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Modern Vernacular: Translating First Nations Traditions Towards a Model of Contemporary Sustainable Architecture

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MODERN VERNACULAR :
TRANSLATING FIRST NATIONS TRADITIONS TOWARDS A MODEL OF CONTEMPORARY
SUSTAINABLE ARCHITECTURE

by

Farida Abu-Bakare

Bachelor of Architectural Studies, Carleton University, 2009

A design thesis project
presented to Ryerson University
in partial fulfillment of the
requirements of the degree of
Master of Architecture
Toronto, Ontario, Canada, 2012

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Farida Abu-Bakare

Modern Vernacular :

Translating First Nations traditions towards a model of contemporary sustainable architecture

Farida Abu-Bakare

Master of Architecture, 2012

Architecture Program, Ryerson University

Abstract

Current contemporary buildings consume resources, generate waste and contribute to atmospheric pollution, relying on green rating and point systems to dictate the sustainable attributes of a project. The effectiveness of these point systems has come into question and current designers are examining the knowledge generated by thousands of years of vernacular architecture, which is becoming increasingly valued for its sustainable attributes.

First Nations peoples reflected a bias for sustainable thinking long before the sustainable architecture of today; their architecture was derived from a direct response to site and an intimate understanding of nature. Using the architecture of the past as a means of looking forward, the goal of this thesis is to assert key sustainable design strategies derived from the First Nations peoples approach to architecture towards a model of contemporary sustainable design.

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I would especially like to thank Vincent Hui for being an outstanding mentor throughout this whole process. His foresight, support and encouragement have allowed me to broaden my scope and explore bigger ideas.

Dedication

Dedicated to my family.

Author's Declaration

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Dedication

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01

Introduction

In an environment of continuous resource depletion, the building industry is taking measures to promote sustainable building practices. Buildings are excessively consuming natural resources, significantly transforming natural landscapes, and producing enormous quantities of waste and pollutants (Farr, 2008). There are increasing demands on our energy and material resources, and with 50% of landfill waste generated by building construction we need to begin to rethink our priorities when it comes to the state of architecture today (Chambers, 2011).

The building industry must begin to consider the efficiency of a building's lifespan and effect on the natural environment from construction to demolition. A truly sustainable architecture is one that consumes resources in an amount less than or equal to the resources it creates. Its waste must serve as fuel or purpose to some other process, so that there is, in effect, no waste at all (Brebbia, 2010)

Sustainable architecture is not just about efficient use of resources and a symbiotic relationship with the site, but about designing in an environmentally responsible way. Renzo Piano, in discussing sustainable architecture said, "Architecture is a second nature that is laid on top of the real one " (Weissberger, 2007). Renzo Piano's practice was characterized by its sensitivity to site and local tradition as well as by its combination of traditional materials and techniques with those from the cutting edge of technology (Buchanan, 1992).

Fig. 1 :
Mass Raw Material
Consumption. Image
Credit



Piano's believed in designing in reconciliation with nature and the environment. Piano's Jean-Marie Tjibaou Cultural Centre is indicative of an integration of balance between traditional and current architecture. Balance and harmony, integration and mediation, cultural and ecological sensitivity, are themes of an architectural language that can produce innovation without ignoring context.

Architecture must not alienate nature from how we design and develop our built environment. Today our architecture has exploited rather than aligned with nature's design and there must be a manner in which we can begin to design in harmony with nature. In order to achieve this, we must begin to design buildings that work with – not against – nature. There is a need to for more site-specific architecture and to shift from acting like we are not part of nature to seeing ourselves as an integral part of nature (Chambers, 2011). This philosophy of building in harmony with nature is found within the beliefs of First Nations people.

Sustainable design is not a new concept. First Nations people reflected a bias for sustainable thinking long before the sustainable architect of today. As ancestral stewards of the land and its resources, Canada's First Nations have positioned themselves at the forefront of the environmental movement (Taggart, 2009). First Nations philosophies evolve from the notion of integration, stewardship, and respect for the land. Using energy conservation measures, low-impact site and construction management techniques, and responsible material choices, evokes the traditional building strategies of the First Nations people who built without compromising the future of their land and resources (Kohler, 2003).

Fig. 2 :
Renzo Piano's Jean-
Marie Tjibaou Cultural
Centre

Sustainability puts the health of nature's ecosystems before all else. The First Nations people viewed nature as a "being", where humans are seen as part of nature. They built within nature's constraints making little change to the landscape. They embraced nature by letting the site's climate, materials, and resources dictate their approach to construction. This traditional approach toward architecture passed on from generation to generation amongst the First Nations people is becoming increasingly valued for its sustainable attributes in sustainable architecture today (Taggart, 2009).

Inspired by the strategies and principles of the architecture of the First Nations people, this thesis looks to define an architecture that is synchronized with the natural forces around it and blends with the local environment. It looks to develop a design that puts us in touch with the natural forces of life – sun, wind, earth, and water – and celebrates the cycle of seasons.

Interaction with nature is critically important to sustainable development within architecture. Sustainable architecture is foremost about re-imagining the relationship between architecture and the environment (Hawken, 2000). First Nations people were perhaps the last inhabitants of North America to have truly understood the meaning of sustainability and to have lived accordingly making the simple and obvious choices rather than relying on complex technologies (Taggart, 2009). This thesis hopes to provide a basic and practical approach to sustainable design derived from First Nations design strategies to demonstrate how current architecture can respond to site, nature, and the environment.

Fig. 3 :
Smudge Ceremony
Image Credit - Colin I.
Mills, 2009



02

First Nations Spirituality

Traditionally, spirituality has played an important role in the lives of the First Nations peoples; the spiritual connection to the “Creator” was evident in every aspect of their lives. In traditional First Nations culture, all parts of creation were believed to have spirit. Historical and contemporary First Nations leadership have declared that spiritual concerns are and always were central to First Nations way of life.

First Nations perspectives are based on the distinct world view in First Nations culture. This world view is that we live in a universe made by the “Creator” and we need to live in harmony with nature, one another and with oneself. Each First Nations culture expresses this same world view in a different way with different practices.

The concept of First Nations spirituality is the application of respect for the “Creator” that has given life to all creations, and these creations shall maintain harmony as interdependent elements. The concept of life and “supreme being” is not merely in the physical world but also in meta-physical forms that are important in maintaining harmony between and amongst living beings and those in nature.

This belief in the “Creator” and the existence of the next world provided a basis for the First Nations respect for all natural phenomena. The respect for the natural environment, including trees, rocks, water bodies and wild animals, is an intrinsic part of First Nations spirituality.

2.1 **First Nations Seventh Generation Philosophy**

The practice of sustainability has been long withstanding with First Nations culture. The Great Law of the Iroquois, hold appropriate to think seven generations into the future. First Nations peoples see the linking of one generation to the next as part of a continuum, and emphasize planning for seven generations for children so as the future of their peoples. They believed there was a link between environmental quality of life and sustaining a human quality of life and we must look back seven generations and look forward seven generations and realize that we are the balance and live accordingly. This understanding gave rise to a relationship that is intimately connected to the sustainability of the earth and its resources.

First Nations philosophies can provide a framework for provoking an ethic of stewardship and sustainability development in our communities today. The Walpole Island First Nations of Southwestern Ontario have emerged as a leader in environment and sustainable development among Canadian First Nations communities. They are the first of Canada's First Nations communities to take leadership in the field of environment and sustainable development.

Preservation, conservation and stewardship of the land and its resources are major sources of the guiding principles within their community. They believe that their land is sacred and they are simply inhabitants holding it in trust for future generations. They have maintained their cultural heritage and traditional knowledge of the environment, while effectively integrating western science. The complementary use of traditional knowledge and Western science is an important strategy in environment and resource management on Walpole Island.

The Walpole Heritage Center was established to research environmental protection, heritage restoration, and preservation. The Heritage Center has established positive interactions with non-First Nations alike, educating them about the impacts of pollution, environmental quality and species at risk. The Heritage Center has spearheaded efforts to foster a better understanding of the relationship between western science and traditional knowledge.

Fig. 4:

Aerial View of Walpole
Island First Nations
Community

Image Credit - Karen
Abel, 2005



2.2 Honoring the Earth

First Nations people have always been intimately aware of their symbiotic relationship with nature and assumed the role as the spiritual guardians of the earth. For First Nations people, a sense of identity is deeply rooted in their established spiritual traditions and principles. First Nations spirituality is intimately linked to the environment which they inhabit. First Nations peoples have a spiritual, mental and physical connection to the earth, the land they live on, and all living things in it (AFN, 2009). Their spirituality is preoccupied with the relationship of the earth, nature in the sense that the earth is accepted as part of their being (Mudrooroo, 1995). They believe that the earth gives birth to, nurtures, and sustains all life. They believe in balance and respecting what the land gives them and learn to live harmoniously with the land, adapting to its gradual changes.

Everything is taken and used with the understanding that we take only what we need, and we must use great care and be aware of how we take and how much of it so that future generations will not be put at risk. It is also based on their needs and values extending back thousands of years from hunting, gathering, and fishing to harvesting food for self, family, and community. This relationship that is based on a profound spiritual connection to the earth guide First Nations peoples' to practice reverence, humility, and reciprocity towards nature and the environment (AFN, 2009).

2.3 First Nations Ceremonies

First Nations spirituality is guided by ceremony . The traditional ceremonial places of First Nations rituals were a part of their natural landscape. Natural sites are used as places of worship or for holding First Nations rituals and ceremonies. First Nations peoples use these ceremonies to give thanks to the earth and to reconnect with nature, seeking balance and harmony in their lives. Their ceremonies were seen as rites of passage, and purification.

The sweat lodge is a First Nations tradition where individuals enter a dwelling to experience a sauna-like environment. The sweat lodge ceremony is intended as a spiritual union with the “Creator” and a respectful connection to nature giving thanks to the earth. The Lodge is a sacred space of a purification rite for cleansing the mind, body and spirit. The ceremony can be quite different from area to area, tribe to tribe, or even event to event and is still in practice among many First Nations today (AFN, 2012).

The site of the lodge is always chosen with great care. A fire-pit is dug, where rocks are heated. A pit, which will hold the hot rocks during the ceremony, is then dug in the center of the spot where the lodge will be built. Traditional First Nations sweat lodges were made of saplings, which were bent to form a dome. This dome is meant to represent the womb of Mother Earth. The ceremony usually takes place in the late afternoon, and sometimes lasts until dawn of the next day (Asikinack, 2006).

There are two styles of sweat lodge ceremonies; one where only heated rocks are used, and another where water is poured on the rocks. Once all the participants are inside the lodge, the fire-tender begins to pass in the heated rocks, which are placed in the pit. The number of rocks used varies from as few as sixteen to as many as sixty-four (AFN, 2012).

Fig. 5 :
The dome shaped shell
of a First Nations sweat
Lodge

The number and placement of the rocks are as important as the overall ceremony; each First Nations focuses on different aspects their culture as the number relates to different needs. Once a number of heated rocks are passed into the lodge, the entry is closed and the host begins to pray (Asikinack, 2006). Participants can say prayers in their own way during this time. This process can be repeated as many as four times, depending on the needs of the participants. During the Sweat Lodge Ceremony, all four elements are represented during a sweat. The air, earth, fire and water are respected during the sweat. Each round is dedicated to one of the four directions and winds of change beginning from the East (Asikinack, 2006).

In recent years, the sweat lodge has come to be widely used as a prayer ritual separate from other rites. It has achieved the status of principle rite, meaning that this is the main prayer and healing ceremony among many First Nations. It is sometimes a way in which First Nations offer to share their spirituality with non-First Nations.



A sweat lodge ceremony is meant as a place of safety, giving, sharing, receiving, releasing, cleansing and healing. It is a process of renewal through the integration of the spiritual and physical. Done with ceremony and ritual, it becomes a place where one can reconnect with each other, the spirits, ancestors, and the earth. It is meant as a place of awareness, re-energizing, refocusing utilizing all powers of the universe: earth, and things that grow from the earth, water, fire, and air (Twice, 2012). The intent of the ceremony is to empower the natural elements of being through a means of purification and prayer. The four elements are water, air, fire, and earth. Each element brings a quality of balance to our lives.

Fig. 6 :
First Nations sweat lodge
- Image Credit: Steven
Julian, 2011



2.4 Summary

First Nations believe that all things are created equally, Humans are not above other things in creation. They believe that we are all related and affected by all things in nature and by changes experienced by any parts of nature. First Nation spirituality expresses that we can live harmoniously with nature, its resources are a privilege and we can use them towards our needs while respecting their importance. First Nations philosophies about human interactions with nature can provide a valuable lesson for mainstream society to reconnect with nature and establish mutually beneficial and reciprocal relationship with the environment.

First Nations believed that each generation has a responsibility to ensure the survival for the seventh generation. They believed that when we begin to separate ourselves from that which sustains us, we immediately open up the possibility of losing understanding of our responsibility and our kinship to the earth. In the drive towards sustainability development in our current society, First Nations spirituality and principles can provide a framework for engendering an ethic of stewardship and sustainability towards nature and the environment (Beckford, 2008). Their need for harmony and balance and desire to maintain a connection to the earth is sought out in every aspect of their lives, including their built environment and shapes the scope of this thesis.



Fig. 7 :

Interior of Contemporary
Longhouse in Native
Child and Family
Services by Levitt
Goodman Architects

03

Design

First Nations Architecture + Contemporary

First Nations people survived extreme climates for centuries based on traditional knowledge of what to build, where to build, and how to build it. First Nations architecture was an example of sustainability without the reliance on technology that is found in current architecture. Far removed from the complex technologies of present day, First Nations people relied on an intimate understanding of nature to achieve sustainability in built structures.

