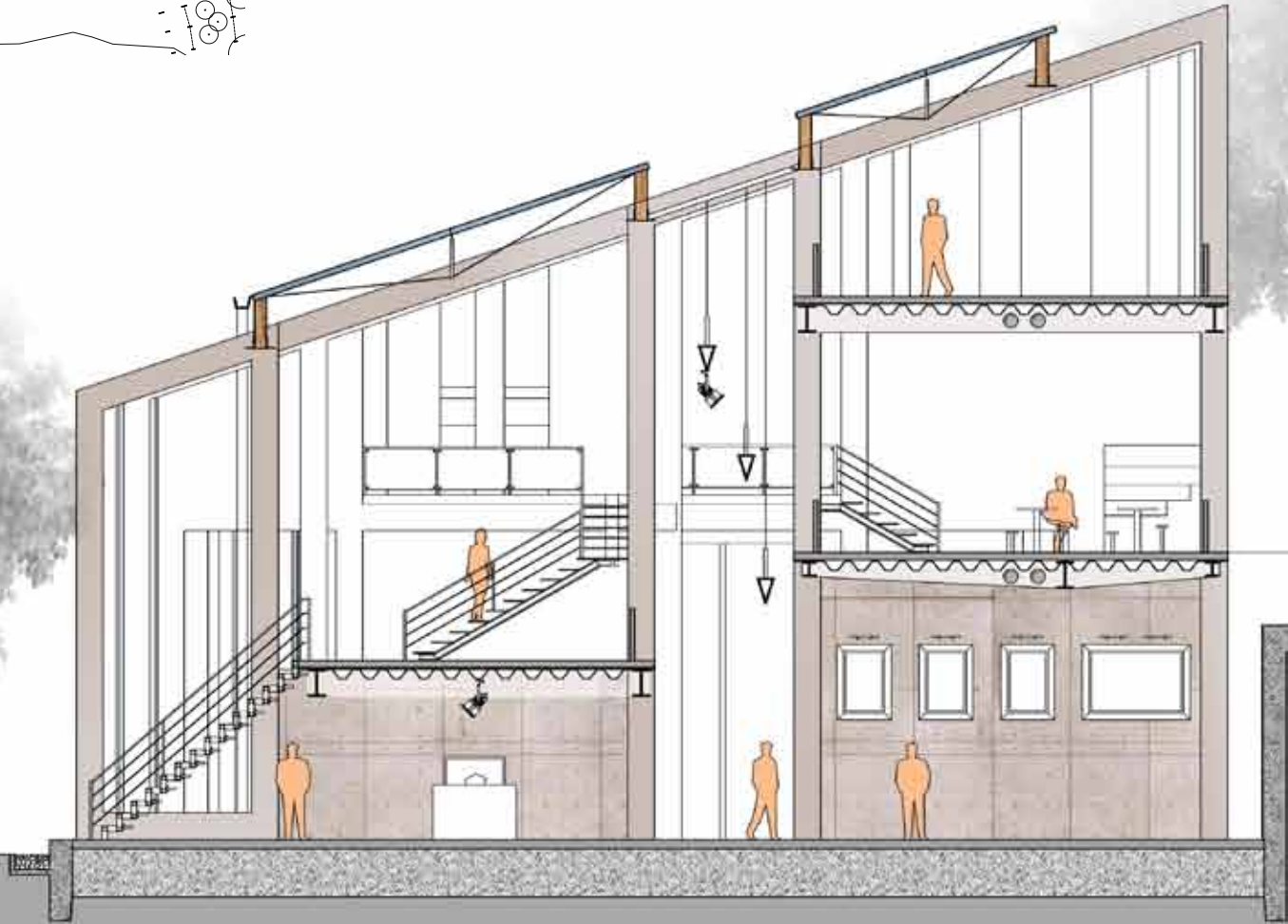
10 20 40 feet

Photo and illustration by the author

f r a m e o r w a l l ?



