

Demonstrations

by
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Master of Architecture

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Abstract

A two-part project was used to study the idea of demonstration in architecture. The first was the design and fabrication of cycloidal drawing tools. The second was the design of another studio building for the College of Architecture and Urban Studies at Virginia Tech.

First, the study of cycloidal lines became the catalyst for designing and fabricating cycloidal drawing tools.

Drawing a cycloid is a demonstration of its construction. There are no specialized tools available for drawing these types of lines, so several iterative generations of design were needed to refine the form of the tool and reach adequate accuracy.

Second, an additional studio building for the College of Architecture and Urban Studies at Virginia Tech was designed. It was designed to be a place for the demonstration of craftsmanship. The building was placed adjacent to Cowgill Hall. The form of the building was explored through traditional tools of architectural design, namely drawings of plans, sections, elevations and details.

For the best representation of this thesis, please refer to the book found in the Art and Architecture library.

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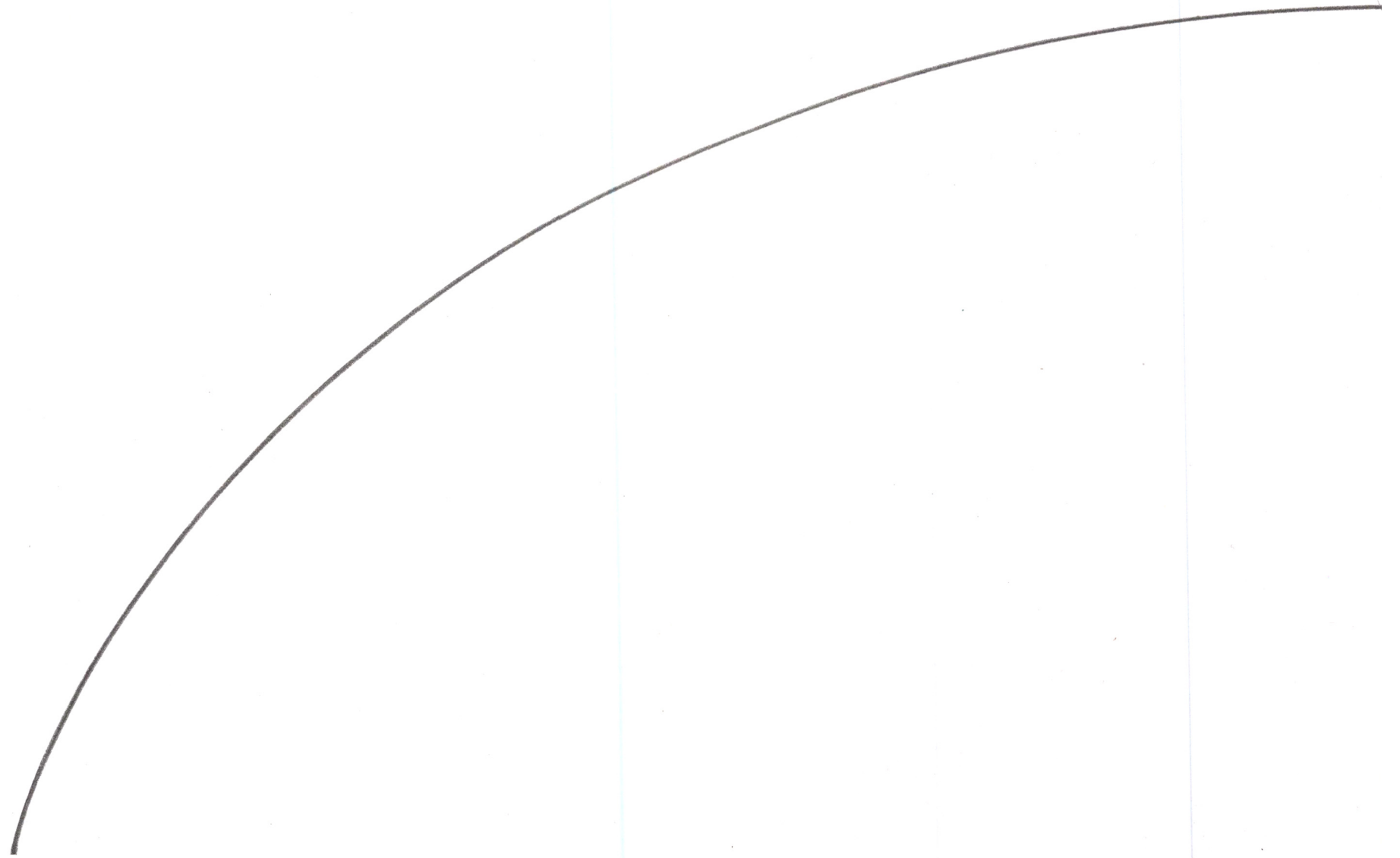
On Cycloids

A Cycloid is a line that follows a fixed point on the edge of a circle while it is put in motion along a straight line. They have the proportion of the diameter : circumference, or $1 : \pi$. The period, or length, is the circumference of the circle rolled out flat, while its maximum height is the diameter of the circle.

The act of drawing a cycloid is a demonstration of its construction.

There are no readily available tools for drawing these lines. These tools were designed through different generations of design, each one making a refinement to the next.

half of a cycloid, left
pencil on vellum



On Tools

The tool comes to life when it is put into action, and for the craftsman the action is the true showing, the showing of the tool and thus the showing of the craftsman. It is something that starts and finishes, and the thing left is more of a trace of what has happened.

The space between the tool and the action is the place where a craftsman dwells. The drawings shown in this document are the traces of the tools and contain the space between the tool and the craftsman.

*half of a cycloid, right
pencil on vellum*

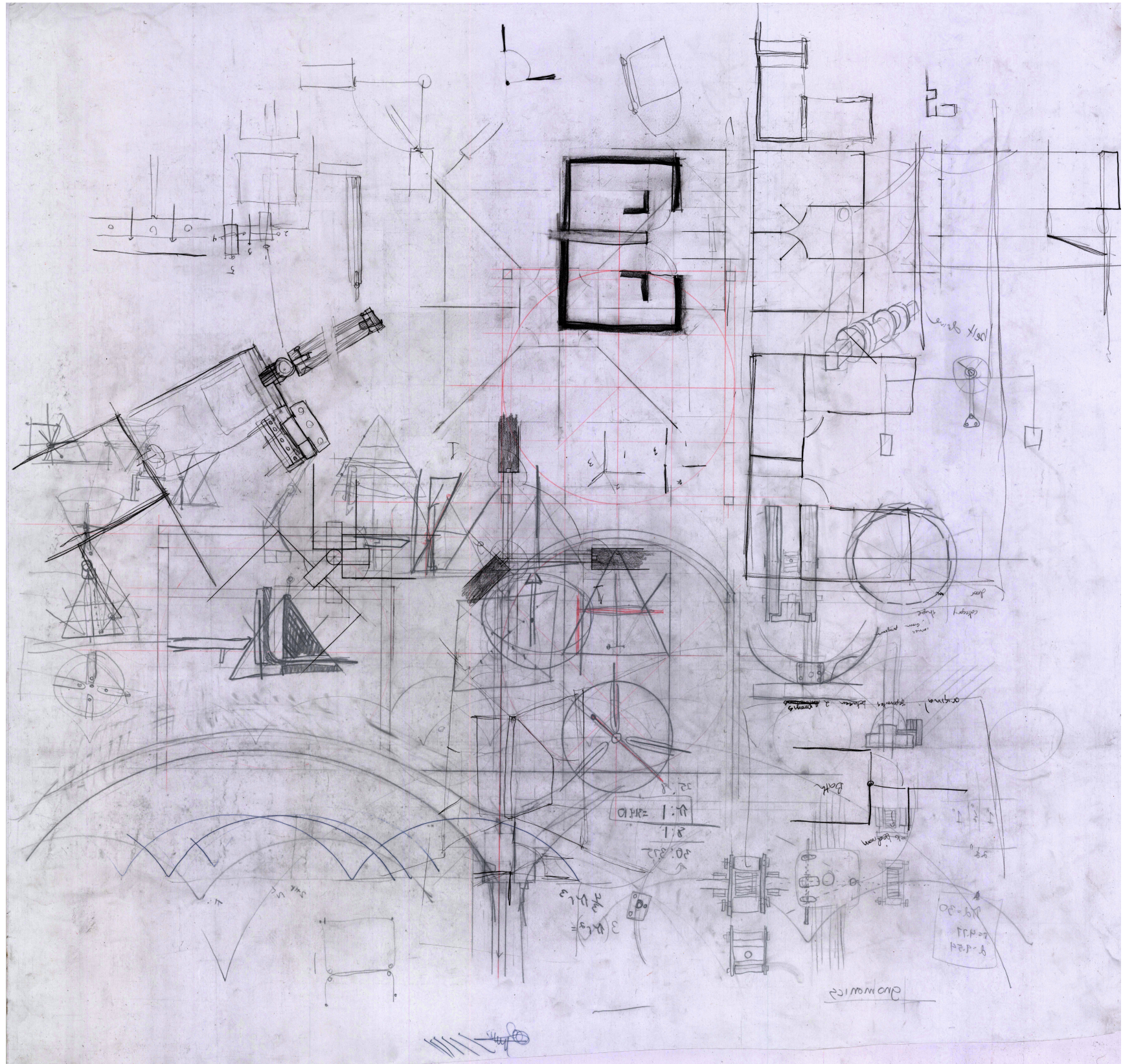
Generation 1

This tool was designed to rotate along a standard parallel bar, that accompanies most drafting tables architects traditionally use. The holes are drilled to accept standard lead pointers at various distances from the center.

It showed the difference between drawing and geometry, because it proved impossible to bring the pencil point directly to the perimeter of the circle.

