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Turning the Tide
Renewing Development Practices in Saint John,
New Brunswick

by
Colin Turner

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To my family and friends

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ABSTRACT

This thesis seeks to explore the idea that the construction of an experimental school of sustainable product design and craft can assist in the renewal process of the Saint John urban waterfront and surrounding region.

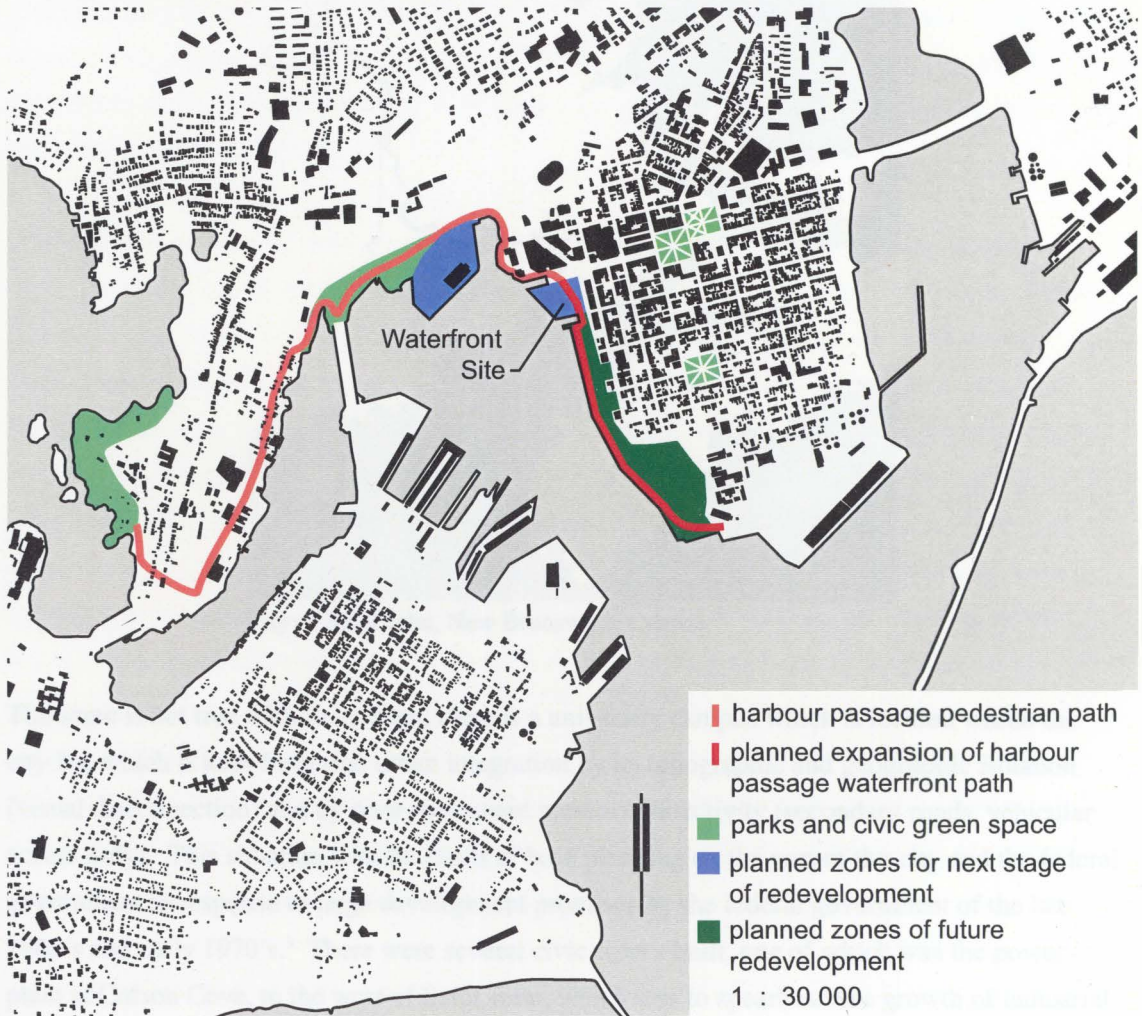
The building is to act as a symbolic architecture meant to inspire progress and change in the way we engage our environment through sustainable means. The building will take its form based on harnessing the natural energies of the environment. It is intended to blend in size and form with the large scale dynamic elements of the harbour. Urbanistically, the building will connect the Harbour Passage pedestrian waterfront path, the Market Square internal pedestrian movement system, the civic outdoor space of Market Slip and the future planned expansion of the waterfront path. The building will provide excess clean energy and cooling for the downtown business district. Tours of the building will draw in the public to explore the technologies of the building and the ideas generated within.

Thesis Question

Can a school of sustainable product design & craft serve to both promote and teach sustainable technology, practice and thinking?

Introduction

The city of Saint John, New Brunswick exists at a point of change regarding the loss of traditional industry and the planned redevelopment along its historical industrial waterfront. The city of Saint John is currently taking steps to redevelop the vacant industrial waterfront lands of the historic peninsula. The current redevelopment of the urban waterfront lands is a move by the city to bolster the strength and focus of the historic downtown core as civic centre by reconnecting people to the waterfront, the historic threshold between the city and sea. The city intends to achieve this by creating a waterfront pedestrian path where recreational activity and civic events will be constructed.¹ A large motivator for this action is the fact that the urban waterfront lands have been primarily used for heavy industry, disconnecting and denying the pedestrian access to the waterfront. The city intends to continue the implementation of this policy as a means of renewing the civic core, a project that was begun in the early 1980's with the construction of the Market Square mixed use development.²



Saint John waterfront redevelopment scheme

City of Saint John

Southern New Brunswick, as a region, has historically been defined by three cities, Fredericton, Moncton and Saint John, each of which with their own distinct urban condition and cultural demographic. The last two decades have seen growth in two of these cities while Saint John has suffered a decline, largely due to the loss of industrial production. The other two cities of the region would seem to have more resilient economies based predominantly in the high tech sectors and information technology than relying on industrial production. This can be correlated with the fact that these cities also have active university campuses integrated with their respective urban centers, Fredericton having the older and better established of the two, Moncton providing the French speaking university for the region.



City of Saint John, New Brunswick, Canada

The same is not true with Saint John, there is a university campus which is located within the city but which is kept from true urban integration by its topographic and geographic isolation (visual disconnection) and by poor movement system connectivity (secondary roads, vehicular access only). This situation was the result of bold planning on the part of the city and the federal government in response to large development promises by the federal government of the late 1960's and early 1970's.³ There were several civic works built, one of which was the power plant at Colson Cove, to the west of Saint John, which was to spearhead the growth of industrial production in that location.

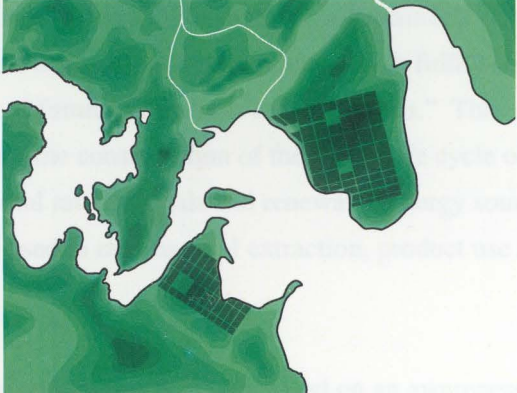
The Saint John Community College was built in the east end of the city. Another was the construction of the regional hospital for Saint John and surrounding area. Adjacent to this was the construction of the University of New Brunswick's Saint John campus. These constructions were to be centers around which city growth would occur, however the growth never really did occur at the scale expected.⁴ The result of this situation is that the University of New Brunswick in Saint John and the Saint John Community College have no urban connection. These institutions were placed at a distance so out of scale with the layout of the city that they embody an unusual semi-rural character, due to the urban sprawl.

The current trend of the campus in Saint John is to cater to a large demographic of international students. The university hopes to encourage these internationals to immigrate and settle in the region to bolster the professional working class, however most of these students live on the campus or in the surrounding suburban areas which lack the historic culture and geographic prominence of the urban core of the city, which is most strongly identified with the image of Saint John. Living in isolation on the periphery of the city, these students do not develop an affinity for the historic city and tend to move on to other centres, not developing a desire to participate in the community in which they have studied.⁵

Urban sprawl has been a condition that most modern cities of the world have and continue to deal with on an ever-increasing scale. Urban sprawl is a condition of disembodied growth that consumes natural landscape like a cancer. Left to its own end, urban sprawl creates zones of built homogeneity that reduces the presence of nature in juxtaposition to the city, blurring the line where one ends and the other begins. This condition of urban sprawl was introduced by the de-liberalist planning practices of the 1960's and 1970's, which were seen as valid strategies at the time. The plan of that time was to expand the city footprint by using existing and new institutions as growth centres. The Colson Cove Power plant to spearhead industrial growth in the west end of the city, the Saint John Regional Hospital and University of New Brunswick Saint John to promote settlement in the north end of the city, the construction of the New Brunswick Community College in the east end of the city. These institutions have had some accompanied growth but on their own are not enough to sustain healthy expansion of the city. New growth centres require new civic forums to draw people, and accommodate their activity, something that was not carefully planned out when these institutions were created. The result of which has led to the lack of civic focus for many parts of the city.⁶

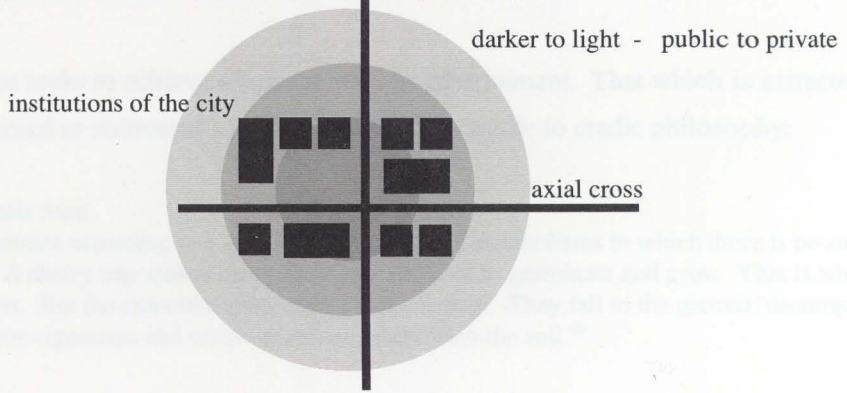
The original layout of the city is based on the British gridiron system of subdivision, which allowed for quick and easy town planning and construction. The standard gridiron layout

consists of a central open space connected to a grand parade (military control) surrounded by an orthogonal grid of building lots. Saint John was laid out in this fashion with a grid developed on the eastern peninsula and on the western side of the harbour. The eastern peninsula was laid out with a northern open public square and a southern one. The northern square was the focus for the civic buildings while the southern square remained the focus for residential building lots. The main axial street ran from the northern square to a public space on the waters edge. The axis extended beyond to the mouth of the Saint John River. The public space by the waters edge, known as Market Square, was the site where the loyalists landed in 1783 when they arrived in the British held territory and founded the city of Saint John.⁷



1795 British city plan of Saint John
scale 1 : 75 000

The British gridiron town plan is itself based on the work of the Renaissance which in turn is based on the classical Roman town plan, which begins with a two axis forming a cross (axis mundi) becoming the major circulation, followed by the placement of all of the public institutional buildings around that crossroads. This proved very successful as many of the Roman towns founded on this model are still inhabited centres today. The success can be attributed to an efficient use of land, good circulation and the placement of the public institutions in the core of the plan, allowing for the most democratic sharing of public space.



Abstraced typical Roman town plan

Sustainable Development

The history of sustainable development in a post industrial modern sense begins in 1968 with the formation of the Club of Rome, an environmental think tank of individuals, who published four years later the report "The limits to growth" beginning thought that economic development must be mitigated by environmental protection. Later that year the first UN summit "on man and the environment" occurred. Further that year the Prime Minister of Norway had a report published titled "our common future" that was subsequently discussed at the UN resulting in the idea of sustainable development, an idea which linked global environmental problems to the poverty of the majority of the worlds population. The concept of sustainable development was further defined at the 1992 Rio Earth Summit as "development, which fulfills the current needs without compromising the capacity of future generations to fulfill theirs." Three principles emerged from this conference. First, "the consideration of the whole life cycle of a material." Second, "development of use of natural raw materials and renewable energy sources." Third, "reduction in the materials and energy used in raw material extraction, product use and destruction or recycling of waste."⁸

The notion of sustainable development is based on an awareness of environmental risk. However, it is also a social project, which seeks to reconcile ecological, economic and social factors. It goes hand in hand with the basic principles of environmental law: -precaution – prevention – remedy at source – polluter pays – use of best available technology.⁹

Essentially, the key to proper sustainable growth is the achievement of a balance or equilibrium between the growth of a project and the size of project that can be sustained by the surrounding environment. Initially, a project may not be able to support a large infrastructure around it, however over time the infrastructure may develop to allow for increased growth that can be naturally sustained. How is that balance achieved?

Sustainable design seeks to achieve a balance with its environment. That which is extracted from the system is returned or recovered in some fashion. The cradle to cradle philosophy;

Waste equals food

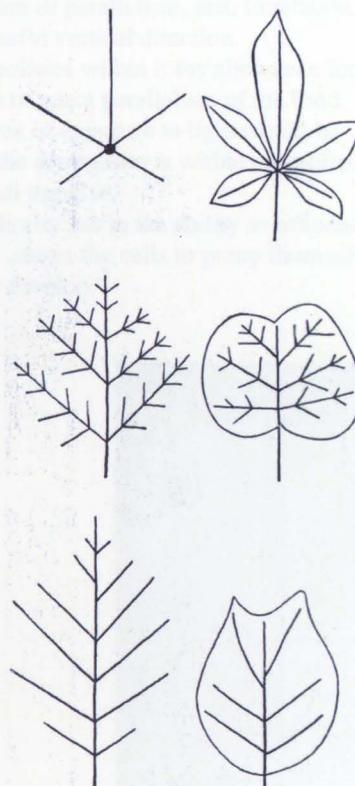
Nature operates according to a system of nutrients and metabolisms in which there is no such thing as waste. A cherry tree makes many blossoms and fruit to germinate and grow. That is why the tree blooms. But the extra blossoms are far from useless. They fall to the ground, decompose, feed various organisms and microorganisms, and enrich the soil.¹⁰

The balance of growth is key to sustainability and this balance of growth is mirrored in the study of Klee's diagrams on movement systems.

As in nature, the life force of design must flow freely before rich flowering and fruitful forms can be produced. The diagrams based on Paul Klee's work, on this page, illustrate the flow of lines of energy along the veins and sub veins radiating outward from the stem of the leaf, and from them, the outward flow of the flesh of the leaf. This flow of energy expires in space, the points of expiration determining the form of the leaf.

With the tree itself, a more complex expression of precisely the same principle is manifest: The form is determined by the location of expiration of the energy of growth in relation to the point where the seed was planted in the earth. This was explained to me by my great teacher Eliel Saarinen as the point of equilibrium between the creative impulse of growth and the restrictive requirements of correlation: the necessity of conducting the nourishing chemicals of the soil to the outermost leaf.¹¹

Sustainable growth is closely associated with the study of movement systems, as the health and maintenance of a building depend not only on the performance of the materials and details but also on how well traffic can flow or move through it. Through efficient design of movement systems, so to are the tenets of sustainable design met.



Klee's diagrams on movement systems from (Bacon 1976, 128)

Movement Systems

Circulation and access to any given architectural work is determined by the systems of movement, which connect the building to the city and the city to the building. Through analysis of the movement systems surrounding the waterfront site, a greater understanding of the underlying order can be achieved.

Bacon refers to the term “simultaneous movement systems, or paths along which city dwellers move or are transported” as the basic underlying influence towards successful design in cities. He identifies that in order to successfully create experiences in the city, the designer must determine where the most effective locations or converging points of movement systems occur or will occur and design pleasing spaces around them. The greater the number of movement systems in the area local to the site the greater the exposure to the public that site enjoys.

To understand the significance of simultaneous movement systems or paths along which city dwellers move or are transported, three concepts must be considered: 1. Relationship of mass and space, Continuity of Experience and Simultaneous continuities...

As we look at the tree we see in its basic design a form which is capable of growth and which is a direct physical expression of a series of basic movement systems. The seed of the tree contains the initial impulse for growth, a directive which results in a series of tubes possessing a common quality: unity of direction or parallelism, and, in relation to the environment in which they are located, a purposeful vertical direction.

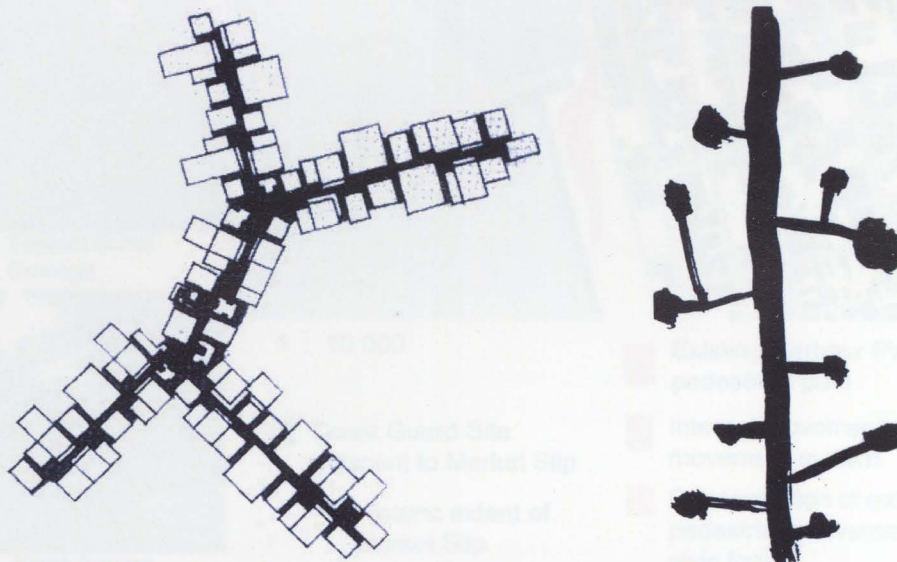
The wonderful thing is that this original directive includes within it the allowance for divergence. If it did not, the indefinite continuation of exact parallelism of the food carrying tubes would result in death, because the area of exposure to light would be insufficient to nourish growth. On the other hand, the divergence is within controlled limits and is always related to the original directional impulse.

So the strength of the city plan should lie not in authority but in the ability to influence growth, just as the seed has within it a force, which causes the cells to group themselves according to an order necessary for the organism to develop.¹²



Klee's diagram of overlapping spheres of influence regarding natural movement systems from (Bacon 1976, 129)

Movement systems also preoccupy the work of Shadrach Woods. He frequently refers to the 'Stem', the pedestrian movement pathways which feed his buildings. This is illustrated in the following diagrams.



Stem and cell diagrams from (Candilis et al. 1999, 128, 130)

The concept of movement systems led to the study of the downtown of Saint John that mapped out the movement systems, which converge in and around the site. The identification of relevant movement systems bordering the site led to the organization and location of points of access to the site and pathways through the site.



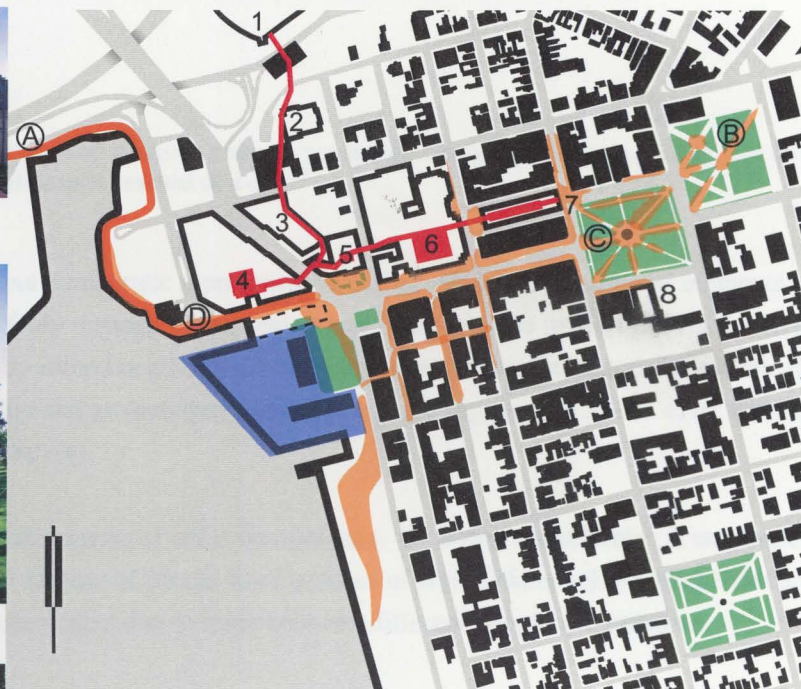
A. Harbour Passage Pedestrian Path



B. Loyalist Burial Grounds



C. Kings Square



1 : 10 000

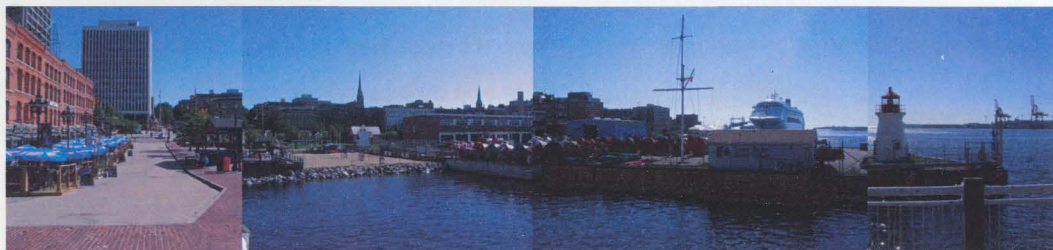
■ Coast Guard Site adjacent to Market Slip

--- Historic extent of Market Slip

■ Existing Harbour Passage pedestrian path

■ Internal Movement pedestrian movement system

■ Concentration of external pedestrian movement in civic forum



D. Market Slip and Coast Guard Site

Significant Public Buildings

- | | | | |
|--------------------------------|------------------------|-------------------------------|---------------------|
| 1. Harbour Station Civic Arena | 4. Market Square | 5. City Hall | 7. City Market |
| 2. YMCA | - New Brunswick Museum | 6. Brunswick Square | 8. Imperial Theatre |
| 3. Aquatic Centre | - Public Library | - Hotel and Convention centre | |
| | - Retail Space | - Office Space | |
| | - Restaurant Space | - Retail Space | |

Relationship between Internal and External Pedestrian Movement Systems of the Civic Forum

City and School

Only the consolidation of all centres – cultural, academic, commercial, athletic, health, and civic – into one forum will inspire renewal of a city.¹³

Kahn is speaking here about democratic representation and equality being essential elements in a healthy urban condition. Only through the representation of all of these institutions in the civic forum will a city be equally rooted in all of the essential nutrients that it requires. These are all facets of a city's personality and as such they should be equally represented in the civic forum, the nerve centre of a healthy city.

Some believe that the initial purpose of cities was defense. By living collectively, it was easier to come together in common defense of one another in times of war. Others believe that cities are a natural manifestation of interaction due to trade between different people and cultures.

A city – is a symbol of that which is an undeniable focus of getting together; the feeling that man as being cannot be denied; that may take ugly forms, ugly shapes, but you can't deny it.¹⁴

Kahn's interpretation of the first city starts to get to the heart of what it means to live together in a city. Regardless of the initial impulse or impulses that caused people to live together, there is an undeniable cultural exchange that occurs between people in a city. Through that exchange, culture and knowledge inevitably develop and grow.

The city itself, which is the natural habitat of western man, is the school, college, university. We see the city as the total school, not the school as a 'micro-community'. Places of teaching and learning, when they can be identified as such, are an integral part of the structure of the city.¹⁵

Woods is clearly saying that the essence of 'school' is in fact inseparable from the essence of 'city'. A city cannot grow without this vital institution and lacking any formal place defined as a school, the city will inevitably create them elsewhere, wherever people congregate and interact and exchange knowledge.