49

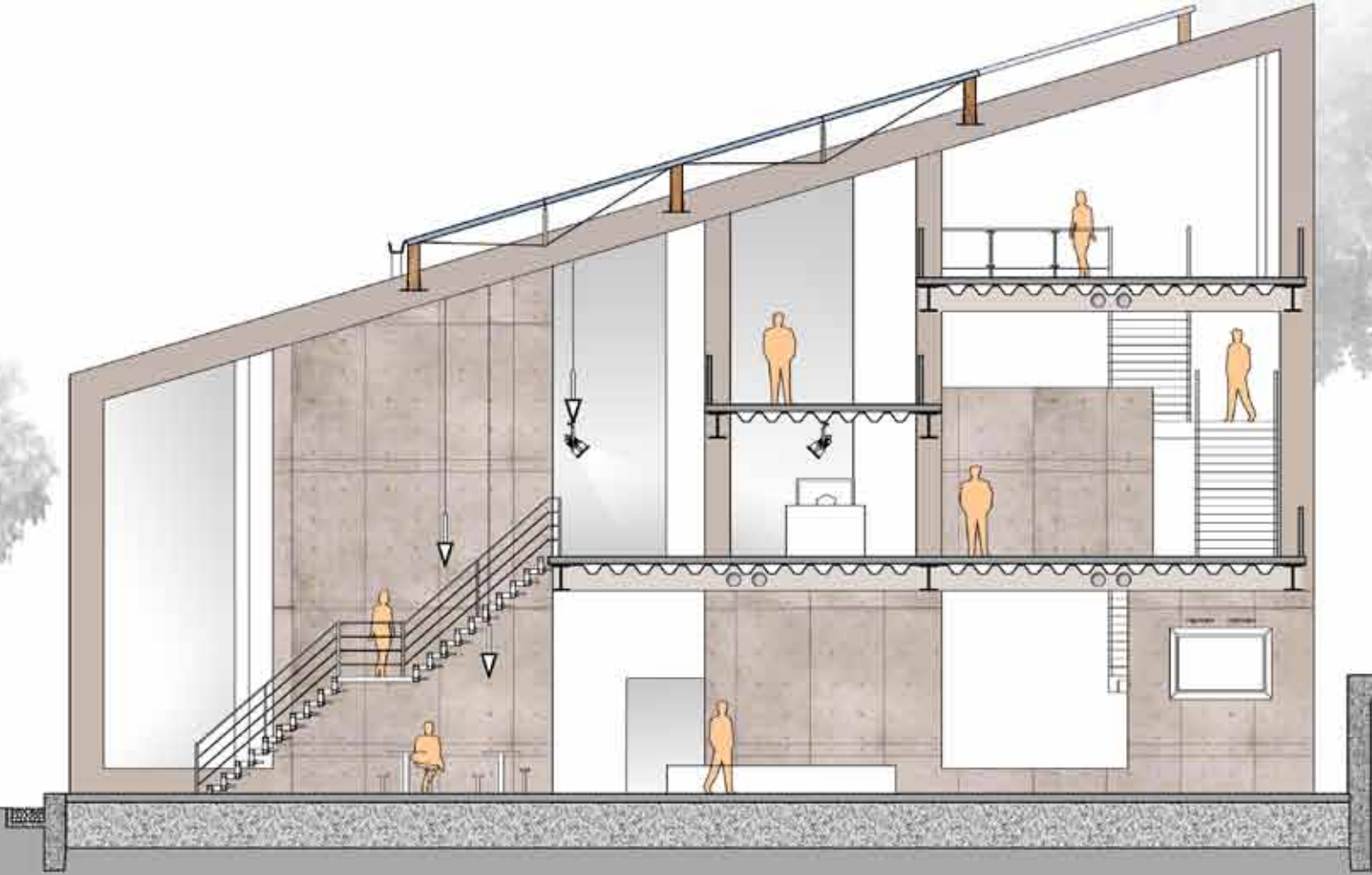


50

B - B s e c t i o n

f r a m e o r w a l l ?

