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THE DEGREE OF MASTER OF ARCHITECTURE

TITLE: **Sound and Architecture**

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SOUND + ARCHITECTURE

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ABSTRACT | Sound + Architecture

"If surgery is all about reparation, then architecture is about experimentation" (Wiel Arets). With Detroit as my playground I see unique opportunities to speculate, experiment, and create. As a city ages, it is seen as a procession of phases, and in these phases it must learn new techniques in order to survive. New buildings and ideas can be inserted into the context of the city; old buildings and ideas can be used and injected with new life and energy.

Through a series of experiments with new techniques and innovations this thesis will attempt to re-consider the way we perceive sound and the way this experience can be enhanced through the interaction with architecture. How can we heighten our senses toward sound or change the way we traditionally experience sound and how can this influence and ultimately create an architecture? A building can be experienced beyond the simple look of its façade, it can become a canvas or an instrument for sound. This investigation will address sound as the tool of innovation, seeking to render a relationship between the human experience and architecture.

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Sound is a unique medium, which travels through air, water, many building materials and the earth[1]. A sound is perceived by our ears, felt by our bodies and understood in our minds. The experience of a particular sound can leave us with a smile on our face, a tear in our eye, or a dance in our feet. This idea of sound has caused me to speculate about its mysterious qualities that have the potential to create an atmosphere, affect our emotions so easily, and cause an experience to be remembered forever. The question I began wondering about was if this idea of sound could somehow influence an architectural response. Could a new way of considering sound be a means of experiencing and developing a richness in architecture? Could the human experience be enhanced through the interaction with sound and architecture? What else could be learned in the process?

Sounds, simply stated, are vibrating particles that create a small change in the atmospheric pressure and can travel great distances. Tiny vibrating particles are forced in a direction causing them to bump into other particles and that particle into the next and so on. Each particle moves only an infinitesimal distance and then returns to its original position, this distance traveled is called a cycle. The number of complete cycles each particle moves in one second is the frequency of vibration. The ear can detect sounds over a wide range of loudness and frequencies[2].

Architecture creates a setting that becomes the medium for sound to be heard and remembered. As stated by Architect Steen Eiler Rasmussen, in his book "Experiencing Architecture", "The architect is a sort of theatrical producer, the man who plans the setting for our lives. Innumerable circumstances are dependant on the way he arranges this setting for us. When his intentions succeed, he is like the perfect host who provides every comfort for his guests so that living with him is a happy experience[3]." In this instance sound creates a setting and is seen as the place, the

architecture is only a backdrop for this event to occur. The architect must then manipulate this room to create the perfect sound or the desired sound for that place so that it can be experienced fully and to its utmost potential by all its participants. Once the architecture has been created, the sound can then be controlled and enclosed or concealed within a space depending on the design and the intent. The architecture becomes a way of enhancing this experience through precise moves and material selections. The look of the space then becomes very important in the design. From the punctures in the wall to the volume of the space to the connections of materials, no detail should be overlooked and no moment is less important than another. Certain materials have qualities that are considered good for absorbing sound and can be used to keep the sound within a room while others are better for reflecting or directing sound throughout a particular space. The room can be designed to magnify or increase the distance sound travels inside a space. The architecture can focus the sound to a specific point, or amplify the sound toward an area in a room. The sound can be scattered throughout a room creating resonance or reverberation, engulfing the room with sound and energy. The space can be designed to let the sound flow out of a particular space and into another or through the circulation corridor. This occurrence of the sound traveling through the building could be a way of progression within a space or throughout the whole building. Hearing this sound throughout the spaces could create a sense of intentional or accidental eavesdropping creating a sense of connection between all functions and all those within or around the building. Sound is only limited by distance or interruption. This idea offers a wide range of unique design possibilities to be explored throughout the process of experimentation.

Dutch architect Wiel Arets talks about the idea of experimentation in architecture, "If surgery is all about 'reparation,' then architecture is about 'experimentation[4].'" This is the attitude I adopted as I have continued through the process; to experiment, looking at new ways to see the experience, the materials, the body's interaction within the space, to test and re-test. "Arets buildings are instruments which enable the inside and outside world to be quantified and experienced[5]." There is a blurring of the two worlds with a seamless precision.

In determining a program I looked for certain functions that could both incorporate sound into the architecture and celebrate and allow an interaction with the body through this experience in order to enhance it. Two of the main program spaces are sound recording studios and dance studios.

The recording studios will be a place to create and produce sounds or music. They will address spatial opportunities in creating a unique space for this richness of the act of making sounds. While much is known about the acoustics of recording studios and how this has informed an

architectural response, I intend to reconsider those moments in hopes of enhancing the space through speculation and experimentation with new ideas and innovations. "Architecture is seen as virological; it operates invisibly as a catalyst of events[6]." This quote from Wiel Arets, speaks of architecture as a background for the human interaction, my studio spaces will be thought of in the same manner. I intend to create these spaces to still accommodate the sounds and the process of recording, but only to look at new means of this production and design. However, I do not want the architecture to be an obvious feature, but to act as a player in the same realm and as a spark to the function (not the function itself).

In looking for a way to create a space that celebrates the body through these ideas of sound and architecture, I began to speculate about the movements of ones body (how the body could be mapped through the sound or the architecture itself, or how the body could leave its impression on a place). I then incorporated the idea of dancing into the scheme; this could be looked at as one form of celebrating the body. As the body moves, its trail could be traced thus creating a mapping. By taking those mappings and overlaying them with sound, we can begin to see another layer of the mapping which is amplified by sounds. Perhaps the ground or the walls could move with a certain rhythm created by the music and the body's impact with the floor below. Each studio, however, should be looked at as separate entities from the recording studio spaces. They should feel lighter, with much more of a transparent nature, not as a heavy concrete, such as is necessary with the recording studios (at times). These studios will have a sense of a translucency, a type of floating light box, creating a skin of sorts with silhouettes of the dancing bodies within. The light and shadows of this space become very important in creating almost a natural setting or a stage for a performance to be seen or created. The detail of these spaces is in the subtle simplicity. In the book "Concrete Regionalism," a critique of Wiel Arets work, one writes, "where his buildings seem simple, they also reveal great richness and poetry," also that he prefers "the suggestiveness of translucency over the false promise of clarity," and "the idea of solid transparency, a transparent alabaster skin.[7]" Although much different spaces, the recording studios and the dance studios, they must have the same rigor and meticulous attention to detail, the richness of the simplicity must come in the moments of greatest detail.

During the day these dance spaces will allow natural light to enter at selected framed instances. This type of fenestration will also act as punctures to the outside world, a connection with the city beyond. "This is Architecture of provocation, not simply an apartment house, but an inverse lighthouse magnified and towering alongside the water's edge. At night glimpses of the trapped light seep out to refill the sky once again.[8]" This quote from the book "Strange Bodies" gives a

description of the type of qualities I see these dance studios taking on. By lighting the studios from within at night the "light boxes" hovering over the street show the silhouettes of dancing which becomes visible from the exterior space or the cities surrounding context.

Circulation spaces can now become the place of discourse between the program spaces. A connection provides an opportunity to give meaning to another space of "in between." The Sound Gardens use this between space as a place of rest, to gather, and to listen to music. These spaces embrace the views of the surrounding city context, with selected framed punctures through the skin of the building.

Where can sound influence the movement and the interactions throughout the building? Can ones movement within this circulation now take on more meaning? Can the body now be mapped through the motions or sounds within this space; does it have a connection with the sounds from the recording studios and the movement of the dancing? These moments are areas of great challenge and opportunity. For such a building and a program to respond, it must receive and welcome interaction. The human hand is the driving force of this project, without the human creating the sound, the dance, or the performance, my building will stand still. If the spaces have a discourse in the manner of the prior description, then my building can and will truly sing. This building is all about the sounds, and for these sounds to be made and to be heard it needs the human to survive. Hopefully, with my thought process of continuous speculation, experimentation, and creation, I have taken these concerns into consideration, and given them a real solution.

[1] Egan, M. David. Architectural Acoustics. : McGraw-Hill, inc., 1988.

[2] Egan, M. David. Architectural Acoustics. : McGraw-Hill, inc., 1988.

[3] Rasmussen, Steen Eiler. Experiencing Architecture. 12th United States Edition. : The M.I.T Press, 1974.

[4] Lootsma, Bart. Wiel Arets Strange Bodies. : Basel Boston Berlin, 1996.

[5] Lootsma, Bart. Wiel Arets Strange Bodies. : Basel Boston Berlin, 1996.

[6] Slessor, Catherine . Concrete Regionalism. : Thames & Hudson, 2000.

[7] Slessor, Catherine . Concrete Regionalism. : Thames & Hudson, 2000.

[8] Lootsma, Bart. Wiel Arets Strange Bodies. : Basel Boston Berlin, 1996.

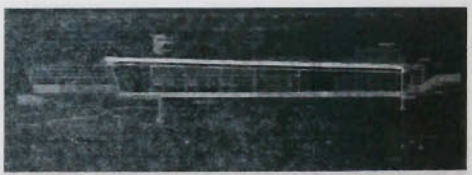
PRECEDENT STUDY | Police Station | Vaals, Netherlands | Wiel Arets | 1993-1995

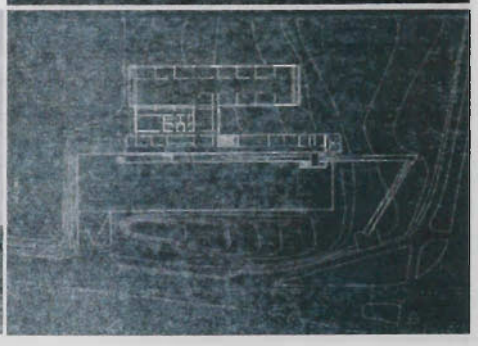
06

The second precedent study I researched was the Regional Police Station in Vaals, Netherlands. The idea for the building was concentrated around an open working environment. The police force was reorganized to embody a more open way of working. Arets uses translucent and transparent glass screens and walls to create different spaces within the police station. The building bridges a difference in the levels in the landscape and is composed of zinc, timber, and concrete, three contrasting materials. A partly raised pedestrian walkway runs the length of the east elevation, delivering visitors to the stations main public entrance[1].

The police station, like much of Arets work, has a unique sense of materiality. The three materials he uses have a contrasting look, but works well with the surrounding context. The long and very obvious bridge is a way of inviting guest and visitors to experience the whole building as they enter. It is a natural progression where the architecture is slowly uncovered. The way the building progresses is very important to the way I have been looking at the circulation spaces within my program. The openness of the interior spaces have subtle moments of privacy and the glass walls give separation while not cutting off views throughout. The style of the building is very unique considering the function occupying the space. All of his ideas are new ways of thinking in many aspects and the reconsidering of materials and uses of those materials is much the same way of considering my recording studios and the way the dance studios will contrast them. The works of Arets and the way of thinking and problem solving will prove to be very influential in the progress of my thesis.

[1]Slessor, Catherine . Concrete Regionalism. : Thames & Hudson, 2000.

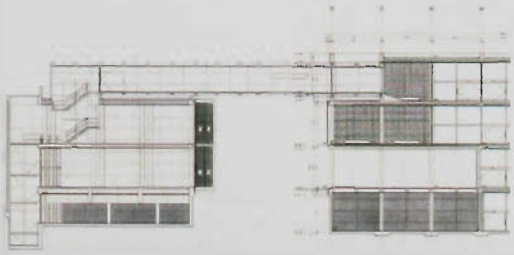




PRECEDENT STUDY | Academy of Arts | Maastricht, Netherlands | Wiel Arets | 1989-1993

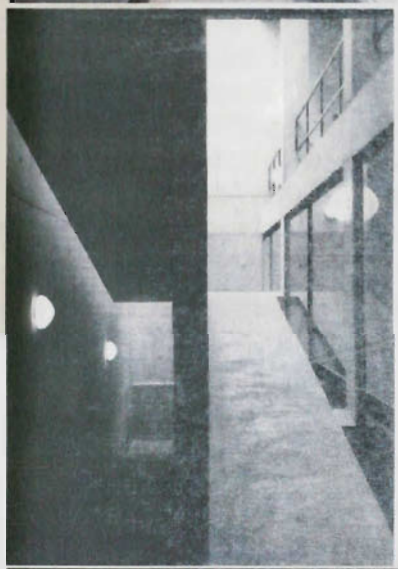
For this study I looked at Architect Wiel Arets and his extension on the Academy of Arts in the Netherlands. Arets was asked to extend the existing academy of arts, which lies in the historic part of town. The area had just undergone a reconstruction to a modest urban master plan, creating housing and a square. His new extension pierces the square, both completing and disrupting it. By inserting an elevated bridge he creates an entrance to the extension, giving those occupants new and unexpected views. The floor of the bridge is a grid of glass blocks giving a surreal feeling of walking on air. The bridge is surrounded by tall trees which some describe as walking through the treetops. The light which passes through the trees and through the glass block is very subtle and gives a dynamic sense of movement. Another element includes a meandering ramp walkway where more curious views can be seen. The glass block clad is a type of transparent skin, slot like windows penetrate the walls for sudden views through. At night the light seeps out through the many glass blocks[1].

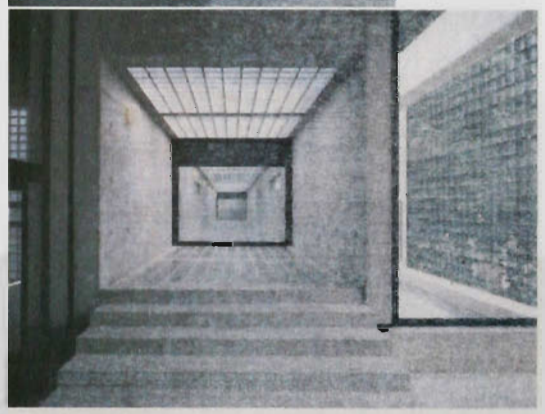
This building became very influential to me as I was forming ideas and thoughts for my thesis question. The way Arets uses materials and the type of material selection is so thought out and become a vital part of all his projects. The concepts of the elevated bridge, the sense of walking through the treetops, the "unexpected views," and the importance of the light have all been intricate ideas in which my project have considered in emphasizing my program. His circulation spaces meander and become elevated; they create new ways of viewing. I have used these ideas in talking about selected or framed
views in the context of my site.



[1] Slessor, Catherine . Concrete Regionalism. Thames & Hudson, 2000.

Academy of Arts Extention





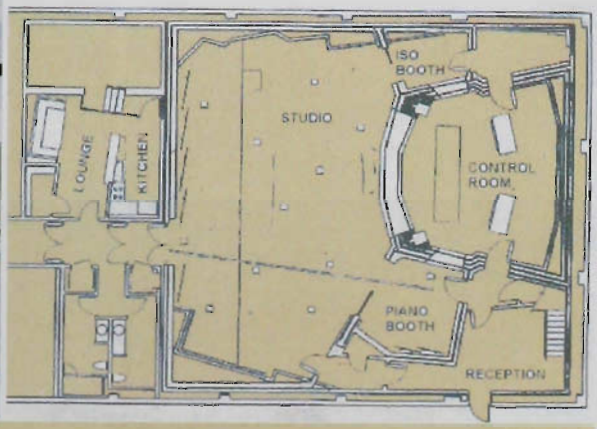
Regional Police Station

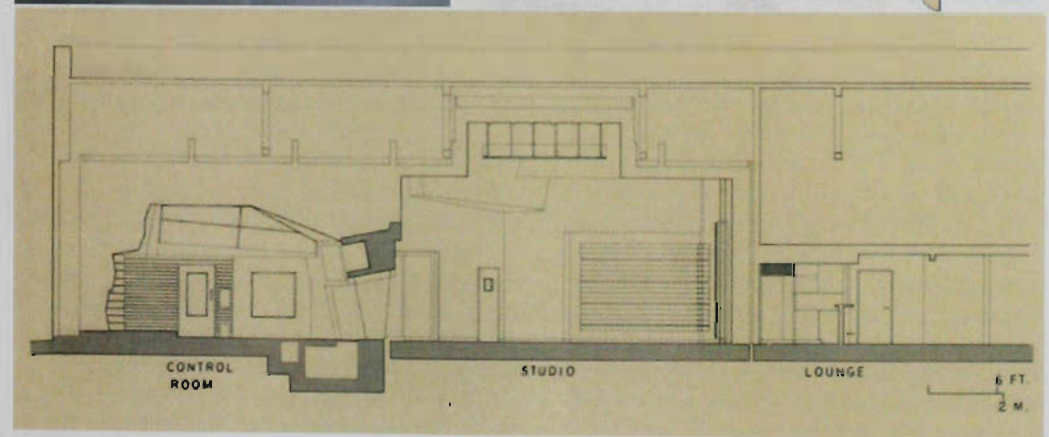
These images show Architect Wiel Arts' delicate use of materials. From the zinc facade (top right), to the concrete (middle right) and wood (bottom right) circulation corridors. A seamless transition gives this Police Station a unique character on the existing landscape.

Wiel Arets extension to the Arts Academy beautifully expresses light travelling through this building. He uses ramps to create meandering views from dynamic perspectives. A sense of materiality ties the existing building to the new extension.

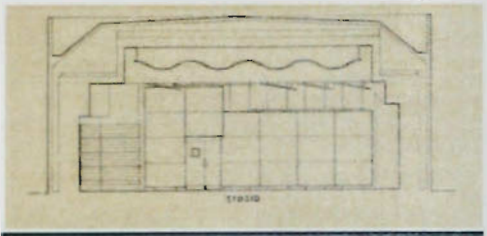
PROGRAM PRECEDENT | Bad Animals Recording Studio | Seattle, Washington | Studio Bau:ton

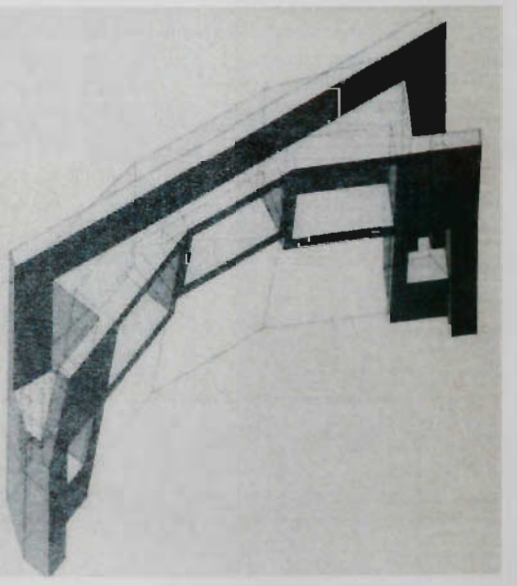
While searching for precedent studies, I came across a recording studio in Seattle, Washington, by the Architecture firm, Studio Bau:ton. What especially interested me in this project was the seamless blur of aesthetics and technology. They have created a space which is both pleasing to the eye and the ear. The recording studios are completely acoustically sound. The control rooms focus the sound to a precise point optimizing the producers ability to create pure and crisp sounds. The studios, on the other hand, keep the music alive, meaning the sounds are "live" and therefore they last as long as possible by bouncing around the room. The walls have stylish but functional angles to maximize the sounds potential to stay "live." The ceiling is an undulating maple deflection panel, breaking up vertical symmetry within the studios. This project is a great precedent not only for the program but for tectonic studies as well. The way Studio Bau:ton has constructed this project gives a considerable amount of insight for potential sound acoustic studies.





PROGRAM PRECEDENT | Bad Animals Recording Studio | Seatle. Washington



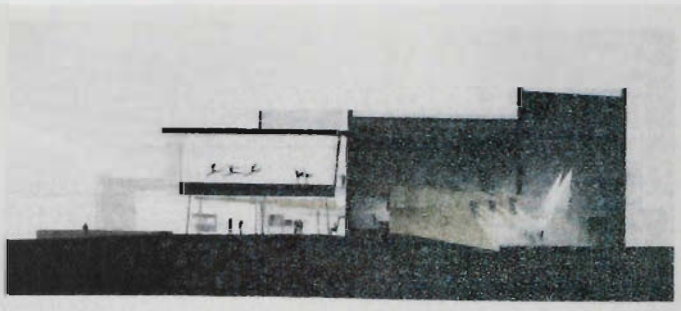


TECTONIC PRECEDENT STUDY | Dance Theatre | Tucson, Arizona | Gould Evans

In looking for a tectonic precedent for the dance studio protion of my program, I began to look for projects that incorporated my ideas of transparency and use of light and shadow. Arizona architect Gould Evans does just that in his Dance Theatre on the campus of the University of Arizona. His dance studio space is lifted off the ground in much the same manner as the proposed dance studios in my design. He uses randomly placed columns to hold up the structure, and the area below the dance space becomes an outdoor lobby or entrance to the building.

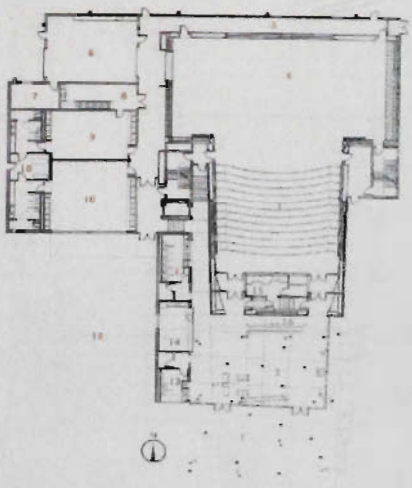
In order to create a transparent skin on the facade of the building he uses a vernacular material of rusted woven wire panels. This material gives the building a luminous feeling as the light pours through the membrane at night. He looks at the space between the dance studios and the music theatre as a means of circulation between the two functions, thus creating an acoustic break between the spaces.

TECTONIC PRECEDENT STUDY | Dance Theatre | Tucson, Arizona | Gould Evans

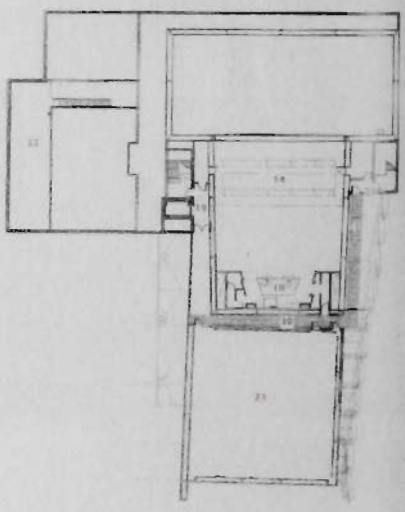


long section

perspective of structure



ground floor plan (scale approx 1:750)

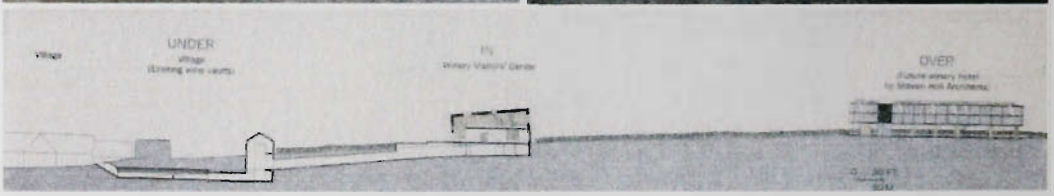


first floor plan

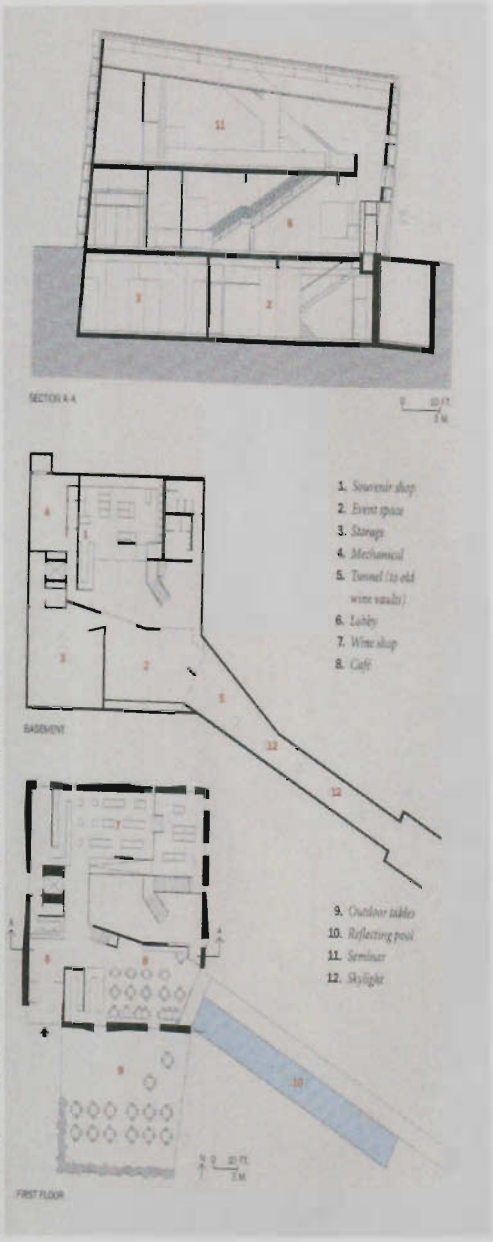
TECTONIC PRECEDENT STUDY | Dance Theatre | Tucson, Arizona | Gould Evans

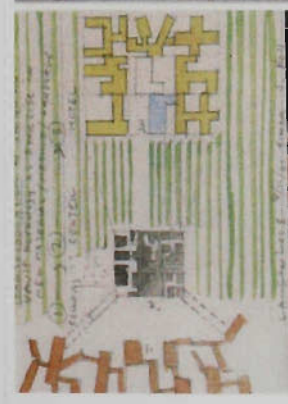
TECTONIC PRECEDENT STUDY | Loisium | Langenlois, Austria | Steven Holl

While searching for a material as well as a formal expression of my acoustic and sound spaces, I came across a project by architect Steven Holl, a winery welcome center in Langenlois, Austria. The material accentuates the formal qualities of the building, creating a unique tectonic with an illusion of a thickened skin. This thickened exterior condition, however, still functions on the interior, which has a much lighter feel. This becomes a desirable look, one that is similar to the recording studios within my program. Holl also uses natural light as a means of egress, at the top of a stairway a window expresses the movement differently than other moments in the design. This is a nice detail in showing the circulation throughout the building and also functions as a means of moving visitors through the spaces.



TECTONIC PRECEDENT STUDY | Loisium | Langenlois, Austria | Steven Holl



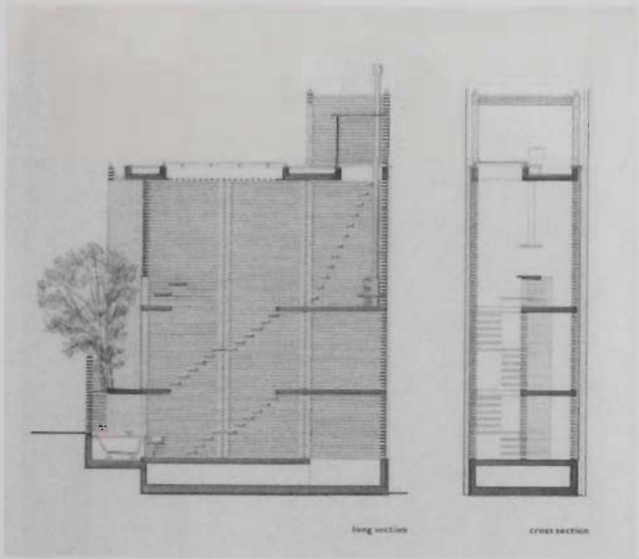


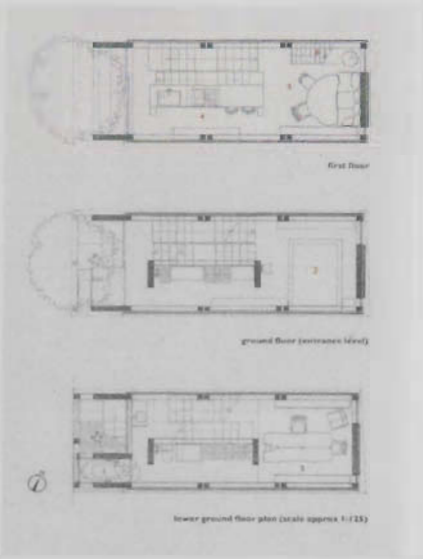
TECTONIC PRECEDENT STUDY | Loisium | Langenlois, Austria | Steven Holl

TECTONIC PRECEDENT STUDY | House | Kobe, Japan | Hiroaki Ohtani

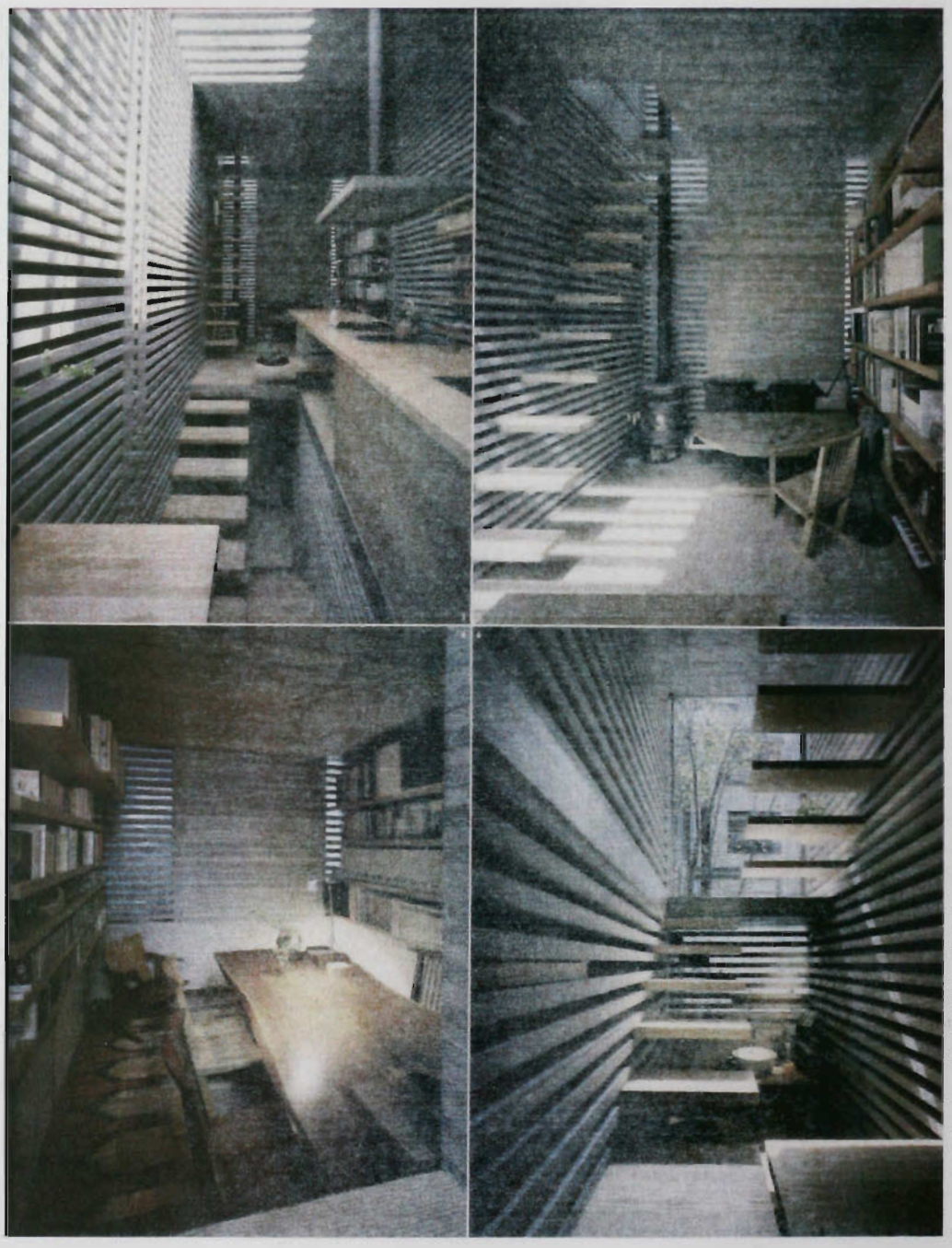
My third tectonic precedent study came in the form of a small house in Kobe, Japan. I was looking particularly for a tectonic of selected views and use of materials that I could incorporate into these instances. Architect Hiroaki Ohtani uses horizontal precast concrete members to create such a scene. The house is constructed entirely out of these horizontal members and has no forms of vertical construction. The light and shadows are the dominate attraction into this space.

In creating a space of viewing but with a certain amount of privacy, I see this being an opportunity to express such ideas. Between the restaurant and the circulation, or between the recording studios and the dance studios are where I see these ideas being expressed in my design.





TECTONIC PRECEDENT STUDY | House | Kobe, Japan | Hiroaki Ohtani

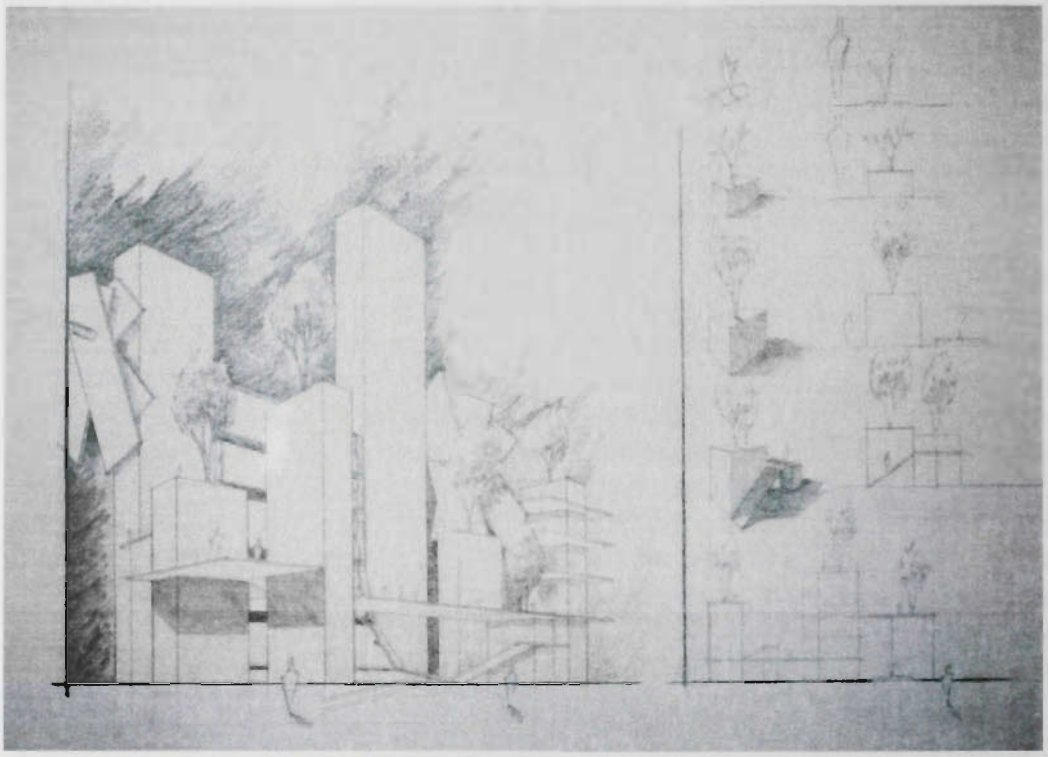


SKETCH PROBLEM | Progression of Time | Injected + Entangled

During the design thinking process of the studio I was given a sketch problem to create a habitable construct while re-considering the ideas of a room. Emphasis was to be considered on the progressive nature of the construction of the urban landscape and the layers that make and measure the progression of time. Another idea I was to consider was the possibility to document the city through the detail of the landscape, and to reveal what is invisible in conventional plan views.

I started with an idea of growing, how the body grows over time, and used this as a way to document time in the city. As a child we would document our growth by a line on the wall, you could see the results of your growth each time a new line was drawn. I used this idea in creating a public garden of visual simulates that would continuously change over time. The idea was a fictional outdoor space which could physically grow out of the ground, constantly creating new views, new life, and become a measurement of the cities growth. Parts of the space would grow consistantly, giving accurate documentation of time itself. Another portion of the space would only grow in conjuntion with the cities progress, thus showing a relationship to time and growth of the city. The growth of the space would result in new areas to explore, giving city dwellers an everchanging, fresh place to gather. The visual results of the cities progress would give the bystander a visual depiction, causing an awarness in the city, almost a visual forum of voices in informing its people of progress or decay.

