Architecture as a Translation of Noise

by Jorge Bernal

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

Master of Architecture

Marco Frascari, Chair

Susan Piedmont-Palladino
Commitee Member

Paul Emmmons
Commitee Member

Light, Space, Color, and texture are elements often used in the construction of Architectural composition.
This thesis is about adding sound (noise) to that palette.

abstract

First and foremost, I would like to thank my Thesis committee. Marco Frascari, Susan Piedmont-palladino, and Paul Emmons. For over 2 years they put with my sometimes-clueless explorations in noise, Architecture, and god knows what else. Their unrelenting trust and support allowed me to achieve my goals. I also need to thank Jaan Holt, Mathew Mindrup, Christopher Cabacar, Andrew Woodrum, and Alessandro Ayuso for their interest and conversations.

I want to thank my mother Lucia, for her support through sacrifices the past 20 years, and her unconditional love. My father Jorge Sr. for his words of encouragement throughout my Graduate studies. My two sisters Lucia and Ana, who were there for me when I needed them. And last but not least American Airlines for having 9 flights daily to Miami, without which I would not have made it through the winters.

For Jaime Aresti-Zamora

Acknowledgement

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Children are often drawn to noise.
A primal instinct, that transforms into something more complex as we get older. Our brain is able to transform noise into words, sentences, music, noise… is this Alchemy?
Although I can't remember what my first memories of noise are, I do know when my interest began on how it applies to Architecture.

In the summer of 1994 I enrolled for my second semester of Architecture School (Design 2.) Our assignment was to design a "House for Beethoven." We were to choose a musical piece by him and design around it, I chose Beethoven's 5th symphony. I struggled to find the same kind of balance and harmony I was hearing, with a clear beginning and end. At the same time I began listening to the new sounds coming out of England, in the form of "Electronic Music", more specifically "hardcore". I would ask myself, why couldn't architecture be as radical as what I am hearing?

Hardcore mutated into "jungle" and eventually into "drum and bass". When broken down, drum and bass is a product of the recombination of known sounds, music, processed in analog and digital equipment to produce a new sound. This manipulation and distortion (within time/space) of sound made me think the same could be done with built space.

But how could space be manipulated in such a way? Parking garage! Florida being so flat and abundant space means there are lots of concrete (post tension and pre-cast) parking structures around. There was an uncanny resemblance in the vibrations these structures produced and the low frequency bass in the music I was listening to. How could I use this?

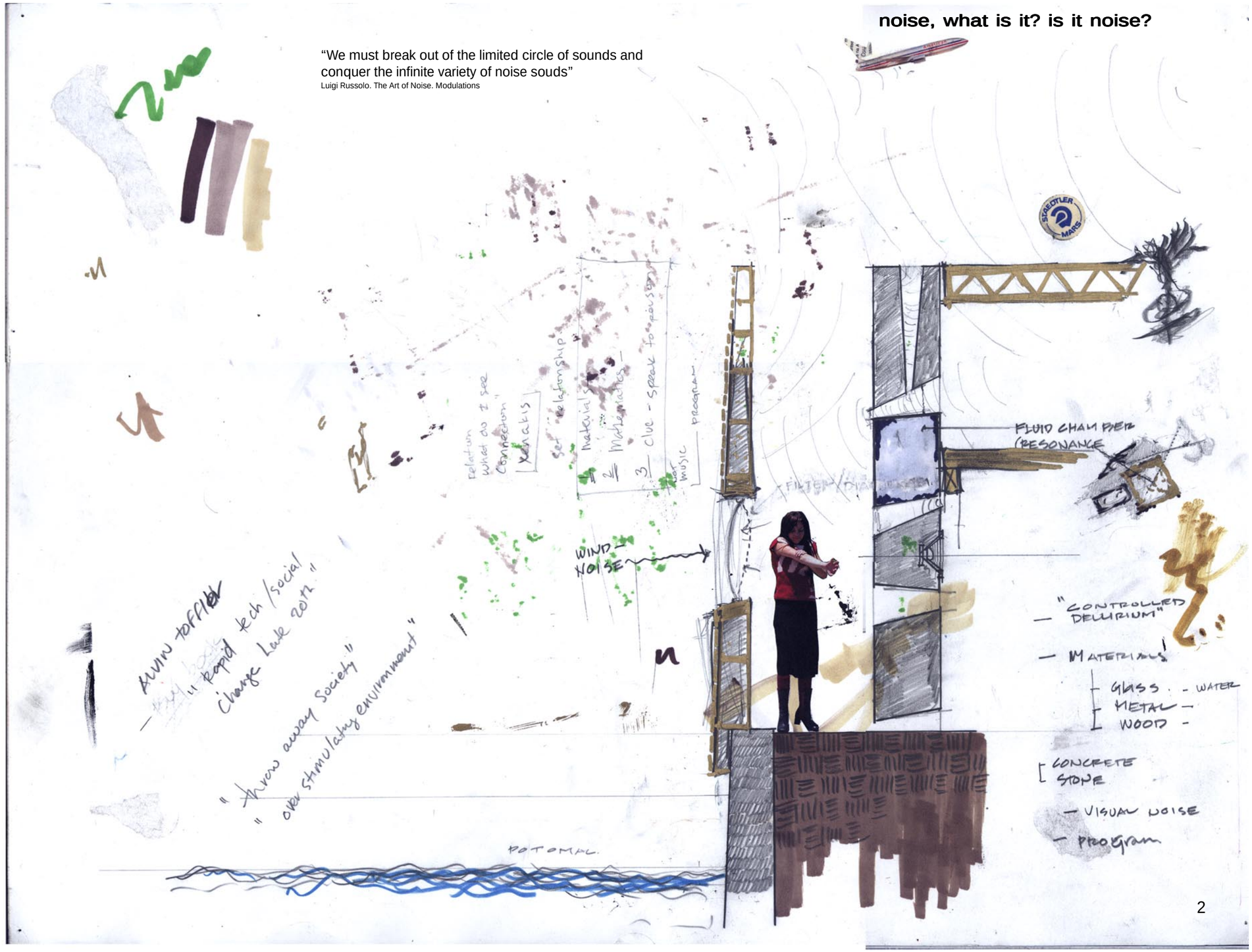
In the fall of 1998 our design class went to New York City for a field trip. This trip would eventually change the way I view life. Visits to James Turrel's room in PS1 made me think of how calming (quiet/white noise) architecture could be, but showed me how static/moving objects and traditional architectural elements (light, texture, etc.) can affect the acoustics of a space.

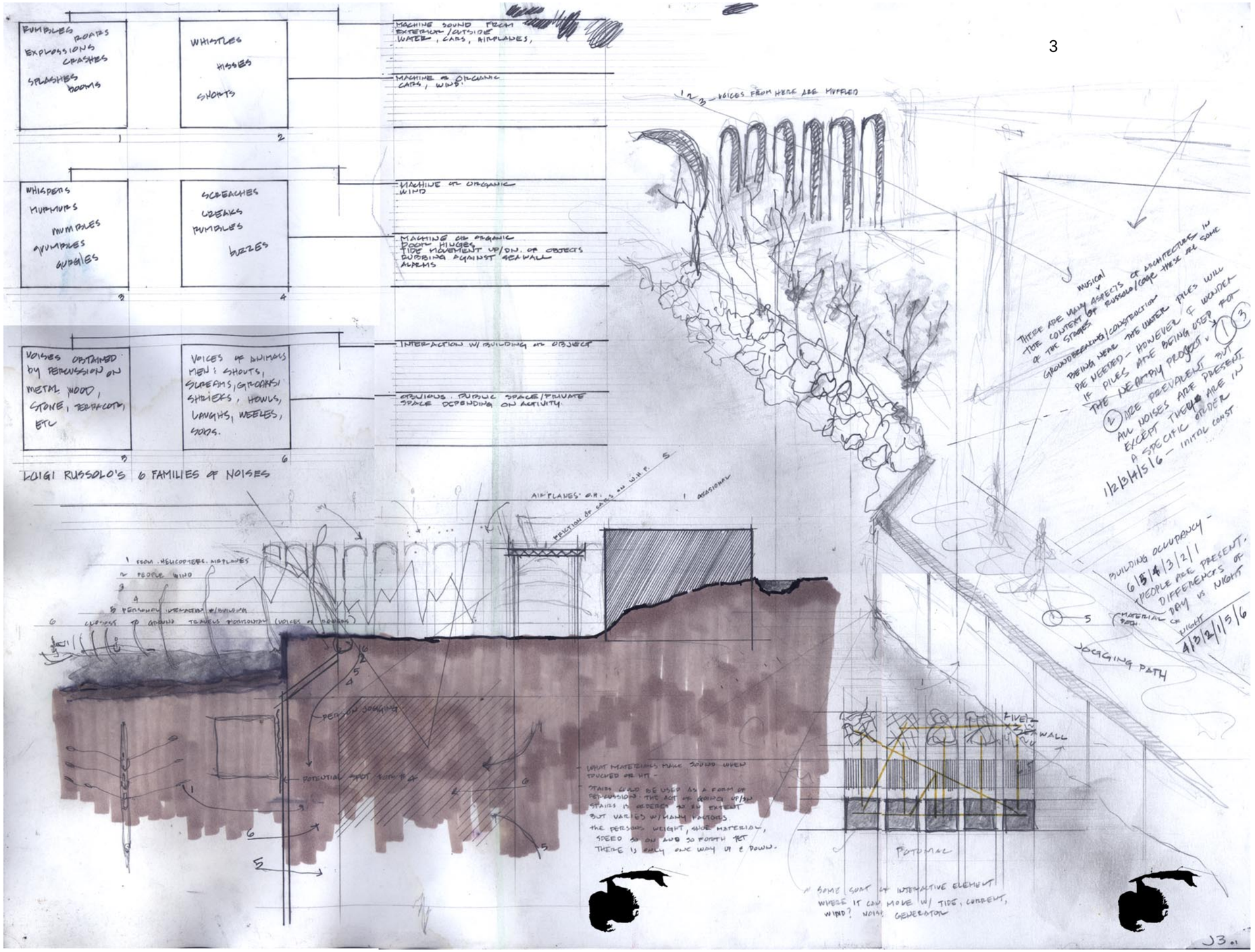
My interest in sounds have continued, what follows is an exploration on abstract, improvised architectural collages, drawing directly from contemporary and historical methodologies of noise-sound composition.

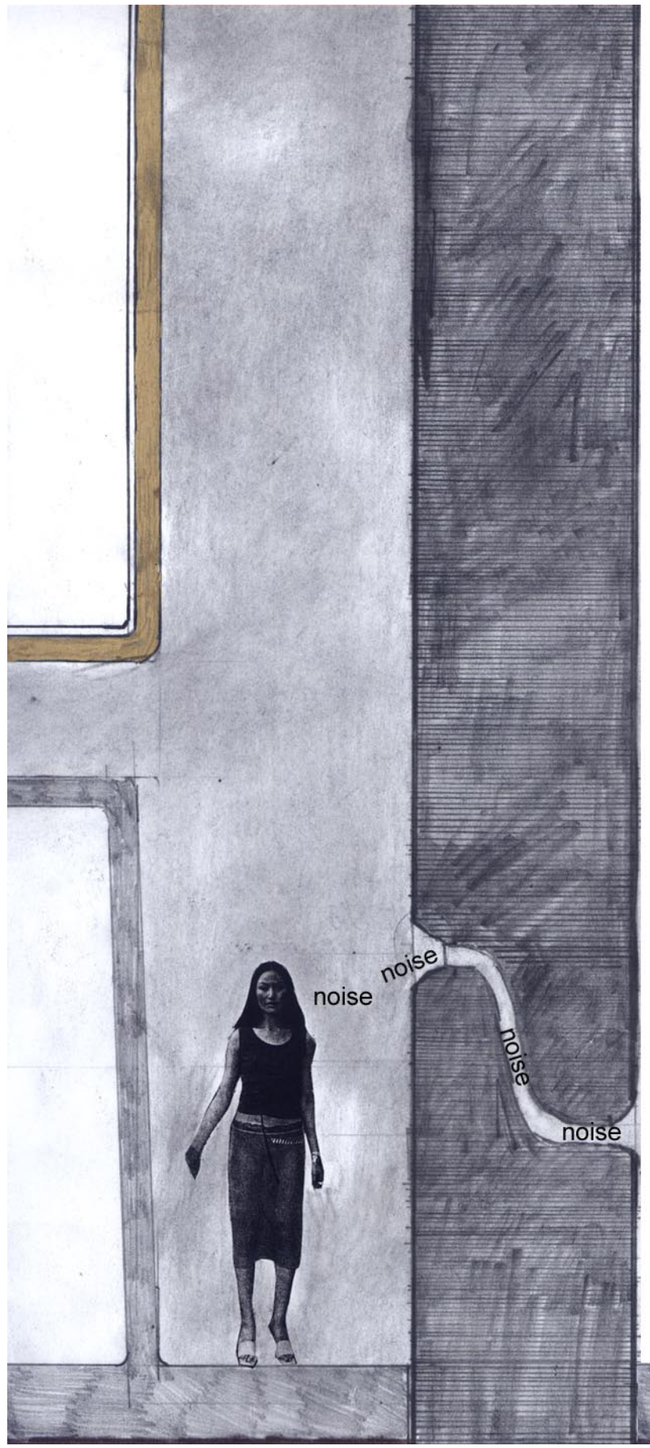
random thoughts...intro?

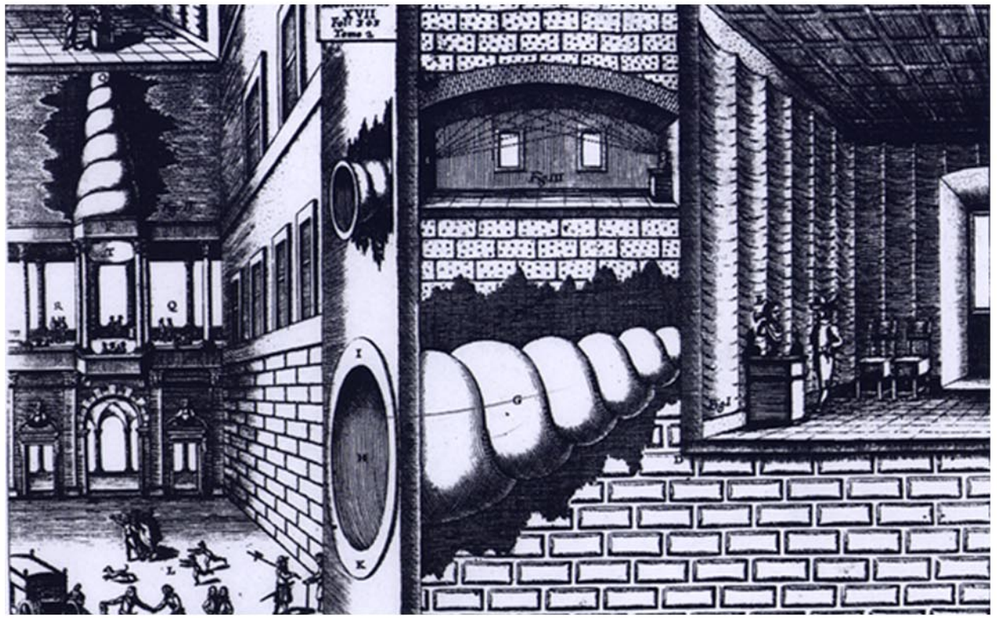
noise, what is it? is it noise?

“We must break out of the limited circle of sounds and conquer the infinite variety of noise souds”
Luigi Russolo. The Art of Noise. Modulations




RUMBLES ROARS
EXPLOSIONS
CRASHES
SPLASHES
BOOMS
1
WHISTLES
HISSES
SHOTS
2
MACHINE SOUND FROM EXTERIOR/OUTSIDE WATER, CARS, AIRPLANES,
MACHINE OR ORGANIC CARS, WIND
WHISPERS
MURMURS
RUMBLES
MUMBLES
GURGLES
3
SCREECHES
CREAKS
RUMBLES
BUZZES
4
MACHINE OR ORGANIC WIND
MACHINE OR ORGANIC DOOR HINGES TIDE MOVEMENT UP/ON, OR OBJECTS BUBBING AGAINST SEA WALL ALARMS
VOICES OBTAINED BY PERCUSSION ON METAL WOOD, STONE, TERRACOTA, ETC
5
VOICES OF ANIMALS MEN: SHOUTS, SCREAMS, GROANS, SHRIEKS, HOWLS, LAUGHS, WEEPS, SONGS.
6
INTERACTION W/ BUILDING OR OBJECT
OBVIOUS: PUBLIC SPACE/PRIVATE SPACE DEPENDING ON ACTIVITY
LUIGI RUSSOLO'S 6 FAMILIES OF NOISES
1 FROM HELICOPTERS, AIRPLANES
2 PEOPLE, WIND
3
4
5 PERSONAL INTERACTION W/BUILDING
6 CLOSEST TO GROUND TRAVELS MOST/LOUDLY (VOICES OF HUMANS)
AIRPLANES' O.H.
1 OCCASIONAL
PERSON JOGGING
POTENTIAL SPOT FOR
WHAT MATERIALS MAKE SOUND WHEN TOUCHED OR HIT -
STAIRS COULD BE USED AS A FORM OF PERCUSSION. THE ACT OF GOING UP/ON STAIRS IN ORDER TO AN EXTENT BUT VARIED W/ MANY FACTORS THE PERSONS WEIGHT, SHOE MATERIAL, SPEED SO ON AND SO FORTH YET THERE IS ONLY ONE WAY IT'S DOWN.
SOME SORT OF INTERACTIVE ELEMENT WHERE IT CAN MOVE W/ TIDE, CURRENT, WIND? NOISE GENERATOR
1 2 3 — VOICES FROM HERE ARE MUFFLED
MUSICAL
THESE ARE MANY ASPECTS OF ARCHITECTURE IN THE CONTEXT OF THE STAGES OF RUSSOLO/COPE THESE ARE SOME GROUNDBREAKING/CONSTRUCTION
BEING HERE THE WATER PILES WILL BE VEERED - HOWEVER & WOULDN'T IF PILES ARE BEING USED FOR THE DEEMPHY PROJECT
1/2/3/4/5/6 — INITIAL CONST
BUILDING OCCUPANCY - 6/5/4/3/2/1
PEOPLE ARE PRESENT. DIFFERENCES OF DAY VS NIGHT
4/3/2/1/5/6
5 MATERIAL PATH
JOGGING PATH
RIVER WALL
POTOMAC
J3.01


