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Creating a cultural dialogue : reinforcing cultural identity on First Nations communities through the use of local materials and vernacular strategies

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**CREATING A CULTURAL DIALOGUE:
REINFORCING CULTURAL IDENTITY ON FIRST NATIONS COMMUNITIES THROUGH THE
USE OF LOCAL MATERIALS AND VERNACULAR STRATEGIES**

by

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Bachelor of Architecture, McGill University, Montreal, 2008

A design thesis|project

Presented to Ryerson University

In partial fulfillment of the

Requirements for the degree of

Master of Architecture

Toronto, Ontario, Canada, 2011

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Master of Architecture Degree 2011

Ksenia Eić

Master of Architecture

Ryerson University

Abstract

The focus of this thesis|project is to reinforce the cultural identity of First Nations communities by incorporating local materials, vernacular strategies, and a collaborative effort into the design and build process. The Maliseet First Nations at Tobique, N.B., which will be used as a case study for this thesis|project, has experienced a deterioration of culture and community throughout the years. As oral tradition is fundamental to Maliseet culture, speaking the language, practicing techniques, and engaging with the community is vital in order to uphold the Maliseet people's cultural identity. However, these practices and values are fading in Aboriginal communities throughout the country. Isolated reserves such as Tobique also suffer from a lack of economic development and employment opportunities, causing residents to feel that they must fend for themselves rather than work collaboratively. Currently, almost all residential construction is contracted to outside developers, which use little to no band labour or resources. With limited government funding, houses constructed over the past few decades have generally been low in quality and constantly require repair, with many instances of severe mould damage. Learning from and incorporating vernacular strategies, techniques, and material use would offer appropriate responses to site and climate while reinforcing the Maliseet people's connection with their land and heritage. Engaging the entire community in the design and built process would pass on knowledge, techniques, and cultural values to the younger generation while strengthening the sense of community and cultural identity. An architectural approach which strives to enable a group of people through use of these strategies will promote self-sufficiency, engage the people in their culture and community, and open a cultural dialogue on the possibilities of design and its contribution to an evolving cultural identity.

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I would also like to thank Gary Gould - general manager of Skigin-Elnoog (off-reserve) Housing - and Andy Scott - former minister of Indian and Northern Affairs - for their time and input. Both gave valuable insight on Indian Affairs in Canada, especially pertaining to housing. Thank you both for your time, the information you shared with me, and for commenting on the practicality and relevance of my design proposal. This all helped me to determine existing opportunities and what issues needed to be address. I especially appreciate your positive attitudes to this thesis|project while still outlining the challenges, as most people said it could not be done.

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Introduction

The development of this thesis has brought many issues into light. The original intent of the research was to develop a simple, economically viable housing solution which would engage the residents and use local materials. Through investigation of cultural values, new questions arose. What is culture and how can it be reflected or reinforced through architecture? When delving into this issue further, it became evident that the more pertinent question was *can* and *should* architecture reflect culture? What is the role of an outsider and architect in the development of a new architectural typology which can establish a cultural dialogue and reinforce cultural identity? Personal biases and perspectives are ever present. Imposing an architectural intervention, however (seemingly) suitable or empowering, is often inappropriate. An architectural language should grow from its surroundings and be engaged with the community, rather than imposed upon it.

After many failed attempts to design a housing typology and/or construction methodology, it became clear that this was not the correct approach. To research and outline lessons taken from vernacular strategies and how to reinterpret them into the present context is much more valuable. The dialogue which arises from learning these strategies, and in turn discussing their applications, is the most important aspect of this whole process. The engagement with a group of people, in this case the Maliseet First Nations at Tobique, with the development of their community is vital if an architectural intervention is to reinforce cultural identity. A culturally-responsive, community-driven housing initiative would engage residents in a cultural dialogue and reinforce their cultural identity through both mind and body. In the developmental process leading to the design, it is essential to consider the regional context and how culture, local materials, and vernacular strategies can be integrated into an appropriate and engaging design. An architectural approach which strives to enable a group of people through use of these strategies will reinforce cultural identity and enable the residents to engage in and learn from their heritage. The cultural dialogue which emerges is the most important aspect of this process and this thesis discusses the importance of architects and cultural groups researching and engaging this topic.

1. The Cultural Implications of Architecture

The relationship between culture and architecture is complex. Entire nations are often defined by a single architectural style, and yet their culture, and the vocabulary used in vernacular architecture, is far more complex than this simple description would suggest. Cultural biases are often expressed through architectural forms and styles without consideration to an evolving cultural identity or way of life. Culturally-responsive architecture must respect the complexities and changing qualities of culture, expressing these nuances while allowing for development over time. The question then becomes, why is it important to consider the effects of cultural identity and development in architectural projects? The importance of these implications have begun to be brought into question as a result of discussions on critical regionalism in architecture, which have become increasingly influential over the past couple of decades. A regionalist approach would allow groups of people and rural communities the opportunity for self-expression and reinforcement of cultural identity; However, the opportunity for nostalgic referencing and misrepresentation are great and should be avoided. From the perspective of a designer, one must remain aware of the challenges involved in working with and representing a group of people and recognize one's own biases. With so many complexities regarding culture and its representation, it becomes questionable whether architecture can in fact represent a culture. More importantly, should this be considered a role of architecture? How can the built form contribute to an evolving cultural identity rather than a static representation of a singular vision of culture?

1.1 The hierarchy of culture

The word "culture" is multi-layered and extremely difficult to define. The Oxford Dictionary defines "culture" as "the arts and other manifestations of human intellectual achievement regarded collectively" and/or "the ideas, customs, and social behaviour of a particular people or society." What becomes clear is that "culture" is not clearly definable and can be interpreted in several different ways depending on one's perspective and opinion. Architectural history itself has developed based on Western biases towards certain cultures and social levels. It is difficult to determine when the emergence of culture as an integral part of architectural discourse occurred as different civilizations evolved in completely different eras (Baydar, 2004). According to Gulsum Baydar in his article "The Cultural Burden of Architecture", colonization, throughout different moments in history and in geographic contexts, has resulted in the discovery of diverse

cultures and their effects on each other. At the moment of colonization, the question of defining architecture shifted from Vitruvius's notion of the difference between architecture and shelter to conflicting notions of universal and regional architecture. This created tension as ideas of "wholeness, continuity, and essence" were integral to the Western definition of culture and art (Baydar, 2004). Reinforcement of ethnic and racial hierarchies followed colonization, with imposition of rigidly defined architectural languages and cultural values. Post-colonial ideologies stressed heterogeneous, decentered cultural categories, which suppressed and classified ethnic groups through a lack of defined cultural identity as opposed to an overly rigid, misrepresented definition of cultural identity (Baydar, 2004). Both of these definitions of cultural identity can be extremely detrimental to a group of people and can result in social and cultural isolation.



Figure 1.1 Tjibaou Cultural Centre by Renzo Piano. Image credit: Galinsky

While architecture can be used to suppress a people, it can also be used to re-establish power through expression of cultural identity and development. Temples, monuments, churches, and cathedrals have been used to represent power for centuries. While most minority groups do not possess the resources for such endeavours, some have utilized the same strategy to give themselves a voice and a sense of establishment. The Tjibaou Cultural Center in New Caledonia by Renzo Piano (Figure 1.1) played a symbolic role for the Kanak people. It stood to elevate their status with relation to the French and surrounding island cultures. The beautiful, grand forms and advanced systems in the complex provide a sense of progress and wealth to the aboriginal people (Findley, 2005). Arguably, the reflection of culture in the building

more successfully establishes a sense of status, pride, and power to the Aboriginals than it acts to fulfill a lost sense of cultural identity. That being said, the centre reinterpreted vernacular building strategies of the Kanak people to provide a site specific and culturally appropriate response (Findley, 2005). This shows that grand architecture used to reinforce power is not solely used as a method of establishing dominance; it can work on a cultural level for minority groups as well.

Throughout history, architecture has been used as a tool for displaying power and wealth, with cultural precedents generally being taken from buildings for the privileged and wealthy (Rudofsky, 1964). This not only leads to a misrepresentation of culture, but can have serious sociological implications due to use of inappropriate design strategies. Egyptian architect Hassan Fathy strove to re-interpret vernacular building strategies and techniques in order to provide adequate housing for Egypt's rural poor. He criticized modern Egyptian architecture for replacing vernacular strategies and architectural styles for a more universal architectural language (Fathy, *Architecture for the Poor*, 1969). He believed that the existing architecture disregarded culture and climate and produced sub-par living conditions. It also disconnected the population with its cultural heritage. He believed that implementation of vernacular strategies and techniques would provide more culturally and climatic responsive architecture while reinforcing cultural identity. A key part of this was the engagement of public with these built forms, passing on techniques through participating in the building process (Fathy, *Architecture for the Poor*, 1969). While his aspirations were great, he fell prey to the issues Rudofsky expressed in *Architecture Without Architects* of setting design precedents on the wealthy. For his housing proposals for New Gournah, Fathy implemented a courtyard house design used by the bourgeoisie of mediaeval Cairo. The working class had difficulty accepting these layouts as they generally could not afford trading usable land for open space. Public buildings grouped around large squares, a common phenomenon in the Mediterranean context but extremely rare in Upper Egyptian villages. The centre of social life in Egypt was commonly the streets themselves, with the winding, narrow streets of New Gournah acting as far more successful social spaces than the squares Fathy provided (Steele, 1988). This demonstrates the importance of understanding the multiple layers of culture and vernacular architecture. While a given architectural style may be of cultural significance, its implications may vary depending on its application. Assuming immediate acceptance of a "culturally relevant" design is a dangerous assumption. Even if the architect involved in a project is from the area in question, they still

possess their own biases and must work closer with the residents to provide what is needed - a culturally relevant design with regards to its appropriateness to the current reality.

1.2 Establishing cultural roots

While the Kanak people were able to commission a remarkable work of architecture, not all minority groups are so lucky. Unfortunately, the development of most suppressed groups is left to the will and involvement of the government. Even when working with the best of intentions, this involvement can be extremely detrimental and cyclical in nature. A prime example of this is the cultural, as well as social and physical, suppression of African American people. In his book *Architecture for the Poor*, Hassan Fathy discusses the “rootlessness” of African Americans and how atomization of a people has rendered them nearly powerless and without a sense of cultural identity. Africans were sold as slaves in West Africa and shuffled around to eliminate the unity and power of tribes. Rebellion was next to impossible as the members of different tribes could barely communicate with one another. Families were also separated to further atomize the people. Even after the American Civil War, African American communities largely consisted of shanty towns overrun with poverty and little opportunity for people to gain skills and employment. These conditions were seen as disgraceful and detrimental to the residents. Many citizens, architects, developers and politicians worked to build a better reality for the African American people. While the notion of urban renewal seemed commendable, Fathy explained that “it represented yet a new uprooting of communities whose roots were battered and undernourished. However weak were the ties between neighbours, the process sundered them and forced the individuals to begin all over again in a new, alien, if better physical environment.” The “vertical slums” which resulted from the social housing projects maintained, if not worsened, poor living conditions. Fathy argued that the growing social problems, such as a surge in crime, were a result of a lack of sense of territorial identification. The seemingly good intentions of outsiders only exacerbated social and cultural issues and the African American people struggle to this day to ground themselves and gain positive momentum.

1.2.1 Disconnection with culture on First Nations communities

A similar story exists for the First Nations population in Canada. While bands maintain a certain portion of ancestral lands, similar social ills and issues regarding cultural identity exist in

these communities. While Africans were intentionally segregated and tribes mixed to reduce power, Aboriginal bands maintain a percentage of their land and given rights to remain on these communities. Many of these reserve communities are located in isolated contexts and are dependent on government funding as a result. . Geographic isolation minimizes employment opportunities but also weakens communication between bands as well as between the Aboriginal and non-Aboriginal population. This has led to misunderstandings and resentful feelings between the Aboriginal and non-Aboriginal populations. The non-Aboriginal population feels that there is an unfair bias towards First Nations and that they are receiving an unequal amount of funding and aid. The misunderstanding comes from the fact that this reliance is detrimental to the Aboriginal people and has resulted in a cyclical pattern of dependence that the Native people and government alike have been struggling to change for decades. The dependency on outside aid has also affected the culture in these communities. The housing is banal, inadequate for the size of families, and disregards cultural and climatic contexts. Depression, substance abuse, and high drop-out rates are some of the many social and health-related issues which have resulted from an apathetic and hopeless mentality. Many Aboriginal people feel a profound sense of loss and disconnection with their cultural heritage and much of this has to do with the realities on Native reserves. The residents do not engage with their community and its development on a fundamental level, thus distancing them from each other and their heritage.

1.3 Effects of outside influence

Issues regarding loss of cultural identity and disengagement with community and heritage are common effects of outside influence. The effects of a global economy and a universal architectural language are especially conflicting in rural communities, such as Native reserves, where poor populations struggle to maintain cultural identity and adequate living standards. (Steele, 1988). It is an undeniable fact that outside influences will continue to shape these communities, making them more dependent on outside aid and diluting distinctions in culture. The dilemma arises in that these communities will lose autonomy, self-sufficiency and connection with their own culture and vernacular strategies, which have supported their way of life for generations (Balbaa, 2007).

Responding to these issues is extremely challenging. In his publication “Regionalism within Modernism” Suha Ozkan discussed the opportunities and challenges of vernacularism

and neo-vernacularism. He explained that although some Hassan Fathy's aspirations were noble, many of his projects executed in rural contexts were unsuccessful. This was largely due to Fathy's uncompromising ideals and the "distorted aspirations and values" the locals held towards contemporary design. Ozkan described this reinterpreted take of vernacularism as neo-vernacularism. This is most commonly seen in touristic applications as it reflects a certain universally accepted image of local culture (Ozkan, 2007). Pallasmaa criticises this approach in his essay "Tradition and Modernity" as it often applies one-dimensional, nostalgic references of vernacular forms in order to create a "sense of place." The issue with this strategy is that it assumes that culture is static and of the past – something to be referenced (Pallasmaa, Tradition and Modernity: The Feasibility of Regional Architecture in Post-Modern Society, 2006). The same opinion is shared by Keith Eggener, who writes about the tendency for "sentimental embracing" of the past. A single architect's vision or interpretation of a culture can become the definition of regional architecture for a particular area or group of people. He criticises Frampton's precedents for critical regionalist projects, especially his selection of Luis Barragan. Eggener discussed how Barragan's work was so widely accepted by the global community and yet unappreciated by the locals. His reflection of Mexican architecture through his projects was seen as pure, energetic, and colourful by the architectural community, and yet the references were all based only on his own understanding, experiences, and opinions (Eggener, 2007).

1.3.1 The role of architecture in defining culture

The issues arising from Eggener's criticism of Luis Barragan brings into question the role of architecture in defining and reflecting culture. A single work of architecture cannot possibly define an entire people and their history, and yet this is often the result of works by well-known regionalist architects. While commending Fathy's efforts, Ozkan also spoke of the failures and challenges that emerged. Ozkan defined his approach as "abstract regionalism," a category of regionalism aiming to respond to cultural issues through extracting qualities of a building into a newly synthesized design (Ozkan, 2007). The challenges involved in this strategy are described by Ozkan in the following:

An attempt is made to define, in terms of design elements, the prevalent culture of the region concerned. This is a long, tedious, and sometimes endless devotion to an ideal. The line which separates a solemn, praiseworthy, regionalist achievement from a worthless pastiche or a pot-pourri of the past is very thin and delicate. (p.109)

This thesis originally aimed to reinforce cultural identity through architecture using an abstract regionalist approach. After several design exercises and extensive research into issues pertaining to housing on Aboriginal communities it became evident that this is not simple to achieve. The concerns brought up by Ozkan, Eggener, Frampton, Pallasmaa, and other architects point to the challenges of reflecting or reinforcing culture through architecture. They also question what the role of architecture is with regards to cultural identity and the undeniable presence of biases. While architecture can reinforce biases and singular definitions of culture, it can also establish a new narrative of the past and reframe our understanding of current cultural and social conditions. The dilemma of re-interpretive narrative in architecture and how it affects our understanding of the past are explained by Collier in the following:

The story never stays the same; every time we tell it we reinterpret it in the light of new experience. Sense-making happens not just by retelling the past so as to integrate it into the present, but by interpreting both past and present in the light of understandings of future direction and purpose. (p.92)

1.4 Summary

Just as our understanding of the past is constantly changing, so is our understanding of others and our own cultural identity. The fluid quality of culture and our interpretation of it make it almost impossible to represent in a single architectural effort. For this reason, the focus of this thesis is to discuss the opportunities that exist in reinforcing cultural identity through architecture and possible strategies that can be implemented. Through learning from vernacular strategies and techniques, a group of people – such as First Nations communities – can reconnect with their heritage and engage in their culture. What is most important in this strategy is opening a cultural dialogue within a community as well as between the architect and cultural group. Rather than proposing a complete design, an architect should present approaches and techniques inspired by vernacular strategies to a community in order to re-acquaint them with culturally and regionally appropriate design. It is important to work closely with the residents in order to enable them to actively engage in an architectural response, thus reinforcing their connection to their heritage as well as their community. An architectural approach which strives to enable a group of people through use of vernacular strategies, local materials, and a collaborative effort will reinforce cultural identity and enable the residents to engage in and learn from their heritage.

2. The Language of the Built Form

The effects of culture on architecture, and vice-versa, are multi-faceted. The language of the materials and form of a building can hold significant meaning and symbolism. Brian Vall, a local architect in Acoma Pueblo – the oldest continually-occupied city in North America – explained that in order to build significant Native American architecture one must ask the question “will this building talk and tell a story?” Housing on most First Nations communities, do not seek to tell a story through use of materials, building process, or design. Instead, bands are given cheap, typical CMHC – the Canadian Mortgaging and Housing Corporation - style residences which often fall into disrepair and do not respond to the local context. While it is clear that providing an appropriate and contextual housing type is necessary for the betterment of these communities, what is often not addressed is the importance of tectonics and semiotics. Embracing these aspects in the design and build process could develop a rich cultural dialogue and instil meaning into the building itself. Opening this cultural dialogue through the tectonics and semiotics of the built form would unite mind and body and reinforce Native people’s connection with their land, community, and spirituality. It would also encourage further experimentation with material use and design strategies.

2.1 Architecture and evolving cultural identity

The language of the materials and form of a building can hold significant meaning and symbolism. Contemporary Native architecture often attempts to incorporate Aboriginal styles and symbolism in their form or facade; however, many of these attempts are simply applied styles which play off of nostalgia. Rather than seeing culture as static and a thing of the past, culturally appropriate designs acknowledge that the built form shapes as well as reflects culture (Eggener, 2007). The Egyptian architect Hassan Fathy sought to strengthen communities through the use of local materials and vernacular building techniques and strategies. He felt that through this strategy he could help re-teach cultural heritage and techniques to the residents. Fathy studied pre-industrial building systems of Egypt in order to understand their aesthetic qualities, learn climate control techniques and implement economical construction techniques in a contemporary way. In his book, *Natural Energy and Vernacular Architecture*, Fathy criticises how architects have substituted vernacular strategies for modern materials or forms and explains how both the material and how it is used are vital to maintaining a context appropriate

design. He explains how this is why one often feels “physically and psychologically uncomfortable” in these modern buildings and that particular groups of people may feel that their entire culture is being disregarded and replaced by a foreign architectural language. Moreover, the performance of the building and response to climate may be significantly sacrificed simply for what the architect feels is a more fashionable or interesting design.

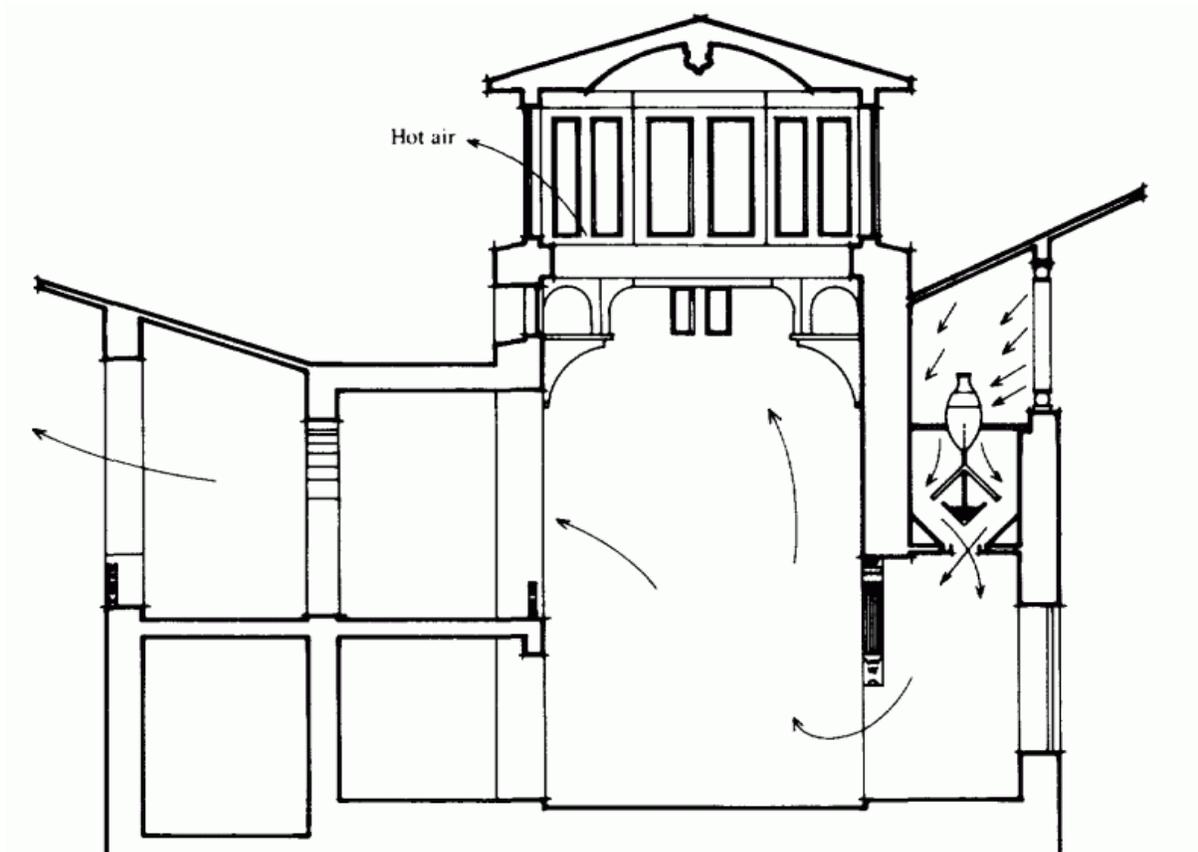


Figure 2.1 Sectional study in climate control and use of vernacular strategies and materials by Hassan Fathy. Image credit: Fathy

Architectural styles are not the only modern innovations which influence the design and construction of a building. The dependency that many rural communities have on outside aid is quite significant. With such influences from the modern world as standardization, mass-production, and uniformity of life-style, the diversity and specificity of different cultures and localities is diminishing. In his essay “Tradition and Modernity: The Feasibility of Regional Architecture in Post-Modern Society,” Pallasmaa explains that cultural anthropology has revealed that the physical and mental worlds of individuals are in fact strongly connected. The

realities and organization of one world is a projection of the other (Pallasmaa, 2006). This would suggest that the physical world of a community which is plain and apathetic affects the residents on a mental and spiritual level. Architecture must do more than respond to the evident socio-economic problems of a site; it must reflect and contribute to the social, spiritual, and cultural contexts.

Architectural strategies and styles must also be flexible and reflect local contexts. In Tijuana, Mexico, goods, architectural styles, and cultural ideologies are carried over from San Diego, California. As the California style architecture symbolizes wealth, miniature versions of houses found across the border are produced in Tijuana by bringing components, decorative elements, and even so much as entire houses from San Diego. The small house found in these communities are not adequate for the sizes and number of families residing in them so make-shift additions are often added in sometimes quite haphazard ways. Strange connections and developments result, such as those shown in Figure 2.2. The image on the right shows a house that was shipped over from the states and placed on top of a steel structure which hovers above an auto-repair shop. While this architecture appears to be alien and culturally irrelevant to the area, it has arisen naturally and is actually quite contextual. To replace these styles, materials and techniques used and lifestyle of the residents for something more “traditional” would in fact be ignoring much of the context. However, the reality in these neighbourhoods is less than desirable living conditions and unsafe structural systems in these communities. This led estudio Teddy Cruz to develop a building process for the residents; one which plays off of their resourcefulness and affinity for recycling. The proposal, *Manufactured Sites*, suggests utilizing the *Maquiladoras* – steel assembly plants - to produce a flexible, prefabricated frame that can be used for housing scaffolding. Utilizing excess materials and processes readily available at the plant, these simple frames can be utilized to the users’ choosing. This small architectural gesture allows for a safer, efficient and more liveable environment while working with and improving the local economy. This type of system could be beneficial to First Nations communities as well as similar make-shift and resourceful strategies are employed by their residents (Actar, 2008). Using available local resources, a more gradual and flexible strategy would allow for the residents to develop how they choose and in a time and fashion suitable to their needs and capacity. Materials and methods could also be chosen accordingly to play off of an adaptive and resourceful culture.



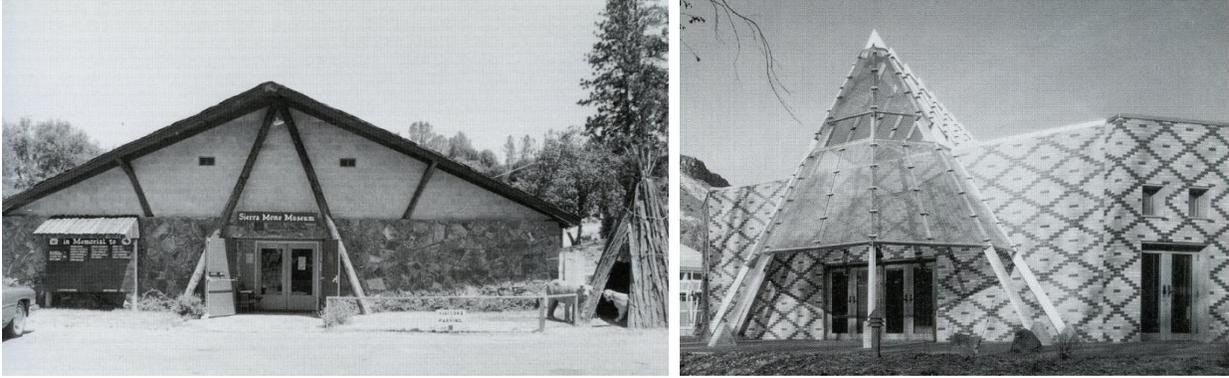
Figure 2.2 Informal developments in Tijuana, Mexico. Image credit: Actar



Figure 2.3 Manufactured Sites proposal by estudio Teddy Cruz. Image credit: Actar

2.2 The importance of using local materials

As seen from the examples above, more importantly than incorporating the use of local materials is *how* they are used. Craftsmanship has been dismissed as a method of the past while fabrication has been elevated because of the emphasis placed on consumption, permanence, and durability in the modern world. Frampton's primary argument in *Labour, Work and Architecture* is that machines produce but craftsmanship unifies people and brings about invention (Frampton, 2002). This follows Ruskin's argument in the *Seven Lamps of Architecture* where materials and decoration must speak of truth and honesty. Craftsmanship allows for irregularities and imperfections which, in themselves, are expressions of truth in materiality and construction. According to Ruskin, machines lack this expression and lose much of the expressive qualities architecture and craftsmanship has to offer (Ruskin, 1989). Many contemporary examples of Aboriginal architecture use vernacular forms or materials but do not incorporate them in an integrated or meaningful way. The residents are often not involved in the building process and only occasionally contribute to the design. This seems to be such a wasted opportunity to engage the community in its development as craftsmanship and construction has traditionally been such a strong element of Aboriginal culture.



**Figure 2.4 Sierra Mono Museum, North Fork, California. Lee Hatfield (left) Warm Springs Museum.
Image credit: Nabokov**

The effects of incorporating craftsmanship and community involvement into projects on Native reserves span far greater than reinforcing cultural values. Having members actively participate in the reconstruction of their community could potentially greatly improve their morale and sense of pride in the community. In his essay *Labour, work and architecture*, Kenneth Frampton discusses the need for human beings to be active and how this affects their social surroundings. He states that “the human condition of labour is life itself” (Frampton, 2002). It is also stated in his essay that the feeling of isolation can be present even in the most populated of areas. Tobique has a rather large population, but the area itself is still relatively isolated even given the inclusion of a new four lane highway within close proximity of the community. With so many social and health-related issues on Native reserves such as alcohol and drug addiction, spousal abuse, high drop-out rates for high school, and depression, segregating the residents from the construction of their homes, and therefore making them less actively engaged in their culture and community, seems to be exacerbating the problem. It has even been observed that crime and abuse has lowered while self-esteem and entrepreneurial behaviour has risen in Native reserves where a band-owned construction company has been started as it employs many of the members, provides adequate housing, and promotes homeownership (Infometrica Limited, 2006).

2.2.1 Challenges stemming from the global economy

While the benefits of an engaging architectural response can be great and multi-layered, the effects of a global economy and well-established construction industry makes proposing vernacular building techniques and use of material extremely challenging. The mud-brick

buildings in Djenne, Mali (Figure 2.5) are beautiful, unique and closely tied to the community's local identity. The residents participate in the re-mudding of the remaining mud-brick structures at the beginning of every wet and dry season, engagement with the buildings in a physical and spiritual level. However, with water being such a scarce and precious resource, these vernacular materials and techniques are being replaced with more "modern" and universal strategies. The concrete houses which have replaced the vernacular structures do not respond to climatic, social or cultural conditions, but returning to mud-brick buildings does not appear to be a viable option (Balbaa, 2007). This is the case not simply because of the scarcity of water but because of the grounded and powerful position the architects, engineers and administrators have in imposed Western strategies who will not re-skill or give up their position (Habraken, 1998). This reality exists on First Nations communities as well, as stick-frame construction has overtaken timber framing and other more vernacular Aboriginal building techniques. The system which is set up to provide funding, bring in outside developers, and enable the construction industry to run as per usual means significant challenges to any who suggest alternative housing designs. The one saving grace may be the independent jurisdiction that the Band administration on a reserve holds, which is always pushing for self-sufficiency and a means of expressing local identity. For this reason, these reservation communities may be the perfect sites to explore unconventional building strategies and material use to reinforce cultural identity.

2.3 Learning through the hands

Embracing craftsmanship not only encourages architectural and cultural expression, it passes on knowledge to those engaging in the process in a profound way. As shown through the art installations in the previous section, the feeling of disconnection with the past as well as forgetting cultural techniques and values is prevalent amongst Native people in Canada. While there has been a recent movement to reinforce oral tradition and re-teach Aboriginal language to the youth population, there are few who seek to reinforce these values through built forms. As speaking the language is important to pass on stories, legends, and history, embracing craftsmanship would allow one to learn through their hands. In his book, *The Thinking Hand: Existential and Embodied Wisdom in Architecture*, Pallasmaa argues that the potential of the body as a "knowledge entity" is far superior to using visual stimulation alone and is underestimated and underappreciated in today's society. He explains that "it is only through the unity of mind and body that craftsmanship and artistic work can be fully realized" (Pallasmaa, *The Thinking Hand : Existential and Embodied Wisdom in Architecture*, 2009).

Vernacular architecture often engages the community in such a way as to connect mind and body in a spiritual and educational manner. Taymoore Balbaa speaks of how the mud structures in Djenne, Mali accomplish just through virtue of the material properties. The structures demand that the entire communities engage in re-mudding these structures by hand at the beginning of the wet and dry season. He explains that this engagement has nourished traditions by training subsequent generations of masons and strengthened regional pride (Balbaa, 2007). The significance of these structures comes through the connection forged between them and the community and between the mind and body of each resident who participates in the re-mudding process.

In many developing countries, implementing this strategy of engaging individuals and communities in the design and construction process has been quite beneficial. Reintroducing craftsmanship into the process has also helped to reinforce cultural values, vernacular techniques, and community pride. Figure 2.6 shows images from the Yodakandiya Community Complex build process in Sri Lanka. Habitat for Humanity worked with the community after a tsunami hit the area in 2004. Involving the community in the design and construction created a stronger connection between the buildings and the people themselves and helped to rebuild the local social support networks (Open Architecture Network, 2010).



**Figure 2.5 Entire community participating in building process in Djenne, Mali.
Image credit: Balbaa (left and centre) and Gao Mali (right)**



Figure 2.6 Community involvement in construction of Yodakandiya Community Complex, Sri Lanka, Habitat for Humanity. Image credit: Open Architecture Network



Figure 2.7 Marshall Studio Addition, Mi'kmaq First Nations, Richard Kroeker. Image credit: Richard Kroeker

While many examples of contemporary Aboriginal architecture do not carry over the idea of learning and reinforcing cultural identity through building and craftsmanship, the works of Richard Kroeker are based on this principle. Working and researching out of Dalhousie University, Kroeker has done several projects with and for Mi'kmaq people in Nova Scotia. His designs were largely inspired by the canoe making techniques of the Mi'kmaq people, which fascinated him as the building process was both mentally and physically engaging. He soon learned that drawings and plans were next to useless with this construction method, and the value lay in the learning process involved in their construction. The passing on of techniques and culture was achieved through engaging in the activity itself; through the embracing of craftsmanship. He developed a simple truss system made out of curved spruce saplings,

inspired by vernacular building materials and techniques, and allowed the form to result from the incorporation of these methods (Architecture and Ideas, 2006). This method of learning through engaging in the build process and through the use of craftsmanship is an integral part to Aboriginal heritage and contributes to the evolution of cultural identity.

2.4 Rhythm in building, material and form

The language of a building can be expressed in many ways. One method would be reflecting the inherent qualities and characteristics of materials through form while the way in which one articulates the treatment of the facade is another. Both of these strategies rely on using materials to either showcase their variances or by creating a certain rhythm or flow through a given arrangement or construction technique. One of the masters of expressing rhythm and material qualities is Alvar Aalto through his extensive use of brick in several of his projects. The left image in Figure 2.8 shows a section of the facade of Alvar Aalto's Baker House, completed in 1949. Distorted, over-burnt bricks were turned and used to generate interest in an otherwise flat and regular facade. This sort of patterning produced from intricate bricklaying is reminiscent of Islamic architecture (Eastaugh & Sternal-Johnson, 2009). One simple building component can be used in a creative way to produce something interesting and engaging. This makes the facade richer and, in this case, brings about an almost Braille-like quality that suggests the materials hold a certain meaning. The image on the right of Figure 2.8 is of a Summer Home by Aalto in which he explores using different types, sizes and orientations of brick to produce a more intricate facade.

