Aquatic Architecture:
Craft at the Water's Edge

by

Ryan Stitt

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Azrieli School of Architecture and Urbanism
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Abstract

In the contemporary city, water is a forgotten substance, though water offers life and sustenance to it. This thesis offers consideration to the importance and awareness of natural water in the urban context. By influencing a city and its inhabitants with an architectural project that diligently responds to water, an awareness of water is conveyed to the inhabitants of the city.

A building located on the water's edge needs to respond to its aquatic context. The proposed project, a Canadian Centre for Aquatics allows the natural environment to influence the design and change its character as the project ages. This project explores the idea of integrating a building with the landscape, using water to influence the design and dictate the program of the building.

Architecture that can respond to water through material, structure, craft and detailing can increase the awareness of the problems surrounding water usage in urban culture.

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To everyone that has been part of this journey, your support and thoughts are appreciated and reflected in the finalizing of this project. My journey continues and your guidance will be the foundation I will build on.

Preface

I shall refuse to assume that all water may be reduced to H₂O. I will not deal with city space as though it could be universally defined in terms of Cartesian coordinates or of census criteria. For only does the way an epoch treats water and shape a history: the very substances that are shaped by the imagination-and thereby given explicit meanings-are themselves social creations to some degree.¹

- Illich, *H₂O and the waters of forgetfulness*

As water becomes removed from the urban landscape, humans become disconnected from water and the importance to life that it holds. The vital relationship between human existence and water has slowly been eroded, both environmentally and poetically in modern urban living. Water can provide both the technological and poetic sustenance necessary and critical for life.

As a metaphor for the architect, the modern boat builder fights this disconnect by being involved in a craft that gives the greatest level of respect to water. A master boat builder marries the history of the craft with personal ingenuity and contemporary technology to preserve and reactivate a craft that has deep roots in Canadian history. This group of individuals bring an aquatic activity to life by creating a physical entity that allows people to experience water at a tactile level.

This thesis proposes a building that creates a connection between the land and the water in the urban setting of Toronto's waterfront, to house the craft of boat building. This building will be designed to further explore the relationship between craft and water. Toronto's waterfront is in the midst of a revitalization project with an initiative of rejuvenating the waterfront for the

¹ Illich, Ivan. *H₂O and the waters of forgetfulness: reflections on the historicity of "stuff"*. Dallas: Dallas Institute Of Humanities And Culture, 1985. 4

citizens of Toronto.² The waterfront is being exposed to the city and reconnected with the inhabitants of Toronto. This must be carefully approached, ensuring the waterfront is not once again cut off from the city.

This proposal, a building for the Canadian Centre for Aquatics, will develop a parcel of land on the Toronto waterfront, east of the downtown core. It will reconnect the urban population of Toronto with its waterfront through a highly crafted building. The act of boat building will inspire both the craft and assembly of the building and the program of the Canadian Centre for Aquatics as well. The position of the visitor highlights the function of the boatbuilding apprentices and the role of the spectator, to allow a rethinking of water and the craft of making.

² Waterfrontoronto. City of Toronto. 2000. Web. 10 Sept. 2009 (<http://www.waterfrontoronto.ca/>)

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Introduction

In architectural design water has become no more than the "stuff that circulates through indoor plumbing,"³ and has essentially lost its role as a poetic element of architecture and landscape. Canada has the "largest surface area of freshwater found in one place anywhere in the world,"⁴ and urban Canada's connection with water has diminished and become lost under its shimmering surface.

However, it is not this ever changing surface of water that makes it so difficult to explore the historical "stuff." It is the deep ambiguity of that stuff itself that makes it as elusive for us as space was incomprehensible for Plato. Water remains a chaos until a creative story interprets its seeming equivocation as being the quivering ambiguity of life.⁵

The Canadian Centre for Aquatics tries to achieve this. Currently water is essentially unknown to the urban inhabitant of Toronto. The Canadian Centre for Aquatics tries to create a new narrative to reinterpret the role of water in the city.

New architecture must support and bring awareness to people, reflecting the importance of fresh water, respecting and dealing with the surrounding aquatic elements. People are attracted to water and are drawn to the benefits that it offers to them, "Toronto has looked to its waterfront as a source of prosperity, inspiration and creativity... Its cultural landscape holds the stories of Canada's diverse communities and their contributions to our cultural life."⁶ The Toronto waterfront Port Lands (See Figure 1) offer a space where the urban population can reconnect with the poetic potential of water through a supporting architectural project.

This thesis proposes that the waterfront of Toronto needs to be developed in a way that brings a natural source of water back to Torontonians allowing for an interaction with it. This

³ Illich, Ivan. *H₂O and the waters of forgetfulness: reflections on the historicity of "stuff"*. Dallas: Dallas Institute Of Humanities And Culture, 1985. 1

⁴ Natural Resources Canada. Nrcan.gc.ca. Government of Canada, 2003. Web. 4 Feb. 2010 (<http://atlas.nrcan.gc.ca/site/english/maps/freshwater/distribution>)

⁵ Illich, Ivan. *H₂O and the waters of forgetfulness: reflections on the historicity of "stuff"*. Dallas: Dallas Institute Of Humanities And Culture, 1985. 25

⁶ Evenson, Jeff and ERA Architects. "Canada's Urban Waterfront: Waterfront Culture and Heritage Infrastructure Plan." *Part 1 – Central Waterfront* 2001: 3

proposal for the Canadian Centre for Aquatics will reconnect the water with the city and its population by creating an inhabitable space that links land to water via the craft of architecture. The architecture of the Canadian Centre for Aquatics directs a focus towards the fundamental role that architecture has in showing the importance of water to our society while giving individuals a place to experience it.

Fig. 1. Toronto Port Lands aerial view, highlighting the proposed site for the Canadian Centre for Aquatics.

A craftsman that works with wood has a complete respect for the history and potential of the material they use.⁷ This is true of the Canadian First Nations who made birch bark canoes to allow for more efficient lives, promising living conditions and a longer life expectancy. (See Figure 2) The native craftsman understood that water gave a purpose for their craft. Additionally water participates in the life of a tree which provided the craftsman's wood. Making these boats took

⁷ Nakashima, George. *The Soul of a Tree: A Woodworker's Reflections*, New York: Kodansha America Inc, 1998. 58

great skill and concentration that was only achieved by a master craftsman who held a vital role in the native tribes.⁸

Fig. 2. Traditional native Cree birch bark canoe.

Even long ago there were some men who could not make all the things that were needed. In each camp there were only a few who could make everything. The hardest thing to build was the canoe. The man who could make a canoe was very happy because the people depended on it.⁹

The craftsman of today continues this tradition of boat building knowing that accomplishing a highly crafted sea worthy vessel is a tremendous feat. (See Figure 3) The craft is now practiced for the beauty of the object, not because the object is a necessity of life. A good wooden boat is created with the same level of detail, time and effort as a perfectly designed and crafted piece of architecture: this makes the role of the boatbuilder analogous to that of the architect. The knowledge of structure, joinery, materials and craft, though at a different scale than a building, must

Fig. 3. New cedar strip canoe using traditional techniques and forms.

⁸ Taylor, J. Garth. *Canoe Construction in a Cree Cultural Tradition*, National Museum of Man Mercury Series. Ottawa: Canadian Ethnology Service, 1980. 17

⁹ *ibid.* 17

be known to the full capacity of the craftsman to create the best finished product.¹⁰ This thesis will propose a building that borrows from this knowledge of craft and joinery to create a building that engages the inhabitants in the architecture similarly to the craftsman and the vessel. The tradition of the boat will inspire the building.

¹⁰ Sennett, Richard. *The Craftsman*. New Haven: Yale University Press, 2008. 128

WATER

Chapter 1: Disengagement with Water

The Toronto waterfront is clearly enjoyed when, "millions of people regularly visit and make active use of its cultural and entertainment resources and the thousands of acres of green and open space along its 46 kilometre expanse"¹¹.