Generation 1
plywood and rubber band





cycloid residue #1
ink and pencil on vellum

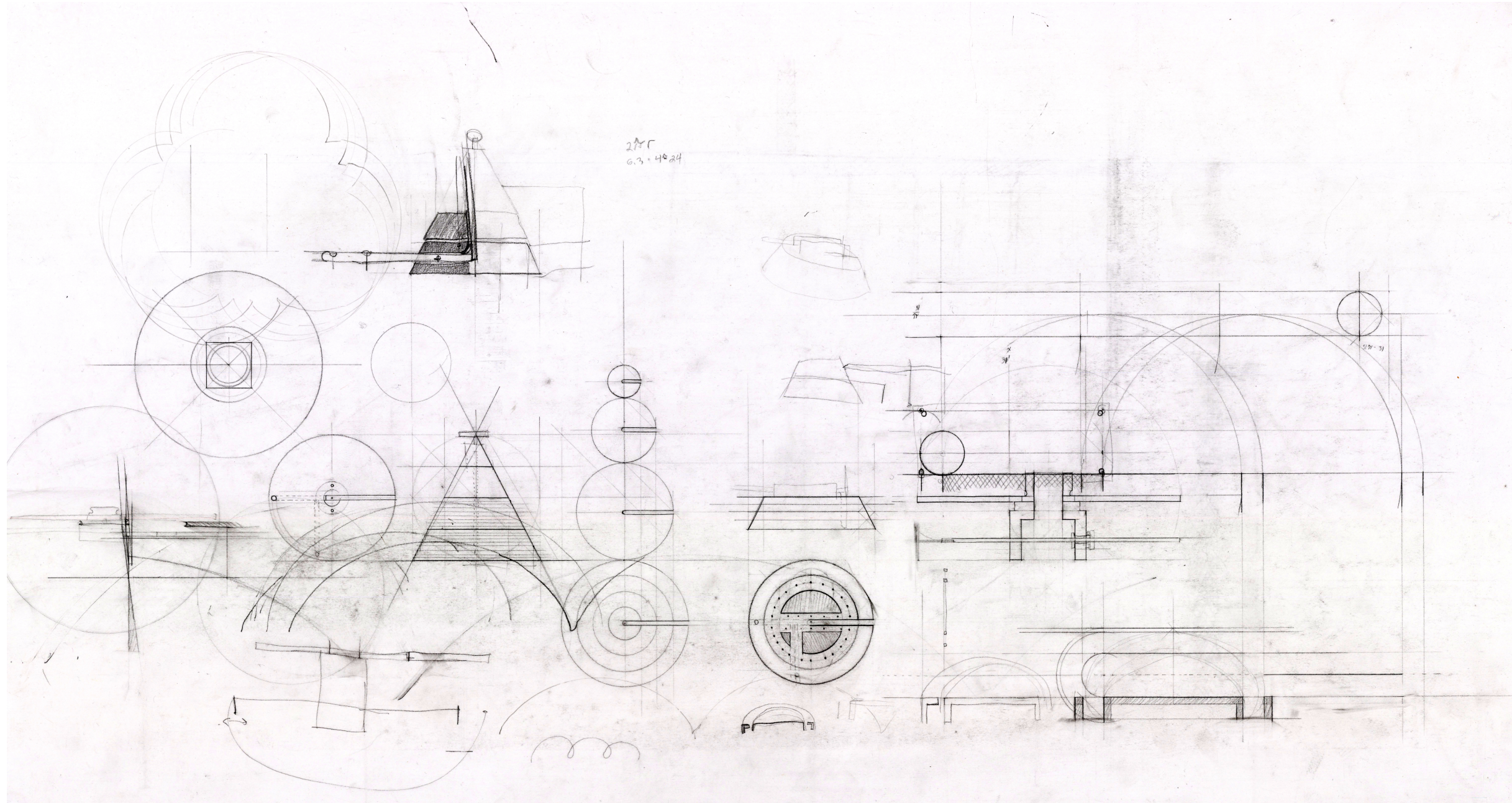
Generation 2

This tool consisted of standard PVC piping and a trammel point. It also ran along a parallel bar. The idea was to use the trammel point (a tool traditional to carpentry) with the PVC, thus bringing the point closer to the outside diameter of the pipe. The point resided inside the wall thickness of the pipe.

However, it still did not close the gap between the pencil point and the edge of the circle. It also did not have a consistent circle that ran along the edge of the bar, and it was very limited in the availability of different diameter pipes.

Generation 2
PVC piping and trammel point





cycloid residue #2
pencil on vellum

Generation 3

In order to have the diameter and pencil point in the same place, they had to be separated in to two different levels. The tool then became a central shaft of wood that held a brass arm to hold pencil lead, and a threaded mount for various sized circles above it.

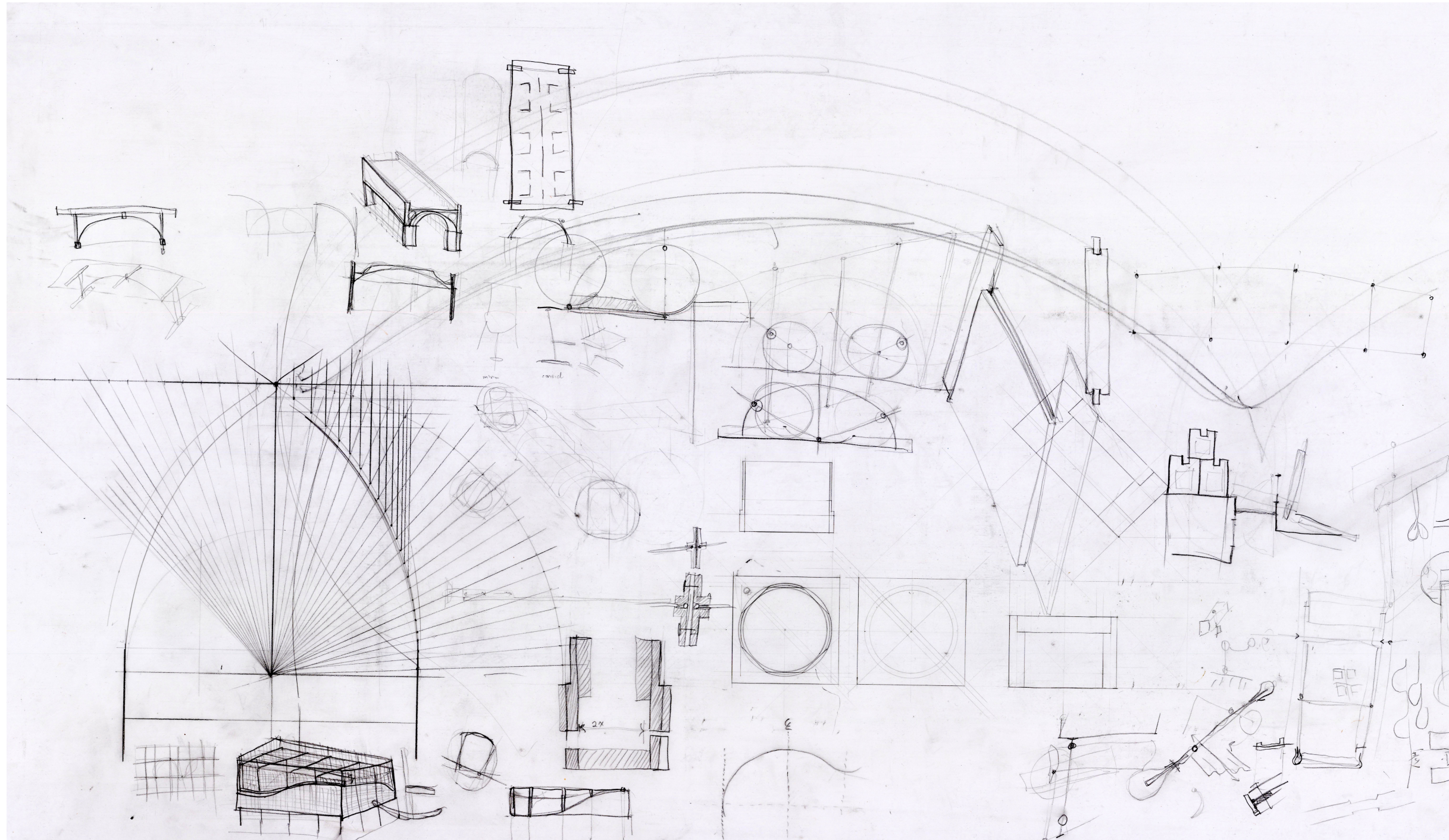
In order to use it in conjunction with a parallel bar, an auxiliary fence had to be made to lift the bar to the height of the circle on the top of the machine. This then allowed for the arm underneath to rotate freely and could be adjusted to any position desired.

This form works very well, although this model does not operate very smoothly. Also, the brass bar could not occupy the center point of the circle and was awkward to adjust.