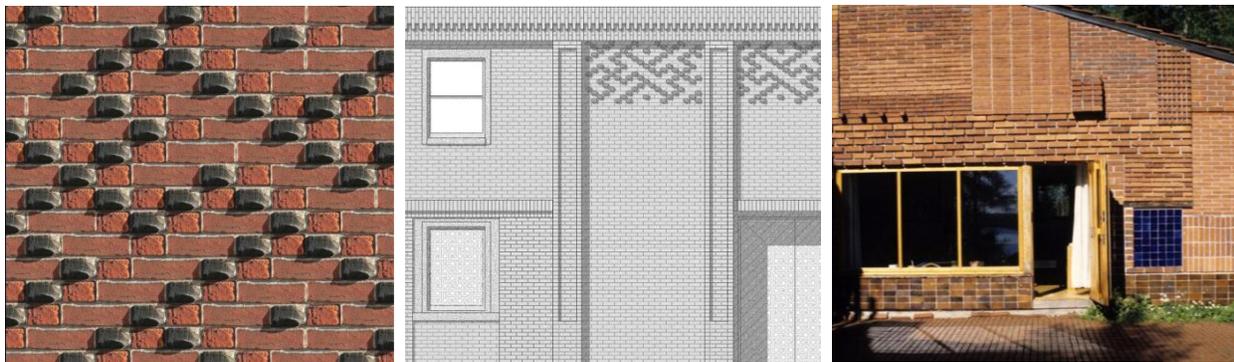


Figure 2.8 Alvar Aalto - Baker House (left) and Mosque (centre), Cambridge. Summer Home (right), 1949. Image credit: Eastaugh & Sternal-Johnson (left and centre), Architecture Week (right)

The rhythms and patterns produced through material use can hold cultural meaning as well. The structure of the Jean-Marie Tjibaou Cultural Center in New Caledonia, designed by Renzo Piano, was inspired by vernacular Kanak techniques (Figure 1.1). The building integrates vernacular strategies such as natural ventilation and wind-resistance, weaving of wood material, a layered skin and an arrangement of buildings on site similar to Kanak villages (Galinsky, 2010). While the scale is much larger than traditional structures, the forms speak of an articulation of materials which reflects cultural identity and characteristics of materials and their application.

2.5 Summary

Architecture can be very expressive and have a quality similar to language. Certain vernacular structures and built objects hold significant symbolic or literal meaning while few contemporary buildings have succeeded in doing this as they rely too heavily on referencing and nostalgia. There are challenges involved in using unconventional building techniques because of established practices and inter-reliant companies in the construction industry; However, First Nations communities, which are always pushing for autonomy and self-sufficiency, may be perfect areas to push these design ideas and unconventional techniques. Creating a language through the built form and material use will enable architecture to create a cultural dialogue with the Maliseet people's cultural identity. Learning from vernacular systems and exposing characteristics and nuances in the materials will create an interesting as well as culturally relevant housing design for the First Nations at Tobique; one that will speak of the culture of the residents. If a housing design is developed and implemented, the process may be used as initiator for further exploration in such typologies and techniques.

3. Aboriginal Spirituality and Cultural Values – learning from vernacular strategies and suggested methods of incorporating these into the built form

3.1 Maliseet Spirituality and Connection to the Land

The built form can respond to cultural conditions in several different ways. While it is important to gain an understanding of semiotics and tectonics, these tools must be used carefully. The role of architecture with regards to cultural identity is often viewed as a re-interpretive and representative one. Abstracting values and connection to ancestors and the land may only be an exercise in defining Aboriginal identity to the non-indigenous population. Simply understanding and respecting the relationship with the land can reinforce this connection (Fantin, 2003). How an architectural intervention situates itself on a site can respond to climatic, cultural, social, and site-specific conditions. In order to appreciate the multi-layered implications and approaches of vernacular structures it is vital to understand the deep-rooted, spiritual connection that Aboriginal people share with the land.

The relationship of the Aboriginal people of the Maritime Provinces with the land is a spiritual one. As quoted on the government of New Brunswick's website, "a Native person's sense of themselves as a distinct group or nation is bound up with the place that is their home." More important than reinterpreting the connection Native people have with their land is to understand and respect it. It is important to reinforce the notion of occupation and place-making rather than asserting cultural branding. In her essay "Aboriginal Identities in Architecture," Shaneen Fantin discusses issues of representation and cultural identity in Aboriginal architecture in Australia. She has researched Aboriginal living environments in Arnhem Land, Australia extensively and speaks of the dilemma of outside influence and abstraction of Aboriginal ancestral histories. She explains that "the significant meaning of Aboriginal places traditionally comes from their occupation and creation by ancestors, and their use and recognition by Aboriginal people over time" (Fantin, 2003). Wolastoqiyik, the Native word for Maliseet, means "the people of the beautiful river" (Wallis, 1957). Their creator was made from Mother Earth and the natural elements (National Indigenous Literacy Association, 2007). Their spirituality stems from this connection with the creator, Mother Earth, and the land.

In Mi'kmaq and Maliseet legend, there were seven levels of creation and all related to a direction, a purpose, and a connection with nature. The first level was located in the centre, and

represented the giver of life. When one looks above to the sky, they are connected with the creator, who contains all things. The second level is the sun, or grandfather, which created shadow. The creation of shadows connects the people with the spirits of their ancestors, which are reflected in their own body and movements. The third level is Mother Earth. By looking below, to the Earth, Grandfather Sun connects the Mi'kmaq and Maliseet people to their ancestors as well as Mother Earth. The fourth level is Glooscap, the creator of the Mi'kmaq and Maliseet people. He was said to be created out of a bolt of lightning hitting the surface of the Earth and formed out of the dirt, leaves, feathers, bones, stones, wood and other elements of Mother Earth. The fifth level is Grandmother, who teaches Glooscap how to live with and understand Mother Earth. She is the voice of wisdom and is connected to the South. The sixth level is the Nephew, who is connected to the West. He symbolises strength and looking to the future. The seventh level is Mother, who is connected to the North. She was created by Grandfather Sun and Mother Earth from a leaf on a tree. She passes on love and understanding to the Mi'kmaq and Maliseet people (National Indigenous Literacy Association, 2007).



**Figure 3.1 “When Glooscap Left the Earth” by Luke Simon, 1997.
Image courtesy of the University of New Brunswick**

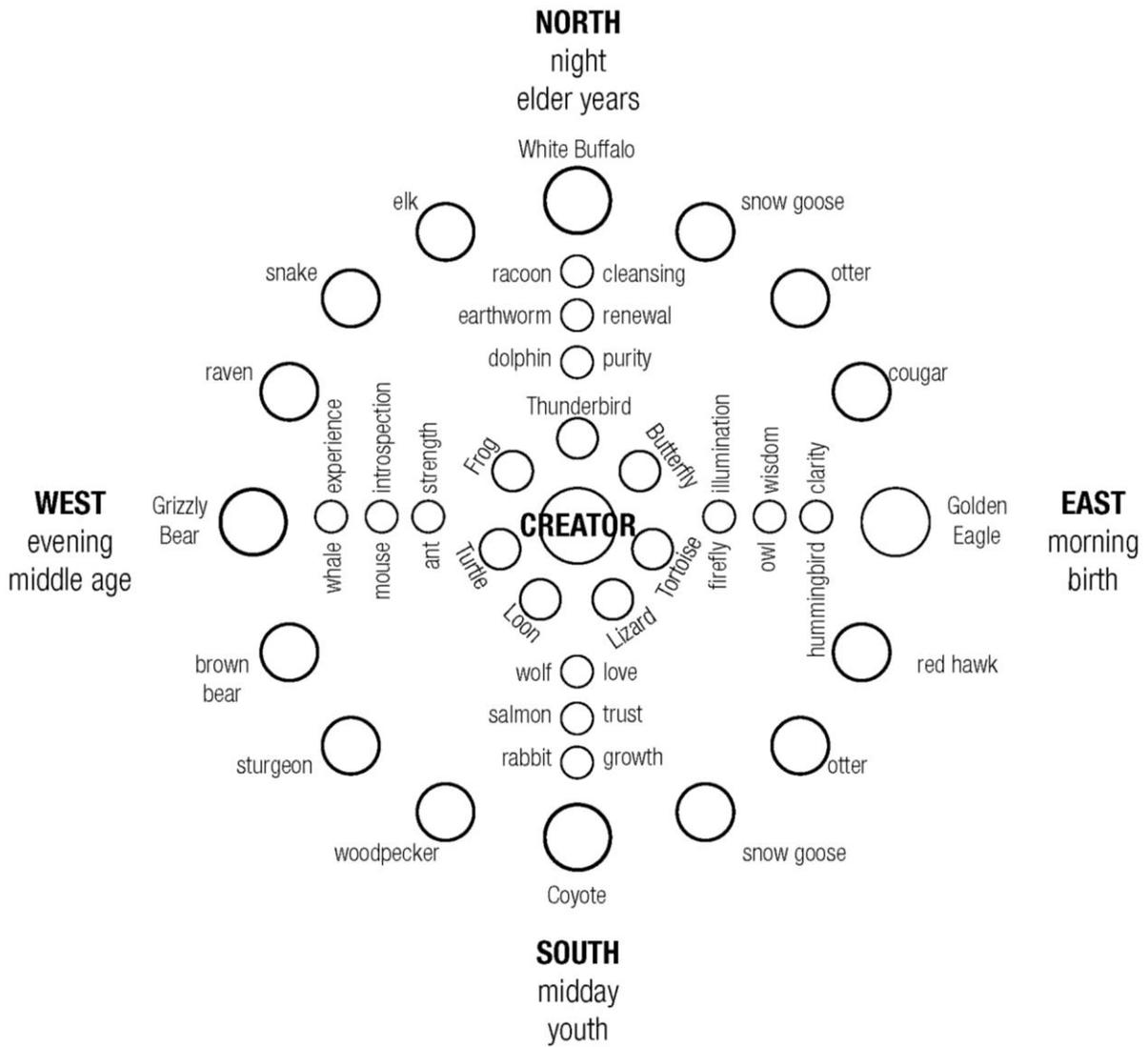


Figure 3.2 Medicine Wheel – multiple layers of spirituality

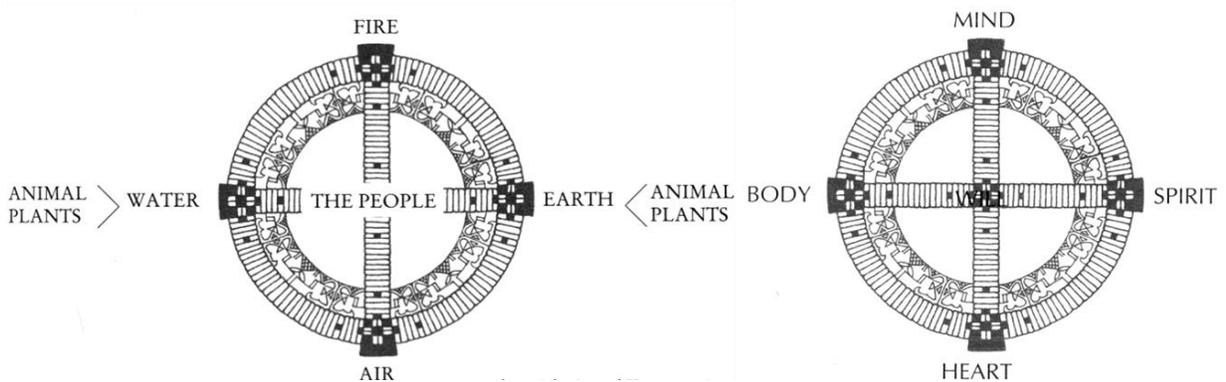


Figure 3.3 Symbolic significance of circle. Image credit: Leavitt

While there are several levels of creation in Abenaki lore, there remains one creator. Tabaldak, meaning “The Owner” is the creator of the Abenaki and Algonquian people. He was said to have attempted to create people from stone but, finding these too cold, used wood instead (Glooscap Heritage Centre, 2011). This shows that respecting Mother Earth, trees, stones, animals, and other living things and natural elements has more to do than a desire to live in harmony with the land; according to legend, the Abenaki people are directly connected to the forest and the land, as they were themselves formed from them. Glooscap was the first human created, with some saying that he was formed from the dust of the body of Tabaldak. Glooscap was then given the task of “creat[ing] a good world,” while his twin brother, Malsumis, sought to do the opposite. Stories and legends pertaining to Glooscap all speak of the importance of living in balance with one’s surroundings and with nature (Maine Historical Society, 2011). Glooscap also had the power “to shape the environment around him” and to even transform into animals (Glooscap Heritage Centre, 2011). The hero shot an arrow at birch or ash trees, splitting the bark open and showing the people to use the land and its resources (Wallis, 1957). The symbolic role of Glooscap to both Mi’kmaq and Maliseet cultures is significant and represents their connection with the land. While many have forgotten much of this lore, there remains a strong desire to be connected and live with the land. The legends of the seven levels of creation and those of Glooscap speak of the importance of living in harmony with nature and learning from the past and their ancestors.

The Maliseet learned to live harmoniously with the land, adapting through its gradual changes. If resources for one species were scarce, they adapted to what was available. In fact, there is no Mi’kmaq or Maliseet word for “scarcity” (LeSourd, 2007). The act of hunting itself was also considered sacred. When a hunter killed a bear, there was a ceremony performed over its carcass so as not to offend the spirit of the animal, many of which were believed to have special powers (McDonough R. , Maliseet Indian Historical Village: Report on Historical Analysis & Design Recommendations, 2006). The circle is a very culturally significant symbol to Aboriginal people across North America and also expresses their connection with the land. There is no start or end to a circle, it is continuous and infinite. It is used to represent the connection with the earth and with community and is used in several cultural applications such as healing circles. Aboriginal people believe that the mind, body and spirit are strongly connected, as are people to the earth. With degradation of the body comes degradation of the mind, and in order to heal one you must heal the other (Figure 3.3). This spiritual healing method is used in many

Aboriginal health and addictions centres and shows that engaging in activity can be spiritually profound and affect one on a very personal and cultural level (Miziwe Biik, 2010).

The Mi'kmaq and Maliseet believed that divine beings were responsive to people and their prayers, which is why Roman Catholicism was easily accepted and welcomed by the Aboriginals upon the arrival of French settlers. Most Maliseet remain very strong Roman Catholics even today, and the church at Tobique is a very important and central structure in the community (McDonough, 2010). Several houses have Catholic symbols adorning the entrance and exterior; however, many houses also display Maliseet symbols. This would imply a desire to embrace both Maliseet and Roman Catholic culture, beliefs and ways of life.



Figure 3.4 Houses on Tobique with Maliseet and Roman Catholic symbols

Although many people choose to move off-reserve to more economically and socially fruitful environments, the Maliseet communities along the St John River are historically as well as spiritually significant locations. This is why the degrading conditions on First Nations communities are such a difficult issue for the government and Aboriginal people alike to respond to. Leaving the communities is often the only alternative for individuals seeking better education, living standards, and social settings; however, they often have to give up status rights and leave the land that is so spiritually and historically important to their people.

3.2 Connecting the built form to the land

Connection with the land is important for Aboriginal people to feel both spiritually and physically. As shown in the medicine wheels, mind, both, spirit, and heart are all interconnected

and each affects the other. For this reason it is important to engage residents of First Nations communities with the development of their community and their own dwellings. Connecting their house with the land they live on and with their mind, body, and spirit will reinforce cultural identity to the individual. Considering orientation and method of connecting with the earth is extremely important. As shown in previous section, each direction has a profound symbolic meaning and cultural significance to the Maliseet people, as with other Aboriginal groups. Connecting the building with the sky, earth, forest, underworld, and ocean or river would reinforce this cultural bond with the land.

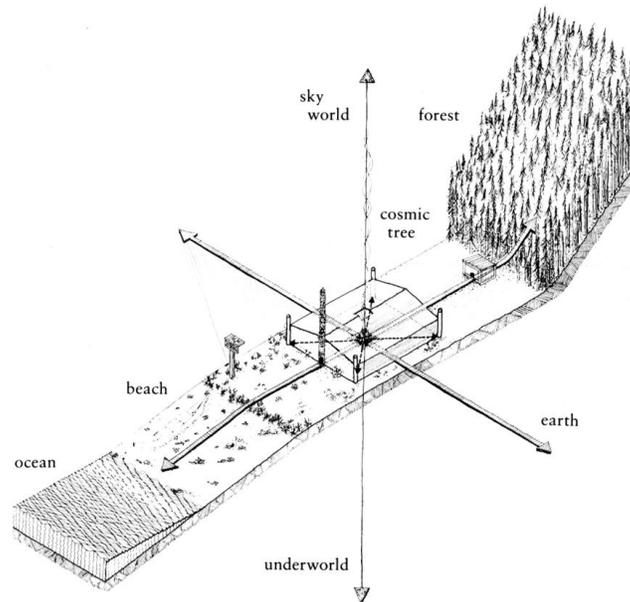
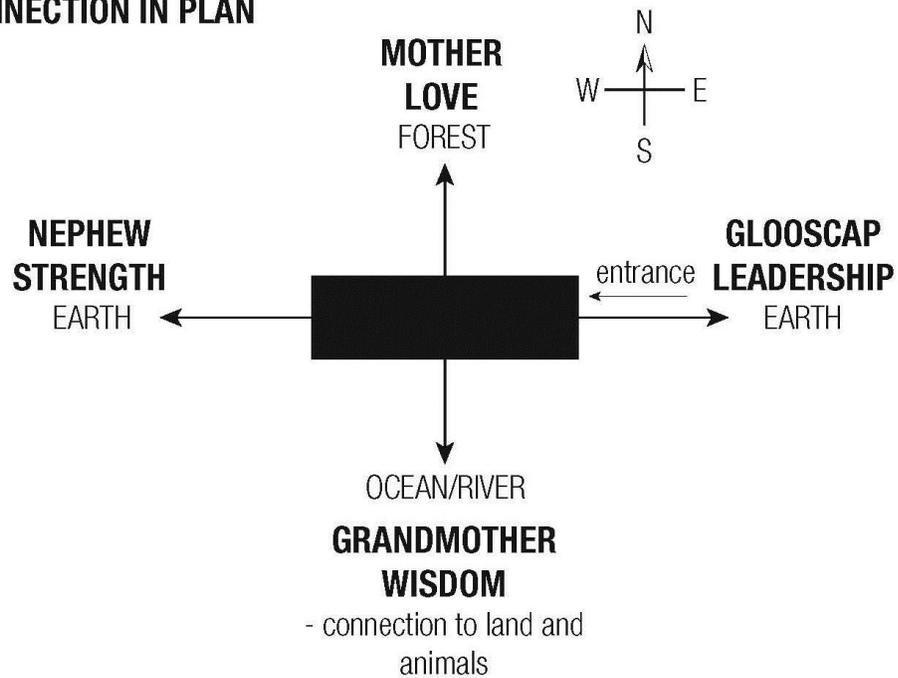


Figure 3.5 The relation of a structure to the land, sky, water, and forest indicates the importance Aboriginal people have to connection with the land. Image credit: Nabokov

Section 5.1 discusses the location and brief historical background of the Maliseet First Nations at Tobique, NB, which is used as a case study for this report. As the section describes, the Maliseet were originally a nomadic people and traveled along what is known today as the St. John River to hunt and find food in the summer months. Tobique is located at the intersection of two rivers – the St. John and the Tobique Narrows. This historical connection with the river, as well as the land, should be referenced in an architectural project if it is to reinforce cultural identity. As shown in Figure 3.6, orientation and connection with the sky, forest, earth, and ocean or river is extremely important. Figure 3.7 shows a map of Tobique and two selected sites to explore opportunities and methods of connecting with the land and reinforcing cultural identity through the built form.

CONNECTION IN PLAN



CONNECTION IN SECTION

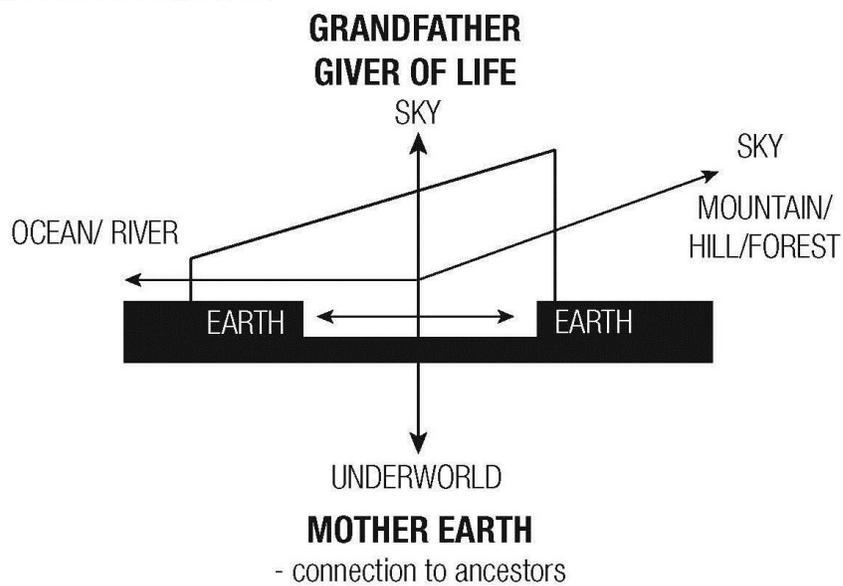


Figure 3.6 Connection of a built form with the land – orientation and spiritual significance



Figure 3.7 Map of Tobique First Nations and two selected sites to explore methods in which the built form can connect with the land.

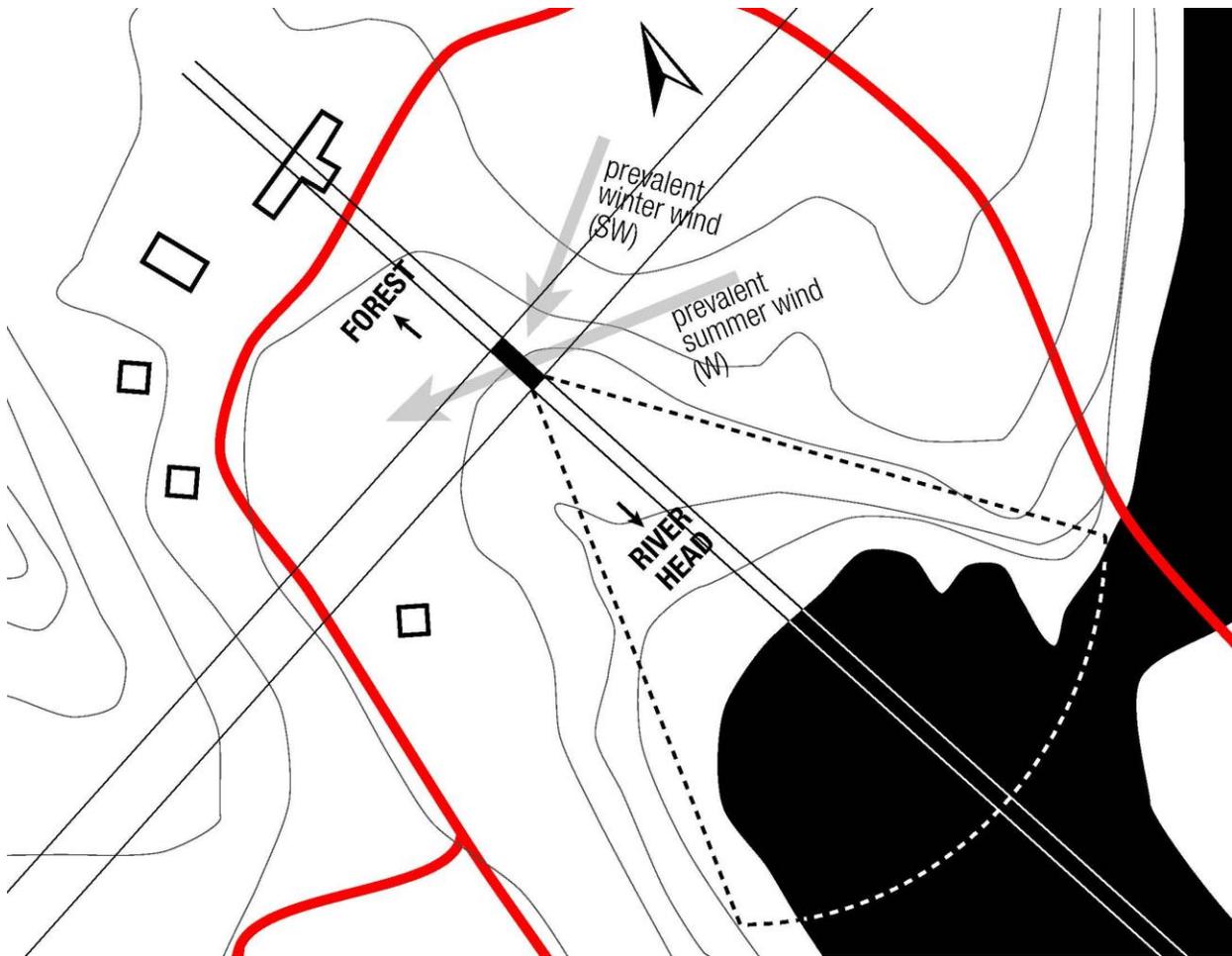


Figure 3.8 Site 1 – connection to river, forest and land

Figure 3.8 illustrates the opportunities existing on site 1. This site is particularly appealing as it is located a hillside with a spectacular view of the Tobique Narrows. This reinforces the connection with the river, both visually and spiritually. There is great opportunity to connect back to the forest and the land as well, along with considering wind direction and natural ventilation. The only drawback to a site such as this is that it is an exception rather than the rule and, although very exciting, not necessary a useful precedent for other locations on Tobique as well as other reservation communities. Refer to Figure 3.11 - Figure 3.14 for sectional drawings of site 1 which explore methods of relating and integrating into the landscape through a minimal intervention approach.

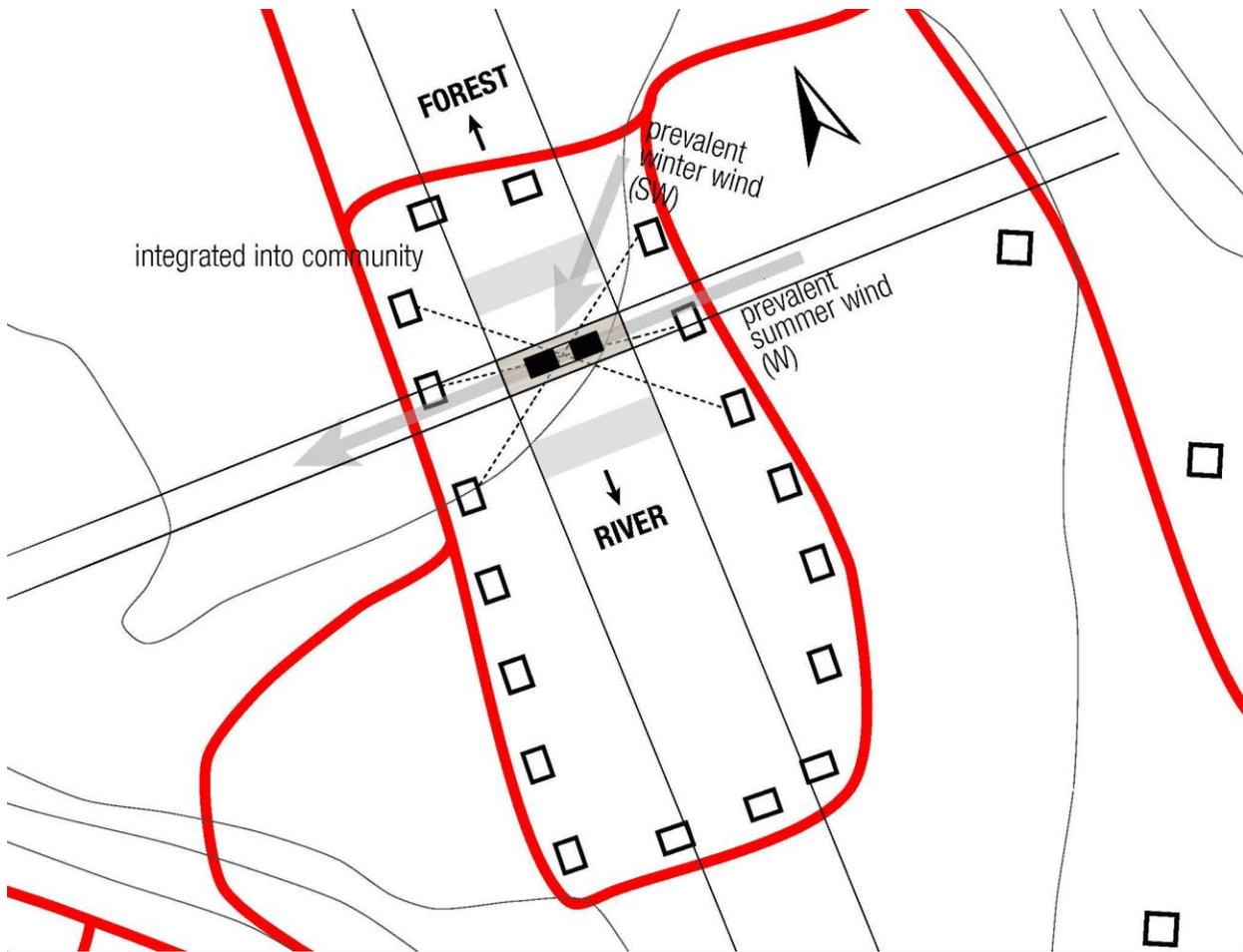


Figure 3.9 Site 2 – connection to the community, forest, and river

While orientation and connection to the land, forest, and river are important, it is also important to relate to the surrounding community. As shown in Figure 5.5, vernacular approaches to settlements and community was much more centred on family and was far less rigid than planning implemented today. Figure 7.10 shows a typical housing layout in a Cree community and how the planning does not allow for social interaction and engagement amongst the residents. Considering the positioning of a building in its community is extremely important. This could provide opportunities to create social spaces and more socially interactive areas. Considering connection with the land in terms of exterior space is also an option. Creating a deck area or semi-exterior space could allow for opportunity to connect with the outside both visually and physically. Refer to Figure 3.15.

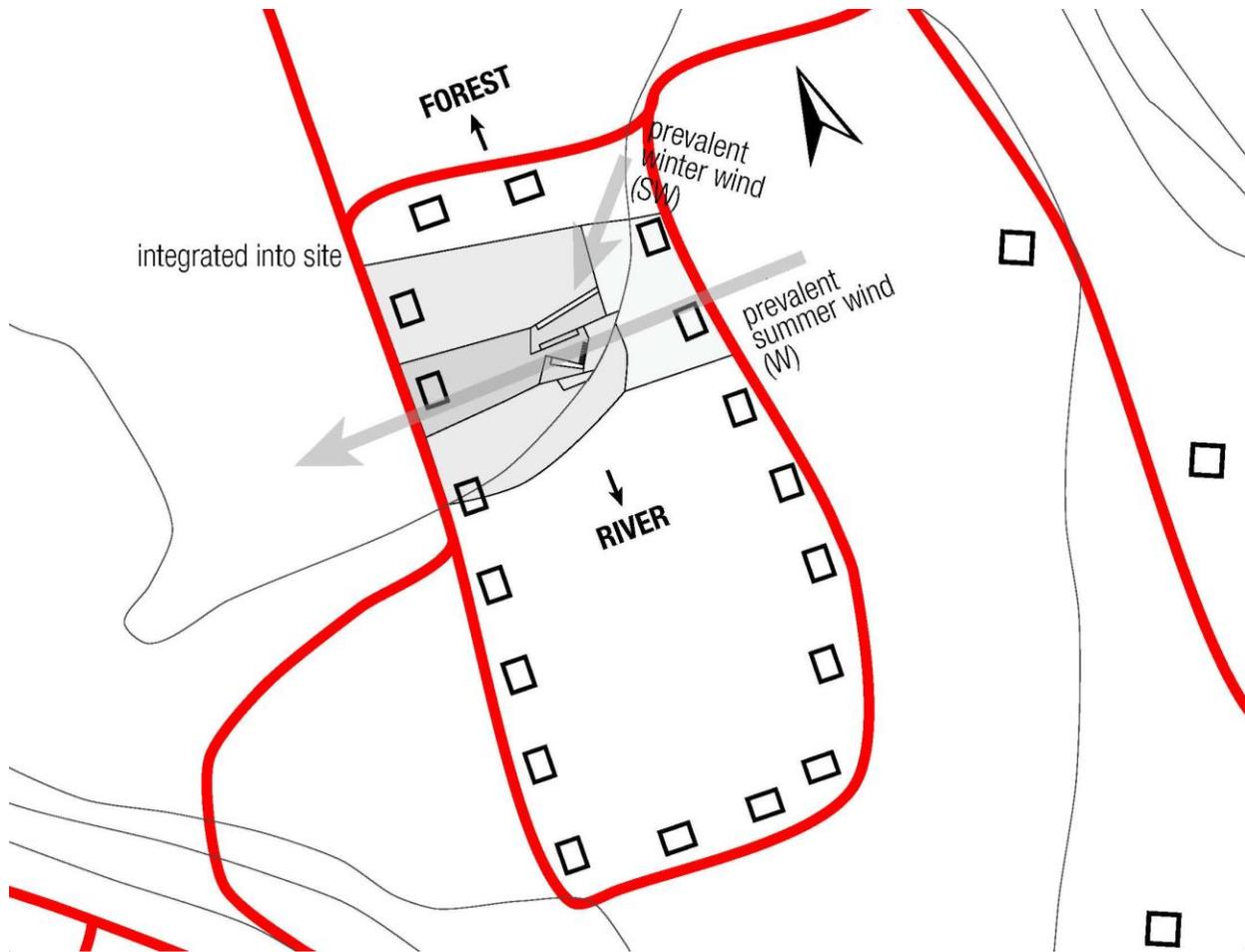


Figure 3.10 Site 2 – integrating into the landscape

While respecting the land and making minimal interventions onto it are one way of interpreting connecting with the Earth, another is to physically engage with it. By digging into the ground and creating and/or working with the landscape, an architectural intervention can more directly engage with the land. Figure 3.10 explores the option of a larger intervention that attempts to become engrained in the landscape and how this could reinforce connections with culture and spirituality. Refer to Figure 3.17.