(See Figure 4) On the other hand, we

Fig. 4. People enjoying the Toronto waterfront.

continue to pollute our waterways; and 20% of the pollutants in oceans, rivers, bays, streams, lakes, and other bodies of water come from water based activities, and the remaining 80% is derived from land based activities."¹² People do not understand that their activities away from the waters edge negatively impact water to a greater degree then their water based activities.

The challenge of bringing awareness to the current state of Canada's fresh water presents itself in large urban centres such as Toronto. Different from most countries, Canada is fortunate that it has the largest amount of surface area covered by freshwater."¹³ With the concerns surrounding the future of this large source of natural fresh water, this thesis proposes that an increased level of environmental awareness should be seen in the city of Toronto's culture. Torontonians can see the substantial bodies of water including the "Humber, Don and Rouge River"¹⁴ converge at the shores of Lake Ontario, but there is a lack of critical awareness

¹¹ Evenson, Jeff and ERA Architects "Canada's Urban Waterfront: Waterfront Culture and Heritage Infrastructure Plan " *Part 1 – Central Waterfront* 2001. 3

¹² Studio Press Theme Scipeeps. News & Articles On Air, 2009. Web 6 Oct 2010 (<http://scipeeps.com/water-pollution-facts-in-numbers-and-stats/>)

¹³ Natural Resources Canada Nrcan.gc.ca. Government of Canada, 2003. Web 4 Feb 2010 (<http://atlas.nrcan.gc.ca/site/english/maps/freshwater/distribution>)

¹⁴ Evenson, Jeff and ERA Architects "Canada's Urban Waterfront: Waterfront Culture and Heritage Infrastructure Plan " *Part 1 – Central Waterfront* 2001. P. 3

created from these. A unique form of contact with these bodies of water will offer a potential to see the physical state of the environment as well as see the need for attention to rejuvenate the water's edge of Toronto. The Canadian Centre for Aquatics will bring a level of interaction between the citizens of Toronto and the water's edge, promoting recognition of the natural water environmental condition. This building and its public spaces will create exterior and interior spaces that bridge the gap between land and water to give Torontonians exposure to their waterfront and a first-hand view of the current condition of the water.

Regarding the interaction of city-dwellers with water, Ivan Illich states "the smell, sight, taste and tactility of this ineffable stuff called water can also be applied to the urban space."¹⁵ Whereas our existing urban contact with water comes in plastic bottles and is heard as it "reverberates through the plumbing of a modern city... plumbing is no water, but a stuff which industrial societies creates."¹⁶ These artificial environments and vessels bring our water into the city. Rain may be the only source of natural water that happens in the city, but once it makes contact with the ground it becomes a product of the urban world and is discarded through the sewers. Rain that falls outside of the urban setting brings life to the ground and maintains water levels in naturally occurring sources of water. Water dominates and dictates how the human population progresses and survives. The connection that is made between the individual and water is diminished to a point where only a few moments provide the city dweller this vital moment of contact to reflect.

The awareness of water can become more prevalent if it possesses an importance. An architectural project should be able to give back something that is greater than its financial value. The proposed Canadian Centre for Aquatics brings a project to Toronto that creates awareness to the native water of Toronto as well as a contribution to the cultural of the city.

¹⁵ Illich, Ivan. *H₂O and the waters of forgetfulness: reflections on the historicity of "stuff"*. Dallas: Dallas Institute Of Humanities And Culture, 1985. 8

¹⁶ *ibid.* 7

Steps are being taken to try and reintroduce fresh water to the city of Toronto and its inhabitants.¹⁷ Lake Ontario, "being the 17th largest lake in the world"¹⁸ measuring 311 km in length and its surface area is 19,009 square km¹⁹, offers a massive aquatic environment to enjoy. The shoreline of Lake Ontario which Toronto is located on is now being developed to give citizens access to it with green spaces and multi-use buildings. Awareness is created through interaction with the shoreline and in turn will enhance the perception of fresh water and push people to become involved in the process of making our natural water sources cleaner and usable in the future.

¹⁷ Waterfrontoronto. City of Toronto. 2000. Web. 10 Sept. 2009 (<http://www.waterfrontoronto.ca/>)

¹⁸ Great Lakes Environmental Research Laboratory. Glerl.noaa. National Oceanic and Atmospheric Administration, 2004. Web. 28 Nov 2010 (<http://www.glerl.noaa.gov/pr/ourlakes/lakes.html>)

¹⁹ *ibid.*

Water must be thought of actively during the design of a building to ensure that it will be able to respond appropriately, whether letting the water in, or keeping it out. The exterior and detailing of a building must respond to the elements and protect the interior from unwanted water. The site must be controlled to properly manage water with regards to building envelope penetration, drainage and material exposure. Often in the design of architecture water is only given importance when coming out of the kitchen faucet or filling the toilet bowl. However, it is how the building responds to water and mitigates the line between full control and moments where the water plays a role in life of a building that water finds its true place in architecture. Water is vital to the existence of humans and is often neglected in architecture by not utilizing it in ways that gives respect to its full range of qualities as a substance. If it is allowed to work with a building it can offer a story of change and weathering that allows a building to develop character. Consequently if water is not substantially controlled it can be detrimental to the building.

The Canadian Centre for Aquatics aims to achieve a harmonious “wedding between water and urban space.”²⁰ It is designed to emanate the ideas and sensations of water while being located at the threshold between land and lake, in an aquatic environment. The Toronto harbour gives the Canadian Centre for Aquatics a place to affect and showcase this adjacent water. It brings water into the design as a generator for both the interior and exterior spaces of the building as well as the program. Water is allowed to play a role in the story of the Canadian Centre for Aquatics through the views of the site it resides in. The building also responds to water by offering tangible and visible solutions for rain water collection and filtering, creating a minimal site run off impact on the Toronto Harbour. The principle program of the building, a

²⁰ Illich, Ivan. *H2O and the Waters of Forgetfulness*. 1926. United States of America: The Dallas Institute of Humanities and Culture, 1985. 7

boat-building workshop and exhibition hall, will create an interaction between the building and the waterway. The Canadian Centre for Aquatics is meant to be enjoyed and sustain a long life, becoming a permanent piece of architecture for the City of Toronto. This time allows water to influence the exterior materials of the building through weathering by snow, water and sun. Instead of trying to rid a building of water the Canadian Centre for Aquatics embraces it and allows water to be an active part of it, through time.

I View

A large portion of the average Torontonians' life is spent in the buildings, homes and on road ways that make up the city. This phenomenon can be reversed if architecture enhances the engagement of the water on the site as well as allowing the inhabitants of the building and site to view the lake.

Toronto has been referred to as a "Harbour City"²¹ which seemingly indicates that the city relies heavily on the harbour, which was true in the industrial past. (See Figure 5 & 6) As industry grew in the early 1900's the waterfront was overtaken by factories and shipyards, cutting the waterfront off from the citizens. Many North America cities have the same issues with their waterfront being taken over by industry and blocked off from the residents. Nathan Ward stated in an article in the New York Times in 2010 that New Yorkers have been halted from "claiming our waterfront"²². This is also true, for the residents of Toronto and their waterfront.

Fig. 5. Contemporary view of Victory Soy Mills, that existed on the proposed Canadian Centre for Aquatics site.

Fig. 6 Victory Soy Mills, 1947

²¹ Osbaldeston, Mark. *Unbuilt Toronto: a history of the city that might have been*. Toronto: Dundurn Press, 2008. 53

²² Ward, Nathan. "Take Me to the River. Finally." *The New York Times* 2 July 2010.