First Nations people have a strong tradition of architectural form varying in size, shape, permanence, structure, and material. Each Nation has developed its own unique architecture throughout history in order to best suit their needs and the requirements of their climate.

First Nations architecture lies within thousands of years of history. These factors foster great geographic and cultural differences, from which a regional architecture developed. The traditional architecture of the First Nations peoples has varied amongst their subcultures. The First Nations of Canada contained five broad cultural regions that each gave rise to distinctive building forms, which reflected these conditions (Kalman & Mills, 2002).

The Canadian East Coast and Plains were woodlands of a temperate climate. These resources available to the First Nations of this region were saplings, birch and elm bark, sinew, and reed. These materials determined the forms of the wigwam, the longhouse, and the teepee. The Canadian West Coast and British Columbia Interior Plateau were forests, islands and water ways of a temperate climate (Nabakov, 1989).

The resources available to the First Nations of this region were cedar timber, split planks, and bark. These materials determined the form of the plank house and the Haida house. The Canadian North was an Arctic and Subarctic tundra. The resources available to the First Nations of this region were snow, sod, timber, seal skin, and stone. These materials determined the forms of the igloo and winter house. The wigwam, teepee, and snow house were more temporal building forms perfectly suited to their specific environments and the semi nomadic cultures. While the longhouse, pit house and plank house, were responses to the need for more permanent building forms (Nabakov, 1989). Their buildings address the primary need for shelter in an environmentally conscious and contextually responsive manner. The shape, form, and materiality of all the buildings formed across North America are different depending on the location of the site and the materials that were immediately available.

The striking features of all First Nations architecture were highly evolved building-forms perfectly suited to their environment. There was the consistent integrity in their architecture between structural forms and cultural values in their approach to climate, materials, and site. These built forms evolved as a response to the climatic and topographical characteristics of the regions in which they were created. Each of these building types represents a specific adaptation to their region. They are connected to their environment, shaped by their context, informed by their place and responsive to the conditions by which they inhabit. We can look back to First Nations architecture to see how we can begin to derive sustainable strategies and use them toward current contemporary design.

3.1 **Climate - Responsive Architecture**

Low energy buildings, passive solar houses, and solar energy utilization is found throughout sustainable architecture. However mainstream architecture tends to neglect climate as one of the key drivers of form (Dahl, 2010). Buildings today are characterized more through globalization's universal architectural expression rather than local cultural and climatic conditions. The steel or concrete frame glass box found in London does not vary much from one found in Kuala Lumpur.

Whether located in tropical climates where shade and cooling are desired, or in arctic climates where heating and lighting, the solutions are generally dominated by the use of high energy consuming climate control systems. These provide fresh air, appropriate levels of temperature and humidity, thereby ensuring comfort, but fail to exploit an alternate tradition based upon more responsive climatic design strategies (Dahl, 2010).

A study of traditional architectural customs offers a wealth of understanding and source of inspiration for climatically adapted architecture. Traditional architecture is characterized by its ability to ensure an optimized level of resource saving and climatic adaptation, and consequently a high level of built-in sustainability (Dahl,2010). Paul Oliver, one of the pioneering researchers in the field of vernacular architecture, espoused that traditional buildings should reveal methods and principles for responding to a particular region's social, cultural, and climatic characteristics.

Vernacular architecture needs to be seen as a constantly evolving entity, reacting to the changes in the communities that shaped its form. This is an “adaptive architecture”; an architecture that is resilient, constantly reinventing itself with the changing social, cultural, and environmental milieu in which it is situated. First Nations people designed dwellings that successfully met the problems of the most severe climates.

First Nations architecture was responsive to its local climate, responding to the changes in terrain, ecology of the region, and the local climatic conditions of rain, wind, and sun. The different climates in which First Nations settled had an impact on how they built but they all shared a knowledge and respect for nature. When preparing a site for habitation they responded to the climate with strategies to maximize heat in the winter months and to shade against heat gain in the summer months. Exploring the properties of the earth, they used natural features of the earth to shelter the built structures from wind and sun and orient them in a way to take advantage of the sun during cooler seasons.

First Nations achieved a proper way to control the environment in the absence of technological fixes, which current models of sustainable design could learn from. Technology should reinforce passive strategies instead of overcoming natural occurrences. This was the case for structures built by First Nations people. Recent concern regarding the environmental impact of architecture has encouraged architects to explore passive energy conservation measures.

The benefits of ventilating buildings naturally, rather than mechanically, are becoming increasingly recognized. Natural ventilation techniques are found throughout First Nations architecture (Allard & Santamouris, 1998). Natural ventilation can be a substitution for mechanical systems.

The archetypal model of the use of natural ventilation in First Nations architecture is the First Nations tepee. Its envelope was a membrane of sewn animal skins, a climate-responsive skin with large flaps at the top providing an opening for smoke. This envelope is conceived of as a skin with variable climate adaptive modes.

When there was heavy rain, the flaps were closed to protect the inside from water infiltration. In temperate weather conditions, the envelope was closed except at the top, where the opening functioned as a smoke stack. In hot weather, the perimeter of the tepee can be rolled up to allow maximum ventilation. In cold weather, an inner liner was added to create dead air space or allow limited ventilation required for smoke exhaustion while shielding the occupants from direct draughts. When winds blow, a windbreak of branches is positioned around the tepee to protect the inside.

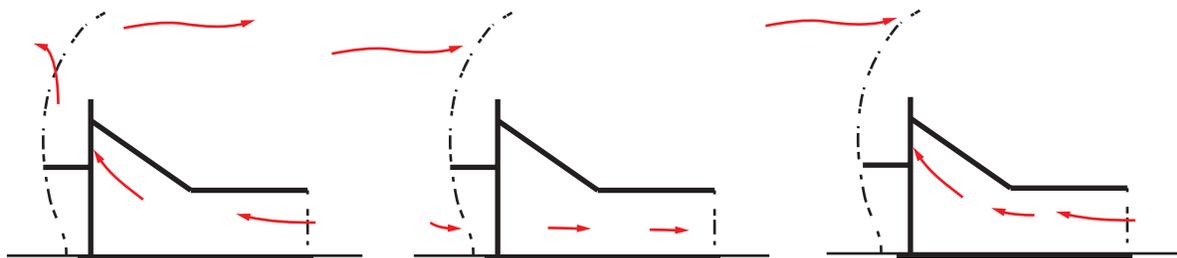
Solutions to the adapting climate can be found within the architecture developed by the First Nations people, in which double skins were insulated in winter by internal air cavities, which were opened up and ventilated in the summer (Gonçalves, 2010). Contemporary buildings like the Cultural Centre Jean-Marie Tjibaou, composed of a series of sea-shell like structures 9 meters to 24 meters high, designed by Renzo Piano is an inspiring modern interpretation of the adaptable skin concept of traditional shelters like the First Nations tepee.

The forms as well as the layout of the buildings constituting the Centre take the climatic characteristics of the site and wind movements into account. The linear narrow development of the complex flows along a spinal path, to which are symmetrically connected the seashell structures grouped in three 'villages' separated by gardens, allowing for air to be let through while protecting the inner spaces from strong hot winds (Allard & Santamouris, 1998).

Fig. 8 :
Renzo Piano's Tijbaou Centre design; schemes of the airflow patterns with wind (l) weak (c) medium (r) strong

The seashell structure has a double envelope: an external operable bent grid-like shell and an internal impermeable, but also operable louvered vertical wall. When the wind is weak, both the bottom part of the external envelope and the top of the inner wall, are open, so that warm air inside the building can be exhausted as a result of the stack and Venturi effects.

When the wind is of medium strength, both bottom parts are open to allow for cross ventilation. When the wind is very strong, all openings on the shell are automatically closed. A negative pressure zone is created at the top of the external shell deflecting the wind, thus increasing the stack airflow driven from the inside spaces through a roof vent (Allard & Santamouris, 1998). Jean-Marie Tijibaou Cultural Centre is indicative that vernacular structures can serve as models of sustainable strategies towards current architecture.



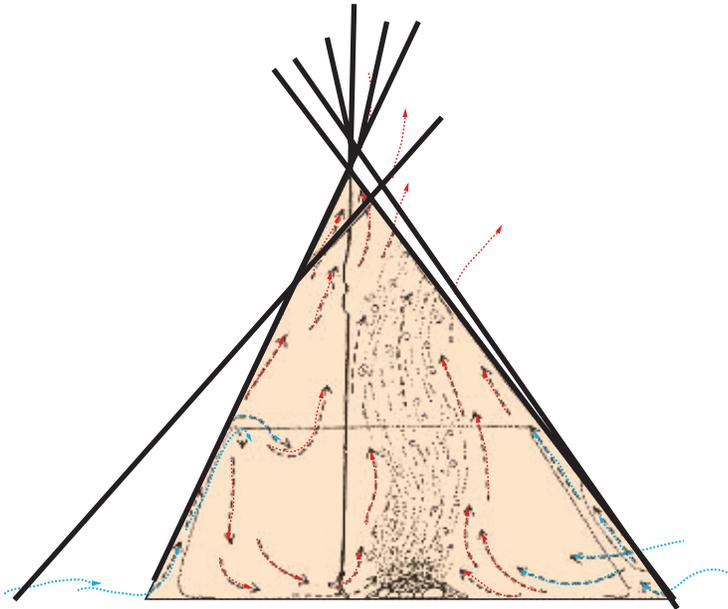
The Nicola Valley Institute of Technology of Busby and Associates is considered a new and refreshing perspective on First Nations architecture versus contemporary building. The project is a contemporary reflection of First Nations traditional forms and building techniques. The First Nations inspired techniques are apparent from the planning configuration to the sectional and spatial analysis of the central atrium space. The design concept is based on traditional native pit houses having in-ground construction; sod roofs to limit solar gain, and vaulted construction open at the top for ventilation (Taggart, 2009).

The micro climate of the Nicola Valley is hot and dry in the summer and quite cold in the winter. It is from this climatic condition that the Aboriginal people learned to construct two effective building types. The First Nations tepee was a simple and efficient ventilation structure that promoted cooling by convection in the summer months. This concept is difficult to utilize in most contemporary building types as it demands close attention be paid to solar orientation, sun-angles and building glazing and thermal materials.

This natural ventilation inspired by the tepee occurs through convection and is achieved in the atrium space (Pieterse, 2003). In winter months the pit house was an earth-sheltered structure built with a southern orientation to maximize solar heat gains in winter and which relied on thermal mass to minimize heat losses. While NVIT does not attempt to replicate or mimic the traditional forms of either First Nations structure, it uses the same principles of these building typologies of First Nations architecture. In terms of site NVIT was built into the existing slope to increase shelter and insulation to the north. On the lower level of the roof, soil is placed and covered with native plants to contribute to the reduced heating and cooling of the building.

The earth sheltering helps to insulate the atrium and through passive solar heating, a pressure differential is created necessary to naturally ventilate the building (Taggart, 2009). NVIT showcases possibilities and impact that First Nations architectural principles could have on current architecture. The building plays a key role in how these principles could potentially influence the direction of Canadian sustainable architecture in the future.

Fig. 9:
The natural ventilation strategies of the First Nations teepee



3.2 Material Responsive Architecture

First Nations people showed genius in their adaptation of available materials for building purposes. Building in harmony with nature, First Nations peoples had a respect for the earth and the vast resources it provided. The First Nations people developed architectural forms, responding to environmental challenges with the materials that were readily available to their region.

First Nations people depended upon the resources of their immediate surroundings, and as in most other cultures, the first building material was wood in its various forms, from saplings for structure to bark and leaves for finish materials. Stones were used on foundations. Saplings were used as main support beams because they were more pliable than large tree trunks and took less time to cut and place. Sod and snow were used both as complete building systems and as finish materials. As hunter-gatherers they had a large supply of animal skins and large bones that were also used (Nabokov, 1989).

A strong sense of design, and sophisticated methods of joining materials, produced an impressively broad range of buildings for a variety of dwellings and ritual uses. First Nations derived their architecture from the properties of the site, letting the materials dictate where they would settle, the composition of structure, and the method of construction.

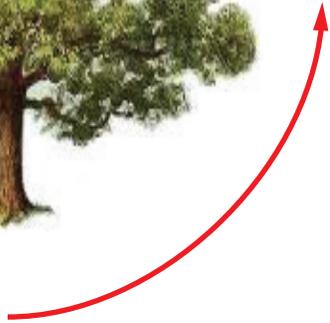
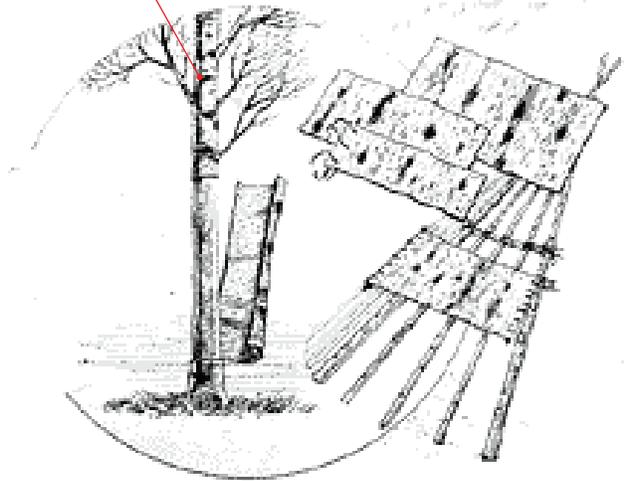


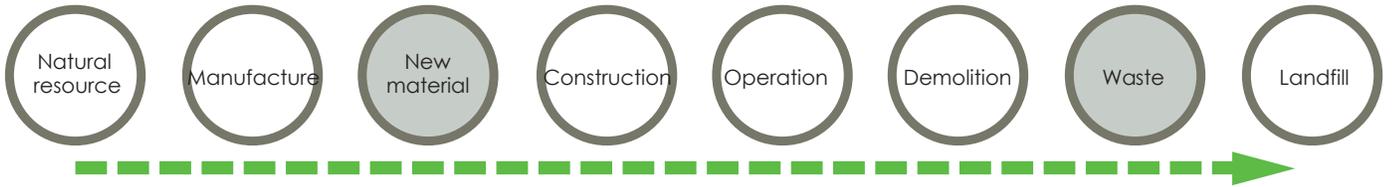
Fig. 10:
Diagram of the onsite
resources that determine
the form of a First
Nations teepee

First Nations architecture did not create waste. First Nations relied on natural material that was easily disposed of and naturally recycled back into the environment. Unfortunately the nature of waste has changed significantly now taking many years to dissolve in landfills (AFN, 2009).