noise
noise
noise
noise




noise
noise
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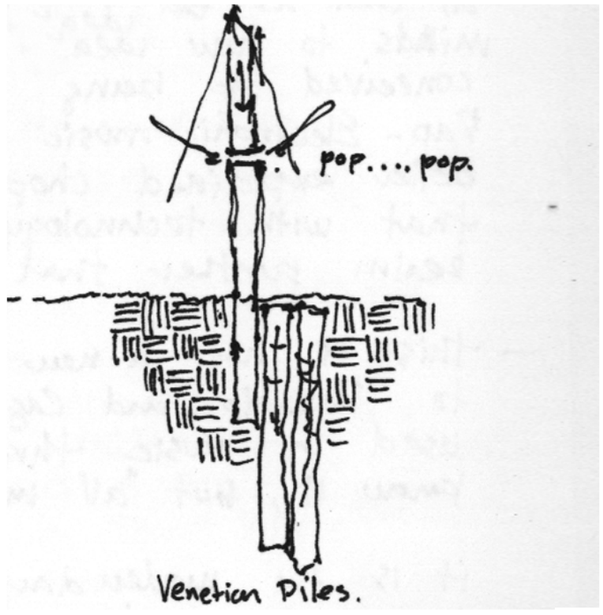
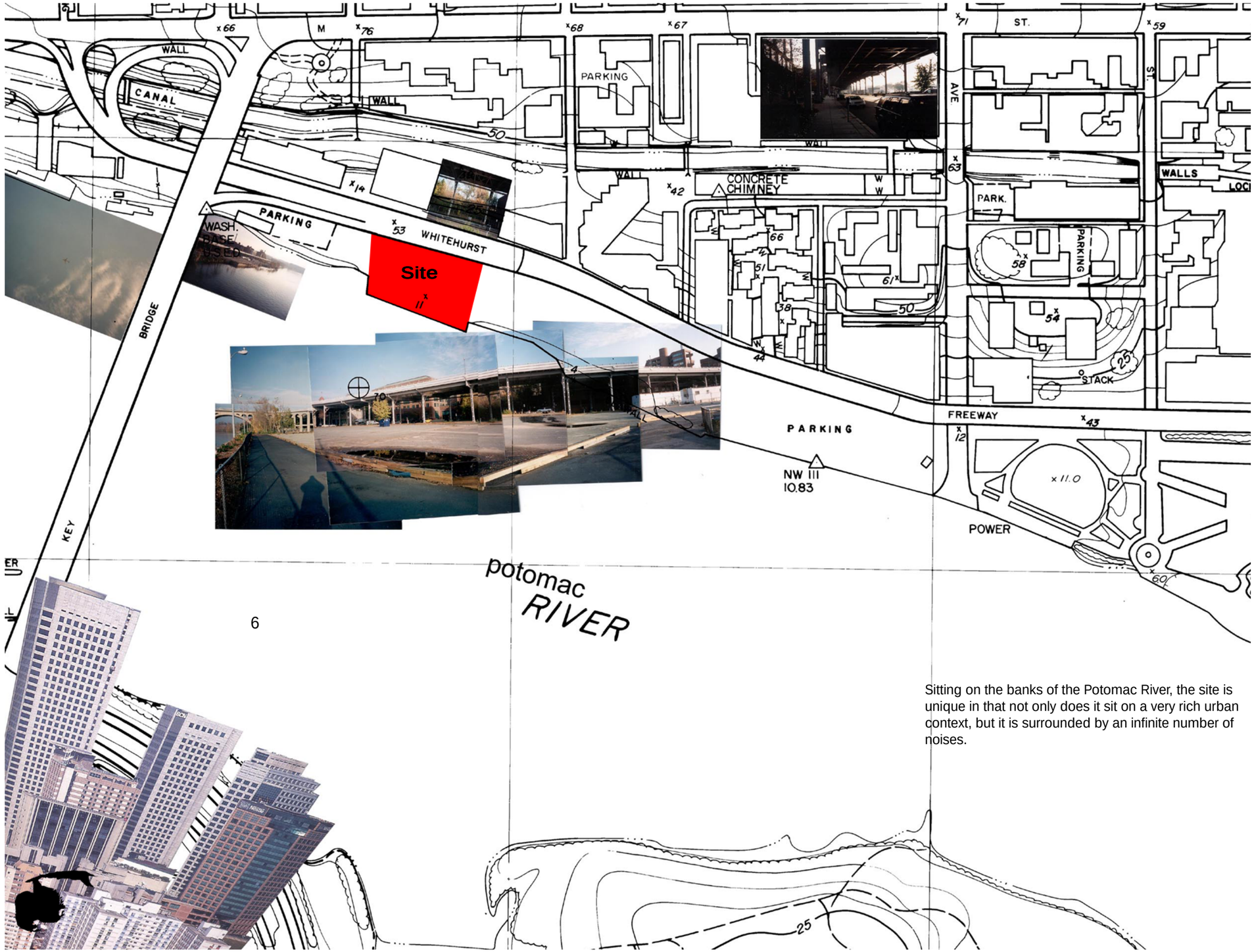
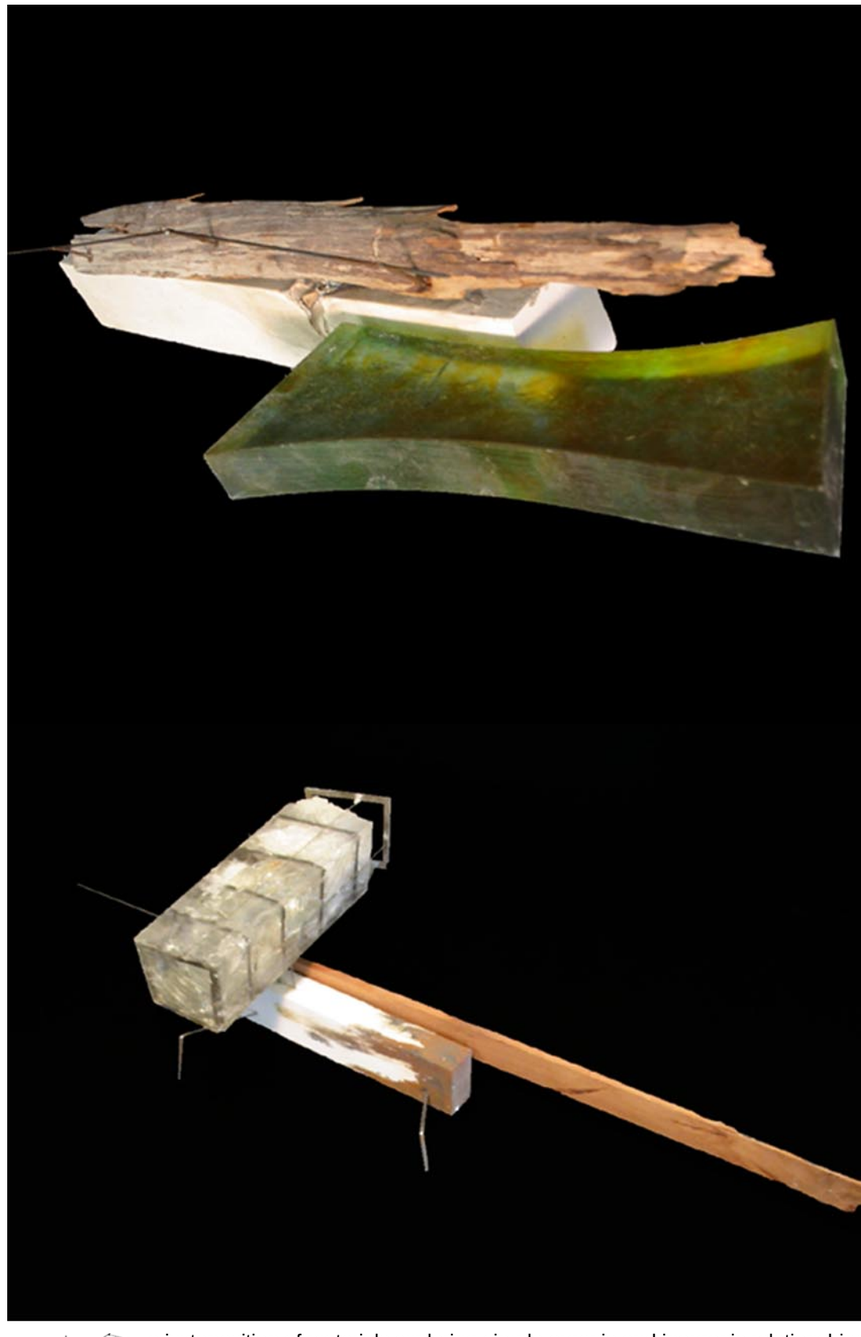


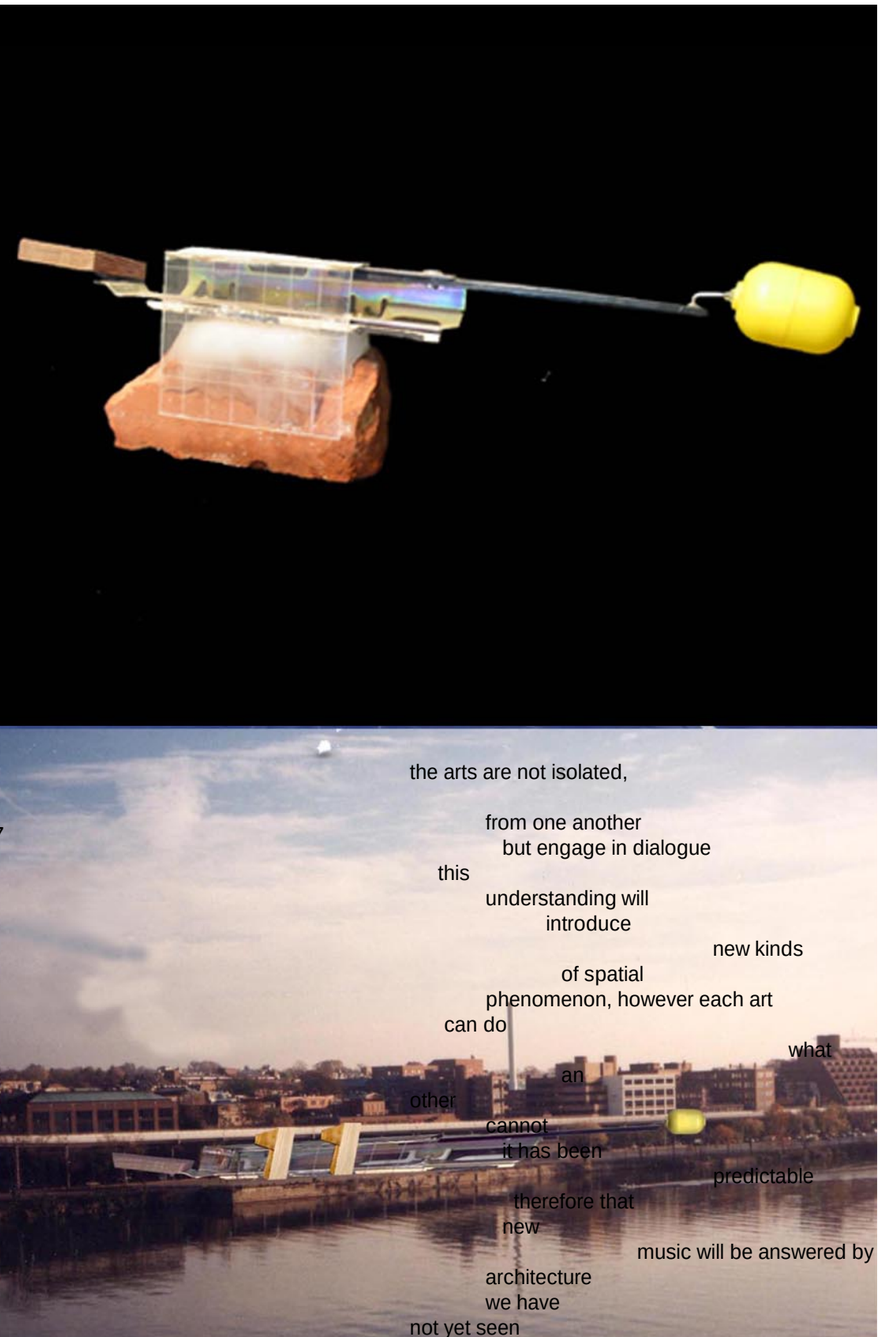
As Marco stated in a previous class: In Venice during the construction of a new building, piles being driven into the “shit sub-soil” that is below it. Venetians developed a way of coping with the thumping sounds. Repetitious bass/hammering of piles the noise became the drumbeat behind indigenous songs. The hammering has a noise pattern associated with it. It has to do with the depth of the sub-soil, which they are being driven into, and the composition of the sub-soil (absorbs/amplifies vibration) size of machinery too.

Relationship of buildings/fabric with the water.
There has to be order; but then what is order?
Can’t order be chaotic?



Sitting on the banks of the Potomac River, the site is unique in that not only does it sit on a very rich urban context, but it is surrounded by an infinite number of noises.

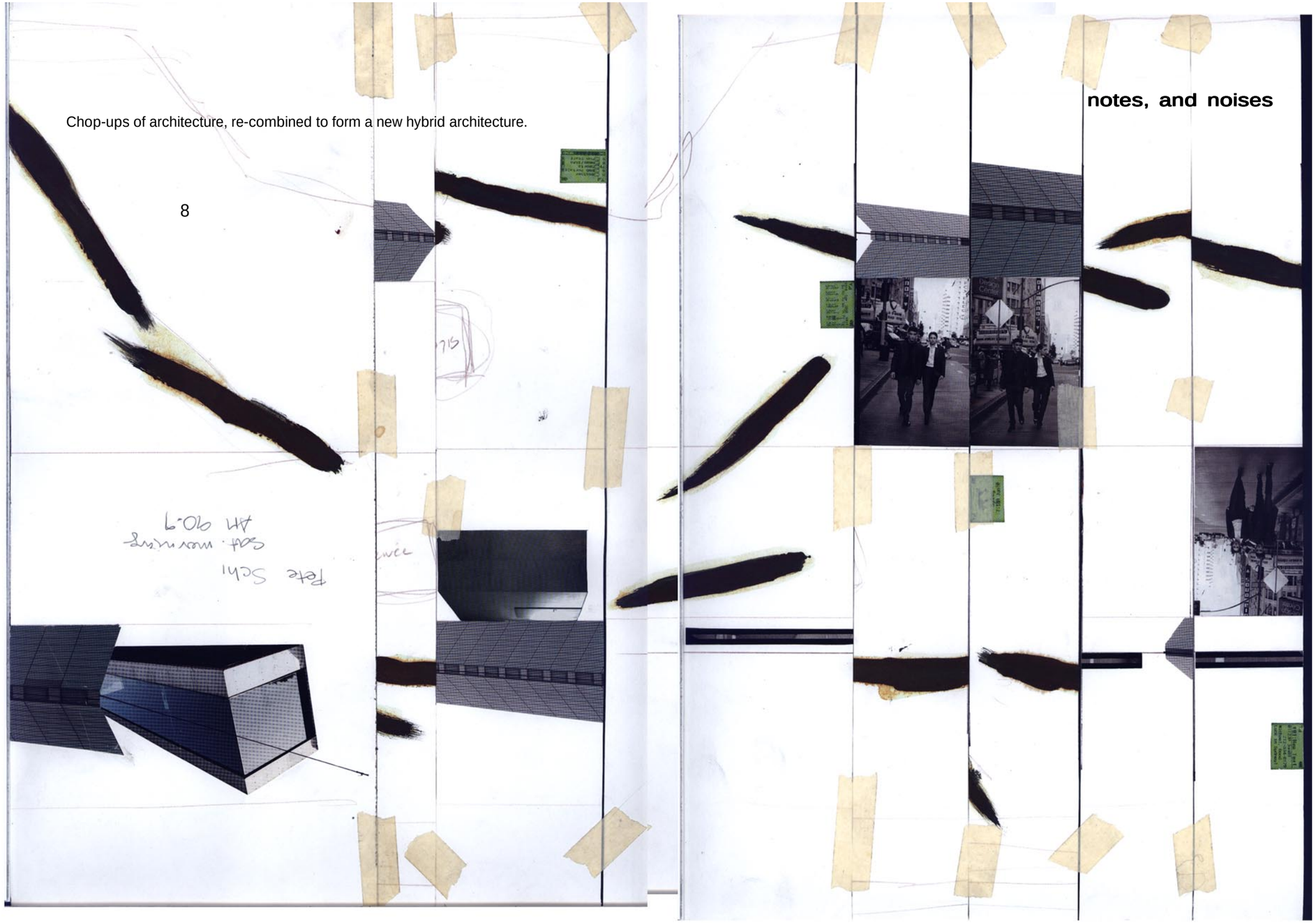




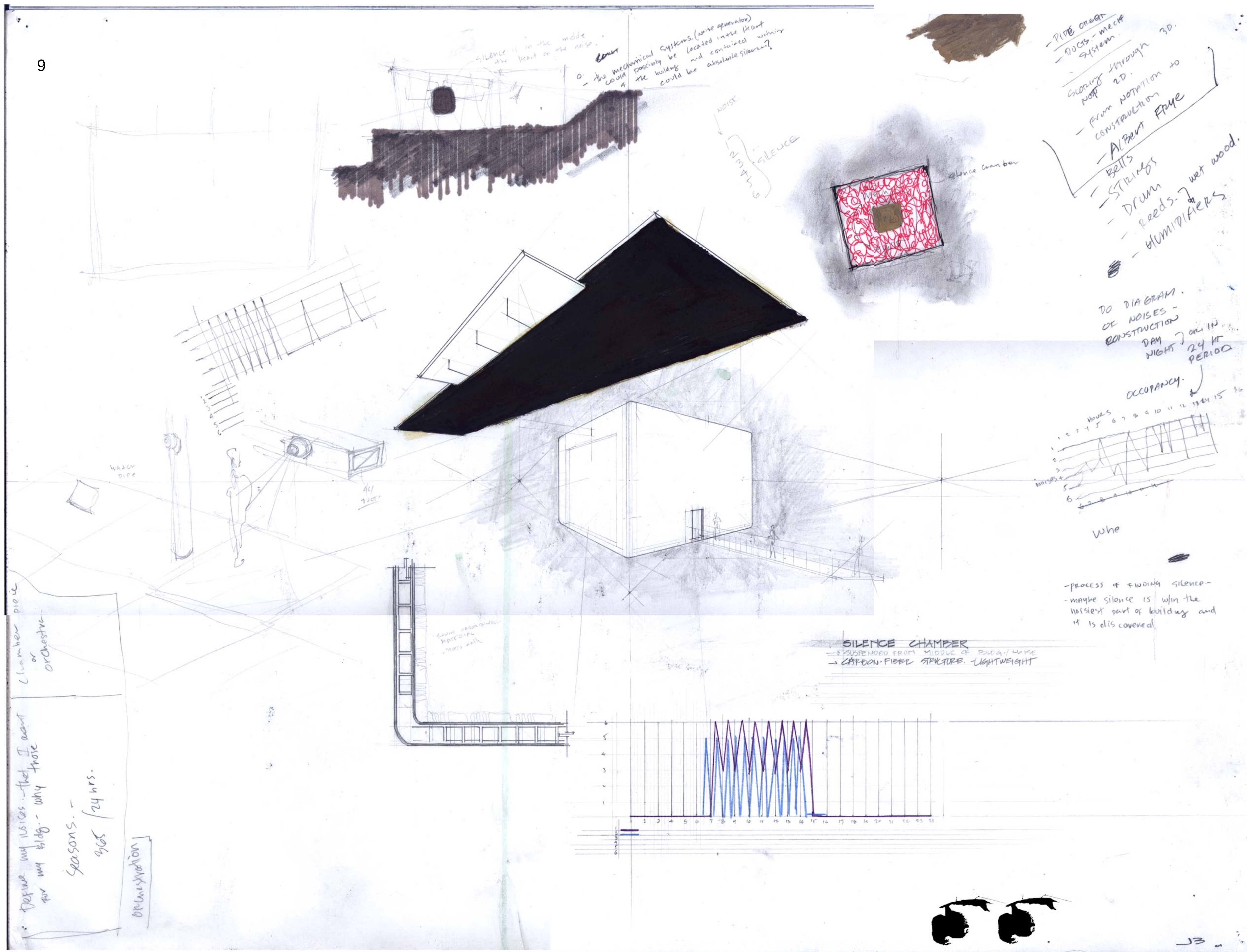
a juxtaposition of materials exploring simple organic and inorganic relationships.
Steel, driftwood, cast resin, wax formed hydrocal, and brick.