Toronto's waterfront has been progressing through a development since 2001 much like that of New York via initiatives to invite the citizens of Toronto back to their waterfront. Currently green spaces and residential complexes are beginning to utilize the defunct shipping yards and unused industrial properties such as the sugar

Fig. 7. Proposed Canadian Centre for Aquatics site as it currently exists. View from Cherry St. looking west.

beach development which opened in 2011 and the port lands greening project from 2007-2010.²³ The one concern with new developments at the water's edge is that the new buildings could produce the same issues that the shipping yards once did, namely, cut off the waters edge from the public. This thesis proposal is dedicated to keeping the water accessible for the public of Toronto. The project is on a thirteen square kilometre lot with water on the south and west boundaries of the site, placing the project in direct contact with the waters edge, (See Figure 7 & 8) and maintains contact with the water by allowing views and continuing public boardwalks and paths to it both on the exterior and interior public spaces.

²³ Waterfrontoronto. City of Toronto. 2000. Web. 10 Sept. 2009 (<http://www.waterfrontoronto.ca/>)

Fig. 8. Proposed site for the Canadian Centre for Aquatics, aerial view.

Upon entering the building along the east elevation the public will have a full view of the water through the building via a grand hall. This area acts as a river in both shape and principle. The two perimeter walls of the space meander with a constantly changing curve, much like a riverbank. This hall is the main exhibition space where permanent examples of historic wood boats are located both at the floor level and hanging from the exposed structure above creating the feeling of immersion and weightlessness. (See Figure 9) Moving through the space, east to west; the visitor gets closer to the water of the harbour. Nearing the end, the walls begin to curve away from each other opening up to the floor, roof and glass façade. The glass façade along the south elevation gives a full view of the harbour. (See Drawing 1/A301)

Along this façade a ten metre wide hall spans the entire length of the building. The hall is used as a temporary exhibition and event space. (See Drawing A201 & A205) Occupants of this space are able to enjoy the connection between the building and the water. The public spaces

achieve a high level of awareness of the aquatic environment by giving an expansive view of the natural water that encompasses the site, and effectively creating a space dominated by water.

Fig. 9. Perspective view from inside the Canadian Centre for Aquatics looking down the "River Space"

II Collection

The element of water in architecture is exemplified in the work of Louis Kahn at the Salk Institute for biological studies located in La Jolla, California. This building complex, which was completed in 1966, houses one of the United States top research groups that work extensively on biological developments for the quality of human

Fig. 10. Louis Kahn's Salk Institute depicting the central water channel.

life. The interior laboratory spaces off the main corridor are designed with an open concept creating an environment where the individuals become a team. These spaces can be easily manipulated and promote the sharing of information and techniques among the staff working here. The building is situated with the western edge of the property opening towards the Pacific Ocean, creating an intensification of the view to the water (See Figure 10). Kahn places the same level of importance on designing the exterior spaces of the complex as he does with the interior. In this courtyard a channel of water runs through the centre dividing the space in half. The stream cuts through a limestone channel in the surface of the courtyard, and is set at a perpendicular angle to the shoreline giving the illusionary experience that the water is moving across the site and draining back into the distant ocean. This however is not the case, as the channel actually empties into a reflection pond that is below the surface level of the upper courtyard. (See Figure 11) This detail in the design by Louis Kahn gives meaning to the water and uses it to engage in the site and the architecture. The channel is a physical division in the complex that is small in width and depth and is an obstacle that needs to be navigated. The water details that Kahn has included in the design of the Salk Institute are encountered by the employees and the users of this site everyday. People have a constant reminder of the

importance of water and the beauty it holds. Louis Kahn has successfully used water in an architectural detail to express the purity and preciousness of the element, and the connection between the water we touch and the larger scale of the planet. (sky, ocean, horizon).

In this example, water enhances the experience of the architecture and the site. Water has a

power on its own that creates the potential to create an additional layer of interest and beauty in design that is very seldom utilized. The everyday casual and poetic experience of water in the built environment is rare. This thesis contends that there is a correlation between the loss of understanding of water as a poetic substance and the concern for water in our environment.

Fig. 11. Louis Kahn's Salk Institute. Water spilling out the end of the courtyard channel into the reflection pond.

III Interaction

An expanding theme and common challenge in modern architecture is mixed use buildings. This is driven by the culture we live in and the demand to maximize the use of land in the urban context. The Canadian Centre for Aquatics is a mixed use building offering an exchange between the various individuals that occupy the building and the building itself. The two groups that make up the occupancy are the general public and the educational community of the boatbuilding school. These groups use the facility for different purposes, but also have interaction with regards to the boat/artefact; the students mastering the craft and the public viewing and experiencing the creation and use of these vessels. As the boats act as a link between the users of the Canadian Centre for Aquatics it also acts a catalyst for the design of the building. The project establishes a building designed by borrowing concepts from the craft of boatbuilding, while the boats that are crafted within it in turn reflect the building. Duality in architecture at the human level and the building function paired with the building is not a simple thing to achieve. The Canadian Centre for Aquatics proposes the ability to reflect these different levels of interaction harmoniously in an architectural project.

The Canadian Centre for Aquatics, though split into two different programs, exists with one major program of a cultural beacon for the awareness of water. The plan of the building creates physical separation between the educational community and the general public. The public space is located to the south portion of the building and the private school located to the north. (See Figure 12) This divides the major occupancies of the building, but they are still allowed to interact with each other through the boat-building process.

Fig 12. Canadian Centre for Aquatics first floor plan illustrating the division between the Public and Private occupancies.

The largest spaces in the Canadian Centre for Aquatics are dedicated to the boat. While describing Peter Zumthor's St. Benedict Chapel Marco Masetti states "At the centre of architecture, there seems to be

Fig 13. Peter Zumthor's St. Benedict Chapel plan.

an empty space. You can't plan emptiness, but you can draw its boundaries, and so empty comes to life."²⁴ In the plan of St. Benedict Chapel the building seems to be very empty and committed to the exterior form of the building. (See Figure 13) The plan actually brings strength and

²⁴ Masetti, Marco. "Multiplicity and Memory: Talking About Architecture with Peter Zumthor." *Arch Daily*. N.p., n.d. Web. 2 Nov. 2010. p. 2

meaning to how the space is used and the human interaction that brings life into it. The same notion to space is simulated in the plans of the Canadian Centre for Aquatics. On the public side of the building the large exhibition spaces and the workshop on the school side of the building look to be empty space in plan. These spaces become full of life and character when boats and people begin to interact in the space. It is these two entities that develop the character of the building.

In the Canadian Centre for Aquatics the boat is the metaphor for the construction methods and form. The typical wooden boat is emulated throughout the interior of the building by allowing the structure, purlins and decking to be exposed in the large spaces of the workshop, exhibition halls and lounge area. (See Drawings A201 & A202) The typical construction of a wooden boat is

Fig. 14. Typical construction drawing for wooden boat construction.

very simple and can be broken down into the frame (structure) and the planks (sheathing). These two elements in the design are constructed entirely from wood, a material that offers the duality of strength and flexibility. The frame of the boat is cut to shape the desired form of the finished vessel. The frame elements, commonly known as ribs, are spaced evenly along the full length of the vessel from bow to stern giving an overall structure. The frame is the heavier piece of the construction and acts as the supporting structure to the form. In crafting the wooden boat the planks are milled much thinner so they become ply-able and can be fastened perpendicular to the frame. The planks form the exterior shape of the vessel and fully enclose the structure, allowing it to repel water and become a sea worthy vehicle. (See Figure 15)

The Canadian Centre for Aquatics is constructed using the assembly process of a boat. The structure and decking of the building relate to the method of the frame and planks of the boat. In the south hall this practice can be seen with the roof decking being

Fig. 15. Cedar strip canoe being constructed showing the planks being assembled over the frame.

fastened perpendicular to the steel truss as well as the ceiling planks. (See Drawing 3/A501 & 4/A501) A canoe's form is limited to one curve as it is the single form that allows the vessel to function properly. In the spaces at the Canadian Centre for Aquatics this shape and construction method is employed in succession to create the larger spaces. The structure of these spaces is constructed from glue-laminated timbers that are manufactured to start at the top of the foundation piers and progress upwards into an arched parabola that moves downwards to the other foundation piers. This structure gives the form of a boat's hull. This is repeated through the space like the ribs of a canoe (See Drawing 3/A302) creating an elongated form. At the arched portion of the structure the wood decking is fastened to give a vault form.