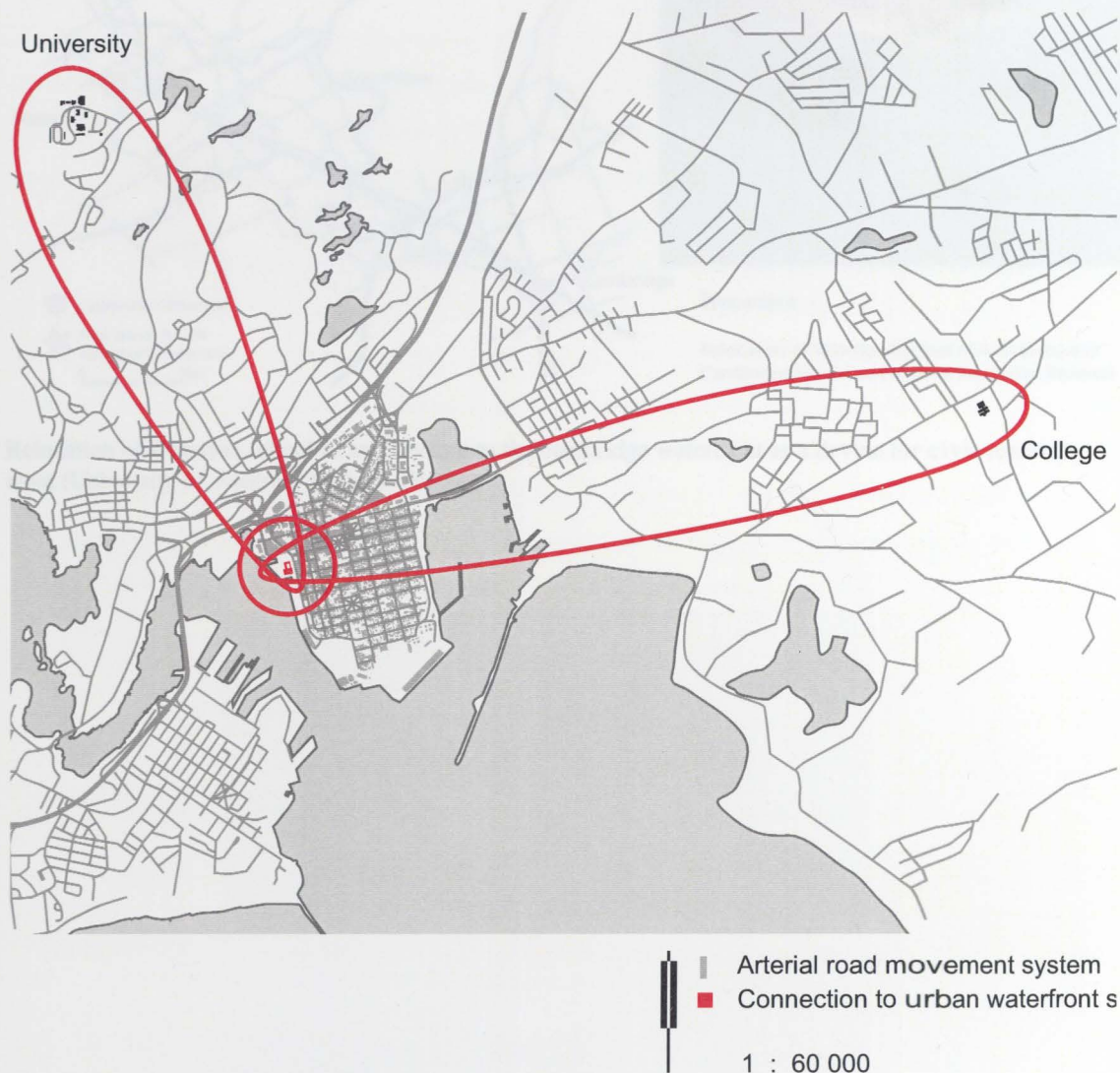
What is school? It was a man sitting under a tree talking to a student who didn't know he was a student, simply talking about what occurred to him as a realization.¹⁶

Kahn's interpretation of what a place of learning initially was and still is today. The clues to what he meant are in the short description above. The man speaking to the student is spreading knowledge and ideas, to Kahn this is what school is, growing knowledge and ideas in the same way as natural organisms develop and grow, by speaking about them and using metaphor as a device to reinforce the meaning. Sitting under a tree, the man is at the root, the tree represents the growth of ideas and the student represents the seed of that idea.



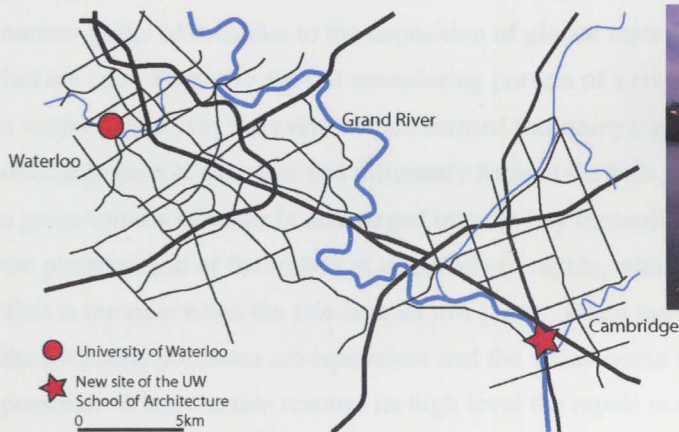
The initial impulse of the idea correlates to the initial impulse of a seed to grow

The urban scheme for the program involves renewing the relationship between the college and the urban core, and the University and the urban core. Both of these institutions currently have no representation in the core. Placing the new post secondary program in the civic forum signifies the importance of education to the healthy growth of the city. Adding this institution to the core ultimately strengthens the core's ability to influence growth in the city



Renewing the relationship between existing university and college institutions and the civic forum of the urban core

Recently, the University of Waterloo School of Architecture announced that it would be moving its facilities from the main campus in Waterloo to an old industrial building in the downtown core of Cambridge, Ontario, on the Grand River. The intent behind the decision is to use the institution of the School of Architecture as a civic rejuvenation project, renovating historic property and assisting in the efforts to revitalize the core health of Cambridge and serve as an example of thoughtful and sustainable design.¹⁷



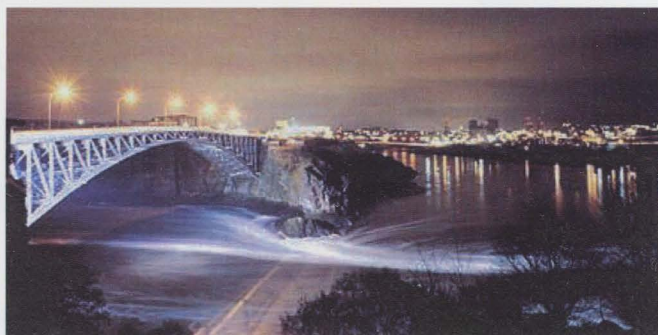
Precedent -

Relocation of Waterloo School of Architecture to Cambridge Waterfront to Promote Urban Renewal

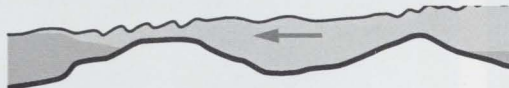
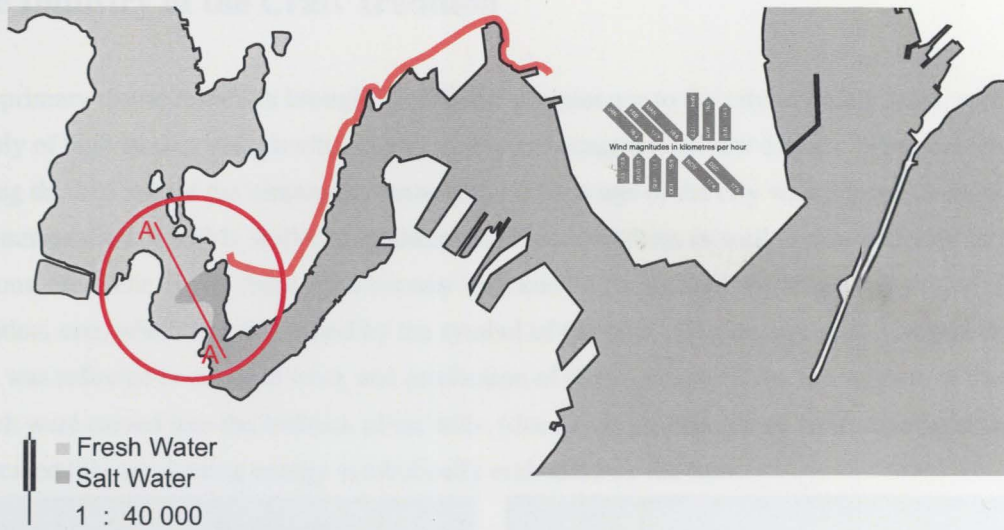
Relocation of Waterloo school of architecture to the cambridge waterfront as a device for civic renewal from (University of Waterloo website, 2005)

Reversing Falls

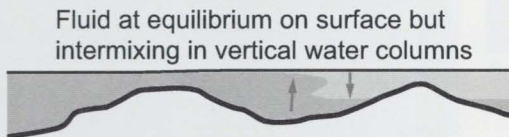
The concept of threshold has always been an underlying characteristic or quality to the city of Saint John. Founded at the mouth of the Saint John River, the largest watershed in the province, extending from the northern reaches of Maine to the Bay of Fundy, there existed a natural gateway or threshold embodied in the natural formation of the reversing falls. The falls are a geological wonder that came about when the old portion of the meandering river cut through a narrow gorge of rock due to the deposition of glacial material at the mouth of the river during the last ice age. Normally the old meandering portion of a river gradually flows into the bay, through a wetland, however the event, which formed this narrow gap in the rock, bypassed the normal discharge path of the river and ultimately formed the falls, which exist today. The fact that such a great volume of water is discharged into the bay through this relatively small opening creates the phenomenon of the turbulent waterfalls or rapids, which are quite dangerous to navigate. This is the case when the tide is at its low point. When the tide rises there comes a point where the hydraulic pressures are equivalent and the watercourse is calm and passage through is possible. When the tide reaches its high level the rapids occur in the opposite direction making passage through treacherous and sending salt water as much as ten miles upriver. Throughout the process the salt and fresh waters intermix as eddies in the horizontal plane and as vertical water columns in the vertical plane. The tides of the Bay of Fundy are the highest in the world and are impressive in their own right, however the expression of the energy of the tide and the energy of the river are ultimately manifested in the narrow orifice of the reversing falls.



Images of the Reversing Falls from (Reversing Falls website, 2005) & from (Arctic Circle, 2002)



Diagrammatic Section AA -
Low Tide, Fresh water Outflow



Diagrammatic Section AA -
Median Tide, Fresh and Salt Water in Balance



Diagrammatic Section AA -
High Tide, Salt Water Infiltrates Inland



Currents Intermixing
in Horizontal Plane

Reversing Falls, symbol and example of a natural sustainable system

The Reversing Falls exist as an end node to the waterfront Harbour Passage pedestrian pathway. They represent a threshold to the past, the industry of timber harvest for manufacture, and also a symbol of renewal, manifesting the ever-renewing tidal cycle. The falls play a significant role in generating the metaphor for the thesis project, harnessing several forces and intermixing them with foreseen and unforeseen results.

The Industry of the Craft Tradition

The primary resource, which brought wealth and prominence to the city of Saint John, was the supply of high quality old growth timber for ship construction and raw export. This occurred during the first half of the nineteenth century, the golden age of the city which bore witness to the immigration of highly skilled shipbuilders and woodworkers as well as other trades such as masons, etc.¹⁸ The city of Saint John became well known for its hard working and skilled crafts tradition, one, which was embodied by the symbol of the falls. The energy and raw power of the falls was reflected in the hard work and production of the populace. Even the streets of the city, which were carved into the bedrock of the hills, (due to the grid layout on an irregular terrain) expressed this unrelenting energy symbolically embodied by the falls.



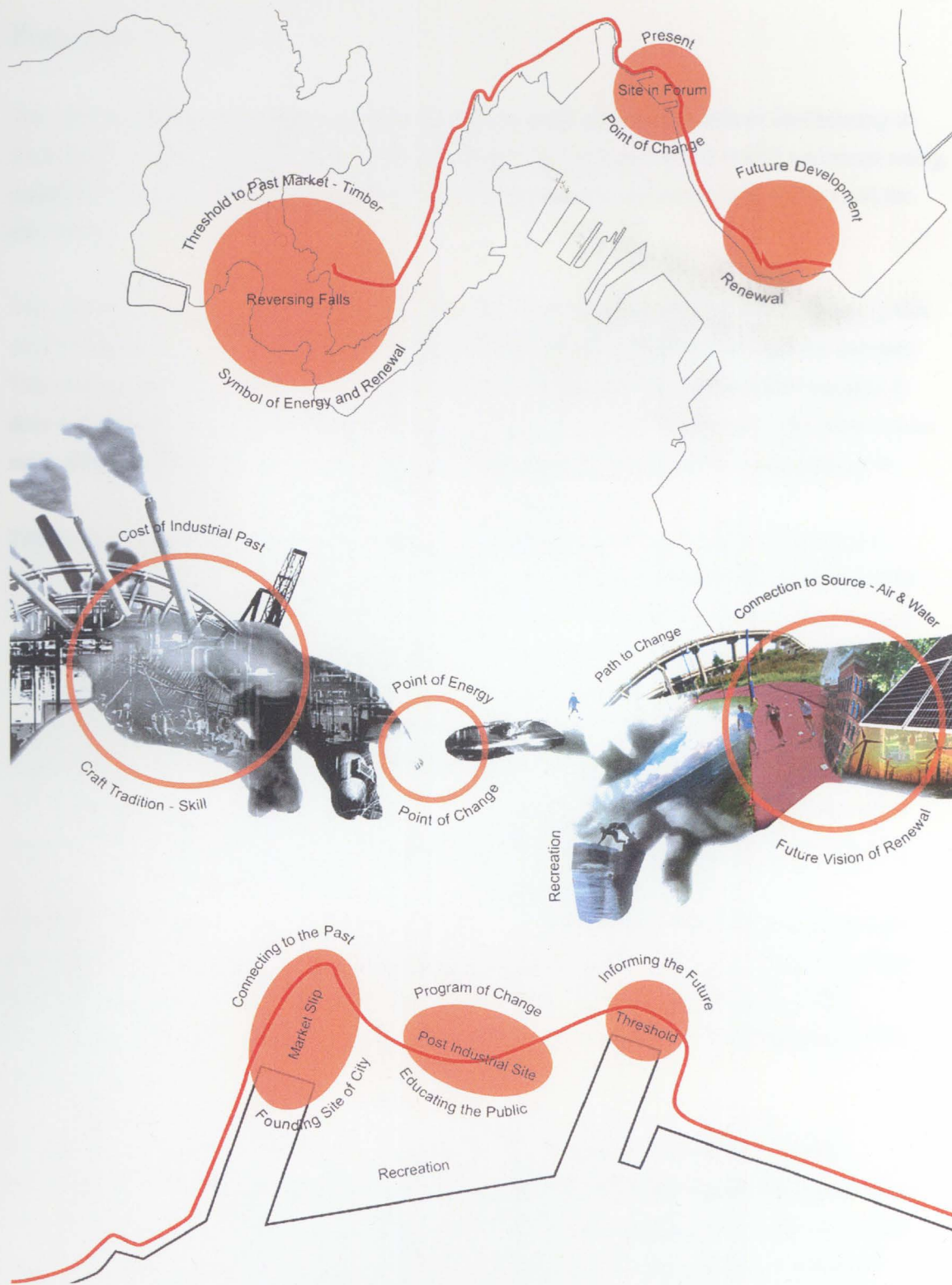
The historic hand craft of prominence in the city - shipbuilding



Scene from 19th century of Victoria Rink during a skating carnival from (Schuyler 1984, 59)

Photograph of the former Reversing Falls cable suspension bridge from (Schuyler 1984, 75)





Representation of the points along the pedestrian path, the history of the city and the vision for the future

Program

The program of the surrounding city fabric consists of small shops, pubs, office and housing in the historic quarter. The modern development consists of office, mixed use retail and small eating establishments mixed with civic institutions such as city hall, the historical city market and the city library.

The program of the new construction is to follow the ideals of sustainable growth. Meaning that there will be a mixture of core program with secondary program added for the sake of diversity. This strategy has been most effective in urban renewal projects in cities around the world as it does not limit the use of the site to one program during one part of the day but expands the use to many different programs which can make better use of the site throughout its daily life cycle.

There exists a disconnection between the University and the civic core, which was identified earlier in this report. The intent of the new mixed-use facility is to introduce the presence of the University into the downtown by creating a new program of study for the region. The creation of a program of industrial design was determined to suit the city of Saint John as it speaks to the industrial craft heritage of the city as well as providing a post secondary creative craft based school of design. No such creative institutions exist in the city currently. There exists a great opportunity to strengthen the intentions of the university by locating a second campus in the downtown core which in turn would strengthen the urban fabric by adding a new demographic which in turn would be a seed for a potential new market of product design and manufacture.

The programming of the new campus will be centered on sustainable industrial product design with ancillary specialized faculty program centered around materials research. This supporting program is to retain the main faculty at the existing campus location in Fredericton. The waterfront campus will house a graduate level lab intended to support the other faculties of the new campus.

There will also be a community college based element of industrial craft and production, specifically metal, wood and plastics. This program will offer a creative hands on experience to the school, intended to act as a bridge between the skilled crafts tradition of the city's populace and a new creative and practical outlet for that skilled talent. It is also a proposed threshold between the environmental ravages of the past and present, and a possible step toward reparations for that legacy through future environmentally sensitive and sustainable design and production. The concept of the campus on the major axis of the city signifies the importance of the institution,

in forging a new direction for the future development, and the philosophical ideals embodied by its sustainable model, by relating to the founding symbol of the city. The association of this axis with market place also signifies the campus as a valuable future resource for the city in terms of the potential that it could yield.

Program Flow Diagram

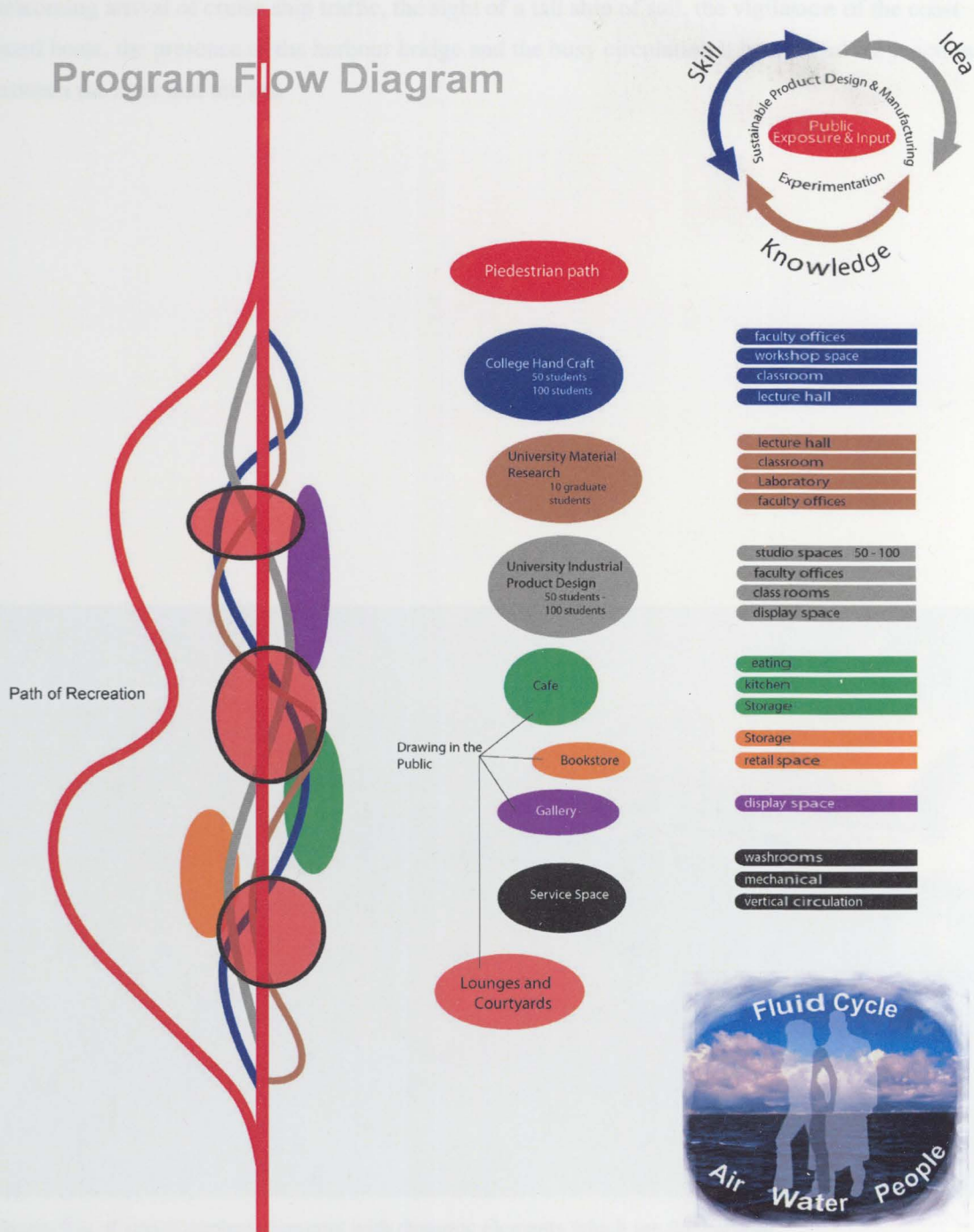
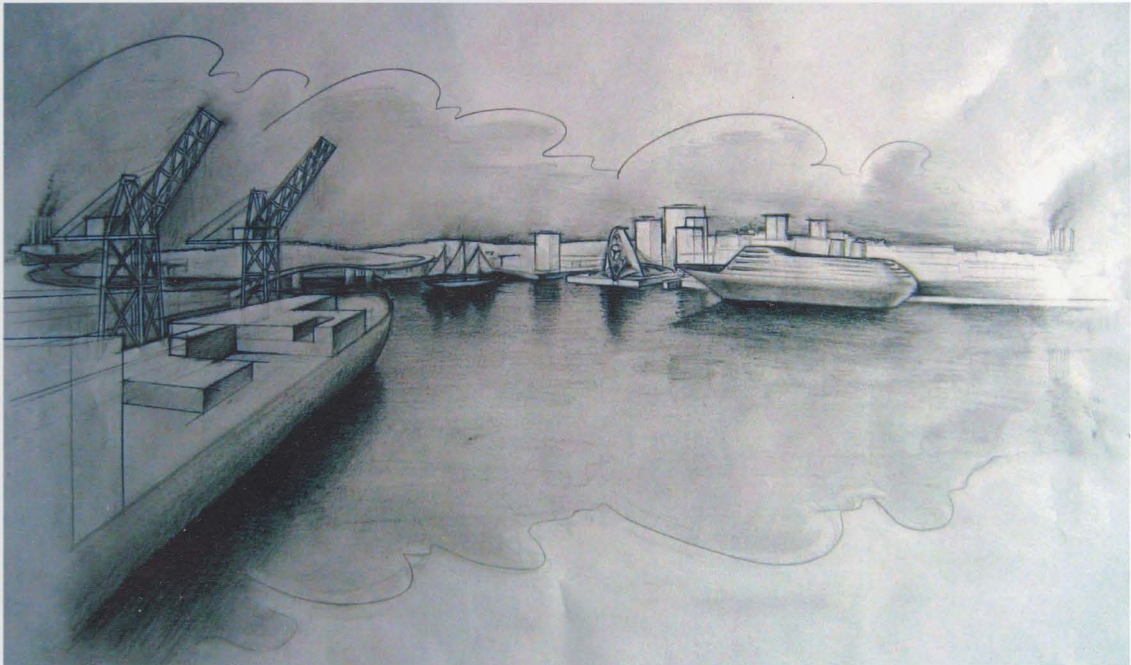


Diagram created to represent the building program and the movement through the building program

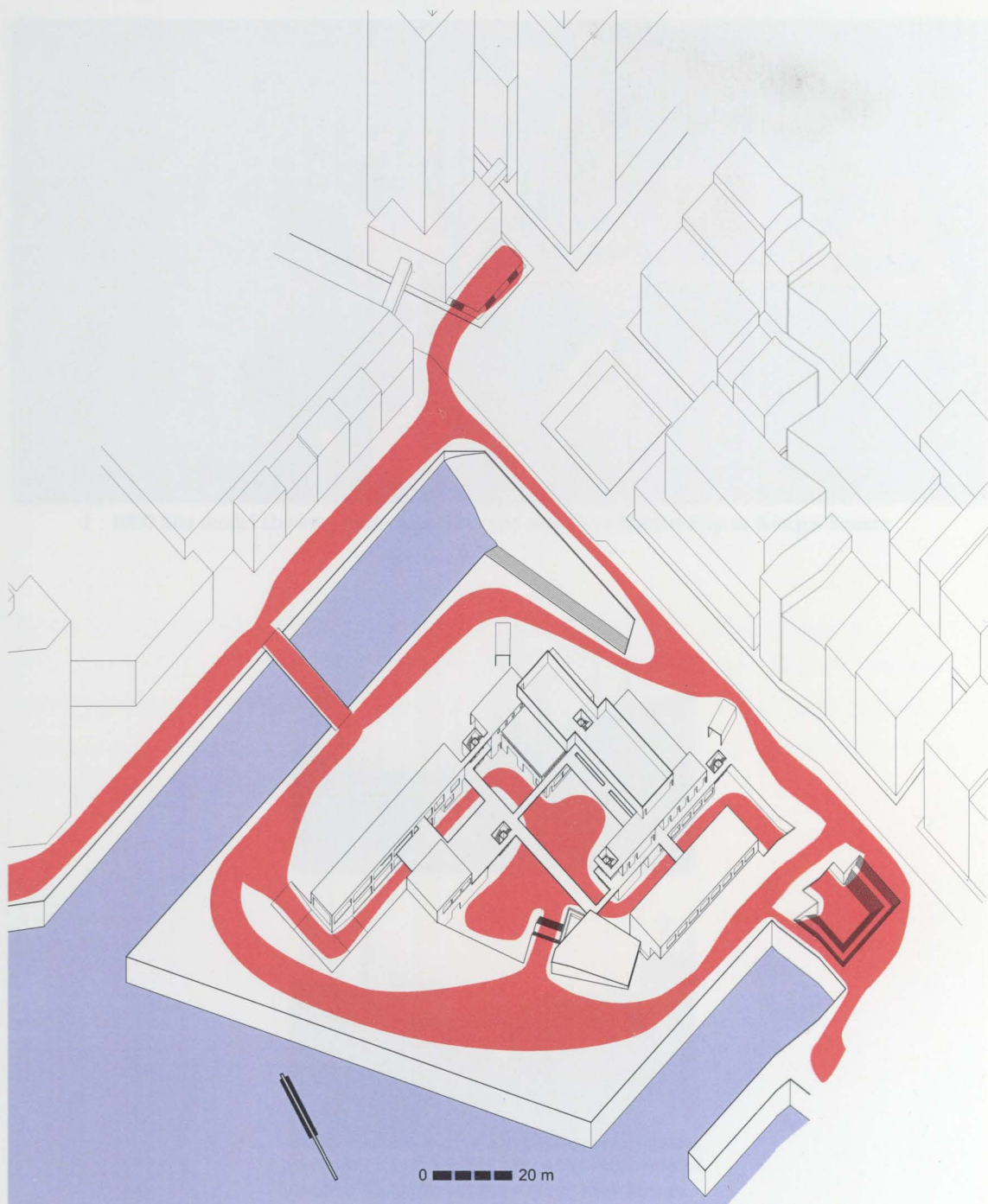
Design

The design of the building takes on two major scales and therefore separate engagements with the city. The first is the superstructure which addresses the large scale dynamic elements, which are the harbour. The steady traffic of cargo ships, the constant movement of the cranes, the welcoming arrival of cruise ship traffic, the sight of a tall ship of sail, the vigilance of the coast guard boats, the presence of the harbour bridge and the busy circulation it bears and the junction between the river and the sea.