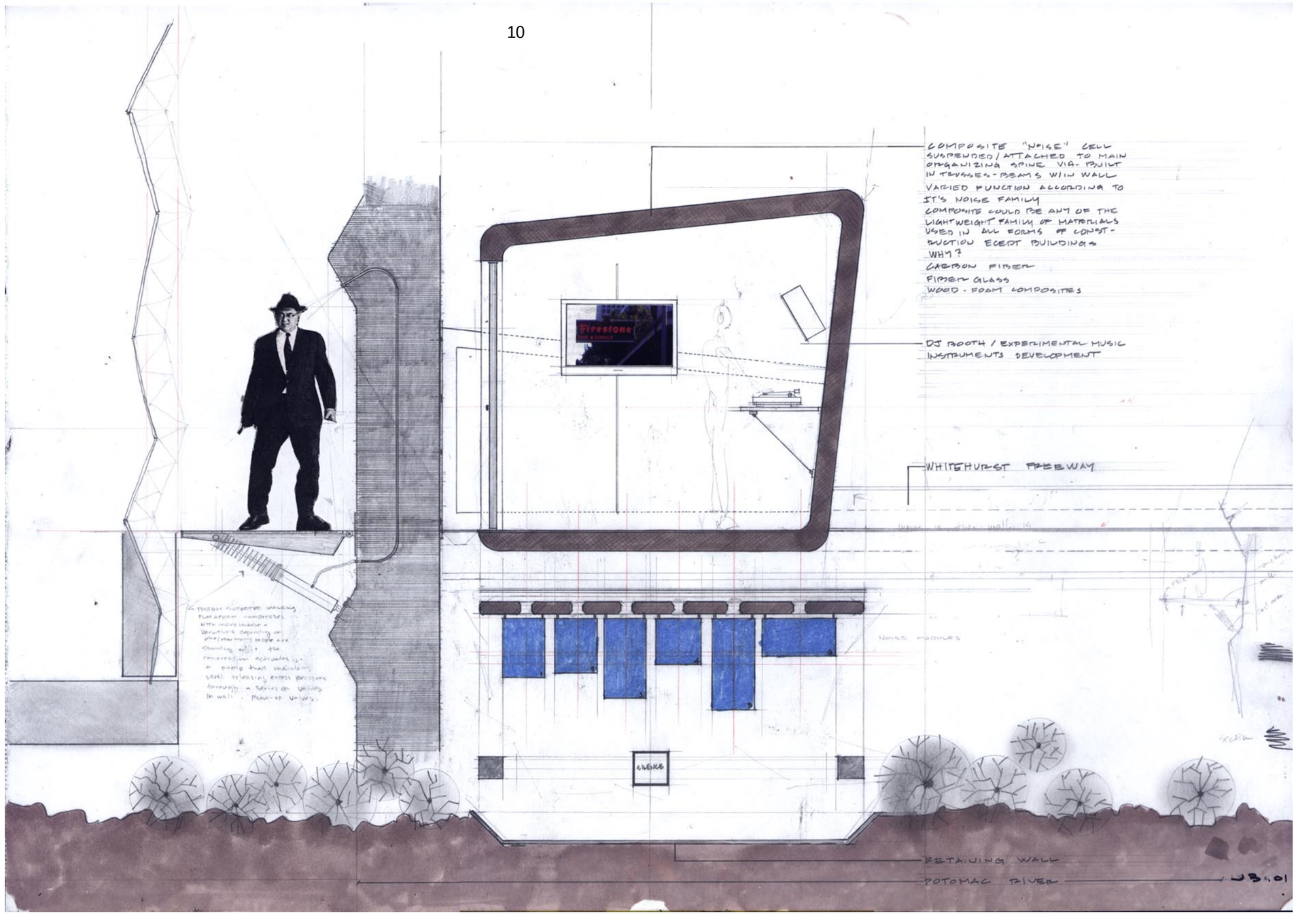
sequence of space-sequence of noise

Chop-ups of architecture, re-combined to form a new hybrid architecture.

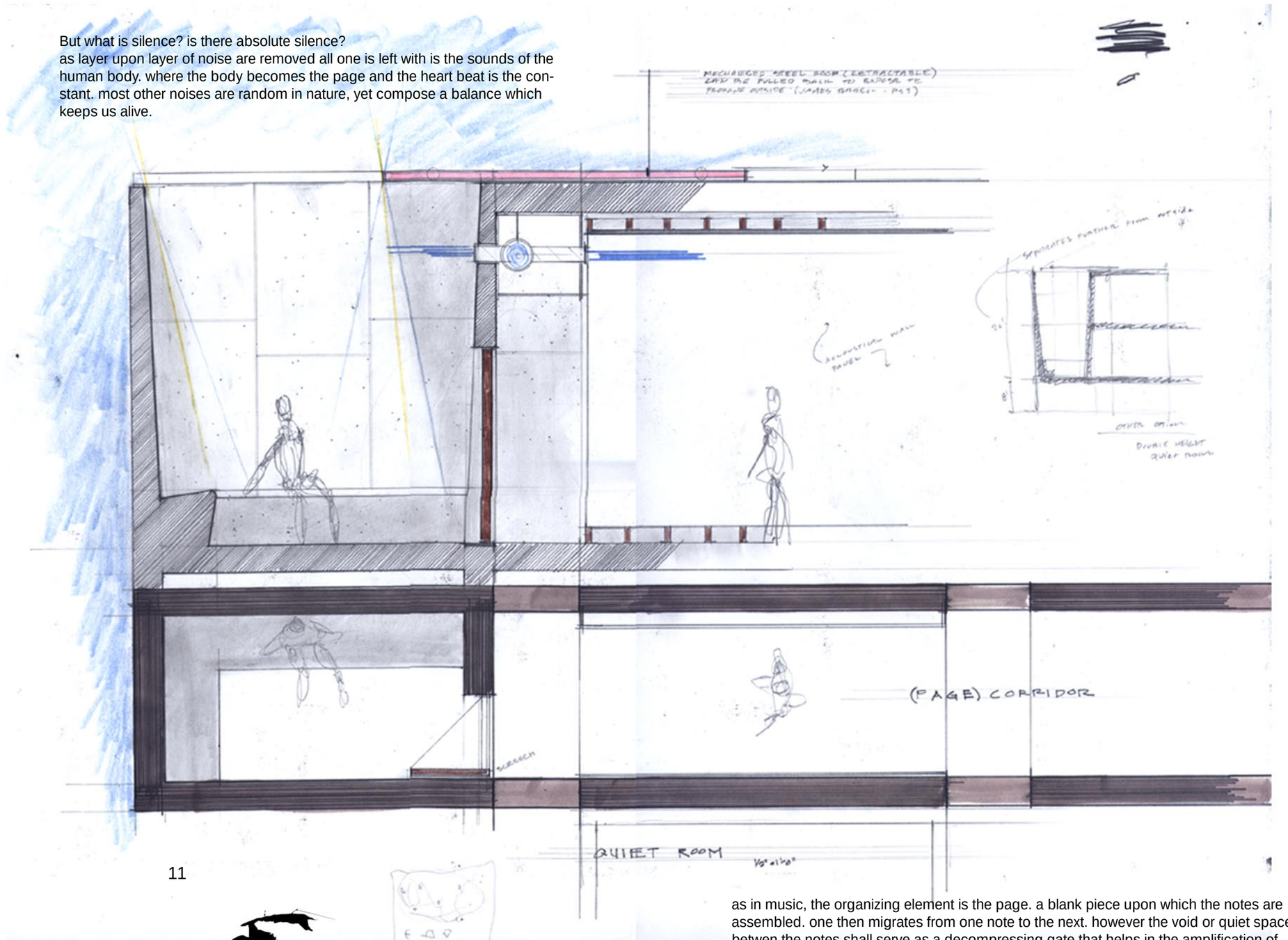


We in the west have become exceedingly good at breaking up problems (wholes) in to little pieces in order to solve the larger problem. According to Alvin Toeffler this can be attributed to the philosophical roots of the industrial revolution. Where most have failed, musicians have been increasingly good at splicing together this chain of broken pieces into what can be called music. I say, “What can be called music” because alone the pieces are nothing but fragments of a note, or noise. People like Teo Marcero (Miles Davis producer) put together some incredible sets/albums using some scissors and tape.

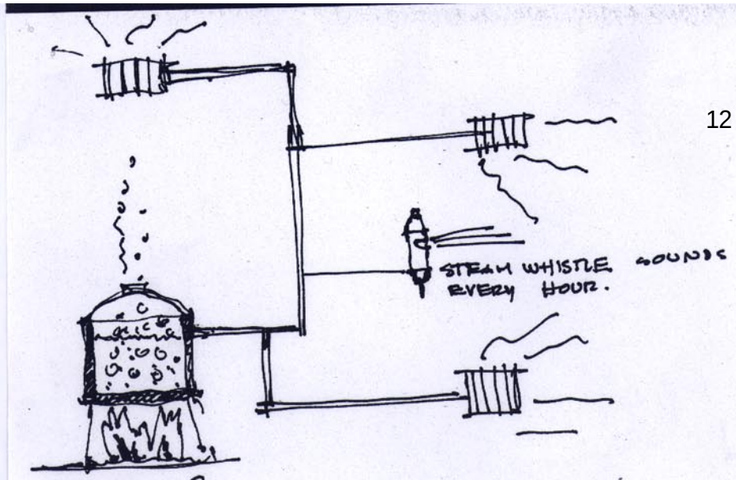

Q. - the mechanical systems (noise generator) could possibly be located in the heart of the building and contained within could be absolute silence?
NOISE
SILENCE
silence chamber
- PIPE ORGAN
- DUCTS - MECH SYSTEM.
SCORING THROUGH 3D. NOT 2D.
- FROM NOTATION TO CONSTRUCTION
- ALBERT FRYE
- BELLS
- STRINGS
- DRUM
- REEDS.] WET WOOD.
- HUMIDIFIERS
DO DIAGRAM. OF NOISES - CONSTRUCTION
DAY NIGHT] OR IN 24 HR PERIOD
OCCUPANCY.
HOURS
NOISES
whe
- PROCESS OF FINDING SILENCE -
- maybe silence is w/in the noisiest part of building and it is discovered
SILENCE CHAMBER
→ SUSPENDED FROM MIDDLE OF BLDG./NOISE
→ CARBON-FIBER STRUCTURE. LIGHTWEIGHT
chamber piece or orchestra
Define my noises - that I want for my bldg. - why those
seasons. - 365 / 24 hrs.
orchestration


COMPOSITE "NOISE" CELL SUSPENDED / ATTACHED TO MAIN ORGANIZING SPINE VIA- BUILT IN TRUSSES - BEAMS W/IN WALL VARIED FUNCTION ACCORDING TO IT'S NOISE FAMILY
COMPOSITE COULD BE ANY OF THE LIGHTWEIGHT FAMILY OF MATERIALS USED IN ALL FORMS OF CONST-RUCTION EXCEPT BUILDINGS
WHY?
CARBON FIBER
FIBER GLASS
WOOD - FOAM COMPOSITES
DJ BOOTH / EXPERIMENTAL MUSIC INSTRUMENTS DEVELOPMENT
WHITEHURST FREEWAY
Noise modules
RETAINING WALL
POTOMAC RIVER
B1.01

But what is silence? is there absolute silence?
as layer upon layer of noise are removed all one is left with is the sounds of the human body. where the body becomes the page and the heart beat is the constant. most other noises are random in nature, yet compose a balance which keeps us alive.



as in music, the organizing element is the page. a blank piece upon which the notes are assembled. one then migrates from one note to the next. however the void or quiet space betwen the notes shall serve as a decompressing gate that helps in the amplification of senses once a note is engaged.



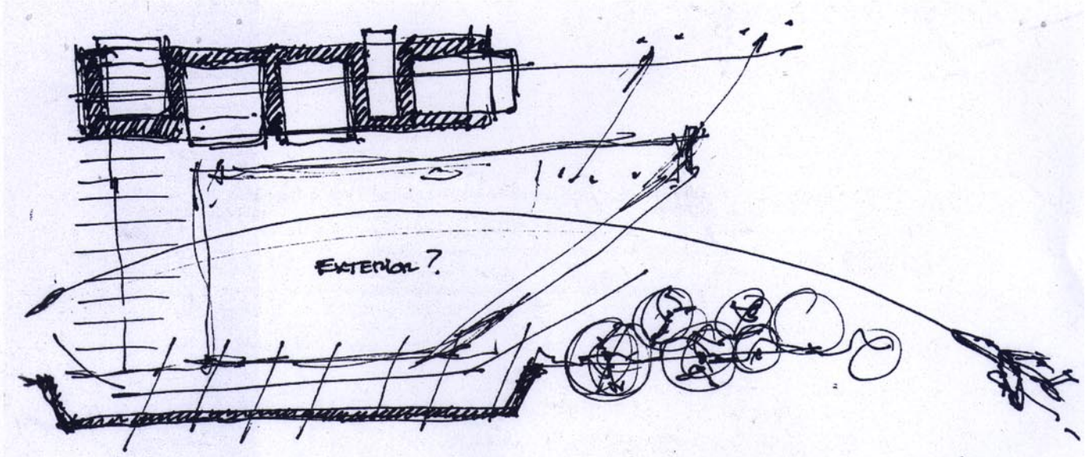
BOILER ?
CALDO - WINTER.

- How do these two systems work together?
- do I want two separate systems?
- can natural breezes/air be incorporated design / composition.

Program- research the program. of a "think tank."

Entry (public - private)
offices
General - Space - Impror.
circulation
Back of House
Bathrooms.

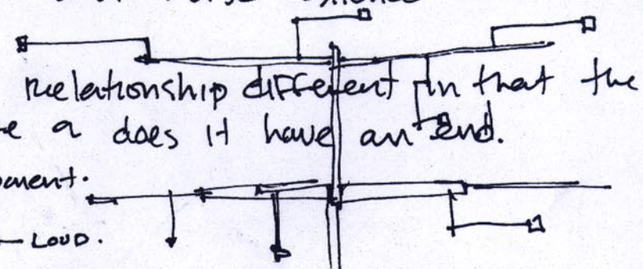
Relationship.
Noise - interruptions of glass on the silent body. of Concrete.



What is the Relationship between private - public and the space "in-between" and Noise - Silence and everything in between.

Is noise - silence relationship different in that the interstice is infinite a does it have an end.

- solid versus transparent.