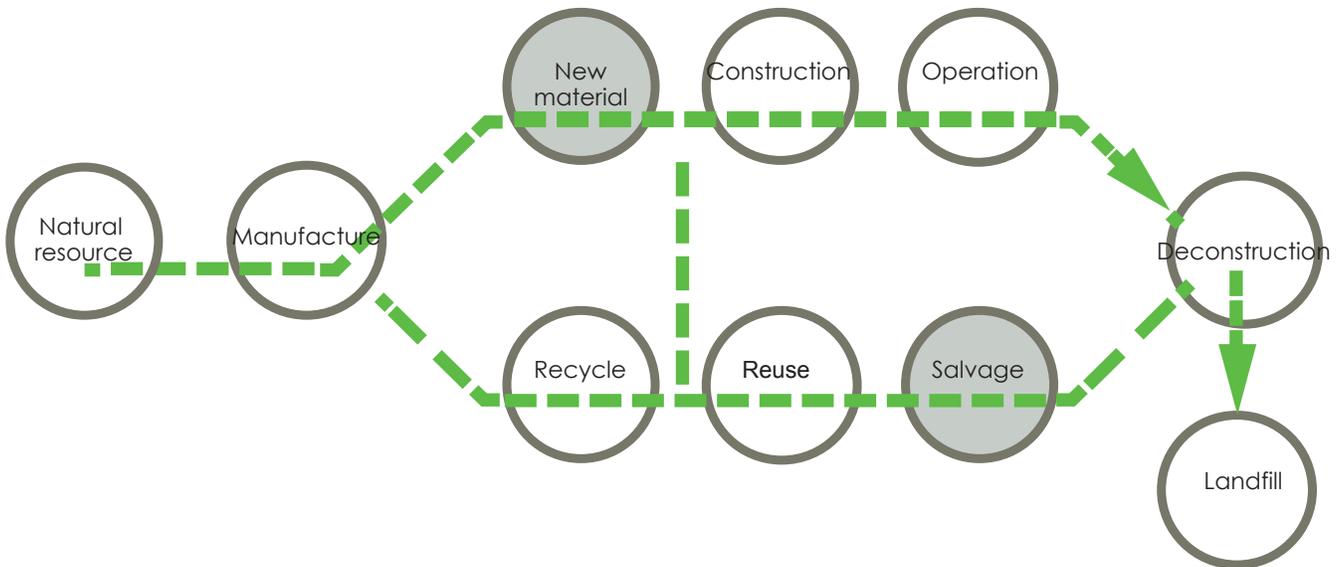
First Nations believed that we are all related and affected by all things in nature and by changes experienced by any parts of nature. There are increasing demands on our energy and material resources and with the rapid changes in our built environment, we are using more and more natural resources to produce new materials to construct the built environment out of.

With 50% of landfill waste generated by building construction we need to begin to rethink our priorities when it comes to the state of architecture today (Chambers, 2011). It is necessary to consider all stages of life of the materials; the production, the construction, the life cycle, and the demolition.

Each construction material is manufactured from raw materials, energy, and produces waste. A clear step towards a better-built environment is taking the waste we have produced in other aspects of our life and putting it towards building materials. Using these materials in construction would not only create greener buildings but also eliminate this waste from landfills or recycling centers that often expend more energy than they are saving (Bahamon, 2010).



Design with new material - cradle to grave



Design with reused/recycling material - cradle to cradle

Fig. 11 :
Material flows
comparison between
design with new material
and design with reused/
recycling material

Material reuse has been a popular trend in sustainable architecture over the last decade. Using old materials and giving them a new life in a building keeps those materials from wasting away in a landfill. Architect and Author Alejandro Bahamon of 'Rematerial: From Waste to Architecture' says that when creativity meets resourcefulness, waste can become the material for building.

Changing the concept of material life cycle from "cradle to grave" to "cradle to cradle" in the building industry. The traditional material life cycle in building industry is linear; there is little use of the waste materials and they tend to send to the landfill. Design with reused material in new construction converts the linear material flow into a closed loop and harvests the remained value embodied in the salvage materials (Zhang, 2011).

In Herzog and de Meuron's Dominus Winery , gabion walls; cages, cylinders, or boxes filled with rocks, concrete or sometimes sand and soil are used a building envelope system. Although Herzog and de Meuron did not use reused filling material in this project, they develop a building envelope system with great potential for utilizing reused materials. The stones of two sizes were packed into a cage to formulate a rain screen, which allows for varying degrees of penetration to light the interior. This gabion wall also acts as a thermal mass that retains cool air during night and releases it to regulate the hot temperature in the daytime (Zhang, 2011).



Fig. 12 :
Herzog & De Meuron,
Dominus Winery,
California

There are different types of material reuse in new building construction. Building adaptive reuse requires the least amount of intervention the structural system. Much of the envelope system of an existing structure is retained, while the interior and mechanical system are replaced and updated. Architectural components reuse, which is the extraction of materials, elements or components from the waste stream and repurposing without further processing or with only minor processing that do not alter the material's nature. The building materials, elements or components from a demolished building could be reused in a different way to construct a building system in a new project. Usually these reused items need to be treated to meet the standards of new construction. Waste material recycling, where recycled materials refer to the use of waste materials, through a series of changes or treatments to make new products.

Herzog and de Meuron are known for their creative use of materials and adaptive reuse projects. The Tate Modern Museum is a contemporary art museum housed in the shell of a former power station. Herzog and de Meuron made a conscious choice only to hint at the ultra-modern interior from the outside of the building. The 5-story Turbine Hall that once house the generators of the station now features gigantic works of specially-commissioned contemporary art by premiere artists from around the world.



Fig. 13 :
Herzog & De Meuron,
Tate Modern Museum,
London

3.3 Site-Specific Architecture

Historically, First Nations architecture has always been site responsive and conscious of the sun and moon, constellations, changes in season, prevailing weather patterns, migration of animals, and the fertility of the soil. Buildings were responses to site, thereby producing the built form as not only a place to live but also a place that documented their way of life including their beliefs in relation to each other and the world around them. Site constraints and elements such as solar orientation, wind direction, and proximity to water dictated which site they settled on and the manner in which they approached their construction (Two Row, 2009).

These forms evolved as a response to the climatic and topographical characteristics of the regions in which they were created. These building types represent a specific adaptation. The relationship of structure to ground and ground to surrounding spaces was carefully controlled. Their buildings had a comfortable relationship with the earth. First Nations structures were not often placed above the ground plane, but instead grew out of the landscape.

This type of building practice is in keeping with the close relationship First Nations people share with Mother Earth and the respect they give it. They are connected to their environment, shaped by their context, informed by their place and responsive to the conditions they inhabit.

Their primary approach to site planning and construction, involved arranging spaces, which were immersed and connected back to nature. They maintained an integrated approach between site, context, and materials (Nabokov, 1989).

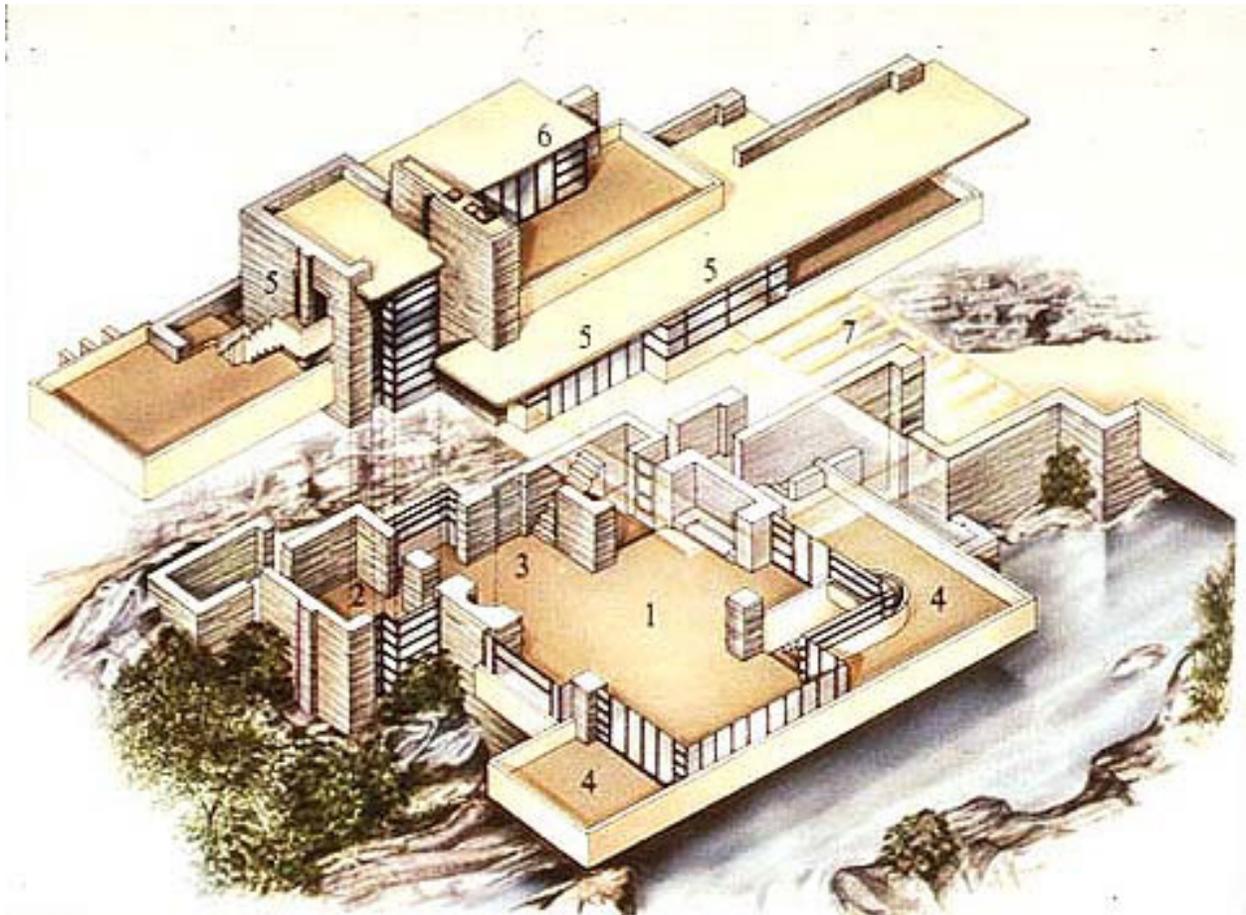
Organic architecture stems from this same philosophy of site integration. It is in architecture that promotes harmony between human habitation and the natural world. Frank Lloyd Wright's manifesto on organic architecture advocated the unity of building and site, the articulation of material and the dynamic potential of the plan. For Wright architecture develops "from within outward, in which entity is the ideal." Nature exists as the binding element, a continuum of space and a means of uniting architecture with its purpose. Wright argued "A building should appear to grow easily from its site and be shaped to harmonize with its surroundings" (Carlson, 2002).

Frank Lloyd Wright's Fallingwater is an example of Frank Lloyd Wright's concept of organic architecture. Organic Architecture promotes harmony between people and nature through design so well integrated with its site that buildings, furnishings, and surroundings become part of a unified, interrelated composition. Wright asserted that when architecture is properly carried out no landscape is ever outraged by it but is always developed by it and that a good building makes the landscape more beautiful than it was before the building was built.

Contemporary First Nations architects like William Woodsworth cite Frank Lloyd Wright as a source of inspiration towards their design. Woodsworth describes Frank Lloyd Wright as a respectful participant in the indigenous architectural discourse within the North American landscape (Woodsworth, 2008). Wright's architecture sanctified landscape and space, and designed in an integrated, environmentally responsible, and cultural sensitive approach that speaks to the traditional qualities of First Nations architecture.

Fig. 14:
Siting cross section of
Frank Lloyd Wright's
Falling Water

The idea of organic architecture refers not only to the buildings' literal relationship to the natural surroundings, but how the buildings' design is carefully thought about as if it were a unified organism (Pearson, 2001). Materials, motifs, and basic ordering principles continue to repeat themselves throughout the building as a whole. Geometries throughout Wright's buildings build a central mood and theme. Essentially organic architecture is also the literal design of every element of a building: From the windows, to the floors, to the individual chairs intended to fill the space. Everything relates to one another, reflecting the symbiotic ordering systems of nature (Freed, 2007).



3.4 Summary

Examining the parallels of First Nations architecture and contemporary architecture reveal many similarities in the current strategies put forth towards creating sustainable design. The research reveals that First Nations respect of nature responds to current issues of building design . Their energy conservation methods towards climate, their responsible material choices, their low impact construction reflect clear cut strategies towards building design today. This chapter examines First Nations architecture key design strategies towards their architecture. Deriving a design that manages to encompass the principles of a site-responsive, material resourceful, and climate responsive architecture.