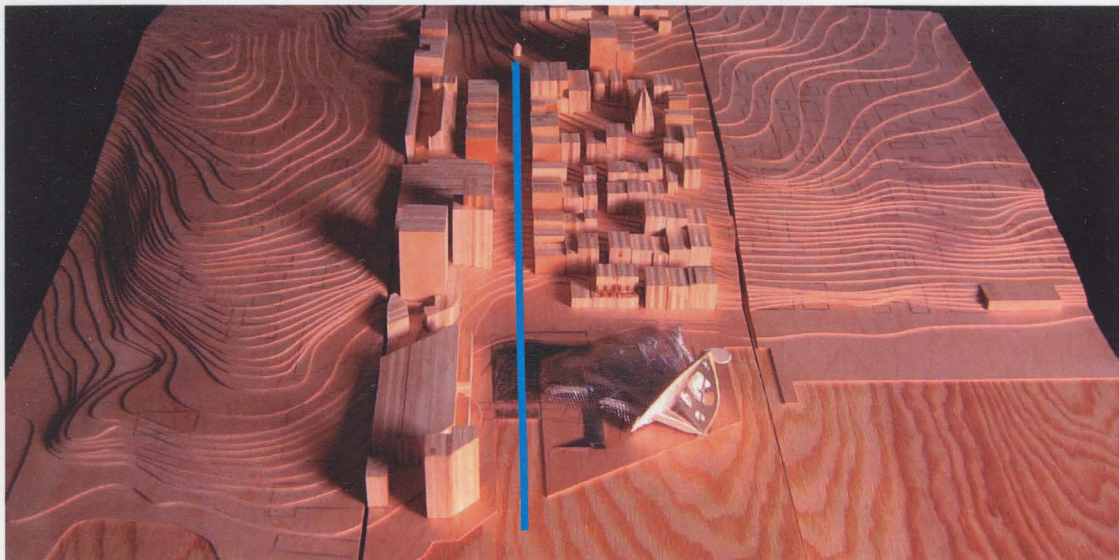
Perspective of superstructure engaging with dynamic elements which are the harbour

The second engagement with the city is the building's urban connection. The building connects into the existing fabric of the city through several major site moves. The program diagram reveals that the major circulation through and around the school structure of the building, connects directly into the route of the waterfront pedestrian walking path. People are encouraged and drawn to the water's edge which is where the primary entrances are located.



Axonometric of school structure showing circulation patterns through and around building

The major site design move that was undertaken on the Market Square side of the site was the re-excavation of the Market Slip, the traditional merchant wharf which continued the main civic axis extending down the hill from Kings Square. The tidal waters of the Bay of Fundy used to reach the base of King's Street, a strong reinforcement of the importance of the water to the city's past (founding) and to its future (marine based economy).

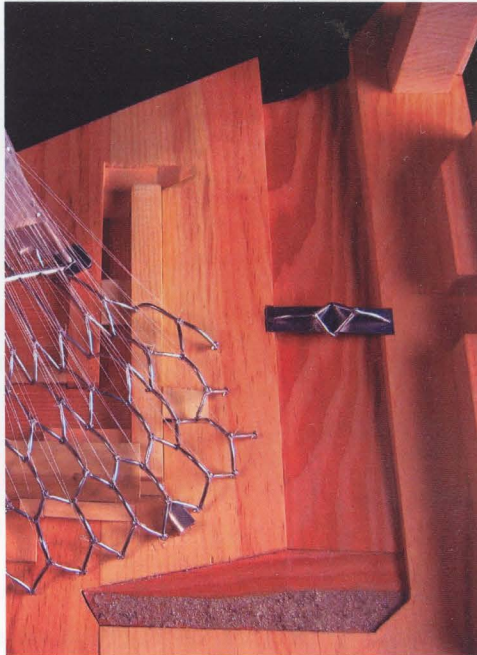


1 : 1000 Site model showing excavation plan and axis from Market Slip to Kings Square



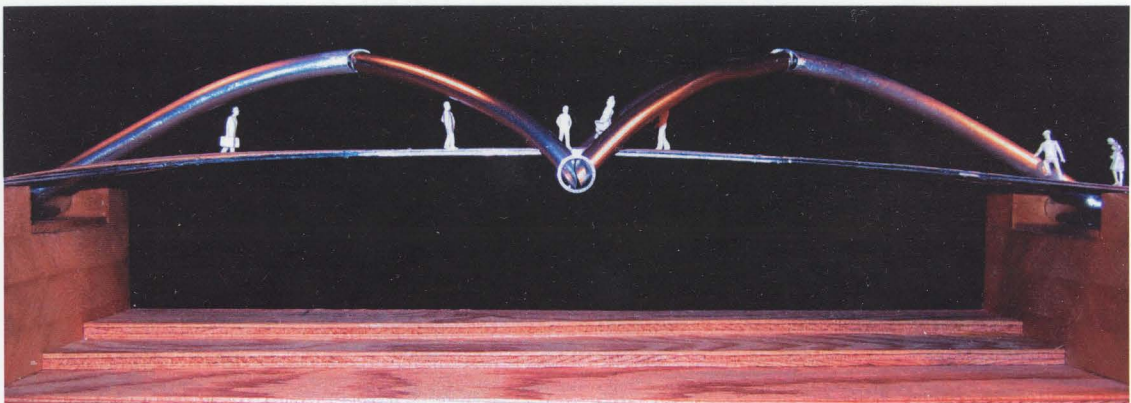
Photographs of Market Slip when tidal waters reached Kings Street from (Erb, New Brunswick Photographers, 2005)

The excavation runs back to the base of Kings Street, then continues southward revealing an architectural reconstruction of the original shoreline. This cut will show people how much the morphology of the water's edge has been altered since the settlement of the city.



1 : 500 Building model showing excavation of market slip and reconstruction of shoreline

In order to maintain and support the existing movement system of the Market Square development, a bridge is proposed to join the two sides at the point where the Market Square wharf side entrance is located. The bridge is to be constructed using two large tubular steel section trusses which have a scale associated with the industrial order of the harbour but with a form that welcomes people to experience it.



1 : 100 Structural bridge model showing thin profile as viewed from the head of Market Slip

The deck is constructed of layered steel plate frame either pinned or welded and connected to the two end span round steel section horizontal members. When the trusses are inserted into the horizontal members, and the deck is given a slight camber, the bridge gains its structural integrity. The deck need only span half of the distance across and is to be finished with wooden decking on the outsides and structural glass in the centre.



1 : 100 Bridge model showing structure

Through the glass, the waters of the tide will be visible, changing the mud and rock into a dynamic surface of water under wave action. The glass therefore represents the idea, the formless beginning to thought. From that glass strip, the structure emerges to engage its opposite from the other side.



1 : 100 Bridge model showing structural glass

People move across the bridge separated by the structure at the end points but encouraged to intermix in the common space of the middle.

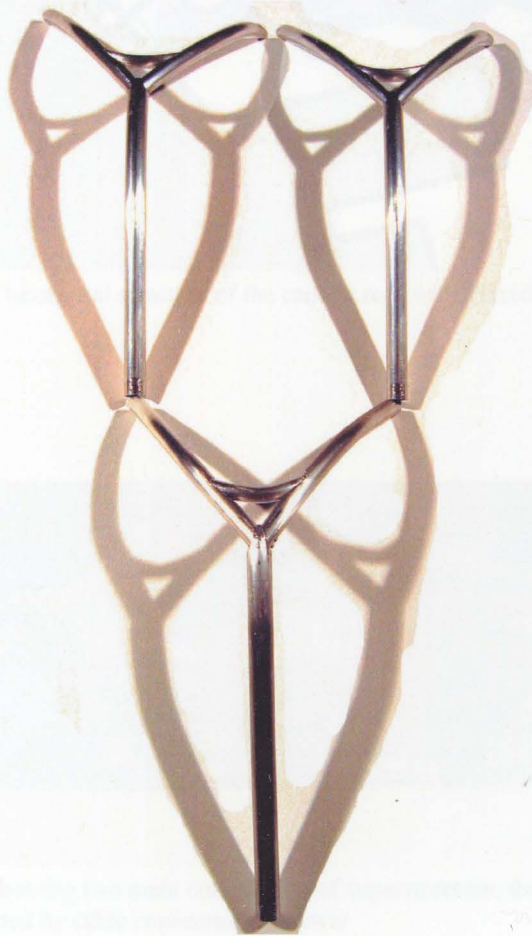


1 : 100 Bridge model showing circulation



1 : 100 Structural elements of bridge

The structural elements of the bridge are the same elements used to support the canopy roof of the superstructure. The elements of the bridge bear against each other held together by the horizontal member. The elements of the canopy roof are connected in series, forming a hexagonal grid which radiates out from a single point.



1 : 100 Structural elements of superstructure canopy roof

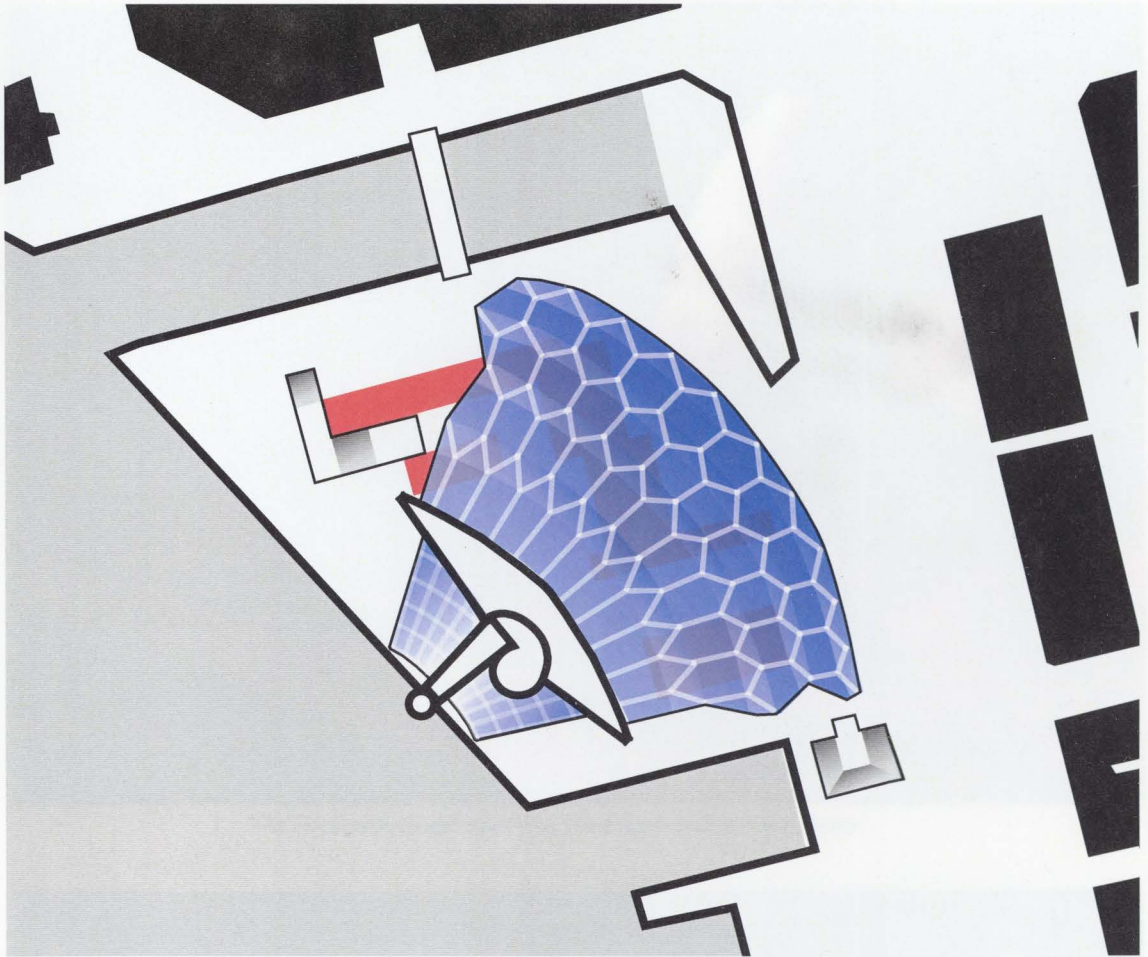
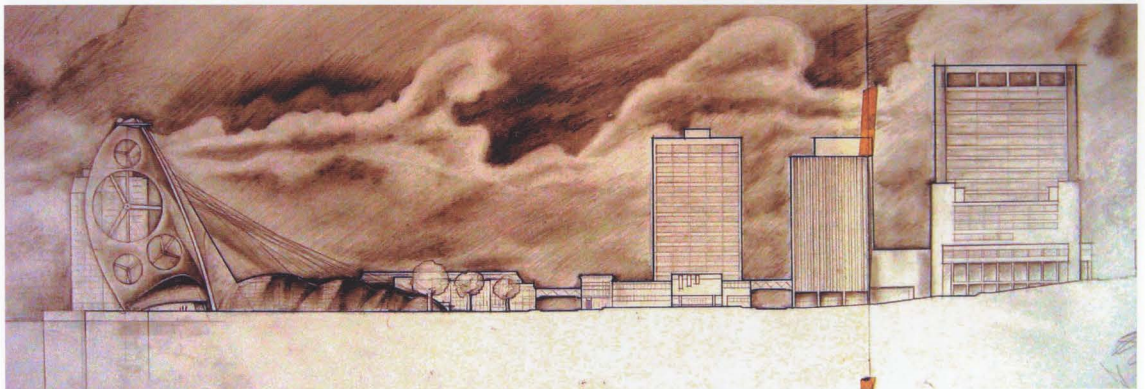
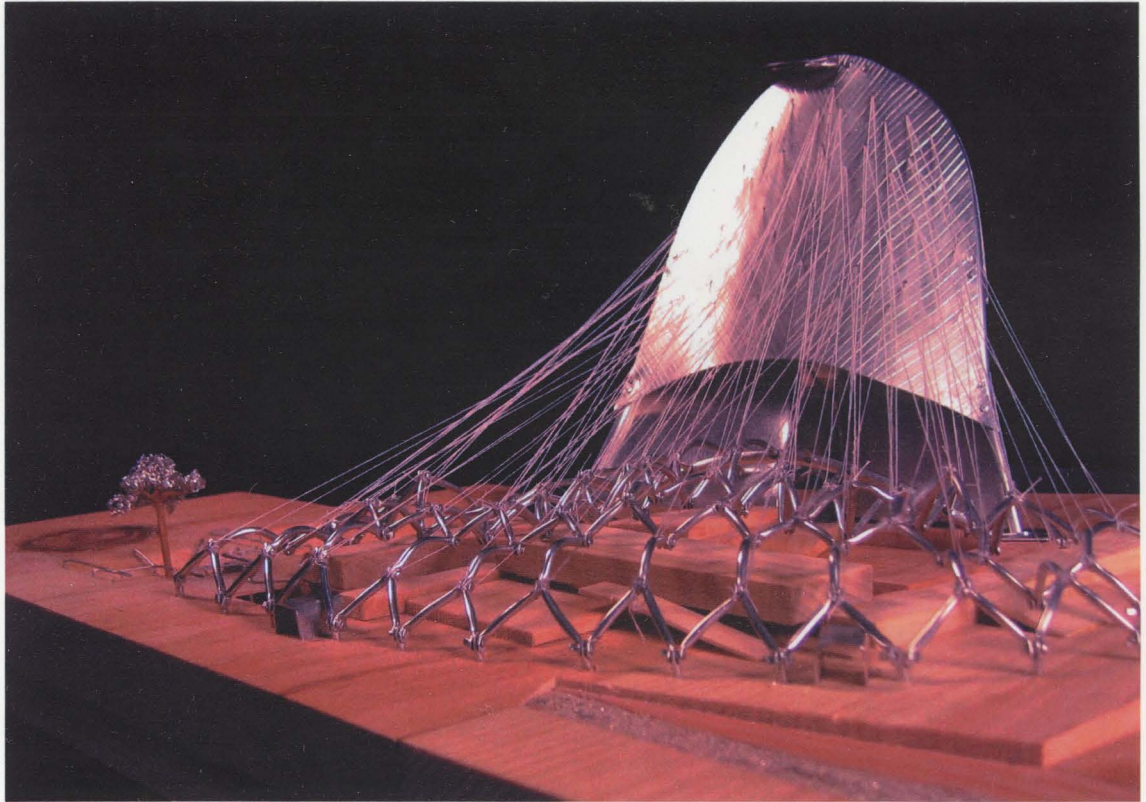


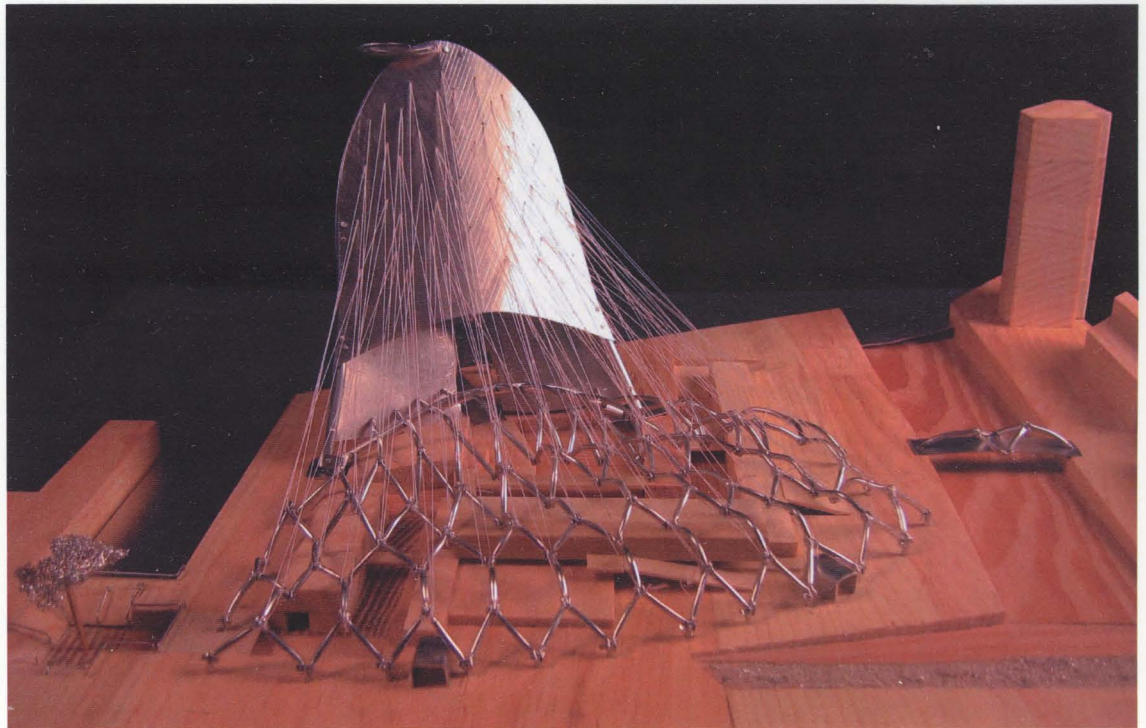
Diagram of hexagonal structure of the canopy roof with glazed skin



Elevation of building showing two main components of superstructure; the cantilever tower and the canopy roof supported by cable connections to tower



1 : 500 Structural model showing view descending King Street



1 : 500 Structural model showing city side view

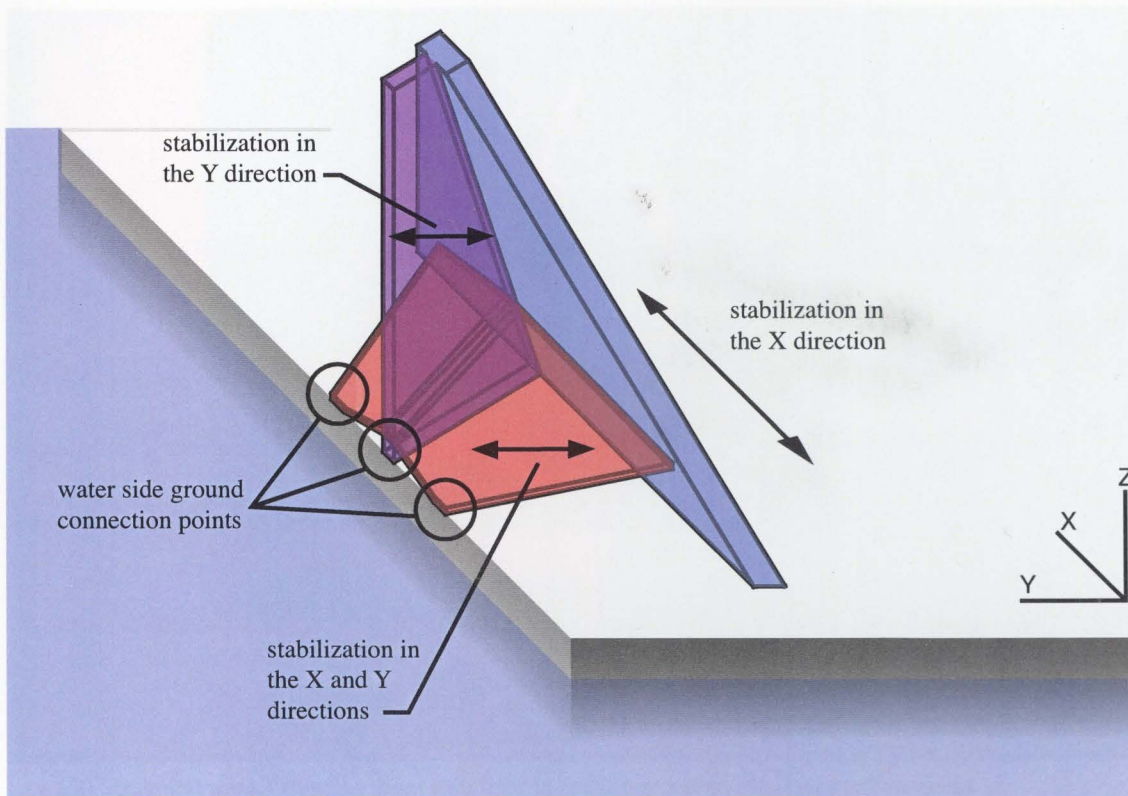


Diagram of cantilever tower structural principles

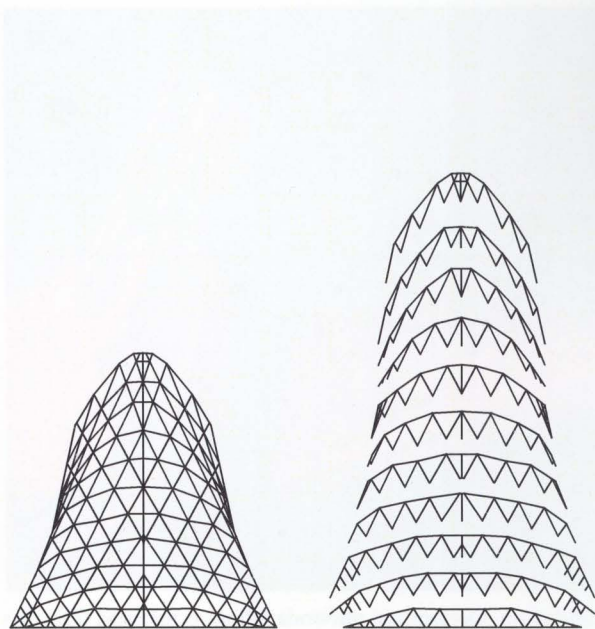
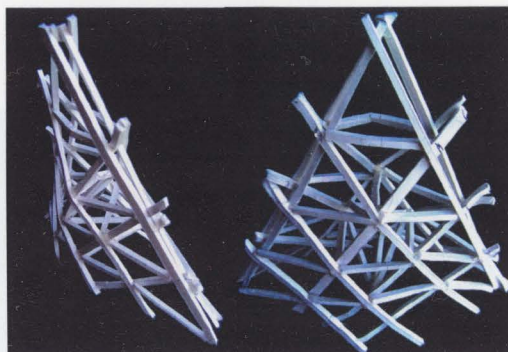


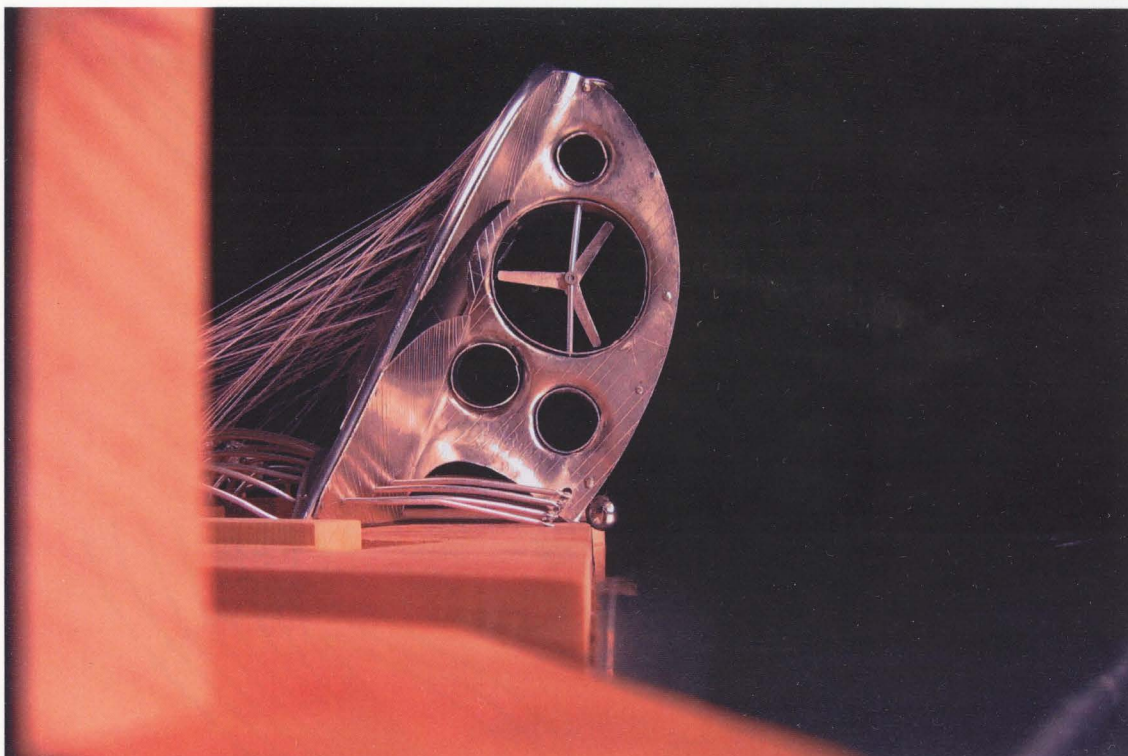
Diagram of rear elevation of cantilever tower and its assembly by crane in preassembled sections