The imagery, material and form of a boat become integrated into the design of the Canadian Centre for Aquatics. As the building is meant to house the construction and history of boat building, the ancient craft gives back to the structure and allows the vessel to affect the composition of the project through its design and message.

IV Time

Time is associated with everything both natural and man-made as it is equated with the life and existence of an object. A person's life can be described from the time they were born to the time they die just like every other living thing in nature. Man-made materials and objects have a life expectancy as well, including architecture. In a building, time begins to show itself on the exterior by the effects of the elements on the materials and on the interior by the effects of use by its inhabitants.

The Canadian Center for Aquatics is located on the water's edge of the Toronto harbour. This site (being located right next to Lake Ontario) has high exposure to the varying climate throughout the four seasons and high levels of moisture and wind from the lake. Due to these natural environmental conditions that speed up typical exterior weathering, the building will be designed to adapt and change through time to expose the effects of water in its construction.

The material pallet of the Canadian Centre for Aquatics' uses common materials; the exterior walls are comprised of concrete, glazed curtain walls with aluminum mullions and cedar cladding. These materials are paired together to show the changing progression of the buildings appearance through time. The concrete and wood will change their appearance as the

Fig. 16. Cedar plank. On the right cedar planks that have not been exposed to the elements and on the left cedar planks that have been exposed to a natural environment.

environment is allowed to change the texture and colouring of the material. (See Figure 16 and 17) The curtain wall systems will not be affected in this manner. The metal and glass, being

nonporous materials, will hardly be affected compared to the porous materials of wood and concrete. This will give awareness to how the water and environment of the site affect the buildings appearance which further enhances the awareness of water to the observant spectator.

Like the vertical exterior elements of the building, the roof of the building will react in the same fashion with the elements. The main roof surface will be an inhabitable undulating surface allowing visitors to interact on its wood deck surface. The elements will be allowed to affect the appearance and texture of the wood deck much like the exterior

Fig. 17. Concrete. On the right concrete that has not been exposed to the elements and on the left concrete that has been exposed to a natural environment.

cladding. As people move over the site their physical presence will leave an impression on the building; certain high traffic areas will show the traces of their passage as contrasted against the areas that are less used. In addition, these changes to the wood deck will contrast against the metal elements of the non-habitable areas. In this way, time can be seen in the building. The uninhabitable portions of the roof and water collection channels are zinc, which does weather to some degree, but at a small scale is 'self healing' in that it fills in small scratches in its surface when exposed to air and water. This provides a material contrast to the weathering and wear of the wood.

In the design and detailing of a building an architect usually tries to combat the effects of time; against the finished material being altered by water, people and time. When one of these elements does affect a building it is often considered a blemish in the appearance of the project. The Canadian Centre for Aquatics allows for the exterior of the building to be altered by water and people over the course of time as part of its design strategy. This allows the building to

become part of its environment allowing for change and giving a visual awareness of the relationship between water and the building.

Chapter 3: The Craft of Building (a boat)

A boat is defined as a "small vessel for traveling over water, propelled by oars, sails or an engine."²⁵ The boat is built to respond to water and offer a mode of safe transportation across bodies of water. It is a vessel that allows water to be navigated for both prosperity and

Fig. 18. Turned over boat on shore.

recreation. When not in use, boats are commonly stored on land to keep the vessel ready for when it is needed in the water again. (See Figure 18) The boat is the connection between water and land.

When the boat is pulled on shore, a second spatial meaning for the boat begins. Canada Natives used their boats both in the water and on shore and it was pivotal to their existence. The Native boat builder crafted canoes to be used on bodies of water for the transportation of people, supplies and additionally allow for exploration.²⁶ As Native hunters would travel for extended periods of time searching for food and hunting grounds they would be separated from their tribe's main camp. The boat achieved a temporary dwelling for the hunter as when turned upside down it offered protection from the elements. The bottom of the canoe repelled the natural elements by working in reverse from its initial design intention of allowing the boat to float. The opening of the boat always provided a place to exist during both activity and rest.

²⁵ Simpson, J. A., and E. S. C. Weiner. *The Oxford English dictionary*. 2nd ed. Oxford: Clarendon Press ;, 1989.

²⁶ Taylor, J. Garth. *Canoe Construction in a Cree Cultural Tradition*, National Museum of Man Mercury Series. Ottawa: Canadian Ethnology Service, 1980. 18

Using this inverted technology, the Native People began to adapt the form and structure of the boat for their permanent shelters. Hunters returned to camp with stories of using the canoe as a shelter. The members began to see the possibilities in the boats structure. The Hurons transferred the form of the canoe

Fig. 19. Huron long house.

into a permanent dwelling to develop and erect their long houses. The long house shared the same exterior form as the canoe. (See Figure 19) A cross section of a canoe is the profile of an arch and similarly, the long house shares this same profile in its constructed form. The canoe has the opening of the arch towards the sky, while the long house's arch opening points towards the earth. The buildings interior uses the same construction methods. The vertical structure was constructed of ribs made of tall saplings to create the arched form. Depending on the size of the building some internal supports were needed to hold the weight of the building. Horizontal sheathing was applied to the exterior of the ribs and exposed to the interior spaces, fastened in a banding composition starting from the bottom of the building moving upwards towards the peak. (See Figure 20) These methods of construction are also employed

Fig. 20. Interior structure of a Huron long house.

in modern buildings. By using the technical design ideas of a boat, Frank Gehry created the Spadina Street façade of the Art Gallery of Ontario.

Its faceted glass panels, supported by rows of curved wood beams, evoke the skeleton of a ship's hull or the ribs of a corset. At either end of the building, the glass peels back to reveal powerful crisscrossing steel and wood structural beams.²⁷

Gehry, a native of Toronto, has put an emphasis on expressing the history of Canadian culture in his design and material selection. The curved wood beams that Nicolai Ouroussoff refers to are glue-laminated-wood beams constructed from Douglas fir from the west coast of Canada. (See Figure 21) These beams curve in towards the building as they move vertically higher. This creates a resemblance to the saplings used as ribs in the Huron's long houses. The visitor is able to experience this feeling from both outside the building as well as from the street as the faceted glass façade reveals the structure.

Fig 21. Frank Gehry's Art Gallery of Ontario. Glue-laminated beams in the exhibit hall facing Dundas St.

The construction method and form of a boat is often compared to some aspects of architecture. Both a boat and a dwelling need to be crafted with a high level of skill in the design as well as in the execution of the construction. If the execution is done with great care and detail the function of both will be superior. This is the ultimate goal in both the craft of boat building and architecture. The end product is physically different; but the process to achieve the two final products is the same.

²⁷ Ouroussoff, Nicolai. "Gehry Puts a Very Different Signature on His Old Hometown's Museum." *The New York Times* 24 November 2008. Web.

Peter Zumthor is a master at understanding the full process of craft that must be present in the development of an architectural work. This is evident in his design of St. Benedict Chapel in Sumvigt, Switzerland. Sumvigt is a small mountain town in the Swiss Alps that had its chapel destroyed by an

Fig. 22 Peter Zumthor's, St. Benedict Chapel.

avalanche in the early 1980's. (See Figure 22) The original chapel was a place of communal gathering in Sumvigt and was an integral part of this small community. A competition was issued for the design of a new chapel to ensure it would be created with the same level of importance to the citizens and the community. This competition was won by Zumthor for the level diligence that he put into the design of the building. It was obvious to see that he had true intentions of making this place an important piece of the Sumvigt community through highly crafted construction and by creating a sacred space without using the conventional model of a chapel.