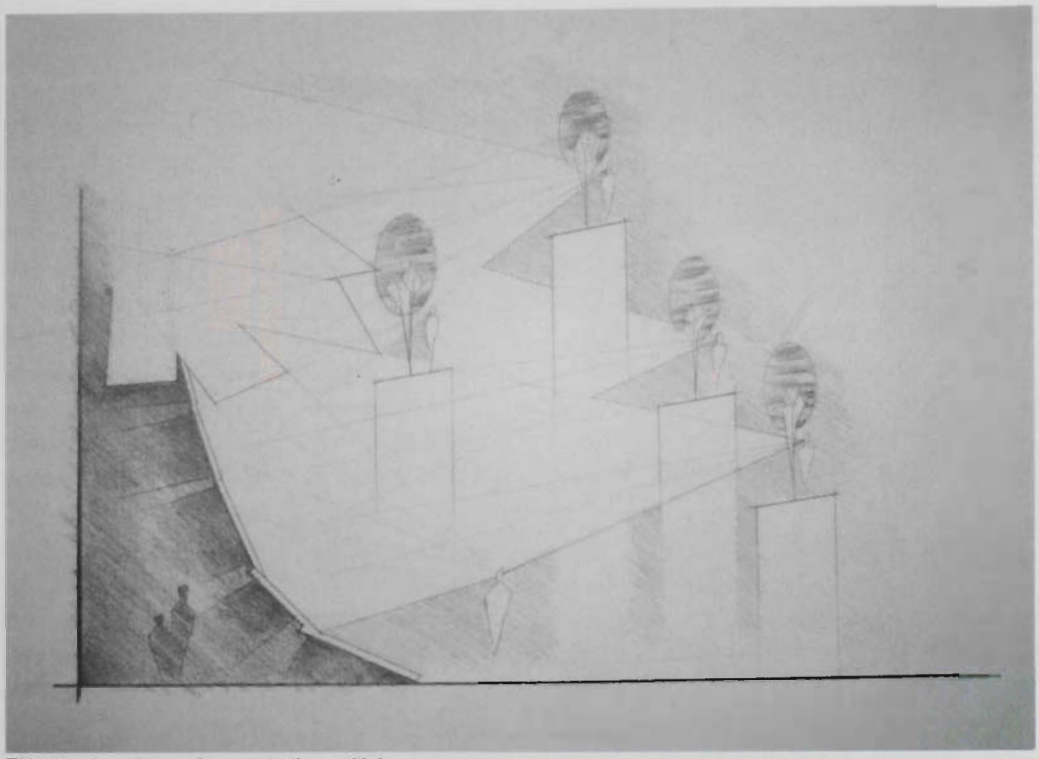
SKETCH PROBLEM | Progression of Time | Injected + Entangled



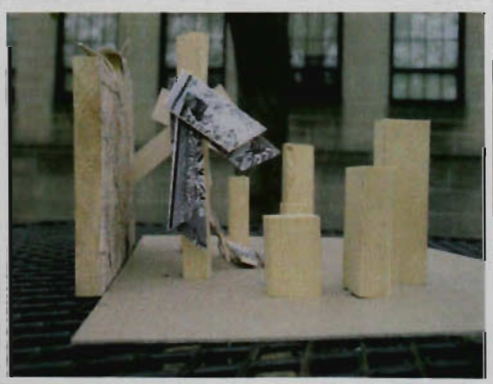
This drawing shows a view into the space on the left side. On the right side is the documenting of the growth of the space from out of the ground. As the structures grow, new life, such as vegetation, aslo emerge from these spaces.

These two photos show my model of this space. In order to occupy these multiple trajectory points, the people of the city would have to build bridges and walkways to inhabit new areas. This would give a sense of pride in the space and ensure that the city was involved its the growth.

SKETCH PROBLEM | Progression of Time | Injected + Entangled

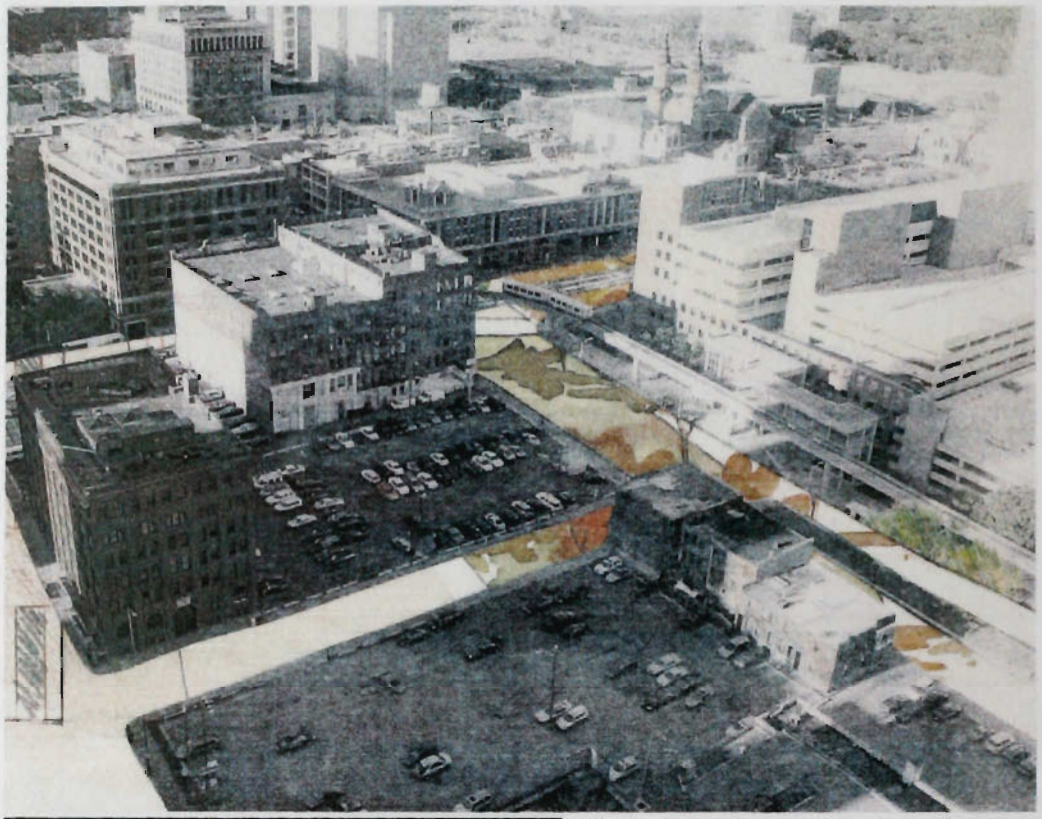


This drawing gives reference to the multiple, changing views within, on, and around the space. It also shows the habitable space behind the curtain veil which becomes a space to place art and a space of gathering. This space gives way to new and unexpected views onto and out of the site.

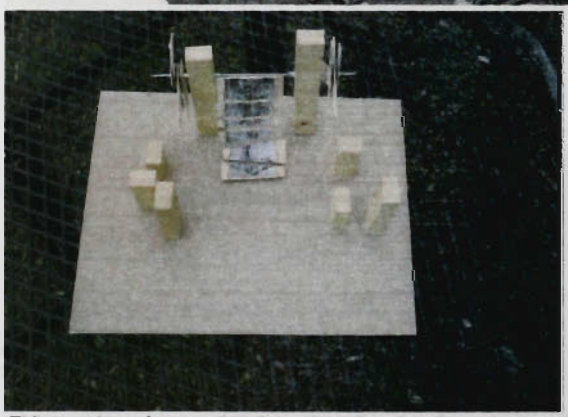


The photos are of similar types of conditions in model form. Pieces of art can be added or subtracted from rotated canvases hung off of the the growing structures.

SKETCH PROBLEM | Progression of Time | Injected + Entangled



This top image shows my site selection for this sketch problem. The site I chose was the alley and parking lot at the corner of Beaubien and Lafeyette Streets in Detroit.



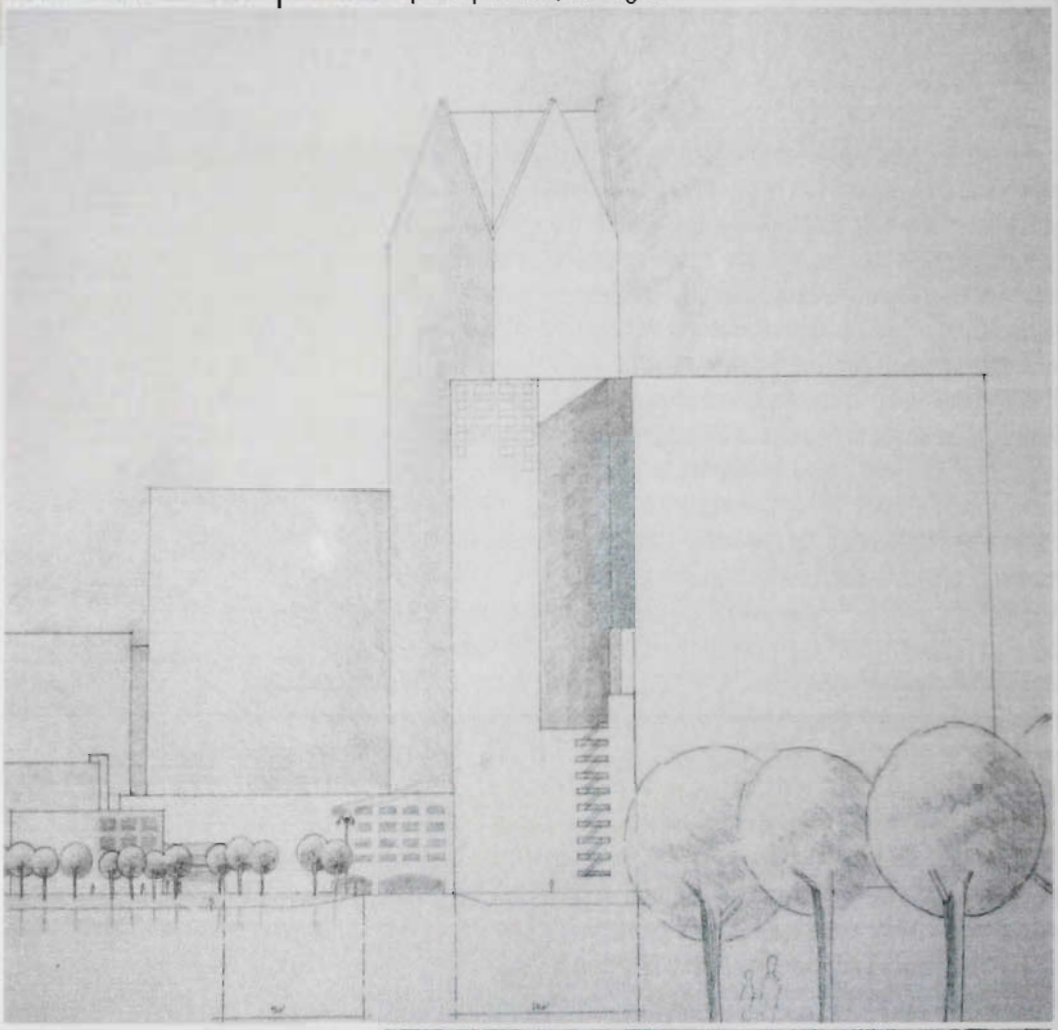
This top view of my model shows how the plan does not reveal as much information about the growth. Not until your within the space can you get a feel for the overall dimensions. The image on the left shows an early sketch of this form.

SITE ANALYSIS | Cadillac Square | Detroit, Michigan

In selecting a site, I was looking for a space that offered opportunities that could be unique in continuing this exploration of my thesis questions. I looked for the chance to include a civic type performance space adjacent to or within the site I selected. This would create an opportunity to reside on both the inside and outside worlds and create a connection of the two. For this, the surrounding context became important in offering unique views and moments of provocative perspectives into and out of the site. The site I finally chose was within the area of Cadillac Square, surrounded by Congress Street to the south and by Bates Street to the west. It currently includes, yet another, existing surface parking lot , in downtown Detroit. The scale of the site is that of mostly skyscrapers and includes one small four story building which contributes in offering two opposing points of view. One view from well above in the building to the west, to eye level from the smaller building below. This situation has created and interesting "in between" type of void space where the site is located. These moments offer incredible opportunities to embrace the site within its context. In the book, "Vessels and Fields," Patricia Phillips looks at the works of Wellington Reiter and writes about this same type of moment in his work. She says, "We are often transported high above or cast startlingly below the sites. Offering inconceivable simultaneous points of view, these multiple trajectories are the lineaments of new provocative perspectives[1]." The contrast of a very vertical juxtaposed with a more horizontal space gives a moment of speculation to any observer within this site. The empty wall of elevator shafts that occupies most of the east façade of the First National Bank building offers the potential for a towering screen to project from the site below or across the street to embrace this very obvious edge condition. This projection could be seen from these multiple points of view, making it a desirable space from inside and outside these spaces and perhaps involve those interacting with the spaces, a way for the occupant to activate the space and see their results displayed high above on this screen.

[1] Rykwert, Joseph. The Seduction of a Place. New York: Pantheon Books, 2000.

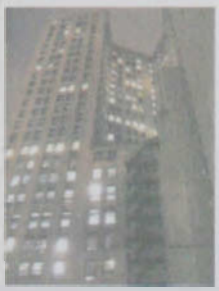
SITE ANALYSIS | Cadillac Square | Detroit, Michigan

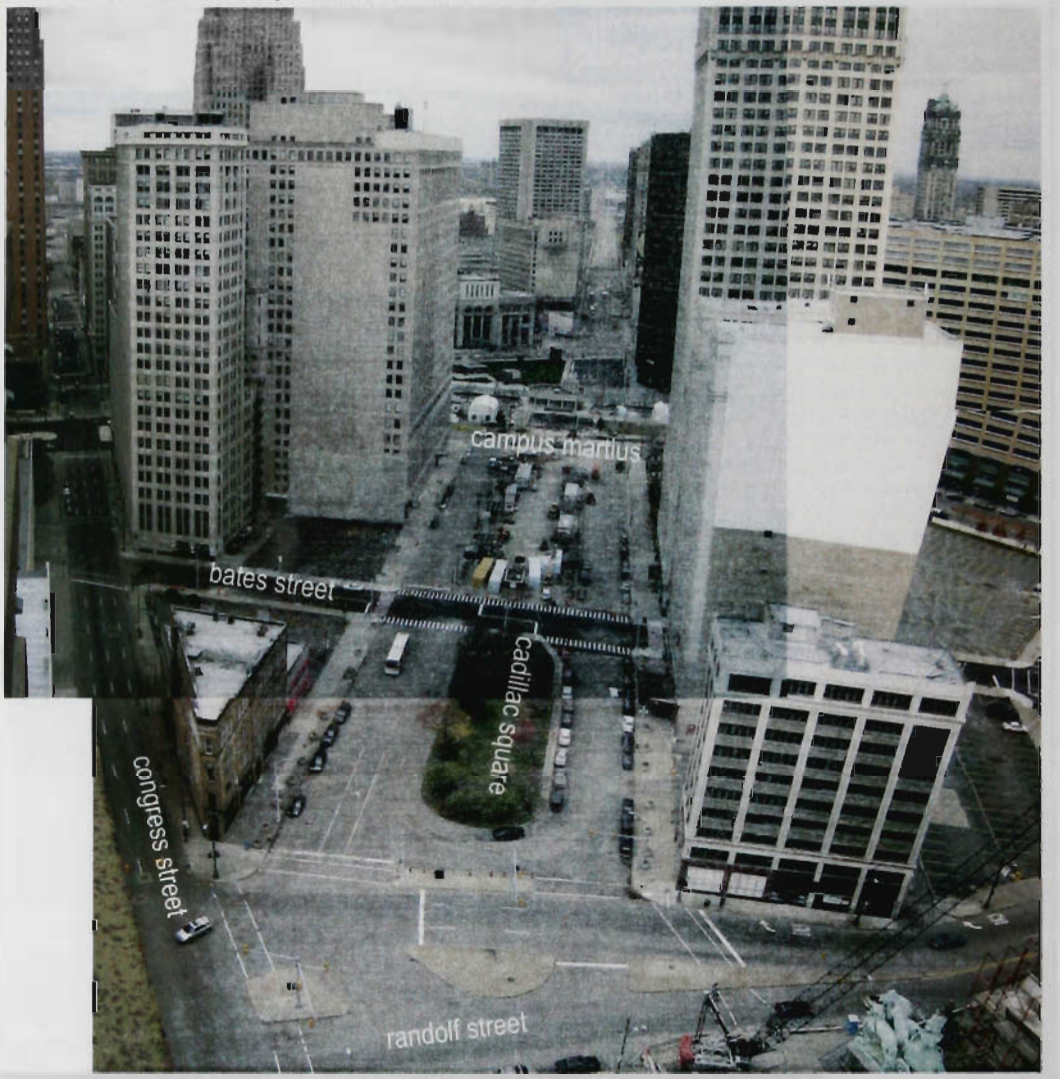


The drawing above was an early rendering of the existing context of my site (looking south). This drawing was done during the site analysis portion of the process.

To the right is a TerraServer image of my existing site. The highlighted region of the photo gives some better focus to my immediate area of concern.

The following pictures are a few images of my site at night. The top left image is looking north at the Cadillac Tower building. The top right image is looking south, with the RenCen in the background. Above is a picture looking south at the Comerica Tower. The bottom left is an image looking down into the site at night. Below is looking at the First National building adjacent to my site.

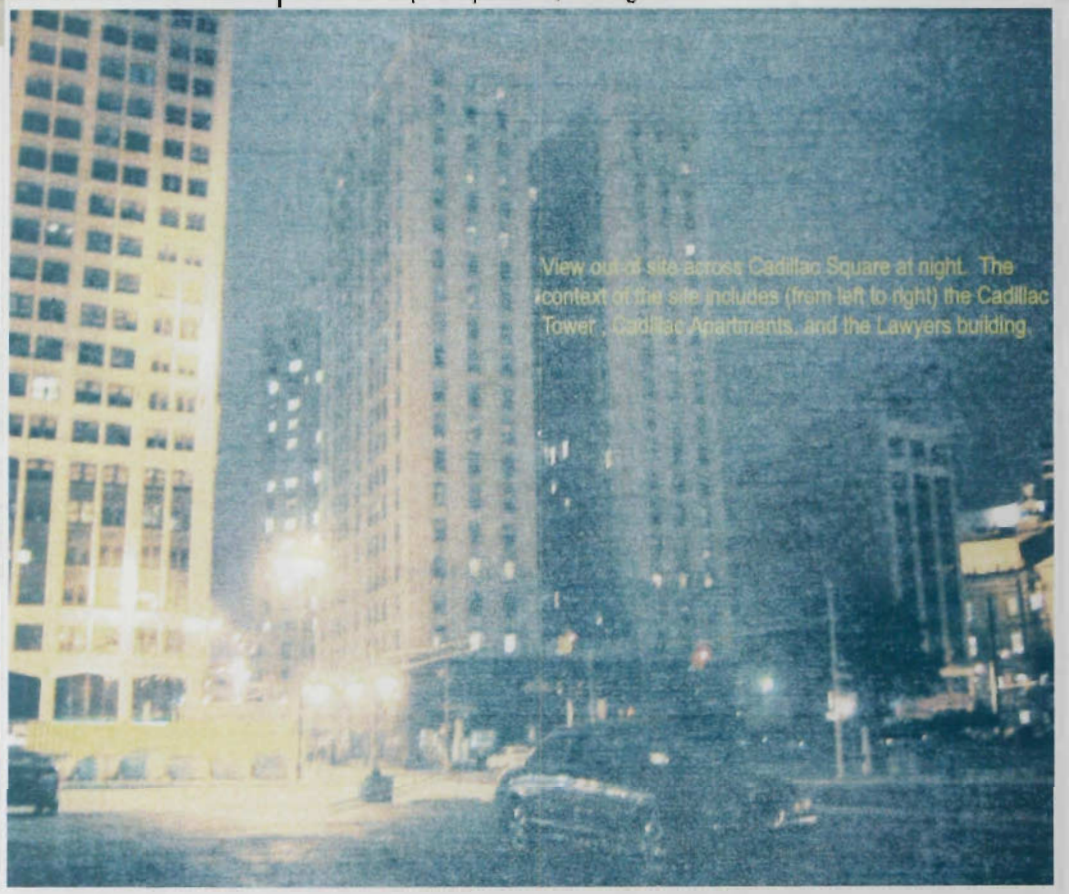




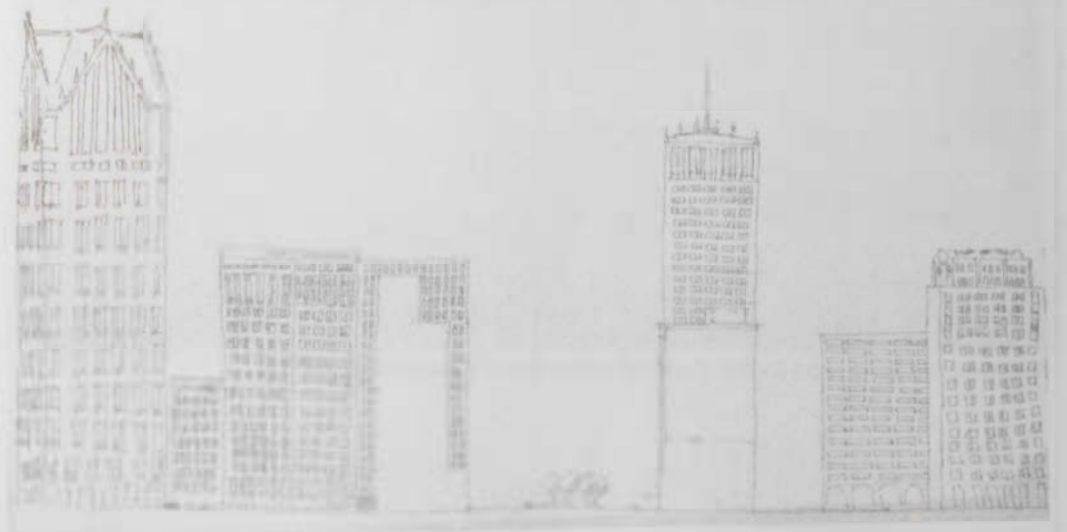
Bates Street runs between the two existing parking lots of my site. Campus Martius is still under construction in the backround of this picture.

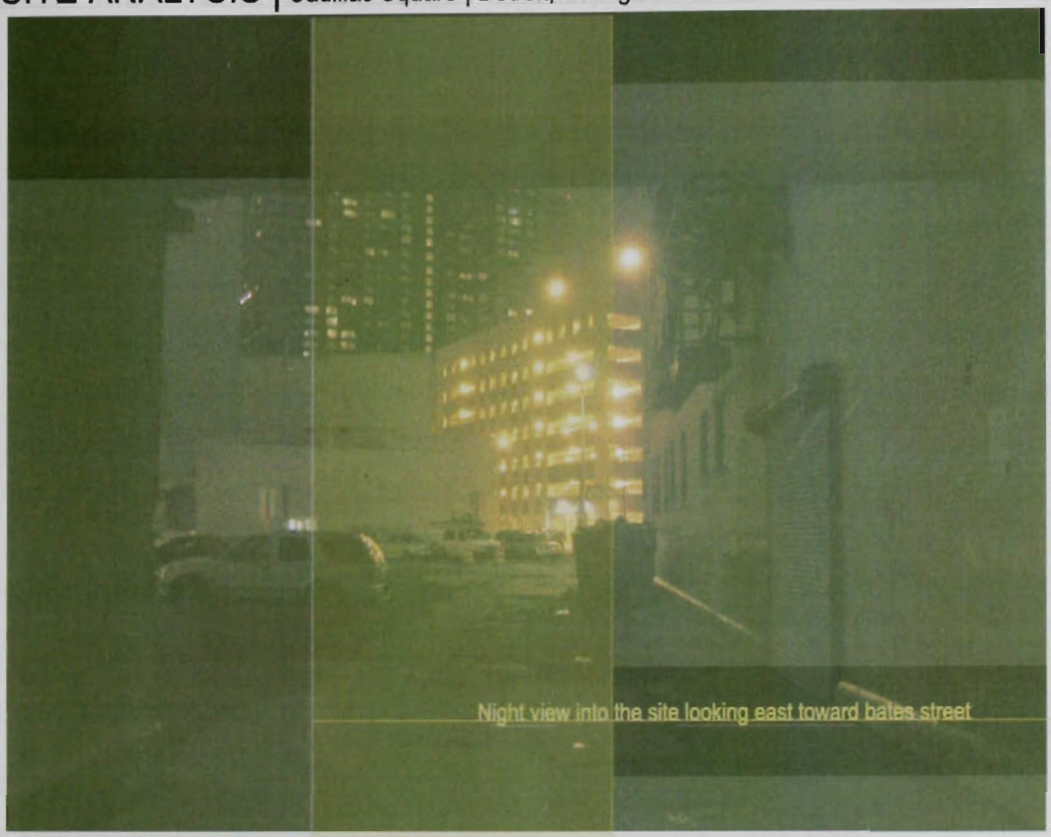
This photo is looking into the site from the west. In the backround (from left to right) the Cadillac apts, the Lawyers building, the Wayne County building, the Millender Center, and the RenCen are visible.

View looking into the site from Cadillac Square, showing some of the surrounding context.

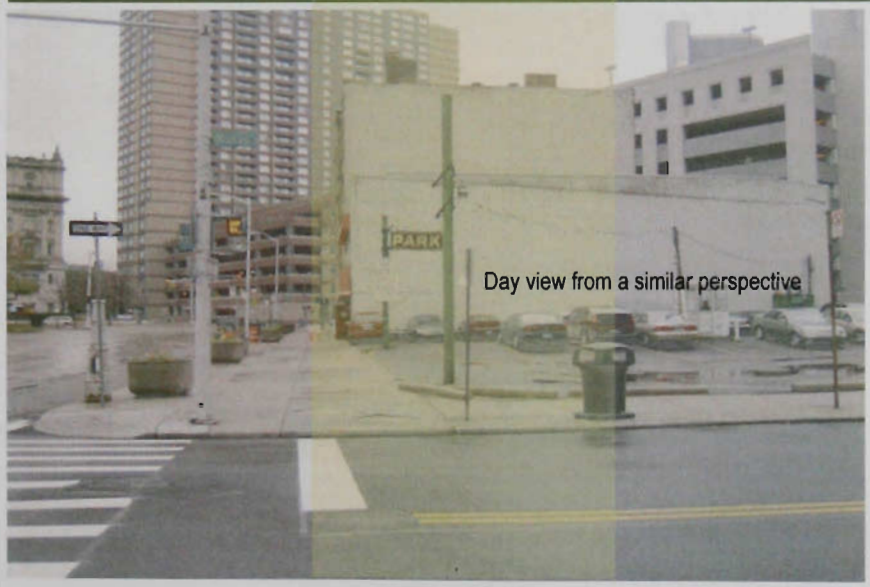


View out of site across Cadillac Square at night. The context of the site includes (from left to right) the Cadillac Tower , Cadillac Apartments, and the Lawyers building.





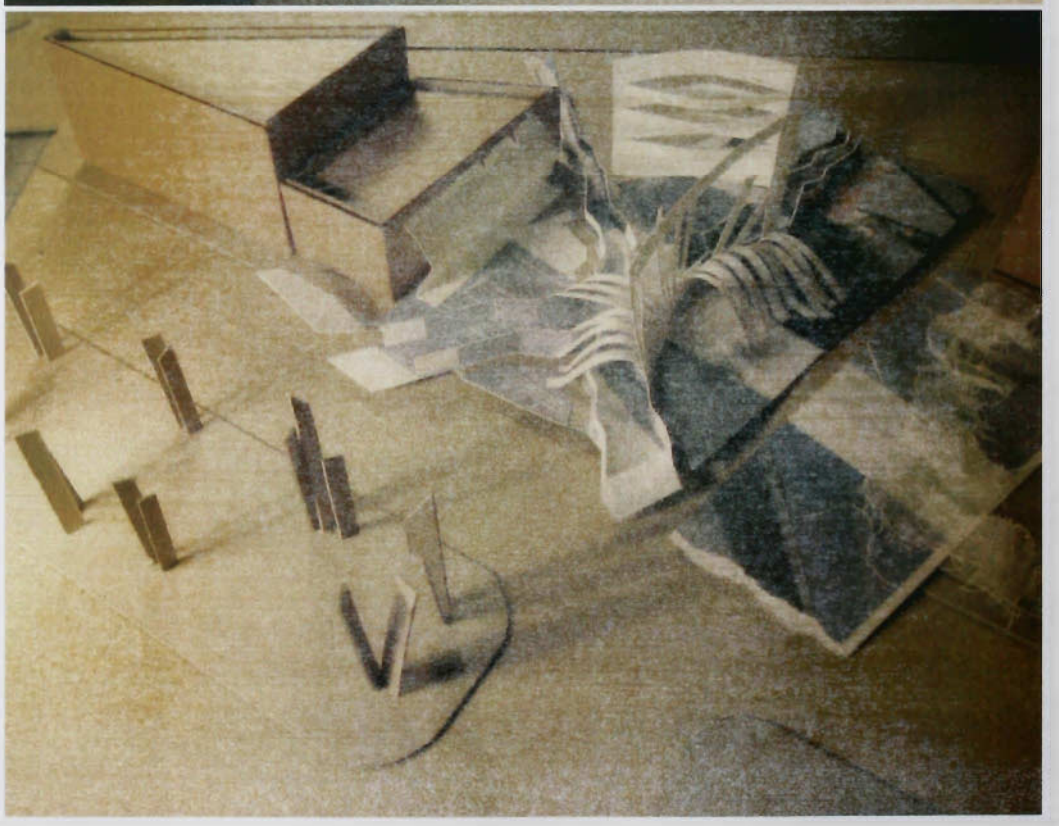
Night view into the site looking east toward bates street



Day view from a similar perspective

SITE ANALYSIS | Cadillac Square | Detroit, Michigan

These two photos are of a site model showing an analysis of potential building conditions and a programmatic layout at an early stage of the design.



PROGRAM STATEMENT | Sound Spaces

The proposed program for this thesis will be a sound center including a series of sound recording studios, dance studios, and a variety of other spaces. These other spaces include a restaurant | cafe, sound listening booths, performance areas, sound gardens, and thinking pods. I will introduce a building into the context of the city where sounds, performances and activities can be seen either intentionally or perhaps by chance. As the outdoor, public spaces, provide encounters of street performances and other various activities, inside would create, at times, more intimate types of venues. Sounds could be heard throughout the individual spaces with the focus on an intentional overflow of sound into other spaces to create an "eaves dropping" of sounds in, on, and around the building. This spilling of sound, however, will be limited depending on the acoustic tightness for the function of some spaces. This will give some privacy to create more personal sounds without the interference from other spaces.

The main functions of the program will be spaces designated to record sounds, and those spaces designed to observe and appriciate these sounds. I intend to focus on the sounds of individual spaces and how they relate and contribute to overall volumes within the building. Spatial opportunities that can arise from this idea will begin to inform the framework of my dance studios. Re-thinking the traditional ideas of the recording studio will heavily affect the outcome of the spaces. The use of materials becomes important in creating uniques sounds as well as individual spaces that separate from the greater building itself.

Lounge spaces will be placed throughout the building as a place to relax and listen to music and perhaps be a place to influence and spark ideas for creating these sounds. A small theater/performance space can provide a means of hearing live music and give the artists a chance to perform for small groups of fans. These performance areas also become dance performance areas, where visitors and guests can watch a performance of the body in relation to the sounds. Sound Gardens will know be areas where the studios leave an impression on the building. Where angled walls become functions of the sound on the inside of a space they also become listening areas on the back side in these gardens. The restaurant will be a gathering place for visitors before or after exploring the building. They are a place of re-energizing and rest. These areas are also very much influenced by the sounds, allowing performances to be seen and heard within the restaurant.

I imagine a variety of actions taking place in and around this building, such as, performing (singing, dancing, reading, entertaining), creating | producing (sound and dance), listening, and eavesdropping. The outdoor space is a place for spectacles of street performances. Spontaneous music could be heard and created at various music stations within the building. I intend to create an atmosphere that anyone can become the director of their own style of music. I picture a

PROGRAM | Quantitative Summary

gathering of bystanders becoming an audience of chance, where at any given time music can be seen and heard by those who are simply passing by. This audience could possibly become enticed by such a spectacle leaving them wanting more, as they continue around the site.

PUBLIC	restaurant | bar café | lounge | listening rooms | recording studios | dance studios | performance space | civic | outdoor space | circulation space
PRIVATE	recording rooms | control rooms | listening rooms | iso. booths | piano room | vocal room | dance studio | kitchen | back of house functions | mute room
SERVANT	kitchen | control rooms | broadcasting | mixing rooms | mechanical rooms | janitorial services | storage | loading zone | coat check | back of house functions
SERVED	restaurant | bar | café | performance spaces | stage | seating | floor space | lounge | recording studio
INDIVIDUAL	recording studios | iso. booths | piano room | vocal room | dance studio | stage | mute room | listening rooms
COLLECTIVE	recording studios | restaurant | bar | café | lounge | listening rooms | dance studios | performance space | stage | circulation space | civic | outdoor spaces

RECORDING STUDIOS	CAPACITY	NO. OF UNITS	NSF|UNIT	NSF|TOTAL
	10	9	1,500	13,500

Purpose | Functions
These spaces provide the media and the technology for creating and producing music, where ideas transfer from mind to music | space to sound. There will be five of these studios, with one designated as an experimental room used for teaching and learning how to create music, with classes designed to teach this trade.

Activities
Creating, producing, recording, writing, singing, and playing music | sounds will all be done in these recording studios.

Spatial relationships
Spaces should be located whereas circulation embraces these studios, possibly centrally located with one per floor. Classes could be held on the top floor to create movement through the building and a chance of interaction with others as well as spaces throughout the building. Performance spaces should branch off of these spaces to create a mixing of ideas and audiences.

Special considerations
They must provide access for moving equipment in, out, and around these studios (i.e. elevators, door openings, storage, etc). Selected views into the space are critical to experience the act of creating music within the studios.

Equipment | Furnishings
Moveable band equipment will be in this space as well as recording devices such as microphones with acoustical considerations as well.

Behavioral considerations
The room must be able to accommodate the needs of the function, the ceilings may fluctuate in height and the walls may have angular movements to create the most desirable sounds.

CONTROL ROOM	CAPACITY	NO. OF UNITS	NSF|UNIT	NSF|TOTAL
	5	5	500	2,500

Purpose | Functions
These rooms control the final results of what is created by the musician. Music can be mixed, changed, tweaked, and enhanced in these rooms.

Activities
The actual recording of the music is done in the control room. This space is critical in finalizing music; professional personnel will primarily utilize this room.

Spatial relationships
This space is critically located in adjacency with the recording studio. These two spaces act as one and must be used in specific relation to one another.

Special considerations
Viewing from this space into the recording studio and visa versa will be seen in all control rooms. These spaces only function as a pair.

Equipment | Furnishings
Mixers, samplers, computers, and other technical devices will all be housed in the control room.

Behavioral considerations
The wall must be a certain type of material to keep sounds in or out. The shape of the room must be that of focus of all sound to a point in the room.

ISO. BOOTHS	CAPACITY	NO. OF UNITS	NSF|UNIT	NSF|TOTAL
	1	10	100	1,000

Purpose | Functions
The isolation booths are used for creating specific sounds in a controlled atmosphere. Certain music | sounds which cannot be created in the studio will be done in these spaces.

Activities
The activities are similar to the recording studio, but a more intimate setting desirable here.

Spatial relationships
This space will be located in near or in the recording studio itself. These two spaces act as one and must be used in specific relation with one another.

Special considerations
Viewing from this space into the recording studio and control room is needed.

Equipment | Furnishings
Recording equipment

Behavioral considerations
Special heights may vary depending on the desired sound (possibly a controlled space, whereas the ceiling can be adjusted to create unique sounds and reverberations).

VOCAL REC. ROOM	CAPACITY	NO. OF UNITS	NSF|UNIT	NSF|TOTAL
	1-10	1	200	200

Purpose | Function
This room will serve as a controlled vocal recording room where voice-over dubbing and optical isolated voice recordings are done.

Activities
Some of these activities include singing, speaking, and reading.

Spatial relationships
This space will also be in close relation to one of the studios but perhaps a separate room.