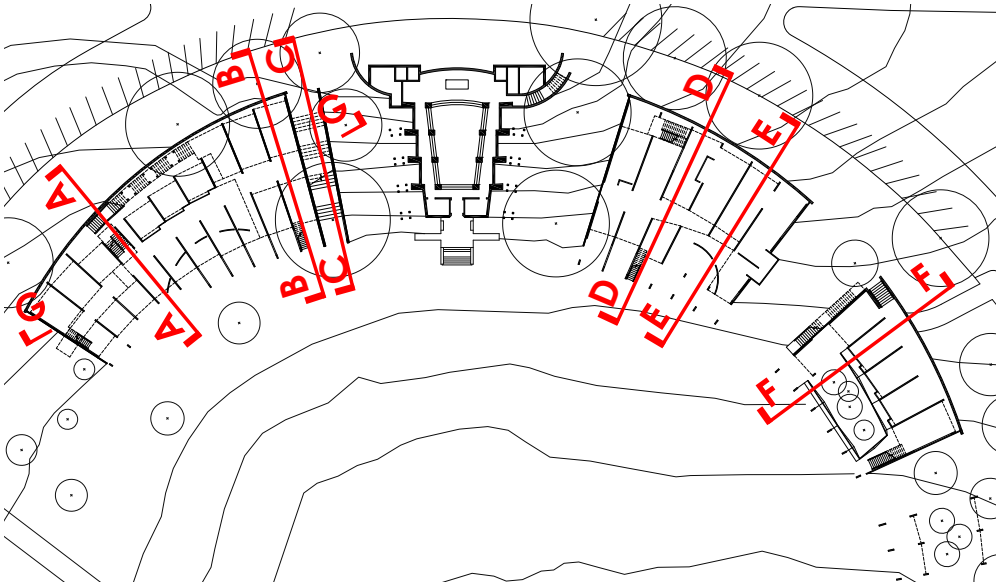
51



52

D - D s e c t i o n

f r a m e o r w a l l ?