St. Benedict Chapel sits at the highest point in the town making the journey up the twisting roads memorable as it seems to be a monumental feat to reach it. The approach to the site is from the west looking east which gives a view of the expansive mountains to the East and

Fig. 23. Clerestory window at St. Benedict Chapel.

South. When the chapel is reached it seems to sit in solitude, perched above all the other dwellings in the village, as if it is the only building existing on the mountainside. Zumthor shows

a conscious effort in understanding the relationship between the site and the building by giving the only view to the outside through a clearstory window high in the structure, removing all sight lines to the overpowering mountainous landscape, but still allowing you to see the sky and giving you a sense of the vastness outside. (See Figure 23)

St. Benedict Chapel is skilfully crafted with the highest level of detail, achieved by Zumthor's understanding of the materials he had chosen, the building and craftsmanship, as a composition. The roof structure has a slightly arched central wood beam, stretching in the long dimension of the building from the front entrance over the central altar to the back of the chapel. (See Figure 24) From this central beam, wood joists span to the outer edge of the roof emulating ribs in the construction of a boat. The central beam acts like the keel of a boat and the joists arraying from the central beam create an

Fig. 24. Interior view of St. Benedict Chapel's roof structure.

image of the ribs used in the construction of a boat. Where the roof beams meet the exterior of the building the vertical columns are turned corresponding to the curve of the roofline and are carried through the chapel floor. As the columns flow into the basement they imitate the structure found in the hull of a boat. (See Figure 25)

The exterior of St. Benedict Chapel is finished with shakes layered overtop of plywood sheathing on the walls and planks on the roof. The shake shingles are layered in a standard manner starting from the bottom of the structure and moving upwards to the top; like the long house of the Hurons. This style of construction allows the natural material to be unfinished while

still protecting the building from the elements by repelling water. (See Figure 26) The cladding works well with the structure in continuing the construction typology of a boat. The Canadian First Nations used these same principles with birch bark and cedar strip canoes by staggering layers of the exterior material to create a barrier that repels water from the surface.²⁸

Fig. 25. Section of St. Benedict Chapel.

Zumthor's Chapel removes the visitor from the direct surrounding environment. He allows the visitor to be aware of the space they are in and the greater surroundings that occupy the site. One can imagine that if you were to take St. Benedict Chapel, detach it from the ground and flip it on its roof it would

Fig. 26. Shake cladding on St. Benedict Chapel.

resemble a boat in the landscape.²⁹ The landscape accepts Zumthor's chapel in a similar way that a boat responds to water;

The craftsmen studied the movement of the sea and listened to the vibration of the board before deciding how to make a keel. The sea had one form and the current another. The ship's shape was determined by the pressure of the waves. The sea as a material could be clearly understood, but the fundamental challenge resided in determining the impact of a soft mass on a defined form.³⁰

²⁸ Taylor, J. Garth. *Canoe Construction in a Cree Cultural Tradition*, National Museum of Man Mercury Series Ottawa: Canadian Ethnology Service, 1980. 17

²⁹ Masetti, Marco. "Multiplicity and Memory. Talking About Architecture with Peter Zumthor." *Arch Daily*. N.p., n.d. Web. 2 Nov. 2010. <www.archdaily.com/85656/>

³⁰ Fehn, Sverre. *The Thought of Construction*. New York: Rizzoli, 1983. 26

The boat and the building are the defined form and the environment in which it is placed is the soft mass³¹. The sea offers the same challenges to a master boat builder as the landscape and environment affects the architect. For both to be able to design and build something that will exist in those circumstances they have to understand the environment that the object is being placed in as well as ensuring that the material selection of the object will be able to respond to those environments.

³¹ Masetti, Marco. "Multiplicity and Memory: Talking About Architecture with Peter Zumthor." *Arch Daily*. N.p., n.d. Web. 2 Nov. 2010. <www.archdaily.com/85656/>

I Material

Architecture in its simplest form is an object placed in the landscape for people to occupy and seek refuge from the elements. Built architecture can be broken down into a list of materials that come together to make a full composition; its structure, surfaces, connections and joints. Wood is a material that is commonly used in the architectural process. It can serve a variety of purposes from a solid structural component down to a delicate finish.

In Canada there is a great tradition of wood being used as a building material typically in the structure as well as the exterior cladding and interior finishes. Early French and English settlers used wood as their primary material in the buildings

Fig. 27. Example of an early Toronto school house.

they constructed.³² Wood was convenient as it came from the trees that were cut down to make a clearing for the settlement. It also offered a strong and durable material that could be dimensionally changed to suit the dwelling being built. (See Figure 27) The wood in these buildings was used in a manner that did not exploit the possibilities of the material and was used no more than "a transitional step from the simple log hut."³³ The tree grew as a straight and tall object in its natural habitat. This was directly transferred into the ideas of how the material would suit the architecture. Wood was traditionally used in the form of post and beam construction following the relationship of the tree trunk and branches; trunk as the vertical component and the beams as the horizontal branches stemming from the tree (See Figure 28).

³² Hay, William. "Architecture for the Meridian of Canada" *Anglo-American Magazine*, Volume 11, (Jan-July 1853): pp 253 – 255.

³³ *ibid.* 255

Imaginative ideas and applications of the material have been more recently explored as tested with engineered wood products, made possible by advances in adhesives.

Today, the design possibilities for wood in architecture are unlimited. By embracing new technologies, we can discover new potential for wood and can enhance its natural capabilities through advanced curing processes and material combinations.

Fig. 28. Traditional post and beam construction.

Sverre Fehn sees this ability to alter the characteristics of wood offering an "ontological nature of different materials and elements"³⁴ In similar ways he sees the technique of timber lamination as a process "whereby wood is destroyed as a structural identity, and transformed into a glued matrix where its intrinsic fibrous structure assumes, like concrete, a universal nature."³⁵ The universal nature that Fehn is alluding to is the fact that man is now able to dictate nature by changing the properties of the material allowing for a new level of exploration into the material and its possibilities. This allows for new shapes and forms to be developed which can create an advanced level of creativity. The skill of the craftsman was very apparent in the early stages of Canadian architecture as the joinery was completed with a high level of precision using simple tools. These craftsmen used the material in a way that they believed to be proper and respecting of the natural order of the material. "If the framing, instead of being concealed, was made to appear boldly to view,"³⁶ patrons of the dwelling would experience the material and see the beauty in the functionality of it.

³⁴ Fehn, Sverre. *The Thought of Construction*. New York: Rizzoli, 1983. 14

³⁵ *IBID.* 14

³⁶ Hay, William. "Architecture for the Meridian of Canada" *Anglo-American Magazine*, Volume 11, (Jan-July 1853): pp 253 – 255.

Wood is a Canadian material. The Canadian landscape is covered by dense forests that are harvested for lumber which is used in the architectural process. We can see continual innovations happening in the structural systems that are being used in buildings such as the Richmond Oval in Vancouver or the Art Gallery of Ontario in Toronto.³⁷ These buildings show the ability to create large structures using wood as a primary structural material. In the case of the Richmond Oval; arches that are comprised of

Fig. 29. Richmond Oval interior.

thousands of small wooden members in a web like pattern are able to span large distances of over 100 meters. (See Figure 29) The webbed arches are used in the long track speed skating arena where no vertical support can be used. These types of structures were previously designed with metal truss systems creating linear buildings with flat roofs giving a very dark industrial feel to a building. Wood is being allowed to redefine the way in which structure can be integrated into the design of a building while offering a material with an entirely different feeling to that of steel. This is possible through the invention and use of digital technology. Computer Aided Design based programs and CNC (Computer Numerical Control) milling machines. In *The Craftsman*, Richard Sennett refers to Victor Weisskopf, a theoretical physicist, as he says "people may let the machines do this learning, the person serving as a passive witness to and the consumer of the expanding competence, not participating in it."³⁸ In his example, the craftsman is becoming an accessory to the machine and not harnessing the tool to make them a better craftsman. The modern craftsman is trying to achieve a harmonious relationship between "the head and the

³⁷ Structurlam Products Ltd. Structurlam. 2009. Web. Nov 13 2009 (<http://www.structurlam.com/home/>)

³⁸ Sennett, Richard. *The Craftsman*. New Haven: Yale University Press, 2008. 44

hand”³⁹ if the two become “separate it is the head that suffers.”⁴⁰ The craftsman needs to continue to learn while not forgetting the knowledge he already possesses. This aspect of expanding the craft relates also to the architect and his material imagination.