Fig. 15 :
Alfred Waugh's First
Peoples House, Victoria,
British Columbia



04

Built Upon Tradition

Current designers are looking to First Nations architecture for new strategies to apply to current buildings. Architects are exploring the properties of the earth used by builders of pit-shelters and the insulating advantages of roofs planted with greenery and the site-specific attributes of First Nations architecture are slowly being incorporated into current design (Taggart, 2005).

The 2004 documentary “Living Architecture” by National Film Board of Canada, featured a virtual tour of seven Aboriginal communities of Pueblo, Mohawk, Inuit, Crow, Navajo, Coast Salish, and Haida. The film showcases the employing of old and new materials and techniques featuring First Nations designers who are currently successfully melding tradition with sustainability.

Aboriginal Architecture, “Living Architecture” explores the way Aboriginal architecture reflects the diversity of environments and Aboriginal cultures across North America. Traditional and ceremonial buildings reflect all aspects of life in a particular region and time. Architectural designs were affected by technology, climate, society, religion, economics and history. The film looks at how Aboriginal architecture continues to evolve in response to on-going changes in the natural environment. Current designers are looking to discover if these same ideals be applied to non- First Nations contemporary buildings.

In the exhibition “41° to 66°” co-curated by architects John McMinn and Marco Polo, contemporary buildings from six distinct geographical areas of Canada: Atlantic, Continental, Prairie, Mountain, West Coast, and Arctic, are featured which have drawn their inspiration from vernacular building types and responded to the climate, geography, and cultural differences characteristic of each region. The curators chose to display buildings that address the related issues of sustainability and cultural identity.

The exhibition is a study of contemporary architecture in Canada featuring buildings that have genuinely attempted to address the challenges of sustainability, not only in conservation of energy and resources, but also in response to issues of regional identity and culture. McMinn and Polo argue that early First Nations building types such as the tepee, igloo, and sod house are appropriate models of sustainability for contemporary Canadian building (Lee & Koopman, 2008).

With principles such as conservation of resources, use of local materials, effective ventilation, and the way the shape of a building responds to climate are embodied in the design of these structures (Lee & Koopman, 2008). First Nations people used the resources that were available to them: animal hides, pine trees or in the case of the igloo, snow. Today's architects and builders have far more options available to them in terms of materials and methods of construction. But what is important is not the appearance or iconic shapes of these structures, but the way they are built and the methodology behind their design.

The buildings selected by McMinn and Polo are part of this modern building industry, yet manifest a clear effort to address regional methods of sustainable building. Projects like the Nk'Mip Desert Cultural Centre in Osoyoos, BC have some of these qualities. Designed by Hotson Bakker Boniface Haden Architects for the Osoyoos First Nation, the building uses curving rammed earth walls as a focal design element. The rammed earth walls have low embodied energy but are constructed by the surrounding earth.

As the walls blend in with the mountainside it appears to emerge from the landscape, engaging the user with the site. Hotson Bakker Boniface Haden Architects approach was not to mimic traditional architecture, but to understand it's principles of look to the site to dictate a building's form, material and function.

The exhibit argued not for a return to historical building techniques but instead for a return to a sustainable use of materials and regional building practices. A central concept of the exhibition was building “tectonics”, a term traditionally used to describe the inherent use of materials in buildings and the method of construction, but one which the curators have broadened to include the way buildings function from an energy point of view - a key factor in sustainability.

First Nations buildings display very clear tectonics such as the way wood poles are lashed together on a tepee, or the way frozen water makes the joint line between two layers of snow in an igloo. The contemporary buildings on display in this exhibit shared an equally strong tectonic, although a modern one. With buildings of steel or wooden structures, which are often exposed with carefully detailed connections, natural materials such as wood are left unpainted, the junctions between dissimilar materials are highly articulated.

Richard Kroeker’s Murdena Marshall Meeting Hall in Eskasoni, Nova Scotia is a great example of clear tectonics. In this project small diameter spruce and pine trees are selected for their natural flexibility to form curved arch truss members. The result is a sinuous and organic building that links to the craft traditions of the region and reflects First Nations cultural practices.

The Kugluktuk Recreation Complex in Nunavut by Pin/Matthews Architects responds to the environmental forces of its Arctic environment. The design of the walls and roof form responds to patterns of snow accumulation and drifting, as well as sun and wind patterns across the site. Many of the modern architects have attempted to attune their buildings to their local climate and have begun to look at the tectonics of energy use (Lee & Koopman, 2008). The solar orientation of the buildings are carefully observed taking advantage of passive solar heating and daylighting. The flow of air within and around buildings is also a key driver of form.

Fig. 16 :
Alfred Waugh's
Squamish Lil'wat Cultural
Centre
Whistler, British
Columbia

"41° to 66°" began a dialogue for answers towards more elusive questions regarding sustainability in our architecture today. McMinn and Polo suggest that the current model of Canadian sustainable architecture must look to the strategies of traditional archetypes of vernacular architecture as a means of progressing further within sustainable design.

Alfred Waugh's Squamish Lil'wat Cultural Centre showcases a contemporary reinterpretation of First Nations vernacular architecture. Located within an urban forest, the site has been treated with great respect. The building follows the sloping terrain of the site, leaving the forested area mostly untouched.



The building is a contemporary reinterpretation of the traditional longhouses of the Squamish people, and the Istken or pithouse of the Lil'wat people. Their cultures are grounded in rich, ancient traditions, and continue to grow and evolve in a modern world. The Squamish Lil'wat Cultural Centre was created to preserve their cultures and share them with others.

The building is tucked into the natural incline of the site in order to minimize excavation and 64% of the land was preserved as natural habitat. Waste generated during construction was either recycled or salvaged to avoid disposal in landfills. As much as possible of the materials used to construct the building were sourced regionally. The integrated design process of the Squamish and Lil'wat Nations resulted in a contemporary architecture derived from First Nations testimony to build in harmony with the land and to honor the earth.

Situated on the traditional lands of the Lekwungen people located at the heart of the University of Victoria Campus, Alfred Waugh's First People's House is a multi-purpose educational facility, housing the Indigenous Graduate Student Union, Native Student Union, classrooms, faculty and counseling offices, Elders and student lounges, study areas and a ceremonial space. It was developed as a building design that would honor the identity and pride of Native students; provide a welcoming and supportive environment; and offer an invitation to the world to share and enjoy First Nations culture.

The project seeks to reinforce the position of Canada's First Nations as custodians of Nature. This is reflected in the site design in which minimal irrigation and low-maintenance indigenous plants, including wild grasses, will replace the existing non-local varieties. The upper roof and the lower planted roof drain into the storm water retention pond to the west and north of the building. The west pond has a pond liner, is aerated, and contains water all year. The north pond is seasonal and is the overflow for the west pond (Waugh, 2011)

Fig. 17:
Alfred Waugh's First
People's House cross
section of natural
ventilation technique

The building is passively cooled and reduces energy consumption through the use of a low-velocity displacement ventilation system. This approach is inspired by the Coastal Salish longhouse which had a smoke vent at the top and moveable cedar planks at the bottom of the perimeter walls, and could be raised to allow a low level draft for the fire pit (Waugh, 2011).

Fresh air for the building ventilation system is supplied through a concrete totem and pre-conditioned by passing it through an earth loop before it enters the building.

To allow fresh air intake through operable windows during all seasons, an innovative system was developed combining user-controlled operable windows mechanical vents. Radiant heating lines set below the mechanical louvers pre-heat the air before entering the room ensuring fresh air can be supplied during the winter without compromising thermal comfort.





Fig. 18 :
Alfred Waugh's First
People's House,
University of Victoria

The process of design in Waugh's First People's House reflects the modern and traditional values of the First Nations peoples. Using high technology along side vernacular sustainable strategies, the building takes into the consideration the issues of environment, siting, sunlight, materiality and ventilation. Alfred Waugh consistently creates successful examples of sustainable contemporary architecture by looking to First Nations traditional archetypes for inspiration.

Levitt Goodman Architects' Native Child and Family Services of Toronto [NCFST] portrays a reconnection of nature with First Nations within an urban context. This structure, located in the heart of downtown Toronto, exudes a bold presence from the use of materials, to the incorporation First Nations traditions into its design and planning.

This building is a retrofitted office building. The structure was maintained and re-used as opposed to demolished. Through building orientation, the existing concrete structure is used to maximize the available thermal mass. The floors were also left as concrete, but finished by polishing, so as to minimize the cost of construction as well, which in essence is sustaining the structure and what currently exists. Prominent features of the building stem from the First Nations community and tradition.



Fig. 19:
Levitt Goodman
Architects rooftop garden
of the Centre For Native
Family and Child Well
Being in Toronto.

The rooftop garden houses a First Nations heating lodge and a fire pit. A free-standing meeting room is modeled after the traditional First Nations and is described as “a modern version of the traditional community meeting place” (Bozikovic, 2011). The space is used for meetings, spiritual ceremonies and for private counseling serving as a multi-use space inspired by First Nations traditions.

The building as a whole allows for a sense of tradition, community and culture, where the First Nations community and their beliefs are evident throughout the experience of the building. The buildings access to sunlight, living plants, and the sound of water are constant reminders of the First Nations relationship to the natural world (Goodman, 2011). Levitt Goodman Architects has successfully implemented a contemporary structure that allows a moment of reconnection with nature within the urban fabric of downtown Toronto.



Fig. 20 :

Busby Perkins + Will's
Nicola Valley Institute
of Technology, British
Columbia; atrium
modelled after the First
Nations Teepee

4.1 Summary

These precedents are successful models of contemporary architecture that look to First Nations ideologies, beliefs and approaches to inspire their architecture. Each precedent takes a different approach in translating their traditions, yet manages to tie them back to current sustainable architecture. This thesis is inspired by these projects successful ability to respond and connect to site, nature, and environment. It looks at these precedents as means of proceeding with a design that stems from the virtues of First Nations traditions while encompassing an architecture that responds to the current issues facing sustainability today.

05

Making Connections

Designing with a positive environmental impact involves a building and landscape design that enhances the nature of the site by fostering positive connections between people and the natural environment. To further understand the virtues of First Nations principles and environmental consciousness in application to their site-specific architecture, one must begin to understand how this translates to current architecture. First Nations architecture was a built environment that fostered a response to nature. Building qualities can elicit this response through natural lighting, ventilation and materials. Paired also with the use of shapes and forms that reflect site-specific natural features and processes, certain manipulations of light and space, views and prospects of nature.

The architectural choices made by First Nations were ultimately shaped by their surroundings which in current architecture constitutes as a design that involves many challenges such as promoting energy efficiency, creating renewable energy, reducing resource use, eliminating pollution, minimizing waste and avoiding site destruction. The design encompasses an architecture that is integrated into the site and landscape and forms a building that becomes indigenous and adaptive to its surroundings. Interior to exterior linkages are formed by the bridged connection between the site and building, thus a complete integration of place.

5.1 Site

Brownfield Regeneration

Brownfields offer a more sustainable land development choice and have begun to take center stage in a sustainable strategy to thwart sprawl, preserve open space, reduce greenhouse-gas emissions, and reinvest in urbanized areas and communities (Hollander & al., 2010). Reused brownfields can host new development and new uses that would otherwise spread throughout undisturbed landscapes far outside urban centers. Brownfields can help balance regional land-development processes, so that underutilized land can regenerate. Brownfields stand as both an opportunity for recovering urban land and as a reminder of the harmful and wasteful practices of the past (Russ, 2000).

Common examples of brownfields like corner gas stations, manufacturing plants, mills, silos and landfills are found throughout our urban fabric. These sites are often left contaminated, dilapidated, and dangerous to occupy. Brownfields originated in the early 1990's when researchers saw how emerging regulatory frameworks designed to protect the environment were inhibiting the reuse, cleanup, and redevelopment of former industrial and commercial sites (Hollander & al., 2010). Reusing these sites brings many benefits to the quality of life in the surrounding environment, and if integrated into a broader framework brownfield reuse can address the challenges of reduced consumption of natural resources, cleaner air, water and land; and an overall reduced carbon footprint (Russ, 2000).

Evergreen Brick Works by du Toit Architects Ltd and Diamond+ Schmitt Architects, was a former quarry and industrial brownfield site. The abandoned buildings have been transformed into a cultural center with a focus on the environment. The brownfield site was contaminated with traces of heavy metals, petroleum hydrocarbons, hydraulic oils, lead and silica, all by-products of the brick-making process. In response to the presence of soil contamination, excavation was minimized, filter cloths and other geotextiles were applied to the soil to separate contaminants below from clean soil and storm water above, and raised planting beds were established, providing clean soil volume for new plants (Torza, 2011).

Fig. 21:
Don Valley Brickworks
Toronto before
reconceptualization



Fig. 22 :
Render of Don Valley
Brickworks Toronto,
that is now Evergreen
Brickworks

Most of the buildings were reinforced where needed and repurposed to house the new program and the site was recycled as much as possible while the historical integrity of the Don Valley Brickworks was maintained. Addressing brownfields and the adaptive-reuse of older buildings is inherently sustainable. There are broader sustainable benefits of brownfield reuse and adaptive reuse. The prospect of reconceptualizing and designing upon an environmentally damaged, abandoned landscape rather than undertaking the design of a greenfield or new site, is a contemporary translation of the First Nations approach to site selection.



Victory Soya Mills Silos

Inspired by the restorative approach to environment and nature of the First Nations peoples and their low impact approach to architecture, I looked to the urban fabric of Toronto to discover a site where a building could to grow out of the landscape or structure to enhance its surroundings. I chose the brownfield site of Victory Soya Mills Silos due to its onsite resources, existing structure, proximity to water, solar access and its vicinity to views and connections to the city.

Victory Soya Mills is a prime example of a brownfield site; contaminated land, littered with construction waste, derelict, and abandoned. This design relies on the on-site resources of the site to dictate its form, materiality and function, gradually changing the brownfield site to generate form and encompass program.