Generation 3

plywood, oak, plexiglass, brass, steel
machine screws



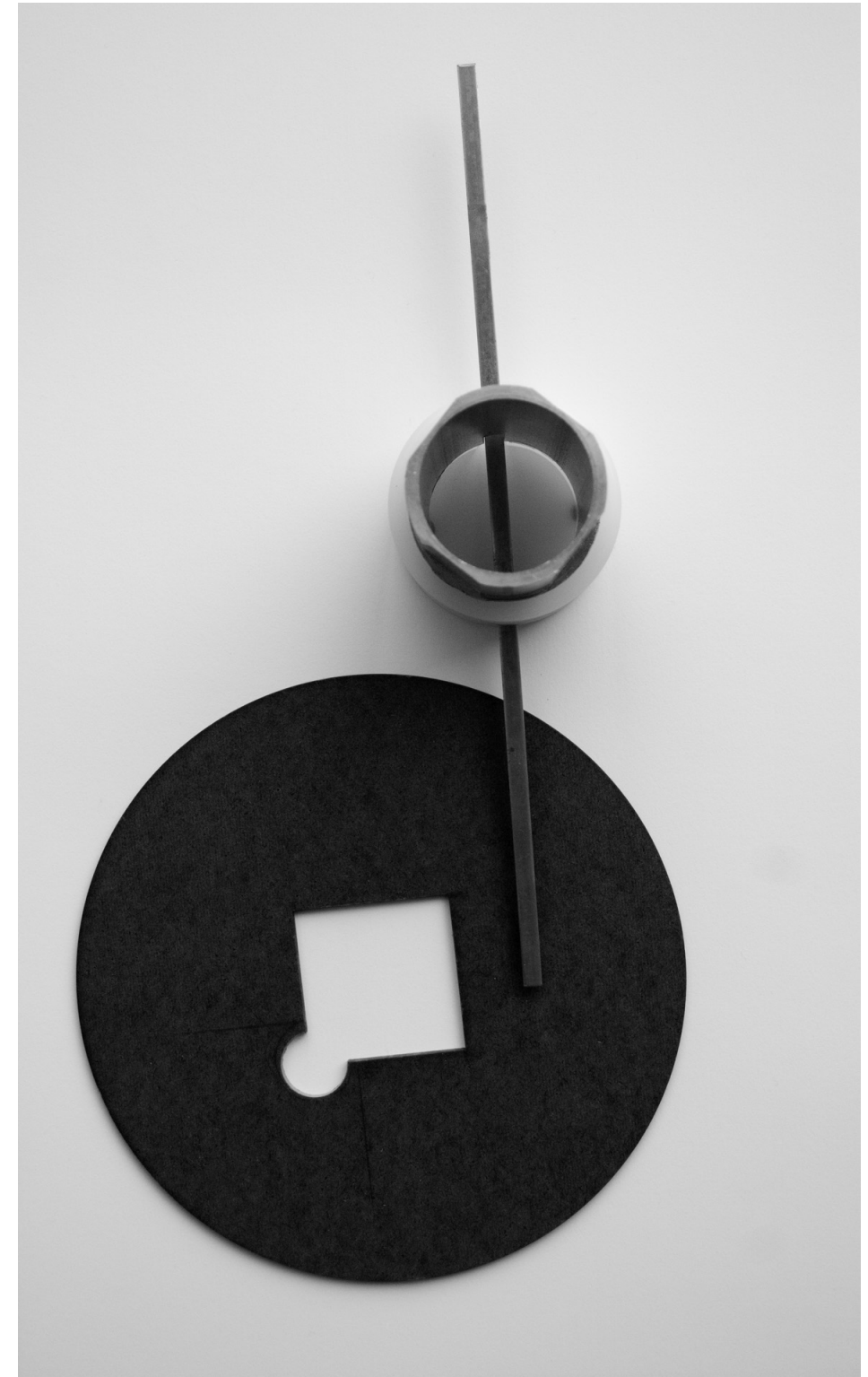


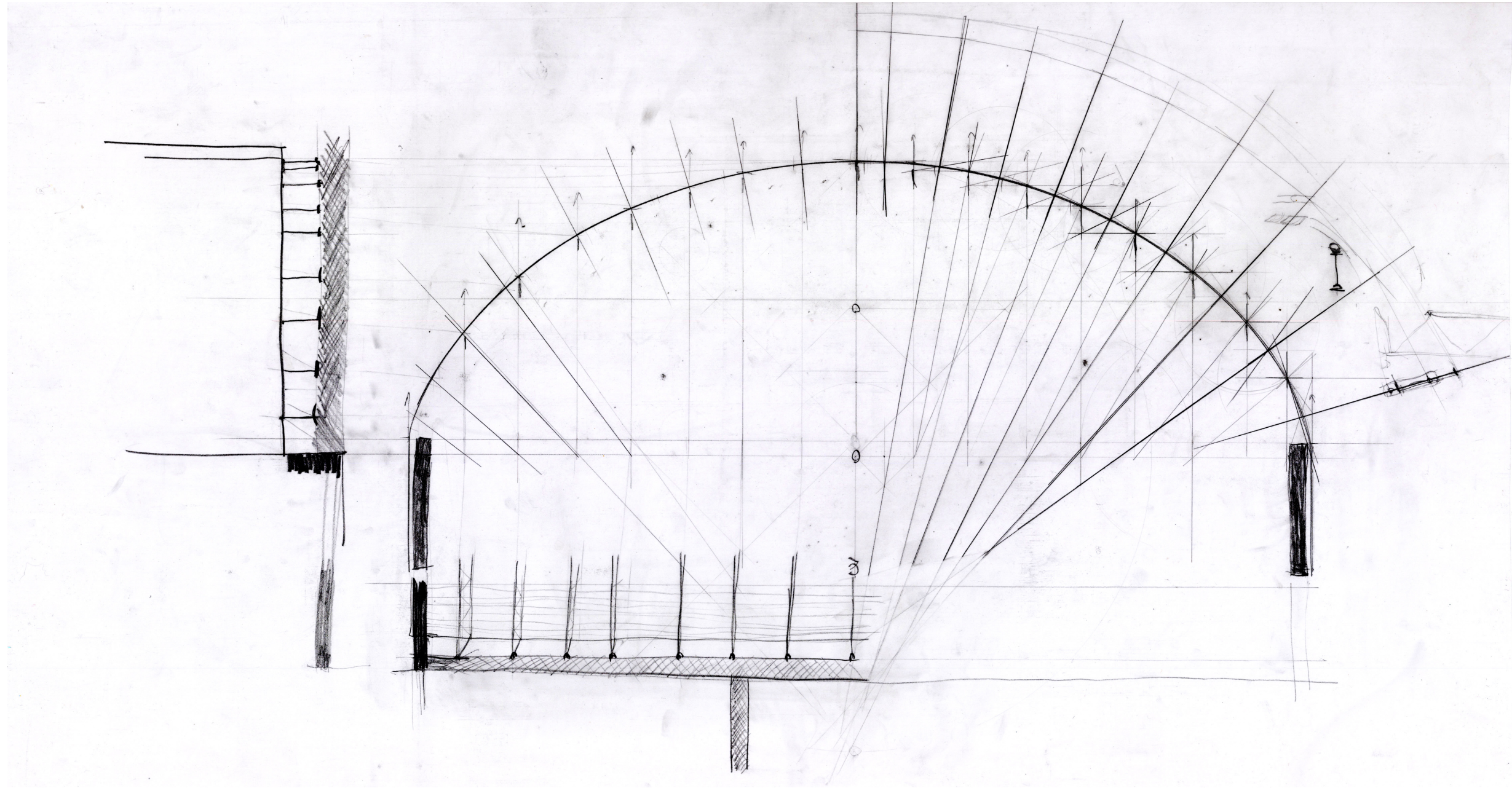
cycloid residue #3
pencil on vellum

Generation 4

The central shaft is now hollow aluminum with a plastic shell. It allows the brass bar to run through the center. The aluminum is milled to accept circles with square holes cut into the center. This locked the circle into its position relative to the arm, and the two halves could not rotate out of position.

Generation 4
aluminum, ultra-high molecular weight polyethylene, masonite, brass, steel screws