The following sectional drawings are design exercises in showcasing methods and opportunities in integrating into the landscape and/or relating to the land through the built form. These exercises demonstrate that one can understand connecting to the earth as a physical, rooted connection or as a spiritual connection which should be respected. One option is to use pile foundations in order to achieve minimal intervention and avoid defacing the earth. The

second option is to embrace this connection and dig into the earth and make the building part of the landscape. Both methods can be equally successful in reinforcing this bond and are only a matter of opinion and preference on the part of the designer and/or community member(s).



Figure 3.11 Site 1 – minimal intervention on land and following landscape



Figure 3.12 Site 1 – quick design exercise to emphasize views and relation to river, forest, and land



Figure 3.13 Site 1 – alternative structure using pile system – referencing canoe construction techniques



Figure 3.14 Site 1 – quick design exercise to show form can relate to river, forest, and land using alternative structural system



Figure 3.15 Site 2 – minimal intervention on land – pile foundation

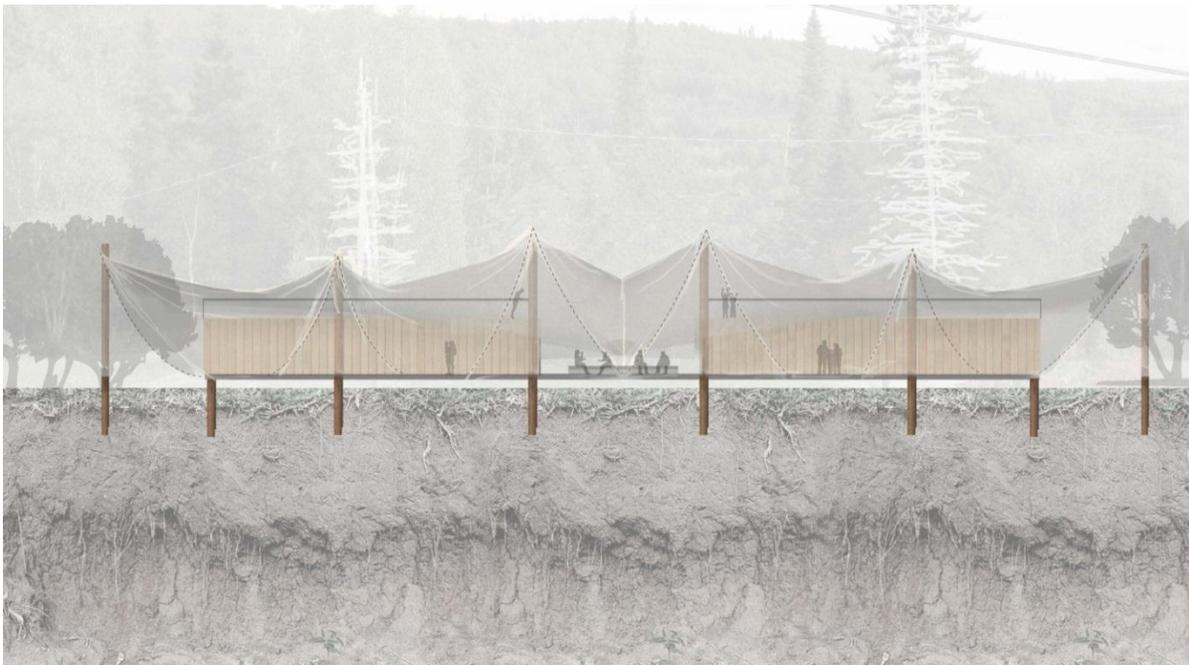


Figure 3.16 Site 2 – minimal intervention on land with layers

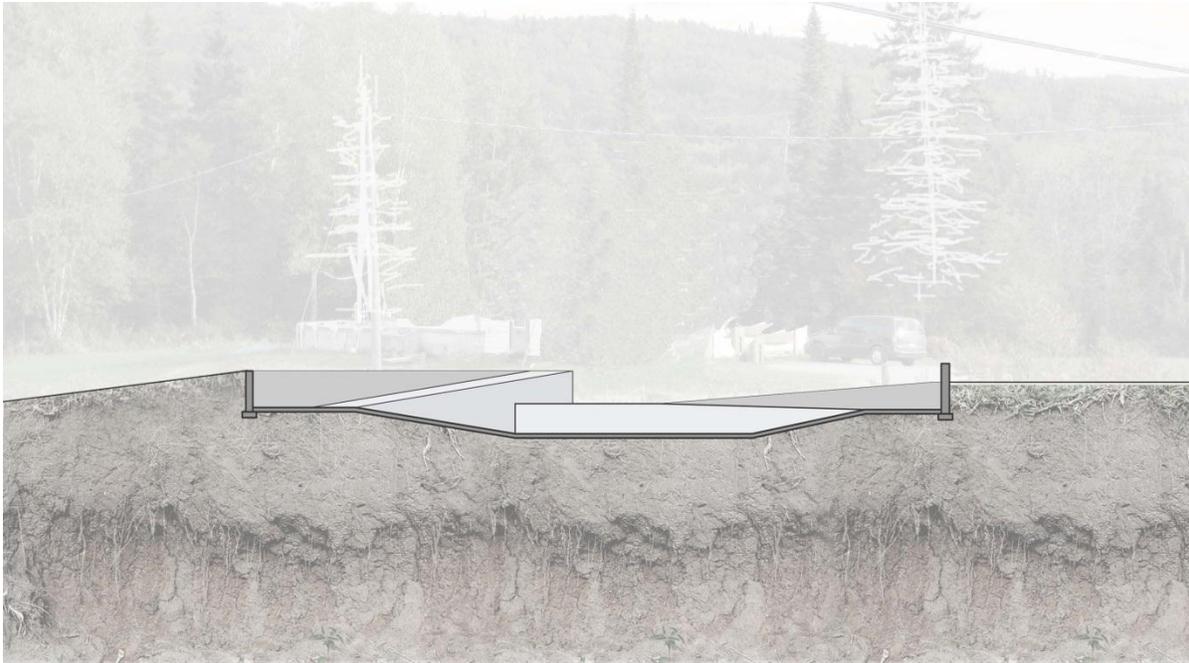


Figure 3.17 Site 2 – integrated into landscape

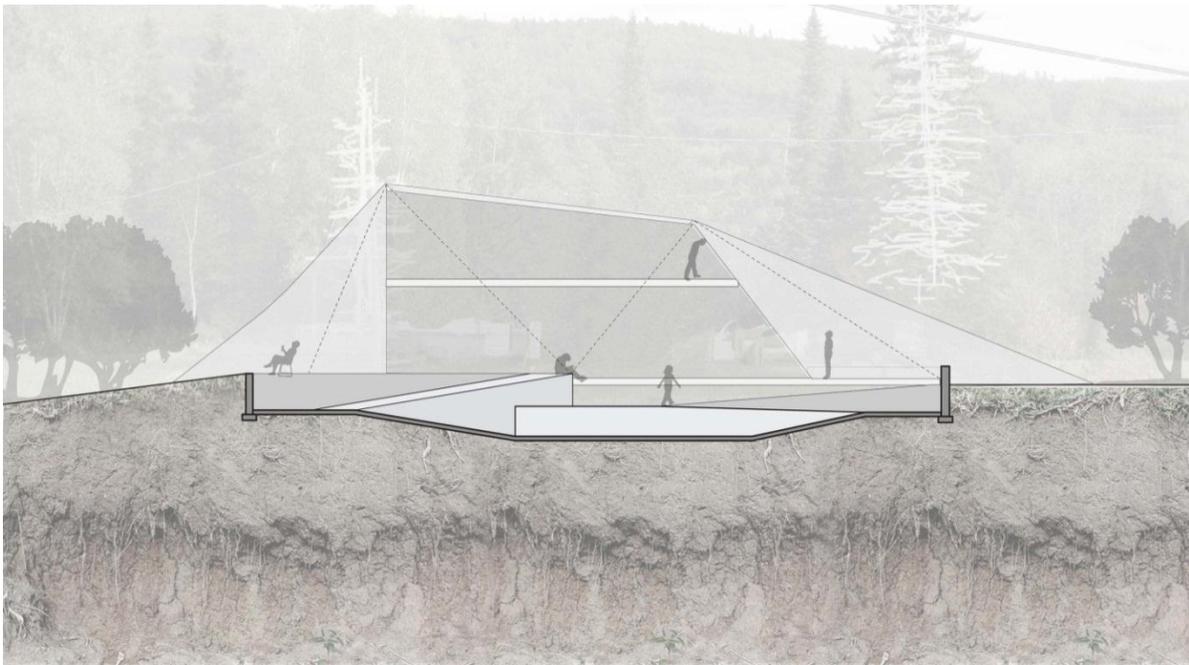


Figure 3.18 Site 2 – integrated into landscape with layers

3.3 Layering



Figure 3.19 Bold Eagle recruits building teepee in CFB Wainwright, AB (left) and Chippewa Wigwam (right). Image credit: Canadian Army (left) and Nabokov (right)

As the Maliseet were a nomadic people, they had to learn to live off the land and adapt to changing conditions. When certain resources were scarce, they adapted and turned to other sources of sustenance. These nomadic tribes also relied on lightweight, quick to assemble, water-resistant, and mobile structures made of birch bark and spruce saplings (Maine Indian Program of the New England Regional Office of the American Friends Service Committee, 1989). While the people are no longer nomadic and their housing required to be much more durable, comfortable, and long-lasting, structural and systemic aspects of these shelters can be studied to rediscover appropriate responses to culture, climate, and site. These strategies, although used in a completely different context, can point to methods of building in these climatic conditions. Methods of working with materials such as birch bark and saplings can be re-applied to more modern materials which utilize similar strategies.

Layering was an extremely important strategy to the construction of vernacular shelters. Layers of Birch bark and animal skins, placed on top of a structure formed out of bent saplings, were used to construct wigwams and longhouses. The resilience, flexibility, light-weight, and water and pest-resistant properties of Birch bark made it the perfect material to use for the exterior envelop. The light color of the bark allowed for a brighter, more open-feeling space on the interior while its insulative qualities when layered retained the heat from the central hearth effectively (Wallis, 1957). As opposed to European strategies of insulative wall systems, the

concept of layering allows for superior performance through use of many thin layers working together.

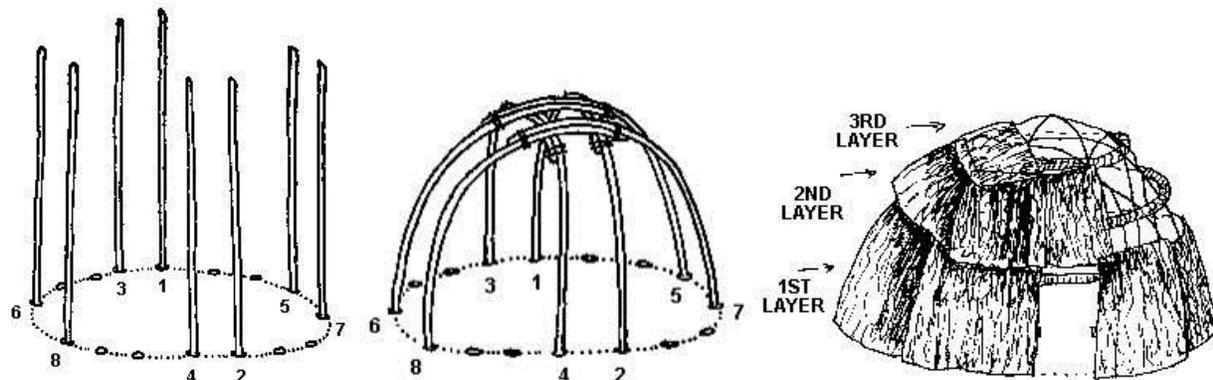


Figure 3.20 Process of building wigwam with sapling structure and layering of Birch bark

Image source: <http://siuarchitecture.blogspot.com/2011/04/how-to-make-wigwam.html>

The concept of layering has been applied to many modern buildings. Double-skin systems have been implemented onto existing buildings in order to increase performance while similar strategies have been incorporated into new structures to reduce the need for mechanical systems. This double-skin system takes advantage of passive strategies such as daylighting and natural ventilation. Layering in modern construction can be executed quite similarly to vernacular Aboriginal structures. In the Pictou Health Centre in Nova Scotia by Richard Kroeker (Figure 3.21) as well as the Dragspelhuset Accordion House in Sweden by 24H Architects (Figure 3.22), a similar strategy of layering of materials was utilized. The accordion house even adapts to changing climatic conditions by allowing the user to extend the living room outward in the summer and retracting it in the winter to produce a smaller, more insulative and layered space. The Wall House in Chile by FAR uses a layer of fabric to produce semi-exterior spaces (Figure 3.21). This not only responds to climatic conditions, by sheltering the house from the elements; shading in certain areas; and providing a second skin, but affords multiple types and layers of spaces. There are completely interior and exterior spaces, but also semi-exterior spaces with multiple levels of visibility and connection with the environment. This application of layering could respond to climatic as well as cultural conditions on Aboriginal communities as it establishes a dialogue with the landscape and environment.



Figure 3.21 Wall House - FAR Architects (left) and Pictou Health Centre - Richard Kroeker (right)
Image credit: Guastalla (left) and Richard Kroeker Design (right)

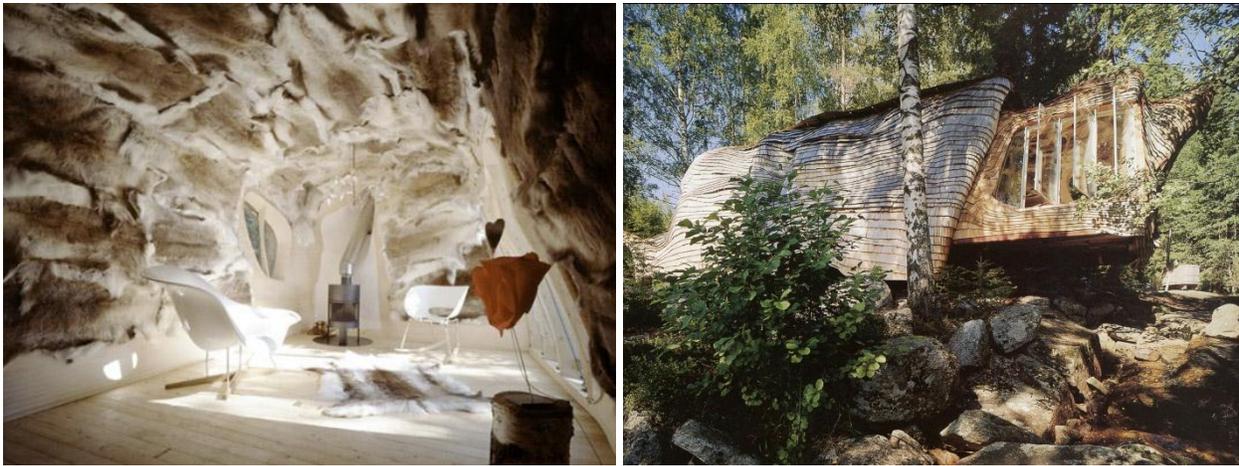


Figure 3.22 The Dragspelhuset Accordion House by 24H Architects. Image credit: Mostaedi

3.4 Vernacular techniques and structural systems

Similarly to how the concept of layering can be applied to modern Aboriginal design as it speaks of the relationship with the land as well as responding to existing climatic and cultural conditions, the investigation and application of other vernacular strategies can be extremely insightful and useful. Techniques such as sewing Birch bark canoes with roots or stretching and working with animal hide can be applied to modern materials and their application in building construction. If one were to implement a similar design strategy as the Wall House, with a fabric skin overlaying the main structure, techniques of working with birch bark and animal hide become extremely valuable. Passing on these techniques would also connect the community with their heritage and engage mind, body, and spirit.



Figure 3.23 Detail of sewing bark on canoe (left) and stretching animal hide – “Indian Woman Dressing A Buffalo Skin” from "The American Aboriginal Portfolio" by Mary Eastman, 1853 (right)
Image source: http://www.stevecayard.com/ab_process.html (left) and Newberry Library, Chicago (right)

Vernacular structural systems can speak of how to work with local materials and take advantage of their inherent qualities. The curved sapling structures of wigwams and longhouses, for example, make use of the bendable, green quality of freshly cut, young Spruce trees. This type of structure would be enticing to implement into a setting such as a Native reserve as the opportunity to use freshly cut saplings is not available in other contexts. This would take advantage of local materials while embracing opportunities which are unique to a particular population and region. It would also present an opportunity to pass on techniques to the youth population and, again, engage mind, body, and spirit.



Figure 3.24 Woman building longhouse and wigwam structure (right)

Image credit: Nabokov (left) and http://woodrunnersdiary.blogspot.com/2009_11_01_archive.html (right)



Figure 3.25 Chief Barry Dana, his wife and daughter building Penobscot wigwam (left). Ingersoll Scout Reservation youth building wigwam (middle), and bark being peeled from Birch tree (right)

Image sources: <http://www.mainegardens.org/category/childrens-garden> (left), KirkKittell.com (middle), and http://www.stevecayard.com/ab_process.html (right)

Below are design exercises on ways of re-interpreting and utilizing vernacular strategies and techniques into a structural system. Figure 3.26 applies techniques involved in building a canoe, in which wooden supports are set along the exterior of the Birch bark shell and used to brace the interior structure (Figure 3.28). The curved saplings are inspired by techniques involved in building wigwams and longhouses. This strategy can be applied in many different ways, such as a truss system (Figure 3.29), crossing of saplings similar to wigwam-construction, or as shown in Figure 3.27.

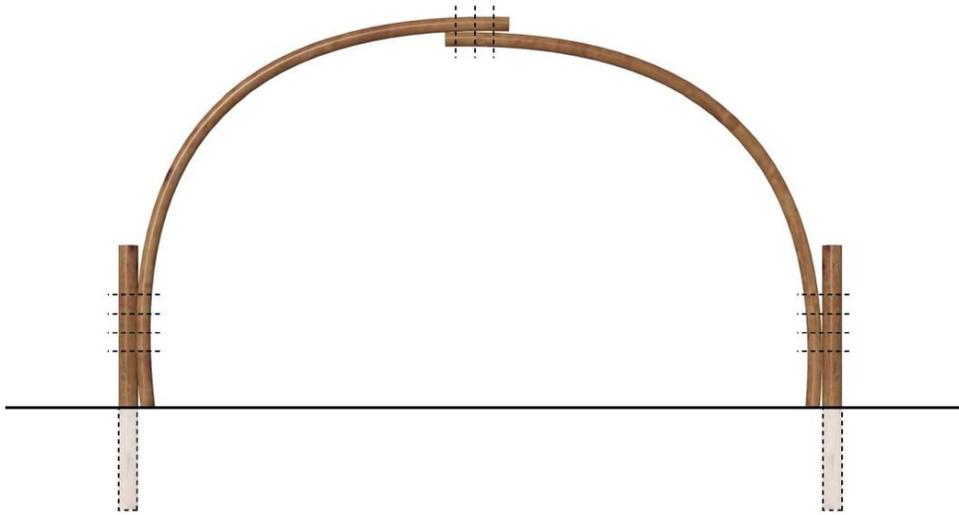


Figure 3.26 Structural concept using principles from canoe construction

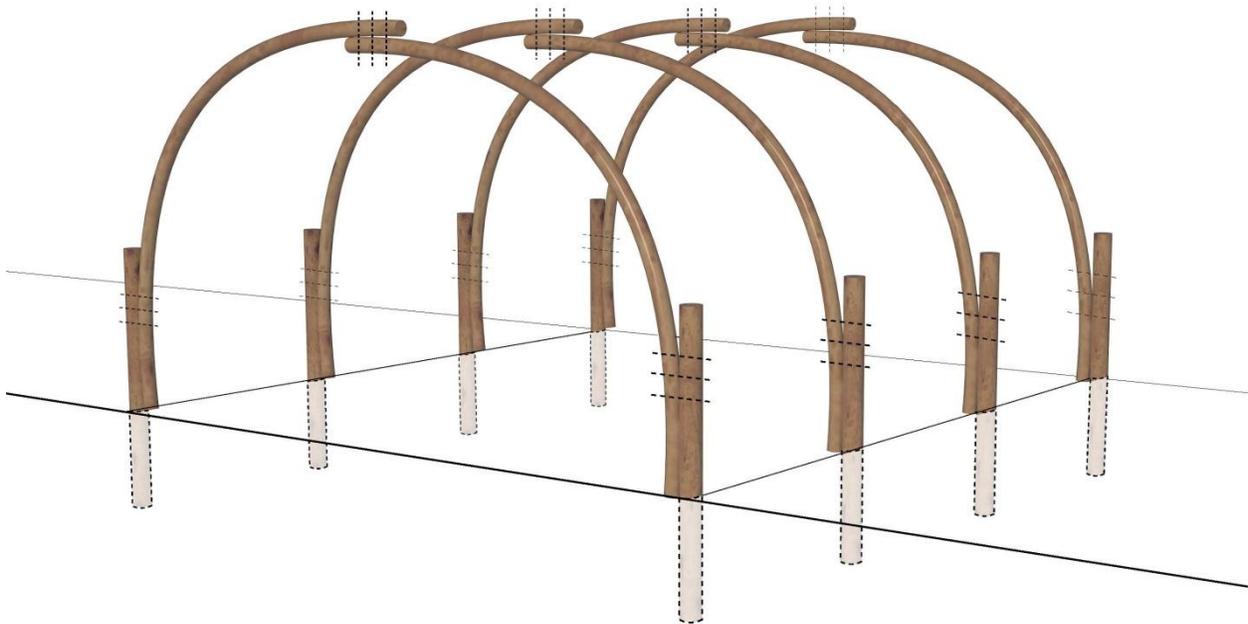


Figure 3.27 Structural concept using principles from canoe construction

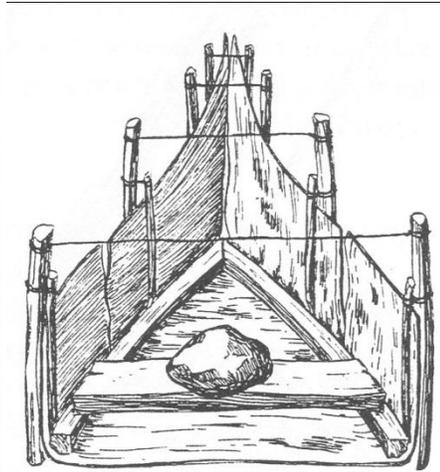


Figure 3.28 Canoe construction – structural supports

Image credit: http://www.stevecayard.com/ab_process.html (left) and Maine Indian Program of the New England Regional Office of the American Friends Service Committee (right)



Figure 3.29 Constructing truss out of curved Spruce saplings using form-work

spruce shingles

plywood (curved)

wood spacers

- cellulose or rigid insulation between

wood strapping

- excess Spruce or Balsam Fir after processing into building components

curved truss (spruce)

- different heights result from different lengths of harvested saplings as well as varying widths of the building

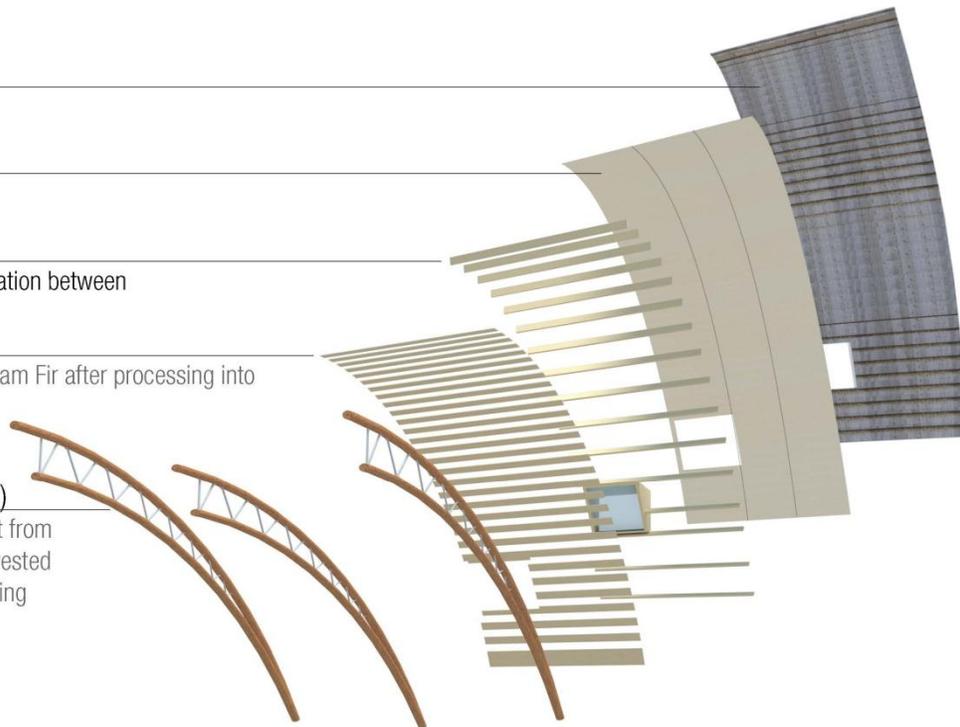


Figure 3.30 Exploded axonometric of a roof system

truss supports

- forms from concrete supports used for plywood supports

wall supports - "exterior studs"

(young spruce or balsam fir cut in half)

aluminum spacers

- used to support plywood and prefab panels

plywood

(or gypsum board for interior)

prefab panels

- windows installed into panels
- wood siding

aluminum spacers

- used to support plywood and prefab panels

wall supports - "exterior studs"

(young spruce or balsam fir cut in half)

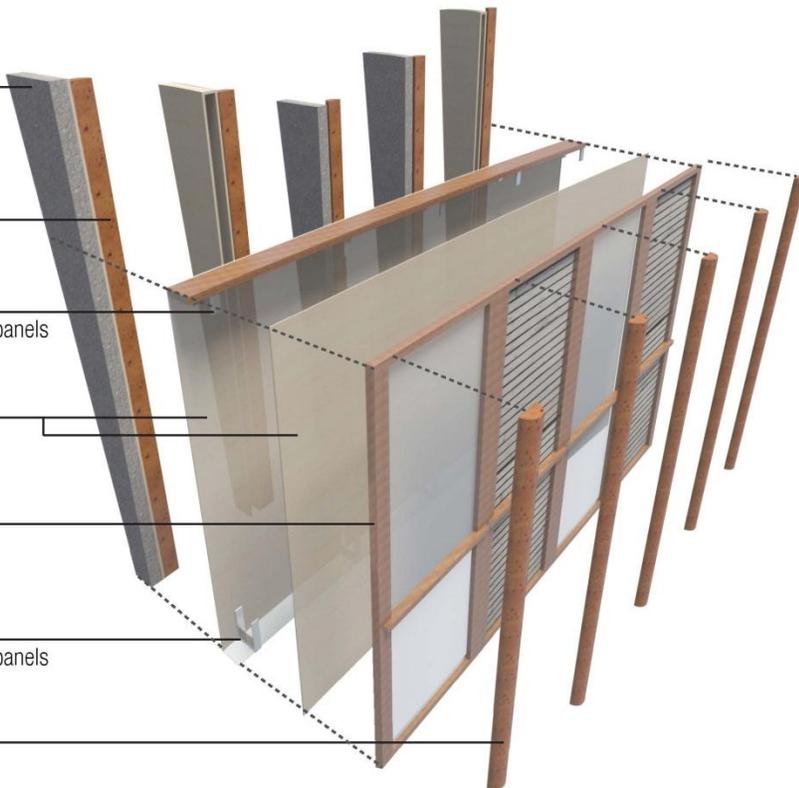


Figure 3.31 Exploded axonometric of a wall system

Figure 2.7 shows images of the trusses formed out of curved saplings for the Marshal Studio Residence by Richard Kroeker. Kroeker has worked closely with the Mi'kmaq people of Nova Scotia and has sought to reinforce cultural identity through engagement with the materials and vernacular techniques. This design demonstrates a simple application of this idea. This truss system was inspired by canoe construction techniques in that the process of building a canoe enabled you revolved around the passing of knowledge. Building one frame work enabled you to build the next and to learn from the whole process. As these vernacular materials are still local to the indigenous population they can apply these strategies to their own housing and construction. Figure 3.30 shows an exploded axonometric of a roof system which could be implemented using this structural concept. Figure 3.31 resulted from a design exercise shown in Section 8.4. The intent was to utilize local materials and a panelized exterior wall system to incorporate local materials and vernacular strategies. It was inspired by layering and structural systems (refer to Figure 5.4) as the space provided between the supports and panels is completely free of studs and therefore reduces thermal bridging.

Vernacular structures took advantage of properties of materials for non-structural aspects as well. The section of the Chippewa wigwam (as shown in Figure 5.4) shows that by placing stones on the floor and placing the hearth directly on top of these, a radiant floor system resulted. By incorporating modern materials and techniques a similar strategy can be utilized. Figure 3.32 shows a radiant floor system passing under a hearth that is inset into the concrete floor. This would allow for the heat to transfer to the tubes and heat the entire space. Another strategy would be to capture the heat coming from the fireplace and chimney. By directing the hot air through or along the walls the central hearth would be effectively heating the entire space, or possibly house.

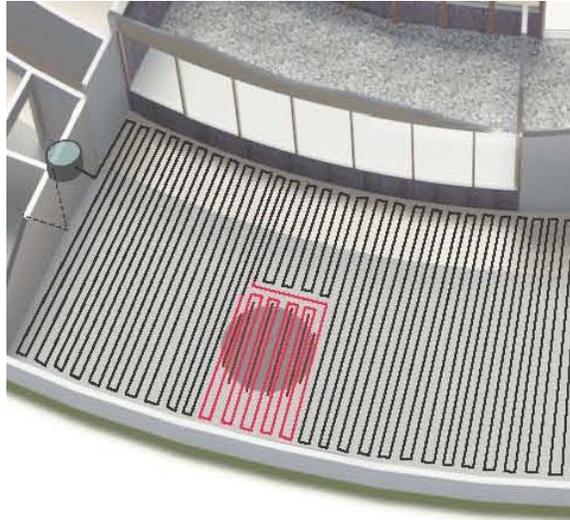


Figure 3.32 Radiant floor system passing under hearth to minimize need for electric heater

3.4.1 Craftwork and techniques

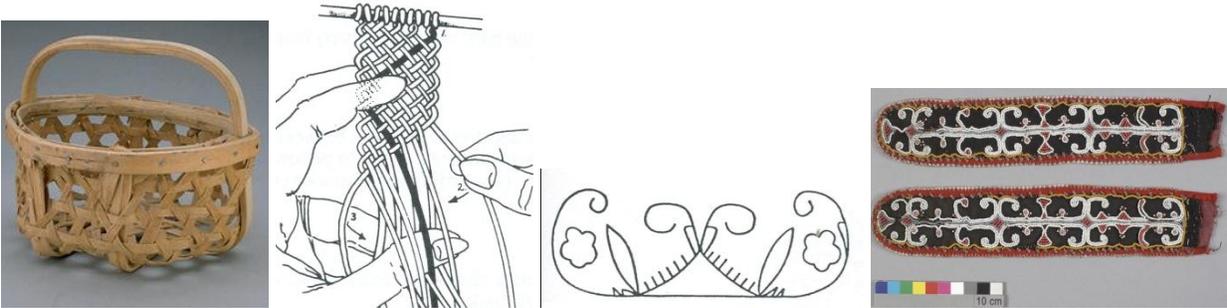
As the Mi'kmaq and Maliseet people lived off the land, they developed equipment, techniques, and craftwork using the resources around them. The primary materials used were stone, clay, roots, bark, wood, skin, bone, ivory, antler, shell, hair, fur, feathers, quills and sinew. Copper, a common, soft metal found in the region, was also used to make fish hooks, rings, and beads. Wood and bark were extremely important materials to the Native people, especially the Maliseet as they were a river tribe and used canoes made of birch bark and ash wood to traverse the waters in the summers in search of food. European settlers not only influenced the Aboriginal people through introduction of new technology and equipment, such as metal pots and weapons, but also influenced their craftwork. The First Nations adopted the geometric designs drawn with mathematical instruments and the floral patterns used by the Europeans. These techniques inspired the double-curved motif (Figure 3.34), which is one of the most popularly used Wabanaki designs today (Maine Indian Program of the New England Regional Office of the American Friends Service Committee, 1989).

Birch bark was a very important material used not only to construct shelters but to fabricate canoes, containers, torches, bags, and was even used in burials to wrap the dead (LeSourd, 2007). Spruce, birch, and cedar were the primary timber species used for the construction of shelters and canoes, while birch bark and ash splints were used for containers, pots, cladding for shelters, baskets, utensils, snowshoes and most other items (Augustine,

2005). The Mi'kmaq and Maliseet people produced much of the same items and equipment using the same materials, as both groups originated in New Brunswick and Nova Scotia. Figure 3.34 shows images of tools used to peel and work with the material and of a Birch bark container made by members of Tobique centuries ago. These artifacts demonstrate how the Maliseet people used available materials in innovative but simple ways, working with materials like Birch bark to form everything from shelters to canoes to containers for food. Figure 3.33 shows a craftsman making basket and a woven Cedar siding developed by Richard Kroeker for the Long Cove House. This demonstrates that these vernacular techniques can be incorporated into design and integrating it into the building process, be it for structural, envelop, or decorative purposes. This would, again, pass on techniques and engage the residents with use of local materials and connect mind, body, and spirit.



**Figure 3.33 Woven White Cedar strip facade of Long Cove House by Richard Kroeker
Image credit: Richard Kroeker Design**



**Figure 3.34 From left to right –woven basket from Tobique, Maliseet weaving technique, Maliseet double-curved motif, and Mi'kmaq ornament with double-curved motif.
Image credits: Canadian Museum of Civilization (far left and far right) and Leavitt**

3.4.2 Oral tradition and the dilemma of cultural identity

While the Maliseet people built many objects and structures out of local materials for utilitarian reasons, they also used the materials given to them by the land to create symbolic and meaningful objects. As stated in *Maliseet and Micmac First Nations in the Maritimes* by John Leavitt, “[traditional] techniques are another way – like the oral tradition, spirituality, and adaptations to the environment – to which peoples express and define their identity.” Wampum belts are an interesting example of built objects which are instilled with symbolic and literal meaning. A given arrangement of beads and/or shells has a specific meaning, and wampum belts were used to unite and send messages between tribes. They were later used to establish alliances and arrange important events and agreements between Aboriginal nations and European settlers (Canadian Museum of Civilization, 2008). The structure or elements on the facade of a building could also reflect meaning. For example, each stick/pole used in a Cree Tepee is symbolically and spiritually significant (Rickard, 2005). The materials utilized for the construction of contemporary housing could be used to express cultural value as well. Building with local materials while embracing certain traits or irregularities would speak of their inherent qualities. Like the wampum belt, the nuances and rhythm of the materials and resulting structure would reflect a language of the built form; one that could allow Aboriginal people to express their cultural values and re-connect to their heritage and community.



