

TECTONICS:

AN INVESTIGATION OF A MATERIAL LANGUAGE

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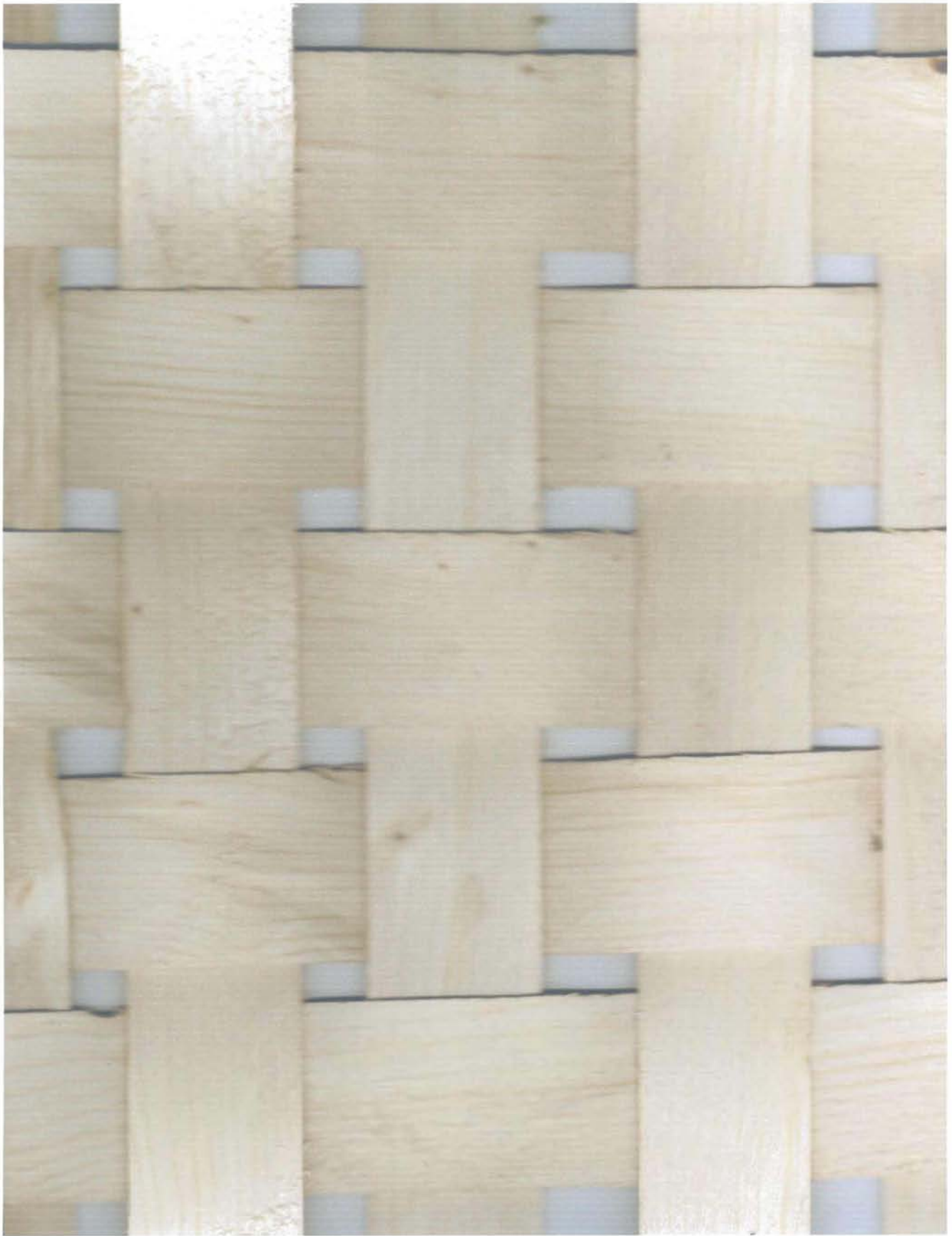
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ABSTRACT

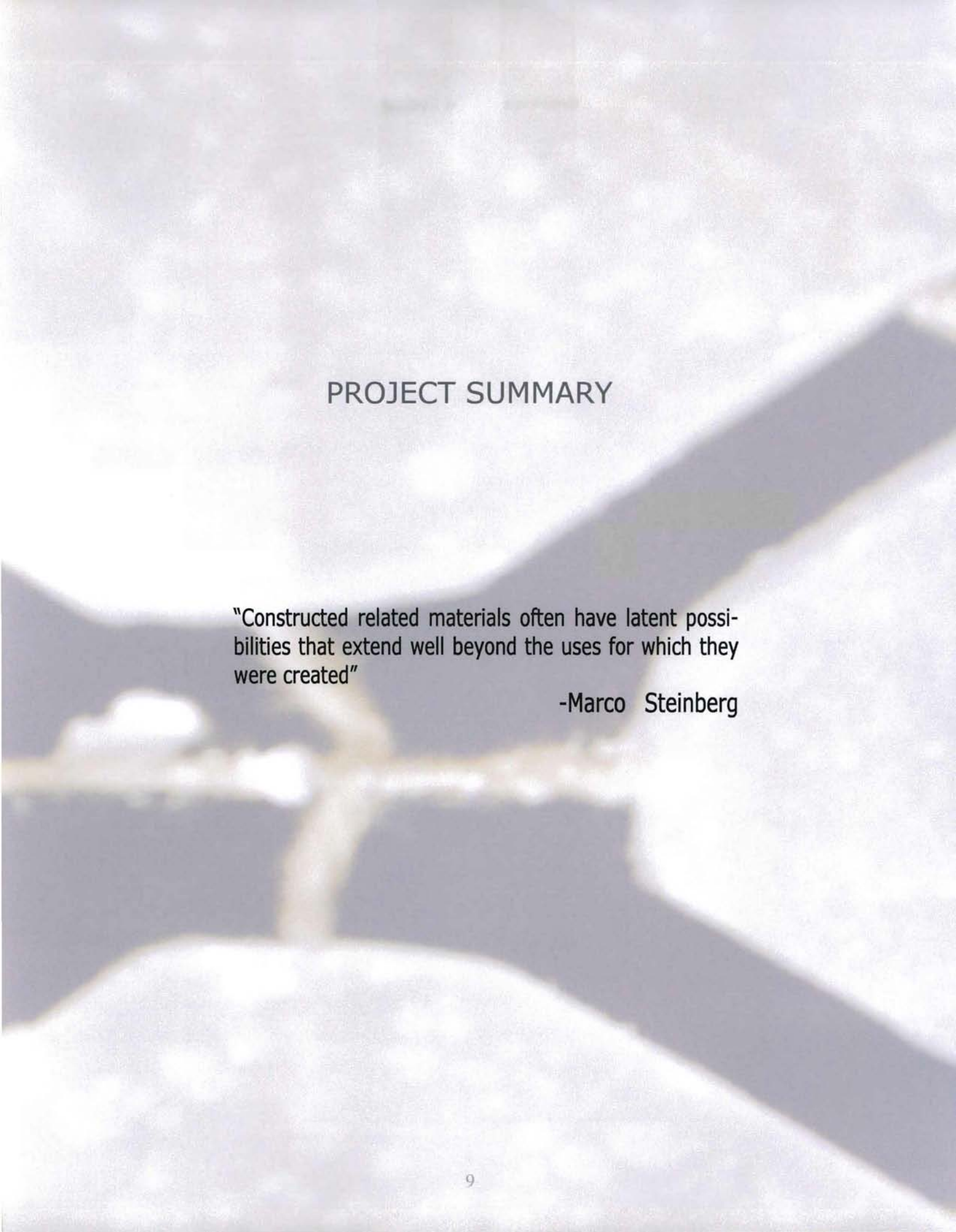
"You end up with a material so intriguing that it generates a project in your mind, an idea that you couldn't have had if you didn't have proper contact with that material and its properties"
-Sheila Kennedy

ABSTRACT

With the investigation of the tectonics of materials, primarily concrete and wood, this thesis begins to question and challenge the conventional uses and assemblies of these relatively common materials. The thesis begins to focus on the act of making, such as a cast of concrete or a carved piece of wood, and how such actions consistently play a role in the form and function of an environment. There is an opportunity to have a greater connection to the spatial awareness between the users of a space and the built environment. The methodology behind this thesis is reflective to the human scale and the human factor used to create a spacial condition.







PROJECT SUMMARY

"Constructed related materials often have latent possibilities that extend well beyond the uses for which they were created"

-Marco Steinberg

PROJECT SUMMARY

Materiality is constantly around us. It is in the cured concrete slab beneath our feet, in the porous brick on the walls, and the smooth finished ceiling plane above us. All of these characteristics of materials are in direct relationship to the process used to create them. The finish of the concrete floor can only be achieved in the craftsmanship of the framework and the pouring of the cement. The strength and texture of the wall can only be achieved by the baking of the individual brick and the precision of hand stacking them. Not only do these materials take their form from the process used to create them, but they can also begin to be influenced by the users of the spaces.

The built environment of this project will begin to emphasize and embrace the disconnect between the scale of the body and the scale/tectonics of the materials. The interior lining is geared towards the scale of the human, encompassing both textures and materials. The exterior lining will begin to address and manipulate the larger street scale to allow for a more connection between it and the body. The environment creates a separated built space secluded, yet encompassed by the surrounding landscape.

This will be accomplished by creating both loops and circuits. The interaction between the circuits and loops help unify as well as contain both programmatic as well as circulation aspects of the built environment.

"Materials are used to evoke the authenticity of an experience"

-Sheila Kennedy

The loops will move in a north-south orientation on the site and will encircle/ enfold the users as they occupy the spaces. The tectonics of these loops will focus primarily on the process used to cast concrete, as well as paying close attention to the view of the adjacent Detroit river. The circuit of the project will be the running/ multipurpose track. It will surround the built environment and allow the user to join/ exit as they wish as they progress through out the spaces.

With the design of "running, stretching, swimming, and lifting" this thesis begins to interweave the relationship between the materials around us, the space they occupy, and our human bodies. The "running, stretching, swimming, and lifting" begin to address the surrounding environment by incorporating both the tectonics of materials and the tectonics of the body. With the investigation of the capability of materials, both common and uncommon applications, this thesis begins to investigate both the process of building and its ability to influence our spatial understanding.





THESIS

"You think materials as being motionless. In reality, many of the materials I work with have to move , or at least they're moving while we're forming them"

-Michael Cima

TECTONICS: An investigation of a Material Language

“Construction related materials often have latent possibilities that extend well beyond the uses for which they were created.”

Marco Steinberg

The role of the architect is unique from that of any other profession. There is a large focus on the scientific aspect, but there is also an equal focus on the art of a building. Both of these thoughts play a strong role in the materiality of the building. Although there are many qualities of today’s architect that has been lost, there is still the need to focus attention to the skin and bones of a building, more specifically its materials. The architect of today’s architecture is not and cannot be as connected to his or her work as in previous times. One culprit to this occurrence is that of technology. With all of the advances in 3-D design, drafting, and modeling, it is almost unreasonable for an architect to not utilize these instruments to their fullest. The architect can complete an entire project without actually being directly involved in the project as a whole. In addition, the division of labor since the industrial revolution continues to reflect increasing specialization, which has progressively diminished the role of the architect, especially in the area of construction. This narrowing responsibility has also led to architects being further subdivided into categories such as technical, artistic, and theoretical—preventing us from becoming a coherent voice in society. ¹

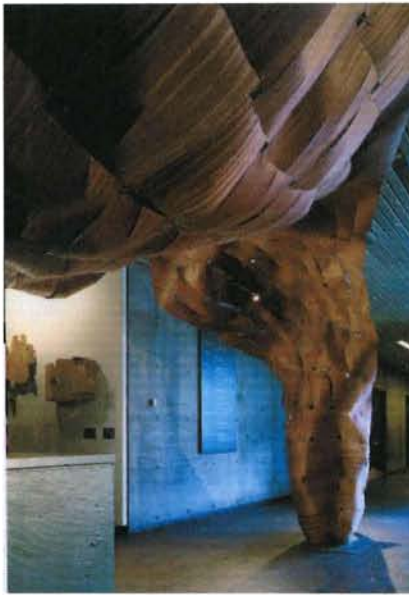
Along with these ideas of why the architect is currently so disconnected with the architecture they are designing, is the fact that the architect is so disconnected with the materials and the application of the materials towards the project. From the stand point of an architect, it is easy to say that an architect can take on the role of every subdivision of labor in a single project, but in reality there is a reason the

field of architecture is so divided. When the aspiration pushes beyond simple utility of building to architecture, it is the architect who pushes the assemblies and their joints by massing, shaping, surfacing, and profiling.² Although these topics are important and stem off one another, I have chosen to focus this thesis project on that of materials, process, and their application. This thought can greatly be summed up in Marco Steinberg's quote stated above.

This thesis project focuses on the possibilities of current materials but applied in creative ways with architecture. It requires a hands-on approach which has become lost over the years. "As new materials are invented and technological advances made, architect practice has moved from working within the limits of static materials to transforming them into dynamic elements by combining, laminating, casting, and weaving. We can vicariously experience the fantasy of immortality through technological innovation, as it is conceivable that we will soon be able to create invincible materials".³ Although there will be unique and unimaginable materials in the future, there should be a focus on re-exploring "conventional" materials. Once the "conventional" material is studied, it can now be the job of the architect to challenge its inherent properties and apply them in more prosperous ways. "Historically speaking, the discovery and utilization of materials such as concrete and steel changed the course of architecture. In considering applications of new materials, we soon realized that research on innovative methods will have a profound impact on conventional design methodologies, general conceptions of form, and modes of production".⁴

Not only is it important in the field of architecture for architects to be involved in the research and application of materials, but it is also important for architects to take a "hands on" approach. "We talk as though good material were found instead of being made. It is good only because workmanship has made it so. Good workmanship will make something better out of pinchbeck than bad will out of gold. Some materials promise far more than others but only the workman can bring out what they promise".⁵ So as progression of this thesis occurred, the focus became a combination of the tectonics of both the material as well as the human body/ scale. With the investigation of both common and uncommon materials, the process used to create them, and the process used to transform the "raw" material into one cohesive structure. This will allow for an environment that will incorporate both the process the structure went through as well as the spatial relations that the human experiences.

The start of this thesis began with an investigation of materials. It was the interest in the “everyday” materials that then began to influence the different possibilities that they could possibly have. “New materials provide designers with significant possibilities for shaping space and fabricating with new methods, yet many opportunities for innovation exist within traditional materials as well”.⁶ The precedent study “Edge” by Nader Tehrani, Kristen Giannattasio, Heather Walls, John May, and Richard Lee, helped with the idea of innovative material studies, containing “common” materials. It was this small group of designers that explored panels of plywood combined with rubber to form an unconventional fabric inspired skin.



They took an everyday common material that for the most part is not thought of as being “flexible”. Manipulating a single sized unit and connecting it to itself they were able to create a larger cohesive form work. Therein lies the seduction of this exercise: the idea that the requirements of traditional tectonics may be challenged and indeed overcome through the invention of a new system of units. “The aim then is to demonstrate the flexibility of a single medium when confronted with unconventional problems”.⁷ Their project as a whole incorporates an already existing material combined with technique, as well as the tectonics to create of a new skin type and also a new process for bending plywood. The project is not as much about the end result, but more rather about the process and getting the architect intimately involved with the material.

This precedent led to studies involving wood and concrete. The tectonics of the wood as a material and its flexibility became the main focus for one preliminary section of the project. It is the stacking of wood and incorporating a new material contained within the slices of wood that became the fascination. Once again, it was not as much as the end result as it was the process of studying the wood and its characteristics to develop a method of stacking. These were the exact thoughts of one studio's project. One such assignment was; "Make a vessel out of concrete that will hold and pour a gallon of water. Critique, revise, and repeat. Embedded in this seemingly simple statement are numerous key principals: the idea that the student uses her own hands, drawing on her own skills and resources, to fashion something out of a raw material; the idea that the thing has a typological correspondence to things already existing in the world: the idea that the thing is made with a predefined material with its own behavior, history, technical requirements, body of research, and cultural memory."⁸ This studio took this way of thinking and applied it completely towards all of their assignments. The only way to have a successful project in the end is for the creator to be strictly involved with the material in a "hands on" approach. It is only then will they understand the material enough to allow for a project that understands the core qualities that make up the material.



Another material that must mandate its creator to become involved is concrete. Just the components, and process needed to make concrete is a prime example of how much involvement it really takes to create it. The interest of concrete lies in its latent possibilities primarily due to its components as well as its process. "The beauty of most evolved casting techniques lies in both the sensitivity to the properties of the cast material and a pairing of those properties with an appropriate method".⁹ Just the fact that the formula for concrete is cement, gravel (or any aggregate), sand, and water allows for flexibility

in the mixing of the cement. It is here that it is possible to ask what happens if there is more sand or aggregate. What happens if you substitute an alternative liquid in place of water? It is these types of questions that begin to allow for an exploration of such a conventional material that will result in alternate uses. Although it is possible to incorporate these thoughts and methodologies into a physical built environment, it would be more fruitful to combine these thoughts with a program/ building type that will best utilize the methods and experiences for the occupant.

“The materials that surround the human body, including clothing and shelter, function as boundaries that mediate between the body and its environment”.¹⁰ With this thought in mind, it made sense that the “program” aspect of the project would intimately involve the human scale and materials. This led to the exploration of common human experiences and actions; the act of running, swimming, stretching, weight lifting, yoga/ dance, and a multi use court. By combining the different actions with the material studies, a direct correlation between how a person inhabits a space and how the materials and their process can inform the space become the main focus/ goal of this project. Morphosis architecture group took similar thoughts while creating the Campus Recreation Center at the University of Cincinnati, Ohio. “With the muscular body of an athletics compound, the slit eyed head of a dorm, the diaphanous wings of a swarm of lecture halls, and the robust belly of a food court”.¹¹ Even in the description of the “built” environment, there is a link between that of an average building and that of human characteristics used to describe something built and intended to be inhabited. By incorporating human experiences and the built environment, the human characteristics can begin to merge with the building characteristics. They achieve this by manipulating the materials to achieve more human qualities as well as with the interweaving of the programmatic spaces, which allow for each individual space to be aware of the adjacent spaces.



“Material can be a progenitor for form”¹² The new “built” environments; the running, swimming, weight lifting, stretching, yoga/ dance, and courts, are created out of the materials themselves and what they are capable of achieving. The materials begin to “inform” and “filter” the experiences that the program supports. They take into account what exactly is occurring in, around, above, outside, inside, and adjacent to the activities. By engaging in the built environment, the users are forced to adapt and utilize the spaces. “Materials are used to evoke the authenticity of an experience” -Sheila Kennedy. The built environment will filter the user from the scale at the street level, through to the more rural, less built scale of the site and ultimately to the river front.

The built portion of this project closely relates the skins of the interior with those of the exterior. These skins need to address the micro scale of the human on both the interior and exterior, but it also has to address the macro scale of the city and the landscape on the exterior. While the occupant is on the interior of the space and utilizing it for whatever the program implies, the scale, tectonics, textures, and scale will all be geared around the scale of the human. As the progress through the built environment they gradually pass from the “micro” to the “macro”, which will be more of a scale of an exterior environment, or a cityscape.

The concept of the separate skins derive from the idea that a cast, predominately that of concrete, has positive, negative, good, bad, and smooth, or rough surfaces. In general a cast has a smooth or rough side depending on the desire of the craftsman because there is only one exposed edge. A smooth texture can only be achieved by utilizing a material that will have a smooth texture, which can only be accomplished during the building of the form work. “It is sensory and tactile: things are heavy or light, rough or smooth”-Toshiko Mori. It is with the casting of concrete and the stacking of wood that these results will begin to take form.

This methodology then influenced the site layout and strategy. The built environment and landscape are as equally important as the built program spaces. The exterior spaces are viewed as usable spaces and allow for the programmatic spaces to spill into the exterior, making the design of them just as challenging as those spaces on the interior.

The site strategy was initially influenced by the Detroit river, paralleled to the shape and occupancy of the site itself. By viewing the site as thin strips from the river to Jefferson, there immediate became a rhythm that could influence decisions made as the project progresses. Paired with these ribbons, are the two ribbons in the opposite direction, creating a pocket in the landscape which is influential in the design of the programmatic spaces.

By incorporating materials and material studies, parallel to site studies and strategies, there is now the foundation for a design method and process. This thesis project can and will only be successful if these studies are rich enough to influence in the design itself. Although the final result may not be a completely cohesive project, it is the focus of these studies and the process that become the important focus in this thesis investigation.





PRECEDENT ANALYSIS

"Materials are used to evoke the authenticity of an experience"

-Sheila Kennedy

PRECEDENT ANALYSIS

Sheila Kennedy
+
Franco Violich
KVA Architect



Model of Terminal, View from River





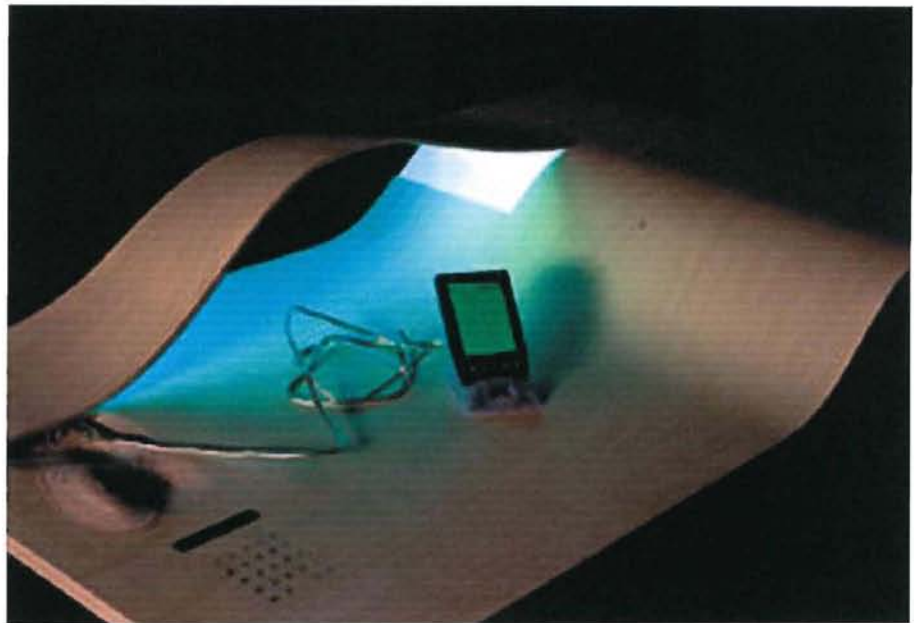
The East River, New York, NY.

The East Side River Ferry Terminals are located along the East River fronts in Manhattan New York. The East River connects Long Island Sound with the Upper New York Bay. It is a good transportation means to see the city from an “on the water” view point. The firm that is completing the work along the East River is KVA Kennedy & Violich Architecture Inc. KVA was founded in 1988 by Sheila Kennedy and Franco Violich. They are a practice that aims to explore

newer possibilities in both architecture as well as urbanism. Along with design KVA incorporates a strong focus in both programmatic building design as well as an approach to problem solving combined with research. KVA also includes collaboration with artists, educators, and community members. They also work extensively with new technologies such as seating, furniture, and also lighting. KVA also strives to complete cost effective, innovative architectural projects eared towards their clients needs.

KVA also tries to rethink and re-utilize current and everyday materials in a newer and unseen approach. They view current materials as having an almost disconnected feeling from the site, due primarily to the fact that most materials are pre-formed. KVA aims to take a standard material and re-form the characteristics of the material and apply it in a new form and use. When they do develop new materials and/or systems, it is more of a re-vision of a previous material that is currently not being utilized to its fullest potential. Sheila Kennedy graduated from Harvard University's Graduate School of Design with a Masters Degree. She completed internships in Switzerland, at the office of Mario Campiand also in Boston firm Kallmann, McKinnel, and Wood. Shei-

la also teaches at the Harvard Graduate School of Design. The other principal of KVA is Franco Violich. Like Sheila Kennedy, Franco also attended the Harvard University's Graduate School of Architecture where he also received a Masters Degree in Architecture. Franco worked in Switzerland in the office of Theo Holtz and was also an Associate of Design in the office of Don Hisaka in Cambridge. He is a leader in both the research and application of new materials and new methodologies involving recycled building materials.



Electroluminescent Plywood Desk

The project along the East River in New York, is essentially made up of a total of seven Ferry Landings along the River. Their end use will be primarily private commuter ferries. Each Terminal has unique features as well as different site criteria. For instance, the Battery Marine terminal, located on the southern most tip of Manhattan, will have its docking slip located within a landmark building. Along with the new ferry terminal, the facade of the building will also

under go extensive renovation. There will also be a new pier built that will support a free standing terminal building that will hold an indoor outdoor ticket area, bathrooms, concession areas, and also offices. This pier will be located at 34th Street. In this particular instance, the structure as a whole is in a curvilinear form and a section of the roof protrudes into the underlying occupied space. This feature will create a shelter feeling while the users utilize the space.



Model of Terminal, on 34th Street

The shelter located at 62nd street is currently being constructed off site due to construction of the FDR highway. This shows how flexible and material oriented the projects are, they can easily be adapted and worked on off site. Once construction of the terminal is complete, it will be moved to a temporary location until it can be permanently located in its site. The terminals also take inspiration from surrounding architecture and sites. An example of this is the 90th Street terminal which will have a lighter feeling rook because it is in close proximity to Gracie Mansion. This also shows that the terminals are also geared

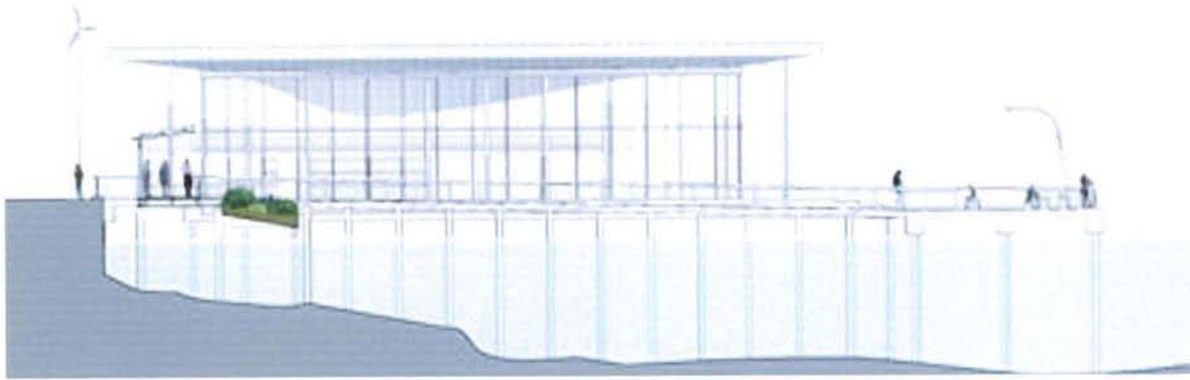
to reflect site characteristics as well as current site amenities.

KVA is teaming up with a marine engineers because of the extensive work with the landings. They are also working close with Ken Smith, a landscape architect. The idea behind one such shelter is a organic curve that follows the curve of the river. The wall on the waterside is considered to be a wind screen with wind turbines incorporated which provide power for the

lighting as well as the irrigation pumps. The form as a whole is constructed of stainless steel ribs with are laser cut and then overlaid with more stainless steel. At eye level and below, the steel is perforated which allows the users to see out of the space. The way the steel is formed creates an organic shaped structure that is light enough so it does not feel overwhelming.



Aerial of proposed model of a terminal



Drawing of Sectional view

The ticket booths located within the terminals are constructed of a corrugated metal block which is then glazed. Along the ticket booth are stools made of concrete and then topped with four slabs of Lucite containing heat sensitive lighting devices which turn on when sat on. They utilize energy conserving LED lights, photo sensors, and also photovoltaic cells. KVA adapted marine-buoy lighting technologies to develop energy saving and unique lighting systems.

The East River Ferry Terminal project tries to incorporate innovative design and also the use of alternative energy. With these in combination of good design, the end results are user friendly, low maintenance structures, because the ferries do not run 24 hours so the structures will not be in use all the time.



Drawings of benches with lighting



Perspective view of Model

When relating this project to that of my own, one of the major similarities is the use of materials in an unconventional use. The steel for example is used in a way that is not conventional for steel. Simply by cutting the steel into ribs, it allowed for maximum flexibility and adaptation of the material. It is also interesting to see how KVA followed an organic form for the size and shape of the shelters. It seems to reflect the shape of the connecting river but also helps relate more to the human form, especially when the user is on the inside. This impact can best be seen in the sectional drawing.

Along with the protruding roof line, the innovative seating utilized around the ticket booth is another strong relation to my project. It is interesting that KVA chose a material and a process that would actually become interactive once sat upon. It shows the gear towards the human and their experience in all aspects of inhabiting a space, that is often over seen.

The last relationship is the transparency of the terminal as a whole. By using the repetitive peer, it allows for the user to see straight through the building and focus on the river. It is an interesting approach especially when viewing the section because this feeling continues down into the water. This allows the river to become the focus of the site and not the actual terminal building.

Endnotes for Precedent-4,5

MORPHOSIS
+
ARCHITECTS



The multilayered classroom wing includes a westerly shading device that evokes a stadium structure. A variety of granite steps descending the hillside continue beneath the building, where concrete-clad steel columns lift the structure above the ground plane.



Located on the campus of the University of Cincinnati, Ohio, is the 350,000 sq..ft. Recreation community center combination. The project was created by Morphosis Architecture group, the building has characteristics such as muscular, diaphanous winged, and a robust belly. These characteristics are normally not found within a recreational facility but with their combination with each other as well as with the site and location work well as a whole project. Conceptual drawings and collages allowed the architect to take into close consideration both the landscape as well as the human factor in the design stages of the project. It is easier to see the usage of human characteristics that are built into the foundation of the design of the complex as a whole.