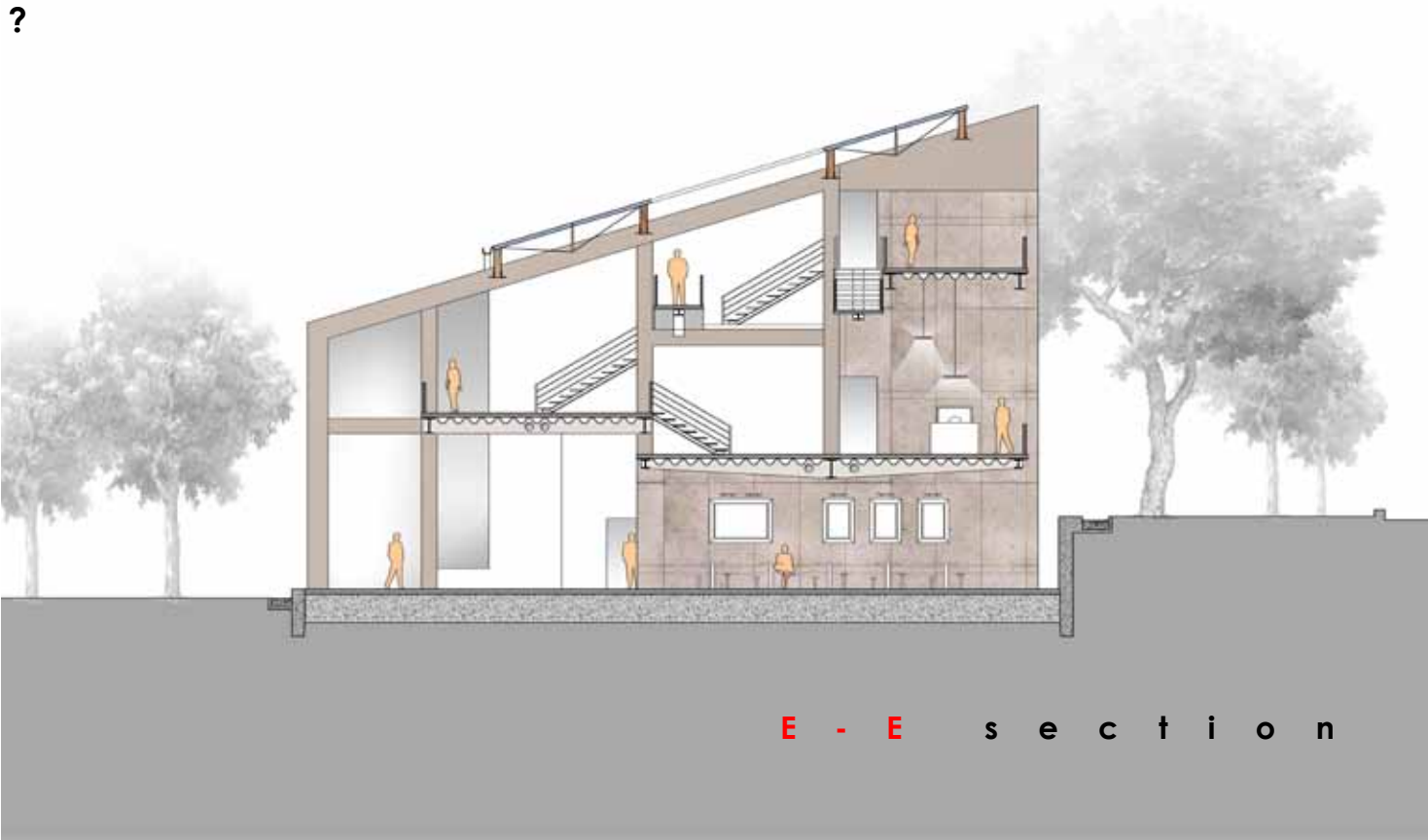
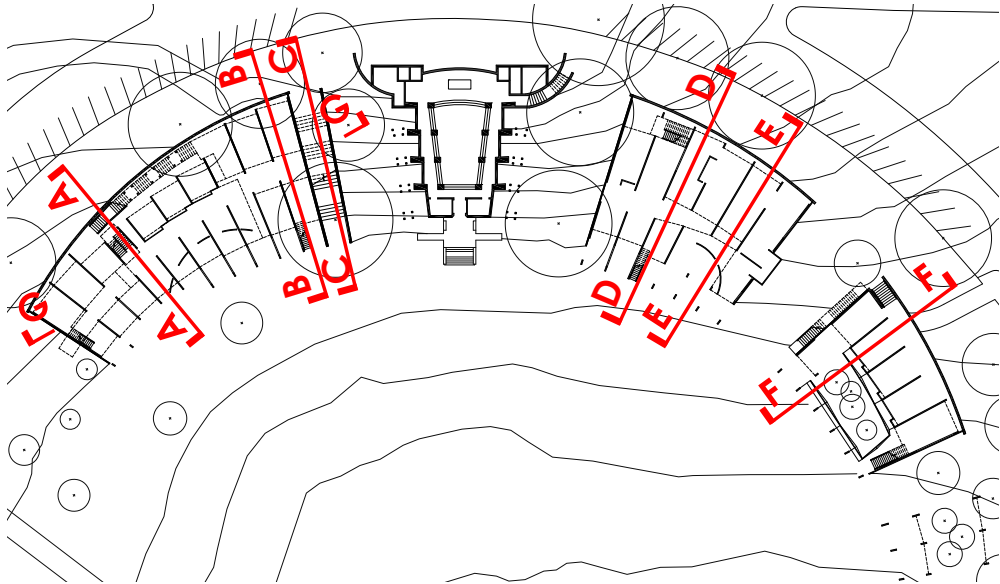
53



i n t e r i o r s t r u c t u r e



f r a m e o r w a l l ?



i n t e r i o r s t r u c t u r e



C - C s e c t i o n

f r a m e o r w a l l ?