- How do these two systems work together?
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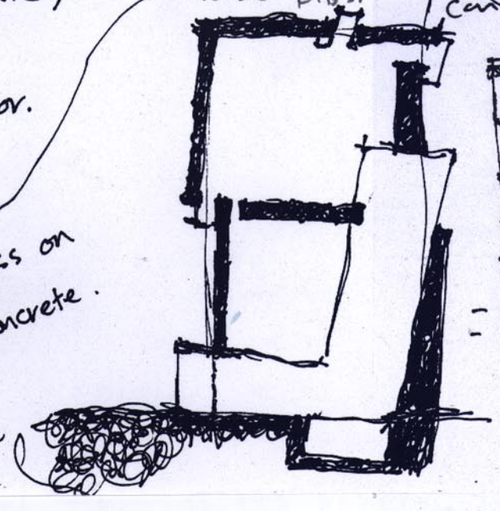
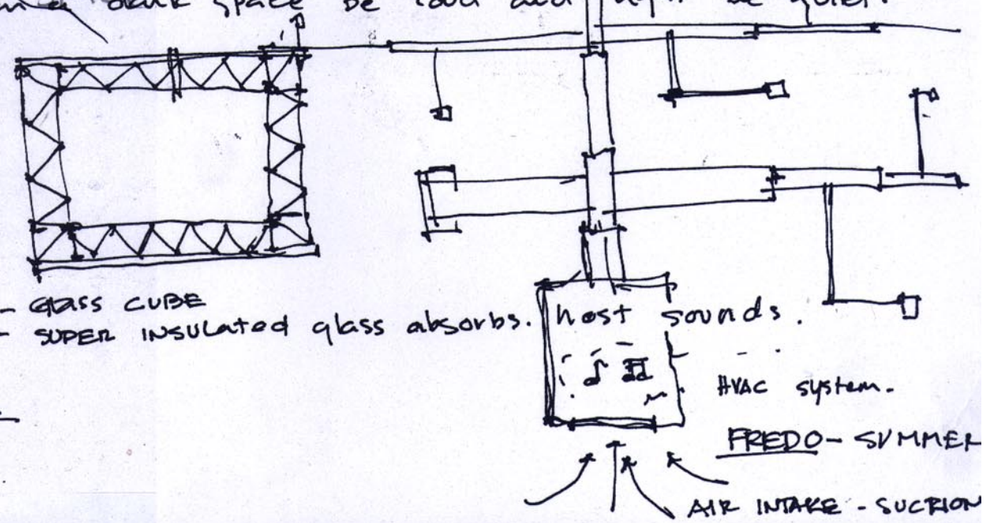
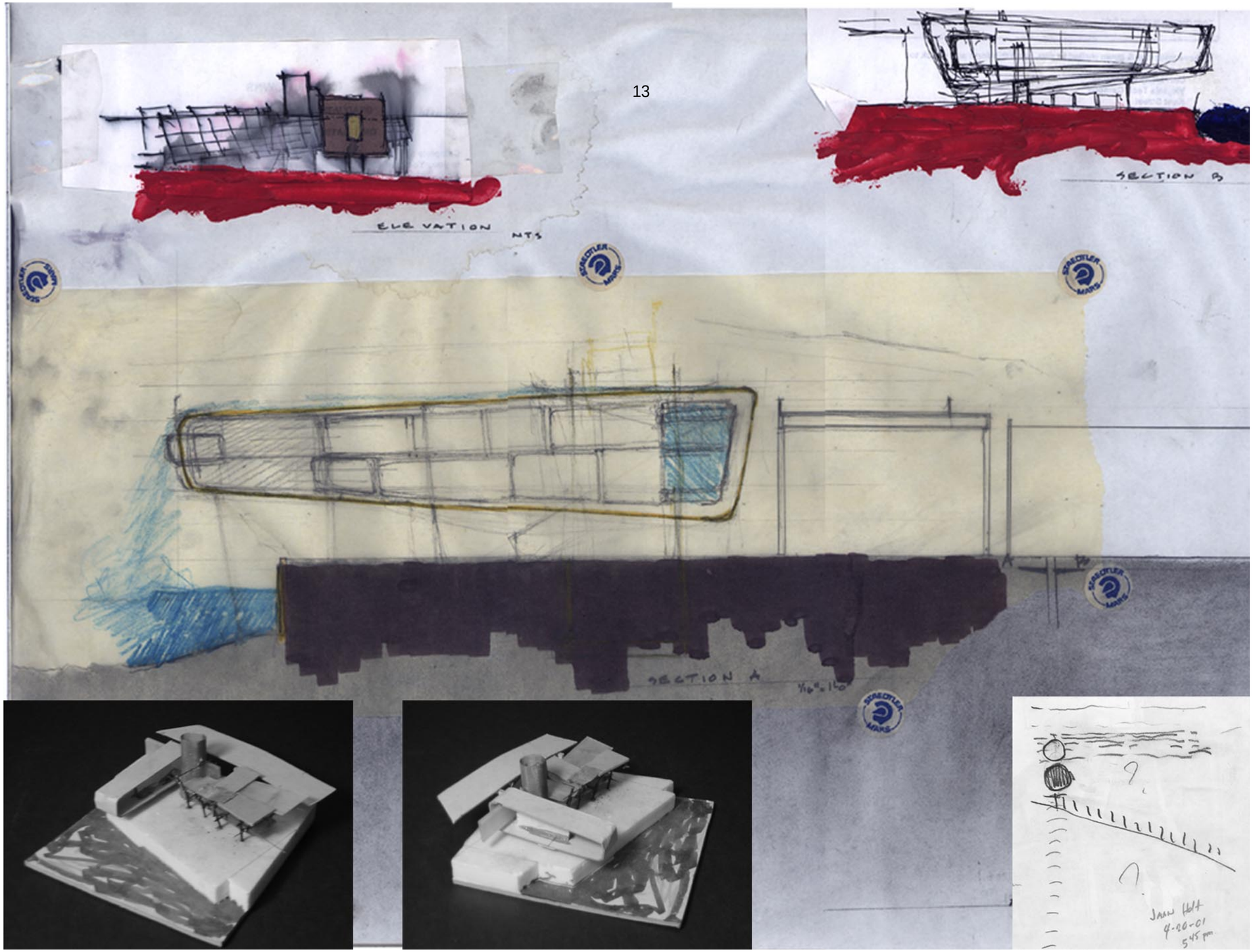


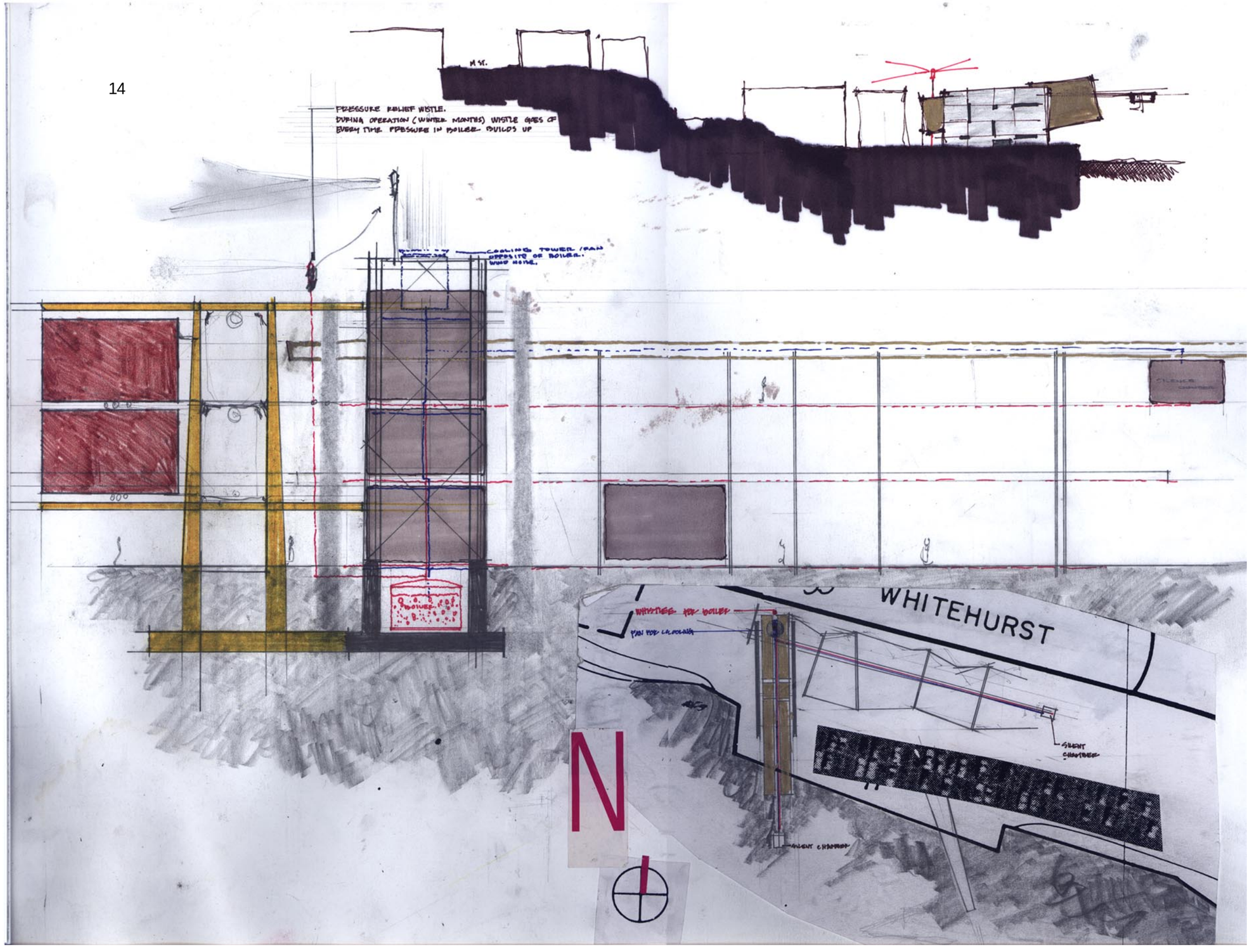
How do spaces light play into the composition.

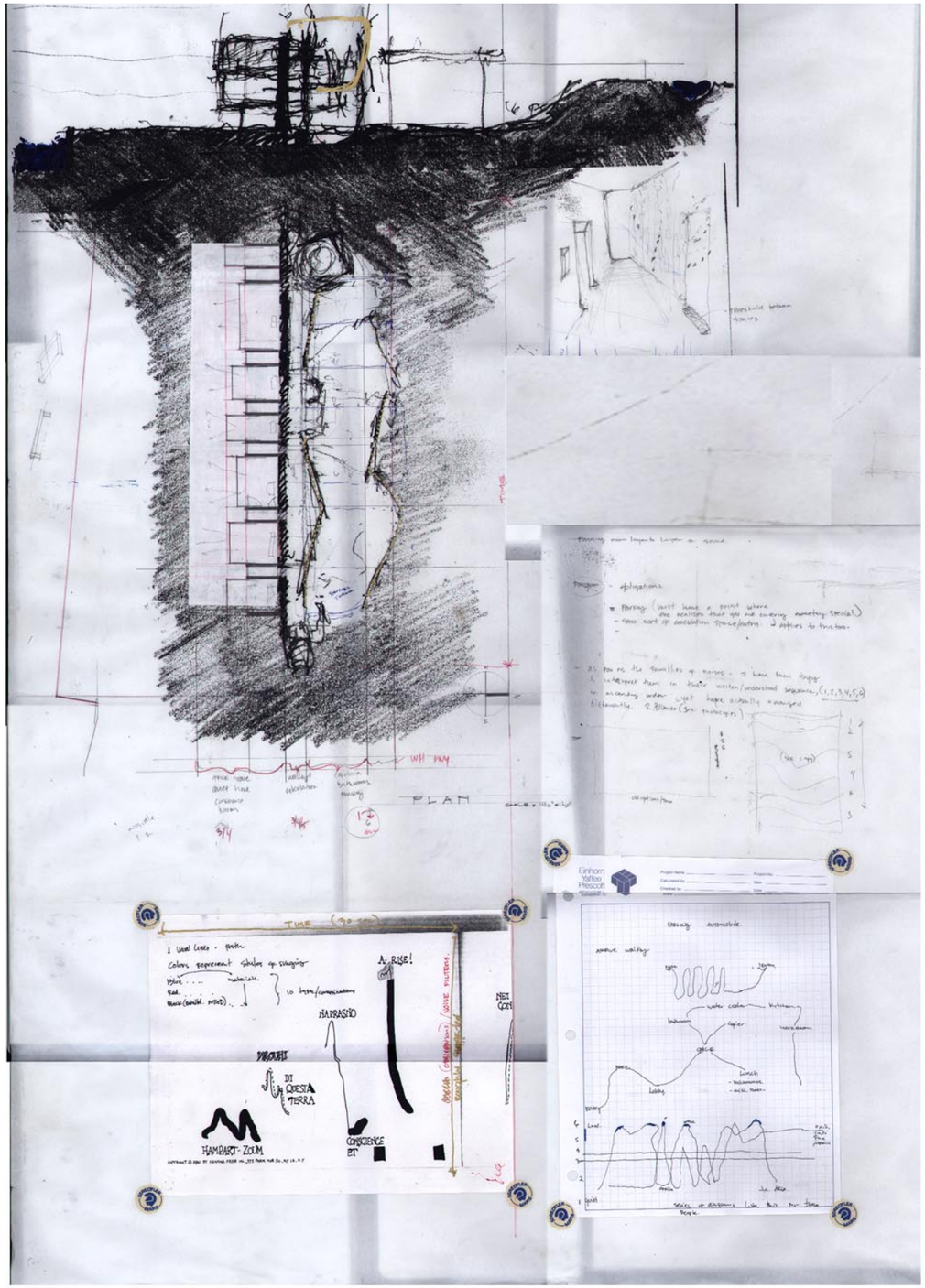
Blank space be loud and light be quiet.

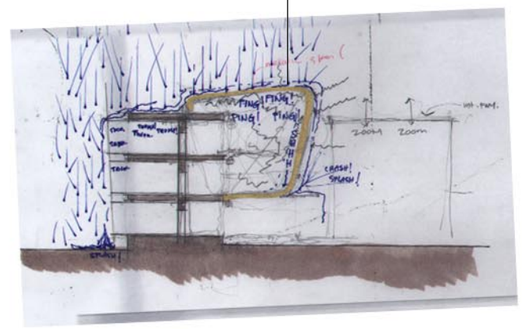



ELEVATION NTS
SECTION B
SECTION A

JAAN Hbt
4-20-01
5:45 pm


PRESSURE RELIEF WISTLE.
DURING OPERATION (WINTER MONTHS) WISTLE GOES OF
EVERY TIME PRESSURE IN BOILER BUILDS UP
COOLING TOWER / FAN
OPPOSITE OF BOILER.
WHITEHURST
SILENT
CHAMBER
N





Marco Frascari's Class notes Feb. 15, 2001

The reason "old" European cities/towns were so successful as well as the reason why they are so attractive today (in a modern context) can be related/associated to the whole idea of my thesis.
Buildings were a collage of cut-ups of different ideas and the generations of families passed by, and new owners took over. They added new pieces, modified old, and deleted some. Creating a bigger collage of buildings within the large context of the city.
Modern thought of a clean view of the city "organized" codified city doesn't work because there is no history to the architecture (mythical)
Old architecture which embodied these qualities (the majority at least) spoke to the new owner/generation allowing them to add with the language. New contemporary architecture specially residential which tends to be heavily codified by the cities, communities and where all architectures look the same, don't speak to it's occupant therefore the maximum amount of personalization boils down to "decoration" and not architecture.

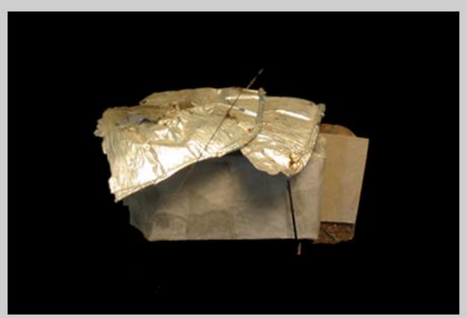
April 24, 2001

What kind of music is this (your project) what is it's structure?
M.Frascari, Friday April 20, 2001

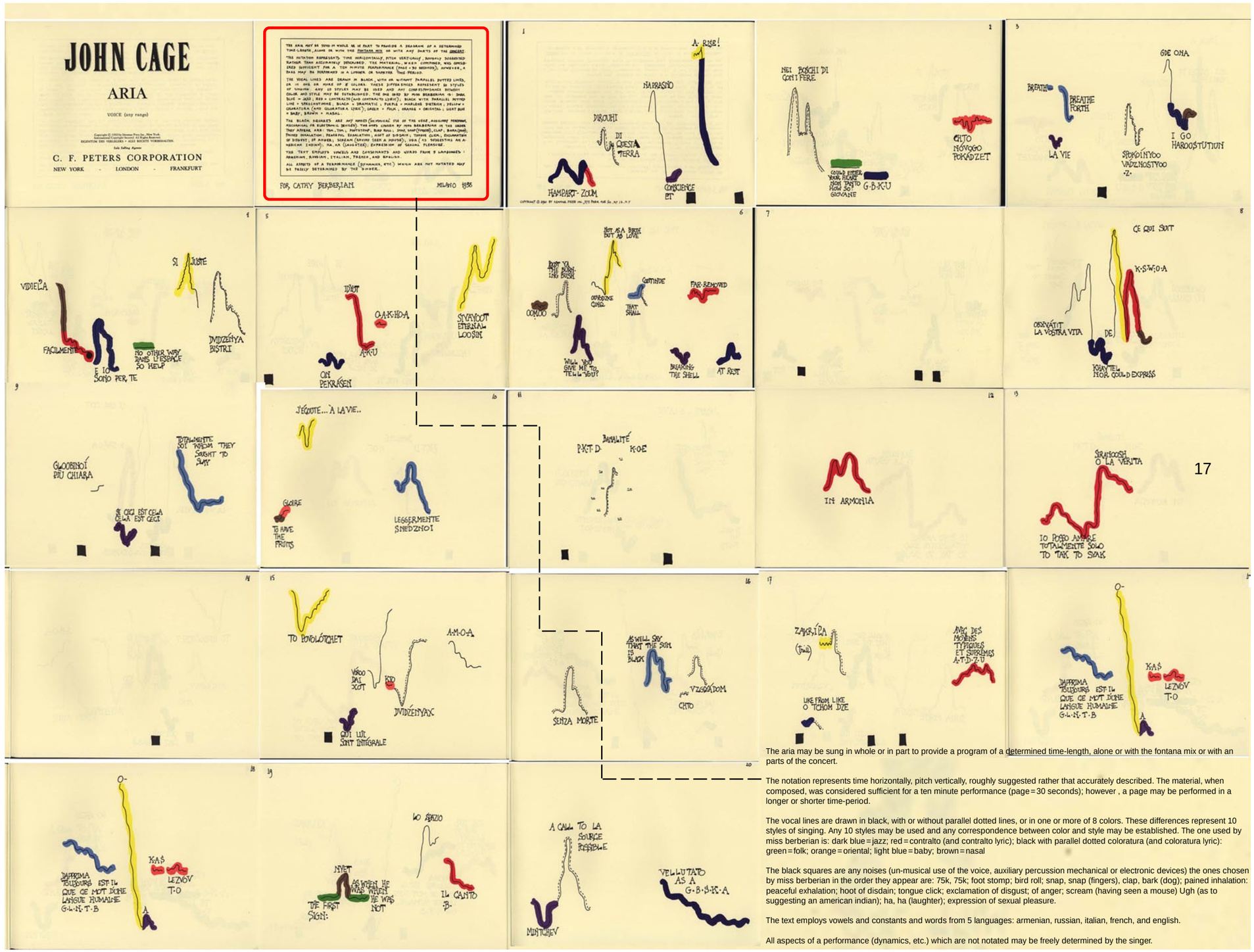
I will have to say that a mental block prevented me from answering this most essential question. It also came up on Monday's review with Susan and Paul. Only after some pushing/dialogue did I realize that what I have been looking for I have had in my possession for months now, John Cage's Aria piece. Last I remember I spent four months tracking this essential piece for one purpose only, to be able to understand its structure in order to apply it to Architecture.