The building as well as the other existing buildings, such as the football field, are connected together through a “connective tissue” which is essentially the walking, running and other connective spaces. Another large characteristic of the program is the idea of merging spaces. This idea is accomplished not by physically merging them but rather visually and experientially merging them. It is done by allowing each space to be aware and have a constant visual connection to each adjacent space. For instance the swimmers in the pool can see the runners on the track, but also see the occupants on the exterior of the space, and vice versa



Exterior Picture



Digital Montage



Digital Montage



Digital Montage



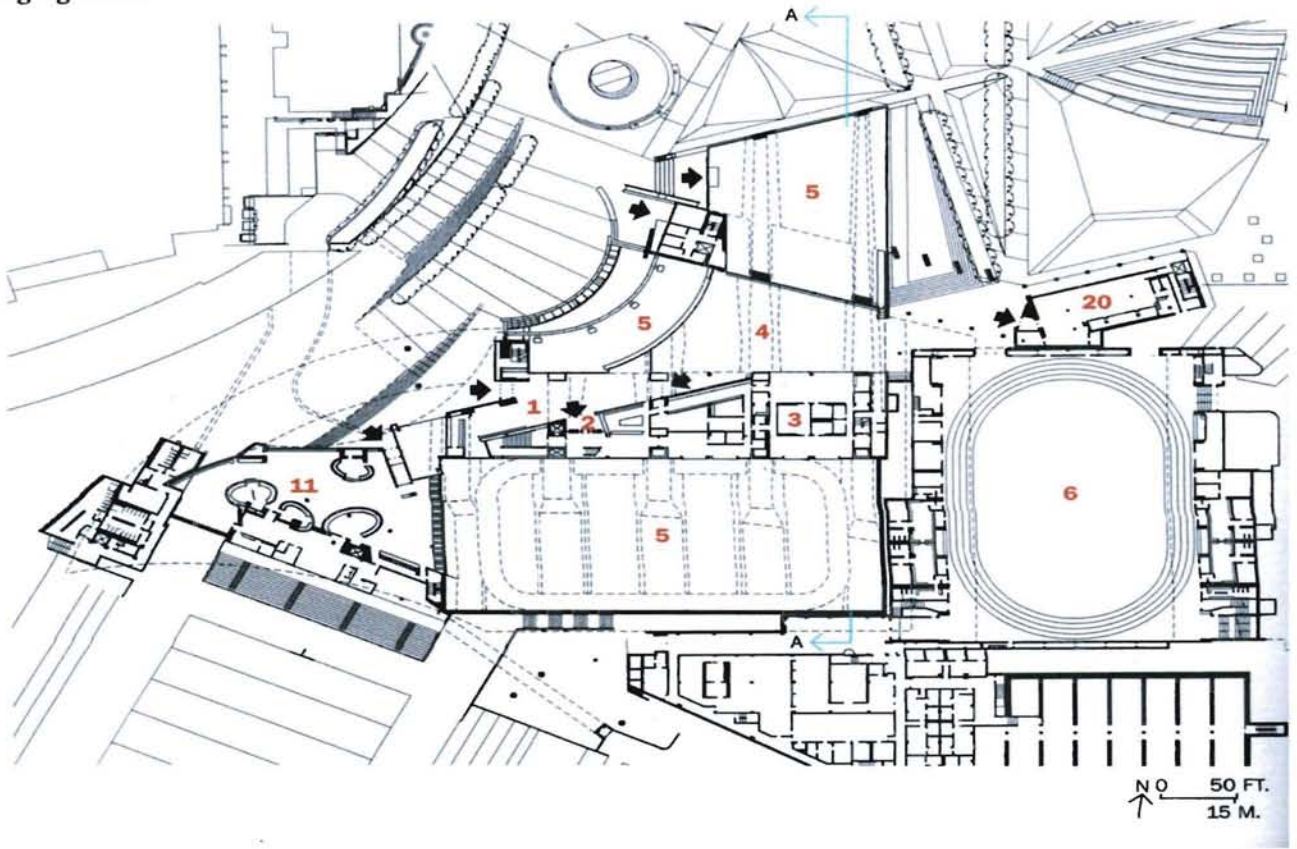
Digital Montage

The interior spaces follow the exterior and characteristics of the building as a whole, they aren't just separate entities from the program. An example is the swimming pool, and lap area. Instead of a straight swimming area it curves and flows like a stream or other natural body of water. It also allows for a better work out, rather than just swimming straight, it forces the body to move and adapt to the curves. Like the characteristics of the swimming area, the running track also follows a close connection the exterior of the building. It allows the runners a birds eye view of most of the spaces as well as linking some of the exercising areas.

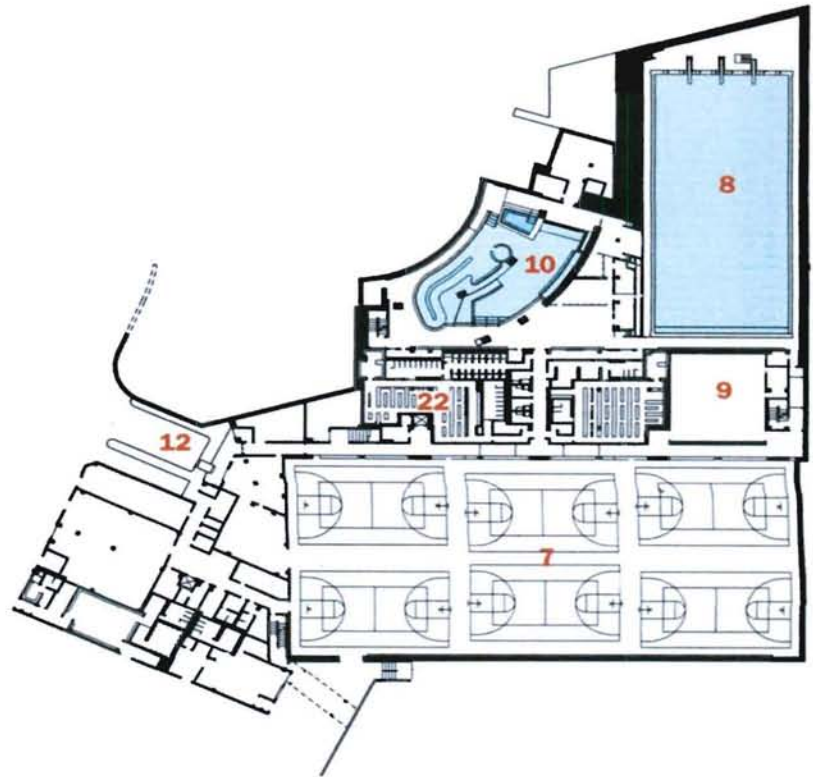


Interior Pictures

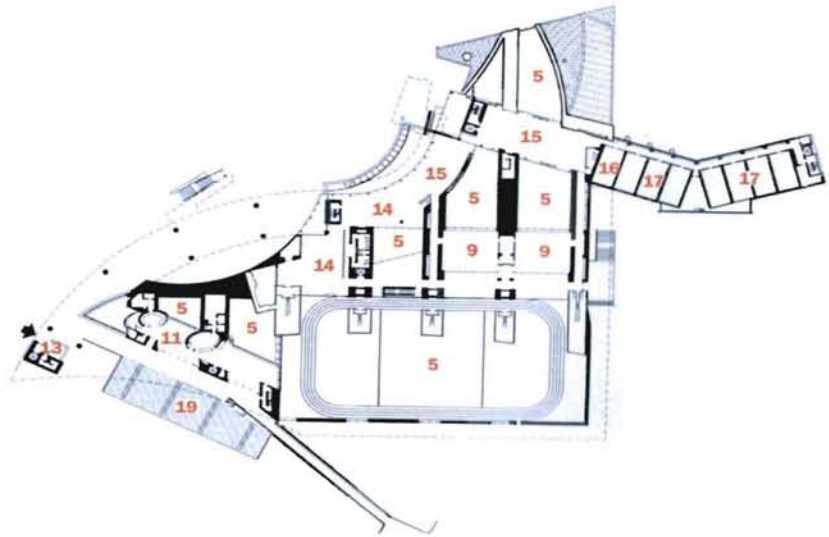




Plans

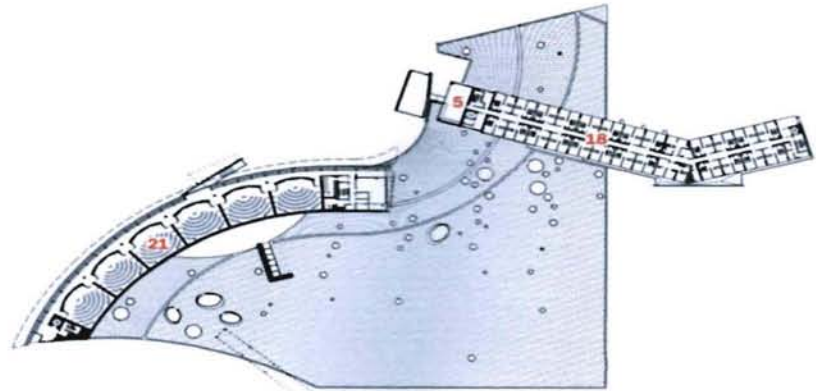


The spacial relations of both the inner exercising spaces as well as the relationships of the new built buildings with the existing can be easily seen by viewing both the larger site plan as well as the smaller floor plans. The fact that the way the building relates to the existing buildings gets followed through into the inner spaces.

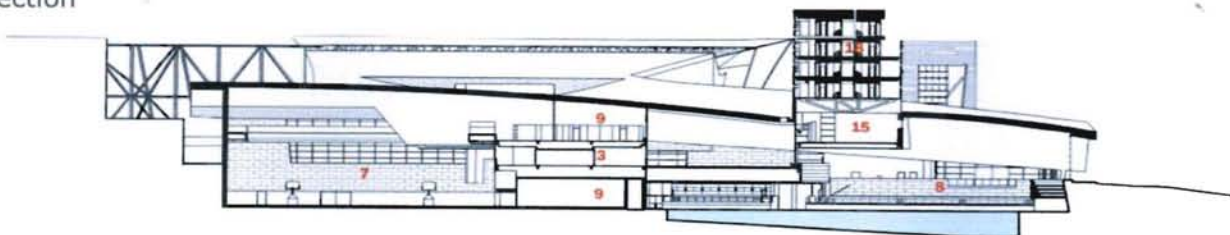


Plans
I 15

Although it is hard to tell from the plans, the specialized areas, such as the swimming, running, and basketball courts are linked in an organic and creative way, unlike conventional recreation centers.



Section



Endnotes for Precedent- 1



MATERIAL STUDIES

"New materials provide designers with significant possibilities for shaping space and fabricating with new methods, yet many opportunities for innovation exist with traditional materials as well".

-Toshiko Mori

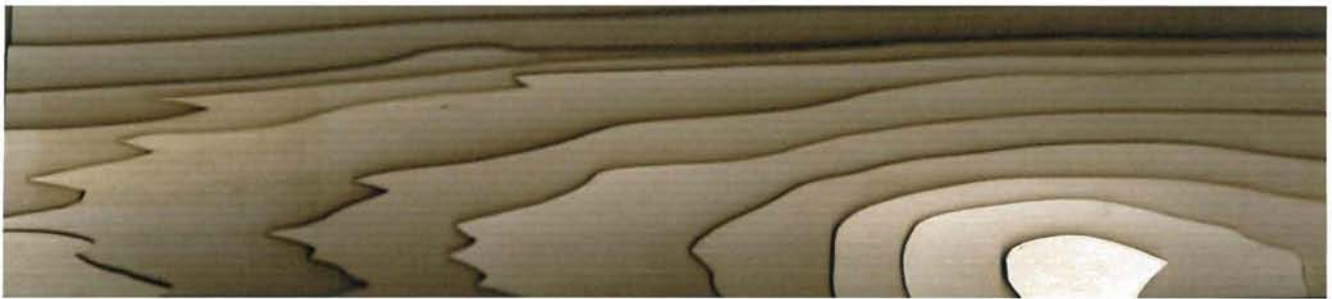
MATERIAL STUDIES

[*tectonics*]: the science or art of assembling, shaping, or ornamenting materials in construction; the constructive arts in general.

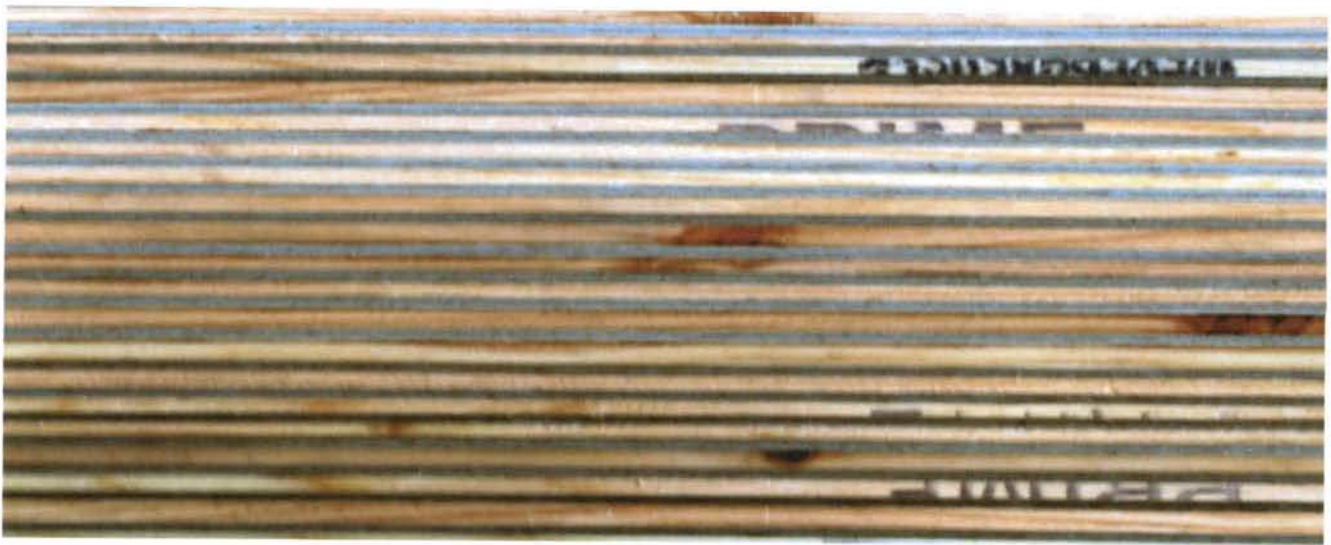
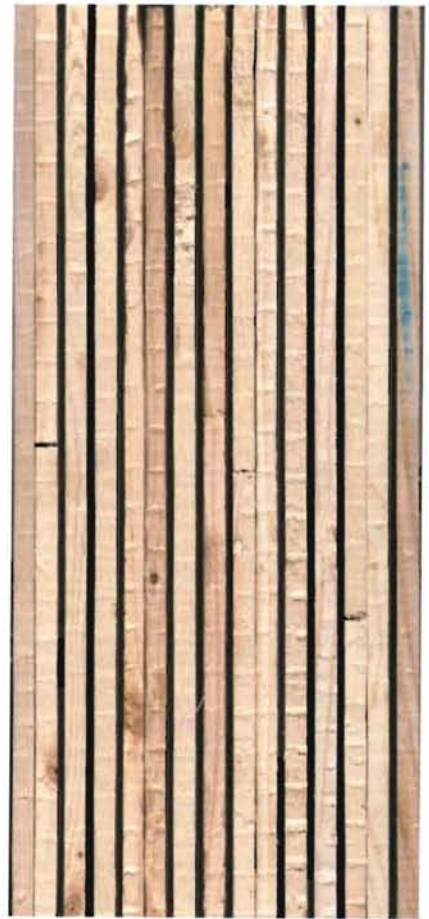


The cast of concrete was an exploration of not only the characteristics of concrete, but also the process of casting. The process of casting is one of the best examples of the definition of tectonics. In order for a concrete shape to be successful it needs to have enough framework to support the shape. The cast of concrete above is not as important as an end result but rather its process. It involved the idea of creating a framework, mixing the cement and water, pouring the mixture, spreading the concrete, and finally compacting the mixture into all of the crevasses. If one of these steps are forgotten or messed up, the end result would not be successful.

One of wood's most intriguing characteristics is its grain. The idea behind the larger, layered wood study was to achieve a height influenced by the natural form of the wood grain. The wood was cut in accordance to its grain and then raised higher until reaching the end. The end result is a topography looking model that emphasizes the grain pattern.



The next study was focused in on the stacking of thin slices of wood and chipboard. The wood and chipboard were of the same thickness creating a uniform thickness to the study as a whole. This study was once again a focus in on what it takes to make a simple form but with smaller pieces. The act of cutting both the wood and chipboard became the challenging aspect. If they were not the same size, the piece would not flow properly. By just feeling the surface of the piece, it is difficult to tell where the wood starts and the chipboard starts.



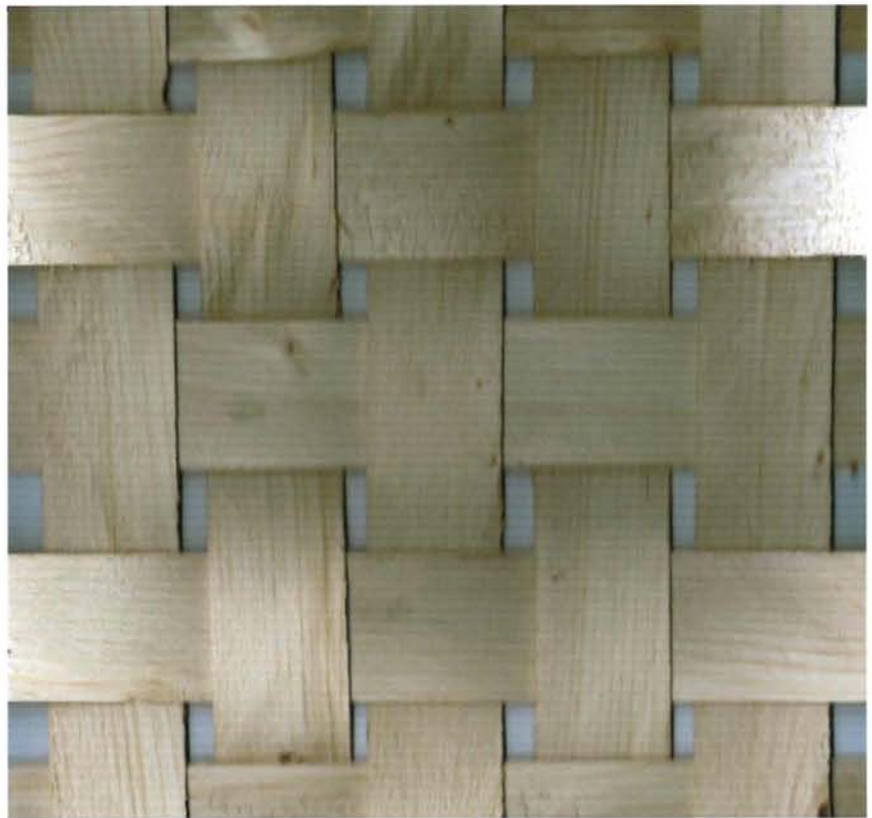
Similar to the other wood and chipboard stacked study, this study is also looking into the process and tectonics of wood and chipboard. This one however has wood stacked together every 3rd layer. This begins to start a rhythm within a repetition. It helps to create a different orientation of the void, the chip board, areas. The rough cut wood also changes the feel of the entire piece, it helps to emphasize the characteristics of the wood.

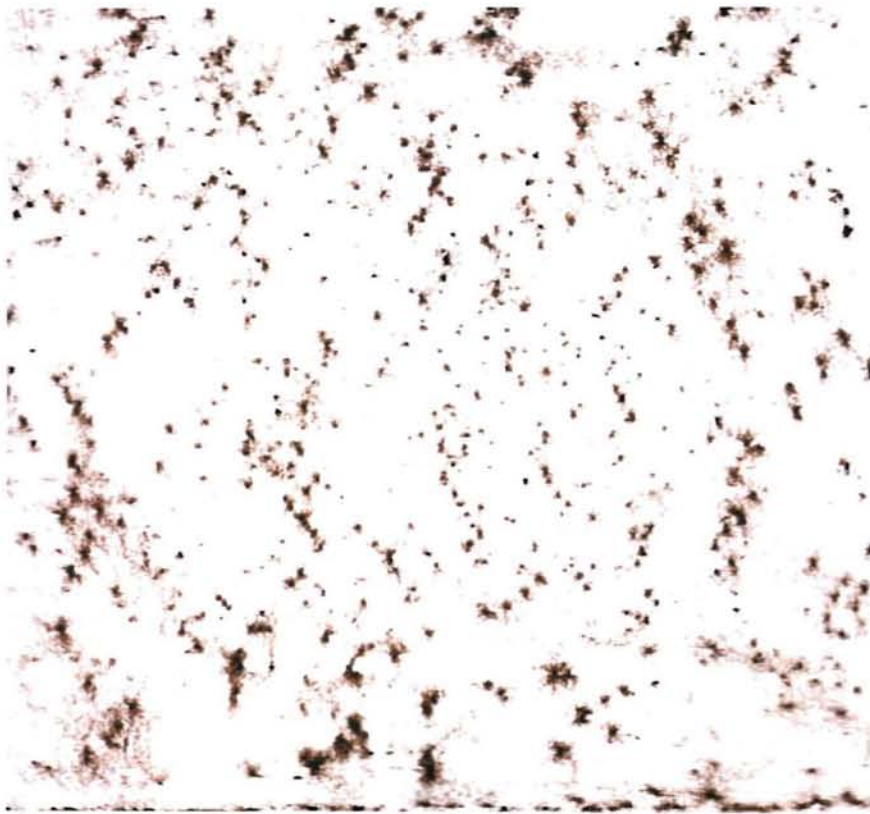
In this model the chipboard extends past the wood strips to form a pattern that is opposite of the wood. The extension of chipboard also allows for two pieces to connect and form a sturdy, glue less connection. The connection helps to explore the possibilities of two simple materials assembled and manipulated to create a versatile pattern.



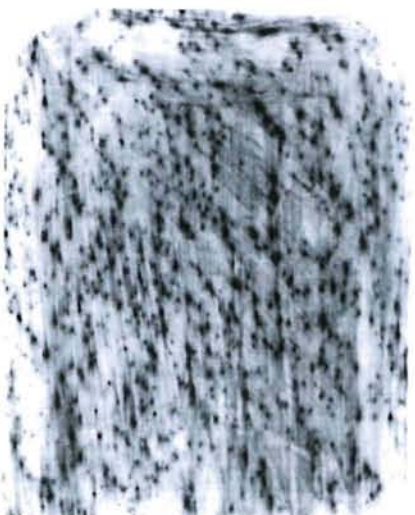
“You think of materials as being motionless. In reality, many of the materials I work with have to move to function, or at least they’re moving while we’re forming them”
-Michael Cima

By altering the size, in both width and thickness, of wood, it is possible to achieve effects that wood would not normally accomplish. In this case it is weaving, not normally a characteristic of wood. It is also interesting to look at the spaces created beyond the wood, the negative gaps create a pattern in of themselves.



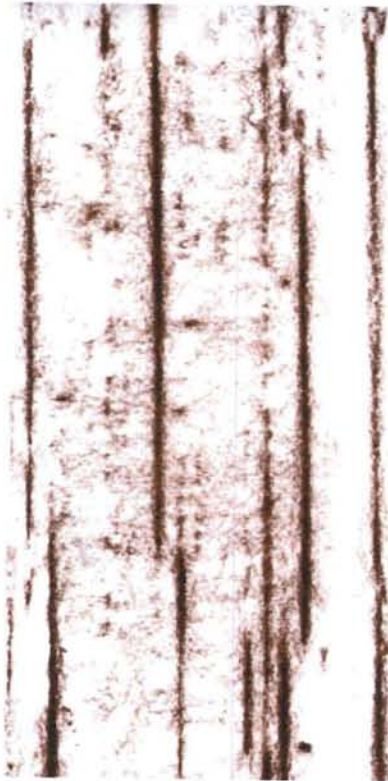
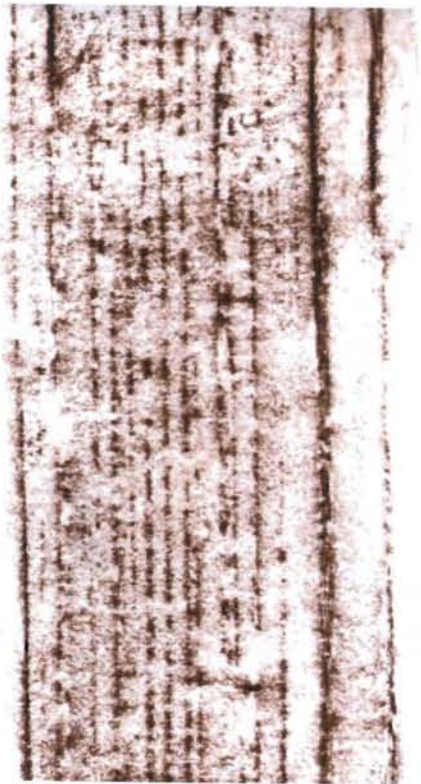
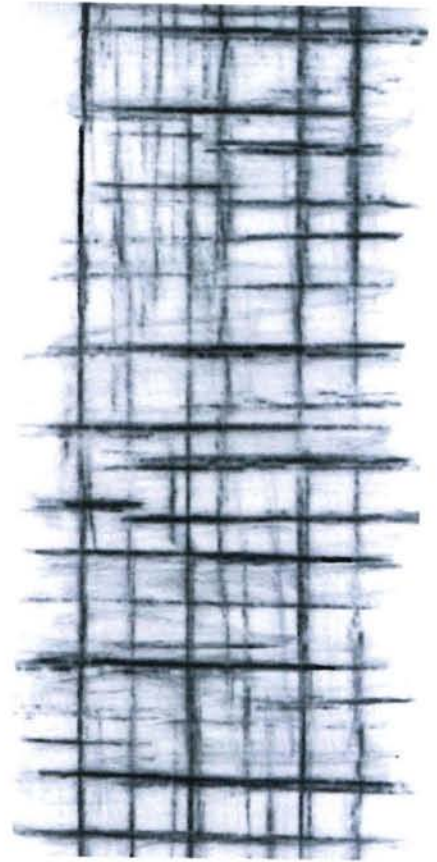
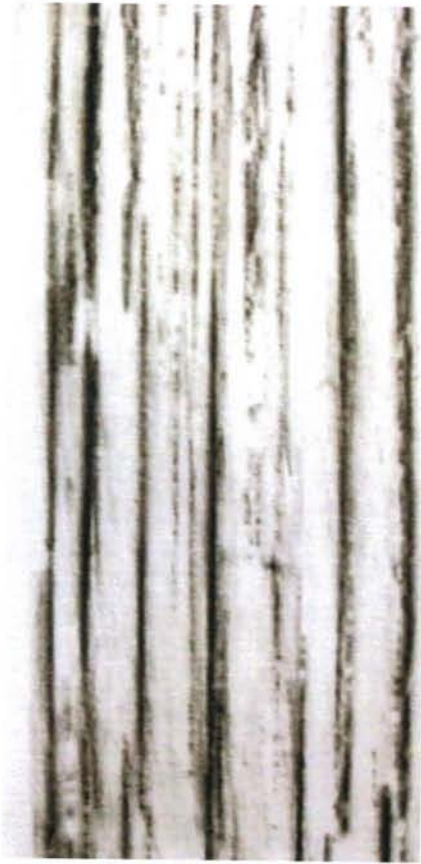


Pastel rubbing of concrete

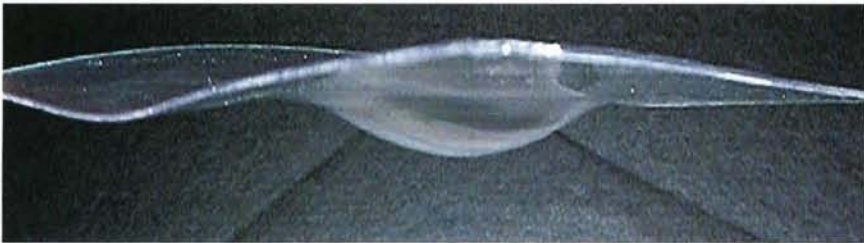


Charcoal rubbing of concrete

Following the construction of the different material studies was the creation of rubbings from each separate sample. The rubbings act as 2-dimensional representation of the 3-dimensional models. They also created a different perspective of the surface variation of each piece.



Charcoal and Pastel rubbings of wood



One characteristic of the East River Ferry Terminals is the stainless steel roof that protrudes into the space. This plexiglass model explores the impact of a plane that has a portion of it that extends into the surrounding space. It creates not only an actual physical impact, but also a feeling of denseness.