Figure 3.35 wampum belt based on the George Washington treaty belt which was presented to the Iroquois to ratify the Canandaigua treaty of 1794

Image courtesy of the Woodland Cultural Centre Museum

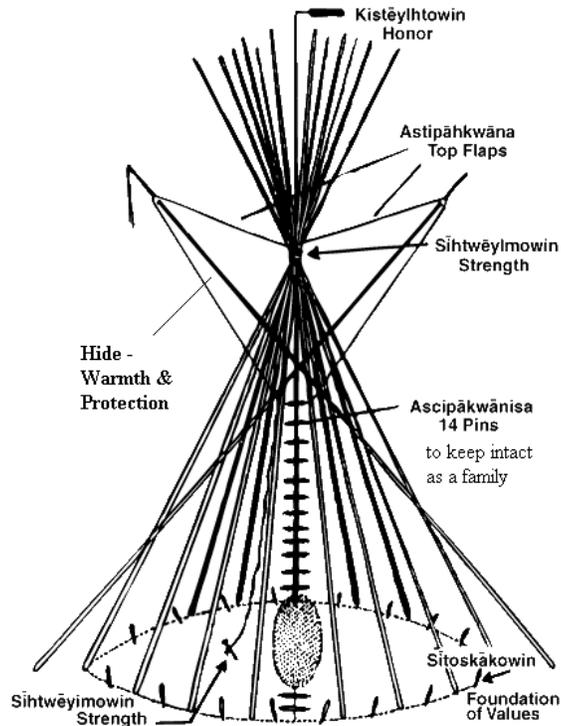


Figure 3.36 Diagram of significance of poles in a Cree Tepee (left)

Image credit: <http://www.chiefmistawasisschool.ca/>

The importance of language to Aboriginal culture is a recurring theme in this report as it is closely linked to cultural identity. Culture is a constantly evolving aspect of people's identity. The Maliseet and Mi'kmaq people's cultures are very unique and complex as they have adapted over thousands of years, are largely based off living harmoniously with their surrounding environment, and have been heavily influenced by European settlers. Unfortunately, language, traditions, techniques, and other aspects of Maliseet culture have been largely forgotten and/or are fading quickly in many communities in New Brunswick over the past couple of decades (Maine Indian Program of the New England Regional Office of the American Friends Service Committee, 1989). This is a very challenging trend to address as Native people of the Maritimes have a history of oral tradition. History and traditions were largely left unrecorded and were traditionally kept alive through frequent repetition, reciting on special occasions and events, and storytelling. As reciting these stories in another language would alter their tone and meaning, most stories are only told in their native tongue. They were traditionally used to pass on legends, tales, and history as well as allowing people to reflect on their current state of affairs.

However, with weakened, less socially active communities and the increasing use of the English language these stories are told much more infrequently (Leavitt, 1995). This shows that the loss of language means much more to these First Nations groups than the inability to speak Maliseet or Mi'kmaq; it means a loss of culture, history and identity at a fundamental level.

The three images shown in Figure 3.37 are art installations which were part of an exhibit at the Canadian Museum of Civilization in 2007 and 2008 entitled "In My Lifetime: Contemporary Aboriginal Art." Two works by Nadia Myre, shown in the left and centre images, expresses the longing of Aboriginal people of her generation to reconnect with their cultural heritage. In the video "Wish," (still image shown on the left) the body of the artist, Nadia Myre, is abstracted into shadows and patterns which move rhythmically, representing a desire to physically and spiritually connect with the ancestors. Myre's installation piece, "Grandmother's Circle," (centre image) also speaks of a cultural disconnection. The description of the installation explains how "the circle invokes the spirits of Myre's maternal ancestors, and honours the strength of community and family. At the same time, by placing four wooden poles outside the circle, the artist expresses her distance from that past, her sense of loss of identity, and her longing to reconnect with the culture of her ancestors." Myre's obsession with loss of identity stems from the fact that she was born in Montreal but was reinstated as a band member of the Kitigan zibi Anishinabeg in Maniwake, Quebec in 1985 due to a change Aboriginal policy addressing Aboriginal disinheritance (Canadian Museum of Civilization Corporation, 2011). This struggle with identity and issues regarding Native status is a common dilemma amongst Aboriginal people in Canada.



Figure 3.37 Still from video "Wish" (left) and "Grandmother's Circle" (centre) by Nadia Myre, and "Refaire l'alliance" by Sonia Robertson. Image credit: Canadian Museum of Civilization

3.5 Summary

Aboriginal people have a spiritual, mental, and physical connection to the land they live on. They believed in balance and respecting what the land gave them. As Maliseet and other Aboriginal cultures are based off of an oral tradition, speaking the language and engaging in traditional and community activities is vital to uphold and build upon their cultural identity. The semantics of built objects are expressed through the use of local materials and their inherent properties. What is so self-destructive about the current system in place for Aboriginal people in Canada is that they are generally not engaging in their communities or resources on a fundamental level. Similar to the spoken word and practicing traditional techniques, engaging the community in a culturally responsive housing design could help to reinforce cultural identity. Learning from vernacular strategies and techniques and incorporating them into the built form could establish a cultural dialogue between the modern and the vernacular and between the Aboriginal people and their heritage.

4. A Collaborative Strategy Which Engages the Entire Community

4.1 Passing on of Knowledge

Aboriginal populations have been striving to achieve self-sufficiency for decades. The Assembly of First Nations has pointed to the importance of self-sufficiency and for the community to engage in its own development. Government initiatives have been put forward to encourage this and there have been many forestry and training programs made available to residents of New Brunswick and other Aboriginal communities. This report outlines the importance of engaging in culture and community and how this would reinforce cultural identity to the residents of these communities. Employing a band-initiated housing initiative could foster training and employment opportunities while providing the opportunity to pass on knowledge to the current generation. The diagrams below demonstrate opportunities to involve, train, and pass on knowledge to different demographics in the community.

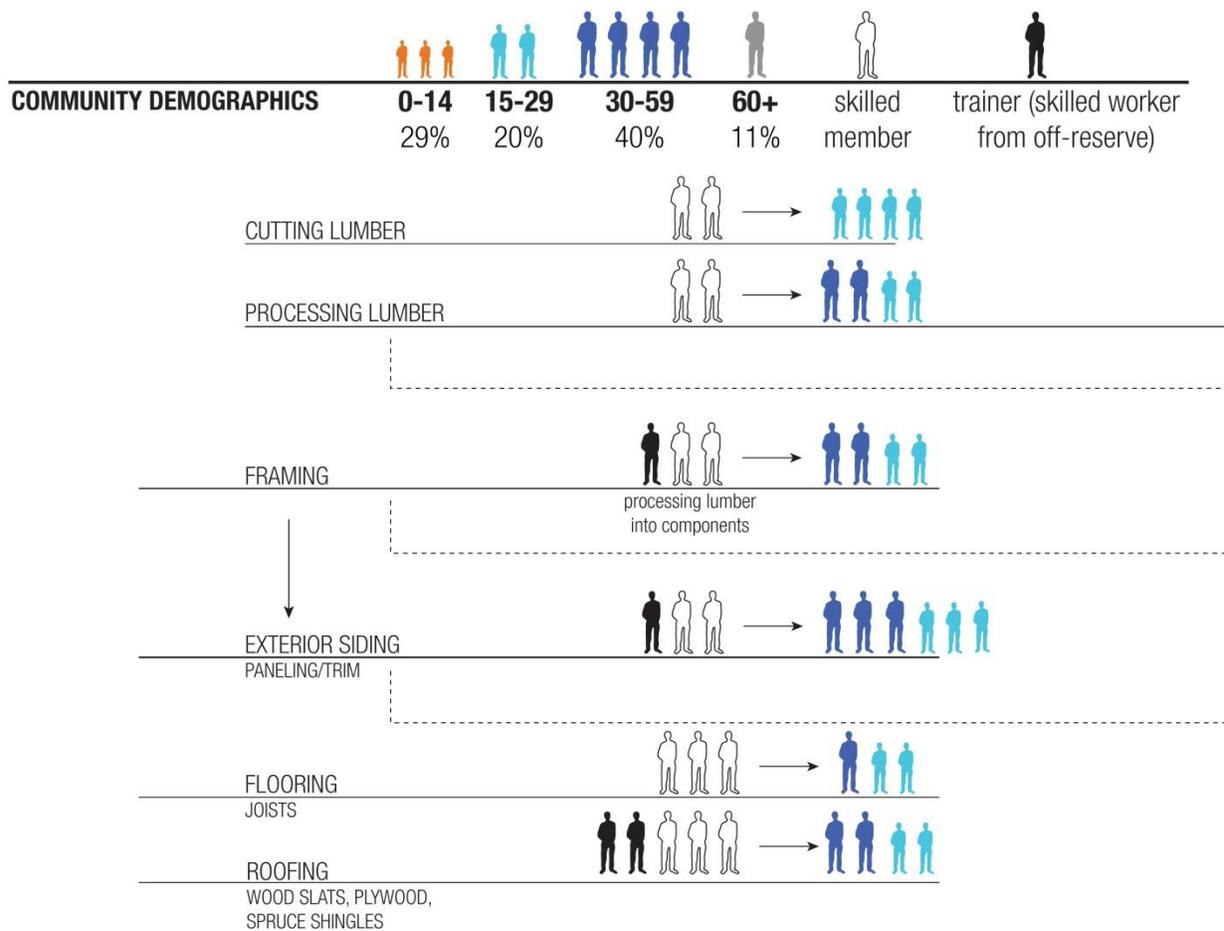


Figure 4.1 Training band members using local as well as outside skilled labourers

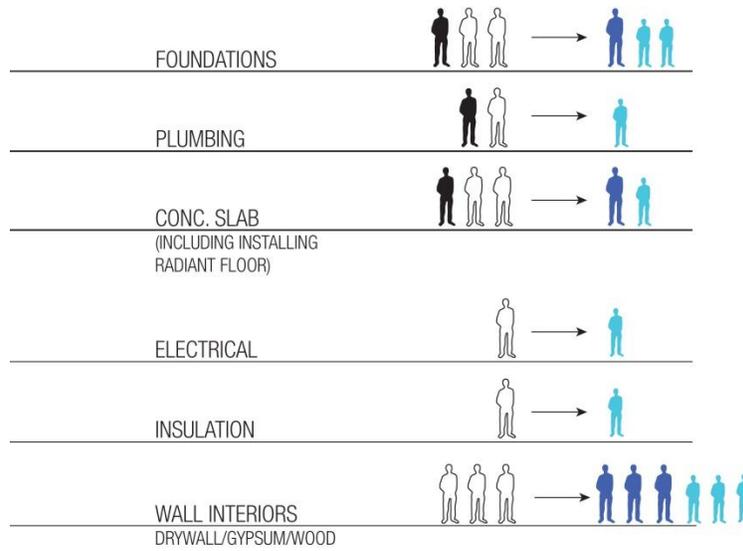


Figure 4.2 Materials and skilled labour brought from outside sources - necessary for parts of the construction process

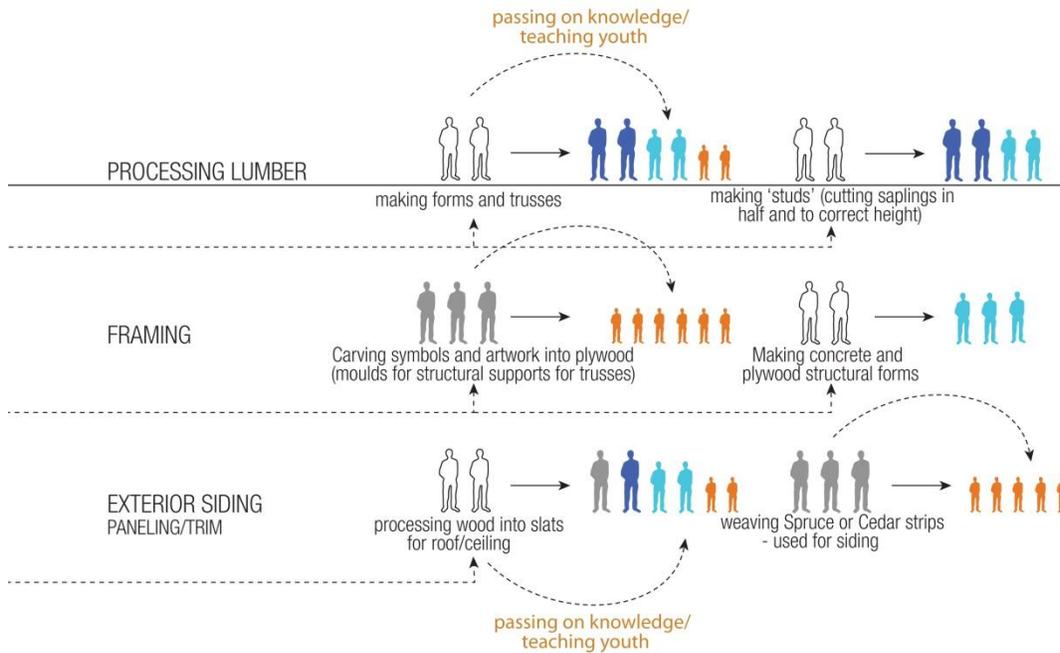


Figure 4.3 Passing on knowledge and skills from elder population to youth



Figure 4.4 Engaging whole community in construction of housing and passing on vernacular strategies and techniques

The image above represents the overall intent of this thesis; to engage the entire community and to pass on knowledge to the younger generation. This will reinforce cultural identity and connect the residents with the culture physically, mentally, and spiritually. Not only will it be beneficial culturally, but through this process many employment and training opportunities could be made available. This would benefit the individuals as well as the community as a whole in becoming more self-sufficient (see Appendix A).

4.2 Material Resources at Tobique

The area designated to the reserve at Tobique is 7km in length and amounts to 24.7km². The 320 on-reserve houses are mostly located along the river on the south-west tip, with the village of Perth seen south across the river. The main species at Tobique appear to be Spruce and Balsam Fir. The report on “Management of NB Crown Forests” made by the department of Natural Resources New Brunswick stated that “the province’s geographic position combined with its variable topography, soils and climate have produced a remarkable diversity of

vegetation, including 39 species of native trees.” The main species of trees growing in New Brunswick are Spruce at 31%, Balsam Fir at 19%, Sugar Maple at 8%, Red Maple at 8%, Cedar and Poplar at 7%, White and Yellow Birch at 5%, Pine at 4%, and Beech at 3% (see Figure 3.5); However, areas along the Saint John River, particularly between Perthandover and Edmonston, have a wide variety of species not seen in other parts of the province (Government of New Brunswick - Department of Natural Resources, 2003).

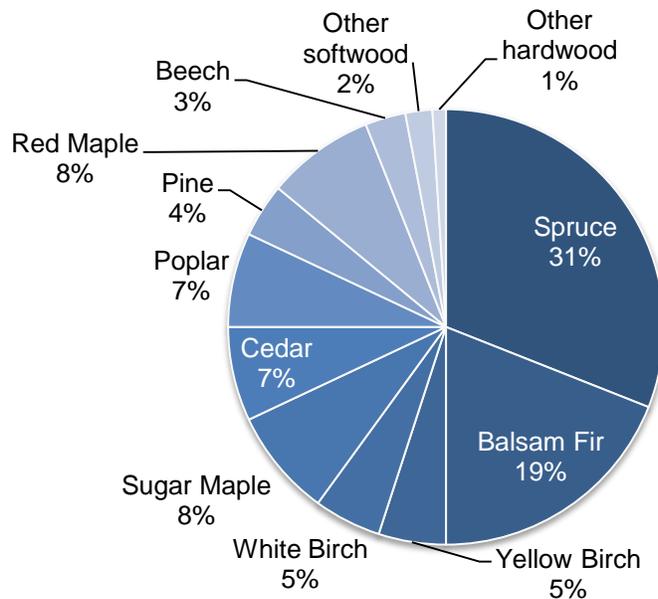


Figure 4.5 Species of Trees in New Brunswick.

Information courtesy of the Government of NB, Department of Natural Resources

Annual Timber Harvest for Tobique 2007-2008	
Land Area (km ²)	24.93
Softwood Harvested	30,062
Estimated Spruce Trees Harvested	15,277
Estimated Balsam Fir Trees Harvested	9,363
Estimated Pine Trees Harvested	1,971
Hardwood Harvested	3,276
Estimated Birch Trees Harvested	840
Estimated Maple Trees Harvested	1,344

Table 1. Annual Timber Harvest for Tobique 2007-2008

Information courtesy of the Government of New Brunswick



	Red Spruce	Balsam Fir	Yellow Birch	White Birch	Eastern White Pine	Sugar/Red Maple
percentage in NB	31%	19%	5%	5%	4%	16%
soft/hardwood	softwood	softwood	hardwood	hardwood	softwood	hardwood
potential uses in housing construction	Curved trusses	Studs, joists, etc.	Bark exterior (vernacular) Tar	Bark exterior (vernacular) Tar	Exterior and finishing	Flooring and finishing

Table 2. Species of trees in NB and potential use in housing construction

Table 2 shows the species of trees on Tobique, estimated from that found in New Brunswick, and potential uses for each in housing construction. Spruce is quite abundant and can be used for the primary structural elements. Birch is an important material in vernacular structures but may prove to be too labour-intensive and scarce to incorporate on a large scale for portions of a housing design for Tobique. However, Birch tar, made by boiling birch bark, has been used by Maliseet traditionally for waterproofing of canoes. It has even been used to preserve wood housing in Scandinavia for centuries and could potentially be used on exterior wood siding for houses on Tobique as well (Wingard, 2010).



Figure 4.6 From left to right: Boiling Birch bark to form tar and wooden house in Scandinavia preserved through application of Birch tar. Image credit: Wingard

4.3 Skilled labourers

There also exist many skilled workers in Tobique and in many other reserves in Canada. Several training programs are available to Native people and many band members work in construction and other trades. These skilled labourers are very capable of building and repairing

their own homes and do when the funding is available. An on-reserve construction and housing company did in fact exist on the reserve in Tobique. The company was very successful for the first few years of operation, and then work plummeted (Perley, 2010). Management of funding started to fall apart and the band continued to get more and more in debt. Third party management was sent to Tobique around 2005 and began to shut all programs and buildings down because, allegedly, the band did not have enough money to maintain and run them. The administration building, high school and community centre were all shut down and all the workers were told to evacuate immediately. The administration building was a particularly sad case in which the band allowed homeless members access into the building for temporary shelter but then sent them an eviction notice a few months later. The large, beautiful log building which looked over the head of the river was completely trashed, with some people even going so far as to cave in the roof in the back portion. A proposal for a museum/tourist attraction had been written for that same admin building only a year or so before this, which could have potentially brought in more revenue for the band as well (McDonough R. , Interview with Ron McDonough - Consultant for the Maliseet First Nation at Tobique, 2010). The band administration had no place to go and so a few of the workers set up shop in the garage next to the old admin building. Many jobs were lost and the buildings which were integral to the community were shut down.

Figure 4.7 shows the occupation breakdown for Tobique. For trade, 14% is in construction and 4% manufacturing. Although a fair number of members are trained in construction trades, many federal programs and funding opportunities exist for training in First Nation communities, especially for forestry initiatives (First Nations Forestry Program, 2009). This means that the skills for starting a housing construction operation on Tobique, especially if working with the other members of their tribal council – the Mi'kmaq First Nations at Burnt Church and Elsipogtog - would be available. If additional members needed to be trained, funding would be available to bring tradesmen to train them.

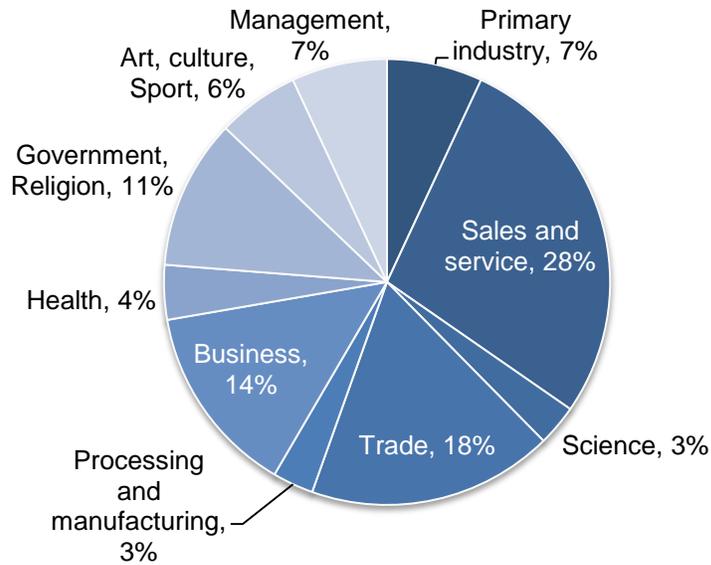


Figure 4.7 Occupation breakdown for Tobique, 2005
 Statistics courtesy of citydata.com

4.4 Positive impacts of using local materials and developing housing

The economic possibilities of starting to use band resources for housing and construction are great. Housing construction on First Nations not only stimulates the local economy, but the provincial and national as well. The research report *The Economic Impact of Residential Construction in First Nation Communities* published by the CMHC and INAC in 2006 pointed to the positive economic impacts of housing construction in rural areas – which accounts to 60% of Aboriginal communities - and to the overall Canadian economy. Direct, indirect and induced economic impacts can benefit these communities. A policy paper written in 2004 by the National Aboriginal Capital Corporation Association stated direct positive effects of residential construction are the following: aggregate demand and consumption, growth of complementary industries, capital formation for business financing, savings rate, rate of economic growth, and employment. The research report also indicates that the greatest local economic impact is seen in communities with a population of 1,000 and over, which includes Tobique.

Tobique has had a construction and housing company on the reserve but as funding is scarce to none at present, little more than repair work is being done. Even when the community was actively building their own housing they did not use their own timber resources as it

required special machinery and more time and funding. The band had cut down lumber and sold it outside businesses but when asked if they thought of producing or had produced value-added products, Ken Perley stated that the band and government simply didn't push for that, even though it would be beneficial economically (2010). This attitude and scarce funding allocations seems to be a result of failed business ventures attempted by Tobique in past years. There are, however, a growing number of examples of First Nations communities who have taken their resources in their own hands, so to speak. The First Nations Forestry Program, created by the Canadian Government in 2004, provides many funding and training opportunities for communities throughout the country in order to promote economic development and self-sufficiency (First Nations Forestry Program, 2009). While this is not the focus of this thesis, it is good to note the real economic and social benefits which can arise from a band-run housing or forestry company. The proposed design does not respond to economic development in such a direct way as the following projects do, but it is important to realize that an initiative such as this could encourage further development, especially if done in a way that strengthens the community and creates a sense of pride. The use of local materials proposed in this design project could lead to further investment in equipment, sale of value-added products, and collaboration amongst band members and different communities (see Appendix A).

4.4.1 Cold Lake First Nation in Alberta – Dechen Corporation

The Dechen Corporation - a forestry company on the Cold Lake First Nation, 300 km northeast of Edmonton, AB – was created in 2006 and has overcome several funding, social, political, and entrepreneurial challenges to become a successful construction and housing company. The Cold Lake First Nation has around 2,350 band members with 1,200 living on-reserve. The Dechen Corporation employs around 25 band members full-time and an additional 25 during peak seasons, providing much employment and training opportunity for members. It has also encouraged 52 businesses to start up on the reserve (Faiz, 2009).

The main hurdle to surpass was securing \$300,000 for start-up financing from federal funding and bank loans. Receiving bank loans or aid from businesses is a huge challenge as home-ownership is uncommon on reserves, making the use of collateral impossible, as well as there being a large gap between market values for houses on and off-reserve. As Section 89 in the Indian Act prohibits the use of reserve land as collateral, entrepreneurs must put other

assets forward to attain bank loans or proving the viability of a business based on its merits, its cash flow, and the band's credit history (Faiz, 2009).

Retaining skilled workers on the reserve is also a challenge as most move off the reserve in search of employment opportunities. Also, as the community is comparatively small and isolated it does not offer many employment or entrepreneurial opportunities or even social/recreational facilities. The sawmill crew, which includes 12 workers under an on-site foreman, receive special training throughout the year through various programs. Services and products provided by the Dechen Corporation include rough lumber of all dimensions, tannage, pipeline skids, logging for oil and gas industry, log hauling, and log homes. The band uses its own reserve's lumber to allow workers at Dechen to build or renovate homes. The equipment use by, services carried out by, and number of people needed for each crew include the following (Cold Lake First Nation, 2009):

- Logging; three fully equipped mechanical lines, skilled operators, 10 man camp
- Log Hauling; two self-loading log trucks
- Slashing crews; including fully qualified chainsaw operators, crew leader and certified safety officer.
- Saw and planer mill operations; providing dimensional and specialty lumber products, currently developing log home kit packages for local and global markets

4.4.2 Acadia First Nation in Nova Scotia – Gardners Mill Property

The Acadia First Nation assumed management of the Gardners Mills Property, 1,174 hectares of forests and lakes, in 1993. The band developed a forest management plan and produced value-added products, such as dimensional lumber, using a portable sawmill. The community has now set up the mill in a permanent location and has purchased new equipment to expand their range of products. The operation used a total of \$51,440 of funding from the First Nation Forestry Program for start-up costs (management, training, road construction, etc.), employs six people, operates nine months a year, and continues to run a successful operation. In 2006, the FNFP had continued to support the band's plans for expansion of operations. This case study shows that the operation of a sawmill and production of value-added timber products using band resources is possible on First Nations communities. It offers a more long-term and

sustainable method for economic development and meeting housing needs (First Nations Forestry Program, 2009).

4.4.3 Eel Ground First Nation in New Brunswick – Forestry development program

Another example of a successful First Nation forestry company which harvests band resources to produce timber products is Eel Ground First Nation. The band's forestry company, Straight Arrow Specialized Lumber Products, has carried out forest management activities since 2005 according to their forest management plan. The forestry program has increased employment within the community, with seven new positions filled in 2007 alone, and FNFP funding – which has amounted to \$131,100, has been used to complete 40 hectares of pre-commercial thinning (First Nations Forestry Program, 2009).

4.5 Summary

Residential construction can stimulate community development as income generated can be spent on services, industries and goods. Purchasing supplies from local businesses would also contribute to the provincial economy. Indirect impacts also include higher productivity of workers and entrepreneurial behaviour. Cold Lake First Nation, a First Nations community in Alberta, has seen huge socioeconomic improvement in their community, along with great indirect economic impacts such as encouraging 52 businesses to start up on the reserve as a result of starting their own housing construction company (Faiz, 2009). There is great potential for a culturally-relevant housing initiative on Tobique as it has the critical area, resources, population, and skilled labourers available. The FNFP precedents show the potential economic and social benefits of a starting forestry or construction initiative. If the band members of Tobique can work collaboratively, both amongst themselves and with other communities, a positive socio-economic change could result. Tobique has a housing construction company on the reserve; however, the rush to use available funding and provide housing resulted in inadequate housing for many of the residents. Using band-owned resources and band labour would cut back on dependence on outside funding and incorporating vernacular strategies would reinvigorate cultural identity and potentially renew community pride. Creating this cultural dialogue is a key component to success. Without it, the development will not be sustainable and the residents will have no real connection to or investment in the process.

5. The Maliseet First Nations at Tobique: Historical Background

The Maliseet people have a very rich and long-reaching history, one which must be fully understood before any implications or design proposals can be made on their way of living. The Maliseet are a First Nations group originating from the Abenaki, or Wabanaki, tribe – the eastern division of the Algonquian nation that includes the Maliseet, Mi'kmaq, Passamaquoddy and Penobscot groups. These Aboriginal groups inhabited the Maritimes for approximately 10,600 years and have adapted and endured through numerous changes and challenges. They equipped themselves to survive the harsh Eastern North American climate; strove to maintain communication, trade and relations between bands; and adapted constantly to fluctuations in resources. While these groups were constantly adapting and evolving with their changing environments, the arrival of the French in the 1600's and Loyalists in the late 1700's probably brought about the largest and fastest changes to their lifestyle, culture, and social structure (LeSourd, 2007). Through their alliance with the French, the Maliseet way of life was affected in almost every regard. There was a gradual change in religion, politics, lifestyle, and use of the

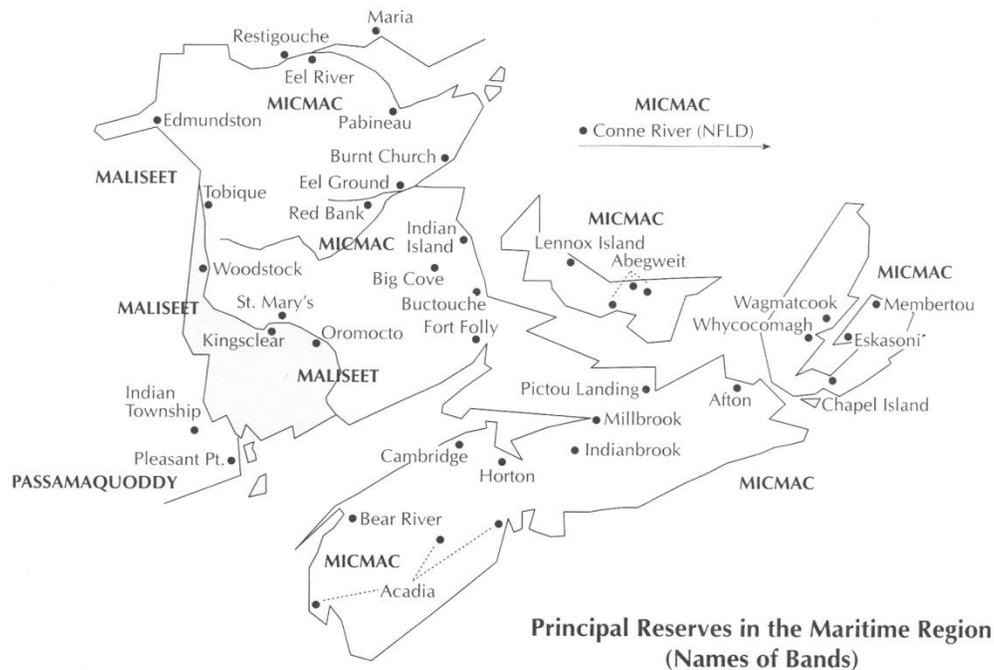


Figure 5.1 Map of Micmac, Maliseet and Passamaquoddy reserves in the Maritimes
Image credit: Maine Indian Program of the New England Regional Office of the American Friends Service Committee

land, with their means of surviving altering dramatically as a result of the introduction of new technology and trade. The struggle between the British and the French for control over the land and trade in the new world strengthened the alliance between the French and Maliseet, as both needed each other to fend off the British and Iroquois forces (McDonough, 2004).

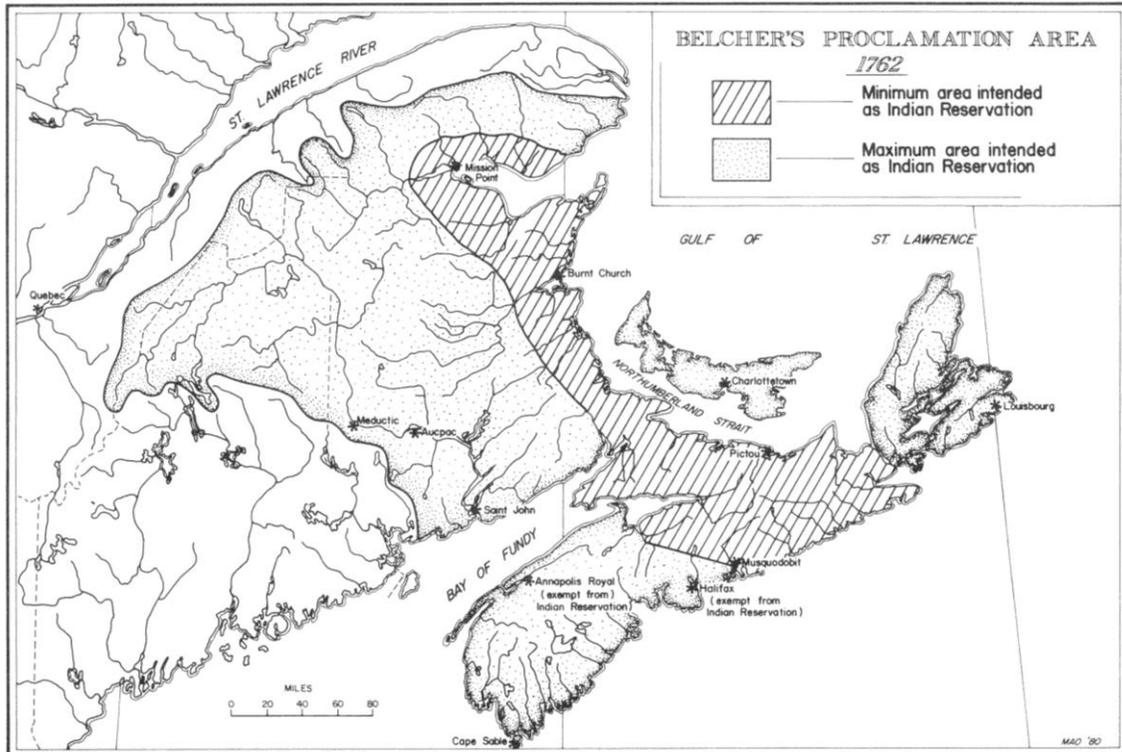


Figure 5.2 Map of area intended as Indian Reservation in the Maritime Provinces
Image credit: Gould, G.

5.1 Maliseet settlements

The Maliseet traditionally occupied most of the Saint John River region in current-day New Brunswick and Northern Maine. Permanent settlements, occupied during the fall, winter and spring months, were situated along the coast, lakes, and rivers. At around 1600AD, the population of the Abenaki people in what are known today as Maine, New Brunswick, PEI, and Nova Scotia was around 32,000. The villages built alongside rivers, lakes and coastlines ranged from 6 to over 100 houses. Birch bark canoes were made for travel in the summer while snowshoes were fabricated for ease of movement while hunting in the wintertime (Maine Indian

Program of the New England Regional Office of the American Friends Service Committee, 1989).