Architecture is not only a vessel for light but a machine for sound (noise sound)
Daniel Liebskind, April 6, 2001 Lecture - National Building Museum

In my search to apply contemporary methodologies of electronic music to Architecture I realized that I had to understand where it came from (it's history) Many people contributed to this movement, but at the core is John cage. His approach although analog was the light that fueled the fire that is now Electronic Music and all it's sub-genres. Yes, Iannis Xenakis is also a forefather but my interest of research is based more on Chance operations/improvisational structure rather than purely mathematical. Like in the movie "Pi" everything in the world can be broken down into mathematics, but I believe that there has to be something more beautiful in randomness/improvisation without meaning than a definite answer.
Electronic music has come a long way purely on the experimentation of "Artist" with new technologies. The thirst for what will be, when the market doubles chip speed next year is and what new "things" will come out is what drives the movement to bigger and better things. This can all be once again tied historically to the futurist movement. It was their argument that with the creation of new machines, new sounds the search for the next "thrill" is what drove the invention of new machines.



Produced with trash found in the studio, this model became a pivotal point in my process. It brought back into focus he primary material relationships, shich would lead to the starting point for finalizing my ideas.



The aria may be sung in whole or in part to provide a program of a determined time-length, alone or with the fontana mix or with an parts of the concert.

The notation represents time horizontally, pitch vertically, roughly suggested rather that accurately described. The material, when composed, was considered sufficient for a ten minute performance (page = 30 seconds); however , a page may be performed in a longer or shorter time-period.

The vocal lines are drawn in black, with or without parallel dotted lines, or in one or more of 8 colors. These differences represent 10 styles of singing. Any 10 styles may be used and any correspondence between color and style may be established. The one used by miss berberian is: dark blue = jazz; red = contralto (and contralto lyric); black with parallel dotted coloratura (and coloratura lyric): green = folk; orange = oriental; light blue = baby; brown = nasal

The black squares are any noises (un-musical use of the voice, auxiliary percussion mechanical or electronic devices) the ones chosen by miss berberian in the order they appear are: 75k, 75k; foot stomp; bird roll; snap, snap (fingers), clap, bark (dog); pained inhalation: peaceful exhalation; hoot of disdain; tongue click; exclamation of disgust; of anger; scream (having seen a mouse) Ugh (as to suggesting an american indian); ha, ha (laughter); expression of sexual pleasure.

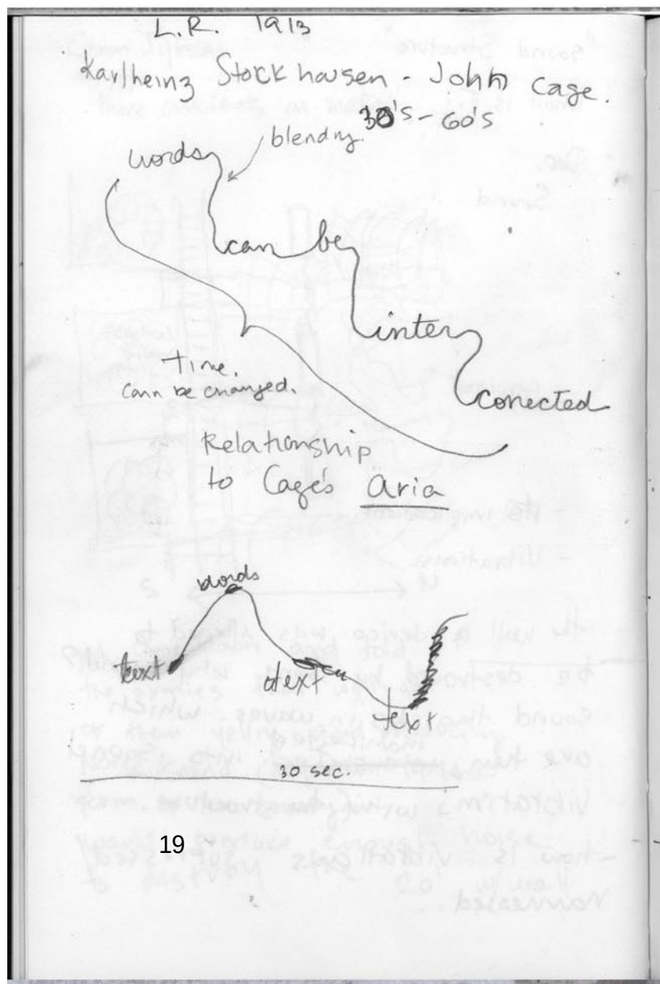
The text employs vowels and constants and words from 5 languages: armenian, russian, italian, french, and english.

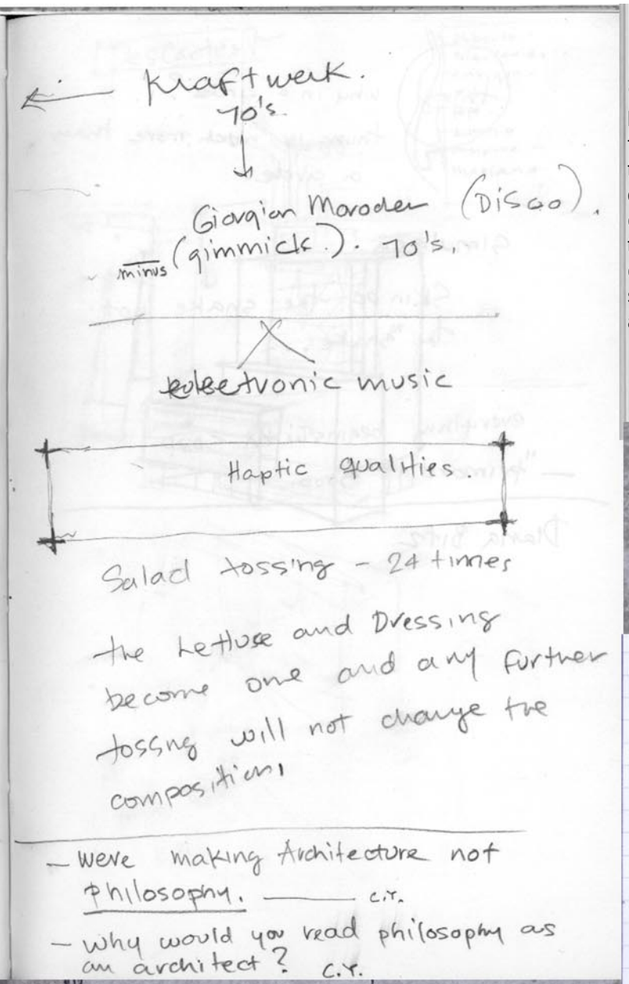
All aspects of a performance (dynamics, etc.) which are not notated may be freely determined by the singer.

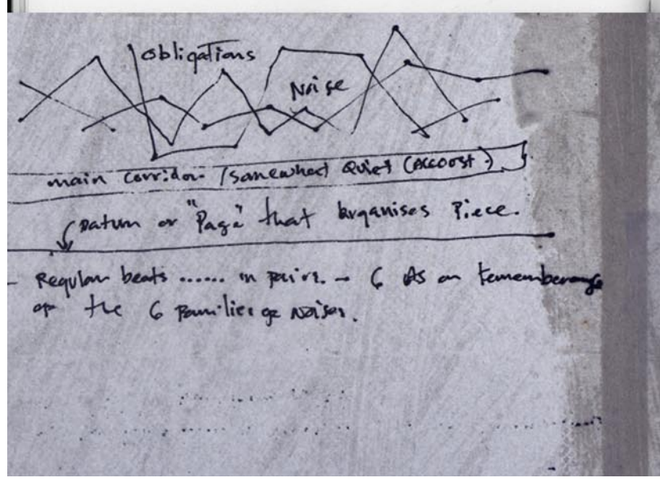
What does the term. that building is of sound structure? Marco Frascari end of term presentation Dec. 01

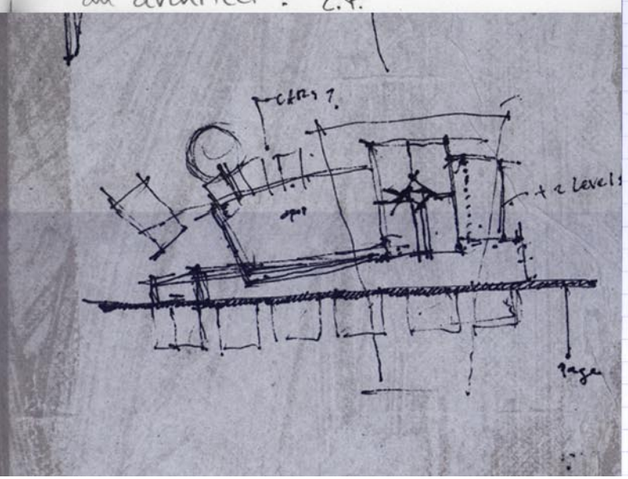
God came down and told the armies that with all for them yelling/playing trumpets producing noise(organized by them being in an army) they would produce enough noise to destroy the 20’ wall; the wall of Jericho.
The wall of Jericho was allegedly destroyed by sound. Why sound? Sound travels in waves, which are then manifested, into sound vibrations within the structure.

How are vibrations suppressed/manifested?



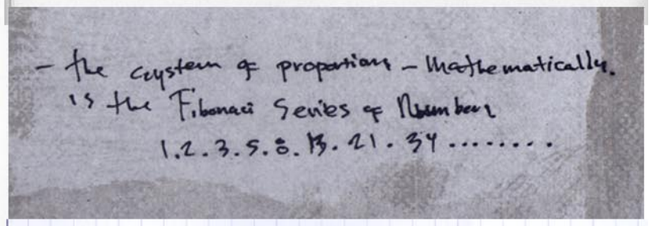


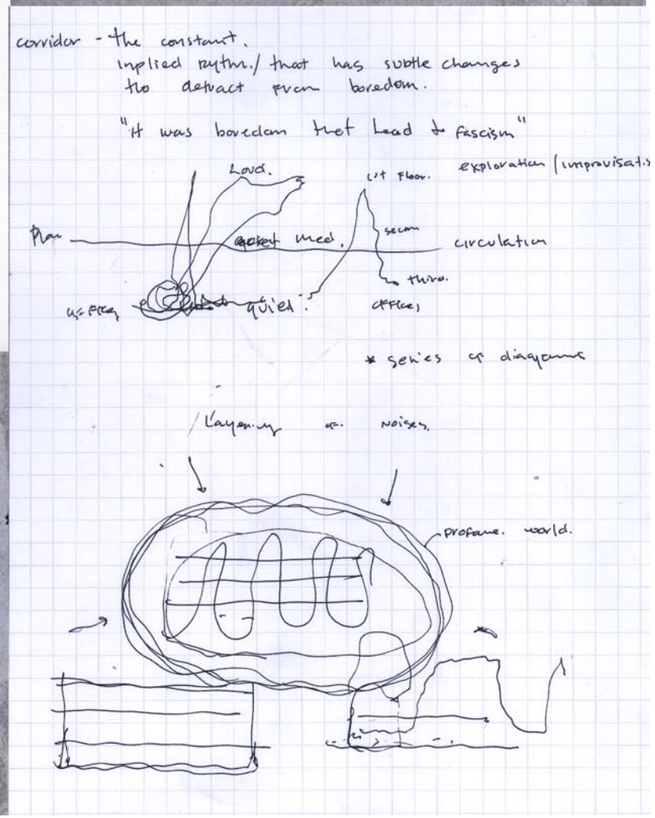


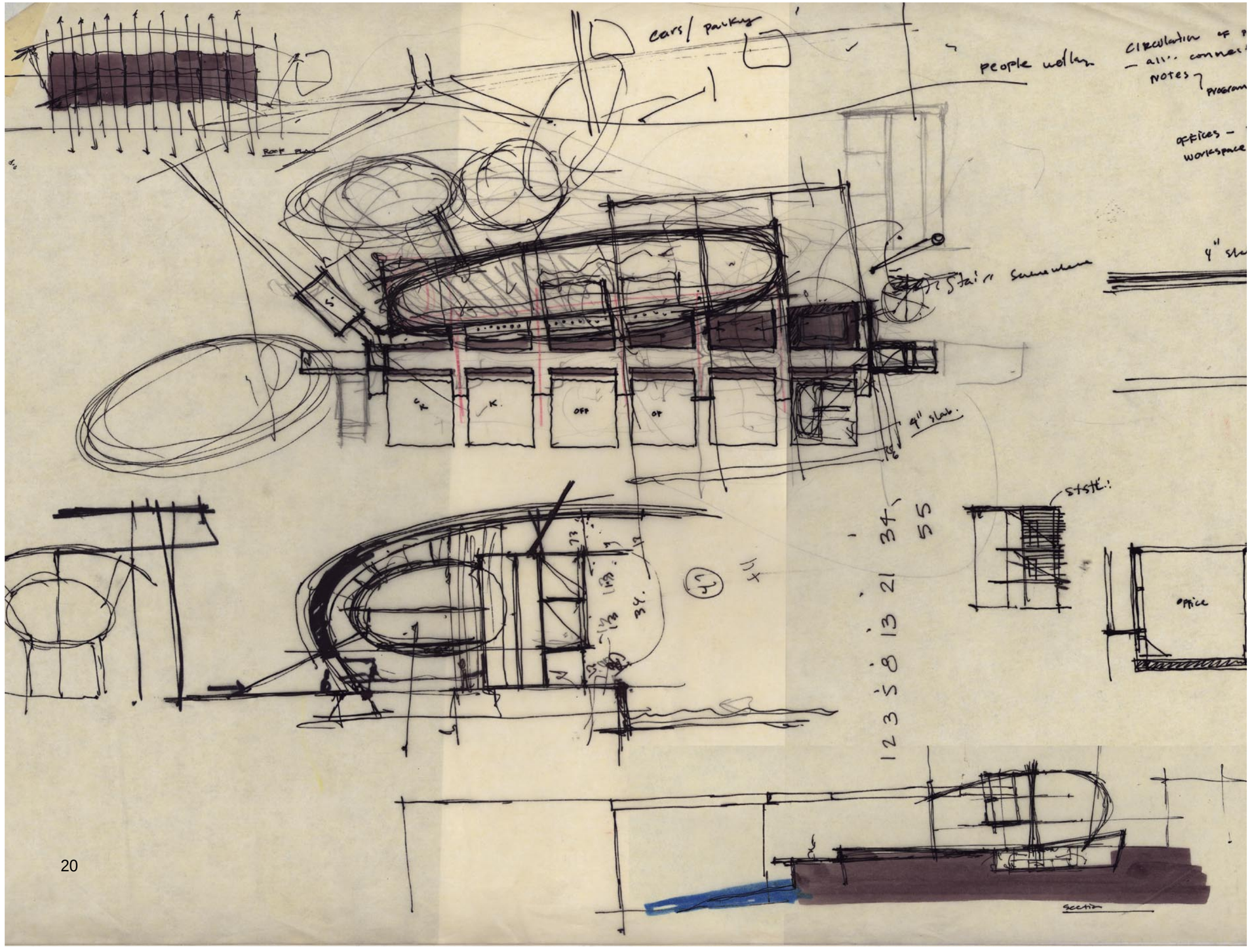


“But the world of sound also embraces the opposite of melody, harmony, and rhythm. There is disharmony and broken rhythm, fragments and clusters of sound, and there is also the purely functional sound we call noise. Contemporary music works with these elements. Contemporary architecture should be just as radical as contemporary music. But there are limits. Although a work of architecture based on disharmony and fragmentation, on broken rhythms, clustering and structural disruptions may be able to convey a message, as soon as we understand its statement our curiosity dies, and all that is left is the question of the buildings’ practical usefulness.”

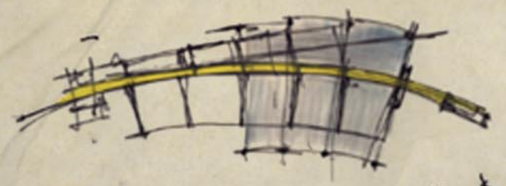
Zumthor, Peter. Thinking Architecture

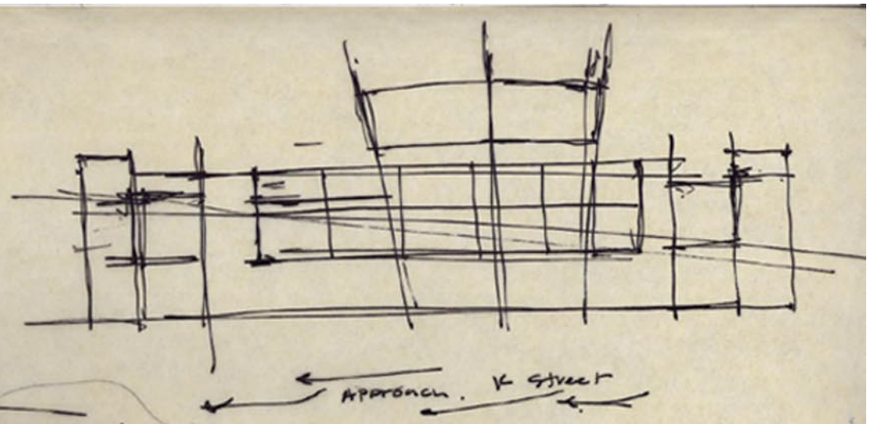





cars/ parking
people walking
Roof Plan
Stair
4" slab
4" slab.
office
Section

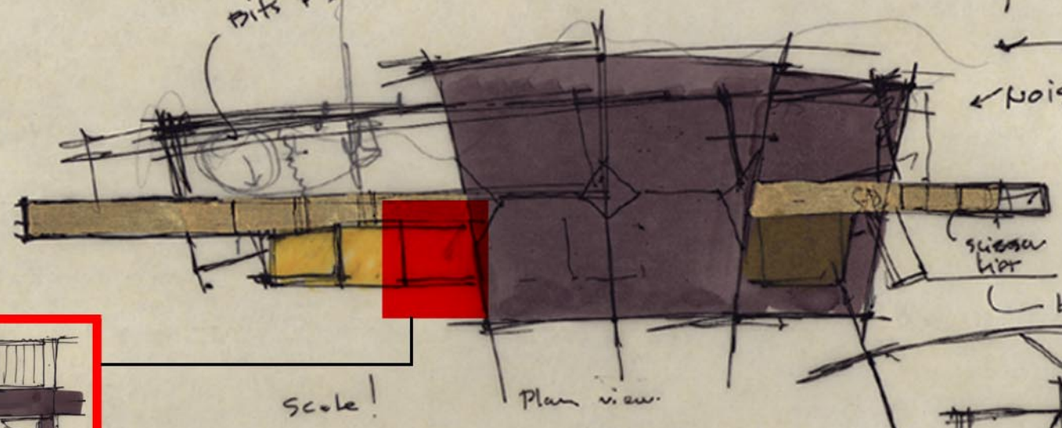
* - the spine (concrete) represents the page
why concrete? because it is the most static
or (sound) material in (architecture) densifi ← prove.





approach. ← street

bits & pieces.