SITE ANALYSIS

"It is sensory and tactile: things are heavy or light, rough or smooth"

-Toshiko Mori

SITE ANALYSIS



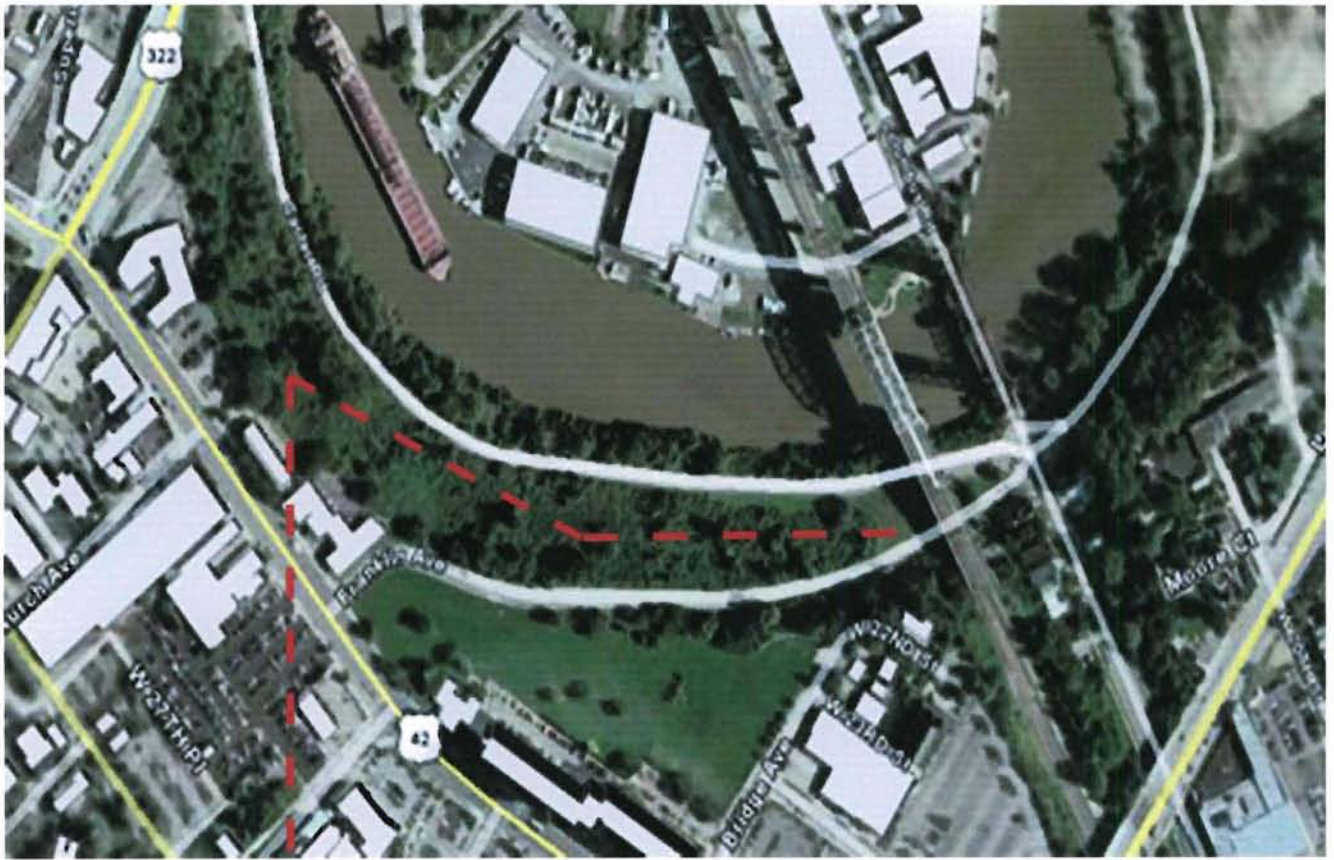
Site A Location - Woodward, Detroit, Michigan





Site B Location-Clark St., Detroit, Michigan





Site C Location-Riverbed St., Cleveland, Ohio





Site D Location- Jefferson Ave., Detroit, Michigan





Site E Location- Wilkins St., Detroit, Michigan



SITE LOCATION





SITE DOCUMENTATION



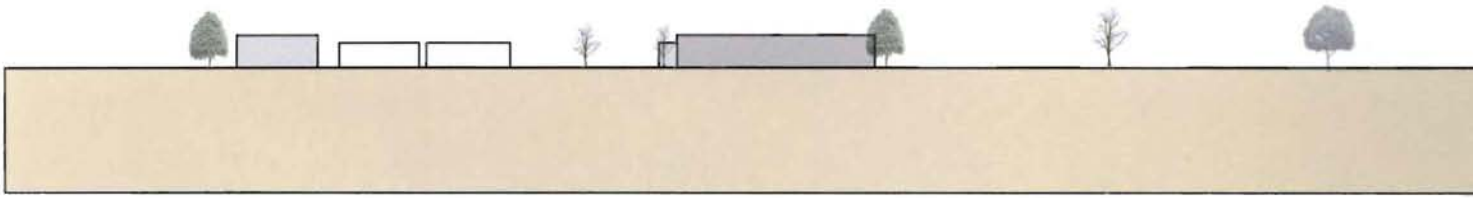
Old Photographs of site



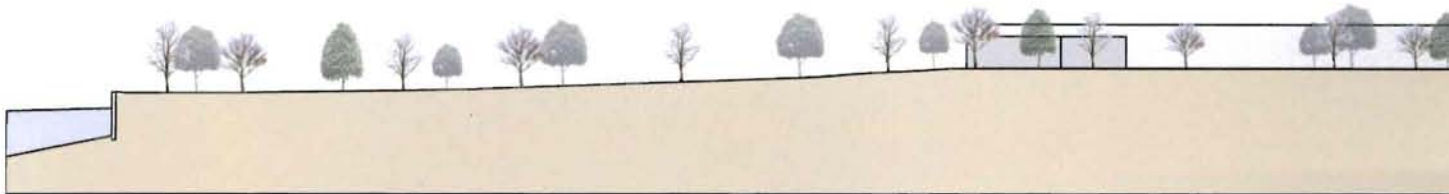


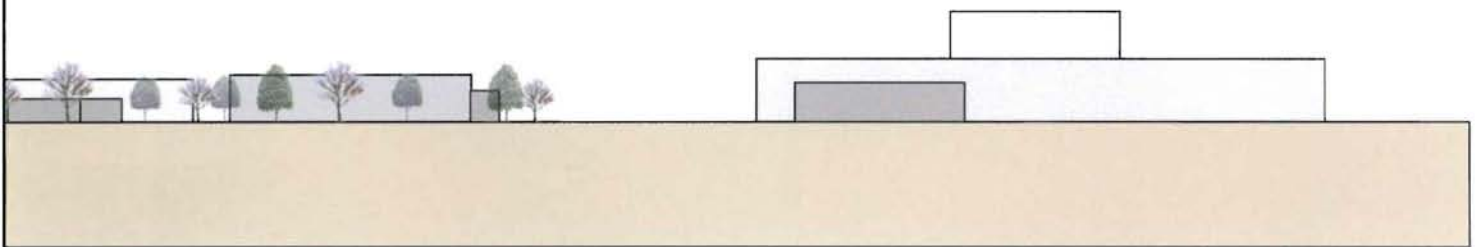
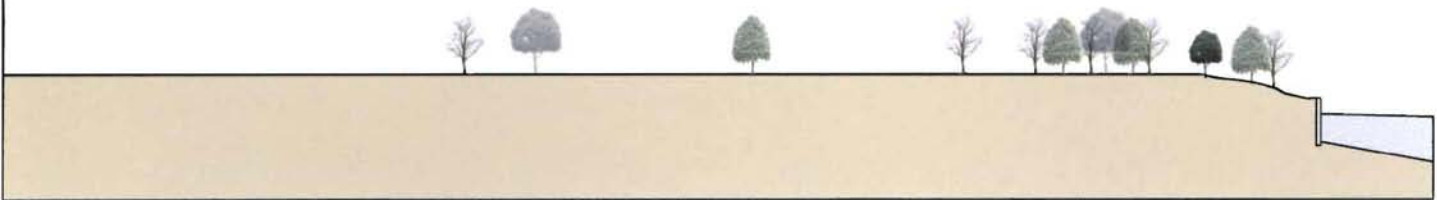
Photographs of site in current condition



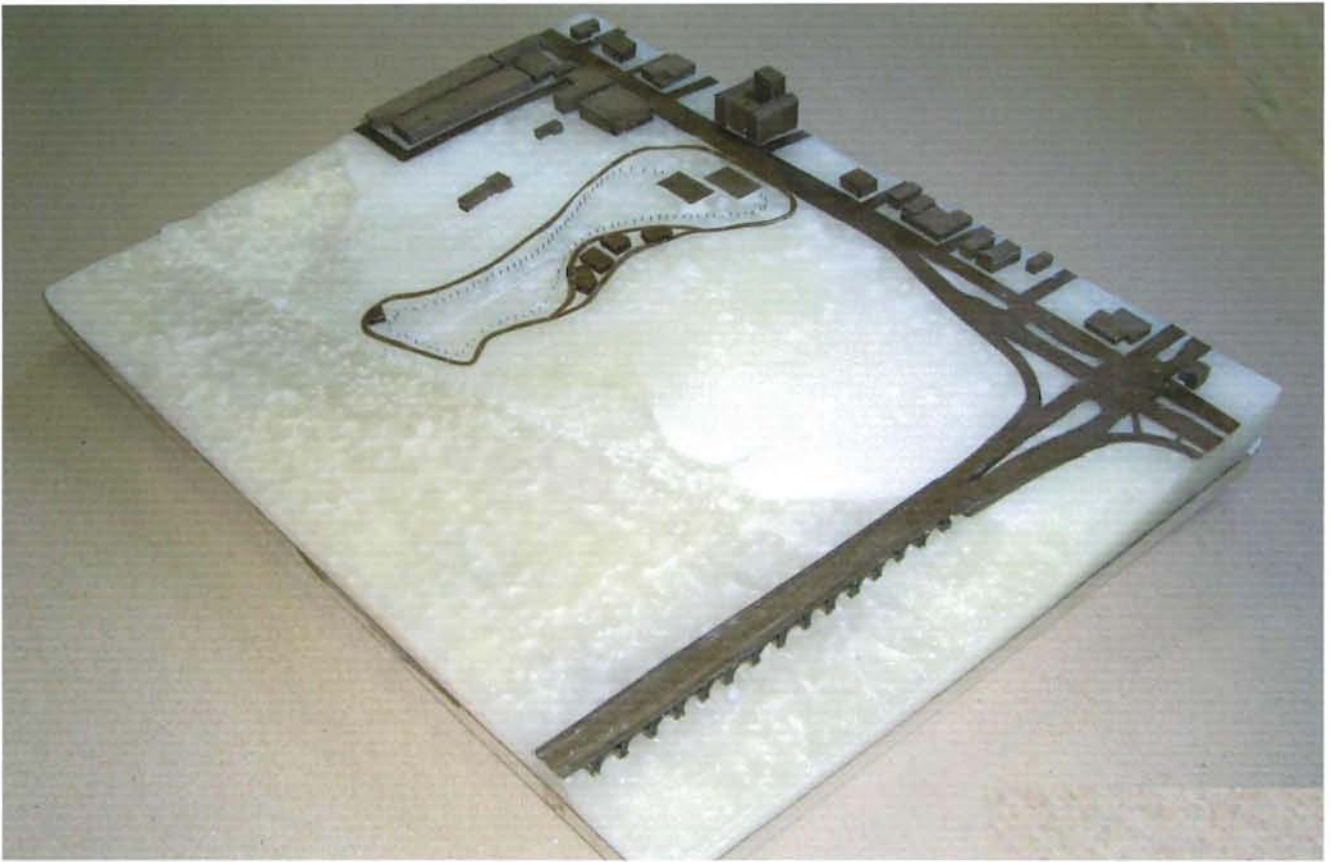


section looking west





section looking east



preliminary site model





preliminary site model







PROGRAM

"Material can be a progenitor for form"
-Stephen Kieran

PROGRAM

The program for this thesis project will contain activities similar to those of a conventional recreation center; however, this project tries to incorporate such activities in an unconventional building form. The activities include running, swimming, stretching, weight lifting, yoga/ dance, and a multipurpose court. The goal of the program is to allow the users to occupy the different areas of the structure and utilize them for their designated purposes.

The project takes the approach of having interior and exterior areas. The interior having a influence directly related towards the scale of the human body, while the exterior is focused more on that of the scale of the street and city. With the combination of these two areas, is the opportunity to allow the user to progress through a “filter” of sorts. This allows them to completely separate themselves from the outside surroundings and focus solely on their inner and out bodies.

Quantitative Summary-

Sq... Ft.

Multipurpose Track-

	69480	
-General Running area	50000	
-Small Lobby/ Entrance	400	
-Rest rooms		6400
-Locker rooms	400	
-Manager Office	100	
-Equipment Storage	600	
-Mechanical/Circulation	11580	
-Outdoor area	25000	

Stretching-

	3000	
-General Area	1200	
-Small Lobby/ Entrance	200	
-Rest rooms		400
-Locker rooms	400	
-Manager Office	100	
-Equipment Storage	200	
-Mechanical/Circulation	500	
-Outdoor area	800	

Swimming-

	6120	
-General Pool	3400	
-Small Lobby/ Entrance	200	
-Rest rooms		400
-Locker rooms	600	
-Lifeguard Offices	300	
-Equipment Storage	200	
-Mechanical/Circulation	1020	
-Outdoor area	600	

Weight Lifting-

	4400	
-Free Weight Area	1200	
-Machine Area	1200	
-Small Lobby/ Entrance	200	
-Rest rooms		400
-Locker rooms	400	
-Manager Office	100	
-Equipment Storage	200	
-Mechanical/Circulation	740	
-Outdoor area	400	

Recreation Center-

Sq.... Ft.

Yoga/ Dance Studio-

-General Area	3120	
-Small Lobby/ Entrance	1200	
-Rest rooms	200	400
-Locker rooms	400	
-Manager Office	100	
-Equipment Storage	300	
-Mechanical/Circulation	520	
-Outdoor Area	400	

Multipurpose Courts-

-2-3 Court Area	29100	
-Small Lobby/ Entrance	20000	
-Rest rooms	400	800
-Locker rooms	400	
-Manager Office	200	
-Large Equipment Storage	1500	
-Mechanical/Circulation	5800	
-Outdoor area	7500	

Multipurpose Track

Room Name	Capacity	Units	Sq.Ft. Per Unit	Total Net Area
Track	25	1	69480	69480

Purpose/ Function-

There are multiple tracks that change size and shape as they travel through the site. There is also a close relationship with the tracks and the site, the site acting as the tracks in some instances.

Activities-

Running, Walking, Jogging, Calisthenics, and other General Work Out Activities

Spatial Relationship-

The tracks act as a “framework” as to which each other built environments branch off of. The tracks vary in height, width, length, and relationship to adjacent functions.

Phenomenological-

The Tracks allow for the user to constantly be aware of speed, time, and the relationship of their body to the surrounding environment. This is achieved with natural light, surface variation and markings, and also the intersecting of spaces.

Contextual/ Site Relationship-

The tracks will run the entire width, as well as length of the site. They are the singular connecting element between all of the “built” spaces. They will be influenced by the user, materials, as well as natural characteristics of the site.

Assembly/ Craft-

The size of the materials, or the actual units, will be geared off of the scale of the body. In one area they may be spread out to subconsciously allow for the user to speed up, or slow down in other areas.

Spatial Considerations-

In some areas the light from above is allowed to pass through the track itself.

Behavioral Considerations-

The track as well as the “wall” surrounding the track will help influence speed, pace, as well as framing views as the users pass through the space.

Mechanical/ Electrical Systems-

In general the track will not have a distinctive mechanical system; only in the instances where it intersects the other areas will it adapt those systems.

Stretching Environment

Room Name	Capacity	Units	Sq.Ft. Per Unit	Total Net Area
Stretching	20	1	3000	3000

Purpose/ Function-

The stretching room allows for the users to become more in touch with their bodies, it is also an area where they can begin to unwind and loosen up their bodies.

Activities-

Stretching, Meditation, Light Exercising.

Spatial Relationship-

The stretching area will be tucked into/ under/ contained in, with the tracks. It will also be on, near ground level. Although the floor plan will be rectilinear, the height may vary.

Phenomenological-

The intention of this space is to be a calming, simple environment in order for the body and mind to be free from distractions.

Contextual/ Site Relationship-

The general location on the site will be in the middle, away from the road and the water. The space will be sunken about a foot to 18 inches. This allows for the users to be aware of the site and its surroundings as they stretch on the floor.

Assembly/ Craft-

The space will be made up of layered natural stones. The floor will be warm and soft to the touch because that is where the majority of action will be taken place. Also, there will be occasions where the walls protrude into the space, creating a “visual” connection to the earth.

Spatial Considerations-

Low if any artificial lighting, primarily natural lighting from skylights/ walls.

Behavioral Considerations-

Short ceiling heights to allow the human scale to be comfortable and relaxed.

Mechanical/ Electrical Systems-

Conventional mechanical system, along with optimal natural ventilation to allow users to smell, taste, and experience nature as much as possible.

Swimming Pool

Room Name	Capacity	Units	Sq.Ft. Per Unit	Total Net Area
Pool	20	1	6120	6120

Purpose/ Function-

To allow users to exercise in a semi weightless environment. It is also an opportunity to allow the users a more intimate relationship with the site.

Activities-

Swimming, Water exercising, Water Aerobics, Swim Lessons.

Spatial Relationship-

The majority of the pool will be sunken into the ground with exception of an 18 inch portion on the top. A portion of the upper half of the area will be cut through by the track, allowing both activities to intersect one another.

Phenomenological-

Allows the users to feel a secluded feeling from the exterior spaces.

Contextual/ Site Relationship-

Located with close proximity to the Detroit River, or another exterior water feature.

Assembly/ Craft-

A strong relation to a repeated shape, tile like. The textures of the surfaces are smooth and cool to the touch.

Spatial Considerations-

Majority of area will be dark with slits/ "gill" like openings in the walls to allow for natural light.

Behavioral Considerations-

Ceiling heights will be high but not high enough to allow for the users the feel insignificant in the area.

Mechanical/ Electrical Systems-

Systems to adjust humidity, as well as incorporating natural ventilation to allow space to "breathe".

Weight lifting

Room Name	Capacity	Units	Sq.Ft. Per Unit	Total Net Area
Weight	25	1	4400	4400

Purpose/ Function-

The weight room will incorporate both free, as well as machine weights. The intention is to allow for the users to improve their physical bodies as well as their minds.

Activities-

Lifting, both machine and free weights, personal training.

Spatial Relationship-

The area is in close proximity to the track as well as the stretching areas.

Phenomenological-

The weight lifting area allows for a more intense focus on one's body as well as their surroundings.

Contextual/ Site Relationship-

There is no specific site location although the structure as a whole will be sunk into the ground to provide a connection to the site.

Assembly/ Craft-

The structure is built from larger repeated units, which will protrude into the site and help "ground" the structure to the surrounding environment.

Spatial Considerations-

Height of wall is geared toward height of human so the human is "sunk" into the ground, allowing for a connection between the environment and the user.

Behavioral Considerations-

Incorporation of wall system into the interior space that allows the user to utilize the structural system as a tool in the activity of lifting.

Mechanical/ Electrical Systems-

Because of the structural system and lack of natural ventilation, there needs to be an extensive mechanical system.

Yoga/ Dance Studio

Room Name	Capacity	Units	Sq.Ft. Per Unit	Total Net Area
Yoga	20	1	3120	3120

Purpose/ Function-

The combination yoga and dance studio allows the users to become in touch with their bodies as well as their surrounding environment.

Activities-

Individual yoga as well as class yoga and dance.

Spatial Relationship-

The yoga/ dance area is segregated slightly from the other programs to allow for the most peaceful and relaxing environment possible.

Phenomenological-

The environment for the yoga area allows the user to constantly be aware of their body, just as they are in the actual participation of yoga.

Contextual/ Site Relationship-

Although there is not specific location on the site, there is an opportunity to allow for the maximum amount of windows/ openings to have the connection, as well as inspiration from nature.

Assembly/ Craft-

The structure is built from small repeated elements that are near to the scale of the human.

Spatial Considerations-

Height of walls and ceiling based off of dimensions of the human scale, allowing for a comfortable peaceful experience.

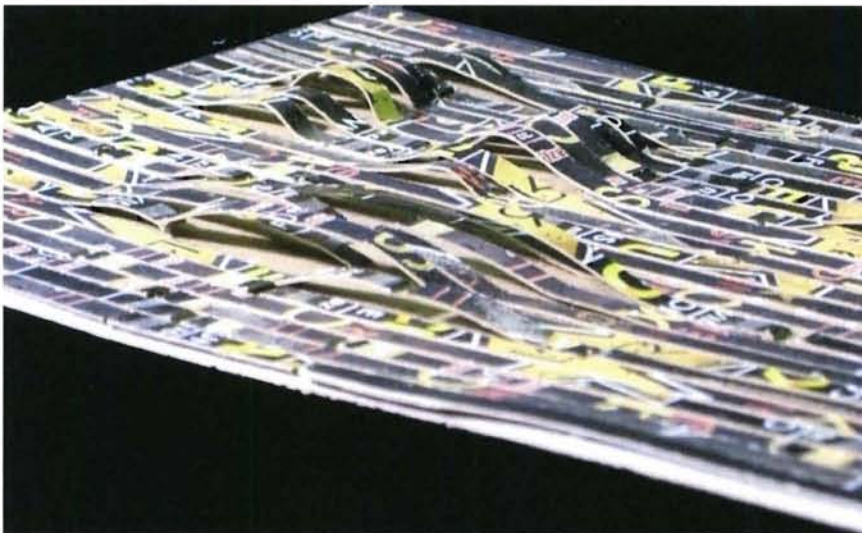
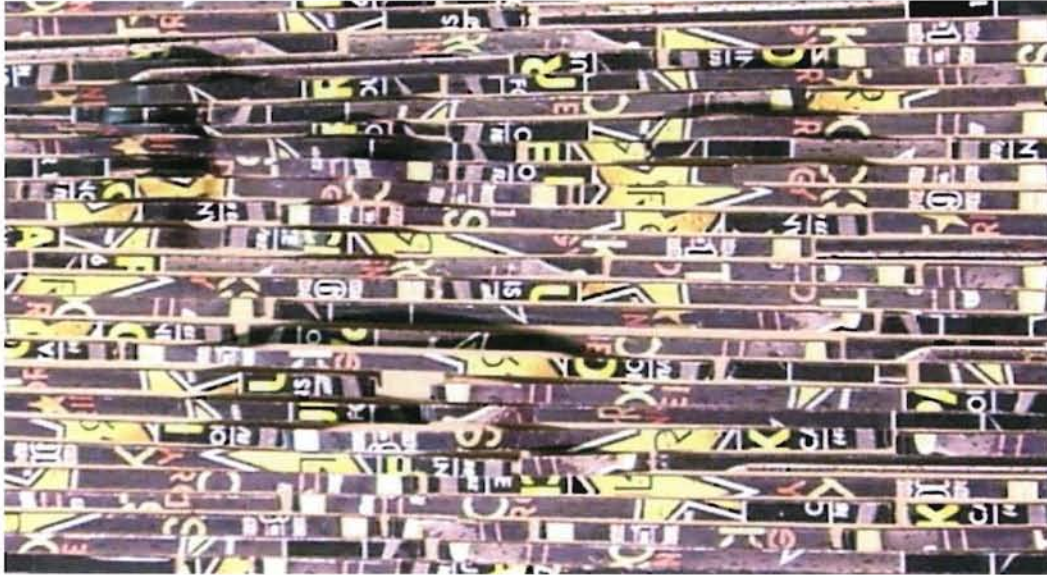
Behavioral Considerations-

Surfaces and materials are geared towards constant interaction with the human and texturally pleasing.

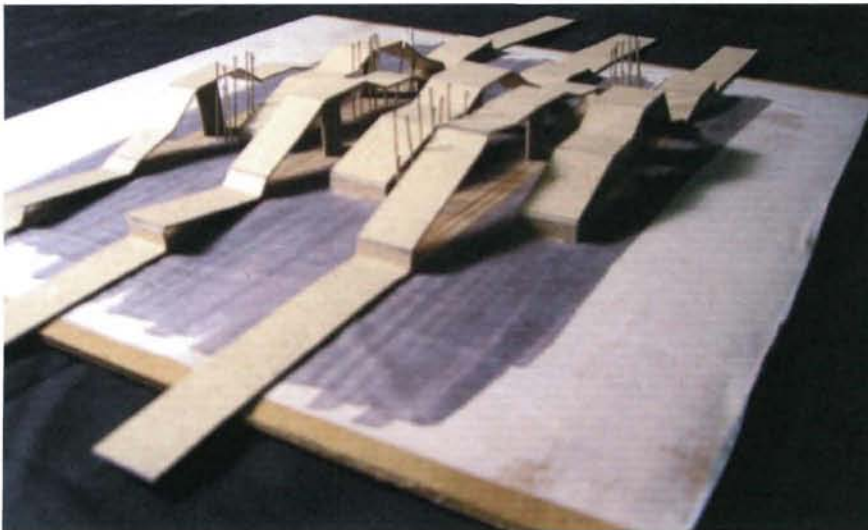
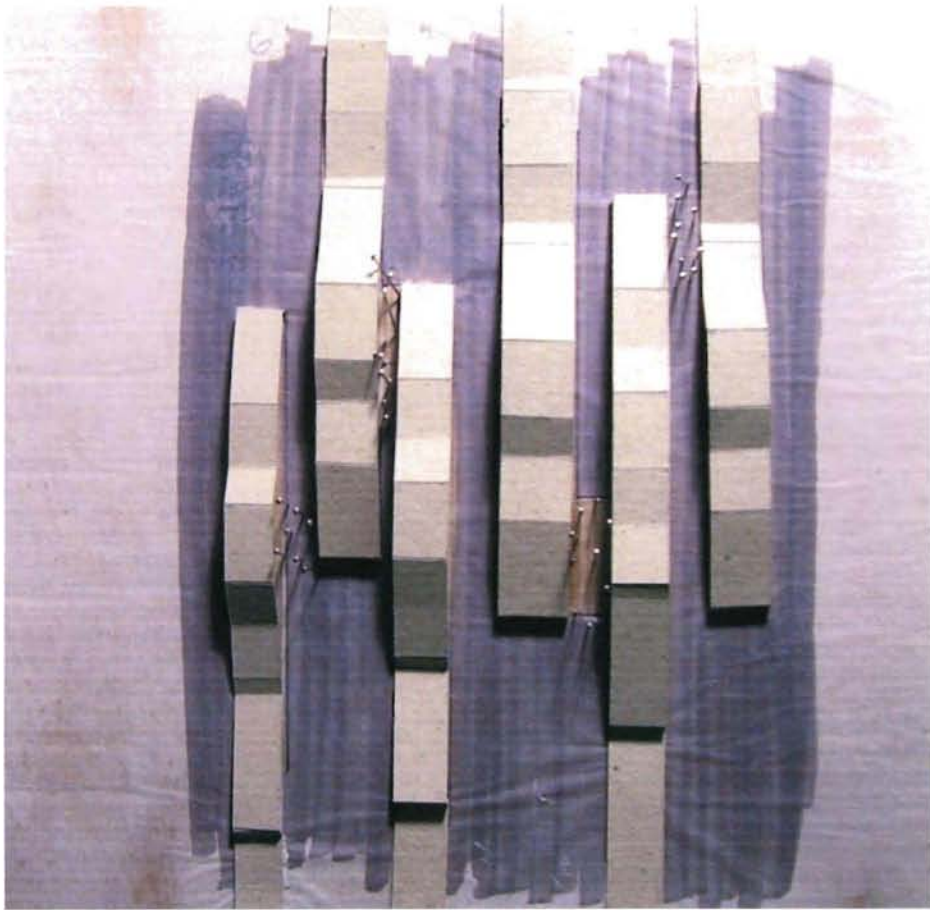
Mechanical/ Electrical Systems-

Mostly natural ventilation and lighting, with some mechanical systems, more for backup purposes.

PROGRAM DIAGRAMS



This program diagram was the initial study of the relationship of the buildings to one another as well as to the site. It became an influential study of the final design as well as the overall site strategy. This study became a continuous link to this project from abstract to actual design.



Similar to the previous program diagram, this is a study of both site and building relationship and placement. It is a focused area of the site and develops the spaces in between the buildings.



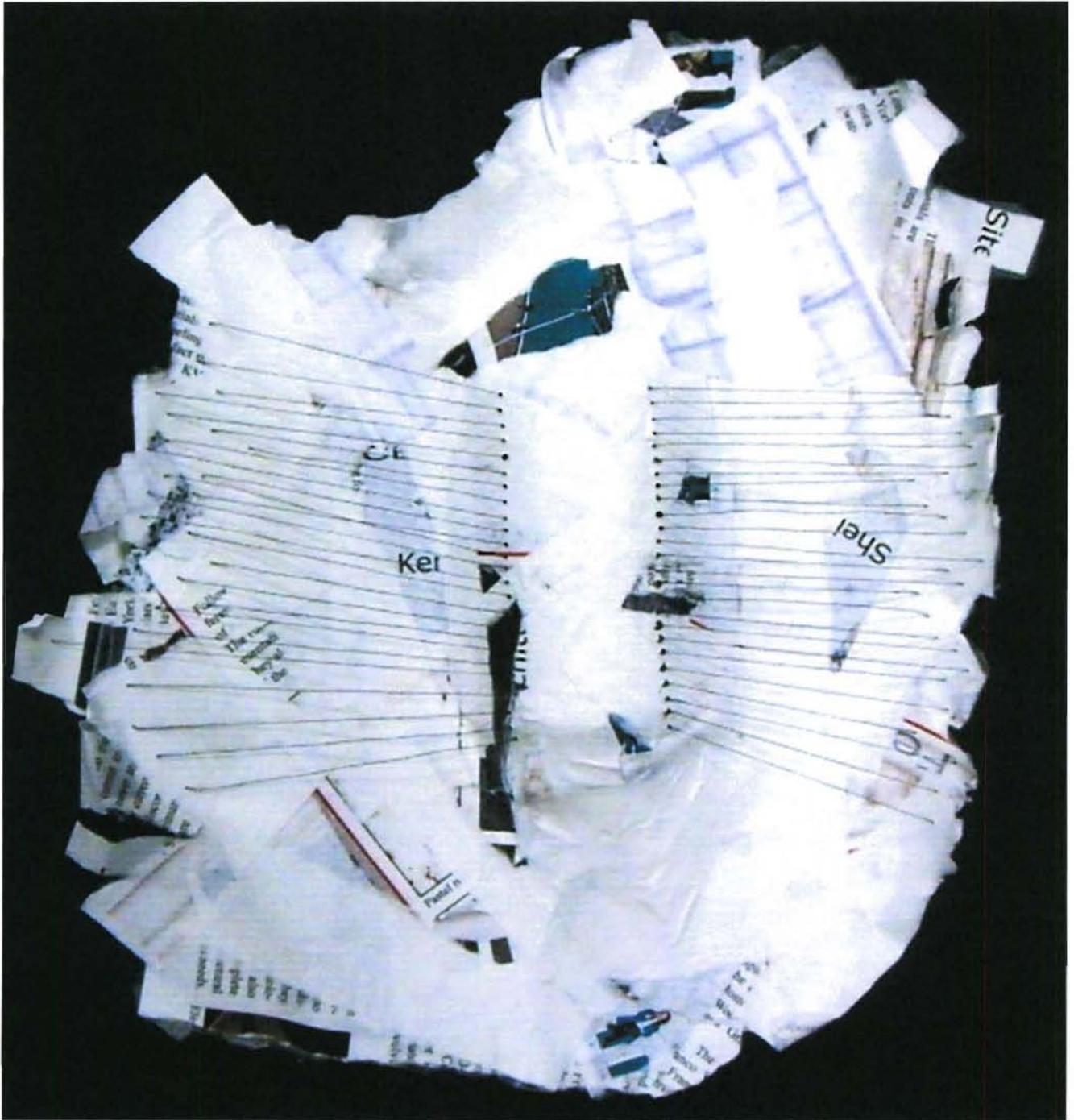


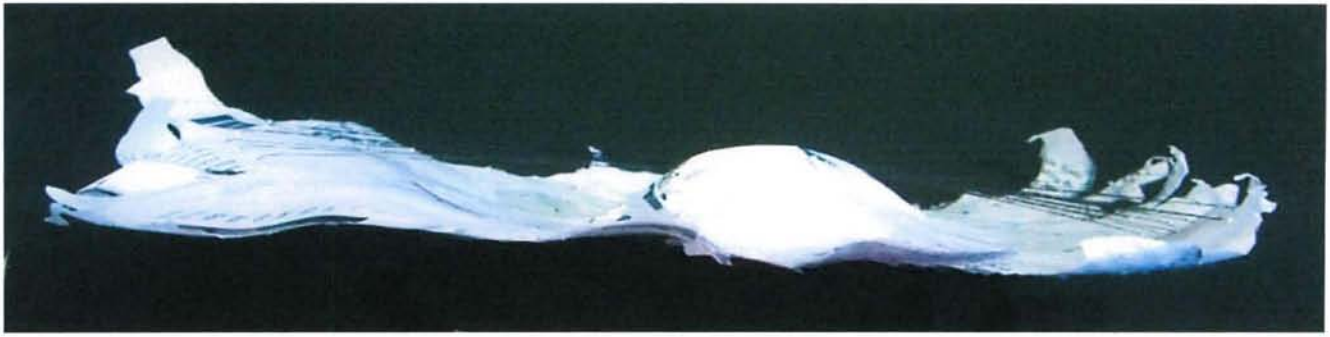
DESIGN PROCESS

"We talk as though good material were found instead of being made. It is good only because workmanship has made it so".