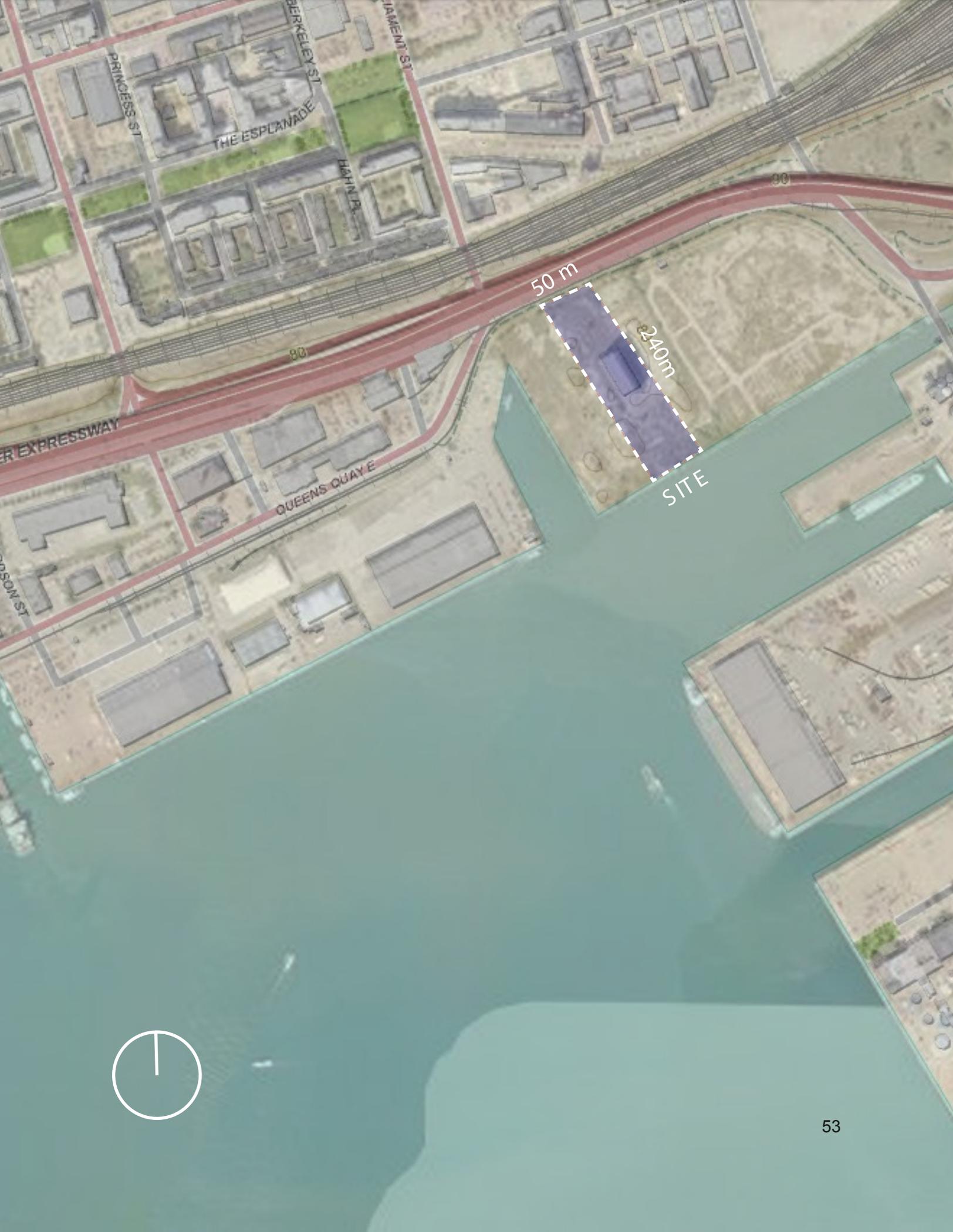
Fig. 23:

The Victory Soya Mills
Looking South West
littered with construction
waste

Fig. 24 :

Site Plan, Scale 1:2000





The site has been left untouched since the 1980s, however as it is prime waterfront property there have been many proposals for the re-conceptualization of the site but none of these plans have yet been realized. In the University of Toronto publication “Arium” edited by Neeraj Bhatia and Jurgen H. Mayer, the Victory Soya Mills Silos were the site of choice for numerous design projects used to showcase the relationships between weather and architecture. The most notable project “Thermarium” by University of Toronto M.Arch Graduates Daniel Rabin and Annie Ritz, examines the process of water overflow and envisions the site as a new beach typology for the Toronto Waterfront.

Fig. 25 :
Thermarium by Daniel Rabin & Annie Ritz using the silos for sediment extraction

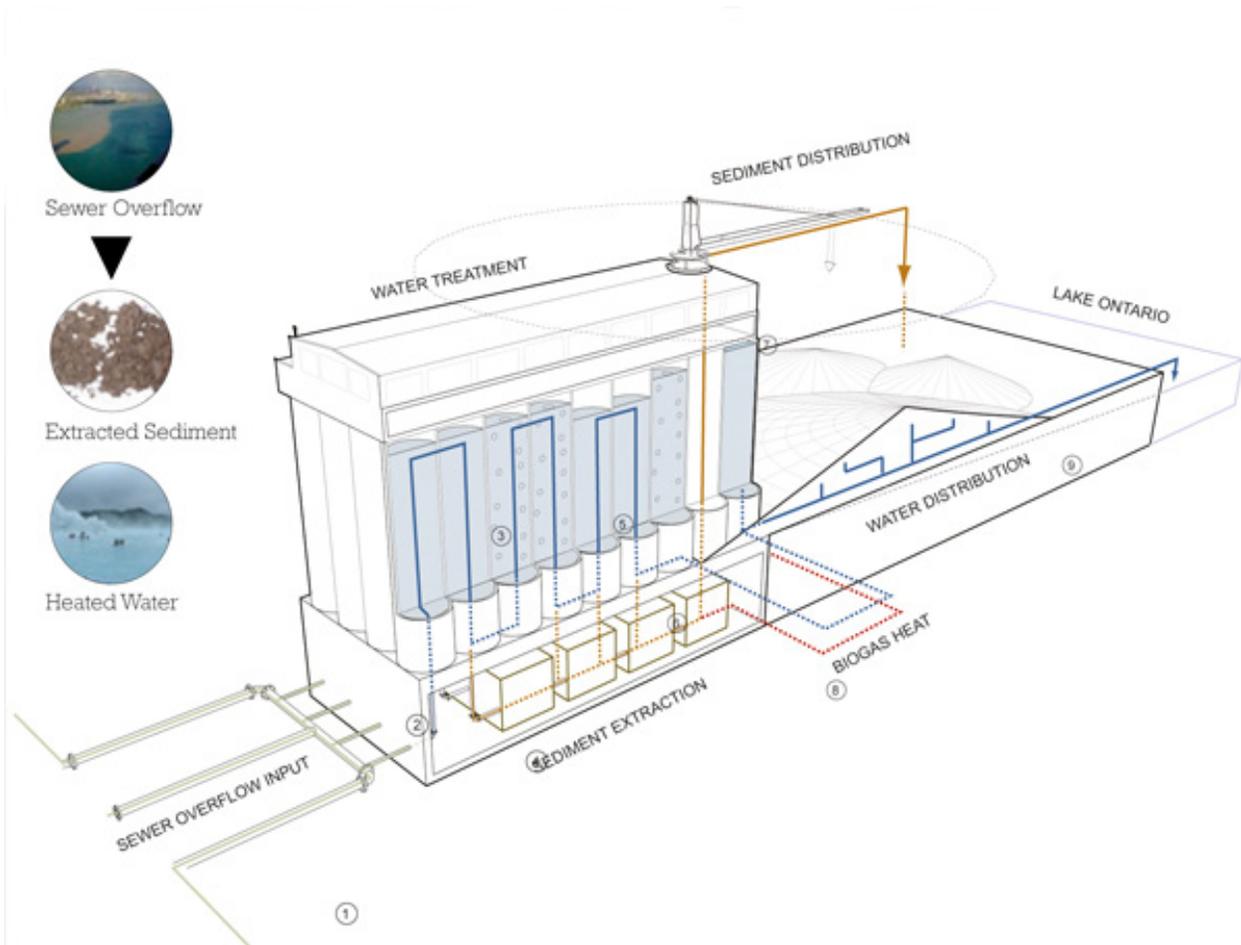
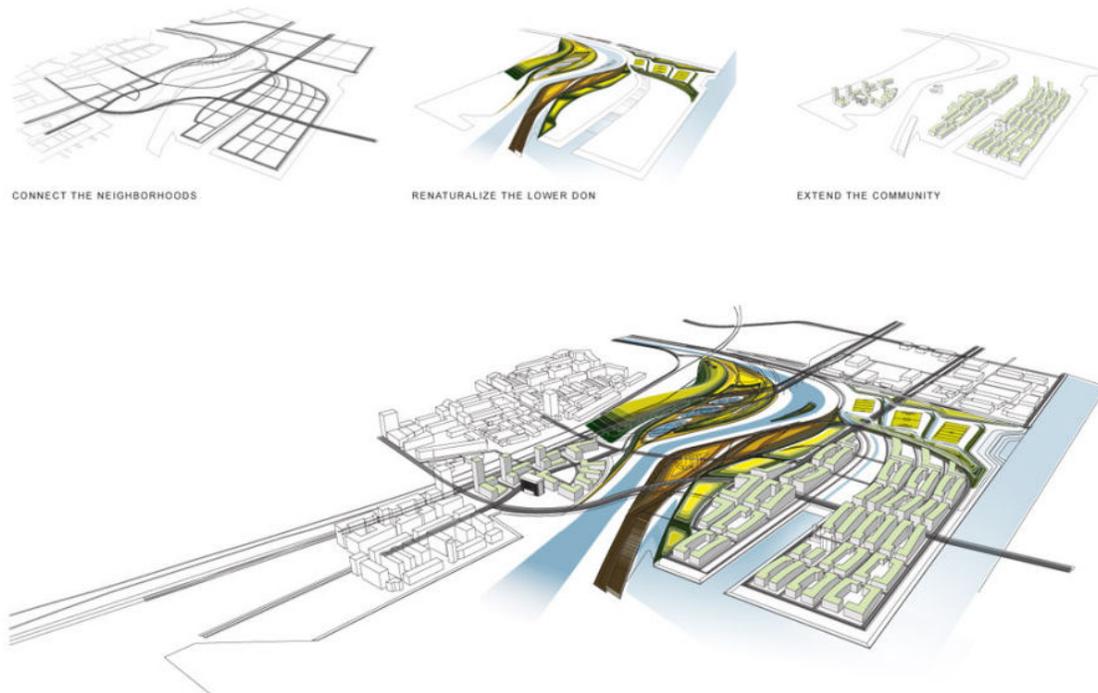


Fig. 26 :

Waterfront Toronto
– West Don Lands
Precinct Plan by
Weiss-Manfredi
Architects

Waterfront Toronto – West Don Lands Precinct Plan

As part of the West Don Lands precinct plan the Victory Soya Mills Silos is situated in the development area of 55 acres labeled East Bayfront. The site extends from Lower Jarvis east to Parliament Street and from Lake Shore Boulevard south to the edge Victory Soya Mills Silos. The revitalization of this land is likely to unfold in phases over the next 10-15 years. The Victory Soya Mills silos are absent from most of the architectural proposals, appearing untouched in the design prospects presented for the site.



5.2 Program

This thesis project focuses on transforming a brownfield site into an architecture drawn from the philosophies of First Nations that utilizes on site and surrounding architectural resources towards a new building design. The intent of the design is to architecturally respond to the First Nations' need to maintain a connection with nature. The project hopes to providing a place that can facilitate this reconnection within Toronto's urban fabric. The program of a First Nations Healing Centre came about as the First Nations sweat lodge ceremony was seen as an essential process of purification when they sought to reconnect with nature.

Fig. 27:
Diagram of procession
through space

The procession through the structure engages the user with the elements present on site. At each point there is a space that commemorates a moment, or grand gesture that engages the user. With the First Nations Healing Centre being placed within the urban fabric of downtown the procession to the site would be most likely by vehicle. However the design encompasses a ramp that leads the user to the entryway of the building by hiding away the parking symbolic of the beginning of the procession, by leaving behind urbanity.