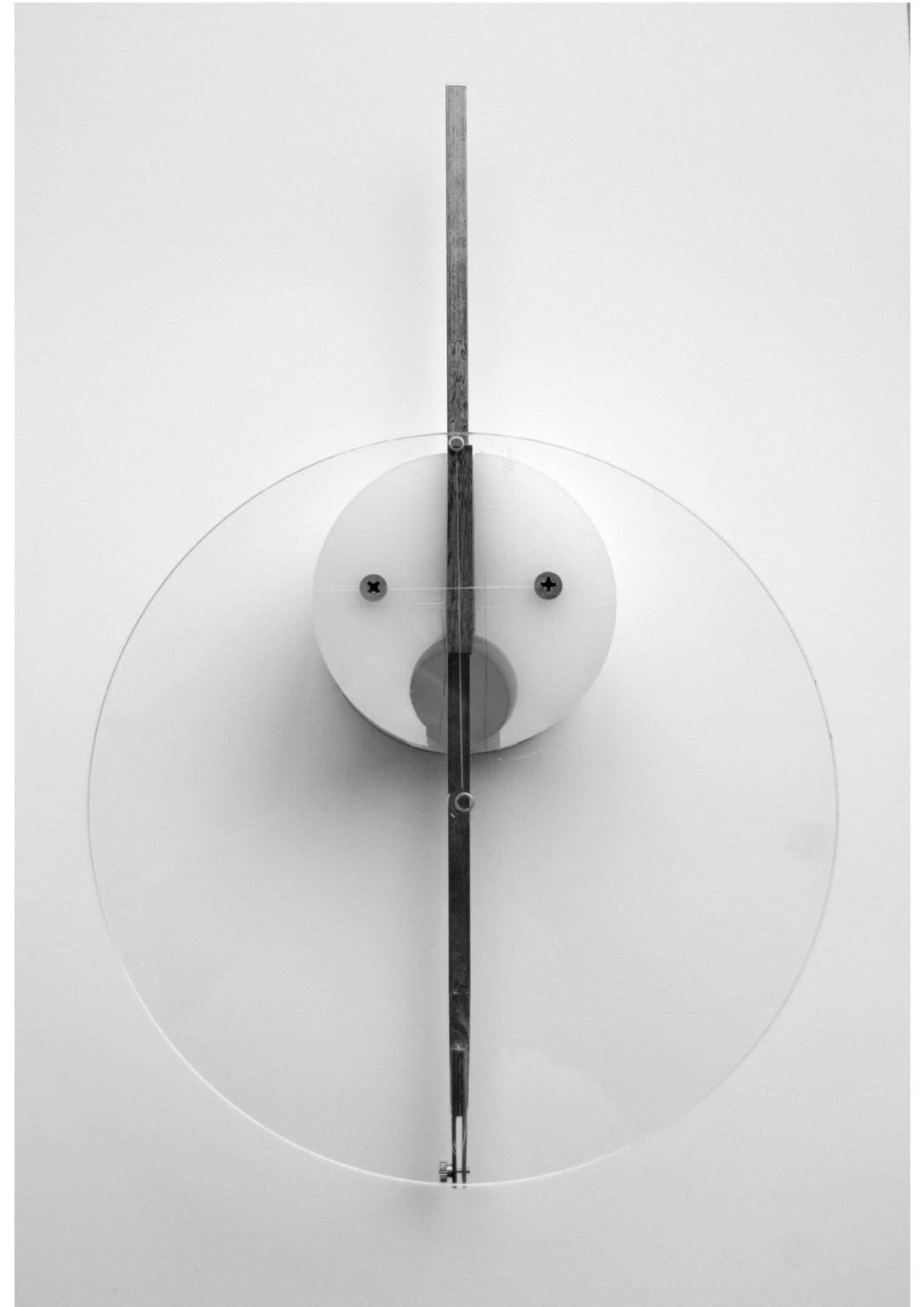
cycloid residue # 4
pencil on vellum

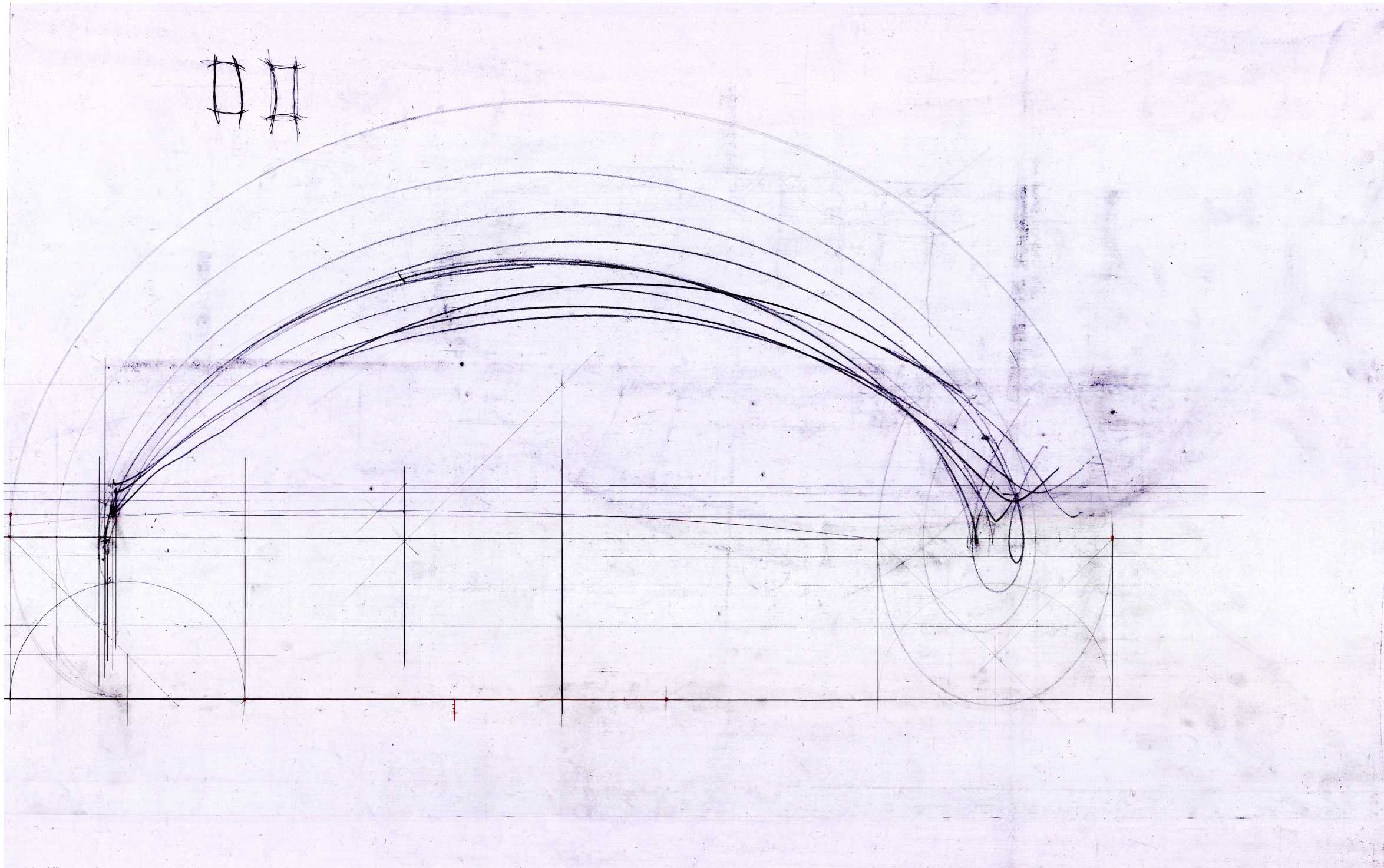
Generation 5

In the most recent generation, the lower body of the tool is mounted eccentrically to the circle on top. It allows the pencil point to occupy the center of the circle, and gives some more weight to the tool.

By having the weight off center, it provides a very smooth resistance, which allows for good control while rotating.

Generation 5
plexiglass, ultra-high weight
polyethelene, walnut, brass, brass
screws



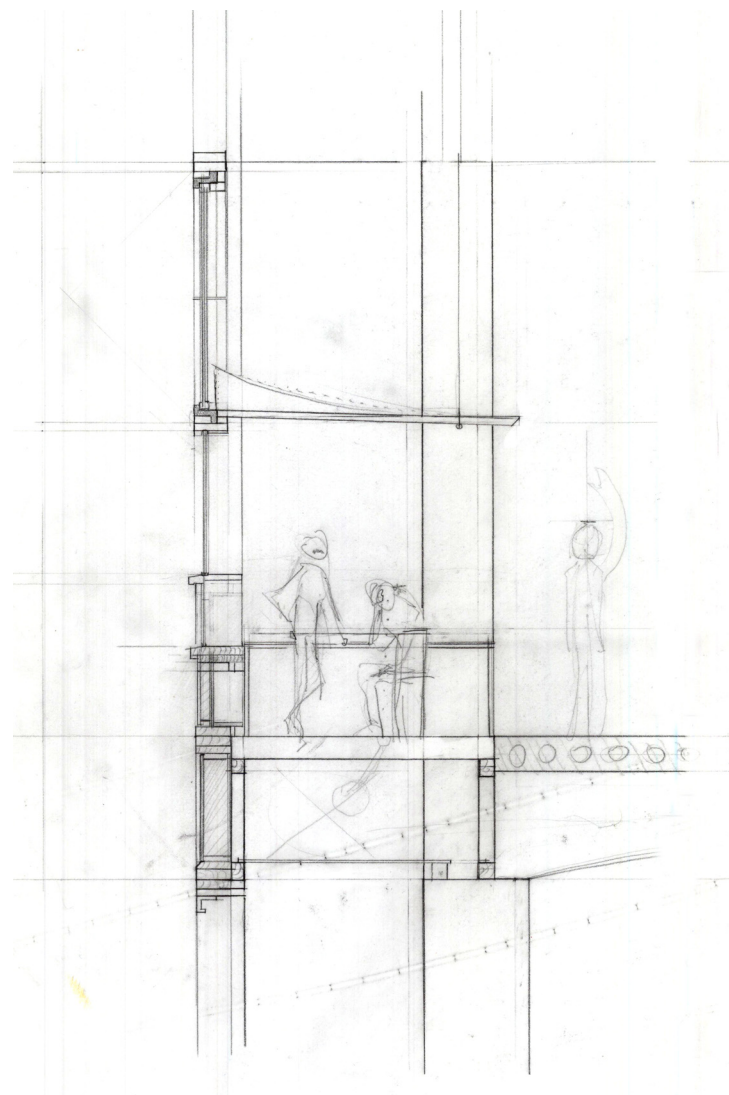


cycloid residue #5
pencil on vellum

Addition to the College of
Architecture and Urban
Studies at Virginia Tech

The second part of this thesis
is the design of a school for
the College of Architecture
and Urban Studies at Virginia
Tech.

The building is also a place
for demonstration. The
power of architecture is in its
inclusiveness. The building
is designed to give a place for
craftsman of different media
to practice their art. They
will leave the traces of their
making into the building, thus
demonstrating the craft for the
students inhabiting it.



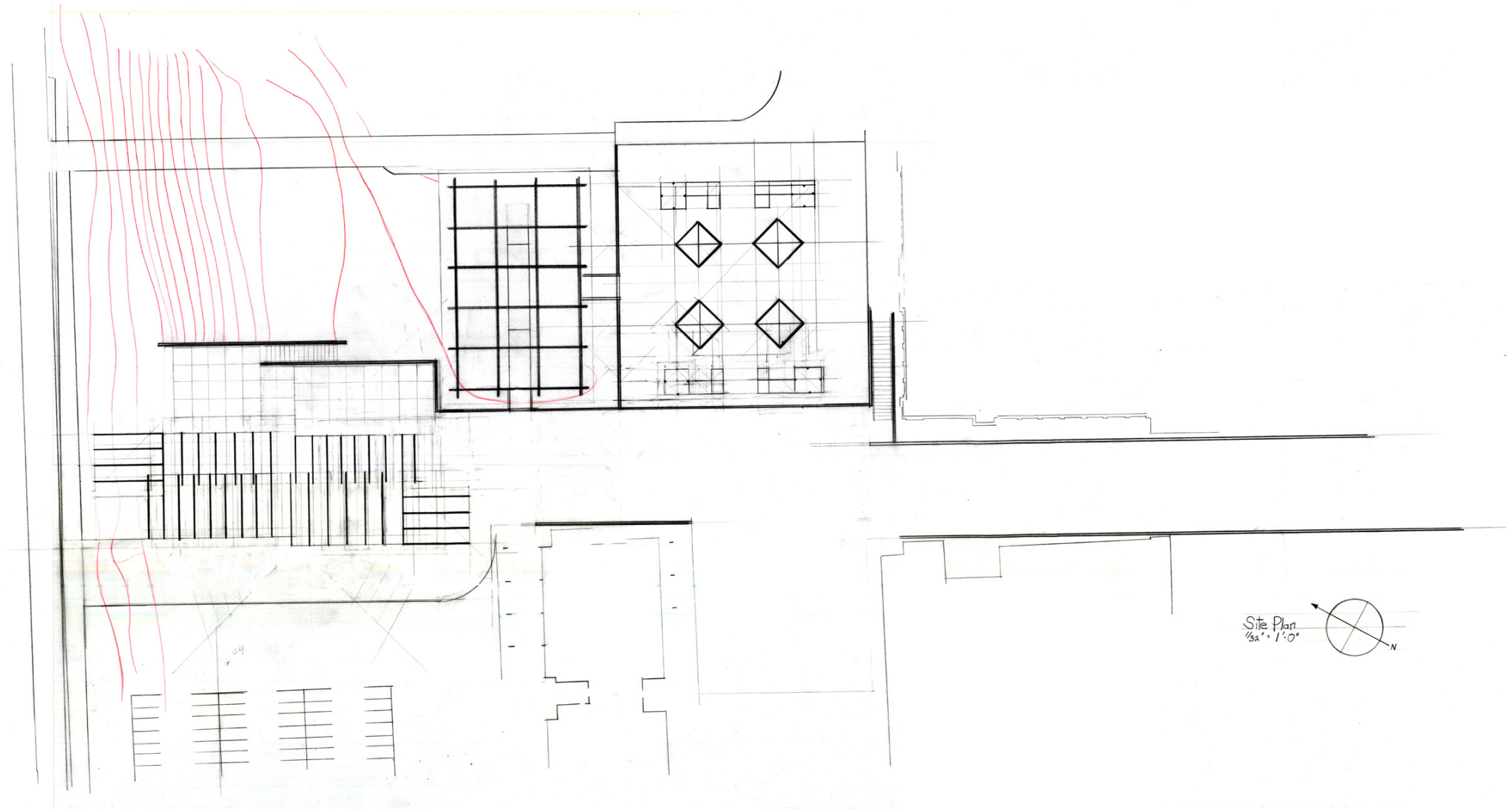
Section Sketch through desk
pencil on vellum

Situation on Campus

In order to keep the students and facilities of the School of Architecture together, the building is placed where Bishop Favoro Hall and the Johnston Student Center now sit.