-David Pye

DESIGN PROCESS



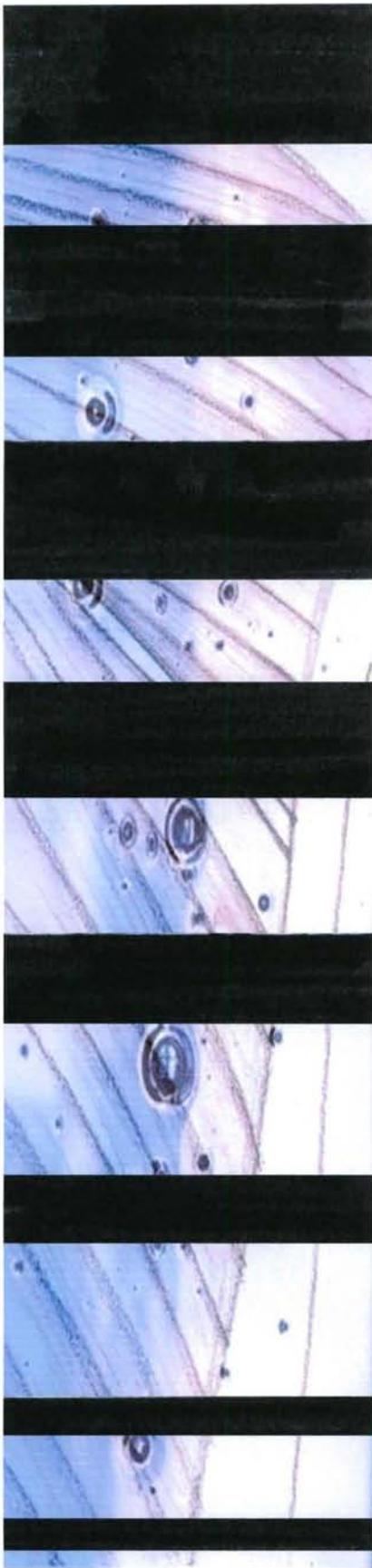


With taking a paper and glue mold of a previous plexiglass model study, I began an exploration in both connection and section. With the edges of the model being connected to the inner bubble with thread, there becomes a link between the interior space and exterior space. This also has an influence from the muscle systems in the human body. Muscles are close thread like elements that connect to the human bone, similar to this study. The sectional view of this study was also helpful in understanding the qualities of how characteristics of the body can be seen in a cross sectional view point. This could potentially help with the development of how the program of a space can be influenced by the muscle system of the body.



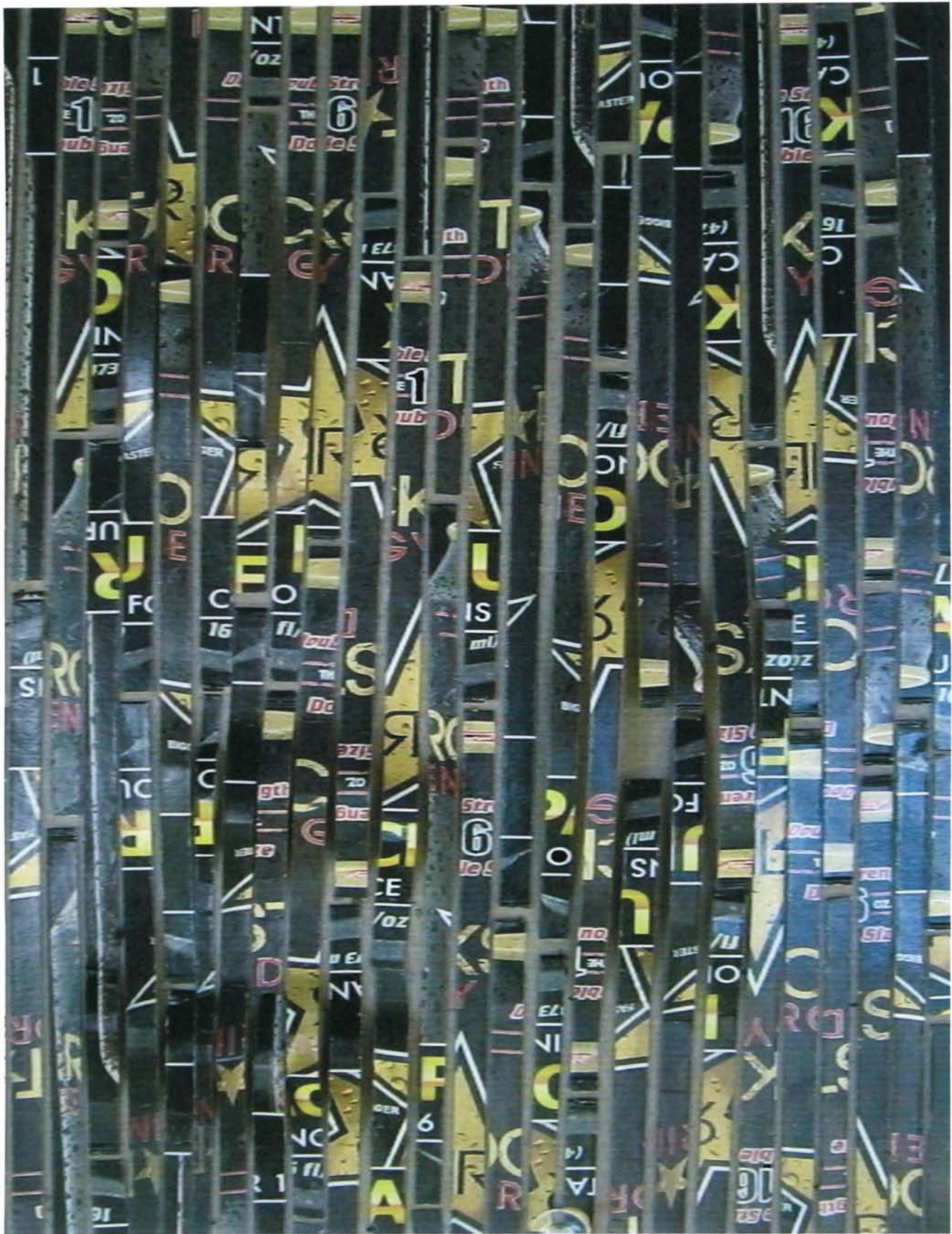


abstract collage



The collage is an exploration of how the portions of the human body can begin to relate together. The rectangles begin to suggest repetition and speed, taken in influence from the characteristics of running. The interwinding ribbon is to represent the idea of stretching and how the body can be stretched in order to allow for muscle growth and relaxation.

The illustration of the muscle system is to help with the idea of lifting and change in muscle size and tone. The last aspect of this collage is the idea of water and how it can give the swimmer the feeling of weightlessness. This idea is shown with the drawings of bubbles.

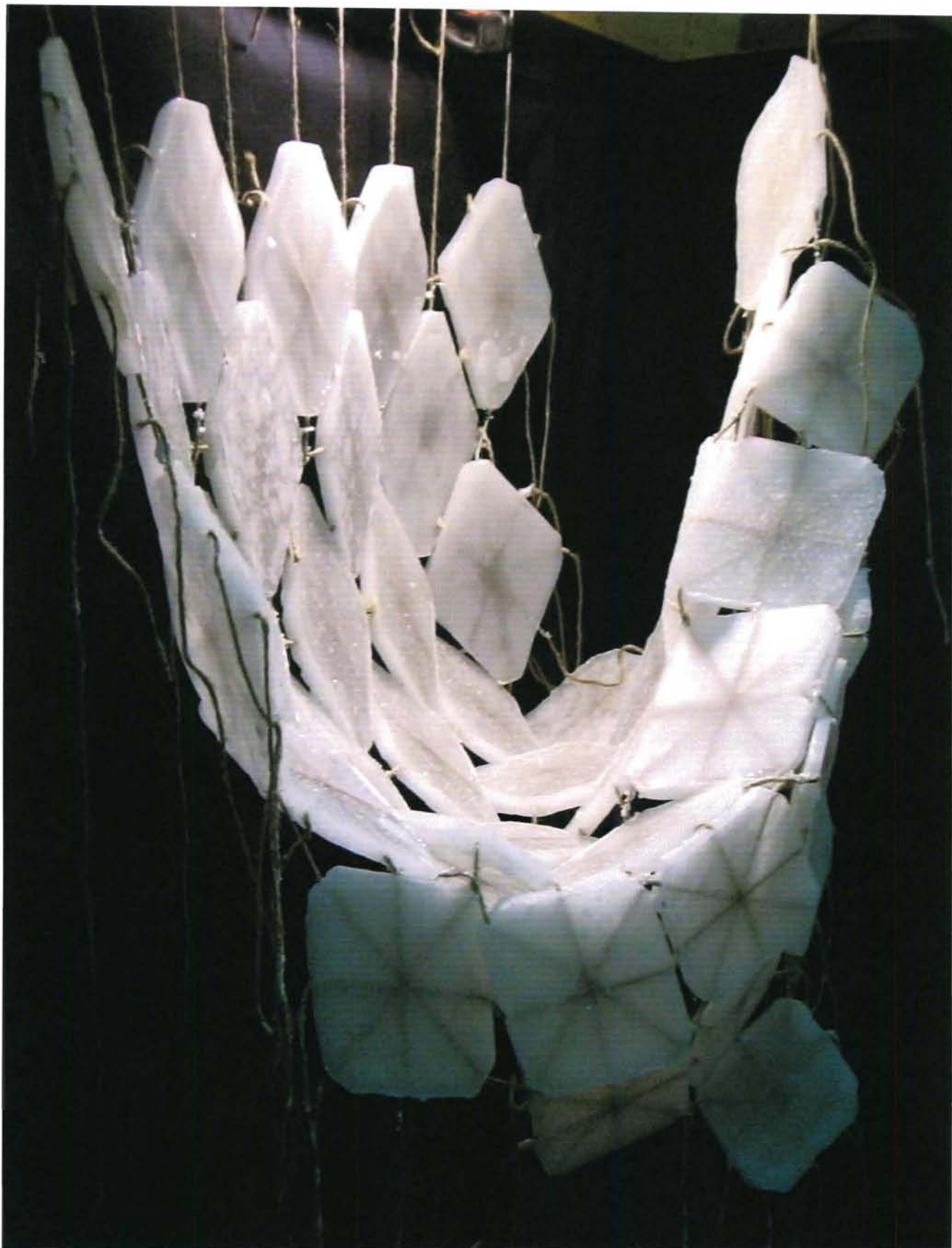




The images above begins to represent the idea of loops and circuits. Made from strips of chipboard, the piece begins to extend into the vertical dimension. By using the same width strips there is a uniform consistency as well as an overall pattern. These loops begin to express the idea of possible loops and circuits that the possible program can begin to extrude from. It also includes the idea that the landscape and the built forms can begin to be merged into one cohesive form and environment.



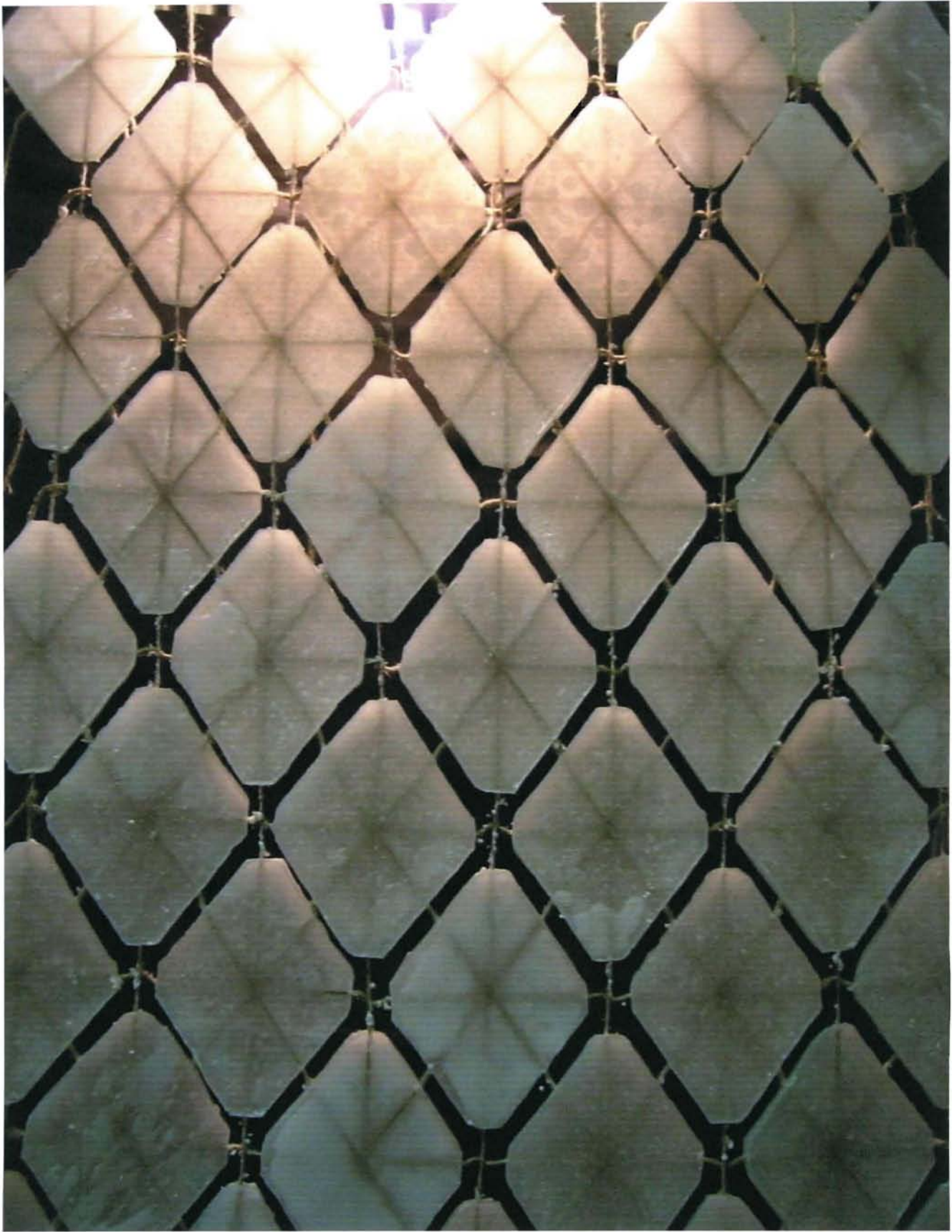
This study deals with the idea of elongated elements and what occurs in the negative spaces. The darker areas represent a brick like material and the lighter colored background helps show what occurs if the stacked elements extend past on another. It is more of an exploration in the tectonics of a “conventional” wall building system.



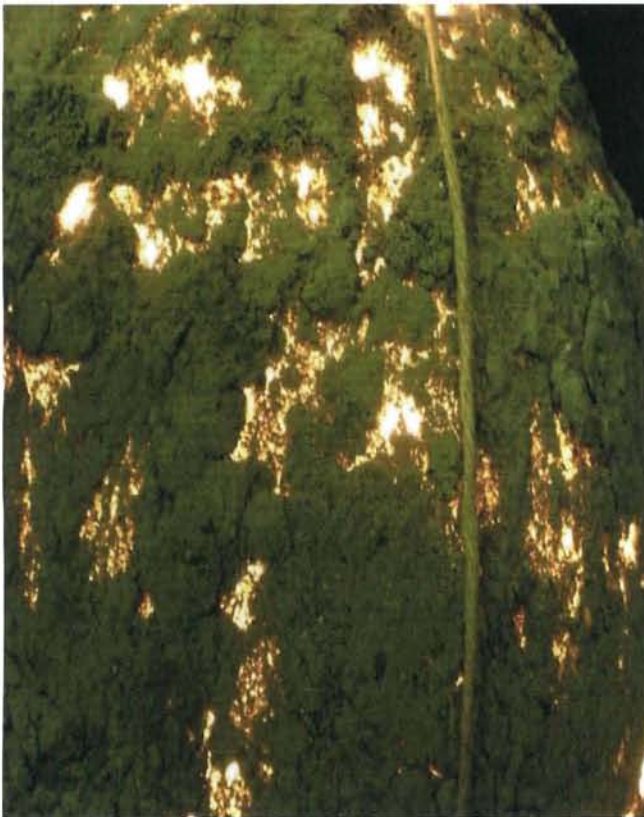
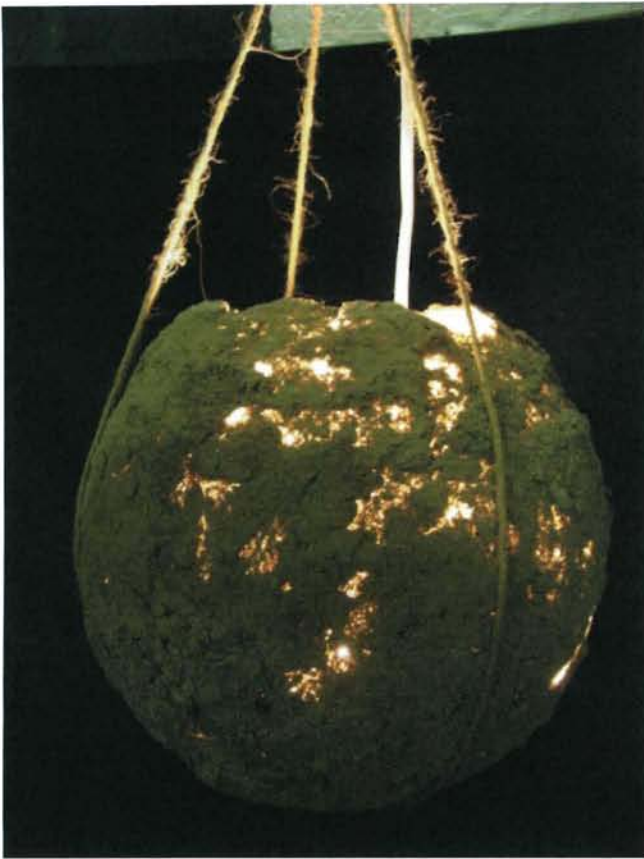
This study involved taking a general diamond shaped cast of wax and repeating it on the diagonal. Imbedded in the was is natural twine which allowed for each cast to become linked to one another. The goal of the study was to take a simple shape, repeat it, while connecting it to itself. The end result became a fabric tessellation of wax that was flexible enough to for shapes when manipulated. In its unaltered form, it is a screen that allows for natural light to pass through as well as diffused light.











In this study, concrete became the focus, but not in the conventional form. By incorporating concrete with glue, the concrete became strong enough to spread thin, almost like a coating. Once the concrete was set, there were areas that became transparent and allowed light to pass through. This gave the concrete an unconventional lightness characteristic. The only way this was achieved was by experimenting with the raw material with a hands on approach.

This study involved casting a concrete mass with using a fabric as a form work. The fabric used was a coarse burlap which allowed for some of the pattern on the material to be evident once the cast was dry. The fabric was used as the form work so it allowed the concrete to move in a more natural unconfirmed way.

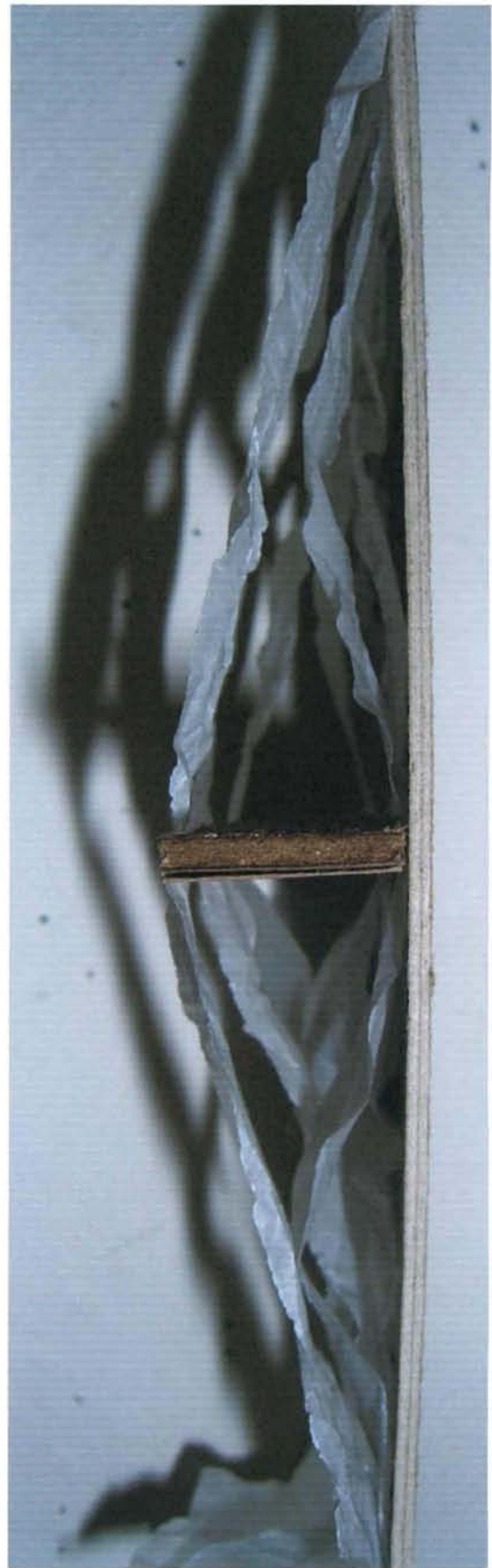


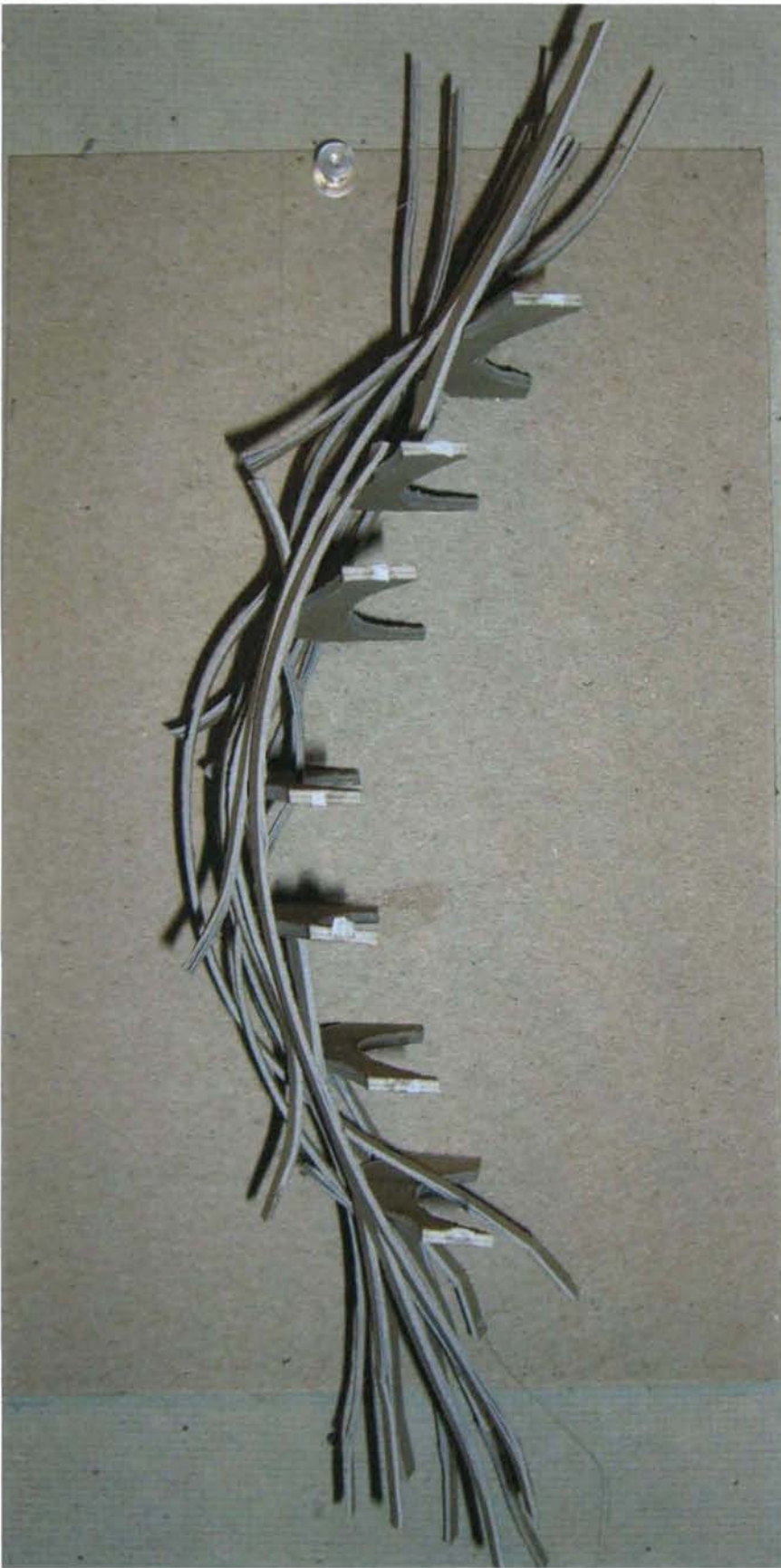


Another aspect of concrete that was studied was the impact of altering the materials used to create it. By substituting rubber cement in place of the water, the end result is a concrete like material that still allows for flexibility of the material even when its dry. Although it isn't necessary an aspect that will be explored in the final project, it is helpful to explore the material on its own.

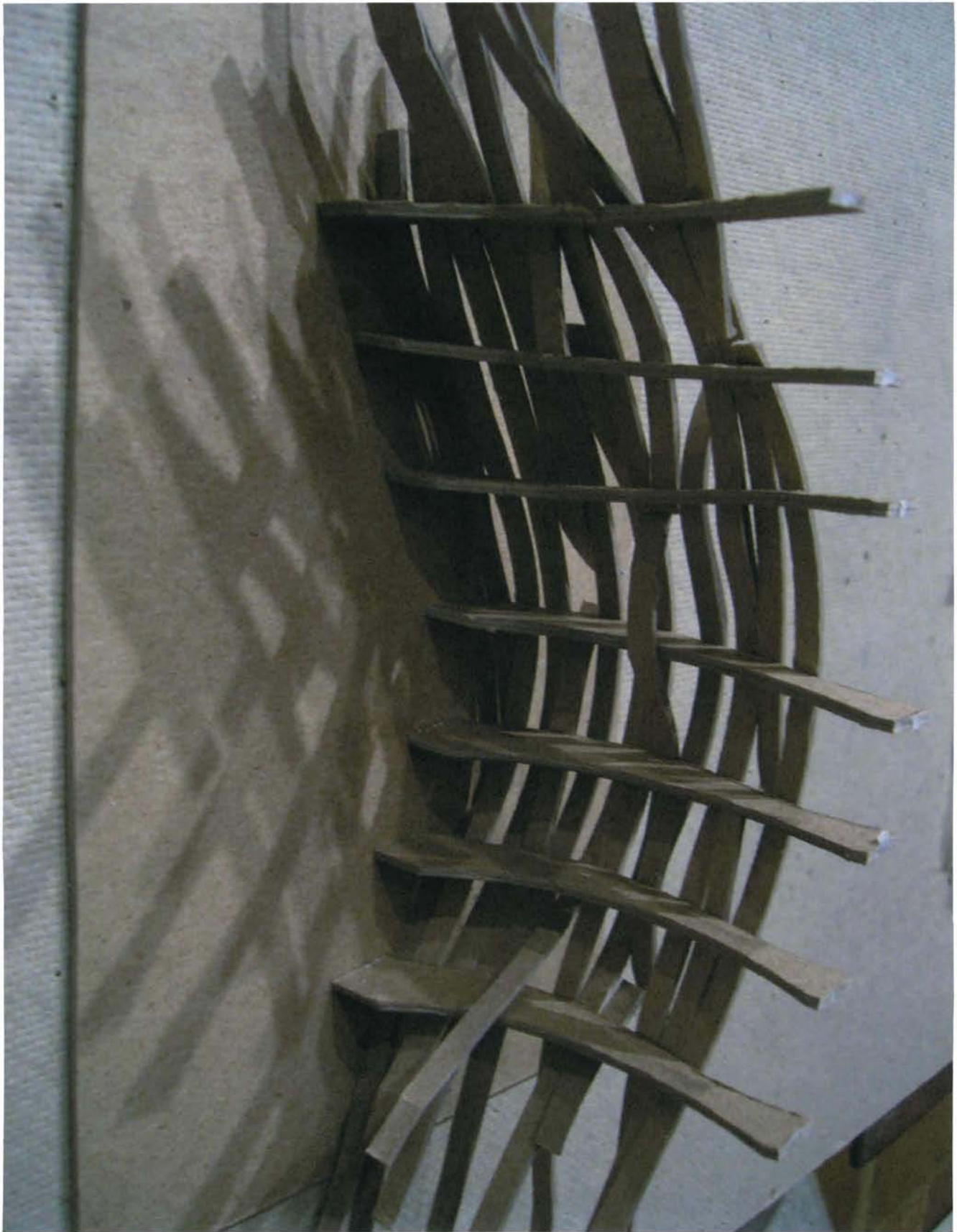


In the images on the left and right, the cardboard piece represents the running track while the folded trace paper represents the skin of the building. This study was intended to explore the relationship of the running track, the exterior of the building, and the building itself, and the interior. By having the skin overlap and enfold over the track, it allows for a more connected and protected feeling for the users of both elements.