Procession through Space

- A Entryway
- B Circulation
- C Lobby Space
- D Ceremonial Space
- E Exitway (Return to A)

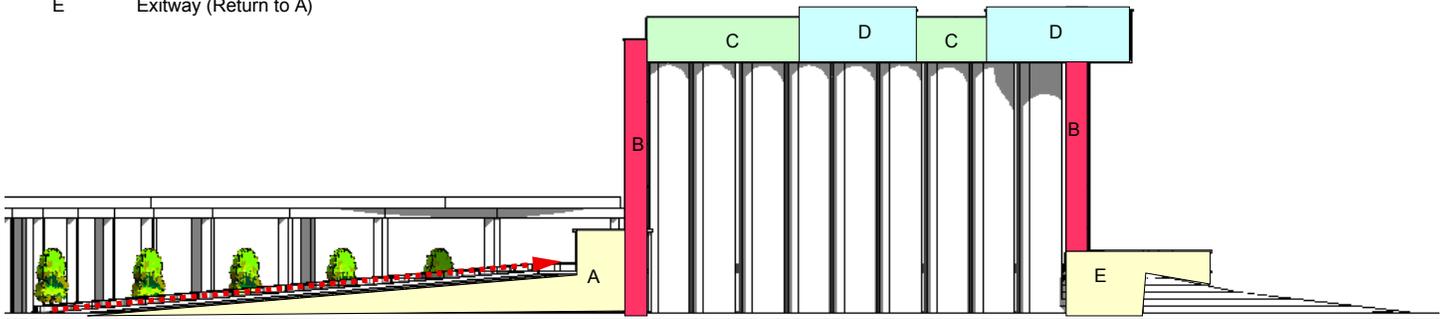


Fig. 28 :
Exterior render of the
entryway (over)

Fig. 29 :
Exterior render of above
the roof (over)

Fig. 30 :
View from glass elevator
overlooking the city of
Toronto (over)





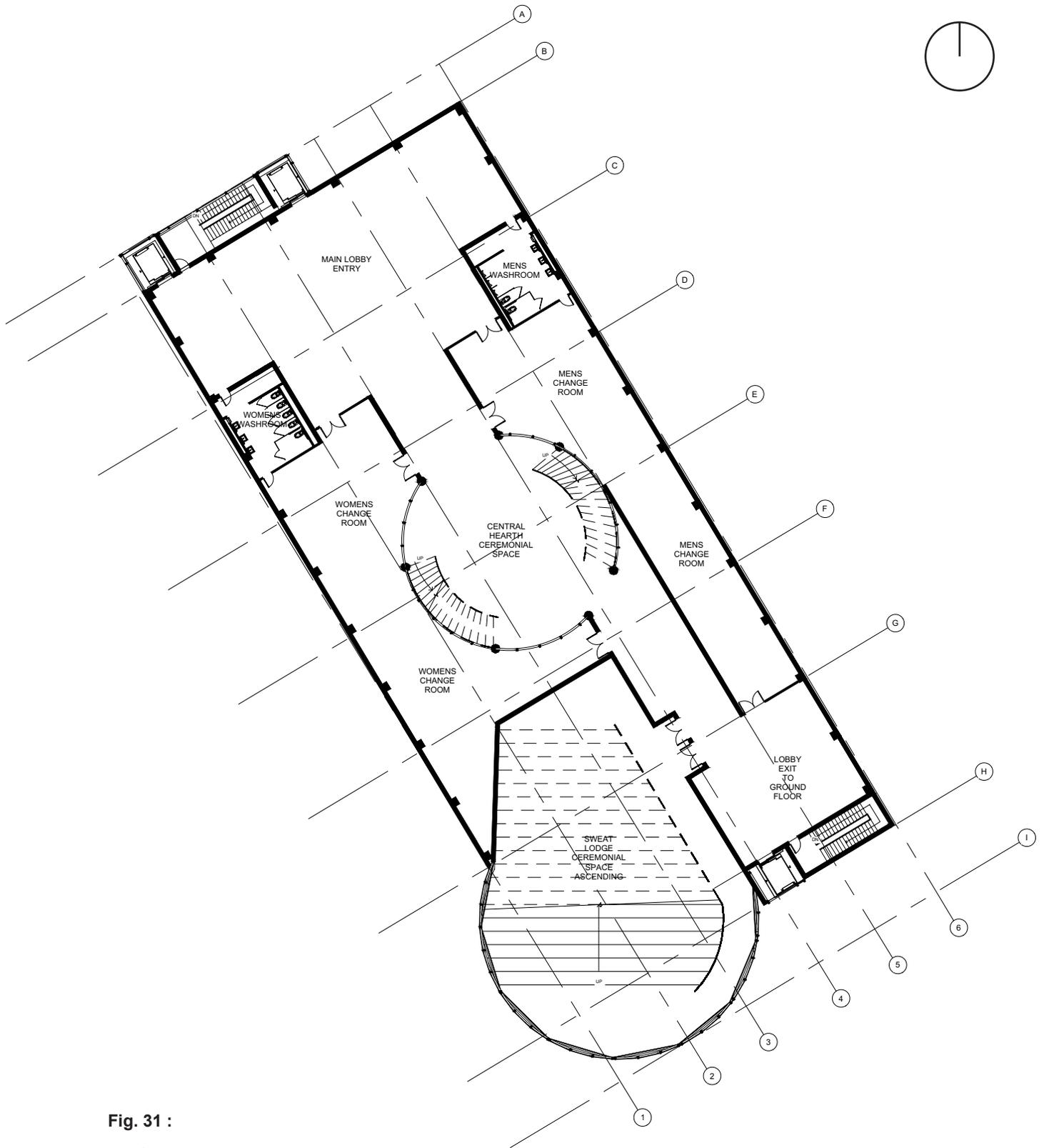


Fig. 31 :
 Roof Floor Plan Level 1
 1:400

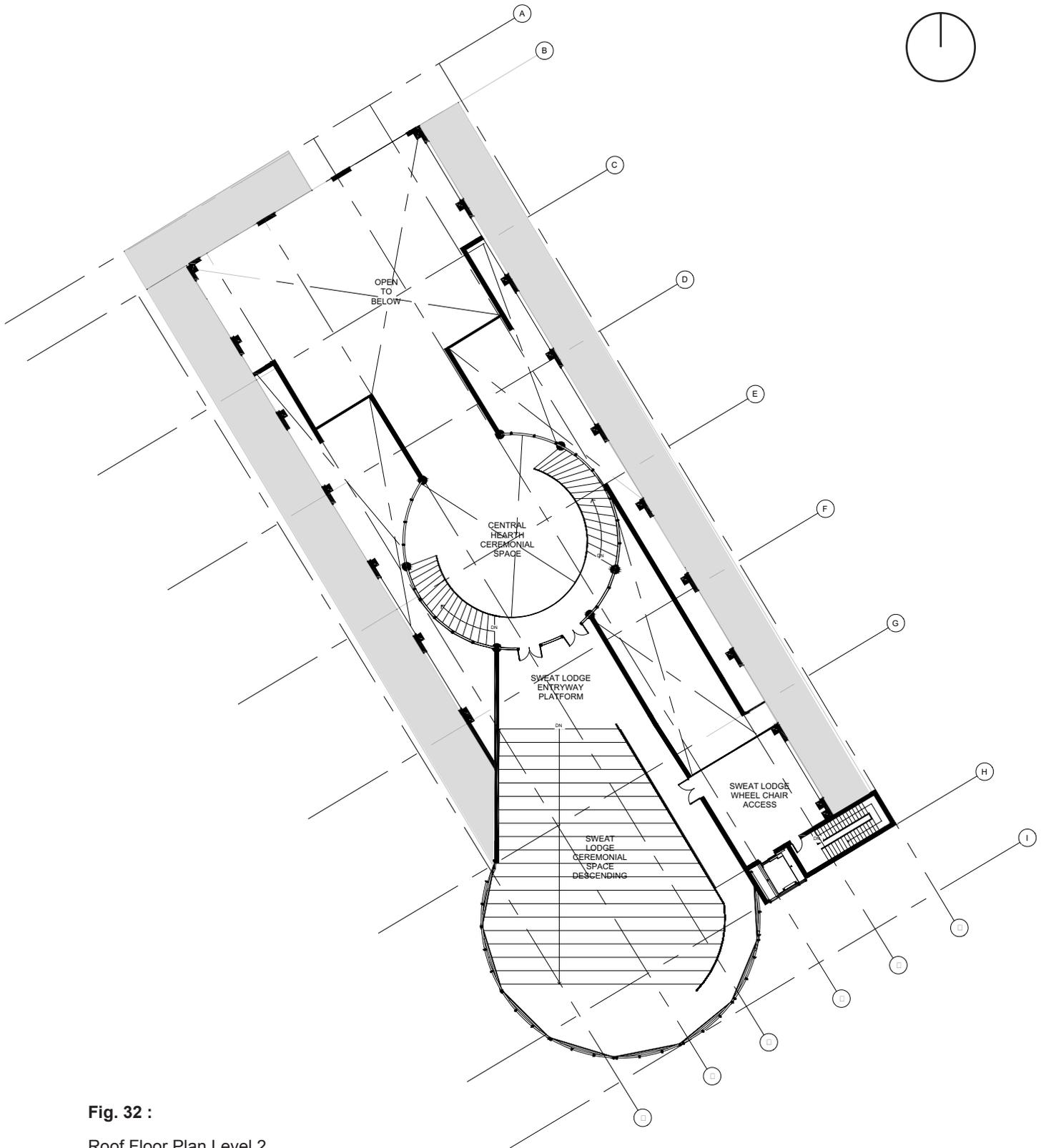


Fig. 32 :
 Roof Floor Plan Level 2
 1:400



The ceremonial spaces are transitions within the design towards the reconnection with nature. They act as places of solace and reflection within the building. Moments of interaction with the site's elements, as the sky and sun pour through the windows and the roofs to give the user the feeling of connection with the environment.

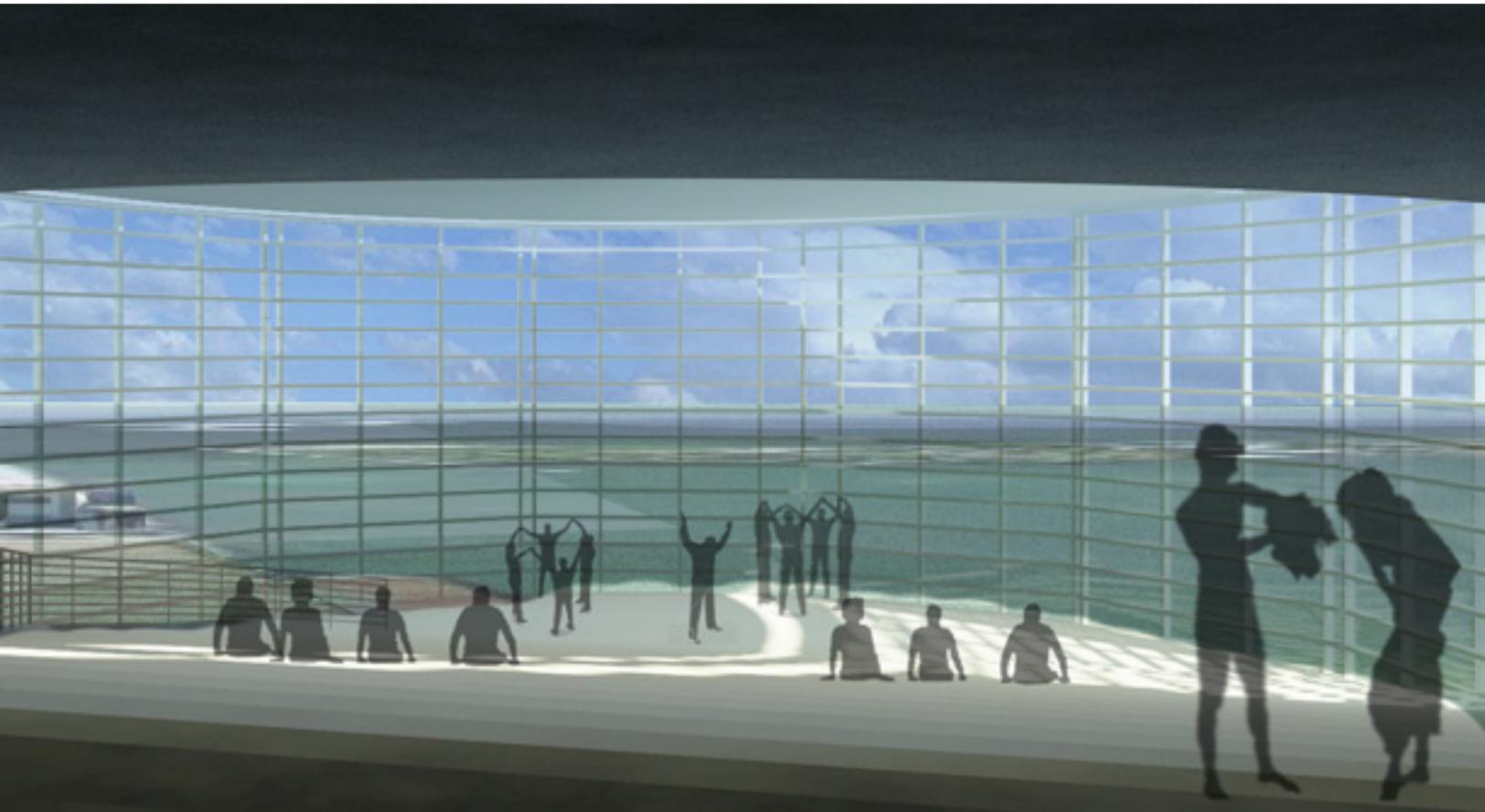


Fig. 33:

Interior render of the ceremonial space

(previous)

Fig. 34 :

Interior render of the sweat lodge space

(previous)

Fig. 35 :