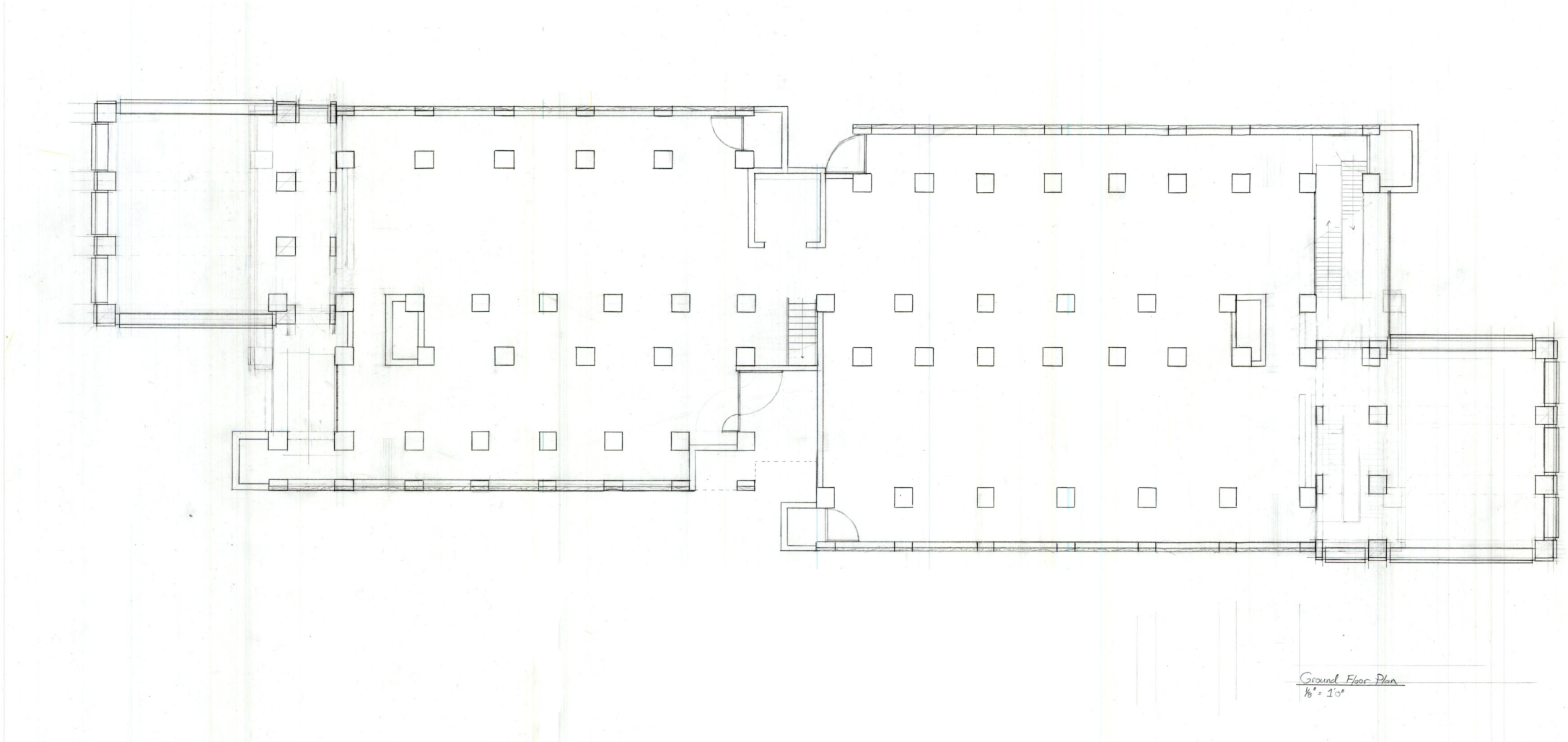
There building is placed 14 ft below the floor of Cowgill, and a deep trench is dug through the space between Cowgill and Derring and Buruss and Pamplin.

Removing these two buildings allows for a flat pathway connecting the parking lot and the drill field, making a perceptible axis connecting two major parts of campus.



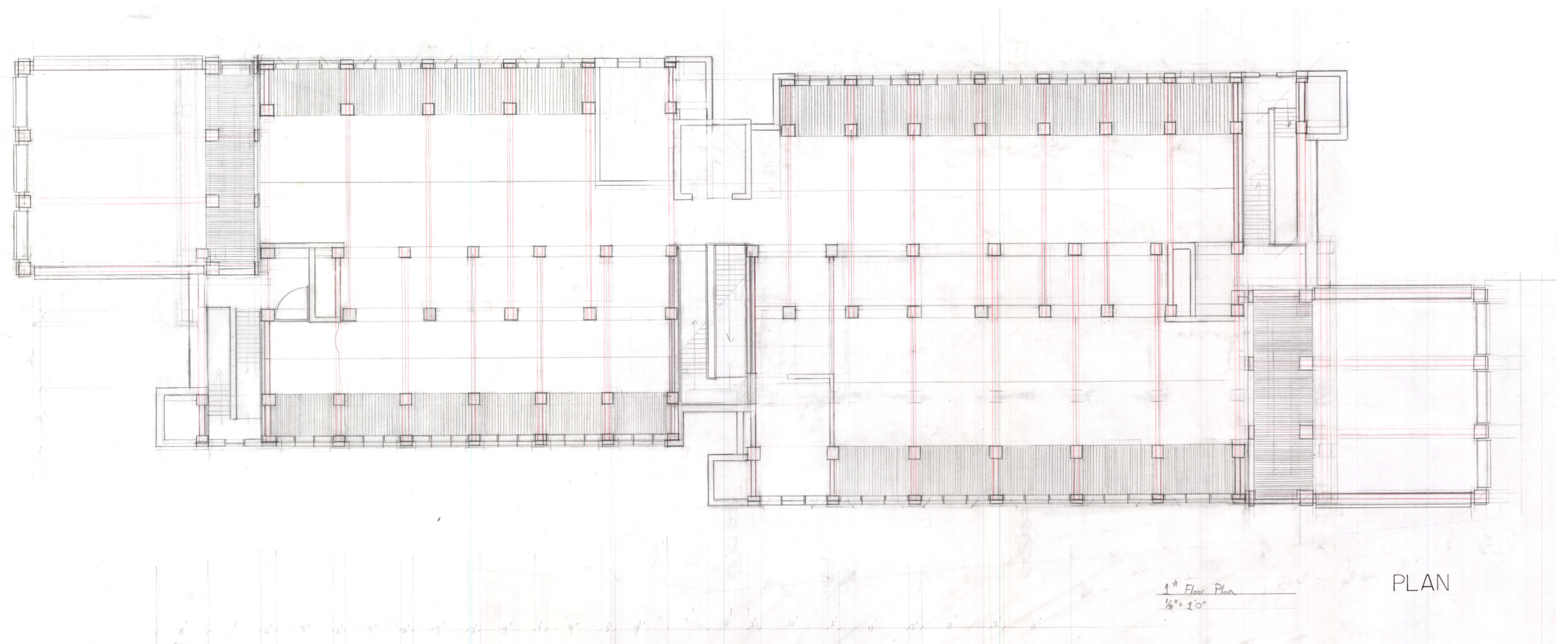
Site Plan
pencil and colored pencil on vellum

The plan of the building is an architectural demonstration of rhythmic phasing, stemming from certain types of modern musical composition.

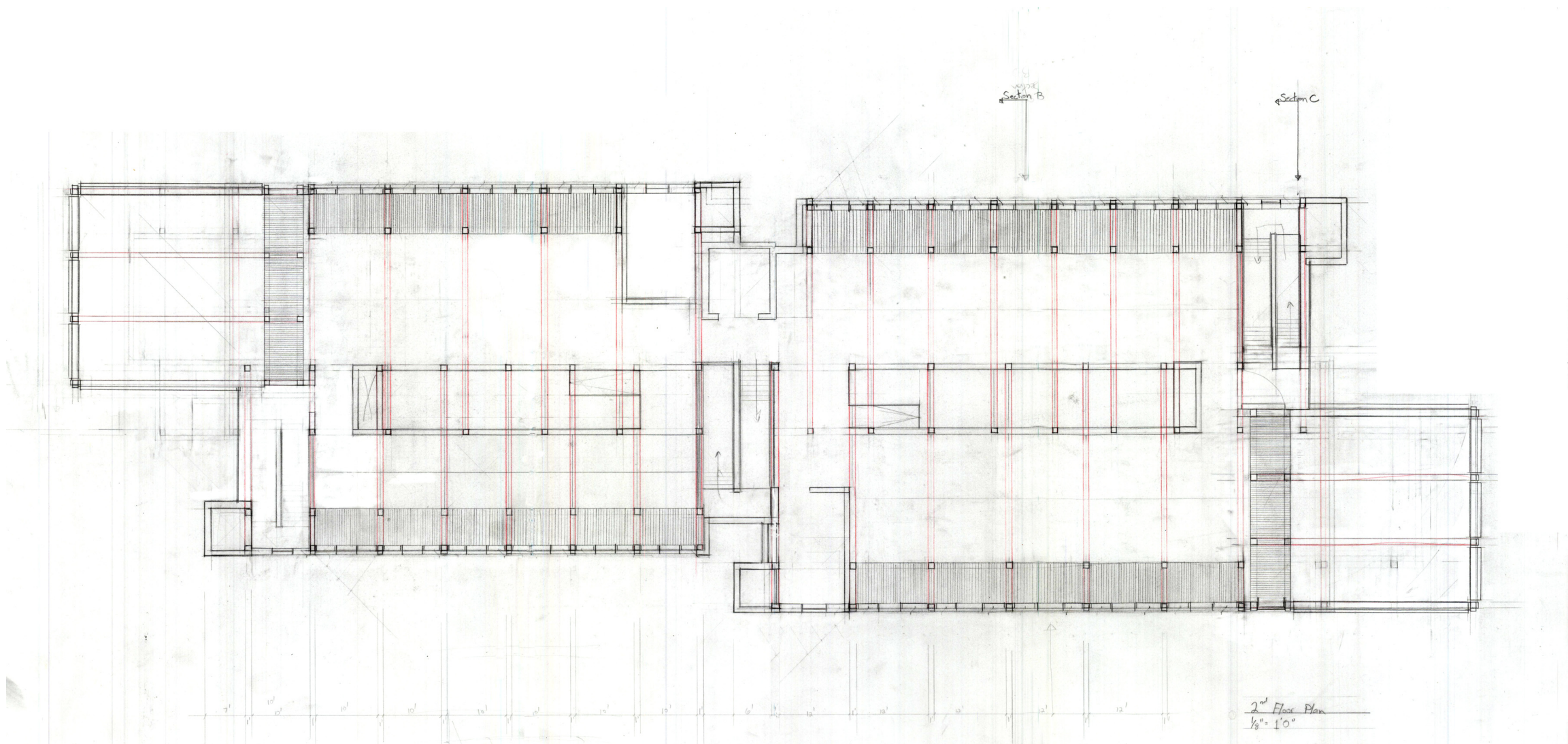


Ground Floor Plan
pencil on vellum

It is two simple periods of differing rhythms laid out to turn onto it again. It is a 5 : 4 relationship. Where one side is laid out as a proportion of 5, it is then contrasted against a proportion of 4. These two numbers are found to come together again in a set period of six 4s and five 5s.