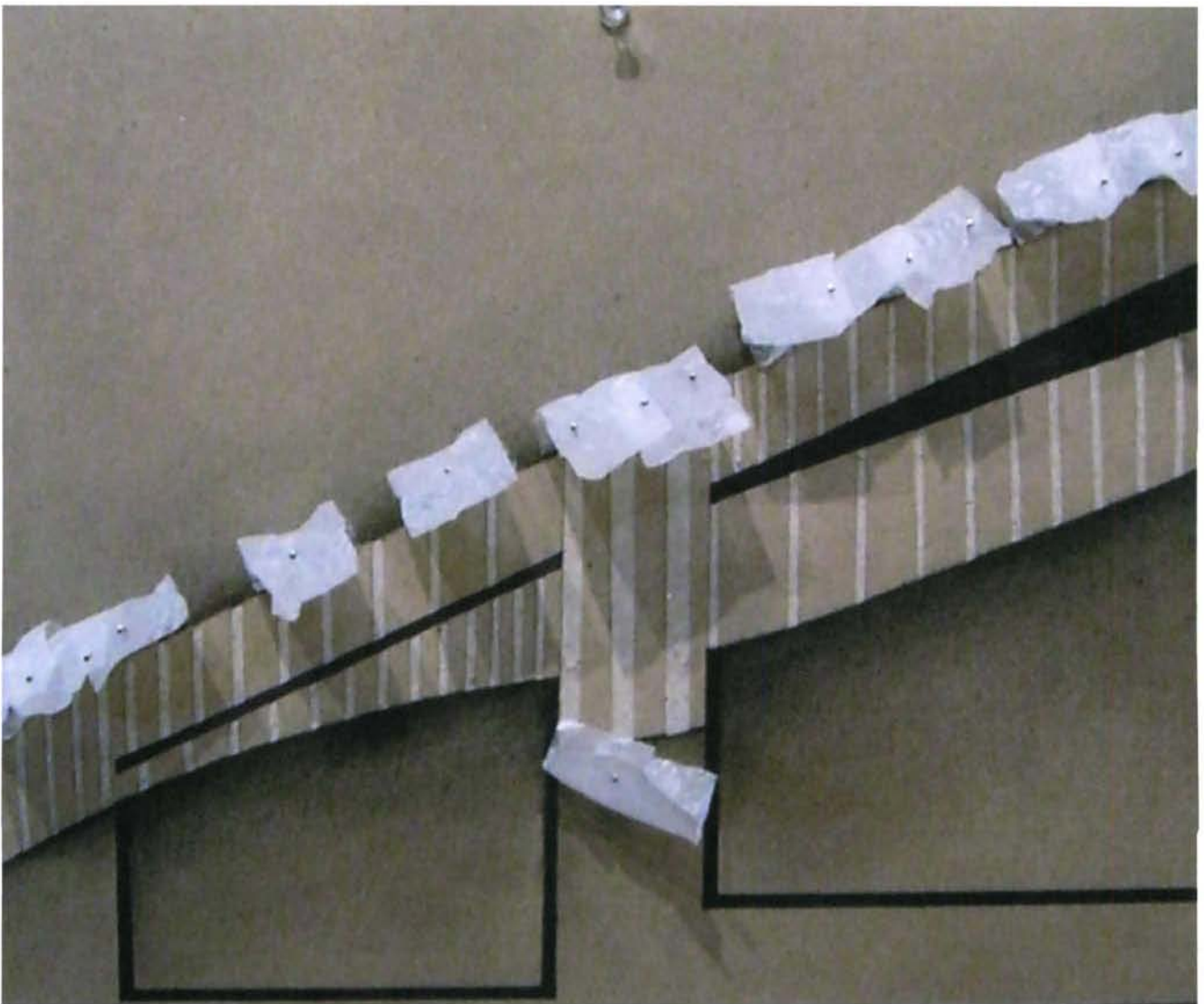




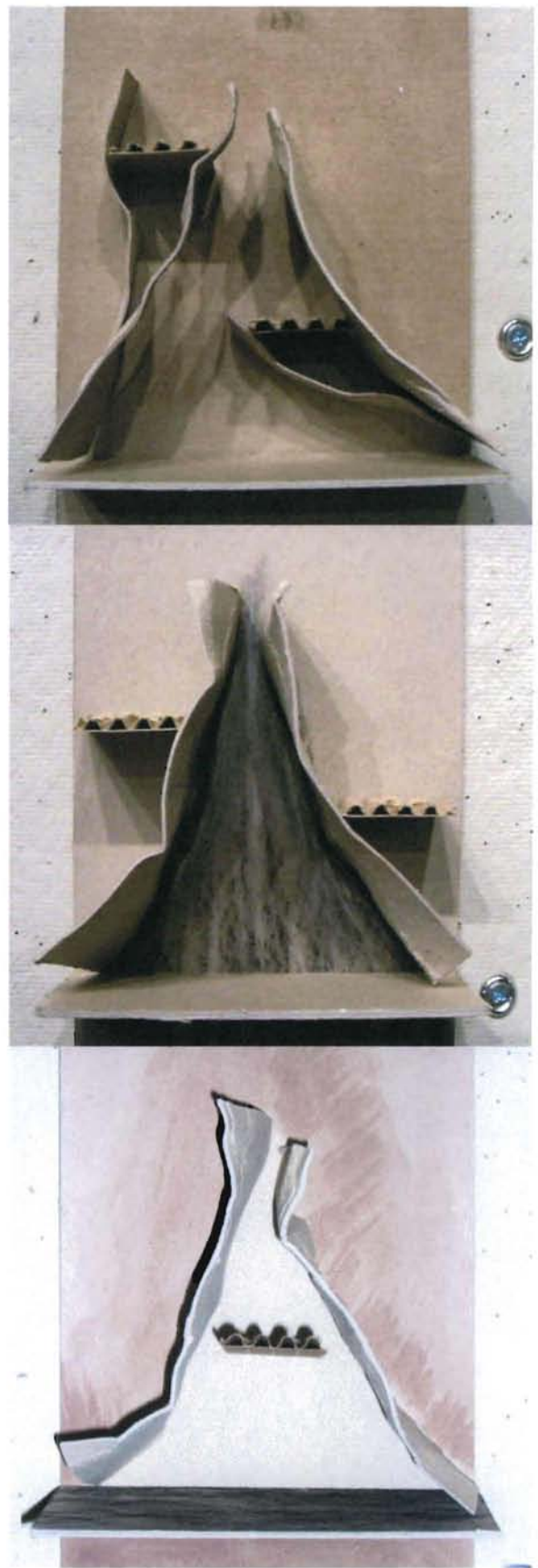
The focus of this study was the exploration of how one element of the built environment can begin to support/ interact with the more structural aspect of a structure. The thinner members begin to weave throughout the larger more supportive elements creating a much more light feeling for a normally heavy construction methodology.

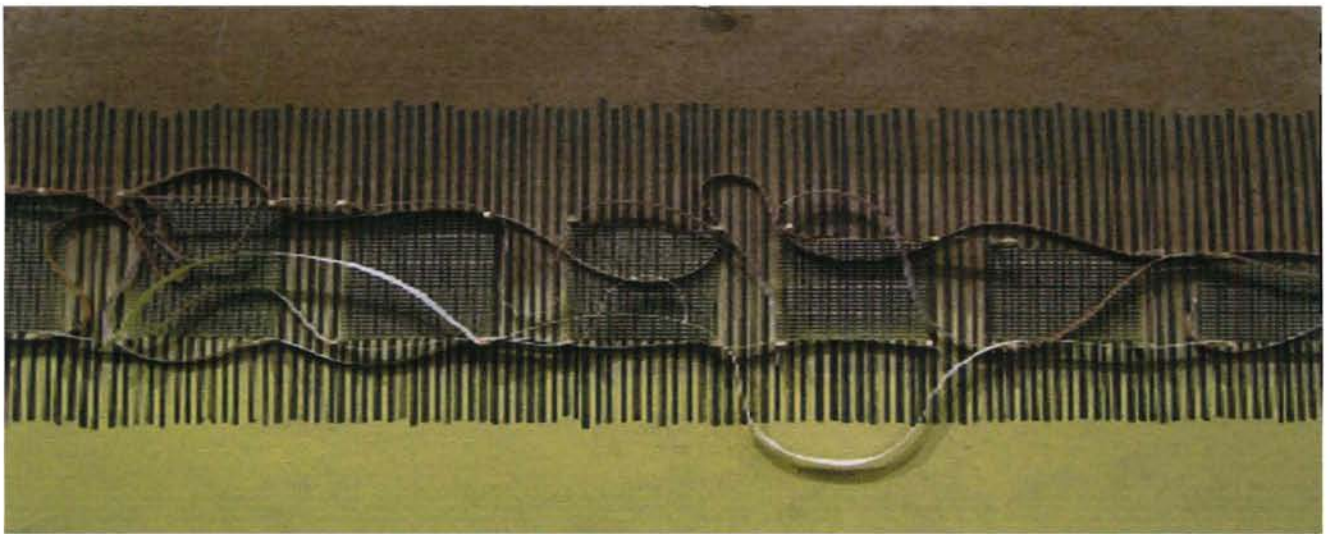
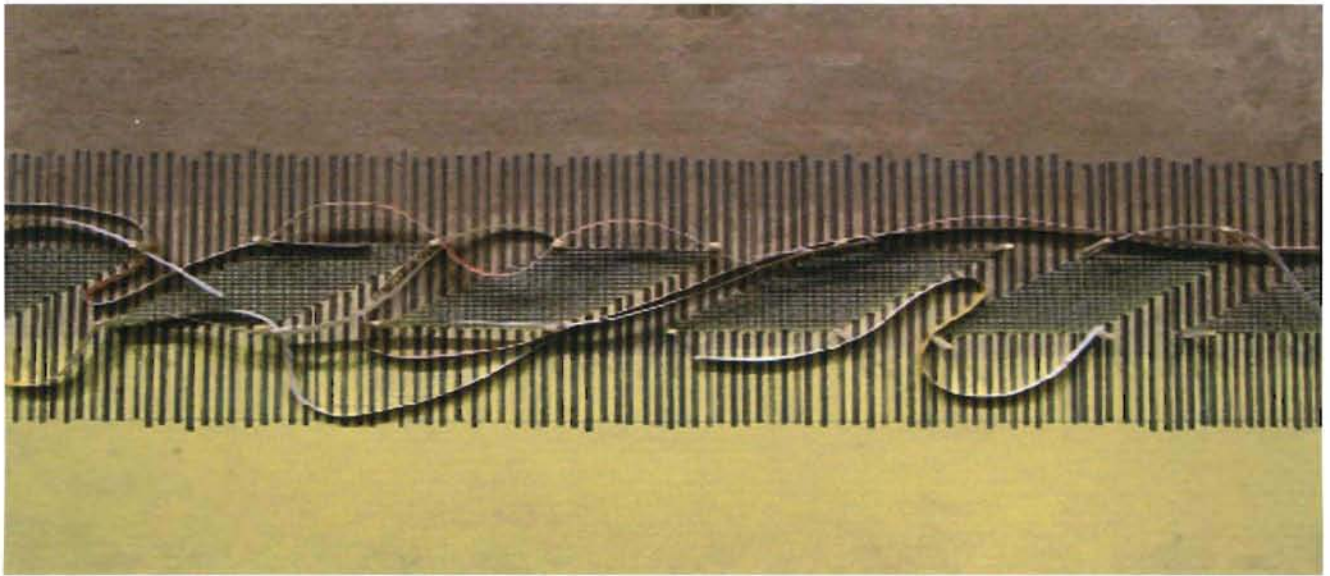


Similar to the study which involves the skin of the building and the track, this study begins to explore these two dynamic elements of the building but in a plan view. It looks at both sections of the outer skin and repetition on the actual track itself to help force the user to become aware of their speed.

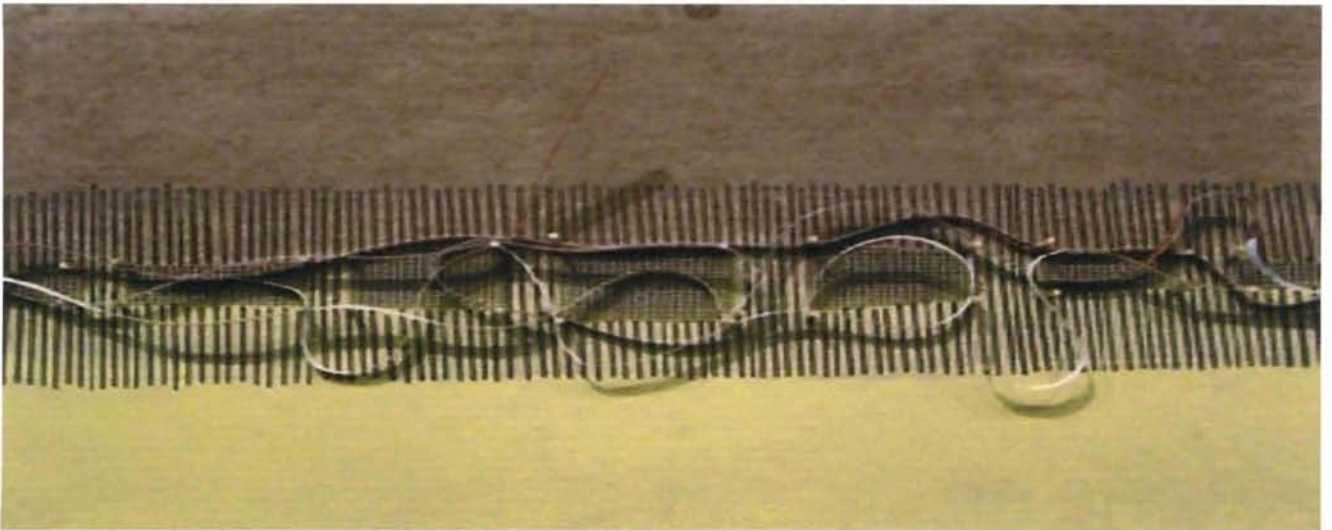
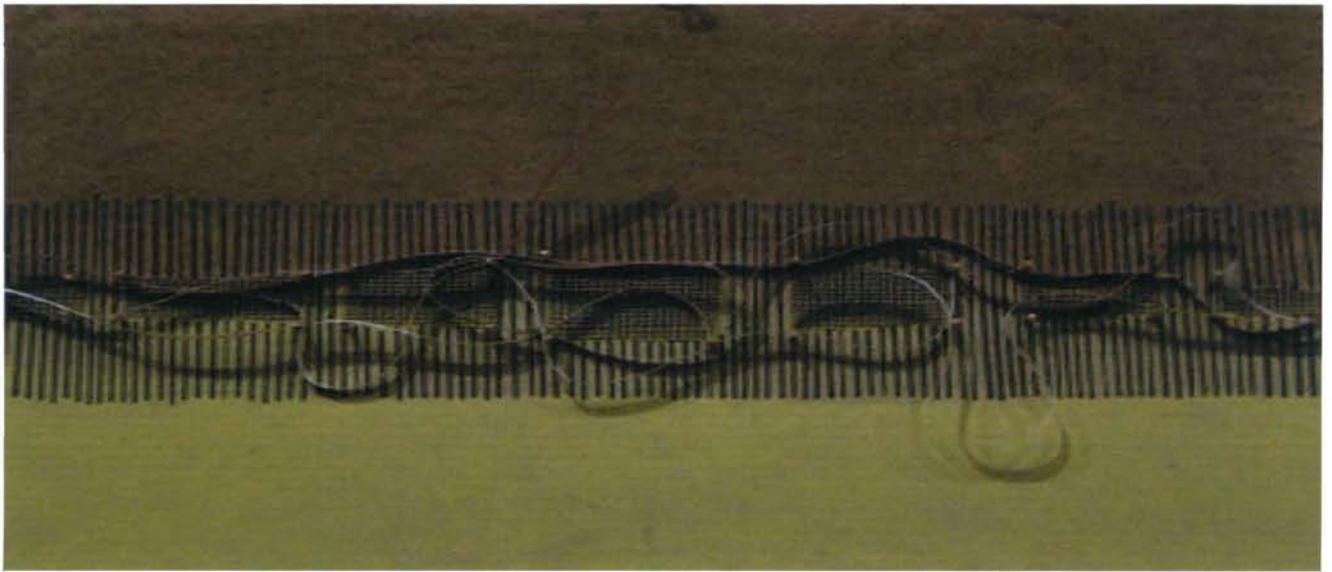


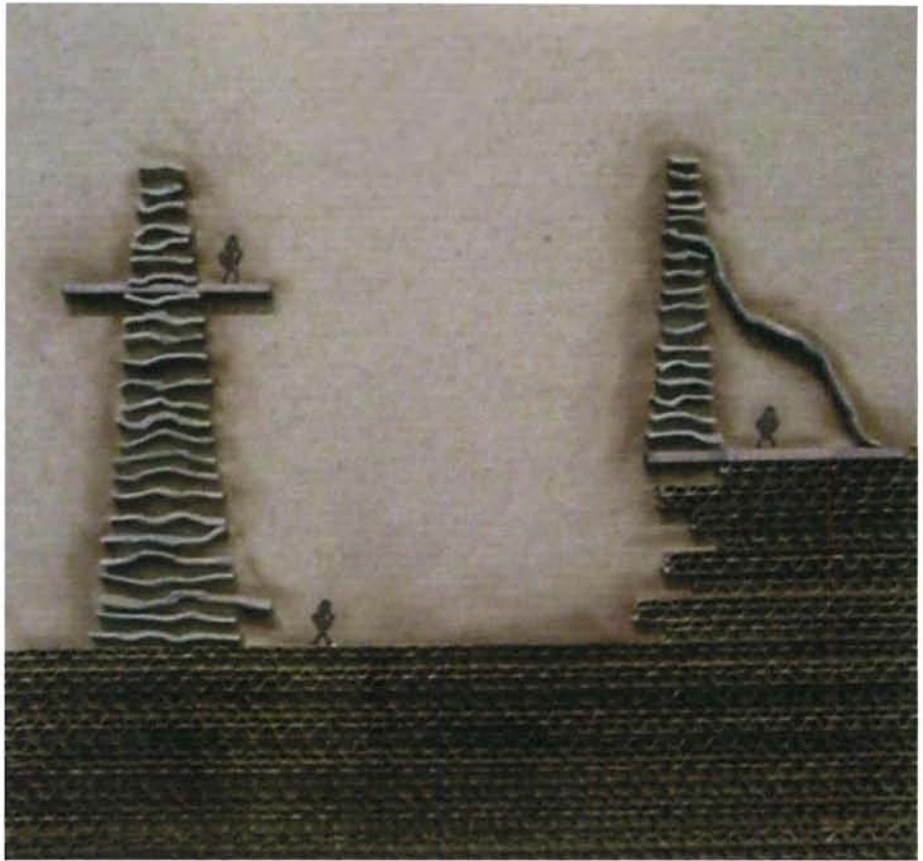
These smaller cross sections of the spaces allow for the interaction of the building skins and the track and other built elements of the program to be studied at more detailed and intimate levels. It places these built spaces within, next to, on top, and beneath other built environments which allows for a spacial/ relational study to begin to unfold.





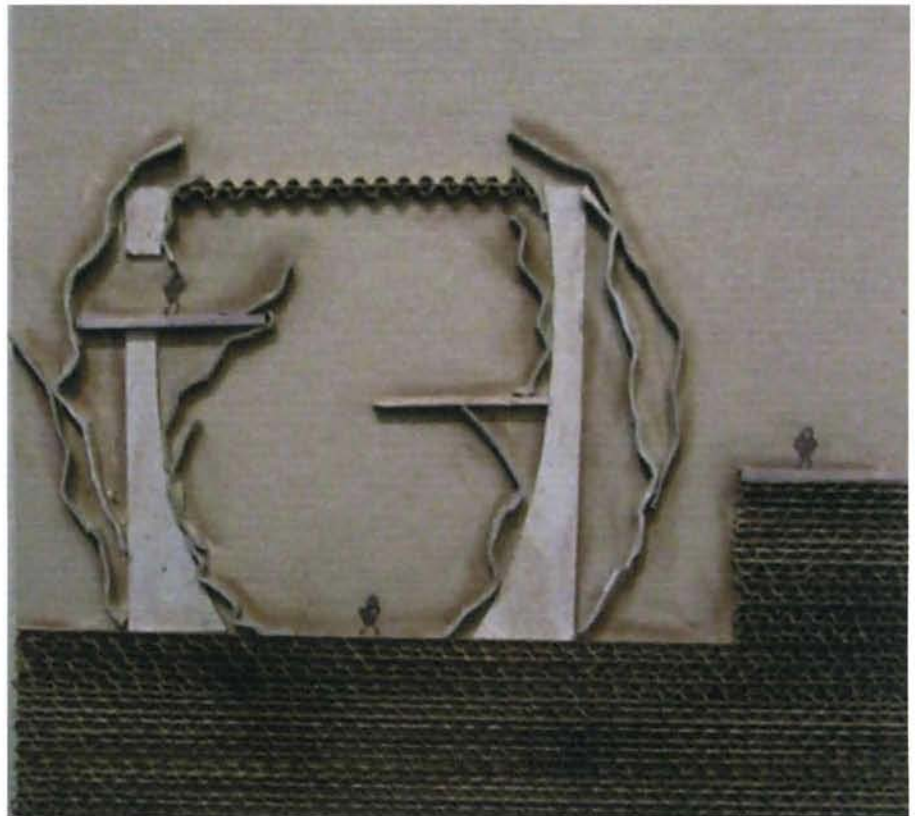
These four images are of models that are studies of how the spaces on the interior can interact with those on the exterior. The strips of photographs are representative of the movement through the walls of a built space. The black lines show the intermediate space that is between the exterior and interior.



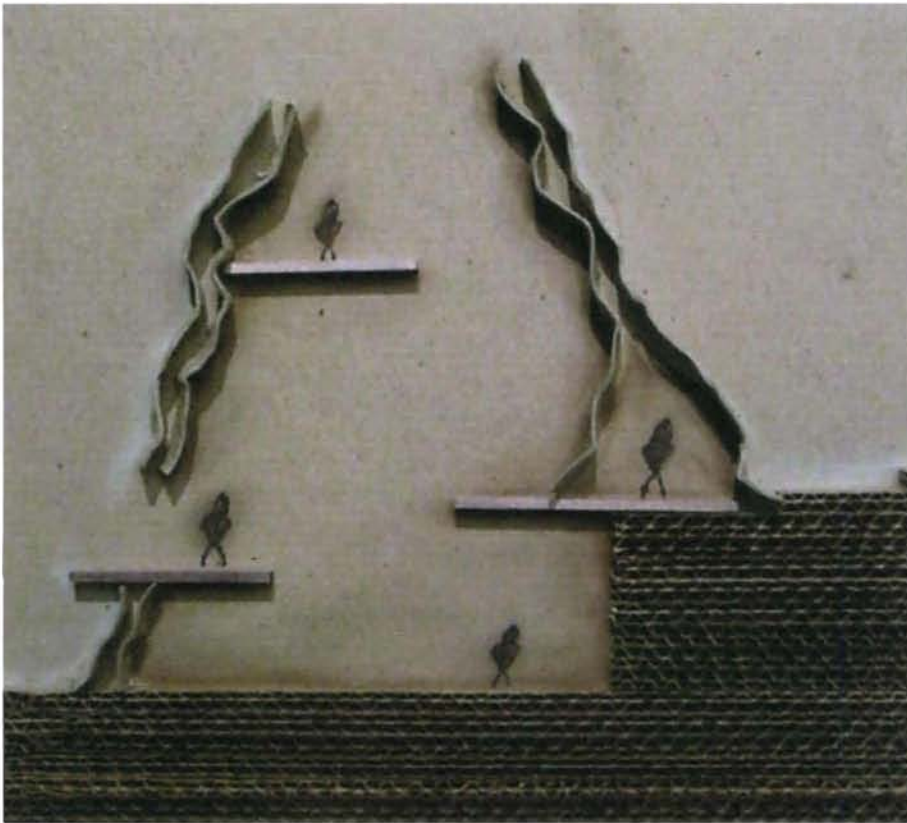


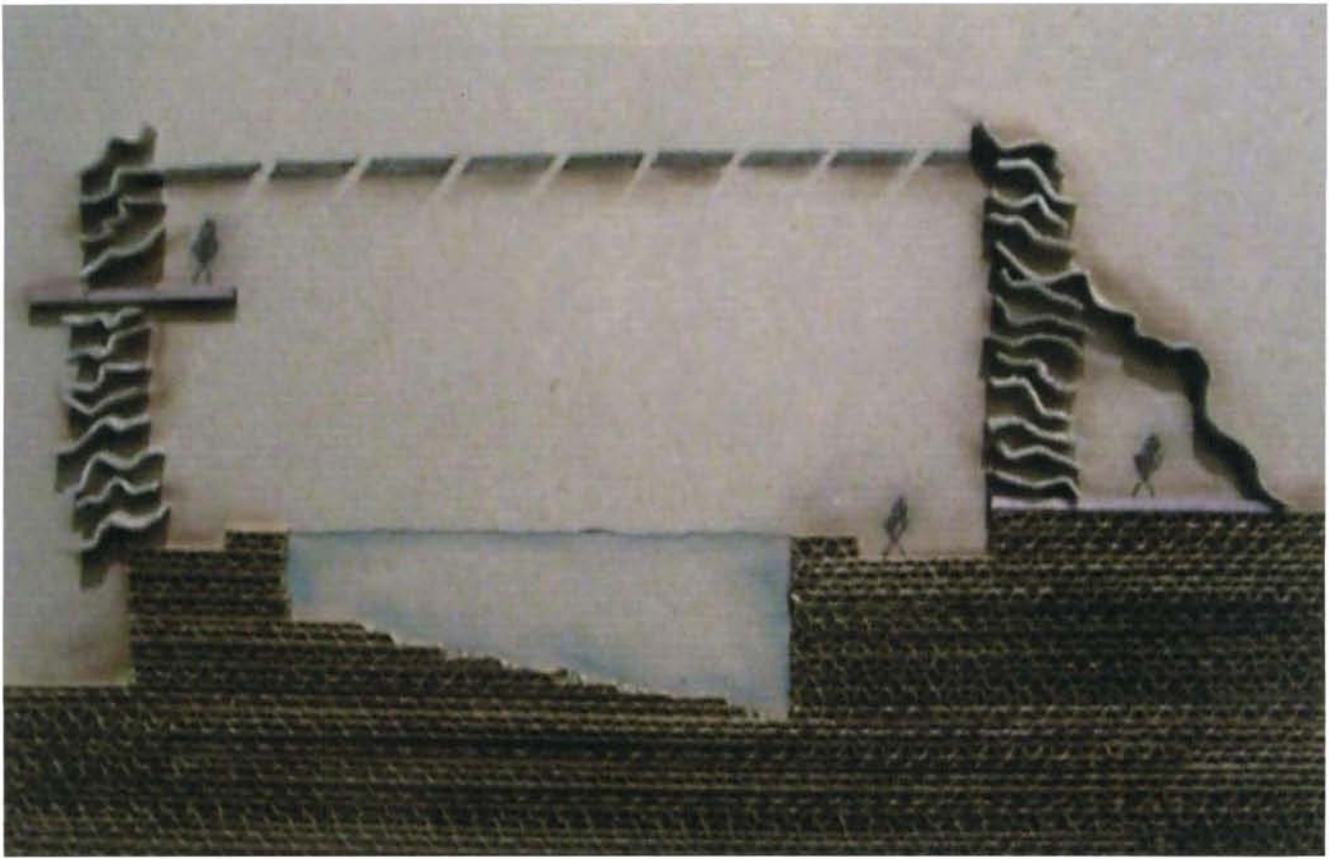
This mode/ sectional study begins to explore the cross section of the weight lifting environment. It incorporates the idea of larger heavier stacked elements towards the bottom and thinner lighter members towards the top, based on the activity of lifting and the power behind it.

In the same method as the previous study, this study investigates the section of an environment, the stretching/ dance area. By having a shorter ceiling height, the users of the space become more adapted and in tune to the scale of their bodies, and not over shadowed by their environment. There is also a fluidity in the assembly of the skins on both the interior and exterior of the space.