View from glass elevator overlooking the waterfront and Toronto Islands

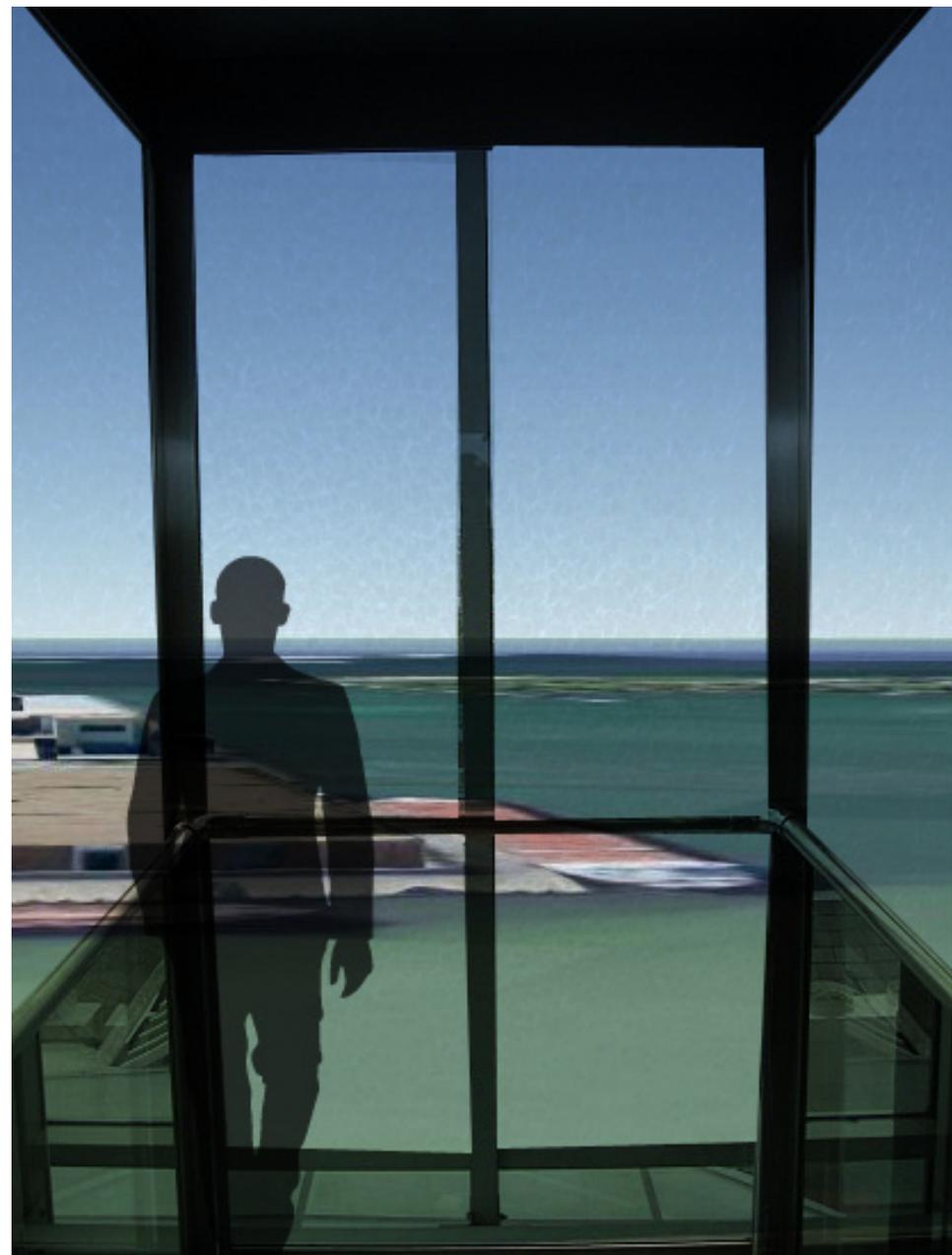


Fig. 36:

Render of the exterior
waterfront



5.3 Resources

First Nations architecture is in sync with its surrounding and becomes a natural extension of its circumstance. The site offers a variety of on site resources and in tandem with the First Nations strategies of environmental responsibility and continuous devotion to nature and the environment, this design looks to the site to dictate its form, materiality and function.

The Victory Mills Silos stand 39 meters high made up hollow concrete silos on 12000 square meters site filled with debris and construction waste. In accordance with the approach derived from First nations of taking a site for its conditions, the design encompasses the reuse of the silos as a structural element. Historically the roof was used to access the top of the silos. The roof serves as a major focal point of the design and offers a unique space to house the program due to its orientation upon site, remnants of structure, and access to natural light.

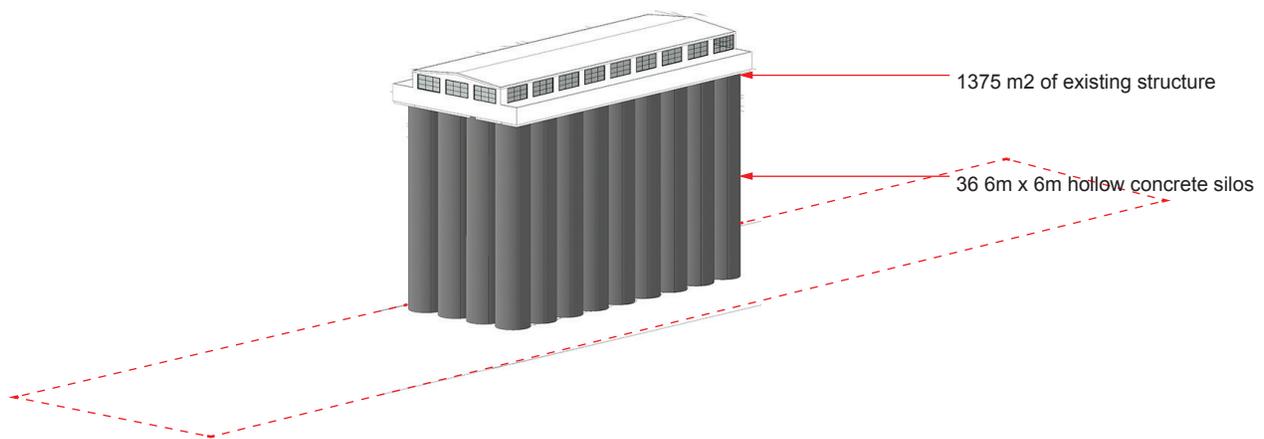


Fig. 37 :
Illustration of the current
site conditions



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333

369

80

Fig. 38 :
Illustration of on-site
material resources

In regard to First Nations respect for the site, the design looked for manners for the structure to reflect its site's properties, in hopes for the structure to blend seamlessly with its environment. The debris and construction waste on site led to serve a greater purpose in the design. By harvesting the waste material into architectural elements, unique methods of material expression, tectonic logic, and spatial organization are development. In light of First Nations material resourcefulness, gabion wall construction was considered for its ease in construction and access to debris on site. Gabion walls are easily adapted to building construction. They are essentially cages made up of materials found on site. Materials such as rubble, concrete, brick are readily available on the site, so it was a logical step in beginning to generate the form of the structure.

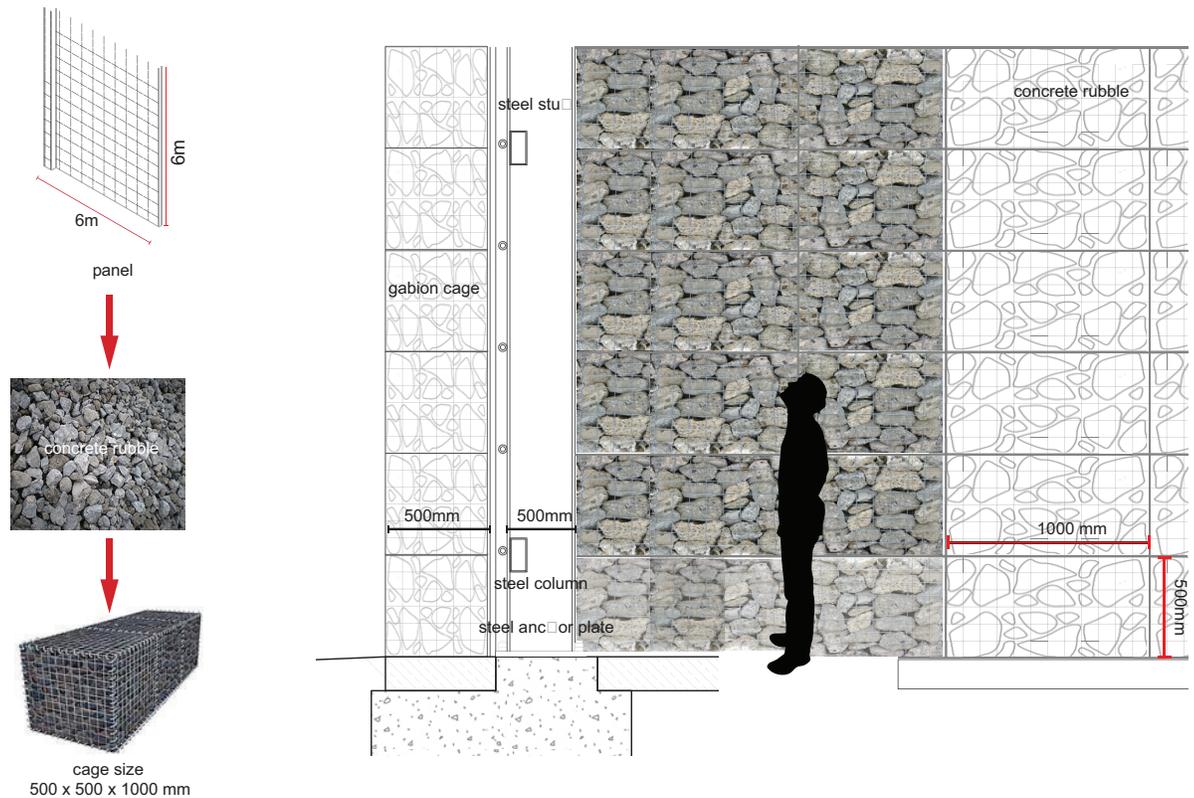


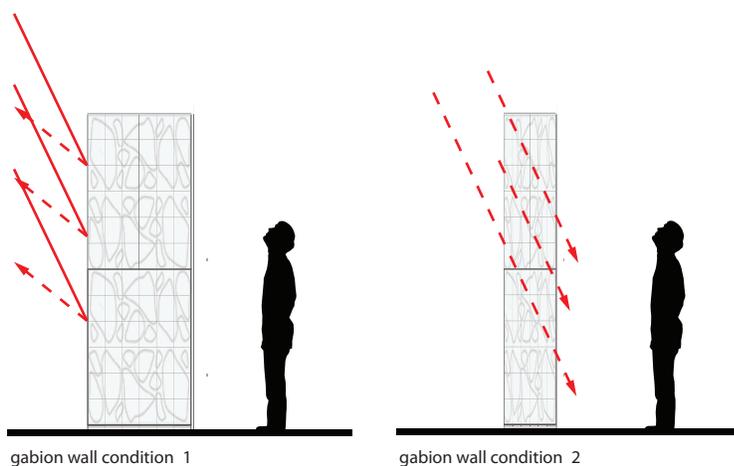
Fig. 39 :
Concrete rubble gabion
wall construction detail





Fig.40 : The thickness of the gabion walls dictate the amount of light which enter the building allowing different conditions to manipulate light to varying degrees throughout the design.
 Render of parking lobby below the main entryway

Fig. 41: Illustration of gabion wall conditions



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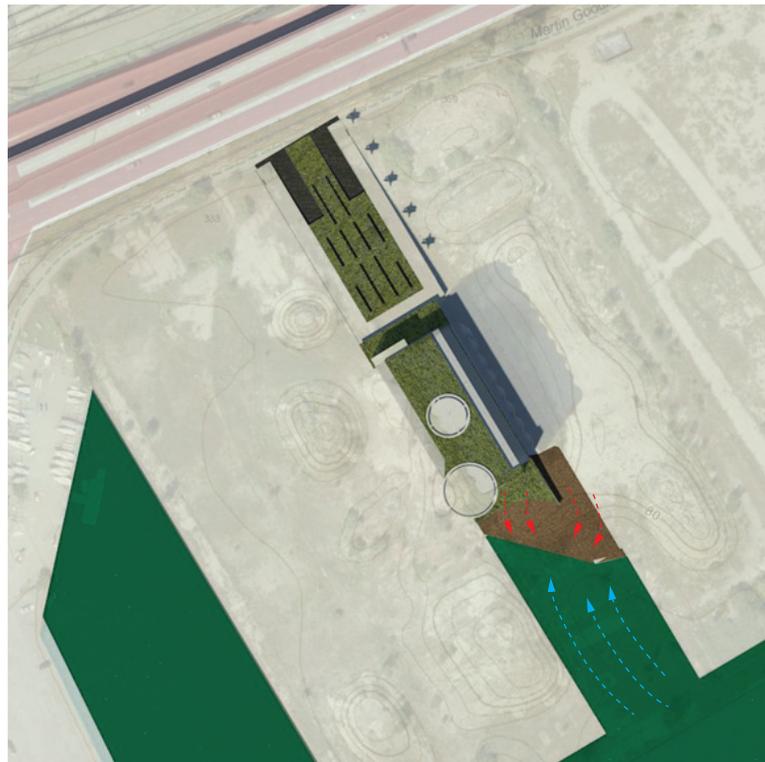


Fig. 42 :
Site Plan of earth
topography (before)

Fig. 43:
Axonometric of site
design

Fig. 44:
Illustration of earth
topography to water

Upon further investigation of the site there were further on site resources such as manufactured earth topography left behind from the extensive industrial use for the site. To draw in the waterfront to engage with the design, these topographies were studied to determine the form of the building while paying close attention to the orientation of the site towards opportunities for natural light and ventilation strategies.



Paired with importance of materiality, the design took into account the passive First Nations approach to appropriating to climate. The study of First Nations architecture offers a wealth of climatic understanding and as a source of inspiration for climatically adapted architecture. The building design attempts to adapt to its local environment through the passive ventilation strategies. This is the essence of intelligent design: smarter, not wasteful. The silos are oriented on site in a manner that allows access to maximum solar gain, which allows the natural environment to both heat and cool the building.