Diagrammatic model of cantilever tower construction using 900mm hollow steel sections



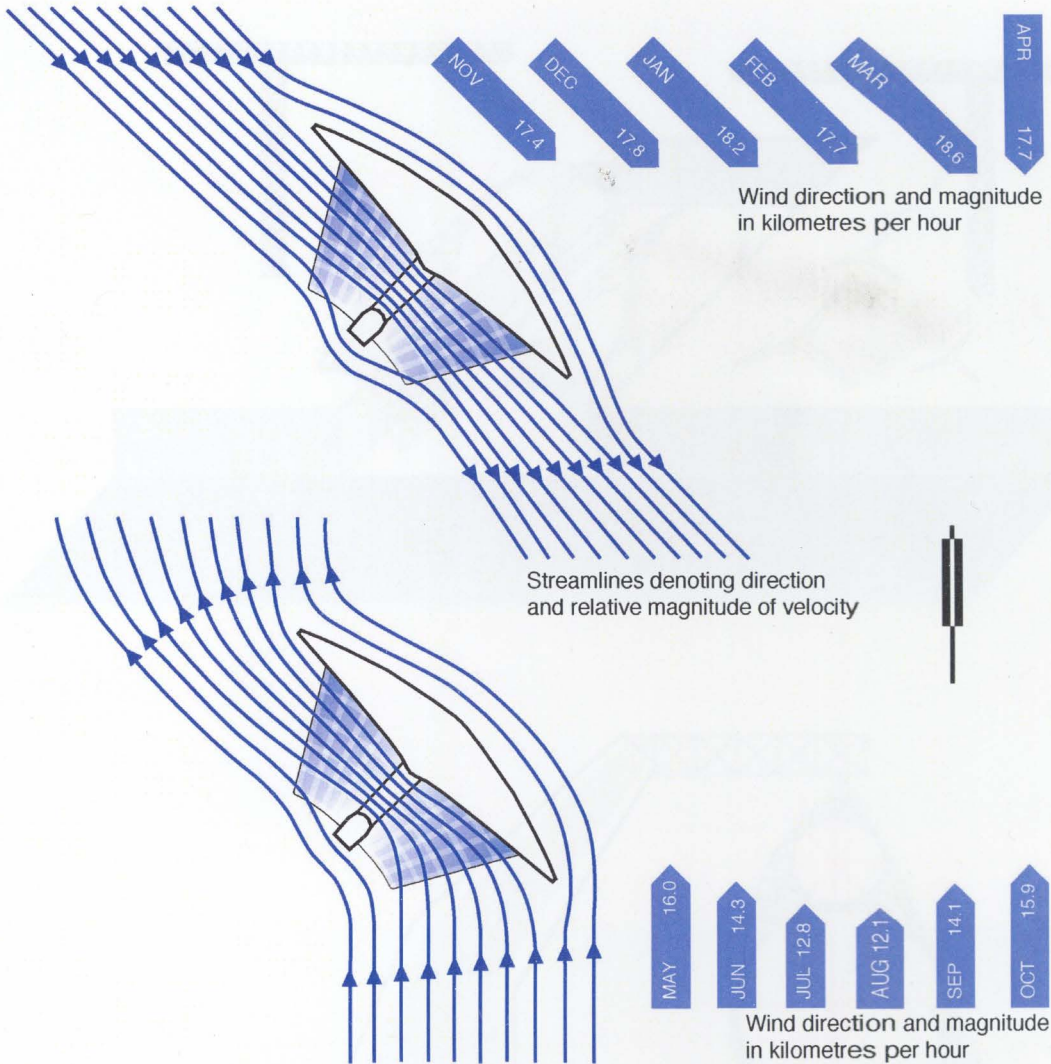
900mm hollow steel section painted white finish



1 : 500 Structural model showing front stabilizer to cantilever tower, also houses four wind turbines and accomodates an elevator on its leading edge



1 : 500 Structural model showing harbourside elevation and observation platform



Schematic diagram of cantilever tower's form acting as a sail, catching the wind, channeling it, increasing its velocity in order to maximize electrical power generation from the wind turbines



Use of Local industry for construction of superstructure of the building

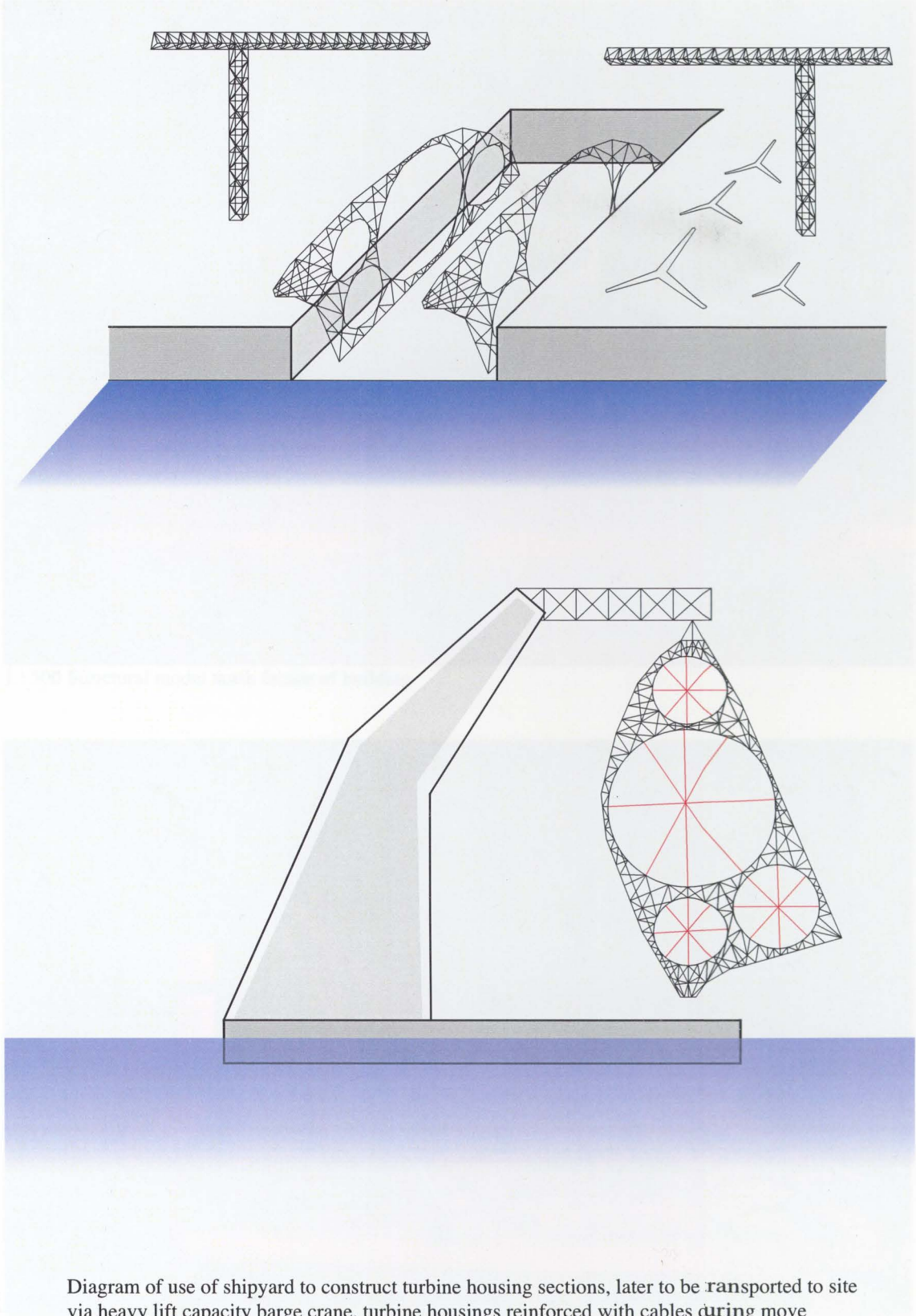


Diagram of use of shipyard to construct turbine housing sections, later to be transported to site via heavy lift capacity barge crane, turbine housings reinforced with cables during move



1 : 500 Structural model north facade of building



1 : 500 Structural model south facade of building

The superstructure is intended to not simply symbolically and poetically represent the idea of 'turning the tide' changing the way we treat our environment, but also to passively engage the environment to generate electricity, ventilate the building and educate the public.

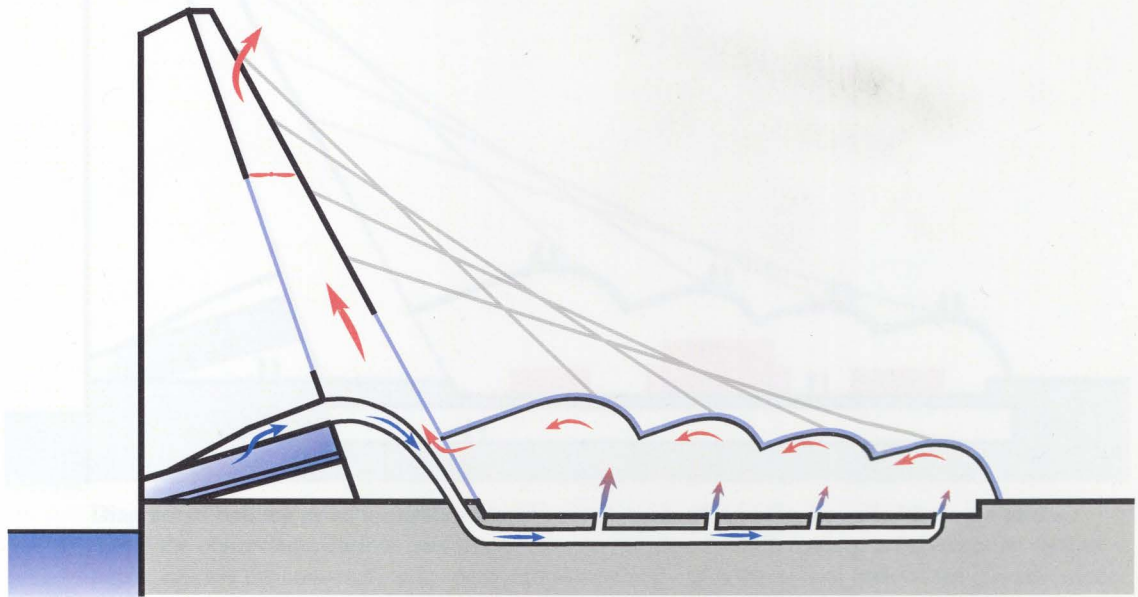


Diagram of passive air flow through the building, heat and vertical air flow energy generated by the stack effect can be recovered by horizontal turbines located periodically in the tower structure. Canopy structure creates a micro climate underneath and an open floor space.

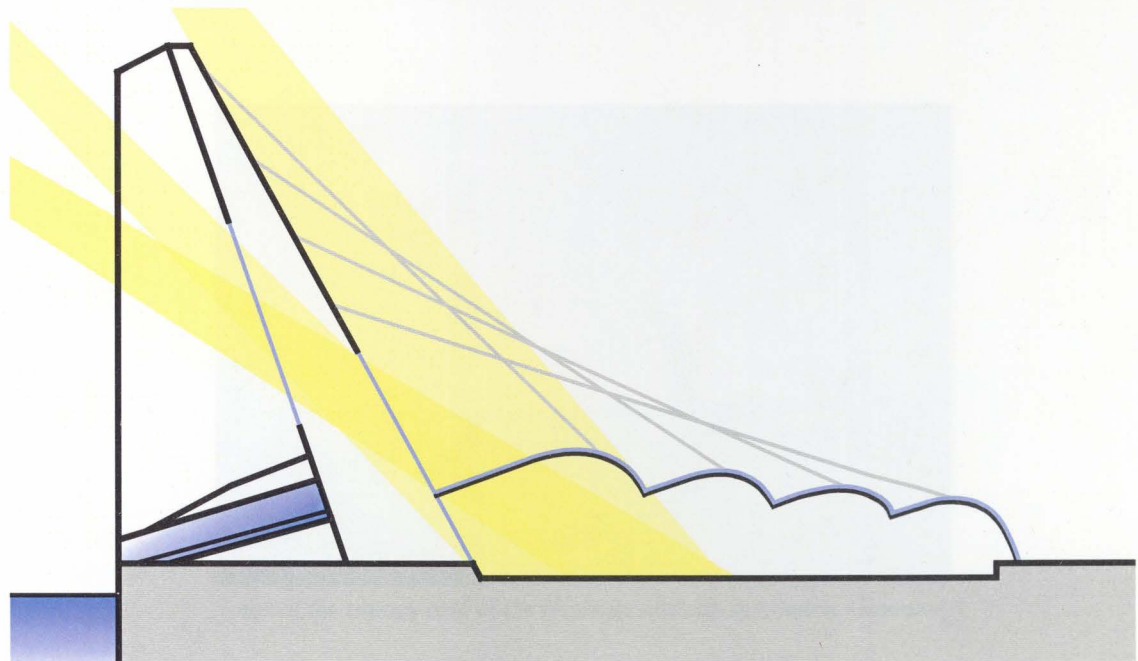


Diagram of winter, spring/autumn and summer sun angles, front of tower is partially glazed to admit light into the main public lounge space, photovoltaic cells embedded in some portions of the glazed skin.

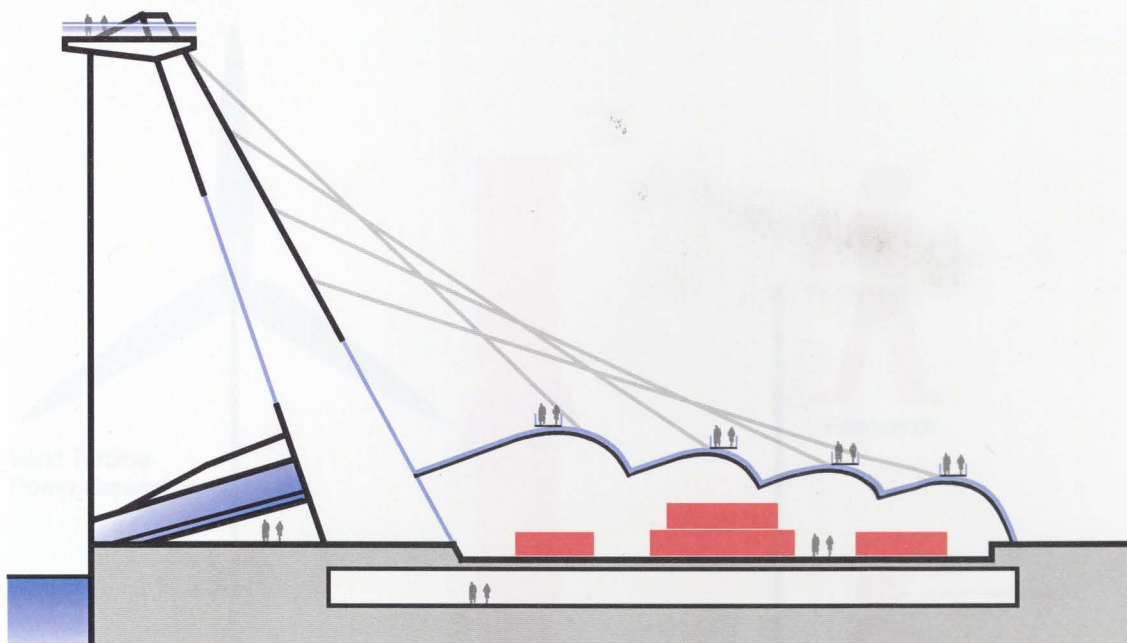
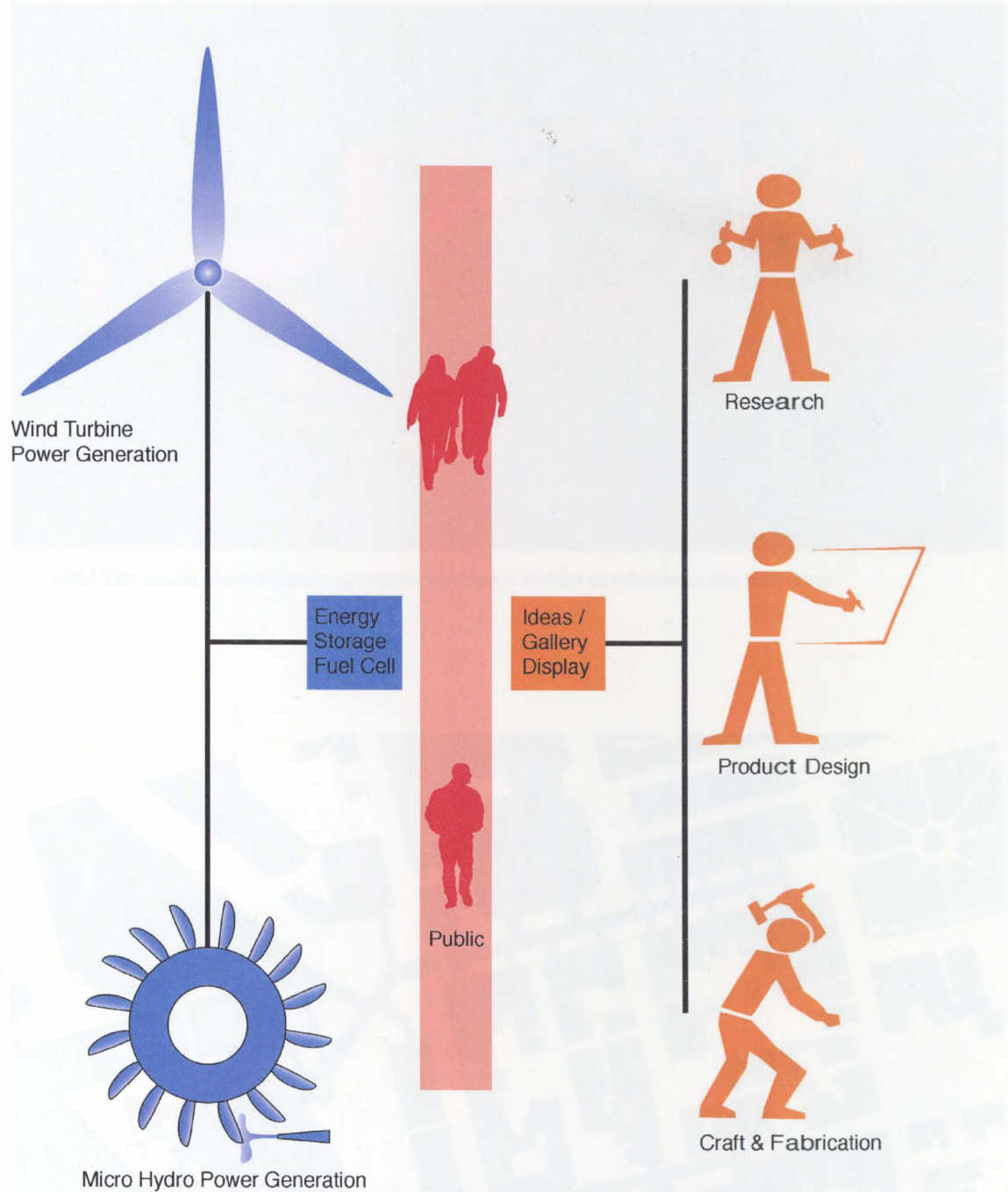


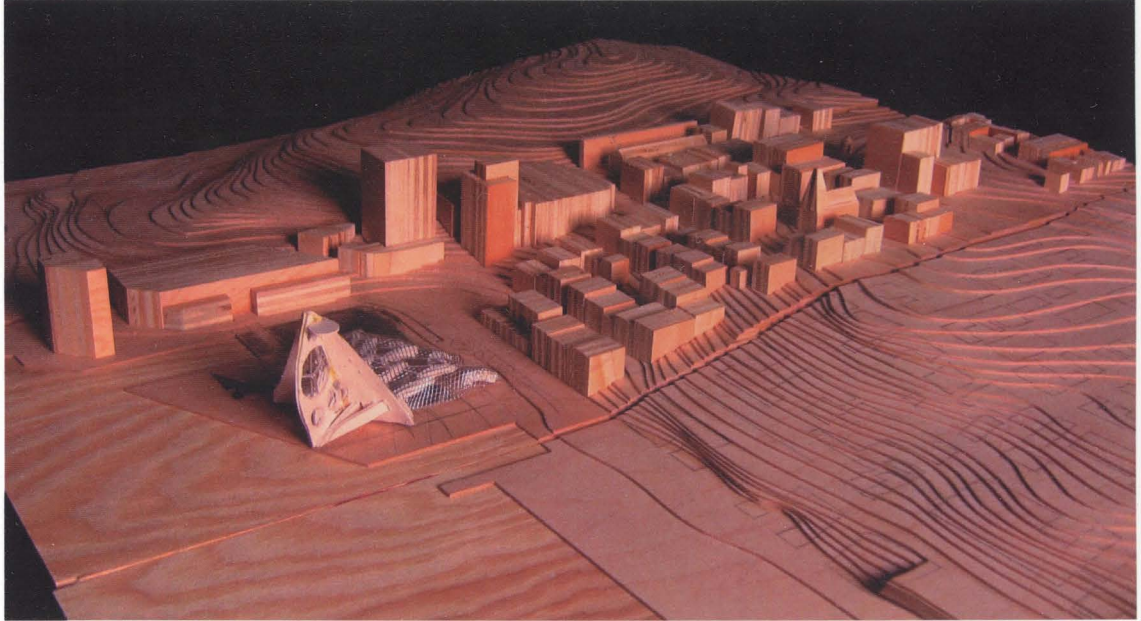
Diagram of building as an informative tourist event, tours of the school available to the public, use of the observation deck to gain perspective on the city, catwalks on top of the canopy roof so public can see the construction up close and see the activity in the school below the glazed surface



Tours of the canopy roof of the Olympic stadium in Munich, Germany



Schematic diagram of what the public encounter while touring the building and the program, micro hydro turbines are located below the tower in the plinth, sea water retained for heat exchange purposes is released at low tide through the micro hydro turbines, the energy being stored in a fuel cell, conversely ideas which have generated tangible products are displayed in the public gallery



1 : 1000 Site model showing main downtown business district in relation to the building