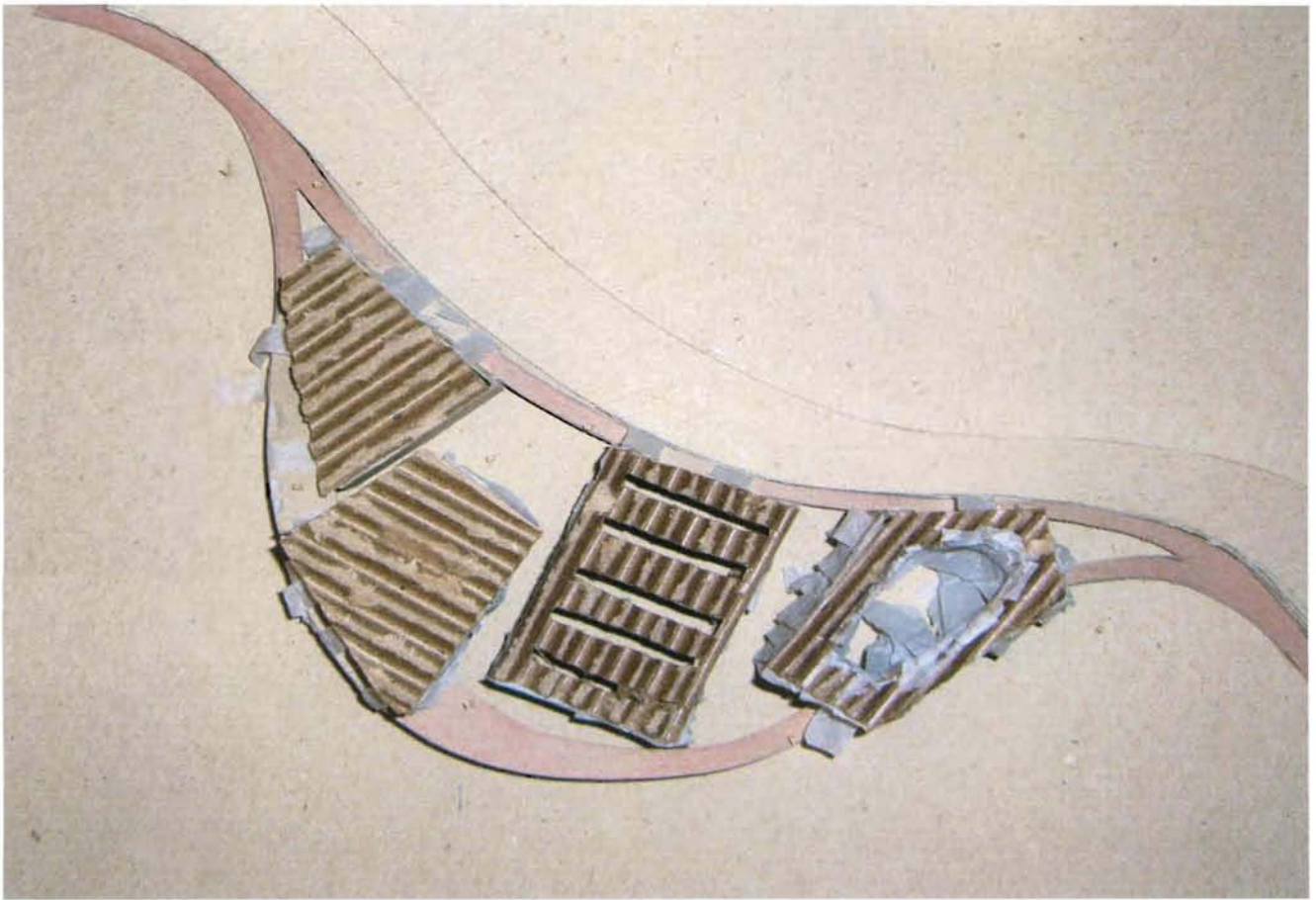


This next section is the yoga/
martial arts type area. The space
is elongated to help with the idea
that the body is elongated and in
a tense state of mind. The skins
are simple in this space in or-
der to focus the energy inwards
as the users utilize the space.





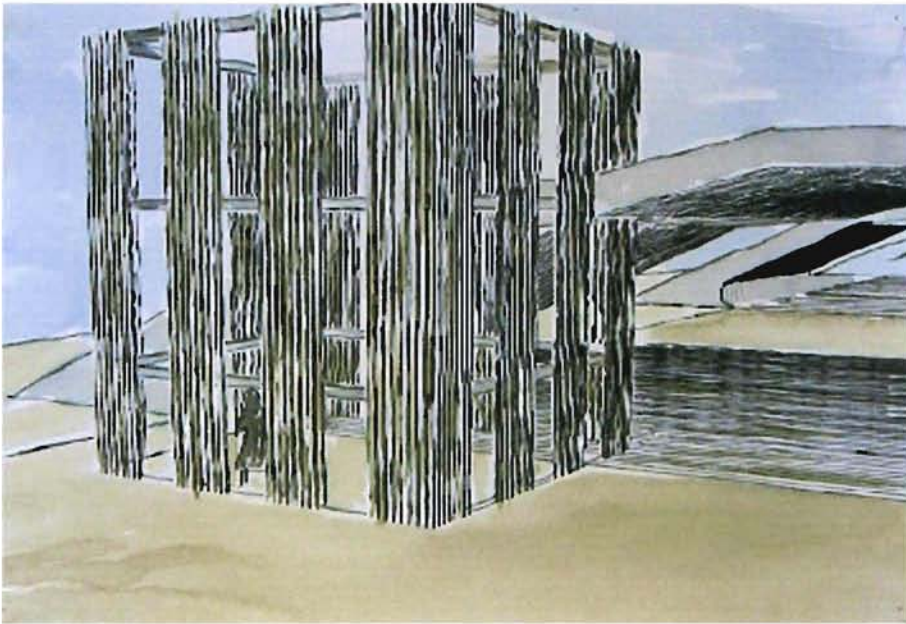
The last sectional study is that of the swimming area. The space is relatively uninterrupted with a translucent roofing system allowing for maximum light. The walls began to take the form of horizontal stacked elements that allow for air and ventilation to pass through, almost like the gills of a fish.





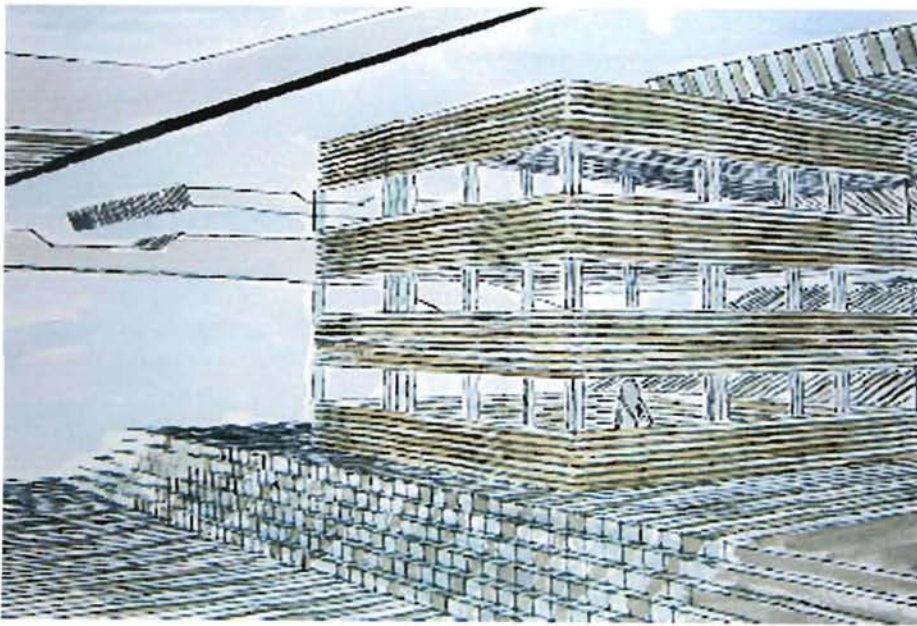
This model is the first study in bring all of the built environments into on cohesive building form. The track begins to form 2 separate tracks the interact with the site, one in a more flat general purpose use, and the other in a more all terrain use. These two tracks begin to intersect with one another and the building creating intimate pockets that create spaces that allow for spaces that are more geared towards the intimate levels of the human scale.





The image above is a water colored rendering of what the possible yoga/ martial arts studio would look like. The main object this image depicts is the idea of a material stacked and oriented in a vertical manner. The image below is of the weight lifting area, made up of larger pre cast elements.





The image above shows what the stretching/ dance area would be like. Similar to the yoga, but the materials would be in a vertical orientation. The image below is a section cut through the swimming area.

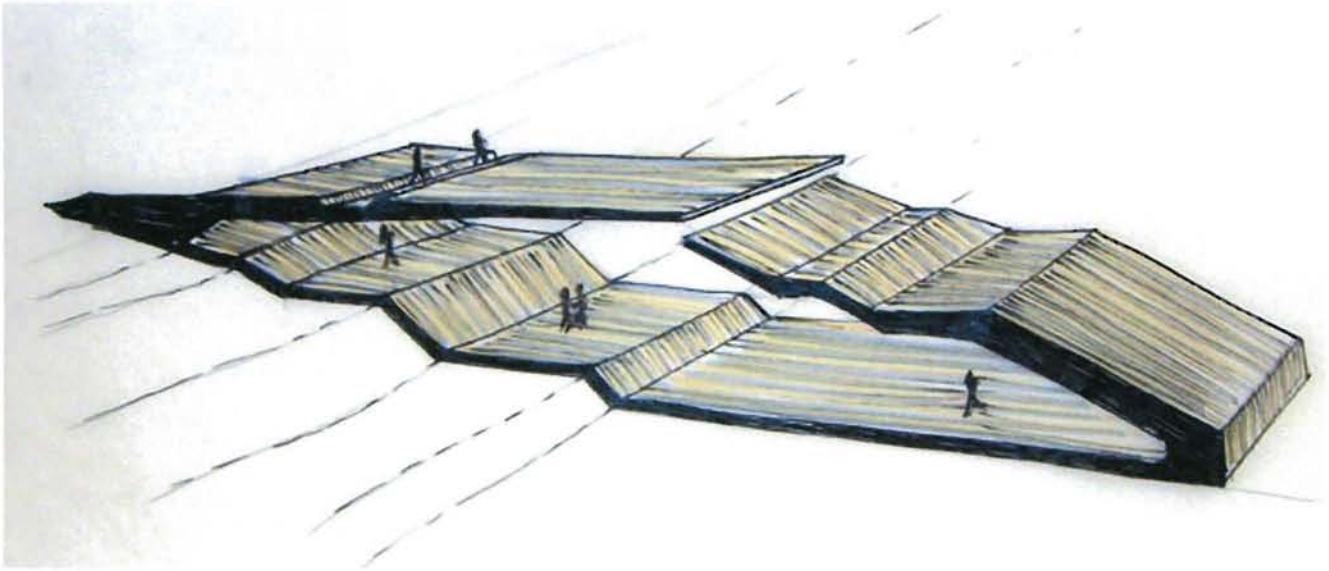




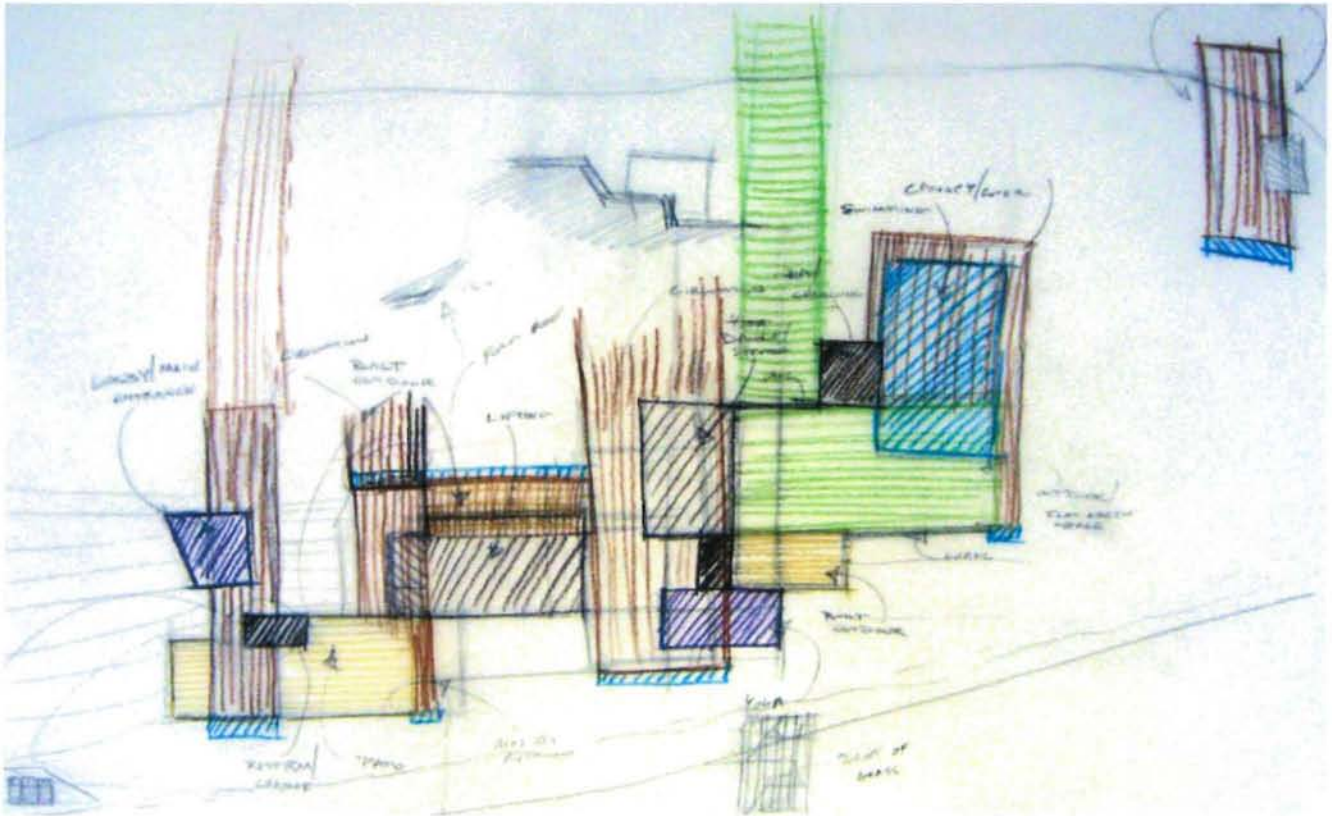
The image on the top left is a section cut through the lifting portion of the site. The materials depicted are pre cast concrete elements to help show weight and permanence. The second image on the left shows what the section of the dance and yoga areas would be like. The materials on these are primary wood and glass, the difference is the orientation of the stacked wood. The orientation is based off of the activities that take place with in and around the areas. The last image on the left is the section through the main entrance located on the lower south end of the site.

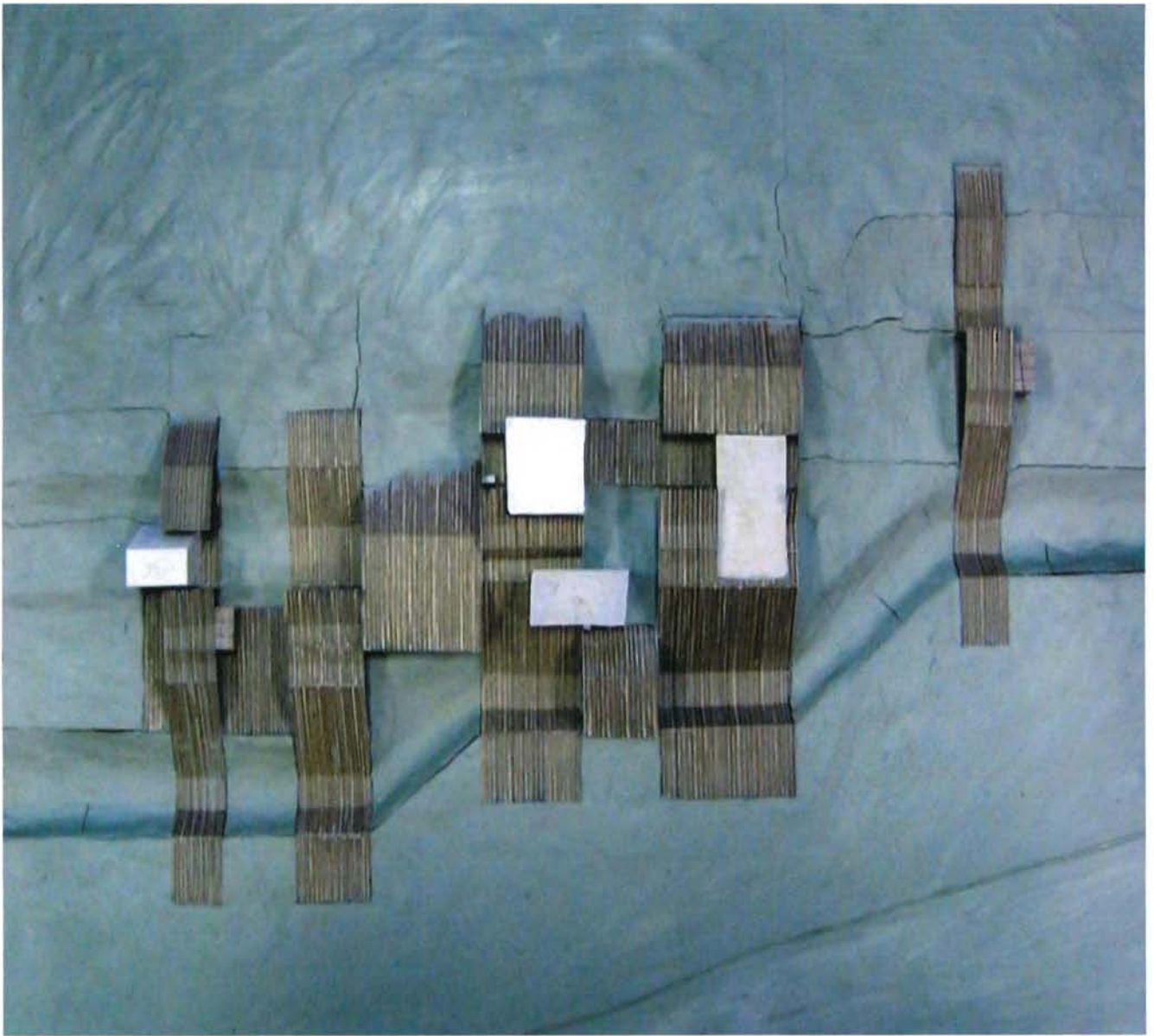


Site plan showing relations of program spaces and the running track. Also shown in context to the Detroit river and also the perimeter site.

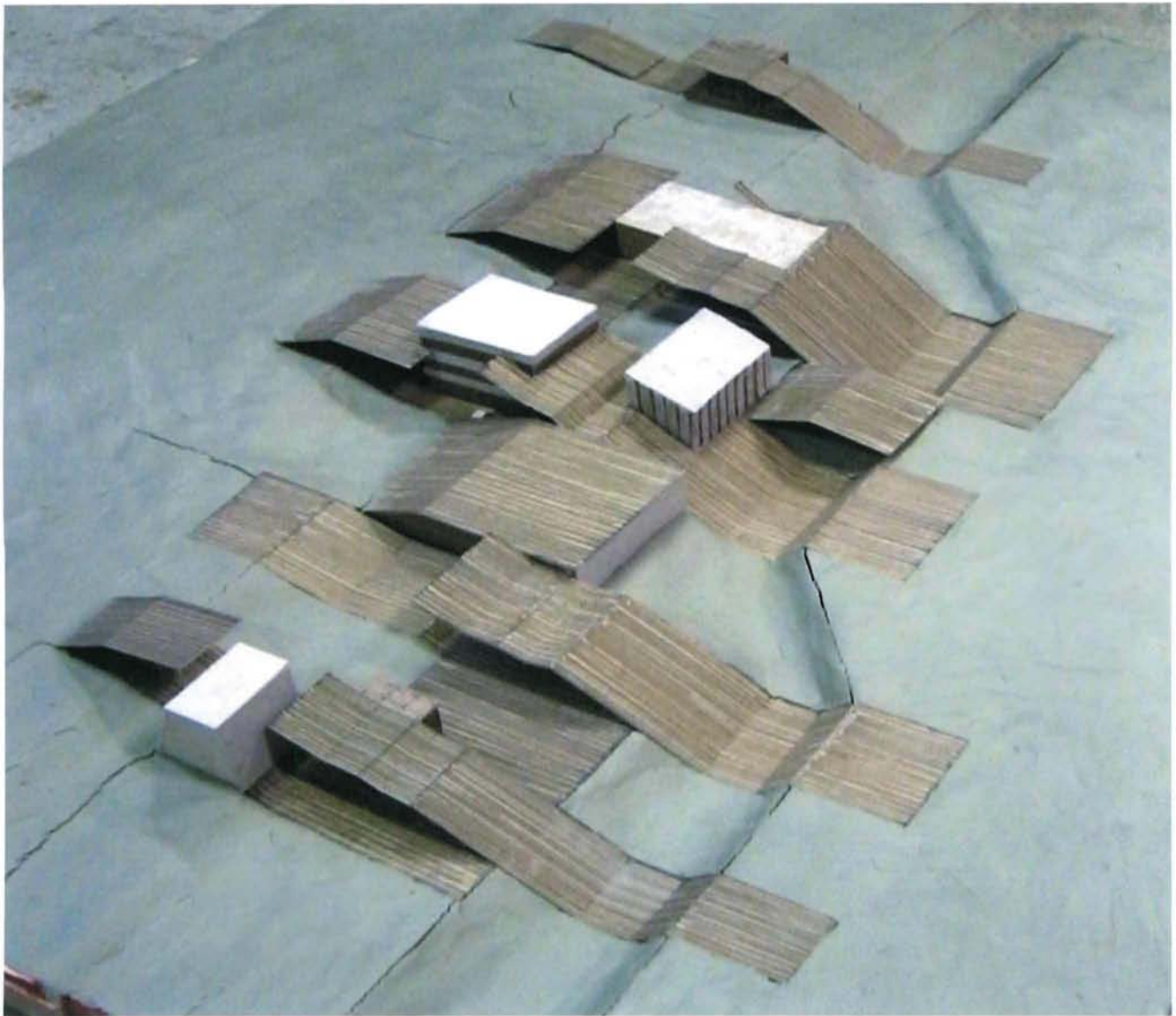


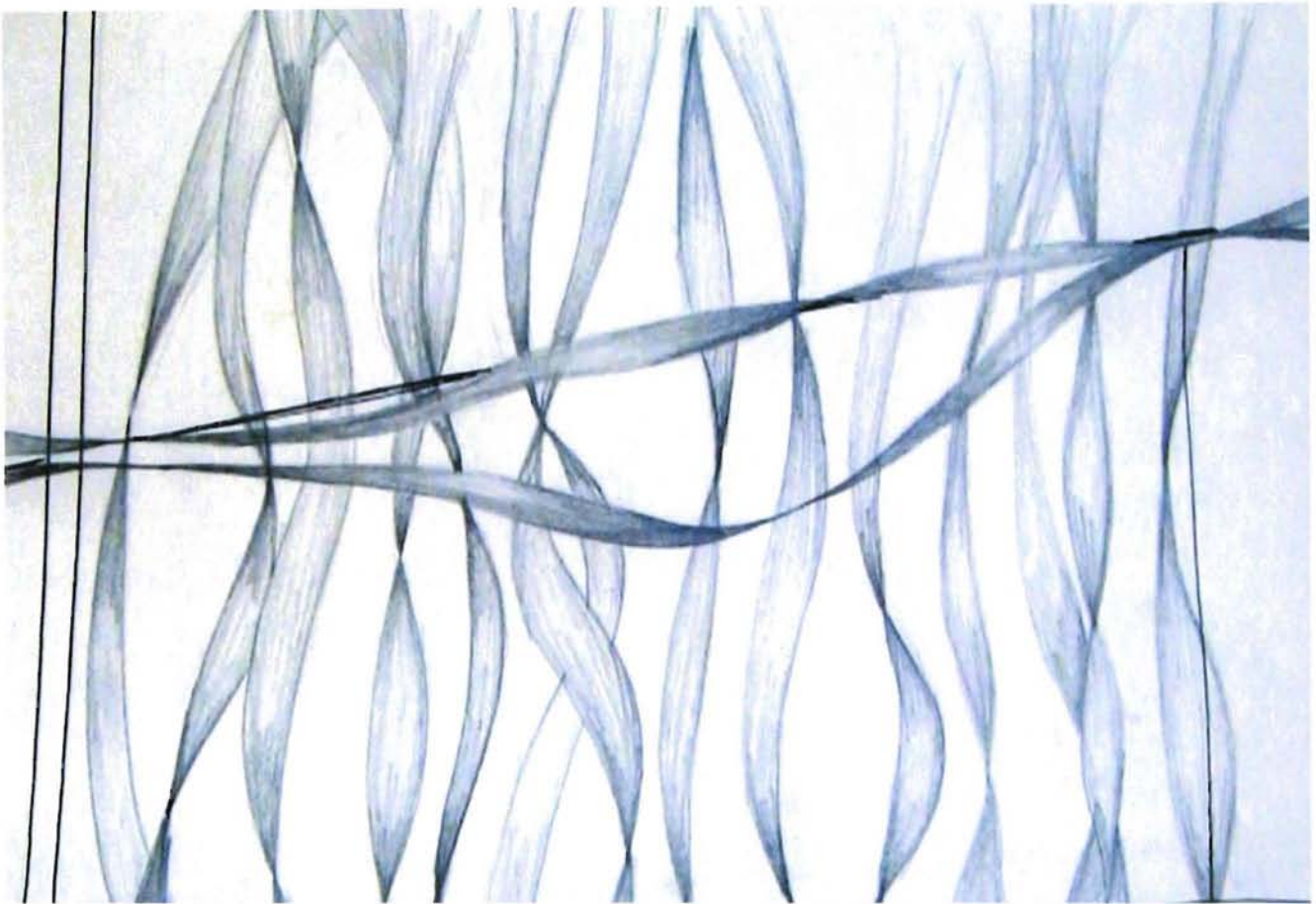
Top image is a sketch of the possible loop form. Lower image is an image of the orientation of program spaces and the intersecting areas.



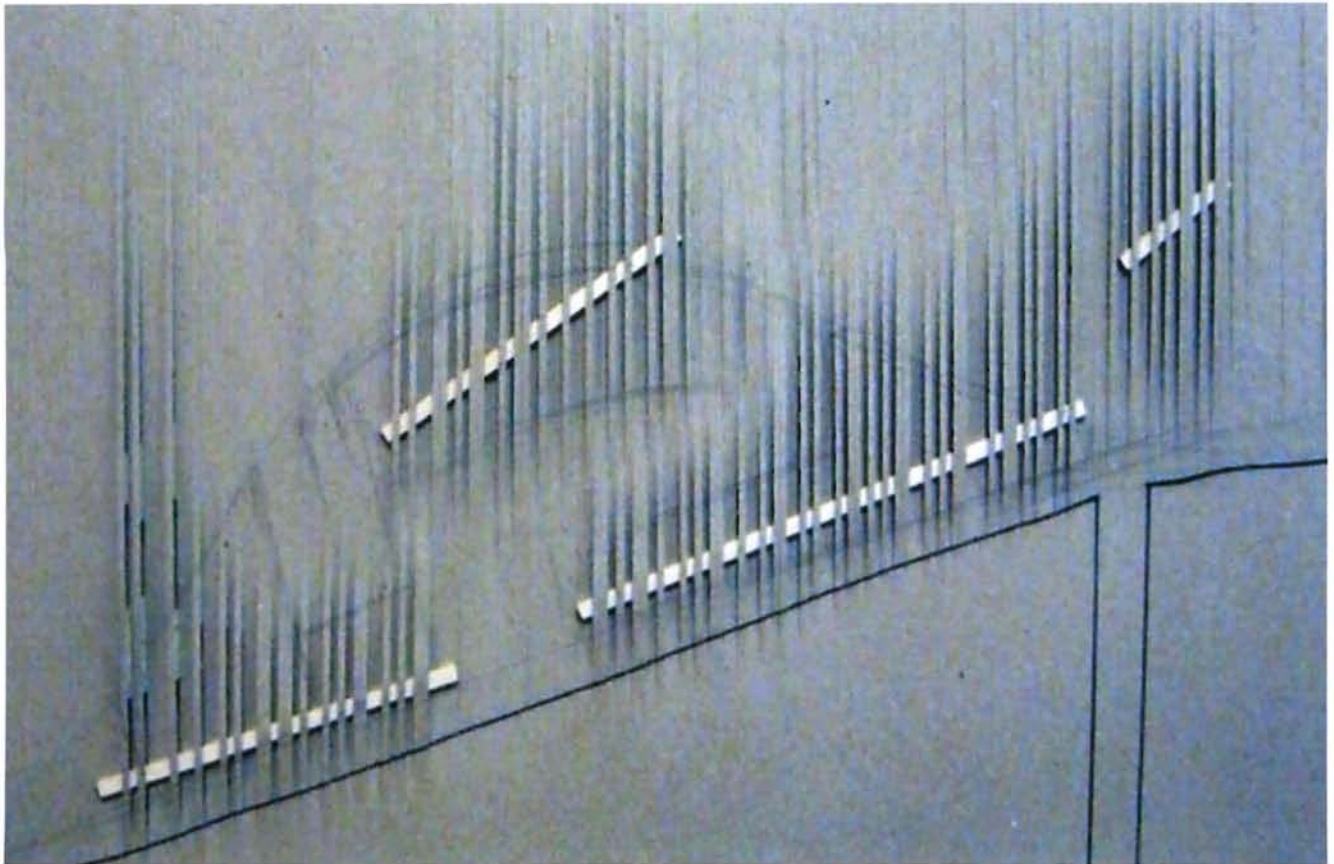
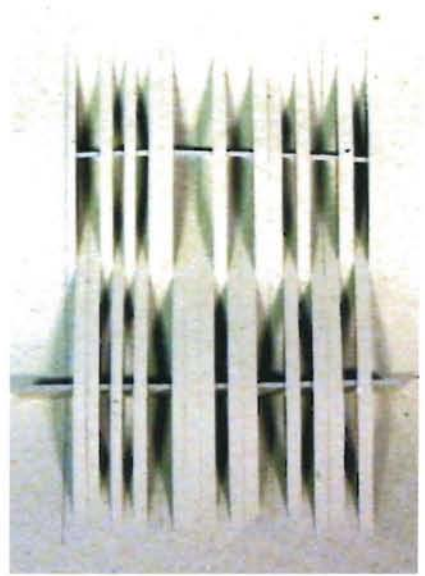
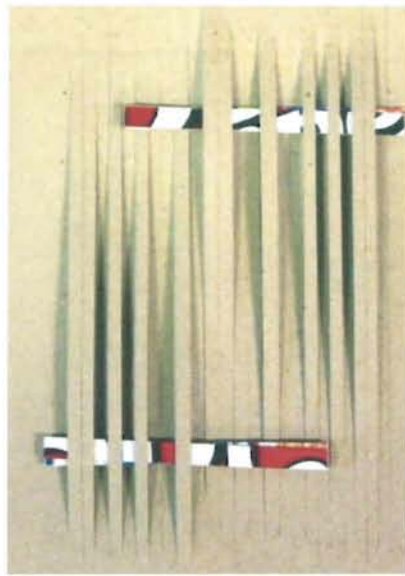
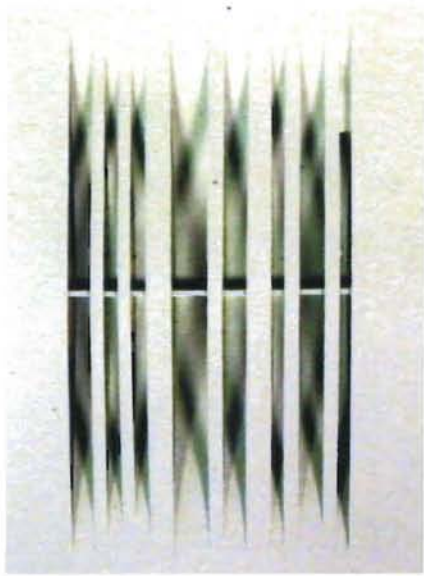


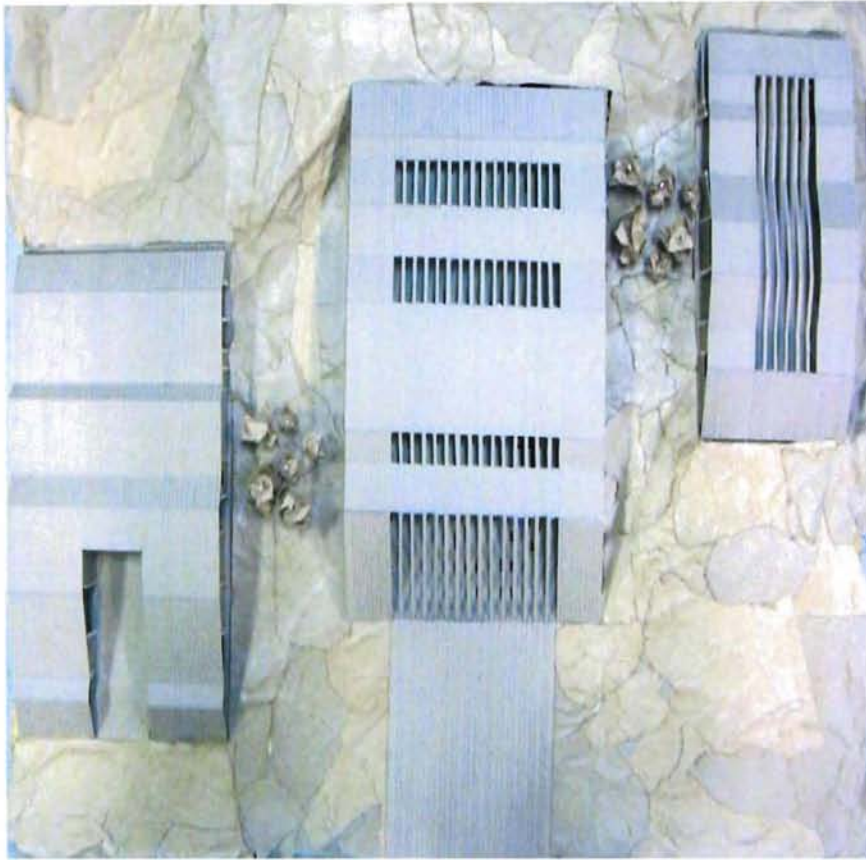
These images depict the site model for the previous drawings. The aim for this model was to explore the ground plane, specifically where the building meets the ground, and what are the possibilities for the programmatic spaces that could occupy these areas.