Special considerations
This space will also be in close relation to one of the studios but perhaps a separate room.

Special considerations
This would be a more private space for the individual or a small group of individuals working together.

Equipment | Furnishings
Specific recording devices, as well as seating and reading pedestals will be in this room.

Behavioral considerations
Special vocal considerations, depending on the acoustic of the room

PIANO ROOM	CAPACITY	NO. OF UNITS	NSF|UNIT	NSF|TOTAL
	2	1	200	200

Purpose | Functions
This room is specifically designed to maximize the potential sounds of the piano.

Activities
The acts of playing, creating, and learning music on the piano are seen here.

Spatial relationships
This space is located within the context of one of the recording studios

Special considerations
Viewing from this space into the recording studio and control room are considerations.

Equipment | Furnishings
Piano and various recording devices

Behavioral considerations
Space must optimize the technical sounds of the piano.

DANCE STUDIOS	CAPACITY	NO. OF UNITS	NSF|UNIT	NSF|TOTAL
	20	4	2,000	8,000

Purpose | Function
These two dance studios will be used for instructive lessons in learning different dance techniques as well as privately reserved for practice sessions and smaller more intimate classes.

Activities
Dancing, teaching, learning, creating, and performing are all activities seen throughout the dance studios.

Spatial relationships
These spaces will be in adjacency to each other with a common dressing | locker room. The space should feel very open and inviting, the volume of the room should be over exaggerated. One of the studios will be more open to visitors walking by to see the activities going on inside while the other will be a bit more private, perhaps still having silhouettes or shadows of the dancers through the design materials and innovations. The space should act as a catalyst to dance, more of a back round to the actual dancing itself.

Special considerations
I imagine the dance studios could be pulled to an exterior wall allowing for natural light to enter into the space during the day as well as to take advantage of views of the surrounding context. Sounds should be able to mix into the circulation spaces to create an eavesdropping of visitors, create a sense of wonder and interest. Almost like a clip or a teaser that guides you in a direction to see what activity is going on.

Equipment | Furnishings
This space will be furnished with speaker systems in order to create maximum sounds in the dance studios. The floor area should be open to create maximum space horizontally and also vertically.

Behavioral considerations
The spaces should allow for the architecture to reverberate sounds into circulation spaces and other selected rooms as well.

PERFORMANCE SPACE	CAPACITY	NO. OF UNITS	NSF|UNIT	NSF|TOTAL
	75	3	2,000	6,000

Purpose | Functions
This space is used for entertaining and being entertained through music and other performance venues. It will be seen as a means of expression for the performer and allow smaller crowd to enjoy the music.

Activities
The activities seen here will be performing, listening, dancing, talking, and connecting. These activities depend on and encourage an interaction between the performer and the audience.

Spatial relationships
The stage and audience will be in close context of each other to create a more intimate setting. Adjacencies will be to the restaurant | bar | café spaces. Circulation space will create framed views of this space as well as unexpected encounters around the stage and performance. The vertical circulation will be in the same area to encourage others to experience and encounter the performances. This will give unique views from the circulations space to the stage | audience and also from the audience to the "balcony" type circulation space.

Special considerations
Seating style should be arranged to optimize the views of the stage and the comfort of the occupant.

Equipment | Furnishings
Specific equipment must be housed in close vicinity depending on the performance taking place. Microphones and other performing devices will be seen here.

RESTAURANT | CAFE	CAPACITY	NO. OF UNITS	NSF|UNIT	NSF|TOTAL
	50	1	2,500	2,500

Purpose | Functions
The restaurant functions as a space to rest and rejuvenate the body and the mind.

Activities
Activities to take place in the restaurant include eating, drinking, reading, pondering, talking, and resting.

Spatial relationships
In context with the performance area will include an entrance from the street. The hope is to draw people off the street and into the building, to create a possible interest of continuing into the building to experience more than just the food and drinks.

Special considerations
I see this space having an exterior wall condition where natural light is used to fill the space during the day and create views in at night.

Equipment | Furnishings
The equipment will include tables, chairs, booths, stools, bar, register, kitchen (all necessary kitchen equipment), etc.

Behavioral considerations
This space should be open to the building to allow those in the building to access as well as those off the street to continue through. It should also allow for deliveries and have a loading zone (hidden from the public).

LOUNGE	CAPACITY	NO. OF UNITS	NSF|UNIT	NSF|TOTAL
	30	6	1,000	6,000

Purpose | Functions
I see the lounge as a space to relax and think, a space to come together with others, and a space to create and ponder new ideas.

Activities
The lounge will have activities such as, conversation, reading, relaxing, eating, and drinking.

Spatial relationships
These lounge spaces will each be adjacent to a recording studio, and more private depending on the studio it is used by. Access should be through the recording studio separating the private from the public. One lounge will be public and include music listening booths and sound rooms.

Special considerations
This space should also take advantage of the natural light conditions.

Equipment | Furnishings
The lounge will include seating in a common space and also have a small snack bar to accommodate those being served.

LISTENING ROOMS	CAPACITY	NO. OF UNITS	NSF|UNIT	NSF|TOTAL
	VARIES	10	20-100	1,000

Purpose | Functions
The function of these space is to experience music and sounds of different kinds, also to sample new music which is created throughout the studios.

Activities
Activities include listening, sampling, and experiencing music.

Spatial relationships
Spaces vary depending on sounds, and volume, a possible manipulation of the spaces depending on the sounds being heard. These spaces could be within or next to the circulation spaces throughout the building.

Special considerations
The rooms are located throughout the building with unique specifications per space.

Equipment | Furnishings
Headphones, music control systems, as well as technology to create and manipulate the sounds.

Behavioral considerations
Intended to optimize the experiences of sound.

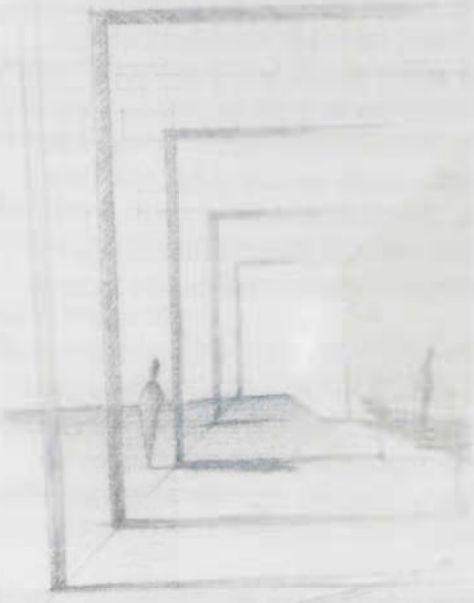
DESIGN PROCESS | Springboard

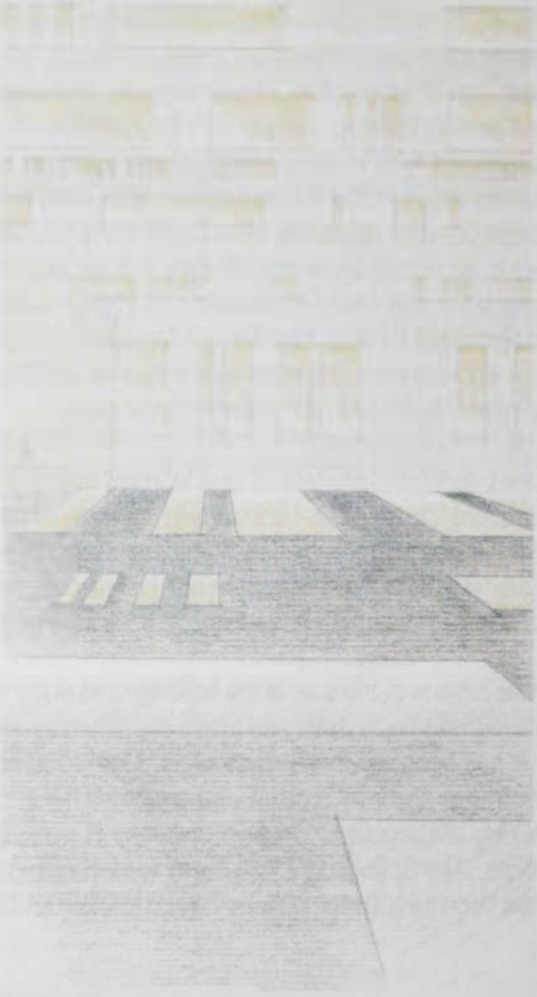
The springboard was the first step towards design thinking. We were to create artifacts that were relevent and supportive of our thesis questions. We did this by using a process, my methodology consisted of speculation, experimentation, and creation. I would create an idea | drawing | model and put it to the test. I began with the questions in my thesis, then I took those questions and considered them in some formal aspect of design. This artifact then became a target of questioning, how has it informed me, what can I take from it, how does this relate to my thesis? These constant questions were crutial in the development of the project, everything I was doing had to be necessary in order to take another step forward. I would test, and re-test, until I was satisfied or had a lead toward the next idea or question. We looked at sectional qualities of the design in great detail, how the building could emerge, this was in the section. We also began to look at perspective vignettes as a means of creating artifacts. Gestural drawings were begining to inform me toward next steps in the process.

It was during this process of development that I loosed up my ways of thinking about my own questions. In doing so I started with the materials and ways of constructing models and drawings. I let the ideas be informed by a process, I used the same materials in a new way. Allowing the material to define an edge, instead of a crisp cut, the precise intended edge from a torn piece of cardboard | chipboard | paper, these became my boundries.

I was looking at the site, at the building, and at my spaces in that building. Each of these components were examined inside and out to try and see things in a new way, to catch something that had been previously overlooked. I looked at how the site could inform my building with wrappings and insertions into the context of my site. I looked at the surrounding context for clues into my investigation. I looked for means of creating views of the city from my new vanishing points. The Springboard was a way to start thinking three dimension. Each of these artifacts then became a stepping stone toward another investigation, and so on.

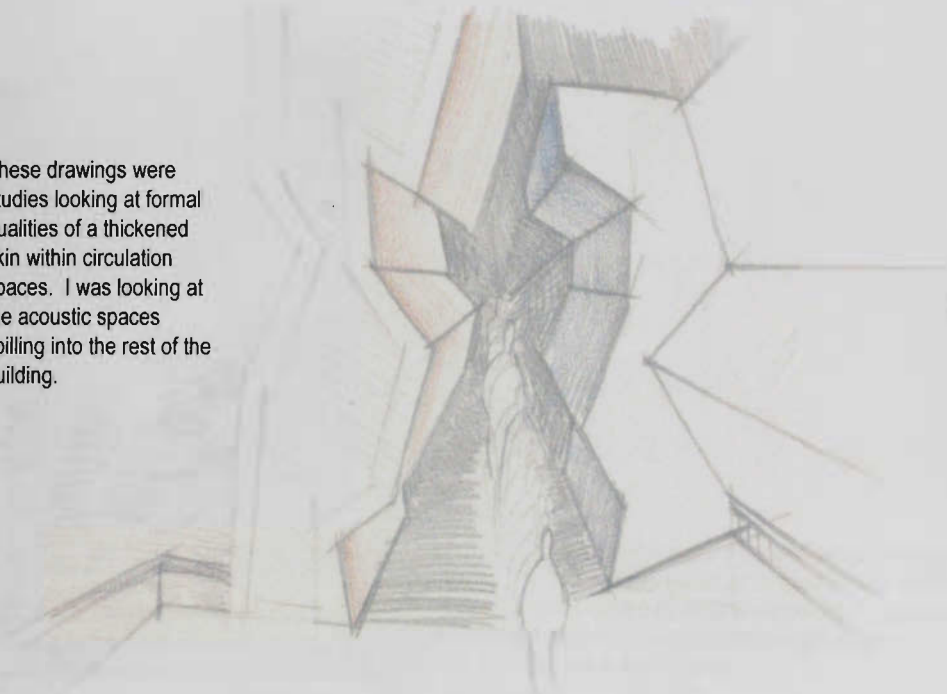
DESIGN PROCESS | Springboard | Drawings

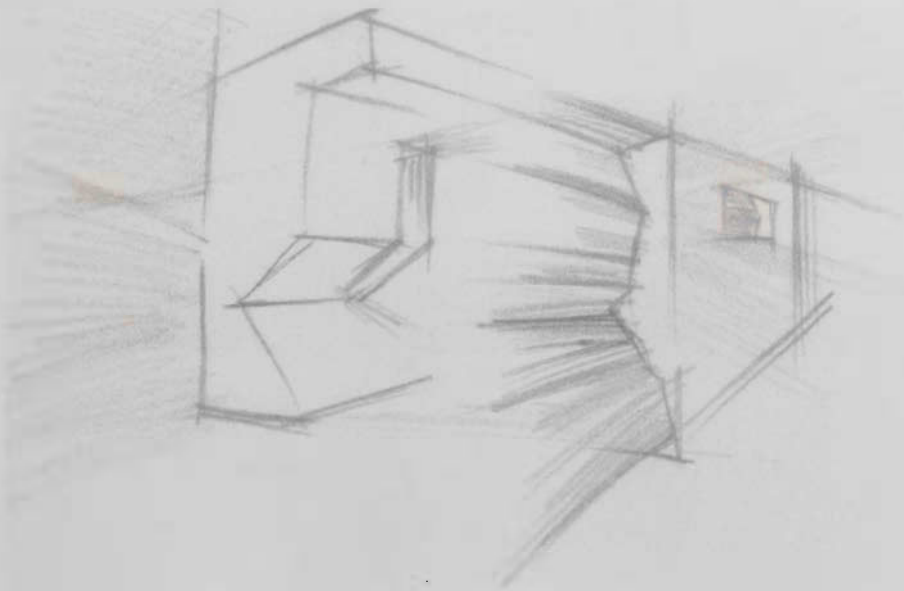


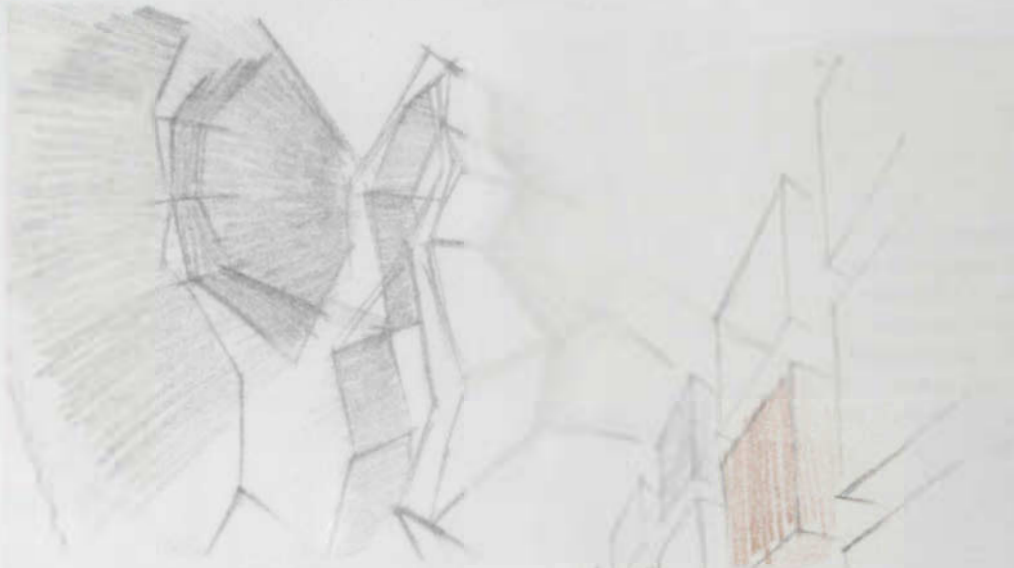


These studies were looking at views, and punctures in the skin of the building. They are also experimenting with ideas of light and shadow. The eavesdropping from one space to another is explored in the top left drawing.

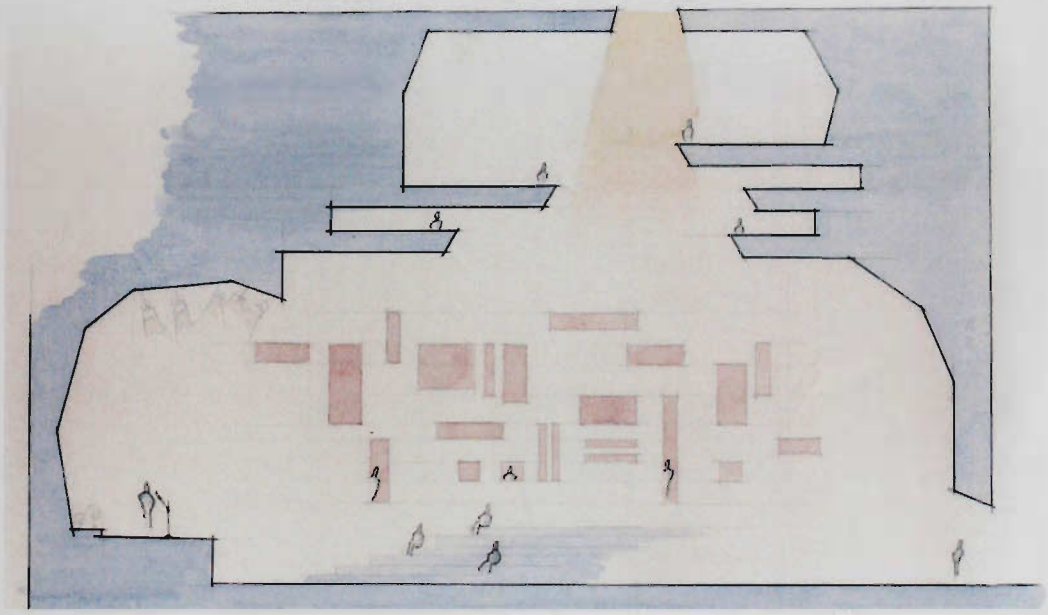
These drawings were studies looking at formal qualities of a thickened skin within circulation spaces. I was looking at the acoustic spaces spilling into the rest of the building.







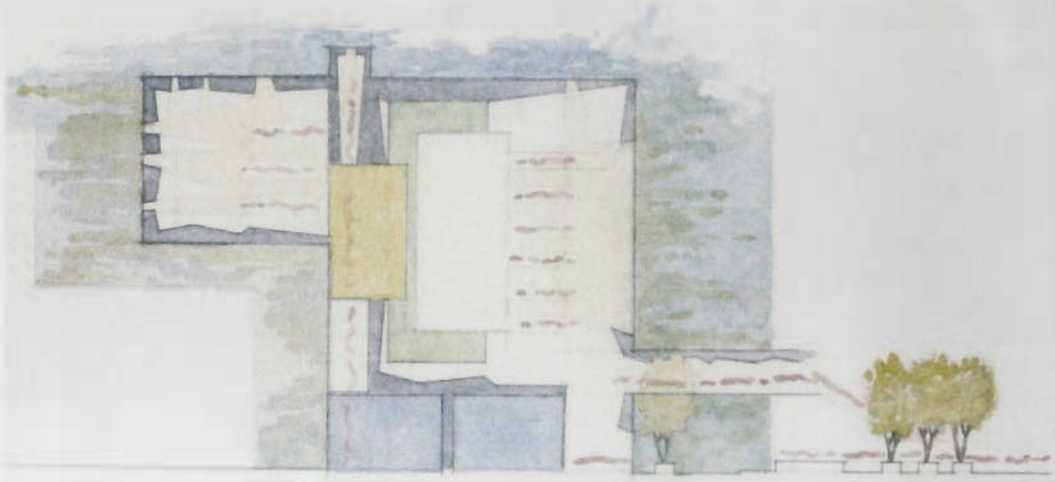
Studies looking at the sound and how to express sound within my spaces were done during this springboard stage. I also began to think about the architecture creating the sound at moments within the building.



The study below is considering the acoustic spaces within the building as well as the dance studio spaces, and how the interact.

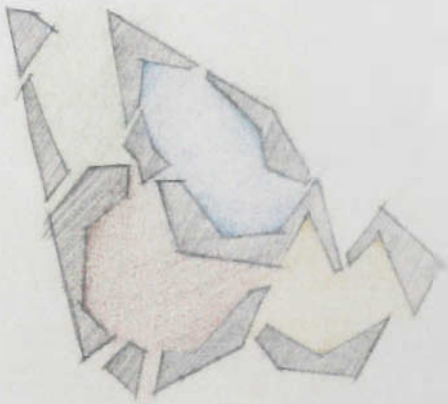
Above is a study looking at selected views into a performance space. This is the idea of eavesdropping from one space into another.

DESIGN PROCESS | Springboard | Drawings

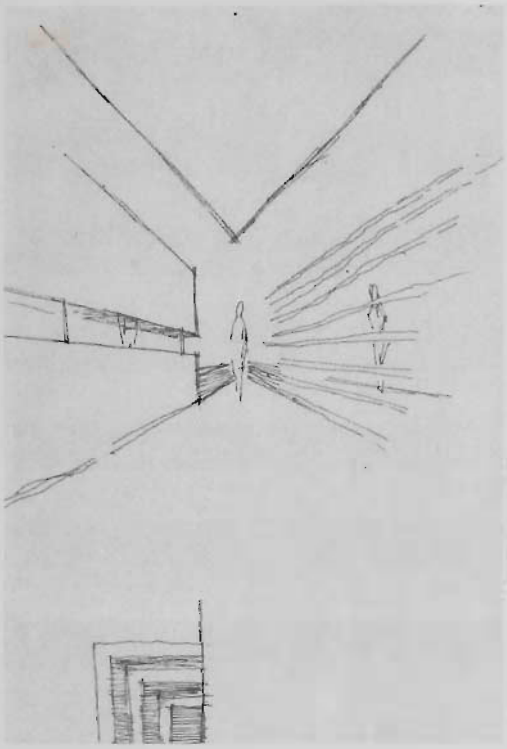


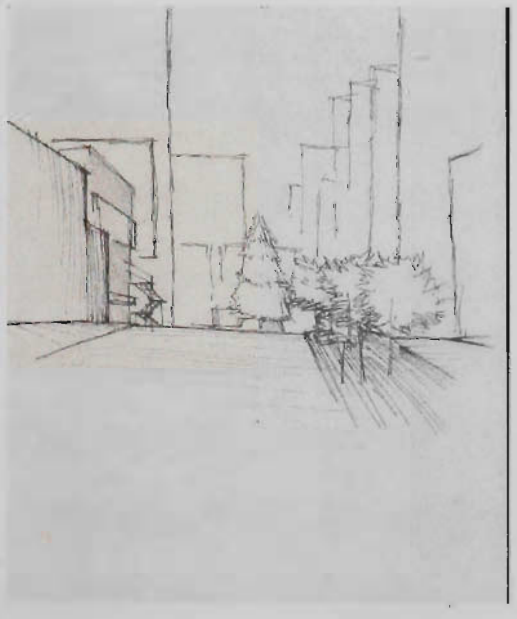
The study above is a spatial layout diagram. I began to look how the building could occupy the site and how this could result in a program plan.

Another study looking at the circulation areas. I was speculating on the idea of mapping the body. How the movement through one space could inform another space within the building.

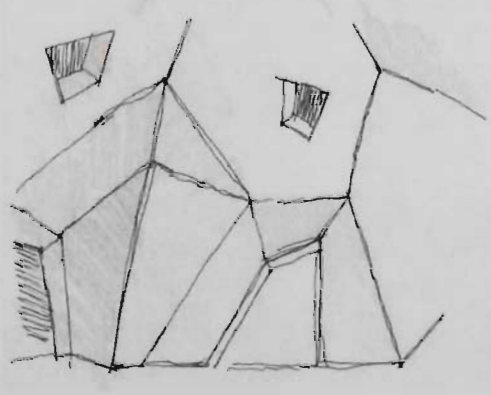


I began investigating poshe spaces of a wall structure. I was looking at the dichotomy between the open spaces.



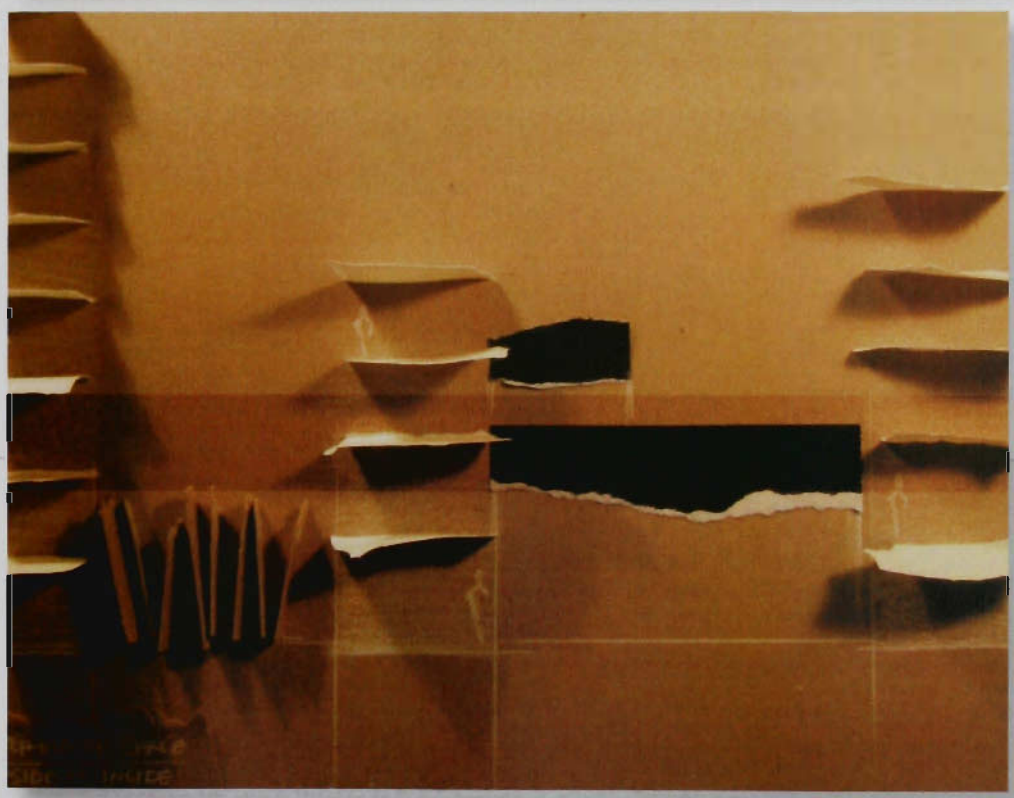


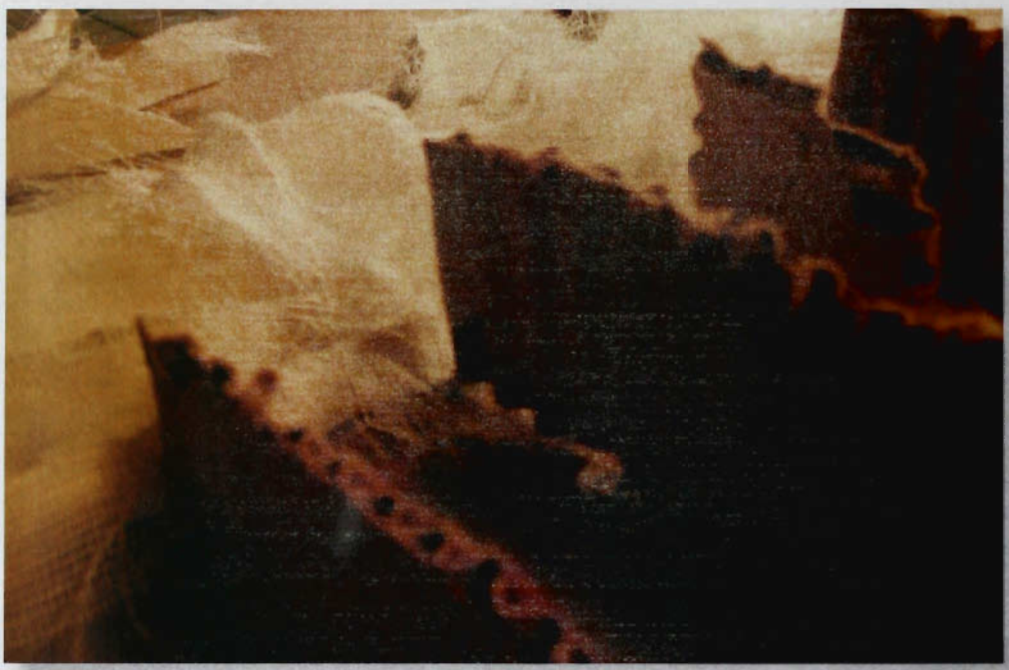
I used these sketches to look at views within the building (top left) and views out to the context of the city (top right). Also, these studies were looking at moments between spaces, or, again, these circulation and sound garden spaces. Where one space ends another begins, giving a dual function to individual walls (bottom right).



DESIGN PROCESS | Springboard | Models

the following models are studies looking at site conditions. The wrapping of space, the sound of space, and the layers of space. These informed an exterior skin as well as punctures within that skin. The top right image was the first model of this kind, giving way to later studies.





More images showing my investigation into the wrapping of the site. I was continuously questioning the surrounding context and how it could inform my positioning within my site.

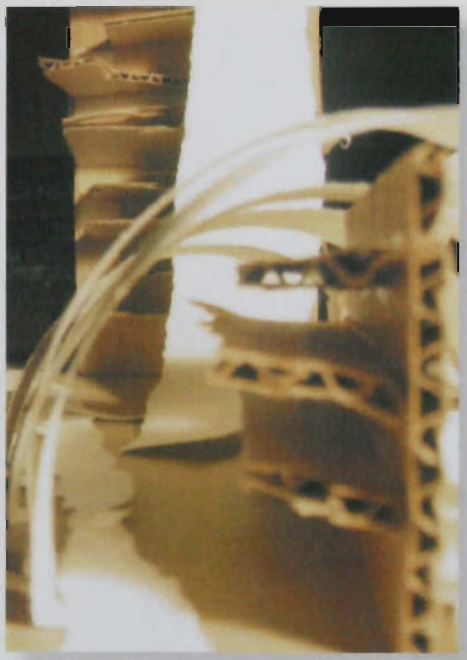
The image above is showing a spatial planning of spaces and how they connect the outside worlds with the inside worlds. I was addressing the existing context and looking at ways to blur that edge between.

an early wall section study looking at ideas of light and shadow, sound and silence(right). I was questioning how light and sound could be trapped within or spilled out or a space.

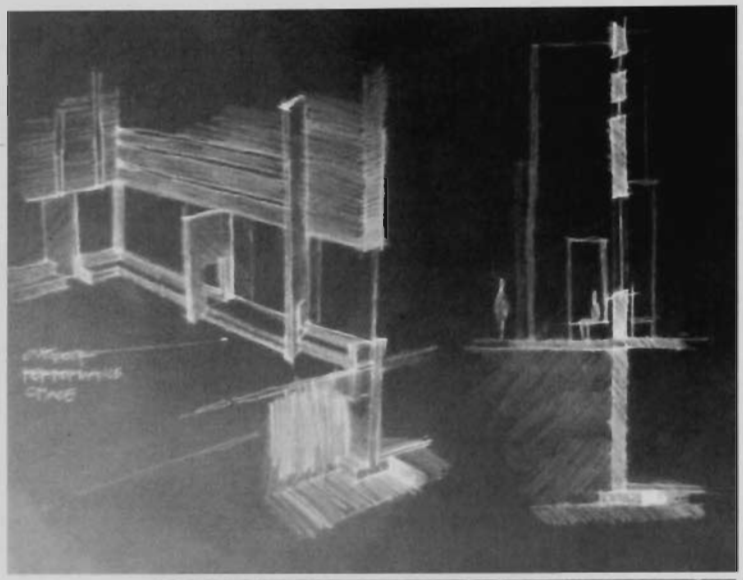
To the left is another wall section study which looks to explore eavesdropping and overflow of sounds from one space to another.

Above is another wall section study. This study is a dual mode model, showing both conditions.

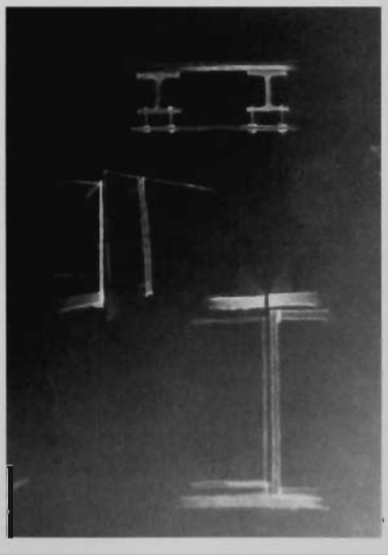
Above and below are more springboard models looking a similar senerios. The emphasis on these are the views (above) and the wrapping (below) of existing buildings.

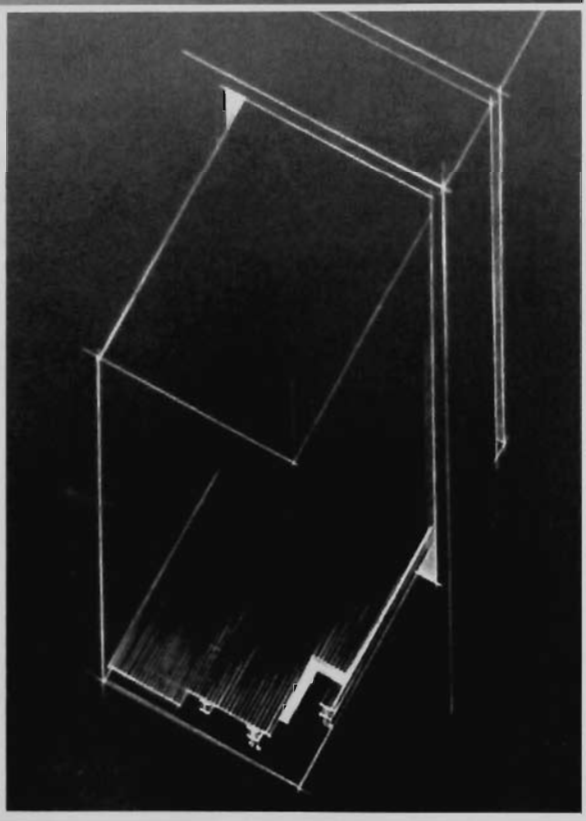


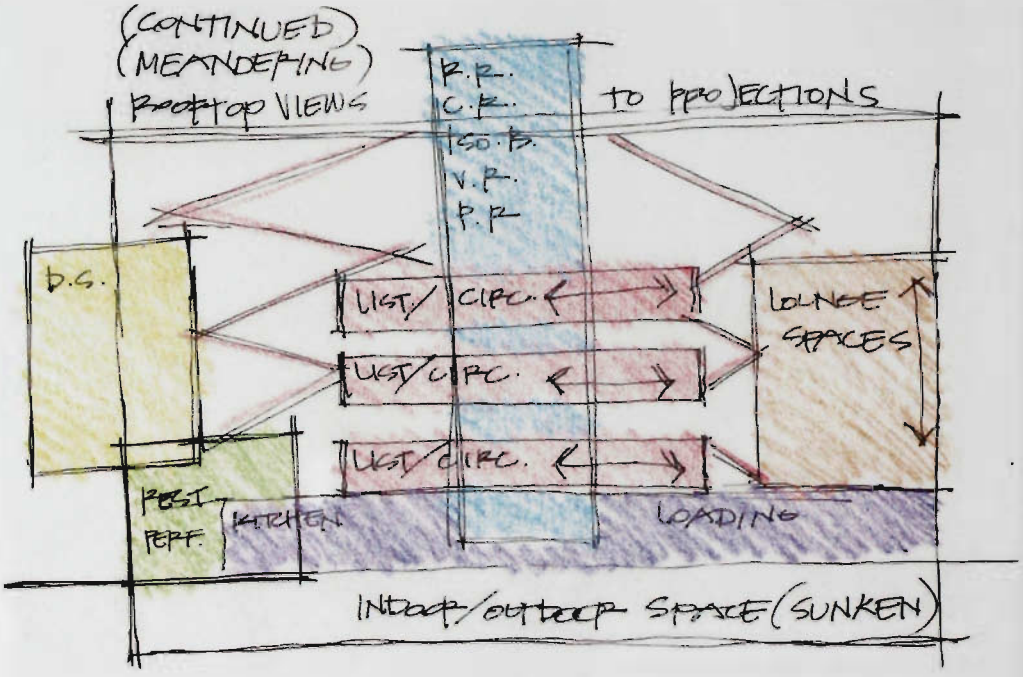
Both of these models are studies of the skin of building. They informed me of fenestration and areas of viewing within the building.