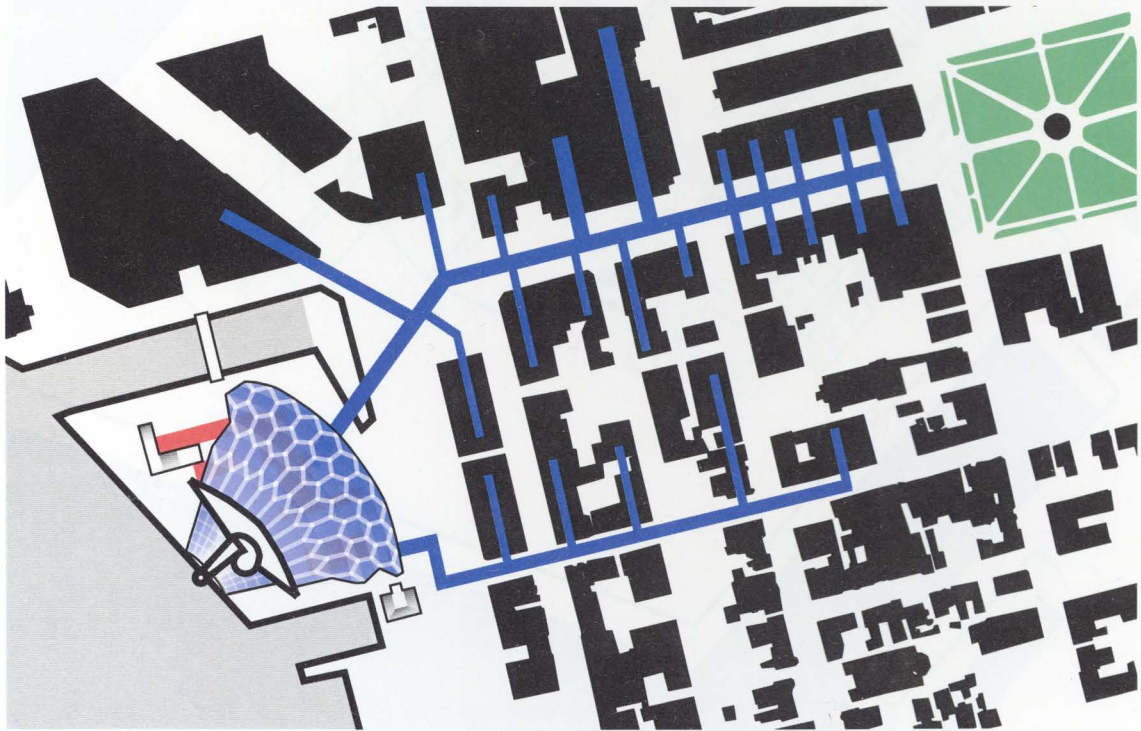
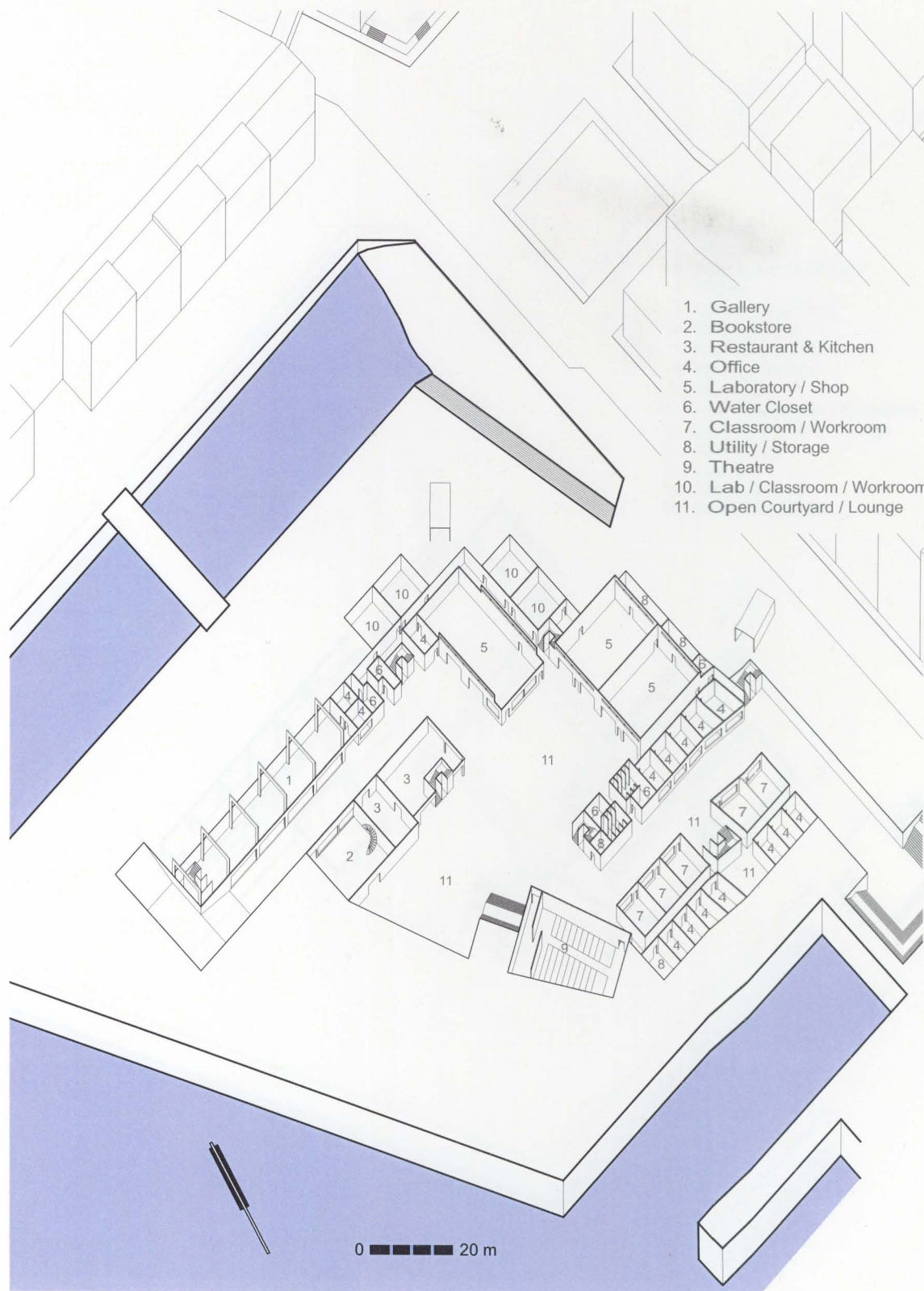
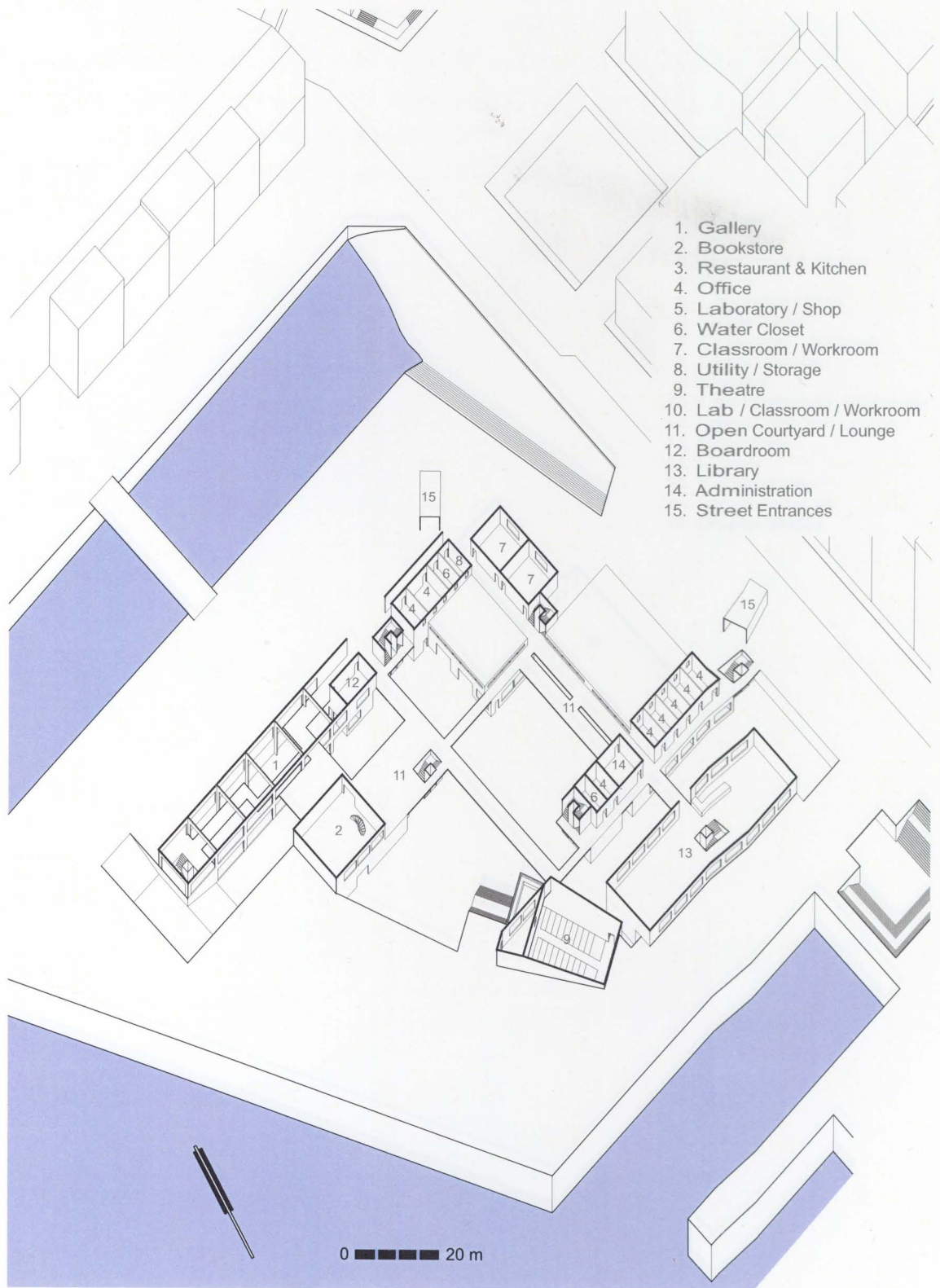


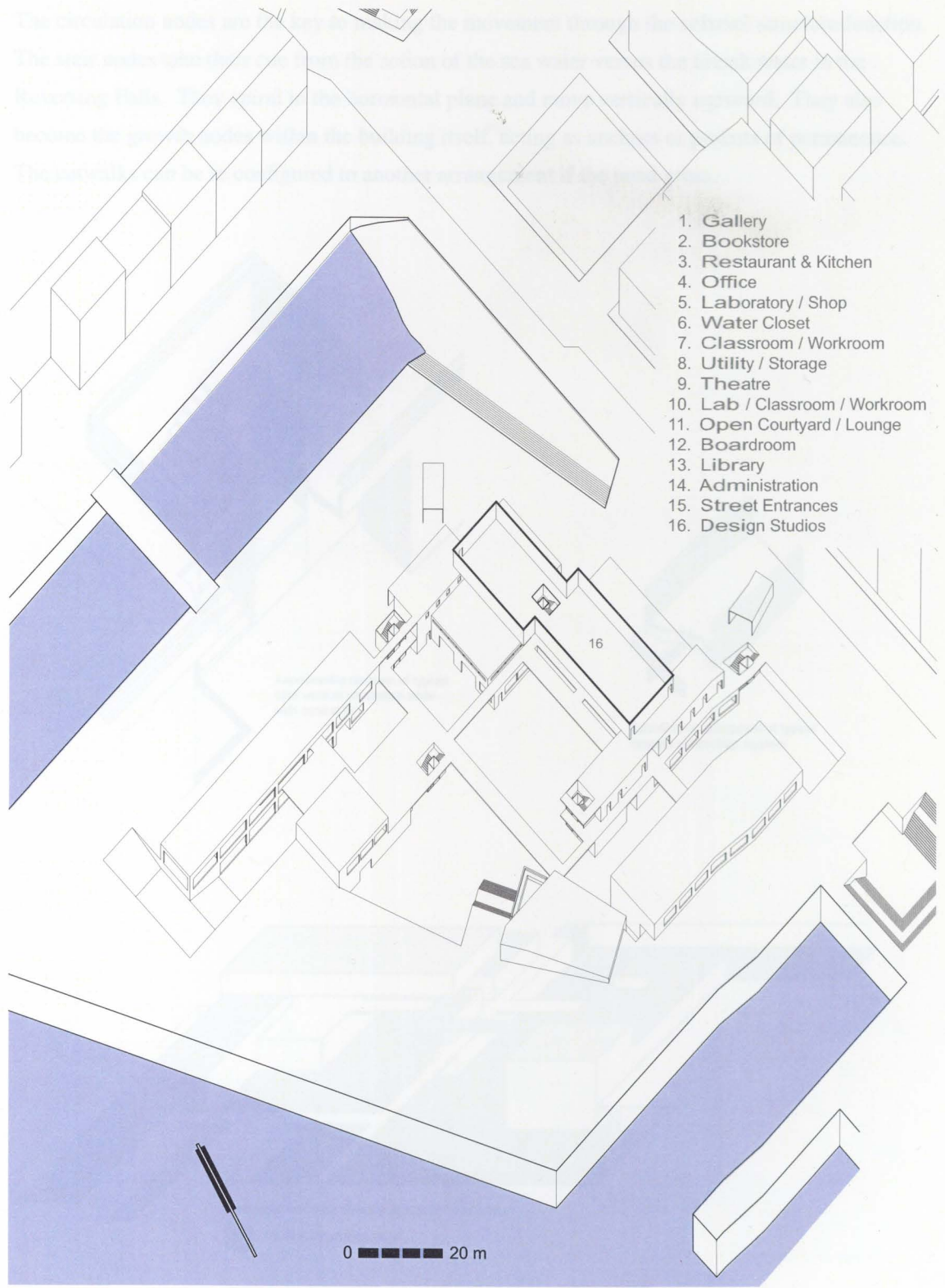
Diagram of glycol heat transfer loop system that allows the building to use sea water to cool the downtown business district as well as providing excess electricity



Axonometric drawing of below grade level of school structure



Axonometric drawing of at grade level of school structure



Axonometric drawing of upper level of school structure

The circulation nodes are the key to making the movement through the school structure function. The stair nodes take their cue from the action of the sea water versus the fresh water in the Reversing Falls. They spiral in the horizontal plane and move vertically upward. They also become the growth nodes within the building itself, acting as anchors or points of permanence. The catwalks can be re configured to another arrangement if the need arise.

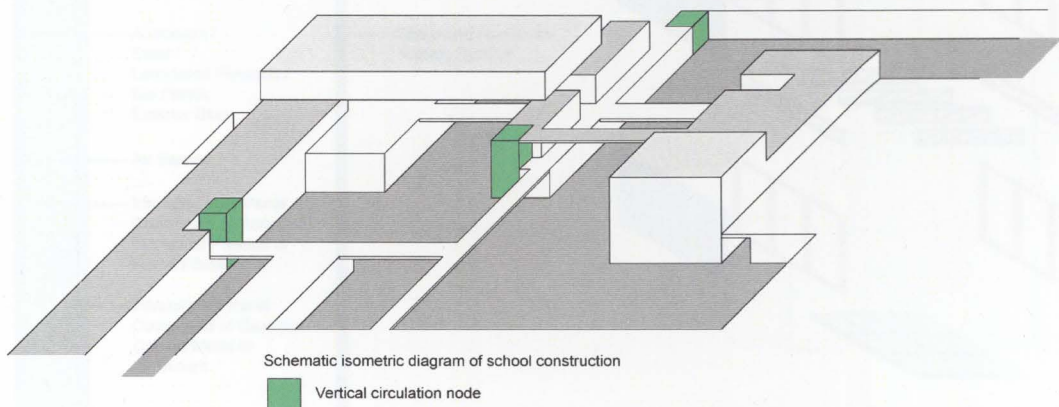
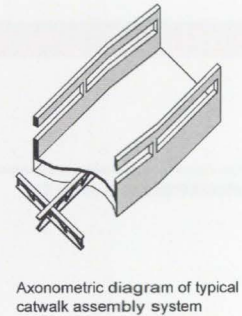
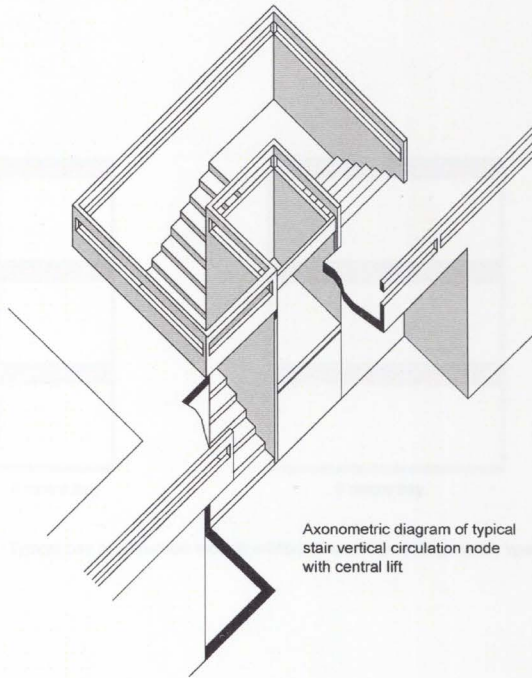
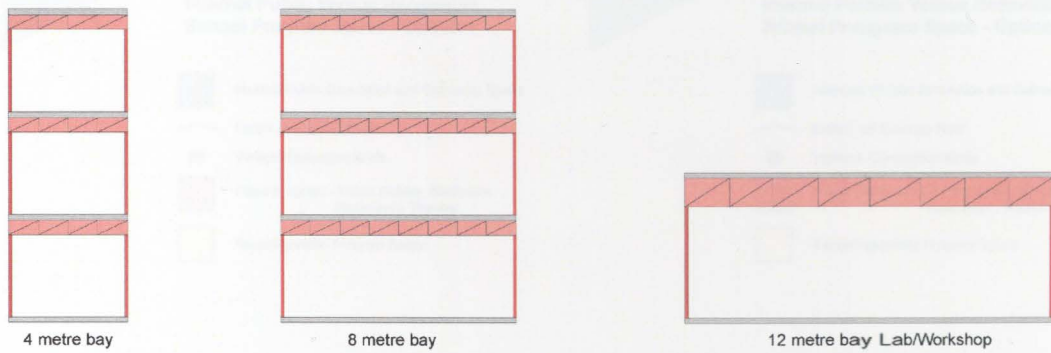


Diagram of circulation nodes, catwalks and public space

The structure of the school is to be composed of a modular system of components which can be easily disassembled and reassembled elsewhere inside the micro climate under the canopy roof. The modular components are to be primarily steel structure with concrete floor modules and composite wall panels. The intention behind this is to allow the school to expand or contract or adapt its program needs while experimenting with new layouts and materials for the modular system.



Typical bay construction module widths of reconfigurable program space

Wall Panel Types

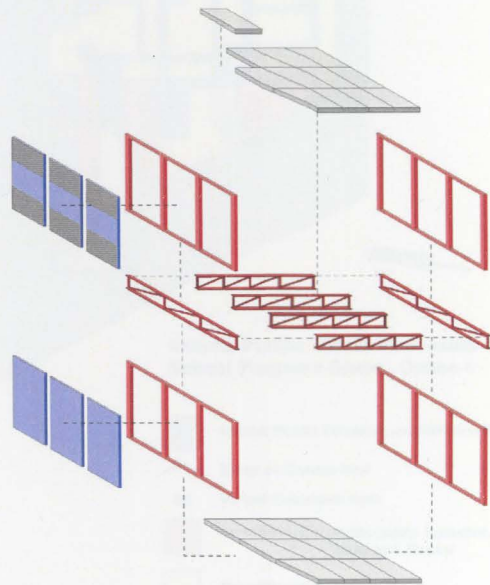
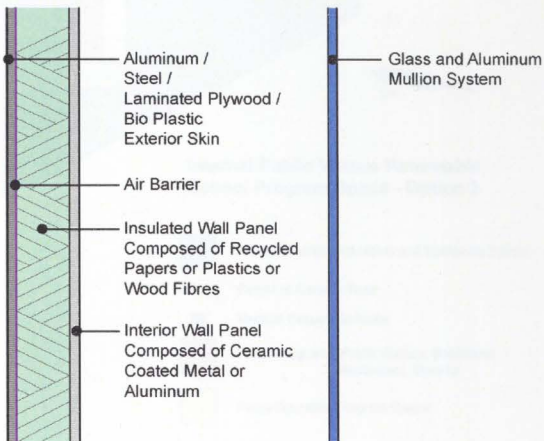
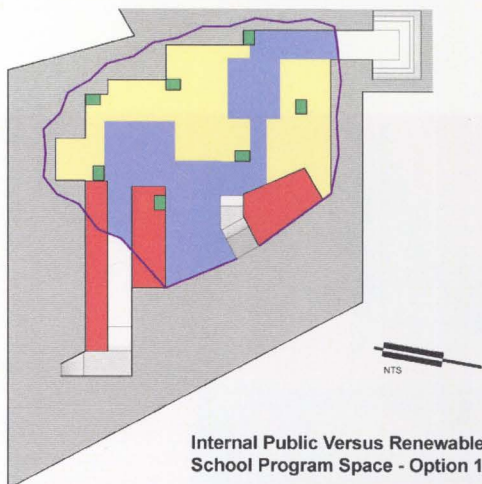


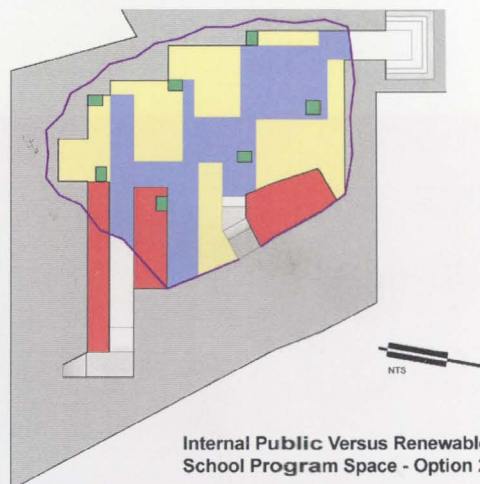
Diagram of modular construction system of reconfigurable school and mixed use program space

Diagram of a modular construction system idea for the school structure



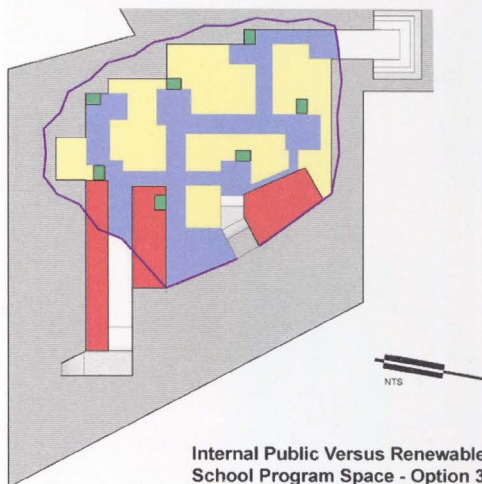
Internal Public Versus Renewable School Program Space - Option 1

- Internal Public Circulation and Gathering Space
- Extent of Canopy Roof
- Vertical Circulation Node
- Fixed Program - Public Gallery, Bookstore, Restaurant, Theatre
- Reconfigurable Program Space



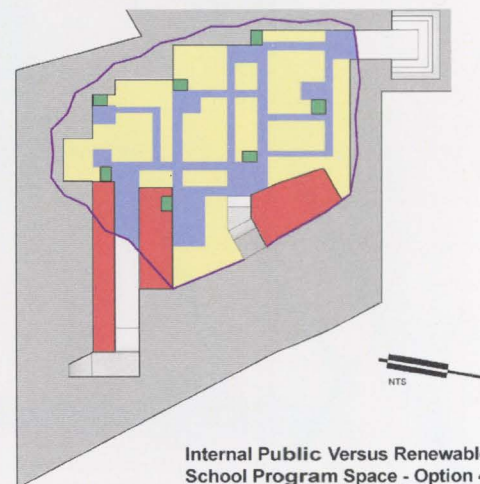
Internal Public Versus Renewable School Program Space - Option 2

- Internal Public Circulation and Gathering Space
- Extent of Canopy Roof
- Vertical Circulation Node
- Fixed Program - Public Gallery, Bookstore, Restaurant, Theatre
- Reconfigurable Program Space



Internal Public Versus Renewable School Program Space - Option 3

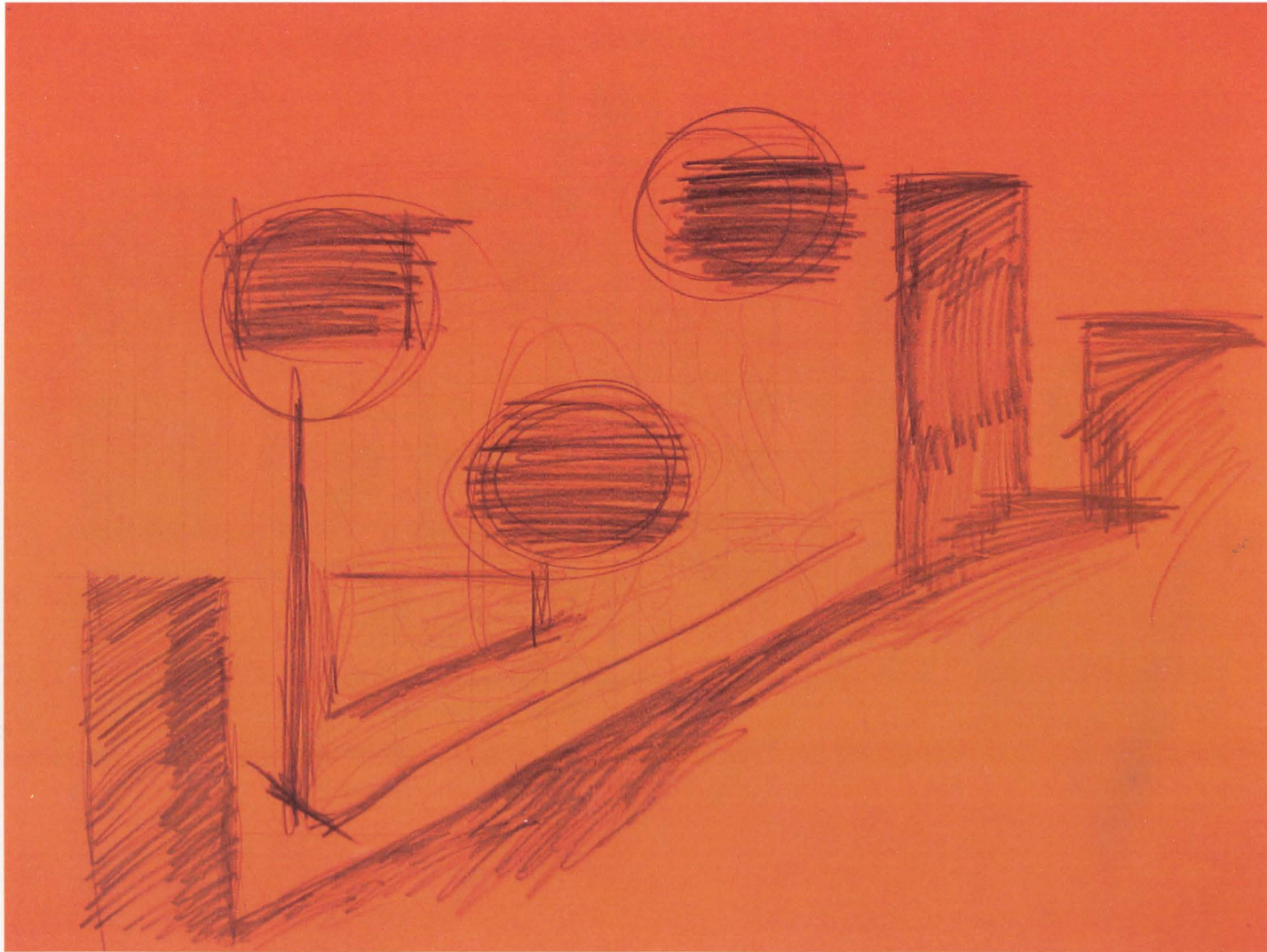
- Internal Public Circulation and Gathering Space
- Extent of Canopy Roof
- Vertical Circulation Node
- Fixed Program - Public Gallery, Bookstore, Restaurant, Theatre
- Reconfigurable Program Space