← noise!

entry.

— maybe the noisy shed roof can be a high space that can bring people in

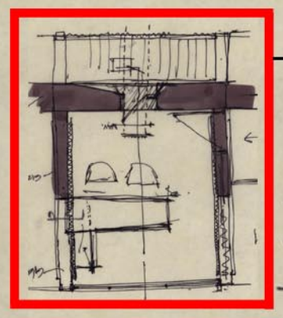
Gathering

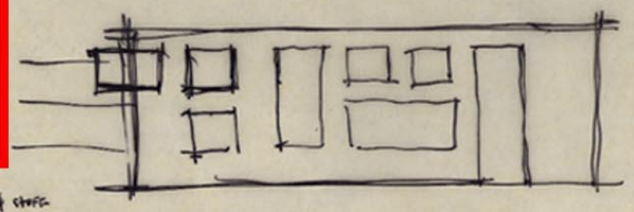
scissor lift

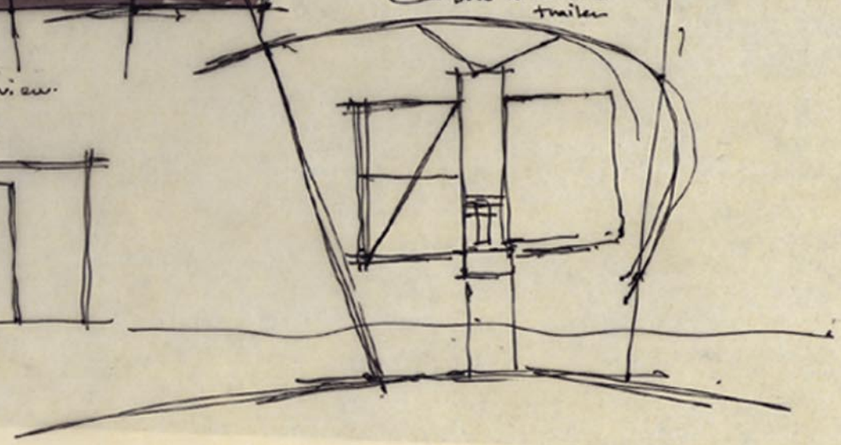
how wide is a trailer

scale!

plan view.







exhaust & stacks

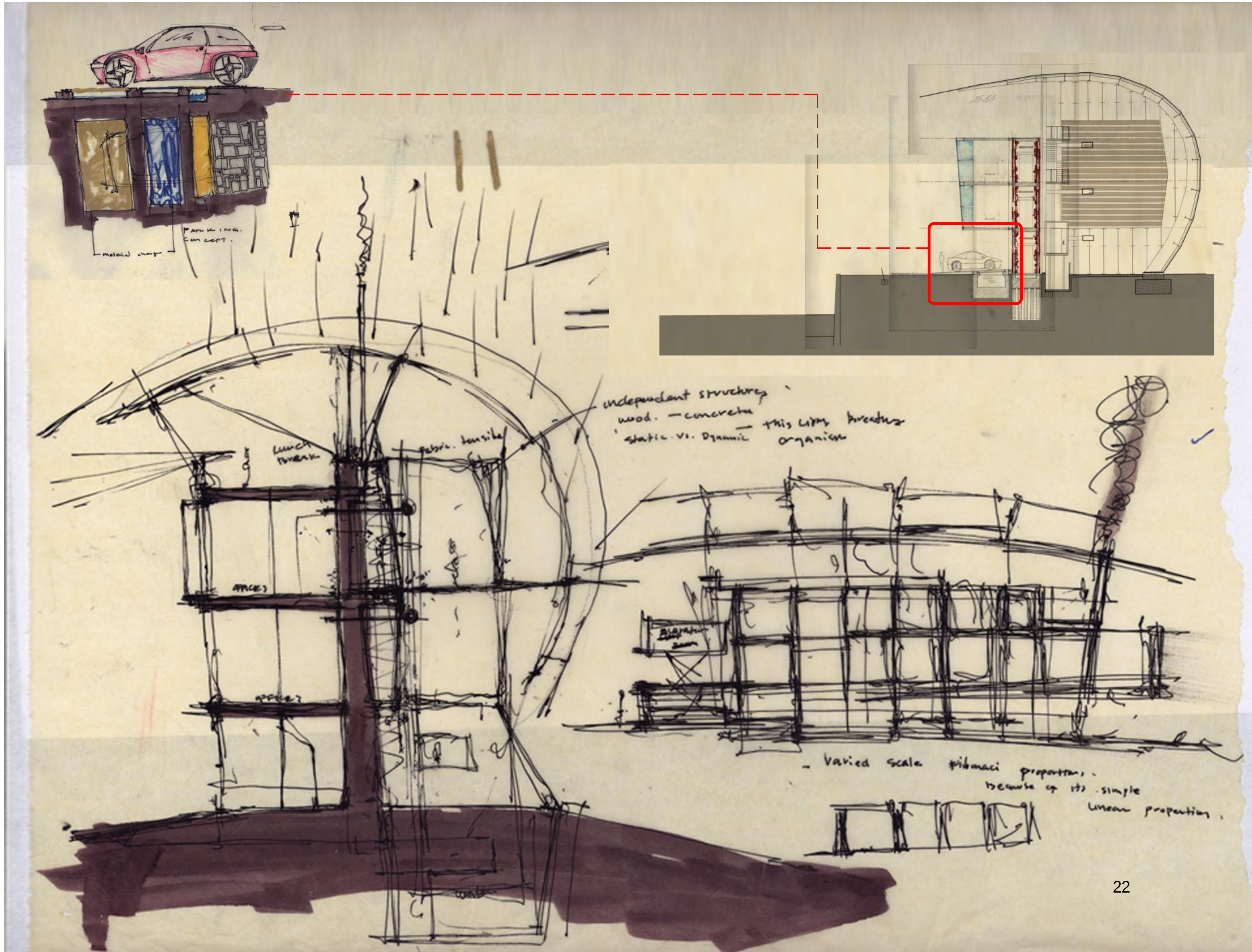
N/G

35'.

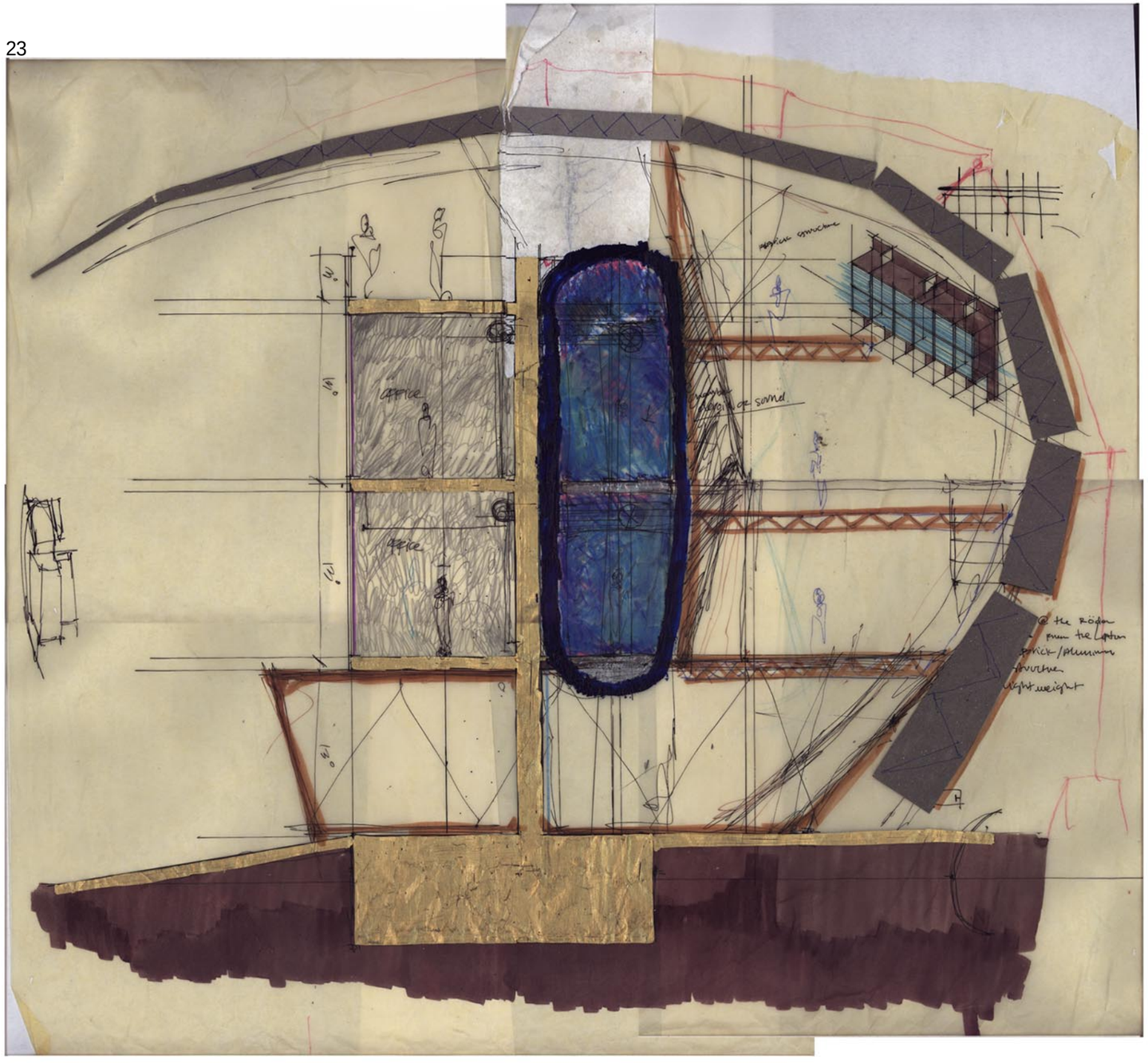
34'.

1"

1 2 3 5 8 13 21 34 55 89. ~~for~~ main spine
fibonacci proportions. everything else has been Fucked with!

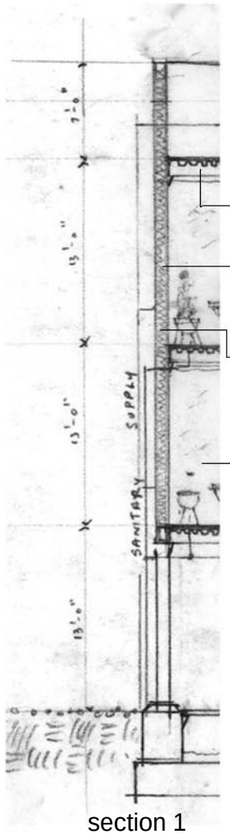

independent structures
wood. — concrete
static vs. Dynamic
this lines breathes
organism
lunch break
fabric. tensile
offices
Varied scale
proportion.
because of its simple
linear proportion.

23

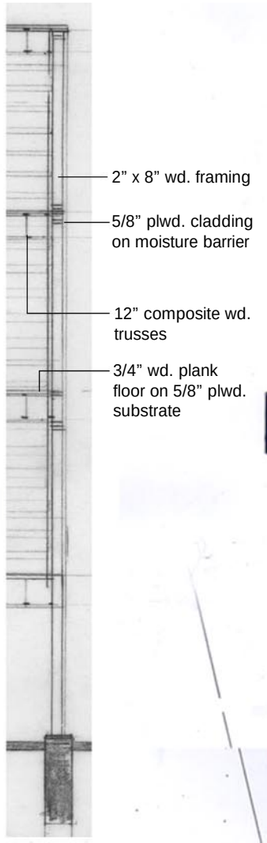


24

Site Plan
scale: 1” = 40’



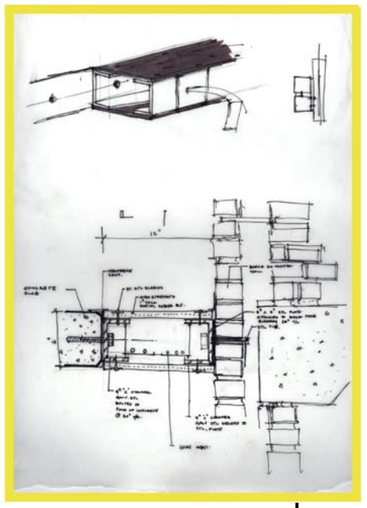
section 1
3/32” = 1’-0”

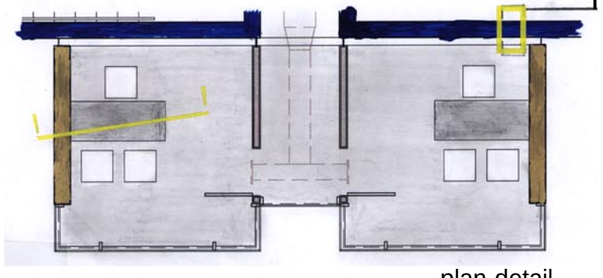


section 2
3/32” = 1’-0”

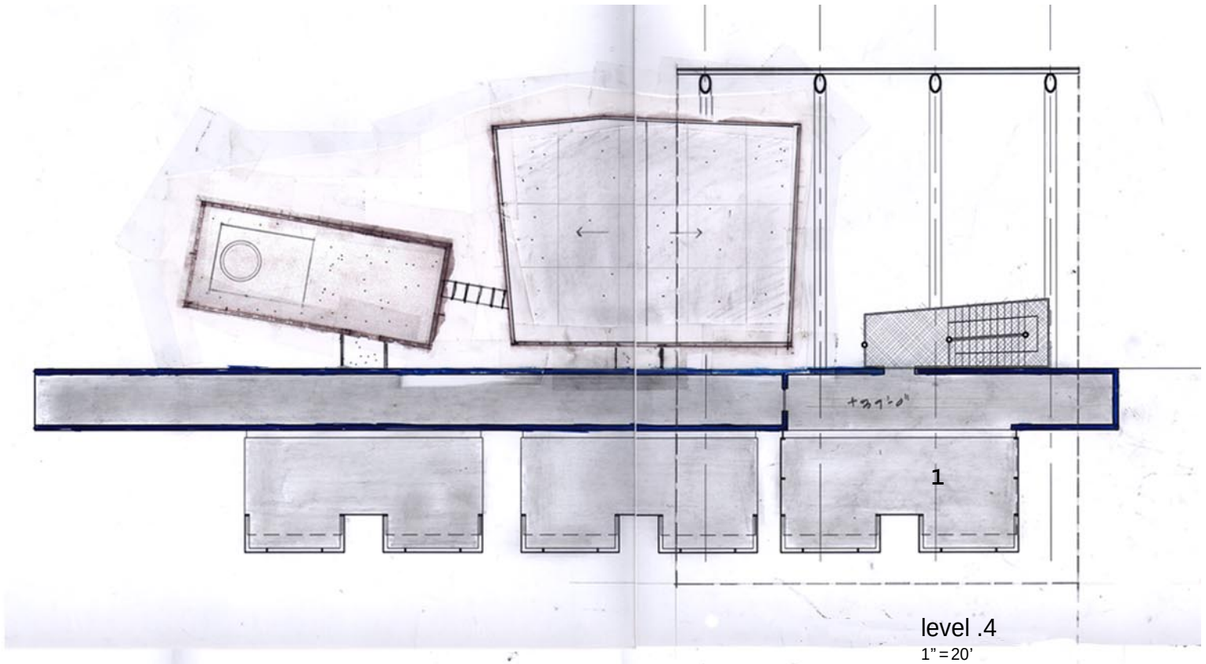
key
1.gravel
2.drum
3.potomac
4.walk
5.blank page
6.wood note
7.metal
8.fluid chamber
9.concrete box-low frequency

key
1.observation
2.drum
3.fluid chamber
4.concrete-low frequency
5.blank page
6.wood note
7.metal