First Floor Plan
pencil on vellum

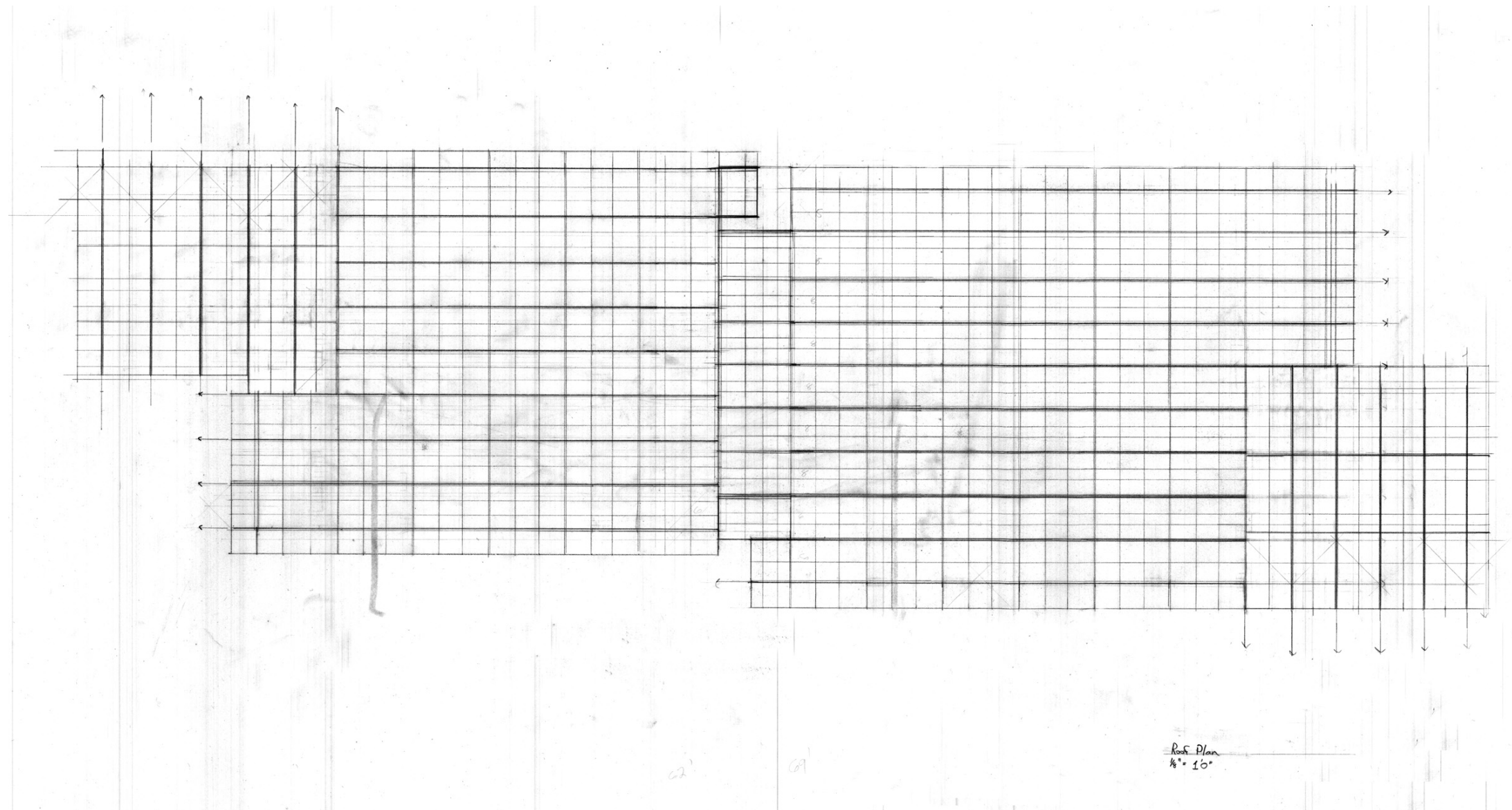


Each period is reflected and rotated in the longitudinal halves and the structure is turned against itself to give the building an end.

These rooms at the ends of the buildings are places for demonstration of the art of the architect, namely drawings and models.

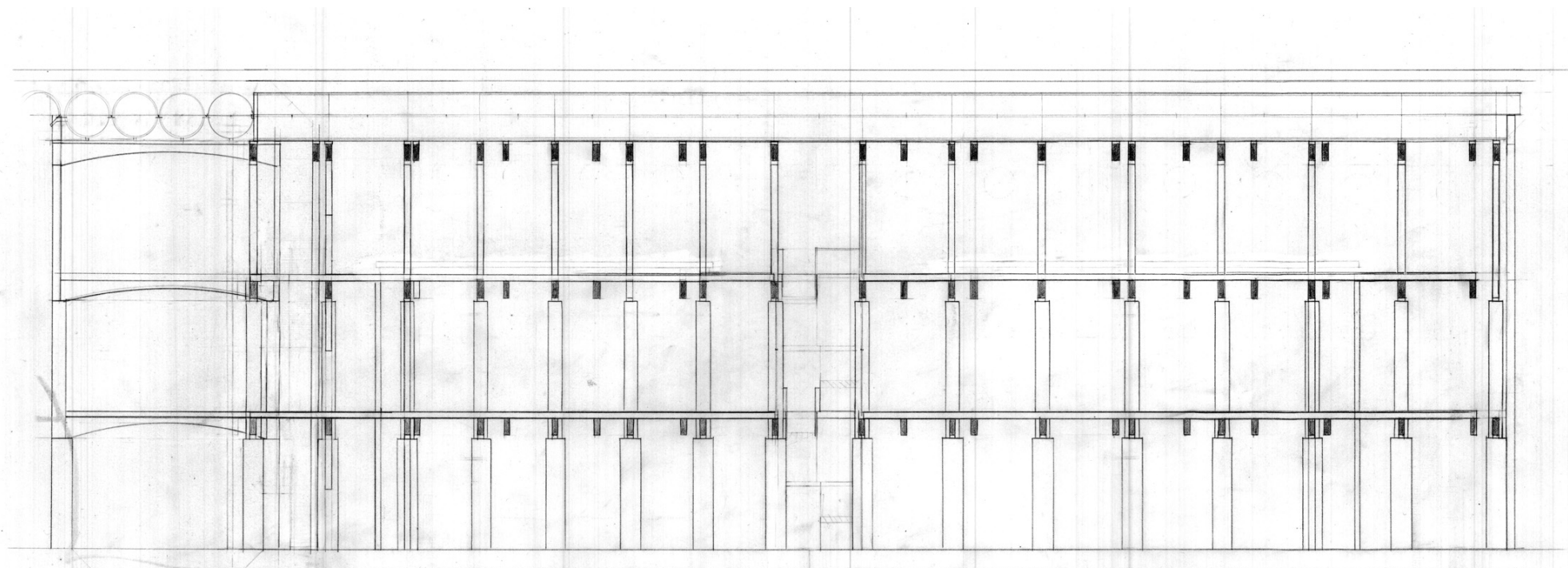
Second Floor Plan
pencil on vellum

The building is designed, as tools should be, to be durable, and to reveal its function to the people inhabiting it. The living of the building will then receive the trace of the patterns of dwelling and the stains of the environment.



Roof Plan
pencil on vellum

The section drawn through the main axis of the building shows the intersecting rhythms of each half and creates a lovely corridor.