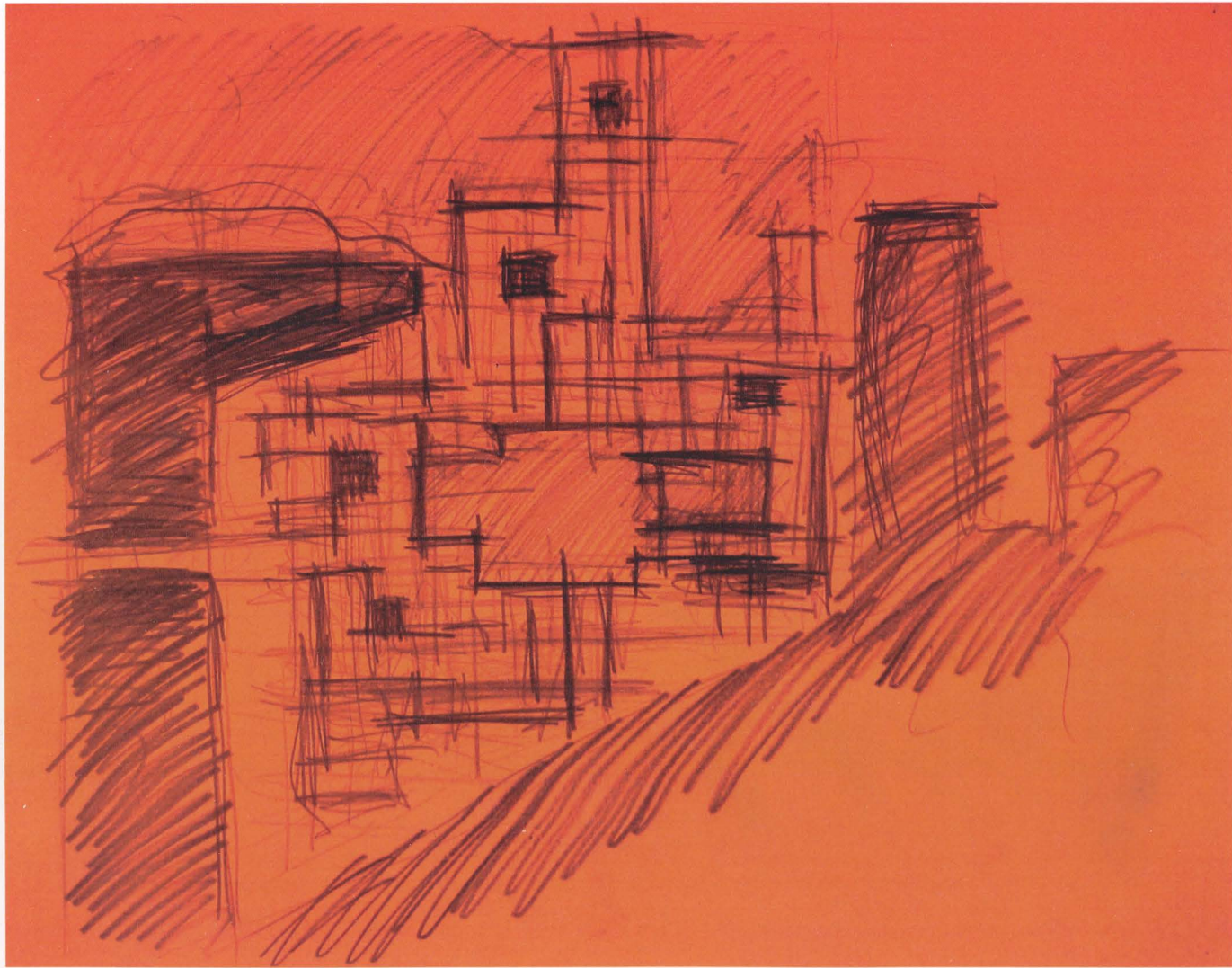
Internal Public Versus Renewable School Program Space - Option 4

- Internal Public Circulation and Gathering Space
- Extent of Canopy Roof
- Vertical Circulation Node
- Fixed Program - Public Gallery, Bookstore, Restaurant, Theatre
- Reconfigurable Program Space

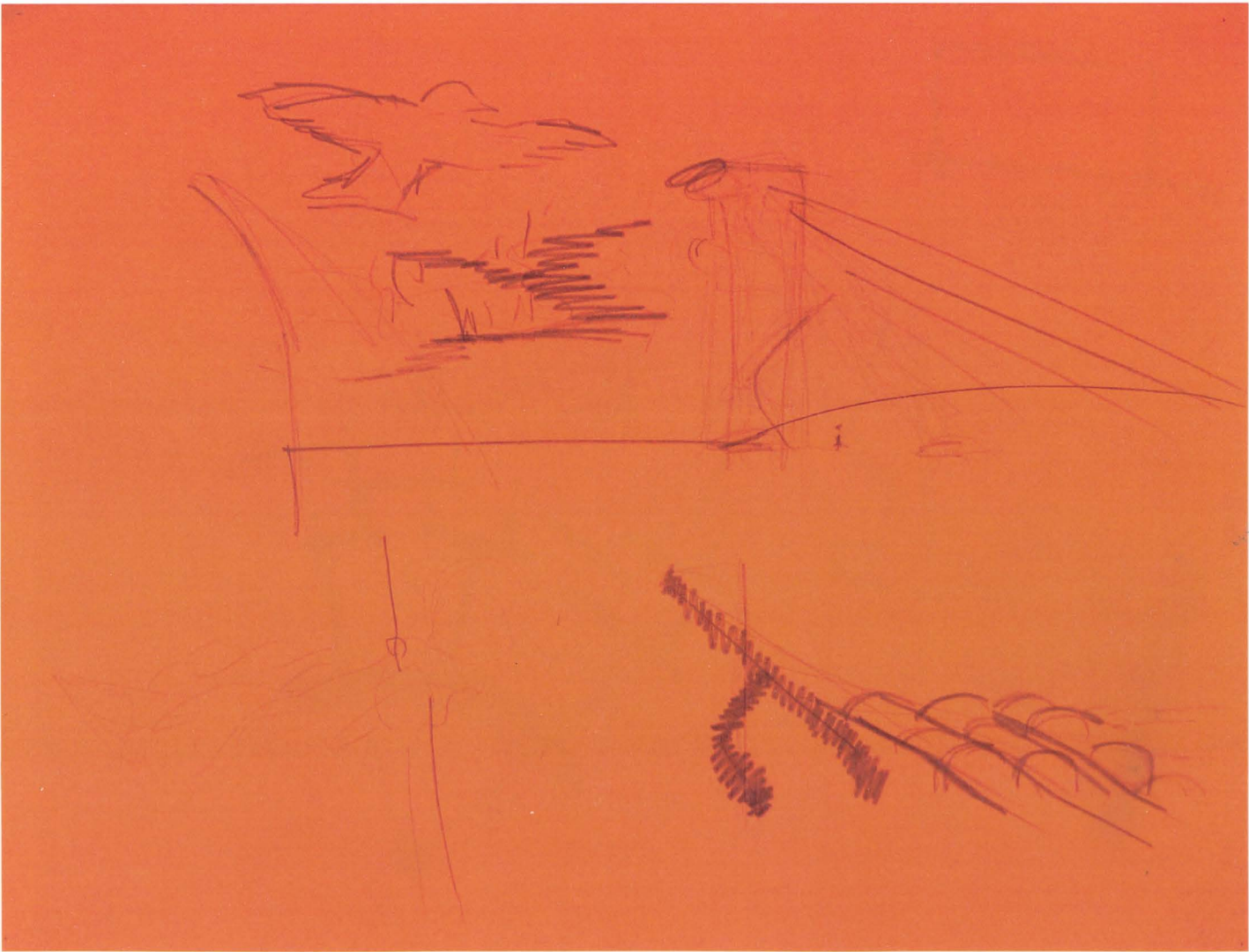
Schematic diagram of possible internal school structure built arrangements



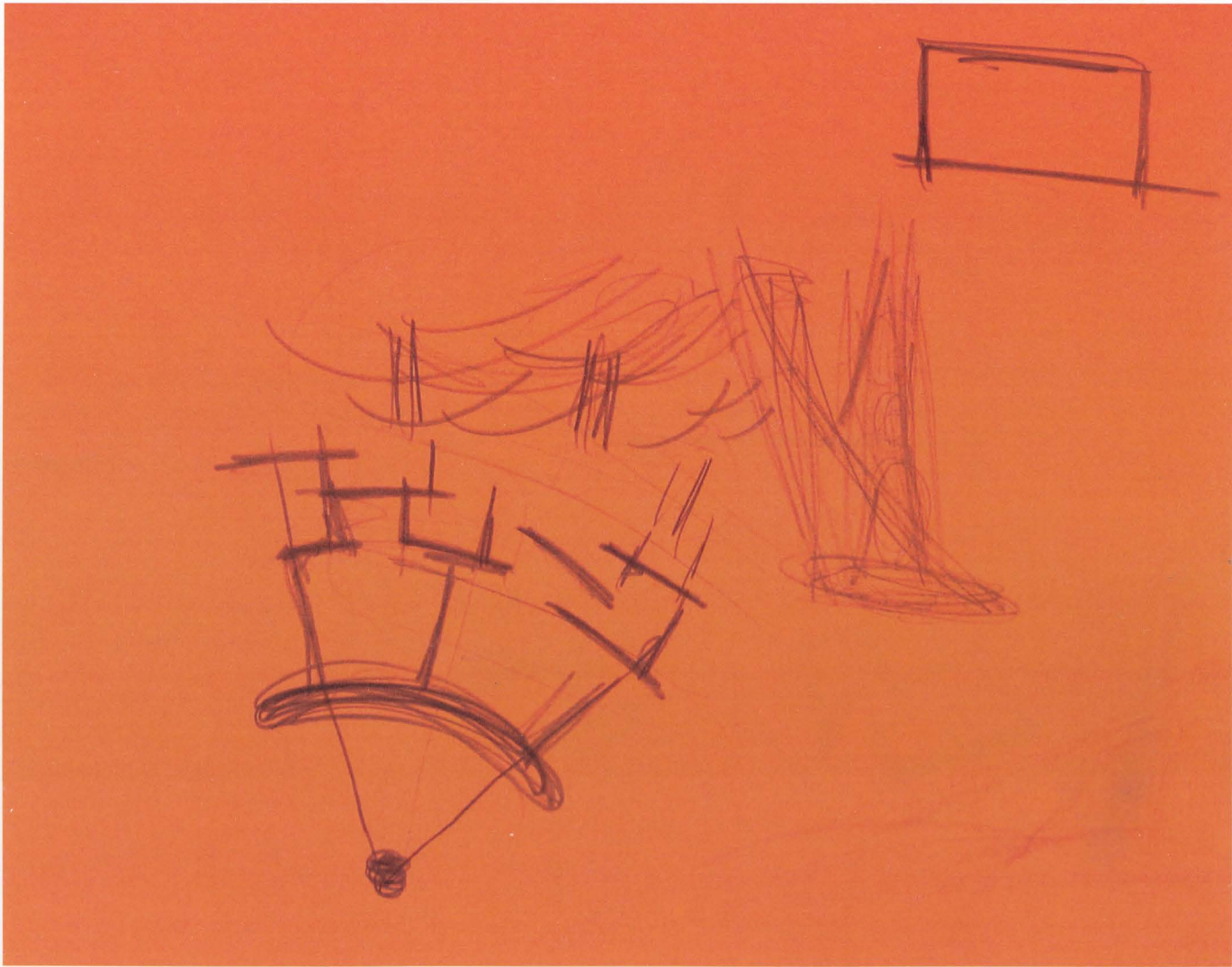
Conceptual site drawing



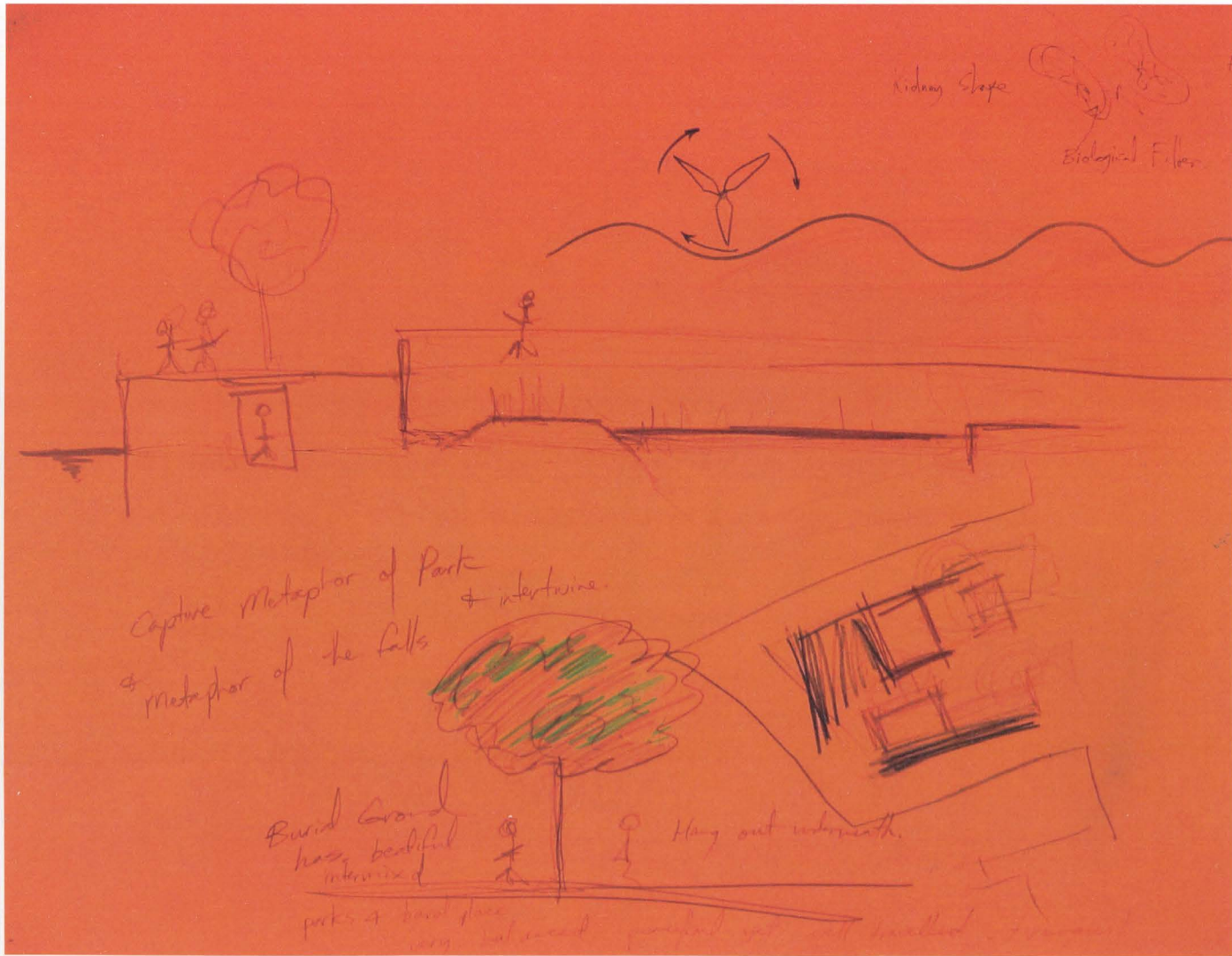
Conceptual site drawing



Conceptual drawing of the central passage or site, providing and connecting all



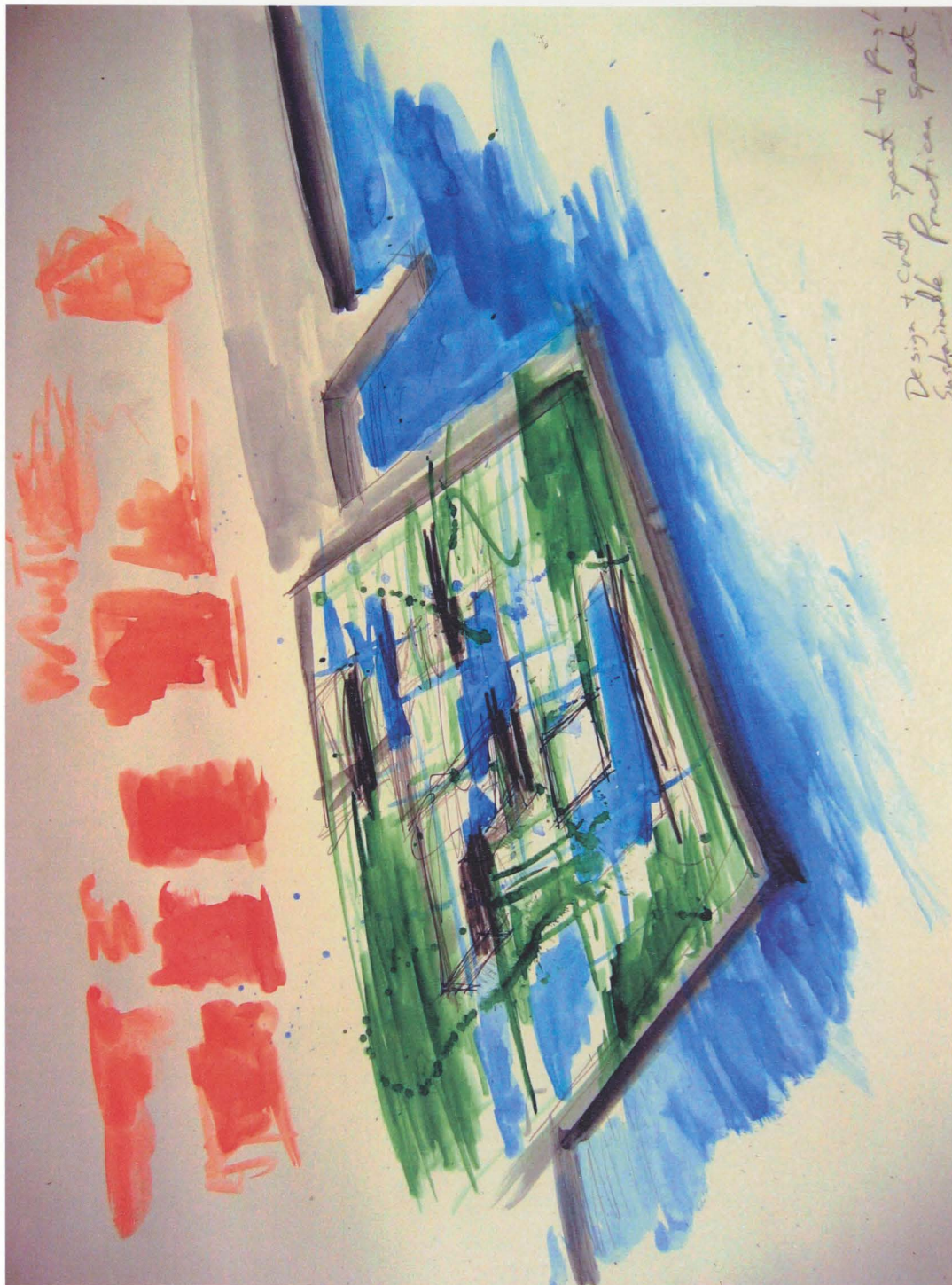
Conceptual drawing of the initial impulse or idea, growing and branching out



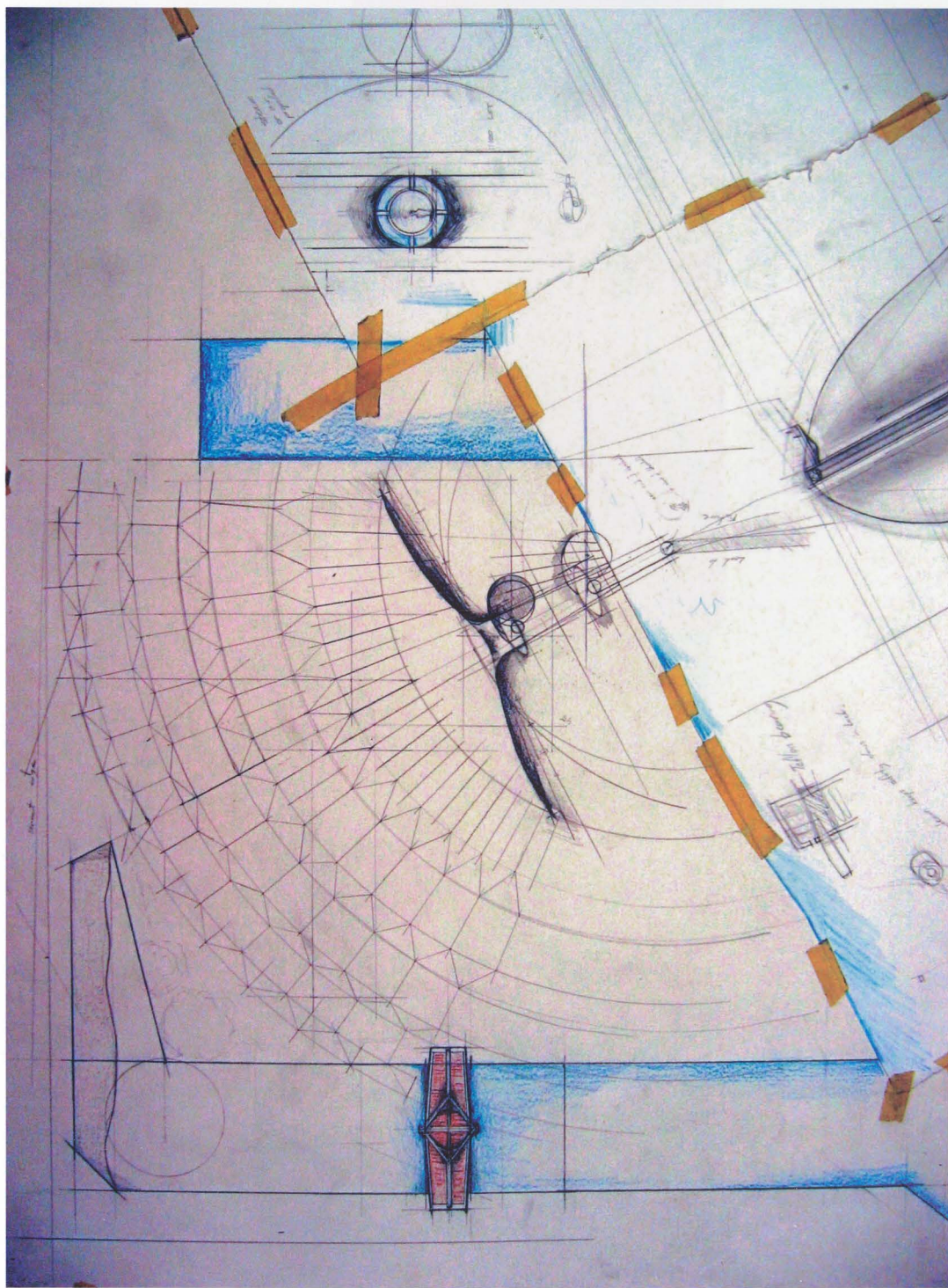
Building concepts



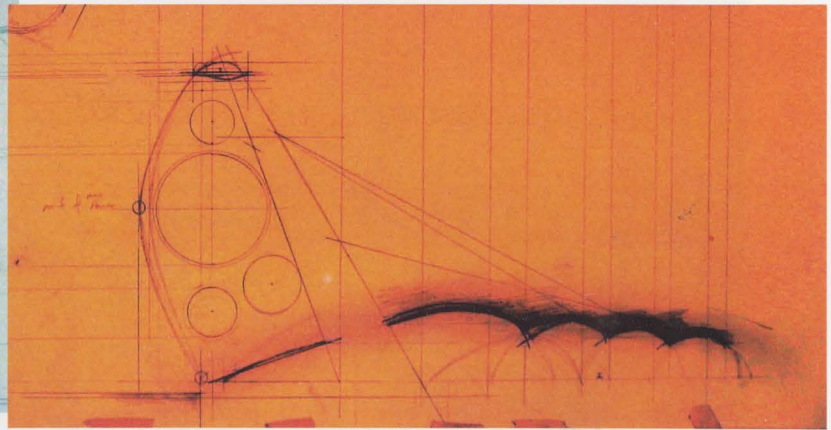
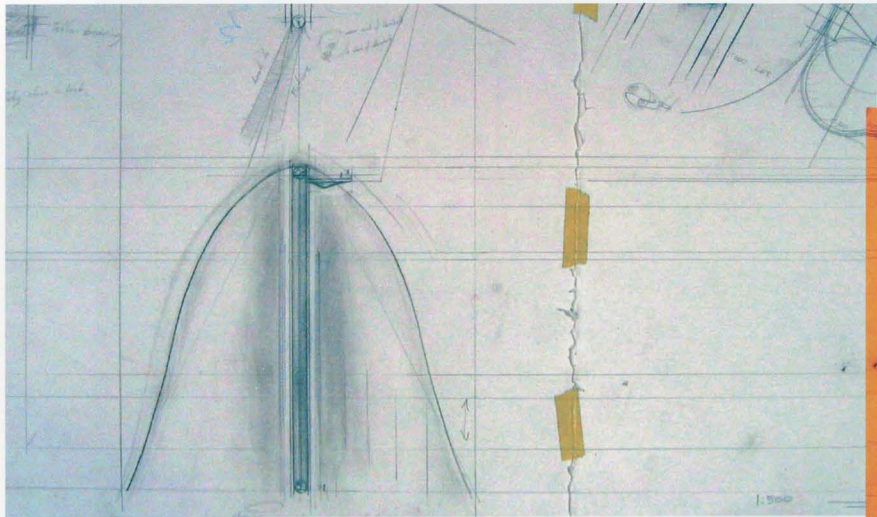
Concept of interior courtyard gathering space