Population at Tobique (2009)				
	On-Reserve Pop.	Off-Reserve Pop.	Non-Registered On-Reserve Pop.	Natives Living in Surrounding Area
Population	1,398	550	244	21
Total using on-reserve facilities	2213			

Table 3. Population at Tobique (2009) Information courtesy of Government of Canada

The Maliseet Nation at Tobique was established in 1801 under its native name, Wolastokwik Negoot-Gook, translated into “where the two great rivers meet.” This refers to its location at the confluence of the Saint John and Tobique rivers in north-western New Brunswick. At this time, the reserve land totalled 7,444 hectares (18,394 acres) but was reduced to 1/3 of this size as a result of expropriated land for settlement use by the Government of New Brunswick (refer to Figure 5.2). This includes the village of Perth-Andover, located 10km from the reserve, with a population of approximately 1,900 and an estimated service population of close to 6,000 (including the Native population at Tobique). The ‘invalid surrender’ of these lands was finally recognized by the federal government in May, 2008, and negotiations have been taking place between the Maliseet and government for land rights ever since (Wallis, 1957). The current population living on the Tobique reserve is 1,398 people, with 1,948 total registered members. Due to a cutback in housing subsidies for off-reserve housing, 44 members have recently moved back onto the reserve. An additional 21 natives, living in the surrounding area, and 200 non-registered people – spouses and children not qualifying for registered status-, living on the reserve, use the Tobique’s facilities and services (McDonough R. , 2009).

As the Maliseet are a nomadic people, the style of houses built about 2,500 years ago were simple but resilient, taking full advantage of available material. Wigwams built were oval-shaped, 10-12ft across, and sunken 4-24” into the ground for protection from the cold (Figure 5.4). The floors were covered in fine beach gravel or woven boughs. Hearths in wigwams and tepees were placed near the entrance and benches were situated along the walls (Figure 5.3). (Maine Indian Program of the New England Regional Office of the American Friends Service

Committee, 1989). Longhouses, possibly only used for community gatherings, had a circular plan 30-40ft in diameter and were domed in shape (Figure 5.5). Spruce or cedar was often used for the structure of longhouses and wigwams while birch bark and sometimes animal skins were used for the envelope/skin of these structures (LeSourd, 2007).

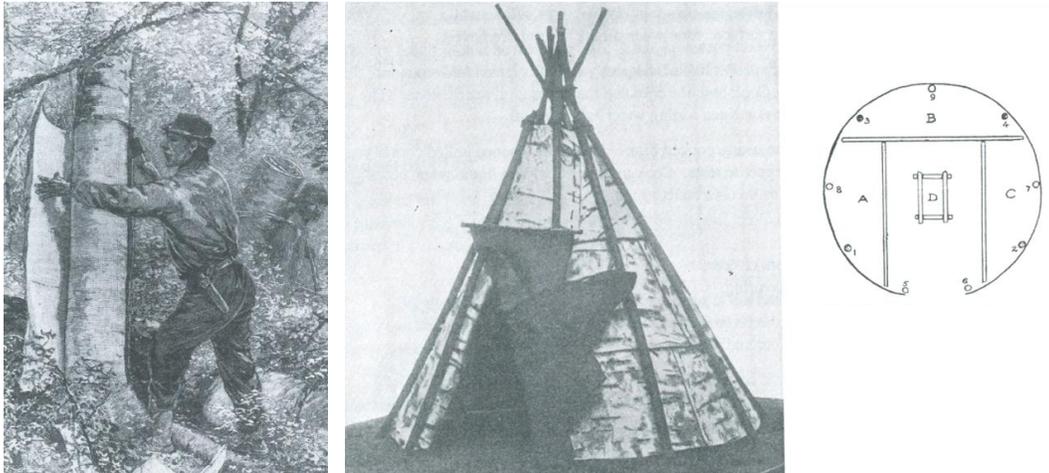


Figure 5.3 Peeling Birch bark (left), Teepee (right). Image credit: Maine Indian Program of the New England Regional Office of the American Friends Services Committee (left), Nabokov (right)

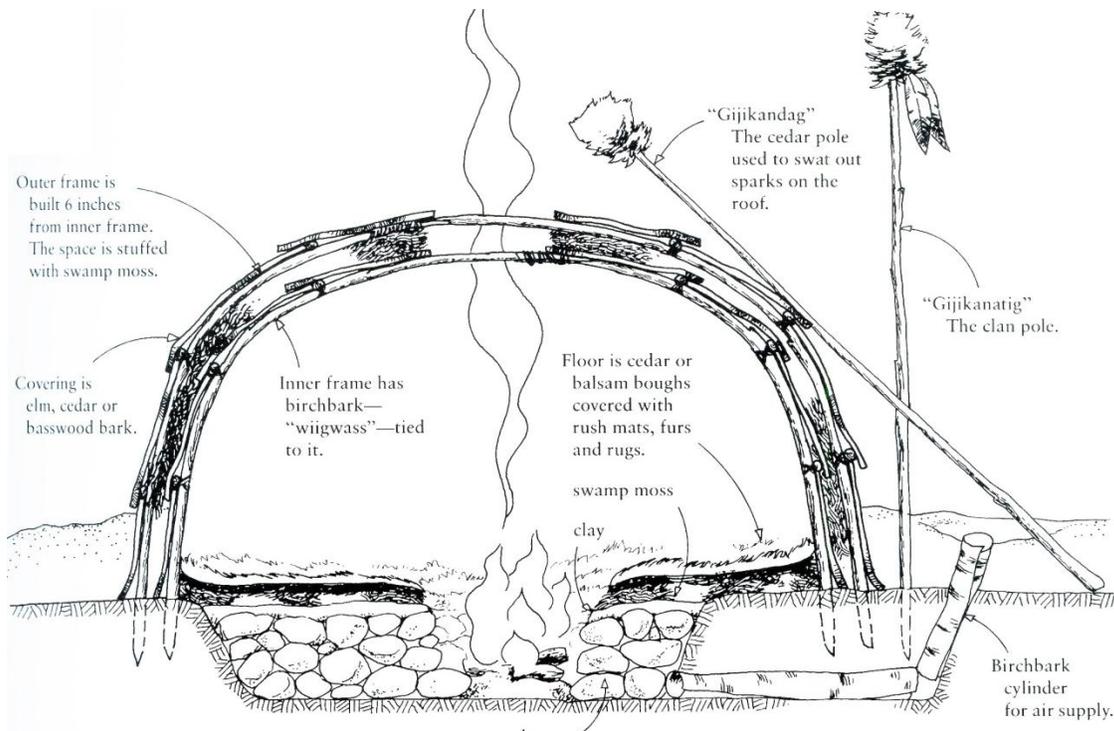
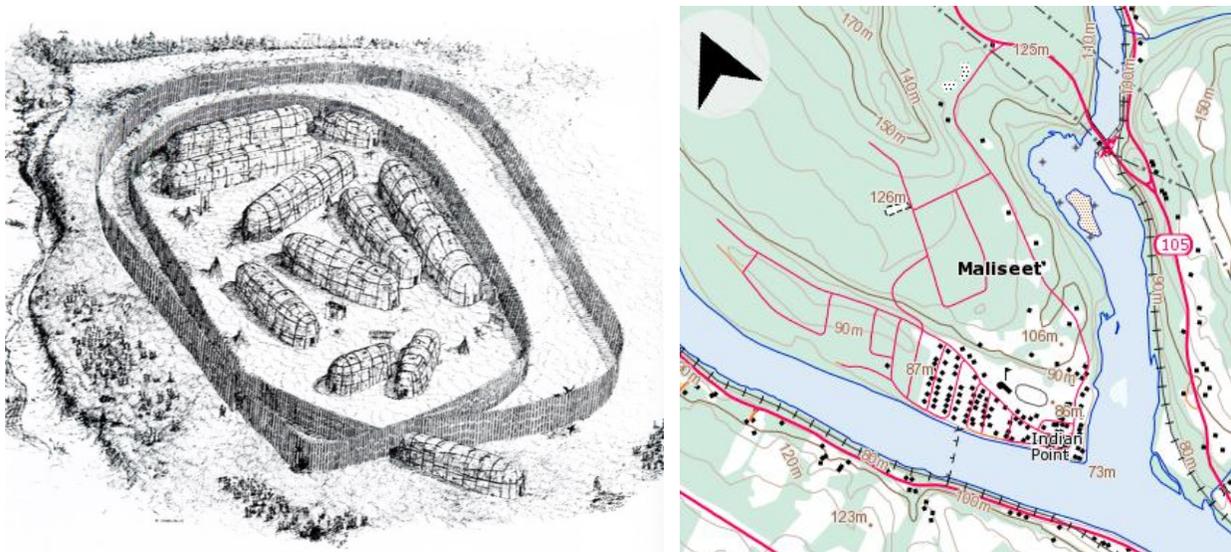


Figure 5.4 Chippewa wigwam. Image credit: Nabokov

One cannot propose returning to past ways of living, but there are lessons to be learned from these vernacular structures. While the European influence to Maliseet culture and way of life is undeniable, a housing strategy that embraces modern as well as vernacular strategies would marry what would appear to be contradictory sides of communities' Aboriginal heritage. The housing on Tobique and many other First Nations communities are in poor condition and are inadequate for the multiple families and generations that live in them. Traditional communities, as well as vernacular structures such as longhouses and wigwams, were arranged in a communal and centralized manner. Contrary to this, reserve communities today are laid out like a typical suburb. Detached housing in Tobique line straight streets with wide gaps between them (Figure 5.5). Compared to vernacular community layouts and growth patterns, the community planning at Tobique, with detached houses lined along a rigid street grid, does not promote social interaction or even provide sufficient private space. The Maliseet people have traditionally relied on a collaborative, community environment, and the reserve system put into place reinforces this mentality. However, bands and even band members have become more distant as a result of the design and layout of the communities coupled with social and economic difficulties. In order to build a stronger community, a more social approach to housing design should be incorporated.



**Figure 5.5 Longhouses and community growth (left) and Tobique (right).
Image credit: Nabokov (left) and Government of Canada (right)**

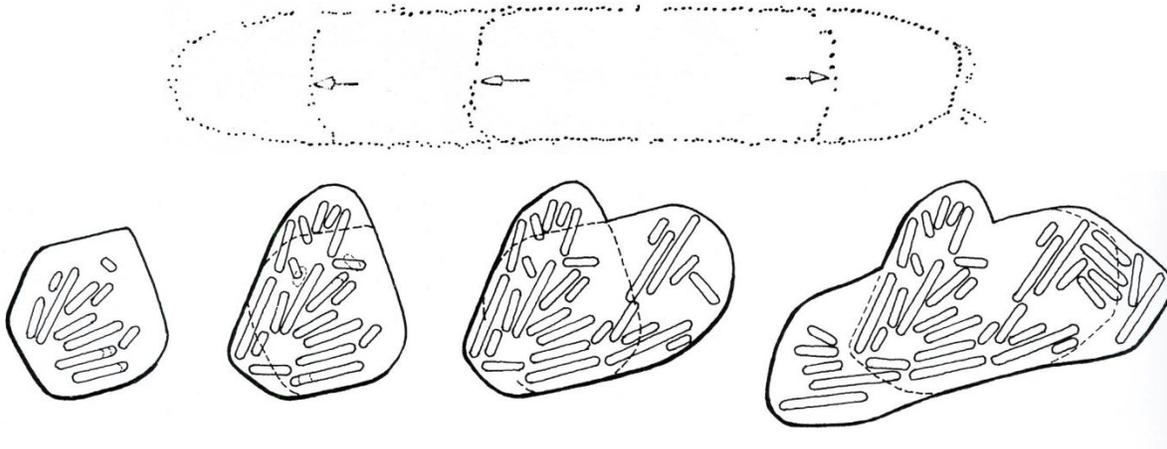


Figure 5.6 Longhouse expansion (above) and community growth. Image credit: Nabokov

5.2 Land treaties and the reservation communities

Why have these lands, given to Aboriginal people as a treaty right, caused so much turmoil and debate regarding territory and possession? Upon arrival to present-day New Brunswick, the loyalists had to adapt to and endure very difficult conditions. However, they very quickly began to encroach upon Native land and take what had been promised to Aboriginal people in the treaties signed by them in 1762. The British had signed an agreement with the Aboriginals to their rights in keeping some of their land as they feared a similar uprising as had occurred in the United States by tribes like the Mohawk. These treaties, however, were not enforced by officials once broken by the loyalists encroaching upon Native land (Gould & Semple, 1980).

There began massive land takeovers and the Maliseet could do nothing to stop their displacement. As stated in several sources such as *The Malecite Indians of New Brunswick*, a history of the Maliseet people written by Wilson Wallis in 1957; *Our Land: The Maritimes*, literature chronicling Native history and claims in the Maritime Provinces published 1980; *The Wabanakis of Maine and the Maritimes*, written by the Maine Indian Program of the New England Regional Office in 1989; Ron McDonough's report on historical analysis for the Maliseet historical village submitted in 2006; and the First Nations profile of Tobique taken from the INAC website, the amount of reserve land the Mi'kmaq and Maliseet people ended up with amounted to nothing close to the territories originally guaranteed to them (Figure 5.2). By the mid-19th century, virtually all Maliseet people had been reduced to poverty as a result of their

geographic and social isolation as well as diminishing resources. Game was drastically overhunted and soon the Maliseet too began to take from the forests what they could before there was nothing left to hunt (McDonough, 2006).



Figure 5.7 “Small Village” - Frank Shebageget (left) and “Unsettlement” - Hanna Claus (right)
Image credit: Canadian Museum of Civilization Corporation

Figure 5.7 shows two installation pieces which were displayed in 2007 and 2008 at the Contemporary Aboriginal Art Exhibit in the Canadian Museum of Civilization. They both speak of the conditions and issues on First Nations communities. The image on the right is of the piece “Small Village” by the Anishnabe (Ojibwa) artist Frank Shebageget, which comments on the “substandard federal housing projects on First Nations reserves across Canada” and the uniformity of suburban development (Canadian Museum of Civilization Corporation, 2011). The image on the left is “unsettlement,” an installation piece by Mohawk member Hanna Claus. The miniature single-family houses covered with wallpaper motifs from Victorian England were said to symbolize Western consumption and values. Conversely, “the shadows of beads spill out from the buildings, evoking the multi-family dwellings so central to the lives of the artist’s Mohawk ancestors.” Both projects express issues of conformity, banality, and disregard to site and cultural context that exist on First Nations communities (Canadian Museum of Civilization Corporation, 2011). Rather than simply supplying bands with cheap, bandage solutions, addressing social and cultural issues through housing is vital to rejuvenate Aboriginal communities.

5.3 Summary

The design of housing and community planning of Native reserves do not promote social interaction or engagement with culture or site. The reserve system set into place by the British have left Aboriginal people with only a fraction of the land guaranteed to them and caused a cycle of dependency of federal funding. Many feel disconnected with their culture and heritage and feel powerless to change their, and their community's, circumstances. In addition to this, the banal and repetitive detached homes neither respond to local climatic or social contexts. Vernacular structures and community growth were centred on the idea of family and community, and although the reserve system enforces this idea in theory, it has atomized groups and caused many socioeconomic problems. A more integrated design and construction strategy which engages the residents with the development of their community physically and spiritually will strengthen cultural identity. This will allow the community to become more self-reliant and establish their own understanding of their culture and its evolution, avoiding outside perspectives and influence.

6. Social and Health-Related Issues at Tobique

Engaging the community through a housing initiative that uses local materials and labour is not only economically beneficial but socially as well. As mentioned previously, the community at Tobique suffers from several social and health-related problems. Some of these concerns stem directly from poor construction, materials and maintenance, such as serious mould damage developing in several homes throughout Tobique. Other issues are at least partially a result the isolated and anti-social nature of the geographic location and community planning of many reservations. While the problems surrounding life on Native reserves seem overwhelming, social ills such as crime and abuse has been seen to lower, while self-esteem and entrepreneurial behaviour has risen in communities where a band-owned construction company has been implemented. Many of these positive effects are a result of provided employment and training opportunities, provision of adequate housing, and promotion of homeownership (Infometrica Limited, 2006). *The First Nations Housing Action Plan*, published in 2005 by the Assembly of First Nations, described adequate housing as a basic human right and saw it as “a key link to education, health, economic opportunities and employment outcomes.” The report also stated that many families experience “a cycle of stress and sickness that is never ending, placing an additional burden on the already strained health care system” (Assembly of First Nations, 2010). The following section discusses some of the major social and health-related issues existing at Tobique and how a housing proposal, which embraces vernacular strategies and local resources, could help to address or mitigate some of these concerns.

6.1 Strained funding

As shown in section 1, the current population living on the Tobique reserve is 1,398 people, with 1,948 total registered members. The number of people reliant on band facilities is much larger than the registered population and, therefore, what funding formulas afford. This means that health, educational, and other community facilities and resources are stretched thin. See Appendix A for funding figures for Tobique.

Population at Tobique (2009)				
	On-Reserve Pop.	Off-Reserve Pop.	Non-Registered On-Reserve Pop.	Natives Living in Surrounding Area
Population	1,398	550	244	21
Total using on-reserve facilities	2213			

Table 4. Population at Tobique (2009). Information courtesy of Government of Canada

6.2 Health Concerns

These services are stretched thin as issues of maintenance and an increasing population continue to grow. Figure 6.1 displays the primary health issues that exist, amongst several others, at Tobique. It is clear that addiction is a major concern and is currently addressed by the addition of a rehabilitation centre on the reserve. Many families have expressed concerns with alcohol addiction, both among the youth and the more mature population. There appears, however, to especially be problems with alcohol addictions amongst the fathers and older male population. All of these health concerns, however, exasperate existing issues of facilities in disrepair and an overall lack of sufficient services or funding (McDonough R. , 2009).

Social problems worsened by poor housing design and community planning are not the only issues affected by poor housing design. As a result of cheap construction and materials, as well as improper maintenance, around 75% of homes on the First Nation community at Tobique experience serious mould damage (Perley, 2010). The overcrowded and air-tight homes cause poor living conditions and health concerns which could be addressed through site-specific design strategies and principle. Vernacular techniques and material use could inform some of these design concerns (see sections 1, 2 and 3).

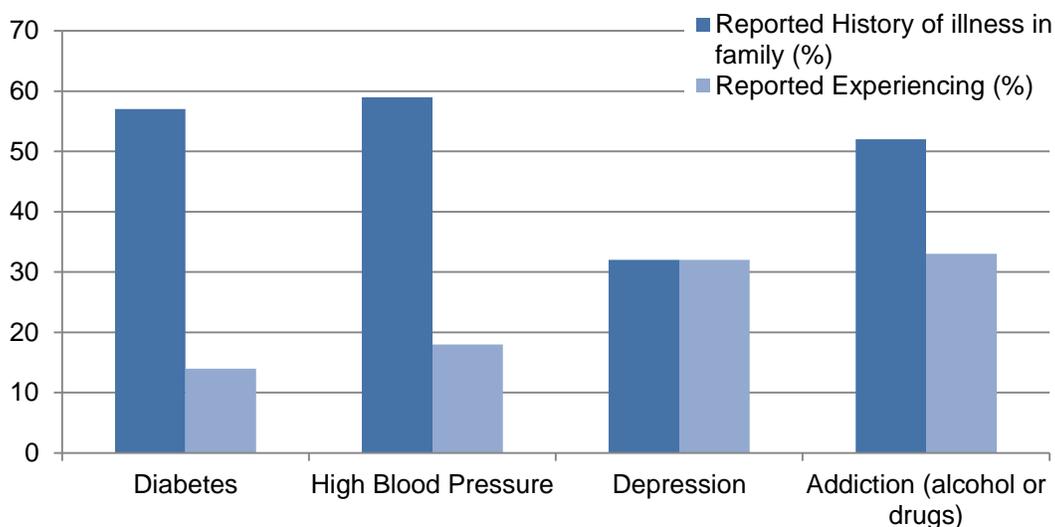


Figure 6.1 Reported percentages of health issues on Tobique.
Information courtesy of Ron McDonough.

6.3 Employment and Income

Problems regarding a growing population, under-funding and a lack of facilities also affect education, job opportunities and housing. The average income for residents of Tobique, recorded in 2001, was a meagre \$10,257, with only 54% coming from actual earnings. The remainder of this income comes from “government transfers.” In 2004, an estimated 33% of members were eligible for social assistance, while, in 2008, over 400 adults were receiving Income Assistance payments from INAC – Indian and Northern Affairs Canada. Much of the employment available to the community members are seasonal – picking potatoes (primarily youth population), construction jobs in the US, the Negoot-Gook Fisheries in Grand Manan and jobs stemming from Tobique Forestry, which works from crown land allocations (McDonough R., 2009). Only a few businesses are all-year, such as Maliseet Capital Construction, which is not currently operating beyond repairs (Perley, 2010). Most employment on the reserve stems from cutting pulp and the repair of houses. This makes it very difficult for residents to earn a proper living and to support their families, or to make enough money to eventually move off the reserve and look for work elsewhere. It is also useful to note that the houses on reservations generally are not owned by the residents, with some exceptions in the cases where the new federal mortgaging system was put in place on First Nation communities and was successful. Unfortunately, many communities, Tobique included, have attained considerable debt as a result of the homeownership, mortgaging system failing (Assembly of First Nations, 2005). As

shown above, the low annual income level of the band members and the fact that many are on social assistance would show that these communities are not financially stable enough to employ such a system. The houses are often passed down from generation to generation and it is impossible to use houses as collateral due to Section 89 of the Indian Act (White, Maxim, & Beavon, 2004).

6.4 Education

Employment above minimum wage is also difficult to find as many residents are unskilled, high-school drop outs, and/or did not attend a college or university. A staggering 69%, versus 42% provincially – also far below the national average –, of youth aged 15-24 have no certificate, diploma or degree, with 20% (26% provincially, again low) of the total population never having attained a high school certificate or equivalent (see Figure 6.2). Along with high drop-out rates, there are also many reports of absenteeism, poor academic performances, alcoholism, drug abuse, delinquency, teen-age pregnancies, emotional disorders and even suicides in both the middle school and high school levels. An elementary school was situated on the reserve in Tobique, however, due to water damage and maintenance issues, it had to be closed down and temporarily relocated to the basement of St. Anne's Catholic Church, also located on-reserve. The youth attend middle school and high school in Perth-Andover, just 10km south of Tobique. Much tension is still present in middle and high school between natives and non-natives, however. There are universities and colleges located in nearby cities, such as Mount Allison in Sackville and the University of New Brunswick, St. Thomas University, and several colleges in Fredericton, but a 34% of the total population have no certificate, diploma or degree, compared to 29% provincially. It should also be noted that this provincial percentage is below the national average. There is some hope for the community, though, in that it has a very youthful population, with 37% in the range of 0-19 years of age, compared to 22% in New Brunswick (McDonough R. , 2009). While health and social services will still continue to be strained with an increasing population, the large percentage of youth will likely place more emphasis on improving educational facilities, job training and providing/enabling for employment opportunities. In terms of federal government funding, in 2007 \$2,528,523, the second largest amount of Aboriginal funding for Tobique after social assistance, was allotted towards elementary/secondary education. An additional \$1,503,530 was designated to post-secondary education (Statistics Canada, 2007).

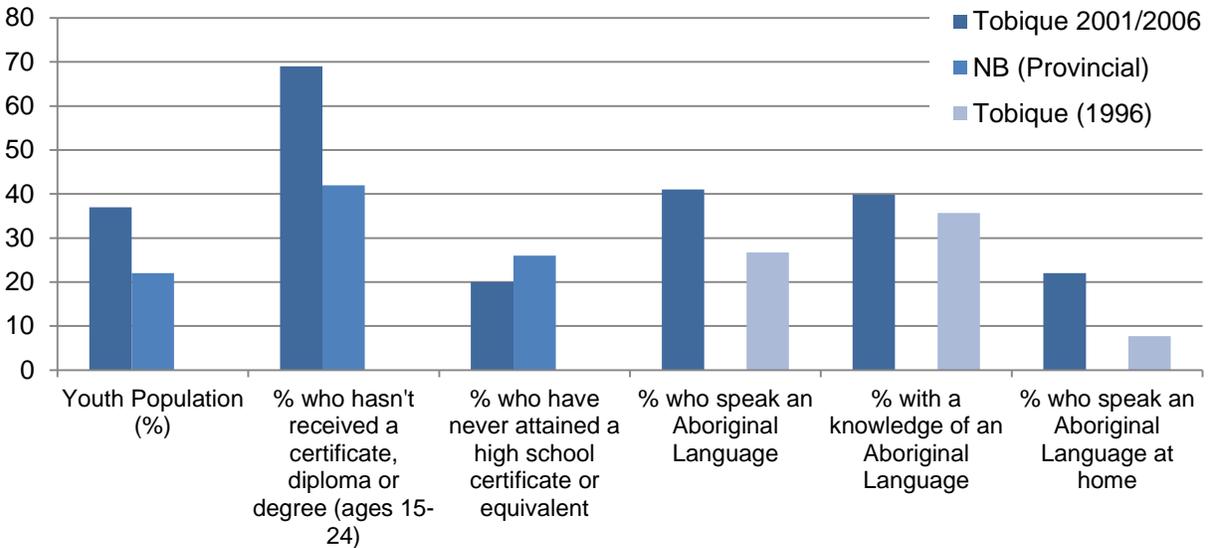


Figure 6.2 Graph of youth population with regards to education and language

6.5 Language

While much of their culture has, and continues to, fade, there is still a sizable percentage of people on the reserve in Tobique who speak an Aboriginal language. According to Census data taken in 2001, all registered members at Tobique spoke English but there had been an increase in the percentage of the population who speak or have knowledge of an Aboriginal language. Figure 6.2 shows the statistics for members of Tobique who can speak Maliseet. The numbers appear to have risen, which is encouraging and may have pointed to the educational system stepping in and teaching the youth population their Native language. However, according to the housing director at Tobique and Ron McDonough – consultant -, this high percentage of Maliseet-speaking members is primarily accounted for by the previous generation. Many factors, such as schools shutting down; a lack of funding; and apathetic behaviour, have led to the loss of language amongst the youth population (Perley, 2010). This is very unfortunate because, as stressed in this research, oral tradition is integral to Aboriginal heritage. The poor state of repair of buildings and shortage of housing could be an opportunity to engage in a cultural dialogue through the body rather than through words. This intent was expressed in section 2 and seems even more relevant and important in this context where language and social unity is fading.

6.6 Summary

While housing cannot respond to all of the social problems on Tobique, a culturally-relevant design can mitigate or eliminate negative health effects due to improper design and construction. Many of the social and health-related problems on the reserve stem from feelings of apathy and hopelessness, as it is inconceivable for many residents to imagine positive change and development for themselves or their community. A culturally sensitive design which involves the whole community would promote community pride and lessen certain social issues through virtue of physical and social engagement. A band-run housing initiative would also employ residents and therefore stimulate economic activity and provide employment and training opportunities. As funding is strained, using local labour and resources would also lessen the band's reliance on federal funding and create a more sustainable system. All in all, the construction of context-sensitive housing would bring about positive socio-economic change.

7. Housing Issues

7.1 The Housing Crisis on First Nations Communities

The state of First Nations housing and infrastructure in Canada, although showing improvements with change in policy and management over the years, is in such a state of crisis that it has been compared to those in third world countries (Assembly of First Nations, 2005). It has even required Habitat for Humanity to step in and work with the CMHC to improve the situation (Indian and Northern Affairs Canada, 2009). The reports *People to People: Nation to Nation*, put together by the Royal Commission on Aboriginal People in 1996, and *The First Nations Housing Action Plan* state that First Nations believe that the “provision of housing and services is a treaty right” as defined by section 35 of the Canadian Constitution and that the federal government has responsibility to aid, supply, and improve housing on First Nation communities. Substandard living conditions and large housing backlogs exist in many reserve communities. The Aboriginal population in Canada is also growing at a much faster rate and has an increasingly young population with a median age of 24.7 years, compared to 37.7 years for non-Aboriginals. This leads to overcrowding, with 10.3% of on-reserve residents living in crowded conditions, compared to 1.4% of non-Aboriginal households. Many residences on reserves also house multiple generations as well as extended families, requiring specific design and size requirements (CMHC and INAC, 2004). The poor state of repair coupled with socially and culturally inappropriate housing design resulted in 22.5% of residents living in inadequate housing conditions, compared to 2.5% of non-Aboriginal people in Canada (Statistics Canada, Census 2001).

7.1.1 Importance of self-sufficiency

Although the Indian Act was created in 1948, the notion of Aboriginal rights did not even exist until the 1960's. They obtained the right to vote in federal elections in 1960 and compulsory enfranchisement was removed from the Indian Act in 1961. It was not until 1967, though, that First Nations were given the status of “citizens plus,” wherein the federal government acknowledged that they were to have both federal and additional Aboriginal rights (White, Maxim, & Beavon, 2004). As shown in the previous section, mismanagement and misappropriation of land by the British occurred in the past, and many Aboriginal communities blame much of their socioeconomic problems on these past wrongdoings and to the current

Canadian Government. Many federal funding programs are available to First Nations, but they are often not sufficient and do not seek a long-term solution (Trousdale, Cook, & Chamberlin, 2008). This claim is backed up by several reports such as the *Tobique FN Needs Assessment Report* by Ron McDonough, *The First Nation Housing Action Plan*, and the *Aboriginal Housing Background Paper*. To this day, the government continues to search for a way of ending the cycle of dependency of the First Nations. Policy makers look to promote social, economic and political integration while Indian leaders seek the recognition of their treaties, Aboriginal rights, and settlement of land claims (Leavitt, 1995). This can only be achieved if First Nation communities become self-sufficient, set up more businesses which can create a flow of capital and income between the community and outside businesses (Infometrica Limited, 2006), and create structured financial and economic plans to address current and future goals (Harivel & Anderson, 2008).

The majority of successful or developing First Nation communities are the ones that are self-determining and self-sufficient. The Muskwium First Nation in British Columbia has taken matters into their own hands by essentially waiving their land rights. They developed the allocated crown land and then sell it to developers. Communities do not, however, have to take this route to attain self-sufficiency and help their economy. Many reserves in Northern Ontario have taken advantage of the amount of timber resources available on their lands and have harvested, sold lumber, and manufactured housing (Scott, 2010). The Dechen Corporation, Eel Ground First Nation, and Acadia First Nation are primary examples of communities who have improved their local economy through use of local timber resources (First Nation Forestry Program, 2004). Creating self-determining strategies such as these is vital for the development of First Nations communities

7.1.2 Federal funding for housing

The Canadian government allocates approximately \$250 million per year to housing for First Nations, \$125 million towards the construction of on-reserve housing and \$125 million towards the repair and renovation of existing federally-assisted on-reserve social housing. These amounts would allow for the construction of 2,300 new units, the renovation of 3,300 existing units, and the continued subsidizing of 25,000 units of existing rental housing on-reserve. Indian and Northern Affairs Canada also allots \$150 million for lot servicing, renovation,

new construction of high-density multi-unit dwellings and renovation to support conversions of band-owned housing to private ownership (INAC, Call letter for INAC's Canada's economic action plan housing program, 2009). The research report *The Economic Impact of Residential Construction in First Nation Communities* published by the CMHC and INAC in 2006 pointed to the positive economic impacts of housing construction in rural areas – which accounts to 60% of Aboriginal communities - and to the overall Canadian economy. Direct, indirect and induced economic impacts can benefit these communities. A policy paper written in 2004 by the National Aboriginal Capital Corporation Association stated direct positive effects of residential construction are the following: aggregate demand and consumption, growth of complementary industries, capital formation for business financing, savings rate, rate of economic growth, and employment. The research report also indicates that the greatest local economic impact is seen in communities with a population of 1,000 and over, which includes Tobique and the other two Mawiw Council bands – Burnt Church and Elsipogtog. If the three Mawiw council bands work collaboratively and pool resources and funding, initiating and running a band-owned housing construction company would be much more feasible, while ensuring a large enough population to meet demand and sale requirements (see Appendix A).

Traditional funding for housing allocated to bands through the government was based on the fact that band members did not own the property their houses were situated on. A certificate of possession would be given to residents who have paid off their homes, although they do not own the land the house is situated on as it is band property. A new system was put into place through the Canadian Economic Action Plan in 2009 to encourage and allow for members to become home-owners (Indian and Northern Affairs Canada, 2009). This would hopefully result in members carrying out better maintenance on their dwellings and allowing them to use their houses as collateral if they choose to move off-reserve (Scott, 2010). Members of the Madawaska First Nation community in New Brunswick take pride in their houses as they pay for and choose from a range of sizes, layouts and types of housing, resulting in great diversification of housing on the reserve (CMHC, 2008). However, bands in poor economic conditions with members receiving far below the provincial average annual income cannot support this mortgaging system. These communities end up in essentially insurmountable amounts of debt. Tobique currently holds a \$45 million dollar debt (Pritchett, Accountability: Critics blame Department of Indian and Northern Affairs for promoting a culture of fiscal irresponsibility, 2010). This debt was not only brought on by failed ventures but improper management and use of

funding. The government is wary of increasing funding with the band's history of failed ventures and improper financial management; as a result, the band can only use the housing loan program funding for houses which have paid off their mortgages, which is only a small percentage. Tobique cannot build new housing until their debt is repaid, which seems nearly impossible, and is struggling to keep up with demands for housing repairs on the reserve (Perley, 2010). Although home-ownership may not be a valid option for many First Nations communities, band and individual involvement in housing construction was described as an important factor in addressing these concerns by both the 1987 and 2004 reports on the Evaluation of CMHC On-reserve Housing Program, and later confirmed by other analysts and evaluators (Infometrica Limited, 2006). A housing system dependant on a steady income of federal funding is not a sustainable one and, as is evident on Tobique, the funding allocated is often not enough to keep up with demand. A band-run housing initiative based around using local material resources and labour would allow for a more self-sufficient system.

Although these challenges are great and few employment opportunities exist on these communities, which are often small and isolated, many band members remain and want more for their communities. Benefits are available to band members on Tobique but many members also speak in forums, on Facebook groups, in community newsletters and in person of how the community was strong only a couple of decades ago and how they want to help restore that sense of community. As expressed by members of Tobique, such as the present and former housing directors of Tobique - Ken Perley and Dana Francis -, and interviews of Maliseet people in *The Wabanakis of Maine and the Maritimes* and *Maliseet and Micmac First Nations of the Maritimes* - both literature on the historical accounts of Maliseet culture as well as an educational resource - living as one community as well as living with extended and elder members of the family are very important aspects of the way Maliseet people live, especially on-reserve. Many of the existing houses are overcrowded as there is a lack of available housing but also because larger families tend to live together (Leavitt, 1995 and CMHC and INAC, 2004).