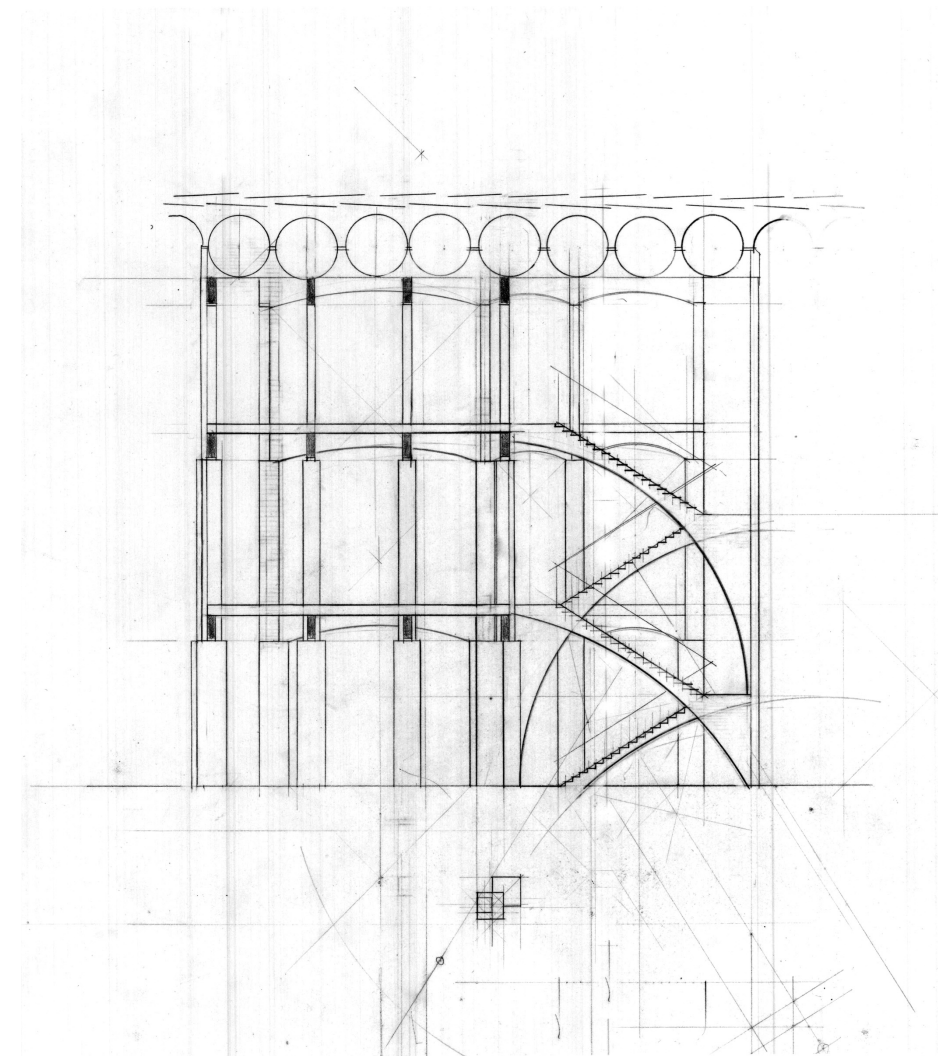
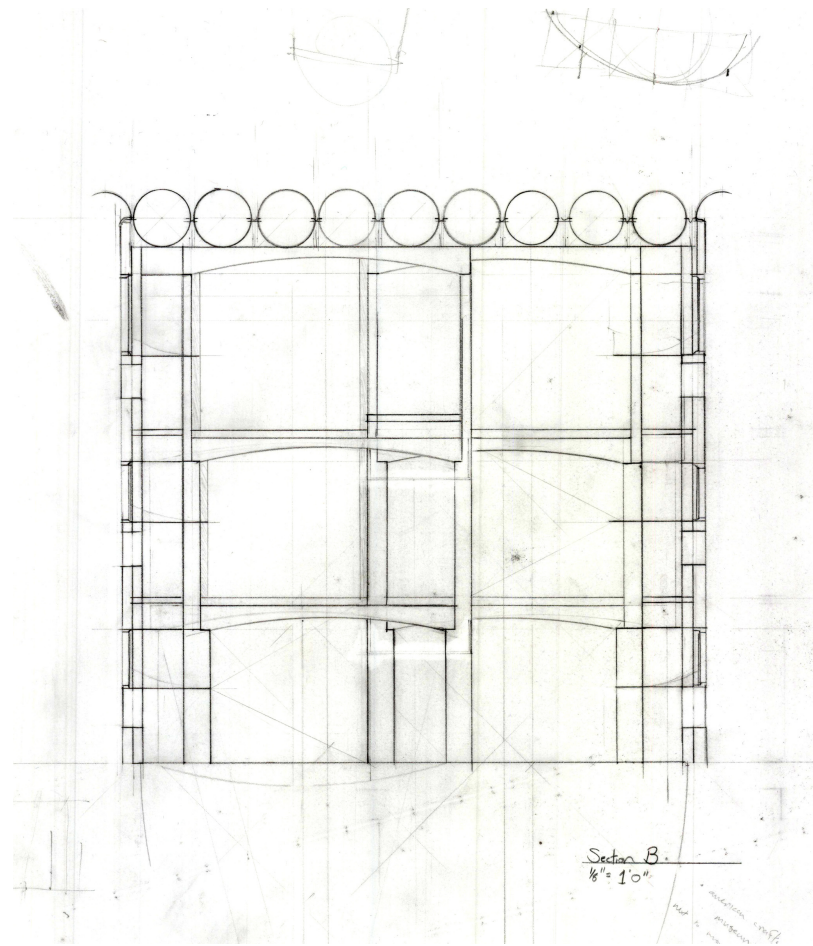


Section A
1/8" = 10"

Long Axis Section
pencil on vellum

The structure of the building is large masonry columns, spanned by cast-in-place concrete beams.

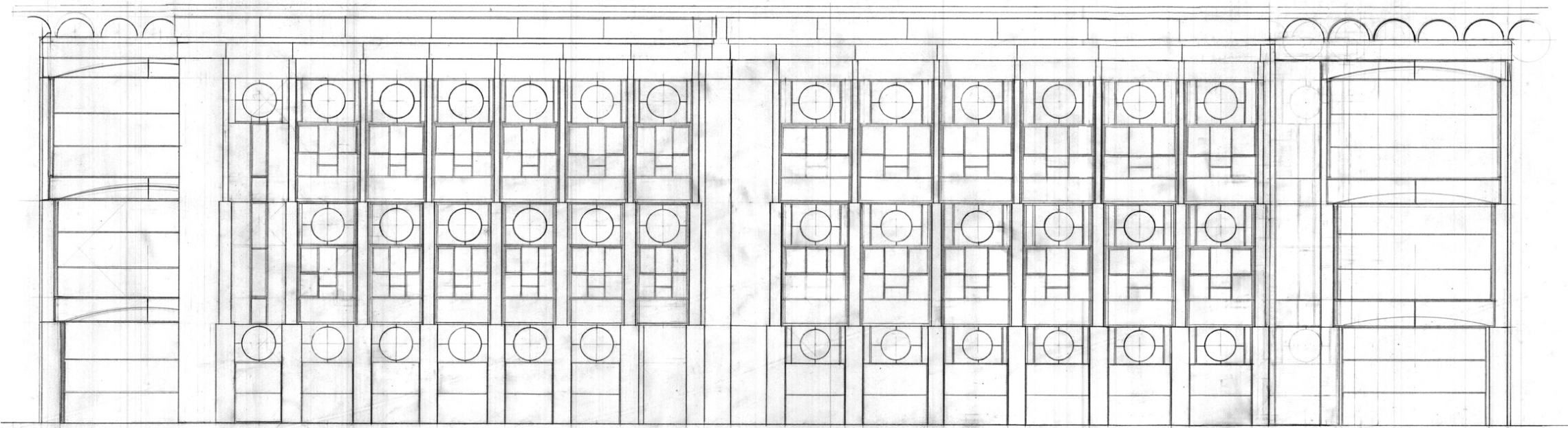
The floor in the middle is precast hollowcore concrete slab while the perimeter floor is wood.



Short Axis Sections
pencil on vellum

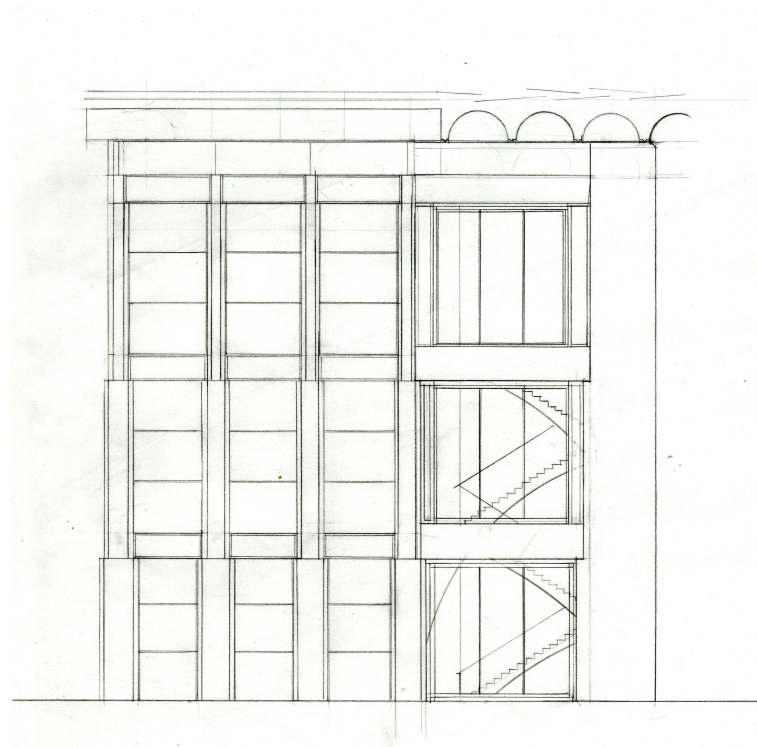
Elevations

The composition of the facade shows the parts of the building behind it.