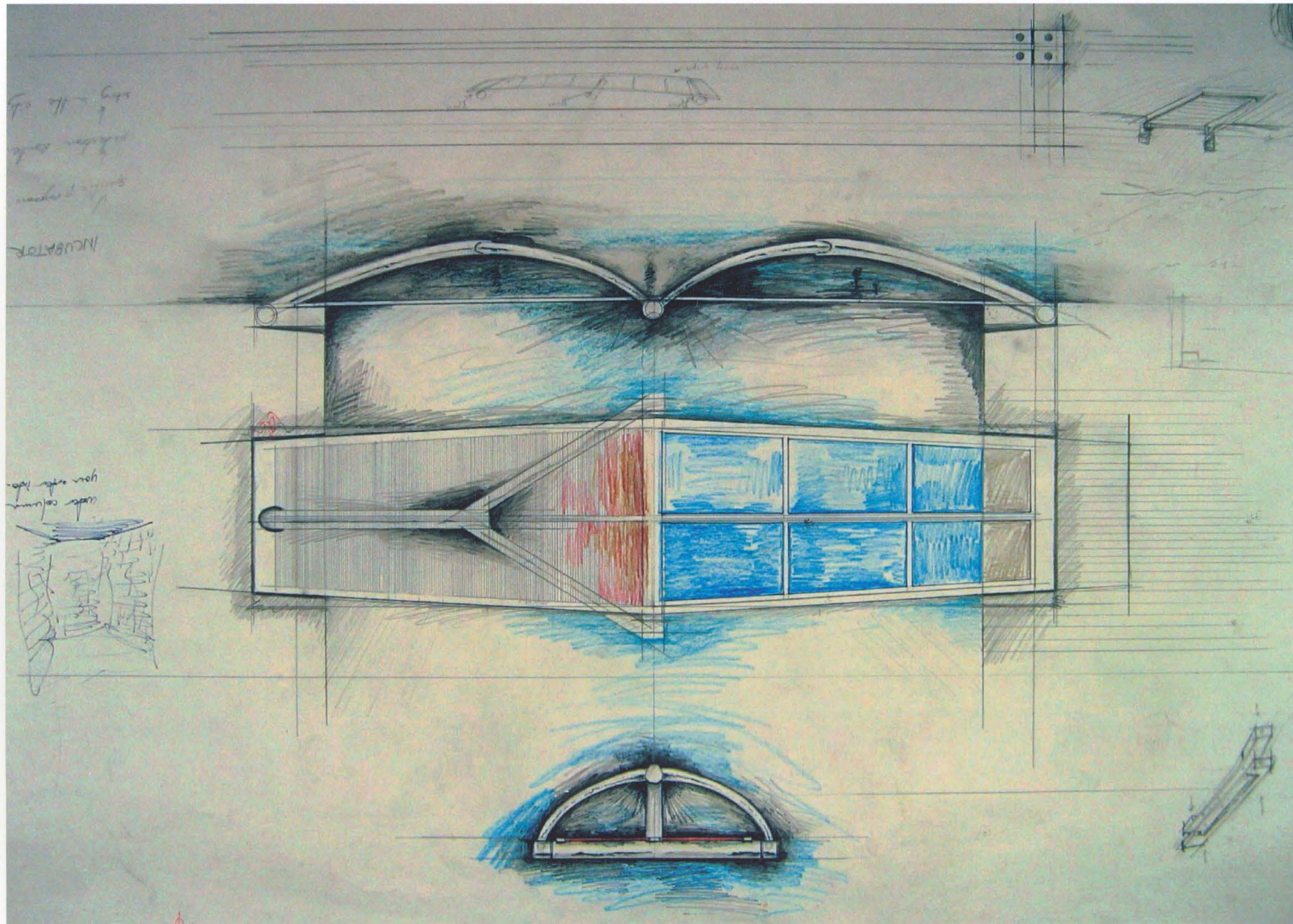
Conceptual site drawing



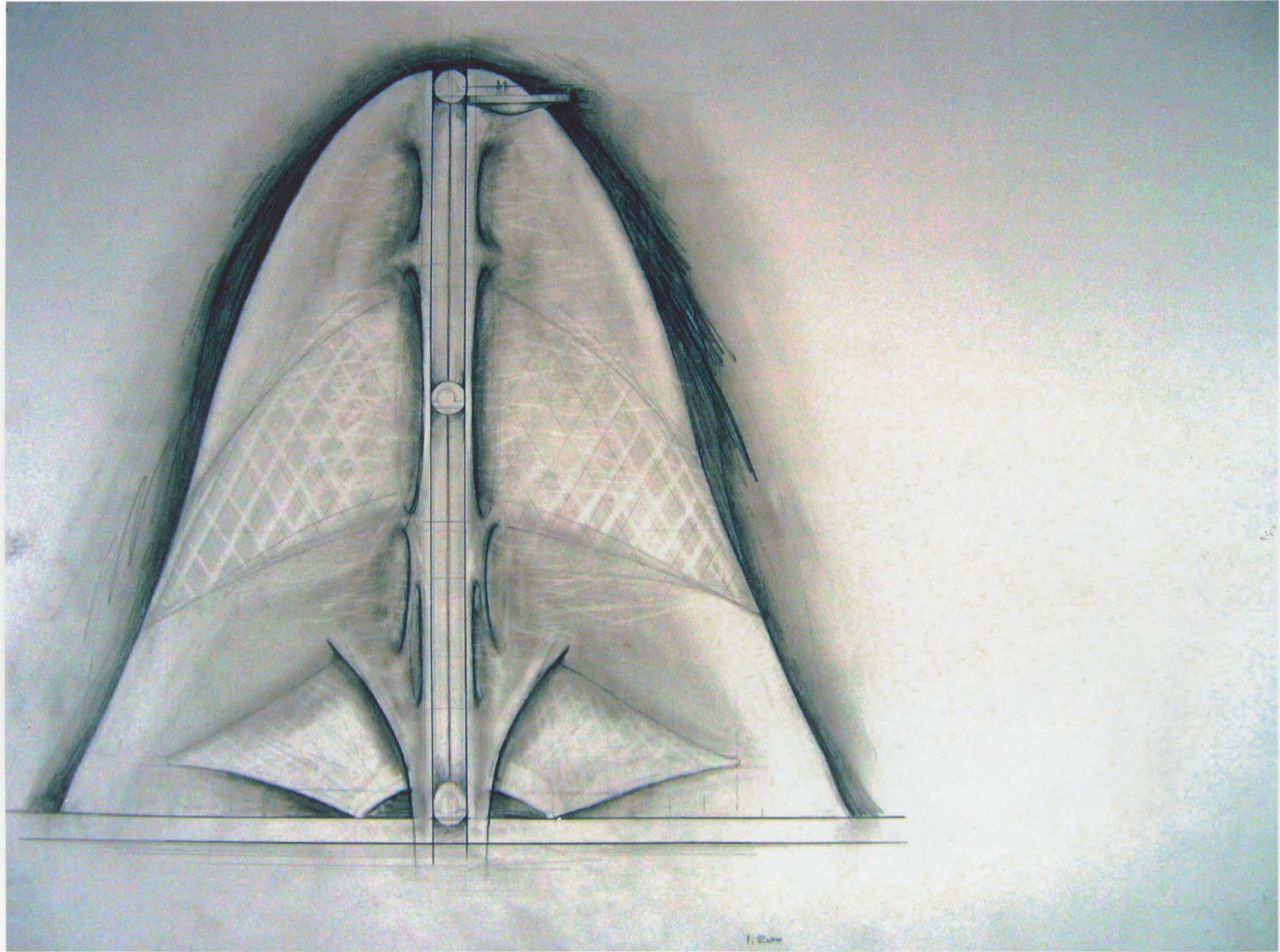
1 : 500 Site plan



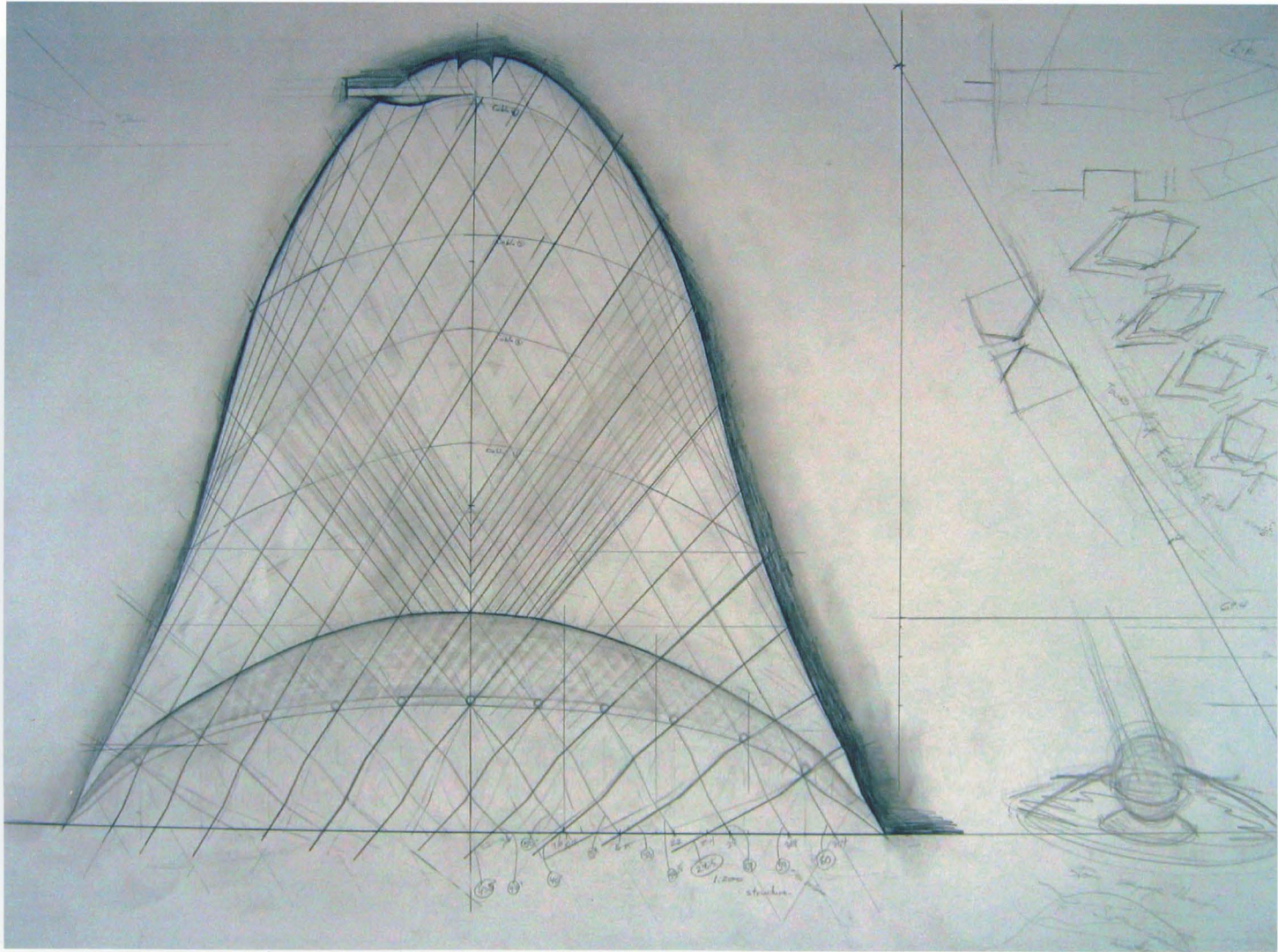
1 : 500 Front and side elevation



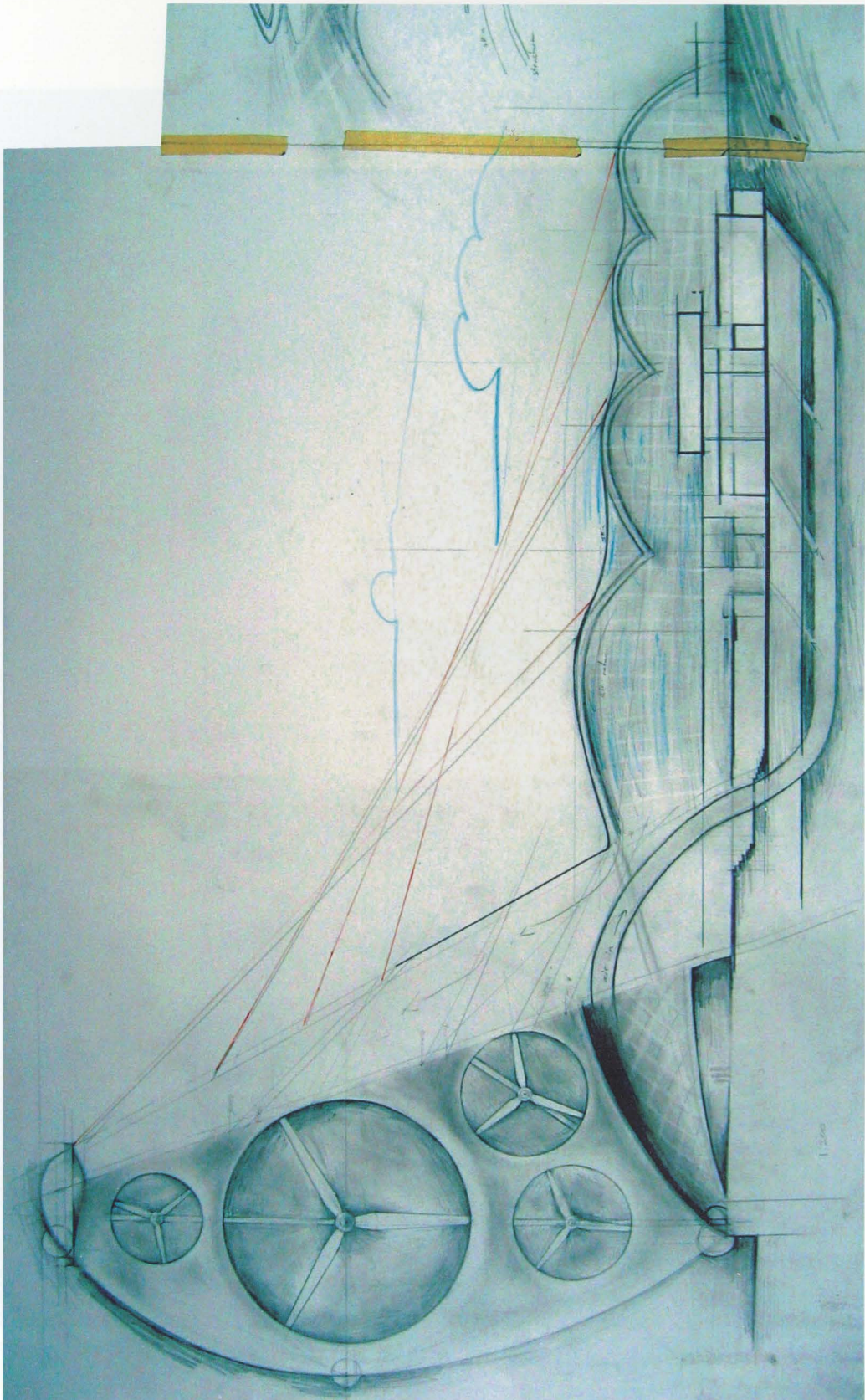
1 : 100 Bridge



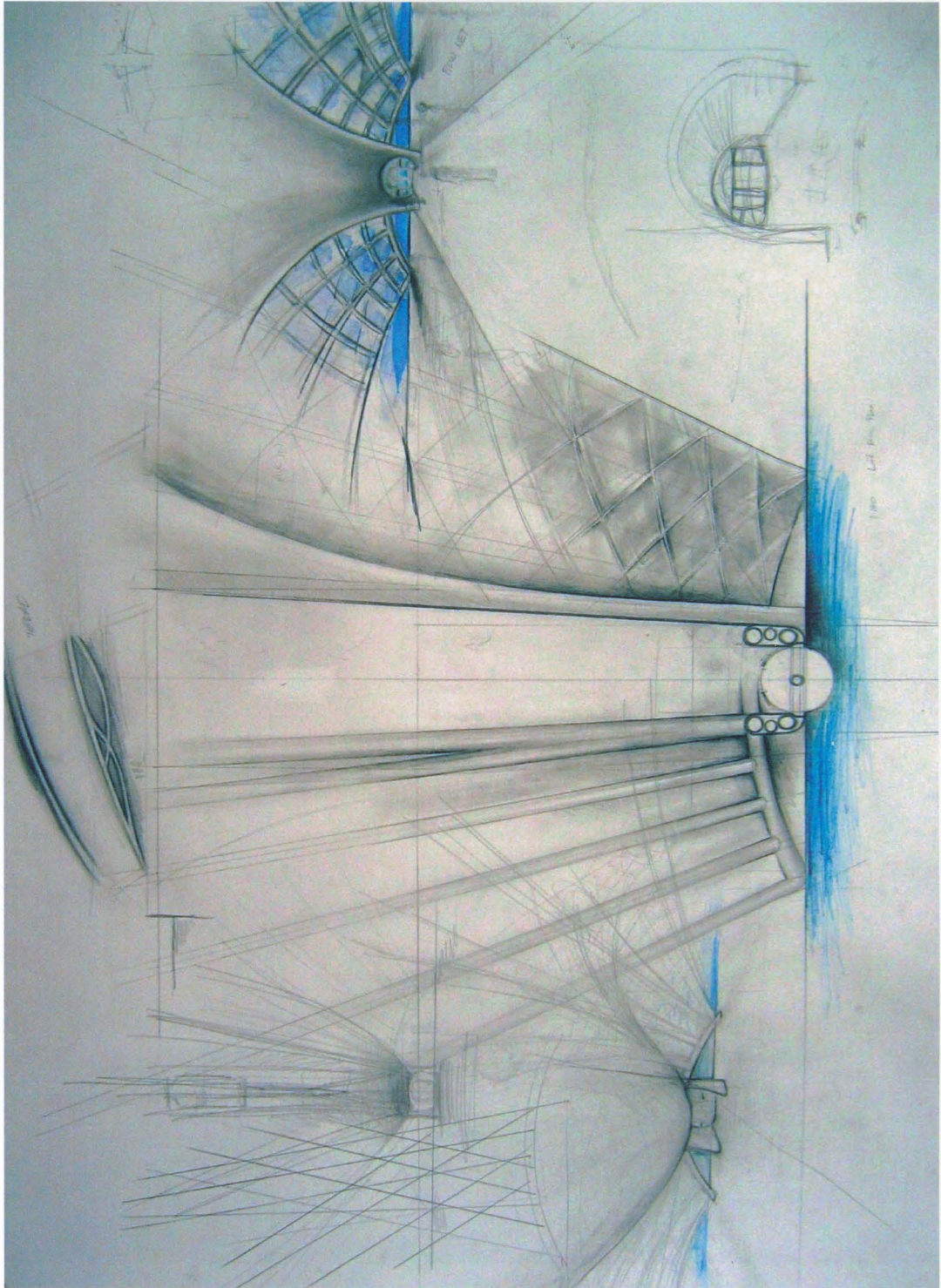
1 : 200 Front elevation



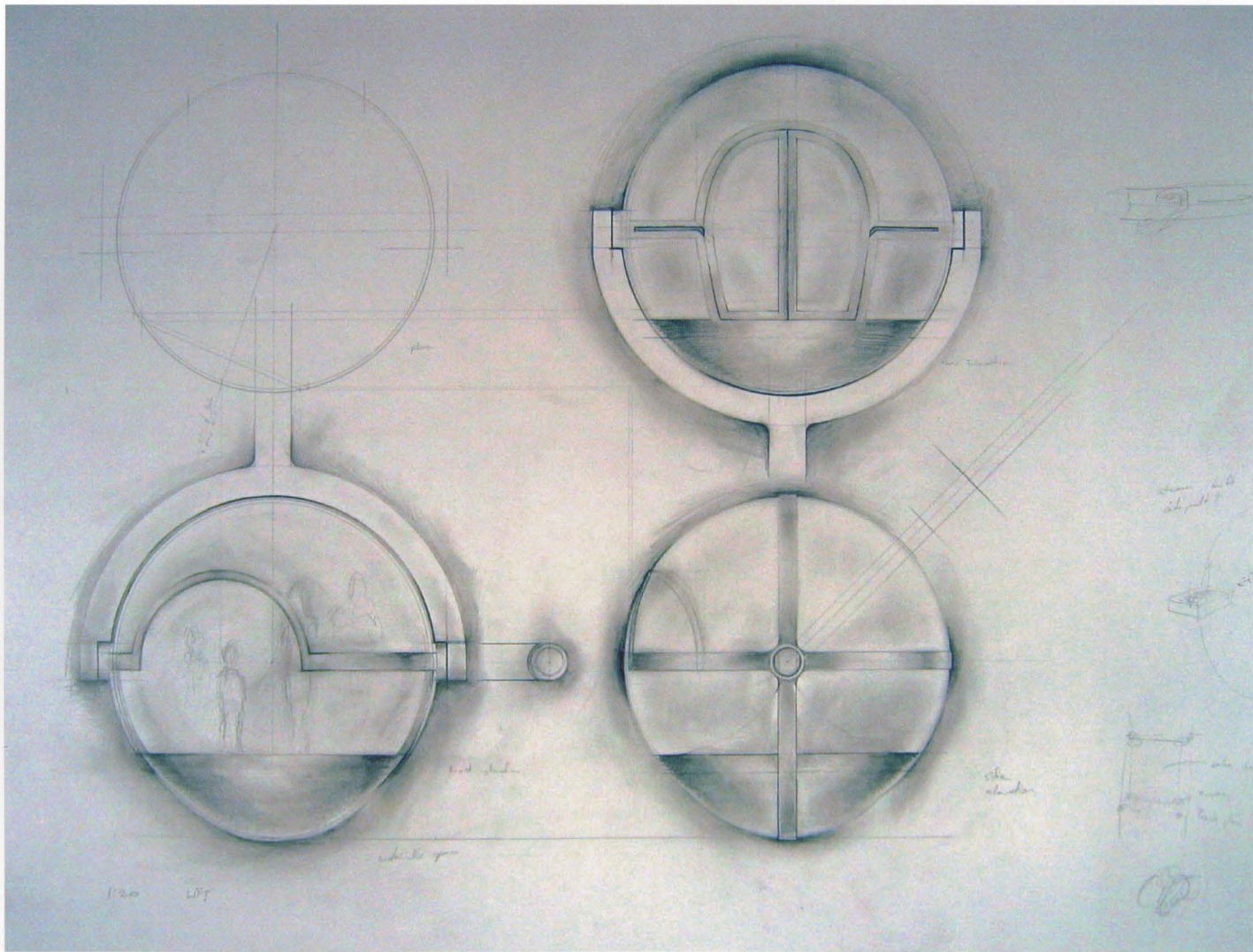
1 : 200 Rear elevation



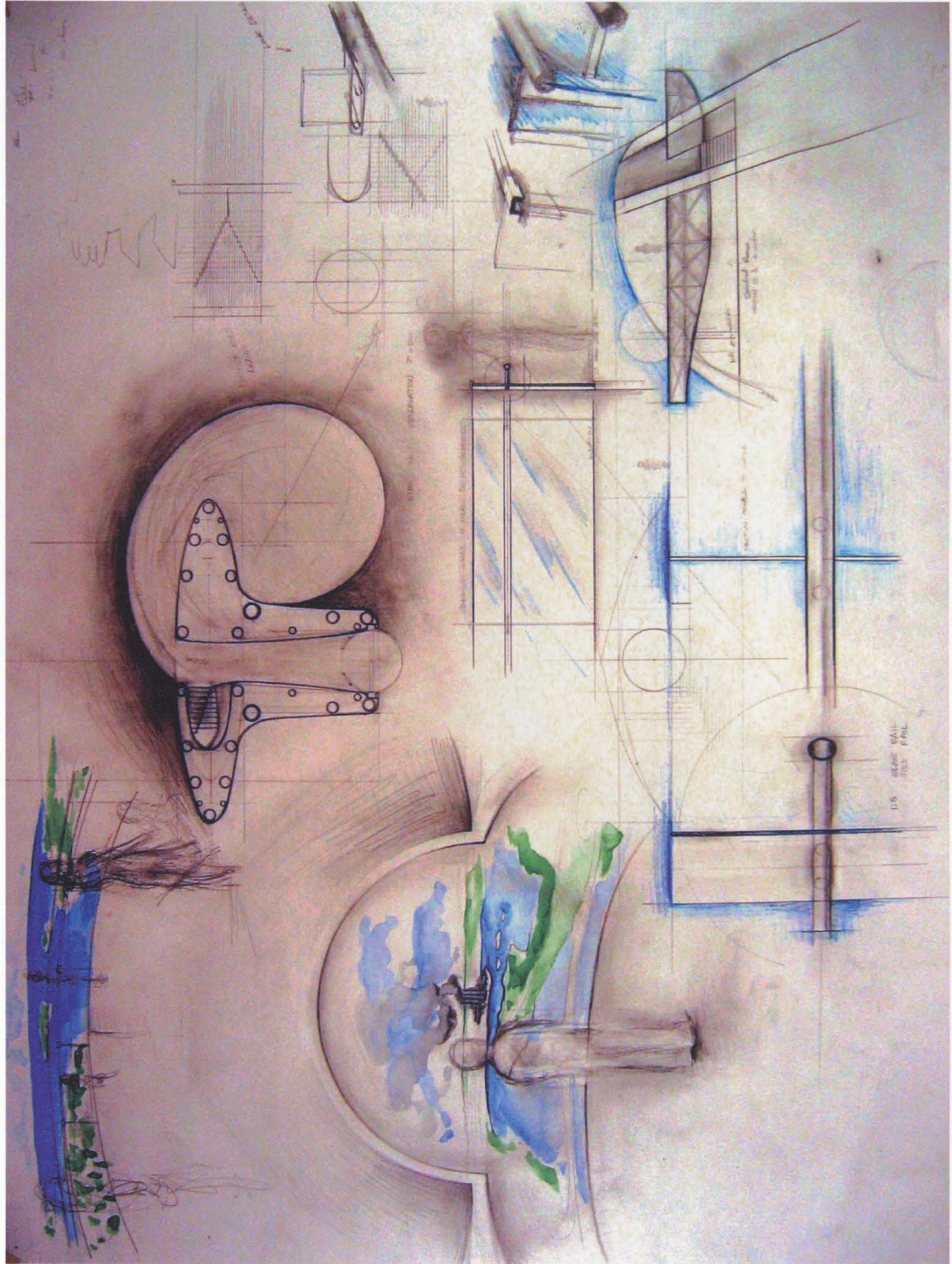
1 : 200 Section



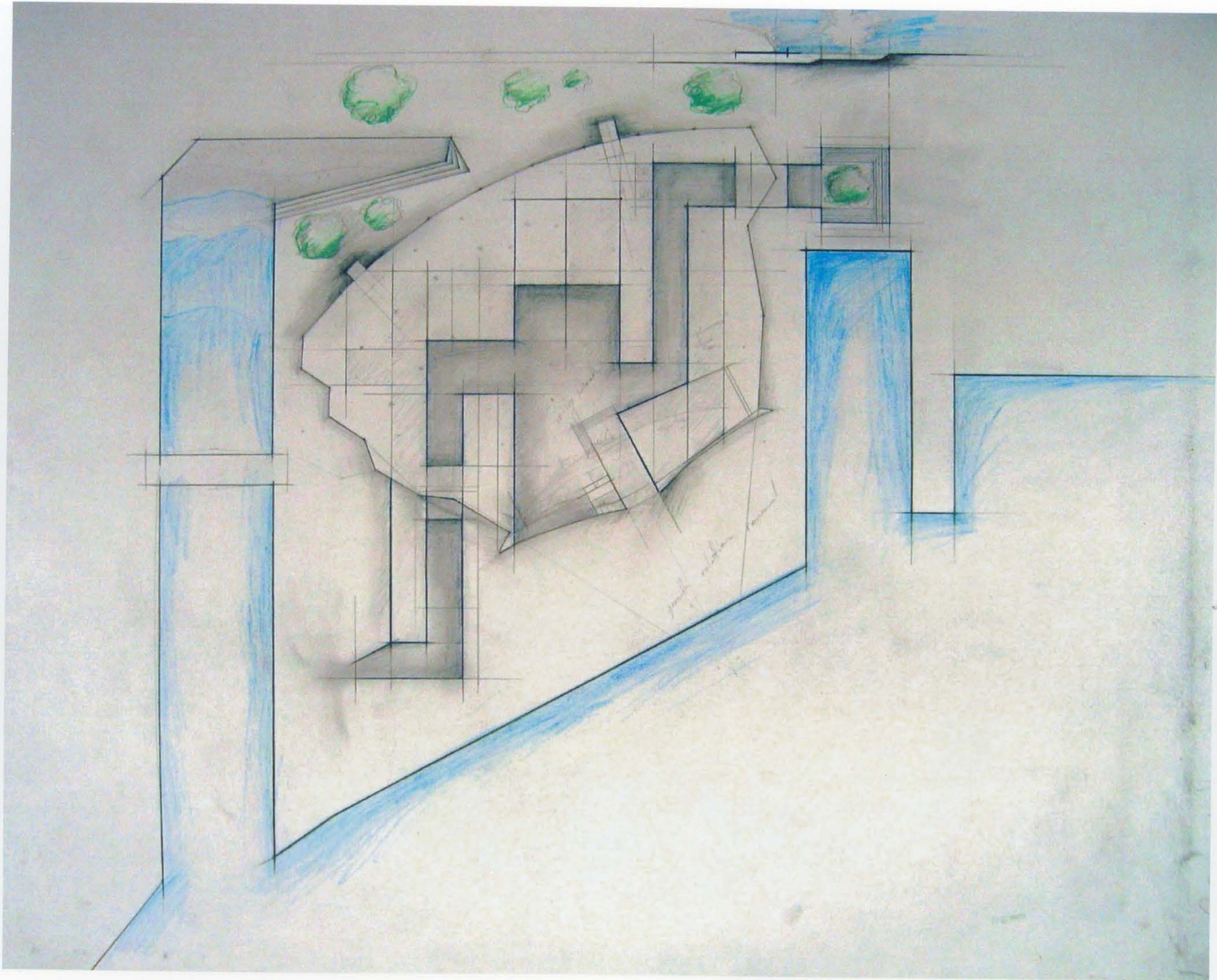
1 : 100 Base of lift plan



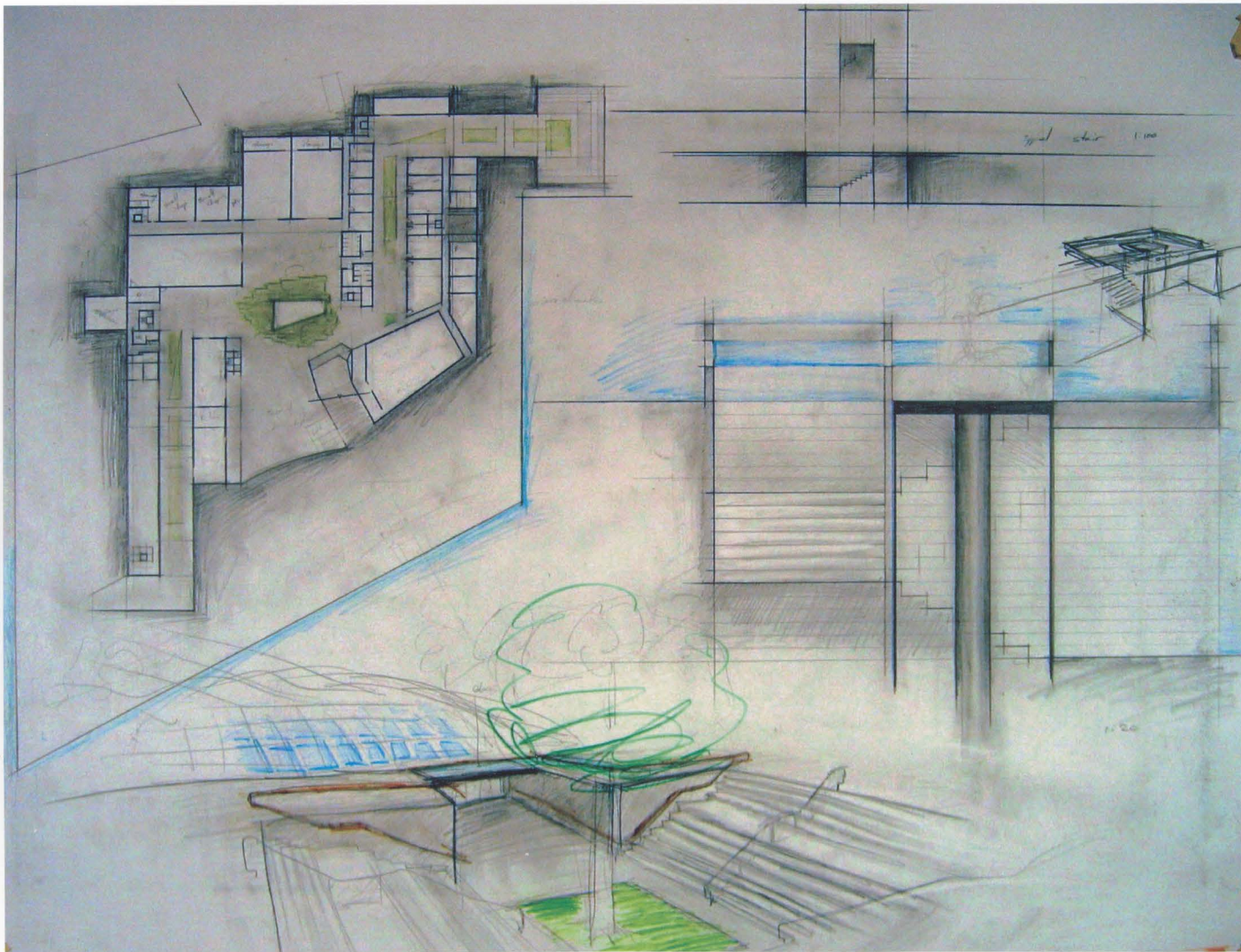
1 : 20 Lift detail



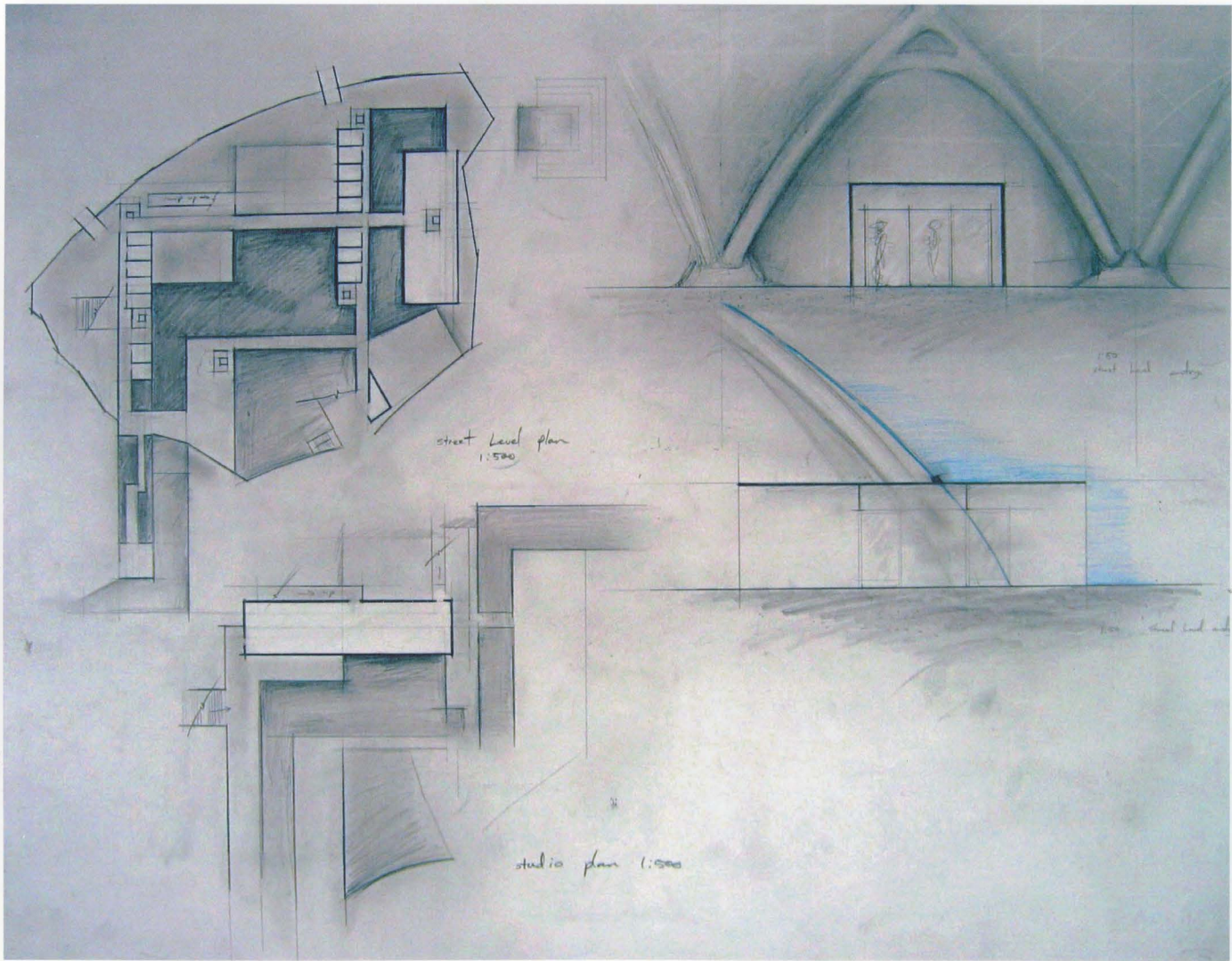
1 : 100 Observation platform plan



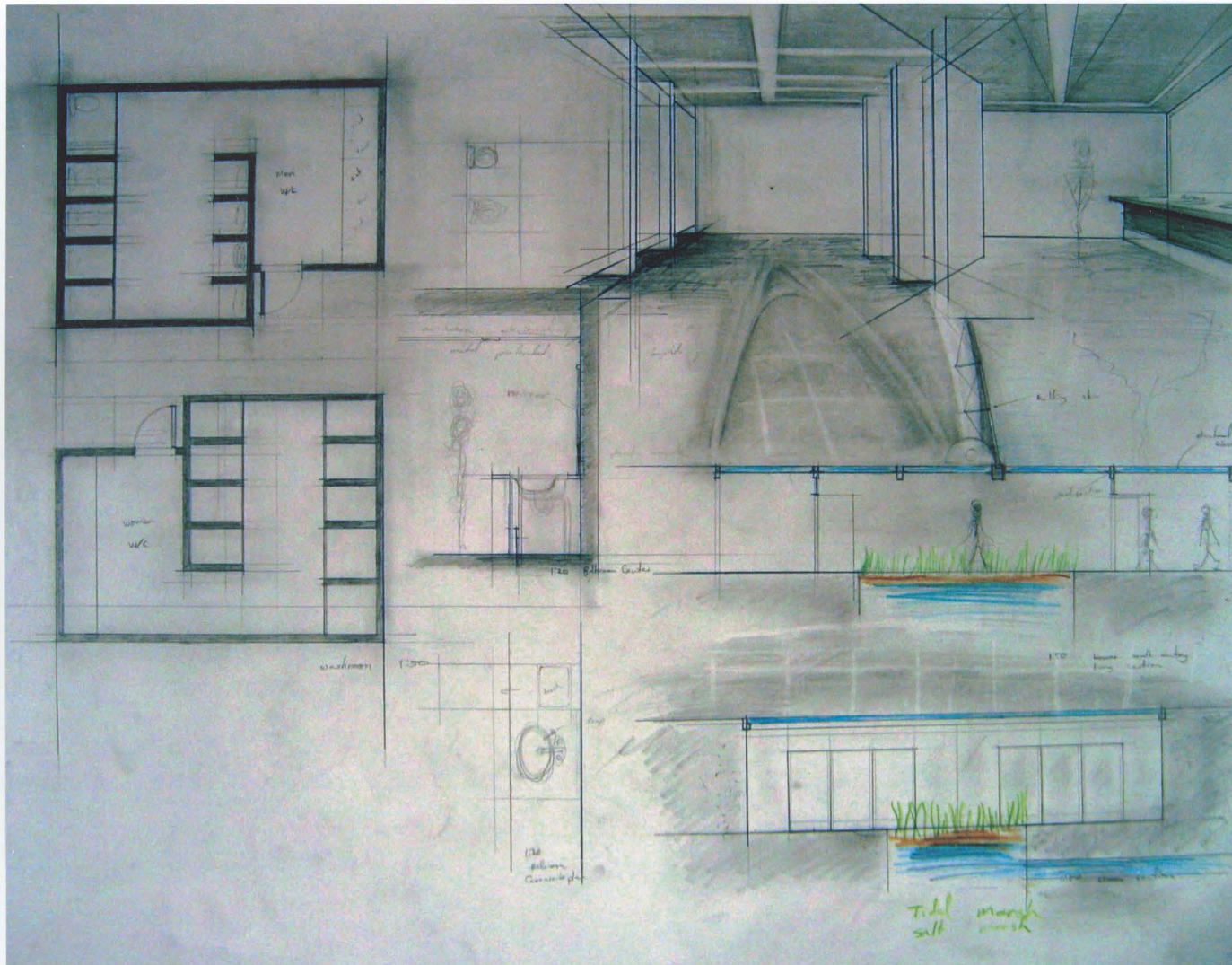
1 : 500 School structure plan & extent of canopy roof



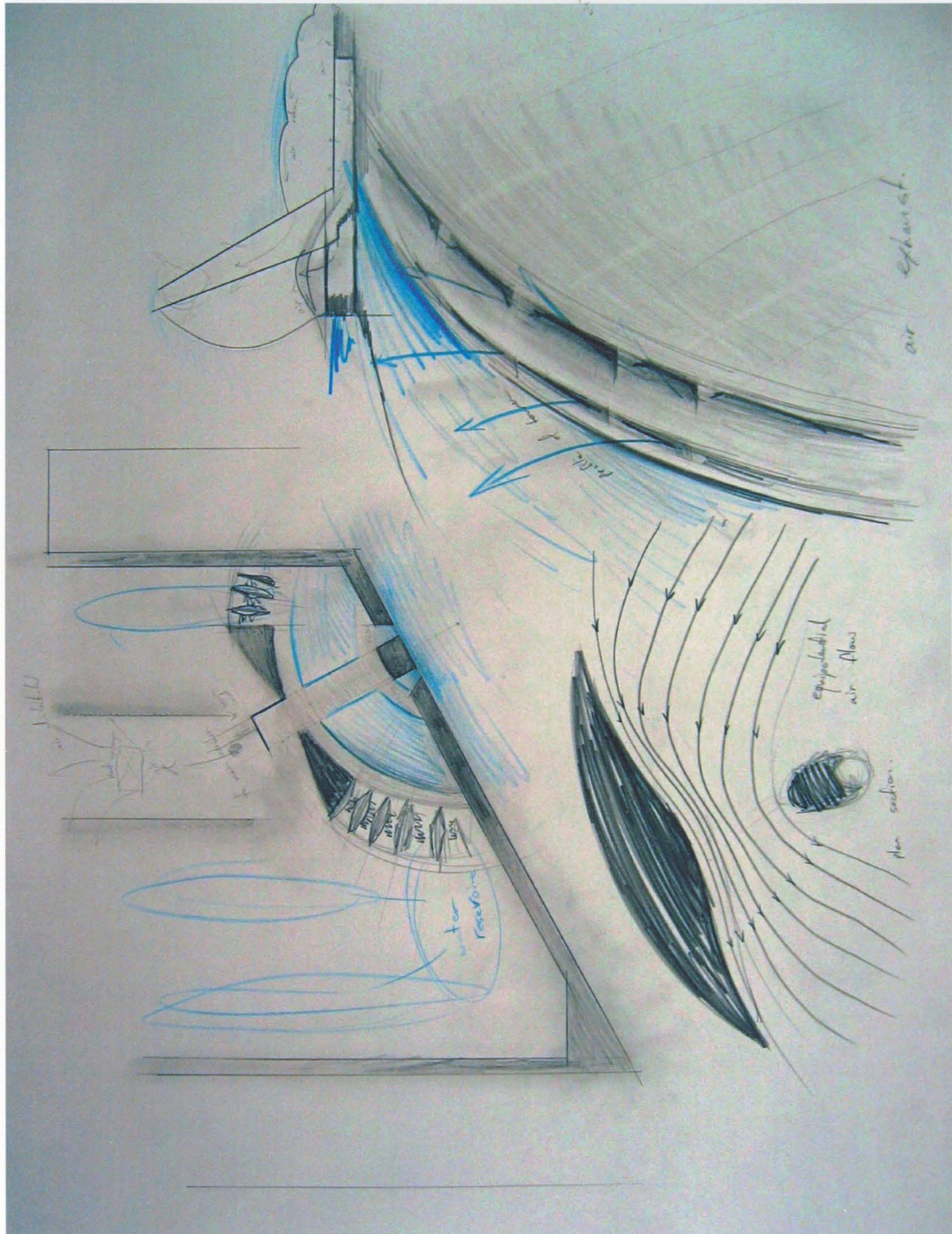
1 : 500 School structure plan



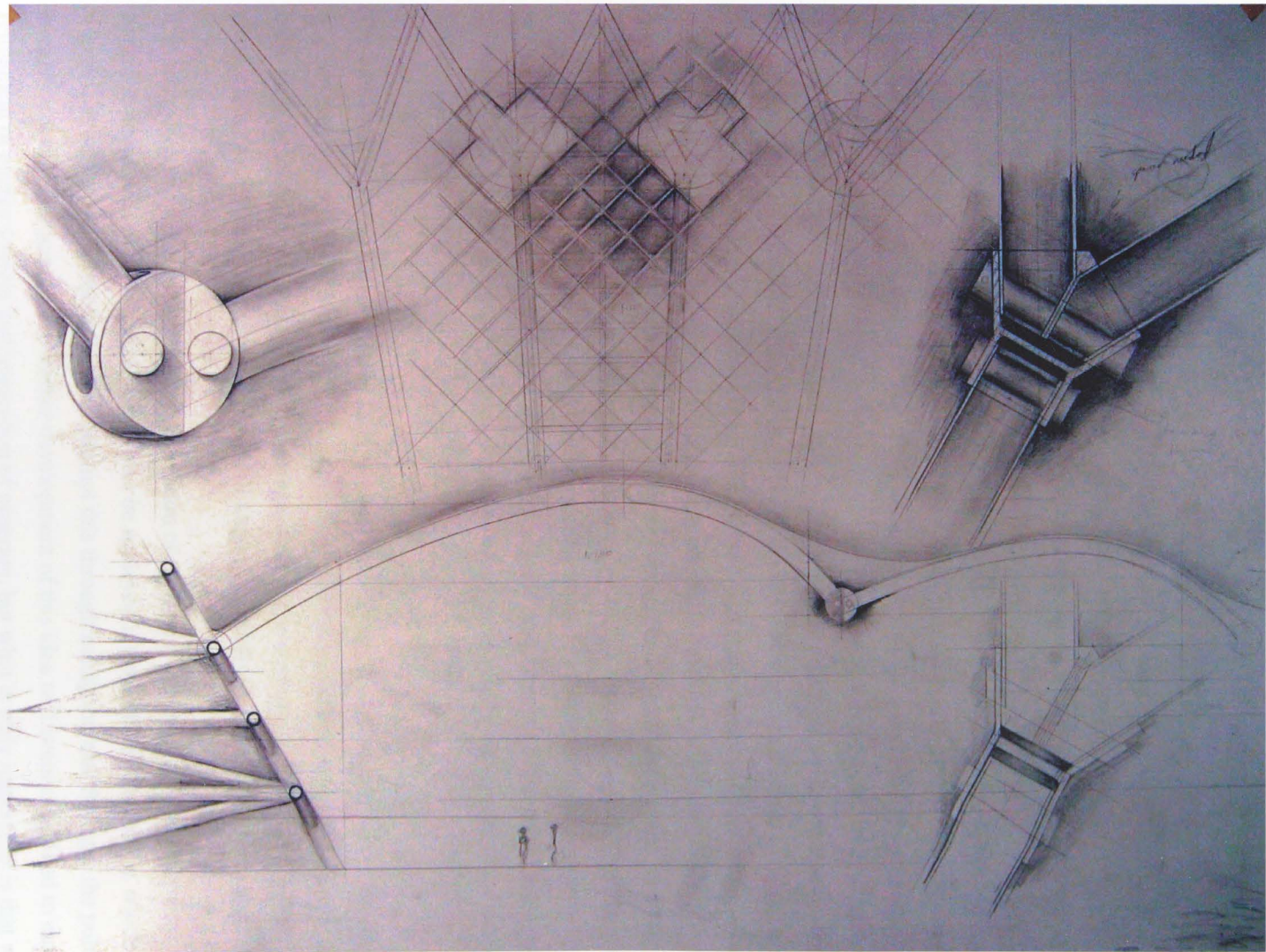
1 : 500 Second and third level plan



1 : 100 Washroom plan and 1 : 50 section through entry



1 : 500 Building systems plan



1 : 100 Section through canopy and connection details

Summary

Can a school of sustainable product design & craft serve to both promote and teach sustainable technology, practice and thinking?

At the city scale the building engages the elements which compose the realm of the harbour as well as demonstrating how to harness the natural wind and water energy available on the site. The building becomes an event that offers information and inspiration to visitors and users regarding sustainable technology and thinking. The superstructure creates a micro climate for the school, supporting its energy and environmental needs. The Superstructure consists of two separate forms which work together to support the school inside, two forms coming together to support the idea of positive change. The space under the canopy is in fact a lab intended to not only experiment with the agenda of the school but with the idea of school itself. The program integrates design, materials research and craft as a means of reaching the realization of the idea through materials and the skill of craft. The fluid interaction of people and ideas directly relate to the hydro dynamic action of the Reversing Falls, a symbol of cycle, renewal and energy. Water is an element which is as ancient to humans as the earth itself but what is unique about it is that it is constantly in a state of flux and renewal, always forming and reforming its own makeup. This is the metaphor that the school structure captures by using a modular system to allow for the constant rebuilding or reorganization of the internal layout and function. It is intended for the people involved with this institution to interact in the same way, constantly sharing ideas with colleagues as well as with the public in a continuing effort to search for better solutions to the wasteful practices of our current consumption.