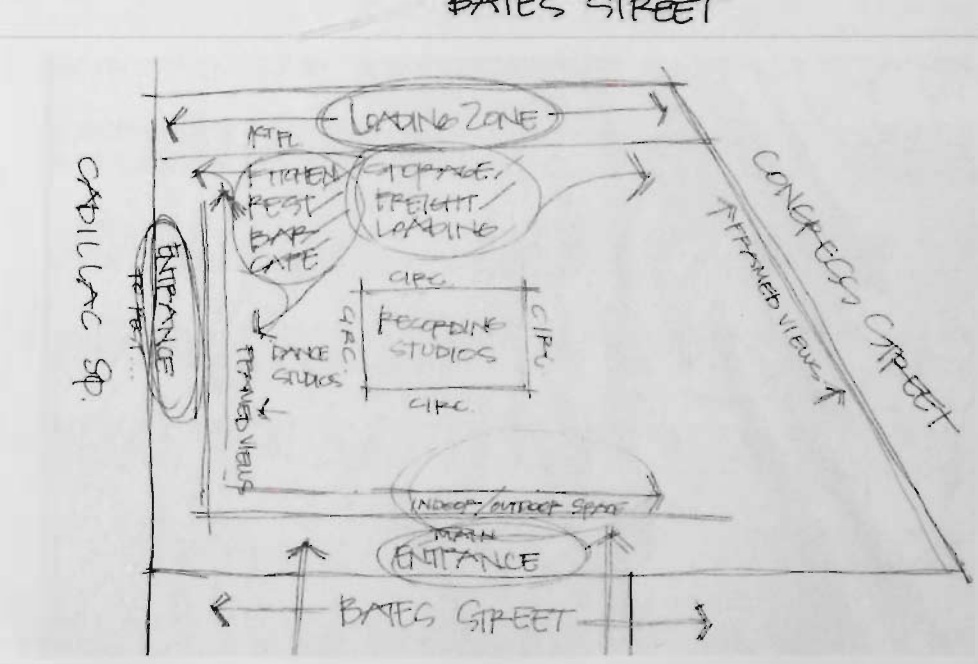


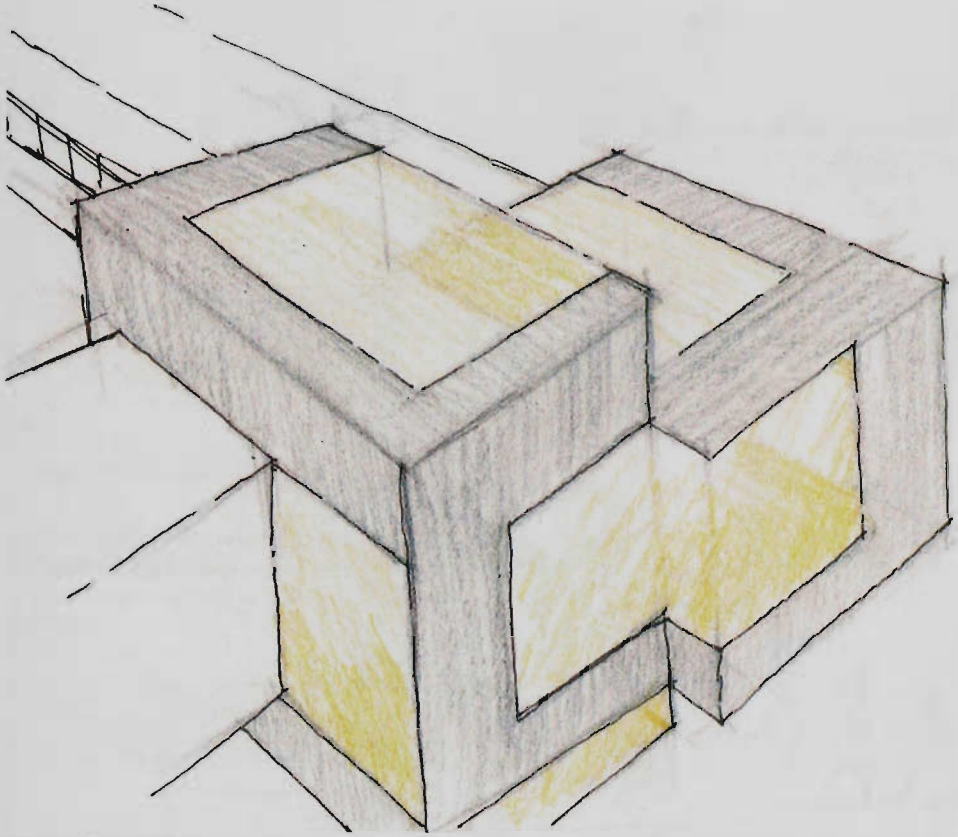
These tectonic studies were done during a charette looking at different moments within our building. We were to explore opportunities in our buildings where we could zoom in and consider how our buildings would be constructed and|or detailed.



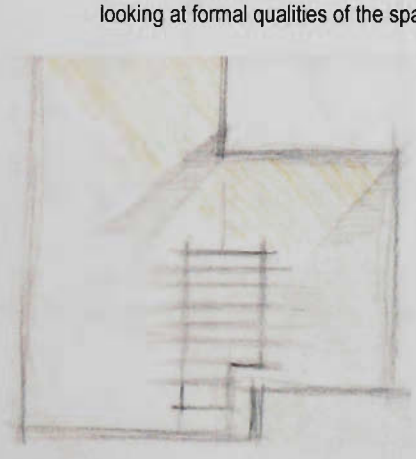


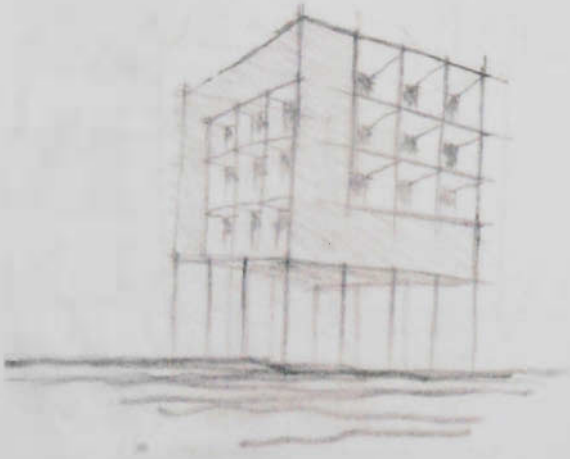

(CONTINUED)
(MEANDERING)
ROOFTOP VIEWS
R.R.
C.R.
SO. B.
V.R.
P.R.
TO PROJECTIONS
B.S.
LIST./ CIRC.
LIST/ CIRC.
LIST/ CIRC.
LOUNGE SPACES
PERF.
KITCHEN
LOADING
INDOOR/OUTDOOR SPACE (SUNKEN)

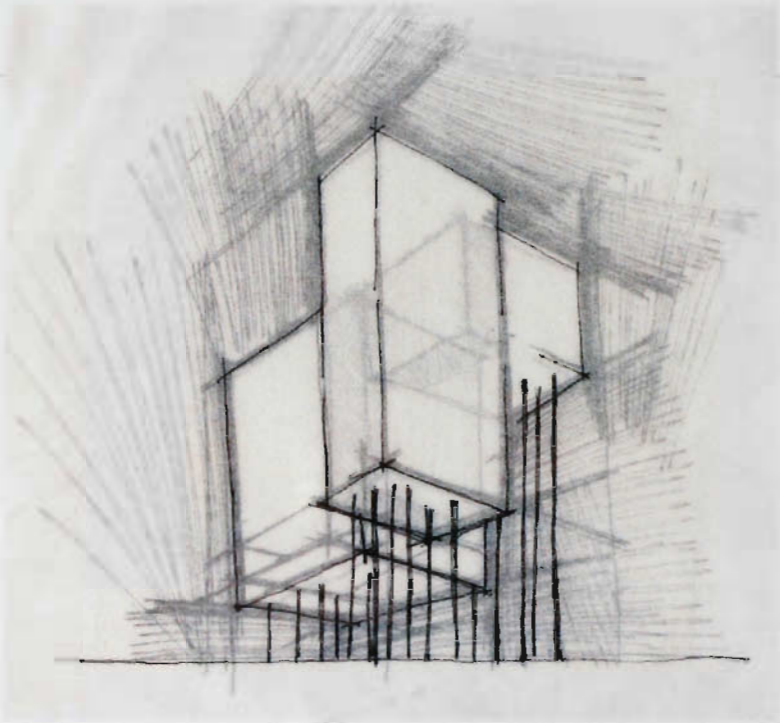

BATES STREET
LOADING ZONE
ENTRANCE
RECORDING STUDIOS
DANCE STUDIOS
CIRC.
PLANNED VIEWS
INDOOR/OUTDOOR SPACE
MAIN ENTRANCE
BATES STREET
CADILLAC SQ.
CONGRESS STREET

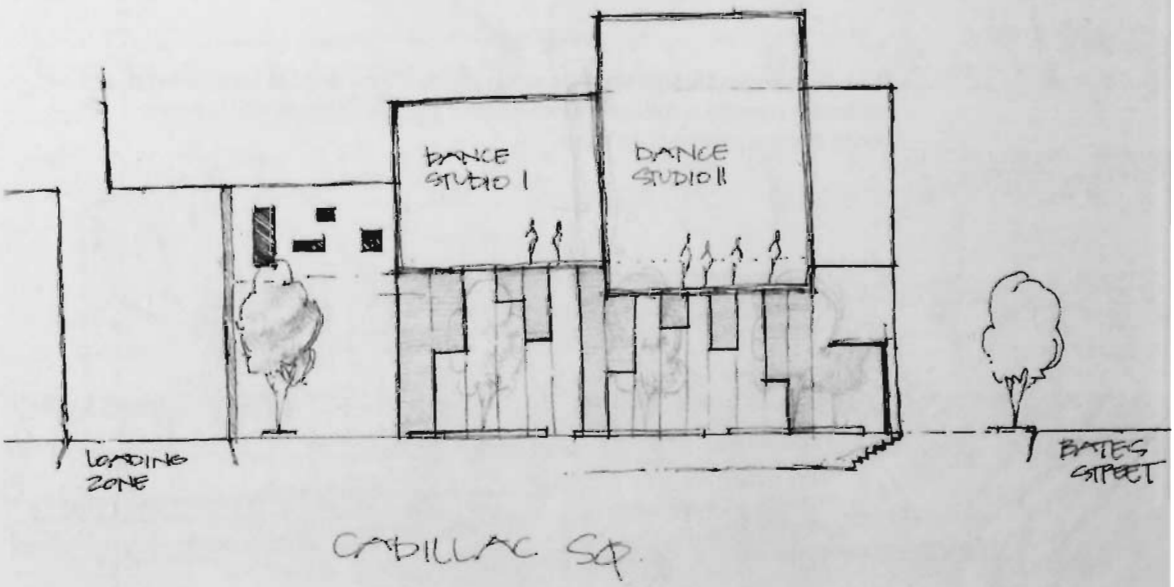


These three images are sketches of the dance studios. These sketches were looking at moments of intersection and how it affected interior and exterior conditions. I was also looking at formal qualities of the space





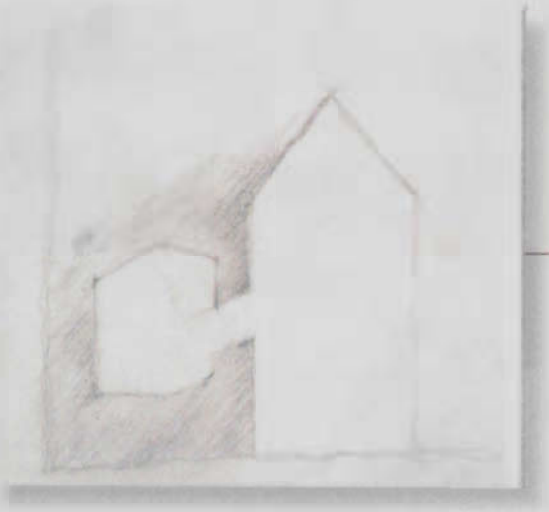



DANCE STUDIO I
DANCE STUDIO II
LOADING ZONE
BATES STREET
CADILLAC SQ.

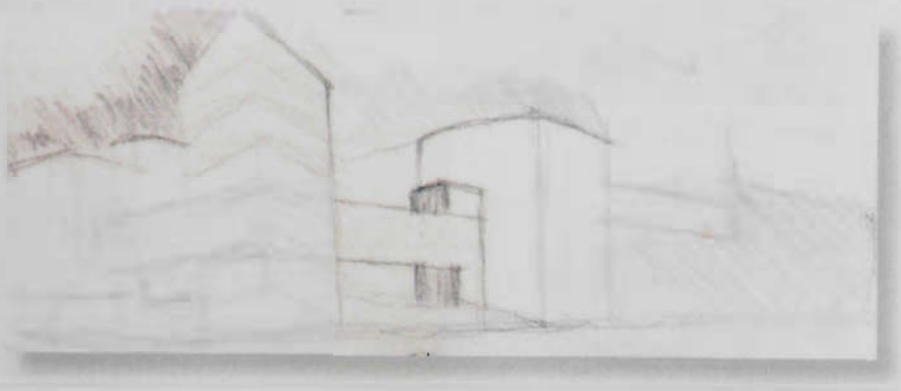
I began sketching formal qualities that could occupy the volumes I had been considering for my dance studio space.

The first one was looking at the lightness of the dance studios and imagining the way in which they would be supported.

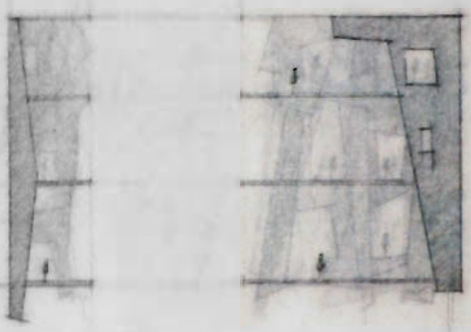
The middle sketch is looking ways of approaching the studios, or how they can begin to connect to the rest of the building.

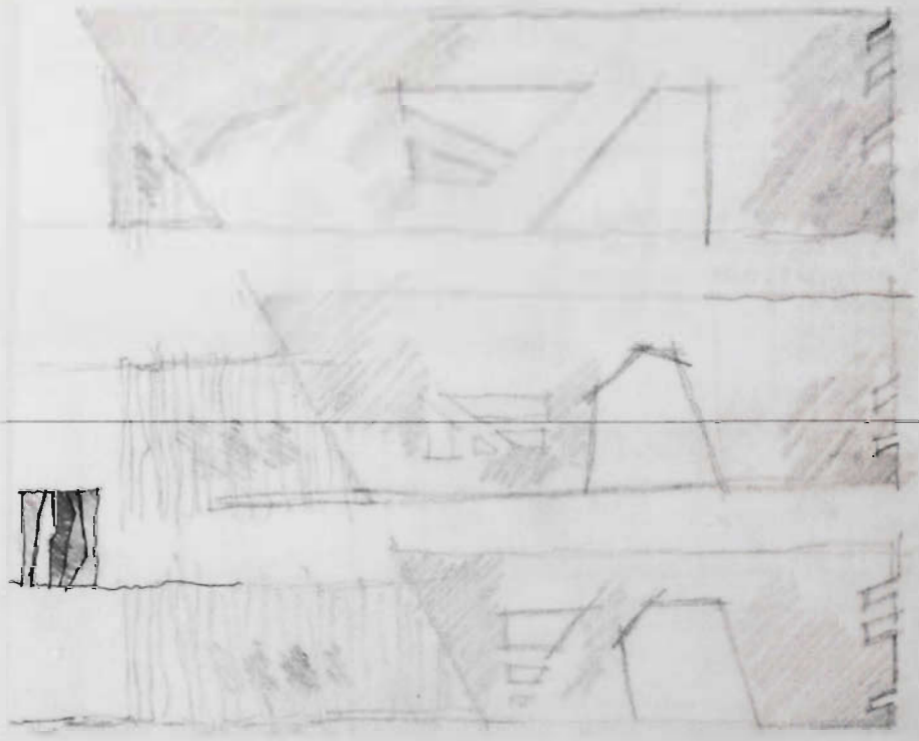


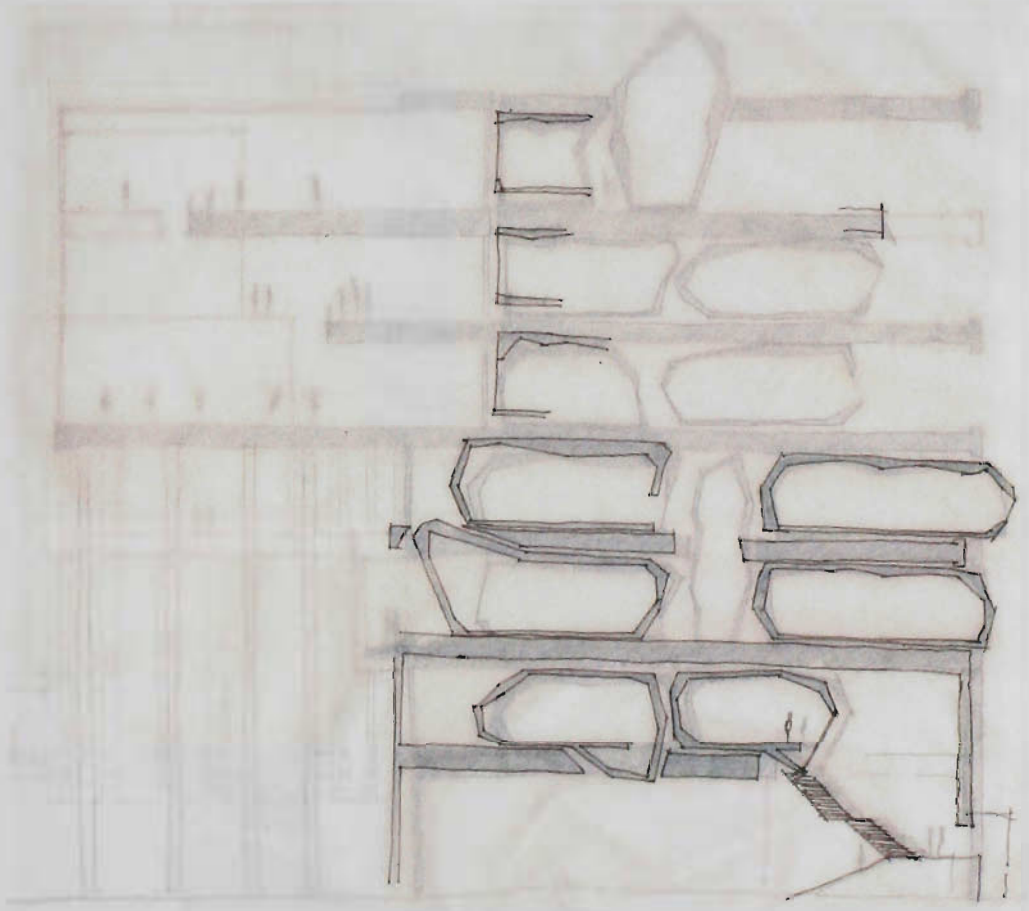
The bottom sketch is both examining this idea of connection as well as asking how the building will address the site.



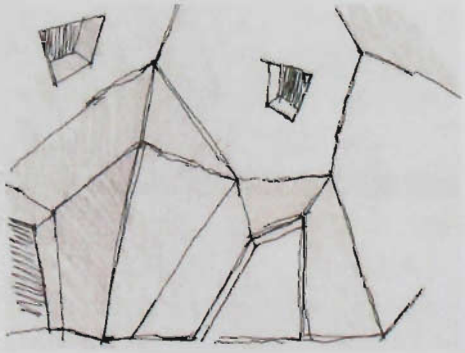
Studies of the sound studios and looking at the layers that can exist in these moments.

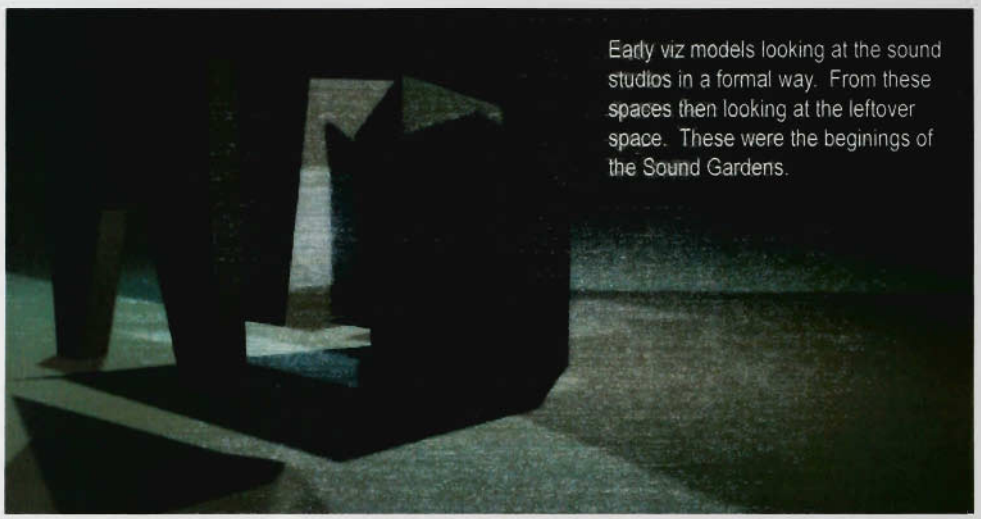




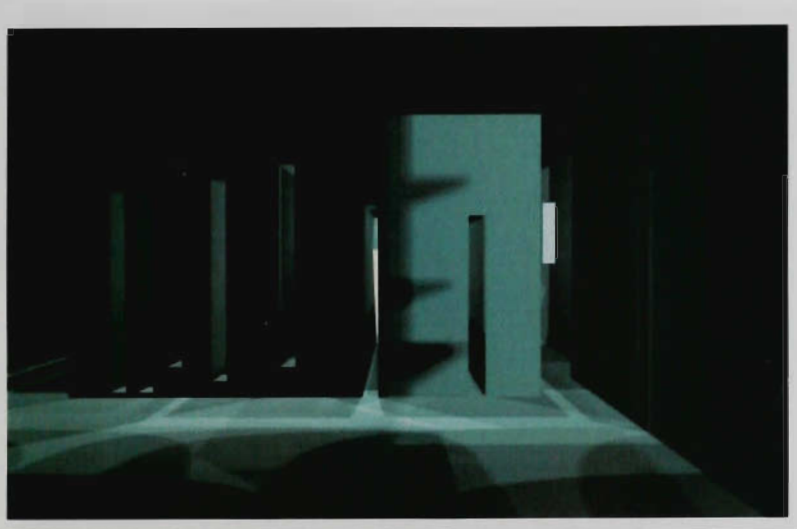


Another sketch looking at the layers of sound studios as well as the connection and relationship to the dance studios and other parts of the building. I began to think about the potential for in between spaces of acoustic breaks and what events could occur. The viz model shows another form of representation of these moments.

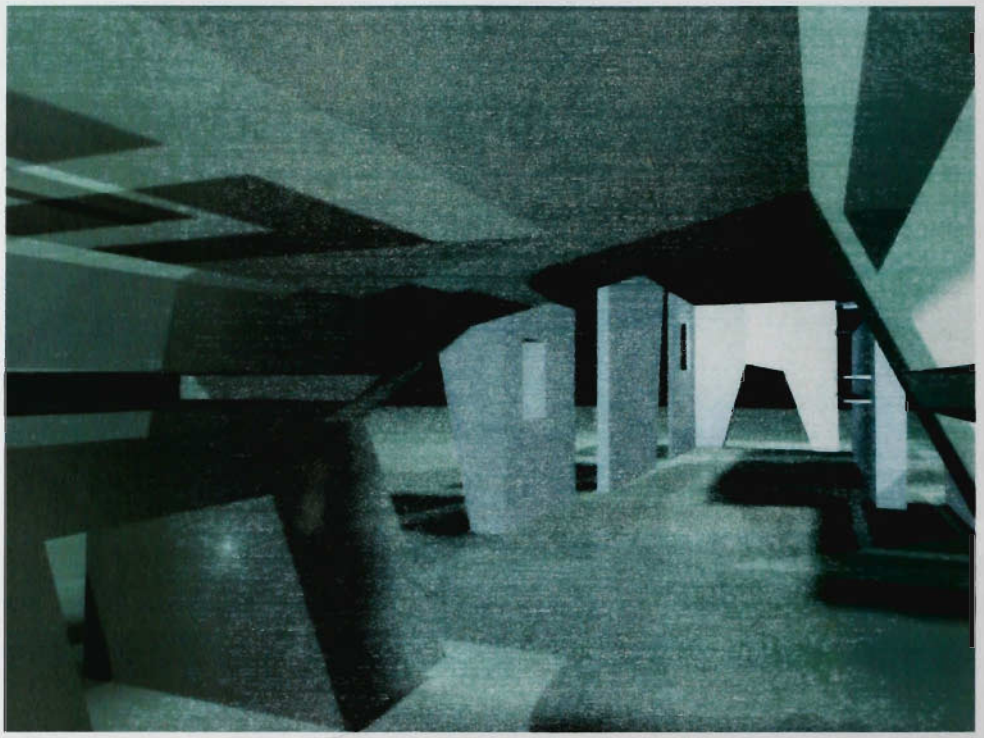


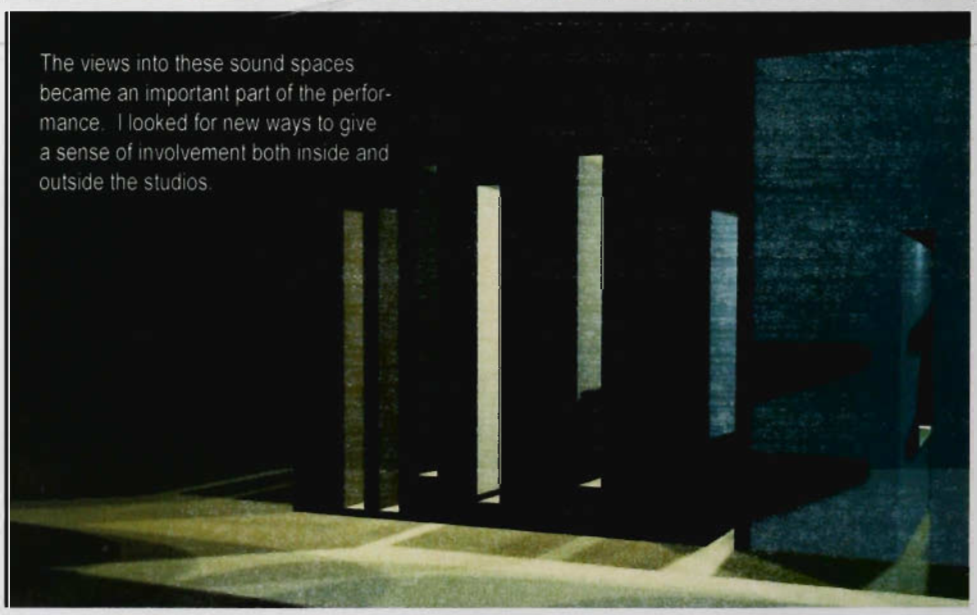


Early viz models looking at the sound studios in a formal way. From these spaces then looking at the leftover space. These were the beginings of the Sound Gardens.

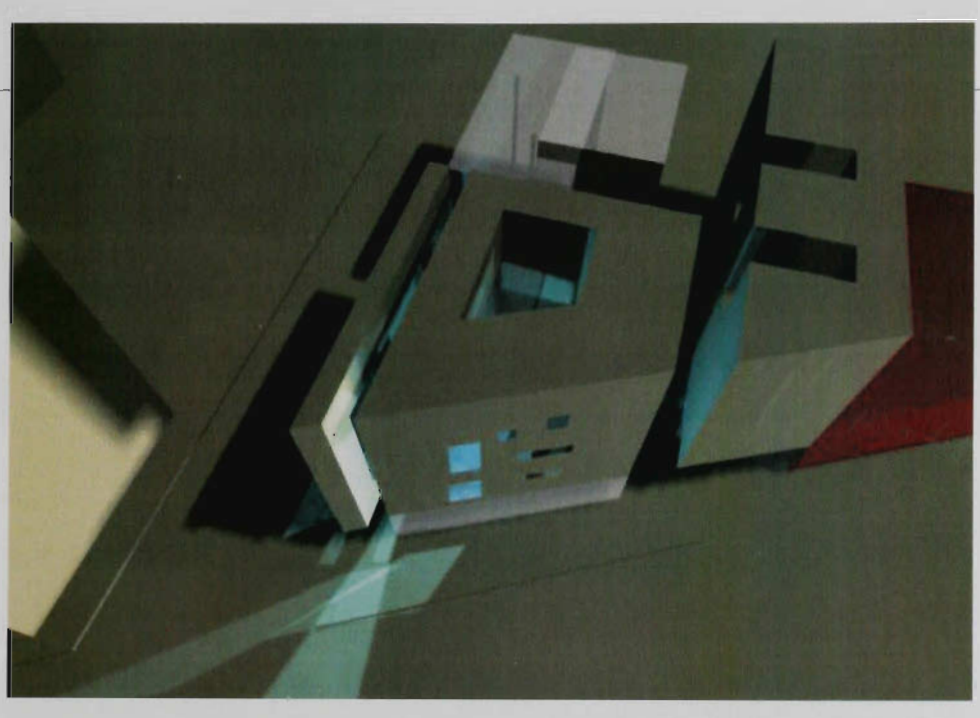


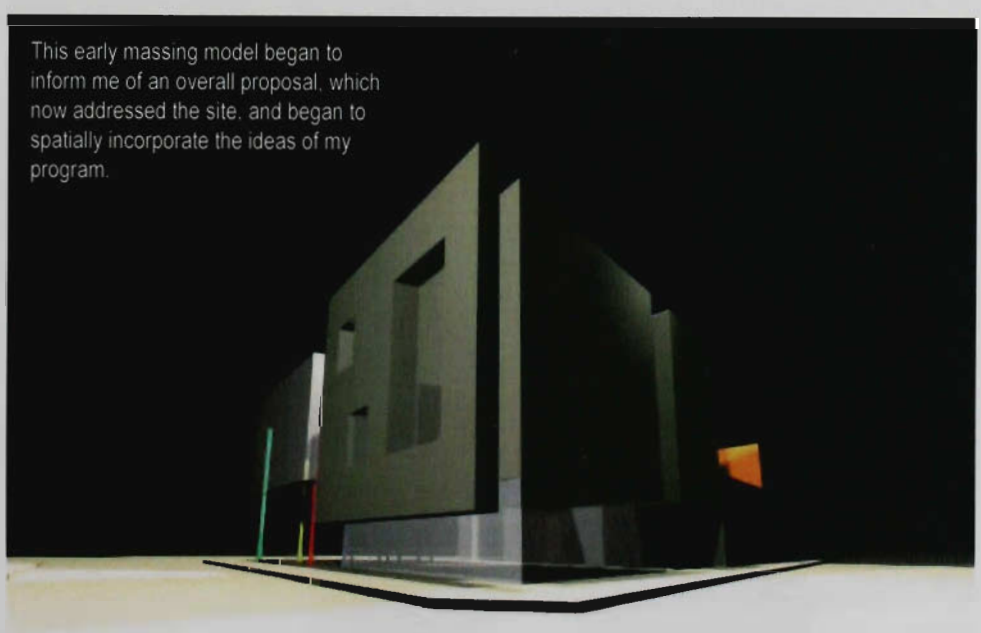
more views looking at the viz model within the conceptual sound studios.



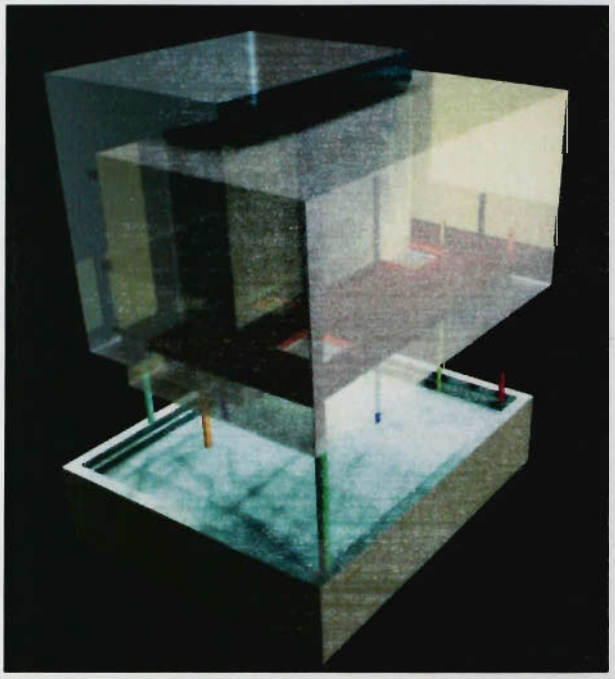


The views into these sound spaces became an important part of the performance. I looked for new ways to give a sense of involvement both inside and outside the studios.



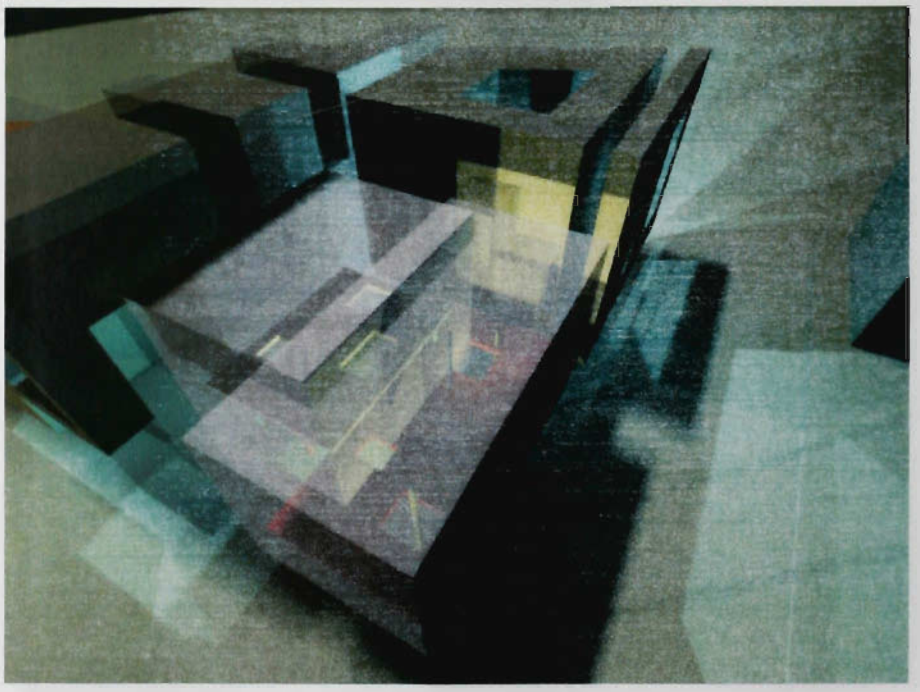


This early massing model began to inform me of an overall proposal, which now addressed the site, and began to spatially incorporate the ideas of my program.



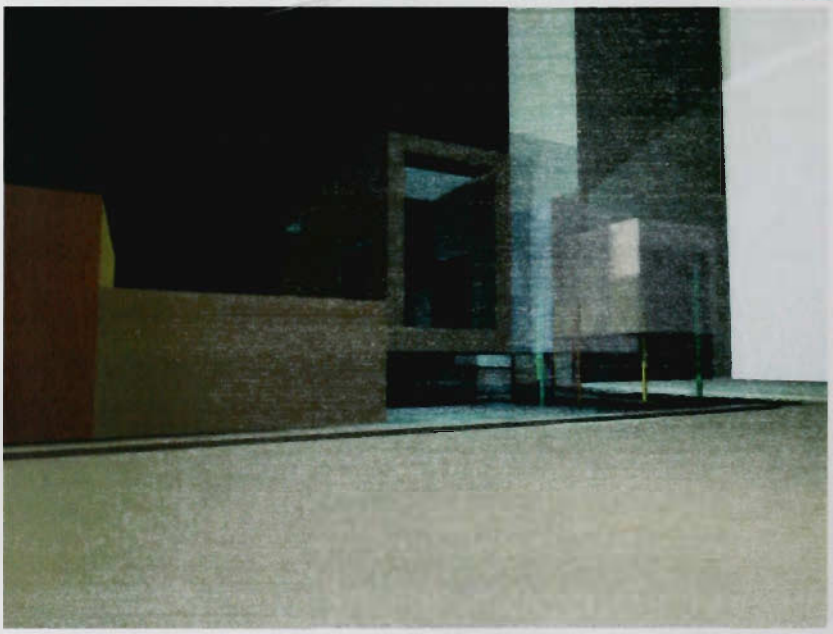
From this model I could now begin to piece together moments I had been investigating. This is an example of the dance studios starting to take shape. This model also gave me quick snapshots of what was really going on or helped me to determine the functionality of particular moments.