7.2 Family types on Tobique

Section 5.3 shows images of houses on Tobique which have been expanded rather extensively. These photos illustrate that additions and expansion of housing is not at all uncommon on Tobique and may in fact be necessary as there are several instances of

overcrowding, a backlog of 300 houses (McDonough , 2009), and many instances of elderly family members and extended families living in the same household (Perley, 2010). A collaborative housing strategy might be beneficial for the many young, single mothers that live on such reserves. In the 2006 Census of the Tobique, 38% of the 225 Census Families were listed as “married-couple families,” compared to 69% for New Brunswick, while 42%, compared to 16% for the province, were “lone-parent families.” Eighty out of the 95 lone-parent families were single-mothers. The average number of people in these households, however, was 3.1, compared to 2.5 provincially. With such an array of household types and affinity for extended families and multiple families and demographics to live together, the standard CMHC or pre-fabricated houses are inadequate. Section 5.4 discusses the issues surrounding typical CMHC and pre-fabricated housing design and what can be done to address certain cultural, social, and climatic contexts.

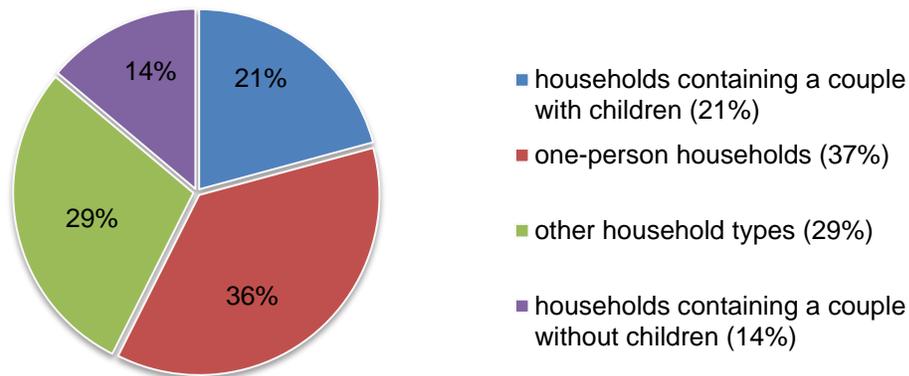


Figure 7.1 Household characteristics on Tobique. Image credit: City-Data.com

7.3 Condition of Housing on Tobique

An isolated community in a poor socioeconomic situation grows much differently than the typical town or residential neighbourhood. The informal additions which have been added over the years by residents of Tobique are one example of the development which can occur in these areas. Poor materials and construction are often used and the resulting addition or overall building seldom conforms to or performs up to national building standards. Generally, this type of development is an undesirable outcome for both the residents as well as the provincial and federal government who are to respond to these developments, although it shows that the residents have taken matters in their own hands to a certain degree in order to alter their residences into something more appropriate for their needs. This type of development indicates

that there is something lacking in what is provided, but the question is where to go from here, especially with a struggling local economy and limited funds.

The quality of housing on the reserve varies greatly. As stated by both Ron McDonough - a consultant who has worked with the people of Tobique for around 15 years - and Ken Perley - housing director at Tobique - the quality of homes built on the reserve is often low. There are many houses, however, that are in great condition and that look like the types of houses you would see in any other residential community. Ron McDonough stated that many, but not all, of the houses and properties in extremely good condition were the ones where the resident had a certificate of possession, meaning they own the house. Some homes are in excellent condition, with the residents carrying out proper maintenance of the house and property while others fall into serious disrepair. As stated earlier, mould is a serious concern for the residents, with 75% of homes with serious mould damage. When speaking to Dana Francis about housing construction on Tobique he said that over 100 houses were built in 2-3 years when he was housing director over a decade ago (Francis, 2010). This was because of a change in housing policy and funding which was available for a short period, as most funding initiatives are. This caused the band to boost construction activity dramatically while they could benefit from these changes. In a rush to build as many houses as possible while the program lasted, the quality of construction sometimes suffered. Grabbing opportunities as they become available and rushing to carry out plans is not a sustainable method, but many First Nation communities do the same. Short-term planning is also common as band elections are every 2 years, making leadership unstable (Wade, 2008).

With the population growing, the availability of housing is continuing to become a larger and larger problem at Tobique. In the 2006 Census, it was recorded that 365 dwellings were located on the reserve with no less than 47% "requiring major repairs," compared to 10% for the province. In the 2004 Tobique Comprehensive Community Plan, 69% of the 83% of houses in need of some degree of repair were due to mould issues. On top of these maintenance and repair concerns, there exists an unmet demand of approximately 200 houses on the reserve, which is continuing to increase each year (McDonough R. , 2009). Although Aboriginals living on-reserve do not pay property tax, there are also subsidies available to off-reserve members. However, due to cutbacks, many people have moved back to the reserve or find it even more difficult to imagine moving off-reserve. This is a huge issue as some members must eventually

be able to find jobs elsewhere and live off the premises as the population is growing at a high rate (McDonough R. , 2009).

7.4 Housing types on Tobique

The size, construction type, and condition of housing on First Nations communities vary greatly between communities and even amongst residents. There are a wide range of types of housing and condition of housing on Tobique. Typical CMHC housing found in many other residential communities throughout the country as well as prefabricated homes can be found throughout the reserve. One notable characteristic of many of the residences is that make-shift additions, many of which are as simple as a vestibule, have been attached by the band members. This would suggest that the current housing does not fulfill all of the residences requirements and/or that there is no proper entry-way.



Figure 7.2 Typical CMHC housing on Tobique, all in relatively good condition.



Figure 7.3 Prefab houses on Tobique. The photo on the far right shows a make-shift vestibule/ addition on the front and the photo in the middle shows a vestibule which was added as well.



Figure 7.4 Houses in disrepair on Tobique, all of which have make-shift additions, sunrooms and vestibules added to them.

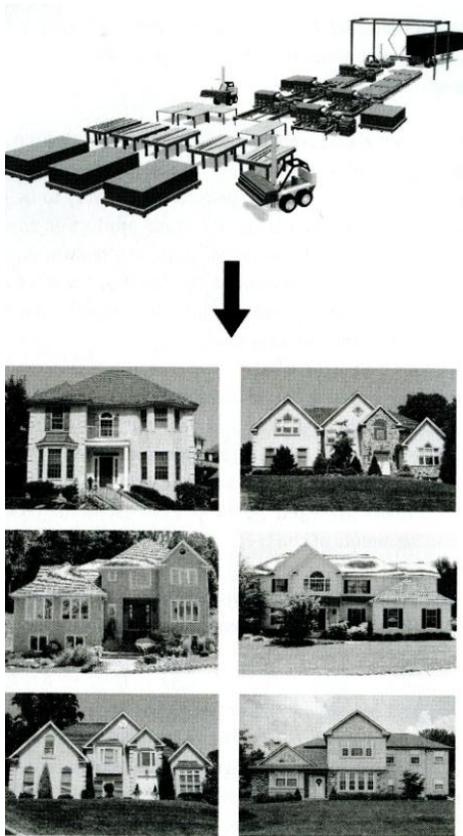


Figure 7.5 Houses on Tobique with make-shift additions, sunrooms, and vestibules.



Figure 7.6 Houses on Tobique with extensive expansions. The addition in the image on the left seems to have been done professionally and successfully and the images in the middle and right appear to have been executed at least be partially by the homeowner(s) or band members.

7.4.1 Issues regarding pre-fabricated homes at Tobique



A large percentage of existing houses at Tobique are inadequate in several aspects. They are not sensitive to social, cultural, and climatic contexts and are often overcrowded, dilapidated, and inflexible. This is extremely evident in the pre-fabricated residences supplied by a local pre-fabricated homes manufacturer. Many of the houses on Tobique are modular, prefabricated buildings of this kind and are extremely affordable but inflexible. To achieve a profit and an efficient process, modules must be standardized and produced in large quantities and generally in large assembly plants. As written in *Prefab Prototypes* by Mark and Peter Anderson (2007) “the paradox is that the more standardized the units become, the less flexible they are, and the narrower the range of possible applications.” Many modular buildings are also intended to be temporary structures but ultimately end up as permanent, poorly planned installations (Anderson & Anderson, 2007).

Figure 7.7 Automating mediocrity
Image credit: Kieran Timberlake

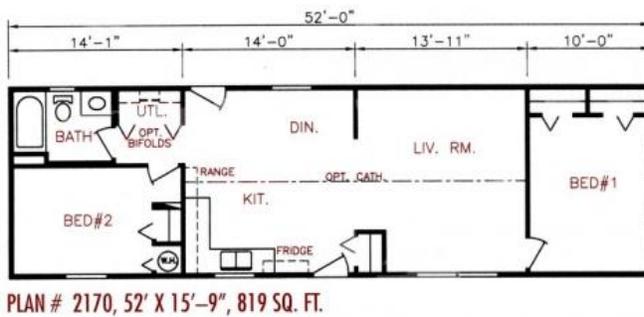


Figure 7.8 Typical floor plan for Maple Leaf pre-fabricated homes (left) and pre-fab home with added vestibule on Tobique. Image credit: Maple Leaf Homes (left)

While pre-fabricated homes are affordable and easy to build as they are shipped read-made to the site, Figure 7.8 shows the plan of a typical home on the left and an ad-hoc vestibule addition of a house on Tobique on the right. The reality is that the design is extremely inflexible and does not consider climatic conditions, such as providing an entrance vestibule. The entrance also opens directly into the kitchen, which would be both awkward and inappropriate, especially in the winter time with snow-covered boots. The bedrooms are separated with only one opening onto the living room. This does not take into account social living or preference for the bedrooms of younger children and elderly to be closer to the master bedroom (Afshari-Mirak, 1994). Also, as extended families tend to live together, this small, inflexible structure does not allow for this household type. Small, inadequate housing such as this result in overcrowding and the cheap construction requires constant maintenance and often leads to mould damage (Perley, 2010). The style of the architecture also does not speak of any Aboriginal values.

Similar housing design issues exist in First Nations communities across Canada. In his thesis report, *Cultural Approaches to Native Canadian Housing*, Ghader Afshari-Mirak shows existing housing plans in Cree communities in Northern Quebec. As shown in Figure 7.9, Afshari-Mirak points out some of the issues and inadequacies regarding housing provided in these communities. He points out that vestibules, integrated living and kitchen areas, clustered bedroom arrangements, location of entrances, and general social-approach are necessary and often missing. Like with the pre-fabricated houses found on Tobique, these typical CMHC style buildings are very inflexible and too small for the extended families and range of age demographics that tend to live together in First Nations communities (Afshari-Mirak, 1994).

spaces afforded in these plans are cleared of bushes and trees but do not support social relationships amongst residents. Traditional communities were set up in a more amorphous way, with clusters forming over time (see Figure 5.5). These communities were had a strong social structure and were far less rigid and uniform. Afshari-Mirak explains the following about vernacular planning compared to federal planning of First Nations communities:

Traditionally, meeting and socializing spaces were important and combined various levels of social activities. Traditional native planning which were based upon hierarchy of space, low density and a scattered layout were violated by the government's closely spaced housing projects. Privacy, socializing, grouping and movement had significance for the Natives, and all were rejected in the planning of new reserves (p. 59).

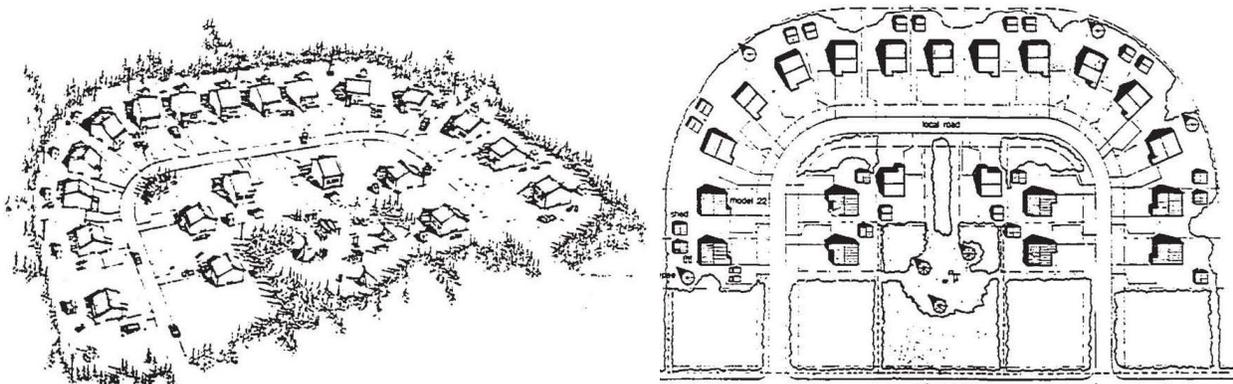


Figure 7.10 Housing layout in Cree community - loop arrangement. Image credit: Afshari-Mirak

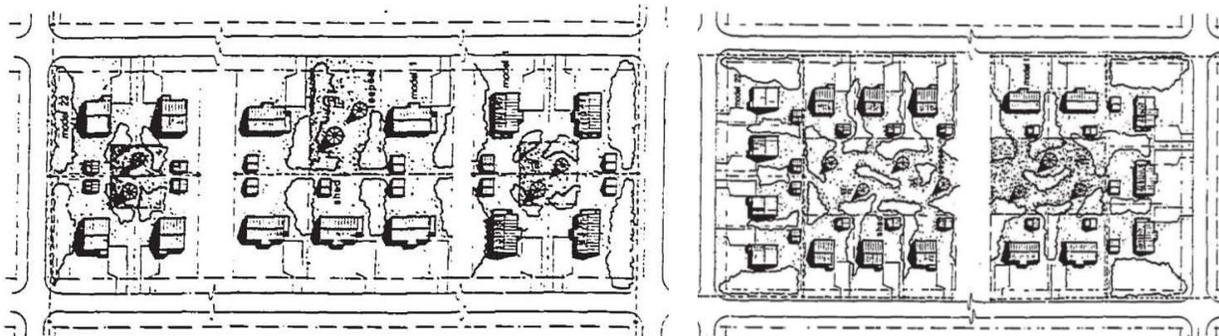
The arrangement of houses on Tobique (refer to Figure 3.7 and Figure 5.5) is quite similar to the Cree community in Northern Quebec shown in Figure 7.10. The linear street pattern with detached housing discourages social interaction and does not afford usable, common social spaces. The same issue exists in housing off-reserve as well. Skigin-Elnoog Housing is an off-reserve housing company which supports primarily single-parent families looking for affordable housing. The examples shown in Figure 7.11 make visible the lack of social spaces afforded. Both have a paved parking area in the prime area opening in front of the main entrances with little distinction between private and public space. A single-mother living at the housing development shown in the image on the left (Figure 7.11) explained that she was glad to have a place to raise her children in a safe, affordable, and prime location in the city but was unhappy with the lack of soft-surfaces for her children to play on, social areas, and little

privacy. She explained that row housing was not a preferred housing type for most Aboriginal people and that the thin walls allowed you to hear your neighbours clearly. When asked what could be done to improve the design she said she would have preferred more separation between houses as well as a more social and soft-surfaced common area in the back (Gould G. , 2010).



**Figure 7.11 Off-Reserve housing - Skigin-Elnoog Housing in Fredericton, N.B.
Designed by Maple Leaf Homes**

To respond to some of these concerns, a planning company – Daniel Arbour and Associates – proposed housing block designs for a Cree community in Northern Quebec in 1988. The design on the left is a infill housing design for an existing block and the design shown on the right is for a new housing block design which increases the width of the blocks to provide larger common areas between houses. These central areas promote social interaction and provide spaces for communal storage and construction of tepees. This design also holds Aboriginal values by providing an intimate communal atmosphere and lack of the conventional hierarchical layout of most suburban streets (Afshari-Mirak, 1994). To uphold these social and cultural values, a similar housing layout which provides common, shared, social spaces will be used for this thesis project.



**7.12 Housing Block Designs by Danial Arbour and Associates, 1988 for Cree Community
Image credit: Afshari-Mirak**

7.6 Summary

Issues surrounding housing on First Nations communities are abundant. Not only is there a severe shortage of and inadequate funding allocated to housing, but the design of residential construction is inadequate and not sensitive to local context and cultural values. Typical CMHC and pre-fabricated housing are generally inflexible and too small for the multiple families and age demographics that tend to live in a single household. These residences are often built out of cheap material and with low-quality construction techniques. These design issues, coupled with disregard to climatic context, leads to overcrowding, mould damage, and construction of ad-hoc additions. The layout of the residences ignores Aboriginal values and social contexts, with awkwardly placed entrances and small and non-central living spaces. The arrangement of houses in the community also overlooks social and cultural values, with inadequate and anti-social common spaces provided for the houses. The grid-like pattern and detached homes facing the street does not provide either adequate private or social spaces (Afshari-Mirak, 1994). This is completely contrary to vernacular community arrangements, which were clustered in smaller groupings and promoted social interaction and a more communal way of living. In order to promote and develop a more socially and culturally sensitive community, the design and arrangement of housing should be more socially-oriented. The houses will provide both public and private areas and the arrangement will promote social interaction and offer areas for communal activity.

8. Discovery Through Design

It was discussed previously how difficult it is to reflect or reinforce cultural identity through architecture. Stepping back, it was interesting to discover that every housing type, construction method, and architectural style or ideology that was criticized in the beginning of this process was utilized in at least one of the design exercises. This does not mean that these designs were irrelevant or mistakes but that they were part of an exploration and learning process. The following designs showcase opportunities, issues, and the difficulties involved in attempting to strike a balance between simplicity, affordability, and cultural relevance. This design process also shows that responding architecturally to cultural, economic, and social issues on First Nations communities is extremely challenging. Ultimately, it was decided to avoid presenting a complete design in order to reinforce the central argument of this thesis – that the engagement of the community in the design and build process through the use of vernacular strategies and local materials will reinforce cultural identity. This will also enable them to become more self-reliant and self-sustaining, while connecting them with their culture both physically and spiritually. The design experience as a whole has been extremely challenging and has demonstrated the difficulties involved in responding to housing issues on First Nations communities. The design proposals at each stage of development had a different focus and perspective on the topic and how to approach it. How frequently the approach shifted, and how much issues of economics and feasibility held back the creative process, points to the multi-layered quality of existing issues and how overwhelming they can become. While these designs are not entirely successful, they illuminate many challenges regarding economics, feasibility, and cultural sustainability which must be addressed. It is hoped that presenting this process will open a dialogue on what can and must be done to respond to the housing crisis on reservation communities.

8.1 Kit-of-Parts design

Upon beginning this thesis, the economic difficulties on reservation communities appeared to be the most pertinent problem to address. Some communities have started housing construction companies and used their timber resources to generate employment and training opportunities. This led to the developing of a kit-of-parts housing design which would use local materials and resources to help address existing socio-economic conditions. The issue with this proposal was that it focused too much on economics and not enough on what the architecture

would provide for the residents beyond a roof over their heads. Another question was how would this rather typical construction method help to avoid design and construction related issues that exist in the CMHC and pre-fabricated housing on Tobique? The intent was noble but further research indicated that architecture could have a more profound meaning to the residents of a First Nation community and that this should be more seriously considered. A pre-fabricated design undermined important cultural values and realities such as multi-family dwellings, a social/communal lifestyle, craftsmanship, oral tradition, and connection to the land. Many of these cultural values have been fading in First Nations communities like Tobique, and many Aboriginal people feel a great sense of loss and frustration. To reconnect Aboriginal people with these values became the central focus.

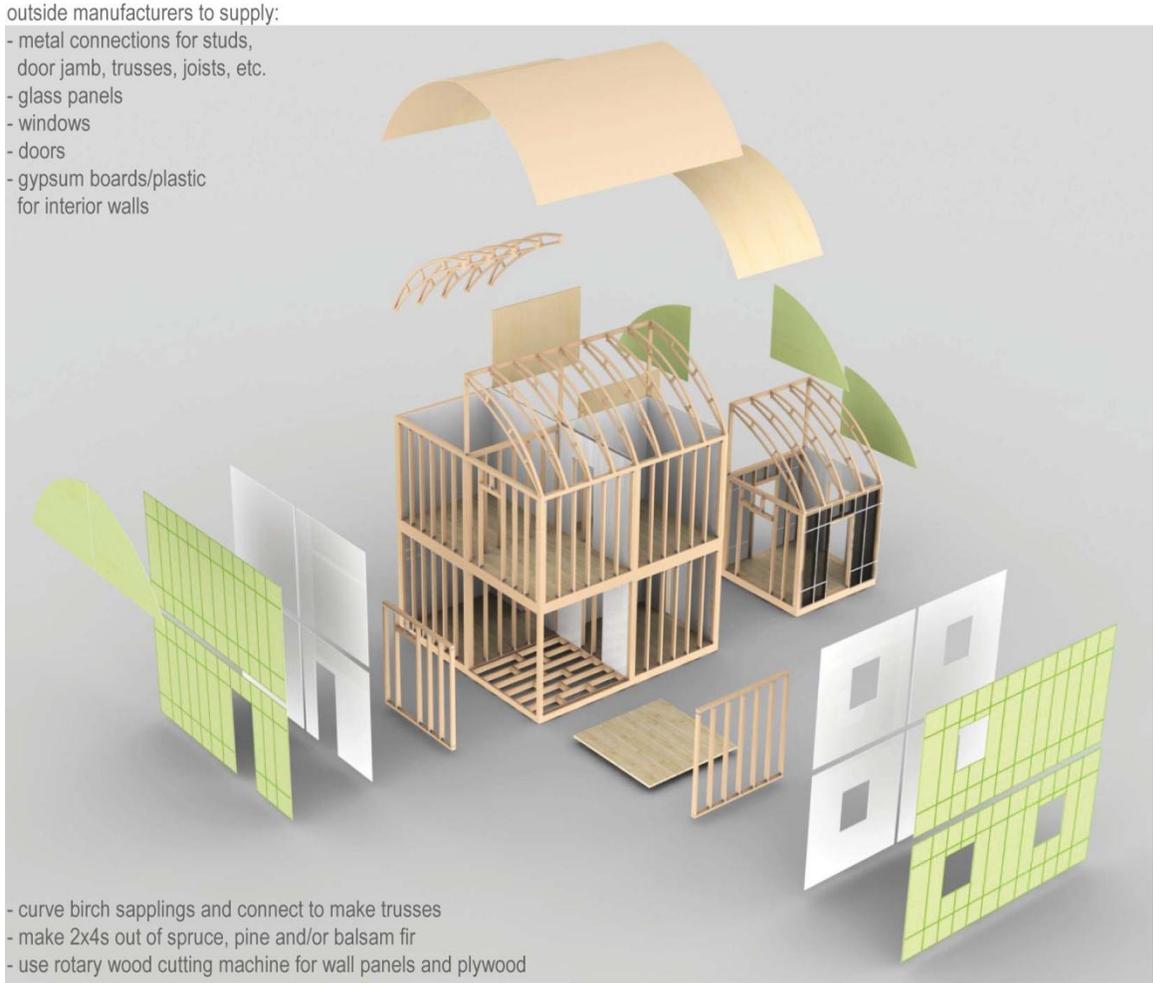


Figure 8.1 Kit-of-Parts housing design – exploded view



Figure 8.2 Assembly of units

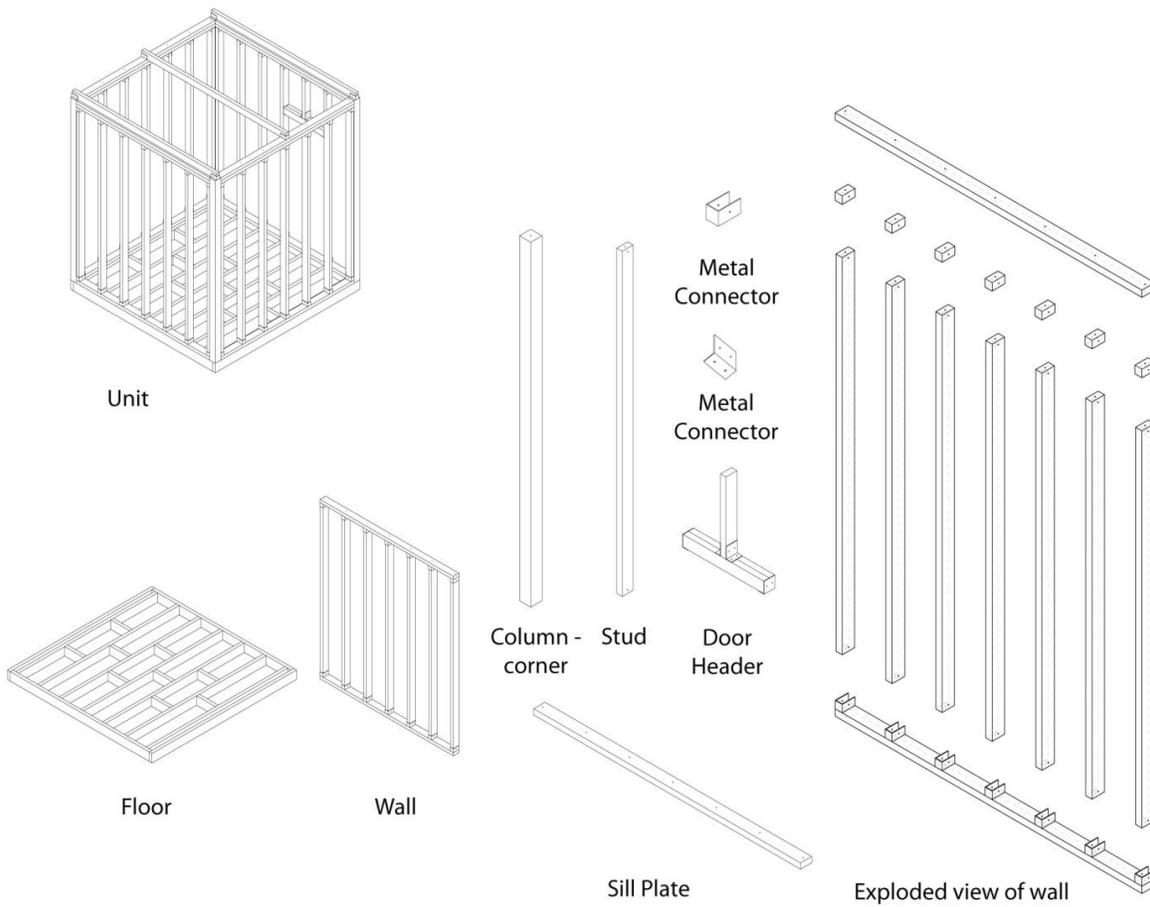


Figure 8.3 Pieces/components for assembly of units | using timber resources and metal components from suppliers

8.2 Longhouse-inspired design

While it was always an objective to avoid designing overly referential, nostalgic and out-dated buildings for First Nations communities, it proved more challenging than expected to propose a truly pure or genuine reflection of Aboriginal culture and values in an architectural design. The aim was to try to keep the simple and modular design strategy but to use the materials in a more interesting and culturally-significant way. The frustration came it seemed almost impossible to avoid creating something overly “Native” looking in a way that was referencing vernacular forms and techniques too directly and not reinterpreting them adequately. While some of the designs were relatively simple to build, the forms; spaces provided; and construction methods utilized did not seem to reinforce fading cultural values as intended. It appeared that developing something more modern that still relied on simple construction methods and available resources was more appropriate.



Figure 8.4 Longhouse-inspired modular design

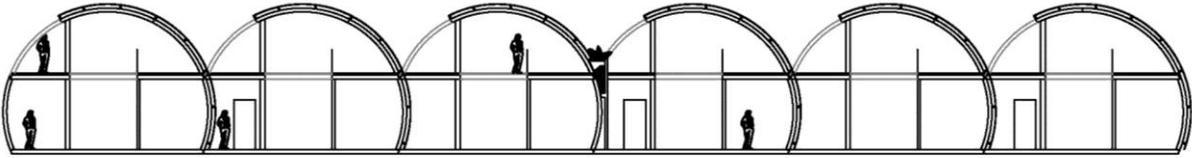


Figure 8.5 Section of multiple units

The following images are for a design exercise undertaken which focused on using available material resources for their inherent qualities. The curved roof has been maintained throughout this project as it both references vernacular methods as well as taking advantage of inherent qualities of the timber resources available on a reserve that would not be possible in other contexts. Dimensioned lumber is kiln dried and processed, and must therefore have moisture put back into it through a steaming process in order to become bendable. Freshly cut saplings, however, are full of moisture and have a smaller diameter, making them able to bend into forms and used for structural purposes.

A wall system was developed which would allow the band members to cut down imperfectly shaped trees and incorporate them into their house. This would be reflected on the shape of the wall and give a more organic feeling to the space. Figure 8.7 shows photos of models made to explore these ideas. The first idea for the wall system was to create a curved shape. The foundation was to be on piles to allow for an affordable, fast, and easy construction system which would not disturb the ground. To emphasize a simple wall system, a panelized exterior system was proposed. The models built demonstrated that the curved wall was not as easy to build as originally intended and the curve seemed somewhat arbitrary. The idea of using the timber resources as found was maintained and a flexible wall system which would conform to differently shaped studs was suggested (Figure 8.10).

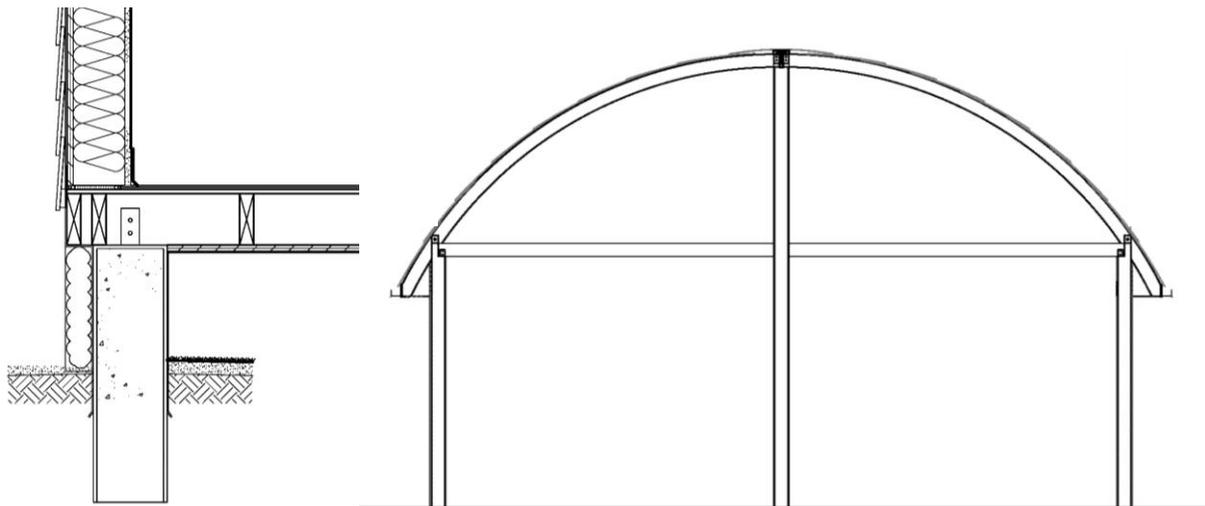


Figure 8.6 Foundation section (left) and short section of building (right)