The construction of the building using local industry and labour strengthens the civic attachment or pride associated with the built work. The spectacle of the construction also would serve to build civic attachment and pride of the final construction. The stronger the attachment that the city feels for the building, the more likely it will attract the public and deliver its message.

The ultimate goal of this project is the proliferation of the idea to the public. The only way that wide acceptance of sustainable practice can be achieved is through its promotion, which is why it is so important for the building to attempt this through metaphor, and through the public engagement of the program. The further development of this idea will eventually lead to more refinement of energy sources and integration of program, but what is truly important is that we always reach for new ways of thinking about our common situation and how to improve upon it. Teaching people how to actively assist in turning the tide.

Notes

1. Urban Strategies Inc., "Land Use Plan and Implementation Strategy", *Saint John Waterfront Development Partnership* [web site], 2005 [cited 18 July 2005], available at <http://www.sjwaterfront.com>
2. Conversation with head Saint John city planner Jim Baird, 19 October 2004.
3. Ibid.
4. Ibid.
5. Ibid.
6. Ibid.
7. Ann Gordon Condon, *The Loyalist Dream for New Brunswick*, (Fredericton: New Ireland Press, 1984), 70.
8. Dominique Gauzin Muller, *Sustainable Architecture and Urbanism*, (Berlin: Birkhauser, 2002), 13.
9. Ibid.
10. William McDonough, and Michael Braungart, *Cradle to Cradle*, (New York: North Point Press, 2002), 92.
11. Edmund N. Bacon, *Design of Cities*, (Harmondsworth: Penguin Books, 1976), 128.
12. Ibid., 34.
13. Alessandra Latour, ed., *Louis I. Kahn, Writings, Lectures, Interviews*, (New York: Rizzoli International Publications, 1991), 73.
14. Ibid., 101.
15. George Candilis, Alexis Josic, Shadrach Woods, and Manfred Schiedhelm, *Free Berlin University*, (London: AA Publications, 1999), 113.
16. Alessandra Latour, ed., *Louis I. Kahn, Writings, Lectures, Interviews*, (New York: Rizzoli International Publications, 1991), 101.
17. *University of Waterloo Media Relations* [web site], 2005 [cited 18 July 2005], available at <http://www.newsrelease.uwaterloo.ca/archive/news.php?id=2521>
18. Thomas William Acheson, *Saint John, The Making of a Colonial Urban Community*, (Toronto: University of Toronto Press, 1985), 11.

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- University of Waterloo Media Relations* [web site], 2005 [cited 18 July 2005], available at <http://www.newsrelease.uwaterloo.ca/archive/news.php?id=2521>
- University of Waterloo Faculty of Architecture* [web site], 2005 [cited 18 July 2005], available at <http://www.architecture.uwaterloo.ca/>
- Erb, Isaac, *New Brunswick Photographers* [web site], 2005 [cited 18 July 2005], available at http://nasismiddle.nbed.nb.ca/photographers/pages/isaac_erb_2_1.htm
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