The bottom model shows the dance studios in context with the greater massing model. I could now determine connections to these studios and look for opportunities of incorporating sound.

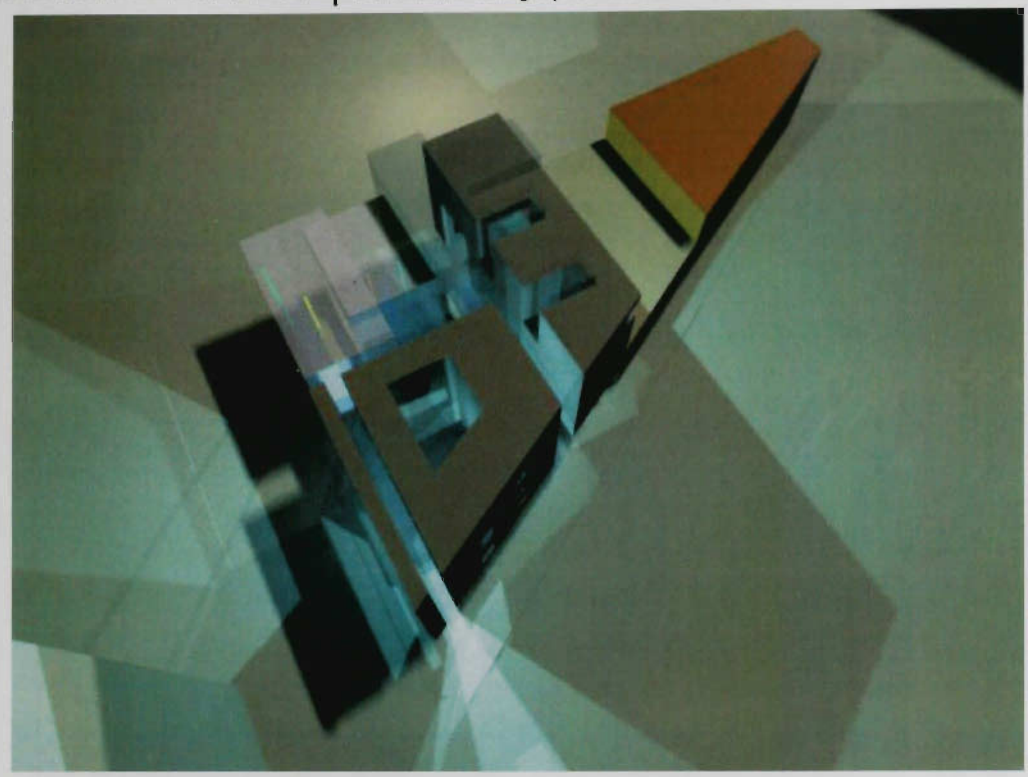


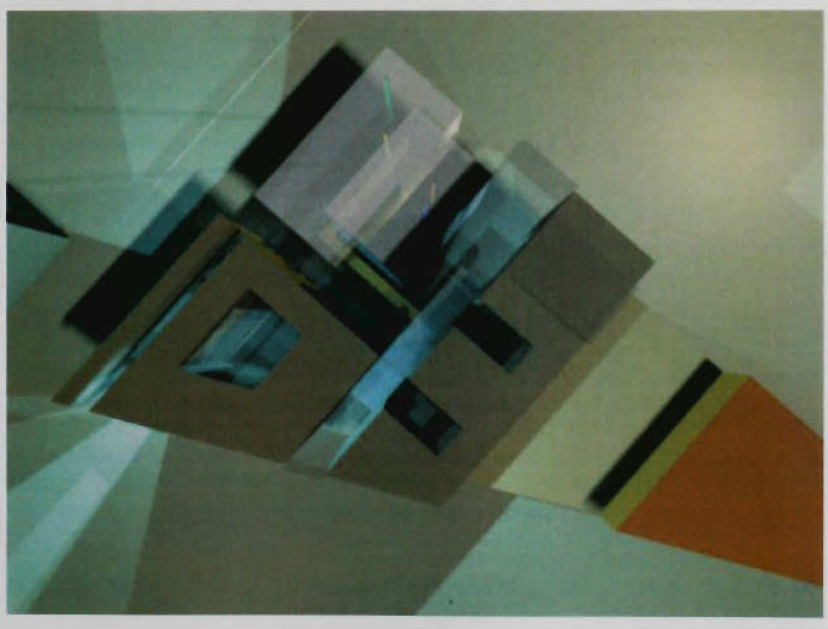
By piecing the model together I know had a comprehensive idea of what my sketches were saying. I looked at adjacencies, I looked at program layout, and entrances into the building. I also began wondering about this space below the dance studios. Since my dance studios were almost floating light boxes they left behind an open square of space.

I needed to address the idea of sound and begin to incorporate it into this proposal. From here I was also looking at the buildings openings and how I could carve away to create my instrument of sound.

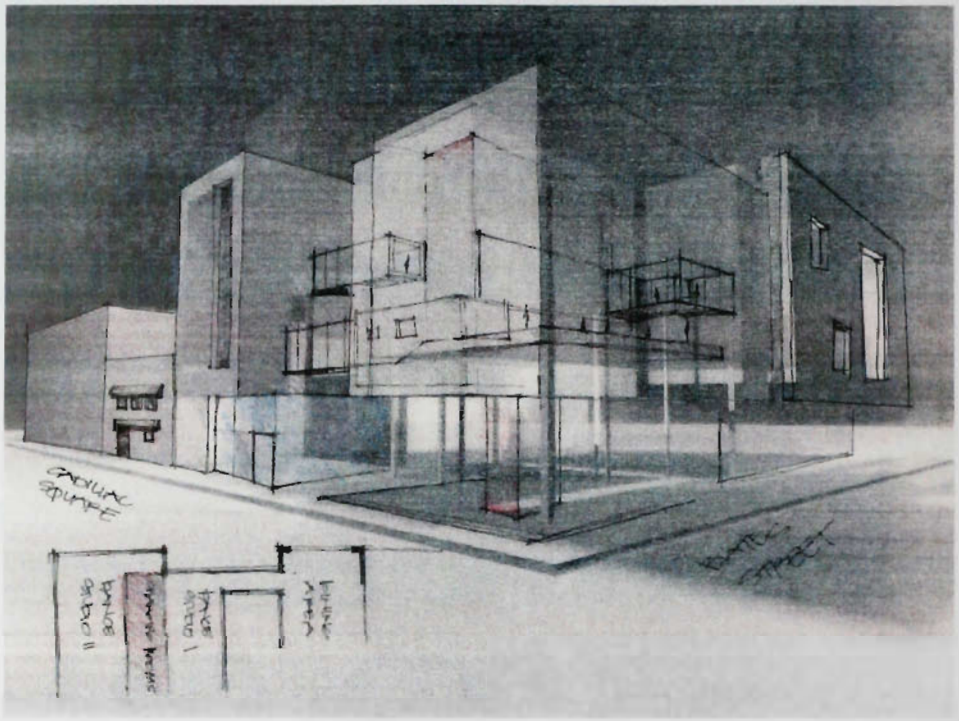


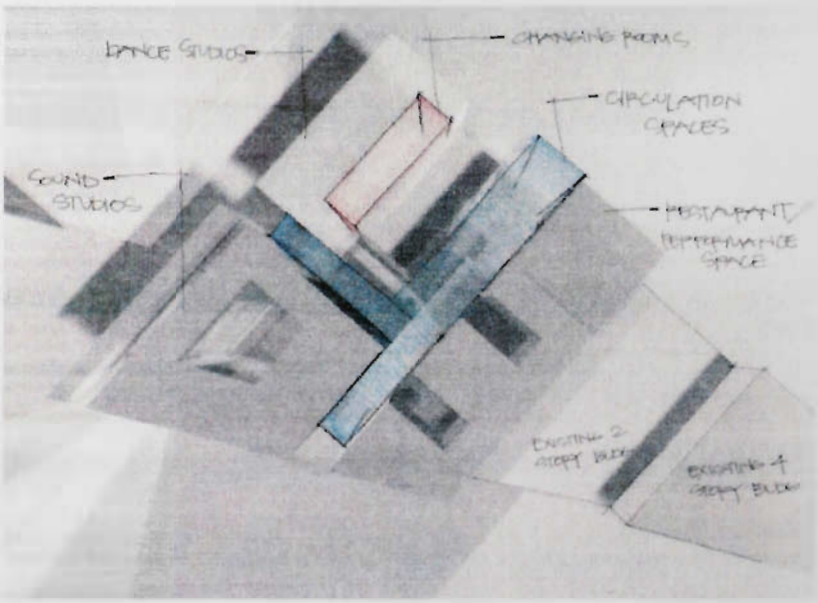
more perspective views of the viz model from an exterior condition. I was looking at areas where I could frame views of the city, or create views of the surrounding area.



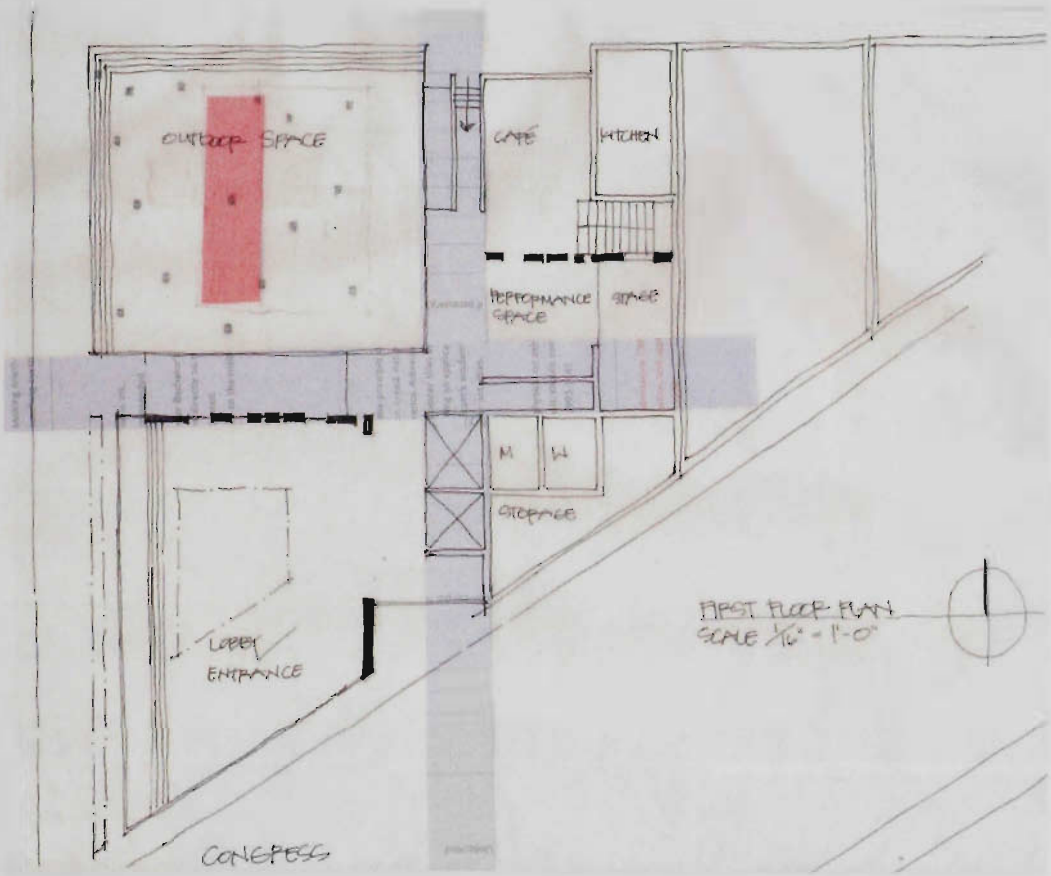


Aerial views of the building show areas of separation, these spaces become circulation corridors. These are important spaces of transition from one sound or space to another.



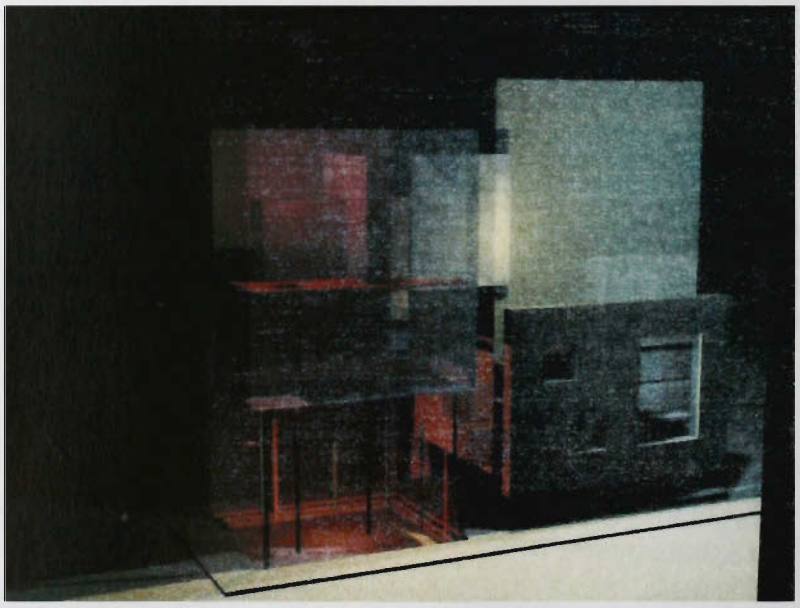


My viz model now became an important tool in overlaying and sketching new layers of information.

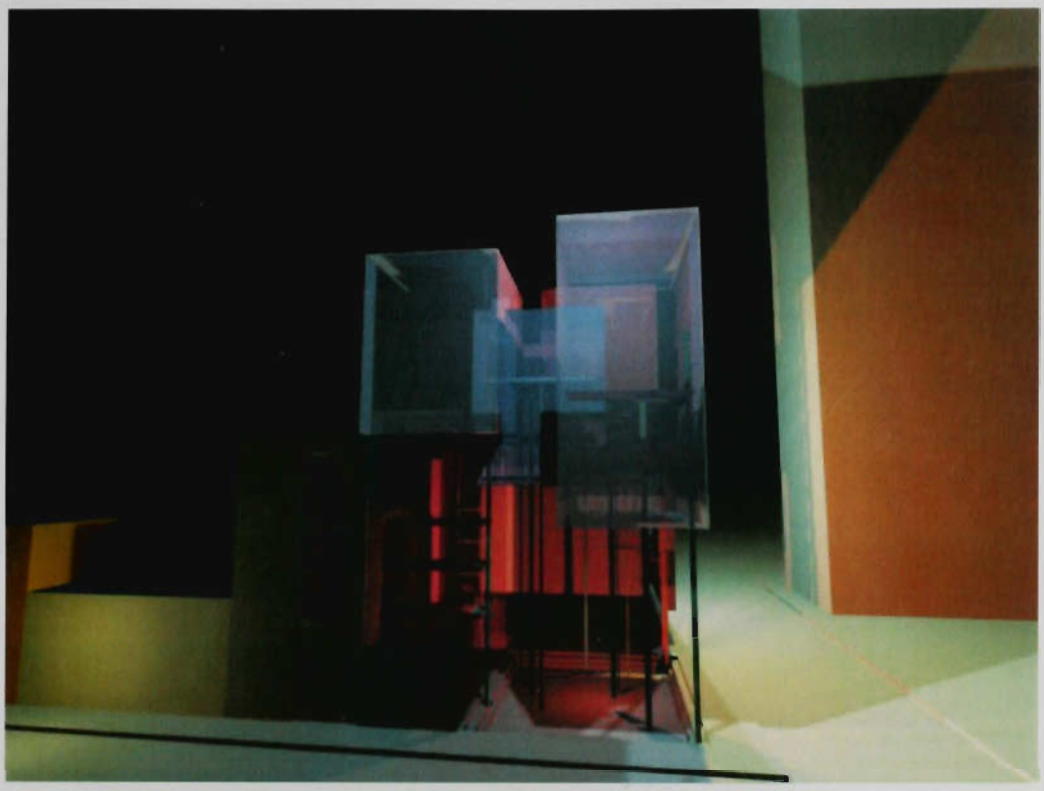


During the Design Development stage, I took a pass at a ground floor plan, trying to consider circulation, sound, and views within, on, and around the spaces. I address issues of entrances, core spaces, and other function spaces needed in any given building. I added an outdoor performance space under the dance studios. I was still struggling to represent my sound studios at this point.

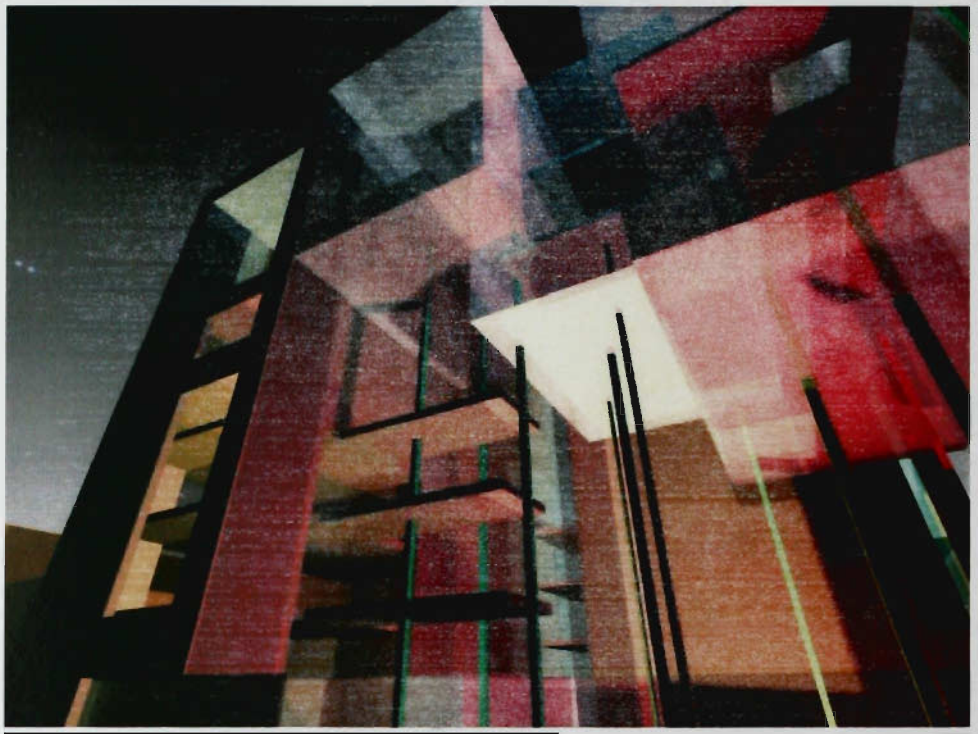
It was during this stage that I began to re-think the size of the program. I realized it would be benifitial to increase the vertical space I could occupy. I doubled the size of my program to better situate the building within the taller context of the surrounding buildings. I now had to find ways to increase the height of the overall building proposal. I added lounges, and two more dance studios, as well as a number of recording studios to help bulk up the size of the project. I went from a proposed four story building to a seven story building.



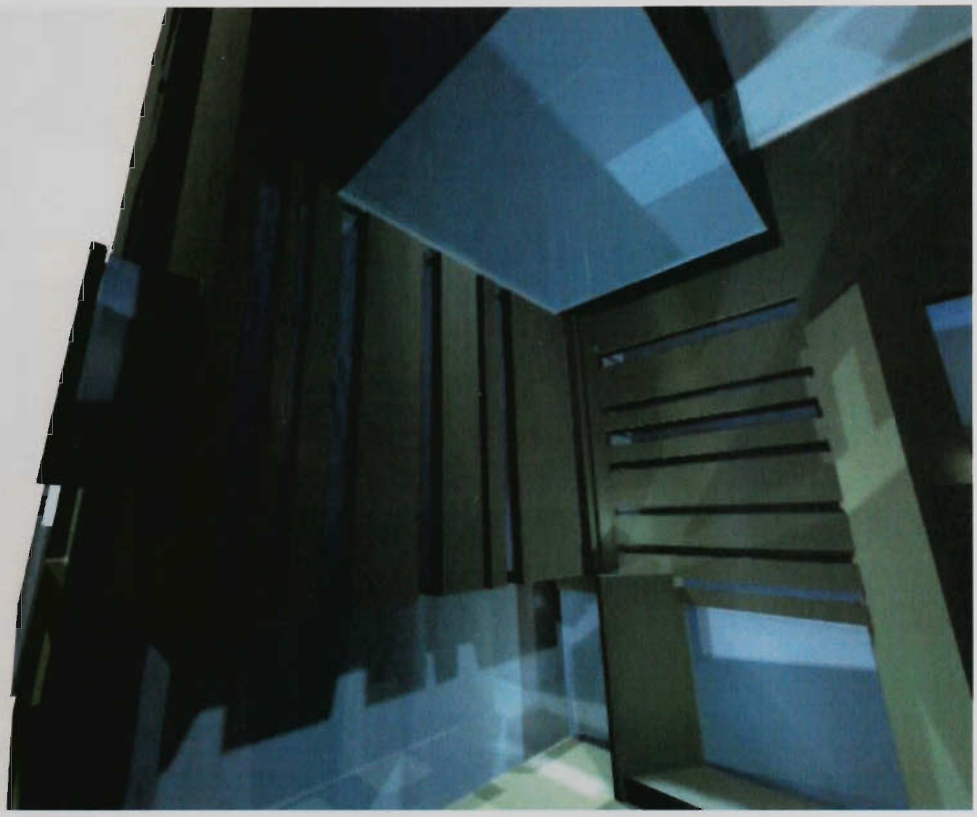
I added program space to my existing model and looked for ways of subtracting from the building to reach as much of the sky as possible.



I experimented by adding dance studios and volumes and then lifted them high off of the ground. This gave more space for interactions below and increased the height at the same time.

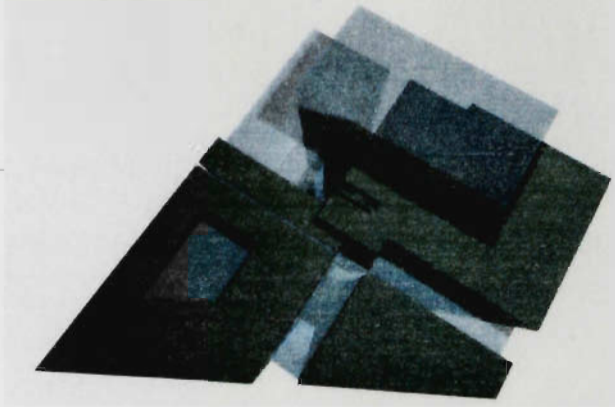


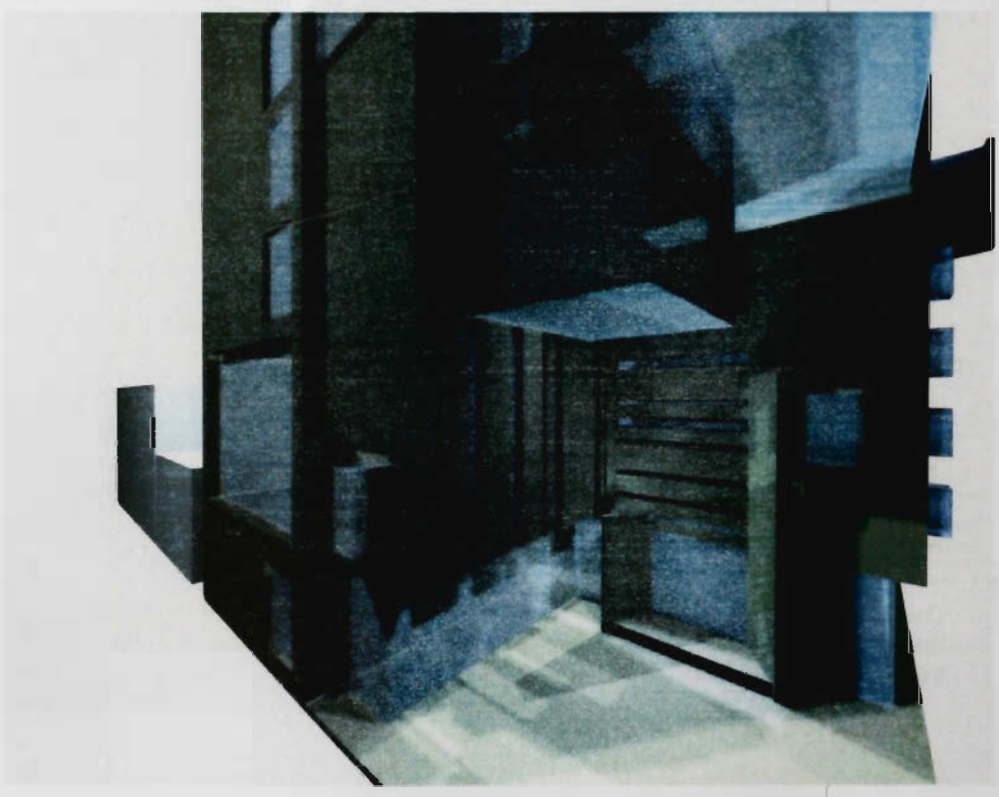
More images of the process of increasing the size of the project.

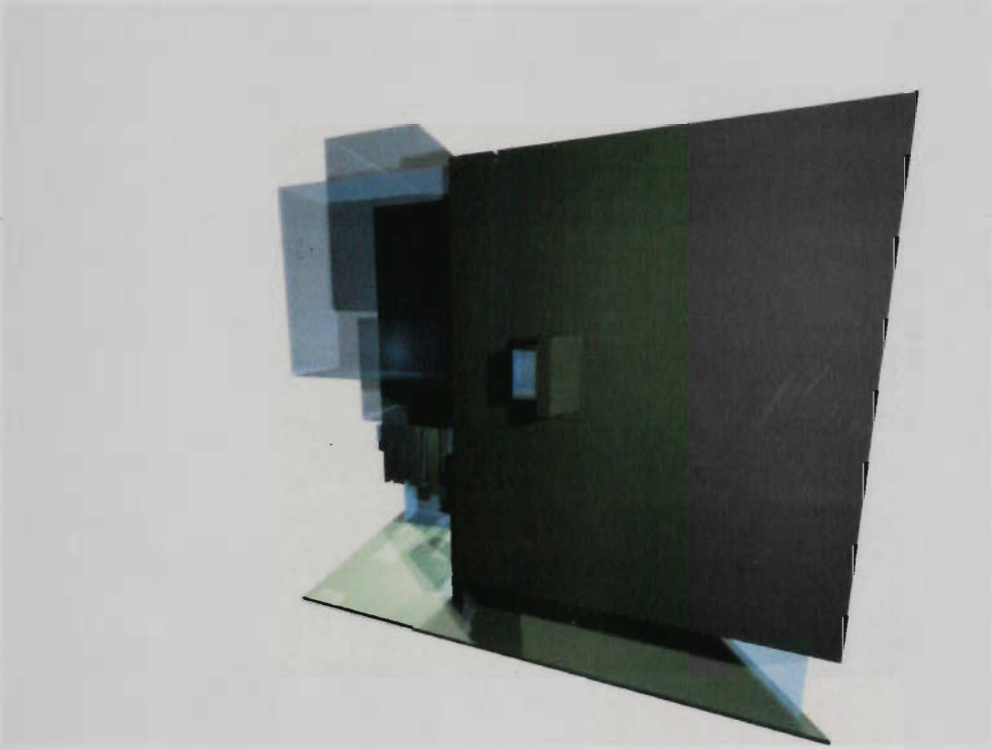


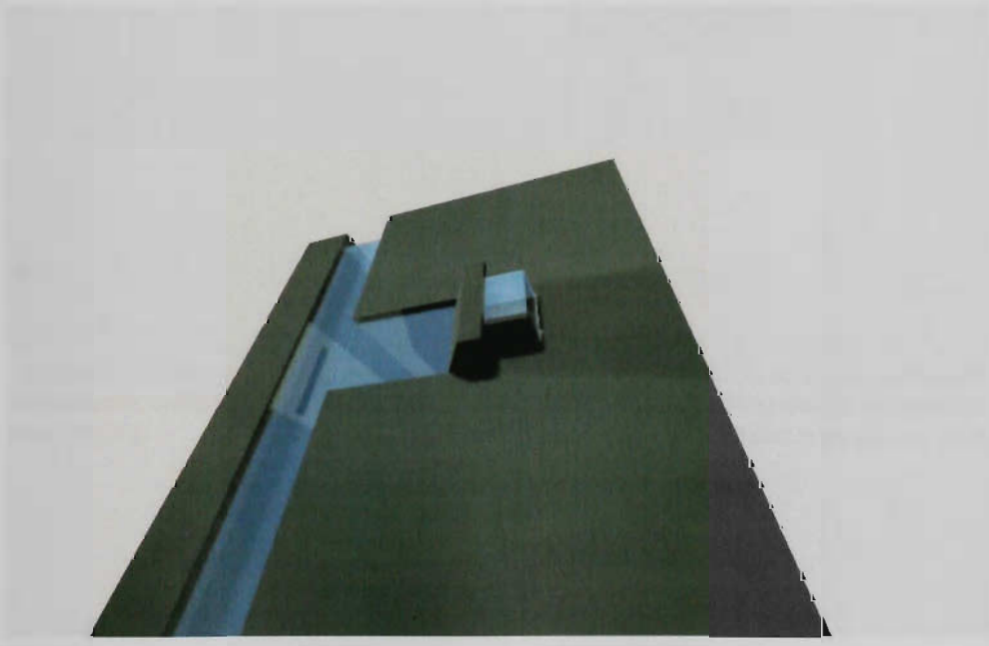
Once I had figured out the capacity of my building, I had to dig in and become much more detailed with the moments that now existed. I used a process of sketching and working things out in my head, then relaying the information into model form in the computer.

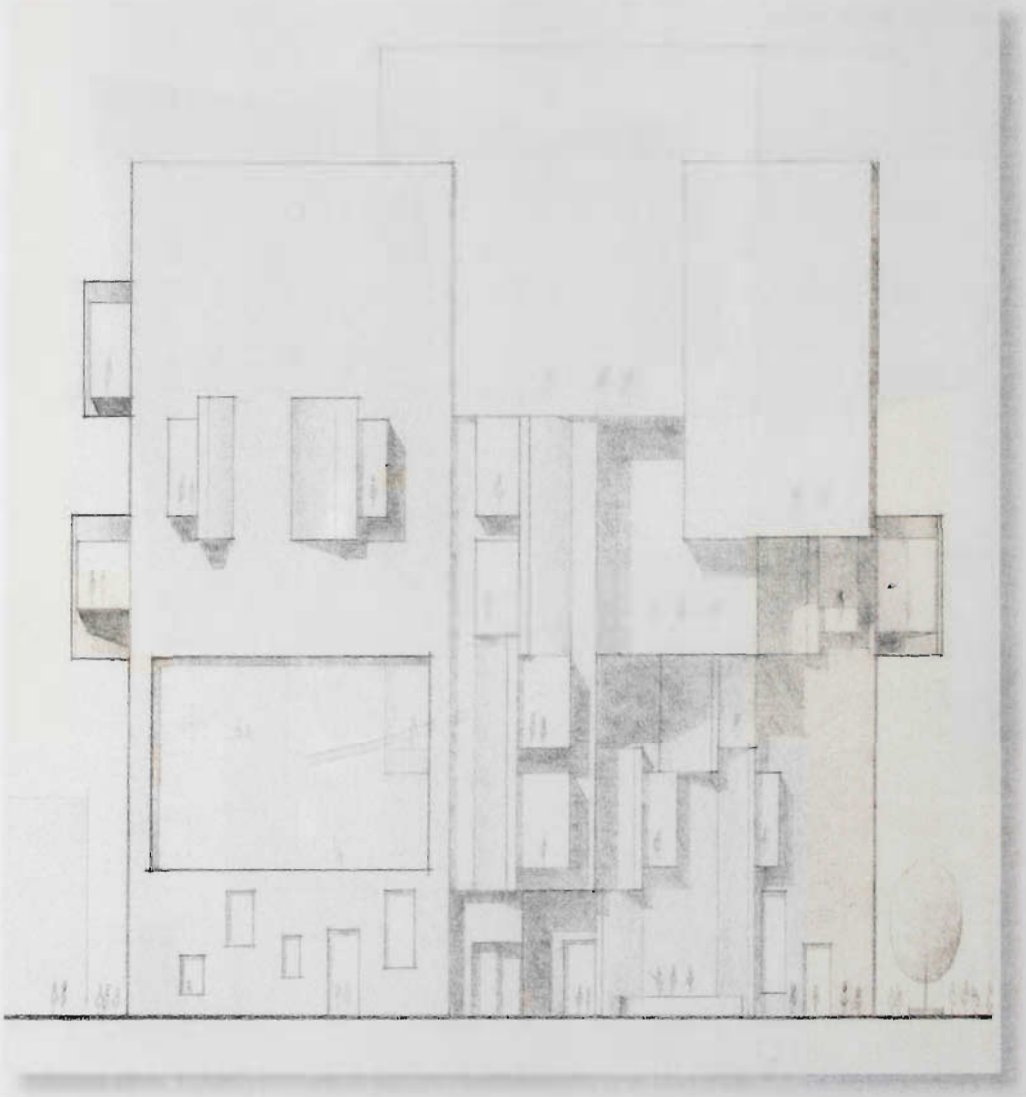
more detailed images from different perspective views.