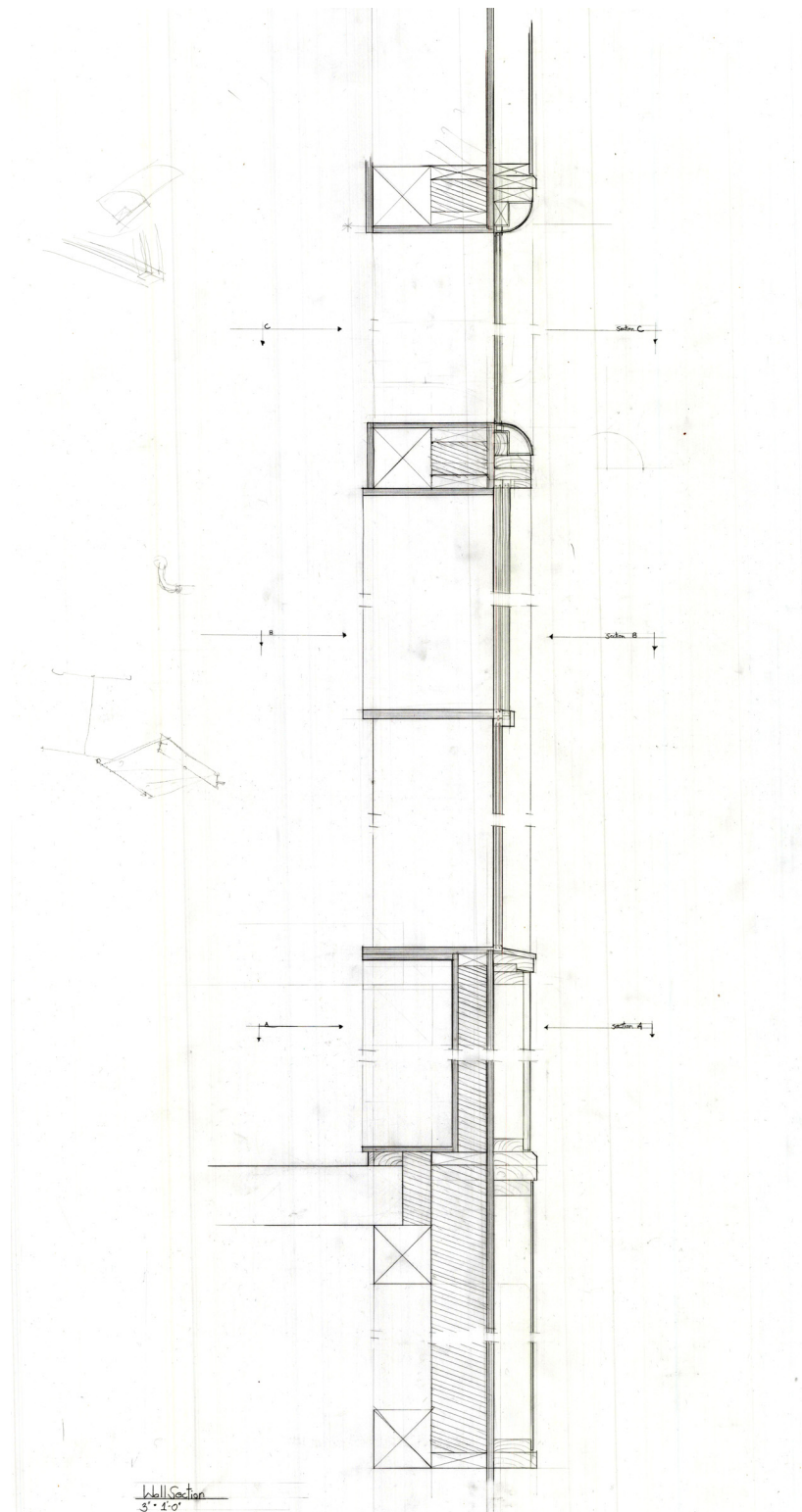


West Elevation
1/8" = 1'-0"

West Elevation
pencil on vellum



North Elevation
pencil on vellum



Wall Section

Each floor in the building is very tall, 16 ft of inhabitable space.

The topmost place is a large circular window with a frame of cast porcelain. It is the space of light, and can travel deep into the width of the building.

The middle place is for the students. They are given a room, which is thought of as a cabinet.

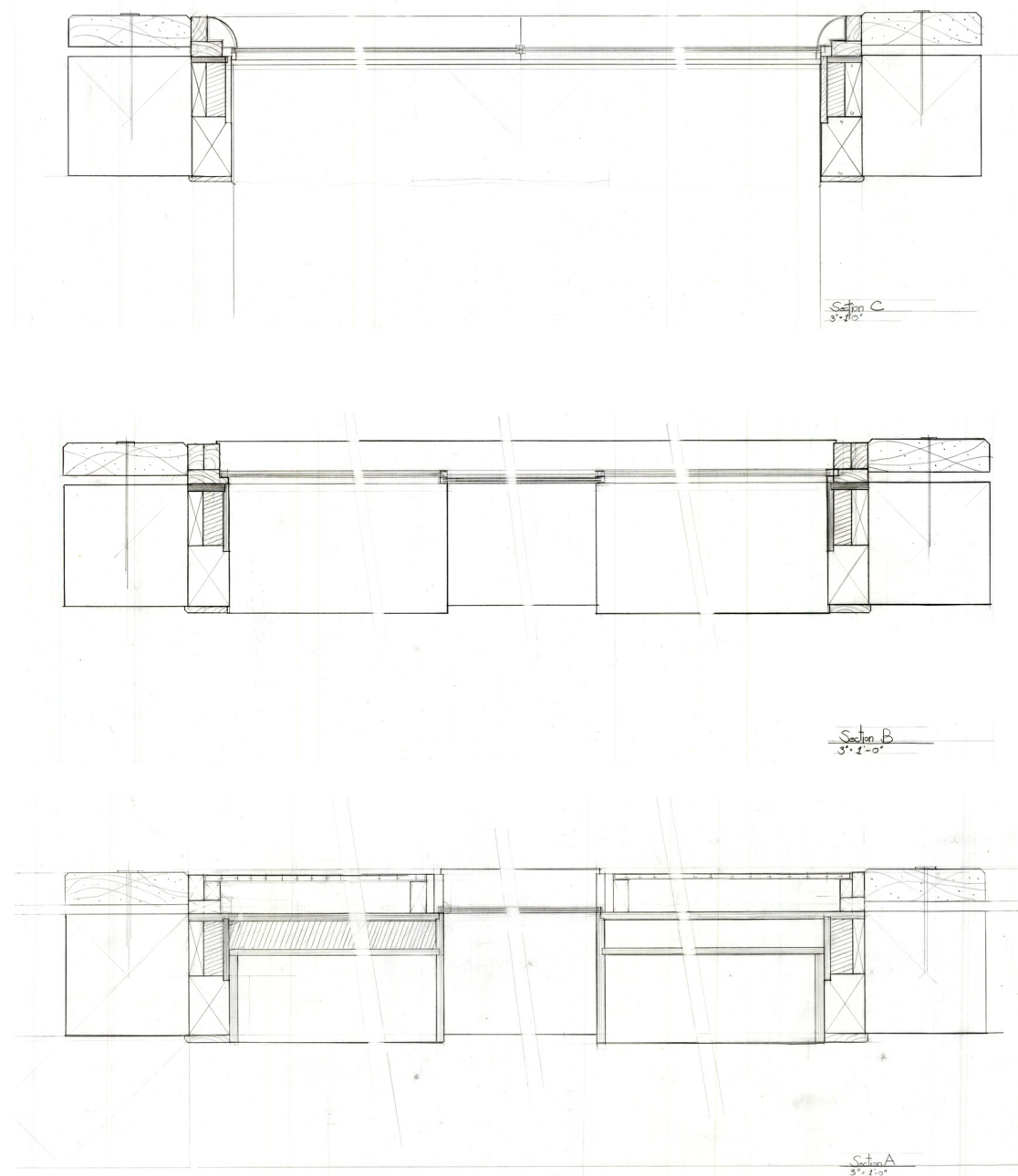
The lowest place is a large pathway that runs the buildings mechanical needs, with generous dimensions to allow for the servicing and addition of future mechanical systems.

Wall Section
pencil on vellum

This wall section was a big part of the development of the studio. It shows the place for the student and the place for architecture. The structure of the wall is made of masonry, which dictates a certain thickness, while the carpenter fills the spaces between.

The inherent difference in structural roles between the two allows for the place for the student to be. The generous thickness of the wooden section allows for several levels of windows, deep sills and cabinetry.

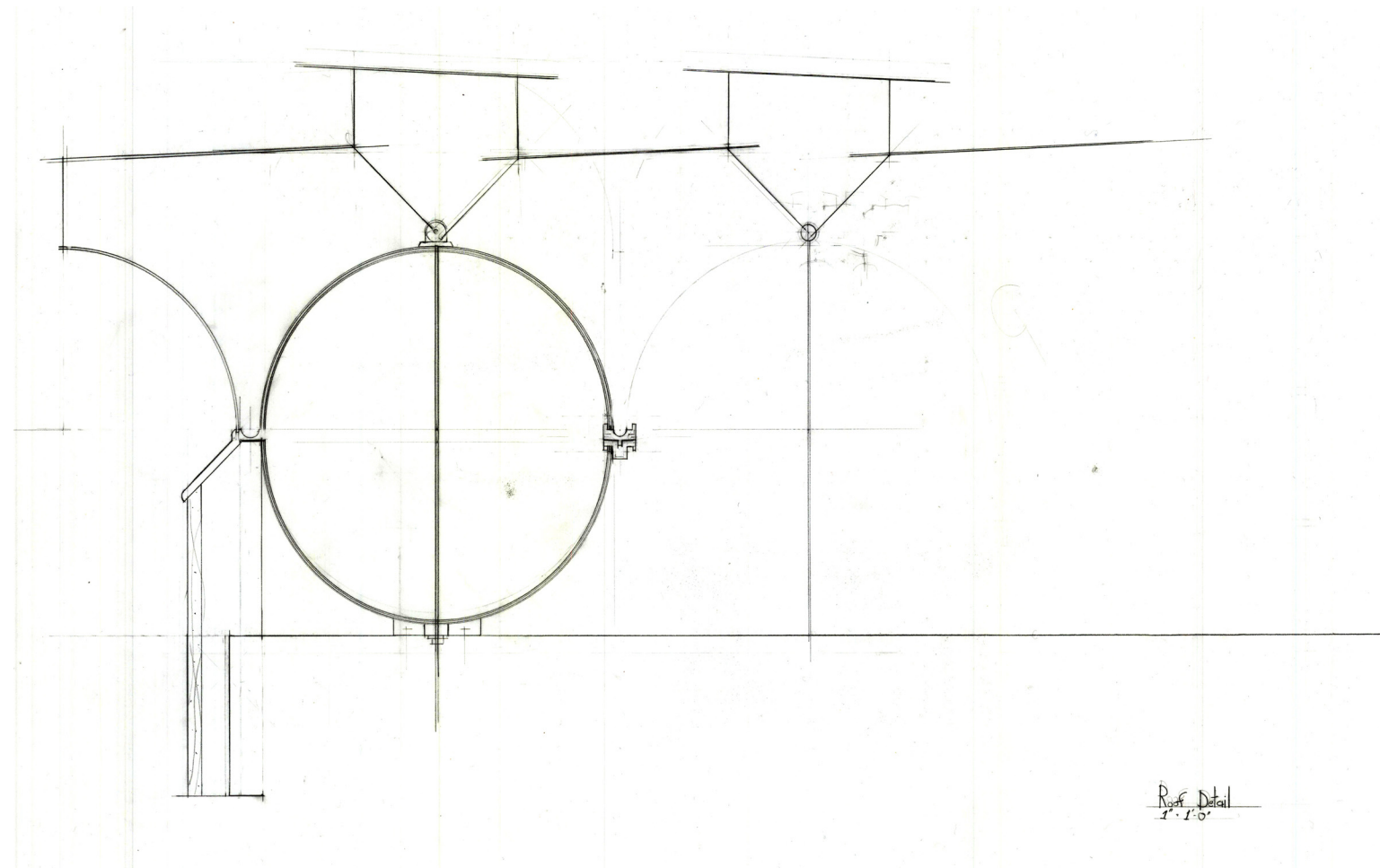
Wall Sections, plan view
pencil on vellum



Roof Detail

The roof is a series of glass tubes with panes of glass held above the tubes.

The top panes begin to structure the elements as they fall onto the roof.



Roof Detail
pencil on vellum

All photographs, drawings, and writings contained in this document are
the product of the author.

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Ciriculum Vitae

2002-2006: New York State College of Ceramics at Alfred University
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