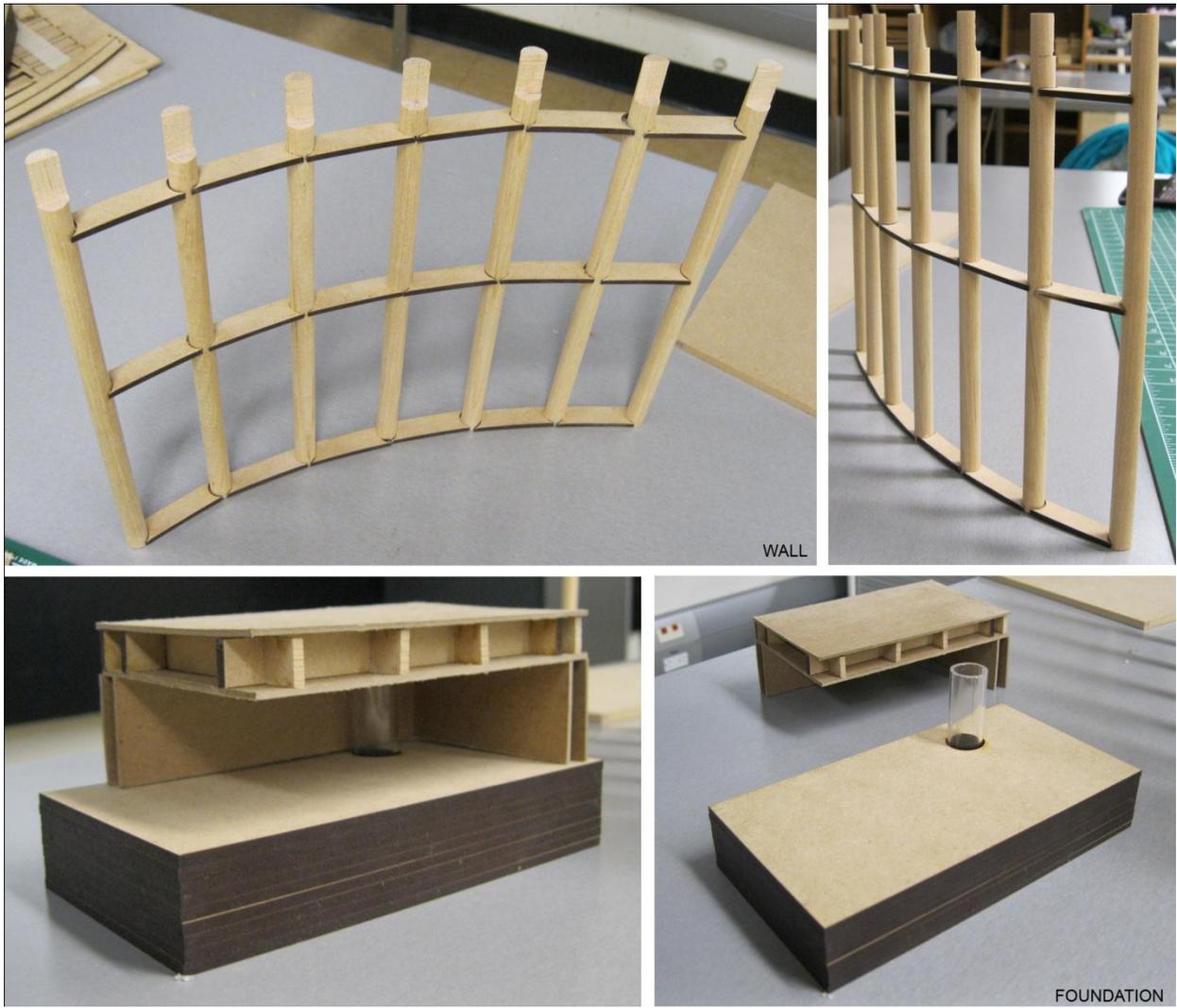


Figure 8.7 Models of the wall system and pile foundation

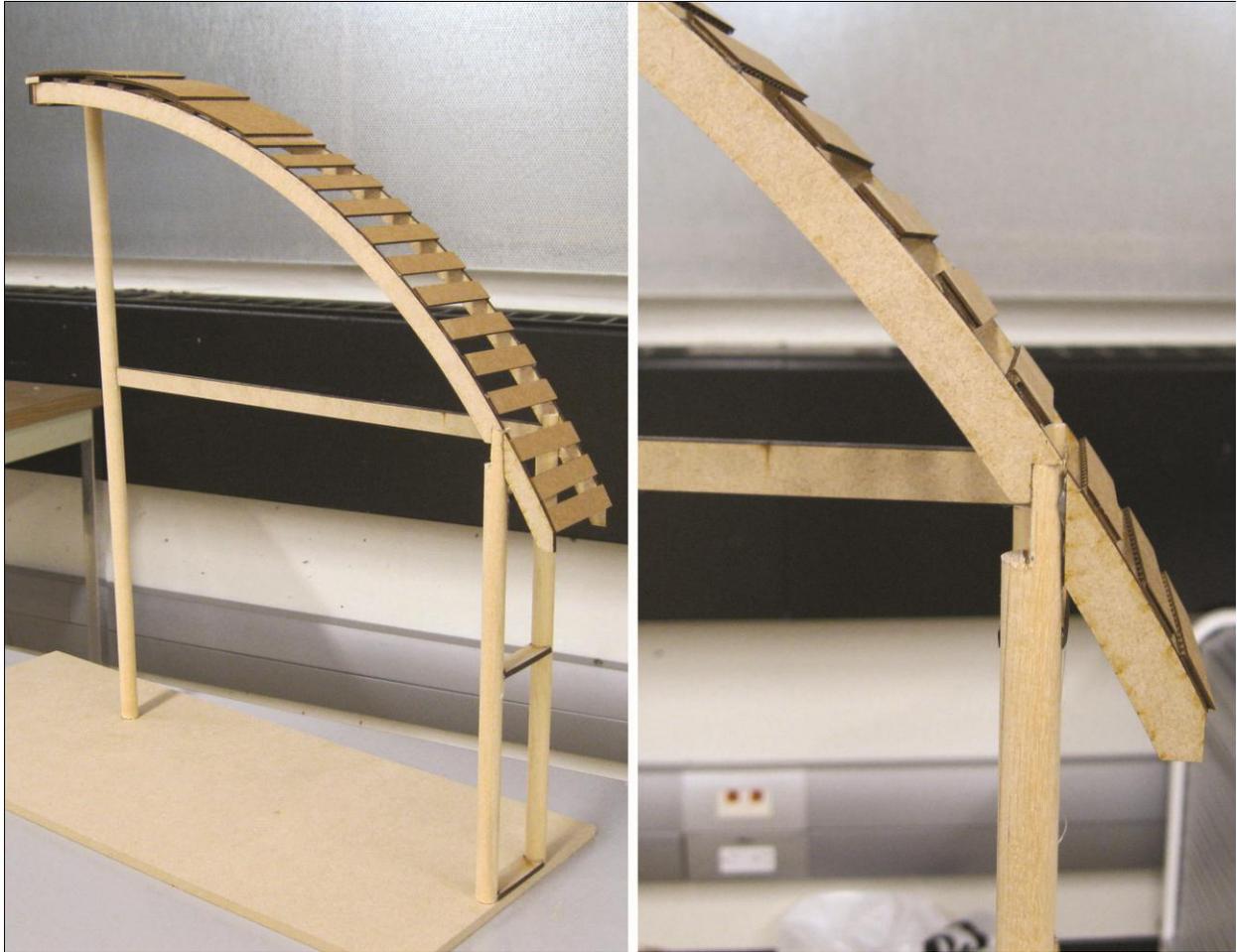


Figure 8.8 Model of curved roof



Figure 8.9 panelized system for exterior wall

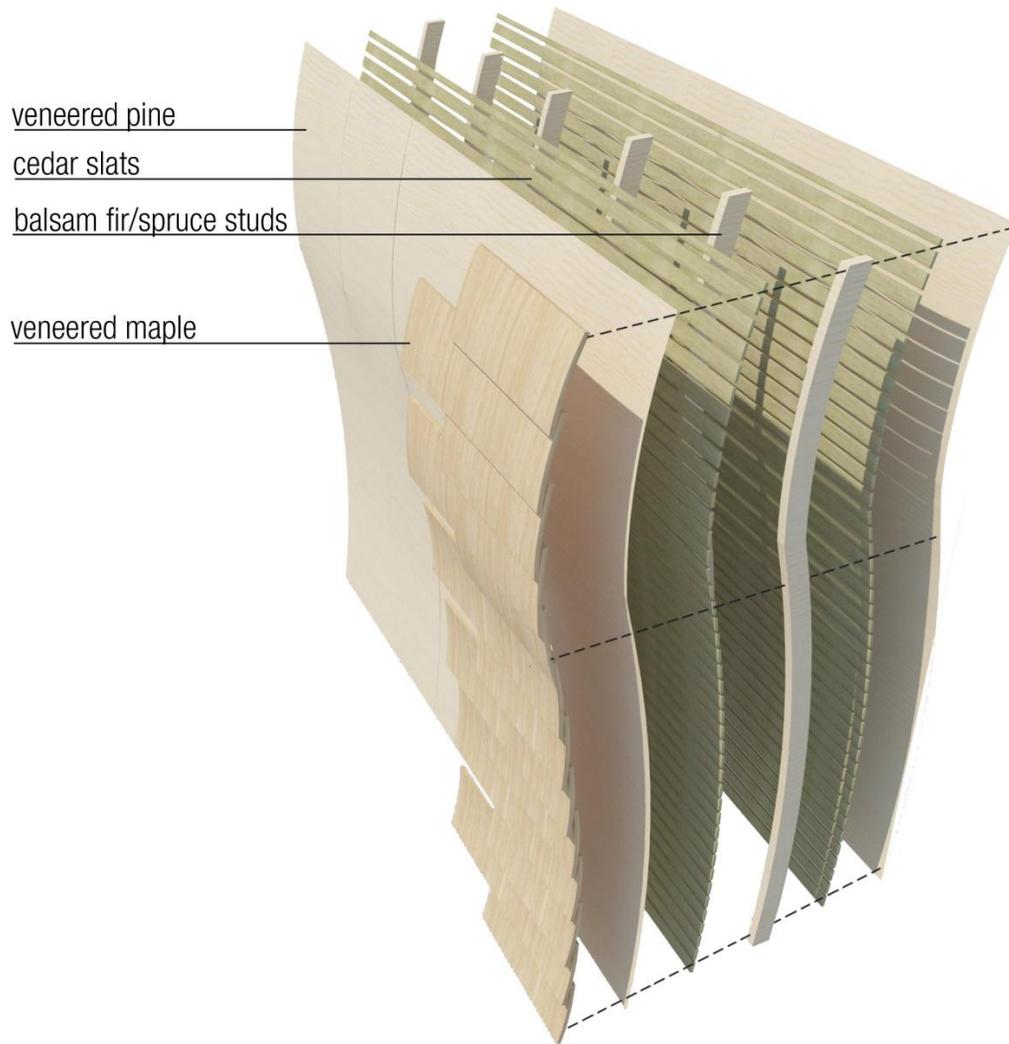


Figure 8.10 Flexible wall system

8.3 Two story, modern take on longhouse

The images shown on the following pages are of another design exercise which aimed to marry modern styles and methods with vernacular techniques and material use. The primary issue with this design was that it did not push the ideas discussing previously far enough. Although all of the construction methods related to vernacular strategies (structures dug into the ground, curved roof/walls, log building, natural ventilation, etc.) they did not reinterpret vernacular strategies successfully or in a culturally relevant way. Upon the completion of this design it was decided to look further into the significance and meaning of connecting mind with body. It also became evident that consideration of the potential positive social and cultural

impacts of engaging the entire community with local architecture and the construction process was imperative. As discussed by Hassan Fathy regarding his housing for the poor in Egypt (Fathy, *Architecture for the Poor*, 1969) and Taymoore Balbaa with the mud structures of Djenne (Balbaa, 2007), tying back to vernacular strategies not only reconnects people with their past but re-teaches the people about aboriginal values, techniques, and context-sensitive design. Most importantly, the focus was redirected to the significance of oral tradition in Native culture. The aim was to open a cultural dialogue between the Maliseet people at Tobique and their past and encourage strengthening the bond between mind and body and band members themselves.

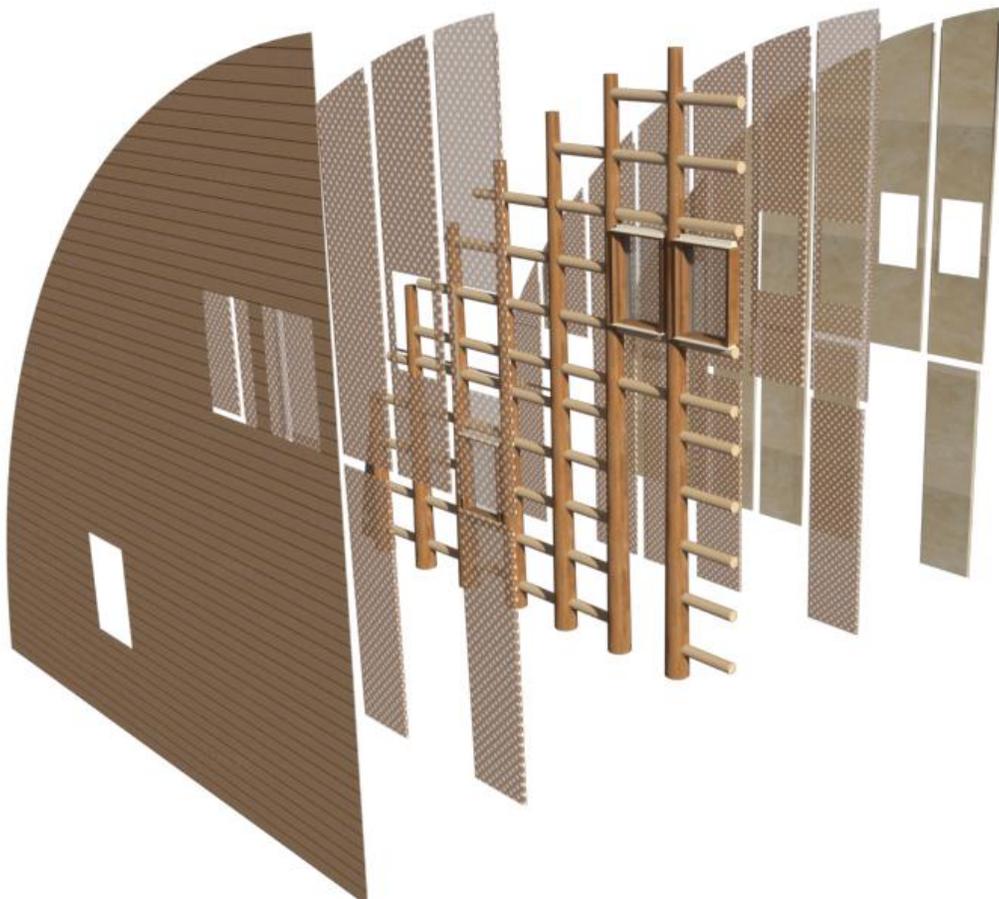


Figure 8.11 Two storey wall system



Figure 8.12 Section – Slab on grade foundation

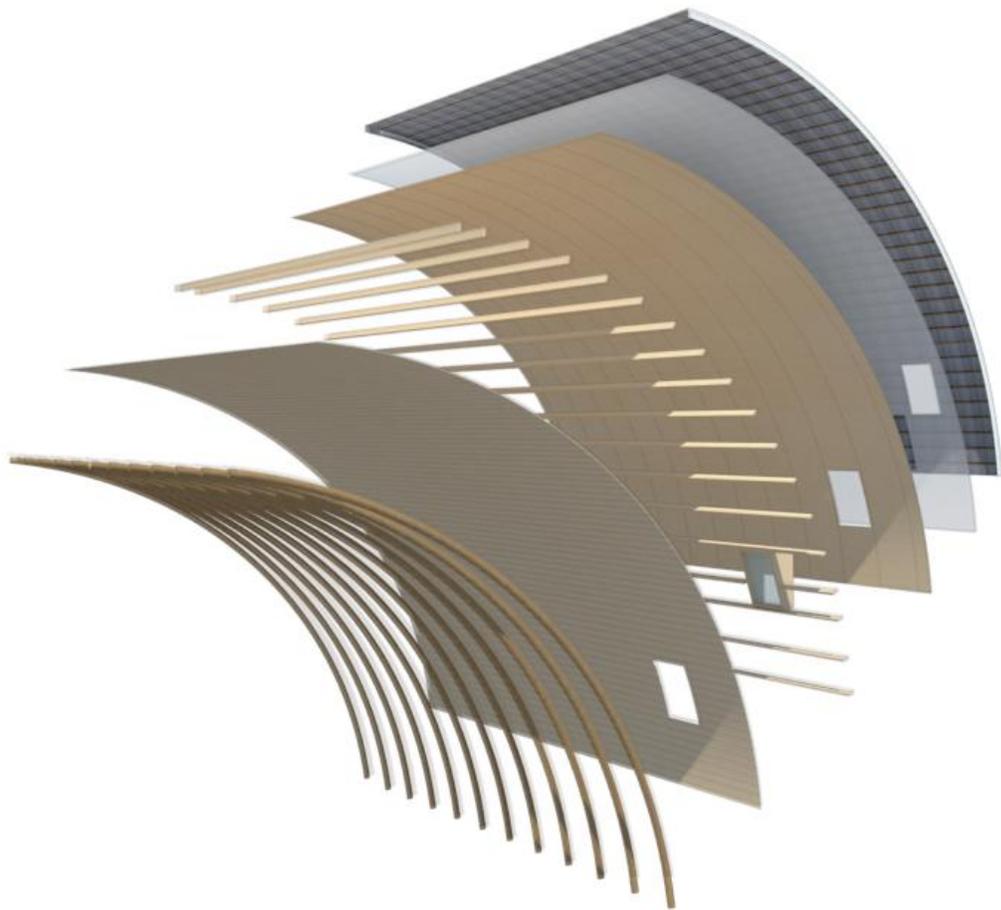


Figure 8.13 Exploded Axonometric of roof



Figure 8.14 Two storey modern take on the longhouse



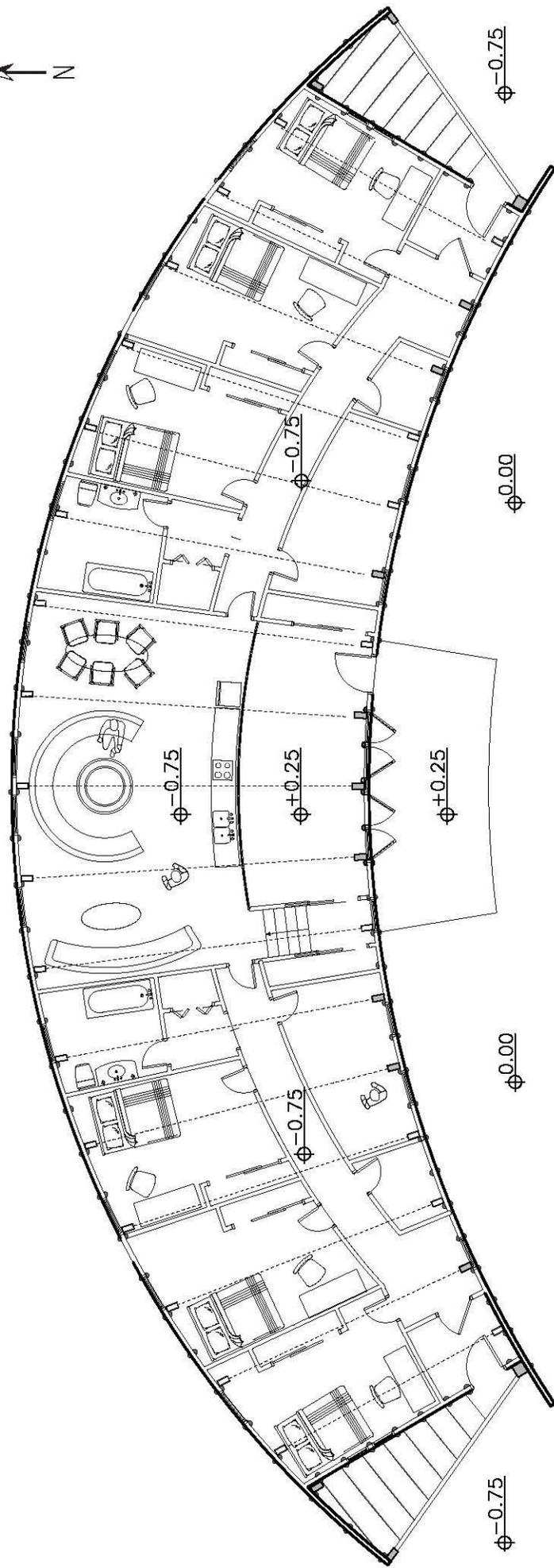
Figure 8.15 Interior view

8.4 Multi-Family Design Proposal

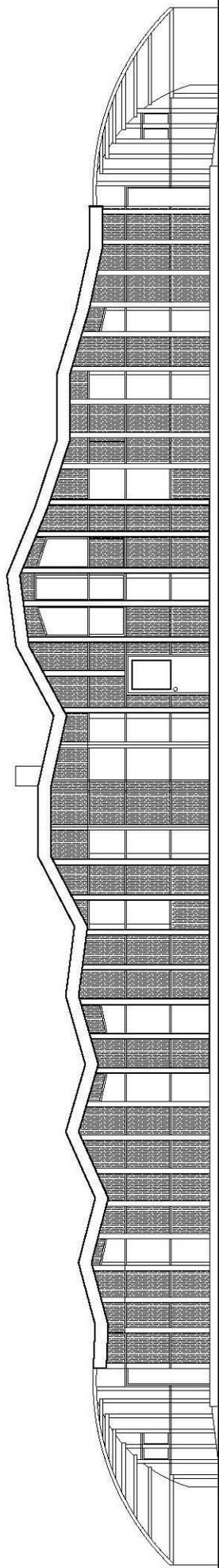
Existing social, economic, and cultural issues on First Nations communities have rarely been handled in a thoughtful and truly integrated way with regards to housing design and typology. Anti-social housing and community design only exacerbates a growing sense of loss of cultural identity in First Nations communities like Tobique. Many lessons can be learned from vernacular strategies, and looking to them for inspiration will create a more context-sensitive design, both with regards to climatic and cultural realities. This design proposal explores the idea of creating a cultural dialogue through the language of materials and the built form. This dialogue is created between mind and body by involving residents in the construction process and reinforcing the importance of craftsmanship and connection to land. Initiating a project such as this would also potentially promote further exploration into construction techniques and uses of local materials, vernacular strategies, etc. Working together with the materials from their land while learning from vernacular strategies would enhance the sense of community and hopefully strengthen relations in the band and, eventually, between bands.

The inadequate houses provided on Tobique, which were not designed to respond to multiple families and multiple generations living together, lacked sensitivity to social concerns and Aboriginal values. Some of the primary issues brought up from analysis of typical community planning and CMHC housing is that there is not enough separation between private and public and that any public space allocated does not promote social interaction. The aim of this design was to create a more integrated living environment with multiple levels of social/public and private spaces. This led to the development of a multi-family residential unit with a central, common space. While this particular curve does not have to be used for each specific site and orientation, the curve was incorporated to cradle a common, public space between buildings (see Figure 8.19).

Figure 8.16 Floor plan and South Elevation (opposite page)



FLOOR PLAN 1:150



SOUTH ELEVATION 1:150

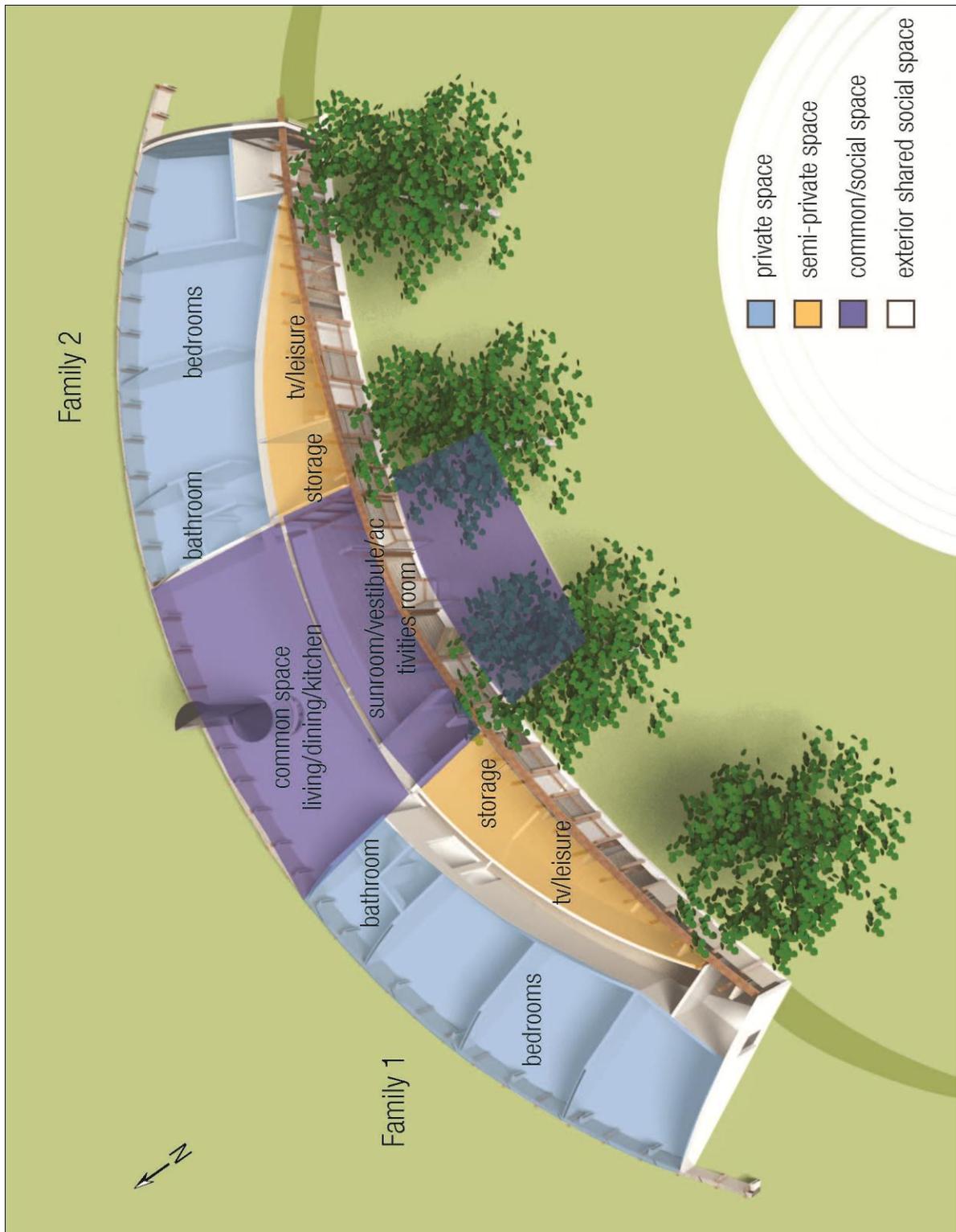


Figure 8.17 Space Types – public and private

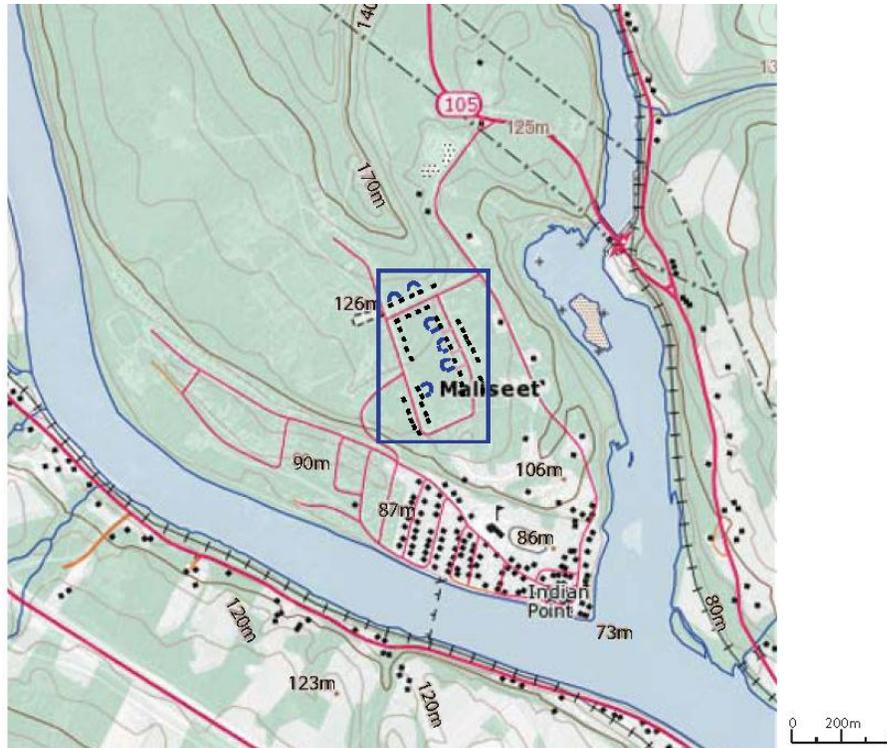


Figure 8.18 Site plan for Tobique – proposed area to infill and create smaller social spaces. Base map courtesy of the Government of Canada.

Rather than suggesting starting to develop a new residential area in Tobique, it was proposed to build these residences in the interstitial spaces of the existing housing in the community. This particular site has a relatively large area between streets and would allow for further development (Figure 8.18). Creating these smaller, circular common spaces would allow for more intimate, usable common areas for families and neighbours, rather than providing one large green space. While this design does not propose to build onto or change existing housing, these social spaces will hopefully create a more pleasant living environment for the band members and provide an area to engage in social and cultural activities. With regards to dilapidated housing, it is anticipated that the band and their repair funding can deal with these challenges for the time being, and perhaps eventually replace these homes for newer, more culturally relevant housing.

To create a language of the built form, trusses made from curved saplings of different lengths to accentuate and celebrate these differences. This would create an undulated roofline that both create its own landscape and creates a rhythmic pattern on the elevation. The properties and characteristics of the materials are made evident and expressed in this way.



Figure 8.19 Site plan – building next to two pre-fab houses

Vernacular methods of radiant heating through the rocks on the floor under and around the hearth inspired a similar strategy for this design. Using modern radiant floor heating methods and techniques, tubes will be laid in a poured concrete floor. The difference is that instead of heated by electric power and a water heater, the tubes will pass under and around the hearth, which is inset into the floor with a ceramic or brick base to protect degradation of the concrete. The hearth is central in the space, which allows for even heating of the floor as well as giving prominence to social activity. A seating area is arranged around the hearth to provide a space for family activity and passing on of stories, history and simply engaging in leisure activities.

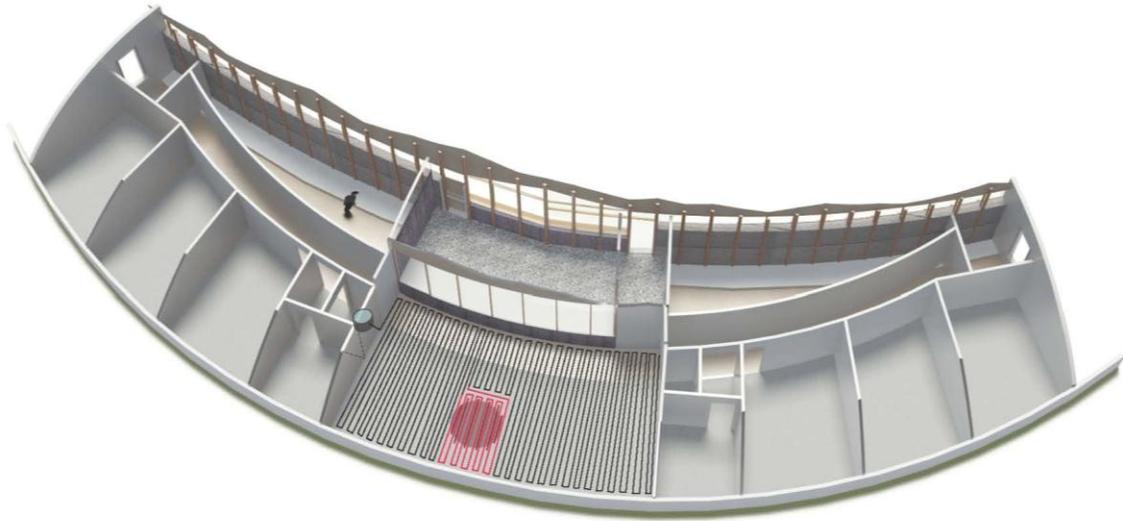


Figure 8.20 Radiant floor heating – tubes passing under hearth, absorbing heat

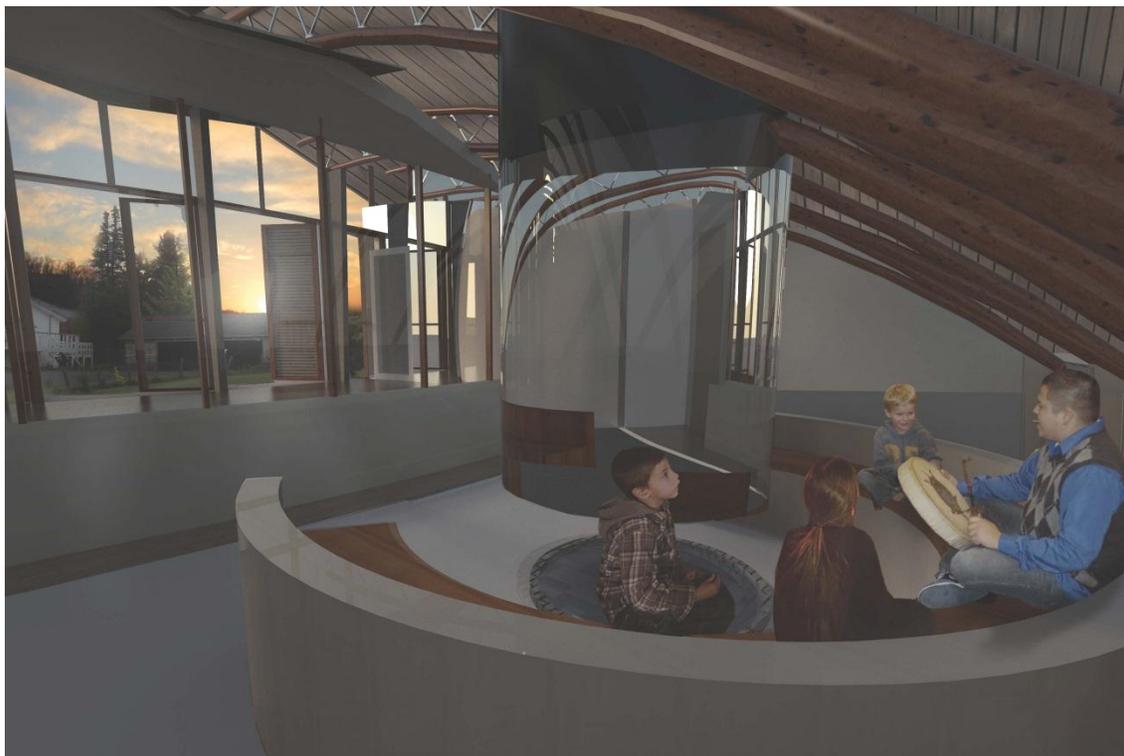


Figure 8.21 Interior rendering – common space/living room

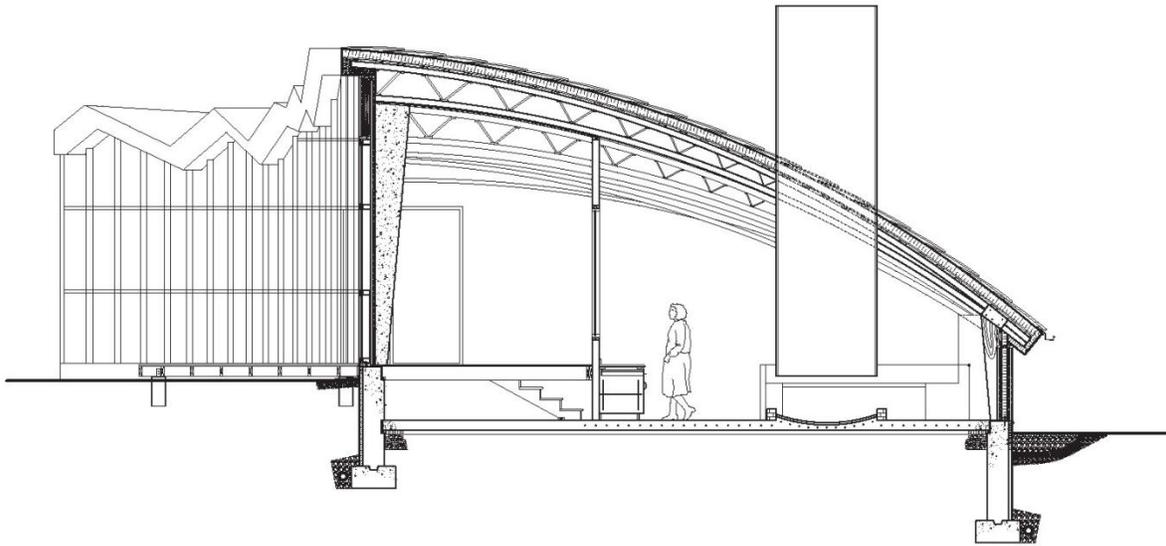


Figure 8.22 Short section through house – vestibule/sunroom and seating area around hearth

The intent of this design, like with the previous designs, was to be simple to construct using local materials and relatively unskilled workers. The wall system was inspired by vernacular techniques; the section of the wigwam with the double bent sapling structure (Figure 5.4) allowed for a rigid as well as insulated space. To reduce thermal bridging, and therefore build-up of moisture and development of mould, a wall system was developed using young Spruce or Balsam Fir by cutting them in half, separating the two pieces with metal spacers and filling the void with cellulose or rigid insulation. Figure 8.23 shows an exploded axonometric of this system. The construction of the roof was also inspired by vernacular strategies. The curved structure provided by the saplings, with wood strapping and shingles placed on top are reminiscent of the construction process of a canoe (see Section 3.4). The connection between truss and column is made with an adjustable metal piece similar to a pipe connector. These would be standardized pieces with the trusses being made from the same forms but differing in length. This would allow for interesting interior spaces as well as elevation while being relatively simple to build.