The journey of a tree becoming usable wood is long and seemingly uneventful. The extended time frame of this process can last hundreds of years.⁴¹ When you start to look at a tree, it has many facets to its life that makes it interestingly complex, yet a tree seems trivial in our everyday outlook on life. It is very seldom that one sees a tree and is able to encompass its effects on our life;

We are left in awe by the nobility of a tree its eternal patience, its suffering caused by man and sometimes nature, witness to thousands of years of earth’s history, its creations of fabulous beauty. It does nothing but good, with its prodigious ability to serve, it gives off its bounty of oxygen while absorbing gases harmful to living things. The tree and its pith live on. Its fruit feeds us. Its branches shade and protect us. And finally, when time and weather bring it down, its body offers timbers for our houses and boards for our furniture. The tree lives on.⁴²

This quote which was taken from the thoughts of George Nakashhima in (1988), a superior craftsman and woodworker shows that all of these different objects crafted from wood directly affect many moments in our lives. When the tree’s life has come to an end it is up to the architect and craftsman to develop a new life for the milled wood. The only way that this material is experienced is by being used and enjoyed by people. If wood is used in a design and offers an interesting moment in an architectural work, it will engage the senses and create a connection to the wood. Wood is a material that has a story of both past and present. Furthermore to the imaginative production and unique forms that are created in the architect’s mind are brought forward through the hands of the craftsman.

³⁹ Sennett, Richard. *The Craftsman*. New Haven: Yale University Press, 2008. 44

⁴⁰ *IBID.* 44

⁴¹ Nakashima, George. *The Soul of a Tree: A Woodworker’s Reflections*, New York: Kodansha America Inc, 1998. 79

⁴² *IBID.* 81.

Materials define the feel of the architecture and give it character. For a harmonious design to be achieved using different materials there must be considerable knowledge of all the used materials their capabilities and interrelationships. To understand the material, the life and process of it must be considered. The combinations of natural wood (an common material in Canadian architecture) with concrete; metal and glass (modern materials in Canadian architecture) are married together to give a reflection on the past, the present and future. The proposed building for this thesis, The Canadian Centre for Aquatics, is a building that strives to show the progress of craft and technology through both the work done inside as well as the image it gives to the city through its materials.

In the design of the Canadian Centre for Aquatics, wood is used to shed light on two different aspects of the building, namely structure and finishes, and the technological or educational program an (aquatic boat-building museum and school). The challenge that is presented with wood is to bring homage to the craft of boatbuilding being practiced. (See Figure 30) All the groups of individuals that use the building are able so see the use of wood that is developed in the design of the building. Specifically, the student's craft is largely built around the understanding of and dedication to wood. The student's surrounding is reflective of their preferred working materials, giving a constant mental reminder through the interaction between their everyday movements in the building. A simple walk from the classroom to the workshop places a student on a path where they can touch the exposed wooden structure. They can feel and visualize the material they are about to create their masterpiece from.

Fig. 30. Rendering of the Canadian Centre for Aquatics boat building workshop from the second level walkway.

The building is structurally constructed from Red Cedar in its roof and ceiling decking and Douglas-Fir in the structural timbers. Both woods have significant historical context to the craft of boat making in Canada. The red cedar was a typical material used by the Algonquin craftsman in their canoe construction. It offers a material that can be easily manipulated to form curves and can be used as a final finish. The Natives of the West coast used Douglas-Fir in their boats as "Douglas-Fir possesses optimum characteristics,"⁴³ for both strength and ability to be sculpted. These fundamental components of the material are easily transferred into structural elements in a building. This begins to tell the story of the natural material and journey of the wooden fibres. From the forest it grew in, the mills where it was cut to the erecting of it on site; wood creates a story of its journey from start to finish.

The Canadian Centre for Aquatics will use both traditional and contemporary materials in the building. With wood being the dominant material both structurally and in the finishes of the

⁴³ GetOn.com. BC Lumber Sales. DBA: Okanagan Lumber Sales, 2004. Web. 25 Sept. 2009 (<http://www.bclumbersales.com/douglas-lumber.php>)

building the elements of concrete, steel and glass will act as the supporting role in the composition of the building. As the building opens upwards from the site surface towards the water (facing south) the southern façade will be entirely glazed with the wood structure penetrating through the glass creating the exterior wooden canopy. (see drawing A301) The forward portions of the eastern and western walls will also be clad in glass. Having the glass facing the water allows for a visual connection with water. The wooden components of the interior will be able to interact with the exterior conditions. This simulates the idea of the structure adopting a sense of being in a forest on the shoreline of an untouched Canadian lake. This will allow for the other material used in the construction such as the glazing elements to become even more transparent in the composition of the facade.

Contemporary materials, concrete and steel, will create material transitions and connection points in the building's structural details. All materials come together and begin to act as one system. Creating one combined story of their past. At the moments where they begin to combine and develop them into one narrative that explains of how the Canadian Centre for Aquatics celebrates the past and present through the material composition of the building.

II Structure

The structure of this project will recall magic in the craft of wooden boat construction. The structure of the Canadian Centre for Aquatics is made of laminated timbers, designed through computers and cut by computer numerical control (CNC) machines to ensure precision and to allow for the shape of these timbers to be possible. The columns rise up from the ground at the main junction points in the building up to the beams at the underside of the roof in a parabolic shape, starting at one point then splitting into two members traveling in opposing directions. Two additional curved timbers are introduced at this point and move in opposing directions to the primary structure. These timbers have a design emulating the natural roots of the symbolic tree that the wood came from and they function as the vertical component of the structure holding up the roof. The columns meet the wood timber beams at the low points in their undulating curves. The beams are constructed as continuously flowing units with no straight moments in the 'Z' axis, and they form the structure for an organically shaped roof. (See Drawing 2/A302 and Figure 31) The roof beams began in a 'X' and 'Y' grid formation that was extruded and skewed in correspondence with the programmatic spaces. With the beams dimension and placement utilizing these principles, it forms the downward portions of the structure where the columns meet the ground floor plane.

The overall composition of the structure is showcasing the essence of the wood and its capabilities in design. While moving through the structure you feel as if it is dynamically similar to the forest that the wood has been harvested from. This is the initial feeling received by the visitor, but another sense of symbolism begins to develop as you experience the building through the school. The wooden boat begins to emerge as a primary image in the built structure in this area. The structure begins to more clearly emulate the structural ribs of a canoe. This is when the roof and exterior cladding begin to show their meaning, allowing for the building's purpose to exist in the design.

Fig. 31. Perspective view of the Canadian Centre for Aquatics inhabitable roof.

The roof plane undulates correspondingly with the structure of the building offering the sense of a natural field close to the waters edge. At moments portions of the major roof plane break away from the inhabitable roof. The structure is extended which allows viewing points into the building from atop the roof. These also act as moments for natural light to enter the building. The view points will give visitors a look into what is happening in the gallery spaces, the school and the wooden boats being crafted below.