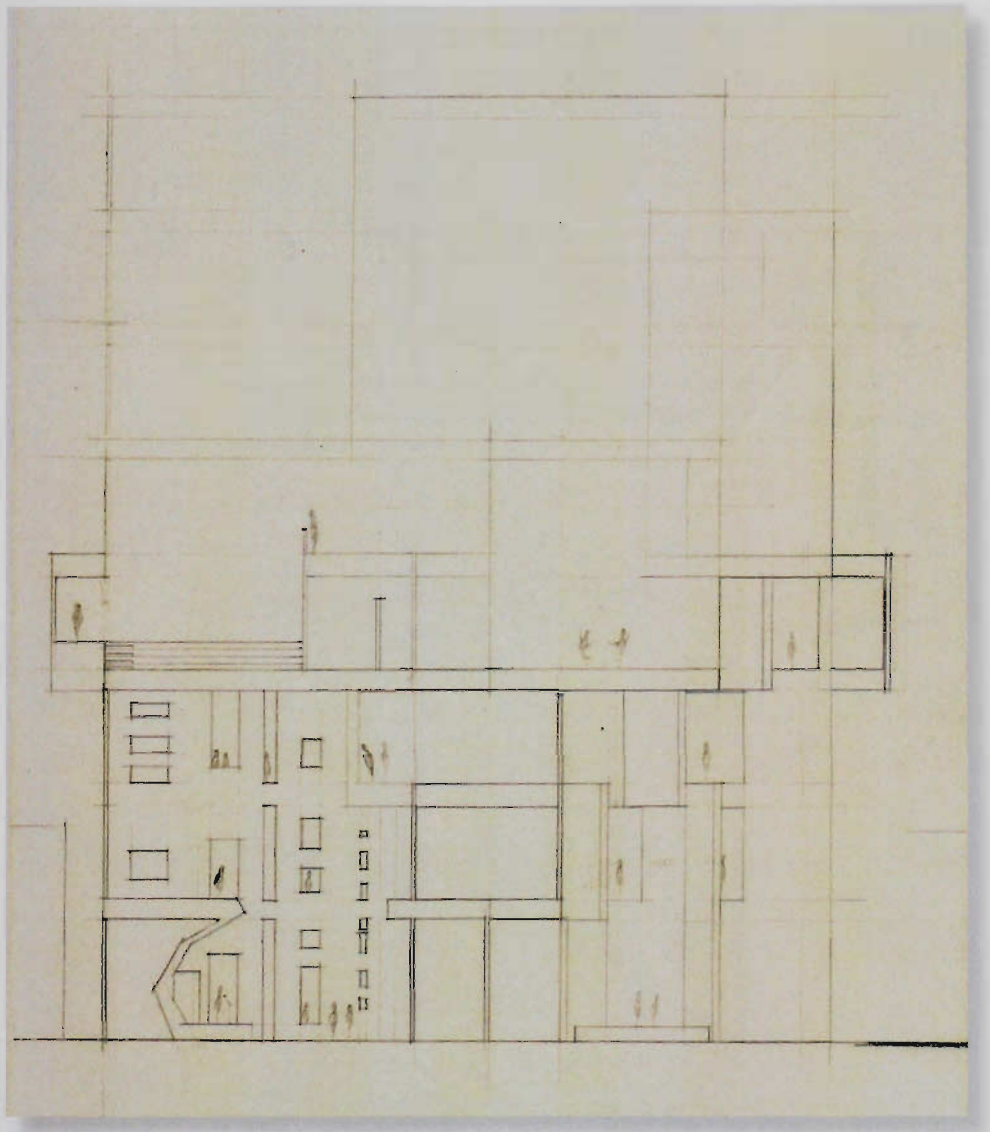




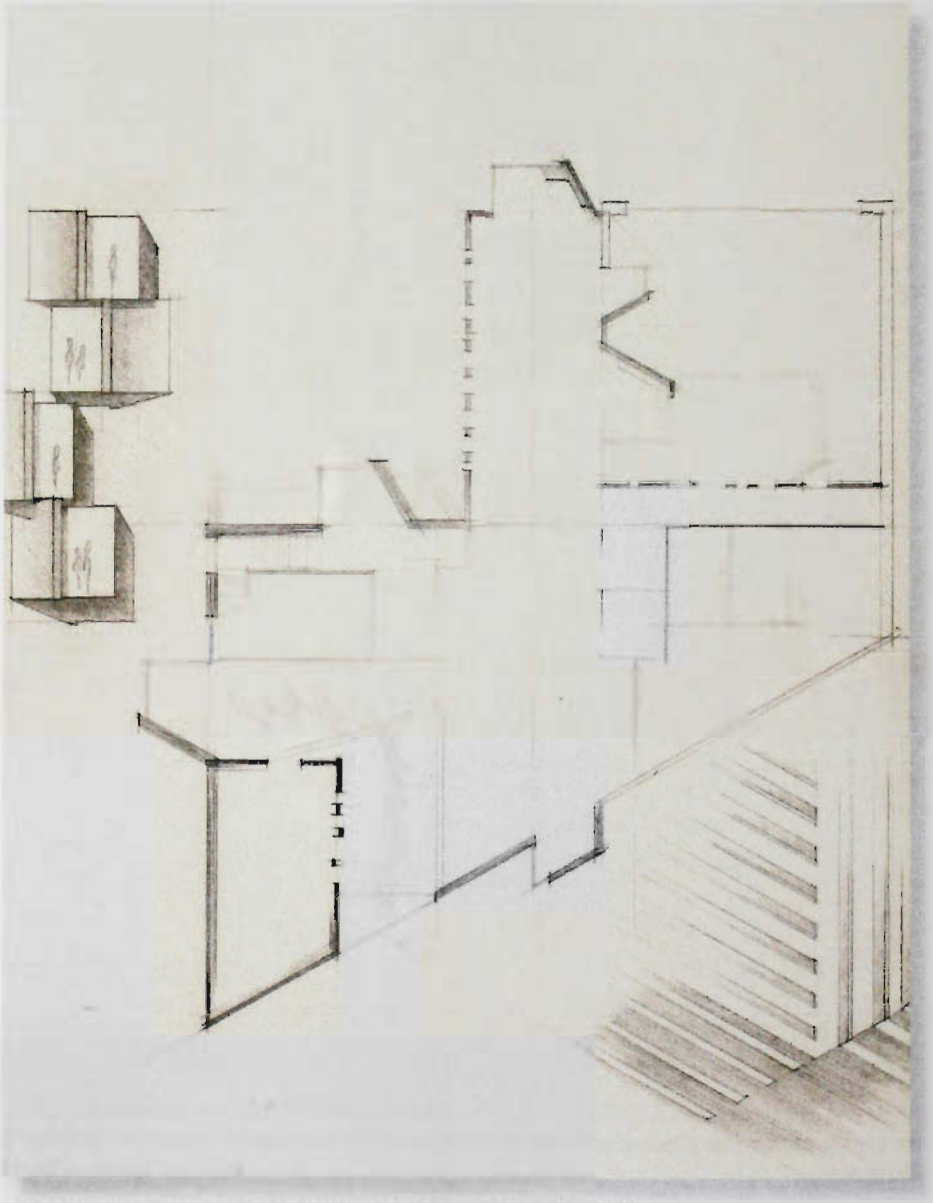




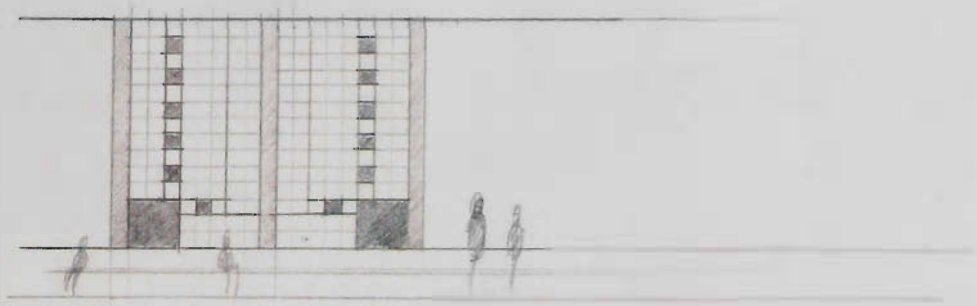
The detailed changes in the viz model then went back into drawing form to keep a process of both media. I could now make necessary changes to the overall proposal. I did this with another set of floor plans, sections, and a series of sketches.



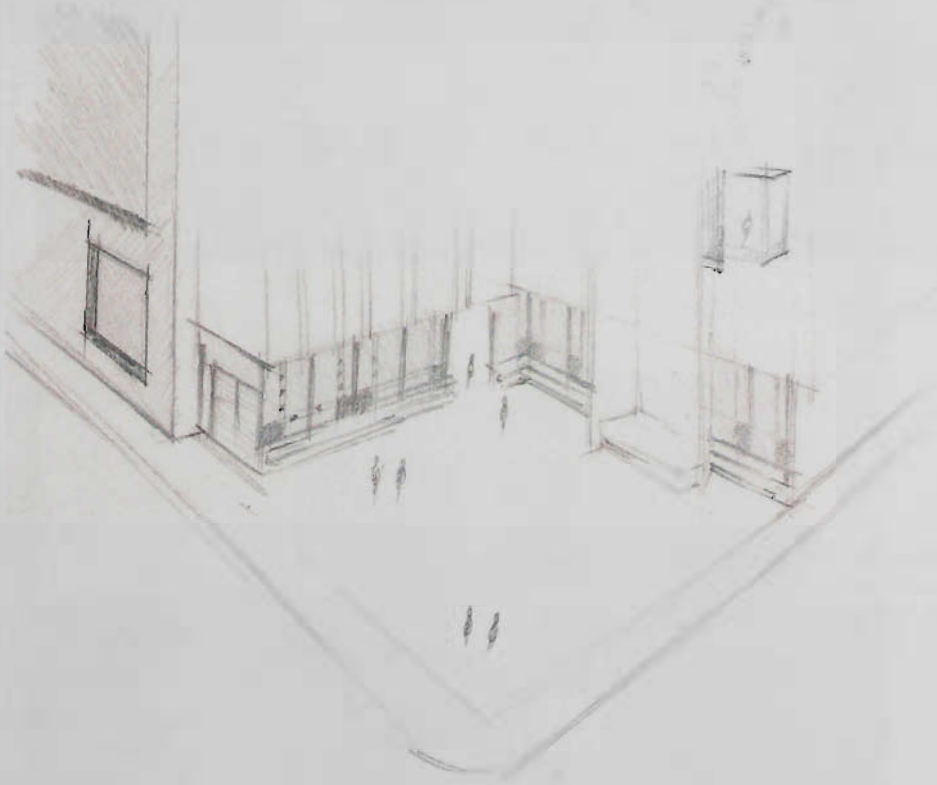
A loose section cut from the elevation on the previous page. This section was looking at areas of sound and eavesdropping.

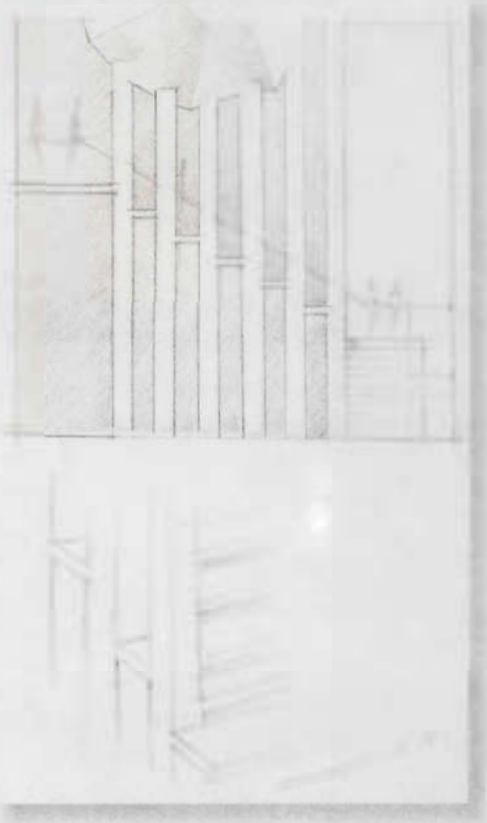


A floor plan from the same stage of development. Also, I was looking at more details and drawing sketches that could inform the plans. The sketch in the top left is an early drawing of the viewing and thinking pods.

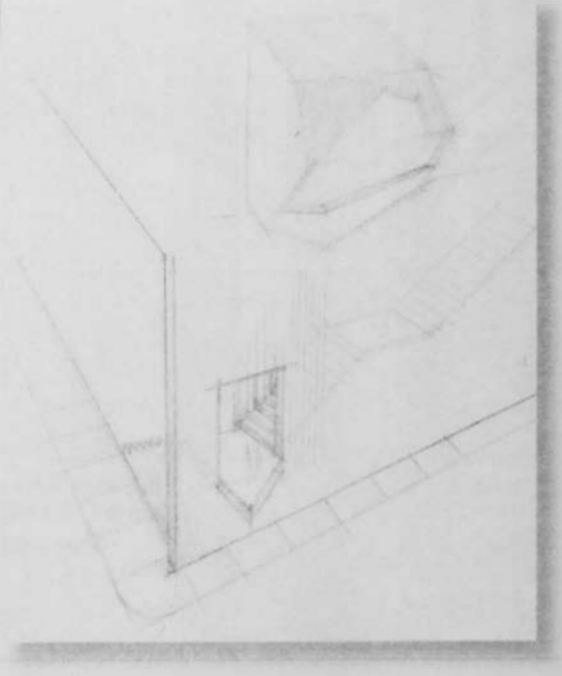


Above is a sketch of a window and bench detail in a performance space. Below are detailed sketches of the same performance space under the dance studios.

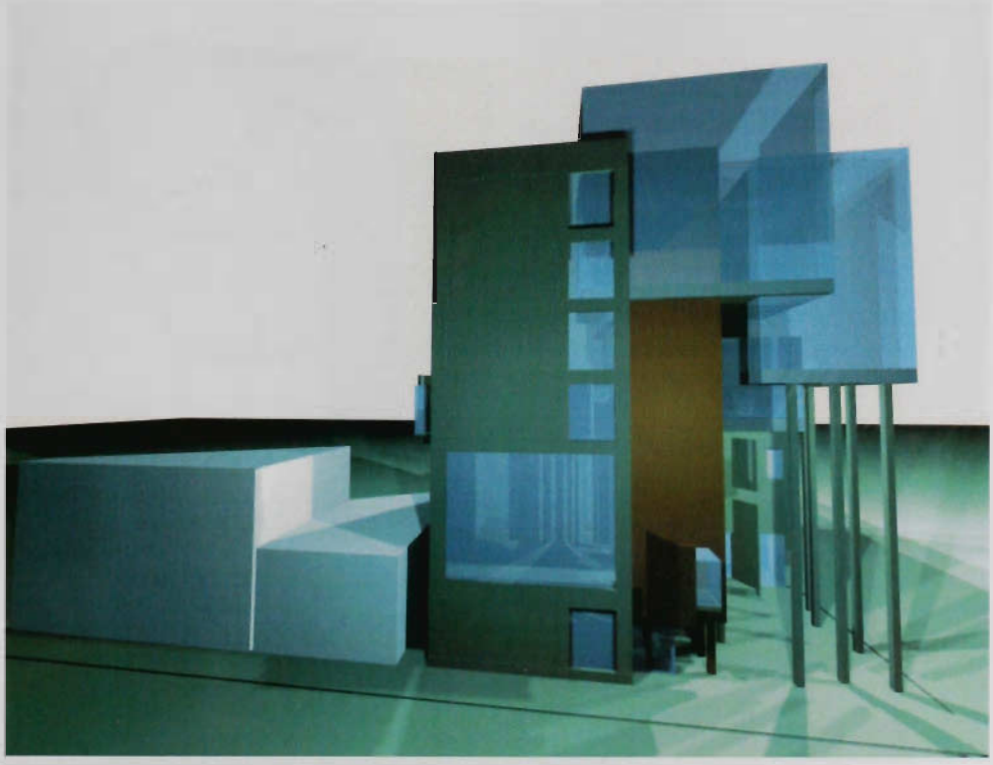


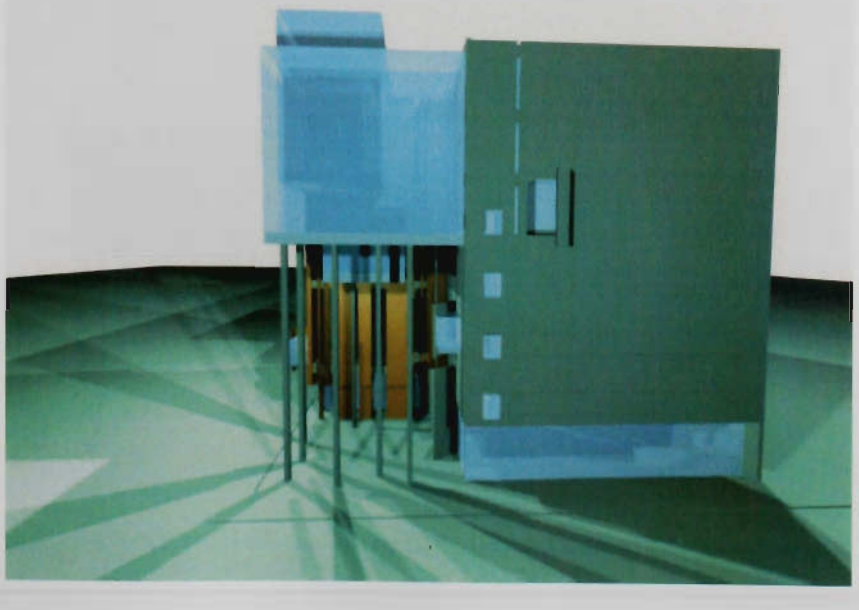


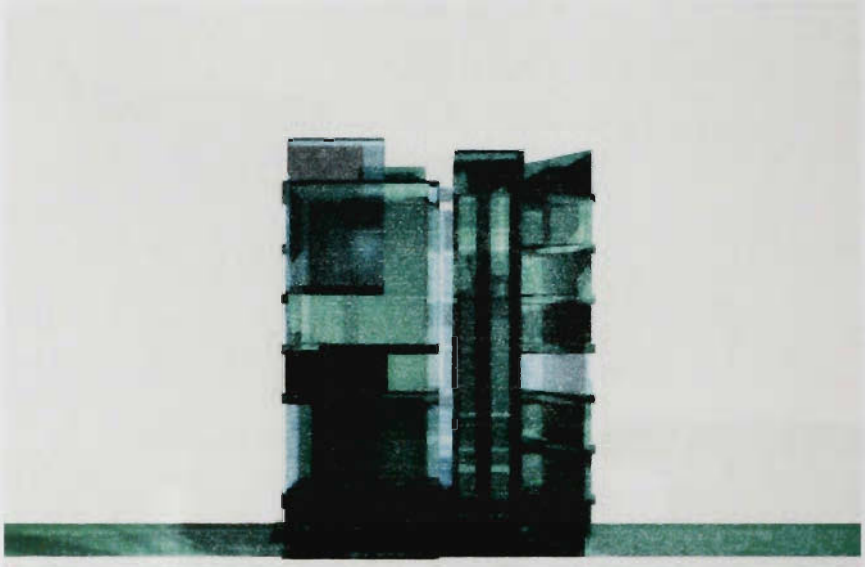
Sketch of stair detail in lobby space. The Acoustic space above is seen in ceiling. As visitors walk up the stairs they have views into the recording studio.



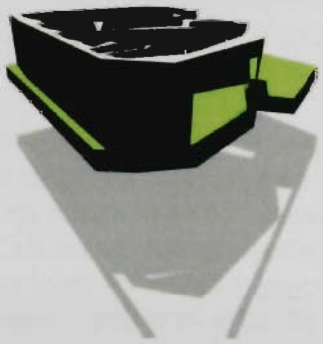
Another view of the stair detail. This drawing also shows how the stair puncturing through the facade revealing new moments of viewing.



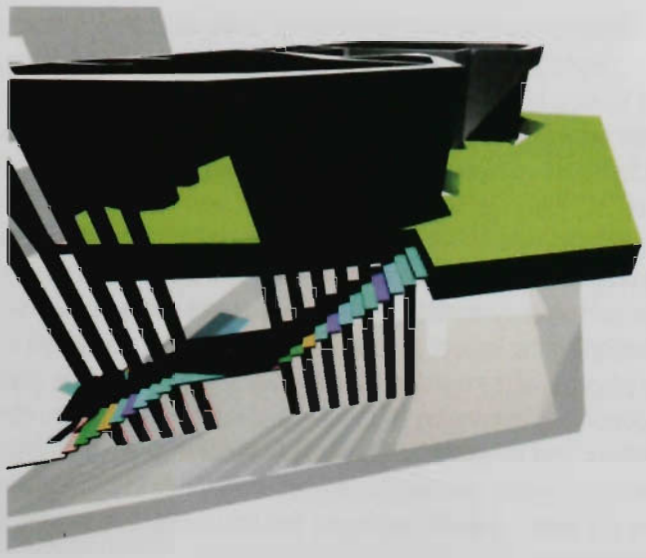




These three images are sectional studies of the final sound studios.



This sectional study shows the stair details in previous sketches.



DESIGN PROCESS | Design Development

From the beginning of schematic design until this current stage of more concrete design making decisions, my thesis investigation and questions have been the consistent driving force. The initial process begins with simple studies looking at sound in a conceptual and somewhat formal expression, experimenting with study models and sketches. The movement of sound is an important factor in placement of walls, volumes of spaces, and adjacent program functions. The select and framed views, the eavesdropping of sounds and performances, the acoustic considerations, and the circulation throughout the building now become moments of a more critical concern.

I first examined ways in which my site could contribute to and enhance the design. The scale of the site is one of the most important factors in bringing sound to this space. The size of the program greatly impacts the flow and rhythm of sound on my site. Adjacent buildings and surrounding context is also an important factor in the placement of functions such as entrances, loading zones, etc.

The location of program spaces became an issue at this point. I begin developing these spaces individually and as a whole. I examined how these spaces act on their own and also how they act together with the various other program spaces. The dance studios are a "light" space, utilizing the views of the surrounding context. The acoustic spaces encompass a heavier feel and are more about the function within the walls | edges. I express the sound spaces by showing the spaces, not just within the studio, but also with other, more unique views into this space.

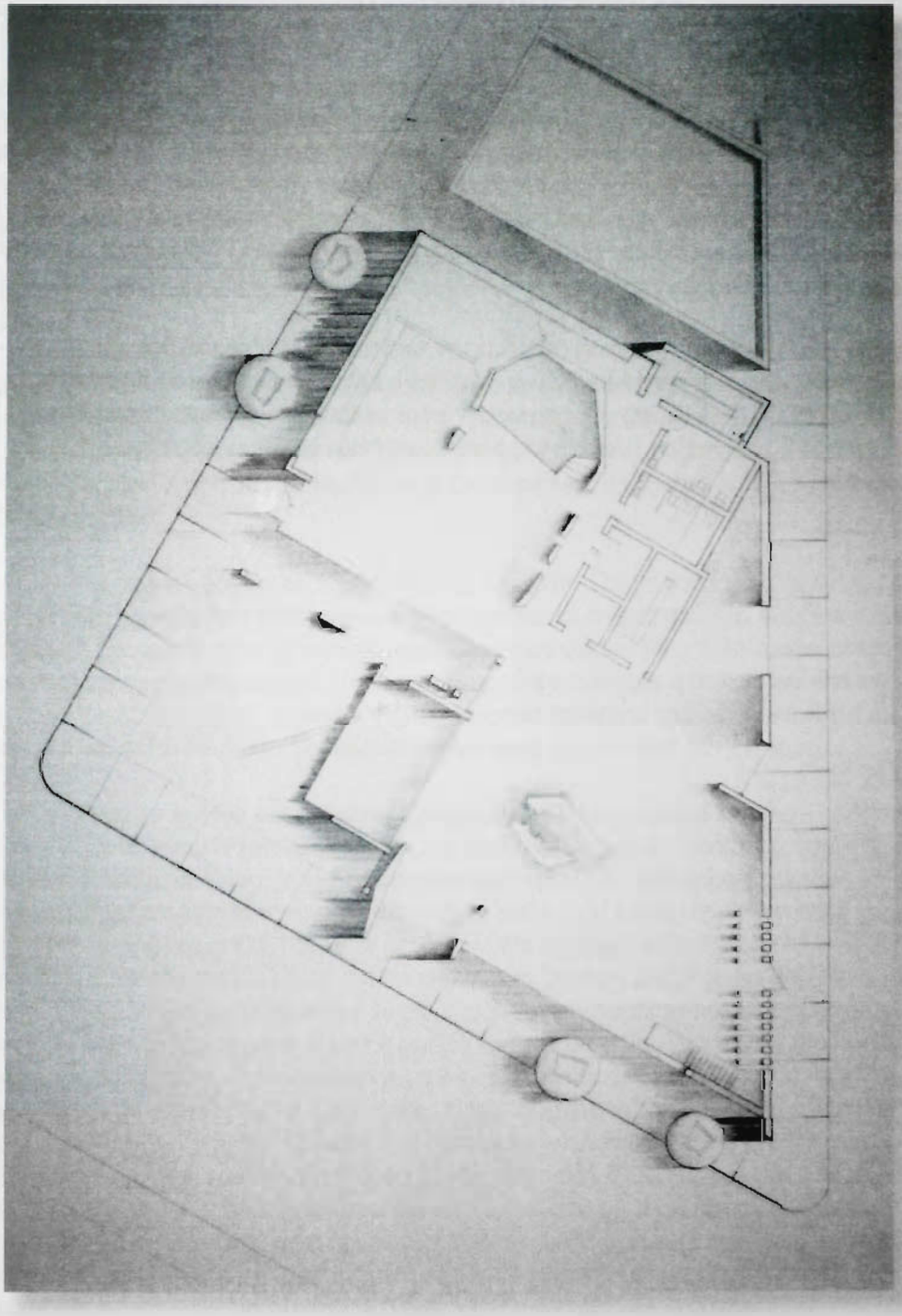
The areas of overlap and the areas of close adjacencies emerge as spaces with more potential. Using vignettes as a way to see these spaces, my methodology included sketching moments and looking at spatial concerns as well as programming needs. My initial model gives me a loose backdrop of program spaces, circulation, scale, and form in which I could now base some decisions off. Using this model, I can now dig deeper into my thesis investigation by overlays and more informed vignette studies based on new parameters. At this point of design development, my project takes on a much larger scale. In order to gain some height and better proportion to my project I increased the number of sound studios and dance studios, as well as added a couple new performance spaces. This step changes some of my preconceived notions and I start re-questioning the impact of sound at a new scale. I also begin to look at more sound spaces within the program of my building. By increasing the scale of the overall project, I could seek other opportunities of bringing sound into and out of the building. New ideas emerged such as sound gardens, and the listening booths now became even more important factors within the design. The performance spaces give me an opportunity to show sound in a larger more expressive way. How the sound is seen and heard and translating this into the architecture is crutial to this thesis investigation.

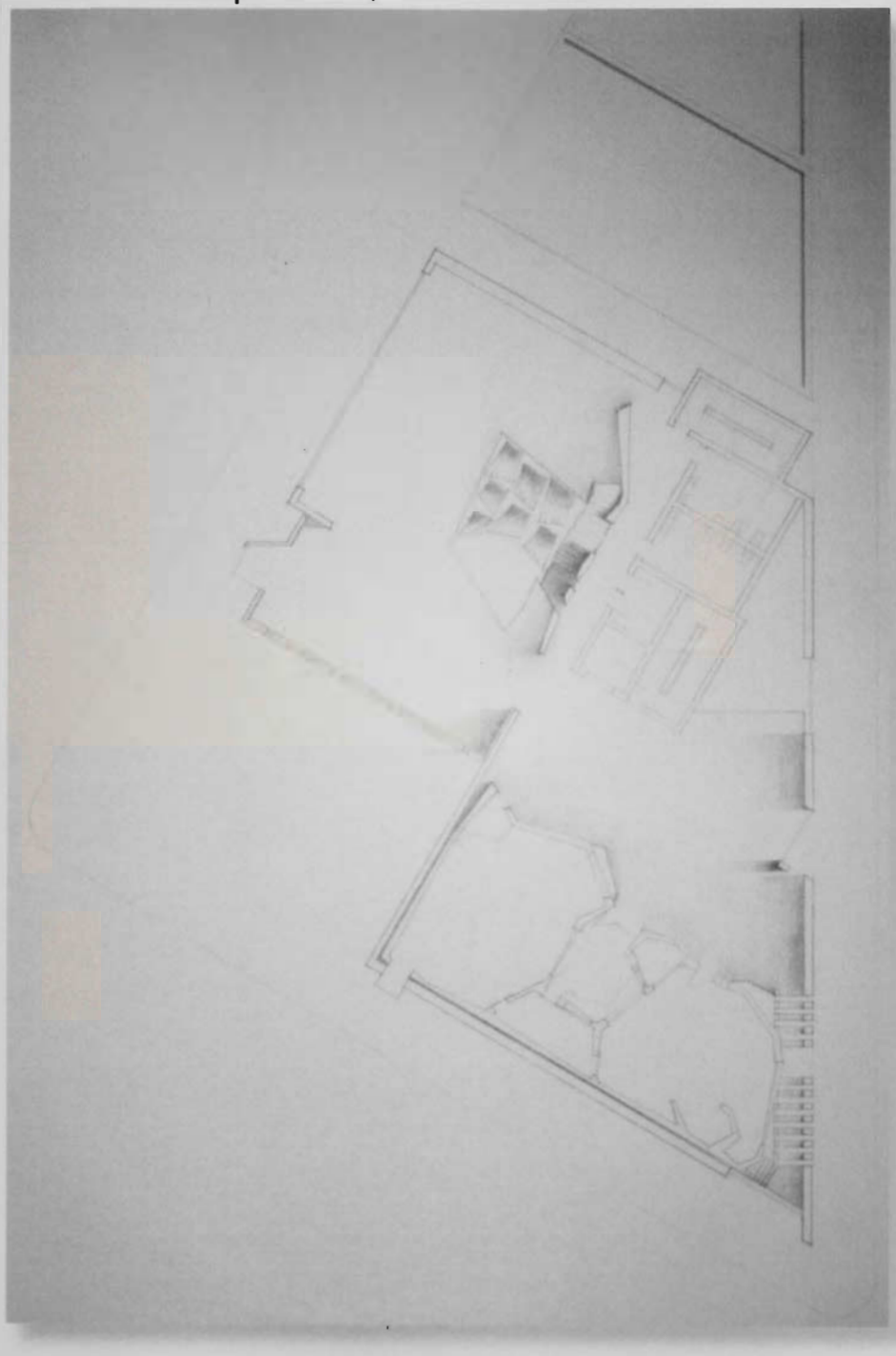
DESIGN PROCESS | Design Development

Now, as my building becomes even further developed, sound expression begins to spill out of the building, into the overall "shape". The fenestration considers both how one sees into and out of the building. Select and framed views critically placed these moments within the building. Viewing pods and thinking pods developed at this stage as well. These are select spaces within the building to collect oneself, to sit and think, or to investigate other moments of the building. For example, in these spaces one could view a performance of the city, a music performance, or dancing.

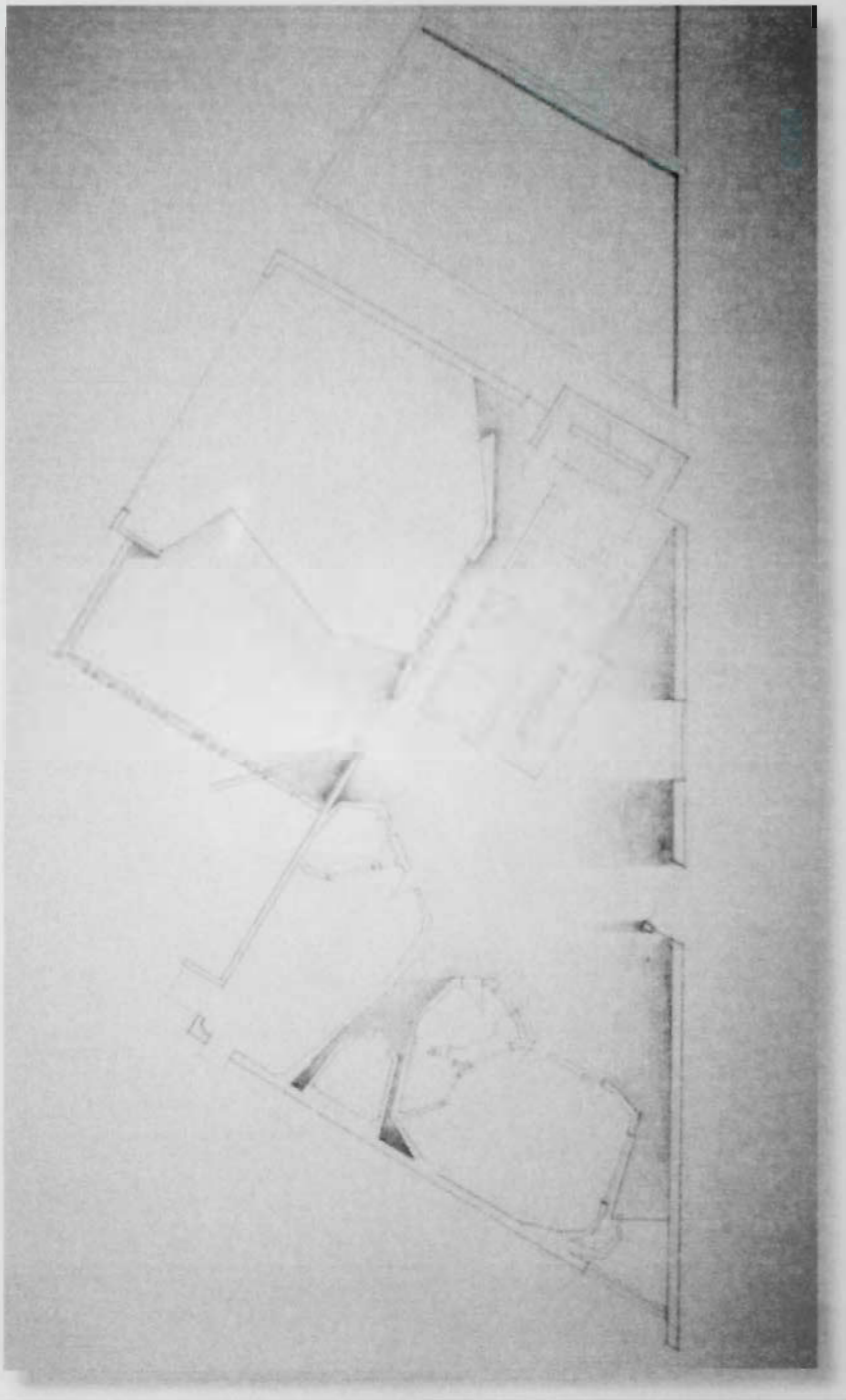
Currently, I am focused on re-working moments re-examining ideas of sound, through eavesdropping, circulation, and select views within the building. In order to fully articulate these ideas I intend to re-visit my original questions and continue the process of speculation, experimentation, and creation. I look to find a clarity within the boundries of my thesis investigation.