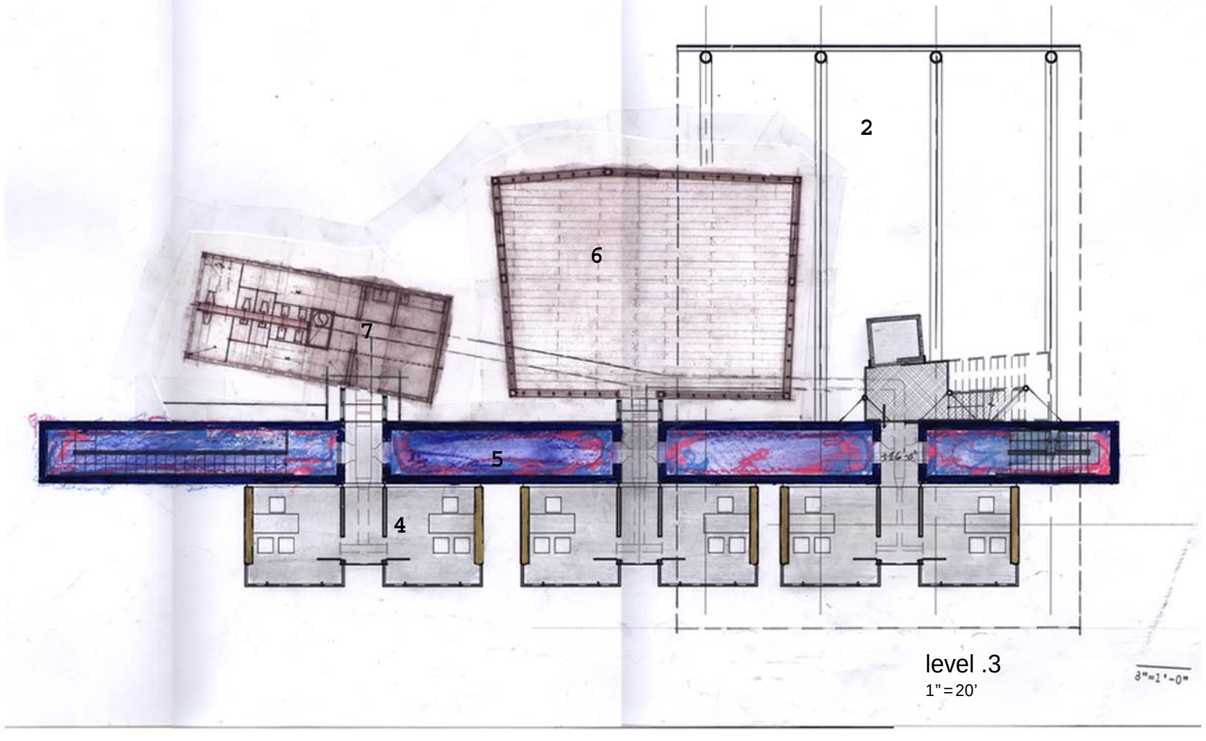




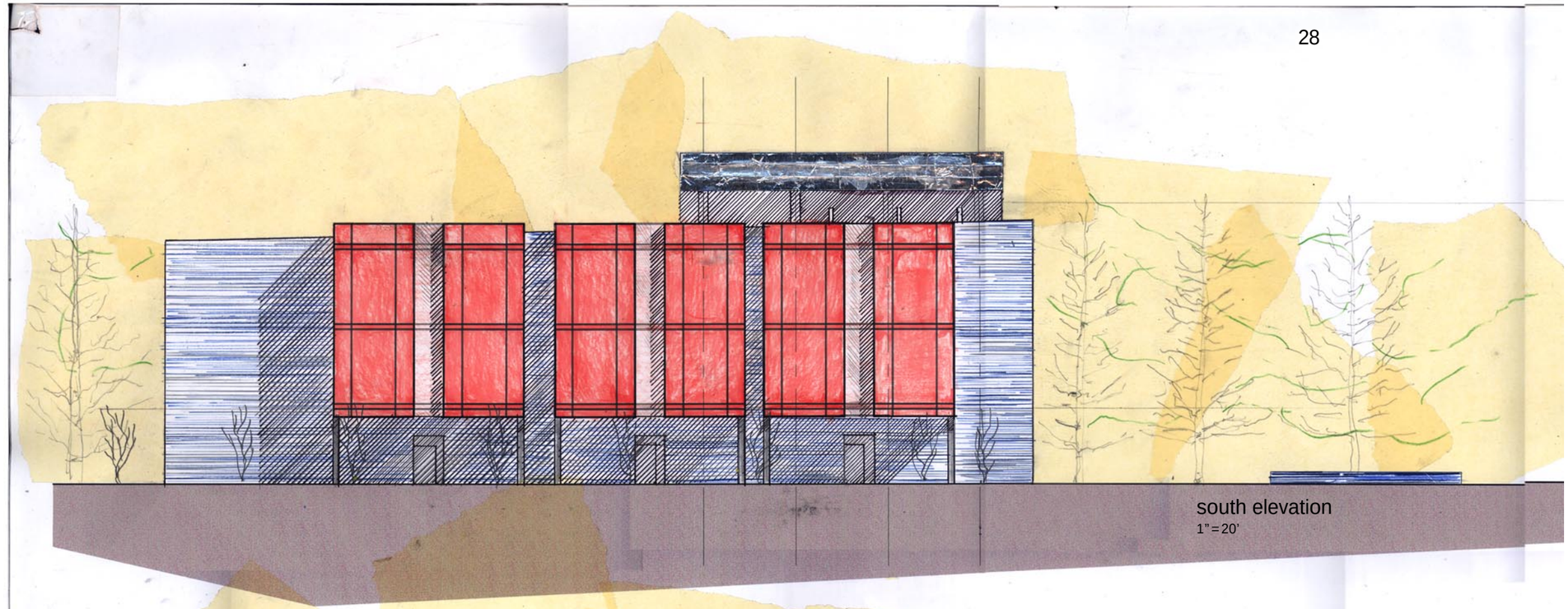
plan detail
1" = 10'



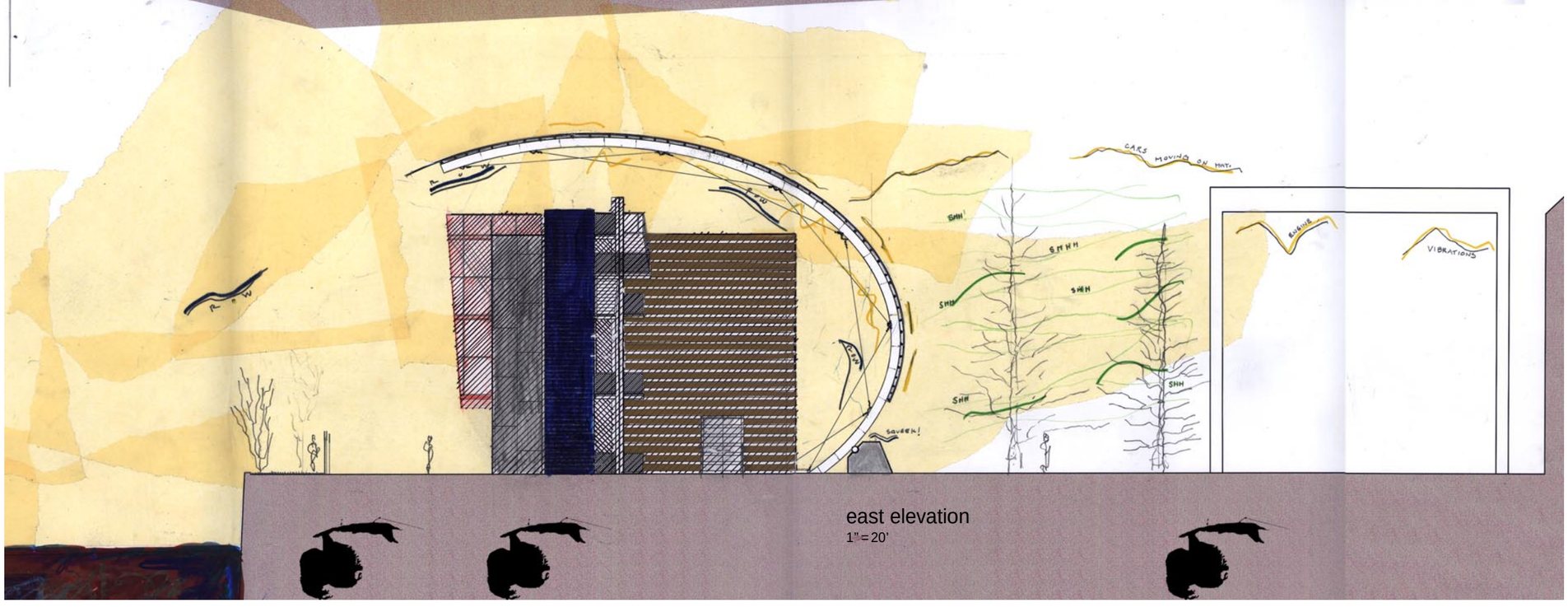
level .4
1" = 20'



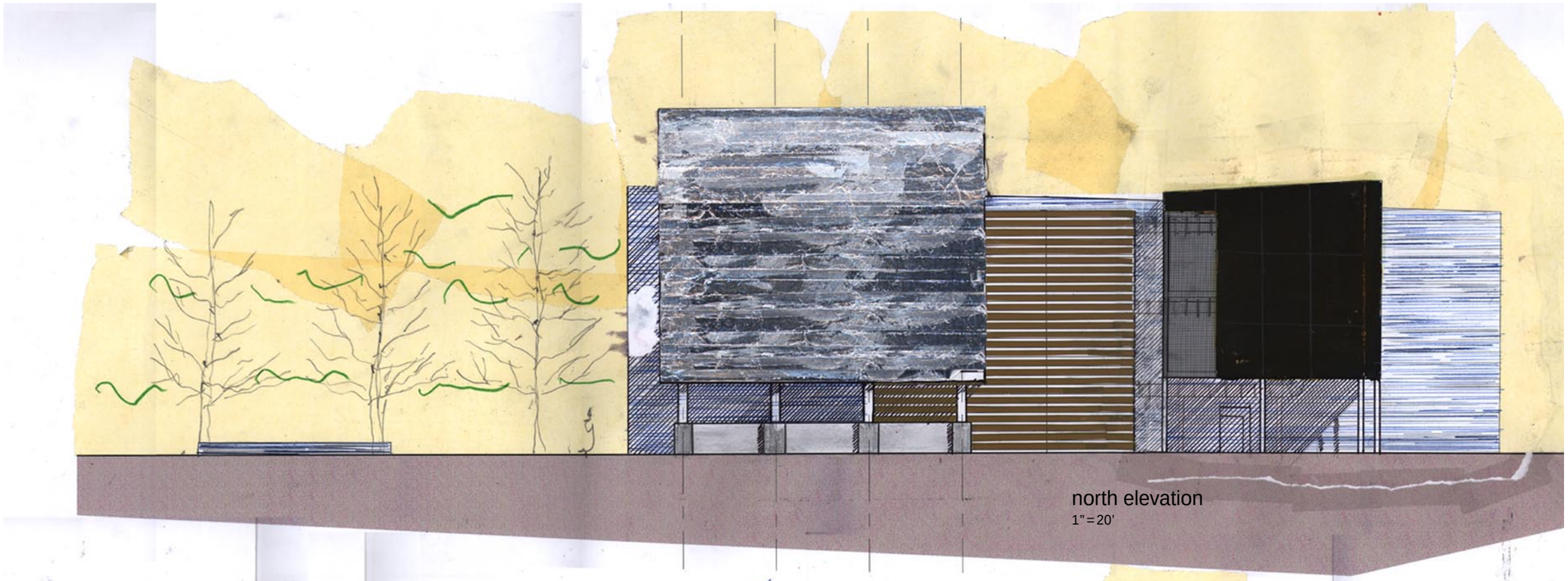
level .3
1" = 20'



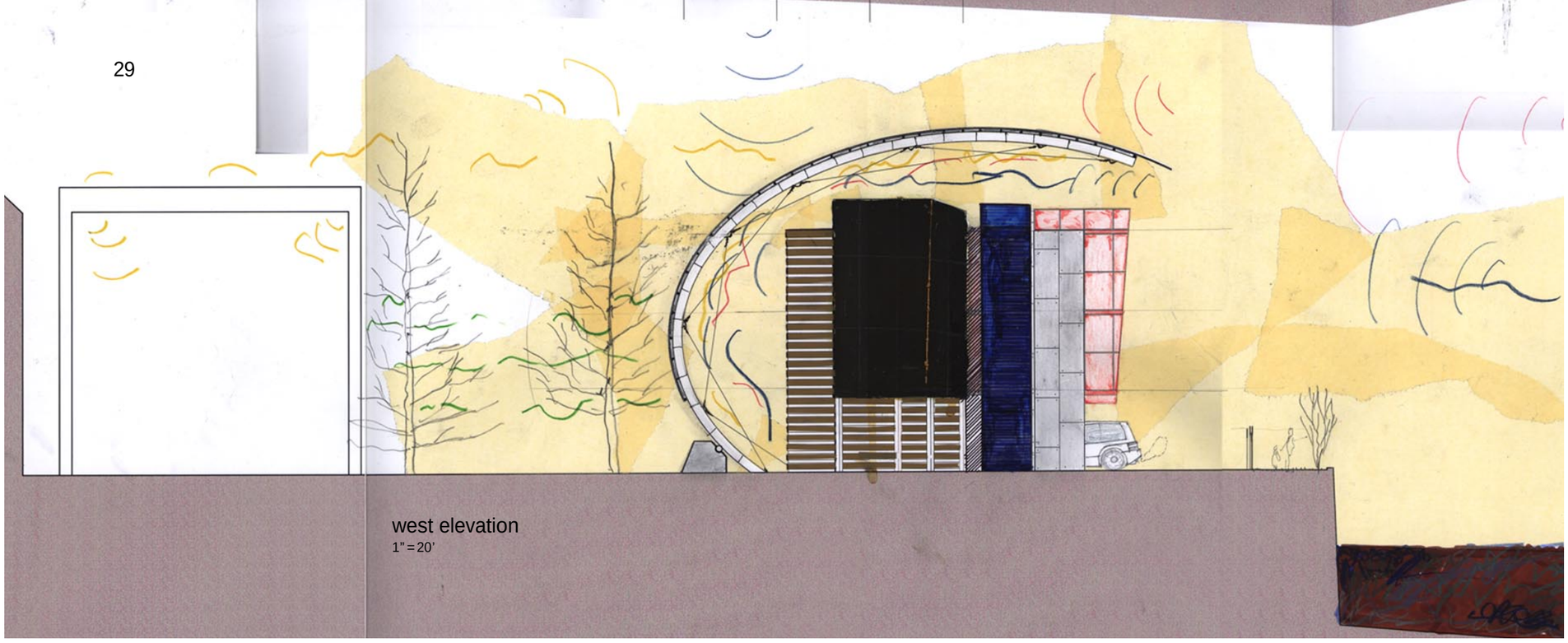
south elevation
1" = 20'



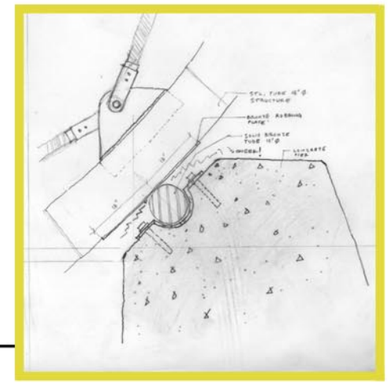
east elevation
1" = 20'

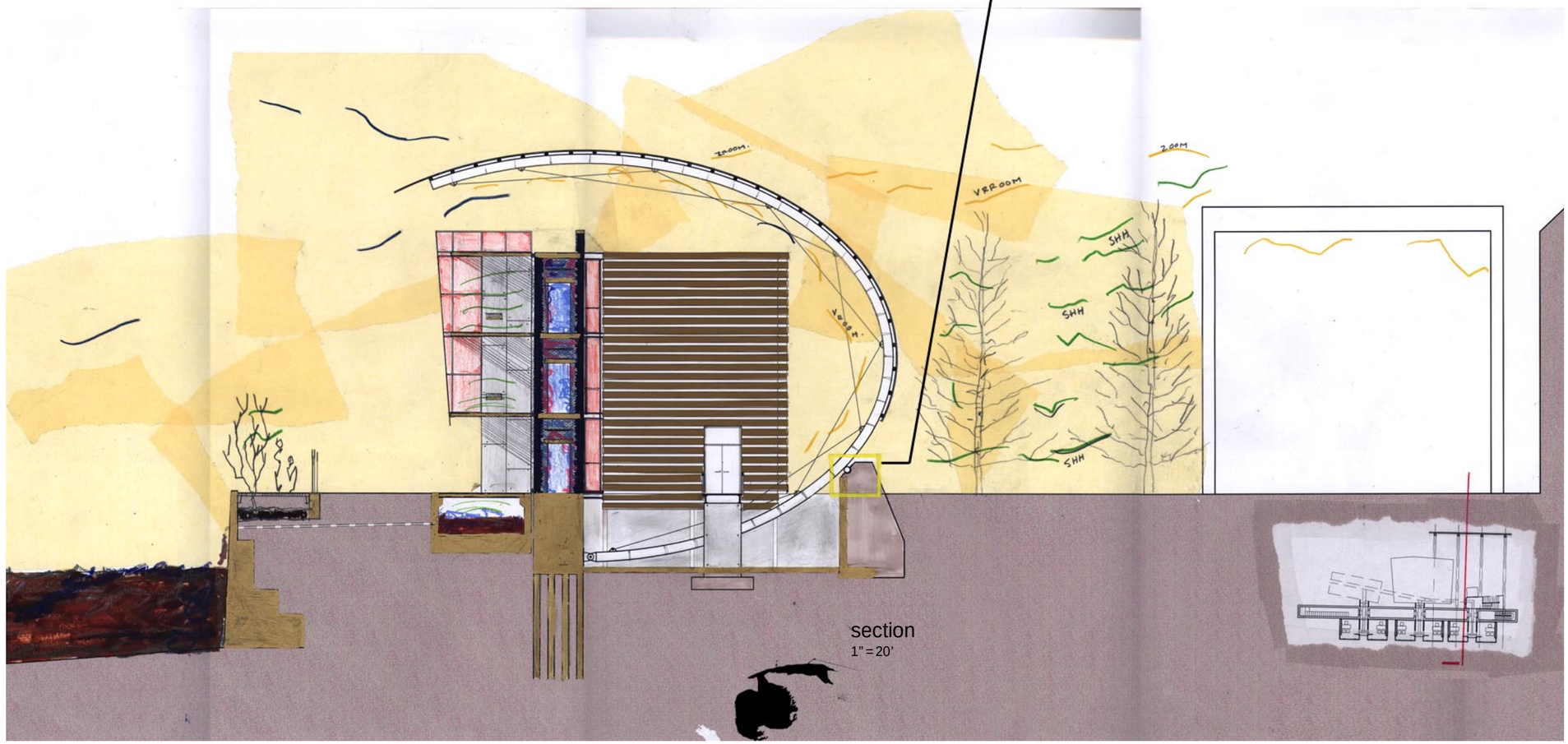


north elevation
1” = 20’