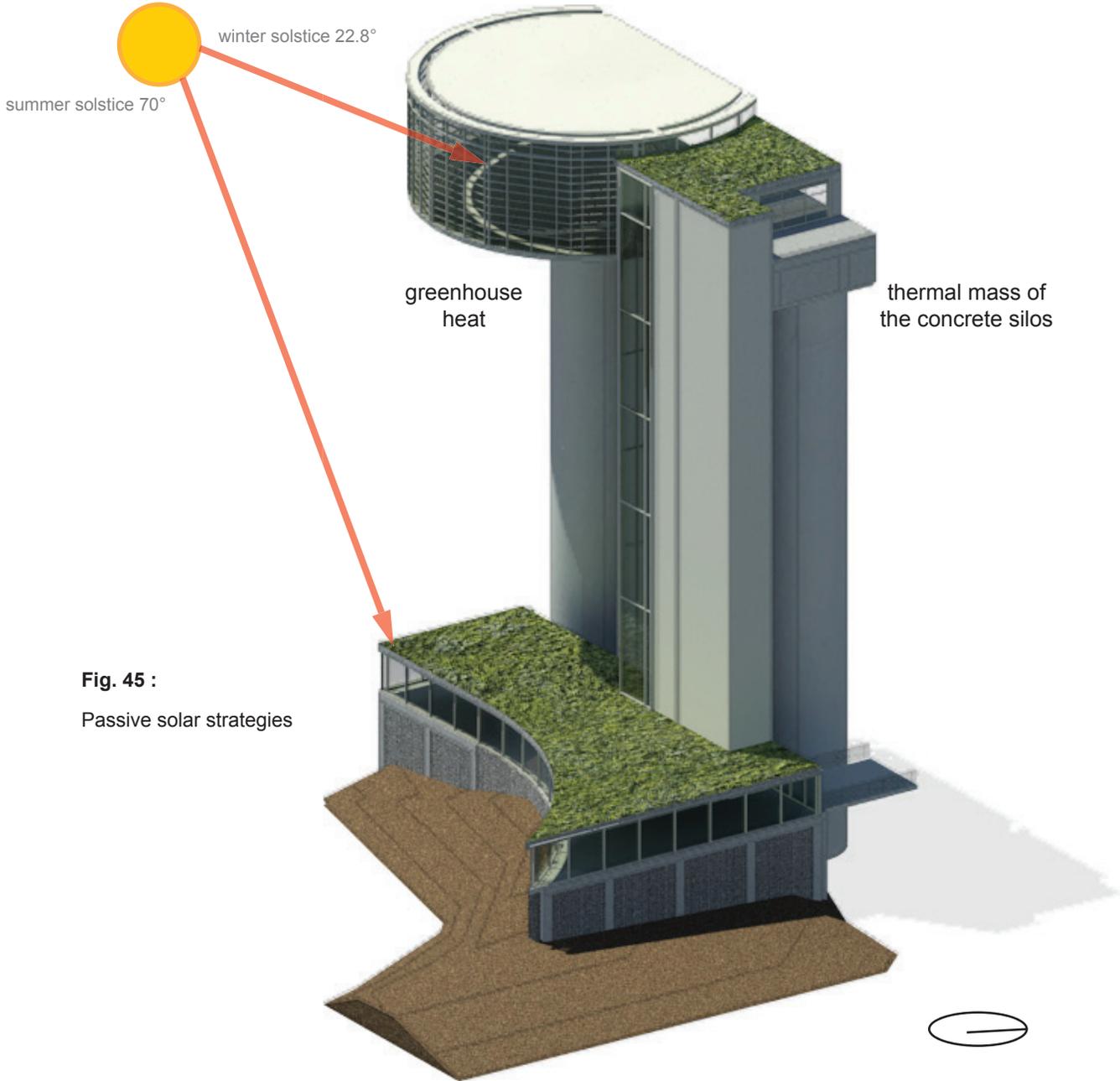


Fig. 45 :
Passive solar strategies

Fig. 46 :

Roof Short Section

1:200 with plan section

cut of thermal mass of

concrete silos

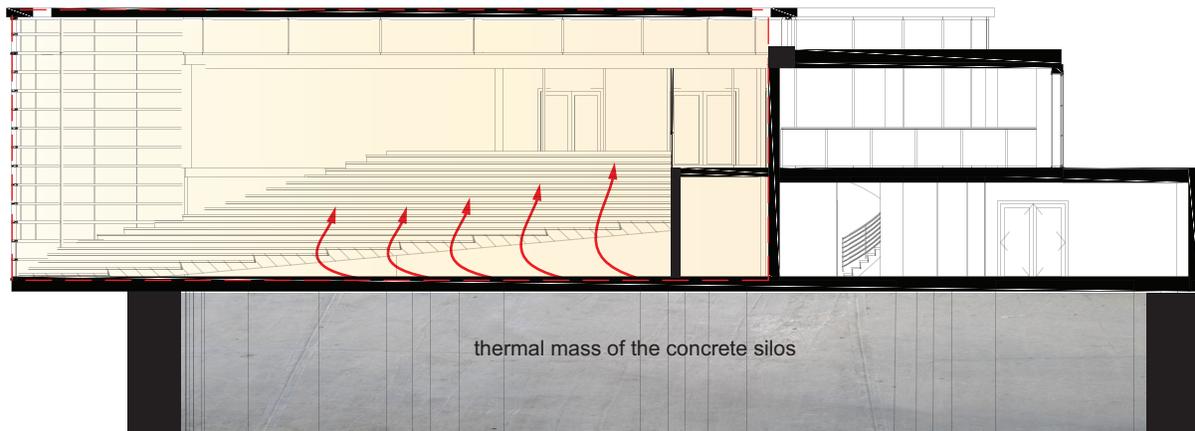
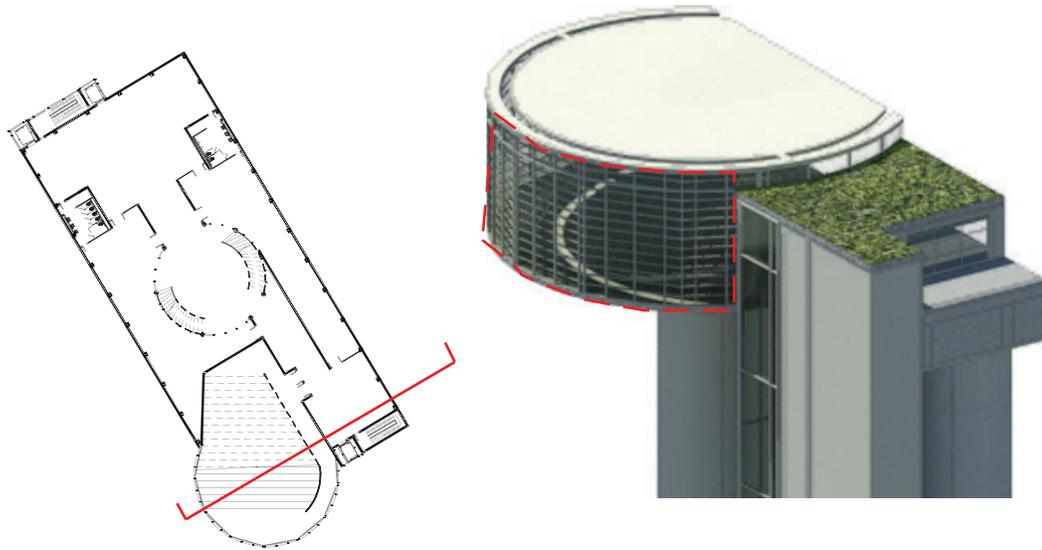
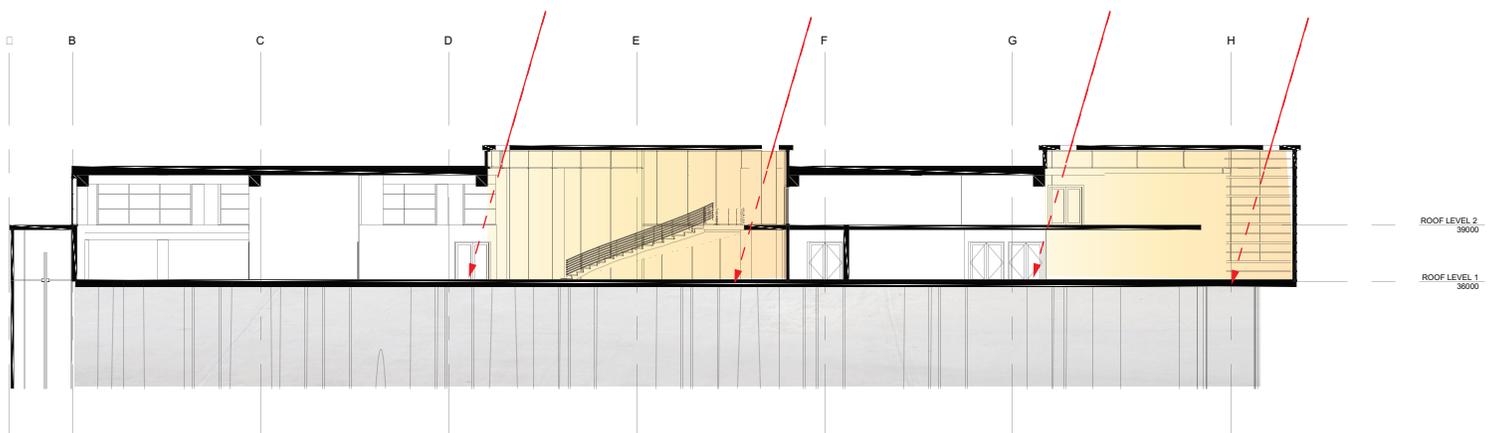
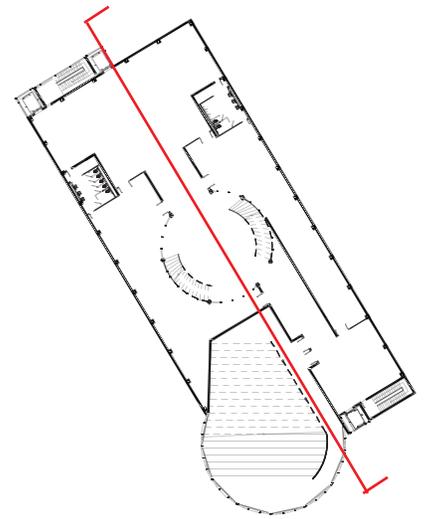




Fig. 47 :
 Render of roof skylight
 composition, Roof Long
 Section 1:400 and plan
 section cut



06

Conclusions

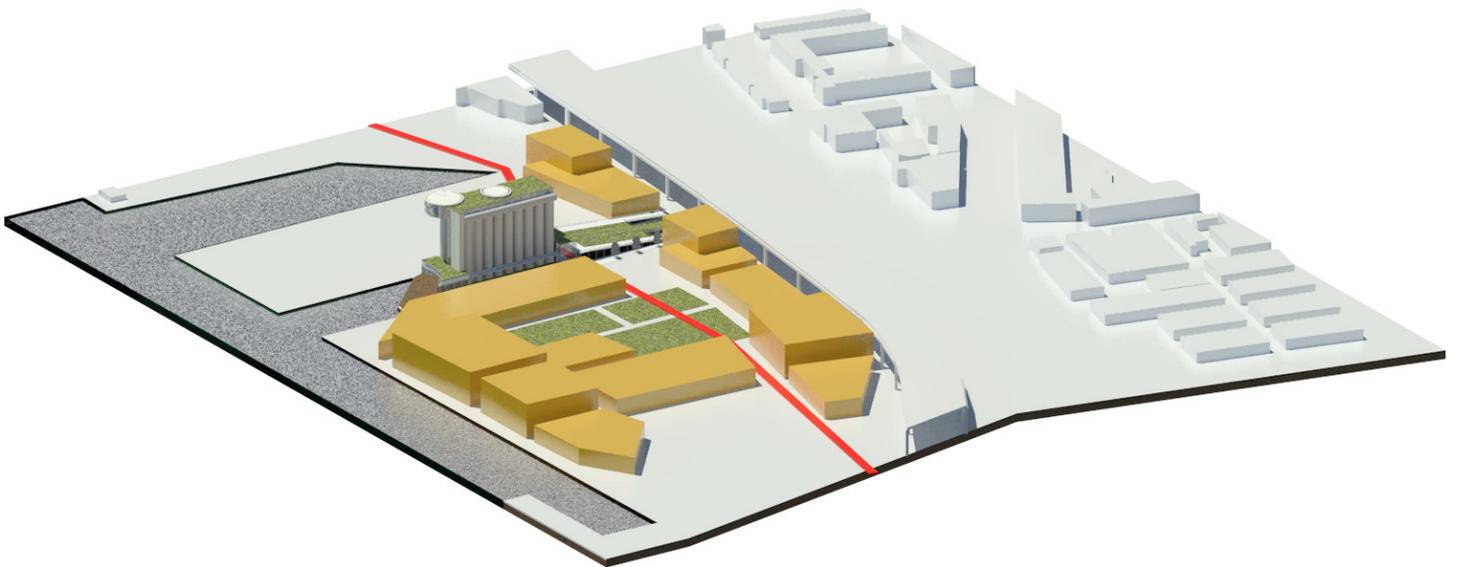
The thesis was inspired by the First Nations ethics, stewardship, and sustainable philosophies towards the earth and respect for the land. It looked to understand how these ideologies shaped their architecture. It sought out to derive key strategies from First Nations architecture and apply them to a current model of contemporary architecture. The research showcased that current designers have also looked to traditional archetypes as a means towards a more sustainable architecture and applied them to the design.

If we are to design in an environmentally responsive and responsible way, we need a holistic and comprehensive approach to looking at building design. First Nations architecture abided more closely to environmental sensitivity than the architecture of today. We have the opportunity as architects to learn from the First Nations approach and begin to let structure, form, material choice and response to the locale and climate distinguish our architecture.

Rather than destroying the environment through our architecture, we must begin to align our design with nature. We are part and parcel of an environmental chain. As we destroy our environmental links, we undermine our own well-being and future. First Nations carried these beliefs throughout their culture and perhaps it is time we passed this traditional knowledge onto our own generations using the past as a means of looking forward.

Fig. 48

Axo of the future
planning for the site
encompassing a
streetcar line .



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