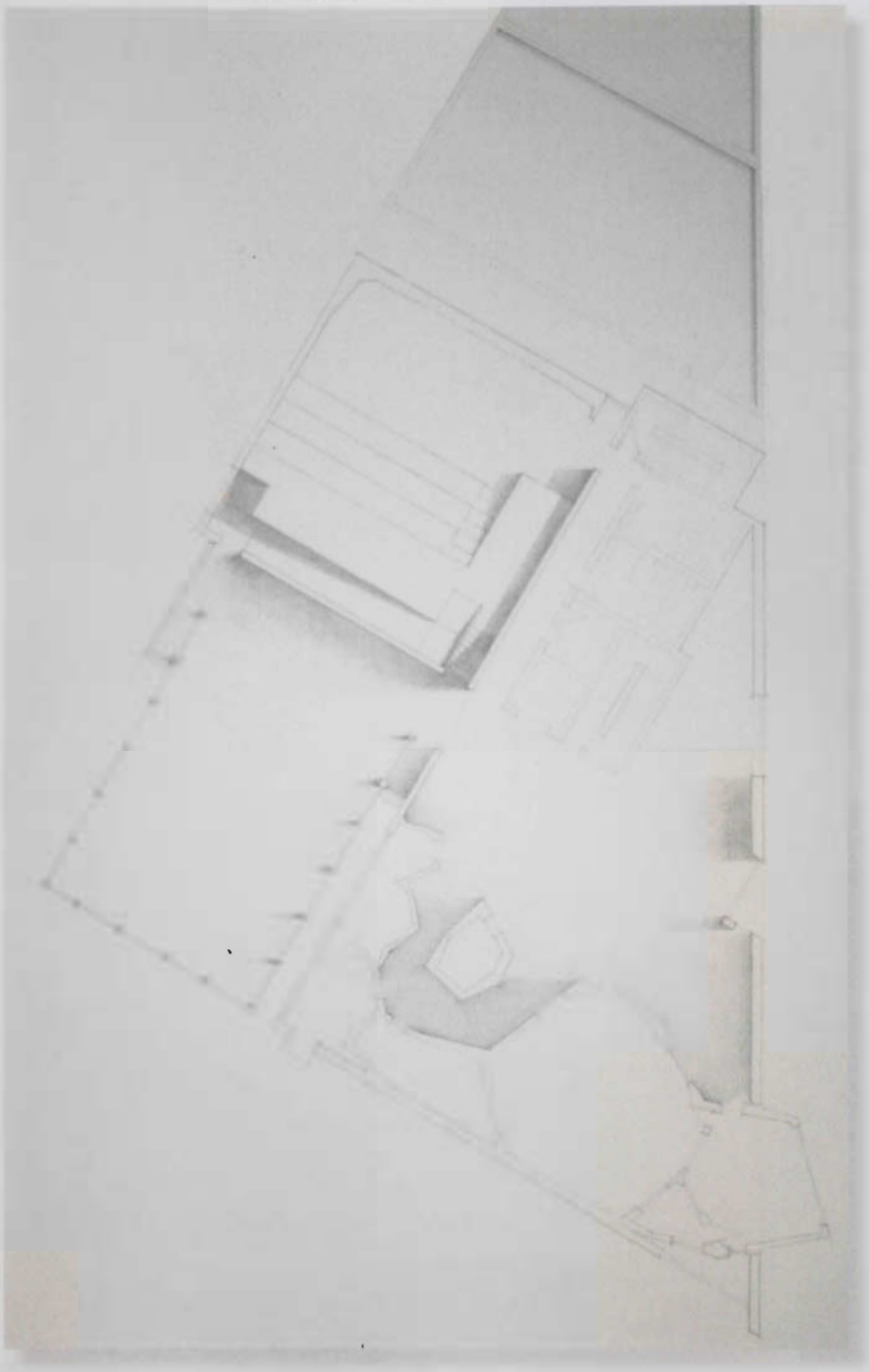
FINAL PROJECT | Floor Plans | Ground Floor