III Detail

A completed building is composed of multiple elements and components of varying sizes. Craft is an essential element of these components, from the largest to the smallest pieces of the building. Every point of connection in the structure of a building, in the building's envelope, and finishes must be refined, revealing the craft in every moment. Italian architect, Carlo Scarpa, was a master in detail and craft which is evident in his projects. In the Brion Vega Cemetery in Italy, Scarpa places a gate in a passageway that obstructs direct entry (See Figure 32) to a small praying area which exists at the end of the hall. The

Fig. 32. Carlo Scarpa's Brion Vega Cemetery.

gate itself moves on a vertical axis which moves when the visitor pushes down on it. Counterbalanced with weights to keep it upright in the space, the gate slides into the floor when pushed down lightly allowing visitors to gain passage. (See Figure 33) As the visitor then passes over the gate, it closes behind them and reveals that it has been submerged in water. The floor of the hallway is cantilevered over a pond, which the visitor realizes only through the interaction with the gate. This moment allows people to be connected to the architecture they are experiencing through detail and allows them to entertain how they are an influential part of the architecture. It is details like this that make people remember the experience the architecture creates. Marco Frascari states;

"In Scarpa's works the relationship between the whole and the parts and the relationship between craftsmanship and draftsmanship allow a direct substantiating *in corpore vili* of the identity of the processes of perception and production, that is, the union of the construction with the constructing in the making and use of details."⁴⁴

⁴⁴ Frascari, Marco. "The Tell-The-Tale Detail" *VIA: The building of Architecture*. 1984 p 24

Scarpa had full belief that no part or moment in architecture could go without being fully considered. The care taken with the smallest details solidify the design of a project as a whole, making the project harmonious and allowing the craft to be exemplified in the eyes of the user.

Most details occur at points of material connection with the joining of two or more materials. Marco Frascari affirms this statement by saying, "it is possible to observe that any architectural element is defined as detail as it is always a joint... Details are then a direct result of

the multifold reality of the functions in architecture. They are the mediate or immediate expressions of the structure and the use of buildings."⁴⁵ The moments in architectural design where these joints occur tell the story of the building. The way in which two materials are attached reveals the intention of a building both figuratively and metaphorically. Frascari continues, "Too much attention can not be given to produce a distinct Character in every building, not only in great features, but in minor details likewise: even a moulding, however diminutive, contributes to increase or lessen the Character of the assemblage of which it forms a part."⁴⁶ The care the craftsman, (i.e. the architect), takes in the design of the details in a building, shows that the attention to design and care have been exercised throughout the entire project. Details celebrate the small moments in architectural projects that are often disregarded. They create the character of the building and tell the story of the architectural concepts. A

Fig. 33. Carlo Scarpa's Brion Vega Cemetery. Passageway blocked by gate.

⁴⁵ Frascari, Marco. "The Tell-The-Tale Detail" *VIA: The building of Architecture*. 1984 p. 24

⁴⁶ *ibid.* p 25

building becomes an object combined of many pieces that allow it to excel as a whole becoming a unique experience.

RESPONSE TO WATER

Chapter 4: Inhabitable Space – The Project: The Canadian Centre for Aquatics

In Toronto there are few places where one can escape the chaos of the city, skyscrapers, people and traffic. The hard surfaced world of Toronto offers limited moments of reflection on the natural elements. Toronto is a "Harbour City"⁴⁷ that was

Fig. 34. Swimming at a Toronto waterfront beach 1922.

established because of its geographical location. This location brought wealth to the city, both financially and culturally. The water's edge brought a natural recreational world (See Figure 34) to the citizens of Toronto as well as bringing the financial prosperity of industry. Industry won this battle for the waters edge, taking over the harbour and leaving little space for Torontonians to enjoy the waterfront.

Today, the waterfront of Toronto is in the process of a major revitalization project that aims to re-establish its edge as inhabitable space for locals as well as tourists. Waterfront Toronto is an organization that was established to oversee the planning and development of Toronto's waterfront.⁴⁸ The organization seeks sustainable projects to improve the condition of the waterfront's edge while sticking to the slogan of "Our new blue edge".⁴⁹ A long term project expanding over 800 hectares of waterfront land consisting of mixed use developments and sustainable community elements has been initiated. These projects are allowing for people to

⁴⁷ Osbaldeston, Mark. *Unbuilt Toronto: a history of the city that might have been*. Toronto: Dundurn Press, 2008. 53

⁴⁸ Evenson, Jeff and ERA Architects. "Canada's Urban Waterfront: Waterfront Culture and Heritage Infrastructure Plan." *Part 1 – Central Waterfront* 2001. Print

⁴⁹ Waterfronttoronto. City of Toronto. 2000. Web. 10 Sept. 2009 (<http://www.waterfronttoronto.ca/>)

reconnect “to both the city and the lake”.⁵⁰ Cleaning the waterfront and protecting the aquatic environment is a mandate that is associated with the redevelopment of this area.

The waterfront revitalization project has been put into full effect on the western side of Toronto with residential towers, park space, and cultural buildings.⁵¹ On the East end of the harbour the revitalization has been focused on the development of an entertainment district. These two areas flank the dockyards of the harbour where the future site of the Canadian Centre for Aquatics will exist. The Canadian Centre for Aquatics will be a central component to the revitalization of the Toronto waterfront, acting as a link between the eastern and western edges.

The development of the Canadian Centre for Aquatics will provide a large urban park space to the city, utilizing the waterfront as a source of interaction and gathering for the city, its inhabitants and society.

Activities will include kayaking, night time outdoor movies, small musical ensembles, fishing, art installations and rental spaces for events and a museum. Merging the two different functions together will allow for both to interact with each other and give awareness to both. The boats built at the school will create an actual connection to the water in the physical sense and the visitors will use the park with the enjoyment of having the water close to them.

The boardwalk that extends along the waterfront of Toronto will continue across the Canadian Centre for Aquatics shoreline. The bike path which currently runs along the north edge of the property following Lakeshore Boulevard will be rerouted through the site bringing the flow of people onto the site and not just constrained to the outer edges. Vehicular access onto the site enters off of Cherry Street from the East side of the site. This entrance / exit will bring vehicles into a communal parking lot, to be shared by the patrons of the building as well as visitors to the park. These paths and parking facilities will be surrounded by green spaces offering the

⁵⁰ Waterfronttoronto. City of Toronto. 2000. Web. 10 Sept. 2009 (<http://www.waterfronttoronto.ca/>)

⁵¹ *ibid.*

opportunity for leisure activities. The green spaces will be composed of native species of trees and plant life which will mature into an urban forest. The green space on the ground plane will flow up and onto the roof of the Canadian Centre for Aquatics. The building's footprint will be in the southwest corner of the site pulled back from the waters edge by the dimension of the perimeter boardwalk. (See Drawing A101)

The site is currently covered by concrete and asphalt. These materials create a heat island and a site with severe surface water run-off. The development on the site will begin by removing all of these hard surfaces and replacing them with a majority of soft naturally living surfaces. This will effectively solve the issue of heat absorption and water run off. The plants introduced to the site will clean the existing soil by filtering toxins. Water runoff from the site and the building are carefully controlled and directed towards on site bioswales to divert water from sewers and clean it before reaching the lake.

The boardwalk condition that edges the site between water and land is flanked on land by an ecological aquatic buffer. This buffer acts as a catch basin for the site. When the water enters the controlled aquatic element it arrives with the remaining contaminants washed from the surface of the site. Plant life in the basin responds to the water by filtering the toxins out of the water.

Chapter 5: The Apprentice and the Spectator

Both the public and private occupants of the building have an integral role in the building. The private occupants (faculty, staff and students of the school) are constant occupants of the building. Their spaces are occupied all year long and at all times of the day. They get to experience and understand the building while allowing it to influence the progression of their craft. The public occupants are immersed in the architecture for short periods of time as they visit the building for different functions or spend time on the site. A connection between these displays, the craft of boat building and the construction of the Centre allow for the visitor to see a relationship between the craft of construction and the craft of boatbuilding, which are both employed to raise awareness of the water.