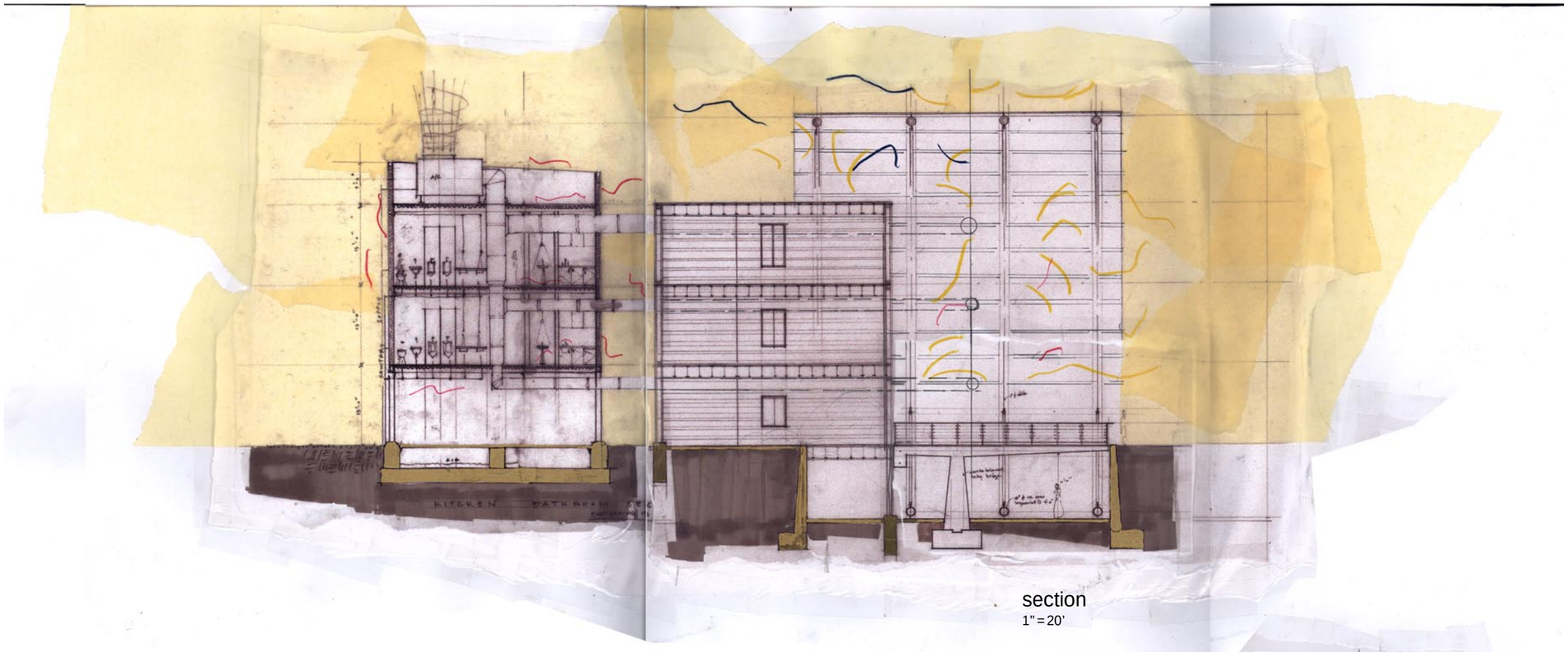


west elevation
1” = 20’

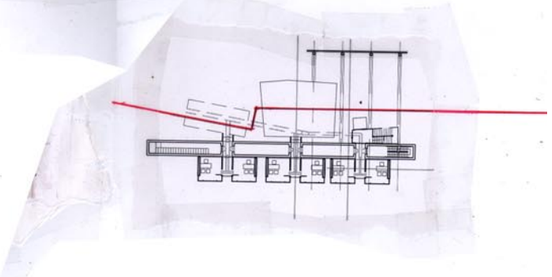


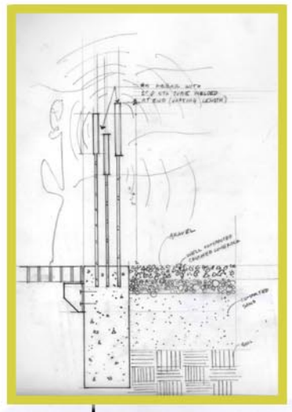


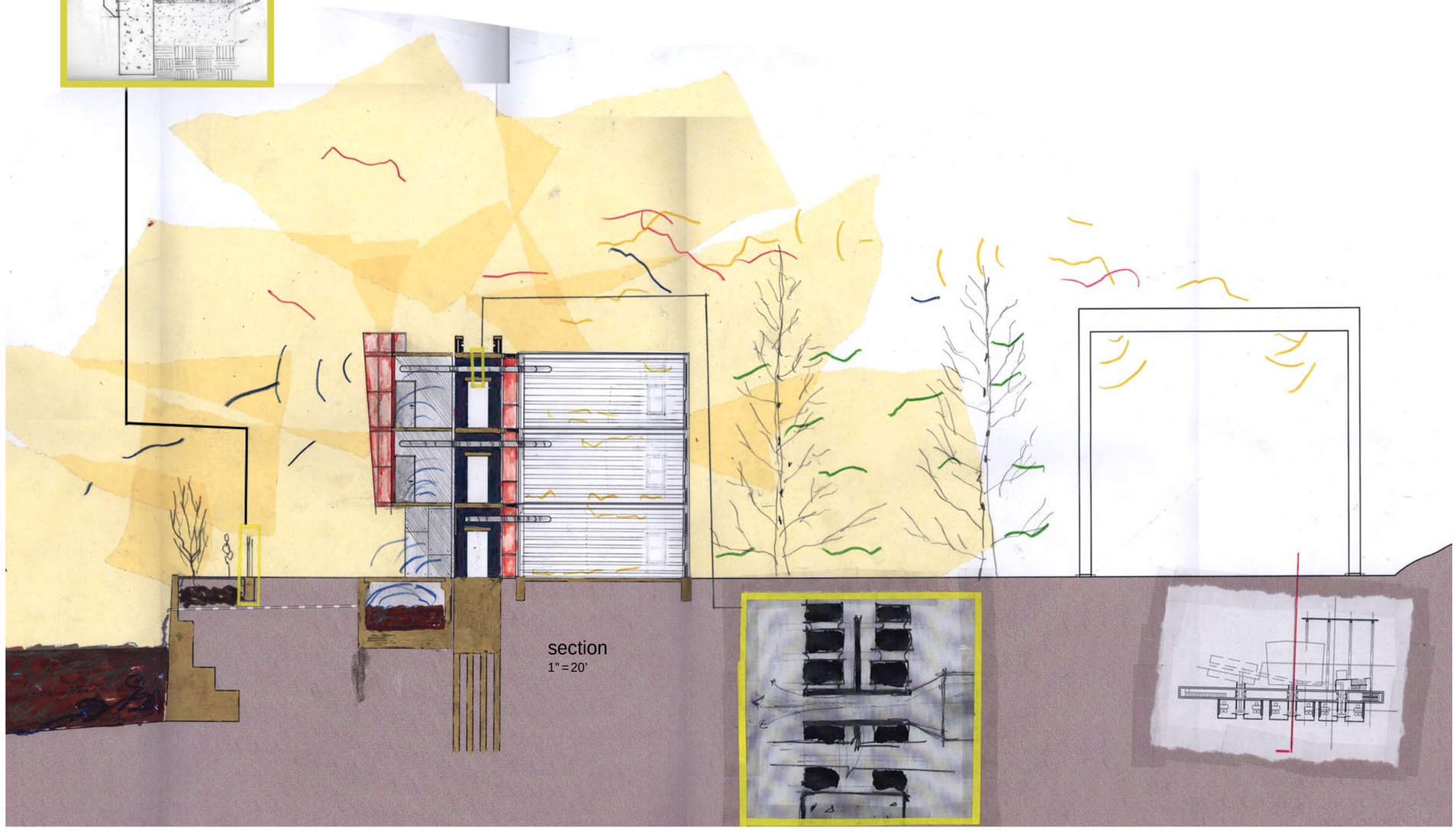
section
1" = 20'



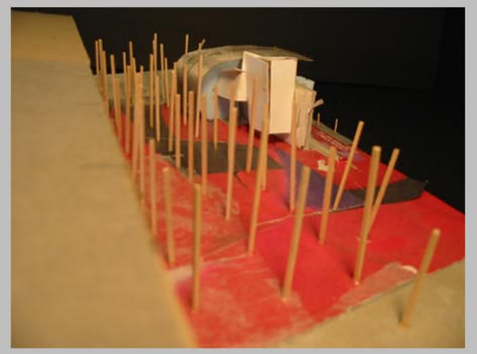
section
1” = 20’

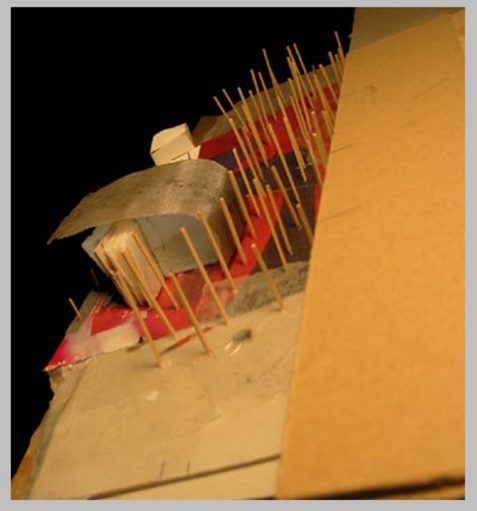


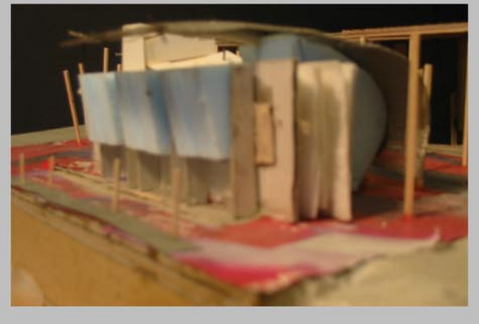


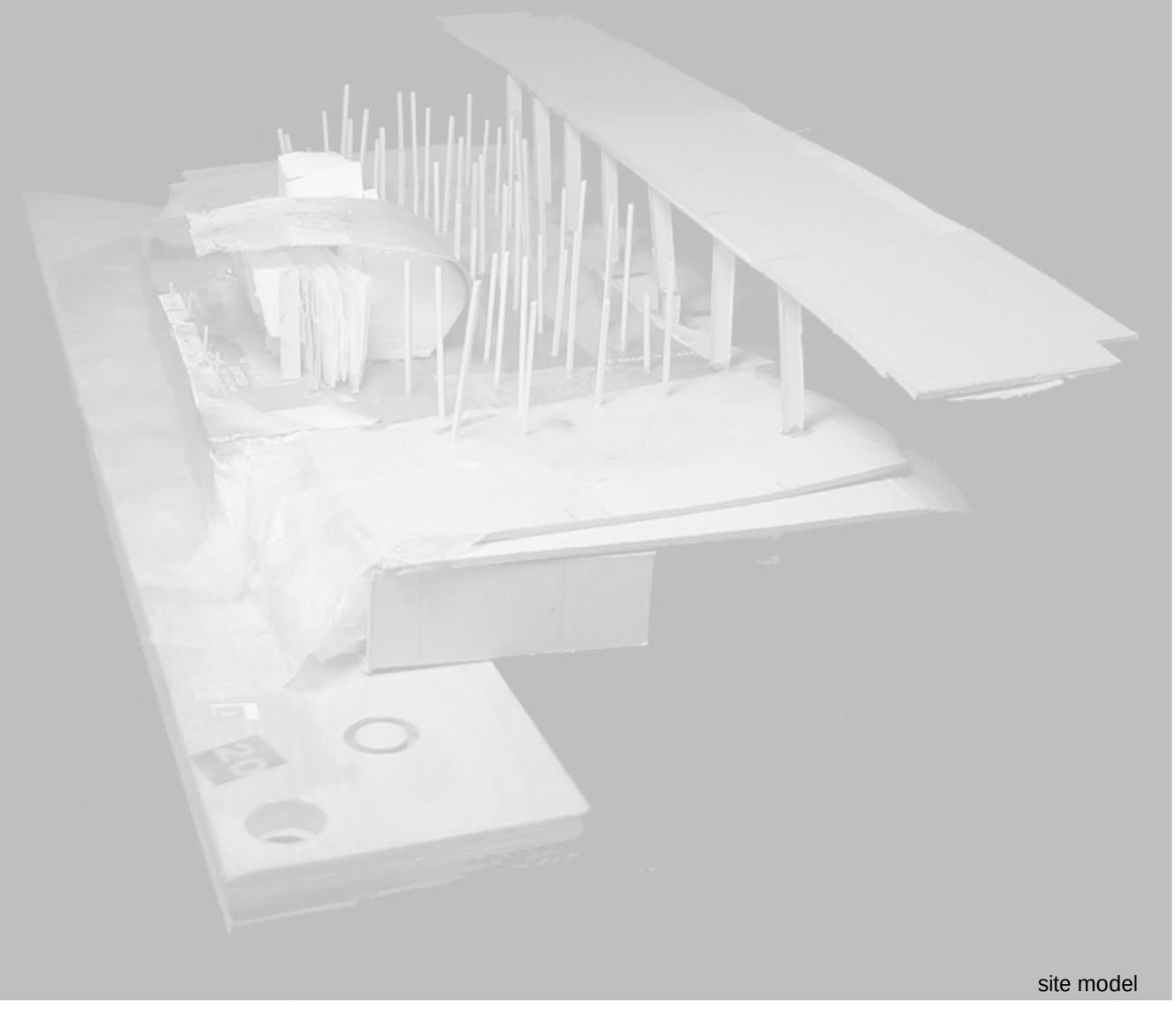


section
1" = 20'



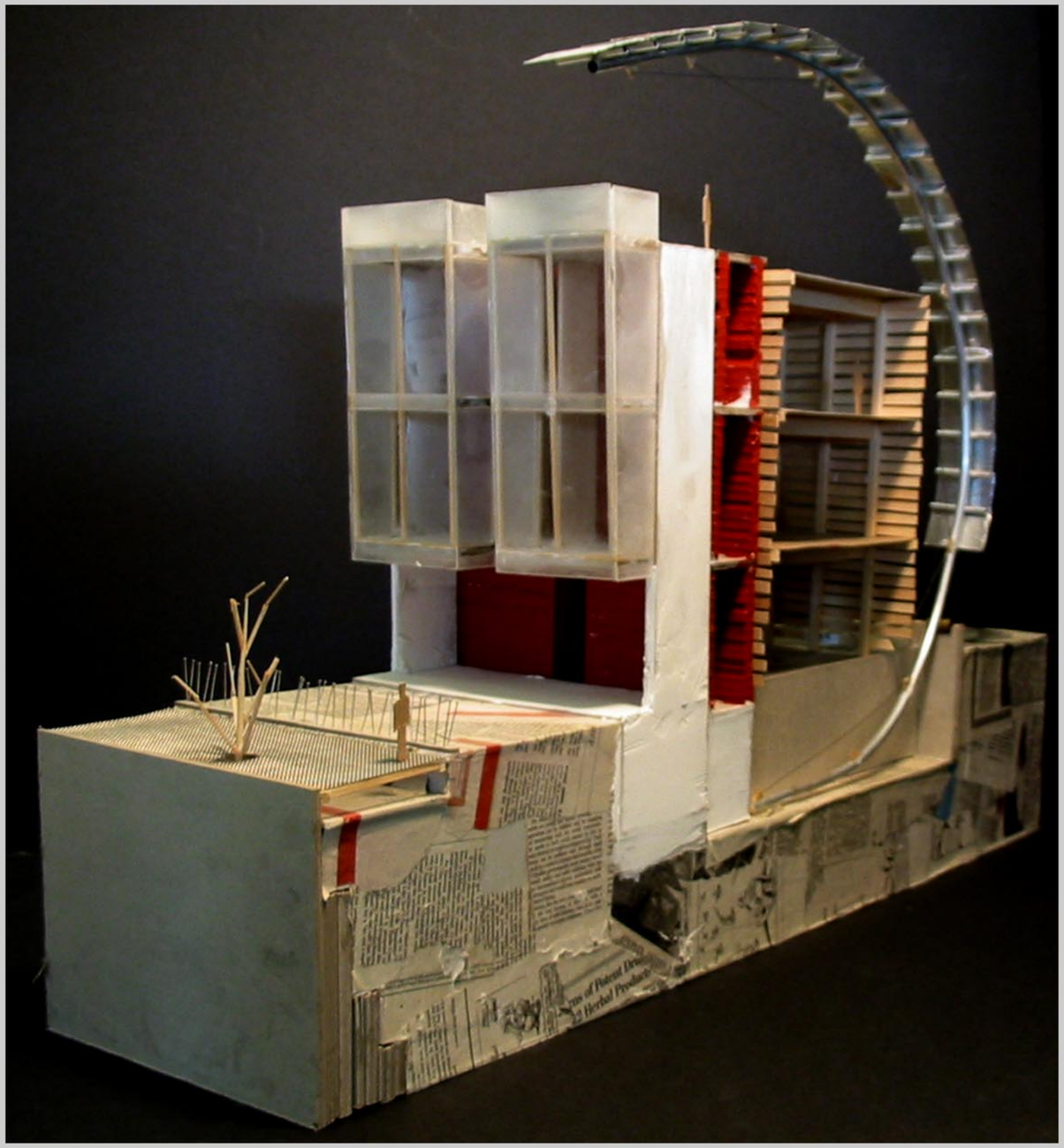






site model

detail model



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Douglas Kahn. *Noise Water Meat-A history of Sound in the Arts*. (MIT Press. 2001)

Bibbliography

Education

Virginia Polythecnic Institute and State University M.Architecture	February 2002
Florida International University B.S. Architecture	May 1999
Miami-Dade Community College A.A. Architecture	May 1997

Professional

Einhorn Yaffee Prescott Washington, DC	Aug.1999-Dec.2003
Schapiro Associates Bay Harbor, Fl.	May 1995-Aug.1999
Bruce Bernal & Assoc. Coral Gables, Fl.	June 1992-May 1995