The above drawing is a conceptual site study to help develop the placement of the project program. The ribbons represent the horizontal and vertical rhythm for activity placement. The studies on the top of the opposite page are similar to the ribbon study but are more focused in and relate how the built areas will relate to the unbuilt.. The larger image to the right is a combination of both studies.





The following model is a study in the actual program spaces and their relationship to one another, as well as their relationship to the built landscape/site. This was the first model that began to depict the detail in some of the specific spaces, such as the swimming area. It is also one of the first models to explore the exterior spaces in between the built forms.





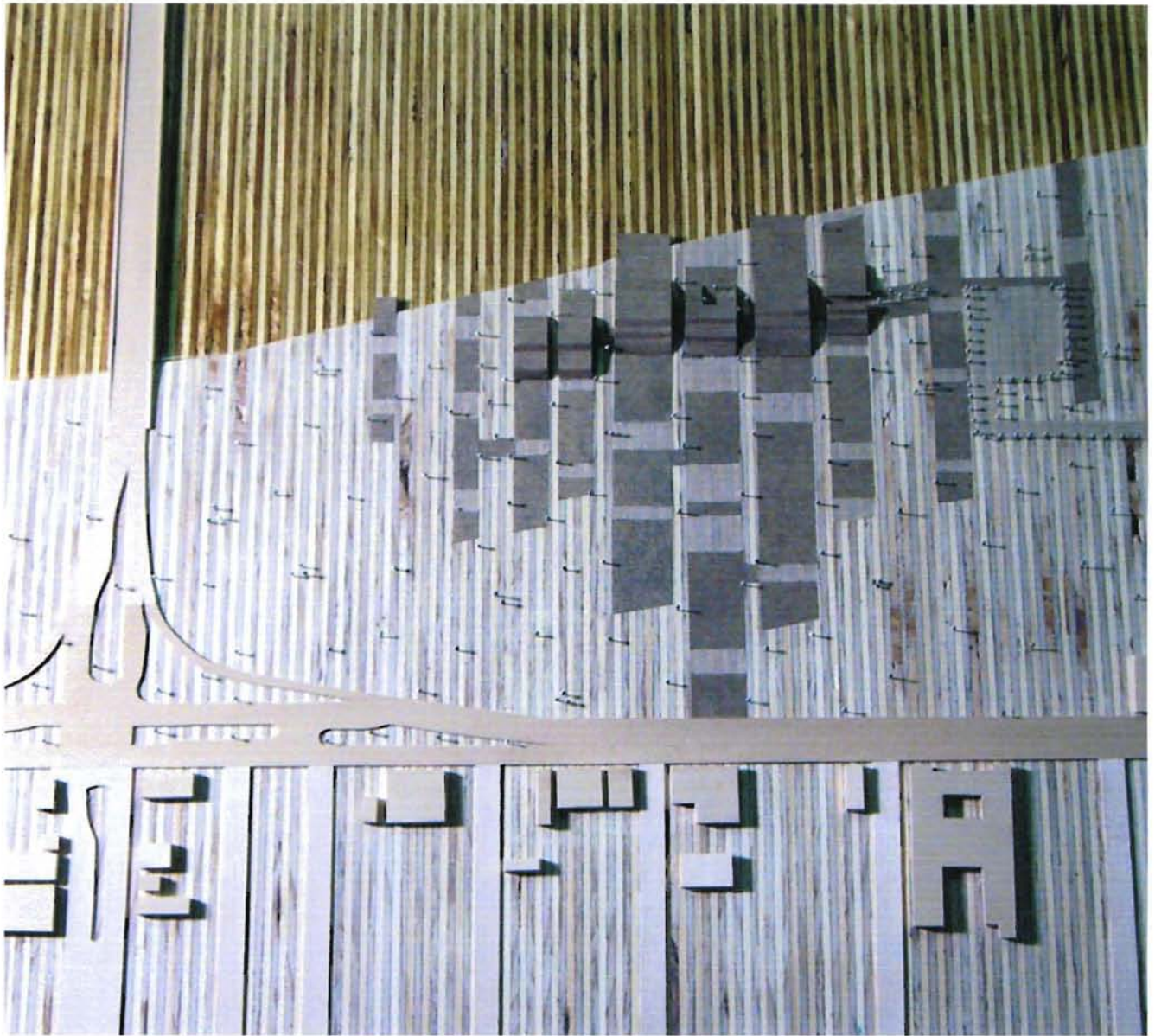




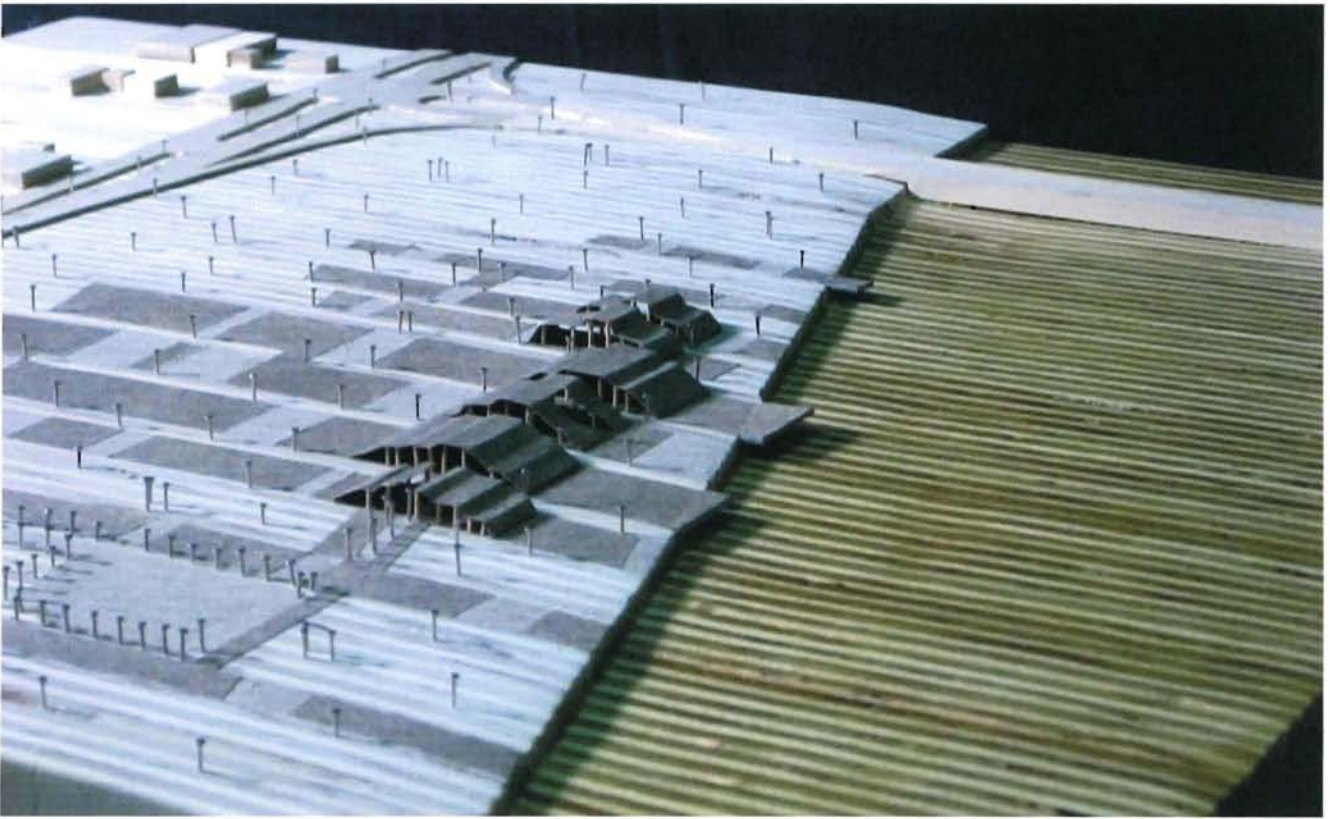
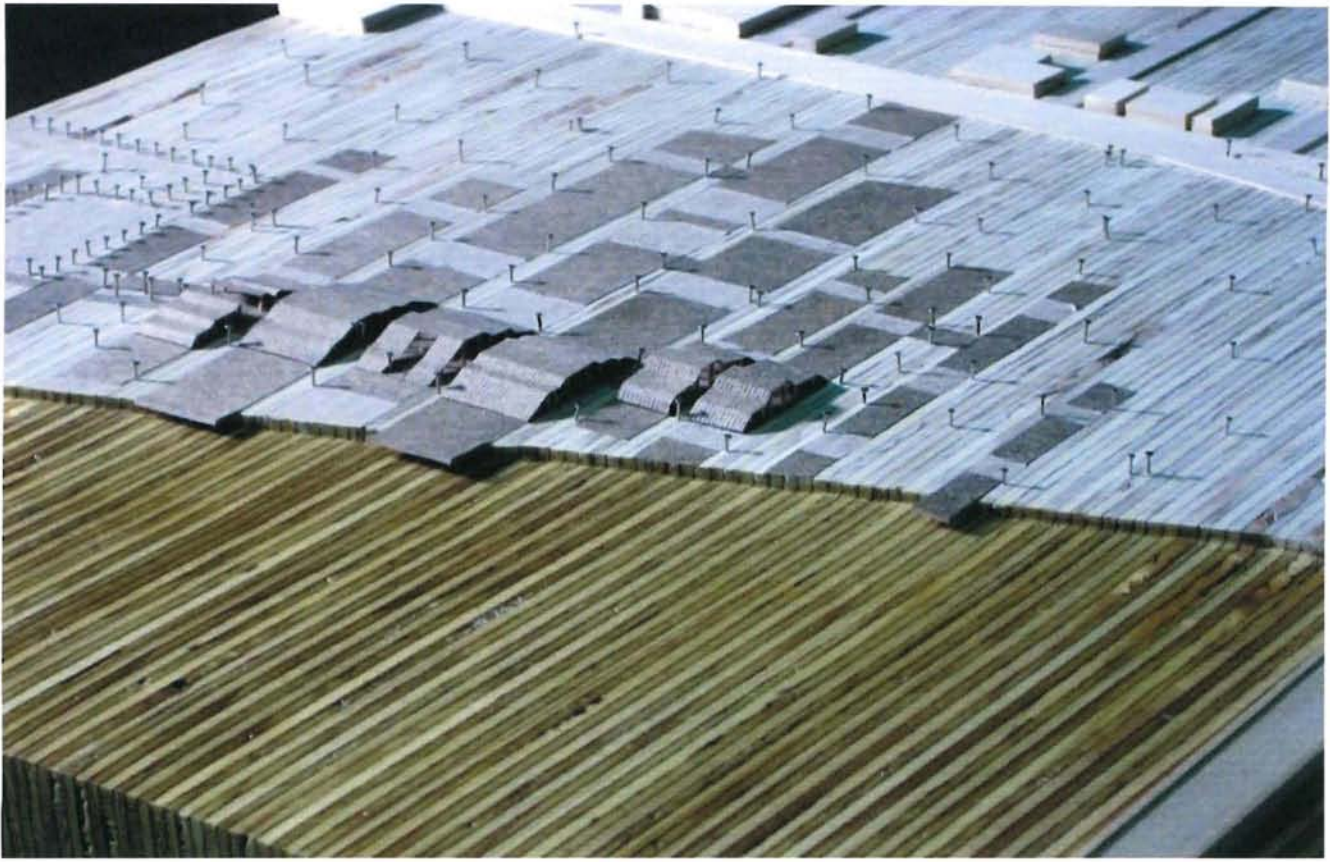
FINAL PROJECT

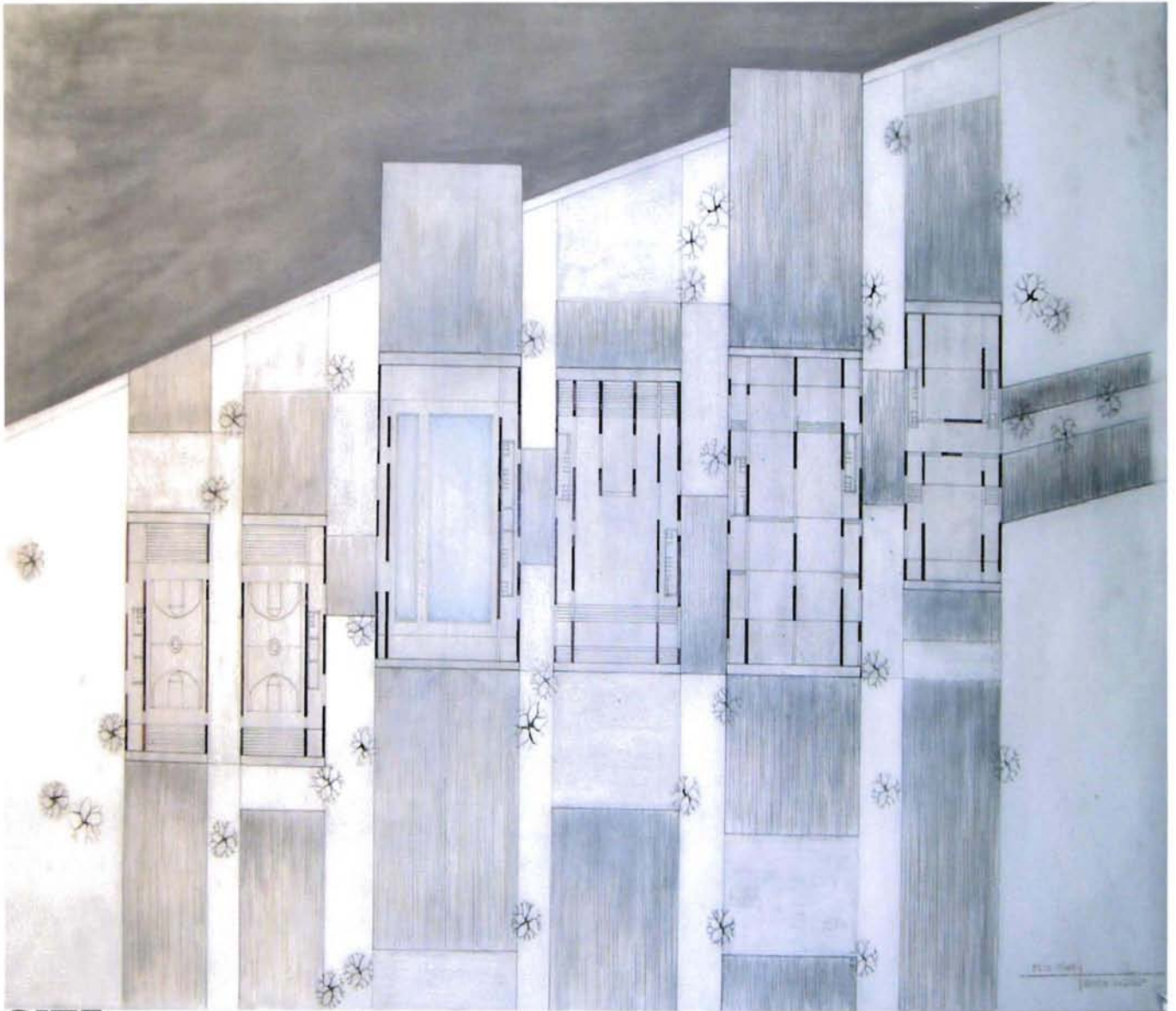
"The materials that surround the human body, including clothing and shelter, function as boundaries that mediate between the body and its environment"

-Toshiko Mori



The final site model is constructed of plywood, bass wood, and chipboard. It shows the 6 built proposals as well as the context of the surrounding site, the Detroit River, and buildings along Jefferson Ave.



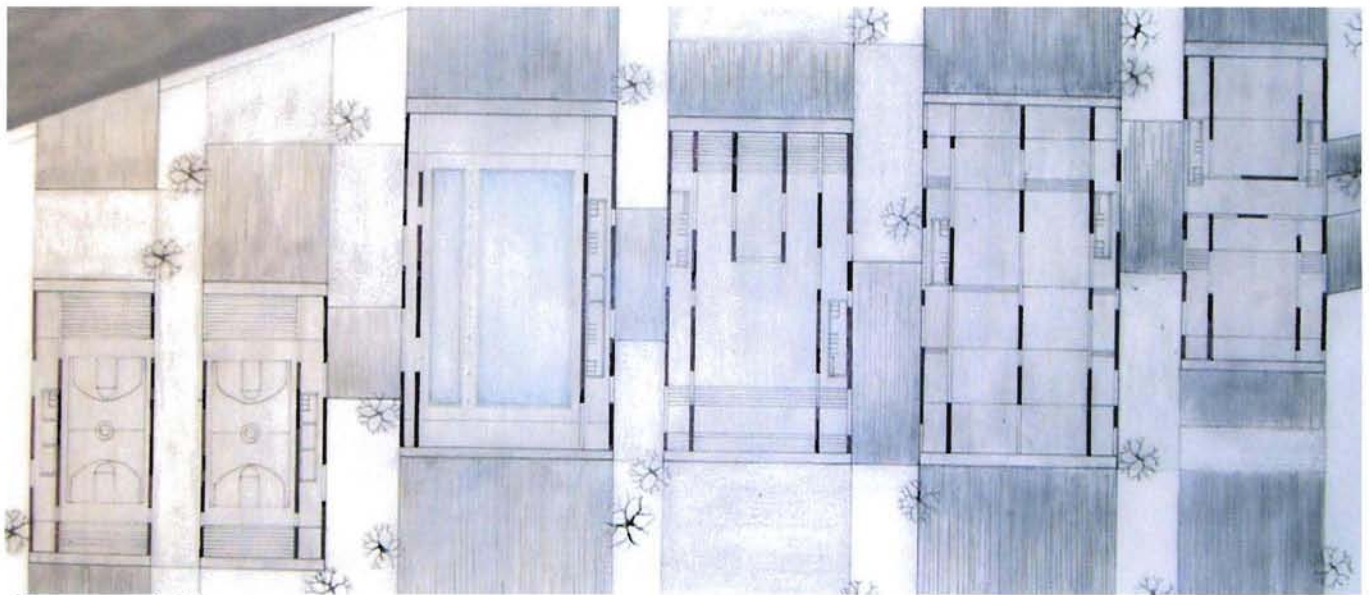


SITE

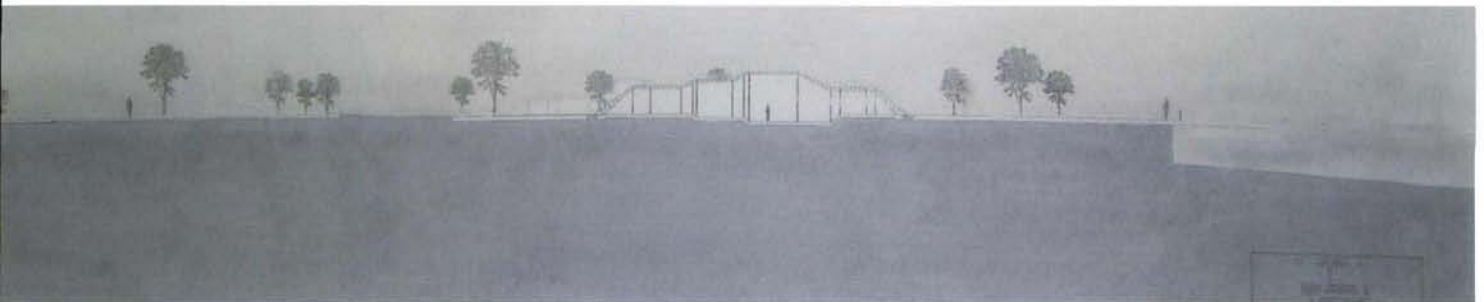
Section Cut



The Final Site drawings are drawn with ink, pencil, charcoal, marker, and pastel and are drawn on vellum. They depict the first floor of all of the buildings as well as the surrounding built landscapes.



Close up of Site

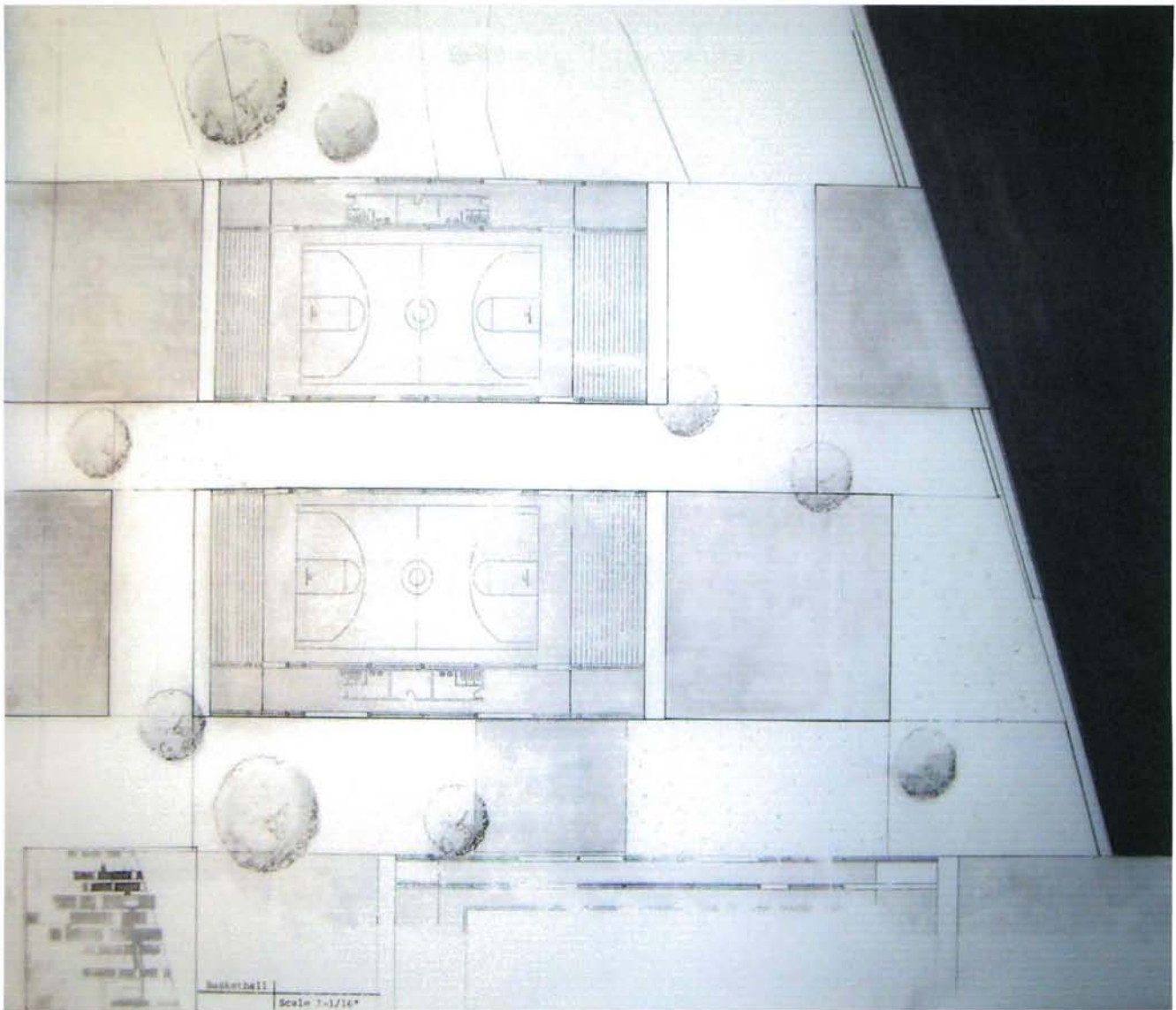




MULTI-USE COURTS



The Multi-use Courts are designed with vertical wood to help accentuate the height of the built structure. The model is made of bass wood and chipboard, and the drawings are done on vellum with ink, pencil, marker, and charcoal.