The Canadian Centre for Aquatics brings people to the water's edge and gives them a well-crafted space where they can enjoy and reflect on the state of the water around them. The attraction to the site also allows visitors to become involved in what the students are creating. Visitors can view craft being practiced in the craft of boat building. The public needs to be involved in the process, to understand the level of commitment required to achieve good craft. At the Canadian Centre for Aquatics the public is able to see the craft in its entirety and experience the journey from raw material to the final crafted product.

The visitors know boats are being created though they cannot see it. The sense of sound brings intrigue between the student's actions and the visitor. On the decked rooftop, openings exist allowing for a public view into the workshop. Here the visitors will be able to see first hand what the students are accomplishing and the craft that they are practicing. The visual connection allows the visitors to fully appreciate the level of discipline and work ethic that is used in the craft of boat building. The students and visitors use the Canadian Centre for Aquatics for different purposes, but both of their experiences are enhanced by the presence of the other.

The building and its occupants need each other to allow for the meaning of the project to develop. The building acts as a vessel that carries the students through the study of the boat building craft. The Canadian Centre for Aquatics is the leader in re-establishing the lost craft of boat building. Visitors to the site are enabled by the craft of the building to contemplate the water on the site. They represent the link to bringing knowledge of water and craft to those that have not yet engaged in either. The craftsman knows the beauty and challenge in their work and if it cannot be shared and experienced by the general public then the craft cannot survive. The craftsman thrives on having his masterpieces viewed and used. Both the visitor and student play an equal role in the Canadian Centre for Aquatics and the success in the meaning of the project.

The meaning of water to the Canadian public is diminishing and needs a rebirth. This is greatly to do with the disconnect between people and the importance in understanding what water means to them as an element. This changing view of water and the importance that is generated by the Canadian Centre for Aquatics needs to be harnessed. The building is intended to allow reflection on the degradation of water, and inspire a poetic view of water rather than simply seeing it as H₂O. Ivan Illich writes,

The water we seek is the fluid that drenches the inner and outer spaces of the imagination. More tangible than space, it is even more elusive for two reasons: first, because this water has nearly unlimited ability to carry metaphors and second, because water, even more subtly than space, always possesses two sides.⁵²

If water is allowed to exist in this changed interpretation within architectural and urban settings with our urban cultures and architecture it has the ability to affect us. These inherent characteristics of water bring can create memories and leave a lasting impression on the mind if water is allowed to entre the spaces of everyday life.

This thesis presents architecture as analogous to a boat and draws linkages between craft, water and the vessel which constrains to direct the gaze of the inhabitants towards the water. The project integrates water through innovative wastewater diversions, views to Lake Ontario, and public viewing decks to raise the awareness of water and its connection to the built environment. The project rehabilitates a polluted section of industrial waterfront and opens the area to allow public access through its design and landscaping.

People do not use natural sources of water respectfully which triggers a disconnection with it. In the disconnection, water's level of importance becomes severely diminished. The Canadian Centre for Aquatics fights this issue of convenience for Torontonians by creating a

⁵² Illich, Ivan. *H₂O and the waters of forgetfulness: reflections on the historicity of "stuff"*. Dallas: Dallas Institute Of Humanities And Culture, 1985. 24

place that is in Toronto's backyard and offers public interaction with water. The site of the Canadian Centre for Aquatics achieves this by the programming installed on the site. The Centre offers a schedule of events and activities that will attract the attention of Torontonians, bringing them to the waters edge. The environment and venue that is experienced will convince people to return for solitude and enjoyment.

In this thesis we have seen that there is a possibility for water to emerge as a part of the urban context. An architectural project that allows water to be an influential part of its design and purpose can create this harmonious equation between the natural aquatic environments and the built world we live in. The respect given to water in a building allows the users to see and develop awareness to the state at which the natural sources of water exist. The Canadian Centre for Aquatics tries to achieve this.

The craft of boat building, much like the urban awareness of water has become lost from a societal context. It is a craft that no longer serves a functioning purpose to our lives, but continues at a personal level between the vessel and the craftsman. In this thesis the marrying of craft with the element of water solidifies the project in bring back both of the items into the urban city. The Canadian Centre for Aquatics design and program is dictated by the craft of boat building and the vessel through its structure, materiality and forms. This building gives homage to a craft that is exceptionally important to Canadian history and allows the public to interact with a physical example of this craft turned into an inhabitable dwelling.

The Canadian Centre for Aquatics creates a connection between the city and the water offering a place where Torontonians and others can be an active part to this connection. The ability to interact with the waters edge gives a physical bond between the human and the environment.

Appendix A – Drawings

A101 – Site Plan

A102 – Alternate Site Plan

A201 – First Floor Plan

A202 – Second Floor Plan

A203 – Roof Plan

A204 – Structure Plan

A205 – Enlarged Floor Plan

A301 – West and East Elevation

A302 – South Elevation and South Hall Section

A303 – Exhibition Space Sections and Workshop Bay Section

A401 – Workshop Dock Detail

A402 – Roof Water Collection Detail

A501 – Structure Axonometric

A502 – Structure Detail

A503 – Structure Roof Decking Detail

GARDINER EXWY.

LAKESHORE BLVD.

LAKES

PARLIAMENT ST.

Project

CANADIAN CENTRE FOR AQUATICS

Project

SI

Project	Scale:	Drawing No.	Orientation:
SITE PLAN	1:1500	A101

Project

CANADIAN CENTRE FOR AQUATICS

Project

AL

Project	Scale:	Drawing No.	Orientation:
ALTERNATE SITE PLAN	1:1500	A102

Project

CANADIAN CENTRE FOR AQUATICS

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Project

FIRST FLOOR

Scale:

1:400

Drawing No.

A201

Orientation:

Project

CANADIAN CENTRE FOR AQUATICS

Project

SI

Project	Scale.	Drawing No	Orientation.
SECOND FLOOR	1:400	A202

Project

CANADIAN CENTRE FOR AQUATICS

Project

R

Project

ROOF PLAN

Scale

1:400

Drawing No

A203

Orientation:

Project

CANADIAN CENTRE FOR AQUATICS

Project

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project
STRUCTURE PLAN

Scale:
1:400

Drawing No.
A204

Orientation:

Project

CANADIAN CENTRE FOR AQUATICS

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ENLARGED PLAN

Scale:

1:200

Drawing No.

A205

Orientation:

Project

CANADIAN CENTRE FOR AQUATICS

Project

W

Project	Scale:	Drawing No.	Orientation:
WEST & EAST ELEVATION	1:300	A301

Project

CANADIAN CENTRE FOR AQUATICS

Project

SC
SC

Project	Scale:	Drawing No.	Orientation:
SOUTH ELEVATION & SOUTH HALL SECTION	1:300	A302

Project

CANADIAN CENTRE FOR AQUATICS

Project

EX
W

Project	Scale:	Drawing No.	Orientation:
EXHIBITION SPACE SECTION & WORKSHOP BAY SECTION	1:300	A303

Project
WORKSHOP DOCK DETAIL

Scale:
1:150

Drawing No.
A401

Orientation:

Project

CANADIAN CENTRE FOR AQUATICS

Project

RC

project	Scale.	Drawing No	Orientation:
ROOF WATER COLLECTION DETAIL	1:75	A402	

Drawing No. A501 – Structure Axonometric

No illustration available

Project

CANADIAN CENTRE FOR AQUATICS

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Project
STRUCTURE DETAIL

Scale:
AS NTD.

Drawing No.
A502

Orientation:

1
A503

ROOF STRUCTURE ELEVATION

1:20

Project

CANADIAN CENTRE FOR AQUATICS

Project

RC

2
A503

ROOF STRUCTURE SECTION
1:20

3
A503

ROOF STRUCTURE PLAN
1:20

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