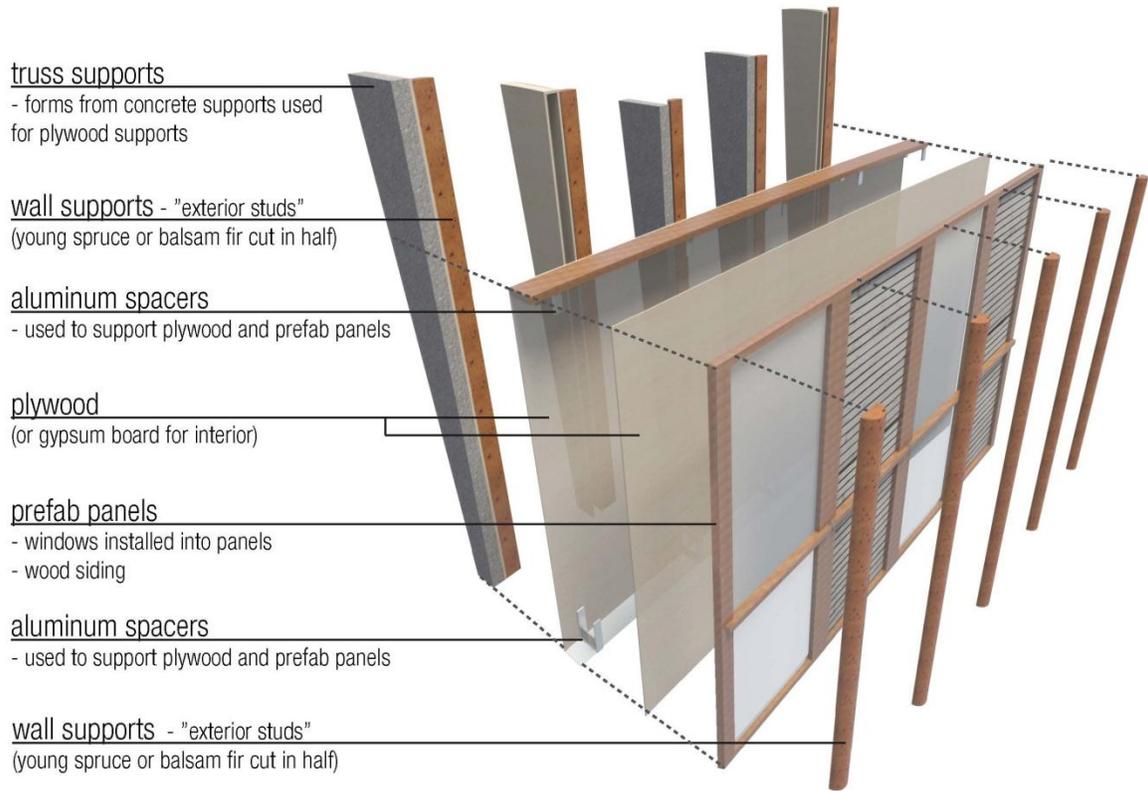


Figure 8.23 Exploded axonometric of wall

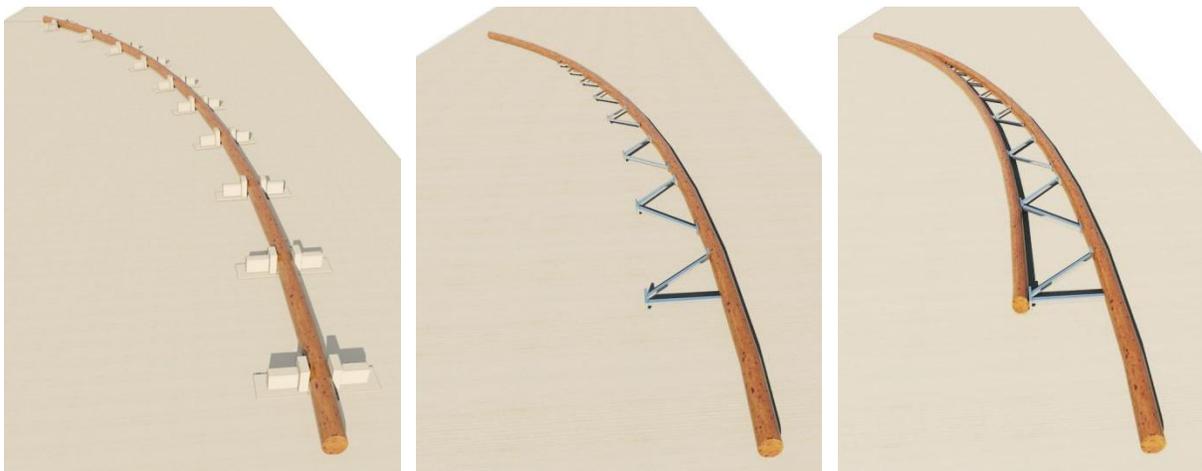


Figure 8.24 Construction of spruce sapling truss – bend into form and attach metal spacers

spruce shingles

plywood (curved)

wood spacers

- cellulose or rigid insulation between

wood strapping

- excess Spruce or Balsam Fir after processing into building components

curved truss (spruce)

- different heights result from different lengths of harvested saplings as well as varying widths of the building

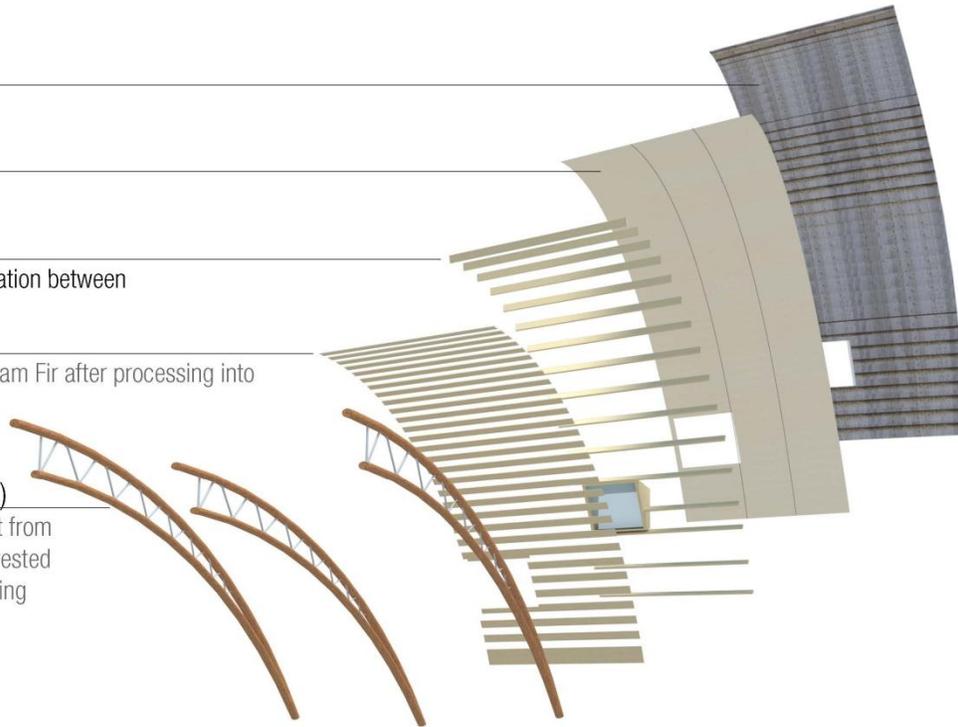


Figure 8.25 Exploded axonometric of roof



Figure 8.26 Sunroom/activity room – semi-exterior space

As explained previously, language and oral tradition are very important for Maliseet culture. The common, social space provided in the centre of the building promotes social interaction between family members or multiple families as well as different generations. This would hold the living, dining and kitchen areas while the TV/leisure rooms would be located separately, promoting social activities in this central space while providing separation of public and private areas. This design incorporates vernacular strategies and material use to provide a more socially and culturally integrated housing typology. It promotes social interaction while providing separation of public, semi-public, and private areas.

8.5 Summary

While none of the designs presented in this section were entirely successful, they are shown in order to understand the discovery and design process during the development of this thesis. They demonstrate the different challenges and ways of approaching the issues regarding housing on First Nations communities. As this topic is extremely complex, there are several ways of approaching it and responding to existing issues and concerns. The design exercises are presented in order to open a dialogue between architects, Aboriginal people, non-Aboriginal people, and the Canadian government. The final designs may not have achieved the goal of reinforcing cultural identity, but certain approaches and strategies have. It is hoped that the research made in this report will be utilized to discuss ways of engaging the Aboriginal population and responding architecturally to the housing crisis on reservation communities.

9. Conclusion

Native reserves in Canada are, more often than not, designed to provide the bare essentials for residents and to leave the rest to band leadership. Geographic and cultural isolation coupled with mounting socio-economic challenges make attaining sustainable and positive development extremely difficult. The stunted development of culture, education, infrastructure, economy, and community in these areas result in feelings of hopelessness and/or apathy amongst residents. Government-initiated housing and construction programs, though well-intentioned, rarely focus beyond alleviating overcrowded and inadequate housing conditions. Typical CMHC and pre-fabricated houses do not encourage social interaction or multi-family and inter-generational living. The cheap materials and rushed construction work done on these residential units lead to serious mould damage which requires constant repair and maintenance while creating serious health issues. The ever-present social and health-related problems on reservation communities - such as addiction, high drop-out rates for high school, and depression - are exacerbated by a feeling of disconnection with their past and loss of cultural identity. The lack of employment opportunities and belief that they will be unable to support themselves if they move off the reservation community, as mortgages cannot be attained from their housing and few are skilled workers, reinforces the sense of hopelessness and apathy. As Aboriginal spirituality and healing methods describe, the mind and body are strongly connected, and engaging in one initiates the development of the other. This belief is supported by anecdotal evidence of improved entrepreneurial behavior, sense of community pride, and general positive attitude of residents in Native reserves where band-run housing construction companies have been established. Promoting community engagement into the building process is extremely important for this reason, while also working to connect the people to their resources and land. As oral tradition and craftsmanship are important aspects of Aboriginal culture, focusing on the potential for creating a language of the built form is also extremely important. This, again, connects them with their land and materials in a spiritual way, while also embracing and re-acquainting themselves with their cultural values.

As culture is constantly evolving, any proposed housing typology for a group of people must acknowledge its impact on a changing cultural identity and consider the effects of its implementation. In order to enable Aboriginal people and further the development of their cultural identity, a housing strategy must incorporate vernacular techniques, use of local

material, and encourage the engagement of the entire community. The outcome of the design itself is less important than the concept of exploring these ideas and engaging in a cultural dialogue. This approach of learning from vernacular strategies and engaging in a cultural dialogue can be applied to First Nations communities across Canada and even to non-Aboriginal cultures throughout the world. The importance of building upon an evolving cultural identity is a universal concept, and it is encouraged that others engage in design explorations to open up this dialogue. It is hoped that this thesis project will inspire others to do just this. Responding to the housing crisis on First Nations communities is not a lost cause, and it is not impossible to achieve positive change. In order to see this positive change, architects, politicians, and Aboriginal and non-Aboriginal people alike must engage in and explore possibilities regarding architecture and design to truly empower and re-instill cultural identity to a nation.

Appendix A. Cost and production of housing through a collaborative construction company model

The previous section looked at prefabrication construction methods and the benefits and applicability of each type to this housing design proposal for Tobique First Nations. It also discussed the importance of flexibility and adaptability. This section shows the cost and figures associated with the harvesting, production, funding, and equipment needed for using timber resources for the implementation of a kit-of-parts housing design for Tobique, in collaboration with their tribal council - Mawiw Council – members, the Mi'kmaq First Nations at Burnt Church and Elsipogtog.

Figure A.1 shows the concept of using, exchanging and selling resources, components, and housing units on First Nation communities. This type of collaborative process focusing on the important of generating a flow of materials is vital for such an initiative to be economically and socially successful.

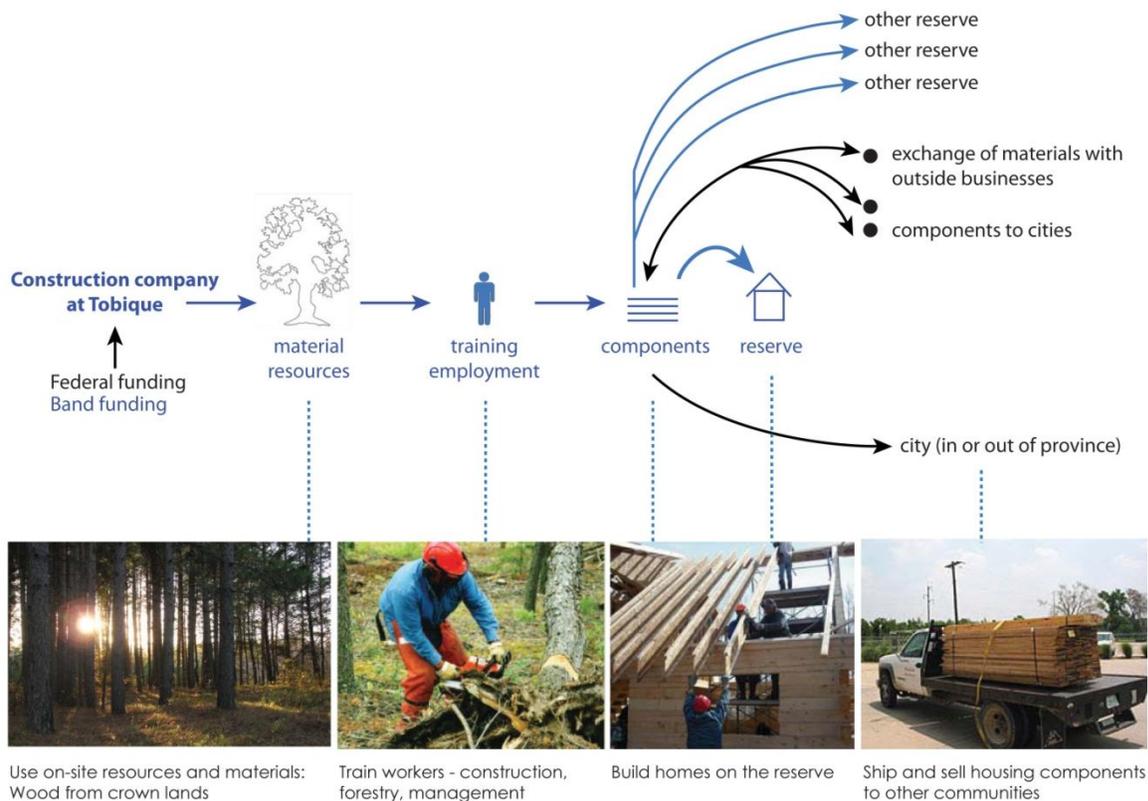


Figure A.1 Use and exchange of resources

Appendix 1.1 Funding needed and amount of profit and housing made through using a Kit-of-Parts design

While this thesis focuses on using local materials and vernacular strategies to reinforce cultural identity, explorations made at the beginning of this process were focused on feasibility and economic development. The use of a kit-of-parts housing design allows for the production of standardized components through the use of local timber resources. While the final design is very typical of CMHC style housing, it is shown here to illustrate what sort of possibilities can emerge regarding economic development and employment opportunities if a collaborative effort is made amongst First Nations communities using local resources and labour.

Appendix 1.2 Kit-of-Parts design exercise

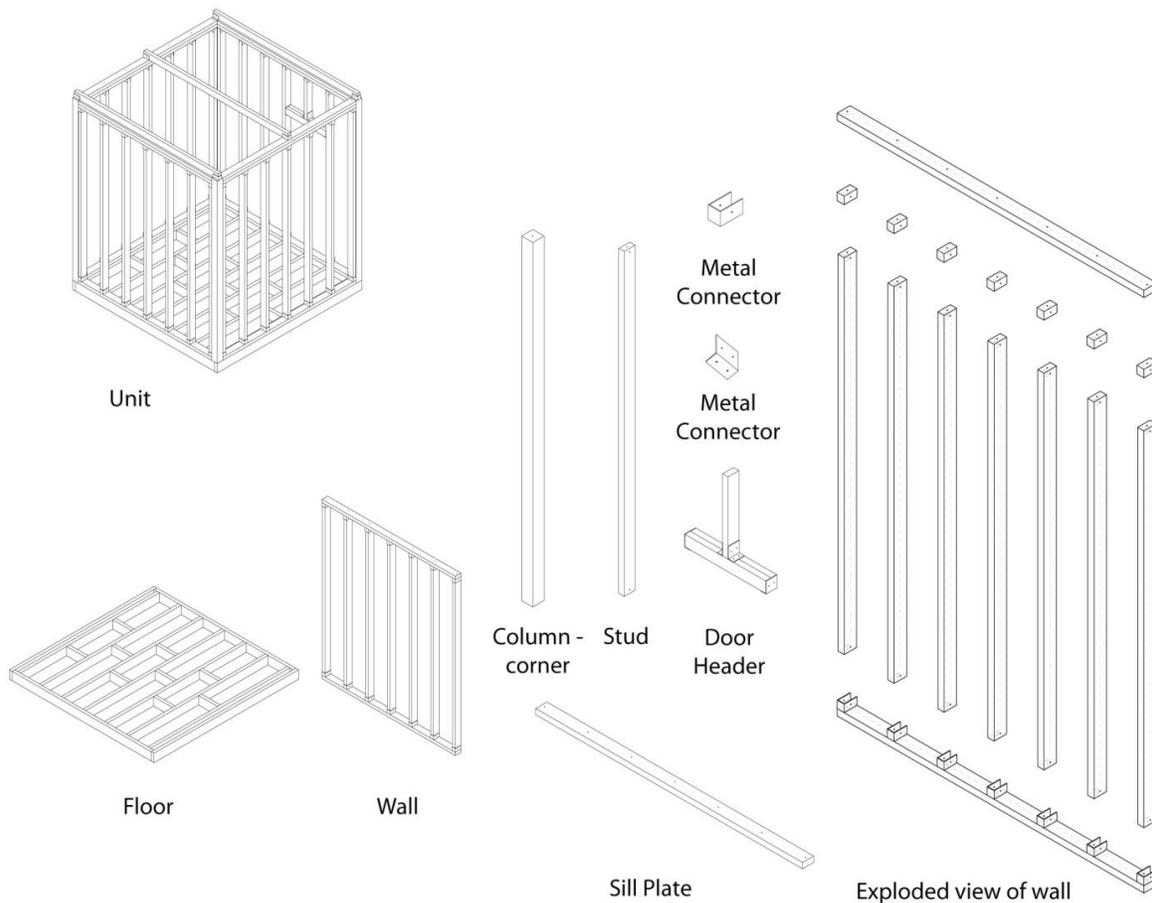


Figure A.2 Pieces/components for assembly of units | using timber resources and metal components from suppliers

Appendix 1.3 Federal Funding towards housing and construction

In New Brunswick, it is typical that the focus of each band is towards their interests and few seek to collaborate and pooling resources between communities. However, sustainable development will never take place without cooperation and a more network strategy. Skilled workers are also stretched thin in each community. For example, there are 15 social workers in NB – one for each community. Rather than working as a team and sharing the work amongst social workers in other native communities, social workers are over-worked and burn out quickly. A feasible strategy might be to have the home of social work services in one community, home of housing in another, etc. and set up a network of skilled workers and training (Scott, 2010).

The Mawiw Tribal Council consists of the three largest First Nations communities in the Maritimes - Tobique, Burnt Church, and Big Cove. The three bands spoke of setting up a prefabricated housing factory or construction company in one of the reserve communities and pooling funding and resources to carry out the initiative. Unfortunately, the project was never carried out as there was too much bickering regarding where the factory would be built, how much resources would be given from each community, how the funding would be used, etc. (Scott, 2010) Conversely, the original purpose of forming this tribal council was to band the three largest communities together to share resources and put their allocated funding to better use (Mawiw Council of First Nations, 2009). If the spirit of this union is reignited today, these communities could see much development and improvement socially, economically, and culturally.

Population of Mawiw Council Members 2008-2009			
	Tobique	Burnt Church	Elsipogtog
Population:			
On-reserve	1,414	1,188	2,297
Total	1,995	1,687	3,036

Table 5. Population figures courtesy of INAC – First Nation Profiles



Figure A.3 Maliseet FN at Tobique, Mi'kmaq FN at Burnt Church, and Mi'kmaq FN at Elsipogtog
 Images courtesy of Statistics Canada

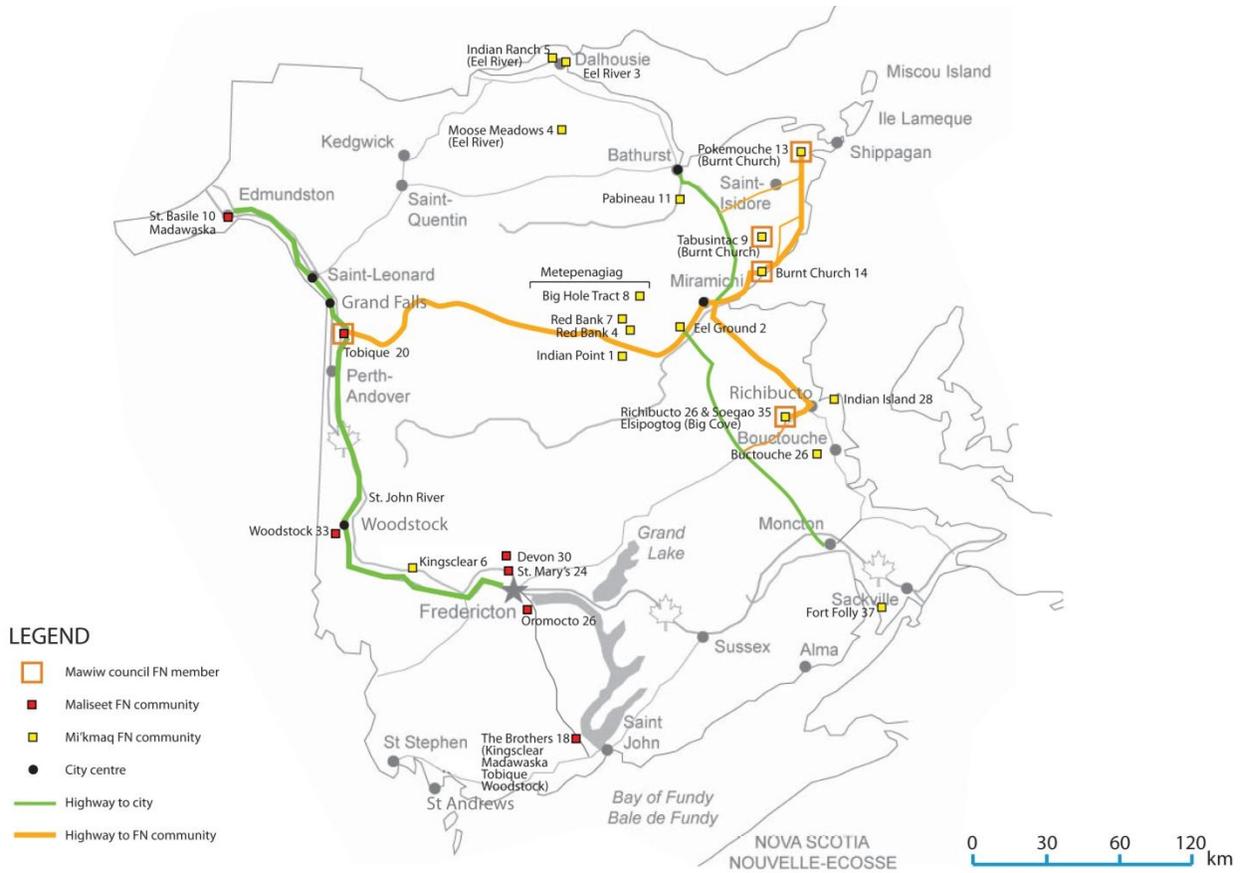


Figure A.4 Network between First Nation communities and towns/cities in New Brunswick

Table A.2 shows the annual federal funding for Mawiw Council members in 2008-2009 regarding housing, construction, infrastructure, and economic development. These funds could be used towards a network strategy, kit-of-parts housing design to develop the economy in these communities while providing much needed housing.

Annual Federal Funding for Mawiw Council Members 2008-2009 (\$ Can.)				
	Tobique	Burnt Church	Elsipogtog	Total (\$)
Housing + Capital	500,000	567,286	1,418,826	2,486,112
Community Infrastructure	1,633,145	1,832,667	814,013	4,279,825
Economic Development	118,771	114,865	253,789	487,425
CMHC (non-profit)	-	140,735	367,515	508,250
RRAP – housing conversions	91,330	-	59,865	151,195
GeoConnections – Forestry Management	28,235	-	-	28,235
FNFP – New Brunswick skills training	70,000/15(NB First Nation Communities)*3 = 14,000			14,000
CMHC – Proposed Development Funding	Max. of 75,000 + 3% (of projects over \$500,000)			75,000
Mawiw - Infrastructure		130,786		130,786
Mawiw – Land Management		25,000		25,000
Mawiw – “Other”		34,195		34,195
Total Funding Allocated:				8,220,023

Table 6. Funding allocations courtesy of INAC – FN Profiles, CMHC, FNFP, and GeoConnections

Appendix 1.3 Value-added products and construction

The band has had a construction and housing company on the reserve but as funding is scarce to none for Tobique at present, little more than repair work is being done. Even when the community were actively building their own housing they did not use their own timber resources as it required special machinery and more time and funding. The band had cut down lumber and sold it outside businesses but when asked if they thought of producing or had produced value-added products, Ken Perley stated that the band and government simply didn't push for that, even though it would be beneficial economically (2010). This attitude and scarce funding allocations seems to be a result of failed business ventures attempted by Tobique in past years.

Policies exist on management and cutting of timber resources. The government of New Brunswick website, for example, has many resources available on Crown Land Publications, policies, and statistics. Bands must plan out the usage of their resources, and how they plan to manage, grow, and maintain the forests. The Table below shows the amount of annual timber harvested, how many units can be made, and how many trees required per unit.

Annual Timber Harvest and Production of Housing Units 2007-2008			
	Tobique	Burnt Church	Elsipogtog
Land Area (km ²)	24.93	9.54	12.18
Softwood Harvested	30,062	23,346	33,625
Estimated Spruce Trees Harvested	15,277	11,864	17,088
Estimated Balsam Fir Trees Harvested	9,363	7,272	10,473
Estimated Pine Trees Harvested	1,971	1,530	2,205
Hardwood Harvested	3,276	2,387	1,820
Estimated Birch Trees Harvested	840	612	466
Estimated Maple Trees Harvested	1,344	979	746
Approx. Total Board Feet/Housing Unit		391	
		(producing 18 components/unit @2"x4"x8ft)	

Estimated # of Spruce/Balsam Fir/Pine Trees Needed for Single Housing Unit	4 (@12" diam. and 41ft high - half of maximum diam. and height)
Estimated # of Spruce Saplings Needed for Roof Structure of Single Unit	10 (@3.5-4" diam. and 15ft high)

Table 7. Diameter, heights, and description of trees courtesy of International Wood Collectors

Annual (estimated) amount of houses constructed	
Mawiw Council	
Total Softwood Harvested	87,033
# of units produced (@ 3% of harvest, not including saplings)*	652
# of houses constructed (using an average of 6 units/house)	108

Table 8. Projected annual profit made from harvests and value-added products (right)

Table 9. Annual (estimated) amount of houses constructed (above)

Projected annual profit made from harvests and value-added products	
Mawiw Council	
Total Softwood Harvested	87,033
# of 2x4s sold (@ 15% of harvest)	234,989
Profit made from 2x4s (selling at \$8/piece)	\$1,879,912
Annual Profit from Crown Harvests – softwood and hardwood (2006-2007)	\$1,167,920
Projected Total Annual Profit from Crown Harvests + Selling of 2x4s	\$2,872,644
Increase in Profit	146%

Tables 8 and 9 show the projected annual production of housing units and profits made from sale of timber harvest and value-added products. Profit made from annual harvest of crown land on Tobique amounts to \$1,167,920. Tobique can profit selling harvested timber, but selling value-added products would lead to greater profit margins. As shown in Table 9, if only 15% of harvested softwood was processed into 2x4 lumber and sold at \$8 apiece, an annual profit of \$1,879,912 could be attained. This surpasses the total annual profit of crown harvests which was \$1,167,920 from 2006-2007 and gives an increase in profit of 61% without even taken into consideration the potential profit attained from sale of housing and their components.

Purchasing forestry industry equipment would aid the band's economic development through the production of value-added products and production and sale of housing units. Table 10 shows the projected first-year expenditures for Tobique, Burnt Church and Elsipogtog. As the table demonstrates, even after purchase of expensive equipment and other materials needed, labour fees, and other costs, the bands attain a profit of 64,892. This is assuming production of 108 houses, with an average of 6 units per house, and their purchase from band-members. Table 10 also shows that the use of federal funding – which amounts to \$8,220,023 available to housing, infrastructure, and economic development – was not necessary to make a profit. Therefore, the bands could use the federal funding available for initial costs and then put first year profits towards housing construction and repairs, infrastructure, economic development and other needs in the community.

Projected First-Year Expenditures (\$ Can.)								
Equip- ment	Portable Sawmill x 3 (Norwood)	Log Loader x 3 (Rotobec)	Tractor x 3 (John Deere 440A)	Chainsaw x 18 (Husq- varna 460)	Kiln	Auto- mated Sawmill (DaveCo)	CNC Router (Ex- Factory)	Sum of Cost (\$)
Cost (\$)	120,000	240,000	75,000	9,000	60,000	260,000	22,500	786,500
Labour	9 Sawmill operators	3 Log Loaders	3 Tractor operators	15 Harvest- ers	15 House Constr.	3 Auto- mated Sawmill Operators	-	
Cost (\$40,000 /person)	360,000	120,000	120,000	600,000	600,000	120,000	-	1,920,000
Materials (for 6 x 108 units)	Plywood (12 4x8' pieces/ unit → \$150/unit)	Metal Connector s (@\$0.10 each - 65/unit)	Windows (\$200 each ~8/unit)	Doors (\$300 each ~5/unit)	Siding	Other (insul., gypsum board, paint, etc.)	-	
Cost – Approx. (\$)	1,749,600	~6,318	1,036,800	1,296,000	648,000	750,000	-	5,486,718
Overhead	Running Auto. Sawmill	Gas (25 2- way trips for 2 bands)	Training	Set-up	Safety/ Repair	Other Fees (manage- ment, etc.)	-	
Cost - Approx. (\$)	51,000	90,000	100,000	100,000	150,000	100,000	-	591,000
Total Cost of Expenditures (-\$)								8,784,218
Projected Total Profit from Crown Harvests + Selling of 2x4s (\$):								2,872,644
Project profit from selling houses (108 * \$54,136)								5,846,682
Total Profit (\$):								64,892

Table 10. Projected First Year expenditures (\$ CAD.)

*cost of equipment and some of labourer estimates courtesy of Norwood Industries, Rotobec, Autotrader, Husqvarna, INAC, and FAO Corporate Document Repository. Material costs courtesy of Kent and Home Depot, and some estimated. Other figures estimated.

Appendix 1.4 Equipment Needed

The images shown below are of the equipment and tools necessary in carrying out this harvesting and production of the housing components. Moisture content is a key factor in producing dimensioned lumber as the wood will warp over time unless kiln-dried. The Boston Bar First Nation, a band in British Columbia, has collaborated with Western Economic Diversification Canada to design and construct a portable kiln. The kiln can hold 17,000 board feet of lumber and is powered by a domestic hot-water boiler. It is portable so that it can be sold and transported to other communities and set up and operated for \$50,000 (Western Economic Diversification Canada, 2003). Purchase of this kiln, or one similar, would be vital for Tobique.



Figure A.5 Log hauling, debark and denotch, and check moisture content
Images courtesy of Norwood Industries Inc.



Figure A.6 Portable Sawmill ~\$36,000 and Twin-cut Mobile Automated Sawmill ~\$260,000
Image credit: Norwood Industries Inc. and DaveCo



Figure A.7 (left to right) Rotobec log loader ~\$80,000, John Deere 440A tractor ~\$25,000, and Husqvarna chainsaw ~\$500. Images courtesy of Autotrader and Husqvarna



**Figure A.8 Nova dry kiln ~\$50,000 Medium sized 5,000-10,000 board feet and CAM-WOOD WR 408 CNC Router ~22,500
Image credit: Nova Dry Kiln and Ex-Factory**

Equipment such as a portable sawmill, automated sawmill, log loader, tractor and chainsaws are needed for harvesting and cutting raw lumber. A CNC Router would be needed, however, to accurately and efficiently cut the holes in the wood components where they will be connecting to the metal connectors. This is an important element to the kit-of-parts housing design as it is meant to be a simple, fast, and easy to attach and disassemble assembly process, requiring little training or instruction.

Constraints to consider when shipping units to other communities include maximum dimensions allowable for transport on roads, which is 16ft wide by 72ft long (Jones, 2010). The prefab buildings found on Tobique, and also Skigin-Elnoog off-reserve residential units, were modular units based off these dimensions. A panelized system is often considered less cost efficient as it requires more labour and assembly on-site, but it is a far more practical solution for

operation smaller than a large assembly plant. The panels are also much easier to ship, and can be shipped in greater quantities in stacked together. Transport and fuel costs, however, make the practical radius of sales about 300 miles (Jones, 2010). This may reduce slightly when using a panelized system if greater quantities of houses can be shipped at one time.

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