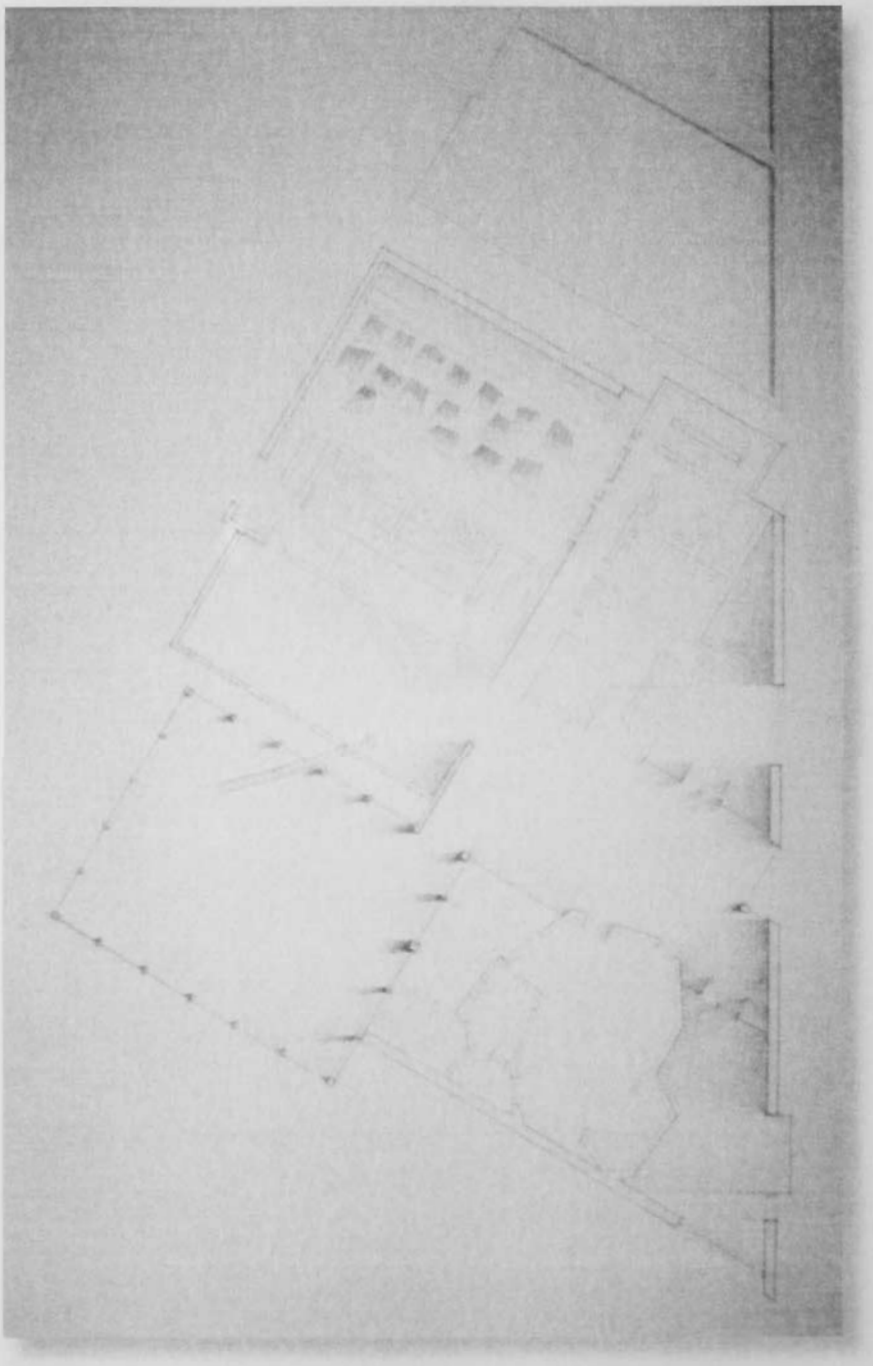


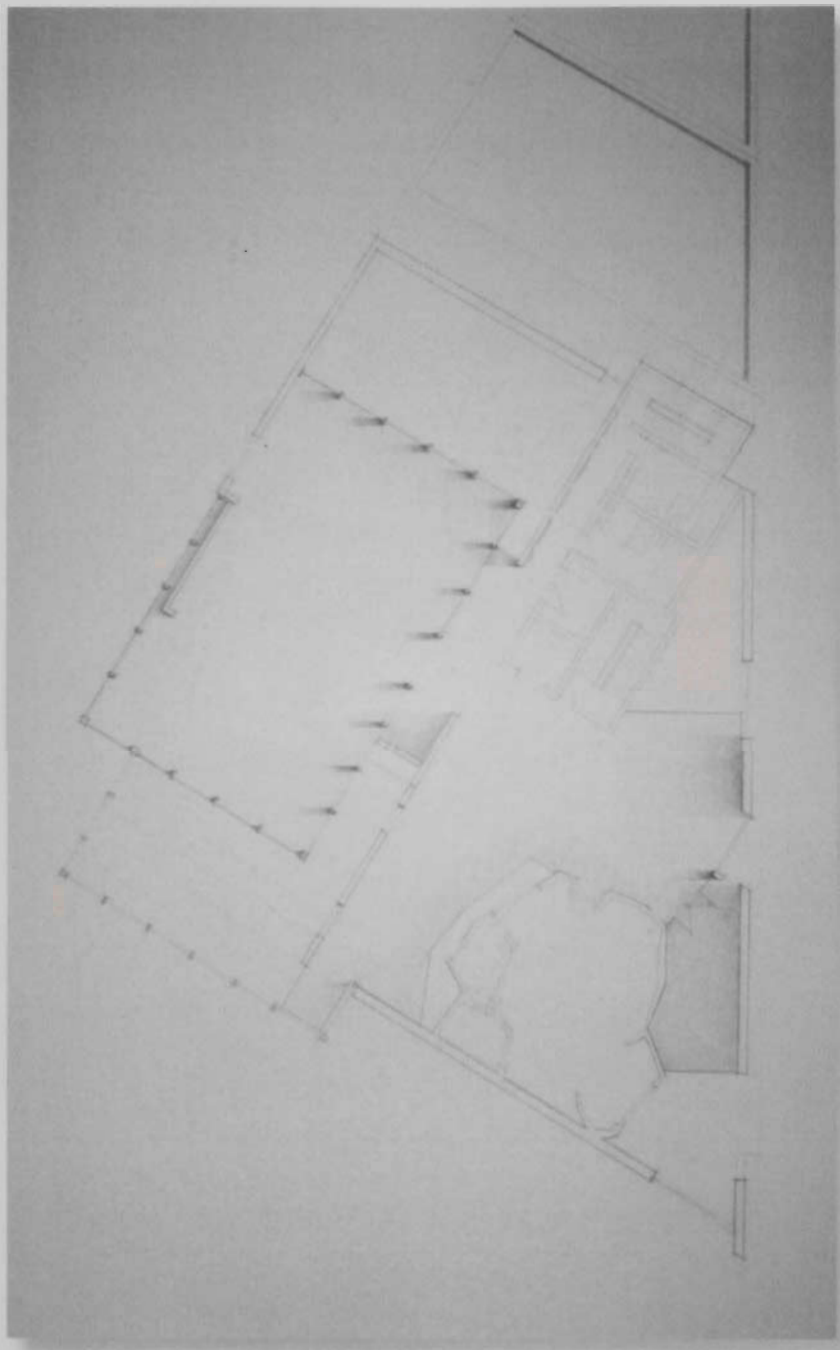
FINAL PROJECT | Floor Plans | 3rd Floor

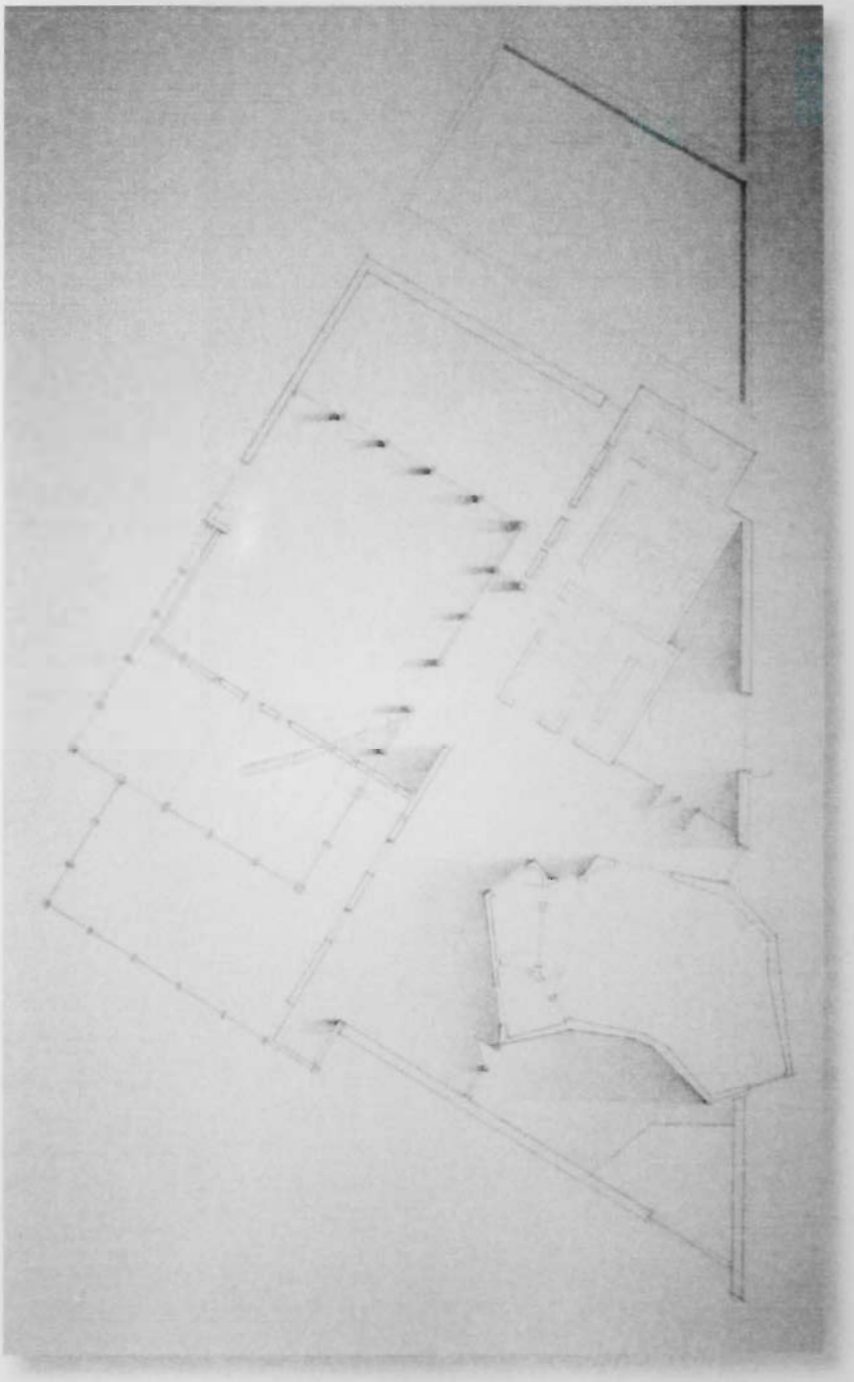




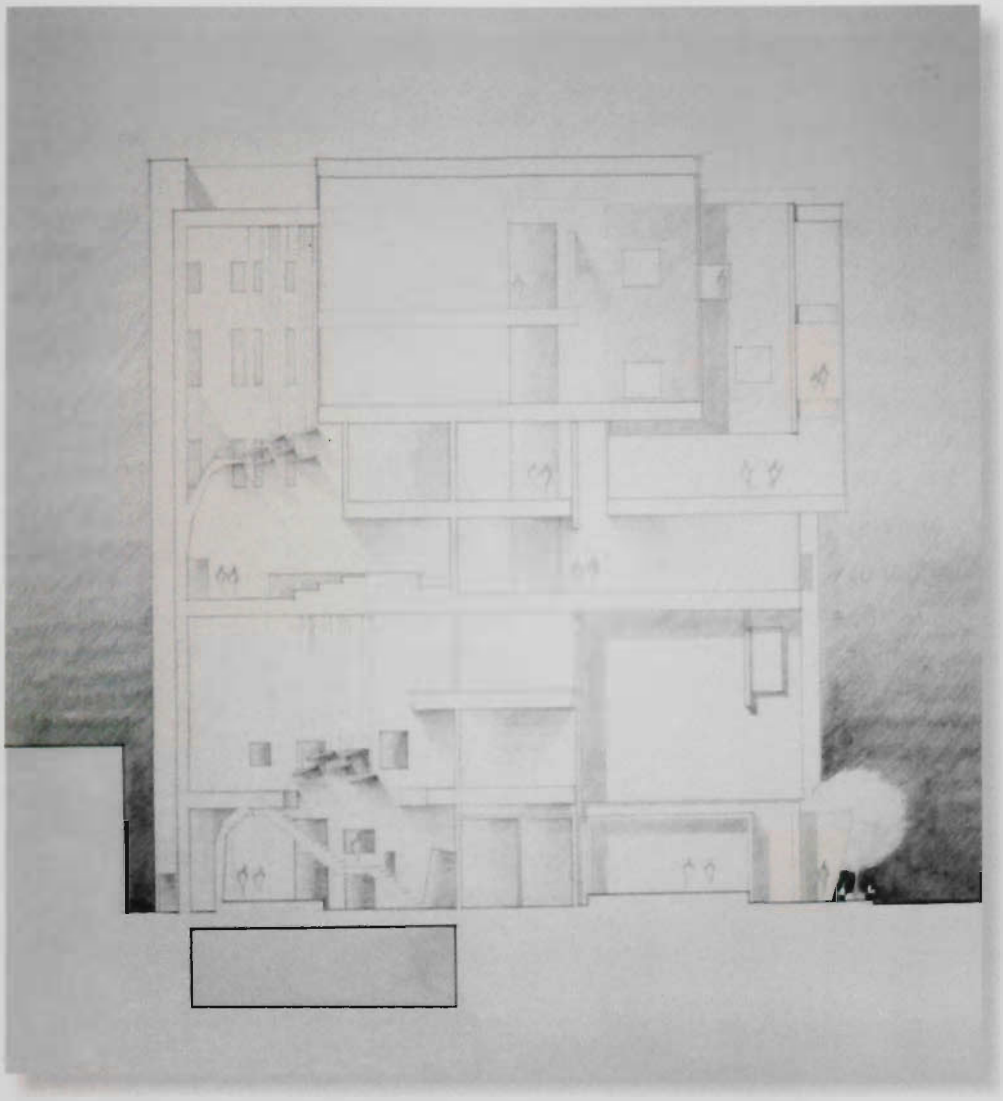
FINAL PROJECT | Floor Plans | 5th Floor

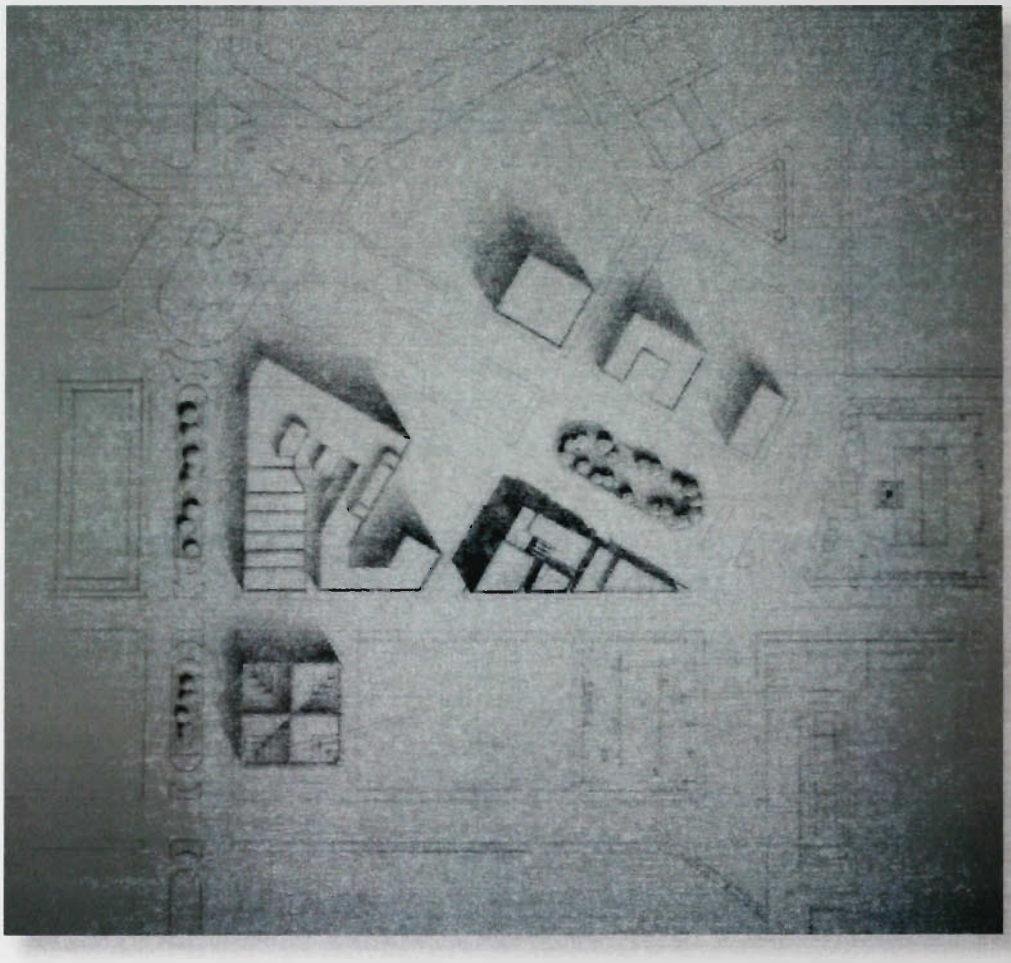


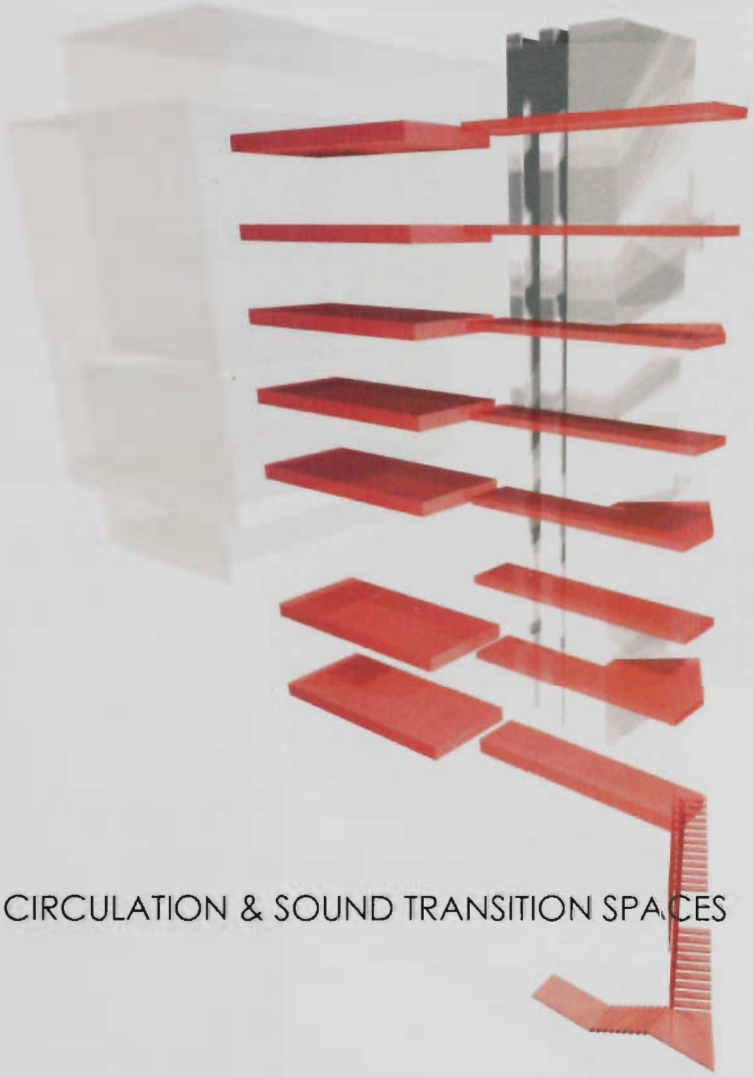




FINAL PROJECT | Section | Dance Studios | North to South

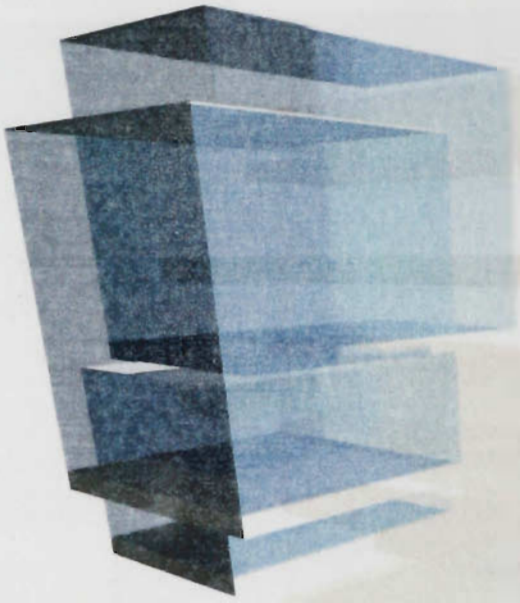






CIRCULATION & SOUND TRANSITION SPACES

FINAL PROJECT | Diagrams



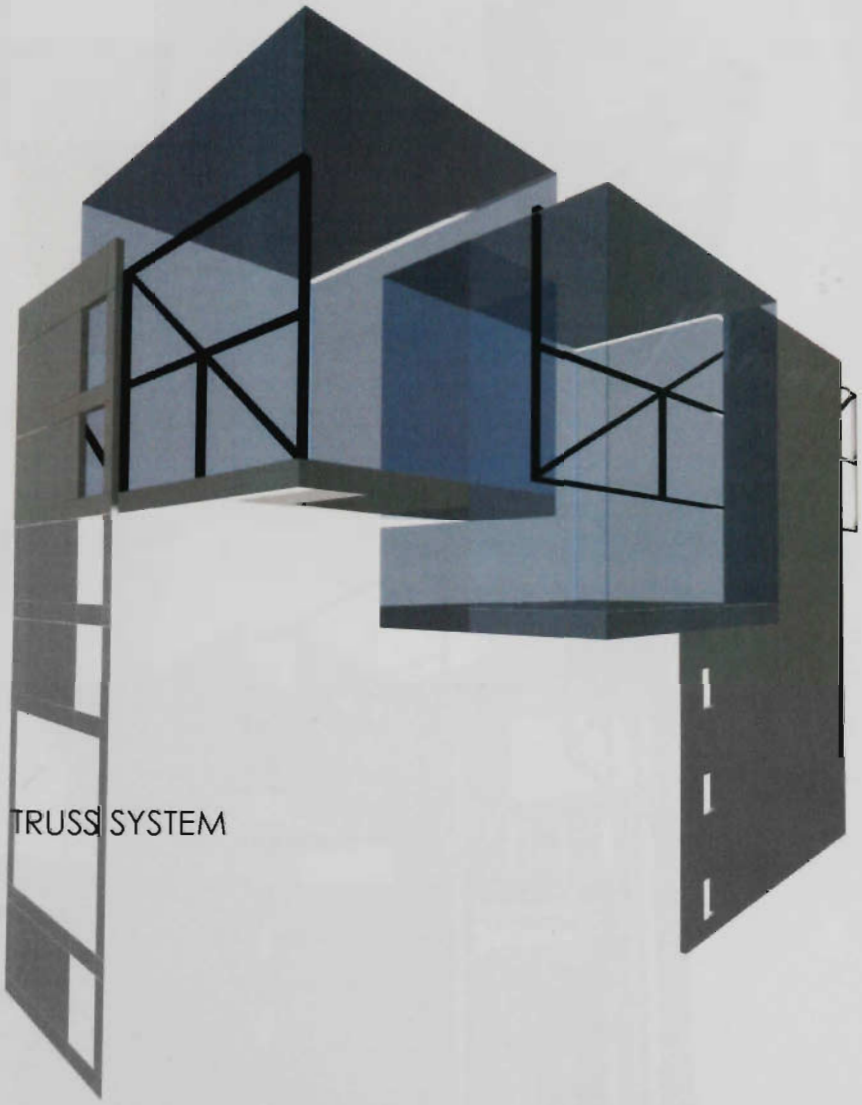
DANCE STUDIOS

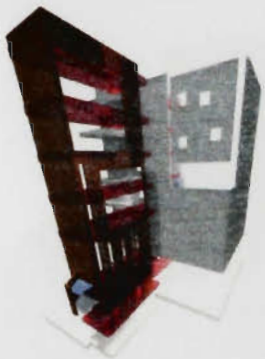
FINAL PROJECT | Diagrams

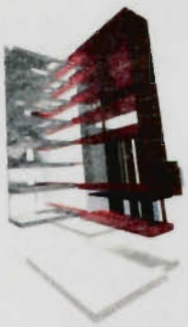
0101

SOUND STUDIOS

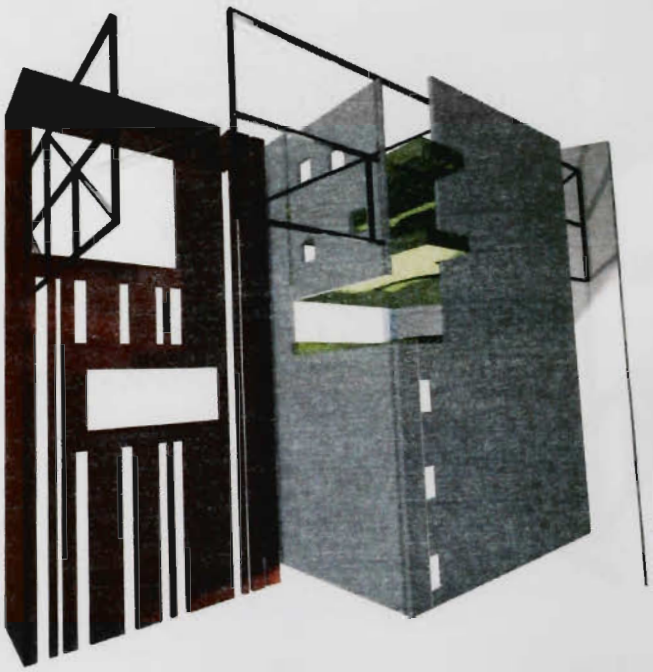
VERTICAL TRANSITIONS

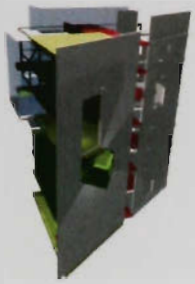

TRUSS SYSTEM



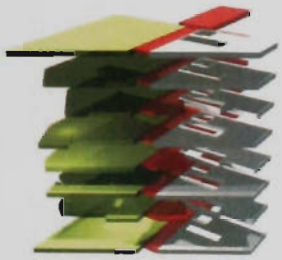


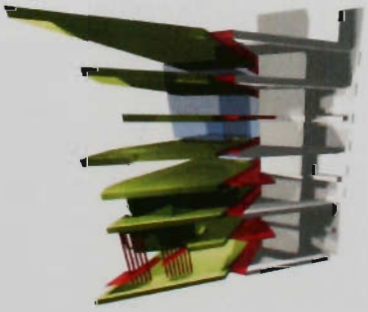
VIEWING SPACES





SECTIONAL DIAGRAMS





FINAL PROJECT | North Elevation

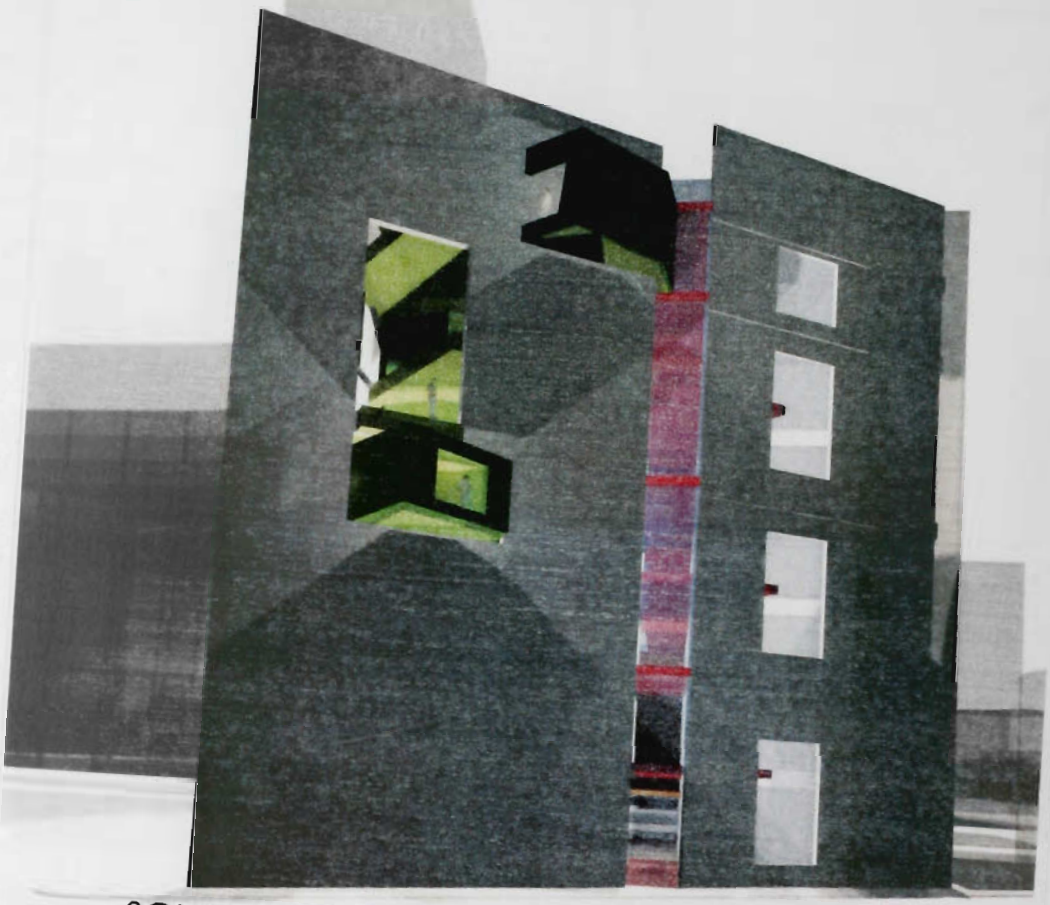
0106

NORTH ELEVATION

FINAL PROJECT | West Elevation

WEST ELEVATION

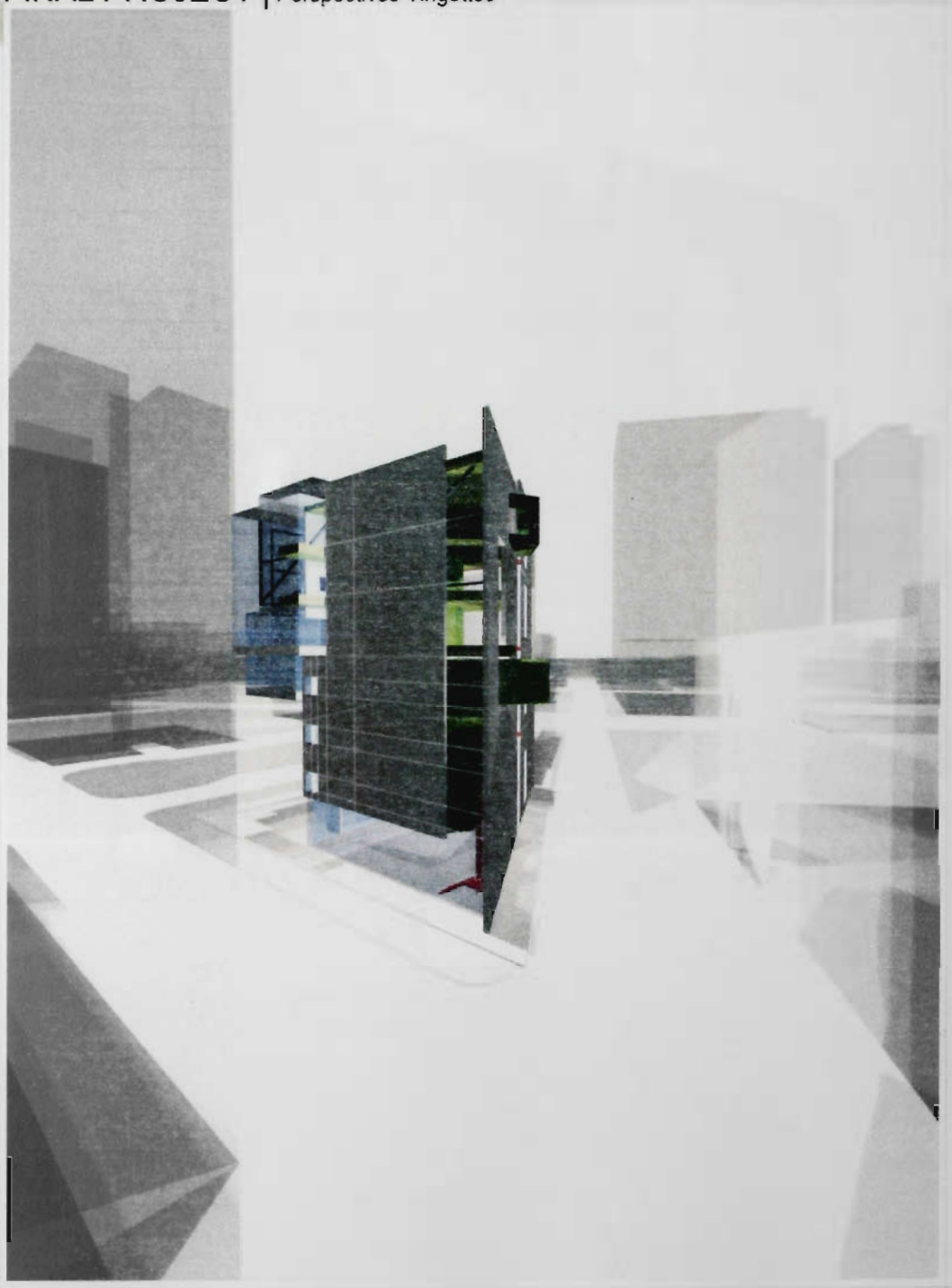
FINAL PROJECT | South Elevation

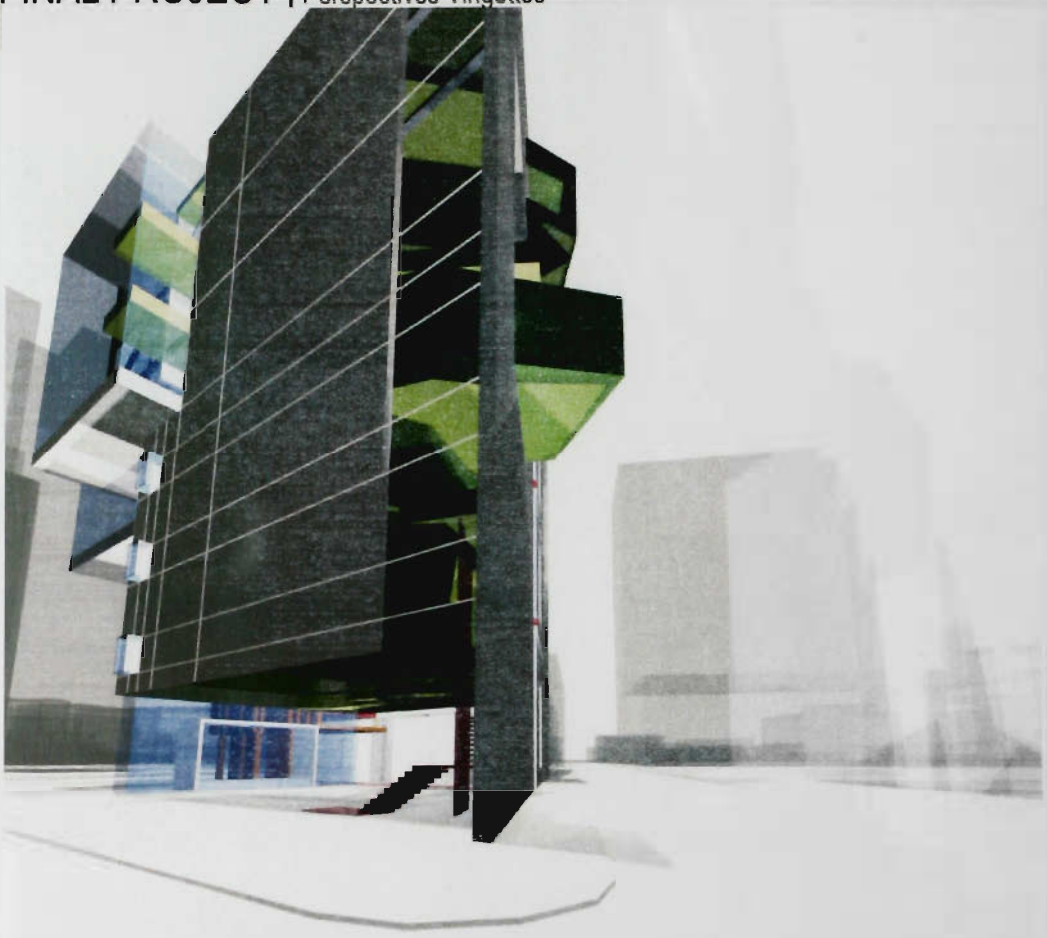


SOUTH ELEVATION

FINAL PROJECT | East Elevation

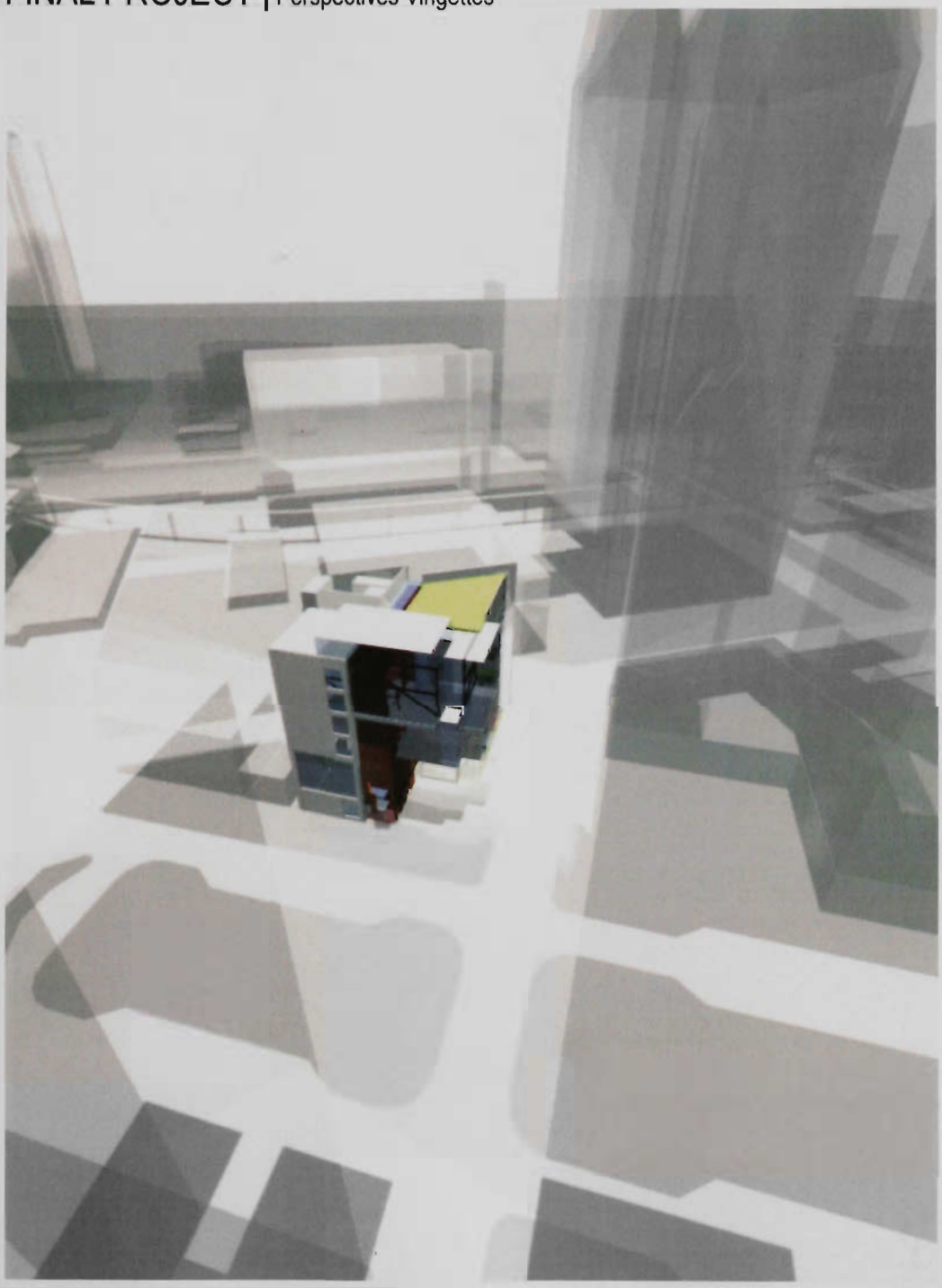
EAST ELEVATION

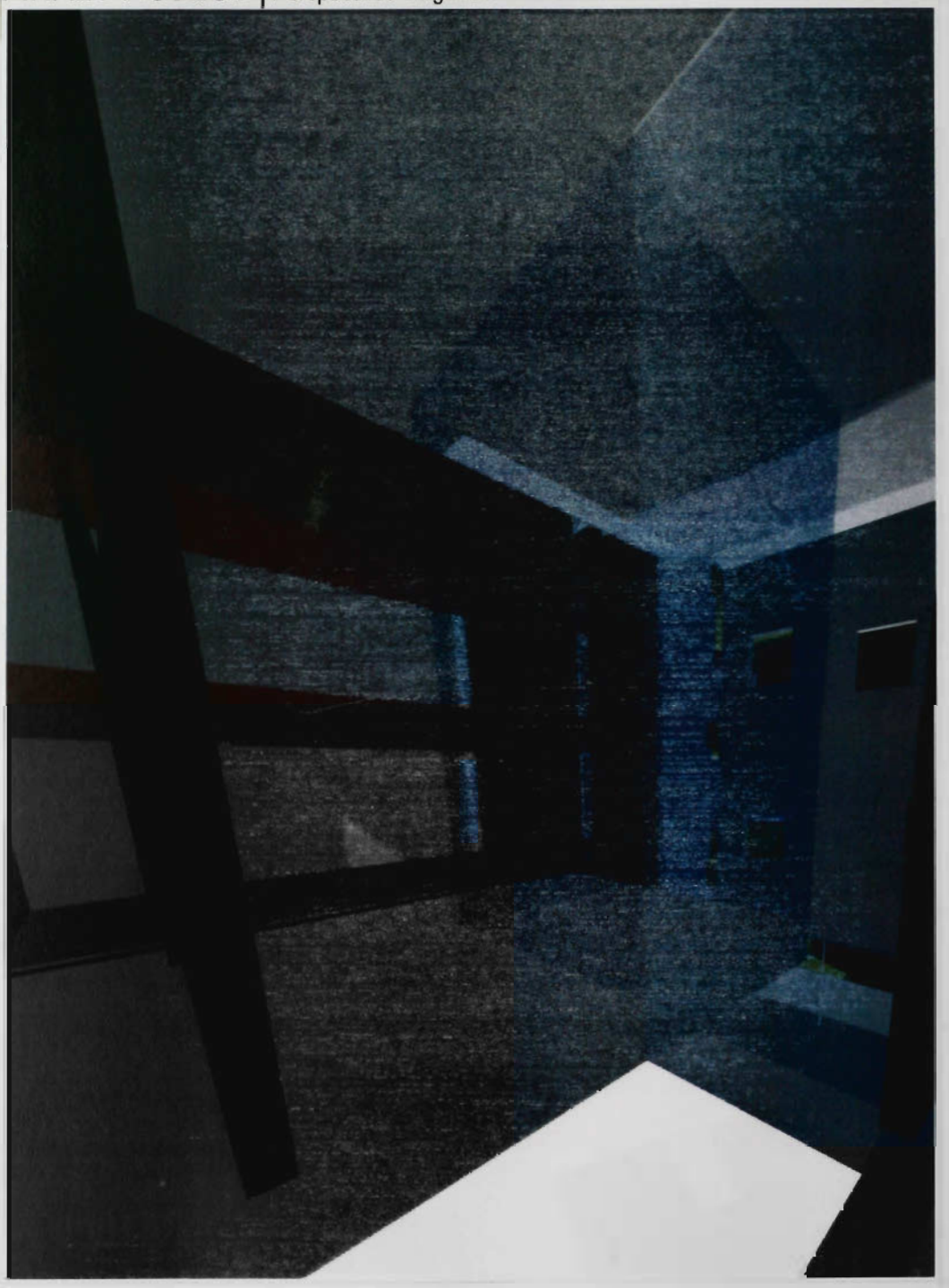




CORNER OF BATES AND CONGRESS STREETS

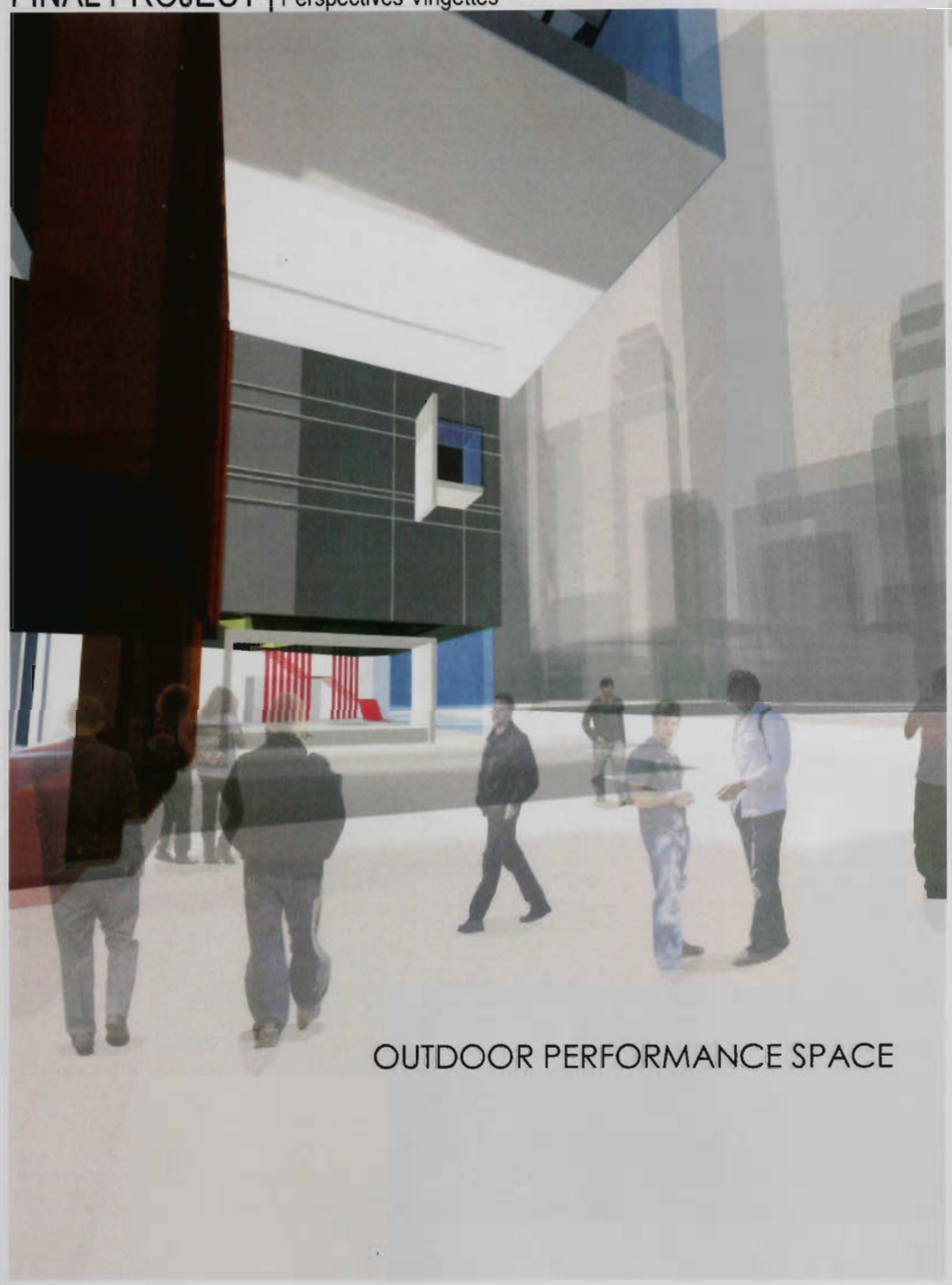
FINAL PROJECT | Perspectives Vingettes



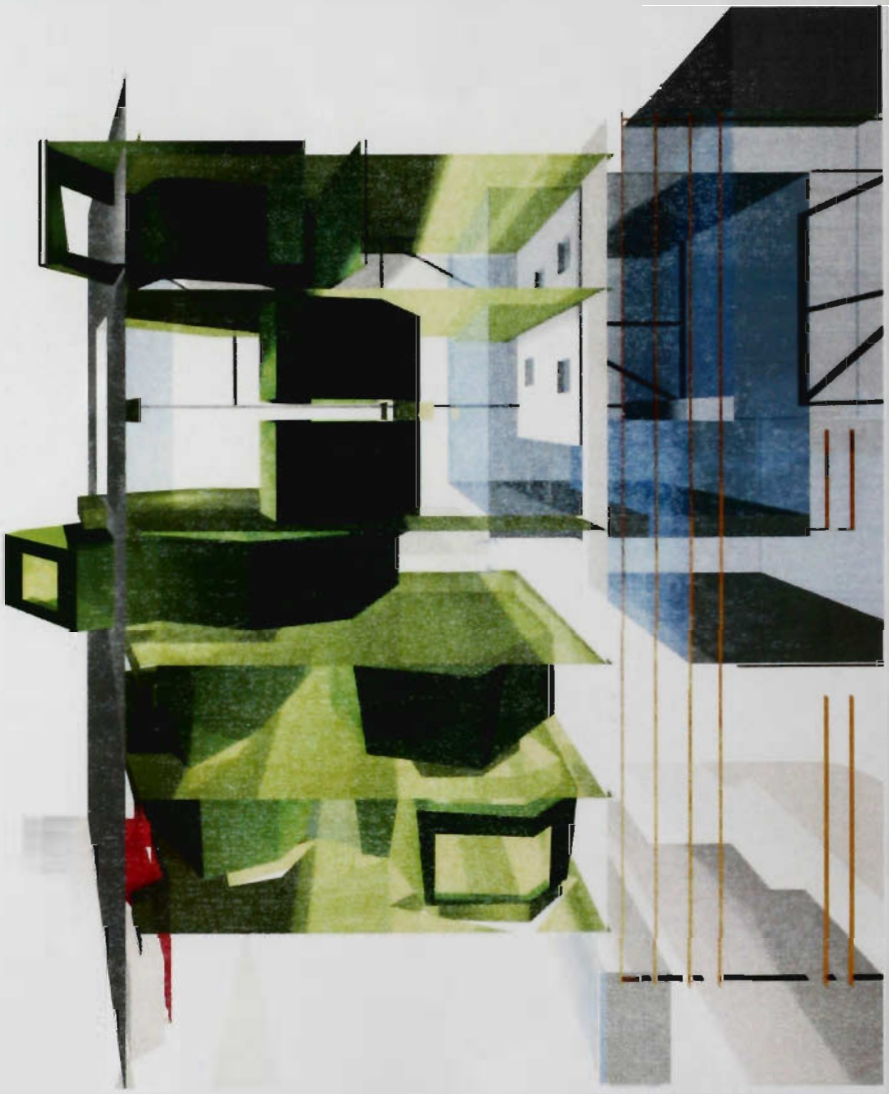


INTERIOR LOBBY PERSPECTIVE

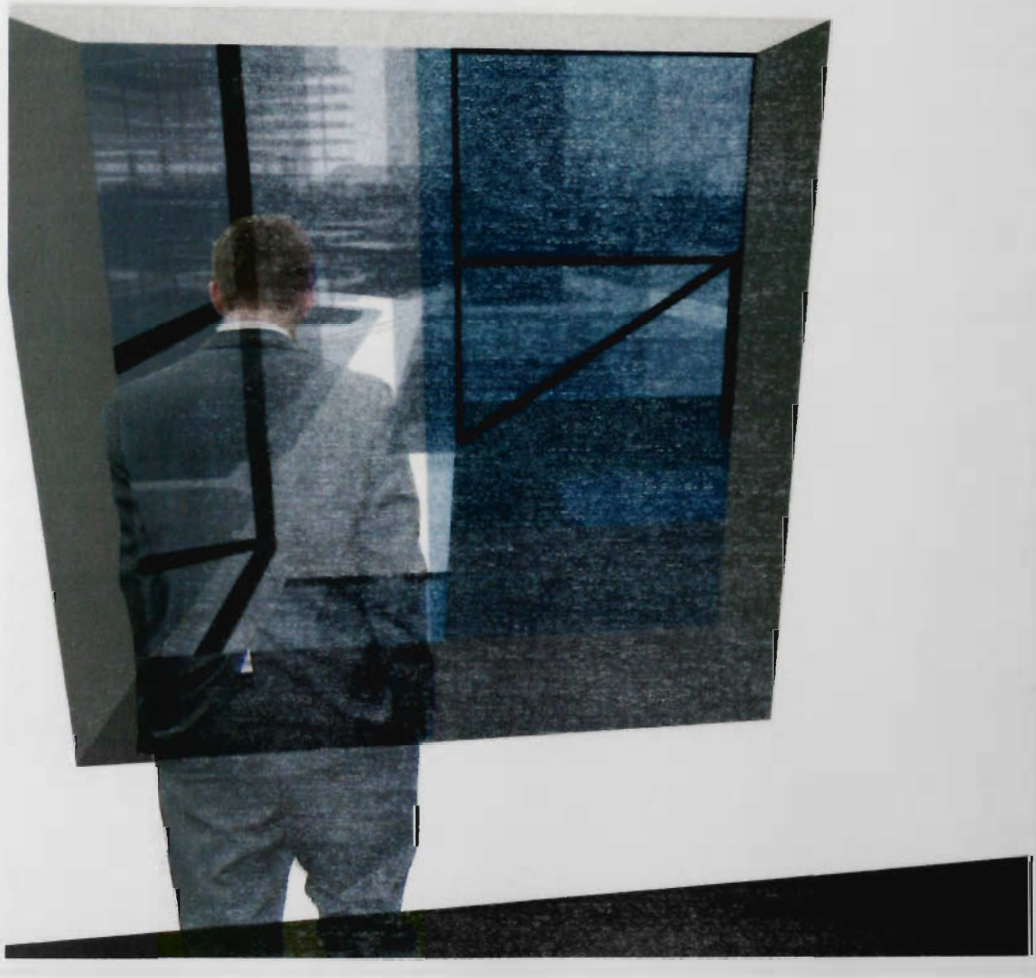

LOBBY PERSPECTIVE


OUTDOOR PERFORMANCE SPACE

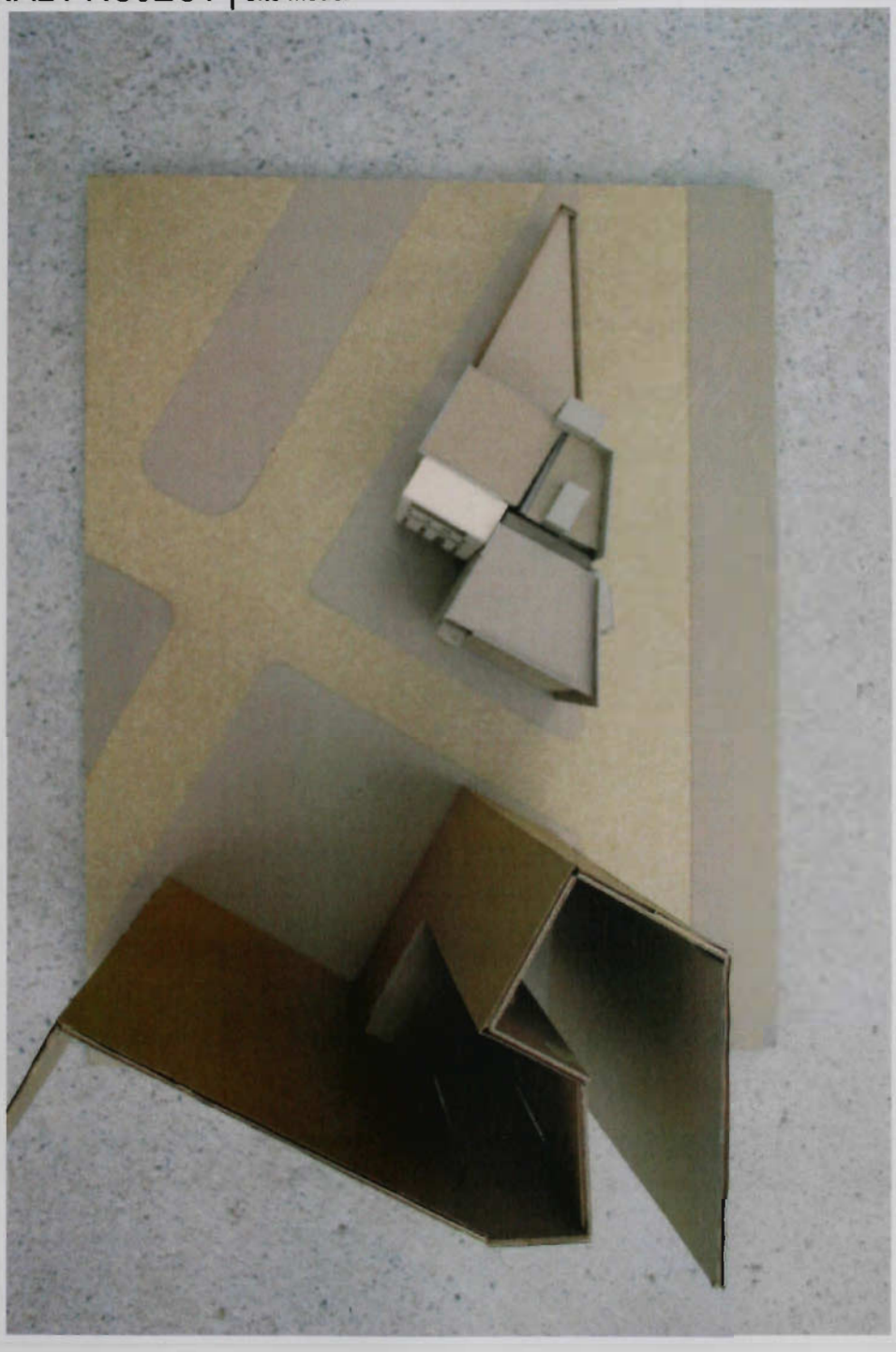
SECTION PERSPECTIVE



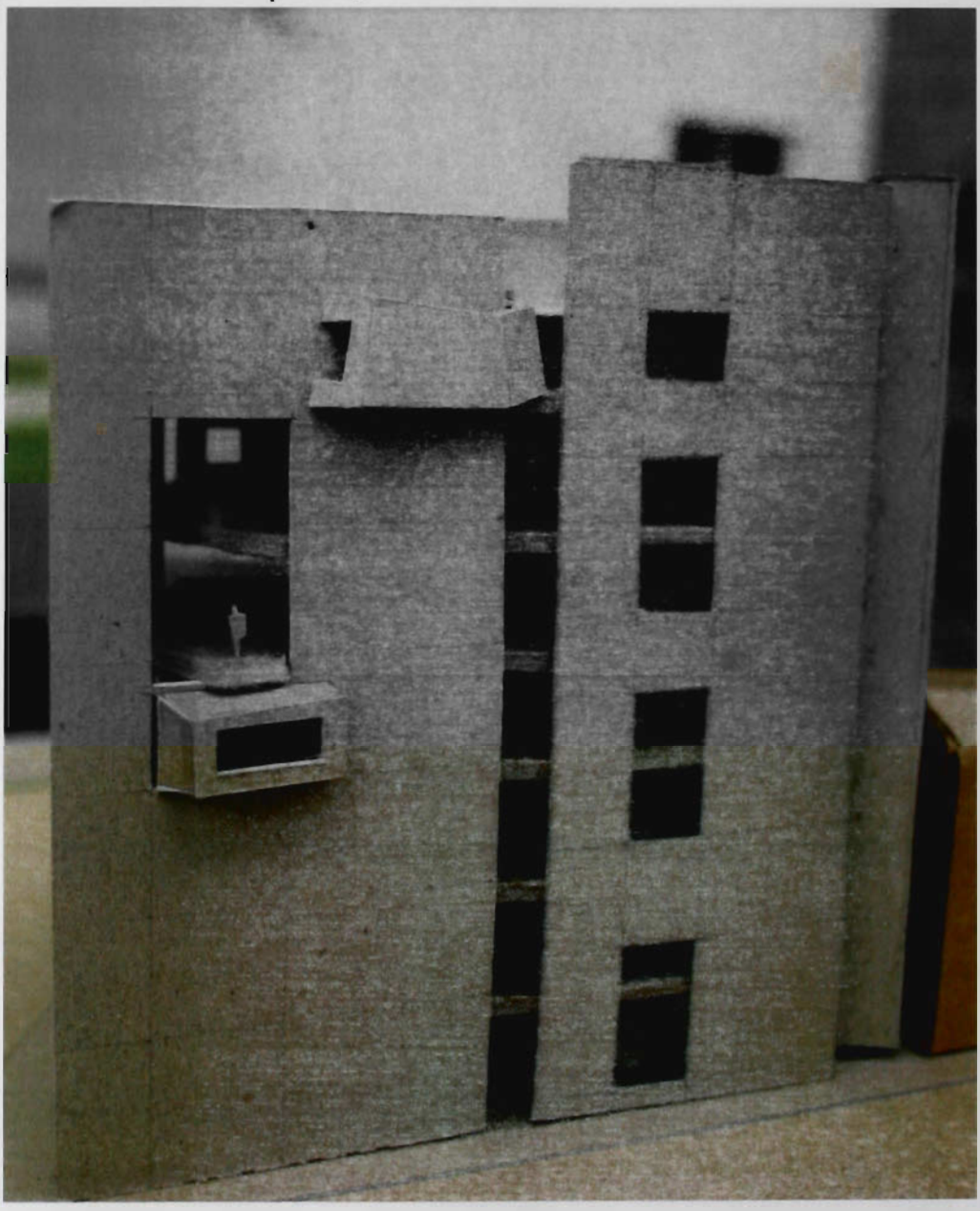
FINAL PROJECT | Site Plan



FINAL PROJECT | Site Model



FINAL PROJECT | Building Model



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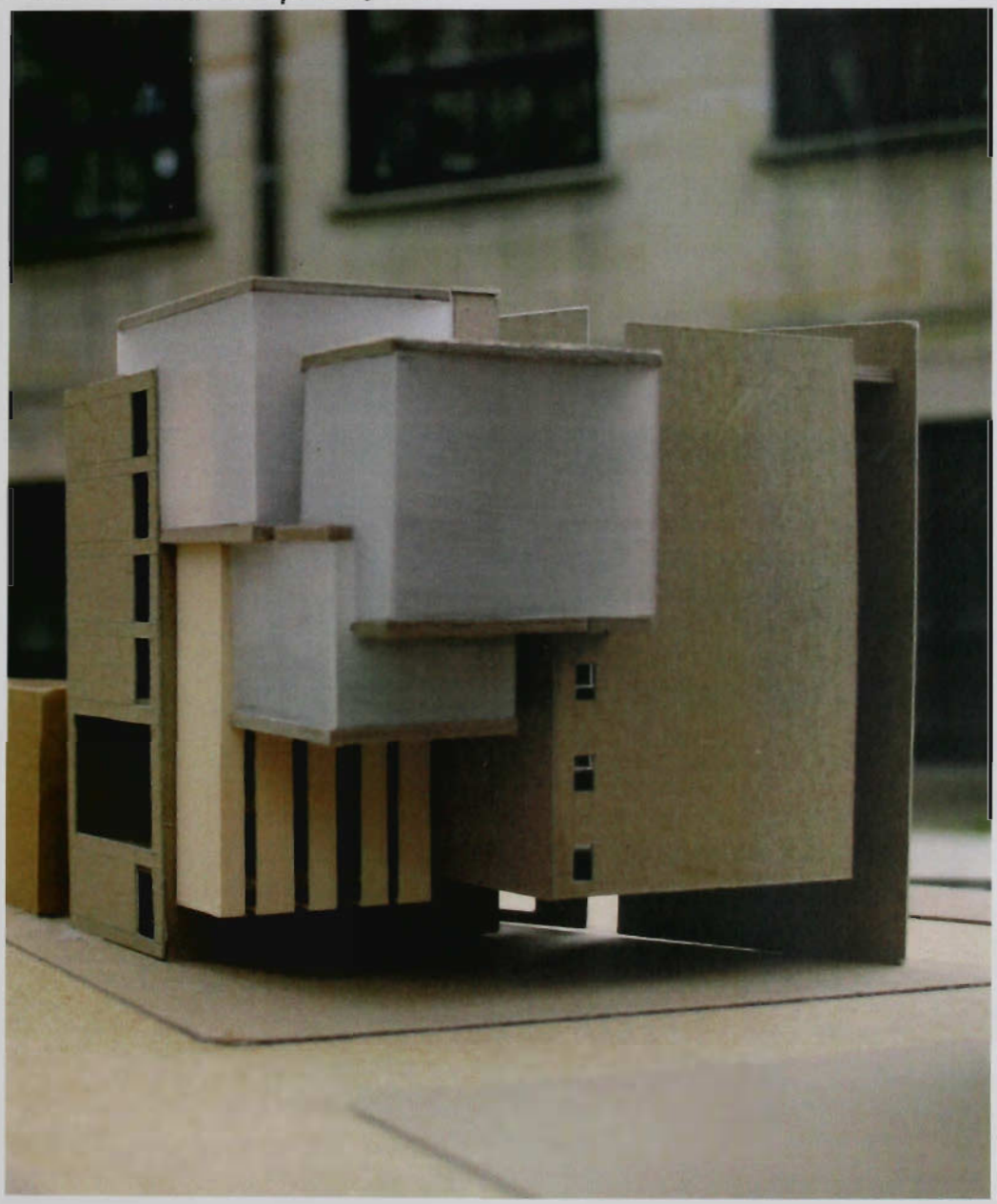

FINAL PROJECT | Building Model

FINAL PROJECT | Building Section Model

FINAL PROJECT | Building Section Model

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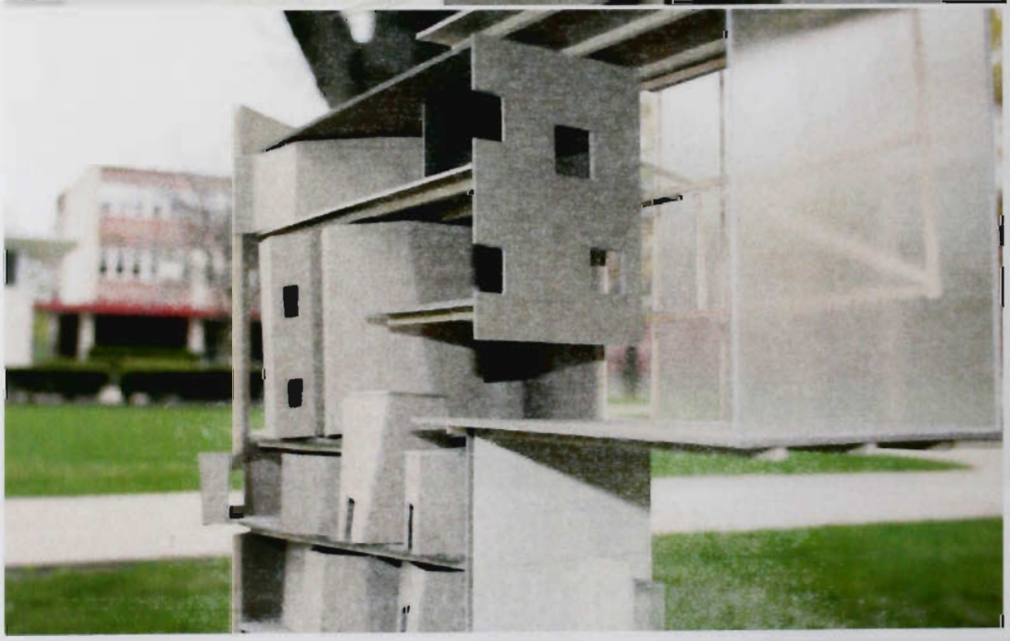

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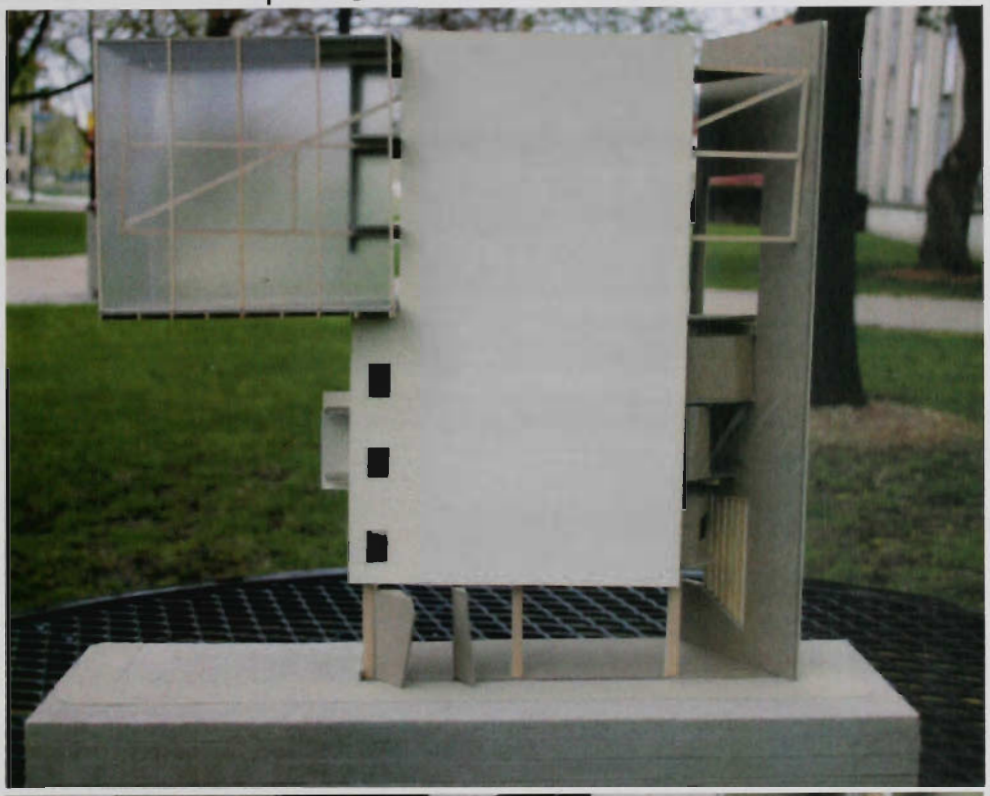

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ENDNOTES

[1] Egan, M. David. Architectural Acoustics. : McGraw-Hill, inc., 1988.
[2] Egan, M. David. Architectural Acoustics. : McGraw-Hill, inc., 1988.
[3] Rasmussen, Steen Eiler. Experiencing Architecture. 12th United States Edition. : The M.I.T Press, 1974.
[4] Lootsma, Bart. Wiel Arets Strange Bodies. : Basel Boston Berlin, 1996.
[5] Lootsma, Bart. Wiel Arets Strange Bodies. : Basel Boston Berlin, 1996.
[6] Slessor, Catherine . Concrete Regionalism. : Thames & Hudson, 2000.
[7] Slessor, Catherine . Concrete Regionalism. : Thames & Hudson, 2000.
[8] Lootsma, Bart. Wiel Arets Strange Bodies. : Basel Boston Berlin, 1996.