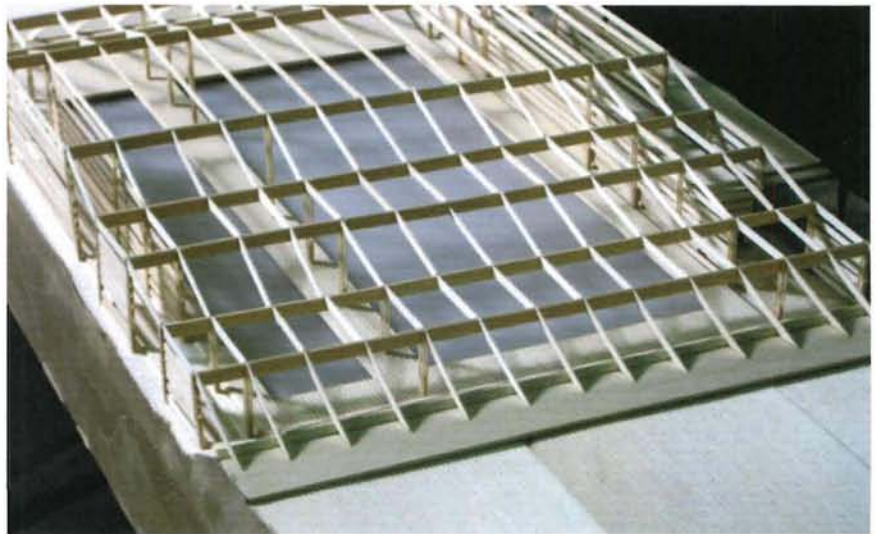
Floor Plan

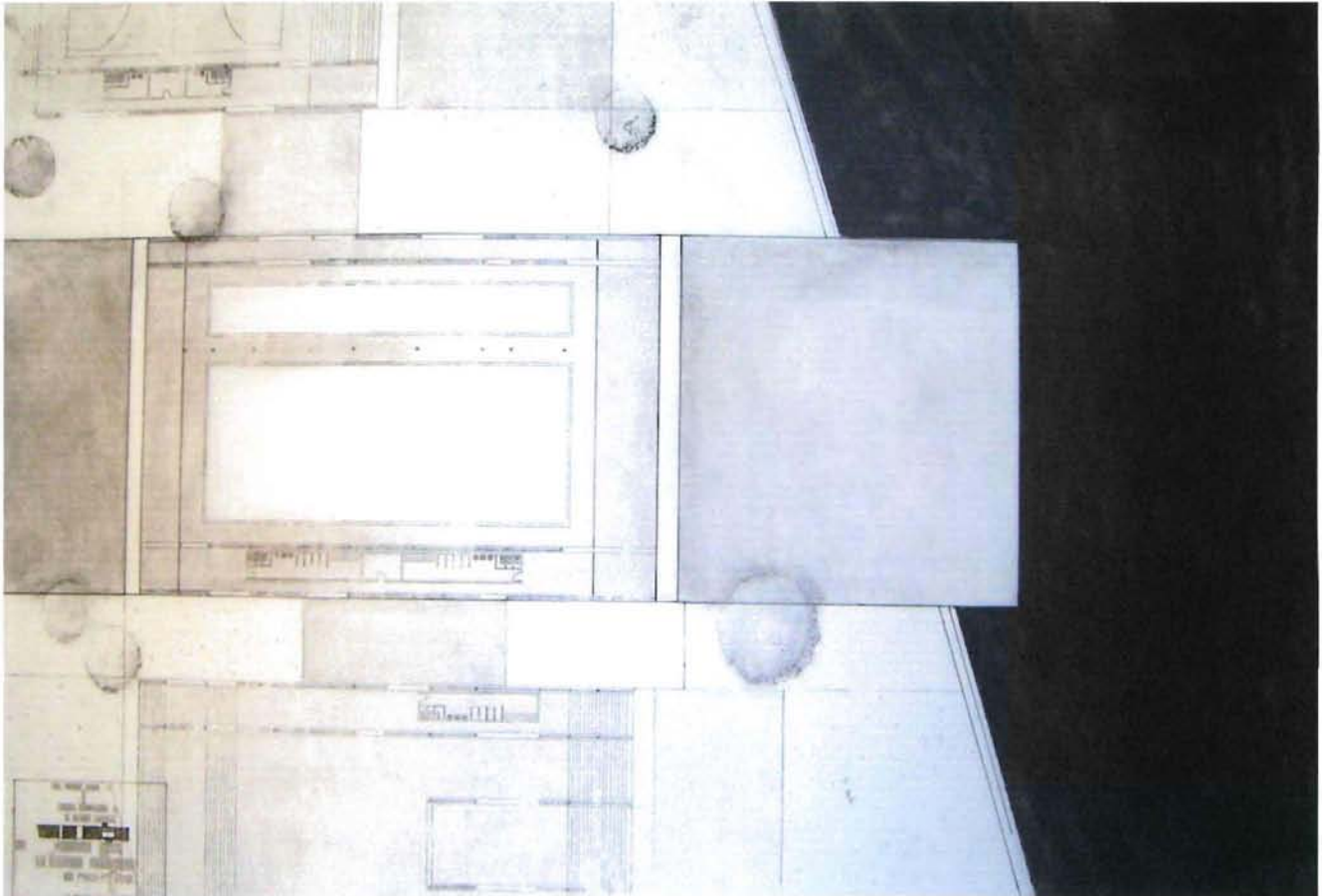




NATATORIUM ENVIRONMENT

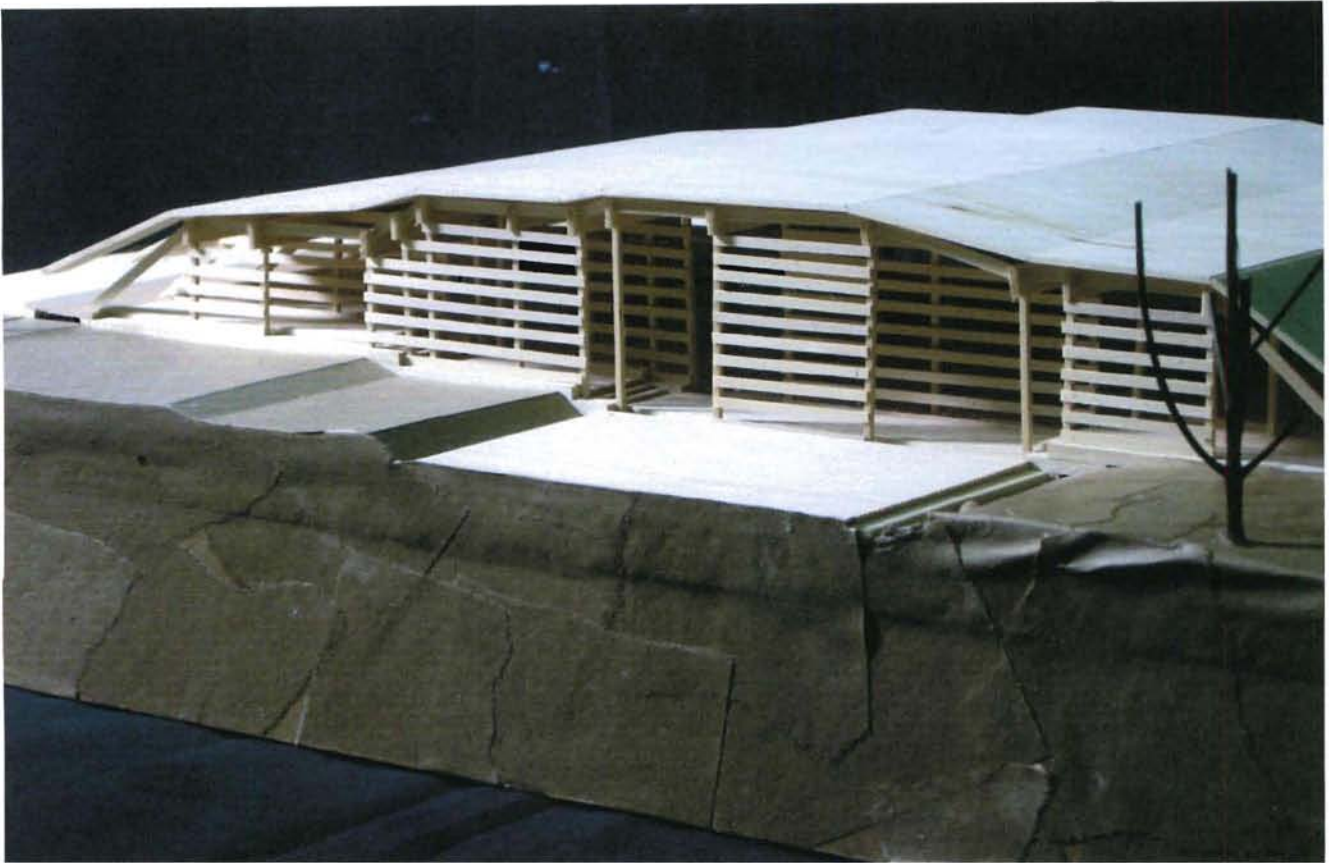
Similar to the Multi-use Courts, the Natatorium is composed of wood but in a horizontal orientation, taking inspiration from the gills of a fish. The drawings are also on velum drawn with pencil, marker, ink, and charcoal.



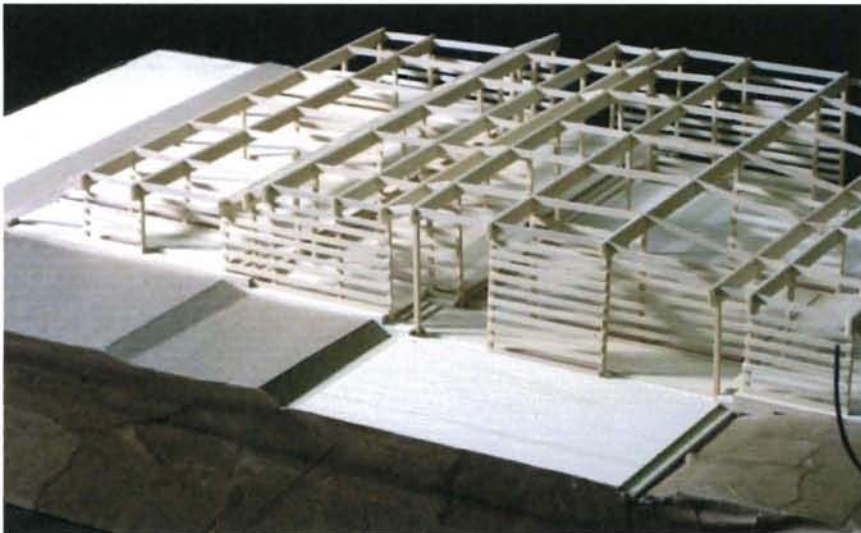


Floor Plan

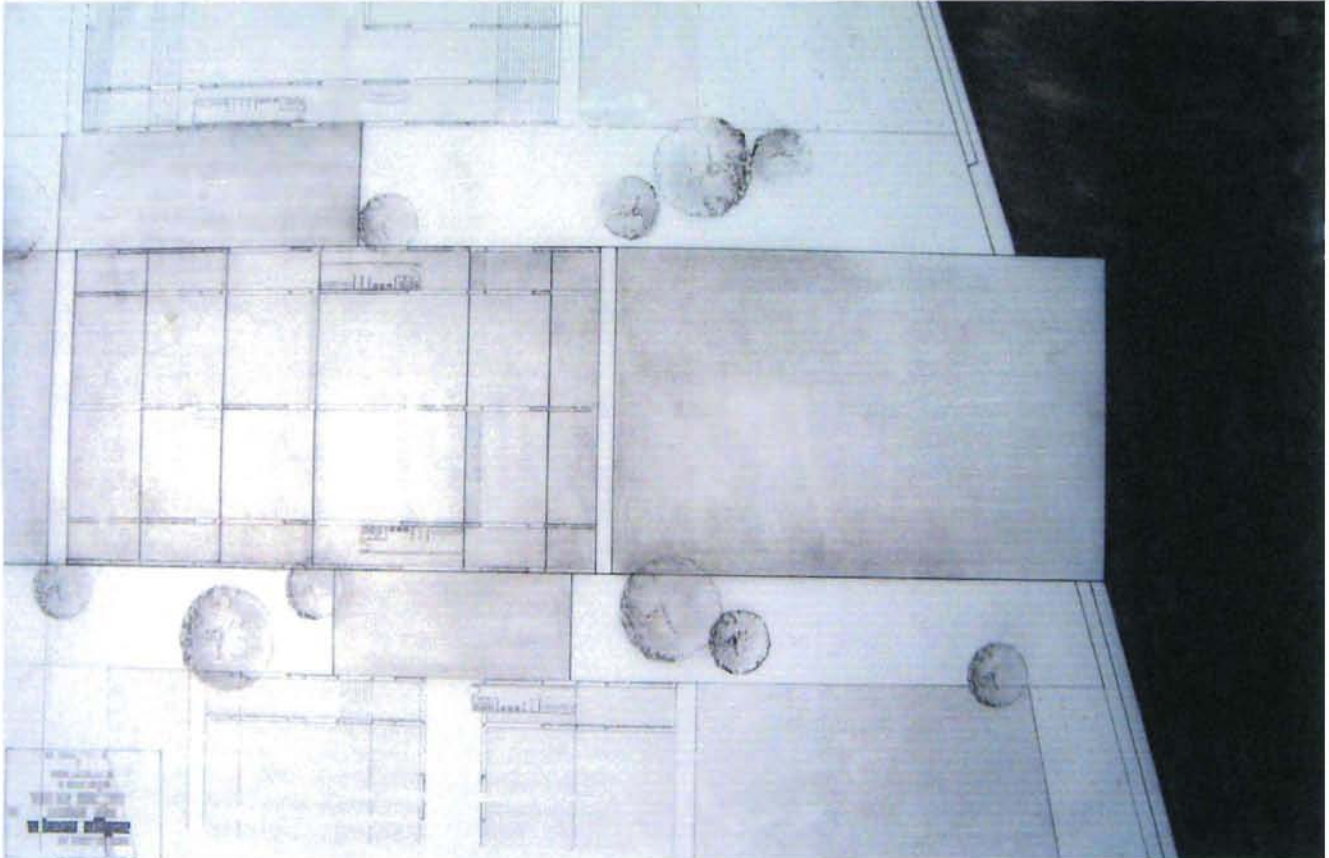




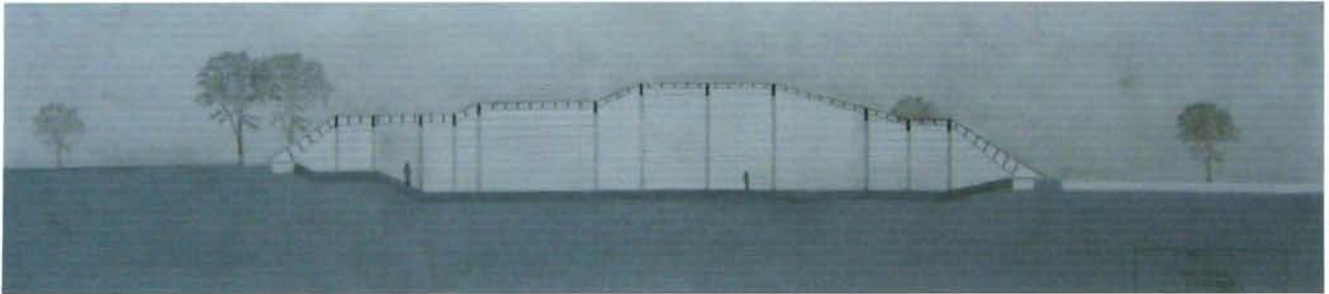
CONTACT ENVIRONMENT

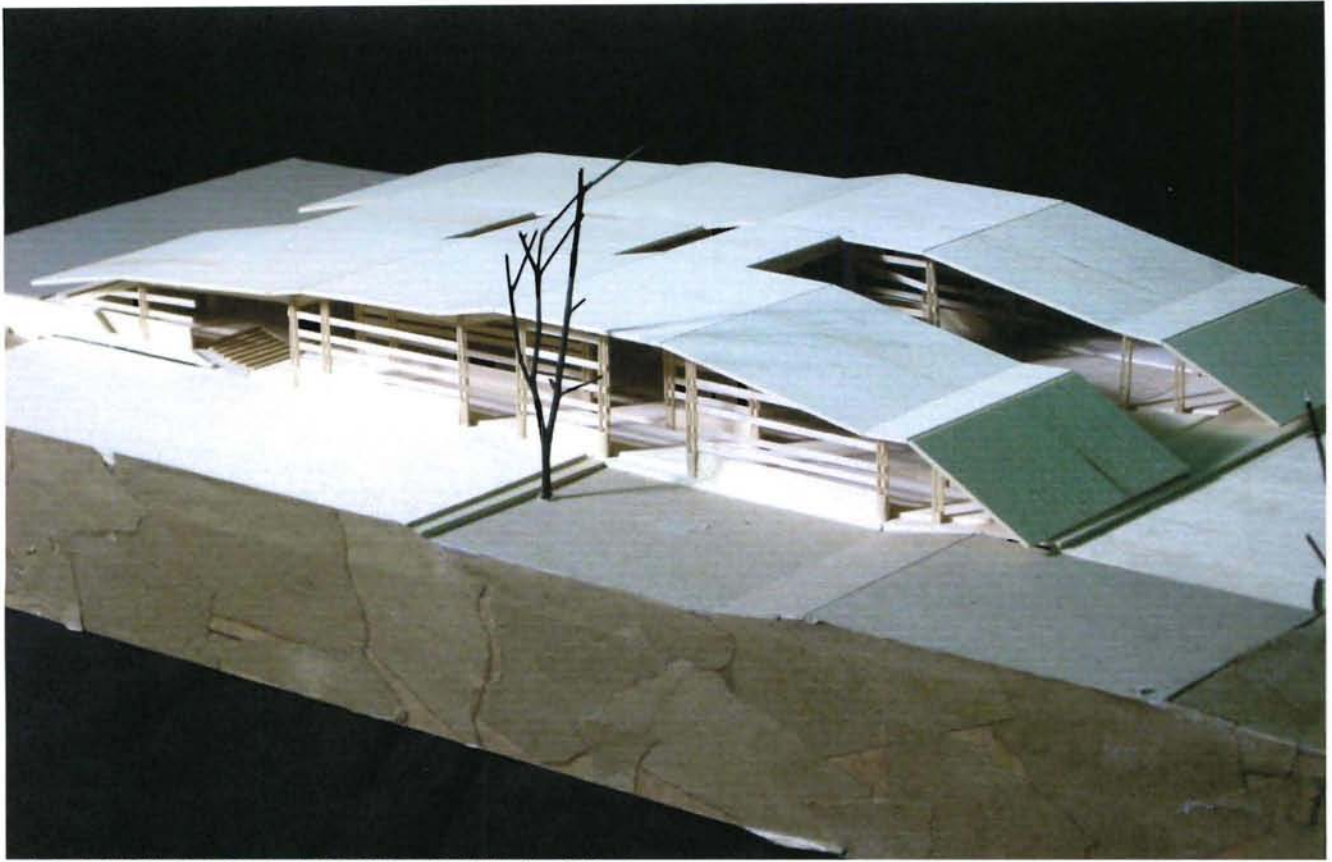


The Contact Environment is geared towards activities such as karate, martial arts, and other full contact activities. The wood screens on the building are oriented in a horizontal fashion, but as they progress towards the ceiling, the spacing gets tighter. The drawings are done in the same manor as the previous drawings



Floor Plan

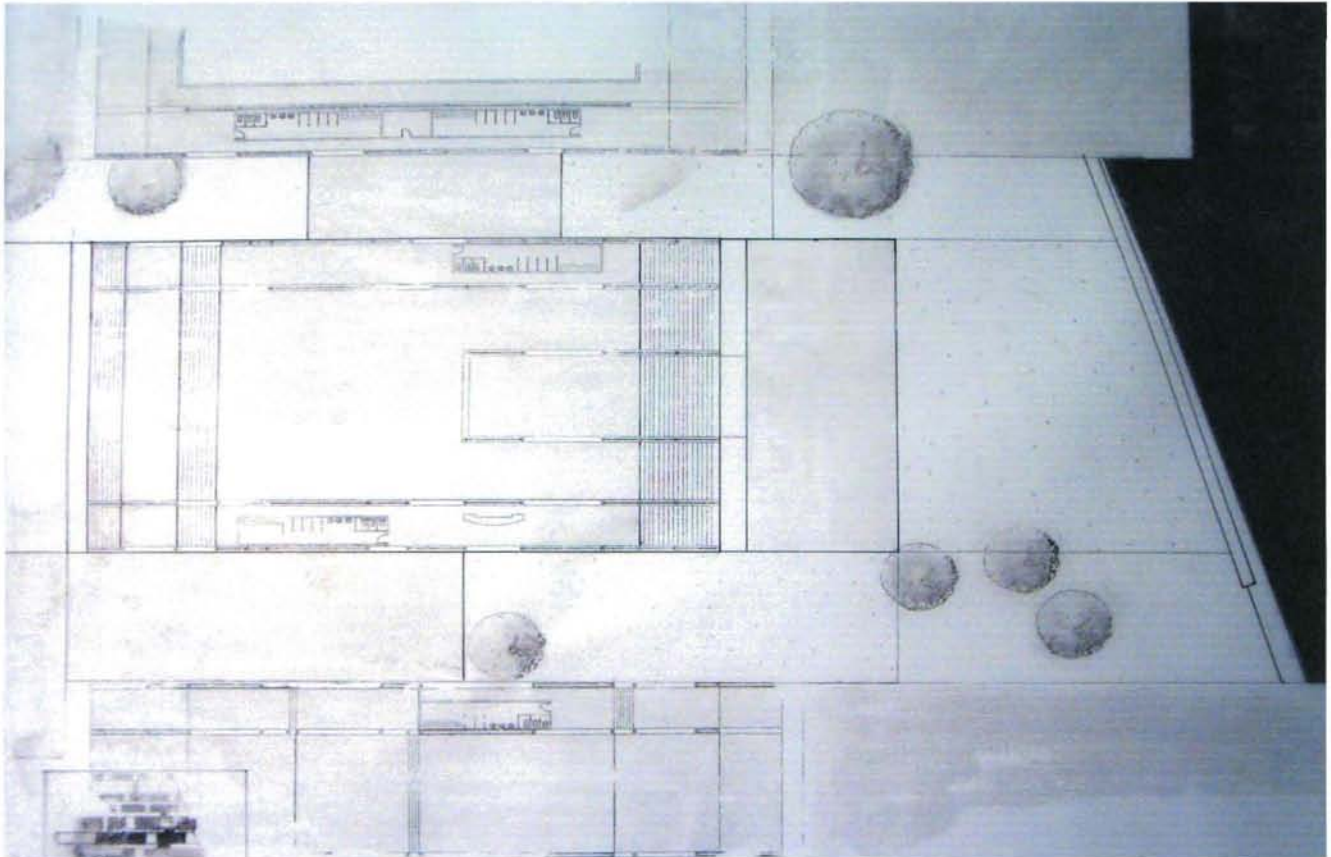




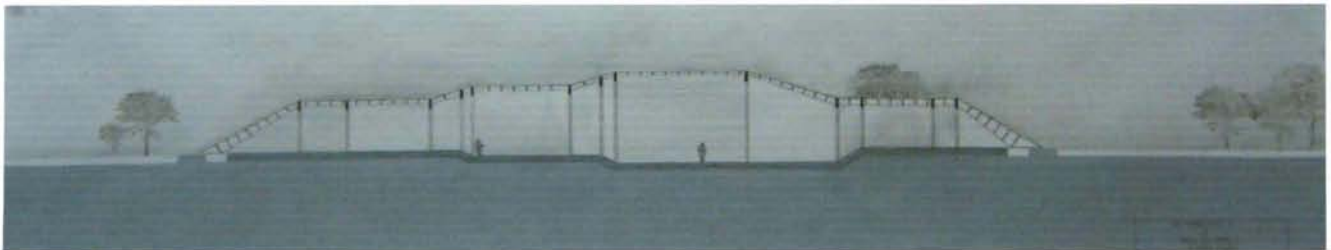
TRAINING ENVIRONMENT

The fourth building in this program is the Training environment. The skin on this section is also composed of wood but applied in a staggering order with a spacing between each board. This comes from the implication of feeling strength and power when within the structure. The drawings are also done on vellum in pencil, charcoal, marker, and ink.





Floor Plan

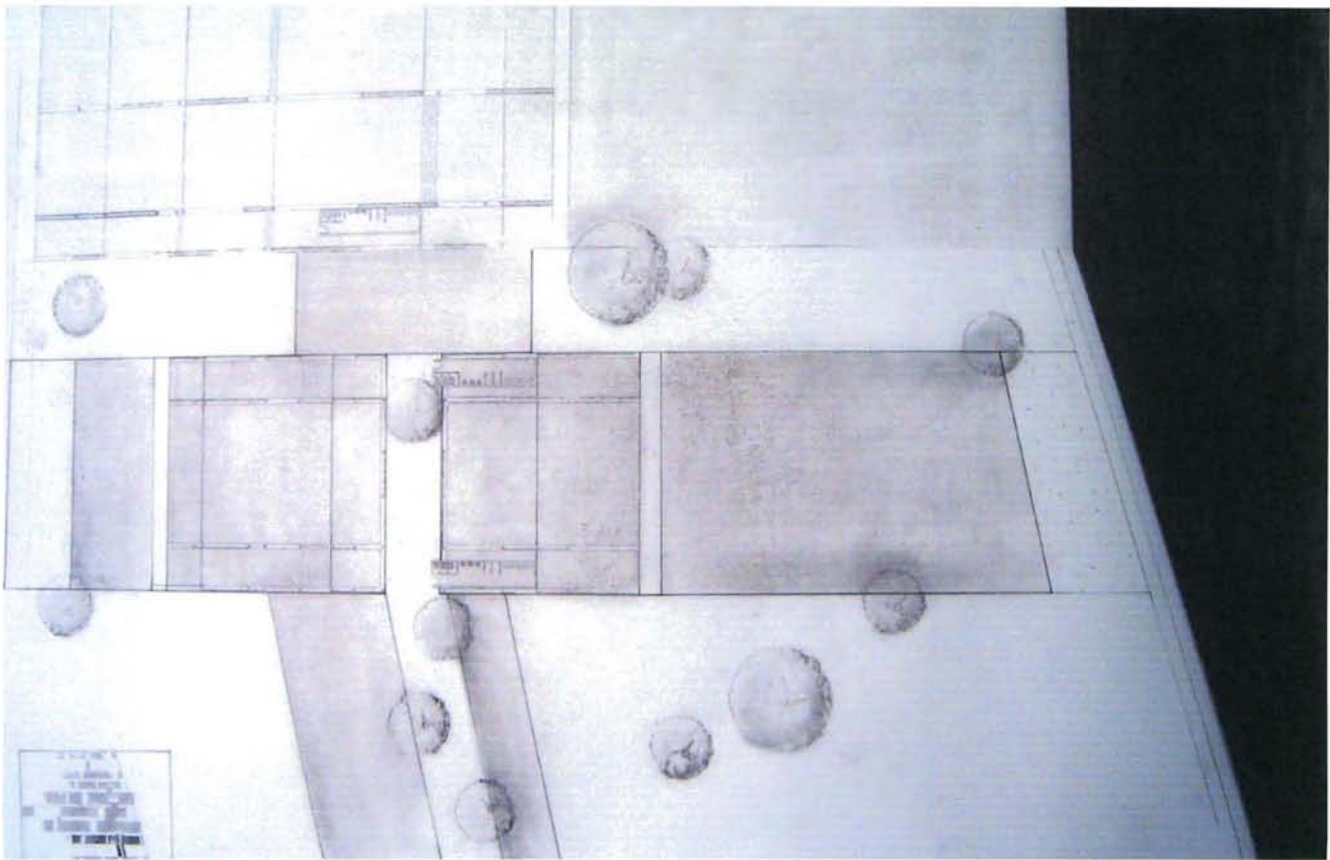




INTERNAL ENVIRONMENT



The last building in this program is the Internal Environment. This area is geared towards activities such as stretching, yoga, and pilates. The model pictures are the same as the Training Environment because these buildings are very similar. The skin on this building is composed of wood boards arranged in a vertical orientation with a slight arc to them, reflecting almost a breath or a stretch of the human muscle.



Floor Plan



Section Cut through opposite direction and adjacent building







CONCLUSION

“The beauty of the most evolved casting techniques lies in both the sensitivity to the properties of the cast material and a pairing of those properties with an appropriate method”

-Toshiko Mori

CONCLUSION

From the initial thesis questions that were asked in the beginning of this investigation to the final responses to those questions, this thesis investigation became an exploration in the process of design rather than solely a design process. It was in the learning process that I was able to expand my thinking of my initial questions.

I began this investigation by questioning the role of the architect in today's construction process. Although this was an entirely way too broad of a question, I tried to keep true to my initial interest to keep my interest going throughout the project. As discussions between my professor and I evolved, so did the direction of my project. By shifting the focus from the role of the architect to the role of materials and craftsmanship, I was able to have a rich thesis investigation and an evolved design proposal.

In order to stay true to this new thesis question, I began the investigation with material studies and explorations. There were times that I was able to get lost in these material investigations which allowed for more in-depth, richer studies. One such study was that of the wax and string study. If I allowed myself to be restricted too much by the end design or solution, the piece would not lend as many possibilities that it allowed for throughout the entire solution. That piece, along with many others, influenced my design solutions from their moment of creation to my final stages in design development, throughout the final design. So it became studies like this that became the real work that influenced my process of design.

As these material studies evolved, so did the thesis question and program for the space. The program started to evolve into environments for activities for stretching, running, swimming, training, ext. These activities became important because they allowed for enough variety in the different

environments, but they also allowed for the built landscape so support the interior spaces. These programmatic spaces were greatly influenced from the previous studies, especially the programmatic diagrams. They became pockets built into the landscape, allowing for a greater relationship between the built and the un altered landscape. This methodology could have only been achieved because of the rich diagrams produced earlier in the semester.

When the design of the actual built environments began, they were strictly influenced by the thesis question as well as the tectonics of the materials. I was able to get somewhat detailed with these structures because the method of how they were made is an important aspect of this project. The idea of skins remained a prominent aspect, as well as the idea of threshold. This new concept of threshold became important because the project need the interior spaces to be connected to the exterior. By emphasizing the threshold at each building; the users of the spaces were now constantly aware of when they entered, exited the built environment.

As the thesis project came to a close and I have had time to reflect on the project as a whole, I became aware that the project is not being as cohesive as I intended. Although this is a disappointment, I took the process and the individual studies as the most important and influential aspects. When I view the project from the perspective as a study and a solution to a proposed question, I believe it is a successful exploration in what I have originally set out to accomplish.



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"Good workmanship will make something better out of pinchbeck than bad will out of gold. Some materials promise far more than others but only the workman can bring out what they promise"

-David Pye



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- 2 Kieran, Stephen, and James Tiberlake. *Refabricating Architecture*. 1st. New York, NY: McGraw-Hill, 2004
- 3 Mori, Toshiko. *Immaterial/Ultramaterial*. 1. New York, NY: George Braziller, Inc., 2002
- 4 Mori, Toshiko. *Immaterial/Ultramaterial*. 1. New York, NY: George Braziller, Inc., 2002
- 5 Pye, David. *The Nature and Art of Workmanship*. 1st. London: Cambridge University Press, 1968.
- 6 Mori, Toshiko. *Immaterial/Ultramaterial*. 1. New York, NY: George Braziller, Inc., 2002
- 7 Mori, Toshiko. *Immaterial/Ultramaterial*. 1. New York, NY: George Braziller, Inc., 2002
- 8 Gore, Nils. "Journal of Architectural Education." *Craft and Innovation* 58(2004): 39-44.
- 9 Mori, Toshiko. *Immaterial/Ultramaterial*. 1. New York, NY: George Braziller, Inc., 2002
- 10 Mori, Toshiko. *Immaterial/Ultramaterial*. 1. New York, NY: George Braziller, Inc., 2002
- 11 Amelar, Sarah. "Morphosis intertwines programs and forms for a Campus Recreation Center at the University of Cincinnati." *Architectural Record* October, 2006: 100-109.
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- 1 Amelar, Sarah. "Morphosis intertwines programs and forms for a Campus Recreation Center at the University of Cincinnati." *Architectural Record* October, 2006: 100-109.
Used to research the Campus Recreation Center in Cincinnati, Ohio. Informative with text as well as with images and floor plans. Helpful in the program stage of the thesis.
- 2 Gore, Nils. "Journal of Architectural Education." *Craft and Innovation* 58(2004): 39-44.
Architectural work from students studios. Useful to study how these projects were created with the materials in mind prior to the form of their projects.
- 3 Kieran, Stephen, and James Tiberlake. *Refabricating Architecture*. 1st. New York, NY: McGraw-Hill, 2004
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- 4 Knecht, Barbara. "Brave new solid-state, carbon-fiber world." *Architectural Record* 08 Sept 2006 <http://archrecord.construction.com/innovation/2_Features/0310carbonfiber.asp>.
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- 5 KVA, KVA. "Mission Statement." KVA Kennedy& Violich Architecture LTD.. 19 Sept 2006 <<http://www.kvarch.net/directory.htm>>.
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6 Mori, Toshiko. *Immaterial/Ultramaterial*. 1. New York, NY: George Braziller, Inc., 2002

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7 Pelli, Cesar. *Observations for young architects*. 1st. New York, NY: The Monacelli Press, Inc., 1999.

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8 Pye, David. *The Nature and Art of Workmanship*. 1st. London: Cambridge University Press, 1968.

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9 Schroepfer, Thomas, and Liat Margolis. "Integrating Material Culture." *Journal of Architectural Education* 60(2006): 43-48.

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