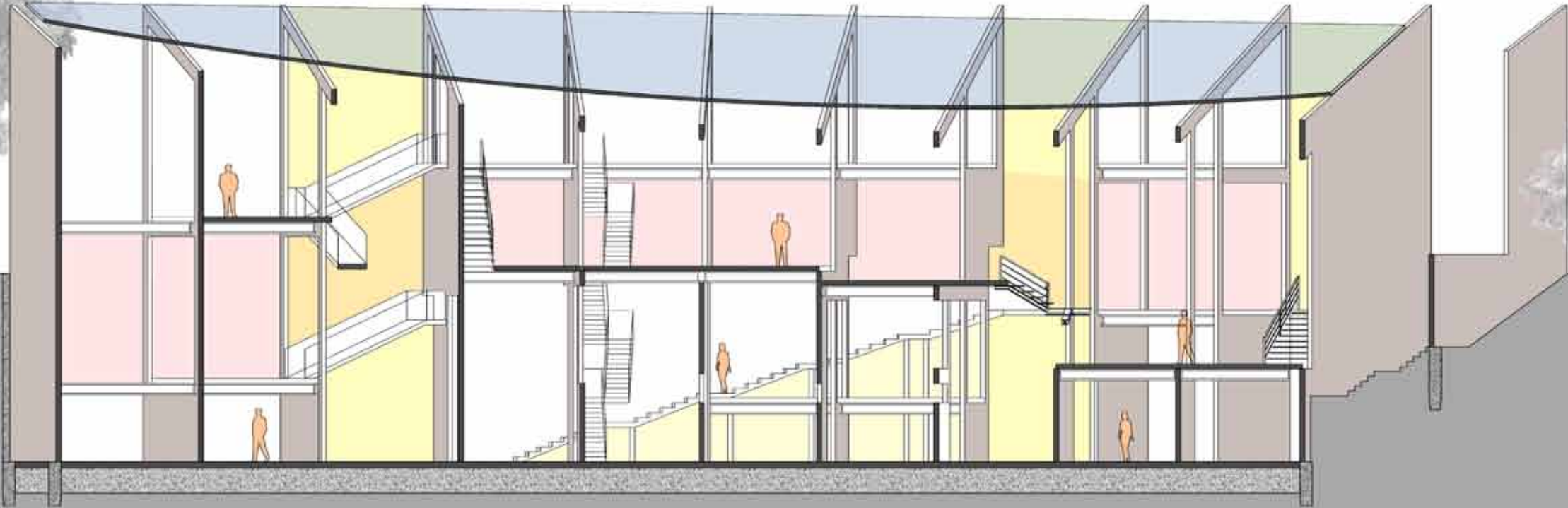
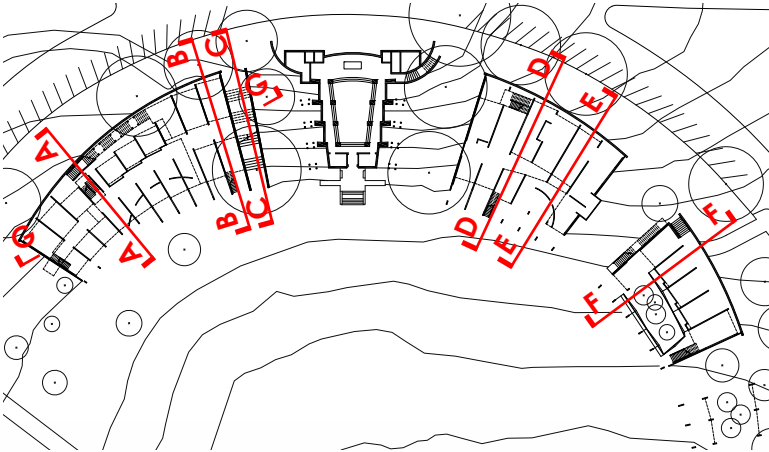


57

58

n o r t h w i n g





G - G s e c t i o n

h i e r a r c h y a n d e n c l o s u r e

There is a certain hierarchy in the construction. For example, the roofs are elevated outward from the major structure; the façade is carefully set back from the edge of the "plane frame walls." Therefore, the structure can be recognized from exterior to interior.

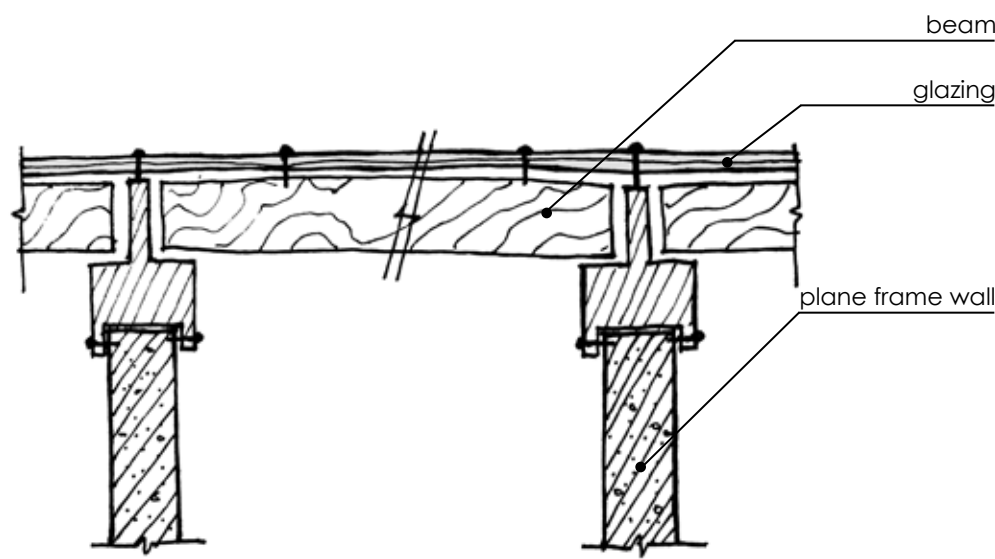
63



64



h i e r a r c h y a n d e n c l o s u r e

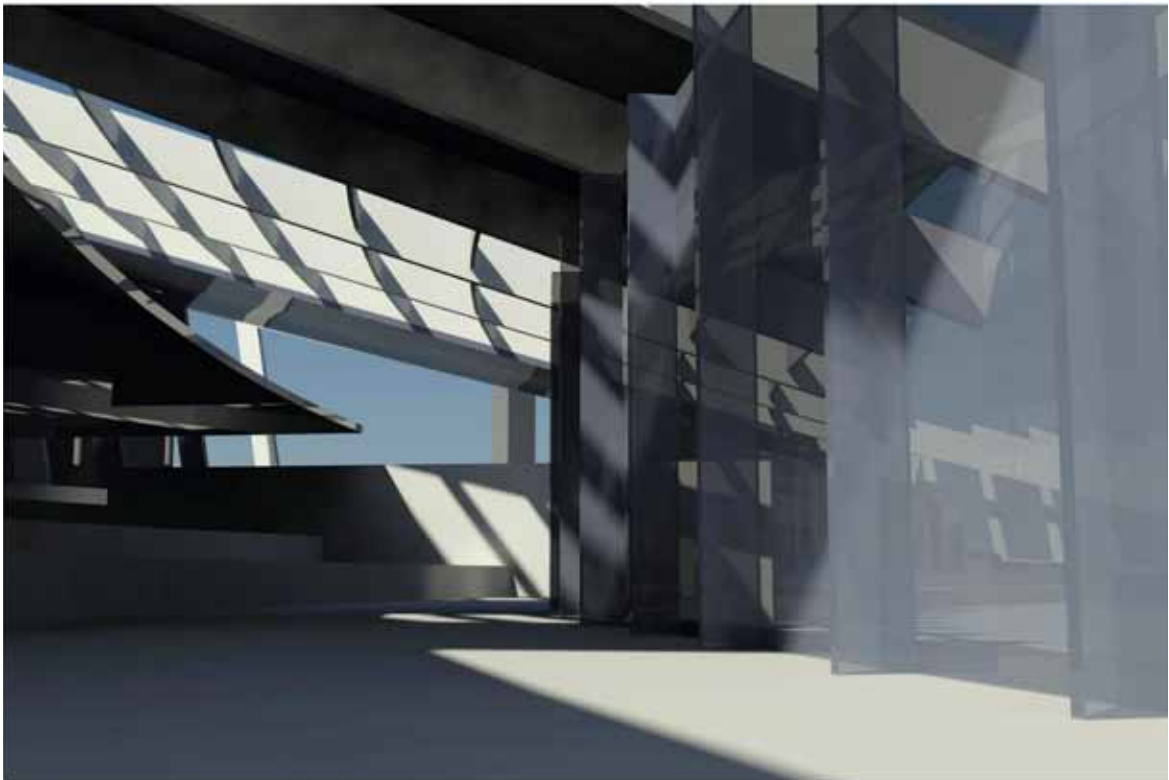


sketch of the roofing construction



r o o f s t u d y

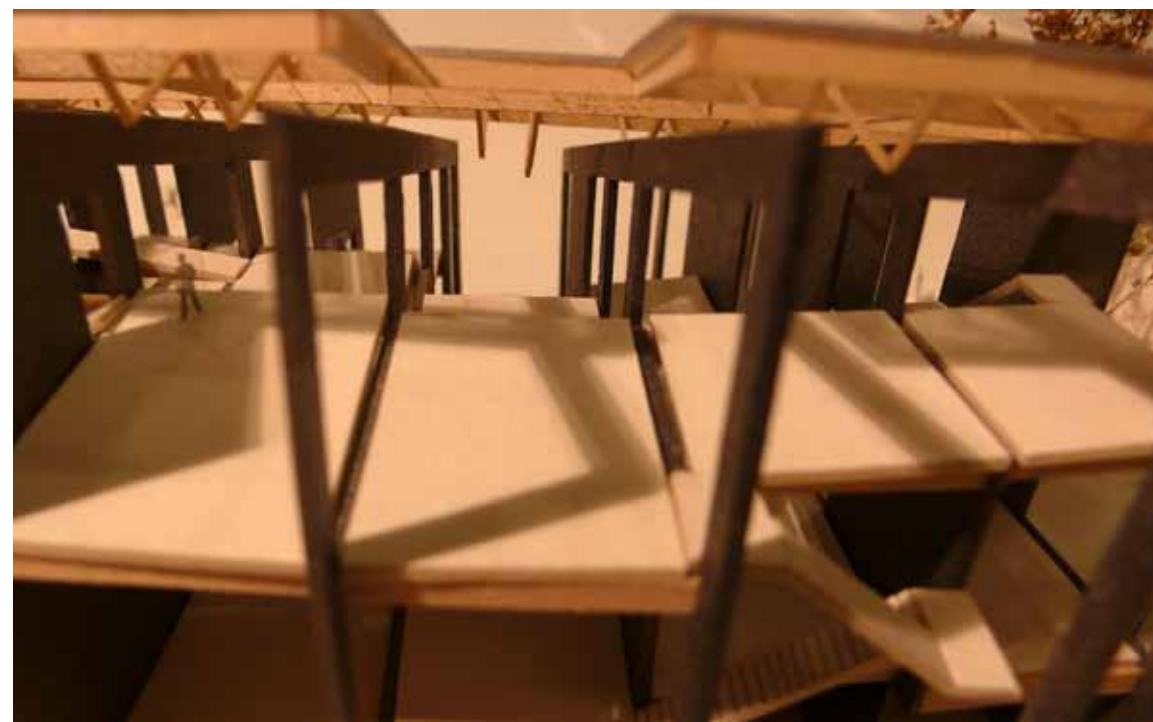
model by the author May 2010



another scheme for the roof rendering by the author Dec 2009

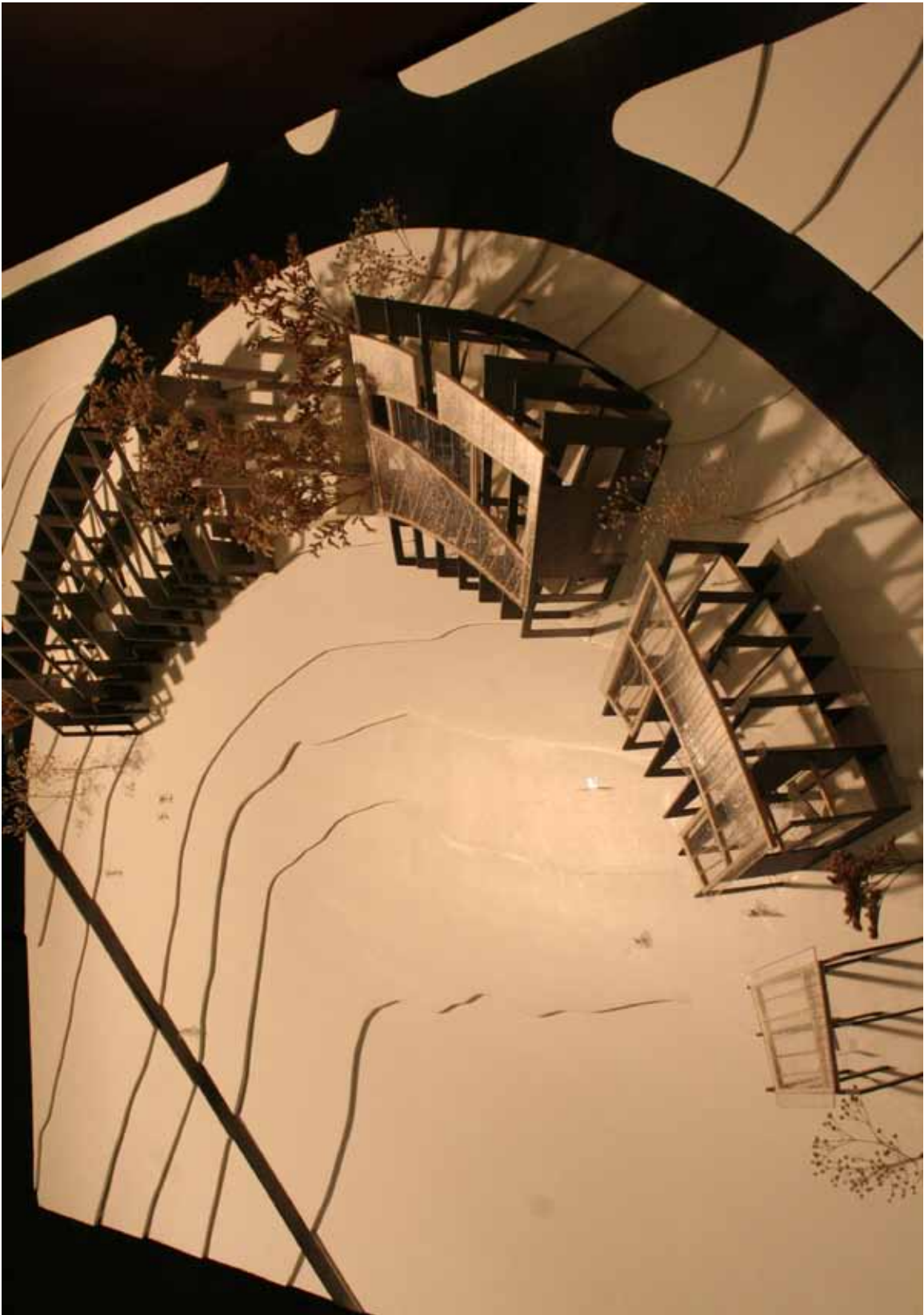


67



68







b i b l i o g r a p h y

Peter Wallenstien; **Virginia Tech, Land-Grant University, 1872-1997: History of a School, A State, A Nation**; Pocahontas Press, 1997

Andrea Maffei; **Toyo Ito: Wokrs, Projects, Writings**; Electa Press, 2002

Francis Strauven; **Aldo van Eyck: The Shape of Relativity**; Amsterdam: Architectura & Natura Press, 1998

Jere Stuart; Urban Space: **A Brief History of the City Square**; California State Polytechnic University Press, 1978

University Archives of Virginia Tech;
<http://spec.lib.vt.edu/archives>

All drawings, photographs, models, and sketches are created by the author except:

P1. Virginia Tech 1983 campus master plan from the University Archives of Virginia Tech

P3-4. Satellite photos from Google Earth

